GROUNDFISH MANAGEMENT TEAM REPORT ON RESTRUCTURING WEST COAST GROUNDFISH STOCK COMPLEXES

Introduction and Background

This document provides a GMT-recommended process for reorganizing groundfish stock complexes, along with stock complex alternatives for Council consideration. The process described herein may be used by the Council to develop its own alternative(s) based on the Council's objectives. This statement provides alternatives, rationale, and the completed process for Slope and Shelf rockfish. Alternatives, rationale, and the process for consideration of reorganizing the remaining complexes will be provided in a separate statement. The remaining complexes include Other Fish (cartilaginous fish and roundfish), Other Flatfish, and Shelf Rockfish.

Much of the background information developed by Council Staff and the Groundfish Management Team (GMT) for reorganizing stock complexes was provided in "Considerations for Restructuring West Coast Groundfish Stock Complexes: Preliminary Alternatives and Analyses" (Agenda Item F.8.a, Attachment 1, June 2013) and in "Groundfish Management Team Report on Considerations for Restructuring West Coast Groundfish Stock Complexes" (Agenda Item F.8.b, Supplemental GMT Report 2, June 2013). These documents, as well as the Scientific and Statistical Committee Report on Adopt Preliminary Stock Complex Aggregations (Agenda Item F.8.b, Supplemental SSC Report, June 2013) provide background, detail, and discussion on various considerations that should be made while reorganizing stock complexes including: (a) inflator stocks, (b) coast-wide versus area management, (c) indicator species, and (d) other attributes and considerations.

The GMT developed and applied numerous tools that may be used for restructuring stock complexes. First, the GMT developed a four-step process that may result in logical and consistent decisions regarding stock complexes (Agenda Item F.8.b, Supplemental GMT Report 2, June 2013). Second, the GMT developed numerous tools that may be used to support objectives and decisions including (a) co-occurrence tables and maps describing co-occurrence (Agenda Item F.8.b, Supplemental GMT Report 2, June 2013), (b) catch relative to overfishing levels (OFLs) and allowable biological catch (ABCs) to evaluate risk of overfishing (Agenda Item G.8.b, GMT Report 1, September 2013), (c) productivity and susceptibility analysis (PSA) and catch analyses to evaluate whether stock should be in or out of the fishery (Agenda Item G.8.b, GMT Report 2, September 2013), and potential costs to state sampling programs, data quality, and to the fishing industry (Agenda Item G.8.b, GMT Report 3, September 2013). A state report provided by Oregon Department of Fish and Wildlife (ODFW) also evaluated potential costs of restructuring stock complexes to their state sampling program (Agenda Item F.8.b, ODFW Report, June 2013).

In June, the Council adopted a range of alternatives for restructuring the slope and Other Fish complexes from the GMT Report (Agenda Item F.8.b, Supplemental GMT Report 2, June 2013). Further, the Council tasked the GMT with analyzing the impacts associated with those alternatives. The Council asked the GMT to examine the need to reconfigure the shelf rockfish

complex, adding that if the GMT determines there is a need to develop alternatives for reconfiguring the shelf rockfish complex, the GMT should apply the same approach and analysis. Restructuring the Other Flatfish complex was given a low priority and alternatives for restructuring the nearshore rockfish complexes were dropped from further consideration during this cycle.

At this meeting, the GMT not only provides additional analytical methods to evaluate stock complexes, we also expand and improve upon the four-step process described in June such that it can be employed to fully help the decision making process of stock reorganization depending on the objectives. This decision making process is described in more detail below.

The GMT provides no additional alternatives from those adopted in June. Instead, we provide the decision-making process so that the Council may develop the most effective alternatives to satisfy Council objectives. This process allows the Council to make policy choices, while the GMT provides the tools and analysis.

Objectives

There is a need to evaluate and consider changes to the current structure of stock complex groupings to ensure that the species in each complex are sufficiently similar in geographic distribution, life history, and vulnerabilities to the fishery such that management impacts are similar.

The GMT notes that stock complexes may be reorganized for biological purposes (e.g., remove species from complexes to reduce the probability of overfishing a particular stock), for logical purposes (e.g., match stocks with similar life histories, distributions, and vulnerabilities), or some combination of the two. There are logical issues with some of the current stock complexes in the groundfish FMP. For instance, the Other Fish stock complex includes species with dissimilar life histories and species that do not co-occur. Yet, as shown below, only one species within that complex has had historical catches that have approached the component OFL (i.e., dogfish shark), whereas the other species within the Other Fish complex may be at much lower risk of overfishing (e.g., cabezon). Additionally, many complexes include stocks that have extremely low OFLs (e.g., shortraker) and very high OFLs (e.g., splitnose rockfish, an inflator species). Disparate OFLs within a single complex may cause overfishing for susceptible stocks with relatively low OFLs. This provides an example of a logical and biological purpose for reorganizing a complex. The ideal complex would be of stocks that co-occur in proportion to their component OFLs-ABCs.

The SSC has noted that no two stocks are exactly alike, and in establishing stock complexes there will always be tradeoffs between management practicality and concerns about individual species (Agenda Item I.3.b, Supplemental SSC Report, April 2012).

Process for Identifying Needed Changes

The process proposed by the GMT consists of two general steps. The first step is to decide what species to include in the FMP and whether any stocks should be designated Ecosystem Component (EC) species. The first step should be completed before developing alternative complex configurations. The second step identifies species that may be at risk of overfishing,

and provides a decision-making process for stock reorganization, depending on Council objectives.

Step 1: In or out of the Groundfish FMP and EC: As described above, the decisions regarding adding stocks to the FMP, removing stocks from FMP, or designating stocks as EC species may occur independently of stock reorganization. The GMT provided new methods for evaluating whether a species is in or out of the fishery (Agenda Item G.8.b, GMT Report 2, September 2013), and provides the Council with clear direction in a supplemental GMT statement to help make the decision (Agenda Item G.8.b, Supplemental GMT Report 6). That supplemental GMT statement should be used to follow this decision-making process. Once the "in or out" decision is made, then results of that decision can be applied to the stock-reorganization step. Some considerations for removing or adding species to the FMP include:

1. What are the implications of adding new species to the FMP, or adding new species to the FMP as an EC species?
2. What are the implications of adding new species to the FMP (and a particular complex) that have no calculated OFLs?
3. What are the implications of removing species from the FMP (and a particular complex) that have OFLs, leaving a complex with only a few of the remaining species with contributing component OFLs?
4. Other?

Step 2: Reorganization of Stock Complexes: This second step involves numerous processes, depending on Council objectives. That process is shown below.

(a) Are any stocks within the complex potentially at high risk of overfishing? The GMT considered using two methods to evaluate this risk: (1) PSA analysis and (2) ratios between catch and component OFLs/ABCs (Appendix B). The GMT stresses that for those species with component OFLs available, the ratio of catch to OFL/ABC should be used to evaluate risk of overfishing. The PSA scores are subjective, and should only be used to evaluate risk for those species that do not have associated OFLs.

Considerations for determining whether stocks may be at risk for overfishing include:

- If potential overfishing is identified for a stock in one of two management areas, and if there is no biological reason for separate OFLs/ABCs, then a coast-wide evaluation of catch relative to OFL/ABC should be made to determine whether a potential biological problem exists. This was recommended by the SSC (Agenda Item F.8.b Supplemental SSC Report, June 2013) and discussed by the GMT when developing alternatives for Slope Rockfish during the June Council meeting (Agenda Item F.8.b, Supplemental GMT Report 2, June 2013).

(b) Stocks that are at risk of overfishing or newly assessed stocks – Individual Management? If there is a risk of overfishing, or if stocks are newly assessed, then we presume that individual management is the best option. Indeed, that is the action most often taken by the Council in the past. However, there have been some instances where the Council has chosen to continue complex management because of management practicality (e.g., blue rockfish in CA and blackgill rockfish south of 40°10 N. latitude). As such, this presumption should be tested while attempting to balance the tradeoffs between management practicality and concerns about

individual species. We have clearly heard from the GAP and members of the public that removing a species from a complex may reduce their ability to achieve annual catch limits (ACLs) for other species, may cause allocation issues, may create additional constraining species, and may be an additional burden for processors and vessels (e.g., extra sorting requirements).

The presumption that species at risk of overfishing or newly assessed species should be removed from the complex should be explored by the Council. In some cases, individual species management may not be necessary for implementing the management measures necessary to prevent the risk of biological overfishing (as demonstrated under the current management regime for blue rockfish in CA where the component OFL has not been exceeded since the stock was assessed in 2007 and HG implemented). Considerations for removing a species from a complex include:

- Co-occurrence: National Standard 1 Guidelines recommend that management measures should have similar effects on the species within a complex.
- Similarity of appearance: Separating species that look very similar may cause additional burden to the fishing industry and may result in increased "contamination" of market categories.
- Impact on fishing operations and buyers: Additional market categories may result in additional bins, sorting, etc.; sampling the species within a complex rather than individually might achieve adequate catch accounting with less disruption to fishing communities.
- Impact on the management and administration of the state sampling programs
- Complexes containing relatively few species and thus few component OFLs
- Complexes that contain species with OFLs based on data poor methods

Alternatives

The alternatives described here are intended to better align species according to their ecological distributions, interactions with the fishery, and relative vulnerabilities to overfishing. Following the process described above, the Council may mix and match past alternatives (i.e., those provided at the June meeting) and create new alternatives to meet their objectives.

