

Transplant Experiment Reports

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I. SPRING MIGRATION 1981

A. Migration Stop in the San Luis Valley, Colorado

The first sighting of a northbound whooping crane, juvenile 80-2 accompanying its foster parents, was made by Refuge Biologist J. Kauffeld on 15 February in the San Luis Valley (Fig. 1). By 14 March, 18 different whooping cranes, including 4 juveniles, were in the Valley.

All 17 whoopers observed on the winter grounds in New Mexico and Arizona in 1980-81 were relocated during March 1981. In addition, 1 whooper, 79-11, which was not observed during the winter, was seen in the Valley on 24 February (Table 1). This whooper probably wintered somewhere in the northern highlands of Mexico, possibly in the state of Chihuahua, where some sandhills originating from Grays Lake normally winter .

Whoopers were present in the Valley from 15 February-26 April. At least 12 different whoopers were observed utilizing the Monte Vista NWR, and 1 bird visited Alamosa NWR.

Three of 4 juveniles arrived in the San Luis Valley in company with their foster parents. One juvenile, 80-17, had already separated from its foster parents at the time the family initiated spring migration from New Mexico on 15 February (see Rept. #16:39). Two juveniles finally separated from their foster parents in the Valley during March, whereas the 4th juvenile migrated from the Valley toward the summering area with its parents on 1 April.

Activities associated with the breakup of foster-parent families are essentially the same as we have observed among normal sandhill crane families. Juveniles initially show their approaching independence by drifting farther from the company of their foster parents during daily activities. The males of 2 foster-parent pairs occasionally chased their juveniles from the immediate proximity of the pairs. Prior to final family breakup, both juvenile whoopers first temporarily separated from their foster parents for various periods of time, ranging from several minutes up to days.

Juvenile 80-5 first separated from its foster parents on 12 March but rejoined and remained most of the time with them through 27 March. It was alone on 28 March but rejoined the parents on the morning of 29 March; it again departed their company during the afternoon and remained separated through 31 March. It rejoined its foster parents during the morning of 1 April, but final separation occurred during the afternoon of the same day. This juvenile remained in the San Luis Valley to 11 April in company with other sandhill cranes but formed no close associations with any individuals.

The family breakup involving juvenile Patuxent No. 3 was similar to that of 80-5. It remained with its foster parents through 18 March but temporarily separated and rejoined them on several occasions between 19-29 March. It was last observed accompanying its foster parents during mid-morning hours on 29 March. Between 30 March-11 April it associated with other sandhill cranes daily.

Several whoopers were observed temporarily associating with each other in the San Luis Valley although no lasting bonds were established. An older male, 75-1, accompanied 79-9 (believed to be a 1 3/4-year-old female) daily between 1-4 April. However, when 75-1 migrated on 4 April,

whooper 79-9 remained behind. No whoopers were observed attempting to pair with sandhills.

Most whooping cranes migrated from the San Luis Valley between 4-11 April. Only Patuxent No. 2 remained in the Valley after 11 April; it was last sighted on 26 April (J. Kauffeld, pers. comm.).

B. Loss of a Juvenile Whooping Crane in the San Luis Valley

Juvenile 80-17 was observed almost daily between 9 March, when it was first located in the Valley, and 22 March, the last day it was observed alive (Table 1). This bird was radio instrumented in August 1980 and the transmitter was still operational in March 1981. Whooper 80-17 roosted nightly and spent midday hours in wetlands on Monte Vista NWR. It departed twice daily, morning and afternoon, to feed in private barley stubble fields north of the refuge.

After 22 March the status of this whooper was unknown until 9 April when its remains were found beneath a power line at the edge of the stubble field where it had fed daily until it disappeared. The dead whooper was finally located from a faint radio signal. The bird had been scavenged by animals and little remained intact to ascertain cause of death. Remains of 5 sandhill cranes were also found in less than $\frac{1}{4}$ mile, hidden in the brushy field border under the same power line. The evidence strongly suggests that all 6 cranes died after colliding with the power line.

Circumstantial evidence indicated that at least one other whooper perished during March in the San Luis Valley. Whooper 75-7 was observed and positively identified on both the morning and afternoon of 2 March, 5 miles north of the Rio Grande River near the county line dividing Alamosa

and Rio Grande counties. It has not been observed since that date and is presumed dead.

Mortality resulting from collisions of cranes with power lines in the San Luis Valley will probably increase in the future. More lands are being converted annually to agriculture, and these acreages are being irrigated by overhead sprinkler systems. New irrigation wells are being serviced by electricity which has resulted in a great increase in the construction of power lines throughout the area occupied by cranes in the Valley.

C. Sightings Along the Spring Migration Route

A number of reports were received of whoopers in migration between the San Luis Valley and the summer range. It was not possible to verify all sightings, but those that occurred along the normal migration route and corresponded with departure dates from the San Luis Valley were probably authentic. Locations are shown in Figure 1.

1. Hart's Basin, Eckert, Colorado, 1 and 5 April

M. Petersen, U.S. Forest Service, positively identified whooper 80-2 during the evening of 1 April in Hart's Basin. This juvenile, accompanying its foster parents, departed Monte Vista Refuge at 10:20 a.m. the same day. Hart's Basin is about 135 air-miles from Monte Vista.

On 5 April M. Petersen identified 75-1 in the same location. It arrived about 3:00 p.m. and departed the next morning. Bird 75-1 was last observed in the San Luis Valley during mid-morning on 4 April.

Observations made by M. Petersen and others in recent years indicate that Hart's Basin is frequently used as an overnight stop during spring migrations (see Reports No. 15 and 16).

2. Northeastern Utah, 3-11 April

The following reports were received from Ouray Refuge Manager H. Troester:

- a) 3 April - A. Hacking, Ouray NWR, observed 2 whooping cranes with sandhills in migration northeast of Vernal around 5 p.m.
- b) 10 April - A whooper migrating with sandhills over Vernal about 10:30 a.m. was sighted by R. Burdick.
- c) 11 April - M. Perry and J. Zumbo observed a whooper with sandhills in migration over Vernal during the morning.

3. Near Laramie, Wyoming, 27 April

G. Meacham, Jones Hole National Fish Hatchery, reported to H. Troester that he observed a whooper about 10 miles west of Laramie. The whooper was flying by itself about 100 feet above the ground and crossed Interstate 80 in front of Meacham as it flew toward a pond.

Mr. Meacham is well acquainted with cranes and the description which he provided indicates that he observed a whooper. Although the location is considerably east of the normal range of whoopers originating from Grays Lake, we do have records of bird 78-10 migrating through this general area. It is conceivable that this crane follows this route annually to and from the San Luis Valley and its summer area in Wyoming (see Reports No. 15 and 16).

4. Near Craig, Colorado, 30 April, 30 May

The following sightings were provided by T. Lytle and P. Goodman, Colorado Division of Wildlife:

- a) 30 April - Big Gulch, north of U.S. Highway 40 (T. 5N, R. 91 or 92W, S. 6 or 11). A whooping crane was reported on the ground; information provided on colored leg bands indicated that it was juvenile 80-5.

- b) 30 May - D. Zimmerman reported seeing a whooper $1\frac{1}{2}$ miles southwest of Craig at 6:30 p.m., soaring on thermals.

II. RETURN TO SUMMER AREAS

A. Status

Eighteen whoopers were initially located in the San Luis Valley during February and March. One whooper, 80-17, was found dead under a power line and a second bird, 75-7, vanished in early March. Consequently, I believe that 16 whoopers were probably alive to continue the spring migration.

Only 13 of these 16 whoopers were known to have survived through the summer period and return to the winter grounds during 1981-82. Of the 3 birds which were apparently lost (79-9, 79-11, 80-5), only the fate of 79-9 is currently known.

Whooper 79-9 was found dead on 16 August on the W. Binning Ranch, about 10 miles northwest of Pinedale, Sublette County, Wyoming (T. 35N, R. 110W, S. 36). The bird was found in a meadow near the Newfork River by the rancher when he started cutting hay. The specimen was turned over to Biologist J. Straley, Wyoming Game and Fish Department.

From the appearance of the remains, the bird had been dead for about 1 month. The head was missing from the carcass and it had been scavenged to some extent. There were no power lines or fences in the immediate area.

The specimen was shipped to the National Wildlife Health Laboratory, Wisconsin, for examination. The report received from the NWH Laboratory stated that the condition of the bird had deteriorated sufficiently to preclude a proper necropsy.

The loss of the head from the carcass plus the fact that the remains were not dismembered suggested that the whooper may have been killed by

an avian predator, possibly a golden eagle. I have observed 2 dead sandhill cranes similar in appearance which were killed by golden eagles.

The status of 2 other whoopers which have not been observed since March (79-11) or May (80-5) is unknown (Table 1). Whooper 79-11 was last observed in the San Luis Valley on 13 March. 80-5 was known to have migrated through northwest Colorado (30 April) and was photographed by Biologist L. Roop, Wyoming Game and Fish Department, on 2 May near Cody, Wyoming. This was the last sighting of whooper 80-5. It appears that both birds succumbed during the spring or summer period.

B. Summer Distribution

Fifteen different whooping cranes were identified 1 or more times from April-October on the summer range occupied by the Rocky Mountain Population of Greater Sandhill cranes. Seven were observed in eastern Idaho, 7 in western Wyoming, and 1 in southwestern Montana. Only 12 of the 15 birds were known to spend the summer at one location (Table 1 and Figure 1).

Summer distribution, including unconfirmed reports, were:

IDAHO

Of 7 whooping cranes located in eastern Idaho, 4 (75-1, 76-15, 79-10, 80-2) returned to Grays Lake NWR, including 2 older birds (75-1, 76-15) which have summered there annually since 1977. A 2-year-old whooper, 79-10, which had spent the previous summer near Antero Reservoir, Colorado, returned to Grays Lake NWR in 1981. One juvenile, 80-2, completed the spring migration with its foster parents and returned to Grays Lake. This was only the second time since the initiation of the experiment that a juvenile completed the return migration to Grays Lake in company with its foster parents. All other juveniles returning to Grays Lake except 76-15

and 80-2 separated from their foster parents on the wintering area or during migration.

Three other whoopers (77-17, 79-4, Patuxent #1) summered in Idaho in 1981, including 2 (77-17, 79-4) in the Bear River Valley and 1 (Patuxent #1) near Island Park Reservoir. These same 3 whoopers had spent the 1980 summer in approximately the same locations except that Patuxent #1 was about 16 air-miles east of its previous summer location. All 7 whoopers remained in eastern Idaho until they migrated in late September or October.

WYOMING

Seven different whoopers were identified in western Wyoming during 1981. Six were sighted in the upper Green River Basin of Lincoln and Sublette counties (76-7, 78-1, 78-10, 79-9, Patuxent #2, and Patuxent #3). The summer location of 79-9, however, was unknown until it was found dead in August. The seventh whooper, 80-5, which apparently has vanished, was observed only once on 2 May near Cody.

One or more whoopers have summered in the upper Green River Basin annually since 1977, with the largest number, 6, recorded in 1981. One whooper, 78-1, which was found on Horse Creek west of Daniel in early May, apparently departed for an unknown summer location (Table 1). It may have departed because of extremely dry condition of the meadows where it had spent the previous 2 summers.

A number of sightings of whooping cranes in western Wyoming were received:

1. Green River Basin, Sublette and Lincoln Counties

- a) 11 April - an unidentified (leg band) whooper was observed some 5 miles northwest of Big Piney (T30N, R112W, S23) by B. Johnson, Wyoming Game and Fish Department.

- b) 13 April - 1 whooper was observed near Merna between Horse and Beaver creeks by D. Boroff. Description of leg bands indicated that it was 76-7.
- c) 5-6 May - a whooper, identified as Patuxent No. 2, was first reported by S. Norelius, Wyoming Game and Fish Department. It was on the Bull Ranch, South Cottonwood Creek (T33N, R112W, S29).
- d) 5-7 May - 1 whooper was observed on Horse Creek near Merna by D. Boroff. Description indicated that it was 78-1.
- e) 8 or 9 May - Fontenelle Creek - A report from the Wyoming Game and Fish Department was received of a whooper in company with sandhills on the A. McGuiness Ranch. The bird was Patuxent #3 and it spent the summer in the area.

2. Grand Teton National Park, Teton County

(Most observations were provided by R. Wood, Resource Specialist)

- a) 5 April - near Christian Pond - a single whooper in flight was reported by Ranger D. McLaren
- b) 10, 11, 12 June - Willow Flats - Mr. and Mrs. W. Matier, Tucson, Arizona, observed a whooping crane in company with a small group of sandhill cranes on all 3 dates. The Matiers are experienced bird watchers. They observed the crane at long distance with a spotting scope and could not detect the presence of color bands. I interviewed them on 15 June and am convinced that they observed a whooper. We searched this area a number of times in June and July but did not locate the bird. However, I suspect that it was either 78-1 or the missing 79-11.

- c) 11 June - Willow Flats - M. D. Wright and E. Mendel, Edmonton, Alberta, observed a single whooping crane with 5-6 sandhill cranes.
 - d) 12 June - Willow Flats - Fish and Wildlife Service Law Enforcement Agent W. Hawes observed a whooping crane with sandhill cranes.
 - e) 1 July - Willow Flats - J. Lamoreux, Columbus, Indiana, observed a whooping crane by itself flying toward Willow Flats.
3. 2 May, Sage Creek, 4 Miles East of Cody
- L. Roop, Wyoming Game and Fish Department, observed and photographed bird 80-5. This was the last time that this bird has been observed.
4. Mid-May, Star Valley, near Thayne
- A report of a whooping crane with sandhills was obtained from the Wyoming Game and Fish Department in June, but no details were available. Thayne is about 20 air-miles southeast of Grays Lake.
5. 22 June, Union Pass, Wind River Range
- A. Shoemaker, Dubois, Wyoming, and 2 companions observed a whooper with several sandhill cranes. We later located Patuxent #2 in this vicinity in Fish Creek Park (T. 40N, R. 109W, S. 3, 4, 9, 10, 11), Sublette County. The meadows occupied by the whooper are on the Bridger-Teton National Forest at about 9,000 feet elevation and are within a mile of the Continental Divide.

MONTANA

1. 17 April, Red Rock Lakes NWR

Whooper 79-7, which summered at Grays Lake NWR in 1980, was located by refuge personnel at Red Rock Lakes NWR on 17 April. It

spent the entire summer in the area and departed in mid-September. Periodic observations of the bird were provided to us by the refuge staff.

2. 2 May, near Townsend

Fish and Wildlife Service personnel from the Billings Area Office received a report from H. Morgan, Helena, of a whooping crane in a marsh area along the Missouri River, 5½ miles southeast of Townsend. Nothing further was learned about this observation.

III. 1981 WHOOPING CRANE EGG TRANSPLANT

A. Habitat Conditions at Grays Lake and Preparation for the Egg Transplant

Water conditions at Grays Lake were poor during April. Snow pack in the surrounding watershed was deficient compared to the 20-year average. A snow course, located near Grays Lake at 6,840 feet elevation and monitored by the Soil Conservation Service, contained 26 inches of snow on 1 March, 17 3/4 inches below the 20-year average. Water content of the snow was 6.7 inches, 48 percent below normal for the 20-year mean on 1 March. The minimal water content of the snow pack was the second lowest recorded in 20 years, exceeded only by the extreme drought year of 1977.

May, however, was cool and wet, with 5.15 inches of precipitation recorded; low temperatures of freezing or below occurred on 17 days (Table 2). The precipitation temporarily improved marsh water levels but did not substitute for the lack of snow pack which provides a water supply to the marsh throughout the summer in years with above-average snow depth.

From January through September, Animal Damage Control (ADC) agents removed 30 coyotes and 5 red foxes on the refuge and within 3 miles of the boundary. Seventeen coyotes were taken by aerial hunting, 11 were trapped,

1 was shot, and 1 was taken on M-44's. Of 5 foxes removed, 4 were by M-44's and 1 was shot.

The predator removal program appeared to be relatively effective; little sign of canine predators was observed in the crane and waterfowl nesting area in 1981.

The first sandhill cranes arrived at Grays Lake on 21 March, and the first nest was located on 23 April. A sufficient number of foster-parent pairs and alternates were located prior to the arrival of whooping crane eggs. Thirty sandhill crane eggs were removed from nests in 1981 and sent to Patuxent Wildlife Research Center.

B. Arrival of Whooping Crane Eggs

No eggs produced by captive stock at Patuxent Wildlife Research Center were available to send to Grays Lake in 1981. Although several whooper eggs were laid at Patuxent during the period which coincided with sandhill crane nesting chronology at Grays Lake, all were infertile.

Seventeen whooping crane nests, including 14 with 2-egg clutches, were located in Wood Buffalo National Park, Canada, in 1981 by Canadian Wildlife Service biologist E. Kuyt (Table 3). Twelve eggs were picked up, held overnight in an incubator at Fort Smith, and transported by aircraft chartered by the Canadian Wildlife Service. The eggs arrived in Idaho Falls at 11:53 a.m. 26 May.

In previous years, eggs have been transported from Idaho Falls to Grays Lake by helicopter. However, a storm system moved into the area accompanied by heavy rain showers which grounded all light aircraft. We drove by vehicle to Grays Lake and placed the eggs in an incubator at 2:40 p.m. while rain showers continued.

On 27 May the 12 eggs were placed in selected foster-parent nests. An airboat was used to transport 9 eggs to nests, 1 egg was walked to a nest, and 2 eggs were transported by an amphibious vehicle.

At one nest, immediately after the whooper egg was switched for a sandhill egg, a ring-billed gull flew near and continued to circle in the vicinity of the exposed nest. The foster parent which had been incubating the single sandhill egg (until we arrived) moved and remained several hundred yards away. Since the gull showed no inclination to leave the area and made several low passes over the nest, we decided to remove the whooper egg and place it elsewhere; the original sandhill egg was replaced in the nest. Later observations showed that the gull did not prey upon the sandhill egg.

C. Incubation and Hatching

All 12 foster-parent pairs accepted their respective whooping crane eggs and continued incubation duties. Due to inclement weather during the peak of the anticipated hatching period, it was impossible to check nests until 8 June.

Of 12 eggs received, 5 hatched by 12 June (Table 3). Seven eggs failed to hatch; 1 was destroyed by a predator (believed to be a raven), 2 were addled and were either infertile or sustained an early embryonic death, and 4 contained well-developed embryos. The 2 eggs which were either infertile or sustained early embryonic deaths came from nests in Canada which also failed (Table 3). Possibly all eggs from these two clutches were infertile.

The reasons why the 4 eggs which contained well-developed embryos failed to hatch are unknown. Possible causes were: 1) the cold, wet weather at Grays Lake may have affected some eggs or 2) something adverse

may have happened to the 4 embryos during some phase of their transportation. As a result, we reviewed various aspects of egg transportation to ascertain if anything abnormal occurred.

Dr. Scott Derrickson of Patuxent WRC calibrated the thermometers used in the egg transportation cases and found that 1 read 1.5° F higher than the actual temperature. We do not believe that this small deviation could adversely affect the eggs. Transporting the eggs by vehicle some 120 miles from Idaho Falls to Grays Lake added to their handling time compared to previous years. We did not, however, knowingly sustain any significant bumps that would adversely impact the eggs. We have transported sandhill crane eggs and whooping crane eggs originating from Patuxent in this same manner on a number of occasions without adverse hatching results. The sequence in which individual eggs were placed in nests at Grays Lake was reviewed to determine if possibly the trip in the airboat or amphibious vehicle may have adversely impacted some eggs. There was no evidence to support this contention; the first 2 eggs put out failed to hatch but the last 2 eggs put out made the entire trip and hatched (#13 and 14). There was also no evidence that placement of eggs in the incubator at Grays Lake had any adverse influence since all 12 eggs were together. Had the incubator malfunctioned, it should have adversely affected all eggs.

This is the first year that we have had a significant number of eggs (4) which we believe should have hatched but instead failed. After reviewing the available information, however, we are unable to arrive at an acceptable explanation for their failure to hatch.

D. Whooping Crane Young and Foster Parents

Of 5 young which hatched and left nests, none survived to fledge in 1981. Three chicks were sighted only several times during the first week after hatching. Two others were observed through late June with the last observations obtained on 30 June.

Cold weather, including rain and snow between 3-15 June, is suspected of being responsible for the demise of the chicks. Although the territories of the respective foster parents were searched for remains of chicks, none were located. No sign of predators was found on these territories. Consequently, I suspect that the loss of at least 3 chicks (81-2, 81-5, 81-13) is attributable to inclement weather.

Reasons for the loss of the 2 remaining chicks (81-9, 81-14) are uncertain, although I suspect that a scarcity of food, primarily insects, was a major contributing factor. An abnormal number of sandhill chicks succumbed in 1981. Many were believed to have starved; I encountered a number of sandhill chicks in semi-starved condition in June and July. Weights of many chicks captured and banded in 1981 were below normal.

The cold weather, combined with a lack of moisture after mid-June and July, was apparently responsible for the lack of insects, the primary food for young cranes. In July only 0.28 of an inch of precipitation was received and on 4 days below-freezing temperatures were recorded, including a low of 23⁰ F on 8 July.

The production of young sandhills at Grays Lake in 1981 was the second lowest recorded in the past 12 years. Poorer production was recorded only during the extreme drought year of 1977. The environmental conditions which contributed to the poor sandhill production no doubt had the same influence on whooper chicks in 1981.

E. Capturing and Color-Marking Sandhill Cranes

Due to the lack of young whoopers in 1981, we put considerable effort into capturing and color-marking sandhill cranes to further evaluate movements of specific breeding pairs and their young. A total of 123 sandhills was captured in southeastern Idaho, including 104 at Grays Lake (Table 4). Most were color-marked with 2 3/8-inch high neck collars.

F. Staging for Fall Migration and Departure from Grays Lake

Cranes started gathering at traditional staging sites at Grays Lake in mid-August. By 22 September over 2,200 sandhills and 4 whoopers were at staging sites on the refuge (Table 5). As in previous years, the largest concentration occurred in the southeastern portion of the refuge where grain and bait fields were available.

Small numbers of sandhills were first observed migrating from Grays Lake on 21 September. The last sandhills departed Grays Lake on 18 October. The first whooper, a 1-year-old (80-2), migrated on 29 September, and the other 3 departed on 16 and 17 October. Fall migration chronology is summarized in Table 5.

IV. FALL MIGRATION OF WHOOPING CRANES

Summer locations were known for 12 whooping cranes in 1981, including 7 in eastern Idaho, 4 in the Green River Basin of western Wyoming, and 1 in southwestern Montana. They departed their respective summer areas between late August and 17 October (Table 1).

Of 7 whoopers in eastern Idaho, 6 remained in their same summer locations until migrating in late September and October. One whooper, Patuxent #1, left its summer site at Island Park Reservoir in late August

and moved about 55 air-miles to a sandhill crane staging area in Teton Basin (Table 1, Fig. 1) where large numbers of sandhills congregate to forage on grain crops. This whooper remained in the Teton Basin until it migrated in October.

The 4 whoopers summering in the Green River Basin all departed their respective summer areas between late August and mid-October. One whooper, either 76-7 or 78-10, was observed 4 miles south of Big Piney, Wyoming, on 15 September (C. Thornton, Wyoming Game and Fish Department, pers. comm.). Patuxent #2 was observed by personnel of the Colorado Division of Wildlife near Hayden, Colorado, on 4 September with about 300 sandhill cranes, foraging in winter wheat stubble. Patuxent #2 moved about 240 air-miles from its summer area to the staging site at Hayden.

Several reports were received of whoopers in migration between summer areas and the San Luis Valley. All sightings occurred along the known migration route utilized by the Rocky Mountain population of sandhill cranes. Refer to Fig. 1 for locations.

1. 9 October, Jensen, Utah - Refuge Manager H. Troester received a report from R. Burdick of a whooper about 3/8 mile south of the highway bridge which crosses the Green River near Jensen, Utah.
2. 19 September, Hart's Basin, Eckert, Colorado - S. Hemphill observed a whooping crane at 9:30 a.m. flying with sandhills (F. Wild, U.S. Forest Service, pers. comm.).
3. 1 October, Lost Lake, Grand Mesa (near Grand Junction), Colorado - B. Baurle reported 2 whoopers in migration with about 150 sandhills at 3:30 p.m. (T. Lytle and P. Goodman, Colorado Division of Wildlife, pers. comm.).

4. 1 October, Hotchkiss, Colorado - N. Ward, Hotchkiss National Fish Hatchery, received a report from a nearby rancher, J. Markwood, of a whooper migrating with a flock of sandhills at 2:30 p.m. in the vicinity of the hatchery.
5. a) 18 October, Garnet Mesa, Colorado (southeast of Delta) - Two sightings of a whooper in migration with a flock of about 35 sandhills were reported seen by F. Wild at 10:48 a.m. and by J. McCrain at 11:00 a.m. (F. Wild, U.S. Forest Service, pers. comm.).
b) P. Born reported to the Colorado Division of Wildlife (T. Lytle and P. Goodman, pers. comm.) that 1 whooper with about 50 sandhills was in migration following the contour of Grand Mesa toward Delta, Colorado, at 11:20 a.m.

I suspect that the above 3 sightings were all of the same bird.

Twelve whooping cranes were observed in the San Luis Valley during fall 1981 (Table 1). The first whooper, whose identification was not obtained, was observed at Monte Vista NWR on 17 September. One or more whoopers were present in the Valley continuously through 18 December. This is the latest date that a whooper has ever been recorded in the Valley (M. Nail and J. Kauffeld, pers. comm.). At least 6 different whoopers were known to utilize Monte Vista NWR during the fall migration.

One bird, 76-15, was not observed in the Valley; it departed Grays Lake on 16 October and arrived at Bosque del Apache NWR in New Mexico on 20 October. This whooper has followed the same rapid fall migration pattern from summer to winter area in 5 consecutive years.

One whooper (Patuxent No. 3) lost a leg band containing a nonfunctional radio-transmitter while in the valley. When the bird first arrived in late October, it still wore the 3-inch high plastic leg band with the attached

transmitter. By early November it had lost the band. It walked with a slight limp and the leg was scratched in the area where the band had been. Since it takes considerable pressure to open the band, I suspect that the bird may have entangled its leg in something such as barbed wire in order to loosen the band. This is the first plastic leg band placed on whoopers at Grays Lake which is known to have been lost. This bird was banded in August 1980.

V. WHOOPING CRANES ON WINTER AREAS 1981-82

A. Status and Distribution

Thirteen whoopers arrived and remained in the middle Rio Grande Valley, between Los Lunas and Bosque NWR, New Mexico, during the winter 1981-82 (Table 1, Fig. 2). Arrival dates ranged from 18 October to 29 December (\bar{X} = 21 November). The whooper (Patuxent No. 1) which had spent the previous winter in southeastern Arizona (Report No. 16) returned to New Mexico in 1981.

Of 13 whoopers in the Rio Grande Valley, 7 confined most of their activities to Bosque NWR; 8 utilized the refuge (Table 1). One whooper spent the majority of the winter at and in the vicinity of Belen State Refuge and 6 others utilized the area; 5 whoopers visited the Bernardo State Refuge but none used it as a primary winter area as in previous years. Five other whoopers (77-17, 78-1, 78-10, Patuxent No's. 1 and 3) wintered primarily on private lands near Los Lunas (2), Polvadera (1), and Luis Lopez (2). A minimum of 4 different whoopers was known to visit the Edeal Dairy near Los Lunas (Table 1, Fig. 2).

Other wintering areas utilized by cranes originating from Grays Lake were searched for the presence of missing whoopers 79-11 and 80-5. These

areas included wintering sites in southwestern New Mexico, southeastern Arizona, and northwestern Chihuahua, Mexico. Nothing was learned about the status of these missing whoopers.

One or more whoopers occupied winter areas in the middle Rio Grande Valley for 137 days ($4\frac{1}{2}$ months) from 18 October to 3 March. The time individual whoopers spent on the winter grounds ranged from 57 days to 126 days (\bar{X} = 93 days, n = 13).

As large numbers of cranes arrived in the middle Rio Grande Valley in November, reports of migrating whoopers were received by the Fish and Wildlife Service and the New Mexico Game and Fish Department and were kindly made available (Fig. 2):

1. 31 October - 1 whooper with flock of sandhills in migration near the Sandia Mountains north of Albuquerque (J. Sands, NMGFD).
2. 8 November - 2 whoopers on east side of Rio Grande River near Belen State Refuge (W. Prentice).
3. 17 November - 1 whooper migrating with sandhills southeast of Belen State Refuge (J. Sands).
4. 17 November - 1 whooper with sandhills near Fairacres (R. Little, NMGFD). Nothing further was learned of this sighting.
5. 23 November - 1 whooper with some 60 sandhills in migration over south Albuquerque--11 a.m. (reported to Bosque NWR by unknown person).

B. Whooping Cranes and the Bosque del Apache Refuge Snow Goose Hunt

Regulations and hunter requirements for the 1981-82 refuge snow goose hunt were essentially the same as recent hunts. The 16-day hunt was again divided into 3 hunt periods: 20-24 November (5 days), 9-14 December (6 days), 30 December-3 January (5 days). Hunter training courses were again

offered in various locations in the state and 769 individuals took the course; 68 failed to pass the test and were not eligible to participate in the refuge goose hunt in 1981-82.

A prehunt slide program was presented to hunters daily and included a program on species recognition. The pager radio communication system, which provides contact with each blind, was again used in 1981.

A total of 854 hunter days was recorded. Hunters harvested 959 geese (820 snow, 9 blue, 130 Ross'). No non-target species were taken during the 3 hunts.

I recorded 7 instances of whoopers entering the goose hunting area; 6 during the first hunt and 1 during the second hunting period. When whoopers entered the hunt area, refuge personnel alerted blinds in the vicinity of the bird via pager radio. No problems were encountered between hunters and whoopers.

Four incidents of whoopers leaving the refuge, probably due to disturbance created by the hunt, were recorded. Two birds left temporarily during the first hunt and 2 during the opening of the second hunt. All returned to the refuge and reestablished themselves in feeding areas outside the hunt unit.

The very low incidence of whoopers entering the hunt or leaving the refuge in 1981 was primarily due to refuge management procedures. Adequate crops of corn and milo were planted between the roost and hunt area in Unit 17A; this proved to be very attractive to the whoopers. During the second hunt 5-6 whoopers used the field daily, and during the third hunt all 7 whoopers on the refuge foraged Unit 17A. Results in 1981 certainly demonstrated that proper placement of grainfields in relation to hunt areas can minimize disturbance to whoopers without adversely influencing the goose hunt.

As in the previous year, the New Mexico Game and Fish Department closed the snow goose season off the refuge during the second and third hunt. The closed seasons were 9-18 December and 28 December-3 January. The closure was mainly implemented to minimize hazards to whoopers leaving Bosque NWR due to disturbance created during the refuge hunt. Off-refuge hunters are not required to take and pass a training course as are refuge hunters.

The 1981 goose hunt on the refuge was extremely well run by the refuge staff and proved to be less disturbing to whoopers than any of the recent hunts during the past few years. The management of crop fields to entice the whoopers away from the hunt area proved very successful.

C. Avian Cholera Outbreak at the Bosque del Apache Refuge

Between 12 January-12 February 1982, refuge personnel picked up 208 snow/Ross' geese, 2 ducks, 8 coots and 1 sandhill crane which had died in various units in the refuge. Field necropsies of dead geese on 12 January revealed symptoms of avian cholera. Specimens sent to the National Wildlife Health Laboratory proved positive for avian cholera.

To counter the problem, refuge personnel (1) established increases in water flow through waterfowl and crane roost areas, and (2) retrieved all dead birds daily and burned them.

The die-off decreased in early February as the weather moderated. Cranes apparently were not as susceptible to avian cholera as snow geese, even though both species shared common roost areas. The 1 sandhill crane picked up did not show symptoms of avian cholera and apparently died from other causes. I thank managers Perry and Montoya for making the above data available.

D. 1982 Spring Migration from Winter Areas

The 7 whoopers wintering at Bosque NWR departed between 9-26 February (\bar{X} = 15 February). As in previous years, many sandhills (about 8-9,000 on 18-20 February) and at least 7 whoopers gathered at the Belen State Refuge. Four of the 7 whoopers wintering at Bosque Refuge and 2 from Luis Lopez stopped at Belen Refuge prior to migrating to Colorado.

The first major crane migration departing the Rio Grande Valley left on 13 February; large numbers also left daily between 19-23 February. The 13 whoopers wintering in the middle Rio Grande Valley migrated between 9 February and 3 March (Table 1). Nine whoopers departed between 19-23 February; mean departure date for the 13 whoopers was 21 February.

Mr. W. Beverly, Coronado State Monument Park Ranger, observed 6 different whoopers in migration near Jemez Canyon Dam (Fig. 2) and provided the following sightings:

1. 13 February - 1 whooper with flock of sandhills in flight early in the afternoon.
2. 20 February - 3 different whoopers in migration with sandhill crane flocks. The first bird passed by at 12:30 p.m.; the second and third whoopers were in the same flock migrating north between 2-2:30 p.m.
3. 21 February - 2 whoopers observed migrating in company with sandhill cranes; the first bird about 1:30 p.m. and the second at 2 p.m.

Refuge biologist J. Kauffeld observed the first whooper (76-15) at Monte Vista NWR on 22 February. By 25 February, Biologist Kauffeld had located 7 different whoopers in the San Luis Valley. All 13 whoopers that had wintered in New Mexico were relocated in the San Luis Valley by 22 March (Table 1).

VI. ACTIVITIES OF WHOOPING CRANES

A. Associations Between Individual Whooping Cranes in New Mexico, 1981-82, and Sex Determination of Individuals

During the winter 2 or more whoopers were observed together on numerous occasions. In those instances when 2 or more were determined to be following each other, foraging together, or engaged in some other activity together, they were recorded as an "association." Associations were not recorded when several birds were in close proximity to each other but did not appear to pay any attention to each other's presence; 162 associations were recorded (Table 6).

The most frequent association involved whooper 75-1, a male which has established a territory at Grays Lake, and whooper 76-15, whose sex is uncertain, followed by Patuxent No. 2, a male, who often joined the above two birds. Both whoopers 75-1 and Patuxent No. 2 were observed unison calling in the presence of 76-15 but it never responded.

The associations observed during the winter among various whoopers suggest that they recognize each other. Even though the few whoopers were mixed among thousands of sandhills during the winter period, none showed any inclination to associate with specific sandhills. Instead, they tended to either behave as individuals or associate with other whoopers (Table 6).

Intensive observations of individual whoopers during the past year confirmed that the majority of the whoopers alive are males. Of 13 individuals alive during the winter of 1981-82, the sex of 11 was ascertained from unison calls during the past year. Based upon unison calls, the following whoopers were classified as males: 75-1, 76-7, 77-17, 78-10, 79-4, 79-7, 79-10, 80-2, and Patuxent No. 2. Only 2 whoopers,

78-1 and Patuxent No. 1, were identified as females. Two other birds (76-15 and Patuxent No. 3) had not been observed unison calling.

Dr. Scott Derrickson, Behaviorist, Patuxent Wildlife Research Center, visited the winter area in January 1982 and observed each individual whooper. Based upon their behavior and, in some instances, unison calls, he concluded that the same 9 birds identified above were males and that 78-1, Patuxent No. 1 and No. 3 were probably females. He was uncertain about the sex of 76-15 which he believed may be a female based upon its behavior, although its large size suggested that it could be a male.

Thus, of 13 whoopers observed during the winter of 1981-82, 9 were males, 3 appear to be females, and the sex of 1 bird is uncertain.

In any event, observations by Dr. Derrickson and myself revealed that an unbalanced sex ratio favoring males does exist among the Grays Lake whoopers. The data certainly suggest that the survival of males is much higher than females although we have no knowledge of the sex ratio at hatching.

The winter distribution of the 3 (or possibly 4) females appears to limit the opportunity for pair formation to occur. The 2 older females, 78-1 ($3\frac{1}{2}$ years old) and Patuxent No. 1 ($2\frac{1}{2}$ years old), wintered at the Edeal Dairy, and at times were together (Table 6), but none of the males remained in the area (Table 1). Edeal Dairy is about 50 air miles north of Bosque Refuge where the majority of males wintered. The youngest female, Patuxent No. 3 ($1\frac{1}{2}$ years old), wintered 6-10 miles north of the Bosque Refuge at Luis Lopez. Two males, temporarily in the area, joined Patuxent No. 3 on 8 different occasions (Table 6). Patuxent No. 3 showed only minor interest in them although the males appeared to respond positively to her presence. At Bosque Refuge, 6 of 7 whoopers present were males; the sex of the

remaining bird (76-15) is uncertain. However, all 6 males plus 1 other male who temporarily visited the refuge were observed associating with 76-15 on 1 or more occasions, suggesting that this bird may be a female.

B. Time Budget Analysis

Data were collected on 12 different whooping cranes to determine how they spent their time in various diurnal activities. Time budget data were obtained by recording coded behavioral point counts at 15-second intervals. A timer equipped with a buzzer was utilized and the exact activity at the time the buzzer sounded was recorded. This sampling technique provides an opportunity to better quantify activities of individual whooping cranes.

A total of 621 hours of time budget data was collected throughout the geographical range occupied by the whoopers between November 1980 and February 1982. Activities were recorded on the winter grounds in New Mexico (30.4%), the spring and fall migration stop in the San Luis Valley, Colorado (26.1%), and on the summer grounds at Grays Lake NWR, Idaho (43.5%). Where feasible, complete diurnal activity patterns from dawn to dark were recorded. Various activities were coded and summarized under 8 major categories and are discussed in the text under the following headings: feeding; drinking; alert/vigilant behavior; resting; body maintenance/comfort movements (preening, etc.); locomotion--including walking, running, jumping, and flying; agonistic behavior; and vocalizations.

1. Activities of Whooping Cranes on the Winter Grounds in New Mexico

A total of 189 hours of time budget activities was recorded, primarily at Bosque Refuge, on 11 different whoopers, including juveniles accompanying foster parents, yearlings (1½ years old), and older birds, during the winters of 1980-81 and 1981-82.

Daily activity patterns of individual whoopers at Bosque Refuge include leaving the night roost after sunrise and flying to nearby agricultural fields where they spend most of the daylight hours and then return to the night roost near sunset. Examples of 2 different whoopers provide insight into their activities in a 24-hour cycle. On 3 January 1982, whooper 79-4 ($2\frac{1}{2}$ -year-old male) flew from the roost 20 minutes after sunrise to a nearby agricultural field where it remained for 8:08 hours; it returned to the same wetland roost 83 minutes before sunset. In a 24-hour cycle it spent 15:49 hours (65.9%) at the roost wetland, 3:08 hours (33.9%) in agricultural fields, and 3 minutes and 15 seconds (0.2%) flying to and from the roost. On 28 November 1981, whooper 80-2 ($1\frac{1}{2}$ -year-old male) departed the roost 74 minutes after sunrise and flew to a nearby agricultural field where it remained 8:17 hours. It returned to the roost 24 minutes before sunset. In a 24-hour cycle it spent 15:37 hours (65.1%) at the roost, 8:17 hours (34.5%) in agricultural fields, and 6 minutes (0.4%) flying from and to the roost. These examples typify the daily activity patterns of whooping cranes wintering at the Bosque Refuge.

Three categories of activities, feeding, alert behavior, and locomotion, consumed from 70-93% of the diurnal activities of whoopers in various sex and age groups (Table 7-11). The major activity of both juveniles and $1\frac{1}{2}$ -year-old whoopers was feeding, followed by alert behavior and locomotion (Tables 7 and 8). In contrast, older whoopers spent more time in vigilant (alert) behavior, followed by feeding and locomotion (Tables 9 and 10). These data indicate that older whoopers are more alert and are more efficient at feeding. They spend considerably less time foraging than younger whoopers.

Most body maintenance (comfort movements) activities occurred at the roost sites, primarily during early morning hours before whoopers departed for agricultural fields. From 5-11% of all diurnal activities of various aged whoopers was devoted to body maintenance (Tables 7-10).

Time budget data show that corn was the primary winter food for whoopers and that wetland roost sites at Bosque Refuge were used more extensively as feeding areas than I had previously recorded. During the winter 1981-82, over 15% of all foraging activities occurred in wetlands.

Whoopers wintering at the Bosque Refuge generally departed morning roosts $\frac{1}{2}$ -1 hour after sunrise (Tables 7-10) which is considerably later than morning roost departure times elsewhere in their geographical range (Idaho and Colorado - Tables 12-18). The late departures probably resulted from their activities in wetland roosts, including foraging and comfort movements, and the fact that they did not have wetland habitat available until they returned to the roost near sunset. Consequently, they utilized wetland roosts more extensively during early morning hours than at summer areas and at the migration stopover area in Colorado.

2. Activities of Whooping Cranes in the San Luis Valley, Colorado

Activities were recorded by the time budget method on 7 different whoopers in the San Luis Valley for 162 hours (76.5 hours - spring; 89.5 hours - fall) during March-April and October-November 1981. Activities of juveniles, yearlings (1 $\frac{1}{2}$ - 1 $\frac{3}{4}$ year old) and older whoopers were observed. It was not possible to obtain complete diurnal activities (dawn to dark) on some individuals because they utilized night roost sites that were impossible to approach without flushing

the birds. As a result, activities at roost sites of certain individuals are missing (Tables 12 and 13).

Daily activity patterns of whoopers in the San Luis Valley are essentially similar in the spring and fall but differ somewhat from their activity patterns on the winter area. Whoopers normally left night roosts within a few minutes after sunrise and flew directly to nearby agricultural fields, primarily harvested barley, for the morning feeding period. Generally, between 0930-1100 hours (MST) the cranes would depart grain fields and fly to nearby wet meadows or shallow wetlands, usually a different location than the night roost site. Whoopers (and sandhills) would remain at the midday wetland sites for 4-6 hours, usually departing between 1500-1630 hours to agricultural fields for a second feeding period. Around sunset they returned to night roosts. Thus, whoopers (and sandhill cranes) in Colorado normally made 2 feeding flights daily, morning and afternoon, to agricultural fields while they spent midday hours in the immediate vicinity of a shallow wetland or wet meadow.

An example of 1 whooper (76-15) during a 24-hour cycle illustrates a typical daily activity pattern and how cranes utilized different habitat types in the San Luis Valley. On 13 March 1981, whooper 76-15 left the night roost 11 minutes after sunrise and flew for nearly 2½ minutes to a nearby barley stubble field where it remained until 1055 hours. It then flew to a nearby wet meadow where it spent the midday hours. At 1513 hours it returned to the same barley stubble field it had used during the morning and foraged there until returning to the night roost at 3 minutes after sunset. In a 24-hour cycle it spent 11:59 hours (49.9%) at the night roost, 4:32 hours (18.9%) during the

morning feeding period in the barley stubble field, 4:16 hours (17.8%) at the midday wetland site, 3:04 (12.8%) at the evening feeding site in barley stubble, and 9 minutes (0.15%) flying between the night roost, barley fields and midday wet meadow sites.

Time budget data indicate that activities of whoopers in the San Luis Valley were similar during spring and fall. The same 3 categories of activities as on winter areas (feeding, locomotion, and alert behavior) encompassed 82-89% of their diurnal activities (Tables 12-17). Feeding was the primary activity for all birds with 38-53% of their diurnal cycle spent in this activity. As in New Mexico, older whoopers tended to spend less time foraging and more time in vigilant behavior (Tables 12-17) than younger whoopers.

Body maintenance (comfort movements) involved from 6-10.5% of the total diurnal activities for those whoopers for which complete diurnal cycles were obtained. These values are essentially identical to those observed on the wintergrounds (5-11%).

3. Activities of Whooping Cranes on the Summer Grounds, Grays Lake NWR, Idaho

Time budget activities were recorded on 4 whoopers for 270 hours between late April and mid-October 1981 at Grays Lake NWR. Data were collected on the activities of a 1-year-old male (80-2), a 2-year-old male (79-10), a 5-year-old bird whose sex is undetermined (76-15), and a 6-year-old male (75-1) which had established a territory.

Activity patterns of whoopers at Grays Lake differed from those observed along the migration route in Colorado and on the winter grounds. Whoopers are rather sedentary for most of their stay at Grays Lake. Most of their daily requirements are found within a limited

locale which I have named the "activity area" (see Report No. 14:2). Activity areas are not defended against the presence of other cranes; usually sandhills occupy the same area. In contrast, male 75-1 occupied a territory annually since 1978 which he defended against trespass by other cranes. All daily requirements are found in activity areas and territories including habitat for roosting, loafing, escape cover, and feeding. In 1981, male 75-1 spent 190 days at Grays Lake and was on his territory daily except for several days prior to initiating the fall migration.

After mid-August, whoopers generally left their activity areas and joined sandhill flocks staging near refuge grain fields prior to fall migration. During the fall male 75-1, however, would temporarily leave his territory to forage daily in a refuge grain field.

Whoopers at Grays Lake, as in Colorado, left night roost sites near sunrise and returned around sunset (Table 18). Since daily habitat requirements were fulfilled in the immediate vicinity of roost sites, whoopers often walked from roost sites to adjacent meadows to forage. An example of 1 whooper (79-10) on 29 May illustrates his generalized activity pattern during a 24-hour cycle. The male started foraging in the wetland roost at 20 minutes before sunrise. He slowly walked from the roost, foraging enroute to an adjoining meadow where he spent the day. He stayed within 0.5 miles of the roost during the day and spent less than 2 minutes flying. He then walked back to the roost 3 minutes before sunset. During a 24-hour cycle this bird spent 8:35 hours (35.8%) at the night roost and 15:25 hours (64.2%) in adjacent meadows and wetlands during the day. The amount of time spent at the night roost is about the reciprocal of that observed for whoopers

on the winter grounds. This is due primarily to the long day length during the summer in Idaho.

As in the other geographical locations, feeding, locomotion, and alert behavior accounted for the majority of daily activities. On the average, they spent 72-79% of their time in these 3 activities (Tables 18 and 19). Whoopers were involved in body maintenance (comfort movements) approximately 8-10% of the time. This is essentially the same amount of time devoted to this activity in Colorado and New Mexico.

As the time for fall migration approached, whoopers increased the amount of time they spent foraging. This probably is in response to the need to build additional energy reserves for migration.

VII. RELEASE OF A CAPTIVE-REARED FEMALE WHOOPING CRANE AT GRAYS LAKE REFUGE

By 1980 it was apparent that a skewed sex ratio favoring males existed among surviving whooping cranes raised at Grays Lake NWR. During the spring and summer of 1980, 3 sexually mature males, all originating from the initial egg transplant in 1975, had established and were regularly defending territories at Grays Lake. These males apparently remained unpaired due to the absence of females in the older age cohorts. Consequently, it was jointly proposed in 1980 by Patuxent Wildlife Research Center and the Idaho Cooperative Wildlife Research Unit to release at Grays Lake Refuge a captive, parent-reared, female whooping crane originating from Patuxent's captive flock. The oldest available female at Patuxent capable of flight was hatched in 1978 (3 years old in 1981). Although we did not anticipate that the female would lay eggs in 1981, we expected that she could be old enough to form a pair bond.

Captive-reared whooping cranes have never been released into the wild. However, knowledge obtained from experiments with captive-reared sandhill

cranes released in (1) Florida between 1971-75, (2) Grays Lake in 1976 and 1980, and (3) Mississippi in 1981 indicated that a whooper could be released and expected to survive. If she paired with a wild male, her chances for survival and learning the proper migration route would be greatly enhanced.

Previous experiments with captive-reared sandhill cranes released in the wild showed that hand-reared cranes did not adapt well to the wild and are generally unsuited for release programs. These studies demonstrated that cranes reared in captivity by crane parents or foster parents, rather than hand-reared by humans, are capable of surviving in the wild. Survival rates appeared to increase when parent-reared cranes were preconditioned to the foods available at the release site.

The primary objective of this experiment was to test the possibility of establishing a pair bond between a parent-reared, captive female whooping crane and a wild, sexually mature male whooping crane on his territory at Grays Lake NWR, Idaho.

Before the female was transported to Grays Lake Refuge, she was subjected to pre-release conditioning at Patuxent which included (1) converting the normal diet of pelleted feed to barley seed and (2) stimulating foraging activity by scattering insects on the ground in her pen. At Grays Lake Refuge a holding pen, 24 feet x 40 feet x 8 feet high was constructed with aluminum angle iron and covered with small-mesh nylon netting. The pen was located on the north end of the territory of male 75-1 and contained cattail-bulrush marsh in one end and upland meadow in the opposite end. A feeder containing barley seed was placed in the enclosure. The area around the pen was also baited with barley to entice the male to the vicinity and provide a supplemental food source for the female after her release.

Initially, we considered placing the enclosure between 2 male whoopers (75-1, 75-4) whose territorial boundaries were separated by $\frac{1}{4}$ mile. This would have provided the opportunity for either male to pair with the female. Unfortunately, male 75-4 vanished on the winter grounds in November 1980.

Activities of both male and female were monitored almost daily. Both casual observations and time budget data were recorded. Time budget data were collected for 192.5 hours, including 103.5 hours on the male and 89 hours on the female.

The female molted her flight feathers (primaries) several days prior to her arrival at Grays Lake. The premature molt was believed to have resulted from the influence of artificial lighting used to stimulate early egg laying in Aleutian Canada geese held in a nearby pen at Patuxent. As a result, the female was flightless for some 6-7 weeks after her arrival at Grays Lake.

For convenience in analyzing activities of the 2 whoopers, the season was divided into 5 periods: (1) male on territory before arrival of female, (2) arrival period--female in pen, (3) post-release period--female flightless, (4) summer, and (5) fall (Table 19).

A. Arrival of Male 75-1 on His Territory and Construction of Holding Pen,
10-25 April

Male 75-1 arrived at Grays Lake Refuge on 10 April and immediately reoccupied his territory, then mainly covered with snow. He left his territory daily to forage in a nearby refuge grain field but spent most of the remaining time patrolling his territory and chasing trespassing sandhill cranes. Time budget activities reflect his preoccupation with territorial patrol; 51% of his time was devoted to locomotion (walking, running, flying) and 1.3% in aggressive interactions. Only 12.6% of his time involved feeding (Table 19).

On 22-23 April, we constructed an enclosure for the female on the north end of the male's territory. The male occupied the southern part of his territory during pen construction and spent considerable time watching us. Prior to leaving the construction site on 22 April, we pre-baited the area with barley and placed a life-size silhouette whooping crane decoy provided by Patuxent about 30 yards from the pen.

Within 16 minutes after our departure from the pen site, male 75-1 approached the area. Walking in a stiff-legged strut, he passed the decoy some 15 yards away and then turned and walked in a semi-circle around the decoy. He briefly danced to the decoy and then stood and watched it. He finally walked a short distance away and foraged on barley. Within 4 minutes the male returned to the decoy and again stood and watched it for several more minutes. He finally walked away. On 24-25 April, the male returned to the pen site and fed on barley but paid little attention to the decoy.

B. Arrival of Female Whooping Crane and Confinement Period in Pen, 26 April-

4 May

After some difficulty with airline transportation, including an unscheduled deplaning in Chicago, the female whooper arrived at Grays Lake Refuge at 2135 hours on 25 April, accompanied by Dr. S. Derrickson. It was too late to place her in the pen so she was held overnight and put in the enclosure the following morning at 0745.

Immediately after her release, the female bathed and then inspected the pen. Within minutes after we released the female and departed, the male flew over the pen and landed about 60 yards away. The 2 birds watched each other briefly, then the male walked away. At 0812 the male returned and watched the female who was pacing along the side of the pen. The male remained in the area, looking at the female and foraging; most of the time the female paced back and forth in the pen.

During the first day the male arrived and left the pen site a minimum of 16 times. Often, when he left the pen area, he was off chasing sandhills which had trespassed on other portions of his territory. One time (at 1428 hours) the male approached the side of the pen and the female and they stood watching each other until the male departed.

Activities of the 2 whoopers during the days following the placement of the female in the pen were somewhat similar. The male approached the pen numerous times, watching the female and foraging on barley. On a number of occasions he approached the side of the pen immediately adjacent to the female; often she would pace back and forth and test the netting, apparently trying to get out. One time (0915 hours, 29 April) the male approached and the female danced while he picked up a piece of vegetation. The netting prevented the completion of the dance sequence. While away from the pen, the male patrolled his territory and chased trespassing sandhills. He spent considerable time fighting with sandhills (3.9% - Table 19) as he attempted to expand his normal territorial boundary by 100-150 yards to the southeast. Whether the presence of the female prompted his efforts to expand his territory is conjectural.

In the pen, the female devoted two-thirds of the diurnal period to foraging and walking (Table 19). While foraging, she spent 74.9% of the time feeding in the marsh and 25.1% eating barley. Of the time devoted to walking (locomotion), 75.2% involved nervous pacing back and forth along the sides of the pen. She obviously wanted to be liberated and her pacing behavior appeared to perplex the male. Since the 2 birds exhibited interest in each other and we were concerned about the possibilities of a coyote finding the female in the pen, we decided to release her on 4 May.

C. Release of Female and Flightless Period, 4 May-9 June

We banded and radio-tagged the female and released her at 1117 hours, 4 May. During our presence at the pen the male was about 200-400 yards away, patrolling and foraging in the southeastern portion of his territory, and very alert. After being released, the female traveled south along the west side of his territory. At 1123, the male flew to the vicinity of the female and she approached him. The 2 remained in the proximity of each other, walking about, calling, and foraging until 1203 when the male left to pursue trespassing sandhills in the southeastern part of his territory.

The male returned and landed near the female and she approached him. The 2 foraged together; at 1328 she danced and then attempted to fly as the male again flew off to challenge trespassing sandhills. The female then walked southwest, leaving the territory. We headed her back to the territory while the male was pursuing sandhills. She disappeared into a pond covered with cattails and remained out of sight for the rest of the day. The male continued his aggressive behavior toward sandhills, especially in the southeastern part of his territory where he was attempting to usurp additional land.

While the female was flightless, she confined most of her activities to the northeastern $\frac{1}{4}$ of the male's territory and adjoining area. She was relatively secretive, apparently due to being flightless, and often remained hidden in dense emergent vegetation, only occasionally moving over 150 yards from escape cover. She foraged primarily in wetlands and adjacent meadows (59.3% of her foraging time); however, she made considerable use of barley (40.7% of her foraging time) placed in the vicinity as a supplemental food source. Comfort movements and resting consumed 23.2% of her diurnal activities, the most time devoted to these activities during her stay at Grays Lake. In

late May and early June she attempted to fly on several occasions. By 7 June she was walking much farther from escape cover and was observed flying a short distance on 9 June.

During the same period, the male spent considerable time in aggressive encounters with sandhills, patrolling and taking more land for his territory. Some 14% of all his diurnal activities were devoted to aggressive behavior toward sandhills, the highest recorded during the spring-summer periods (Table 19). The male did not go through a flightless period in 1981.

One of the most dramatic encounters between the male and sandhills occurred on 22 May and lasted for 53 minutes. The male was harassing a sandhill pair on the west end of his territory; he first threatened the pair with aggressive struts and various threat postures along with occasional running charges. This was followed by an aerial chase which ended near the point of beginning. More threats and charges ensued until the whooper knocked the male sandhill down in a shallow pond and beat on it with his bill. The sandhill finally struggled free and attempted to fly but was knocked from the air by the whooper. The sandhill then limped across a meadow with the whooper beating on it the entire distance, knocking the sandhill down on several more occasions. Both birds disappeared in emergent vegetation and the whooper soon returned to his territory and began preening.

The sandhill pair was not observed in the vicinity after this incident. I suspect that the whooper seriously wounded the sandhill and it may have later died. The whooper directed many of its blows at the head of the sandhill. We searched the emergent vegetation where the sandhill was last observed but found only scattered feathers.

Between 5 May-9 June the male was observed approaching the flightless female for brief periods on 7 different occasions. Their behavior suggested mild interest in each other; aggression was not observed between the 2 birds.

Frequently, when both whoopers were apart on the territory but visible to each other, one bird would watch the activities of the other but few attempts to join each other occurred.

D. Summer Period - Female Flying (10 June-August)

After attaining flight, the female frequented open meadows and a refuge grain field east of the male's territory. She spent most of the summer in the area. At times she joined sandhills; at other times she was solitary and occasionally the 2 whoopers were together.

On the morning of 8 July, the female was feeding with about 150 sandhills in a refuge grain field. The male landed near the female and they walked around together foraging for 34 minutes. The male finally left for his territory and the female attempted to follow but she apparently was not sufficiently strong to fly along with him and she soon landed by herself.

One incident which appeared promising occurred on 26 July. At 0700 the 2 birds were foraging near each other on the southern half of the territory. The male flew to the refuge grain field while the female remained behind. At 0747 the male returned and landed near the female; she looked at him as he landed and then continued foraging. The male started preening and then gave a Unison Call and the female responded with a Unison Call (the only time she was observed giving unison with the male). The 2 birds approached each other and preened. The male finally started foraging and soon the 2 birds were separated. The 2 whoopers did not remain together for any extended period during the summer.

The male continued to demonstrate strong territorial behavior throughout the summer; 13.9% of his diurnal activities involved aggressive interactions with sandhill cranes. The amount of time devoted to feeding was minimal, only 13.5% (Table 19).

E. Fall (September-October)

The female continued to occupy portions of the male's territory and areas to the east, south and north. She was more mobile during this period, moving between 3 refuge grain fields. She fed daily in the grain fields and spent considerable time hunting grasshoppers. As in the summer, she often joined groups of sandhills, particularly after mid-September. Sandhills were staging in the area prior to the fall migration. At other times she was solitary. The 2 whoopers were together on a number of occasions, foraging and resting. She also associated with 2 other whoopers who had moved into the area for the fall staging period.

The male exhibited somewhat similar behavior. Although he still spent considerable time on his territory, aggressive behavior subsided. He spent much time foraging on grasshoppers and visiting refuge grain fields.

Feeding was the primary activity and both whoopers exhibited dramatic increases in the amount of time devoted to foraging compared to other periods in the spring and summer. Apparently this was in preparation for the forthcoming fall migration.

The female associated with 3 different whoopers during September and early October. She foraged and roosted with 76-15 on several occasions. On the night of 1 October she roosted with the male and 76-15. On 2 October male 76-10 (2 years old) spent several hours with the female. He joined her several different times on 3 October and spent the entire day of 4 October with her. She did not accompany him to the roost that evening; instead, she accompanied several sandhills to a minor roost. We captured her with the aid of a backpack night-lighting unit during the night of 4 October and returned her to Patuxent on 5 October.

During the following days the male associated with the 2 other whoopers almost daily. All 3 migrated on 16-17 October.

Although a pair bond was not established between the male and captive female, much was learned about the potential for releasing captive parent-reared whoopers into the wild. The female successfully adapted and lived for over 5 months at Grays Lake Refuge. Activities of the female (Table 19) and 3 wild non-territorial whoopers at Grays Lake (Table 18) were similar and indicated that she adapted to the wild environment. Preconditioning at Patuxent and in a holding pen at the site prior to release apparently was adequate for the female to make the necessary adjustment to the wild.

The male exhibited considerable interest in the female while she was in the pen. Immediately after her release, the female responded positively to the male. Although he joined her on many occasions, he appeared overly preoccupied with territorial expansion and defense; his extreme aggressive/territorial behavior is difficult to interpret. Interactions between the 2 whoopers later in the spring and summer indicated only mild interest in each other.

It is conjectural if the female would have accompanied other cranes in the fall migration. However, the possibility of losing the female or of her migrating to an undesirable location did not warrant the risk of allowing her to attempt the migration.

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U.S. Fish and Wildlife Service, including observers employed by the following national wildlife refuges: Alamosa, Bear Lake, Bosque del Apache, Grays Lake, Monte Vista, National Elk, Ouray, and Red Rock Lakes; personnel at the Denver and Albuquerque Regional Offices, Billings and Boise Area Offices; and Law Enforcement Agents in Regions 1, 2, and 6. We also appreciate reports provided by cooperators at Grand Teton National Park, Wyoming, and the assistance and efforts of private landowners who hosted whooping cranes.

Table 1. Distribution and movements of whooping cranes in the Rocky Mountain region, February 1981-March 1982.

Whooper I.D. No.	Locations	Dates Observed At This Location
75-1	<ol style="list-style-type: none"> 1. Monte Vista NWR & vicinity, CO 2. Hart's Basin, Eckert, Delta Co., CO 3. Grays Lake NWR, ID 4. San Luis Valley, CO 5. Bernardo State Refuge, NM 6. Bosque NWR, NM 7. Belen State Refuge, NM 8. San Luis Valley, CO 	22 Feb.-4 Apr. 1981 5 Apr. 10 Apr.-17 Oct. 21 Oct.-19 Nov. 20 Nov.-6 Dec. 7 Dec.-11 Feb. 1982 16-20 Feb. 25 Feb.
75-7	last observed 4 miles north of Rio Grande River, Alamosa, CO (San Luis Valley)	2 March 1981
76-7	<ol style="list-style-type: none"> 1. Monte Vista NWR & vicinity, CO 2. South Beaver Creek, Sublette Co., WY 3. Monte Vista NWR & vicinity, CO 4. Bosque NWR, NM 5. Monte Vista NWR & vicinity, CO 	4-21 Mar. 1981 13 Apr.-9 Sept. 3 Oct.-1 Nov. 4 Nov.-26 Feb. 1982 3 Mar.
76-15	<ol style="list-style-type: none"> 1. Monte Vista NWR & vicinity, CO 2. Grays Lake NWR, ID 3. Bosque NWR, NM 4. Belen State Refuge, NM 5. Monte Vista NWR & vicinity, CO 	17 Feb.-4 Apr. 1981 12 Apr.-16 Oct. 20 Oct.-13 Feb. 1982 14-20 Feb. 22 Feb.
77-17	<ol style="list-style-type: none"> 1. San Luis Valley, CO 2. Bear Lake Valley, ID 3. San Luis Valley, CO 4. Bernardo State Refuge, NM 5. Polvadera, NM 6. San Luis Valley, CO 	22 Feb.-8 Apr. 1981 13 Apr.-3 Oct. 2-16 Nov. 29 Nov.-5 Dec. 6 Dec.-19 Feb. 1982 ±23 Feb. <u>2/</u>
78-1	<ol style="list-style-type: none"> 1. San Luis Valley, CO 2. Horse Creek, Sublette Co., WY 3. summer location unknown 4. San Luis Valley, CO 5. Edeal Dairy & vicinity, Los Lunas, NM 6. San Luis Valley, CO 	22 Feb.-10 Mar. 1981 5-7 May --- 2 Oct.-16 Nov. 17 Nov.-19 Feb. 1982 3 Mar.

Table 1 - continued

I.D.	Locations	Dates
78-10	<ol style="list-style-type: none"> 1. San Luis Valley, CO 2. near Daniel, Sublette Co., WY 3. San Luis Valley, CO 4. Edeal Dairy, Los Lunas, NM 5. Bernardo State Refuge & vicinity, NM 6. Edeal Dairy, Los Lunas, NM 7. Bernardo State Refuge, NM 8. Luis Lopez area, NM 9. Bosque NWR, NM 10. Luis Lopez area, NM 11. Bosque NWR, NM 12. Luis Lopez area, NM 13. Belen State Refuge, NM 14. San Luis Valley, CO 	<p>22 Feb.-8 Apr. 1981 24 Apr.-2 Sept. 21 Oct.-21 Nov. 23-26 Nov. 3-6 Dec. 6-18 Dec. 29 Dec. 3-10 Jan. 1982 11 Jan. 13 Jan-10 Feb. 11-12 Feb. 12-13 Feb. 15-20 Feb. 23 Feb.</p>
79-4	<ol style="list-style-type: none"> 1. San Luis Valley, CO 2. Bear River Valley, Franklin Co., and Oxford Slough, Bannock Co., ID 3. San Luis Valley, CO 4. Bosque NWR, NM 5. Bernardo State Refuge, NM 6. Polvadera, NM 7. Bosque NWR, NM 8. Monte Vista NWR, CO 	<p>22 Feb.-7 Apr. 1981 22 Apr.-20 Sept. 3-17 Nov. 20-22 Nov. 25 Nov. 26-27 Nov. 28 Nov.-9 Feb. 1982 25 Feb.</p>
79-7	<ol style="list-style-type: none"> 1. Monte Vista NWR & vicinity, CO 2. Red Rock Lakes NWR, MT 3. San Luis Valley, CO 4. 3 mi. N. Bosque NWR, NM 5. Bosque NWR, NM 6. 3 mi. N. Bosque NWR, NM 7. Bosque NWR, NM 8. Luis Lopez area, NM 9. Belen State Refuge, NM 10. San Luis Valley, CO 	<p>22 Feb.-11 Apr. 1981 17 Apr.-16 Sept. 21 Oct.-23 Nov. 6-8 Dec. 9 Dec. 11-16 Dec. 20 Dec.-12 Feb. 1982 15-22 Feb. 23 Feb. 1-2± Mar.</p>
79-9	<ol style="list-style-type: none"> 1. Monte Vista NWR, CO 2. found dead 10 mi. northwest of Pinedale, Sublette Co., WY 	<p>27 Feb.-9 Apr. 1981 16 Aug.</p>

Table 1 - continued

I.D.	Locations	Dates
79-10	<ol style="list-style-type: none"> 1. San Luis Valley & Alamosa NWR, CO 2. Grays Lake NWR, ID 3. San Luis Valley, CO 4. Edeal Dairy, Los Lunas, NM 5. Bernardo State Refuge, NM 6. Edeal Dairy & vicinity, Los Lunas, NM 7. Belen State Refuge, NM 8. San Luis Valley, CO 	<p>3 Mar.-11 Apr. 1981</p> <p>2 May-16 Oct.</p> <p>30 Oct.-20 Nov.</p> <p>24 Nov.-18 Dec.</p> <p>29 Dec.</p> <p>2-9 Jan. 1982</p> <p>12 Jan.-21 Feb.</p> <p>4 Mar.</p>
79-11	<ol style="list-style-type: none"> 1. Monte Vista NWR, CO 2. not observed since 13 March 1981 	24 Feb.-13 Mar. 1981
80-2	<ol style="list-style-type: none"> 1. Monte Vista NWR & vicinity, CO 2. Hart's Basin, Eckert, CO 3. Grays Lake NWR, ID 4. Monte Vista NWR, CO 5. Bosque NWR, NM 6. Belen State Refuge, NM 7. Monte Vista NWR, CO 	<p>15 Feb-1 Apr. (a.m.)1981</p> <p>1 Apr. (p.m.)</p> <p>10 Apr.-29 Sept.</p> <p>3-4 Oct.</p> <p>18 Oct.-16 Feb. 1982</p> <p>17-20 Feb.</p> <p>23 Feb.</p>
80-5	<ol style="list-style-type: none"> 1. Monte Vista NWR & vicinity, CO 2. Big Gulch, near Craig, CO 3. Sage Creek, 4 mi. E. Cody, WY 4. not observed since 2 May 1981 	<p>5 Mar.-11 Apr. 1981</p> <p>30 Apr.</p> <p>2 May</p>
80-17	<ol style="list-style-type: none"> 1. Monte Vista NWR & vicinity, CO 2. found dead under powerline N. of Monte Vista NWR 	<p>9-22 Mar. 1981</p> <p>9 Apr.</p>
Patuxent No. 1	<ol style="list-style-type: none"> 1. Monte Vista NWR & vicinity, CO 2. Island Park Reservoir, Fremont Co., ID 3. Teton Basin, near Driggs, ID 4. Monte Vista NWR & vicinity, CO 5. Edeal Dairy, Los Lunas, NM 6. San Luis Valley, CO 	<p>14 Mar.-7 Apr.</p> <p>8 June-late Aug.</p> <p>13 Sept.-6 Oct.</p> <p>28 Oct.-11 Dec.</p> <p>26 Dec.-20 Feb. 1982</p> <p>25 Feb.</p>

Table 1 - continued

I.D.	Locations	Dates
Patuxent No. 2	1. Monte Vista NWR & vicinity, CO	17 Feb.-26 Apr. 1981
	2. South Cottonwood Creek, Sublette Co., WY	5-6 May
	3. Horse Creek, Sublette Co., WY	13 May
	4. Union Pass, Sublette Co., WY	22 June-late Aug.
	5. near Hayden, Routt Co., CO	4-15 Sept.
	6. Monte Vista NWR & vicinity, CO	25 Sept.-30 Oct.
	7. Bosque NWR, NM	3 Nov.-1 Mar. 1982
	8. Monte Vista NWR, CO	8 Mar.
Patuxent No. 3	1. Monte Vista NWR & vicinity	1 Mar.-11 Apr. 1981
	2. Fontenelle Creek, Lincoln Co., WY	8 or 9 May-15 Oct.
	3. San Luis Valley, CO	21 Oct.-18 Dec.
	4. Luis Lopez area, NM	29 Dec.-28 Feb. 1982
	5. Belen State Refuge, NM	2-3 Mar.
	6. San Luis Valley, CO	22 Mar.

Table 2. Temperature and precipitation data for May-June 1981, Grays Lake NWR, Idaho.^{1/}

Date	Precipitation (in.)	Temperature (F)		Date	Precipitation (in.)	Temperature (F)	
		H	L			H	L
<u>MAY</u>				<u>JUNE</u>			
1		77	<u>32</u>	1		66	<u>30</u>
2	0.15	65	50	2		67	36
3		52	34	3	0.85 rain	62	44
4		66	<u>20</u>	4	0.02 rain	66	<u>30</u>
5	tr.	64	<u>30</u>	5		74	36
6	0.26 rain	50	<u>32</u>	6	0.30 rain	72	40
7	0.09 (snow)	47	<u>28</u>	7	0.13 rain	70	44
8	0.01 (snow)	44	<u>26</u>	8	tr.	69	50
9	tr.	60	<u>20</u>	9	0.06 rain	62	45
10		66	<u>28</u>	10		70	42
11	0.39 (6" snow)	48	<u>32</u>	11		75	42
12	0.92 (10" snow)	52	<u>24</u>	12		67	42
13		60	<u>18</u>	13	0.27 (rain & snow)	54	<u>30</u>
14		70	<u>28</u>	14	0.05 (snow)	50	<u>26</u>
15	0.20 rain	45	40	15	0.01	62	<u>24</u>
16	0.15 rain	44	<u>30</u>	16		70	<u>30</u>
17	0.52 (rain & snow)	50	<u>32</u>	17		60	<u>32</u>
18	0.01	66	<u>26</u>	18		68	<u>30</u>
19		68	44	19		70	50
20	0.04 rain	62	36	20		70	50
21	0.51 rain	50	33	21		68	50
22	0.72 rain	53	38	22		78	<u>32</u>
23	0.08 rain	64	42	23		72	42
24	0.10 rain	66	<u>32</u>	24		72	<u>30</u>
25	0.12 rain	70	46	25		88	38
26	0.38 rain	64	46	26		86	50
27	0.44 rain	64	40	27		80	46
28		68	<u>32</u>	28		70	39
29		70	33	29		78	<u>30</u>
30		70	37	30		86	36
31	0.06	66	44				
Total/Ave.		5.15		1.69			
		$\bar{x}=60$	$\bar{x}=33$			$\bar{x}=70$	$\bar{x}=38$

^{1/} Data provided by R. Stoor, Grays Lake NWR.

Table 3. Comparison of whooping crane egg success in 1981 for eggs remaining in nests in Wood Buffalo Park, N.W.T., Canada,^{1/} and for 12 eggs transported to Grays Lake NWR, Idaho, and incubated by sandhill cranes.

Nest No. at Wood Buffalo Park	Clutch Size	Egg Success ^{2/}		Hatching Dates Idaho	Potential Egg Success Rating ^{3/}
		Canada	Idaho		
81-1 Sass R.	2	S	U ^{4/}	---	-1
81-2 Klewi R.	2	S	S	before 8 June	-1
81-3 Little Buffalo R.	2	S	U ^{5/}	---	0
81-4 Sass R.	2	S	U ^{4/}	---	0
81-5 Klewi R.	2	S	S	before 8 June	-2
81-6 Klewi R.	2	U	U ^{6/}	---	-2
81-7 Nyarling R.	2	S	U ^{4/}	---	0
81-8 Sass R.	2	U	---	---	---
81-9 Sass R.	2	S	S	7± June	-4
81-10 Klewi R.	2	U	U ^{6/}	---	-2
81-11 Klewi R.	2	S	U ^{4/}	---	-2
81-12 Klewi R.	2	U	---	---	---
81-13 Sass R.	2	U	S	11± June	-3
81-14 Klewi R.	2	S	S	11± June	0
81-15 Sass-Klewi R.	1	U	---	---	---
81-16 Sass	1	U	---	---	---
81-17 Klewi	1	S	---	---	---

^{1/} Nesting data for Wood Buffalo Park provided by E. Kuyt, Canadian Wildlife Service.

^{2/} S = Successful; U = Unsuccessful

^{3/} Potential egg success is rated (0=excellent to -4 poor) by E. Kuyt and is based upon reproductive performance of each pair in previous years.

^{4/} Egg failed to hatch but contained remnants of a dead embryo.

^{5/} Egg destroyed by predator, probably a raven.

^{6/} Egg failed to hatch and contained no evidence of an embryo, and was either infertile or sustained a very early embryo death.

Table 4. Age and locations of sandhill cranes captured, banded, and color-marked in southeast Idaho during summer 1981.

Age	Location			Total
	Grays Lake	Blackfoot River	Bear River Valley near Montpelier	
Adults	8	0	0	8
Young	96	15	4	115
Total	104	15	4	123

Table 5. Counts of sandhill and whooping cranes at Grays Lake NWR, Idaho, 31 August-18 October 1981.

Date	No. Sandhill Cranes	No. Whooping Cranes ^{1/}
31 August	1,630	4
8 September	1,767	4
17 September	2,083	4
22 September	2,213	4
28 September	2,009	4
29 September	1,730	4(1)
4 October	1,695	3
6 October	523	3
9 October	253	3
13 October	287	3
15 October	315	3
16 October	361	3(2)
17 October	110	1(1)
18 October	48	0
19 October	0	0

^{1/} Figures in parentheses indicate number of whooping cranes migrating on that date.

Table 6. Associations between individual whooping cranes during the winter 1981-82, New Mexico.

Whooper I.D. Nos. <u>1/</u>	Location	Frequency (n)
<u>Groups of 2</u>		
75-1 & 76-7	Bosque NWR	4
" & 76-15	"	16
" & 79-4	"	2
" & Patuxent #2	"	6
" & 80-2	"	4
76-7 & 76-15	"	9
" & 79-4	"	3
" & 79-7	"	2
" & Patuxent #2	"	4
" & 80-2	"	1
76-15 & 78-10	"	1
" & 79-4	"	8
" & 79-7	"	5
" & Patuxent #2	"	7
" & 80-2	"	6
78-1 & 78-10	Edeal Dairy, Los Lunas	8
" & 79-10	"	3
" & Patuxent #1	"	7
78-10 & 79-10	"	2
" & Patuxent #3	Luis Lopez Area	4
79-4 & 79-7	Bosque NWR	3
" & Patuxent #2	"	6
" & 80-2	"	4
79-7 & Patuxent #2	"	1
" & Patuxent #3	Luis Lopez Area	4
" & 80-2	Bosque NWR	1
79-10 & 80-2	Belen Refuge	1
Patuxent #2 & 80-2	Bosque NWR	4
<u>Groups of 3</u>		
75-1, 76-7, 79-4	Bosque NWR	1
75-1, 76-7, Patuxent #2	"	1
75-1, 76-15, 79-4	"	1
75-1, 76-15, 79-7	"	2
75-1, 76-15, Patuxent #2	"	14
75-1, 76-15, 80-2	"	2
75-1, 79-4, 80-2	"	1
75-1, 79-4, Patuxent #2	"	1
75-1, Patuxent #2, 80-2	"	1
76-7, 76-15, Patuxent #2	"	2
76-7, 76-15, 79-4	"	1
76-7, 76-15, 80-2	"	1
76-7, Patuxent #2, 80-2	"	2
76-15, 79-7, 80-2	"	1

Table 6. (continued)

Whooper I.D. Nos.	Location	Frequency (n)
<u>Groups of 4</u>		
75-1, 76-7, Patuxent #2, 80-2	Bosque NWR	1
76-7, 76-15, 78-10, 79-4	"	1
76-7, 76-15, 79-7, 80-2	"	1
79-4, 79-7, Patuxent #2, 80-2	"	1
<u>Group of 6</u>		
75-1, 76-7, 76-15, 79-4, Patuxent #2, 80-2	Bosque NWR	1
Total No. of Groups Observed		162

^{1/} Individual whooping cranes are listed in sequence according to age; the older birds first and younger birds last.

Table 7. Time spent in various diurnal activities by 3 juvenile whooping cranes^{1/} accompanying sandhill crane foster parents during Winter 1980-81, Bosque del Apache NWR, New Mexico. Information obtained from Time Budget Analysis with data points collected at 15-second intervals.

Activity	Morning Roost Site		Evening Roost Site		Farm Fields		Total	
	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>
Foraging	298	16.5	200	40.7	3,481	43.5	3,979	38.6
Drinking	1	0.1	19	3.9	20	0.2	40	0.4
Alert	246	13.7	43	8.8	1,664	20.8	1,953	19.0
Resting	454	25.2	34	6.9	797	10.0	1,285	12.4
Comfort Movements	559	31.0	115	23.4	479	6.0	1,153	11.2
Locomotion								
1. Walking, Running	209	11.6	53	10.8	1,075	13.4	1,337	13.0
2. Flying	0	0	0	0	114	1.4	114	1.1
Agonistic Behavior	5	0.3	5	1.0	52	0.6	62	0.6
Vocalization	11	0.6	0	0	18	0.2	29	0.3
Out of Sight	18	1.0	22	4.5	309	3.9	349	3.4
Total Data Points	1,801	100	491	100	8,009	100	10,301	100
Hours of Time Budget (%)	7:30 (17.5) 2:03 (4.8) 33:22 (77.7) <u>42:55</u> (100)							
Departure (a.m.) from roost in relation to sunrise	n=26, \bar{x} =55 minutes \pm 35 (S.D.) <u>after sunrise</u> (Range: 2 minutes before to 121 minutes after sunrise)							
Arrival (p.m.) at roost in relation to sunset	n=11, \bar{x} =12 minutes \pm 28 (S.D.) <u>before sunset</u> (Range: 60 minutes before to 26 minutes after sunset)							

^{1/} Juveniles 80-2 (male), 80-5 (male), Patuxent No. 3 (probable female)

Table 8. Time spent in various diurnal activities by 3 male whooping cranes^{1/} during Winter 1980-81, Bosque del Apache NWR, New Mexico. Information obtained from Time Budget Analysis with data points collected at 15-second intervals.

Activity	Morning Roost Site		Evening Roost Site		Farm Fields		Total	
	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>
Foraging	0	0	200	40.7	4,135	51.9	4,335	46.8
Drinking	0	0	19	3.9	1	tr.	20	0.2
Alert	178	22.1	43	8.8	1,925	24.1	2,146	23.1
Resting	312	38.7	34	6.9	71	0.9	417	4.5
Comfort Movements	246	30.5	115	23.4	133	1.7	494	5.3
Locomotion								
1. Walking, Running, etc.	59	7.3	53	10.8	1,386	17.4	1,498	16.2
2. Flying	0	0	0	0	98	1.2	98	1.1
Agonistic Behavior	1	0.1	5	1.0	41	0.5	47	0.5
Vocalization	10	1.3	0	0	111	1.4	121	1.3
Out of Sight	0	0	22	4.5	70	0.9	92	1.0
Total Data Points	806	100	491	100	7,971	100	9,268	100
Hours of Time Budget (%)	3:21	(8.7)	2:03	(5.3)	33:13	(86.0)	38:37	(100)
Departure (a.m.) from roost in relation to sunrise	n=24, \bar{x} =45 minutes \pm 33.9 (S.D.) minutes <u>after</u> sunrise (Range: 2 minutes before to 162 minutes after sunrise)							
Arrival (p.m.) at roost in relation to sunset	n=11, \bar{x} =12.8 minutes \pm 28.6 (S.D.) <u>before</u> sunset (Range: 51 minutes before to 26 minutes after sunset)							

^{1/} 1½-year old males 79-4, 79-7, and Patuxent No. 2

Table 9. Time spent in various diurnal activities by 3 adult (one 5½-year-old; two 4½-year-old)^{1/} whooping cranes during Winter 1980-81, Bosque del Apache NWR, New Mexico. Information obtained from Time Budget Analysis with data points collected at 15-second intervals.

Activity	Morning Roost Site		Evening Roost Site		Farm Fields		Total	
	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>
Foraging	4	0.8	-	-	1,519	33.2	1,523	30.1
Drinking	2	0.4	-	-	10	0.2	12	0.2
Alert	83	17.3	-	-	1,671	36.5	1,754	34.7
Resting	200	41.7	-	-	74	1.6	274	5.4
Comfort Movements	143	29.8	-	-	404	8.8	547	10.8
Locomotion								
1. Walking, Running	47	9.8	-	-	751	16.4	798	15.8
2. Flying	0	0	-	-	26	0.6	26	0.5
Agonistic Behavior	1	0.2	-	-	39	0.9	40	0.8
Vocalization	0	0	-	-	27	0.6	27	0.5
Out of Sight	0	0	-	-	57	1.2	57	1.2
Total Data Points	480	100	-	-	4,578	100	5,058	100
Hours of Time Budget (%)	2:00	(9.5)	-	-	19:05	(90.5)	21:05	(100)
Departure (a.m.) from roost in relation to sunrise	n=34, \bar{x} =39.4 minutes \pm 32.6 (S.D.) <u>after</u> sunrise (Range: 4 minutes before to 122 minutes after sunrise)							
Arrival (p.m.) at roost in relation to sunset	n=9, \bar{x} =2.1 minutes \pm 24.6 (S.D.) <u>after</u> sunset (Range: 54 minutes before to 28 minutes after sunset)							

^{1/} Adults 75-1 (male), 76-7 (male), 76-15 (sex uncertain)

Table 10. Time spent in various diurnal activities by 5 whooping cranes (ages $2\frac{1}{2}$ - $6\frac{1}{2}$ years old)^{1/} at the Bosque del Apache NWR, New Mexico, Winter 1981-82. Data obtained from Time Budget Analysis with data points collected at 15-second intervals,

Activity	Morning Roost		Evening Roost		Agricultural Fields		Total	
	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>
Foraging	150	8.0	539	34.1	4,460	33.6	5,149	30.8
Drinking	2	0.1	36	2.3	6	tr.	44	0.3
Alert	546	28.9	283	17.9	5,055	38.1	5,884	35.2
Resting	172	9.1	0	0	221	1.7	393	2.3
Comfort Movements	671	35.5	111	7.0	429	3.2	1,211	7.2
Locomotion								
Walking, Running	304	16.1	595	37.6	2,480	18.7	3,379	20.2
Flying	0	0	0	0	141	1.1	141	0.8
Agonistic Behavior	22	1.2	13	0.8	74	0.6	109	0.6
Vocalization	17	0.9	2	0.1	130	1.0	149	0.9
Out of Sight	4	0.2	2	0.1	272	2.0	278	1.7
Total Data Points	1,888	100	1,581	100	13,268	100	16,737	100
Hours of Time Budget	7:52 (11.3)		6:35 (9.4)		55:17 (79.3)		69:44 (100)	
Departure (a.m.) from roost in relation to sunrise	n=96, \bar{x} =44 minutes \pm 31.8 (S.D.) <u>after sunrise</u> (Range: 1 minute before to 151 minutes after sunrise)							
Arrival (p.m.) at roost in relation to sunset	n=26, \bar{x} =30.6 minutes \pm 26.7 (S.D.) <u>before sunset</u> (Range: 83 minutes before to 5 minutes after sunset)							

^{1/} Whooping cranes 75-1 (male), 76-15 (sex uncertain), 79-4 (male), 79-7 (male), and Patuxent No. 2 (male)

Table 11. Time spent in various diurnal activities by 3 female whooping cranes^{1/} in farm fields in the Rio Grande Valley, New Mexico, Winter 1981-82. Information obtained from Time Budget Analysis with data points collected at 15-second intervals.

Activity	No. Data Points	%
Foraging	1,311	32.2
Drinking	0	0
Alert	1,187	29.2
Resting	26	0.6
Comfort Movements	54	1.3
Locomotion	1,294	31.8
Agonistic Behavior	81	2.0
Vocalization	6	0.2
Out of Sight	108	2.7
Total Data Points	4,067	100
Hours of Time Budget	<u>16:57</u>	
Departure (a.m.) from roost in relation to sunrise	n=1, 46 minutes <u>after</u> sunrise	
Arrival (p.m.) at roost in relation to sunset	n=1, 3 minutes <u>before</u> sunset	

^{1/} Whooping cranes 78-1 (3½ years old), Patuxent No. 1 (2½ years old), Patuxent No. 3 (1½ years old). They have been tentatively identified as females based upon their behavior and unison calls.

Table 13. Time spent in various diurnal activities by 2 male whooping cranes^{1/} in the San Luis Valley, Colorado, 11 March-8 April 1981. Information obtained from Time Budget Analysis with data points collected at 15-second intervals.

Activity	Morning Feeding Site		Midday Wetland Site		Evening Feeding Site		Total	
	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>
Foraging	1,332	63.7	468	26.3	1,061	59.1	2,861	50.5
Drinking	0	0	4	0.2	0	0	4	0.1
Alert	200	9.6	360	20.3	215	12.0	775	13.7
Resting	7	0.3	281	15.8	8	0.4	296	5.2
Comfort Movements	45	2.2	236	13.3	21	1.2	302	5.3
Locomotion	422	20.2	219	12.3	464	25.9	1,105	19.5
Agonistic Behavior	5	0.2	2	0.1	19	1.1	26	0.5
Vocalization	1	tr.	13	0.7	1	tr.	15	0.2
Out of Sight	80	3.8	195	11.0	6	0.3	281	5.0
Total Data Points	2,092	100	1,778	100	1,795	100	5,665	100
Hours of Time Budget (%)	8:43	(36.9)	7:24	(31.4)	7:29	(31.7)	23:36	(100)
Departure (a.m.) from roost in relation to sunrise:	n=4, \bar{x} =29 minutes after sunrise (Range: 12 to 44 minutes after sunrise)							
Arrival (p.m.) at roost in relation to sunset:	n=4, \bar{x} =7 minutes after sunset (Range: 0 to 15 minutes after sunset)							

^{1/} 1 3/4-year-old birds 79-4 and 79-7

Table 15. Time spent in various diurnal activities by a 1½-year-old whooping crane, Patuxent No. 3 (probable female), in the San Luis Valley, Colorado, 31 October-21 November 1981. Information obtained from Time Budget Analysis with data points collected at 15-second intervals.

