DARKBLOTCHED ROCKFISH (*SEBASTES CRAMERI*) 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 2000 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 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 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 darkblotched 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

Darkblotched rockfish (*Sebastes crameri*) have a low potential productivity and a long mean generation time of 33 years. There is no evidence of genetic stock structuring in the darkblotched rockfish population. Rogers *et al.* (2000) observed this was consistent with the smooth cline in age, size, and relative abundance indices of the coastwide population with no obvious breaks within the species range. Larger fish are generally found in deeper water (>200 fm Nichol 1990). Lenarz (1993) reported evidence from the 1977 through 1992 NMFS triennial surveys of a higher proportion of larger fish in southern areas. The center of biomass distribution on the West Coast is off Oregon (Rogers, *et al.* 2000), which comports with the majority of landings in the Columbia INPFC area.

Darkblotched, like many *Sebastes* species, are long-lived, slow growing, and late to mature. Females grow faster than males and attain a larger mean size. The maximum reported age for darkblotched is 66 years.

The age at 50% maturity for males is estimated to be 5.1 years and 8.4 years for females (Nichol and Pikitch 1994). The estimated length at 50% maturity is 29.6 cm and 36.5 cm for males and females, respectively. Westrheim (1975) reported a smaller size at 50% maturity for darkblotched in Alaska and British Columbia waters than Nichol (1990) did for the stock off Oregon. Nichol and Pikitch (1994) report darkblotched fecundities ranging from 19,815 oocytes (565.0 g) for a 32.5 cm female to 489,064 oocytes (1,724.0 g) for a 47.0 cm female.

Darkblotched reproduce via internal fertilization and are viviparous (live-bearers). Spawning occurs from December through March off Oregon (Nichol and Pikitch 1994). Wourms (1991) describes one clear seasonal peak of spawning annually. Darkblotched larvae are planktonic and are distributed from Southern California to the Bering Sea (Matarese, *et al.* 1989). A long planktonic life stage would likely contribute to the apparent lack of genetic structuring in the West Coast population.

2.2 Current Stock Status and Management History

Darkblotched rockfish were managed as part of a coastwide *Sebastes* complex, which was later segregated into north and south management units divided at 40°30' N latitude. Darkblotched rockfish was first assessed in 1993 (Lenarz 1993). The estimated range of likely natural mortalities (M = 0.025-0.05) were based on a range of maximum ages (60 years to 105 years). Fishery selectivity was estimated from length compositions in the California fishery, which were converted to an age-based selectivity function. The relative fecundity per recruit was plotted as a function of fishing-related and natural mortality to estimate $F_{35\%}$ (the target MSY proxy harvest rate at that time) and $F_{20\%}$ (the overfishing harvest rate) relative to fecundity per recruit. The estimated the range of likely harvest rates (F) at the MSY target ($F_{35\%}$) was 0.04 to 0.06, and the overfishing harvest rate ($F_{20\%}$) ranged between 0.07 and 0.11. While Lenarz (1993) did not calculate an ABC for darkblotched, he did note the estimated MSY and overfishing harvest rates were lower than expected. He also noted a trend of decreasing size of darkblotched from the length composition data.

The next informative assessment for darkblotched addressed all West Coast *Sebastes* without individual ABCs (Rogers, *et al.* 1996). Two methodologies were explored for estimating an ABC for darkblotched,

(1) fishing-related mortality was assumed to equal natural mortality (F=M) to estimate an $F_{35\%}$ harvest rate, and (2) estimation of $F_{35\%}$ using a simple stock synthesis model. In the F=M approach, a proxy adjustment (Q) to triennial survey data was calculated to estimate relative biomass of generic *Sebastes*. It was determined that adjusting Q by 0.5 and then by M approximated $F_{35\%}$ estimates from stock synthesis models for most rockfish. A Q of 0.8 (instead of 0.5) was assumed for darkblotched, since the survey swept most of the depth range of darkblotched and caught smaller fish than the fishery. The other factors that influenced the magnitude of Q was a noted decreasing trend in estimated survey biomass over time, and the estimated size at 50% maturity was greater than estimated size at 50% selectivity (i.e., the survey caught darkblotched at sizes less than those estimated for most maturing and mature fish). The F=M method was compared to a stock synthesis modeling approach that incorporated triennial survey data and a POP bycatch effort index.

