DATA AND ANALYSIS SUPPORTING THE PRIORITIZATION OF SPECIES FOR STOCK ASSESSMENTS IN 2019 AND 2021

The Pacific Fishery Management Council (Council) has for many years undertaken a deliberative process throughout the spring of even-numbered years to identify fish stocks that would be assessed during the following year. Over the years, the Council reviewed an increasing array of information related to the importance of assessing each species in the next cycle. In August 2015, the National Marine Fisheries Service published a Technical Memorandum, entitled "Prioritizing Fish Stock Assessments" [https://www.st.nmfs.noaa.gov/Assets/stock/documents/PrioritizingFishStockAssessments_FinalWeb.pdf] , which described a framework for a more consistent and thorough approach for making such decisions in all regions.

This framework, which included all of the stock/fishery metrics previously considered by the Council, along with some new ones, was initially discussed with the Council in the fall of 2015. Subsequently NMFS staff assembled data pertaining to each of the "Factors" into an Excel workbook that was reviewed with the Council and/or Advisory Bodies during the March, April, and June Council meetings of 2016. An updated version of that workbook, in electronic form (H.4_Att2_NMFS_Prioritzation_Workbook_MAR2018BB), accompanies this document. All of the data directly used in scoring have been updated and in a few cases, formulas for transforming the data have been modified slightly from those used in 2016.

This prioritization framework is intended to help in synthesizing a broad range of relevant information in a manner that can more clearly identify which species should be considered for Benchmark (i.e. Full) assessments, or subsequent Updates. The ranking process provides a useful tool for focusing discussion on species where new assessments may have the greatest potential to enhance fishery benefits or reduce the potential for future fishery losses, but it is not intended to replace the discussion and deliberation that are such beneficial elements of the Council process. It is, in fact, through thoughtful review and discourse, that improvements to the framework can be identified.

An important consideration for selecting any species for assessment is whether the (potentially) available data (e.g. trend and compositional data) are adequate to conduct the desired level of assessment. This aspect of prioritization is not scored as 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 workbook should still be considered as 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 processes by which Factor Scores are derived or weighted may not yet yield rankings that reflect the best judgments of the Council's outstanding consensus process. As consideration of priorities for 2019 are considered this spring it will be important to identify any important disconnects and discuss means of improving the implementation of the framework.

The Excel workbook that accompanies this document begins with an Overview tab, followed by one listing species that are included in or excluded from the detailed data analysis, along with some supporting documentation, and a Summary tab in which the Factor Scores are assembled and multiplied by a set of weights, resulting in a total score and ranking. Following the Summary tab, there is a series of tabs that document the development of each Factor Score New this year is an implementation of the Ecosystem Importance Factor, identified in the NOAA Tech. Memo, which was abandoned last cycle, due to a lack of time and clear vision for scoring ecosystem importance. Descriptions of the content and issues associated with each tab, along with the source of data and information used in scoring each Factor, are provided below.

Descriptions of Excel workbook Tab contents

Overview

The Overview tab includes a table which lists all of the Factors, the information source(s) and basis for scoring each Factor. The scoring approach or formula, if applicable, is presented to the right of a Factor. As noted above, the Ecosystem Importance Factor has now been included, and also contributes, to the determination of assessment frequency. The Non-Catch Value Factor has been removed, since it did not appear to provide a meaningful and quantifiable means for differentiating species. The graphs containing stock trends from the trawl survey and prior assessments, provided in the Trends tab, have not yet been updated since 2016. Additional or updated graphs (through 2016) will be among the supplemental materials submitted prior to the March Council meeting. Trawl survey data for 2017 are not expected to be available until later in the spring, but should be available in time for inclusion in the final package for the June meeting.

Species

The purpose of the Prioritization exercise is to identify species that are strong candidates for a benchmark or update assessment during the next two cycles (2019 and 2021), or potentially an intermediate-level assessment. In order to qualify as a strong candidate, a stock should have at least some fishery importance and sufficient data to provide useful indices and compositional information for an assessment. While periodic review of fishing mortality, to

determine if a dire situation might elevate the importance of assessing a species, should be conducted, paring down the number of species on which the Council family should focus is of considerable value. Even with the exclusion of species that have little fishery importance, and in most cases little data with which to conduct an age-structured assessment, well over half of the species in the FMP have been retained for detailed review and evaluation (58 this cycle vs 71 last cycle).