Alternatives are stratified into five major species groups (Slope Rockfish, Shelf Rockfish, Flatfishes, Roundfishes, and Cartilaginous Fish). Considerations for restructuring stock complexes for these five species groups can be decided independently and are thus presented and analyzed independently. Status Quo is shown for each alternative. Alternatives adopted by the Council at the June Council meeting are shown for Slope Rockfish and for Other Fish complexes. Results and discussion for species that may be potentially at risk of overfishing are provided for each complex (Appendix B).

Recommendations to add or remove species from the FMP or recommendations to designate EC species within a complex should be considered while using information provided by Supplemental GMT Report 6. If those recommendations were made prior to creating additional complex alternatives, then those additions/removals/EC designations should be reflected in any newly created alternative below.

Slope Rockfish Alternatives

Status quo and two alternatives created by the GMT at the June meeting are provided in this section for slope rockfish. In addition, results of our process that may be used to create additional alternatives are provided. The Council may use the results of this process, along with information provided in Status Quo and Alternatives 1 and 2, to create additional alternatives that better align with the Council's objectives.

Status Quo Slope Rockfish Alternative

Table 1. Status quo slope rockfish stocks and stock complexes.

Slope Rockfish Stocks	**Slope Rockfish Stock Complexes**	
	N of 40°10'	**S of 40°10'**
Overfished Stocks	Aurora	Aurora
Darkblotched	Bank	Bank
POP N of 40°10'	Blackgill	Blackgill
Non-overfished Stocks	Redbanded	POP
Longspine thornyhead N and S of 34°27'	Rougheye	Redbanded
Shortspine thornyhead N and S of 34°27'	Sharpchin	Rougheye
Splitnose S of 40°10'	Shortraker	Sharpchin
	Splitnose	Shortraker
	Yellowmouth	Yellowmouth

Slope Rockfish Alternative 1

Alternative 1 would result in a northern-distributed slope rockfish (redbanded, sharpchin, and yellowmouth rockfishes), denoted here as Slope Rockfish Complex A, and southern-distributed slope rockfish complex (bank and blackgill rockfishes) called Slope Rockfish Complex B. Although these stocks are caught primarily either in the north or in the south, the complex would be managed using coastwide ABCs under this alternative.

Further, under Alternative 1, several species are removed from the complexes and managed separately (rougheye, shortraker, aurora, splitnose, and POP). Rougheye, shortraker, and aurora rockfishes are managed individually on the presumption that species vulnerable to overfishing might be easier to manage under individual specification. At the time of the June Council meeting, it was thought that all species were vulnerable to overfishing, based on catches relative to 2013 OFLs and on PSA scores. In this alternative, splitnose rockfish is also managed individually (i.e., as it currently is south of 40° 10' N. lat.) as it would have a very large relative OFL/ABC contribution and could act as an inflator species in the complex. In addition, POP

could be removed from the southern slope complex all together and managed separately using a coastwide OFL/ABC/annual catch limit (ACL).

The GMT points out that there is no full assessment for shortraker rockfish. The OFL for this species was provided using data poor assessment methods (i.e., data quality is listed as category 3, sub-category c). Although most species managed separately are category 1 or 2 stocks, Pacific cod is managed separately (coastwide) and is listed as a category 3 (sub-category b) stock (Agenda Item G.7.a, Attachment 1, September 2013).

Slope Alternative #1

Individual Management Coastwide
Rougheye
Shortraker
Aurora
Splitnose
POP

Slope Rockfish Complex A Coastwide
Yellowmouth
Redbanded
Sharpchin

Slope Rockfish Complex B Coastwide
Bank
Blackgill

Slope Rockfish Alternative 2

The second slope alternative recommends managing splitnose and POP coastwide rather than in any complex (as in Alternative 1) as well as bank rockfish, under the similar rationale that it may serve as an inflator species.

This alternative also maintains the status quo management line with separate north and south complexes, but with the caveat that those species with low occurrence on one side of the management line are highlighted to indicate that evaluation of overfishing should be done on the entire coastwide OFL rather than small contributions on one side of the line.

Slope Alternative #2

Individual Management Coastwide
Splitnose
Bank
POP

Slope Rockfish North of 40°10' Complex
Yellowmouth
Sharpchin
Shortraker
Rougheye
Redbanded
Aurora
Blackgill*

Slope Rockfish South of 40°10' Complex
Yellowmouth*
Sharpchin*
Shortraker*
Rougheye*
Redbanded
Aurora
Blackgill

*These species have low OFL/ABC contribution to this complex for this area. The determination of whether the policy to prevent overfishing is being violated should be evaluated at the total coastwide OFL.

Slope Rockfish Process for Developing Additional Alternatives

Step 1: *Are there any species that the Council desires to add to or drop from the slope rockfish complex, or designate as EC species?* See Agenda Item G.8.c, Supplemental GMT Report 6.

Step 2a: Which species in the Status Quo slope rockfish complex (Table 1) may be vulnerable to overfishing. For this test, the GMT refers to coastwide catches and coastwide component OFLs/ABCs to assess biological risk of overfishing (see Appendix B). The PSA scores were not used for this evaluation, because catch relative to OFL is a more reliable indicator for species with OFLs. The ratio of catch to OFLs or catch to ABCs may suggest vulnerability to overfishing if the catch:OFL ratio exceeds 100 percent. Distributions relative to the 40°10 N. latitude management line are included to help evaluate slope rockfish Alternatives 1 and 2.

Rougheye Rockfish: Coastwide catches relative to 2013 component OFLs/ABCs suggest that rougheye rockfish may have been at risk of overfishing during certain years (Appendix B). Using 2013 component OFLs from a data poor assessment (71.5 mt), the ratio of 2009-2011 average catches to the 2013 component OFL is 330 percent. The recent full-stock assessment for rougheye rockfish shows the 2015 coastwide component OFL to be substantially higher (206

mt). Using this new information, the ratio of 2009-2011 average catches to the 2015 component OFL is 115 percent. Average catches were higher during the 2009-2011 period than during the 2004-2009 period.

The distribution of rougheye rockfish is disproportionate north and south of 40° 10' N. latitude. For the data poor assessment associated with 2013 component OFL/ABC, the distribution was shown as 99 percent of the stock in the north and 1 percent of the stock in the south. The most recent full stock assessment for rougheye rockfish associated with 2015 component OFLs show the distribution to be 98 percent north and 2 percent south.

Shortraker Rockfish: Coastwide catches relative to 2013 component OFLs/ABCs suggest that shortraker rockfish may be at risk of overfishing during certain years (Appendix B). Using 2013 component OFLs from a data poor assessment (18.8 mt), the ratio of 2009-2011 average catches to the 2013 component OFL is 166 percent. Average catches were higher during the 2009-2011 period than during the 2004-2009 period. The 2013 component OFL was exceeded 6 out of 8 years using 2004-2011 catches.

The distribution of shortraker rockfish is disproportionate north and south of 40° 10' N. latitude. For the data poor assessment associated with 2013 component OFL/ABC, the distribution was shown as 99 percent of the stock in the north and 1 percent of the stock in the south.

Blackgill Rockfish: Blackgill rockfish has a Category 1 assessment south of 40° 10' N. latitude, and a Category 3 assessment north of the management line. This species is managed within the slope rockfish complex both in the north and south management areas. In the south, it is managed using harvest guidelines.

The coast-wide catches relative to 2013 component OFLs/ABCs suggest that blackgill rockfish may be at risk of overfishing during certain years (Appendix B). Using 2013 coastwide component OFLs from a full assessment (122.6 mt), the ratio of 2009-2011 average catches to the 2013 component OFL is 114 percent. Average catches were higher during the 2009-2011 period than during the 2004-2009 period. The 2013 component OFL was exceeded 4 out of 8 years using 2004-2011 catches. The year 2011 showed the highest catch of the 8-year period.

The distribution of blackgill rockfish is disproportionate north and south of 40° 10' N. latitude. For the data poor assessment associated with 2013 component OFL/ABC, the distribution was shown as 3 percent of the stock in the north and 97 percent of the stock in the south.

It is important to note that trip limits have recently been implemented for blackgill rockfish south of 40° 10' N. latitude. Results of those trip limits are not yet known.

Aurora Rockfish: The risk analysis for aurora rockfish show contradictory results, depending on whether the 2013 component OFLs/ABCs (data-poor assessment) or 2015 component OFLs/ABCs (full assessment) are used. Coastwide catches relative to 2013 component OFLs/ABCs suggest that aurora rockfish may be at risk of overfishing during certain years (Appendix B). Using 2013 component OFLs from a data poor assessment (41.5 mt), the ratio of 2009-2011 average catches to the 2013 component OFL is 110 percent. The recent full-stock assessment for aurora rockfish shows the 2015 coastwide component OFL to be substantially higher (92 mt). Using this new information, the ratio of 2009-2011 average catches to the 2015 component OFL is 50 percent. In addition, the 2015 ABC would not have been exceeded during

any year during the 2004-2009 period. Average catches were lower during the 2009-2011 period than during the 2004-2009 period.

