

Whooping Crane Eastern Partnership

2014 Condensed Annual Report



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INTRODUCTION

The current Whooping Crane Eastern Partnership strategic plan is a guide to setting general priorities and goals for 2011-2015. The plan outlines a broad direction for reintroduction efforts and serves as a foundation for annual work plans based on WCEP's four operating principles (using good science; collaborative partnerships; open communication; timely evaluation). WCEP implements its activities through coordinated joint and individual efforts by partners working with state and federal agencies that have jurisdiction over the whooping cranes and/or the habitats they use. The partnership works through a "team approach" where key areas of WCEP activity and day-to-day decisions are addressed by one or more project teams that include individuals from partner groups with expertise in that area.

Where is WCEP with respect to its fundamental goal of creating a self-sustaining eastern migratory population (EMP) of whooping cranes? The minimal benchmark in the 2007 Third revision of the International Recovery Plan for a second population such as the eastern migratory population is a self-sustaining flock comprised of 100 birds and 25 breeding pairs (Criterion 1). We appear to have met the goal for Criterion 1 this year: the maximum size of the eastern migratory population through 31 December 2014 was 103 birds (54 males, 49 females), and nests were initiated by 25 pairs in 2014. It has taken 10 years from the first nesting attempt in 2005 to achieve this goal of nesting pairs. Fully 50% of the population is exhibiting reproductive behavior.

While releases have continued into the EMP, lack of natural recruitment continues to be a major impediment to achieving the goal of a self-sustaining population. Of 28 nesting attempts by the 25 pairs in 2014, 8 produced hatchling(s) and only 1 chick fledged. In addition, the size of the EMP has remained flat for nearly five years: on March 1, 2014, our monitoring team documented 103 birds (59 males and 44 females); at the end of 2011, the population totaled 104 birds. Additional birds are necessary to provide resilience, so that the number of nesting pairs may remain stable in the face of environmental and demographic variation in the coming years. WCEP also wants to encourage range expansion and colonization of nesting habitat in eastern Wisconsin, in order to minimize the reliance on intensive nest management in the Necedah National Wildlife Refuge region in order to succeed.

Using the outcomes of the 2012-13 Structured Decision Making workshops, the WCEP Guidance Team agreed to support a mixed release strategy involving release of at least 15 chicks per year – and preferably 25 – to enhance geographic range expansion and settling of cranes in eastern Wisconsin, expressly to improve our chances of reaching the sustainability goal. In the 2010 WCEP strategic plan, we predicted releases would include 12-20 chicks per year for eastern WI (60-100 over the 5 year period 2011-15). WCEP is likely to meet the lower end of that range: between 2011 and 2014, 53 chicks were released in eastern Wisconsin. For perspective, between 2001 and 2004, 53 birds were released at Necedah NWR (about 13 per year). But in the following 6 years 2005-2010, even with the loss of nearly all of the 2006 ultralight migration birds in Florida to a lighting storm, we released 125 birds (about 21 per year). We must strive for these higher release numbers.

Unfortunately, an emerging concern may be suboptimal juvenile and sub-adult survival among those birds intended for eastern Wisconsin: 52% of 2011-13 birds survive (22 of 46). Using published annual survival rates of unpaired individuals observed through 2010 (0.877; Converse et al. *J Ornithol* (2012) 152 (Suppl 2):S561–S572) we expect that 35 (or 76%) of these birds should be alive today. The problem spans both ultralight-guided and direct autumn release birds. The loss of young, pre-breeding birds will continue to hamper our progress forward and our ability to meet the objectives outlined above.

WCEP hopes to receive more functional guidance from the Fish and Wildlife Service & International Whooping Crane Recovery Team to improve our chances of success. More chicks for release are needed

in order to meet critical population growth and expansion goals in eastern Wisconsin, while also making efficient use of scarce conservation dollars and partner effort (particularly the NGOs) and improving the quality and resilience of the population. But we need other operational refinements to be made as well that improve our chance of increasing the odds of getting birds to breeding age in eastern Wisconsin. For 2015, it seems prudent for the use of costume-reared chicks to continue, since the release of experimental parent-reared chicks is incomplete, and success or failure of this method at a larger scale cannot yet be inferred from the results. Of course, we are supportive of this project continuing, but through a separate allocation process. There will be a more robust release cohort due to the re-allocation of 4 birds to Louisiana in 2014.

2015 marks the beginning of a new planning effort within WCEP. It is the time when we will evaluate our performance based on the 2011-2015 WCEP Strategic Plan, and make modifications for the next five years. In fact, several efforts are coinciding this year: the WCEP Research & Science Team “Re-boot”; an all-Partnership face-to-face meeting in September in Wisconsin; the Whooping Crane Recovery Team initiating a program-wide Population and Habitat Viability Assessment; and a major new outreach effort to protect free-ranging whooping cranes. The Guidance Team also hopes to more directly engage individual team leaders on a regular basis.

The re-drafting of a new WCEP Strategic Plan will be the primary work objective of the Guidance Team in 2015; we need this to be able to provide guidance beginning in 2016. Perhaps WCEP needs increased flexibility to aid Whooping Crane recovery and our own operations and objectives – whether management or research related. Flexibility must be shown by all partners as well, as we refine strategies and ways to contribute based on the biological patterns we see in the EMP. For example, in any one year, we may release anywhere from 0 to 30+ birds, if it were to better assist both EMP and LA release programs, be more cost efficient across the captive centers, and meet scientific standards in these experiments.

To summarize:

- 1) On the surface, we are meeting a numeric population goal, both total and effective population size, but we are not meeting the functional sustainability goal.
- 2) We have several strategies in place to address this; yet we are early in the process: such as with releases in eastern Wisconsin and nest management research at Necedah. Other considerations should be considered in planning: limits to wild chick survival, black fly control options, and research into other mechanisms of poor performance.
- 3) Releases of costume reared birds should continue to enhance demographic, genetic, geographic range, and functional goals for the population in 2015.
- 4) A mixed release strategy following our approved allocation plan should continue until compelling modifications are clearly warranted by solid science. The parent rearing project is an altogether separate, research objective that we continue to support.
- 5) Management options should be assessed to improve juvenile and sub-adult survival.
- 6) A more open and engaged dialogue with the Recovery Team is needed. The US Whooping Crane Recovery Coordinator will attend the March WCEP Science reboot meeting and spend time with the Guidance Team. The RT is beginning a holistic review of the recovery program

that hopefully will assess the most effective uses for the captive flocks and reintroduction as tools for species recovery.

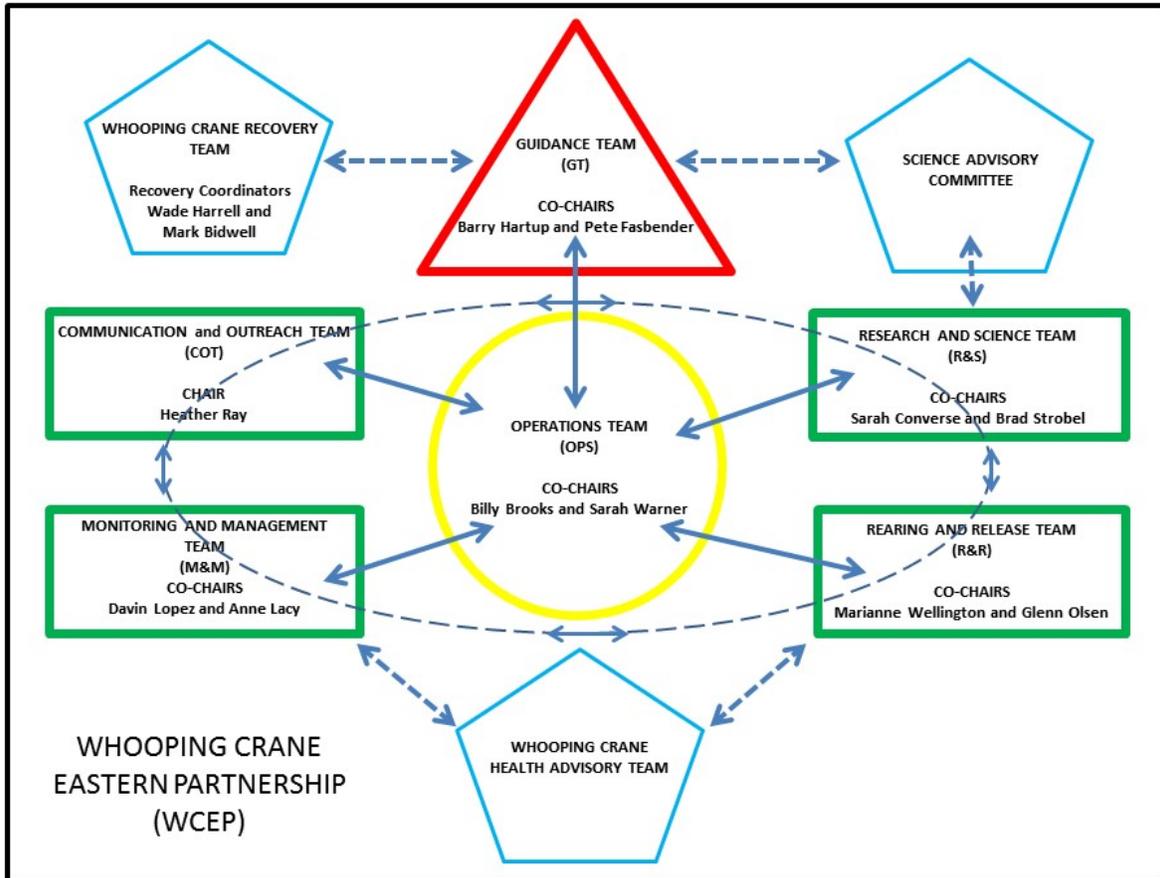
Guidance Team: Bill Brooks, U.S. Fish and Wildlife Service; Joe Duff, Operation Migration; Pete Fasbender, U.S. Fish and Wildlife Service; John French, USGS Patuxent Wildlife Research Center; Barry Hartup, International Crane Foundation; Davin Lopez, Wisconsin Department of Natural Resources; Doug Staller, Necedah National Wildlife Refuge.

OPERATIONS TEAM

Each WCEP operational team has co-chairs. These team leaders make up the Operations Team. Project decisions that cannot be made within a team or between teams are made by the Operations Team. The Operations Team Chairs update the Guidance Team on the project needs, operations and decisions. If the Operations Team is unable to come to agreement on a decision that involves multiple teams, they seek the support of the Guidance Team. In 2014, the Operations Team accomplishments include:

- Monthly conference calls to discuss project operations held on the third Tuesday of each month; summary notes of the call are posted to the WCEP Wiki; 2014 call dates were on 2/21, 3/18, 4/22, 5/20, 6/17, 7/15, 8/19, 9/16, 10/21, 11/18 and 12/16. Operations Team also held a special topic call on 11/13 regarding the proposal to move the 2014 UL cohort from WI to TN and continue the UL migration from that point due to extraordinary circumstances.
- Planned and facilitated the WCEP Annual Meeting on February 11th to report on 2013 accomplishments. The meeting was held as a webinar as well as several partners gathered at ICF to participate as a group. The webinar format allowed for reduced travel costs for the partnership as participants were able to attend via the internet from their work locations around the country.
- 2013 WCEP Annual Report was drafted by Operational Teams Co-Chairs; compiled by the Communications and Outreach Team; reviewed and edited by the Operations Team and Guidance Team; finalized and posted on the BringBacktheCranes.org website in March. Drafting of 2014 Annual Report was initiated in December.
- 2014 work plans and budgets were finalized in January 2014. Drafting 2015 work plans were initiated in December 2014.
- Concurs and supports the Research & Science Team “Forced Renesting” research plan in March.
- Supported USFWS and Monitoring & Management Team recommendations to prevent territories on or immediately adjacent to Volk Field due to human safety issues.
- Recommended (July) there is a significant need for more intensive monitoring of chick rearing due to the high loss of wild hatched chicks prior to fledging.
- Concurred (August) with Monitoring & Management Team research plan that was vetted with the Rearing & Release Team research plan to place 3 backpack satellite transmitters on 2014 UL cohort birds during their training and migration.
- Recommended to the Guidance Team in October that WCEP hold face to face meeting of the entire partnership in September 2015.

- Concurred with the process of the Rearing & Release Team decision (November) that was vetted with the Monitoring & Management Team to move the 2014 UL cohort from WI to TN and continue the UL migration from that point due to extraordinary circumstances; and also concurred with the development of a “Contingency Plan” for intervention if this cohort’s spring migration to WI is not complete.



REARING & RELEASE TEAM

In 2011 whooping crane release efforts were moved from Necedah National Wildlife Refuge (Necedah) in central Wisconsin to an area referred to as the Wisconsin Rectangle roughly associated with the Fox, Wolf, and Rock Rivers. This area includes wetland complexes believed to provide whooping cranes with appropriate nesting habitat. Since 2011, a total of 46 juvenile whooping cranes have been released in this area using the Ultra-light (UL) and Direct Autumn Release (DAR) methods, 23 birds from each method. The Parent-rearing (PR) release project has been considered to be a research project and is reported on in the Research and Science Section of the annual report.

In 2014 we had hoped to release another 14-20+ birds in the Wisconsin Rectangle due to the potential of an increased number of eggs to be harvested from Necedah to bolster the number of eggs produced in captivity. In anticipation of an increase in number of chicks for release, the Wisconsin Department of Natural Resources (DNR) obtained permits for expanding the training facilities at White River Marsh State Wildlife Area (White River) and Operation Migration (OM) constructed a second wet pen scrape for the UL birds. The staff at Horicon National Wildlife Refuge and the International Crane Foundation explored areas for additional or mid-season housing for the more DAR releases. Unfortunately the egg harvest from Necedah was lower than expected, resulting in the number of fertile, viable eggs available for the reintroduction programs remaining fairly consistent with previous years'. Priority of fertile eggs went to the parent-rearing program and the remaining eggs were split between Whooping Crane Eastern Partnership (WCEP) and Louisiana (LA) Programs, thus leaving ~6-7 chicks each for UL and DAR. Unfortunately only 4 of 6 chicks assigned to the DAR project survived. This number was lower than the International Crane Foundation (ICF) minimum requirement for use of the modified DAR technique. The hope was to maintain the balance between WCEP and LA release numbers; however, it was determined that the best use of these birds, due to timing of events, would be to incorporate them into the LA release this year and increase the number of birds available for WCEP next year. This decision resulted in only 7 birds for the Wisconsin Rectangle.

2014 was the second year since the release programs moved to the Wisconsin Rectangle area that there was a major challenge with the UL led migration. On a November WCEP Rearing and Release team conference call, Operation Migration proposed moving the entire 2014 cohort from Wisconsin (where they had been grounded by weather) to Carroll County, TN due to severe weather predicted to arrive in WI. The move resulted in a lack of migration experience for the entire cohort between Wisconsin and Tennessee. How this may affect their ability to return to Wisconsin was a large enough concern for many members of WCEP and has resulted in a plan to track the 2014 UL led birds on their northern migration in the spring of 2015.

