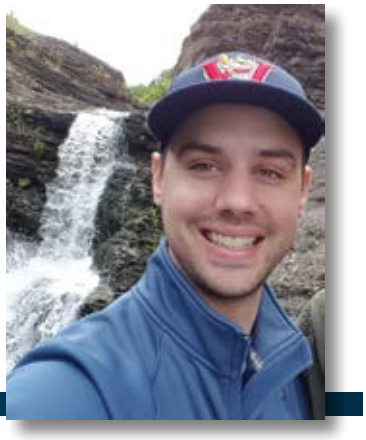
Big Whoop



By Nick Pink, *AWA Conservation Specialist*

The whooping crane is a large bird that migrates to Alberta's Wood Buffalo National Park each summer to breed. While not yet out of danger, multi-generational recovery efforts have resuscitated this iconic species from the brink of extinction and made the crane a symbol of successful conservation. The Calgary Zoo has been a part of these recovery efforts, establishing a captive breeding and research program in 1992 that continues today. The work is far from over; currently the whooping crane is listed as Endangered in Alberta under the *Wildlife Act*, under Schedule 1 of the Canadian *Species at Risk Registry*, and under the International Union for Conservation of Nature (IUCN) *Red List of Threatened Species*. To learn more about current recovery efforts, I spoke to Kelly Swan, a conservation research population ecologist and a (now former) part of the whooping crane recovery research team with the Calgary Zoo.

Nick Pink: How did you come to work in conservation research at the Calgary Zoo?

Kelly Swan: After completing an undergraduate degree at the University of Toronto, I took field technician jobs around the world. My first job was in the Galapagos Islands and from there I did amphibian and reptile work and a fair amount of bird work here in Alberta. Upon completing a Masters degree at the University of Victoria, I accepted an opportunity with the Calgary Zoo fellowship program and I've been here about five years.

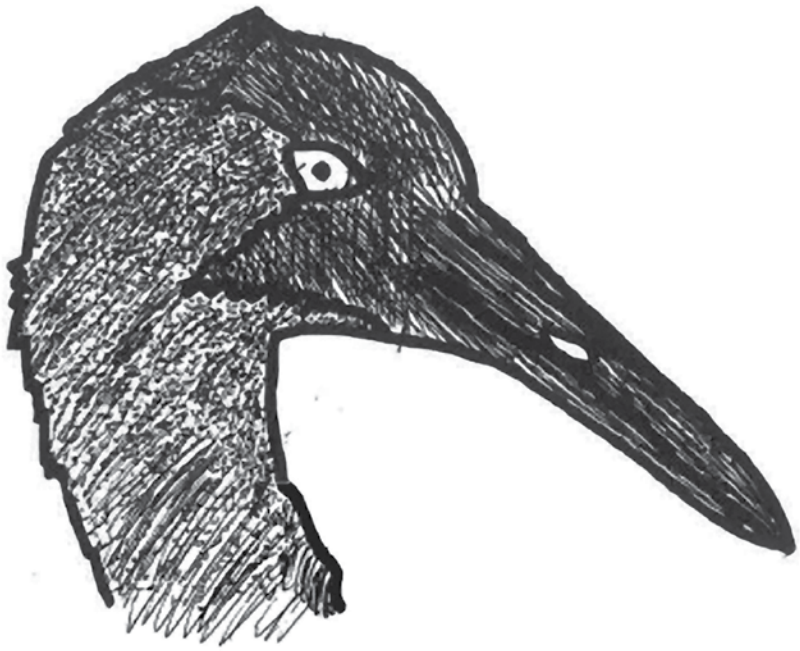
My fellowship ended in 2013 and I was offered a position overseeing a new whooping crane research project, with our collaborators in the United States. We have been looking at the incubation conditions that are best to maximize hatch success of whooping cranes in captivity, and becoming more involved with whooping crane recovery planning efforts.

NP: How would you describe the whooping crane to someone who may not be very familiar with the bird?

KS: As adults, whooping cranes stand about five feet tall with up to a 7.5 foot wingspan, beautiful white feathers, black wing tips, and a red head. They're quite striking and people have long been enamored with them. They're fairly long lived, up to about 25 years or so in the wild. The earliest breeding would be at three or four years though some may not breed until they are a few years older than four. They tend to be monogamous, they form pairs and stay together as long as both partners are alive. And of course they're named for their distinctive call – a whoop – which is worth looking up if you haven't heard it before.

NP: Where do they live?

KS: The only remaining natural flock breeds in, and a little bit outside of, Wood Buffalo National Park, in Alberta and the Northwest Territories. They migrate to Texas every fall to the Aransas National



In the 1940's, there were only 21 whooping cranes in the wild. Thanks to international recovery efforts, there are over 450 whooping cranes in the wild today. Image drawn by students at Lochearn Elementary School in Rocky Mountain House.

