did groundfish appear to be a relatively minor part of regional marine recreational effort.

### 3.4 Bycatch of overfished species among sectors

Two major classes of fishing gear are used in the limited entry fixed gear sector: traps and longlines. These gears have different rates of observed bycatch of the overfished species. Baited longlines, whether deployed horizontally on the bottom or deployed vertically in the water column, are much more effective at capturing rockfish, and therefore, more prone to incidentally catch overfished rockfish species than traps. Limited entry fixed gear fisheries have primarily targeted rockfish and sablefish on the shelf and slope. Groundfish landings for this sector are depicted in Tables 8 and 9. With no corresponding bycatch model for this fishery, discard in the fishery is not as well known nor understood as in the limited entry trawl fishery. The proportion of shelf rockfish species landed with fixed gear has increased in recent years. This has been especially true since the small footrope restrictions were imposed on the trawl fishery in 2000. Some shelf rockfish species, such as canary rockfish and yelloweye rockfish, have been a highly valued target for this sector of the fishery.

Directed open access fisheries that target groundfish use the same fixed gear types and fish in the same areas as the limited entry fixed gear sector. Rockfish are targeted species for this sector as well. The landings of overfished groundfish species in open access non-shrimp fisheries (Table 9) include landed catch from open access fisheries targeting groundfish and landings of incidentally-caught groundfish in incidental (non-shrimp) open access fisheries. The distribution of groundfish catch and bycatch in incidental open access fisheries is far less certain than in the other sectors (Table 10). In some cases, groundfish landings may have been an important supplement to the income generated while pursuing nongroundfish targets, while, in other cases, groundfish bycatch was truly incidental.

Most bocaccio harvest occurred in Southern California in recent years, although in 2000, Northern California had a slightly higher harvest than Southern California (Table 11). Canary rockfish are harvested primarily in Northern California and Oregon, with minor amounts in Southern California and Washington. Cowcod are encountered almost exclusively in Southern California. Widow rockfish are caught primarily in Northern California, and occasionally in Oregon but rarely in Southern California and Washington. Yelloweye rockfish are caught throughout Washington, Oregon, and Northern California, although most of the Northern California catch occurs north of Cape Mendocino. Yelloweye are caught rarely in Southern California. Lingcod is popular throughout the West Coast , but the majority of harvest occurs in Northern California and Oregon.

## 4 IMPACTS OF THE ALTERNATIVES

This chapter analyzes the impacts, or environmental consequences, of the alternatives. It is organized by resource with the impacts of each alternative appearing under the discussion of that resource. Table 15, below, provides a list of the alternatives and summarizes their impacts.

**TABLE 15.** Potential affects of the alternatives on key resources.

| | **Status Quo (no action)** ***0 sq. miles*** | **36° to Mexico Alternative** ***~465 sq. miles*** | **36° to 34°27' Alternative** ***~140 sq. miles*** | **34°27' to Mexico Alternative (preferred)** ***~325 sq. miles*** |
|---|---|---|---|---|
| ***Biological*** | | | | |
| **Bocaccio (≤20 mt OY)** | 0 mt (total: 19.5 mt) | 2.53 mt (total: 22.03 mt) | 0.31mt (total: 19.81 mt) | 2.22 mt (total: 21.71 mt) |
| **Canary (44 mt OY)** | 0 mt (total: 43.7 mt) | 0.64 mt (total: 44.34 mt) | 0.41 mt (total: 44.11 mt) | 0.23 mt (total: 43.93 mt) |
| **Lingcod (651 mt OY)** | 0 mt (total: 552.2 mt) | 10.1 mt (total: 562.3 mt) | 6.7 mt (total: 558.9 mt) | 3.4 mt (total: 555.6 mt) |
| **Cowcod (2.4 mt OY)** | 0 mt (total: 0.4 mt) | 0.3 mt * (total: 0.7 mt) | 0.2 mt * (total: 0.6 mt) | 0.1 mt (total: 0.5 mt) |
| **Yelloweye Rockfish (22 mt OY)** | 0 mt (total: 16.7 mt) | 1.1 mt * (total: 17.8 mt) | 1.1 mt * (total: 17.8 mt) | trace (total: ~16.7 mt) |
| **Widow Rockfish (832 mt OY)** | 0 mt (total: 269 mt) | 4.8 mt * (total: 273.8 mt) | 4.8 mt * (total: 273.8 mt) | trace (total: ~269 mt) |
| **Other Groundfish Species** | effects neutral | greatest take | least take | medium take |
| **Nongroundfish Species** | effects neutral | greatest groundfish retention | least groundfish retention | medium groundfish retention |
| **Protected Species** | effects neutral | greatest increase in protected species effects | least increase in protected species effects | medium increase in protected species effects |
| ***Habitat*** | effects neutral | greatest increase in habitat effects | least increase in habitat effects | medium increase in habitat effects |
| ***Socioeconomic*** | | | | |
| **Commercial & Recreational Groundfish Revenue** | effects neutral | greatest revenue gained | least revenue gained | medium revenue gained |
| **Nongroundfish Revenue** | effects neutral | greatest revenue gained | least revenue gained | medium revenue gained |

* Recreational catch by depth data not available for these species between 36° N. lat. and 34°27' N. lat. Recreational estimates for these species are estimated total catch during September through December for all depths, not just the 21-30 fm depth range. Therefore, the estimated mortality for these species for the "36° to Mexico" and "36° to 34°27' " Alternatives is high because it includes estimates from depths other than just 21-30 fm.

trace= <0.1 mt

There are direct, indirect and cumulative effects on the biological and socioeconomic environments as a result of the alternatives. Biological impacts might include localized depletion of a population or individuals at a particular life stage in that population, changes in prey availability or presence of predators. The biological impacts discussed in this chapter focus on the estimated harvest of overfished species as a result of the alternatives. This is measured in relation to the overall OY for the species. The socioeconomic impacts of the alternatives might include changes in revenue, changes in the fishing

behavior, shifts in fishing effort by area, etc. The socioeconomic impacts mentioned in this chapter are, for the most part, qualitative because of a lack of socioeconomic data specific to the area of ocean available for fishing. The socioeconomic impacts discussed in this EA focus on the square miles of ocean that would become available for groundfish fishing as a result of the alternatives. The assumption is made that more area open to fishing equals increased potential revenue. Table 16 below shows the area of ocean that would open to fishing as a result of the alternatives. The area around islands, shown at the bottom of Table 16, would be added to both the "36° to Mexico" Alternative and the "34°27' to Mexico" Alternative (preferred alternative) because they fall within the geographic area of those alternatives. Figures 1 through 4, at the end of this document, are GIS maps showing the 20 fm and 30 fm depth contours for the preferred alternative, "34°27' to Mexico" Alternative. These figures also show a series of numbered points which represent latitude and longitude coordinates used to approximate the depth contour.

**TABLE 16.** Planimetric Area Estimates between 20 fm and 30 fm depth contours. (M. Park, CDFG, unpublished data)

| N-S Extent | Square Meters | Square Kilometers | Square Miles |
|---|---|---|---|
| "36° to 34°27' " Alternative | 362,683,583 | 362.7 | 140.03 |
| "34°27' to Mexico" Alternative | 569,255,296 | 569.3 | 219.79 (325.50 w/islands) |
| "36° to Mexico" Alternative | 931,938,879 | 931.9 | 359.82 (465.53 w/islands) |
| | | | |
| Islands: | | | |
| Northern Channel Islands | 232,165,234 | 232.2 | 89.64 |
| Santa Catalina | 16,347,855 | 16.3 | 6.31 |
| San Clemente | 25,270,634 | 25.3 | 9.76 |

Area calculations made with X-Tools, an ArcView extension that can calculate areas (sq m ) polygon shapefiles.
Equations for conversion to square miles and square km obtained from http://www.unitconverter/
Area figures have not been rounded.

The data used to analyze the alternatives was compiled by CDFG as part of their proposal to the Council on a boundary line change for the recreational and commercial fixed gear sectors. At the June 2003 Council meeting, data was presented on estimated take of bocaccio and canary rockfish for the commercial and recreational sectors as a result of the alternatives. Since the June 2003 Council meeting, CDFG staff have also analyzed the estimated take of other overfished species, including cowcod, lingcod, yelloweye rockfish and widow rockfish. The data compiled by CDFG since the June Council meeting has not been reviewed by the Council and its advisory bodies.