The upper section of the Species tab lists the species which are included on every subsequent tab in the workbook. In an effort to allow the Council family to evaluate the appropriateness of this prescreening, a summary of various data elements are presented which bear on the importance and ability to assess the excluded species. These data include a 3-year average of fishing mortality and OFL (or OFL contribution) attainment, significance to commercial and recreational fisheries, a summary of commercial and recreational samples (length and age structures), as well as a metric of the adequacy of commercial length sampling, and a 4-year summary of average encounter rates and sample collection aboard NWFSC trawl surveys.

We have conducted at least one Benchmark or Update assessment for 35 species since 2005, although the most recent assessments for two of those have been data-limited. Even with an increased use of Updates in the future, it is not clear how many species can be provided age-structured assessments, while maintaining *no more than* a 6-10-year cycle for previously-assess species. There are certainly 'interesting' cases among the excluded species, but few of them seem likely to generate sufficient interest to support an assessment with a STAR Panel review.

Commercial Importance

The commercial importance score is based on the coastwide ex-vessel revenue generated by commercial landings of groundfish during the period 2012-16. The raw revenue amounts have a very large range (from $0 to $118 million) and so a transformation is used to compress the distribution and reduce the differences between species. In the 2016 prioritization analysis, a 2-stage logarithmic transformation was used to compress the distribution and rescale so that the largest score was equal to 10. This approach led to a very slow drop-off in scores with decreases in revenue. For example revenues equal to 10% and 1% of the largest amount received scores of 8 and 6. A revised approach is proposed this cycle, in which the revenue amount is exponentiated to the 0.18 power [$Initial_Value_i=Revenue_i)^{(0.18)}$], with a simple multiplicative scalar used to achieve a maximum score of 10 [$Score_i=Initial_Value_i * 10/(Initial_Value_{MAX})$]. In contrast to the 2016 approach, species with revenue 10% or 1% of the largest amount would receive scores of 6.61 and 4.37. All commercial revenue data were obtained from PacFIN on 1/16/2018, using the online Explorer Tool. Revenue amounts included in this tab's scoring do not include sales of Tribally-caught groundfish. Those are included in the Tribal tab. Since Pacific hake is not included in this exercise, sablefish is the

top-scoring commercial groundfish, followed by Dover and petrale soles, shortspine thornyhead, and lingcod.

Recreational Importance

Recreational landings lack a measure of value that is equivalent to commercial ex-vessel revenue. In the absence of an equivalent metric, the approach implemented in 2016 relied on calculation of a "pseudo value" for the recreational landings of each species, which is calculated by multiplying landed catch amounts in each state by a set of state-specific relative weights, which serve the same function as prices. These weights were initially developed in collaboration with the state recreational representatives to the GMT in 2016. Additional input on the ranks and values of these weights was requested of the recreational representatives on the GAP that year. No additional solicitation of comments on the state weights for species was conducted this winter, however, input received at the March 2018 meeting, or soon thereafter, can be incorporated into the package supporting the Council's final selection in June. The pseudo values are transformed into Factor Scores using the same exponential transformation that is applied to commercial revenues in the previous tab. To the right of the main data section in this tab, the state-specific weights for species are listed in descending order. Amounts of retained recreational catch during the period 2012-16 were extracted from the RecFIN database on 1-5-2018. The top-scoring recreational species is black rockfish, followed by lingcod, vermillion/sunset rockfish, blue/deacon rockfish and California scorpionfish.

