

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON STOCK ASSESSMENTS AND
REBUILDING ANALYSES FOR 2011-2012 GROUND FISH FISHERIES

The Scientific and Statistical Committee (SSC) reviewed the report of the Groundfish Subcommittee that reviewed eight rebuilding analyses: bocaccio, Pacific ocean perch (POP), cowcod, canary rockfish, yelloweye rockfish, widow rockfish, darkblotched rockfish, and in addition petrale sole, which is pending.

Progress towards rebuilding for the rockfish was reviewed in relation to the median times to rebuild (T_{target}) that were adopted in Amendment 16-4 and/or the current T_{target} that was adopted in 2007 (Table 1). Rebuilding is occurring for all species (Figure 1) and the SSC notes the following:

- 1) Catches of six of the seven overfished rockfish stocks have been lower than what was available as a cumulative optimum yield (OY) during the period of rebuilding. The only exception is canary rockfish, which exceeded its cumulative OY by 14 percent over the period 2000-2007. This overage was due primarily to an excess harvest of 40 mt in 2001, when constraints on the groundfish fishery were first being imposed. In five of the six other cases, catches have been far below the available OY, with catches of darkblotched rockfish approaching the cumulative OY. In general, management has been very effective at curtailing fishing mortality on the overfished stocks in order to rebuild them as quickly as possible.
- 2) All assessments met the appropriate technical requirements by utilizing the latest version of the rebuilding program (3.12a) and by using the appropriate outputs from the rebuilding program.
- 3) In all instances the calculated times to rebuild are within six years of the T_{target} adopted either under Amendment 16-4 or as modified in 2007. In four cases (darkblotched rockfish, bocaccio, cowcod, and widow rockfish) rebuilding is one to five years ahead of schedule. Yelloweye rockfish is three years behind schedule. However the probability of recovering by the current T_{target} of 2084 is well above 40 percent. For these five stocks, progress towards rebuilding is considered adequate and the SSC recommends that no redefinition of T_{target} or adjustment to the rebuilding harvest rate is necessary.
- 4) Two stocks are behind schedule and are very unlikely to rebuild by the current T_{target} , i.e., canary rockfish and Pacific ocean perch. Canary rockfish is six years behind schedule, with a 26 percent probability of rebuilding by the current T_{target} (2021) under the adopted harvest rate. Pacific ocean perch is only three years behind schedule. However, the new $T_{F=0}$ (time to recover if harvest ceased in 2011) is 2018 and is greater than the adopted T_{target} (2017). For canary rockfish this deviation from T_{target} is due primarily to changes in our understanding of stock productivity and depletion due to re-estimation of the time-series of historical catches. In the case of Pacific ocean perch, the change is due primarily to revised estimates of stock productivity and depletion arising from two Northwest Fisheries Science Center (NWFSC) survey indices that were low in 2007 and

2008. These changes represent fundamental revisions to our understanding of the status of these species, which in turn warrant revisions to T_{target} .

- 5) Given the results of this year's assessments, new maximum times to rebuild ($T_{\text{max}(\text{new})}$) were calculated for each stock based on the most recent assessment models and National Standard 1 Guidelines (Table 1). These are needed for the two stocks that are markedly behind schedule (canary rockfish and Pacific ocean perch). Rebuilding will occur for these stocks well before ($T_{\text{max}(\text{new})}$) if the current target spawners per recruit (SPR) harvest rates are maintained. For this reason the SSC suggests that considering *status quo* harvest rates for all overfished stocks is a reasonable starting point for the Council's deliberative process when developing OYs for the 2011-2012 biennial cycle.

The SSC notes that while the Terms of Reference for Rebuilding Analyses were recently revised, a few of the specifications contained therein were ambiguous to some analysts and, therefore, a careful editing of the current Terms of Reference would be helpful before the next assessment cycle.

