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Conference Report

Outlook grim for North Pacific Rockfish: Rockfish Symposium, Friday Harbor Laboratories, University of Washington, USA, September 25–26, 2003

Rockfish, among the most common benthic fish on the Pacific coast of North America, are members of the highly diverse genus *Sebastes* (Scorpaenidae). About 100 described species are found in the North Pacific from Japan to the Gulf of California, with a few species in the South Pacific and the Atlantic (Love *et al.* 2002). Rockfish diversity is highest in California, where 54 species co-occur off Santa Barbara; 35 species are found in Washington State, 26 of which are in inland marine waters; 36 species are recorded in British Columbia (coastal and inland marine waters combined)[1]. At present, 12 species occur commonly in the inland marine waters of Puget Sound in Washington State, but the reported catch consists almost entirely of just two species, the quillback (*Sebastes maliger*) and the copper rockfish (*S. caurinus*)[1]. High fishing pressures from the 1960s to the 1990s all along the Pacific coast have driven rockfish populations so low that recovery now seems to be problematic.

To discuss these issues, this Rockfish Symposium brought together rockfish biologists and fisheries managers from California to British Columbia, along with representatives from Indian tribes in Washington State. The keynote speaker, Milton Love (Marine Science Institute, University of California at Santa Barbara), shared nearly 50 years of his research on Pacific rockfish, declaring that 'since the age of nine, rockfish were all I really cared about'. Love is an avid fisherman who eventually became a biologist, and recently co-authored a monograph on NE Pacific rockfishes (Love *et al.* 2002). In 1990, he co-authored a pioneering paper on life-history characteristics of 19 species of rockfish, by dissecting fish at a seafood processing plant (Love *et al.* 1990). With extensive underwater experience, Love reported that in southern California you can still see 20–25 species of rockfish on a dive – 'they dominate every habitat, [but] there are very, very few adult rockfish left of all species … they're almost all small'. Overfishing is blamed for the steep declines of these magnificent fishes. Love catalogued the gradual improvements in fishing technology and consequent moves into increasingly deep waters by fishers over the last 100 years. Even by the early 1960s, the Californian catch was dominated by single healthy year classes, large old animals having already been depleted. In contrast, Love described one reef near a deep canyon wall, that does not show up on sonar and that is still populated with enormous rockfish.

Other talks included information on basic rockfish biology and life history; the distribution and condition of the rockfish and lingcod resources in Puget Sound and the Strait of Georgia; a database on distribution, morphology, life history and identification of all species of rockfish; physical oceanography of Puget Sound; how to culture rockfish; the history and future of marine fish management in Puget Sound; population genetics of Puget Sound rockfish; short-term (10 years or less) effects of marine preserves on rockfish and lingcod density and age distribution; the spatial distribution of sites in the San Juan Islands (Washington State) showing evidence of pre-contact use of halibut, lingcod and rockfish by indigenous people; and an overview of the recent history of regional marine conservation efforts and progress towards establishing co-managed Marine Stewardship Areas between state and local governments and the numerous American Indian tribes with treaty fishing rights in the region. These short talks conveyed much information in a short time. An executive summary of the meeting, talk titles and outlines, reference list for rockfish information in San Juan County of Washington

[1]Rockfish species diversity numbers were provided during the symposium by Milton Love (Marine Science Institute, University of California at Santa Barbara, USA) for California, Art Kendall (NOAA, National Marine Fisheries Service, Seattle, WA, USA) for coastal Washington State, and Wayne Palsson (Washington State Department of Fish and Wildlife, Mill Creek, WA, USA) for inland waters of Washington State. The number of rockfish species in British Columbia was provided by Scott Wallace (Sierra Club of Canada, B.C. Chapter).

State, life-history summaries and local management history, will be posted online at http://www.sjcmrc.org/.

'The only thing in worse shape than rockfish is abalone'

Rockfish stocks in Washington and British Columbia are not in much better shape than in California. A one-fish bag limit, effected recently in Puget Sound, Washington, and the Strait of Georgia, British Columbia, is intended to discourage the catch of these fishes, while allowing rockfish that are caught unintentionally to be kept, because with swim bladders, they are not likely to survive catch-and-release. Wayne Palsson (Washington State Department of Fish and Wildlife, Mill Creek, WA), who helps set quotas, said that 'our contention is that a rockfish caught is a rockfish dead'. Prior to the 1980s, rockfish were thought to be so plentiful that daily bag limits were commonly set at 15–20 rockfish, about the number one could expect to be able to carry away from the dock. Someone speculated that those regulations had nothing to do with conservation but were designed to keep fish in the freezer, rather than in the garbage. Some fishery managers from Canada and the United States, themselves enthusiastic former rockfishers, compared names they had been called by irate members of the public, as fishing opportunities became limited because of stock collapses.