Rogers *et al.* (2000) assessed darkblotched stock status in 2000 and determined the stock was at 14% to 31% of its unfished level, depending on assumptions regarding the historic catch of darkblotched rockfish in the foreign fishery from 1965 through 1978. They incorporated five relative abundance indices in a length-based stock synthesis model (Methot 1990) to derive current estimates of abundance and productivity. The five indices included three NMFS surveys with different latitudinal and depth coverages, the POP effort index developed in the generic *Sebastes* assessment (Rogers*, et al.* 1996), and a logbook index derived from California trawl logbook and species composition data stratified by major California port (Ralston 1999). Major uncertainties in the assessment model included the uncertain foreign catch composition, which had a significant effect on estimated unfished biomass (B_0), and assumptions regarding maturity, discard rates, and unchanging selectivity over time. Of these, the foreign catch of darkblotched influences estimates of stock status the most; larger assumed historical catches increase estimates of B_0. Four accepted model runs varied the assumed foreign catch proportion from 0% to 20%, which resulted in significant differences in B_0 and the spawning index. Only one of those model runs (assuming 0% foreign catch of darkblotched) estimated the stock was not overfished. In all cases, the spawning biomass increased over the three-year time period with the reduced catch and the estimated very large 1994 year class reaching maturity. The Stock Assessment Review (STAR) Panel (PFMC 2000) and the GMT were unable to resolve the uncertainty in foreign catch composition. While the GMT thought it implausible that no darkblotched were caught in the foreign fishery, they could not offer a definitive recommendation. Therefore, the Stock Assessment Team's (STAT) assumption of 10% of foreign catch was composed of darkblotched (Rogers*, et al.* 2000) was accepted, leading to the conclusion that the spawning stock biomass was 22% of its unfished level.

The rebuilding analysis (Methot and Rogers 2001, Appendix A in the Amendment 16-2 FEIS) was recommended by the SSC and adopted by the Council in 2001. On the earlier recommendation of the SSC (June 2001 Council meeting), they incorporated results of the 2000 triennial slope trawl survey conducted by the Alaska Fishery Science Center and modeled a more recent time series of recruitments. Incorporating these data resulted in a downward revision in the estimated recruitment and abundance throughout the time series in the Rogers *et al.* (2000) assessment. The mean recruitment in 1983 through 1996 was estimated to be about 67% of earlier estimates. This led to a revised estimate of spawning stock biomass at the beginning of 2002 of 14% of its unfished level. The minimum time to rebuild (T_{MIN}) in the absence of fishing was estimated to be 14 years with a median rebuilding year of 2014. The maximum time to rebuild (T_{MAX}) in accordance with the National Standard Guidelines was 47 years (2047).

A new, expedited stock assessment update and rebuilding analysis (Rogers 2003) was completed in June 2003, after adoption of this rebuilding plan. Expedited assessments are designed to update previous assessment models with new catch, survey, and other input data. Expedited assessments are reviewed by the Groundfish Subcommittee of the SSC before being recommended to the Council for use in management.

The expedited assessment update and rebuilding analysis is discussed in the 2004 Rebuilding Plan Addendum.

2.3 Fisheries Affected by the Rebuilding Plan

Darkblotched rockfish occur on the outer continental shelf and continental slope, mainly north of Point Reyes. Because of this distribution they are caught exclusively by commercial vessels. Most landings have been made by bottom trawl vessels targeting flatfish on the continental shelf, rockfish on the continental slope, and the Dover sole–thornyhead–sablefish complex, also on the slope. Vessels in the Pacific whiting fishery, which use midwater trawl nets, catch relatively modest amounts of darkblotched rockfish. They are also caught in small amounts in fixed gear fisheries. Vessels participating in these fisheries are part of the Federal groundfish license limitation (limited entry) program.

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

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

Sector	Postseason Catch Estimates for 2002
Recreational[a/]	0.0
Fixed Gear Limited Entry	0.2
Directed Open Access	0.1
Other Commercial	0.8
Tribal	1.6
Research[b/]	0.1
Trawl (Shoreside)	76.2
Trawl (At Sea)	3.1
Total Postseason Catch Estimate[c/]	82.1
2002 Total Catch OY	168.0

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).

