

Hunting and fishing activities cause dietary changes in South American fur seals and sea lions

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The results of this study of the UB could help designing proper measures for the management and preservation of the South-western Atlantic Ocean. Credit: Massimiliano Drago, UB-IRBio

Researchers of the Faculty of Biology and the Biodiversity Research Institute (IRBio) of the University of Barcelona reconstructed the dietary habits of South American sea lions and seals in the area of Rio de la Plata (Uruguay) over the last 7,000 years. The results show that these species' diets were different until late 20th century, when they started coinciding without overlapping each other.

According to the study, published in the journal *Journal of Animal Ecology*, changes in the source distribution could occur due the bottom-trawling and hunting of these animals –which started in the 18th century and lasted until the second half of the 20th century in Argentina and Uruguay. These findings could explain the differences in the tendencies of both species in the south-western Atlantic Ocean, where sea lions would adapt better to the changes in the food network, caused by the human impact. This information is relevant to design proper measures for the management and preservation of these ecosystems.

UB-IRBio researcher Massimiliano Drago is the first author of the study, in which the experts Lluís Cardona and Lisette Zenteno (UB-IRBio), and Pablo Inchausti (University of the Republic, Uruguay) and others have also taken part.

Study of the eating patterns dating from the Holocene

The South American sea [lion](#) (*Otaria flavescens*) is a robust marine mammal with a short nose, which is abundant in South American coasts, from Perú to Cape Horn, up to the Brazilian coasts. With a similar geographic distribution, the South American fur seal (*Arctocephalus australis*) is half its size and has a longer nose, and feeds mainly from pelagic fish –those species living in middle waters or near the shallows– and holds a lower position in the food pyramid of the marine ecosystem compared to the other species.

To reconstruct the diets of these animals in different periods, researchers used carbon and nitrogen stable isotope analyses to the bone remains of sea lions and seals. This technique allows them to get information on the food they ate, since they are registered in body tissues with a predictable isotope division.

"Results show that South American sea lions and fur seals showed a strong trophic segregation during the middle Holocene (approximately about 5,000 and 3,000 years ago) and during the early half of 20th century, but this segregation decreased over time, especially during the late 20th century and beginning of the 21st century," says Massimiliano Drago.

Effects of the marine resource exploitation

Researchers think the progressive convergence of diets in both species could be explained with the recent history of the exploitation of marine resources in Uruguay, characterized by an intense exploitation of otarids (sea lions and seals), and overfishing. These changes would have changed the diet of these predators and the structure of the food network in Rio de la Plata and closer areas to the Atlantic Ocean over the recent fifty years.

"The reduction of the average size of groundfish –those living at the bottom- due the fishing of bigger species due intense bottom trawling could be particularly beneficial for those otarids with a small mouth, that is, male and female seals and female sea lions. However, it would not be the case for male [sea lions](#)," notes the researcher Massimiliano Drago, affiliated at the Department of Evolutionary Biology, Ecology and Environmental Sciences of the UB.

Bigger dietary plasticity in seals

Also, according to the new study, fur seals could benefit from the reduction of a potential competitor such as the sea lion, whose populational abundance decreased as a consequence of its commercial exploitation, leaving more availability for preys they have in common.

"Despite the stoppage in hunting, the sea lion population, a species sharing habitat with fur seals, did not recover in Uruguay, and it is the only population in the distribution area of the species which has negative growth rates. These findings show that seals (*A. australis*) seem to show a bigger dietary plasticity, which enabled them to benefit more from the changes in the trophic network due anthropic pressure," adds Drago.

The results could also help understanding the impact of industrial fishing in trophic relations in the communities of marine predators from other ecosystems, and have implications in the field of preservation biology.

"These findings could be relevant to understand the current behaviour and predict future changes in the structure of marine ecosystems. It is basic information to develop and set management and preservation plans in the protected marine areas," concludes the researcher.

More information: Massimiliano Drago et al. Isotopic niche partitioning between two apex predators over time, *Journal of Animal Ecology* (2017). [DOI: 10.1111/1365-2656.12666](https://doi.org/10.1111/1365-2656.12666)

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