The Rearing & Release team continued to collaborate with the Monitoring & Management Team on important subjects such as type of tracking devices to use on the cranes, expanding personnel available to band whooping cranes in the southern U.S. and developing the plan to track the 2014 UL birds on their northern migration in the spring of 2015.

We would like to recognize and thank all the captive centers and private, state, and federal landowners who support the reintroduction programs by hosting the various release activities.

Release Projects

Ultralight-led Whooping Crane Release Project

Glenn H. Olsen, USGS Patuxent Wildlife Research Center

Joe Duff, Operation Migration

Terry Peacock, St. Marks' National Wildlife Refuge

May to July:

In 2014 USGS Patuxent Wildlife Research Center (PWRC) hatched 7 whooping crane chicks for the ultralight-led releases into the Eastern Migratory Population (EMP) (Table 1; see Appendix for 2001-2014 summary information). The chicks were hatched between May 12 and May 21, a 9 day spread in ages.

Table 1. Chicks hatched at PWRC for UL releases

ID	Hatch Date	Gender	Origin
2-14	May 12	F	EMP
3-14	May 13	F	PWRC
4-14	May 15	M	PWRC
7-14	May 18	F	ICF
8-14	May 19	F	ICF
9-14	May 19	F	EMP
10-14	May 21	F	EMP

Medical: Some of the crane chicks showing signs of enteritis were diagnosed with *Salmonella* species. This resulted in additional cleaning and disinfecting of pens in the middle of the season as well as treating the chicks during the busiest time of the year. Overall 2014 was a good year; the chicks had no major disease problems, and no mortalities among the whooping crane chicks being reared for migration behind the ultralight aircraft.

Training: The process of training whooping crane chicks to follow ultralight aircraft on a 1200-mile migration begins early in life. Even before the egg hatches, we play recordings of the ultralight engine sound, in addition to the natural sounds of nature and whooping crane calls. After hatching, the chicks spend the next day in one of our intensive care units, as they would normally be brooded in the nest for about 24 hours. As the chick gains strength and dries out after hatching, it is moved to an inside pen and we start training them to eat and drink on their own. All chicks at this stage are next to adult whooping crane role models 24 hours a day, but only see the costumed caregivers as needed. We teach the crane chicks to feed from a puppet head, and then graduate to eating from the food bowl on their own.

After the chicks are somewhat independent, we begin training. At first we walk them in areas outside of their pens. This is called foraging with a puppet, and had a mean time of 567 minutes (Standard Deviation, SD \pm 149 minutes, range 376-823 minutes). The training began on day 5.7 on average (SD \pm 1.6,

range 4-9 days) and ended on day 31.1 on average ($SD\pm 3.3$ days, range 27-36 days). Next we include the ultralight aircraft in the walks but do not ask the chicks to follow the aircraft. This is called foraging with the ultralight or trike as they are called (after the 3-wheel landing gear tricycle arrangement). We only have records for 2 of the chicks participating in this behavior this year. The two chicks averaged 37.5 minutes of this type of training ($SD\pm 24.7$ minutes, range 20-55 minutes). This training began on day 6 for one chick that received only one session and on day 8 for the other chick that received training on days 8 and 9. We will need to improve our record keeping in order to capture this type of training event in subsequent years.

Circle pen training is the next stage for the chicks. This is where the chicks first learn to follow the ultralight aircraft. The chick is inside a circular pen, with the ultralight outside. This training began between days 8 and 11 (mean 9.3 days, $SD\pm 1.3$ days) and ended between days 29 and 36 (mean 31.1 days, $SD\pm 3.0$ days). Mean number of minutes of circle pen training was 222 ± 59 minutes, range 163-312 minutes. The next type of training with the ultralight aircraft is called open field training. In this type of training, a long low (60 cm) fence divides a mowed field, with the aircraft taxiing up and down on one side and the chicks running alongside on the other side of the fence. This started on the day after circle pen training ended, between days 30 and 37 (mean 32.4, $SD\pm 3.0$ days) and ended between 47 and 56 days-of-age (mean 50.9 days, $SD\pm 3.2$ days). Chicks averaged 265 minutes of open field training ($SD\pm 13$ minutes, range 248-277 minutes).

In the natural world, whooping crane chicks are reared singly, or in rare instances, as twins. We are asking a group of cranes to be together and migrate together when they would not normally be found in such a social situation. The young cranes each would stay with its parents through fall migration and winter, separating only before or during spring migration. For the young whooping cranes to all be in one large group, we need to do further behavior modification training called “socialization training.” We start this socialization with other young cranes early at Patuxent. In 2014, the mean age to begin socialization was 11.3 days ($SD\pm 1.8$ days, range 9 to 14 days of age). The chicks each receive far more socialization training than all types of ultralight training combined. In 2014 the mean amount of socialization training was 304.8 hours ($SD\pm 17.1$ hours, range 283.3 to 327.2 hours). Socialization efforts continued until the cranes were shipped to Wisconsin.

Another aspect of crane training is to get them accustomed to natural habitats, and to that end the young whooping cranes are placed in pens with ponds or wetlands. Ponds and wetlands are both important for foraging and as nighttime roosting locations for protection from nocturnal predators. The value of pond exposure was demonstrated in a research study done in 1995 with non-migratory Florida whooping crane releases. By teaching cranes about wetlands and ponds, especially as roost sites, survival was significantly increased. In 2014 young whooping cranes were first placed in the pens with ponds or wetlands at a mean age of 31.0 days of age ($SD\pm 2.9$ days of age, range 28-35 days of age). Pond exposure lasted at Patuxent until the cranes are shipped to Wisconsin. The mean pond exposure was 296.1 hours ($SD\pm 17.9$, range 274.0 to 323.0 hours). Much of the socialization occurs in the pond areas, so there is a great amount of overlap.

On July 8th all seven chicks (mean age of 52.3 days, $SD\pm 3.4$ days) were transported by private aircraft from BWI Airport, Maryland to Wautoma Airport which is only ten miles from the training facility at White River Marsh in Wisconsin.

July to October, Summer training:

The birds spent a total of 95 days at the summer training facility in White River (13 year average = 100.62 days). They had access to water roosting on 90 nights (13 year average =90.5 days). The weather allowed us to train them with the aircraft on 44 days (13 year average = 53.7 days).

Whooping cranes fledge between 80 and 100 days of age, however it is difficult to determine the exact date when they are able to fly. It is easier to fly within a meter above the surface than it is to fly higher. This phenomenon is known as flying in ground effect. During the training, our birds pass through a stage when they can fly the length of the runway but are still not able to gain any altitude above the ground. As birds in the wild would not have the advantage of a short grass runway, we record the birds as having fledged when they are all able to fly a complete circuit around the pen site. The 2014 cohort fledged at an average of 83.3 days on August 8.

Injury:

Number 4-14, which is the only male in the cohort, developed a persistent limp in the right leg on August 23. At the direction of the veterinarian it was initially treated with medication beginning on August 26. It improved however the limp reappeared or the leg was re-injured. On September 17 it was taken to ICF where Barry Hartup, DVM attached a hinged hock brace. The bird was held back from training for several weeks but eventually made a full recovery. Although the bird had to be anesthetized to fit the brace, this treatment seemed to work very well. Almost as soon as it was returned to the pen, the limp was significantly reduced. On one of its post recovery flights, number 4-14 dropped out and landed in tall reeds. It had to be led out on foot and covered several hundred meters over rough terrain. During the exercise the leg appeared to be completely stable.



Hinged leg brace placed on 4-14 after an injury occurred.

Backpack tracking devices:

On September 16, backpack mounted remote tracking devices from Microwave Telemetry were attached to three of the seven young of year Whooping cranes in the ultralight cohort. The experiment was designed to test the viability of a backpack mounting system that offer some advantages over leg mounted devices. Similar units were deployed on captive cranes at ICF and on wild sandhill cranes in Wisconsin. However, the UL birds offered the best opportunity to observe their use in flight, particularly in a migratory situation.

The units were attached to numbers 2-14, 7-14 and 9-14, which were all 5 months old, post-fledge females. In addition, six of the seven birds were fitted with aluminum Fish and Wildlife Service identification bands. Number 4-14, the only male in the cohort, sustained the leg injury mentioned above and was wearing a leg brace. No bands or tracking devices were fitted to that crane until later.

Attaching the backpack transmitters to the birds required catching, handling and holding each crane for approximately 15 to 20 minutes. We know from previous years that handling the birds for transmitter placement often results in a temporary mistrust of the costume that can retard training by a week or more. For that reason we normally use temporary snap on, leg-mounted transmitters that can be

attached without holding the birds. Permanent bands and standard transmitters are fitted to the birds once they arrive in Florida and their wariness of the costume is no longer an issue.

The backpacks were on the birds for 10 days, which was sufficient time for us to regain their trust. During that period we were able to fly with them on five mornings but it was obvious that their ability to keep up with the aircraft was impaired.



Their flight endurance was shortened from 20 minutes before the backpacks were fitted, to 3 minutes after. From images we were able to capture, part of the problem appeared to be disrupted airflow over the bird's back causing loss of lift and increased drag. On September 26 the backpacks were removed. Thereafter the weather deteriorated and we were unable to rebuild their endurance or to break their habit of turning back to the pen.

Whooping crane with a backpack mounted transmitter attached. Note apparent ruffling of feathers.

October to December, Migration:

The target departure date in late September was missed and migration did not begin until October 10. On the second day, the birds showed little interest in the aircraft and once released, most of them returned to White River from the first stop. They were crated to the second stop in hopes they would follow us better from an unfamiliar location. Unfortunately poor flying conditions prevailed for 15 straight days. Thereafter, only two birds made it on their own to the third stop near Lodi, Wisconsin where we were grounded for another 19 days. Forecasters were predicting continued unusually cold temperatures and snow accumulations of at least foot, too deep to operate the aircraft. With no break in the weather anticipated for the predictable future we petitioned WCEP to move the birds farther down the migration route to Carroll County, TN.

Carroll County, TN was selected for several reasons including the fact that it is the halfway point of our migration and the end of our relatively straight run south. If the birds could make it back to that point from their wintering grounds and headed straight north, they would end up on the west side of Lake Michigan and close to White River Marsh. The request was approved by the Rearing and Release Team and by a special meeting of the WCEP Operations and Guidance teams.

The move was conducted on November 13 using two enclosed vans. The drive took place overnight to take advantage of cold temperatures and reduced traffic. One van pulled the travel pen trailer and the other carried the birds. This provided a backup vehicle in case of mechanical problems. A team was sent ahead to set up the other travel pen in preparation for the arrival of the birds. The trip to TN went smoothly and the birds recovered quickly.

Unfortunately, once in TN, we were grounded for another week. Because the birds had so little opportunity to fly with the aircraft, they were reluctant to follow it for any distance and on one of our

attempts, we only made it one mile. Instead of reinforcing yet another negative experience, we moved the pen rather than crate the birds back to the original location. Although it was a short flight, it ended well for the birds and appeared to instill in them the concept of migration. On our next attempt, the birds followed for 65 miles and climbed to over 5000 feet. Thereafter, the weather and the birds cooperated and we covered 466 miles in 16 days. We arrived at St Marks NWR, FL on December 11, 2014.

Winter monitoring and soft release:

The decision was made by refuge managers and the Rearing and Release team to winter all the birds at St Marks NWR this year. The migration ended on December 11, 2014. All of the birds made the 46-minute flight from the last stopover in Leon County, FL and landed at the pen site.

Because of travel issues over Christmas, the banding operation was postponed until early January. To avoid long term confinement, the birds were released into the larger open pen and recaptured prior to banding which occurred on January 5, 2015. The birds were then again released into the larger, open pen on January 8, 2014. The WCEP veterinary team determined that no post migration examination was necessary.

Facilities:

White River Marsh State Wildlife Area:

The training facility in Wisconsin is located in a closed section of the White River Marsh State Wildlife Area in Green Lake County (*43.54.35 N and 89° 6.641 W*). It consists of a dry pen that was built using post and stringer construction. This enclosure is lined with steel siding that is also buried into the ground 0.5 meters to deter digging predators. This solid wall structure provides a visual barrier so the birds cannot see activity outside. The dry pen covers an area of ~240 sq. meters and includes a covered feeding station and fresh water pans. It is oval to avoid corners where birds could become trapped. A double panel gate, 2 meters wide, provides easy access to a grass runway that is ~18 meters wide and extends ~275 meters.

The dry pen is attached to a wet pen constructed of chain link fence on steel posts that surrounds a pool. It measures 17 meters by 30 meters and has a water depth of up to 0.5 meters. Water is provided from a well and a pump that is run daily to maintain the level appropriate for the birds to roost. Water levels during the 2014 season remained high which limited the amount of water we had to pump in. Both the dry pen and the wet pen are covered with top net and surrounded by multiple strands of electric fence.

The training area is monitored 24/7 via a remotely directed camera, which streams a live video feed over the internet. At twilight it automatically switches to an infrared system. The camera is mounted on a 10-meter tower and has a view of both pens and the surrounding area. It is capable of zooming up to one mile with good clarity.

St Marks NWR:

The soft release facility at St Marks NWR is in an area closed to the public while the whooping cranes are present. It includes an enclosure that covers an area of approximately 1 hectare and encompasses two ponds of brackish water. The perimeter fence is 2 meters tall and protected by multiple strands of electric fence. Fresh water is supplied through bubblers and the birds are provided with a constant

supply of food. This enclosure is not top netted. Within the release pen, a smaller top netted pen is constructed where the birds are kept until they can be fitted with permanent marking bands and radio tracking devices.

Direct Autumn Release Program

Marianne Wellington, International Crane Foundation

Seven whooping crane chicks hatched at ICF in the spring of 2014. All seven chicks were costume reared. Six chicks were intended for release into the DAR program and one chick was originally intended to remain in captivity to become part of the breeding stock. Unfortunately two chicks intended for release died before a month of age, leaving four chicks for the DAR project. Generally ICF hatches 8-10 chicks in order to ensure having a minimum of six for the DAR release project. With four chicks being less than believed minimal number needed for release at Horicon where few adult whoopers are available to act as guide birds, ICF consulted with the WCEP and Recovery Team members to see if these chicks would be more effective in the recovery of whooping cranes if incorporated into either the UL project in the Eastern U.S. or in the Louisiana Release project. It was decided to transfer all the chicks to PWRC where they would be incorporated into the group of young whooping cranes destined to be released in Louisiana.

Without a DAR project to work on, ICF staff and interns took the opportunity to work with the USFWS Refuges to scout out several other locations in the Wisconsin Rectangle that might work for either an early rearing location (July-September) or another soft release pen. Working with Steve Lenz, refuge complex manager, and his crew, we scouted out 2 potential sites on the Horicon Refuge where ICF could possibly move the DAR cohort to in July/August in 2015. Horicon staff facilitated having these areas treated to reduce the cattail population, thus making the areas more open and suitable for a soft release pen.

ICF DAR interns visited the site selected at Horicon several times throughout the fall to take water depth measurements and to record any sightings of sandhill or whooping cranes in the vicinity that would aid in using this site as a soft release site versus having to relocate the birds on the refuge for release near sandhill flocks. Through these visits, it became obvious that more work would need to be done to keep the site more open and more exploration is needed to see if the areas the sandhills were using could be accessed from the pen site in order to facilitate interactions with other cranes prior to release.



