APPENDIX E
TO AMENDMENT 16-3
TO THE PACIFIC COAST GROUNDFISH FISHERY MANAGEMENT PLAN

BOCACCIO (*SEBASTES PAUCISPINIS*)
DRAFT REBUILDING PLAN
ADOPTED APRIL 2004
PACIFIC FISHERY MANAGEMENT COUNCIL

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1.0 Introduction

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended in 1996 by the Sustainable Fisheries Act (SFA), states : "For a fishery that is overfished, any fishery management plan, amendment, or proposed regulations... for such fishery shall... specify a time period for ending overfishing and rebuilding the fishery..." (Sec. 304(e)(4)). The MSA also states this time period "shall be as short as possible," and usually may not exceed 10 years. However, in setting a time period for rebuilding the stock, fishery managers may take into account various mitigating factors, such as the biology of the stock and the needs of fishing communities, such that the time period may exceed 10 years. Rebuilding plans must also take into account variations and contingencies in ecological and environmental conditions that cause maximum sustainable yield (MSY) biomass to vary over time, which affects the practicable time period for rebuilding the stock.

Further detail on stock rebuilding is provided in National Standards Guidelines (published in the Code of Federal Regulations, Chapter 50, Part 600). They specify how rebuilding should occur and, in particular, establish constraints on Council action (50 CFR 600.310(e)). Rebuilding should bring stocks back to a population size that can support MSY (B_{MSY}). A rebuilding plan must specify a target year (T_{TARGET}) based on the time required for the stock to reach B_{MSY}. This target is bounded by a lower limit (T_{MIN}) defined as the time needed for rebuilding in the absence of fishing (i.e., fishing mortality rate [F] = 0). Rebuilding plans for stocks with a T_{MIN} less than 10 years must have a target less than or equal to 10 years. If, as is the case with most of the groundfish stocks, the biology of a particular species dictates a T_{MIN} of 10 years or greater, then the maximum allowable rebuilding time, T_{MAX}, is the rebuilding time in the absence of fishing (T_{MIN}) plus "one mean generation time." Mean generation time is a measure of the time required for a female to produce a reproductively-active female offspring (Pielou 1977; and especially Restrepo, *et al.* 1998) calculated as the mean age of the net maternity function (product of survivorship and fecundity at age). The MSA states that although the rebuilding time should be as short as possible, the needs of fishing communities are a mitigating factor (Sec. 304(e)(A)(i)). In order to balance the need to rapidly rebuild overfished stocks with resulting socioeconomic impacts to fishing communities, the Council has chosen the target years for overfished stocks which are greater than the minimum rebuilding time (T_{MIN}).

Because of the uncertainty surrounding stock assessments and future population trends (due, for example, to variable recruitment), the rebuilding period limits and the target need to be expressed probabilistically. At the outset of the rebuilding period T_{TARGET} should be set so there is at least a 50% probability of achieving B_{MSY} within the T_{MAX}.[1/] For a given fishing mortality rate, rebuilding analyses also provide an estimate of the probability the stock will rebuild by T_{MAX}; this statistic is denoted P_{MAX}.

The Council developed Amendment 12 to the Pacific Coast Groundfish Fishery Management Plan (FMP) to specify an effective process for implementing rebuilding plans. This amendment was approved by the Council in April 2000 and approved by National Marine Fisheries Service (NMFS) on December 7, 2000. However, in January 2001, the Natural Resources Defense Council (NRDC), along with other conservation organizations, challenged the adequacy of Amendment 12 (*Natural Resources Defense Council, Inc. et al., v. Donald Evans, Secretary of Commerce, et al.,* 168 F. Supp. 2d 1149 (N.D. Cal 2001)) in Federal District Court. They claimed rebuilding plans submitted pursuant to Amendment 12 were inadequate for two reasons. First, they did not take the form of FMPs, plan amendments, or regulations as required by the MSA. Second, rebuilding plans could allow overfishing under the "mixed-stock exception." The NRDC argued that the overfished species provisions in the SFA demonstrate Congress's intent to eliminate this exception, so