To estimate impacts from a boundary line change between 20 fm and 30 fm, CDFG staff reviewed catch by depth data, seasonal distribution of catches and estimated total catch (T. Barnes and J. Curtis, CDFG, unpublished data). Catch by depth data was based on the most recent information available (2001 and 2002) from the Marine Recreational Fisheries Statistical Survey (MRFSS) for bocaccio and canary rockfish. MRFSS data has species-specific catch by depth data only for the recreational fishery. For the commercial fixed gear fishery, there is no historical catch by depth data for the gillnet fishery during the base years selected (1995-1999). Therefore, CDFG assumed that catch by depth data from the recreational fishery was a reasonable proxy for catch by depth for the commercial fixed gear fishery given that similar species are taken in these fisheries. CDFG looked at data from recreational fisheries during 1993-1999 to figure the seasonal distribution of catches, in order to get a larger sample size and reduce inter-annual variation. The base years used for the estimated total catch in the analysis were intended to represent recent years when shelf rockfish opportunities were not constrained by season closures or depth restrictions, thus giving a better representation of catch by depth in the absence of restrictions. The base years selected for the analysis differed for the commercial fixed gear and recreational fisheries. For the commercial fixed gear fishery, the base years selected for analysis were 1995-1999 for bocaccio and canary rockfish. For the recreational fishery, the base years selected were 1993-1999. Both base year

periods ended at 1999 because there have been more restrictions on the fishery in recent years (2000 to present), which may have skewed data about fishery distribution. The base years for the commercial fishery did not go earlier than 1995 because of a change in commercial landing receipts before 1995. The base years for the recreational fishery did not go earlier than 1993 because there were data gaps in the recreational information before 1993 and CDFG felt that using data earlier than 1993 was using data that was too far in the past to be representative. Table 17 shows the results of the CDFG analysis presented at the June 2003 Council meeting.

After the June 2003 Council meeting, CDFG compiled data on the estimated take of lingcod, cowcod, yelloweye rockfish, and widow rockfish in the commercial non-trawl and recreational fisheries (T. Barnes and J. Curtis, CDFG, unpublished data). For the commercial fishery, the same base years used to get the average commercial non-trawl catch for canary rockfish and bocaccio, 1995-1999, were used to gather data on these overfished species. These species and years were used because species-specific catch by depth data is available. The average of the percent of canary and bocaccio species caught between 20 fm and 30 fm was 11%. This 11% was then applied to the historical catch of each of the following species: lingcod, cowcod, yelloweye rockfish and widow rockfish. This number was then divided by 1/3 for each species to represent the estimated catch that may occur between 20 fm and 30 fm for the last 1/3 of the calendar year for which this action is proposed. For the recreational fishery, the data continues to be derived from MRFSS but uses more recent years. The base catch, depth analysis, and region analysis for lingcod, cowcod, yelloweye rockfish and widow rockfish all used data from 1999 and 2000, recent years when there were no major area closures in place. The wave analysis continued to use data from 1993 through 1999. Table 18 shows the results of the commercial and recreational data for these overfished species.

As part of an effort by the Council to track how management decisions affect estimated mortality of overfished groundfish species, the Council's GMT works through a "bycatch scorecard." The bycatch scorecard, first introduced in developing the 2003 specifications and management measures, tracks estimated fishing mortality from the commercial limited entry, commercial open access, and recreational sectors as well as mortality from research catch and exempted fishing permits. These categories are further broken down by gear type, target fishery or state, depending on the category. The bycatch scorecard is tallied in developing the annual management measures and is updated inseason as new estimates of mortality become available or management measures change. A copy of the bycatch scorecard as tallied at the June 2003 Council meeting after all inseason adjustments had been adopted (including estimates for bocaccio and canary rockfish only of moving the boundary line to 30 fm south of 34°27' N. lat. for commercial non-trawl and recreational fisheries during September through December) is included as Table 12. An additional supporting document presented at the June Council meeting is included as Table 13. The bycatch scorecard represents the best estimates of total catch and is an aid for management decisions. The scorecard estimates which sectors are taking which overfished species and roughly how much of those species.

## 4.1 Biological Impacts

### 4.1.1 Overfished Groundfish Species

The bycatch scorecard (Table 12), discussed in the introduction to Section 4 of this EA, along with commercial non-trawl and recreational data compiled by CDFG (Table 18) was used to analyze the biological impacts of overfished groundfish species. For the commercial non-trawl fishery, CDFG data on estimated mortality for each overfished species in the commercial non-trawl fishery discussed in this EA was added to the following rows in the bycatch scorecard: limited entry fixed gear, open access groundfish directed, open access California gillnet, and open access salmon troll. These rows represent categories of participants in the groundfish fishery that use non-trawl gear. All of these categories for the commercial

fishery are coastwide, except for the open access California gillnet category. Therefore, estimates of total mortality for overfished groundfish species taken from the bycatch scorecard are high because they include coastwide estimates for the commercial nontrawl fishery rather than estimates specific to the subject area of this analysis (southern California). Tribal commercial fixed gear fisheries were not included because they occur exclusively off Washington and are, therefore, not in the area of this proposed action. For the recreational fishery, CDFG data on estimated mortality for each overfished species in the recreational fishery discussed in this EA was added to the row in the bycatch scorecard titled "recreational groundfish CA (S)." This category for the recreational fishery includes estimates on total mortality of overfished groundfish species south of 40°10' N. lat. Because all alternatives in this EA affect areas south of 36° N. lat., estimates of total mortality of overfished groundfish from the bycatch scorecard for the recreational fishery will also be slightly high because they include estimates on total mortality south of 40°10' N. lat. rather than estimates specific to the subject area of this analysis (southern California). Data from CDFG estimating the total mortality of overfished species as a result of the proposed action are specific to the areas delineated in the alternatives. Thus, the first step in the analysis evaluated the direct effects from the commercial non-trawl and recreational fisheries of each alternative on overfished species.

The second, and final, step in the analysis of the direct effects of the alternatives on overfished groundfish species was to add estimates of total mortality from the CDFG data for commercial non-trawl and recreational fisheries (Table 18) to total estimated mortality from all categories listed at the bottom of the bycatch scorecard (Table 12). This number was then compared to the OY for 2003 to determine the overall impact of the alternatives on overfished groundfish stocks. [NOTE: The bycatch scorecard in Table 12, as tallied at the June 2003 Council meeting after all inseason adjustments had been adopted, includes estimates for the preferred alternative ("34°27' to Mexico" Alternative) for bocaccio and canary rockfish. For the analysis in this EA, estimates for the other alternatives for bocaccio and canary were back-calculated by removing the preferred alternative estimates from the scorecard for these species and then adding CDFG data for the appropriate alternative. ]

#### 4.1.1.1 Impacts on Bocaccio

While there is currently no target fishery for bocaccio, because of its broad distribution, bocaccio are still intercepted in the prosecution of fisheries targeting other species. The direct effect of the status quo alternative on estimated mortality of bocaccio in southern California, south of 40°10' N. lat., for 2003 is 5-6 mt (5.0 mt from southern CA recreational fisheries plus 1.0 mt from commercial fixed gear (limited entry and open access) fisheries south of 40°10' N. lat.). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 19.5 mt out of a $\leq$20 mt OY are estimated to have been taken. Thus, the estimated bocaccio take under the status quo alternative is <0.5 mt under the OY for 2003 and is, therefore, minimal.

The direct effect of the "36° to Mexico" alternative on estimated mortality of bocaccio in southern California, south of 40°10' N. lat., for 2003 is 6.34-8.53 mt (6.34 mt from southern CA recreational fisheries plus 2.19 mt from commercial fixed gear (limited entry and open access) fisheries south of 40°10' N. lat.). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 22.03 mt out of a $\leq$20 mt OY are estimated to be taken. Thus, the estimated bocaccio take under the "36° to Mexico" alternative is at least 2.03 mt over the OY for 2003. While managers generally try to implement management measures that remain within the OY for a species, especially an overfished species, new information on the stock status (discussed in Sections 1.4 and 3.1.1.1) will likely lead to a much higher bocaccio OY for 2004. Based on the new information, exceeding the 2003 OY by a few metric tons will have a minimal impact on bocaccio.

