Data and analysis supporting the prioritization of species for stock assessments in 2021 and 2023

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1 Introduction

This document provides analysis that is intended to provide the Pacific Fishery Management Council (Council) and advisory bodies guidance on species specific assessment prioritization by synthesizing information by commercial fisheries, recreational fisheries, stock status, and other attributed defined as "Factors". The work presented here follows the the general framework advanced in the 2015 National Marine Fisheries Service Technical Memorandum, "Prioritizing Fish Stock Assessments".

This process was envisioned as a way of synthesizing a broad range of relevant information in a manner that can, over time, provide improved guidance, primarily on which species should be considered for benchmark (i.e., full) assessments, or subsequent stock assessment updates. The ranking process provides a useful tool for focusing discussion on species where a new assessment may have the greatest impact, but it is not a replacement for the judgment of the Council and advisory bodies. An important consideration for selecting any species for assessment is whether the (potentially) available data (e.g., trend and length- and age-composition data) are adequate to conduct the desired level of assessment. This aspect of prioritization is not scored in the way other factors are, and so must be considered independently, at this time. In that regard, the process is likely to help identify important data gaps and/or situations where a data-moderate approach should be undertaken with whatever data are available.

The scoring and weighting of Factors in the associated **Excel workbook** remains a work in progress, particularly as we consider its ability, as currently configured, to provide useful insight into priorities in subsequent cycles, as requested by the Council. There may be important considerations that are not encompassed by any of the existing factors, or the methods by which Factor Scores are derived or weighted may be identified as needing improvement. As consideration of priorities for 2021 are considered this spring it will be important to identify any parts of the scoring that could be improved. As aspects of management change, this framework should adapt to reflect the manner in which those changes affect prioritization.

The **Excel workbook** that accompanies this document begins with an Overview tab, followed by a Summary tab in which the Factor Scores are assembled and multiplied by the base-case weights, resulting in a total score and ranking. Those are followed by a tab for each Factor, which documents the Factor scores and ranks for each species, and a Summary scoring worksheet. The following text provides a description of the content and issues associated with each tab, along with the source of data and information used in scoring each Factor.

2 Description of Factors

2.1 Factor Summary

The total scoring combines the scores by species from each factor using pre-defined weights for each factor. The total scoring by species is calculated as:

$$\mathrm{F}_s = w_c * c_s + w_r * r_s + w_t * t_s + w_d * d_s + w_o * o_s + w_b * b_s + w_h * h_s + w_e * e_s + w_n * n_s + w_a * a_s$$

where w is the weight applied to each factor, c is the commercial importance by species s, r is the recreational importance by species s, t is the tribal importance by species s, d is he constituent demand or choke factor by species s, o is rebuilding by species s, b is relative stock status by species s, h is harvest by species s, e is ecosystem importance by species s, n is new information available by species s, and a is the assessment frequency by species s.The weights for each factor are shown in Table 1.

Table 1: Weights used for each factor in the calculation of total factor score by species

Factor	Notation	Weight Notation	Weight
Commercial Importance	c	w_c	0.21
Recrational Importance	r	w_r	0.09
Tribal Importance	t	w_t	0.05
Constituant Demand/Choke Species	d	w_d	0.11
Rebuild	o	w_o	0.10
Relative Stock Status	b	w_b	0.08
Harvest Status	h	w_h	0.08
Ecosystem Importance	e	w_e	0.05
New Information Available	n	w_n	0.05
Assessment Frequency	a	w_a	0.18

2.2 Commercial Importance

The commercial importance score is based on the coastwide ex-vessel revenue generated by commercial landings of groundfish during the period 2014- 2018. The raw revenue amounts generally have a very large range across goundfish species. Consequently, a transformation is used to compress the distribution and reduce the differences between species.

As in 2018, a 2-stage logarithmic transformation is used to compress and rescale the distribution (to a high score of 10, using the following approach:

$$c_s = \frac{10}{\max(\mathrm{Revenue}_s)} \mathrm{Revenue}_s^{0.18}$$

where Revenue is the total commercial ex-vessel revenue across the summarizing years for each species s. Revenue amounts included in this scoring do not include sales of Tribally-caught groundfish. Those are included in a separate Tribal calculation.

2.3 Recreational Importance

Recreational landings lack a measure of value that is equivalent to commercial ex-vessel revenue. In the absence of an equivalent metric, these rankings continue to rely on the approach implemented in 2016, in which a "pseudo value" for the recreational landings of each species is calculated by multiplying the -4 landed catch amounts in each state by a set of state-specific relative weights, which serve the same function as prices. The factor score by species is calculated as:

$$\text{pseudo values}_s = \sum_{a=1}^{A} \text{catch}_{s,a} * \text{importance}_{s,a}$$

where catch is the recreation catch by stock s and state a and importance by stock s and area a is a qualitative measure to represent the importance of that stock to the recreational fishery by area. The overall factor for recreational importance is then calculated as:

$$r_a = \frac{10}{\max(\text{pseudo values}_s)} \text{pseudo values}_s^{0.18}$$

The recreational importance by species and state are shown in Table 2. These weights were initially developed in cooperation with the state recreational representatives to the Groundfish Management Team in 2016, and were reviewed by members of the Groundfish Advisory Panel in in that year and 2018. The pseudo values are transformed into Factor Scores using the same exponential transformation that is applied to commercial revenues. Continued comments and input from the recreational fishing community or state agencies regarding relative value of species among recreational fishery participants of each state will allow these weights to reflect the current priority of the recreational sector.

Table 2: Recreational importance of species by state based on the relative species desirability.

Species	CA	OR	WA
Arrowtooth flounder	-	0.5	-
Aurora rockfish	-	-	-
Bank rockfish	0.9	-	-
Big skate	0.5	-	0.5
Black rockfish	2	1.9	1.8
Blackgill rockfish	-	-	-
Blue/Deacon rockfish	1.82	1.9	1.8
Bocaccio	1.86	0.6	1.3
Brown rockfish	1.45	0.5	-
Cabezon	1.14	1.5	0.75
California scorpionfish	2	-	-
Canary rockfish	1.78	1.8	1.9
Chilipepper rockfish	1.6	-	-
China rockfish	1.06	1	1
Copper rockfish	1.65	1	1
Cowcod	1.9	-	-
Darkblotched rockfish	-	-	-
Dover sole	0.5	0.7	0.5
English sole	0.5	0.7	0.5
Flag rockfish	1.48	-	-
Flathead Sole	-	0.7	0.5
Gopher/Black and yellow rockfish	1.13	-	-
Grass rockfish	0.91	-	-
Greenspotted rockfish	1.37	-	-
Greenstriped rockfish	1	-	-
Honeycomb rockfish	1.6	-	-
Kelp greenling	1.19	0.8	0.8
Kelp rockfish	1.14	-	0.75
Lingcod	1.97	2	2
Longnose skate	-	0.5	-
Longspine thornyhead	-	-	-
Olive rockfish	1.16	0.8	
Pacific cod	-	0.5	0.6
Pacific Ocean perch	-	-	-
Pacific sanddab	0.82	0.5	-
Pacific spiny dogfish	0.3	-	-
Petrale sole	0.62	0.7	0.5
Quillback rockfish	0.82	1	1
Redbanded rockfish	0.8	-	-
Rex Sole	0.5	0.7	0.5
Rock Sole	0.65	0.7	0.5
Rougheye/Blksptd rockfish	-	-	-
Sablefish	0.5	0.7	0.7
Sand Sole	0.65	0.7	0.5
Sharpchin rockfish	-	-	-
Shortraker rockfish	-	-	-
Shortspine thornyhead	-	-	-
Speckled rockfish	1.6	-	-
Splitnose rockfish	-	-	-
Squarespot rockfish	1.8	-	-
Starry flounder	0.65	0.7	0.5
Starry rockfish	1.1	-	-
Treefish rockfish	0.7	-	-
Vermilion/Sunset rockfish	1.9	1.15	1.15
Widow rockfish	1.15	0.7	0.5
Yelloweye rockfish	1.9	1.8	2
Yellowtail rockfish	1	1.3	1.5