The distribution of aurora rockfish is more evenly distributed north and south of 40° 10' N. latitude than shown for rougheye and shortraker rockfish. For the data poor assessment associated with 2013 component OFL/ABC, the distribution was shown as 37 percent of the stock in the north and 63 percent of the stock in the south. The most recent full stock assessment for aurora rockfish associated with 2015 component OFLs show the distribution to be 19 percent north and 81 percent south.

Presumption: The typical presumption is that for species with full assessments, or species that may be at risk of overfishing, stocks may be best managed individually (i.e., out of the complex). There are other options, however, so this is a decision that should be made by the Council. Other options include leaving some or all of the stocks within a complex and managing using other management measures, such as harvest guidelines (e.g., as blackgill rockfish south is currently managed).

The Council may decide to remove all four species at risk of overfishing from the complex for individual management, or remove most of these species from the complex for individual management (i.e., only rougheye, shortraker, and blackgill rockfish). The Council may also consider retaining one, two, three, or all of the stocks within the slope rockfish complex and managing using other measures. Finally, a new complex could be considered (e.g., a vulnerable species complex consisting of rougheye-shortraker or rougheye-shortraker-blackgill rockfishes) as suggested under Agenda Item F.8.a, Attachment 1, June 2013.

Considerations:

- Coast-wide or North/South Management: Whether species are retained in complexes or removed and managed individually, the Council may consider managing coastwide (e.g., Alternatives 1 and 2) or within the management areas (i.e., Status Quo). Implications of managing coastwide were described under Agenda Item F.8.b, Supplemental GMT Report 2, June 2013.
- Co-occurrence: None of the species have especially high co-occurrence values (Appendix B). All values were deemed to co-occur with other slope rockfish species at moderate to low levels (Appendix B). This suggests that low implication of managing separately.
- Similarity to Other Species: Each of the vulnerable species shown above are similar to one or more other species (Agenda Item G.8.b, GMT Report 3, September 2013). For example, rougheye rockfish, shortraker rockfish, and blackgill rockfish are similar in appearance (also see FEIS 2013-2014, page. C-43, Appendix C). This may result in sorting implications for fishermen and processors (Agenda Item G.8.b, GMT Report 3, September 2013). Port sampling would likely still be adequate, however, sampling coverage levels may need to be examined.
- Implications to buyers and fishermen: Concerns may include (a) identification and therefore sorting problems (Agenda Item G.8.b, GMT Report 3, September 2013), (b) additional bins needed for sorting the new market category, and c) potentially additional constraining species.
- Cost to the management system

- The affects of adding an additional market category and strata on the reliability of the estimates
- Allocations: Slope rockfish have FMP trawl and non-trawl allocations, established under Amendment 21. Further, each biennium set-asides are established to accommodate bycatch in the at-sea whiting fisheries
- IFQ program has default rules for QS allocation in the event a species is removed from a complex or management line implemented
- IFQ program does not yet have an automatic methodology for issuing shorebased carryover when management lines are modified

Potential Inflator Stocks: The Council may consider removing potential inflator stocks from the complexes and managing separately. The GMT generally agreed with discussion presented with the Preliminary Alternatives (Agenda Item F.8.a, Attachment 1, June 2013) regarding potential impacts of inflator stocks to other species within a complex. In other words, the presence of inflator stocks in a complex can increase the risk of overfishing other stocks in the complex since it inflates the complex OFL. The GMT identified two stocks that may be considered "inflator stocks" within the slope rockfish complex (see Appendix B):

- Splitnose Rockfish (north and south)
- Bank Rockfish (south)

Implications and concerns with managing these stocks individually are similar to those shown at risk of overfishing species above.

Slope Rockfishes

Species to add to FMP, delete from FMP, or make EC species:

- See Agenda Item G.8.b, GMT Supplemental Statement 6, September 2013

Select a Geographical Option for Managing the Complex (circle one or create one):

- Status Quo
- GMT Alternative 1
- GMT Alternative 2
- Other

Select none to all of the following species for individual management that may be at risk of overfishing (circle all that you would like to manage individually):

- Rougheye
- Shortraker
- Aurora
- Blackgill
- Other?

Select none to all of the following species for individual management that may be considered inflator species (circle all that you would like to manage individually):

- Splitnose Rockfish (Area or Coastwide)
- Bank Rockfish (Area or Coastwide)

Select none to one of the following if a new complex is desired (or create your own):

- Rougheye-Shortraker
- Rougheye-Shortraker-Aurora
- Rougheye-Shortraker-Blackgill

Appendix A. Tables and figures of species co-occurrence and distribution related to complex alternatives.

Note: this appendix represents an extension of Agenda Item F.8.b Supplemental GMT Report 2 June 2013. It has been expanded to included figures and tables for flatfish.

Table 1. Slope rockfish occurrences (a), co-occurrences (c), and normalized C-scores (e) in the West Coast Groundfish Observer Program (WCGOP) bottom trawl data (2002-2011) North of 40°10' N lat. The shading in (c) is darkest for values less than 0.20 indicating the highest level of co-occurrence, and lighter for values between 0.20 and 0.70, indicating moderate levels of co-occurrence. Values greater than 0.70 are un-shaded indicating the lowest level of co-occurrence. Further explanation of these co-occurrence tables is provided in Agenda Item F.8.b, June 2013.

(a) Total occurrences of Slope Rockfish North of 40°10' N lat.

Darkblotched	Splitnose	Aurora	Pacific Ocean Perch	Redbanded	Rougheye/ Blackspotted	Blackgill	Sharpchin	Shortraker	Bank	Yellowmouth
6487	5033	4795	4334	2744	1508	788	778	597	69	39

(b) Matrix of common occurrences of Slope Rockfish North of 40°10' N lat.

	Splitnose	Aurora	POP	Redbanded	Rougheye/ Blackspotted	Blackgill	Sharpchin	Shortraker	Bank	Yellowmouth
Darkblotched	2743	1679	2700	1867	978	512	528	328	48	28
	Splitnose	1784	2383	2068	877	466	611	301	38	30
		Aurora	1297	1031	661	533	174	295	31	14
			POP	1584	837	310	536	315	24	26
				Redbanded	685	275	449	228	30	19
					Rougheye/ Blackspotted	177	180	273	13	17
						Blackgill	65	83	16	8
							Sharpchin	48	8	16
								Shortraker	5	4
									Bank	6

(c) Matrix of normalized C-scores for Slope Rockfish North of 40°10' N lat.

	Splitnose R	Aurora	POP	Redbanded	Rougheye/ Blackspotted	Blackgill	Sharpchin	Shortraker	Bank	Yellowmouth
Darkblotched	0.263	0.482	0.22	0.228	0.298	0.323	0.295	0.428	0.302	0.281
	Splitnose	0.405	0.237	**0.145**	0.346	0.371	**0.189**	0.466	0.446	0.229
		Aurora	0.511	0.49	0.484	0.288	0.748	0.475	0.547	0.639
			POP	0.268	0.359	0.563	0.273	0.438	0.649	0.331
				Redbanded	0.41	0.586	0.354	0.567	0.559	0.509
					Rougheye/ Blackspotted	0.684	0.677	0.444	0.805	0.558
						Blackgill	0.841	0.77	0.753	0.787
							Sharpchin	0.863	0.875	0.578
								Shortraker	0.92	0.891
									Bank	0.773

Table 2. Slope rockfish occurrences (a), co-occurrences (c), and normalized C-scores (e) in the WCGOP bottom trawl data (2002-2011) South of 40°10’ N lat. The shading in (c) is darkest for values less than 0.20 indicating the highest level of co-occurrence, and lighter for values between 0.20 and 0.70, indicating moderate levels of co-occurrence. Values greater than 0.70 are un-shaded indicating the lowest level of co-occurrence. Further explanation of these co-occurrence tables is provided in Agenda Item F.8.b, June 2013.

(a) Total occurrences of Slope Rockfish South of 40°10’ N lat.

Darkblotched	Splitnose	Aurora	Pacific Ocean Perch	Redbanded	Rougheye/ Blackspotted	Blackgill	Sharpchin	Shortraker	Bank	Yellowmouth
446	1501	855	24	274	13	461	77	7	268	0

(b) Matrix of common occurrences of Slope Rockfish South of 40°10’ N lat.

	Splitnose	Aurora	POP	Redbanded	Rougheye/ Blackspotted	Blackgill	Sharpchin	Shortraker	Bank	Yellowmouth
Darkblotched	347	129	8	134	4	112	23	3	113	0
	Splitnose	404	14	252	8	337	56	5	238	0
		Aurora	13	91	9	233	5	4	67	0
			POP	6	2	7	0	1	4	0
				Redbanded	3	78	18	3	64	0
					Rougheye/ Blackspotted	8	1	0	4	0
						Blackgill	2	4	71	0
							Sharpchin	0	18	0
								Shortraker	1	0
									Bank	0

(c) Matrix of normalized C-scores for Slope Rockfish South of 40°10' N lat.