The direct effect of the "36° to 34°27' " alternative on estimated mortality of bocaccio in southern California, south of 40°10' N. lat., for 2003 is 5.07-6.31 mt (5.07 mt from southern CA recreational fisheries

plus 1.24 mt from commercial fixed gear (limited entry and open access) fisheries south of 40°10' N. lat.). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 19.81 mt out of a ≤20 mt OY are estimated to be taken. Thus, the estimated bocaccio take under the "36° to 34°27' " alternative is <0.19 mt under the OY for 2003 and is, therefore, minimal.

The direct effect of the "34°27' to Mexico" alternative (preferred alternative) on estimated mortality of bocaccio in southern California, south of 40°10' N. lat., for 2003 is 6.27-8.22 mt (6.27 mt from southern CA recreational fisheries plus 1.95 mt from commercial fixed gear (limited entry and open access) fisheries south of 40°10' N. lat.). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 21.72 mt out of a ≤20 mt OY are estimated to be taken. Thus, the estimated bocaccio take under the "34°27' to Mexico" alternative is at least 1.72 mt over the OY for 2003. While managers generally try to implement management measures that remain within the OY for a species, especially an overfished species, new information on the stock status (discussed in Sections 1.4 and 3.1.1.1) will likely lead to a much higher bocaccio OY for 2004. Based on the new information, exceeding the 2003 OY by a few metric tons will have a minimal impact on bocaccio.

As mentioned in Section 3.1.1.1, bocaccio are most prevalent in waters between 54 fm and 82 fm (Casillas *et al.* 1998). However, bocaccio do range into waters less than 20 fm, particularly large juveniles and adults, which are semi-demersal and are most often found in shallow coastal waters over rocky bottoms associated with algae (Sakuma and Ralston 1995). Young and adult bocaccio also occur around artificial structures, such as piers and oil platforms (MBC 1987). Thus, while the alternatives all remain within the OY or slightly above OY for this species, there are predicted to be impacts, particularly on large juveniles and adults, from allowing recreational and commercial fixed gear fishing in waters less than 30 fm. However, because the species is most prevalent in deeper waters (54 fm to 82 fm), these impacts are expected to be minimal because the impacts would occur outside of the range where bocaccio are most prevalent.

In addition to direct effects, there are likely indirect effects as well, including changes in predator/prey relationships. As mentioned in Section 3.1.1.1, adult bocaccio eat small fishes associated with kelp beds, including other species of rockfishes, and occasionally small amounts of shellfish (Sumida and Moser 1984). Bocaccio are eaten by sharks, salmon, other rockfishes, lingcod, albacore, sea lions, porpoises, and whales (MBC 1987). Bocaccio directly compete with chilipepper and widow rockfish, yellowtail, and shortbelly rockfishes for both food and habitat resources (Reilly *et al.* 1992). Predator/prey relationships, like the ecosystems on which they depend, are always in flux. Thus, any take of bocaccio from fishing activities, in addition to natural mortality, will change the balance of predator/prey relationships and the ecosystem functioning. The magnitude of change on predator and prey availability is difficult to determine. The indirect impacts, while predicted to be minimal, would vary from most to least impacts as follows: "36° to Mexico" alternative (most), "34°27' to Mexico" alternative (preferred alternative), "36° to 34°27' " alternative, and the status quo alternative (least). The differences between the alternatives driving the indirect impacts is related to the amount of area that would open up to commercial fixed gear and recreational fisheries. However, indirect impacts of all of the alternatives on bocaccio are predicted to be minimal because the impacts would occur outside of the range where bocaccio are most prevalent.

The cumulative effects of the biological and habitat impacts (see Section 4.2 for habitat impacts) of all of the alternatives, in addition to all of the management measures for groundfish in 2003 as discussed in the 2003 Specs EIS, and all past and foreseeable future actions, are predicted to have a minimal impact on bocaccio because of the limited area proposed to open to fishing and because the stock will continue to be managed to rebuild to sustainable population levels. While in the past, bocaccio has been subject to adverse impacts from fishing that have driven the stock to an overfished status, present and future actions are intended to rebuild the stock while relieving some economic pressure on the fishing industry.

4.1.1.2 Impacts on Canary Rockfish

While there is currently no target non-trawl fishery for canary rockfish, because of its overfished status, canary rockfish are still intercepted in the prosecution of fisheries targeting other species. The direct effect of the status quo alternative on estimated mortality of canary rockfish in southern California, south of 40°10' N. lat., for 2003 is 2.7-5.1 mt (2.7 mt from southern CA recreational fisheries plus 2.4 mt from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 43.7 mt out of a 44.0 mt OY are predicted to be taken. Thus, the predicted canary rockfish take is 0.3 mt under the OY for 2003 and is, therefore, minimal.

The direct effect of the "36° to Mexico" alternative on estimated mortality of canary rockfish in southern California, south of 40°10' N. lat., for 2003 is 3.01-5.74 mt (3.01 mt from southern CA recreational fisheries plus 2.73 mt from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 44.34 mt out of a 44.0 mt OY are predicted to be taken. Thus, the estimated canary rockfish take under the "36° to Mexico" alternative is 0.34 mt over the OY for 2003. Managers generally try to implement management measures that remain within the OY for a species, especially an overfished species. Without new information on the stock status, it is difficult to determine if this additional take of canary rockfish over the OY will be enough to have a substantial impact on the stock.

The direct effect of the "36° to 34°27' " alternative on estimated mortality of canary rockfish in southern California, south of 40°10' N. lat., for 2003 is 2.94-5.51 mt (2.94 mt from southern CA recreational fisheries plus 2.57 mt from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 44.11 mt out of a 44.0 mt OY are predicted to be taken. Thus, the estimated canary rockfish take under the "36° to 34°27' " alternative is 0.11 mt over the OY for 2003. Managers generally try to implement management measures that remain within the OY for a species, especially an overfished species. Without new information on the stock status, it is difficult to determine if this additional take of canary rockfish over the OY will be enough to have a substantial impact on the stock.

The direct effect of the "34°27' to Mexico" alternative (preferred alternative) on estimated mortality of canary rockfish in southern California, south of 40°10' N. lat., for 2003 is 2.77-5.33 mt (2.77 mt from southern CA recreational fisheries plus 2.56 mt from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 43.93 mt out of a 44.0 mt OY are predicted to be taken. Thus, the predicted canary rockfish take under the "34°27' to Mexico" alternative is 0.07 mt under the OY for 2003 and is, therefore, minimal.

As mentioned in Section 3.1.1.2, canary rockfish primarily inhabit waters 91 m to 183 m (50 fm to 100 fm) deep (Boehlert and Kappenman 1980). In general, canary rockfish inhabit shallow water when they are young, and deep water as adults (Mason 1995). Canary rockfish do range into waters less than 30 fm, particularly as juveniles. Thus, while remaining within the OY for this species, there are impacts (discussed below) from allowing recreational and commercial fixed gear fishing in waters less than 30 fm.

In addition to direct effects, there are likely indirect effects as well, including changes in predator/prey relationships. As mentioned in section 3.1.1.2, adult canary rockfish feed primarily on small fishes, as well as planktonic creatures, such as krill and euphausiids (Love 1991; Phillips 1964). Canary rockfish are eaten by salmon, other fishes, marine birds and mammals (Love *et al.* 2002). Canary rockfish are caught with yellowtail, yelloweye, bocaccio, and sharpchin rockfishes and lingcod (Love *et al.* 2002). Predator/prey relationships, like the ecosystem on which they depend, are always in flux. Thus, any take of canary rockfish from fishing activities, in addition to natural mortality, will change the balance of predator/prey relationships and the ecosystem functioning. The magnitude of change on predator and

prey availability is difficult to determine. The indirect impacts, while predicted to be minimal, would vary from most to least impacts as follows: “36° to Mexico” alternative (most), “34°27' to Mexico” alternative (preferred alternative), “36° to 34°27' “ alternative, and the status quo alternative (least). The differences between the alternatives driving the indirect impacts is related to the amount of area that would open up to commercial fixed gear and recreational fisheries. However, indirect impacts of all of the alternatives on canary rockfish are predicted to be minimal because the impacts would occur outside of the range where canary rockfish are most prevalent.

