

The live-fish fishery of California

by M. J. Tegner¹ & P. K. Dayton

Relatively new to California, live-fish fishing started in 1988, mainly to supply local Asian communities. What began as small trapping and hook-and-line operations has now become a complex, multimillion dollar fishery using diverse gear types, targeting many species, and delivering fish in a variety of ways.

The 1995 landings for live fish were estimated at 449 metric tonnes (t), 10 per cent more than in 1994. Fifty-four different species were landed live, with an ex-vessel value of more than US\$ 3 million. Landings are likely to be underestimates for various reasons, including fish buyers failing to code landings as live, or not bothering to report landings at all.

In 1995, hook-and-line gear was used to capture 63 per cent of the reported landings statewide; trap gear landed 23 per cent. The live-fish fishery has grown as an alternate use of lobster traps in the off season, with the prohibition of commercial gill nets within three miles of shore in 1994, and with the identification and rapid expansion of overseas markets.

Target species include California sheephead (*Semicossyphus pulcher*), California halibut (*Paralichthys californianus*), cabezon (*Scorpaenichthys marmoratus*), lingcod (*Ophiodon elongatus*), scorpionfish (*Scorpaena guttata*), and several species of rockfish (*Sebastes* spp.). Statewide the landings jumped in 1989 to 1995 from 16,203 t to 194,942 t for sheephead, 1,473 t to 115,879 t for California halibut, and 163 t to 179,785 t for cabezon. Live-fish landings were mostly made in Southern California; 377 t were landed from Morro Bay South and only 72 t in Northern California in 1995.

In addition to the issue of unsustainable levels of harvest, kelp-forest ecologists are concerned about the effects of the live-fish fishery on community structure. We have evidence that many of these fishes were once important predators on benthic prey: cabezon on abalones, scorpion fish on octopuses, and sheephead on sea urchins.

Some insight into the effects of the live-fish fishery on sheephead populations is offered by California Department of Fish and Game (CDFG) logbook data from commercial-passenger sport-fishing vessels (anglers). From 1981 to 1986, an average of 1809 sheephead per year was taken from the Point Loma kelp forest near San Diego; by 1994–95, the average number had dropped to 145. While there are many animals

which graze on kelps, by far the most important in terms of the frequency and severity of destructive overgrazing are sea urchins. The changes to sheephead populations suggest that outbreaks of destructive grazing by the minimally-exploited purple sea urchin, *Strongylocentrotus purpuratus*, will become more frequent.

The live-fish fishery is taking essentially all fishes that respond to bait in a trap (with one legislated exception), and many of these are now rarely seen. Neither densities nor ecological relationships are known for any of a host of fishes that have functionally if not virtually disappeared from the habitat.

This fishery focuses on animals sized for a single entree (about 1 kg), visually attractive, and hardy enough to survive the rigours of capture and transportation. Small animals bring from US\$ 4 to US\$ 14/kg ex-vessel prices; larger fishes were also sold live, but at considerably reduced prices (with the exception of California halibut).

Sheephead are especially problematic; these fishes are sequential hermaphrodites and the fishery takes only small females which may be pre-reproductive. Rock fishes are not hermaphrodites, but the small size of harvested animals also suggests little chance for reproduction.

These fisheries are minimally regulated, require inexpensive gear and low effort, and have the potential for virtual elimination of the community roles of these species. In 1995, legislation created a limited-entry programme (there are 273 trap permits), which included numbers of traps, trap construction requirements, and incidental catch restrictions.

There are no size limits or quotas. In addition to the small sizes on which this fishery is focusing, management concerns include the illegal use of juvenile lobsters as bait for sheephead and chronic under-reporting.

California Department of Fish and Game (CDFG) biologists report that fishermen often refuse to allow their catches to be measured, and through the use of mobile phones, will move among the different landings of a harbour to avoid samplers (K. McKee-Lewis, CDFG, personal communication). There is a strong need for stock data independent of the fishery, but funds are not available.

¹ Mia J. Tegner, Scripps Institution of Oceanography, University of California, San Diego, La Jolla, California 92093-0201. Phone: (619) 534-2059, fax: (619) 534-6500, e-mail: mtegn@ucsd.edu

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reduced expectations in kelp forests. Submitted manuscript.

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The Nature Conservancy marine conservation programme in the Asia-Pacific Region

by Heidi Kirkpatrick¹ & Chuck Cook¹

Despite heightened awareness and concern surrounding the live reef-fish trade, demand for live fish—and the destructive methods used to capture them—continues to present a daunting challenge.

Prompted by cyanide fishing incidents at two of its flagship conservation sites—Helen Reef in Palau and Komodo National Park in Indonesia—The Nature Conservancy (TNC) realised that unless cyanide fishing was addressed on a regional basis, the trade could easily continue its aggressive geographical expansion into other TNC sites, protected areas and coral reefs throughout the region.

Working with key NGO and government partners, the Conservancy has developed a two-tiered action strategy to address cyanide use and other destructive fishing practices on both regional and site-specific levels.

Regional action plan

TNC's regional efforts will be directed toward 1) promoting sustainable fisheries, 2) developing a preventive plan for Papua New Guinea, and 3) advocating policy reform.

Sustainable fisheries

TNC is working with aquaculture experts, Dr Nephronia Ogburn and Mr Damian Ogburn, to develop environmentally friendly grouper mariculture operations. This industry will provide alternative livelihoods for destructive fishermen as well as relieve pressure on wild stocks. With a goal of eventually gaining market share over wild-caught grouper, TNC plans to establish a grouper mariculture hatchery and demonstration centre in Indonesia that can be replicated across the archipelago.

The Conservancy is also conducting consumer-preference live reef-fish taste tests in Hong Kong, Taipei

and Shanghai. Comparisons of wild-caught to mariculture fish will help guide development of farmed fish that meet consumers' standards for taste, texture and appearance.

In addition to mariculture development, TNC is working with destructive fishers to divert them to sustainable pelagic fisheries and eco-tourism. These efforts are being pursued at Komodo National Park, but will serve as models for other threatened areas in the Asia-Pacific Region.

Papua New Guinea preventive plan

Dr Robert Johannes and Michael Riepen report that Papua New Guinea (PNG) is being looked to as the 'new frontier' for live reef fisheries. In response, TNC has initiated a prevention effort in PNG before the cyanide fishing industry can consolidate its foothold. The Conservancy is working with the PNG Government and local NGOs to draft and enact fisheries regulations to restrict use of poisons and compressed air and establish strict licensing requirements.

TNC will also join forces with PNG's Department of Environment and Conservation and marine-oriented NGOs, such as Conservation Melanesia, the Village Development Trust, the PNG Dive Association, the Motupore Island Research Department (University of PNG) and the Christianson Research Institute. This team will design and implement a major conservation education campaign to combat destructive fishing practices.

Policy reform

TNC will continue to pursue reform at the national level in Indonesia, the Philippines, PNG, United States, Hong Kong, and China, and at the regional level through the Asia Pacific Economic Cooperation (APEC). TNC is working to maintain a dialogue with

¹ The Nature Conservancy, San Francisco