1/ The use of a low bound 50% probability is not specified in regulations; it is the result of litigation (*Natural Resources Defense Council* v. *Daley, April 25, 2000, U.S. Court of Appeals for the District of Columbia Circuit*).

rebuilding plans should not entertain this exception. The Plaintiffs also argued that the environmental assessment (EA) accompanying Amendment 12 failed to consider a reasonable range of alternatives as required by the National Environmental Policy Act (NEPA). The Court found for the Plaintiffs on the claim that rebuilding measures must conform to the MSA-mandated format of a plan, plan amendment, or regulation and the NEPA-related claim of an inadequate range of alternatives. The Court decided the second MSA-related claim, on the validity of the mixed-stock exception, was not ripe for judicial review because the exception had not yet been applied to Pacific groundfish management. In response to its findings, the Court ordered NMFS to revise Amendment 12, so rebuilding plans accord with MSA and NEPA requirements.

Because of the litigation described above, in late 2001 work began on a new FMP amendment for the rebuilding plan adoption process that would be consistent with the Court's findings. The Council and NMFS published a Notice of Intent (NOI) to prepare an EIS on April 16, 2002 (67 FR 18576). According to this NOI, the EIS would evaluate two sets of alternatives: one set addressing the framework for rebuilding plan adoption (or the "process and standards") and a second set evaluating different rebuilding strategies that could be adopted as rebuilding plans for overfished species. (These strategies are described in terms of targets and limits, such as T_{TARGET}, T_{MIN}, T_{MAX}, harvest control rules satisfying a given target, and potential management measures to constrain fishing mortality to levels determined by the harvest control rule.) Based on internal discussion, Council staff decided in late 2002 that the process and standards alternatives should be analyzed in a separate environmental document and adopted as Amendment 16-1. Amendment 16-1 establishes a legally-compliant framework for the adoption and implementation of rebuilding plans. Once rebuilding plans are adopted and approved, two strategic rebuilding parameters, the target rebuilding year (T_{TARGET}) and the harvest control rule (expressed as a fishing mortality rate), are published in federal regulations at 50 CFR 660.370.

Evaluated in an EA, Amendment 16-1 was approved by NMFS in November 2003, and the final rule was published on February 26, 2004 (69 FR 8861) with an effective date of March 29, 2004. Amendment 16-2 adopted rebuilding plans for canary rockfish, darkblotched rockfish, lingcod, and Pacific ocean perch. The Council adopted these rebuilding plans at their June 2003 meeting. NMFS approved the amendment on January 30, 2004, and the final rule for this action was published on April 13, 2004 (69 FR 19347) with an effective date of May 13, 2004. The Council adopted rebuilding plans addressed by Amendment 16-3, covering bocaccio, cowcod, widow rockfish, and yelloweye rockfish, at their April 2004 meeting.

Section 4.5.3.2 of the Pacific Coast Groundfish FMP, as amended, states that rebuilding plans as a whole will be published in the next annual Stock Assessment and Fishery Evaluation (SAFE) document after their approval. It also specifies the contents of rebuilding plans. The remainder of this rebuilding plan addresses the topics as enumerated in the FMP, except for the last two topics. Topic eight, a discussion of how the rebuilding plan will reflect traditional participation in the fishery by U.S. fishermen for fisheries managed under international agreement is not relevant to this rebuilding plan. Topic nine simply states that any additional information useful to the rebuilding plan's goals and objectives be included. Such information is included under the first six topics, enumerated below, as appropriate.

2.0 The Biology and Current Status of the Stock and Fisheries Affected by Stock Rebuilding Measures

2.1 Life History Characteristics

Bocaccio (*Sebastes paucispinis*) is a rockfish species that ranges from Krozoff and Kodiak Islands in the Gulf of Alaska to central Baja California, Mexico (Hart 1988; Miller and Lea 1972). Love, *et al.* (Love, *et al.* 2002) and Thomas and MacCall (Thomas and MacCall. 2001) describe bocaccio distribution and life history. Bocaccio are historically most abundant in waters off Central and Southern California. Juveniles settle in

nearshore waters after a pelagic stage that last several months. Adults are most commonly found at 100 m to 150 m over the outer continental shelf (Allen and Smith 1988). The southern bocaccio stock is most prevalent at the 54 fm to 82 fm depth zone (Casillas, *et al.* 1998).

