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2008 Annual Review

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WCEP Year in Review 2008

Since 2001, the Whooping Crane Eastern Partnership (WCEP), an international coalition of public and private agencies and organizations, has been working to establish a self-sustaining migratory population of whooping cranes in eastern North America.

Whooping cranes (commonly known as “whoopers” for their loud and penetrating unison calls) were on the verge of extinction due to hunting and habitat loss in the 1940s, and were listed as federally endangered by the U.S. Fish and Wildlife Service in 1967.

The recovery goal for this project is a self-sustaining population of at least 125 adult whooping cranes and 25 nesting pairs. Successful establishment of this breeding population will help meet one of the primary recovery objectives identified in the International Recovery Plan.

WCEP Founding Members

International Crane Foundation

Operation Migration, Inc.

Wisconsin Department of Natural Resources

U.S. Fish and Wildlife Service

U.S. Geological Survey's Patuxent Wildlife Research Center and National Wildlife Health Center

National Fish and Wildlife Foundation

Natural Resources Foundation of Wisconsin

International Whooping Crane Recovery Team

YEAR IN REVIEW
Louise Clemency (FWS), Joe Duff (OM)

2008 gave us cause to celebrate our partners – both longtime and new.

Through the efforts of all the hardworking folks out on the ground as well as those toiling behind the scenes and supporting the project with donations, our eastern migratory Whooping crane flock continues to grow. As of mid-February 2009 there are 87 wild birds in the eastern migratory Whooping crane population, consisting of 52 males and 35 females.

As we look back on the challenges and successes of this year, what stands out is how our partners and supporters really come through when we need them most.

We ended our Winter meeting in January of 2008 with the decision to start splitting the ultralight cohort into two groups that would winter at separate locations in Florida. That decision kicked off a tremendous effort to build the kind of outstanding partner support that we have long relied on around the Chassahowitzka NWR at St. Marks NWR. We laid the groundwork for our partnership with the St. Marks NWR as preparations began to build a second release site at the refuge.

Back on the Wisconsin breeding grounds this summer, a much-needed drawdown of the main pool at Necedah NWR meant that the ultralight training had to be shifted to a new site on the refuge. Necedah NWR and OM staff worked hard to make the new pen site suitable for the young whooping cranes, but we realized that the blind previously used by visitors to view the training process was too far from the new site to be useful. As always seems to happen when WCEP has a need, a new partner came through with the perfect solution. Volk Air Force Base helped set up a large camouflage tent outside the new ultralight training site. Thanks to our partners in the Air Force, once again visitors to the refuge were able to watch the young whooping cranes learn to fly alongside the ultralight aircraft, unaware of the human observers hidden in the tent.

The establishment of a new migration route for Operation Migration also resulted in new partnerships. As we explained last year, the turbulent air currents that the ultralight pilots faced trying to cross the Cumberland Ridge posed risks to both pilots and young cranes. This year, OM followed a new route, and was welcomed into the homes and schools of a whole new set of supporters, showing once again how this project brings out the best in so many people.

In Florida, we welcomed another National Wildlife Refuge and community to the Whooping Crane Eastern Partnership, as half of the ultralight birds were brought to St. Marks NWR south of Tallahassee to spend the winter at their newly constructed pensite. The pensite was built through the hard work of refuge staff and local supporters. School kids in Tallahassee became pen pals with school kids in Necedah, sharing the discovery of the migratory species that now visits both their hometowns.

The Southwest Florida Water Management District again hosted our birds at the Halpata site where the cranes stopped before making the final flight to Chassahowitzka. Staff and supporters there help prepare the site for the young cranes through mowing, prescribed burning and pen construction.

Completing the final leg of their assisted migrations to their wintering sites, the young ultralight-led birds were greeted by crowds of old friends at the Dunnellon County Airport near Chassahowitzka and by new friends in the Tallahassee area at the town of St. Marks. Thousands gathered in both locations to see the young cranes and their valiant ultralight pilot companions fly overhead. Our heartfelt thanks to all our partners!

CHICK REARING AND BEHAVIORAL TRAINING

In 2008, USGS Patuxent Wildlife Research Center, Laurel, Maryland (Patuxent) hatched 27 whooping crane chicks. Though not equal to the record 32 hatches in 2007, this was the second highest total hatched at Patuxent.

CHICK REARING AND BEHAVIORAL TRAINING

Glenn H. Olsen
(USGS-Patuxent)

In 2008, USGS Patuxent Wildlife Research Center, Laurel, Maryland (Patuxent) hatched 27 whooping crane chicks. Though not equal to the record 32 hatches in 2007, this was the second highest total hatched at Patuxent. The slight decrease can be attributed to various factors. In 2008 one of Patuxent's long-time breeding females did not lay because her mate was hospitalized with a severe illness. A few other Patuxent female cranes had reduced production, possibly related to increases in handling for artificial insemination. We also did not receive any eggs from the Florida non-migratory population this year as we did in 2007.

Once again, several partners contributed to the Whooping Crane Eastern Partnership (WCEP) effort by sending eggs to be hatched at Patuxent. In addition to the 11 chicks hatched from eggs laid at Patuxent, 8 chicks hatched from eggs from the Calgary Zoo, 3 chicks hatched from eggs from the International Crane Foundation, 1 chick from an egg from the Audubon Center for Research in Endangered Species in New Orleans, Louisiana, and 4 chicks came from eggs taken from abandoned nests at Necedah National Wildlife Refuge. Hatch dates ranged from May 4 to June 15, a span of 43 days. Twenty of the chicks that hatched were shipped out to Necedah NWR in late June and July, 2008 to continue their flight training at the refuge. Two chicks were held back at Patuxent , and 5 chicks died (see the Health Team report for further information on these deaths).

A dedicated crew of Patuxent and Operation Migration personnel plus some wonderful volunteers worked many hours to raise and train this year's cadre of Whooping crane chicks. Their names are listed at the end of this section of the report. All this was done in the stifling heat and humidity of a Maryland summer, and while completely covered in a full length crane costume, hood with mask, and black rubber boots.

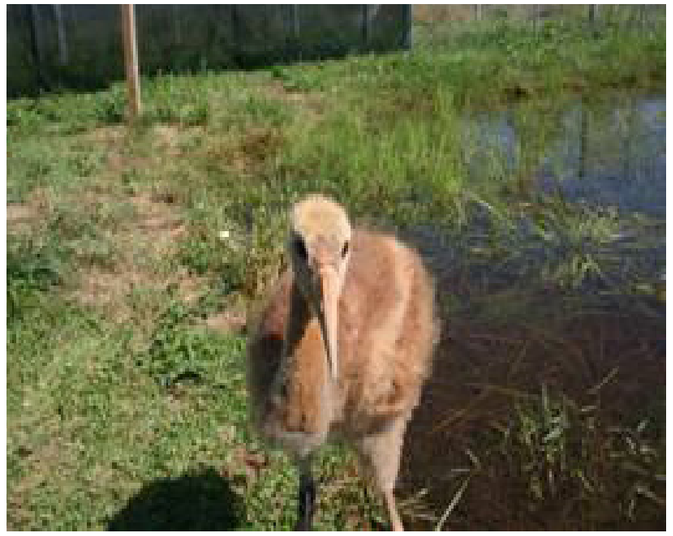
Some of the Crane Crew at USGS Patuxent Wildlife Research Center in the summer of 2008. Kneeling, left to right: Tammy Otto, Sharon Marroulis, Ezra Link; standing, left to right: Dr. Sarah Converse, Jane Chandler, Carlyn Caldwell, Brian Clauss, Jonathan Male, Robert Doyle, Charlie Shafer, Dr. Glenn Olsen

The process of training and behavior modification we use with the whooping crane chicks in order to get them to follow behind the ultralight aircraft on their 1200 mile journey begins early in life. In fact, we play digital recordings of normal parent vocalizations alternated with sounds of the ultralight engine to the eggs even before hatching. After hatching the chicks spend the next day in one of our intensive care units, as they have no parent birds to keep them from being chilled. Gradually as they become dry and stronger, we start coaching them on basic skills such as eating and drinking on their own. Parent birds would normally offer morsels of delectable food items such as insects or small fish to the chicks. We, on the other hand, train them to take crumbled crane starter diet from the bill of the puppet we are holding, and eventually, to eat from a small feed bowl.

Then we begin the training process. The chicks first go for walks with a costumed person, essentially foraging trips. We offer them occasional meal worms to keep their attention focused on following one of their "big" parents. We call this "foraging with puppet," and this started at a average age of 7 days (+ 2 days, range 4-10 days). Chicks received an average of 426 minutes each (+180 minutes, range 194-649 minutes) between the starting age and about 38 days of age (+5 days, range 28-44 days), when they would be placed with their group in a large pen with a pond and no longer go for walks with the staff "parents." This training started on the same day, on average as in the past two years, but chicks received an average of 209 minutes less of this type of training than in 2007 and 250 minutes less than in 2006. The training is still valuable for the chicks when they are very young, but, because of changes in other training, they receive less of this type of training when they are four weeks and older. Instead, they are given more time with their pen mates to forage around several new pens we have created for them.

Shortly after the initiation of these foraging trips, the next phase of training is begun. This is a foraging trip out to the ultralight aircraft. Average age for this to begin was 7.7 days (+ 3.5 days, range 6-17 days) though not all chicks in a given year receive this training. In 2008 four chicks skipped this type of training and went directly to the next step, which is circle pen training. Circle pen training is when chicks first learn to follow the ultralight, and is named after the shape of the pen we use, basically a large circle of low wire (60 cm high), with the chicks on the inside and the ultralight on the outside. The pilot uses an elongated puppet head to coax the chicks along, plus a few rewards of mealworms. Circle pen training began on average at day 8.0 in 2008 (+ 1.4 days, range 6-12 days). Chicks received an average of 325 minutes of this type of training (+ 69 minutes, range 181-440 minutes). Training ended on average at 33.9 days of age (+ 4.1 days, range 28-40 days). This training started 2 days earlier than in 2006 and almost a full day earlier than in 2007. The amount of time the chicks received this training was more than double what they received in either 2006 or 2007 (111.3 minutes in 2006, 150.1 minutes i

Feeding a newly hatched whooping crane chick its first meal using the tip of the bill on the puppet head.



An older whooping crane chick out in the wetland pen about a week before shipment to Necedah National Wildlife Refuge.

When circle pen training ends, open field training usually begins the next day. During open field training, the chicks are in a large mowed field, again with a 60 cm high and 50 m long fence separating them from the taxing ultralight aircraft. The length of the run is about 50 meters before the ultralight and the chicks need turn around and run in the opposite direction. The field is several hundred meters from the crane buildings, so the chicks get addition exercise and training following the person to the training field. In 2008 this training began on average at 35.9 days of age (+ 4.5 days, range 29-42 days), and ended at 44.8 days of age (+ 4.1 days, range 36-51 days). Average training time was 95.5 minutes (+ 14.4 minutes, range 71-121 minutes). Average starting and ending ages were similar to 2006. In 2007, the starting age for open filed training was pushed on average, 13 days earlier than in previous years, and, as it turns out, in the subsequent year of 2008. Ending ages for all three years is similar (45.6 days of age in 2007 and 43.9 days of age in 2006) and correlates with the average shipping age. The average amount of training chicks received was within 4 minutes of what was done in 2006 (91.0 minutes) but greatly differs from 2007 (354.5 minutes) as expected, given the 13 additional days of training chicks received in 2007 over 2006 or 2008.

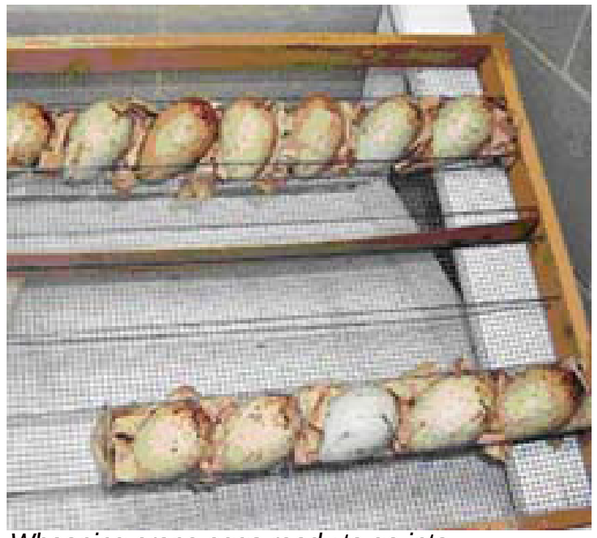
In a natural setting, Whooping cranes are raised singly or at most as rare twins. We are asking a group of whooping crane juveniles to fly together in the fall, not a natural occurrence, as the juveniles stay with their parents throughout the fall migration and winter. For the juveniles to be one big group, we need to do further behavioral modification training that we label "socialization training." We start this socialization process early at Patuxent. At first chicks are introduced to one or two other chicks during activities, such as walks or circle pen training. Of course, the chicks can also see the other chicks in adjacent pens Chicks are carefully supervised by costumed caregivers during any socialization activity when there is direct contact between chicks, as sometime one chick is aggressive toward another chick. Gradually the time the chicks spend together builds up until a week or two before shipping when the chicks are grouped together in a large outdoor pen. In 2008 socialization training started at an average age of 12.9 days (+ 3.2 days, range 8-17 days) and chicks received an average of 173.7

hours of this type of training (+ 83.8 hours, range 35.2-280.1hours). This is similar to last year when this type of training began on 12.3 days of age on average and training total was 191.7 hours average, slightly more than in 2008.

As it gets closer to the time to depart Patuxent, the young whooping cranes are given exposure to ponds and wetlands. Actually, the first training of this type will occur on some of the foraging walks, but as the time to depart for Necedah nears, the chicks are kept in the ponded pens for longer periods. Ponds and wetlands are important both for foraging and as night roosting locations for protection from nocturnal predators. The value of pond training was demonstrated in a study done in 1995 with the Florida non-migratory whooping crane release program. By teaching cranes proper pond/wetland behavior including night roosting, survival was significantly increased. In 2008, this training started on average at 35.9 days of age (+ 5.0 days, range 29-44 days) and chicks received an average of 41.8 hours of pond training (+ 43.8 hours, range 7.0-127.5 hours). Pond training started much earlier in 2007, at 16.6 days of age, but the amount of training was similar, 39.1 hours in 2007 versus 41.8 hours in 2008.

In 2008 Whooping crane juveniles were divided in three groups as in past years. The average age at shipment to Necedah was 46.4 days of age (+ 3.9 days, range 38-52 days of age). The shipment dates were 25 June for whooping cranes numbered 3-08, 4-08, 5-08, 7-08, 9-08, 10-08, and 11-08. The next shipping date was 9 July for whooping cranes numbered 12-08, 13-08, 14-08, 15-08, 16-08, 18-08, and 19-08. The final shipment was on 29 July and consisted of whooping cranes numbered 24-08, 26-08, 27-08, 28-08, 29-08, and 30-08.

Patuxent's new remote medical examination and video monitoring facility near the White Series Pens. This view shows the portable x-ray machine and medical supply cart set up for pre-shipment health examinations.



Whooping crane eggs ready to go into mechanical incubator. Photo by USGS Patuxent.

Medical problems are summarized in the Health Team report, losses were less in 2008 (26%) than in 2007 (31%). All chicks were vaccinated for both West Nile virus and eastern equine encephalitis virus. In spite of this, one chick died at Patuxent from an infection with eastern equine encephalitis virus in the fall. This can happen despite giving preventive vaccinations. Most likely the individual crane failed to develop adequate protection following vaccination. All chicks were tested for internal parasites and given treatment for internal parasites. All Whooping crane chicks received extensive health examinations prior to shipping, including radiographs for ingested metal foreign bodies. No ingested metal foreign bodies were found, as has been the case for the past 4 years.

Caring for and raising Whooping cranes at Patuxent is a full-time job. Adult birds need and receive daily care, decisions are made on pairing new birds, and behavioral observations are made on a daily basis to determine the physiological condition and the health of the birds. Work increases five-fold as the breeding season opens with the cranes performing mating dances, nest building and egg laying as winter moves to spring. Patuxent has a dedicated crew working with the Whooping cranes all year long, and we receive additional help from volunteers and Operation Migration staff during the critical chick rearing period from May through the end of July. We are grateful to all for their dedication. We also thank Operation Migration for use of the ultralight aircraft used in training, for some of the crane costumes and vocalizers, and for the crates used to ship the cranes to Necedah National Wildlife Refuge. In addition to help form Operation Migration, we had help from another partner and a non-partner. Disney World sent two of their animal care personnel to help raise whooping crane chicks, and one animal care person joined the effort from Sea World. We are also grateful for the help from our partners, the U. S. Fish and Wildlife Service staff led by Refuge Manager Brad Knudsen, for their help in housing interns, for assistance with facilities problems throughout the year, and for help in maintaining the closure of the crane area during the breeding season. I also wish to thank Carlyn Caldwell, my veterinary technician for help with compiling the data used in this report. We are sad to say farewell to two of our crane staff at Patuxent. Tammy Otto left in the fall to join her husband, who is pursuing graduate studies in Michigan, and Dan Sprague left as of January 2009 to accept another position at Patuxent with the Contaminants Group.

USGS Patuxent Wildlife Research Center Staff and Volunteers:

Dr. John B. French, Research Manager
Dr. Glenn H. Olsen, Research Wildlife Biologist/Veterinary Medical Officer
Dr. Sarah Converse, Endangered Species Research Biologist
Jonathan Male, Aviculturist
Jane Chandler, Crane Flock Manager
Carlyn Caldwell, Veterinary Technician
Brian Clauss, Biological Technician
Barbara Clauss, Biological Technician
Robert Doyle, Biological Technician
Sharon Marroulis, Biological Technician
Tammy Otto, Biological Technician
Charlie Shafer, Biological Technician
Dan Sprague, Biological Technician
Ezra Link, Seasonal Laborer
Kathy O'Malley, Volunteer
Mary Edwards, Volunteer
Ken Lavish, Volunteer
Susan Kryszak, Volunteer
Abigail Duvall, Volunteer
Paula Wang, Volunteer
Erin Harris, Volunteer
Lillian Carter, Volunteer
Diana Ogilvie, Volunteer
Rachael Dickey, Volunteer
Erin Harris, Student Internship

Operation Migration Staff:

Beverly Paulan, Supervisor of Field Operations
Brooke Pennypacker, Ultralight Pilot
Claire Foltz, Volunteer
Gary Foltz, Volunteer

Disneyworld, Orlando, Florida

Coral Goad
John Thomton

Seaworld

Mark Bishop

ULTRALIGHT MIGRATION

Fourteen endangered whooping cranes and their surrogate parents, four ultralight aircraft, arrived at their wintering grounds in Florida after a trek of more than 1,200 miles through seven states. Seven of the cranes arrived at their wintering location on the St. Marks National Wildlife Refuge (NWR) in Wakulla County, Florida on January 17. The other seven ultralight-led birds arrived at their wintering grounds at the Chassahowitzka NWR in Citrus County on January 23.

ULTRALIGHT MIGRATION TEAM REPORT

Compiled by: J. Duff (OM)

EARLY CONDITIONING AT PATUXENT WRC

COHORT 1:
Seven birds (3-08, 4-08, 5-08, 7-08, 9-08, 10-08 and 11-08) were socialized as Cohort 1 and transported to the Necedah National Wildlife Refuge on 25 June, 2008 at a mean age of 46.25 days (Note: 11-08 was later moved to Cohort 2)

COHORT 2:
Seven birds (12-08, 13-08, 14-08, 15-08, 16-08, 18-08 and 19-08) were socialized as Cohort 2 and transported to Necedah on 9 July, 2008 at a mean age of 43.60 days.

COHORT 3:
Six birds (24-08, 26-08, 27-08, 28-08, 29-08 and 30-08) were socialized as Cohort 3 and transported to Necedah on 29 July 2008 at a mean age of 47.8 days.

We are extremely grateful to the team from Windway Capital who donated the aircraft and crew to make these three round trip flights from Baltimore to Necedah airport.

Flight training at Necedah NWR Photo Operation Migration

"We wish the intrepid pilots of Operation Migration all the best with the new route as they enter the Southeast, and hope for a safe and speedy arrival at St. Marks and Chassahowitzka National Wildlife Refuge." - Sam D. Hamilton, Southeast Regional Director for the U.S. Fish and Wildlife Service

Canfield Site Necedah NWR Photo Operation Migration

Chicks protected their legs from mosquitoes by lying down
Photo Operation Migration

FACILITIES

Due to a draw down of East Rynearson Pool, Site 1 (the East Site) was not available this season. Site 5, or the Canfield Site, was established on the refuge north of the West Rynearson complex. Necedah and Operation Migration staff and many volunteers worked very hard to develop this new site. Several new techniques were used in the construction. Steel roofing panels were used to build the dry pen walls. These panels were buried two feet into the substrate and attached to a 4x4 and 2x4 frame to provide unprecedented predator protection. A viewing room with one way glass was also incorporated into the pen allowing staff to observe the birds without interference. Water structures added by the refuge allow precise control of the levels and flushing of the wet pen. The west site (Site 2) and the North Site (Site 4) were also used this year.