Tribal Importance

Because of the importance of Tribal use of west coast groundfish species, the Subsistence category identified in the NMFS guidance document was expanded to include all Tribal fishing. Commercial revenue from landings by Tribal vessels was obtained from PacFIN concurrently with other commercial data. Those values were transformed using the process described above for commercial revenues, but to a maximum value of 7 [$Score_i = Initial\_Value_i * 7/(Initial\_Value_{MAX})$]. The second part of the score (ranging from 0 to 3), representing the relative value of groundfish species to subsistence harvesters, was then added to produce a total Tribal Factor Score. Species that are important for subsistence users were initially identified using results from a survey conducted in support of an earlier habitat assessment initiative. Those initial scores were then submitted to Tribal representatives for review and modification. No further review was requested prior to the March 2018 Council meeting, but further comments are welcome. The top-scoring species for Tribal importance is sablefish, followed by yellowtail rockfish, Pacific cod, petrale sole, and lingcod.

Constituent Demand and Choke Species

This Factor includes two 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 commercial or recreational sub-area or sub-fleet than is reflected in the coastwide scoring of those Factors. Scoring and ranks for the coast and sub-area/fleets which support these determinations are shown to the right of Column G in this tab, along with additional columns in which the differences between the coastwide and sub-area/fleet values are shown. Initial evaluation of the significance of differences is indicate by'*' and '#' symbols in Column F, for the commercial and recreational fleets, respectively. Additional points were added to recently-rebuilt stocks whose near-term value to fisheries is considerably greater than is reflected by their 2012-16 catch histories on which fishery importance scores are based. These additions are represented by a '$'. The last element (represented by '@') adds consideration where fishing industry concern was expressed for a species during the 2016 process. Input from the Council family and public regarding areas of importance or concern relevant to this tab is encouraged. The symbols assigned to Column F have been assigned 1 point each towards the Constituent Demand score, which is shown in Column E.

Choke-species scores are intended to capture the degree to which unavoidable bycatch of a stock acts as a constraint on the catch of other healthy species. The highest component scores for Choke species are assigned to rebuilding species. Higher scores reflect the need for greater effort by management or fishermen to restrict or modify fishing behavior/gear, resulting in higher harvesting or management costs and/or reduced harvest of co-occurring stocks. The overall Factor Score is the sum of the component scores for Choke Stock and Constituent Demand.

Rebuilding Status

This Factor provides another means of emphasizing the importance of rebuilding stocks, whose harvest amounts are commonly highly restricted. The highest score is assigned to species that are being managed under rebuilding plans and where 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. Finally, since there is a lag between completing rebuilding and the effects on the stock's harvest levels, a score of 3 is provided to such stocks, as compensation.

This scoring of this Factor is informed by assessment results, rebuilding analyses, and fishing mortality estimates.

Non-Catch Value

In 2016, the workbook included a tab to include resource values that are not linked to

consumptive use. However, the only traditional form of non-consumptive value which provided any basis for differentiating species was tied to *in situ* viewing of fish resources. Discussions with advisors in 2016 provided a broad consensus that the economic contributions to this region from scuba and snorkeling that are closely tied to viewing groundfish are minute, compared to the fishery values and other factors included in the analysis. Last cycle, this Factor received only 1% of the overall weighting. For 2018, this Factor was removed from the analysis.

Relative Stock Abundance

Holding other factors constant, scheduling an assessment in the upcoming cycle will be a higher priority for a stock that is more depleted than for a less depleted one, as estimated in the most recent assessment. Correspondingly, the highest scores for this Factor are assigned to stocks that are below the Minimum Stock Size Threshold (MSST), i.e. 'overfished'. Such cases are differentiated in the scoring by whether the spawning biomass trend is decreasing (10), stable (9), or increasing (8). As the ratio of current stock biomass to the unfished level increases, this Factor Score decreases. Depletion in the terminal year of the most recent assessment for each species was 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 PSA (or Vulnerability) score has been used to assign a Factor Score, with the most vulnerable receiving a score of 6, and the lowest assigned a score of 3. Scoring criteria are described and illustrated in columns G and H. The scoring criteria for this Factor were expanded from those listed in the Tech Memo, as part of increasing the maximum score to 10 points. To the right of the scoring criteria, two sets of columns show the stocks ordered by PSA score (with assessment-based depletion levels) and also by depletion level, within each of the three PSA categories used in the analysis. As demonstrated in the last set of columns, it is a tremendous credit to the Council that the most recent assessment for every groundfish species (that has been assessed with an age-structured model) has estimated the spawning potential to exceed the Minimum Stock Size Threshold in the assessment's terminal year, and that the average depletion ratio for even the most vulnerable group of assessed species is estimated to be 50%.