The cumulative effects of the biological and habitat impacts (see Section 4.2 for habitat impacts) of all of the alternatives, in addition to all of the management measures for groundfish in 2003 as discussed in the 2003 Specs EIS, and all past and foreseeable future actions, are predicted to have a minimal impact because of the limited area proposed to open to fishing and because the stock will continue to be managed to rebuild to sustainable population levels. While in the past, canary rockfish has been subject to adverse impacts from fishing that have driven the stock to an overfished status, present and future actions are intended to rebuild the stock while relieving some economic pressure on the fishing industry. Canary rockfish is managed within rebuilding parameters (Table 4) that ensure that the stock grows in size until it is at a sustainable biomass, or $B_{MSY}$.

#### 4.1.1.3 Impacts on Lingcod

For 2003, there is both a commercial and recreational fishery for lingcod. In the commercial fishery south of 40°10' N. lat., the limited entry fixed gear fisheries have a trip limit of 400 lb per month while the open access non-trawl fisheries have a trip limit of 300 lb per month during May through October. In the recreational fishery south of 40°10' N. lat., there is a bag limit of 2 lingcod per day with a gear restriction of 2 hooks and one line when fishing for lingcod during July through December. These fisheries are closed during the winter months to protect lingcod during a sensitive stage of their reproductive cycle when the males are guarding nests of eggs. Taking into account this information, the direct effect of the status quo alternative on estimated mortality of lingcod in southern California, south of 40°10' N. lat., for 2003 is 20-110.3 mt (20 mt from southern CA recreational fisheries plus 90.3 mt from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 552.2 mt out of a 651 mt OY are predicted to be taken. Thus, the predicted lingcod take is 98.8 mt under the OY for 2003 and is, therefore, minimal.

The direct effect of the “36° to Mexico” alternative on estimated mortality of lingcod in southern California, south of 40°10' N. lat., for 2003 is 28.9-120.4 mt (28.9 mt from southern CA recreational fisheries plus 91.5 mt from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 562.3 mt out of a 651 mt OY are predicted to be taken. Thus, the estimated lingcod take under the “36° to Mexico” alternative is 88.7 mt under the OY for 2003 and is, therefore, minimal.

The direct effect of the “36° to 34°27' ” alternative on estimated mortality of lingcod in southern California, south of 40°10' N. lat., for 2003 is 25.6-97 mt (25.6 mt from southern CA recreational fisheries plus 71.4 mt from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 558.9 mt out of a 651 mt OY are predicted to be taken. Thus, the estimated lingcod take under the “36° to 34°27' ” alternative is 92.1 mt under the OY for 2003 and is, therefore, minimal.

The direct effect of the “34°27' to Mexico” alternative (preferred alternative) on estimated mortality of lingcod in southern California, south of 40°10' N. lat., for 2003 is 23.3-93.7 mt (23.3 mt from southern CA recreational fisheries plus 70.4 mt from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries

that intercept groundfish on the West Coast, 555.6 mt out of a 651 mt OY are predicted to be taken. Thus, the predicted lingcod take under the "34°27' to Mexico" alternative is 95.4 mt under the OY for 2003 and is, therefore, minimal.

As mentioned in Section 3.1.1.3, adult lingcod prefer two main habitat types that occur within 30 fm: slopes of submerged banks 10 m to 70 m (5 fm to 38 fm) below the surface with seaweed, kelp, and eelgrass beds and channels with swift currents that flow around rocky reefs (Emmett *et al.* 1991; Giorgi and Congleton 1984; NOAA 1990; Shaw and Hassler 1989). In addition, adult lingcod are considered a relatively sedentary species, but there are reports of migrations of greater than 100 km by sexually immature fish (Jagielo 1990; Mathews and LaRiviere 1987; Matthews 1992; Smith *et al.* 1990). Mature females live in deeper water than males and move from deep water to shallow water in the winter to spawn (Forrester 1969; Hart 1988; Jagielo 1990; LaRiviere *et al.* 1980; Mathews and LaRiviere 1987; Matthews 1992; Smith *et al.* 1990). Mature males may live their whole lives associated with a single rock reef, possibly out of fidelity to a prime spawning or feeding area (Allen and Smith 1988; Shaw and Hassler 1989). Thus, while remaining within the OY for this species, there are impacts from allowing recreational and commercial fixed gear fishing in waters less than 30 fm.

In addition to direct effects, there are likely indirect effects as well, including changes in predator/prey relationships. As mentioned in section 3.1.1.3, lingcod are a visual predator, feeding primarily by day. Larvae are zooplanktivores (NOAA 1990). Small demersal juveniles prey upon copepods, shrimps, and other small crustaceans. Larger juveniles shift to clupeids and other small fishes (Emmett *et al.* 1991, NOAA 1990). Adults feed primarily on demersal fishes (including smaller lingcod), squids, octopi, and crabs (Hart 1988, Miller and Geibel 1973, Shaw and Hassler 1989). Lingcod eggs are eaten by gastropods, crabs, echinoderms, spiny dogfish, and cabezon. Juveniles and adults are eaten by marine mammals, sharks, and larger lingcod (Miller and Geibel 1973, NOAA 1990). Predator/prey relationships, like the ecosystem on which they depend, are always in flux. Thus, any take of lingcod from fishing activities, in addition to natural mortality, will change the balance of predator/prey relationships and the ecosystem functioning. The magnitude of change on predator and prey availability is difficult to determine. The indirect impacts, while predicted to be minimal, would vary from most to least impacts as follows: "36° to Mexico" alternative (most), "34°27' to Mexico" alternative (preferred alternative), "36° to 34°27' " alternative, and the status quo alternative (least). The differences between the alternatives driving the indirect impacts is related to the amount of area that would open up to commercial fixed gear and recreational fisheries. However, indirect impacts of all of the alternatives on lingcod are predicted to be minimal.

The cumulative effects of the biological and habitat impacts (see Section 4.2 for habitat impacts) of all of the alternatives, in addition to all of the management measures for groundfish in 2003 as discussed in the 2003 Specs EIS, and all past and foreseeable future actions, are predicted to have a minimal impact because of the limited area proposed to open to fishing and because the stock will continue to be managed to rebuild to sustainable population levels. While in the past, lingcod has been subject to adverse impacts from fishing that have driven the stock to an overfished status, present and future actions are intended to rebuild the stock while relieving some economic pressure on the fishing industry. Lingcod is managed within rebuilding parameters (Table 4) that ensure that the stock grows in size until it is at a sustainable biomass, or $B_{MSY}$.

#### 4.1.1.4 Impacts on Cowcod

While there is currently no target fishery for cowcod, because of its overfished status, cowcod are still intercepted in the prosecution of fisheries targeting other species. However, due to the sedentary nature of the species and Cowcod Conservation Areas closed to fishing where this species primarily occurs, interception of cowcod is reduced. The direct effect of the status quo alternative on estimated mortality of

cowcod in southern California, south of 40°10' N. lat., for 2003 is 0-0.1 mt (0 mt[1/] from southern CA recreational fisheries plus 0.1 mt from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 0.4 mt out of a 2.4 mt OY are predicted to be taken. Thus, the predicted cowcod take is 2 mt under the OY for 2003 and is, therefore, minimal.

The direct effect of the "36° to Mexico" alternative on estimated mortality of cowcod in southern California, south of 40°10' N. lat., for 2003 is 0.1-0.4 mt (0.1 mt[2/] from southern CA recreational fisheries plus 0.3 mt from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 0.7 mt out of a 2.4 mt OY are predicted to be taken. Thus, the estimated cowcod take under the "36° to Mexico" alternative is 1.7 mt under the OY for 2003 and is, therefore, minimal.

The direct effect of the "36° to 34°27' " alternative on estimated mortality of cowcod in southern California, south of 40°10' N. lat., for 2003 is 0.1-0.2 mt (0.1 mt[2/] from southern CA recreational fisheries plus 0.1 mt from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 0.6 mt out of a 2.4 mt OY are predicted to be taken. Thus, the estimated cowcod take under the "36° to 34°27' " alternative is 1.8 mt under the OY for 2003 and is, therefore, minimal.

The direct effect of the "34°27' to Mexico" alternative (preferred alternative) on estimated mortality of cowcod in southern California, south of 40°10' N. lat., for 2003 is 0-0.1 mt (0 mt from southern CA recreational fisheries plus 0.1 mt from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 0.5 mt out of a 2.4 mt OY are predicted to be taken. Thus, the predicted cowcod take under the "34°27' to Mexico" alternative is 1.9 mt under the OY for 2003 and is, therefore, minimal.