	Splitnose	Aurora	POP	Redbanded	Rougheye/ Blackspotted	Blackgill	Sharpchin	Shortraker	Bank	Yellowmouth
Darkblotched	**0.171**	0.604	0.655	0.357	0.686	0.567	0.665	0.568	0.432	NA
Splitnose		0.386	0.413	**0.067**	0.383	0.209	0.263	0.285	**0.094**	NA
	Aurora		0.451	0.597	0.304	0.36	0.93	0.427	0.691	NA
		POP		0.734	0.776	0.698	1	0.821	0.821	NA
			Redbanded		0.761	0.594	0.716	0.565	0.583	NA
					Rougheye/ Blackspotted	0.378	0.911	1	0.682	NA
						Blackgill	0.97	0.425	0.622	NA
							Sharpchin	1	0.715	NA
								Shortraker	0.854	NA
									Bank	NA

Table 3. Cartilaginous Species occurrences (a), co-occurrences (b), and normalized C-scores (c) in the WCGOP bottom trawl data (2002-2011) coastwide. The shading in (c) is darkest for values less than 0.20 indicating the highest level of co-occurrence, and lighter for values between 0.20 and 0.70, indicating moderate levels of co-occurrence. Values greater than 0.70 are un-shaded indicating the lowest level of co-occurrence. Further explanation of these co-occurrence tables is provided in Agenda Item F.8.b, June 2013.

(a) Total occurrences of Cartilaginous Species coastwide

Longnose Skate	All Other Skates	Spiny Dogfish	Spotted Ratfish	Brown Cat Shark	Bering/ Sandpaper Skate	Big Skate	Black Skate	California Skate	Aleutian Skate	Leopard Shark	Soupfin Shark
19318	18043	16993	16959	15076	15040	6029	5279	2720	539	358	113

(b) Matrix of common occurrences of Cartilaginous Species coastwide

	All Other Skates	Spiny Dogfish Shark	Spotted Ratfish	Brown Cat Shark	Bering/ Sandpaper Skate	Big Skate	Black Skate	California Skate	Aleutian Skate	Leopard Shark	Soupfin Shark
Longnose Skate	7581	10163	10561	8501	11531	2460	2152	974	408	22	29
	All Other Skates	9115	9604	5313	6927	2764	918	875	304	133	52
		Spiny Dogfish	10426	4804	8391	2976	836	1190	294	186	57
			Spotted Ratfish	4059	8420	3113	543	744	288	41	42
				Brown Cat Shark	7448	159	4165	73	360	1	3
					Bering/ Sandpaper Skate	1596	1478	135	312	1	9
						Big Skate	24	1245	13	289	69
							Black Skate	19	115	1	0
								Cal. Skate	1	223	64
									Aleutian Skate	0	0
										Leopard Shark	25

(c) Matrix of normalized C-scores for Cartilaginous Species coastwide

	All Other Skates	Spiny Dogfish Shark	Spotted Ratfish	Brown Cat Shark	Bering/ Sandpaper Skate	Big Skate	Black Skate	California Skate	Aleutian Skate	Leopard Shark	Soupfin Shark
Longnose Skate	0.352	**0.19**	**0.171**	0.244	**0.094**	0.517	0.526	0.61	0.238	0.937	0.742
All Other Skates		0.229	0.203	0.457	0.332	0.459	0.784	0.645	0.429	0.624	0.538
Spiny Dogfish Shark			**0.149**	0.489	0.224	0.418	0.8	0.523	0.447	0.475	0.494
Spotted Ratfish				0.556	0.222	0.395	0.868	0.695	0.458	0.883	0.627
Brown Cat Shark					0.255	0.963	**0.153**	0.968	0.324	0.997	0.973
Bering/ Sandpaper Skate						0.657	0.649	0.942	0.412	0.997	0.92
Big Skate							0.991	0.43	0.974	**0.183**	0.385
Black Skate								0.989	0.77	0.997	1
California Skate									0.998	0.346	0.423
Aleutian Skate										1	1
Leopard Shark											0.724

Table 4. Other Roundfish occurrences (a), co-occurrences (b), and normalized C-scores (c) in the WCGOP bottom trawl data (2002-2011) coastwide. The shading in (c) is darkest for values less than 0.20 indicating the highest level of co-occurrence, and lighter for values between 0.20 and 0.70, indicating moderate levels of co-occurrence. Values greater than 0.70 are un-shaded indicating the lowest level of co-occurrence. Further explanation of these co-occurrence tables is provided in Agenda Item F.8.b, June 2013.

(a) Total occurrences of Other Roundfish coastwide

Giant Grenadier	Pacific Grenadier	California Slickhead	Pacific Flatnose	All Other Grenadiers	California Scorpionfish	Kelp Greenling	Cabezon	All Other Greenlings
7032	6433	4465	4120	3867	148	108	29	28

(b) Matrix of common occurrences of Other Roundfish coastwide

	Pacific Grenadier	California Slickhead	Pacific Flatnose	All Other Grenadiers	California Scorpionfish	Kelp Greenling	Cabezon	All Other Greenlings
Giant Grenadier	4241	3262	2628	1399	0	1	0	0
Pacific Grenadier		2944	2375	1077	0	1	0	0
California Slickhead			1929	1566	0	1	0	0
Pacific Flatnose				1516	0	1	0	0
All Other Grenadiers					0	2	0	0
California Scorpionfish						0	1	0
Kelp Greenling							0	0
Cabezon								0

(c) Matrix of normalized C-scores for Other Roundfish coastwide

	Pacific Grenadier	California Slickhead	Pacific Flatnose	All Other Grenadiers	California Scorpionfish	Kelp Greenling	Cabezon	All Other Greenlings
Giant Grenadier	**0.135**	**0.144**	0.227	0.511	1	0.991	1	1
Pacific Grenadier		**0.185**	0.267	0.601	1	0.991	1	1
California Slickhead			0.302	0.386	1	0.991	1	1
Pacific Flatnose				0.384	1	0.991	1	1
All Other Grenadiers					1	0.981	1	1
California Scorpionfish						1	0.959	1
Kelp Greenling							1	1
Cabezon								1

Table 5. Flatfish occurrences (a), co-occurrences (b), and normalized C-scores (c) in the WCGOP bottom trawl data (2002-2011) coastwide. The shading in (c) is darkest for values less than 0.20 indicating the highest level of co-occurrence, and lighter for values between 0.20 and 0.70, indicating moderate levels of co-occurrence. Values greater than 0.70 are un-shaded indicating the lowest level of co-occurrence. Further explanation of these co-occurrence tables is provided in Agenda Item F.8.b, June 2013.

(a) Total occurrences of flatfish coastwide

Dover Sole	A-tooth Flounder	Rex Sole	Petrale Sole	English Sole	Slender Sole	Pacific Sanddab	Deepsea Sole	Sand Sole	Starry Flounder	Flathead Sole	Curlfin Turbot	Rock Sole	Butter Sole
32418	22768	21300	17273	14637	9562	9101	8521	3232	3015	2750	2537	1375	563

(b) Matrix of common occurrences of flatfish coastwide

	A-tooth Flounder	Rex Sole	Petrale Sole	English Sole	Slender Sole	Pacific Sanddab	Deepsea Sole	Sand Sole	Starry Flounder	Flathead Sole	Curlfin Turbot	Rock Sole	Butter Sole
Dover Sole	21185	18878	13847	9817	8960	5598	8262	556	305	2483	564	532	178
A-tooth Flounder	15247	12438	8473	8042	4536	3194	272	137	2531	236	416	119	
Rex Sole	13462	11222	8492	6979	2658	987	651	2623	1037	786	292		
Petrale Sole	11907	7120	7341	607	1145	946	2502	1434	959	287			
English Sole	5717	8294	171	2588	2297	2203	2241	1269	507				
Slender Sole	3468	619	186	112	1749	285	171	79					
Pacific Sanddab	16	2088	1915	1383	1981	1079	387						
Deepsea Sole	2	2	7	1	3	0							
Sand Sole	2427	75	1207	539	462								
Starry Flounder	39	1393	511	373									
Flathead Sole	64	164	25										
Curlfin Turbot	758	98											
Rock Sole	54												

(c) Matrix of normalized C-scores for flatfish coastwide

	A-tooth Flounder	Rex Sole	Petrale Sole	English Sole	Slender Sole	Pacific Sanddab	Deepsea Sole	Sand Sole	Starry Flounder	Flathead Sole	Curlfin Turbot	Rock Sole	Butter Sole
Dover Sole	**0.024**	**0.047**	**0.114**	0.23	**0.046**	0.318	**0.023**	0.814	0.89	**0.09**	0.764	0.603	0.68
A-tooth Flounder		**0.094**	**0.127**	0.264	**0.103**	0.402	0.537	0.905	0.949	**0.071**	0.898	0.685	0.785
Rex Sole			**0.081**	**0.11**	**0.067**	**0.157**	0.602	0.662	0.76	**0.04**	0.562	0.413	0.475
Petrale Sole				**0.058**	**0.15**	**0.111**	0.896	0.603	0.649	**0.077**	0.399	0.286	0.482
English Sole					0.245	**0.038**	0.968	**0.164**	0.201	**0.169**	**0.099**	**0.07**	**0.096**
Slender Sole						0.394	0.867	0.924	0.952	0.297	0.861	0.86	0.853
Pacific Sanddab							0.996	0.273	0.288	0.422	**0.171**	**0.19**	0.299
Deepsea Sole								0.999	0.999	0.997	0.999	0.997	1
Sand Sole									**0.049**	0.95	0.328	0.507	**0.154**
Starry Flounder										0.973	0.243	0.522	0.296
Flathead Sole											0.952	0.828	0.947
Curlfin Turbot												0.315	0.794
Rock Sole													0.869