Relative Fishing Mortality

In a similar fashion to stock status reasoning, it will be a higher priority to assess a stock whose fishing mortality represents a larger percentage of its Overfishing Limit (OFL), all other things being equal. Here, again, the scoring criteria were expanded from those listed in the Tech Memo, to better capture varying levels of concern that might arise due to harvest. Those criteria are listed and illustrated in columns I and J. Fishing mortality estimates developed by the West Coast Fisheries Observer Program were averaged over the 2014-16 period, and then divided by the average OFL (or OFL contribution) for each stock over the same period, to calculate the ratio used to score this Factor.

For the group of species that had individual OFLs, petrale sole had the highest ratio of fishing mortality to OFL over this period, at 89%. Of the species managed as part of assemblages, the only one with an OFL contribution greater than 35 mt than was near its OFL contribution was vermillion/sunset rockfish, which exceeded its by 7%, or 19 mt, over the 3 years. Squarespot rockfish mortality nearly doubled its 11 mt OFL contribution and received the highest score for this Factor. A number of species, many with no, or very small, OFL contributions also had small tonnage overages. Most of these were among the species removed from the detailed prioritization analysis.

Ecosystem Importance

This Factor is new to the analysis this cycle. 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 a top-down and a bottom-up component, 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 describes the importance of the 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 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), 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 describes the importance of the species as a prey species to 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). This is labeled as the 'Proportion of species available for consumption', in the spreadsheet. 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.

We combined the top-down and bottom-up scores by summing the ecosystem-scaled scores. Last, we re-scaled the summed ecosystem importance score to range between 0 and 10. The top-down scores were higher for the groundfish than the bottom-up scores, which meant that the top-down scores were more influential in determining the total ecosystem importance score.

There were two species that could not be attributed to a functional group from the Koehn et al. 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 groundfish top-down scores were much higher than the bottom-up scores, illustrating that in general, the groundfish species are likely more important as predators than prey in California Current ecosystem. For reference, the five highest top-down scores in Ecopath model were calculated for Hake, Dogfish, 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. Hake was ranked 6th for bottom-up scores.

Relevant New Type of Information Available

As new types/sources of useful information or methods become available for a species, the value of conducting a new assessment for it increases. The scoring of this Factor has been broken down into four categories. The first involves the Bayesian prior for the steepness parameter used to inform stock productivity in rockfish assessments, which increased steadily from 2005 through 2011, and has been fairly stable since. Many of the stocks that received the most points in this category 2 years ago were assessed in 2017. In 2016, only stocks that had previous assessments that used a steepness prior received points in the category. Smaller point amounts have been awarded to previously unassessed rockfish, this cycle, based on the potential for any future assessments to benefit from the availability of this prior information.

The next two categories are for new sources of trend information and for information, such as length, age, or maturity information 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, as well as to species without major assessments. Points are assigned in the last category where issues/problems identified during the review of

prior assessments can now be addressed through the inclusion of newly available data or methods. This Factor includes information from prior assessments, summaries of composition and other data collected from surveys and fisheries, along with review statements by STAR Panels or the SSC.

Assessment Frequency (Years since last assessment, relative to Target Frequency**)**

This Factor is focused on trying to quantify the extent to which a stock is "due" or "overdue" for an assessment, in a manner that reflects the urgency of conducting an assessment during the upcoming cycle. This Factor is dictates the ability of the process to elevate species from mid-lower ranks to higher ones in a desirable, cyclical manner across several biennial periods. Even if all of the other Factor scores remain the same, ideally the scoring and weighting of this Factor lead to lower ranks for stocks that have recently been assessed, allowing other species to rise into the selection spotlight. This functionality assumes greater importance this year, as the Council begins to look forward to the following cycle (2021), in an effort to increase the lead-time for addressing data needs for future assessments. In order to improve cycling performance, and avoid having the same group of species routinely ranked in the top 15 or 20 species, this Factor was modified more than others since 2016.