Site selected for 2014 in September



Site selected for 2014 in October

In preparation for the potential need to have additional rearing and release sites and/or identifying locations where we may be able to move DAR birds for rearing in August, USFWS personnel Bruce Luebke and Jim Lutz showed ICF staff members Eva Szyszkoski, Cyndie Gitter and Marianne Wellington the Uihlein Waterfowl Production Area and Schoenberg Marsh. Although a few places on these management areas may provide suitable habitat, more exploration is needed to see if management needs, for both the refuges and DAR chick rearing program, would be compatible.

DAR Intern Projects:

The DAR interns were willing and able to stay on at ICF after the birds were moved to Patuxent WRC. With this move they participated in several projects relating to captive crane husbandry, behavioral observations, and the tracking of the whooping cranes in the WI Rectangle area. They also monitored the site selected for the 2014 rearing pen at Horicon. The following is a brief summary of projects they presented to the staff at ICF at the end of their internships.

Rachel Koebert summarized data regarding the wild hatched whooping cranes in the Eastern Migratory Population (Figures 1 and 2). We are looking at possibly publishing this but will provide a draft copy to the WCEP partners.

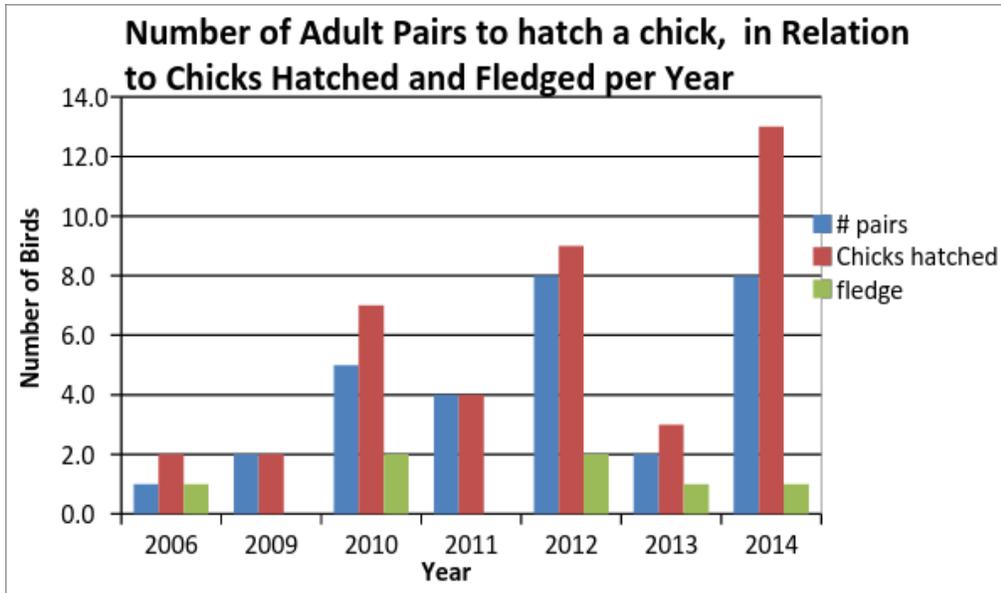


Figure 1. Summary of the number of pairs, chicks hatched, and chicks fledged per year.

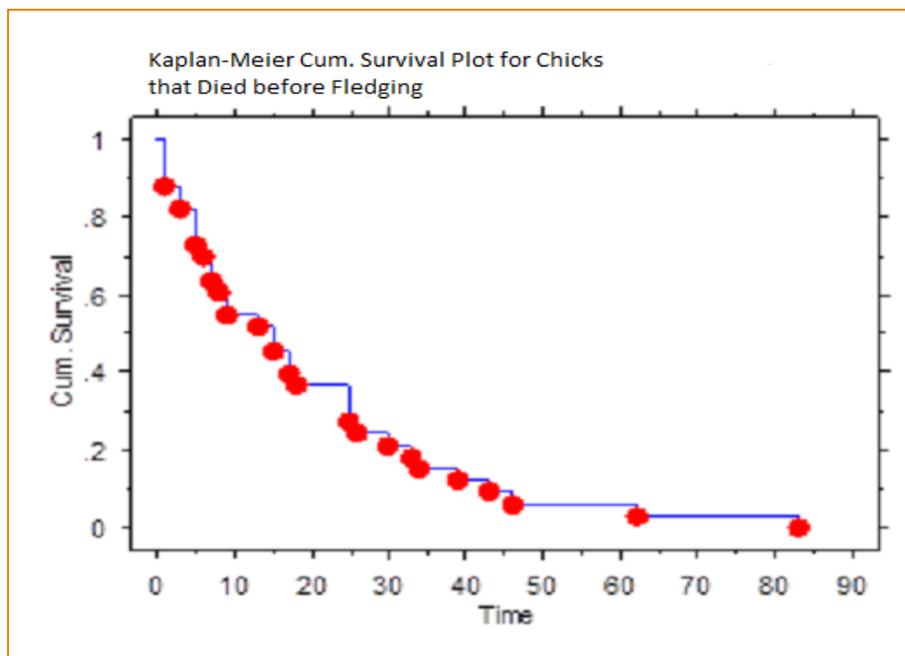


Figure 2. Seventy five percent of the chicks that hatched in the wild died by three weeks of age.

Karis Ritenour helped advance Marianne’s work comparing the Ultra-light Led migration and the DAR release methods. We plan to submit this paper for publication this year. The paper compares the pairing, nesting and survival success of the whooping cranes released during the years 2005-2010. Ninety-nine chicks have been released by UL method and 44 have been released by DAR. Birds were placed in four

different categories: Early Death (<2 years old), Paired, Paired and Nesting, and Never nested. There was no significant difference between the proportions of UL or DAR birds in the categories. The only statistically significant difference between UL and DAR birds was found when comparing ages of birds in the Early Death category. The age of death was younger for the DAR chicks than the UL chicks. This matches the risks involved with the two release methods as the DAR birds are released at an earlier age than the UL chicks and are thus more vulnerable in the wild for a longer period of their lives. A Kaplan Meyer survivability curve compared not only the UL and DAR birds released in 2005-2010, but also data from the wild Wood Buffalo/Aransas flock from 2 different years and the Florida Non-migratory release program.

Karis was also able to organize the data on the birds released within the WI Rectangle and begin looking at how to determine if philopatry was occurring in the WI Rectangle similar to the Necedah releases or if the distribution of birds was less predictable. To date, only one pair of WI Rectangle birds has attempted to nest in 2014 and two male whooping cranes set up territories at Horicon. One male appeared to part of a trio including male and female sandhill cranes. The other male did not have a mate in 2014 as far as we know.

Tiffany Hudson updated a literature search of reintroduction programs which incorporated predator aversion training. From these papers, she presented outcomes and suggestions on what types of training aversion (human, predator, vehicle), timing duration (<5 minutes), and frequency of trainings to consider when reinstating a program at ICF. ICF would like to incorporate a couple of aversion training session for the 2015 birds.

DAR program plans for 2015:

ICF is planning to raise a larger cohort for release in 2015 as part of the agreement with the Recovery Team to offset the 4 extra chicks contributed to LA in 2014. Chicks will be costume reared according to ICF's protocols and transferred to the Horicon NWR around the beginning of September. If two cohorts are raised, we will most likely transfer the oldest group to Horicon in mid to late August and the second one shortly after Labor Day, all dependent upon age of chicks and the ability to build pens and move to Horicon at these times.

Based on the work of DAR Intern Tiffany Hudson, we developed the beginning plans for ICF to re-establish a predator-aversion training program. Currently we are planning on 2-3 sessions of predator-aversion training and 1-2 sessions of vehicle-avoidance training. This training becomes more challenging when the chicks fledge and are more likely to remain in place in the face of danger, relying on flight at the last moment to save avoid the threat. Our main goal is to increase survival immediately post-release and to instill a habit of staying a "safe" distance (yet to be defined) from motorized vehicles. This will be a challenge since wild sandhill cranes are also known to walk the road banks and on the road in the Horicon area. ICF will share our plans with the R&S and M&M teams to see if they have recommendations on how to track potential effects on the cranes overall behaviors as well as including this discussion in the R&S reboot workshop in March.

Acknowledgements:

The Rearing and Release Team is grateful to the many dedicated staff, crew members, and friends that make releasing whooping cranes in the Eastern United States possible.

At St. Marks NWR, forty-one staff members and volunteers completed a work day on October 11, 2014. Volunteers also conducted at least 2 other work days to get the pen ready for the chicks. We had volunteers from the NCCC AmeriCorps, Wakulla High School, Wakulla Middle School, St. Marks Photo Club, St. Marks Refuge Association, and Florida State University.



Volunteers at St. Marks NWR complete a work day on October 11, 2014.

We are grateful to our friends at Disney’s Animal Kingdom for all their assistance with the banding and the over winter monitoring. Thank you also to Eva Szyszkoski, International Crane Foundation and Tim Dellinger, Florida State Freshwater Fish and Wildlife Service, for managing the final banding of the birds and attaching tracking transmitters in Florida prior to the release of the UL birds.

Thanks also to Windway Capital courtesy of Terry and Mary Kohler for relocating the chicks from Patuxent WRC to Wisconsin and for their long-term support of whooping cranes. They have generously provided over 30 round-trip flights in support of this project.



Some of the crane crew at USGS Patuxent Wildlife Research Center during the summer of 2014 (both Operation Migration and Patuxent staff are in the photograph). Kneeling left to right: Maryann Webb, Jordanna Barley, Sarah Reich, Alexandra Sanz, Jade Hackley, and Amanda Boirservert. Second row kneeling: Geoff Tarbox, Augustus Miltenberger, Cameron Staneck, Anna Coxen, and Katherine Halapy. Standing: Dr. Sarah Converse, Rachel Roberts, Brian Clauss, Sharon Peregoy, Robert Doyle, Jane Chandler, Barbara Clauss, Carlyn Caldwell, Brooke Pennypacker, Jonathan Male, Dr. Glenn Olsen, Dr. John French. Charles Shafer is missing from the above picture.

Additional evening volunteers not pictured above: Taylor Callicrate, Susan Krysak, Ken Lavish, Diana Ogilvie, Paula Wang, Andrew Fleming, Mary Edwards, Heather Calabrese. Also not pictured are helpers from three zoos: Debra Talbot from National Zoo, Jeff Pribble from the Birmingham Zoo, and Catherine Poggenburg from the Milwaukee Zoo.

We would also like to acknowledge the 2014 Summer UL Training Team of Brooke Pennypacker, Richard van Heuvelen, Geoff Tarbox, Doug Pellerin, Tom Shultz, and Joe Duff; and the 2014 UL Migration Team of Richard van Heuvelen, Brooke Pennypacker, Heather Ray, Walter Sturgeon, Geoff Tarbox, Colleen Chase, Jo-Anne Bellemer, Doug Pellerin, Clark Schultz, Steve Schildwachter, Bill Minard, John Gerend, David Nadell, David Boyd, Linda Boyd, and Joe Duff.

We are extremely grateful to all the others who provide the stopovers, run the cameras, feed the team, repair the equipment, hangar the aircraft, fund the project, track the birds, prepare the pens, educate the public, and provide the much needed moral support. Without your commitment, there would be no Whooping cranes in the eastern flyway. Thank you!

MONITORING AND MANAGEMENT TEAM

In 2014, most of the older whooping cranes in the Eastern Migratory Population (hatch year 2001-2012) summered on or near Necedah National wildlife Refuge, Horicon National Wildlife Refuge, or White River Marsh State Wildlife Area. Some birds left their summering territories to use staging areas in southern Wisconsin prior to migration. Notable monitoring and management activities in 2014 include:

- On 28 May, no. 1-01 was captured by staff from U.S. Department of Agriculture Wildlife Services, U.S. Fish and Wildlife Service, and Wisconsin Department of Natural Resources at the Volk Field National Guard Base in Juneau County, Wisconsin and removed from the population due to behaviors that created a hazard to aircraft using the base. The bird was transferred to Zoo New England in Boston on 29 May where he will remain.
- One wild fledged chick and fifteen older cranes were captured between 8 September and 7 November for banding or transmitter replacement.
- Twenty-eight nests were initiated by 25 pairs in 2014. Three nests produced single chicks and five nests produced twins. One of these chicks fledged. One male whooping crane apparently paired and nested with a sandhill crane at Horicon National Wildlife Refuge. Failure of the nest was confirmed during a visit 3 June when only egg fragments were found. There was no evidence of a chick.
- Twelve mortalities were recorded in 2014. Five of the mortalities were in Wisconsin.

Seasonal Distribution

Winter 2013/2014

Known final wintering distribution of the Eastern Migratory Population (EMP) included 19 cranes in Indiana, 7 in Kentucky, 18 in Tennessee, 27 in Alabama, 2 in Georgia, 2 in South Carolina and 7 in Florida. The final wintering locations of 8 cranes were not determined. The total in Florida does not include 8 juveniles at the release pen on the St. Marks National Wildlife Refuge. See the [2013 WCEP Annual Report](#) for additional details.

Spring Migration 2014

Similar to 2013, the 2014 spring migration was again late. No. 16-11 and pair nos. 7-11 and 10-11 were the first whooping crane to be documented back on their summering territories (18 March) in the Wisconsin Rectangle. Of documented cranes two years of age or older returning to central or southeastern Wisconsin, 26% did so by 27 March, an additional 42% arrived by 31 March and the remaining 32% returned by 9 April. Two juveniles completed migration to Wisconsin on 18 March – 1 April and an additional eight arrived in Wisconsin by 18/19 April.

Spring and Summer 2014

Extensive spring wandering movement was only noted in one juvenile. Male no. 22-13 was documented traveling into southeastern Minnesota during the spring and moved into central Illinois in July where he remained for the rest of the summer. No. 57-13 (also male) made a few larger spring wandering movements but remained in Wisconsin.

Maximum size of the EMP as of 14 August 2014 consisted of 96 birds (55 males, 41 females) including 93 whooping cranes in Wisconsin, 1 in Illinois, 1 not recently reported, and 1 long term missing. Detailed information about the 2014 Direct Autumn Release, Ultralight-led and Parent-Reared juveniles can be found in the Rearing and Release section of this report.

Most of the older cranes (hatch year 2001-12) summered on or near the Necedah National Wildlife Refuge and in the Wisconsin Rectangle, which includes Horicon National Wildlife Refuge and White River Marsh State Wildlife Area (Figure 1). Early autumn distribution was similar to summer distribution for most cranes in the population; however, some birds left their summering territories to use staging areas at other locations in southern Wisconsin.

Captures and Bandings

On 28 May, no. 1-01 was captured at the Volk Field National Guard Base in Juneau County, Wisconsin and removed from the population due to repeated behaviors that created a hazard to the bird and to aircraft using the base. He was transferred to Zoo New England in Boston, Massachusetts, on 29 May and will spend the remainder of his life in captivity.

Six of the seven juveniles in the ultralight program received their federal bands on 20 September at the White River Marsh SWA, Wisconsin. The seventh bird, who was suffering from a soft tissue injury at the time, received his federal band when all the juveniles received their permanent transmitters and color combinations at the St. Marks National Wildlife Refuge, Florida, on 5 January 2015.

