CANARY ROCKFISH (*SEBASTES PINNIGER*) REBUILDING PLAN
Pursuant to the Pacific Coast Groundfish Fishery Management Plan
Adopted June 2003
Pacific Fishery Management Council

1.0 Introduction

The Magnuson-Stevens 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 that 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 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 Magnuson-Stevens Act 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 that 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 2001 and approved by National Marine Fisheries Service (NMFS) on December 7, 2000.

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*).

However, in January 2000, 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 that rebuilding plans submitted pursuant to Amendment 12 were inadequate for two reasons. First, they did not take the form of fishery management plans, plan amendments, or regulations as required by the Magnuson-Stevens Act. 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 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 that the second Magnuson-Stevens Act-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 Magnuson-Stevens Act 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. Evaluated in an EA, Amendment 16-1 was approved by NMFS in November 2003, in advance of completion of the Amendment 16-2 FEIS (adopting and evaluating rebuilding plans for four species). This ensures adopted rebuilding plans can be prepared in a manner that conforms to the already-adopted framework.

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 SAFE document after their approval. It also specifies the contents of rebuilding plans. Although these components were part of the Amendment 16-2 EIS, they were not included in that document as separate, concise documents. Section 1.3.6 of the Amendment 16-2 FEIS identifies what parts of that document constitute the rebuilding plan, based on nine required topics enumerated in Section 4.5.3.2 of the FMP. This rebuilding plan consolidates that material in a concise document. 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.

Additional Introductory Information

Amendment 16-2 incorporated key elements of the canary rockfish rebuilding plan into the Pacific Coast Groundfish FMP, as required by Amendment 16-1. 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. Amendment 16-2 was approved on January 30, 2004. The final

rule inserting the strategic parameters in Federal regulations was published on April 13, 2004, with an effective date of May 13, 2004.

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

2.1 Life History Characteristics

Canary rockfish (*Sebastes pinniger*) off the West Coast exhibit a protracted spawning period from September through March, probably peaking in December and January off Washington and Oregon (Hart 1988; Johnson, *et al.* 1982). Female canary rockfish reach sexual maturity at roughly eight years of age. Like many members of *Sebastes*, canary rockfish are ovoviviparous, whereby eggs are internally fertilized within females, and hatched eggs are released as live young (Bond 1979; Golden and Demory 1984; Kendall and Lenarz 1986). Canary rockfish are a relatively fecund species, with egg production being correlated with size, (e.g., a 49-cm female can produce roughly 0.8 million eggs, and a female that has realized maximum length (approximately 60 cm) produces approximately 1.5 million eggs). Very little is known about the early life history strategies of canary rockfish, but limited research indicates larvae which are strictly pelagic (near ocean surface) for a short period of time, begin to migrate to demersal waters during the summer of their first year of life and develop into juveniles around nearshore rocky reefs, where they may congregate for up to three years (Boehlert 1980; Sampson 1996). Evaluations of length distributions by depth developed from NMFS shelf trawl survey data generally supported other research that suggests this species is characterized by an increasing trend in mean size of fish with depth (Archibald, *et al.* 1981; Boehlert 1980). Female canary rockfish generally grow faster and reach slightly larger sizes than males, but do not appear to live longer than males. Adult canary rockfish feed primarily on small fishes, as well as planktonic creatures, such as euphausiids (Love 1991; Phillips 1964).

2.2 Current Stock Status and Management History

Canary rockfish were first assessed on the West Coast in 1984, but the assessment was a qualitative trend analysis using survey and catch data (Golden and Demory 1984). Highly variable or unavailable sample data precluded a more quantitative approach. This assessment concluded that the stock was stable and that the ABC and management measures in place were adequate.

