

WHOOPING CRANE RECOVERY ACTIVITIES

October, 2010 – August, 2011

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HIGHLIGHTS

The Aransas-Wood Buffalo population (AWBP) of whooping cranes rebounded from 263 in the spring of 2010 to 279 in the spring, 2011. With approximately 37 chicks fledged from a record 75 nests in August 2011, the flock size should reach record levels of around 300 this fall.

Threats to the flock in Texas including land development, reduced freshwater inflows, the spread of black mangrove, the long-term decline of blue crab populations, sea level rise, land subsidence, and wind farm and power line construction in the migration corridor all continue to be important issues.

Twelve whooping crane juveniles were captured in Wood Buffalo National Park (WBNP) in August 2011, bringing the total number of radioed birds to 23. Crews visited migration stopover sites to gather habitat use data. This project is being carried out by the U.S. Geological Survey (USGS) with partners including The Crane Trust, Canadian Wildlife Service (CWS), U.S. Fish and Wildlife Service (USFWS) and others. It is funded by the Platte River Recovery Implementation Program, The Crane Trust, and the Northern Prairie Wildlife Research Center. The tracking is the first done on the AWBP in 25 years and is a top research priority of the Whooping Crane Recovery Team! Since the 1950s, 525 AWBP whooping cranes have died with only 50 carcasses recovered, and approximate cause of death was determined in only 38 instances. It is imperative that we learn more about whooping crane mortality.

Based on opportunistic sightings, the Cooperative Whooping Crane Tracking Project documented 79 confirmed sightings of whooping cranes in the U.S. Central Flyway during fall, 2010 and 49 sightings in spring, 2011.

Ten captive-raised whooping cranes were released in February, 2011 at White Lake, Louisiana where a non-migratory flock had resided up until 1950. Seven of the birds were alive after the first seven months of the project.

Production in the wild from reintroduced flocks in 2011 was again very disappointing with no chicks fledged in Florida or Wisconsin. Incubation behavior in Florida and nest abandonment in Wisconsin continued to be the focus of research. Data collected so far in Wisconsin indicates that swarms of black flies play some kind of role in a majority of nest abandonments.

The captive flocks had a good production season in 2011. Approximately 17 chicks were raised in captivity for the non-migratory flock in Louisiana, and 18 chicks are headed for Wisconsin (10 for the ultralight project at the White River marshes, and 8 for Direct Autumn Release at Horicon National Wildlife Refuge). Approximately four chicks of high genetic value were held back for the captive flocks.

Including juvenile cranes expected to be reintroduced this fall, flock sizes are estimated at 278 for the AWBP, 115 for the WI to FL flock, 20 nonmigratory birds in Florida, and 24 in Louisiana. With 162 cranes in captivity, the total of whooping cranes is 599.

In personnel actions, Dr. Mark Bidwell is the new Canadian whooping crane coordinator. U.S. whooping crane coordinator Tom Stehn will be retiring September 30, 2011 after 29 years at Aransas.

ARANSAS – WOOD BUFFALO FLOCK

2010 Fall Migration in the Central Flyway

Between September 26 and December 30, 79 confirmed sightings were compiled by Jeanine Lackey of the USFWS Whooping Crane Cooperative Project Tracking Office in Grand Island, Nebraska. This compared to 95 confirmed sightings reported during fall 2009. Sightings were located in North Dakota (n=12), South Dakota (11), Nebraska (14), Kansas (20), Oklahoma (15), Texas (3), and one sighting each from Colorado, Missouri, and New Mexico. The largest group size was 21 reported in flight near the Salt Plains National Wildlife refuge (NWR) in Oklahoma on November 29. Lengthy stopovers included a pair of cranes that lingered in Kansas for 29 days, while a group of 5 cranes staged in North Dakota for 27 days. During late October, a strong low pressure system producing extreme WNW winds pushed some birds out of normal migration paths, evidenced by confirmed sightings in eastern Nebraska and western Missouri. The Missouri sighting is one of only 3 confirmed reports from Missouri since tracking began. The eastern Colorado sighting was a single bird on the Platte River the first half of October. Ten whooping cranes (8 juveniles, 1 subadult, 1 adult) were outfitted with radio transmitters and were successfully tracked via satellite to Aransas.



Migration tracks of 10 radioed whooping cranes in fall, 2010. Dr. Walter Wehtje. The Crane Trust.

The fall migration reporting season began August 18th with 1 whooping crane in a flock of 50 sandhill cranes reported just southwest of Saskatoon. By September 9th, five whooping cranes grouped as 1, 3 and 1 were known to be in Saskatchewan, including radioed subadult # 2009-01 (RAY). By September 13th, numbers had increased to 23 in Saskatchewan, with 18 of those together in a group at Muskiki Lake in SK (near Last Mountain Lake). Numbers built up to 37 at Muskiki Lake on September 29th.

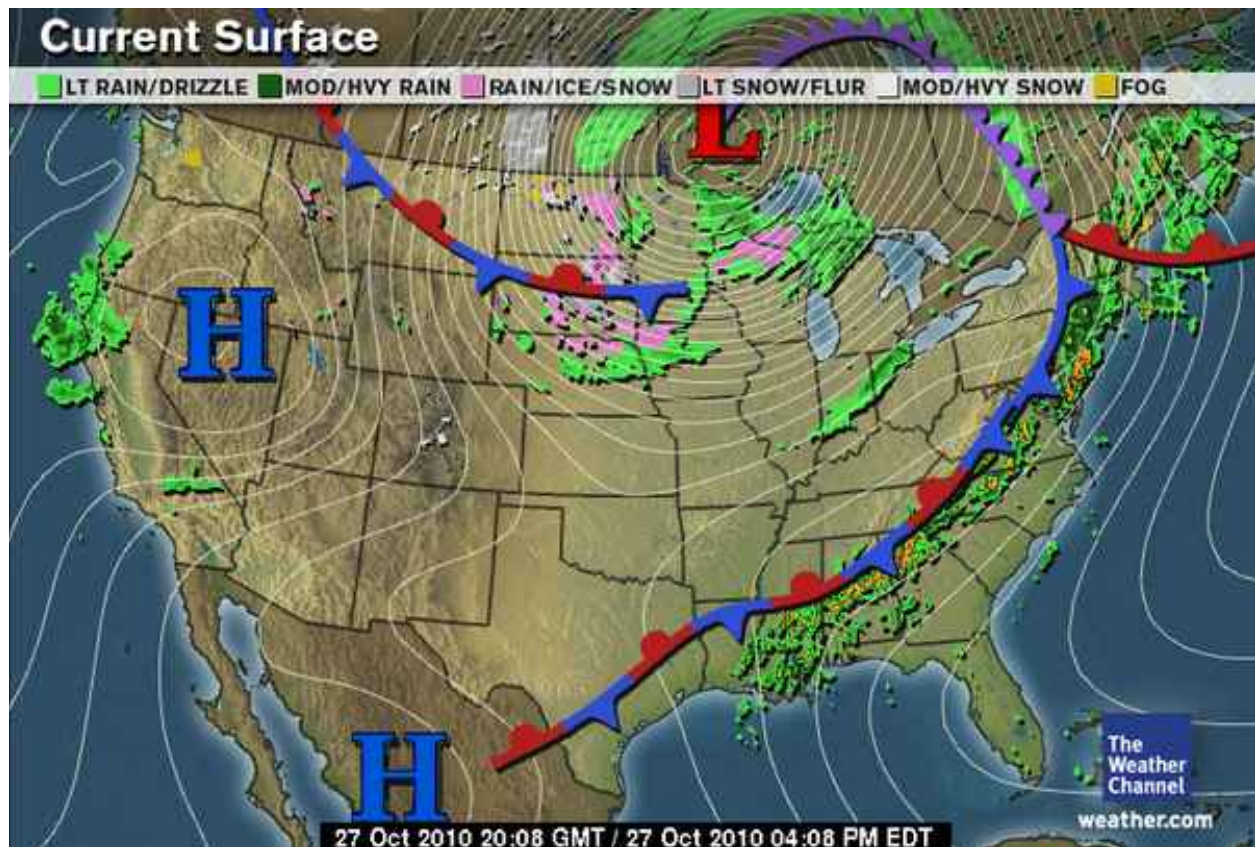
On September 19th, radioed subadult RAY was in North Dakota. Two other radioed cranes had made it to Saskatchewan, but 7 of the 10 radioed cranes were still in Wood Buffalo. The first sighting report in the U.S. though the cooperative tracking network was on September 26th in North Dakota. A second sighting from North Dakota occurred on October 1st. On that same day, one whooping crane was confirmed on the Platte River, but not in Nebraska. It was near the town of Brush in Morgan County in northeastern Colorado on the Elliott State Wildlife Area on the South Platte River. The bird was on a public waterfowl hunting area but with no sandhill hunting allowed, and managers asked for advice on how to handle the situation. About the time a plan was to be implemented, the whooper apparently moved on in the middle of October. This was the 7th sighting in the tracking data base of whooping cranes in Colorado, including one previously also in Morgan County. The 3 singles (2 in ND, 1 in CO) plus the radioed subadult RAY were the only sightings reported in the U.S. through October 8th. By October 16th, radioed subadult RAY has moved through South Dakota and Cheyenne Bottoms, Kansas to Salt Plains, Oklahoma.

The first two whooping cranes arrived at Aransas with a pair sighted October 21st by Dr.'s Felipe Chavez-Ramirez and Walter Wehtje of The Crane Trust who were working at Aransas. With some radioed birds still in WBNP and others in Saskatchewan, North Dakota and Oklahoma (RAY), whooping cranes were spread all the way from the nesting grounds to the wintering grounds. With so many cranes still in Canada, and the first 2 cranes spotted at Aransas five days past the average first arrival date of October 16th, the migration appeared to be about one week later than average in the fall, 2010.

Lots of birds were sighted in Saskatchewan in the fall. On October 21st, retired CWS crane biologist Brian Johns spotted 63 whooping cranes at 3 different locations in Saskatchewan, so that provided telltale evidence of where the majority of the flock was located. On October 22, $28 + 5 = 33$ whoopers were at Marcelin, Saskatchewan. Some cranes had been for about 7 weeks at stopovers in Saskatchewan where staging occurs. The previous record stay was a single at a stopover for 47 days in the fall, which may or may not be broken this year depending on local movements.

On October 24th, one additional radioed crane had departed the nesting grounds, leaving only one radioed crane still in the Park. Biologist Rhona Kindopp of WBNP reported that the fall weather had been very mild up through October 25th, but she was expecting more cranes to leave the Park very soon thereafter with flurries in the forecast.