As mentioned in Section 3.1.1.4, cowcod range from 21 m to 366 m (11 fm to 200 fm) in depth (Miller and Lea 1972) and are considered to be parademersal (transitional between a midwater pelagic and benthic species). Adults are commonly found at depths of 180 m to 235 m (98 fm to 128 fm) and juveniles are most often found in 30 m to 149 m (16 fm to 81 fm) of water (Love *et al.* 1990). MacGregor (1986) found that larval cowcod are almost exclusively found in Southern California and may occur many miles offshore. Adult cowcod are generally solitary, but occasionally aggregate (Love *et al.* 1990). Although cowcod are generally not migratory; they may move, to some extent, to follow food (Love *et al.* 1991). Thus, while remaining within the OY for this species, there are impacts from allowing recreational and commercial fixed gear fishing in waters less than 30 fm.

In addition to direct effects, there are likely indirect effects as well, including changes in predator/prey relationships. As mentioned in section 3.1.1.4, juvenile cowcod eat shrimp and crabs, and adults eat fish, octopus, and squid (Allen 1982). Cowcod are undoubtedly preyed upon by animals higher up on the food chain, such as marine mammals and sharks. Predator/prey relationships, like the ecosystem on which they depend, are always in flux. Thus, any take of cowcod from fishing activities, in addition to natural mortality, will change the balance of predator/prey relationships and the ecosystem functioning. The

---

1/ The bycatch scorecard (Table 12) reports that recreational catch of cowcod is either trace amounts (<0.01 mt), not applicable, or not reported in available data sources.

2/ Recreational catch by depth data not available for this species between 36° N. lat. and 34°27' N. lat. Recreational estimates for this species are estimated for total catch during September through December for all depths, not just the 21-30 fm depth range. Therefore, the estimated mortality for this species for the "36° to Mexico" and "36° to 34°27' " Alternatives is high because it includes estimates from depths other than just 21-30 fm.

magnitude of change on predator and prey availability is difficult to determine. The indirect impacts, while predicted to be minimal, would vary from most to least impacts as follows: “36° to Mexico” alternative (most), “34°27' to Mexico” alternative (preferred alternative), “36° to 34°27' “ alternative, and the status quo alternative (least). The differences between the alternatives driving the indirect impacts is related to the amount of area that would open up to commercial fixed gear and recreational fisheries. However, indirect impacts of all of the alternatives on cowcod are predicted to be minimal because the Cowcod Conservation Areas remain closed to fishing to protect cowcod.

The cumulative effects of the biological and habitat impacts (see Section 4.2 for habitat impacts) of all of the alternatives, in addition to all of the management measures for groundfish in 2003 as discussed in the 2003 Specs EIS, and all past and foreseeable future actions, are predicted to have a minimal impact because of the limited area proposed to open to fishing and because the stock will continue to be managed to rebuild to sustainable population levels. While in the past, cowcod has been subject to adverse impacts from fishing that have driven the stock to an overfished status, present and future actions are intended to rebuild the stock while relieving some economic pressure on the fishing industry. Cowcod is managed within rebuilding parameters (Table 4) that ensure that the stock grows in size until it is at a sustainable biomass, or $B_{MSY}$.

#### 4.1.1.5 Impacts on Yelloweye Rockfish

While there is currently no target non-trawl fishery for yelloweye rockfish, because of its overfished status, yelloweye rockfish are still intercepted in the prosecution of fisheries targeting other species. The direct effect of the status quo alternative on estimated mortality of yelloweye rockfish in southern California, south of 40°10' N. lat., for 2003 is 0.4-2.1 mt (0.4 mt from southern CA recreational fisheries plus 1.7 mt from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 16.7 mt out of a 22 mt OY are predicted to be taken. Thus, the predicted yelloweye rockfish take is 5.3 mt under the OY for 2003 and is, therefore, minimal.

The direct effect of the “36° to Mexico” alternative on estimated mortality of yelloweye rockfish in southern California, south of 40°10' N. lat., for 2003 is 1-1.1 mt (1 mt[3/] from southern CA recreational fisheries plus 0.1 mt from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 17.8 mt out of a 22 mt OY are predicted to be taken. Thus, the estimated yelloweye rockfish take under the “36° to Mexico” alternative is 4.2 mt under the OY for 2003 and is, therefore, minimal.

The direct effect of the “36° to 34°27' ” alternative on estimated mortality of yelloweye rockfish in southern California, south of 40°10' N. lat., for 2003 is 1-1.1 mt (1 mt[3/] from southern CA recreational fisheries plus 0.1 mt from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 17.8 mt out of a 22 mt OY are predicted to be taken. Thus, the estimated yelloweye rockfish take under the “36° to 34°27' ” alternative is 4.2 mt under the OY for 2003 and is, therefore, minimal.

The direct effect of the “34°27' to Mexico” alternative (preferred alternative) on estimated mortality of

3/ Recreational catch by depth data not available for this species between 36° N. lat. and 34°27' N. lat. Recreational estimates for this species are estimated for total catch during September through December for all depths, not just the 21-30 fm depth range. Therefore, the estimated mortality for this species for the “36° to Mexico” and “36° to 34°27' “ Alternatives is high because it includes estimates from depths other than just 21-30 fm.

yelloweye rockfish in southern California, south of 40°10' N. lat., for 2003 is 0-0.01 mt (0 mt from southern CA recreational fisheries plus only trace amounts (<0.01 mt) from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, ~16.7 mt out of a 22 mt OY are predicted to be taken. Thus, the predicted yelloweye rockfish take under the "34°27' to Mexico" alternative is ~5.3 mt under the OY for 2003 and is, therefore, minimal.

As mentioned in Section 3.1.1.5, yelloweye rockfish occur in waters 25 m to 550 m (14 fm to 301 fm) deep with 95% of survey catches occurring from 50 m to 400 m (27 fm to 219 fm) (Allen and Smith 1988). Yelloweye rockfish are bottom dwelling, generally solitary, rocky reef fish, found either on or just over reefs (Eschmeyer *et al.* 1983; Love *et al.* 1991; O'Connell and Funk 1986). Boulder areas in deep water (>180 m or >98 fm) are the most densely populated habitat type, and juveniles prefer shallow-zone broken-rock habitat (O'Connell and Carlile 1993). While yelloweye rockfish primarily occur in waters deeper than 30 fm and the impacts from this action are predicted to remain within the OY for the species, there are impacts from allowing recreational and commercial fixed gear fishing in waters less than 30 fm.

In addition to direct effects, there are likely indirect effects as well, including changes in predator/prey relationships. As mentioned in section 3.1.1.5, yelloweye rockfish are a large predatory reef fish that usually feeds close to the bottom (Rosenthal *et al.* 1988). They have a widely varied diet, including fish, crabs, shrimps and snails, rockfish, cods, sand lances, and herring (Love *et al.* 1991). Yelloweye rockfish have been observed underwater capturing smaller rockfish with rapid bursts of speed and agility. Off Oregon the major food items of the yelloweye rockfish include cancroid crabs, cottids, righteye flounders, adult rockfishes, and pandalid shrimps (Steiner 1978). Predator/prey relationships, like the ecosystem on which they depend, are always in flux. Thus, any take of yelloweye rockfish from fishing activities, in addition to natural mortality, will change the balance of predator/prey relationships and the ecosystem functioning. The magnitude of change on predator and prey availability is difficult to determine. The indirect impacts, while predicted to be minimal, would vary from most to least impacts as follows: "36° to Mexico" alternative (most), "34°27' to Mexico" alternative (preferred alternative), "36° to 34°27' " alternative, and the status quo alternative (least). The differences between the alternatives driving the indirect impacts is related to the amount of area that would open up to commercial fixed gear and recreational fisheries. However, indirect impacts of all of the alternatives on yelloweye rockfish are predicted to be minimal because the impacts would occur outside of the range where yelloweye rockfish are most prevalent.

The cumulative effects of the biological and habitat impacts (see Section 4.2 for habitat impacts) of all of the alternatives, in addition to all of the management measures for groundfish in 2003 as discussed in the 2003 Specs EIS, and all past and foreseeable future actions, are predicted to have a minimal impact because of the limited area proposed to open to fishing and because the stock will continue to be managed to rebuild to sustainable population levels. While in the past, yelloweye rockfish has been subject to adverse impacts from fishing that have driven the stock to an overfished status, present and future actions are intended to rebuild the stock while relieving some economic pressure on the fishing industry. Yelloweye rockfish is managed within rebuilding parameters (Table 4) that ensure that the stock grows in size until it is at a sustainable biomass, or $B_{MSY}$.

