The Re-pairing and Successful Breeding of a Wild Migratory Whooping Crane within Managed Care — a Case Study at White Oak Conservation in Florida

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Through decades of dedicated research and captive husbandry, the endangered whooping crane has been kept from the brink of extinction due in large part to the breeding and reintroduction of captive birds into their historic range. While survival of the adult birds has been relatively successful, chick recruitment is a rarity in the migratory Eastern Population and other experimental release programs. In 2015, 16-11, a male whooping crane hatched in 2011 at the International Crane Foundation and released into the wild as a hatch-year juvenile, paired with another bird, sired offspring, and reared a chick successfully in the wild. Unfortunately, 16-11 found his mate among a flock of greater sandhill cranes, and their progeny was a hybrid. The US Fish and Wildlife Service captured 16-11's offspring in 2015 and then 16-11 in 2016, hoping to find a more appropriate mate for the male whooping crane. Researchers selected Hemlock, a breeding-age whooping crane female born at ICF in 2012, for pairing introductions with 16-11. With the match decided, the two birds were transported from the International Crane Foundation and Horicon Marsh in Wisconsin in 2016 to White Oak Conservation in Florida, where they would be paired and conditioned for release back into the wild.

The introduction of 16-11 and Hemlock began at White Oak Conservation in October of 2016. Throughout their roughly two-year stint in managed care, the two whooping cranes were housed in Flight Pen 3 and 4 (FP 3/4), an isolated set of enclosures that could be split into two equal areas for pair introduction and possible separation. In each pen, there was a pond with a nest island to promote natural roosting, nesting, and foraging behavior. A remote camera system and trap doors built into the capture barn allowed for daily servicing and observation of the birds without human contact, and in order to promote handling in a safe, low-stress environment, a blind alley and dark capture barn were used to catch up the birds for veterinary exams and transport.

Seeking to create the greatest chance for pairing success, White Oak introduced these two whooping cranes in a series of stages designed to ensure the safety and positive receptivity of both animals. Beginning with visual access only, the potential pair reached behavioral milestones such as run flapping and dancing in synchrony through the chain-link fence. In the next stage, the pair was given full access to each other in FP 3 on 31 October 2016 for one hour. The time allocated for introduction increased over the next few weeks until they were left together for an entire day on 12 November. Hemlock and 16-11 remained tightly bonded throughout the introduction process and were observed dancing, moving in synchrony, and unison calling. Finally, on 7 December, the pair was left together overnight with full access to FP 3/4.

The first breeding season between this pair showed further affirmation of a successful pairing, with elaborate pair dancing, precopulatory positioning from female, and unison and contact vocalizations from both birds. In 2017, copulation was observed from early spring until 8 May, usually taking place in the early morning and occurring roughly every other day. Nesting behavior was seen from both the male and the female in FP 4 during the period of copulation, especially around the nest island, but no eggs were laid, possibly due to Hemlock's inexperience in a pair. During the second breeding season, copulation occurred more than a month earlier than the previous year and resulted in the laying of two eggs, the first of which was found on 26 March 2018. As was observed the previous year, roosting and courtship behavior, including early-morning copulation, tended to occur in FP 3 while nest-building behavior occurred around the pond in FP 4. The first egg was laid sometime between the afternoon of 25 March and the morning of 26 March, and the second was presumably laid two days afterward. Due to the high vegetation around the nesting area, the eggs were not seen until 6 April when the female stood up to turn two eggs. Incubation was thorough by both parents. In the initial stages, the female incubated for large amounts of time, leaving the eggs only briefly to feed or drink from the pond. The male, on the other hand, was rarely seen on the eggs in the first week, though he was highly responsive to the female's behavior, immediately moving to the nest and standing to tend them while the female took her brief excursions off the nest. As time progressed, 16-11 was seen incubating during the day with greater and greater frequency and duration, especially during the afternoon. Inferences from video recording led keepers to believe Hemlock incubated overnight, due to the female being the one to leave the nest in the early morning. Even during the incubation period, the pair maintained their bond through courtship behavior. Each

morning at about 6:30 am, the male drew the female from the nest into FP 3, the pair danced, and then the female returned to the nest after about 20 minutes.