On October 25th, Jeanine Lackey in the tracking office in Nebraska reported cranes were on the move, with sightings received from South Dakota, Nebraska and Kansas. On October 27th, the weather map showed an incredibly strong system with record low pressure just north of Minnesota in Canada that has been bringing violent weather to the northern and northeastern U.S., with record strong winds and tornados. Meteorologists described this as a weather "bomb", doing damage to buildings, knocking out power, wrecking tied-down small aircraft, and even flipping over tractor trailer rigs. Conditions on the afternoon of October 27th in Bismarck, ND were winds from the NW at 30 mph gusting to 46 mph. That was expected to really get the cranes moving.



National weather map, 27 October 2010, with closely spaced isobars indicative of strong winds around the low pressure.

A weaker front in central Texas on October 27th pushed on through to the coast and would have helped cranes to reach Aransas.

Biological monitors at two wind farms in South Dakota helped document the fall crane migration. At the Wessington Springs facility, monitors reported seeing their first sandhill cranes of the fall on October 26th (n=8), a few more the following day (n=107), and a mass movement (n=4,620) observed on October 28th, along with 12 whooping cranes observed at 0930 hours in flight heading south 40 meters above the ground. It is possible those 12 whooping cranes had spent the night locally and were sighted resuming their migration flight. Wessington Springs shut down their wind facility that day but resumed operations in the evening. At the Titan I wind facility, 2 flocks of whooping cranes were sighted October 28th in flight heading south. The closest the flying whooping cranes got to a Titan turbine was 0.31 miles and 300 meters above the ground.

On October 29th, 8 whooping cranes accompanied by 14 sandhills were sighted in Missouri, five miles west of Rich Hill in Bates County, that had been blown by the noteworthy low pressure system east outside the usual migration corridor. The birds were sighted standing in a corn field

by two locals and later also seen in flight. I worked closely with the Missouri Bird records Committee to evaluate this report and finally consider it “confirmed”. On October 31st, the cooperative tracking office received numerous reports of cranes having moved.

More low pressure systems moved through the Great Plains on November 6 and November 11, the latter with a strong surge of cold air that aided the crane migration. Jeanine Lackey of the Tracking Office reported on November 8th:

“Observations are still being reported from every state and Canada. A few crane groups have been lingering at locations with number of use days reaching 10 or more.”

But some cranes had already completed the migration. As of November 9th, 6 of the 10 radioed cranes were at Aransas, 1 was in South Dakota, 2 in North Dakota, and 1 in Saskatchewan. On November 16th, the one family had departed Canada, with the 4 families in North Dakota, South Dakota, Kansas, and Oklahoma.

A November 23rd weekly update from the Tracking Office had compiled 9 new sightings (5 from OK, 3 from KS, and 1 from ND). A group of 29 was reported in flight near Salt Plains NWR in northern Oklahoma on the 29th. On that same day, all 10 radioed whooping cranes were at Aransas, and the Tracking Office had no recent sightings north of Oklahoma. Two singles were seen on December 9th near Salt Plains NWR, but apparently resumed the migration on December 13th with the arrival of a cold front. This was the last sighting of the fall migration except for the single that apparently wintered in North Texas.

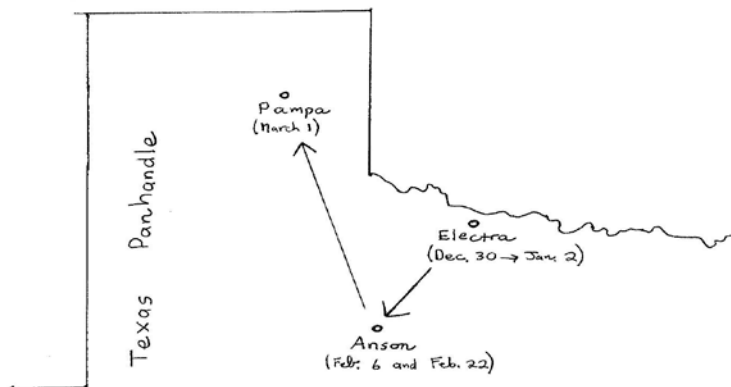
The Quivira NWR area in Kansas had 60 reports for whooping crane sightings in the fall, 2010. Whooping cranes used Quivira NWR area at some time each day from October 25 through November 24, with certain whooping cranes suspected staying multiple days and thus not counted as “new” birds. The refuge estimated that 33 different whoopers (26 adults + 7 juveniles) had used Quivira NWR and nearby fields in the fall. Other use not included in the 33 was seven adults seen near Zenith and a family group near Alden, Kansas.

One whooping crane was sighted December 8, 2010 in flight 11 miles south of Arch, New Mexico by an experienced wildlife employee. This location was 9 miles south of Grulla NWR near the Texas border where at least 2 sightings have occurred in the past. These sightings in New Mexico were all post- Grays Lake flock era, so were Aransas-Wood Buffalo National Park whooping cranes that had apparently followed sandhill cranes to west Texas in the fall before course-correcting.

The dates and locations of single white-plumaged whooping cranes confirmed in north Texas in the 2010-11 winter indicated that a single whooping crane had moved from Electra to Anson to Pampa, Texas from December 30, 2010 through March 1, 2011. This was considered to be a single subadult that wintered north of Aransas and started the spring migration with sandhills.

<u>Number</u>	<u>Date</u>	<u>Nearest Town</u>	<u>Location</u>
1 white-plumaged crane	12/30 through 1/2/11	Electra, Texas	WNW of Wichita Falls
1 white-plumaged crane	2/6/11 through 2/13/11	Anson, Texas	NNW of Abilene
1 white-plumaged crane	2/28/11 through 3/1/11	Pampa, Texas	NE of Amarillo

Figure 4. Locations of a single whooping crane in 2010-11 winter.



One unexpected winter sighting occurred southwest of Aransas. On 2-11-11, Mr. Glasscock, a maintenance worker at Welder Wildlife Refuge near Sinton, Texas flushed a group of 4 cranes (3 sandhills plus one white crane that was noticeably larger than the sandhills) from a refuge lake and watched them fly off. He had no binoculars or camera, but Mr. Glasscock was familiar with the refuge birds. This white crane was re-sighted on March 13th and March 16th, confirming it as a whooping crane, the first ever for the Welder Wildlife Refuge.

Aransas National Wildlife Refuge, Texas – Winter of 2010/2011

The number and distribution of whooping cranes were studied on the wintering grounds at Aransas during the 2010-11 winter. The peak population equaled 238 white-plumaged birds and 45 juveniles totaling 283 cranes. This was 19 birds higher than the 264 cranes present the previous winter, but still a bit of a disappointment given the high production in 2010 of 45 juveniles that arrived safely at Aransas. Mortality between spring and fall, 2010 was estimated at 25 cranes, quite a contrast from the estimate of 5 lost during the same period the previous year, but better than the estimated 34 lost between spring and fall, 2008. Mortality of 4 cranes was

detected at Aransas during the 2010-11 winter, much reduced from the 23 cranes lost at Aransas during the 2008-09 winter. Thus, 29 cranes (11.0 % of the flock of 263), died between spring 2010 and spring 2011, about what is expected. Again, this was a huge improvement over the 57 cranes (21.4% of the flock of 266) that died between spring 2008 and spring 2009.

The peak population of 283 consisted of 140 adults, 98 subadults, and 45 juveniles. A minimum of 23 cranes were color-marked, including one crane marked in the 2010-2011 winter, representing 7.8% of the peak 2010-11 winter population. The estimate of 70 pairs occupying territories was the same as the previous winter. Territories and/or use areas were located on the Refuge (20), Lamar (5), San Jose (17), Matagorda (21), and Welder Flats (7). Cranes generally were found on the refuge (93), Lamar (17), San Jose Island (59), Matagorda Island (81), Welder Flats (32), and north Texas (1). Aransas NWQR's Blackjack Peninsula that held 32.9% of the flock surpassed Matagorda Island for wintering the most cranes due to the crane response to prescribed burns done during the winter.

Quality food resources were considered to be a bit above average during the 2010-2011 winter. Blue crabs and wolfberries were plentiful in the fall. Blue crabs were greatly reduced during winter before crabs moved back into the crane marshes in the spring, but a few crabs always seemed to be available all winter. Cranes used open bay habitats during winter low tide periods foraging on clams and/or invertebrates such as mud shrimp or bloodworms. Cranes also used uplands on both burned and unburned areas, with notably heavy use made foraging on acorns on the refuge burns. Bay and marsh salinities rose in the fall until they exceeded the threshold where cranes had to make daily flights to freshwater to drink. These higher salinities were a portent of worse times to come as a severe drought dripped Texas.

Sightings in the Migration Corridor - Spring, 2011

By April 13th, all but 10 whooping cranes had started the migration from Aransas. Two cranes remained at Aransas through April 29th before departing.

Jeanine Lackey and Tom Stehn of USFWS compiled a brief update on the spring, migration.

Based on observed departures at Aransas, the migration appeared to be about a week early this spring. However, those "early birds" encountered blizzards in the Dakotas in the middle of April that slowed the migration down.

The Cooperative Whooping Crane Tracking Office in Grand Island, Nebraska compiled 45 confirmed sightings in the central flyway since March 4, 2011. The breakdown of confirmed reports by state was as follows: NE = 19, ND = 11, SD = 8, KS = 4, OK = 2, and MT = 1. In addition to the confirmed reports, the office received 18 unconfirmed and 5 probable reports.

Interesting observations of the spring, 2011 were compiled chronologically as follows:

A whooping crane was confirmed with several thousand sandhill cranes on March 4th on the Platte River in Hall County, Nebraska. Biologists on the Platte had noted a huge influx of sandhill cranes that day along with the single whooper. This whooper was probably the bird seen in Pampa, Texas on March 1st since Pampa is only about 500 miles from the Platte. Another earlier than expected sighting occurred with two whooping cranes observed near Stafford, Kansas on March 13th.

Radioed adult crane # 2011-01 departed Aransas the morning of March 21st and flew 395 miles to north Texas. From there, the family group flew to Kansas on the 22nd. They took off again on March 24th and encountered snow and clouds after crossing the Platte. With two inches of snow on the ground, they roosted on the South Loup River that evening and started a multi-night stopover. When sighted on March 28th, the radioed family group was with two other white-plumaged cranes.

A considerable number of whooping cranes stopped along the Platte River. Twenty-two whooping cranes were present April 3-4 in five groups, including two radioed families. The Cooperative Tracking Project database for April 2-5 in Nebraska tallied 15 sightings totaling 77 cranes, including a group of 21 birds confirmed on the Middle Loup River, and other groups of 11 and 9 cranes. This is quite an effort of folks finding and reporting cranes.

