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CREW PROGRESS REPORT
Lindner Center for Conservation and Research of Endangered Wildlife
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The Race to Save a Threatened Ohio Flower from Extinction

Photo of the federally threatened Lakeside daisy at CREW.

The U.S. Fish & Wildlife Service (USFWS) has initiated their 5-year review of the federally threatened Lakeside daisy (*Hymenoxys herbacea*) and is using genetic data generated by CREW scientists to inform future conservation recommendations for the species. The largest and only self-sustaining U.S. population of Lakeside daisy is found in Ohio on the shores of Lake Erie, with most of the population located on the grounds of an active limestone quarry. Because the quarry operation is continuously destroying daisy habitat, the Ohio Department of Natural Resources has established safeguarding populations of the species on the nearby Kelleys Island by translocating seeds to state-protected land. However, whereas many plant species are incapable of self-pollination, Lakeside daisies take it one step further with genetic self-incompatibility, a breeding system that prevents individuals from successfully pollinating their close relatives. This system can be beneficial in avoiding the negative effects of inbreeding, but it requires a baseline level of genetic diversity for continued seed production in the population. As portions of Lakeside daisy habitat and populations are lost to limestone quarrying activities, the species runs the risk of being comprised only of populations with individuals too closely related to maintain seed production and population growth. This is a dangerous situation for the plants, as their long lifespan could make populations appear stable when in reality, they are incapable of producing the next generation. To help USFWS make informed conservation planning decisions for the species, CREW analyzed genetic samples from the remaining natural quarry populations and compared them to the safeguarding populations on Kelleys Island, finding that overall genetic diversity in the species is low, as expected, but the most diverse subpopulations of the species are located in the most vulnerable active quarry zones. Although this finding makes it a race to save diversity in the species before we lose more plants to blasting, the good news is that the safeguarding populations have a genetic diversity comparable to natural populations. Fortunately, this CREW/USFWS partnership helps ensure that the Lakeside daisy can survive even the most explosive population disruptions by informing where seed collections must be made to preserve maximum diversity.

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Too Small to Spar, But Big Enough to Breed

Photo by explore.org

Knowing when polar bears reach sexual maturity is key for successful breeding management, especially as the U.S. zoo population continues to decline. Until recently, it was assumed that males didn't reach maturity until around age five, largely because older, bigger males are the ones observed breeding in the wild. However, new genetic data from wild populations showed that males as young as two have sired cubs, suggesting they are capable long before they'd be able to outcompete older rivals. In zoos, male competition isn't a factor, so we may be missing valuable breeding years. To investigate this, CREW scientists monitored fecal testosterone concentrations in 14 juvenile male polar bears from 11 zoos. They discovered that some individuals began showing adult-like hormone patterns as early as age two, with many others reaching this benchmark by age three—long before they're typically paired for breeding. Interestingly, an individual's hormone patterns weren't always consistent from year to year, suggesting that hormone monitoring alone might not tell the whole story; it's likely that combining hormone tracking with behavioral observations and semen analysis will provide a more complete picture. This study, recently published in *Theriogenology Wild*, offers novel information to guide breeding programs, and hopefully will result in the birth of more cubs.

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Rhinoceros Iron Accumulation and Beyond

Understanding mineral accumulation in rhinos is critical to improving health in managed populations. Although serum values are commonly used to assess mineral status, they often do not reflect true tissue-level concentrations. Under the IMLS-funded American Institute of Rhinoceros Science (AIRS) project, liver mineral concentrations were analyzed in 107 rhinos, creating the largest dataset to-date. Iron overload disorder (IOD) in black rhinos was a primary focus of this project, but our findings highlight the need to move beyond a singular emphasis on excess dietary iron. In addition to elevated iron, black rhinos had significantly higher liver concentrations of molybdenum and lead—minerals known to be associated with physiological iron accumulation in other species. Selenium values were also markedly higher in managed black and white rhinos compared to their wild counterparts, raising potential health concerns. Notably, liver iron accumulation did not increase linearly with age as previously believed; instead, it plateaued in middle-aged individuals and declined in older rhinos, suggesting some degree of regulation and tolerance of excess iron stores. These results underscore the importance of broadening our perspective when evaluating mineral-associated health conditions in managed rhinos. Furthermore, this information is valuable in guiding rhino health assessments, diet formulations, and management activities to ensure rhinos in human care thrive today and in the future.

Photo by Teagan Dumont

Photo of Zuri (left) and Ajani Joe (right).
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