



Research Brief

Exploration of Biomass of Mesopelagic Fishes



FARALLON INSTITUTE

What is the mesopelagic zone and why is the biomass of mesopelagic fishes relevant?

The mesopelagic zone is an aquatic layer of the ocean spanning 200 m to 1000 m depth. Because of this layer's location, mesopelagic fishes provide an important link between lesser-explored deep-sea marine life of the deeper bathypelagic zone and the surface ecosystem that is more familiar. Many mesopelagic fishes take part in diel vertical migration, a feeding pattern in which they migrate upward at night in order to feed on plankton in the productive epipelagic zone. These species play an essential role in the movement of organic matter between the surface and deeper parts of the ocean. Diel vertical migration is the largest migration of animals on the planet.



In scientific literature, the influence of mesopelagic consumers is often overlooked, possibly due to a lack of knowledge about their biomass. *Biomass* is a measurement of the weight of organisms in a given area. Mesopelagic fishes are estimated to be the most abundant vertebrates on Earth.

How did we survey mesopelagic biomass?

We surveyed mesopelagic fish populations off Southern California over three years using trawl net and sound (sonar) surveys together to get the most accurate measurements. In a trawl survey, large nets are used to capture organisms; the number of organisms caught is used to make an estimate of biomass in an area. Trawl surveys tend to underestimate the biomass of mesopelagic fish because many of them are capable of avoiding the nets or are too small to be caught by them. Acoustic surveys make an abundance estimation using sound waves that are projected from the ship and then reflect back from the fish.

What were our results?

Mesopelagic fish biomass varied depending the season and survey area, but results clearly support the idea that their influence on marine ecosystems has historically been greatly underestimated. In this region, a biomass of 25-37 g/m² was estimated. Because most of these fishes weigh less than 1 g, there are more than 50 mesopelagic fishes for every square meter of ocean surface.

Caveat

Both trawl and sonar estimates of biomass are biased by a variety of factors including community composition and the physical attributes of organisms. However, the simultaneous use of multiple measurement methods improves the overall results.

-Brief by Marie M. Sydeman; Photo by Peter Davison

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