

Report on Whooping Crane Recovery Activities (2014 breeding season-2015 spring migration)

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Executive Summary

Whooping cranes are one of the most rare, highly endangered and intensively monitored bird species in North America. The Aransas-Wood Buffalo population (AWBP), which breeds in northern Canada and winters in Texas, is the only remaining wild, self-sustaining migratory population of whooping cranes. In summer 2014, surveys of the AWB detected 82 nests (May) and 32 chicks (August) resulting in an average number of chicks fledged per nest (0.39) that was lower than the long term average of 0.48 but within the long term natural range of variation. In winter 2014 (Dec) the peak population size of the AWB on the primary wintering grounds was estimated as 308 birds (95% confidence interval [CI] 267–350) and additional birds were located outside the survey area. Whooping cranes faced challenging conditions due to forest fires during the 2014 breeding season and continued drought during the wintering season. Several projects were undertaken by a variety of agencies to monitor and investigate the ecology of the AWBP population, including the continuation of an initiative to mark individual birds with satellite transmitters to track their movements during the annual cycle. By the end of 2014, 68 whooping cranes had been marked on the breeding and wintering grounds and 24 marked birds were continuing to provide data. In addition to the AWB, other populations of whooping cranes exist in Wisconsin, Florida, and Louisiana due to the efforts of many government agencies and non-governmental organizations, including the captive breeding centers where whooping cranes are reared for reintroduction. By the end of 2014 there were approximately 143 birds in reintroduced populations and 161 birds held in captivity. Finally, in 2014-15, USFWS, CWS, our partners on the International Recovery Team and other organizations initiated a process to conduct a recovery planning process including an updated Population Viability Analysis (PVA) and, for the first time, a Population and Habitat Viability Assessment (PHVA). The PVA/PHVA process, led by the Conservation Breeding Specialist Group (CBSG), provides our agencies and partners with an opportunity to develop a unified vision for whooping crane management, in order to hasten recovery of the species in cost-effective and biologically appropriate ways. More information on the PVA/PHVA process can be found in the Appendix.

Aransas-Wood Buffalo population

Overview

The Aransas-Wood Buffalo population (AWBP) of whooping cranes is the only remaining wild, self-sustaining, migratory whooping crane (*Grus americana*) population. The AWBP breed and summer in and around Wood Buffalo National Park (WBNP) in the Canadian jurisdictions of Alberta and the Northwest Territories and migrate >2,400 miles through the Canadian prairies and US Great Plains to the mid-coast of Texas to spend the winter. Whooping cranes from the AWBP was reduced to a mere 15 individuals in 1941 and has rebounded to over 300 this winter, representing a > 4% annual growth rate. The ongoing recovery of this whooping crane population is perhaps one of the greatest endangered species success stories. A wide variety of local, state, federal and private conservation organizations are actively involved in planning and implementing whooping crane conservation efforts.

2014 breeding season

For the full update, see the attached report prepared by Canadian Wildlife Service

Annual precipitation preceding the 2014 breeding season was 14 percent above the 60-year average and temperatures were at or above the long-term average throughout the breeding season. Thirty six forest fires occurred in WBNP in 2014. Area affected by fires were 261,851 ha or 5.74% of the park, greatly exceeding the 25-year average of 1%. Eleven fires affected the whooping crane nesting area (as designated in the Recovery Strategy for the Whooping Crane in Canada), burning 25,098 ha or 6.23% of this area. Surveys to locate and count whooping crane breeding pairs and nests in and around WBNP were coordinated by the Canadian Wildlife Service in partnership with Parks Canada Agency. During surveys, 82 nesting pairs of whooping cranes were detected. The number of nests detected in 2014 represents the highest count on record. In addition to nesting pairs, 17-21 territorial pairs were detected suggesting potential for substantial population expansion in upcoming years. Seven nests were found outside of WBNP; two in the Lobstick Creek / Foxholes area, and five north of the Nyarling River. A single nesting pair was found in a previously undocumented nesting area in the Swampy Lakes regions; this pair was identified through regular review of locations of whooping cranes fitted with satellite transmitters and represents the northernmost whooping crane nest on record. Surveys to locate and count fledged whooping cranes detected 32 fledged young; including two family groups that had two offspring. The number of fledged young per nest was 0.39, lower than the 20-year average of 0.48 but within the long term natural range of variation.

Whooping Crane tracking partnership (WCTP)

Note: This is a summary of U.S. Geological Survey's July 2015 Remote tracking of Aransas-Wood Buffalo Whooping Cranes. The 2014 breeding season and fall migration update is available here: <http://www.cranetrust.org> (search under Research)

WCTP overview

The study was conducted by a partnership of researchers from multiple organizations using GPS devices to track individual whooping cranes of the Aransas –Wood Buffalo population.

Efforts focused on putting tracking devices on adult whooping cranes captured on Aransas National Wildlife Refuge NWR, where the birds winter on the Texas coast, and on chicks at Wood Buffalo National Park, the birds' nesting grounds in Canada.

The GPS units are attached to a bird's upper leg and record four to five locations every 24 hours, information that is uploaded to a satellite every two and half days. These data reveal migration routes, habitat use, nesting locations, and much more. Biologists in the United States and Canada will use results of this work to identify management and conservation priorities in both countries.

The research partnership is made up of governmental and non-profit partners that include the U.S. Geological Survey, U.S. Fish and Wildlife Service, Canadian Wildlife Service, Platte River Recovery Implementation Program, Crane Trust, Parks Canada, Gulf Coast Bird Observatory, and International Crane Foundation.

2014 WCTP Breeding Season

Thirty-two marked whooping cranes provided >12,500 locations during the summer of 2014. Five marked subadults spent the entire summer in Saskatchewan and Alberta, south of Wood-Buffalo NP. Two birds spent a portion of June 2013 in North Dakota. Surveys conducted by the Canadian Wildlife Service (CWS) confirmed that ten marked cranes successfully nested and were observed with young during August fledgling surveys; comparison of survey data (i.e., nest locations) and satellite locations of marked birds suggest that another seven marked birds likely nested. During fall staging surveys conducted by CWS, six marked birds were observed to have offspring, providing further support that the WCTP's effort to mark birds has not interfered with reproduction. Three birds spent the summer outside the traditional breeding area, one in south-central Saskatchewan near Brownlee, one in southeastern Alberta near Rumsey and one north of Hay River, Northwest Territories. Six marked cranes were sighted with young during fall migration in Saskatchewan. Of pairs that were detected with young on the breeding grounds, those resighted during fall staging in Saskatchewan were all observed with offspring. No mortalities were identified from the data prior to the onset of migration.

2014 WCTP Fall migration

During fall migration, transmitters from 29 marked whooping cranes provided location data. Two transmitters stopped providing data prior to the initiation of fall migration. Six transmitters provided intermittent data during migration. Whooping cranes began departing WBNP on 20 August 2014 and the last marked bird left on 30 October 2014, with the average departure date of

29 September 2014. Fall migration of marked birds took an average of 42 days during 2014, with a range of 14 to 86 days. For comparison, average migration time during fall 2010 was 36 days (12–70 days; n = 10), fall 2011 was 36 days (9–63; n = 19), fall 2012 was 45 days (9–67 days, n = 25) and fall 2013 was 35 days (9–78, n = 25). During migration, the WCTP documented 200 stopover locations (sites where cranes stopped for >1 night) from every province and state in the Great Plains migration corridor. Whooping cranes spent the greatest amount of time at staging sites in Saskatchewan, Alberta and the Dakotas during fall migration. Other significant stopover sites during fall 2014 migration included one site along the Platte River in Nebraska, three birds stopping at or near Quivira National Wildlife Refuge in Kansas and three birds stopping at Salt Plains National Wildlife Refuge in Oklahoma. No mortalities of marked birds were detected during migration.

2014 Wintering grounds

Additional information from this past winter can be found here:

<http://www.fws.gov/refuge/Aransas/wwd/science/updates.html>

2014 winter habitat conditions

The first marked whooping crane to arrive on the Texas coastal wintering grounds in and around Aransas National Wildlife Refuge was on 31 October 2014. Drought conditions in the wintering grounds, which have been present off and on since 2008, continued during the winter of 2014. A few timely rains in the late summer/early fall, both locally and in Central Texas, provided enhanced freshwater resources on and around the Refuge. While the 2014 precipitation total (22.63 inches recorded at Aransas NWR RAWLS) was well below the annual average of 38 inches for the Refuge (USFWS Aransas NWRC CCP, 2010), over half (13.16 inches) of the annual total fell between August-October of 2014 (<http://www.wrcc.dri.edu/cgi-bin/rawMAIN.pl?sdTARA>). Many traditional freshwater wetlands and ponds on and around Aransas NWR remained dry into the first portion the wintering season and San Antonio Bay salinities only fell under 20 parts per thousand (ppt) after 2 or 3 precipitation events that occurred in September and October 2014 (<http://lighthouse.tamucc.edu/pq/127>). Thus, severe drought conditions have been in place of and on for the last 4 winters. However, precipitation began increasing in late winter and spring 2015, with San Antonio Bay salinities falling under 20 ppt in April 2015 and continue to remain <10 ppt. The first portion of 2015 has been the wettest spring on record since the Aransas NWR RAWLS station came online in 2000, with January–May 2015 rainfall totaling 25.35 inches, more than the annual 2014 rainfall. Staff at Aransas NWR used prescribed fire to improve whooping crane foraging opportunities and overall prairie upland condition. The uplands adjacent to high-use salt marsh areas, both on the Blackjack and Matagorda Island Units of the Refuge were burned during the winter season, with a total of 12,025 acres treated. We observed whooping crane use of the burned areas, both during aerial surveys and by marked whooping cranes.

2014 winter abundance survey

During winter 2014–2015, the primary survey area (approximately 154,000 acres) was surveyed six times between 8 December and 13 December 2014. During the same period, the secondary survey area (approximately 153,000 acres) was all surveyed twice except for Mad Island and Matagorda Peninsula, which were added as new secondary areas this year. Both these secondary areas were surveyed a second time later in the wintering season. We continue to survey and expand secondary survey areas to monitor ongoing expansion of the whooping crane's winter range. Wade Harrell and Beau Hardigree were the primary observers, with Diana Iriarte serving as an observer during one flight.

Preliminary analyses of the survey data indicated 308 whooping cranes (95% CI = 267–350; CV = 0.067) inhabited the primary survey area (Figure 1). This estimate included 39 juveniles (95% CI = 33–46; CV = 0.081) and 112 adult pairs (95% CI = 99–128; CV = 0.064). Recruitment of juveniles into the winter flock was 15 chicks (95% CI = 13–16; CV = 0.055) per 100 adults, which is comparable to long-term [average recruitment](#). The precision of this year's estimates was improved and achieved the target set in the [whooping crane inventory and monitoring protocol](#) (i.e., CV < 0.10).

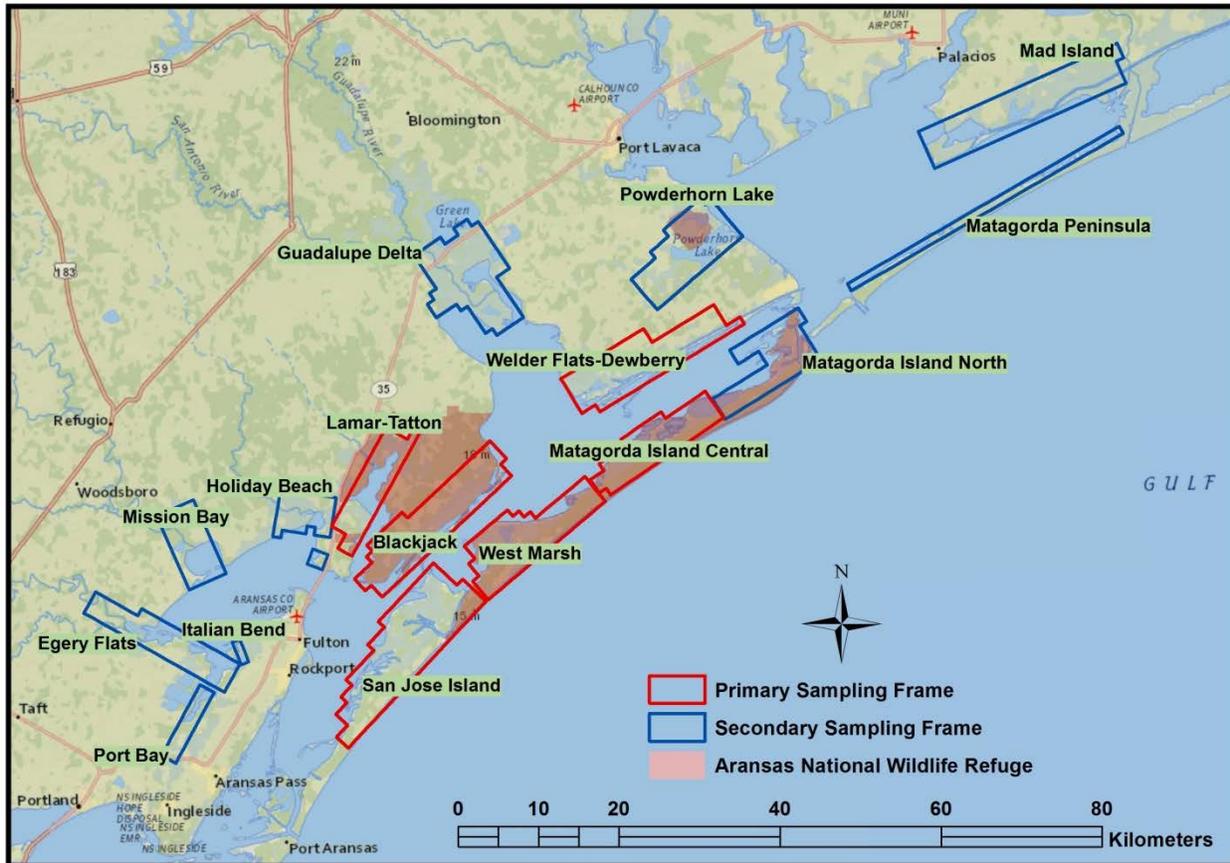


Figure 1. The sampling frame used to monitoring whooping crane abundance on their wintering grounds along the Texas coast of the Gulf of Mexico, USA.

A continued upward trend in whooping crane abundance over the last four years was observed (Table 1), which is consistent with the long-term trend of approximately 4% growth per year. Examination of the 77-year trend in whooping crane abundance shows an increase with occasional, [periodic declines](#) occurring, on an approximate 10-year cycle (Figure 2).

Table 1. Preliminary whooping crane abundance estimates for the Aransas-Wood Buffalo population on their wintering grounds, winter 2011–2012 through winter 2014–2015.

Survey year	Abundance ^a	CV	95% CI		No. assumed beyond primary survey area ^b
			LCL	UCL	
winter 2011–2012	254	0.126	198	324	13
winter 2012–2013	257	0.186	178	362	22
winter 2013–2014	304	0.078	260	354	6
winter 2014–2015	308	0.067	267	350	6

^a Estimated whooping crane abundance in the primary sampling area using aerial surveys and hierarchical distance sampling.

^b Provides our best understanding of the number of whooping cranes, at the time of the aerial surveys, that were outside of the primary survey areas. This information was based on data from Texas Whooper Watch, the whooping crane GPS tracking study, and aerial surveys conducted in the secondary survey areas.

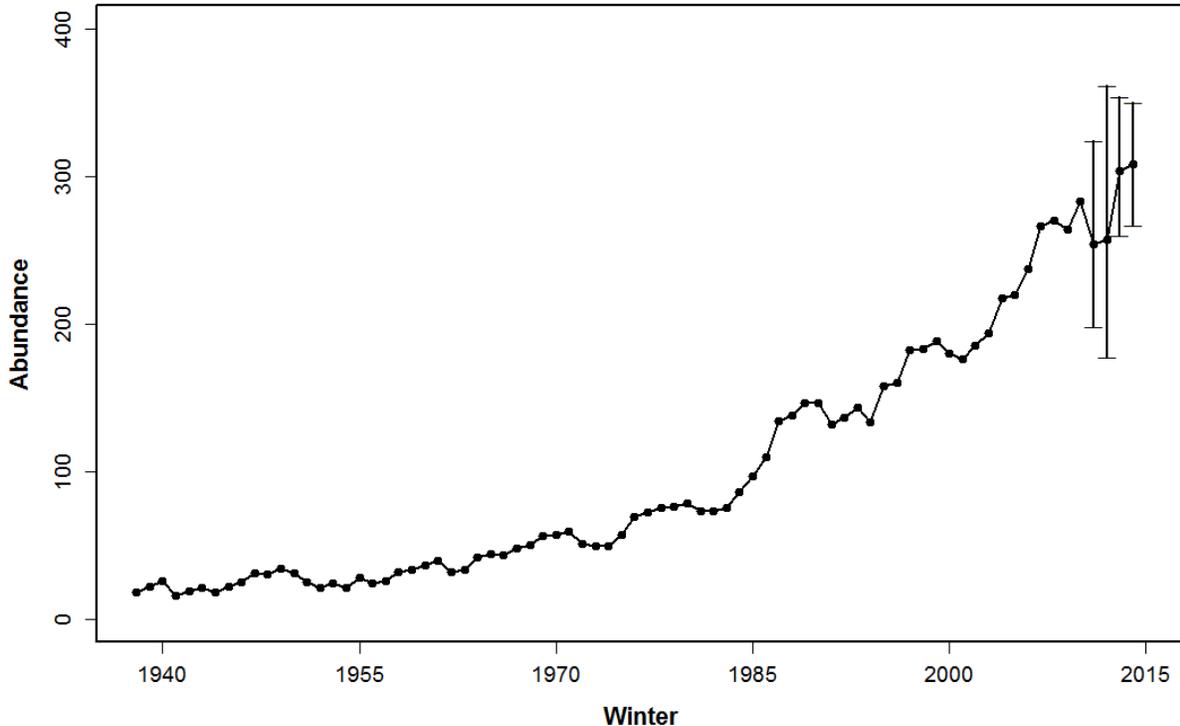


Figure 2. Time-series of whooping crane abundance estimates for the Aransas-Wood Buffalo population beginning in winter 1938–1939. Starting in winter 2011–2012, the precision of abundance estimates were displayed as 95% confidence intervals (these are preliminary estimates). During years prior to winter 2011–2012, the precision of abundance estimates was unknown.

During the survey period, some whooping cranes were observed outside of the primary survey area. These data were based on information from [Texas Whooper Watch](#), the whooping crane GPS tracking study, and aerial surveys conducted in the secondary survey areas. Compared to winter 2011–2012 and winter 2012–2013, few whooping cranes were observed outside of the primary survey area (Table 1).

Table 2 provides our best understanding of whooping cranes that were outside the primary survey areas during the mid-December survey period. Some birds may have been missed. It is impossible to be absolutely certain that individuals did not move between these locations and to/from the primary survey area during the survey period.

Table 2. Whooping cranes documented outside of the primary survey area during December 8 through December 13, 2014.

General area	Data source	Adults	Chicks	Total	Notes
North Matagorda Island (secondary survey area)	Aerial survey GPS tracking study	2	0	2	Pair detected at least once during aerial surveys; one individual was marked as chick in Canada in 2012.
Holiday Beach (secondary survey area)	Aerial survey	2	0	2	Pair detected twice during aerial surveys on different days and locations.
Powderhorn Lake (secondary survey area)	Aerial survey	2	0	2	Pair detected twice during aerial surveys on different days at same location.

Additional information from Texas Whooper Watch can be found here:

http://www.tpwd.state.tx.us/huntwild/wild/wildlife_diversity/texas_nature_trackers/whooper-watch/

Documented mortality on wintering grounds

This season we documented two whooping crane mortalities on and around Aransas NWR. The first mortality was a whooping crane carcass found by a hunter on San Jose Island on January 4, 2015. FWS Office of Law Enforcement and Texas Parks & Wildlife opened an investigation to determine if foul play was involved and several rewards for information leading to a conviction were established. The investigation is still open at this time. One marked bird died on Aransas NWR in March 2015, and the carcass was collected and sent to the National Wildlife Health Center for necropsy. Thus cause of death is unknown but predation is suspected.

Documented morbidity on wintering grounds

On 15 December 2014, a Refuge visitor reported an injured whooping crane near the Refuge observation tower. Photographs were provided to Refuge staff. Later that day, Wade Harrell and Jim Panaccione (Refuge O&G biologist) verified the presence of an adult, unmarked whooping crane near the observation tower that appeared to have an injured wing and blood stained feathers on the lower breast. While attempting to approach the bird for a closer assessment, the bird flew a short distance towards an oak motte and was not relocated. Attempts to relocate the bird the next day by Refuge biologist Diana Iriarte were unsuccessful. Photos were sent to Dr. Barry Hartup, veterinarian with ICF, but he was not able to determine what caused the injury.