[illegible]

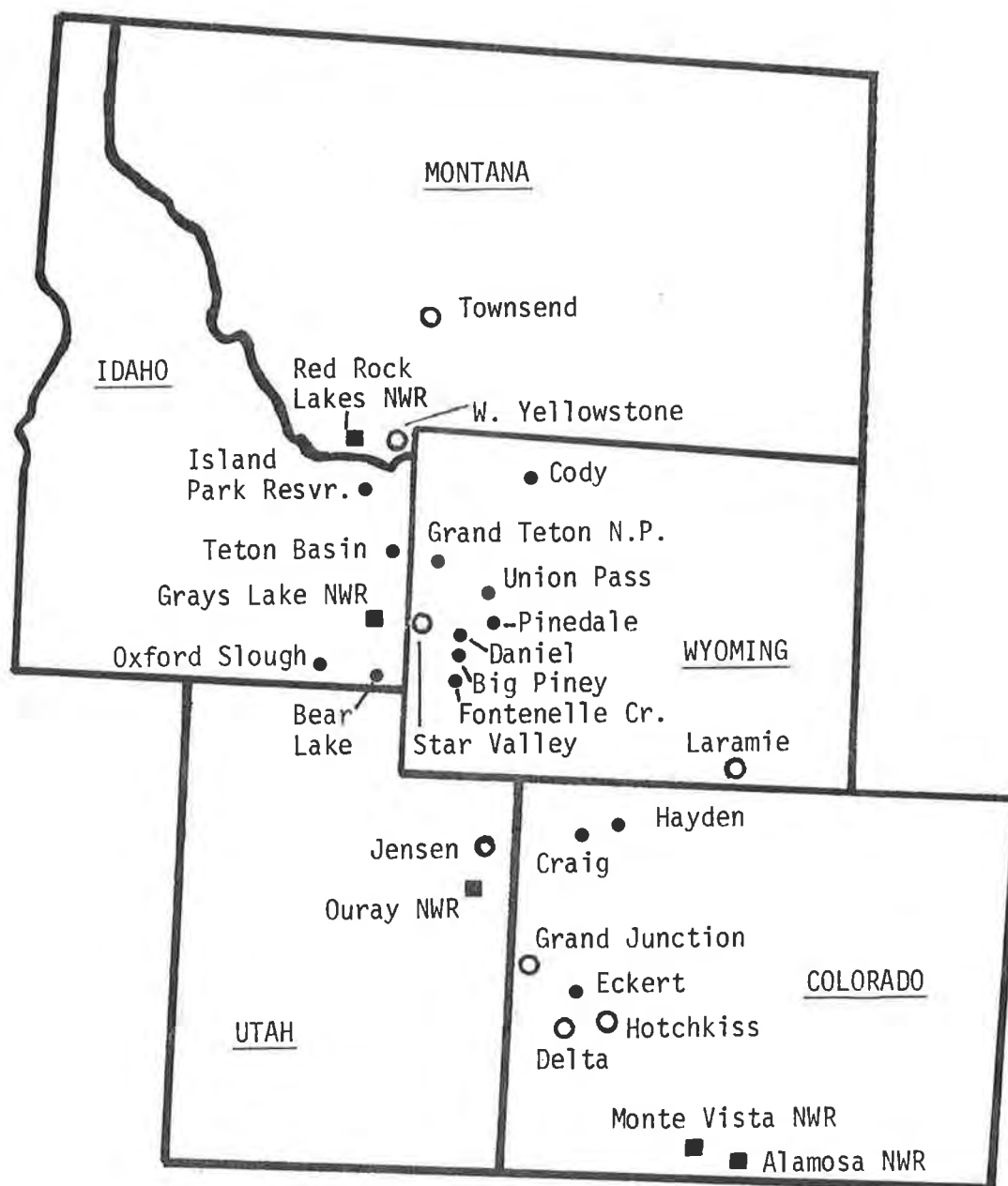
Table 18. Time spent in various diurnal activities by 3 whooping cranes (ages 1-5 years)^{1/} at Grays Lake NWR, Idaho, 20 May-16 October 1981. Data obtained from Time Budget Analysis with data points collected at 15-second intervals.

Activity	Summer Period (20 May-9 Aug.)		Fall Period (Sept.-mid-Oct.)		Total	
	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>
Foraging	5,739	30.5	7,326	34.7	13,065	32.7
Drinking	3	tr.	11	tr.	14	tr.
Alert	2,961	15.8	4,053	19.2	7,014	17.6
Resting	1,580	8.4	858	4.1	2,438	6.1
Comfort Movements	1,492	7.9	1,615	7.6	3,107	7.8
Locomotion	6,197	33.0	4,784	22.7	10,981	27.5
Agonistic Behavior	22	0.1	101	0.5	123	0.3
Vocalization	4	tr.	8	tr.	12	tr.
Out of Sight	798	4.2	2,363	11.2	3,161	7.9
Total Data Points	18,796	100	21,119	100	39,915	100
Hours of Time Budget	78:19	(47.1)	88:00	(52.9)	166:19	(100)
Departure (a.m.) from roost in relation to sunrise	n=14, \bar{x} =7.4 minutes \pm 10.0 (S.D.) <u>before</u> sunrise (Range: 25 minutes before to 9 minutes after sunrise)					
Arrival (p.m.) at roost in relation to sunset	n=18, \bar{x} =2.6 minutes \pm 23.7 (S.D.) <u>before</u> sunset (Range: 45 minutes before to 36 minutes after sunset)					

^{1/} Whooping cranes 76-15 (sex uncertain), 79-10 (male), and 80-2 (male)

Table 19. Comparison of percentages of time spent in various diurnal activities by a 6-year-old territorial adult male (75-1) and a 3-year-old captive-reared female whooping crane released on the male's territory at Grays Lake NWR, Idaho, April-October 1981.

Activity	Before Arrival of Female (24-25 Apr.)		Arrival Period Female in Pen (26 Apr.-4 May)		Post-Release Female Flightless (4 May-9 June)		Summer (10 June-11 Aug.)		Fall (Sept.-Oct.)		Total (Apr.-Oct.)	
	M (%)	F (%)	M (%)	F (%)	M (%)	F (%)	M (%)	F (%)	M (%)	F (%)	M (n)	F (n)
Foraging	12.6	19.9	35.0	16.5	29.9	13.5	36.8	31.8	46.5	5,097	20.5	7,813
Drinking	tr.	tr.	tr.	tr.	0	0	tr.	0	0	5	tr.	5
Alert	19.2	25.6	18.1	20.2	16.3	23.0	14.5	17.6	11.9	5,301	21.3	3,237
Resting	tr.	5.2	0.5	5.3	8.2	1.2	3.9	6.6	2.6	1,133	4.6	894
Comfort Movements	11.3	11.2	7.0	10.5	15.0	4.3	8.0	8.3	11.8	2,402	9.7	2,232
Locomotion	51.1	30.2	32.6	28.9	26.3	36.1	24.5	22.7	23.5	7,727	31.1	5,618
Agonistic Behavior	1.3	3.9	0.2	14.2	0.6	13.9	0.5	1.8	0.1	1,603	6.5	88
Vocalization	1.2	1.9	0.1	1.1	0.1	0.4	0	0.1	0.1	258	1.0	17
Out of Sight	3.3	2.0	6.5	3.3	3.6	7.6	11.7	11.1	3.4	1,309	5.3	1,486
Total (%)	100	100	100	100	100	100	100	100	100	-	100	-
Total Data Points (n)	2,942	7,525	3,945	5,808	5,745	2,444	7,488	6,116	4,212	24,835	-	21,390
Hours of Time Budget	12:15	31:21	16:26	24:12	23:56	10:11	31:12	25:29	17:33	103:28	-	89:07



Whooping Crane Sightings

- confirmed
- unconfirmed
- National Wildlife Refuge

Figure 1. Locations in the Rocky Mountain states utilized by whooping cranes, February-December 1981.

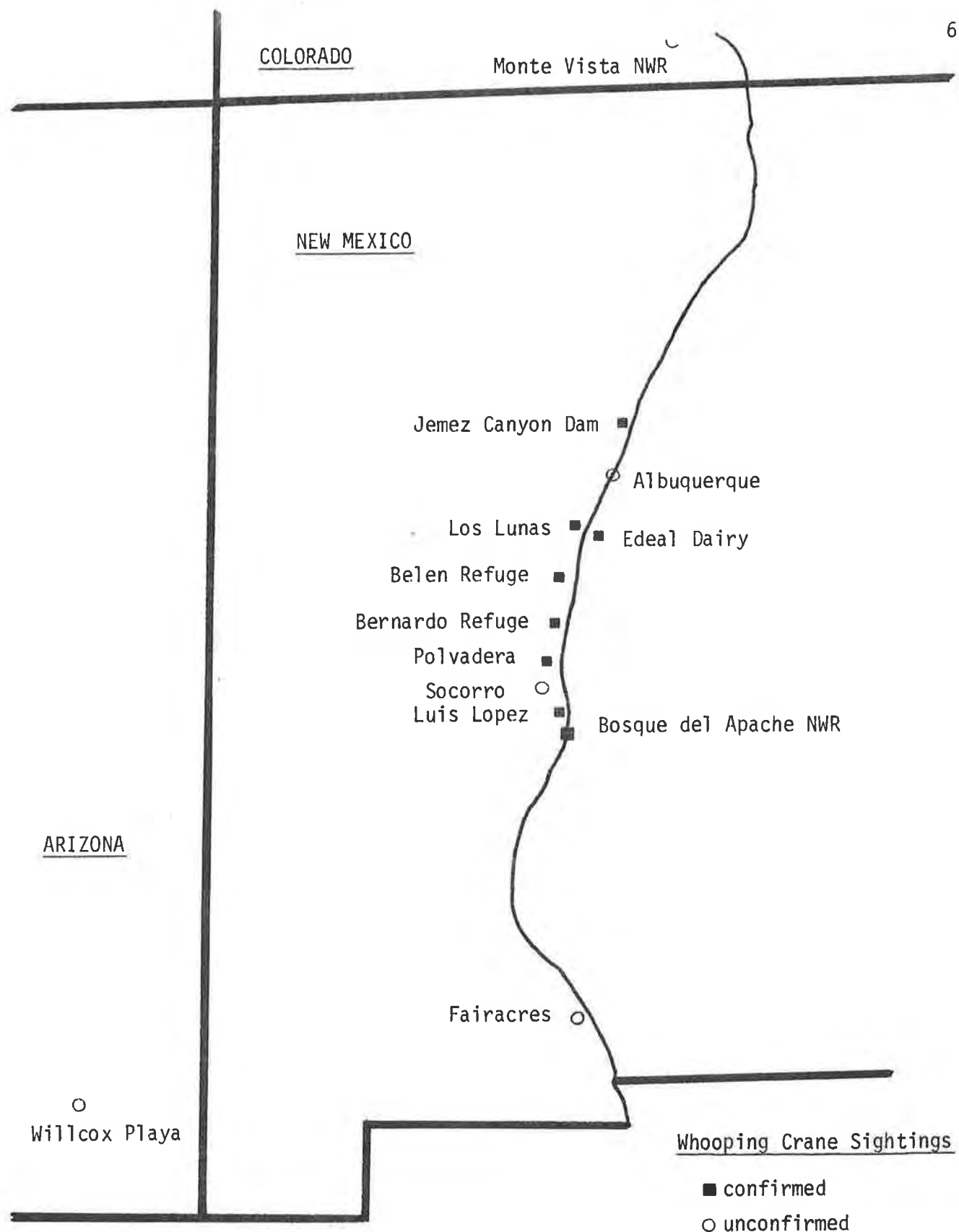


Figure 2. Locations utilized by whooping cranes during the winter 1981-82.

JUL 20 REC'D

Progress Report

No. 16

Whooping Crane Transplant Experiment

FILE	END SPECIES - Whooping Crane	1981
✓	Nail 2/22/80	Stinson
✓	Others 7/91	W. H. H.
	Kauffeld 6/50	W. H. H.
	Winters	W. H. H.
	McDermith	Gray
	X Action	Information

by

Roderick C. Drewien

IDAHO COOPERATIVE WILDLIFE RESEARCH UNIT
College of Forestry, Wildlife & Range Sciences
University of Idaho

Period: November 1979-March 1981

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I. WHOOPING CRANES ON WINTER AREAS IN NEW MEXICO AND MEXICO, 1979-80.

A. Distribution and Status

Sixteen whooping cranes, 8 subadults and 8 juveniles, were known to be alive during the 1979 fall migration. One juvenile (79-12) was killed while migrating through northwestern Colorado in October 1979 by a golden eagle (see Appendix A for necropsy report). The remaining 15 whoopers were located in New Mexico during October and November 1979; 11 of these were observed at their major migration stopping point in the San Luis Valley in Colorado (see Report #15).

The first sandhill cranes arrived in New Mexico during the third week of September. Numbers increased throughout October and November with major influxes occurring between 31 October - 2 November and again between 10-17 November when large flocks left the San Luis Valley enroute to New Mexico. Whooping cranes were reported migrating with sandhills over the Albuquerque area on 31 October, 1 and 11 November. A whooper was reported at the La Cienega ranch south of Santa Fe on 1 November.

Eight subadult whoopers arrived in the middle Rio Grande Valley between 17 October - 17 November, with 7 birds arriving between 11-17 November. All 8 cranes remained in the Rio Grande valley for the winter, including the 1½-year old (78-10) which spent most of the previous winter near Janos, Chihuahua, Mexico (see Report #15).

Of the 8 subadults wintering in the valley, 4 confined most of their activities to the Bosque NWR, and 4 others wintered primarily on private lands including 2 birds at the Edeal Dairy (Fig. 1). Six different subadults utilized the Bosque NWR and 7 utilized either or both of the state refuges at Belen and Bernardo at various times during the winter.

Seven foster-parent families arrived in the Rio Grande Valley between 17 October-26 November. One family remained at the Edeal Dairy for the winter. Six families arrived at but only 5 wintered primarily on the Bosque NWR; one family (79-7) left the refuge in mid-December and was relocated in early January north of Janos, Chihuahua, Mexico, in the same locality where foster-parent family 78-10 spent the previous winter. The foster-parent families wintering in Mexico in 1978 and 1979 involved different sandhill pairs. The pair going to Mexico in 1979 spent the entire winter of 1976-1977 at Bosque NWR with their foster-parent whooper 76-7.

I received 2 reports of whooping cranes observed south and west of the primary wintering area in the middle Rio Grande Valley (Los Lunas to Bosque NWR). A whooper was observed in flight south of Caballo Reservoir on 7 October by J. Bednar and G. Thibodeau of Albuquerque. On 29 October, O. Goodwin reported to the New Mexico Game and Fish Department the observation of a whooper west of Columbus, New Mexico. Nothing further was learned of these sightings.

Locations and movements of 15 whooping cranes during the 1979-80 winter period are summarized in Table 1 and Figure 1.

B. Activities

All whoopers maintained typical daily winter activity patterns as described in previous reports. Whoopers roosted nightly with sandhills and flew daily to nearby agricultural fields to forage and usually, but not always, were associated with sandhills. As in previous winters, the primary foraging sites were in corn and alfalfa fields (Table 2).

One foster-parent family, 79-10, consisted of only one adult throughout the winter period. The loss of one foster-parent, the male, from the family was first noted on 29 September 1979 at Grays Lake, 10 days before the

family migrated. The status of the missing male is unknown. This illustrates that one adult is capable of maintaining the integrity of the family unit in such situations. The female formed a pair bond with a new male the following spring. The pair returned to her territory at Grays Lake but the female did not nest in 1980.

Whoopers were observed closely to ascertain whether individuals exhibited any interest in pair formation with each other or with sandhills. No such behavior was observed, although 2 or more whoopers temporarily associated with each other on various occasions.

The most frequent associations involved subadult 75-4 and a juvenile (Patuxent #1) wintering at the Edeal Dairy, and later, subadult 78-1, after it arrived at the Dairy in January (Table 1). Often, 2 or all 3 whoopers were observed foraging and loafing together; the subadults generally following the foster-pair and juvenile. These associations were continued until the birds migrated in February. Unison calls given by 75-4 indicate that it is a male; the sexes of subadult 78-1 and the juvenile are currently unknown.

Four subadults wintered at the Bosque NWR (Table 1) and at times 2 or more temporarily associated with each other in the roosts or in agricultural fields. On 14 occasions 2 birds were together, on 4 occasions 3 birds were observed together, and on 20 January 1980 all 4 subadults were together. Based upon unison calls, 3 of these birds are males (75-1, 75-7, 76-7) while the sex of the fourth crane (76-15) is unknown because it has not been observed unison calling. Considering that thousands of sandhills winter at the refuge, these associations suggest species recognition.

C. Whooping Cranes and the Bosque del Apache NWR Snow Goose Hunt - 1979

The 1979 special 16-day refuge hunt was divided into 3 sessions: 24-28 November (5 days), 12-17 December (6 days), and 27-31 December (5 days). As in previous years, hunting was allowed from sunrise to 10 a.m., and 20 blinds, each capable of holding up to 3 hunters, were available daily. Hunting was confined to blinds and each hunter was restricted to 10 steel shot shells. The daily bag limit was 5 snow/Ross' geese and the taking of all other species was prohibited.

The requirement initiated in 1977 that all hunters participating in the refuge goose hunt successfully complete a hunter training course was continued. In 1979 it became mandatory that all refuge goose hunters re-take and pass the course every third year. The training course, coordinated by Mr. L. Smith, Region 2, was offered in Albuquerque (2 times), Santa Fe, Las Cruces, Roswell, and at Bosque NWR (3 times). The training course was taken by 628 hunters; 5 failed to pass the test.

An AM radio station was used in 1977 and 1978 to alert hunters of approaching whoopers. In 1979 it was replaced by a one-way communication system in the form of pager radios, whereby refuge employees monitoring the hunt could alert specific blinds through the paging radio located in each blind.

Hunters expended 843 days (of a potential 960) hunting snow geese on the refuge in 1979. They harvested 706 geese (595 snow, 111 Ross'), and reported crippling 284 additional geese. Only one non-target species, an immature white-fronted goose, mistaken for a Blue goose, was shot in 1979.

Although I recorded 32 instances of whoopers entering the snow goose hunting area, they were never threatened by hunters. Refuge personnel

alerted hunters to the presence of the whoopers via the pager radio system. The lack of violations and excellent deportment of hunters are probably related to the Hunter Training Program and to daily briefings provided by refuge personnel prior to hunts. Bird identification training is especially valuable in instances when mixed flocks containing snow geese and both species of cranes appear in the hunt areas together.

Part of the rationale of dividing the 16-day hunt into 3 sessions was to minimize disrupting crane activity patterns and driving large numbers, including whoopers, off the refuge. It was thought that short hunting periods would provide cranes an opportunity to settle down between hunts and resume normal activity patterns. Whoopers forced off the refuge as a result of disturbance are subject to possible mistaken identity by off-refuge snow goose hunters who are not required to participate in a hunter training and bird identification course.

Eight whoopers were utilizing the refuge when the first hunt opened on 24 November. Seven had confined almost all of their activities to the refuge while 1 juvenile and its foster-parents roosted nightly on the refuge and fed daily on private lands. During the 5-day hunt, 3 additional whoopers arrived at the refuge (75-1, 78-1, 79-7) (Table 1). One of these birds, 78-1, arrived on 27 November but left the following morning after flying through the hunting area. On the first hunt day, only one foster-parent family left the refuge; on the second day 2 foster-parent families left and during the last 2 days of the hunt 3 foster-parent families left daily to feed on private lands. The daily departure of 2 additional juveniles resulted from hunting activities; these birds had established feeding patterns in the immediate vicinity of hunting blinds prior to

opening the season. Increasing numbers of sandhills also left the refuge during the last 2 days of the hunt. However, most cranes, including 2 foster-parent families, rapidly settled down and resumed normal activity patterns after the first hunt ended.

Prior to the second hunt, 10 whoopers (4 subadults and 6 juveniles) were at the refuge, including 9 which confined almost all activities to the refuge and one foster-parent family (79-11) which continued to leave the refuge daily to feed on private lands. On the first day of the second hunt only the 1 foster-parent family left the refuge; on the second day 2 foster-parent families left. By the fourth hunt day, 15 December, 5 juveniles and 1 subadult whooper left along with large numbers of sandhills. On the afternoon of 15 December, only 2,588 sandhills were on the refuge out of a night roosting population of some 10,000. One foster-parent family, juvenile 79-7, did not return to the refuge roost and was later located in Chihuahua, Mexico (Table 1).

Ten whoopers were utilizing the refuge when the third hunt started on 27 December. On the first day, the same foster-parent family left as usual and 1 subadult, 77-17, a recent arrival; the subadult did not return (Table 1). On the third day, 29 December, a foster-parent family, 79-9, left the refuge and moved north some 30 miles to Polvadera but returned to the refuge on the evening of 30 December (Table 1). When the hunt ended, 9 whoopers (4 subadults, 5 juveniles) were still utilizing the refuge. However, after the hunt ended, several juveniles and their foster-parents continued to leave the refuge daily for several weeks to forage on private lands. After family activity patterns were disrupted by the hunt and new patterns were established, the birds tended not to return

to the refuge.

Observations of crane activities before, during, and after the refuge hunt revealed that sandhills, including foster-parent families, were much more sensitive to disturbances created by the goose hunt than older whoopers unattached to sandhills. Older whoopers rarely left the refuge; they adapted to the hunt by either departing the roost later in the morning or waiting in refuge fields outside the hunt and then moving into the hunt area to forage after it ended daily at 10 a.m. The only subadults which left the refuge were 2 individuals which arrived at the refuge and had not fully established activity patterns when hunts were being initiated or were under way (77-17, 78-1).

Much of the perennial problems of disrupting crane activity patterns (both sandhills and whoopers) at the refuge as a result of disturbance from the goose hunt is due to the locations of grain crops, mainly corn, in relation to the hunting area. Most corn fields, the preferred winter food of whoopers (Table 2), are located in units open to goose hunting or immediately adjacent to the hunt. If it is desired to reduce numbers of cranes leaving the refuge daily to forage in private fields as a result of hunting disturbance then more corn should be grown in place of green feed (alfalfa and barley) in units south of the hunt and nearer their night roosts.

The snow goose hunt was extremely well-organized and well-run by refuge personnel. I thank Managers R. Perry, N. Fuller, and G. Montoya, for providing data on the refuge goose hunt.

D. Whoopers and the Waterfowl Season Outside the Bosque del Apache NWR

The general snow goose and duck seasons in the middle Rio Grande

valley outside the Bosque Refuge extended from 20 and 30 October 1979, through 20 January 1980. Five whoopers in the valley spent most or all of the winter outside Bosque NWR; others left the refuge at times (Table 1) and appeared in areas open to waterfowl hunting except when they were on state refuges at Belen and Bernardo.

As in other years, law enforcement officers of the FWS and the New Mexico Department of Game and Fish patrolled waterfowl hunting areas and monitored whoopers present in their patrol areas. Fish and Wildlife Service enforcement agents issued 30 citations for migratory bird hunting violations, including several involving the taking of sandhill cranes, in areas occupied by whoopers during the winter months.

Efforts by enforcement agents and the publicity concerning the presence of whoopers were beneficial to the cranes. No incidents were observed by enforcement agents or myself of whoopers or crane flocks containing whoopers being fired upon by hunters. However, I received reports from local (Socorro) waterfowl hunters who observed other hunters shooting at crane flocks containing whoopers as they left the north boundary of Bosque NWR. Both incidents occurred near the Gonzales Woods adjacent to the refuge boundary. This site is a perennial problem area because hunters hide in the woods and shoot, often with poor visibility through the heavy overstory of trees, at passing flocks of ducks and snow geese. This is the same location where FWS law enforcement agents apprehended an individual in 1977 shooting at 2 different whoopers (see Report No. 12).

The first incident occurred on 23 December and was reported by H. Dotson Jr. Around 8 a.m., a flock of sandhills with a whooper flew

from the refuge and passed several hundred yards east of the Dotson blind. Several hunters hiding in the trees in Gonzales Woods fired and the crane flock flared and then scattered in various directions. No cranes were observed to be hit. Mr. Dotson remarked that no waterfowl were visible from his blind.

The second incident was reported by M. Romero and occurred on 10 January near the Gonzales Woods. A flock of sandhills with a juvenile whooper left the refuge flying north. Mr. Romero stated that shots were fired by several hunters and a sandhill fell; the rest of the flock, including the whooper, flared and then proceeded north.

II. SPRING MIGRATION 1980

A. Departure from New Mexico and Migration Stop in Colorado

In late January, many cranes departed areas which they had frequented throughout the winter and moved north within the Rio Grande Valley. Cranes gathered primarily at and in the vicinity of Belen Refuge and the Los Lunas area, including the Edeal Dairy (Fig. 1, Table 1). At least 6 whoopers were known to use the Belen Refuge during this period.

Most whoopers left winter areas between 4-21 February with 7 birds migrating between 18-21 February. No whoopers were observed in the middle Rio Grande Valley after 21 February (Table 1).

Monte Vista Refuge biologist J. Kauffeld reported that the first sandhills arrived on 28 January and the first whooper on 8 February. This bird, juvenile 79-7, had spent part of the winter near Janos, Chihuahua (Table 3). Five other whoopers were observed at the refuge or in the vicinity during

February. By 24 March, all 15 whoopers observed on the winter grounds had been relocated in the San Luis Valley, Colorado (Table 3).

One or more whoopers were present in the Valley between 8 February-10 May. During their stay at least 10 different whoopers utilized Monte Vista NWR and 2 visited Alamosa NWR.

Observations indicated that whoopers made no attempt to pair with each other or with sandhills. Few associations noted in New Mexico were repeated in Colorado. On several occasions, 2 whoopers were observed foraging or resting together but these associations, which involved 6 different birds, were only temporary.

All 15 whoopers remained in the Valley throughout March. Most cranes migrated during the first 2 weeks in April. All but 2 whoopers, both juveniles, departed between 4-16 April. The 8 adult-plumaged whoopers left between 4-10 April (\bar{x} = 8 April), while the last observation dates of 7 juveniles were 8 April-10 May (\bar{x} = 18 April) (Table 3). The refuge received several reports of a whooper summering in the Valley north of Monte Vista but its presence was never confirmed.

The Colorado Division of Wildlife received a number of reports of migrating whoopers in western Colorado between 4-16 April. The reports were summarized by Patsy Goodman, Nongame Ecologist, and kindly forwarded to me. Although it is not possible to verify most sightings, the dates correspond closely with departure dates from the San Luis Valley and the locations are along the crane migration route. Consequently, I suspect most of the reports are authentic.

The first observation was on 4 April when a whooper was reported 5 miles northwest of Montrose; at 4:30 p.m. the same day, a whooper with

about 100 sandhills was sighted in migration over east Grand Junction (Fig. 2). This most likely was subadult 75-4 which departed the San Luis Valley the same morning (Table 3). Other reports from the Grand Junction area were: 9 April - 1 whooper with about 1,000 sandhills, 10 April - 1 whooper with about 150 sandhills, and 16 April - 1 whooper with about 50 sandhills.

Other Colorado sightings were:

- a) Eckert (Fruitgrowers Reservoir) - 5-6 April - 1 bird (B. Huntley),
15-16 April - Whoopers 76-7 and 78-1 - positive identification (M. Peterson).
- b) Soap Creek - 10 April - 1 bird flying with 60 sandhills (F. Wild).
- c) Gunnison - 14 April - 1 bird and 14 sandhills (J. Houston).
- d) Blue Mesa Reservoir - 14 April - 6 whoopers in flight with sandhills (D. Hill) [I consider this to be a questionable sighting];
15 April - 2 whoopers in flight with sandhills (reported by tourists).

The most interesting reports are those of the 2 whoopers in flight over Blue Mesa Reservoir on 15 April and the 2 birds identified at Eckert that evening; they were most likely the same 2 birds. I strongly suspect that the 2 whoopers continued the spring migration together according to sightings received later from Wyoming.

Several sightings of whoopers in northeastern Utah were received from H. Troester, Manager, Ouray NWR. The refuge received a report of 2 whoopers migrating with sandhills on 8 April near Vernal. On 4 May, an immature was observed along the Green River immediately south of the Ouray Refuge boundary by biologist C. McAda.

Although whoopers started migrating from the San Luis Valley in early

April, some sandhills departed in March. The first sandhills arrived at Eckert, Colorado, by 15 March (B. Huntley). Sandhills, including 1 color-marked bird, were near Ouray Refuge on 17 March (H. Troester) and the first sandhill arrived at Grays Lake NWR in Idaho on 22 March (D. Call).

B. Return to Summer Areas

1. Distribution

Of 15 whoopers migrating north during the spring 1980, 13 were relocated on summer areas in Idaho (8), Wyoming (4), and Colorado (1). Four older birds, all originating from the 1975 and 1976 transplants, arrived at Grays Lake between 13-20 April. All had summered there in previous years. A fifth whooper, an immature (79-7) arrived at Grays Lake on 21 May and remained for the summer.

Three other whoopers were found in eastern Idaho. One bird returned to its previous summer location in the Bear Lake Valley near Montpelier. Two other whoopers, both immature, were located in mid-May. One spent the summer near Kilgore, Clark County (Patuxent No. 1) and the other arrived first in Bear Lake Valley, near Montpelier, but moved northwest by mid-June to the Bear River south of Grace, Idaho. All 8 whoopers in Idaho remained in the same areas until migrating in the fall.

Four whooping cranes were found in Wyoming. Three summered north and west of Daniel, Sublette County, along tributaries of the Green River. Two of these cranes (76-7, 78-1) had spent the previous summer in the same localities. The fourth whooper, an immature (79-11), remained on the Idaho-Wyoming border along Thomas Fork of the Bear River.

One immature (79-10) was found summering at and in the vicinity of Antero Reservoir, Park County, Colorado. Antero Reservoir is in the South Platte river drainage in a large mountain valley known as South Park. This was the first confirmed record of a whooping crane from the transplanted population summering in Colorado.

Summer locations of 2 whoopers, both immatures hatched in 1979 (79-9, Patuxent No. 2), remain unknown. Unverified summer sightings suggest that a whooper may have been in Jackson Hole or the upper Green River, Wyoming, or possibly the San Luis Valley, Colorado.

Locations and dates whoopers occupied summer areas are summarized in Table 4 and Figure 2.

A number of whooping crane sightings were reported at various locations in the Rocky Mountains during spring and summer. Reports by states were:

IDAHO

23 April - Bear Lake Valley - B. Schrader reported 2 whoopers flying together between Montpelier and Ovid. This sighting could be authentic as 2 whoopers (77-17, 79-4) were identified in this area in May (Tables 3 and 4). Both birds may have arrived in April before we located them; they were not observed together during May.

MONTANA

The Fish and Wildlife Service Cooperative Whooping Crane Tracking Project received 3 reports of whoopers in areas in Montana which most likely would be visited by Grays Lake birds. The sightings were forwarded to us by M. Anderson. It is impossible to authenticate these sightings. However, the sighting on the Musselshell River is intriguing because it is the second report of whoopers in this same area (see

Report No. 13:10).

16 April - South Fork of the Madison River - Hebgen Lake Area

P. Swanson and D. Morris of West Yellowstone, Montana, reported 5 whoopers in flight; 3 landed nearby and joined sandhills on the ground while 2 continued north. Considering the known distribution of Grays Lake whoopers on this date it is unlikely that 5 would be in a flock in Montana.

30 August - Musselshell River, Meagher Co. - B. Peterson, Billings,
reported 2 whoopers were flushed from the river bank about 1.5 miles west of Martinsdale.

14 September - Bighorn River, Big Horn Co.

T. Viel, Billings, reported 1 whooping crane standing along the river 1 mile south of the Interstate Highway near Hardin.

WYOMING

A number of spring and summer sightings were received of whoopers in northwestern Wyoming, mainly Jackson Hole. Many of the sightings were made available to me by B. Wood, Grand Teton National Park. The frequency of such reports suggests that whoopers probably visited the area. However, verifications by colored leg bands or photographs were not obtained.

Repeated observations of a whooping crane pair between 17-27 April suggest that 2 birds passed through the area. I suspect that the 2 whoopers observed traveling together in western Colorado on 15-16 April (76-7, 78-1) may have continued north to Jackson Hole. Both birds were relocated southeast of Jackson Hole in early May (Table 4) on their summer areas along Horse and Beaver Creeks, west of Daniel. If these 2 birds did travel north together they separated after arriving on summer

areas; the birds summered within 6-8 miles of each other.

JACKSON HOLE SIGHTINGS

17 and 19 April - Blacktail Butte - J. Gilmore reported the presence of a pair of whoopers on both dates near the Teton Science School.

20-21 April - Willow Flats near Jackson Lake Dam, Grand Teton National Park

L. Woodward reported 2 whoopers together in the area on 20 April and S. McGuinness reported seeing a single whooper flying in the same area on 21 April.

27 April - Snake River near Wilson - T. Mangleson reported to me that a reliable observer sighted 2 whoopers together in a meadow near the Snake River. This sighting is the last report of the pair in Jackson Hole.

28 April - Beaver Creek, near Moose - R. Pilgrim observed a single whooper flying toward the Snake River.

16 May - Willow Flats, Grand Teton National Park - J. Daugherty reported a single whooper standing in a meadow.

OTHER WYOMING SIGHTINGS

27 April - Upper Green River, north of Cora

J. Fandek observed a whooper in flight over his ranch. This sighting is probably authentic as Mr. Fandek is a reliable and experienced observer and had a whooper summer on his range in 1977.

30 July - near Lake of the Wood, Union Pass, Wind River Range

J. McCampbell observed with binoculars a single whooper with 2 sandhills foraging in a meadow. This location is directly north of Mr. Fandek's observation and is at the head of the drainage on the Continental Divide. Based upon these 2 observations I strongly suspect that 1 of 2 immatures whose summer locations were unknown summered in the Union Pass area of Park County.

16 June and 1 August, Yellowstone National Park

Reports of a single white crane at Squaw Lake on 16 June and 2 white cranes on 1 August in the Lake-Fishing Bridge area were received.

Nothing further was learned of these sightings.

2. Activities of Subadult Whoopers

Five subadults summered at Grays Lake in 1980, including all 3 survivors from the 1975 year class, 1 hatched in 1976 (76-15), and a yearling, 79-7, (Table 4). The 4 older birds arrived between 13-20 April and the yearling 1 month later. The earlier arrival dates of older whoopers on summer areas occurs annually. Apparently, immatures, after separating from foster-parents primarily in Colorado during March, make a leisurely return trip to summer areas.

The 4 older whoopers returning to Grays Lake had summered here in previous years (see Report Nos. 13 and 15). Upon arrival, each crane immediately, or within a few days, returned to the same locality on the marsh that it had occupied in 1979. According to unison calls given by the older cranes, all three 1975 birds are males. Sex of the 1976 bird (76-15) currently is undetermined as it has not been observed unison calling.

The three 1975 whoopers exhibited territorial behavior, driving sandhills off their respective areas. The development of territorial behavior

among the 1975 birds has varied. In 1978, bird 75-1 first established and defended a territory as a 3-year old and it has continued this behavior annually. Bird 75-4 exhibited some defensive behavior in 1978 (Report No. 14) but did not establish a territory until 1979 as a 4-year-old (Report No. 15); it has continued this same behavior in 1980 on the same territory. Whooper 75-7 did not establish a territory until 1980 when 5-years-old. Although it occupied the same general area in 1979 it did not defend it. In contrast, whooper 76-15, a 4-year old in 1980, has established itself on an *Activity Area* (see Report No. 14:2) where it confines most of its activities but does not defend the area against the presence of other cranes.

The three 1975 whoopers occupied their respective territories for nearly 6 months, from the time of their arrival until they migrated in the fall (Table 4). All 3 birds were observed on their territories on the mornings of the days they migrated in October. The only times they were observed temporarily leaving their respective territories were to feed in nearby refuge grain fields, mainly in the spring and again in the fall. In comparison whooper 76-15, who occupied an undefended *Activity Area* for 4 months, vacated it on 21 August and moved to a sandhill crane staging area on the refuge where it joined crane flocks and remained until migrating in October.

Due to the sedentary behavior of the 4 subadults, only limited opportunity for contact between whoopers prevailed. Virtually all contacts between the 4 adults at Grays Lake occurred in the vicinity of refuge grain fields in the fall. Of 178 observation periods on the 4 subadults at Grays Lake, only 8 (4.5%) involved 2 whoopers actually associating together (63% of the time they were solitary, 32% in company with sandhills). These

associations were all temporary, lasting from over $\frac{1}{2}$ -hour up to several hours at a time. During these 178 observations periods, the 4 older whoopers were observed feeding in agricultural fields 32.5% of the time and 72.5% in marshes and meadows.

In contrast to the activities of the older whoopers at Grays Lake, yearling 79-7 was much more gregarious, often found in company with groups of nonbreeding sandhills. During 62 observation periods at Grays Lake, 79-7 accompanied sandhills 79% of the time and was solitary for the remaining 21%. In contrast, it is rare to see solitary nonbreeding sandhills; they normally are gregarious.

Foraging activities of yearling 79-7 included 66% of the time in agricultural fields, mainly barley, and 34% in wetlands and meadows. It was never observed attempting to defend an area, although it was involved in encounters with sandhills which approached too closely; it was always dominant in these interactions.

Activities of whoopers summering away from Grays Lake (Table 4) are not as well known due to limited periods of observation. However, no older birds (1976-78 year classes) are known to have established territories, although most exhibit various degrees of solitary behavior. Of 5 yearlings observed in 1980 (Table 4), 4 associated with sandhills throughout the summer. The only complete loner, 79-10, resided in Colorado in an area where there are no summering sandhills; it was, however, reported to join Canada geese on several occasions.

III. 1980 WHOOPING CRANE EGG TRANSPLANT

A. Habitat Conditions at Grays Lake and Preparation for the Egg Transplant

Water conditions at Grays Lake were only fair during April. Snow pack in the surrounding watershed was about average compared to the previous 10 years. A snow course, located near Grays Lake at 6,840 feet elevation and monitored by the Soil Conservation Service, contained 48 inches of snow, 1.5-inches above the mean for the previous 10-years on 1 March. Water content of the snow was 13.9-inches, 0.7-inches above the mean for the previous 10-years on 1 March.

Weather during the last half of April was unusually warm and dry. But May was cold and unusually wet, with 5.3-inches of moisture recorded between 6 May-5 June. The last snowfall occurred on 6 June.

From January through 30 June, Animal Damage Control (ADC) agents removed 38 coyotes and 1 red fox on the refuge and within 3 miles of the boundary; 32 coyotes were taken by aerial shooting, 1 on M-44's, and 5 by trapping or shooting.

The first sandhill crane nest was located on 28 April. A sufficient number of foster-parent pairs and alternates were located prior to the arrival of whooping crane eggs. Forty-three sandhill eggs were removed from nests in 1980 and shipped to Patuxent Wildlife Research Center.

B. Arrival of Whooping Crane Eggs

Two whooping crane eggs produced by captive stock at Patuxent Wildlife Research Center, Maryland, were sent to Grays Lake NWR in 1980. The 2 eggs, transported by Dr. S. Derrickson, arrived on 25 May during

a snow storm. The eggs were held over in an incubator until weather moderated on 27 May at which time they were transplanted into sandhill nests.

Nineteen whooping crane nests and 1 renest were located in Wood Buffalo National Park, NWT, in 1980 by Biologist E. Kuyt (Table 5). Initially, the egg pick-up in Wood Buffalo Park was scheduled for 26 May. Inclement weather delayed the egg pickup until 29 May and even on the 29th intermittent showers prevented obtaining single eggs from all available 2-egg clutches; 13 eggs were obtained before weather terminated the pickup effort.

Eggs were placed in an incubator overnight at Ft. Smith and transported to Idaho Falls, Idaho, by aircraft chartered by the Canadian Wildlife Service. The eggs arrived in Idaho Falls at 11:05 a.m., 30 May.

Eggs were transported to Grays Lake Refuge by helicopter by myself and E. Kuyt; we arrived at 12:02 p.m. An airboat was used to transport eggs to selected foster-parent nests. During the egg transplant, temperatures ranged from 58° - 61°F. One egg was determined to be bad (Table 5) at the time it was being transferred to a sandhill nest; the egg was returned to the CWS. Twelve whooping crane eggs originating from Wood Buffalo Park were placed in sandhill nests (Table 5), including 3 eggs which were pipped upon arrival (#1, 2, 5). The last egg was placed in a nest at 1:52 p.m.

C. Incubation and Hatching

All 14 foster-parents accepted their respective whooping crane eggs (12 Canadian, 2 Patuxent) and continued incubation duties. Due to

inclement weather through 6 June, it was impossible to check nests until 7 June.

The 3 pipped eggs received on 30 May hatched the following day. Of 12 eggs received from Wood Buffalo Park, 10 hatched between 31 May-8 or 9 June (Table 5). Two eggs failed to hatch although foster-parents continued to incubate the eggs one week beyond their expected hatching dates. One egg, 80-4, contained a partially developed embryo. The other egg, 80-16, was either infertile or sustained an early embryonic death. At the time it was retrieved from the incubating foster-parents, the egg was cracked and rotten material protruded through fissures in the egg.

Both eggs received from Patuxent Wildlife Research Center hatched. However, one chick died in the nest due to unknown causes when 1-1½ days old (Table 6). Its estimated hatching date was 1 June. The female was still brooding the dead chick at the nest when I arrived on 7 June. When I approached, the male attempted to decoy me away. The behavior observed in this incident exemplifies parental devotion of sandhill pairs to their young.

No eggs were lost to predators in 1980. Control efforts by Animal Damage Control (ADC) and refuge personnel appeared to be effective as little predator sign was found in nesting areas.

D. Whooping Crane Young and Foster-Parents

Detailed observations of foster-parent families were difficult to obtain in 1980. Above-normal precipitation received during May and early June contributed to the rapid growth of tall, rank marsh vegetation. After mid-July, surviving young were more visible because they were

larger and more mobile.

From 11 young which hatched and left their nests, 5 survived to fledge. Of 6 young lost, 4 vanished before they were 30 days old and 2 others were lost between 33-42 days of age (Table 6).

Causes of mortality were undetermined. Predator sign was not detected on any territories of missing chicks and no sign of their remains was located in the dense marsh vegetation to provide clues to their fates. Two chicks (80-8, 80-9) were probably taken by predators. Both disappeared when 33-42 days old (Table 6). When last observed, both were large, active, robust chicks.

During the period 1 July- 30 September, ADC and Refuge personnel, R. Monacott and D. Call, removed 11 coyotes from the refuge and areas immediately adjacent to the boundary. One coyote was trapped near the territory of a whooping crane chick.

The earliest age a chick was observed flying was 78 days when one (80-5) flew an estimated 150-175 yards. Another chick, Patuxent No. 3, flew 450 yards when 82 days old.

Four of 5 foster-parent families continued to utilize their respective territories until they migrated in early October. The 4 families had the advantage of having refuge barley fields within $\frac{1}{2}$ -mile of their respective territories. They were able to leave their territories daily to forage in the grain fields and return to their territories. The fifth family vacated its territory on 5 September when the chick was 89 days old and flew 4 miles to a staging area containing barley in the southeastern portion of the refuge. This family remained in the staging area with hundreds of sandhills until migrating in early October.

E. Capturing and Color-marking Whooping Cranes and Sandhill Cranes

Five young whoopers were captured with the aid of a helicopter on 1 August. All were marked with colored plastic leg bands and instrumented with miniature radio transmitters. Details of the radio instrumentation and tracking project are summarized in Appendix B.

As in previous years, no problems were encountered in handling or banding young whoopers. Subsequent observations revealed that they were not hindered by colored leg bands or radio transmitters. Weights, measurements, and color leg bands used on individual whoopers are summarized in Table 7.

Efforts were made to capture and color-mark sandhill cranes during the summer. Most were color-marked with 3-inch high neck collars. A total of 120 sandhills was captured (Table 8).

F. Staging for Fall Migration and Departure from Grays Lake

Cranes started gathering at traditional staging sites in the Grays Lake Valley in mid-August. By 22 September over 2,000 sandhills and 10 whoopers (5 subadults, 5 juveniles) were at staging sites in the valley. The largest group of cranes, including 8 whoopers, congregated in the southeastern portion of the refuge where grain and bait fields were available.

Sandhills were first observed migrating from Grays Lake on 24 September with flocks leaving daily after that date. I suspect that some sandhills may have left prior to the 24th. The last sandhills left Grays Lake on 19 October. Of 10 whoopers at Grays Lake, 9 migrated between 1-14 October and the last bird left on 19 October. Fall migration

chronology for sandhill and whooping cranes departing Grays Lake Refuge is summarized in Table 9.

IV. FALL MIGRATION OF WHOOPING CRANES

A. Migration of Subadults

Summer locations of 13 subadults were known in 1980, while the locations of 2 others remain unknown. Five summered at Grays Lake Refuge, 3 in other parts of eastern Idaho, 4 in Wyoming, and 1 in Colorado (Table 4). Whoopers departed their respective summer areas between 15-18 August and 19 October (Table 10).

Eleven of 13 subadults whose summer locations were known were later located in the San Luis Valley, Colorado, between 19 September - 8 November. Two other subadults, whose summer locations were known, were not observed during the fall migration in Colorado. One bird, 76-15, completed the migration to its winter site at the Bosque Refuge in 12 days, limiting the opportunity to see it in Colorado. The second bird, 79-11, was not observed in Colorado during the fall, although I observed it along the migration route in northeastern Utah on 1-2 October. The 2 subadults which were not observed during the summer (Table 10, birds 79-9 and Patuxent No. 2) were both located in the San Luis Valley, Colorado.

Eleven subadults, whose departure dates from summer areas and arrival dates at New Mexico winter areas were known, completed the fall migration in 12-79 days. The average time spent enroute was 50 days. Fall migration chronology of subadult whoopers is shown in Table 10.

Four sightings of migrating whoopers were received during the fall from Utah and Colorado. On 5 October, 2 p.m., W. Albrecht reported

observing a whooper migrating with a flock of sandhills over Hyrum, Utah (Fig. 2). This may have been 79-4; it summered in the Bear River Valley, Idaho, north of Hyrum, and migrated on 4 October.

The Colorado Division of Wildlife received 3 reports of migrating whoopers in the Grand Junction area between 7-10 October; the reports were provided to me by Patsy Goodman, Nongame Ecologist. On 7 October 2 reports of migrating whoopers were received; 1 was observed with about 30 sandhills at 3 p.m., 7 miles northwest of Grand Junction, and the second sighting of 1 whooper with sandhills was at 3:05 p.m. at the Clifton Interchange on I-70, 6 miles east of Grand Junction. On 10 October, a whooper with some 80 sandhills was reported at Trickle Park on Grand Mesa.

In addition, I observed whooper 79-11 on the evening of 1 October and morning of 2 October roosting on a sandbar along the Green River near the Stewart Lake state management area south of Jensen, Utah. This whooper departed its summer area near Border, Wyoming, at 1:25 p.m., 1 October. It stopped for the first night of its migration on the Green River near Jensen. These observations were obtained while radio-tracking a juvenile whooper on 1-2 October (see Appendix B).

Refuge Manager, M. Nail, reported that the first major movement of sandhills arrived in the San Luis Valley on 17-18 September, and refuge personnel observed the first whooper, a 2-year old, on 19 September (Table 10). By 23 September, Manager Nail reported over 2,100 sandhills in the area with 1,600 on the Monte Vista and Alamosa Refuges.

Thirteen subadults were observed in the San Luis Valley during the fall; 1 or more were present in the Valley continually from 19 September-

18 November. A minimum of 11 subadults remained in the area through early-mid November. At least 5 subadults were observed utilizing the Monte Vista and Alamosa Refuges during their stay in the valley.

B. Migration of Foster-Parent Families

Five foster-parent families migrated from Grays Lake Refuge between 1-9 October. Only 1 family, the one which we radio-tracked (Appendix B), was observed in the San Luis Valley, Colorado, during the fall migration. Four families were later located on winter areas in New Mexico between 6-25 October. The 4 juveniles spent 5-16 days ($\bar{x} = 9$ days) to complete the migration from Idaho to New Mexico (Table 10). One juvenile, 80-6, has not been seen after it departed Grays Lake with its foster-parents on 9 October.

On 4 October, while we were enroute from the San Luis Valley to Grays Lake after radio-tracking juvenile 80-2, we encountered another radio tagged juvenile whooper near the Wyoming-Utah border. At 2:10 p.m. we located the foster-parent family containing juvenile-Patuxent No. 3 with a flock of sandhills. The flock was passing over the crest of the Uinta Mountains flying in a southeasterly direction at 3,415 m (11,200 ft). The foster-parents involved were the same pair which we radio-tracked with their juvenile whooper in October 1979 (see Report No. 15). The migration location of the foster-parent family on 4 October 1979 was the same as that on 4 October 1980. In 1979, this pair and juvenile whooper Patuxent No. 2 crossed the crest of the Uintas at 12:45 p.m. while in 1980 the pair with juvenile-Patuxent No. 3 crossed at 2:10 p.m.

V. WHOOPING CRANES ON WINTER AREAS - 1980-81

A. Status and Distribution

Twenty whooping cranes, consisting of 15 subadults and 5 juveniles, were known to be alive during the fall migration in October 1980 (Table 10). Of these, 16, and possibly 17 (13 subadults, 4 juveniles), were located on the main winter area in the Rio Grande Valley, New Mexico, during October -November 1980 (Tables 10 and 11). Sixteen whoopers spent the entire winter in the middle Rio Grande Valley. Arrival dates for 12 subadults were from 19 October-24 November (\bar{x} = 14 November). Four juveniles in company with their foster-parents arrival between 6-25 October (\bar{x} = 15 October).

One whooper, 75-4, was tentatively identified on 29 November, at Bosque NWR. Heat waves prevented me from obtaining a positive reading of the alpha-numeric code (A04) on the plastic leg band. The only other whoopers marked with similar yellow leg bands with alpha-numeric codes (A01, A03) were both located the following day some 40-air miles north. Based upon this 1 observation, I believe that 75-4 was at the Bosque Refuge on 29 November. It was not sighted after that date on winter areas or during the spring 1981 migration in Colorado. Our many sightings of this bird during the past several winters show a consistent pattern of winter movements centered around Bosque NWR. Its absence this winter indicates that 75-4 is probably dead.

Patuxent No. 1, a yearling, was found wintering at Willcox Playa, Cochise County, Arizona (Fig. 1) on 26 December by D. Perkins of the University of Arizona. This whooper remained in the vicinity until

migrating in March to Monte Vista NWR, Colorado (Table 11). It spent the previous winter with its foster-parents at the Edeal Dairy (Table 1). Apparently, it followed Greater sandhill cranes to Willcox Playa, a traditional crane winter area used annually by some Greater sandhill cranes from the Rocky Mountain Population. This is the first confirmed record of a whooper wintering in Arizona.

The winter location of yearling whooper 79-11 was not determined, but it was sighted in spring migration at Monte Vista NWR in late February.

Juvenile whooper 80-6 has not been observed since 6 October when it migrated from Grays Lake NWR. Presumably it was lost to unknown causes along the fall migration route.

Between 6-10 January, we surveyed principal crane winter areas in western Chihuahua, Mexico. Heavy precipitation prevented conducting thorough surveys of some areas. No whoopers were located during the survey although 2 different whoopers had been located in this region during previous winters.

Of 16 whoopers wintering in the Rio Grande Valley, 10 (7 subadults, 3 juveniles) confined most of their activities to Bosque NWR, 3 (2 subadults, 1 juvenile) stayed primarily on state refuges at Bernardo and Belen, and 3 others (all subadults) wintered on private lands. Twelve different whoopers utilized the Bosque Refuge and 11 visited state refuges at Bernardo and Belen at various times during the winter. Five different whoopers were observed at the Edeal Dairy, Los Lunas, during the winter period and one (78-1) spent the majority of its time at the Dairy.

As large numbers of sandhills arrived in the Rio Grande Valley in November, several reports of migrating whoopers were received. On 10 November, the Regional Office received a report of a whooper migrating with sandhills over West Mesa near Albuquerque. Apparently it was whooper 79-4 which arrived at Bosque NWR that evening.

Between 16-20 November large numbers of cranes departed the San Luis Valley, Colorado. On 16 November, J. Sands, New Mexico Game and Fish Department, reported seeing many cranes in migration over Espanola. R. Tuber, Albuquerque, observed a whooper in migration near Los Lunas at 4:10 p.m. on the same day. On 19 November, the Bosque Refuge received several reports of a whooper in migration over Corrales (near Albuquerque) at 10:20 a.m. Three different observers reported seeing a single whooper with sandhills on 19-20 November near Caballo Reservoir, south of Bosque Refuge. Possibly this was Patuxent No. 1 which later appeared in Arizona.

On 26 November, I received a report from T. Maxwell of a whooper with sandhills in migration over O. C. Fisher Reservoir, near San Angelo, in west Texas. Nothing further was learned about this sighting.

B. Activities

Older whoopers were again monitored closely to determine if any attempted to form pair bonds with each other or with sandhills. No such behavior was observed.

During the winter, 2 or more whoopers were observed together or in close proximity on numerous occasions. In those instances when 2 or more whoopers were determined to be following each other, foraging

together, or engaged in some other activity together, they were recorded as an "association". Associations were not recorded when 2 or more birds were in close proximity to each other but did not appear to pay any attention to each other's presence; this situation occurred far more frequently than those instances when associations were recorded. Consequently, the number of associations (38) recorded in Table 12 are considered conservative.

One interesting incident occurred at the Bosque Refuge on 3 December, 11:45 a.m. Four whoopers were in close proximity to each other (within 40-50 yards) at the edge of a corn field in Unit 13. One adult, 76-15, walked into the standing corn and broke an entire cob off a stalk. It returned to the field border, dropped the cob and commenced pecking at the dry kernels. Immediately, 2 other whoopers (79-7, Patuxent No. 2) joined 76-15 to eat on the cob. Then a juvenile whooper, Patuxent No. 3, left its foster-parents and joined the 3 older whoopers eating the corn; the older whoopers tolerated its presence. The foster-parents then attempted to join the feeding juvenile but were immediately chased off by the older whoopers. After finishing the corn, the whoopers separated, including the juvenile which rejoined its foster-parents waiting nearby.

During the past 2 years it has become apparent that most older whoopers (1975 and 1976 year classes) are males, as determined by their unison calls. Whoopers can be sexed by their unison calls as can all species in the genus Grus. Of 5 whoopers alive in the 1975 and 1976 year classes, 4 have been observed giving the unison call. All 4 (75-1, 75-4, 75-7, 76-7) have been identified as males. Only 1 older whooper, 76-15, has not been observed unison calling and its sex is

currently unknown.

Reasons for the unbalanced sex ratio among survivors are unknown. However, Dr. S. Derrickson, Patuxent Wildlife Research Center, informed me that in cranes raised in captivity at Patuxent, males survive at a higher rate than females. Currently, I have no explanation as to why the survival of males is much better than females.

The small number of whoopers available in the foster-parent population combined with the unbalanced sex ratio biased toward males apparently explains why we have not observed any pair formation. Undoubtedly, some young females are present, especially in the 1979 year class where survival was high (Table 11). Assuming some younger females are available, then we should expect to see some indication of pair formation in 1982 or 1983.

Data on time-activity budgets were collected during the winter period at the Bosque Refuge on whoopers in various age classes in order to better quantify their activities. Samples of activities were recorded at 15 second point intervals. Over 100 hours of time-activity budgets were collected. Data have not been completely analyzed and will be reported at a later date.

Foraging locations of whoopers were recorded again in 1980-81. As in previous years, corn was the most preferred food on winter areas in the Rio Grande Valley (Table 2).

C. Whooping Cranes and the Bosque del Apache Refuge Snow Goose Hunt

Regulations and hunter requirements for the 1980-81 Refuge snow goose hunt were essentially the same as the 1979-80 hunt. The 16-day hunt was

again divided into 3 hunt periods: 5 days - 22-26 November, 6 days - 13-18 December, and 5 days - 31 December-4 January.

Hunter training courses were again offered in Albuquerque (2), Santa Fe, Las Cruces and at the Refuge (3 times). A total of 536 persons passed and 13 failed the test given at the end of the courses. Persons failing the test were ineligible to hunt at the Refuge in 1980.

Daily, prior to the hunt, refuge personnel gave a prehunt program which included species recognition. The pager radio communication system which provides contact with each blind was used again in 1980.

A total of 831 hunter days (960 hunter days available) was recorded for the 1980 hunt. Hunters harvested 804 geese (587-snows and 7-blues, 208-Ross', and 2 unidentified). The Snow/Ross' goose population on the Refuge peaked at 30,000 in mid-December.

Only 1 nontarget species, a gull, was shot accidentally for a snow goose in 1980. The hunter was cited for the violation.

As in previous hunts, steel shot was required. Refuge personnel collected 300 gizzards during the hunts and analyzed them for ingested shot. Thirty pellets were found of which 9 were ingested; 2 of the ingested pellets were lead and 7 were steel. The remaining 21 pellets were apparently embedded in gizzards at the time birds were shot.

I recorded 21 instances of whoopers entering the goose hunt area, but they were never threatened by hunters. When whoopers appeared in the hunt area, refuge personnel alerted blinds in the vicinity of a bird via the pager radio system. The hunter training course and communication system certainly appear to provide adequate protection for whoopers

residing on the refuge. The importance of this added protection is apparent on those occasions when whoopers temporarily join flocks of snow geese. I observed 9 occasions during the 1980 hunt when whoopers flew with snow geese in the immediate vicinity of or into the hunt unit.

Numbers of whoopers utilizing the refuge were 8, 9, and 11-12 during the 3 hunt periods (Table 11). During the first and second hunts, 2 different whoopers left the refuge on several occasions to feed on private lands. Both whoopers had established feeding patterns in the hunt unit prior to the area being opened. During the third hunt, 3 whoopers left the refuge on the last day. However, all returned and reestablished feeding activities on the refuge after the hunt terminated.

One of the justifications for dividing the 16-day hunt into 3 shorter periods was to minimize disturbances to whoopers and not completely disrupt their activity patterns. The plan appeared to work well in 1980 and probably will in future years provided that sufficient corn and milo forage are available for whooper use outside the hunt unit.

In 1980-81, the New Mexico Game and Fish Department closed snow goose hunting off the refuge during the second and third refuge hunt periods. The snow goose season in the middle Rio Grande Valley ran from 18 October-12 December and 5-18 January. The closure was mainly implemented to minimize hazards to whoopers leaving the Bosque Refuge due to disturbances created during the refuge hunt. Unlike refuge goose hunters, who must take hunter training, no training is required of off-refuge hunters. The closure greatly diminished the likelihood of off-refuge

hunters mistaking a whooper for a snow goose.

A possible benefit from the closure was that large numbers of snow geese established feeding patterns off the refuge during the closed season. When the season reopened, a larger than normal harvest of snow geese occurred outside the refuge. One landowner who rents daily hunting rights on the north boundary reported that hunters took over 800 snow geese on his lands during the 1980-81 season.

Fish and Wildlife Service Law Enforcement Agents wrote 33 citations for migratory bird hunting violations in areas occupied by whoopers outside the Bosque Refuge. None of the violations involved whooping cranes. Agents reported a considerable problem with late shooting, which often disrupted waterfowl and crane roosting activities in the Rio Grande outside the refuge.

D. Snow Goose and Sandhill Crane Depredations of Agricultural Fields

Peak numbers of sandhill cranes wintering at the Bosque Refuge appear to have stabilized in recent years, ranging from 10,000-13,000, while snow geese have been increasing annually with a record 30,000 counted in 1980. Depredation complaints have increased along with the rise in winter bird populations. Depredations on private farm lands north of the refuge were particularly severe in 1980 compared to previous years.

In response to the depredation situation, Fish and Wildlife Service and New Mexico Game and Fish Department personnel held a depredation workshop near Bosque Refuge on 5 November 1980. The uses of pyrotechnics were demonstrated. Seven farmers attended.

Bosque Refuge Manager R. Perry reported that refuge crops were marginal in 1980 due to abnormally high water tables and to alkalinity problems in refuge farm units. Consequently, food supplies were rapidly depleted and many cranes and geese left the refuge, mainly in January and February, to forage on private lands. The problem was compounded by warm, mild winter weather which stimulated new green growth in wheat, barley, and alfalfa; large numbers of geese left the refuge to feed on the new green growth. Through mid-February, Bosque Refuge received 23 requests from 14 farmers to assist with bird depredation problems.

Of 23 complaints received at the Refuge, 12 involved cranes foraging in harvested alfalfa and corn fields, with farmers contending that the cranes compete with their livestock for leftover foods. Six other complaints involved snow geese foraging in wheat, barley, and alfalfa fields, and 2 complaints were received of cranes feeding in newly-planted winter wheat or barley fields. The remaining 3 complaints consisted of 2 dealing with bird problems at cattle feedlots and 1 of cranes tearing apart straw bales left in the field during the winter.

In response to these and other complaints, the Socorro County Rural Development Committee met with interested parties to discuss the problem on 26 February 1981. A committee, including 4 farmers, Refuge Manager Perry, and a representative of the New Mexico Game and Fish Department, was established to work on the migratory bird depredation problem. As a result of the depredation complaints, the New Mexico Game and Fish Department asked the Central Flyway Council to extend the current snow goose hunting season framework dates (1 October-20 January) through mid-February.

Whether conditions that prevailed in the 1980 winter which contributed to large numbers of birds leaving the refuge to forage on private lands will occur again is unknown. However, improvements in refuge crop production would materially reduce off refuge depredations. Efforts currently under way indicate that improvements are forthcoming. During the 1980 winter, the refuge was improving a 135-acre farm tract by establishing a drainage system to attack the problems of high water tables and alkalinity which have plagued this unit in some years.

The refuge could greatly increase winter foods by doing their own farming on certain units. Currently, almost all farming is done by share croppers who receive two-thirds of the production, mainly alfalfa, as their share. Thus, most of the annual production goes to share croppers rather than as food for wintering birds. One of the off refuge complaints about depredation in 1980 is also a refuge share cropper.

The refuge is currently contributing to off refuge depredations by sandhill cranes when large numbers leave due to disturbances created by the annual goose hunt. By increasing corn and milo production closer to the cranes' night roost area and south of the goose hunt, many more cranes would have an acceptable feeding area on the refuge. In any event, if depredations continue, it will be necessary for the refuge to adjust current management practices to minimize the problem on private lands.

E. Botulism and Avian Cholera Outbreaks on Winter Areas Utilized by Whooping Cranes

Between 27 August-7 September 1980, Bosque del Apache Refuge

personnel picked up about 140 birds, mainly green-winged teal and blue-winged teal, with lesser numbers of mallards, shovelers, and other water birds. The die-off was diagnosed as Type C Botulism and occurred in Unit 18B, a primary winter roosting area for thousands of waterfowl and cranes, including whoopers. Low water levels and hot weather along with considerable amounts of dead vegetation apparently created conditions responsible for the botulism outbreak. The problem was eliminated by raising water levels and no additional die-offs from botulism were recorded.

Another outbreak of Type C Botulism occurred in late September and October at Willcox Playa, Arizona. Abnormally warm weather and dry conditions prevailed after a power plant on the west side of the Playa released highly alkaline water. Mr. D. Perkins, University of Arizona, reported to me that about 240 birds, mainly pintail ducks and 129 lesser sandhill cranes, were found dead. Fish and Wildlife Service and Arizona Fish and Game Department personnel put out scare devices to move birds away from the area. No additional botulism problems were encountered with the 4,000 cranes, including one whooper, which wintered in the area.

Between 18 November-8 December, Bosque del Apache Refuge personnel found 14 snow geese, 3 American coots, and 1 Canada goose dead in Unit 18. Four snow geese were confirmed by the Fish and Wildlife Service Madison Laboratory and the Colorado State University Laboratory as having died from avian cholera. In addition, 3 other snow geese necropsied in the field had symptoms of avian cholera. Deaths of the remaining birds were apparently due to other causes.

The die-off occurred at the time when peak winter populations of waterfowl and cranes were arriving at the refuge. In response to the

potential problem, refuge personnel initiated a number of management changes to minimize any further disease outbreaks. These included (1) flushing Unit 18 with fresh water in order to dilute any *Pasteurella* bacteria present, and (2) reduce stress on birds by closing the public tour route through Unit 18 and making additional food (corn and milo) available to the birds. Refuge personnel monitored waterfowl and cranes closely in order to detect any additional losses but no birds were found dead due to avian cholera during the remainder of the winter period.

F. 1981 Spring Migration From Winter Areas

After mid January, many cranes began moving north within the Rio Grande Valley. As in recent years, the favorite staging area was at the Belen State Refuge and vicinity where 9 different whoopers were identified in late January and February (Table 11). Some 11,000 sandhills were in the area by early February.

The 10 whoopers wintering at the Bosque Refuge left between 14 January-23 February. Five moved 50 air miles north to the Belen Refuge prior to migrating. Three others moved about 25 miles north to farmlands near San Acacia, while 2 whoopers migrated directly from the refuge.

The first major crane migration from the Rio Grande Valley left on 13 February. The first whooper (75-7) migrated this same day from the Edeal Dairy around 10:30 a.m. Over 2,500 sandhills passed over the Edeal Dairy, Los Lunas, between 10:30 a.m. - 1:30 p.m. Five whoopers migrated on 14 February. Fifteen whoopers left between 13-19 February, while the last bird, juvenile 80-5, migrated on 23 February. No

whoopers were observed in the Rio Grande Valley winter areas after this date (Table 11).

On 14 February, M. Cash, Sangre de Cristo Audubon Society, was monitoring the crane migration from the Whiterock Overlook along the Rio Grande north of Santa Fe. She observed 2 whoopers migrating in 2 separate flocks, one behind the other, between 2:15-2:30 p.m. I suspect that she observed an unidentified adult and a juvenile (Patuxent No. 3) which migrated over Los Lunas at 11:05 and 11:10 a.m. in separate flocks. Air distance from Los Lunas to the Whiterock Overlook is about 120 miles.

Of 4 juvenile whoopers which migrated in February, 3 departed with their foster-parents and were later located in the San Luis Valley, Colorado, with their foster-parents. One juvenile, 80-17, however, became separated from its foster-parents on 15 February. At 10:42 a.m. 15 February, we picked up the radio signal of 80-17 when thousands of sandhills left the Belen Refuge area and started spiralling on late morning thermals. Thousands of cranes were soaring over a distance of about 15 miles from Belen Refuge northward to Los Lunas. After attaining sufficient altitude, many cranes gathered into numerous flocks and migrated. However, at 12:18 p.m., juvenile 80-17 returned to an area northeast of the Belen Refuge and it was no longer with its foster-parents; it had been with them at the Belen Refuge that morning between 8:30 - 9:10 a.m. This juvenile migrated on 17 February without the company of its foster-parents.

The whooper (Patuxent No. 1) which wintered in Arizona was last observed near Willcox Playa associated with 35 sandhills on 3 March by D. Perkins. This bird was relocated at Monte Vista NWR on 14 March

(Table 11).

Refuge Biologist, J. Kauffeld, observed the first whooper (80-2) at Monte Vista Refuge on 15 February, and he identified 6 other whoopers by 22 February. By 14 March, 18 different whooping cranes were located in the San Luis Valley (Table 11).

Table 1. Distribution and movements of whooping cranes on winter areas in New Mexico and Mexico, October 1979 - February 1980.

Whooper I.D. No.	Location	Dates Observed at this Location
<u>Subadults</u>		
75-1	1. Bernardo Refuge 2. Bosque Refuge 3. Bernardo Refuge 4. Belen Refuge 5. Edeal Dairy, Los Lunas 6. Belen Refuge	11-27 Nov. 28 Nov.-24 Jan. 25-26 Jan. 27 Jan.-16 Feb. 17 Feb. 18-19 Feb.
75-4	1. Edeal Dairy, Los Lunas 2. near Belen Refuge 3. Edeal Dairy & vicinity, Los Lunas	11-17 Nov. 21 Nov. 25 Nov.-21 Feb.
75-7	1. Bosque Refuge 2. Belen Refuge 3. Bosque Refuge	14 Nov.-25 Jan. 27 Jan.-2 Feb. 5-9 Feb.
76-7	1. Bosque Refuge 2. Belen Refuge	11 Nov.-20 Feb. 21 Feb.
76-15	1. Bosque Refuge	17 Oct.-12 Feb.
77-17	1. Polvadera 2. Bosque Refuge 3. Polvadera	17 Nov.-20 Dec. 21-27 Dec. 29 Dec.-4 Feb.
78-1	1. Edeal Dairy, Los Lunas 2. Bernardo Refuge 3. Tome 4. Edeal Dairy, Los Lunas 5. Bosque Refuge 6. Bernardo Refuge 7. Edeal Dairy, Los Lunas	15 Nov. 17-21 Nov. 24 Nov. 25-26 Nov. 27-28 Nov. 1-30 Dec. 31 Dec.-21 Feb.
78-10	1. Lemitar 2. Bernardo Refuge " " " 3. Belen Refuge 4. Los Lunas 5. Belen Refuge	17 Nov.-2 Dec. 8-12, 22-23 Dec., 24-25 Jan. 27 Jan-6 Feb. 8 Feb. 10-19 Feb.

Table 1 continued.

Whooper I.D. No.	Location	Dates Observed at this Location
<u>Juveniles</u>		
79-4	1. Bosque Refuge	17 Oct.-10 Jan.
	2. Bernardo Refuge	10 Jan.
	3. Polvadera	13 Jan.
	4. Bosque Refuge	18-29 Jan.
79-7	1. Bosque Refuge	26 Nov.-15 Dec.
	2. near Janos, Chihuahua	4-6 Jan.
79-9	1. Bosque Refuge	18 Oct.-28 Dec.
	2. Polvadera	29 Dec.
	3. Bosque Refuge	30 Dec.-2 Feb.
	4. Belen Refuge	5-6 Feb.
79-10	1. Bosque Refuge	2 Nov.-12 Jan.
	2. Belen Refuge	17-18 Jan.
	3. Bernardo Refuge	25-26 Jan.
	4. Belen Refuge	27 Jan.-6 Feb.
79-11	1. Bosque Refuge	26 Oct.-21 Feb.
Patuxent #1	1. Edeal Dairy & vicinity, Los Lunas	2 Nov.-18 Feb.
Patuxent #2	1. Bosque Refuge	27 Oct.-12 Feb.

Table 2. Summary of foraging locations of whooping cranes on wintering areas during October 1979-February 1980 and October 1980 - February 1981.

Location of Feeding Activities	Winter 1979-80			Winter 1980-81		
	(Adults(n=8)		Juveniles(n=7)	Adults(n=13)		Juveniles(n=4)
	<u>n</u>	<u>%</u>	<u>n</u> <u>%</u>	<u>n</u>	<u>%</u>	<u>%</u>
Corn	178	47.9	95 39.1	196	40.6	44.2
Alfalfa	89	23.9	66 27.2	147	30.5	24.7
Sorghum	47	12.6	36 14.8	39	8.1	6.0
Wheat-Barley	6	1.6	5 2.0	11	2.3	1.5
Natural Areas (uplands & wetlands)	52	14.0	41 16.9	89	18.5	23.6
Total	372	100	243 100	482	100	199 100

Table 3. Spring migration chronology of 15 whooping cranes in the Rocky Mountain region, February-June 1980.

Whooper I.D. No.	Departure from New Mexico		Observed in Colorado during Migration		Arrival on Summer Area	
	Date last Obs.	Location	Dates	Location	Date 1st Obs.	Location
<u>Subadults</u>						
75-1	19 Feb.	Belen Refuge	3 Mar-5 Apr	Monte Vista NWR & vicinity	15 Apr.	Grays Lake NWR
75-4	21 Feb.	Los Lunas	4 Mar-4 Apr	Monte Vista NWR & vicinity	13 Apr.	Grays Lake NWR
75-7	9 Feb.	Bosque Refuge	13 Feb-8 Apr	San Luis Valley	20 Apr.	Grays Lake NWR
76-7	21 Feb.	Belen Refuge	4 Mar-8 Apr	San Luis Valley	9 May.	Beaver Creek, Daniel, WY.
76-15	12 Feb.	Bosque Refuge	4 Mar-9 Apr	San Luis Valley	17 Apr.	Grays Lake NWR
77-17	4 Feb.	Polvadera	7 Mar-10 Apr	Alamosa NWR & vicinity	3 May	Bear Lake Valley, ID
78-1	21 Feb.	Los Lunas	9 Mar-9 Apr	Alamosa & Monte Vista NWR & vicinity	4 May	Horse Creek, Daniel, WY.
78-10	19 Feb.	Belen Refuge	23 Feb-10 Apr	San Luis Valley	27 Apr.	Daniel, WY.
<u>Juveniles</u>						
79-4	29 Jan.	Bosque Refuge	24 Mar-8 Apr	San Luis Valley	19 May	Bear Lake Valley, ID
79-7	6 Jan.	near Janos, Chihuahua, Mexico	8 Feb-29 Apr	Monte Vista-Alamosa NWR & vicinity	21 May	Grays Lake NWR, ID
79-9	6 Feb.	Belen Refuge	11 Mar-16 Apr	Monte Vista NWR & vicinity	--	summer location unknown --

Table 3 continued.

Whooper I.D. No.	Departure from New Mexico		Observed in Colorado during Migration		Arrival on Summer Area	
	Date last Obs.	Location	Dates	Location	Date 1st Obs.	Location
<u>Juveniles continued</u>						
79-10	6 Feb.	Belen Refuge	19 Feb-10 Apr	Monte Vista NWR & vicinity	26 June	Antero Reservoir, Colorado
79-11	21 Feb.	Bosque Refuge	4 Mar-15 Apr	Monte Vista NWR & vicinity	16 May	Border, Wyoming
Patuxent #1	18 Feb.	Los Lunas	20 Feb-10 Apr	Monte Vista NWR & vicinity	18-19 May	Kilgore, ID
Patuxent #2	12 Feb.	Bosque Refuge	25 Feb-10 May	Monte Vista NWR & vicinity	--	summer location unknown --

Table 4. Distribution of whooping cranes on summer areas in the Rocky Mountain region, 1980.

Whooper I.D. No.	Summer Location	Dates Present
75-1	Grays Lake NWR	15 Apr - 14 Oct
75-4	Grays Lake NWR	13 Apr - 8 Oct
75-7	Grays Lake NWR	20 Apr - 5 Oct
76-7	Beaver Creek, near Daniel, Wyoming	9 May - 20 Aug
76-15	Grays Lake NWR	17 Apr - 7 Oct
77-17	Bear Lake Valley, near Montpelier, Idaho	3 May - 25 Sept
78-1	Horse Creek, near Daniel, Wyoming	4 May - 15-18 Aug
78-10	1. near Daniel, Wyoming	27 Apr - 15-18 Aug
	2. Green River, south of Big Piney, Wyoming	24 Aug - 12 Sept
79-4	1. Bear Lake Valley, near Montpelier, ID	19 May - early June
	2. Bear River Valley, near Grace, ID	16 June - 4 Oct
79-7	Grays Lake NWR	21 May - 19 Oct
79-9	-- summer location unknown --	---
79-10	Antero Reservoir, South Park, Colorado	mid-June - early Sept ^{1/}
79-11	Thomas Fork, Bear River- along ID-WY border	16 May - 1 Oct
Patuxent #1	Kilgore, ID	18-19 May- 16 Sept
Patuxent #2	-- summer location unknown --	---

^{1/} Dates of earliest and latest sightings unknown; received verified reports from 26 June - 1 Sept.

Table 5. Comparison of whooping crane egg success in 1980 for eggs remaining in nests in Wood Buffalo Park, N.W.T., Canada^{1/}, and for 13 eggs transported to Grays Lake NWR, Idaho, and incubated by sandhill cranes.

Nest No. at Wood Buffalo Park		Clutch Size	Egg Success ^{2/} Canada Idaho		Hatching Dates Idaho	Potential Egg Success Rating ^{3/}
80-1	Sass R.	2	S	S	31 May	-1
80-2	" "	2	S	S	31 May	-1
80-3	" "	2	S	S	1-2 June	0
80-4	Klewi R.	2	S	U	--	-8
80-5	Sass R.	2	S	S	31 May	-1
80-6	Klewi R.	2	S	S	1-3 June	-1
80-7	" "	2	S	U ^{5/}	--	-1
80-8	" "	2	S	S	2-4 June	-2
80-9	" "	2	S	S	4-5 June	-2
80-10	" "	2	S	S	2-4 June	-2
80-11	" "	2	S	S	2-4 June	-1
80-12	Nyarling R.	2	S	-	--	?
80-13	Sass R.	1	S	-	--	?
80-14	Klewi R.	2	U	-	--	?
80-14A ^{4/}	" "	2	U(?)	-	--	?
80-15	" "	1	S	-	--	?
80-16	Sass R.	2	U	U	--	-3
80-17	Sass-Klewi	2	S	S	8-9 June	New
80-18	Sass R.	2	U	-	--	New
80-19	Klewi R.	2	U	-	--	New

continued

Table 5 continued.

- 1/ Nesting data for Wood Buffalo Park provided by E. Kuyt, Canadian Wildlife Service.
- 2/ S = Successful, U = Unsuccessful
- 3/ Potential egg success is rated (0 = excellent to -8 = very poor) by E. Kuyt and is based upon reproductive performance of each pair in previous years.
- 4/ Believed to be a reneest of Pair 80-14.
- 5/ Egg determined to be addled when received and was not placed in a sandhill crane nest but was returned to CWS.

Table 6. Survival of whooping crane chicks at Grays Lake NWR, Idaho, summer 1980.

Whooping Crane Chick I. D.	Last Date Obs. with Foster-Parents	Age of Chick When last Obs.
<u>Canada</u>		
80-1	17 June	17 days
80-2	Fledged	--
80-3	16 June	14-15 days
80-5	Fledged	--
80-6	Fledged	--
80-8	7 July	33-35 days
80-9	16 July	41-42 days
80-10	30 June	26-28 days
80-11	11 June	7-9 days
80-17	Fledged	--
<u>Patuxent</u>		
Upper Right #1	Died at nest after hatching	
Upper Right #2	Fledged	--

Table 7. Weights and measurements of 5 young whooping cranes captured, banded, and color-marked at Grays Lake, Idaho, August 1980.

Chick I.D. No.	Age (days)	Weight (g)	Culmen ^{1/} (mm)	Tarsus (mm)	Mid-toe (mm)	Colored Leg Bands	
						left leg	right leg
<u>Canada</u>							
80-2	62	3350	67	264	106	white ^{2/}	<u>yellow</u> blue
80-5	62	3840	66	267	107	<u>yellow</u> blue	white ^{2/}
80-6	60-61	3475	63	251	109	<u>yellow</u> white	white ^{2/}
80-17	52-53	3125	58	244	102	white ^{2/}	<u>blue</u> yellow
<u>Patuxent</u>							
Patuxent #3	56	3450	61	248	104	<u>blue</u> yellow	white ^{2/}

^{1/} Culmen measurement is from tip of mandible to posterior of nares.

^{2/} Radio transmitter attached to leg band.

Table 8. Age and locations of sandhill cranes captured, banded, and color-marked during summer 1980.

Age	Location				Total
	Grays Lake	Blackfoot River, ID	Bear River, WY	Northern Utah ^{1/}	
Adult	1	0	0	0	1
Young	86	15	12	6	119
Total	87	15	12	6	120

^{1/} Captured by personnel of the Utah Division of Wildlife.

Table 9. Counts of sandhill and whooping cranes at Grays Lake NWR, Idaho, September-October 1980.

Date	No. Sandhill Cranes	No. Whooping Cranes ^{1/}	
		Subadults	Juveniles
10 Sept.	1,622	5	5
22 Sept.	2,046	5	5
29 Sept.	1,539	5	5
30 Sept.	1,293	5	5
1 Oct.	1,041	5	5 (1)
2 Oct.	886	5	4 (1)
3 Oct.	676	5	3
5 Oct.	646	5 (1)	3
6 Oct.	519	4	3 (1)
7 Oct.	448	4 (1)	2
8 Oct.	413	3 (1)	2
9 Oct.	218	2	2 (2)
10-13 Oct.	49-52	2	0
14 Oct.	52	2 (1)	0
19 Oct.	4	1 (1)	0
20 Oct.	0	0	0

^{1/} Figures in parenthesis indicate number of whooping cranes migrating on that date.

Table 10. Fall migration chronology of 20 whooping cranes (15 adults & 5 juveniles) from summer areas to winter areas, 1980^{1/}.

Whooper I.D. No.	Summer Area		Migration Stop		Winter Area-New Mexico	
	Location	Date last obs.	Location	Dates Obs.	Location	Date 1st Obs.
<u>Adults</u>						
75-1	Grays Lake NWR	14 Oct.	Monte Vista NWR & Vicinity	3-15 Nov.	Edeal Dairy, Los Lunas	18 Nov.
75-4	Grays Lake NWR	8 Oct.	San Luis Valley	8 Nov.	Bosque NWR	29 Nov.
75-7	Grays Lake NWR	5 Oct.	San Luis Valley	29 Oct.-15 Nov.	Edeal Dairy, Los Lunas	18 Nov.
76-7	Beaver Creek, WY	20 Aug.	Monte Vista NWR & vicinity	22 Sept.	Bosque NWR	28 Oct.
76-15	Grays Lake NWR	7 Oct.	--NOT SIGHTED--		Bosque NWR	19 Oct.
77-17	Bear Lake Valley, ID	25 Sept.	San Luis Valley	3 Oct.-15 Nov.	Polvadera	23 Nov.
78-1	Horse Creek, WY	15-18 Aug.	Rio Grande River & Alamosa Refuge	19 Sept.-3 Nov.	Bernardo NWR	12 Nov.
78-10	Big Piney, WY	12 Sept.	San Luis Valley	3 Oct.-14 Nov.	Edeal Dairy, Los Lunas	18 Nov.
79-4	Grace, ID	4 Oct.	San Luis Valley	28 Oct.-8 Nov.	Bosque NWR	10 Nov.
79-7	Grays Lake NWR	19 Oct.	San Luis Valley	28 Oct.-18 Nov.	Bernardo NWR	24 Nov.
79-9	--Summer Location Unknown--		Monte Vista NWR	2-15 Nov.	Las Nutrias	18 Nov.
79-10	Antero Reservoir, CO	early Sept.	San Luis Valley	27 Oct.-8 Nov.	Edeal Dairy, Los Lunas	18 Nov.
79-11	Thomas Fork, Border, WY	1 Oct.	Green River, Jensen, UT	2 Oct.	--NOT SIGHTED--	
Patuxent #1	Kilgore, ID	16 Sept.	San Luis Valley	3 Oct.-15 Nov.	Willcox Playa, AZ	26 Dec.
Patuxent #2	--Summer Location Unknown--		Monte Vista NWR & vicinity	25 Sept.-18 Nov.	Bernardo NWR	20 Nov.

Table 10 continued.

Whooper I.D. No.	Summer Area		Migration Stop		Winter Area-New Mexico	
	Location	Date last Obs.	Location	Dates Obs.	Location	Date 1st Obs.
<u>Juveniles</u>						
80-2	Grays Lake NWR	1 Oct.	Monte Vista NWR	2-4 Oct.	Bosque NWR	6 Oct.
80-5	" "	9 Oct.	-- NOT SIGHTED --	--	Bosque NWR	14 Oct.
80-6	" "	6 Oct.	-- NOT SIGHTED --	--	-- NOT SIGHTED --	--
80-17	" "	9 Oct.	-- NOT SIGHTED --	--	Bernardo NWR	25 Oct.
Patuxent #3	" "	2 Oct.	Uinta Mts. near Vernal, UT	4 Oct.	Bosque NWR	14 Oct.

1/ Data obtained from many sources, including personnel at Grays Lake NWR, Alamosa and Monte Vista NWR; Bosque del Apache NWR, Colorado Division of Wildlife, Wyoming Game and Fish Dept., New Mexico Game and Fish Dept., and private citizens.

Table 11. Distribution and movements of whooping cranes on winter areas in New Mexico and Arizona and spring migration to Colorado, October 1980-March 1981.

Whooper I.D. No.	Location	Dates Observed at this Location
<u>Adults</u>		
75-1	1. Edeal Dairy, Los Lunas 2. Bernardo Refuge 3. Belen Refuge 4. Edeal Dairy, Los Lunas 5. Monte Vista NWR	18-24 Nov. 30 Nov.-1 Feb. 5-15 Feb. 16-17 Feb. 22 Feb.
75-4	1. Bosque NWR 2. NOT SIGHTED in Colorado	29 Nov. ^{1/}
75-7	1. Edeal Dairy, Los Lunas 2. Bernardo Refuge 3. Bosque NWR 4. Belen Refuge 5. Edeal Dairy, Los Lunas 6. Rio Grande River, San Luis Valley, CO	18-24 Nov. 30 Nov.-1 Dec. 2 Dec.- 28 Jan. 31 Jan. - 11 Feb. 11-13 Feb. 2 Mar.
76-7	1. Bosque NWR 2. San Acacia 3. Monte Vista NWR	28 Oct. - 5 Feb. 9-16 Feb. 4 Mar.
76-15	1. Bosque Refuge 2. San Acacia 3. Monte Vista NWR	19 Oct.-7 Feb. 9-16 Feb. 17 Feb.
77-17	1. San Acacia-Polvadera Area 2. Monte Vista NWR	23 Nov.-15 Feb. 22 Feb.
78-1	1. Bernardo Refuge 2. Las Nutrias-Tome Area 3. Edeal Dairy, Los Lunas 4. Rio Grande River, San Luis Valley, CO.	12-20 Nov. 22-29 Nov. 2 Dec.-17 Feb. 22 Feb.
78-10	1. Edeal Dairy, Los Lunas 2. Bosque NWR 3. San Acacia-Polvadera Area 4. Bosque NWR 5. Polvadera 6. La Joya Area 7. Belen Refuge 8. Rio Grande River, San Luis Valley, CO	18-24 Nov. 29-30 Nov. 2-12 Dec. 19-31 Dec. 1-2 Jan. 18 Jan. 26 Jan.-14 Feb. 2 Mar.

Table 11 continued.

Whooper I.D. No.	Location	Dates Observed at this Location
<u>Adults</u>		
79-4	1. Bosque NWR 2. San Acacia 3. Rio Grande River, San Luis Valley, CO	10 Nov.-11 Feb. 12-16 Feb. 22 Feb.
79-7	1. Bernardo Refuge 2. Polvadera 3. Bosque NWR 4. Rio Grande River, San Luis Valley, CO	24 Nov. 27-29 Nov. 30 Nov.-19 Feb. 22 Feb.
79-9	1. Las Nutrias 2. Bosque NWR 3. San Acacia 4. Bernardo Refuge 5. Bosque NWR 6. Bernardo Refuge 7. Belen Refuge 8. Monte Vista NWR	18 Nov. 18-26 Nov. 1-6 Dec. 7-31 Dec. 2-23 Jan. 24-28 Jan. 31 Jan.-14 Feb. 4 Mar.
79-10	1. Edeal Dairy, Los Lunas 2. Bernardo Refuge 3. Polvadera 4. Bosque NWR 5. Polvadera 6. Belen Refuge 7. Rio Grande River, San Luis Valley, CO	18-24 Nov. 29 Nov.-10 Dec. 18 Dec. 27 Dec. - 2 Jan. 4-9 Jan. 26 Jan. - 18 Feb. 3 Mar.
79-11	1. NOT SIGHTED ON WINTERGROUNDS 2. Monte Vista NWR	24 Feb.
Patuxent #1	1. Willcox Playa, Ariz. 2. Monte Vista NWR	26 Dec.-1 Mar. ^{2/} 14 Mar.
Patuxent #2	1. Bernardo Refuge 2. Bosque NWR 3. Bernardo Refuge 4. Belen Refuge 5. Monte Vista NWR	20-22 Nov. 22 Nov.-26 Jan. 29 Jan. 31 Jan.- 14 Feb. 17 Feb.
<u>Juveniles</u>		
Patuxent #3	1. Bosque NWR 2. Bernardo Refuge 3. Belen Refuge 4. Monte Vista NWR	14 Oct.-25 Jan. 25-29 Jan. 31 Jan.-14 Feb. 1 Mar.

Table 11 continued.

Whooper I.D. No.		Dates Observed at this Location
80-2	1. Bosque NWR 2. Belen Refuge 3. Monte Vista NWR	6 Oct.-1 Feb. 2-14 Feb. 15 Feb.
80-5	1. Bosque NWR 2. Monte Vista NWR	14 Oct.-23 Feb. 5 Mar.
80-6	NOT SIGHTED ON WINTERGROUNDS or in Feb.-Mar. in Colorado	
80-17	1. Bernardo Refuge & vicinity 2. Veguita 3. Belen Refuge & vicinity 4. Monte Vista NWR	25 Oct.-14 Jan. 16 Jan.-2 Feb. 5-17 Feb. 9 Mar.

1/ Identification uncertain.

2/ Data provided by D. Perkins, University of Arizona.

Table 12. Associations between 11 individual whooping cranes during winter 1980-81, New Mexico.

