

PACIFIC OCEAN PERCH (*SEBASTES ALUTUS*) 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. However, in January 2001, the Natural Resources Defense Council (NRDC), along with other conservation

^{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).

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 Pacific ocean perch 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

Pacific ocean perch (*Sebastes alutus*), or POP, have a low potential productivity and a very low population resilience with a minimum population doubling time of more than 14 years (Musick, *et al.* 2000). Genetic analyses suggest a significant mixing of the population across the species' range (Seeb and Gunderson 1988; Wishard, *et al.* 1980). This could be explained by a widespread dispersal of larvae and juveniles transported to deeper waters in a prolonged pelagic phase.

Adult POP make seasonal onshore migrations to feeding grounds in shallower water (180 m to 220 m) during June to August to allow gonads to ripen. They form large schools as much as 30 m wide, 80 m deep, and 1,300 m long. They then migrate offshore to spawn in deeper water (>275 m) in large spawning aggregations. Spawning occurs in September and October in Washington and British Columbia waters. POP are viviparous (bear live young), and eggs are internally fertilized. Young are born in January and February off Oregon (Hitz 1962) and one to three months later in the season in more northern waters (Westrheim 1970). Juveniles remain pelagic for two or three years before becoming demersal (Alverson and Westrheim 1959). Juvenile POP form ball-shaped schools near the surface or hide in rocks. POP migrate to deeper waters as they mature and attain adulthood on the continental slope.

POP larvae eat small zooplankton, small juveniles eat copepods, and larger juveniles feed on euphausiids. Adults eat euphausiids, shrimps, squids, and small fishes. Adults occurring shallower than 150 m feed during the day; those at greater depths move toward the surface to feed at dawn and dusk. Immature fish feed throughout the year, but adults feed only seasonally, mostly April through August. Predators of POP include sablefish (*Anoplopoma fimbria*), Pacific halibut (*Hippoglossus stenolepis*), sperm whale (*Physeter catodon*), and albacore tuna (*Thunnus alalunga*).

POP are slow growing, long-lived, and late to mature. Larvae are 5 mm to 8 mm SL (standard length) at birth, and the larval period lasts several weeks. Juveniles range up to 22 cm to 35 cm depending on sex and region. Growth is slower for males. Largest size is about 54 cm and 2 kg. Maximum age of POP has been revised upwards with recent advances in ageing techniques. Gunderson (1977) originally estimated a maximum age of 30 years for POP. However, estimated longevity using the break and burn technique of ageing otoliths indicate POP can live up to 98 years (Heifetz, *et al.* 2000). Estimated age at 50% maturity of POP is 10 years (Heifetz, *et al.* 1996). Relatively small numbers of young are produced during parturition with only about 300,000 for a female of 20 years of age (Frimodt 1995).

2.2 Current Stock Status and Management History

The first POP stock assessments were done after the heavy exploitation of the 1960s. Westrheim *et al.* (1972) assessed the POP population in the Columbia and Vancouver INPFC areas and determined the mean exploitable biomass from 1966 through 1968 was 34,000 mt. Catch rates declined about 55% for the Washington fleet during that period; the biomass was then estimated to be 18,700 mt during 1969 through 1971 (Technical Subcommittee 1972). Biomass was estimated to have declined another 11% during 1972 through 1974 based on a further decline in catch rates (Gunderson 1977). While the catch rate increased during 1975 through 1977 (Fraidenburg, *et al.* 1978), it was believed this was due to the advent of more efficient high rise nets. Biomass was estimated to be between 8,000 mt and 9,600 mt.

A rockfish survey conducted in 1977 (Gunderson and Sample 1980) was the first fishery-independent index of POP and the beginning of triennial surveys on the West Coast. POP biomass estimates were imprecise, prompting fishermen to ask for closer scrutiny of POP assessments. Therefore, in 1979 NMFS, Washington Department of Fisheries, and Oregon Department of Fish and Wildlife (ODFW) cooperated in a research survey of POP stocks off Washington and Oregon. Biomass estimates from those surveys were more precise than earlier estimates, and indicated stock sizes had not changed since 1977 (Wilkins and Golden 1983). Subsequent assessments (Ianelli, *et al.* 1992; Ianelli, *et al.* 1995) explored an age-structured statistical model (Methot 1990), laying the foundation for more recent assessment work.

Ianelli and Zimmerman (1998) estimated POP female spawning biomass in 1997 was 13% of its unfished level, confirming the stock was overfished. NMFS formally declared POP overfished in March 1999 after the groundfish FMP was amended to incorporate the tenets of the Sustainable Fisheries Act. The Council adopted, and NMFS enacted, more conservative management measures in 1999 as part of a redoubled rebuilding effort.

A new assessment for POP was completed in 2000, which suggested the stock was more productive than originally thought (Ianelli, *et al.* 2000). A revised POP rebuilding analysis was completed and adopted by the Council in 2001 (Punt and Ianelli 2001, Appendix B to the Amendment 16-2 FEIS). This analysis estimated a T_{MIN} of 12 years (2012) and a T_{MAX} of 42 years (2042). It was noted in the rebuilding analysis that a retrospective analysis of historic foreign fleet catches (Rogers 2003) is likely to reduce projections of POP rebuilding periods.