In late December 2014, a female adult whooping crane marked via the USGS telemetry study (Yellow/Aluminum/Yellow color band combination, “YAY”) was observed with an injured left leg on private property near Lamar, TX. Consistent use of coastal marsh near a private residence allowed for regular observation of the injured bird and its unmarked mate. Early observations and photos of the bird were not clear enough to determine what caused the injury, however photos provided by Dr. Elizabeth Smith (ICF biologist) and the property owners to Dr. Barry Hartup indicated that the bird had suffered a fracture to the lower leg, causing swelling to the foot and severe lameness. The injury impeded walking, but not flight for YAY. Capture and rehab attempts were discussed and ruled out due to concerns over making the injury worse, and it was decided to continue closely observing the health of the bird. Both Dr. Smith and Dr. Felipe Chavez Ramirez (WHCR Recovery Team member) were able to regularly observe YAY. By mid-March, it appeared that YAY’s mobility had improved and the leg injury was healing. In April 2015, YAY left the area to begin spring migration with her mate.

Ongoing wintering ground research efforts

Establishing a landscape conservation strategy for whooping cranes on the Texas Gulf Coast

Note: In 2014, the U.S. Fish & Wildlife Services Refuges Biological Sciences Team developed a draft landscape strategy for conserving important wintering habitat for an expanding whooping crane population that is facing threats related to human development and sea level rise. The following is the project summary from the report. Please see appended report for more detailed information on this study.

Shoreline and inland habitats of the Texas Gulf Coast house a diverse spectrum of species, whose populations are threatened by anthropogenic stressors, climate change, and sea-level rise. The conservation response to preserve these species and mitigate threats lies in identifying the prospective areas to conserve and subsequently protect. The challenge becomes understanding species needs and diagnosing the present and future threats to species, in order to steer conservation to the right places. This project meet this challenge by designing a sustainable strategy of landscape stewardship centered on whooping cranes (*Grus Americana*). Our approach took four steps. First, we identified the most important conservation lands for cranes. We relied on GPS telemetry and regression tree models to build species-habitat associations in a resource selection framework. Second, we performed a vulnerability assessment on habitats across the gulf coast by building and integrating predictions of sea level rise and land conversion through the year 2100. Next, we coupled the results of these two steps to identify sustainable conservation lands for whooping cranes and other fauna presumed to rely on similar habitats. Finally, we combined density estimates of whooping cranes with the prediction of sustainable conservation lands, to estimate the maximum number of cranes that could inhabit the project region, inside and outside of protected areas.

Our model outputs identify the area of whooping crane habitat required to downlist the whooping crane from endangered to threatened. Currently, the estimated carrying capacity inside protected areas (159,689 acres) is 646 cranes. However, by the year 2100, the estimated carrying capacity inside protected areas is 397 whooping cranes. To meet the downlisting criteria, an additional 225,577 ac (95% CI 182,646 ac, 274,850 ac) is necessary to support 603 more cranes. This amount is predicted to be 56% of the remaining whooping crane habitat (399,569 ac) within the project area by the year 2100. This project establishes a robust, repeatable, and flexible decision support system to identify, compare, and prioritize habitats for the long-term and sustained conservation of whooping cranes wintering along the Texas Gulf Coast through the year 2100. Such information advances landscape conservation design and implementation by identifying the places that will best support wildlife now and into the future.

WCTP 2014 wintering season

Note: This is a summary of U.S. Geological Survey's June 2014 Remote tracking of Aransas-Wood Buffalo Whooping Cranes. The 2013 wintering season and 2014 spring migration update is available here: <http://www.cranetrust.org> (search under Research)

No trapping or marking of additional whooping cranes on the wintering grounds was conducted in 2014 as the research objectives were met the previous winter. Sixty-eight whooping cranes were been marked with GPS transmitters during the past four years. Currently, 17 of those birds are still being actively tracked.

GPS-marked cranes provided >11,000 locations during winter 2014, of which over >7,000 were within the boundaries of Aransas National Wildlife Refuge. The first date a marked bird arrived on the Texas coast, or nearby wintering areas, was 31 October 2014, with the last to arrive on 14 November 2014. Average arrival date was 10 November, 2014. Birds used a variety of ecologically distinct areas including coastal salt and brackish marsh communities, agricultural and ranching areas, and inland freshwater wetlands. Less than 1% of locations were outside of Aransas and Calhoun counties. One mortality of a marked bird on Aransas Wildlife Refuge was confirmed in March 2015 (see wintering grounds mortality section above).

WCTP 2015 spring migration

Cranes departed wintering sites in Texas between 24 March and 30 April with an average departure date of 9 April. Thirty percent of the birds departed by 1 April and 75% departed by 15 April. The first birds arrived at summer use sites on 18 April, and the last marked crane arrived on 14 May. Average arrival date was 27 April. Total time spent migrating between wintering and summering areas during spring 2015 ranged from 21 to 47 days and averaged 30 days. For comparison, we estimated average migration time during spring 2011 at 30 days (21–38 days; n = 11), spring 2012 at 26 days (15–46; n = 25), spring 2013 at 37 days (16–69 days, n = 32) and spring 2014 at 28 days (15–47, n = 27).

We monitored 19 birds successfully migrating to summer areas. We documented whooping cranes using 81 stopover locations (geographic areas where cranes remained ≥ 1 night), which occurred in every state and province in the Great Plains. As in other years, Saskatchewan contained the majority of sites used, and other northern Great Plains states and provinces received relatively similar use. Cranes spent the most time at staging sites in Saskatchewan followed by North Dakota and South Dakota. Staging in the remaining states and provinces accounted for $< 26\%$ of migration. The general migration corridor used by whooping cranes during spring 2015 was similar to past migrations and other published reports. Three birds stopped at Salt Plains National Wildlife Refuge in Oklahoma; two birds stopped at or near Quivira National Wildlife Refuge in Kansas. Two birds used stopover sites along the Central Platte River in Nebraska. All cranes with active transmitters terminated migration in the traditional summer use area in and around Wood Buffalo National Park. No mortalities were detected during spring migration.

Other ongoing AWBP issues

The Aransas Project v Bryan Shaw et al.

On 10 March 2010, The Aransas Project, a 501-(c)-3 organization, filed suit against the Texas Commission on Environmental Quality (TCEQ) for illegal harm and harassment of whooping cranes in violation of the Endangered Species Act. The Aransas Project alleged that TCEQ was responsible for the take of 23 whooping cranes during the winter of 2008-2009 via their permitting of surface water rights from the San Antonio and Guadalupe river basin. The Aransas Project claims that over-allocation of surface water led to decreased freshwater inflows into San Antonio Bay, leading to increased salinity levels and declines in food and water resources for whooping cranes, causal factors implicated in the “taking” of 23 whooping cranes. A bench trial was held in December 2011 in US District Court, Corpus Christi with Judge Janice Jack presiding. Judge Jack issued a ruling in favor of The Aransas Project on 11 March 2013, which included an order preventing TCEQ from approving or issuing new water permits affecting the Guadalupe or San Antonio Rivers “until the state of Texas provided reasonable assurances that new permits would not result in harm to whooping cranes.” TCEQ was ordered to seek an incidental take permit from US Fish & Wildlife Service. TCEQ appealed the decision and the Fifth Circuit Court of Appeals in New Orleans granted an emergency stay and agreed to hear oral arguments in August 2013. Appellant briefs were provided to the Fifth Circuit in May 2013. The Fifth Circuit heard oral arguments on August 8, 2013 and issued a 34 page opinion on June 30, 2014 that reversed the earlier District Court’s ruling. In summary, the Fifth Circuit found that “The District Court either misunderstood the relevant liability test or misapplied proximate cause when it held the state defendants responsible for remote, attenuated, and fortuitous events following their issuance of water permits.” The Aransas project filed a cert with the U.S. Supreme Court on 16 March 2015, asking the justices to uphold the district court and overturn the Fifth Circuit. That request was declined by the Supreme Court on 22 June 2015.

The US Fish & Wildlife Service was not a named party in the lawsuit and did not take a position on the issue, but still stands to assist all interested parties in developing strategies that provide adequate freshwater inflows to sustain coastal wintering habitat in Texas used by endangered whooping cranes.

Powderhorn Ranch acquisition

On 21 August 2014, a multi-partner coalition including the Texas Parks and Wildlife (TPW) Foundation announced the purchase of the 17,351-acre Powderhorn Ranch along the Texas coast in Calhoun County. The acquisition will conserve a spectacular piece of property that is one of the largest remaining tracts of unspoiled coastal prairie in the state. At \$37.7 million it is the largest dollar amount ever raised for a conservation land purchase in the state and represents a new partnership model of achieving conservation goals in an era of rapidly rising land prices. In years to come, Powderhorn Ranch is expected to become a state park and wildlife management area (for more information, see the press release: <https://tpwd.texas.gov/newsmedia/releases/?req=20140821a>).

The Powderhorn Ranch has had occasional whooping crane use for many years and supports coastal marsh habitat preferred by wintering whooping cranes, primarily along its northern boundary with Powderhorn Lake. This area is included in our secondary aerial survey area (Figure 1) and is expected to provide additional habitat for a growing whooping crane population in future years (see landscape conservation strategy section above).

Reintroduced flocks

Florida non-migratory flock

Current status and future plans

Reproduction milestones for the Florida project include the first nest established in 1996, the first eggs laid in 1999, the first egg hatched in 2000 and the first chick reared to fledging in 2002. Intensive monitoring of the flock was discontinued in June 2012 by the Florida Fish and Wildlife Commission. Since then, monitoring efforts have been opportunistic and have relied heavily on public observations. At this time, the flock size is estimated less than 14, however, only 10 birds (4 males and 6 females) were reported by the public in 2015. At least two wild hatched chicks that fledged from this population still survive on the Florida landscape; the oldest fledged in 2004. One nest was reported during 2015, with one colt still alive at the time of this report. A colt from a 2014 nest was captured in December for a translocation attempt to the Louisiana, but died while in quarantine.

The International Whooping Crane Recovery Team will continue to evaluate how eggs and adult whooping cranes from the Florida non-migratory flock may be integrated into other existing recovery efforts.

Louisiana non-migratory flock

For the full report, see attached prepared by Louisiana Department of Wildlife and Fisheries

Executive Summary from full report:

The Whooping Crane reintroduction program in Louisiana continued significant positive progress during this reporting period. First, the current population has a 61% survival rate (39 of 64 individuals), with the status of six cranes currently unknown. Survival of cranes within the 2011-2014 cohorts continues to be high after one year (70-75% survival), with minimal mortality following this one year period. To reduce costs associated with satellite PTT services, we evaluated cellular, GSM transmitters this year to track four juveniles and one adult crane; we will continue the trial in 2016-2017 to determine their utility in this region. At the end of the reporting period, 27 cranes were located in Louisiana and 6 in Texas. As in previous years, many cranes continue to heavily use the working wetlands – rice and crawfish agriculture – of the historical Cajun Prairie region of southwestern Louisiana (Jefferson Davis, Vermilion, Acadia Parishes). We have also seen an expansion of habitats used in the Mississippi River Alluvial Plain of northeastern Louisiana; these habitats are primarily being used by individuals from the 2013 and 2014 cohorts. Habitat use data continues to indicate that they are habitat generalists, with likely generalized diets.

We observed increased nesting activity in spring 2015, with four pairs nesting (five attempts including one re-nest). The nest locations were scattered across a wide spatial area in southwestern and central Louisiana in widely different habitats. For the latter, nesting was confirmed in coastal marshes on White Lake Wetlands Conservation Area (WLWCA, Vermilion Parish), in an actively fished crawfish pond on private land (Avoyelles Parish), in a riparian freshwater marsh/swamp (Allen Parish), and in an impounded, inland wetland (Allen Parish). The diversity of habitats used is encouraging and is similar to the diversity of habitats (e.g., in coastal wetlands, agricultural lands, seasonal wetlands, etc.) used by reintroduced cranes in Louisiana during the non-nesting period. Where possible (i.e., non-marsh habitats) we continued conducting time activity budgets of nesting pairs. The nesting pairs observed exhibited high levels of nest attendance, with three of the five nesting attempts incubating nests to full term. However, none of the nests produced a hatched chick in 2015. Two nesting attempts by the same pair failed due to egg infertility (the same pair that laid two infertile clutches in 2014), one failed due to flash flooding associated with heavy rainfall (fertile egg), and two failed for unknown reasons after 16-37 days of incubation. We have not observed any incidence of biting black flies or other horsefly species interrupting observed nesting attempts in the Louisiana flock. We have observed 6 breeding pairs formed at the end of the reporting period, with potentially several more pairs forming going into the 2016 nesting season. Therefore, we expect to observe additional nests in 2016.

Public education remains a high priority of the reintroduction program. LDWF staff participated in over 50 festivals and events. A major focus of the education efforts centered on six teacher workshops with 74 middle and high school teachers from Louisiana. The Alexandria Zoo (Alexandria, Louisiana) has shown interest in providing education/outreach opportunities to zoo patrons, with LDWF highly supportive of this cooperative effort. The Whooping Crane public awareness media plan for 2014-2015, funded by a grant from Chevron, included the use of billboard space provided by Lamar Advertising, radio commercial space purchased through the Louisiana Association of Broadcasters, and television commercial space purchased on cable television systems in Alexandria, Lafayette and Lake Charles. Billboards alone were estimated to reach almost 850,000 viewers. A survey of licensed hunters was also conducted to determine awareness and source of awareness of the reintroduction program. Within the survey group (2,165 licensed hunters), 56% had heard about the reintroduction. When asked how they heard about the reintroduction their responses were as follows: TV 29%, radio 16%, website/social media 14%, newspaper 11%, billboard 8%, teacher workshop 1%, and festival 1%. Landowner relationships also remain a high priority, with continuing education efforts ongoing within the crawfish industry. LDWF staff continues to receive high support from farmers with cranes on their property, and no landowner to this point (since 2011) has denied access to their properties.

However, as with prior reporting periods, we were not immune to some setbacks. We had 4 confirmed/likely mortalities during the reporting period, but this was less than the 7 reported last year. Mortalities in 2014-2015 included one via power line collision, one via gunshot, and two likely mortalities with unknown fate.

We will continue to find new and exciting ways to ensure that this reintroduction succeeds, including activities associated with our management, research, and education/outreach programs. During late 2015, a new release pen will be constructed on Rockefeller Wildlife Refuge into a newly refurbished 90 acre marsh unit. This is being completed to facilitate the ability to split the 2015 cohort, additional capacity of future cohorts, and to determine if cranes released “deeper” into the marsh will avoid venturing to the north where all gunshot mortalities have occurred.

Throughout the year, there were highs and lows for our program, including the first nesting attempt and two additional shooting incidents. For the former, the pair incubated both their first and second nests to full term without complications from predators, biting insects, or from disturbance related to the crawfish farmer actively fishing the area around the nest. Predators or biting insects has been a major inhibitor for other reintroduction programs, so observing two, full-term incubation attempts for the first nest of this reintroduction is promising. To address our concern with shootings, we continue to provide significant efforts toward education and outreach with the general public, landowners, and farmers, with our region not exempt from shootings that have occurred throughout the country in the last five years. We will continue to find new and exciting ways to ensure that this reintroduction succeeds, including activities associated with our management, research, and education/outreach programs. However, the Louisiana Whooping Crane Team recommends to the Recovery Team that larger cohorts (>16) be provided in the

future. Larger cohorts are more desirable because they are 1) more cost effective with the annual resources being invested into the program (for annual budget, see Appendix 1) and 2) better able to fill the vast amounts of suitable habitat in the region, increasing the probability of reintroduction success.

Eastern migratory population

For the full report, see attached 2014 Condensed Annual Report prepared by Whooping Crane Eastern Partnership

www.bringbackthecranes.org

Overview

The eastern migratory population (EMP) of whooping cranes was established in 2000 with the goal of establishing a migratory, self-sustaining population in Eastern North America. This fits into the overall recovery strategy of working to establish one or more additional whooping crane flocks that are distinct from the AWBP as outlined in the International Whooping Crane Recovery plan (USFWS 2007). More specifically, the initial goal of this reintroduction project was to establish a minimum of 120 adults consisting of at least 30 breeding pairs if only one reintroduced population is successfully established or 100 adults consisting of at least 25 breeding pairs if two or more reintroduced populations are established. The EMP has nearly met the latter goal with the maximum size of the population currently at 93 adult whooping cranes consisting of 27 nesting pairs (May 2015). At the end of 2011, the EMP numbered 104 birds, so the population has remained relatively stable to slightly declining over the past 4 years.

Since the initiation of this project, 239 whooping cranes have been released into the wild, with around 40% of those surviving to date. Significant milestones in this reintroduction effort include the establishment of two nests established in 2005 and the first fledged chick in 2006. Since 2006, only 7 additional chicks have been fledged in the wild. Overall, survival of released whooping cranes has been acceptable, but successful reproduction, particularly recruitment of wild young, of released cranes has been too low for the flock to be considered self-sustaining.

The Whooping Crane Eastern Partnership (WCEP) was formed at the onset of this project to guide and implement all aspects of the reintroduction effort. Founding members of WCEP include the International Crane Foundation (ICF), Operation Migration Inc., Wisconsin Department of Natural Resources, US Fish & Wildlife Service, the US Geological Survey's Patuxent Wildlife Research Center (PWRC) and National Wildlife Health Center, the National Fish and Wildlife Foundation, the Natural Resources Foundation of Wisconsin and the International Whooping Crane Recovery Team. WCEP has established several project teams that guide various aspects of the reintroduction effort. The teams established within WCEP with a set of specific tasks include the Research & Science Team, Rearing & Release Team, Monitoring & Management Team and Communications & Outreach Team. The team leaders serving on the

aforementioned teams all serve on the Operations Team, which provides overall oversight and direction for the reintroduction project. The Operations Team provides regular updates on decisions, needs and operations to the Guidance Team, which assists in making decisions that cannot be settled at a lower level.

WCEP utilizes two primary methods when releasing captive-reared birds into the wild, Ultralight-led Migration and Direct Autumn Release. Chicks born in captivity and assigned to the Ultralight-led Migration release method are imprinted on costumed caretakers and conditioned to follow one of the Operation Migration aircraft at PWRC. The imprinted chicks are then transported to a release site in Wisconsin. There they continue training in preparation for a fall migration led by the Operation Migration Ultralight aircraft. The terminus for the fall migration is St. Marks National Wildlife Refuge in Florida. Chicks assigned to the Direct Autumn Release method begin at ICF in Baraboo, WI and are moved to Necedah NWR and then to Horicon NWR in Wisconsin, where they are released in late October. While in training at Necedah NWR, costumed caretakers work with chicks in a natural environment to encourage foraging and socialization with other cranes in the area. The chicks are moved to Horicon NWR in early September, where costumed caretakers encourage flight, eventually migrating south with adult cranes.

Major research findings thus far

Reproductive Success experiment

The WCEP research and science team has established research projects aimed at understanding factors that limit the reproductive success of the EMP. Hypotheses investigated include harassment of nesting adult whooping cranes by black flies leading to nest abandonment, nest predation, parental age and experience impacts on nest success and limited crane energy reserves resulting from low wetland productivity. To compare overall reproductive performance, data from the EMP is compared to historical data from the AWBP and Florida non-migratory populations. In order to test the black fly harassment hypothesis, black fly larvae in several targeted river segments in Wisconsin were treated with *Bti* over two years (2011 and 2012). 2009 and 2013 were control, no-treatment years. *Bti* treatments resulted in significantly lower black fly abundance and improved hatching success when compared to control years. Unfortunately, reproductive success, as measured by the number of chicks fledged to fall migration per territory, remained too low to produce a sustainable population in the long term. Other factors, as stated above, that may influence reproductive factors are still under investigation.

In 2014, WCEP began two experiments in order to better understand whooping crane breeding ecology at Necedah NWR. The first experiment, to be conducted through 2016, investigates the effects of forced re-nesting on reproduction. Past data on the EMP (2005-current), comparing initial nest to re-nest attempts, demonstrates that re-nesting whooping crane pairs have higher full-term incubation rates (54% vs. 18%), hatching rates (39% vs. 11%) and fledge rates (21%

vs. 0.1%). Thus, salvaging eggs from initial nests may increase the probability of re-nesting by 25% and increase overall reproductive success. Additionally, removing eggs from whooping crane nests prior to the emergence of parasitic insects may synchronize the initiation of second nests with the decline of parasitic insect populations. Results from the forced re-nesting study will focus on 1) determining if egg salvage induced nest failure can increase re-nesting rate 2) the ability to avoid peak black-fly levels with a modified nesting timing and 3) comparing the reproductive success of forced re-nests and first nests of whooping cranes. In 2014, whooping cranes at Necedah NWR initiated 20 first-nests and 3 re-nests. Four of the 20 first-nests were subject to forced re-nesting, of these, half re-nested. Unfortunately, 7 additional whooping crane first-nests that were available for the forced re-nesting study, failed prior to the projected threshold data. Additionally, 2 first-nests, which subsequently failed, were initiated after the implementation of the forced re-nesting action and could not be included in the study. Adjustments to predicting parasitic insect hatches will be made in 2015 to avoid timing issues that were experienced in 2014.

