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Numerology of the Oceans: Predicting the Fate of Marine Mammals

Just today, a baby boy gained 200 pounds from nursing. At this rate it may seem like he will be fully grown before long, but this little guy has a long way to go. He's a blue whale, the largest animal to ever live on Earth, and he'll continue adding weight like this for the next few years while tagging along on his mother's ocean long migrations.

A new collaborative study suggests that these characteristics may doom blue whales to extinction. Already the International Union of Conservation of Nature (IUCN) deems them endangered.

One of the lead researchers of this study, Dr. Alison Boyer, an ecologist at the University of Tennessee, explains how she helped to create a statistical model to understand what factors makes a species more likely to be in this "at risk" group of endangered species. External factors, such as human impacts, together with intrinsic biological characteristics, like number of births per year and body size at weaning, were used to try to predict the threat rankings across 125 different marine mammals. One-quarter of these animals are currently listed as "endangered."

Having a small geographic range or a slow reproductive rate, like blue whales, were shown to be the best predictors of species that were struggling to persist. On the opposite end, species with large social groups, like bottlenose dolphins, tallied up as less at risk.

Developing a tool to help predict which species may be endangered is vital because 40% of all marine mammals are currently classified as "data deficient" by the IUCN. In other words, we just do not know enough about the numbers of these elusive animals to predict their survival. One such

species is the Amazon river dolphin. Ranging in color from gray to pink, these dolphins have found their way into local legends as spiritual enchanters. By using the predictors from the model, researchers can estimate whether or not "data deficient" species, like the river dolphin, are also likely to be threatened. "The most exciting outcome of this study," says Dr. Boyer, "is that we were able to predict that 13 of the 'data deficient' mammals are likely to be endangered." Exciting, that is, because knowing these animals are at risk, makes it easier to protect them. This list includes the Amazon river dolphin, which has a slow reproductive rate, very small geographic distribution, and small social groups – all characteristics predicted to put it at a higher risk.

After predicting what species are most likely to be high risk, Boyer and her colleagues determined marine mammal "hotspots" by overlapping the geographic ranges of the threatened species. Each hotspot contains six or more threatened marine mammals. Unfortunately, these regions often coincide with areas of high human impact (such as commercial fishing or shipping lanes). Blue whales are often killed by large ship strikes, and the Amazon river dolphin can drown from entanglement in fishermen's nets.

So how can these species be preserved?

One solution offered is the implementation of Marine Protected Areas (MPAs). Like national parks, these areas would be limited in what human activities can occur within their boundaries. If all of the hotspots determined from this study were to be converted to MPAs, it would span only 1.7% of the ocean. There are already initiatives by the international community to include 10% of the world's oceans in MPAs by the year 2020. Dr. Boyer hopes this study can guide the placement of a portion of these new protected areas.

Even if enough ocean is set aside for these species to thrive, can they come back from their threatened status?

The answer is . . . Maybe. Dr. Boyer explains that species such as the humpback whale and gray whale saw thrilling improvements after an international ban on commercial whaling. Sea otters and elephant seals have also seen rebounding populations after certain protections were enacted.

So, Dr. Boyer says, there is real potential to have a huge impact on the graceful giants of the open oceans and the mysterious mystics of the Amazon.