

Appendix E. FMP Amendment Language

4.5.4 Summary of Rebuilding Plan Contents

As noted in Section 4.5.3.3, this section summarizes the contents of rebuilding plans, including the values for rebuilding parameters, at the time of their adoption. The specified numerical values for these parameters are likely to change over time. This section will not be amended to incorporate any revised values. As described in Section 4.5.3.4, if the numerical specification of the harvest control rule or target year for a given overfished species is changed the new value will be published in federal groundfish regulations. In addition, subsequent SAFE documents may include updated values for the parameters listed in Section 4.5.3.3 and Table 4-1.

4.5.4.1 Darkblotched Rockfish

Status of the Darkblotched Stock and Fisheries Affected by Stock Rebuilding Measures at the Time of Rebuilding Plan Adoption

Historically, 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. As a result, fishery-dependent data from this period are generally unavailable. The first darkblotched rockfish stock assessment estimated the proxy MSY harvest rate and overfishing rate for the stock (Lenarz 1993).

Rogers *et al.* (2000) assessed darkblotched stock status in 2000 and determined the stock was at 14% to 31% of its unfished level. This range in biomass estimates encompasses the MSST threshold of 25%; uncertainty in past catches by foreign vessels, which targeted Pacific ocean perch and also caught darkblotched rockfish, was the most important contributor to this wide range for the biomass estimate. A larger unfished biomass (B_0) is computed using larger historic catch estimates. Since the MSST is expressed as a percent of unfished biomass, a larger B_0 increases the absolute value of this threshold, making an overfished determination more likely. Without definitive information on foreign catches, managers assumed darkblotched comprised 10% of this catch, leading to the conclusion that the spawning stock biomass was 22% of its unfished level. Because this is below the MSST, the stock was declared overfished in 2000.

The Council adopted a rebuilding plan for darkblotched rockfish at its June 2003 meeting, as described by the parameter values listed in Table 4-1. These values are based on a rebuilding analysis conducted by Methot and Rogers (2001).

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.

Methods Used to Calculate Stock Rebuilding Parameters

The methods used by Methot and Rogers in their rebuilding analysis do not differ substantially from the approach described in Section 4.5.2.

Rebuilding Parameter Values at the Time of Rebuilding Plan Adoption

Table 4-1 lists the numerical values for B_0 , B_{MSY} , T_{MIN} , T_{MAX} , P_{MAX} , T_{TARGET} and F . The values of B_0 , B_{MSY} , T_{MIN} , and T_{MAX} are derived from the rebuilding analysis used in formulating the rebuilding plan (Methot and Rogers 2001). The Council chose a value of 80% for P_{MAX} , based on a harvest control rule of $F = 0.027$. This results in a target year of 2030.

Darkblotched Rockfish Rebuilding Strategy

As shown in Table 4-1, at the inception of the rebuilding plan the harvest control rule for darkblotched rockfish was a fishing mortality rate of 0.027. Based on the 2001 rebuilding analysis, this harvest rate is likely to rebuild the stock by the target year of 2030. This value is likely to change over time as stock size and structure changes. Any updated

value will be published in federal groundfish regulations. The fishing mortality rate is applied to the exploitable biomass estimate to determine the OY for a given fishing period.

Management measures are implemented through the biennial harvest specification and management process described in Chapter 5. The types of management measures that may be implemented through this process are described in Chapter 6. In 2003, at the time of rebuilding plan adoption, measures intended to limit bycatch of overfished species included prohibiting retention of certain overfished species during some parts of the year, reducing landing limits (cumulative trip limits) on co-occurring species, establishing extensive time/area closures, and restricting 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.)

Beginning in 2002 time/area closures, referred to as Groundfish Conservation Areas (GCAs), came into use as a way of decreasing bycatch of overfished species. GCAs enclose 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. 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, an outer boundary of the GCA was set to move fishing activity into deeper water, away from the depth range of higher abundance for this species. In 2003 this outer boundary was modified during the winter months to allow targeting of petrale sole and other flatfish in shallower depths while still minimizing bycatch. 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, were also lowered. Trip limits for other target species also may be adjusted to reduce darkblotched rockfish bycatch.

4.5.4.2 Pacific Ocean Perch

Status of the Pacific Ocean Perch Stock and Fisheries Affected by Stock Rebuilding Measures at the Time of Rebuilding Plan Adoption

Pacific Ocean Perch (POP) were targeted by Soviet and Japanese factory trawlers between 1965 and 1975. Their large catches during this period substantially contributed to a decline in the West Coast stock. In 1981, just before this FMP was implemented, the Council declared the POP stock depleted and recommended conservative harvest policies. Although management measures discouraged targeting POP while allowing continued fishing on other species, the stock did not recover and the Council recommended still more restrictive measures. A 1998 stock assessment (Ianelli and Zimmerman 1998) estimated POP biomass was 13% of the unfished level, leading NMFS to declare the stock overfished in 1999.