#### 4.1.1.6 Impacts on Widow Rockfish

Although widow rockfish is an overfished species that co-occurs with bocaccio, these species are caught in the prosecution of different fisheries. Widow rockfish is a pelagic, shelf species and is primarily caught by trawl gear. For 2003, there is a commercial non-trawl and recreational fishery for widow rockfish. In the commercial fishery south of 40°10' N. lat., the limited entry fixed gear fisheries have a trip limit of 300 lb per month for minor shelf species including widow rockfish, while the open access non-trawl fisheries have trip limits of between 100 and 250 lb per month for minor shelf species including widow rockfish

during the rest of the year. For the recreational fishery, widow rockfish is included in the Rockfish, Cabezon, Greenling Complex (RCG Complex) south of 40°10' N. lat. which has a bag limit of 10 RCG Complex fish per day and a gear restriction of 2 hook and one line. The recreational fishery is open from July through December. Taking into account this information, the direct effect of the status quo alternative on estimated mortality of widow rockfish in southern California, south of 40°10' N. lat., for 2003 is 0 mt (0 mt from southern CA recreational fisheries plus 0 mt from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 269 mt out of a 832 mt OY are predicted to be taken. Thus, the predicted widow rockfish take is 563 mt under the OY for 2003 and is, therefore, minimal.

The direct effect of the "36° to Mexico" alternative on estimated mortality of widow rockfish in southern California, south of 40°10' N. lat., for 2003 is 1.6-4.8 mt (3.2 mt[4/] from southern CA recreational fisheries plus 1.6 mt from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 273.8 mt out of a 832 mt OY are predicted to be taken. Thus, the estimated widow rockfish take under the "36° to Mexico" alternative is 558.2 mt under the OY for 2003 and is, therefore, minimal.

The direct effect of the "36° to 34°27' " alternative on estimated mortality of widow rockfish in southern California, south of 40°10' N. lat., for 2003 is 1.6-4.8 mt (3.2 mt[4/] from southern CA recreational fisheries plus 1.6 mt from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, 273.8 mt out of a 832 mt OY are predicted to be taken. Thus, the estimated widow rockfish take under the "36° to 34°27' " alternative is 558.2 mt under the OY for 2003 and is, therefore, minimal.

The direct effect of the "34°27' to Mexico" alternative (preferred alternative) on estimated mortality of widow rockfish in southern California, south of 40°10' N. lat., for 2003 is 0-0.01 mt (0 mt from southern CA recreational fisheries plus only trace amounts (<0.01 mt) from commercial fixed gear (limited entry and open access) fisheries coastwide). Adding this estimated mortality into the estimated mortality for all other sectors and fisheries that intercept groundfish on the West Coast, ~269 mt out of a 832 mt OY are predicted to be taken. Thus, the predicted widow rockfish take under the "34°27' to Mexico" alternative is ~563 mt under the OY for 2003 and is, therefore, minimal.

As mentioned in Section 3.1.1.6, adult widow rockfish form dense, irregular, midwater and semi-demersal schools deeper than 100 m (55 fm) at night and disperse during the day (Eschmeyer *et al.* 1983, NOAA 1990, Wilkins 1986). All life stages are pelagic, but older juveniles and adults are often associated with the bottom (NOAA 1990). While widow rockfish are pelagic and primarily occur in waters deeper than 30 fm, there are impacts from allowing recreational and commercial fixed gear fishing in waters less than 30 fm.

In addition to direct effects, there are likely indirect effects as well, including changes in predator/prey relationships. As mentioned in section 3.1.1.6, widow rockfish are carnivorous. Adults feed on small pelagic crustaceans, midwater fishes (such as age-one or younger Pacific whiting), salps, caridean shrimp, and small squids (Adams 1987; NOAA 1990). During spring, the most important prey item is salps, during the fall fish are more important, and during the winter widow rockfish primarily eat sergestid

4/ Recreational catch by depth data not available for this species between 36° N. lat. and 34°27' N. lat. Recreational estimates for this species are estimated for total catch during September through December for all depths, not just the 21-30 fm depth range. Therefore, the estimated mortality for this species for the "36° to Mexico" and "36° to 34°27' " Alternatives is high because it includes estimates from depths other than just 21-30 fm.

shrimp (Adams 1987). Feeding is most intense in the spring after spawning (NOAA 1990). Pelagic juveniles are opportunistic feeders, and their prey consists of various life stages of calanoid copepods, and euphausiids (Reilly *et al.* 1992). Predator/prey relationships, like the ecosystem on which they depend, are always in flux. Thus, any take of widow rockfish from fishing activities, in addition to natural mortality, will change the balance of predator/prey relationships and the ecosystem functioning. The magnitude of change on predator and prey availability is difficult to determine. The indirect impacts, while predicted to be minimal, would vary from most to least impacts as follows: "36° to Mexico" alternative (most), "34°27' to Mexico" alternative (preferred alternative), "36° to 34°27' " alternative, and the status quo alternative (least). The differences between the alternatives driving the indirect impacts is related to the amount of area that would open up to commercial fixed gear and recreational fisheries. However, indirect impacts of all of the alternatives on widow rockfish are predicted to be minimal because the impacts would primarily occur outside of the range where widow rockfish are most prevalent.

The cumulative effects of the biological and habitat impacts (see Section 4.2 for habitat impacts) of all of the alternatives, in addition to all of the management measures for groundfish in 2003 as discussed in the 2003 Specs EIS, and all past and foreseeable future actions, are predicted to have a minimal impact because of the limited area proposed to open to fishing and because the stock will continue to be managed to rebuild to sustainable population levels. While in the past, widow rockfish has been subject to adverse impacts from fishing that have driven the stock to an overfished status, present and future actions are intended to rebuild the stock while relieving some economic pressure on the fishing industry. Widow rockfish is managed within rebuilding parameters (Table 5) that ensure that the stock grows in size until it is at a sustainable biomass, or $B_{MSY}$.

### 4.1.2 Impacts on Other Groundfish Species

The direct biological impacts on other groundfish species of all of the alternatives are predicted to be minimal and remain within the 2003 OY set for those species as a sustainable harvest level, and are minimal. Any indirect and cumulative impacts that might occur are also predicted to be minimal because other groundfish species will continue to be managed at sustainable levels and the various areas that might open to fishing opportunity are a minor part of the range that these species inhabit. For a more detailed description, see Sections 4.2.1.2 and 4.2.1.3 of the 2003 Specs EIS.

### 4.1.3 Impacts on Nongroundfish Fish Species

Nongroundfish fish species are minimally affected by direct, indirect, and cumulative changes in the groundfish fisheries resulting from any of the alternatives because take of these species is only incidental in groundfish fisheries and the area available to fishing for open access groundfish fishery participants targeting nongroundfish species only covers part of that range that these species inhabit. For a more detailed description of nongroundfish fisheries that incidentally take groundfish and on the species they target, see Section 4.2.2 of the 2003 Specs EIS.

### 4.1.4 Impacts on Protected Species

There is limited information documenting the interactions of groundfish fisheries and marine mammals, seabirds and sea turtles, but they are all potentially affected by many aspects of groundfish fisheries. The incidental take of marine mammals, defined as any serious injury or mortality resulting from commercial fishing operations, is reported to NMFS by vessel operators. In the West Coast groundfish fisheries, incidental take is infrequent and primarily occurs in trawl fisheries (Forney *et al.* 2000). Additional effects of groundfish fisheries on marine mammals are more difficult to quantify due to a lack of behavioral and ecological information about marine mammals. However, marine mammals may be indirectly affected by

increased noise in the oceans, change in prey availability, habitat changes due to fishing gear, vessel traffic in and around important habitat (i.e., areas used for foraging, breeding, raising offspring, or hauling-out), at-sea garbage dumping, and diesel or oil discharged into the water associated with commercial fisheries. Based on NMFS annual list of fisheries, the incidental take of marine mammals in the West Coast groundfish fisheries is predicted to minimally effect marine mammal stocks. All alternatives are predicted to have a minimal direct effect on either resident, transient, or ESA-listed marine mammal species because fixed gear and recreational fisheries have minimal to no take of marine mammals. Indirect effects are also predicted to have minimal effect on marine mammals because the magnitude of the proposed action is small compared to the affected marine mammal population and range.