The West Coast POP stock was re-assessed in 2003. The review and Council adoption process for this assessment and rebuilding analysis was complete in June 2003 and was used to set POP specifications and management measures for 2004.

The results of this assessment are discussed in the 2004 Rebuilding Plan Addendum.

2.3 Fisheries Affected by the Rebuilding Plan

POP tend to occur in deep water, at similar depths as darkblotched rockfish, although they have a more northerly geographic distribution. As a result, POP are caught in similar fisheries as darkblotched rockfish, but only north of Cape Mendocino. At the time the rebuilding plan was adopted, limited entry trawl vessels targeting flatfish, including petrale sole and arrowtooth flounder, accounted for more than 90% of all POP landings. POP are not an important component of the recreational fishery.

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

TABLE 1. 2002 base landed catch by fishery for Pacific ocean perch (mt). (From Table 5.3-1a in PPMC 2003.)

Sector	Postseason Catch Estimates for 2002
Recreational ^{a/}	0.4
Fixed Gear Limited Entry	0.2
Directed Open Access	0.0
Other Commercial	0.1
Tribal	0.5
Research ^{b/}	0.3
Trawl (Shoreside)	145.9
Trawl (At Sea)	3.6
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Total Postseason Catch Estimate ^{c/}	151.0
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2002 Total Catch OY	350.0
1998 Total Catch OY ^{d/}	650.0

- 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).
- d/ 1998 OY is for landed catch in the Vancouver and Columbia INPFC areas. 2002 and 2003 OYs are total catch OYs for Vancouver, Columbia, and Eureka INPFC areas.

3.0 Methods Used to Calculate Stock Rebuilding Parameters

The rebuilding analysis (Punt and Ianelli 2001, Appendix B 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 (Ianelli, *et al.* 2000) and rebuilding analysis (Punt and Ianelli 2001) and are as follows:

- Year stock declared overfished: 1999
 - Year rebuilding plan adopted: 2003
 - B₀: 60,212 units of spawning output
 - B_{MSY}: 24,084 units of spawning output
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T_{MIN} : 2012

T_{MAX} : 2042

P_{MAX} : 70%

T_{TARGET} : 2027

Harvest control rule: $F = 0.0082$

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, POP were taken on trips with 33 different primary target strategies. There were no trips taking POP south of Cape Mendocino. All trips for each of these strategies taken together accounted for 65% of the 1998 exvessel value north of Cape Mendocino (see Table 2, data extracted from Table 4.4-10 in the Amendment 16-2 FEIS). For some of these strategies, POP were landed on a very small portion of the trips. For example, in 2002 north of Cape Mendocino, POP were landed on only one-tenth of one percent of the highly migratory species (HMS) trips and nine-tenths of one percent of the salmon trips (reported in Table 3.4-15 of the Amendment 16-2 FEIS). In 2002, POP were taken on trips with 16 different primary target strategies. All trips for each of these strategies taken together accounted for 39% of the 2002 north of Cape Mendocino exvessel value (Table 2). Two strategies that together accounted for 16% of the 1998 north of Cape Mendocino exvessel value were not on the 2002 list, HMS and salmon.

TABLE 2. Catch and/or landed catch of Pacific ocean perch in 1998 and 2002 north of Cape Mendocino. (From Table 4.4-10 in PFMC 2003.)

Primary Target for Trip	Trips with Primary Target	Landed (mt)	Landed or Estimated Catch ^{b/} (mt)
1998			
Limited Entry Fixed Gear Sablefish, No Strata	600	0.002	0.002
Pacific Halibut	214	0.010	0.010
Other Species	1,428	0.014	0.014
Open Access, Nearshore	2,201	0.014	0.014
Open Access, Sablefish, Slope	109	0.014	0.014
Open Access, Sablefish, Shelf	94	0.014	0.014
HMS Plan Species	1,533	0.030	0.030
Limited Entry Fixed Gear, Other Groundfish, Nearshore	215	0.037	0.037
Salmon	4,027	0.156	0.156
Limited Entry Fixed Gear Sablefish, Shelf	182	0.271	0.271
Open Access, Slope	11	0.307	0.307
Limited Entry Fixed Gear, Other Groundfish, Slope	7	0.482	0.482
Other Groundfish (plurality but <50%)	179	0.626	0.626
Limited Entry Trawl, Midwater (Yellowtail and Widow)	255	50.083	0.852
Other Crustaceans	2,060	0.951	0.951
Groundfish/Shrimp Combinations	11	1.031	1.031
Limited Entry Fixed Gear Sablefish, Slope	436	1.050	1.050
Open Access, Shelf	1,265	2.015	2.015
Limited Entry Fixed Gear, Other Groundfish, Shelf	313	2.948	2.948
Pink Shrimp	1,105	5.833	5.833
Limited Entry Trawl, Canary	35	6.909	6.909
Limited Entry Trawl, Left Over	106	13.908	7.071
Open Access Trawl, Other, >50% Groundfish	43	8.932	8.932
Limited Entry Trawl, Petrale Sole	115	15.882	10.093
Limited Entry Trawl, Yellowtail	93	18.522	18.522
Limited Entry Trawl, Whiting	1,326	33.367	33.367
Limited Entry Trawl, Pacific Ocean Perch	14	50.950	50.950
Limited Entry Trawl, Flatfish	957	124.164	72.589
Limited Entry Trawl, DTS	1,627	241.894	76.556
Limited Entry Trawl, Widow	144	77.259	77.259
Limited Entry Trawl, Other Rockfish	165	110.025	110.025
Limited Entry Trawl, Arrowtooth	257	219.747	190.743
Limited Entry Trawl, Slope Rockfish	212	252.107	252.107
Total All Northern Fisheries ^{a/}	37,630	1,240	931.779

