

Seabirds' movement patterns tied to what fishermen toss away

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Humans and human activities have clearly altered the Earth's landscape and oceans in countless ways, often to the detriment of other plants and animals. But a new report published online on January 28th in *Current Biology* shows just what a tangled food web we've woven. Two species of Mediterranean seabirds change their every move based on the activities of local fisheries and, in particular, the fish that people toss away. The seabirds' shifting movement patterns can be seen at the regional scale.

"We show that human activities in the natural environment can promote critical transitions in the spreading properties of foraging animals by locally changing the predictability and availability of their resources," said Frederic Bartumeus of Princeton University and Institut Català de Ciències del Clima in Spain. "Our study suggests an elementary but often disregarded connection between human local resource exploitation and global movement patterns of organisms."

The findings may have important implications for conservation biology and the study of invasive species, the researchers said. The work also provides a solid statistical framework for quantifying movement patterns across ecological scales, which can now be applied to other species and other circumstances.

Bartumeus' team took advantage of existing satellite data on the Cory's shearwater and the Balearic shearwater, which tracked the seabirds' movement over multiple foraging trips. Each trip typically lasts less than

two days and covers distances anywhere from 10 to 1000 kilometers. Because the fisheries don't operate on holidays and weekends, the researchers were able to characterize the birds' activities in the presence and in the absence of the fisheries' trawling activities.

When the fisheries don't operate, [seabirds](#) essentially combine local searching with very large traveling distances, Bartumeus explained. Such a multiscale search pattern generates what he calls superdiffusive movement properties, meaning that the birds spread out from one another at a rate that accelerates over time. "Such a movement pattern allows for efficient explorations when the birds are looking for their natural prey of small fish and squid, which are highly mobile and unpredictably distributed in space and time," he said.

In contrast, when fishermen are discarding fish, seabirds perform local searches around the boats, which act as an "attracting force." As a result of such confined movement, the spreading of scavenging seabirds in the seascape decelerates with time, and movement patterns involve well-defined spatial scales related to the fishery activity.

In a nutshell, says Bartumeus: "Fishery activities impact the foraging ecology of seabirds at much larger spatiotemporal scales than one might expect intuitively. The macroscopic spreading properties of seabirds through the seascape are directly influenced by the presence of fishermen's boats discarding [fish](#)."

Provided by Cell Press

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