The second experiment at Necedah NWR compares the breeding ecology and nesting success of whooping cranes and sandhill cranes. If black flies are the primary causal factor for low reproductive success in whooping cranes, it is expected that sandhill crane reproductive success at the same location may be low as well. If the study does not find this to be the case, other ecological, biological or behavioral differences may be important factors to consider in future research. In 2014, biologists at Necedah NWR located 23 whooping crane nests and 16 sandhill crane nests. Excluding nests that were part of the forced-re-nesting management strategy, the apparent nest success of whooping cranes was 47%, slightly less than the 56% apparent nest success of sandhill cranes. Nest abandonment caused almost half (39%) of the whooping crane nest failures, conversely sandhill crane nest failures causes were more variable. Nesting chronology of whooping cranes and sandhill cranes appeared similar in 2014.

Impact of leg-mounted transmitters on crane copulation and incubation

Staff at Patuxent Wildlife Research Center began a two-year study in 2013 by fitting four pair of known self-fertile sandhill cranes with leg-mounted transmitters and four pair of self-fertile sandhill cranes were fitted with only a color band as a control. All eight crane pairs laid eggs (2 clutches of 2 eggs each). Copulation and incubation was similar across the control and treatment (transmitters attached to leg) groups. In 2014, the control and treatment group was switched, with the former transmitter cranes becoming controls and the controls receiving dummy transmitters. The results in 2014 differed from 2013, with transmitter birds having a lower fertility rate (31%) than the controls (78%). Future efforts will focus on the effects of transmitters on incubation and impacts in the winter season.

Testing backpack harnesses

Staff at the International Crane Foundation and Operation Migration worked to test backpack harnesses on free flying, captive whooping cranes to be released via the guided migration release technique. Three young of year whooping cranes were fitted with backpack transmitters on 16 September 2014. Unfortunately, transmitters placed on the back of cranes appeared to inhibit flight via an unknown mechanism. Thus, the backpack transmitters were removed on 26 September 2014 until further investigation can resolve issues detected in the study.

Education and outreach efforts

The WCEP communication and outreach team issued numerous press releases and statements highlighting major reintroduction activities such as spring and fall migration, ultralight-led migration, hatching and survival of wild-born chicks and updates on illegal shooting rewards. These events were communicated through a variety of venues including print and television media, internet and social media and directed outreach. For example, 105 stories were shared via Facebook. WCEP expanded its media contacts in 2014 to other states in the flyway not previously contacted. Presentations were delivered throughout the year to partner organizations, schools, conservation and birding clubs, professional conferences, civic organizations and zoos. A number of regional and national outreach festivals were attended in 2014, reaching about 12,000 people.

A working group was established in 2013 to address illegal whooping crane shootings. Along with a number of agency and NGO partners, ICF developed two hunter education panels that were installed on kiosks at the Patoka River NWR in Indiana. These signs complement existing WCEP hunter education materials. The International Crane Foundation has established a “Keeping Cranes Safe” initiative that focuses on reducing whooping crane shootings in the EMP (<https://www.savingcranes.org/road-to-recovery.html>).

Current status and future plans

As of May 2015, there were 93 birds (52 males and 41 females) in the EMP.

2014 Breeding Season

A total of 11 chicks were introduced into the EMP in 2014, seven chicks were allocated to Ultralight-led migration release method and four chicks were allocated to Parent Rearing (PR) release method/experiment. The origin of the reintroduced chicks included both captive breeding facilities (Patuxent and ICF) and eggs collected from wild EMP nests. Twenty-five pairs of whooping cranes in the EMP initiated 28 nests in the EMP in 2014. Three nests produced single chick and five nests produced two chicks. One of these chicks fledged. One male whooping crane apparently paired and nested with a sandhill crane at Horicon National Wildlife Refuge, but failed.

2014 Fall migration

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

2014 wintering

Maximum size of the EMP through 31 December 2014 was 103 birds. 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. The total for Florida included 7 newly released juveniles. There were some additional southward movements, especially by birds in Indiana, in early January 2015.

Removal of an individual from EMP in 2014

On 28 May 2014, no. 1-01, the first whooping crane reintroduced into the EMP, was captured at the Volk Field National Guard Base in Juneau County, WI and removed from the population due to repeated behaviors that created a hazard to the bird and to the aircraft using the base. The male whooping crane was transferred to Zoo New England in Boston, MA on 29 May 2014 and will spend the remainder of his life in captivity.

2014 mortalities

Long-term whooping crane survival in the EMP is estimated at 40%. Twelve mortalities were recorded in 2014, five in WI, two in KY, 1 in IN, 1 in IL and 1 in FL. Additionally, 5 long-term missing were removed from population totals.

2014 Parent-rearing results

2014 was the second year of the planned parent-rearing experiment in the EMP. This experiment is designed to test the hypothesis that captive reared whooping crane chicks raised in the most natural setting possible (i.e. raised by adult whooping cranes in captivity rather than a costumed caretaker) will be more fit when released into the wild. This year, 4 parent-reared chicks were placed in individual, temporary pens at Necedah NWR in late September 2013. The temporary pens were all located in areas with adult whooping crane pairs. After a few days of acclimation, the chicks were released. As expected, the chicks formed temporary and longer-term social bonds with adult whooping cranes. One of the four chicks died near Necedah NWR before migrating (blunt force trauma), and three chicks successfully completed fall migration. Behavior observations of all chicks was conducted throughout the second year and compared to behavior of similarly-aged costume reared chicks. Both chicks (2) that were released via the Parent

Rearing method in 2013 and survived through the 2013 fall migration survived their first winter with their parents and successfully completed the spring 2014 migration back to Necedah NWR.

Captive population

**Note: This section was prepared by Bill Brooks, USFWS SE Region*

2014 breeding season overview

Captive Breeding Facility updates

Patuxent Wildlife Research Center held 77 whooping cranes (39 males and 38 females) in 2015, including 27 behavioral pairs. Sixteen of those pairs have laid eggs in the past, but only 11 pairs were productive in 2014 which included an 8 year old female who laid for the first time. Patuxent Whoopers produced 27 eggs, with 13 of them being fertile. Although production improved from 2013, we continue to discuss possibilities for low production. Concerns include past disturbance, diet, ageing flock and lack of time in recent years to get new pairs together. Eight pairs on the Wetland Study were moved to new pen locations for the 2014 Breeding Season. Supplemented by eggs from other sources, Patuxent hatched and reared 27 whooping crane chicks. In August, ICF shipped 5 chicks to Patuxent for the Louisiana Project. One was later euthanized due to respiratory illness. In 2014 seven chicks were sent to White River Marsh, WI in July for the ultra-light led migration release. Four chicks parent-reared by captive adults were shipped to Necedah NWR in WI in September for the Parent Rearing Project. Fourteen chicks were sent to White Lake, LA in December for the LA non-migratory reintroduction. Windway Capital donated flights for all chick transfers. Five chicks died during rearing and 1 was held back from release due to developmental concerns. In October of 2014, Jane Chandler retired as crane flock manager of the Crane Program after 26 years of service and dedication.

The International Crane Foundation (ICF) managed 38 whooping cranes (18 males and 20 females), which included 14 socialized pairs. Eleven of the pairs produced 54 eggs total, of which 23 were fertile, 19 infertile, and 12 were broken. Five of the fertile eggs resulted in dead embryos. Twelve fertile ICF eggs were transferred to PWRC where 11 hatched. Seven chicks hatched at ICF, six from ICF produced eggs, and one salvaged from the Eastern Migratory Population. All of these chicks were isolation reared as candidates for the Whooping Crane Eastern Partnership modified Direct Autumn Release (mDAR) program. Two chicks died less than two weeks of age. The five remaining chicks were transferred to PWRC for release in Louisiana in December along with birds hatched and raised in PWRC for release in Louisiana.

The Calgary Zoo (CZ) managed 22 whooping cranes (10 males and 12 females) in 2014, which included 6 socialized pairs, 1 new pair, and 1 sibling pair on display at the zoo proper. The new pair demonstrated good breeding behavior, but failed to produce any eggs. One pair that hasn't laid since 2010 did adopt and incubate eggs. Four of the pairs produced 16 eggs total, of which 5

were fertile, 6 were infertile, and 5 were broken/ unknown fertility. The five fertile eggs were all transferred to Patuxent, where at least 3 successfully hatched (the other 2 lost to follow up). No whooping crane chicks were hatched out at The Calgary Zoo in 2014.

The Freeport-McMoran Audubon Species Survival Center (formerly referred to as ACRES) managed 6 male and 5 female whooping cranes including a one display pair at Audubon Zoo. This flock produced a total of 12 eggs in 2014, however none of the eggs was fertile. Four birds continue to have a chronic dermatitis issue.

San Antonio Zoo has 4 male and 3 female whooping cranes. There are two socialized breeding pairs. One pair are older birds with declining productivity over the past few years, and the other pair are younger, nine year old birds, that have just begun to show any interest in breeding. In 2014, no eggs were produced.

2015 Captive Population

	Male	Female	Total	Breeding Pairs
Patuxent Wildlife Research Center (PWRC)	37	37	74	26
International Crane Foundation (ICF)	17	19	36	14
Devonian Wildlife Conservation Center (CZ)	9	11	20	7
San Antonio Zoo (SAZ)	4	3	7	2
Audubon Center for Research on Endangered Species (ACRES)	5	4	9	2
Calgary Zoo	1	1	2	0
Homosassa Springs Wildlife State Park	1	1	2	0
Lowry Park Zoo	1	1	2	0
Jacksonville Zoo and Gardens	1	1	2	0
Milwaukee County Zoo	1	1	2	0
National Zoological Park	1	1	2	0
Audubon Zoo (New Orleans)	1	1	2	0
Sylvan Heights Waterfowl Park	1	0	1	0
Subtotal in Captivity	80	81	161	51

Acknowledgments

No one organization or individual is capable of providing all the necessary elements to recover the magnificent whooping crane. We see this recovery effort not only successful due to the great increase in the whooping crane population over the last 60 + years, but also the great deal of cooperation and collaboration that takes place amongst a wide variety of private, state and federal organizations alongside a slew of highly dedicated individuals. If not for everyone's continued effort to assist in the recovery of this species, it is likely that the species would have

been extinct long ago. Our hope, as the biologists tasked by our respective agencies with the coordination of the recovery of this revered species, is that we can all continue to work together to ensure that the species is able to be removed from the endangered species list as recently occurred for the US national bird, the bald eagle. As the population continues to grow, a greater portion of the public will have opportunities to view and appreciate the majesty of the species. We want to thank all the organizations and individuals that contributed to this report along with the wide range of recovery efforts being undertaken.

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APPENDICES

WHOOPING CRANE RECOVERY: COLLABORATION OF INTERNATIONAL EXPERTS

The Opportunity

The Whooping crane (*Grus americana*) is an icon of conservation efforts in North America. In 1941, just 22 Whooping Cranes remained in the wild – the result of widespread hunting and habitat destruction. Conservation biologists have spent decades working to improve the outlook for this long-lived but slow to reproduce species. These efforts have included broad protection for the remaining wild flock and the establishment of an international captive breeding and reintroduction program, which has released hundreds of Whooping Cranes into the wild since 1975.

However, Whooping Cranes remain classified as **Endangered** by the International Union for the Conservation of Nature (IUCN), indicating a **very high risk of extinction in the wild**. To ensure the survival of the species, we must identify the best mode(s) of conservation action under current and future scenarios.



To be effective, conservation actions must be adaptive, strategic, and consider the input of a range of stakeholders. As such, the International Whooping Crane Recovery Team, which currently seeks to update the 2007 International Whooping Crane Recovery Plan, has requested the involvement of the IUCN's Conservation Breeding Specialist Group (CBSG). The CBSG has extensive experience in the design and facilitation of participatory workshops, which bring together the latest scientific knowledge on a focal species. Workshops are conducted over the course of several days, during which CBSG facilitators lead decision-making exercises and explore management actions to improve the outlook for highly endangered species like the Whooping Crane. Invited specialists, researchers, and stakeholders identify extinction drivers, establish criteria for species recovery, and take ownership over management actions generated.

With your support, we plan to hold two innovative CBSG Workshops. A Population Viability Analysis (PVA) workshop will be held at the Calgary Zoo in December 2015, followed by a Population and Habitat Viability Assessment (PHVA) workshop in May of 2016.



Population Viability Analysis

The PVA workshop will focus on the compilation of demographic and ecological data for all wild and captive whooping crane populations. These data will be used to construct a population dynamics model to explore whooping crane population growth projections relative to a variety of stochastic and human-mediated events. This model, constructed in program *Vortex*, is not intended to replace detailed population models recently constructed for the Eastern Migratory and Aransas Wood-Buffer populations. However, it will be the first to incorporate data from all whooping crane populations in a single model and will be instrumental in assessing the fate and management of the species as a whole.

Population and Habitat Viability Assessment

Demographic analyses developed in the PVA workshop will provide a framework for identifying primary threats to Whooping Crane populations. The PHVA workshop will utilize these results, and additional input by workshop participants, to explore optimal management strategies, develop detailed recommendations, and establish timelines and criteria for Whooping Crane recovery.

Expected Outcomes

Detailed reports for each workshop will be produced collaboratively by workshop participants and CBSG staff. Results will be incorporated into the International Recovery Plan for Whooping Cranes and may also be developed for publication by workshop participants.

Funding Requirements

The organization and implementation of two IUCN CBSG workshops will require approximately \$81,100. This includes the participation of CBSG experts in facilitation and population modelling, travel and accommodation for whooping crane specialists and recovery team members, as well as venue expenses. Budget details are appended to this document.

2014 WHOOPING CRANE BREEDING SEASON REPORT CANADIAN WILDLIFE SERVICE

SUMMARY

The Canadian Wildlife Service (CWS) and Parks Canada Agency (PCA) conducted surveys for whooping cranes in Wood Buffalo National Park (WBNP) and surrounding areas as part of ongoing efforts to monitor and understand the breeding ecology of this species. Eighty-two nests, the highest number on record, were detected in May including seven nests outside WBNP, one of which was the most northern nest ever detected. Between 17 and 21 territorial pairs were also observed suggesting potential for considerable population expansion in upcoming years. In August, 32 whooping crane young were detected in 30 family groups. The proportion of fledged young per nest of 0.39 was below the long-term average of 0.48 but within the long-term natural range of variation. Active satellite transmitters on 34 whooping cranes aided searches for nests and fledged young. During May and August surveys, it was confirmed that ten marked cranes successfully nested and were observed with young; comparison of nest locations and satellite positions of marked birds leads us to believe that another seven marked birds also nested. CWS continued to monitor marked birds through the fall staging period in Saskatchewan. During this period, staff confirmed the status of 15 marked birds, six of which had offspring.

HABITAT CONDITIONS

Conditions in Wood Buffalo National Park (WBNP) were generally dry and warm during the whooping crane breeding season. Annual precipitation (May 2013 to April 2014) preceding the 2014 breeding season was 14 percent above the 60-year average. The majority of this precipitation accumulated during the summer and fall months of 2013 where total precipitation was 31% above the long-term average. Despite below average winter and spring accumulation, water levels appeared high during May surveys, presumably giving the birds many options for nesting. Below average spring temperatures delayed the thaw and may have postponed nesting activities.

Warm and dry conditions (particularly during June and July) contributed to an exceptionally active wildfire season. The Northwest Territories experienced 385 fires affecting 3.4 million ha (the 25-year average is 262 fires affecting 528,000 ha; Government of the Northwest Territories 2014). Thirty-six forest fires occurred in WBNP in 2014. Area affected by fires was 261,851 ha or 5.74% of the park, greatly exceeding the 25-year average of 1%. Eleven fires affected the whooping crane nesting area (as designated in the Recovery Strategy for the Whooping Crane in Canada), burning 25,098 ha or 6.23% of this area. However, 13 nests occurred outside the boundaries of the nesting area, and seven of these occurred within 5km of fires.

BREEDING PAIR AND NEST SURVEYS

Surveys to locate and count whooping crane breeding pairs in (WBNP) and surrounding areas were conducted between May 25-29 by Mark Bidwell (Canadian Wildlife Service - CWS; May 25-29) with the assistance of John Conkin (CWS; May 25-29), Sharon Irwin (Parks Canada - PCA; May 25), John McKinnon (PCA; May 26-28) and Richard Zaidan (PCA; May 29). Surveys were performed over 30.8 hours using a Eurocopter 120 Colibri helicopter piloted by Mark Rayner of Phoenix Heli-flight (Fort McMurray). During surveys, 82 nesting pairs of whooping

cranes were detected. The number of nests detected in 2014 is the highest count on record. In addition to nesting pairs, 17-21 territorial pairs were detected suggesting potential for substantial population expansion in upcoming years. Because cranes may move over the duration of the survey, this range reflects the possible number of unique pairs. Seven nests were found outside of WBNP; two in the Lobstick Creek / Foxholes area, and five north of the Nyarling River. A single nesting pair was found in a previously undocumented nesting area in the Swampy Lakes regions approximately 24km north of WBNP; this pair was identified through regular review of locations of whooping cranes fitted with satellite transmitters and represents the most northern whooping crane nest on record.

FLEDGING SURVEYS

Surveys to locate and count fledged whooping cranes were conducted August 09-13 by Sharon Irwin (PCA; August 09-13), Queenie Gray (PCA; August 09-13), Jane Peterson (PCA; August 09, 11, 12) and Amy Lusk (PCA; August 10, 13). Surveys were conducted over 29.7 hours again using a Eurocopter 120 Colibri helicopter piloted by M. Rayner of Phoenix Heli-flight. In total, observers detected 32 fledged young in 30 family groups (two families included twins). The number of fledged young per nest was 0.39, lower than the 20-year average of 0.48 but within the long term natural range of variation.

STATUS OF MARKED WHOOPING CRANES

In 2009, a multi-agency research project to capture and mark whooping cranes was initiated; captured birds are fitted with a satellite transmitter (Platform Transmitting Terminal) with Global Positioning System capabilities mounted on a two-piece leg band. Transmitters are programmed to record the bird's spatial location four times daily, recording both daytime and nighttime locations; this schedule allows for detailed information on diurnal and nocturnal (roosting) habitat use during all stages of the annual cycle, and on migratory behaviour in spring and fall. Through December 2009 to February 2014, 71 whooping cranes have been captured and marked with satellite transmitters; 38 adults and two juveniles were marked on the Texas Gulf Coast wintering grounds and 31 juveniles have been marked during the breeding season in WBNP.

The project, carried out by the Whooping Crane Tracking Partnership (WCTP), represents a cooperative effort between five core partners: the Canadian Wildlife Service, the United States Geological Survey, the United States Fish and Wildlife Service, the Crane Trust, and the Platte River Recovery Implementation Program, with support from Parks Canada, the International Crane Foundation, and the Gulf Coast Bird Observatory. Specific objectives of the research are to: 1) advance knowledge of breeding, wintering, and migration ecology including threats to survival and population persistence; 2) disseminate research findings in reports, presentations, and peer-reviewed literature to provide reliable scientific knowledge for conservation, management, and recovery of whooping cranes; and 3) minimize negative effects of research activities to whooping cranes.

During the 2014 breeding season, 34 transmitters provided positional data and aided searches for whooping crane nests and fledged young. Of these marked cranes, it was confirmed that ten marked cranes successfully nested and were observed with young during August fledging surveys. In addition to confirmed nesters, comparison of survey data (i.e., nest locations) and satellite locations of marked birds leads us to believe that another seven marked birds likely

nested. Observations of whooping cranes during fall staging in Saskatchewan confirmed that one additional marked crane bred successfully in 2014 but was not identified during breeding ground surveys (this transmitter was inactive throughout the breeding and fall migration seasons).

During the fall staging period in Saskatchewan, 29 transmitters offered location data. When possible, re-sighting of marked birds provided information on their status (i.e., with or without offspring or mate). From September through November, visual confirmations of 15 marked birds (13 with active transmitters) were obtained in Saskatchewan by CWS biologists Nicole Skelton, John Conkin and Mark Bidwell. Six marked birds were observed to have offspring, providing further support that the WCTP's effort to mark birds has not interfered with reproduction. Of pairs that were detected with young on the breeding grounds, those resighted during fall staging in Saskatchewan were all observed with offspring. During surveys for marked birds, we observed 116 whooping cranes (100 adults and 16 juveniles). Three family groups included twins; one of these groups included a marked adult.

STOPOVER STUDY

In addition to tracking efforts to monitor and confirm the status of marked birds during fall migration, CWS participated in an ongoing study to collect ground-based habitat information at whooping crane stopover sites. This study aims to improve our understanding of specific habitats and locations selected by whooping cranes during migration and will be used to improve conservation efforts and inform habitat management to aid whooping crane recovery. In particular, information obtained via this study in Canada will inform identification of Critical Habitat under the Species at Risk Act (SARA) and characterize threats at these sites. CWS joins researchers from the Crane Trust, U.S. Geological Survey, and the Platte River Recovery Implementation Program to collect information on stopover sites from Saskatchewan to northern Texas. In 2014, Nicole Skelton (CWS) and John Conkin (CWS) conducted fieldwork to collect data on generalized land cover and potential endangering features at stopover locations in Saskatchewan. CWS staff evaluated 20 stopover sites using standardized protocols, including 13 locations that may be considered for designation as Critical Habitat under SARA.

