Scientists' Statement:

Protecting the Forage Base of the California Current Large Marine Ecosystem

Signatories as of May 9, 2011

We the undersigned marine scientists, fishery scientists, and conservation biologists see a strong and urgent need to shift to an ecosystem-based approach to managing the forage base of the California Current Large Marine Ecosystem (CCLME). Forage species -- including herring, mackerel, anchovy, sardines, market squid, krill, lanternfish, and others -- play a crucial role in marine ecosystems as they transfer energy from plankton to larger fishes, seabirds, and marine mammals (Alder et al. 2008).

Removing forage species from the marine ecosystem can harm marine mammals and seabirds (Tasker et al. 2000, Furness 2002, Baraff & Loughlin 2000, Becker & Beissinger 2006). In fact, fisheries targeting forage species can even reduce the productivity of other commercial fisheries that consume those species as prey (Walters et al. 2005). Insufficient ocean food supply has been linked to the loss of Sacramento River fall Chinook salmon (Lindley et al. 2009), major seabird reproductive failures and population declines (Parrish et al. 2007), and marine mammal mortality events throughout the CCLME over the last decade.

Maintaining a healthy abundance of forage in our coastal marine systems is critical to the resilience of these systems in the face of global climate and oceanographic changes we will face in the coming decades (IPCC 2007). Therefore, management of forage species removal must take into account the multiple roles they play in marine food webs. At the same time, the growth of global demand for forage species for feed for farmed fish and livestock provides an increased financial incentive for the expansion of forage fisheries in order to supply these products, lending urgency to the need for action (Naylor et al. 2009).

In addition, it is also important to prevent development of emerging forage fisheries until we truly understand the ramifications on those species and their predators. Although many key forage species are currently unmanaged and do not yet have significant directed fisheries, fisheries could develop rapidly as aquaculture demand for fish feeds increases.

Forage fisheries management requires a precautionary approach given the important role forage species play for the productivity of California's wildlife and commercial and recreational fisheries as well as the multiple sources of uncertainty regarding these species' population sizes (NRC 2006). Until we understand the ramifications of fishing these species on their predators and surrounding ecosystem, it is imperative to manage forage species prudently by preventing significant expansions of existing fisheries for such species.

Ecosystem-based management is predicated on the explicit accounting of trophic relationships across different parts of the marine food web in the setting of harvest levels (Field & Francis 2006). To do this, managers must be able to calculate and provide for the needs of predators when setting catch limits so that adequate prey is available for higher trophic levels. The science has progressed greatly on this topic in recent years, and new ecosystem models are being developed that can be used to directly answer these questions. In any case, fishery management can better incorporate what we do know about the ecological role of forage species into the way we manage them.

Management should recognize the critical role forage species play and provide guidance on how to account explicitly for the needs of predators when setting catch limits so that adequate prey are available for fish, birds, and mammals. Across state and federal jurisdictions governing the use of the CCLME, we see a strong need for a consistent ecosystem-based policy on forage species that accounts for the value of forage species in the marine food web. Such a policy should accomplish the following:

1. Formally recognize the important ecological role that forage species play in marine food webs;
2. Require that fishery regulations and harvest control rules for forage species explicitly account for the ecological services forage species provide in their respective ecosystems;
3. Prevent development of fisheries for new forage species until the potential population and ecological consequences of such fisheries are evaluated; and
4. Promote higher value uses of forage species landings, such as human consumption, over lower value uses, such as feed for farmed fish or livestock.

Designing and implementing precautionary science-based forage management in the CCLME could establish a model and precedent for practical implementation of this ecosystem-based management approach worldwide. Protecting the base of the marine food web will provide long-term benefits to the diverse and productive California Current Large Marine Ecosystem, users of ocean resources, and current and future generations.

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