One fledged wild hatched chick and fifteen older cranes were captured from 8 September – 7 November for banding and transmitter replacement.

Autumn Migration 2014

The 2014 migration began relatively early, with the first cranes documented leaving on 18 October. Of the 78 cranes with known migration dates or ranges, 38% departed on or before 31 October. An additional 52% departed by 15 November and the remaining 10% by 18 November. One bird (no. 14-12), who summered in northern Indiana, had the latest known migration initiation date of 1 December.

Winter 2014

Maximum size of the eastern migratory population through 31 December 2014 was 103 birds (54 males, 49 females). Estimated distribution at the end of the report period included 40 Whooping Cranes in Indiana, 7 in Illinois, 9 in Kentucky, 7 in Tennessee, 17 in Alabama, 3 in Georgia, 14 in Florida, 4 at unknown locations, 1 not recently reported, and 1 long term missing (Figure 2). The total for Florida includes 7 newly released juveniles. There were some additional southward movements, especially by birds in Indiana, in early January 2015.

Whooping Crane Locations as of 17 August 2014 or Last Report

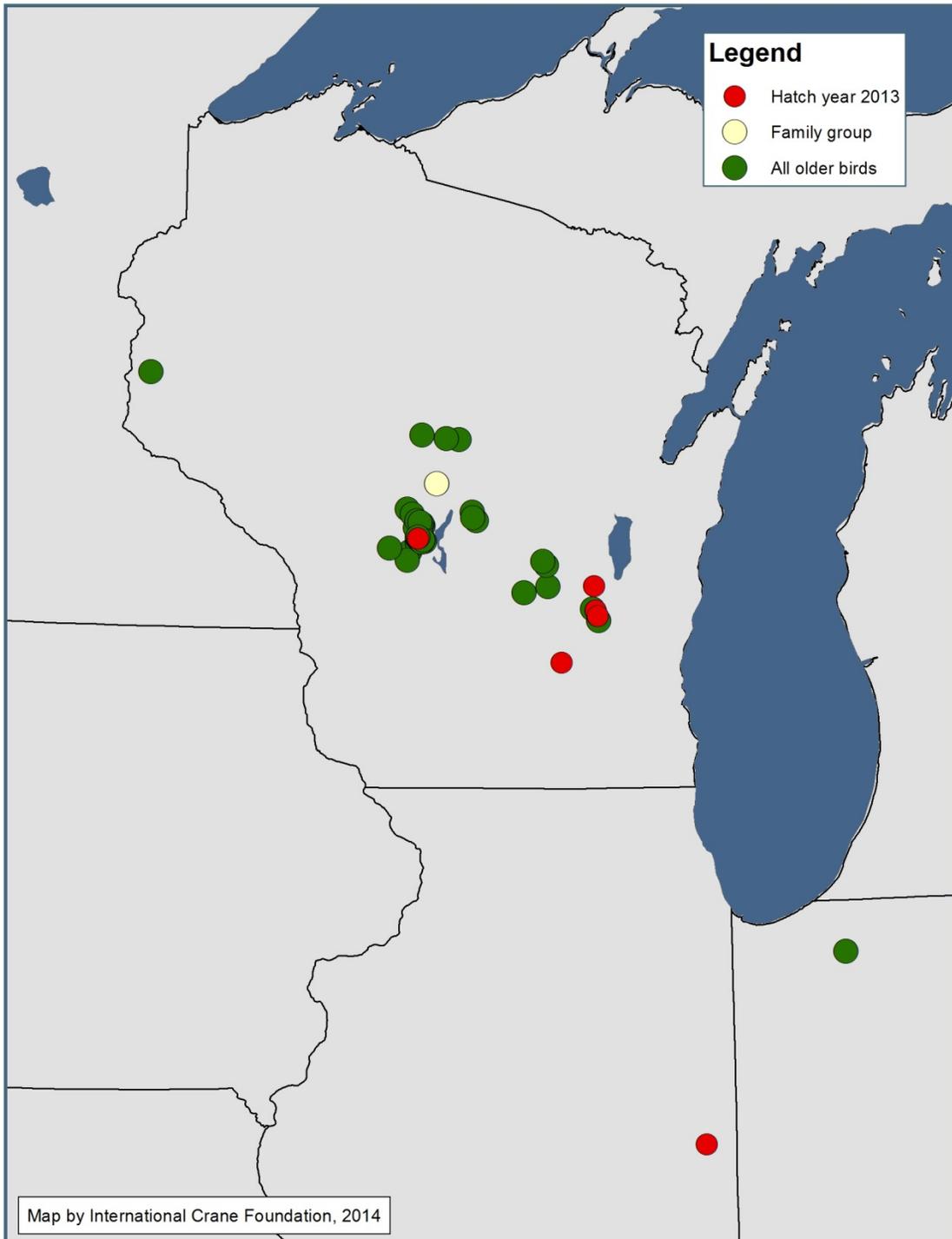


Figure 1. Summer whooping crane locations in Wisconsin, Indiana, and Illinois as of August 17, 2014. Distribution was primarily focused in Necedah National Wildlife Refuge and the Wisconsin Rectangle.

Whooping Crane Locations as of 31 December 2014 or Last Report

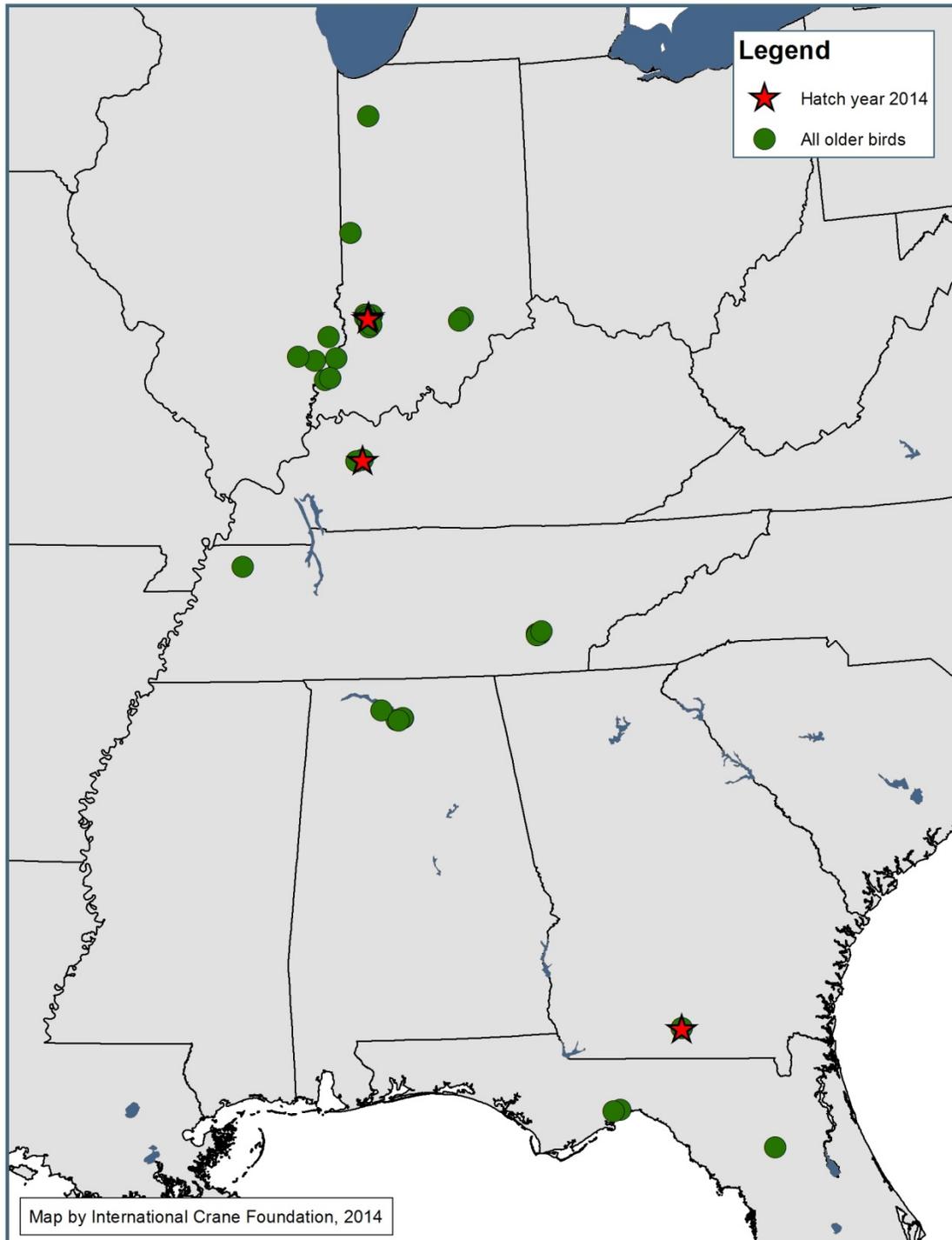


Figure 2. Winter EMP whooping crane locations as of December 31, 2014 or last report. EMP cranes continue to utilize areas throughout the Midwest and Southeast in winter. Areas of concentration included southwest IN, Wheeler National Wildlife Refuge, AL, and Hiwassee State Wildlife Refuge, TN.

Survival

As of 31 December 2014, 239 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 one HY2007 ultralight-led juvenile that was removed from the project prior to release after being unable to fly after handling at the winter release site. An addition of seven wild hatched fledglings (one in 2006, two in 2010, two in 2012, one in 2013, one in 2014) resulted in a grand total of 246 reintroduced individuals (Figure 3), of which 100 (40.6%) may currently survive in the free-ranging eastern migratory population (Figure 4).

The following 12 mortalities were recorded in 2014:

- No. 35-09: Greene Co, IN, January; gunshot
- Nos. 50-13, 51-13 and 54-13, Tazewell Co, IL, January; unknown cause
- No. 1-13: Daviess Co, KY, April; trauma
- No. 3-13: Daviess Co, KY, April; unknown cause
- No. 8-09: Juneau Co, WI, April; egg binding/yolk peritonitis
- No. 4-09: Monroe Co, WI, April; blunt trauma
- No. 19-04: Wood Co, WI, August; disappeared, remains not found
- No. 21-14: Juneau Co, WI, September; blunt trauma
- No. 10-03: Juneau Co, WI, October; unknown cause
- No. 5-13: Wakulla Co, FL, November; unknown cause

Additionally five long-term missing birds were removed from the population totals. Date of mortality is assumed as the same year the bird went missing:

- No. 16-10: Missing since April 2012
- No. 12-07: Missing since March 2012
- No. 11-12: Missing since February 2013
- No. 15-12: Missing since February/March 2013
- No. 17-03: Missing since November 2013

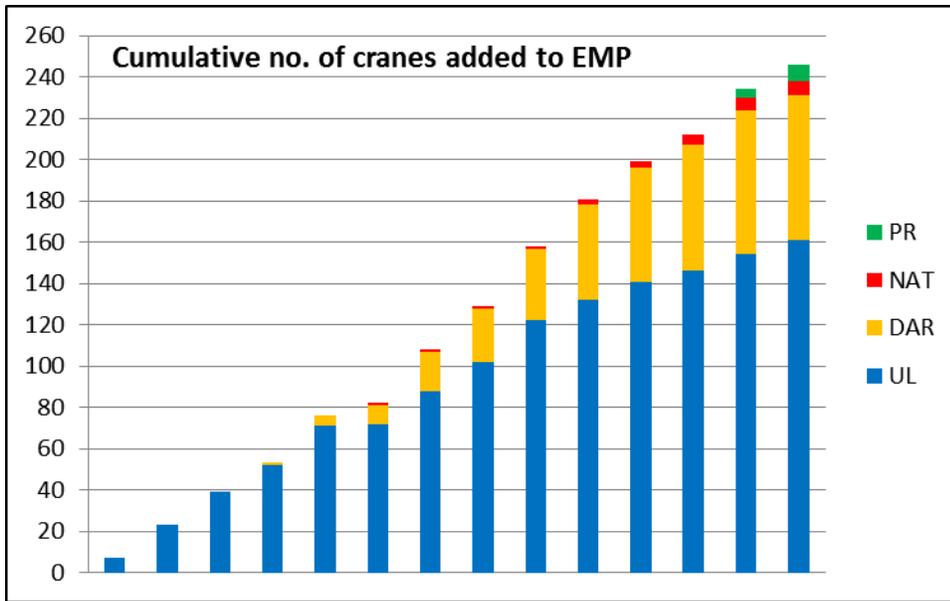


Figure 3. Cumulative numbers of cranes added to the EMP. Green represents Parent-Reared, Yellow represents Direct Autumn Release, and blue represents Ultralight-led birds (see Rearing and Release section for details on release methods). Red represents birds hatched in the wild to free-ranging pairs.

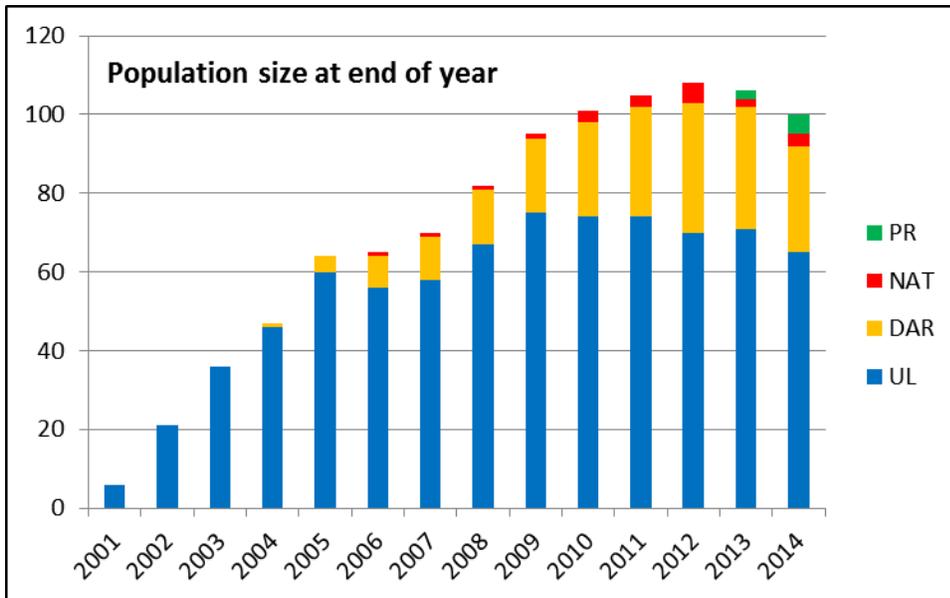


Figure 4. Population size of the EMP at the end of each year including the number that each release type contributed to that year-end total. Green represents Parent-Reared, Yellow represents Direct Autumn Release, and blue represents Ultralight-led birds (see Rearing and Release section for details on release methods). Red represents birds hatched in the wild to free-ranging pairs.