2.4 Tribal Importance

West Coast groundfish species are highly important to northwest coastal Tribes. The Subsistence category identified in the NMFS guidance document was expanded to include the value of Tribal fishing for both commercial sale and subsistence and ceremonial uses. The tribal fishing factor is calculated as:

$$t_s = \frac{\alpha}{\max(\text{revenue}_s)}\text{revenue}_s^{0.18} + \beta_s$$

where revenue_s is the revenue based on ex-vessel prices by species s, α is the initial factor score set equal to 7.0 and β_s is the subsistence score by species s.

Commercial revenue from landings by Tribal vessels were obtained from PacFIN concurrently with other commercial data. The calculation of the Tribal Importance scores is broken into two parts. The first component uses revenues and were transformed using the same process described above for commercial and recreational values, except that the maximum for this part of the total score is set to 7. The second component of the score (ranging from 0 to 3), represents the relative value of groundfish species to Tribal subsistence harvesters (Table 3). These species scores were refined through consultation with Tribal representatives. Continued comments/input from the Tribal community regarding subsistence scores will ensure that the scoring reflect the current prioritization of the Tribal sector.

Table 3: Subsistence score by species

Species	Score	Species	Score
Black rockfish	3.00	Bank rockfish	0
Canary rockfish	3.00	Blackgill rockfish	0
Lingcod	3.00	Bocaccio	0
Pacific cod	3.00	California scorpionfish	0
Sablefish	3.00	Chilipepper rockfish	0
Yellowtail rockfish	3.00	Cowcod	0
Big skate	2.50	Darkblotched rockfish	0
Blue/Deacon rockfish	2.50	Flag rockfish	0
Brown rockfish	2.50	Flathead Sole	0
China rockfish	2.50	Gopher/Black and Yellow rockfish	0
Copper rockfish	2.50	Grass rockfish	0
Cabezon	2.00	Greenspotted rockfish	0
Kelp greenling	2.00	Greenstriped rockfish	0
Longnose skate	2.00	Honeycomb rockfish	0
Pacific sanddab	2.00	Kelp rockfish	0
Petrale sole	2.00	Longspine thornyhead	0
Quillback rockfish	2.00	Olive rockfish	0
Rex Sole	2.00	Pacific spiny dogfish	0
Rougheye/Blksptd rockfish	2.00	Redbanded rockfish	0
Sand Sole	2.00	Rock Sole	0
Shortraker rockfish	2.00	Sharpchin rockfish	0
Starry flounder	2.00	Shortspine thornyhead	0
Widow rockfish	2.00	Speckled rockfish	0
Yelloweye rockfish	2.00	Splitnose rockfish	0
Dover sole	1.50	Squarespot rockfish	0
English sole	1.50	Starry rockfish	0
Pacific Ocean perch	1.00	Treefish rockfish	0
Arrowtooth flounder	0.00	Vermilion/Sunset rockfish	0
Aurora rockfish	0.00		

2.5 Constituent Demand and Choke Species

This Factor includes aspects of species importance that are less easily quantified through formulaic transformation of fisheries data. Constituent Demand is intended to capture elements of fishery importance that are not adequately captured by the scoring for the commercial and recreational fisheries on a coastwide basis. Four elements are currently reflected in the scoring of this component, two of which capture situations in which a species is considerably more important to a segment of the commercial or recreational fishery than is reflected in the coastwide scoring of those Factors. There are different numbers of species present in the catch of each state/fleet and all species with zero catch have been assigned an intermediate commercial or recreational state or gea rank of 57, in order to better facilitate comparison. Those are accompanied by additional columns showing the differences between the coastwide and each state's/fleet's values.

Initial evaluation of the significance of differences is indicated by values ranging generally from 2-0 for the commercial and recreational fleets, respectively. The third element provides an opportunity to elevate scores for "species of concern" that have been identified by stakeholders. One example of such concern might be rapid changes in the availability of a species to fishermen in a particular area. The final component reflects the degree to which the 5-year catch histories (used in scoring the Commercial, Recreational, and Tribal Factors) of species were reduced as a result of rebuilding, or post-rebuilding caution, in the setting of Annual Catch Limits (ACLs). Input from the Council family and public regarding areas of importance or concern relevant to this tab is encouraged. The scoring or each of the above described components generally ranges between 0-2 with higher scores indicating greater impact to either the commercial or recreational fishery.

The overall ranking for Constituent Demand and Choke Species is calculated as:

$$d_s = \text{Choke Stock}_s + \text{Commerical Importance}_s + \text{Recreation Importance}_s + \text{Rebuilding Impact on Landings}_s + \text{Industry Concern}_s$$

2.6 Abundance of Stocks, Relative to their Biomass Targets

Holding other factors constant, scheduling an assessment in the upcoming cycle will be a higher priority for a stock whose spawning biomass represents a lower percentage of that in an unfished condition, as estimated in the most recent assessment. Correspondingly, the highest scores for this Factor would be assigned to stocks that are below their Minimum Stock Size Thresholds (MSSTs, i.e., are overfished). Such cases are differentiated in the scoring by whether the spawning biomass trend is decreasing, stable, or increasing. As the ratio of current stock biomass to the unfished level increases, this Factor Score decreases. Where available, the percentage of unfished biomass estimated in the terminal year of the most recent assessment for each species is used as the basis for scoring. However, most groundfish species have not been assessed in a manner that provides an estimate of relative abundance. For those stocks, the Productivity Susceptibility Analysis (PSA) score, a measure of a species potential vulnerability to fishing pressures, has been used to assign a Factor Score (Table 4).

Scoring criteria for this factor by species are described in Table 5. Rather than basing scores for these species solely on PSA scores, it may be useful in the future to also categorize them according to the average attainment of their OFL contributions (to assemblage OFLs) over the past 10 years. The scoring criteria show the stocks ordered by PSA score (with assessment-based fraction of unfished levels) and also by the fraction of unfished level, within each of the three PSA categories used in the analysis.

