

Advocates for Wild, Healthy Oceans

Pacific Regional Office
116 New Montgomery Street
Suite 810
San Francisco, CA 94105
415.979.0900 Telephone
415.979.0901 Facsimile
<http://www.oceanconservancy.org>

Formerly the Center for
Marine Conservation

A Critique of Federal Management for California Market
Squid (*Loligo opalescens*)

The Ocean
Conservancy



by
Josh Sladek Nowlis

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BACKGROUND

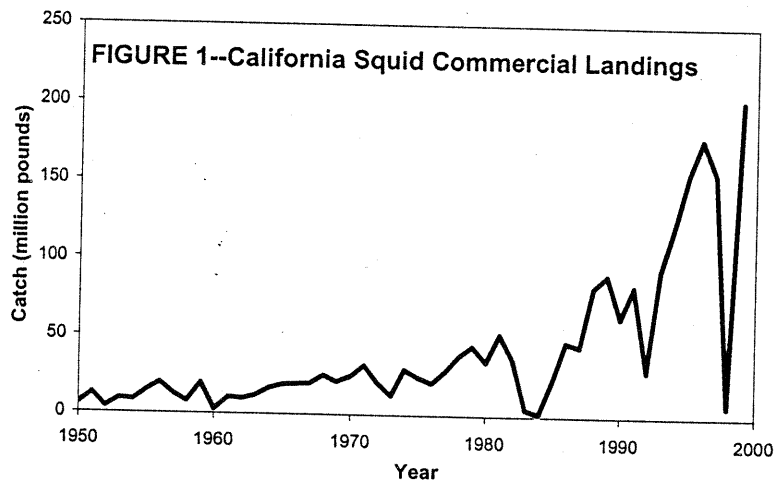
Market squid (*Loligo opalescens*) are the basis of California's largest and one of its newest fisheries. This fishery targets spawning aggregations, when adult squid are found at discrete spawning sites at very high densities. This fishery has raised environmental concerns because of the rapid increase of its catches (Fig. 1), its propensity to crash during El Niño events, and especially the importance of squid to its ecosystem as a prey source for a number of species.

SUMMARY OF CURRENT RECOMMENDATIONS

Currently, market squid are managed primarily through California State regulations, which include weekend closures, limited entry of fishing vessels, and caps on overall catches equal to the highest seasonal catches ever recorded in the State. Federal managers have listed market squid in the Coastal Pelagic Species Fishery Management Plan. Thus far, federal efforts have focused primarily on

determining a management regime based on maximum sustainable yield, MSY, as required by the Magnuson-Stevens Fishery Conservation and Management Act.

The federal efforts have included defining an appropriate biological model for squid (model 1 with natural mortality rate = 0.15 day^{-1} and egg laying rate = 0.45 day^{-1}), determining a threshold value for egg escapement (30 percent of the spawning potential of the individuals sampled), examining the potential management implications of El Niño events (deferred), and recommending information gaps to be targeted with future monitoring.



MAJOR AREAS OF CONCERN

Overfishing

There has been growing concern over the possibility that California market squid are being overfished. Seasonal landings have grown dramatically over the past two decades, with catches in the most recent season exceeding any pre-1980 season by a factor of 5 (Fig. 1). Additionally, squid landings have shown definite signs of El Niño related collapses since the 1980s, a phenomenon that did not appear previously.

Overfishing has also been a concern because of the great amount of uncertainty associated with the management of market squid. The Coastal Pelagic Species Management Team of the Pacific Fishery Management Council recognized several sources of uncertainty in their November 2001, report titled "Recommendations for market squid management and research." These sources of uncertainty included: the use of a new approach (by focusing on egg escapement goals), the degree to which females retain eggs after capture, and the extent to which fishing gear damages egg beds.

Effective fishery management must build in buffers to account for the level of uncertainty in a fishery. The most effective buffers ensure that a set proportion of the unfished abundance level is protected from all fishing pressure (Sladek Nowlis and Bollermann, in press). Despite high levels of uncertainty, existing and proposed management measures for squid lack any kind of buffer.

Similar uncertainties with a lack of adequate buffering have played a role in the collapse of squid fisheries elsewhere (Falklands, eastern US), whereas carefully managed squid fisheries have fared well (South Africa).

Ecosystem Impacts

California market squid and other squid species play a key role in open-water ocean environments as a food source (Pauly et al., 1995; Love, 1996). A wide variety of marine mammals, seabirds, and fish rely on squid as a principal part of their diet. As such, squid play a central role in the food web of open-ocean environments.

Due to the central position of squid at the lower end of the food web, squid fisheries have the potential to negatively impact a number of other fisheries. Other fished species that rely on squid for their diet include but are not limited to: salmon, several rockfish (including bocaccio and cowcod), sablefish, lingcod, yellowtail, white seabass, all tuna species, swordfish, halibut and several other flatfish species, and several shark species (including the common thresher and shortfin mako) (Love, 1996). If squid are fished only to MSY levels, the impacts on these other fisheries could also be substantial (May et al., 1979).

A number of threatened and endangered species also rely on squid. These include fin whales, sei whales, sperm whales, and Guadalupe fur seals (Pauly et al., 1995). Reducing squid, even if only to MSY levels, has the potential to adversely impact these federally protected species.

Squid management measures should be designed to ensure adequate squid to sustain other fisheries and rare animals. At present, the management system for market squid has not adequately addressed this issue.

Lack of Socioeconomic Alternatives or Analysis

Fishery management systems have profound impacts on coastal communities. The squid fishery regulations will not only affect current and future squid catches but also may affect other fisheries and tourist operations based on seeing charismatic members of open-ocean environments, including seabirds and marine mammals. As such, any fishery management plan should provide clear socioeconomic alternatives for consideration.

This issue is of particular importance to the squid fishery, which is significantly impacted by El Niño events. Recent catch levels have served to exacerbate the effects of El Niño years on the squid fishery, whereas pre-1980 catch levels showed little effects of El Niño years. Catch limits have been set equal to the highest seasonal landings on record, assuring that the industry will suffer in El Niño years. Nowhere did managers actively discuss the socioeconomic implications of this strategy, and technical advisors continue to defer the issue. The public has a right to know and managers have a responsibility to devise a plan for the bad years that are sure to come.

CONCLUSIONS

Current California market squid management fails on a number of fronts. It lacks appropriate buffers to avoid overfishing; inadequately addresses impacts on open-ocean environments and the fisheries and rare species they support; and fails to present a range of socioeconomic alternatives.

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