Evaluating Zoos' Contribution in Conserving Biodiversity

"Only if we understand can we care. Only if we care can we help. Only if we help shall all be saved" (Jane Goodall).

The destruction of wild habitats for industrial purposes, in addition to human-induced climate change, has caused environmental crises. Over one million animal species have experienced a population decimation with an alarming number approaching extinction. Zoos have emerged as agents of conservation; they no longer exist to simply showcase animals for human enjoyment, but are vital in the ever-pressing obligations of species preservation. Zoos' leadership and involvement behooves extensive evaluation. They could prove to be invaluable in protecting animal species that have roamed this earth for millennia. This writing seeks to evaluate the scientific contributions of zoos regarding species conservation and recovery. It aims to examine the role of captive breeding and to suggest an improved method based on the voices of important stakeholders. Propositions cannot be ultra-specific, considering the differences in funding and capacity among zoos. However, more generalized solutions can be explored. Zoos are becoming increasingly important in addressing animal endangerment and could benefit from practicing a blend of various conservation methods instead of overreliance on captive breeding.

Zoos have enormous potential to be effective agents of biodiversity conservation. Christina Hvilsom et al., Zoologists of the Scientific Department at Copenhagen Zoo, quantified the number of peer-reviewed scientific works coming from European zoos: "With a total of 3,345 articles, reviews, letters, clinical trials and case reports published in the 21-year study

period, it is evident that zoos and aquaria are contributing a large quantity of peer- reviewed scientific research"(133-138). Hvilsom et al. maintain that the volume of scientific contributions from zoos testifies to their potential to be successful agents for biological conservation and education. To complement these findings., Tse-Lynn Low et al., workers at Daniel P. Haerther Center for Conservation and Research, found an additional 81,342 citations accumulated from North American Zoos (287-299). The combined contribution of zoos amounts to approximately 10,000 articles and findings, a staggering achievement. Furthermore, Low et al. found that research has increased considerably in recent years, showing a promising effort in assisting conservation. Dr. Dalia Conde, Director of Science Species 360, adds that zoos are responsible for the majority of offsite conservation efforts, which are most effective for enacting emergency population recovery plans. Notably, such strategies successfully rescued the Gray Wolf and California Condor from extinction (1390–1391). Conde argues that since most critically endangered species suffer from irreversible habitat loss, captive breeding is the only viable option left for preservation. As logging, farming, and other detrimental human activities continue, zoos may become endangered species' only chance of survival. Clearly, zoos are positively advancing conservation science as natural biodiversity diminishes.

Furthering this advancement, zoos have adopted captive breeding as their principal strategy. Biologist Devra G. Kleiman defines captive breeding in zoos as an *ex situ* conservation method, meaning animals are located outside of their natural habitat. Its opposite, *in situ* conservation, describes territory that is protected to conserve its inhabiting biodiversity (152-161). Andrew Bowkett, an official at Paignton Zoo, explains the concept of reintroduction and captive breeding as "analogous to Noah's Ark." He states that "species threatened with extinction are maintained in captivity, as if aboard an ark escaping the flood, until those factors

threatening their existence are removed and they can be returned to the wild"(773-776). *Ex situ* conservation has been met with considerable controversy and passionate critics who believe it to be both inhumane and ineffective. Paul M. Dolman et al., professors of ecology, support these concerns. Using a scientific model, they found that even in the best-case scenarios for captive breeding, the attempts were dramatically less successful than *in situ* ones (841–850). Furthermore, there remains concern surrounding the changes in animal behaviors that could result from life in an artificial environment. Nonetheless, the captive breeding archetype remains an attractive solution to zoos considering that out of 314 approved species recovery strategies, over sixty percent of zoos chose it (Bowkett). Bowkett asserts that captive breeding has become the "all in" solution for conservation at zoos. This unquestioned devotion could become disastrous if this method proves ineffective. For this reason and the numerous associated risks, captive breeding should be researched more extensively before zoos fully commit.

Captive breeding may also be an infeasible long-term solution. Noel F. R. Snyder et al., directors of Parrot Programs for Wildlife Preservation Trust, claim that it's inadequate because of its costliness and dubious chance at success. Genetic and domestic changes to captive animals, financial demand, disease outbreak, reintroduction failure, and preemption of more effective techniques are all arguments against reliance on captive breeding (138-148). The number of obstacles preventing its success is concerning. This paradigm cannot be prioritized above other approaches without profound understanding of the risks. Adding to its limitations, Andrew Balmford et al, professors of Conservation Science, assert that captive breeding is only suitable for a small subgroup of species. "There are over 6,000 species known to be threatened in the wild [but] constraints on space and resources mean that in practice *ex situ* facilities could at best support viable populations of perhaps only 500"(719–727). This exposes the infeasibility of

captive breeding in terms of capacity. It has caused species to be selected or excluded based on socioeconomic factors, discrediting the previously cited Noah's Ark analogy. An eminent example is the disproportionate focus on large mammals and carnivores despite their poor breeding success and burdensome cost (Balmford et al.) Balmford et al. insist that amphibians would be ideal candidates for captive breeding and are inarguably most in need of emergency recovery. However, zoos continue to fund programs for large mammals because they are more popular. These numerous complications regarding captive breeding and zoos' eager inclination towards it demonstrate a lack of consideration of more optimal conservation solutions.

Ideally, zoos would prioritize holistic conservation without overreliance on captive breeding**.** Stephen Funk et al., Directors at the National Fish and Wildlife Foundation, commend zoos' contribution to conservation. However, with the amount of potential zoos possess to raise funds and gain public attention, they argue that zoos must pitch in further to remain relevant conservation agents (443-455). The main obstacle preventing conservation success is insufficient funding, yet zoos can obtain funding through public appeals. Not all of the responsibility of funding can fall on zoos, but they are crucial institutions and any further effort would assist tremendously. Nick Salafsky et al., directors of a nonprofit conservation organization, argue that improving conservation requires better coordination between zoos. He posits that reaching consensus on measurable goals, priorities, and conservation science will make biodiversity efforts more streamlined and powerful. If international zoological institutions do not thoroughly communicate their priorities, conservation attempts may be less unified and less efficient, resulting in failure to meet more broadly known targets. Snyder et al. acknowledge captive breeding as an effective last-resort recovery technique but caution that "it should not displace habitat and ecosystem protection nor should it be invoked in the absence of comprehensive

efforts to maintain or restore populations in wild habitats"(338-348). Zoos should not simply increase funds for conservation but should use them to assist *in situ* programs instead of cost-inefficient captive breeding programs. Further prioritization of conservation, coordinated action plans, and reevaluation of *ex situ* recovery strategies can strengthen the role of zoos in reversing biodiversity loss.

Zoos have demonstrated understanding and caring toward protecting earth's animals in the face of crisis. They have responded to their obligation to protect biodiversity by partaking in captive breeding programs as a conservation strategy. Although initially a promising prospect, it has been exposed as a risky and costly method. Zoos' intentions to conserve are encouraging; it's the execution that needs refinement. Zoos could benefit conservation science immensely by resorting to captive breeding only as a last-resort practice, and dispersing their finances and resources toward more scientifically approved *in situ* solutions.

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