Table 4: Sorted Productivity Susceptibility Analysis (PSA) score by species.

Species	PSA	Species	PSA
Starry flounder	1.02	Darkblotched rockfish	1.92
Flathead Sole	1.03	Bocaccio	1.93
Shortbelly Rockfish	1.13	Black rockfish	1.94
Butter Sole	1.18	Petrale sole	1.94
English sole	1.19	Yellowmouth Rockfish	1.96
Arrowtooth flounder	1.21	Flag Rockfish	1.97
Curlfin sole	1.23	Honeycomb Rockfish	1.97
Sand Sole	1.23	Greenspotted Rockfish	1.98
Pacific Sanddab	1.25	Big Skate	1.99
Rex Sole	1.28	Brown Rockfish	1.99
Pacific cod	1.34	Leopard Shark	2.00
Chilipepper rockfish	1.35	Yelloweye Rockfish	2.00
California scorpionfish	1.41	Blue/Deacon Rockfish	2.01
Rock Sole	1.42	Canary rockfish	2.01
Cabezon	1.48	Bank Rockfish	2.02
Longspine thornyhead	1.53	Redbanded Rockfish	2.02
Dover sole	1.54	Silvergray Rockfish	2.02
Lingcod	1.55	Sharpchin Rockfish	2.05
Kelp Greenling	1.56	Vermilion Rockfish	2.05
Calico Rockfish	1.57	Widow Rockfish	2.05
Kelp Rockfish	1.59	Tiger Rockfish	2.06
Sablefish	1.64	Blackgill Rockfish	2.08
Longnose Skate	1.68	Rosethorn Rockfish	2.09
Pacific ocean perch	1.69	Starry Rockfish	2.09
Gopher/Black and Yellow Rockfish	1.73	Aurora Rockfish	2.10
Treefish Rockfish	1.73	Speckled Rockfish	2.10
Shortspine thornyhead	1.80	Greenblotched Rockfish	2.12
Stripetail Rockfish	1.80	Cowcod	2.13
Splitnose Rockfish	1.82	Spiny dogfish	2.13
Squarespot Rockfish	1.86	Redstripe Rockfish	2.16
Olive Rockfish	1.87	Quillback Rockfish	2.22
Greenstriped Rockfish	1.88	China Rockfish	2.23
Yellowtail Rockfish	1.88	Shortraker Rockfish	2.25
Grass Rockfish	1.89	Copper Rockfish	2.27
Rosy Rockfish	1.89	Rougheye/Blackspotted Rockfish	2.27

Table 5: Scores applied based the estimated fraction of unfished relative to management targets from the most recent assessment or the PSA score for un-assessed stocks.

Score	Stock Status
1	Stock abundance is well above the target ($SB > 2 * SB_{\text{PROXY}}$).
2	Stock abundance is above the target ($2 * SB_{\text{PROXY}} \geq SB > 1.5 * SB_{\text{PROXY}}$).
3	Stock abundance is above the target ($1.5 * SB_{\text{PROXY}} \geq SB > 1.1 * SB_{\text{PROXY}}$) or abundance is unknown and vulnerability is low ($1.8 >$ PSA).
4	Stock abundance is near the target ($1.1 * SB_{\text{PROXY}} \geq SB > 0.9 * SB_{\text{PROXY}}$), or is unknown and vulnerability is intermediate ($2 >$ PSA ≥ 1.8).
5	Stock abundance is below the target ($0.9 * SB_{\text{PROXY}} \geq SB >$ MSST) and is not declining.
6	Stock abundance is unknown and the vulnerability is high (PSA > 2).
7	Stock abundance is below the target ($0.9 * SB_{\text{PROXY}} \geq SB >$ MSST) and is declining or recent trend unknown.
8	Stock is overfished ($SB \leq$ MSST) and increasing.
9	Stock is overfished ($SB \leq$ MSST) and stable.
10	Stock is overfished ($SB \leq$ MSST) and decreasing.

2.7 Rebuilding Status

This Factor provides another means of emphasizing the importance of rebuilding stocks, whose harvest amounts are commonly highly restricted. The highest possible score would be assigned to species that are being managed under rebuilding plans, whose spawning biomass is continuing to decline. The next highest score acknowledges the importance of completing the rebuilding process (stocks projected to rebuild by the next cycle) and permitting the relaxation of constraints that rebuilding has presented. Species with longer anticipated rebuilding times receive lower scores than those with shorter ones. Table 6 shows how the scores are assigned for this factor according to rebuiding status of the species.

Table 6: Scores applied based on rebuilding status.

Score	Rebuilding Status
0	Not in rebuilding
4	Projected to rebuild in over 20 years
6	Projected to rebuild within 20 years
9	Projected to rebuild within 4 years
10	In rebuilding with declining biomass trajectory

2.8 Fishing Mortality, Relative to Overfishing Limits

Analogously to stock status, it will be a higher priority to assess a stock whose fishing mortality represents a larger percentage of its Overfishng Limit (OFL), all other things being equal. The criteria are listed and illustrated in columns K and L of this tab. Fishing mortality estimates developed by the West Coast Fisheries Observer Program were averaged over the 2016-18 period, and then divided by the average OFL (or OFL contribution) for each stock over the same period, to calculate the ratio used to scoring this Factor. Average ABCs and percentages of ABC attainment are also presented for comparison, but are not used in scoring this Factor.

The scoring of this factor by species are shown in Table 7.

Table 7: Scores applied based the percent of the OFL attainment.

Score	Stock Harvest Status
1	Negligible fisheries impact on the stock (F $\leq$ 0.10*OFL).
2	Low fisheries impact on the stock (0.10*OFL $<$ F $\leq$ 0.25*OFL).
3	Moderately low fisheries impact on the stock (0.25*OFL $<$ F $\leq$ 0.50*OFL).
4	Caution because the OFL is unknown and F $\leq$ 5 mt.
5	Moderate fisheries impact on the stock (0.50*OFL $<$ F $\leq$ 0.75*OFL).
6	Caution because either the F or OFL is unknown and F $>$ 5 mt.
7	Moderately high fisheries impact on the stock (0.75*OFL $<$ F $\leq$ 0.90*OFL).
8	High fisheries impact, potential overfishing on the stock (0.90*OFL $<$ F $\leq$ OFL).
9	Mortality slightly above the OFL or the OFL contribution for the stock (OFL $<$ F $\leq$ 1.1*OFL).
10	Mortality well above the OFL or the OFL contribution for the stock (1.1*OFL $<$ F).

2.9 Ecosystem Importance

Ecosystem importance scores are intended to describe the relative importance of each species to the trophic dynamics of the California Current ecosystem. We based the ecosystem importance scores on an Ecopath model for the California Current ecosystem (**Koehn et al. 2016**). Importance scores have top-down and a bottom-up components, which are summed. First each species was matched to the corresponding functional group from the Ecopath model, and the proportional contribution of each species to the functional group was calculated using the OFL contributions from the Fishing Mortality tab.