The 1990 canary rockfish stock assessment (Golden and Wood 1990) was the first to use the Stock Synthesis Model (Methot 1990) and a catch-at-age analysis. Data sources in this assessment included commercial landings (1967 through 1989), fishery age distribution (1980 through 1988), a commercial trawl effort index from logbooks (1980 through 1987), a catch per unit effort (CPUE) index from the NMFS trawl survey (1977 through 1989), and size distribution data from the survey (1977 through 1989). Only the canary rockfish resource in the Columbia INPFC area was modeled. Golden and Wood (1990) were the first to offer competing hypotheses to explain the lack of older females in the population. These two hypotheses, which have still not been resolved, are that older females have a higher natural mortality than older males or that they are less susceptible to capture by fishing gears than older males. This assessment indicated that stock biomass had declined in the Columbia INPFC area.

The next canary rockfish assessment was in 1994 (Sampson and Stewart 1994). An age-based version of the Stock Synthesis Model was used to assess the status of the resource in the Columbia and U.S. Vancouver INPFC areas. All of the same data sources from the previous assessment were updated and used, except the trawl effort index because of sample and estimation biases associated with logbook data. Results indicated

the harvest rate exceeded the $F_{20\%}$ overfishing threshold, and a reduction in the ABC was recommended. An updated assessment in 1996 (Sampson 1996) verified continued exploitation in excess of the $F_{20\%}$ threshold.

Two age-based stock assessments in 1999 documented the stock had declined below the overfished level ($B_{25\%}$) in the northern area (Columbia and U.S. Vancouver INPFC areas Crone, *et al.* 1999) and in the southern area (Conception, Monterey, and Eureka INPFC areas Williams, *et al.* 1999), and NMFS declared the stock overfished in January 2000. The first rebuilding analysis (Methot 2000a) used results from the northern area assessment to project rates of potential stock recovery. The stock was found to have extremely low productivity, defined as production of recruits in excess of the level necessary to maintain the stock at its current, low level. Rates of recovery were highly dependent upon the level of recent recruitment, which could not be estimated with high certainty. The initial rebuilding OY for 2001 and 2002 was set at 93 mt based upon a 50% probability of rebuilding by the year 2057, a medium level for these recent recruitments, and maintaining a constant annual catch of 93 mt through 2002.

A new coastwide assessment was completed in 2002, treating the stock as a single unit from the Monterey INPFC area north through the U.S. Vancouver INPFC area, and thus, departing from the methodologies of past assessments (Methot and Piner 2002b). Although there is some evidence of genetic separation of the northern and southern stocks (Boehlert and Kappenman 1980; Wishard, *et al.* 1980), the observed variability in growth rate by sex and area was not significantly different at small versus large spatial scales. Methot and Piner (2002b) also determined the areas of highest canary rockfish density were off headlands that separate INPFC areas, which would tend to bias results if the assessment was stratified by INPFC area. A critical uncertainty in canary rockfish assessments is the lack of older, mature females in surveys and other assessment indices. There are two competing explanations for this observation. Older females could have a higher natural mortality rate, resulting in their disproportionate disappearance from the population. Alternatively, survey and fishing gears may be less effective at catching them, because older females hide in places inaccessible to the gear, for example. If this is the case, then these fish (which, because of their higher spawning output may make an important contribution to future recruitment) are part of the population, but remain un-sampled. Methot and Piner (2002b) combined these two hypotheses in a single age-structured version of the SSC-endorsed Stock Synthesis Model (Methot 2000b) by allowing female natural mortality to increase with the maturity function, but also allowing a domed selectivity function (the model determines the selectivity of survey and fishery gear as opposed to assuming a fixed selectivity). They estimated the 2002 abundance of canary rockfish coastwide was about 8% of B_0.

2.3 Fisheries Affected by the Rebuilding Plan

Canary rockfish are encountered in a relatively wide variety of both commercial and recreational fisheries. However, limited entry trawlers targeting flatfish and arrowtooth flounder account for a large proportion of the landed catch, mainly north of Cape Mendocino. Much smaller amounts are caught in the whiting and DTS limited entry trawl fisheries, and by fixed gear vessels targeting groundfish on the continental shelf. Charter vessels account for most of recreationally-caught canary rockfish, mainly off of Northern California and Oregon. Canary rockfish are also caught in California recreational fisheries.