SUMMER TRAINING AT NECEDAH NATIONAL WILDLIFE REFUGE

Over the summer months the birds were trained as often as the weather permitted. Cohort One birds were on the refuge for 114 days and were trained with the aircraft on 61 mornings. Cohort Two was on the refuge 100 days and had 55 days of training. Cohort Three stayed for 80 days and was trained 40 times. These numbers are similar to previous years.

An unusually wet spring resulted in high water throughout the refuge and caused a prolonged mosquito season. This caused additional stress to the birds. More normal rainfall levels in the late summer alleviated the problem.

All three facilities include a top netted dry pen and a wet pen area approximately 50 by 100 feet. On most nights the birds had access to both areas. We are not always able to determine exactly which area the birds are using to roost but Cohort One had access to water roosting on 106 of 114 nights, Cohort Two had access 84 of 100 days and Cohort Three had 74 of 80 days.

FLEDGING

Whooping cranes fledge on average between 80 and 100 days of age. The birds for this project are raised in groups and it is difficult to determine exactly when each bird is able to maintain controlled flight. Therefore these birds are said to have fledged when all the birds of one cohort can fly a short circuit around the pen. Using these criteria, Cohort One fledged on 2 August; Cohort Two on 15 August and Cohort Three on 31 August.

UNITING THE THREE COHORTS INTO ONE FLOCK

The cohorts are trained individually all summer, each progressing at its own rate. Once each group is able to fly for more than a few miles they can be united into one flock. This is accomplished by leading one group to the home site of the other where they are separated by a chain link fence in the dry pen. They are able to posture and challenge through the fence without injury while being observed by the handlers. The two groups are regularly released to the runway together. This distraction minimizes aggression until they begin to socialize and a new dominance structure develops. Thereafter, the dividing barrier is removed.

Because the birds in Cohort One are older and larger, they are united last. Cohort Two, or the middle-age group, is led to the Canfield Site where the youngest birds are housed. Once these birds have been united, the older birds are brought over. They are disadvantaged by the size of the new social order they encounter and the fact that they are in an unfamiliar pen. This helps to balance the two groups and eases their integration.

Cohort Two was led to the Canfield Site and penned next to Cohort Three on 15 September. They were united on 18 September. Cohort One was penned next to them on 3 October and mixed on 5 October.

NUMBER 10-08

When Cohort Three was led to the Canfield site, number 10-08 was separated from the rest of the birds so it could be monitored for signs of aggression. Despite several attempts to socialize this bird with its flockmates it continued to be antagonistic and had to be restrained several times both in the pen and on the runway. Because of the threat it posed to the other birds it was removed from the ultralight study on 7 October. It remained at Canfield after the ultralight-led birds began their migration. It was released on 22 October. It associated with other Whooping cranes and completed the migration to Florida on 1 January 2009. (For details see the WCEP Tracking Team report.)

NEW MIGRATION ROUTE

We had been using the same migration route since the reintroduction began in 2001. We travelled directly south from Necedah until past the built-up area and restricted airspace around Chicago, and then turned southeast. This path took us through Indiana and over the mountains in Kentucky and Tennessee before reaching flatter terrain in Georgia. Often we were delayed crossing the Cumberland Ridge and other geologic obstacles. In addition to weather delays this mountainous terrain provided very few landing sites which limited the options available to pilots in the event of a mechanical problem. Also drop out birds were difficult to track in hilly, wooded areas with few roads.

Thanks to the generosity of an anonymous supporter we were able to develop a new route during the winter of 2008. That pathway took us straight south from Necedah through central Illinois and over the western end of Kentucky and Tennessee. From there we crossed Alabama before turning east to overfly the south-western tip of Georgia and enter the Florida panhandle.

Our new route takes us around the Appalachian Mountains rather than over them. It is mostly over open, flat, agricultural land providing lots of places to land if needed. Even light winds that encounter rugged territory become turbulent as they are forced up one side of a ridge and tumble down the other. This makes it impossible for us to fly even if the winds are from the right direction. Over flat land where there are no obstacles to cause mechanical turbulence so winds can be smooth only a few hundred feet up. This allows us to take advantage of more weather opportunities. On five occasions we were able to climb with the birds, pick up tailwinds and skip a stop covering up to 117.1 miles in 2 hours and 22 minutes. Additionally, the new route provided more education and outreach opportunities to promote the WCEP goals.

Sub-adults challenge for leadership
Photo Operation Migration

MIGRATION 2008

The migration began on 17 October 2008 and was completed on 23 January 2009. Based on predictions of an extended period of poor flying weather the team stood down on 18 December so that some of the staff and volunteers could travel home for Christmas. This was a longer break than was anticipated but was unavoidable due to inclement weather. Coincidently these are the same dates taken last year during a Christmas break. During this period the birds were monitored by an experienced biological technician from Patuxent and another from Operation Migration. The team reconvened on 28 December. Excluding this break, the migration took 88 days which is nine days shorter than the 2007 migration.

Twenty-one stops were made along the new route and it covered a distance of 1093.3 miles to St Marks and 1255.26 miles to Chass, only 43 miles farther than the 2007 migration. The birds flew a total of 34 hours and 13.8 minutes and their longest flight took 2 hours and 22 minutes to cover 117.1 miles.

OM's migration equipment:, 4 trucks, 3 travel trailers 2 motorhomes and 1 camper
Photo Operation Migration

The smaller flock size of only 14 birds meant that each bird received a greater benefit from the vortices generated by the wing, making it easier for them to follow the aircraft. This, combined with more intensive training in the spring, may have been the reason there were fewer drop outs. During the first flight, when the birds are reluctant to leave the familiarity of the refuge, three returned and had to be crated and moved by vehicle. From that point, all the birds made all the flights until day 57 when four would not leave the pen area on a flight from Hardin Co., Tennessee to Franklin Co., Alabama. Six birds made the entire flight unaided and three others missed less than 20 miles. No birds missed more the 65 miles of the 1255 mile migration.

During a major portion of the migration, 27-08, the youngest bird, was reluctant to leave the pen with the rest of the flock during early morning take-offs, or it would drop out early and be picked up by another aircraft. Despite this predictable behaviour 27-08 made the entire flight to the wintering site at Chassahowitzka without being crated.

On 14 January, 2009 the team arrived in Jefferson County, Florida at a stopover that was used as a staging area. A ridge runs the length of this large, 50-hectare field and one of the travel pens was set up on either side, approximately 1500 metres apart. This enabled the team to divide the flock into two groups of seven birds and to launch one of the groups without disturbance to the other. On 17 January 2009, seven birds were led to St. Marks National Wildlife Refuge. After only a few circuits the birds landed next to costumed handlers without the aircraft. The arrival included an over-flight of the village of St Marks where more than 2000 people gathered to witness this event.

On 23 January 2009 the remaining seven birds were led to Chassahowitzka National Wildlife Refuge. After a 48 minute flight that covered 26 miles the birds continued to circle for an additional 1 hour and 10 minutes. Six of the birds finally landed with the costumed handlers but number 04-08 would not land. After many failed attempts to lead the bird to the pen area, it was eventually led back to the mainland where it landed with the aircraft after 2 hours and 14 minutes. It was crated and delivered to the pensite by van and airboat; a distance of six miles.

"St. Marks has been anticipating the birds arrival for months, and the outpouring of community support around Wakulla and Leon counties has been phenomenal." - Terry Peacock, Refuge Manager at St. Marks NWR.

FLOCK DIVISION BETWEEN ST MARKS NWR AND CHASSAHOWITZKA NWR

Criteria used to determine the division between the two wintering sites of the 2008 generation:

1) Divide the flock evenly but if by the time we arrive in Florida there is still an odd number the fate of the extra bird would be determined by other criteria.

- The flock was divided evenly with seven birds going to each wintering site.

2) Attempt to divide females evenly between the two cohorts.

- The birds were divided so each group included five males and two females.

3) As much as possible evenly divide birds that missed significant portions of the fall migration. Birds that missed portions of the migration could be graded on how many miles they missed.

- Eight birds missed portions of the migration and they were evenly divided between the two wintering sites. The birds that wintered at St. Marks missed a combined total of 266.2 miles of the migration with the greatest single distance being 64.8 miles. The birds that wintered at Chass missed a combined total of 114.4 miles with the greatest single distance being 57 miles.

Cranes in flight over Kentucky. Photo by Operation Migration.

4) Evenly divide genetically valuable birds

- The average mean kinship for each group was calculated with the following results: Group A (St. Marks) = .038 Group B (Chass) = .032

5) Evenly divide any birds with behavioral problems.

- Behavioral problems are based on observation and are difficult to quantify. Apart from number 27-08's reluctance to leave the pen during early morning take offs there were no obvious concerns. There were no notable changes or reinforcement of the dominance order and the flock appeared stable. The division was accomplished through discussing with all the members of the migration team and represents an even distribution.

6) Divide or separate any birds with social problems, ex. extreme submission or aggression

- There were no notable extremes in submission or aggression.

7) Keep opposite sex siblings together; same sex siblings could be split.

- We have one set of siblings:
  03-08 (M) and 24-08 (F)
  Plus two sets of triple siblings:
  13-08 (F), 27-08 (M) and 28-08 (M)
  19-08 (M), 29-08 (M) and 30-08 (F)
  Of the three sets of siblings, two were kept together in Group A.

Group A	Siblings	Migration miles missed	Genetic rating	Group B	Siblings	Migration miles missed	Genetic rating
29 M	●	64.8	3	24 F	▲	7.8	8
12 M		00.0	6	19 M	●	57.0	2
26 M		00.0	5	04 M		17.8	1
05 M		11.8	10	03 M	▲	31.8	7
30 F	●	64.8	4	18 F		00.0	9
13 F	■	00.0	12	14 M		00.0	11
28 M	■	64.8	14	27 M	■	00.0	13
Total miles		266.2				114.4	
Total genetic rating			54				51
Average mean kinship			.038				.032

Class of 2008 crane at Chassahowitzka National Wildlife Refuge. Photo by ICF.

"Standing on top of one of Green County's rolling hills, we had a panoramic view across the valley as all four trikes, rose above the treeline and headed straight for us."
-Liz Condie, OM Communications Director

2008 OPERATION MIGRATION FIELD TEAM REPORT

Table 1 Comparison of Training and Migration History of First Eight Generations of WCEP Whooping Cranes

EVENT	2008	2007	2006	2005	2004	2003	2002	2001
First / Last Hatch Date	May 6 Jun 15	Apr 29 Jun 10	May 5 May31	Apr20 Jun3	Apr20 Jun5	Apr21 May23	Apr12 May21	May7 May24
Age spread (days)	40	42	26	44	46	32	39	17
Age-first exp. To Aircraft (days)	NA	NA	8.1	7	8	8	9	7
Gender	8F-12M	8F-10M	9F-9M	9F-12M	5F-11M	6F-11M	10F-7M	4F-6M
Avg. # training hrs at PWRC	NA	NA	3:55	5:06	7:45	11:02	11:56	7:18
Pond exposure at PWRC (hh:mm)	NA	NA	32:24	39:48	55:26	21:42	180:40	19:06
Tot. chicks trans to NNWR	20	18	18	21	16	17	17	10
Avg. age at shipping (days)	44.8 I 43.6 47.8	44.7 I 44.6 46	48 | 47 52	49 | 49 42	53 | 46 41	51 | 43	54 | 45	56
Shipping Date (m/d)	6/25 I 7/9 7/29	6/19 I 7/3 7/18	6/26 | 7/6 7/20	6/15 | 7/6 7/13	6/19 | 6/30 7/15	6/19 | 7/1	6/12 6/27	7/10
Cohort One (C1)	3,4,5,7,9, 10,11	3,6,7,9,10,1 2,13,14	1,2,4,5,6,7, 8,10	1, 2, 3, 5, 6, 7	1, 2, 3, 5, 6, 7, 8	1, 2, 3, 4, 5, 6	1, 2, 3, 4, 5, 7, 8	1, 2, 3, 5, 6
Cohort Two (C2)	12, 13, 14, 15, 16, 18, 19	16,17,18, 21, 22, 24	11, 12, 13, 14, 15	8, 9, 10, 11, 12, 14, 15, 16	12, 14, 15, 16, 17, 18	7, 9, 10, 11	9, 10, 11, 12	4, 7, 9, 10, 11
Cohort Three (C3)	24, 26, 27, 28, 29, 30	26, 27, 33, 35	18,19, 20, 22, 23	19, 20, 21, 22, 23, 24 26	19, 20, 22	12, 13, 14, 16, 17, 18, 19	13, 14, 15, 16, 17, 18	NA
Total days at NNWR	114/100/80	115/101/86	102 | 91| 77	121 | 100 93	117 | 103 88	118 | 106	112 | 107	98
# days trained at NNWR	61 |55 |40	67 I 50 I 40	59 | 52 |41	56	57	69	52	41
# nights water-roosting available	106|84|74	109 I 96 I 82	84 | 75 | 72	93 (M)	76 (M)	99 (M)	82 (M)	9 (M)
Fledging Date C1,C2,C3(m/d)	8/2, 15, 31	7/28 I 8/6 I 8/31	7/28 | 8/10 8/20	7/15 | 8/1 | 8/14	7/17 | 8/02 9/16	7/19 | 7/22 7/30	8/18 | 8/24 9/30	8/29 | 9/6
Pre-mig. health check (m/d)	9/2, 3	9/5	9/6, 7	8/30, 31	9/5 & 6	8/27	8/26,27,29	9/11
Cohorts united	Sep 18 Oct 5	Sep 13, 28	Sep 5, 21	Sep 15, 23	Sep 6, 21	Aug 14, 29	Aug 25 Sep 16	Sep 5
Longest pre-migration flight	41 min	28 min	26 min	32 min	47 min	33 min	24 min	27 min
Migration departure	10/17	10/13	10/5	10/14	10/10	10/16	10/13	10/17
# Cranes began migration	14	17	18	20	14	16	17	8
Total migration distance (miles)	1093.3 1255.26 (*7)	1211.6	1239.1	1209.1	1204.4	1191	1204	1227.28
Total Flight Time	34:13.8 (*6)	37:37	33:40	31:46	33:07	31:53	38:36	35:46
Total flight days	19 / 21(*5)	25	22, 24(*2)	21 25(*1)	21	20	22	26
Total days to complete mig.	82 / 88 (*4)	96	76 78(*2)	61 – 64(*1)	64	54	49	48
Longest flight dist. (miles)	117.1	138	101	115	157	200	107.2	94.7
Longest flight duration. (h/mm)	2:52	2:20	2:45	2:24	3:00	3:03	2:15	2:09
Arrival Date	Jan 17 & 23/09 (*3)	Jan 28/08	Dec 19 & Jan12/07 (*2)	Dec13 & Jan11/06 (*1)	Dec 12	Dec 8	Nov 30	Dec 3
Total cranes to complete mig.	14	17	18	19	13	16	16	7 (1 crated)

(*1) = Arrived 13 Dec 2005 at Halpata. Moved birds 26.1 miles to Chassahowitzka NWR on Jan 9, 10 and 11 2006
(*2) = Arrived 19 Dec 2006 at Halpata. Moved birds 26.1 miles to Chassahowitzka NWR on Jan 11, 12 2007
(*3) = Arrived 17 Jan 2008 at St. Marks NWR. Arrived 23 Jan 2009 at Chass NWR
(*4) = 82 Days to St. Marks / 88 days to Chass (excluding 10 day break at Christmas)
(*5) = 19 days to St. Marks / 21 days to Chass
(*6) = 30 hrs 34.5 min to St. Marks / 34 hrs 13.8 min to Chass
(*7) = 1093.3 miles to St. Marks / 1229.26 miles to Chass

Table 2. Summary of Stops for 2008 Migration

Migration Leg	Migration Day	Date	Distance statute miles	Duration hh:mm	Accumu-lated miles	Location (County)	State	Duration of delay	Birds crated and Distance (miles)	Weather
1	1	Oct 17	4	0:25.0	4	Necedah to 1st Stop	WI	4 days at 1st stop	3,4,5 =4M	Clear, calm temp 28F
2	5	Oct 21	18	0:37.5	22	1st Stop to Juneau	WI	7 days @ Juneau	0	Temp 29F clear. 3 mph headwind (HW)
3	12	Oct 28	26.6	0:40.0	48.6	Juneau to Sauk	WI	0	0	Temp 11F clear 3 mph tailwind (TW)
4	13	Oct 29	43.1	1:05.0	91.7	Sauk to Greene	WI	11 days @ Green	0	Temp 25F Clear 9mph TW
5	25	Nov 10	35.8	0:57.0	127.5	Greene to Winnebago	WI to IL	8 days @ Winnebago	0	Temp 22F clear trashy to 1K ft
6	33	Nov 18	55.0	1:54.0	182.5	Winnebago to La Salle	IL	2 days @ La Salle	0	Temp 17.2 winds 14mph NE
7	36	Nov 21	111.6	2:20.0	295.1	La Salle to Piatt	IL	4 days @ Piatt	0	Temp 16F very clear. 16mph TW
8	41	Nov 26	55.7	2:26.0	349.8	Piatt to Cumberland	IL	0	0	Temp 21F 5mph TW above 1K ft
9	42	Nov 27	108.3	2:52.0	458.1	Cumberland to Union	IL to KY	1 day @ Union	0	Temp 41F Clear no wind.
10	44	Nov 29	63	2:16.0	521.1	Union to Marshal	KY	5 days @ Marshal	0	Temp 44F clear very calm
11	50	Dec 5	117.1	2:22.0	632.2	Marshal to Hardin	KY to TN	6 days @ Hardin	0	Temp 13.2, 12 to 20mph TW
12	57	Dec 12	57	2:17.0	695.2	Hardin to Franklin	TN to AL	5 days plus Xmas break	19, 28, 29, 30 = 57M/ 3 =	Temp 32 / 2 inches of snow, rough below 1100ft,
Christmas break December 18 - 28, 2008										
13	63	Dec 29	53	1:53.0	748.2	Franklin to Walker	AL	0	0	Temp 32F clear 2mph TW
14	64	Dec 30	58	1:50.0	806.2	Walker to Chilton	AL	9 days at Chilton	0	Temp 31F Clear winds surface2mph aloft 10mph
15	74	Jan 9	57.6	2:29.0	863.8	Chilton to Lowndes	AL	2 days @ Lowndes	3,4,5,24,28,29, 30 = 7.8 m	Temp 32F 6ph HW very rough
16	77	Jan 12	51.9	1:53.0	915.7	Lowndes to Pike	AL	0	0	Temp 27F Clear but fog until 8:30.
17	78	Jan 13	109.5	2:25.0	1025.2	Pike to Decatur	AL to GA	0	0	Temp 28 high overcast 7mph TW
18	79	Jan 14	42.1	1:34.0	1067.3	Decatur to Jefferson	GA to FL	2 days @ Jefferson	0	Temp 24F 12mph NW
19	82	Jan 17	26	1:09.0	1093.3	Jefferson to St. Marks	FL	5 days @ Jefferson for the 2nd group	0	Temp 28F winds NW at 8mph
20	86	Jan 21	76.66	1:35.0	1169.96	Jefferson to Gilchrist	FL	0	0	Temp 19F, Wind 12mph NW
21	87	Jan 22	59.3	0:41.0	1229.26	Gilchrist to Marion	FL	0	0	Temp 30F Surface= calm aloft =12mph HW
22	88	Jan 23	26	1:56.0	1255.26	Marion to Chass	FL	0	4 = 6 m	Temp 37F Fog delay clear calm
				Total 34hrs-13.8 mins					12,13,14,18,26,27 made entire trip	

2008 OPERATION MIGRATION FIELD TEAM

Liz Condie COO / Outreach, Operation Migration

Brian Clauss: Aviculturist, Patuxent Wildlife Research Center

Joe Duff: Pilot /Team Leader, Operation Migration

Chris Gullikson: Pilot, Operation Migration

Don Lounsbury: Top Cover Pilot, Operation Migration

Paula Lounsbury: Top Cover Pilot, Operation Migration

John Martineau: Bird Handler, Operation Migration

Tom Miller: Top Cover Pilot, Operation Migration

Gerald Murphy: Top Cover Observer, Driver, Operation Migration

Bev Paulan: Supervisor Field Ops, Operation Migration

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Jack Wrighter: Top Cover Pilot, Operation Migration

All of us at Operation Migration would like to thank the many stopover-site owners who hosted our birds and us for so many years. It is no small task to support a flock of birds and the team of 12 every year and allow them into your homes and hearts. We are proud to have friends like you whose generosity is unbounded and whose support has helped to save Whooping cranes. We would also like to thank the many hosts along the new migration route for taking up the challenge. Already we have an extended Whooping crane family and we are very grateful.