The Council adopted a rebuilding plan for POP at its June 2003 meeting, as described by the parameter values listed in Table 4-1. These values are based on a 2000 stock assessment (Ianelli *et al.* 2000) and subsequent rebuilding analysis (Punt and Ianelli 2001). A retrospective analysis of foreign fleet catches, underway at the time of rebuilding plan adoption, may change the rebuilding period estimates on which the rebuilding plan is based.

POP tend to occur 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.

Methods Used to Calculate Stock Rebuilding Parameters

The methods used in the rebuilding analysis used to develop the rebuilding plan (Punt and Ianelli 2001) do not differ substantially from the approach described in Section 4.5.2.

Rebuilding Parameter Values at the Time of Rebuilding Plan Adoption

Table 4-1 lists the numerical values for B_0 , B_{MSY} , T_{MIN} , T_{MAX} , P_{MAX} , T_{TARGET} and F . The values of B_0 , B_{MSY} , T_{MIN} , and T_{MAX} are derived from the rebuilding analysis used in formulating the rebuilding plan (Punt and Ianelli 2001). The Council chose a value of 70% for P_{MAX} , based on a harvest control rule of $F = 0.0082$. This results in a target year of 2027.

Pacific Ocean Perch Rebuilding Strategy

As shown in Table 4-1, at the inception of the rebuilding plan the harvest control rule for POP was a fishing mortality rate of 0.0082. Based on the 2001 POP rebuilding analysis (Punt and Ianelli 2001), this harvest rate is likely to rebuild the stock by the target year of 2027. This value is likely to change over time as stock size and structure changes. Any updated value will be published in federal groundfish regulations. The fishing mortality rate is applied to the exploitable biomass estimate to determine the OY for a given fishing period.

Management measures are implemented through the biennial harvest specification and management process described in Chapter 5. The types of management measures that may be implemented through this process are described in Chapter 6. In 2003, at the time of rebuilding plan adoption, measures intended to limit bycatch of overfished species included prohibiting retention of certain overfished species during some parts of the year, reducing landing limits (cumulative trip limits) on co-occurring species, establishing extensive time/area closures, and restricting 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.)

Beginning in 2002 time/area closures, referred to as Groundfish Conservation Areas (GCAs), came into use as a way of decreasing bycatch of overfished species. GCAs enclose 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. 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.

Because POP tend to co-occur with darkblotched rockfish, management measures applicable to that species also serve to constrain catches of POP. These measures include configuring the outer boundary of the GCA so that vessels fish in deeper water, where POP are less abundant. A cumulative trip limit, which represents the maximum amount of an identified species or species group that may be landed within the cumulative limit period (in 2003, two months) is also established for this species. 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.) As with darkblotched rockfish, trip limits for target species also may be adjusted in order to minimize bycatch of overfished species.

4.5.4.3 Canary Rockfish

Status of the Canary Rockfish Stock and Fisheries Affected by Stock Rebuilding Measures at the Time of Rebuilding Plan Adoption

Canary rockfish exploitation began in the early 1940s when World War II increased demand for protein (Alverson *et al.* 1964; Browning 1980). Through this decade the trawl fishery expanded in Oregon and Washington, accounting for most of the canary rockfish catch; in California longlines were mainly used to target rockfish during this period. Other gear historically used to catch canary rockfish include hook-and-line (primarily vertical longline), shrimp trawls, and pots and traps. From 1966 until 1976 foreign trawlers were responsible for most of the harvest. After passage of the Magnuson Act in 1977 domestic vessels became the dominant harvesters of this species. In recent years canary rockfish have become an important recreational target north of Cape Mendocino.

Overfishing, or exceeding the MFMT, was detected by a 1994 stock assessments and subsequent update (Sampson 1996; Sampson and Stewart 1994). In both cases the harvest rate exceeded the $F_{20\%}$ threshold. In 1999 two age-based stock assessments showed that the stock was overfished in a northern area comprising the Columbia and U.S. Vancouver management zones (Crone *et al.* 1999) and in a southern area comprising Conception, Monterey, and Eureka management zones (Williams *et al.* 1999). Based on these assessments, the stock was declared 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. According to the analysis, rates of recovery are highly dependent on the level of recent recruitment, which could not be estimated with high certainty.