Bocaccio are found in a wide variety of habitats, often on or near bottom features, but sometimes over muddy bottoms. They are found both nearshore and offshore (Sakuma and Ralston 1995). Larvae and small juveniles are pelagic (Garrison and Miller 1982) and are commonly found in the upper 100 m of the water column, often far from shore (MBC 1987). Large juveniles and adults are semi-demersal and are most often found in shallow coastal waters over rocky bottoms associated with algae (Sakuma and Ralston 1995). Adults are commonly found in eelgrass beds or congregated around floating kelp beds (Love, *et al.* 1990; Sakuma and Ralston 1995). Young and adult bocaccio also occur around artificial structures, such as piers and oil platforms (MBC 1987). Although juveniles and adults are usually found around vertical relief, adult aggregations also occur over firm sand-mud bottoms (MBC 1987). Bocaccio move into shallow waters during their first year of life (Hart 1988), then move into deeper water with increased size and age (Garrison and Miller 1982).

Bocaccio are ovoviviparous (live young are produced from eggs that hatch within the female's body) (Garrison and Miller 1982; Hart 1988). Love *et al.* (1990) reported the spawning season to last nearly an entire year (>10 months). Parturition occurs during January to April off Washington, November to March off Northern and Central California, and October to March off Southern California (MBC 1987). Fecundity ranges from 20,000 to 2,300,000 eggs. In California, two or more broods may be born per year (Love *et al.* 1990). The spawning season is not well known in northern waters. Males mature at three to seven years, with about half maturing in four to five years. Females mature at three to eight years, with about half maturing in four to six years (MBC 1987).

Maximum age of bocaccio was radiometrically determined to be at least 40 and perhaps more than 50 years. Bocaccio are difficult to age, and stock assessments used length measurements as a proxy for age. MacCall *et al.* (MacCall, *et al.* 1999) estimated that the instantaneous rate of natural mortality was 0.20 (82% adult annual survival when there is no fishing mortality).

Larval bocaccio eat diatoms, dinoflagellates, tintinnids, and cladocerans (Sumida and Moser 1984). Copepods and euphausiids of all life stages (adults, nauplii and egg masses) are common prey for juveniles (Sumida and Moser 1984). Adults eat small fishes associated with kelp beds, including other species of rockfishes, and occasionally small amounts of shellfish (Sumida and Moser 1984). Bocaccio are eaten by sharks, salmon, other rockfishes, lingcod, albacore, sea lions, porpoises, and whales (MBC 1987). Adult bocaccio are often caught with chilipepper rockfish and have been observed schooling with speckled, vermilion, widow, and yellowtail rockfishes (Love *et al.* 2002). They compete with chilipepper and widow rockfish, yellowtail, and shortbelly rockfishes for both food and habitat resources (Reilly, *et al.* 1992).

2.2 Current Stock Status and Management History

There are two separate West Coast bocaccio populations. The southern stock exists south of Cape Mendocino and the northern stock north of 48° N latitude in northern Washington (off Cape Flattery). It is unclear whether this stock separation implies stock structure. The distribution of the two populations and evidence of lack of genetic intermixing suggests stock structure, although MacCall (2002) sees some recent evidence for limited genetic mixing of the two populations. Nonetheless, assessment scientists and managers have treated the two populations as independent stocks north and south of Cape Mendocino (40º10' N latitude).

Bocaccio have long been an important component of California rockfish fisheries. Catches increased to high levels in the 1970s and early 1980s as relatively strong year-classes recruited to the stock. The Council began

to recommend increasingly restrictive regulations after an assessment of the southern stock in 1990 (Bence and Hightower 1990) indicated fishing rates were too high. The southern stock has been assessed six times (Bence and Hightower 1990; Bence and Rogers 1992; MacCall 2002; MacCall 2003b; MacCall *et al.* 1999; Ralston, *et al.* 1996) and has suffered poor recruitment during the warm water conditions that have prevailed off Southern California since the late 1980s. The 1996 assessment (Ralston *et al.* 1996) indicated the stock was in severe decline. NMFS formally declared the stock overfished in March 1999 after the groundfish FMP was amended to incorporate the tenets of the SFA. MacCall *et al.* (1999) confirmed the overfished status of bocaccio and estimated spawning output of the southern stock to be 2.1% of its unfished biomass and 5.1% of the MSY level. The northern stock of bocaccio has not been assessed.