DIRECT AUTUMN RELEASE

Year 2008 was the fourth year in which whooping crane chicks were specifically reared for release on the northern reintroduction area. Juveniles were released during the autumn staging period to learn survival skills and the migration route from older, experienced cranes.

DIRECT AUTUMN RELEASE

Richard Urbanek (FWS)

REARING

Ten whooping crane chicks were initially hatched and costume/isolation-reared at the International Crane Foundation (ICF), Baraboo, Wisconsin, for use in the DAR program. One egg was produced at Patuxent Wildlife Research Center and the remainder at ICF. Eight surviving chicks (3 males, 5 females, hatched 5-29 June) were transferred to the isolation-rearing field facility (Site 3) on Necedah NWR on 22 July when chicks were 23-47 days of age. One female in this group had significant bilateral leg rotations and was not initially considered suitable for release.

After transfer to Necedah NWR, all chicks were initially maintained in the chick building. They were frequently attended by costumed parents in adjacent habitat during the day and locked in their individual compartments in the building at night. Chick nos. 31, 32, 33, and 34 (41-53 days old) were transferred from the chick building to the top-netted wet pen on 28 July. Nos. 35 and 38 (59 days old) were transferred on 12 August, and nos. 36 and 37 (62-64 days old) on 20 August. Female no. 34-08 was removed from the project (euthanized) on 22 August because of an untreatable respiratory infection consistent with aspergillosis. The remaining 7 chicks were left together (i.e., not divided by a fence) overnight in the wet pen for the first time on 28 August. Chicks fledged (cleared 100 m without touching the ground) by mid-August to mid-September (72-89 days after hatching). They were allowed to roam freely in the immediate area during daytime with frequent checks by costumed parents, and the group was locked in the wet pen, where they roosted in water, at night.

During the previous 3 years, a resident pair of sandhill cranes had been present at the site throughout the summer, and whooping crane female no. 2-01 was present after returning from Adams County, which she inhabited during spring. In 2008 no. 2-01 was present at Site 3 during the entire spring. In mid-July adult pair nos. 11-02/17-02 moved to Site 3 after their normal territory on East Rynearson Pool was drained. The pair displaced no. 2-01 and the resident sandhill pair from the rearing area. No. 2-01 subsequently moved to unsafe roosting habitat in the scrub-shrub north of Pharm Pool and died. The adult pair remained at the site throughout the summer and treated it as their territory. They routinely interacted aggressively with the chicks, and the male (no. 11-02) frequently challenged the costumed caretakers. The adults were most tolerant of the youngest chick, no. 37, who usually maintained the greatest distance from the adults and did not challenge them. There were also some minor territorial encounters with male no. 2-04, who established a summer use area on the northern part of Site 3. Male no. 11-05, who summered east and south of Site 3, also occasionally appeared but was never aggressive toward the chicks. The adult pair was dominant over both of the latter males and also prevented other adult-plumaged cranes from using the site. On one occasion in September, 10 birds in adult plumage landed at Site 3. Several chicks initially attempted to chase them away, but then the adult pair succeeded in doing so. By the time of release, the adult pair was marginally more sociable, and 1 released chick (no. 37) associated with the pair just after release (see below).

The premigratory health check was performed on 9 September; results were normal for 6 chicks, and some improvement in the female with leg rotations resulted in a recommendation for her release with the other chicks. Juveniles were banded and equipped with transmitters on 7 October. Male no. 33 sustained a fractured right tibiotarsus during banding on that date. The injury was not repairable, and he was euthanized on 9 October.

RELEASE OF DAR JUVENILES

All juveniles were released in areas occupied by older whooping cranes. Releases of the juveniles were conducted shortly before roost time on 18 October. Nos. 31 and 32 were released on eastern Sprague Pool, where they remained to roost. They remained at Sprague Pool on the following day. Nos. 35 and 36 were released on West Rynearson Pool but flew to East Rynearson Pool to roost. They returned to Site 3 and rejoined other birds there on the following morning. Nos. 37 and 38 were passively released at Site 3 after facilities at that site were closed for the season. No. 38 was a costume-reared chick with bilateral leg rotations that had not originally been planned for DAR. On the evening of 21 October, nos. 35, 36, and 38 moved to roost on Goose Pool. They joined nos. 31 and 32 and adult no. 1-04 on mid-northern Sprague Pool on the following day. The five birds remained with no. 1-04 mainly on north-central Sprague Pool until 3 November. On that morning nos. 31 and 36 moved to Killdeer Pool but later returned to the group on Sprague Pool. No. 35 was observed alive flying alone over western Sprague Pool on the same morning. She roosted that night on eastern Sprague Pool, away from the other DAR juveniles, and moved E of Pool 18 on the morning of 4 November. She was killed there by a predator later that day or that night. The mortality site was a small area of standing water within a densely vegetated, mostly dry sedge marsh. She was then drug 70 m to an adjacent woodland, where the carcass was found partially consumed. The remaining four DAR juveniles associated with no. 1-04 until he repaired with his former mate no. 8-05 on 5 or 6 November. On 6 November no. 31 was captured for attachment of the PTT that had previously been deployed on no. 35. The four remaining DAR chicks were associating with no. 16-02 by 9 November and with no. 24-05 by 10 November. No. 24-05 left the group, moved to the southern part of the refuge, and began migration with nos. 13-02 and 18-02 on 17 November. No. 16-02 began migration with the four DAR juveniles from Sprague Pool on the same date.

No. 37-08 (DAR) remained on or near the southern part of Necedah NWR after release and associated with many older whooping cranes (nos. 11-02, 17-02, 9-03, 3-04, 10-03, W1-06, 12-04, 11-05, 46-07 [DAR], 12-05, 27-06 [DAR], 28-06 [DAR], 16-07, 24-07, and 37-07 [DAR]). She began following other whooping cranes to cornfields off the refuge on 24 October. By 25 October she was integrated into the large subadult flock (that also included HY2007 nos. 9, 17, 26, 10, and 22 in addition to several whooping cranes listed above) south of the refuge. She usually roosted with whooping cranes on East Rynearson Pool or in wetlands south of the refuge.

Until migration no. 37-08 (DAR) remained mainly in cornfields south of the town of Necedah with the other whooping cranes noted above as well as with no. 10-08 (see below). She usually roosted with these cranes in wetlands south of the refuge. On 12 November, she roosted on East Rynearson Pool with nos. 10-08, 17-07, 5-05, and 15-04 and was observed with all but no. 17-07 on Camp Road Pool the next day. She returned to roost south of the town of Necedah with no. 10-08 that night and rejoined the large flock of whooping cranes the next day. No. 37-08 began migration with nos. 12-04, 11-05, 12-05, 16-07, 24-07, 46-07 (DAR), and 10-08 from a field south of Necedah on 20 November.

RELEASE OF SALVAGED JUVENILE FROM ULTRALIGHT GROUP

Whooping crane no. 10-08 was released on the evening of 22 October at West Rynearson Pool, Necedah NWR. He had previously been removed from the ultralight-led flock of juveniles because of aggression problems and inability to integrate into that flock. He roosted that night at Site 4. He returned to Site 5 on the following day and remained in that area, where he was occasionally observed with no. 9-05, for the next few days. No. 10-08 was observed with nos. 7-03 and 21-07 on 26 October and with nos. 10-03 and W1-06 on 27 October in cornfields E of the refuge. He then began using cornfields south of the refuge, where many other older

whooping cranes and no. 37-08 (DAR) were also observed. After joining this large subadult flock, he roosted in wetlands south of the refuge with the other whooping cranes (refer to narrative on no. 37-08 above for continuation of report on no. 10-08).

MIGRATION AND WINTERING

Nos. 31, 32, 36, and 38: These four juveniles began migration from Sprague Pool with no. 16-02 on 17 November. They roosted that night near Holcomb, Ogle County, Illinois, and remained in that area, including near Rochelle, until 1 December (Fig. 1). They left this first migration stop and made a short migration movement to west of Ottawa, La Salle County, Illinois, on 1 December. They resumed migration to south of Bloomington, McLean County, Illinois, on 2 December. They continued on to north of Cave-in-Rock, Hardin County, Illinois, on 4 December. On 5 December they continued migration to roost north of Ethridge, Lawrence County, Tennessee, where they remained to winter.

Nos. 37-08 and 10-08: These two juveniles began migration with nos. 12-04, 15-04 and 5-05, 11-05, 12-05, 16-07, 24-07, and 46-07 (DAR) from south of the town of Necedah on 20 November. Nos. 15-04 and 5-05 separated from the larger group near Rockford, Illinois. The group of eight continued on to roost that night south of Cornell, Livingston County, Illinois. On the next day they continued to near Skelton, Gibson County, Indiana, where they remained until they resumed migration on 21 December. They roosted that night near Gum Springs, White County, Tennessee. They resumed migration on 22 December and roosted that night on Weiss Lake, Cherokee County, Alabama (Fig. 1).

Nos. 11-05, 12-05, 16-07, 24-07, 10-08, and 37-08 resumed migration from that area after 26 December, after separating from nos. 12-04 and 46-07, who initially remained. The group of six

arrived on Paynes Prairie Preserve State Park, Alachua County, by the night of 31 December. They were joined there by nos. 7-03, 8-04 and 19-05, and 14-05 by 1 January. The group of 10 cranes remained to winter at this location (Fig. 1).

STATUS OF HY2005-07 DAR WHOOPING CRANES

Table 1 shows the importance of retrieval and translocation to managing DAR birds after release and increasing their opportunities for socialization and pairing. The HY2007 cohort has demonstrated the first firm social bonds between DAR females and other whooping cranes in the population. Nos. 39 and 42 have consistently associated in a group with two HY2007 ultralight males since summer 2008. Likewise, no. 46 associated with 5 HY2007 ultralight cranes during summer 2008, was part of the large subadult flock in the southern Necedah NWR area during autumn staging, and then paired with a 4-year-old ultralight male (no. 12-04) during autumn migration. These positive social associations were made possible by (1) association of all of these DAR females in one large group (containing a male) through their first spring migration and (2) subsequent corrective translocation to the core Central Wisconsin reintroduction area, where a concentrated pool of other potential whooping crane associates was located. Other released DAR birds, which have either not remained in groups or which were not translocated when needed, have not fared as well.

Table 1. Post-release management action summary and current social status of surviving* HY2005-07 direct autumn release (DAR) whooping cranes. February 2009.

Crane no.	Sex	Corrective translocation	Social crane associates	Comments
27-05	F	Yes[b]	Sandhill	
28-05	F	Not needed	Sandhill	
33-05	F	Needed but retrieval unsuccessful[c]	Sandhill	In Michigan each summer
27-06	M	Yes[c]	Whooping	
28-06	M	Not needed	Whooping	
37-07	M	Yes (2X)[d,e]	Whooping	
39-07	F	Yes (2X)[d,e]	Whooping	
40-07	F	Yes[d], Needed but not attempted[c]	Sandhill	Possible mortality
42-07	F	Yes (2X)[d,e]	Whooping	
44-07	F	Yes[d], Needed but retrieval unsuccessful[c]	Sandhill	Joined sandhills after whooping crane associates were translocated
46-07	F	Yes (2X)[d,e]	Whooping	Paired autumn 2008

[a] Total released = 18 HY2005-07 DAR + 1 HY2004 salvaged from ultralight cohort.
[b] Within Kentucky during first autumn migration after separating from other cranes.
[c] In or from Michigan in spring.
[d] From Illinois during first autumn migration.
[e] From Arkansas during first autumn migration.

SUMMARY AND ACKNOWLEDGMENTS

Refer to Tracking section pp. 49 - 50.

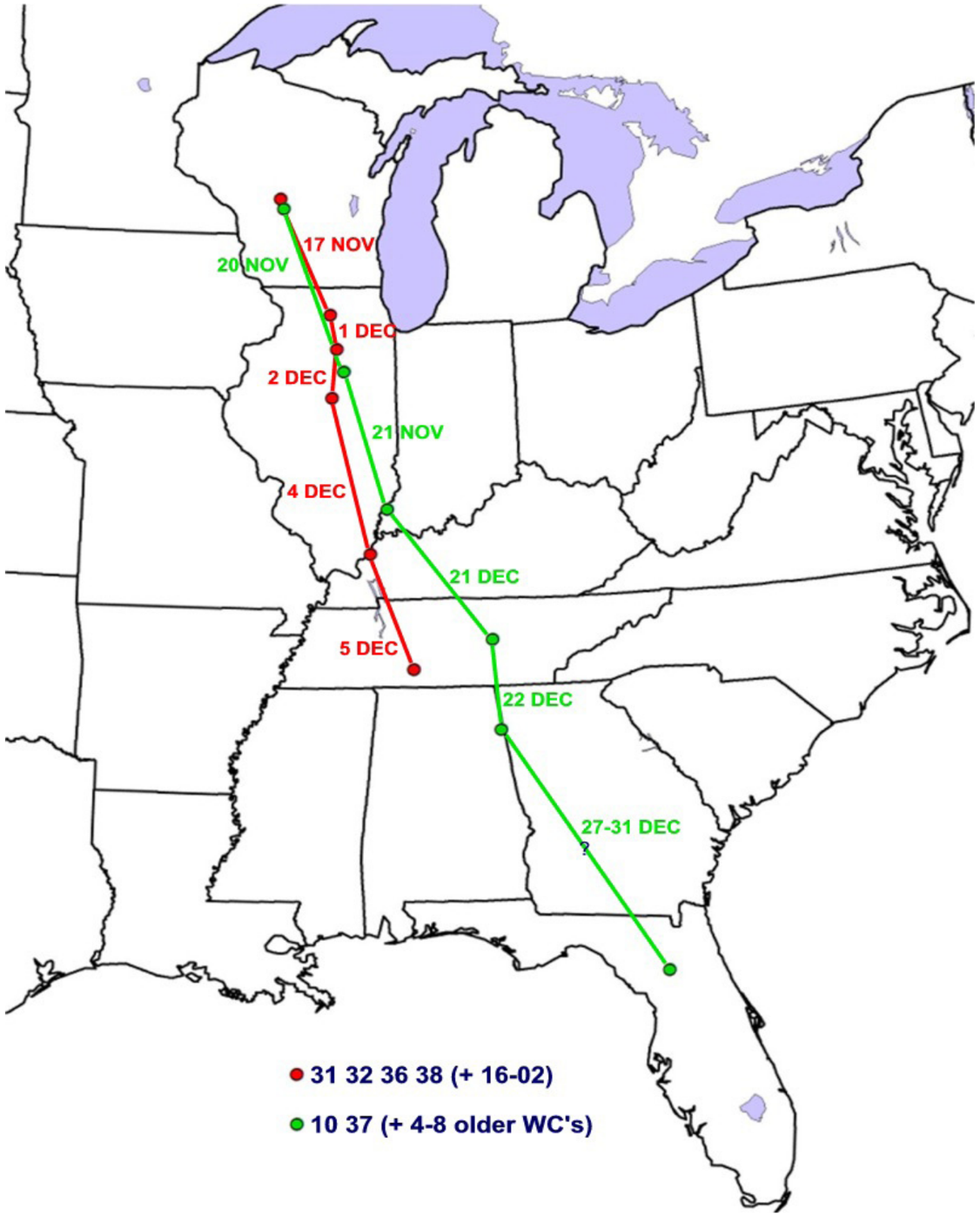

Figure 1. Autumn migration of HY2008 DAR juvenile whooping cranes.

TRACKING

This report documents the biology of whooping cranes in the reintroduced eastern migratory population during calendar year 2008 with additional notes from January and February 2009. The distribution of cranes during this report period, overlaid on total distribution during the course of the reintroduction, appears in Fig. 1. Identification information for all whooping cranes in the eastern migratory population as of 10 February 2009 appears in Appendix A.

TRACKING
Richard Urbanek (FWS)

WINTER 2007/08

Movements and Distribution

The wintering population as typified by status on 10 February 2008 included 59 individuals (31 males, 28 females) distributed in Florida (20), South Carolina (4), Tennessee (18), Alabama (2), Indiana (1), and undetermined (14) (Table 1). A much larger number of cranes (18) in the population than usual wintered in Tennessee, including all DAR cranes except 2 wintering in Pasco County, Florida. Seven of the DAR cranes in Tennessee consisted of the 2007 release cohort, which had been retrieved from migration locations in Illinois and Arkansas and moved to Hiwassee Wildlife Refuge after migrating without the guidance of older cranes.

HY2007 Ultralight-led Cohort

The ultralight-led (UL) migration had departed from Necedah NWR on 13 October 2007. The 17 juveniles (9 males, 8 females) arrived at the holding site on Halpata Tastanaki Preserve, Marion County, Florida, on 27 January 2008. Migration of 16 of the HY2007 juveniles was completed when Operation Migration ultralight aircraft led them from Halpata to the release site on Chassahowitzka NWR on 28 January. Because of earlier wing and chest injuries, 3-07 did not make the flight and was transported to the pensite on 2 February. Bands and transmitters with permanent color identification codes were attached on 3-4 February. The juveniles were retained during a period of acclimation in a top-netted enclosure until they were released on 5 February. One female (35-07) was unable to fly after banding and health check. Despite physical therapy, she never regained flight capability and was eventually removed from the project.

SPRING MIGRATION

Initiation of spring migration was relatively early in 2008 (Table 1). For the segment of the population wintering in Florida, only 5 whooping cranes (excluding juveniles and of a total of 20) remained on known wintering areas by 10 March. No. 1-01 was the first whooping crane confirmed back in Wisconsin (by 14 March). Forty individuals, including 1 HY2007 UL crane, were confirmed back in Wisconsin by 5 April. By 21 April, 56 whooping cranes were confirmed in Wisconsin. No. 16-05 began spring migration far later than any previous record; he departed from Florida for Michigan between 25 June and 2 July.

UL juveniles departed from the Chassahowitzka pensite in three groups on 25 March (6), 26 March (5), and 1 April (5). Fourteen of 15 surviving birds completed migration to the Necedah area in six groups on 19 April (5), by 20 April (1), on 23 April (1, 3), 30 April (3) and 4 May (1). No. 27 did not return and apparently summered in Indiana; she had been transported by box during the Wisconsin portion of the previous autumn UL migration.

The 6 surviving HY2007 DAR cranes migrated to Michigan, where 5 arrived on Fish Point SWA, Tuscola County, on 16 April. Four of these were later retrieved and released in Wisconsin: no. 37 on 2 June and nos. 39, 42, and 46 on 10 June. No. 44 evaded capture. The remaining DAR crane, no. 40, arrived in Mason County by 27 April and had moved to near her summering area in Allegan County by 5 May. Retrieval of no. 40 was not attempted.

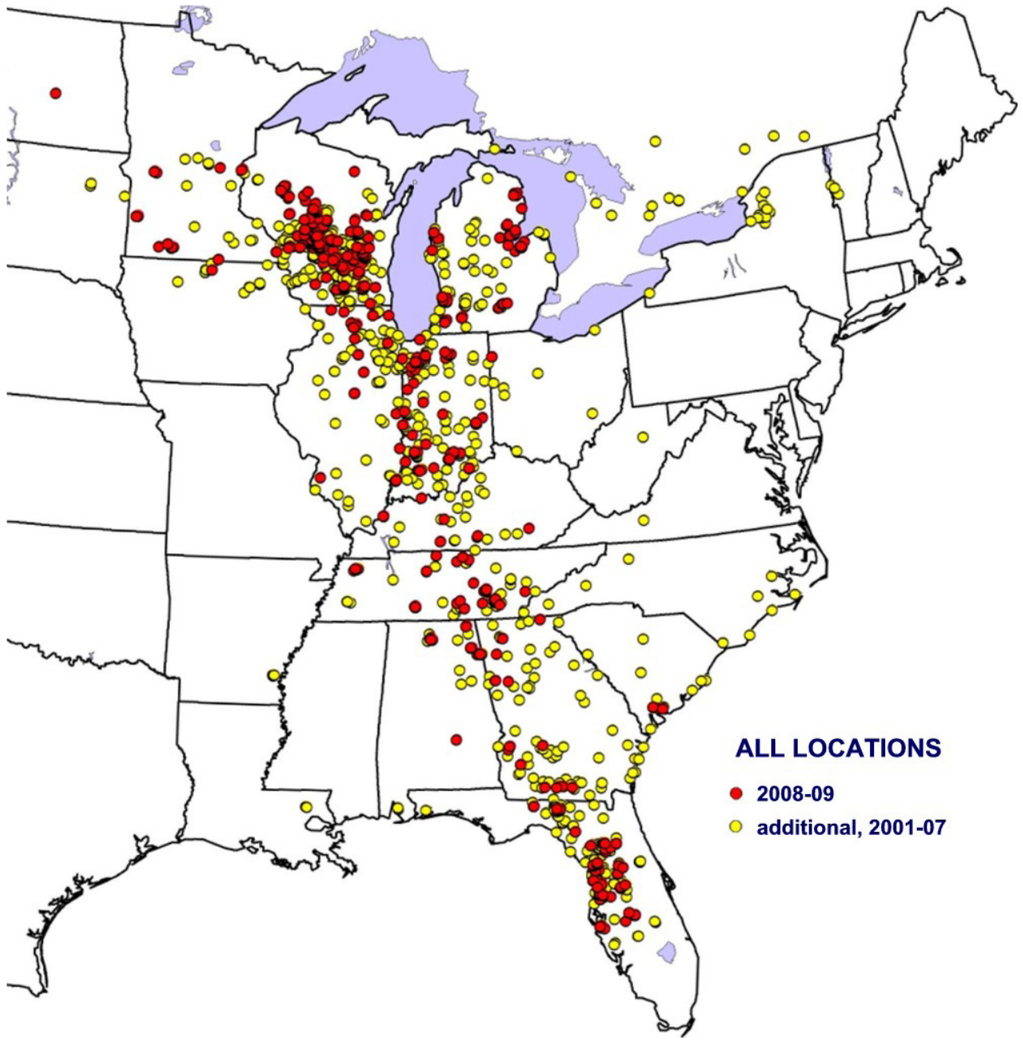

Figure 1. Distribution of whooping cranes in the reintroduced eastern migratory population, 2001-09.