3.0 Methods Used to Calculate Stock Rebuilding Parameters

The rebuilding analysis (Methot and Rogers 2001, Appendix A 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 (Rogers, *et al.* 2000) and rebuilding analysis (Methot and Rogers 2001) and are as follows:

Year stock declared overfished:	2000
Year rebuilding plan adopted:	2003
B_0:	29,044 mt
B_{MSY}:	11,618 mt
T_{MIN}:	2014
T_{MAX}:	2047
P_{MAX}:	80%
T_{TARGET}:	2030
Harvest control rule:	F = 0.027

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 2002, darkblotched were taken in 20 primary target strategies north of Cape Mendocino and 11 strategies south of Cape Mendocino (see Table 2, data extracted from Table 4.4-9 in the Amendment 16-2 FEIS).

Table 2 ranks the strategies based on darkblotched landings. This table provides a sense of the magnitude of some of the choices the Council must make in implementing the rebuilding plan. North of Cape Mendocino, fishing strategies targeting arrowtooth flounder, petrale sole, DTS species, and flatfish by limited entry trawl vessels incurred the highest landings of darkblotched rockfish in 2002. South of Cape Mendocino the same strategies plus the slope rockfish strategy accounted for the bulk of darkblotched rockfish landings, but overall landing were lower than in the north.

TABLE 2. Catch and or landed catch of darkblotched rockfish in 2002 (From Table 4.4-9 in PFMC 2003.)

Primary Target for Trip	Trips with Primary Target	Landed (mt)	Landed or Estimated Catch[b/] (mt)
North of Cape Mendocino			
Limited Entry Trawl, Canary	1	0.000	0.000
Open Access, Shelf	381	0.002	0.002
Open Access, Nearshore	4,229	0.005	0.005
Other Groundfish (plurality, but <50%)	336	0.010	0.010
Limited Entry Trawl, Whiting	632	0.010	0.010
Open Access, Sablefish, Slope	216	0.014	0.014
Open Access, Slope	2	0.015	0.015
Limited Entry Trawl, Lingcod	8	0.034	0.034
Limited Entry Fixed Gear Sablefish, Shelf	105	0.044	0.044
Limited Entry Fixed Gear Sablefish, Slope	316	0.143	0.143
Limited Entry Trawl, Midwater (Yellowtail and Widow)	63	0.149	0.177
Other Species	3,880	0.205	0.205
Pink Shrimp	1,963	0.590	0.590
Open Access Trawl, Other, >50% Groundfish	135	1.485	1.485
Limited Entry Trawl, Slope Rockfish	19	1.500	1.500
Limited Entry Trawl, Left Over	158	0.129	2.509
Limited Entry Trawl, Arrowtooth	184	5.100	4.915
Limited Entry Trawl, Petrale Sole	229	9.880	18.324
Limited Entry Trawl, DTS	1,020	31.913	29.709
Limited Entry Trawl, Flatfish	1,275	15.364	82.652
Total All Northern Fisheries[a/]	43,556	66.591	142.343
South of Cape Mendocino			
Open Access Trawl, Other, >50% Groundfish	29	0.003	0.003
Open Access, Sablefish, Slope	281	0.003	0.003
Open Access, Slope	269	0.008	0.008
Open Access, Nearshore	3,838	0.011	0.011
Limited Entry Trawl, Left Over	3	0.000	0.058
Open Access, Shelf	928	0.059	0.059
Limited Entry Trawl, Chilipepper	54	0.177	0.177
Limited Entry Trawl, Petrale Sole	53	0.012	7.903
Limited Entry Trawl, Slope Rockfish	53	8.172	8.172
Limited Entry Trawl, Flatfish	369	0.309	12.232
Limited Entry Trawl, DTS	625	3.356	26.460
Total All Southern Fisheries[a/]	61,427	12.110	55.087

a/ Includes primary strategies not listed in the table.

b/ If incidental catch rate estimates for darkblotched rockfish are available for the primary target strategy they are used to compute total catch. (These estimates are only available for some trawl strategies.) The incidental catch rate is applied to documented landings of the target species for the target strategy to derive an estimate of the incidental catch of darkblotched rockfish for that strategy. If incidental catch rate estimates are not available, the landed catch amount is used. In some cases total catch estimates based on the incidental catch rate are lower than the actual landed catch. This results if the incidental catch rate estimate, which is based on historical data from several sources, is lower than the actual catch rate for 2002. In addition, the estimates for the limited entry trawl arrowtooth and petrale sole strategies do not include estimates for the months May to October.