Interactions between seabirds and fishing operations are wide-spread and have led to conservation concerns in many fisheries throughout the world. Abundant food in the form of offal (discarded fish and fish processing waste) and bait attract birds to fishing vessels. Of the gear used in the groundfish fisheries on the West Coast, seabirds are occasionally taken incidentally by trawl and pot gear, but they are most often taken by longline gear. Around longline vessels, seabirds forage for offal and bait that has fallen off hooks at or near the water's surface, and are attracted to baited hooks near the water's surface, during the setting of gear. If a bird becomes hooked while feeding on bait or offal, it can be dragged underwater and drowned. Of the incidental catch of seabirds by longline groundfish fisheries in Alaska, northern fulmars represented about 66% of the total estimated catch of all bird species, gulls contributed 18%, Laysan albatross 5%, and black-footed albatross about 4% (Stehn *et al.* 2001). Longline gear and fishing strategies in Alaska are similar to some, but not all, of those used in Washington, Oregon, and California (WOC) longline fisheries. Besides entanglement in fishing gear, seabirds may be indirectly affected by commercial fisheries in various ways. Change in prey availability may be linked to directed fishing and the discarding of fish and offal. Vessel traffic may affect seabirds when it occurs in and around important foraging and breeding habitat and increases the likelihood of bird storms. In addition, seabirds may be exposed to at-sea garbage dumping and the diesel and oil discharged into the water associated with commercial fisheries. All alternatives are predicted to have only minimal direct effects on seabird species, including any ESA-listed seabird species. While seabirds may be taken incidentally in longline and other hook and line fisheries in southern California, low harvest opportunities for groundfish are not predicted to draw new entrants into the fishery. Thus, the direct effects of the proposed action on seabirds of opening up additional area to harvest of groundfish with fixed gear should be approximately the same as the status quo alternative or slightly increased due to additional area open to fishing. Increased area open to fishing may increase the interactions with seabirds. Indirect effects are also predicted to have a minimal effect on seabirds because the magnitude of the proposed action is small compared to the affected seabird population and range.

Sea turtles are known to be taken incidentally by the California-based pelagic longline fleet and the California halibut gillnet fishery. Because of gear and fishing strategies differences between those fisheries and the groundfish fisheries, the predicted take of sea turtles by groundfish gear is minimal. In addition to being incidentally taken in fishing gear, turtles are vulnerable to collisions with vessels and can be killed or injured when struck, especially if struck with an engaged propeller. Entanglement in abandoned fishing gear can also cause death or injury to sea turtles by drowning or loss of a limb. The discard of garbage at sea can be harmful for sea turtles, because the ingestion of such garbage may choke or poison them. Sea turtles have ingested plastic bags, beverage six-pack rings, Styrofoam, and other items commonly found aboard fishing vessels. The accidental discharge of diesel and oil from fishing vessels may also put sea turtles at risk, as they are sensitive to chemical contaminates in the water. All alternatives are predicted to have a minimal direct effect on any sea turtle species, including any ESA-listed sea turtle species because commercial fixed gear and recreational gear used in groundfish fisheries have minimal to no take of sea turtles. Indirect effects are also predicted to have a minimal effect on sea turtles because the magnitude of the proposed action is small compared to the affected sea turtle population and range.

As the West Coast Groundfish Observer Program collects more information about the effects of the West

Coast groundfish fishery on marine mammals, seabirds and sea turtles, additional management measures may be taken to mitigate the effects of the fisheries on protected species, if necessary.

Cumulative impacts to protected species result from the combination of past, present and future direct and indirect impacts of management measures combined with the effects of other activities. A variety of human activities affect protected species and contribute to their listing under relevant laws. These effects include habitat loss and the direct effects of marine activities not related to fishing, such as vessel traffic and at-sea dumping and discharges. As with ecosystem and habitat impacts, cumulative effects cannot be distinguished among the alternatives except in relation to the intensity of direct and indirect impacts. In general, cumulative effects are predicted to vary from most to least impacts as follows: “36° to Mexico” alternative (most), “34°27' to Mexico” alternative (preferred alternative), “36° to 34°27' “ alternative, and the status quo alternative (least/effects neutral). The differences between the alternatives driving the cumulative effects is related to the amount of area that would open up to commercial fixed gear and recreational fisheries. However, because harvest opportunity is not increasing along with the additional area opening up, the cumulative effects are predicted to be minimal.

## 4.2 Impacts on Habitat

The impacts on habitat of the status quo alternative are described in the more detail in Section 4.1.1 of the 2003 Specs EIS. Summarizing from that EIS, the status quo alternative does have some effect on the environment and habitat, however, these effects are reduced from historic levels due to lower trip limits, depth based restrictions (closed areas), and seasonal closures on the groundfish fishery. The proposed action analyzed in this EA and the alternatives developed will also have some effect on the environment and habitat due to various sizes of increased area opening up to fishing between 20 and 30 fathoms in southern California. As shown in Table 16 at the beginning of Section 4, the “36° to Mexico” Alternative opens up the greatest area to groundfish fishing (~465 sq. miles), the “34°27' to Mexico” Alternative (preferred alternative) is next with ~325 sq. miles, followed by the “36° to 34°27' “ Alternative with 140 sq. miles, and finally the status quo alternative would not open any additional area up to fishing. Even with these various sizes of ocean opening to fishing, the direct, indirect and cumulative effects of all of the alternatives is still predicted to be minimal because these effects would still be reduced from historic levels (i.e., there are still large closed areas protecting ocean habitat from groundfish fishing) and because commercial fixed gear and recreational gear which are proposed to be used in the areas opening up generally do not cause extensive damage to habitat.

## 4.3 Socioeconomic Impacts

The distribution, low spawning biomass, and particularly low productivity of bocaccio has posed the largest constraints on fisheries south of 40°10' N. lat. (Cape Mendocino) in 2003. While the proposed action does not change the amount of fish that can be harvested (i.e., does not change trip limits, bag limits or OYs), it does propose to increase the areas that can be fished. The direct effects of the alternatives on the socioeconomic environment thus stem from the effects of opening up an additional 10 fm area to fishing in southern California. The assumption is made that more area available to fishing equals more revenue. Both the commercial and recreational sectors would benefit from all three alternatives except for status quo. The benefit, in qualitative terms, is from the increased area available to fishing. By increasing the area available to fishing, there is predicted to be less effort concentrated in the nearshore inside 20 fm. Reducing this effort concentration is predicted to slightly increase safety due to less competition for space. There is also predicted to be some economic relief on the commercial and recreational fleets by increasing the areas available to be fished. In addition, indirect effects on buyers and support businesses are predicted to benefit from the increased area, proportional to the benefits received by the commercial and recreational fleets. Among the alternatives, Table 16 at the beginning of Section 4, the “36° to Mexico” Alternative opens up the greatest area to groundfish fishing (~465 sq. miles), the “34°27' to Mexico”

Alternative (preferred alternative) is next with ~325 sq. miles, followed by the “36° to 34°27' “ Alternative with 140 sq. miles, and finally the status quo alternative would not open any additional area up to fishing.

The commercial non-trawl sector consists of both the limited entry and open access non-trawl fisheries. The majority of the limited entry non-trawl effort occurs north of 36° N. lat. and is tied with the primary sablefish fishery. The sablefish fishery is a high value fishery which occurs primarily off Washington and Oregon. Therefore, the alternatives are predicted to have a minimal socioeconomic impact on the limited entry non-trawl fisheries aside from some positive benefits of allowing additional area open to fishing. Open access non-trawl effort in southern California, on the other hand, is relatively high in proportion to open access effort along the coast. The number of vessels that participated in the open access fishery and made more than 5% of their revenue from groundfish landed into ports south of approximately 36° N. lat. (south of San Simeon, CA) is 234 out of 771 vessels coastwide (Washington, Oregon and California), or roughly 30% (Table 14). However, the alternatives are also predicted to have a minimal socioeconomic impact on the commercial open access non-trawl fleet because only a small area, between 140 and ~465 sq. miles, would open to fishing.