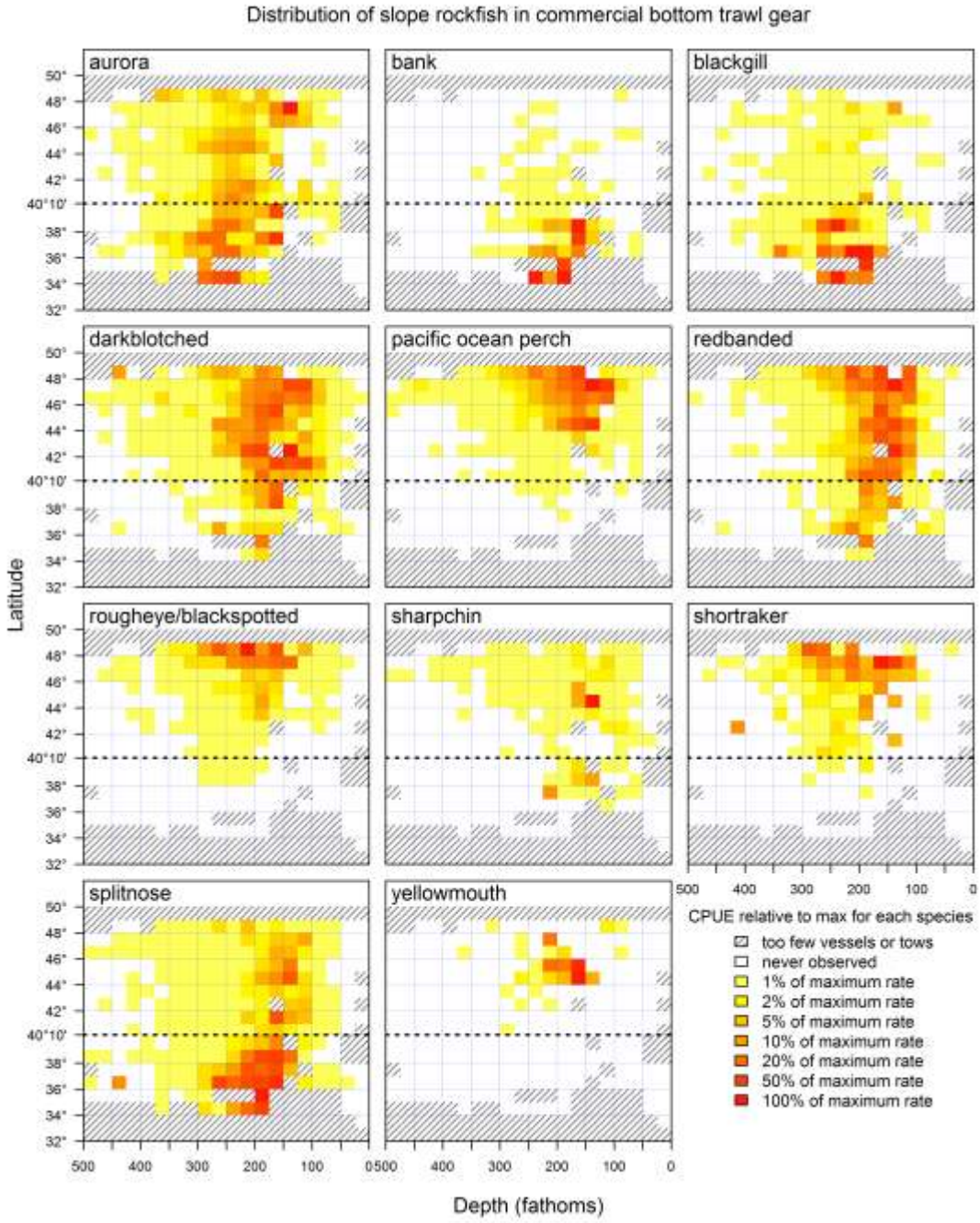

Figure 1. Spatial distribution of Slope Rockfish in WCGOP trawl data (2002 – 2011) for alternatives above. Colors represent CPUE relative to the maximum within each species (see the legend). Darkest red = highest CPUE; lightest yellow = lowest CPUE. Data for hatched boxes could not be displayed because of confidentiality (only 1 or 2 vessels carrying observers fished in the area) or because no vessels carrying observers fished in the area. White areas are places where 3 or more vessels fished and carried observers, but the species in question was not caught.

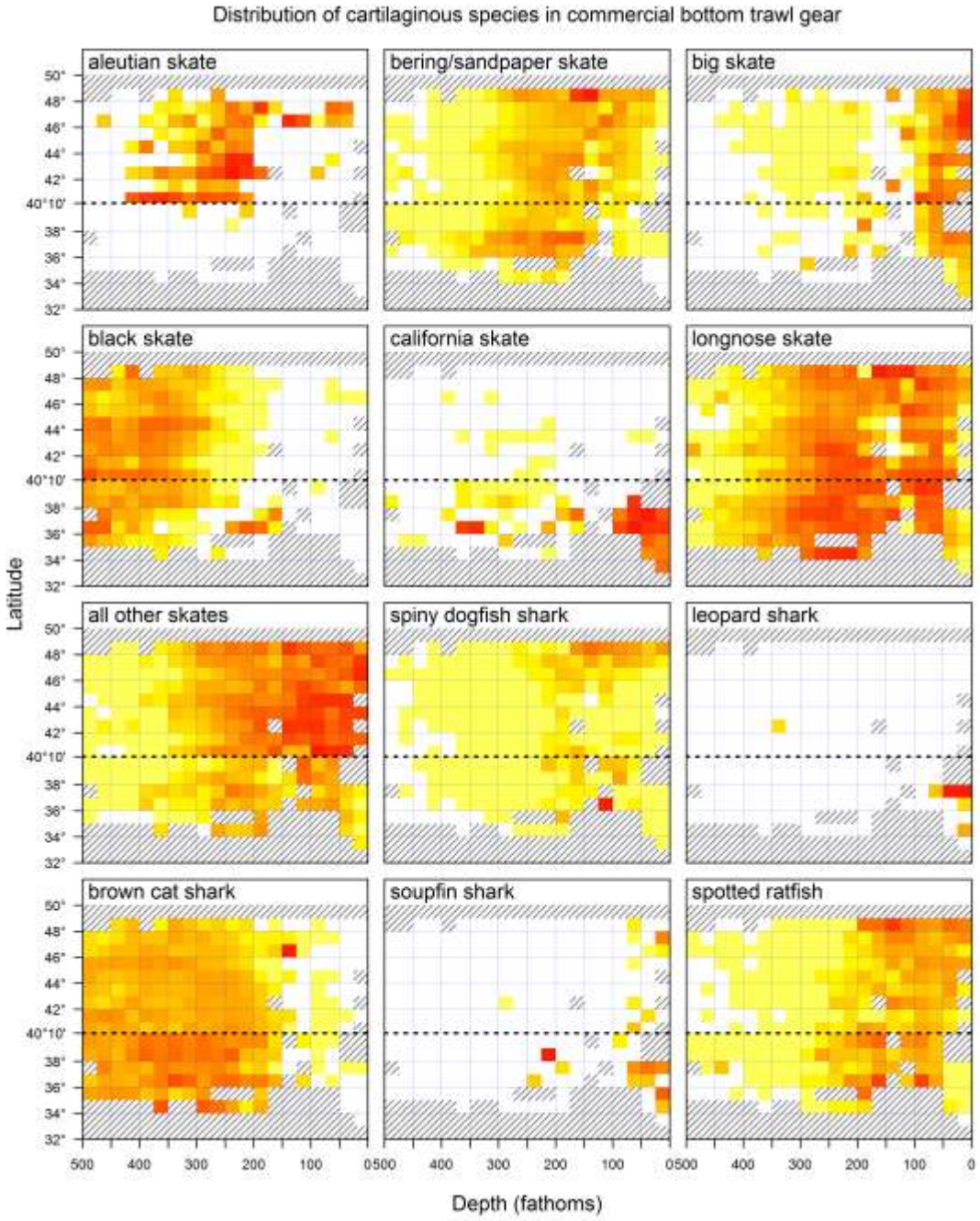

Figure 2. Spatial distribution of Cartilaginous Species in WCGOP trawl data (2002 – 2011) for alternatives above. Colors and hashed areas are described in Figure 1 caption.