Nearing the hatch date, keepers spent long periods observing 16-11 and Hemlock for signs of a chick. The female was still seen getting off the nest at first light, but the male was seen returning to incubate in the morning and incubating consistently throughout the afternoon. On 26 April 2018, the first chick (later determined to be a female) was found hatched around 7:00 am. The development of parental behavior in the adults was by degrees in the first few days. The male, who had successfully raised chicks before, displayed immediate parental competence with purring to the pipped egg, removal of egg shell from the nest once the chick had hatched, and careful leading of the chick to and away from the nest for brooding and foraging. The female was a novice at chick rearing and did have a few clumsy moments, such as stepping on and lightly mouthing the chick's head when it was near the nest. She was very attentive to the egg, however, and did successfully brood the first chick while still on the second egg. The second chick (later determined to be a male) was found hatched in the morning on 28 April. Both chicks were active, though it was obvious that the younger chick was weaker. The female spent time brooding both chicks, and when the older hatchling left the nest, one of the parents was always with her.

Adult whooping cranes tending to twins in pond (top) and brooding hatched/hatching chicks (bottom).
Photo credits — Stephanie Rutan, Mary Ellen Petraska

Although born roughly two days apart, the development of the twinned chicks was fairly equal and smooth. The first chick, having an extra two days to grow, very quickly gained the strength to follow adults while foraging, only stumbling in the tall grass from time to time. The second chick was left alone at the nest more often than the first chick at the same age, but he was mobile enough by the end of his first day to begin following the adults to the pond. By the younger chick's second day, the entire family group had ventured over into FP 3, where the parents foraged and fed the chicks. Conflict between the chicks was infrequent and mild. Whenever aggression was displayed, the adults separated the chicks quickly, sometimes unison calling afterwards. In order to decrease any negative competitive effects between the twinned chicks, mealworms with vitamin supplements were offered in or near the feed station multiple times a day. Hemlock had a higher tendency to feed provided insects to the chicks, while 16-11 was almost never seen feeding mealworms, instead preferring to offer wild forage to his offspring. Both chicks were soon eating on their own as well being fed by their parents, and as the chicks grew more competent, the insects provided by the keepers were weaned in order to encourage the increased consumption of natural forage.

Over the course of five months, the whooping crane chicks grew rapidly and well, learning to forage, preen, and fly on their own. In the last few weeks of their captivity, the family group could be seen flying laps around the flight pens, strengthening the flight muscles that they would need for release. The family group was also observed dancing together on a number of occasions. The adults would begin their dance in the FP 3 pond as usual, and the chicks mimicked their parents, bobbing their heads and spreading their wings out dramatical-

ly. All of these behaviors left the reintroduction team encouraged for the survivability of this group in the wild, and on 24 August 2018, all four whooping cranes were caught up and transported via private plane to Horicon National Wildlife Refuge in Wisconsin where they were released into the wild.

Loading whooping crane family into a plane in Florida for release in Wisconsin. Flight donated by Windway Capital Corporation.

Photo credit — Karen Meeks

Acclimation to managed care was a major component of behavioral observations in caring for 16-11. In order to reduce human impact and maintain wild behavior in the male whooping crane, daily observations and behavioral data were gathered and recorded using remote camera systems and peek holes from the enclosed capture barn. Evidence of maintained, wild behaviors was consistently documented during his nearly two years at White Oak, from his ability to incubate and raise chicks to his vigilance and predator-defense behaviors. 16-11 remained agitated by human presence and responded to keepers as a wild whooping crane would to predators, pacing, guard calling, and avoiding human interaction whenever possible. While any behavioral indication of potential stress is suboptimal, these behaviors also mark-ed a continued maintenance of wild behaviors, something essential for the future success of this bird and his family group in the wild.

Whooping crane family post-release at Horicon Marsh in Wisconsin.