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 Tech Memo, the mean age of harvested fish serves as the starting point, which is then modified by a regional multiplier. In the case of Pacific coast groundfish, there is more than a 10-fold difference in the mean age of fishery catch, so part of the initial adjustment serves to compress the range of the distribution to that it is more useful for calculating target frequency.

This transformed mean-age value is then modified, based on each stock's recruitment variability (using the sigma-R value from the last assessment), the overall importance to fisheries (using the weighted sum of Fishery Factor Scores, as shown in columns R-U of the Factor Summary tab), 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 modified mean catch age. For recruitment variability, species with sigma-R values greater than 0.9 exhibit a high degree of variability, and receive a value of -1. Low variability species (with sigma-R values below 0.3) 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 sum of these adjustments appears in Column K, and is rounded to the nearest 2 years in Column L. In order to promote turnover of the species appearing in the overall top-15, no species was assigned a target frequency of less than 4 years. This is a change from last cycle. The initial score is calculated as the difference between the years since the last assessment and the target frequency (with a minimum or zero).

The guidance in the Tech Memo calls for points to be added to a species once its years since

the last assessment exceeds its target frequency. In order to promote assessing species at their target frequencies, points now start accumulating when the target frequency equals the years since the last assessment. 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 in the first cycle after having been assessed.

In the process of calculating the scientific-uncertainty buffer which separates the ABC from the OFL, the element describing assessment uncertainty (sigma) has been used in a manner that ignores the age of the assessment. The SSC began reviewing research in August 2017 related to determining how much this uncertainty increases over time, due to events that were unknown at the time of the assessment. This research continues and it is anticipated that the SSC will recommend an approach for increasing sigma with assessment age, at least by the time the next annual specifications process begins. Not knowing what form those increases will take, a point was added to the score of all species whose last assessment was no more recent than 2009.

Finally, discussions with Council staff identified another potential source of relevant information bearing on the urgency with which a new assessment might be needed for a species. As part of its review of each assessment, the SSC routinely comments on whether the next assessment for that species can be an update, or should be a full assessment. Normally, an 'update' recommendation implies that there were no major structural or data issues that could not be addressed during the review. Sometimes a recommendation that a 'full' come next may mean that it has simply been quite a while since there was an opportunity to rebuild the assessment from the ground up, and fine-tune the functioning of all elements. In other cases, however, particularly when a full assessment has just been reviewed, the judgment that the next assessment should also be a benchmark reflects the presence of unresolved data and/or modeling issues that will require the focus and freedom afforded a full assessment. Accordingly, the recognition that an assessment was highly uncertain, or that some aspects of the model did not fit harmoniously with others, or that aspects of the data require additional work, carries the concern that the next assessment could result in notably different status and harvest conclusions. Based on this rationale, 1 point was subtracted from the score of all Update-next species, as long as the last assessment was less than 6 years old.

Following all of these modifications to the base scores, a stock's score is capped at a value of 10.

Species that have either never received a benchmark assessment, or those where the SSC has rejected the benchmark (either at the time, or later) are treated differently, since there usually is no existing basis for knowing the mean age of the catch. As in 2016, all of these stocks

were assigned a score of 4. Because all of these stocks had both Fishery and Ecosystem Importance modifiers this cycle, a new approach utilizing this information was implemented. Accordingly, the sum of these two modifiers was subtracted from the base value of 4 points for these species. For example, a stock in the upper-third of both would have a score of 6 (Pacific cod), while one in the bottom-third would have a score of 3. Histograms of target frequency and Factor Scores are provided to the right of the Ranks, in this Tab.

Further exploration will likely be required to achieve desirable, longer-term performance. However, what constitutes 'desirable' performance should be the topic of discussion for the Council and its advisors. There are real limits on how many assessments of different levels of complexity and review. Transitioning to an assessment mix which contains a larger share of more-expeditious Update and Data-Moderate assessments may require changes in Terms of reference that permit more assessment freedom than is currently afforded. What are the expectations for how frequently species will be assessed? How many assessments of various types will the Council family satisfied with? Given recent experience, future reliance on a benchmark-heavy process will almost certainly result in a reduction in the number of species that have assessments that are better than data-poor and no more than 10 years old.