2004 Addendum to the Darkblotched Rockfish Rebuilding Plan

As noted above, the Council adopted the darkblotched rockfish rebuilding plan in June 2003. Since that time additional information has become available on the status of the stock and a change has been made to the harvest control rule, a strategic rebuilding parameter. This addendum describes new information subsequent to rebuilding plan adoption and management measures currently used to constrain darkblotched rockfish fishing mortality to levels determined by the rebuilding plan.

Current Status of the Stock

An assessment and rebuilding analysis update for darkblotched rockfish (Rogers 2003) was completed in 2003, subsequent to development of the original rebuilding plan. It suggests that the stock has not changed significantly from the last assessment, but there is evidence of strong recent recruitment. These strong recruitments have not been validated by indices used in the assessment, resulting in the determination that the stock is at 11% of it unfished level ($B_{11\%}$). New information included in this update includes revised estimates of the darkblotched rockfish catch in foreign fisheries, new fishery length and age composition information, a new Triennial Survey data point, and new slope survey data. Unresolved data discrepancies between data sources in length and age composition limited the amount of new data used in this assessment update. Although the indices suggested improving stock status for darkblotched rockfish, the greatest uncertainty was associated with evidence of recent recruitment strength. The SSC STAR Lite Panel requested progressive inclusion of 1997-1999, 2000, and 2001 recruitment estimates (Ralston*, et al.* 2003). Risk of error progressively increased from including those recruitment estimates because they were based on increasingly limited data. Rebuilding results were sensitive to the high 2000 and 2001 recruitment estimates and including them allowed much greater 2004 OYs because those recruits enter the fishery and help rebuild the stock before the maximum allowable year.

Estimates of Rebuilding Parameter Values

Based on the stock assessment and rebuilding analysis update (Rogers 2003), estimates of rebuilding parameters have changed. The updated values are:

B_0:	30,775 mt
B_{MSY}:	12,310 mt
T_{MIN}:	2011
T_{MAX}:	2044
P_{MAX}:	>90%
T_{TARGET}:	2030 (unchanged)
Harvest control rule:	F = 0.032

The harvest control rule is a strategic rebuilding parameter published in Federal regulations. This change (from F = 0.027) was evaluated in the EIS for the specification of 2004 harvest levels and management measures (PFMC 2004) and implemented through full notice-and-comment rulemaking, as required by the Pacific Coast Groundfish FMP.

For 2004 the OY for darkblotched rockfish is 240 mt. Management measures described below are in place to constrain total fishing mortality to a level at or below OY.

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 darkblotched 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. However, darkblotched rockfish are not expected to trigger such a response in 2004 because projected total fishing mortality is about half the OY determined from this rebuilding plan.

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. In the case of darkblotched rockfish, the cumulative trip limits for minor slope rockfish north of Cape Mendocino, the species complex that darkblotched rockfish are managed under, and for splitnose rockfish, a co-occurring target species, have been reduced. Trip limits for other target species also may be adjusted to reduce darkblotched rockfish bycatch.

Seasons: No closed seasons have been established to limit darkblotched rockfish fishing mortality.

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. To limit darkblotched rockfish bycatch, the seaward boundary of the RCA was set to move fishing activity into deeper water, away from the depth range of higher abundance for this species. The seaward boundary is modified during winter months to allow targeting of petrale sole and other flatfish in shallower depths while still minimizing bycatch.

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 some overfished species. However, these measures have no direct effect on the incidental catch of darkblotched rockfish since they occur in deepwater, soft bottom habitats where large footrope gear is allowed. 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 rockfish while maintaining catch rates for target flatfish species. However, this net design has not proven effective for reducing darkblotched rockfish incidental catch rates.

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

Bag limits: These measures are used for recreational fisheries. Since darkblotched rockfish are not caught in recreational fisheries, bag limits are not applicable.

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.

Likely Allocations Among Sectors in 2004

The Council did not directly allocate darkblotched harvest opportunity among sectors in 2004, although management measures developed by the Council have the effect of distributing harvest opportunity among sectors. However, 2004 management measures adopted by the Council are predicted to result in a distribution of harvest opportunity. According to the 2004 harvest specifications FEIS (PFMC 2004), management measures are predicted to result in the limited entry non-whiting trawl sector catching 42% of the 2004 OY, limited entry fixed gear fisheries catching 1%, the whiting fishery catching 3%, research fisheries catching 1%, and EFP fisheries catching 5%. The remaining 48% of the OY would not be caught.

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.

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