"We applaud the efforts of the WCEP in bringing this nearly extinct species back into wild populations." - Illinois Department of Natural Resources Acting Director, Sam Flood

Table 1. Wintering areas of whooping cranes in the reintroduced eastern migratory population, winter 2007/08. R = Direct Autumn Release. No winter location data were available for nos. 7-03 or 24-05.

Crane nos.	Location	County	Spring departure
Florida			
1-01	Shamrock Acres	Citrus	29 Feb
11-02, 17-02	Tooke Lake	Hernando	16-17 Feb
12-02, 19-04	NE of Gowers Corner	Pasco	6 Mar
16-02	SW of Gowers Corner	Pasco	29 Feb
3-03, 17-03	Long Pond (briefly until 6 Feb)	Marion	unknown
9-03, 3-04	Cedar Hammock	Levy	28 Feb
13-03, 18-03	S of Crystal River, Citrus County (detected migrating in spring)	Unknown	10 Mar
16-03, 11-05	Long Pond	Marion	26 Feb
2-04, 12-04	SW of Mascotte	Lake	17 Mar
8-04, 14-05, 19-05	Cockroach Bay	Hillsborough	26 Feb
6-05	Evans Prairie	Sumter	4 Mar
9-05	Cherry Lake (early winter only)	Lake	unknown
12-05	Lochloosa/Orange Lakes (early winter only)	Alachua	unknown
16-05	Lindsey Lake	Marion	25 Jun-2 Jul
W1-06	Tooke Lake	Hernando	9 Mar
27-06R, 28-06R	Crews Lake	Pasco	25 Mar
Georgia			
9-02, 16-04	Near Carrollton (until 2 Feb)	Carroll	unknown
Tennessee			
5-01 (translocated 16 Dec), 20-04	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs	unknown
7-01	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs	14-25 Feb
1-04, 8-05	Bells Bend	Davidson	unknown
5-05, 15-04	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs	28 Feb-2 Mar
20-05	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs	28 Feb-14 Mar
27-05R	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs	28 Feb-3 Mar
28-05R	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs	28 Feb-12 Mar
33-05R	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs	14-26 Feb
HY2007 37R, 39R, 42R, 43R, 44R, 46R	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs	16 Mar
40-07R	Hop-In Wildlife Refuge	Obion	1-2 Mar
South Carolina			
10-03, 1-05	Combahee Unit, ACE Basin NWR	Colleton	13-17 Mar
11-03, 12-03	Donnelley WMA	Colleton	15-16 Mar
Alabama			
13-02, 18-02	Wheeler NWR	Morgan	11-18 Mar
Indiana			
2-01	Goose Pond FWA	Greene	2 Mar

9-03, who had migrated to New York during the previous 3 springs, finally completed her first unassisted return to Necedah NWR in spring 2008. She and her mate, 3-04, had paired during the previous October, after she had been retrieved from New York. They returned to their territory on East Rynearson Pool as a breeding pair.

SPRING, SUMMER, AND AUTUMN

As usual, yearlings engaged in typical spring wandering, which was quite extensive in 2008 and included movements to Winnebago County, Iowa; Eau Claire, Fond du Lac, Jefferson, Portage, Columbia, Dane, Sauk, Marquette, Waupaca, Shawano, and Iowa Counties, Wisconsin; Stephenson County, Illinois; Freeborn and Jackson Counties, Minnesota; and Stutsman County, North Dakota.

No. 6-05 was associated with unpaired female no. 7-01 near Cottonville, Adams County, during spring, but no pair bond formed. No. 7-01 returned to Horicon NWR by 21 May but was no longer reported there after 12 June. No. 6-05 remained near Cottonville and molted at that location. No. 7-01 reappeared with sandhill cranes in Adams County during autumn staging in October.

On 4 July the population consisted of 68 known or later verified individuals (38 males and 30 females) and possibly 1 male not recorded since October 2007. Distribution of birds during the period included 56 in Wisconsin, 7 in Minnesota, 4 in Lower Michigan, and 1 in Indiana. An additional 7 individuals were added to the population by release of 6 DAR (direct autumn release) juveniles and 1 juvenile removed from the ultralight cohort on 18 and 22 October, respectively, on Necedah NWR. Six surviving juveniles migrated appropriately with older whooping cranes to locations in Tennessee and Florida.

Unlike previous cohorts, many of the HY2007 yearlings summered at widespread locations including areas in Dodge (4) and Chippewa (1) Counties, Wisconsin; Jackson and Pope Counties, Minnesota (4); and a probable but undetermined location in Minnesota (3) (Fig. 2). Most older cranes summered as usual on or near Necedah NWR. Autumn distribution was similar to summer distribution for most cranes in the population, especially the older birds (Tables 2 and 3).

AUTUMN MIGRATION

Initiation of migration in 2008 was highly synchronous in comparison to previous years with 95% of recorded departures occurring during 15-20 November. Migration departures in approximate order by date were as follows:

26 October: Nos. 27-06 (DAR) and 28-06 (DAR)

15 November: Nos. 1-01; 11-02 and 17-02; 11-03 and 12-03; 6-07, 12-07, and 13-07; 33-07

16 November: No. 20-04

17 November: Nos. 13-02 and 18-02 and 24-05; 9-03 and 3-04; 10-03 and W1-06; 13-03 and 18-03; 16-02 and HY2008 (DAR) nos. 31, 32, 36, and 38

18 November: Nos. 9-05 and 14-05; 9-07, 17-07, and 26-07

20 November: Nos. 5-01 and 1-05 and 2-04; 3-03 and 17-03; 7-03 and 21-07, 10-07 and 22-07, and 37-07 (DAR); 1-04 and 8-05; 8-04 and 19-05; 12-04, 15-04, 5-05, 11-05, 12-05, 16-07, 24-07, 46-07 (DAR), 10-08, and 37-08 (DAR)

25 November: No. 6-05

Specific date not recorded: Nos. 7-01; 12-02 and 19-04; 16-03; 16-04; 16-05; 20-05; 27-05 (DAR); 28-05 (DAR); 33-05 (DAR); HY2007 nos. 3, 7, 39 (DAR), and 42 (DAR); 27-07; 44-07 (DAR)

No record of migration: 16-04, 40-07 (DAR)

A group composed of HY2007 nos. 3 and 7 (UL males) and 39 and 42 (DAR females) migrated as far south as Polk County, Florida, before retreating northward to winter in Lowndes County, Georgia, by 30 November. In the only other whooping crane group containing a HY2007 DAR female, no. 46 paired with male 12-04. This pair separated from a larger group, proceeded as far south as Montgomery County, Alabama, and eventually retreated northward and wintered at Weiss Lake, Cherokee County, Alabama. No. 12-04 had wintered in Florida in all previous winters.

WINTER 2008/09

This was the third consecutive year of drought on the wintering areas in Florida and part of widespread drought across southeastern U.S. Arrival dates on major or final wintering areas appear in Table 4. Wintering areas as of 15 February 2009 appear in Fig. 3. The estimated maximum size of the population was 87 birds (52 males and 35 females). Distribution was Indiana (1), Tennessee (19), Alabama (7), South Carolina (4), Georgia (4), Florida (45), and undetermined (7). The total in Florida included 14 recently-released ultralight-led juveniles (refer to Ultralight Migration section pp. 16 - 22)

SURVIVAL

As of 15 February 2009, 128 whooping cranes have been released as juveniles since the reintroduction began in 2001. This value excludes 17 HY2006 ultralight-led juveniles that died during confinement in a storm and 1 HY2007 ultralight-led juvenile that was removed from the project after being unable to fly after an apparent handling injury at the winter release site. Addition of 1 naturally produced juvenile in 2006 resulted in a grand total of 129 reintroduced individuals during the 8 years of the project, of which 87 (67.4%) of those individuals may currently survive (Table 5).

The following mortalities were recorded in 2008:

No. 43-07 (DAR): Spring migration, Fayette County, Indiana, 22 March, power line collision.

No. 14-07: Spring migration, Bledsoe County, Tennessee, 30 March, predation by suspected canid.

No. 9-02: Paired adult female, nested, Monroe County Flowage, Meadow Valley SWA, May, last observed with an injured leg. No carcass recovered.

No. 2-01: Unpaired adult female, Site 3, Necedah NWR, late July, displaced from normal use area by nos. 11-02 and 17-02 and subsequently roosted nearby in an unsafe area.

No. 35-08 (DAR): Newly released juvenile, east of Pool 18, Necedah NWR, 4 November, roosted in water-deficient area after separating from release group, predation by coyote.

No. 21-07: Paired yearling female, wintering, Putnam County, Florida, late December, predation by eagle.

Mortality of another yearling female (no. 40-07 [DAR]) was suspected but not confirmed in southeastern Michigan in November.

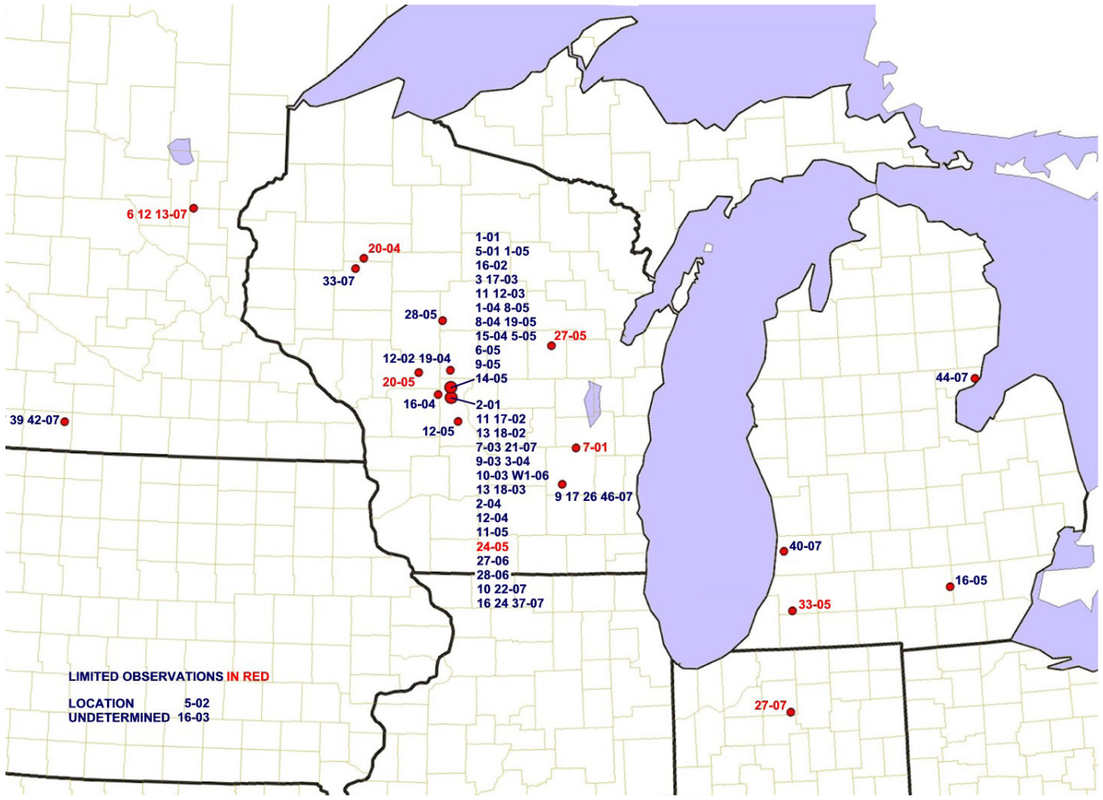

Figure 2. Primary summer use areas of whooping cranes in the eastern migratory population, 2008.

"This Class of 2008 brings another exciting year for this great partnership and it gets us one step closer to seeing the recovery of this magnificent species." - Keith Ramos, acting refuge manager at Chassahowitzka NWR

Table 2. Primary summering areas of whooping cranes in the reintroduced eastern migratory population, 2008. R = Direct Autumn Release. No. 5-02 was not located in 2008.

Crane nos.	Location	County
Central Wisconsin Core		
1-01	Rattail Pool/Lateral, Necedah NWR	Juneau
2-01 (died July)	Site 3, Necedah NWR	Juneau
5-01 and 1-05	mid/northeastern Sprague Pool, Necedah NWR	Juneau
9-02 (presumed died May), 16-04	Dandy Creek/Monroe County Flowages, Meadow Valley WMA	Monroe
11-02, 17-02	Site 3, Necedah NWR	Juneau
12-02, 19-04	G and adjacent flowages, Sandhill SWA	Wood
13-02, 18-02	Site 2, Rice/Rynearson Pools, Necedah NWR	Juneau
16-02	Sprague Pool area, Necedah NWR	Juneau
3-03, 17-03	Pools 9/18/19, Necedah NWR	Juneau
7-03, 21-07	N of East Rynearson Pool, Necedah NWR	Juneau
9-03, 3-04	West-central East Rynearson Pool, Necedah NWR	Juneau
10-03, W1-06	Site 4, Upper Rice/West Rynearson Pools, Necedah NWR	Juneau
11-03, 12-03	northeastern Sprague Pool, Necedah NWR	Juneau
13-03, 18-03	Carter-Woggon Pool, Necedah NWR	Juneau
16-03	Sprague Pool area, Necedah NWR (spring/autumn)	Juneau
1-04, 8-05	Pool 13/Danielson Wetland Restoration, Necedah NWR	Juneau
2-04	Becker Pool, Necedah NWR	Juneau
8-04, 19-05	western Sprague/Goose Pools, Necedah NWR	Juneau
12-04, 12-05	Juneau County Ditch (also Meadow Valley Flowage for 12-05)	Juneau
15-04, 5-05	Pool 19W/Camp Road Pool, Necedah NWR	Juneau
6-05	E of Cottonville	Adams
9-05	Pool 18/Danielson Wetland Restoration, Necedah NWR	Juneau
11-05	E of Site 3, Necedah NWR	Juneau
14-05	Pool 18/Danielson Wetland Restoration, Necedah NWR	Juneau
20-05	Dike 17 WA, Black River SF	Jackson
24-05	Necedah NWR (check)	Juneau
27-06	East Rynearson Pool, Necedah NWR	Juneau
28-06	northern West Rynearson Pool, Necedah NWR	Juneau
10-07, 22-07	S of Necedah	Juneau
16-07, 24-07	S of Necedah	Juneau
37-07R	S of Necedah	Juneau
Wisconsin Outside of Core		
7-01	unknown	unknown
20-04	Washington Creek SWA and vicinity	Rusk
HY2007 9, 17, 26, 46R	Mud Lake SWA, E of Reeseville	Dodge
27-05R	Little Wolf River (late summer)	Waupaca
28-05R	McMillan Marsh SWA and vicinity	Marathon
33-07	Chippewa County Forest	Chippewa
Michigan		
16-05	Waterloo Township	Jackson
33-05R	Pine/Knickerbocker Lakes and vicinity	Van Buren
40-07R	Allegan SGA	Allegan
44-07R	Wigwam Bay	Arenac
Minnesota		
HY2007 3, 7, 39R, 42R	E of Bergen	Jackson
HY2007 6, 12, 13	Dalbo SWMA (late summer)	Isanti
Indiana		
27-07	near Tippecanoe (late summer)	Marshall

Table 3. Primary autumn use or staging areas of whooping cranes in the reintroduced eastern migratory population, 2008 Only areas different from or in addition to summer areas (Table 2) are listed. R = Direct Autumn Release. SL = summer location also used during autumn.

Crane nos.	Location	County
Central Wisconsin Core		
1-01	southwestern Sprague Pool, Necedah NWR	Juneau
5-01 1-05	Mill Bluff/Volk Field, SL	Juneau
12-02, 19-04	Seneca and vicinity	Wood
3-03, 17-03	W of Goose Pool/Pool 13, Necedah NWR, SL	Juneau
9-03, 3-04	southern Necedah NWR/E of Hustler	Juneau
2-04	Mill Bluff/Volk Field	Juneau
12-04	southern Necedah NWR area	Juneau
15-04, 5-05	S of Necedah NWR, SL	Juneau
16-04	Site 3, Necedah NWR (1 obs.)	Juneau
6-05	Colburn SWA and vicinity	Adams
9-05	Site 5, Necedah NWR, SL	Juneau
11-05, 46-07R	southern Necedah NWR area	Juneau
12-05	southern Necedah NWR area	Juneau
20-05 (Oct)	near Shortville	Clark
20-05 (Nov)	Tomah	Monroe
24-05	Sprague Pool, Necedah NWR	Juneau
27-06R, 28-06R	southern Necedah NWR area	Adams/Juneau
HY2007 9, 17, 26	S of Necedah NWR	Juneau
10-07, 22-07	S of Necedah NWR	Juneau
HY2007 16, 24, 37R	S of Necedah NWR	Juneau
33-07	NE of Mauston	Juneau
10-08	S of Necedah NWR	Juneau
HY2008 31R, 32R, 35R (died Oct), 36R, 38R	north-central Sprague Pool, Necedah NWR	Juneau
37-08R	southern Necedah NWR, S of Necedah NWR	Juneau
Wisconsin Outside of Core		
7-01	W of Coloma	Adams
27-05R	Navarino SWA	Shawano
28-05R	S of Marshfield	Wood
HY2007 6, 12, 13	Fish Lake SWA (until 15 Oct)	Burnett
HY2007 6, 12, 13	near Granton (after 20 Oct)	Clark
Michigan		
33-05R	S of Portage	Kalamazoo
44-07R	Devils Lake, Mackinaw SF (until early Oct)	Alpena
44-07R	N of Prescott (after mid-Oct)	Ogemaw
Minnesota		
HY2007 3, 7, 39R, 42R	near Ivanhoe, Rost WMA	Lincoln
Indiana		
27-07	near Atwood	Kosciusko

Table 4. Wintering areas of whooping cranes in the reintroduced eastern migratory population, winter 2008/09. R = Direct Autumn Release.

