

GROUND FISH MANAGEMENT TEAM FINAL RECOMMENDATIONS FOR  
ACCEPTABLE BIOLOGICAL CATCH AND OPTIMUM YIELD LEVELS IN 2001

**ROUND FISH**

**Pacific Whiting** - An update of the previous Pacific whiting assessment is expected by November 2000. The Council has said, if the preliminary results are similar (within about 10%), the current acceptable biological catch (ABC) and optimum yield (OY) values (232,000 mt, U.S. only) will be carried over to 2001. If the results are different, the Council will delay its decision on the final 2001 ABC and OY until the March 2001 meeting.

The 1999 whiting assessment incorporated data from the 1998 whiting surveys. Prior to 1999, ABC specifications for whiting were based on a "Hybrid-F" harvest policy. This approach and the "40-10" default OY reduce yields when biomass falls below a prescribed threshold. However, the Hybrid-F incorporated a steeper initial reduction that was likely to result in greater annual variability of harvest amounts than the 40-10 approach. Because the two approaches afford comparable protection to the stock, and based on the Groundfish Management Team's (GMT's) recommendation, the Council dropped the Hybrid-F approach and switched to the 40-10 default OY beginning in 1999.

The 1999 Stock Assessment Review (STAR) Panel concluded that  $F_{40\%}$  is a legitimate proxy for  $F_{MSY}$  for this stock. However, the GMT reviewed additional information that suggested a lower exploitation rate may be appropriate. The GMT could not reach consensus on a single approach and provided a range bounded by  $F_{40\%}$  and  $F_{45\%}$  for Council consideration.

The coastwide 1999 ABC corresponding to  $F_{40\%}$  was 320,000 mt. The stock was at 37% of the unfished level at that time, and application of the 40-10 policy yielded coastwide target of 301,000 mt for 1999, and 275,000 mt for 2000. The corresponding U.S. OYs, calculated at 80% of the coastwide amounts, were 241,000 mt in 1999, and 220,000 mt in 2000. The spawning stock is projected to continue its recent decline, falling by 16% from 1999 to 2001 using an  $F_{40\%}$  base rate.

The Council adopted a status quo ABC and OY of 232,000 mt for 1999 and 2000. The GMT does not recommend any change for 2001 at this time.

**Lingcod** - Lingcod was designated as overfished in 1999 based on an assessment of the northern portion of the stock. A preliminary rebuilding analysis for the northern portion of the stock indicated the stock could be rebuilt within ten years if harvest is reduced to 275 mt. A roughly equivalent reduction applied coastwide resulted in a coastwide OY of 378 mt. The Council prepared a lingcod rebuilding plan, which National Marine Fisheries Service (NMFS) approved in September 2000, laid out a ten-year rebuilding time and initial harvest of 378 mt. The Council requested a coastwide stock assessment to provide a more comprehensive look at the stock, including the southern portion.

A coastwide assessment (in two parts) was prepared in 2000 that confirmed the stock is overfished. Separate ABCs were calculated for the northern (Vancouver-Columbia) and southern (Eureka-Monterey-Conception) areas based on  $F_{45\%}$ . The GMT's final OY recommendation (611 mt) is the sum of the yields (307 mt plus 304 mt) from the new assessment associated with a constant exploitation rate where 60% of the simulated runs rebuilt in 9 years.

**Sablefish** - ABC (7,661 mt) is based on the  $F_{45\%}$  harvest rate, and OY (6,895 mt) is based on application of the 40-10 harvest policy (the stock is currently estimated at 37% of the initial biomass). There is substantial uncertainty in the stock assessment, and incoming recruitment appears poor. As in the past, this OY applies north of 36° N latitude.

Sablefish management is complicated not only by uncertainty in the biomass assessment, but also by assumed and measured bycatch/discard rates, the methods of applying the discard rates, and several allocations. For a number of years, the ABC has converted to OY by deducting 10% of the ABC “off the top” to account for assumed discard mortality, primarily in the trawl fishery. The original assumption was that trawl vessels discarded an average of 25% of their sablefish catch in order to comply with landing limits. This 25% of the trawl catch was approximately equivalent to 10% of the total catch, and the GMT began applying the 10% deduction to simplify the OY calculations. The 25% trawl discard rate was based on discard rates observed in the mid to late 1980s.

**Pacific Cod** - The GMT recommends no change in the coastwide ABC for Pacific cod from the previous level of 3,200 mt which was set in 1989 near the highest catch on record. The coastwide catch reported by the Pacific Coast Fisheries Information Network (PacFIN) shows a steady decline each year since then to about 1,500 mt in recent years. No quantitative assessment is attempted for Pacific cod off Washington, Oregon, and California, because changes in stock abundance in this area are probably dominated by environmental factors which influence the contribution of fish from the north.