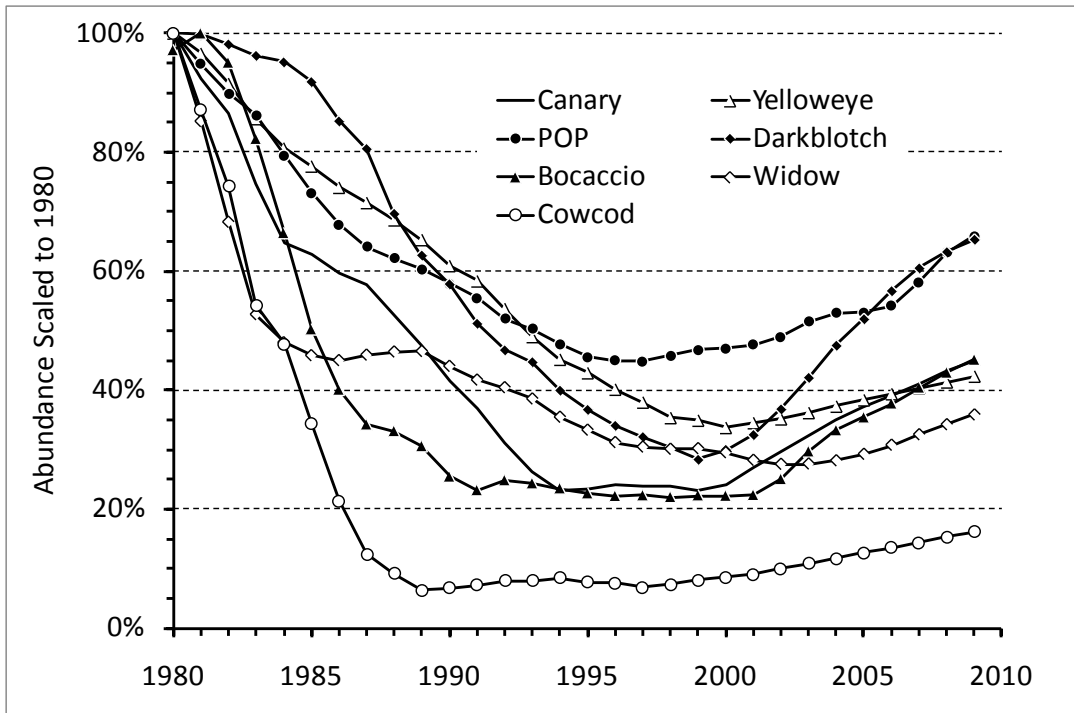


Figure 1. Relative population trajectories of overfished rockfish stocks, 1980-2009.

Table 1. Projected rebuilding target dates for overfished rockfish at current harvest rates

Species	Total Catch / Total OY During Rebuilding ¹	SPR at Adopted Harvest Rate	T_{target} Specified in Amendment 16-4	Adopted T_{target} ²	New $T_{F=0}$	New T_{target} at Adopted Harvest Rate ³	Difference Between Adopted T_{target} and New T_{target} ⁴	$T_{max(new)}$ ⁵
Bocaccio	50% (2000-2008)	77.7%	2026	2026	2018	2022	4	2031
Canary	114% (2000-2007)	88.7%	2063	2021	2024	2027	<u>-6</u>	2046
Cowcod	44% (2002-2007)	79.0%	2039	2072	2060	2071	1	2097
Darkblotched	97% (2001-2007)	62.1%	2011	2028	2016	2027	1	2037
POP	47% (2000-2008)	86.4%	2017	2017	2018	2020	<u>-3</u>	2045
Widow	45% (2002-2007)	95.0%	2015	2015	2010	2010	5	2025
Yelloweye	63% (2002-2007)	71.9%	2084	2084	2047	2087	-3	2089

1. The years considered are the years with reliable catch data since the stock was designated overfished and has been under rebuilding.

2. Current T_{target} is the value adopted by the Council in 2007. In most cases it is the same as in the previous column, i.e. it was unchanged.

3. The new time to rebuild at the adopted SPR harvest rate.

4. Positive values reflect rebuilding being ahead of schedule, while negative values reflect delays. Values which are bolded and underlined indicate a substantial difference indicating a low probability of rebuilding by T_{target} (<40%).

5. $T_{max(new)}$ is the new maximum time to rebuild based on the updated stock assessment and rebuilding analysis. In the case of petrale sole, the maximum rebuilding time is defined by the 10-year rule which is interpreted here as being 10 years beyond the first year for which harvest could be set to zero given the biennial management structure for the West Coast (i.e. 2011).

Petrale Sole

The SSC reviewed the report of the groundfish subcommittee on petrale sole reference points, which met September 30 - October 1, 2009. The SSC discussed the justification for the proxy target spawning biomass level, which was proposed for all flatfish stocks at the September Council meeting. Two major points of discussion were: (1) when is it better to use a stock-specific estimate of B_{MSY} as opposed to a proxy and (2) why is a value of steepness equal to 0.8 appropriate for defining a flatfish proxy.

There are a number of reasons for basing management advice for flatfish stocks on a proxy for B_{MSY} :

- (1) proxies incorporate information from a number of species rather than one species – in contrast stock-specific estimates of B_{MSY} could vary substantially from one assessment to the next;
- (2) proxies provide a constant target offering stability in interpretation and management advice; and
- (3) B_0 and $B_{current}$ are generally more precisely estimated than B_{MSY} .

Although the SSC concluded that the best scientific approach at present is to base management advice for flatfish stocks on a proxy for B_{MSY} , it also agrees that stock-specific estimates of B_{MSY} could potentially be used as reference points in appropriate situations. Conditions for doing so would include: (a) robustness to assessment specifications, and (b) stability of estimates of B_{MSY} among assessments over a number assessment cycles. While the estimate of B_{MSY} from the 2009 petrale stock assessment does appear to be relatively robust to certain assumptions, it remains to be seen whether the estimate will be robust in future assessments. The estimate of B_{MSY}/B_0 for petrale sole is less than 0.2, which is below most national and international standards regarding the range for this quantity. For example, the general guidance under NS1 suggests ranges for B_{MSY} and F_{MSY} , and the values of $B_{25\%}$ and $F_{30\%}$ are at the lower limits of those ranges. This does not imply that B_{MSY}/B_0 must be greater than 0.2, but rather that B_{MSY}/B_0 estimates below 0.25 should be subject to increased scrutiny to confirm their reliability. Finally, although proxies are unlikely to equal the true value of B_{MSY}/B_0 for any single stock, the yield function is generally flat at biomass levels near B_{MSY} , so there is little loss in yield from the use of a proxy reference point.