Crane nos.	Location	County	Arrival date
Florida			
1-01	Shamrock Acres	Citrus	by 30 Nov
5-01, 1-05	Stafford Lake	Hernando	by 27 Dec
12-02, 19-04	SE of Masaryktown	Pasco	by 9 Jan
7-03, 21-07 (died late Dec)	S of Crossley	Putnam	by 3 Dec
7-03, 8-04, 19-05, 11-05, 12-05, 14-05, 16-07, 24-07, 10-08, 37-08R	Paynes Prairie	Alachua	31 Dec
9-03, 3-04, 20-05	Mallory Swamp WMA (until 13 Jan)	Lafayette	by 17 Dec
9-03, 3-04, 20-05	San Pedro Bay (by 17 Feb)	Taylor	
2-04	SW of Mascotte	Lake	3 Jan
9-05	E of Paisley	Lake	unknown
16-05	Salt Sick Lake	Marion	by 12 Dec
27-06R, 28-06R	Crews Lake	Pasco	19 Nov
HY2007 6, 12, 13	NE of Bartow	Polk	by 4 Dec
HY2007 9, 10, 17, 22, 26	Tooke Lake	Hernando	30 Nov
33-07	SW of Lake Wales	Polk	by 2 Dec
33-07	NE of Bartow	Polk	By 31 Dec
Georgia			
HY2007 3, 7, 39R, 42R	S of Hahira	Lowndes	30 Nov
South Carolina			
10-03, W1-06	Combahee Unit, ACE Basin NWR	Colleton	17 Dec
11-03, 12-03	Donnelley WMA	Colleton	20 Nov
Alabama			
11-02, 17-02	Weiss Lake	Cherokee	By 30 Dec
13-02, 18-02, 24-05	Garth Slough, Wheeler NWR	Morgan	by 21 Nov
12-04, 46-07R	Weiss Lake	Cherokee	22Dec, by 12 Jan
Tennessee			
7-01	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs	by 26 Nov
16-02 HY2008 31R, 32R, 36R, 38R	N of Ethridge	Lawrence	5 Dec
13-03 18-03	Candies Creek Unit, Chickamauga WMA	Bradley	
16-03	Hiwassee Wildlife Refuge/Armstrong Bend (Dec)	Meigs	by 27 Nov
1-04, 8-05	Bells Bend	Davidson	by 20 Dec
5-05, 15-04	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs	25 Nov
20-04	Hiwassee Wildlife Refuge/Armstrong Bend (Dec)	Meigs	by 26 Nov
6-05	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs	26 Nov
27-05R	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs	by 23 Nov
28-05R	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs	by 26 Nov
33-05R	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs	30 Nov
37-07R	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs	23 Nov
Indiana			
3-03, 17-03	Ewing Bottoms (until 3 Jan)	Jackson	
27-07	NE of Rockport (25-29 Jan)	Spencer	
27-07	Ewing Bottoms (by 15 Feb)	Jackson	

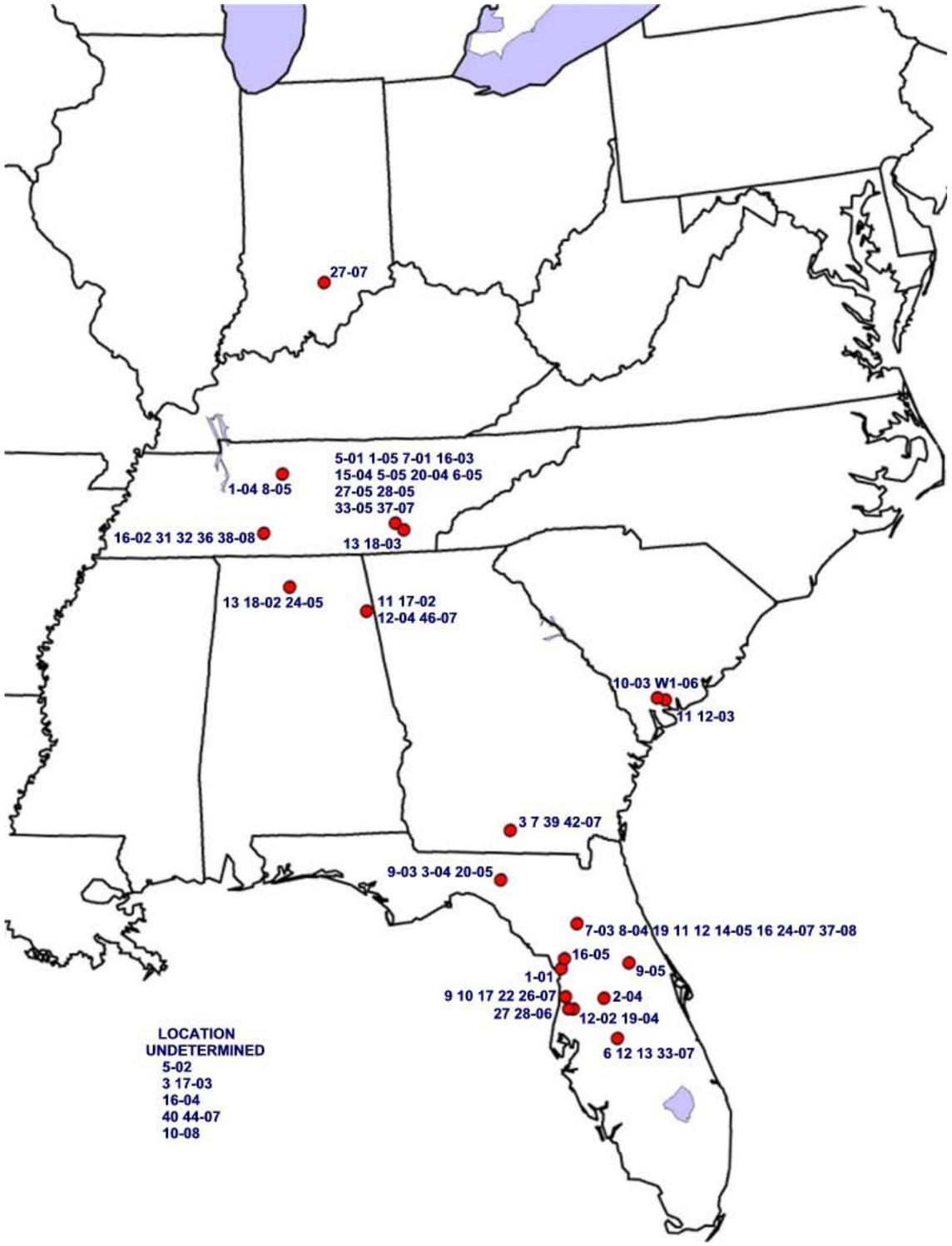

Figure 3. Winter use areas of whooping cranes in the eastern migratory population, winter 2008/09 (most current distribution as of 17 February 2009).

As of 31 December 2008, there have been 42 recorded mortalities (39 confirmed by recovery of a carcass and 3 others inferred based on supporting evidence) (Table 6). The primary known or suspected cause of mortality was predation (52%). The period of highest mortality, accounting for 50% of mortalities of all released birds, was coincident with drought or water deficit on both wintering areas and in Wisconsin and occurred from May 2006 through September 2007. The most concentrated period of mortality occurred for DAR birds just after, i.e., within 3 weeks, of release (15.4%).

REPRODUCTION

At the beginning of April, there were 74 individuals (40 males and 34 females) in the population. This total contained 12 previously existing and 1 newly formed pair, the latter containing the male (no. 10-03) of 1 of the previously existing pairs. The newly formed pair built a nest at Site 4, Necedah NWR, but the female (W1-06) was only 2 years old and no eggs were produced. The remaining 11 pairs all nested: 9 pairs on Necedah NWR, 1 on Monroe County Flowage, and 1 in Wood County Forest (Table 7, Fig. 4). Like the 11 previous first nests in 2005-07, none of the nests in 2008 were successful.

Spring 2008 was unusually late, cold, and wet, resulting in more extensive suitable nesting habitat than usual. The different weather pattern provided a much longer range of incubation to further provide insight into discovering the cause of nest failure. Many nests persisted almost full-term. Time lapse videography and visual observations again showed that the widespread nest failure was not due to disturbance by predators or to water level fluctuations. As in the previous year, failure of the 11 nests in 2008 (incubation period 7 April - 6 May) was consistent with desertion during warm weather. Black fly outbreaks, related to weather, offered an explanation of widespread and simultaneous desertion of multiple nests, and black flies were observed interfering with incubation duties of one pair. There were no renests in 2008, probably because most first nests failed after mid-incubation.

PAIR FORMATION IN 2008

Formed:
Nos. 5-01/20-04, winter 2007/08
Nos. 5-01/1-05, spring
Nos. 10-03/W1-06, spring
Nos. 7-03/21-07, spring
Nos. 11-05/46-07 (DAR), autumn (briefly formed, then association became unclear after they joined larger group, 46-07 later paired with 12-04)
Nos. 16-02/8-05, autumn (briefly formed and then dissolved, after which 8-05 repaired with 1-04)
Nos. 1-04/8-05, autumn (repaired after brief pairing of 16-02 and 8-05)
Nos. 12-04/46-07 (DAR), autumn

Dissolved:
Nos. 5-01/20-04, spring
Nos. 10-03/1-05, spring
Nos. 16-04/9-02 (died), spring
Nos. 16-02 and 1-04/8-05 (see above)
Nos. 7-03/21-07 (died), winter 2008/09

Table 5. Survival (number surviving/number released[a]) of reintroduced eastern migratory whooping cranes by hatch year, as of 28 January 2009[b].

	HY2001	HY2002	HY2003	HY2004	HY2005	HY2006	HY2007	HY2008	Total
UL									
males	2/4	5[c]/6	6/11	6/10	8/11	0/1	9/9	10/10	46/62
females	1/3	2[d]/10	4/5	3/3	4/8	--	5/7	4/4	23/41
total	3/7	7/16	10/16	9/13	12/19	0/1	14/16	14/14	69/102
DAR									
males				0/1[e]	0/1	2/3	1/3	3/3[e]	6/11
females				--	3/3	0/1	5[f]/7	3/4	11/15
total				0/1	3/4	2/4	6/10	6/7	17/26
Natural Reproduction									
females						1/1	--	--	1/1
Grand total	3/7	7/16	10/16	9/14	15/23	3/6	20/26	20/21	87/129

[a] Number fledged in the single instance of recruitment from natural reproduction.
[b] Not included are 17 HY2006 birds that died in winter pen catastrophe and 1 HY2007 female that could not fly and was remanded to permanent captivity. Except for 4 birds noted in footnotes c and d below, all birds in population, past or present, were confirmed either alive or dead as of at least October 2008.
[c] Status of 1 male (no. 5-02) was unconfirmed after October 2007, but he was assumed alive based on previous experience and ability to monitor similar birds.
[d] Status of 3 females (nos. 1-02, 2-02, 9-02) was unconfirmed, but they were assumed dead based on behavior of mate or deviation from previous habits.
[e] Includes 1 male in 2004 and 1 male in 2008 originally reared in an ultralight cohort but later released in autumn on Necedah NWR.
[f] Female no. 40-07 is considered alive for purposes of this summary, although circumstances at her last known location on 17 November indicate possible mortality.

Table 6. Mortalities (n = 42) of reintroduced eastern migratory whooping cranes by confirmed or probable causative factor, sex (number of males, number of females), and location in annual cycle[a], 2001-08.

Cause of mortality	Winter area	Spring Migration	Summer area	Autumn Migration	Total
UL: Total released = 88 (52 males, 36 females)[b]					
Predation (unidentified predator)[c]		0,1	4,3		4,4
Bobcat predation	2,3			1,0	3,3
Alligator predation	1,0				1,0
Eagle predation	0,1		0,1		0,2
Powerline collision[d]				1,0	1,0
Gunshot			1,0	0,1	1,1
Trauma (source unknown)			1,0		1,0
Epicardial hemorrhage			0,1		0,1
Predation of injured bird			1,0		1,0
Euthanized (capture myopathy)			0,1		0,1
Undetermined[e]	1,1		3,1		4,2
Missing[f], no carcass recovered		0,1	0,2		0,3
DAR: Total released = 26 (11 males, 15 females)					
Coyote predation			0,2		0,2
Predation (suspected canid)			1,0		1,0
Bobcat predation		1,0			1,0
Alligator predation	0,1				0,1
Powerline collision		0,1	1,0	1,0	2,1
Aircraft collision				1,0	1,0

[a] Does not include 17 HY2007 juveniles that died in winter pen catastrophy.
[b] Does not include no. 35-07, remanded to captivity.
[c] Includes suspected canid (3).
[d] Includes male found alive under power line (no. 8-02) that later died from unrelated cause in captivity.
[e] Carcass recovered, but cause of mortality could not be determined.
[f] Presumed dead.

Table 7. Whooping crane pairs that produced eggs, reintroduced eastern migratory population, 2005-08.

Male	Female	Territory	Incubation began	No. eggs	Fate of eggs
2005					
1-01	2-02	Necedah NWR, Site 4	16 April	1	Destroyed 17 April
11-02	17-02	Necedah NWR, East Rynearson Pool-East Dike	18/19 April	1	Deserted 19 April/ destroyed 19/20 April
2006					
1-01	2-02	Necedah NWR, Site 4	7 April	unknown	Destroyed 15/16 April
17-03	3-02	Necedah NWR, Pools 18/19	6/7 April	2	Destroyed 15/16 April
2-03	9-02	Meadow Valley SWA, Monroe County Flowage	12/13 April	unknown	Destroyed 26/27 April
11-02	17-02	Necedah NWR, East Rynearson Pool-East Dike	10 April	1 found	Destroyed 19/20 April
13-02	18-02	Necedah NWR, Site 2/Rice Pool	5/6 April	2	Deserted/collected 24 April
11-02	17-02	Necedah NWR, East Rynearson Pool- East Dike	23 May	2	Hatched 22 June
2007					
16-04	9-02	Meadow Valley SWA, Dandy Creek Flowage	8-15 April	2	1 destroyed <21 April 1 infertile (coll. 21 April)
11-02	17-02	Necedah NWR, East Rynearson Pool-East Dike	3 April	2	Deserted/destroyed 21 April
13-02	18-02	Necedah NWR, Site 2/Rice Pool	16 April	1	Deserted/collected 20 April
17-03	3-03	Necedah NWR, Pool 9	19 April	1-2	Destroyed 21 April
17-03	3-03	Necedah NWR, Pool 9	14 May	1	Infertile (coll. 9 June)
2008					
16-04	9-02	Meadow Valley SWA, Monroe County Flowage	By 14 April	1-2	Destroyed by 14 April
11-02	17-02	Necedah NWR, East Rynearson Pool-East Dike	7 April	2	Deserted/2 collected 6 May (1 infertile)
12-02	19-04	Wood County Forest, NE of Dexterville	By 23 April	1	Deserted/infertile (collected 5 May)
13-02	18-02	Necedah NWR, NW East Rynearson Pool	8-9 April	1	Deserted/collected 6 May
17-03	3-03	Necedah NWR, Pool 19 S dike road SW	9-10 April	2	Deserted/1 destroyed 4-5 May, 1 late dead embryo (coll. 5 May)
3-04	9-03	Necedah NWR, WC East Rynearson Pool	8-9 April	1-2	Destroyed 3 May
11-03	12-03	Necedah NWR, NE Sprague Pool	15-17 April	1	Deserted 4-5 May/late dead embryo (coll. 5 May)
18-03	13-03	Necedah NWR, Carter-Woggon N Pool	13-14 April	2	Deserted/collected 6 May
1-04	8-05	Necedah NWR, N of Pool 13 (Danielson WRP)	16 April	1-2	Destroyed 30 April-1 May
8-04	19-05	Goose Pool West	23 April	unknown	Destroyed before 5 May
5-05	15-04	Necedah NWR, Pool 19 S dike road NW	By 14 April	1-2	Destroyed by 30 April

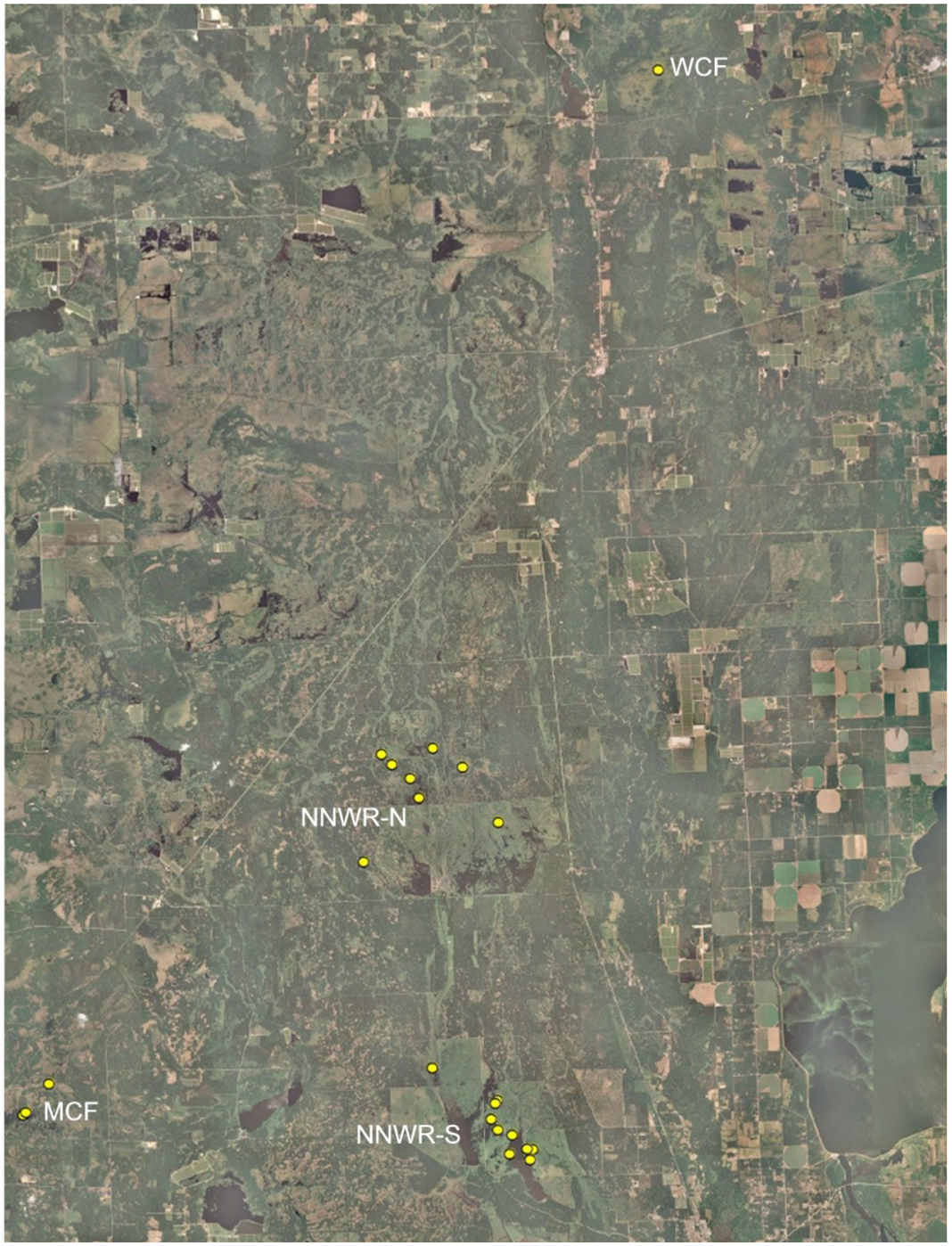

Figure 4. Locations of nests with eggs, eastern migratory whooping crane population, 2005-08. NNWR = Necedah NWR, MCF = Monroe County Flowage, WCF = Wood County Forest.

CURRENT POPULATION STRUCTURE AS OF FEBRUARY 2009

Total 87 individuals (52 males, 35 females)

Adult, confirmed breeding pairs (i.e., have produced eggs): 10
Nos. 11-02/17-02, 12-02/19-04, 13-02/18-02, 17-03/3-03 (sibling pair), 3-04/9-03, 11-03/12-03, 18-03/13-03, 1-04/8-05, 8-04/19-05, and 5-05/15-04

Other currently existing adult pairs that were on territory in 2008: 2
Nos. 5-01/1-05 and 10-03/W1-06

Subadult or newly formed adult pairs: 1
Nos. 12-04/46-07 (DAR)

Currently unpaired males that summered in central core area containing other whooping cranes: 14
Nos. 1-01, 16-02, 7-03, 16-03, 2-04, 16-04, 6-05, 9-05, 11-05, 12-05, 14-05, 24-05, 27-06 (DAR), and 28-06 (DAR)

Currently unpaired males that summered in areas with no other whooping cranes: 1
No. 16-05 (summered in Michigan)

Currently unpaired females that summered in central core area containing other whooping cranes: 0

Currently unpaired females that summered in areas without other whooping cranes: 6
Nos. 7-01, 20-04, 20-05, 27-05 (DAR), 28-05 (DAR), and 33-05 (DAR, summered in Michigan)

Group composition of yearlings (were not included above) and juveniles:

Nos. 16-07, 24-07, 10-08 (possible mortality), and 37-08 (DAR) (part of larger group including 6 older birds above)
HY2007 nos. 6, 12, and 13 (group summered in Minnesota) and 33 (joined group in winter 2008/09)
HY2007 nos. 9, 10, 17, 22, and 26
HY2007 nos. 3, 7, 39 (DAR), and 42 (DAR) (group summered in Minnesota)
Nos. 37-07 (DAR)
HY2008 DAR nos. 31, 32, 36, and 38 (with no. 16-02)
No. 27-07 (summered in Indiana)
No. 44-07 (DAR) (summered in Michigan)
HY2008 nos. 3, 4, 14, 18, 19, 24, and 27 (Chassahowitzka NWR winter release area)
HY2008 nos. 5, 12, 13, 26, 28, 29, and 30 (St. Marks NWR winter release area)

Status unknown but mortality suspected:
No. 5-02 (last observed 16 October 2007)
No. 40-07 (DAR) (summered in Michigan, last observed 17 November 2008)

HUMAN AVOIDANCE AND CONFLICTS WITH HUMAN ACTIVITY

In general, released whooping cranes satisfactorily avoided close proximity to humans and human structures. However, because they have been reared in captivity, they can be easily tamed after release if precautions are not taken. It remains critical that approach of birds by people is carefully controlled on areas where this is possible, and that on other areas the public is aware of the need to view these birds only from a distance. The guidelines for viewing (no closer than 200 m for persons on foot or 100 m while in a vehicle on a public road) must continue to be emphasized. Efforts to reduce human activity near these birds on Necedah NWR also need to be improved.