## ROCKFISH

“Rockfish” means all 55+ species of *Sebastes* and *Sebastes* (thornyheads) off Washington, Oregon, and California. Until 1999, the rockfish ABCs and OYs were divided into two groups: species that could be harvested relatively selectively (Pacific Ocean perch, widow rockfish, shortbelly rockfish, and thornyheads), and the *Sebastes* complex, those species that generally could not be caught without other rockfish. The *Sebastes* complex initially included yellowtail, canary, bocaccio, chilipepper and minor species of the genus *Sebastes*, the latter are subdivided into “remaining rockfish” and “other rockfish” categories depending on the type of stock assessment. Rockfish stock assessments range from relatively rigorous individual assessments (POP, widow, shortbelly, thornyhead, yellowtail, bocaccio, canary) to more generalized, rudimentary individual assessments (for species in the “remaining rockfish” category) to virtually no assessment other than information provided by landings data (the “other rockfish” category).

In the *Sebastes* complex, species with more rigorous individual assessments were assigned individual ABCs and OYs, which often differed north and south of Cape Blanco, Oregon (42° N latitude). Individual ABCs also were calculated for the “remaining rockfish” species, but individual OYs were not specified. For the “other rockfish” category, only one ABC was calculated, based on recent landings of the species in the category. An over-arching OY for the *Sebastes* complex was derived by adding the individual OYs for yellowtail and canary rockfish in the north, and bocaccio and chilipepper in the south, to the summed ABCs (or a fraction of the summed ABCs) for “remaining rockfish” and “other rockfish” in the northern and southern areas. Setting ABCs and OYs north and south of Cape Blanco resulted in some species having an individual ABC and OY in one area, but being included with the minor rockfish species in the other.

The Council separated chilipepper and splitnose rockfish from the *Sebastes* complex in 1999 and assigned individual ABCs and OYs based on concerns that this pooling of ABCs to derive the *Sebastes* OY was leading to over-exploitation of some higher-valued, less abundant rockfish. Because of continued concerns over disproportionate harvest of some pooled species, pending rebuilding plans for four rockfish species, the desire to manage by fishing strategy, and confusion over the definition of *Sebastes*, the GMT developed a new organization for rockfish management for the 2000 fishery. This plan eliminated the over-arching *Sebastes* complex ABCs and OYs, continued specification of existing individual-species ABCs and OYs, and created a new “minor rockfish” group that combines “remaining rockfish” and “other rockfish” under a separate ABC and OY in each area. The minor rockfish OYs are further divided into harvest targets for near-shore, shelf, and slope species subgroups.

The Council also endorsed moving the line that was used to divide the northern and southern ABC areas (at Cape Blanco) further south to a location in the vicinity of the line used to divide northern and southern trip limits (currently 40°30'N. lat., near Cape Mendocino, California). This change was intended to improve the ability to manage to the OYs specified for each area. In conjunction with this change,

fractions of the previous southern-area ABCs and OYs for species occurring in the Eureka area were transferred to the new northern area. Those fractions were determined using survey and landings data.

**Pacific Ocean Perch** - the ABC for this overfished stock is based on the 2000 assessment for the Vancouver and Columbia areas (1,523 mt at  $F_{MSY}$ ) plus 18 mt for the Eureka area. The preliminary OY range of 400-760 mt was based on precautionary evaluation of yields that have a high likelihood of achieving the rebuilding target in 10 years (low) and application of the 40-10 policy to the  $F_{MSY}$  yield for 2001 (high). The Council set the preliminary OY at 626 mt; the GMT concurs.

**Shortbelly Rockfish** - The potential yield of shortbelly rockfish was last examined in 1989. Shortbelly rockfish remains an unexploited stock, and is difficult to assess quantitatively. Alternative yield calculations have given a range of 13,900 mt to 47,000 mt. This species is an important source of forage for seabirds, marine mammals, salmon, groundfish, and other marine life. Recruitment surveys conducted by the Tiburon Laboratory indicate poor recruitment in most of the years since 1989, indicating low recent productivity and a naturally declining population. The GMT recommends ABC and OY be reduced to 13,900 mt, which is the low yield estimate, until more is known about this stock.

**Widow Rockfish** - the 2000 assessment indicates the stock has declined to about 24% of its unfished reproductive potential and is overfished. A preliminary rebuilding analysis prepared after the STAR Panel review indicates the stock is above 50% of its maximum sustainable yield (MSY) level (which is an alternative overfished threshold) meaning the stock is not overfished, although it may be approaching that condition. The 3,727 mt preliminary ABC is based on the  $F_{50\%}$  harvest rate. The GMT recommended an OY range of 2,864 mt (based on  $F_{50\%}$  and the 40-10 policy) to 1,775 mt (based on  $F_{65\%}$  and the 40-10 policy). The lower OY value is calculated to rebuild the stock in 10 years. The preliminary rebuilding analysis used a different methodology, similar to the POP analysis. Because it had not been reviewed by the STAR Panel or Scientific and Statistical Committee, the GMT based its ABC recommendation (3,727 mt) on the stock assessment using the  $F_{50\%}$  harvest rate. The GMT endorses the lower OY of 1,775 mt in order to move quickly to rebuild the stock.