While previous assessments only used data from Central and Northern California, an assessment in 2002 (MacCall and He 2002) also included data for Southern California. While relative abundance increased slightly from the last assessment (4.8% of unfished biomass), potential productivity appears lower than previously thought, making for a more pessimistic outlook. The Council assumed a medium recruitment scenario for the 1999 year class, which was not assessed (MacCall *et al.* 1999). The 2002 assessment revealed the 1999 year class experienced relatively lower recruitment. Therefore, although the 1999 year class contributed a substantial quantity of fish to the population, it did not contribute as much to rebuilding as was previously thought.

The 2003 bocaccio assessment differs greatly from the 2002 assessment. It is driven by the strength of the incoming 1999 year class that had not recruited into the indices used for the 2002 assessment and by a revised lower estimate of natural mortality (MacCall 2003b). In addition to the 2001 Triennial Survey data, the 2003 assessment used larval abundance data from recent CalCOFI surveys as well as length and catch per unit effort (CPUE) data from recreational fisheries. In calculating the recreational CPUE information, a new method was used that identifies relevant fishing trips by species composition and adjusts the catch history for regulatory changes that effect the level of discard and avoidance. The results of these calculations suggest recreational CPUE has increased dramatically in recent years and is at a record high level in Central California north of Pt. Conception. The Stock Assessment Review (STAR) Panel recommended the use of two assessment models as a means of bracketing uncertainty from the very different signals between the Triennial Survey and the recreational CPUE data. Following the STAR Panel meeting, MacCall presented a third "hybrid" model that incorporated the data from all of the indices. The SSC recommended, and the Council approved, the use of this third modeling approach. This resulted in modest improvement in estimated stock size, but significantly affected the estimated productivity of the stock. These results had substantial effects on the rebuilding outlook for bocaccio which, under the 2002 assessment, was not expected to rebuild within T_{MAX} even with no fishing related mortality. Total mortality in 2003 fisheries was restricted to less than 20 mt as a means of conserving the stock while minimizing adverse socioeconomic impacts to communities. The current rebuilding analysis (MacCall 2003a), using the "hybrid" model, suggests the stock could rebuild to B_{MSY} within 25 years while sustaining an OY of approximately 300 mt in 2004 (see Table 2-2).

2.3 Fisheries Affected by the Rebuilding Plan

Fisheries in Central and Southern California are affected by the bocaccio rebuilding plan because the overfished population occurs in these waters. Recreational and limited entry trawl fisheries in this region have accounted for the bulk of landings in recent years. For example, 2004 catch projections show recreational fisheries south of Cape Mendocino accounting for 46% of total bocaccio fishing mortality and limited entry trawl fisheries accounting for 43% (PFMC 2004b).

Table 1 shows the distribution of bocaccio landings by major fishery sector in 2003. It can be seen the recreational fisheries account for the largest proportion of bocaccio landings.

TABLE 1. 2003 base landed catch by fishery for bocaccio (mt).

Sector	Postseason Catch Estimates for 2003
Recreational[a/]	10.78
Fixed Gear Limited Entry	0.22
Open Access	0.23
Tribal	0
Research	0.43
Trawl (Shoreside)	0.11
Trawl (At Sea)	0
Total Postseason Catch Estimate[b/]	11.77
2004 Estimated Total Mortality[c/]	145
2004 Total Catch OY[c/]	250
1998 Total Catch OY	230

a/ Preliminary.
b/ Federal permits only; does not include Oregon and California state-issued scientific fishing permits.
c/ From Table 5-12 Amendment 16-3 Rebuilding Plans EIS. Projected annual estimated mortality as of March 15, 2004. Category totals include landings made on exempted fishing permits (EFPs).