The HY2007 ultralight-led cohort exhibited a significantly greater degree of inadequate human avoidance behavior than most earlier cohorts. This may have been related to the long length of the aircraft-led autumn migration and the relatively short subsequent period of acclimation to habitat isolated from human activity at the winter release site.

The first problem occurred with the group composed of nos. 16, 17, 21, 24, and 26 during spring migration near Glendale, Daviess County, Indiana. They were found by the public in a highly exposed cornfield along a major public road and attracted much attention, which they largely ignored. They stopped over at this site from 31 March until they departed on 16 April.

The same group later settled near Stoughton, Dane County, Wisconsin on 22 April, and human avoidance issues continued. On 13 May all but no. 24 (escaped capture) were retrieved and released back on Necedah NWR. This action broke up the group; nos. 16, 21, and 24 had no further human avoidance problems. Nos. 17 and 26 joined no. 9-07 (see below).

No significant problems occurred again until mid-September, when nos. 9, 17, and 26-07 and 10 and 22-07 began feeding on spilled corn at the newly operational ethanol plant south of the town of Necedah. DAR no. 46 had associated with nos. 9, 17, and 26 during the summer in Dodge County but left the group and joined other whooping cranes shortly after the other three yearlings began using the ethanol plant. On 28 October the swamp monster was used to successfully scare birds off the plant grounds. Several swamp monster tarps set on poles on the grounds, efforts by plant staff to remove spilled corn, and presence of corn in newly harvested nearby fields were successful in dissuading the birds from returning.

However, the same group of five birds, after being separated during migration, rejoined at the Chassahowitzka NWR pensite at the end of autumn migration. On 30 November, the group moved to nearby Tooke Lake. This lake is at low water level because of persistent drought and is surrounded by residential development. This site also supports tame non-migratory sandhill cranes, which tolerate people and do not foster an environment that facilitates avoidance of humans and human activity by reintroduced cranes, and has been a persistent problem during the past three winters of drought. The HY2007 cranes remained to winter at this site, where they were frequently exposed to human sights, sounds, and structures, and they fed from bird feeders in yards of local residents. Requests by project staff that local residents refrain from feeding the cranes were largely honored with mixed results.

HY2007 nos. 3 and 7 in a group with DAR nos. 39 and 42 also demonstrated inadequate human avoidance behavior during autumn in Lincoln County, southwestern Minnesota, but this consisted mainly of ignoring vehicles that passed on country roads in a sparsely populated rural area.

Five recently released HY2007 DAR birds had demonstrated inadequate avoidance of waterfowl hunters in southern Illinois during autumn 2007. Such behavior is not atypical of costume-reared birds that have not associated with older, wild cranes. This group was retrieved and released in Tennessee. There were no subsequent significant problems, and all selected areas in spring that were well away from people. A group of five DAR birds, including four from the group noted, settled in appropriate habitat on Saginaw Bay, Michigan.

With one exception (no. 5-01, see below), some improvement was noted for older birds with a previous history of inadequate human avoidance:

No. 1-01 has one of the poorest winter territories, adjacent to a housing development just north of Crystal River, Citrus County, and has associated with tame non-migratory sandhill cranes that have been fed by people during the past several winters. Beginning in winter 2007/08, a time-release feeder containing corn was deployed in an area of suitable habitat on an adjacent cattle ranch. This effort was continued in winter 2008/09 and has been moderately successful in encouraging this bird to remain in acceptable habitat and away from people.

Nos. 11-02 and 17-02 wintered for the second consecutive year on Tooke Lake, Hernando County, during winter 2007/08. Wetlands on their original wintering site in Pasco County have not been in good condition since winter 2005/06 and have not recovered from drought. This pair did not return to Tooke Lake in winter 2008/09 and instead shortstopped to winter away from people at Weiss Lake, Cherokee County, Alabama.
No. W1-06 is the only naturally produced crane in the population and the HY2006 chick of nos. 11-02 and 17-02. She was exposed to the situation at Tooke Lake during winter 2006/07 and returned there in winter 2007/08. During spring 2008 at Necedah NWR, she paired with male no. 10-03, and she subsequently wintered with him in appropriate habitat on Ace Basin NWR, Colleton County, South Carolina, in winter 2008/09.

No. 5-01: The original mate (no. 4-02) of this male died in January 2007. He then found a captive female in Homosassa Springs Wildlife State Park (HSWSP), 6 miles from the Chassahowitzka NWR release site, and attempted to pair with her. He was captured and held in the pen at Halpata Tastanaki Preserve during most of February 2007 and then released at Paynes Prairie Preserve State Park on 26 February 2007. This translocation was successful. He eventually paired with female no. 19-05 and remained at Paynes Prairie until they departed northbound on spring migration. However, that pair dissolved after he migrated back to his territory on Necedah NWR. At the end of autumn migration 2007, no. 5-01 returned to HSWSP and again landed in the park because of attraction to the captive female. He was again captured and penned at Halpata. On 16 December he was translocated to Hiwassee Wildlife Refuge, Tennessee, where most of the unpaired females in the population were wintering. He remained at Hiwassee and paired with no. 20-04. They began migration together by 6 March, but by the time no. 5-01 was confirmed back on his territory on Necedah NWR on 30 March, no. 20-04 had already separated from him. She was later found at her previous summer location in Rusk County.

No. 5-01 next paired with no. 1-05 at Sprague Pool, Necedah NWR, on 8 April 2008. No evidence of nesting was discovered. They remained together through the summer and then began autumn migration (along with no. 2-04) from Volk Field on 20 November. They arrived on Hiwassee WR/Armstrong Bend by 23 November and departed after 19 December. The three birds arrived on the drought-stricken territory of no. 5-01 on Stafford Lake, Hernando County, Florida, by 27 December. No. 2-04 separated from them on 3 January 2009. After some local movements including to the Chassahowitzka pensite, no. 5-01, now with no. 1-05, returned again to HSWSP. The pair was captured, held for 2 days at Halpata, and then released on Paynes Prairie on 22 January. They returned to Stafford Lake on 30 January, then to the

Chassahowitzka pensite, and again to HSWSP on 1 February. They were again captured and transferred to Halpata. On 4 February they were moved back to Armstrong Bend, Tennessee, and released again. They remained to continue wintering at this site.

INTERACTION WITH NON-MIGRATORY WHOOPING CRANES

There were no significant interactions between reintroduced migratory whooping cranes and members of the non-migratory flock during winter 2007/08. During winter 2008/09, no. 33-07 was present on a ranch in Polk County from 2 to 24-29 December. He occasionally associated with a HY2006 wild-hatched female from the non-migratory flock at this location but then moved to winter elsewhere (with three other HY2007 ultralight-led males in Polk County); the female did not follow. An adult non-migratory pair was briefly on Paynes Prairie during January, but no interactions with the 10-12 migratory whooping cranes also present were recorded.

SUMMARY AND CONCLUSIONS

Survival was 100% at the release site on Chassahowitzka NWR during winter 2007/08.

Natal site fidelity remained high for UL cranes. Returning yearlings exhibited extensive spring wandering in 2008. This was the first summer during the history of the reintroduction that the majority of yearlings (15/21) summered outside the core reintroduction area of Central Wisconsin.

Initiation of autumn migration in 2008 was highly synchronous in comparison to previous years with 95% of recorded departures occurring during 15-20 November.

Winter site fidelity was again affected by drought.

The period of high mortality, apparently drought-related, that occurred from May 2006 to September 2007 did not recur. Mortality rate resumed lower levels, and there were 6 mortalities in 2008. By the end of the year, there had been 42 recorded mortalities in the population.

Eleven breeding pairs produced eggs in 2008. For the fourth consecutive year, all first nests failed. Desertion was the common cause. There were no renests. Specific study of the problem, including role of harassment of incubating cranes by black flies, will proceed in 2009.

Social behavior was normal, and pair bond formation was progressing but limited by the number of females in the core reintroduction area. Twelve breeding pairs are expected in 2009.

Habitat use, roosting, and foraging behavior of most birds were generally satisfactory. There is room for expansion into additional suitable habitat in the core reintroduction area by future territorial pairs.

The DAR program produced successfully migrating birds but continued to face challenges. Keeping the juveniles in groups, especially during spring migration, and prompt retrieval and corrective translocation of birds in errant locations may be necessary for success. The first pairing of a DAR female occurred in 2008.

Human avoidance remained generally adequate for most cranes in the population; however, some of the HY2007 UL cranes demonstrated more problems than in most of the previous cohorts.

After release of the 14 ultralight-led juveniles in January/February 2009, the eastern migratory population consisted of an estimated maximum 87 individuals. Number of individuals in each year class was as follows: HY2001 (3), HY2002 (7, including 1 long-term missing), HY2003 (10), HY2004 (9), HY2005 (15), HY2006 (3), HY2007 (20), and HY2008 (20).

ACKNOWLEDGMENTS

I thank Sara Zimorski (Co-leader, Tracking and Winter Management Team) and Marianne Wellington (Co-leader, DAR Team) (ICF) for their efforts and dedication to the reintroduction. We especially thank the following individuals who were involved with tracking released cranes, captures, isolation-rearing DAR chicks, or other field support: Anna Fasoli (tracking crew chief), Eva Szyszkoski (tracking field manager), Colleen Wisinski, Rosemary Hartman, Tom Czubek, and Betsy Reichenberg (ICF); John Cullum, Binga Elger, and Megan Fitzpatrick (USFWS- DAR); Bryan Woodward, Gator Gates, Kate Goodenough, Lindsey Landowski, Bill McCoy, Steve Delehanty, Sara Vacek, and Rich King (USFWS); Richard van Heuvelen and Chris Gullikson (OM); Brian Clauss (PWRC); Beth Kienbaum, Nancy Businga, Jasmine Batten, and Wayne Hall (WDNR); Marty Folk, Tim Dellinger, Steve Baynes, and Kathy Chappell (Florida Fish and Wildlife Conservation Commission [FWCC]); Dean Harrigal (South Carolina DNR); Jim Bergens, Brad Feaster, and John Castrale (Indiana DNR); Larry Armstrong, Jason Jackson, Rob Klippel, and Jeff Womac (Tennessee Wildlife Resources Agency); Judd Eastwood (Alabama DNR); Robert Schwartz (Winnebago County [Iowa] Conservation Board); Mark Vaniman, Richard Baker, and Carrol Henderson (Minnesota DNR); Scott Terrell, Don Neiffer, and Scott Tidmus (Disney's Animal Programs); Nathan Ramsay (NWHC); Marilyn Spalding (University of Florida); and Dan Kaiser, Connie Decker, Lee Sterrenburg, Ron Hoffman, Don Avers, Don Schmuck, Jack Barholz, and Joanne Hammock. We are grateful to the landowners that allowed us access to their properties. To the many other individuals and staff of cooperating agencies who supported the monitoring effort, we also extend our sincere thanks.

We greatly appreciate the contributions and aircraft support provided by Terry Kohler, Mike Frakes, Tom Trester, Charles Koehler, Mike Mauer, Stu Walker, Matt Waage, Jesse Jacobson, and Mary TenHaken (Windway Capital Corporation) and additional aircraft assistance by Buddy Powell, Jorge Neumann, Lew Lawrence, and Greg Baker (Wildlife Trust) and by Florida FWCC.

We thank the following individuals and their staffs for essential physical and logistical support at field sites: Larry Wargowsky (Necedah NWR, USFWS), Jim Kraus and Keith Ramos (Chassahowitzka NWR, USFWS), Nick Robbins (Crystal River Preserve State Park, Florida Department of Environmental Protection), Charlie Luthin (NRFW), John Christian (USFWS), Billy Brooks (USFWS), and Mary Barnwell (Southwest Florida Water Management District). Without the contributions of these and many others, this effort would not have been possible.

Appendix A. Whooping cranes in eastern migratory population, 10 February 2009.

Hatch year	Crane no.	Sex	BBL Band no.	Frequency (MHz)	Color code (left:right) L=long bands with transmitter	PTT ID	Studbook no. Own	Studbook no. Sire	Studbook no. Dam	Mate
2001	1	M	659-00215	164.946	L G/W:G/R/G		1629	1114/114	1119	
2001	5	M	659-00213	165.407	L G/W:W/R/G		1633	1147	1142	
2001	7	F	659-00214	--	L G/W:W/R		1635	1127	1154	
2002	5	M	599-32118	--	L R/W:G/R/W		1664	1133	1135	
2002	11	M	599-32114	165.133	L R/W:R/G		1672	1147	1142	17-02
2002	12	M	599-32121	--	L R/W:W/R/G		1673	1114	1119	19-04
2002	13	M	599-32122	165.233	L R/W:G/R/G		1674	1127	1154	18-02
2002	16	M	599-32125	165.060	L R/W:R/G/R		1677	1147	1142	
2002	17	F	599-32115	165.251	L R/W:G/R		1678	1144	1136	11-02
2002	18	F	599-32126	165.371	G:L R/W		1679	1128	1101	13-02
2003	3	F	599-34056	--	L G/R:W		1698	1144	1136	17-03
2003	7	M	599-34048	165.041	R/W/G:L G/R		1702	1133	1135	
2003	9	F	599-34042	165.182	W/R/W:L G/R		1704	1144	1136	3-04
2003	10	M	599-34049	164.395	W/G/R:L G/R		1705	1175	1188	W1-06
2003	11	M	599-34050	--	G/W/R:L G/R		1706	1127	1154	12-03
2003	12	F	599-34043	164.305	W/R:L G/R		1707	1133	1135	11-03
2003	13	F	599-34051	164.433	R/W/R:L G/R		1708	1133	1135	18-03
2003	16	M	599-34052	--	R/G/W:L G/R		1711	1144	1136	
2003	17	M	599-34053	164.315	W/G/W:L G/R		1712	1144	1136	3-03
2003	18	M	599-34054	164.355	G/R/W:L G/R		1713	1147	1142	13-03
2004	1	M	599-37449	164.364	R/G/W:L W/G		1744	1133	1135	8-05
2004	2	M	599-37450	164.173	W/R/W:L W/G		1745	1127	1154	
2004	3	M	599-37451	164.414	G/R/W:L W/G		1746	1133	1135	9-03
2004	8	M	599-37454	165.084	G/R/G:L W/G		1751	1133	1135	19-05
2004	12	M	599-37455	164.884	G/W/R:L W/G		1755	1127	1154	
2004	15	F	599-37446	--	L R/G/(PTT):L W/G	--	1758	1144	1136	5-05
2004	16	M	599-37457	--	W/G/R:L W/G		1759	1144	1136	
2004	19	F	599-37447	--	L W/R/(PTT):L W/G	--	1762	1128/110	1263	12-02
2004	20	F	599-37448	--	L G/R/(PTT):L W/G	--	1763	1133	1135	
2005	1	F	599-37231	165.383	L G/W:R/G/W		1782	1162	1167	
2005	5	M	599-37233	164.564	L G/W:G/R/W		1786	1133	1135	15-04
2005	6	M	599-37234	164.704	L G/W:R/W/G		1787	1133	1135	
2005	8	F	599-37239	164.995	L W/R/(PTT):L G/W	--	1790	1127	1154	1-04
2005	9	M	599-37236	164.284	L G/W:R/W/R		1791	1162	1167	
2005	11	M	599-37241	165.163	W/R/W:L G/W		1793	1041	1197	
2005	12	M	599-37242	164.804	G/R/W:L G/W		1794	1560	1135	
2005	14	M	599-37243	165.955	R/W/G:L G/W		1796	1182	1098	
2005	16	M	599-37244	164.775	W/R/G:L G/W		1799	1189	1195	
2005	19	F	599-24696	164.913	G/R/G:L G/W		1802	1560	1135	8-04
2005	20	F	599-37238	--	L R/G/(PTT):L G/W	--	1803	1182	1098	
2005	24	M	599-24700	165.055	R/G/R:L G/W		1807	1560	1135	
2005	27	F	599-32128	164.734	L G/W:L R/W(PTT)	--	1811	1128	1263	
2005	28	F	599-32129	164.695	L G/W:L G/R(PTT)	--	1812	1128	1140	
2005	33	F	599-32130	165.935	L R(PTT):L G/W	--	1819	1128	1140	
2006	W1	F	599-34058	165.622	L R/G:W/G/W		1874	1672	1678	10-03
2006	27	M	599-55902	--	L R/G:L R/W(PTT)	--	1864	1182	1219	
2006	28	M	599-55903	165.484	L R/G:L W/R(PTT)	--	1865	1182	1098	

Appendix A. Continued.

Hatch year	Crane no.	Sex	BBL Band no.	Frequency (MHz)	Color code (left:right) L=long bands with transmitter	PTT ID	Studbook no. Own	Studbook no. Sire	Studbook no. Dam	Mate
2007	3	M	599-55936	164.215	L R/G:R/G/W		1881	1216	1202	
2007	6	M	599-55937	164.245	L R/G:W/R/W		1884	1256	1241	
2007	7	M	599-55938	164.485	L R/G:G/R/W		1885	1165	1164	
2007	9	M	599-55939	164.505	L R/G:G/W/G		1887	1476	1288	
2007	10	M	599-55940	164.515	L R/G:R/W/G		1888	1147	1119	
2007	12	M	599-55941	164.726	L R/G:W/R/G		1890	1267	1261	
2007	13	M	599-55942	164.957	L R/G:G/W/R		1891	1386	1261	
2007	16	F	599-55933	164.545	L R/G:L W(PTT)	15045	1894	1420	1168	
2007	17	F	599-55944	165.458	L R/G:L W/G(PTT)	38637	1895	1674	1679	
2007	22	F	599-55934	165.142	L R/G:L G/W(PTT)	15331	1900	1216	1202	
2007	24	M	599-55946	165.194	L R/G:R/W/R		1902	1216	1202	
2007	26	F	599-55947	165.994	G/W/G:L R/G		1904	1147	1119	
2007	27	F	599-55948	164.742	R/W/G:L R/G		1905	1254	1156	
2007	33	M	599-55951	165.433	W/R/G:L R/G		1909	1127	1154	
2007	37	M	599-55929	164.234	R/G/W:L R/G		1914	1182	1098	
2007	39	F	599-55923	165.152	L W(PTT):L R/G	38634	1917	1216	1202	
2007	40	F	599-55924	164.614	L G/W(PTT):L R/G	38636	1918	1267	1261	
2007	42	F	599-55931	165.693	G/R/W:L R/G		1921	1254	1156	
2007	44	F	599-55932	165.122	L W/G(PTT):L R/G	72160	1923	1128	1535	
2007	46	F	599-55927	165.446	L W/R(PTT):L R/G	72161	1927	1128	1263	
2008	3	M	599-55958	165.421	L R/W:G/W/R		1932	1127	1154	
2008	4	M	599-55961	165.347	L R/W:W/G/R		1933	1165	1292	
2008	5	M	599-55965	164.074	W/G/W:L R/W		1934	1674	1679	
2008	10	M	599-55960	165.071	L R/W:R/G/W		1939	1713	1708	
2008	12	M	599-55966	164.534	R/G/W:L R/W		1941	1100	1197	
2008	13	F	599-55962	164.593	L W/G(PTT):L R/W	44263	1942	1216	1202	
2008	14	M	599-55967	164.764	G/R/W:L R/W		1943	1254	1156	
2008	18	F	599-55963	164.604	L R/G(PTT):L R/W	38635	1947	1182	1101	
2008	19	M	599-55968	165.283	G/W/G:L R/W		1948	1267/138	1261	
2008	24	F	599-55964	165.583	L G/R(PTT):L R/W	15050	1950	1127	1154	
2008	26	M	599-55969	165.558	R/W/G:L R/W		1952	1165	1164	
2008	27	M	599-55970	164.463	W/R/G:L R/W		1953	1216	1202	
2008	28	M	599-55971	165.592	G/R/G:L R/W		1954	1216	1202	
2008	29	M	599-55972	165.210	G/W/R:L R/W		1955	1267/138	1261	
2008	30	F	599-55973	164.903	W/G/R:L R/W		1956	1267/138	1261	
2008	31	M	599-55955	165.113	L R/W:L G/W(PTT)	62170	1958	1128	1263	
2008	32	F	599-55952	165.333	L R/W:L G(PTT)	62169	1959	1189	1195	
2008	36	M	599-55957	165.546	L R/W:G/W/G		1965	1128	1140	
2008	37	F	599-55954	165.659	L R/W:L W/G(PTT)	62171	1966	1128	1263	
2008	38	F	599-55959	165.747	L R/W:R/W/G		1963	1422	1366	

HEALTH

2008 was a successful year, but still with some health issues for the whooping cranes, both the chicks raised to fly with the ultralights and with the wild birds. Fourteen healthy whooping crane colts were raised and flew south in the fall with the ultralight aircraft, and 6 Direct Autumn Release (DAR) colts and one extra colt were released in Wisconsin to migrate with wild whooping cranes.