The top-down component represents the importance of each species as a predator of managed or protected species in the California Current ecosystem. We represent this as an index of the proportion of total consumption in the ecosystem that can be attributed to each species. The

score is the product of several factors; 1) the proportion of the functional group's adult diet consisting of managed or protected species, 2) the functional group's total consumption rate (QB*B defined in Ecopath), and 3) the proportion of the functional group that consists of the species (calculated from the OFL percentages). The product is then divided by the summed total consumption of managed or protected species. We then re-scale that proportion using all the functional groups in the Ecopath model, not just groundfish, to range from 0 to 10.

The bottom-up component represents the importance of the species as a prey species to all predators in the ecosystem. We used the proportion of total consumer biomass to represent the contribution of each species. This index has been used by others to describe the importance of forage species to ecosystem dynamics (**Smith et al. 2014**) and is referred to as the 'Proportion of species available for consumption'. We calculated the index value for each species in the prioritization, using biomass from the ecopath model and attributing it to each species using the OFL percentages as we did with the top-down score. Because juvenile life stages of groundfish may be more important prey items than adult, we added apportioned biomass from the four juvenile fish groups in the Ecopath model (juvenile rockfish, juvenile flatfish, juvenile thornyhead, and juvenile roundfish) to each of the relevant species biomasses. The species biomass was divided by the total consumer biomass from the model (all functional groups summed except phytoplankton and detritus). These percentages were then scaled to the ecosystem by dividing by the most abundant consumer functional group and rescaled to range from 0 to 10.

The ecosystem factor score e_s is calculated as:

$$e_s = \frac{10 * (\text{Top Down}_s + \text{Bottom Up}_s)}{\max(\text{Top Down}_s + \text{Bottom Up}_s)}$$

The groundfish top-down scores were much higher than the bottom-up scores, illustrating that in general, the groundfish species are, on balance, more important as predators than prey in California Current ecosystem. For reference, the five highest top-down scores in Ecopath model were calculated for Pacific hake, Pacific spiny dogfish, California sea lions, sablefish, and arrowtooth flounder. The five highest bottom-up scores at the ecosystem-scale were for benthic infauna, euphausiids, mesopelagics, copepods, and epibenthic invertebrates. Pacific hake was ranked 6th for bottom-up scores.

There were two species that could not be attributed to a functional group from the Koehn et al., (**2016**) model: California scorpionfish and Pacific cod. In the absence of information, we assigned these species the median top down and bottom up scores for all groundfish that were present in the model. The top-down and bottom-up scores were combined by summing the ecosystem-scaled scores and then these scores are re-scaled to range between 0 and 10.

2.10 Relevant New Types of Information Available

As new types or sources of useful information or methods become available for a species, the potential value of conducting a new assessment for it increases. The scoring of this Factor has been broken down into three categories. The first two categories are for new sources of trend information and for information, such as length, age, maturity data, or genetic research that help inform stock structure or population dynamics in an assessment. Although these categories are intended to focus on new sources of information, some points have been assigned where there are significant amounts of new data from existing sources since the last benchmark or update assessment, as well as to species without major assessments. Points are assigned in the last category where issues or problems identified during the review of prior assessments can now be addressed through the inclusion of newly available data or methods. The scoring for each of the items included in this component are somewhat subjective. The overall scoring for this factor is calculated as:

$$n_s = \text{Trend}_s + \text{Stock Structure}_s + \text{Issues}_s$$

The categories of new information and potential scores are shown in Table 8.

Table 8: List of scoring adjustments made based on new sources of information that can be used for a new stock assessment.

Notation	Item	Score
Trend	New sources of trend information	0-2
Stock Structure	New information on stock structure or dynamics	0-3
Issues	Prior assessment issues can be addressed	0-1

2.11 Assessment Frequency

The original focus of this Factor was to quantify the extent to which a stock is "overdue" for an assessment (e.g., has it been more than the target number of years since the last assessment was conducted?). Gradually, other considerations which reflect the urgency of conducting a new assessment during the upcoming cycle have been included in the calculation of the final score for this Factor.

The first step in this process involves the calculation of a target assessment frequency for all stocks that have had a benchmark assessment. As described in the NMFS Technical Memo (**Methot et al., 2014**), the mean age of harvested fish serves as the starting point, which is then modified by a regional multiplier. In the case of U.S. west coast groundfish, there is more than a 10-fold difference among species in the mean age of fishery catch, so part of the initial adjustment serves to compress the range of the distribution to a range that is more useful for calculating target frequency. The mean age of the catch is transformed as:

$$T_s = (\bar{A}_s * 20)^{0.38}$$

where $\bar{A}$ is the mean age in the catch for stock s.

The transformed mean-age value (T_s) is then modified, based on each stock's recruitment variability (using the σ_R value from the last assessment), the overall importance to fisheries, and the ecosystem importance score, as described in the previous section. For each of these variables, a species is assigned a value of 1, 0, or -1, which is added to the scaled modified mean catch age. For recruitment variability, species with that exhibit a high degree of recruitment variability ($\sigma_R > 0.9$) receive a value of -1, low variability species ($\sigma_R < 0.30$) receive a +1, with others receiving values of zero. For the Fishery and Ecosystem Importance scores, the top-third of each receive a -1, the bottom-third a +1, and the rest zero. The combined score based on the recruitment variability r_s, fishery importance f_s, ecosystem importance e_s, and the transformed mean age T_s defining the assessment frequency recommended is calculated as:

$$F_s = \begin{cases} T_s + r_s + f_s + e_s & \text{if} < 10 \\ 10 & \text{if } T_s + r_s + f_s + e_s > 10 \end{cases}$$

where the F_s score is then rounded to near factor of 2 to align with the PFMC groundfish biennial cycle

The number of years a stock is "overdue" for assessment is calculated as the difference between the years since the last assessment and the target frequency (with a minimum value of zero). In an effort to better reflect Council selection decisions of the past decade, a value of 2 was subtracted for any stock that was assessed in the previous cycle. This makes it harder, but not impossible for a species to return directly to the top-20. The guidance in the Technical Memorandum calls for points to be added to a species after it has not been assessed by its target frequency. In order to promote assessing species by the time the target frequency has been reached, points start being added when the target frequency equals the years since the last assessment. This is calculated as:

$$\text{Target Score}_s = \begin{cases} -2 & \text{if LAY}_s - \text{NAY} = 2 \\ 0 & \text{if LAY}_s - \text{NAY} - F_s < 0 \\ \text{LAY}_s - \text{NAY} - F_s & \text{otherwise} \end{cases}$$

where LAY is the last year the stock s was assessed and NAY is the next assessment cycle year. If a stock has not had an accepted assessment to-date a score of 4 is assigned.

Several other conditional adjustments are made to initial scores. The first of these adds one point to the species if the prior assessment will be 10 years old by the next assessment year.

