THE PEW ENVIRONMENT GROUP

www.PewEnvironment.org/PacificFish.

The Pacific Fish Conservation Campaign is working to suspend the expansion of fisheries on forage stocks until an ecosystem-based approach can be implemented that conserves the prey base for all marine life. Our work is informed by the conclusions of the Lenfest Forage Fish Task Force.

SCIENCE BEHIND FORAGE FISH MANAGEMENT

The Lenfest Forage Fish Task Force is a group of 13 preeminent scientists who conducted the most comprehensive worldwide analysis of the science and management of forage fish populations to date. The task force set out to provide practical, science-based advice on sustainable forage fish management.

Its main findings are based on workshops, site visits, review of existing theory and practice, case studies, and quantitative modeling of marine food webs. The group's findings are excerpted here from its 2012 report, *Little Fish, Big Impact.*

Forage fish are vulnerable

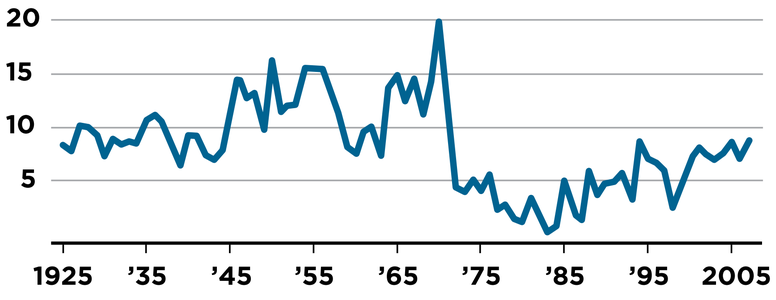
They can rebound rapidly in some cases but have biological andecological characteristics that make them vulnerable to overfishing.

They fluctuate,

Forage fish abundance is highly variable, often unpredictable, and sensitive to changes in environmental conditions.

Peruvian anchoveta

North/Central stock, in metric tons



are easily caught,

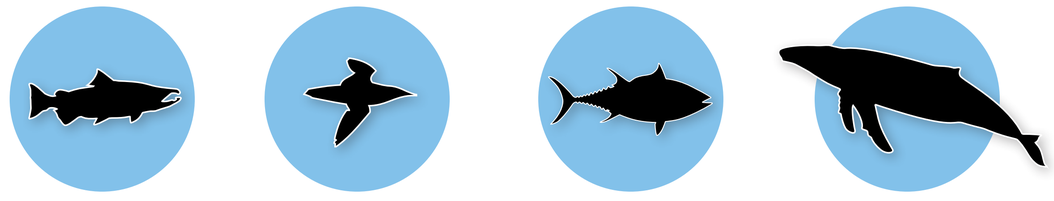
Because they form dense schools—often called "bait balls"—forage fish are easily caught, even when their abundance decreases.

and vulnerable to collapse

Fishermen are able to scoop up large numbers of forage fish during a natural population decline, greatly compounding that decline. Indeed, several forage fish populations collapsed in the 20th century, and the task force's analyses suggest conventional management could lead to more collapses.

Forage fish are valuable as prey

Many predators are highly dependent on forage fish



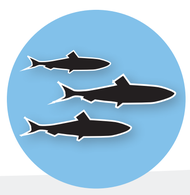
and decline when forage fish decline

Modeling by the task force found that the more a predator's diet relies on forage fish, the more its population declines when forage fish decline.

Globally, forage fish have greater monetary value as prey

The task force compared the global value of the direct catch of forage fish with the value of allowing them to remain in the ocean as prey for other commercially valuable fish.