**Bocaccio** - Bocaccio in the south is overfished; the ABC (122 mt) is based on  $F_{50\%}$ . The OY is unchanged from 2000, which was set based on the rebuilding plan.

The first bocaccio assessment was prepared in 1990 with subsequent assessments in 1992, 1996, and 1999. For 1997, the Council set the ABC at 265 mt, the 1997-1999 average estimate of yields at the  $F_{35\%}$  level presented in the 1996 document. When setting the 1998 ABC for bocaccio, the Council endorsed the  $F_{40\%}$  harvest policy for rockfish in the *Sebastes* complex. This resulted in reduction of the bocaccio ABC to 230 mt, which was also established as the harvest guideline, which was also the 1999 OY. In 1998, the GMT calculated the bocaccio stock to be about 7% of unfished abundance, and on March 3, 1999 NMFS notified the Council that this stock is below its overfished threshold (defined as 25% of the unfished biomass).

In conjunction with the preparation of a bocaccio rebuilding plan, a new assessment was prepared and submitted for STAR Panel review and evaluation during 1999. As in previous assessments, the geographic range was limited to the waters off California. Trawl surveys and landings patterns show bocaccio distribution is split into northern (Washington) and southern (California) areas of abundance, with few fish found in the intervening area. Results of genetic research show little mixing between these areas of high abundance, indicating distinct genetic stocks.

**Canary Rockfish** - Two canary rockfish assessments in 1999 addressed the northern and southern portions of the stock and estimated current abundance to be between about 7% of unfished in the south to 20% of unfished in the north. The coastwide ABC (228 mt) is based on  $F_{50\%}$ . The GMT's final coastwide OY (60 mt) recommendation is based on the initial rebuilding analysis, the sum of 40 mt in the north and 20 mt in the south.

Two new assessments for canary rockfish were completed during 1999, in northern and southern areas, separated at Cape Blanco. Although each area was assessed separately, there is no definitive evidence

for separate northern and southern stocks of canary rockfish. The division was made to simplify the assessment procedure for a variety of reasons (different data sets, etc.). Each assessment indicates the canary rockfish population is overfished at this time. Landings and survey data indicate an absence of older female canary rockfish, and two possible explanations for this are explored in the northern assessment. The first possibility (scenario 1) is that females die from natural mortality at a faster rate than males, and the difference becomes greater with age. The second possibility (scenario 2) is that female canary rockfish die at a consistent rate as they age (i.e., are subject to a constant mortality rate) but become more difficult to catch as they get older. At this time, the scientific community is uncertain which explanation is correct; the 1996 and 1999 STAR Panels concluded both assumptions were equally valid. However, Scenario 1 is consistent with the yellowtail rockfish assessment. The two scenarios lead to significantly different conclusions with respect to current abundance and the status of the stock compared to unfished conditions. Under scenario 1 (females die younger), current spawning biomass is estimated to be 949 mt for the northern area, which is 6.8% of the unfished spawning biomass. Under scenario 2 (female canary rockfish don't die young, but don't get caught), the northern population is in significantly better shape, with current spawning biomass estimated at 6,663 mt, which is 22.9% of the unfished spawning biomass. In either case, the canary rockfish stock is below 25% of the unfished biomass and therefore overfished.

The southern assessment was the first ever for that portion of the geographic range of the stock. The southern model performed better under the assumption of constant natural mortality than under the assumption of increasing mortality with age for females. Under base case conditions, the current spawning biomass in the southern area is estimated to be 529 mt, which is 7.7% of the unfished spawning biomass. If female canary rockfish actually die younger than males, the condition of the stock is substantially worse.

There is tremendous uncertainty in the rebuilding projections due to poorly estimated levels of recruits per spawner during 1996-1998. The 1996-1998 recruits per spawner level appear anomalously high relative to the 1987-1995 estimates due to a high number of young canary captured in the 1998 triennial trawl survey. If recent recruitment is similar to the earlier period, it will be difficult to rebuild to the current target biomass, even with no fishing mortality. If recent recruitment is high, and one of the three years is used in the projection, catch in 2001 would need to be only about 13-15 mt per year in order for the stock to begin to rebuild. If all three years are used, annual catches of 150-185 mt in the north would allow rebuilding. Such an optimistic scenario is risky because it is based upon three large, but poorly estimated, recruitments in 1996-1998. Intermediate scenarios using the 1996-1998 recruitments at a reduced level (as recommended by the 1999 STAR panel for canary rockfish) would reduce catches to 25-40 mt for the area covered by the northern assessment. The GMT suggested 20 mt would represent the OY contribution of the southern portion of the stock.