This element acknowledges the SSC's previously expressed preference for not endorsing model projections beyond a 10-year period. Now, with an uncertainty buffer that increases with time, this addition might need to be revisited. If, at the time of the last assessment, the SSC recommended that an Update was suitable for the next assessment and that assessment will be no more than 6 years old, one point is subtracted. This is intended to reflect the decreased need for a new assessment to be a benchmark. If a species is at or beyond its target frequency an additional point is added.

With the Council's adoption of uncertainty buffers that increase with the time since the last assessment, a new element has been incorporated to reflect concern over the degree to which upcoming catches are likely to be constrained by future ABCs. For each species, the largest of either the 2016 - 2018 average fishing mortality or that in 2018 is compared with the draft ABC (or ABC contribution) for 2022. The overall score for the Assessment Frequency Factor a_s is calculated as:

$$a_s = \text{Target Score}_s - (r_s + f_s + e_s) + \text{Assessment Age}_s + \text{Update}_s + \\ \text{Target Frequency}_s + \text{Catch}_s$$

where Assessment Age for stock s is applied if the time since the last assessment will be 10 years or greater by next assessment cycle, the Update by stock s is based on the time since the last assessment and if the STAR panel recommended an Update for the next assessment, the Target Frequency by stock s is whether the time since the last assessment is greater that the recommended target frequency T_s, and the Catch by stock s is an adjustment to reflect if catches are anticipated to be constrained in the future if the stock is not assessed in the next cycle. The potential adjustment scores for each of these items is given in Table 9.

This Factor is a key element in the ability of the process to elevate species from lower ranks to higher-priority levels in a reasonable cyclical manner. Further exploration will likely be required to achieve desirable longer-term performance. What is 'desirable' should be the topic of discussion with Council and advisory bodies. There are real limits on how many assessments of different levels of complexity and review.

Table 9: List of scoring adjustments made depending upon assessment age, the level of recommended next assessment, the target assessment frequency, and potential of future ABCs constraint.

Item	Score
Assessment Age	
Number of years since last assessment $\geq$ 10 years	1
Otherwise	0
Update	
Number of years since last assessment $<$ 6	1
Otherwise	0
Target Frequency	
Number of years since last assessment $\geq T_s$	1
Otherwise	0
Catch	
Current mortality would exceed future ABC	2
Current mortality is more than 75 percent of future ABC	1
Current mortality is less than 20 percent of future ABC	-1
Otherwise	0

3 Data availability

In order to provide guidance about the available data coastwide and by state that can be used to support an assessment the following tables are provided by species. The key sources of data evaluated are: NWFSC West Coast Groundfish Bottom Trawl Survey (WCGBTS), NWFSC Hook & Line Survey, commercial data available in PacFIN, and recreational data available in RecFIN. The NWFSC WCGBTS survey has been conducted annually since 2003 and the NWFSC Hook & Line Survey has occured on an annual basis since 2004. The commercial data was summarized for two time periods: early, 1980-2001, and recent years, 2002 - 2018. The recreational data was summarized from 2007-2018. The quantity of data available from each data sources is presented as the average same across that time period (e.g., summarized as the total samples available divided by the number of years). If samples were only collected during of a portion of the years examined the average number of samples may not be accurately reflect the true number of annual samples available for an assessment.

The types of data presented are the average number by year of lengths, otoliths collected, read ages, sexed fish, and weighed fish. The data for lengths, otoliths collected, and read ages are summarized on a coastwide level (CW), California (CA), Oregon, (OR), and Washington (WA). Evaluating these data may provide useful guidance on the ability to conduct area based assessments when appropriate. In some instances the coastwide total may not equal the totaled state average numbers due to rounding of the average sample numbers. The maturity samples collected and maturity samples read reflect a total number of fish sampled rather than an annual average. The average number of otoliths that have been collected is not currently available in a reliable fashion across all state data included in PacFIN. These data are requested from each state directly and the available numbers here may not accurately reflect the true numbers across all species and years if these data were not easily extractable at the state level.

3.1 arrowtooth flounder

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	3221	521	1463	1235	922	179	436	306	170	23	87	59	3207	884	217	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	770	0	78	691	47	0	47	0	250	0	32	218	769	0	0	0
Commercial (Recent)	2072	401	1049	622	969	38	900	31	44	0	1	42	2037	0	0	0
Recreational	6	1	5	0	0	0	0	0	0	0	0	0	0	6	0	0

3.2 aurora rockfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	1623	1333	266	23	694	502	175	16	193	141	46	4	1610	689	567	567
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	372	362	7	3	96	90	6	0	0	0	0	0	292	0	0	0
Commercial (Recent)	1778	1041	675	61	947	292	635	20	66	40	26	0	1442	0	0	0
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3.3 bank rockfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	111	102	8	0	66	63	2	0	0	0	0	0	98	68	432	30
NWFSC Hook and Line	159	0	0	0	158	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	1762	1762	0	0	939	939	0	0	230	230	0	0	1343	0	0	0
Commercial (Recent)	508	431	65	11	234	160	64	10	0	0	0	0	280	0	0	0
Recreational	39	39	0	0	0	0	0	0	0	0	0	0	0	29	0	0

3.4 big skate

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	328	125	112	90	66	22	24	19	64	21	24	18	345	85	180	180
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	5	0	5	0	0	0	0	0	0	0	0	0	5	0	0	0
Commercial (Recent)	457	72	306	78	60	0	50	10	44	0	35	9	457	0	0	0
Recreational	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3.5 black and yellow rockfish

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	353	352	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	306	304	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Recreational	677	675	2	0	0	0	0	0	0	0	0	0	0	381	0	0

3.6 black rockfish

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	599	599
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	1348	795	176	375	57	53	4	0	422	26	39	356	638	0	0	0
Commercial (Recent)	4688	558	4124	4	995	17	978	0	535	14	520	1	4108	0	0	0
Recreational	24044	8956	12521	2567	574	16	328	230	2085	0	596	1489	2568	16581	0	0

3.7 blackgill rockfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	516	502	13	0	361	348	12	0	0	0	0	0	512	361	126	126
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	1490	1460	2	27	130	130	0	0	26	26	0	0	933	0	0	0
Commercial (Recent)	1333	941	364	27	559	199	357	3	58	58	0	0	638	0	0	0
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3.8 blue rockfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	2	2	0	0	1	1	0	0	0	0	0	0	2	1	0	0
NWFSC Hook and Line	42	0	0	0	41	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	552	532	18	0	7	7	0	0	1	0	1	0	37	0	0	0
Commercial (Recent)	532	259	273	0	94	8	86	0	125	4	120	0	276	0	0	0
Recreational	12005	8421	3457	127	36	19	17	0	57	0	57	0	217	6893	0	0