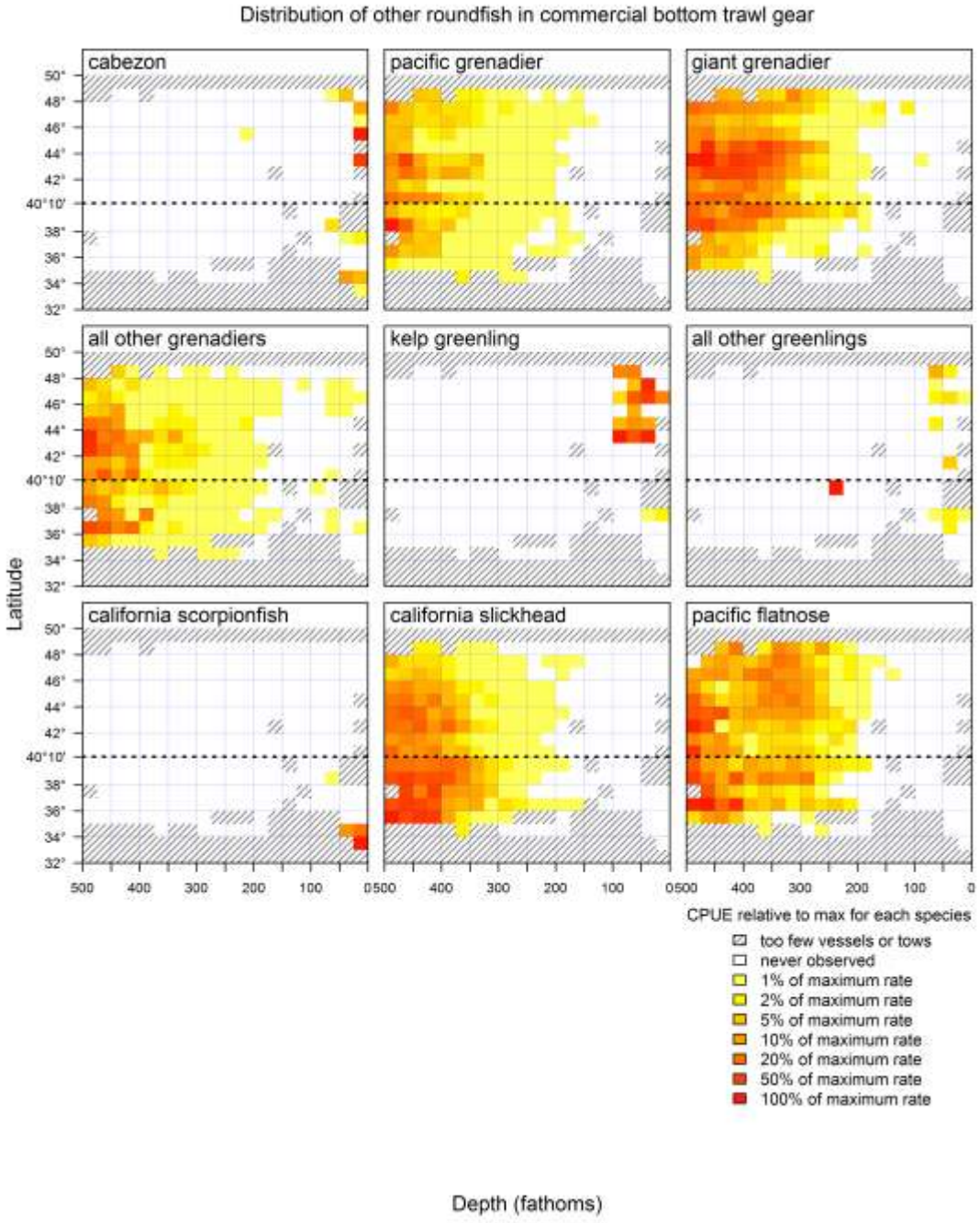

Figure 3. Spatial distribution of Other Roundfish in WCGOP trawl data (2002 – 2011) for alternatives above. Colors and hashed areas are described in Figure 1 caption.

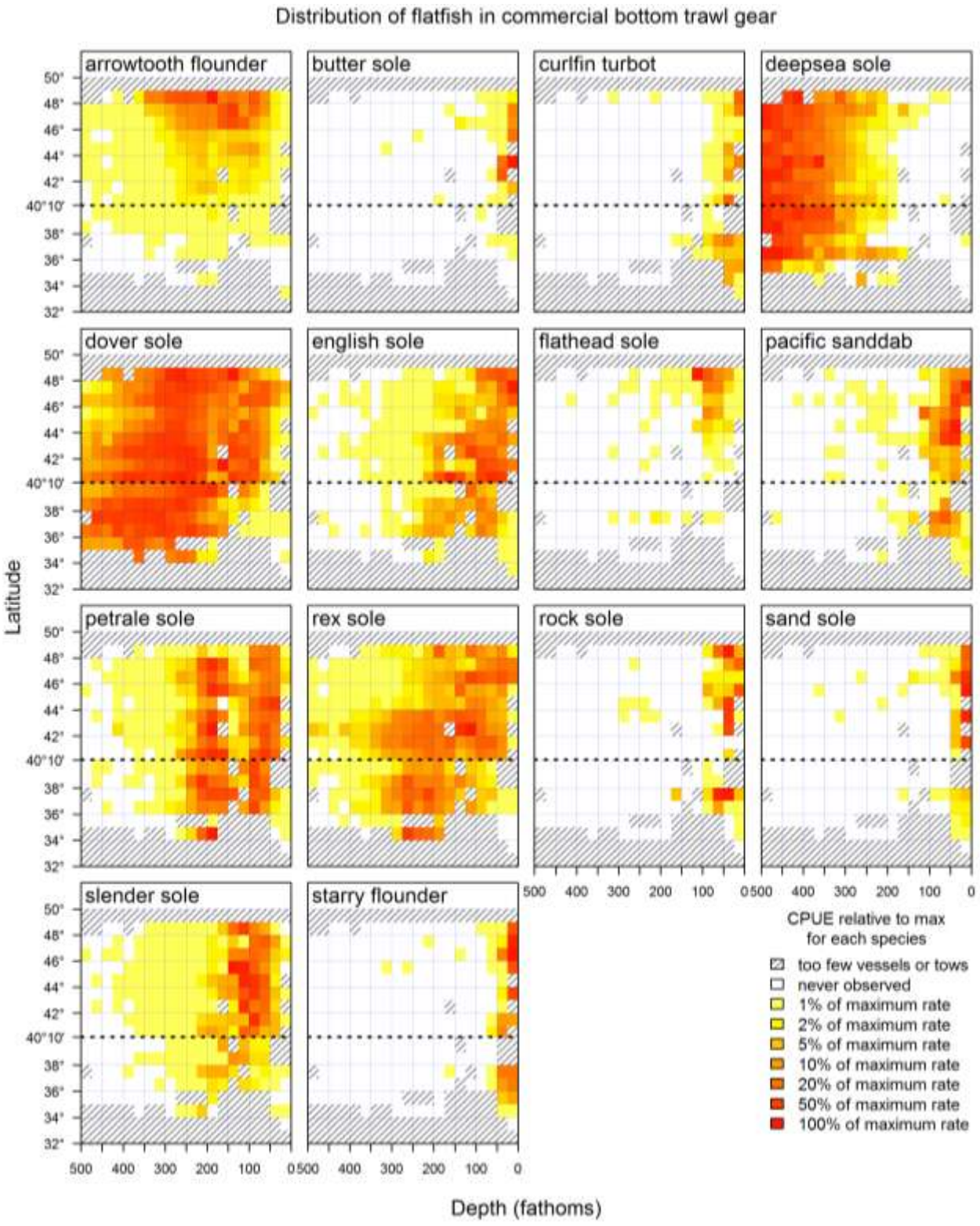

Figure 4. Spatial distribution of Other Roundfish in WCGOP trawl data (2002 – 2011) for alternatives above. Colors and hashed areas are described in Figure 1 caption.

Appendix B.

Table 1. Metrics that may be used to evaluate the risk of overfishing for Minor Slope Rockfishes Rockfish north of 40₀10´ N latitude. Metrics include (1) average annual catch (2011, 2009-2011, and 2004-2011) as a percent of the 2013 ABC and the 2013 OFL, (2) percent of years (N = 8 years) that catch would have exceeded the 2013 OFL or the 2013 ABC, and (3) percent contribution of the management-unit OFL (i.e., north or south of 40₀10' N latitude) OFL to the coastwide OFL. Shaded areas represent potential areas of concern (i.e., higher risk of overfishing).

Species	2013 OFL	2013 ABC	Percent ABC 2011	Percent ABC 2009-2011	Percent ABC 2004-2011	Percent Years Over ABC 2004-2011	Percent OFL 2011	Percent OFL 2009-2011	Percent OFL 2004-2011	Years Over OFL 2004-2011	Percent Coastwide OFL
Aurora Data-Poor Assessment	15.4	12.8	161%	285%	232%	88%	134%	237%	193%	75%	37%
Aurora Full Assessment 2015	17.4	16.6	124%	220%	179%	75%	119%	210%	171%	75%	19%
Bank	17.2	14.4	5%	5%	10%	0%	4%	4%	8%	0%	3%
Blackgill	4.7	3.9	119%	199%	177%	88%	99%	165%	147%	75%	3%
Redbanded	45.3	37.7	0%	60%	80%	25%	0%	50%	66%	0%	81%
Rougheye Data-Poor Assessment	71.1	59.3	349%	396%	315%	100%	291%	331%	263%	100%	99%
Rougheye Full Assessment 2015	201.9	193	107%	122%	97%	50%	103%	116%	92%	63%	98%
Sharpchin	214.5	178.9	4%	4%	6%	0%	3%	4%	5%	0%	96%
Shortraker	18.7	15.6	181%	191%	162%	75%	151%	159%	135%	75%	99%
Yellowmouth	192.4	160.5	0%	2%	3%	0%	0%	2%	3%	0%	100%
Splitnose	939	897.7	3%	9%	11%	0%	3%	9%	10%	0%	36%
Pacific Ocean Perch*	844	807	8%	16%	15%	0%	7%	16%	15%	0%	100%

*Managed outside of complex

**Trace amount caught; i.e., the average catch does not round to 0.1 mt.

Table 2. Metrics that may be used to evaluate the risk of overfishing for Minor Slope Rockfish south of 40₀10′ N latitude. Metrics include (1) average annual catch (2011, 2009-2011, and 2004-2011) as a percent of the 2013 ABC and the 2013 OFL, (2) percent of years (N = 8 years) that catch would have exceeded the 2013 OFL or the 2013 ABC, and (3) percent contribution of the management-unit OFL (i.e., north or south of 40₀10' N latitude) OFL to the coastwide OFL. Shaded areas represent potential areas of concern (i.e., higher risk of overfishing).