Having promised in 2002 to highlight conservation of inshore rockfish stocks already known to be in a deplorable condition, Canada's federal fisheries ministry is still grappling with what measures should be taken to prevent further collapse. In British Columbia, several months after the Rockfish Symposium, public meetings have been held to obtain feedback on 89 proposed Rockfish Conservation Areas. Scientists and conservationists recommend that no rockfish or lingcod fisheries should proceed in Canadian inland waters until the sustainability of these fisheries can be shown, and are calling for much larger rockfish conservation areas, perhaps as much as 50% of the known rockfish habitat. As in Washington State, involvement of the indigenous First Nations people in British Columbia is imperative in order for any conservation measures to be effective.

Talks about a transborder network of marine stewardship areas between island-rich areas of British Columbia and Washington inland waters, including a large amount of rocky reef rockfish habitat are ongoing. This region could be critical to a rockfish recovery programme. All of San Juan County, Washington, which forms a substantial portion of this boundary area on the American side, was declared a Marine Stewardship Area on 27 January 2004, although no new regulations were put into effect.

With a scenario all-too-similar to the once unimaginable collapse of cod stocks in the north-west Atlantic, a Pacific coast manager told us that as little as 15 years ago, it seemed unthinkable that there would not always be plenty of rockfish around. Jeff Marliave (Vancouver Public Aquarium, British Columbia, Canada) surmised that 'the surface of the sea is arguably the largest barrier to human imagination', echoing the thoughts of G. Carlton Ray 15 years ago, who pointed out that the oceans, unlike forests, will still look like oceans after their contents have been removed (Ray 1988).

Rockfish are some of the longest living fishes, exceeding 200 years in the Gulf of Alaska (Love *et al.* 2002), and are characterized by internal fertilization of their eggs (they do not lay eggs on gravel, rocks or seaweed like salmon or other NE Pacific groundfish). There is evidence that successful recruitment for many rockfish species occurs only once in many years, leading to low general reproduction rates and populations often dominated by single year classes. The larvae are released live by the females, at about the size of an eyelash. Many species of rockfish are highly territorial as adults. Eric Eisenhardt (University of Washington, Seattle) put acoustic transmitters in 14 adult copper rockfish off the west side of San Juan Island. All but one stayed within 100 m^2 for his entire 2-month study, with the remaining fish moving only about 1 km.

The rockfish situation was summed up most graphically by Paul Plesha (Northwest Fisheries Science Center, National Oceanic and Atmospheric Administration, Seattle), who mentioned that only 2 weeks earlier he had been in the same room at a similar meeting concerning abalone (a very large and particularly delectable marine mollusc), and that 'the only thing in worse shape than rockfish is abalone'. He said that the abalone fishery has been driven to near extinction first by overfishing, and then after closures, by poaching.

'How do we protect the fish?'

Since the 1990s, fishery managers have moved away from encouraging rockfish fishing and into

questions like 'How do we protect the fish?', according to Greg Bargmann (Washington State Department of Fish and Wildlife, Olympia, WA). The goal now is to sustain rockfish populations for the future. With new awareness of changes in water quality, habitat issues and effects on adult and larval rockfish survival are now understood to be as important as harvest issues.

Consensus during round table discussions was that rockfish recovery must be examined in terms of the threats that affect populations at each stage of the entire life cycle. This life cycle view appears also to be the best way to look at data gaps and determine which research needs are the most important. The rockfish biologists were painfully aware that salmon on the Pacific coast get most research and management money, leaving rockfish as poor second cousins. Milton Love's extraordinary efforts, working on his own time and pocket at a fish-processing plant, provided basic data on about one-third of the rockfish species in California. Accompanied by videos of SCUBA and submersible surveys, evening conversations were stimulating. One of us (K.R.) argued that it is important for regulations to allow people to continue fishing at some level, lest the only connection for many with the resource be lost.

An insightful comparison was made by Milton Love between rockfish and halibut fisheries in the NE Pacific. He said the Halibut Commission[2] has resulted in a well-managed fishery: 'This is a fishery in which the fishermen have a lifelong investment and sometimes have even asked for a decrease in the quota. The rockfish don't have that'. In contrast, Love told that only 3 years after banning all fishing between 37 and 275 m deep in Southern California, in 2003 the Pacific Fishery Management Council[3], with no new data, moved the shallow-depth limit from 37 m to 55 m deep, re-exposing rockfish to fishing after only a 3-year respite. It is ironic that one of the last bastions of large rockfish in California is environmentally controversial offshore oil platforms – some now support the highest densities of adult bocaccio rockfish (*Sebastes paucispinus*) and are serving as *de facto* marine reserves.

[2]The International Pacific Halibut Commission, established in 1923, is a research and regulatory agency that is responsible for managing the halibut fishery in the United States and Canadian waters for sustainable yield.

[3]Eight regional Fishery Management Councils were established in the United States in 1976, partially in order to link the domestic fishing community more directly to the management process. The Pacific Council is responsible for fisheries 3–200 miles (4.8–322 km) off the coasts of California, Oregon and Washington.

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