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2014 Louisiana Whooping Crane Report

Louisiana Department of Wildlife and Fisheries

Coastal and Non-game Resources

1 June 2014 to 30 June 2015



3 August 2015

EXECUTIVE SUMMARY and RECOMMENDATIONS

The Whooping Crane reintroduction program in Louisiana continued significant positive progress during this reporting period. First, the current population has a 61% survival rate (39 of 64 individuals), with the status of six cranes currently unknown. Survival of cranes within the 2011-2014 cohorts continues to be high after one year (70-75% survival), with minimal mortality following this one year period. To reduce costs associated with satellite PTT services, we evaluated cellular, GSM transmitters this year to track four juveniles and one adult crane; we will continue the trial in 2016-2017 to determine their utility in this region. At the end of the reporting period, 27 cranes were located in Louisiana and 6 in Texas. As in previous years, many cranes continue to heavily use the working wetlands – rice and crawfish agriculture – of the historical Cajun Prairie region of southwestern Louisiana (Jefferson Davis, Vermilion, Acadia Parishes). We have also seen an expansion of habitats used in the Mississippi River Alluvial Plain of northeastern Louisiana; these habitats are primarily being used by individuals from the 2013 and 2014 cohorts. Habitat use data continues to indicate that they are habitat generalists, with likely generalized diets.

We observed increased nesting activity in spring 2015, with four pairs nesting (five attempts including one re-nest). The nest locations were scattered across a wide spatial area in southwestern and central Louisiana in widely different habitats. For the latter, nesting was confirmed in coastal marshes on White Lake Wetlands Conservation Area (WLWCA, Vermilion Parish), in an actively fished crawfish pond on private land (Avoyelles Parish), in a riparian freshwater marsh/swamp (Allen Parish), and in an impounded, inland wetland (Allen Parish). The diversity of habitats used is encouraging and is similar to the diversity of habitats (e.g., in coastal wetlands, agricultural lands, seasonal wetlands, etc.) used by reintroduced cranes in Louisiana during the non-nesting period. Where possible (i.e., non-marsh habitats) we continued conducting time activity budgets of nesting pairs. The nesting pairs observed exhibited high levels of nest attendance, with three of the five nesting attempts incubating nests to full term. However, none of the nests produced a hatched chick in 2015. Two nesting attempts by the same pair failed due to egg infertility (the same pair that laid two infertile clutches in 2014), one failed due to flash flooding associated with heavy rainfall (fertile egg), and two failed for unknown reasons after 16-37 days of incubation. We have not observed any incidence of biting black flies or other horsefly species interrupting observed nesting attempts in the Louisiana flock. We have observed 6 breeding pairs formed at the end of the reporting period, with potentially several more pairs forming going into the 2016 nesting season. Therefore, we expect to observe additional nests in 2016.

Public education remains a high priority of the reintroduction program. LDWF staff participated in over 50 festivals and events. A major focus of the education efforts centered on six teacher workshops with 74 middle and high school teachers from Louisiana. The Alexandria Zoo (Alexandria, Louisiana) has shown interest in providing education/outreach opportunities to zoo patrons, with LDWF highly supportive of this cooperative effort. The Whooping Crane public awareness media plan for 2014-2015, funded by a grant from Chevron, included the use of billboard space provided by Lamar Advertising, radio commercial space purchased through the Louisiana Association of Broadcasters, and television commercial space purchased on cable television systems in Alexandria, Lafayette and Lake Charles. Billboards alone were estimated to reach almost 850,000 viewers. A survey of licensed hunters was also conducted to determine awareness and source of awareness of the reintroduction program. Within the survey group (2,165 licensed hunters), 56% had heard about the reintroduction. When asked how they heard about the reintroduction their responses were as follows: TV 29%, radio 16%, website/social media 14%, newspaper 11%, billboard 8%, teacher workshop 1%, and festival 1%. Landowner relationships also remain a high priority, with continuing education efforts ongoing within the crawfish industry. LDWF staff continues to receive high support from farmers with cranes on their property, and no landowner to this point (since 2011) has denied access to their properties.

However, as with prior reporting periods, we were not immune to some setbacks. We had 4 confirmed/likely mortalities during the reporting period, but this was less than the 7 reported last year. Mortalities in 2014-2015 included one via power line collision, one via gunshot, and two likely mortalities with unknown fate.

We will continue to find new and exciting ways to ensure that this reintroduction succeeds, including activities associated with our management, research, and education/outreach programs. During late 2015, a new release pen will be constructed on Rockefeller Wildlife Refuge into a newly refurbished 90 acre marsh unit. This is being completed to facilitate the ability to split the 2015 cohort, additional capacity of future cohorts, and to determine if cranes released “deeper” into the marsh will avoid venturing to the north where all gunshot mortalities have occurred.

Recommendations to the Whooping Crane Recovery Team (WCRT)

- Larger Cohorts – The Louisiana Whooping Crane Team is prepared to accommodate larger cohorts (25-36) into the future with the construction of a second release pen at Rockefeller Wildlife Refuge. Therefore, we recommend to the WCRT that larger cohorts be provided in 2016 and beyond (as per the WCRT 2015 egg allocation letter dated 13 April 2015). Larger cohorts are more desirable because they are 1) more cost effective with the annual resources being invested into the program and 2) better able to fill the vast amounts of suitable habitat in the region (as evident in Figures 1 and 4). Ultimately, larger cohorts will increase the probability of reintroduction success in Louisiana. Cranes reintroduced in Louisiana have shown high survivorship, utilized multiple habitat types across a large spatial area, exhibited diverse nesting habitat preferences in the first two years (without observation of black fly pestilence), and shown capabilities to incubate eggs to full term. Therefore, we advocate and concur with the WCRT 2015 egg allocation letter that the captive flock resources would best be utilized by bolstering the Louisiana reintroduction program in 2016 and into the future.
 - Genetics – Along with larger cohorts, we request that future cohorts also be genetically diverse relative to the existing Louisiana flock on the landscape. Currently, the Louisiana flock is genetically overly represented by three captive breeding pairs (16 of 39 birds from the 3 pairs), with one full sibling pair already observed. Even though we would like to receive all captive-reared birds in the future, this may not be compatible with improving the Louisiana flock’s genetic diversity. In order to improve genetic diversity, it may be necessary to make egg exchanges between the three captive centers and WCEP.
- Early Hatched Captive Birds – In all prior years of the Louisiana reintroduction, we have consistently received a majority of chicks that were hatched in the middle to late stages of the captive nesting season. These later-hatched chicks are less resilient than the early-hatched chicks. As a result, Louisiana’s allocation has consistently dropped lower than expected by the end of the season due to chick mortality or ailments. Also, Louisiana birds have already shown early nesting tendencies (late February – early March), with the nesting period more naturally aligned with earlier-hatched chicks. We argue that a fair and well-conceived allocation would dictate that the Louisiana reintroduction receive early-hatched chicks to insure equitable allocation numbers and the most robust chicks. This would facilitate the greatest opportunity for the Louisiana reintroduction to succeed.
 - Separate Cohort Deliveries – With the inclusion of early-hatched chicks, it may be difficult to socialize chicks with a wide range of hatch dates. Thus, it will be necessary to make two or more separate cohort deliveries during the fall. This is now acceptable for the Louisiana reintroduction with the addition of the second release pen.
- Fertile Captive Eggs for Infertile Pairs – In the last two nesting seasons, we have experienced a nesting pair that has consistently laid infertile eggs (n = 8 eggs in 4 clutches). This is uncommon as fertility in the WCEP flock has been ~77% for even early breeders (E. Szyszkoski, unpubl. data). Further, in both years, this pair has incubated all 4 clutches to term, indicating appropriate nesting behaviors and attendance. In future years if this pattern continues with this pair (or another pair exhibits similar infertility), we recommend that a captive fertile egg be allocated for the second nesting attempt. This methodology would be preferable because the chick would be “parent reared” with learned behaviors rather than a naïve, costume-reared chick upon arrival. Further, in one instance with an infertile WCEP pair, a fertile egg was given to them to incubate two years in a row (one to fledging), with natural fertility observed the two years later (E. Szyszkoski, pers. obs.).
- Educational Display Crane – We recommend that a crane or pair of cranes – possibly deemed not suitable for wild-release – be devoted to the Alexandria Zoological Park (Alexandria, Louisiana). They are a new partner with LDWF in providing education and outreach on Whooping Cranes, and this would provide for further education, outreach, and appreciation for the species in Louisiana. The zoo currently holds three other species of cranes in their collections (Black-crowned Crane, Demoiselle Crane, and Florida Sandhill Crane).

RECENT COHORT SUMMARIES, PEN MANAGEMENT, AND SOFT RELEASE

2013 Cohort

In early June 2014, a group of 3 males (L1, 3, & 6-13) left WLWCA, initially moving ~14 miles to the southeast before moving northwest and settling down on private ag land near the border of Jefferson Davis and Allen Parishes. They remained in this area during the summer, made a brief trip to WLWCA in late October, returned to their previous location, and again returned to WLWCA in mid-February 2015. While at WLWCA, L3-13 separated from the other two males, but all three (now in two separate groups) returned to their previous area in early March. In late March, a longtime solitary female (L14-11) met up and briefly associated with L1 & 6-13, with L3-13 was also seen with the group on one occasion. By the end of April, L1 & 6-13 met up with a trio of 2011 birds and L3-11 left with them. Over the next few weeks, L3-11 paired with L1-13, they separated from L6-13, and thereafter nested in a nearby, small isolated wetland. This left L6-13 to rejoin L3-13 in mid/late May on private property in Allen Parish where they remained through the end of the report period.

Conditions in the WLWCA marsh were excellent and the rest of the cohort remained until L9-13 left by herself in late July, moving north and settling on private ag property in Calcasieu Parish for several weeks before moving northwest into Jefferson Davis Parish. In early October, she moved a short distance to the east with some of her data points indicating overlap/proximity to two adult pairs in the area. She returned to WLWCA at the end of December and stayed until leaving in late January with two males, L7 & 8-13. The group returned to WLWCA in late March and stayed for several weeks before heading north in mid-April, this time with two juvenile females (L9 & 11-14) following them. One week later the trio headed south, returning to WLWCA, while the juveniles remained behind. L8 & 9-13 left WLWCA by early June and moved to private property in Jefferson Davis Parish where they remain. L7-13 was later discovered with two females, L11-12 & L10-13. We hope L9-13 will remain with L8-13, and they will become a breeding pair next spring.

L7 & 8-13 left the WLWCA marsh in mid-August and moved ~160 miles north to private property in Franklin Parish; this property was previously catfish ponds but now is currently enrolled as CRP lands. They remained at this location until early/mid-November, returned briefly to WLWCA, returned to the north, and then once again returned to WLWCA in mid-December. By late January they returned north, but L9-13 accompanied them. They returned to WLWCA in late March, stayed several weeks, and then returned north in mid-April with L9 & 11-14. About a week later, L7, 8, & 9-13 headed back to WLWCA while the 2014 juveniles remained behind. L8 & 9-13 left WLWCA in early June and moved to private property in Jefferson Davis Parish where they remain. L7-13 was later discovered with L11-12 & L10-13, both of whom are females. We hope L8 & 9-13 will remain together and become a breeding pair next spring and L7-13 could pair with L11-12 or L10-13.

In early September L4-13 left WLWCA and moved to private ag land in Acadia Parish. In mid-October she was caught and briefly restrained to clean off her satellite transmitter that was not functioning due to the solar panel being covered in mud. This resolved the situation and we began receiving data again. She remained at this same location until late October when she moved south into Vermilion Parish (north of Gueydan) and then was unfortunately shot (see Morbidity and Mortality section below).

In mid-November L10-13 left WLWCA and moved north to private ag property in Acadia Parish. This was the first time she left WLWCA since arriving and being released. By the next week she had moved back into Vermilion Parish (southeast of Gueydan), remained there for several weeks, and then returned to WLWCA at the release pen shortly after the 2014 cohort arrived. She left several days later and ultimately returned near the area she had previously been using in Acadia Parish. She again returned to WLWCA at the end of December and began associating with newly released L8-14 as well as L11-12 (possibly other birds who were coming and going from the refuge impoundment); some of the latter had non-functional transmitters and could not be tracked. By mid-June she left WLWCA and was found with L11-12 and L7-13. After some localized movements, they settled in an area of private property in Acadia Parish.

2014 Cohort

As with prior Whooping Crane cohorts, the 2014 cranes (n = 14, 6 males, 8 females; 4 from ICF and 10 from Patuxent) were transported from Patuxent Wildlife Research Center (PWRC) in Maryland to Louisiana on 4 December. They were transported in individual crates by airplane, truck and trailer, and finally by boat. Once at the release site at White Lake Wetlands Conservation Area (WLWCA), each bird was unloaded and examined by state wildlife veterinarian, Dr. Jim LaCour, before being carried and placed into the 100 foot diameter top-netted pen. On 6 December, the birds were banded and received their transmitters. This year we tested six Microwave Telemetry solar powered GSM (cell)/GPS transmitters; these are almost identical to the PTTs previously used, but the GSM transmitters rely on cell towers to transmit the data rather than satellites. Ultimately, if this technology proves effective, this could result in significant savings on the data costs. Four chicks received the new GSM transmitters and 10 received the standard GPS PTTs that we have been using since the 2011 cohort. Eight birds, including all four with the GSM units, also received a VHF transmitter to allow real time tracking and observations, while also providing a backup method of tracking if the GSM units did not function properly. After banding, the temporary fence was rolled back and the birds were given access to the entire top-netted pen. Food was provided and the birds were checked each day.

On 29 December 2014, the birds were released into the 1.5 acre open pen and allowed to begin exploring the surrounding marsh. Food was provided in the open pen and the birds continued to be checked each day. Evening roost observations were conducted on 10 nights after the birds were released, but similar to previous years, very little effort was made to encourage them to roost inside the pen. Instead we simply observed and documented where the birds settled down to roost in the evenings.

Similar to last year, numerous birds from prior cohorts returned to the WLWCA marsh shortly after the new cohort arrived. At one point in early January, 18 of the 26 older Whooping Cranes were present in the WLWCA refuge impoundment. There was interest and aggression from some of the older birds towards the juveniles through the fence and aggression between various adults as well. However, the difference this year was that the older birds did not leave, so once the juveniles were released from the top-netted pen, there were more interactions between them and the adults. Several pairs of adults were successful in driving the juveniles out of the pen and preventing them from accessing the feeders. Thus, due to the aggression of some of the adults, we had to adjust our management of the chicks. In order to encourage the adults to leave and not become territorial over the pen, the feeders were removed periodically for several weeks starting just three days after the chicks were released. During this time the juveniles were only allowed access to food when a costumed caretaker was present once per day. The juveniles remained in the area and eventually the adults moved elsewhere in the marsh or left the area entirely. This permitted us to return the feeders and for the juveniles to access the pen again. With time the juveniles gained confidence and were later able to defend themselves, the pen, and the feeders from some older birds when they returned again later in the winter.

Although the presence of the adults created challenges for the chicks it also created opportunities for interactions and new associations between various adults who previously had not encountered each other. It also gave us the opportunity to observe the interactions and behavior of adult cranes. This included several copulation attempts by two different pairs and the opportunity to catch one bird to replace her failed PTT. In the future, this may present the best opportunity we have to observe and to capture older birds who need their transmitters replaced.

Food was provided more intermittently throughout the winter due to the presence of various adults but was discontinued after 16 March. All juveniles as well as several adults remained in the area until mid-April when some of them began to leave, likely in response to higher water levels due to heavy rains and flooding conditions earlier in the month. The two ICF females, L9 & 11-14, apparently followed older birds north. Later they separated from the older birds, but they remained in the area, moving locally between Franklin, Richland, and Caldwell Parishes through the end of the report period.

A group of three birds, L5, 6, & 10-14, left at the same time and spent several days in Calcasieu Parish before moving to and settling in Jefferson Davis Parish, an area that has had high crane use since 2012. Several birds remained in the WLWCA marsh and a total of six in two different groups moved into TX.

EXTENDED USE OF TEXAS HABITATS BY HATCH YEAR (HY) 2012 & 2014 BIRDS

Starting with the first cohort of Whooping Cranes released in Louisiana, some individuals from every release group have made short, exploratory trips into eastern Texas but typically returned within several days. Beginning in May 2013, seven members of the 2012 cohort spent approximately six months in areas around Dallas, Texas. As with all previous border crossings, we informed our USFWS and TPWD colleagues, but the lengthy stay of the birds in 2013 raised some concerns, as the birds are considered fully endangered while in Texas. Because of the logistics of monitoring these groups, we rely heavily on TPWD and USFWS colleagues, USFWS Whooper Watch volunteers, and private citizens to help monitor the birds along with the data from their transmitters. A smaller number of those original seven HY2012 birds returned to Texas in 2014 and 2015, again spending significant amounts of time in the Dallas area. Additionally, this year six 2014 birds have also spent time in southeast Texas with details described below.

HY2012

L5-12

2014 – In mid/late August, L5-12 left Lewisville Lake (LL) and first moved east to the Lake Fork Reservoir in Rains County. She remained there ~one week before leaving on 6 September and returning to Louisiana. By the next week she had returned to the private farm in Acadia Parish where she spent time the previous fall. In early October we stopped receiving location data for her and discovered her PTT was no longer attached. She was caught on 10 November and given a new PTT; her feathers were examined and it was determined she had likely molted during the spring while in Texas. Just after the capture and again in early December she made brief trips to WLWCA, each time returning to the farm in Acadia Parish. She returned to WLWCA again at the end of December.

2015 – She remained in and around the WLWCA refuge impoundment early 2015, and was occasionally seen near the pen associating with other cranes in the area. She was seen on 8 April at the release pen with a male (L14-12) unison calling and exhibiting pre-copulatory behavior together. She left WLWCA on 22 April and flew to Angelina County, TX before continuing on several days later to Smith County. She was confirmed alone at this location and remained here until 4 June when she continued towards Dallas, spending a day on Lake Ray Hubbard before moving to a private ranch north of LL in Denton County. Many habitats she previously used at LL (e.g., shallow lake margins due to drought) were not suitable due to significant rain this spring. She remained in Denton County through the end of the reporting period (on 30 June a volunteer reported two cranes at this location, but a follow up flight on 8 July confirmed only L5-12).

L6, 8, & 14-12

2014 – Early/mid-May L8 & 14-12 left WLWCA and returned to Texas. They moved frequently for several weeks before settling down on private property in Kaufman County, ~8 miles east of where they spent the summer and fall of 2013. On 31 May 2014, L6-12 also left WLWCA and ultimately moved to private property in Ellis County, Texas, very close to where she spent the summer and fall 2013 (~7-10 miles of the two birds in Kaufman County). In late June/early July she made a short trip to an area south of Fort Worth before returning to Ellis County. In early September L8 & 14-12 moved and found L6-12 and the three birds remained together in Ellis County until leaving on 7 November for Louisiana. They returned to areas formerly used on WLWCA (leased ag sections), remained there for several weeks, and then returned at the end of November to the National Audubon Society's Paul J. Rainey Sanctuary (RWS) to remain until the end of 2014.

2015 – In early February the trio of L6, 8, & 14-12 began to separate. Initially L8 & 14-12 came to WLWCA and L6-12 remained at RWS. Around this same time L14-12's PTT failed (we later confirmed the antenna was missing) so it became difficult to keep track of him. Shortly after arriving at WLWCA, L8-12 began moving frequently and was seen alone during a flight on 16 February. Throughout much of the spring and through the end of the reporting period, her frequent movements continued, mostly in central Louisiana but also briefly into TX. She settled by herself in Acadia Parish during May and June. By mid-February L6-12 left the RWS refuge and briefly came to the leased ag section of WLWCA, returned to RWS, and then returned to WLWCA again in early March. In mid/late March, L14-12 was found at this location with L6-12, but then on 8 April he was seen at the release pen with L5-12. He has not been seen or confirmed since then but he is not trackable without a functional PTT. In mid/late April L6-12 moved to several different locations in Louisiana before leaving in mid-May and heading to TX, arriving in Ellis County near where she spent the past two summers. She remained at this location through the end of the reporting period (confirmed alone at this location during a flight on 8 July).

HY2014

In mid-April many of the yearlings who had remained in the WLWCA marsh began to leave the area, likely in response to rising water due to heavy rains and flooding in the previous weeks. A group of four yearlings (L1, 12, 13, & 14-14) arrived in Texas on 22 April and settled on private ag land southwest of Beaumont (Jefferson County). Movement into Texas has not been unusual for yearlings first dispersing away from WLWCA, but they typically return to Louisiana after several days. However, these birds stayed for about one month, moved northwest several miles into Liberty County, and then moved again weeks later to the northeast. They have settled to the south of Nome (Jefferson County) where they currently remain, having now been in Texas for ~3 months.

Also in mid-April, a pair of 2014 males left WLWCA and spent several weeks on private property in Cameron Parish before moving on 14 May to Texas and settling near Devers (~16 miles west of the four yearlings already in TX). These birds were observed at this location on 3 June, but one bird's PTT failed to turn on again after 8 June; another's GSM unit has not provided new location data since 24 June. A ground search on 30 June and aerial searches on 8 and 27 July failed to detect these birds at this location so their current location and status is unknown.

Additional information (e.g., individual band colors, radio frequencies, etc.) on surviving reintroduced Whooping Cranes is summarized in Appendix 2.