3.0 Methods Used to Calculate Stock Rebuilding Parameters

The rebuilding analysis (MacCall 2003a) uses the methods outlined in the SSC Terms of Reference (SSC 2001) for stock rebuilding. Section 4.5.2 of the Pacific Coast Groundfish FMP explains this methodology in general terms.

4.0 Estimates of Rebuilding Parameter Values at the Time of Rebuilding Plan Adoption

Amendment 16-3 incorporates rebuilding parameter values into Section 4.5.4.1 of the Pacific Coast Groundfish FMP. These values are derived from the stock assessment (MacCall 2003b) and rebuilding analysis (MacCall 2003a). The Council adopted rebuilding plan parameters based on the STATc model in the stock assessment. They are as follows:

Year stock declared overfished:	1999
Year rebuilding plan adopted:	2004
B_0:	13,387 B in eggs in 2003
B_{MSY}:	5,355 B in eggs
$B_{CURRENT}$ (% of B_0)	7.4% in 2003
T_{MIN}:	2018
T_{MAX}:	2032
P_{MAX}:	70%
T_{TARGET}:	2023
Harvest control rule:	F = 0.0498

For the harvest control rule, the fishing mortality rate is applied to the exploitable biomass estimate to determine the OY for a given fishing period. The Council may also apply a precautionary adjustment to this value. In 2004 the OY computed based on the STATc model in the stock assessment (MacCall 2003b) was 306 mt, and the Council made a precautionary reduction for a resulting OY of 250 mt.

Rebuilding parameter values are likely to change over time as stock size and structure changes. While most of these parameters reflect the biology of the stock or national policy described in National Standard Guidelines, the interrelated values of the target year and the harvest control rule may be changed by the Council. For example, changes in stock productivity may necessitate revision of the harvest control rule in order to rebuild the stock by the identified target year with the same rebuilding probability (P_{MAX}). The values of these two parameters are published in federal regulations (50 CFR 660.370), and any such change is subject to notice-and-comment rulemaking.

5.0 Process and Standards For Reviewing the Rebuilding Plan

The MSA states that the Secretary of Commerce shall review rebuilding plans routinely, and at least every two years, to determine if adequate progress is being made in stock rebuilding (§304(e)(7)). Section 4.5.3.1 of the Pacific Coast Groundfish FMP describes a range of review processes and standards that may be used by the Council to conduct such a review. For all adopted rebuilding plans the Council chose the following standard:

> The Council, in consultation with the Scientific and Statistical Committee (SSC) and Groundfish Management Team (GMT), will determine on a case-by-case basis whether there has been a significant change in a parameter such that the chosen management target must be revised.

As part of their statement at the April 2004 Council meeting (Exhibit C.12.b, Supplemental SSC Report), the SSC discussed the development of criteria to be used in the case-by-case review process adopted by the Council for rebuilding plan reviews:

The SSC notes that each rebuilding plan needs to include standards for evaluating the progress of rebuilding. These standards need to be developed for use in the assessments that will be conducted during 2005. As directed by the Council, the SSC Groundfish Subcommittee will develop standards and include them in its Terms of Reference for Rebuilding Analyses. This may require a meeting of the SSC Groundfish Subcommittee, particularly if a draft set of standards are to be provided to the Council for revision in September 2004 and final adoption in November 2004. The standards are likely to include a comparison of current stock status relative to that expected under the current rebuilding plan.

6.0 Management Measures Used to Rebuild the Stock

6.1 Management Measures Incorporated into the FMP Specifically to Rebuild Bocaccio

Other than the types of management measures implemented through the biennial management cycle, no additional measures are adopted as part of this rebuilding plan. To provide information about the types of management measures implemented through the periodic management, harvest specifications and management measures applying to bocaccio in 2004 are discussed below.

6.2 Management Measures Used in 2004 to Rebuild the Stock

The Pacific Coast Groundfish FMP establishes a framework for the periodic application of harvest specifications and management measures. Harvest specifications consist of "optimum yield" (OY) values (a total allowable catch) applicable to a calendar year. OYs are established individual stocks, stock complexes, and species groups, and represent a total fishing mortality (landed catch plus bycatch) threshold. All fully assessed stocks, and therefore all overfished species, have individual OYs. A variety of management measures are applied to constrain total fishing mortality to a level at or below the OY. With the adoption of the FMP Amendment 17 the Council transitioned to a two-year management cycle. OYs still apply to a calendar year, but the process of establishing them and identifying necessary management measures occurs every two years. With implementation, 2004 is the last year in the annual cycle; the first biennial cycle applies to 2005-2006.

