Advocates for Wild, Healthy Oceans

Pacific Regional Office
116 New Montgomery Street
Suite 810
San Francisco, CA 94105

415.979.0900 Telephone
415.979.0901 Facsimile
http://www.oceanconservancy.org

Formerly the Center for
Marine Conservation

The Ocean Conservancy

19 June 2002

Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 200
Portland, OR 97220-1384

RE: G.2. Amendment 10 to the CPS FMP—Squid MSY Control Rule

Dear Chairman Radtke and Other Members of the Council:

We are deeply concerned about the inadequacy of all options the Council is exploring for establishing a maximum sustainable yield (MSY) for California market squid under amendment 10 to the Coastal Pelagic Species Fishery Management Plan (CPS FMP). We believe all options under consideration would fail to meet the Magnuson-Stevens Conservation and Fishery Management Act's (M-S Act) National Standard 1, to achieve optimum yields on a continuing basis (16 U.S.C. § 1851(a)(1)). They would also be inconsistent with default management measures established in amendment 8 to this FMP (PFMC 1998). We respectfully request that the Council take immediate action to replace the options currently under consideration with a range of options that would meet this legal standard and be consistent with default policies established in amendment 8.

Legal Issue

California market squid is listed as a management unit species under the Council's Coastal Pelagic Species Fishery Management Plan. As a management unit species, squid must be managed according to the provisions of the M-S Act. Therefore, the National Marine Fisheries Service (NMFS) and the Council have a legal obligation to promulgate management measures that ensure the California market squid fishery achieve optimum yields on a continuing basis. Specifically, the law requires that "[a]ny fishery management plan which is prepared by any Council, or by the Secretary, with respect to any fishery, shall contain the conservation and management measures … which are consistent with the national standards" (16 U.S.C. § 1853(a)(1)(C)), the first of which identifies that "[c]onservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry" (16 U.S.C. § 1851(a)(1)). This language is clear in the requirement to achieve optimum yield (OY) from all U.S. fisheries. The M-S Act defines OY with respect to maximum sustainable yield (MSY), but ***as reduced by relevant social, economic, and ecological factors*** (16 U.S.C. § 1802(28)(B), emphasis added).

Amendment 10 lacks any analysis of relevant social, economic, or ecological factors. The amendment also admits that the preferred alternative cannot determine a definitive yield at this time (p. 29). Without the ability to determine appropriate yields, it is difficult to understand how the Council concluded that this alternative would "most likely produce a reliable and stable MSY proxy/control rule that would allow for landings at or above their current levels" (p. 30).

Scientific Background

Maximum sustainable yield is not defined in the M-S Act but NMFS defines it as the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions (50 C.F.R. § 600.310(c)(1)(i)), consistent with fishery science textbooks (e.g., Clark 1990). The theory of MSY rests on the idea that removing this amount of fish per annum will ultimately lead to a stable fishery that achieves the highest possible yields. If more fish is caught, the population will drop to unproductive levels. If less is caught, the maximum yields will go unrealized with the additional productivity absorbed by the ecosystem. This latter point is especially important for species like squid, which serve as a primary food source for numerous other species, because fishing at MSY levels is likely to reduce the productivity of other fisheries and the ecosystem as a whole (May et al. 1979).

Achieving MSY is not easy. Environments fluctuate and managers must make decisions amidst substantial amounts of uncertainty. As a result of these challenges, a policy that removed the MSY every year would almost certainly crash a fishery. As an alternative, fishery scientists in the mid-1900s advocated policies that removed a set fraction of the remaining population every year, with the fraction called the fishing mortality rate (or F_{MSY}) and this sort of policy called a constant fishing mortality rate policy. Amendment 10 proposes such a policy, which is termed egg escapement. Such policies should also achieve MSY in theory, and are a bit more stable because they scale back fishing rates if a population drops to lower levels. However, constant fishing mortality rate policies designed to achieve MSY are not stable enough and present the very real potential to crash in fluctuating environments with management uncertainty (Sladek Nowlis and Bollermann 2002). Consequently, most reputable fishery scientists have rejected MSY policies altogether, instead advocating a more precautionary approach (e.g., Larkin 1977; Ludwig et al. 1993; Dayton et al. 1995). MSY policies have also been rejected on the basis that the social or economic goal of a fishery may not be maximizing yields. Instead, maximizing profits or stabilizing yields may be more important factors (Clark 1990).

This brings us to the concept of optimum yield (OY), which addresses many criticisms of MSY policies. By law, OY must be less than or equal to MSY according to relevant social, economic, and ecological factors. Social and economic factors include avoiding fishery collapse and the choice of a yield goal, be it maximum sustainable catches, maximum sustainable profits, or stable yields. Ecological factors should include consideration of how the fishery on one species might affect others in its ecosystem, including but not limited to the role of the fished species as prey and habitat. Avoiding collapse is one concern from an ecological perspective, but the higher standard of maintaining productive populations is justifiable for ensuring functioning ecosystems.

Key Issues

The Council recognized these issues when it produced amendment 8 to the CPS FMP (PFMC 1998). This amendment provided default management measures for coastal pelagic species including the following:

- Setting aside a specific amount of a stock (called CUTOFF) to protect stocks when biomass is low (PFMC 1998, p. B-84).

