Is fleet diversity key to sustainable fisheries?

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Concern about fisheries is widespread around the world. Over the past several decades, a robust discussion has taken place concerning how to manage fisheries better to benefit ecosystems and humans. Much of the discussion has focused on preserving biological diversity, a critical component of healthy ecosystems. One aspect that gets less attention is the role of fishing fleet diversity.

Fishing fleets can be diverse in many ways, including the gear they use, the fishing grounds they visit and when, and the species they target. A new study by a researcher at the Bren School of Environmental Science & Management at the University of California, Santa Barbara suggests that fleet diversity is important to fishery management success, and can even improve the sustainability of fisheries that aren't managed.

Titled "Consequences of fleet diversification in managed and unmanaged fisheries" and written by Sustainable Fisheries Group postdoctoral scholar Matt Burgess, the study was published today in the e-First section of the *Canadian Journal of Fisheries and Aquatic Sciences*.

Burgess used a mathematical model to show that fleet diversity helps managers by giving them more management options, which is especially important in fisheries that target multiple species. In such fisheries, it can be difficult to reduce overfishing of slow-growing species like marlin and rockfish without under-fishing faster-growing species like tunas and sole. Under-fishing negatively impacts the industry by leaving profits in the sea, while changing fishing gear to be more selective and, thus, leave more of the slow-growing species in the water, can be

difficult and costly. But in a diverse fleet, rather than having to make gear more selective or sacrifice the catch of robust species, managers can balance catches across species by influencing how fishing effort is allocated among different fishing strategies. Being able to balance catches better across species allows diverse fishing fleets to increase overall catches and profits, while reducing overfishing at the same time.

"For managers, the challenge is helping a diverse fleet achieve this potential," says Burgess.

One management strategy that has shown promise recently is individual fishing quotas (IFQs). The IFQ approach allows managers to set catch limits for each species in a multispecies fishery and assign a share of the catch – a quota – to each fishing vessel at the start of the season. Vessel owners can then either catch their quota or sell parts of it to other fishermen. In theory, this system gives fishermen an incentive to balance their catches as efficiently as possible across species. IFQs have been adopted recently in trawl fisheries in British Columbia and the U.S. west coast. There is evidence in both cases that tradeoffs previously required to protect slow-growing species while profiting from fast-growing species have been lessened.

Burgess's theory also predicts that diversifying fleets could reduce overfishing of slow-growing species even without management, because competition within a diverse fleet should promote more balanced catches. If correct, that approach could offer hope for multinational fisheries on the high seas, which are notoriously difficult to manage.

"This might be what's going on in the high seas tuna fisheries of the western and central Pacific," Burgess suggests. In a previous study, he and colleagues at UCSB and the University of Minnesota found that the relative impacts of the western and central Pacific tuna fisheries on tuna and marlin species gradually became more balanced after deep-set

longline and purse-seine fishing strategies were introduced in the 1970s. These fisheries had been previously dominated by shallow-set longline fishing, which is known for high by-catch rates.

Provided by University of California - Santa Barbara