A subsequent assessment (Methot and Piner 2002b) treated the stock as a single coastwide unit (covering the area from the Monterey zone through the U.S. Vancouver zone). This differed from past assessments, where northern and southern areas were treated separately. The lack of older, mature females in surveys and other assessment indices was another consideration in this assessment. Older females may simply have a higher natural mortality rate, or survey and fishing gear may be less effective at catching them. If these fish are in fact un-sampled, productivity estimates should be higher because older, larger fish are more fecund. Methot and Piner (2002b) combined these two hypotheses in a single age-structured version of the SSC-endorsed stock synthesis assessment model (Methot 2000b). They estimated the 2002 abundance of canary rockfish coastwide was about 8% of B_0 .

The Canary rockfish rebuilding plan was adopted by the Council at its June 2003 meeting and is based on a 2002 rebuilding analysis (Methot and Piner 2002a). The 2002 rebuilding analysis updated the first rebuilding analysis for canary rockfish, completed in 2000, using information from the aforementioned stock assessment. The Council's rebuilding strategy, when combined with the results of this rebuilding analysis, required a substantial reduction in the OY for 2003. As a result, fisheries must be managed for canary rockfish bycatch, often limiting the amount of target species that may be harvested.

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.

Methods Used to Calculate Stock Rebuilding Parameters

The methods used in the rebuilding analysis used to develop the rebuilding plan (Methot and Piner 2002a) do not differ substantially from the approach described in Section 4.5.2.

Rebuilding Parameter Values at the Time of Rebuilding Plan Adoption

Table 4-1 lists the numerical values for B_0 , B_{MSY} , T_{MIN} , T_{MAX} , P_{MAX} , T_{TARGET} and F . The values of B_0 , B_{MSY} , T_{MIN} , and T_{MAX} are derived from the rebuilding analysis used in formulating the rebuilding plan (Methot and Piner 2002a). The Council chose a value of 60% for P_{MAX} , based on a harvest control rule of $F = 0.022$. This results in a target year of 2074.

Canary Rockfish Rebuilding Strategy

As shown in Table 4-1, at the inception of the rebuilding plan the harvest control rule for canary rockfish was a fishing mortality rate of 0.022. Based on the 2002 canary rockfish rebuilding analysis (Methot and Piner 2002a), this harvest rate is likely to rebuild the stock by the target year of 2074. This value is likely to change over time as stock size and structure changes. Any updated value will be published in federal groundfish regulations. The fishing mortality rate is applied to the exploitable biomass estimate to determine the OY for a given fishing period.

Management measures are implemented through the biennial harvest specification and management process described in Chapter 5. The types of management measures that may be implemented through this process are described in Chapter 6. In 2003, at the time of rebuilding plan adoption, measures intended to limit bycatch of overfished species included prohibiting retention of certain overfished species during some parts of the year, reducing landing limits (cumulative trip limits) on co-occurring species, establishing extensive time/area closures, and restricting 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.)

Beginning in 2002 time/area closures, referred to as Groundfish Conservation Areas (GCAs), came into use as a way of decreasing bycatch of overfished species. GCAs enclose 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. 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 management measures in use at the time of rebuilding plan adoption were intended to discourage fishing in these areas. Under the regulations in place during 2003, bottom trawling is prohibited in the GCA, which encompasses depth ranges where canary rockfish are most frequently caught. In addition, the aforementioned restrictions on the use of trawl nets equipped with large footropes discourage fishing in the rocky habitat preferred by this species. In areas shoreward of the GCA large footrope gear is prohibited, preventing trawlers from assessing rocky habitat in these shallower depths. In areas deeper than the GCA, 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 (currently two months). 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 outside of the GCA, these measures encourage fishing exclusively in deeper water to take advantage of the higher limits afforded this gear type.

Recreational fisheries are managed mainly through bag limits, size limits, and fishing seasons established for each West Coast state. Bag and size limits have been established for canary rockfish. In addition, managers have the option of closing areas to recreational fishing if needed to prevent the canary rockfish OY from being exceeded.

4.5.4.4 Lingcod

Status of the Lingcod Stock and Fisheries Affected by Stock Rebuilding Measures at the Time of Rebuilding Plan Adoption

A 1997 stock assessment concluded that the lingcod stock in the Columbia and Vancouver zones (including the Canadian portion of the Vancouver management zone) was less than 10% of B_0 , below the $B_{25\%}$ MSST (Jagiello *et al.* 1997). The Council responded by imposing substantial harvest reductions coastwide, reducing the harvest targets for the Eureka, Monterey, and Conception areas by the same percentage as in the north. In 1999, scientists assessed the southern portion of the stock and concluded the condition of the southern stock was similar to the northern stock, thus confirming the Council had taken appropriate action to reduce harvest coastwide (Adams *et al.* 1999). Based on these assessments, the lingcod stock was declared overfished in 1999.