- Recommending the possible establishment of a maximum catch cap (called MAXCAT) to decrease the chance of inadvertent overfishing, reduce year-to-year variation in catch levels, and avoid overcapitalization during short periods when a stock is highly abundant (PFMC 1998, p. B-84, illustrated in Fig. 4.1.2-2).

- Making ABC (i.e., OY) equal to 25% of the best estimate of MSY catch level (PFMC 1998, p. B-83).

We believe that these three issues must be addressed for the CPS FMP to meet legal standards under the M-S Act.

CUTOFF

Ironically, specifying OY is not the most effective means for achieving OY in a fishery susceptible to environmental variability and subject to management mistakes. Instead, the fishery is far more likely to achieve OY on a continuing basis if a specific amount of the stock is set aside safe from fishing (CUTOFF). Fisheries managed using a constant fishing mortality policy, like the egg escapement proposal in amendment 10, are likely to crash when scientific information is inaccurate or unavailable and when their productivity fluctuates with environmental conditions (Sladek Nowlis and Bollermann 2002). Policies that set aside a fixed amount of a stock are capable of sustaining productive fisheries even when faced with these challenges (Lauck et al. 1998; Mangel 1998; Sladek Nowlis and Bollermann 2002). The set aside must be larger the greater the uncertainty, with set asides of 30 to 40 percent being especially effective when uncertainty is high (Sladek Nowlis and Bollermann 2002). This issue was recognized in amendment 8 to this FMP (PFMC 1998) and needs to be recognized now with respect to California market squid. None of the alternatives in amendment 10 do so.

MAXCAT

Amendment 8 to this FMP (PFMC 1998) highlighted the value of capping catches at a maximum catch level (MAXCAT). It pointed out that such an approach avoids several problems. Without such a cap, there is potential for excessive quotas to be set if abundance estimates are wrong. Moreover, uncapped policies have two potentially negative socioeconomic consequences: they are more likely to have high year-to-year variability in catches and are likely to encourage overcapitalization of the fishing fleet in times of plenty. We expect these coastal pelagic species to fluctuate with environmental conditions and a policy that allows catch of a fraction of the standing stock will fluctuate with the environment. This property will lead to varying catch levels and can lead to the build up of unsupportable capacity during years when squid is

abundant. In contrast, a capped policy is less likely to fluctuate, especially if caps are set at low levels. We recommend the Council seriously consider capping catches at OY, as this policy is the most likely to achieve OY on a continuing basis. Regardless, the Council has not considered these important socioeconomic factors in any of the options in amendment 10. As a result, these options are not likely to achieve OY on a continuing basis.

OY = 25% MSY

Amendment 8 of this FMP (PFMC 1998) also recommended by default that the allowable biological catch (i.e., OY) be set to 25 percent of the best estimate of MSY catch levels. This policy is sensible on several grounds. We know that California market squid make important contributions as a food supply to many marine mammals, birds, and fish, including several species that are listed under the Endangered Species Act or serve as important fishery resources (see Tables 1 and 2). Thus there is a compelling ecological reason to set OY substantially below MSY to reduce impacts on an entire ecosystem. Moreover, setting OY at 25 percent of MSY has the potential to provide substantial socioeconomic benefits if OY is treated as a cap on total landings. A low cap such as this is likely to substantially reduce year-to-year variation in squid catches. We have previously presented the Council with evidence that the squid fishery used to thrive even during El Niño conditions back when catch levels were lower (pre-1980). Under the heavier fishing pressure of recent years, the fishery crashes during El Niño conditions. Here again, none of the options being considered in amendment 10 address this fundament issue and thus none are likely to achieve OY on a continuing basis. This analysis should be the backbone of any capacity planning for the fishery, as it will substantially affect both the average and expected year-to-year variation in squid yields.

Recommendations

Based on the legal requirements of the M-S Act, and for the good of California market squid and the people and ecosystems it supports, it is imperative that the Council reconsider its list of management alternatives. The new set of options should address the following:

1. Propose an OY control rule capable of achieving optimum yields on a continuing basis. An MSY control rule is inadequate because it fails to account for relevant social, economic, and ecological factors.

2. Develop one or more options for setting aside a portion of the unfished squid abundance (i.e., CUTOFF), with the magnitude of the set aside reflecting the high uncertainty involved in managing the California market squid fishery (i.e., 30-40% of unfished abundance). Closed areas are probably the most practical way to achieve this set aside requirement, but quota systems or other options could also be explored.

3. Cap total landings (i.e., MAXCAT) at the chosen OY, rather than allowing catches in excess of OY (and MSY) when squid are abundant. If OY is set low, there is a greater chance of maintaining a fishery through bad years. If OY is set higher, consideration should be paid to what alternative fishing opportunities are likely to be available during and immediately following El Niño years when squid catches will be low.

4. Define OY in the context of MSY. Reduce OY to account for the importance of squid for its ecosystem, recognizing that one-quarter of MSY is an established precedence for West Coast coastal pelagic species. Consider whether further reductions are warranted to achieve socioeconomic goals of the fishery, with particular attention given to stabilizing yields.