3.9 bocaccio

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	527	504	8	15	325	305	6	13	179	173	1	4	492	327	837	737
NWFSC Hook and Line	1030	0	0	0	750	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	2738	2621	8	108	1900	1893	7	0	234	223	0	11	2099	0	0	0
Commercial (Recent)	609	384	162	62	243	60	157	26	6	6	0	0	351	0	0	0
Recreational	2981	2947	21	13	14	5	0	9	0	0	0	0	4	2083	0	0

3.10 brown rockfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	30	30	0	0	22	22	0	0	0	0	0	0	30	22	12	0
NWFSC Hook and Line	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	388	370	0	17	4	4	0	0	0	0	0	0	5	0	0	0
Commercial (Recent)	152	152	0	0	5	5	0	0	0	0	0	0	6	0	0	0
Recreational	4751	4732	18	1	1	1	0	0	0	0	0	0	1	2387	0	0

3.11 cabezon

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	504	408	96	0	0	0	0	0	0	0	0	0	12	0	0	0
Commercial (Recent)	925	192	732	0	5	0	5	0	20	0	20	0	388	0	0	0
Recreational	2541	927	1419	195	151	0	47	104	144	0	144	0	709	1898	0	0

3.12 California scorpionfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	172	172	0	0	75	75	0	0	5	5	0	0	165	74	0	0
NWFSC Hook and Line	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	42	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Recreational	3632	3632	0	0	0	0	0	0	0	0	0	0	0	2890	0	0

3.13 canary rockfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	723	151	241	330	451	93	161	196	340	77	115	148	704	448	1179	1169
NWFSC Hook and Line	19	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	3158	833	1232	1092	191	111	80	0	2159	85	1020	1053	2584	0	0	0
Commercial (Recent)	1756	221	1000	533	563	55	475	33	966	15	456	493	1607	0	0	0
Recreational	2762	1109	1447	206	256	9	176	71	114	0	0	114	261	2029	0	0

3.14 chilipepper

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	1932	1819	109	3	694	647	44	2	540	508	30	1	1782	695	157	157
NWFSC Hook and Line	132	0	0	0	119	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	5167	5163	4	0	3773	3772	1	0	2123	2123	0	0	4020	0	0	0
Commercial (Recent)	1398	1251	144	2	528	390	138	0	323	323	0	0	875	0	0	0
Recreational	444	443	1	0	0	0	0	0	0	0	0	0	0	311	0	0

3.15 China rockfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	263	92	171	0	0	0	0	0	2	0	2	0	167	0	0	0
Commercial (Recent)	713	73	640	0	49	0	49	0	74	0	74	0	639	0	0	0
Recreational	1966	1065	689	212	150	0	80	70	108	0	52	56	245	1101	0	0

3.16 copper rockfish

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	64	64	0	0	42	42	0	0	0	0	0	0	61	42	160	49
NWFSC Hook and Line	69	0	0	0	67	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	256	233	8	14	3	3	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	159	98	60	0	19	0	19	0	0	0	0	0	0	0	0	0
Recreational	4968	4076	757	135	214	2	147	65	20	0	0	20	211	3108	0	0

3.17 cowcod

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	44	43	0	0	43	42	0	0	29	29	0	0	40	43	217	102
NWFSC Hook and Line	41	0	0	0	40	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	142	142	0	0	0	0	0	0	4	4	0	0	30	0	0	0
Commercial (Recent)	33	32	1	0	14	13	1	0	0	0	0	0	17	0	0	0
Recreational	12	12	0	0	0	0	0	0	0	0	0	0	0	8	0	0

3.18 darkblotched rockfish

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	1891	390	954	546	813	176	427	209	666	149	350	166	1868	807	898	898
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	1470	1095	224	149	1036	996	40	0	610	561	49	0	1359	0	0	0
Commercial (Recent)	3781	1056	2185	538	1126	324	703	99	1829	282	1292	253	3515	0	0	0
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3.19 Dover sole

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	10193	4628	3551	2013	1506	745	491	269	489	242	163	83	10176	1499	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	5659	3138	1755	765	1169	1052	117	0	3349	1261	1600	488	5639	0	0	0
Commercial (Recent)	6277	2120	2962	1194	2530	469	1639	422	992	378	416	196	6124	0	0	0
Recreational	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0

3.20 English sole

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	4890	2469	1626	794	972	511	281	178	56	30	16	9	4889	964	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	3111	263	878	1969	950	553	397	0	1839	0	476	1362	3080	0	0	0
Commercial (Recent)	3504	1169	1394	940	1274	90	1082	102	534	0	45	488	3349	0	0	0
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3.21 flag rockfish

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	27	27	0	0	19	19	0	0	0	0	0	0	27	19	0	0
NWFSC Hook and Line	11	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	45	45	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	13	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Recreational	723	723	0	0	0	0	0	0	0	0	0	0	0	558	0	0

3.22 flathead sole

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	630	4	194	431	167	2	79	85	0	0	0	0	626	167	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	47	0	47	0	42	0	42	0	0	0	0	0	0	0	0	0
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3.23 gopher rockfish

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	684	684	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Commercial (Recent)	463	458	5	0	3	3	0	0	2	2	0	0	15	0	0	0
Recreational	5246	5241	5	0	0	0	0	0	0	0	0	0	1	2866	0	0

3.24 grass rockfish

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	164	153	11	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	199	167	32	0	0	0	0	0	0	0	0	0	0	0	0	0
Recreational	323	316	7	0	0	0	0	0	0	0	0	0	0	214	0	0

3.25 greenspotted rockfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	460	398	59	2	256	208	46	2	44	44	0	0	445	256	175	175
NWFSC Hook and Line	276	0	0	0	271	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	501	500	1	0	46	45	1	0	0	0	0	0	0	0	0	0
Commercial (Recent)	163	139	24	0	38	14	24	0	0	0	0	0	0	0	0	0
Recreational	1093	1093	0	0	0	0	0	0	0	0	0	0	1	758	0	0

3.26 greenstriped rockfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	2386	819	959	607	657	267	238	152	213	84	79	49	2332	642	73	73
NWFSC Hook and Line	43	0	0	0	42	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	393	228	67	97	58	49	9	0	0	0	0	0	0	0	0	0
Commercial (Recent)	649	100	320	228	331	12	296	23	0	0	0	0	0	0	0	0
Recreational	160	148	7	5	4	0	0	4	0	0	0	0	3	118	0	0

3.27 honeycomb rockfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	17	17	0	0	10	10	0	0	0	0	0	0	17	10	0	0
NWFSC Hook and Line	12	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Recreational	902	902	0	0	0	0	0	0	0	0	0	0	4	733	0	0

3.28 kelp greenling

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	49	2	35	11	38	2	25	10	0	0	0	0	49	38	8	8
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	381	168	213	0	0	0	0	0	0	0	0	0	267	0	0	0
Commercial (Recent)	1872	61	1810	0	26	0	26	0	19	0	19	0	1872	0	0	0
Recreational	2808	670	1890	248	245	0	199	46	228	0	157	71	974	2014	0	0

