

# The fisherman is a predator like any other

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For Peru fishing is a prime source of foreign exchange, second only to mining. The country's anchovy fishing fleet, which seeks the Peruvian anchovy *Engraulis ringens*, is the world's largest single-species fishery, with an average of 8% of global landings.

For safety and monitoring purposes, vessels have the statutory obligation to be equipped with satellite geopositioning indicators, seeing that industrial-scale fishing is prohibited within a band of 5 nautical miles (about 9 kilometres) from the coast.

This satellite device, the vessel monitoring system (VMS), gives the real-time position of the vessels to an accuracy of 100 m, communicated to bodies responsible for vessel movement recording and scientific monitoring of fishing. Scientists from the IRD and the Peruvian Institute of the Sea (IMARPE) used this high-resolution spatial information to characterize vessel movement in campaigns targeting shoals of this anchovy species, a pelagic fish that usually lives and builds up off the coasts. These methods shed light on the spatial interactions between fish and fishermen and enabled researchers to devise new tools that could improve monitoring and hence operational fish stock management.

The characteristics of movements traced between December 1999 and March 2003 by the 809 vessel fleet were compared with those of theoretical movement models usually applied to study trajectories of animals.

The results showed that in their search for fish concentrations, the

fishermen adopted movement strategies similar to those described for natural predators, such as albatross or seals. Attributes considered as characteristically human, like the use of detection technologies (sonar, echo-sounding), communications (radio between vessels), and also economic motives or attachment to a port, did not produce a prey search strategy radically different from that of animal predators. Whether human or not, top predators of marine ecosystems must confront a degree of uncertainty as to the location of their prey. They therefore develop search strategies that enable them to manage this uncertainty while reducing “unproductive” movements to a minimum.

This convergence found between prey search by fishermen and natural predators could change our general perception of human activity in marine ecosystems exploited for fishing. Fishermen are not solely economic agents whose catches (i.e. removal of organisms) constitute a disturbance acting from outside the ecosystem.

They are part and parcel of it and their behaviour obeys the same laws as for other higher predators. Such results emphasize the importance of applying an ecosystem-based approach to fisheries management, integrating knowledge about the biotic, abiotic and human components of the marine ecosystems exploited, along with their interactions.

This study will moreover have immediate practical applications for fish stock management, as VMS data analysis provided an indication in real time of the fragility of the stock drawn upon. Off Peru, the anchovy are at the mercy of fishermen particularly when climatic conditions force shoals to gather and stay very close to the coast.

The research team indeed showed that the spatial behaviour of fishermen was a good indicator of the spatial distribution of fish.

Thus the grouping together of fishing vessels near the coast can be an

alarm signal showing high vulnerability of stock exploited and give clues as to possible management measures to relieve the fishing pressure during these critical periods. This type of analysis, already used for monitoring the Peruvian anchovy stock, is being developed for application to European fisheries by way of the European Project CEDER, initiated by the European Union as part of its Sixth Framework Programme.

Source: Institut de Recherche Pour le Développement

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