HEALTH TEAM

2008 was a successful year, but still with some health issues for the whooping cranes, both the chicks raised to fly with the ultralights and with the wild birds. Fourteen healthy whooping crane colts were raised and flew south in the fall with the ultralight aircraft, and 6 Direct Autumn Release (DAR) colts and one extra colt were released in Wisconsin to migrate with wild whooping cranes. Four juvenile female whooping cranes died and were necropsied at the National Wildlife Health Center in 2008. Prior to transfer to Necedah NWR, 2 of the 10 (20%) hatched chicks died at ICF. This compares to pre-transfer mortality of 3/15 (20%) in 2005, 2/14 (14%) in 2006, and 4/15 (27%) in 2007.

Prior to transfer from PWRC, 6 of the 26 (23%) hatched chicks died or were withdrawn from the project. Prior to migration/release at Necedah, 5 out of 20 (25%) ultralight birds were lost or withdrawn from the project., and 2 out of 8 (25%) DAR birds were lost from the project.

USGS PATUXENT WILDLIFE RESEARCH CENTER HEATH REPORT

Glenn H. Olsen (USGS-Patuxent)

In the spring of 2008 USGS Patuxent Wildlife Research Center in Laurel, Maryland hatched 27 whooping crane chicks, 8 from eggs from the Calgary Zoo, 4 from eggs from Necedah National Wildlife Refuge, 3 from the International Crane Foundation, and 1 from the Audubon Center for Research on Endangered Species. Of these 27 whooping cranes, only 14 managed to start the ultralight migration (numbers 3, 4, 5, 12, 13, 14, 18, 19, 24, 26, 27, 28, 29, and 30-08). Unlike in previous years, the highest survival rate was the late hatched birds.

Among the 14 whooping cranes that started migration in October, 2008, 64% (9) were positive for *Salmonella spp.* As young chicks, usually around days 3 to 5, 43% (6) suffered slight dehydration corrected by injections of fluids. Curved or crooked toes were found on 79% of the chicks at one point or another, and one chick required the application of small “snowshoes” to correct a foot problem shortly after hatching. Two chicks suffered minor wounds on their upper bills that were treated without further complications (we have lost chicks due to bill deformities following injury in the past). Other problems that were seen in single chicks included swollen vent area, soft tissue swelling on the wing, soft tissue swelling of a digit, swollen eyelid, lameness, carpal rotation, and moist/wet respiratory sounds. All were successfully treated prior to shipping to Necedah.

Losses from the program included two whooping crane chicks that were euthanized for bowed legs/leg rotation problems and one that was euthanized because of severe scoliosis. These were whooping crane 1-08 euthanized at 36 days of age due to a leg injury, a possible iatrogenic injury to the proximal epiphysis of the right tarsometatarsus subsequent to multiple handling bouts to treat a 12 cm^2 skin slough on the ventral abdomen that started on day 29, and whooping crane 25-08 was euthanized on day 27 due to a bilateral lateral rotation of both legs that was first noted at day 19. No definitive cause has been identified for this condition. Whooping crane 8-08 was euthanized at day 35 due to extreme scoliosis, a recurring problem in captive whooping cranes.

Two whooping crane chicks (2-08 and 6-08) died from acute peritonitis/enteritis of bacterial origin, possibly a clostridial organism, but, despite repeated cultures, no organism has been isolated. At this point, the organism appears to be resistant to various antibiotics tried on the chicks. Epidemiological investigations have shown us that the disease, which killed 5 chicks

in 2007 and 2 in 2008 is associated with 2 or possibly 3 pens in the Propagation Building. By switching our chick rearing to a different building, the Crane Chick Building last used for Florida non-migratory release rearing and by maintaining stringent isolation between facilities, we were able to stop further deaths. However, such a stringent isolation program was a burden on the technical staff, and it remains to be seen if such a program can be instituted again. We thank Dr. Marilyn Spalding, University of Florida, for help in reading the histopathology and the tentative diagnosis of these cases.

Whooping cranes 7-08, 9-08, and 11-08 were injured when 10-08 attacked them. See the report below for the disposition of these birds. Bird 9-08 was returned to Patuxent where it died from eastern equine encephalitis while still in quarantine (diagnosis of cause of death from Dr. Spalding). Whooping cranes 15-08 and 20-08 suffered from respiratory infections due to aspergillosis. Bird 15-08 was sent to Necedah NWR only to be subsequently euthanized. Bird 20-08 was under treatment at Patuxent and was not sent to Wisconsin. The health team discussed aspergillosis/respiratory infections at their fall meeting and are recommending that no whooping cranes with a history of respiratory infection be included in groups sent to Necedah in the future. Lastly, bird 17-08 was pulled from the release program to be raised as a flock replacement, replacing a bird that died the previous winter. Thus, only 58% (14 of 27) potential whooping crane chicks made it into the migration group. If the ultralight-led migration technique produces a viable reproducing and migrating whooping crane flock, then, possibly, the lower survival to migrate percentage is justifiable. If not, then we should consider investigating other release techniques.

Young whooper chick being fed by a costumed technician with a whooper puppet head. Photo by USGS Patuxent Wildlife Research Center.

CRANE CARCASS SUBMISSIONS TO THE USGS NATIONAL WILDLIFE HEALTH CENTER

Kimberli J. Miller (USGS-NWHC)

The USGS National Wildlife Health Center received 4 juvenile female crane carcasses for diagnostic evaluation in 2008. Trauma was the primary diagnosis in all 4 birds. The diagnostic findings are summarized below.

NWHC Case # 20684, WCEP Reference # DAR No. 43-07, USFWS Band #599-55925.
The crane was found dead on 3/22/08 beneath a transmission line in a corn field near the town of Glenwood in Fayette County, IN. This juvenile female crane was in good body condition and good post mortem condition. Lacerations, fractures and a ruptured liver were consistent with blunt trauma. Tests for avian influenza, West Nile Virus, salmonella, lead poisoning and exposure to organophosphate and carbamate pesticides were negative. The preliminary diagnosis is trauma; the final report is pending.

NWHC Case #20695, WCEP Reference #14-07, USFWS Band #599-55943.
The remains of this juvenile female bird were found on 3/30/08 in a field near Pikeville, Bledsoe County, Tennessee. The bird appeared to have been killed by a predator, possibly a coyote. The carcass was heavily scavenged but was in good body condition. Multiple puncture wounds were present in the skin and muscle. The final diagnosis was predation. Of interest, a steel screw was found in the stomach content and a chondroma-like neoplasm was present in the subcutaneous tissues of the left hock. A full range of motion was present in the hock and microscopically the growth appeared benign, therefore the finding is likely insignificant. Tests for avian influenza, West Nile Virus, lead poisoning and exposure to organophosphate and carbamate pesticides were negative.

NWHC Case #22105, WCEP Reference #07-08, USFWS Band# no band
This juvenile female crane was one of 3 chicks traumatized by a pen-mate on 6/27/08. It was transferred to the International Crane Foundation on 6/28/08 and died the next day.
The chick was in fair body condition and good post mortem condition. Severe bruising, edema, abrasions, penetrating wounds and feather damage on the head, neck and body were consistent with intraspecies aggression trauma.

There was also secondary maggot infestation of the wounds (myiasis). As per the pathologist, the myiasis may have extended into the thorax resulting in air sacculitis and peritonitis. Tests for avian influenza, West Nile Virus, salmonella, lead poisoning and exposure to organophosphate and carbamate pesticides were negative. The preliminary diagnosis is trauma with secondary myiasis; the final report is pending.

NWHC Case #22347, WCEP Reference #35-08, USFWS Band# 59955953
This crane was found dead on 11/05/08, 1 mile ease of Pool 18N at Necedah NWR, WI.
The juvenile female crane was severely scavenged but was in good body condition with abundant subcutaneous, perirenal and coronary fat. Injuries observed at necropsy were consistent with predation trauma. Hemorrhage was noted at some of the scavenging sites on the carcass. Tests for avian influenza, West Nile Virus, salmonella, lead poisoning and exposure to organophosphate and carbamate pesticides were negative. The preliminary diagnosis is trauma due to predation; the final report is pending.

ICF HEALTH TEAM REPORT

Barry K. Hartup (ICF), Betsy Reichenberg (ICF)

Ultralight pre-release clinical issues

A major problem encountered this year was the attack of 10-08 on penmates 7-08, 9-08, and 11-08 on the 27th of June. All three chicks sustained severe trauma resulting in one chick dying and the other two being withdrawn from the program for captive breeding. Emergency care and hospitalization was provided at ICF for the worst two chicks affected, 9-08 and 11-08. 9-08 suffered trauma to the head and back, and 11-08 suffered trauma to the back and an incomplete fracture of the lower left side of the mandible. Both birds were anesthetized in order to provide treatment for shock, remove numerous broken blood feathers and to splint 11-08's lower mandible. Upon recovery, 9-08 was returned to PWRC due to its valued genetic status, and 11-08 was returned to Necedah NWR to continue training. Unfortunately, 11-08 was deemed to not be a candidate for release due to a malocclusion of the bill from the fracture, a deformity of the right leg, and the majority of the flight feathers having defects. This bird was later transferred to the Milwaukee County Zoo on the 2nd of October. 7-08 sustained wounds to the back, wings and legs, but was deemed by keeper staff to be the lesser injured of the three birds, and remained at Necedah NWR on the evening of the attacks. The following day, however, 7-08's condition worsened and she was brought to ICF for treatment. It was discovered that the wounds had become infested by maggots and the chick died despite treatment. 10-08 did sustain a defect of the upper bill from the attack and showed lameness in the left leg. This chick was treated with an analgesic and made a full recovery. However, due to the bird's aggressive nature it was unable to be integrated into the ultralight flock and was directly released at Necedah NWR on the 22 October.

Chick 15-08 developed respiratory issues shortly after being transferred to Necedah NWR. The chick was started on antifungal treatment and taken to the University of Wisconsin Veterinary Medical Teaching Hospital for a CT scan. The chick was diagnosed with fungal respiratory disease (later confirmed as aspergillosis), and was humanely euthanized.

Chick 16-08 displayed wing flipping and droop shortly after arriving at Necedah NWR. Upon examination of the carpal joint, a luxating tendon was discovered. It was determined that this was due to a developmental tendon condition and the chick was removed from the WCEP project for captive breeding at PWRC.

The ultralight chicks received comprehensive health examinations and testing for internal parasites, salmonellosis, Mycobacterium avium, Infectious bursal disease virus (IBDV), AI (avian influenza), NDV (Newcastle disease virus), zinc and lead levels, complete blood counts, and chemistry panels while at Necedah NWR. This year, 2 out of the 16 ultralight chicks had titers considered positive for IBDV. Six out of 20 chicks tested positive for salmonellosis, (S. braenderup group C1), and 1 out of the 6 was a repeat positive. There was one chick that tested positive for coccidia, but follow-up testing was negative. There were no chicks that tested positive for Mycobacterium avium; however, two chicks did test positive for a rapidly growing Mycobacterium sp. that had no clinical significance to their health.

Direct Autumn Release pre-release clinical issues

Respiratory disease affected 5 out of 10 chicks. Of these 5, 2 were successfully treated with antifungal medication and made full recoveries. The other 3 chicks were euthanized due to aspergillosis. Torrential rains in June during the early chick season compromised many of the chick pens at the ICF rearing facility and forced staff to erect temporary quarters for 8 days. Direct chilling, fungal overgrowth in humid conditions and/or stress from extra manipulation were likely factors in cases involving young chicks. Possible environmental exposure, vaccination or other unidentified stressor were believed to be factors in cases involving older chicks that had been already transferred to Necedah.

Limb deformities were prevalent this year. Five out of 10 chicks had toe problems that were corrected with treatment. In addition, 5 chicks had leg rotations of varying degrees (3 of these had toe problems as well), 4 of which were corrected with treatment. Chick 38-08 had bilateral tibiotarsal rotations. The left leg was rotated about 45 degrees while the right was mildly rotated at 17 days of age. Contact between the hocks occurred frequently when the bird was walking, standing, or sitting. Hydrotherapy treatment did not result in any significant improvement. The chick was allowed to be transferred to Necedah NWR with the intention of moving the bird to a captive breeding program if the condition did not worsen. However, an exam at 75 days of age showed moderate improvement in the rotation and the chick was deemed an acceptable release candidate. Two chicks had carpal rotations that were corrected with treatment.

One chick was treated for a laceration of the ventro-lateral neck overlying the jugular vein that occurred shortly after being handled for an exam. The laceration was sutured closed and the chick made a full recovery.

Chick 33-08 suffered a fracture of the right tibiotarsus during handling for band placement on the 7th of October and was subsequently euthanized due to poor prognosis. Necropsy results of this bird also showed lymphoid necrosis, possibly indicative of IBDV infection, but the chick was seronegative on two previous tests.

The DAR birds also received comprehensive health exams and testing for internal parasites, salmonellosis, *Mycobacterium avium,* IBDV, AI, NDV, zinc and lead levels, complete blood counts and chemistry panels while at ICF and Necedah NWR. There were no positive cases of salmonellosis. At Necedah, the birds did test positive for coccidia, but follow-up testing was negative. No birds tested positive for Mycobacterium avium. It should be noted that in both the DAR and ultralight cohorts, several birds were found to have titers to IBDV of 16, just below our cut-off for a seropositive result.

Recommendations and Actions for 2009

ICF will work to compile all health testing done on WCEP whooping cranes in order to analyze normative hematology and chemistry values for various age groups of juvenile whooping cranes released by WCEP. We will also be summarizing trends in parasite burdens and microbiology results from 2001-08.

The Health Team suggests that PWRC work to establish diagnostic CT imaging capacity for chronic respiratory disease by forging a relationship with the VA-MD regional School of Veterinary Medicine or a nearby human hospital. The transfer of birds with a history of respiratory disease that were subsequently imaged and euthanized has occurred for the past 2 years, representing a significant cost. Development of locally available imaging capability and diagnosis would be helpful similar to how PWRC developed capacity to cope with the incidence of hardware disease a few years ago by securing endoscopy equipment.

The veterinary and bird care staff at ICF will again work to identify potential solutions to the incidence of fungal respiratory disease in the DAR cohort. Modifications being considered include: decreasing the number of well-chick evaluations to decrease handling stress; altering vaccination schedules for WNV and EEE; use of prophylactic antifungal medication; new protocols for pen maintenance to decrease risk of fungal growth; environmental monitoring; scale training chicks for weighing rather than direct handling.

WISCONSIN FREE-RANGING WHOOPING CRANE HEALTH SCREENING SUMMARY

Nancy K. Businga (WDNR), Julie Langenberg (WDNR), Jasmine Batten (WDNR)

Opportunistic health screening is conducted on free-ranging Wisconsin whooping cranes during capture for radio-transmitter changes or for translocations. Routine screening includes: physical exam, serology for Infectious Bursal Disease virus (IBD), Eastern Equine Encephalitis virus (EEE), West Nile virus (WNV), Newcastle's Disease virus (NDV), and Avian Influenza viruses (AI), blood analysis for heavy metals (zinc and lead), complete blood count (CBC) including a screen for blood parasites, a serum chemistry profile, fecal culture for Salmonella and Campylobacter, a fecal acid fast screen for avian TB-compatible bacteria, and fecal parasitology. Serum, whole blood, and fecal samples are also archived, when available. In 2008, 7 male and 9 female cranes ranging from 1 to 6 years (nine were 1 year olds) were examined and health screened. (The WDNR and WCEP-ICF crane health databases contain complete results on each crane screened.)

Physical Examination Results

There were no major abnormal findings based on physical exams. Two cranes (16-02 and 10-03) had mild to moderate chronic soft tissue enlargements associated with one lower leg, but no associated lameness. However, crane 16-02 had a significant lameness in 2006 and still dangles this leg at a 90 degree angle when flying. Crane 10-03 was captured and examined in 2007 and no leg abnormalities were noted at that exam. (In the Fall of 2008, monitoring staff reported that crane 15-04 had an abnormal gait and was observed to have fishing line wrapped around the left leg, but the bird migrated and was observed to be walking normally by December.) Small healing wounds or minor feather damage were noted for several cranes during the physical exams (01-04, 16-07, 17-07, 21-07, 26-07, 39-07, 42-07).

Viral Serology

IBD: Samples from all 16 cranes were submitted for IBD testing; completed results have titers between 2 and 4, not highly indicative of exposure to IBD. (11 results are pending as of 12/18/08).
EEE: Samples from all 16 cranes were submitted for EEE testing; 1 crane (24-05) was positive at 1:100; 5 cranes had results that were interpreted by USDA-NVSL to be positive at titers of 1:20-1:40 (13-02, 16-02, 09-03, 10-03, and 22-07). (1 result is pending as of 12/18/08)
WNV: Samples were submitted from all 16 cranes for testing for WNV; all completed results were negative. (8 results are pending as of 12/18/08)
NDV and AI: Thirteen cranes were tested for NDV and 15 cranes were tested for AI and all results were negative for evidence of these viruses.

Heavy Metals

Thirteen cranes were evaluated for serum zinc levels and all 16 cranes were evaluated for blood lead levels. All results were considered within normal limits.

Hematology

Complete blood count (CBC) evaluations were done on 13 cranes and 14 cranes were screened for blood parasites. Two cranes (13-02 and 46-07) were considered to have a mild heterophilia, likely due to the stress of capture. Three cranes (09-03, 21-07 and 26-07) had somewhat elevated eosinophil and/or basophils counts. No hemoparasites were seen.

Clinical Chemistry

Fourteen cranes had serum chemistry profiles conducted. Five cranes (13-02, 10-03, 37-07, 42-07, and 46-07) showed mild elevations of one or more of the AST, CK, and LDH enzymes, compatible with mild myopathy associated with the capture event. Six cranes (13-02, 10-03, 16-07, 21-07, 22-07, and 42-07) had serum alkaline phosphatase levels over published reference ranges.

Fecal Bacteriology

Cloacal swabs from 14 cranes were submitted for fecal culture. All 14 had negative results for Salmonella. Eight cranes had evidence of Campylobacter spp. (16-07, 17-07, 21-07, 26-07, 37-07, 39-07, 42-07, and 46-07). Fecal smears from 12 cranes were submitted for screening for acid fast bacteria. All slides were negative for evidence of avian TB-compatible bacteria.

Fecal Parasitology

Feces were collected from 14 cranes and were analyzed using formalin sedimentation. No parasites were seen on the majority of the samples; four (09-03, 37-07, 39-07, and 46-07) had small numbers of trematode eggs.

Based on these summarized findings from health screening of 16 free-ranging WCEP cranes in Wisconsin in 2008, very few significant health problems were identified. As would be expected in a wild population of cranes, cases with evidence of minor to moderate limb trauma were detected, and, especially in the case of 15-04, should continue to be monitored. Serum antibody screening continues to support that WCEP cranes are exposed to EEE at a low rate, though, based on these results, it is impossible to judge when and where exposure occurs. In WCEP cranes, there is continued detection of serum alkaline phosphatase enzyme levels well above published references for whooping cranes; the WCEP Health Team has not associated this finding with any disease process. Nothing unusual was detected from the microbiology and parasitology screening; Campylobacter spp. are sporadically recorded from captive and free-ranging cranes and the levels of fecal parasites detected are as expected.

Viral Serology-Addendum

IBD: Samples from all 16 cranes were submitted for IBD testing; completed results have titers between 2 and 16, not highly indicative of exposure to IBD. (1 result is pending as of 2/9/09).
EEE: Samples from 15 cranes were submitted for EEE testing; 1 crane (24-05) was positive at 1:100; 5 cranes had results that were interpreted by USDA-NVSL to be positive at titers of 1:20-1:40 (13-02, 16-02, 09-03, 10-03, and 22-07).
WNV: Samples were submitted from 15 cranes for testing for WNV; fourteen were negative at 1:20; one crane (24-05) was reported to be positive at 1:40.

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PRESENTATIONS

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Hartup, B. K., M. G. Spalding, N. J. Thomas, G. A. Cole and Y. J. Kim. "Thirty years of mortality assessment in whooping crane reintroductions: Patterns and implications." IUCN International Wildlife Reintroduction Conference, Lincoln Park Zoo, Chicago, IL, 2008; 57th Annual International Conference of the Wildlife Disease Association, Edmonton, Alberta Canada, 2008; 11th North American Crane Workshop, Wisconsin Dells, WI, 2008.