Primary Target for Trip	Trips with Primary Target	Landed (mt)	Landed or Estimated Catch ^{b/} (mt)
2002			
Limited Entry Trawl, Yellowtail	10	0.001	0.001
Limited Entry Trawl, Canary	1	0.004	0.004
Pacific Halibut	379	0.006	0.006
Open Access, Nearshore	4,229	0.012	0.012
Other Species	3,880	0.019	0.019
Limited Entry Fixed Gear Sablefish, Shelf	105	0.021	0.021
Pink Shrimp	1,963	0.032	0.032
Limited Entry Fixed Gear Sablefish, Slope	316	0.186	0.186
Open Access Trawl, Other, >50% Groundfish	135	0.214	0.214
Limited Entry Trawl, Whiting	632	0.221	0.221
Limited Entry Trawl, Slope Rockfish	19	3.365	3.365
Limited Entry Trawl, Leftover	158	0.518	3.802
Limited Entry Trawl, Petrale Sole	229	8.077	14.435
Limited Entry Trawl, DTS	1,020	60.566	37.779
Limited Entry Trawl, Arrowtooth	184	43.282	39.727
Limited Entry Trawl, Flatfish	1,275	29.703	81.958
Total All Northern Fisheries ^{a/}	43,556	146	181.783

a/ Includes primary strategies not listed in the table.

b/ If incidental catch rate estimates for Pacific ocean perch 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 Pacific ocean perch 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 1998 and 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 Pacific Ocean Perch Rebuilding Plan

As noted above, the Council adopted the Pacific ocean perch 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 POP fishing mortality to levels determined by the rebuilding plan.

Current Status of the Stock

The new 2003 assessment for POP (Punt, *et al.* 2003) incorporates updated survey and fishery data, including the retrospective of foreign fleet catches (Rogers 2003). The assessment region covers areas from southern Oregon to the U.S. border with Canada, the southern extent of POP distribution. The overall conclusion is that the stock is relatively stable at approximately 28% of its unfished biomass ($B_{28\%}$). Many cases were presented in the rebuilding analysis (Punt, *et al.* 2003) and, based on SSC advice, the Council chose the one based on the full Bayesian posterior distribution where recruits were resampled to project future recruitment (Case C). Using the full Bayesian posterior distribution captured more of the assessment model uncertainty than using the maximum of the posterior density function. Resampling recruits rather than recruits per spawner was recommended because only the southern fringe of the stock occurs in waters off the U.S. West Coast. One would want to resample recruits per spawner if measured recruitment is a function of measured stock size. However, it is unlikely that the recruitment measured off the U.S. West Coast is wholly from the portion of the parental stock occurring in these same waters. Therefore, resampling recruits was advised.

Estimates of Rebuilding Parameter Values

Based on the 2003 assessment for POP (Punt, *et al.* 2003) and rebuilding analysis (Punt, *et al.* 2003), estimates of rebuilding parameters have changed. The updated values are:

B_0 :	37,230 units of spawning output
B_{MSY} :	14,892 units of spawning output
T_{MIN} :	2011
T_{MAX} :	2042 (unchanged)
P_{MAX} :	>70%
T_{TARGET} :	2027 (unchanged)

Harvest control rule: $F = 0.0257$

The harvest control rule is a strategic rebuilding parameter published in Federal regulations. This change (from $F = 0.0082$) 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 POP is 444 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 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 POP 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, POP 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. As in past years, cumulative trip limits, which vary by regulatory sector, have been set for 2004 established for POP. Trip limits for overfished species are intended to discourage targeting on them while permitting any incidental catch to be landed. (Bycatch discarded at sea is more difficult to monitor.) Trip limits for target species also may be adjusted in order to minimize bycatch of overfished species.

Seasons: No closed seasons have been established to limit POP 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. As with darkblotched rockfish, 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 the 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 POP 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.

Size limits: No size limits are applicable to POP.

Bag limits: These measures are used for recreational fisheries. POP are rarely caught in recreational fisheries. Washington, Oregon and California have established bag limits for groundfish and/or rockfish, which would apply to any recreational POP catches.

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 POP 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 are predicted to result in the limited entry non-whiting trawl sector catching 15% of the 2004 OY, limited entry fixed gear fisheries catching less than 1%, the whiting fishery catching 3%, research fisheries catching 1%, and EFP fisheries catching 8%. The remaining 73% 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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