

# Marine mammal longevity study reveals remarkable advances in animal welfare in zoological institutions

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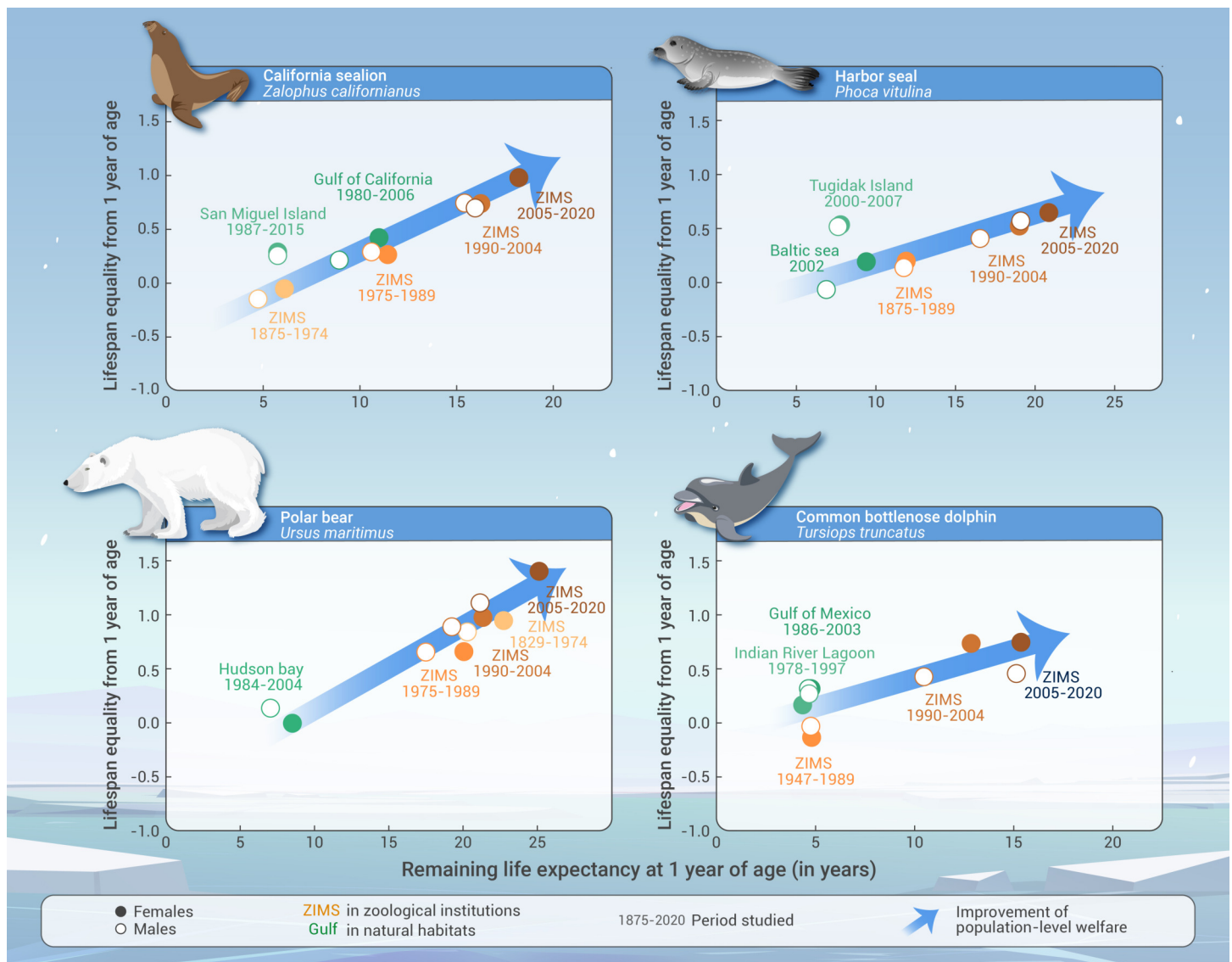
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Ongoing concerns around animal welfare in human care, particularly with regard to the charismatic animals that are marine mammals, have led to government bans in recent years, even in the absence of strong scientific support. This was exemplified in 2017 when SeaWorld USA terminated their orca breeding program, due to pressure from animal rights activists. However, the reality is that similar to humans, who are now experiencing extended lifespans due to advancements in healthcare and medicine, a

recent study shows that marine mammals in modern aquariums and zoos are also living longer lives.<sup>1</sup> Aquariums and zoos are the main facilities for maintaining marine mammals. As such, they play an essential role in the science and practices of conservation, and contribute to the sustainable development of our oceans.<sup>2</sup>

The study, led by Species360 and University of Southern Denmark Research Scientist Dr. Morgane Tidière in collaboration with 41 co-authors



**Figure 1.** Life expectancy and lifespan equality for females and males of four marine mammal species, i.e. harbor seal, California sea lion, polar bear, and common bottlenose dolphin, in human care across time and compared to their wild counterparts Data in blue indicate animals in human care whereas data in green indicate animals in the wild (adapted from ref. ).

from academic, governmental, and zoological institutions around the world, is the first to examine life expectancy and lifespan equality together as a proxy of population welfare in marine mammal species. This study provides compelling evidence that the animal care and management practices at aquariums and zoos have significantly improved over time. The study also shows that current populations of marine mammal species live longer in zoological institutions than in the wild as a result of advances in animal care practices centered on animal welfare. The results have just been published in *Proceedings of the Royal Society B: Biological Sciences*.<sup>1</sup> The full study can be read here: <https://royalsocietypublishing.org/doi/10.1098/rspb.2023.1895>.