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Pinkerton, M. E. and B. K. Hartup. "Aspergillosis associated with presumed infectious bursal disease in captive whooping cranes (Grus americana)." 57th Annual International Conference of the Wildlife Disease Association, Edmonton, Alberta Canada, 2008.

Poster: Examination of Opportunistically Collected Eggs Laid by Whooping Cranes in Florida. Marilyn G. SpaldinG, Department of Infectious Diseases and Pathology, College of Veterinary Medicine, University of Florida, Box 110880, Gainesville, FL 3 2610, USA, SpaldingM@vetmed.ufl.edu, Martin J. Folk, Florida Fish and Wildlife Conservation Commission, 1475 Regal Court, Kissimmee, FL 34744, USA, and Stephen A. Nesbitt, Florida Fish and Wildlife Conservation Commission, Wildlife Research Laboratory, 1105 S.W. Williston Road, Gainesville, FL 32601-9044, USA

Poster: Eastern equine encephalitis in Florida Whooping Cranes. Marilyn G. Spalding, Department of Infectious Diseases and Pathology, College of Veterinary Medicine, University of Florida, Box 110880, Gainesville, FL 32610, USA, SpaldingM@vetmed.ufl.edu, and Lillian M. Stark, Florida Department of Health, Bureau of Laboratories – Tampa, 3602 Spectrum Boulevard, Tampa, Florida 33612

Poster: Pathology associated with lightning strike and drowning mortality of whooping cranes in Florida. Marilyn G. Spalding, Department of Infectious Diseases and Pathology, Box 110880, College of Veterinary Medicine, University of Florida, Gainesville, Florida 32611, USA, SpaldingM@vetmed.ufl.edu, Scott Terrell, Disney's Animal Kingdom Veterinary Services, 1200 N Savannah Cricle, Bay Lake Florida 32830, USA, and WILLIAM B. Brooks, U.S. Fish and Wildlife Service, 7915 Baymeadows Way, Suite 200, Jacksonville, Florida 32256-7517, USA

Platform presentation: Leg problems and power line interactions in the FLORIDA RESIDENT flock of whooping cranes (Grus americana). Jamie L. Miller, Department of Infectious Diseases and Pathology, College of Veterinary Medicine, University of Florida, Box 110880, Gainesville, FL 32610, USA, DowJ@vetmed.ufl.edu, (352) 256-8589, Marilyn G. Spalding, Department of Infectious Diseases and Pathology, College of Veterinary Medicine, University of Florida, Box 110880, Gainesville, FL 32610, USA, SpaldingM@vetmed.ufl.edu, (352) 392-2239 x5867, Martin J. Folk, Florida Fish and Wildlife Conservation Commission, 1475 Regal Court, Kissimmee, FL, 34744, USA, Marty.Folk@MyFWC.com, (407) 348-3009

COMMUNICATIONS AND OUTREACH

The Communications and Outreach Team (COT) continues to keep the project, now in its eight year, in the media and public spotlight. The COT is comprised of communications and education specialists representing WCEP founding members, partners and volunteers. The team remains essential to building support for the project through education, media relations and coordinated public outreach efforts.

COMMUNICATIONS AND OUTREACH

Joan Garland
(International Crane Foundation)

The Communications and Outreach Team (COT) continues to keep the project, now in its eight year, in the media and public spotlight.

The COT is comprised of communications and education specialists representing WCEP founding members, partners and volunteers. The team remains essential to building support for the project through education, media relations and coordinated public outreach efforts.

The team is responsible for and directs all aspects of external communications to advance public understanding and continued support for the protection and restoration of whooping cranes and their habitat in eastern North America. The partnership recognizes that a cohesive voice is critical to the project's success. To carry out its mission, the COT is responsible for developing and implementing specific procedures and protocols for all communications aspects of the project.

Joan Garland, education outreach coordinator with the International Crane Foundation, and Dan Peterson, visitor services manager with the Necedah National Wildlife Refuge, chaired the Communications and Outreach Team in 2008.

Joan Garland (ICF), gives presentation to McCallie School in Chatanooga, Tenn. Photo by ICF.

2008 ACCOMPLISHMENTS

WCEP media releases and press statements

The COT issued press statements and releases on the transfer of chicks to Necedah NWR, departure of the ultralight-led and Direct Autumn Release fall migrations, St. Marks NWR winter site decision, arrival of the ultralight-led migration, and the spring return to Wisconsin of wild whooping cranes.

New outreach opportunities

The addition of St. Marks NWR as a winter site and the new ultralight-led migration route provided WCEP with new audiences for media and education and offered opportunities to reinforce key messages about conservation and the WCEP partnership. The Communications and Outreach Team issued news releases to state partners along the new ultralight-led migration route. These targeted press releases increased media coverage during the fall migration.

Another significant WCEP story that caught the media's attention this year was the Direct Autumn Release program. As WCEP continues to expand the use of this reintroduction technique as a supplement to the ultralight-led migrations, additional media are inquiring about and tracking the progress of the Direct Autumn Release birds.

"Education is a huge part of our WCEP mission. If we don't educate the public about the plight of the whooping crane, we can't ensure future generations will carry on the crane conservation mission." -Joan Garland, ICF Education Coordinator

Volk Air Force Base helped set up a camouflage tent outside the new ultralight training site at Necedah for visitors to watch the young cranes as they learn to fly behind the ultralight aircraft. Photos by FWS

Joan Garland (ICF), gives presentation to Hammet Bowen Elementary in Ocala, Fla. Photo by ICF.

Media Coverage

Major media outlets covering WCEP topics this year included the Chicago Tribune, the Associated Press, Discover Magazine, ESPN News, and the Milwaukee Journal Sentinel. Wire stories continued to enjoy extensive pick-up regionally and nationally. A list of known media coverage in 2008 appears in Appendix 1.

Environmental Education

Education continues to be a key component of the COT's efforts. The whooping crane reintroduction project has offered a strong opportunity to inform and motivate students along the flyway about cranes and wetland conservation. The migration of these birds highlights the dependence of cranes and other wildlife on wetlands along the migration route. Most of these wetlands are privately owned, so the decisions and conservation outlook of future generations are critical to the survival of these cranes.

The COT delivered presentations during the fall migration to schools along the flyway, especially in Wisconsin, Tennessee, Georgia and Florida. Programs were presented throughout the year at schools, universities, conservation and birding clubs, professional conferences, birding festivals, civic organizations and zoos. Outreach representatives distribute education materials, including posters, brochures and CDs that help interpret crane migration, behavior and ecology.

Journey North

Thanks to tremendous support from Tom Stehn and Brian Johns, Journey North has been reporting since 1994 on the natural phenomenon of spring migration of the wild Whooping Cranes between Aransas NWR and Canada.

In Fall 2001,WCEP invited Journey North to report to schools on the ultralight-led migrations south. Operation Migration news and photos are the core of Journey South, giving classrooms a wondrous front seat for the daily migration progress and stories. Each spring, northward migrations of both flocks are covered as well, centering on field reports, data and photos from Brian and Tom, Operation Migration and ICF.

Journey North continues to grow and to expand its role as the nation's premiere online citizen science project for children K-12. The program is now reaching 790,110 students at 30,487 sites; the site receives 2 million web hits per month (24 million/year), and over 175,000 distinct hosts.

Journey North keeps a current bio page on every individual bird in the new EMP, and students come to care about the species through personal knowledge of birds in the new flock as well as the exceptional bird stories shared from the natural flock by Tom and Brian in their regular JN reports in the spring season. Journey North is deeply grateful for the dedication and generosity of spirit consistently shown over the years by the WCEP contributors, and is proud to be performing such a successful educational function on behalf of Whooping cranes and the partnership.

Although JN is funded by Annenberg and intended for students, manybirders and other interested adults read or participate in this online program, much to the benefit of the Whooping cranes-at the very least through increased awareness of their plight and habitat requirements, and also through monetary contributions to WCEP partner organizations.

OUTREACH AND EDUCATION PROGRAMS

International Crane Foundation

Over 23,500 visitors to the International Crane Foundation received WCEP programs and information as part of their tour of the foundation.

ICF staff provided WCEP education outreach programs and materials to more than 9,200 people in eleven states and Canada--states included Minnesota, Wisconsin, Iowa, Kansas, Nebraska, Illinois, Tennessee, Georgia, Louisiana, Florida, and Texas. Communications and Outreach Team Co-chair Joan Garland provided interactive programs to schools along the flyway in Wisconsin, Tennessee, Georgia and Florida during the fall migration.

Joan Garland (ICF), gives presentation to McCallie School in Chatanooga, Tenn. Photo by ICF.

Operation Migration

OM representatives took advantage of every possible opportunity to visit the Observation Tower at the Refuge to speak with those gathered to watch the morning training sessions. Pilots and ground crew also hosted and addressed many groups when their refuge tour included a visit to the hangar. As awareness for WCEP's Whooping crane project grows, so do requests for speakers and presentations.

The outreach undertaken by OM as the guest of Disney's Animal Kingdom for International Migratory Bird day is, in terms of numbers, by far its largest endeavor. The presentation delivered by OM annually at the Necedah Whooping Crane Festival continues to be standing room only. The growth of attendance at EAA AirVenture in Oshkosh, WI is equally encouraging.

OM staff and volunteers gave close to 40 formal presentations to groups large and small in Canada and the U.S. during 2008, and an unconfirmed total of 55 presentations were made by volunteers. Combined, the presentations reached and estimated audience of 4,375.

During 2008, school presentations delivered by Operation Migration personnel more than doubled the previous year's number. Interest was especially high in Alabama, and in the new areas of Illinois, Kentucky, Tennessee and Florida that the more westerly migration route passed through.

OMcooperates closely with Journey North, making information, photos, and other materials available to enhance the learning experience of its vast audience of school children.

OM issued numerous press releases and conducted more than 250 media interviews (in both the U.S. and Canada) related to its work with the Class of 2008; 186 of those during the migration. While the attention of the media throughout part of the previous migration route lessened somewhat, the phenomenal attention and interest along the new migration flyway boosted overall coverage/outreach enormously. Worthy of note was the significant increase in interest of radio stations.

In addition to conventional media coverage, OM participated in several major media projects. Among these were: a video documentary filmed by Alabama Public Television; a feature article in the New York Times Magazine; a radio series by the British Broadcasting Corporation; and, a daily live segment on a morning radio show as the migration passed through Illinois.

During 2008, largely due to the new route and terrain more amenable for viewing, the ultralight migration team was able to host 17 flyovers. At some stopover locations, due to the unavailability of an appropriate viewing site, the audience could only consist of our Stopover Hosts and their family. Other venues attracted scores of excited and enthusiastic spectators from confirmed 'Craniacs' to those newly aware of the Whooping crane project.

OM's website is a major outreach and education tool for WCEP, most particularly the Field Journal and Photo Journal web pages. The year round entries in the Field Journal attract a large, and worldwide readership, especially during the fall migration

Wisconsin Department of Natural Resources

The Wisconsin Department of Natural Resources provided outreach presentations to adult and youth audiences around the state, reaching approximately 700 people.

"Eight years ago we started out with a few speakers and some crafters, with about 500 people in attendance. Now, people from all over the United States and from all around the world come to the event." Dave Arnold, Necedah Crane festival chairman and Lions Club member

Necedah NWR

A total of 3,841 people attended WCEP outreach activities on and off Necedah NWR. Necedah NWR staff delivered programs to 819 visitors. Over the summer, 422 visitors participated in blind tours at Site Five, and 2,600 people attended the Necedah Whooping Crane Festival in September.

Chassahowitzka NWR

Volunteers continued to provide valuable educational programs on behalf of WCEP. Members of the Friends of Chassahowitzka NWR and refuge staff presented outreach programs to over 1,100 people throughout Florida. An additional 700 people were present at the arrival event in Dunnellon, Florida. The unofficial headcount at 2008 migration flyovers was ~4,550. More than 2000 of those attended the Arrival Event Flyover in St. Marks, FL, and just over 500 were present for the Arrival Event in Dunnellon.

St. Marks NWR

St. Marks NWR staff delivered programs to over 3,700 people in nearby communities, including an open house at the refuge that was attended by 60 people. An additional 2,000 supporters attended the flyover event in St. Marks, Florida.

OUTREACH PRODUCTS

The WCEP brochure Whooping Cranes: North America's Endangered Legacy was updated and redesigned in 2008. The brochures are distributed at schools and outreach events along the flyway. The Wisconsin Department of Natural Resources developed a new set of crane education curriculum "A Closer Look at Whooping Cranes" to complement the WCEP crane trunks. The curriculum is multi-disciplinary and adheres to Wisconsin Model Academic Standards.

REGIONAL AND NATIONAL EVENTS

WCEP participated in a number of regional and national outreach events in 2008, reaching thousands of people. Events attended included the Necedah Whooping Crane Festival (details below), the Port Aransas Whooping Crane Festival, the Illinois Renewable Energy Fair, Bald Eagle Days in Wisconsin and Illinois, the Southernmost Illinois Bird Festival, and the North American Association for Environmental Education Annual Conference.

Necedah Whooping Crane Festival: Attendance was approximately 2,600 people at this annual event, held in partnership with the Necedah Lions Club. WCEP partners represented at this festival included Operation Migration Inc., U.S. Fish and Wildlife Service, International Crane Foundation, and USGS Patuxent Wildlife Research Center and USGS National Wildlife Health Center.

Flyover events: Approximately 75 people witnessed the ultralight-led migration departure at Necedah NWR. A crowd of around 2,000 supporters gathered to watch the cranes fly over the town of St. Marks, Florida. Staff and volunteers from the St. Marks NWR coordinated the flyover event. The arrival at Dunnellon, Florida attracted approximately 700 people. Project partners from Chassahowitzka NWR, Friends of the Chassahowitzka NWR, the International Crane Foundation, and Operation Migration Inc. delivered an informative talk and WCEP project summary to the crowd of supporters. Volunteers from Chassahowitzka NWR, Friends of the Chassahowitzka NWR, Citrus County Chapter of the Audubon Society, and the Dunnellon/Marion County Airport manager volunteered their time to coordinate this event.

Web site improvements: WCEP partner and related web sites continue to be effective and efficient means of communicating up-to-date information to large numbers of stakeholders, news media, students, and the general public. In 2008, the COT redesigned and reorganized the WCEP partnership web site www.bringbackthecranes.org. To make the site more user-friendly to those who are unfamiliar with the partnership, the site was restructured to focus on specific activities involved in the reintroduction, such as tracking or the Direct Autumn Release. A link to the U.S. Fish and Wildlife Service's online whooping crane observation form was added to the partnership web site to make it easier for the public to submit whooping crane sightings.

Appendix 1: 2008 Media Coverage

The following list represents the known media coverage of WCEP activities during 2008 as well as recorded media queries to the Communications and Outreach Team. The number next to the name of the outlet represents how many separate new stories appeared in that outlet or how many contacts were made. In some cases the stories that appeared in listed media outlets were Associated Press wire stories or appeared on the web site of the media outlet.

i Ludington Daily News - Ludington, MI

Traverse City Record Eagle - Traverse City, MI

Rockford Register Star - Rockford, IL

Associated Press - USA

News Dispatch - Michigan City, IN

The Tennessean - Nashville, TN

St. Petersburg Times - St. Petersburg, FL (2)

Citrus County Chronicle-Crystal River, FL

Tallahassee Democrat-Tallahassee, FL (3)

Ocala Star-Banner-Ocala, FL

Wakulla newspaper - Crawfordville, FL

Louisiana Public Broadcasting - Baton Rouge, LA

Milwaukee Journal Sentinel – Milwaukee, WI (7)

RedOrbit - Dallas, TX

Leader-Telegram - Eau Claire, WI

Waukegan News Sun - Waukegan, IL

2TheAdvocate - Baton Rouge, LA

Chicago Daily Herald - Chicago, IL

BurlingtonFreePress.com - Burlington, VT

Earthtimes - London, UK

Green Bay Press Gazette – Green Bay, WI (3)

Urbana/Champaign News-Gazette - Champaign, IL

La Crosse Tribune - La Crosse, WI

South Marion Citizen - Ocala, FL

Houston Chronicle – Houston, TX

The Ledger - Lakeland, FL

The Tennessean - Nashville, TN

Chicago Tribune – Chicago, IL (3)

Burlington Times News - Burlington, NC

Bay News 9 - Tampa, FL

RedOrbit - Dallas, TX

Peoria Journal Star - Peoria, IL (2)

Henderson Gleaner - Henderson, KY

Traverse City Record Eagle - Traverse City, MI

The Herald-Times - Bloomington, IN

South Marion Citizen - Ocala, FL

WEAU-TV 13 - Eau Claire, WI

North Florida NewsDaily - Glen Saint Mary, FL

Appleton Post Crescent – Appleton, WI

The Ledger - Lakeland, FL

Hattiesburg American - Hattiesburg, MS

Appendix 1: 2008 Media Coverage (continued)

Trading Markets - Los Angeles, CA

WKBT - La Crosse, WI (3)

Herald Times Reporter - Manitowoc, WI

United Press International

The Capital Times - Madison, WI

IT News Online - Mumbai, Maharashtra, India

Discover Magazine - New York, NY

Baraboo News Republic - Baraboo, WI

Tuscaloosa News - Tuscaloosa, AL

Mullet Wrapper - Pensacola, FL

Marshall Independent - Marshall, MN

Journal Gazette and Times-Courier - Charleston, IL

Bloomington Pantagraph – Bloomington, IL (2)

WIFR - Rockford, IL

WIBA-AM - Madison, WI

Wisconsin Radio Network - Madison, WI

WIFR - Rockford, IL

Chicago Public Radio - Chicago, IL

KARE - Minneapolis, MN

Minneapolis Star Tribune - Minneapolis, MN

Reiten Television KXMB Bismarck - Bismarck, ND

Waukegan News Sun - Waukegan, IL

Dekalb Daily Chronicle - Dekalb, IL

Belleville News Democrat – Belleville, IL

Chicago Public Radio - Chicago, IL

WGIL Radio News - Galesburg, IL

Journal Gazette and Times-Courier - Charleston, IL (2)

The Chattanoogan - Chattanooga, TN

Wildlife Extra - Hereford, England, UK

Ocala.com - Ocala, FL

Kansas City Star – Kansas City, MO

The Tennessean - Nashville, TN

Burlington Hawk Eye – Burlington, IA

Knoxville News Sentinel - Knoxville, TN

Times Daily - Florence, AL

Clanton Advertiser - Clanton, AL

Memphis Commercial Appeal - Memphis, TN

Atlanta Journal Constitution – Atlanta, GA

Greeneville Sun - Greeneville, TN

Clanton Advertiser - Clanton, AL

Murfreesboro Post - Murfreesboro, TN

Times Daily - Florence, AL

Tampabay.com - St. Petersburg, FL

Newsday - Long Island, NY

Baltimore Sun – Baltimore, MD

WIFR - Rockford, IL

Wisconsin Radio Network - Madison, WI

Wisconsin Public Radio – Milwaukee, WI (3)

Kansas City infoZine - Kansas City, MO

Tampa Tribune - Tampa, FL

CharlotteObserver.com - Charlotte, NC

Tampabay.com - St. Petersburg, FL (6)

Times Daily - Florence, AL

Emailwire – USA

Wakulla.com - Crawfordville, FL (5)

ESPN – USA

Citrus Daily - Local Citrus County News - Inverness, FL (2)

WWSB ABC 7 - Sarasota, FL

Ocala - Ocala, FL (5)

WCTV - Tallahassee, FL (5)

Tallahassee Democrat - Tallahassee, FL (3)

Post Searchlight - Bainbridge, GA

Crossville Chronicle - Crossville, TN

BainbridgeGa.com - Bainbridge, GA (2)

Gainesville Sun - Gainesville, FL

WKOW-TV.com - Madison, WI

Troy Messenger - Troy, AL

Clanton Advertiser - Clanton, AL

Charleston Post Courier - Charleston, SC

Daily News & Analysis - Mumbai, India

WAAY - Huntsville, AL

Times Daily - Florence, AL

WJHG-TV - Panama City, FL

Bloomington Pantagraph – Bloomington, IL

Sun-Sentinel.com - Fort Lauderdale, FL

Wildlife Extra - Hereford, England, UK

Blogger News Network - USA

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Florida Fish and Wildlife Conservation Commission
Friends of Necedah National Wildlife Refuge
Illinois Department of Natural Resources
Journey North
Kentucky Department of Fish and Wildlife Resources
Tennessee Wildlife Resources Agency
University of Wisconsin- Madison School of Veterinary Medicine
University of Florida, College of Veterinary Medicine
Friends of Chassahowitzka National Wildlife Refuge
Georgia Department of Natural Resources
Indiana Division of Fish and Wildlife
Friends of St. Marks National Wildlife Refuge
Milwaukee County Zoo

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