Identification of Whooping Cranes in Groups	Frequency (n)
75-1 & 75-7	3
75-7 & 76-15	1
75-7 & 79-7	3
75-7, 76-7, 79-7	1
75-7, 76-7, Patuxent #2	1
75-7, 79-7, Patuxent #2	2
75-7, 79-7, 79-9	1
75-7, 79-9, Patuxent #2	1
75-7, 76-15, Patuxent #2, Patuxent #3	1
75-7, 79-7, Patuxent #2, Patuxent #3	1
76-7 & 79-7	1
76-15 & 79-4	2
76-15 & 79-7	2
76-15 & Patuxent #3	6
76-15, Patuxent #2, Patuxent #3	2
76-15, 79-7, Patuxent #2, Patuxent #3	1
79-4 & 80-2	1
79-4 & 80-5	1
79-7 & Patuxent #2	1
Patuxent #2 & Patuxent #3	6
Total	38

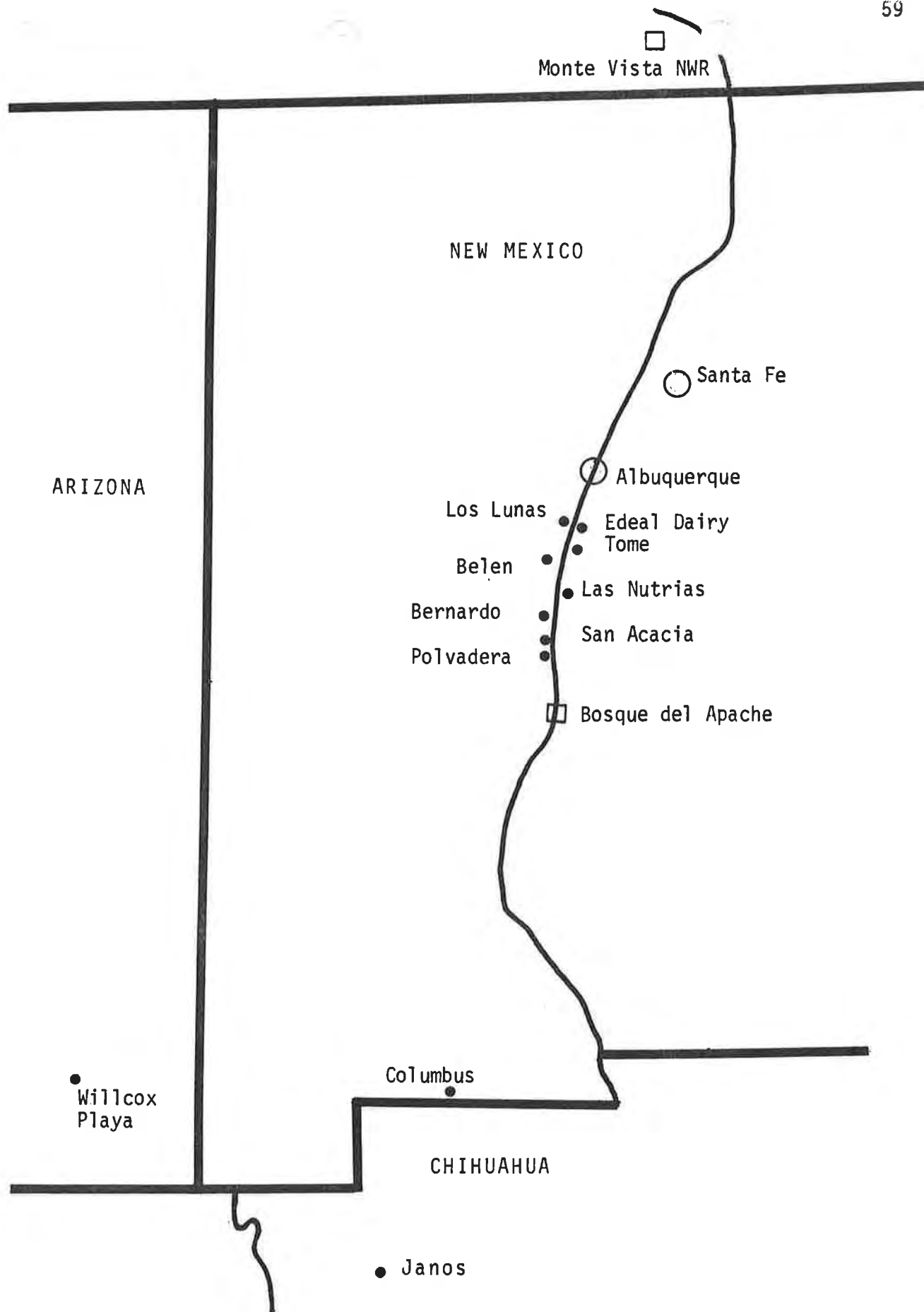
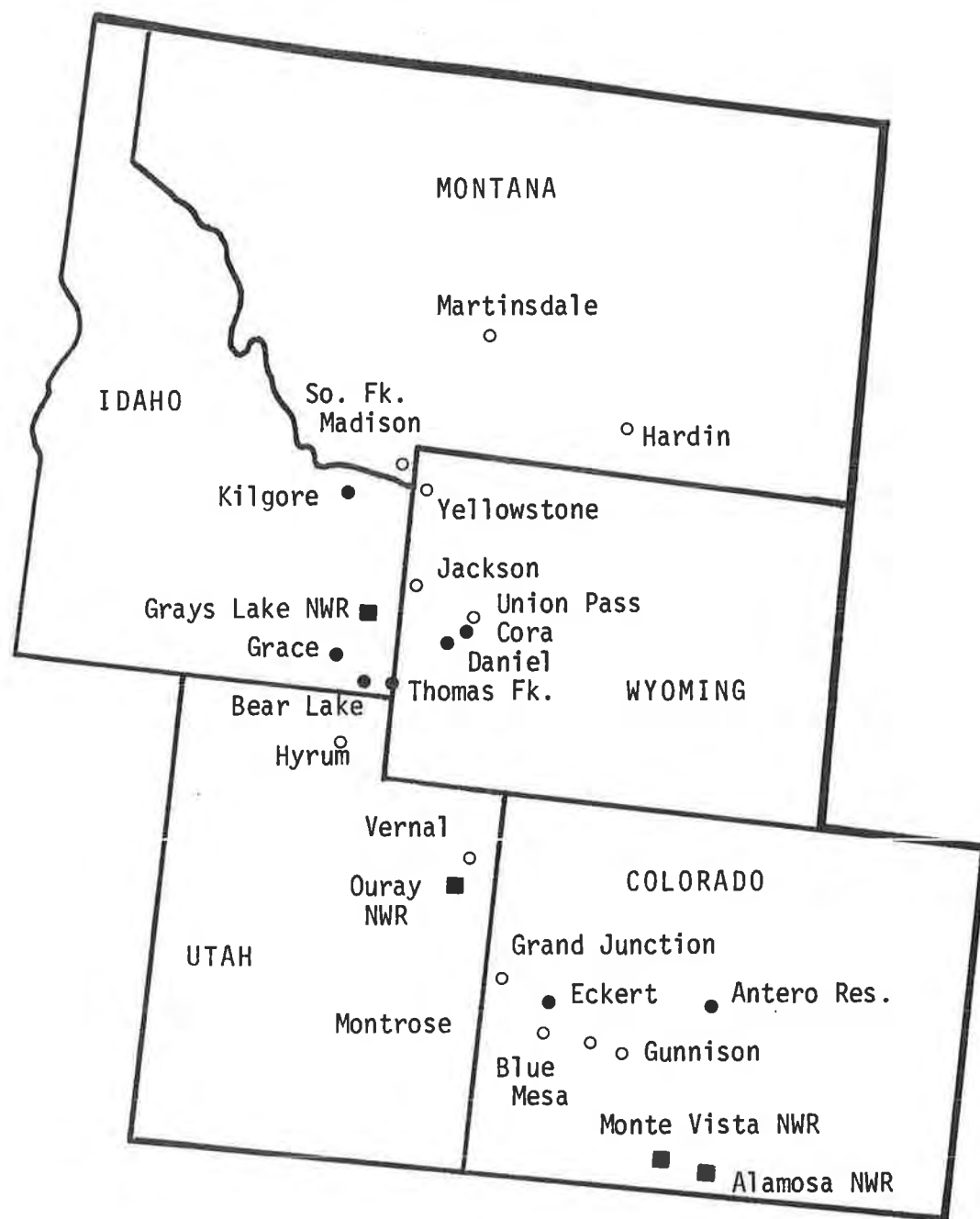


Figure 1. Locations utilized by whooping cranes during winters of 1979-80 and 1980-81 in Arizona, New Mexico and Chihuahua, Mexico.



Whooping Crane Sightings

- Confirmed
- Unconfirmed
- National Wildlife Refuge

Figure 2. Locations in the Rocky Mountains utilized by whooping cranes, April-October 1980.

APPENDIX A TO PROGRESS REPORT # 16

Necropsy and analytical reports of juvenile whooping crane, 79-12, killed presumably by a golden eagle on 13 October 1979 near Rangely, Colorado. The necropsy was done by the National Wildlife Health Laboratory, Madison, Wisconsin and the analytical report by Patuxent Wildlife Research Center, Laurel, Maryland.

Final Necropsy Report

PWRC: P.R. 1856

NWHL: 1601-15,405

Species: Whooping Crane

Submitter: Harry E. Stiles, Special Agent-In-Charge
P.O. Box 25486
Denver Federal Center
Denver, CO 80225

History: This young whooper was part of a "foster parent flock" from Gray's Lake, Idaho. The bird had leg band #R 599 29 379, Band No. A 14 and radio transmitter No. 164432. The bird left Gray's Lake, Idaho October 11th. On October 13, 1979 hunters saw the 6 month old crane rise from a small pond accompanied by two darker birds, presumably its sandhill crane "foster parents". After the cranes attained altitude the whooper was attacked by a large dark bird thought to be a golden eagle. The hunters recovered the carcass and turned it over to Lou Vidakovich, Colorado Division of Wildlife Officer in Dinosaur County. The pond where the party witnessed the attack is southwest of Rangely in northwestern Colorado.

Gross Necropsy: This immature male whooping crane weighed 4,200 grams and was in good body condition. He had moderate amounts of subcutaneous fat and well developed muscles. There was abundant mesenteric and coronary fat present. There were multiple skin lacerations over the back and sides which did correspond to the possible grasp of an eagle. There was blood in the oral cavity. The lungs had scattered areas of edema and hemorrhage along the ventral border of the right lung. The left tibiotarsus was fractured.

There was a massive wedge shaped laceration of the right liver lobe 20 mm wide by 20 mm deep extending completely across the lobe. A massive clot was attached to the laceration. There was a small amount of bloody fluid in the pericardial sac. Necropsy by Dr. L. N. Locke.

Laboratory Results

Parasitology: A wet smear of the kidney revealed no coccidian oocysts. The proventriculus contained 78 to 81 female Tetrameres grusi and one male. No other parasites were found in the gastrointestinal tract.

Bacteriology: Culture of the liver and small intestine was negative for pathogens.

Virology: Egg inoculations of a cloacal and a tracheal swab were negative for Newcastle disease virus, avian influenza and other detectable viral pathogens. Primary duck embryo fibroblast cultures of liver and spleen were negative for viral growth.

Diagnosis: Trauma caused by eagle attack.

SKS/km

Sheila K. Schmeling

Sheila K. Schmeling

PATUXENT WILDLIFE RESEARCH CENTER - ANALYTICAL REPORT - PR-1856

Submitter: Harry Stiles, Special Agent-in-Charge, Denver, Colorado.

Specimen Data: Whooping crane attacked by eagle. Seized from Stanley Rasmussen, one of the hunters who observed attack on 13 October 1979. Crane bore USFWS band number 599-29379.

Results: ppm wet weight; organochlorine compounds. Lower limit of reportable residues = 0.1 ppm.

<u>Sample No.</u>	<u>NWHL No.</u>	<u>Identification</u>	<u>Wet Wgt.,g</u>	<u>Lipid Wgt.,g</u>
80-865	1601-15,405	Carcass	10.00	0.72
80-866	1601-15,405	Brain	11.38	0.74
<u>Compound</u>		<u>Carcass</u>	<u>Brain</u>	
p,p'-DDE		-	-	
p,p'-DDD		-	-	
p,p'-DDT		-	-	
Dieldrin		-	-	
Heptachlor epoxide		-	-	
Oxychlorane		-	-	
cis-Chlordane		-	-	
trans-Nonachlor		-	-	
cis-Nonachlor		-	-	
Endrin		-	-	
Est. Toxaphene		-	-	
Mirex		-	-	
HCB		-	-	
Est. PCB		-	-	
- = none detected				

W. L. Reichel

W. L. Reichel, Project Leader
Env. Residue Chemistry

APPENDIX B TO PROGRESS REPORT # 16

Radio-Telemetry Study of Whooping Cranes

Introduction

In August 1979, 5 flightless, young whooping cranes were radio-tagged with miniature transmitters attached to plastic leg bands (see Report #15). No problems were encountered in radio-tagging young whoopers and the birds did not appear to be hindered or otherwise adversely affected by the plastic leg bands and attached transmitters. Results showed that antenna breakage was the major technical problem encountered in the study. Within 41 days following radio-tagging, 3 of 5 transmitters sustained broken antennas, apparently caused by preening activities of the whoopers. Although transmitters with broken antennas still emitted signals, transmission ranges were significantly reduced.

A fourth transmitter malfunctioned due to unknown causes 2 months after the bird was radio-tagged, although the antenna was still intact. Only 1 transmitter was completely operational at the end of the winter period in February 1980. This transmitter, however, malfunctioned in March 1980 when the antenna broke off. As of March 1981, only 1 of 5 transmitters put on in August 1979 still emitted signals but the range was greatly reduced due to a broken antenna.

Because of the technical problems encountered, I contacted Telemetry Systems, Inc. (P.O. Box 187, Mequon, WI 53092) manufacturer of the solar powered transmitters used in 1979, and Telonics (1048 East Norwood, Mesa, AZ 85203). Telemetry Systems, Inc. agreed to make improvements in the transmitter design with emphasis on a better quality antenna. Whip antennas

of larger diameter (1/16" stainless steel) were employed in 1980 models. Antennas were encased in a tight sheath of heat-shrunk plastic and were reinforced with 2 small metal springs at the point where antennas emerged from transmitters. Telonics agreed to construct battery-powered transmitters suitable for attachment to plastic leg bands used on whoopers. Telonics was informed of the problem with antenna breakage and incorporated a strong antenna in their transmitter design for testing in 1980.

In June 1980, 11 greater sandhill cranes reared at Patuxent Wildlife Research Center were released at Grays Lake NWR to evaluate reintroduction techniques. All sandhills were radio-tagged along with 5 young whoopers reared in the wild at Grays Lake in 1980. Thus, I had the opportunity to test 2 different transmitter designs (solar-powered, battery-powered) on 16 cranes. This report summarizes results of this study through 15 March 1981.

METHODS

Seven solar-powered transmitters similar to those used in 1979 (see Report #15) but with improvements in antenna design and 9 battery-powered transmitters were placed on sandhill and whooping cranes in 1980 (Tables 1 and 2). Telemetry Systems transmitters were powered by solar cells and rechargeable batteries and Telonics transmitters by batteries only. Two sizes of Telonics transmitters were tested, a smaller unit with an estimated life of 10-12 months and a larger unit with an estimated life of 20-24 months. Estimated life of the solar units was 2 or more years. Total weight of the radio package (plastic band and transmitter) was 45-50 grams for the Telemetry Systems units and the small Telonics units and 65-70 grams for the larger Telonics units. Antennas were 21-24 cm long and pointed down the birds' legs. All transmitters were in the 164 MHz frequency range.

Two methods of attaching transmitters to 3-inch high plastic leg bands were tested in 1980. One method, used in 1979, involved epoxying the transmitter to the leg band. The second method used a set of 4 tiny stainless steel nuts and bolts. Attachment with nuts and bolts is considered temporary since the bolts are expected to corrode in 2-3 years and allow the transmitter to drop off. This attachment method was developed by S. Melvin, University of Wisconsin (pers. comm.).

Crane movements were monitored with Telonics scanning receivers (Receiver Model TR-2, Scanner/Programmer Model TS-1). For tracking from the ground and from a vehicle, Telonics nondirectional whip antennas and directional yagi antennas were employed.

One juvenile whooping crane was tracked by aircraft during a portion of its fall migration. Yagi antennas were attached to wing struts with mounts designed by Erotex Inc. (Box 547, Afton, WY 83110). Strut-mounted antennas were connected to a switch box and receiver in the cockpit. Migratory movements were plotted on sectional Aeronautical Charts.

In June, 11 sandhill cranes were transported from Patuxent Wildlife Research Center, Maryland to Grays Lake NWR, Idaho. Prior to being released, each bird was radio-tagged. In August, 5 flightless young whooping cranes were captured with the aid of a helicopter. All 5 birds were fitted with radio packages (3-inch high plastic leg bands and transmitters).

RESULTS

Operation of Transmitters

All transmitters were tested and operated satisfactorily prior to attachment to the cranes. Variations in reception ranges were noted after they were placed on cranes but this was mainly due to differences in terrain occupied by individual birds and the relative locations of transmitters and receiving antennas. Maximum ranges recorded on the ground were 7-8 km (5 miles) with no major range differences between solar and battery-powered units.

Observations following radio-tagging revealed that the added weight of different style transmitters had no apparent effect upon cranes. Both sandhills and whoopers were observed preening transmitters and especially antennas. Cranes normally engage in preening activities daily. While preening, they treat antennas much like a feather that is out of place. Preening of antennas was most pronounced soon after cranes were radio-tagged and decreased with time as they became more accustomed to the radio packages. However, preening of antennas continued; whoopers have been observed engaged in this activity 7 months after being radio-tagged.

Transmitters on Whooping Cranes

Five flightless young whooping cranes were captured and radio-tagged on 1 August. Birds were 7-8 weeks old and weighed 3,125 to 3,850 g when captured. Chicks were also color-marked with plastic leg bands for future identification after transmitters failed.

As in 1979 no adverse effects were noted from capturing and radio-tagging young whoopers. Handling time in 1980 for individual birds was reduced to

4-5 minutes compared to 12-19 minutes in 1979. Reduced handling time in 1980 resulted from attaching transmitters to leg bands with tiny bolts prior to radio-tagging rather than banding the birds and then gluing the transmitters to the bands in the field.

In 1980, all 5 transmitters operated satisfactorily from time of radio-tagging in August through early October when all 5 foster-parent families migrated from Grays Lake. This is a marked improvement over 1979 when 3 of 5 transmitters sustained broken antennas during the same period.

One juvenile whooper (80-6) has not been located after departing from Grays Lake and the status of its transmitter is unknown (Table 1). The 4 remaining juveniles were relocated on winter areas in the Rio Grande Valley, New Mexico in late October. All 4 radios continued to function properly until 4 January when one Telonics transmitter failed due to a broken antenna. A second Telonics unit failed after 14 February due to a broken antenna. Both radios are completely inoperative; no signals are received even at very close ranges (100 m). The remaining 2 transmitters, both solar-powered units, were still operational on 15 March 1981. Status in March 1981 for the 10 transmitters put on whoopers in August 1979 and 1980 is summarized in Table 1.

Transmitters on Sandhill Cranes

Eleven transplanted sandhill cranes released at Grays Lake Refuge on 18 June were radio-tagged. Following is the status of the 11 radios during the summer and fall at Grays Lake: 4 were recovered from dead cranes within 6 weeks and all transmitters were still operating satisfactorily, 1 was lost from a leg band, 1 failed for unknown reasons, and 5 were operating

normally 3½-months later in early October when the surviving transplanted sandhills migrated from Grays Lake (Table 2).

The first radio failed on 5 August. It was later determined that the Telonics transmitter dropped off the plastic leg band. This radio had been attached with tiny bolts and it apparently worked loose at the points of attachment. Possibly the unit fell off in the marsh; no signal was received after 5 August. A second Telonics transmitter failed on 3 September, cause unknown. We were unable to approach the bird closely after that date to ascertain whether the transmitter was still attached to the leg band and had malfunctioned, or if it also dropped off the band. Both ground and aerial surveys failed to pick up signals from these 2 transmitters although both cranes were seen in the area.

Of 5 sandhills which migrated from Grays Lake NWR in early October with operating transmitters only 1 was relocated on the winter grounds. Consequently, the status of 4 radios after early October is unknown. The fifth crane was relocated in the Rio Grande Valley, New Mexico; its solar-powered transmitter was operational through 22 January 1981. After that date no signal was received until 13 March when the bird was found at Monte Vista NWR, Colorado. The antenna was broken and the maximum signal transmission range was reduced to about 0.5 km (0.3 miles). Information on transmitters placed on transplanted sandhill cranes at Grays Lake NWR in June 1981 is summarized in Table 2.

Aerial Tracking a Juvenile Whooping Crane

The aerial tracking system was tested from a Cessna 182 on the morning of 1 October. Signals from 5 radio-tagged juvenile whoopers, all on the

ground at Grays Lake Refuge (elevation 1,947 m / 6,390 feet), were received 20-32 km (12-20 miles) ground-to-air at 2,750 m (9,000 feet). Within 1 hour after we finished testing the tracking system 3 foster-parent families left the ground and initiated spiralling flights. Two families returned to the refuge, but the third, with Canadian juvenile 80-2, departed Grays Lake with a flock of sandhills at 1130 hours (Table 3). The juvenile was 124 days old when it started the migration.

The juvenile, with its foster-parents, was tracked by air 485 miles (780 km) for 2 consecutive days, 1-2 October, until it arrived at the Monte Vista NWR, Colorado. Calculated map distances travelled are minimal values since they do not reflect distances actually flown. The cranes interrupted their migration to spiral upward on thermals at various points along the route and they also made significant climbing movements to cross major mountain ranges. Radio contact was maintained with the flying whooper continually except for periods when we landed to refuel the aircraft. The migrating whooper was also observed frequently during the 2-day trip. The maximum air-to-air radio reception range recorded in 1980 during aerial tracking on 1-2 October was 100-115 km (60-70 miles).

A high pressure system dominated the weather during the 2-day migration period. National Weather Service data from Salt Lake City, Utah, and Grand Junction, Colorado showed that winds aloft at 2,750 m (9,000 feet) and 3,650 m (12,000 feet) favored the cranes during their migration; prevailing winds were from the north and northwest (330° to 010°, wind speed 5-11 knots). On 1 October, the first day of the migration, the foster-parent family flew continuously for nearly 6 hours through southeastern Idaho, southwestern Wyoming, and into northeastern Utah where it roosted that night.

Large numbers of sandhills were migrating on 1 October. Nearly 1,000 sandhills in flocks of various sizes passed over the Bear River in the vicinity of Cokeville, Wyoming, between 1230 and 1345 hours, including the juvenile whooper. A yearling radio-equipped whooper (79-11) was observed leaving its summer area north of Border, Wyoming, to join the migration. It was in a different flock and some 25 km (15 miles) behind the group with the foster-parent family.

The altitude of the migrating flock containing the juvenile whooper varied between 2,600 m (8,500 feet) and 4,025 m (13,200 feet) on 1 October. The maximum altitude, 4,025 m, recorded for the juvenile during the migration occurred when the flock crossed the Uinta Mountains along the Utah-Wyoming border. We were flying at 3,960 m (13,000 feet) along the crest of the Uintas when the flock with the whooper passed at an estimated distance of 60-75 m over the top of the aircraft.

The family stopped to roost for the night on a sandbar along the Green River south of Jensen, Uintah County, Utah, near the Stewart Lake state waterfowl management area (Table 3, Fig. 1). Some 1,800 sandhills and one yearling whooper (79-11) also roosted overnight there.

On the morning of 2 October the family foraged in fields near the roost site then resumed their migration at 1118 hours (Table 3).

The flock was 5 km (3 miles) west of Bonanza, Utah at 1156, crossed the White River at 1207 and entered Colorado at 1240. The cranes were flying at elevations of 2,150-2,450 m (7,000-8,000 feet) after leaving the Green River but they climbed as they crossed into Colorado and approached the Roan Plateau (Fig. 1).

By 1450, the foster-parent family crossed the Colorado River East of Grand Junction and was flying up the Gunnison River Valley along the south foothills of Grand Mesa. They passed north of Delta and by 1620 were 8 km (5 miles) south of Crawford flying at 2,850 m (9,350 feet) and climbing on thermals. At 1710 the cranes were flying at 3,450 m (11,300 feet) south of Blue Mesa Reservoir. The flock, flying at 3,750 m (12,300 feet), crossed the Continental Divide south of Cochetopa Pass at 1807 into the La Garita Creek drainage. Darkness overtook the cranes as they approached the San Luis Valley. We were unable to observe the exact location where the family landed, but radio signals indicated that the whooper landed at 1938 in the northern portion of Monte Vista NWR.

The following morning, 3 October, the family was found feeding in a barley stubble field adjacent to the northeastern boundary of the refuge. The family remained in the area for only a few days; they arrived on the winter area at the Bosque del Apache NWR, New Mexico, on 6 October.

A comparison of the migratory movements of juvenile whoopers aerially tracked in 1979 and 1980 from Grays Lake, Idaho, to the San Luis Valley, Colorado, is summarized in Table 3 and Figure 1.

DISCUSSION

The performance of the transmitters tested on cranes in 1980 was much improved over those used in 1979. Antenna breakage, the major problem encountered in 1979, however, has not been entirely eliminated with the new units. In 1979, 3 of 5 radios sustained broken antennas within 41 days and the 2 remaining units malfunctioned after 2 and 7 months, respectively. In contrast, of 16 transmitters tested in 1980, none were known to have

failed from broken antennas during the 1 1/2 - 3 1/2 months testing period at Grays Lake. However, 2 of the 16 units became inoperative for unknown reasons. The status of 5 transmitters was followed for 7 1/2 months through 15 March 1981. All operated satisfactorily for 5 months, then 3 radios sustained broken antennas between 5-7 months, while 2, both solar-powered units, were still functioning at 7 1/2 months.

Recent discussions with Telemetry Systems, Inc. about antenna problems indicate that only minor improvements in antenna design are available. These include the use of (1) slightly larger diameter whip antennas and (2) stronger and longer springs to reduce antenna bending and stress at the point where the antenna emerges from the transmitter. Even with these minor improvements it must be recognized that antenna breakage due mainly to preening activity will probably limit the useful life of transmitters. Thus, we currently have a transmitter that appears to be reliable for about 6 months but broken antennas can be expected after that time period.

Two types of transmitter (solar- and battery-powered) designs were tested in 1980. After comparing the attributes of both models, I currently favor the solar-powered units for use on whooping cranes. The configuration, design and distribution of weight of the solar units best fit the contour of the plastic leg bands used on cranes. The solar package does not project outward as far from the band as the battery powered units, thus reducing contact with vegetation. Antenna life of solar units appears to be longer based upon the small sample of both transmitter types followed through the winter of 1980-81.

The time involved in handling and radio-tagging young cranes has been reduced and streamlined. Transmitters can be attached to plastic leg bands

with miniature bolts and nuts prior to the time of capturing birds. Thus, processing time is the same as when cranes are only captured and color-marked without radio-tagging. The use of corrodible bolts as a means of attaching transmitters to leg bands will presumably ensure the loss of radios several years later, after the units are no longer operating.

Table 1. Status on 15 March 1981 of 10 radio transmitters attached to Juvenile Whooping Cranes at Grays Lake NWR, Idaho, August 1979 and 1980.

Bird I.D. No.	Manufacturer	Radio Transmitter		Current Status of Transmitter
		Frequency MHz	Method of Attachment	
<u>1979</u>				
74-4	Telemetry Systems ^{1/}	164.537	Epoxy	-Operational for 19 days, antenna broken, signal weak, intermittent signals received at close range through 3-15-81.
79-9	Telemetry Systems	164.454	Epoxy	-Operational for 41 days, antenna broken, signal weak, through April 80, NO signal received since April 80 but radio still on leg band 3-15-81.
79-11	Telemetry Systems	164.487	Epoxy	-Operational Aug 79-6 Mar 80; 7 March - 10 April weak signal, antenna broken; no signal received since April 80 but radio still on band 3-15-81.
79-12	Telemetry Systems	164.320	Epoxy	-Operational 14 days, antenna broken, signal weak through early Oct 79, crane killed by eagle on 13 Oct 79.
Patuxent No.2	Telemetry Systems	164.510	Epoxy	-Operational 2 months, radio failed due to unknown causes in Oct. 79; antenna still present after radio became inoperative. Radio on band 3-15-81.
<u>1980</u>				
80-2	Telonics ^{2/}	164.064	Miniature bolts	-Operational Aug. 80 to 14 Feb. 81; Mar 81, antenna broken, no signal, radio inoperative.

Table 1 continued.

I.D.	Manufacturer	Frequency	Method of Attachment	Current Status of Transmitter
80-5	Telemetry ^{1/} Systems	164.630	Miniature bolts	-Operational (Aug. 80 - 15 Mar. 81)
80-6	Telemetry Systems	164.580	Miniature bolts	-Operational through 6 Oct. 80 when crane migrated. Bird has not been located since leaving Grays Lake in Oct. 80.
80-17	Telemetry Systems	164.480	Miniature bolts	-Operational (Aug. 80 - 15 Mar. 81)
Patuxent No.3	Telronics ^{2/}	164.122	Miniature bolts	-Operational Aug. 80 - 3 Jan. 81, inoperative 4 Jan. - 15 Mar. 81, antenna broken.

^{1/} Transmitters powered by solar cells supplemented with rechargeable nickel cadmium batteries. Antennas modified for 1980 transmitters.

^{2/} Battery powered transmitters.

Table 2. Status of 11 radio transmitters attached to transplanted Patuxent sandhill cranes at Grays Lake NWR, Idaho, 18 June 1980.

Bird I.D. No.	Manufacturer	Radio Transmitter Frequency Method of Attachment MHz	Current Status of Transmitter
T-19	Telonics ^{1/}	164.011	7/31/80 - Operational, bird dead, radio removed.
T-20	Telonics	164.043	10/5/80 - Operational, crane migrated ^{3/}
T-21	Telonics	164.055	10/5/80 - Operational, crane migrated ^{3/}
T-22	Telonics	164.094	8/5/80 - Radio failed, crane lost trans- mitter from leg band.
T-23	Telonics	164.024	10/5/80 - Operational, crane migrated ^{3/}
T-24	Telonics	164.035	9/3/80 - Radio failed, cause of failure unknown.
T-25	Telonics	164.104	7/31/80 - Operational, crane dead, radio removed.
T-26	Telemetry ^{2/} Systems	164.547	7/30/80 - Operational, crane dead, radio removed.
T-27	Telemetry Systems	164.557	1/22/81 - Operational - NEW MEXICO 3/13/81 - Weak signal, antenna broken-COLO.
T-28	Telemetry Systems	164.574	10/5/80 - Operational, crane migrated ^{3/}
T-29	Telemetry Systems	164.605	8/2/80 - Operational, crane dead, radio removed.

^{1/} Battery powered transmitters.^{2/} Transmitters powered by solar cells supplemented with rechargeable nickel-cadmium batteries.^{3/} Crane migrated on 10/5/80 and has not been relocated.

Table 3. Summary of the fall migration of 2 Greater sandhill crane foster-parent pairs with their radio-instrumented juvenile whooping cranes (Patuxent No. 2, Canadian 80-2) from Grays Lake NWR, Idaho to the San Luis Valley, Colorado 3-5 October 1979 and 1-2 October 1980.

Date	Departure Location	Departure Time	Arrival Location	Arrival Time	Distance Migrated (Miles/Km)	Flight Time (Hr:min)
<u>1979 (Patuxent No. 2)</u>						
3 Oct.	Grays Lake NWR, ID	1150	Henry's Fork, WY	1734	164/264	5:44
4 Oct.	Henry's Fork, WY	1152	Grand Mesa, CO	1809	171/275	6:17+ 15 to 30 min. 1/
5 Oct.	Grand Mesa, CO	1054	San Luis Valley, CO	1543	163/262 498/801	4:49 16:50+ 15 to 30 min. 1/
<u>1980 (Canadian 80-2)</u>						
1 Oct.	Grays Lake NWR, ID	1130	Green River, S. of Jensen, UT	1714	220/354	5:44
2 Oct.	Green River, S. of Jensen, UT	1118	San Luis Valley, CO	1938	265/426 485/780	8:20 14:04 (\bar{x} = 34.5mph/55.9kph)

1/ The whooper was in the air 6 miles from the roost site when we located it at 11:52 AM. We estimated that the bird was flying for 15 to 30 minutes prior to being located.

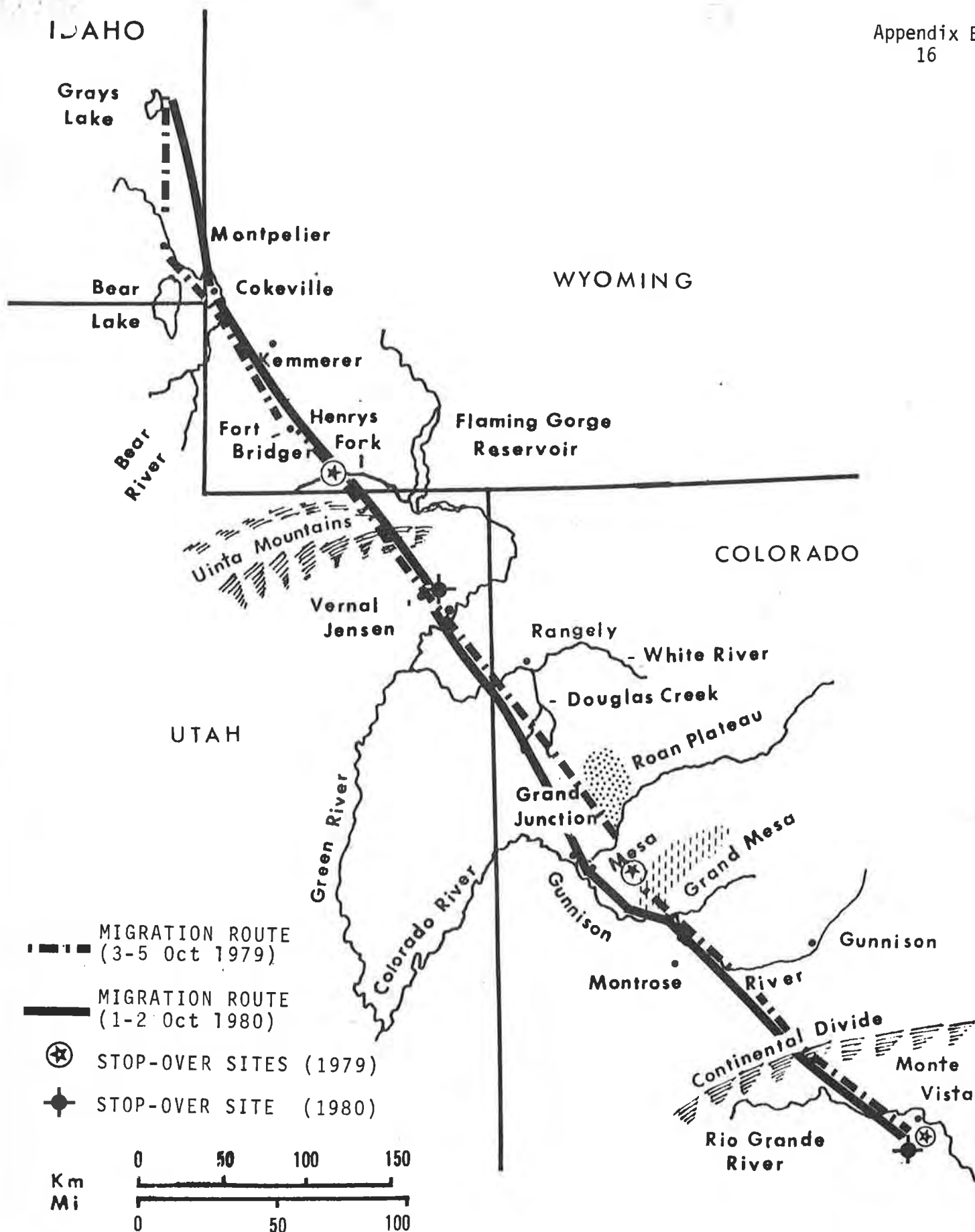


Figure 1. Fall migration routes of 2 sandhill crane foster-parent pairs with their radio-instrumented juvenile whooping cranes, 1979 and 1980.

**Migration of Radio Monitored
Whooping Crane Family from
Ft. Smith, N.W.T., Canada to
Aransas National Wildlife
Refuge, Texas; Fall 1981
(Ground Crew Report)**

NOV 5 1983

FILE <i>End. Species - Whooping Crane</i>	
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<input checked="" type="checkbox"/> Suthers <i>11/15</i>	<input type="checkbox"/> Espinosa
<input checked="" type="checkbox"/> Kauffeld <i>11/18</i>	<input type="checkbox"/> Martinez
<input type="checkbox"/> Jones	<input type="checkbox"/> Mondragon
<input type="checkbox"/> Cossick	<input checked="" type="checkbox"/> Gomez <i>1/20</i>
<input type="checkbox"/>	<input type="checkbox"/>
X Action	✓ Information

MIGRATION OF RADIO-MONITORED WHOOPING CRANE FAMILY

FROM

FT. SMITH, N.W.T., CANADA

TO

ARANSAS NATIONAL WILDLIFE REFUGE, TEXAS

FALL 1981

(Ground Crew Report)

by George Vandel

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PREFACE

The nature of the study allowed several investigators to record and summarize data. This report represents the data and observations collected by the ground crew consisting of Steve Labuda, Brian Johns, Dave Blankenship, and myself. A report covering the migration as seen by the air crew will be provided by other cooperators.

INTRODUCTION

This report represents the efforts to gather data on the habitat used and behavior of a transmitter fitted whooping crane (Grus americana) and its parents during fall migration from Wood Buffalo National Park (breeding grounds) to Aransas National Wildlife Refuge (wintering grounds). This study was conducted from September to November 1981. The migration involved joint cooperation between the U.S. Fish and Wildlife Service (USFWS) and the Canadian Wildlife Service (CWS).

The ⁶following objectives were set:

- 1) Identify the habitat used by the cranes during their migration.
- 2) Document the behavior, habits, and hazards of a migrating whooping crane family.
- 3) Provide information to develop a future plan of action for migration monitoring.

Although much has been learned about whooping crane activities at their wintering and breeding grounds, their exact path of migration, use of stopover sites, and habits of an individual family unit have not been well documented (Johnson and Temple 1980).

Due to combined efforts from many organizations and individuals, the USFWS has monitored the migration path of color-banded whooping cranes since 1977. Although much information has been obtained, the remote characteristics of the land area used by the cranes during the migration has left gaps in our knowledge.

Radio telemetry has been suggested by the Whooping Crane Recovery Plan (USFWS 1980) as a workable method of obtaining migration information to allow protection of the whooping cranes under the Endangered Species Act of 1973.

Previous studies (Drewien and Bixeau In Press, Melvin and Temple 1980) have shown the safety and dependability of using miniature radio transmitters to maintain contact with migrating cranes. Additional studies by Johnson and Temple (1980) have developed parameters for collecting data on habitat used by whooping cranes.

MATERIALS AND METHODS

Equipment used by the ground crew consisted of two telemetry receivers, three sets of hand held directional antenna, one removable roof mounted antenna, and one permanent roof mounted directional antenna. One 60 watt radio was used for 2-way communication with the crew.

A Chevrolet, 2-wheel drive Suburban outfitted for telemetry studies was on loan from Northern Prairie Research Center for use during the northern one-half of the migration. A privately owned 4-wheel drive, Chevrolet Suburban was used by the ground crew during the southern half of the project.

A total of four personnel were involved with the actual ground crew portion of the migration and two personnel, field coordinators, were on 24-hour call for logistical and supervisory assistance. Three of the four people directly involved with the

ground crew did not work at the same time but were switched at various locations during the project. One ground observer was with the project from start to finish. One field coordinator worked until the cranes reached the Kansas/Oklahoma border, and the other until the cranes reached the wintering area.

The duties of the ground crew were as follows: to assist the air crew in actual migration and assume their duties in event of conditions which would ground the aircraft. To monitor the daily movements of the cranes when they are not actually migrating, obtain trespass permission from landowners, classify, and document the habitat used by the migrating cranes.

The field coordinators were responsible for helping to arrange personnel switch-overs, communication, and making decisions when problems arose.

The movements, activities, and habitat of the cranes were recorded in field notes, habitat forms, and on 1:250,000 Topographical Maps.

Movements of cranes were monitored visually whenever possible using the telemetry equipment to triangulate the location when visual contact was lost. The cranes were located in the morning 1 hour before sunrise and contact was maintained until after dark. Due to logistical conflicts this procedure could not be followed every day but was practiced during most of the project.

Times and durations of movements, locations, weather, habitat used, hazards, and behavior were monitored as closely as possible. The cranes were not monitored at night.

All sites used by the cranes were described using the habitat evaluation guide in the whooping crane recovery plan (USFWS 1980). All wetlands used were classified using criteria developed by Cowardin (et. al. 1979).

Every effort was made to view the cranes at a distance to avoid disturbance.

RESULTS AND DISCUSSION

Overview

The Klewi family departed the breeding grounds on 17 September; the Nyarling family 4 October; and the Little Buffalo family about 17 October. The Klewi birds arrived in the Glaslyn, Saskatchewan, area on or about 24 September. The cranes spent their time utilizing harvested grain fields, small wetlands, and a large wetland named Midnight Lake until 11 October. On that date the Klewi chick flew into a power line forcing the tracking crew to abandon the parent birds. The Klewi adults were subsequently observed at their traditional wintering territory at Aransas NWR on 27 October (Steve Labuda Pers. Comm.).

The Nyarling family arrived in the Unity area of Saskatchewan on or about 10 October. The Nyarling birds also utilized small wetlands and harvested grain fields. On 11 October the Nyarling

family moved 20 km south to an area around Luseland, Saskatchewan, where they remained until 20 October. While in the Luseland area they fed on abundant waste grain and utilized two small wetlands for roosting.

When the Nyarling family left the Luseland area, they flew 280 km, making two short stops enroute. They roosted for the evening at a reservoir near Neville, Saskatchewan. The birds remained in the area until shortly after 1400 when they resumed migrating. The family flew 220 km to the Poplar River in northeastern Montana. The cranes began to migrate again the next day and flew, apparently non-stop, 720 km to Alkali Pond near Valentine NWR in northcentral Nebraska. They continued the migration the next day flying 170 km to a stockpond on the Wood River northwest of Oconto, Nebraska. The crane family fed until 1100 the next morning then flew non-stop 308 km, landing to roost near Rush Center, Kansas. They continued their steady migration the next day flying 200 km after making two stops and landing near Waynoka, Oklahoma, to roost. They flew 227 km the next day, landing to roost a few kilometers south of Ft. Sill Military Reservation. On 27 October the cranes flew most of the day into 25-40 km/hr headwinds covering only 50 km to the Byers Lake, Texas, area. The cranes remained in the Byers Lake region until northerly winds resumed on 1 November when they flew 360 km the next day stopping to roost 32 km north of their traditional wintering ground on Aransas NWR. The morning of 3 November, the Nyarling family landed on the Refuge.

Staging Area Description

NOTE: The term "staging area" is used throughout this report due to lack of a more appropriate term describing the area in Saskatchewan frequented for long periods of time by migrating whooping cranes.

Whooping crane families have been thought to use the cultivated lands of southern Saskatchewan as a stopover point on their migration (Johnson and Temple 1980.) The Klewi family spent 15 days in an area 60 km north of North Battleford, Saskatchewan, near Midnight Lake. The Nyarling family flew to an area 50 km southwest of North Battleford near Luseland, Saskatchewan, spending 10 days.

Weather during the fall whooping crane use varied with highs around 10°C and lows of -5°C. A few days were warm with temperatures around 22-23°C. Skies were generally cloudy with occasional rain, drizzle, fog, and snow. Winds varied with frontal passage and tended to be north one day and south the next showing no definite pattern during the area use period (table 1).

Topography in the area of Midnight Lake is generally flat with some relief in the area of rivers or larger lakes. The area could be described as aspen parkland with boreal forest to the north and grasslands to the south.

Land use in the area is basically small grain farming with crops such as wheat, barley, and rape seed planted in the spring and harvested during the late summer or early fall. Field

sizes vary from 4 ha to over 100 ha. In addition to small grains, hay, alfalfa, and small scale livestock raising occur in the area. The cropland is well interspersed with aspen and brush patches or strips. The area is quite rock strewn so may brush-covered rock piles occur. Palustrine wetlands are abundant and vary considerably in size. Most wetlands were dry in September 1981 due to drought conditions although local farmers stated rains during the growing season allowed for average crop yields. Farmsteads and roads are common in this area and allow for access to whooping crane use sites.

The Luseland area was quite similar to the above description. The main differences being a more gently rolling terrain with interspersed vegetation being more brush than aspen. The Midnight Lake area had more crop variety with Luseland more dependent on large wheat fields. Oil had been discovered in the Luseland area and active wells were pumping within 1 km of a stopover site.

When conversations with individuals involved whooping cranes, we found most people to be well informed and concerned, landowners in particular were very helpful and cooperative.

DAILY ACTIVITY ON THE STAGING AREA

Roost Site Activity

Whooping crane activity while on the staging area involved leaving the roost around 0715 about 30 minutes before sunrise. Lack of light made it hard to determine what the crane family

was doing just prior to departure, but walking and wing flapping were observed. The families would either walk or fly from the roost and immediately begin vigorous feeding in an adjacent grainfield. They would feed until about 1000 when they would return to the roost until 1100. They would then return to feed until 1300 when they would again fly into the roost. At 1400 they returned to feed until 1600 at which time they flew into the roost. They returned one more time at 1700 and would feed until 1900 or 30 minutes after sunset when they returned to the roost for the evening.

Although we could not observe the cranes on the roost sites at night we detected no movements. The families were observed to be in the same location in the morning as seen the previous evening. On two occasions the Klewi family flew into the roost early. Once at 1832 and once at 1742, both times as a result of disturbance.

Roost 2 (table 2) used by the Klewi family was likely to be the preferred site and the family was never seen to be disturbed into entering it early.

In the morning the cranes would walk from the water to higher ground and fly from roost 2 (table 2), however they flew directly from the water at roost 1. A fence occurred between roost 2 and the barley field where the Klewi family preferred to feed (site 2, table 3). The cranes walked toward the fence, then after a few minutes hesitation, flew into the grain field to

eat. The flight from roost 2 (table 2) was usually about 100 m, generally to one of three favored spots. From roost 1 (table 2) the flight was longer and would sometimes involve passing over feeding site 1 (table 3) in favor of feeding site 2 near roost 2. Although no reason could be seen for flying over feeding site 1, waterfowl hunters were observed on the location one morning.

The Narling family was thought to have walked from the roost to the feed site. By the time it became light enough to see, the cranes were observed feeding within 50 m of the wetland vegetation. The actions and times of movement were quite similar to those of the Klewi family.

TABLE 1
Weather*

DATE	WIND Direction	WIND SPEED IN KM/H	CLOUDS	PRECIPITATION	TEMP. °C
9/25	WNW	8-16	fog changing to clear	light drizzle	6
9/26	WNW	16	Broken overcast	none	4
9/27	SW	16	clear	none	10
9/28	SE	30	overcast	light rain	6
9/29	SE	6	overcast	none	6
9/30	NE	8	overcast	light drizzle	6
10/1	SE	30	clear	none	6
10/2	N	10	overcast	light drizzle	0
10/3	NW	3	clear	none	0
10/4	NW	3	clear	none	0
10/5	SSW	32	clear	none	7
10/6	SSW	8-24	overcast	none	4
10/7	SW	16	overcast	none	13
10/8	ESE	8	overcast	light rain	10
10/9	NW	8-16	overcast	light rain	2
10/10	WNW	16-24	overcast	light rain	2
10/11	NW	calm	overcast	none	2
10/12	NW	16-24	overcast	none	-1
10/13	NW	16	overcast	light snow	-1
10/14	S	8	clear	none	-1
10/15	S	8-16	fog changing to clear	none	10

10/16	WNW	8-16 changing to 60 for 1 hour	high overcast changing to storm	1 hour of hard rain	4
10/17	NNW	32.	Broken overcast	none	2
10/18	SW	8-16	clear	none	4
10/19	NW	24-35	overcast	none	4
10/20	NW	35-50	overcast	snow squalls	-2
10/21	NW	24-35	overcast changing to partly cloudy	snow squalls	-2
10/22	NW	22-35	overcast	snow squalls	-2
10/23	unknown				
10/24	NW	16	overcast	none	-1
10/25	N	24	overcast	fog and heavy rain	2
10/26	SW	16	unknown	unknown	unknown
10/27- 30	S	16-32	clear to partly cloudy	none	7
11/1	NW	16-24	clear	none	7
11/2	NW	16	clear	none	13
11/3	NW	16	clear	none	16

*Temperatures and wind speeds are approximate and represent weather reports from local AM radio stations. Temperatures are daily highs.

While at their roost during the day, both families were observed drinking and preening. The Klewi chick was seen to bathe in the water dunking and splashing much like a sparrow in a bird bath on one occasion. The cranes also appeared to be feeding at times while walking around the roost site. Although no food was visible at the roost, insects were seen in the air on warm days and unidentified insect parts were found in the droppings of the Nyarling birds. While walking in the vegetation around roost 2 the Klewi family was observed jumping, flapping their wings, and pecking the ground. One observer saw what looked like a large (rat-sized) rodent in the beak of the smaller adult which then transferred it to the chick. The action lasted 2-3 minutes and the birds then walked back to the roost.

The chick was observed to be within 1-10 m of an adult (usually the smaller adult) while on the roost, one adult would occasionally walk 30 m from the remaining two birds. Generally the birds remained quite close to one another. When the cranes were observable, at least one bird (usually the larger adult) would be alert with its head up, and watching.

Feeding Site Activity

Most of the daylight hours at the stopover sites were spent eating grain. Each family used five fields spending the majority of their time feeding on two of those fields (table 3).

Different locations in the favored fields were used rather than one spot. The cranes would begin to feed as soon as they landed. The chick would be the first to feed sometimes as soon as its feet touched the ground. The adults would remain erect and watch for 1 to 5 minutes after landing. Generally the smaller adult would begin to feed with the larger adult waiting the longest. The larger adult would always to be more alert the entire time the family was feeding.

While feeding the cranes would bend over pecking at the ground then look up, then go back to pecking. This action allowed for only a 3-5 second period when all three heads would be down for the Klewi family. The Nyarling family was observed to have all three heads down for periods up to 2 minutes.

The cranes would walk slowly while feeding. Their movement would sometimes be continuous in one direction or randomly circular. The family would occasionally fly to another part of the field or to another field for no apparent reason. On one occasion the Klewi family stopped feeding and flew 50 m to a different spot on the field. They walked quickly to the location from where they had flown, then flew 50 m to the location where they has just landed. They then walked quickly back to the original location and resumed feeding.

The families would interrupt feeding to jump and flap their wings, then return to feeding. This action may be similar to that described by Allen (1952) as a mating "dance." It was performed by both families but observed more often with the Klewi family. The action was usually initiated by the larger adult but all three birds were seen starting the "dance." The chick would mimic the action of parent birds.

The cranes would usually remain within 30 m of each other while feeding. If they had no disturbances the larger adult would occasionally walk slowly away and feed up to 100 m from the other two birds. The chick was almost always within 10 m of one adult spending most of its time with the smaller of the two parents.

The Klewi family fed on chisel-plowed barley fields. They were observed flipping pieces of soil to get waste grain or insects just under the surface. Loose grain and grain heads were found above the ground and 1-2 cm under the soil surface. The chick was seen tilting its head up and performing an act best described as "choking" perhaps to force grain heads down its throat. Although the adults were seen doing this on one or two occasions, the chick did it several times on different occasions.

The Nyarling family fed on wheat and barley fields that had been hailed on in July and August. The result of the hail was highly abundant waste grain on fields 8, 9, 10, and 11 (table 3). These fields were not plowed so the grain was above ground and easily

accessible. The hail was of such volume that melt-water filled roost sites 4 and 5 (table 2). Landowners stated the areas were dry before the hailstorms.

The crane families were quite possessive of the feeding areas and were seen chasing mallards (Anas platyrhynchos), black-billed magpies (Pica pica), and a single snow goose (Chen caerulescens) from the fields.

MIGRATION

Activities of the Ground Crew from the Breeding Grounds to the Staging Area

The author left Pierre, South Dakota, by bus on 18 September and met Al Novera in Jamestown, North Dakota. Steve Labuda flew from Texas on 18 September and met with Novera and the author in Bismark, North Dakota on 19 September. Personnel then drove to Saskatoon, on the same day. The crew remained in Saskatoon until 25 September when Brian Johns, Labuda, and the author drove to Meadow Lake, Saskatchewan, to assist the air crew in locating the Klewi family.

The Ground crew spent the afternoon of 25 September driving west and north 120 km before returning to Meadow Lake. No signals were received. On 26 September the ground crew drove south and east before linking up with the air crew at Jackfish Lake, Saskatchewan. Again no signals were received. We learned from the air crew that our route had taken us within 2 km of the Klewi family. Attempts that afternoon failed to sight the

cranes but signals were heard using the air crew's receiver. |

On 26 September the ground crew sighted the cranes and were able to "tune" the telemetry receiver to the proper frequency. The receiver used by the ground crew had a reception "range" which necessitated testing it with the actual transmitter being monitored. Once this "tuning" in was accomplished there were no additional major problems with the receiving equipment.

The Narling family left the breeding grounds the morning of 4 October and were located near Reward, Saskatchewan, on 11 October.

The cranes were observed roosting in a 4 ha wetland (roost 3, table 2) and feeding in surrounding dry wetlands and grain fields. The sites used by the cranes were within 200 m of a crossroad which was driven on by several landowners and curious observers. Possibly due to the close, frequent vehicular traffic the Nyarling family left the Reward area at 1428 on 10 October and were tracked by the ground crew while they flew non-stop 19 km to a wetland near Luseland. They were observed on roost 4 (table 2) at 1850.

Nyarling Family: Observations of the Ground Crew from the Staging Area to the Wintering Grounds

On 20 October, the Nyarling family was observed at 0830 on a wetland (table 3) 3 km southeast of roost 3. It is unknown if the cranes flew to the wetland that day or roosted overnight. The weather was winds from west-northwest at 32 to 48 km/h,

skies were mostly cloudy with a few patches of blue sky visible. Fresh snow was evident in isolated spots and flurries were in the air. Snow showers with gusty northwest winds were forecast that day and for 21 October. At 0854 the family took off and began circling, gaining altitude and moving south. They flew 32 km and landed in a wheat field, site 13 (table 3), southeast of Kerrobert, Saskatchewan, and fed for 2.5 hours during which moderately heavy snow fell. They resumed migration at 1158 when the snow stopped. They flew non-stop until they landed briefly in a wheat field (site 14, table 3) near Success, Saskatchewan, just south of the south Saskatchewan River. A local landowner reported a sighting of the Nyarling family to the CWS during this stop. The cranes resumed migration at 1546 and flew non-stop to a reservoir (roost 6, table 2) south of Neville, Saskatchewan. The cranes landed at 1645 on the shore of Russel Creek on an oxbow 100 m west of the creek entrance to the reservoir.

At 0650 on 21 October, radio signals indicated the cranes had moved to a location on the reservoir 300 m east of their 20 October landing site. The time and circumstances of the move were unknown. The cranes were last observed at 1800 so the move was probably made in the dark.

The cranes were observed at first light (0700) standing 3 m offshore in 20 cm of water with 20 Canada geese (Branta canadensis) and 30 mallards. At 0724 the cranes flew to feed (site 6, table 3)

until 1114. During the time on the field the cranes made two short flights to different parts of the same field. After feeding 2 hours and 50 minutes, the family flew to the 20 October landing site. At 1137 the cranes flew towards the feeding location. Instead of landing in the field, the cranes landed on the edge of a 30° bank that extended for 200 m from the edge of the reservoir to the level land containing the wheat fields. After landing 10 m down from the top of the bluff, the cranes walked up the steep hill to the wheat field to feed. They then flew to the roost site on the oxbow at 1140. They remained at the roost site walking up and down the shoreline until 1346 when they returned to feed.

The ground crew left the cranes assuming no migration would occur. When the aircraft flew over the area at 1600 to check, the Nyarling family had resumed migration. The weather had changed from snow squalls to partly cloudy. Northwest winds continued at 25 to 32 km/h. By following their migration path a radio signal was received at 1630 and the cranes were located visually at 1700. At this point the cranes had crossed the border into the United States. The cranes continued to fly until approximately 1800 when they landed to roost (site 7, table 2) in an isolated area of Montana on the Poplar River.

At 0800 on 22 October, the air crew observed the Nyarling family feeding on a wheat field adjacent to the roost site (site 7, table 3). While the air crew cleared customs, the cranes

resumed migration and were located 24 km northwest of Sidney, Montana. The family flew non-stop to a wetland complex south of Merritt Reservoir near Valentine NWR in Nebraska after flying approximately 720 km. During this time, the ground crew drove continuously in an attempt to catch up with the birds and the air crew.

At 0715, on 30 October the air crew located the family on Alkali Pond (site 8, table 2). The location was 5 km from where the cranes were believed to have landed the previous evening. Radio contact was made with personnel from the Valentine National Wildlife Refuge who monitored the cranes from the ground. The cranes were observed by the air crew and refuge personnel leaving the roost at 0930 when they flew to an adjacent irrigated alfalfa field. The roost site was covered with 6.0 mm ice. The cranes left 3 oval open spots 9 m from shore. The spots measured 60 cm x 90 cm and were 150 cm apart. A trail of 15 cm diameter holes led from the open spots to the shore line. The cranes fed on a bare area or cattle trail in the alfalfa (site 17, table 3) until 0955 when they resumed migrating. The whooping cranes roosted for the night at a stockpond (roost 9, table 2) on the Wood River 3 km northwest of Oconto, Nebraska. At this location the ground crew was finally able to link up with the air crew.

Due to poor visibility the morning of 24 October, the ground crew located the cranes at the roost while the air crew remained

at the airport. At 0700 the cranes flew into a picked corn field to feed (site 18, table 3). While the chick fed, the adults remained nervous and alert. At 0747 two persons on horseback flushed the birds back to the roost. The cranes were observed flipping "cow chips" for insects as they foraged near the roost in an adjacent pasture. The family then flew to a different cornfield to feed (site 19, table 3). At 1100 the cranes departed south with a 16 km/h northwest wind. The cranes flew to a roost site (roost 10, table 2) 11 km south of Rush Center, Kansas. No stops were observed during the 307 km flight.

On 25 October, rain and low ceilings prevented the aircraft from flying until 0930. The ground crew located the family on a winter wheat field at 0700 (site 20, table 3). The Nyarling family departed the area at about 0715 without being seen. Radio signals had indicated the cranes were in the air, but foggy, rainy conditions made ground tracking impossible. The cranes flew 8 km and resumed feeding in wheat stubble (site 21, table 3). After feeding for 2 hours, the cranes departed. They flew until 1410 then landed at a spot 15 km north and 5 km west of Coldwater, Kansas. The family drank and fed in a cow pasture until 1443. The cranes then flew until 1607 when they landed in a freshly tilled field near the Cimarron River. After 30 minutes the cranes flew to a site on the Cimarron River west of Waynoka, Oklahoma. They stayed for 30 minutes then flew 40 km again landing on the river, this time roosting for the night after the day's 200 km flight (roost 11, table 2.)

on 26 October, the ground crew located the roosting whooping cranes 400 m down stream from 40 sandhill cranes. The Nyarling family was observed standing in 30 cm of water. At 0724 the whooping cranes flew to a milo stubble field (site 22, table 3) where they fed with sandhill cranes until 0955 when they resumed migration.

Evidence was found in the field that the whooping cranes had once again been turning over "cow chips" to feed on insects.

The Nyarling family flew straight through the Fort Sill artillery range, 100 m above ground, with 11 sandhill cranes just prior to sunset. The Narling family landed to roost on a wetland (roost 12, table 2) just south of the range within hearing distance of artillery fire.

At 0645 on 27 October the Nyarling family was observed walking from the roost to begin feeding in an adjoining cattle pasture. At 0932 the family flew 3 km south to an open area in a milo field (site 23, table 3) where they remained until 1139 when they resumed migration. Southerly winds at 24 to 40 km/h forced the family to fly most of the day moving only 50 km. The cranes landed on Lake Byers, Texas, to roost (roost 13, table 2).

On 28 October, the family flew approximately 8 km north into Oklahoma to feed in a milo field (site 24, table 3). They attempted to migrate at 1326 and were seen spiralling to gain altitude but flew 8 km to the Red River where they roosted for

the night. They remained in the area on 29, 30, and 31 October, making occasional spiralling flights only to settle back down due to steady 32 to 56 km south winds. They fed in milo fields and freshly planted winter wheat during the 3 days (sites 23, 24, and 25, table 3).

On 31 October a frontal passage caused a change in the weather. The next morning winds were blowing out of the northwest at 16 to 32 km/h. At 0835 the Nyarling family resumed migration heading in a southeasterly direction. The family made several short flights of 2 to 5 km stopping among feeding sandhill cranes along the Red River. At about 1000 the Nyarling family started a non-stop flight that ended 6 km southeast of Rose Bud, Texas (roost 15, table 2).

After roosting for the night the cranes left the site at 0730 and were found feeding on a sorghum field. At 0900 the family resumed migration and flew 291 km to a roost site on a flooded pasture about 32 km north of their traditional wintering location (roost 16, table 2).

At 0722 on November 3 the Nyarling family flew the remaining distance landing at 0800 on Mustang Lake, Aransas National Wildlife Refuge, Texas.

HABITAT

Roost Sites

Roost sites used by the radio-tracked whooping cranes south of

the Boreal Forest were classified as follows: 12 Palustrine, three Riverine, and one Lacustrine. All 16 roost sites shared certain characteristics:

- 1) Less than 3 km from cultivated fields.
- 2) Gradual slope of the shore line and bottom providing shallow water for security while roosting.
- 3) Good horizontal visibility and unlimited vertical visibility.
- 4) Relatively bare bottom with few if any floating or rooted aquatic plants.
- 5) Isolation from human disturbance.

Although many potential roost sites have these five characteristics, why migrating cranes fly over several "suitable" roosts in favor of others is known only to the whooping cranes at this time. Some observations of late evening stopovers, however, do suggest specific selection. Optimum roost sites probably are not always available when they are ready to roost.

On 21 October the Nyarling family was followed visually as they flew along the Poplar River. They continued flying after sunset until they came to a stretch of the river that had adjacent wheat fields. They had flown over about 20 km of similar river habitat until they found an area with bordering wheat fields when they landed to roost. They were observed feeding on these fields in the morning.

Roost sites 1 and 2 used by the Klewi family represent the first visible wetland complex along the migration path and

south of the Boreal Forest having adjoining grain fields (E. Kuyt, Pers. Comm.). Perhaps the staging area roost sites, as well as other northern roost sites are selected for a nearby source of abundant waste grain.

While at the staging area the Nyarling family and the Klewi family each used two wetlands for roosting (roosts 1 and 2 for the Klewi family and roosts 4 and 5 for the Nyarling family). Roosts 1 and 2 were 1 km apart and roosts 4 and 5 were 2 km apart. Both families changed roost sites randomly and when one roost was disturbed. There may be a tendency for family units to select an area containing 2 or more wetlands in close proximity for use as alternative roost sites during their extended stay in central Saskatchewan.

When observed on the roost, prior to sunrise or just after sunset, the cranes would be standing in water about half way up the tarsal protion of the leg. During the day the cranes would not only stand in the water as previously described but walk around the roost site at the waters edge or in the surrounding upland cover. When the Nyarling family used wetlands farther south (areas not yet affected by a hard freeze) they tended to spend more time foraging and feeding, taking advantage of food sources located at the roost site.

Some evidence suggesting traditional roost site selection and/or migration path is shown by two obervations of Nyarling family components. Roost site 10 is 48 km east of a fall roosting

occurrence of the Nyarling parents and their color marked chick in Barton County, Kansas on 22 October 1978. This 1978 chick was observed 1 May 1980 at Washita NWR, Custer County, Oklahoma, 56 km west of the fall 1981 Nyarling family flight path through Oklahoma.

Roost site 1 used by the Klewi family, was also used by a different family in 1980 (USFWS files). According to the landowner, the family was present from September 1 to October 27, 1980.

Although known data does not provide evidence of traditional roost site use by a specific whooper family during migration, future sightings of marked birds should be checked for traditional use of a general area by whoopers.

Loafing Sites

In addition to the roost sites, the Klewi family used one wetland as a loafing site. Most of the day's activities when not feeding were spent on the roost sites. The cranes did not appear to select specific sites for loafing, but instead used the familiar roosting area for drinking, preening, foraging, and loafing. Since the roost site was always close to the feeding area, the necessity of a separate loafing area was not observed, the loafing site used by the Klewi family was adjacent to feeding site 1. The cranes usually walked to the location but when disturbed while feeding they flew the 200-300m to the site.

Feeding Sites

Johnson and Temple (1980) found small grain comprising over 70 percent of the known migration feeding sites. Our observations of the Nyarling family found small grains to dominate the feeding sites from the area south of the Boreal Forest to Nebraska. From Nebraska to Texas, a variety of food sources were utilized (table 3).

As with Johnson and Temple (1980) we found the feeding sites used by the Nyarling and Klewi families to have certain characteristics:

- 1) Good horizontal visibility.
- 2) Abundant food source.
- 3) Relative security.
- 4) Close proximity to a roost site.

The fields used by the migrating cranes were generally flat allowing an unrestricted field-of-view for 300-500 m. We did notice that the cranes utilized a "swale" or "dip" in the field if one was present. A frequent view of the feeding cranes was just a head visible above the ground level. The head would disappear only to pop up again several minutes later.

It is unknown if this action was taken knowingly, by the cranes to provide concealment, or simply part of the random wanderings made during feeding.

An abundant food source was found in the Canadian grain fields.

This may be the reason for the extended stopover made in the area. The grain may offer the cranes, particularly the chick, an excellent source of energy to prepare the birds for the remainder of the migration. Of the six separate whooping cranes observed feeding, the two chicks were definitely the most vigorous feeders.

While feeding, both families tended to utilize the center of the field or the edges farthest away from roads or buildings. The Klewi family was seen feeding next to large (455+ kg) round bales of straw on one occasion (site 3, table 3) and were seen feeding 75 m from a aspen strip which bordered a road on site 2 (table 3).

The Nyarling family was found to be turning "cow chips" at sites 18 and 21 (table 3). Closer examination of the "chips" revealed crickets and spiders hiding under the hardened material.

On one occasion the Nyarling family was found using an unharvested milo field (site 24, table 3). The cranes were observed pecking at the ripened seed heads which had grown 2-3 m above the ground. The cranes were standing in a strip of 50 cm high millet while feeding on the taller milo heads. In the same area the family was observed feeding on recently planted wheat seed (site 25, table 3).

Since the first activity after leaving the roost involved feeding, most feeding sites were adjacent to the roost site.

Exceptions were feeding stops made during the day while actively migrating. Stops made during migration for feeding were infrequent. On 22 October the Nyarling family flew 720 km non-stop. On 20 October the cranes made two stops, one during a snow squall and one during which the weather remained good. On 25 October the cranes made a feeding stop in foggy weather 8 km from the roost. Other stops may have been made but were not observed by the ground crew.

Whooping cranes may be opportunistic feeders while migrating, taking advantage of an attractive field or stopping when they detect threatening weather.

Weather

Wind direction, wind velocity and cloud conditions were quite variable (table 1) during the Nyarling family's 10-day stay at Luseland, Saskatchewan. On 20 October the cranes left the Luseland area and migrated steadily (except for night stops) for 7 days. Winds during this period of time were northwesterly varying from 16 to 32 km/h. From 27 October to 1 November, south winds at 32 to 56 km/h allowed the cranes to migrate only 50 km. On 1 November northwest winds resumed until the cranes arrived at the coast of Texas on November 3.

During the migration, effects of daily weather were noted as follows:

On 16 October a storm accompanied by 65 km/h winds began with the passage of a cold front. During the hour-long storm the

Nyarling family stood facing into the northwest wind on roost site 5 in 20 cm of water. They had their necks bent and heads flattened down against the top of the body until the storm subsided.

On 17 October with northwest winds at 16-32 km/h and clear skies the Nyarling family left its feeding location (site 10, table 3) at 1015 to begin spiralling upwards. After reaching about 300 m AGL the family descended to field site 8 after flying 2 km in 5.5 minutes. Observers watching a different group of whooping cranes 50 km north of Luseland noted the same behavior at the same time only these birds continued to migrate.

At other times strong gusts of wind appeared to catch the birds causing them to spread their wings and quickly flap to regain balance. The only other noticeable effect of the wind was that it determined the direction for the cranes to take off and land.

Snow squalls causing poor visibility may have caused the Nyarling family to land at feeding site 13 (table 3), 1 hour after they began migrating on 20 October. Soon after the snow stopped the cranes resumed flying after being on the ground for about 2 hours.

While at roost site 6 the Nyarling family remained in the area until 1400 when they took off and flew 220 km. Weather during the period up to 1400 included snow squalls which at times reduced visibility to 100 m.

Cold weather the night of 21-22 October caused 6.0 mm of ice to form on roost site 8 (table 2). The cranes were not known to be affected and managed to keep a small area open. They also broke ice to leave the roost.

On 16 October the Little Buffalo family was seen on the breeding grounds near Ft. Smith, NWT. At that time the water on the breeding area was still open. On October 19 a cold spell caused the water at the breeding grounds to be covered with 10 cm of ice and the Little Buffalo family was thought to be observed on Witchekan Lake, Saskatchewan, approximately 800 km southeast of Ft. Smith.

Flying Behavior

Before becoming airborne the cranes would walk toward one another. Usually the larger adult would walk to where the smaller adult and the chick were located, but the opposite was also observed. The family would begin to walk as a unit into the wind. Once again the larger adult would be in the lead. After walking 5-10 m, all three birds would lower their heads, necks out-stretched, take two or three quick steps, spread their wings, flap and become airborne. This behavior named "preflight march and lean" was done simultaneously by all three birds. The time to accomplish the behavior varied from 10 minutes to 10 seconds usually taking about 2-3 minutes.

The larger adult crane led the landing formation followed by the smaller adult and the chick. After gliding and losing altitude, the birds stretched out their legs to touch the ground

while stopping their movement by wing flapping. The cranes usually landed keeping the relative position as described for take-offs. Immediately after landing the cranes would stretch and fold their wings.

Interactions With Other Birds

Whooping cranes encountered a variety of avifauna during the 2400 mile migration (table 2). At times the families would appear aggressive to other birds and at times passive. Aggressive interactions were noted by Johnson and Temple (1980) with great blue herons (Ardea herodias), white pelicans (Pelecanus erythrorhynchus), and snow geese. Passive interactions were observed with Canada geese, trumpeter swans (Olor buccinator), and snow geese. Whooping crane interactions during the project were noted with sandhill cranes (Grus canadensis), mallards, Canada geese, white-fronted geese (Anser albifrons), whistling swans (Olor columbianus), snow geese, and a black-billed magpie.

The Klewi family was observed chasing mallards from roost 2 during the day. The Klewi family was also observed moving 40 m to chase four sandhill cranes from roost site 1 just prior to darkness. While feeding on site 2 (table 3) the entire Klewi family chased a black-billed magpie by running and wing-flapping for 30 m. When the adults stopped, the chick continued to run and flap at the magpie an additional 100 m. During this action, the magpie would fly and land keeping 20-20 m ahead of the cranes. When the chick stopped it was the farthest away from

the adults that was observed during the project. The adults remained in one spot jumping and flapping until the chick gave up and flew towards the adults. The adults then took flight and the entire family flew to another field.

On another occasion, the Klewi family allowed a flock of mallards to feed within 30 m, completely ignoring them. Canada and white-fronted geese were seen feeding 100 m away from the cranes on site 1 (table 3). Although each group of birds would feed and watch the other, no aggressive displays were noted. 200-300 whistling swans were observed using the same roost as the cranes (roost 1, table 2), but they were never observed within 200 m of each other.

The Nyarling family ran and wing flapped for about 30 m to chase a single snow goose which landed near them at feeding site 10 (table 3). During a storm (described on page 36), nine whistling swans landed on roost site 5 (table 2) being used by the Nyarling family. The swans remained without incident then flew away when the weather cleared.

The observers noted more "aggressive, bold" activities by the chick belonging to the Klewi family. The Klewi chick appeared larger than the Nyarling chick and had been identified by blood samples to be a male (E. Kuyt Pers. Comm.). The Nyarling chick appeared more "docile" and attentive to its parents and was smaller; this bird had been identified by blood samples to be female.

For unknown reasons the Nyarling family appeared to be less "tense" and not as wary as the Klewi family.

While the Nyarling family was using the area near Neville, Saskatchewan, (roost 6, table 2), they roosted with approximately 120 Canada geese, four snow geese and 30 mallards. The cranes separated from the waterfowl before sunrise and fed alone until 1100 when they flew to where the geese were feeding. After feeding together for 2-3 minutes the geese left the field and flew down to the reservoir. The cranes continued to feed, then joined the geese a short time later. An atmosphere of toleration existed on the roost site. While walking to the water's edge the larger adult would lead the way through the geese resting on shore. The geese would watch the cranes and when approached to within 2 m walk quickly out of the way allowing the crane family complete freedom of access. The cranes appeared to be oblivious to the presense of geese, completely ignoring them.

Near Duck Lake in Nebraska, the Nyarling family was joined by another pair of whooping cranes. The two groups spent about 38 minutes flying together then separated.

Shortly after their encounter with the whooping cranes the Nyarling family was joined by 15 sandhill cranes. They stayed together for most of the migration that day.

The Nyarling family roosted 400 m from approximately 40' sandhill

cranes on the Cimarron River. When the Nyarling family left the roost at 9:55 a.m. to feed, the sandhills waited 4 minutes to follow and land on the same field 300 m away from the whooping cranes. The Nyarling family continued their migration with 11 sandhill cranes when leaving the feeding site. The two crane species were still traveling together when last observed just before dark. When observed on roost site 2 the next morning, the whooping cranes were alone.

The last encounter with other birds occurred the morning before arriving at Aransas Refuge at roost 16 (table 2). The larger adult of the Nyarling family was heard vocalizing with a sandhill crane and another crane of unknown species. The vocal exchange lasted for 4 minutes at which time the Nyarling family flew to the Refuge.

Interactions With Livestock

Cattle usually ignored the whooping cranes and vice versa. During their walking the whooping crane families tended to avoid cattle, staying 100 m away. Cattle were observed walking past an area used by the Klewi birds at roost 2 (table 2). The situation caused the cattle to pass between the cranes and the wetland forcing the cranes to move toward a fence. As the cattle came within approximately 20 m of the cranes the family began to jump and flap their wings. This action had no visible effect on the cattle and ceased after 5 minutes when the cattle had passed.

The Nyarling family was approached by a curious cow on feed site 9

(table 3). The cranes stopped feeding when the cow came within 40m, flapped their wings and began walking quickly away. The cow followed the fast walking cranes for 1 or 2 minutes then gave up and joined the other cattle and the cranes resumed feeding.

While at feed site 8 (table 3), horses in an adjacent pasture began to walk toward the cranes. The cranes took off and resumed migration at 0955 after having been feeding in the field for 20 minutes. It is unknown if the approaching horses caused an early departure.

Another curious cow approached the Nyarling family on 27 October while the cranes were feeding in a pasture. As the animal approached to within 25 m the cranes flew to another part of the pasture.

Hazards

On 11 October we left the Klewi family at 1406 on field site 2 (table 3) to visit the location of the Nyarling birds near Reward, Saskatchewan. We returned to the location at 0700 on 12 October to resume our monitoring. We had trouble picking up a signal and finally located the cranes in a direction indicating they were on the roost where we left them on 11 October. We saw the adults on the pond at 0710 in very dim light and drove to an observation position in a farm yard overlooking the pond. At 0721 the adult birds flew out to feed in the barley field without the chick. We immediately left the observation area to locate the chick using a hand held antenna. The bird was located in field 2 (table 3),

100 m south of the roost site under a power line which crosses the field (fig. 2). The injured chick was lying prone on the ground with its wings spread, head up and legs directly out behind its body. It was lying parallel to the wire facing east. As we approached, the crane flapped its wings but was unable to alter its position. The bird was covered with a coat and found to have no visible damage other than a 30 mm gash below the left eye where the facial skin joins the maxilla. The bird was alert and despite being wrapped in a coat, was able to struggle in an attempt to escape. We phoned E. Kuyt in North Battleford who made arrangements to meet with a local veterinarian. While driving to North Battleford we noticed the chicks legs were cold and completely limp. By 0845 the veterinarian had examined the bird and expressed his opinion that spinal injury may have paralyzed the bird's legs. Arrangements were made with the University of Saskatchewan Veterinary College in Saskatoon for a more thorough examination by a wildlife veterinarian. Fish and Wildlife Service aircraft #N729 flew the bird to Saskatoon and arrived at 1100. The bird died on October 19.

The parents of the injured bird flew from their position 100 m southwest of the chick when we approached to within 200 m. They flew to the southwest corner of the field and remained until we left. Throughout this time, the parents watched and vocalized. The adult birds were last seen on roost site 2 at 1300 when we flew over the area on our return flight from Saskatoon.

From its position on the ground, the chick appeared to have hit

the wire during its flight from the roost to the field. Assuming a normal day's activity pattern, the cranes would have returned to the roost at 1300, to the field at 1400, to the roost at 1600, to the field at 1700, and returned to the pond after sunset. The chick was likely to have hit the wire between 1400 and 1700 spending the night in the field. Weather (table 1) was probably not a factor in the collision.

The rural electric power line hit by the crane was a single strand about 30 m high suspended by poles 100 m apart. The cranes had flown over the line on many occasions. The normal flight would be with the larger adult in the lead followed by the smaller adult, then closely followed by the chick. Although this formation was observed most frequently, the chick would sometimes lag behind or fly above or below the adults. When the cranes entered the field from another area they would come in 150-200 m high and form a half circle losing altitude to land missing the wire by 100 m. When flying from roost to field or from field to roost they would appear to fly directly toward the wire and at the last minute flare over the wire missing it by 5 m. On 11 October the cranes were observed to fly under the wire at 0732 while flying from roost site 2 (table 2) to feed on field 2 (table 3). On 30 October, E. Kuyt observed the chick to "barely miss the wire." Although always concerned when flying around the wire, the tracking crew felt the family was always aware of the danger and had thus far managed to avoid it.

Power lines of virtually the same description as above existed on roost site 4 but were 600-700 m east of the roost and were never observed to be flown over by the Nyarling family on their way to feed.

No estimate could be made about numbers or frequency of power line occurrence, but they do occur sporadically varying from single strand to multi-strand.

Predators

A coyote (Canis latrans) and a red fox (Vulpes fulva) were seen in the area within 1 km of roost site 2 (table 2) and fresh coyote tracks were found on the edge of field 1 (table 3). A coyote was observed along the edge of field 2 (table 3) where the Klewi family was feeding. The cranes were aware of the coyote and all stood watching and calling. The coyote hesitated looking the cranes direction for a moment then continued its path north and away from the site. Dead, partially eaten waterfowl and regurgitated material were found on the edge of roost site 2 (table 2). No predators were observed during the remainder of the migration.

On two occasions the cranes may have made movements during the evening, 300 m on roost 6 (table 2) and a questionable 3 miles at roost site 7. The cranes were not located visually when they actually set down on 22 October (roost site 7), so it is unknown if the cranes moved or the location was not pinpointed precisely due to darkness.

Bald eagles (Haliaeetus leucocephalus) and golden eagles (Aquila chrysaetos) were seen flying in the area of the cranes on several occasions but no interest in the cranes was indicated and the cranes did not appear bothered by their presence. Predation of a whooping crane by a golden eagle has been known to occur (USFWS 1980). Johnson and Temple (1980) described "nervous" behavior by whooping and sandhill cranes in response to avian predators. This behavior was not observed with the Nyarling or Klewi families.

Toxicants

While feeding on winter wheat (site 25, table 3) the Nyarling family was exposed to seed wheat treated with a fungicide "Granox N-M" manufactured by Chipman Inc., Stoney Creek, Ontario, Canada. Active ingredients involve MANEB (Manganese ethylenebisdithiocarbamate) 50 percent, HCB (Hexachlorobenzene) 10 percent and inert ingredients 40 percent. Scat samples were obtained but the outcome of analysis is unknown at this writing. The cranes fed in the field 28 and 31 October and 1 November. They were observed pecking at the ground and were thought to be ingesting the recently planted wheat seed.

No adverse behavior was noticed and no estimate could be made on how much treated grain was ingested.

Aircraft

Both the Klewi family and the Nyarling family tended to ignore the Service aircraft. On the few occasions the airplane came within 500m; no reaction was observed. This may be due to the

conditioning received by the families during census work performed by light aircraft on both the wintering ground and the breeding ground (E. Kuyt, Pers. Comm.).

A helicopter was observed disturbing the cranes while the Klewi family was using a lake near Ft. McMurray, Canada. The cranes became alarmed when the aircraft approached and the family flew 1.5 km to another area (E. Kuyt Pers. Comm.).

The Nyarling family was known to have flown in areas of heavy air traffic on two occasions resulting in no observed change of their behavior or flight path. In both instances the tracking crew was given outstanding assistance by both military and civilian personnel. Due to the cooperation received, all potentially dangerous situations were avoided.

At Ft. Sill, Oklahoma, the family flew at an altitude of 100 m AGL in an area that was being used for artillery fire and aircraft bombing practice. When told whooping cranes were migrating through the area, officials called a cease fire and all military aircraft were notified of the cranes presence. The air crew was also given clearance to fly through the area.

When the Narling family flew over Fort Worth, Texas, air traffic controllers routed the air crew through the area and notified other aircraft to be alert.

Interactions With Humans

Due to their large size, white color and rarity, whooping cranes are frequently viewed by curious observers. The cranes use of

agricultural fields also brings about frequent encounters with farm equipment.

The observed reactions to humans by the whooping crane families varied with time of day, distance, feeding time at the site, whether they were on a roost or feeding on a field, the frequency of the disturbance, and the type of disturbance.

Human activities which were known to disturb the cranes are listed in increasing order of disturbance to the cranes.

- 1) light aircraft
- 2) farm equipment
- 3) moving vehicle
- 4) stopped vehicle occupants remaining inside.
- 5) stopped vehicle occupants outside
- 6) people on foot

The cranes were less likely to be disturbed early in the morning after landing to feed or if they had just landed to feed during the day. A response to humans at this time would be walking away or a short flight within the field away from the intruder. After feeding for 2-3 hours, the cranes were more easily disturbed.

A sudden close approach by humans (within 300 m) would always cause an immediate response from the cranes. The response involved flying to the roost or if in the roost moving to another part of the roost or another area. The degree of response by the cranes to approach varied with the distance and nature of the human activity.

Examples of human encounters, include:

A tractor began to work in a field (site 9 table 3) being used by the Nyarling family. The tractor was pulling a chisel plow and came to within 100 m of the feeding cranes. The cranes walked slowly and continued to feed as they crossed the tip of the roost until they were 300 m away from the closest tractor pass. They remained feeding at this distance in an unworked portion of the field until the tractor finished and left the area.

A tractor entering a field flushed the Nyarling family from a milo field (site 23, table 3). The tractor approached to within 250 m before flushing the cranes. The cranes had been feeding for 1.25 hours. The family flew 250 m away to an adjacent wheat field (site 24, table 3). Two days later a pickup truck driven by a land owner flushed the cranes from the same field (site 24, table 3) after they had been feeding for 4 hours. The truck approached to within 200 m and resulted in the cranes flying back to the roost.

Two people on horseback riding down a road surprised the Nyarling family at site 18 (table 3). A hill separated the cranes from the road and the horses approached to within 75 m before being observed. The cranes flew back to the roost, waited 1 hour, then flew to another field (site 19, table 3) to feed.

After feeding (site 2, table 3) for 30 minutes observers

driving along a road unknowingly approached to within 100 m of the cranes causing them to fly into the roost. The cranes remained in the roost for 20 minutes then flew to the same field to feed. After the family had been feeding for 2.5 hours observers walking 300 m away and behind an 8 m wide strip of brush and aspen were detected by the cranes. The birds flew into the roost remained there for 1 hour, then returned to the field to feed.

A tractor driving on a road 300 m away caused the cranes to fly into the roost for the night 1 hour before their normal time. Two people on foot walking along the same road caused the cranes to fly from the same field (site 1, table 3) into roost 1 (table 2) 30 minutes early one other occasion.

The Klewi family was observed from a distance of 300 m from a parked vehicle with the occupants inside. The cranes were on the edge of the roost closest to the road and did not appear disturbed. The vegetation was high enough so that only a head or neck was visible. The cranes would pop a head up every 2-3 minutes as if to check then return to roost activities.

On 13 October the Nyarling family was disturbed by bird watchers on two occasions. Both involved a vehicle being driven down a dirt road adjacent to the roost the cranes were using. The cranes flew to two separate fields where they fed undisturbed.

Hunters using field 1 (table 3) may have been detected by the

Klewi family causing the birds to fly from roost 1 (table 2) to field 2 (table 2). Conversation with the hunters determined that they were aware of the whooping cranes and their rare status. Conservation officers and local land owners were thought to have informed people of the cranes use of the area. Although landowners and curious onlookers caused the cranes to move, at no time did the cranes appear to be in danger.

EQUIPMENT PERFORMANCE

Reception distances using the ground vehicle antenna varied from 2-3 km with the cranes on the ground to about 32 km when the cranes were airborne. If the cranes were located in a depression or behind a bank or hill, reception was cut down to about 1 km or less. The higher the altitude flown by the cranes the better the reception. While monitoring, a signal would become noticeably stronger as the cranes became airborne. Bright clear days produced a stronger signal than cloudy days. The signal strength increased from pre-dawn hours to after sunrise. When the chick was observed preening or pecking its leg, the signal strength would decrease when its head went down and increase when its head came up. When the transmitter was submersed in water the signal decreased.

Two-way communication between the aircraft and the ground crew was less than satisfactory. The aircraft would receive the ground crew up to 130 km away yet the aircraft had to be within 8 km for

the ground crew to receive a signal. At certain times while in Canada the ground crew could communicate with National Wildlife Refuges as far away as Louisiana or Texas, yet could not receive the aircraft 16 km away.

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Correspondence 1980

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NOV 3 1980

End Service Whooping Crane 1980	
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biologist. 11/19	
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FA/SE/FWS - Intra- Service
Consultation, Refuges

NOV 12

MEMORANDUM

To: Area Manager, Salt Lake City
From: Acting Regional Director, Region 6
Subject: Section 7 Consultation, Alamosa and Monte Vista NWRs

This responds to your October 10, 1980, memorandum regarding possible Section 7 consultation on Alamosa and Monte Vista National Wildlife Refuges (NWR) on the occurrence of whooping cranes within waterfowl hunting areas.

On August 24, 1978, Acting Director Schreiner issued the following biological opinion on the 1978-79 late season regulations relative to several listed species including the whooping crane:

"Based on my consultation team's review of the above information and other information and data available to the Service, it is my biological opinion that the late season of 1978-79 Regulations Frameworks is not likely to jeopardize the continued existence of the species addressed herein. I further conclude that the Service has taken all reasonable measures to insure that these regulations are compatible with other conservation programs being carried out for each of these species."

By memorandums dated August 21, 1979, and July 14, 1980, Intra-Service Section 7 consultations were completed for the proposed 1979-1980 and 1980-1981 late season hunting regulations for certain migratory birds (copies attached). Intra-Service consultation was also concluded on July 9, 1979, and July 14, 1980, on proposed 1979-1980 and 1980-1981 early season hunting regulations for certain migratory birds (copies attached). It was concluded that the proposed changes from the 1978 regulations will not significantly affect any listed species. Therefore, the proposed actions are not likely to jeopardize the continued existence of the whooping crane.

NOV 12 1980

If your hunting program for Alamosa and Monte Vista NWRs falls within the attached early and late hunting season regulations, a separate intra-Service consultation is not necessary. The Washington programmatic consultation should suffice. If your actions do not fall within the early or late hunting season regulations, or have been modified or altered, a separate intra-Service consultation should be conducted if it is determined that hunting may affect the whooping crane.

Attachments

/s/ CLYDE JONES

bcc: ARD, Refugees

SE:SFetherman:las/10/28/80

Revised:WWathen:las/10/31/80



NOV 17 1980

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

INTER-OFFICE TRANSMITTAL

E. E. Heier - Whistling Canyon 1980

Nail	11/17	McDermith
Suthers	11/3	Espinosa
Biologist	11/25	Martinez
Maddux	11/29	
Winters		

X Action \ Information

☐ Director, _____

☐ Regional Director, _____

☒ Project Leader, alamosa

☐ _____

☐ Regular Mail

☐ Air Mail

☐ Action

☐ Information

FROM

Tis

OFFICE

SLC

DATE

Received at Alamosa
NRW 10/27/80 undated.