Table 1 (data extracted from Table 5.3-1a in the Amendment 16-2 FEIS) shows the distribution of canary rockfish landings by major fishery sector.

TABLE 1. 2002 base landed catch by fishery for canary rockfish (mt). (From Table 5.3-1a in PFMC 2003.)

Sector	Postseason Catch Estimates for 2002
Recreational[a/]	18.0
Fixed Gear Limited Entry	1.6
Directed Open Access	0.2
Other Commercial	1.4
Tribal	6.1
Research[b/]	0.1
Trawl (Shoreside)	41.7
Trawl (At Sea)	2.4
Total Postseason Catch Estimate[c/]	71.5
2002 Total Catch OY	93
1998 Total Catch OY[d/]	1,045

a/ Preliminary.
b/ Federal permits only. Doesn't include Oregon and California state-issued scientific fishing permits.
c/ Category totals include landings made on exempted fishing permits (EFPs).
d/ 1998 OY is for Vancouver and Columbia INPFC areas; 2002 OY are coastwide.

3.0 Methods Used to Calculate Stock Rebuilding Parameters

The rebuilding analysis (Methot and Piner 2002a, Appendix C in the Amendment 16-2 FEIS) 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

Section 4.5.4.1 of the Pacific Coast Groundfish FMP lists rebuilding parameter values as estimated when the rebuilding plan was adopted in 2003. These values are derived from the stock assessment (Methot and Piner 2002b) and rebuilding analysis (Methot and Piner 2002a) and are as follows:

Year stock declared overfished: 2000

Year rebuilding plan adopted: 2003

B_0: 31,550 mt

B_{MSY}: 12,620 mt

T_{MIN}: 2057

T_{MAX}: 2076

P_{MAX}: 60%

T_{TARGET}: 2074

Harvest control rule: F = 0.022

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.

These 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 Magnuson-Stevens Act 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.

6.0 Management Measures Used to Rebuild the Stock

Other than the types of management measures implemented through the periodic management cycle, no additional measures are adopted as part of this rebuilding plan. Section 4.3 of the EIS evaluating Amendment 16-2 (PFMC 2003) describes the types of management and monitoring measures implemented through periodic management.

Management measures in place in 2004 are discussed in the 2004 Rebuilding Plan Addendum.

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 maximum sustainable yield 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 darkblotched rockfish rebuilding plan.

8.0 Potential or Likely Allocations Among Sectors

In any given year, the Council will recommend to NMFS harvest regulations that allocate available harvest among uses in what the Council believes is an optimal fashion. Sections 3.4.2, 3.4.4, 3.4.6, and 3.4.7 (in the Amendment 16-2 FEIS) describe a variety of harvest sectors and target strategies where the overfished species may be taken. The Council will likely vary the allocation between different fisheries over the period of the rebuilding plan based on changing information about bycatch rates, changing marginal values, and changes in limiting species that affect the amount of the complex available for harvest. 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.

In 1998, canary rockfish were taken on trips with 39 different primary target strategies north of Cape Mendocino. All trips for each of these strategies taken together accounted for 99% of the 1998 exvessel value north of Cape Mendocino (see Table 2a, data extracted from Table 4.4-11 in the Amendment 16-2 FEIS). For some of these strategies, canary rockfish were landed on a very small portion of the trips. For example, in 2002 north of Cape Mendocino, canary rockfish were landed on less than one-twentieth of one percent of the Dungeness crab trips and on two-tenths of one percent of the highly migratory species (HMS) trips (reported in Table 3.4-15 of the Amendment 16-2 FEIS). For some of the other nongroundfish target fisheries, canary rockfish were encountered more frequently. For example, almost 9% of the salmon trips included at least one canary rockfish. In 2002, canary rockfish were taken on trips with 24 different primary target strategies north of Cape Mendocino. All trips for each of these strategies taken together accounted for 47% of the 2002 exvessel value north of Cape Mendocino (Table 2b, data extracted from Table 4.4-11 in the Amendment 16-2 FEIS). Two strategies that together accounted for 49% of the 1998 exvessel value north of Cape Mendocino were not on the 2002 list, Dungeness crab and HMS.