Groundfish fisheries are multi-species; several target species and a range of incidentally-caught species may be caught in a single haul. For this reason, there are few management measures intended solely for a single overfished stock. Instead, a variety of measures are applied to a given fishery sector to constrain fishing mortality of the full range of target and incidentally-caught species. The current management regime, therefore, induces regulatory discards, which for overfished species can be an important component of total fishing mortality. Bycatch has, therefore, become a crucial issue in effective groundfish management. This has necessitated the development of more accurate estimates of bycatch in order to track total fishing mortality. The measures in effect in 2004 and their effect on constraining bocaccio catches are summarized below. This list generally follows the discussion of management measures that may be implemented as part of the framework described in Section 6.2 of the Pacific Coast Groundfish FMP. A more detailed discussion of many of these measures may be found in the Final EIS for the 2004 groundfish harvest specifications and management measures (PFMC 2004b).

Harvest limits (harvest guidelines or quotas): As described above, the Council sets OYs for each overfished stock (among other managed species). For overfished species these OYs are calculated based on information from the most recent stock assessment and rebuilding analysis with the value determined by the strategic parameters (T_{TARGET}, $P_{MAX,}$ and harvest control rule) identified in the rebuilding plan. Although resulting OYs are considered harvest guidelines, the Council has treated them as hard limits on total fishing mortality for overfished species. For example, they have closed fisheries late in the year if an overfished species' OY

is projected to be exceeded. Projected landings of bocaccio in 2004 are below the OY (which also represents a precautionary reduction from the computed OY); bocaccio are not a key constraining stock in 2004.

Permits, licenses, and endorsements: Participation in the Washington, Oregon, and California groundfish fishery was partially limited beginning in 1994 when the federal vessel license limitation program was implemented (Amendment 6). Subsequently, Amendment 9 further limited participation in the fixed-gear sablefish fishery by establishing a sablefish endorsement. There is currently no federal permit requirement for other commercial participants (fishers or processors) or recreational participants (private recreational or charter). A buyback of vessels in the limited entry trawl fishery, and associated permits, was completed in 2003. This reduced participation in this sector by roughly one-third.

Trip landing and frequency limits: Cumulative trip limits have been a key fixture of groundfish management for many years. Currently, these limits set for stocks, stock complexes, and species groups dictate the total amount of fish that may be landed during a two-month period. Separate limits are established for the limited entry trawl, limited entry fixed gear, and open access sectors. Landing limits on target species may be adjusted in order to limit coincident catch of overfished species. A limited entry trawl trip limit of 100 pounds per month was established in 2004 for large footrope gear, which may only be used seaward of the Rockfish Conservation Area (RCA) (see discussion below). Limited entry fixed gear and open access limits vary by two-month period and north and south of Point Conception within a range of being closed in some periods to 300 pounds per two-month period.

Seasons: California manages its recreational fisheries according to four sub-areas defined by latitudinal boundaries. Different closed seasons have been applied, and modified inseason, primarily to limit canary rockfish catches, the most constraining of the overfished species; but these actions also serve to limit recreational catches of bocaccio.

Area closures: Beginning in 2002, an RCA came into use as a way of decreasing bycatch of overfished species. It encloses the depth ranges where bycatch of overfished species is most likely to occur, based on information retrieved from log books and the at-sea observer program, and fishing by designated groundfish fishery sectors is prohibited within its boundaries. The boundaries vary by season and fishery sector, and may be modified in response to new information about the geographic and seasonal distribution of bycatch. South of 40º10' N latitude (a line near Cape Mendocino, California) the seaward boundary of the RCA for the limited entry trawl sector is 150 fm in 2004, and the shoreward boundary varies between 75 fm and 100 fm, depending on period. (Around offshore islands the inner boundary extends to the shoreline.) The seaward boundary is the same for limited entry fixed gear and open access sectors; the shoreward boundary either 20 fm, 30 fm, or 60 fm, depending on area and period. California has implemented, and modified inseason, closed areas in their recreational management, restricting fisheries to areas shoreward of boundaries at 20 fm, 30 fm, or 60 fm, depending on sub-area and month.