SUBJECT

Covers our Section 7 situation somewhat.
I am still out on whether we do Section 7
or not. Washington will most likely decide.



United States Department of the Interior

FISH AND WILDLIFE SERVICE
WASHINGTON, D.C. 20240

ADDRESS ONLY THE DIRECTOR
FISH AND WILDLIFE SERVICE



In Reply Refer To:
FWS/OES 375.0

AUG 24 1978

MEMORANDUM

To: Chief, Office of Migratory Bird Management

Through: Associate Director, Fish and Wildlife Management
Acting

From: Director - Fish and Wildlife Service

Subject: Biological Opinion-Section 7 and Late Season of the 1978-79
Regulations Framework for Certain Migratory Game Birds in
the United States

By memorandum dated June 16, 1978, you requested formal consultation under Section 7 of the Endangered Species Act of 1973 on parts of the 1978-79 hunting regulations frameworks for certain migratory game birds in the United States. As a result of your request, I appointed a consultation team to assist me in determining whether there would be jeopardy to seven listed species as a result of the regulations.

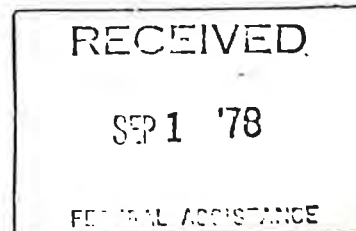
The team was comprised of Messrs. Jay Sheppard, Marshall Jones, and Ms. Janice Hill, all of the Office of Endangered Species.

This examination addresses the regulations being proposed for late seasons; this category generally includes regulations for seasons opening on or after October 1 (in the Central and Pacific Flyways September 28 is being proposed as the framework opening date for waterfowl seasons). Late season regulations include the general waterfowl seasons, special scoup seasons, and most sandhill crane seasons. Late seasons do not include woodcock, snipe, and gallinules because the frameworks for these species are established in conjunction with other early season frameworks. However, seasons for some of these species are not selected early because many State conservation agencies desire to have them coincide with or be established within the waterfowl seasons, which are selected later.

REGIONAL DIRECTOR - 6



(Larry Kline, OES/wo)



The Service's consideration of Section 7 requirements last year for late seasons was documented in several memoranda. On June 14, 1977, the Office of Migratory Bird Management supplied data and other information regarding the Aleutian Canada goose, Mexican duck, whooping crane, Mississippi sandhill crane, southern bald eagle, brown pelican, peregrine falcon, Everglade kite, and several western clapper rails, plus considerable background information on the general situation regarding migratory game bird hunting. A consultation team was appointed to further review seven species (bald eagle, Arctic and American peregrine falcons, Everglade kite, Aleutian Canada goose, Mexican duck, and whooping crane). The results of the threshold examinations for the last two species were reported in a memorandum dated July 21, 1977, in which I concluded "that a likelihood exists that the late season of the 1977-78 hunting regulations framework may jeopardize the continued existence of the Mexican duck and the whooping crane." On August 22, 1977, I issued a biological opinion for these two species. As a result of that conclusion no waterfowl hunting seasons were initially established in portions of west Texas, southern New Mexico, and southeastern Arizona to provide additional protection for "pure" Mexican ducks in those areas. As a result of suit brought in U.S. District Court, El Paso, Texas, the Service subsequently established waterfowl hunting seasons in those areas. I rendered specific instructions to the Regional Director, Albuquerque to assure that our responsibilities under the Act were met with regard to the whooping crane. The threshold examination report dated August 4, 1977, which addressed five other Endangered species, conveyed a "no likelihood of jeopardy" conclusion.

On July 21, 1978, the consultation team met with your representatives to discuss the proposed regulations and their anticipated effects on the seven species for which consultation was requested. Those species are the Aleutian Canada goose, Mexican duck, Everglade kite, bald eagle, Arctic and American peregrine falcon and whooping crane. Your staff provided the consultation team with numerous reports, publications and correspondence from knowledgeable sources on these listed species. Copies of all pertinent documents are included in an administrative record maintained at the Office of Endangered Species and are incorporated herein by reference. Subsequent to our receipt of your request for consultation on the aforementioned species, the Mexican duck (Anas diazi) was delisted and, therefore, shall not be addressed in this opinion.

The proposed changes in the regulations for 1978-79 late seasons are as follows:

Zoning. To allow Connecticut, North Carolina, Alabama, and Nevada to establish duck hunting seasons by zones. The zones are defined in the May 25, 1978, Federal Register on pages 22423 and 22424. Zoning in these States will be

considered experimental until sufficient information has been gathered to permit an evaluation of the results of zoning. A request from Illinois to zone its goose season is still under consideration (Illinois initiated an experimental zoning for duck seasons in 1977).

Goose and brant seasons. Most of the seasons and limits are established after breeding habitat and production information for the current year becomes available.

As stated previously, the Service rendered a biological opinion on August 22, 1977, on the 1977-78 late season migratory game bird hunting regulations. In that opinion, summaries of the biological data, conservation efforts, and concerns of the consultation teams were provided for the Aleutian Canada goose, Everglade kite, bald eagle, and Arctic and American peregrine falcons. Also on August 22, 1977, a biological opinion was rendered on the Mexican duck and the whooping crane. This biological opinion therefore addresses only those changes in the 1977-78 late season regulations from last year, and any changes in the status of the aforementioned species and their habitats which could be affected by the framework not considered in previous biological opinions.

Based upon my review of the findings of the consultation team, it is my biological opinion that the late season regulations for the 1978-79 frameworks for certain migratory game birds in the United States is not likely to jeopardize the continued existence of the Aleutian Canada goose, Everglade kite, bald eagle, or the Arctic and American peregrine falcons, or destroy or adversely modify their Critical Habitats, or habitats that may be determined critical in the future. I further find that this program does not adversely affect continued conservation efforts towards these species in furthering the purposes of the Act. A summary is provided below:

ALEUTIAN CANADA GOOSE (Branta canadensis leucopareia)

The primary focus of the Service's recovery effort for the Aleutian Canada goose is to restore viable populations on other islands in the Western Aleutians. Once additional, viable nesting populations are reestablished and the numbers are increased, this subspecies will be considered for reclassification to Threatened or possible removal from Endangered Species Act protection. Captive-reared Aleutian Canada geese are being released on Agattu Island this summer, in hopes that they will adopt the traditional migration route from the Aleutian nesting areas to California. It is not known, at present, where these birds will migrate. These immatures may be led southward to the usual wintering areas by "guide birds" which have completed at least one full migration. Some individuals may stray from the usual migration routes and possibly winter

in new locations. Thus to propose additional closure areas in California would be premature at this time. Section 20.26, Title 50 CFR, provides a means for effecting emergency closures of migratory bird hunting seasons should circumstances necessitate such action. California has indicated its willingness to undertake emergency action if adjustments to the closed areas are needed. Also, State conservation agencies have been alerted by Pacific Flyway representatives to this possibility as have Service field offices in Region 1. Therefore, in view of the above precautionary measures available should the need arise, the cooperation espoused by the State of California, and reports of fewer Aleutian Canada geese shot last season in conjunction with migratory waterfowl hunting, it is my opinion that the proposed late season regulations are not likely to jeopardize the continued existence of the Aleutian Canada goose.

WHOOPING CRANE (Grus americana)

On July 21, 1977, the Service issued the results of a threshold examination on the impacts of the 1977-78 late season hunting regulation framework on the whooping crane and the Mexican duck which concluded that a likelihood existed that the aforementioned framework could jeopardize the continued existence of the Endangered whooping crane. A biological opinion dated August 22, 1977 instructed the Regional Director, Albuquerque, to modify or amend the "procedures to be followed by the Service in conducting the snow goose hunt in the Rio Grande Valley of New Mexico (Bosque del Apache NWR) to assure that our responsibilities under the Act are met with regard to the whooping crane." All such modifications have been satisfactorily implemented at Bosque and unless any changes to these procedures are proposed for the Bosque hunt that may affect the crane or any new species added to the list, further consultation on the Bosque snow goose hunt is unwarranted.

Critical Habitat was determined for the whooping crane on May 15, 1978 (43 FR 20938-20942) to include areas in the States of Colorado, Idaho, Kansas, Nebraska, New Mexico, Oklahoma and Texas. Additional Critical Habitat areas were proposed in the Federal Register on August 17, 1978 (43 FR 36588-36590), to include sites in Kansas, Montana, Nebraska, North Dakota and South Dakota. The consultation team considered many factors in trying to determine if any possible jeopardy exists to the continued existence of either the Gray's Lake or Aransas flock of whooping cranes. There continues to be major increases in both populations which, in my estimation, have resulted from expanded recovery efforts, increased monitoring by Federal and State biologists and law enforcement agents, and the implementation of all other instructions recommended in my biological opinion of August 22, 1977. Based on the above, it is my biological opinion that the late season migratory game bird regulations is not likely to jeopardize the continued existence of the whooping crane, or destroy or adversely modify its Critical Habitat.

Silent on
Alamogosa -
Monte Vista

BALD EAGLE (Haliaeetus leucocephalus)

Since our consultation on the 1977-78 late season hunting regulations, the Service issued a rulemaking (February 14, 1978) which deletes the subspecific name Haliaeetus leucocephalus leucocephalus (southern bald eagle) from the list of Endangered species and added the entire species Haliaeetus leucocephalus (bald eagle) as Endangered throughout the 48 conterminous United States, except in Washington, Oregon, Minnesota, Wisconsin, and Michigan, where it is listed as Threatened (43 FR 6230-6233). Based on a review of the data available to me, documents supplied by your staff, and recommendations of the consultation team, it is my biological opinion that the subject regulation frameworks are not likely to jeopardize the continued existence of the bald eagle.

PEREGRINE FALCON (Falco peregrinus)

Two North American subspecies are presently classified as Endangered - Arctic (F. p. tundrius) and American (F. p. anatum) peregrine falcons. There have been no changes in their legal status since our consultation last year, nor has the Service determined any additional Critical Habitat areas. As directed in last year's biological opinion, my Associate Director for Fish and Wildlife Resources has increased the Service's law enforcement efforts toward raptors, and has also increased the Service's efforts in making the public more aware of the ecological value of raptors.

Based on a review of recent data on the species, documents supplied by your staff, and recommendations of the consultation team, it is my biological opinion that no likelihood exists that the subject regulation frameworks are not likely to jeopardize the continued existence of the Arctic and American peregrine falcons.

9/18/78
error
given to
Gay Shepard
who will
pass it on.

EVERGLADE KITE (Rostrhamus sociabilis plumbeus)

There have been no changes in the legal status of this subspecies since our consultation last year, nor have any additional areas been determined as Critical Habitat for the kite. The Service is presently conducting studies on the various uses of Everglade kite habitat to determine what, if any, conflicts may exist. Although the studies have not yet been completed, I have received no indication that hunting activities have been detrimental to the kite or its habitat. Based on the best information available to me, it is my biological opinion that the subject frameworks are not likely to jeopardize the continued existence of the Everglade kite, or destroy or adversely modify its Critical Habitat.

CONCLUSION

Based on my consultation team's review of the above information and other information and data available to the Service, it is my biological opinion that the late season of 1978-79 Regulations Frameworks is not likely to jeopardize the continued existence of the species addressed herein. I further conclude that the Service has taken all reasonable measures to insure that these regulations are compatible with other conservation programs being carried out for each of these species.

Keith M. Schreiner

October 10, 1980

Area Manager, Area 5
Salt Lake City, Utah

Section 7 Consultation, Alamosa-Monte Vista NWR

Regional Director, Region 6
Denver, Colorado

SURNAME
AW:

AW Tisdale observed a whooping crane within the open waterfowl hunting area on Alamosa Refuge on October 7, 1980. This observation and subsequent discussions with Refuge Manager Nail brought to light a problem we have been ignoring for some time. Whooping cranes from the foster parent program are found on the Alamosa-Monte Vista Refuge during planned refuge waterfowl hunts (same as State seasons) often within the hunting areas.

Section 7's were approved July 7, 1980 regarding proposed habitat improvements. Consultation has never been initiated addressing the refuge hunting program. As you know, the State of Colorado was somewhat apprehensive about the foster parent program and its potential to affect hunting. Should consultation affect hunting on the refuge, the State would most likely be upset.

Based on experience at other refuges with whooping crane-hunter conflicts, do you have suggestions regarding the initiation of consultations at Alamosa-Monte Vista?

JLTisdale:bh
10-10-80

cc: Official File
Reading File

FILE <i>Edo Spencer Whooping Crane</i>	
<input checked="" type="checkbox"/> Nail <i>10/10/80</i>	<input type="checkbox"/> McDermith
<input checked="" type="checkbox"/> Subers <i>10/10</i>	<input type="checkbox"/> Espinosa
<input checked="" type="checkbox"/> Biologist	<input type="checkbox"/> Martinez
<input checked="" type="checkbox"/> Maddux	
<input checked="" type="checkbox"/> Winters	
<input checked="" type="checkbox"/> Action	<input type="checkbox"/> Information

OCT 14 1980

Mel,

Good Talking to you the other day.
Enclosed are the descriptions of color-markers
used in 1980.

Hope that you had a good elk hunt.
Probably will see you in early Oct.
as we intend to radio track one of
the whoopers to Monte Vista.

Best Wishes
Rod

1980

FILE	End. Species - Whooping Crane
✓ M. H. 9/16	
✓ Suthers.....	McDermith.....
✓ Biologist.....	Espinosa.....
✓ Maddux.....	Martinez.....
✓ Winters.....	
X Action	Information


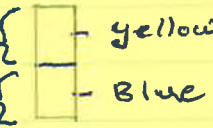

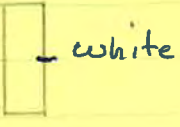

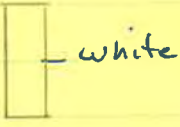
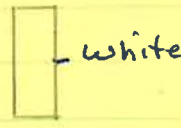
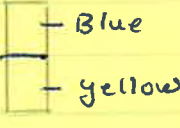

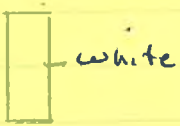
RECEIVED
Alamosa Refuge
Alamosa, Colorado

SEP 16 1980

12 Sept. 80
Wynnn, Idaho
83285

Mel,

Enclosed are descriptions of colored leg bands
used on whooping cranes hatched at Grays Lake
in 1980:




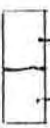

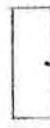


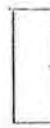
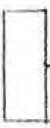
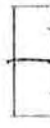

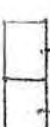


BIRD	LEFT	RIGHT
<u>Identification No.</u>	<u>LEG</u>	<u>LEG</u>
A. CANADIAN BIRDS		
80-2	3-inches high {  1 1/2-inches high 1 1/2-inches high	{  yellow Blue
80-5	 yellow Blue	 white
80-6	 yellow white	 white
80-17	 white	 Blue yellow
B. PATUXENT BIRD		
PATUXENT # 3	 Blue yellow	 white

Radio transmitters are attached to each large (3" high)
white leg band

Best Regards,
Rod

Mel,

Enclosed are descriptions of colored leg bands used on whooping cranes hatched at Grays Lake in 1980:

BIRD	LEFT	RIGHT
<u>Identification No.</u>	<u>LEG</u>	<u>LEG</u>
A. CANADIAN BIRDS		
80-2	3-inches high {  - white 1 1/2-inches high {  - yellow 1 1/2-inches high {  - Blue	
80-5	 - yellow  - Blue	 - white
80-6	 - yellow  - white	 - white
80-17	 - white	 - Blue  - yellow
B. PATUXENT BIRD		
PATUXENT # 3	 - Blue  - yellow	 - white

Radio transmitters are attached to each large (3" high) white leg band

Best Regards,

Rock

1 Oct, 79
Wayan, Id.
83285

Mel,

Enclosed is a list of colored bands
put on 8 juvenile whoopers at Grays Lake
in 1979. I hope that you can understand
this list. If you have any problems with
it let me know.

Hope to see you soon.

Best Regards,

Rod

COLOR-MARKED WHOOPING GIRRES

GRAYS LAKE NW12 - 1979

<u>I. D. No.</u>	<u>LEFT LEG</u>	<u>RIGHT LEG</u>
1. PATUXENT #1	$1\frac{1}{2}" \left\{ \begin{array}{l} \text{yellow} \\ \text{white} \end{array} \right.$	$1\frac{1}{2}" \left\{ \begin{array}{l} \text{Blue} \\ \text{white} \\ \text{Blue} \end{array} \right.$
2. PATUXENT #2	$\left\{ \begin{array}{l} \text{yellow} \\ \text{Green} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Blue} \end{array} \right.$
3. CANADA # 79-4	$3" \left\{ \begin{array}{l} \text{Blue} \end{array} \right.$	$\left\{ \begin{array}{l} \text{yellow} \\ \text{Green} \end{array} \right.$
4. " # 79-7	$\left\{ \begin{array}{l} \text{yellow} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Blue} \\ \text{white} \\ \text{Blue} \end{array} \right.$
5. " # 79-9	$\left\{ \begin{array}{l} \text{yellow-orange} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Green} \\ \text{yellow} \end{array} \right.$
6. " # 79-10	$\left\{ \begin{array}{l} \text{yellow} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Blue} \\ \text{white} \end{array} \right.$
7. " # 79-11	$\left\{ \begin{array}{l} \text{Green} \\ \text{yellow} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Blue} \end{array} \right.$
8. " # 79-12	$\left\{ \begin{array}{l} \text{yellow} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Blue} \end{array} \right.$

A. number circled indicates bird has radio transmitter attached to 1 leg band

B. All bands have a total height of 3-inches; bicolored bands on each leg are $1\frac{1}{2}$ -inches tall with 1 band over a second

COLOR MARKERS ON WHOOPING CRANES KNOWN TO BE ALIVE IN SEPTEMBER 1978

1975

1. Yellow band - AO1 left leg
 2. Yellow band - AO3 left leg
 3. Yellow band - AO4 left leg
- } All have FWS band on right leg.

1976

1. Yellow band - AO6 left leg
Small white band - right leg
2. Yellow band - AO9 right leg
Large white band - left leg

1977

1. Green - left leg (2 small bands)
White
Yellow - right leg (1 large band)

1978

1. Small yellow - right leg
Large green with white stripe - left leg
2. Yellow - A10 - left leg
Green with white stripe - right leg
3. Yellow band - All - right leg
FWS band - left leg



THE FOLLOWING THREE BIRDS MAY OR MAY NOT BE ALIVE - SPECIAL EFFORT SHOULD BE MADE TO LOCATE THEM.

1975

Yellow band - A02 - left leg.

1977

1. Large yellow - left leg
Large green - right leg
2. Large green - left leg
Yellow
Green - right leg

Whooping

Crane

Sightings

Spring 1980

Leox sightings - Ken Walker

DATE	TIME	LOCATION	HABITAT	NO. ADULTS	WITH PARENTS
75-1	A01				
75-7	A03				
75-4	A04				
76-7	A09				
76-15	A09				
77-17					
78-10					
78-1					
Pat. #1					
Pat. #2					
79-4					
79-7					
79-9					
79-10					

[illegible]

(11)

Pat. # 1

Pat. # 1

79-10

DATE	TIME	Location	habitat
APR. 3	1745	across from runway May 285	old building
APR. 4	1745	to line road to N. end of 4E	plowed building
APR. 8	0853	to 21 + 4m. road 135	plowed building
APR. 10	0620	across from runway May 285	old building

DATE	TIME	Location	habitat
APR. 4	0657	across from runway May 285	old building
APR. 10	0620	to 135 + SE	plowed building
APR. 10	0620	to 25, 4m. road 5102	plowed building

20	20	20	20
----	----	----	----

	(4)	75-1	75-7	75-4	76-7	76-15	77-17	78-10	78-1	Prt #1	Prt #2	79-4	79-7	79-9	79-10
DATE				AOR. 3 (1)		AIR. 7		AIR. 5	AIR. 5	MAR 22	AIR. 7				MAR 31 (1)
TIME				1745		0015		1645	1635	1700	1645				0215
LOCATION				from coming down 285		S101		E 25 to 285 turn over S102	E 135 + E 1	from coming down 285	Rd 1 E, line with S 55				Rd 3 S turn west S 102
OBSERVATION				cut brush		brush cutting		plowed brush cutting	brush cutting	cut brush cutting	cut brush cutting				plowed brush cutting
ATE				AIR 4		AIR 5		MAR 10	AIR 9	MAR 25	AIR 5				79-11 MAR 24
TIME				0657		0055		1705	0030	0830	1800				0715
CATION				from coming down 285		(RDSIC) turn right off 285		KC 25, 4 mi. west of S102	LD 150 +	from coming down 285	with brush cutting over top NW 1/4 RC				RD 10 S turn left NW 1/4 road
DISTANCE				cut brush		brush cutting		plowed brush cutting	brush cutting	cut brush cutting	cut brush cutting				cut brush cutting

⑤

	A01	A03	A04	A06	A09	77-17	78-10	78-1	Pat.#1	Pat.#2	79-4	79-7	79-9	79-10
DATE	75-1	75-7	75-4	76-7	76-15				(A) 27 P.H.	Pat# 2 P.H. 9(?)	79-4	79-7	79-9	79-10 APR. 2
TIME									0128	0758				1600
LOCATION					Box 25, 4 mi. west of S102				near farm among Hwy 285	west of Hwy. near crossing N.W. ridge H.C.				Pos 101, 4 mi. north of 25
HABITAT					cloudy valley				Lake Valley VCS	Cuts valley				cut valley Lake cuts
DATE									MAR. 2 23	APR 10				APR. 14
TIME									0730	0550				0110
LOCATION									near farm along Hwy 285	ridge & unmarked 2.5 or mile from road - very rough terrain				Pos 101, high peak of 25.
HABITAT									cut valley	cut valley				cut & at bottom fields
NOTE?									water	water				No

7 A01	A03	A04	A06	A09	77-17	78-10	78-1	Pat.#1	Pat.#2	79-4	79-7	79-9	79-10	79-11
APR. 5		MAR. 31		APR. 3		MAR. 3 (4)	APR. 3 (?)	MAR. 20	APR. 5 (?)			APR. 9	MAR. 24	MAR. 19
0847		0750		0745		080	0835	0725	0733			0620	0920	0735
0885 + 3E		across from among, Aug 285		across from among, Aug 285		0815 1/4 mi. west of 6 line, got out of ditch	082E, 2 mi. north of 6 line, 85	across from among, Aug 285	082E, 2 mi. north of 6 line, 85			0835 + SE	0825, 1/2 mi. west of 5101 on point	08105 1/4 mi. west of 5101 on point
cut, barley		cut, barley		cut, barley		cut, barley	much wheat (ungr.)	cut, barley field	much wheat + barley			cut, barley	cut, barley	cut, barley
		APR. 2		1141 4		APR. 3	APR. 6	MAR. 21 (2)	APR. 6			APR. 10	MAR. 28 (3)	MAR. 21
		1535		0732		0734	0740	0746	1615			0615	0845	0655
		across from among, Aug 285		across from among, Aug 285		0815, 1/4 mi. west of 6 line, west of ditch	08135 + SE	across from among, Aug 285	08135, south of west of 6 line, south of office			08135 + SE	08101, 1/2 mi. north of 285	08105, 1/4 mi. north of 285
		cut, barley		cut, barley		cut, barley	planted, barley	cut, barley field	much wheat, barley			cut, barley	much wheat, barley field	cut, barley field
								also, vision	YES			YES	vision	vision
								median						right side

	A01	A03	A04	A06	A09	77-17	78-10	78-1	PAT #1	PAT #2	79-4	79-7	79-9	79-10
DATE	MAR 31	75-7	75-4	76-7	76-15		MAR 27③	MAR 26	MAR 16	REC 3			APR 6	MAR 200
TIME	0720		0925		1545		1600	1455	1550	0645			0737	0745
LOCATION	RO 85 + 3E		across from quarry Aug 285		RO 15, 1 mi west of ca. line		4 mi south of 15, 4 mi west of ca. line 105 (along side)	4 mi into of 15, 4 mi west of ca. line 105 (along side)	across from quarry Aug 285	RO 2E, 2 mi north of 85			RO 135 + 5E	RO 35 + 5001
HABITAT	cut badland		cut badland field		cut badland		flaming badland	cut badland	cut badland	* tall "grass" meadow			cut badland the plain to former field	cut badland field
ATE	APR 13		MAR 25(2)		APR 3		MAR 28	MAR 31	MAR 17	APR 4			APR 1	79-11 MAR 18
TIME	0945		0930		0920		0925	0705	0750	0625			1730	075
LOCATION	RO 3E + 85		across from quarry Aug 285		RO 15, 1 mi west of ca. line 105 (along side)		RO 15, 4 mi west of ca. line 105 (along side)	RO 115, 4 mi west of ca. line 105 (along side)	across from quarry Aug 285	RO 2E, 2 mi north of 85			RO 135 + 5E	RO 105, 1/4 mi south of 105
HABITAT	cut badland		cut badland		cut badland		cut badland	flaming badland	cut badland	meadow			cut badland field	cut badland field
FACTS?									YES	YES			meadow	didn't check

⑤	A01		A004		A003		A06		A09		77-17	78-10	78-1	Pat. #1	Pat. #2	79-4	79-7	79-9	79-10	
	75-1	MAR. 28(17)	75-7	MAR. 22	75-4	MAR. 28	76-7	MAR. 28	76-15	MAR. 28		MAR. 20	MAR. 25	MAR. 12	MAR. 28(2)	APR. 5		APR. 2	MAR. 17	
TE	1608	1608	1705			1545	1545	0918			1730	0925	0925	0700	0947	1700		1715	0805	
ME	1608	1608	1705			1545	1545	0918			1730	0925	0925	0700	0947	1700		1715	0805	
ation	1608	1608	1705			1545	1545	0918			1730	0925	0925	0700	0947	1700		1715	0805	
itit	1608	1608	1705			1545	1545	0918			1730	0925	0925	0700	0947	1700		1715	0805	
TE	1608	1608	1705			1545	1545	0918			1730	0925	0925	0700	0947	1700		1715	0805	
ME	1608	1608	1705			1545	1545	0918			1730	0925	0925	0700	0947	1700		1715	0805	
ATION	1608	1608	1705			1545	1545	0918			1730	0925	0925	0700	0947	1700		1715	0805	
bitat	1608	1608	1705			1545	1545	0918			1730	0925	0925	0700	0947	1700		1715	0805	
overdo?	1608	1608	1705			1545	1545	0918			1730	0925	0925	0700	0947	1700		1715	0805	

	A01	A03	A04	A06	A09	77-17	78-10	78-1	Pat. #1	Pat. #2	79-4	79-7	79-9	79-10	79-11
	75-1	75-7	75-4	76-7	76-15										
E	MAR. 24	APR. 7	MAR. 20 ②	APR. 3	MAR. 25		MAR. 13	MAR. 18	MAR. 11	MAR. 24 (?)	APR. 2	APR. 10 (?)	MAR. 22	MAR. 27	MAR. 14
E	0725	0750	0725	1620	0805		0715	0720	1115	0820	1637	1620	1620	A.M.	0718
ion	RD 3E, 1/4 mi. north of 105	RD 3N + 3E	cross from among things 285	RD 2N + country line	country line rd. 1/4 mi. north of 15		RD 2S 1 1/4 mi. south of 6	RD 10S 1/4 mi. south of Co. line	RD 10 1/2 mi. north of 105	RD 2E, 1/2 mi. north of 105	RD 3N + 3E	RD 10S, 1/4 mi. south of Co. line	RD 10S, 1/4 mi. south of Co. line	RD 2S 1/2 mi. north of 105	105, 1/4 mi. south of 105
T	cut looking across	brush looking	cut looking field	plowed looking	plowed looking (30 ft.)		plowed looking (30 ft.)	plowed looking field	grass area	weeds looking + what	brush looking	plowed looking	cut looking looking field	cut looking looking field	cut looking looking field
	MAR. 26 (7)	APR. 8	MAR. 21	APR. 4	MAR. 26		MAR. 27	MAR. 27	MAR. 11	MAR. 27 (7)	APR. 3	APR. 1	MAR. 13	MAR. 13	MAR. 16
	0830	0630	0740	1640	1548		0927	1030	1600	1300	1544	0715	0850	0850	1945
ion	RD 8S + 2E	RD 3N + 3E	cross from among things 285	RD 2N + country line	country line		RD 3N + 3E	RD 10N + 3E	RD 4S 1/2 mi. north of 105	RD 2E, 1/2 mi. north of 85	RD 3N + 3E	RD 10S, 1/4 mi. south of Co. line	RD 10S, 1/4 mi. south of Co. line	RD 2S 1/2 mi. north of 105	RD 10S, 1/4 mi. south of Co. line
T	cut looking	brush looking	cut looking field	brush looking	cut looking		cut looking	brush looking	cut looking field	weeds looking	brush looking	cut looking	cut looking looking field	cut looking looking field	cut looking looking field
											YES		YES	YES (1)	UNCESSARY

	A01	A03	A04	A06	A09	77-17	78-10	78-1	Pat #1	Pat #2	79-4	79-7	79-9	79-10
DATE	MAR 17	MAR 1	MAR 7	MAR 24	MAR 21	APR 10	MAR 6	MAR 14	MAR 6	MAR 20	MAR 27	APR 1	MAR 19	MAR 6
TIME	1645	1615	0500	0943	1612	0735	1730	1800	1640	0700	0823	0800	0830	1720
Location	1) RD 75, 1/4 mi. west of SE	RD 30 + SE	curves from quarry	RD 5N, 3/4 mi. west of Cal. line	RD 25, 1/4 mi. west of S102	curving Rattle, near Quercus hill	mod. of 25 1/4 mi. west of Cal. road	RD 105, 1/2 mi. west of Cal. line	mod. of 1/4 mi. west of SE	RD 75, 1/4 mi. west of SE	RD 30 + 30	LAND'S FROM CONCRETE (AREA) BEHIND HOUSE	1) RD 125 1/4 mi. west of SE	mod. of 25 1/2 mi. west of Cal. road
Habitat	1) mod. bushy 2) cut bushy	bushy bushy field	cut bushy field	cut bushy	plowed bushy field	cut bushy	plowed bushy field	cut bushy field	cut bushy field	mod. of 1/4 mi. west of SE	plowed bushy field	cut bushy field	cut bushy field	plowed bushy field
ATE	MAR 20	APR 6	MAR 17	MAR 31	MAR 24		MAR 17	MAR 17	MAR 17	MAR 22	MAR 31	APR 6	MAR 17	79-11 MAR 12
Time	1605	1710	0750	0800	0903		1505	1505	0800	1640	1640	1640	1600	0330 0925
Location	RD 75, 1/4 mi. west of SE	RD 20 + Cal. line road	curves from quarry	RD 15, 1/4 mi. west of Cal. line	Cal. line road, 1/4 mi. west of S102		RD 105, 1/2 mi. west of Cal. line	RD 105, 1/2 mi. west of Cal. line	curves from quarry	RD 75, 1/4 mi. west of SE	RD 30 + 30	land's from concrete (area) behind house	RD 125 1/4 mi. west of SE	RD 125 1/4 mi. west of SE
Habitat	mod. bushy	plowed bushy	cut bushy field	cut bushy	cut bushy		cut bushy field	cut bushy field	cut bushy field	cut bushy field	plowed bushy	plowed bushy	cut bushy	cut bushy
with									water	water	YES	near by M. road	plowed bushy	plowed bushy

2

②	A01	A03	A04	A06	A09	77-17	78-10	78-1	Pat. #1	Pat. #2	79-4	79-7	79-9	79-10
DATE	MAR. 16(7)	MAR. 20(2)	MAR. 5	MAR. 17	MAR. 20	MAR. 18	MAR. 4	MAR. 11	MAR. 4	MAR. 12	MAR. 26	MAR. 6	MAR. 14	MAR. 5
TIME	1530	1635	0820	0125	0745	1030	1600	1645	1600	1400	1605	0930	1800	0905
LOCATION	AD 3E + BS	AD 3N + 3E	South of thing 285 across from among	AD 3N + 3E	AD 2S + 500	along ridge with and	South of thing 285 across from among	AD 4S + 4S	South of thing 285 across from among	AD 2S + 500	AD 3N + 3E	South of thing 285 across from among	AD 4S + 4S	AD 2S + 500
HABITAT	cut bushy field	brush bushy field	cut bushy field	cut bushy field	cut bushy field	cut bushy field	cut bushy field	cut bushy field	cut bushy field	cut bushy field	brush bushy field	cut bushy field	cut bushy field	brush bushy field
IN PROGRESS										YES	YES	YES	NO	NO
DATE	MAR. 17	MAR. 25	MAR. 26	MAR. 20	MAR. 20	APR. 1	MAR. 5	MAR. 12	MAR. 5	MAR. 13	MAR. 26(3)	MAR. 9(7)	MAR. 17	MAR. 6
TIME	0715	0650	1640	0845	1730	0947	0920	1710	0820	1645	1620	1600	1640	0830
LOCATION	AD 2S + 3E	AD 3N + 3E	South of thing 285 across from among	AD 5N + 4N + ca. line	AD 2S + 4N + 510Z	being cut line with grass location	South of thing 285 across from among	AD 4S + 4E	South of thing 285 across from among	AD 2E + 4N + 510Z (MV before)	AD 3N + 3E	South of thing 285 across from among	AD 4S + 4N + ca. line	AD 2S + 500
HABITAT	cut bushy field	brush bushy field	cut bushy field	cut bushy field	brush bushy field	cut bushy field	cut bushy field	cut bushy field	cut bushy field	cut bushy field	brush bushy field	cut bushy field	brush bushy field	cut bushy field
with plants					the line is off.				UNDER TAIN	YES	YES	the under wood	NO	under wood

4/25 - Pat #2 MV Ryger

4/24 - Pat 79-7, but couldn't read number

4/15 - 79-11

4/16 - 79-9

Boys Lake
#01 - #03
A03
A04
A09

76-7
Ecloat, Colo
77-02
78-1

W. 50 H - Curran -
- Keeping Curran - Slide Program -
- Curran Program -

4/15/80

Chart 13 McRiggs - Inn, Yellow-Green, Tammiller, Green
Pat # 2
Yellow - Tammiller (79-11) 7:55 am

8:45 - Tammiller 1/2 mile west but about
Green & yellow on one leg, couldn't read other
leaf was too bad



4/14/80

B535E - 6-4 right, Knoxville left
79-9, 2:30 AM

Steve Samsen Whooper Observations

10/28/80

78-10 Between Highway 160 + Rio Grande River

79-4 "

PATUX #1 "

79-10 "

10/29/80

77-17 Perry Quarter East of Alamosa NWR

79-7 South of Monte Vista

10/30/80

A03 No. of River

10/31/80

78-1 South of River - Higel's

Mels:

Enclosed are color-markers on whooping cranes. The following are known to be alive in Sept. 1978:

1975

1. yellow band - A01 left leg
 2. yellow band - A03 left leg
 3. yellow band - A04 left leg
- } all have FWS bands on right leg

1976

1. yellow band - A06 - left leg
Small white band - Right leg
2. yellow band - A09 - Right leg
large white band - left leg

1977

1. $\begin{cases} \text{Green} \\ \text{white} \end{cases}$ - left leg (2 small bands)
 $\begin{cases} \text{yellow} \end{cases}$ - Right leg (1 large band)

1978

1. $\begin{cases} \text{Small yellow} - \text{Right leg} \\ \text{large Green with white stripe} - \text{left leg} \end{cases}$ $\begin{cases} \text{Green} \\ \text{white} \\ \text{Green} \end{cases}$
2. $\begin{cases} \text{Yellow} - \text{A10} - \text{Left leg} \\ \text{Greens with white stripe} - \text{Right leg} \end{cases}$ $\begin{cases} \text{Green} \\ \text{white} \\ \text{Green} \end{cases}$
3. $\begin{cases} \text{Yellow band} - \text{A11} - \text{Right leg} \\ \text{FWS band} - \text{left leg} \end{cases}$

over

RECEIVED

SEP 25

MONTE V
NWR

FILE	
Hall	
Acst.	
Gender	
Winters	
X Action	✓ Inform

The following 3 bands are from birds that may possibly still be alive:

1975

Yellow band - AC2 - left leg

1977

1. large yellow - left leg

large Green - Right leg

2. large Green - left leg

Yellow - Right leg.
Green

I hope that this information will help you.
I will be looking forward to receiving any reports,
especially if you locate one of the missing birds.

Best Regards,

Red

WHOOPING CRANE RECOVERY TEAM

U.S. FISH & WILDLIFE SERVICE
NEBRASKA GAME AND PARKS COMMISSION
TEXAS PARKS & WILDLIFE DEPARTMENT
NATIONAL AUDUBON SOCIETY



REPORT AND MINUTES OF WHOOPING CRANE RECOVERY TEAM July 17-19, 1979

Team Meeting #11: Laurel, Maryland

Members Present: Mr. David Olsen, Team Leader, Washington, D.C.
Dr. Harold Irby, Austin, Texas
Dr. Ray Erickson, Laurel, Maryland
Mr. David Blankinship, Rockport, Texas
Mr. Lawrence Smith, Albuquerque, New Mexico

Members Absent: Mr. Ross Lock, Lincoln, Nebraska
Dr. Roderick Drewien, Wayan, Idaho

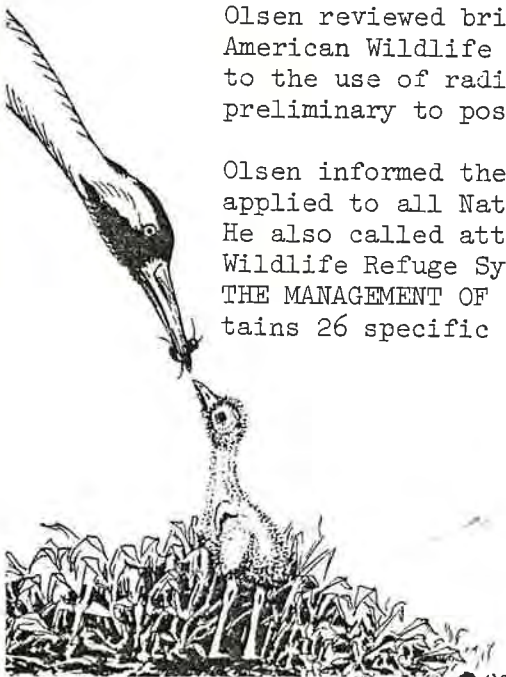
Others Present: Mr. Conrad Fjetland, Pinkerington, Ohio
Dr. Scott Derrickson, Laurel, Maryland

JUN 16 1980

July 17, 1979, Patuxent Wildlife Research Center. Team Leader Olsen opened the meeting at 8 a.m. with some general comments and information. Purpose of this meeting was to review the comments received as a result of Agency Review of the Draft Plan and either take action in regard to comments or make a response to the comments. While the planning effort has been underway for a considerable time, it is encouraging that many of the items within the plan have served as guidance and been put into practice. In view of Ray Erickson's pending retirement at the end of the year, it is desirable that the Team have this opportunity to review with him the program at Patuxent.

Olsen reviewed briefly the meeting with Canadians during the North American Wildlife Conference during March, 1979. The Canadians agreed to the use of radio transmitters on some of the Grays Lake birds as a preliminary to possible use of transmitters on Wood Buffalo Lake birds.

Olsen informed the Team of the new master planning procedure to be applied to all National Wildlife Refuges during the next three years. He also called attention to the Secretary's Task Force on the National Wildlife Refuge System and its report titled FINAL RECOMMENDATIONS ON THE MANAGEMENT OF THE NATIONAL WILDLIFE REFUGE SYSTEM. This report contains 26 specific recommendations for administration of the refuge system.



End. Species Whooping Crane 1979
MAY 14
6/16
6/27
FJ

Smith discussed the management planning process underway in the Pacific Flyway covering individual goose, crane, and swan flocks or populations. The Pacific Flyway Council endorsed a position statement on whooping cranes calling for full State and Provincial involvement in planning for a third flock of whooping cranes, or for release of Patuxent reared whooping cranes at Grays Lake or elsewhere in the Pacific Flyway. This type of management planning is to be initiated in the Central Flyway during F. Y. 1980.

Smith reported on the status of the Corps of Engineers' Chloride Control proposal for the Salt Plains National Wildlife Refuge. This proposal, which would have changed considerably the management and face of Salt Plains NWR, has been shelved for the time being. Stated reason for shelving the project was that current information on potential use of the treated water by industry was lower than originally expected. Thus, the benefit/cost ratio dropped and made the project unprofitable AT THIS TIME. The Corps is continuing studies and the project could be resurrected at any time.

Smith reported on preliminary planning for the 1979 Bosque del Apache NWR snow goose hunt. In an effort to increase the harvest of snow geese, the refuge will recognize the State bag limit of 5 birds and permit the use of ten steel shot shells. The 16-day season will be divided into three hunt periods. Each blind will be provided with a paging radio rather than the AM radio units that left much to be desired. Plans are to re-test hunters who took the Bosque hunter training program prior to 1978.

Blankinship reported on habitat conditions in the Aransas area and on the Spring departure of the whooping cranes. Blue crabs of the appropriate size are abundant. The Mexican oil spill in the south end of the Gulf of Mexico is presently an unknown as to possible contamination of coastal habitat in Texas.

Erickson and Derrickson reported on the captive flock at Patuxent. Lineage records are maintained for all birds. Five eggs were sent to Grays Lake, of which four hatched. This was the first year that all eggs were incubated under sandhill cranes. Future plans are to send only those eggs known to be fertile to Grays Lake. Of sixteen eggs retained at Patuxent, eight hatched and four birds are being raised under foster parent sandhill cranes. The nesting phenology at Grays Lake and Patuxent was not suitable for transfer of these sixteen eggs.

The Team was impressed with the numerous details required in the successful rearing of whooping cranes in captivity--most of them learned the hard way. As an example, tetracycline is used in their water to prevent yolk sac infection. A worming medicine is required to prevent spiny headed worms which puncture the gut--possibly obtained from eating insects or frogs.

The need to expand the capability of incubating whooping crane eggs under sandhill cranes at Patuxent is indicated.

Discussion revolved about ways to increase fledging at Grays Lake. Improved predator control and an increased number of eggs would be required. However, the eggs that can be sent to Grays Lake in any one year depends on the similarity of the nesting phenology at Grays Lake and Patuxent. Fjetland asked if the Grays Lake population of whooping cranes could ever develop without predator control. Erickson believes that whooping crane parents will provide better protection to young whooping cranes than occurs with sandhill foster parents. The reaction of young whoopers to alarm signals from sandhill parents is quite the opposite from that of young sandhill cranes and confusing to the parent birds when trying to protect the young.

Following a lunch break, the Team got to the task of reviewing as a group the comments received following distribution of the Agency Review Draft of the Recovery Plan. It was quickly decided to utilize a method employed with other recovery plans similar to that of handling comments in environmental impact statements. The agency comments will be printed in the final plan, with margin notations as to the response number that applies to each particular portion of the comments. This is particularly useful where there are several comments of a similar nature. The balance of the day was utilized in discussing each comment and either making a decision to change the plan, if needed, or otherwise respond to the comment.

July 18, 1979. The Team toured the captive whooping and sandhill crane facilities at Patuxent and an area of the station where new pens are under construction.

The Team discussed the potential transfer of the two whoopers presently at the San Antonio zoo to increase the genetic diversity at Patuxent. The Team recommended that Patuxent arrange the transfer of Ektu and Criptu to Patuxent and possibly make two Patuxent birds available to the San Antonio zoo. Such a transfer would require that Patuxent veterinarian, Jim Carpenter, travel to San Antonio and assist in tests on the birds before shipping. Probable transfer date would be September.

Some discussion was held on methods of releasing Patuxent parent reared yearling or older sandhill cranes at Grays Lake as a preliminary to the possible release of similarly raised whooping cranes. It appears probable that more whooping cranes could be produced at Patuxent for release as yearlings than can be accomplished through egg transplant. This is a point of concern with the Pacific and Central Flyway Councils and will require proof of feasibility through testing with sandhill cranes. Fifteen sandhill cranes of three egg classes will be available for such experimentation in 1981. Scott Derrickson and Rod Drewien

should draft a detailed plan. These plans should be presented to the 1980 Central and Pacific Flyway Technical committee meetings by Rod or Scott.

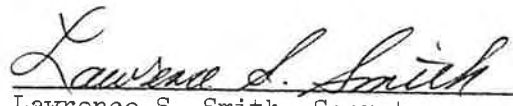
The balance of the day was utilized in completing the review of comments on the draft plan and drafting a response for all comments.

July 19, 1979. The Team had the benefit of two presentations by the Patuxent staff that were both very interesting and impressive from the point of view of a better understanding the many problems that have had to be solved in the way of disease prevention and proper nutrition. Dr. James Carpenter recounted the efforts and cooperation they had received in identifying the cause of lesions and granuloma found in almost any tissue of sandhill and whooping cranes--eventually traced to a coccidia. It was important to learn whether this organism was present in cranes in the wild before birds, rather than eggs, would be placed in the wild from Patuxent. The coccidia was found to be present in Grays Lake sandhill cranes and a nomenclature for the species needs to be developed.

Dr. John Serafin, Nutritionist, has worked with the diets for several sandhill crane species as well as the whooping crane. The leg disorder developing with 14-21 day old chicks has been found to be a dietary problem. It would be interesting to know where the program would be today if we could have known ten years ago what we know today about raising whooping cranes in captivity. Frequently, solutions to problems in raising sandhill cranes did not work with whooping cranes.

The meeting concluded mid-day. Olsen will have the response to comments typed for review by Team members and make the agreed to changes in the recovery plan. The plan will then be submitted to the Albuquerque Regional Director for review and recommendation for approval by the Director.

As to a future Recovery Team meeting, the next North American Wildlife Conference scheduled for Miami, Florida would make a logical time and place for the next meeting. It is a convenient time to discuss whooping crane plans with the Canadians. Florida has been mentioned as a possible site for a non-migratory flock of whooping cranes. The location would offer some Team members an opportunity to view potential release sites.


Lawrence S. Smith, Secretary
Whooping Crane Recovery Team

U.S. FISH AND WILDLIFE SERVICE

region 6

80-24

REFER: SOLT 303/234-3990

APRIL 18, 1980

FOR RELEASE UPON RECEIPT

EARTH DAY 1980 BRINGS TO AMERICA'S HEARTLAND GREATEST NUMBER OF WHOOPING CRANES ON SPRING MIGRATION IN HALF A CENTURY

DENVER--The giant, graceful white birds that symbolize endangered wildlife in America are migrating northward now through the States of the Rocky Mountain-Missouri Basin Region. Their numbers on this spring's migration are the largest in at least half a century.

Seventy-six whooping cranes are enroute from the Texas Gulf Coast to the desolate, marshy region 2,600 miles north where they nest in Canada's Wood Buffalo National Park.

Fifteen additional whooping cranes--none more than five years old--are journeying a shorter distance from New Mexico across the Rocky Mountains to Idaho.

The 91 wild cranes stop to rest and feed in hospitable States like Kansas, Nebraska, the Dakotas, Wyoming, Montana and Utah. In these states the tallest of North America's birds still can find the kind of solitary grassy marshlands that have sustained cranes from prehistoric times.

Thousands of years ago migrating cranes flew only as far north as the Great Ice Sheet would allow. Then, they nested well down in what is now the lower 48 States. Some cranes did not migrate at all. As the ice melted, many cranes found new marshes farther and farther northward. Gradually the migration routes were created that flocks of cranes would follow for thousands of years.

-MORE-

FILE <i>Endangered Species - whooping crane</i>	
<input checked="" type="checkbox"/> Nail <i>MM 1/2</i>	<input type="checkbox"/> W. Dermith
<input checked="" type="checkbox"/> Suthers <i>4/27</i>	<input type="checkbox"/> Espinosa
<input type="checkbox"/> Biologist	<input type="checkbox"/> Martinez
<input checked="" type="checkbox"/> Maddux <i>5/1</i>	<input checked="" type="checkbox"/> Gandy
<input type="checkbox"/> Winters	<input checked="" type="checkbox"/> M. B. B. <i>1980</i>

hatched at the U.S. Fish and Wildlife Service's Patuxent Research Center in Maryland.

Some of the female cranes at Patuxent began laying eggs at five or six years of age, but none of the "captive" cranes has mated naturally. Fertile eggs are produced by artificial insemination.

But the Patuxent whoopers are playing an increasingly important role in an experiment begun in 1975. Some of their eggs with extra eggs from the wild whooping crane nests in Canada are placed each spring in the nests of greater sandhill cranes in Idaho.

The unsuspecting sandhill cranes hatch the whooping crane eggs and serve as foster parents to the young whoopers, teaching them to fly and taking them on migration 870 miles from Idaho to New Mexico.

In the fall of 1979, 15 young whoopers migrated over the sandhill crane route to New Mexico. The youngest of them went on to Mexico with its foster parents. All 15 are returning now to Idaho. They stayed longer than usual in Colorado's San Luis Valley, but at least three of them, including the youngest, are already at Grays Lake National Wildlife Refuge in Idaho.

These 15 will continue to fly the migration route independently. The hope is that they and other whooping cranes hatched in Idaho will mate with each other and form a second migratory flock with a relatively short and safe route between nesting and wintering grounds.

Two flocks of whooping cranes in the wild would be a great step forward in saving the beautiful white bird from going the way of the passenger pigeon and sabre-toothed tiger.

1980 WHOOPING CRANE COUNT

Whooping cranes flying New Mexico/Idaho migration route.....	15
Whooping cranes flying Texas Gulf Coast/Canada's Wood Buffalo Park route.....	76
Whooping cranes in Patuxent captive flock.....	24
Whooping cranes at National Crane Center, Wisconsin.....	2
Whooping cranes at San Antonio Zoo, Texas.....	2
Total world population.....	119

###

1
(orig sent to Aurland 3/24)

RM Alamosa - Monte Vista

PERMIT FOR ENDANGERED SPECIES PHOTOGRAPHY

To: Regional Director, Region 6

From: Refuge Manager, Alamosa - Monte Vista National Wildlife Refuge

The following individual has requested permission to photograph an endangered species, the whooping crane and bald eagle.

Name Gary Gerhardt Firm Rocky Mountain News
Address _____ Telephone _____
Denver, Colorado

Dates March 28 - April 4, 1980 or any other date in April substituted by the photographer. (inclusive)

The applicant has outlined a plan to photograph, and has agreed to follow precisely any instruction and restrictions set by refuge personnel. I have reviewed the plan and believe this activity (will not) (~~may~~) affect the continued existence of the endangered species.

I recommend: (Approval) (~~Disapproval~~) Subject to these special stipulations:

Photographer will contact Refuge Manager on arrival. Any special conditions existing at that time will be furnished to the photographer.

Gerhardt is a reporter for RMN. He will take photo-photographer with him on assignment to San Luis Valley refuges - Recommend further that permit be approved - VRT, PA

Signature: Melvin T. Nail

Refuge Manager
Melvin T. Nail

Approved: Danny M. Ryan

Regional Director

3/24/80

(Date)

FILE	End. species - whooping crane
Nail	3/24/80
McDon	3/24/80
Colins	
...	

MAR 28 1980

cc: Area Manager

UNITED STATES
DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

MAILING ADDRESS:
P.O. Box 25486
Denver Federal Center
Denver, Colorado

STREET LOCATION:
134 Union Boulevard
Lakewood, Colorado

March 26, 1980

Region 6 Release # 73

MEMORANDUM

To: Regional Directorate, Regional Staff Offices, Area Managers,
and Project Leaders, Region 6

From: Regional Director, Region 6 (PA)

Subject: Permits for commercial filming; delegation of authority

Effective with receipt of this memorandum, Project Leaders have authority to grant permission for commercial photographers to film on FWS-managed property. However, permission to film endangered species still must be coordinated in advance of photography with the Regional Office of Public Affairs.

The attached form must be signed by the applicant and the Project Leader. The Project Leader may determine whether to require posting of bond or to waive bond. (Bond normally is not required.) All special stipulations set by the Project Leader must be agreed to by the applicant and all commercial photography may be subject to supervision by refuge personnel. A copy of the completed form and any attachments should be mailed to the Regional Office (attention: Public Affairs) for filing.

In the event of requests for major activities, such as motion picture production or filming for television commercials, Project Leaders will, before granting permission, consult by telephone with the Regional Public Affairs Officer.

It is our intent to cooperate with all photographers, both commercial and non-commercial, but primary consideration always will be given to the welfare of the wildlife resource. It is desirable to have the Fish and Wildlife Service associated only with activities that might be termed "in good taste." If you have any doubts about a proposed activity, or about the credibility of an applicant, contact the Regional Public Affairs Officer immediately. Any appeal of a Project Leader's ruling by an applicant must be to the Regional Office.

These procedures are in accord with CFR 43, Part 5 (copy attached).

Attachments

James C. Grithen
JAMES C. GRITHEN

Date _____

APPLICATION FOR PROFESSIONAL PHOTOGRAPHY
ON U.S. FISH AND WILDLIFE SERVICE LANDS
(REGION 6)

To the Project Leader, _____,
U.S. Fish and Wildlife Service, Department of the Interior, Region 6:

(1) Permission is requested to make, in the area mentioned above,
a _____.

(2) The scope of the filming (or production or recording) and the
manner and extent thereof will be as follows: X(Complete this section on
attached addendum)

Weather conditions permitting, work will commence on approximately
_____ and will be completed on approximately _____.

(3) The undersigned accepts and will comply with the following
conditions:

(i) Utmost care will be exercised to see that no natural features
are injured, and after completion of the work the area will, as required
by the official in charge, either be cleaned up and restored to its prior
condition or left, after clean-up, in a condition satisfactory to the
official in charge.

(ii) Credit will be given to the U.S. Fish and Wildlife Service,
Department of the Interior, by an appropriate sub-title or acknowledgement
at the beginning of the film, unless the Regional Director relinquishes
the requirement for such a credit in writing. However, this credit or
acknowledgement may not be used on any film until Regional Office personnel
have reviewed the film and the producer has corrected any portions of the
film as recommended by the Regional Director after his review of the film.
It is understood that such recommendations for correction from the
Regional Director will only relate to technical accuracy.

(iii) Pictures will be taken of wildlife only when such wildlife
will be shown in its natural state or under approved management conditions
if such wildlife is confined.

(iv) Any special instructions received from the official in charge
of the area will be complied with. X(See attached addendum)

(v) Any additional information relating to the privilege applied for
by this application will be furnished upon request of the official in charge.

Bond Requirement \$ _____

Applicant
For _____
Company

Approved: _____

Title

Date _____

ADDENDUM TO APPLICATION FOR PERMISSION
TO FILM

Addendum No. _____ Date _____

NAME: _____

REPRESENTING (COMPANY, etc.) _____

TYPE OF FILM TO BE MADE (movie, still, sound, etc. - including title
of production, if applicable) _____

The scope of the filming activity and the manner and extent that the
production will involve the use of Refuge land are as follows:

FILMING LOCATION (be specific): _____

FILMING DATE(S) (include hours): _____

NUMBER OF PERSONS INVOLVED: _____

NUMBER, TYPES AND USE OF VEHICLES: _____

WHERE WILL VEHICLES BE PARKED: _____

DESCRIBE ANY MAJOR PROPS, TEMPORARY CONSTRUCTION ETC.: _____

USE OF DOMESTIC ANIMALS (number and type): _____

CLEAN UP WILL BE COMPLETED BY: _____

BOND/DEPOSIT REQUIREMENT: ☐ YES ☐ NO AMOUNT: \$ _____

CREDIT WILL _____; WILL NOT _____ BE GIVEN TO THE DEPARTMENT OF
THE INTERIOR AND THE FISH AND WILDLIFE SERVICE THROUGH THE USE OF AN
APPROPRIATE TITLE OR ANNOUNCEMENT.

ATTACH ADDITIONAL SHEETS AND/OR MAPS IF NECESSARY.

APPROVED (signature)

(signature)

DATE

DATE

Name of Company

Street

City, State, Zip Code

RM, Mamora-Monte Ustá
(F4I, we sent original
PHOTOGRAPHY to Mc Namara)

From: Refuge Manager, Alamosa-Monte Vista National Wildlife Refuge

Name	<u>Charles McIlamara</u>	Firm	<u>E & P Mountain Commuter</u>
Address	<u>Route 2 Box 314</u>	Telephone	<u>674-8048 (office) 838-7735 (home)</u>
	<u>Pine, CO 80470</u>		

The applicant has outlined a plan to photograph, and has agreed to follow precisely any instruction and restrictions set by refuge personnel. I have reviewed the plan and believe this activity (will not) (may) affect the continued existence of the endangered species.

The Photographer must stop in the Refuge headquarters when arriving at Refuge for consultation with Refuge Manager.

Signature: Melvin
Refuge Manager

(Date)

cc: Area Manager

End. Species - Whooping C.

✓	No.	MM 3/18	McBarnett
	Authors	3/24	Eggs
	Weight		Marines
	Measuring		
	Wings		
	Y. Azlon		Information

MAR 14 1980



MAR 24 1980

ENDANGERED SPECIES TECHNICAL BULLETIN

Department of the Interior • U.S. Fish and Wildlife Service • Endangered Species Program, Washington, D.C. 20240

Service Plan Maps Whooping Crane Recovery

A popular symbol of endangered wildlife, the whooping crane (*Grus americana*) stands to benefit from a Service-approved recovery plan.

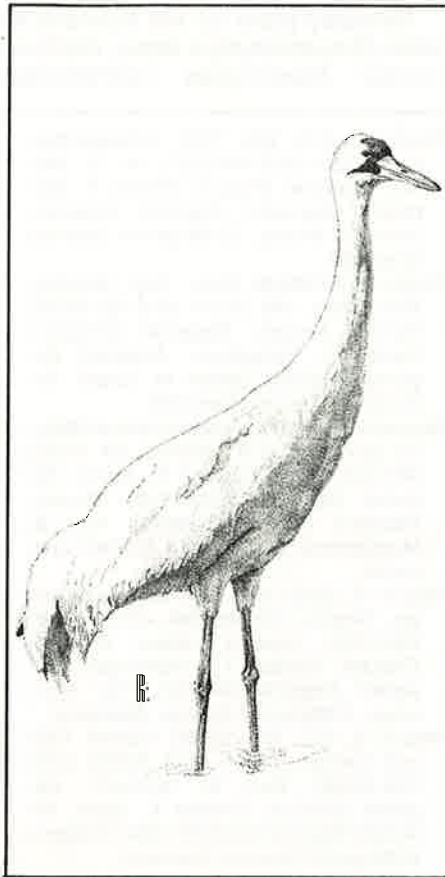
The concept of whooping crane recovery is not new to those concerned with the survival of this stately bird, the tallest in North America. Management actions by the United States and Canada, in response to increasing public concern for the crane, have resulted in a gradual increase in their numbers—from a dismal low point of only 21 birds in 1941, to 119 in both wild and captive populations.

According to the Service-appointed Whooping Crane Recovery Team, the plan's prime objective of removing the whooping crane from Endangered status could be met by (1) increasing to at least 40 nesting pairs the wild population that migrates between breeding grounds in Canada's Wood Buffalo National Park and wintering grounds at the Aransas National Wildlife Refuge in Texas and (2) establishing at least two additional, separate, and self-sustaining populations numbering at least 20 nesting pairs each.

(Current whooper populations include the wild Wood Buffalo-Aransas flock, a foster-reared wild population which migrates between Grays Lake National Wildlife Refuge in Idaho and the Rio Grande Valley in New Mexico, and captive birds at the Service's Patuxent Wildlife Research Center in Maryland, the International Crane Foundation in Baraboo, Wisconsin, and the San Antonio Zoo.)

Background

The whooping crane has never been common in recent times, with the population estimated at about 1,300 in the



mid-1800's. At the time of the establishment of the Aransas Refuge in 1937, only two small breeding populations remained—the migratory Wood Buffalo-Aransas flock and a sedentary population in southwestern Louisiana. A storm in 1940 reduced the Louisiana population beyond recovery. The last member of that population was taken into captivity in 1948.

Historically, the whooper's breeding

range (during North American settlement) extended from central Illinois, northwest through the northern half of Iowa, western half of Minnesota, northeastern corner of North Dakota, southern Manitoba and Saskatchewan, to the vicinity of Edmonton, Alberta. Whooping cranes disappeared from the heart of their breeding range in the northcentral United States by the 1890's. In 1954, an isolated breeding population was discovered in Wood Buffalo National Park—the only wild population that managed to survive.

Reasons for Decline

There have been many factors associated with the species' decline. As with many other migratory birds with delayed sexual maturity (estimated at 4 to 6 years of age) and apparent life-long pair bonds, whooping cranes adhere to their ancestral breeding grounds, migratory routes, and wintering areas, leaving little likelihood for expansion.

Most significant in the species' decline are man-associated factors. The agricultural development of the Great Plains made nearly all of the whooper's original range unsuitable. Disruptive practices included draining, burning, plowing, sowing, cultivating, harvesting, and human activity associated with these operations. Although whoopers will tolerate short periods of human intrusion, they are extremely wary on the breeding grounds and will not stay near human activity.

To date, there is no evidence that pesticide contamination has adversely affected the welfare of the whooping crane. However, potential harm from environmental contamination (such as oil spills which have occurred near the

Continued on page 4

Whooper Recovery

Continued from page 1

Aransas Refuge) remains a threat.

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Recovery Plan Recommendations

Among the recovery methods outlined in the Service's plan are habitat management, law enforcement, captive propagation and cross-fostering. Although the availability of nesting habitat in the Wood Buffalo Park does not appear to be limiting the whooper's expansion, the loss of wintering habitat will eventually prevent population increases. It is the opinion of the recovery team that the Aransas Refuge and nearby habitat can support at least 40 nesting pairs and associated sub-adults and birds of the year. (There are currently 76 birds in this population.) There is believed to be sufficient habitat on the remainder of the Texas coast to support several hundred whooping cranes, if they would use it.

The plan also calls for identification and protection of stopover sites along the migration route. Little is known about the consistency of site use by whoopers in migration. An important goal of the plan is to determine which areas are most often used and why.

Management practices should be applied first to areas designated as Critical Habitat or other areas of concern, according to the plan. Critical Habitat for the whooper (F.R. 5/15/78) consists of nine refuges and migratory stopover areas used by the two wild populations (See June 1978 BULLETIN). Included in the designation are Platte River bottoms between Lexington and Dehman, Nebraska, one of the principal resting and feeding areas for the whooping crane during its spring migration. It is one of the last suitable areas for whoopers to rest before the last leg of their 2,600-mile journey back to Wood Buffalo Park.

The recovery plan calls for captive propagation of whoopers to produce eggs which can be used in a cross-fostering program. Experimental efforts involving egg transfers have also shown signs of success. In a cooperative effort between our Service and the Canadian Wildlife Service (CWS), eggs

from whooping crane nests in Wood Buffalo Park and those captive-produced at Patuxent are being transferred to wild sandhill crane (*Grus canadensis*) nests at Grays Lake Refuge. Once placed in the nest, the eggs are incubated and hatched, and the whooper chicks are reared and reintroduced into the wild by their sandhill crane foster parents.

Experiments at Patuxent indicate that parent-reared birds possess wild characteristics even after several years in captivity, and may be capable of making the transition from captivity to the wild. Depending on the results from release experiments with parent-reared sandhill cranes, these parent-reared whoopers will either remain with the captive flock at Patuxent, or be released at Grays Lake to bolster that population.

At present, 15 whoopers are located in the Rio Grande Valley, the wintering grounds of the Grays Lake sandhill cranes. Results from the Grays Lake experiment will aid future transplantings designed to establish new, self-sustaining populations and insure the long-range security of the whooping crane. Our Service and the CWS plan to implement a program to establish and manage addi-

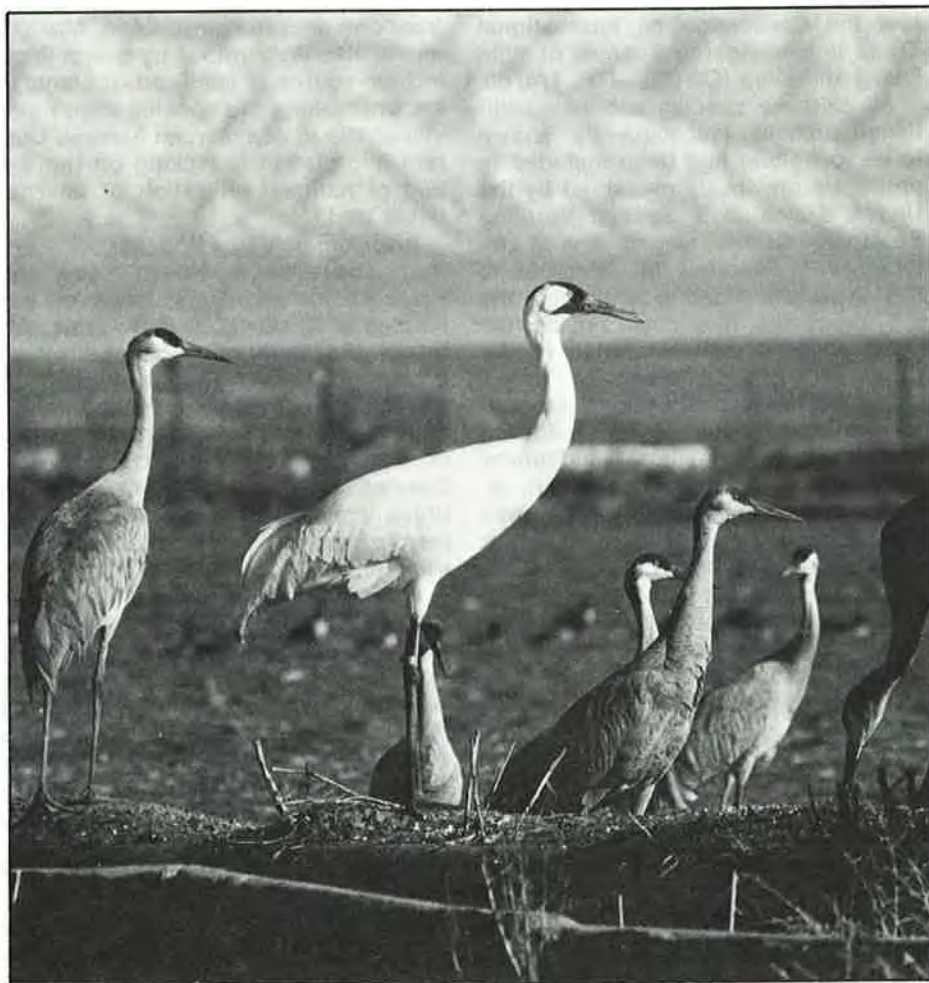
tional whooping crane populations.

Additional objectives of the recovery plan include:

- reducing mortality. Little is known about whooper mortality. The extent to which accidents, shooting, human disturbance, and the availability of food or habitat during migration affect whooping cranes is unknown. A high mortality among sub-adults exists for unidentified reasons. Finding the reasons for these losses and a method of remedial management are high priorities in the recovery plan.

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- improving public information. Because the whooping crane will never be an abundant species, preservation and eventual recovery will require the interest and concern of an informed public.



Immature whooping crane (foreground) with Grays Lake sandhill cranes on wintering grounds in New Mexico's Rio Grande Valley.

Photo by Rod Drewien

FILE	End. Specio - Whooping Crane 1980
Nail	7/17/82
Smithers	
Biologist	
Maddux	
Winters	
X Action	



MAR 24 1980

ENDANGERED SPECIES TECHNICAL BULLETIN

Department of the Interior • U.S. Fish and Wildlife Service • Endangered Species Program, Washington, D.C. 20240

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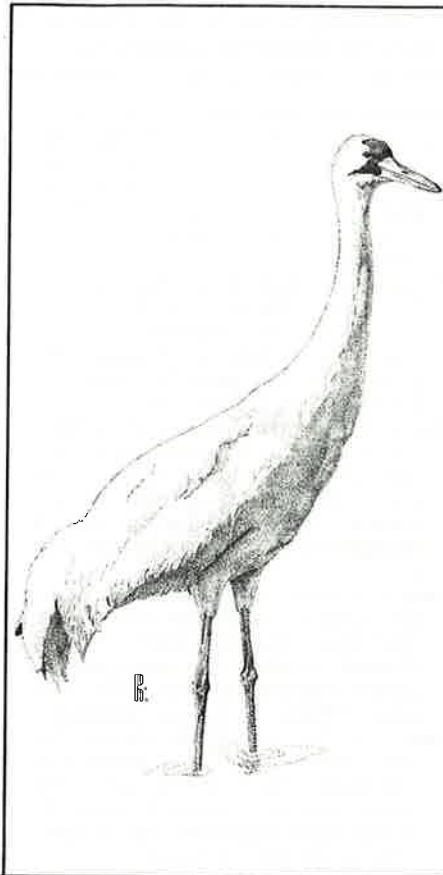
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Continued on page 4



REGIONAL BRIEFS

Endangered Species Program regional staffers have reported the following activities for the month of January.

Region 1. The 'Ewa Plains Botanical Survey has been completed. Copies are available from the Pacific Islands Area Office, U.S. Fish and Wildlife Service, 300 Ala Moana Blvd.,

Rm. 5302, Honolulu, Hawaii 96850.

Status reports on 21 candidate Threatened and Endangered plants in Idaho were received in the regional office.

Recovery plans for the Pahrump killifish (*Empetrichthys latos*), California condor (*Gymnogyps californianus*),

and California least tern (*Sterna albirostris brownii*) were submitted for the Director's approval.

Region 2. The red wolf (*Canis rufus*) and Gila trout (*Salmo gilae*) Endangered Species Reports were published and are available from the Albuquerque Regional Office.

Jack Woody met with the Departamento de Pecas in Mexico to discuss cooperative agreements for conservation programs in areas of mutual concern—specifically, sea turtles and freshwater fishes.

The first quarterly Dexter National Fish Hatchery Endangered Fishes Program review was held.

A female loggerhead sea turtle (*Caretta caretta*), radio tagged in Louisiana, is now reported near Brownsville, Texas. The turtle has logged 400 miles in 4 months.

Region 3. Regional personnel met with the Louisa Ecological Advisory committee to discuss the Illinois mud turtle (*Kinosternon flavescens spooneri*). A public meeting on the reproposal of Critical Habitat for this species was held in Springfield, Illinois.

The Regional Office hosted a meeting of plant contractors from all six States (also attended by Forest Service, Nature Conservancy, and Region 5 representatives).

Region 5. Funding for plant survey work in Delaware, Maryland, and West Virginia has been approved. This is the second round of surveys in these States, and will provide data on additional plants which should be considered for protection as Endangered or Threatened species.

Final reports for rare and endangered plants of New York, Maryland, and Pennsylvania were received.

Both Region 5 and 3 are coordinating their plant activities, cooperating in the development of survey formats, data exchange, and conservation plans.

Region 6. Public meetings were held on January 10 (on the reproposal of Critical Habitat for the Beaver Dam slope population of the desert tortoise, *Gopherus agassizii*, and on January 31 (on the Critical Habitat reproposal for the Illinois mud turtle, *Kinosternon flavescens spooneri*).

To further assess the effects of the O'Neill Irrigation Project, Interior's Water and Power Resource Service (WPRS) is sponsoring a study of the Niobrara River in northern Nebraska. Subsequent to our Service's September 1979 biological opinion indicating that reduced water flows resulting from the proposed Norden Dam would likely jeopardize the whooping crane (*Grus americana*), WPRS will study possible alternatives to dam opera-

U.S. Fish and Wildlife Service Washington, D.C. 20240

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Associate Director and
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(202-343-4646)

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(703/235-2407)

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Region 2, P.O. Box 1306, Albuquerque,
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Region 4, Richard B. Russell Federal Bldg.,
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Region 5, Suite 700, One Gateway Center,
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Denver, CO 80225 (303-234-2209): Don W. Minnich, Regional Director; Charles E. Lane, Assistant Regional Director; Don Rodgers, Endangered Species Specialist.

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Jon Nelson, Ass't Area Director; Dan Benfield, Endangered Species Specialist.

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, and Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas. **Region 3:** Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico, and the Virgin Islands. **Region 5:** Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia. **Region 6:** Colorado, Iowa, Kansas, Missouri, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Alaska Area:** Alaska.

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Whooper Recovery

Continued from page 1

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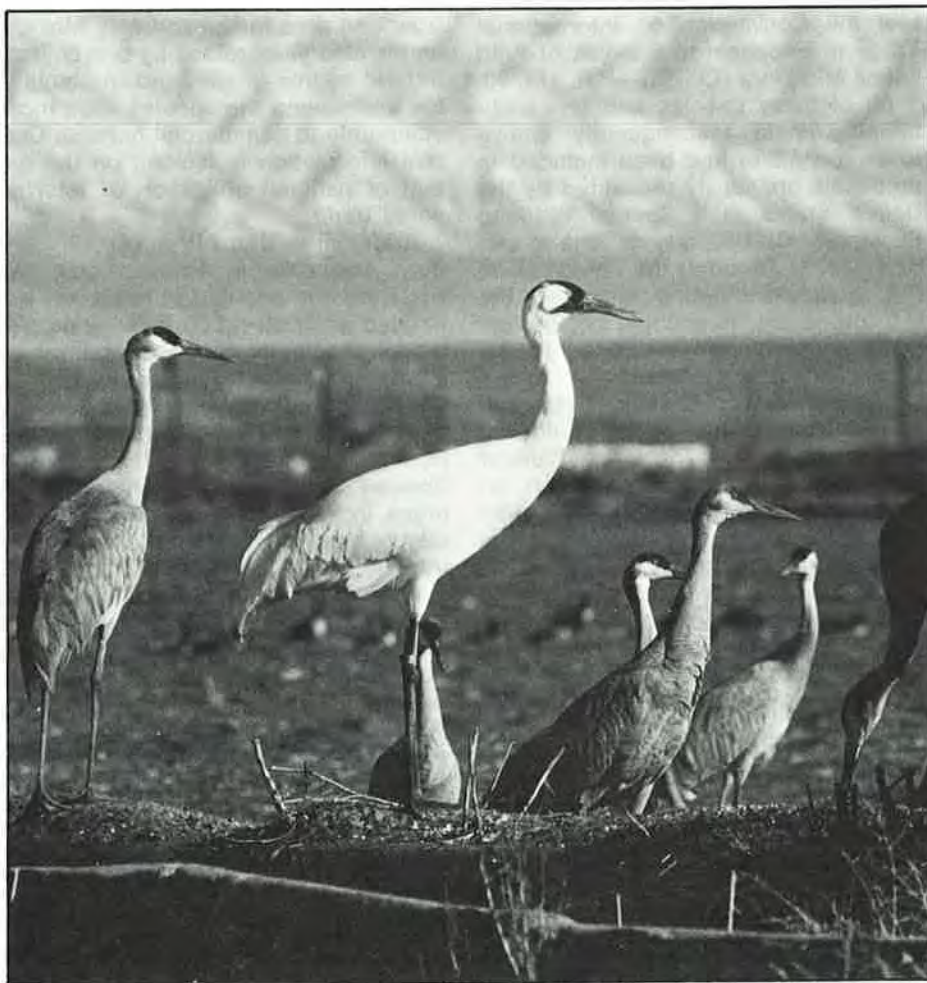
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Immature whooping crane (foreground) with Grays Lake sandhill cranes on wintering grounds in New Mexico's Rio Grande Valley.

Photo by Rod Drewien

tions to maintain sandbars and associated habitat used as a stopover along the whooper's long migration to its breeding grounds in Canada. Our Service (with funding from WPRS) will also conduct bald eagle (*Haliaeetus leucocephalus*) surveys along the Niobrara to determine possible impacts.

Three Primates and Seven Cacti Considered for Transfer to Appendix I

Based on information indicating the need to further restrict trade in these species, the Service is considering proposing the transfer of two monkeys, a mandrill, and seven species of Mexican cacti from Appendix II to Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)—F.R. 1/4/80.

All of these species and one additional primate (subsequently shown to be ineligible) had been included in proposals previously presented by the United States at a Special Working Session of CITES party nations in October 1977. Although the delegates to the technical meeting endorsed the U.S. proposals, they could not be formally adopted until submitted to the Conference of the parties.

The Service is now seeking information on the status of the following plants and animals now listed under Appendix II (those species which, although not now necessarily threatened with extinction, may become so unless trade in them is strictly controlled) to determine whether to proceed with U.S. proposals to place them on the more restrictive Appendix I (those species threatened with extinction which are or may be affected by trade).

Cacti

Ariocarpus agavoides (Castaneda) E. F. Anderson. Known as the living rock cactus, Magueyitos or Chaute, this cactus is known from one area in Tamaulipas, Mexico, where it is threatened by overcollecting for horticultural purposes. Plants grown from seed may take at least five years before flowering (none are known to be grown by



Photo by Jessie Cohen

The Diana monkey, occurring only in West Africa, is one of the primates being considered for transfer to Appendix I of CITES.

any U.S. nursery), and most specimens in trade are therefore obtained from the wild.

Ariocarpus scapharostrus Bodeker. This cactus is also called the living rock cactus or Chaute. It is known from one area in Nuevo León, Mexico, and is also jeopardized by overcollecting. No source of seed-grown plants is known, making the species even more vulnerable to commercial harvest. Current information is lacking on the extent of national utilization or international trade.

Aztekium ritteri Bodeker. Known from one area in Nuevo León, the Aztec cactus population has been estimated at 2,000–3,000 individuals. Although the extent of national utilization and international trade are not known, collecting from the wild has apparently endangered this species (which is difficult to cultivate). The Endangered Species Scientific Authority (ESSA) urges inclusion of this cactus on Appendix I due to its rarity, restricted distribution, and high value in trade.

Echinocereus lindsayi Meyran. Known from one location in Baja California, Mexico, this cactus (which has no common name) has been virtually extirpated from its native habitat by American collectors. Although the extent of national utilization and international trade are not known, the species is considered in need of additional protection because of its popularity.

Obregonia denegrii Fric. This cactus is known from two valleys in Tamaulipas, Mexico. ESSA reports that it has been virtually extirpated from its type locality and is absent from other areas where it once was known to occur. Specimens in trade are usually ob-

tained from the wild, although the extent of national utilization and international trade are unknown. (A Mexican authority reports that this species is threatened by illegal harvest for American entrepreneurs.)

Pelecyphora aselliformis Ehrenberg. The "hatchet" cactus is known only from one general area in San Luis Potosi, Mexico, but may be extinct in the wild due to harvest for horticultural purposes. ESSA recommends its inclusion on Appendix I because of its rarity, restricted distribution, and vulnerability to commercial trade.

Pelecyphora strobiliformis (Werdermann) Fric. This cactus (having no common name) is known from a few areas in Tamaulipas and Nuevo León. ESSA recommends the species for inclusion on Appendix I because of its rarity, restricted distribution, and high trade value. (A Mexican authority reports that overcollecting for American entrepreneurs is a major threat to the cactus.)

Primates

Cercopithecus diana (Linnaeus, 1758). Known as the Diana monkey or Diana guenon, this species occurs only in the coastal forests of West Africa from Gambia to Ghana (with unconfirmed reports of its occurrence in Cameroon and Zaire). The monkey inhabits the middle and upper levels of mature primary forest, only rarely coming to the ground from tall trees. Timber cutting is a serious threat to the species, along with hunting for food (especially in Liberia) and taking for zoological exhibition. ESSA urges its addition to Appendix I because trade

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WHOOPING CRANE RECOVERY TEAM

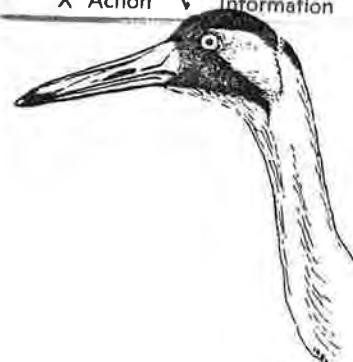
U.S. FISH & WILDLIFE SERVICE

NEBRASKA GAME AND PARKS COMMISSION

TEXAS PARKS & WILDLIFE DEPARTMENT

NATIONAL AUDUBON SOCIETY

FILE <i>End Species - Whooping</i>	
<input checked="" type="checkbox"/> Noll <i>7/11/84</i>	<input checked="" type="checkbox"/> McDermitt <i>1980</i>
<input checked="" type="checkbox"/> Suthers <i>6/16</i>	<input checked="" type="checkbox"/> Espinoza
<input checked="" type="checkbox"/> Biologist <i>6/27</i>	<input checked="" type="checkbox"/> Martinez
<input type="checkbox"/> Maddux	<input type="checkbox"/>
<input type="checkbox"/> Winters	<input type="checkbox"/>
X Action \ Information	



REPORT AND MINUTES OF WHOOPING CRANE RECOVERY TEAM March 22 & 23, 1980

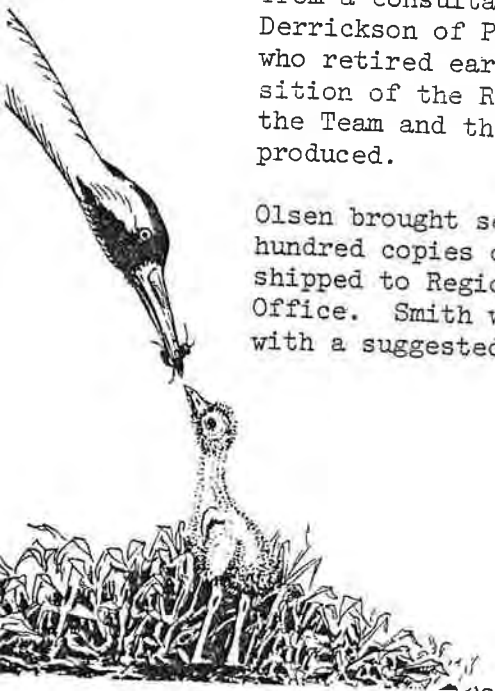
Team Meeting #12: Miami, Florida

Members Present: Mr. David Olsen, Team Leader, Washington, D.C.
Mr. William Brownlee, Austin, Texas
Dr. Scott Derrickson, Laurel, Maryland
Dr. Rod Drewien, Socorro, New Mexico
Mr. Ross Lock, Lincoln, Nebraska
Mr. David Blankinship, Rockport, Texas
Mr. Lawrence S. Smith, Albuquerque, New Mexico

Others Present: Dr. Ray Erickson, Laurel, Maryland (Retired)
Mr. Conrad Fjetland, Washington, D.C.
Mr. Tom Logan, Tallahassee, Florida
Mr. Steve Nesbitt, Gainesville, Florida
Mr. Kurt Johnson, Madison, Wisconsin
Mr. Scott Melvin, Madison, Wisconsin

March 22, 1980. Deauville Hotel, Miami, Florida. Team Leader Dave Olsen opened the meeting at 8:30 a.m. with an introduction of Tom Logan of the Florida Game and Fresh Water Fish Commission. Bill Brownlee of the Texas Parks and Wildlife Department was introduced to the Team as a replacement team member for Dr. Hal Irby. This was the first meeting attended by Rod Drewien since his change in status from a consultant to the Team to that of Team member. Dr. Scott Derrickson of Patuxent was named as a replacement for Dr. Ray Erickson, who retired early this year. In view of these changes in the composition of the Recovery Team, Olsen reviewed the responsibilities of the Team and the role of the Team now that the Recovery Plan has been produced.

Olsen brought several copies of the Recovery Plan for the Team. Five hundred copies of the plan were printed. Four hundred have been shipped to Region 2 for distribution and 100 held in the Washington Office. Smith will provide the Region 2 Endangered Species Office with a suggested distribution for the Recovery Plans.



Aransas NWR and vicinity. Individual birds were sacrificed at various intervals and detailed post-mortem examinations conducted. Preliminary results suggest that the ingested crude oil had relatively little effect on the cranes. Similar results have been documented previously on a number of other avian species using a variety of crude oils. Because crude oils vary considerably in composition and toxicity, these experiments should be expanded. Sandhills are also being utilized in studies involving nutrition, wing moult, coccidia infection and cholera.

A contract has been let for the long needed perimeter fence around the crane facilities at Patuxent. However, if the remainder of the interior fences are not repaired, it may be necessary to transfer some of the birds elsewhere. Derrickson commented that at some future time it will be advisable to disperse some of the Patuxent birds to other breeding facilities.

Rod Drewien reported on the status of the Grays Lake flock of experimental whooping cranes. Weather at Grays Lake for the 1979 season was no problem, but coyote predation continued. Sixteen eggs were hatched. By the end of June, 13 young remained, with three chicks from Canadian eggs having disappeared. Eight young fledged to fly south. Six of these birds were from Canadian eggs and two from Patuxent eggs. Five of the young carried radio transmitters on their leg bands. One of these young birds with radio was killed by a golden eagle while departing from a migration stop in Colorado. Seven young birds and eight adult plumaged birds arrived on New Mexico wintering grounds. One young bird accompanied its foster parents to Mexico. Only one radio of the four on the wintering areas continued to work, with the problem being loss of the antennae. As many as four whooping cranes were observed together temporarily while on the wintering area. All 15 birds had been located during the period March 10-15. Blankinship requested that a summary of the age of surviving cranes be included in each of Drewien's progress report.

With Messrs. Tom Logan and Steve Nesbitt of the Florida Game and Fresh Water Fish Commission the Team pursued the question as to whether Florida might be suitable for the establishment of a non-migratory population of whooping cranes. Team members Derrickson, Blankinship and Drewien had spent March 27 and 28 with Nesbitt and Logan inspecting sandhill crane use areas. Florida has both migratory (subspecies tabida) and resident (pratensis) sandhill cranes. Sandhill cranes use the Payne's Prairie near Gainesville (15,000 acres), Three Lakes south of Orlando (53,000 acres, of which 13,000 acres are crane habitat), the J. W. Corbett Area west of Palm Beach (56,000 acres), and the C. W. Webb Area near Fort Myers (68,000 acres).

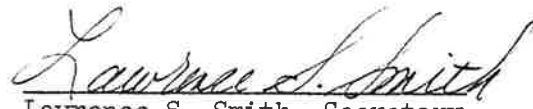
more than one make or type should be used in order to shorten the development period. Derrickson suggested that the Canadians should be brought into development of the radio tracking project.

March 23, 1980. Olsen opened a discussion regarding areas within the recovery plan that need further attention. One of these is Plan Item 3, page 82, Determine desired whooping crane population distribution. Another is Plan Item 13241, page 66, Develop critical habitat criteria. Olsen asked Ross Lock to take the lead in drafting critical migration habitat criteria and circulate it to the Team. Fjetland suggested that it would help to develop a map, indicating the suitable whooping crane migration habitat that is already preserved. This could then be studied to consider if the cranes could survive with this habitat alone.

Scott Melvin presented an illustrated program to the Team on his two year project involving the radio-tracking of Interlakes sandhill cranes between their nesting and wintering areas. Thirty-one cranes were captured and marked in 1978, with radio packages applied to 16 cranes. Thirty-three cranes were marked in 1979 despite a helicopter accident. Twenty cranes were radio equipped in 1979. As in 1978, a radio-tagged Interlakes crane chick and its family were tracked continuously during their migration from North Dakota to wintering areas near the Texas Gulf Coast. The crane, M54, left Kidder County, North Dakota at approximately 10:15 a.m., CST, on October 16 and arrived near Port Lavaca, Texas shortly before noon on October 23. The 1,325-mile journey took 169.5 hours to complete. The migrating cranes covered from 42-550 miles per day, at average speeds of 13-44 miles per hour, depending on the speed and direction of the wind. A total of four nights were spent in Nebraska, two in Kansas, and one while crossing Texas. The cranes were grounded by inclement weather in southern Nebraska for two days and three nights. Roost sites were varied and included a tiny pond in the sandhill country of northern Nebraska, a wetland on the Quivira NWR in central Kansas, and a sandbar along the Ninnescah River in southern Kansas. The results of this research continue to demonstrate the practicality and safety of miniature radio transmitters for use in studies of whooping crane migration ecology. No abnormal behavior or interactions between the radio-tagged birds and other cranes with which they came in contact was observed nor were there any indications that the radio-tagged cranes were encumbered or inconvenienced by the radio packages.