The use of 0.8 for steepness when selecting the proxy target biomass and fishing mortality levels is based on a number of considerations:

- (1) The resultant proxies should provide “Pretty Good Yield” (as conceived by MacCall and defined by Hilborn (2010)) across a number of related stocks and, in this case, should reflect the uncertainty in the correct value for B_{MSY} for petrale sole.
- (2) Although the likelihood profile for petrale sole puts little density below the value of 0.8, fixed values and assumptions in the assessment necessarily decrease the perceived uncertainty in estimated parameters, including steepness. Steepness, in particular, should be better estimated in an assessment model after a partial return trip (i.e., a rebuilding period). In the 2005 assessment, the average value of steepness for the northern (0.88) and southern (0.72) stocks was 0.8. Moreover, the prior for pleuronectid flatfish from Myer’s meta-analysis is centered at 0.8.

The SSC endorses the conclusion of the groundfish subcommittee report that proxy target reference points for west coast flatfish of $B_{25\%}$ and $F_{30\%}$ are the best scientific information available. This conclusion is based on a number of considerations, including information on stock-recruit relationships for all west coast flatfish that have been assessed, national and international guidance on proxies for B_{MSY} and F_{MSY} , and the results of a meta-analysis of flatfish stock-recruit relationships. Any of these factors when considered in isolation could give the impression that reference points based on a steepness of 0.8 (i.e., $B_{25\%}$ and $F_{30\%}$) are either overly aggressive for flatfish, or too precautionary. Neither view is tenable when the information is considered comprehensively (Fig. 1). The SSC continues to support the use of proxy reference points for status determination and harvest control rules. A key criterion for selecting a proxy is

that it will perform well for the group of stocks to which it will be applied, and perform at least adequately for each member of the group. Consequently proxies would not necessarily be based on the average or the midpoint of the available information.

The SSC has noted previously that other aspects of the Council’s harvest policy, such as the overfished threshold and the point at which the precautionary reduction for OY becomes zero (40-10), are policy decisions that are at the discretion of the Council. A policy that mimics the Council’s default proxies for groundfish would be to set the MSST to $B_{15\%}$, which is 60 percent of the target stock size, and to implement a 25-6.25 precautionary adjustment for OY. Alternatively, the Council could set the MSST to 50% of $B_{25\%}$, which is the lowest value recommended by the National Standard 1 guidelines.

Hilborn, R. 2010. Pretty Good Yield and exploited fishes. Marine Policy 34: 193-196.

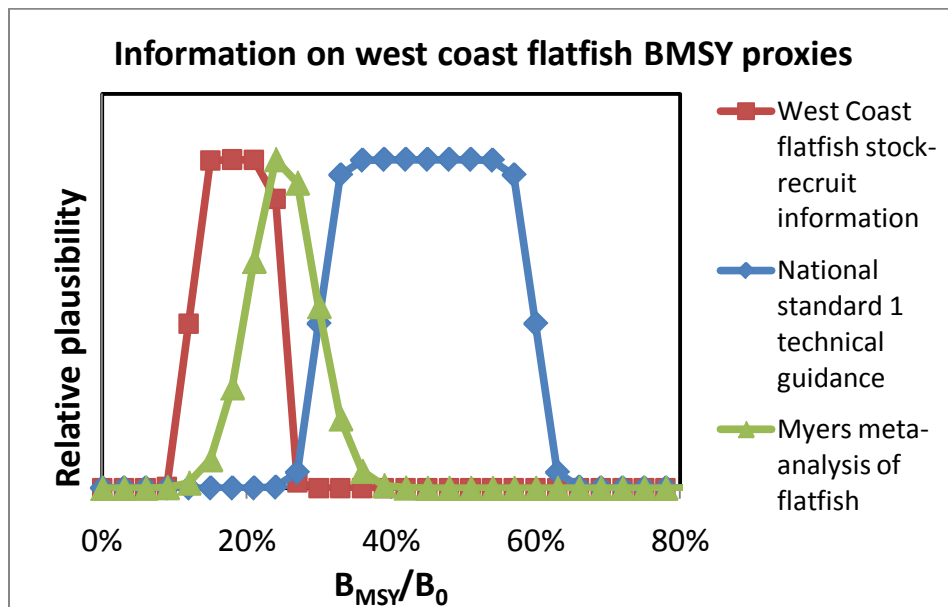


Figure 1. Schematic of information considered when recommending a B_{25%} proxy for B_{MSY}.

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