



Little Fish, Big Deal

Protect the key to a healthy ocean

Small schooling fish species such as sardines, saury, and smelt—commonly known as forage fish—play a critical role in sustaining a vibrant Pacific Ocean. These species eat plankton (tiny plants and animals drifting near the surface) and then become food for bigger fish, seabirds, and marine mammals. Forage species serve as the vital link in the marine food web, connecting microscopic plankton to humpback whales the size of school buses.

The Pacific coast

The ocean off the West Coast of the United States is one of just a few marine ecosystems in the world dominated by cold-water upwelling, in which nutrients pulled from the depths fuel the growth of microscopic plants, known as phytoplankton, at the surface. Forage fish feast on these blooms of life, in turn becoming food for an astonishing array of ocean wildlife. A recent decade-long tagging study¹ revealed that tuna, sharks, seabirds, seals, and whales cross the Pacific every year to feed in the rich marine ecosystem along the coast.

Protecting the bait

In Alaska, the North Pacific Fishery Management Council officially recognized the importance of abundant prey by placing important forage species off-limits to fishing beginning in 1998, with the strong support of commercial fishermen. The Alaska Groundfish Data Bank, a commercial fishing industry organization, applauded the action, noting that targeted fishing for predator fish and for the prey they need to survive is “akin to burning a candle at both ends.”² Fishery managers in California, Oregon, Washington, and Idaho demonstrated similar farsighted thinking in 2006 by acting to protect krill, a tiny shrimplike creature that is a principal source of forage for whales and other marine life.

Keeping an eye on the big picture

Forage fish account for more than one-third of the total global catch of wild marine fish and are mostly used to feed livestock, poultry, and farmed fish rather than humans.³ Yet in 2012, a group of eminent scientists calculated that forage fish are worth twice as much in the water as they are in the net because of the commercial value of predators supported by forage species.⁴



It's important to leave my grandson some semblance of the opportunity I had.

Lee Taylor, Oregon commercial fisherman

When fishery managers establish fishing regulations and catch limits, they often overlook the critical role that forage fish play in the marine food web. These managers are beginning to think more broadly. Ecosystem-based fisheries management considers how everything is connected in the ocean rather than taking a piecemeal, species-by-species approach.

Forage fish are the key link in the food web for ...

... bigger fish

Albacore tuna and salmon are among the important commercial and recreational species that need abundant forage fish. One study found that small schooling fish account for 80 percent of the diet of tuna on the West Coast.⁵ In the case of salmon, forage fish provide an extra benefit at the critical point where the salmon make the transition from freshwater to ocean. First, the forage fish provide alternative prey for predatory fish, seabirds, and marine mammals that would otherwise feed on the bite-size juvenile salmon as they leave the river. Then, as salmon mature, forage fish become a key food source. The additional calories provided by small schooling prey such as herring and whitebait smelt enable salmon to grow larger, produce stronger eggs, and successfully reproduce.

... marine mammals

Whales, seals, and dolphins are among the larger animals that depend on forage fish. A single humpback whale consumes 1,000 pounds of tiny fish a day, and a shortage of prey can have serious consequences. In 2009, scientists documented 80 percent mortality among pups in a population of sea lions off the coast of California when females left them for a week at a time in search of food.⁶ A similar high-mortality event for sea lions along the coast took place in 2013, with insufficient nutrition suggested as the cause.⁷

... seabirds

New research reveals that seabirds need even more forage fish than previously understood. Scientists recently discovered that seabird populations around the world experience breeding failures when their main source of prey dips below one-third of its maximum population size.⁸ Even relatively small seabirds require an incredibly large amount of oil-rich forage such as herring to breed and migrate successfully. A single seabird species, the common murre, collectively devours more than 200,000 tons of forage every year.⁹

Making the marine food web a priority

From Washington, DC, to your local harbor, fishery leaders across our country recognize the need to shift to an ecosystem-based approach to managing our nation's oceans. As they do so, decision makers must remember that a healthy and productive Pacific marine food web depends on an abundance of forage fish. The Pacific Fishery Management Council has a chance to establish itself as a leader by improving protection of forage fish as the first concrete initiative of its Fishery Ecosystem Plan.



If forage fish go,
everything goes.

Darrell Ticehurst, *member of the
Coastside Fishing Club and former
member of the Pacific Fishery
Management Council*

Take action

Ask the Pacific Fishery Management Council to help ensure a balanced and productive marine food web for generations to come. The council can start by protecting all species of forage fish that serve an important role as prey in the marine food web, including Pacific saury, sand lance, and several kinds of smelts.



Endnotes

- 1 Barbara A. Block, et al., "Tracking Apex Marine Predator Movements in a Dynamic Ocean," *Nature* 475:86-90 (2011).
- 2 Alaska Groundfish Data Bank letter to the North Pacific Fishery Management Council. April 9, 1997. http://www.pewenvironment.org/uploadedFiles/PEG/Publications/Other_Resource/Alaska%20Groundfish%20Data%20Bank%20Testimonial.PDF.
- 3 Ellen K. Pikitch, et al., *Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs*, Lenfest Ocean Program (Washington, DC, 2012), p. 108. See www.lenfestocean.org/ForageFish.
- 4 Ellen K. Pikitch, et al., "The Global Contribution of Forage Fish to Marine Fisheries and Ecosystems," *Fish and Fisheries* 10.111/faf.12004 (2012).
- 5 Aaron M. Dufault, Kristin Marshall, and Isaac C. Kaplan, "A Synthesis of Diets and Trophic Overlap of Marine Species in the California Current," U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-103, p. 70 (2009).
- 6 Sharon R. Melin, et al., "Unprecedented Mortality of California Sea Lion Pups Associated with Anomalous Oceanographic Conditions Along the Central California Coast in 2009," *California Cooperative Oceanic Fisheries Investigations Report*, Vol. 51, 2010.
- 7 Deborah Sullivan Brennan, "SeaWorld says sea lion strandings are up," *San Diego Union-Tribune*, Feb. 27, 2013, accessed Feb. 28, 2013. <http://www.utsandiego.com/news/2013/feb/27/sea-lion-rescue-SeaWorld/>.
- 8 Philippe M. Cury, et al., "Global Seabird Response to Forage Fish Depletion—One-Third for the Birds," *Science* 334:1703-06 (2011).
- 9 Jennifer E. Roth, et al., "Annual Prey Consumption of a Dominant Seabird, the Common Murre, in the California Current System," *ICES Journal of Marine Science* 65:1046-56 (2008).



For further information, please visit:

pewenvironment.org/pacificfish

Write the council at:

pfmc.comments@noaa.gov

Contact: Paul Shively, project manager

Email: pshively@pewtrusts.org

Phone: 503-230-1222

Project website: pewenvironment.org/pacificfish

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