Kurt Johnson reported on his study of whooping crane migration use sites. Kurt had visited 49 whooping crane use sites to evaluate the habitat. The sites included 14 upland types and ten wetland types, from fresh-to-brackish water. The birds appear opportunistic, as demonstrated by their use of a variety of types. There may be some

The Team concluded its meeting at 4:00 p.m. and joined the Whooping Crane Conservation Association again to sit in on the business meeting of the Association's Trustees.

A handwritten signature in cursive script, reading "Lawrence S. Smith". The signature is written in dark ink and is positioned above the printed name and title.

Lawrence S. Smith, Secretary
Whooping Crane Recovery Team

End. Species - Whooping Crane 1980

PERMIT FOR ENDANGERED SPECIES PHOTOGRAPHY

To: Regional Director, Region 6

From: Refuge Manager, Alamosa - Monte Vista National Wildlife Refuge

The following individual has requested permission to photograph an endangered species, the whooping crane.

Name Ron Spomer Firm South Dakota
Division of Administration Dept. of Game, Fish and Parks
Address Dept. of Game, Fish & Parks Telephone 605-224-3387
Pierre, South Dakota 57501

Dates February 15, 1980 - April 15, 1980
(inclusive)

The applicant has outlined a plan to photograph, and has agreed to follow precisely any instruction and restrictions set by refuge personnel. I have reviewed the plan and believe this activity (will not) (~~may~~) affect the continued existence of the endangered species.

I recommend: (Approval) (~~Disapproval~~) Subject to these special stipulations: When Mr. Spomer arrives we will discuss his activity in detail with him and outline any restrictions we think are necessary depending on the current situation.

Signature: Melvin T. Nail
Refuge Manager
Melvin T. Nail
Approved: James P. Tutman
Acting Regional Director
2/6/80
(Date)

cc: Area Manager



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
ALAMOSA - MONTE VISTA NATIONAL WILDLIFE REFUGES
P. O. BOX 1148
ALAMOSA, COLORADO 81101
FEBRUARY 1, 1980

Mr. Ron Spomer
Division of Administration
Dist. of Game, Fish and Parks
Piere, South Dakota 57501

Dear Mr. Spomer:

We generally have good numbers of both sandhill and whooping cranes all during the month of March, but it would probably be best if you planned your trip sometime during the last two weeks.

We do not have any permanent blinds on the refuge, but there would be no problem with you using a portable blind.


We have an area on Monte Vista Refuge where you could camp while you are here. It has water, rest rooms and shade although shade isn't really needed here in March. You could camp there with a trailer, camper, or tent, whichever you prefer.

You should have no problem getting the photos you want. We should have approximately 13,000 sandhill cranes and could have as many as 16 whooping cranes in the San Luis Valley during that time.

You would have good opportunity to photograph whooping cranes off the refuge. If you want to photograph them on the Monte Vista Refuge, you would need a photography permit issued by our Regional Director in Denver. I have sent them a copy of your request and recommended approval. By copy of this letter, I am asking them to issue you a permit.

Sincerely,

Melvin T. Nail
Refuge Manager

cc: Regional Director, Region 6 (PA) 





UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
ALAMOSA - MONTE VISTA NATIONAL WILDLIFE REFUGES
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Sincerely,

Melvin T. Nail
Refuge Manager

cc: Regional Director, Region 6 (PA)

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To: Regional Director, Region 6

From: Refuge Manager, Alamosa - Monte Vista National Wildlife Refuge

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Firm Dept. of Game, Fish and Parks
Division of Administration
Address Dept. of Game, Fish & Parks Telephone 605-224-3387
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follow precisely any instruction and restrictions set by refuge personnel.
I have reviewed the plan and believe this activity (will not) (~~may~~) affect
the continued existence of the endangered species.

I recommend: (Approval) (Disapproval) Subject to these special stipulations:
When Mr. Spomer arrives we will discuss his activity in detail with him
and outline any restrictions we think are necessary depending on the
current situation.

Signature: _____

Refuge Manager
Melvin T. Nail

Approved: _____
Regional Director

(Date)

cc: Area Manager



Correspondence 1982-1983

November 10, 1983

Public Service Company of Colorado
400 Washington
Alamosa, Colorado 81101

Dear Sir:

This letter is to inform you of a whooping crane striking one of your powerlines. We are not asking for any action on your part. We merely want to document the incident and make you aware of it.

At approximately 7:00 a.m. on October 19, 1983 an immature whooping crane struck your 115 KV transmission line. The location of the line and strike are shown on the attached map. The legal description of the area is the NW 1/4, Section 23, T.38N., R.9E. After striking the line, the bird was on the ground for several minutes. The bird later flew away with its sandhill crane foster parents.

Crane researcher Wendy Brown later located an immature whooping crane with misplaced and damaged feathers that we believe is the crane that struck the line. The bird appears to be healthy, and it does not appear to be suffering any ill effects of the collision.

Sincerely,

Melvin T. Nail
Refuge Manager

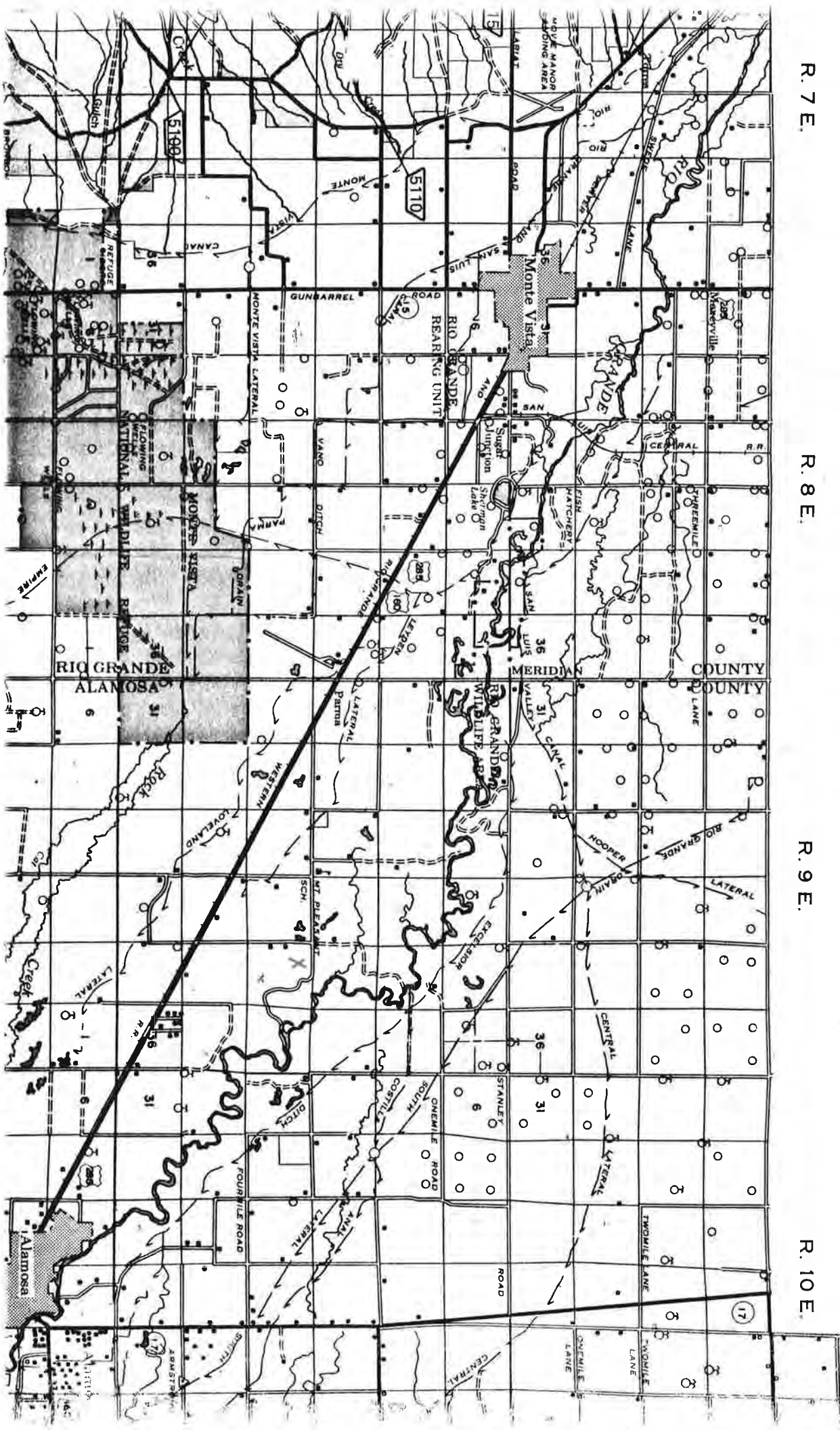
Attachment (1)

bcc: Regional Director, Region 6 (WR - Division 4)
Fred Bolwahn (SE) Salt Lake City, Utah

FILE COPY

R. 10 E

X Location of October 19, 1983 whooping crane-powerline strike



SEP 28 1983

MEETING REPORT

Date: 23 September 1983

To: Files

From: Fred L. Bolwahn

Subject: Coordination of Whooping Crane/Powerline Strike Monitoring Program

Date: 16 September 1983

Time: 9:00 a.m.

Place: Alamogosa National Wildlife Refuge

Participants

See attached list of attendees.

Purpose

To plan the program for monitoring the effectiveness of Colorado-Ute Electric's removal of a four mile section of static line on the San Luis Valley-Haverly Transmission line in reducing loss of bird life, particularly whooping cranes, as well as develop coordination between this program and a program sponsored by Region 2 to also study the problem of birds striking powerlines. The Region 2 study will also take place in the San Luis Valley.

Summary

After introductions Jerry Walker of Colorado-Ute Electric (CUE) outlined how they prepared to carry out the monitoring effort this fall. Between October 1 and November 15 CUE personnel will walk the powerline once a week, generally on Wednesday. All dead birds observed will be picked up, identified and other information recorded on a form that CUE developed for recording the field data (See attached draft sample). It was decided that only that portion of the powerline south of the river will be walked. It was also decided that refuge personnel will walk the line each Friday and Donna Kingery will volunteer and do the same on Monday of each week. CUE will revise the form to be used in the field as per discussions during the meeting. A copy will be sent to Region 2 and Rod Drewien in order to try and achieve uniformity between the data collected in the two monitoring efforts. Howard Laire will be the primary coordinator of the CUE monitoring program and Monty Griffith will be the local contact point for CUE.

In the spring of 1984 CUE will carry out a similar monitoring program for eight weeks. In addition it appears likely the Electric Power Research Institute (EPRI) will fund a research project utilizing electronic equipment to monitor bird movements around a portion of the powerline and bird reactions to the magnetic field created by powerlines.

CUE will compile data and prepare report on the fall monitoring effort prior to beginning the spring 1984 data collection.

FILE <i>Endangered Species - Whooping Crane</i>	
<input type="checkbox"/> Nail <i>9/29</i>	<input type="checkbox"/> McDermith
<input type="checkbox"/> Suthers <i>9/29</i>	<input type="checkbox"/> Espinosa
<input type="checkbox"/> Kauffeld ...	<input type="checkbox"/> Martinez
<input type="checkbox"/> Jones	<input type="checkbox"/> Mendragon ...
<input type="checkbox"/> Cossick	<input type="checkbox"/> Gray
<input type="checkbox"/>	<input type="checkbox"/> <i>Long 10/25</i>
<input checked="" type="checkbox"/> X Action	<input checked="" type="checkbox"/> Information

Copy to Phil Norton 9/29/83

Following the presentation of CUE's monitoring program Gary Halverson, Fish and Wildlife Service (FWS), Region 2 discussed plans for their monitoring program. He explained that since Region 2 has been assigned the lead responsibility for the whooping crane recovery program they are extremely concerned with the problem of whoopers colliding with powerlines. Because of the identified need to learn more about the problem Region 2 has contracted with Idaho State University and Dr. Rod Drewien to carry out a six week study of the problem in the San Luis Valley funded with \$2,800. Exactly which lines will be studied and in what locations remain to be determined. Gary expects that this study will be the start of a much larger effort which will receive funding from industry and government. The Edison Electric Institute has been approached with the need to answer questions concerning this problem. Jerry Walker suggested that Region 2 contact EPRI to gain their support for such a project. Gary solicited support and assistance for this project from the various electric companies having powerlines in the valley. He will be making follow-up contacts soon.

Recommendations

It appears that much of the data to be collected by the two monitoring efforts will be comparable if collected properly. Close coordination of the effort and a sharing of information collected is important. It is suggested that personnel from CUE and the Alamosa Refuge work closely to assure the success of their monitoring of the CUE powerline and whenever possible coordinate with Region 2 and Dr. Rod Drewien in furthering both programs.

A copy of the reports generated by the two CUE monitoring programs and the results of the EPRI project should be forwarded to the FWS Endangered Species Office in Salt Lake City to be reviewed for a determination whether further Section 7 consultation is necessary on this CUE powerline. This submission of the last report should be done by June 1984.

cc: Refuge Manager ✓

Alamosa-Monte Vista NWR

P. O. Box 1148

Alamosa, Colorado 81101

Rod Drewien

Grays Lake NWR

Wayan, Idaho 83285

Donna Kingery

5402 South 104

Alamosa, Colorado 81101

Jim J. Lewis

San Luis Valley Rural Electric Cooperative, Inc.

3625 West U.S. Highway 160

Monte Vista, Colorado 81144

Donald L. Zimmerman

Chief-Western Area Electric

Rural Electrification Administration

Washington, D.C. 20230

Jerry Walker
Colorado-Ute Electric Association Inc.
P. O. Box 1149
Montrose, Colorado 81402

bcc: Official file
Reading file
APA/SE-W.Wathen

FLB/jg:9-19-83

<u>Name</u>	<u>Organization</u>	<u>Phone No.</u>
Jon Kauffeld	ALAMOSA/Monte Vista NW	588-4021
Deanna Kingery	4406 Curley Rd	589-9635
Walt Hughes	Alamosa/Monte Vista NW	589-4021
Jim J. Linn	San Luis Valley Rural Elec	852-3538
Robert E. Cole	San Luis Valley Rural Elect	852-3538
Monty R. Griffith	Colorado-Ute Elect. Assn	754-2566
HOWARD LAIRE	COLORADO-UTE ELECT	249-4501
Jerry A Walker	Colorado-Ute Electric Association	249-4501
Gary Halvorson	U.S. Fish & Wildl. Serv., Albuq. NM	(505) 766-3974
Melvin T. Noel	Alamosa-Monte Vista NW	589-4021
Fred L. Bolwahn	FWS Endangered Species - Silt Lake City	801/524-4430

BY _____ DATE _____
CHKD. BY _____ DATE _____

SUBJECT _____

SHEET NO. _____ OF _____

JOB NO. _____

OBSERVER _____

DATE _____

TIME _____

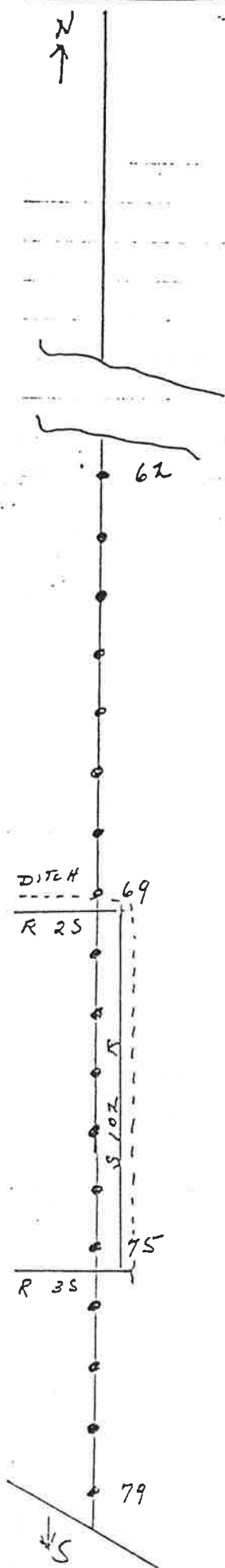
START _____

FINISH _____

1. LOCATION OF BIRDS FOUND
MARKED ON MAP.

2. I.D. SPECIES AND NOTES
REGARDING EACH FIND.

DISTANCE FROM LINE (ft) AND
SIGNS OF INJURY, ETC.





FISH AND WILDLIFE SERVICE

INTER-OFFICE TRANSMITTAL

<input type="checkbox"/> Director, _____	<input type="checkbox"/> Regular Mail
<input type="checkbox"/> Denver Service Center _____	<input type="checkbox"/> Air Mail
<input type="checkbox"/> Regional Director, _____	<input type="checkbox"/> Action
<input type="checkbox"/> Project Leader, <u>BOSQUE DEL APACHE, MONTE VISTA NWR.</u>	<input checked="" type="checkbox"/> Information
<input type="checkbox"/> Area Office, _____	

from <i>Larry Smith</i>	Office <i>R.O. alby.</i>	Date <i>9/28/83</i>
subject		

Attached is information from Rod Drewien on the year class of whooping cranes in last winter's population. I lacked this information and perhaps you do.

Note: As of Monday, 9/26, Gene Barney advised that they were accounting for 19 young whooping cranes and none had left yet.

-1908 (Attach securely to material to be transmitted & mail through regular channels)
Rev. 11/78)

SEP 30 1983

FILE <i>End. Series - Whooping Crane</i>	
<input type="checkbox"/> Nal <i>7/12/83</i>	<input type="checkbox"/> McDermith ...
<input checked="" type="checkbox"/> Suthers <i>11/3</i>	<input type="checkbox"/> Espinosa
<input type="checkbox"/> Kauffeld ...	<input type="checkbox"/> Martinez
<input type="checkbox"/> Jones	<input type="checkbox"/> Mondragon ...
<input type="checkbox"/> Cossick ...	<input type="checkbox"/> Gray
<input type="checkbox"/>	<input checked="" type="checkbox"/> Gomez <i>10/5</i>
<input checked="" type="checkbox"/> Action	<input checked="" type="checkbox"/> Information

RECEIVED
REFUGES

SEP 26 '83

Larry,

Enclosed is the information which
you requested for winter population
of whoopens for 1982-83. If you have
any questions concerning this information
please contact me.

Reed

SEP 26 '83

WHOOPING CRANES WINTERING IN THE RIO GRANDE VALLEY OF NEW MEXICO AS A
RESULT OF THE WHOOPING CRANE TRANSPLANT EXPERIMENT AT THE GRAYS LAKE NATIONAL
WILDLIFE REFUGE, Idaho.

1975-76	4	
1976-77	6	(3 - 1975, 3 - 1976)
1977-78	6	(3 - 1975, 2 - 1976, 1 - 1977)
1978-79	9	(3 - 1975, 2 - 1976, 1 - 1977, 3 - 1978)
1979-80	15	(3 - 1975, 2 - 1976, 1 - 1977, 2 - 1978, 7 - 1979)
1980-81	17	(2 - 1975, 2 - 1976, 1 - 1977, 2 - 1978, 6 - 1979, 4 - 1980)
1981-82	13	(1 - 1975, 2 - 1976, 1 - 1977, 2 - 1978, 5 - 1979, 2 - 1980, 0 - 1981)
1982-83	15	(2-1976, 2-1978, 4-1979, 2-1980, 0-1981, 5-1982)

*Rod - Can you update their
accounting of Gray Lake whoopers
on wintering area.*

**Colorado-Ute
Electric Association, Inc.**

P. O. Box 1149
Montrose, Colorado 81402
(303) 249-4501

September 22, 1983

SEP 23 1983

Mr. Melvin T. Nail
Refuge Manager
U.S. Fish & Wildlife Service
Alamosa-Monte Vista NWR
P.O. Box 1148
Alamosa, Colorado 81101

FILE <i>Env. Spec. - Whooping Crane</i>	
<input checked="" type="checkbox"/> Nail <i>MLN</i>	<input type="checkbox"/> McDermith
<input checked="" type="checkbox"/> Suthers <i>SL</i>	<input type="checkbox"/> Espinosa
<input type="checkbox"/> Kauffeld ...	<input type="checkbox"/> Martinez ...
<input checked="" type="checkbox"/> Jones	<input type="checkbox"/> Mondragon
<input type="checkbox"/> Cossick ...	<input type="checkbox"/> Gray ...
<input type="checkbox"/>	<input checked="" type="checkbox"/> <i>Samuel</i>
<input checked="" type="checkbox"/> Action	<input checked="" type="checkbox"/> Information

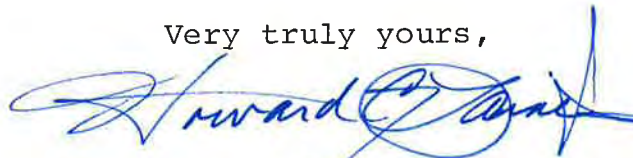
Dear Mr. Nail:

San Luis Valley-Waverly 115-kv Transmission Line
Whooping Cranes - Monitoring Program

This letter sets forth the plan for a monitoring program requested by U.S. Fish and Wildlife Service (FWS). This monitoring program will encompass a section of line north from the intersection of Road 3 South and Road 102 to the Rio Grande River. Mrs. Donna Kingery has agreed to walk this line on Mondays. Colorado-Ute personnel will walk the line on Wednesday and FWS will walk the line on Friday. October 3, 1983 will be the starting date and monitoring will continue through mid-November. Observation of the bird's activity and behavior in the vicinity of the line will be recorded. Injured or dead birds will be turned over to FWS. A copy of the monitoring form is enclosed.

Please feel free to contact me if you have any questions or comments on this plan.

Very truly yours,


Howard G. Laire, Jr.
Environmental Specialist

HGL:ds

Enclosure

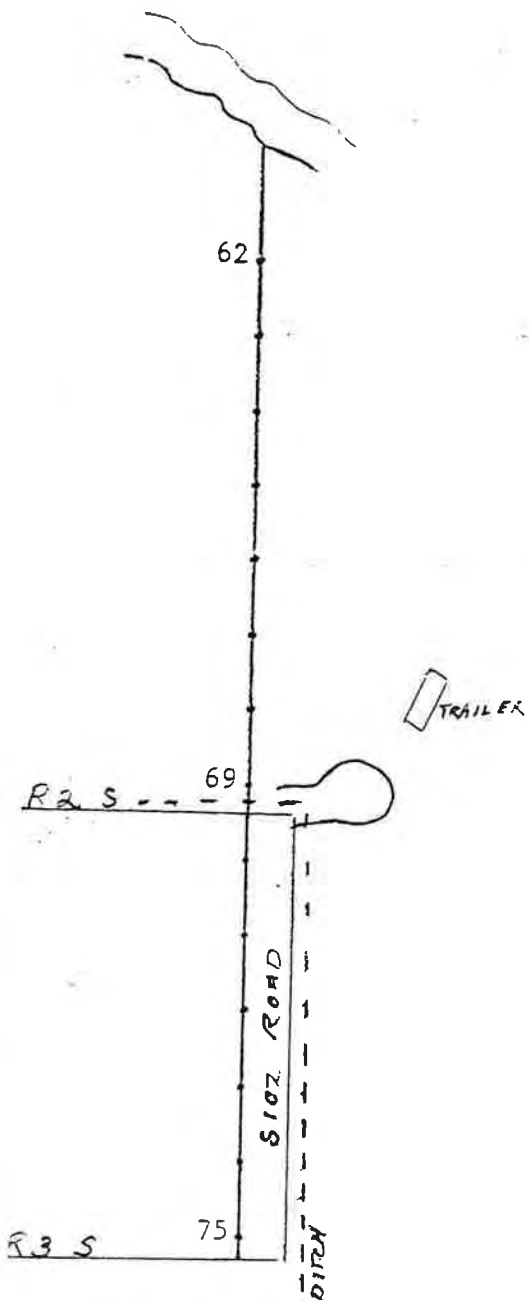
cc: Mr. Rod Drewier
Mr. Jim J. Lewis

BIRD MONITORING FORM

1. Observer _____
2. Date _____
3. Time Start _____
Finish _____
4. Day's Weather Condition _____

5. Location of Bird(s) _____
6. Condition of Bird(s) _____

7. Estimated Time of Injury or Death _____



Bird Monitoring Form Procedures

1. Fill in Observer's name.
2. Fill in Date of observation.
3. Fill in the Time observation started and Time observation finished.
4. Fill in the Weater Conditions on the day the observation took place (sunny, rain, hazy, etc.).
5. Mark the Location of dead or injured birds on the map with an X. Identify each species and make notes regarding each find (distance from line, etc.). (See attached example.)
6. Give the Condition of each bird found (broken left wing, dead, etc.). (See attached example.)
7. Give an estimate on how long the bird has been injured or dead. Also give the cause of injury or death. (See attached example.)
8. Stay on the west side of S102 Road.

BIRD MONITORING FORM

SAMPLE

62.

X SAND HILL CRANE ADULT ♀
DEAD, 5 FT S TOWER 63
BROKEN NECK DEAD ABOUT
2 DAYS

X MALLARD ADULT ♂
DEAD, 12 FT SW TOWER 65
BROKEN NECK DEAD ABOUT
4 Hrs.

 TRAILER

69.

X SAND HILL CRANE ADULT ♂
BROKEN LEFT LEG, 10 FT
SE TOWER 70 INJURED
ABOUT 1 DAY

75.

1. Observer JOHN DOE
2. Date 9-15-83
3. Time Start 11:45
Finish 14:20
4. Day's Weather Condition CLOUDY
SLIGHT RAIN.
5. Location of Bird(s) S63 SW 65
6. Condition of Bird(s) SE 70
2 DEAD
1 INJURED LEFT LEG.
7. Estimated Time of Injury or Death 63-2 DAYS, 65 Hrs, 70 1 DAY

R2 S - - - -

P3 S

9/16/83

Name

Organization

Phone No.

Jon Kauffeld	Alamosa/Monte Vista NWR	588-4021
Donna Ringery	4406 Curley Rd	589-9635
Walt Hughes	Alamosa/Monte Vista NWR	589-4021
Jim J. Lewis	San Luis Valley Rur/Elec	852-3538
Robert E. Cole	SAN LUIS VALLEY RURAL ELECT	852-3538
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Jerry A Walker	Colorado-Ute Electric Association	249-4501
Gary Halvorson	U.S. Fish & Wildl. Serv, Albug. NWR ⁽⁵⁰⁵⁾	766-3874
Melvin T. Nail	Alamosa-Monte Vista NWR	588-4021
FRED L. Bolwahn	FWS Endangered Species - Silt Lake City	801/524-4430

BY _____ DATE _____

SUBJECT _____

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

JOB NO. _____

OBSERVER _____

DATE _____

TIME _____

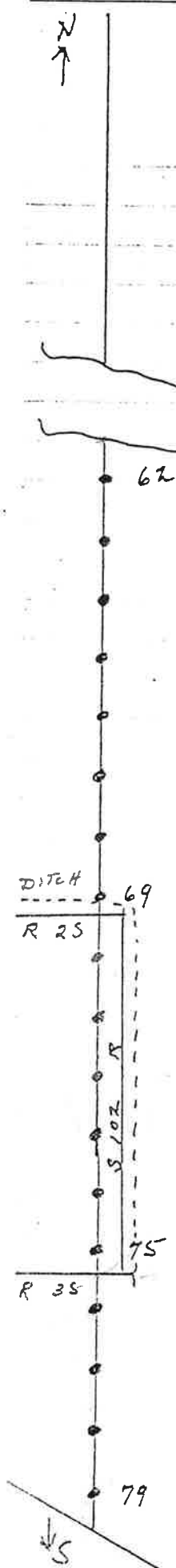
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MARKED ON MAP.

2. I.D. SPECIES AND NOTES
REGARDING EACH FIND.

DISTANCE FROM LINE (ft) AND
SIGNS OF INJURY, ETC.





IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

POST OFFICE BOX 1306
ALBUQUERQUE, NEW MEXICO 87103

AUG 17 1983

MEMORANDUM

TO : Director, Patuxent Wildlife Research Center

FROM : Regional Director, Region 2 (SE)

SUBJECT: Disposition of Whooping Crane Carcass

In response to your letter of July 28, 1983, I agree the carcass of "Ida" should be destroyed. We appreciate the National Wildlife Health Laboratory's thorough examination of the carcass which showed it is heavily contaminated with Clostridium tetani.

I assume the Canadian Wildlife Service will be notified of Ida's final deposition.

In the event another adult whooping crane specimen is available, I request it be earmarked for the Bosque del Apache NWR.

/s/ Michael J. Spear

bc: Bosque del Apache NWR, w/incoming
Alamosa/Monte Vista NWR, w/incoming
Aransas NWR, w/incoming
Larry Smith, Refuges, R-2, w/incoming

*Jon - Is this the bird that
was killed on the Pecos River
here last spring?*

yes

GHalvorson:vah/8-15-83

AUG 22 1983

FILE *End. Spec - whooping crane*

<input type="checkbox"/> Nall <i>MAK</i>	<input type="checkbox"/> McDermitt
<input type="checkbox"/> Suthers <i>8/15</i>	<input type="checkbox"/> Espinosa
<input checked="" type="checkbox"/> Kauffeld <i>8/24</i>	<input type="checkbox"/> Martinez
<input type="checkbox"/> Jones	<input type="checkbox"/> Mondragon
<input type="checkbox"/> Cossick	<input type="checkbox"/> Gray
<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Action	<input checked="" type="checkbox"/> Information

memorandum

DATE: JUL 28 1983

REPLY TO: Director, Patuxent Wildlife Research Center, Laurel, MD 20708

SUBJECT: Disposition of whooping crane carcass

TO: Regional Director, USFWS, P. O. Box 1306, Albuquerque, NM 87103

The whooping crane carcass that you requested in your 15 June memo for mounting and display at the Bosque del Apache NWR is currently stored at the National Wildlife Health Laboratory (NWHL) in Madison, Wisconsin. NWHL personnel have advised against the use of this carcass for any purpose since it is heavily contaminated with Clostridium tetani, a bacteria which constitutes a health risk to the taxidermists and others coming in contact with it. Such a situation could incur certain legal liabilities by the FWS, and it has therefore been recommended that the carcass be incinerated.

Final disposition of this carcass will not be made until we receive a final decision from you. Should you decide against the use of this specimen, we would attempt to provide Bosque del Apache NWR with another carcass in the future if and when one becomes available.

David L. Trauger

End. Sp. R-2	
JOHNSON	
Carley	
Holmes	
Johnson	
Kalogiski	
Langowski	
KAYSER	
Hogg	
Padgett	
SANCHEZ	
FILE whooping	X

APP C4 9/8

FILE
CL-8-13

FWS REG 2
RECEIVED

AUG 11 '83

SE

OPTIONAL FORM NO. 10
REV. 1-80
GSA FPMR (41 CFR) 101-11.6
5010-114

AUG 1 1983

16 August 1983

Mr. Jerry Walker
Manager, ENvironmental Services
Colorado-Ute Electric Association, Inc.
P. O. Box 1149
Montrose, Colorado 81402

Dear Mr. Walker:

The purpose of this letter is to inform you of a meeting which has been scheduled for 16 September 1983, 9:00 a.m. at the headquarters of the Alamosa National Wildlife Refuge. One purpose of the meeting is to discuss and decide upon a monitoring program which will help evaluate the effectiveness of the removal of the static wire from a portion of the San Luis Valley-Waverly 115 kV transmission line as agreed to by Colorado-Ute Electric Association and the Fish and Wildlife Service (FWS).

Another purpose is to review a second monitoring effort being funded by FWS, Region 2, aimed at learning more about the total problem of bird strikes on powerlines. If possible these two monitoring efforts should be coordinated so that the results of each are compatible and comparable. In this day of shortage of funds for everyone we must avoid duplication of effort and try to compliment each others efforts.

If you have any questions please call 801/524-4430, FTS 588-4430.

Sincerely,

Fred L. Bolwala
Field Supervisor

cc: Official file
Reading file
AFA/SEJ/Watson
Regional Director,
Region 2, (AFA/SE)
P. O. Box 1306
Albuquerque, NM 87103
Refuge Manager
Alamosa-Monte Vista NWR
P. O. Box 1148
Alamosa, Colorado 81101

FLB/jg:8-16-83

AUG 22 1983

FILE <i>Endangered Species</i>	
<input type="checkbox"/> Nally	<input type="checkbox"/> McDermith
<input type="checkbox"/> Suthers	<input type="checkbox"/> Espinosa
<input checked="" type="checkbox"/> Kauffeld	<input type="checkbox"/> Martinez
<input checked="" type="checkbox"/> Jones	<input type="checkbox"/> Mondragon
<input type="checkbox"/> Cossick	<input type="checkbox"/> Gray
<input type="checkbox"/>	<input type="checkbox"/>
X Action ✓ Information	

Copy to Phil 8/26

whooping crane

Mr. Rod Drewierⁿ
Grays Lake NWR
Wayan, Idaho 83285jMr. Drewierj

Ms. Donna Kingery
5402 South 104
Alamosa, Colorado 81101jMs. Kingeryj

Mr. Jim J. Lewis
San Luis Valley Rural Electric Cooperative, Inc.
3625 West U. S. Highway 160
Monte Vista, Colorado 81144jMr. Lewisj

Mr. Donald L. Zimmerman
Chief-Western Area Electric
Rural Electrification Administration
Washington, D.C. 20250jMr. Zimmermanj

Mr. Jerry Walker
Manager, Environmental Services
Colorado-Ute Electric Association, Inc.
P. O. Box 1149
Montrose, Colorado 81402

End. species - whooping crane

ATTENDANCE AT POWERLINE STUDY MEETING 8/4/83

John Huckabee
Electric Power Research Institute
Palo Alto, California

Sidney A. Gauthreaux, Jr.
Department of Biological Sciences
Clemson, University
Clemson, South Carolina 29631 803-656-2328

Jerry Walker
Colorado UTE
Montrose, Colorado

Jim Lewis
San Luis Valley Rural Electric Cooperative
Monte Vista, Colorado

Mel Nail
MIT Suthers
Jon Kauffeld

28 July 1983

R.W. Bryant
Vice President
Colorado-Ute Electric Association Inc.
P. O. Box 1149
Montrose, Colorado 81402

Dear Mr. Bryant:

This responds to your 27 June 1983 letter outlining plans designed to reduce the hazard of the San Luis Valley-Waverly 115-kV transmission line due to birds striking the line. This plan was developed in response to the Fish and Wildlife Service (FWS) request dated 27 April 1983.

The FWS has reviewed your plan and agrees that it should be implemented. I relayed this decision to Mr. Howard Laire of your office on 26 July 1983. We also discussed the need for an early meeting to formulate the details of a monitoring program. This should probably take place in August or early September. I will initiate the necessary contacts shortly.

At this time it would appear that implementation of the plan will make it unnecessary to enter into formal Section 7 consultation. Hopefully the monitoring will prove that removal of the static wire will eliminate the hazard to whooping cranes and other species of birds. Upon completion and evaluation of the program a determination will be made if further action including formal Section 7 consultation is needed.

If you have any questions please call. Mr. Mel Nail of the Alamosa Refuge should be contacted at the start of work to remove the static wire.

Sincerely,

Fred L. Bolwahn
Field Supervisor

AUG 03 1983

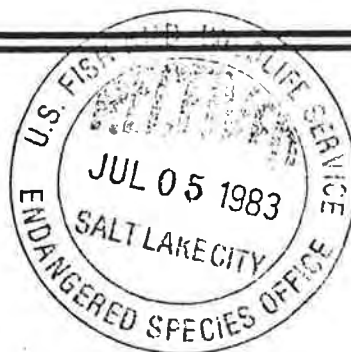
FILE *Encl. 8-1-83 - Whooping CRANE*

<input type="checkbox"/> Nail <i>7/27/83</i>	<input type="checkbox"/> McDermith
<input checked="" type="checkbox"/> Suthers <i>8/3</i>	<input type="checkbox"/> Espinosa
<input checked="" type="checkbox"/> Kauffeld <i>8/11</i>	<input type="checkbox"/> Martinez
<input type="checkbox"/> Jones	<input type="checkbox"/> Mondragon
<input type="checkbox"/> Gossick	<input type="checkbox"/> Gray
<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Action	<input checked="" type="checkbox"/> Information

cc: Official file
Reading file
AFA/SE-Wathen
Refuge Manager ✓
Alamosa-Monte Vista NWR
P. O. Box 1148
Alamosa, Colorado 81101
Rod Drewler
Grays Lake NWR
Wayan, Idaho 83285
Donna Kingery
5402 South 104
Alamosa, Colorado 81101
Jim J. Lewis
San Luis Valley Rural Electric Cooperataive, Inc.
3625 West U.S. Highway 160
Monte Vista, Colorado 81144
Donald L. Zimmerman
Chief-Western Area Electric
Rural Electrification Administration
Washington, D.C. 20250

FLB/jg:7-27-83

**Colorado-Ute
Electric Association, Inc.**



P. O. Box 1149
Montrose, Colorado 81402
(303) 249-4501

June 27, 1983

Fred L. Bolwahn, Field Supervisor
U.S. Fish and Wildlife Service
Endangered Species Office
1406 Federal Building
125 South State Street
Salt Lake City, Utah 84138

Dear Mr. Bolwahn:

San Luis Valley-Waverly 115-kv Transmission Line
Whooping Cranes - Informal Section 7 Consultation

This letter sets forth plans to reduce the alleged hazard of the subject line to the endangered whooping crane and to other birds on a four-mile section north from the intersection of Road 3 South and Road 102 extending to One Mile Lane north of the Rio Grande River in the San Luis Valley. This plan was requested in your April 27, 1983 letter to Colorado-Ute. The mitigation plan and monitoring program proposed by Colorado-Ute is as follows:

Mitigation Plan

The static wires would be temporarily removed from the above four-mile section of line.

Monitoring Program

The proposed monitoring program requested by the U.S. Fish and Wildlife Service (FWS) would consist of Colorado-Ute personnel and FWS personnel (to the extent that FWS personnel are available) walking the above section of the line once each week from October through mid-November 1983, and from mid-February through mid-April 1984. Observations of the birds' activity and behavior in the vicinity of the line would be recorded by Colorado-Ute, FWS and Mrs. Donna Kingery, if Mrs. Kingery wished to participate. Any injured or dead birds found in the vicinity of the line would be turned over to the FWS for identification and inspection. The location of such birds would also be given to FWS.

Mr. Fred L. Bolwahn

-2-

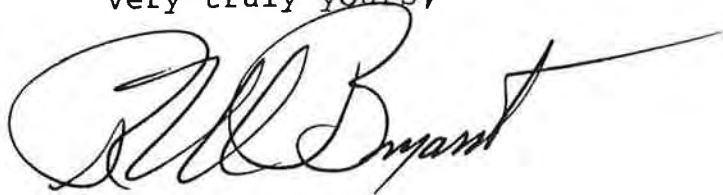
June 27, 1983

The removal of the static wires leaves this line vulnerable to outages from lightning strikes. Colorado-Ute would request replacing the static wires if lightning-caused outages or disturbances occurred that resulted in deterioration of the quality of electric service to consumers.

This plan was developed after Colorado-Ute evaluated a number of alternatives and reviewed them with you and other FWS staff at two meetings and during several phone conversations. We believe this plan is a most reasonable plan from a mitigation and cost standpoint. After this plan is implemented, Colorado-Ute and FWS will monitor this section of the line and evaluate the effectiveness of this mitigation measure. Colorado-Ute will continue to consult with FWS in the event this plan proves ineffective in reducing bird injury and mortality or in the event lightning-caused problems adversely affect service to consumers.

We would appreciate your written concurrence of this plan at the earliest possible date so that we can schedule to complete this work in a timely manner. Please contact Jerry A. Walker if you have further questions or comments on this plan.

Very truly yours,

A handwritten signature in dark ink, appearing to read 'R. W. Bryant', with a long horizontal flourish extending to the right.

R. W. Bryant
Vice President

RWB/JAW/lre



DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
INTER-OFFICE TRANSMITTAL

☐ Director, _____

☐ Regional Director, _____

☒ Project leader, Lawrence - North Vista No. 2

☐ _____

FROM _____ OFFICE _____
1406 FEDERAL BUILDING
125 SOUTH STATE STREET
SALT LAKE CITY, UTAH 84138

DATE
7/6/63

SUBJECT

Not - Take a look at this and then let us know what you think. Have anyone else you want review if a law. Don't give a call.

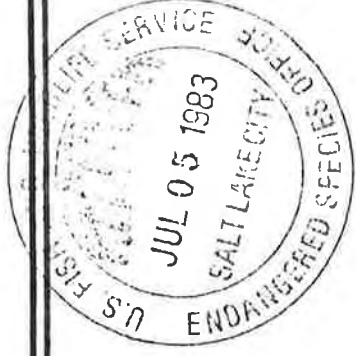
Noted

FILED 7-10-63

<input type="checkbox"/> Mail <input checked="" type="checkbox"/> Regular Mail	<input type="checkbox"/> Modern Mail
<input checked="" type="checkbox"/> Subers	<input type="checkbox"/> Espinosa
<input checked="" type="checkbox"/> Kaufeld	<input checked="" type="checkbox"/> Martinez
<input type="checkbox"/> Jones	<input type="checkbox"/> Alti Modragon
<input type="checkbox"/> Osside	<input type="checkbox"/> Gray
<input checked="" type="checkbox"/> Action	<input type="checkbox"/> Action
<input type="checkbox"/> Information	<input checked="" type="checkbox"/> Information

Colorado-Ute Electric Association, Inc.

P. O. Box 1149
Montrose, Colorado 81402
(303) 249-4501



June 27, 1983

Fred L. Bolwahn, Field Supervisor
U.S. Fish and Wildlife Service
Endangered Species Office
1406 Federal Building
125 South State Street
Salt Lake City, Utah 84138

Dear Mr. Bolwahn:

San Luis Valley-Waverly 115-kv Transmission Line
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Mr. Fred L. Bolwahn

-2-

June 27, 1983

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We would appreciate your written concurrence of this plan at the earliest possible date so that we can schedule to complete this work in a timely manner. Please contact Jerry A. Walker if you have further questions or comments on this plan.

Very truly yours,

A handwritten signature in dark ink, appearing to read "R. W. Bryant", with a long, sweeping horizontal stroke extending to the right.

R. W. Bryant
Vice President

RWB/JAW/lre

End. species - whooping crane
7/7/83
JK

TELEPHONE CONVERSATION RECORD

FISH AND WILDLIFE SERVICE
Regional Office - Region 6

ROUTING

1	John Green	4	Kathy
2	Don	5	
3	Jane	6	

DATE 7/6/83

FILE REFERENCE

FA/SE/whooping
cranes

RECORD

TO: Wuthen

FROM: Gary Halverson, SE, R-2

CONVERSATION

Gary called to say that they (R-2) were planning on funding (\$2,000), with '84 money, a fall monitoring study on transmission lines and collisions with cranes. The Idaho State Coop Unit (Rod Drwain) will do the monitoring. Gary did not think that there were enough funds available to do a large full blown study but this monitoring would give us detailed information on the magnitude of the problem. We can then decide after the study what further course of action should be taken. The monitoring study will be conducted in San Luis Valley, Colorado.

copy to: PL, Pierre & SC (SE)
ARD, WR
Refuge Manager, Alamogosa NWR
JES

FILE # End. Species - whooping crane

<input type="checkbox"/> Nall <u>7/1</u>	<input type="checkbox"/> McDermith
<input checked="" type="checkbox"/> ers <u>7/1</u>	<input type="checkbox"/> Espinosa
<input checked="" type="checkbox"/> Kauffeld <u>7/1</u>	<input type="checkbox"/> Martinez
<input type="checkbox"/> Jones	<input type="checkbox"/> Mondragon
<input type="checkbox"/> Cossick	<input type="checkbox"/> Gray
<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Action	<input checked="" type="checkbox"/> Information

JUL 12 1983

5 July 83

mel,

Many thanks for the report of the juvenile whooper. The day your letter arrived we also received a phone call from the Forest Service people in Delta. They had the same color-markings but on the opposite leg (right leg = yellow) which is PATuxent No. 4. The bird with the yellow on the left leg is dead (82-15).

This report is good since we have not located PATuxent No. 4 on the summer areas. PATuxent No's 5 & 6 are at Grays Lake but we have not found 82-13 yet. PAT# 4 1st showed up at Hart's Basin (near Delta) on 19 April. Apparently, it is hanging around that area.

Good to hear about you & Milt drawing permits for Bighorn. That really sounds great. We will not know what (if any) we draw until early August as they draw on 1 Aug.

Just spent 3 weeks at a crane refuge in China on a field trip paid by International Crane Foundation - it was very interesting & fun. Summer is just arriving here also - very wet & cool spring throughout June! Hatched 26 of 28 whooper eggs - may be best year ever if we can keep them alive!

Best Regards,

Rod

May 1983

<input type="checkbox"/> Nall	<input type="checkbox"/> McDermitt
<input checked="" type="checkbox"/> Suthers	<input type="checkbox"/> Espinosa
<input checked="" type="checkbox"/> Kaufeld	<input type="checkbox"/> Martinez
<input type="checkbox"/> Jones	<input type="checkbox"/> Mondragon
<input type="checkbox"/> Corsick	<input type="checkbox"/> Gray
<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> X Action	<input checked="" type="checkbox"/> Information

WHOOPING CRANE POWERLINE MORTALITY/INJURIES

Mortality Date

- 1st week, November 1965 Rawlins Co., Kansas near Ludell. Hit a 3-wire powerline on a clear day.
- April 16, 1967 Russell Co., Kansas near the Wilson Reservoir north of Dorrance. This mature female was found under a powerline with neck abrasions.
- April/May 1977 Uinta Co., Wyoming found May 29 1/2 mile east of Lonetree. This immature male from the Grays Lake-Bosque del Apache flock died from impact injuries. The collision may have been with a vehicle, fence line, or powerline, though current judgement is this crane hit the powerline. The bird was found under a powerline.
- March/April 1981 Rio Grande Co., Colorado. Grays Lake-Bosque del Apache juvenile 80-17 was found April 9 beneath a powerline at the edge of a barley stubble field north of Monta Vista NWR. Evidence strongly indicates this crane collided with a powerline. Five sandhill cranes were found dead in less than 1/4 mile under the same powerline.
- October 19, 1981 Saskatchewan near Reward. Picked up injured chick a.m. October 18 under powerline in a barley field. This chick appeared to have hit the wire during its flight from the roost to the field and likely had flown over the line on many occasions. The single strand powerline about 30 ft. high was suspended by poles 300 feet apart. Family had been observed to flair over this line at the last minute and also fly under the line.
- October 15 or 16, 1982 Coryell Co., Texas near Oglesby. This yearling whooper, popularly called Ms. Nyarling was found in a harvested maize field adjacent to a north-south running four-wire powerline estimated to be 20-25 ft. above the ground. The bird was reported lying stretched out full length about 3-4 yards east of a point directly under the easternmost wire with head northeast and feet to the southwest. The October 16 weather was clear as was the October 15 eve conditions.
- March 1983 Alamosa Co., Colorado, northwest of Alamosa. Grays Lake-Bosque del Apache 1976 "Ida" severely fractured its left wing in late February/early March 1983. Amputation was required. The same 115 kV transmission line that caused the fall 1982 injury at Alamosa is judged responsible for this injury. Ida died March 18, 1983.

27 April 1983

Copy To

Mr. Jerry A. Walker
Manager, Environmental Services
Colorado-Ute Electric Association, Inc.
P. O. Box 1149
Montrose, Colorado 81402

Dear Mr. Walker:

This letter is a follow-up to 12 April 1983 meeting at the Alamosa-Monte Vista National Wildlife Refuge at which we discussed the problem of bird strikes on powerlines in the San Luis Valley. Of particular concern is a three mile section of 115 kV line located along Road 102 beginning at road 3 South and going north across the Rio Grande River.

During the meeting it was generally agreed that the line posed a hazard to whooping cranes, sandhill cranes as well as other species of waterfowl. During a visit to the site cranes were observed in the vicinity of the lines and sandhills seen closely crossing over the powerlines.

Since the whooping crane is an endangered species and at least two, possibly more, have recently been injured by the lines and died, it is urgent that steps be taken to eliminate the problem. A number of possible solutions were discussed during the meeting. As I recall you offered to develop a plan of action which would reduce or eliminate the hazard to birds and still be economically feasible for Colorado-Ute Electric.

As the first step in complying with the intent and spirit of the Endangered Species Act I suggest that you initiate informal Section 7 consultation by submitting your plan. The Fish and Wildlife Service will review the plan and determine if further formal consultation might be necessary. One important ingredient of any plan will be a monitoring program to evaluate the effectiveness of any measures taken to protect cranes from the hazard of the powerline in question.

Enclosed is a copy of my report on the 12 April 1983 meeting. If you feel any changes should be made please let me know. By copy of this letter I am keeping the participants from other offices or agencies informed of actions pertaining to this matter. Since REA in Washington would be the Federal agency involved in any future formal consultation action should that be necessary, I am sending them a copy of this correspondence.

I believe that our meeting was a big step in the right direction in resolving the problem that exists in the San Luis Valley. I look forward to working with you and the others in totally resolving the problem.

Sincerely,

W. Robert Benton

 Fred L. Bolwahn
ACTING Field Supervisor

cc: Official file
Reading file
AFA/SE-Wathen
Refuge Manager ✓
 Alamosa-Monte Vista NWR
 P.O. Box 1148
 Alamosa, Colorado 81101
Rod Drewien
 Grays Lake NWR
 Wayan, Idaho 83285
Donna Kingery
 5402 South 104
 Alamosa, Colorado 81101
Jim J. Lewis
 San Luis Valley Rural Electric Cooperative, Inc.
 3625 West U.S. Highway 160
 Monte Vista, Colorado 81144
Donald L. Zimmerman
 Chief-Western Area Electric
 Rural Electrification Administration
 Washington, D.C. 20250

FLB/jg:4-21-83

TRIP REPORT

Date: 27 April 1983
To: File
From: Fred L. Bolwahn
Subject: Crane-Powerline Problems At And Near The Alamosa-Monte Vista
National Wildlife Refuge

Date: 12 April 1983
Place: Alamosa-Monte Vista National Wildlife Refuge

Participants

See attached list

Purpose

To open a dialog with Colorado-Ute Electric Association, and San Luis Valley Rural Electric Cooperative to determine the facts concerning a problem involving whooping crane, sandhill crane and other species colliding with powerlines in the San Luis Valley resulting in numerous recent mortalities including at least two whoopers. The ultimate goal is to take steps to alleviate or eliminate the problem. One particular three mile stretch of 115 kV line was the focus of our attention.

Summary

After opening comments stating the purpose Jerry Walker of Colorado-Ute stated that they were unaware of the problem until they received a letter from Donna Kingery. He wanted to find out exactly where the problem was, look at the site, receive any suggestions as to possible steps that might be taken to solve the problem and then discuss what must be done.

The thrust of the ensuing discussions was that a section of 115 Kv powerline can be pinpointed where large numbers of cranes including whoopers twice daily travel between a marshy roosting area and nearby grain fields. The section of line posing a problem begins at the intersection of Roads 102 and 3 South and continues north across the river for a total distance of about 3½ miles. It was believed that the shield wires on top of the poles above the main conductors were the primary culprits because of their smaller size and dull color making them less visible.

No proven solution is known. Possible solutions advanced included large orange balls or brightly colored sleeves placed on the shield wires, replacing the wire with a brightly colored wire, burial of the line, moving the line, and planting a row of fast growing trees adjacent to the line to eventually make a barrier higher than the wires causing birds to fly over the lines. This latter solution is a long term one which would require intermediate steps until the trees grew tall enough.

It was emphasized that whatever steps were taken a monitoring program would be necessary to observe the results. Considerable discussion resulted on the need for research on this problem.

It was pointed out that Region 2 is in the process of contacting the Edison Electric Institute about a research project on bird strikes on powerlines. Jerry Walker indicated that another organization in California was interested in doing similar research and that he would be discussing the problem at hand with them.

Colorado-Ute suggested that they put together a plan aimed at solving the hazard to cranes and other bird life. They will submit their plan for review and consurance by the FWS to begin the Section 7 consultation process. The FWS will solicit information from other knowledgeable interested parties. Should the plan be acceptable then consultation will be concluded. However, should problems still exist REA will be requested to enter into formal consultation on this matter.

After the meeting the site was visited with numerous cranes being observed barely skimming over the lines. Two whoopers were observed in the area.

Recommendations

To begin the consultation process I will write a letter to Colorado-Ute requesting that they enter into informal Section 7 consultation as required by the Endangered Species Act. They will respond with their estimate of the situation and the steps that they plan to take to help solve the problem. If through informal discussions agreement can be reached as to the steps to be taken to try and resolve the problem of bird strikes on the powerline and to monitoring necessary to evaluate the degree of success there will be no need for formal Section 7 consultation with the provision that should monitoring prove the measures ineffective consultation will be reinitiated.

<u>Name</u>	<u>Organization</u>	<u>Phone</u>
Frederic L. Bolwahn	FWS - Salt Lake City	801/524-4430
Melvin T. Nail	Alamosa - Monte Vista NWR	303-589-4021
Milton B. Suthers	Alamosa - Monte Vista NWR	303-589-4021
Jon D. KAUFFELD	Alamosa - Monte Vista - NWR	589-4021
Kod Drewien	University of Idaho Idaho Coop. Wildlife Research Unit	(208) 574-2178
Wendy Brown	"	"
Ferry A Walker	Colorado - Ute Electric Assoc Montrose CO	249-4501
MICHAEL J. SRAMEK	COLORADO UTE	249-4501
JORDAN AMERMAN	COLORADO UTE	249 4501 X 3353
Monty R. Griffith	CUEA - SAN LUIS AREA	303-249-4501
Donna L. Kingery		303 589-9635
Jim J. Lewis	SLVREC	303-852-3538

memorandum

DATE: April 29, 1983

MAY 2 1983

REPLY TO
ATTN OF: Laboratory Diagnostician, NWHLSUBJECT: Final Report - P.R. 2959 - Whooping
Crane Collected in Rio Grande County, Colo.TO: Jon Kauffeld
Alamosa-Monte Vista NWR

FILE <i>145-111-1-600001</i>	
<input type="checkbox"/> Nally <i>Mike</i>	<input type="checkbox"/> McDermott
<input checked="" type="checkbox"/> Suthers <i>3/2</i>	<input type="checkbox"/> Espi
<input checked="" type="checkbox"/> Kauffeld <i>3/2</i>	<input type="checkbox"/> Ma
<input type="checkbox"/> Jones	<input type="checkbox"/> Mc
<input type="checkbox"/> Cossick	<input type="checkbox"/> Gr
<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Action	<input checked="" type="checkbox"/> Information

Copy to (WNR) 5/2/83

Final Dx: Avian tuberculosis/terminal salmonellosis

Comment - This case is extremely interesting as it documented the first occurrence of avian tuberculosis in an endangered whooping crane. Additionally, salmonellosis was diagnosed concurrently, probably as a terminal systemic infection.

Mycobacterium avium, the organism isolated from this case, is undergoing further testing at Ames, Iowa by Dr. Thoen, a leading authority in the specialized field of mycobacteria. The isolate is pathogenic and there is some potential for human infection. This plus the occurrence of Salmonella enteritidis, a known human pathogen, renders the skin and carcass a bio-safety hazard. It is unfortunate as the skin was a nice candidate for mounting. The material will have to be incinerated.

We thank you for this specimen and apologize for the long delay in the final written report. However, mycobacteria are very slow-growing organisms and we do not have in-house capability to isolate and grow the organism. Therefore, we must rely on specialists like Dr. Thoen to work these specimens into their research schedules.

R.K. Stroud

Richard K. Stroud, D.V.M., M.S.

RKS:ls

Enclosure

cc: Wildlife Biologist, Grays Lake NWR
Refuge Manager, Alamosa NWR
Jim Carpenter, PWRC
Asst. Regional Director (ARW)

NATIONAL WILDLIFE HEALTH LABORATORY—NECROPSY REPORT

SUBMITTER'S NAME & ADDRESS

Jon Kauffeld
Alamosa-Monte Vista NWR
P.O. Box 1148
Alamosa, CO 81101

cc: Rod Drewier
Grapes Lake NWR

CASE NO. 2959-30,069

USFWS Band #599-29377; PWRC
COLLECTED: 7/15/82
RECEIVED: 7/20/82
EXAMINED: 7/20/82
FINALIZED: 4/29/83
PROSECTOR: RKS

SPECIES: Whooping crane

TELEPHONE NO.

SPECIMEN: Carcass

WEIGHT: 3250

PRESERVED BY: Frozen

(GRAMS)

HISTORY SUMMARY:

~~WILD CAPTURED~~

FOUND DEAD/~~EUTHANIZED~~

the Empire Canal, near 9-Mile South Rd. and 5E Rd., Rio Grande Cty, Colorado. Land is 3-mil SE of Monte-Vista NWR. Bird present from mid-May until 7/15. Last seen alive 7/14/82 at 0530 hrs. Bird seen limping and noted to have a knot on the right leg below the knee. It was lethargic, had been feeding in the marsh and walking about 250 yds to an open grain bin which contained brewing barley (?) treated with avitox 200, a fungicide known to be mildly toxic to bobwhite quail. Bird noted to be emaciated. Found 50 yds N. of the grain bin. Blue-colored transmitter on right leg and yellow and green colored band on left leg both removed by Refuge personnel before shipment.

External Examination

Right leg has some areas of callus and excoriation at the joint. Joint does not appear swollen. There is fairly extensive caking of feces around the vent feathers.

Internal Examination

Musculoskeletal system - There is complete absence of subcutaneous fat. Severe breast muscle atrophy is evident on opening the carcass. There is no evidence of broken bones or subcutaneous bruising.

Oral cavity - The tongue is normal in color and texture. There are small, possibly 2-mm long, parasites present in the nasal pharynx. These may be small fly larva. There are larger fly larva present in the oral cavity along with fly eggs. The dorsal surface of the mouth cavity has a fossa which contains a necrotic area. This is a caseonecrotic mass which is present within the fossa. It measures 1.5-cm long by 1.0-cm wide.

Cardiovascular system - The heart is flaccid. There is evidence of serous atrophy of coronary fat. There are fine whitish short streaks in the musculature which may represent foreign bodies. These are more prominent in the intra-ventricular septa. Normal blood clot is present in the ventricles. The major vessels and arteries branching from the heart are normal.

Respiratory system - There is a single nodule, approximately 2-mm diameter, on the serosal surface of the trachea. The lungs are moderately wet, otherwise normal. Air sacs are normal.

Digestive system - There is a single lesion in the esophagus which is a flattened raised area with a possible parasite tract leading from it. There is a very large, crateriform ulcer which is approximately 2-cm diameter at the proventricular-ventricular junction. This has a caseonecrotic core and is partially hollowed and

AGE: Immature
SEX: Male

P.M. STATE:
BODY CONDITION:

(SEE NEXT PAGE)

BACTERIOLOGY Liver - RC & acid fast
Brain swab - RC
Nas. pharynx - AF, Fung. RC

PHOTOS: Digestive system, mouth lesions, spleen, ventricular cavitation

TOXICOLOGY

HISTOLOGY

PARASITOLOGY Kidneys - Coccidia
Ectoparasites (lice)
Esoph & trach - Capillaria

OTHER Tissues for TB culture to Dr. Theon in Ames sent on 7/27/82

CARCASS DISPOSAL: INCINERATED
HELD YES

FINAL DIAGNOSIS: Avian tuberculosis / Terminal Salmonellosis

Lab. Diagnostician Richard K. Stroud, NWHL,
Madison, WI

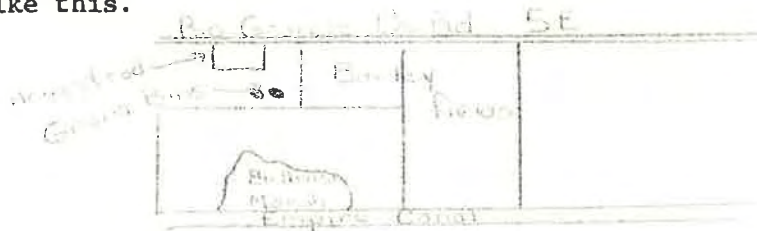
May 9, 1983

Asst. Refuge Manager (Biologist), Alamosa-Monte Vista NWR

Draft Manuscript on Avian Tuberculosis and
Salmonellosis in a Whooping Crane

I have received the draft manuscript and have made the following comments:

- 1) Suggested corrections on history of the bird are made on the draft on page 1, 2nd paragraph. I am not sure of the exact date of radio tagging at Grays Lake NWR in the summer of 1979. Rod Drewien, University of Idaho, who is on contract to FWS for this work generally does the marking and radio tagging in late summer just before the birds have reached flight stage.
- 2) I will clarify habitat use. The area the bird (Pat. #2) used looks something like this.



The entire area of marsh, barley fields, and up to the grain bins would probably be about 40 acres. The bird did feed occasionally in the open grain bin (wind had blown the top off and doors were left open). Two other sandhill cranes and a few pheasants, probably sparrows and blackbirds also fed to some extent in the grain bin. However, the resident of the homestead, Jackie Jones, Alamosa-Monte Vista NWR Refuge Assistant had two dogs which excluded birds from using the grain bins most of the time.

I believe you have overemphasized the importance of the grain bin on page 4. The bird spent most of the time from mid-May until July 15 in the marsh and barley field where it fed on green barley and probably insects in the marsh. It really only frequented the area of the grain bin in the last week or so of its life and probably was doing very little feeding at this time.

If I can be of further assistance, please let me know.

memorandum

DATE: May 4, 1983

REPLY TO
ATTN OF:

Lab. Diagnostician, National Wildlife Health Laboratory, Madison, WI

SUBJECT:

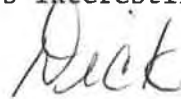
Whooping crane (599-29377-PWRC#2); NWHL PR-2959-30069

TO:

Jon Kauffeld, Ass't Refuge Manager, Region 6

Enclosed is a manuscript (draft) which I have written as a Case Report for the Journal of Wildlife Disease describing the pathologic findings in the whooping crane submitted last July. The manuscript is not complete because Dr. Thoen still has not finished his workup. However, I believe it does give most of the information of interest.

I would appreciate your reviewing the manuscript particularly in the area of the history. I had only the history submitted with the carcass to go on. The acknowledgement section is not included, but I will place your names in that section as the contributors of the specimen. Thank you again for this interesting case.



Richard K. Stroud

RKS/mb

Enc. Draft Manuscript

MAY 6 1983

FILE	
<input type="checkbox"/> Nail	<input type="checkbox"/> McDermith
<input type="checkbox"/> Suthers	<input type="checkbox"/> Espinosa
<input type="checkbox"/> Kauffeld ...	<input type="checkbox"/> Martinez
<input type="checkbox"/> Jones	<input type="checkbox"/> Mondragon
<input type="checkbox"/> Cossick	<input type="checkbox"/> Gray
<input type="checkbox"/>	<input type="checkbox"/>
X Action ✓ Information	

OPTIONAL FORM NO. 10
(REV. 1-80)
GSA FPMR (41 CFR) 101-11.6
5010-114

memorandum

DATE: March 29, 1983

REPLY TO
ATTN OF: Laboratory Diagnostician, NWHL

SUBJECT: Preliminary Report - P.R. 3208 - Whooping
Crane from Grays Lake NWR

TO: Rod Drewien
Grays Lake NWR

APR 25 1983

<input checked="" type="checkbox"/> Nall	<input checked="" type="checkbox"/> McDermitt
<input checked="" type="checkbox"/> Suthers	<input checked="" type="checkbox"/> Espinosa
<input checked="" type="checkbox"/> Kauffeld	<input checked="" type="checkbox"/> Martinez
<input type="checkbox"/> Jones	<input type="checkbox"/> Mondragon
<input type="checkbox"/> Cossick	<input type="checkbox"/> Gray
<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> X Action	<input checked="" type="checkbox"/> Information

The specimen you submitted was examined and has been given a preliminary diagnosis based on gross findings as follows:

<u>Accession Number</u>	<u>Species</u>	<u>Preliminary Diagnosis</u>
31,752	Whooping crane USFWS Band 629-02527	Gangrene around amputated limb stump (induced broken wing)/possible septicemic condition

NOTE: When laboratory tests are completed, a final necropsy report will be forwarded to you.

All inquiries regarding this case should refer to the P.R. number above and should be directed to Dr. Richard Stroud at 608/264-5418 or FTS 364-5418.

RK. Stroud
Richard K. Stroud, D.V.M., M.S.

RKS:ls

Enclosure

cc: Jim Carpenter, PWRC

NATIONAL WILDLIFE HEALTH LABORATORY—NECROPSY REPORT

SUBMITTER'S NAME & ADDRESS Rod Drewien Grays Lake NWR Wayan, ID 83285		CASE NO. 3208-31,752 SFWS Band #629-02527 COLLECTED: 3/8/83 RECEIVED: 3/24/83 EXAMINED: 3/28/83 FINALIZED: PROSECTOR: RKS
SPECIES: Whooping crane	TELEPHONE NO.	SPECIMEN: Carcass WEIGHT: 4510 PRESERVED BY: Frozen (GRAMS)

DRY SUMMARY: ~~WILD/CAPTURED~~ ~~FOUND DEAD IN HAZARD~~ Received from Grays Lake NWR.
 Bird was hatched in 1977 in Idaho and foster-reared. Thought to have been shot in late 1977. Ten days ago it hit a powerline and badly damaged the wing. Taken to vet clinic in Alamosa. Recovering well following amputation. Died while being transported to OPSY: Denver. Additional history enclosed.

Fluoroscopic examination of the entire body revealed no lead shot or other bullet fragments.

EXTERNAL EXAMINATION

The body is covered by an elastic stocking. The left wing has been recently amputated. The distal end of the humerus is covered by a well-placed bandage. There is some yellow staining of the feathers around the vent. The remaining feathers on the left side of the body appear to be somewhat ruffled. The base of the feathers are slightly caked with some blood and in some areas de-feathering is evident. The right wing looks fairly normal. There is a thick, yellowish, mustard-colored fluid oozing from around the mouth (this is probably esophageal content). Eyes are moderately sunken. The head and neck appear normal. No lesions were noted on the feet.

The bandage is removed from the left amputated wing tip. The underlying area shows a discoloration of greenish to dark black. The skin appears to be necrotic. There is an exudative material on the end of the bone. Underlying musculature and subcutaneous tissues or approximately the distal 8 cm of the left wing shows necrosis. There is a somewhat foul smell suggestive of gangrene.

On skinning the left side of the chest there are several large air pockets. It cannot be determined whether these are produced from bacterial gas or if there is a change here due to freezing and thawing.

INTERNAL EXAMINATION

Musculoskeletal system - Subcutaneous fat is undergoing serous atrophy however, there are remnants of fat which have a yellowish tinge both on the thoracic inlet area, on the legs and up around the wings and rib cage. There is no obvious breast muscle atrophy. No other injuries are noted on the skinned carcass..

Cardiovascular system - Normal clot present in both ventricles. No changes in the myocardium noted. Pericardium looks normal. No excess fluid present. Moderate amounts of coronary fat are noted.

Respiratory system - Lungs, air sacs and trachea all normal.

Subadult (?) Male		P.M. STATE: Fair to good BODY CONDITION: Good	(SEE NEXT PAGE) PHOTOS: Lesion around amputated wing	
BIOLOGY Brain swab - RC Liver - RC Tissue - impression smear	VIROLOGY	TOXICOLOGY	HISTOLOGY Testes along w/many tissues	
BIOLOGY Kidneys Entire GI tract	OTHER CBLK to PWRC	CARCASS DISPOSAL: INCINERATED HELD Skin for possible mount		

DIAGNOSIS:

3208-31,752 Whooping crane
USFWS Band #629-02527

Digestive system - Mouth, esophagus and proventriculus normal. Gizzard lining appears somewhat thickened, possibly hyperkeratotic. The musculature of the gizzard has some areas of apparent fibrosis. Small intestine is normal throughout. The liver is dark in color indicating congestion. There are occasional, very small, white foci present. These measure less than $\frac{1}{2}$ -mm diameter.

Lymphatic and endocrine system - Spleen is approximately 1-cm diameter, appears somewhat congested, is round; no foci or hemorrhages noted. Adrenals appear fairly large, yellow, no hemorrhages noted.

Urogenital system - Kidneys normal. Testes are yellow blotched with darker brown to black coloration. Testes are 2.5-cm long by approximately 4-mm diameter.

Nervous system - Posterior right lobe of the cerebellum has several small areas which may represent subdural hemorrhage. These are less than 1-mm diameter and may be due to terminal septicemia. No bruising or other contusive type lesions noted.

Alamosa - End. Species - Whooping Crane
4/12/83 Meeting at Monte Vista NWR Headquarters to
Discuss Powerline/Whooping Crane Mortality Problem.

<u>Name</u>	<u>Organization</u>	<u>Phone</u>
Frederick L. Bolwehn	FWS - Salt Lake City	801/524-4430
Melvin T. Nail	Alamosa - Monte Vista NWR	303-589-4021
Milton B. Suthers	Alamosa - Monte Vista NWR	303-589-4021
Jon D. Kauffeld	Alamosa - Monte Vista NWR	589-4021
Rod Drewien	University of Idaho Idaho Coop. Wildlife Research Unit	(208) 574-2178
Wendy Brown	"	(303) 589-4021
Jersey A. Walker	Colorado - Ute Electric Assoc Montrose CO	249-4501
Michael J. Sramek	Colorado UTE	249-4501
Jordan Amerman	Colorado UTE	249 4501 x 3353
Monty R. Griffith	CUEA - San Luis Area	303-249-4501
Anna L. Lingery	Private Citizen	303 589-9635
Jim J. Lewis	SLVREC	303-852-3538

NATIONAL WILDLIFE HEALTH LABORATORY—NECROPSY REPORT

CASE NO. 2959-30,069

SUBMITTER'S NAME & ADDRESS

Jon Kauffeld
Alamosa-Monte Vista NWR
P.O. Box 1148
Alamosa, CO 81101

*(cc: Rod Driscoll
Givings Lake NWR*

TELEPHONE NO.

USFWS Band #599-29377; PWRC #2

COLLECTED: 7/15/82
RECEIVED: 7/20/82
EXAMINED: 7/20/82
FINALIZED: 4/29/83
PROSECTOR: RKS

SPECIES: Whooping crane

SPECIMEN: Carcass

WEIGHT: 3250

PRESERVED BY: Frozen

(GRAMS)

HISTORY SUMMARY:

~~WILD/CAPTIVE~~

FOUND DEAD/~~EXTENDED~~

Found on a private marsh located near the Empire Canal, near 9-Mile South Rd. and 5E Rd., Rio Grande Cty, Colorado. Land is 3-miles SE of Monte-Vista NWR. Bird present from mid-May until 7/15. Last seen alive 7/14/82 at 0530 hrs. Bird seen limping and noted to have a knot on the right leg below the knee. It

NECROPSY: was lethargic, had been feeding in the marsh and walking about 250 yds to an open grain bin which contained brewing barley (?) treated with avitrox 200, a fungicide known to be mildly toxic to bobwhite quail. Bird noted to be emaciated. Found 50 yds N. of the grain bin. Blue-colored transmitter on right leg and yellow and green colored band on left leg both removed by Refuge personnel before shipment.

External Examination

Right leg has some areas of callus and excoriation at the joint. Joint does not appear swollen. There is fairly extensive caking of feces around the vent feathers.

Internal Examination

Musculoskeletal system - There is complete absence of subcutaneous fat. Severe breast muscle atrophy is evident on opening the carcass. There is no evidence of broken bones or subcutaneous bruising.

Oral cavity - The tongue is normal in color and texture. There are small, possibly 2-mm long, parasites present in the nasal pharynx. These may be small fly larva. There are larger fly larva present in the oral cavity along with fly eggs. The dorsal surface of the mouth cavity has a fossa which contains a necrotic area. This is a caseonecrotic mass which is present within the fossa. It measures 1.5-cm long by 1.0-cm wide.

Cardiovascular system - The heart is flaccid. There is evidence of serous atrophy of coronary fat. There are fine whitish short streaks in the musculature which may represent foreign bodies. These are more prominent in the intra-ventricular septa. Normal blood clot is present in the ventricles. The major vessels and arteries branching from the heart are normal.

Respiratory system - There is a single nodule, approximately 2-mm diameter, on the serosal surface of the trachea. The lungs are moderately wet, otherwise normal. Air sacs are normal.

Digestive system - There is a single lesion in the esophagus which is a flattened raised area with a possible parasite tract leading from it. There is a very large, crateriform ulcer which is approximately 2-cm diameter at the proventricular-ventricular junction. This has a caseonecrotic core and is partially hollowed and

(SEE NEXT PAGE)

AGE: Immature

P.M. STATE:

SEX: Male

BODY CONDITION:

PHOTOS: Digestive system, mouth lesions, spleen

ventricular cavitation

BACTERIOLOGY Liver - RC & acid fast

VIROLOGY

TOXICOLOGY

HISTOLOGY

Brain swab - RC

Nas. pharynx - AF, Fung. RC

Many tissues

PARASITOLOGY Kidneys - Coccidia

OTHER Tissues for TB culture to

CARCASS DISPOSAL: INCINERATED

Ectoparasites (lice)

Dr. Theon in Ames sent on 7/27/82

HELD YES

Esoph & trach - Capillaria

FINAL DIAGNOSIS: Avian tuberculosis / Terminal Salmonellosis

filled with food items which have been impacted into the cavity. Throughout the small intestine there are five major areas which are described as firm, nodular whitish- to cream-colored tumors or enlargements. These have a caseous character to a firm fibrous character. There are five major areas of the intestine affected starting at the duodenum and transversing all the way to the caecal-colic junction. The larger masses are made up of nodules ranging from 1-cm to 2-mm diameter. Additionally, there are several smaller foci along the small intestinal tract. In some areas it appears that the small intestine may be partially occluded by the presence of these large masses. The liver is large, has numerous white- to cream-colored caseous foci scattered throughout. These range from 2- to 3-mm diameter. Some have an apparent necrotic core. The spleen is similarly enlarged and has been almost totally replaced with nodular firm to caseous material arranged in multiple nodules ranging up to 1- to 1.5-cm diameter.

Urogenital system - There are two foci approximately 3- to 4-mm diameter embedded within the parenchyma of the kidneys. The kidneys are a grayish color. Serous atrophy of perirenal fat is noted. The testes are elongate, approximately 3-cm long, very narrow and have a bi-colored appearance being black and tannish color. These apparently, are immature testes.

Lymphatic and endocrine system - The adrenal glands are a light mustard color, apparently slightly enlarged, but show no evidence of lesions.

Nervous system - Brain is soft. No lesions noted.

BACTERIOLOGY - Acid fast stain of liver positive. No mycotic growth. Routine culture of liver yielded Salmonella enteritidis serotype Agona, Pseudomonas putrefaciens, Pseudomonas fluorescent group and Enterobacter sp. There were occasional acid fast rods present in stain of nasal pharynx but no mycotic growth. Routine culture yielded Enterobacter sp., P. putrefaciens, Streptococcus fecalis, S. avium, S. morbillorum (viridans), S. sanguis (viridans) and Staphylococcus sp. No bacterial growth from brain swab.

PARASITOLOGY - Negative for coccidia and helminths. No identification of maggots submitted.

HISTOPATHOLOGY:

Trachea - Granuloma with typical necrotic center. Occasional cell densely packed with acid-fast organisms present.

Kidney, adrenal, heart - No significant findings in these tissues.

Liver - Granuloma with typical necrotic center. Large giant cells contain dense masses of acid-fast bacteria in what appears to be a cytoplasmic vacuole. These organisms appear as minute short rods. Some areas have deposition of homogenous eosinophilic material presumed to be amyloid.

Intestinal lesions - Granuloma appear to arise in the submucosa. They are typical rounded lesions, containing epithelioid cells and occasional macrophages containing dense clusters of acid-fast bacilli. Lesions have necrotic centers.

2959-30,069 Whooping crane

HISTOPATHOLOGY (cont.):

Spleen - Typical granulomas are present in the spleen. Amyloid-like substance present throughout minute acid-fast organisms restricted to large vacuole-like intracellular structure in occasional large macrophage.

Gizzard - Typical granulomatous lesion with occasional macrophages containing dense aggregations of minute acid-fast rods.

Comment - The infection contains remarkably few organisms for avian tuberculosis except the occasional dense-packed apparently intracellular bacteria.

Histologic Dx: Avian tuberculosis

UNITED STATES GOVERNMENT

Memorandum

U.S. FISH & WILDLIFE SERVICE
Region 2, Albuquerque, New Mexico 87103

TO : Whooping Crane Files

DATE: March 24, 1983

FROM : Gary L. Halvorson, Endangered Species Biologist

SUBJECT: Death of the Whooping Crane (Ida)

On March 22, 1983, I talked to Rod Drewien about the death of the recently injured member of the Grays Lake-Bosque del Apache flock. This is a record of that death.

On March 18, 1983, Rod Drewien was transporting the 1976 Ida, (who recently collided with a powerline in Alamosa County, Colorado) to the Denver airport. Ida's wing had recently been amputated because of this accident and had recuperated to the point of being fit for travel to Patuxent WRC. Ida was in a cage in the cab of Drewien's truck for this journey. Periodically Rod would stop the truck and check the status of this bird. After being in transit for approximately 1 hour and 45 minutes, at about 11:50 a.m., and approximately 30 miles south of Denver, Ida raised an unusual amount of commotion which caused Rod to stop the truck and physically examine this bird. Its heartbeat was rapid and body semi-limp; she went into shock and died shortly thereafter.

Ida was sent to the Madison Health Laboratory on March 23.

Gary L. Halvorson

cc: Larry Smith, Region 2
Wayne Wathen, Region 6 (SE)
Scott Derrickson, Patuxent WRC
Bosque del Apache NWR
Alamosa NWR
SE Field Office, Pierre, SD
Aransas NWR
Director, FWS, Washington, D.C. (AFA)
ARD (AFF), Region 2
Director, FWS, Washington, D.C. (OES)
ES Field Offices, Albuquerque, NM; Tulsa, OK;
Fort Worth, TX; Corpus Christi, TX; Houston, TX

APR 4 1983

FILE *End. Species - Whooping Crane 1983*

<input type="checkbox"/> Neal <i>7/11</i>	<input type="checkbox"/> McDermitt <i>7/11</i>
<input type="checkbox"/> Suthers <i>4/11</i>	<input type="checkbox"/> Tepinosa
<input checked="" type="checkbox"/> Gouffard <i>7/11</i>	<input type="checkbox"/> Martinez
<input type="checkbox"/> Jones	<input type="checkbox"/> Mondragon
<input type="checkbox"/> Coslick	<input type="checkbox"/> Gray
<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Action	<input checked="" type="checkbox"/> Information

Regional Director, Region 6 (RW)

March 18, 1982

Refuge Manager, Alamosa-Monte Vista NWR

Whooping Crane Egg

An empty whooping crane egg is available from the foster parent whooping crane program in Idaho. We would like to have the egg along with a sandhill crane egg and nest for a display at the Alamosa-Monte Vista headquarters. Since the whooping crane is an endangered species, we would need to have authorization to possess it. Would you please take whatever action is necessary to obtain this authorization for us?

cc:
Area Manager, Salt Lake City (AW)

THE FOLLOWING PAGES WERE TAKEN FROM THE BOOKLET: Avian Mortality at
Man-made Structures: An Annotated Bibliography (Revised)

Biological Services Program, FWS/OBS-80-54, July 1980.

211. Drewien, R.C. 1973. Ecology of Rocky Mountain Greater Sandhill Cranes. Ph.D. Thesis. Univ. of Idaho, Moscow.

Collisions with power lines accounted for 36% of the observed mortality in the population that was studied.

522. Nesbitt, S.A., and D.T. Gilbert. 1976. Powerlines and fence hazards to birds. Fla. Nat. 29(2):23.

A sandhill crane was killed on a foggy February morning when it collided with a power line near Gainesville, Fla. Such collisions may be a major mortality factor for cranes and other birds such as herons, waterfowl and raptors. Careful siting of power lines is important to minimize their impact.

785. Walkinshaw, L.H. 1956. Sandhill Cranes killed by flying into power line. Wilson Bull. 68(4):325-326.

In Nebraska, along the North Platte River, five cranes were found dead beneath 30-foot high power lines on the morning of 22 March 1954. Apparently, they had flown into the lines earlier in the morning before it was light.

822. Wheeler, R.H. 1966. Sandhill Crane casualties in the blizzard of March 22, 1966. Nebr. Bird Rev. 34(4):69-70.

Some birds were killed during the stormy weather when they collided with power lines and trees.

827. Willard, D.C., J.T. Harris, and M.J. Jaeger. 1977. The impact of a proposed 500 KV transmission route on waterfowl and other birds. Public Util. Comm., Salem, Oreg. 89 pp.

From October 1976 to April 1977, a study was made to determine the potential impact of a proposed power line through areas used by waterfowl, pelicans, cranes, and other birds in the Klamath Basin, Oreg. Data were collected on flight height, weather conditions, and movement patterns as well as mortality along existing lines. During spring 1977, five stretches of line were checked and 23 birds, including 14 American Coots, were recovered. Most of the birds were found under distribution lines. Daily checks were not made and the effect of scavenger removal was not adequately assessed. One transmission line and one distribution line were checked in fall 1976 on 12 dates, and 18 birds were found, 9 at each site. Ten of the casualties were Pintails. Records from the Klamath Basin National Wildlife Refuge during 1962-76 listed 194 dead birds of 8 species, including 47 white pelicans and 116 Pintails, as having been killed by colliding with overhead wires. In February 1977, the Klamath Wildlife Area reported 32 dead birds in three weeks along a 4-mile stretch of 69 KV lines. In April 1977, 27 dead birds were found along 1-1/4 mile of 69 KV line checked on seven dates. The following conclusions are made: (1) large birds such as pelicans and swan are particularly vulnerable to collisions with overhead wires; (2) low-level movements under condi-

827. (cont.)

tions of strong wind and poor visibility increase the possibility of strikes occurring, although birds run into wires regularly even in clear, calm, bright weather; (3) the impact on easily found species is usually an overestimate; and (4) scavenging, though it occurs, is probably trivial.

908. Ellis, D.H., J.G. Goodwin, Jr., and J.R. Hunt. 1978. Wildlife and electric power transmission. Pages 81-104 in J.L. Fletcher and R.G. Busnel, eds, Effects of noise on wildlife. Academic Press, New York.

The problem of bird mortality due to collision and electrocution at power lines is briefly discussed. The Japanese Crane and the Eagle Owl are examples of species that have suffered appreciable losses due to wire strikes. Eagles in the United States and vultures in southern Africa are particularly prone to electrocutions. Utility companies in the U.S. have cooperated to reduce the electrocution hazard by modifying utility pole design and conductor configurations.

947. Kaiser, G.W. and R. McKelvey. 1978. Destruction of birds by man-made objects. Unpublished manuscript. Draft. 7 pp.

Power line collisions involve more species than commonly believed. Overhead wires are the major source of mortality among greater Sandhill Cranes on their California wintering grounds, and in southwestern British Columbia, an estimated 12 Great Blue Herons are killed annually at power lines in agricultural areas around Delta. Trumpeter Swans have also been recovered beneath power lines at Delta and Port Alberni, Vancouver Island. In the Vancouver area, the most lethal wires are the 5 cm cables leading to the Roberts Bank Superport jetty. Surf Scoters, American Wigeon, Glaucous-winged Gulls, and shorebirds are regularly found dead under those wires. Birds feeding in the tidal zone must cross these wires two or four times a day and become confused as they climb over the cables. Usually it is only the lower tail of the flock that collides, but even at slow speed, the impact is always fatal. Among shorebirds, the kill rates varies with species. Dunlins are killed sporadically and the incidents appear to be weather dependent. However, Western and Least Sandpipers are killed so often that Marsh Hawks, Merlins, and Glaucous-winged Gulls patrol the area regularly for casualties. Driftwood logs pulled up along the beach pose a collision hazard to nocturnal sea birds returning to their nests and to fledgling Cassin's Auklets as they try to fly to the sea. To eliminate the hazard to birds, the Port Alberni power lines were marked with fishing floats bolted to the conductors. Since then, the loss of swans has almost been eliminated. The large cables at the Roberts Bank Superport will be buried which will eliminate that hazard.

997. Rigby, R.W., Refuge Manager, Bosque del Apache National Wildlife Refuge, Socorro, N. Mex. 1978. Letter to Michael Avery, National Power Plant Team, Ann Arbor, Mich. 19 October. 1 p.

At the Bosque del Apache National Wildlife Refuge, orange aircraft warning markers were placed on power lines (7.2/12.5 kV) traversing the refuge to reduce the incidence of collisions by Sandhill Cranes, and, possibly, Whooping Cranes. Prior to the use of markers, two to seven Sandhill Cranes were killed each year from collisions with power lines. No deaths were recorded for 3 years straight after markers were installed. Finally the line was buried.

112. Boylan, B.T., Jr. 1956. Lake Andes birdlife 40 years ago. S. Dak. Bird Notes 8(3):40-41, 43.

A Whooping Crane was injured, probably by flying into a telephone wire.

363. Idaho Wildlife Cooperative Research Unit. 1976. Semi-annual report. 29(2):27.

One foster-parented Whooping Crane died by striking a barbed-wire fence in Colorado.

364. _____. 1977. Semi-annual report. 30(2):12.

The death in Colorado of one foster-parented Whooping Crane by colliding with a barbed-wire fence is reported. Death by collision appears to be a major cause of mortality among foster-parent reared Whooping Cranes.

860. Anonymous. 1965. Rare Whooping Crane is found dead near Atwood. Goodland (Kansas) Daily News, 5 November: 1.

A Whooping Crane was found dead in a wheat field near Atwood, Kans., on 4 November. The bird apparently struck a nearby power line. An abrasion on one leg was the only visible mark on the bird. A Photograph of the crane accompanies the article.

861. _____. 1968. Rare Whooping Crane found near reservoir. Russell Daily News, Russell, Kansas. 16 April: 1.

A Whooping Crane was found dead earlier in the week at Lake Wilson, Kansas. The bird had not been shot, and the death may have resulted from a wire collision or some other cause. (Subsequent autopsy by U.S. Fish and Wildlife Service personnel confirmed wire collision as the probable cause of death.)

G. Halvorson
March 1983

WHOOPING CRANE POWERLINE MORTALITY/INJURIES

Mortality Date

1st week, November 1965 Rawlins Co., Kansas near Ludell. Hit a 3-wire powerline on a clear day.

April 16, 1967 Russell Co., Kansas near the Wilson Reservoir north of Dorrance. This mature female was found under a powerline with neck abrasions.

April/May 1977 Uinta Co., Wyoming found May 29 1/2 mile east of Lonetree. This immature male from the Gray's Lake-Bosque del Apache flock died from impact injuries. The collision may have been with a vehicle, fence line, or powerline, though current judgement is this crane hit the powerline. The bird was found under a powerline.

March/April 1981 Rio Grande Co., Colorado. Gray's Lake-Bosque del Apache juvenile 80-17 was found April 9 beneath a powerline at the edge of a barley stubble field north of Monta Vista NWR. Evidence strongly indicates this crane collided with a powerline. Five sandhill cranes were found dead in less than 1/4 mile under the same powerline.

October 19, 1981 Saskatchewan near Rewand. Picked up injured chick a.m. October 18 under powerline in a barley field. This chick appeared to have hit the wire during its flight from the roost to the field and likely had flown over the line on many occasions. The single strand powerline about 30 ft. high was suspended by poles 300 feet apart. Family had been observed to flair over this line at the last minute and also fly under the line.

October 15 or 16, 1982 Coryell Co., Texas near Oglesby. This yearling whooper, popularly called Ms. Nyarling was found in a harvested maize field adjacent to a north-south running four-wire powerline estimated to be 20-25 ft. above the ground. The bird was reported lying stretched out full length about 3-4 yards east of a point directly under the easternmost wire with head northeast and feet to the southwest. The October 16 weather was clear as was the October 15 eve conditions.

