

Scientists and zoos team up on landmark elephant welfare project

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Given that elephants are the largest land mammals on the planet, one might expect that when it comes to enclosures for zoo elephants, size matters.

However, a newly released study in which the University of California, Davis, played a key role reveals that social interactions and having an array of opportunities to engage with their surroundings may be more important for elephants than space.

The research effort is the largest multi-institutional zoo-elephant welfare project conducted to date and includes nine studies that analyzed the lives of 255 African and Asian elephants in 68 accredited North American zoos. The results will be released July 14 as a special collection in the open-access journal *PLOS ONE*, published by the Public Library of Science.

The goals and comprehensive findings of these studies will be presented in a companion overview. Pre-publication, embargoed copies of the papers have been made available by the journal and can be obtained by contacting Pat Bailey at pjbailey@ucdavis.edu or Cheryl Meehan at cheryl.meehan@aware.institute.

"This is the first coordinated set of studies aimed at evaluating a number of behavioral and physical aspects of welfare for the North American zoo elephant population and, importantly, identifying the most important aspects of elephant management, housing and care," said Cheryl

Meehan, a UC Davis staff research associate in the Department of Population Health and Reproduction, School of Veterinary Medicine. Meehan provided consulting services to the project through her organization, AWARE Institute, and is the lead author for the overview.

Time alone is risk factor for zoo elephants:

The full research collection contains studies on elephant welfare factors including behavior, body condition, foot-and-joint health, female reproductive function and walking distance.

Some of the results confirmed the researchers' expectations. For example one of the studies found that spending time on hard flooring was the No. 1 risk factor for both foot and musculoskeletal health problems, which were common in the elephant population.

Other findings revealed previously unknown links between elephant management and welfare. For example, a research team led by Joy Mench, professor in the UC Davis Department of Animal Science, and graduate student Brian Greco found that more than three-quarters of the elephants studied performed stereotypic behaviors such as swaying or rocking.

These types of behaviors are considered to be among the most important behavioral indicators that the welfare of a captive animal is compromised, but their causes are difficult to pinpoint.

The researchers also found that for elephants, spending time alone was an important risk factor, while spending more time in larger social groups, particularly those that included young animals, had a protective effect. Additionally, having experienced multiple inter-zoo transfers increased an elephant's risk of performing stereotypic behavior.

The authors interpret these results to mean that the social lives of elephants play a large role in their behavioral health and recommend that zoo elephant programs consider management changes to support larger, multigenerational social groupings.

Meehan said that some of the other results were quite surprising.

Enclosure size was surprisingly less important:

"We expected to find associations between the size of zoo exhibits and welfare, but space ended up being of minor importance when compared to social factors and management practices such as enrichment programs," she said.

For example, female elephants who experienced a wide variety of enrichment opportunities and feeding options, such as puzzle feeders that require work to gain access to food, were more likely to have normal reproductive function. This result indicates that day-to-day management practices could be an important tool in addressing the reproductive issues that are particularly common among female African elephants.

Mench said that the research team hopes the results of these studies will provide zoos with "objective information about how [elephants](#) are faring behaviorally, physiologically and emotionally, and the positive and negative outcomes of various zoo housing and [management practices](#)."

Provided by UC Davis

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