**Chilipepper Rockfish** - The 2000 ABC (3,681 mt) for the Monterey and Conception areas was based on the 1998 assessment and application of the  $F_{40\%}$  harvest rate. The stock is estimated to be above the 40% precautionary threshold, so the default OY would equal ABC. Application of  $F_{50\%}$  results in an ABC of 2,700 mt. The GMT recommends OY remain at 2,000 mt. (The northern remaining rockfish ABC in 2000 includes 32 mt of chilipepper for the Eureka area.)

**Cowcod** - Cowcod comprise a single stock, and the stock has been designated as overfished based on the 1999 assessment of the Conception area. The assessment indicates current biomass in the Conception area is 4 -11% of the initial biomass (the best estimate is 7%). The 2000 Conception area ABC was set at 5 mt, and OY less than 5 mt for the Monterey and Conception areas combined. The rebuilding analysis confirms that total catch in the Conception area must be no more than 0.6 to 6.4 mt. The base case (60% probability of achieving rebuilding in the allotted time) is 2.1 mt. The GMT concurs with the Council's 2.4 mt OY. In addition, the GMT notes that annual landings in recent years for both the Conception and Monterey areas were similar. The GMT recommends a separate OY (2.4 mt) for the Monterey area, based on a proportional reduction in that area.

**Darkblotched Rockfish** - The 2000 assessment indicates the stock is overfished, with the best estimate of current biomass about 22% of the initial biomass. A major uncertainty in the assessment is historic catch of darkblotched rockfish in the Russian fishery from 1965-1978. It is likely some percentage of the

red rockfish catch was really darkblotched rockfish. Only the model assuming no foreign catch or the model with variable likelihood weights and priors given 37 mt catch would not be considered overfished in 2003. In all cases, the spawning biomass increased over the three-year time period with the reduced catch and the estimated very large 1994 year class reaching maturity. The ABC range reflects a range of 10% darkblotched in the Russian catch and 0%. The lower OY (95 mt) is the constant annual catch that would rebuild the stock in 10 years, based on the 10% assumption. The upper OY (159 mt) is the constant catch to rebuild in 10 years, assuming 0%. If none of the foreign catch was made up of darkblotched rockfish, the catch level to rebuild the stock in ten years would be 159 mt. The Council chose an intermediate value (130 mt) as the upper end of the OY range. The GMT believes the assumption of zero foreign catch is incorrect, but cannot offer a definitive recommendation at this time.

**Splitnose Rockfish (often called “rosefish”)** - The 2001 ABC (615 mt) is a reduction from 2000 based on the revised  $F_{MSY}$  harvest rate policy. ABCs for stocks assessed using  $F=M$  are reduced 25% as a “risk neutral” adjustment. (For 2000, this was the OY adjustment). Consistent with the Council’s precautionary policy, the GMT’s OY recommendation (461 mt) reflects a 25% reduction from ABC because of the less-rigorous assessment method used for this stock.

**Chilipepper Rockfish** - The ABC (2,700 mt) for the Monterey and Conception areas is based on the 1998 assessment and application of the  $F_{50\%}$  harvest rate. The stock is estimated to be above the 40% precautionary threshold so the default OY would equal ABC. OY is set at 2,000 mt, in part to avoid increased bycatch of bocaccio. (The northern remaining rockfish ABC in 2000 includes 32 mt of chilipepper for the Eureka area.)

**Yellowtail Rockfish** - A new assessment of yellowtail rockfish in the Eureka, Columbia, and Vancouver areas was prepared in 2000, indicating the stock appears substantially more abundant than the previous assessment. The stock is now estimated to be at 63% of its pristine level. ABC (3,146 mt) applies to the U.S. portion of the assessed area. Although the estimate of stock size has increased, ABC is less than in 2000 due to application of the  $F_{50\%}$  harvest rate. Because the stock appears to be larger than the MSY size, OY may equal ABC. However, the stock is expected to continue declining in the near future due to poor recruitment in recent years.

## **THORNYHEAD ROCKFISH**

The individual assessments for shortspine thornyhead and longspine thornyhead in 1997 covered the area from central California at 36° 00' N latitude (the southern boundary of the Monterey management area) to the Canadian border at 48° 29' N latitude (the northern boundary of the U.S.-Vancouver management area). The STAR Panel expressed concern that current management requires more detailed information on thornyheads than can be obtained from the available data. Given the kinds and quality of data, there are major uncertainties in the assessments regarding (1) growth and natural mortality for shortspine thornyhead; (2) problems with separating longspine and shortspine thornyheads in the historic landings; (3) difficulties estimating year class strength; and (4) unknown discard rates.