As shown in Tables 6 and 7, most of the recreational activity on the West Coast is in California, especially southern California. California has roughly 1.7 million out of the 2.5 million anglers on the West Coast participating in the recreational fishery (Table 6). In 2001, southern California has 577,000 out of 927,000 angler trips coastwide from charter boats and 1,757,000 out of 2,886,000 angler trips coastwide from private boats (Table 7). Of these angler trips, groundfish catch occurred on 35% of the charter trips (204,000 out of 577,000 trips) and 14% of the private trips (252,000 out of 1,757,000 trips). While there will be socioeconomic benefits from any of the alternatives under the proposed action, the alternatives are predicted to have a minimal socioeconomic impact on the recreational sector because only a small area, between 140 and ~465 sq. miles, would open to fishing.

For the nongroundfish fisheries, opening up an extra 10 fm of that area is predicted to benefit other nongroundfish fisheries, like salmon troll and California set gillnet fisheries. These fisheries will benefit from the increased area to retain incidental catch of groundfish. Species other than groundfish are not under the management authority of the Groundfish FMP and therefore not the focus of this EA.

In general, the direct, indirect and cumulative socioeconomic effects of the alternatives are predicted to vary from most to least negative effects among the alternatives in the following order: status quo alternative (most), “36° to 34°27' “ alternative, “34°27' to Mexico” alternative, and “36° to Mexico” alternative (least/effects neutral). The differences between the alternatives driving the effects is related to the amount of area that would open up to commercial fixed gear and recreational fisheries. However, because harvest opportunity is not increasing along with the additional area opening up, the effects are predicted to be minimal and, therefore, not significant.

## 4.4 Unavoidable Adverse Impacts (on all resources)

The proposed action represents a tradeoff between different adverse effects, balancing short-term resource and socioeconomic impacts against long-term sustainability of those resources. Thus, although a given adverse effect may be avoided, it may be at the expense of incurring some other effect. All of the alternatives would likely incur the following adverse effects even if mitigation measures are implemented.

The risk or likelihood that certain fish stocks will not recover or decline further: Rebuilding analyses model the probability of stock recovery for a given harvest policy. The Council follows a risk-averse policy in that harvest policies have a greater than 50% probability of recovery within the maximum specified time period ($T_{MAX}$). But this means there is some likelihood, albeit less than 50%, of stocks not recovering.

The risk that total fishing mortality could exceed the OY for one or more species: For species with low OYs, inaccurate total catch data, or data that is not available to managers in time, could result in total catch exceeding OYs. Managers would not have the necessary information in time to close fisheries or impose other management measures to prevent such an overage. This is especially a problem with recreational catch information.

The risk that OY values will be met early in the year: Even with the restrictive management measures developed for the 2003 season, there is some chance the harvest specification for one or more species may be met before the end of the fishing year. For critical overfished species, such as bocaccio, the OY values are so low relative to possible landings that fisheries may have to be closed. If a fishery is closed for most of the year, firms may go out of business, may not be able to find the necessary skilled labor when they eventually reopen, or for charter boat fisheries, may lose their clientele.

## 4.5 Relationship of Short-Term Uses and Long-Term Productivity (on all resources)

Short-term uses generally affect the present quality of life for the public, in contrast to long-term productivity, which affects the quality of life for future generations, based on environmental sustainability. The proposed action indirectly affects the sustainability of marine resources by allowing fishing in an area that was previously closed. However, while there is predicted to be additional take of groundfish associated with opening this area, the additional take of groundfish, including overfished species, is predicted to be within sustainable levels of harvest. This represents a tradeoff between short-term benefits, reflected in revenue generated from fishing in 2003, and long-term productivity of fish stocks, which determines the abundance of fish in the future, and thus future harvests. Managers must respond to changes in resource status, whether as a result of harvests or other environmental factors– this requires effective monitoring of total fishing mortality. A better understanding of the role environmental and ecological factors play in affecting stock productivity would also enhance managers' ability to predict future stock response to current harvest levels. The proposed action in this EA is tied to the annual groundfish management cycle. Annual management is based on the framework in the FMP, which dictates how harvest control rules and management measures should be set in order to produce sustainable harvests over the long term. While harvests in any one year affect long-term productivity, they are part of an ongoing activity, fishing over many years, that cumulatively affect productivity.

## 4.6 Irreversible and Irretrievable Commitments of Resources (on all resources)

An irreversible commitment represents some permanent loss of an environmental attribute or service. The use of non-renewable resources are irreversible; unsustainable renewable resource use may be irreversible if future production is permanently reduced or, at the extreme, is extinguished.

The use of non-renewable energy resources, such as fossil fuel, represents a pervasive irreversible commitment associated with the proposed action, because fishing vessels are mechanically powered.

The proposed action, however, does not by itself represent an irreversible commitment, because harvest levels are specified and management measures set on an annual basis and adjusted through inseason actions throughout the year. Cumulatively, past, current, and future specifications have resulted in an irreversible commitment if the time necessary for overfished stocks to recover is considered so long as to be irreversible.

A resource is irretrievably committed if its use is lost for time, but is not actually or practically lost permanently. The analysis of direct, indirect and cumulative impacts in Chapter 4 generally describes irretrievable resource commitments and in the case of renewable resources these parallel the tradeoff between short-term use and long-term productivity. All of the alternatives would allow fishing in an area

previously closed within the previously announced harvest specifications for 2003. The fish that are harvested in this area represent an irretrievable resource commitment, as do the inputs in terms of capital and labor (including energy and resources) needed to harvest and market these fish.

## 5 DETERMINATION OF A PREFERRED ALTERNATIVE

NMFS has chosen the "34°27' N. lat. to Mexico" alternative as the preferred alternative by examining which alternative would provide some economic relief to the commercial non-trawl and recreational fleets, with minimal impacts to overfished species prevalent in this area, namely bocaccio and canary rockfish. The agency has reviewed how additional harvest of overfished species would change depending on which alternative was selected (this analysis appears in Section 4.1). Because of the new science for bocaccio that indicates a modest increase in bocaccio harvest in 2003 should not interfere with stock rebuilding and because of the severe restrictions commercial non-trawl and recreational fisheries in southern California are experiencing, the Pacific Council recommended to NMFS to use the knowledge of the improved bocaccio forecast as a means to relieve restrictions on southern California fisheries without additional risk to the status of the stock. NMFS contemplated all of the alternatives for this EA. For bocaccio, there was not a large difference between the "34°27' N. lat. to Mexico" alternative and the "36° N. lat. to Mexico" alternative. While the "36° N. lat. to 34°27' N. lat." alternative has the least biological impact on bocaccio, the agency concurred with CDFG's preference to provide economic relief to commercial non-trawl and recreational fishers in the southern end of the area. Opening the area between 20 and 30 fm in the more southern end of the area would provide more relief because there are more fishery participants in that area. The agency then considered what has become the more constraining species, canary rockfish, since bocaccio abundance is projected to be higher than previously expected. Between the two alternatives, the "34°27' N. lat. to Mexico" alternative and the "36° N. lat. to Mexico" alternative, the predicted take of canary from the "36° N. lat. to Mexico" alternative is too high. Thus, the agency chose the "34°27' N. lat. to Mexico" alternative as the preferred alternative. The preferred alternative meets the purpose of and need for action by providing some economic relief to southern California fishermen while keeping harvest of groundfish stocks at sustainable levels.

The environmentally preferred alternative would be the status quo alternative. The status quo alternative is more environmentally conservative because it does not open up additional area to fishing. Thus, it is more likely to protect habitat and possibly minimize interception of overfished species, like bocaccio and canary rockfish.

## 6 FINDING OF NO SIGNIFICANT IMPACT

To determine the significance of the action analyzed in this EA, NMFS is required by NEPA, 40 CFR 1508.27 and NOAA Administrative Order 216-6 Section 6.02 to consider the context and intensity of the proposed action. Based on the EA, review of the National Environmental Policy Act (NEPA) criteria for significant effects, and my knowledge of the predicted impacts, I have determined that the actions to be implemented would not have a significant effect upon the quality of the human environment. Therefore, preparation of an EIS on the final action is not required under Section 102(2)(c) of the NEPA, its implementing regulations (40 CFR Part 1500-1508), or NOAA/NMFS environmental review procedures (NAO 216-6). This determination is based on the following factors from CEQ's implementing regulations at 1508.27 and from NAO 216-6 Section 6.02:

1) In reaching my conclusion of no significant impacts, I recognize that there are both beneficial and adverse impacts of this project as discussed in Section 4.0. However, none of the impacts associated with the proposed actions were significant.

2) The proposed action does not significantly affect public health or safety as discussed in