In 1998, canary rockfish were taken on trips with 30 different primary target strategies south of Cape Mendocino. All trips for each of these strategies taken together accounted for 50% of the 1998 exvessel value south of Cape Mendocino (Table 2a). For some of these strategies, canary rockfish were landed on a very small portion of the trips. For example, in 2002 north of Cape Mendocino, canary rockfish was landed on only one-tenth of one percent of the limited entry fixed gear sablefish slope, coastal pelagic species (CPS), salmon, and California halibut trips, and on less than one-twentieth of one percent of the prawn and Dungeness crab trips (reported in Table 3.4-16 in the Amendment 16-2 FEIS). In 2002, canary rockfish were taken on trips with 10 different primary target strategies. All trips for each of these strategies taken together accounted for 14% of the 2002 exvessel value south of Cape Mendocino (Table 2b). Four strategies that together accounted for 22% of the 1998 exvessel value south of Cape Mendocino were not on the 2002 list, CPS, California halibut, Dungeness crab, and salmon.

TABLE 2a. Landed catch of canary rockfish in 1998. (Based on Table 4.4-11 in PFMC 2003)

Primary Target for Trip	Trips with Primary Target	Landings (MT)
North of Cape Mendocino		
Open Access, Sablefish, Nearshore	7	0.001
Dungeness Crab	15,336	0.002
California Halibut	3	0.002
Open Access, Sablefish, Slope	109	0.004
Limited Entry Fixed Gear Sablefish, No Strata	600	0.009
Limited Entry Trawl, Lingcod	2	0.009
Limited Entry Fixed Gear Sablefish, Nearshore	6	0.011
Open Access, Slope	11	0.024
HMS Plan Species	1,533	0.037
Limited Entry Fixed Gear Sablefish, Slope	436	0.057
No landing wt or two species groups of equal wt	186	0.076
Limited Entry Fixed Gear, Other Groundfish, Slope	7	0.109
Pacific Halibut	214	0.293
Groundfish/Shrimp Combinations	11	0.432
Limited Entry Trawl, Leftover	106	11.318
Open Access, Sablefish, Shelf	94	0.711
Limited Entry Trawl, Petrale Sole	115	1.872
Limited Entry Trawl, Whiting	1,326	0.877
Other Crustaceans	2,060	0.957
Limited Entry Trawl, POP	14	1.201
Limited Entry Fixed Gear Sablefish, Shelf	182	1.636
Other Species	1,428	1.952
Salmon	4,027	2.168
Limited Entry Fixed Gear, Other Groundfish, Nearshore	215	2.819
Open Access, Nearshore	2,201	3.073
Limited Entry Trawl, Flatfish	957	67.099
Open Access Trawl, Other, >50% Groundfish	43	8.000
Pink Shrimp	1,105	10.473
Limited Entry Trawl, Midwater (Yellowtail and Widow)	255	75.006
Limited Entry Trawl, DTS	1,627	101.033
Other Groundfish (plurality, but <50%)	179	23.947
Limited Entry Trawl, Slope Rockfish	212	33.540
Limited Entry Trawl, Yellowtail	93	36.209
Limited Entry Trawl, Canary	35	61.553
Limited Entry Fixed Gear, Other Groundfish, Shelf	313	69.138
Limited Entry Trawl, Widow	144	90.985
Open Access, Shelf	1,265	121.210
Limited Entry Trawl, Other Rockfish	165	122.242
Limited Entry Trawl, Arrowtooth	257	216.881
Total all Northern Fisheries[a/]	37,630	1,066.966
South of Cape Mendocino		
Limited Entry Fixed Gear Sablefish, Slope	690	0.003
Limited Entry Trawl, Leftover	12	0.015
CPS Plan Species	2,768	0.007
Open Access, Sablefish, Shelf	22	0.010
California Halibut	3,194	0.011
Dungeness Crab	3,786	0.013
Groundfish/Shrimp Combinations	1	0.015
Limited Entry Fixed Gear, Other Groundfish, Slope	830	0.020