In mid-April, snow in the Dakotas held up the migration, but by the end of the month, multiple whooping cranes had been confirmed in Saskatchewan. As reported by Mark Bidwell of the CWS, the first sighting in Canada occurred on April 11th, with 17 whooping cranes flying together just north of Francis, SK. On April 15th, The Crane Trust reported that the first radioed crane had barely crossed the border into extreme southern Saskatchewan. By April 21st, 5 of the 11 radioed birds were in Canada. On April 25th, the first radioed crane had arrived on the nesting grounds in Wood Buffalo National Park, and two others were nearing the Park. Four were in Saskatchewan, while the remaining four were spread out between Nebraska and North Dakota. By April 28th, four of the radioed birds had reached WBNP and six were in Saskatchewan. One had just departed Nebraska and migrated into North Dakota. On either May 2 or 3, the last remaining radioed crane in the U.S. left North Dakota and flew to Saskatchewan.

Interesting notes written May 4 by Walter Wehtje of The Crane Trust:

- The two radioed adults that will be nesting are 5 miles apart in Wood Buffalo National Park, and apparently staying on their nesting territories.
- One of the radioed juveniles (# 2010-03) flew all the way to Wood Buffalo National Park, but then reversed course and returned to Saskatchewan near Prince Albert. That is a huge distance of back-tracking.
- The subadult "RAY" is actually west of Wood Buffalo National Park near Fort Providence, N.W.T.

The following is taken from the spring, 2011 report entitled “*Aransas Wood Buffalo Population Radio-Marked Whooping Crane Spring 2011 Migration Report*” by Dr. Walter Wehtje of The Crane Trust:

Since December, 2009, 12 Whooping Cranes have been captured and fitted with a GPS platform transmitter terminal (PTT)... A total of 11 marked birds were tracked during the 2011 spring migration... Whooping Cranes left ANWR from 21 March through 6 April. Travel time varied from 24 to 37 days. However, the number of days spent in actual flight was similar, averaging 12 days. Differences in migration period were due to the amount of time individual birds spent on the ground during their journey... Based on cumulative distance measurements between GPS fixes, the birds’ migration routes ranged from 2,385 miles to 2,546 miles.

The cranes followed similar paths and birds stopped over in each province and state that they migrated across. The birds spent the most time in central Saskatchewan followed by North Dakota, South Dakota and Nebraska. The birds spent a total of 207 nights in the five states and three provinces before reaching WBNP. However, because most birds spent multiple nights at the some stopover sites, there were only 81 unique locations. Of the U.S. locations, the vast majority were on private property... The only NWR visited by the radioed cranes during this migration was Salt Plains NWR in Oklahoma. The use of upland sites was greater than during the previous fall migration. However, it may well be that many of them held sheet water – this was a very wet spring throughout much of the flyway. As was the case during the fall, all eight young birds migrated successfully, with seven of them reaching WBNP. The sole exception was # 2010-06, which stopped in central Saskatchewan. After moving around for some time, it seems to have settled in southern Saskatchewan, near the border with North Dakota.

In conclusion, the spring 2011 migration provided the first opportunity to follow the first cohort of young birds as they migrated northwards... As with the previous fall migration, this season continues to demonstrate the promise of this project.

Summer, 2011 - Wood Buffalo National Park

In mid-May, Mark Bidwell and Kathy St. Laurent of CWS with help from Parks Canada found a record 75 nests on aerial surveys, surpassing the previous high by one. Water levels looked excellent and hopes were high for an excellent production year.

June production surveys were not done in 2011. Summer fires indicated habitat conditions were dry in the Park. In August, approximately 37 chicks were tallied on August surveys (final number pending). Production will be less than the 46 chicks fledged from 74 nests the previous year. Twelve whooping crane juveniles not quite old enough to fly were captured and radioed by personnel of the radio telemetry project.

Management Projects at Aransas

Refuge Observation Tower

The new refuge observation tower remained closed during the 2009-10 crane season. Deemed unusable due to safety concerns, the new ramp noticeably swayed when an individual rocked the structure. All parties involved in its construction denied responsibility for this unsafe condition, maintaining they had met all USFWS contract specifications. There was also concern that the tower's location, an opening between Mustang Lake and an oak tree mott, was unsatisfactory. Its massive roller-coaster type support structure was completely visible and reflective, whereas the old tower was mostly hidden by the trees.

The new tower was disassembled and stored on the old refuge airstrip in October 2010. Repairs were made to the old tower to prolong its usability through the 2010-11 season, after which it was torn down. A redesigned tower, constructed in summer 2011, will utilize the same footprint as the original tower with emphasis placed on it blending in with the natural environment.



Tower construction built in front of old tower. April, 21, 2009. Photo by Tom Stehn.

Matagorda Island West Marsh Restoration

With the cranes gone for the summer, work continued on a multi-year project to improve water circulation on Matagorda Island. In the 1940s, large portions of the estuarine marsh on a private ranch on the southern end of Matagorda Island were sectioned off with levees to promote drainage of the marsh for cattle production. This condition persisted until the late 1970s when Matagorda Island became part of the Aransas National Wildlife Refuge Complex. The Service installed dozens of culverts in the levee system in an attempt to restore natural flow patterns. Over the years, multiple culverts have needed replacement due to siltation, erosion, and collapse that restricted or eliminated tidal exchange in the marsh. In 2009 and 2010, 4 sets of culverts were replaced and portions of 2 levees were removed. Funding of approximately \$300,000 was obtained from the Coastal Bend Bays and Estuary Program along with additional federal stimulus dollars. A study was also initiated to assess how the new culverts were impacting marsh circulation. Three more culverts will be replaced in 2011.

Radio-Telemetry Study

In December 2010, a radio-telemetry study was initiated by The Crane Trust, Wood River, Nebraska (formerly called the Platte River Habitat Whooping Crane Trust) in partnership with USGS Northern Prairie Wildlife Research Center. A team of experienced crane biologists captured two cranes at a feeder on the Johnson Ranch on Lamar. It proved difficult to capture whooping cranes using snares since a crane had to be lured to an exact location to step on a treadle (see photograph). When tripped, nylon twine attached to a fishing pole tightened around the crane's foot and the crane would hop on one leg trying to escape. The capture team stayed close by in blinds ready to grab the snared crane. Handling time was kept to 15 minutes with health checks done, blood samples taken, the bird weighed, and the radio attached. The GPS satellite radios recorded 4 locations daily accurate to 10 meters, and downloaded that data every 56 hours.



Dr. Felipe Chavez-Ramirez of the Platte River Whooping Crane Habitat Trust sets a snare on the Johnson Ranch. Photo by Marty Folk, Florida Fish and Wildlife Conservation Commission. December 10, 2009.

The crane researchers mounted a capture operation of juveniles just prior to fledging in August, 2010 in Wood Buffalo National Park. They captured and radioed 9 juveniles, although one disappeared 2 weeks after banding and was presumed dead. The remaining 8 juveniles provided excellent data through one-year post banding. One additional crane, an adult female was captured on January 8, 2011 on the Johnson ranch next to the refuge's Lamar Unit. Personnel had set out a snare attached to a long twine, and when the bird stepped in the snare, they yanked on a fishing pole and tightened the snare, ran out from blinds and grabbed the bird. Designated as radio # 2011-01, this family group hung out a lot between 4th and 12th streets on Lamar utilizing game feeders, and then flew across St. Charles Bay to the extreme south end of Aransas NWR to roost. This radioed adult migrated back to WBNP and nested, but later died during the summer, 2011. Project biologists radioed an additional 12 juveniles in WBNP in August, 2011.

Resource Issues that Threaten the AWBP

Black Mangrove

A long-range threat to the cranes is the ongoing northward range expansion of black mangrove on the Texas coast. This expansion is connected with climatic warming and the lack of hard, winter freezes. Average winter water temperatures have risen about 3 degrees coast-wide over the past 30 years (James Tolan, Texas Parks and Wildlife Department, quoted in the Corpus Christi Caller-Times, October 16, 2009).

In the past, hard freezes over multiple days limited the northward spread of mangrove since mangrove can only tolerate short spells of freezing temperatures, but these freezes have to be severe. I remember in 1983 when the bay edges froze and the manager's children went ice-skating on San Antonio Bay. Temperatures were below 20 degrees Fahrenheit something like 5 days in a row. Although McMillan (1975) suggested that the Texas mangrove population belongs to a genetic race capable of surviving colder temperatures, the December 1983 freeze resulted in an 85 percent reduction in Texas, with twig damage to the base of the plant or to 50 cm above the base (Lonard and Judd 1985). However, mangrove shrubs under 1-meter in height sustained only leaf loss. Lonard and Judd (1985) observed re-growth of severely damaged plants from the base or from below ground structures the following spring. Aransas has not had any weather like that in over 2 decades. In the 2010-11 winter, night-time temperatures dropped as low as 25 degrees for several days during two separate cold spells, but daytime temperatures that rose just above freezing helped the mangrove survive.

Whereas 15 years ago only a few individual black mangrove (*Avicennia germinans*) were present at Aransas (McAlister and McAlister 1995), black mangrove has in the last 5+ years notably invaded portions of the crane range. Thousands of black mangrove shrubs are present, as well as a few red mangrove individuals known on the north end of Matagorda Island. Mangrove is now found on Matagorda Island from Shell Reef Bayou all the way to the north end of the island. It can also be found along the GIWW on Aransas NWR, and on the islands on either side of Shoalwater Bay at Welder Flats. Instead of scattered bushes the way it used to be, some areas are now 100% mangrove coverage. I have no idea why it is not invading marshes on San Jose Island, but it may be limited by seed source or by specific water regimes in those areas. Dr. Liz Smith of the International Crane Foundation plans to study the distribution of mangrove in the crane area. The Mission-Aransas National Estuarine Research Reserve also has applied for funding to do a mangrove study.

With continued global warming, the range of the mangrove will likely move north and decrease the value of the salt marsh for whooping cranes since they do not utilize brushy habitat. Mangrove shrubs in the crane area are shading out and eliminating plants important to whooping crane such as Carolina wolfberry that is an important food source in the fall when the cranes

arrive. Plant heights of mangrove at present appear all less than 4 feet. It is doubtful the cranes will tolerate the presence of mangrove as it gets taller and denser since it would restrict visibility and could greatly increase the risk of predation from bobcats. It is not known if whooping cranes would eat mangrove fruits.