Reproduction

Twenty-eight nests by 25 pairs were initiated in 2014; 25 first nests and three re-nests. All first nests were initiated between 7-26 April except two late first nests initiated on 5 and 15 May. Of the first nesting attempts, three nests hatched out one chick and five hatched out two chicks. Four others had eggs removed as part of a re-nesting experiment and one was incubated past full term. Re-nesting attempts by three pairs were initiated on 10-20 May. All re-nests and some late first nests failed in late May, coinciding with a late emergence of blackflies.

Male no. 16-11 apparently paired and nested with a sandhill crane female at the Horicon National Wildlife Refuge. He was observed sitting on a nest on 16 May and during subsequent observations. A sandhill crane was also observed sitting on the same nest. Failure of the nest was confirmed during a visit on 3 June, when only egg fragments were found. There was no evidence of a chick.

To date in the EMP there have been a total of 134 first nest and 26 second nest attempts. Of these 160 nests, at least 40 colts have hatched, seven of which survived to fledging.

Table 1. Summary of reproduction by year in the reintroduced eastern migratory whooping crane population.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Date of first nest initiation	16 Apr	5-6 Apr	3 Apr	7 Apr	~2 Apr	<1 Apr	3-4 Apr	≤ 26 March	15 Apr	~7 Apr	
Number of nesting attempts	2 first	5 first + 1 re-nest = 6	4 first + 1 re-nest = 5	11 first	12 first + 5 re-nest = 17	12 first + 4 first re-nest + 1 second re-nest = 17	20 first + 2 re-nest = 22	22 first + 7 re-nest = 29	21 first + 2 re-nest = 23	25 first + 3 re-nest = 28	134 first + 26 re-nest = 160
Young hatched	0	2	0	0	2 ^a	7 ^a	4	9 or 10 ^b	3	13	40 or 41
Young fledged	0	1	0	0	0	2	0	2	1	1	7

^a 1 egg from captive propagation.

^b Outcome of one nest unknown

Fledged chicks:

1 by pair 11-02/17-02, Necedah NWR, 2006

2 by pair 3-04/9-03, Necedah NWR, one each in 2010 and 2013

3 by pair 12-02/19-04, Wood County, one each in 2010, 2012 and 2014

1 by pair 13-03/9-05, Necedah NWR, 2012

RESEARCH & SCIENCE TEAM

INTRODUCTION

Prepared by Sarah J Converse, USGS Patuxent Wildlife Research Center

The 2014 WCEP Research and Science Team annual report highlights several projects on which the team concentrated their discussions and efforts in 2014. The first three of these (breeding ecology on Necedah NWR, parent-rearing, and telemetry effects on copulation and incubation) are directly related to investigations of reproductive failure in this population. Given the importance of reproductive failure to population sustainability, continued focus on this issue is critical.

In March 2015, we will hold the WCEP Science Reboot meeting at the International Crane Foundation. This meeting will bring together experts from inside and outside WCEP, with the goal of revising and prioritizing for testing our hypotheses about the causes of reproductive failure in this population. Given all that we have learned in the past several years, now is a good time to revisit our vision for how research and science efforts can contribute to solving the major challenge of this reintroduction effort.

In 2015, we hope to engage in further discussions about the value and the potential for testing the captive selection hypothesis, which hypothesizes that captive genetic selection has resulted in heritable, non-adaptive changes in animals released to the Eastern Migratory Population. In 2014, we reviewed a proposal for release of wild-sourced individuals into the population, which was developed with the goal of testing this hypothesis. Further work on that proposal will be carried out with a small team including members of the International Whooping Crane Recovery Team.

Also in 2015, we expect to focus additional effort on the ecology and management of winter habitat in the Eastern Migratory Population, and on social and individual factors influencing the dynamics of winter site selection. In 2015, we expect final publication from several major research efforts, including the 2009-2013 nesting success experiment, and the Eastern Migratory Population Simulation Model (EMPSim) and WCEP structured decision making planning process.

The science output associated with the Eastern Migratory Population reintroduction effort continues to grow. An additional 4 papers were added in 2014 to the 26 previously-published peer-reviewed papers concerning the Eastern Migratory Population, and a number of additional papers are in preparation or revision. The most widely cited paper (Runge et al. 2011) has now been cited 85 times (scholar.google.com, accessed 7 January, 2014) compared to 57 citations at the end of 2013 (scholar.google.com, accessed 23 January, 2014). We strongly advocate that the partners continue to emphasize publication of results from our efforts, because this can contribute critical information to the field of reintroduction biology (e.g., Armstrong and Seddon) and can also serve as a high-impact way of communicating the importance of this effort. The reintroduction of the Eastern Migratory Population is already one of the best-documented reintroduction efforts worldwide, and this impact should continue to grow.

BREEDING ECOLOGY AND MANAGEMENT RESEARCH ON Necedah NWR

Prepared by Bradley N. Strobel, Wildlife Biologist, Necedah National Wildlife Refuge, 11385 Headquarters Road, Necedah WI 54646

All data and conclusions contained in this report are preliminary and subject to revision. The assessment is provided on the condition that neither the U.S. Fish and Wildlife Service nor the United States Government may be held liable for any damages resulting from the authorized or unauthorized use of the assessment.

Effects of Forced Renesting on Reproduction of a Reintroduced Population of Whooping Crane (*Grus americana*)

After 13 years of Whooping Crane releases in the eastern U.S., the population's survival rate, migration behavior, habitat selection, pair formation and egg production all appear to be sufficient to allow a self-sustaining population. Unfortunately, reproduction is near 0 and the population is not self-sustaining. In 2013, all first crane nests on federally-owned property abandoned shortly after parasitic flies were detected on the landscape. Within the EMP, whooping crane nest abandonment typically occurs synchronously and appears to coincide with the emergence of parasitic insects (Urbanek et al. 2010, Converse et al. 2013). In 2010, the Whooping Crane Eastern Partnership's (WCEP) Research and Science Team explored 2 potential strategies to increase the reproductive success of the EMP. The first strategy included a management action to eliminate or greatly reduce the local population of parasitic insects to simultaneously evaluate the effect of the treatment on whooping crane reproductive success and the feasibility of the strategy being used as a long-term management action. The second strategy (hereafter, Forced Renesting) included directly managing the whooping crane nests by salvaging eggs from nests with 'low' probability of success to encourage pairs to nest a second time when the probability of nest success is higher.

Since individuals within the EMP began nesting in 2005, renests have had higher full-term incubation rates (54% versus 18%), hatching rates (39% versus 11%) and fledge rates (21% versus 0.1%) than initial nest attempts. Unfortunately, the observed renesting rate for pairs that failed during incubation of a first nest has been 25% (23 renests from 89 initial nests not incubated full term). Salvaging eggs from early nests may increase the probability of renesting above 25% and, in turn, increase reproductive success. Nesbitt (1988) removed eggs from 17 first-nests of Florida sandhill cranes (*Grus canadensis pratensis*) and found that 76% of pairs renested. Similarly, Drewien (1973) found that 4 of 7 (57%) greater sandhill crane pairs that failed early in incubation nested a second time. Removing eggs from Mississippi sandhill crane nests, in 2011 and 2012, resulted in >80% apparent renesting rate (S. Hereford, personal communication). The average interval between the termination of first nests and the initiation of second nests was 17 days for Florida sandhill cranes (Nesbitt 1988). Removing eggs from whooping crane nests immediately prior to the emergence of parasitic insects may synchronize the initiation of second nests with the decline of parasitic insect populations, and in-turn increase reproductive success.

In 2014, we implemented the first year of a 3-year program of forced-renesting protocol to assess the methods ability to increase the reproduction of whooping cranes in the EMP. The project was funded with a U.S. Fish & Wildlife Service Cooperative Recovery Initiative grant. Our objectives were to (1) determine if egg salvage induced nest failure can increase the population's renesting propensity, (2) quantify and compare the reproductive success (i.e., hatch rate, fledging rate) of forced renests, natural renests and first nests of whooping cranes and (3) evaluate the financial costs and the biological benefits

to the population of the forced-renesting management action to inform future decisions about if and how the strategy should be implemented on an operational basis.

During April and May 2014, Whooping cranes initiated 20 first-nests and 3 second-nests on the Necedah NWR (Figure 1). Four of the 20 nests were subject to forced renesting, of these, half renested. Unfortunately, 7 additional whooping crane nests, which were available for implementing forced renesting, failed prior to the projected threshold date (Figure 1). Additionally, 2 first-nests, which subsequently failed, were initiated after the implementation of the forced renesting action and were unavailable for forced-renesting. On 1 May 2014 we collected seven eggs from four nests, and transferred them to the International Crane Foundation, and subsequently to the USGS Patuxent Wildlife Research Center in Maryland.

We monitored black fly abundance periodically throughout the summer using artificial nests. These data indicated that the degree day metric adequately predicted the first detection of black flies on the landscape (Figure 1). Unfortunately, the weather immediately following the emergence of black flies was unseasonably cold, rainy and windy. Inclement weather likely precludes blackflies from parasitizing whooping cranes, as we did not observe incubating whooping cranes demonstrating behaviors indicative of stress (i.e., rubbing or shaking their heads). This also explains why 5 of the control nests hatched successfully despite blackflies having emerged. Unfortunately, black fly abundance peaked substantially later than during previous years and coincided with multiple whooping crane's abandoning their nests, including the renesting attempts resulting from the forced renesting action.

To ensure adequate resources are available to implement forced-renesting during the 2015 and 2016 breeding seasons, we have collaborated with faculty and staff at the University of Wisconsin, Stevens Point (UWSP). Along with Necedah NWR staff, UWSP faculty and a graduate student will implement actions, collect data and analyze the outcome to guide future conservation efforts for this population of whooping cranes. Logistically, one modification will be made to ensure appropriate timing of the forced-renesting action in 2015 and 2016. In addition to monitoring degree days to predict when black flies will emerge, we will also monitor the 7-day short-term weather forecast to predict when conditions facilitating blackfly parasitism will occur. In addition, given the low chick survival rates in the EMP, we will salvage one egg from all nests with 2 viable eggs in the clutch. These salvaged eggs will be used to ensure that each nest on the landscape has at least one viable egg.

2014 Whooping Crane Nest Chronology & Fate, Necedah NWR

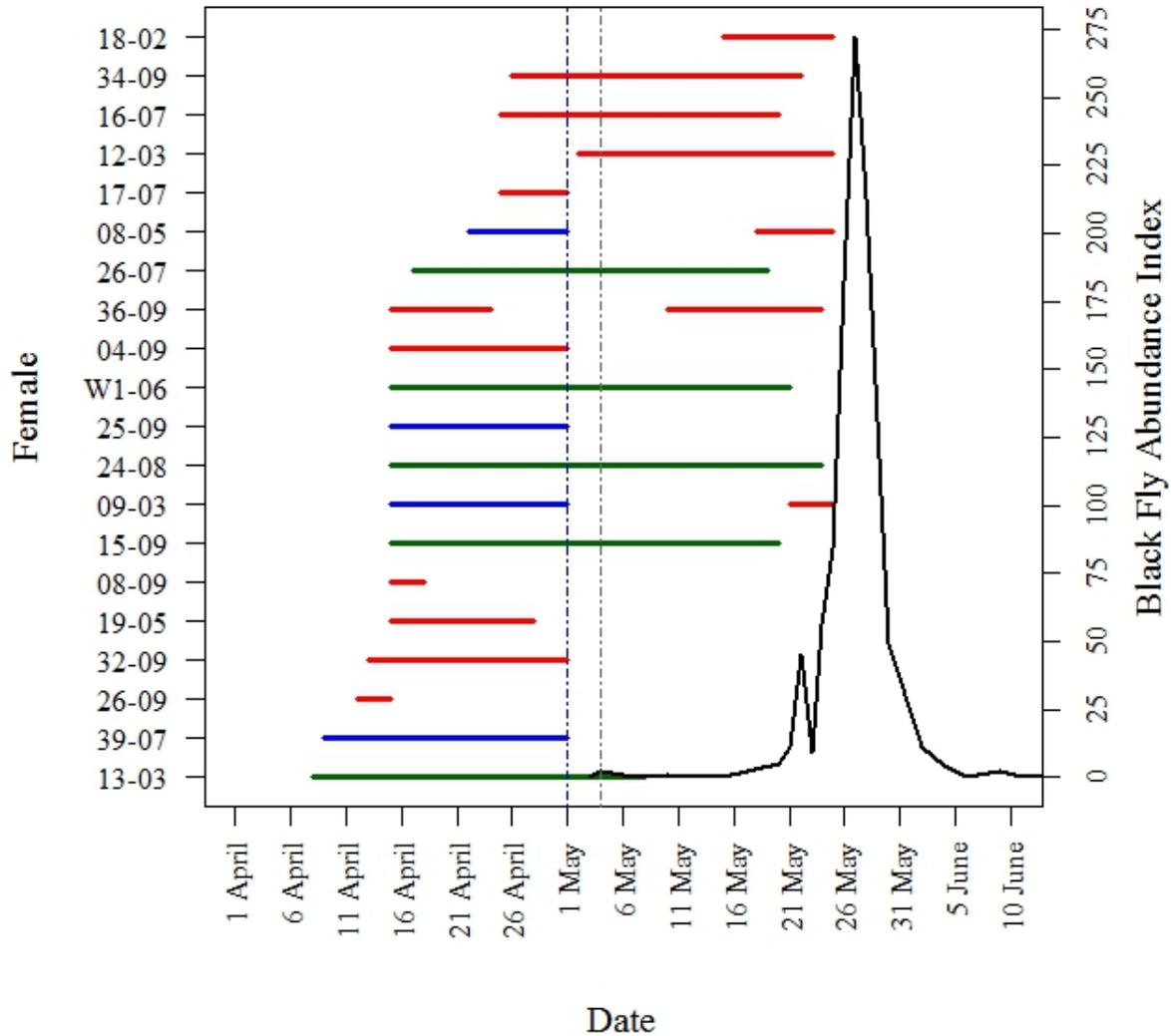


Figure 1. Whooping crane nest chronology and fates during the spring of 2014 on the Necedah NWR. Colored bars indicate the period of activity for each whooping crane nest. Green bars indicate successfully hatched nests, red bars indicate failed nesting attempts and blue bars indicate nest subjected to forced-renesting. The black line shows the black fly abundance index measure as the total number of *Simulium annulus* and *Simulium johannseni* captured using sweep net samples of artificial nests with sandhill crane brood mounts. The vertical dashed blue line indicates the implementation of the forced re-nesting action, intended to occur 5 days prior to black fly emergence. The vertical gray dashed line indicates the first date black flies (*Simulium annulus* or *Simulium johannseni*) were detected at artificial nests.

Comparing Breeding Ecology and Reproductive Success of Sandhill Cranes and Whooping Cranes

Reintroduction of extirpated species into previously occupied portions of their range is often conducted to conserve imperiled species (Seddon et al. 2007). Since 2001, the U.S. Fish and Wildlife Service, along with its partners, have been working to establish the eastern migratory population (EMP) of whooping cranes, *Grus americana*, in central Wisconsin. Eggs produced by captive whooping cranes have been artificially hatched, reared and released into the population for 13 consecutive years but has not yielded a self-sustaining population. The lack of success should not be surprising, as most animal reintroduction efforts are unsuccessful, and those that attempt to reintroduce captive individuals into the wild are substantially less successful than those using wild animals (Fischer and Lindenmayer 2000, Robert 2009).