**Shortspine thornyhead** - The ABC recommendation (757 mt) is based on a synthesis of two stock assessments prepared in 1998 and application of the  $F_{50\%}$  harvest rate. The ABC and OY apply only to the area north of 36° N latitude, which is the northern boundary of the Conception area. The stock size was estimated to be 32% of the unfished abundance in 1999. The OY (689 mt) is based on  $F_{50\%}$  and the 40-10 policy. The landed catch equivalent will reflect a 30% reduction for discard. A separate ABC for the part of the Conception area north of Point Conception is based on historical landed catch (123 mt); the OY, which is landed catch, is 50% of ABC, based on the risk averse policy. A total catch OY (78 mt) could be computed by adding an assumed discard of 30%. There is no ABC or OY for the southern Conception area.

**Longspine thornyhead** - The ABC (2,461 mt) north of the Conception area is based on the average of the three-year individual ABCs at  $F_{50\%}$ . The stock is estimated to be above the 40% precautionary threshold. Application of the new discard adjustment results in landed catch OY of 2,067 mt. A separate ABC for the Conception area north of Point Conception is based on historical average landed catch (390

mt). The OY (195), which is landed catch, is 50% of ABC, based on the risk averse policy. A total catch OY (235 mt) could be computed by adding an assumed discard of 17%. There is no ABC or OY for the southern Conception area.

## **MINOR ROCKFISH**

The Minor Rockfish category includes the “other rockfish” and “remaining rockfish” categories. These categories include the species that have never been assessed (other rockfish) or have been assessed by less-rigorous methods (remaining rockfish).

### Vancouver, Columbia, and Eureka Areas

The remaining rockfish category in the north includes bocaccio, darkblotched, redstripe, sharpchin, silvergrey, splitnose, yelloweye, and yellowmouth rockfish, each of which has an individual ABC based on historical catch or a simple assessment. It also includes the northern portion of the chilipepper rockfish stock, which was assessed in 1998, and black rockfish, which was assessed in 1999. The other rockfish category includes all other rockfish species that have not been assessed; the ABC for this group is based on historical catch records. The final GMT ABC recommendation for the northern portion of the minor rockfish category is 4,823 mt, which is the sum of the ABCs for the remaining rockfish (2,755 mt) and other rockfish (2,068 mt). The GMT’s final OY recommendation (3,137 mt) is the sum of 75% of the remaining rockfish ABC and 50% of the other rockfish ABC. The GMT’s final ABC and OY recommendations differ from the preliminary recommendations. The GMT recalculated ABCs based on the revised risk-neutral harvest rate.

The ABC levels for both the remaining rockfish and other rockfish categories are based on limited data. There is great uncertainty about the current biomass of these stocks and a serious lack of quantitative information on long-term sustainable yields. Recent ABC estimates were developed for the remaining rockfish component based on NMFS survey biomass estimates, assumed levels of catchability, and an assumption that a sustainable fishing mortality rate would be equal to the natural mortality rate for each species (i.e.,  $F=M$ ). ABC levels for the other rockfish component have been based on less information than the remaining rockfish component. For 1999 and 2000, the Council endorsed the GMT’s proposal to reduce the remaining rockfish component by 25% (i.e., to 75% of the current level) and the other rockfish component by 50%. These reductions of 25% and 50% were based on suggested target catch levels for data-poor situations from Restrepo et al. (1998. Technical Guidance on the Use of Precautionary Approaches to Implementing National Standard 1 of the Magnuson-Stevens Fishery Conservation and Management Act. Draft NOAA Tech. Memo.). This technical guidance suggests a 25% reduction for stocks above the  $B_{MSY}$  level and a 50% reduction for stocks between the minimum stock size threshold (i.e., the overfished/ rebuilding threshold) and the  $B_{MSY}$  level. In 2000, a panel of stock assessment scientists recommended the  $F=M$  approach is too aggressive for rockfish and that  $F=.75M$  is more risk-neutral. An additional 25% reduction would be consistent with a risk-averse approach.

Species assigned to 'Minor Rockfish' Subgroups in the northern area (Vancouver, Columbia, and Eureka areas).