MAR 25 1983

FILE <i>End. Species-Whooping Crane</i>	
<input type="checkbox"/> Naff <i>Miller</i>	<input type="checkbox"/> McGermish
<input type="checkbox"/> Suthers <i>3/25</i>	<input type="checkbox"/> Espinosa
<input checked="" type="checkbox"/> Kauffeld <i>3/20</i>	<input type="checkbox"/> Martinez
<input type="checkbox"/> Jones	<input type="checkbox"/> Mondragon
<input checked="" type="checkbox"/> Cossick <i>3/24</i>	<input type="checkbox"/> Gray
<input type="checkbox"/>	<input type="checkbox"/>
X Action	✓ Information

OVER

Injury Date

May 1956

Lampasas Co., Texas. Yearling (Rosie) collided with a high wire (powerline?) and crippled one wing.

Fall 1982

Alamosa Co., Colorado, northwest of Alamosa. Gray's Lake-Bosque del Apache 2-year old sustained a lower leg injury by flying into a powerline running between a barley field and roosting marsh. We lost track of this individual as of March 1983.

Late February/early
March 1983

Alamosa Co., Colorado, northwest of Alamosa. Gray's Lake-Bosque del Apache 1976 "Ida" severely fractured its left wing. Amputation was required. The same transmission line that caused the fall 1982 injury at Alamosa is judged responsible for this injury.

UNITED STATES GOVERNMENT

Memorandum

U.S. FISH & WILDLIFE SERVICE
Region 2, Albuquerque, New Mexico 87103

TO : Whooping Crane Files

DATE: March 15, 1983

FROM : Gary L. Halvorson, Endangered Species Biologist

SUBJECT: Alamosa County, Colorado Whooping Crane (Ida) Injury

FILE <i>End. Species - Whooping Crane</i>	
<input type="checkbox"/> Nail	<input type="checkbox"/> McDermith
<input type="checkbox"/> Suthers <i>3/1</i>	<input type="checkbox"/> Espinosa
<input type="checkbox"/> Kauffeld <i>3/1</i>	<input type="checkbox"/> Martinez
<input type="checkbox"/> Jones	<input type="checkbox"/> Mondragon
<input type="checkbox"/> Cossick	<input type="checkbox"/> Gray
<input type="checkbox"/>	<input type="checkbox"/>
X Action Information	

MAR 17 1983

On March 11, 1983, Wendy Brown, an employee of Rod Drewien, conveyed the following information to me. This information further emphasizes the Service's need to develop a strategy that will adequately deal with powerlines adversely affecting the recovery of the whooping crane.

On Tuesday, March 8, 1983, Wendy Brown found an injured whooping crane in a roosting marsh approximately 3/8 mile east of a powerline (approximately 115 kV) in the NW 1/4 Section 16, T.29 S., R.9 E., New Mexico Principal Meridian, approximately 8 miles NW of Alamosa, Colorado. This is the 1976 "Ida" (likely a female) of the Gray's Lake-Bosque del Apache flock. Its left side was bloody and the left radius and ulna were completely fractured with the wing tip hanging loosely. Her wing was subsequently amputated at the humerus/radius-ulna joint by a veterinarian. Ida was previously seen February 28, 1983, and the veterinarian estimates the injury occurred shortly after this sighting.

This is a powerline inflicted injury according to best judgement. In the past several weeks, casual surveys under the subject north/south powerline have revealed several dead sandhill cranes. This line was installed in 1980 and each year it inflicts injury and mortality to sandhill cranes and perhaps the whooping crane. Data indicates another whooping crane was injured by this line last fall.

Gary L. Halvorson

Attachment

cc: w/attachment

cc: w/o attachment

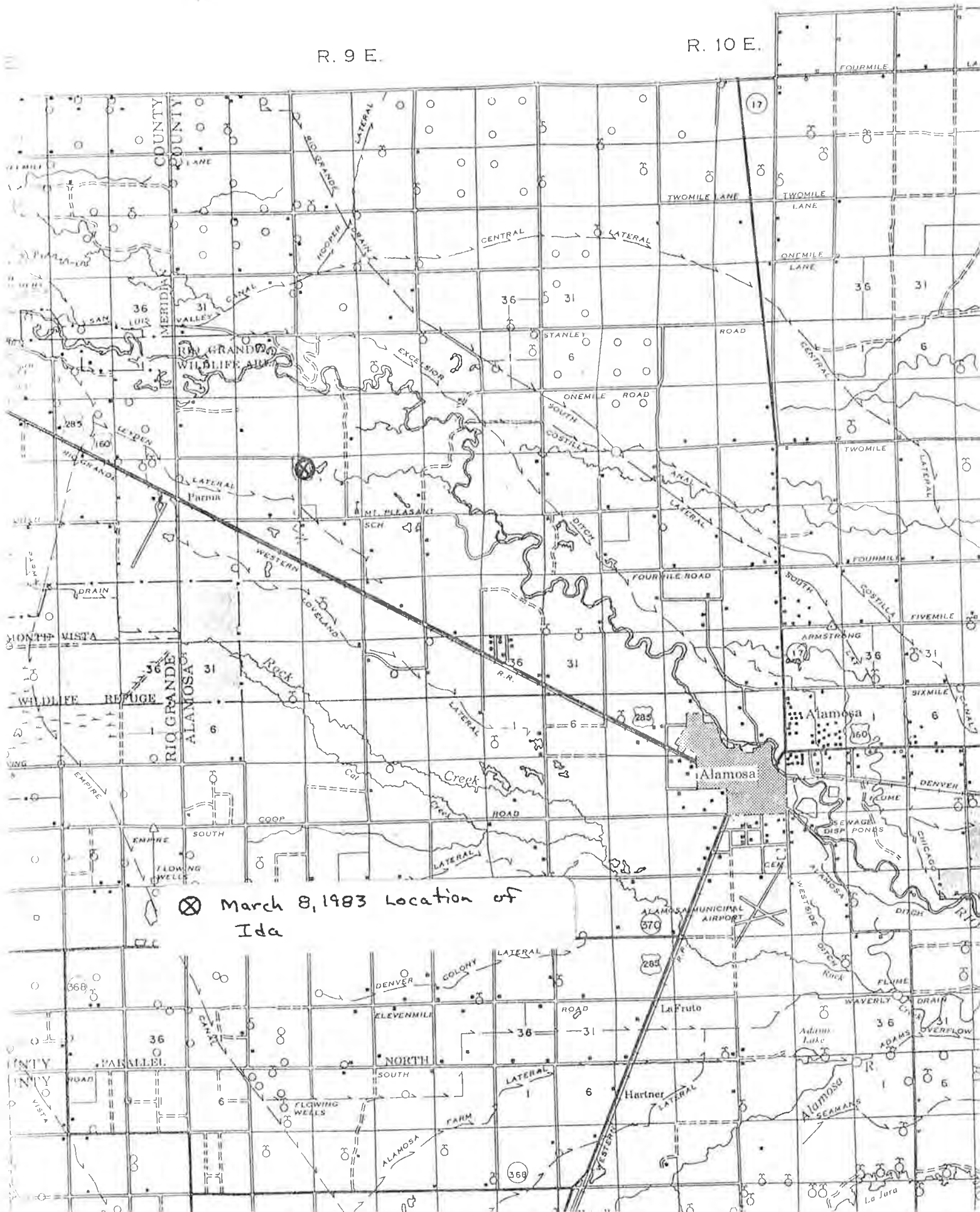
Larry Smith, Region 2
Wayne Wathen, Region 6 (SE)
Scott Derrickson, Patuxent WRC
Gary Halvorson, Region 2
Bosque del Apache NWR
✓ Alamosa NWR
SE Field Office, Pierre, SD

Director, FWS, Washington, D.C. (AFA)
ARD (AFF), Region 2
ES Field Office, Albuquerque, NM
ES Field Office, Tulsa, OK
ES Field Office, Fort Worth, TX
ES Field Office, Corpus Christi, TX
ES Field Office, Houston, TX
Aransas NWR, Austwell, TX

Power line

R. 9 E.

R. 10 E.



⊗ March 8, 1983 Location of
Ida

Grays Lake National Wildlife Refuge
Weekly Whooping Crane Project Report

REPORT #19

August 23, 1982

Weather (extremes, precip, impact on whoopers)

High: 90 No precipitation.

Low: 45

Water Levels (existing level, planned level, impact on whoopers)

Existing: 6386.01 inches.

Habitat (food and cover availability, supplemental feeding)

Some drying of upland habitat. Grasshoppers and other insects increasing. Placement of barley on bait sites continues.

Egg Transplant Results This Year						
No. Transplanted	No. Hatched	No. Infertile	No. Lost (Predators)	No. Lost (Unknown)	Fertile (Not hatched)	
Canadian Eggs	14	8	0	0	0	6
Patuxent Eggs	13	11	0	0	0	2
Total Eggs	27	19	0	0	0	8

Status of Chicks to Date				
No. Observed This Week	Est. No. on Refuge	Predator Loss This week	Unknow Loss This Week	Predator Loss to Date

Canadian Chicks _____

Patuxent Chicks _____

Total Chicks Five chicks banded but expect others present, difficult to see in tall grass.

Status of Yearlings, Subadults (2-3 years), Adults (4 years +)

Yearlings (No. & locations)

None.

Sub Adults (No. & Locations)

One at Island Park. One at Blackfoot River in Idaho. One at LaBarge, Wyoming. One at Grays Lake. One at Preston, Idaho. One near Border, Wyoming.

Adults (No. & Locations)

One at Bear Lake. One at Grays Lake. Two at Daniel, Wyoming. One at Moran, Wyoming.

Other Comments. (Predator control activities, etc.)

None.

SEP 2 1982

FILE	_____	_____
Nail	_____	McDermith
Suthers	_____	Espinosa
Kaufeld	_____	Martinez
Jones	_____	Mondragon
Winters	_____	Gray
X Action	Information	

cc: Ron Lambertson (AFA), Washington, D.C.
John Spinks, Chief (OES), Washington, D.C.
Royce Williams, Dick Norrel, IDFG, Boise, ID
Jerry Mallet, IDFG, Pocatello, ID
Jerry Nugget (FW), Denver, CO
Regional Director, (FW), Denver, CO
D. R. Blankinship, Recovery Team, Rockport, TX
ARW, PA, SE, Region I Portland, OR
Grays Lake Manager NWR, Wayan, ID (2)
Chuck Peck, SIRC
James Carpenter, Patuxent Wildlife Research Center
SE Team Leader, Boise, ID
LE, Boise, ID
Joe Packham, ADC, Boise, ID
Regional Director, Region 2, Albuquerque, NM
Vi Solt, Region 2, Albuquerque, NM
SE, Region 6, Billings, MT

UNITED STATES GOVERNMENT

Memorandum

U.S. FISH & WILDLIFE SERVICE
Region 2, Albuquerque, New Mexico 87103

TO : Area Manager, Austin Area Office

DATE: May 20, 1982

FROM : ARD (AFA)

SUBJECT: Fencing Blackjack Peninsula Whooping Crane Habitat

Recent information from Rod Drewien about barbed wire fences and crane mortality is of interest. His data shows four-strand fences apparently are more hazardous to whooping cranes than are three-strand fences. Based on his experience, I recommend that we use a three-strand design for the new pasture fences at Aransas. It appears cranes will crawl through a three-strand fence but will fly or jump over a four-strand fence. Typically, it is the young that kill themselves. A young whooper was killed by running into a four-strand fence at Alamosa last year. The 1975 year-class Gray's Lake whooper also killed itself this May 15, 1982, by running into a four-strand fence. The three-strand specifications used at Gray's Lake NWR are:

bottom wire - 18" aboveground
middle wire - 30" aboveground
top wire - 42" aboveground

If you want to discuss this further, please give Gary Halvorson a call at FTS 474-3972.

cc: Refuge Manager, Aransas NWR, Austwell, TX
ARW - Region 2

SEP 22 1983

FILED	
<input type="checkbox"/> Nall	<input type="checkbox"/> McDermitt
<input checked="" type="checkbox"/> Suthers	<input type="checkbox"/> Espinosa
<input type="checkbox"/> Kauffeld	<input type="checkbox"/> Martinez
<input type="checkbox"/> Jones	<input type="checkbox"/> Mendragon
<input type="checkbox"/> Cossick	<input type="checkbox"/> Gray
<input type="checkbox"/>	<input checked="" type="checkbox"/> Gomez
X Action	Information

I would like to check with Rod and see if this applies to Adults.

Route To Murray & Alamosa

copies sent 2-1-82
U. S. STATES GOVERNMENT *fh*

memorandum



DATE: January 8, 1982

REPLY TO: Area Manager, South Dakota - Nebraska - Kansas
ATTN OF: Pierre, South Dakota

SUBJECT: Cooperative Whooping Crane Tracking Project

TO: Director, U.S. Fish and Wildlife Service
Washington, D.C. 20240

Attached is a resume of whooping crane sightings reported to our office. Thank you for your cooperation in monitoring migration of the whooping crane.

C. J. Sowards

Attachment

JWS:njd

Distribution

Area Manager, North Kansas City, MO
Area Manager, Austin, TX
Area Manager, Salt Lake City, UT
Area Manager, Bismarck, ND
Area Manager, Billings, MT
Regional Director, Denver, CO
Regional Director, Albuquerque, NM
Law Enforcement District #5, Independence, MO
Law Enforcement District #4, Denver, CO
Cleveland Vaughn, SRA, Omaha, NE
John Cooper, SRA, Pierre, SD
David Kraft, SRA, Bismarck, ND
Cornelis Vendel, SRA, Lenexa, KS
Dr. Lucille Stickel, Patuxent Wildlife Research Center, Laurel, MD
Rod Drewien, Soda Springs, ID
Harvey Miller, Central Flyway Representative, Denver, CO
Refuge Manager, Aransas NWR, Austwell, TX
Refuge Manager, Medicine Lake NWR, Medicine Lake, MT
Bird Banding Laboratory, Laurel, MD
State Supervisor, Lincoln, NE
Manager, Area 4 Field Stations (19) South Dakota - Nebraska - Kansas

FILE <i>Whooping Crane - sightings 1982</i>	
<input checked="" type="checkbox"/> Nail <i>1/13</i>	Espinosa
<input checked="" type="checkbox"/> Suthers <i>2/14</i>	Martinez
<input type="checkbox"/> Kauffeld <i>2/14</i>	Mondragon
<input type="checkbox"/> R.	Major
<input type="checkbox"/> W.	Gray
<input type="checkbox"/> McDonnell	
<input type="checkbox"/> X Action	Location

1/8/82

WGJ

COOPERATIVE WHOOPING CRANE TRACKING PROJECT
(September - December 1981)

Whooping crane migrations are monitored spring and fall of each year. Sighting reports are forwarded to the Area IV Office of the U.S. Fish and Wildlife Service, Pierre, South Dakota, by private individuals, Audubon, other organizations, State and Federal Conservation Agencies, and Canadian Wildlife Service and their cooperators in Saskatchewan and adjacent provinces.

Cooperation throughout the whooping crane flyway continues to be excellent. The identification of color-marked birds is providing new information each migration. We can't overemphasize the importance of looking closely for the colored leg bands. In 1981, three young were marked and radio tagged, and two of these are wintering at Aransas. One radioed young bird died after striking a power line in Canada.

Whooping crane arrivals at Aransas National Wildlife Refuge, a sighting report summary, a map of degree-block sighting locations, and a map showing the migration route of two radio tagged young birds and their parents, are included with this narrative resume. Repeat sightings, of the same birds at the exact same location during a stop-over period, are not included when known to be repeats. Sightings classified as unconfirmed, based on whooping crane recovery plan criteria are not shown in the report; only Canadian sighting reports classified as "accepted" are shown. All reports received are on record in the Pierre, Area Office and are available upon request.

Arrivals at Aransas National Wildlife Refuge occurred from October 22 through December 2. A total of 73 whoopers are wintering at Aransas (survey 12/2/81). This total includes 71 adults and subadults and 2 young-of-the-year. Seventy-six whoopers departed for the breeding grounds last spring, and one summered in Texas. Three young were known to start the fall 1981 migration. Six adult plumaged cranes and one young, of the total anticipated, have not arrived at Aransas National Wildlife Refuge as can be determined as of 12/29/81.

Recorded observations of migrant whooping cranes started August 30 in Canada, and September 29 in the United States. The last sighting report was on December 10. Sightings were reported from Alberta, Canada (3), Saskatchewan, Canada (16), Montana (1), North Dakota (6), South Dakota (3), Nebraska (6), Kansas (6), Missouri (1), Oklahoma (8), and Texas (8). A total of 58 confirmed and probable sightings were recorded. Thirty-three sightings of color-marked birds were reported.

Details of reported color-marked whoopers are as follows:

<u>Color Combination*</u>	<u>Observation Date</u>	<u>Location</u>
Nil-W (1978) (RWR band on left leg has been lost)	September 15, 1981	Seagram Lake, Saskatchewan, Canada. SW 12-42-24-W3.
Nil-W (1978)	October 19, 1981	Stafford County, Kansas. Quivira NWR.
Nil-Short R (1977?)	September 11-21, 1981	Big Sucker Lake, Saskatchewan, Canada. 51-3-W3.
Long R-Short R (?)	September 11-21, 1981	Big Sucker Lake, Saskatchewan, Canada. 51-3-W3.
Long R-Short R (?) (Possibly blue/red on right, but not sure about the blue)	October 26, 1981	Stafford County, Kansas. Quivira NWR.
R-R (1977)	September 25-October 7, 1981	Witchehan Lake, Saskatchewan, Canada. 51-10-W3 and NW4-51- 11-W3.
R-R (1977)	October 17 and 19, 1981	Keppel Lake, Saskatchewan, Canada. NW $\frac{1}{4}$ -6-40-17-W3.
R-R (Questionable since reported at Witchehan Lake on same date)	September 30-October 1, 1981	Ten miles north of Ogema, Saskatchewan, Canada. 9-22-W3.
Nil-RWR (1978)	October 26, 1981	Stafford County, Kansas. Quivira NWR.
G-R (1977)	September 25-October 7, 1981	Witchehan Lake, Saskatchewan, Canada. 51-10-W3 and NW4-51- 11-W3.
R/W-G (1981)	September 17-24, 1981	Near Ft. McMurray, Alberta, Canada.
R/W-G (1981)	September 25-October 13, 1981	Midnight Lake, Saskatchewan, Canada. 52-16-W3. Radio- tagged. Died after striking power line.
BWB-Nil (1979 incomplete)	September 30-October 1, 1981	Ten miles north of Ogema, Saskatchewan, Canada. 9-22-W2.
Nil-R/W (incomplete)	September 30-October 1, 1981	Ten miles north of Ogema, Saskatchewan, Canada. 9-22-W2.

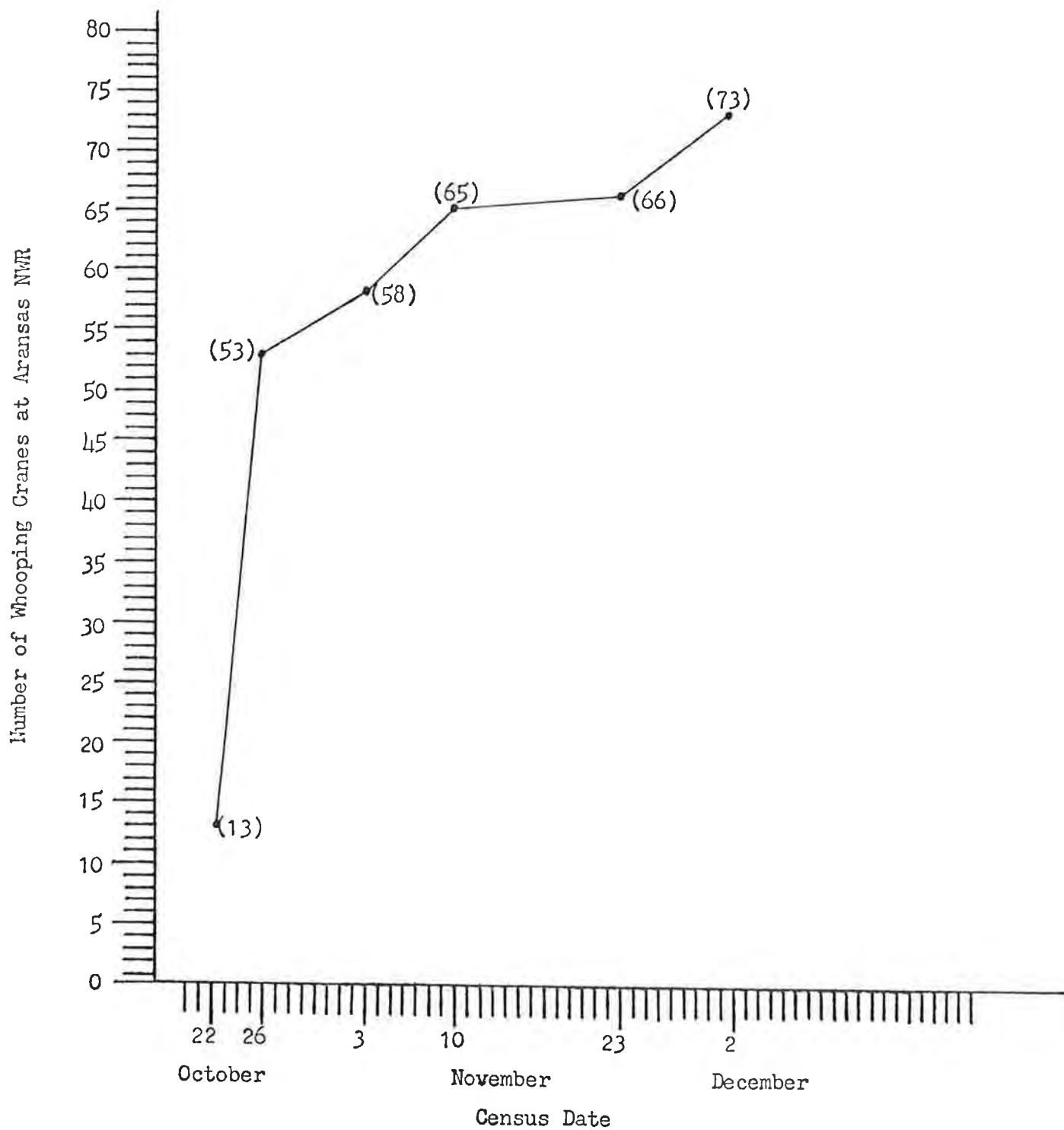
R-Nil (1977)	October 17 and 19, 1981	Keppel Lake, Saskatchewan, Canada. NW $\frac{1}{4}$ -6-40-17-W3.
W-R (1977)	October 17 and 19, 1981	Keppel Lake, Saskatchewan, Canada. NW $\frac{1}{4}$ -6-40-17-W3.
R-W (1977)	October 17 and 19, 1981	Keppel Lake, Saskatchewan, Canada. NW $\frac{1}{4}$ -6-40-17-W3.
R/W-BWB (1979)	October 10-11, 1981	Seagram Lake, Saskatchewan, Canada. W $\frac{1}{2}$ -9-42-24-W3 and NE36-41-24-W3.
W-R/W (1981)	October 6-7, 1981	Michael Lake, Alberta, Canada. Radio-tagged.
W-R/W (1981)	October 7-8, 1981	22 mi. south of Michael Lake.
W-R/W (1981)	October 10-11, 1981	Near Reward, Saskatchewan, Canada. 38-24-W3 and 38-23-W3.
W-R/W (1981)	October 11-20, 1981	Near Luseland, Saskatchewan, Canada. 36-24-W3 and 37-25-W3.
W-R/W (1981)	October 20-21, 1981	Near Neville, Saskatchewan, Canada. 11-12-W3.
W-R/W (1981)	October 21-22, 1981	Roosevelt County, Montana. 40 mi. west of Medicine Lake on Poplar River.
W-R/W (1981)	October 22-23, 1981	Cherry County, Nebraska. About 32 mi. southwest of Valentine. T29N, R31W, Sec.24.
W-R/W (1981)	October 23-24, 1981	Custer County, Nebraska. 2 $\frac{1}{2}$ mi. northwest of Oconto.
W-R/W (1981)	October 24-25, 1981	Pawnee County, Kansas. 10 mi. south and 1 $\frac{1}{3}$ mi. west of Rush Center. T20S, R18W, Sec. 5.
W-R/W (1981)	October 25-26, 1981	Woods County, Oklahoma. Cimarron River, 3 $\frac{1}{2}$ mi. southwest of Waynoka. T24N, R16E, Sec. 8.
W-R/W (1981)	October 26-27, 1981	Comanche County, Oklahoma. 10 mi. east of Lawton on Hwy 7, 5 mi. south on Hwy 65, and 2 mi. west.

W-R/W (1981)	October 27-28, 1981	Clay County, Texas. 5 mi. west of Byers on Lake Byers.
W-R/W (1981)	October 28-November 1, 1981	Clay County, Texas. Red River, 5 mi. northwest of Byers.
W-R/W (1981)	November 1-2, 1981	Falls County, Texas. 5 mi. southeast of Rosebud.
W-R/W (1981)	November 2-3, 1981	Refugio County, Texas. 2½ mi. northwest of Tivoli.

*The color of the left leg band appears first and the right leg band second.

Thanks, again, to the many cooperators. Use-site evaluations were continued this fall; your continued assistance is essential to the success of the evaluations. Please contact the Area Office in Pierre, South Dakota, if observation details are desired (Post Office Box 250, Zip 57501, Commercial telephone: 605/224-8692 or Federal Telecommunications System: 782-5226).

Correction: In the spring 1981 tracking report, we reported that 78 birds had wintered at Aransas NWR. However, Aransas believes that a young bird was lost in late December or early January. One bird remained at Aransas all summer and 76 birds were thought to start the spring migration.



Chronological Arrivals at Aransas NWR, Texas; Fall, 1981

FALL 198 JOPING CRANE TRACKING PLOT R₁ S*
(Confirmed and Probable Sightings Only)

Date**	TX	OK	MO	KS	NE	SD	ND	MT	Sask., CA	Alb., CA
8-30									C1-0	
9-2									C1-0	
9-11									C2-0	
9-15									<u>C2-0</u>	
9-17									<u>C2-0</u>	
9-20										C2-1
9-25									C2-0	
9-26									C2-0; C2-1	
9-29									C1-0	
9-30							C1-0		C1-0	
10-3									<u>C4-0</u>	
10-5							P2-0			
10-6							C1-0			
10-7										C2-1
10-10							P3-0			C2-1
10-11									C2-1; C2-0	
10-11									<u>C2-1</u>	
10-15		P3-0					P4-0			
10-17										
10-18									<u>C4-0</u>	
10-19	P4-0	C4-0		C4-0; P1-0	C2-0				C2-1	
10-20		C4-0			P8-0					
10-21		C9-0; C2-0; C2-0					P2-0	C2-1		
10-22					C2-1					
10-23					C2-0; C2-0; C2-1					
10-24					C6-0; C2-1					
10-25		C2-1					P2-1			
10-26		<u>C2-1</u>			C6-0					
10-27	C2-1									
10-28	<u>C2-1</u>									
10-29						P2-0				
11-1	C2-1									
11-2	<u>C2-1</u>									
11-5						P5-1				
11-16	P4-0			P1-0						
12-1	P1-0									
12-3	P4-1									
12-10			P1-0							
TOTAL REPORTED SIGHTINGS										
	8	8	1	6	6	3	6	1	16	3
GRAND TOTAL OBSERVATIONS = 58										

*Each report classified as confirmed (C) or probable (P) and represented by number of whooping cranes reported: adult-young, young reported color-marked are underlined once; birds color-marked in 1977, 1978, 1979, or 1980 are shown as adults and underlined twice.

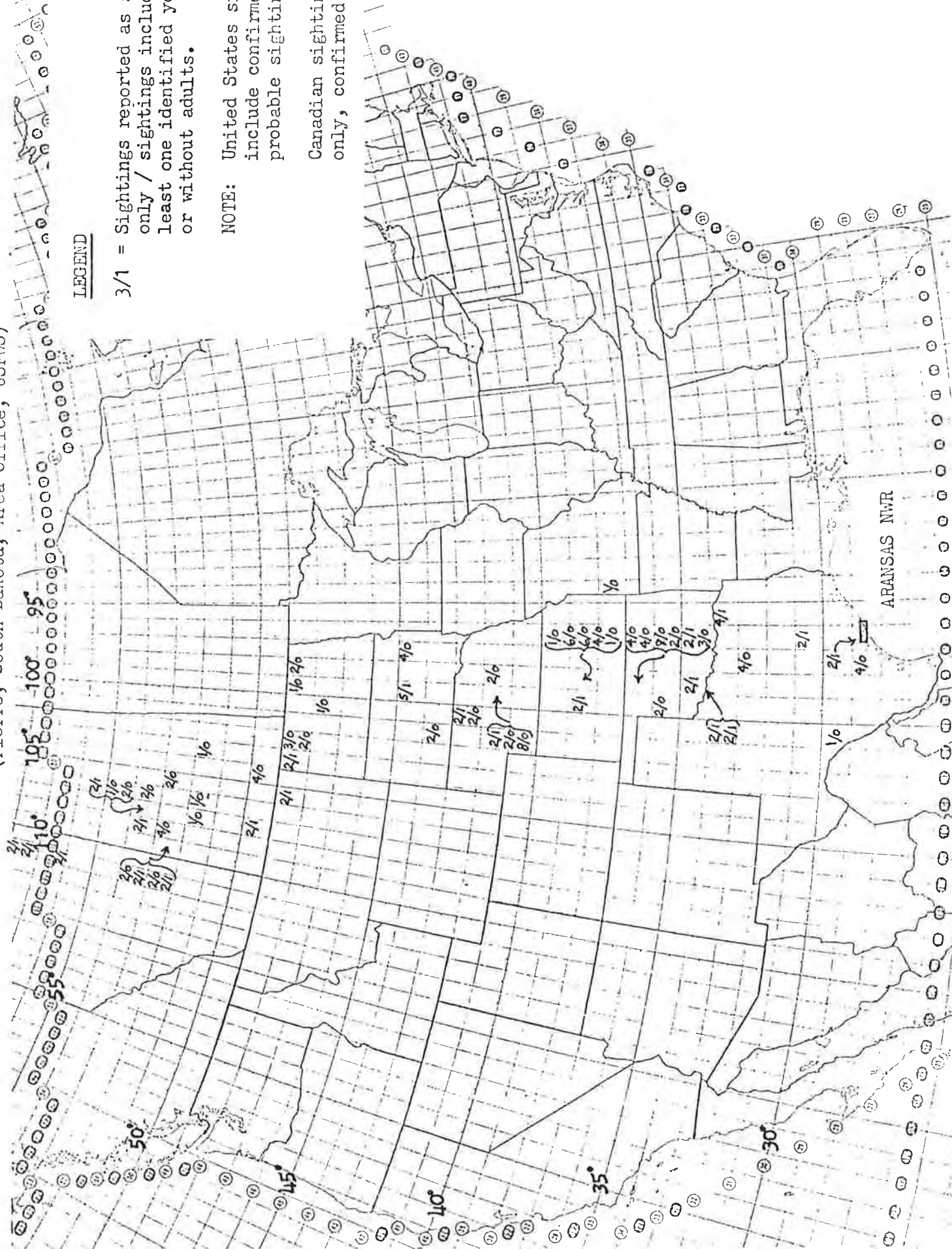
**First date of sighting used when bird(s) at location several days.

LEGEND

3/1 = Sightings reported as adults, only / sightings including at least one identified young, with or without adults.

NOTE: United States sightings include confirmed and probable sightings.

Canadian sightings, de
only, confirmed.



Fall 1981 Migration Route of Two Radio-Tagged Whooping Cranes
 Color-Marked White - Red/White (—) and Red/White - Green (---).



NORTH AMERICA

SCALE OF MILES

0 100 200 300 400 500 600



DEPARTMENT of the INTERIOR

news release

FISH AND WILDLIFE SERVICE

For Release Upon Receipt

FILE	Est. Status - Whooping Crane	1981
Mail	7/11/80	
Suthers	11/6/80	
Kauffeld	11/22	
Rupert		
Winters		
McDermitt		
X Action		
	Epinoza	
	Martinez	
	Mandragon	
	Major	
	Gray	
	Information	

Joy Davis 202/343-5634

WHOOING CRANE POPULATION MAY DECLINE SLIGHTLY; U.S.-CANADIAN TEAM TRACKS BIRDS DURING MIGRATION

Four whooping crane chicks were raised in wild and captive flocks in 1981, a year which may see a slight population decline despite intensive research to propagate the endangered species.

The highlight of this year's research is a first-time effort by the U.S. Fish and Wildlife Service and the Canadian Wildlife Service to radio track the main flock on their 2,600-mile fall migration from Canada's Wood Buffalo National Park to the Texas Gulf Coast. On October 12, trackers reported one of the chicks hit a power line in north Saskatchewan and died several days later of apparent spinal injuries.

While researchers expressed regret over the loss of the young crane, they emphasized that had the flock not been tracked, the fate of the bird probably would have remained a mystery. Service scientists stress that the more they learn about mortalities, the better prepared they are to prevent them. Previous collisions with power lines have been documented in the Grays Lake National Wildlife Refuge flock. Power companies in problem areas have cooperated with researchers to solve the problem, sometimes by attaching brightly colored markers to the lines.

The Wood Buffalo flock produced three chicks this year during an exceptionally dry nesting season that saw increased egg losses to predatory animals. In August, brush fires swept through the forests and marshes, eventually destroying some 70 percent of the cranes' nesting habitat. However, the chicks escaped the ravaged area with their parents and the rest of the flock.

Crane Research Around the World:

**Proceedings of the International Crane
Symposium at Sapporo, Japan in 1980
and Papers from the World Working
Group on Cranes, International Council
for Bird Preservation**

Editors

**James C. Lewis
U.S. Fish and Wildlife Service
Fort Collins, Colorado**

and

**Hiroyuki Masatomi
Hokkaido College
Hokkaido, Japan**

1981

USE OF RADIOTELEMETRY TO STUDY MOVEMENTS OF JUVENILE WHOOPING CRANES

RODERICK C. DREWEN, Idaho Cooperative Wildlife Research Unit¹, University of Idaho, Moscow, Idaho 83843 USA
ELWOOD G. BIZEAU, Idaho Cooperative Wildlife Research Unit, University of Idaho, Moscow, Idaho 83843 USA

Recent use of radiotelemetry equipment in studies of sandhill cranes (*Grus canadensis*) has demonstrated that miniature radio transmitters could be safely and successfully employed to monitor movements and activities of *Grus* (Crete and Toepfer 1978, Toepfer and Crete 1979, Nesbitt 1979, Anderson et al. 1980, Melvin and Temple Unpubl. Prog. Reports, Univ. Wisc.). Successful results from these studies prompted the proposal that similar equipment be used to monitor whooping crane (*G. americana*) movements from the nesting grounds in Wood Buffalo National Park, Canada, to the winter area at Aransas National Wildlife Refuge, Texas, in order to provide a better understanding of their migration ecology.

United States and Canadian Wildlife Service officials, however, jointly agreed that additional experimentation was warranted before approval could be given to attach radio transmitters to flightless young whooping cranes in Wood Buffalo Park. Consequently, it was decided to evaluate the use of radiotelemetry equipment on whooping cranes reared by foster-parent sandhill cranes at Grays Lake National Wildlife Refuge, Idaho. It is possible to evaluate the use of radiotelemetry including equipment failures because members of this introduced whooping crane population are individually color leg banded and are monitored year-round (Drewien and Bizeau 1978). This paper presents findings of a radiotelemetry study of juvenile whooping cranes from August 1979 to 15 February 1980.

METHODS

Radiotelemetry Equipment

Radio transmitters similar in design to those successfully placed on sandhill cranes during 1978 in Manitoba by personnel of the Canadian Wildlife Service and the University of Wisconsin (S. Melvin and S. Temple, Unpubl. Prog. Reports, Univ. Wisc., Madison) were utilized at Grays Lake Refuge, Idaho, in 1979. Five transmitters in the 164 MHz frequency range were purchased from Telemetry Systems, Inc. (P.O. Box 187, Mequon, Wisc. 53092)².

Transmitters were powered by 10 or 20 solar cells (10 cells per panel) and 2 nickel cadmium batteries. Transmitters were epoxied to 7.5-cm-high colored plastic leg bands; antennae were 24 cm long and extended down the bird's leg. Colored leg bands with attached transmitters were placed above the tibio-tarsal joints to enhance visibility and signal transmission. Total weight of the radio package (plastic leg band and transmitter) was 45-50 g for units with a single solar panel and 55-60 g for units with 2 solar panels. Es-

timated transmitter life according to the manufacturer is 2 to 3 years. Transmitter data are summarized in Table 1.

Whooping cranes were monitored by ground and aerial tracking with AVM model LA12 receivers (AVM Instrument Co., Champaign, Illinois) and yagi "H" style directional antennae (model RA-ZAK, 164-Telonics, 1300 West Univ., Mesa, Arizona 85201). An RA-5A-164 Telonics nondirectional magnetic roof mount antenna was also used while ground tracking from vehicles. When signals were received, cranes were located either visually or with the aid of yagi directional antennae.

One juvenile whooping crane was aerially tracked in a Cessna 182 aircraft during a portion of its fall migration. Yagi antennae were attached to wing struts with mounts specially designed by Erotek Inc. (Box 547, Afton, Wyoming 83110). Strut-mounted antennae were connected to a switch box and radio receiver in the cockpit in order to follow the signals of the migrating crane. Migratory movements were plotted on sectional Aeronautical Charts (U.S. Dept. Commerce).

Trapping and Radio-tagging Flightless Young Whooping Cranes

Flightless young whooping cranes were captured, banded with No. 9 U.S. Fish and Wildlife Service bands, and individually marked with colored 3.75-cm- or 7.5-cm-high plastic leg bands in August 1979. Five young were also fitted with radio transmitters attached to colored leg bands. A helicopter was used to assist in locating and capturing the young cranes. Additional information on capturing and banding flightless young whooping cranes is presented elsewhere (Drewien and Bizeau 1978, Drewien and Kuyt 1979, Kuyt 1979).

Radio-tagged cranes were monitored almost daily from the time of capture until their fall departure in October from Grays Lake Refuge. Monitoring of movements and activities was resumed on the winter grounds at the Bosque del Apache National Wildlife Refuge, New Mexico, throughout the winter period.

RESULTS

Testing Radio Transmitters

Tests of 5 transmitters before radio-tagging young cranes indicated that 4 functioned properly but 1 emitted signals with a range of only 0.5 km. The malfunctioning transmitter was returned to the manufacturer for repair and was returned to us in late August. Reception ranges of properly functioning transmitters varied between individual units and were affected by differences in terrain, vegetative cover, and other factors. Reception ranges were tested ground-to-ground under a variety of conditions, and from aircraft to ground on 30 September. An estimate of air-to-air reception ranges was obtained on 3-4 October when we tracked 1 juvenile whooping crane during the fall migration. Reception ranges recorded were: Ground-to-ground ($n = 5$) 2.5 km to 8 km, aircraft-to-ground ($n = 2$) 25 km to 35 km, and air-to-air ($n = 1$) estimated 80± km.

¹A contribution of the Idaho Cooperative Wildlife Research Unit which is jointly supported by the U.S. Fish and Wildlife Service, Idaho Department of Fish and Game, Wildlife Management Institute, and the University of Idaho (College of Forestry, Wildlife, and Range Sciences).

²Mention of a product or manufacturer does not constitute endorsement by the authors or the agency they represent.

Capturing and Radio-tagging Flightless Young Whooping Cranes

Eight young whooping cranes were captured on 6 August and 4 were instrumented. The 4 radio-tagged cranes were about 8 weeks old and weighed from 2,950 to 3,650 g when captured. Chicks which were radio-tagged were also color-marked with plastic bands for future identification after transmitters failed. A 5th crane, originally banded on 6 August, was recaptured and radio-tagged with the repaired radio on 28 August. This young whooping crane was killed by a coyote (*Canis latrans*) on 3 September. The transmitter was recovered and placed on another crane recaptured on 9 September (Table 1).

No adverse effects were noted from capturing, banding, and radio-tagging young whooping cranes. Young whoopers captured and only marked with colored leg bands were processed and released within 2.5-4 minutes after capture. Young that were radio-tagged were held 12-19 minutes. Attachment of transmitters, including gluing and sealing small openings between the transmitters and the bands, resulted in the increased time birds were held. Observations following radio-tagging revealed that the added weight of the miniature transmitters had no apparent effect upon the young cranes. As in previous years, young whooping cranes paid little attention to the new bands (Drewien and Bizeau 1978) or attached transmitters that appeared as bulges on the sides of bands. Young whoopers, however, were observed intermittently preening the antennae projecting from the transmitters.

Radio Tracking Juvenile Whooping Cranes

Ground Tracking--Young whooping cranes were monitored almost daily from time of radio-tagging until they migrated from Grays Lake Refuge between 3 and 11

October. These cranes could be observed and individually identified by their colored leg bands with a spotting scope at ranges of 1-2 km; consequently, it was possible to evaluate transmitter retention and performance. Three of 5 transmitters malfunctioned 19 to 41 days after the cranes were radio-tagged (Table 1). The 3 transmitters did not completely stop emitting signals, but only weak signals were received intermittently at normal ranges up to 3 km. When these same cranes were approached closely (400-800 m) signals were usually, but not always, received.

One of the 3 whooping cranes with a malfunctioning transmitter (bird 79-12, Table 1) was killed by a large raptor, presumably a golden eagle (*Aquila chrysaetos*) in northwestern Colorado on 13 October during fall migration. Examination revealed that the antenna was broken 1.6 cm from the point where it emerged from the transmitter. The radio was still operational but maximum receiving range was reduced to about 0.5 km.

The 4 surviving radio-tagged juvenile whooping cranes were all relocated on the winter area at Bosque del Apache Refuge, New Mexico, between 17-27 October. In New Mexico during winter, observations of the 2 surviving cranes that had malfunctioning radios before departing Grays Lake Refuge revealed that antennae were also missing from their transmitters. Apparently, malfunctioning of the 3 radios at Grays Lake Refuge was related to broken antennae which greatly reduced signal transmission distances. We suspect the damaged antennae were partially or entirely caused by the preening activities of the young whooping cranes.

Only 1 of the 4 radio-tagged whooping cranes relocated in New Mexico by late October had a transmitter that was still operating satisfactorily (Table 1). Signals from 2 other cranes wearing transmitters with broken antennae were received at maximum distances of

Table 1. Summary of data on radio transmitters placed on young whooping cranes, August 1979 to 15 February 1980.

Model	Frequency (MHz)	Pulse rates (ppm)	Drain (ms)	Whooping crane identification ^a	Date crane radio-tagged	Date transmitter last functioned properly	Status (15 Feb 1980)
RS50-2TM-3X (single solar panel)	164.320	82	0.40	79-13 ^b 79-12	28 Aug 9 Sep	23 Sep	Bird dead--13 Oct signal weak (antenna broken)
	164.454	53	0.46	79-9	6 Aug	16 Sep	Signal weak (antenna broken)
RS50-2TM-6X (2 solar panels)	164.487	134	0.78	79-11	6 Aug	15 Feb	Operational
	164.510	130	0.62	Patuxent No. 2	6 Aug	6 Oct	Inoperative
	164.537	66	0.84	79-4	6 Aug	25 Aug	Signal weak (antenna broken)

^aIdentification numbers (79-series) were assigned by E. Kuyt, Canadian Wildlife Service, at time of egg pickup in Wood Buffalo National Park, Canada. Patuxent No. 2 originated from an egg produced by a captive pair of whooping cranes at Patuxent Wildlife Research Center, Laurel, Maryland.

^bWhooping crane 79-113 was killed by a coyote on 3 September. The transmitter was removed and placed on 79-12 on 9 September.

0.5 to 1 km during ground surveys. One transmitter which was operational on 6 October was inoperable by late October (Table 1). The status of the transmitters remained the same through mid-February 1980.

Although signal reception distances of the 2 transmitters with broken antennae were greatly reduced, it was still possible to locate the individual birds in order to monitor their daily activities. All 3 juveniles confined their winter activities, between late October and mid-February, to the Bosque del Apache Refuge and adjacent areas within 8 km. All 3 foster-parent families roosted nightly in the refuge roost area. Two families confined most of their daily activities to the refuge, while the 3rd frequently foraged in private lands outside the refuge.

Aerial Tracking--The aerial tracking system was tested on the 5 radio-tagged cranes on 30 September. Signals from the 3 birds with the malfunctioning radios could only be received within 2 to 4 km, air-to-ground. Signals from 2 cranes with fully operational radios (Table 1) were received 25-35 km air-to-ground from an elevation of 3,050 m. As a result of these findings, we decided to track the 1st juvenile whooping crane that migrated from Grays Lake Refuge with a fully operational transmitter.

On 3 October, a foster-parent pair with a radio-tagged juvenile, 115 days old, initiated the fall migration. This juvenile was hatched by its sandhill crane foster-parents from an egg produced by a captive whooping crane at Patuxent Wildlife Research Center, Laurel, Maryland. The juvenile was tracked by air for 800 km without difficulty for 3 consecutive days until the family arrived in the San Luis Valley, Colorado, the major fall migration stopover area utilized by cranes from Grays Lake, Idaho (Drewien and Bizeau 1974). Radio contact was maintained daily except for periods when we landed to refuel the aircraft. Visual contact was also made daily. The foster-parent family completed this segment of the migration in about 17 hours of flying time during the 3-day period.

The migration pattern of the foster-parent family was typical of that which we have observed among sandhill cranes. Daily migrations are normally initiated late in the morning and terminated before sundown. After the daily migration began the family did not land until it arrived at the night roost site. Flock size was not constant; numbers of sandhill cranes in the flock with the foster-parent family changed daily and sometimes during the same day.

Calculated map distance covered by the foster-parent family during the 3-day migration was 802 km. Distances traveled daily were remarkably equal, averaging 267 km per day (range 262-276 km). All distances were minimum values calculated from aeronautical flight charts. Cranes actually flew considerably farther than indicated by map distances. Time was spent spiralling on thermals to attain higher altitudes at various points along the route. Significant climbs in altitude also were made to cross major mountain ranges. Calculated travel distances do not reflect these events. A summary of the migration data is presented in Table 2 and Fig. 1.

A high-pressure system located over Nevada and western Utah dominated the weather during the 3-day migration period, 3-5 October. National Weather Service data from Salt Lake City, Utah, and Grand Junction, Colorado, showed that winds aloft (at approximately 3,050 m) favored the cranes during their migration; prevailing winds were from the northwest (320-360°, wind speeds 5 to 15 knots).

On the 1st day (3 October) the foster-parent family flew nearly 6 hours through southeastern Idaho and southwestern Wyoming. The flock roosted for the night in a small livestock-watering reservoir along Henry's Fork of the Green River (Fig. 1) near Lonetree, Uinta County, Wyoming. The stock reservoir was within 0.8 km of a ranch headquarters. Henry's Fork flows eastward along the north base of the Uinta Mountains.

On 4 October, the flock containing the radio-tagged juvenile was located at 1152 hours, 10 km from the night roost site, spiralling on late morning thermals to attain sufficient altitude to cross the Uinta Mountains. The flock spent an hour climbing about 1,225 m and then crossed the mountain pass at 1245 hours, flying at an altitude of about 3,350 m. The birds then descended to about 2,300 m as they passed over the Green River near Vernal, Utah, and continued southeasterly into Colorado near the place where the White River leaves Colorado (Fig. 1).

The cranes again climbed to 3,200 m as they crossed the Roan Plateau. At 1733 hours the flock crossed the Colorado River near the confluence of Clear Creek and continued to the foothills of Grand Mesa. They stopped for the night in a dry meadow on a brushy hillside on the west slope of Grand Mesa.

The following morning (5 October) the foster-parent family was found foraging in an agricultural field

Table 2. Summary of the fall migration of a greater sandhill crane foster-parent pair with their radio-instrumented juvenile whooping crane (Patuxent No. 2), Grays Lake NWR, Idaho, to the San Luis Valley, Colorado, 3-5 October 1979.

October	Departure location	Departure time (hours)	Arrival location	Arrival time (hours)	Distance migrated (km)	Flight time (hours:min)
3	Grays Lake NWR, ID	1150	Henry's Fork, WY	1744	264	5:54
4	Henry's Fork, WY	1152	Grand Mesa, CO	1809	276	6:17 + 15-30 min ^a
5	Grand Mesa, CO	1054	San Luis Valley, CO	1543	262	4:49
Total					802	16:50 + 15-30 min ^a

^aThe whooper was in the air about 10 km from the roost site when we located it at 1152 hours. We estimated that the bird was flying for 15 to 30 minutes before we located it.

near Molina, Colorado, about 6 km north of the roost site. The birds were airborne by 1054 hours and spent the next hour climbing the west slope of Grand Mesa. The flock passed over Grand Mesa at 1206 hours at an altitude of 3,600 to 3,660 m.

The cranes maintained this altitude and, with the assistance of a strong tailwind (15 knots, 350%), migrated directly toward the San Luis Valley. They crossed the Continental Divide at 1504 hours south of Cochetopa Pass flying at an altitude of 3,630 m and landed in a wet meadow 1.5 km north of Monte Vista National Wildlife Refuge at 1543 hours. The family remained in the area during their 2.5-week stay in the San Luis Valley, Colorado.

The juvenile whooper and its foster-parents were located on the winter grounds at Bosque del Apache Refuge, New Mexico, on 27 October but the transmitter no longer functioned.

DISCUSSION AND CONCLUSIONS

Considerable data have been obtained on juvenile whooping cranes reared by sandhill crane foster-parents during the 6 months since birds were first radio-tagged. The use of radiotelemetry equipment provided us with the ability to rapidly locate and monitor individual whooping cranes both on their summer areas in Idaho and some 1,200 km southeast at their winter site in New Mexico. Information was acquired on their daily and seasonal movements, activities, and causes of mortality.

Problems were not encountered in capturing and radio-tagging young whooping cranes. All sandhill crane foster-parents rejoined their radio-tagged young shortly after they were released. The only unusual behavior we observed in young whoopers as a consequence of their being radio-tagged was their preening of transmitter antennae, which occurred primarily in the 1st month after banding. The plastic leg bands with attached transmitters did not appear to hinder or otherwise adversely affect the young cranes.

Aerial tracking of 1 juvenile and its sandhill crane foster-parents during fall migration provided some insight into crane migration characteristics. The flight speed of the foster-parent family over the 3-day, 800 km route averaged 46-47 km/hour. The maximum daily flight speed recorded averaged over 54 km/hour on 5 October. The foster-parent family had the advantage of northwesterly tailwinds throughout the 3-day migration period. A maximum migration altitude of over 3,600 m was recorded on 2 occasions when the cranes flew over high mountains in Colorado. Much of the migration was made at altitudes above 2,750 m. The 3 daily departure times were in late morning, after 1050 hours, and arrival times at night roost sites were near sundown. The family flew from 5 to 7 hours per day (mean 5.7 hours).

Migration data obtained for the juvenile whooper and its foster-parents are generally similar to that reported for the Eastern population of greater sandhill cranes (Crete and Toepfer 1978, Toepfer and Crete 1979, Anderson et al. 1980). Anderson et al. (1980) reported an average daily migration of 297 km/day (range 115-530), morning departure times ranging from 0800-1033, cranes flying 6-8 hours daily, and landing near sunset. Crete and Toepfer (1978) and Toepfer and Crete (1979) found that cranes flew 272-484 km/day and landed before or at sunset. The above-mentioned studies all reported that cranes generally migrated with favorable tailwinds.

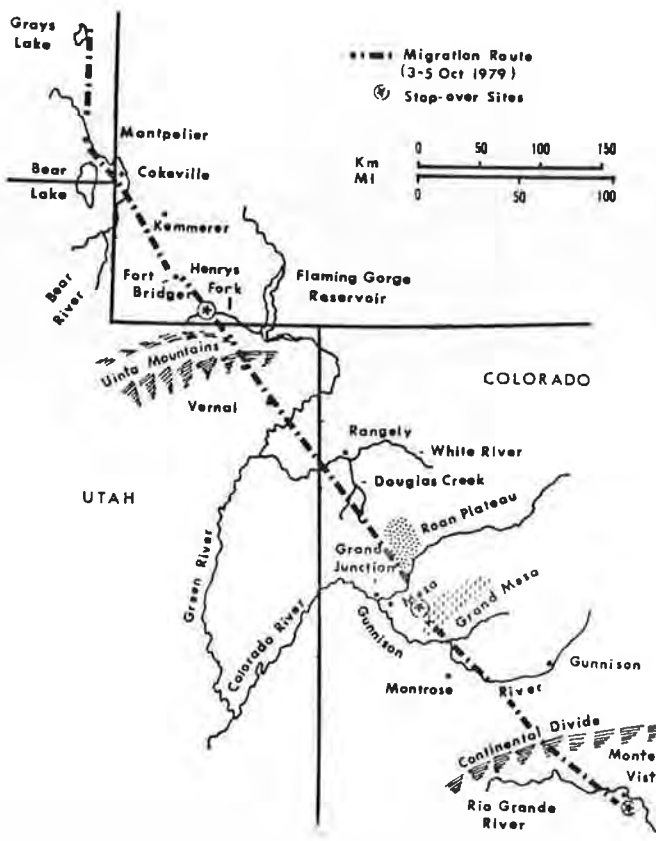


Fig. 1. Fall migration route of 1 greater sandhill crane pair with their radio-instrumented juvenile whooping crane, 3-5 October 1979.

The major technical problem encountered during the initial 6 months of the study has been the partial or entire malfunctioning of most transmitters. Only 1 of 5 transmitters was still properly operating 3 months after placing them on birds. Three transmitters sustained broken antennae which significantly reduced transmission ranges. Loss of antennae was apparently caused by the cranes' preening activities. A 4th transmitter completely failed after 2 months due to unknown technical difficulties.

Before radio-tagging more whooping cranes, improvements in transmitter design, especially antennae, are needed to reduce technical problems encountered in the current study. The manufacturer has indicated that stronger antennae will be installed on new models to be tested in 1980. We are also investigating ways of reducing the handling time of young cranes being radio-tagged. This could be accomplished by attaching the transmitters to plastic leg bands before capture. Instead of permanently epoxying transmitters to leg bands, we are currently testing the use of miniature screws that are susceptible to corrosion 1-2 years after contacting saline water. Transmitters would then be jettisoned from the leg bands after their serviceable life and thus eliminate any future encumbrance to the cranes. If current technical problems are corrected, the radio-tagging of young whooping cranes on the Canadian nesting grounds could be accomplished with negligible impact upon the birds. Considerable data could then be obtained on their migration ecology.

ACKNOWLEDGMENTS

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WHOOING CRANE POPULATION MAY DECLINE SLIGHTLY; U.S.-CANADIAN TEAM TRACKS BIRDS DURING MIGRATION

Four whooping crane chicks were raised in wild and captive flocks in 1981, a year which may see a slight population decline despite intensive research to propagate the endangered species.

The highlight of this year's research is a first-time effort by the U.S. Fish and Wildlife Service and the Canadian Wildlife Service to radio track the main flock on their 2,600-mile fall migration from Canada's Wood Buffalo National Park to the Texas Gulf Coast. On October 12, trackers reported one of the chicks hit a power line in north Saskatchewan and died several days later of apparent spinal injuries.

While researchers expressed regret over the loss of the young crane, they emphasized that had the flock not been tracked, the fate of the bird probably would have remained a mystery. Service scientists stress that the more they learn about mortalities, the better prepared they are to prevent them. Previous collisions with power lines have been documented in the Grays Lake National Wildlife Refuge flock. Power companies in problem areas have cooperated with researchers to solve the problem, sometimes by attaching brightly colored markers to the lines.

The Wood Buffalo flock produced three chicks this year during an exceptionally dry nesting season that saw increased egg losses to predatory animals. In August, brush fires swept through the forests and marshes, eventually destroying some 70 percent of the cranes' nesting habitat. However, the chicks escaped the ravaged area with their parents and the rest of the flock.

All three chicks in the Wood Buffalo flock were captured and fitted with radio transmitters by U.S.-Canadian researchers several weeks before fire ignited the habitat. Trackers followed the first two chicks to leave Wood Buffalo; the first was being tracked by a team of U.S. and Canadian Government biologists in a Canadian airplane when it hit the power line. In Southern Saskatchewan an American plane carrying a Canadian biologist--the only tracker to follow the entire route--was standing by to pick up the trail, with a ground research team also following the flock. The same tracking procedures now are being used to track the second chick, last reported to be near Texas. Earlier, trackers found that the tagged chick had covered 470 miles in one day at altitudes of up to 9,000 feet, leaving Montana, overflying North and South Dakota, and landing in Nebraska.

As the international team began monitoring the main flock, other researchers recaptured a captive-reared female whooper set free last spring at Grays Lake National Wildlife Refuge in Idaho. The female had been transported to Idaho from the Patuxent Wildlife Research Center near Washington, D.C., as a possible mate for a lone male raised by sandhill crane surrogate parents. However, scientists felt the two whoopers did not establish a strong enough bond to guarantee that the male would lead the female on the 870-mile migration route to Bosque del Apache National Wildlife Refuge in New Mexico.

The Grays Lake foster flock was started in 1975 to establish a second wild flock of whooping cranes, to build the birds' population and to eventually ensure separate migratory flocks. This would diminish the chance of a natural disaster eradicating the species in the wild. The sandhill cranes in Idaho hatch "spare" eggs taken from nests at Wood Buffalo and from a captive breeding flock at Patuxent. A recent shortage of suitable female whoopers prompted scientists to introduce the female raised at Patuxent into the foster flock. Since the recaptured Patuxent female made a good adjustment to the wild, researchers will repeat the experiment next year.

Despite the two surviving chicks raised at Wood Buffalo Park and one raised in captivity at Patuxent, scientists say the whooping crane population has not increased, as several mortalities are known. A complete count will be conducted when migration ends in December, and will probably show a slight decline. However, the bird that has become a symbol of all endangered species has been making a gradual comeback: in 1980, whoopers numbered nearly 100 in the wild and 24 in captivity, in contrast to a dismal low of 15 in 1941, when many considered the cranes' extinction to be inevitable.

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Whooping Crane Preyed Upon by Golden Eagle^a

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The Golden Eagle (*Aquila chrysaetos*) is the largest predatory bird in North America and is well known for its predatory abilities. Attacks have been reported on mammals such as whitetail jackrabbits (*Lepus townsendi*) (McGahan 1967, J. Wildl. Mgmt. 31: 496), pronghorn antelope (*Antilocapra americana*) (Bruhns 1970, Can. Field-Natur. 84: 301), Mallards (*Anas platyrhynchos*) (Kelleher and O'Malia 1971, Auk 88: 186), and Great Blue Herons (*Ardea herodias*) (Carnie 1954, Condor 56: 3). This communication describes an attack on an immature Whooping Crane (*Grus americana*) by a Golden Eagle and the subsequent necropsy findings.

The victim was an apparently healthy immature Whooping Crane that had been raised by foster-parent Greater Sandhill Cranes (*Grus canadensis tabida*) at Grays Lake National Wildlife Refuge in Idaho [Drewien and Bizeau 1978, Pp. 201-222 in *Endangered birds—management techniques for preserving threatened species* (S. A. Temple, Ed.). Madison, Wisconsin, Univ. Wisconsin Press] and was migrating through Colorado enroute to wintering grounds in New Mexico.

The attack occurred southwest of Rangely, Colorado and was witnessed by a party of nine deer hunters on the afternoon of 13 October 1979. An interview with the hunters revealed the following scenario. The Whooping Crane, accompanied by two Sandhill Cranes, was flying at an estimated altitude of 300 m when the eagle attacked. The Whooping Crane glided toward the ground after being struck and crashed into a juniper (*Juniperus* sp.) tree just before hitting the ground. The crane was still alive when found by one of the hunters but died about 10 min later.

Subsequent x-ray examination and necropsy at the National Wildlife Health Laboratory (NWHL) showed that the cause of death was a direct result of the eagle attack and the subsequent fall. Four talon

^a A contribution from the U.S. Fish and Wildlife Service project 1210-903.02.

wounds were noted, ranging in size from 1.5 cm \times 1.5 cm \times 1 mm deep to 2.5 cm \times 2.0 cm \times 10 mm deep. The wounds located at the dorsal body surface were examined for the feasibility of an eagle kill by using the claw of a dead eagle awaiting necropsy at the NWHL. The eagle's claw, when spread into a striking position, fitted the talon wounds found on the crane.

Internal examination revealed a large, wedge-shaped laceration about 2 cm across and 2 cm deep on the right liver lobe with an associated blood clot attached to this laceration. Scattered edema and pulmonary hemorrhages were found along the ventral border of the right lung. The right abdominal air sac was filled with blood. Rupture of the liver was the probable cause of death.

Bacterial, viral, parasitic, and chemical analyses of tissues indicated that this crane had no detectable diseases, defects, or toxicants. Abundant quantities of subcutaneous, abdominal, and coronary fat and the degree of muscular development showed that the bird was in very good condition.

On 6 August 1979, this crane was banded at 56 days of age by personnel of the Idaho Cooperative Wildlife Research Unit and fitted with a 50-g radio transmitter leg pack to facilitate observations of movement and behavior. The bird was observed frequently before migration. During that period, it appeared to be normal and healthy. As further evidence of its physical soundness, it had migrated an airline distance of 400 km since departing from Grays Lake on 11 October, 2 days before the eagle attack. We conclude that this healthy immature whooping crane died as a direct result of an aerial attack by a golden eagle.

Received 30 September 1980, accepted 16 December 1980.

Whooping Crane Sightings 1981-1983

MTV Refuge FALL 83 Sightings

		<u>Use Days</u>
Pat #5	- 10/14 - 10/31	18
Un Ad	- 10/13	1
83-8	- 10/8 - 11/1 ²	25
83-9	- 10/17 - 11/14 ³	28
83-14	- 11/1 - 11/11	11
76-7	- 10/11 - 11/8 ¹¹	28
79-10	- 10/12 - 10/17, 11/3 - 11/12 ⁵	16
Pat #1	- 10/13 - 11/14 ⁶	30
Pat #3	- 10/22 - 11/20	29
82-13	- 10/20 - 10/29, 11/6 - 11/20 ⁸	24
Pat #9	- 10/13 - 11/11 ⁹	29
Pat #11	- 10/13 - 11/9 ¹⁰	27
		<hr/> 266

- Peak pop 10 -

SLV - FALL 1983

Date	Time	Location	Notes	Date	Time	Location	Notes
10/20	0800	85/3E	D. Goez				
10/21	0830	85/3E	FEEDING w/ PAT 5 & 83-8 - VERY CLOSE - ROCK OF 500+				
10/22	1210	Unit 17 NW.R.	LOCATED - CLOSE TO U.I.A.				
10/22	1345	85/3E	CLOSE TO PAT 5 & 83-8				
10/25	1340	WINGS					
10/29	0920	85/4E					
10/31	1540	105/102					
11/5	0800	35/103					
11/7	0835	85/4E					
11/7	1500	85/3.5E					
11/8	0755	85/4E					
11/20	1530	4E/HW/160	near PAT 3				

Wh. per Sightings
S.L.V. Fall 1983

Date	Time	Location	Notes	Date	Time	Location	Notes
10/13	1615	East side 25/5101		11/8	0900	River SE	
10/14	1145	River SE		11/8	1515	25/101	
10/16	0830	25/5101					
10/17	1806	25/101					
10/18	0920	River SE					
10/19	0830	25/101					
10/20	0850	25/101E					
10/22	1358	River SE					
10/23	1735	25/5101					
10/24	1710	25/101					
10/25	0822	25/100					
10/25	1750	25/101					
10/26	1645	25/101					
10/27	0940	River SE					
10/28	0945	102N/2N					
10/31	0705	102N/3N →	near un-banded adult for 2m				
11/1	0640	25/101					
11/2	0739	25/5101					
11/3	1400	25/101					
11/4	0627	25/101	* Arrival Time				
11/4	1320	River SE					
11/4	1550	25/101					
11/5	0625	25/101	* Arrival Time				
11/7	0621	25/101					
11/7	0945	River SE					

W. PER SIGNINGS
S.L.V. FALL 1983

<u>Date</u>	<u>Time</u>	<u>Location</u>	<u>Notes</u>	<u>Date</u>	<u>Time</u>	<u>Location</u>	<u>Notes</u>
10/13	1636	Stinky Ro/104.5					
10/14	0840	1N/105N					
10/21	1705	2N/103					
10/22	0900	2N/103					
11/1	1745	3S/104	Siccom Only - Roosted Time				
11/3	1600	3S/104.5	W/ 2,000 + S.H.				

WHEELER SIGHTINGS
S.L.V. FALL 1983

4
ω

Date	Time	Location	Notes
11/2	0915	Savage DC Cassio Falls	
11/6	0916	Savage DC Falls	

6 OPER SIGHTINGS

PAT # 4

S.L.V. FALL 1983

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>NOTES</u> TO ROOST 1837	<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>NOTES</u>
10/10	1745	1W/102		11/17	1550	1W/100N	
10/12	1030	STAPLEY/101	Loarue By Cave				
10/12	1740	1N/102					
10/13	1130	1N/100N					
10/14	1117	1W/100N					
10/20	1000	1N/105					
10/23	0925	1N/104					
10/24	1710	2S/101					
10/28	1040	1W/100N					

*

2 at #5

WYHOOPER SIGHTINGS
S.L.V. FALL 1983

DATE	TIME	LOCATION	NOTES	DATE	TIME	LOCATION	NOTES
10/13	1800	S100/160	ARRIVED TOPAY				
10/14	0345	75/S100					
10/17	0800	105/S102					
10/21	0830	85/3E	Cause TO 82-13 & 83-8				
10/21	1700	85/3E					
10/22	1735	85/3E					
10/24	1800	85/3E	standing close to 83-8 and 82-13				
10/28	0800	85/3E					
10/31	1630	85/1E					

HOOPER SIGHTINGS S.L.V. FALL 1983

PAT # 6

DATE	TIME	LOCATION	NOTES	DATE	TIME	LOCATION	NOTES
10/26	0840	25/101	↻ KINSEY				
10/26	1015	RIVER SE					
10/26	1645	25/101					
10/27	1656	25/101					
10/28	0730	25/101	* CLOSE TO 7910 ROOST DEP 0727				
10/28	0715	25/101	LARGE BIRD - CLOSE TO 7910 OR SIMILAR IN SIZE (D. KINSEY)				
10/29	1624	25/101					
11/3	1340	RIVER SE	FALL 11/23-12 TO 25/101				
11/4	1550	25/101					
11/7	0621	25/101	AT RIVER SE 0645				
11/8	0900	RIVER SE					
11/10	0830	25/101					
11/11	1500	25/101					

WHOOPEE SIGHTINGS

PNT # 7 (OBSERVED TO 10/17)

S.L.V. FALL 1983

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>NOTES</u>	<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>NOTES</u>
10/10	1800	12/105					
10/12	1700	12/105					
10/14	1710	12/105					
10/16	1805	20/103					
10/31	0705	30/102	CLONE TO PNT #15				
11/3	1022	12/100					
11/5	0850	12/104					

Wheeler Signatures

Pat #12

S.L.V. Fall 1983

<u>Date</u>	<u>Time</u>	<u>Location</u>	<u>Notes</u>	<u>Date</u>	<u>Time</u>	<u>Location</u>	<u>Notes</u>
10/21	1005	(9.55/5E) WINTS					
10/22	1110	WINTS					
10/22	1325	WINTS					
10/25	1340	WINTS					
10/24	1455	WINTS					
10/29	1615	WINTS					
10/31	1515	WINTS					
11/3	0728	WINTS					

*

Post 11

WOOPEE SIGHTINGS
S.L.V. FALL 1983

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>NOTES</u>	<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>NOTES</u>
10/13	1800	S100/160					
10/14	0849	25/S101					
10/15	0902	35/4E					
10/22	1030	WITHS - E/Empire C					
10/25	1710	SE/35	can point to a meadow hand on mountain no birds or other parent				
11/1	1655	SE/HW160					
11/3	0920	SE/HW160					
11/5	1547	SE/HW160					
11/7	0920	SE/HW160					
11/8	0929	SE/HW160	close to 83-9				
11/8	1520	SE/HW160					
11/9	0727	SE/HW160					

WHOOPEE SIGHTINGS

S.L.V. FALL 1983

<u>Date</u>	<u>Time</u>	<u>Location</u>	<u>Notes</u>	<u>Date</u>	<u>Time</u>	<u>Location</u>	<u>Notes</u>
10/13	1530	MVR Res					
10/14	1920	MVR Res N					
10/14	1410	MVR Res S					
10/16	1553	MVR Res					
10/17	1711	MVR Res					
10/20	1130	MVR Res					
10/21	1140	MVR Res					
10/22	1710	BS/GB.					
10/24	1731	95/6-B.					
10/26	1538	MVR Res					
10/29	1045	MVR Res					
10/31	1500	MVR Res					
11/1	1130	MVR Res					
11/4	1500	MVR Res	SEVEN ONLY				
11/11	1250	MVR-Res	FLYING IN				

*

Whopper Sitrus
SLU - Fall 1983

Part # 1

<u>Date</u>	<u>Time</u>	<u>Location</u>	<u>Notes</u>	<u>Date</u>	<u>Time</u>	<u>Location</u>	<u>Notes</u>
10/13	1800	Hw 160/5100	- This last yellow Gnu on Mount Lee! - Feed w/ Part II Family Gnu for 25 min - URAY CLOSE TO CHUCK APPEARED TO FEED ONCE!	11/14	0830	SE/Hw 160	
10/13	1555	"					
10/14	0800	"	NEAR U.I. J.				
10/16	0815	35/5E					
10/20	0830	85/3E	P. Gonce				
10/22	1445	85/3E					
10/22	1735	85/3E					
11/1	1640	35/4E					
11/3	0920	35/5E					
11/5	1547	5E/Hw 160					
11/8	0820	5E/Hw 160					
11/8	0929	5E/Hw 160					
11/8	1530	5E/35					
11/10	0800	5E/3.5S					
11/11	0830	5E/Hw 160	feeding close to 8329				
11/11	1625	5E/35	close to Part 3				
11/12	1600	4E/35	feeding close to Part 3				
11/13	0819	4E/35					

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Chaparral Siohtiridos
S.L.V. Fall 1983

79-10

<u>Date</u>	<u>Time</u>	<u>Location</u>	<u>Notes</u>	<u>Date</u>	<u>Time</u>	<u>Location</u>	<u>Notes</u>
10/12	1830	35/3E	Arundo tunny pm	11/5	0904	85/3E	standing near 76-7
10/13	0815	85/4E		11/8	0415	85/3E	same field 7c-7
10/14	1800	95/3E		11/8	1500	4E/3S	moved betw. 2 fields twice in 1/2 hr. (w/fin 4m)
10/15	0800	85/3E		11/12	0830	85/3E	ca 50 S.H.
10/19	0800	25/101					
10/20	0650	25/101					
10/23	0900	82/103					
10/25	1750	25/101	very close to U.M.A.				
10/26	0840	25/101	P. Kungray				
10/26	1320	Run SE					
10/26	1645	25/101					
10/27	1650	25/101	very close to U.M.A. to Roost 1802				
10/28	0730	25/101	Roost Red- 0725 - arrive Flywib w/ 83-12 family group				
10/31	0900	25/102					
11/1	0646	25/101					
11/1	1530	25/101	Roost Arrive 1645				
11/1	1645	Higels	very close to 78-1				
11/2	0739	85/5/01	very close to 83-12				
11/2	1700	Higels					

Whisper Structures
SLV - Fall 1983

79-7

<u>Date</u>	<u>Time</u>	<u>Location</u>	<u>Notes</u>	<u>Date</u>	<u>Time</u>	<u>Location</u>	<u>Notes</u>
10/13	1550	35/104	D. Kinney				
10/16	0910	Hw160/104					
10/18	0800	"					
10/20	0845	35/102 "					
10/20	1640	Hw160/104	Roosting 35/103				
10/23	0800	2N/102					
10/23	1707	25/1025					
10/25	0902	25/102					
10/25	1620	35/5103					
10/25	1715	35/103					
10/26	1512	"					
10/31	0900	25/102					
11/2	0545	35/102					
"	"						
11/2	1615	35/103					

79-4

<u>Date</u>	<u>Time</u>	<u>Location</u>	<u>Notes</u>
10/19	1640	25/101	
10/23	0925	10/104	
10/31	0802	Gossams NE	
11/3		Bosque	M. Hawkes

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>NOTES</u>	<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>NOTES</u>
10/12	0800	12/105					
10/12	1700	"					
10/14	1710	"					
10/17	1800	25/101					
10/20	1000	12/105					
10/21	1740	"					
10/23	0940	Stoney/105					
10/26	0840	25/101	O. Kiveeay				
10/26	1740	25/5102					
10/31	1200	25/102					
11/2	0658	35/5102					
11/3	1040	25/102					
11/4	0636	25/101	ARRIVAL FROM PORT				
11/5	0800	25/10100					
11/9	0818	12/1100					

WHOOPEA SIGNINGS
SLV FALL 1983

78-1

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>NOTES</u>	<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>NOTES</u>
10/9	1731	25/101	M. Phil				
10/13	1750	25/102					
10/19	0910	5109 / 5109 H1010					
10/19	1640	"					
10/20	1000	10/105					
10/28	1045	H1613					
10/31	0956	H1613					
11/1	1530	25/101					
11/1	1630	H1613	close to 7.9-10				
11/2	0600	H1613	Roost Dgm 0635				
11/2	0658	35/5102					
11/3	1546	35/102					
11/5	0645	35/103	Same Fall 79?				

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Whoopea Sentinels
SLV Fall 1983

76-7

<u>Date</u>	<u>Time</u>	<u>Location</u> <small>Swamp Bear Area 1 mi. N. of AUG.</small>	<u>Notes</u>	<u>Date</u>	<u>Time</u>	<u>Location</u>	<u>Notes</u>
10/11	1315						
10/14	0830	25/2E					
10/16	0800	25/3E					
10/20	1600	35/2E					
10/21	0824	35/2E					
10/27	0750	25/2E					
10/29	1625	25/2E					
11/1	1056	4.55/2.5E	LOAFING				
11/1	1608	25/2E					
11/5	0904	85/3E	standing near 79-10				
11/7	0756	85/3E					
11/8	0715	85/3E	same field 79-10				
11/8	1530	5E/35					

Parrot Has
Star Band - Left
All Day Check -
Wren Band - White Cereals

83-19

Hooper Sightings
S.L.V. Fall 1983

Date	Time	Location	Notes	Date	Time	Location	Notes
10/14	1155	River SE		10/31	0830	25/101	
10/15	0940	River SE		11/1	0640	25/101	
10/15	1610	25/101		11/1	1530	25/101	
10/16	0835	25/101		11/2	0739	25/101	
10/17	1606	25/101		11/3	1400	25/101	
10/18	0920	River SE		11/4	0640	25/101	
				11/4	1530	25/101	
				11/7	0830	25/101	Sigurd Only
10/19	0810	25/101					
10/19	1640	25/101					
10/20	0850	25/101					
10/22	1420	85/1015					
10/22	1807	25/1015					
10/24	1710	25/101					
10/25	0837	25/101					
10/25	1750	25/101	To Roost 1810				
10/26	1015	River SE					
10/27	1035	Hills					
10/27	1650	25/101	To Roost 1655				
10/28	0730	25/101					
10/29	1624	25/1015					

WHOOPEE SIGHTINGS
S.L.V. FALL 1983

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>NOTES</u>	<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>NOTES</u>
10/17	1705	S104/HW160					
10/18	0806	S104/HW160					
10/19	0854	S104/HW160	N. NAIL - CHICK MAY HAVE HIT LINE TODAY.				
10/20	1640	S104/HW160	A few 2's & COVERTS APPARENT AUGUSTED - L. WIDB				
10/21	0928	S104/HW160					
10/24	0855	S104/HW160					
10/25	0940	S104/HW160					

W. HOOPER SIGHTINGS

S.L.V. FALL 1983

83-15

<u>Date</u>	<u>Time</u>	<u>Location</u>	<u>Notes</u>	<u>Date</u>	<u>Time</u>	<u>Location</u>	<u>Notes</u>
10/10	1745	1N/102					
10/11	1745	1N/102					
10/12	0910	1N/102					
10/12	1740	1N/102					
10/15	1505	102N/1N					
10/15	1610	25/5101					
10/16	1755	1N/102					
10/19	1735	1N/102					
10/21	1645	1N/102					
10/23	0755	102N/1N					
10/28	0945	102N/2N					
10/31	0705	102N/3N					

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WHOOPEE SIGHTINGS

83-14

S.L.V. FALL 1983

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>NOTES</u>	<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>NOTES</u>
11/1	1110	GETZ'S GUANOCEL/AS	RECENT w/ silver collar				
11/1	1608	2E/2S					
11/3	10900	2S/2E	SIGNAL ONLY - BIRDS IN AIR				
11/8	0860	2S/2.5 E					
11/8	1613	2E/2S					
11/11	0932	2E/2S					

WHOPPER SIGHTINGS

S.L.V. FALL 1983

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>NOTES</u>	<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>NOTES</u>
10/24	1710	25/101					
10/25	0832	25/100					
10/25	1750	25/101	* To Roost 1819				
10/26	1340	25/101 Shrivers					
10/26	1645	25/101					
10/27	1650	25/101					
10/28	0730	25/101	* ARRIVES 0725 w/ 79-10				
10/29	1625	25/5101					
10/31	0830	25/101 W					
11/1	1530	25/101					
11/2	0739	25/5101	Very close to 79-10 CLOSE TO UWA (From Part C) - Few noticed to 25/101				
11/3	1340	Rioxa SE					
11/4	0625	25/101	* Arrival Time				
11/7	0636	25/101	* Arrival Time				
11/8	0900	Rioxa SE					
11/8	1615	25/101					

*

W. HOOPER SIGHTINGS

S.L.V. FALL 1983

Date	Time	Location	Notes	Date	Time	Location	Notes
10/13	0940	S100 S4105/160		11/12	1533	SE/HW160	
10/13	1610	Hwy 160/1005	W/ more SH yellow band + chick w/ yellow band no collar	11/13	0800	SE/HW160	
10/13	1800	S100/1605		11/14	0830	SE/HW160	
10/20	1620	35/SE (East)					
10/25	0730	S100/1605					
10/25	1710	35/SE →	2nd parent 1st chick black				
10/26	0909	35/SE					
10/27	0910	35/SE					
10/31	0715	SE/160 HW Airport					
11/1	1655	SE/HW160					
11/5	1547	SE/HW160	Female parent w/ chick 12 white band				
11/7	0920	SE/HW160					
11/8	0817	SE/HW160					
11/8	0929	SE/HW160	Close to Pad 11				
11/8	1520	SE/HW160	w/ chick adult seen w/ yellow leg band.				
11/9	0727	SE/HW160					
11/10	0800	SE/3.55					
11/11	0830	SE/HW160 GETS	feed on rice to Pad 1				
11/11	1640	SE/35	D. Grand Field - Still nifty nest to family group w/ yellow leg bands! The 2 Family saws them together!				