From an ecological standpoint, it may not be coincidental that the southern end of the crane range used to start just a few miles north of black mangrove. Hundreds of acres of occupied crane range have already been impacted. I believe the northward spread of mangrove is one of the most worrisome issues facing the cranes and estimate that > 33% of the winter crane range could become a monotypic stand of mangrove. Although its eventual distribution in the crane range may be limited by hydrological conditions, it currently is found over about one third the width of Matagorda Island from the outer bay edges inwards towards the interior marshes. The density of the mangrove seems to be increasing exponentially. No one has formulated any plans on what to do about this situation. Mangrove could theoretically be controlled with chemicals, but what a massive undertaking that may not be feasible. Also, mangrove has always been a plant favored by fisheries biologists, so permitting for mangrove control could be a difficult issue.



Dark green mangrove bushes filling in the salt marsh in the whooping crane winter range. Phot by Tom Stehn, USFWS.

Cedar Bayou

Cedar Bayou is a natural opening between the Gulf of Mexico and the bay systems and coastal marshes that make up the critical habitat of the whooping crane. An open Cedar Bayou boosts bay productivity. This pass is very important for organisms including shrimp and crabs that move between the bays and Gulf to complete their life cycle. By early 2010, Aransas County officially became the applicant for a dredging permit, continuing the earlier efforts of a citizen group called Save Cedar Bayou, Inc. In August 2010, USFWS wrote a draft biological opinion as part of the formal Section 7 consultation for the proposed dredging. On October 8, 2010 an armada of boats and officials traveled to Cedar Bayou in support of the permit application. Final details involving mitigation slowed the process, but in 2011 the County received their dredging permit. However, project costs have risen and are now estimated to be greater than 5 million dollars. Only about a half million dollars have been raised so far.

Crab Traps, Closures, and Decline of Blue Crab Populations

Over many decades, abandoned commercial crab traps had literally been scattered throughout Texas bays. These abandoned traps continued catching fish, crabs and the occasional diamondback terrapin for many months until the trap wire rusted through, a tremendous waste of the resource. Abandoned traps also posed a navigation hazard to sports fishermen. For the past ten years, a new Texas Parks and Wildlife Department (TPWD) regulation provided a 9-day period in February when all crab traps had to be out of public waters. During that period, it became legal for anyone to pick up any traps that remained. This very successful program has resulted in the removal of 29,053 traps, with 9,254 coming from San Antonio Bay where the whooping cranes winter. Now that's a lot of litter! This program has resulted in fewer abandoned traps in the water catching critters and getting tangled on boat props.

In 2011, the closure period ran from February 18-27, with the public organized to pickup traps on February 19th. The San Antonio Bay system vied for the most traps removed, coming in a close second with 554 traps removed out of the coast-wide total of 1,491. Refuge staff picked up around 100 traps.

Two years ago, the refuge posted the waters on Matagorda Island as closed to commercial crabbing. In mid-September 2010, a fishing guide who frequently fishes Matagorda Island called the refuge to report 50+ commercial crab pots on Matagorda Island located in Fifth Lake which is located between Power and Contee Lakes. TPWD was asked to respond and the traps got removed.

In December 2010, the only commercial blue crab traps observed on whooping crane overflights were a string of around 100 in the bay edge off of Matagorda Island between Twin Lakes and Power Lake. No traps were found in the crane marshes or within 100 yards of shore from a crane marsh, a zone that the refuge had asked TPWD to consider closing. Before making a

recommendation to the TPWD Commission, state biologists wanted additional data on how many crabbers would be impacted. Following the drought in 2008 and 2009 and the crash of the crab population, local fishermen stopped crabbing since harvest became so low that it wasn't worth their effort. Thus, information could not be collected on the crabbing pressure previously observed. Thus, TPWD never took action on the proposed closure.

A forum entitled *Blue Crabs: A Hot Topic in the Coastal Bend* held in January, 2011 was described by Chad Leister, Coastal Training Program Coordinator, Mission-Aransas National Estuarine Research Reserve (NERR).

"Blue crabs are economically valued as a food item and are a major component of the estuarine food web. They are scavengers that also serve as prey items for other crabs, fish, and many types of birds, including the endangered Whooping Crane. Unfortunately, blue crab abundance is declining both locally and statewide, according to the Texas Parks and Wildlife Department. The Coastal Training Program (CTP) hosted a "Blue Crabs and Texas Coastal Ecosystems Conference" at the University of Texas Marine Science Institute on January 26, 2011. This one-day event was timely and relevant for the Senate Bill 3 process, which allows scientists and other stakeholders to submit freshwater inflow recommendations to the Texas Commission on Environmental Quality. Expert scientists involved in this process had considered using blue crabs as an indicator of salinity levels, but knowledge about local blue crab populations is limited. The CTP recognized this information gap and provided a forum for the exchange of information between over 75 experts, local resource managers, scientists, and stakeholders. The conference featured numerous local speakers in addition to blue crab experts Dr. David Eggleston from North Carolina State University and Dr. Dan Rittschof from Duke University. Evaluation surveys showed that participants found the information very helpful with 98% of attendees reporting an increase in their knowledge and skills. One participant described the event as providing, "a broad base of information on a discrete topic ... a really great opportunity to share information and gain different perspectives."

Freshwater Inflows

Water resources continued to receive a tremendous amount of attention in Texas in 2010 with several major ongoing initiatives. The population of Austin and other Central Texas cities has exploded; Austin's water use nearly tripled between 1970 and 2010. Texans are realizing that inexpensive water is a limited resource. The current drought, drier than any other October, 2010 through May, 2011 stretch in Texas history, has heightened the stakes in an already contentious long-term planning battle over water.

Water issues are of great concern for whooping cranes. Data show that the health and survival of the endangered whooping crane flock is directly related to freshwater inflows from the Guadalupe and San Antonio rivers. The two rivers emerge from underground springs near San Antonio and run 250 miles to the southeast where they join before entering San Antonio Bay and flow into whooping crane critical habitat north of Aransas. Inflows carry sediments and

nutrients that increase bay productivity and boost crab populations. When inflows are high, blue crabs, the primary food of the whooping crane, are usually abundant. Inflows also lower bay and marsh salinities, which also benefits blue crabs since fewer predators on blue crabs are found in less saline waters, thus boosting blue crab survival. Inflows also maintain salinity levels below 18 parts per thousand needed for drinking water by whooping cranes.

Ongoing work on water issues included the following:

Environmental Flows Allocation Process

The Texas Senate Bill 3 Environmental Flows Allocation Process for establishing minimum inflows for the Guadalupe, San Antonio, Mission, and Aransas rivers and for Aransas and San Antonio bays got started in 2009 and was completed in March, 2011. Unfortunately, the resultant recommendations reduced the level of recommended inflows by about 80% compared to the levels previously recommended by TPWD (Longley 1994). The report is very difficult to understand with much of it based on hydrology models that, in my opinion, may not have properly weighed basic ecological principles.

In the summer of 2011, the report written by the San Antonio Basin and Bays Expert Science Team (BBEST) was being evaluated by the Basin and Bay Area Stakeholder Committee (BBASC) for the Guadalupe, San Antonio, Mission, Aransas and Copano Basins. The BBASC is charged with considering other uses of water and balancing the needs for water development for human use with the water needs to protect a sound environment. If the BBASC finds that the flows for the environment cannot be met given existing and proposed diversions, the BBASC is to develop strategies aimed at achieving these targets. The BBASC will then provide its comments and recommendations to the Texas Commission on Environmental Quality (TCEQ) for consideration in developing rules to govern the future of the basin. These comments are scheduled for submission to the TCEQ by September 1, 2011.

Edwards Aquifer Recovery Implementation Plan (EARIP)

The EARIP continued working hard in 2010 and 2011 on a plan to protect endangered species connected with springs in the Texas Hill Country. Although the Edwards Aquifer is a long way from the coast, spring flow can be a major component (up to 80%) of river inflows into whooping crane critical habitat in times of drought. Sufficient inflows are essential to support abundant blue crab populations, the primary food of whooping cranes during winter. Unfortunately in my opinion, this group had decided not to consider the impact of spring flows on the whooping crane despite a publication by Frye (2010) that had cited numerous studies linking the two. It will be up to USFWS to decide if the increased pumping amounts allowed in the draft plan would adversely affect whooping cranes. A funding mechanism to pay for projects needed to protect endangered spring species was still a sticking point in June, 2011.

The Aransas Project Law Suit

Concerning The Aransas Project's lawsuit against the TCEQ for illegally harming endangered whooping cranes, an appeal in the case was ruled upon by the end of 2010. The court allowed the San Antonio River Authority (but not 2 other groups) to support the Guadalupe Blanco River Authority (GBRA) in defense of the charges pending against the TCEQ. Parties are currently busy getting ready for the trial scheduled to start in December, 2011.

Land Development

Real estate development pressures that have increased rapidly in whooping crane habitat in Aransas and Calhoun counties make the need for habitat protection measures paramount for the recovery of the species. For the species to reach the downlisting target of 1,000 cranes, the flock would have to expand into all available salt marsh between the Nueces and Colorado Rivers from Corpus Christi to Brazoria, Texas (Stehn and Prieto 2010). In addition to protecting salt marsh, upland buffers are needed along all salt marsh areas to provide the cranes necessary upland foraging habitat, fresh water to drink, and a buffer from disturbance. Buffers will also allow the marsh to move inland as sea level rises. Without protecting these additional lands, whooping cranes will not have enough winter habitat to support flock expansion and recovery goals may never be reached.

Although the economic recession slowed down land development projects in the crane area, projects that the USFWS was involved with in 2010 and 2011 are described below. These developments that have applied for permits or are in the process of applying included The Boardwalk and Reserve at St. Charles, Falcon Point Ranch, and the Shell Point Ranch. Whooping cranes have been sighted using all of these properties. The USFWS is recommending formal consultation under the Endangered Species Act (ESA) for all of these actions, and will assess impacts of all these proposed projects.

Falcon Point Ranch

A 700-acre Falcon Point Ranch canal lot housing development has been proposed on property at Welder Flats near Seadrift that includes some whooping crane critical habitat. The developer has applied for a Section 404 Wetlands permit from the Corps of Engineers. This development would remove 136 acres of upland whooping crane critical habitat, but would stay out of the much larger salt marsh area on the property where the cranes spend nearly all their time during the winter. The Service requested that the Corps require formal consultation under the ESA. Work on this matter continued in 2011, with efforts made to get key parts of the property protected through conservation easements, including one from the Natural Resources Conservation Service (NRCS). When the deal through the Texas Nature Conservancy (TNC) for a proposed conservation easement on the nearby Cliburne Ranch fell through, permission was received to transfer grant monies that had been obtained over to Falcon Point. The Whooping

Crane Conservation Association agreed to provide a match for a 10-acre piece of land on Falcon Point inside whooping crane Critical Habitat. However, the costs are high and the deal was still pending in summer, 2011.