	NEAR-SHORE	SHELF	SLOPE
<b>Minor Rockfish</b>			
'Other rockfish'	Principal species BLUE RKF CHINA RKF COPPER RKF QUILLBACK RKF	Principal species CHILIPEPPER GREENSTRIPED RKF PYGMY RKF ROSETHORN RKF STRIPETAILED RKF VERMILION RKF	Principal species AURORA RKF REDBANDED RKF ROUGHEYE RKF SHORTRAKER RKF
	Secondary species BLACK-AND-YELLOW RKF BROWN RKF CALICO RKF GOPHER RKF GRASS RKF KELP RKF OLIVE RKF TREEFISH	Secondary species BRONZESPOTTED RKF CHAMELEON RKF COWCOD DWARF-RED RKF FRECKLED RKF GREENBLOTCHED RKF GREENSPOTTED RKF HALFBANDED RKF HONEYCOMB RKF MEXICAN RKF PINK RKF PINKROSE RKF ROSY RKF SPECKLED RKF SQUARESPOT RKF STARRY RKF SWORDSPINE RKF TIGER RKF	Secondary species BANK RKF BLACKGILL RKF
'Remaining rockfish'	BLACK RKF	BOCACCIO REDSTRIPE RKF SILVERGREY RKF YELLOW EYE RKF	SHARPCHIN RKF SPLITNOSE RKF YELLOWMOUTH RKF
<b>Associated species with individual OYs</b>		YELLOWTAIL RKF	PACIFIC OCEAN PERCH
<b>Associated species with individual coastwide OYs</b>		CANARY RKF SHORTBELLY RKF WIDOW RKF	DARKBLOTCHED RKF

**Black Rockfish** - The 1999 assessment of the portion of the black rockfish resource north of Tillamook Head, Oregon. The previous (1994) assessment used an age-structured version of the stock synthesis model to fit age composition data from the recreational and commercial fisheries and catch per unit of effort (CPUE) data from the recreational fishery and a nearshore jigging survey. These data were updated and supplemented with tag release and recovery data for the 1999 assessment. A completely new model written in AD Model Builder was used in 1999 to assess current black rockfish abundance. A new stock synthesis model and an updated version of the 1994 stock synthesis model were also provided as a basis for comparison. The AD model explicitly accounts for sampling uncertainty and provided the most statistically rigorous model with the fewest set of assumptions.

The AD model biomass projections for black rockfish were sensitive to tag recovery reporting rates, and therefore reporting rates were used to define alternative scenarios in the assessment. Results showed a general decline in black rockfish biomass since 1986, the base year in the assessment. At  $F_{45\%}$  and tag reporting rates of 25%, 50%, and 75%, the expected 1999 spawning biomass is 88%, 88%, and 85% of unfished spawning biomass respectively. This indicates that although the black rockfish stock may be declining in abundance, it appears healthy relative to the 40-10 harvest policy. Projected 2000 yields at  $F_{45\%}$  and tag reporting rates of 25%, 50%, and 75% are 655, 737, and 844 mt respectively. The GMT considered the 75% reporting rate to be too high, and that projections based on the 25% and 50% recovery rates should be equally weighted in calculating an ABC for black rockfish. Based on the AD model results for the preferred recovery rates and  $F_{50\%}$ , the GMT recommends a black rockfish ABC of 615 mt (down from 700 mt, which was based on  $F_{45\%}$ ) for the portion of the stock in the U.S. Vancouver and Columbia area north of Tillamook Head. Recent catch in the southern Columbia and Eureka areas has been about 500 mt in recent years. The sum of these (1,115 mt) is the ABC for the combined areas for 2001. In calculating the overall minor rockfish OY for the northern area, the GMT reduced the portion south of Tillamook by 50%, consistent with the precautionary policy for unassessed areas. Thus, the black rockfish total contribution to the OY for the northern minor rockfish category is 865 mt (615 + 250).

#### Monterey and Conception Areas

The Minor Rockfish (south) category includes the "Remaining Rockfish" (ABCs based on  $F=.75M$ ) and "Other Rockfish" (ABCs based on historical catch) categories in the Monterey and Conception areas combined. The ABC is the sum of all those individual species ABCs in these areas. The total catch OY is the sum of 75% of the "remaining rockfish" ABCs plus 50% of the "other rockfish" ABCs in these three areas. The reduction in the contribution of remaining and other rockfish to OY is intended to address uncertainty in stock status due to limited information. The expected commercial landed catch target in 2001 will reflect recreational harvest and may also reflect a 16% discard adjustment for the limited entry fishery.

The remaining rockfish category in the southern area includes bank, blackgill, canary, darkblotched, Pacific Ocean perch, and sharpchin rockfish. The final GMT ABC recommendation for the combined Minor Rockfish category (3,556 mt) is the sum of the ABCs remaining rockfish (854 mt) and other rockfish (2,702 mt). The GMT's final (total catch) OY recommendation (2,043 mt) is the sum of 75% of the remaining rockfish ABC and 50% of the other rockfish ABC.

Species assigned to 'minor rockfish' subgroups in the southern area (Monterey and Conception).