Substantial ecological and behavioral differences exist between captive-reared and wild individuals (McPhee 2003, Frankham 2008, Williams and Hoffman 2009). In fact, behavioral differences have even been found in whooping crane colts exposed to different captive rearing techniques (Kreger et al. 2004). Obviously, captive individuals experience strikingly different conditions during their growth and development than do wild individuals. To understand how captive-reared and wild individuals differ ideally one would compare wild and captive individuals of the same species living in the same area. Unfortunately, no other data on a breeding population of whooping cranes exists to allow such comparisons for the EMP. However, sandhill cranes may serve as a relevant population for comparison since they are biologically and ecologically similar to whooping cranes and breed on and around the Necedah NWR.

Few data have been collected on the nesting ecology of sandhill cranes on NNWR. To understand the factors limiting the reproductive success of the EMP we collected reproductive ecology data on the population of sandhill cranes nesting at NNWR. Our objectives were to (1) compare the reproductive success of sandhill and whooping cranes and, if differences exist, evaluate factors that may be responsible for differences in reproductive success, and (2) explore the nest initiation data to compare whooping cranes and sandhill cranes nesting phenologies at NNWR. While data collected from sandhill cranes may provide the best available reference, it is important to recognize that the traits of sandhill cranes may be the result of different selective pressures than those experienced by whooping cranes. Still, identifying differences in the breeding ecology of sandhill cranes and whooping cranes, and understanding how these differences may influence their reproductive success, may help guide the reintroduction of whooping cranes in the eastern United States.

We located 23 whooping crane nests and 16 sandhill crane nests on Necedah NWR or the adjacent federally owned lands. Excluding nests that were part of the forced-renesting management strategy, the apparent nest success of whooping cranes was 47%, slightly less than the 56% apparent nest success of sandhill cranes. Monitoring data and nest contents indicated nest abandonment caused the most whooping crane nest failures (9). Sandhill crane nest failures did not appear to be caused by a single factor disproportionately. Frequent ground-based monitoring and aerial surveys allowed us to locate both sandhill crane and whooping crane nests. Whooping crane nest initiation dates were also often obtained through direct observations of radio-marked adults. Sandhill cranes were not radio-marked and therefore, nest initiation dates were estimated by floating eggs in warm water and referencing the float angle and shell exposed to Fisher and Swengel (1991). The first whooping crane nest was initiated on April 8, 2014, and the first sandhill crane nest was initiated on April 7, 2014. Nesting chronology of whooping cranes and sandhill cranes appeared similar in 2014 (Figure 2).

From March – June 2014, we recorded nesting behavior, with trail cameras placed at 9 whooping crane nests and 7 sandhill crane nests. We monitored nests until either eggs hatched or nests were abandoned. We identified behaviors (incubating, away from nest, manipulating nest platform, etc.) from 16,487 photos of sandhill crane nests and 25,544 photos of whooping crane nests. Preliminary analyses indicated that whooping cranes spent more time away from nests than sandhill cranes ($F=5.3$, $df = 1,1$, $p = 0.0395$) and that cranes that had successful nests spent less time away from the nest ($F=11.7$, $df = 1,1$, $p = 0.0051$). These results should be interpreted with caution because the definition of behaviors and failure dates is somewhat arbitrary and can greatly influence these results.

TABLE 1. Fates of crane nests monitored on the Necedah National Wildlife Refuge during the spring/summer of 2014.

	Sandhill Crane		Whooping Crane	
Failed, Abandon	1	6.3%	9	39.1%
Failed, Forced renest	0	0.0%	4	17.4%
Failed, Human Induced	1	6.3%	0	0.0%
Failed, Other	3	18.8%	3	13.0%
Failed, Predation	2	12.5%	2	8.7%
Hatched	9	56.3%	5	21.7%
TOTAL	16		23	

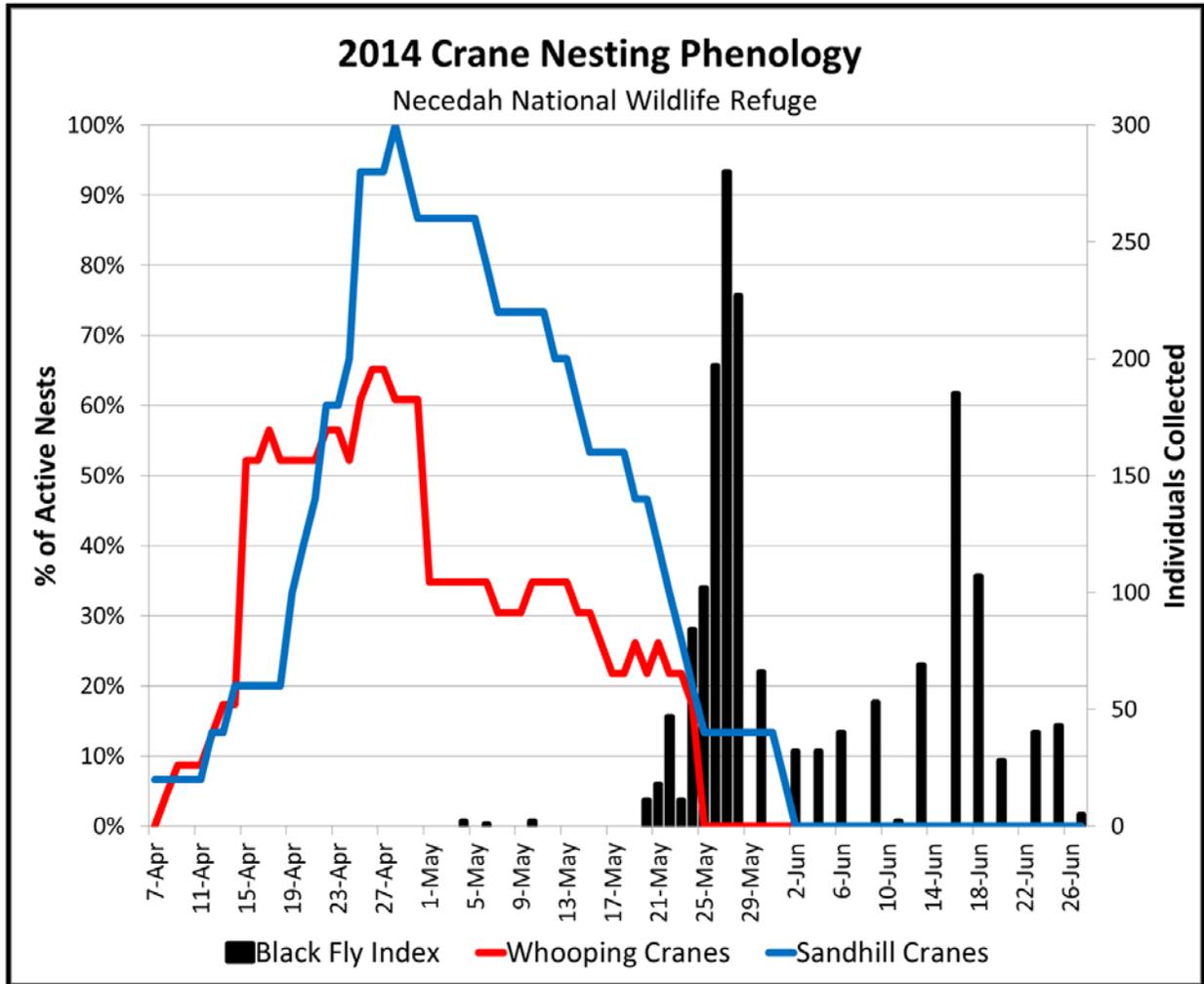


Figure 2. Chronology of nesting activity of whooping cranes and sandhill cranes on the Necedah National Wildlife Refuge and adjacent federally owned lands during the spring of 2014. Black fly abundance indices were developed from sweep net collections at 2 artificial crane nests with sandhill crane brood mounts.

PARENT-REARING EXPERIMENT

Prepared by Glenn H. Olsen, USGS Patuxent Wildlife Research Center

The recovery plan for the whooping crane requires the establishment of two new wild flocks of 25 or more breeding pairs, which would be in addition to the existing native flock that migrates between Aransas, Texas and Wood Buffalo National Park, Alberta. In 2001 a reintroduction of a migratory whooping crane flock between Wisconsin and Florida began, using birds imprinted on costumed people and ultralight aircraft to lead the birds on their first fall migration. This program has been successful in establishing migrating whooping cranes in the east. In 2005 a direct autumn release program was initiated where whooping crane colts are costume reared and released as a group in Wisconsin in the fall to find their own way south, usually with adult whooping cranes. A third method was developed in 2013, where the whooping crane chicks were reared in captivity not by costumed people, but by adult whooping cranes. The goal is to introduce a hypothesized more behaviorally appropriate individual. The chicks are moved from Patuxent each September to sites in Wisconsin, where they are released singly in

the territory of adult whooping crane pairs. The goal is for each chick to form a bond with these allo-parents and migrate south with them.

Both 2013 parent-reared (PR) whooping cranes survived the winter and remained with their allo-parents all winter. Both cranes returned to Necedah in the spring of 2014. Crane 24-13 was left behind by its allo-parents in central Kentucky when they migrated north. After several week alone in Kentucky, 24-13 migrated north on its own, following the path it had taken south, even stopping for a few nights at the same stopover. Once back at Necedah, 24-13 settled in some wetlands in southwestern Juneau County, Wisconsin, along with several other unpaired whooping cranes. In November, 24-13 migrated south to Knox County, Indiana, with 3-11, 7-12 and 38-09. Three other whooping cranes have also joined this group in Indiana.

Six eggs were assigned to the 2014 PR project and all eggs hatched successfully. One chick was lost at 10 days of age due to a bacterial infection, and another chick lost to predation by a large black rat snake. The snake killed the chick, but the chick was so large the snake was unable to ingest it. The snake was found in the pen and removed. All 4 remaining chicks were given 12 days of pond exposure before being shipped by private aircraft to Necedah National Wildlife Refuge on September 19, 2014. This length of time is about the same as the ultralight chicks received this year (12.3 days) before being sent to Wisconsin, and is the time established in the research study with the Florida non-migratory whooping crane releases in 1995. Three temporary pens had been created on Necedah NWR, and the former ultralight pen at site 4 built by Operation Migration were used to introduce the young cranes to their new environment. Cranes were held overnight together at site 4, and then on the morning of September 20, with help from the International Crane Foundation, all 4 cranes received satellite transmitter leg bands (commonly called PTTs), conventional VHF transmitter leg bands and small metal numbered Bird Banding Laboratory leg bands. After this each crane was assigned to a temporary pen and monitored several times daily. After establishing that adult pairs were visiting all the pen sites, the 4 cranes were released on September 22 and 23. For the next two weeks the cranes were monitored closely and continued to be with adults, in some cases the intended allo-parents we had selected, in other cases, moving to other pairs of adults.

One young bird, 21-14, flew northeast off the refuge in early October. The signal was lost for a while and then the bird was found dead in a water-filled ditch in this general location. The body was taken to the USGS National Wildlife Health Center (a WCEP partner organization) for necropsy. The diagnosis was blunt force trauma, possibly hit by a motor vehicle, though the body was found about a half mile from the nearest roadway. The other 3 released PR birds have done well to date, migrating south with allo-parents.

The PR project is a large endeavor, starting with eggs contributed by several institutions, then with chicks reared at USGS Patuxent Wildlife Research Center with the help of lead biological technicians Rachel Roberts and Robert Doyle, but with help from all the crane crew and Carlyn Caldwell, veterinary technician. Extensive behavioral observations were made of all chicks this year, including number of times per hour that the adult parents fed the chicks. These observations were conducted by Cameron Stanek, Anne Harshbarger and Rachel Roberts. Windway Corporation flew the chicks from Maryland to Wisconsin. In Wisconsin, help constructing temporary pens and monitoring birds was freely given by Doug Stahler, refuge manager, Brad Strobel, refuge biologist, his intern Scott Collins, and the staff of the Necedah National Wildlife Refuge. From the International Crane Foundation, Marianne Wellington and her interns Rachel Koebert, Tiffanay Hudson, and Aubrey Klink came out to help with temporary pen construction, banding and observations of cranes after release. Eva Szyzkowski from ICF helped with

banding and tracking cranes on migration. The migration history and wintering locations of the PR cranes and their allo-parents are from her monthly update 6 November-4 December 2014.

TELEMETRY EFFECT ON COPULATION AND INCUBATION CONSTANCY

Prepared by Glenn H. Olsen, USGS Patuxent Wildlife Research Center

The Whooping Crane Eastern Partnership (WCEP) has been introducing whooping cranes (*Grus americana*) into eastern North America since 2001. WCEP has used two novel techniques to accomplish this. The first is to costume-rear whooping cranes and train them to follow people in costumes flying ultralight aircraft. The second technique also involves people in costumes rearing whooping cranes, but in this case, called direct autumn release, the whooping crane colts are released near adult whooping cranes sometime in the fall of the year. The goal in both cases is to create a new migratory flock of whooping cranes referred to as the Eastern Migratory Population (EMP).

To date the techniques have been successful in introducing somewhere above 200 whooping cranes into the wild and having them migrate from reintroduction sites in central Wisconsin to wintering sites in Florida and other southern states. However, the whooping cranes, once they reach sexual maturity, do not consistently do well reproducing. An intact antenna that later becomes broken or shortened is associated with a change from laying infertile to fertile eggs in 40% of cases where we have documented evidence of such antenna breakage (n=5 cases), so in 60% of cases, there was no associated change in fertility with a broken or shortened antenna on the leg band transmitter. In most cases, the broken antenna is shortened but not completely removed at the radio. Mean antenna length is reduced to 57.2mm, range 53-61mm, n=5. Specific results from individual wild whooping cranes are as follows: male 04-08 56mm, male 16-02 58mm, male 12-02 58mm, male 02-04 53mm, and female 26-07 61mm (WCEP conference call 14 Dec. 2012).

In addition transmitters, either with an intact antenna or a shortened antenna, may cause discomfort during incubation, which may lead to the increased incident of nest abandonment seen in this population, as compared to the Wood Buffalo/Aransas population. This may only be one part of the nest abandonment issue, but needs to be fully investigated. Leg band transmitters have been used on the Wood Buffalo/Aransas flock in the past, with as many as 20% of the population marked in this manner.

During 2013 8 pairs of sandhill cranes in the captive colony at USGS Patuxent Wildlife Research Center were tested. In each year 4 pairs received leg band mounted dummy transmitters complete with antennas and 4 pairs were controls with no transmitters but with leg bands. During the winter of 2013-2014 the leg band transmitters were changed, with the former transmitter cranes becoming controls and the controls receiving refurbished dummy transmitters. The results from 2014 are reported here. Eventually we will also examine differences between the two years.

In April, 2014, the male in one pair (S9-10) was discovered to have a fractured humerus. This required surgery to repair, plus a sling for much of the breeding season. This pair produced no fertile eggs this season and may have to be removed from the study.

The summary for this project is in the tables below.