Shell Point Ranch

This property located immediately north of Holiday Beach has been looked at by several developers over the past several years. Preliminary advances made to protect it with conservation dollars had been unsuccessful. In the past, aerial data showed that a low number of whooping cranes had occasionally used these marshes. Data in the 2009-10 winter from the radioed Newcomb Bend crane family indicated considerable use on the property, with 10 percent of all their locations on the Shell Point Ranch. The property is low in elevation and has two marshes totaling 63 acres adjoining Copano Bay. Original plans were altered so that these two salt marshes would not be built upon, but development would occur right up to the edge of those areas. This permit application to the Corps of Engineers was still pending through August, 2011 and is expected to go through formal consultation under the ESA.

The Reserve at St. Charles and The Boardwalk

This housing development has been started, but is still awaiting action on its permit application to build canal lots. Ongoing construction is currently only on bay-front homes. The owner has apparently purchased a conservation easement on the Falcon Point Ranch as a mitigation measure and has donated a 9-acre piece of the property to Goose Island State Park

Big Tree Ranch

In March 2008, Horizon Environmental had contacted the refuge and Ecological Services about building a canal subdivision on the 80-acre Big Tree Ranch. This property is located on the west side of St. Charles Bay immediately south of the Lamar Unit of the Aransas NWR and surrounds the historic largest live oak tree in Texas that is a part of Goose Island State Park. In 2009, the planned subdivision fell through and the property was put back on the market. Goose Island State Park and the adjacent property owners put a proposal together to purchase the property for conservation purposes and applied for a grant. However, funding for this project was not received through the Coastal Issues Assistance Program (CIAP) in 2011. CIAP also turned down funding requests for a whooping crane lands acquisition project submitted by TNC and did not fund the dredging to re-open Cedar Bayou.

Land Protection

Whooping cranes already make considerable use of wetlands and adjacent upland habitats on private lands outside of Aransas and Matagorda Island NWRs. Real estate development pressures are rapidly increasing along these formerly isolated salt marshes along the bay shores.

Additional lands must be protected in the next 10 years or it may be too late for the species to reach recovery goals. Some of these areas are included as designated Critical Habitat; others are not. Although an expansion of Critical Habitat is warranted and was discussed with the Regional Director, the backlog of listings and critical habitat designations nation-wide make it unlikely that USFWS will initiate this action anytime soon.

The Service prepared a map in GIS format showing the current range of the whooping crane and habitats that the cranes are expected to use in the future. Upland buffers a minimum of 300 meters wide are needed along all marsh areas used by the cranes to provide them necessary upland foraging habitat, fresh water to drink, and a buffer from disturbance. Buffers will also allow the marsh to move inland as sea level rises.

The TNC in partnership with other agencies continued work to protect key areas with conservation easements placed on buffer areas as a means for people and wildlife to coexist. However, no large pot of funds has been set aside for this urgent need. Instead, TNC had to apply for individual grants when a piece of property became available. This slows the acquisition process and can discourage landowners not willing to wait several years before a transaction can be completed.

In 2009, the Coastal Bend Bays and Estuaries Program (CBBEP) moved to protect 168 acres of salt marsh near Holiday Beach that is occupied by whooping cranes. Fortunately for the cranes, the jurisdiction of the CBBEP reaches up into the southern portions of the crane range. In April 2009, the Texas Parks and Wildlife Department (TPWD) received a grant for \$260,250 to purchase the tract. The Whooping Crane Conservation Association agreed to provide a private match for the grant. This matter was still pending in July, 2011.

The Natural Resources Conservation Service (NRCS) purchased a conservation easement under the Wetland Reserve Program on the rest of the John Welder and worked to protect the Jay Cliburn property at Welder Flats as well as a portion of Falcon Point Ranch. NRCS is authorized to offer around \$1,750 per acre for conservation easements.

Aransas NWR partnered with the USFWS Division of Realty to write a Preliminary Project Proposal (PPP) for additional refuge land acquisition. This is part of the Land Acquisition Plan (LAP), a step-down plan identified in the refuge's Comprehensive Conservation Plan that was finalized in September, 2010. The PPP will identify lands which consist of suitable whooping crane habitat which would be instrumental in the downlisting and recovery of the species. Lands to be acquired may consist of both fee title acquisition and conservation easements. The LAP will include an Environmental Assessment or Environmental Impact Statement which will be open to the public for comment.

Oil and Gas

In 2010, Chaparral Energy obtained a permit to work on gas wells in Mesquite Bay. They carried out a marsh creation project to place the dredge material generated from getting equipment to the well sites. The new marsh was placed just off-shore of Roddy Island and should produce potential habitat for whooping cranes and other wetland species as well as stop erosion along the shoreline of Roddy Island. Field operations for the new marsh were started in May, 2010. Vegetation was planted in the fall, 2010 and additional contouring was completed in the spring, 2011. One additional marsh creation project occurred in the 2010 summer as the Corps of Engineers used dredged material to create a second rectangular cell at Welder Flats at Beneficial Use Site "A".

At Aransas, the Hill Corporation purchased the Aransas field from ConocoPhillips and will continue to carry out oil and gas operations on the refuge. Conoco had first discovered this hydrocarbon field in the 1930s about 6 years before the refuge had been established and had operated over 80 wells during the life of the field. Currently, only a few wells are still producing, and wells drilled recently have not been producers. No seismic operations were conducted in whooping crane critical habitat in 2011.

In Canada in October 2010, the oil sands giant Syncrude was fined \$3 million for the deaths of 1,600 ducks that had occurred a few years previously. In late October, another 350 waterfowl died in a tailings pond, much to the consternation of environmentalists. Radio telemetry data from whooping cranes shows that the tar sands region is located in their migration corridor. In fall 2006, a whooping crane family group had been sighted on the Platte River in Nebraska with what appeared to be oil on their lower bodies. One can only speculate if the cranes had gotten in to a waste pit in the tar sands region, though the exposure could have taken place anywhere between the Northwest Territories and Nebraska. However, tar sand waste pits are an issue of concern for whooping cranes.

Power Lines

Collision with power lines is the number one known source of mortality for fledged whooping cranes. Communications continued in 2010 between the Service and Avian Power Line Interaction Committee (APLIC) on measures that might be implemented to reduce the threat that continued power line expansion in the migration corridor poses for whooping cranes. A meeting was held in January, 2011 to see if the utility industry was interested in writing a Habitat Conservation Plan (HCP) for utility construction and operations throughout the whooping crane corridor. A technical committee chaired by Jim Jenniges of Nebraska Public Power Districts was formed to explore this further.

A local power line issue at Aransas arose as a family of whooping cranes continued to use a game feeder located adjacent to Highway 35 just north of Holiday Beach on property owned by

Mr. Dan Parker. After twice observing the cranes low in flight coming in to that feeder, I had requested in March 2010 that the American Electric Power (AEP) utility mark the distribution lines on both sides of Highway 35 close to the feeder. This project was completed on one side of the highway by October, 2010.



Power line marked by AEP with bird flight diverters on one side of highway by Lamar feeder. October 27, 2010. Photo by Tom Stehn.

Sea Level Rise

To forecast the effects of sea level rise (SLR) at Aransas, USFWS scientists in the Washington office contracted work on a Sea Level Affecting Marshes Model (SLAMM) out to Warren Pinnacle Consulting, Inc. in Warren, Vermont. This was completed in October 2010 (Clough and Larson 2010). Highlights of the report are provided below.

Changes in tidal marsh area and habitat type in response to sea-level rise were modeled using the Sea Level Affecting Marshes Model (SLAMM 6) that accounts for the dominant processes involved in wetland conversion and shoreline modifications during long-term sea level rise. Successive versions of the model have been used to estimate the impacts of sea level rise on the coasts of the U.S. Within SLAMM, there are five primary processes that affect wetland fate under different scenarios of sea-level rise: inundation, erosion, overwash, saturation and accretion.

Based on IPCC (2007) projections, SLAMM 6 was run using a primary scenario of a likely range of 0.21 to 0.48 meters of sea level rise by 2090-2099 “excluding future rapid dynamical changes in ice flow.” The scenario that was run as a part of this project falls near the middle of this estimated range, predicting 0.39 meters of global sea level rise by 2100. Maximum sea level rise predictions used predicted 0.69 meters of global SLR by 2100.

The latest literature (Chen et al., 2006, Monaghan et al., 2006) indicates that the eustatic rise in sea levels is progressing more rapidly than was previously assumed, perhaps due to the dynamic changes in ice flow omitted within the IPCC report’s calculations. A recent paper in the journal *Science* (Rahmstorf, 2007) suggests that, taking into account possible model error, a feasible range by 2100 of 50 to 140 cm. This work was recently updated and the ranges were increased to 75 to 190 cm (Vermeer and Rahmstorf, 2009). Pfeffer et al. (2008) suggests that 2 meters by 2100 is at the upper end of plausible scenarios due to physical limitations on glaciological conditions. A recent US intergovernmental report states "Although no ice-sheet model is currently capable of capturing the glacier speedups in Antarctica or Greenland that have been observed over the last decade, including these processes in models will very likely show that IPCC AR4 projected sea level rises for the end of the 21st century are too low." (US Climate Change Science Program, 2008) A recent paper by Grinsted et al. (2009) states that “sea level 2090-2099 is projected to be 0.9 to 1.3 m for the A1B scenario...” Grinsted also states that there is a “low probability” that SLR will match the lower IPCC estimates. To allow for flexibility when interpreting the results, SLAMM was also run assuming 1 meter, 1½ meters, and 2 meters of eustatic sea-level rise by the year 2100.

The historic trend for sea-level rise in this area was estimated at 5.16 mm/year using the nearest NOAA gage with long-term SLR data (8774770, Rockport, TX). The rate of sea level rise for this refuge has been substantially higher than the global average for the last 100 years (approximately 1.7 mm/year, IPCC 2007a), and this difference is likely due to land subsidence. The differential between local and global rates of sea-level rise is projected to continue through the year 2100 within these model simulations.

Results for Aransas NWR - Between 5% and 15% of undeveloped dry land – which makes up roughly half of the refuge – is predicted to be lost in sea-level rise scenarios of up to one meter by 2100. However, when sea-level rise increases to two meters by 2100, the dry-land loss approaches 56%. Inland fresh marsh is relatively unaffected until sea-level approaches and exceeds one meter by 2100. Up to 30% of this land-cover category is ultimately vulnerable to the effects of sea-level rise. Refuge salt marshes show an interesting pattern in this analysis with up to 70% of regularly flooded marshes lost in scenarios of

approximately one meter of SLR. However, in higher SLR scenarios, much of the dry lands on Matagorda Island and San Jose Island are predicted to convert to marshlands thus reducing overall category loss rates.