Photo credit — Hillary Thompson

From her daily roosting habits to chick care and predator vigilance, Hemlock appeared to evolve in her behavior over her two years at White Oak, growing more like her mate and presumably more wild. When she first arrived at White Oak in October 2016, the female was observed roosting on her hocks in the grassy corners of her pen. In one of her earliest overnight introductions with 16-11, she was seen roosting in the FP 3 pond as a wild bird would. Hemlock also grew more vigilant and defensive while paired with 16-11, though this development took a great deal more time than her roosting adaptation. Even after a year at White Oak, the female was still consistently coming to the feeders if she heard human noise from the barn and making soft purring vocalizations indicative of a positive response. By early spring of 2018, she began to move away from human noise with the male, preferring to walk tightly with 16-11 in an alert posture. Initially, Hemlock also failed to stay vigilant while foraging, a crucial operation for survival in the wild. While the male kept his head up and alert to watch for predators, Hemlock was almost never seen taking over guard duty. As 2018 progressed, keepers observed an increase in her alertness and the early stages of this predator-vigilance behavior. Lastly, while the female's attention to her eggs was superior to her mate's, Hemlock's maternal instincts toward the hatched chicks came less naturally. Throughout the chicks' development, she became less clumsy around them and responded more readily to their calls, but these behaviors took time. Her defensive response regarding the chicks also shifted. During the chicks' first veterinary exam, the female mimicked the male's guard calls and flap jumping when keepers neared their offspring but was delayed in her response and did not appear to be moving aggressively toward the keepers. In subsequent exams, the female was markedly more aggressive toward humans, often charging, jumping, and kicking in an attempt to protect her chicks. Hemlock even began to perform the predator distraction display with 16-11, getting low in the grass with wings outstretched in order to draw a predator's attention.

The results of this novel experiment have been varied but ultimately encouraging. The re-pairing of a wild migratory crane in a captive setting was successful in every sense of the word, leading to not only increased wild behavior from the captive female but also the rearing of healthy, strong twin chicks to fledge, a rarity for captive breeding. Unfortunately, Hemlock was found deceased in a small copse of woods a month after her release. It appeared that she did not respond well to the new environment, and though she did not succumb to predation, she may have had difficulty foraging appropriately. Even with this setback, 16-11 and his two chicks have remained together as of early November and will hopefully migrate soon. One could speculate that as a fully mature bird, Hemlock's adaptation to captivity was possibly too great to overcome, and future re-pairing and release efforts may benefit from younger birds or single, adult mates also from the wild. Looking forward, this newly established technique may be utilized to help additional small endangered migratory crane populations rebound by maximizing pairing likelihood so that we can once again hear the bugling of these charismatic birds where it has fallen silent.

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For further news on this crane family, see Hillary Thompson's report on pages 12-13. — Ed.

THE 6TH BLACK-NECKED CRANE CONSERVATION NETWORK MEETING HELD IN HUIZE NATIONAL NATURE RESERVE, YUNNAN PROVINCE OF SOUTHWESTERN CHINA

The 6th Black-necked Crane Network Meeting was held 11-13 December 2017 at Huize National Nature Reserve, Yunnan Province. The meeting was organized by the National Bird Banding Center of China, the Kunming Institute of Zoology of the Chinese Academy of Sciences, the International Crane Foundation, and the Yunnan Environmental Protection Agency of Yunnan Province and Huize National Nature Reserve. A total of 83 participants from 30 organizations attended the meeting. The 3-day event included two days of presentations and a one-day field trip to the Huize National Nature Reserve, which is a major wintering site of Black-necked Cranes. The presentations covered topics in research, habitat management, education, and migration. Participants discussed how to improve communication and cooperation among the network sites as well as with other networks, such as the East Asian-Australasian Flyway Partnership.

The meeting produced several highlights and concerns. Highlights included (1) presentations on applications of new technology in resource monitoring and reserve management; (2) reporting on the discovery of a large population of Black-necked Cranes wintering in Linzhi Prefecture, Tibet and its new migration route; (3) news that research and conservation capacity have increased (many young scientists and reserve managers presented their work at this meeting). While the global and regional populations of Black-necked Cranes are stable, there are serious concerns about emerging impacts on the cranes, such as transitioning away from traditional crop farming to new or alternative crops, increasing numbers of wild dogs, on-going or potential hydro-electric projects, tree plantations in wetlands, pressures from tourism, and disturbance from collecting of medicinal plants.

The Black-necked Crane Conservation Network was established in 2012 by the Kunming Institute of Zoology of the Chinese Academy of Sciences, the National Bird Banding Center of China, and the International Crane Foundation. The network aims to provide a platform for information exchange and sharing of research, monitoring, education and conservation of Black-necked Cranes and their habitats for the range provinces in China.

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