COHORT DISTRIBUTION AND HABITAT USE

Cohort Distribution

Crane movements were monitored weekly through the use of remote monitoring devices. During this reporting period, two types of remote transmitters were deployed on the cranes. Most cranes (n=34) had GPS satellite transmitters and a smaller number (n=5) were included in a test group that received GSM transmitters (described above). The satellite transmitters are programmed to collect data at three time periods every day (8AM, 4PM, and 12AM GMT time) and transmit the data every 48 hours. GSM transmitters collect numerous points throughout the day with data transmission occurring every day when within range of cellular towers. Only data points that match those collected via the GPS satellite transmitters as closely as possible are included in the analyses. When satellite data were unavailable, high quality Doppler readings were used to indicate location. These readings are included in the distribution information.

Of the more than 19,000 data points transmitted by remote monitoring devices between 1 June 2014 and 30 June 2015, 88.1% were located in LA while the remaining 11.9% occurred in TX with hatch year (HY) 2012 cranes spending the most time in TX (Table 1, Figure 1).

Habitat Use

Of all the points collected between 1 June 2014 and 30 June 2015, only 57.9% were used in the habitat calculations because all points have not been classified at this time. Habitat type was classified either remotely by using the most recent satellite imagery on Google Earth or directly making site visits to inspect the area (i.e., ground truth). There was no method for random selection of the points and not all points were ground-truthed, so biases may exist. Because habitat changes rapidly in the working wetlands of the Cajun Prairie, the habitat was grouped into four major categories: agriculture, wetland, pasture, and other. Doppler data points were excluded from the habitat analysis. Points representing HY2014 cranes only include data after their release from the top-netted pen in late December 2014.

Total data collected and analyzed for habitat use throughout cohorts was fairly equal (Table 2). While habitat use between HY2012 and HY2013 cohorts appeared similar, HY2011 and HY2014 birds spent significantly more time in one specific habitat type (Figure 2), with HY2012 birds preferring agricultural areas and HY2014 using wetlands. For the latter, this is likely due to the time period covered by this report when they were still associated with food at the pen. By the end of the reporting period, all HY2014 birds had dispersed away from WLWCA so future analysis of their habitat use may be different than reported herein. If habitat is analyzed by state, cranes show a tendency to use wetland and agricultural habitat in Louisiana and wetland and pasture in Texas (Figure 3).

MOLTING

One of the four birds documented molting in spring/summer 2014 was found dead, likely killed by a predator while molting. The other three successfully completed their molt. Based on data from her GPS PTT, it was suspected that L5-12 (a 2 year-old) may have molted while in TX. In November after returning to Louisiana, she was captured to replace her PTT which had fallen off. While in hand, the condition of her primary and secondary feathers was evaluated and these suggested she had indeed molted while in TX. We were not able to confirm whether two additional birds who summered in Texas in 2014 molted or not.

We have not confirmed any birds molting in spring 2015 despite numerous birds (2, 3, and 4 year-olds) who could have molted for the first or second time. Because of increased nest monitoring, we could not devote as much time to observe birds for molt. Further, other birds are missing or have non-functioning transmitters, and therefore, they cannot be tracked. During captures this fall and winter, we may be able to evaluate the feather condition of birds and confirm whether they molted (but without knowing the time it occurred).

PAIRING AND REPRODUCTION

Nesting activities in 2015 included four pairs and five nesting attempts (for Nesting Summary see Table 3). Nests occurred in three parishes (Allen, Avoyelles, and Vermilion) in central and southwestern Louisiana (Figure 4). Details of nesting and reproduction occur below. We are well aware of the black fly pestilence issue with the WCEP flock, and to this point, we have not observed any evidence of biting black flies or other horsefly species that are inhibiting proper nesting behaviors of reintroduced Whooping Cranes in Louisiana.

L1 & 6-11 –The pair used the WLWCA marsh in the early spring, using the refuge, the east-side marsh, and the hunting marsh. We did not receive much data from L6-11's GSM transmitter but in early-mid April, overlapping data points from L1-11's transmitter indicated they may have a nest (Vermilion Parish). Unfortunately, from 10-14 April, the area received ~10 inches of rain. When we were able to investigate on 16 April, we found the nest had flooded. A small piece of egg shell was present along with one whole egg indicating there had been two eggs (Figure 5). The intact egg was candled and determined to be fertile, so it was transferred to ACRES that day for further incubation and evaluation. However, it was later determined to be non-viable, likely due to water inundation and >24 hr abandonment by the pair. The pair remained at WLWCA through the end of the report period but did not re-nest.

L7 & 8-11 –In early-mid January they returned to the same farm (Avoyelles Parish) where they nested in 2014. In mid-February the landowner informed us that the birds constructed a nest platform in one of the crawfish fields, but no eggs were laid. During a check at mid-day on 27 February, the birds were not defending the nest they had built, but the next morning the landowner reported that the birds had built a new nest and were sitting on it. Two eggs were later confirmed in that nest, and the birds successfully incubated the eggs past full term before they were collected and determined to have been infertile. Just as in 2014, the birds re-nested ~2.5 weeks later and again incubated two eggs past full term. These eggs were also found to be infertile.

L10 & 11-11 –Starting in early December and through early June 2015, the pair began making regular, almost weekly trips, back and forth from agricultural lands in Jefferson Davis Parish to WLWCA. Although transmitter data never suggested the birds were incubating, there were two clusters of points in the WLWCA refuge and hunting marsh from April and May that were investigated during a flight in late May. At one of the locations a crane nest was seen and later investigated from the ground. Because the birds did not remain at this location for very long, we do not believe they produced any eggs.

L1 & 7-12 –Starting in late November the birds began making periodic trips back to WLWCA. They were aggressive to the newly released chicks and territorial of the pen/feeders until other adults arrived and likely displaced them. No evidence of nesting was observed in spring 2015, but they are considered a breeding pair because they have been associated for over one year and have been observed copulating. They remained in the WLWCA marsh through the end of the report period. This pair are full siblings.

L2 & 13-11 – During a flight on 29 April, four nest platforms were seen in a wetland (Allen Parish) occupied by this pair, but upon observation, the pair was foraging in a nearby pasture. The nest site was in an impounded wetland consisting primarily of herbaceous vegetation surrounded mostly by pasture and bordered by a wooded area to the south. The next week while the birds were elsewhere those four platforms were examined and two additional platforms were discovered. There was no evidence of eggs at any of those platforms, but when next checked on 14 May, the birds were incubating on a new nest. The nest was not visible from the ground and during the next flight the bird remained sitting so the number of eggs was unknown. Observations were conducted and the birds continued to incubate normally through the last observation late on 9 June. During the next check early on 12 June the birds were no longer sitting and there was no evidence of a chick. A small piece of egg shell was found at the nest, with the cause of the failure unknown.

L3-11 & 1-13 – Beginning with a roost point on 16 May this newly formed pair were exclusively staying in a small wetland (Allen Parish), approximately one mile from the farm fields they had been formerly utilizing. A flight over the area on 28 May found the pair on a nest with 2 eggs, with several other possible nest platforms elsewhere in the wetland. A ground check the following week confirmed that observations of this nest would not be logistically feasible (i.e., tall vegetation precluded the ability to observe the nesting behaviors from a distance without disturbing the birds). A flight on 17 June found the adults off the nest, in a field ~1.5 miles to the south. One egg remained in the nest and was collected later that day (Figure 6); no evidence or remains of the second egg were located. The intact egg was transferred to ACRES the next day to be evaluated and incubated. However, it began to rot and when opened, the fertility could not to be determined. Later evaluation of the transmitter data indicated the male had left the wetland on 13 June and this is likely when the nest failed for unknown causes.

Nest Monitoring

A total of 18 nest monitoring sessions (54 observation hours) were completed in 2015 on three nest attempts in locations that were conducive to visual observations (Table 4). One additional nest was investigated from the ground after being discovered during an aerial survey (see *L3-11 & 1-13* above), while a final nest failed due to flooding (see *L10 & 11-11* above). As in 2014, nest monitoring was alternated among three time periods – morning (0700 – 1000 hrs), midday (1100 – 1400 hrs), and late afternoon (1500 – 1800 hrs). The amount of time an adult spent on the nest was recorded and detailed notes were made on the behavior of the incubating adult, as well as that of the non-incubating adult and its distance from the nest. General habitat conditions, weather conditions, predators, bird species in the nest vicinity, and various behaviors displayed by the nesting pair were also documented.

The first nest attempt by *L7 & 8-11* in 2015 was initiated on 28 February, nearly a full month before their first attempt the previous year. Despite the earlier start, the average temperature and nest attendance times of the female and male in 2015 were similar to those in 2014 (Table 4). When comparing their first nest attempts in each year, the average time spent within close range of the nest (i.e., <50 m) while not incubating tended to be greater for both the female and male this year compared to last year. The time spent far from the nest (i.e., >50 m) for the female or male during their first nest attempt each year were not different. During *L7 & 8-11*'s second nest attempt in 2015, the average nest attendance time of the female was greater than that of the male, demonstrating an inverse relationship when compared to their first attempt this year. The female's nest attendance time during the second nest attempt averaged more than 2 hours for the monitoring period, while the male's average nest attendance was less than 1 hour. However, the male did spend considerably more time close to the nest when not incubating during this nest attempt compared to the female.

The first nest attempted by *L2 & 13-11* was initiated between the afternoon of 5 May and 14 May. Their nest attendance times were fairly comparable to those recorded for *L7 & 8-11*'s first nest attempt this year. During the monitoring period, the female's nest attendance averaged approximately 1 hour, while the male's nest attendance averaged slightly less than 2 hours. The female and male spent similar amounts of time close to the nest when not incubating, but the female tended to spend more time far away from the nest.

MORTALITY, MORBIDITY, AND HEALTH ISSUES

To date, we have experienced mortality in all crane cohorts (Table 5). As transmitters fail it will become increasingly difficult to keep track of every individual and our certainty about the size of the population and the survivorship of the various cohorts will not be as strong.

Total survivorship for all cohorts is 61% (39 out of 64), but survivorship has increased dramatically since the first cohort with one year survival increasing from 30% with the 2010 cohort to 75%, 71%, and 70% for the 2011, 2012, and 2013 cohorts, respectively (Table 5). Six mortalities are attributed to wanton shooting by people (24% of mortalities), 4 to presumed predation (16%), 2 to disease (8%), 2 to power line collision (8%), and 11 for unknown causes (44%). Even though shooting has contributed significantly to our mortality numbers, Louisiana has not been the only region with wanton shooting of Whooping Cranes and thus, it unfortunately appears to be an increasing problem nationwide.

Whooping Cranes that are handled for any reason (primarily transmitter change) receive a cursory physical examination and samples are obtained for the following routine tests: fecal parasite examination, cloacal culture, complete blood count, serum chemistry, and serological testing for Inclusion Body Disease of Cranes (IBDC). To date, fecal examinations have detected *Capillaria* spp. (nematodes) and *Salmonella* Litchfield was cultured from the cloaca of L6-11 but was not causing disease. IBDC tests have been negative and the only hematological abnormality detected has been an eosinophilia possibly attributable to parasite infestation. The number of birds recaptured and sampled thus far has been small (9 captures of 7 different birds), but extra serum and blood samples have been saved for future testing, research, or disease screening.

Mortality (Mortality Table – see Appendix 3.)

Overall survival continues to be satisfactory and appears to level off after the initial months following the release of juvenile cohorts (Table 5). Unfortunately, there was an additional shooting incident that resulted in the death of one bird (L4-13). This most recent case remains open and under investigation. The two previous cases remain open and unsolved with large financial rewards still offered for information leading to the arrest and conviction of the person(s) responsible. Predation (or suspected predation) of newly released birds is expected and is currently at an acceptable level. Below is a summary of mortalities observed throughout the reporting period (all mortalities to date in Appendix 2).

L13-12 – Completed his molt and was confirmed flying again by 4 July when a roost data point indicated he had flown across a road to a new, nearby location. He was last seen alive mid-day on 23 July. His GPS PTT turned on normally through 25 July and gave a 1600 point on that day. The PTT failed to turn on as scheduled on the 27th and 29th, and then again on the 31st even though weather had been clear and sunny and all other PTTs were turning on as scheduled. A ground check on 30 July could not detect a VHF signal from local roads bordering fields where he was last located and from which his signal could previously be heard. A flight to determine his status on 1 August detected a weak VHF signal still in the area, but no bird was seen and indicated he was most likely dead. During a ground search of the area, his carcass was found near a small power line crossing the field. Examination of the remains was consistent with a power line strike. Based on the condition of the carcass and the timing of PTT failure, we suspect the bird died after 1600 on 25 July or on 26 July before the PTT should have turned on again on 27 July.

L5-13 – Mortality for this bird has not been confirmed through recovery of remains or his transmitter, but he is presumed dead and is no longer counted in the population total. As of 25 March 2014 when he was last observed up close, his previous eye injury was still resulting in tissue above his eye drooping down and possibly reducing his field of view. It is unknown if or how much this compromised his vision though he did appear to fly and forage normally. However, as a result of his injury and temporary isolation during treatment, he lost his place in the flock and once returned he was often alone or only loosely associated with the other juveniles. His PTT had not been working properly and last gave a GPS point on 21 May and a low quality Doppler point on 16 June; the transmitter turned on, on 19 June for the last time but providing no new data. He was last seen and positively identified through photographs during a flight on 27 June 2014. At this time he was in the northwest end of the WLWCA refuge, not far from a pair of adult cranes. He had been in this area, occasionally near and possibly loosely associated with them since early April when he moved away from the pen after food was discontinued. He was not observed during flights over the refuge on 10 July, 4 Sept, and 26 Sept or during an airboat search of the refuge on 22 July.

L4-13 – After being picked up with a significant injury to her left leg on the evening of 2 November she was held in a transport crate overnight and taken to the LSU vet school on the morning of 3 November. Radiographs revealed a badly broken/shattered left tibiotarsus that could not be repaired so she was euthanized. Radiographs also revealed the presence of metal particles in/around the wound indicating the cause of the injury was gunshot. Law enforcement

personnel were notified and her carcass was sent to the USFWS Forensics Laboratory where necropsy results confirmed she had been shot. A \$10,000 reward was offered for information leading to the arrest and conviction of the person(s) responsible for shooting this bird. This case remains open and under investigation. See morbidity section below for additional details on initial reported injury and capture.

L2-14 - Mortality has not been confirmed for this bird through recovery of remains or transmitters, however she is missing and presumed dead and is no longer counted in the population total. She had a new GSM/cell transmitter as well as a VHF transmitter. The GSM transmitters on this bird and others had not been working well while the birds were in the WLWCA marsh. She was last seen during a flight on 23 March with the other juveniles and several adults in the eastern marsh at WLWCA. Her VHF signal was last detected still in the area on 2 April. We last received data from the GSM transmitter on 3 April; the transmitter turned on again on 10 April but no additional data was received. We suspect she was dead by 19 April when most juveniles dispersed away from WLWCA and this bird was not found with any of them. A flight on 29 April and subsequent ground and aerial searches have failed to detect a VHF signal in the WLWCA area or in the vicinity of any of the other cranes in the population.

Morbidity

L4-13 – Last seen on 28 October on private property (Acadia Parish) and was walking normally. Transmitter data from 30 October indicated she had moved ~17 miles southwest into Vermilion Parish, just north of Gueydan where she was later reported to be injured. On the afternoon/evening of 2 November two different people reported seeing this bird close to a road and reported that she appeared sick or injured. She was observed standing at the eastern edge of a plowed dirt field, ~50-60 yards south of a rural paved road. She was alive, not moving, and appeared to have an injured left leg. There were no power lines or fences noted in the immediate area. She was in a dry field and many of the surrounding fields were also dry, although there was a field with a second crop of rice just east of where she was initially located. While a costume and crate were picked up in order to capture and transfer her, the sun set and she moved a very short distance into the rice field. She was easily approached and picked up. Her breathing sounded labored and “gurgling,” and swelling and dried blood could be felt on her upper left leg. She felt thin and was weak, but she was kept in the crate overnight because she was calm. She was alive but weaker the next morning prior to being transported to the LSU vet school for evaluation of her injury. Radiographs revealed a badly broken leg that could not be repaired so she was euthanized.

EDUCATION, OUTREACH, AND MEDIA

Landowner Sentiment

We continue to be pleased by landowner cooperation and enthusiasm for the project and thus far, no landowner has denied our request to access their property. The vast majority of landowners have been fully engaged and excited about cranes on their land. Once a crane is located on a new property and remains there for several days, we attempt to find the owner or farmer for the property, then contact them and set up a meeting to discuss the project. We discuss the individual bird or birds that are on their property, as well as our needs or requests for accessing their property in order to monitor the birds. Additionally, we gather information on the management activities in their fields (to assist with habitat evaluations), while providing them with information about the project and landowner appreciation gifts (e.g., coffee mugs and t-shirts). Additionally, a thank you card from LDWF’s administration is sent to the landowner or farmer thanking them for their support of the project and our efforts. To date, we have met and worked with ~120 individual landowners and farmers.

Teacher Workshops

As with the 2013-2014 Whooping Crane education and outreach program, the 2014-2015 season was similar with a large portion of outreach centered around hosting “Give a Whoop!” educator workshops. Six workshops were provided across Louisiana between 11 June 2014 and 14 March 2015. A total of 74 educators from Louisiana participated in the professional development workshops, with the group primarily consisting of middle and high school teachers.

LDWF staff conducted four formal/non-formal educator workshops and a Master Naturalist Whooping Crane workshop for the New Orleans and Acadiana chapters. This workshop provided them with six hours to be used toward their Master

Naturalist certification. The sixth workshop served participants of the Osher Lifelong Learning Institute (OLLI). As with the Master Naturalist workshop, the agenda was modified to reflect the needs of this specific group.

Outreach

A large component of the education initiative is devoted to outreach. LDWF staff participated in over 50 festivals and outreach efforts where literature and information were delivered to the public. An estimated 4,000 individuals were exposed to information regarding Whooping Cranes in Louisiana. Outreach efforts typically consist of Whooping Crane exhibits with related items and literature at state wide festivals/events. Because our message spreads through attendance at festivals and other events, requests for presentations has significantly increased. Statewide requests for presentations range from audiences including school age children, members of Rotary/Kiwanis, and local conventions. Participation in state-wide events is vital in both informing and updating the residents of Louisiana about the reintroduction project. As with our education strategy, outreach will be ongoing in order to effectively increase the level of awareness and appreciation with the general public.

During this reporting year, the LDWF administrative coordinator mailed 153 solicitation letters to Louisiana attorneys as part of our annual WC program outreach effort. The letter briefed them of the reintroduction program and asked that they consider purchasing a framed print entitled "Taking Flight" (by R.C. Davis, a Louisiana artist) for display. In previous years, print solicitation letters were sent to other groups having public offices in the state including veterinary clinics, dental offices, and restaurants. In support of this wildlife reintroduction project, R.C. Davis donated his painting and copyrights to the Louisiana Wildlife & Fisheries Foundation.

LDWF was contacted by the Education Curator of the Alexandria Zoo, who requested materials for distribution to zoo guests inquiring about the reintroduction of Whooping Cranes in Louisiana. The zoo currently houses three crane species (Black-crowned, Demoiselle, and Florida Sandhill) and hopes to eventually acquire a pair of Whooping Cranes to add to their exhibit of animals. Upon further discussion, it became apparent that the Alexandria Zoo would make an ideal partner in Louisiana Whooping Crane education, based upon their desire to aid in our efforts and their proximity to areas where our reintroduced cranes inhabit. Education initiative money was used to purchase the majority of the same items used by LDWF in our Whooping Crane education trunk. These items included a replica skull, egg, crane chow, leg bands, and brochures. We have agreed that the zoo will keep these items with the intent to renew this agreement each year so long as they document how many times the program is given and the number of individuals educated using the zoo's Whooping Crane trunk. This partnership will result in a substantial number of zoo visitors becoming educated about the Louisiana Whooping Crane reintroduction.

Several new items were created to help promote the project and spread our message. These items were used during the "Give a Whoop!" educator workshops as well as various outreach events around the state. New items for 2014-2015 included promotional stadium cups, new Whooping Crane magnets (Figure 7), tape measures (Figure 8), and a new flyer regarding Whooping Cranes and crawfish fields (Figure 9).

Media Public Awareness

The LDWF public outreach media plan included the use of billboard space provided by Lamar Advertising, radio commercial space purchased through Louisiana Association of Broadcasters (LAB), and television commercial space purchased on cable television systems in the Alexandria, Lafayette, and Lake Charles market areas.

LDWF purchased nine vinyl signs from Lamar in July 2014 in sizes ranging from 10 x 36 to 14 x 48 feet. These were displayed in five markets around the state on billboard space donated by Lamar. The targeted markets (and # of boards per market) included Alexandria (1), Hammond (1), Houma (2), Lafayette (2), Lake Charles (1), and Shreveport (2). These billboards resulted in an estimated 850,270 weekly views by the traveling public during the time frame all signs were in place. The new design featured a photo of a single Whooping Crane walking in a shallow marsh (Figure 10).