MOON TO LAKE CREEK,
TOWN OF LEOA, - 2 HOOPER
WHITE STATIONS FROM WIDE
COVERS

HOOPER SIGHTINGS

S.L.V. FALL 1983

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u> Unit 23 MVP	<u>NOTES</u>	<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>NOTES</u>
10/8	1600		A. NAL				
10/11	0830	85/4E					
10/12	1255	85/4E					
10/13	1730	85/4E					
10/21	0830	85/3E	CLOSE TO R-45 AND 82-13				
10/21	1340	85/3E					
10/21	1700	85/3E	CLOSE TO R-45 AND 82-13				
10/22	1745	85/3E					
10/24	0736	75/2.5E	* ROOST DEP				
10/24	1800	85/3E	→ SEEN standing near Pats for ~2 min.				
10/25	0930	85/3E					
10/29	0855	85/3E					
11/2		Bosque					

Hooper Sightings

S.L.V. Fall 1983

Date	Time	Location	Notes	Date	Time	Location	Notes
10/12	1045	River SE		11/1	1530	25/101	
10/12	1800	25/102		11/1	1630	Hicks-Roost	78-1 & 79-10 closest
10/13	1110	25/101		11/2	0739	25/101	
				11/4	0640	25/101	
				11/4	1213	River SE	
10/14	0849	25/101		11/4	1550	25/101	
				11/5	0625	25/101	
10/15	1604	River SE		11/7	0621	25/101	* Roost Arrived
				11/7	0945	River SE	
10/16	0835	25/101		11/8	0900	River SE	River Bottom
				11/8	1515	25/101	
10/19	0830	25/101		11/9	0910	10/100	Stewart Bay - no AR
10/19	1640	25/101 W					
10/23	1731	25/101					
10/24	1710	25/101					
10/25	0832	25/100					
10/25	1750	25/101					
10/26	1340	25/101 Shrivers					
10/26	1645	25/101					
10/27	0940	25/101					
10/28	0730	25/101					
10/29	1624	25/101					
10/31	0830	25/101 W					
10/1	0640	25/101					

WHOOPEA SIGHTINGS S.L.V. FALL 1983

JUMARKED ADULT

DATE	TIME	LOCATION	NOTES	DATE	TIME	LOCATION	NOTES
10/10	1800	12/105		10/26	1015	RIVER SE	
10/12	1700	12/105					
10/13	0745	12/105N		10/26	1645	25/101	
* 10/13	10815	83/9E]	Part 3??				
10/13	1730	85/4E					
10/13	1655	12/105					
10/14	0815	12/105N					
10/14	1710	12/105		10/27	1650	25/101	close to 79-10
10/16	1805	22/103		10/28	0730	25/101	Roost 0737 DEP
				10/28	0715	25/101	large bird camp 79-10
				10/29	1624	25/101S	
10/20	1680	12/105		10/31	0705	102N/3N	w/ Pat 15
				* 11/1	1420		in flight over power line and toward 25/101 played in wind
10/21	1700	12/102		11/3	1022	12/100N	
				11/3	1340	River SE	seen w/ 83-12 to 25/101
10/23	0900	22/103		11/4	1550	25/101	
				11/5	0850	12/104	
* 10/24	10837	125/108	Part 6?	11/7	0621	25/101	AT River SE 0945
				11/8	0900	River SE	
* 10/25	1715	35/103		11/10	0830	25/101	
* 10/25	1640	25/101	East Side				
* 10/25	1750	25/101	very close to 79-10	11/11	1500	25/101	

10/26 0840 25/101

River SE

Whooper Sightings

Unidentified Adults

S.L.V. FALL 1983

Date	Time	Location	Notes	Date	Time	Location	Notes
10/19	1700	1 MI N. OF AUR - W. OF 3E (Sueva Reef area)	MEL MAIL (PROG 78-7)	11/10	0800	3.55/5E	PROG PRT #3
10/19	1700	1 MI N. OF AUR - W. OF 3E (Sueva Reef area)	MEL MAIL (PROG 78-7)	11/19	0727	SE/HW160	
10/13	1015	Stanley Rd/M100		11/13	0742	85/4E	
10/13	1605	35/102	D. KINERAY - PRTS 79-7	11/15	0800	4E/HW160	
10/17	1800	3E/35		11/17	1531	4E/HW160	
10/19	1640	25/101	CLUSE- ONE 15				
10/19	"	"	PROG 74-4				
10/21	0930	8.55/1E	PROG PRT #3				
10/21	1410	Stanley Rd/M100.5					
10/22	1216	AUR 17 - AUR	LOAFING CLOCK 70 82-13				
10/23	0800	20/1102					
10/23	1100	85/2.5 E	PROG PRT #3				
10/24	0729	75/2.5 E	ROOST DEP				
10/24	1625	25/101					
10/25	0930	85/3E					
10/25	1340	WINS	LOAFING				
10/26	0900	GASSARS	Feeding to RUM				
10/26	1235	RIDGE SE	SPIRALING				
10/27 10/28 10/31	1417 1000 1115	85/2.5 E HIGELS - WEST 25/2.5 E	PROG PRT #3 hmf in pvt. grade				
11/3	0855	35/3E	PROG 76-7				
11/4	1006	HIGELS	SPIRALING - 1050 PRTS 78-10				
11/4	1000	HIGELS	PROG 78-1				
11/7	0920	SE/HW160					
11/8	1515	25/101	PROG PRT #6				

for -
River NW = between
north bank of R6 and
the 3N rd, west of
county line, east of
3E road

River South = marsh
along S bank of R.6,
east of county road.
Containing what should be
clearing

See you north fork
Creek

SPRING 83 SIGHTINGS

Date	Time	Loc	Notes
Pat 1	2/18	0815	
Pat 2	2/18	0830	
Pat 3	2/18	1120	
Pat 4	2/18	1140	
Pat 5	2/18	1340	
Pat 6	2/18	1410	
Pat 7	2/18		
Pat 8	2/18		
Pat 9	2/18		
Pat 10	2/18		
Pat 11	2/18		
Pat 12	2/18		
Pat 13	2/18		
Pat 14	2/18		
Pat 15	2/18		
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Pat 87	2/18		
Pat 88	2/18		
Pat 89	2/18		
Pat 90	2/18		
Pat 91	2/18		
Pat 92	2/18		
Pat 93	2/18		
Pat 94	2/18		
Pat 95	2/18		
Pat 96	2/18		
Pat 97	2/18		
Pat 98	2/18		
Pat 99	2/18		
Pat 100	2/18		

Date	Time	Location	Notes
Pat 1	2/21	1430	Belton R
Pat 2	2/21	1500	"
Pat 3	2/21	1530	Casa Col
Pat 4	2/21	1600	Belton R
Pat 5	2/21	1630	"
Pat 6	2/21	1700	"
Pat 7	2/21	1730	"
Pat 8	2/21	1800	"
Pat 9	2/21	1830	"
Pat 10	2/21	1900	Belton R
Pat 11	2/21	1930	"
Pat 12	2/21	2000	"
Pat 13	2/21	2030	"
Pat 14	2/21	2100	"
Pat 15	2/21	2130	"
Pat 16	2/21	2200	"
Pat 17	2/21	2230	"
Pat 18	2/21	2300	"
Pat 19	2/21	2330	"
Pat 20	2/21	2400	"
Pat 21	2/21	2430	"
Pat 22	2/21	2500	"
Pat 23	2/21	2530	"
Pat 24	2/21	2600	"
Pat 25	2/21	2630	"
Pat 26	2/21	2700	"
Pat 27	2/21	2730	"
Pat 28	2/21	2800	"
Pat 29	2/21	2830	"
Pat 30	2/21	2900	"
Pat 31	2/21	2930	"
Pat 32	2/21	3000	"
Pat 33	2/21	3030	"
Pat 34	2/21	3100	"
Pat 35	2/21	3130	"
Pat 36	2/21	3200	"
Pat 37	2/21	3230	"
Pat 38	2/21	3300	"
Pat 39	2/21	3330	"
Pat 40	2/21	3400	"
Pat 41	2/21	3430	"
Pat 42	2/21	3500	"
Pat 43	2/21	3530	"
Pat 44	2/21	3600	"
Pat 45	2/21	3630	"
Pat 46	2/21	3700	"
Pat 47	2/21	3730	"
Pat 48	2/21	3800	"
Pat 49	2/21	3830	"
Pat 50	2/21	3900	"
Pat 51	2/21	3930	"
Pat 52	2/21	4000	"
Pat 53	2/21	4030	"
Pat 54	2/21	4100	"
Pat 55	2/21	4130	"
Pat 56	2/21	4200	"
Pat 57	2/21	4230	"
Pat 58	2/21	4300	"
Pat 59	2/21	4330	"
Pat 60	2/21	4400	"
Pat 61	2/21	4430	"
Pat 62	2/21	4500	"
Pat 63	2/21	4530	"
Pat 64	2/21	4600	"
Pat 65	2/21	4630	"
Pat 66	2/21	4700	"
Pat 67	2/21	4730	"
Pat 68	2/21	4800	"
Pat 69	2/21	4830	"
Pat 70	2/21	4900	"
Pat 71	2/21	4930	"
Pat 72	2/21	5000	"
Pat 73	2/21	5030	"
Pat 74	2/21	5100	"
Pat 75	2/21	5130	"
Pat 76	2/21	5200	"
Pat 77	2/21	5230	"
Pat 78	2/21	5300	"
Pat 79	2/21	5330	"
Pat 80	2/21	5400	"
Pat 81	2/21	5430	"
Pat 82	2/21	5500	"
Pat 83	2/21	5530	"
Pat 84	2/21	5600	"
Pat 85	2/21	5630	"
Pat 86	2/21	5700	"
Pat 87	2/21	5730	"
Pat 88	2/21	5800	"
Pat 89	2/21	5830	"
Pat 90	2/21	5900	"
Pat 91	2/21	5930	"
Pat 92	2/21	6000	"
Pat 93	2/21	6030	"
Pat 94	2/21	6100	"
Pat 95	2/21	6130	"
Pat 96	2/21	6200	"
Pat 97	2/21	6230	"
Pat 98	2/21	6300	"
Pat 99	2/21	6330	"
Pat 100	2/21	6400	"

ID	Date	Time	Locality	Notes	Day	Time	Notes		
18-1	3/4		2102, a	2. K-1	UIA	3/13	0830	25/510	2
18-13	"		2301A		18-16	"	"	25/510	
18-1	"		23		18-10	"	0845	25/510	
UIA	"		17		UIA	"	0915	35/510	
*	3/6		See Route 1 & 2	For 1st sighting	18-7	"	1650	20/510	
18-10	3/7	1300	Donna Kingery Eyes of side of ground		18-4	"	1330	20/510	
18-4	"	"	55/510-8		UIA	"	1800	25/510	
18-1	"	"	East of Hues		18-16	"	1810	Hues 5 Route	
18-1	"	1415	35/510-3		UIA	3/13	1816	"	
18-10	"	1430	Shady Rd - 18-10-2		18-10	3/14	0630	25/510-2	
18-1	"	1645	Shady Rd - 18-10-2		18-10	3/14	0645	25/510-1	
18-1	"	1650	18/510-2		18-1	"	"	"	
18-1	"	1700	18/510-2		18-1	"	0715	25/510-2	
18-1	"	"	18/510-2		18-1	"	0800	25/510-2	
18-1	"	0735	18/510-2		18-1	3/17	0630	25/510-2	
18-1	"	"	18/510-2		18-1	"	"	"	
18-1	"	"	18/510-2		18-1	"	0700	1630	
18-1	"	"	18/510-2		18-1	"	0816	"	
18-1	"	"	18/510-2		18-1	"	0830	20/510-2	
18-1	"	"	18/510-2		18-1	"	0900	25/510-2	
18-1	"	"	18/510-2		18-1	"	0920	25/510-2	
18-1	"	"	18/510-2		18-1	"	1550	35/510-2	
18-1	"	"	18/510-2		18-1	"	1630	25/510-2	
18-1	"	"	18/510-2		18-1	"	1635	25/510-2	
18-1	"	"	18/510-2		18-1	"	1740	25/510-2	

[illegible]

[illegible]

ID	Date	Time	Location	Notes
36-1	4/2	0615	GS/60	
36-3	"	0700	95/77	
36-5	4/2	1220	95/77	1000' Area - looking " "
36-1	4/3	1010	"	
36-3	4/3	1630	95/66	
36-10	"	1715	10/102	
36-1	"	"	"	1st quarter - long to
36-1	4/5	1105	95/66	near pasture again
36-2	4/6	0300	35/103	just five to looking over
36-1	"	0305	25/101	Army light
36-4	"	0800	10/102	up 100' - long light
36-16	"	0830	10/100	
36-16	"	0845	95/66	near 36-3 - 4
36-5	"	0920	35/3E	3 birds seen moving to end of 36-3
36-3	"	1005	95/66	3 birds seen moving to end of 36-3
36-1	"	1430	65/66	3 birds seen moving to end of 36-3
36-3	"	1500	95/66	3 birds seen moving to end of 36-3
36-5	"	1600	25/101	3 birds seen moving to end of 36-3
36-1	"	1750	10/101	3 birds seen moving to end of 36-3
36-3	4/6	1300	95/66	
36-10	"	1635	95/66	
36-1	4/7	0600	65/66	
36-13	"	1015	95/66	
36-3	"	1300	95/66	
36-10	"	1305	95/66	
36-4	"	1310	95/66	
36-5	"	1810	25/100	
36-3	4/8	0605	95/66	
36-5	"	0630	25/100	
36-6	"	0645	25/100	
36-7	"	0750	35/3E	
36-4	"	0800	10/102	
36-5	"	1705	95/66	
36-10	"	1715	95/66	
36-1	"	"	"	
36-4	"	1750	10/101	

[illegible]

IC	Date	Time	Location	Notes
82-3	4/15	1200	River 1 mi	mealy
82-10	4/16	1300	"	shd
82-2	"	"	"	"
82-4	"	1330	1 mi from 5	quartz - large round
82-1	4/16	0630	24101	
82-4	4/16	0730	24102	
82-3	"	0745	from NW	1 mi from 5 - doing well
82-10	"	"	"	shd
82-3	"	"	"	shd
82-1	4/18	0715	24101	shd 5 SH - mealy
82-13	4/17	1100	R 121173	shd around
"	"	1400	"	- shd 8 degrees SH -
"	"	"	"	small shd of quartz then
82-13	4/20	0500	"	shd
82-13	4/20	0600	10.5 S 102	few dr 0500 - very
82-13	4/21	0630	10.5 S 102.5	shd 5 SH - quartz
82-6	"	0709	24101	shd - 10 mi from shd
82-10	"	1200	10.5 S 102.5	shd
"	"	1630	"	shd
82-6	4/22	0445	24102	shd
82-6	4/22	0600	24101	shd

IC	Date	Time	Location	Notes
82-13	4/22	1145	10.5 S 103	
"	4/23	0730	10.5 S 103	
"	4/24	0730	"	
82-13	4/24	1900	10.5 S 102	
82-6	5/2	1400	River 5 mi	shd

FALL 82 Sightings

- Wendy Braion -

10/3 - unidentified whooper - ^{Carbon Point} Whosper Sightings - San Luis Valley - Fall 82

10/9 Pat #1 76-7
Melon Gate

10/10 76-7
3503E

Date	Time	Location	ID	Notes
10/9		R.G. 35/SE	Pat 5	W/ 10 SH
10/13		R.G. 35/3E	76-7	"
10/14		Alamosa W/102	78-1	"
10/14		"	78-10	"
10/14		Alamosa 15/102	79-4	"
10/14		Alamosa Stanley 102	79-7	"
10/21		Alamosa High	78-1	
			79-7	
			78-10	
			80-2	Injured rt leg
10/22	0800	Alamosa 25/5101	79-4	w/ 20 SH
10/22	0800	Alamosa 25/5101	Pat 6	w/ 4 SH
10/22	1430	Alamosa 25/5101	78-1	w/ 19 SH
10/22	1440	Alamosa High	80-2	laying down
10/22	1700	R.G. 35/Emperal	82-13	w/ 175 SH
10/23	0700	Alamosa High	78-1	
10/23	0730	Alamosa 25/5101	79-4	feeding w/ 12 SH
10/23	1000	R.G. 25/5100	79-7	feeding w/
			78-10	1200 SH -
			78-1	with ground cat.
10/23	1100	Alamosa High	78-1	cast-castel
			78-10	fine mouth
			80-2	injured - right
10/24	Dawn	R.G. - 85	82-13	*

* Radio Signal Only - no sighting

Date	Time	Location	Notes
10/24	0900	R6, 35/5E	Pot 1 feeding
			76-7
10/24	0930	Alamosa 25/5W	72-1 feeding
10/24	1100	Hwy 3 Road	80-2 moved better to 2 unidentified owl sites - Alamosa
10/24	2M	Alamosa 25/5W	79-4 feeding
10/24	PM	Alamosa 25/5W	Pot 6 feeding
10/25	0800	Alamosa 20/5W	Pot 4 feeding, Owl perched
10/25	AM	R6, 35/5E	Pot 1 feeding
			76-7
10/25	1400	Alamosa 35/5W	80-2 feeding w/ 200 SH
10/25		Alamosa 25/5W	79-4 owl 100 yds apart
			79-7
10/25	AM	Alamosa 35/5E	Pot 1
			76-7
10/23	1000	Alamosa 5101	79-4 feeding - chick
			76-7
10/23	1130	Alamosa 35/5W	80-2 long over when flying
10/23	1630	Alamosa 15/5106	Pot 3 feeding w/ 800 SH
10/23	AM	Alamosa 15/5106	Pot 3 feeding w/ 300 ST
10/28	1700	Alamosa 10/5102	Pot 4 feeding w/ 40 S
10/29	AM	Alamosa 20/5102	Pot 4 feeding - not large
10/29	1030	Alamosa 5101	79-4 feeding
10/29	1045	Alamosa - Highway	78-10 feeding - not seen
10/29	1130	Alamosa - 35/5W	80-2 feeding - not seen
			above first

Date	Time	Location	ID	Notes
11/4	dawn	R5 SS/3E	82-13	feeding w/ 5 SH
11/4	1005	Alameda ridge north end	Pat 4	feeding
11/5	1010	Alameda ridge S01	Pat 6	feeding
11/5	1015	Alameda ridge	79-7	feeding
		102.8	78-1	"
			80-2	"
11/6	0715	Alameda ridge S01	Pat 6	feeding w/ 24 S
11/6	1000	Alameda ridge north end	79-4	feeding w/ 10 S
11/6	1030	Alameda ridge S01	Pat 4	feeding
11/6	1030	Alameda ridge S01	Pat 6	feeding
11/6	1030	Alameda ridge S01	79-7	feeding
11/7	0630	R6 - 85	82-13	didn't see
11/7	0700	R6 SS/5E	Pat 1	feeding - north area
11/7	0930	Al. 25/S101	79-4	feeding - west area
11/7	0940	Al. 35/S102.8	80-2	feeding
11/7	0900	Al 25/S102	78-10	feeding - north
			79-7	central
			79-10	west
11/7	1000	Al. - S102.8	80-2	feeding
			79-7	"
11/7	1700	R6 SS/5E	76-7	feeding - west
11/8	0600	Al 1.25/S100	Pat 6	feeding - confirmed -
11/8	0545	R6 - NW ridge	82-13	not always sighted west
11/8	0815	Al - 20/S102	Pat 4	feeding w/ 12 SH

Date	Time	Notes	sets
11/12	0900	35/5E	76-7 79-10 out and with further up
11/13		A ¹ Hugs	Pat 1 80-2 - long 10 St
11/13	210	A ¹ 25/5101	Pat 6 79-4 further - fur off
11/13	1620	A ¹ 25/5101	78-10 82-13 further *
11/14	0300	R6 85	76-7 79-7 further
11/14	1500	R6 35/5E	79-7 further
			Pat 1
11/15	0630	A1 Hugs front	80-2 82-13 * further - fur back
11/15	1530	R6 95/3E	82-13 * further
11/15	1600	R6 35/5E	Pat 1 Pat 3 further
11/15	1630	A1 35/5102.8	80-2 further
11/16	0630	R6 - NW R. Eng -	82-13 * further
11/16	0730	R6 - 35/5E	Pat 1 Pat 3 further up. see
11/16	0830	A1 - 35/5102.8	80-2 further - on the 3505H
11/16	0930	A1 35/5102.8	80-2 further

* Radio Signal Only

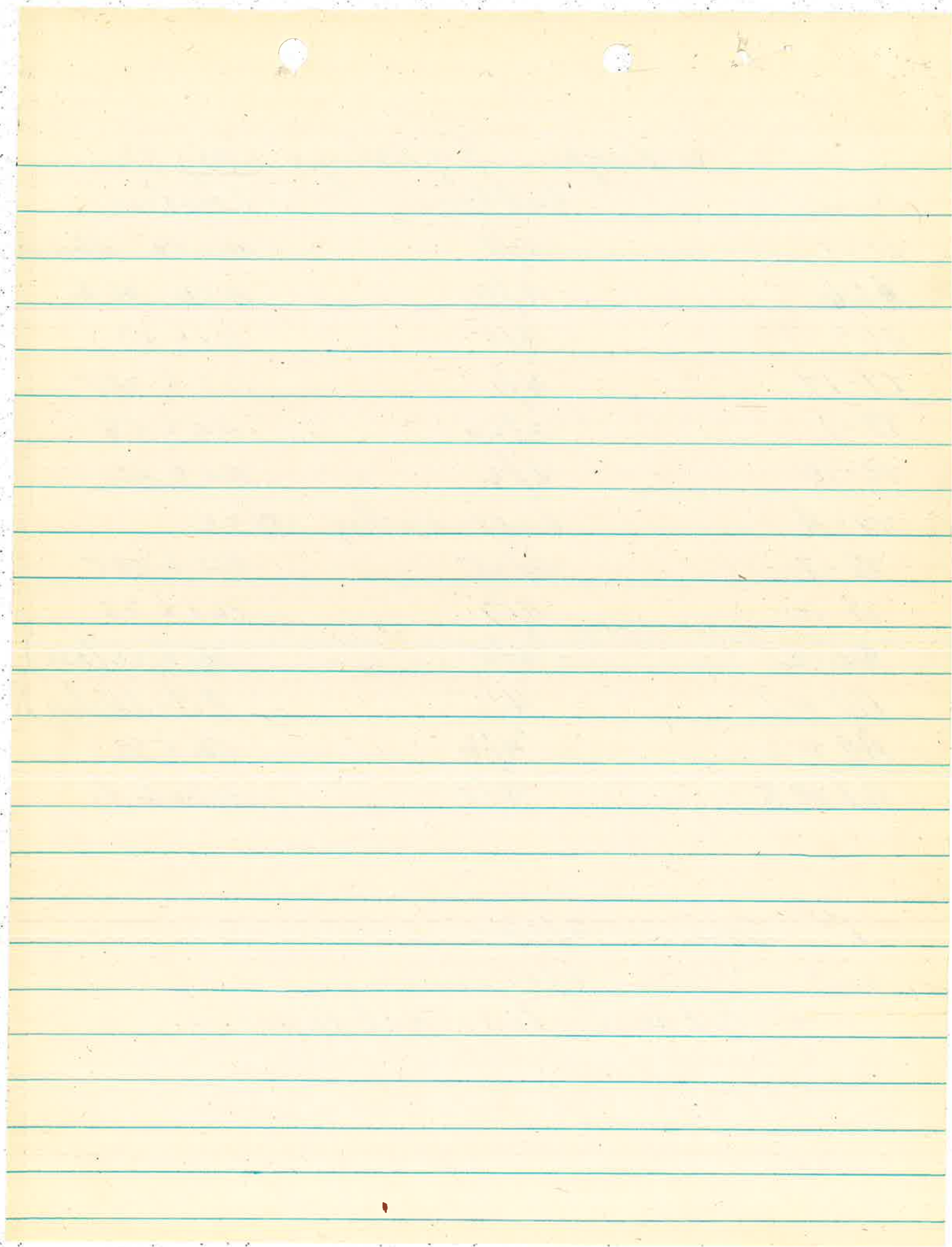
Whooper Sightings - Spring 82

<u>Crow</u>	<u>Last Seen</u>	<u>Location</u>
75-1	4/1	11N & 58 Alamosa
A06	4/6	MTV d. 2
A09	4/5	101 E, 25
77-17	4/1	125 E, 285
78-1	3/26	11N & 58
78-10	4/6	101 E, 25
79-4	Left Valley	3/22
79-7	3/25	125 E, 285
79-10	4/9	101 E, 25
80-2	4/3	3E & 25 (MTV)
Pat #1	4/6	Gete (Molvin)
Pat #2	4/8	5E & 95
Pat #3	4/1	Wisebarts

1st Seen - 2/22

Last " - 4/17

+ Pat #2 here all summer

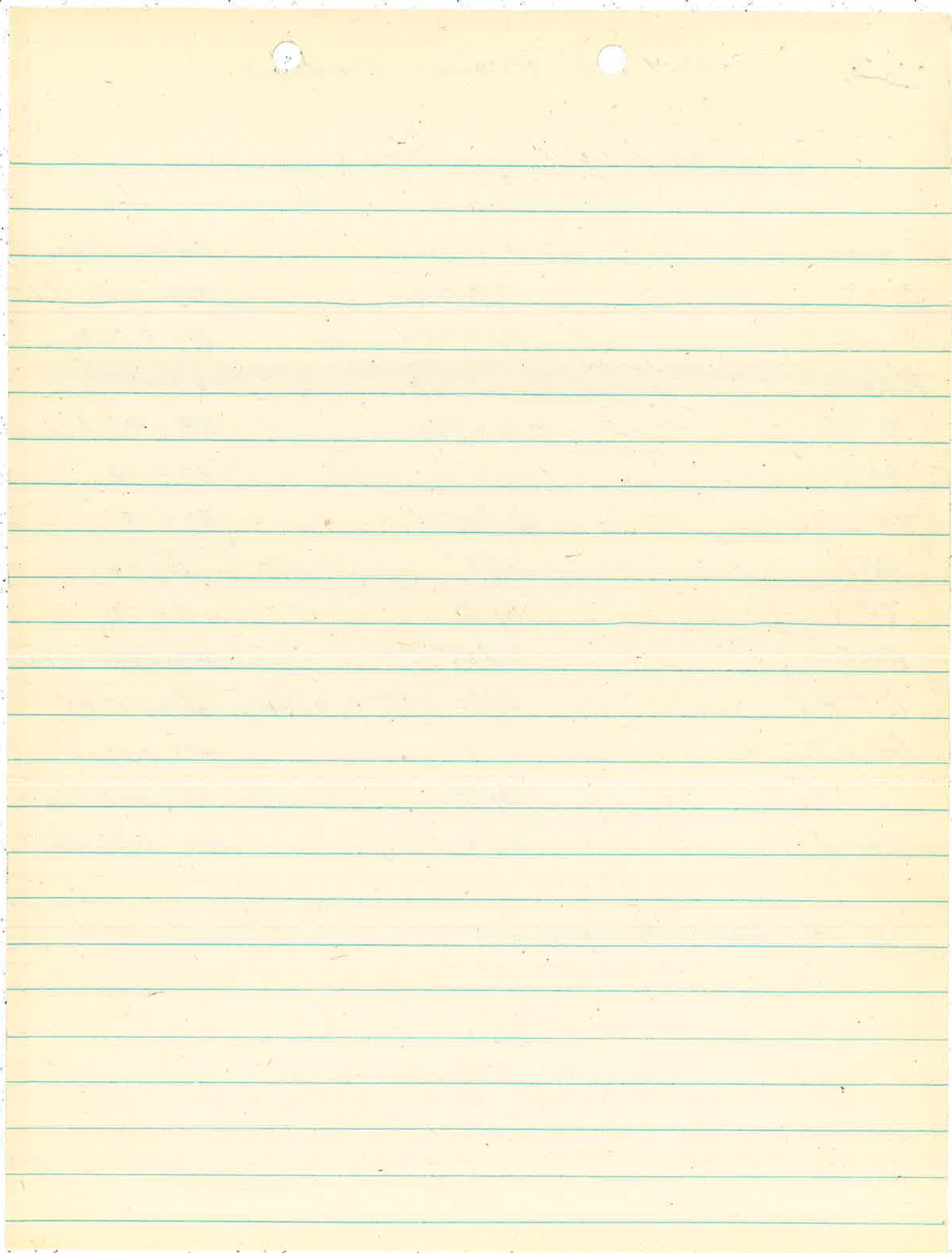


ONLY 13 KNOWN SIGHTING

Whooping Crane Sightings

<u>Crane</u>	<u>Date Seen</u>	<u>Location</u>
80-2	3/4/82	MTU NWR-41
78-10	3/3/82	25 & 102 (armory)
Pat #3	3/2/82	45 & 46
79-10	3/5/82	88 & Countyline
A06	3/5	35 & 3E
79-4	2/25	35 & 3E
A01	3/3	Saguache County C & 58
78-1	3/3	C & 58
A09	2/25	MTU NWR-422
Pat #1	2/25 & 3/3 By D. Kingery	GILMORES
Pat #2	3/9	MTU NWR-423
77-17	3/9	125 & 1 mi E 285
79-7	3/9	125 & 1 mi E 285

Only other bird - Pat #3



March 22nd - Sandhill Count

Wills & Surrounding Area - $981 + 1500 = 2,481$

Rock Creek - 990

Adams Lake - (whooper) 1,850

Rio Grande River - LaSaucer to Refuge - 448

ALAMOSA NWR 51

River ALAMOSA to Monte Vista (whooper) 4,192

+ 1,000 at Center (58 ± C)

Whoopers - 5 MTV
 Alana Adams - 3
 Westbrook - 2
 Prenter - 3
 River

11
 535.00
 5.00
 10.00
 1.00
 3.50
 1.10
 1.65
 .32

 550.57

2/22 - 69 yellow left, large white right
Cochran Meadow - 10:50 am 1109

- Un whooper - Transmitter left by young
Unit 19 7:55 79-2

2/23 - 78-10, 25 & ~~10~~ 8:45

80-2, Unit 6 9:25

Unidentified - Unit 22

2/24 - 80-2, 5E, 8S, 1/2 south of intersection

3 still in ALANOSA

234-5898

75-1 (AOI) lg. yellow - left

- 2/25 1/2 mi S. of Gilman House.
3/3 6 mi E; 2 mi N of Center; Saguache Co.
3/10 6 mi E; 2 mi N of Center; Saguache Co.; 9:15 A.M.
3/15 C.R. 58; Hwy 112; ^{Alamosa} Saguache Co. 9:30 A.M.
3/25 11 N; CR 58; Alamosa Co.; 7:00 A.M.
3/26 " " " " 6:30 A.M.
3/30 11 N; CR 58; Alamosa Co.; 5:40 A.M.
4/1 11 N; CR 58; " " 4:55 P.M.

401

76-7 (A06) Lg. 4" Left
Sun. White R

3 March	4E; 3S; R.G. Co.	5:45 p.m.
10 March	4E; 3S; " "	9:00 a.m.
11 March	4E; 3S; " "	8:35 a.m.
15 March	3E; 3S; " "	5:55 p.m.
17 March	3E; 2S; " "	8:30 a.m.
24 March	5E; 2S; " "	5:10 p.m.
29 March	CLP; 9S; " "	9:00 a.m.
29 March	5E; 2S; " "	5:50 p.m.
3 April	3E; 2S; " "	7:12 a.m.
5 April	UNIT 2 MUNOZ (Leaf Arm)	3:00 p.m.
6 April	5E; 1/2 mi S of 1685	5:55 p.m.

76-15 (A09) Lg Yel R
Lg White L

Date	Unit	Time	Location	Time	Notes
22 Feb	Unit 22	9:30 A.M.			
25 FEB.					
3 March	2S; 102E;		Alamosa Co.	6:03 p.m.	
10 March	2S; 102E;		" "	5:15 p.m.	
14 March	2S; 101E;		" "	9:45 A.M.	
26 March	1 mi N of intersection		101E + 2S; Ala. Co.	3:00 p.m.	Roost
30 March	" "		" "	4:40 p.m.	
31 March	" "		" "	5:27 p.m.	
2 April	" "		" "	5:30 p.m.	
3 April	" "		" "	10:00 A.M.	
5 April	" "		" "	8:40 A.M.	

77-17 (Alberta)

9 March	125; 74 mi E	Hwar 285; R.G. Co.
12 March	125; 285	R.G. Co. 8:05 a.m.
25 March	125; 285	" 5:05 p.m.
30 March	125; 285	R.G. Co. 5:25 p.m.
1 April	125; 285	R.G. Co. 8:05 p.m.

- 3 March 6 miles E; 2 miles N of Center: Saguache Co.
- ? 5 March 35; 38; R.G. Co.
- 10 March 6 mi. E; 2 miles N of Center; C.R. 57; 4:30 p.m.
- 15 March C.R. 58; Hwy 112; 8:40 A.m.
- 26 March C.R. 58; 11; 7:00 A.m.

78-10, - Sm. wh R
Green/Wh./Green L

23 Feb.

2S + 102

8:45 a.m.

3 March	2S; 102 E	
10 March	3S; 102 E	Ala. Co. : 5:25 p.m.
11 March	3S; 102 E	" " : 9:45 p.m. Loading Area
12 March	2S; 102 E	" " : 4:35 p.m.
14 March	2S; 102 E	" " : 4:25 p.m.
17 March	2S; 102 E	" " : 8:45 a.m.
26 March	1 mi. N of Intersection	101 E; 2S; Ala. Co. : 3:00 p.m.
29 March	102; 2S	Ala. Co. : 6:07 p.m.
30 March	1 mi. N of	101 E; 2S; Ala. Co. : 4:40 p.m.
31 March	101 E; 2S	: 5:45 p.m.
2 April	" "	: 5:30 p.m.
3 April	" "	: 10:00 a.m.
5 April	" "	: 8:40 a.m.
6 April	" "	: 5:20 p.m.

22 FEB.

79-4

Unit 19 (possible) Transmitter left log.

25 FEB. 3E, 3S ; ~~South of~~ MUNAR; R.G. Co.

10 March 3E, 3S ; RG Co. ; 5:55 p.m.

11 March 4E, 3S ; RG Co. ; 8:40 p.m.

11 March UNIT 14; " ; 5:55 p.m.

13 March " " " ; 7:43 A.M.

14 March Unit 14; " ; 7:55 A.M.

17 March Unit 14; " ; 7:08 A.M.

22 March Sighted near Grand Mesa headed north
 by Melvin Peterson 835-3770 (Home)

79-7

9 March	1251 3/4 mi. E of 28	R.G. Co.
12 March	1255, 255, R.G. Co.	8:00 a.m.
25 March	1251, 283, R.G. Co.	5:05 p.m.

79-10

4 March	3S; 104; Alamosa Co.;	8:10 A.M.	
7 March	2S; Co. Line Rd.; Alamosa Co.;	8:35 A.M.	
5 March	8S; Co. Line Rd.;		
11 March	1.8S; " " ; Alamosa Co.;	4:40 p.m.	CHEURON TEST FIELD
14 March	2S; 101E; " " ;	4:35 p.m.	
25 March	Crow's TL; Alamosa Co.;	6:15 A.M.	
26 "	1 mi N of 101E + 2S intersection;	Alamosa Co.;	3:00 p.m. ROOST
30 March	" " " " " "	" "	4:40 p.m.
31 March	" " " " " "	" "	5:27 p.m.
2 April	" " " " " "	" "	3:30 p.m.
3 April	" " " " " "	" "	10:00 A.M.
5 April	" " " " " "	" "	8:40 A.M.
6 April	" " " " " "	" "	5:20 p.m.
9 April	101 + 2S	" "	8:10 A.M.

23 Feb.

Unit 6

9:25 A.M.

24 Feb.

SE; 85 1/2 mi. S of intersection

6 Mar.

TS; Hunter Parking #4; R.G. Co. MUNWR: 3:40 p.m.

4 Mar.

Unit 1 MUNWR

8 Mar.

Unit 23: 1:30 p.m.

11 Mar.

Unit 22; MUNWR 7:25 A.M.

12 Mar.

Unit 22; " 3:20 p.m.

14 Mar.

" " " 10:55 A.M.

16 Mar.

" " " 8:25 A.M.

17 Mar.

" " " 7:21 A.M.

26 Mar.

" " " 4:05 p.m.

27 Mar.

" " " 8:00 A.M.

29 Mar.

C.L.R.: 95; R.G. Co.: 8:32 A.M.

1 April

C.L.R.: 95; R.G. Co.: 3:40 p.m.

3 April

3E: 1/2 mi S of 25; R.G. Co.: 7:12 A.M.

★ PATIENT No 1

25 FEB, $\frac{1}{2}$ mile S. of Belmont House
 3 Mar, 4E, 3S; R.G. Co. : 5:45 p.m.
 5 Mar, 5E; $\frac{1}{2}$ mi. S of $\frac{160}{285}$: R.G. Co.
 10 Mar, 10E, 3S, : 4:15
 14 Mar 5E; 1 mi. S of $\frac{160}{285}$: 8:55 A.M. : R.G. Co.
 17 Mar, Empire Canal; $\frac{1}{2}$ mi S of $\frac{160}{285}$: 8:05 A.M. R.G. Co.
 24 Mar, 5E; 3S; 9:02 A.M. : R.G. Co.
 29 Mar, 5E; 3S; 5:30 p.m. : R.G. Co.
 31 Mar, 5E; $\frac{1}{2}$ mi S of $\frac{160}{285}$: R.G. Co. : 5:55 p.m.
 6 April 5E; $\frac{1}{2}$ mi S of $\frac{160}{285}$: R.G. Co. : 5:55 p.m.

PATUXENT No. 2

8 March Cozt 17 2:25 p.m.
 9 March " 23 9:00 A.M.
 11 March L 23 7:40 A.M.
 1 April ^{SE} ~~SE~~ ⁹⁵ R.G. Co. 3:35 p.m. Loaf
 5 April ^{SE} ~~SE~~ ⁹⁵ R.G. Co. 2:05 p.m. Loaf
 6 April SE: 95 R.G. Co. 9:20 A.M.
 8 April SE: 95 R.G. Co. 4:50 p.m.

★ PATIENT NO. 3

25 March Wiselort Feedlot: 4:45 p.m. : Ala. Co.
 30 March Wiselort Feedlot: 5:45 p.m. : Ala. Co.
 6 April UNIT 17 MUNWR, ~~Ala.~~ R.G. Co.: 8:55 A.m.
 8 April UNIT 14 MUNWR: " : 6:30 p.m.
 9 April " " " " : 7:27 A.m.
 1 April Wiselort Feedlot: ~~Ala.~~ Ala. Co.: 8:15 A.m.

Whooping Crane Sightings

Fall 1981

- 9/17 - Unidentified - MTV refuge - Nels Winkens
9/25 - " - Unit 20 MTV
9/28 - Pat #2 - Bailey Field - 8S & Empire Canal
10/3 - " - " " " " "
10/3 - A06 & 80-2 - Rd 25 & 2E
10/4 - Pat #2 - Unit 24, MTV
10/4 - 80-2 - N. Melvin Gate, E. Empire Canal
10/4 - A06 - West of Melvin Gate house
10/5 - Unidentified - 3N & 102
AM 10/21 - Pat #3 - Rd 25 & 101
10/21 - 78-1 - Rd 108 & 15
10/21 - Unidentified - Rd 106 & 15
PM 10/21 - 78-1, 78-10, A01, 79-7 - Rd 102 & 25
10/21 - Pat #3 - Rd 101 & 25
10/26 - A06 - West Melvin Gate house
10/28 - Pat #1, Pat #2 - Bailey Field - 8S & Empire Canal
12/1-10 - Pat #1, ~~2~~ - Unit 18, Bankers & " "
12/10 - Pat #3 & Pat #1 - Unit 18
12/10 - Pat #3 - Unit 24 (Bankers)
12/18 - Last day for whoopuses and Soundhills

COLORADO - FALL 1981
(AS OF 11/23/81)

BIRD	LAST SEEN	DATE
75-1	HIGER'S WET MEADOWS LEFT AT 1103	11/19
77-17	ALAMOSA COUNTY RD 25 + S101	11/16
78-1	ALAMOSA COUNTY RD 25 + S101	11/16
78-10	HIGER'S WET MEADOWS	11/21
79-4	ALAMOSA COUNTY RD 14 + 104	11/17
79-7*	ALAMOSA COUNTY RD 25 + S101 STILL HERE AS OF 0900	11/23
79-10	MONTE VISTA UNIT 9	11/20
PAT #1*	ALAMOSA COUNTY RD 25 + CO. LINE STILL HERE AS OF 0900	11/23
PAT #3	ALAMOSA COUNTY RD 25 + S101	11/22

2,000 S.H. CRANES

KENT WILL CALL RUD TONIGHT

PAT #2

10/29 + 10/30

BS + EMPIRE CANAL

11/3

BOSQUE

76-7

10/30

RG. CO. 3S, SE

EMPIRE CANAL N of UNIT 2

10/31 + 11/1

RG. CO. 3S, SE

11/4

BOSQUE

79-7 + PAT #1 still here as of 0900 11/23/81

FALL 1981

COLORADO

75-1

	LOCATION	INTERVAL	TIME
10/30	A.CO. 15, 106-108		
10/31	A.CO. 15, 106-108	0705-0841	1 hr 36 min
	GREEN HEAD DUCK CLUB		
11/6	A.CO. 25, 102		
	GREEN HEAD DUCK CLUB	0932-1301	3 hr 29 min
	A.CO. 35, 103	1325-1453 / 1453-1725	1 hr 28 min / 1 hr 35 min
11/7	A.CO. 35, 103	0635-0652	17 min
	A.CO. 25, 102	1531-1541	10 min w/ 79-7
	GREEN HEAD DUCK CLUB		
11/9	A.CO. 35, 102.8		
21 OCT	ON RIVER		
11/10	GREEN HEAD DUCK CLUB		
	A.CO. 25, 102	0832-0931	1 hr 1 min
	HIGGS	1306-1535	35 min
11/11	A.CO. 25, 102		
	HIGGS WET MEADOW		
	GREEN HEAD DUCK CLUB (ROOST)	0620-0648	28 min
11/12	A.CO. 2N, 104		
	HIGGS N OF DUCK CLUB		
11/13	A.CO. 2N, 104	0642-0842	2 hr
	HIGGS WET MEADOW	1123-1235	1 hr 10 min (w/ 78-1)
	A.CO. 35, 102.8	1241-1327	46 min
11/14	A.CO. 25, 101	0630-0642	6 min (w/ 78-1 & 79-7)
	A.CO. 25, 101, LINE		
	A.CO. 35, 102.8		
11/16	A.CO. 25, 102		
	A.CO. SE of 51.25		
	A.CO. WET MEADOW NW of DUCK CLUB	1027-1127 / 1352-1454	1 hr / 1 hr 2 min
	A.CO. 35, w/ 102.8	1501-1532	31 min
	A.CO. SE of 51.25	1546-1632	46 min
	GREEN HEAD DUCK CLUB	1635-1735	58 min
11/17	GREEN HEAD DUCK CLUB (ROOST)	0611-0646	35 min

75-1

<u>DATE</u>	<u>LOCATION</u>	<u>INTERVAL</u>	<u>TIME</u>	<u>STATION</u>
11/17	A. CO. 25, 102	0835-0903	25 min	102
	GREEN HEAD DUCK CLUB	0909-1034	1 hr 25 min	102
11/18	A. CO. 25, 102			
	GREEN HEAD DUCK CLUB (R. ST)			
11/19	WET MEADOW N. of HIGGS' HOUSE			

FALL 1981
 COLORADO
77-17

DATE

LOCATION

11/2

GREEN HEAD DUCK CLUB

11/4

"

(ROOSE)

A. CO. 2S, 102

11/5

A. CO. 3S, 104-103

11/6

A. CO. 3S, 103-104 (w/ 79-7 lying)

11/7

A. CO. 3S, 102

A. CO. 2S, 102

GREEN HEAD DUCK CLUB

11/9

"

101-1134

7)

11/9

A. CO. 2S, 101(E)

11/10

A. CO. 2S, 101(E)

"

A. CO. 1/4 NW of GHD CLUB

11/11

A. CO. 2S, 101(W)
 A. CO. 2S, CO. LINE

HIGER WET MEADOW

A. CO. 3S, 102.8

11/13

A. CO. 2N, 104-106

A. CO. 3S, 102.8

11/14

A. CO. 3S, 102.8

11/16

A. CO. 2S, 102

A. CO. 2S, 101

FALL 1981
COLORADO

78-1

<u>DATE</u>	<u>LOCATION</u>
10/30	A.CO. 25, 102
11/2	A.CO. 25, 102 - CO. LINE
11/3	GREEN HEAD DUCK CLUB
11/4	" (ROOST)
11/7	A.CO. 25, 102
11/7	A.CO. 25, 102
11/9	A.CO. 35, 102.8

ROOST ON RIVER
N RIVER, 106 CATCH THAN ROOST

11/10	A.CO. 25, 102
11/11	A.CO. 25, 102
	HILL'S WET MEADOW
	GREEN HEAD DUCK CLUBS
11/13	A.CO. 25, 104-106
	HILL WET MEADOW
	A.CO. 35, 102.8
11/14	A.CO. 25, 101
11/16	A.CO. 25, 102
	A.CO. 25, 101

1124-1226

1241-

0636-0642

55 min (w/75-1)

6 m (w/75-1 & 79-7)

FALL 1981
COLORADO

78-10

	<u>LOCATION</u>	<u>INTERVAL</u>	<u>TIME</u>
10/20	A. CO. 25, 102		
10/31	GREEN HEAD DUCK CLUB	1153-1251	58 min
11/2	A. CO. 25, 102		
	GREEN HEAD DUCK CLUB		
11/3	"		
11/4	" (ROOST)		
	A. CO. 25, 102		
11/6	A. CO. 25, 102		
11/7	A. CO. 25, 102		
11/9	A. CO. 25, 101		

21 OCT ON RIVER

11/13	A. CO. end of 1.25 S		
"	A. CO. 25, 101		
	A. CO. off SC end of 51.25		
11/16	A. CO. 25, 101		
	A. CO. WET MEADOW NW of DUCK CLUB		
11/17	GREEN HEAD DUCK CLUB (AM ROOST)		
	A. CO. SE of end of 1.25 S		
	GREEN HEAD DUCK CLUB		
11/18	A. CO. 25, 101		
	GREEN HEAD DUCK CLUB (ROOST)		
11/19	A. CO. 25, 102		
	A. CO. N of 25, 102		
11/20	GREEN HEAD DUCK CLUB (ROOST)		
11/21	A. CO. 25, 102		
	HIGER WET MEADOW		

FALL 1981
COLORADO

79-4

<u>DATE</u>	<u>LOCATION</u>	<u>INTERVAL</u>	<u>TIME</u>
11/3	A.CO. 1N, 104		
11/4	A.CO. 1N, 104	0655-0917/1543-1718	2 hr 22 min / 1 hr 35 min
	A.CO. HIGER'S, ON RIVER	1014-1035	21 min
11/5	A.CO. 2N, 104		
11/9	A.CO. 1N, 104		
11/11	A.CO. 2N, 104 (E)		
	A.CO. 2N, 104 (W) <i>logging</i>	1017-1137	1 hr 20 min
	A.CO. 1N, 104		
11/12	A.CO. 4N, 106 ¹⁰⁴⁻	0835-0855	20 min (w/79-10)
11/13	A.CO. 1N, 104	0911-0950	39 min
11/13	A.CO. 2N, 104-106	1546-1702	1 hr 16 min
11/17	A.CO. 2N, 104		
	A.CO. 1N, 104		

FALL 1981
COLORADO

79-7

	LOCATION	INTERVAL	TIME
10/30	A.CO. 3S, 102		
11/2	A.CO. 2S, 102		
11/3	A.CO. 2N, 106		
11/5	A.CO. RIVER-HIGLES		
11/6	A.CO. 3S, 104	0720-0818	58 min
	A.CO. 3S, 103-104 (hanging w/ 77-17)		
11/7	A.CO. 2S, 102	1447-1614	1 hr 27 min
	GREEN HEAD DUCK CLUBS	1621-1729	1 hr 8 min
11/9	"	0935-1134	1 hr 59 min
21 OCT	ON RIVER		
11/10	GREEN HEAD DUCK CLUBS - ROOST		
11/10	A.CO. 2S, 101	0645-0926	2 hr 41 min
	A.CO. NW of DUCK CLUBS	1117-1145	28 min
	GREEN HEAD DUCK CLUB	1145-1223	38 min
	HIGLES WET MEADOW	1250-1317	27 min
	A.CO. 32, 103-104	1317-1345	1 hr 58 min
	A.CO. 2S, 102		
11/11	A.CO. HIGLES WET MEADOW	0606-0654	48 min
	A.CO. 2S, 101		
11/12	GREEN HEAD DUCK CLUBS } HIGLES WET MEADOW }	1200-1300	1 hr
11/14	A.CO. 2S, 101/25+CA LINE	0634-0939	3 hr 5 min
	GREEN HEAD DUCK CLUB	0950-1243	2 hr 53 min
	A.CO. 3S, 103-104	1255-1415 / 1500-1510	1 hr 20 min / 10 min
	A.CO. 2S, 102 } A.CO. off SE end of 51, 25 }	1518-1644	1 hr 26 min
11/16	A.CO. 2S, 101		
11/17	A.CO. SE of end of 1, 25-5		
	GREEN HEAD DUCK CLUB		
	A.CO. field next to Higel house	1405-1503	58 min
	A.CO. 2S, 102	1640-1653	13 min
	Higel wet meadow N of house	1700-1729	29 min

79-7

<u>DATE</u>	<u>LOCATION</u>	<u>INTERVAL</u>	<u>TIME</u>
11/18	WET MUD W. N. of HIGGINS' HOUSE A. CO. 25, 102 GREEN HEAD DUCK CLUB (ROOST)	0605-0635	30 min
11/19	A. CO. 25, 102 WET MUD W. N. of HIGGINS' HOUSE		
11/20	A. CO. 25, 102 A. CO. 25, 101 GREEN HEAD DUCK CLUB		
11/21	GREEN HEAD DUCK CLUB (ROOST) A. CO. 25, 102 GREEN HEAD DUCK CLUB	0635-0643	10 min (w/ P.H. #3)
11/22	A. CO. 25, E of 101 GREEN HEAD DUCK CLUB		
11/23	A. CO. 25, W. of 101		

JUL 1967
COLORADO

79-10

	LOCATION	INTERVAL	TIME
10/30	R.G.C. 35, SE GETZ'S N of UNIT 2 ON EMPIRE CANAL		
10/31	R.G.C. 35, SE	1455-1707	2 hr 12 min
11/1	R.G.C. 35, SE	0642-0909	2 hr 27 min
11/5	R.G.C. 35, EMPIRE CANAL MUNNR UNIT 9	0937-1037	1 hr
11/11	A.CO. 1N, 104		
11/12	A.CO. 4N, 106	0830-1037	2 hr 7 min
11/14	A.CO. HIGEL WET MEADOW A.CO. 35, 102.8 A.CO. N of 25, 104 A.CO. SE end of 51.25	1420-1458	28 min
11/20	R.G.C. 35, SE (E+W of SE) MUNNR UNIT 9	1044-1436	3 hr 52 min

FALL 1981
COLORADO

PAT #1

LOCATION

10/30 EMPIRE CANAL N of MV UNIT 2
10/30 R.G.C. 3S, SE
11/1 R.G.C. 3S, SE
11/5 R.G.CO. 8S, EMPIRE CANAL
11/9 R.G.CO. 3S, SE
11/12 R.G.CO. CO. LINE S. of AIRPORT
11/16 R.G.CO. 8S, EMPIRE CANAL
11/17 R.G.CO. 8S, EMPIRE CANAL
11/18 R.G.CO. 8S, EMPIRE CANAL
11/20 R.G.CO. 8S, EMPIRE CANAL
MV NWR UNIT 9
11/22 R.G.CO. 8S, EMPIRE CANAL
11/23 R.G.CO. 3S, SE
A.CO. 2S, CO. LINE

FALL 1981
COLORADO

PAT #3

	<u>LOCATION</u>	<u>INTERVAL</u>	<u>TIME</u>
10/30	A.CO. 25, 102		
10/31	GREEN HEAD DUCK CLUB	1019-1255	2 hr 36 min
11/2	A.CO. 25, 102	0650-0847	1 hr 55 min
	GREEN HEAD DUCK CLUB	0852-1052	2 hr
11/3	"	1245-1506 / 1720-1747	2 hr 21 min / 27 min
	A.CO. 25, 102	1515-1716	2 hr, 1 min
11/4	GREEN HEAD DUCK CLUB (ROOST)	0605-0637	28 min
11/5	A.CO. 35, 104-105		
11/6	A.CO. 35, 104		
11/9	A.CO. 35, 104-105		
21 OCT	W of HIGEL'S		
11/10	A.CO. HIGEL'S		
	A.CO. 35, 103-104		
	A.CO. 25, 102		
11/11	A.CO. HIGEL - WET MESSON (ROOST)	0659	
11/13	A.CO. END of S1.25		
11/14	A.CO. first SE end of S1.25	0654-0931	2 hr 37 min
	A.CO. 1/4 mi NW of GHD CLUB	0931-1024	53 min
11/17	A.CO. 25, 102		
	GREEN HEAD DUCK CLUB	1105-1248	1 hr 43 min
	A.CO. field next to Higal house	1248-1305	17 min
11/18	GREEN HEAD DUCK CLUB (ROOST)		
11/19	A.CO. 25, 102		
	A.CO. WET MESSON N of HIGEL'S HOUSE	1010-1110	1 hr
	GREEN HEAD DUCK CLUB	1300-1321	21 min
	A.CO. 35, 103-104	1332-1503	1 hr 31 min
	A.CO. N of 25, 102	1510-1544	34 min
	A.CO. 25, 102	1544-1651	1 hr 07 min
	WET MESSON N of HIGEL'S HOUSE	1651-1711	12 min
	GREEN HEAD DUCK CLUB		
11/20	GREEN HEAD DUCK CLUB (ROOST)		

PAT #3

DATE

LOCATION

INTERVAL

TIME

11/20/81

A.C. 25, 102

A.CO. 25, 101

GREEN HEAD DUCK CLUB

1645-1727

42 min

11/21/81

GREEN HEAD DUCK CLUB (ROOST)

0625-0644

19 min

A.CO. 25, 102

HIGEL WET MEADOW

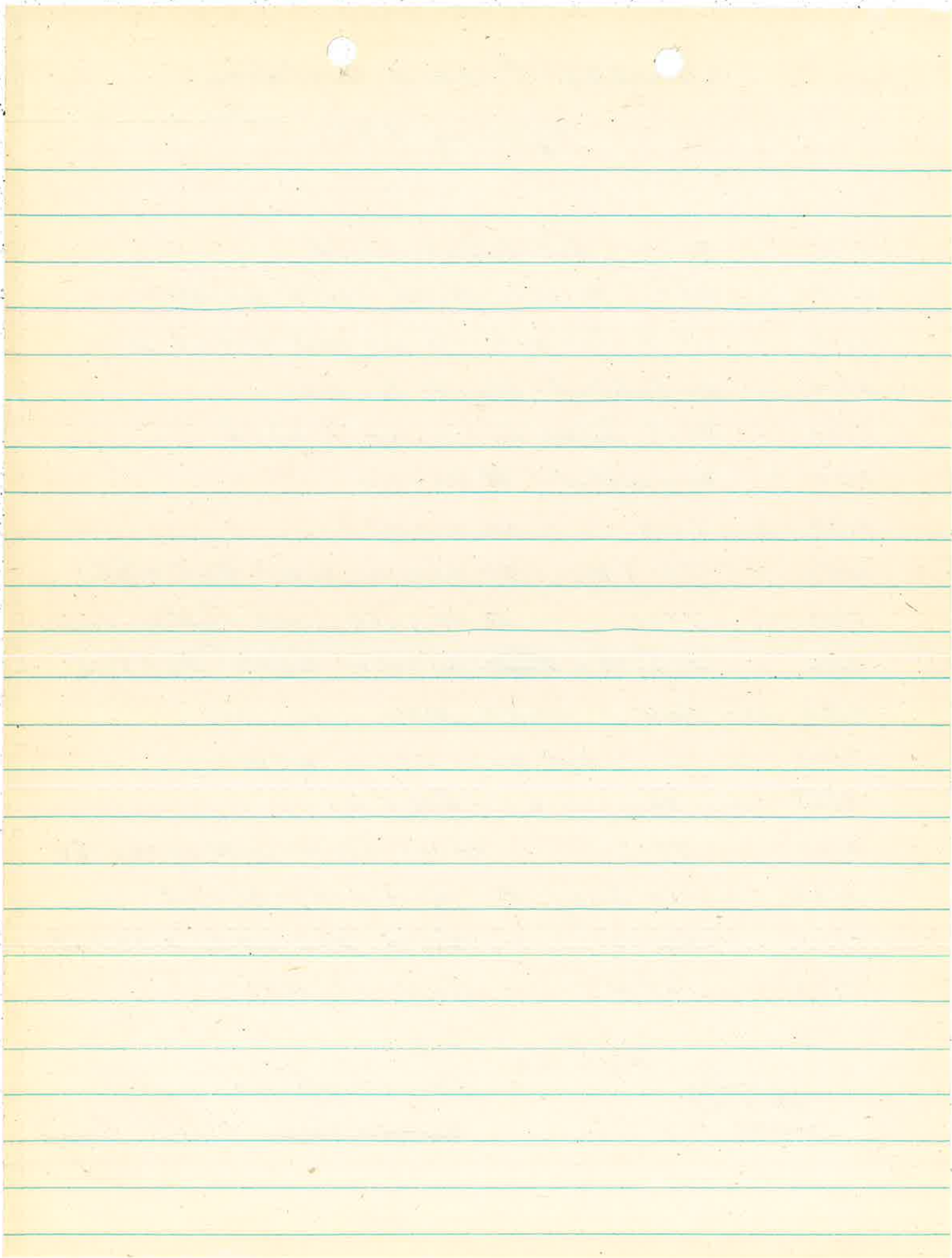
11/22/81

A.CO. 25, 101(c)

Whooping Crane Sightings Spring 1981

- 2/15 - 80-2, Bud Eaton's Field
2/17 - A09, 1/2 mile south Unit 20 MTU
2/17 - 80-2, Pat #2 - 1/2 mile East Unit 23 MTU
2/17 - Unidentified - Unit 6 MTU
2/22 - A01?, Pat #2, A09 - Unit 23 F2
2/23 - Unidentified - RD 25 E 101
2/23 - 79-4 - RD 25 E 101
2/23 - 79-7, 78-1 - RD 25 E 102, West CWT club
2/23 - 77-1 - RD 35 E 104, east Stillings house
2/24 - 80-2, 79-11, ~~79-11~~, A01, 3, 4? - 22 F2 Monke Vista
2/27 - A09 - 20 F2 MTU
2/27 - 79-9, Pat 2 - 22 F2 MTU
2/27 - 78-1, 79-4 - RD 25 E 101
2/27 - 79-7 - Rd 103, 1 1/2 mi south of Hwy 160
2/27 - Unidentified - Rd 1N E 1E of CL road
2/27 - A01, 3, 4? - Stanley Rd E 2 miles E CL road
2/29 - Pat #3 - Unit 21 MTU

Written in Black Ink - Jon Kauffeld
~~Blue ink~~ sightings - ~~Ken Walker~~ Keith Gray



4/11/81

Jon,

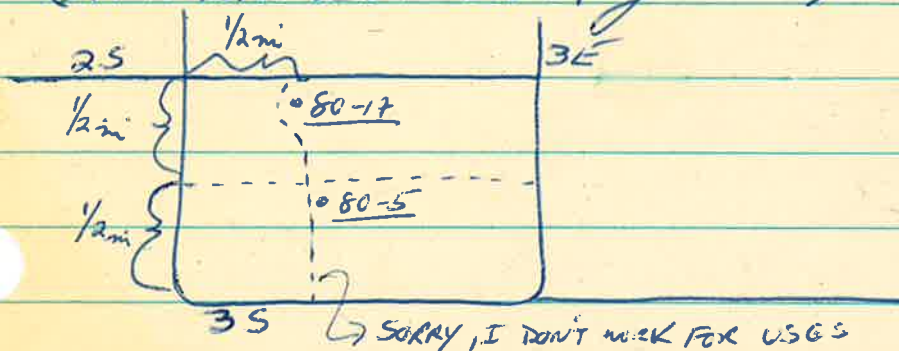
A brief explanation, if I may:

When I state a sighting occurred N, S, E or W of a certain road I intend the bird was within $\frac{1}{2}$ mile of and visible from that road; i.e.

N of 35 is represented by 80-5

S of 25 is represented by 80-17

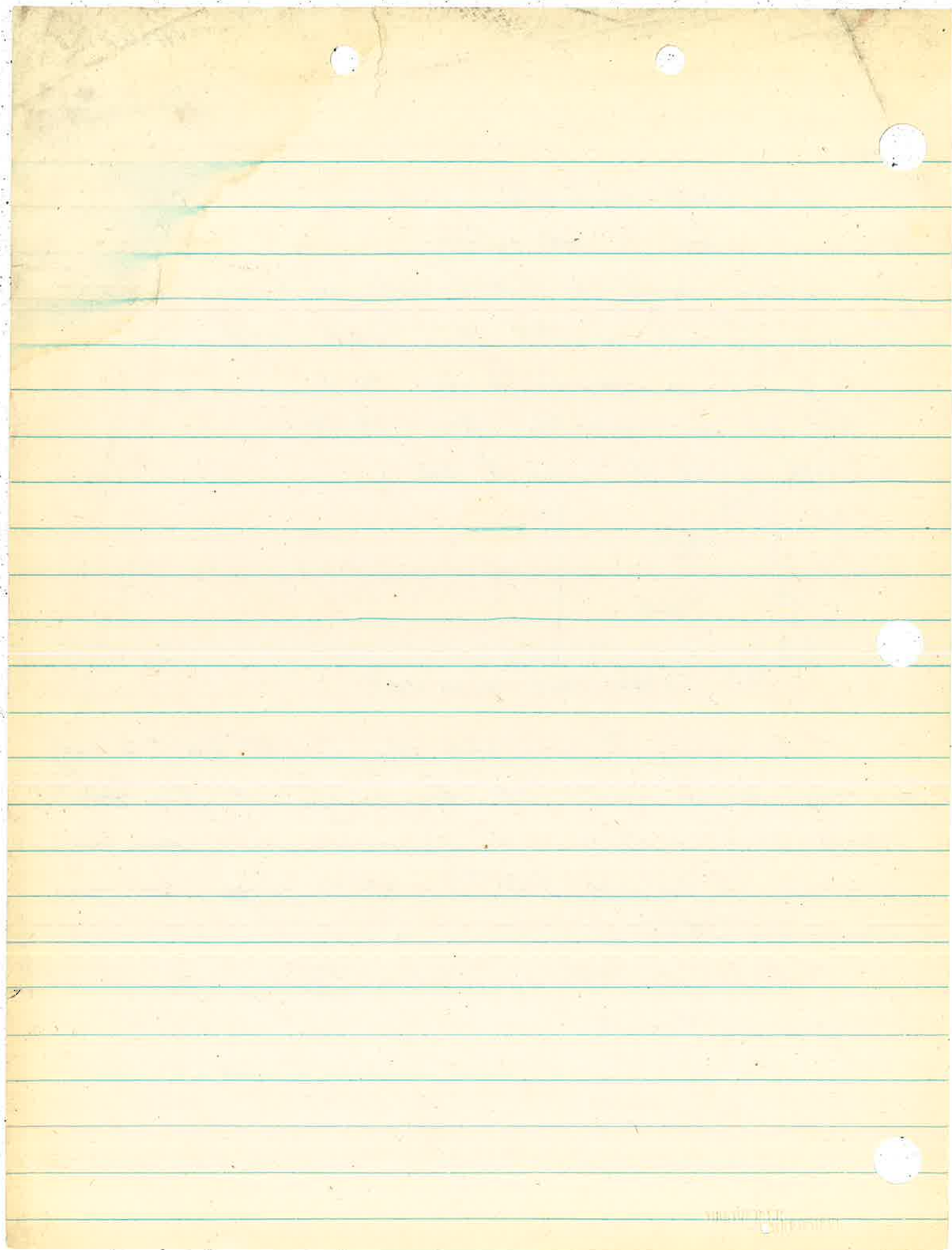
(both would be west of 3E)



This evening I was able to locate PAT #2, only. You may, however, want to keep an eye out for PAT #3, 79-10, 79-7 + 80-5 all of whom were here this morning. I did see PAT #3 + 79-10 fly, but you never can tell.

Thanks for the assistance. My regards to all. See you in August?

Leitch



UNKNOWN
(CONT)

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>AGE CLASS</u>
3/29/81	010	MUNNR UNIT 3	1 AD (PAT #1?)
3/30/81	0755	NJ RD 3N, 1/2 mi E of CO. LINE	1 AD (78-10?)
	0900	SJ RIVER, 1/2 mi E of CO. LINE	1 AD (79-7)
	0950	MUNNR UNIT 4	1 AD (PAT #1?)
3/31/81	0730	" UNIT 22	1 AD (78-9?)
	0800	SJ RD 10S, WJ RD 3E	1 AD (75-1?)
	0925	EJ US 100, NJ RD 3S	1 AD
	0945	MUNNR UNIT 7	1 WC (CHECK?)
4/1/81	1125	SPRALLING NJ MUNNR	1 WC (?)
	1225	SJ RIVER, 1/2 mi E of CO. LINE	1 AD (76-5?)
4/1/81	1210	NJ STANLEY RD, WJ RD 102	1 AD (78-10?)
4/8/81	1135	"	1 AD
4/9/81	1800	SJ RD 2N, 1/4 mi E of CO. LINE	1 AD
4/10/81	0720	NJ RD 2N, 5 mi E of CO. LINE	2 AD (PAT #3 79-10?)
	0825	MONTAVISTA NR UNIT 14	1 AD (PAT #2?)
	1140	NJ STANLEY RD, 1/2 mi E of CO. LINE	2 AD (PAT #3 79-10?)
4/11/81	0910	"	1 AD, 1 CHECK (79-10?)

UNKNOWN

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	<u>AGE CL.</u>
2/17/81	-	MONTA VISTA NWR	1 AD
2/27/81	-	RD 1N, RD N 102	1 AD (A01 203 A04)
	-	"	1 CHICK
	-	MONTA VISTA NWR UNIT 22	1 AD
3/15/81	0627	RD 2S, w/ RD 5101	1 AD
	1430	N/ RD 1, 25S, 1/2 E/ CO, LINE	1 AD (77-4?)
3/17/81	1145	MV NWR UNIT 19	1 AD
	1800	S/ RD 2S, w/ RD 5101	1 AD (78-10?)
3/21/81	1050	MV NWR UNIT 23	1 AD (75-1? 75-7?)
	1620	S/ RD 2S, w/ RD 5101	1 AD (78-10? 79-10?)
3/5/81	-	MV NWR UNIT 14	1 AD (?)
3/22/81	1345	" UNIT 17	1 CHICK (80-2?)
	1400	" UNIT 16	CHICK ?
	1425	" UNIT 7	1 CHICK (80-5?)
3/23/81	0820	S/ RD 10S, E/ RD 30	1 AD (75-1? 75-7?)
3/24/81	1130	N/ STANLEY RD, w/ S104	1 AD (79-10?)
	1610	S/ RD 2S, w/ RD 5101	1 AD (78-1?)
3/25/81	0640	"	1 AD (79-4?)
	1610	MV NWR UNIT 9	1 AD, 1 CHICK
3/27/81	1050	" UNIT 4	1 AD
	1700	E/ US 160, N/ RD 3S	1 AD (79-4?)
3/29/81	0940	N/ STANLEY RD, w/ RD 102	1 AD (?)
	1010	MV NWR UNIT 4	AD (PAT #1, PAT #2?)

75-1
(A01)

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
3/2/81	-	RD 5N, $\frac{3}{4}$ mi E of CO. LINE
	1055	S of RD 5N, 1 mi W of CO. LINE
3/4/81	1500	MONTIE VISTA NWR UNIT 17
3/5/81	1500	"
3/18/81	1700	S of RD 8S, W of RD 3E
3/20/81	1030	1 mi N of RD 10S, $\frac{1}{2}$ mi W of CO. LINE
3/29/81	0750	S of RD 10S, E of RD 3E
4/1/81	1740	MONTIE VISTA NWR UNIT 22 (WITH 79-9)
4/3/81	1055	1 mi N of RD 10S, W of CO. LINE
	1745	S of RD 8S, E of RD 5E
4/4/81	0905	1 mi N of RD 10S, W of CO. LINE

75-7
(A03)

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
3/2/81	1055	S of RD 5N, $\frac{3}{4}$ mi W of CO. LINE

76-7
(406)

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
3/4/81	1545	MONTZ VISTA NWR UNIT 14
3/8/81	1512	"
3/9/81	1443	"
3/11/81	1435	"
3/12/81	0825	"
	1610	"
3/13/81	1554	"
3/14/81	1539	"
3/15/81	1045	" UNIT 6
3/16/81	1005	" UNIT 19
3/17/81	1630	" UNIT 20
3/18/81	1630	" UNIT 14
3/19/81	1625	" UNIT 20
3/21/81	0655	S of RD 25, W of RD 3E

76-15
(A09)

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
2/17/81	-	MONTE VISTA NWR
2/27/81	-	" UNIT 20
3/4/81	1500	" UNIT 17
3/5/81	1545	"
3/10/81	1320	N of RD 1.25 S, 1 mi E of CO. LINE
	1607	N of RD 2 S, W of RD S101
3/11/81	-	"
3/12/81	-	"
3/13/81	-	"
	1240	N of RD 1.25 S, 1 mi E of CO. LINE
	1649	N of RD 2 S, W of RD S101
3/14/81	0645	"
3/15/81	0644	"
	1430	N of RD 1.25 S, 1 mi E of CO. LINE
3/16/81	1600	N of RD 2 S, W of RD S101
3/17/81	0625	"
	1800	"
3/18/81	0640	"
	1555	N of RD 1.25 S, 1 mi E of CO. LINE
	1825	N of RD 2 S, W of RD S101
3/19/81	0625	"
	0905	N of RD 1.25 S, 1 mi E of CO. LINE
3/21/81	0600	N of RD 1.25 S, 1/4 mi E of CO. LINE

76-15
(CONT)

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
3/22/81	0705	NJ RD 2S, WJ RD S101
	1653	"
3/23/81	1700	"
3/24/81	1610	SJ RD 2S, WJ RD S101
3/25/81	0630	NJ RD 2S, WJ RD S101
3/26/81	0710	"
3/27/81	1715	"
3/28/81	1645	"
3/29/81	1620	NJ RD 2S, EJ RD S101
3/30/81	0710	NJ RD 2S, WJ RD S101
	1655	NJ RD 2S, EJ RD S101
4/1/81	0725	NJ RD 2S, WJ RD S101
	1835	"
4/2/81	0650	" (WITH 79-4)
	1105	SJ RIVER, 1mi E of CC, LINE
4/3/81	0630	NJ RD 2S, WJ RD S101
	1630	NJ RD 2S, EJ RD S101
4/4/81	0750	NJ RD 2S, WJ RD S101 (WITH 79-4)

77-17

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
2/22/81	-	RD 5104, RD 35
3/21/81	1730	E of US 285, N of RD 125
3/23/81	0655	W of RD 5108, S of RD 125
3/25/81	1805	E of US 285, N of RD 125
3/27/81	0800	"
3/29/81	0650	"
4/1/81	0630	"
	1655	"
4/3/81	1820	E of RD 5108, N of RD 125
4/6/81	0640	"
4/15/81	1820	N of RD 25, E of RD 5101
4/18/81	0700	S of RD 1W, E of CO. LINE

78-1
(A10)

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
2/22/81	-	RD 25, RD 5101
3/5/81	1700	1/2 mi W GREEN WING TEAL CLUB
'81	1343	"
3/10/81	1630	N of RD 1W, E of CO. LINE

78-10

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
3/2/81	-	RD 5N, 3/4 mi E of CO. LINE
	1055	S of RD 5N, 1 mi E of CO. LINE
3/5/81	0955	STANLEY RD, E of CO. LINE
3/7/81	1650	E of RD 5101, N of RD 2S
3/7/81	0820	S of RD 2S, E of CO. LINE
3/9/81	0910	S of RD 2S, W of RD 5101
	0925	N of RD 1.25 S, 1 mi E of CO. LINE
3/10/81	1315	"
	1607	S of RD 2S, W of RD 5101
3/11/81	-	S of RD 2S, E of CO. LINE
3/12/81	-	"
3/13/81	-	"
3/14/81	0640	S of RD 2S, W of RD 5101
3/15/81	0633	"
	1720	"
3/16/81	1600	"
3/17/81	0935	GWT CLUB
3/18/81	0645	S of RD 2S, W of RD 5101
	1825	"
3/21/81	1620	"
3/22/81	0705	"
	1800	"
3/24/81	1610	"

78-10
(CONT)

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
3/25/81	0635	S of RD 2S, W of RD S101
3/26/81	0710	"
3/27/81	1740	N of RD 2S, E of US 160 (ARMORY)
3/30/81	1630	N of RD 3N, 1 mi E of CO. LINE
4/2/81	0725	S of RD 4N, E of CO. LINE
4/3/81	0710	"
4/6/81	0750	S of RD 3N, E of CO. LINE
4/8/81	1730	W of RD 2S, E of RD S101

79-4

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
2/22/81	-	S of RD 2S, W of RD S101
3/2/81	-	"
3/5/81	1710	N of RD 3S, E of RD S102.8
3/7/81	0820	S of RD 2S, E of CO. LINE
3/11/81	-	RD S104, 4 mi E of CO. LINE
3/12/81	-	RD 2S, W of RD S101
3/13/81	-	"
	1240	N of RD 2.25S, 1 mi E of CO. LINE
	1650	S of RD 2S, W of RD S101

79-4
(cont)

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
3/14/81	0644	S of RD 25, W of RD S101
3/15/81	0658	"
	1725	"
3/16/81	1600	"
3/17/81	0700	"
	1800	"
3/19/81	0635	"
	0905	N of RD 1.25 S, 1 mi E of CO. LINE
3/21/81	0600	N of RD 1.25 S, 1/4 mi E of CO. LINE
	1620	S of RD 25, W W of S101
3/22/81	0705	"
	1655	"
3/23/81	1700	"
3/24/81	1610	"
3/26/81	0710	"
3/27/81	1130	GWT CLUB
3/28/81	0915	S of RD 25, W of RD S101
	1620	N of RD 35, E of US 160
3/29/81	1620	N of RD 25, E of RD S101
3/30/81	1655	"
4/1/81	0725	N of RD 25, W of RD S101
4/2/81	0650	" (with 7.)
4/3/81	0615	N of RD 35, E of US 160

79-4

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
4/3/81	1630	N of RD 2S, E of RD S101
4/4/81	0750	N of RD 2S, W of RD S101 (with 76-15)
4/7/81	1705	N of RD 1N, 1 mi E of CO. LINE

79-7

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
2/2/81	-	RD 2S, E of RD S101
2/11/81	-	CORNER FILLER RD, 1 mi S of US 160
3/2/81	-	RD S102, RD 2S,
3/5/81	0915	W of RD S104, S of RD 3S
	1725	"
3/7/81	0900	N of RD 3S, ?
3/18/81	0720	S of US 160, W of RD 50
	1815	"
3/19/81	0655	"
3/20/81	1515	MONTIC VISTA NWR UNIT 2
	1545	S of US 160, W of RD 50
4/1/81	0630	"
3/22/81	0735	"

79-7
(cont)

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
3/22/81	1630	N of RD 35, W of RD 5E
3/23/81	1455	"
3/27/81	1700	E of US160, N of RD 35
3/28/81	0710	"
	1620	"
3/30/81	0655	"
4/1/81	0700	"
	1235	GWT CLUB
4/2/81	0635	E of US160, S of RD 35
4/3/81	0625	"
4/4/81	0605	"
4/6/81	0705	"
4/8/81	0610	"
	1745	"
4/10/81	0645	"
4/11/81	0630	"

79-9

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
2/27/81	-	MONTA VISTA NWR UNIT 22
3/4/81	1630	E of RD 5E, N of RD 10S
3/5/81	1530	E of RD 4E, S of RD 7S
3/11/81	1818	MONTA VISTA NWR UNIT 22
3/18/81	1715	S of RD 9S, E of RD 4E
3/20/81	1010	"
	1030	1 mi N of RD 10S, W of CO. LINE
3/21/81	1030	S of RD 9S, E of RD 4E
3/23/81	0820	S of RD 10S, E of RD 3E
3/25/81	0900	1 mi N of RD 10S, W of CO. LINE
3/29/81	0750	S of RD 10S, W of RD 3E
3/30/81	1755	MONTA VISTA NWR UNIT 22
4/1/81	1740	" (with 75-1)
4/2/81	0945	" UNIT 21
4/3/81	1010	"
4/7/81	0745	" UNIT 14
4/8/81	1045	"
4/9/81	0710	"

79-10

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
3/3/81	-	RD N104, 1 st N J RIVER
3/4/81	0825	PERRY BUTTE SPRINKLER
3/5/81	0755	"
3/6/81	0800	"
3/11/81	-	RD 2S, E of CO. LINE
3/12/81	-	"
3/13/81	-	"
	1650	"
3/14/81	0625	S of RD 2S, W of RD S101
3/16/81	1600	"
3/17/81	0755	N of RD 3N, 1 st E of CO. LINE
3/18/81	0737	"
3/22/81	0705	S of RD 2S, W of RD S101
	1710	"
3/23/81	1700	"
3/24/81	1755	N of RD 3N, E of CO. LINE
3/25/81	0640	S of RD 2S, W of RD S101
3/26/81	0710	"
3/27/81	1715	N of RD 2S, W of RD S101
3/28/81	1630	N of RD 2S, E of RD S101
3/30/81	0710	N of RD 2S, W of RD S101
	1655	N of RD 2S, E of RD S101
4/6/81	0715	N of RD 2S, W of RD S101

79-10
(CON'T)

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
4/6/81	1700	1 mi N of US 160, W of RD 504
4/7/81	1710	S of RD 1N, 1 mi E of CO. LINE
4/10/81	1800	N of RD 2N, 5 mi E of CO. LINE
4/11/81	0653	"

79-11

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
3/13/81	-	RD 2S, 3 mi E of MONTE VISTA
	1619	MONTE VISTA NWR UNIT 17

80-2

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
2/15/81	-	MONTE VISTA NWR
3/4/81	1500	" UNIT 17
3/5/81	1500	"
3/17/81	1120	"
	1645	"
3/18/81	1710	"
3/19/81	1455	"
3/21/81	1100	" UNIT 16 (WITH PARENTS)
3/25/81	0900	" UNIT 17

80-2
(CONT)

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
3/26/81	0850	MONTA VISTA NWR UNIT 17 (WITH PARENTS)
3/27/81	1015	" (")
3/28/81	1755	" (")
3/29/81	0825	" (")
3/30/81	1800	"
3/31/81	0840	" (")
4/1/81	0900	" UNIT 8 (LEAVING WITH PARENTS)

80-5

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
3/5/81	1412	RADIO SIGNAL MOUNTAIN HQ
3/9/81	1412	"
	1434	MONTA VISTA NWR UNIT 7 (WITH PARENTS)
3/10/81	0836	S of RD 25, W of RD 30
	1020	MONTA VISTA NWR UNIT 6
3/11/81	1520	" UNIT 20 (WITHOUT PARENTS)
3/12/81	0805	FLYING TO UNIT 1 FROM NORTH (ALONE)
	0818	MONTA VISTA NWR UNIT 6
3/13/81	-	RD 25, RD 30
	0655	N of RD 35, W of RD 30
	1625	MONTA VISTA NWR UNIT 7
3/15/81	0945	N of RD 35, W of RD 30 (WITH PARENTS)

80-5
(CONIT)

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>	
3/16/81	0630	N of RD 35, W of RD 30	
3/17/81	1659	"	(WITHOUT)
3/18/81	0806	"	(WITH)
	1750	"	(WITH)
3/19/81	0815	"	
	1645		(WITH)
3/20/81	1545	S of US 160, W of RD 50	(WITH)
3/21/81	1115	MONTRE VISTA NWR UNIT 7	(WITH)
3/22/81	1450	"	(?)
3/24/81	0710	N of RD 30, W of RD 30	(WITH)
3/24/81	0800	"	(WITH)
	1630	"	(WITH)
3/27/81	1030	MONTRE VISTA NWR UNIT 2	(WITH)
	1745	S of US 160 ^{1 mi} , W of RD 50	(WITH)
3/28/81	0955	MONTRE VISTA NWR UNIT 7	(WITH)
	1715	N of RD 35, W of RD 30	
3/29/81	0840	"	(WITHOUT)
	1145	MONTRE VISTA NWR UNIT 7	(WITHOUT)
	1715	N of RD 30, W of RD 30	(WITH)
3/31/81	1700	"	(WITHOUT)
4/1/81	0800	"	(WITH)
	1815	"	(WITHOUT)
4/2/81	0800	"	(WITHOUT)

80-5
(CONIT)

DATE	TIME	LOCATION
4/2/81	1045	1m-S/RD 35, W/RD 36
4/3/81	0745	"
4/4/81	0825	N/RD 35, W/RD 36 (WITHOUT)
4/6/81	0810	" (WITHOUT)
4/7/81	0815	1m-S/RD 35, W/RD 36 (WITHOUT)
4/8/81	1025	" (WITHOUT)
	1600	" (WITHOUT)
4/9/81	0740	N/RD 35, W/RD 36 (WITHOUT)
4/10/81	0825	MONTA VISTA NWR UNIT 14 (WITHOUT)
4/11/81	0800	N/RD 35, W/RD 36

80-17

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
3/9/81	1753	S of RD 25, W of RD 30
3/10/81	0817	"
3/12/81	0856	"
3/13/81	"	"
	0647	1 mi S of RD 35, W of RD 30
3/14/81	1605	RADIO SIGNAL → RD 35, RD 30
3/17/81	1620	MONTES VISTA NWR UNIT 14
3/18/81	1630	"
3/19/81	1545	"
3/20/81	1450	"
3/21/81	0655	S of RD 25, W of RD 30
	1215	MONTES VISTA NWR UNIT 13
3/22/81	1430	"
4/2/81	1530	DETA S of RD 25, 10 yds E of RD 30 POWER LINE

DAT #1

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
3/14/81	1545	MONTES VISTA NWR UNIT 13
3/16/81	1005	" UNIT 19
3/17/81	1150	" UNIT 20
3/18/81	1750	N of RD 35, W of RD 30
3/19/81	0815	"

DAT #1
(CONT)

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
3/19/81	1645	NJ RD 35, WJ RD 35
3/20/81	1745	NJ RD 35, WJ RD 50
3/21/81	0630	SJ US 160, WJ RD 50
3/22/81	1630	NJ RD 35, WJ RD 35
3/24/81	0655	"
3/25/81	0745	SJ US 160, WJ RD 50
3/26/81	0750	"
	1045	MONTIC VISTA NWR UNIT 3
3/28/81	1700	NJ RD 35, WJ RD 50
3/29/81	0850	SJ US 160, WJ RD 50
	1630	"
3/30/81	0835	"
	1715	"
3/31/81	0650	"
4/1/81	0745	"
	1825	NJ RD 35, WJ RD 50
4/2/81	0745	"
	0910	MONTIC VISTA NWR UNIT 4
4/3/81	0725	SJ US 160, WJ RD 50
4/4/81	0815	"
4/6/81	0800	"
4/7/81	1035	MONTIC VISTA NWR UNIT 4

DAT #2

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
2/17/81	-	MONT VISTA NWR
2/27/81	-	" UNIT 22
2/4/81	1500	" UNIT 17
3/5/81	1545	"
2/8/81	1521	" UNIT 14
3/9/81	1614	"
2/11/81	1435	"
3/12/81	0737	" UNIT 6
	1610	" UNIT 14
3/14/81	1700	NJ RD 35, WJ RD 30
4/6/81	0630	"
3/17/81	1630	MONT VISTA NWR UNIT 20
	1659	NJ RD 35, WJ RD 30
3/18/81	0806	"
	1750	"
3/19/81	0815	"
	1645	"
3/20/81	1745	NJ RD 35, WJ RD 30
3/21/81	0630	SJ US 160, WJ RD 30
3/22/81	0735	"
3/23/81	0940	MONT VISTA NWR UNIT 7
3/24/81	0710	NJ RD 35, WJ RD 30
3/25/81	0755	"

DAT #2
(CONT)

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
3/25/81	1550	MONTU VISTA NWR UNIT 2
3/26/81	1045	" UNIT 3
3/27/81	1810	NJ RD 35, WJ RD 56
3/28/81	1700	"
3/29/81	1705	"
3/30/81	1020	MONTU VISTA NWR UNIT 2
	1720	NJ RD 35, WJ RD 36
3/31/81	0655	"
4/2/81	1010	MONTU VISTA NWR UNIT 14
4/3/81	1710	" UNIT 14
4/7/81	0745	"
4/8/81	1045	"
4/9/81	0710	"
	1700	"
4/10/81	1700	"
4/11/81	0815	"
	1815	"

DAT #3

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
2/28/81	-	MONTA VISTA NWR
3/4/81	1500	" UNIT 17
3/5/81	1545	"
3/12/81	0930	S of RD 25, W of RD 3E
3/13/81	0638	S of RD 8S, 1 mi E of CO. LINE
3/14/81	1605	N of RD 3S, W of RD 3E
3/16/81	0625	"
3/17/81	1659	"
3/18/81	0806	"
	1750	"
4/9/81	0815	"
	1645	"
3/21/81	0650	"
3/24/81	0710	"
3/25/81	0755	"
3/26/81	0800	"
3/27/81	1025	MONTA VISTA NWR UNIT 8 (WITH PARENTS)
	1800	N of RD 3S, W of RD 3E
3/28/81	1715	" (WITHOUT)
3/29/81	0840	" (WITHOUT)
	1045	MONTA VISTA NWR UNIT 8 (WITH)
	1715	N of RD 3S, W of RD 3E (WITHOUT)
3/30/81	1600	"

DAT #3
(CONT)

<u>DATE</u>	<u>TIME</u>	<u>LOCATION</u>
3/31/81	0655	NJ RD 35, WJ RD 30
	1700	"
4/1/81	0800	"
	1815	"
4/2/81	0800	"
	1045	1/2 mi S of RD 35, WJ RD 30
4/3/81	0745	"
4/4/81	0825	NJ RD 35, WJ RD 30
4/6/81	0815	WJ RD 30, 1/2 mi S of RD 35 (WITHOUT)
4/7/81	0835	" (WITHOUT)
4/8/81	1730	NJ RD 25, WJ RD 5101
4/9/81	1730	"
4/10/81	0635	NJ RD 2N, 5 mi E of CO. LINE

8/7/81

Documents for USFWS
Met Nail

- 1) Whooping Crane - No. 15
- 2) Memo - annual output repts
- 3) Public Use Outputs - Monte Vista & Alamosa Refuges
- 4) Average Monthly waterfowl populations 1/13/79
- 5) " " " 5/31/78
- 6) " " " 5/13/77
- 7) Public Use Report - 2/09/80 - Alamosa
- 8) " " " - Monte Vista
- 9) " " " 1/31/81 - Alamosa / Monte Vista
- 10) Whooping Crane observation map
- 11) Memo PPBE Output Reporting - 5/19/78

JOHN SCHENCK

303-694-0808



FISH AND WILDLIFE SERVICE FEATURE RELEASE

E

FILED Ed. Steins - whooping cough

MMA 7/10
7/10
7/26

✓
✓

McDonnell
Action

Information

Davis 202/343-2193
343-5634

The first captive-reared whooping crane to be released into the wild is adjusting to her new environment--which includes a prospective mate--with apparent success, making U.S. Fish and Wildlife Service scientists optimistic that another innovative means of propagating the endangered species has been found.

Like many a mail-order bride in the heyday of the frontier, the three-year-old female has travelled a long distance to begin a new life--from the Service's captive flock at the Patuxent Wildlife Research Center near Washington, D.C. to the remote Grays Lake National Wildlife Refuge in Idaho.

Scientists hope she will mate with a male whooper hatched at Grays Lake in 1975, the first year of a continuing cross-fostering program in which sandhill cranes serve as surrogate parents. The young whoopers learn a migration route from the sandhills, a critical step in establishing a second wild flock of whooping cranes. The female crane's successful adaptation to the wild would encourage scientists who seek solutions to the shortage of females at Grays Lake, a problem that has slowed population growth. For unknown reasons, female cranes suffer a higher mortality rate than males in the first months of life.

Each step in the female whooper's progress from her Patuxent pen to the Idaho wilderness has been carefully monitored by researchers since this is the first attempt to release a captive-reared whooping crane into the wild.

"Whooping cranes mate for life, and they're very selective," said Dr. Scott Derrickson, who heads Patuxent's crane propagation program. "The disappearance during the last migration of two lone males and the failure of another to stake out a breeding territory left just one possible mate for the female."

over

The behavior of the two young cranes so far has been encouraging to Service scientists at both Patuxent and the Cooperative Wildlife Research Unit at the University of Idaho. When the female arrived at Grays Lake, she was placed in a pen next to the male's territory, so the two could become accustomed to each other without risking her safety. After retreating from her handlers, the female began to forage for food. The male immediately flew near the pen, and the two appraised each other. Within several days, he was spending considerable time close by, and the two were showing signs of bonding by synchronizing their everyday behavior, foraging and preening at the same time. Then the eager female began practicing the species' spectacular premating ritual dance, and the male responded with graceful leaps and swirls.

"There's no question of their mutual attraction," said Derrickson, though he cautioned that the real proof of the birds' pair bond is yet to come. A sturdy bond is shown by the distinctive dual calls for which the cranes are named, a duet composed of one note sounded by the male, followed by two staccato notes by the female. The two have begun calling to each other, but have not yet united in a duet. Meanwhile, the female has been released from her pen, since the male appeared disturbed by the barrier.

"We might have heard their 'unison call' by now if the male hadn't gotten sidetracked from courtship," said Derrickson. "Suddenly, for an unaccountable reason, he began to try to expand his territory in two directions at once. However, he keeps returning to the female's roost, and we think that when his wing feathers molt and he can't fly, he won't be this aggressive.

"If these whoopers form a bond, it's possible they could produce a chick as early as next spring," added Derrickson, who explained that females may become sexually mature at four years of age. The transplanted female is too young to breed this year, but is old enough to establish a lifetime pair bond. The male has shown his readiness for several years by his territorial behavior.

Should the whoopers fail to establish a bond before the fall migration, the female will be sent back to Patuxent, since she could not survive without an experienced mate to guide her to wintering grounds at Bosque del Apache National Wildlife Refuge in New Mexico. This 870-mile migration route was imprinted on the male by his foster sandhill parents.

"We learned from an experiment last year that captive-reared sandhill cranes transplanted to the wild must integrate with the other birds to know when and where to migrate," emphasized Derrickson. "This principle applies to whooping cranes, and we hope this female represents the beginning of a new program to speed their reproduction."

Transplanting captive-reared females could be the newest in a number of successful techniques that have restored the whooping crane from a low of 15 in 1941 to this year's record number of nearly 100 birds in the wild and 24 in captivity. But, at the moment, scientists are listening for the raucous but welcome unison call that will signal the successful pairing of the two young cranes...and the prospect of new whoopers to come.

WHOOPING CRANE RECOVERY TEAM

U.S. FISH & WILDLIFE SERVICE
NEBRASKA GAME AND PARKS COMMISSION
TEXAS PARKS & WILDLIFE DEPARTMENT
NATIONAL AUDUBON SOCIETY



REPORT AND MINUTES OF WHOOPING CRANE RECOVERY TEAM

March 20-21, 1981

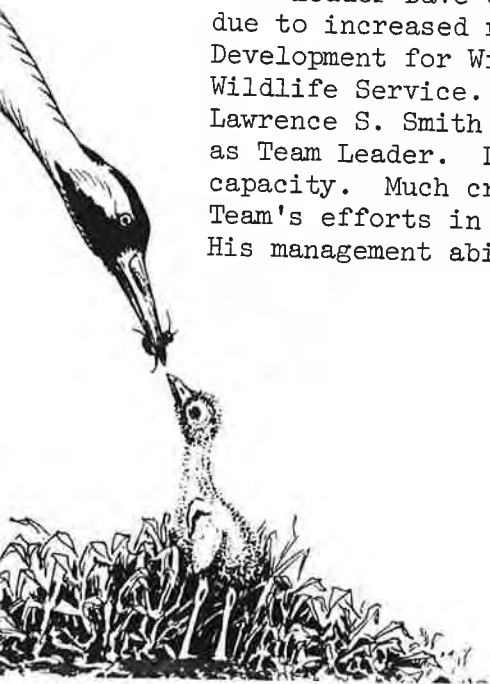
Team Meeting # 13: Laurel, Maryland

Members Present: Mr. Lawrence S. Smith, Team Leader, Albuquerque, NM
Mr. David Blankinship, Rockport, Texas
Mr. William Brownlee, Austin, Texas
Dr. Scott Derrickson, Laurel, Maryland
Dr. Rod Drewien, Socorro, New Mexico
Mr. Ross Lock, Lincoln, Nebraska

Others Present: Mr. Hugh Boyd, Ottawa, Canada
Mr. Ernie Kuyt, Edmonton, Alberta, Canada
Mr. Conrad Fjetland, Washington, D.C.
Mr. David Olsen, Washington, D.C.
Mr. Bill Gill, Washington, D.C.
Mr. Glen Smart, Washington, D.C.

March 20, 1981, Patuxent Wildlife Research Center, Laurel, Maryland

(A brief note on organization of the Team is necessary at the outset. Team Leader Dave Olsen requested that he be replaced as Team Leader due to increased responsibilities in a new position as Chief, Program Development for Wildlife, in the Washington Office of the Fish and Wildlife Service. By letter dated September 24, 1980, Team Member Lawrence S. Smith was appointed by the Director of the Service to serve as Team Leader. Dave Olsen agreed to continue to serve in an advisory capacity. Much credit goes to Dave for his work in organizing the Team's efforts in producing a Recovery Plan for the whooping crane. His management abilities will be missed.)



Following introductions, Smith requested Ross Lock to fill his former position as Team Secretary. The agenda was adjusted to take advantage of the several individuals present that could only be with the Team for the morning. Dave Olsen, Glen Smart, and Conrad Fjetland informed the Team of significant Federal budget cuts for 1982 that will impact on endangered species and habitat preservation programs. Funding for recovery of species is expected to be given highest priority, with de-emphasis on listing of species and Section 7 consultation. Bill Gill from the Office of Endangered Species explained a priority rating system for endangered species work that has been established.

A major topic of discussion for this meeting was the possibility of utilizing radios on the Wood Buffalo Park juvenile birds. The Team believes that one of the highest priority needs in support of recovery of the whooping crane is a better determination of the habitat utilized by whooping cranes during migration in the United States. Information on the specific sites utilized by the cranes during migration is being gained very slowly through the present migration monitoring system, while habitat loss and alteration continues. At the present time, observation reports on migrating cranes account for considerably less than 10% of their migration use days.

As background for this discussion Rod Drewien had prepared tabular information on the use of radio transmitters on 10 juvenile whooping cranes and 11 transplanted sandhill cranes at Grays Lake National Wildlife Refuge (NWR). Experience with the use of radio transmitters on sandhill cranes has earlier been covered in a report by Scott Melvin and Dr. Stanley Temple, titled "Migration Ecology and Wintering Grounds of Sandhill Cranes from the Interlake Region of Manitoba". A primary cause of radio failure has been the breaking off of the antennae. It appears that antenna life is the limiting factor in the operating life of radio transmitters. The cranes treat the antenna as feathers by frequently preening them. Eventually the antennae break at the point of attachment to the transmitter. Better success was had with transmitter units in 1980 using antennae with a thicker base and formed from stiffer metal. The transmitters utilized in 1980 were fastened to the color coded plastic leg band with miniature bolts designed to corrode and break off in a period of 18 months to two years. The transmitters have never been observed to be of hindrance to the cranes and represent only a slight bump on the leg band.

Drewien reported on the radio tracking by aircraft of one family group between Grays Lake and southern Colorado during both 1979 and 1980 and the wealth of information that was secured in a short time. Range of the transmitter signal is 30 to 50 miles air to air, up to 25 miles from airplane to birds on the ground, and up to 6 miles ground to ground. On the basis of his experience, Drewien believes there is

excellent potential for tracking family groups from Wood Buffalo Park through the fall migration.

Hugh Boyd acknowledged that the transmitter technology and results from the past two years look acceptable. He could see no objection to the application of transmitters on a limited number of young whooping cranes at Wood Buffalo Park during the 1981 banding operation as a joint FWS/CWS endeavor. The Team deferred further discussion on the planning of this project in order to receive a report and recommendations from Ernie Kuyt when both he and Hugh Boyd could be present.

Prospects and Conditions at Wood Buffalo Park -- Ernie Kuyt

Water levels in the Park have been steadily declining since 1977. It does not appear that conditions will improve for the 1981 nesting season. Low water levels decrease food supplies forcing birds to travel overland, which increases the possibility of predation. Some nesting sites could become unsuitable, and it is thought that the two breeding pairs did not nest during 1980 due to dry conditions. Kuyt recommended that one egg from all two-egg nests continue to go to Grays Lake NWR if suitable habitat conditions occur there by nesting time. As the habitat situation at Grays Lake is not favorable at this date, other alternatives mentioned were: 1) collect fewer eggs, 2) place some eggs from historically successful nests in historically unsuccessful nests, 3) send eggs from certain nests not represented in the Patuxent captive flock to Patuxent, and 4) collect no eggs. Nineteen pairs of whoopers nested in 1980, three of which were new. Kuyt believes there is the possibility of 4 to 6 new nests during 1981.