Species	2013 OFL	2013 ABC	Percent ABC 2011	Percent ABC 2009-2011	Percent ABC 2004-2011	Percent Years Over ABC 2004-2011	Percent OFL 2011	Percent OFL 2009-2011	Percent OFL 2004-2011	Percent Years Over OFL 2004-2011	Percent Coastwide OFL
Aurora Data-Poor Assessment	26.1	21.7	32%	42%	120%	50%	27%	35%	100%	50%	63%
Aurora Full Assessment	74.3	70.7	10%	13%	37%	0%	9%	12%	35%	13%	81%
Bank	503.2	459.4	6%	7%	12%	0%	6%	7%	11%	0%	97%
Blackgill	130	118.7	127%	123%	95%	50%	116%	112%	86%	50%	97%
Redbanded	10.4	8.7	6%	21%	28%	0%	5%	18%	24%	0%	19%
Rougheye Data-Poor Assessment	0.4	0.3	119%	390%	365%	50%	90%	292%	273%	38%	1%
Rougheye Full Assessment	4.1	3.9	9%	30%	28%	0%	9%	29%	27%	0%	2%
Sharpchin	9.8	8.2	5%	24%	19%	0%	4%	20%	16%	0%	4%
Shortraker	0.1	0.1	0%	1391%	708%	50%	0%	1391%	708%	50%	1%
Yellowmouth	0.8	0.7	0%	2%	1%	0%	0%	2%	1%	0%	0%
Splitnose*	1,684	1,610	3%	7%	10%	0%	2%	6%	9%	0%	64%
Pacific ocean perch**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%

*Managed outside of complex

**Trace amount caught; i.e., the average catch does not round to 0.1 mt.

Table 3. Metrics that may be used to evaluate the risk of overfishing for Minor Shelf Rockfish north of 40₀10´ N latitude. Metrics include (1) average annual catch (2011, 2009-2011, and 2004-2011) as a percent of the 2013 ABC and the 2013 OFL, (2) percent of years (N = 8 years) that catch would have exceeded the 2013 OFL or the 2013 ABC, and (3) percent contribution of the management-unit OFL (i.e., north or south of 40₀10' N latitude) OFL to the coastwide OFL. Shaded areas represent potential areas of concern (i.e., higher risk of overfishing).

Species	2013 OFL	2013 ABC	Percent ABC 2011	Percent ABC 2009-2011	Percent ABC 2004-2011	Percent Years Over ABC 2004-2011	Percent OFL 2011	Percent OFL 2009-2011	Percent OFL 2004-2011	Percent Years Over OFL 2004-2011	Percent Coastwide OFL
Bronzespotted**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Bocaccio	284	236.9	2%	1%	2%	0%	1%	1%	2%	0%	24%
Chameleon**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Chilipepper	156	111	2%	10%	14%	0%	2%	7%	10%	0%	8%
Cowcod**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Dusky**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dwarf-red**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Flag	0.1	0.1	1%	15%	11%	0%	1%	15%	11%	0%	0%
Freckled**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Greenblotched	1.3	1.1	0%	0%	0%	0%	0%	0%	0%	0%	5%
Greenspotted	15.5	14.1	1%	1%	1%	0%	1%	1%	1%	0%	16%
Greenstriped	1,252	1,143	1%	1%	2%	0%	1%	1%	2%	0%	84%
Halfbanded**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Harlequin**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Honeycomb**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Mexican**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Pink**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Pinkrose**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%

Table 3. cont.

Species	2013 OFL	2013 ABC	Percent ABC 2011	Percent ABC 2009-2011	Percent ABC 2004-2011	Percent Years Over ABC 2004-2011	Percent OFL 2011	Percent OFL 2009-2011	Percent OFL 2004-2011	Percent Years Over OFL 2004-2011	Percent Coastwide OFL
Puget Sound**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Pygmy**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Redstripe	269.9	225.1	4%	4%	3%	0%	3%	3%	2%	0%	100%
Rosethorn	12.9	10.8	49%	44%	39%	0%	41%	36%	33%	0%	86%
Rosy	3	2.5	1%	3%	4%	0%	1%	2%	4%	0%	6%
Silvergray	159.4	133	1%	2%	6%	0%	1%	1%	5%	0%	100%
Speckled	0.2	0.1	0%	0%	0%	0%	0%	0%	0%	0%	1%
Squarespot	0.2	0.1	0%	0%	0%	0%	0%	0%	0%	0%	2%
Starry**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Stripetail	40.4	33.7	5%	5%	14%	0%	4%	4%	11%	0%	63%
Swordspine**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Tiger	1	0.8	168%	102%	116%	50%	134%	82%	93%	50%	100%
Vermilion	9.7	8.1	279%	231%	221%	100%	233%	193%	184%	100%	3%
Yellowtail*	4579	4378	31%	23%	17%	0%	30%	22%	16%	0%	100%

*Managed outside of complex
**Trace amount caught; i.e., the average catch does not round to 0.1 mt.

Table 4. Metrics that may be used to evaluate the risk of overfishing for Minor Shelf Rockfish south of 40₀10´ N latitude. Metrics include (1) average annual catch (2011, 2009-2011, and 2004-2011) as a percent of the 2013 ABC and the 2013 OFL, (2) percent of years (N = 8 years) that catch would have exceeded the 2013 OFL or the 2013 ABC, and (3) percent contribution of the management-unit OFL (i.e., north or south of 40₀10' N latitude) OFL to the coastwide OFL. Shaded areas represent potential areas of concern (i.e., higher risk of overfishing).

Species	2013 OFL	2013 ABC	Percent ABC 2011	Percent ABC 2009-2011	Percent ABC 2004-2011	%Years Over ABC 2004-2011	Percent OFL 2011	Percent OFL 2009-2011	Percent OFL 2004-2011	Percent Years Over OFL 2004-2011	Percent Coastwide OFL
Bronzespotted	3.6	3	0%	0%	1%	0%	0%	0%	1%	0%	100%
Bocaccio*	884	845	13%	10%	9%	0%	13%	9%	8%	0%	76%
Chameleon**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Chilipepper*	1768	1690	19%	19%	12%	0%	19%	18%	11%	0%	92%
Cowcod*	11	9	11%	8%	8%	0%	9%	6%	7%	0%	100%
Dusky**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Dwarf-red**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Flag	23.4	19.5	43%	34%	37%	0%	35%	28%	31%	0%	100%
Freckled**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Greenblotched	23.1	19.3	7%	4%	5%	0%	6%	3%	4%	0%	95%
Greenspotted	80.3	73.3	25%	21%	21%	0%	23%	19%	19%	0%	84%
Greenstriped	229.7	212.4	0%	1%	2%	0%	0%	1%	2%	0%	16%
Halfbanded**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Harlequin**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Honeycomb	9.9	8.2	98%	66%	52%	0%	81%	55%	43%	0%	100%
Mexican	5.1	4.2	0%	0%	4%	0%	0%	0%	3%	0%	100%
Pink	2.5	2.1	0%	0%	2%	0%	0%	0%	2%	0%	100%
Pinkrose**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%

Table 4. cont.