The 30-second LAB radio ad was broadcast 7,642 times around the state by LAB member stations in Alexandria, Baton Rouge, Carencro, Crowley, Hammond, Lafayette, Lake Charles, Leesville, Monroe, New Iberia, New Orleans, Ruston, Shreveport, Ville Platte, and Winnsboro for five weeks spanning 5 January to 9 February 2015. The message again

stressed the presence of cranes now in the state, the need to observe them from a distance if encountered, and a call to action to alert LDWF's Enforcement Division if anyone was observed harming Whooping Cranes.

Cable television viewers were targeted with a new 30-second PSA featuring Louisiana musician Zachary Richard. Time purchased on cable systems in the Alexandria, Lafayette, and Lake Charles market areas included rural locations in parishes where the crane population spends considerable time. A total of 9,461 television spots were scheduled from February to May 2015 on cable networks including Animal Planet, County Music Television (CMT), ESPN, ESPN2, Fox Sports South, FX, Headline News, History Channel, MTV, NBC Sports, National Geographic Channel, The Weather Channel, Tru TV, TV Land, and the SEC Network.

LDWF once again included questions about the Whooping Crane reintroduction in the 2014-2015 Post-Season Hunter Survey. Two questions were included in the survey: 1) Have you heard of the Whooping Crane reintroduction project? And 2) how did you hear about it? In a random sample of licensed Louisiana hunters, 2,165 responded to the mailed-out survey and 56% of those responding said they were aware of the Whooping Crane reintroduction. When asked how they heard about the project, the responses noted the following information sources: TV 29%, radio 16%, website/social media 14%, newspaper 11%, billboard 8%, teacher workshop 1%, and festival 1%.

RESEARCH PRODUCTS

Along with formal and informal public outreach, our program also produced a peer-reviewed publication in the reporting period. In addition to published articles, we also have several manuscripts in preparation, particularly a manuscript regarding the habitat use and movements of reintroduced Whooping Cranes (below); we hope that this manuscript will be submitted by 1 September 2015. Additional manuscripts are being considered with existing data, particularly one focusing on home range and movements of juvenile reintroduced cranes in Louisiana and one on time activity budgets of reintroduced juvenile cranes.

Publications

Kang, S. R., and S. L. King. 2014. Suitability of Coastal Marshes as whooping crane Foraging Habitat in Southwest Louisiana, USA. *Waterbirds* 37:254-263.

Perkins, T.L., S.L. King, W. Selman, and S. Zimorski. In Prep. The spatial and temporal use of broad and novel habitats by a reintroduced population of whooping cranes (*Grus americana*) in southwestern Louisiana.

Selman, W., S. Zimorski, C. Gaspard, C.C. Smith, and P. Vasseur. 2015. Emydid turtles. Unusual basking location (on Whooping Crane nest). *Herpetological Review* 46:78-79.

Presentations

Vasseur, P., C. Smith, S. King, S. Zimorski, and C. Gaspard. 2014. Nesting activity of whooping cranes reintroduced to Louisiana. Louisiana Association of Professional Biologists Fall Symposium, Baton Rouge, Louisiana. Poster Presentation.

Table 1. Distribution of points collected via remote transmitter devices for the Louisiana non-migratory population of Whooping Cranes, 1 June 2014 – 30 June 2015.

Cohort	No. of points collected	No. of points in TX (% of total)	No. of points in LA (% of total)
HY2011	5363	5 (.1)	5358 (99.9)
HY2012	5393	1773 (32.9)	3620 (67.1)
HY2013	4517	0 (0.0)	4517 (100.0)
HY2014	4094	521 (12.7)	3573 (87.3)
All cohorts	19367	2299 (11.9)	17068 (88.1)

Table 2. GPS and GSM data points collected for habitat analysis of the Louisiana non-migratory population of Whooping Cranes, 1 June 2014 – 30 June 2015.

Cohort	No. of cranes	No. of data points collected	No. of points used for habitat analysis	% used for habitat analysis
HY2011	7	5356	3452	64.5
HY2012	10	5332	3248	60.9
HY2013	8	4495	2540	56.5
HY2014	14	4093	1930	47.2
TOTALS	39	19276	11170	57.9

Table 3. Nesting attempts of Whooping Crane pairs in the reintroduced Louisiana non-migratory population, 2014-15.

Year	Male	Female	Nest Location - Parish	Nesting Attempt	Incubation began	No. eggs	Outcome of nest, fate of eggs	Number of days of incubation	Number of days to renest
2014	L8-11	L7-11	Avoyelles	1	24 March	2	Full term, collected 30 April - both infertile	37	18
2014	L8-11	L7-11	Avoyelles	2	19 May	2	Full term, collected 26 June - both infertile	38	-
2015	L8-11	L7-11	Avoyelles	1	28 Feb	2	Full term, collected 9 April - both infertile	40	18
2015	L8-L11	L7-11	Avoyelles	2	28 April	2	Full term, collected 4 June - both infertile	37	-
							Failed via flooding on ~13 April, eggs collected 16 April		
2015	L1-11	L6-11	Vermilion	1	~3-4 April	2	1 fertile, non-viable egg & shell fragment of second egg	~9-10 max	-
2015	L2-11	L13-11	Allen	1	6-14 May	1 or 2	Failed (?), collected 12 June - egg fragment	27-37	-
2015	L1-13	L3-11	Allen	1	16-28 May	2	Failed by ~13 June PM, collected 17 June - 1 egg (unk fertility)	16-28	

Table 4. Mean nest attendance for the LA non-migratory Whooping Crane population, 2014 - 2015. Monitoring sessions consisted of 3-hr observation periods alternated among 3 time periods - morning, midday, and late afternoon.

Crane Pair	Monitoring Dates	Monitoring Sessions*	Nest Attempt	Avg. Temp (°F)	Nest Attendance (min)		Time Spent <50 m Away From Nest (min)		Time Spent >50 m Away From Nest (min)	
					Female	Male	Female	Male	Female	Male
2014										
L7 & 8-11	3 Apr – 25 Apr	7	1 st	68.5	69.0	107.9	17.1	2.4	59.3	65.0
L7 & 8-11	22 May – 18 Jun	7	2 nd	79.6	50.0	120.3	5.0	4.8	114.4	45.3
2015										
L7 & 8-11	13 Mar – 2 Apr	7	1 st	68.0	68.0	109.9	50.1	22.4	61.9	47.7
L7 & 8-11	4 May – 1 Jun	6	2 nd	79.4	123.3	51.5	7.7	58.8	43.5	75.2
L2 & 13-11	15 May – 9 Jun	5	1 st	82.3	56.0	109.8	47.8	43.0	76.0	27.2

Table 5. Post-Release survival of each cohort up to 30 June 2015. Green shaded cells represent current survivorship of last four cohorts. Because some cranes have not recently been seen, located, or have non-functional transmitters, these numbers reflect the maximum survival at this time; these numbers may be adjusted later if the birds are not located or observed again.

Post-release Survival	2010 Cohort (3/14/11)	2011 Cohort (12/27/11)	2012 Cohort (12/17/12)	2013 Cohort (1/2/14)	2014 Cohort (12/29/14)
3 months	8/10 = 80%	15/16 = 93.75%	13/14 = 92.9%	9/10 = 90%	14/14 = 100%
6 months	7/10 = 70%	14/16 = 87.5%	12/14 = 85.7%	8/10 = 80%	13/14 = 92.8%
9 months	3/10 = 30%	12/16 = 75%	11/14 = 78.6%	8/10 = 80%	
12 months	3/10 = 30%	12/16 = 75%	10/14 = 71.4%	7/10 = 70%	
15 months	2/10 = 20%	12/16 = 75%	10/14 = 71.4%	7/10 = 70%	
18 months	2/10 = 20%	12/16 = 75%	10/14 = 71.4%	7/10 = 70%	
21 months	2/10 = 20%	12/16 = 75%	9/14 = 64.3%		
24 months	2/10 = 20%	12/16 = 75%	9/14 = 64.3%		
2.5 years	1/10 = 10%	10/16 = 62.5%	9/14 = 64.3%		
3 years	0/10 = 0%	10/16 = 62.5%			
3.5 years		10/16 = 62.5%			

Figure 1. Locations for all Louisiana reintroduced Whooping Cranes between 1 June 2014 and 30 June 2015.

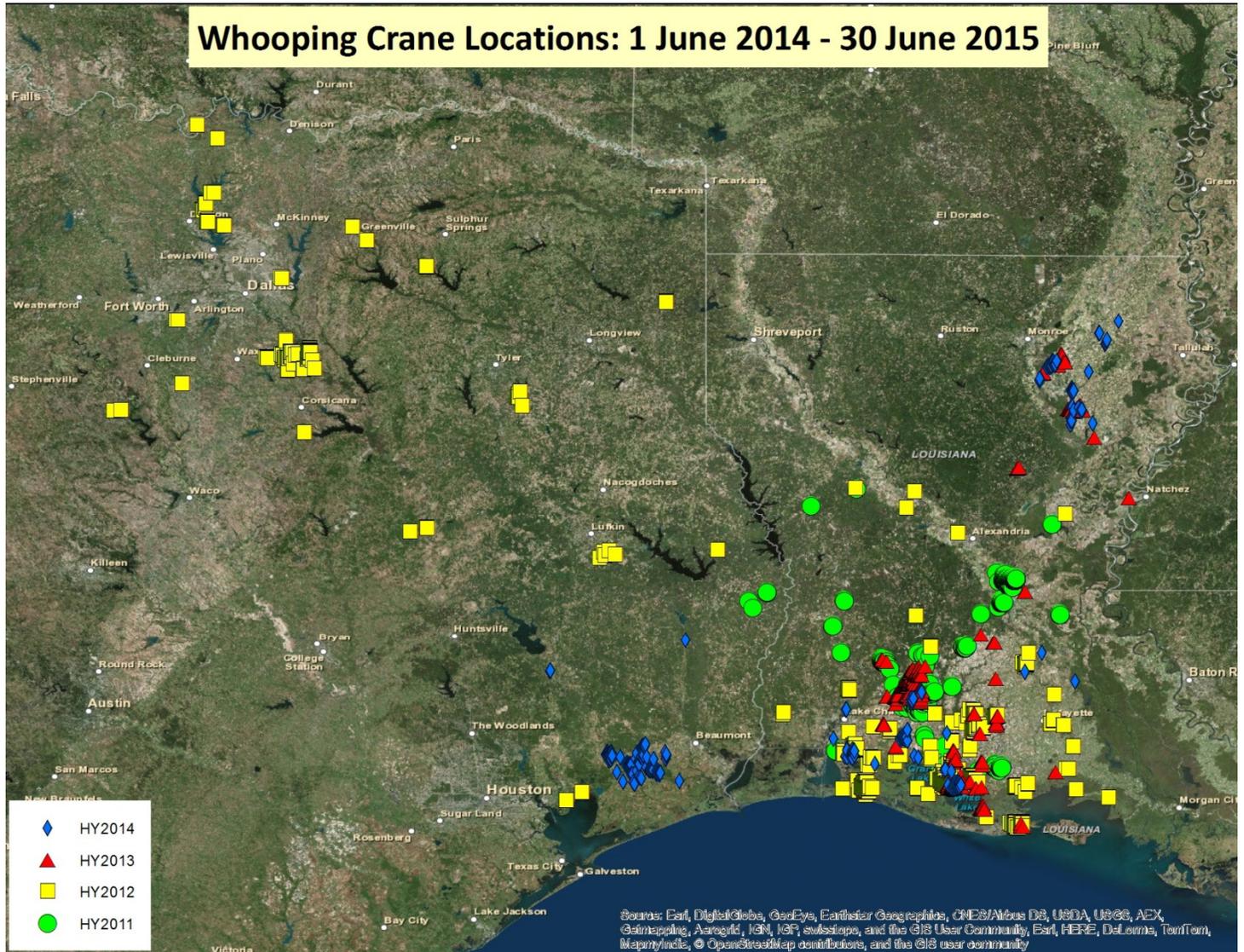


Figure 2. Habitat use by cohort in the Louisiana non-migratory population of Whooping Cranes, 1 June 2014 – 30 June 2015.

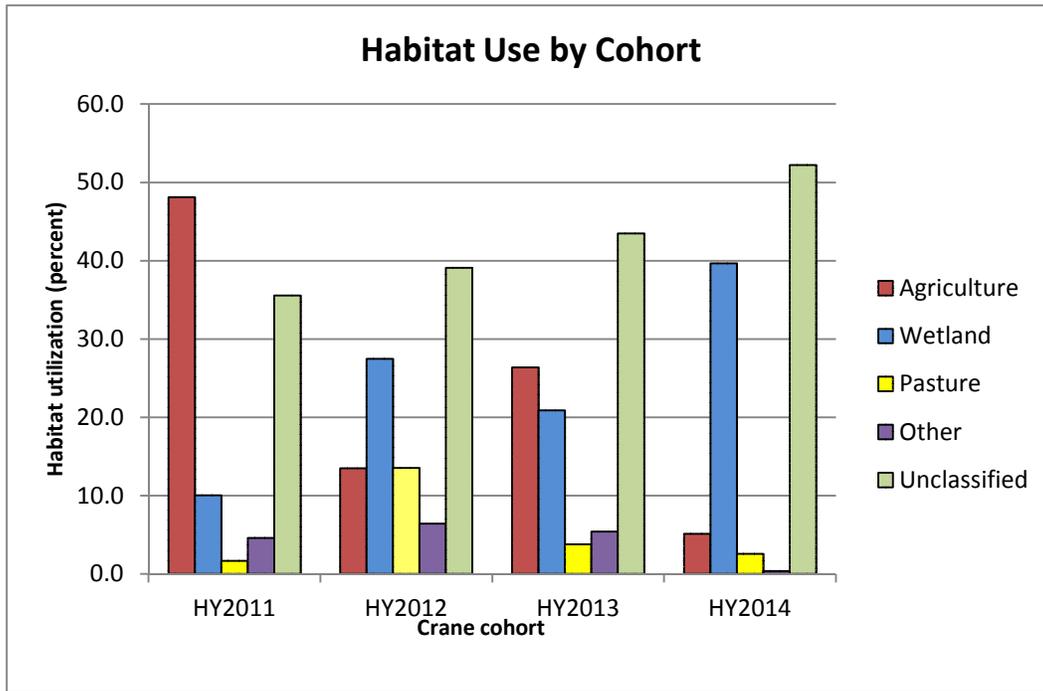


Figure 3. Habitat use by state for the Louisiana non-migratory population of Whooping Cranes, 1 June 2014, 30 June 2015.

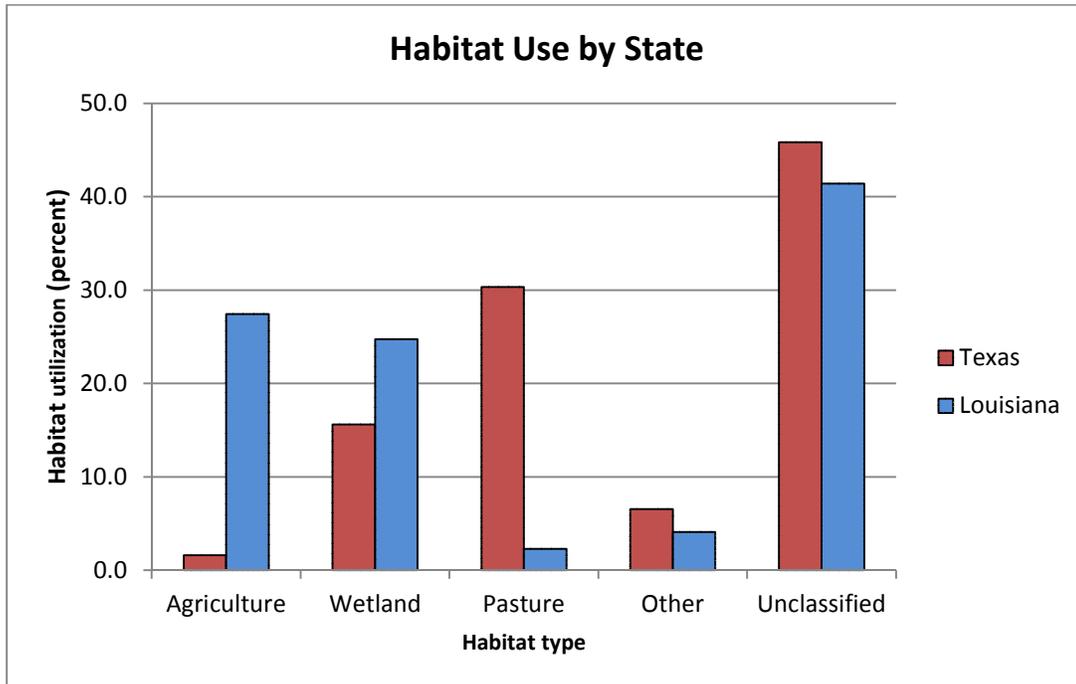


Figure 4. Approximate locations of reintroduced Whooping Crane nests during the 2015 nesting season. Note the distances between nearest nest location points.



Figure 5. Failed/flooded nest of L1 & 6-11 at WLWCA with one intact, fertile, but non-viable egg remaining.



Figure 6. Failed nest of L3-11 and L1-13 on private property in Allen Parish with one intact egg of undetermined fertility remaining.



Figure 7. New Whooping Crane magnet.

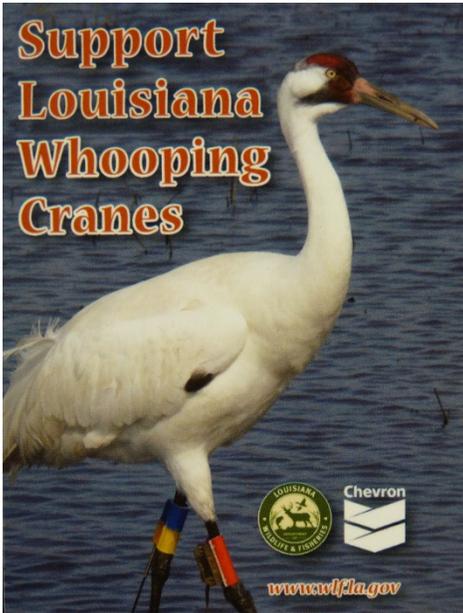


Figure 8. Five foot long tape measure used to promote the height of the cranes and emphasize that they are the tallest bird in North America.



Figure 9. New information sheet about Whooping Cranes and crawfish farms.



Whooping Cranes & Crawfish Farming

In 2010, the Louisiana Department of Wildlife and Fisheries (LDWF), along with the LSU AgCenter and other partners, began a whooping crane re-introduction program in southwestern Louisiana. The goal of the re-introduction program is to establish a population within its historic range, but outside of its current range. Our objective is to establish a population in Louisiana, consisting of at least 120 individuals and 25–30 reproductive pairs, and to sustain those levels for 10 years without further reintroductions.

Achieving our goal would restore an iconic wildlife species that was once more abundant in Louisiana than anywhere in North America. Reintroduced populations of whooping cranes are designated as nonessential experimental populations (NEP), which provides management flexibility as the species is not treated as endangered but as threatened. As a result of this designation, farm management activities can continue as planned. Intentional killing, harming or harassment of a whooping crane, however, is illegal as they are still protected under both state and federal laws.

LIFE HISTORY

The whooping crane is a large white bird but its size (up to 5 ft tall) and the red patch on its head distinguish it from other white wading birds. The whooping crane is a long-lived species that can live up to 30 years in the wild but has a low reproductive capacity. Whooping cranes begin breeding at 3–4 years of age and lay one to two eggs, which are incubated for about 30 days. They may hatch two chicks but usually only one survives.



Whooping cranes may initially nest from February to April, but may re-nest into June if the first nest fails. They build floating platforms of wetland vegetation; young pairs may build nest platforms without laying eggs the first season. Chicks are flightless for about 90 days and are susceptible to predation by snakes, turtles, birds and mammals.

Adults are also flightless for about six weeks during a molt of all their flight feathers. They first undergo this molt at 2–3 years of age and then again every two to three years. In Louisiana, molt can begin in mid-April but most will begin in late May with birds being able to fly again by early July. The birds are susceptible to predators at this time and they often become shy and secretive and will not open their wings. Stable water within walking distance is an important habitat component to facilitate escape from predators.

Whooping cranes reintroduced to Louisiana utilize a wide range of habitats including coastal marshes, crawfish ponds and rice fields. They are non-migratory; therefore, they are present on these landscapes throughout the year. Whooping cranes often forage in shallow water and have a varied diet consisting of frogs, snakes, turtles, mice, crawfish, aquatic and terrestrial invertebrates, tubers, and seeds. They also depend on shallow water environments when roosting at night and for nests to provide protection from predators. Thus far, whooping cranes released in Louisiana have molted in marsh, rice fields and crawfish ponds. Whooping cranes will flock together in small groups (usually < 10) when young, but as adults they are territorial. Whooping cranes have never existed in large numbers due to their low reproductive potential, thus they are not likely to exist in great numbers on the Louisiana landscape into the future. Further, their territoriality as adults will limit the number of birds in a single location.

Figure 10. New billboard design used in 2014. Nine of these billboards were produced.



Appendix 1. Whooping Crane Program Budget for LDWF Fiscal Year 2014-2015.