Primary Target for Trip	Trips with Primary Target	Landings (MT)
No landing wt or two species groups of equal wt	605	0.025
Salmon	7,526	0.029
Prawns	3,132	0.045
Limited Entry Trawl, Petrale Sole	41	0.233
Other Species	3,114	0.091
Pink Shrimp	70	0.093
Limited Entry Trawl, DTS	548	6.431
Other Groundfish (plurality, but <50%)	333	0.199
Limited Entry Fixed Gear Sablefish, Shelf	27	0.244
Open Access, Slope	166	0.254
Limited Entry Trawl, Flatfish	386	1.449
Limited Entry Trawl, Midwater (Yellowtail and Widow)	16	0.845
Limited Entry Trawl, Chilipepper	111	1.391
Limited Entry Fixed Gear, Other Groundfish, Nearshore	169	1.466
Limited Entry Trawl, Yellowtail	3	3.455
Limited Entry Trawl, Slope Rockfish	316	3.581
Open Access, Nearshore	6,201	4.184
Limited Entry Fixed Gear, Other Groundfish, Shelf	312	7.014
Limited Entry Trawl, Canary	5	9.815
Limited Entry Trawl, Widow	29	10.048
Limited Entry Trawl, Other Rockfish	141	18.434
Open Access, Shelf	2,441	26.233
Total all Southern Fisheries[a/]	63,298	95.654

a\ Includes primary strategies not listed in the table.

TABLE 2b. Landed catch of canary rockfish in 2002. (Based on Table 4.4-11 in PFMC 2003.)

Primary Target for Trip	Trips with Primary Target	Landings (MT)
North of Cape Mendocino		
Limited Entry Fixed Gear Sablefish, Slope	316	0.001
Other Groundfish (plurality but <50%)	336	0.010
Open Access, Sablefish, Slope	216	0.021
Open Access, Nearshore	4,229	0.031
Limited Entry Trawl, Canary	1	0.061
Pacific Halibut	379	0.102
Open Access, Sablefish, Shelf	128	0.166
Other Species	3,880	0.211
Limited Entry Trawl, Slope Rockfish	19	0.239
Limited Entry Trawl, Other Rockfish	1	0.251
Limited Entry Trawl, Leftover	158	0.844
Open Access, Shelf	381	0.262
Limited Entry Fixed Gear Sablefish, Shelf	105	0.272
Limited Entry Trawl, Yellowtail	10	0.286
Limited Entry Trawl, Whiting	632	0.433
Salmon	8,390	0.445
Limited Entry Trawl, DTS	1,020	5.174
Pink Shrimp	1,963	1.214
Limited Entry Fixed Gear, Other Groundfish, Shelf	52	1.333
Limited Entry Trawl, Petrale Sole	229	2.224
Open Access Trawl, Other, >50% Groundfish	135	2.316
Limited Entry Trawl, Midwater (Yellowtail and Widow)	63	1.128
Limited Entry Trawl, Arrowtooth	184	12.271
Limited Entry Trawl, Flatfish	1,275	15.696
Total All Northern Fisheries[a/]	43,556	44.991
South of Cape Mendocino		
Other Groundfish (plurality, but <50%)	180	0.002
Limited Entry Trawl, Other Rockfish	28	0.003
Limited Entry Trawl, Widow	1	0.009
Open Access, Shelf	928	0.010
Prawns	2,083	0.028
Limited Entry Trawl, Slope Rockfish	53	0.036
Open Access, Nearshore	3,838	0.046
Limited Entry Trawl, DTS	625	1.492
Limited Entry Trawl, Flatfish	369	0.748
Limited Entry Trawl, Chilipepper	54	0.698
Total All Southern Fisheries[a/]	61,427	3.147

a\ Includes primary strategies not listed in the table.