Wildlife Refuge and overwinter there. Whooping cranes cover a huge tract of land over their migration route and have a number of stopover sites. There have been a few reintroduction efforts and you can currently find reintroduced whooping cranes in Louisiana, in a non-migratory population. That's a relatively new reintroduction effort that started in 2011. There's also a migratory reintroduced flock that breeds in Wisconsin and overwinters in Florida. That effort is still ongoing but we're into the 17th year of releasing birds into that flock.

NP: Were non-migrating populations of whooping cranes something that occurred naturally or is that something that's happened since they've been reintroduced?

KS: Yes, there were migratory and non-migratory populations so that Louisiana reintroduction is meant to try and restore a population that actually existed there until the 1940s. It was around that time – the early 1940's – that the wild population of whooping cranes dwindled to just 21. A few of those individuals were in Louisiana as part of a non-migratory population. The others were in the flock that ranges from Wood Buffalo to Aransas.

NP: So there were about 21 individuals in the 40s, how many are there today?

KS: The Wood Buffalo flock that migrates to Texas has roughly 300 individuals – so it's been a really positive and great improvement – and they're still increasing. There's been no reintroduction or reinforcement of that population. We've increased conservation, awareness, protection throughout their range and they've been steadily increasing. Aside from that population, there's roughly 150 or so in the reintroduced flocks, so the total number of whooping cranes that exist in the wild is 450-500. They're doing a little better but there aren't the thousands that existed before they were really in trouble.

NP: So the whooping crane wasn't always a rare bird then?

KS: There were probably tens of thousands, which is not a really high number compared to other species of birds.

NP: From a population genetics point of view, 21 individuals would seem like a very small number of individuals to successfully bring a species back from the edge of extinction. Were there problems caused by a lack of genetic diversity in the species?

KS: Definitely, whenever there are only a few individuals left in a population, we need to be concerned about genetic diversity. All of the whooping cranes that exist today are thought to be derived from only six to eight individuals – this can be a detriment to productivity, disease resistance, and adaptation to global change at the population level. When pairing birds in captivity, setting recovery goals, or deciding where to release birds to the wild, maximizing genetic diversity is always at the forefront of people's minds. We can't do anything about that initial genetic bottleneck, but we can try to maximize the genetic diversity that we now have, and our goal is to increase wild whooping crane numbers quickly, so natural genetic variation will also increase.

When conservation efforts began, they pulled eggs from the Wood Buffalo flock, one egg per nest, and brought them into captivity in order to establish the captive breeding population that we have now. Narrow genetic diversity has been a challenge in captivity as well. In captivity sometimes you'll have questions about "is this harder because of the particular genetics that we're dealing with?" and it's not always easy to answer. But we've definitely been successful in establishing captive breeding flocks and those in turn have produced offspring released to the wild. The sooner there are more individuals the more likely there isn't a notable consequence in the wild natural flock. As far as I'm aware there haven't been any discernible problems that have been attributed to a particular overrepresentation of a negative inherited trait.

NP: How did the cranes decline from tens of thousands to so few?

KS: Largely habitat alteration for agricultural development and hunting.

NP: What kind of challenges do the cranes face today?

KS: Unfortunately, there is still the risk of poaching in their southern range, as well as powerline collisions during migration, and predation of chicks. Water management is also an issue; there have been challenges in the south with diversion of water for different uses that can affect food availability and roosting sites. Climate change, of course, is another big concern.

NP: Something we've been monitoring at AWA is the UNESCO mission report for Wood Buffalo National Park where the Mikisew Cree petitioned the World Heritage Committee to have the status of Wood Buffalo to be added to the List of World Heritage in Danger, as they are concerned about water supply to the area. Is water usage affecting the whooping crane in the Park?

KS: I think it's a concern for the future, as far as I know now it's not impacting populations at this time.

NP: What does the Calgary Zoo do for whooping crane conservation?

KS: The Zoo is the only Canadian breeding facility for whooping cranes. We hold the third largest captive-breeding population, after Patuxent Wildlife Research Center in Laurel, Maryland, and the International Crane Foundation in Wisconsin. There are also two other zoos involved: the San Antonio Zoo and the Audubon Nature Institute. We've been involved since 1992, which is when we started breeding whooping cranes for reintroduction. In the early days, we

were doing a lot of the captive rearing as well. Part of the issue with raising whooping cranes in captivity is that they can imprint [when young animals become attached to and learn the behaviour of their caregivers] on humans. That's something we work to mitigate because we obviously don't want them to be attracted to humans upon release.

NP: I understand there was an issue when they used sandhill cranes as surrogates; the whooping cranes had trouble mating with each other.

KS: In the first reintroduction attempt in the 1970s the idea was, "what if we just put whooping crane eggs in sandhill crane nests?" They use a lot of the same habitats, and have a similar life-history; it could solve the problem of teaching the cranes how to survive and where to migrate, because they could learn from experienced birds. That effort failed, because the whooping cranes didn't differentiate between sandhill cranes and their own species.