ITEM	DESCRIPTION	USF&WS	Foundation	SWG	Rockefeller	Conoco	Chevron	LSU	Total
SALARIES and FRINGE BENEFITS	Rockefeller Biologist and Techs	\$ 976	\$ 40,790	\$ 73,611	\$109,738			\$ 29,924	\$ 255,039
OPERATING SERVICES		\$ 927			\$ 1,630				\$ 2,557
TRAVEL	Training, meetings and conferences	\$ 531			\$ 279				\$ 810
SUPPLIES	transmitters		\$ 919		\$ 7,598		\$ 9,833		\$ 18,350
PUBLIC OUTREACH			\$ 4,096				\$ 96,491		\$ 100,587
FUND RAISING PROMOTION			\$ 327						\$ 327
ACQUISITIONS	Satellite transmitters						\$ 40,700		\$ 40,700
MAJOR REPAIRS									\$ -
CONTRACTUAL SERVICES	LDWF or Contract Aircraft	\$ 13,000							\$ 13,000
	Satellite transmitter data acq.			\$ 15,241					\$ 15,241
	Veterinary services								\$ -
TOTAL	TOTAL	\$ 15,434	\$ 46,132	\$ 88,852	\$119,245	\$ -	\$147,024		\$ 416,687

Appendix 2. ID sheet for Louisiana Whooping Cranes. Birds in gray are missing and presumed dead but no remains to confirm their death have been recovered. They are not counted in the population total.

Louisiana Whooping Cranes June 2015

Hatch year	Crane no.	PWRC ID	Sex	BBL Band no. Below left hock	Color code (left:right) T=long band with transmitter	VHF Frequency	PTT ID	Studbook no.			Mate
								Own	Sire	Dam	
2011	L1	8	M	1098-00882	T B/Y(VHF) : T B/R (PTT)	165.530	M: 112456	2103	1254	1156	6-11
2011	L2	11	M	1098-00883	T B/R (PTT) : B/Y/B	-	(N: 104976)	2106	1702	1904	13-11
2011	L3	14	F	1098-00884	T B/R (PTT) : T Y (VHF)	165.399	M: 112457	2109	1717/1420	1168	1-13
2011	L6	18	F	1098-00887	T B/R (cell) : T B/Y (VHF)	164.703	M: 460	2113	1127	1154	1-11
2011	L7	19	F	1098-00888	T B/R (PTT) : T R/Y (VHF)	165.331	M: 112460	2114	1254	1156	8-11
2011	L8	20	M	1098-00889	T B/R (VHF) : B/Y/R	165.042	-	2115	1147	1119	7-11
2011	L10	22	M	1098-01101	T B/R (PTT) : T Y/R (VHF)	NFT	M: 112462	2117	1147	1292	11-11
2011	L11	23	F	1098-01102	T Y (VHF) : T B/R (PTT)	NFT	(M: 112463)	2118	1165	1164	10-11
2011	L13	29	F	1098-01104	T B/R (PTT) : T Y/B (VHF)	165.482	M: 112464	2124	1147	1210	2-11
2011	L14	30	F	1098-01105	T B/R (PTT) : R/Y/B	-	(M: 112454)	2125	1133	1135	
2012	L1	9	F	1098-01109	B/Y/R : T Y/B	-	M: 121403	2149	1127	1154	7-12
2012	L2	12	F	1098-01110	T Y/B (PTT) : T R (VHF)	165.357	M: 112455	2152	1674	1679	
2012	L5	15	F	1098-01113	T Y/B (PTT) : T R/B (VHF)	164.823	M: 132313	2155	1731	1219	
2012	L6	17	F	1098-01114	T Y/B (PTT) : T Y/R (VHF)	164.458	M: 112466	2157	1267	1261	
2012	L7	18	M	1098-01115	T Y/B (PTT) : Y/R/Y	-	M: 121395	2158	1127	1154	1-12
2012	L8	19	F	1098-01116	T Y/B (PTT) : B/R/Y	-	M: 121396	2159	1267	1261	
2012	L9	21	F	1098-01117	T Y/B (PTT) : R/Y/B	-	M: 121397	2161	1189	1195	
2012	L10	22	M	1098-01118	R/B/R : T Y/B (PTT)	-	M: 121398	2162	1775/1737	1593	
2012	L11	23	F	1098-01119	T Y/B (PTT) : Y/R/B	-	(M: 121399)	2163	1133	1135	
2012	L12	24	F	1098-01120	T R (VHF) : T Y/B (PTT)	165.546	(M: 121400)	2164	1127	1154	
2012	L14	28	M	1098-01122	T Y/B (PTT) : B/R/B	-	(M: 121402)	2176	1794	1900	
2013	L1	10	M	1098-01123	T R/Y (PTT) : T B (VHF)	164.913	M: 112461	2195	1138	1440	3-11
2013	L3	12	M	1098-01125	T R/Y (PTT) : R/B/R	-	M: 132302	2197	1422	1366	
2013	L5	14	M	1098-01127	Y/B/Y : T R/Y (PTT)	-	M: 132304	2199	1672	1904	
2013	L6	15	M	1098-01128	T R/Y (PTT) : B/Y/B	-	M: 132305	2200	1147	1119	
2013	L7	18	M	1098-01129	T R/Y (PTT) : T R/B (VHF)	165.021	(M: 132306)	2202	1731	1219	
2013	L8	25	M	1098-01130	T R/Y (PTT) : T B/Y (VHF)	164.214	M: 132307	2208	1439	1818	
2013	L9	26	F	1098-01131	B/R/B : T R/Y (PTT)	-	M: 132308	2209	1731	1219	
2013	L10	29	F	1098-01132	- : T R/Y (PTT)	-	M: 132309	2211	1100	1263	
2014	L1	5	F	1098-01151	T R/B (PTT) : Y/B/Y	-	M: 121401	2239	1147/1127	1154	
2014	L2	12	F	1098-01152	T R/B (cell) : T Y (VHF)	164.136	M: 455	2245	1439	1818	
2014	L3	34	M	1098-01153	T R/B (cell) : T B/Y (VHF)	165.251	M: 456	2263	1731	1219	
2014	L4	35	M	1098-01154	T R/B (PTT) : R/B/Y	-	M: 121404	2264	1677	1894	
2014	L5	14	F	1098-01155	T R/B (PTT) : T R/Y (VHF)	165.032	M: 132310	2247	1147	1292	
2014	L6	15	M	1098-01156	T R/B (PTT) : T Y/B (VHF)	165.062	M: 132311	2248	1267/1386	1261	
2014	L7	16	F	1098-01157	B/Y/B : T R/B (PTT)	-	M: 132312	2249	1731	1219	
2014	L8	17	F	1098-01158	T R/B (cell) : T Y/R (VHF)	165.471	M: 457	2250	1581/1737	1593	
2014	L9	37	F	1098-01159	T Y (VHF) : T R/B (PTT)	164.013	M: 132314	2268	1731	1193	
2014	L10	22	F	1098-01160	B/R/Y : T R/B (PTT)	-	M: 142421	2255	1267/1386	1261	
2014	L11	38	F	1098-01161	R/Y/R : T R/B (PTT)	-	M: 142422	2269	1731	1219	
2014	L12	28	M	1098-01162	T R/B (PTT) : Y/R/Y	-	M: 142423	2259	1267/1386	1261	
2014	L13	30	M	1098-01163	T B/Y (VHF) : T R/B (cell)	164.222	M: 458	2260	1182	1195	
2014	L14	33	M	1098-01164	T Y/R (VHF) : T R/B (PTT)	165.420	M: 142424	2262	1182	1195	

2012	L3	M	2153	~3 Nov 2013	Acadia Parish	10.5+	Powerline collision – severed wing, broken leg
2012	L4	M	2154	~7 May 2013	Cameron Parish	4.5+	Trematodiasis (Cyclocoelum sp.) resulting in hepatitis and bacterial septicemia Emaciation
2012	L9	F	2161	~10 August 2013	Rockefeller Refuge	7.5+	Mortality unconfirmed (transmitter stopped working, no carcass found)
2012	L10	M	2162	18 February 2013	NE Rayne Acadia Parish	2	Mortality unconfirmed (transmitter stopped working, no carcass found)
2012	L13	M	2165	~26 July 2014	Gillis, SE Beauregard Parish	19+	Powerline collision
2013	L2	M	2196	~1-2 April 2014	WLWCA refuge	3	Unknown (scavenged) – likely predation – coyote bite mark in femur
2013	L4	F	2198	3 Nov 2014	Captured – broken leg, N of Gueydan, Vermilion Parish	10	Euthanized at LSU vet school – severely broken left leg due to gunshot
2013	L5	M	2199	After 27 June, by ~10 July	WLWCA refuge, NW corner	~6	Mortality unconfirmed (PTT stopped working 6/16/14, bird seen on 6/27/14 & not again after that)
2014	L2	F	2245	After 2 April 2015, by 29 April	WLWCA?	3+	Mortality unconfirmed (Cell transmitter – last data 3 April, last turned on 10 April, VHF last detected @ WL on 2 April) Dead - possibly by ~19 April when other juvies left WL, by 29 April when VHF not heard during flight over WL

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.

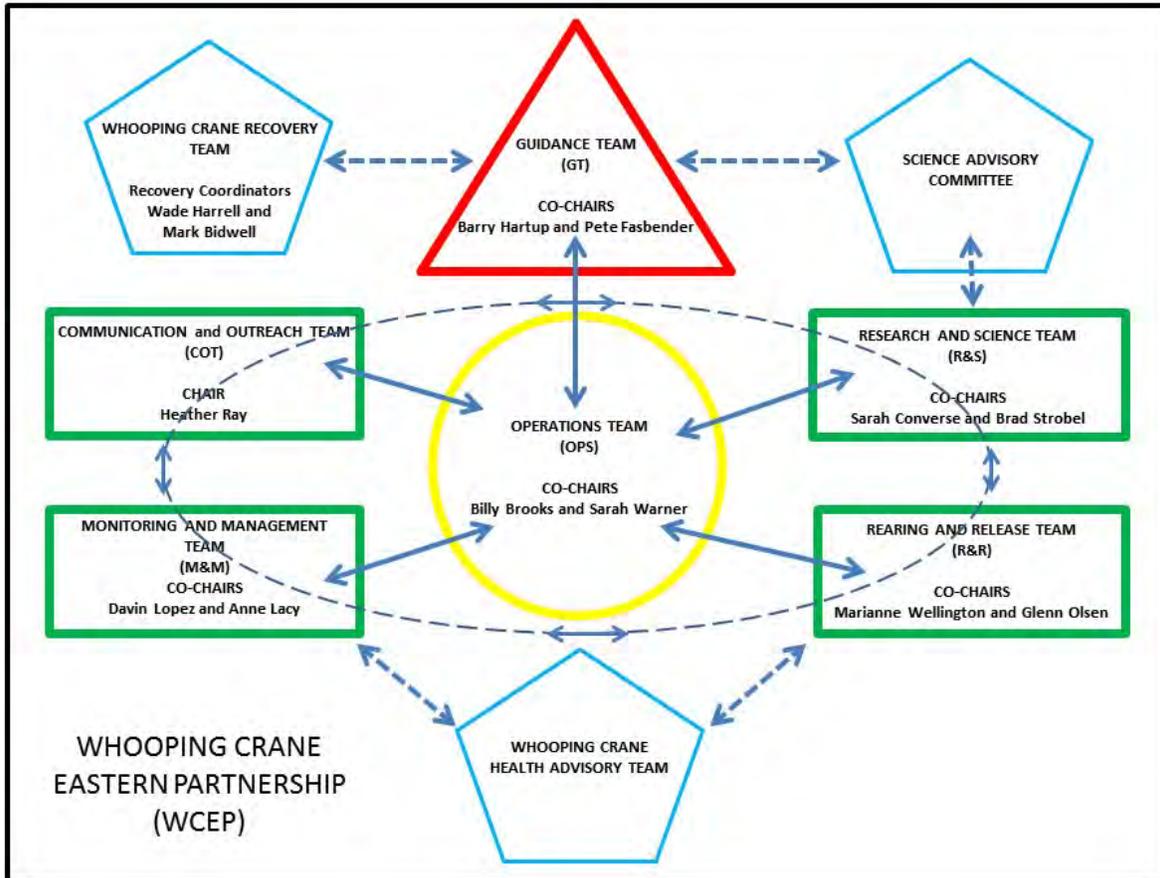
Guidance Team: Bill Brooks, U.S. Fish and Wildlife Service; Joe Duff, Operation Migration; Pete Fasbender, U.S. Fish and Wildlife Service; John French, USGS Patuxent Wildlife Research Center; Barry Hartup, International Crane Foundation; Davin Lopez, Wisconsin Department of Natural Resources; Doug Staller,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

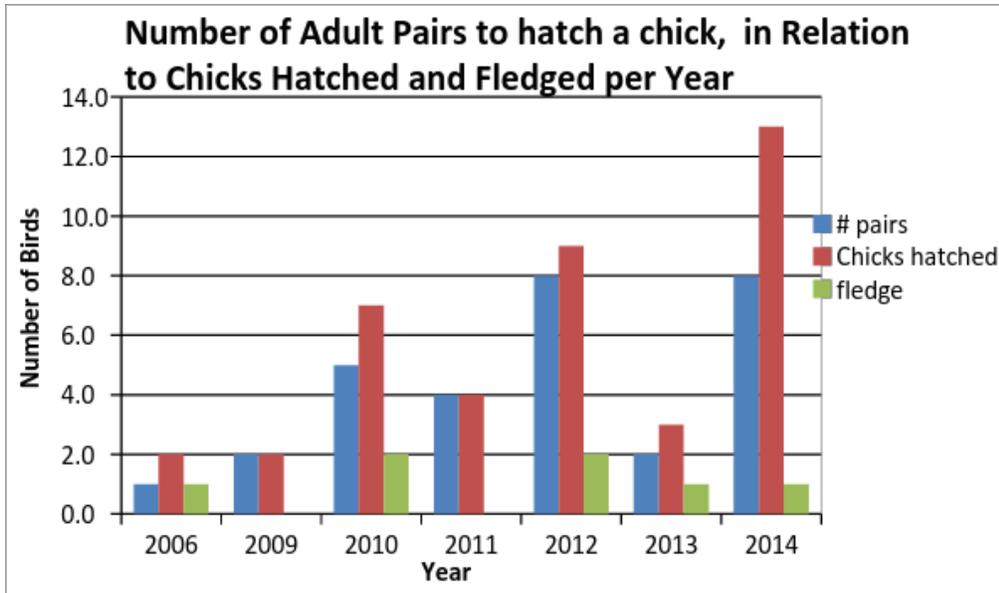


Figure 1. Summary of the number of pairs, chicks hatched, and chicks fledged per year.

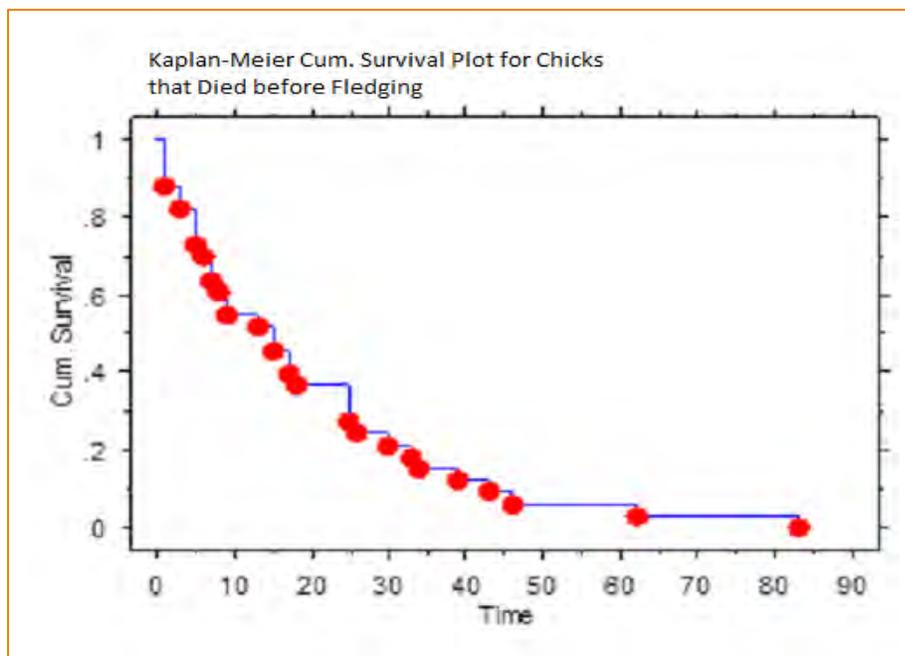


Figure 2. Seventy five percent of the chicks that hatched in the wild died by three weeks of age.

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

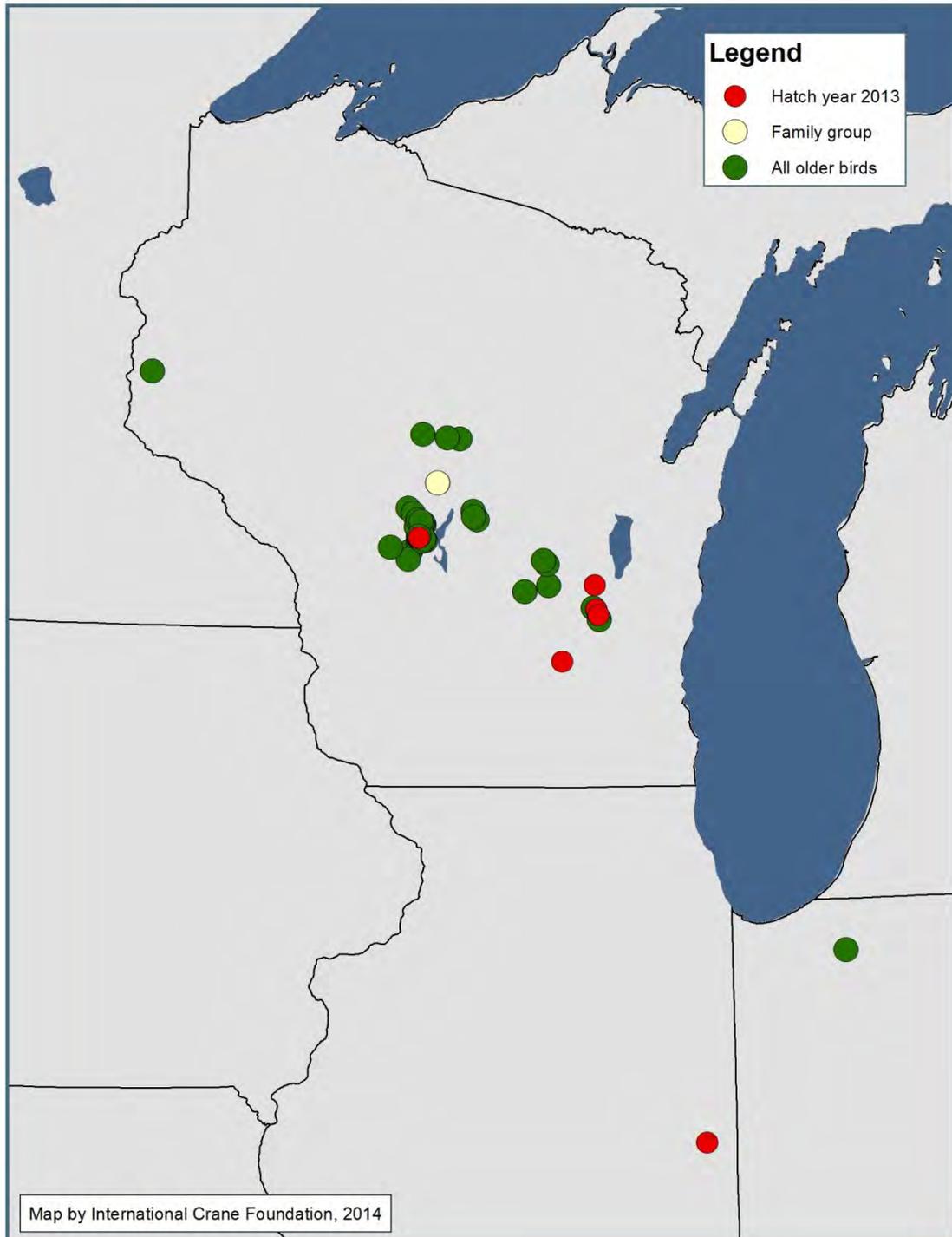


Figure 1. Summer whooping crane locations in Wisconsin, Indiana, and Illinois as of August 17, 2014. Distribution was primarily focused in Necedah National Wildlife Refuge and the Wisconsin Rectangle.