3.29 kelp rockfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	42	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	29	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Recreational	880	880	0	0	0	0	0	0	0	0	0	0	0	677	0	0

3.30 lingcod

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	1549	804	444	299	821	411	252	157	310	141	107	60	1458	813	1325	760
NWFSC Hook and Line	51	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	1979	423	388	1167	124	0	124	0	1337	151	191	995	1883	0	0	0
Commercial (Recent)	2439	473	1545	419	151	0	109	42	491	27	212	250	2381	0	0	0
Recreational	14740	6181	7391	1168	1023	21	749	253	669	0	198	471	6332	10491	0	0

3.31 longnose skate

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	2972	1697	797	477	129	67	42	20	0	0	0	0	3363	306	508	508
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	83	0	83	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	1698	490	813	394	311	0	273	38	0	0	0	0	0	0	0	0
Recreational	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

3.32 longspine thornyhead

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	6452	3881	1743	827	853	530	214	109	0	0	0	0	3769	847	31	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	3543	2441	1084	17	918	141	777	0	1	0	1	0	2048	0	0	0
Commercial (Recent)	5457	3749	1406	301	1104	3	1097	4	0	0	0	0	2913	0	0	0
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3.33 olive rockfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
NWFSC Hook and Line	34	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	75	75	0	0	3	3	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	15	15	0	0	3	3	0	0	0	0	0	0	0	0	0	0
Recreational	2106	2104	2	0	7	7	0	0	0	0	0	0	0	1115	0	0

3.34 Pacific cod

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	236	0	16	218	77	0	5	71	0	0	0	0	235	77	51	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	2311	0	0	2311	0	0	0	0	43	0	0	43	2038	0	0	0
Commercial (Recent)	963	1	206	755	235	0	194	41	52	0	0	52	946	0	0	0
Recreational	5	0	2	3	2	0	0	2	0	0	0	0	2	3	0	0

3.35 Pacific ocean perch

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	842	7	360	474	520	7	251	261	263	4	126	133	824	512	583	583
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	2323	0	1012	1310	535	44	491	0	1007	0	228	778	2310	0	0	0
Commercial (Recent)	2166	0	1594	572	955	24	852	79	932	0	601	331	2150	0	0	0
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3.36 Pacific sanddab

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	5138	3032	1455	650	817	476	231	109	501	296	142	62	5110	816	0	0
NWFSC Hook and Line	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	130	0	130	0	65	0	65	0	61	0	61	0	125	0	0	0
Commercial (Recent)	1849	1174	674	0	623	141	482	0	173	43	129	0	1711	0	0	0
Recreational	2988	2914	74	0	0	0	0	0	0	0	0	0	530	1823	0	0

3.37 Pacific spiny dogfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	1904	988	238	678	583	288	111	183	36	17	7	11	1902	577	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	43	0	0	43	0	0	0	0	0	0	0	0	43	0	0	0
Commercial (Recent)	1059	18	132	908	49	0	0	49	210	0	0	210	766	0	0	0
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3.38 petrale sole

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	4176	1868	1432	876	1202	533	393	275	784	394	231	159	4172	1192	545	394
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	955	232	442	281	711	625	86	0	608	83	308	217	949	0	0	0
Commercial (Recent)	5803	2385	2117	1300	1472	144	1304	24	1316	104	485	726	5446	0	0	0
Recreational	259	109	148	2	0	0	0	0	1	0	0	1	1	239	0	0

3.39 quillback rockfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	12	1	5	5	10	1	4	4	0	0	0	0	12	10	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	163	98	20	44	0	0	0	0	0	0	0	0	39	0	0	0
Commercial (Recent)	172	29	134	9	57	2	53	2	7	0	7	0	142	0	0	0
Recreational	1584	330	1048	206	347	0	215	132	28	0	28	0	362	1042	0	0

3.40 redbanded rockfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	187	43	89	54	176	42	83	50	0	0	0	0	182	175	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	179	88	1	89	28	26	2	0	0	0	0	0	116	0	0	0
Commercial (Recent)	1406	237	604	563	898	86	568	244	15	0	15	0	1313	0	0	0
Recreational	2	0	1	1	1	0	0	1	0	0	0	0	0	1	0	0

3.41 rex sole

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	8259	3147	3511	1600	606	261	228	116	0	0	0	0	8237	710	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	1243	0	1175	68	1081	69	965	47	0	0	0	0	0	0	0	0
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3.42 rock sole

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	23	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	94	56	38	0	42	5	37	0	0	0	0	0	0	0	0	0
Recreational	58	55	3	0	0	0	0	0	0	0	0	0	0	36	0	0

3.43 rougheye rockfish

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	288	5	27	255	9	0	9	0	0	0	0	0	163	0	0	0
Commercial (Recent)	2187	51	847	1288	1252	21	764	467	88	0	40	48	2128	0	0	0
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3.44 sablefish

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	4559	2384	1518	656	1947	991	654	301	1245	629	416	199	4475	1967	978	876
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	5923	2273	1681	1967	1027	0	1027	0	1259	507	605	146	3101	0	0	0
Commercial (Recent)	11694	4521	3685	3488	3042	0	2859	183	1394	351	674	368	6236	0	0	0
Recreational	125	3	99	23	11	0	0	11	0	0	0	0	14	102	0	0

3.45 sand sole

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	56	16	35	4	27	14	11	1	0	0	0	0	56	27	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	8	1	1	5	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	394	201	193	0	184	2	182	0	0	0	0	0	0	0	0	0
Recreational	95	41	54	0	0	0	0	0	0	0	0	0	0	76	0	0

3.46 sharpchin rockfish

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	1075	171	502	401	438	80	186	171	0	0	0	0	1062	431	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	339	196	44	98	22	22	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	191	5	90	95	98	2	88	8	0	0	0	0	0	0	0	0
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3.47 shortraker rockfish

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	2	0	1	0	2	0	1	0	0	0	0	0	2	2	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	43	0	4	39	5	0	5	0	0	0	0	0	29	0	0	0
Commercial (Recent)	278	2	148	127	217	0	146	71	1	0	1	0	273	0	0	0
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3.48 shortspine thornyhead

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1350	737
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	1698	1240	429	28	387	387	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	5665	3146	1674	844	13	7	0	6	0	0	0	0	0	0	0	0
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3.49 speckled rockfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	15	15	0	0	7	7	0	0	0	0	0	0	15	7	0	0
NWFSC Hook and Line	216	0	0	0	209	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	120	120	0	0	10	10	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	18	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Recreational	644	644	0	0	0	0	0	0	0	0	0	0	0	477	0	0

3.50 splitnose rockfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	2875	1751	918	206	694	398	235	60	181	98	63	20	2521	681	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	1632	1564	31	36	472	468	4	0	74	74	0	0	1309	0	0	0
Commercial (Recent)	1524	803	583	137	762	170	571	21	0	0	0	0	1149	0	0	0
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3.51 squarespot rockfish