We still have to worry about "imprinting" when breeding whooping cranes in captivity, so one method that has been used is costume rearing, where a caretaker puts on a white sheet with a puppet head. With this method, a caretaker is in a white sheet 24/7 around the birds, never saying a word, not letting them hear human sounds, and teaching them how to exercise, find food, and feed using the puppet head. It's been effective at preventing imprinting on humans, but we now are trying to allow for more natural parent-rearing by captive cranes. Early on at the zoo we were doing costume rearing and sending chicks to the US to the reintroduction efforts there.

More recently, we are doing a mixture of sending eggs to the US and hatching some eggs at our Devonian Wildlife Conservation Centre for parent rearing. We send eggs or chicks to the American facilities: Patuxent Wildlife Research Center or ICF, and they coordinate their eventual release to the wild. Since 1992, we've sent nearly 100 eggs and chicks to the reintroduction program and are still actively involved in that. Ultimately they are released in the Louisiana non-migratory population or the Wisconsin migratory flock.

NP: I understand the Zoo is also doing research with a type of data logging egg that records nest conditions, can you tell me about that research?

KS: One of the early research projects that we did with whooping cranes was to develop data logging eggs that record temperature, humidity, rotation, light levels. We put those under whooping cranes to observe the natural conditions under the bird. One of the ways that managers maximize the production of whooping cranes in captivity is by pulling the first set of eggs that the whooping cranes will lay. Just like in the wild when a bird's nest is predated, if there's enough time in the breeding season, the bird will reclutch and lay more eggs. Conservation managers utilize this behaviour in order to get the bird to keep laying eggs, because the more eggs we have, the faster the captive population will grow. But then we are faced with the problem of where do you put those eggs after you've pulled them? We do use foster incubators like sandhill cranes in captivity and artificial incubators which are less expensive and easier than having other species of cranes around simply to in-

Whooping cranes form pairs and stay together as long as both partners are alive. PHOTO: © D. KNAPIK

Alberta's Wood Buffalo population of whooping cranes migrates to Texas when winter comes to Alberta.
PHOTO: © CALGARY ZOO

cubate eggs. But what we've seen is that the hatch success is higher with natural incubation than artificial incubation. So the question we have is, what's the difference? How can we make our artificial incubators better? How can they better mimic natural conditions? We're trying to determine this by pairing a data logging egg with a real egg and putting them under a bird or in an artificial incubator, so when that real egg fails or hatches, we know what kind of conditions it experienced.

NP: Are there any other initiatives for whooping crane recovery that the Zoo is a part of?

KS: We are working closely with the international whooping crane recovery team (IRT), which includes our Head Veterinarian, Dr. Sandie Black. The team is quite remarkable because you don't often see a single international team for one species, but there are Canadian and American co-chairs, both from the government, and then other representatives from various stakeholder groups. We've been working with the IRT in holding international IUCN-facilitated recovery planning workshops. We essentially bring international leaders in whooping crane science and recovery together to generate population models based on the most recent data for whooping cranes and use those models to make plans for the future. The most recent recovery plan for whooping cranes was published in 2007, which is quite old by this point, and the recovery team is looking at what our goals for recovery should be. What are our goals for downlisting? How can we reach downlisting goals faster? How are we doing now? What other management techniques may be effective?

Bringing all these people together is meant to inform a lot of those questions. So the Zoo has been involved in wider whooping crane recovery planning. And we are looking to expand our whooping crane research in general.

NP: With the whooping crane increasing in numbers and seemingly on track to recovery, what work is left to be done? Are there still significant hurdles that need to be solved?

KS: Across the board, there are a lot of things we have yet to learn. Even as the population grows in Wood Buffalo, where are they expanding to? What sorts of habitats should we expect that they will require over the next several decades?

The whooping crane has become this icon of successful conservation efforts in North America, because a lot of people, like my mom, remember hearing about the reintroductions in school. But we're also still learning because neither of the reintroduced flocks are self-sustaining; they still rely on releases of new individuals.

NP: So despite the success, it's not in the bag yet.

KS: No. But there are some promising developments recently. In Louisiana, where the newest reintroduction attempt began in 2011, they've actually already had successful breeding. Actually, just last year, one of the birds that we sent laid the first eggs in the wild in Louisiana since the 30s. They've seen some successful breeding but there's still predation and some eggs not hatching successfully. These kinds of things certainly happen naturally in the Wood Buffalo flock, but it's hard to say with such a small population what the trend will be for this reintroduced flock. There's still much more to learn and that's what really interesting about this species and these efforts. Whooping crane efforts inform other projects as well; some of the challenges such as the failed idea to put whooping crane eggs in sandhill crane nests in the wild, inform us where you can go right and where you can go wrong. There's always some element of trial and error with a new reintroduction program but the whooping cranes program has brought about a lot of information for other avian reintroduction programs. It's pretty neat that way.

NP: I noticed that the zoo received an award in 2016 for the whooping crane recovery program.

KS: We did, that was from the Association of Zoos and Aquariums (AZA). They annually award conservation programs from AZA accredited institutions. We won the 2016 North American Conservation Award, jointly with the ICF, San Antonio Zoo, and Audubon Nature Institute. It's recognition from our peers for a job well done.

Thanks to Kelly and the Calgary Zoo for their participation.