Whooping Crane Locations as of 31 December 2014 or Last Report

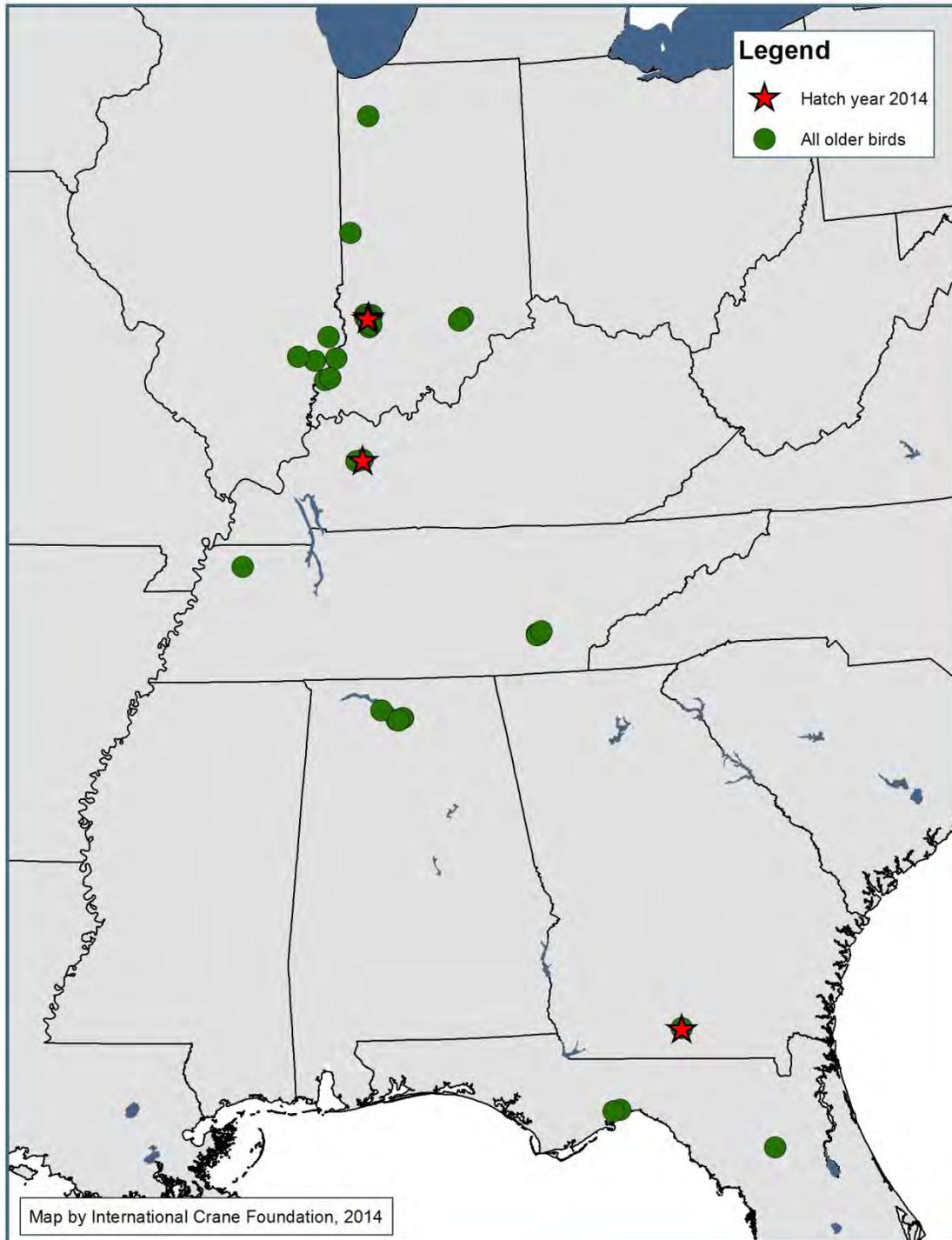


Figure 2. Winter EMP whooping crane locations as of December 31, 2014 or last report. EMP cranes continue to utilize areas throughout the Midwest and Southeast in winter. Areas of concentration included southwest IN, Wheeler National Wildlife Refuge, AL, and Hiwassee State Wildlife Refuge, TN.

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

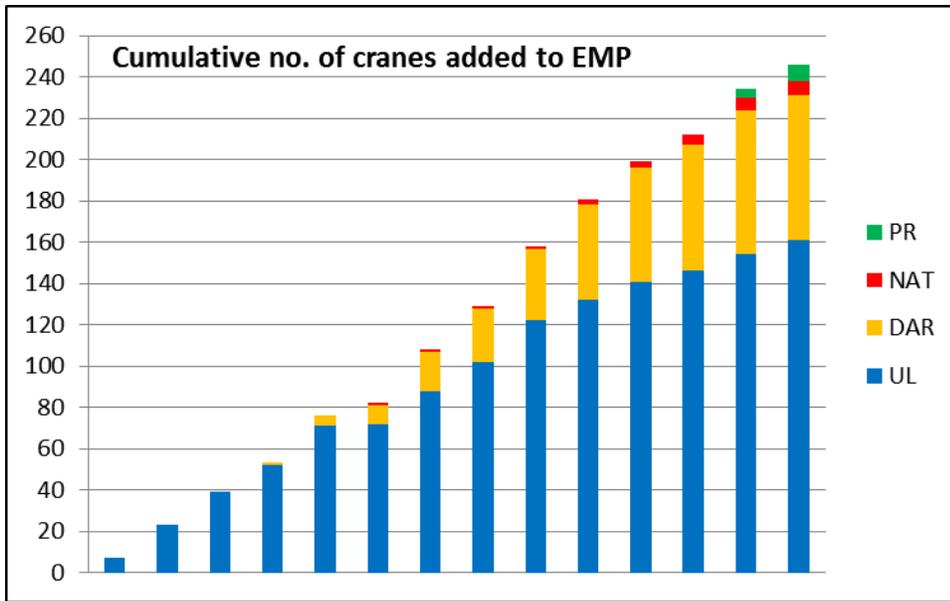


Figure 3. Cumulative numbers of cranes added to the EMP. Green represents Parent-Reared, Yellow represents Direct Autumn Release, and blue represents Ultralight-led birds (see Rearing and Release section for details on release methods). Red represents birds hatched in the wild to free-ranging pairs.

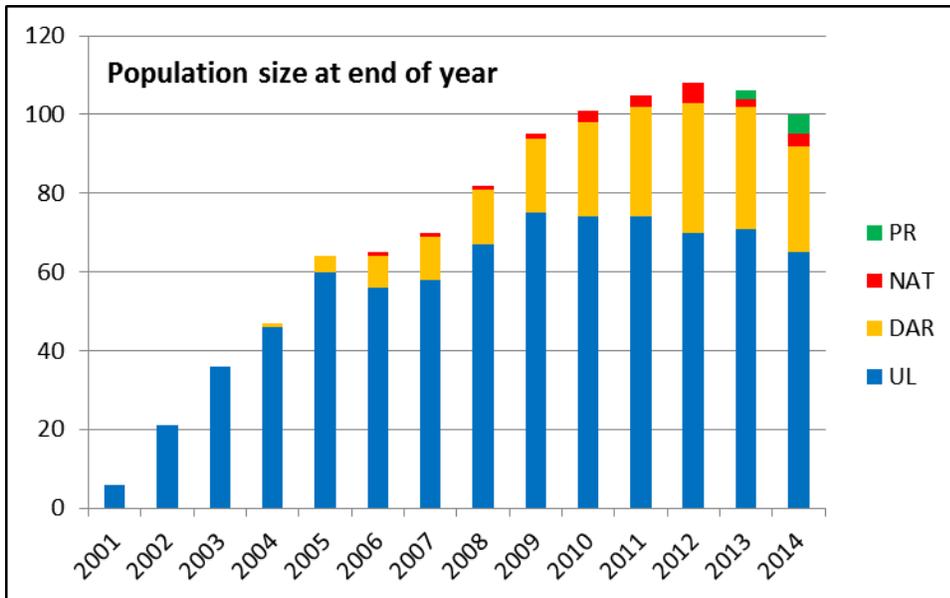


Figure 4. Population size of the EMP at the end of each year including the number that each release type contributed to that year-end total. Green represents Parent-Reared, Yellow represents Direct Autumn Release, and blue represents Ultralight-led birds (see Rearing and Release section for details on 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. Renesting attempts by three pairs were initiated on 10-20 May. All renests 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 renest = 6	4 first + 1 renest = 5	11 first	12 first + 5 renest = 17	12 first + 4 first renest + 1 second renest = 17	20 first + 2 renest = 22	22 first + 7 renest = 29	21 first + 2 renest = 23	25 first + 3 renest = 28	134 first + 26 renest = 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

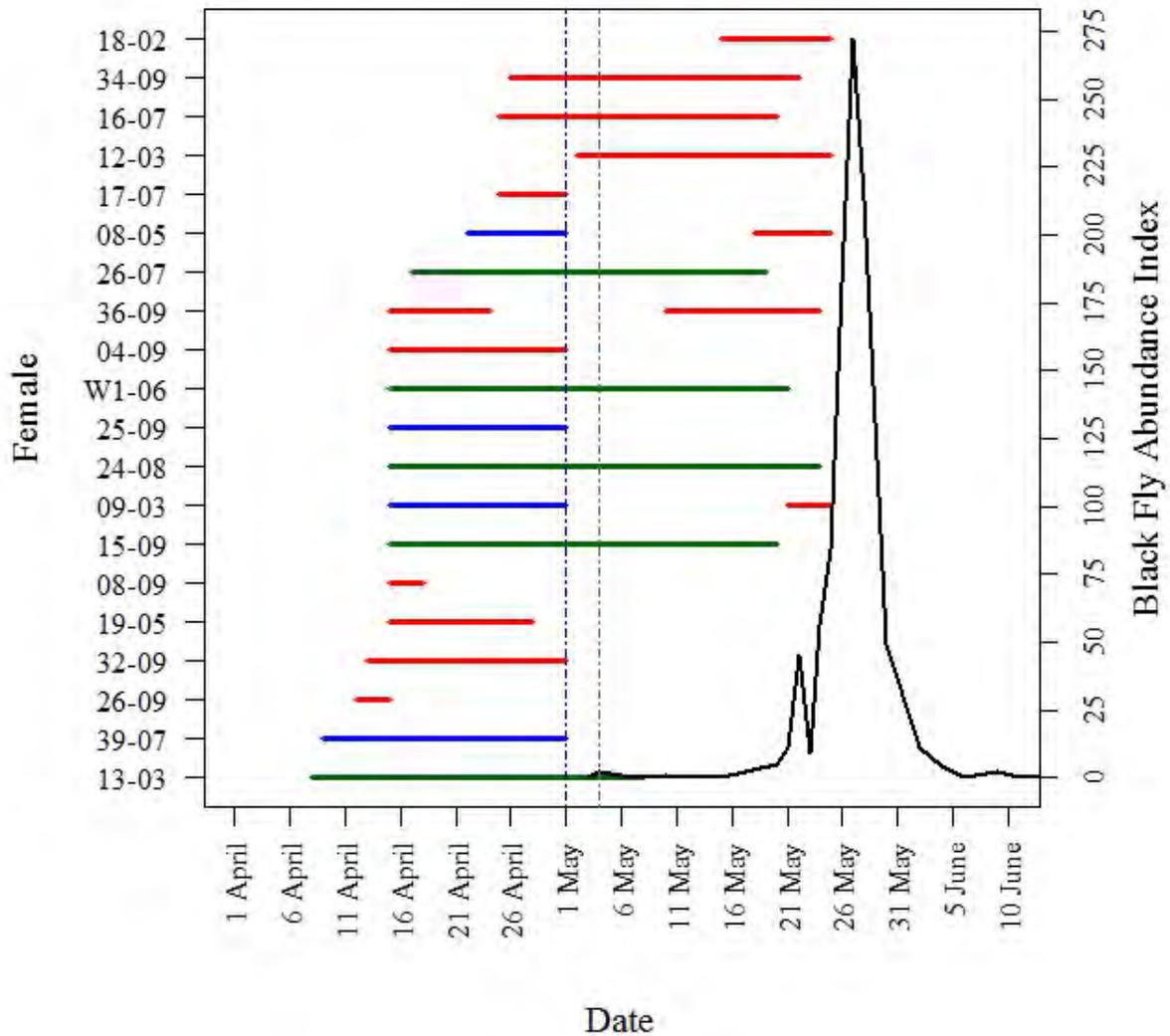


Figure 1. Whooping crane nest chronology and fates during the spring of 2014 on the Necedah NWR. Colored bars indicate the period of activity for each whooping crane nest. Green bars indicate successfully hatched nests, red bars indicate failed nesting attempts and blue bars indicate nest subjected to 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	

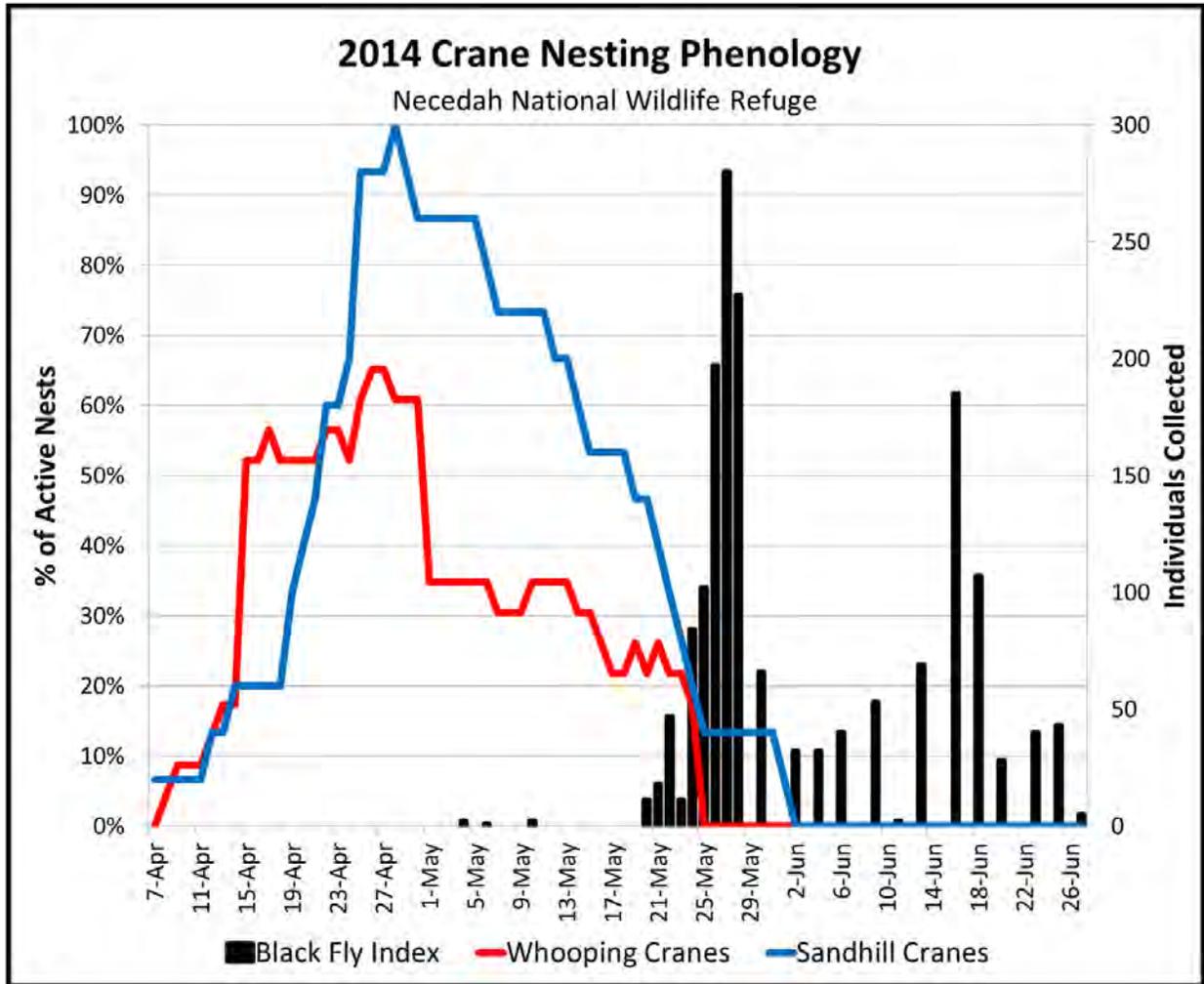


Figure 2. Chronology of nesting activity of whooping cranes and sandhill cranes on the Necedah National Wildlife Refuge and adjacent federally owned lands during the spring of 2014. Black fly abundance indices were developed from sweep net collections at 2 artificial crane nests with sandhill crane brood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

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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.

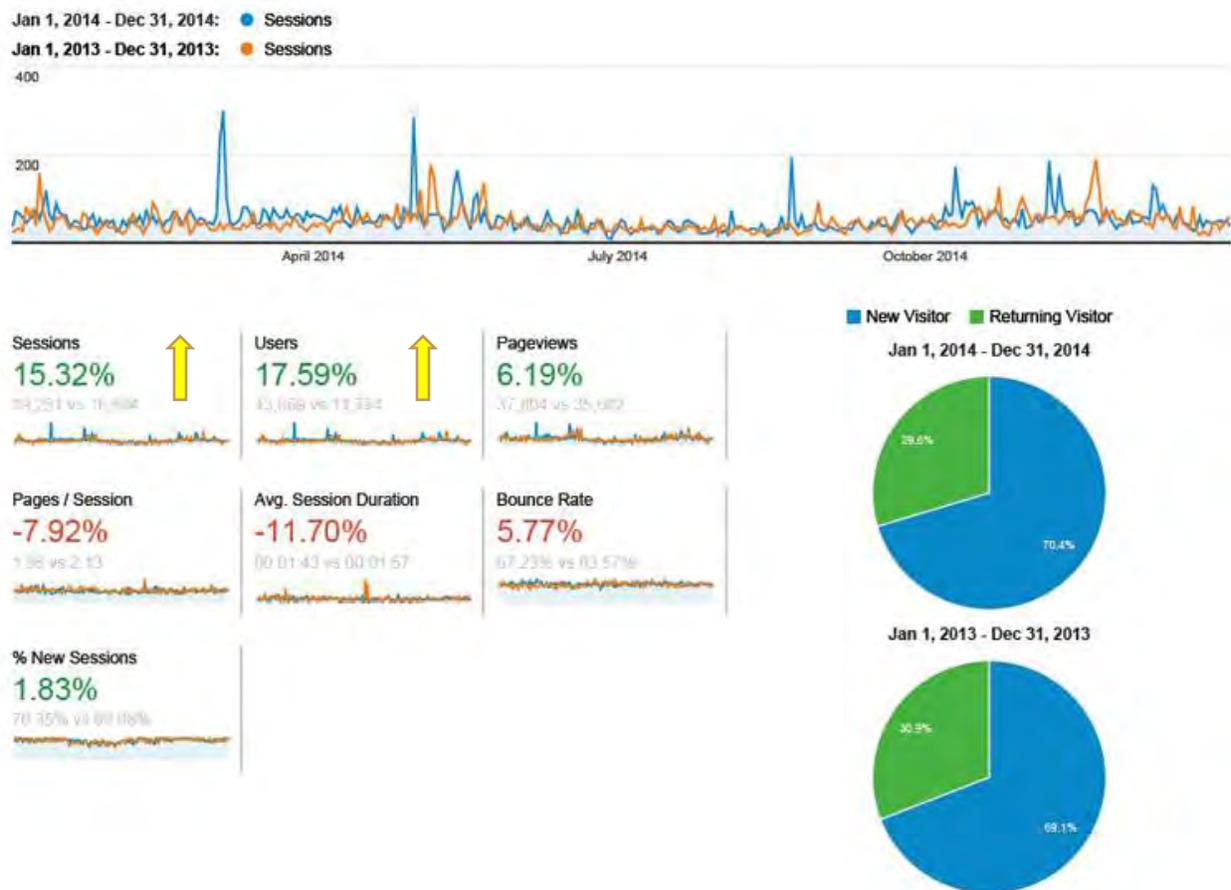
Other education and outreach activities included interpretive tours and education programs at partner facilities, the live Operation Migration CraneCam, and ultralight-guided migration flyover events, held during the summer at the White River Marsh SWA and along the migration route. The COT also continues 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%.

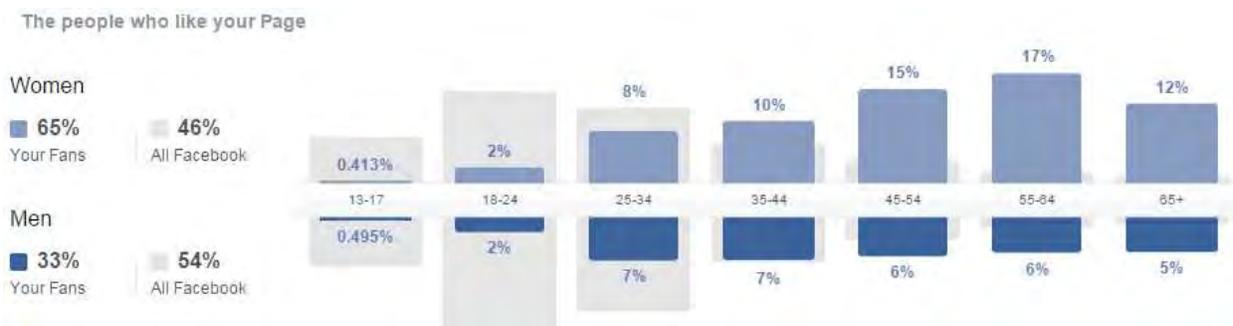
During 2014 a total of 105 stories were shared/published on the WCEP Facebook Page ([facebook.com/WhoopingCraneEasternPartnership](https://www.facebook.com/WhoopingCraneEasternPartnership)).

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