2004 Addendum to the Canary Rockfish Rebuilding Plan

As noted above, the Council adopted the canary rockfish rebuilding plan in June 2003. This addendum describes new information subsequent to rebuilding plan adoption and management measures currently used to constrain POP fishing mortality to levels determined by the rebuilding plan.

Process and Standards For Reviewing the Rebuilding Plan

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.

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 for 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 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 canary rockfish 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 2004).

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. Because of canary rockfish are caught in a range of commercial and recreational fisheries, and the 2004 OY consistent with rebuilding plan targets is a relatively low 47.3 mt, limiting canary rockfish fishing mortality by constraining target fisheries is an important management issue in 2004. Canary rockfish is also unusual because the stock assessment shows a difference in the average size of fish caught in the commercial and recreational fisheries. As a result, the distribution of catch between these two sectors affects the OY because the number of fish caught per unit weight would vary. The Council therefore considered catch sharing for this species during the harvest specification process.

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. Limited entry trawl trip limits for canary rockfish are set at a very low level in 2004 (100-300 lbs per two-month period, depending on time of year); retention is prohibited in the limited entry fixed gear and open access sectors. Trip limits for the minor shelf rockfish complex have also been reduced to limit coincidental canary rockfish catch.

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, along with other overfished species caught in recreational fisheries.

Area closures: Beginning in 2002 a Rockfish Conservation Area (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. Canary rockfish prefer rocky areas on the continental shelf so RCA boundaries in 2004 prevent fishing in areas of high abundance. Because canary rockfish are particularly vulnerable to fixed gear, RCA boundaries for fixed gear limited access and open access sectors north of Point Conception are designated with canary rockfish occurrence in mind. Recreational groundfish fisheries in Oregon are closed in depths greater than 40 fathoms from June through September to reduce canary rockfish catches. Washington and Oregon also have mechanisms in place to implement additional closed areas if the canary rockfish catches approach the harvest guideline for this species. California has implemented, and modified inseason, closed areas in their recreational management sub-areas.

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. This is the preferred habitat for canary rockfish. 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 canary rockfish (as well as some other overfished species) are not encountered. Vessels are allowed to use all gear configurations during any given cumulative limit period. However, vessels which use the small footrope configuration are restricted to lower cumulative trip limits than 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 40º 10' N lat. 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.

Size limits: No size limits are applicable to canary rockfish.

Bag limits: Oregon, Washington, and California have prohibited retention of canary rockfish as part of bag limits applied to recreational fisheries.

Fishery monitoring and bycatch estimation: All groundfish landings are monitored through a fish ticket 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. Washington, Oregon, and California have recreational fishery monitoring programs, which use dockside monitoring, surveys, and limited at-sea observation.

Likely Allocations Among Sectors in 2004

The Council did not directly allocate canary rockfish harvest opportunity among sectors in 2004, although management measures developed by the Council have the effect of distributing harvest opportunity among sectors. Management measures adopted by the Council for 2004 are predicted to result in a distribution of harvest opportunity. According to the 2004 harvest specifications FEIS (PFMC 2004), management measures

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.

are predicted to result in the limited entry non-whiting trawl sector catching 21% of the 2004 OY, limited entry fixed gear fisheries catching 1%, the whiting fishery catching 12%, open access fisheries catching 5%, tribal fisheries catching 8%, recreational fisheries catching 33%, research fisheries catching 2%, and EFP fisheries catching 9%. According to these projections, the remaining 10% of the OY was not predicted to be caught. Subsequent inseason estimates indicate that all of the canary rockfish OY will be taken in 2004. The increase in total catch is attributable to updated bycatch estimates for the limited entry fixed gear sector and unanticipated catches in the recreational sector.

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