	Lengths				Otoliths				Ages							
Data Source	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA	Sexes	Weights	Maturity Collected	Maturity Read
NWFSC WCGBTS	243	243	0	0	70	70	0	0	0	0	0	0	203	70	118	118
NWFSC Hook and Line	92	0	0	0	88	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Recreational	1109	1109	0	0	0	0	0	0	0	0	0	0	1	829	0	0

3.52 starry flounder

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	28	22	4	1	24	19	3	1	0	0	0	0	28	24	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	116	0	8	107	10	0	10	0	0	0	0	0	0	0	0	0
Commercial (Recent)	332	171	161	0	156	3	153	0	0	0	0	0	0	0	0	0
Recreational	44	33	8	3	0	0	0	0	0	0	0	0	0	32	0	0

3.53 starry rockfish

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	3	3	0	0	3	3	0	0	0	0	0	0	3	3	0	0
NWFSC Hook and Line	113	0	0	0	108	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	198	198	0	0	3	3	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	21	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Recreational	2030	2030	0	0	0	0	0	0	0	0	0	0	4	1242	0	0

3.54 tree rockfish

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NWFSC Hook and Line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial (Recent)	29	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Recreational	695	695	0	0	0	0	0	0	0	0	0	0	0	542	0	0

3.55 vermilion rockfish

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	149	149	0	0	102	101	0	0	0	0	0	0	141	101	0	0
NWFSC Hook and Line	1436	0	0	0	1141	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	631	622	8	0	19	19	0	0	5	5	0	0	40	0	0	0
Commercial (Recent)	405	291	114	0	102	8	94	0	11	0	11	0	129	0	0	0
Recreational	8704	7910	716	78	185	5	130	50	0	0	0	0	174	5892	0	0

3.56 widow rockfish

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	250	93	96	60	157	62	63	32	156	61	62	32	249	158	306	0
NWFSC Hook and Line	48	0	0	0	47	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	7023	2458	2751	1814	2896	1880	1016	0	5353	1694	1885	1773	6735	0	0	0
Commercial (Recent)	2296	273	1250	773	817	140	615	62	1019	61	471	486	2085	0	0	0
Recreational	947	428	291	228	5	1	0	4	179	0	0	179	196	450	0	0

3.57 yelloweye rockfish

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	49	6	22	19	49	6	22	19	5	1	3	1	49	48	221	97
NWFSC Hook and Line	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	322	202	54	65	5	5	0	0	13	0	1	11	79	0	0	0
Commercial (Recent)	73	1	29	42	22	0	19	3	44	0	9	34	68	0	0	0
Recreational	122	52	66	4	10	10	0	0	2	0	0	2	2	50	0	0

3.58 yellowtail rockfish

Data Source	Lengths				Otoliths				Ages				Sexes	Weights	Maturity Collected	Maturity Read
	CW	CA	OR	WA	CW	CA	OR	WA	CW	CA	OR	WA				
NWFSC WCGBTS	967	102	169	695	489	43	94	350	64	6	15	43	963	481	726	363
NWFSC Hook and Line	95	0	0	0	82	0	0	0	0	0	0	0	0	0	0	0
Commercial (Early)	5755	1019	2005	2730	488	465	23	0	4701	354	1911	2435	5169	0	0	0
Commercial (Recent)	3496	164	1737	1594	333	58	254	21	2181	21	1125	1034	3137	0	0	0
Recreational	7085	4303	2130	652	7	7	0	0	390	0	0	390	477	3260	0	0

4 Assessment Calendar

5 Stock Assessment History

Table 10: History of assessment since 2003 for West Coast groundfish stocks where F = full assessment, U = update assessment, DM = data moderate assessment, and dr = data report. A * indicates an assessment that was rejected by the SSC.

Species	2003	2005	2007	2009	2011	2013	2015	2017	2019	Status
Arrowtooth Flounder			F				DM*	U		0.87
Aurora rockfish						F				0.64
Big Skate									F	0.79
Black rockfish										0.47
N (WA)	F		F				F			0.43
S (OR and CA)	F		F							
OR							F			0.60
CA							F			0.33
Blackgill rockfish (S. of 40 10' N. lat.)		F			F			U		0.39
Blue/deacon rockfish										0.42
OR								F		0.69
CA (N of Pt. Conception)			F					F		0.37
Bocaccio (S. of 40 10')	F	U	F	F	U	U	F	U		0.49
Brown rockfish						DM				0.42
Cabezon										0.56
OR	F*			F					F	0.53
CA	F	F		F						
S. CA									F	0.49
N. CA		F		F					F	0.65
Cal. scorpionfish (S. of 40 10' N. lat.)		F						F		0.54
Canary rockfish		F	F	U	U	dr	F			0.56
Chilipepper rockfish (S. of 40 10' N. lat.)			F				U			0.64
China rockfish										0.49
N. of Cape Mendocino						DM				
S. of Cape Menocino						DM				
North (WA)							F			0.73
Central							F			0.62
South							F			0.30
Copper rockfish						DM				0.59
Cowcod	U	F	F	U	dr	F	dr	dr	F	0.57
Darkblotched rockfish	U	F	F	U	U	F	F	U		0.40
Dover sole		F			F					0.84
English sole		F	U			DM				0.89

Continued on next page

Table 10: History of assessment since 2003 for West Coast groundfish stocks where F = full assessment, U = update assessment, DM = data moderate assessment, and dr = data report. A * indicates an assessment that was rejected by the SSC.

Species	2003	2005	2007	2009	2011	2013	2015	2017	2019	Status
Gopher/Black and Yellow rockfish		F							F	0.44
Greenspotted rockfish										0.35
N. of Pt. Conception					F					
S. of Pt. Conception					F					
Greenstriped rockfish				F						0.81
Kelp greenling										
OR		F					F			0.80
CA		F*								
Lingcod										0.49
N. of 40 10' N. lat.	F	F		F				F		0.58
S. of 40 10' N. lat.	F	F		F				F		0.33
Longnose skate			F						F	0.57
Longspine thornyhead		F				F				0.75
Pacific ocean perch	F	U	U	U	F	dr	dr	F		0.77
Pacific sanddabs						F*				
Pacific hake/whiting		F	F	F	F	F	F	F		0.72
Petrale sole		F		F	F	F	U		U	0.39
Rex sole						DM				0.80
Rougheye/blackspotted rockfish						F				0.47
Sablefish		F	F		F		U		F	0.39
Sharpchin rockfish						DM				0.68
Shortbelly rockfish			F							0.73
Shortspine thornyhead		F				F				0.74
Spiny dogfish					F					0.63
Splitnose rockfish				F						0.66
Starry flounder										0.50
North (WA/OR)		F						DP		
South (CA)		F						DP		
Stripetail rockfish						DM				0.78
Widow rockfish		F			F		F		U	0.92
Yelloweye rockfish		U	U	F	U	dr	dr	F		0.28
Yellowtail rockfish										
N. of 40 10' N. lat.	U	U				DM		F		0.75
S. of 40 10' N. lat.								F*		