Aransas National Wildlife Refuge is predicted to show more severe effects of sea-level rise than other areas because of its historically-high relative sea-level rise, likely due to land subsidence. Sea-level rise is predicted to continue to be differentially higher in this location than it is worldwide. Within the refuge itself, inundation in the Matagorda Unit is predicted to be most extreme, with regularly-flooded, irregularly flooded and beach converting to water, and dry land converting to swamp and regularly flooded marsh. In the Aransas Unit, land loss occurs mainly along the Intracoastal Waterway, which is lined by regularly and irregularly flooded marshes... The Tatton and Lamar Units, both small properties populated by few dikes and many marshes, are also predicted to be heavily impacted by sea level rise.

A chapter on “Coastal Impacts” by Dr. Paul Montagna et al. in a book entitled *The Impact of Global Warming on Texas, 2nd Edition* (J. Schmandt, J. Clarkson and G. R. North, eds. 2009) provided data on expected sea level rise and its effects.

Tide gauge records in south Texas show a rise of 1.8 mm per year, and land subsidence was recorded at 2.8 mm annually, or a net change of 4.6 mm (0.18 inches) each year at Rockport. This shows that land subsidence caused by extraction of oil, gas and ground water withdrawal is a significant component of relative sea level rise. The Intergovernmental Panel on Climate Change (2007) provides sea level rise model projections by the year 2099 of 0.6 to 1.9 feet. After adding estimates for land subsidence, the amount of projected relative sea level rise by the year 2100 is 1.5 to 3 feet in Rockport. On the low-lying, sandy barrier islands of the micro-tidal Texas coast, a rise of just 0.3 feet in relative sea level can cause conversion of fringing low marshes and flats to open water and sea grass beds, and usually dry high marshes and flats to usually wet low marshes and flats (Gilbeaut et al. 2003). Based on the observed conversion of tidal flats to open water and sea grass beds and the migration of marshes into higher areas since the 1950's on Mustang Island (White et al. 2006), it is unlikely that vertical accretion will offset the effects of relative sea level rise. Upland slopes on Mustang Island and other barrier islands in Texas increase towards the core of the islands, which will temper the amount of new marsh that can develop, and it is likely that future development will obstruct new marsh creation. Erosion of the outer edges of marsh and flats since the 1930's has caused shoreline retreat in the range of 1.6 – 8 feet per year along most of the Mustang Island bay shoreline (Morton and Paine 1984, Williams 1999). Rising sea level, increasing aridity, and increasing storm intensity will drive the Texas barrier islands toward narrower, lower-lying islands that are more frequently washed over and severed by tropical storms. Eventually, portions of the Texas barrier islands chain will be destroyed, similar to the demise of the Chandeleur Islands in Louisiana following recent hurricanes.

There has been a long-term trend of increasing temperature along the entire Texas coast at a rate of 1 degree F every 13 years measured starting in the late 1970's. It appears that increased water temperatures will lead to decreased dissolved oxygen and water quality. Increasing sea surface temperatures along the Texas coast mimic what is occurring in many of the World's

oceans. These increased surface temperatures are correlated to increased occurrence of intense tropical storms (Webster et al. 2005). Tropical storm activity is variable from year to year, but more intense storms could have dramatic effects on coastal inundation and habitats.

Dr. Elizabeth Smith of TAMU-CC did some mapping and analysis of how habitats on the Lamar Peninsula might be affected by sea level rise. Her graphics (not provided here) are eye-catching.

Sea level rise is often a combination of global (glacial and ice cap melting, thermal expansion of seawater) and local (subsidence) effects. These changes in sea level result in coastal habitat changes, resulting in several implications of coastal species territory maintenance and reproduction. In addition, development rates continue to increase along the coastal zone and native coastal habitats are converted to urban and municipal land uses.

This project focused on the Lamar Peninsula that is located between St. Charles and Copano bays and inland of Blackjack Peninsula where the Aransas NWR is located. The peninsula has a combination of small urban development areas and conservation sites. To incorporate these models into GIS, we created crosswalks that described how the wetland types would shift under a 1-m sea level rise scenario along the Texas Coast.

Current elevation of Lamar Peninsula ranges from 0 m to 6 m, with an extensive area comprised of the 1-m contour. When referring to the present wetland conditions to the future sea level rise map, it becomes apparent that potential habitat for whooping cranes may be available.

Dr. Smith's maps showing projected shifts in whooping crane territories assumes that habitats are allowed to move and change over time. Coastal development including bulkheading may not allow such changes to occur.

Wind Energy Development

The development of wind farms is occurring at a rapid pace in the Central Flyway with many of the best wind sites located in the whooping crane migration corridor. Multiple wind farms have already been built, and it is important to analyze the potential impact of literally tens of thousands of wind turbines that will be placed in the whooping crane migration corridor in the coming years. Current estimates are that 2,705 turbines are operational at 40 wind farms in the U. S. whooping crane migration corridor. The average wind development project consists of 57 turbines (data generated by the Great Plains Wind Energy Habitat Conservation Plan in March, 2011).

The majority of wind farms do not require federal permits and thus there is no nexus for the companies to consult with USFWS under the Endangered Species Act (ESA). However, all projects must avoid "take" of endangered species under Section 9 of the ESA. For the totality of wind energy development, there is a very definite issue of adverse impacts to whooping cranes. Wind farms have the potential to directly kill whooping cranes from the turbines themselves or associated power line development, or could result in "take" of hundreds of square miles of migration stopover habitat if whooping cranes tend to avoid wind farms. The National Academy

of Science Report (Reed 2004) on Platte River endangered species stated unequivocally the threat to whooping cranes if migration habitat is lost.

Early on in discussions with wind companies, USFWS talked of two possible scenarios for offsetting anticipated impacts of wind farms. These were to set aside whooping crane migration stopover habitat in perpetuity to counter potential loss of habitat from wind farm construction, as well as to mark new power lines as well as some existing power lines to offset the threat of whooping cranes colliding with a wind turbine or power lines built to support wind development.

At the urging of USFWS at meetings held in Denver and Houston as well as regular conference calls, 19 of the largest wind development companies joined together to work on endangered species issues throughout the whooping crane migration corridor in the U.S. With the support of the State of Oklahoma, the industry group received a grant of \$1,080,990 to develop a landscape level, multi-species habitat conservation plan (HCP) that would include the lesser prairie chicken. The grant was awarded through the Cooperative Endangered Species Conservation Fund under the HCP Planning Assistance Program. The HCP will be designed to avoid and minimize impacts to endangered and threatened species associated with wind energy development. This multi-species effort called the Great Plains Wind Energy HCP will be the first of its kind to involve alternative fuel sources while protecting endangered species. In a meeting in Tulsa, Oklahoma in November 2010, two species were added to the HCP (piping plover and interior least tern), joining the whooping crane and lesser prairie chicken. An additional meeting was held in March, 2011 in Albuquerque and in August in Denver. However, wind development projects are currently being built and are not waiting for this HCP to be completed. It does appear that this industry group will agree to have the wintering grounds of the whooping cranes as off-limits to wind energy development.

In 2010, monitoring for cranes was done at the Titan I wind facility in South Dakota. In the spring, a group of 5 whooping cranes spent 3 days approximately 2 miles from the project. The closest they ever were on the ground from a turbine was 1.2 miles. When they resumed migration, the nearest turbine was shut down in a very rapid response when the biological monitor called in that the cranes were flying. The cranes passed by that turbine at a distance of about one-half mile. In the fall, two groups of whooping cranes (2+1 and 2) flew within 0.5 and 0.3 miles from an operating turbine, but did not seem to alter their flight behavior.

Research on sandhill cranes in west Texas done by Dr. Kerry Griffis-Kyle and graduate student Laura Navarrete of Texas Tech University documented two observed instances of sandhill cranes being killed by wind turbine blades. Although sandhill cranes definitely avoided wind farms, she also observed accommodation with cranes foraging right at the base of turbines. Research done by USGS at Horicon NWR in Wisconsin also showed some avoidance by sandhill cranes from wind farms.

Supplemental Feeding

In response to the loss of 23 whooping cranes related to insufficient food resources, the refuge conducted limited supplemental feeding using whole kernel corn placed in game feeders during the 2008-09 winter season. By fall 2009, the situation was exacerbated by low crab numbers in the marshes. However, permission to resume supplemental feeding was denied by the Service, pending further discussion, because of reservations about using game feeders. Discussions continued into late February 2010. During this time, conditions improved and the refuge felt that food resources were sufficient for cranes, so supplemental feeding was no longer an immediate need. Using structured decision making concepts, a meeting was held on 31 August – 1 Sept 2010 for approximately a dozen participants to discuss future courses of action should conditions decline again. This exchange of ideas focused primarily on why, how, and what triggers would be used to justify supplemental feeding. Subcommittees were formed to write plans, but due a lack of follow-up strategies, progress stalled.

Over the last several months, the refuge has been gripped by another drought, making food availability for cranes worrisome. USFWS Coastal Biologist Bill Ostrand continued his work to investigate blue crab mariculture, talking with Dr. Harriet Perry associated with the Gulf Coast Research Lab at Southern Mississippi University. She produces crabs and could be contracted to produce 10,000 blue crabs for the refuge. However, the preferred crab rearing method would place small crabs in refuge marsh ponds prior to the arrival of the cranes and would thus have to be fed to promote growth. During this time, I believe raccoons, feral hogs, herons, and egrets may feast on crabs.

Education and Outreach

Whooping Crane Coordinator Tom Stehn wrote weekly reports on the spring migration for Journey North, an internet educational group for middle school children based in Minneapolis. The whooping crane has always been one of their featured species. One of the nation's premier Internet-based "citizen science" projects, Journey North enables students to watch spring sweep across the northern hemisphere by following the migration patterns of whooping cranes and other species. The free online educational website recorded nearly 21 million page views. Tom Stehn also provided written updates for newsletters of the North American Crane Working Group, the Whooping Crane Conservation Association, and The Crane Trust.

Planning is always a part of any recovery program. The refuge's Comprehensive Conservation Plan was finalized in September 2010, a process that had been initiated 6 years earlier.