1980 Nesting Season at Wood Buffalo Park

Good information on arrival dates of mated pairs of whooping cranes on their nesting grounds revealed a 15 day migration period from Aransas NWR to the Park. Very mild weather and no snow between the U. S. Border and the nesting grounds apparently permitted a more rapid migration than normal. Sixteen pairs were observed on the nesting ground by April 27. One pair was accompanied by its chick from the previous year, which was found to have been separated from the parent birds an hour later. Two of the 19 nests contained a single egg, with the other 17 having two eggs. One pair lost its egg to a predator, re-nested, laid two eggs, both of which failed to hatch. Two pairs of whoopers known to have successfully nested in previous years did not lay eggs in 1980 (believed to have been caused by drought conditions). Thirteen eggs were transferred to Grays Lake NWR on May 29, one was infertile, with 12 being placed under sandhill cranes. Six chicks were located at Wood Buffalo Park for color banding during August. During the banding operation, two ml. of blood was drawn from a wing vein of each chick. Dr. Brian Biederman, of the University of Calgary, utilized a technique for sex determination, involving microscopic examination of chromosomes from fresh blood samples to indicate that three chicks were males and

three females. Approximately 82% of this population of whooping cranes were observed during 1980 on or near the nesting ground. This fact, plus the observation of banded chicks returning to Wood Buffalo Park, pretty much puts to rest an earlier theory that most of the sub-adult birds summered at some as yet undiscovered area.

Grays Lake Project, 1980, Prospects for 1981

Fifteen whooping cranes migrated north from New Mexico during the spring of 1980. Thirteen birds were located during the summer--four of these birds summered at Grays Lake, with the remainder within an 80 to 100 mile radius of Grays Lake. The male whooping cranes summering at Grays Lake displayed a defensive behaviour with territories of 40-50 acres. Each male displaced two pairs of sandhill cranes. Twelve eggs were transferred from Wood Buffalo Park and placed under sandhill cranes at Grays Lake, of which ten hatched and four chicks survived to migrate. Two eggs were transferred from the Patuxent flock, both hatched, with one surviving to migrate. Fifteen adult plumaged birds and 5 chicks migrated from their summer area. Seventeen birds (13 adults and 4 chicks) were located on wintering areas -- 16 in New Mexico and 1 in southeastern Arizona.

The habitat conditions at Grays Lake are not very promising for the 1981 season. Water levels are 48% of normal, with some chance for improvement as April and May are usually wet months.

One problem coming to light as far as initial pairing and nesting among the Grays Lake whooping cranes is that most of the oldest birds appear to be males. Both birds of the 1975 year class have been identified as males from their unison call. Of the two birds in the 1976 year class, one has been identified from its call as a male and no opportunity occurred to identify the other bird from its call.

Derrickson and Drewien had submitted a proposal to the Service with an accompanying Section 7 Evaluation Form for the Experimental Release of a captive female whooping crane at Grays Lake NWR. This proposal offers some potential to hasten pair formation and nesting in this situation where it might be several more years before enough females are available for pairing. The proposal involves transporting a 3-year-old parent-reared, fullwinged, captive female from Patuxent Wildlife Research Center (PWRC), and placing her in a temporary enclosure on a resident male's territory. If, and when, a pair bond is established, the captive female would be released. If a pair bond is not established in a reasonable period, the female will be returned to PWRC. If the bird should be released and for some reason pair bond dissolution occurs, there would be opportunity to capture the bird during wing molt and return it to PWRC. This proposal is based

in part on the results of a release of two female and nine male captive sandhill cranes at Grays Lake during 1979. One female was soon accepted by a wild male which assisted her adaptation to natural foods and she subsequently accompanied the male bird on the fall migration cycle south for the winter. There is evidence from the Wood Buffalo Park-Aransas flock that some individuals pair in their third year, and the breeding season would appear to be the best time to attempt the pair bond formation. The Team discussed the many details of the proposal with Drewien and Derrickson and went on record in support of the proposal. If this experiment should be successful, one more female would be available from PWRC next year for such a release.

The Patuxent Flock

Scott Derrickson reviewed the program with the captive whooping crane flock at Patuxent. Six eggs had been produced in 1980. One egg was broken by the parent birds. Two eggs, determined to be fertile, were sent to Grays Lake.

It is hoped that five pairs of whooping cranes will produce fertile eggs during 1981. As many eggs as possible will be sent to Grays Lake NWR as a first priority. Unfortunately, the number of eggs that can be transferred from PWRC to Grays Lake in any given year will be determined by the phenological differences between the two locations. Nineteen pairs of greater sandhill cranes will be available at Patuxent for incubating whooping crane eggs and to serve as foster parents to whooping cranes. Derrickson stressed the importance of having whooping cranes raised by crane parents rather than hand-raised. This makes a difference in the need for artificial insemination which results in additional stress for the birds. Parent-raised birds also have higher egg fertility. At the close of the afternoon session Derrickson conducted the Team on a tour of the crane propagation facilities. Twenty whooping cranes are presently held at Patuxent. With two birds at the San Antonio Zoo and two birds at the International Crane Foundation facility at Baraboo, Wisconsin, there is a total of 24 whooping cranes in captivity.

Florida Game and Fresh Water Fish Commission Proposal

Bill Gill of the FWS Endangered Species Office in Washington provided the Team with a copy of a presentation by the Florida Game and Fresh Water Fish Commission titled FLORIDA GAME AND FRESH WATER FISH COMMISSION PARTICIPATION SCHEDULE FOR THE WHOOPING CRANE RECOVERY PLAN. As the Team member most familiar with the Florida work, Derrickson briefed the Team on studies being carried out by the Commission in Florida on the non-migratory Florida sandhill crane. Existing sandhill crane habitat is being evaluated as potential whooping crane habitat. Pairs of Florida sandhill cranes will be trapped and marked on the most promising of those areas to gather movement and productivity information. These combined data will be used to select and

recommend study sites and candidate foster parents for possible introduction of whooping cranes to establish a non-migratory flock. Comments were made that the future of this study may be in doubt in view of what the Team heard regarding the elimination of funding for Section 6 of the Endangered Species Act which involves State Cooperative funding.

Migration, Spring and Fall, 1980

Ross Lock reported on the migration observations as reported in the U. S. to the Pierre, South Dakota, Area Office of FWS. The first confirmed sighting in the Spring was on March 22 of two birds in Kansas. The last report was of May 1 of two birds in Oklahoma. The two birds in Oklahoma were both color banded, one in 1977 and the other in 1978. These were the only reports during the Spring migration of color band observations. A total of 14 confirmed and probable sightings were recorded. Of these 14, ten were confirmed sightings as follows: Nebraska (5), Kansas (3), Oklahoma (1), South Dakota (1).

The first confirmed sighting during the fall migration was on October 12 of four birds in South Dakota. The last confirmed sighting was on November 7 of one juvenile in Kansas. No color bands were noted on this bird and it appeared to be alone. A total of 20 confirmed and probable sightings were recorded. Of these 20 sightings, 12 were confirmed sightings as follows: North Dakota (6), South Dakota (2), Kansas (1), Oklahoma (3). Only one color banded bird was observed in the U. S., a juvenile hatched in 1980, observed with 5 adult plumaged birds on October 21-27 in North Dakota.

Report on Wintering Area, 1980/81

Dave Blankinship reported that conditions on the wintering area were generally excellent. The coastal wintering area had only one night with freezing temperatures, and there were no serious oil spills. The food supply remained plentiful through the winter. Arrival of the birds was earlier than normal, with the last bird (subadult color banded in 1979), arriving December 8. The high count of 78 birds was recorded only once during the winter. Counting birds was difficult due to a considerable amount of movement during the period of the survey flights--a problem which will increase with increasing numbers of cranes. Dave felt that there may have been as many as 80 birds.

Several large tracts of upland on the Aransas Refuge were burned, with these areas receiving heavy use by whooping cranes. Twenty-eight whoopers were observed at one time on a burned tract.

Because of the many color banded birds in the population, it will be possible to observe and interpret new pair bond formation. Behavioral observations indicate the formation of three new pairs that are being considered as almost certain breeders for 1981.

Texas Study of Impact of Human Activity on Whooping Crane Wintering Area

Bill Brownlee reported on the study being carried out by Texas Parks and Wildlife to determine the impact of the waterfowl season and human activity on the movement of whooping cranes. It appears that the effect of crane encounters with hunters is not significant. While hunters, particularly those with airboats, may occasionally cause or limit movement of whooping cranes, there is little danger of damaging confrontation.

Platte River Whooping Crane Critical Habitat Maintenance Trust

Ross Lock presented a status report on the progress of the Whooping Crane Trust in the preservation of whooping crane and waterfowl habitat on the Platte River in Nebraska. The Trust, operating with a \$7.5 million fund made available as an element of the settlement from litigation against the Grayrocks Dam and Reservoir in Wyoming, has purchased some 1,900 acres of Platte River land in Hall County. This purchase contains one of the most pristine portions of the Platte River characterized by open channel areas, shallow sandbars and native wet prairie meadows. The area is ideal roosting and loafing habitat for whooping cranes and is heavily used by sandhill cranes and many species of waterfowl. The property is leased to The Nature Conservancy for management. An additional area of 400 acres on the Platte River has just recently been purchased by the Trust.

Update of Appendix D of the Recovery Plan

Ross Lock had revised and updated the list of confirmed whooping crane migration sightings for the Wood Buffalo-Aransas population which was designated Appendix D of the Recovery Plan. Availability of this list will be announced in the Endangered Species Technical Bulletin.

Critical Habitat

The Team discussed ideas on critical habitat designation for whooping cranes suggested in Kurt Johnson's and Stanley Temple's final report on Migration Ecology of the Whooping Crane. In view of severe budget cuts in the Federal Endangered Species Program and the many restrictive guidelines and procedures that the FWS must follow, it is very unlikely that additional critical habitat designation for the whooping crane will be made in the foreseeable future. The proposed radio tracking of whooping crane families will hopefully provide a better understanding of their migration habitat needs. With the result of this study, we can better zero in on habitat that will be essential to maintain for the cranes.

Desired Whooping Crane Population Distribution

There was some discussion regarding completion of item 3 of the Recovery Plan -- Determine Desired Whooping Crane Population Distribution. It was

decided that Scott Derrickson would prepare a draft document that will outline the Team's position on the ultimate continental distribution of the whooping crane in relation to the biological needs of the species.

Public Information

The Team reviewed the film "FOLLOW MY LEADER", which was produced by Survival Anglia Limited of Great Britain, which is one of the best and most current film on the whooping crane. A group of FWS personnel meeting in Denver during January made some recommendations for an improved education/information program concerning the plight of the whooping crane. Their recommendations, prepared in response to a memorandum from the Chief, Office of Extension Education for the FWS, were made available to Team members. The Team reviewed an informational handout on the Whooping Crane, which had been produced by the Biological Services Program of the FWS. Several errors were detected and Drewien and Derrickson agreed to review and mark up the article for possible revision.

Miscellaneous

The last hour of the meeting on Saturday, March 21, was used to brainstorm the radio tracking project and to provide some rough estimates of the cost of the project. These estimates were made available for use at a meeting of the Canadian Wildlife Service/U.S. Fish and Wildlife Service Joint Review Committee to be held on March 26 and 27.

Two meetings of interest were noted. A 1981 Crane Workshop, co-chaired by Drs. Rod Drewien and Jim Lewis, is to be held on August 25-27 at the University of Wyoming's Research Center in Grand Teton National Park. The Whooping Crane Conservation Association will hold its annual meeting September 24-26 at Baraboo, Wisconsin.

Ross Lock, Secretary
Whooping Crane Recovery Team

WHOOPING CRANE IN SAN LUIS VALLEY

<u>YEAR</u>	<u>DATE ARRIVED</u>	<u>DATE DEPARTED</u>
1975	October 9	November 20
1976	February 17 October 5	May 12 November 17
1977	February 21 October 5	April 8 November 19
1978	February 27 October 1	May 11 November 28
1979	February 20 September 29	April 13 November 16, 1979
1980	February 8	May 10
1980	September 19	November 17
1981	February 15	April 24
1981	September 17	

**Management of Migratory
Crane Habitat on Alamosa and
Monte Vista National Wildlife
Refuges, circa 1981**

MANAGEMENT OF MIGRATORY CRANE HABITAT ON ALAMOSA AND MONTE VISTA NATIONAL WILDLIFE REFUGES

JON D. KAUFFELD, Alamosa-Monte Vista NWR Complex, P. O. Box 1148, Alamosa, CO 81101

Abstract: The San Luis Valley, Colorado, has long been a major stopover for migrating greater sandhill cranes (*Grus canadensis tabida*). The Alamosa and Monte Vista National Wildlife Refuges (NWR's) within the valley are major concentration areas for cranes. The refuges and surrounding private land provide roosting, loafing, and feeding habitat for sandhill and whooping cranes (*G. americana*). Cranes are present in the spring from mid-February to early May and in fall from late August to late November. Cranes spend more time in the valley than in their summer or winter ranges. The refuges have over 500,000 crane use days per year. Management practices for cranes consist of flooding meadows and ponds for loafing and roosting habitat, and planting barley, wheat, and field peas for feed. These practices are compatible with waterfowl management. Refuge personnel also provide surveillance during waterfowl hunting seasons, monitor sandhill and whooping crane populations, and provide access for public viewing of these and other bird life. A major management problem is the losses due to collisions with fences and powerlines. Recommendations are made for crane management.

Throughout recorded history the San Luis Valley, Colorado, has been a major stopover point for greater sandhill cranes. Valley residents associate the arrival of spring and fall with sandhill cranes just as some persons associate the arrival of Canada geese (*Branta canadensis*) with these seasons in other parts of the United States. The San Luis Valley is a high mountain valley with elevations varying from 2,280 to 2,380 m. The valley is bordered by the San Juan Mountains to the west and the Sangre de Cristo Mountains on the east. Mountain peaks exceed 4,260 m on both ranges. The climate of the valley is dry and cold with annual precipitation averaging 18 cm/year and temperatures reaching 45°C in winter and 32°C in summer. Despite the arid climate, the valley has abundant groundwater and streamflow from surrounding mountains which produce vast acreages of flooded natural meadows. These are used extensively by cranes as loafing and roosting areas. Abundant grain, principally barley, provides feed for migrating cranes.

Within the valley, the U.S. Fish and Wildlife Service manages Alamosa and Monte Vista NWR's. Alamosa NWR is 6 km south of Alamosa, Colorado, on the east side of the valley. The 4,194-ha refuge consists primarily of natural riverbottom wetland dissected by old oxbows and sloughs of the Rio Grande River. Monte Vista NWR is on the west side of the valley 10 km south of Monte Vista, Colorado. This 5,758-ha refuge consists primarily of flooded meadows, ponds, and some cropland. The refuge has been created by man through extensive dike and pond development. The refuges and surrounding private lands are major concentration areas for cranes. One other crane concentration area, almost wholly in private ownership, exists along the Rio Grande River between Monte Vista and Alamosa.

Since the initiation of the sandhill crane foster-parent program in 1975, whooping cranes have accompanied sandhills to the valley. In an effort to protect the whooping cranes, the U.S. Fish and Wildlife Service in 1978 designated both refuges as critical habitat. As a result of the whooping crane flock and the increase of the greater sandhill crane flock, crane management now receives a higher priority than in the past.

PERIOD OF USE BY CRANES

Since 1975 refuge personnel have recorded whooping crane use of the valley. Whooping cranes generally arrive in mid-February and stay until late April to early May during spring migration. During fall migration they are present from early October to mid-November (Table 1). As the whooping crane population increased from 3 in 1975 to 14 in 1981, the arrival and departure dates have become more similar to the sandhill crane arrival and departure dates.

During the past years, sandhill crane use has generally preceded whooping crane use by 2 weeks to 1 month during the fall and by approximately 2 weeks during the spring. The 1st sandhills usually arrive in late August; they are believed to be a small population (35-50) that nests in northwestern Colorado. After these arrive, sandhill populations gradually increase with peak numbers being reached in mid to late October. By late November nearly all sandhills have left the valley. During spring migration sandhills arrive in large numbers (2,000-5,000) in mid-February with populations reaching their peak in mid to late March. Most sandhills leave the valley from mid-April to mid-May, their departure date depending largely upon spring weather conditions. When the com-

bined spring and fall use is considered, sandhill and whooping cranes spend more time in the San Luis Valley than they do at their nesting or wintering areas.

Sandhill crane use presently exceeds 500,000 use days/year on Monte Vista NWR and 50,000 use days/year on Alamosa NWR (Table 2). A use day is 1 crane using the refuge for any portion of 1 day. Although Table 2 shows an increase in use on both refuges, crane populations have not increased to the extent shown. Use days recorded from 1976 to 1978 are an underestimate because at that time refuge personnel did not survey nighttime roosting populations which considerably exceed daytime use.

Crane use is heavier on Monte Vista NWR in spring than in fall. This difference is a direct result of management. Refuge meadows are flooded to provide loafing areas for cranes and to apply water for waterfowl nesting. Most refuge grain crops are left standing during fall and this standing grain is unattractive to cranes and waterfowl. However, grain crops are mowed during February to provide feed for cranes and waterfowl. Thus, peak populations of sandhills occur during March and April when 8,000 use the refuge.

Table 1. Whooping crane use of the San Luis Valley, 1975-1981.

Year	Date arrived	Date departed
1975	9 Oct	20 Nov
1976	17 Feb	12 May
	5 Oct	17 Nov
1977	21 Feb	8 Apr
	5 Oct	19 Nov
1978	27 Feb	13 Apr
	1 Oct	28 Nov
1979	20 Feb	13 Apr
	29 Sep	16 Nov
1980	8 Feb	10 May
	19 Sep	17 Nov
1981	15 Feb	24 Apr

Table 2. Crane Use Days on Monte Vista and Alamosa NWR's from 1976-1981

Year	Monte Vista NWR			Alamosa NWR		
	Spring	Fall	Total	Spring	Fall	Total
Sandhill cranes						
1976	186,362	94,591	280,953	7,283	16,429	23,712
1977	199,724	181,255	380,979	1,519	7,368	8,887
1978	219,000	155,500	374,500	2,921	19,628	22,549
1979	250,000	138,150	388,150	9,800	31,000	40,800
1980	357,100	152,500	509,600	24,100	29,000	53,100
1981	399,250			60,000		
Whooping cranes						
1975		35	35			
1976	98	7	105			
1977	133	14	147			
1978	80	130	210			
1979	147	70	217	1	64	65
1980	349	101	450	84	35	119
1981	339			30		

The situation is different on Alamosa NWR where meadows and sloughs are flooded during the fall with water diverted from the Rio Grande River. The water is diverted to provide opportunities for hunting and habitat for waterfowl nesting the next spring. There are no pump wells on Alamosa NWR; consequently, the only way to provide sufficient water in spring is to flood during fall and then add water as soon as irrigation ditches flow again in April. Waterfowl and cranes that roost

on Alamosa NWR generally feed in barley fields on private land southeast of the refuge. Heavy fall use by cranes and waterfowl, and winter use by waterfowl, leaves these private fields with only small amounts of feed during spring migration. Consequently, in most years, use of Alamosa NWR in spring is not as heavy as in fall. Peak populations have reached 2,500 cranes during fall.

Whooping crane use follows much the same pattern as use by sandhills. On Monte Vista NWR use has increased from 35 use days in 1975 to 450 in 1980 (Table 2). Whooping cranes did not start using the Alamosa NWR until 1979. The major factor behind the increase is the population increase of this species due to the foster-parent program.

HABITAT USED BY CRANES

Habitat used by sandhill and whooping cranes on the refuges is similar. Roosting locations are ponds and sloughs where the birds use water up to 0.3 m deep. Loafing areas are wet meadows of baltic rush (*Juncus balticus*), sedges (*Carex* spp.), spikerush (*Eleocharis* spp.), greasewood (*Sarcobatus vermiculatus*), and a variety of grass species. These meadows do not have to be very wet to attract cranes; 2 to 4 cm of water is satisfactory. Cranes will sometimes use dry meadows as long as a ditch with water or a stream is nearby. Although some feeding activity occurs in meadows, they are primarily used for resting, preening, and other social activities. The other major habitat used is grainfields during morning and evening. Barley is the primary crop so cranes use it most frequently, but will also utilize wheat, field peas, and potato fields. Primary feeding activity in potato fields is searching for insects and grubs. Cranes seem to prefer wheat over barley, and waste grain from wheatfields will be cleaned out rapidly.

Each habitat type is usually used in the course of cranes' daily activities. Cranes leave the roost at or shortly after sunrise and fly to grainfields to feed. Feeding continues until 0930-1000 hours and then cranes fly to loafing areas. At about 1530-1600 hours they fly to grainfields to feed again. About sunset they return to the roost. Weather extremes can cause changes in activity patterns. On extremely cold days cranes will often spend nearly all day feeding in the grainfields. On warm days the amount of time spent feeding will often be 1-2 hours less than normal and more time will be spent at loafing sites.

The distances between roosting, loafing, and feeding areas are important factors influencing crane use. Optimum habitat in the San Luis Valley has all these components within 1-2 km. Cranes fly farther to feed only after grain is completely eaten in nearby fields. Ten kilometers is the maximum distance these cranes have been known to fly from roost to feeding sites.

Although the habitat of surrounding private land is similar to refuge land, different management practices create conditions which influence crane use. Some differences are that most of the meadowland surrounding the refuges is either grazed or hayed, thus privately owned meadows contain closely cropped vegetation. When these meadows are wet they appear to be more attractive than wet meadows on the refuges which contain taller vegetation. Refuge meadows are used less by cranes in fall because we retain the residual cover for duck nesting the next spring. During spring months refuge meadows are flooded earlier than most meadows owned by private landowners and this makes refuge meadows more attractive. During fall, even when many cranes may loaf on surrounding ranches, few of these ranches provide adequate roosting areas like the refuges provide.

CRANE MANAGEMENT PHILOSOPHY AND PRACTICES

Both refuges are waterfowl refuges and many of the management practices designed for waterfowl also aid cranes. On both refuges as much meadow flooding and filling of ponds as practical is conducted. This is done by pumping groundwater from February through May at Monte Vista NWR and by diverting water from the Rio Grande during the fall at Alamosa NWR. Flooding of these meadows provides excellent loafing habitat for cranes and also provides numerous nesting territories for waterfowl. During the fall at Monte Vista NWR some "crane water" usually will be pumped into areas where hunting is prohibited to provide loafing habitat specifically for cranes. Refuge personnel are able to supply roosting habitat by keeping ponds full or nearly full during spring and fall.

At Monte Vista NWR approximately 140 ha (350 acres) of cropland are planted each year to provide feed for waterfowl and cranes. At Alamosa NWR 32 ha (80 acres) are planted. Each refuge has more than double the stated acreage in cropland, but the farm fields are rotated every year because refuge soils are marginal in productivity. Sweet clover, volunteer barley, wild oats, and other plants are allowed to grow in idle fields and then plowed under the next spring to provide some organic matter. Each field is deep chiseled every 3 years to break up the hardpan (crusted soil surface). The chiseled fields provide cranes access to grubs and other insects and cranes use the fields for short periods after chiseling.

If necessary, some of the planted acreage is harvested to provide emergency feed, but most of the crop is left standing in the fall and then mowed during February to provide spring feed. The reason for delaying wildlife use of refuge crops is that most of the private cropland is already harvested when cranes arrive in the fall. There are thousands of acres of stubble fields, surrounding both refuges, where cranes can feed. Feeding activity in these fields causes very little conflict with private landowners. From 1979 to the present, only 1 depredation complaint was received. It is our philosophy that cranes and waterfowl should use private fields and it is not necessary for the refuges to provide their entire feed requirements. Thus, refuge fields are left for spring feed when many of the surrounding private fields have been picked clean by fall crane use and fall and winter waterfowl use. We believe that by providing spring feed the refuges provide critical nutritional needs that are important to crane and waterfowl nesting success during summer months.

During April 1981 refuge personnel surveyed grainfield use on both refuges. Fields at Monte Vista NWR were essentially devoid of grain. Crane populations during the 1st week of April dropped from 6,000 to 300 nearly overnight. These cranes moved north to the Rio Grande River for 7-10 days and then left the valley heading northward. Although spring migration northward was somewhat earlier this year than in some years, I believe that the precipitous decline in refuge populations was probably because there was no feed remaining. Approximately 2,300,000 duck use days, 150,000 goose use days, and 55,000 crane use days had consumed nearly all of 144 ha (359 acres) of 30 bushels/acre barley, some wheat, and field peas. An estimated 10,770 bushels of barley were available during the 1980-81 fall and spring period. Crane feed requirements, an estimated 113 g (1/4 lb) to 151 g (1/3 lb) per day per crane, would consume 25% of the total feed on the refuge with the remainder used by ducks and geese.

In addition to providing the necessary habitat components, refuge personnel also perform other management functions. Weekly counts of sandhill and whooping cranes are conducted on both refuges. Locations and identities of whooping cranes are recorded. During the past 2 years much of the whooping crane watching has been taken over by R. Drewien and his assistants. Refuge personnel do most of the whooper observing before Drewien's personnel reach the valley and after they depart. Several aerial census flights have been flown during spring months in an attempt to count the entire valley population. The San Luis Valley is an excellent spot to monitor the greater sandhill Rocky Mountain flock because nearly the entire population migrates through the valley.

Both sandhill and whooping cranes are present during waterfowl hunting season. Refuge personnel actively patrol during weekends and often during weekdays. The primary focus of law enforcement is to make our presence known in order to deter unlawful activities. To date we have had no problems with hunters shooting at or killing sandhill and whooping cranes. Each refuge has 60% of the refuge closed to hunting so birds have a place where they are not harassed. All hunters must park in designated parking areas. During the weekend nearly all hunters are checked as they return to the parking areas. Approximately 50% of all hunters are checked throughout the hunting season. Both refuges receive heavy hunting pressure relative to surrounding areas in the valley. As a result of this pressure, we do not actively try to increase fall crane use on the refuges, and possibly could not even if so desired. At present, waterfowl hunting is not hurting refuge crane populations.

In addition to use by hunters, a 10-km tour route on Monte Vista NWR is provided so that cranes and other birds can be viewed and photographed. Whooping crane tours are given in the spring, and several movies and television programs have been made on the refuges. Public use has been heaviest when cranes have been in the valley, especially since whooping cranes began to use the area.

MANAGEMENT PROBLEMS

Probably the major problem encountered with sandhill and whooping cranes is mortality caused by collisions with powerlines and fences. Drewien (1976) reported that mortality from collisions with aerial obstructions was significant; 2 immature whoopers have collided with fences and 1 with a powerline. All of these accidents have occurred on private land. Sandhill crane deaths from similar accidents have occurred on the refuges. Although there are no data on sandhill mortality, it is fairly common to see dead sandhills under powerlines near grainfields. Most mortality seems to occur during foggy mornings or in periods of high wind when birds are flying from roosting areas to grainfields or vice versa. The cost of burying powerlines is prohibitive. Fences cannot be removed because they are a necessary part of our grazing program, which is our major grassland management tool. All unneeded fences have been removed. Even if all fences and powerlines on the refuges were removed, it would only be a small portion of the hazards cranes face.

The only other problem which may become more acute in the future is the cropland management program on the refuges. With the increase of the crane population, the cranes are beginning to take a significant portion of our feed. In the future, due to budget cuts, we may not be able to adequately feed both cranes and waterfowl.

CONCLUSIONS AND RECOMMENDATIONS

Based on our experience, the following recommendations are made for other areas that may be or will become involved in crane management.

1. Waterfowl and crane management appear to be compatible. Good nesting habitat for waterfowl is also good crane loafing habitat. Management practices such as flooding meadows in the fall, which do not specifically help waterfowl, can be used to entice cranes into a certain area.

2. Grainfields, roosting areas, and loafing areas should be within 4-5 km of each other and closer if possible. Optimum habitat in the San Luis Valley has these features within 1-2 km of each other.

3. Grain should be available in a condition attractive to cranes when they need it most. Any cropland management program should consider surrounding cropland practices such as harvest time, fall plowing, and other aspects which will influence grain availability, crane distribution, depredation complaints, and other factors. The less grain available on surrounding private land, the greater the responsibility of the refuge manager to provide such food.

4. Powerlines, telephone lines, fences, or other aerial obstructions should be kept to a minimum. If possible, do not allow new lines to cross areas which receive heavy crane and waterfowl use. Although the refuges will continue to try to keep mortality to a minimum, it is our philosophy that some mortality from these and other factors is inevitable. Both sandhill and whooping cranes have to survive in a modern world. It is impossible for management to remove all hazards.

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FACTORS AFFECTING TRAP-RELATED MORTALITY OF SANDHILL CRANES¹

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Abstract: A total of 1,456 sandhill cranes (*Grus canadensis*) was captured with rocket nets near Rich and Mound Lakes, Terry County, Texas, in January and February 1979 and 1980. Nearly 5% of captured cranes was incapacitated during and immediately following net extension. An additional 10% was processed, released, and later found dead near the trap site. The age and sex composition of cranes released and later found dead did not differ ($P = 0.53$) from cranes that survived. The proportion of cranes that was released and later found dead varied between trapping attempts ($P = 0.006$) but did not vary between trapping locations ($P = 0.95$) or between cranes marked with radio transmitters and cranes marked with neck collars ($P = 0.56$). Mortality related to trapping was not associated ($P > 0.05$) with numbers of cranes captured, hour of day, temperature, wind speed, or a stress variable. Mortality varied with wind chill ($P = 0.02$) but the relationship was unclear. The percentage death rate was the same ($P = 0.66$) for cranes released in dry, wet, or muddy conditions. Time spent under nets before processing did not affect survival of sandhill cranes ($P > 0.70$).

Sandhill cranes are difficult and expensive to capture in large numbers. Ramakka (1979) noted 10-14% losses while capturing sandhill cranes with rocket nets in Texas. Wheeler and Lewis (1972) and Ramakka (1979) suggested that trap-related mortality of sandhill cranes could be reduced by elevating rockets to 45° and by processing and releasing cranes quickly after capture. We tested the relationship between trap-related mortality of cranes captured with rocket nets, and selected variables that might be controlled by trapping crews.

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METHODS

In January and February 1979, 740 cranes were captured at Rich and Mound Lakes, Terry County, Texas. A total of 715 cranes was trapped during the same period in 1980 at Rich Lake. Six rocket nets, using 4 rockets per net, were fired over cranes attempting to drink at freshwater springs (Ramakka 1979). All cranes were marked with a U.S. Fish and Wildlife Service (FWS) aluminum leg-band and a plastic neck collar. Cranes captured in 1979 were also marked with colored legbands, and 21 cranes (9 in 1979 and 12 in 1980) were fitted with a backpack radio transmitter. Each crane was released immediately after handling onto the lake bed that served as a roost for 30,000-120,000 cranes.

Trap-related deaths were divided into immediate or delayed categories for analysis. Nearly 5% of captured cranes was immediately incapacitated (could not walk or fly from the trapping site) during net extension (Table 1). In 1980, all incapacitated cranes, and 42 additional cranes were sacrificed for later laboratory analysis. An additional 10% of captured cranes that was marked and released was later found dead during extensive inspections of the lake bed near the trap site. For purposes of statistical analysis, marked cranes that we found dead were assumed to represent a random sample of all marked cranes that died within a week of capture and release. Statistical analyses were performed using the Statistical Analysis System (Barr et al. 1979).

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The Conservation Status of the
Breeding Ground of the Red-
Crowned Crane in Hokkaido,
Japan, 1983

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THE CONSERVATION STATUS OF THE BREEDING GROUND OF THE RED-CROWNED CRANE IN HOKKAIDO, JAPAN

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ABSTRACT

The Red-crowned Crane (*Grus japonensis*) in Hokkaido, Japan, has decreased drastically this century because of human intrusion into its habitat. Although its numbers have actually increased from 30-300 during the past three decades, the future of this species in Japan is not assured. The recent increase is due to artificial feeding in winter, which has brought the population to saturation level in the breeding habitat. The protection of the breeding habitat is now the most important factor in protecting the species. It is difficult to estimate the security of each nesting area because both the government and many private parties own the land and their plans for it change. Many factors contribute to an optimal nesting habitat and well established pairs may continue to nest even when several of these are lacking. Each nesting area was ranked from 1 to 5 depending on the security of the habitat from development and its use by the cranes, and a forecast was calculated for the long-term survival of these habitats.

INTRODUCTION

There are two populations of the Red-crowned Crane (*Grus japonensis*) in the world. One is migratory and is found in southeastern Siberia and northern China during the breeding season and in Korea and southern China in winter. The other is sedentary and inhabits Hokkaido, Japan (Archibald 1972). During the International Crane Workshop, we discovered that the migratory population was about 700 to 800, much less than previously estimated, and the population in Japan was about 300. Both populations have decreased drastically during recent centuries due to impacts by man (Masatomi 1979, 1981b).

Until the 17th century, Hokkaido was inhabited exclusively by aboriginal people, the Ainu. They called the cranes "Sarurunkamui," God of the Marsh, and they lived peacefully with them. After the Japanese conquest, the cranes soon vanished from southwestern Hokkaido due to hunting and agricultural development of the marshes at the end of the 19th century. A small flock survived in eastern Hokkaido; the first nest of this group was found in 1926 (Saito 1926). Until recently, the cool climate in eastern Hokkaido delayed the development of the marshes into farmland, so that the present habitat has been the last refuge for the cranes in Japan.

Apparently limited by food supply in winter, the cranes maintained their population at about 20 to 40 birds until the early 1950s. When the streams in which the cranes fed froze over during the unusually cold winter of 1952, the local people scattered corn on the

agricultural fields where the cranes searched for gleanings. At the same time, the crane was approved as a Special Natural Monument by the Japanese Government, thereby giving the birds utmost protection. The artificial feeding was continued each winter and the crane flock has increased to 300 birds over the past three decades (Fig. 1).

Although the population is still increasing, the cranes face various problems concerning the security of their breeding habitats. Despite the cranes' continued increase in numbers, the intense agricultural development on and near the breeding habitat gives great concern for their ultimate fate. This paper examines and evaluates the present environmental status of each breeding territory of the Red-crowned Crane in Hokkaido and outlines the proposed fate of each piece of real estate that constitutes a crane territory.

THE NESTING TERRITORIES

Listed on Table 1 is each nesting territory. The location of each territory is shown on Fig. 2 to 7. In most cases each marsh used by nesting cranes is simply labelled in alphabetical order from west to east or south to north. Marshes that were former nesting grounds have two letters: the first indicates the marsh to the immediate west or east, the second is 'Z'. For example, PZ is a former breeding marsh and located west of marsh P. Marshes that have recently become or will possibly become nesting grounds also have two letters, the first indicating the marsh to the immediate west or east, the second being 'A' or 'B'. For example, OA is a newly found breeding ground and located east of marsh O. In each marsh, each nesting territory is numbered approximately from south to north. The combination of alphabet and the number describes each nesting territory. For example L6 is the sixth and most northern nesting territory in marsh L. For convenience, some territories have been given numbers at variance with this system.

Nesting status data in the whole area were collected from various sources. The first air survey was carried out in Kushiro and Nemuro districts by Archibald, Masatomi, and Kitagawa in 1972. The results of the survey confirmed that the cranes in Hokkaido do not migrate but breed on the remote marshes in Hokkaido. Therefore, an air survey was done of the entire breeding range by the Hokkaido Educational Committee in 1973, 1974, 1979, and 1980. Archibald and Masatomi flew over the marshes again in 1977. Only Kushiro district was surveyed by the Kushiro Educational Committee in 1978. Most of the data from before 1972 were taken from Masatomi (1974) and Inoue (1975, 1976). The International Crane Foundation-Japan surveyed most of the areas in 1981 and Masatomi did the same in 1982. Some data were provided by the author by local people. Table 2 shows the complete nesting status for the past two decades.

THE POPULATION CHANGE

Since 1952, an annual winter census of the Red-crowned Cranes has been carried out by the Hokkaido Educational Committee. Although there are various problems with the results, mentioned by Masatomi (1981a), the population trend is worthy of discussion (Fig. 1). The rate of increase between 1952 and 1960 was about 23 percent/year, much higher than in the years after 1960. The crane population was probably limited by the quantity of natural food in winter before 1952, which explains the rapid and constant increase after the start of artificial feeding in 1952. However, since 1960 something has happened to abate the rapid increase. After 1960, crane mortality due to collision with power lines increased, especially in autumn and winter when cranes gathered at the feeding stations where power lines are more concentrated than on the marshes. Thousands of tourists visit the feeding stations to appreciate and photograph the birds. To photograph a crane in flight, impatient photographers would sometimes flush the cranes. In the resulting confusion, the cranes often flew into the high tension wires and died. Between 1962 and 1980, 2.1 percent of adults and 13.4 percent of chicks were killed by striking power lines. Recently, the crane

Table 1. Key to names of each marsh and each breeding territory of the red-crowned crane. E: east, Es: estuary, L: lake, M: marsh, N: north, P: pond, R: river, S: south, V: vicinity, W: west.

Code	Marsh	Code	Breeding territory
A	Toberi	A1	Toberi R Es
AA	Horokayanlo	AA1	Horokayanlo
B	Okamanai	B1	Seika
C	Kimonto	C1	Kimonto N
		C2	Kimonto S
		C3	Kimonto Konuma
D	Yudo L	D1	Yudo L
		D2	Yudo R
DA	Chobushi L	DA1	Chobushi L
E	Tonkeshi	E1	Tonkeshi
EZ	Onbetsu	EZ1	Onbetsu
F	Koitoi	F1	Koitoi
G	Kushiro M	G1	Olanoshike
		G2	Tsuruno
		G3	Hokuto
		G4	Hokuto-Shindo E
		G5	Hokuto-Shindo W
		G6	Shimo-Ninshibetsu
		G7	Seturi R Toya V
		G8	Sake-Masu Fukajo
		G9	Iwabokki-yama SW
		G10	Kushiro R Suimon V
		G11	Seturi R Bunkien V
		G12	Takobu L
		G13	Oshima R
		G14	Akanuma V
		G15	On-nenai
		G16	Shimosekuri
		G17	Hosooka
		G18	Toro-Futamata N
		G19	Toro-Futamata S
		G20	Kenechaha R No. 1
		G21	Kenechaha R No. 2
		G22	Kenechaha R No. 3
		G23	Arekinai
		G24	Kirakotan
		G25	Miyajimazaki
		G26	Chiruwatsunai
		G27	Shimokuchoro S
		G28	Shimokuchoro N
		G29	Shirarutoro S
		G30	Kayanuma
		G31	Shirarutoro S
		G32	Kattaro
		G33	Kattaro-Kami
		G34	Numaoro
		G35	Numaoro-Kami
		G36	Ososhibetsu
		G37	Ososhibetsu-Kami
GZ	Onnebira		Onnebira
H	Bekanbeushi R		Bekanbeushi R
		III	Bunkai V

Table 1. (continued)

Code	Marsh	Breeding territory
H2	Chanbetsu No. 1	
H3	Chanbetsu No. 2	
H4	Chanbetsu No. 3	
H5	Chanbetsu No. 4	
H6	Katamusari R	
H7	Fuppushi	
H8	Chanbetsu No. 5	
H9	Sho-Bekaneushi R	
H10	Takkaruushi R Karyu	
H11	Chu-Bekaneushi R	
H12	Bekaneushi R Es	
H13	Bekaneushi R Tai-betsu R Goryuten	
H14	Itoizawa	
H15	Itoizawa E	
H16	Itoizawa W	
I1	Tokitai	
I2	Tobai R Es	
J1	Mochirippu L	
K1	Hichirippu S Konuma	
K2	Hichirippu E	
K3	Hichirippu W	
K4	Hichirippu N	
L1	Biwase Ichiban R	
L2	Biwase R Es	
L3	Dei R	
L4	Rokuban R	
L5	Onnuma	
L6	Wakasa P	
M1	Poroto P	
N1	Esashito P	
O1	Fureshima	
OA1	Baba	
P1	Tosanporo P	
PA1	Hikitsu	
PZ1	Nokamappu	
Q1	Suido P	
R1	Onneto S	
R2	Onneto Nishi-Sanban R	
R3	Onneto N	
S1	Shunkunitai E	
S2	Shunkunitai Kitsunemori	
T1	Betoga R	
T2	Kaigarakotan	
T3	Sosanbetsu	
T4	Yarimukashi	
T5	Betoga R W	
U1	Myogo	
U2	Furen R Joryu	
U3	Tonden R	
U4	Kinura R	
U5	Furen R E	
U6	Furen R Es	
U7	Anebetsu	
U8	Furen R Kami	

Table 1. (continued)

Code	Marsh	Breeding territory
V	Yashubetsu	
U9		Mumei R
V1		Munisu
V2		Yashubetsu R
V3		Ponyashubetsu R
W	Shikotan	
W1		Ipponmatsu
W2		Bochi
W3		Tsubo
X	Nishibetsu	
X1		Kanein
X2		Seimarubetsu
X3		Barasan L
X4		Barasan R
Y1		Ipponmatsu
Y2		Bokko P
Y3		Todowara
Y4		Ekitarasu
Y5		Pon-Nittai
Z	Chashikotsu	
Z1		Tohoro R Es
2A	Tofutsu	
2B	Kunashiri Island	
2Z	Shibetsu R	
ZA1		Chashikotsu R Es
ZB1		Tofutsu L
ZZ1		Uennai
		Shibetsu R

numbers have begun to increase again. One reason for this is that yellow plastic pipes have been attached to power lines. These help the cranes see the wires, and the mortality from this source has declined. Another reason for the recent population increase might be the improvement in census techniques by using helicopters rather than just ground surveys. For example, in 1980, 19 birds not observed from the ground were counted from the helicopters (Hokkaido Educational Committee).

Although the worst period for collision with wires was between 1962 to 1966 and between 1967 and 1971, the number of the birds still increased by 6 percent (Table 3). Undoubtedly, the decline in mortality by collision with wires was a primary factor in the dramatic increase in the population after 1976, particularly since the productivity of the flock remained approximately constant at 13-14 percent from 1962 to the mid-1970s (Table 4). Constant productivity indicates an increasing number of breeding pairs in the increasing population. However, some of the nesting territories have been destroyed. Displaced pairs or new pairs may be more tolerant to nesting close to humans. During the air survey in 1981, two new nesting sites were found (V1 and V2 on Fig. 6). They were very close to each other and divided by a bridge that brought the new pairs much closer to human activities. Another reason for the increase is that some birds have migrated from Hokkaido to colonize new nesting areas. Kunashiri Island (Fig. 7), which is located about 20 km east of the eastern coast of Hokkaido had one nest in 1982 (ZB1). Suisho Island (Fig. 5) has extensive marshlands and is located less than 10 km from the tip of Nemuro Peninsula. Cranes have been breeding near the tip of the peninsula every year for more than ten years. Therefore, it is possible that cranes may expand their breeding range to more Soviet islands. Tofutsu Lake in Abashiri, northeastern Hokkaido (2A1, Fig. 8), which has had five to eight birds for several years during the breeding season had the first successful breeding pair in 1982. This is also an example of the expansion to a completely new place. It is clear that the traditional nesting areas in southeastern Hokkaido have reached a saturation level. Additional crane pairs must colonize new areas in northeastern Hokkaido or the Soviet islands. There is evidence that some pairs are now attempting to nest on interior marshes such as OA1 (Fig. 5), which had the first nest in 1981. This marsh is very

Table 2. Breeding status of each breeding territory between 1966 and 1982 on the re-crowned cranes; and the environmental evaluation of each breeding territory in 1980s and 1990s. N: nest, f: family, A: adult, SA: subadult, Br: incubating, ei(2): one (two) egg(s) on a nest, number on the upper right: number of (adult) cranes, number on the lower right: number of chicks, Y: yearling, EE: environmental evaluation, 1: pristine, 2: pristine but with adjacent problems, 3: on-site development, 4: almost completely destroyed, 5: habitat destroyed (cont'd.).

	A1	AA1	B1	C1	G2	C3	D1	D2	DA1	E1
before 1966										
1966							1A			
1967	N									
1968	N									
1969	N									
1970	N									
1971	N									
1972	N									
1973	N									
1974	N									
1975	N									
1976	N									
1977	N									
1978	N									
1979	N									
1980	N									
1981	A2									
1982										
EE past 1970s										
present 1980s	5	4	3	2	2	2	3	3	3	4
future 1990s	5	5	5	4	4	4	3	3	3	5

small and nesting attempts apparently failed in both 1981 and 1982 (Momose, pers. comm.). In addition, the productivity of the population between 1977 and 1981 dropped to 11.6 percent compared to 13-14 percent before that (Table 4), although the total population increased by 28.8 percent in the same period (Table 3), again suggesting saturation of available habitat.

These data indicate that the cranes are becoming more tolerant of nesting in proximity to humans, but also that good habitat is limited and declining in eastern Hokkaido. Development projects are rapidly destroying crane breeding habitat.

THE PROBLEMS OF THE BREEDING HABITAT

Agriculture. Agricultural developments are the biggest threat to the marshes. Fig. 9 shows the agricultural development areas in the Kushiro district. Kushiro Marsh, the biggest marsh in Japan, has eleven rivers running into it. Ten of them have nesting sites on their reaches and in addition the water levels of the rivers control the water levels of the marshes. The upper reaches of these rivers have been used for agricultural development. The rivers have been deepened and straightened. Nishibetsu River (G6, Fig. 9), where a breeding pair has been observed every year since 1969, used to support 1668 ha of marsh

Table 2. (continued)

	EZ1	F1	G1	G2	G3	G4	G5	G6	G7	G8
before 1966										
1966										
1967										
1968	N									
1969	N									
1970	N									
1971	N									
1972	N									
1973	N									
1974	N									
1975	N									
1976	N									
1977	N									
1978	N									
1979	N									
1980	N									
1981	N									
1982	N									
EE past 1970s										
present 1980s	?	4	5	3	2	3	3	4	3	1
future 1990s	?	5	5	4	4	5	4	5	5	2

along its reaches. These have been destroyed by agricultural development since 1972, and in 1982, for the first time in many years, no nest was found. The four breeding sites G32, G33, G34, G35 (Fig. 9), on the upper reaches of two other rivers have been found in marsh reeds (*Phragmites communis*), which grow in groups on drying marshes. Apparently no more reeds (*Phragmites communis*) remained in these marshes and yet cranes have made an effort to breed. Tober Marsh in Tokachi (A1, Fig. 9) was also a traditional breeding site. A nest was observed almost every year between 1967 and 1980. The eggs were washed away in 1980 and no nest was found in 1981 or 1982. The marsh was completely destroyed for pasture except for the very center, where water remained but was too deep for the cranes to nest.

Straightening rivers causes not only the destruction of the marshes along the rivers themselves, but also the instability of the water level on the connected marshes. Although there is an area approved as a Special Natural Monument in Kushiro Marsh (Fig. 9), it is only 17 percent of the whole marsh and it holds only six to seven pairs at the most. The monument area is located at the center of Kushiro Marsh where all the rivers converge. Recently, nesting sites have tended to move to the edge of the marsh, probably because of excessive water from the straightened rivers. Therefore, the Special Natural Monument is less important for the conservation of the Red-crowned Crane. Of the 119 nesting sites examined 53.8 percent have faced some kind of agricultural development.

Deforestation. Recently deforestation around marshes has been more of a threat. Spring runoff is accelerated when forests are removed, resulting in erosion of the hills, filling of the marsh with eroded soils, flooding of the marsh in spring, and drought in summer. Although reforestation is practiced, it takes many years before the young trees can benefit in the conservation of water and the prevention of erosion. In addition, many deforested

Table 2. (continued)

	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18
before 1966										
1966										
1967										
1968				A ²			A ²			*A ²
1969				N			N			*N
1970				N			N			*N
1971				N			A ²			*N
1972				N						*N
1973				A ²			N ²			N
1974	A ¹	N	N ²	A ²			N ²			N
1975	N	N								N
1976										
1977										
1978	1 ²	A ²	A ²			1 ²				
1979	1 ²	1 ²				N ²	N ²			SA ²
1980	N ²					N ²	N ²			SA ²
1981	A ¹					N ²	1 ²			A ²
1982		A ²				SA ²	N ²			A ²
EE past 1970s										
present 1980s	3	1	1	2	2	1	3	2	2	2
future 1990s	4	2	2	3	3	2	3	4	2	2

	G19	G20	G21	G22	G23	G24	G25	G26	G27	G28
before 1966										
1966										
1967										
1968					A ²	A ²				*A ²
1969					N					
1970					N					N
1971					N					
1972	N	N	N	N	N	N				
1973	N ²	1 ²	N	N	N	N				
1974	N	N ²	N ²	N ²	N ²	1 ²				
1975	N				N	N				N
1976										
1977					A ²	N ¹	N ¹			
1978		1 ²	1 ²	1 ²	1 ²					
1979	A ²	N ²	1 ²	1 ²	N ²	N ²	1 ²			
1980					N ²	N ²	A ²			
1981					1 ²	N ²				
1982					N ²					
EE past 1970s										
present 1980s	2	2	2	2	1	1	1	2	3	3
future 1990s	3	3	3	3	2	2	4	4	4	4

Table 2. (continued)

	G29	G30	G31	G32	G33	G34	G35	G36	G37	G21
before 1966										
1966										
1967										
1968	A ²									
1969	N									
1970	N									
1971	N									
1972	N									
1973	1 ²	N ²								
1974	N ²	N	1 ²	A ²						
1975	N									
1976										
1977	A ¹		N ²	N ²						
1978			N ²	N ²						
1979	1 ²	N ²	N ²	N ²						
1980	N ²	N ²	N ²	N ²						
1981										
1982										
EE past 1970s										
present 1980s	2	2	3	2	3	2	3	2	3	
future 1990s	2	2	3	4	4	4	4	4	4	

	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10
before 1966										
1966										
1967										
1968										
1969										
1970										
1971										
1972	N	N	N							
1973	1 ²	N	N ²	N ²						
1974	N ²	N ²	N ²	N ²						
1975	N									
1976										
1977	N ¹	N ¹	A ¹							
1978										
1979	N ²	1 ²	1 ²	1 ²	N ²					
1980										
1981										
1982										
EE past 1970s										
present 1980s	1	2	2	2	4	2	1	2	1	1
future 1990s	1	2	3	3	5	3	1	3	1	1

Table 2. (continued)

	H11	H12	H13	H14	H15	H16	I1	I2	J1	K1
before 1966										
1966										
1967										
1968									A ²	A ²
1969										
1970										
1971									A ²	
1972									N	
1973									N ²	A ¹
1974	N ²								A ²	N ²
1975	N								N	N
1976									N	N
1977	A ²	A ²	N ¹ A ¹						N ¹	N ¹
1978	N ²			A ²					N ²	Y ¹
1979	N ²	A ²	N ²	N ²					N ²	N ²
1980									N ²	N ²
1981									N ²	N ²
1982									N ²	N ²

EE past 1970s										
present 1980s	1	1	1	2	2	2	1	1	2	1
future 1990s	1	1	1	3	3	3	1	1	4	1

	K2	K3	K4	L1	L2	L3	L4	L5	L6	M1
before 1966										
1966										
1967										
1968					A ²	A ²				
1969										
1970										
1971						A ²				A ²
1972		N						N	N	N
1973								N ²	N ²	N ²
1974	N ²							N ²	N ²	N ²
1975								N	N	N
1976								N	N	N
1977	N ¹			A ²	N ¹	N ²		N ²	N ¹	N ¹
1978										
1979										
1980										
1981										
1982										

EE past 1970s										
present 1980s	1	1	1	2	2	3	2	3	3	1
future 1990s	1	1	1	2	2	3	4	4	4	1

Table 2. (continued)

	N1	O1	OA1	P1	PA1	PZ1	Q1	R1	R2	R3
before 1966										
1966										
1967										
1968										
1969										
1970										
1971										
1972										
1973										
1974										
1975										
1976										
1977	N ¹	N ¹		N ²	A ¹	N ²	N ¹			
1978										
1979	N ²	A ²		N ²	A ²		N ²	A ²		
1980										
1981										
1982										

EE past 1970s										
present 1980s	3	2	3	1	?	5	1	1	3	1
future 1990s	4	2	4	1	?	5	1	1	3	1

	S1	S2	T1	T2	T3	T4	T5	U1	U2	U3
before 1966										
1966										
1967										
1968										
1969										
1970										
1971										
1972										
1973										
1974										
1975										
1976										
1977										
1978										
1979										
1980										
1981										
1982										

EE past 1970s										
present 1980s	2	2	2	1	1	1	1	2	2	2
future 1990s	4	4	2	1	1	1	1	2	2	2

Table 2. (continued)

	U4	U5	U6	U7	U8	U9	V1	V2	V3	W1
before 1966										
1966		N								
1967	ASA	15								
1968		N								
1969		1	NNN				N ²			
1970			N ¹				N ¹			
1971			NGA				N ²			
1972			N				N+N	A ²	N+N	N
1973	SAL		15	A ²			N ²	15	N ²	
1974	NGA	N ²	N ²	A ¹			N+A ²	N ²	N+A ²	
1975		A ²	N				N	15	N	
1976										
1977	A ²	N ¹					N ¹		N ²	N+A ¹
1978										
1979	A ²			15	15	A ²	A ¹			
1980			A ¹	N ²				A ²	A ²	A ²
1981	N ²						N ²	N ²	N ²	N ²
1982			N ²							
EE past 1970s										
present 1980s	1	1	1	3	3		2	2	2	2
future 1990s	1	1	1	4	4		3	3	3	2

	W2	W3	X1	X2	X3	X4	Y1	Y2	Y3	Y4
before 1966										
1966	N	N	N		N					
1967	N	N	N		N					
1968		N	N		N					
1969		N ¹	N		N					
1970		N	N		N					
1971		N	N		N					
1972	N	N	N		N					N
1973	15	15	15		15					
1974	N	N	N		N					
1975	N	N			N					
1976					N					
1977	N ²	N ¹			A ¹		A ¹	N ¹	A ²	
1978								15		
1979		15	A ²		N ²		N ²			A ²
1980		A ²			N ²		N ²			
1981	15	N ²			N ²		A ²	N ²	N ²	A ²
1982		N ²			N ²		N ²			
EE past 1970s										
present 1980s	2	2	2	4	2	1	1	1	2	2
future 1990s	2	2	3	5	2	1	1	1	2	2

Table 2. (continued)

	Y5	Z1	Z2	ZA1	ZB1	ZZ1
before 1966						
1966						
1967	15	A ²				
1968						
1969						
1970					N	
1971	N ²	A ²	A ²			
1972	N	N				
1973	N ²	15				
1974	N ²	15				
1975	15	15				
1976	N ²	N ²				
1977	N ²	N ²				
1978	N ²	15				
1979	A ¹	15				
1980						
1981	N ²	N ²				
1982	A ²	A ²	15	N		
EE past 1970s						
present 1980s	2	1	1	1	4	
future 1990s	2	1	1	1	4	

areas are converted to farmland from which runoff and erosion go on unabated indefinitely. This is very serious around Kushiro Marsh. Kushiro is well known as a city of paper production and large areas of eastern Hokkaido have been deforested. The replacement of trees has not followed quickly enough to protect the marshes. One of the purposes of deforestation is agricultural development and in this case marshes are most affected. This has been an obvious problem in Furen Lake. The estuary of Furen River has been eroded by about 50m for the past six to seven years (Matsumura & Yamamoto 1980). This fact threatens the nesting sites U4, U5, U6 (Fig. 6). Shunkunitai (S1, S2, Fig. 6), has had the same erosion problem. Deforestation of the upper reaches of the rivers and agricultural development produce flooding and thus erosion of the river banks. Fig. 10 shows the areas transformed into agricultural fields in the north region of Furen Lake between 1945 and 1975. The breeding habitats H1, H2, H3, H4, H7, H10 (Fig. 4), have maintained their quality, but the hillsides around the marshes were all deforested (Koyanagi, pers. comm.).

Roads, Urbanization, and Other Development. Every kind of development involves the building of roads which brings disturbance for the cranes. A forest road was built behind the north end of Biwase Marsh (Fig. 4). Two nesting sites, L5, L6, visible from the road, have since been deserted, although pairs had bred in both sites before the construction of the road. In addition, this road will extend further west where L4 will soon be affected (Koyanagi 1980). A road will be constructed along Mochirippu Lake for a salmon hatchery. Nesting has been reported there (J1, Fig. 4) since 1972 (Negatani, pers. comm.). The city of Nemuro has considered constructing a road between Nemuro and the town of Bekkai through five traditionally good breeding territories (S1, S2, W1, W3, Fig. 6). Cranes

Table 3. Rate of population growth of the Red-crowned Crane.

Period	Average increase	% of increase
1952-1956	52.8	
1957-1961	137.0	159.5
1962-1966	159.6	16.5
1967-1971	169.2	6.0
1972-1976	185.4	9.6
1977-1981	238.8	28.8

Table 4. Percentage of chicks in the Red-crowned Crane population from winter count.

Year	% of chicks in population	Average
1962	11.2	
1963	13.5	
1964	11.5	13.3
1965	14.5	
1966	15.8	
1967	17.4	
1968	13.0	
1969	10.5	14.3
1970	17.4	
1971	13.3	
1972	12.8	
1973	12.2	
1974	20.9	13.9
1975	6.8	
1976	18.4	
1977	9.4	
1978	9.4	
1979	13.7	11.6
1980	14.8	
1981	10.1	
1982	11.7	

are very sensitive to any kind of transformation of their environment and even a little-used forest road might easily cause cranes to abandon their nests. Part of Takikobu Lake (G12, Fig. 3), has been filled to straighten a road for a camping ground. This had been a traditional nesting site since 1969, but no nest was found in 1982.

Big cities with increasing populations are spreading rapidly. In Kushiro, the largest city in eastern Hokkaido, a nesting territory (G1, Fig. 3), was completely destroyed in 1972 to make a residential area for factory workers. In the southern part of Kushiro Marsh new houses and apartment buildings are lined up along the drainage ditches, facing the dried marsh. A sea port is being constructed at the end of Tonkeshi Marsh (E1, Fig. 2). During construction, a pair bred on their original nesting territory, but after hatching their eggs, the pair moved to the upper reaches of the Otsu River to raise the chicks.

Predation is another hazard. A garbage dump has been located near the nesting spot at Tonkeshi. Crows are attracted by the garbage and have been identified as predators of cranes (Ehara, pers. comm.). The pair's desertion of their nesting site after egg hatching might be due to the threat from crows. In addition, the marsh has become dryer, and it is doubtful how much longer the pair can keep nesting there. Minks, which have escaped from captivity and become wild, can also be predators of cranes. They live in the

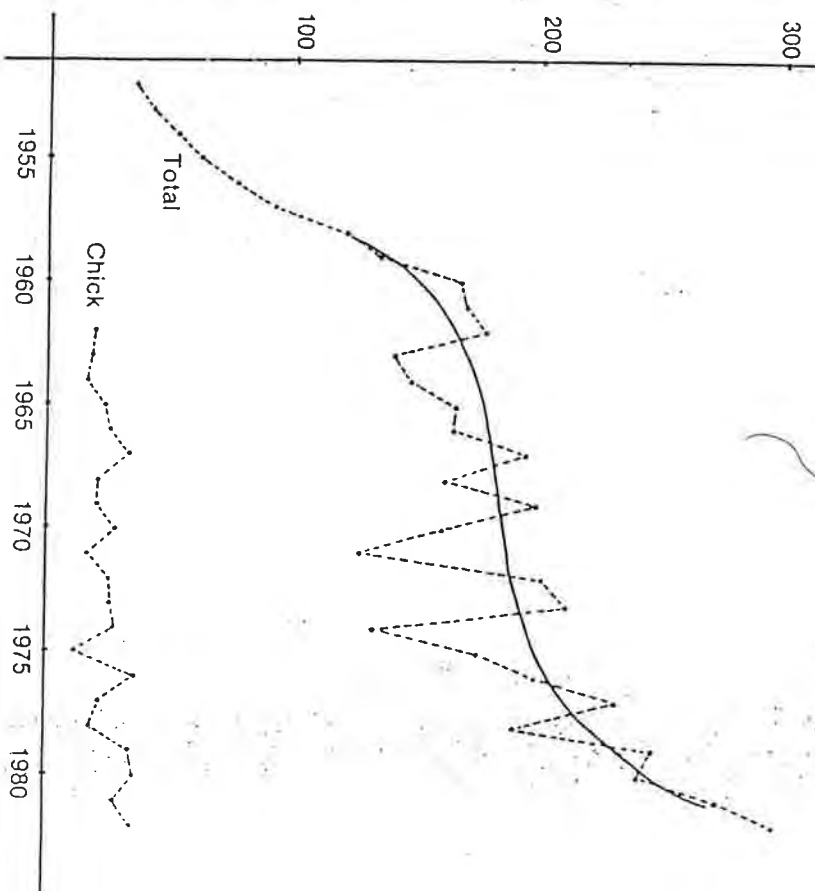


Fig. 1. Population of the red-crowned crane in the wild in Hokkaido, Japan.

marshlands, and thus pose a new problem, especially for the crane chicks. There are no predators for minks in Hokkaido and eventually they may become a serious problem (Mura 1974).

Gravel pits have threatened some nesting pairs. Breeding site F1 (Fig. 3), has faced a problem from gravel extraction on the north hillside. The marsh has been filled up and polluted with soil from this operation (Koyanagi 1980). G5 (Fig. 3) and N1 (Fig. 4) have faced the same problem. FZ1 (Fig. 5) was destroyed by the construction of a dam that dried up the marsh.

The roosting area in winter will not be discussed here in depth but it is also very important. Cranes need open water to stand in to sleep. The temperature in Kushiro often falls to -20°C in winter and all water freezes except the rivers. The upper part of Setsuri River and some other rivers in that vicinity have been used for roosting by cranes for many years. Many of these sites are threatened by canalization of the rivers, replacing the shallows with their tree lined banks by deep concrete canals.

ANALYSIS OF THE NESTING TERRITORIES

The results of the annual winter survey indicate that the number of Red-crowned Cranes in Hokkaido has been increasing (Fig. 1), which does not seem consistent with the development factors affecting the wetlands. In fact, in the early 1970s, it was said that the

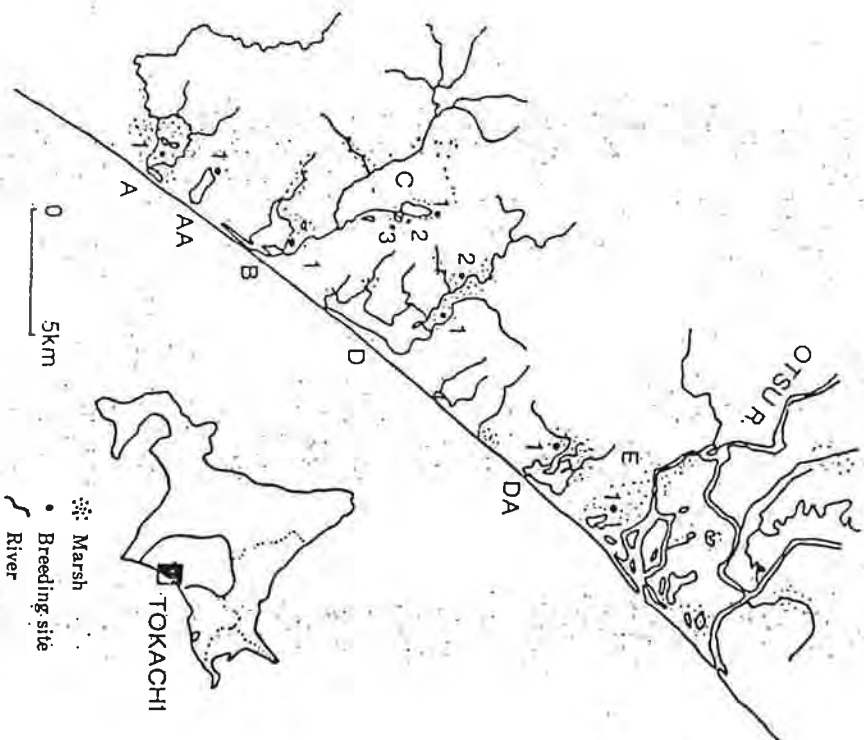


Fig. 2. Breeding territories from A to E in Tokachi.

Red-crowned Cranes would disappear from Japan in the near future. Contrary to that prediction, the population has been increasing. Was the prediction wrong?

My research indicates that the cranes will eventually disappear if the attrition of the marshland continues, although the cranes are slightly more adaptable to man than was thought possible, as shown by the recent nesting in smaller marshes near human disturbances.

In addition, cranes are long-lived, perhaps living for several decades, and rapid environmental changes may not cause an immediate drop in the population. As shown by the Tonkeshi (E1) pair, cranes sometimes have a strong tendency to stick to their traditional nesting sites despite development, and thus an immediate drop of the population is not evident. Perhaps many pairs are currently looking for new nesting sites, the scarcity of which induces young birds to breed on less than optimal marshes.

What is the prediction for the next decade? This is projected by considering the nesting data and the development plan. Each nesting site is ranked from 1 to 5 to indicate decreasing habitat quality (Table 2). Data from the 1970s were not analyzed because of insufficient information on the individual nesting sites. A total of 119 nesting territories were analyzed (Table 5).

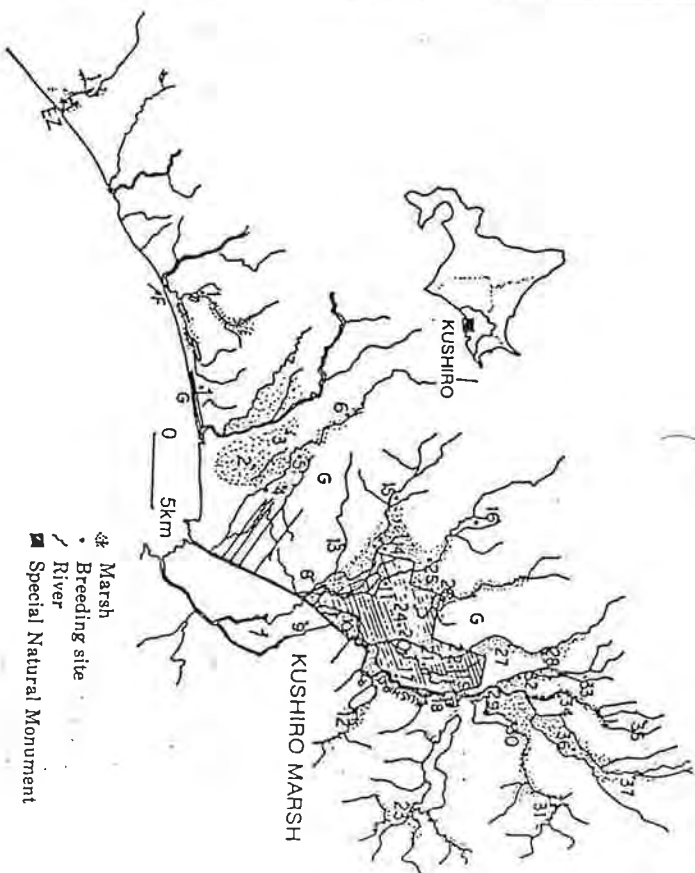


Fig. 3. Breeding territories from F to G in Kushiro.

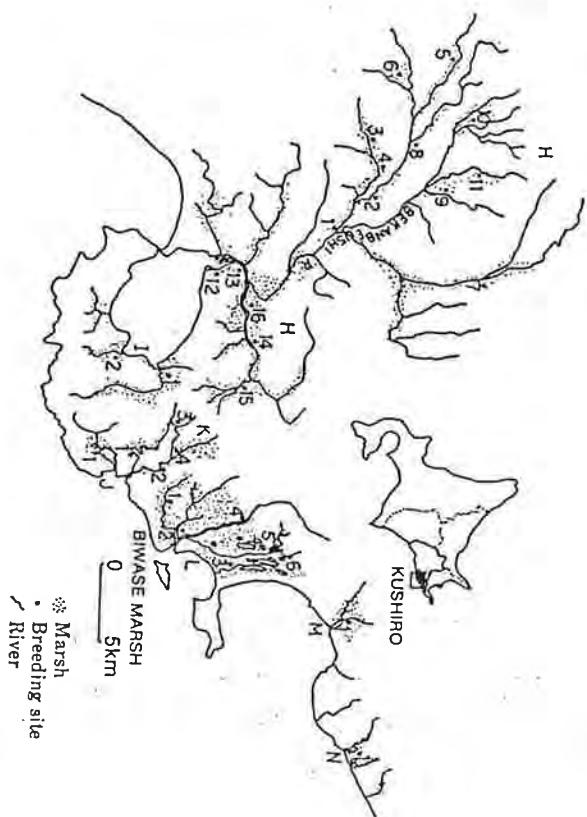


Fig. 4. Breeding territories from H to N in Kushiro.

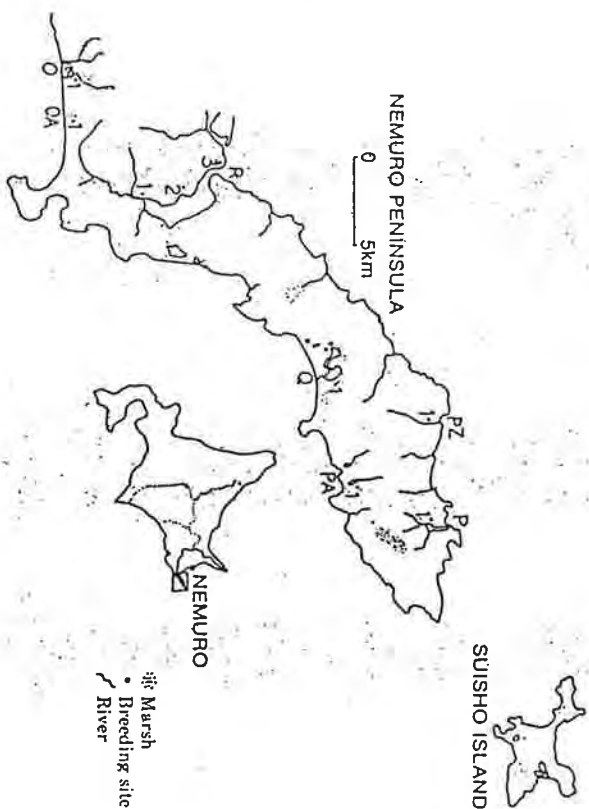


Fig. 5. Breeding territories from O to R in Nemuro.

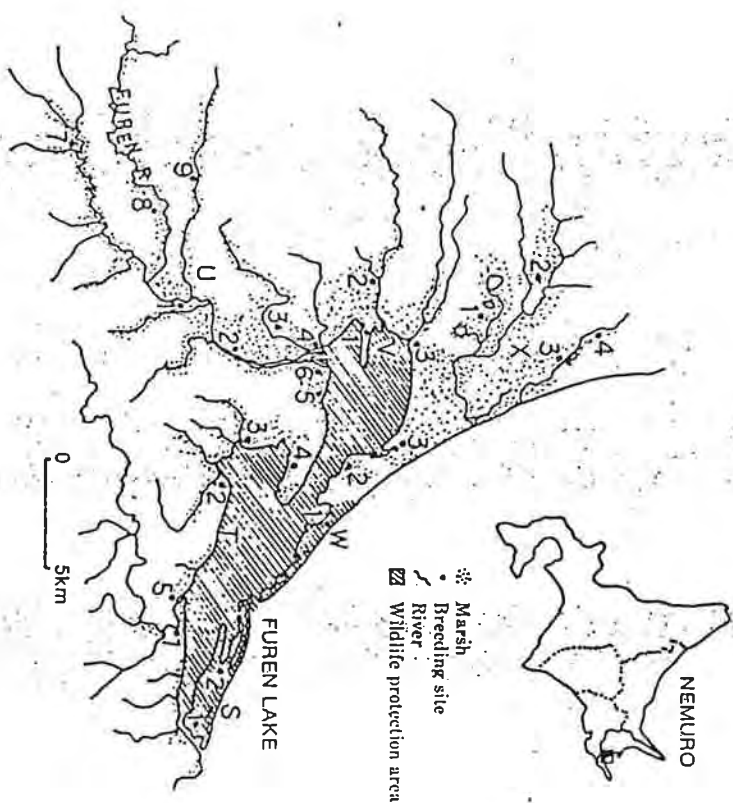


Fig. 6. Breeding territories from S to X in Nemuro.

Table 5. Percentage of the marshes in each category.

	1980s	Percentages —	1990s
1 - pristine	35.3		25.2
2 - pristine but neighbouring problems	40.3		21.0
3 - on-site development	16.0		19.3
4 - almost completely destroyed	5.9		24.4
5 - habitat destroyed	2.5		10.1

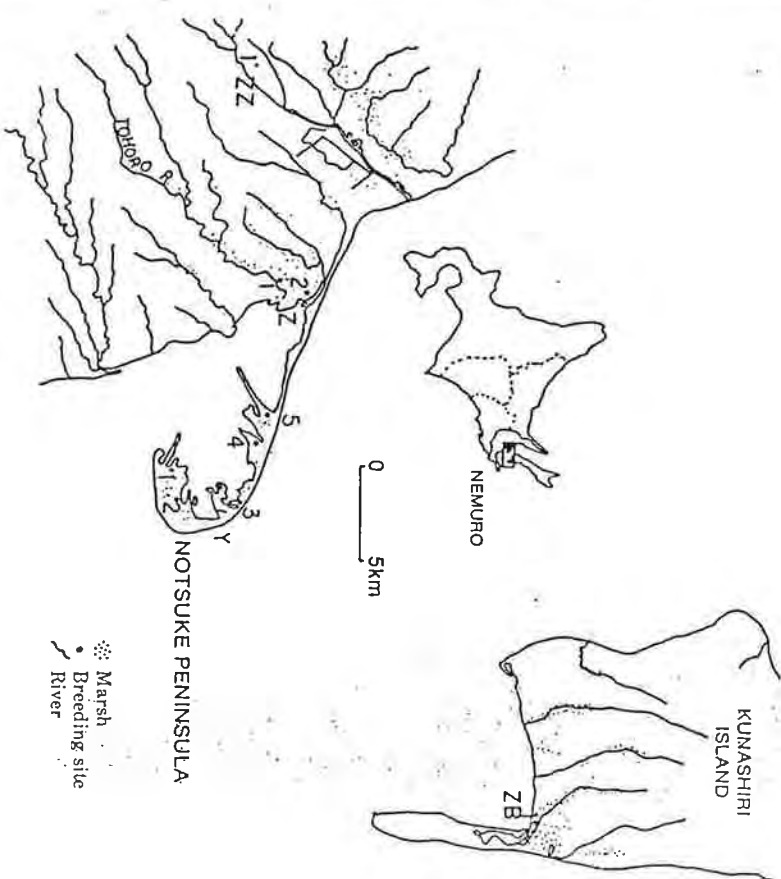


Fig. 7. Breeding territories from Y to ZZ in Nemuro.

Categories 4 and 5 include 8.4 percent of the crane breeding marshes in 1982 and are expected to increase to 34.5 percent by 1992. Some cranes are able to nest in category 4 areas (E1, F1, H5). Some are probably older pairs that tolerate a gradual deterioration of their habitat; others may be young pairs that moved into suboptimal habitat for lack of anything better. If the development plan is implemented as planned, it may very well accelerate beyond that rate.

Categories 1 and 2 are now 75.6%, but expected to be 46.2% in 1992. Each year a few new nesting areas are occupied, primarily through expansion of range, so there is a limited potential for expanding the number of the nesting sites. However, these new nesting sites

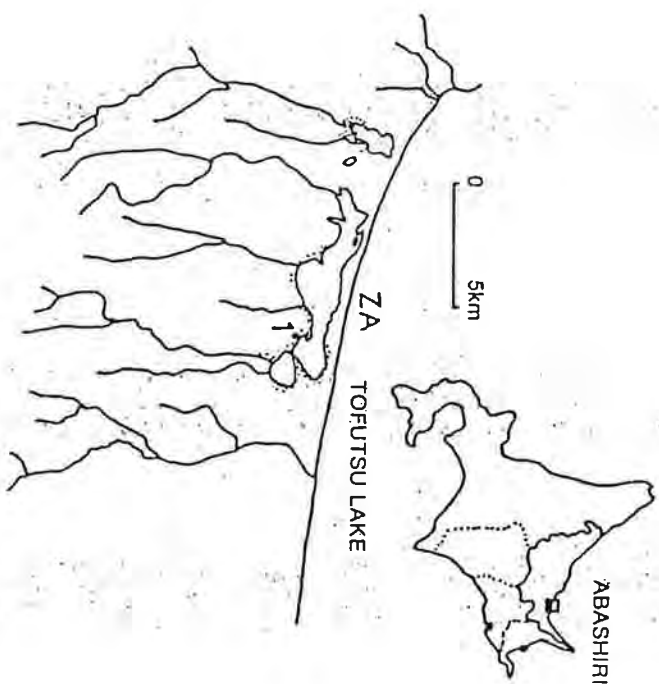


Fig. 8. Breeding territory ZA in Abashiri.

may not be adequate to support successful breeding, particularly on some of the as yet unoccupied marshes near Furen Lake.

Obviously, there are development limits beyond which the cranes cannot successfully breed, and a point may soon be reached when the productivity of the population will begin to decline on the limited and shrinking marshlands. Many mated pairs may live without breeding for several decades. It then becomes extremely important to monitor the productivity of the birds, as indicated by the percentage of immature birds in the winter flocks.

RECOMMENDATIONS

Each winter, an accurate count of the Red-crowned Cranes and their productivity is made by the Hokkaido Educational Committee. Air surveys of the breeding grounds providing data on the number and distribution of nests are carried out almost every year. Public education about crane conservation is often covered by the mass media. However, active programmes to protect the marshes are lacking. The seriousness of this problem is compounded by fact that the public has been assured that the population is increasing. Consequently, few realize the importance of protecting the marshes.

Several steps should be taken. First of all, the development around the 5012 hectare Special Natural Monument in Kushiro Marsh should be stopped or changed. Second, small marshes with one or two breeding pairs should be protected by local towns and cities. Third, the plan of road construction between Nemuro and Betsukai should be cancelled and Furen Lake, including the marshes along the lake, should be approved as a restricted area, its main purpose being the protection of wildlife. Fourth, a coordinated system of restricted areas, perhaps called "National Sanctuaries," should be considered for all of Japan.

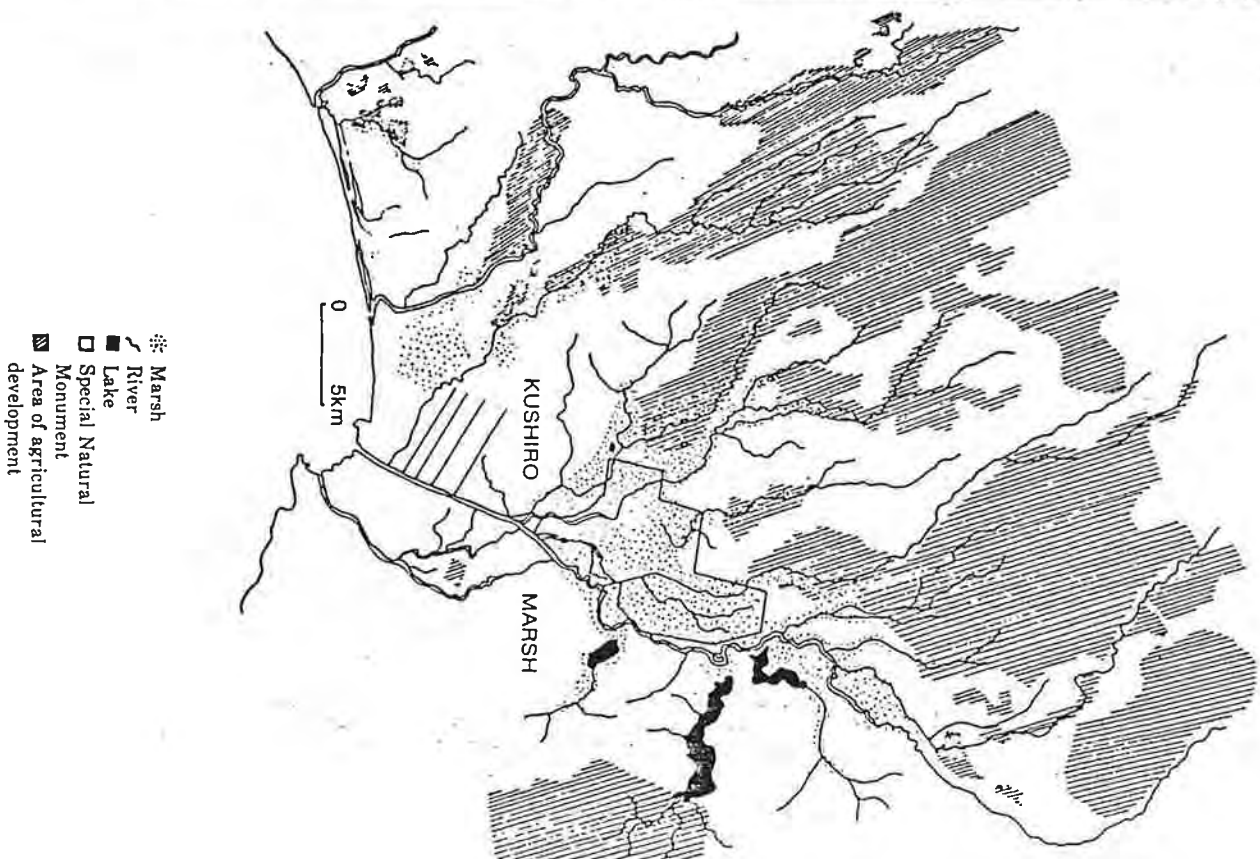


Fig. 9. Areas of agricultural development around Kushiro Marsh in 1980.

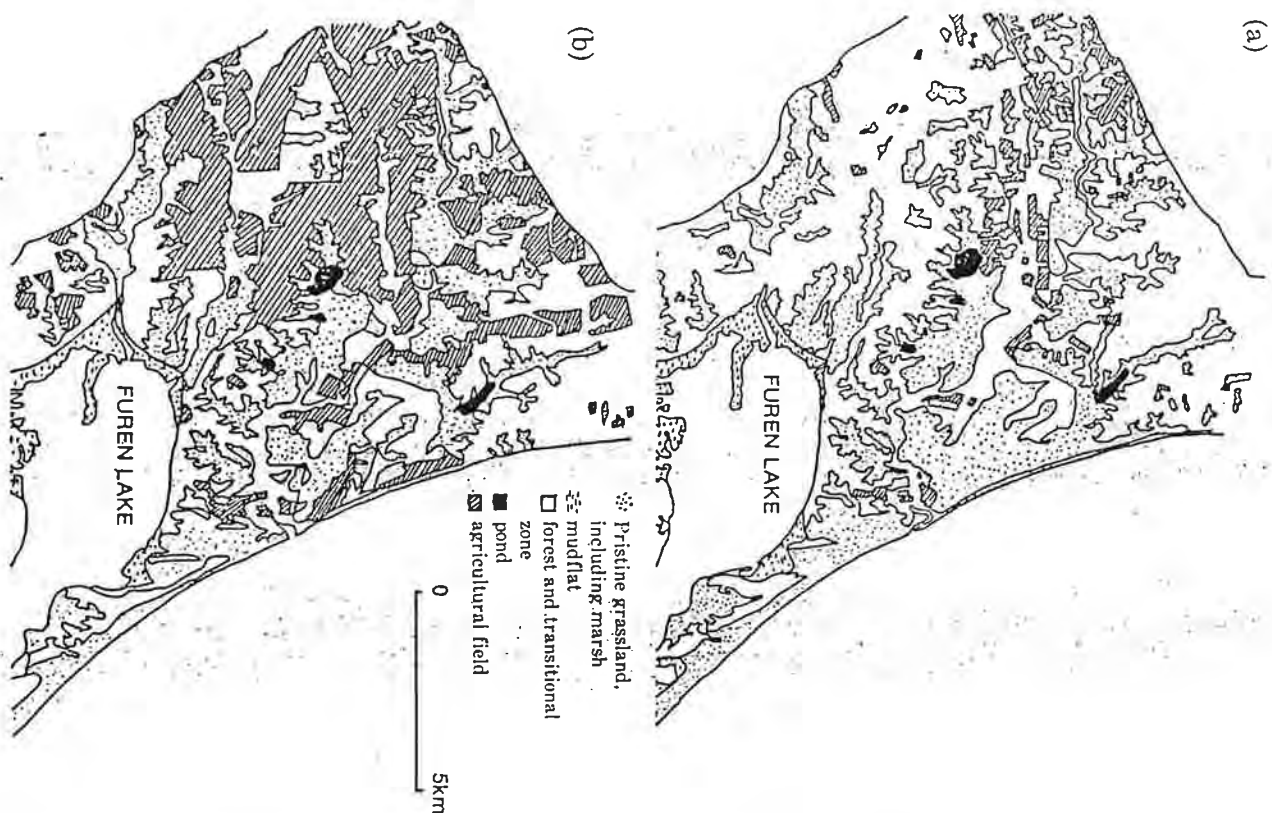


Fig. 10. Transformation of forests into agricultural fields around marshes in the north region of Furen Lake in 1945 (a) and 1976 (b) (Hokkaido Educational Committee).

Although cranes lay two eggs each year, most pairs usually rear only one chick. Researchers in Canada have found that collecting one Whooping Crane (*G. americana*) egg from each nest with two eggs augments the productivity of the wild cranes (Erickson 1976). In addition, the collected eggs establish a captive flock at the same time. Egg collecting could likewise be practiced in Hokkaido without detriment to the wild cranes. Many captive birds could then be established at both the Tanchō Breeding Center and Kushiro Crane Park with resulting progeny distributed to marshlands in Northern Hokkaido that have yet to be colonized by cranes.

Crane research should be continued and expanded. Since 1977, all of the chicks of the Whooping Crane, which is much more endangered than the Red-crowned Crane, have been all colour marked, without harm to the population (Drewien & Kuyt 1979). Colour marking with plastic leg bands would significantly improve the quality of research for Red-crowned Cranes. Such study would provide insight into the longevity of cranes, the age of first breeding, the "loyalty" of breeding pairs to a particular nesting area, the extent of monogamy, and other important consideration that will help man develop a sound conservation programme for this species.

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ON THE DISTRIBUTION OF THE RED-CROWNED CRANE IN THE DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA

PAK U IL

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The Government of DPRK emphasizes the necessity of worldwide protection of the Red-crowned Crane and the importance of international cooperation to help these treasured birds. It has therefore designated the birds and their living places as state natural monuments in April, 1946, and has established the state protection system for the conservation of cranes.

Every year toward the end of October, flocks of Red-crowned Cranes fly from the north into our country to winter. During their stay they live on scattered grain, grass seeds, grass roots, worms and field rats in the paddy and reed fields.

WEST COASTAL AREA

The main areas where Red-crowned Cranes winter in our country are the west coastal areas of South Hwanghae Province and Kaesong City (37°50' - 38°40'N, 125°09' - 126°30'E). These cranes cover the vast plains in Unyul, Chagkjon, Ilyongyon, Kangryong, Ongjin, Pyoksong, Taetan, Paechon, and Yonan counties. South Hwanghae Province and Pannun County, Kaesong City. As the cranes fly into this area, they settle first in the neighbourhood of Unyul County, South Hwanghae Province. When it gets colder they move south and winter in the above-mentioned counties.

The following numbers of Red-crowned Cranes have been observed in these areas in recent years:

229	November 1979 - February 1980
217	November 1980 - February 1981
224	November 1981 - March 1982

EAST COASTAL AREA

Red-crowned Cranes also winter in the east coastal area of our country. According to our investigations the main eastern wintering site is the neighbourhood of Kasong County, Kangwon Province (38°40'N, 128°10' - 129°20'E) where 68 cranes were observed between December 1981 and January 1982.