5. Consider management measures to ensure that the capacity in this fishery is appropriate. Attention should be paid to the expected average yield as well as how fishing capacity would be supported during unproductive years if such years are expected based on the choice of OY level.

These considerations closely match the default policies set forth in amendment 8 of the CPS FMP (PFMC 1998) and meet M-S Act requirements. At a minimum, the Council needs to provide a rationale for why it has diverged from its own amendment 8 policy and why an MSY control rule is adequate for this fishery. Thank you for consideration of our concerns. Do not hesitate to contact us if you would like any additional information or require clarification of any of our points.

Sincerely,

Joshua Sladek Nowlis, Ph.D.
Senior Scientist, Fish and Ecosystem Programs

References

Clark, CW. 1990. *Mathematical Bioeconomics: The Optimal Management of Renewable Resources*, 2nd Ed. John Wiley & Sons, Inc., and New York. 386 p.

Dayton, PK, SF Thrush, MT Agardy, and RJ Hofman. Environmental effects of marine fishing. *Aquatic Conservation: Marine and Freshwater Ecosystems* 5: 205-232.

Larkin, PA. 1977. An epitaph for the concept of maximum sustainable yield. *Transactions of the American Fisheries Society* 106: 1-11.

Lauck, TC, CW Clark, M Mangel, and GR Munro. 1998. Implementing the precautionary principle in fisheries management through marine reserves. *Ecological Applications* 8 Supp.: S72-S78.

Love, M. 1996. *Probably More Than You Want to Know About the Fishes of the Pacific Coast.* Really Big Press, Santa Barbara. 381 p.

Ludwig, D, R Hilborn, and C Walters. 1993. Uncertainty, resource exploitation, and conservation: lessons from history. *Science* 260: 17, 36.

Mangel, M. 1998. No-take areas for sustainability of harvested species and a conservation invariant for marine reserves. Ecology Letters 1: 87-90.

May, RM, JR Beddington, CW Clark, SJ Holt, and RM Laws. 1979. Management of multispecies fisheries. *Science* 205: 267-277.

Pacific Fishery Management Council (PFMC). 1998. *Amendment 8—The Coastal Pelagic Species Fishery Management Plan.* Pacific Fishery Management Council, Portland, OR.

Pauly, D, A Trites, E Capuli, and V Christensen. 1995. Diet composition and trophic levels of marine mammals. *ICES CM 1995 Marine Mammal Committee*/N:13.

Sladek Nowlis, J, and B Bollermann. 2002. Methods for increasing the likelihood of restoring and maintaining productive fisheries. *Bulletin of Marine Science* 70: 715-731.

Table 1—Marine Mammals That Rely on Squid in California. Source: Pauly et al. 1995.

Species	***% small squid in diet***
Risso's dolphin	50
Dwarf sperm whale	40
Northern elephant seal	40
Pygmy sperm whale	35
Short-finned pilot whale	30
Pacific white-sided dolphin	30
Dall's porpoise	30
Northern right whale dolphin	30
Baird's beaked whale	30
Cuvier's beaked whale	30
Guadalupe fur seal[2]	30

Species	***% small squid in diet***
Bottlenose dolphin	20
Striped dolphin	20
California sea lion	20
Common dolphin	15
Northern fur seal	15
Harbor porpoise	10
Sperm whale[1]	10
Killer whale	5
Fin whale[1]	5
Sei whale[1]	5

Table 2—Squid Are Part of the Diet of The Following California Fish Species. Source: Love 1996.

Species	***Species***	***Species***
Sixgill shark	Greenspotted rockfish[3]	Pacific barracuda[3]
Spiny dogfish	Splitnose rockfish[3]	Skipjack tuna[3]
Horn shark	Greenstriped rockfish[3]	Pacific bonito[3]
Whale shark	Chilipepper rockfish[3]	Pacific mackerel[3]
Common thresher shark[3]	Cow rockfish (cowcod)[3]	Albacore[3]
White shark	Vermilion rockfish[3]	Yellowfin tuna[3]
Shortfin mako shark[3]	Bocaccio[3]	Bluefin tuna[3]
Soupfin shark[3]	Greenblotched rockfish[3]	Swordfish[3]
Tiger shark	Olive rockfish[3]	Striped marlin[3]
Blue shark	Sablefish[3]	Pacific sanddab[3]
Scalloped hammerhead shark	Lingcod[3]	Speckled sanddab
Pacific angel shark[3]	Giant sea bass[3]	Bigmouth sole
Pink salmon[3]	Kelp bass[3]	California halibut[3]
Coho salmon[3]	Ocean whitefish[3]	Fantail sole
Steelhead salmon[3]	Yellowtail[3]	Petrale sole[3]
Sockeye salmon[3]	Jackmackerel	Curlfin turbot
California lizardfish	Dolphinfish[3]	Greenland halibut
Plainfin midshipman	White seabass[3]	

[1] Listed as endangered under the Endangered Species Act.
[2] Listed as threatened under the Endangered Species Act.
[3] Major fisheries exist for these species.