Public relations are always a large part of the whooping crane program. Aransas staffer Vicki Muller handled much of the publicity, providing crane updates to the numerous newspaper and radio stations that contacted the refuge. Tom Stehn handled media issues that were potentially more controversial, such as articles about water issues and The Aransas Project law suit. Tom

Stehn spoke at the Aransas NWR festival held October 16, 2010. Tom made his annual presentation at the Crane Festival in Port Aransas on 26 February, 2011. That afternoon, he joined an outstanding panel focusing on threats facing the whooping cranes, an event that the board of the International Crane Foundation attended.

The two whooping crane tour boats running throughout the 2010-11 winter (Black Skimmer and Wharf Cat) provided excellent opportunities to photograph the cranes. The cranes see these two boats on nearly a daily basis and allow close approach. The public and media are directed to these tour boats because of the access to the cranes that they provide. An estimated 6,738 people rode the commercial whooping crane tour boats during the 2010-11 winter. Small charter boats also can be hired specifically for photography for folks wanting to spend more time in the crane area, but information on these trips is not tabulated.

On 31 December 2010, a flash flock party was held in Aransas Pass to celebrate the 73rd birthday of the refuge to help keep the refuge in the public eye. The event was organized by Richard Gonzales, a coastal environmental educator with the Gulf of Mexico Foundation. The public was “invited to wear clothing that is white, red and black, the colors of the endangered whooping crane to help raise public awareness of the challenges to restore their population. We also want to proclaim December 31st as “Tom Stehn day” as he is the leading wildlife biologist to study the whooping cranes while they stay at the refuge, and he is also from Aransas Pass and that is a great thing for the local community to recognize,” added Gonzales. “So we want the public to share in this annual tribute to one of our own as well as the whooping cranes.” At the event were life-size wooden cutouts of “Lobstick”, his mate “Lipstick”, and their juvenile “Chapstick”. If the Lobstick crane brings twins, maybe the other chick could be called “Chopstick”. At the annual June “Shrimporee” festival in Aransas Pass, local professional singer Hilda Lamas debuted a whooping crane theme song called “The Whoop”. A contingent of teenagers did a choreographed dance to the song at the Shrimporee, all organized by Richard Gonzales.

Administration

The USFWS Regional office undertook efforts in the fall, 2010 to hire a Regional Pilot and station that person on the Texas Coast to do the whooping crane census flights and monthly coastal waterfowl counts. A pilot was hired, but medical issues arose before he reported for work and the position remained vacant. Efforts continued in 2011 to fill the position. In the meantime, whooping crane flights were conducted in the 2010-11 winter by contract pilot Gary Richey of Air Transit Solutions, Castroville, Texas.

An issue surfaced in 2010 involving waterfowl hunting on Matagorda Island (MI). Since the 1980’s, Texas Parks and Wildlife Department (TPWD) has hosted small scale waterfowl hunts at freshwater ponds on the island through a Memorandum of Agreement (MOA) with USFWS. In the MOA, TPWD is primarily responsible for public use, while USFWS is primarily responsible

for wildlife management. Although Matagorda Island is a refuge unit, USFWS learned that formal steps to officially open the area for hunting were never initiated. This also applies to the state-owned marshes on Matagorda Island that, through a conservation easement, can be managed as part of the refuge, but currently is not. This marsh area has been traditionally open for waterfowl hunting and heavily used by guides and locals. In September 2010, Refuge Manager Dan Alonso briefed the Regional Director on these issues. A decision was made to continue hunts status quo in 2010, but to immediately begin required administrative steps to formally open waterfowl hunting on MI.

In September 2010, two local conservationists, Pete Fisher and Chuck Naiser, produced a print of Texas marshes on San Jose Island with part of the proceeds going to whooping crane recovery. They gave \$5,000 to Friends of Aransas and Matagorda Island for whooping crane management.

Court money was received from the 3 hunters that shot 2 whooping cranes in fall, 2004 in Kansas. They reimbursed USFWS for the \$2,500 in veterinary clinic bills for care of the injured cranes. The court forwarded the money to Migratory Birds, and I got the funds transferred to the whooping crane budget.

Tom Stehn and Carey Strobel went through AWBP mortality records 1987-2010 to update a paper on flock mortality written by Lewis et al. (1992) and submitted a manuscript to the 12th North American Crane Workshop held in March, 2011 in Nebraska.

PERSONELL

Dr. Mark Bidwell started work in January, 2011 as the new Canadian whooping crane coordinator replacing the retired Brian Johns. Mark has experience working with blue cranes in South Africa, and did his PhD working on water birds just south of Wood Buffalo National Park. Mark dove right in and attended the Recovery Team meeting in March, 2011 held in conjunction with the 12th North American Crane Workshop in Grand Island, Nebraska and conducted the nesting surveys in May, 2011 in Wood Buffalo National Park. Lea Craig-Moore of CWS had her third child and went on family leave for 12 months starting in September, 2010.

As one new coordinator came on, another is on his way out. Tom Stehn announced his retirement effective September 30, 2011. I am really going to miss all my colleagues and folks that are so passionate about cranes, but after 29 years working at Aransas, it's time for a change. Aransas biologist Brad Strobel in March, 2011 took over the winter census flights and will do a fine job. I expect reports such as the one you are now reading will lag until a new whooping crane coordinator is appointed.

The International Crane Foundation (ICF) for the past several years has seen a big need for work to be done on various whooping crane issues. In 2010, ICF obtained grants to see this work carried out and considers this work in Texas as extremely important. Dr. Elizabeth Smith started her new job with ICF in January as their whooping crane coordinator in Texas. USFWS-Corpus Christi provided her office space since the goal is for her to work closely with Ecological Service biologists on various crane issues. ICF's education specialist Joan Garland spent nearly 2 months in South Texas during the 2010-11 winter doing public outreach and education about whooping cranes. She frequently rode on the *Black Skimmer* tour boat to make one-on-one contact with folks that had come to see whooping cranes. Dr. George Archibald continued his efforts raising awareness of the threats to Texas wetlands.

Dr. Walter Wehtje of The Crane Trust is the new coordinator of the radio telemetry project. Dr. Felipe Chavez-Ramirez resigned from The Crane Trust in the fall, 2010 and started work as the Science Coordinator at the Gulf Coast Bird Observatory in Lake Jackson, Texas. His connections with Mexico/Cuba etc. will be important as much research needs to be done south of the border for so many wintering North American birds. I am hopeful he will stay involved with his work on whooping cranes and Cuban sandhill cranes.

In 2011, whooping crane flock geneticist Dr. Ken Jones moved from the U. of Georgia to run a genetics lab at the U. of Colorado – Denver Medical School. Results from his genomics study of the captive flock are expected by the end of 2011.

In a tragic accident in June 2011, former Aransas graduate student Thom Lewis and his flight instructor were killed doing touch and go's at Eglin Air Force Base in Florida. Thom Lewis will be missed by so many folks. After his crane disturbance study at Aransas in the early 1990s, Thom had for years been the biologist at St. Vincent NWR. A few years ago, he had moved to a Migratory Bird position at Patuxent to become a pilot/biologist.

FLORIDA

In 2011, there were 7 nest attempts by the five non-migratory Florida whooping crane pairs (2 pairs re-nested). At 3 nests, the cranes did not return after biologists placed data-logger eggs and night surveillance cameras at the nests. Of the other 4 nests, none hatched any chicks. Wetland water levels, though sufficient for nesting, were marginal. Sandhill cranes in Florida also had a poor production year due to low water levels, a situation that has plagued the reintroduction. Only 11 total chicks have fledged in the life of the reintroduction that was started in 1993. Twenty whooping cranes continue to survive in that flock with no additional reintroductions planned. Research on the flock remains focused on production issues, including night-time incubation behavior.

EASTERN MIGRATORY POPULATION (EMP)

The reintroduction of more birds into the EMP continued in 2010. Operation Migration led 11 birds south from Wisconsin to Florida, and biologists from ICF led the rearing and direct autumn release (DAR) of 11 whooping cranes at Necedah NWR.

Production issues continued to haunt the EMP in 2011, with 4 chicks hatched from 22 nesting attempts, but none of the chicks fledged. There have only been 3 chicks fledged since nesting of the EMP began in 2006. The 22 nesting attempts in 2011 compared to at least 15 the previous summer is encouraging.

The hatching of 4 chicks in Wisconsin and the full-term incubation of other nests was correlated with an experimental application of the biological control agent Bti used to control black flies. However, the majority of pairs still abandoned nests, though they did seem to stay closer to the nests than in years past. Data collected at Necedah NWR on black fly abundance needs to be analyzed to learn more about the suspected link between nest abandonment and black flies. A complicating factor in that analysis was the unusual late and cold spring in Wisconsin in 2011 making the black fly hatch later in the crane incubation period than usual. River flooding also had made the control of black flies much more difficult, so there were still many black flies present to bother the cranes, though perhaps numbers had been reduced by the Bti application.

For the first time ever, a 2-year-old whooping crane was documented nesting. Previously, all whooping cranes that laid eggs had been 3 or more years of age. Eva Szyszkoski made the discovery and wrote up the following:



Wisconsin nests of a 2-year old female. Photo by Eva Szyszkoski.

With the continued growth of the Eastern Migratory Whooping Crane Population, more cranes reaching breeding age, and wetlands on the Necedah National Wildlife Refuge (the original release location in western Wis.) being rapidly claimed by breeding pairs, Whooping Crane pairs have started spreading out into new nesting areas. This year there were five nests located off of the Necedah refuge. One of those nests was the nest of pair nos. 33-07 and 5-09. What makes this nest remarkable is that #5-09 is the first two year old female to lay an egg in the Eastern Migratory Population. Although many two year old females have built nest platforms with their mates, usually they must be at least three years old to produce an egg. Number 5-09 and her mate nested in Adams County, Wisconsin and incubated their single egg for 40 days (ten days over full-term) until we intervened and removed it from the nest. Examination of the egg at ICF indicated that it was infertile.

Another pleasing development was the production of a second generation of wild whooping cranes in Wisconsin in 2011. Wild # 1-06, who in 2006 became the first wild migratory whooping crane chick to be hatched in the northern U.S. in more than a century, in turn produced an offspring in 2011. The young chick was given the moniker “Wild 1-11”, but as the first chick of a wild-hatched Wisconsin whooping crane in a population struggling with nesting issues, maybe, as Operation Migration suggested, it should have more appropriately been known as "Hope". Unfortunately, “Hope” did not survive.

One Florida non-migratory male whooping crane # 1343 spent part of the winter associated with an EMP female at Paynes Prairie in Florida. In the spring, this duo migrated to Wisconsin. However, the association did not last. Within days after arrival in Wisconsin, the Florida male returned to his mate in central Florida, covering a total of > 2,274 miles.