Economic importance of forage fish
TOTAL $16.9 BILLION



Direct Value of commercial forage catch

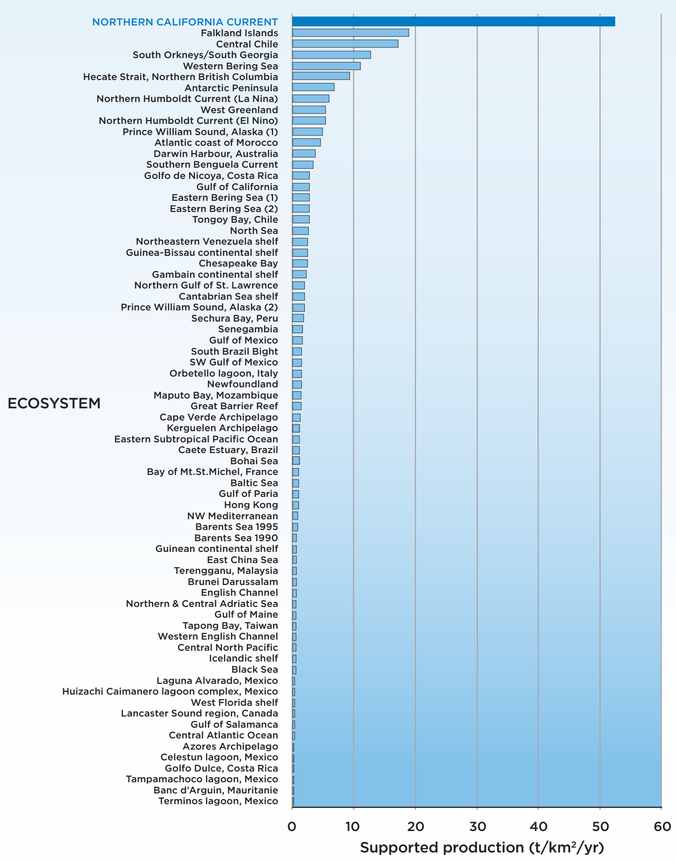
$5.6 billion

Supportive value of forage fish to other commercial catch

$11.3 billion

Importance to other predators

The importance of forage fish to other predators is especially important along the Pacific coast, where forage fish were estimated to contribute 52 tons per square kilometer annually to the production of their predators in the northern California Current.

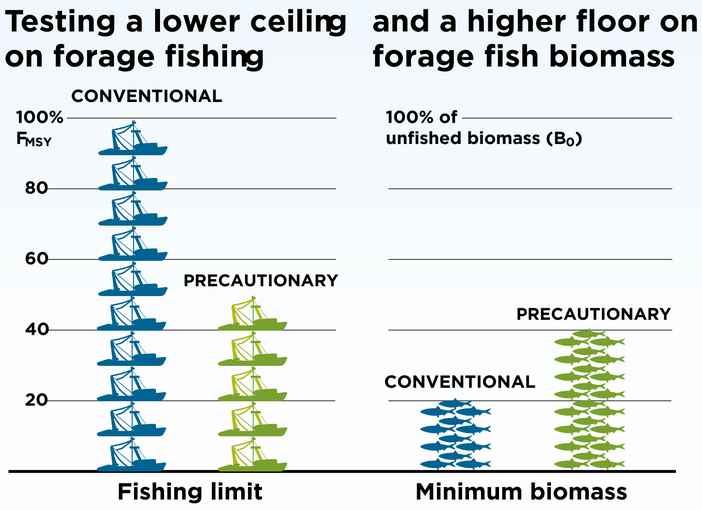


Conventional management is too risky

Task force compared conventional and precautionary strategies

Conventional management is based on maintaining maximum sustainable yield (MSY). The task force analyzed food web models to compare this strategy to several more precautionary approaches. For example, one of these methods limited fishing to 50 percent of the rate needed to reach MSY (50 percent of FMSY). It also doubled the minimum biomass of forage fish that must be left in the ocean, compared to the conventional minimum. (Full results in Chapter 6 of the report.)

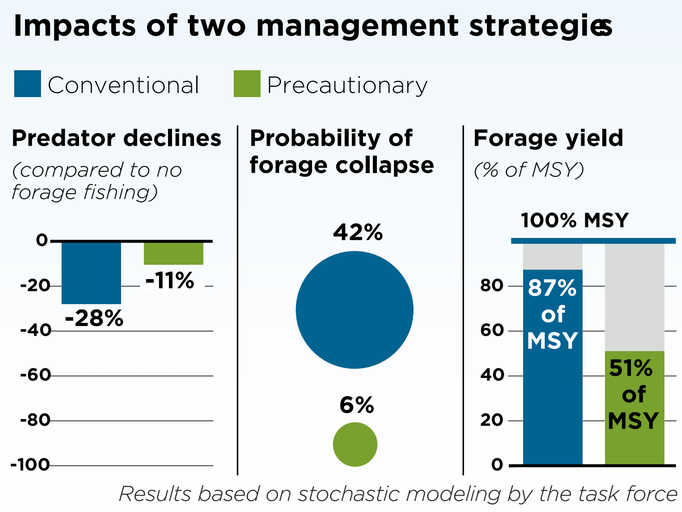
Testing a lower ceiling on forage fishing and a higher floor on forage fish biomass



Only precautionary management protects predators and prey

The task force found that the only fishing strategies that reliably prevented a decline in dependent predators were those that limited fishing to half the conventional rate. The figure below shows that a precautionary strategy lessened declines in dependent predators and reduced the likelihood of forage fish collapses, although it also reduced the yield of forage fish.

Impacts of two management strategies



Results based on stochastic modeling by the task force

Pikitch, E., et al., 2012. Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs. Lenfest Ocean Program. Washington, DC. 108 pp.