Treatment	Pen	Fertile Eggs	Infertile Eggs	Unknown	% Fertile
Control	R23/24	4	0	0	100
Control	R29/30	2	1	1	50
Control	Y41/42	4	2	0	67
Control	S1/2	4	0	0	100
Total		14	3	1	78

Treatment	Pen	Fertile Eggs	Infertile Eggs	Unknown	% Fertile
Transmitter	R9/10	1	5	0	17
Transmitter	R31/32	0	4	0	0
Transmitter	S17/18	3	1	0	75
Transmitter	S9/10	0	1	1 egg broken	0
Total		5	11	0	31

In 2013 there appeared to be no effect of the transmitters on fertility, with the fertility rate for the transmitter equipped birds being higher than the controls. The opposite was true this year, with the transmitter equipped birds having a lower fertility rate, 31% versus 78% for the controls. We still need to do the analysis by pairs.

In addition to looking at transmitter effects on fertility, we looked at the effects on incubation by placing a data logger egg in 7 of the nests this year to replace one egg. The cranes were then allowed to incubate to term. The analysis of this data is just starting, but no cranes abandoned their nests during incubation.

Now we are watching for winter effects of transmitters on the birds, such as ice build-up or problems tucking legs up into the feathers. We will continue making observations this winter on the birds with transmitters.

Acknowledgements: I thank Barbara Clauss and Brian Clauss, lead biological technicians and the entire crane crew for their help in this study.

TRANSMITTER ATTACHMENT TESTING

Prepared by Anne Lacy, International Crane Foundation

In cooperation with Operation Migration, we had the opportunity to test backpack transmitters on free flying, yet essentially captive, Ultralight Whooping Cranes. It was hoped that observations of the birds while flying would give insight into possible effects of these transmitters on flight capacity. Birds with harnesses were observed for any undue effects of the backpack.

Birds were outfitted the morning of September 16th, 2014; the first attempt at following ultralights was on September 17th; harnesses were removed the morning of September 26th, for a total of 10 days with harnesses and 5 training days.

Results:

- 1) Quick Attachment: Three birds chosen by Operation Migration as best candidates for transmitter placement (#'s 2, 7, 9) were in hand between 15-20 minutes. As all handlers were engaged with handling or transmitters/bands, actual time was not kept (placement of backpacks in 2013 time averaged 5.9 min/bird, 3 birds). Handling time decreased slightly with each subsequent bird as process was repeated. Placement and fitting of backpack is somewhat of a difficult procedure, given the pressure to process quickly and still get fitting done in a precise manner; therefore it is recommended that both persons be experienced in both fitting of Teflon harnesses and crane handling for efficient processing.
- 2) Placement on UL birds prior to migration: the first day after placement, the crew simply taxied UL up and down runway to get birds running and flapping their wings. Two of three harnessed birds did so. The third was reticent to leave the pen area. On three consecutive mornings (22-24 Sept) flight conditions allowed the UL to fly and each of the three harnessed birds flew for one minute or less while the other three birds followed the UL for up to 20 minutes. After 5 training attempts with no marked improvement in the ability of the birds to follow the UL, the decision was made to remove the harnesses. After a rest period, the UL again lifted off and this time 6-7 birds followed for up to five minutes (the 7th flew three circuits around the pen site).

After placement, there were no observations of aggression or other abrupt changes in behavior beyond reluctance to fly. There was no apparent sign of injury or irritation from the harness, although a thorough health exam was not performed.

Additional observations of the backpack on the birds while in flight provided supplementary information on the potential effects of the harness and transmitter. While in flight, it appeared as though the feathers surrounding the transmitter on the back of all three birds were ruffling in the wind, indicating disruption in airflow over the back (see image below). It could be that the transmitter created a drag such that the airflow was disrupted to the extent that the birds found it difficult to follow the UL plane.

Conclusion: Transmitters placed on the back of cranes appear to either inhibit flight in some way or make the bird reticent to follow as a result of the placement. Although we have documented adult sandhill cranes migrating to winter areas and back after backpack transmitter placement, it is unknown how it may have affected their behavior and energy expenditures. Further study is warranted to determine how all transmitters, leg and back mounted, effect the overall fitness of cranes.



7-14 flying in lead with backpack transmitter on 23 September 2014. Note “ruffling” of feathers on back.

Literature Cited

- Armstrong DP and PJ Seddon. 2008. Directions in reintroduction biology. *Trends in Ecology and Evolution* 23: 20-25.
- Converse SJ, JA Royle, PH Adler, RP Urbanek, and JA Barzen. 2013. A hierarchical nest survival model integrating incomplete temporally varying covariates. *Ecology and Evolution* 3:4439-4447.
- Drewien RC. 1973. Ecology of Rocky Mountain greater sandhill cranes. Ph.D. Thesis. University of Idaho, Moscow, Idaho, USA.
- Fischer J and DB Lindenmayer. 2000. An assessment of the published results of animal relocations. *Biological Conservation* 96:1-11.
- Frankham R. 2008. Genetic adaption to captivity in species conservation programs. *Molecular Ecology* 17:325-333.
- Fisher IJ and SR Swengel. 1991. A guide for aging sandhill crane eggs. *Wildlife Society Bulletin* 19:494-497.
- Kreger MD, I Estevez, JS Hatfield, and GF Gee. 2004. Effects of rearing treatment on the behavior of

- captive whooping cranes (*Grus americana*). *Applied Animal Behaviour Science* 89:243-261.
- McPhee ME. 2003. Effects of captivity on response to a novel environment in the oldfield mouse (*Peromyscus polionotus subgriseus*). *International Journal of Comparative Psychology* 16:85-94.
- Nesbitt SA. 1988. Nesting, renesting, and manipulating nesting of Florida sandhill cranes. *Journal of Wildlife Management* 52:758-763.
- Robert A. 2009. Captive breeding genetics and reintroduction success. *Biological Conservation* 142:2915-2922.
- Runge MC, SJ Converse and JE Lyons. 2011. Which uncertainty? Using expert elicitation and expected value of information to design an adaptive program. *Biological Conservation* 144:1214-1223.
- Seddon PJ, DP Armstrong, and RF Maloney. 2007. Developing the science of reintroduction biology. *Conservation Biology* 21:303-312.
- Urbanek RP, SE Zimorski, AM Fasoli, and EK Szyszkoski. 2010. Nest desertion in a reintroduced population of migratory whooping cranes. *Proceedings of the North American Crane Workshop* 11:133-141.
- Williams SE and EA Hoffman. 2009. Minimizing genetic adaptation in captive breeding programs: a review. *Biological Conservation* 142:2388-2400.

COMMUNICATIONS AND OUTREACH TEAM

The 14th year of whooping crane reintroductions by WCEP saw a continued effort by the Communications and Outreach Team (COT) to lead external communications for WCEP including outreach, education, and media relations. The COT is responsible for and directs all aspects of external communications and public contact on behalf of WCEP. COT members include communications and education specialists and other key partner staff representing WCEP founding members. The functions of COT remains essential to building support for the project through education of the general public in a variety of methods, and coordinated public outreach efforts including interactions with various media.

WCEP Media Releases/Press Statements

The COT issued press releases and statements for significant milestones or events in the project this year, including:

- Kentucky Shootings Reward Offered
- Spring migration update
- Arrival of ultralight cranes at White River Marsh
- Departure of the ultralight-led fall migration
- State-by-state updates of ultralight-led migration
- Arrival of ultralight-guided migration at St. Marks NWR

Impact: assessing Media Coverage

Google News Alerts which included “Whooping Crane Eastern Partnership” were issued on the following dates in 2014:

Date	Topic
8 January	Kentucky shootings and reward offered
15 January	Kentucky shootings and reward offered
14 May	First wild-hatched WHCR chick of 2014
15 May	First wild-hatched WHCR chick of 2014
10 June	General WCEP Story
1 July	Lee Bergquist – WCEP article Milwaukee Journal Sentinel
22 July	Barzen response to Bergquist article
5 October	Illegal Shooting/Albino Sandhill angle. WI shooting which occurred 7/13
1 December	Ultralight Migration
10 December	Ultralight Migration
12 December	Ultralight Migration
13 December	Ultralight Migration
18 December	Ultralight Migration
27 December	Ultralight Migration

Increasing Outreach Opportunities

WCEP focused on expanding outreach to partners and audiences beyond the states in the flyway of the EMP, via:

- Project updates and news releases on Facebook and Twitter
- Expanding the WCEP media contact list to include many other states along the flyway
- Presentation at various crane festivals both in and outside the EMP range

Education and Outreach Programs and Events

The COT continued to focus on education in 2014. The EMP reintroduction effort provides a wonderful opportunity to inform students and adults along the flyway, and to motivate their interest in the conservation of cranes and wetlands. The migration of EMP whooping cranes highlights the dependence of cranes and other wildlife on wetlands along the migration route, so the decisions and conservation outlook of future generations are critical to the survival of these cranes.

Presentations were delivered throughout the year at partner organizations, schools, conservation and birding clubs, professional conferences and birding festivals. Outreach representatives distributed education materials, including brochures and curricula, which help interpret crane migration, behavior and ecology. In addition to presentations, the team also participated on other outreach activities such as radio and TV interviews and live, interactive web-chats.

Education accomplishments in 2014 included our continued partnership with Journey North to extend outreach efforts into schools throughout North America. Journey North is an internet-based education project that links students across North America to track wildlife migration and seasonal change, including WCEP cranes' status, individual biographies for each bird and general locations during the fall and spring migrations. Journey North reaches nearly 1 million students at 54,000 sites worldwide, and their website receives over 250,000 visitors per month. Operation Migration funds the Journey North whooping crane participation each year.

WCEP partners participated in a number of regional and national outreach festivals in 2014, reaching approx. 12,000 people. Events attended included the Port Aransas Whooping Crane Festival, Texas; Whooping Crane Festival, Princeton, Wisconsin; Bald Eagle Days, Wisconsin; Wisconsin Wetlands Association Annual Conference; International Migratory Bird Day, Florida; Rivers and Wildlife Festival, Nebraska; and the St. Marks NWR Wildlife Heritage and Outdoors Festival, Florida.

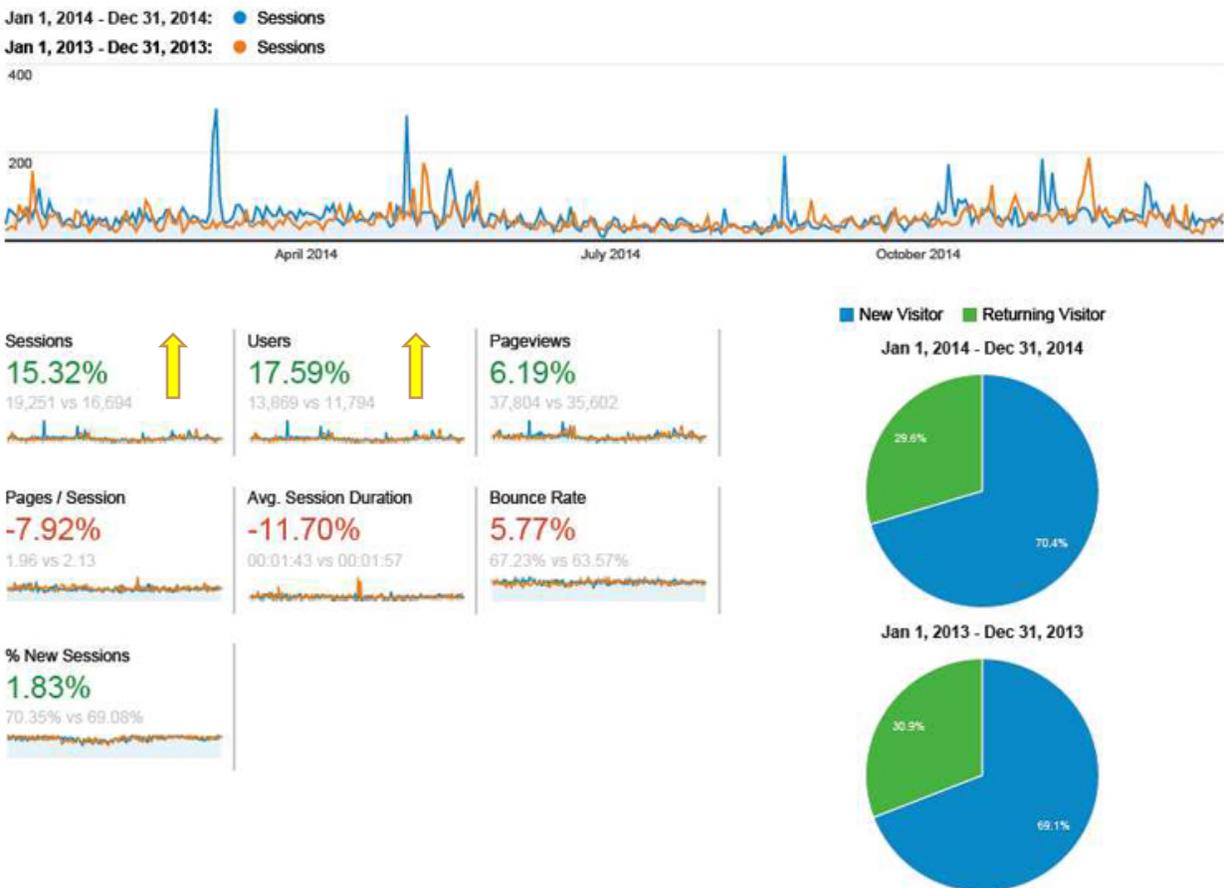
Other education and outreach activities included interpretive tours and education programs at partner facilities, the live Operation Migration CraneCam, and ultralight-guided migration flyover events, held during the summer at the White River Marsh SWA and along the migration route. The COT also continues to maintain the whooping crane trunk, an education manual for use in schools and by other groups: (dnr.wi.gov/files/PDF/pubs/ER/ER0661.pdf).

WCEP Website

The WCEP website (www.bringbackthecranes.org) and related partner websites continue to be effective and efficient means of communicating up-to-date information to large numbers of supporters, media, students, and the general public.

www.bringbackthecranes.org – had 13,869 unique visitors in 2014. This number is up 18% from 2013 when the site had 11,794 visitors.

Also up (by 15%) was the number of sessions for the site during the year. A ‘session’ is defined as the period of time a user is actively engaged with the site. This means that the 13,869 unique visitors we logged in 2014, made multiple visits totaling 19,251.



Alternatively, pageviews and the session duration was down in 2014 over 2013, which could mean that there is room for improvement in that we should strive to increase the amount of new content, or that we’re effective at sharing the content we are posting and visitors do not need to click from page-to-page to locate the information they’re seeking.

When combined with partner websites: <http://www.operationmigration.org> (135,004) and www.savingcranes.org (WCEP-related pages: 40,249) unique visitor traffic, a total of 189,122 people were reached. This represents an increase of 8% over 2013.

Where are they coming from?

Of the 19,251 sessions/visits, search engines generated 8,415 visits, while referring websites and social media sites generated the majority of the balance.

The top two traffic generating sites in each category are listed below.