Subsequently, Jagiello (2000) conducted a coastwide lingcod assessment, which showed substantial increase in stock size and suggested that the stock was younger and more productive than previously thought. A revised rebuilding analysis of coastwide lingcod (Jagiello and Hastie 2001) was adopted by the Council in September 2001. It confirmed the major conclusions of the 2000 assessment and rebuilding analysis, but slightly modified recruitment projections to stay on the rebuilding trajectory that reaches target biomass in 2009. The rebuilding plan adopted by the Council at its June 2003 meeting is based on this 2001 update of the original rebuilding analysis produced by the same author. Because the minimum time period within which lingcod could be rebuilt is less than 10 years, the maximum allowable rebuilding period (T_{MAX}) is 10 years. The Council chose a target year equal to T_{MAX} , with the stock expected to rebuild by 2009.

Lingcod are encountered in a diverse array of commercial fisheries. Historically, limited entry trawl and limited entry fixed gear vessels accounted for the majority of lingcod landings. The open access sector, comprising many different gear types and fishing strategies, also lands a significant amount coastwide in nearshore and continental shelf areas. Lingcod are an important species in recreational fisheries, which account for an increasing portion of overall lingcod mortality as commercial landings declined dramatically beginning in 1998. Although recreational lingcod catches are reported coastwide, most of the recreational catch occurs in Northern California and Oregon, with private boats making most of this catch.

Methods Used to Calculate Stock Rebuilding Parameters

The methods used in the rebuilding analysis used to develop the rebuilding plan (Jagiello and Hastie 2001) do not differ substantially from the approach described in Section 4.5.2.

Rebuilding Parameter Values at the Time of Rebuilding Plan Adoption

Table 4-1 lists the numerical values for B_0 , B_{MSY} , T_{MIN} , T_{MAX} , P_{MAX} , T_{TARGET} and F . The values of B_0 , B_{MSY} , T_{MIN} , and T_{MAX} are derived from the rebuilding analysis used in formulating the rebuilding plan (Jagiello and Hastie 2001). The Council chose a value of 60% for P_{MAX} , based on a harvest control rule of $F = 0.0531$ for the northern portion of the stock and $F = 0.061$ for the southern portion of the stock. This results in a target year of 2009.

Lingcod Rebuilding Strategy

As shown in Table 4-1, at the inception of the rebuilding plan the harvest control rule for canary rockfish was a fishing mortality rate of 0.0531 for the northern portion of the stock and 0.061 for the southern portion of the stock. Based on the 2001 lingcod rebuilding analysis {Jagiello, 2001 #274, this harvest rate is likely to rebuild the stock by the target year of 2009. This value is likely to change over time as stock size and structure changes. Any updated value will be published in federal groundfish regulations. The fishing mortality rate is applied to the exploitable biomass estimate to determine the OY for a given fishing period.

Management measures are implemented through the biennial harvest specification and management process described in Chapter 5. The types of management measures that may be implemented through this process are described in Chapter 6. In 2003, at the time of rebuilding plan adoption, measures intended to limit bycatch of overfished species included prohibiting retention of certain overfished species during some parts of the year, reducing landing limits (cumulative trip limits) on co-occurring species, establishing extensive time/area closures, and restricting 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.)

Beginning in 2002 time/area closures, referred to as Groundfish Conservation Areas (GCAs), came into use as a way of decreasing bycatch of overfished species. GCAs enclose 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. 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.

In addition to the more general measures described above, which are intended to reduce bycatch of all overfished species, lingcod landings by the limited entry fixed gear and open access sectors were prohibited during the winter months in 2003. Lingcod are more vulnerable in shallow depths (where vessels in these sectors are more likely to fish) during the winter because of their spawning behavior. For the same reason, retention of lingcod by recreational fishermen during winter months was prohibited in Washington and California during 2003. Recreational bag and size limits are also used to manage total lingcod fishing mortality.

TABLE 4-1: Specified rebuilding plan parameters at the time of plan adoption.

Species	Year Stock Declared Overfished	Year Rebuilding Plan Adopted	B_0	B_{MSY}	T_{MIN}	T_{MAX}	P_{MAX}	T_{TARGET}	Harvest Control Rule
Darkblotched Rockfish	2000	2003	29,044 mt	11,618 mt	2014	2047	80%	2030	$F = 0.027$
Pacific Ocean Perch	1999	2003	60,212 units of spawning output	24,084 units of spawning output	2012	2042	70%	2027	$F = 0.0082$
Canary Rockfish	2000	2003	31,550 mt	12,620 mt	2057	2076	60%	2074	$F = 0.022$
Lingcod	1999	2003	22,882 mt N; 20,971 mt S	9,153 mt N; 8,389 mt S	2007	2009	60%	2009	$F = 0.0531$ N; $F = 0.061$ S

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