Trawl Survey Trends

This section has not yet been updated since 2016. An update including 2016 data will be submitted as part of a supplemental package for the March meeting. Data from 2017 are expected to be available in time for inclusion in the final package for June.

Assessment Calendar

A 2019 calendar, in the next-to-last tab, highlights the Council meeting schedule, holidays, briefing book deadlines relevant to assessments, and possible weeks for scheduling STAR Panels. Please note that assessments reviewed in some possible weeks prior to the June Council meeting would not be presented to the SSC and Council until September. A condensed 6-month version of this calendar in provided in Table 1 of this attachment.

Stock Assessment History

The last tab of the workbook contains a tabular summary of west coast groundfish assessments conducted since 2003, by year, assessment type, and species (excluding Pacific hake, which has been conducted annually). Each stock's depletion ratio, as estimated in the most recent assessment, is also indicated. Periods during which species were in rebuilding status are highlighted in pink.

Factor Summary

All of the Factor Scores are assembled in columns F-O of this tab, with the proposed Factor Weights being found in row 7 of those columns. The products of the Factor Scores and

Weights are found in columns R-AA, and are summed into a total weighted score in columns C and AC, with the ranks across species in the adjoining columns.

Sablefish, last assessed with an update in 2015 (and benchmark in 2011), emerges as the highest-ranked species for 2019 in the current analysis. Longnose skate, unassessed since 2007, checks in at #2, with big skate nearby at #13. Time-intensive production ageing is scheduled to begin shortly for both of these species (for the first time on this coast). Four species that are all important to both commercial and recreational nearshore fisheries are next. Gopher and vermillion rockfishes and cabezon have not been assessed since before 2010, and the vermillion assessment was not accepted by the SSC for use in managing the fishery. Black rockfish was assessed using 3 state-level models in 2015 and each of these faced data and modeling challenges. Whether the issues that were noted by reviewers could be more successfully addressed in 2019 should be a topic for SSC and Council consideration.

Pacific cod is ranked #7. This is a species which is of considerable importance to commercial and tribal trawl fisheries in the north coast. The next three species are all important in California: brown and copper rockfishes, which both had data-moderate assessments in 2013, and cowcod, which appears to be nearing the end of its rebuilding, and hasn't been assessed since 2013. Then, after petrale and Dover soles and big skate, six nearshore and slope rockfishes round out the top-19.

The weights assigned to Factors reflect an iterative process, starting from the final weights used in 2016. The change in the fishery scoring formulas allowed the Commercial weight to be lowered, which also helped to create room to add weight to the new Ecosystem Factor. The weight for the Assessment Frequency Factor was also increased from 2016, in order to promote inter-annual cycling of species.

Conclusion

The data and analysis contained in Attachment 2 provide a substantial amount of information to digest. A few additional pieces will be submitted as supplemental materials for the March meeting. These will include:

- An additional workbook tab which combines the final rankings that summarizes data availability for each species,
- Discussion focusing on data and other constraints/opportunities associated with assessing individual high-ranking species,
- Updated survey trend information for many species, through 2016,
- One or more additional workbook tabs focused on identifying high-ranking species for assessment in 2021.

Playing the prioritization analysis forward to 2021 will most likely only involve changes to two Factors: Assessment frequency and New Information. Changes to both of these sheets

will depend on which particular species are assumed to be selected for assessment in 2019, and so more than one scenario may be developed to illustrate the effects of some alternative 2019 choices.

Table 1. 2019 Calendar highlighting possible STAR Panel weeks

April

Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

May

Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

June

Su	Mo	Tu	We	Th	Fr	Sa
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

July

Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

August

Su	Mo	Tu	We	Th	Fr	Sa
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

September

Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	*1*	*2*	*3*	*4*	

Holidays
Council Meetings
Prospective Briefing Book Deadlines
Possible STAR Panel weeks, for review in June
Possible STAR Panel weeks, for review in Sept.
Mop-up Meeting