Gear restrictions: Definitions of legal gear types and restrictions on mesh size in trawl gear have been part of the FMP since its inception. More recently, restrictions have been put on the use of trawl nets equipped with large footropes. By using large footropes with heavy roller gear, bottom trawlers can access rocky habitat on the continental shelf. In areas shoreward of the RCA large footrope gear is prohibited, preventing trawlers from assessing rocky habitat in these shallower depths. In areas seaward of the RCA, either small or large footrope gear may be used, although large footrope gear is the preferred type in these depths. In addition, cumulative trip limits are structured to encourage vessels to fish exclusively in deep water where some overfished species, including bocaccio, are less likely to be encountered. Vessels are allowed to use all gear configurations during any given cumulative limit period. However, trawl vessels which use the small footrope configuration are restricted to lower cumulative trip limits for target species in comparison to vessels using large footrope configurations. As noted above, vessels using small footrope gear may not retain bocaccio (south of 40º10' N latitude) while there is a small cumulative trip limit for vessels using large

footrope configurations. Since the large footrope configuration may only be used seaward of the RCA, these measures encourage fishing exclusively in deeper water to take advantage of the higher limits afforded this gear type.

Exempted fishing permits (EFPs) have been authorized to test new gear that reduces the incidental catch rate of overfished species. A trawl net design with a cut back headrope has been extensively tested in Oregon and Washington waters and is being tested in California waters. Tests show substantial reduction in catches of some rockfish species while maintaining catch rates for target flatfish species. Sufficient testing has occurred in Oregon waters to transition this modified gear configuration into the regulatory regime for fisheries north of 40º10' N latitude as a replacement for small footrope trawl gear shoreward of the RCA. This is likely to occur as part of the management measures implemented for the 2005-2006 biennium. Ongoing testing in California waters may allow implementation of a similar regulatory measure for waters south of 40º10' N latitude at some point in the future.

Size limits: A 10-inch minimum size limit is applicable to bocaccio in waters off California.

Bag limits: These measures are used for recreational fisheries. California has implemented a 10-fish bag limit for the rockfish-cabezon-greenling stock complex. Within the 10-fish bag limit there are bocaccio sub-limits of two fish north of 40º10' N latitude and one fish south of 40º10' N latitude.

Fishery monitoring and bycatch estimation: All groundfish landings are monitored through a fishticket system requiring reporting by buyers and processors. As noted, bycatch has become a crucial component of total fishing mortality for overfished species. NMFS has developed a "trawl bycatch model" (Hastie 2001; Hastie [2003]), which is used to project total fishing mortality in the limited entry groundfish trawl fishery for key species, based on a given set of management measures.[2/] This model includes a depth component and is used to determine the depth ranges enclosed by the RCA. NMFS implemented the West Coast Groundfish Observer Program in August 2001, and these data were first used to estimate total fishing mortality beginning in mid-2003. The trawl bycatch model has been continually updated, both to evaluate the effect of different closed area configurations on total fishing mortality and to incorporate new bycatch rates based on observer data (Hastie 2003). In 2004 bycatch modeling was expanded to the primary sablefish fishery prosecuted by limited entry fixed gear vessels (Hastie 2004). As more observer data from different fishery sectors become available, further model extensions will be developed to more accurately estimate bycatch of overfished species in these sectors.

In recent years, efforts have been made to improve recreational fishery sampling in California. For instance, in 2001 the Pacific States Marine Fisheries Commission (PSMFC), with support from NMFS, began a new survey to estimate party/charter boat (commercial passenger fishing vessel [CPFV]) fishing effort in California. This survey differed from the traditional Marine Recreational Fisheries Statistical Survey (MRFSS) telephone survey of anglers to determine CPFV trips by two-month period. The survey sampled 10% of the active CPFV fleet each week to determine the number of trips taken and the anglers carried on each trip. This 10% sample was then expanded to make estimates of total angler trips for Southern California and Northern California. However, the requisite precision for managing for the low OYs of overfished species like canary rockfish and bocaccio was still lacking. Fishery scientists from the California Department of Fish and Game (CDFG) and the PSMFC designed a new program for sampling California's recreational fisheries, incorporating both the comprehensive coverage of the MRFSS program and the high quality sampling of CDFG's Ocean Salmon Project. The goal of this new program, the California Recreational

2/ A large proportion of total groundfish landings is attributable to this sector. Accurately predicting total catch mortality in this sector is, therefore, crucial in determining how well a given set of management measures will constrain fishing to OYs.