Mortality was also an issue for the EMP. During the summer of 2011, at least 5 whooping cranes died in Wisconsin. An additional six birds were shot and killed within a 16-month period in 3 separate incidents in Indiana (n=1), Georgia (n=3) and Alabama (n=2). Rewards were offered in all the cases. Two people were apprehended and pled guilty in the Indiana case. An unnamed juvenile had been charged with the shooting, and the accompanying 18-year old was charged with providing false information. The suspects had allegedly been out road-hunting, shooting whatever they could find (Matt Mendenhall, Birdwatching magazine, April 19, 2011). Deputy Prosecuting Attorney Gregory Carter of Vermillion County, Indiana provided information about the sentencing. However, the sentencing of the juvenile is confidential and cannot be disclosed. The 18-year-old was peripherally involved and received a sentence of 1 year which was suspended. The convicted party did have to pay some court costs, but the prosecutors did not ask for restitution.

At the urging of the Recovery Team, the Whooping Crane eastern Partnership (WCEP) decided that all cranes re-introduced into Wisconsin in 2011 would be done in what the project has termed the Wisconsin rectangle, an area that includes Horicon NWR 70 miles southeast of Necedah. Studies indicate that fewer black flies occur in this area, and the Recovery Team feels that moving the reintroduction to this area provides the best hope of success. In 2011, Operation Migration moved their operation to the White River marshes where they trained 10 birds to fly south in the fall. The chicks had been hatched at the USGS Patuxent Wildlife Research Center. ICF hatched chicks at ICF and reared them at Necedah, but will move them to the Horicon NWR at the age of fledging. It is believed that the location where a whooping crane fledges will have a strong influence on where it ends up nesting.

LOUISIANA

Louisiana Department of Wildlife and Fisheries (LDWF) worked hard in preparation for the planned re-introduction of a non-migratory whooping crane flock at White Lake (30 miles southwest of Lafayette) where a population had once resided. By the end of October 2010, LDWF had built a release pen, hired staff, ordered radios, started work on the impoundment levee, sent 2 people to Patuxent for crane handling experience, worked on a video for a project documentary, and formed a science advisory committee.

The federal 10j rule was passed in February, 2011 designating the nonmigratory whooping crane flock in Louisiana as experimental nonessential. This legal classification eases the regulatory tasks to manage the reintroduction. With the rule passed just in time, 10 birds were flown to Jennings and penned at White Lake on February 16, 2011. It was an historic day since there has not been a non-migratory wild whooping crane in Louisiana since 1950. Congratulations to all that have worked so hard to make this happen. A large media event was held February 22nd.



Aerial view of the crane pen pre-release at White Lake, Louisiana (King and Perkins 2011)



Conditions in the covered pen on 1 March 2011 (King and Perkins 2011).

After acclimation in a small pen out in the marsh with the cranes immediately starting to forage on wild food items, the birds were released on March 14th into a larger open-topped pen. Within a short period, the cranes were exploring the Louisiana marshes. The most independent of the 10 cranes flew north 30 miles and utilized crawfish farm habitat. Supplemental feeding was reduced on April 25 and eliminated on May 8. The other 9 also did some exploring, first flying north to agricultural lands, and then on May 15 apparently made a quick jaunt across the Texas border before returning to White Lake the following day. There has been some concern about the cranes allowing close approach by humans.

By June 12th, 2 of the cranes were missing and feared dead. One additional bird was re-captured due to illness with lung issues consistent with the fungus aspergillosis and had to be euthanized. Seven cranes were being monitored at the end of August, 2011. Two of the cranes were at White Lake, and 5 were in agricultural lands to the north.

CAPTIVE FLOCKS

The captive flocks had a good production season in 2011. Eighteen chicks are scheduled to enter the migratory reintroduction program in Wisconsin (10 ultralight and 8 direct autumn release), and approximately 17 chicks are being formed into a cohort for Louisiana. Approximately 4 chicks of high genetic value will be held back for the captive flocks. Some of the re-introduced birds came from wild eggs abandoned in Wisconsin. One eastern migratory whooping crane with a wing tendon injury was removed from the wild and placed with the captive flock at Patuxent.

A tremendous amount of difficult work goes into breeding and rearing whooping cranes. The current five breeding facilities are located at Patuxent, the International Crane Foundation, Calgary, New Orleans, and San Antonio. These facilities work very well together, sharing expertise, birds, and eggs. On December 1 2010, Calgary shipped three white-plumaged whooping cranes to ICF for breeding purposes. This was the first time flock managers had used FedEx for shipment of live whooping cranes. The transport worked smoothly and involved approximately 20 people by the time you add up all the inspectors and handlers and shippers. Dwight Knapik of the Calgary Zoo accompanied the birds in the airplane and also in the truck that drove the cranes from Milwaukee to Baraboo. It was about an 18 hour day for Dwight getting the birds to the Calgary airport by 5 AM and arriving at ICF at 9 PM. This was our third year we had tried to get this done, struggling with airline schedules, cargo restrictions, permit issues, and even weather. One of the Calgary cranes will be paired with a 41-year-old male.

On January 9 2011, EMP male crane # 5-01 made a repeat visit to the Homosassa Springs Wildlife State park in Florida, apparently attracted to the whooping crane pair on display at Homosassa. With this male having made approximately 6 visits starting in 2007 to Homosassa,

and also caused difficulty spending time on a military air field in Wisconsin, it was decided to permanently keep # 5-01 in captivity. This bird had been nicknamed "Romeo" by the media after repeated attempts to visit the female whooping crane at Homosassa. The voiceless male at Homosassa named "Rocky" was transferred to the National Zoo in Washington, D.C.

Whooping crane back at D.C.'s National Zoo

Published by UPI: July 5, 2011

WASHINGTON, July 5 (UPI) -- North America's tallest bird, the statuesque whooping crane, is once again in residence at the Smithsonian's National Zoological Park, officials said.

After an 88-year hiatus, a whooping crane can once again be seen by visitors to the Bird House at the zoo in Washington, a Smithsonian release said Tuesday.

An 11-year-old, 5-foot-tall male whooping crane named Rocky has come to the park from Homosassa Springs State Park in Florida, the release said.

"It is an honor for the National Zoo to once again exhibit this magnificent species," Dennis Kelly, director of the National Zoological Park, said. "Although most people have heard of whooping cranes, very few have had the privilege of seeing one in person. We are thrilled to have Rocky here as an ambassador for his species."

Just eight other zoos in the country exhibit these birds.

By 1938, hunting and agricultural expansion had reduced wild whooping crane populations to an estimated 21 individuals, so zoos, research centers and nature preserves acted quickly to curtail the threat of extinction.

Today, U.S. whooping crane populations are managed by the U.S. Fish and Wildlife Service, which said 407 whooping cranes reside in breeding centers and protected nature reserves in the eastern and midwestern United States and Canada, while another 167 individuals are in human care.

"To their remarkable population recovery and subsequent reintroduction is one of the greatest conservation stories in North America," Ed Bronikowski, senior curator at the National Zoo, said. "Thanks to the continuing efforts of many, this species is not going extinct anytime soon."

Shipping whooping cranes and their parts around the U.S. and especially crossing the border with Canada is a time-consuming proposition from the aspect of permits. This is one of the most frustrating parts of my job with USFWS. Each shipment takes months securing permits and making arrangements. The tall stack of permits needed to bring a live whooping crane across the border seems "excessive" to me, and even live eggs need to be inspected by a USFWS and USDA agents. Shipments carried out in the last year included:

February 4 – feathers shipped from ICF and from ICF to Louisiana for education purposes.

February 14 – whooping crane blood from Wood Buffalo National Park shipped from Calgary to the National Wildlife Health Center.

February 22 - specimen shipped from the national Wildlife Health Center to the Louisiana Department of Wildlife and Fisheries for display purposes.

April 26 - 3 eggs imported Calgary to Patuxent.

May 3 - 4 eggs from the wild at Necedah NWR shipped to Patuxent.

May 7 - 3 eggs imported SSC in New Orleans to Patuxent.

May 20 - 2 eggs imported Calgary to Patuxent.

May 25 - 3 eggs imported SSC in New Orleans to Patuxent.

May 25 - live whooping crane shipped from Homosassa to the National Zoo.

June 9 – Front Royal drives two eggs from ICF to Patuxent.

June 27 – ultralight chicks flown by Windway Corporation from Patuxent to Necedah.

WHOOPING CRANE NUMBERS IN NORTH AMERICA

Aug 30, 2011

Wild Populations

	Adult	Young	Total	Adult Pairs
Aransas/Wood Buffalo	278	- ^A	278 ^A	78
Florida non-migratory	20	0	20	8
Louisiana non-migratory	7 ^B	17 ^B	24	0
Wisconsin/Florida migratory	97	18 ^C	115	17
Subtotal in the Wild	402	35	437	103

^A The Aransas-Wood Buffalo population is currently estimated at 278. In 2010, a record 74 pairs nested and fledged 49 chicks, 45 of which arrived safely at Aransas. One later died. In May 2011, a record 75 nests were located. Chicks fledged in Canada in 2011 (approximately 37) are not included in this table since the size of the AWBP is not known until the cranes migrate to Aransas in the fall.

^B Ten juveniles were transported to White Lake, Louisiana in mid-February, 2011. Two are missing and presumed dead, the third was captured and had to be euthanized due to illness. 17 juveniles are currently being raised in captivity for release in Louisiana in the fall, 2011.

^C 18 juveniles are currently being raised for release into the eastern migratory population.

Captive Populations

	Adult	Young ^A	Total	Breeding Pairs
Patuxent WRC, Maryland	73	2	75	15
International Crane Foundation, WI	35	2	37	11
Devonian Wildl. Cons.Cent./Calgary	19	0	19	6
San Antonio Zoo, Texas	7	0	7	1
Species Survival Center, Louisiana	10	0	10	2
Calgary Zoo, Alberta	2	0	2	0
Homosassa Springs Wildl State Park, FL	2	0	2	0
Lowry Park Zoo, Tampa, Florida	2	0	2	0
Jacksonville Zoo, Florida	2	0	2	0
Milwaukee County Zoo, Wisconsin	2	0	2	0
National Zoological Park, Washington D.C.	1	0	1	0
New Orleans Zoo, Louisiana	2	0	2	0
Sylvan Heights Waterfowl Park, NC	1	0	1	0
Subtotal in Captivity	158	4	162	36

^A Chicks raised in 2011 for the eastern migratory population and Louisiana flocks are listed as wild birds.

TOTALS (Wild + Captive) 437 + 162 = 599

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