<u>Search Engine</u>	Sessions
Google	7473
Bing	473
<u>Referring Websites</u>	
operationmigration.org	1286
fws.gov	481
<u>Social Media</u>	
Facebook.com	1309
Twitter.com	28

WCEP Social Media Sites

Social media sites provide WCEP with an additional tool to better reach new and existing audiences about the project and its partners.



Through increased usage and exposure, the number of “Likes” on the WCEP Facebook page grew from **669** on 1 January 2014 to **1203** on 31 December 2014, representing an **80%** growth rate over the 12 months. Comparatively, in 2013 the page grew in size by 69%.

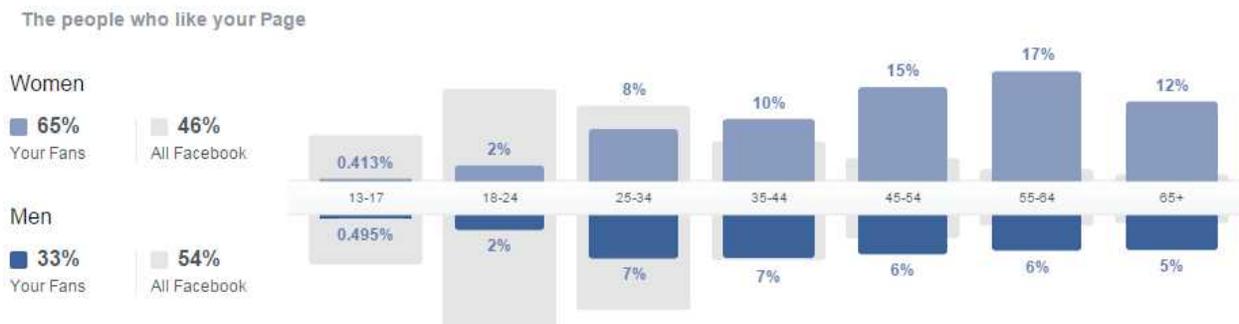
During 2014 a total of 105 stories were shared/published on the WCEP Facebook Page ([facebook.com/WhoopingCraneEasternPartnership](https://www.facebook.com/WhoopingCraneEasternPartnership)).

It is important to note the type of post that gets the most attention so that we can continue to provide this type of content and continue to build the WCEP Facebook audience.

On that note, the following table lists the five most popular posts in 2014, along with their respective **Lifetime Post Total Reach**. Facebook defines this as **The total number of people your Page post was served to. (Unique Users)**

Post Message	Type	Posted	Lifetime Post Total Reach
And they're off! http://operationmigration.org/InTheField/2014/10/10/today-is-the-day/	Link	10/10/14 8:12 AM	56256
Help spread! A good identification of waterbirds in flight and standing. Please don't shoot Whooping cranes.	Photo	2/12/14 11:09 AM	4788
Family photo featuring parents 12-02/19-04 and their wild hatched youngster W3-14.	Photo	7/20/14 1:49 AM	3626
PTT hits received over the weekend confirm that at least two sub-adult Whooping cranes (#'s 2-13 & 8-13) have arrived back at the St. Marks Refuge winter pen site.	Status	11/24/14 4:48 AM	2047
Want to help ensure maximum penalties are applied to person(s) illegally shooting Whooping cranes? The International Crane Foundation (ICF) and members of the Whooping Crane Eastern Partnership are deeply concerned about the recent reports of Whooping Cranes being shot in Kentucky and Louisiana, adding to the frightening series of shootings of these highly endangered birds.	Status	2/14/14 5:59 AM	1826

Demographic breakdown of WCEP Facebook page 'Likes':



While the majority of WCEP’s Facebook fans reside in the U.S. we also have followers from 44 other countries.



WCEP also uses the very popular Twitter (twitter.com/bringbackcranes). In an effort to continue to expand outreach, WCEP is actively following numerous Twitter feeds that are similar in scope and nature to WCEP’s. The Communications and Outreach Team primarily utilized Twitter to disseminate news releases, post project images and to send out important updates and breaking news items.



In addition to Facebook and Twitter, the Communications and Outreach team has a dedicated WCEP Flickr site ([flickr.com/photos/wcep1](https://www.flickr.com/photos/wcep1/)), which provides a central location to post and disseminate photos pertaining to the reintroduction project. Currently the Flickr

site hosts 164 photos. The Monitoring and Management Team often receives many high-quality photos from the public that are available for WCEP and others to use as well as the countless photos taken by partners during various activities. The Flickr site allows the Communications and Outreach Team to direct the media and the public to the site, which provides the photos for download and contains crediting information as needed.

Illegal Shooting and Hunter Education Initiative

The Communications and Outreach team coordinated a conference call on 7 May with a Steve Stoinski, FWS Law Enforcement Officer to discuss and learn about the process taken during an active investigation when a Whooping crane is found shot.

ICF developed two hunter education panels as part of this new initiative. The panels were installed on kiosks at the Patoka River National Wildlife Refuge in Indiana. The signs are available to other state and federal wildlife refuges along the eastern flyway and complement existing WCEP hunter education materials.

The Communications and Outreach Team has and will continue to work with our various partners to develop and promote a fairly new initiative launched at ICF, titled Keeping Whooping Cranes Safe.



Hunter education panels at Patoka River NWR. Photo: Eva Szyszkoski

WCEP Wiki – aka Google Drive

To provide an effective information sharing structure for the partnership, the Communications and Outreach Team continues to develop and manage WCEP’s Google Drive. This central site serves as a repository for WCEP information, which is accessible to all WCEP members.

Documents can be worked on collaboratively between partners and a central calendar includes the various team conference calls each week/month and can be used to send out automatic meeting reminders.

Appendix
2001 - 2014 Operation Migration Field Team Report

EVENT	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	Mean
Early imprinting and conditioning at USGS Patuxent															
First /last hatch dates	May 12 / May 21	May14/May19	Apr 30/ May 9	Apr 28/May14	May1/May26	May3/Jun5	May6/Jun15	Apr 29/Jun10	May5/May31	Apr20/Jun3	Apr20/Jun5	Apr21/May23	Apr12 /May21	May 7 /May24	Apr 29 / May 26
Age Range (days)	9	5	9	16	25	33	40	42	26	44	46	32	39	17	28.7 days
Age of first exposure to aircraft	N/A see PWRC report	NA	NA	9.5	NA	NA	NA	NA	8.1	7	8	8	9	7	8.08 days
Gender	1M/6F	5M 3F	2M-4F	5M-5F	6M-7F	11M-9F	12M-8F	10M-8F	9M-9F	12M-9F	11M-5F	11M-6F	7M-10F	6M-4F	M- 108/F-93
# of training hrs at PWRC	NA See PWRC report	NA	NA	8.9	NA	NA	NA	NA	3.55	5.06	7.45	11.2	11.56	7.18	8.84 hrs
Pond exposure at PWRC (hhh:mm)	NA See PWRC report	NA	NA	43.4	NA	NA	NA	NA	32:24:00	39:48:00	59:26:00	21:42	180:40	19:06	56hr 38 min
Summer Training, Socialization and Fledging in Wisconsin															
# of chicks transported to WI	7	8	6	10	13	23	20	18	18	21	16	17	17	10	15.1/ total 197
Mean age at shipping (days)	53	48	49	53.3	56.75 / 51.6	51 /44.5 /36.7	44.8/ 43.6/47.8	44.7/44.6/45	48/47/52	49/49/42	53/46/41	51/43	54/45	56	46.35
Shipping date (m-d)	July 7	7-9	6-22	6-29	6-30/ 7-9/ 7/28	6-25/7-02/ 7-10	6-25/ 7-9/ 7-29	6-16/ 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	June 27
Cohort #1	2, 3, 4, 7, 8, 9, 10	1,2,3,4,5,7,8,9	4,5,6,7,10,11	1,2,3,4,5,6,7,9,10,12	1,2,3,4,5,6,8,9 (*12)	1,3,4,5,6,7,8,10,11	3,4,5,7,9,10,11	3,6,7,9,10,12,13,14	1,2,4,5,6,7,8,10	Site 4=1,2,3,5,6,7	Site4=1,2,3,5,6,7,8	Site 4= 1, 2,3,4,5,6	Site 2=1,2,3,4,5,7,8	Site 1= 1,2,3,5,6	7 birds
Cohort #2	NA	NA	NA	NA	10,11,15,16,17	12,13,14,15,18,19	12,13,14,15,16,18,19	16,17,18,21,22,24	11,12,13,14,15	Site 2= 8,9,10,11,12,14,15,16	Site 2= 12,14,15,16,17,18	Site 1= 7,9,10,11	Site 1 = 9,10,11,12	Site 2= 4,7,9,10,11	5.6 birds
Cohort #3	NA	NA	NA	NA	NA	22,24,25,26,27,28,29,31	24,26,27,28,30	26,27,33,35	Site 1=18,19,20,22,23	Site 1=19,20,21,22,23,24,26	Site 1= 19,20,22	Site 2= 12,13,14,16,17,18,19	Site 4= 12,14,15,16,17,18	NA	5.6 birds
Days at intro site	93	85	99	102	102/93	112/106/97	114/100/80	115/ 101/86	102/91/77	121/100/93	117/103/88	118/106	112/107	98	100.62 days
Days trained at intro site	44	52	61	64	61/41	63/58/51	61/55/40	67/50/40	59/52/41	56	57	69	52	41	53.7
Nights water roosting was available	90	83	97	102	NA	101/97/89	106/84/74	109/96/82	84/75/72	93(m)	76(m)	99 (m)	82 (m)	9(m)	85.5 nights
Fledging date (m/d)	Aug 8	8/9	8/5	8/18	8/8 , 8/26	7/20, 8/17, 9/1	8/2, 8/15, 8/31	7/28, 8/6,8/31	7/28, 8/10, 8/20	7/15, 8/1, 8/14	7/17, 8/20, 9/16	7/19, 7/22, 7/30	8/18, 8/24, 9/30	8/29, 9/6	August 14 / 94 days
Pre-migration Vet checks	NA	NA	NA	NA	NA	9/9,10	9/2, 3	9/5	9/6, 7	8/30, 31	9/5, 6	8/27	8/26, 27, 29	9/11	NA
Cohorts united	NA	NA	NA	NA	9/17	9/8, 10/7	9/18, 10/5	9/13, 9/28	9/5, 9/21	9/15, 9/23	9/6, 9/21	8/14, 8/29	8/25, 9/16	9/5	Sept 14
Longest pre-migration flight	23 mins	28 mins	42 mins	18 mins	34 mins	44 mins	41 mins	28 mins	26 mins	32 mins	47 mins	33 mins	24 mins	27 mins	32.6 mins
Migration															
Migration departure date (md)	Oct-10	Oct 2	Sept 28	Oct 9	Oct 10	Oct 16	Oct 17	Oct 13	Oct 5	Oct 14	Oct 10	Oct 16	Oct13	Oct 17	Oct 11
Number of cranes to start the migration	7	8	6	10	12	20	14	17	18	20	14	16	17	8	13.8 birds
Total flight time (h:m)	15 hours 40 mins	25rs 4 mins	25 hrs 1min	28 hrs 2mins	38 hrs 42 mins	36 hrs 45 mins (*9)	34 hrs 13 mins (*6)	37 hrs 37 mins	33 hrs 40 mins	31 hrs 46 mins	33 hrs 7 mins	31 hrs 53 mins	38 hrs 36 mins	35 hrs 46 mins	33 hrs 26 mins
Total distance (miles)	Total 1105 miles (38 miles before transported to TN / 531 miles thereafter)	1112	1098 SM	703 SM (*13)	1099 SM / 1285 SM	1094.5 SM/ 1238.6 SM(*8)	1093.3 SM / 1255.26 SM (*7)	1211.6 SM	1239.1 SM	1209.1 SM	1204.4 SM	1191 SM	1204 SM	1227.28 SM	1166.7 SM
Total Flight days	12	18	17	17	19/ 21 (*5)	22/24 (*10)	19/21 (*5)	25	22/ 24 (*2)	21 / 25 (*1)	21	20	22	26	20 to St Marks
Total days to complete the migration	63*(14)	96	57	89 to Wheler	66 St Marks/ 73 Chass	82 / 89 (*11)	82 / 88 (*4)	98	76 / 78 (*2)	61 / 64 (*1)	64	54	49	48	72.14days
Longest flight distance (miles)	117 SM	124 SM	177	67	116	116	117.1	138	101	115	157	200	107.2	94.7	NA
Longest flight duration (hrs mine)	2hrs 20 mins	2 hrs 56 mins	3 hrs 6 mins	2 hrs 43 mins	2 hrs 56 mins	3 hrs 10 mins	2 hrs 52 mins	2 hrs 20 mins	2 hrs 45 mins	2hr 24 mins	3 hrs	3 hrs 3 mins	2 hrs 15 mins	2 hrs 9 mins	2 hrs 44 mins
Arrival date	Dec 11, 2014 St Marks NWR	Jan 5 St Marks	Nov 23 St Marks	Feb 4 Wheeler	Dec 15 St Marks Jan 15 Chass	Jan 13 Halpata Jan 20 Chass	Jan 17 St Marks Jan 23 Chass (*3)	Jan-28	Dec 19 / Jan 12 (*2)	Dec 13 / Jan 11 (*1)	Dec-12	Dec-08	Nov-30	Dec-03	NA
Division between St Marks & Chass	NA	NA	NA	NA	St Marks 1,5,6,8,10 / Chass 3,9,15,16,17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of cranes to complete the migration	7	8	5	9	5 St Mark / 5 Chass / 10 Total	20	14	17	18	19	13	16	16	6 (1 crated) 7 Total	12.78/ 179 total
Survival from shipping to WI to arrival at wintering site (%)	100%	100%	83%	90%	76%	86%	70%	94%	100%	90%	81%	94%	94%	70%	87.70%

(*1) = Arrived 19 Dec 2006 at Halpata, Moved the bird 26.1 miles to Chass NWR on Jan 11 and 12 2007
(*2) = Arrived 19 Dec 2006 at Halpata. Moved birds 26.1 miles to Chass NWR on Jan 11 and 12, 2007
(*3) = Arrived 17 Jan 2009 at St Marks NWR. Arrived 23 Jan 2009 at Chass NWR
(*4) = 82 days to St Marks / 88 days to Chass excluding 10 day Christmas break
(*5) = 2010 19 flights to St Marks / 21 flights to Chass
(*6) = 30 hrs 34.5 mins to St Marks / 30 hrs 13.8 mins to Chass
(*7) = 1093.3 miles to St Marks / 1229.26 miles to Chass

(*8) = 1094.5 miles to St Marks / 1238.6 miles to Chass
(*9) = 31 hrs 47 mins to St Marks / 36 hrs 45 mins to Chass
(*10) = 22 flights to St Marks / 24 flights to Chass
(*11) = 82 days to St Marks / 89 days to Chass
(*12) = 2010 number 04-10 and 11-10 were shipped to WI late due to health concerns that cleared up
(*13) = 2011 Ended the migration due to poor weather in Alabama. Birds wintered at Wheeler NWR

(*14) = In 2014 the birds only flew for 38 miles in 36 days. Due to weather they were relocated to Carroll Co TN on Nov 14. Thereafter they flew 531 miles to St Marks FL