	NEAR-SHORE	SHELF	SLOPE
<b>Minor Rockfish</b>			
"Other rockfish"	Principal species	Principal species	Principal species
	BLACK RKF	BRONZESPOTTED RKF	AURORA RKF
	BLACK-AND-YELLOW RKF	CHAMELEON RKF	REDBANDED RKF
	BLUE RKF	COPPER RKF	
	BROWN RKF	GREENBLOTCHED RKF	
	CALICO RKF	GREENSPOTTED RKF	
	CHINA RKF	SPECKLED RKF	
	GOPHER RKF	STARRY RKF	
	GRASS RKF	STRIPETAIL RKF	
		VERMILION RKF	
		YELLOW EYE RKF	
	Secondary species	Secondary species	Secondary species
	KELP RKF	DWARF-RED RKF	ROUGHEYE RKF
	OLIVE RKF	FLAG RKF	SHORTRAKER RKF
	QUILLBACK RKF	FRECKLED RKF	YELLOWMOUTH RKF
	TREEFISH	GREENSTRIPED RKF	
		HALFBANDED RKF	
		HONEYCOMB RKF	
		MEXICAN RKF	
		PINK RKF	
		PINKROSE RKF	
		PYGMY RKF	
		REDSTRIPE RKF	
		ROSETHORN RKF	
		ROSY RKF	
		SILVERGREY RKF	
		SQUARESPOT RKF	
		SWORDSPINE RKF	
		TIGER RKF	
"Remaining rockfish"		BANK RKF	
		YELLOWTAIL RKF	DARKBLOTCHED RKF
			PACIFIC OCEAN PERCH
			SHARPCHIN RKF
<b>Associated species with individual OYs</b>		BOCACCIO	SPLITNOSE RKF
		CHILIPEPPER	
		COWCOD	
<b>Associated species with individual coastwide OYs</b>	Coastwide	CANARY RKF	BLACKGILL RKF
		SHORTBELLY RKF	
		WIDOW RKF	

**Bank Rockfish** - Based on the 2000 assessment, the GMT recommends ABC for the Monterey and Conception area be increased from 81 mt in 2000 to 350 mt for 2001. This species will contribute 200 mt (ABC minus 25% as a precautionary adjustment) to the 2001 minor rockfish OY in the south.

**Blackgill Rockfish** - The GMT recommends the 2001 ABC for the Monterey and Conception areas combined be set at 343 mt. The ABC for the Conception area is derived from F<sub>50%</sub> three-year average catch estimates based on three assumed levels of natural mortality. Using assumed natural mortality estimates for the decision table (Table 15, Page 54) of 0.037, 0.047, and 0.57, the resulting mean ABC is 268 mt; 75 mt was added for the Monterey area. The OY contribution to the minor rockfish category is 306 mt, the sum of the Conception area ABC (268 mt) and 38 mt (75% of ABC) for the Monterey area.

Blackgill rockfish in the Conception area was assessed for the first time in 1998. A simple two-parameter stock assessment model was developed based on stock reduction analysis and an assumption of constant recruitment. Average fishing mortality during 1980 to 1997 based on catch curve analysis was an essential element in the assessment model. The STAR Panel had concerns that the total mortality estimated in the model may be low and should be interpreted with caution. The STAR Panel's preferred model configuration indicates catches above recent levels of 150 mt and 250 mt per year would likely lead to a spawning biomass decrease.

North of the Conception area, blackgill are primarily taken as bycatch in the trawl fishery. Blackgill landed in the Conception area are taken in a directed fixed gear fishery (set longline and setnet) that developed in the mid-1970s. Landings peaked in 1983 at 1,112 mt and declined to a low of 153 mt in 1997.

## FLATFISH

**Arrowtooth Flounder** - A stock assessment conducted in 1993 resulted in maintaining the ABC in U.S. waters at 5,800 mt (equal to peak catch in 1990). The assessment author recommended conservative management, especially until new data and models can estimate absolute biomass and exploitation rates. However, the GMT recommended no change in ABC because there was no decline in fishery CPUE during 1987 to 1992 and no trend in triennial bottom trawl survey CPUE during 1977 to 1992, although survey CPUE fluctuated over a three-fold range. Future work on this assessment probably should include the Canadian zone. Fishery logbook data indicate that most of the U.S. catch occurs near the U.S.-Canada border. The survey indicates that the biomass is about two times higher in the surveyed portion of the Canadian zone than in U.S. waters. Catch in Canada increased greatly in 1990 and was nearly 50% of the U.S. catch in 1992.

**Dover Sole** - The 1997 Dover sole assessment north of the Conception area provided landed catch ABCs based on the  $F_{40\%}$  harvest rate. The GMT recommends the 2001 total catch ABC be 7,151 mt, which is the average of yields calculated for 2000-2002 at  $F_{40\%}$ , inflated to reflect 5% discard. The FMP set the original ABC for the Conception area at 1,000 mt based on average landings; for 1998, this was inflated to reflect 5% discard for a total catch ABC of 1,053 mt. The coastwide total catch ABC is 8,204 mt. To calculate the total catch OY (7,677 mt), the GMT reduced the Conception area's OY contribution by 50% (to 526 mt), consistent with the new harvest policy. The landed catch target would be 95% of OY, or 7,293 mt.