Benefiting from the 200 years worth of data from the world's largest database of information on wildlife in human care – the Species360 Zoological Information Management System (ZIMS) – the study authors used the same statistical methods used to assess improvements in human population welfare,<sup>3</sup> to look at whether four key marine mammal species – the harbor seal (*Phoca vitulina*), California sea lion (*Zalophus californianus*), polar bear (*Ursus maritimus*), and common bottlenose dolphin (*Tursiops truncatus*) – have seen improved conditions of life in human care, and whether that can be observed through a progressive concentration of individuals reaching old age. These species were selected as the database had records of at least 100 individuals of each sex per period and species, which was essential to provide reliable mortality estimates and minimize uncertainty. Finally, Bayesian survival trajectory analyses were performed on males and females of each species across 3 to 4 periods of at least 15 years between 1829 and 2020, representing a total of 8,864 individuals from more than 1,200 zoological institutions in over 100 countries worldwide.

Applying the same methodology for wild populations with data obtained from the scientific literature, the authors examine the values obtained for these four marine mammal species living in aquariums and zoos compared to their counterparts in the wild.

The authors find that the life expectancy of the four marine mammal species has increased by over three times, and that the rate of deaths in the first year of life has declined by up to 31% over the last century in aquariums and zoos included in the study. Additionally, the life expectancy of these species in aquariums and zoos is currently two to three times longer than that of their counterparts in the wild (Figure 1). However, the authors would like to note the difficulty of monitoring marine mammal populations in their natural habitat, often leading to a higher uncertainty in the estimation than for the zoo populations where individuals are under human care from birth to death. Moreover, some well-monitored wild marine mammal populations are situated either in highly protected areas, or in regions significantly impacted by human activities. Therefore, comparisons with such wild populations should be made with considerable caution.

In addition to looking at how long these four species are living, researchers looked at how many of them were living well by examining lifespan equality, which can show if a population is consistently living longer lives and avoiding less predictable earlier causes of death. Researchers found conclusively that the four species had a progressively increasing lifespan equality across time in zoological institutions. They also highlighted that current populations of the four species living in zoological institutions included in the study had a higher lifespan equality than their counterparts in the wild.

The researchers found a significant improvement in longevity and lifespan equality for the four species from the 1990s onwards, which is believed to be a result of advancements in zoological practices, such as implementing advanced veterinary, environmental, nutritional and enrichment measures, as well as the voluntary cooperation of animals in routine examinations through positive reinforcement training. These improvements in how progressive aquariums and zoos care for animals are a result, for example, of the establishment of regional and national zoo associations, accreditation standards, coordinated breeding programs, shared databases and professional

networks which foster knowledge sharing, thereby collectively improving animal welfare.

Lead study author, Dr. Morgane Tidière, commented on the significance of the study, saying: "Our findings indicate that significant progress has been made in enhancing the welfare of marine mammals in zoological institutions, as a result of improvements in management practices in progressive aquariums and zoos. Professional aquariums and zoos of today cannot be compared to those of 30 years ago." Dr. Tidière continues: "This kind of research is possible as a result of the standardized data collected and shared by Species360 member aquariums and zoos around the world."

Species360 is an international non-profit organization that facilitates international collaboration in the collection, sharing and analysis of knowledge and data on wildlife. Their members participate in enhancing animal care, improving welfare, and contributing to species conservation by entering information about the animals under their care into ZIMS (<https://species360.org/>).<sup>4</sup> Species360 has over 1,300 current members, including zoos, aquariums, rescue centers, and wildlife sanctuaries. This substantial network has been compiling information on animals in human care since the early 1800s, making it the most comprehensive source of such data worldwide.

The authors insist that these results reflect the average welfare of marine mammals in Species360 member facilities, rather than demonstrating a global minimum standard achieved by all aquariums and zoos worldwide. Nonetheless, these findings serve as evidence of positive progress in the management and care of animals within professional zoological facilities. The researchers hope the findings inspire other institutions, which are not part of professional zoo and aquarium bodies, to invest time and resources into enhancing their animal management practices.

The results of this study contribute to the ongoing dialogue surrounding the wellbeing of animals in aquariums and zoos and may help inform future policy decisions.<sup>5</sup> For example, the governments of France (2021) and Spain (2023) passed bans on cetaceans for shows, but due to the study of Tidière et al., the bans did not extend to individuals involved in research projects with conservation and welfare goals. It demonstrates the importance of scientific research in understanding and improving the lives of animals in zoological institutions. We hope that these results will encourage researchers from academic, biologists from zoological institutions, and policy makers from international institutions, to increase their collaboration in order to improve the knowledge of threatened species and settle accurate conservation plans to reverse, or at least slow down, the rate of biodiversity extinction.

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## DECLARATION OF INTERESTS

The authors declare no competing interests.