Fisheries Survey (CRFS), is to produce in a timely manner marine recreational, fishery-based data needed to sustainably manage California's marine recreational fishery resources. The changes proposed in this program should increase the timeliness and accuracy of recreational fisheries data so that they can be more effectively used for inseason monitoring, estimating take for species of concern, developing harvest guidelines, producing stock assessments, and providing other information critical to management decisions. The PSMFC and CDFG fully implemented the CRFS plan in January 2004.

7.0 Goals and Objectives of the Rebuilding Plan

The Pacific Coast Groundfish FMP identifies the following goals and objectives of rebuilding plans:

> The overall goals of rebuilding programs are to (1) achieve the population size and structure that will support the MSY within the specified time period; (2) minimize, to the extent practicable, the adverse social and economic impacts associated with rebuilding, including adverse impacts on fishing communities; (3) fairly and equitably distribute both the conservation burdens (overfishing restrictions) and recovery benefits among commercial, recreational, and charter fishing sectors; (4) protect the quantity and quality of habitat necessary to support the stock at healthy levels in the future; and (5) promote widespread public awareness, understanding, and support for the rebuilding program. More specific goals and objectives may be developed in the rebuilding plan for each overfished species.
>
> To achieve the rebuilding goals, the Council will strive to (1) explain the status of the overfished stock, pointing out where lack of information and uncertainty may require that conservative assumptions be made in order to maintain a risk-averse management approach; (2) identify present and historical harvesters of the stock; (3) where adequate harvest sharing plans are not already in place, develop harvest sharing plans for the rebuilding period and for when rebuilding is completed; (4) set harvest levels that will achieve the specified rebuilding schedule; (5) implement any necessary measures to allocate the resource in accordance with harvest sharing plans; (6) promote innovative methods to reduce bycatch and bycatch mortality of the overfished stock; (7) monitor fishing mortality and use available stock assessment information to evaluate the condition of the stock; (8) identify any critical or important habitat areas and implement measures to ensure their protection; and (9) promote public education regarding these goals, objectives, and the measures intended to achieve them.

No additional goals and objectives are identified for the bocaccio rockfish rebuilding plan.

8.0 Potential or Likely Allocations Among Sectors

In any given year, the Council will recommend to NMFS harvest regulations that indirectly allocate available harvest among uses in what the Council believes is an optimal fashion. (The FEIS for Amendment 16-3 contains information on past allocations among different fishing strategies, based on an analysis of landings data (PFMC 2004a, Appendix B).) The Council will likely vary the allocation between different fisheries over the period of the rebuilding plan, based on new information about bycatch rates and the marginal economic value of overfished species catches. As stocks recover at different rates the overfished species that shape fishery management will also change. Within a given sector or region the species with the lowest OY relative to target species strongly influences the types of management measures that must be imposed, depending on the bycatch rate for a particular gear type. In determining an optimal allocation, the Council is likely to take into account equity, geographic allocation, and other social factors in addition to economic efficiency.

Given this indirect form of allocation, projected total catch by sector, reported in the 2004 harvest specifications FEIS (PFMC 2004b), provide a good indicator of this de facto allocation. Table 2.2.5-1 in that

document reports these estimates for 2004, which proportionately by broad sector are: 18% for the limited entry non-whiting trawl sector, 5% for limited entry fixed gear fisheries, no catches by the whiting fishery, 5% for open access fisheries, no catches by tribal fisheries, 25% for recreational fisheries, 1% for research fisheries, and no catches by EFP fisheries. According to these projections, the remaining 46% of the OY was not predicted to be caught.

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