The 1997 Dover sole stock assessment treated the entire population from the Monterey area through the U.S.-Vancouver area as a single stock, based on recent research on the genetic structure of the population. The assessment author generated projections of spawning biomass and expected landings for 1998 to 2000 under a variety of harvest policies and three recruitment scenarios. The hypothetical harvest policies ranged from an immediate reduction to the  $F_{45\%}$  harvest rate to an increase up to the  $F_{20\%}$  harvest rate. In all cases, for each of the low, medium, and high projected recruitments, the expected spawning biomass increased from the estimated year-end level in 1997 through the year 2000 due to growth of the exceptionally large 1991 year-class and to the lower catches observed in the fishery since 1991.

**English Sole** - The GMT recommends continuation of the coastwide ABC of 1,100 mt set in 1994 for the Eureka through Conception areas, and 2,000 mt for the Columbia and Vancouver areas. The coastwide landed catch during 1992 to 1996 averaged 1,330 mt. The age-structured version of the stock synthesis program was used to assess the status of the stock of female English sole occurring off Oregon and Washington (Columbia and U.S.-Vancouver management areas). The analysis used age-composition data from the Oregon and Washington trawl fisheries, and estimates of relative abundance and length composition from the 1977 to 1992 triennial bottom trawl surveys. The survey CPUE increased ten-fold over this period. The assessment indicated a large and steady increase in the biomass to about 133,000 mt of age-four and older females in 1992. The increase is attributed to high recruitment during the period examined. A specific ABC was not estimated, but the early age-at-maturity suggests the stock can sustain a high exploitation rate, and the large biomass suggests the stock is healthy in the Columbia

and Vancouver areas. The 2,000 mt ABC recommended in 1994 is about a doubling of the average catch (1,145 mt) during 1985-1994. The GMT supports continuation of this ABC.

The Monterey and Conception areas contributed 52% of the total catch during 1983 to 1991, but there has been no recent assessment for these areas. The survey CPUE in the Monterey and Eureka areas was without trend during 1983 to 1992. The ABC for these areas was set equal to the 1983 to 1991 average yield of 1,100 mt.

**Petrale Sole** - The GMT recommends the ABC for the Vancouver and Columbia areas combined be reduced to 1,262 mt, based on  $F_{40\%}$ , and the coastwide ABC be 2,762 mt. A stock assessment for petrale sole in the Vancouver and Columbia areas was prepared in 1999, and projected the stock would increase to 42% of the unfished level in 1999. For 2000, the ABC for these areas was increased from 1,200 mt to 1,440 mt, based on the  $F_{35\%}$  calculations included in the assessment. The  $F_{40\%}$  calculations (1,262 mt) were also included in the assessment, and the GMT recommends this as the ABC for 2001. The GMT recommends continuation of the ABCs in the southern areas: Eureka - 500 mt; Monterey - 800 mt; and Conception - 200 mt. If an OY were established for this stock, the contribution to OY from the southern areas would be 50% of the ABCs, resulting in a coastwide OY of 2,017 mt. Recent landings in these areas combined have been about 800 mt per year, similar to the 750 mt they would contribute to OY.

The previous (1993) stock assessment in the Columbia and U.S.-Vancouver Areas used the length-based version of the stock synthesis program. The 1999 assessment also used the length-based version of stock synthesis, but the data were separated into two distinct fisheries; a winter fishery which tends to catch larger and older fish from spawning aggregations, and a summer fishery that tends to operate closer to shore. The period covered by the 1999 assessment was 1977-1998. Initial age composition was not forced to conform to equilibrium conditions. Compared to the previous assessment, the 1999 assessment included more recent fishery length and age composition data, observations from the NMFS shelf survey for 1995 and 1998, and newly available break and burn age determinations. Retention and discard were modeled using logistic functions of length. The length at 50% retention was much larger in the 1999 assessment than in the previous one.

**Other Flatfish** - Arrowtooth flounder was removed from this group of species in 1991 and there was no change in the ABC for the remaining species: Vancouver - 700 mt; Columbia - 3,000 mt; Eureka - 1,700 mt; Monterey - 1,800 mt; and Conception - 500 mt. These ABC levels were originally set on the basis of historical catch levels prior to the development of the arrowtooth flounder fishery, and current catch levels remain well below the level of ABC.

#### **OTHER GROUND FISH**

The GMT recommends no change in the coastwide ABC of 14,700 mt.