Species	2013 OFL	2013 ABC	Percent ABC 2011	Percent ABC 2009-2011	Percent ABC 2004-2011	%Years Over ABC 2004-2011	Percent OFL 2011	Percent OFL 2009-2011	Percent OFL 2004-2011	Percent Years Over OFL 2004-2011	Percent Coastwide OFL
Puget Sound**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Pygmy**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Redstripe	0.5	0.4	0%	9%	5%	0%	0%	8%	4%	0%	4%
Rosethorn	2.1	1.8	7%	7%	13%	0%	6%	6%	11%	0%	41%
Rosy	44.5	37.1	17%	15%	14%	0%	14%	12%	11%	0%	22%
Silvergray	0.5	0.4	0%	0%	0%	0%	0%	0%	0%	0%	71%
Speckled	39.4	32.8	25%	22%	12%	0%	21%	19%	10%	0%	99%
Squarespot	11.1	9.2	60%	35%	28%	0%	50%	29%	23%	0%	100%
Starry	62.6	52.2	43%	16%	7%	0%	36%	14%	5%	0%	61%
Stripetail	23.6	19.7	20%	47%	41%	0%	16%	39%	35%	0%	100%
Swordspine	14.2	11.9	1%	1%	0%	0%	1%	0%	0%	0%	93%
Tiger**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Vermilion	269.3	224.6	90%	72%	85%	25%	75%	60%	71%	13%	97%
Yellowtail	1064.4	887.7	5%	8%	17%	0%	4%	6%	14%	0%	100%

*Managed outside of complex

**Trace amount caught; i.e., the average catch does not round to 0.1 mt.

Table 5. Metrics that may be used to evaluate the risk of overfishing for Minor Nearshore Rockfish north of 40o10´ N latitude. Metrics include (1) average annual catch (2011, 2009-2011, and 2004-2011) as a percent of the 2013 ABC and the 2013 OFL, (2) percent of years (N = 8 years) that catch would have exceeded the 2013 OFL or the 2013 ABC, and (3) percent contribution of the management-unit OFL (i.e., north or south of 40o10' N latitude) OFL to the coastwide OFL. Shaded areas represent potential areas of concern (i.e., higher risk of overfishing).

Species	2013 OFL	2013 ABC	Percent ABC 2011	Percent ABC 2009-2011	Percent ABC 2004-2011	Percent Years Over ABC 2004-2011	Percent OFL 2011	Percent OFL 2009-2011	Percent OFL 2004-2011	Percent Years Over OFL 2004-2011	Percent Coastwide OFL
Black and yellow**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
China	9.8	8.2	237%	186%	162%	100%	198%	155%	136%	88%	37%
Gopher**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Grass	0.7	0.5	312%	177%	204%	75%	223%	126%	146%	75%	1%
Kelp**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Blue (CA)	59.7	51.9	85%	74%	88%	13%	74%	64%	76%	13%	19%
Brown	5.5	4.6	32%	25%	22%	0%	26%	21%	18%	0%	3%
Calico**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Copper	26	21.6	54%	43%	40%	0%	45%	36%	33%	0%	16%
Olive	0.3	0.2	515%	305%	159%	50%	343%	203%	106%	50%	0%
Quillback	7.4	6.2	214%	169%	203%	100%	179%	141%	170%	100%	58%
Treefish	0.2	0.1	0%	0%	0%	0%	0%	0%	0%	0%	1%

*Managed outside of complex

**Trace amount caught; i.e., the average catch does not round to 0.1 mt.

Table 6. Metrics that may be used to evaluate the risk of overfishing for Minor Nearshore Rockfish south of 40o10´ N latitude. Metrics include (1) average annual catch (2011, 2009-2011, and 2004-2011) as a percent of the 2013 ABC and the 2013 OFL, (2) percent of years (N = 8 years) that catch would have exceeded the 2013 OFL or the 2013 ABC, and (3) percent contribution of the management-unit OFL (i.e., north or south of 40o10' N latitude) OFL to the coastwide OFL. Shaded areas represent potential areas of concern (i.e., higher risk of overfishing).

Species	2013 OFL	2013 ABC	Percent ABC 2011	Percent ABC 2009-2011	Percent ABC 2004-2011	Percent Years Over ABC 2004-2011	Percent OFL 2011	Percent OFL 2009-2011	Percent OFL 2004-2011	Percent Years Over OFL 2004-2011	Percent Coastwide OFL
Black and yellow	27.5	23	102%	116%	78%	38%	85%	97%	65%	13%	100%
China	16.6	13.8	98%	133%	112%	63%	81%	111%	93%	25%	63%
Gopher	182.6	171.5	58%	59%	44%	0%	54%	55%	41%	0%	100%
Grass	59.6	49.7	45%	37%	34%	0%	37%	31%	29%	0%	99%
Kelp	27.7	23.1	3%	19%	19%	0%	3%	16%	15%	0%	100%
Blue	260.7	232.2	25%	22%	62%	25%	22%	20%	55%	25%	81%
Brown	204.6	170.6	67%	58%	48%	0%	56%	48%	40%	0%	97%
Calico**	0	0	NA	NA	NA	NA	NA	NA	NA	NA	0%
Copper	141.5	118	55%	50%	45%	0%	46%	41%	38%	0%	84%
Olive	224.6	187.4	13%	11%	20%	0%	10%	9%	17%	0%	100%
Quillback	5.4	4.5	2%	33%	42%	0%	2%	27%	35%	0%	42%
Treefish	13.2	11	124%	91%	70%	13%	103%	76%	59%	13%	99%

*Managed outside of complex

**Trace amount caught; i.e., the average catch does not round to 0.1 mt.

Table 7. Metrics that may be used to evaluate the risk of overfishing for the Other Flatfish Complex. Metrics include (1) average annual catch (2011, 2009-2011, and 2004-2011) as a percent of the 2013 ABC and the 2013 OFL, (2) percent of years (N = 8 years) that catch would have exceeded the 2013 OFL or the 2013 ABC, and (3) percent contribution of the management-unit OFL (i.e., north or south of 40o10' N latitude) OFL to the coastwide OFL. Shaded areas represent potential areas of concern (i.e., higher risk of overfishing).

Component Stock	2013 OFL	2013 ABC	Percent ABC 2011	Percent ABC 2009-2011	Percent ABC 2004-2011	Percent Years Over ABC 2004-2011	Percent OFL 2011	Percent OFL 2009-2011	Percent OFL 2004-2011	Percent Years Over OFL 2004-2011
Butter sole	4.6	3.2	28%	28%	36%	13%	20%	20%	25%	0%
Curlfin sole	8.2	5.7	31%	62%	186%	63%	22%	43%	130%	50%
Flathead sole	35	24.3	33%	29%	124%	38%	23%	20%	86%	38%
Pacific sanddab	4801	3331.9	10%	12%	15%	0%	7%	8%	10%	0%
Rex sole	4371.5	3033.8	15%	19%	22%	0%	10%	13%	15%	0%
Rock sole	66.7	46.3	17%	13%	24%	0%	12%	9%	16%	0%
Sand sole	773.2	536.6	15%	12%	12%	0%	10%	9%	8%	0%
Slender Sole***	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Deep Sea Sole***	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

*Managed outside of complex

Table 8. Metrics that may be used to evaluate the risk of overfishing for the Cartilaginous Fish Complex. Metrics include (1) average annual catch (2011, 2009-2011, and 2004-2011) as a percent of the 2013 ABC and the 2013 OFL, (2) percent of years (N = 8 years) that catch would have exceeded the 2013 OFL or the 2013 ABC, and (3) percent contribution of the management-unit OFL (i.e., north or south of 40o10' N latitude) OFL to the coastwide OFL. Shaded areas represent potential areas of concern (i.e., higher risk of overfishing).

Component Stock	2013 OFL	2013 ABC	Percent ABC 2011	Percent ABC 2009-2011	Percent ABC 2004-2011	Percent Years Over ABC 2004-2011	Percent OFL 2011	Percent OFL 2009-2011	Percent OFL 2004-2011	Percent Years Over OFL 2004-2011
Longnose skate*	2902	2774	41%	47%	32%	0%	39%	45%	31%	0%
Big skate	458	317.9	25%	23%	43%	0%	17%	16%	30%	0%
California skate	86	59.7	16%	20%	54%	13%	11%	14%	38%	13%
Leopard shark	167.1	116	18%	28%	36%	0%	13%	19%	25%	0%
Ratfish	1441	1000.1	7%	10%	19%	0%	5%	7%	13%	0%
Soupfin shark	61.6	42.8	12%	10%	37%	0%	8%	7%	26%	0%
Spiny dogfish	2980	2044	81%	66%	83%	25%	56%	45%	57%	0%
Aleutian Skate***	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Black Skate***	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bering/Sandpaper skate***	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
All other skates (not in the BB)***	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Brown cat shark***	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

*Managed outside of complex

**Trace amount caught; i.e., the average catch does not round to 0.1 mt.

***No estimate of OFL available

Table 9. Metrics that may be used to evaluate the risk of overfishing for the Other Roundfish Complex. Metrics include (1) average annual catch (2011, 2009-2011, and 2004-2011) as a percent of the 2013 ABC and the 2013 OFL, (2) percent of years (N = 8 years) that catch would have exceeded the 2013 OFL or the 2013 ABC, and (3) percent contribution of the management-unit OFL (i.e., north or south of 40o10' N latitude) OFL to the coastwide OFL. Shaded areas represent potential areas of concern (i.e., higher risk of overfishing).

Component Stock	2013 OFL	2013 ABC	Percent ABC 2011	Percent ABC 2009-2011	Percent ABC 2004-2011	Percent Years Over ABC 2004-2011	Percent OFL 2011	Percent OFL 2009-2011	Percent OFL 2004-2011	Percent Years Over OFL 2004-2011
Finescale codling/Pacific flatnose	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pacific rattail/grenadier**	1519	1054.2	11%	14%	10%	0%	8%	10%	7%	0%
Giant rattail/grenadier	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
All other rattails/grenadiers	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cabezon (WA)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cabezon (OR and CA)	219	210	47%	38%	37%	0%	45%	36%	36%	0%
California Scorpionfish*	126	120	87%	67%	60%	0%	83%	64%	57%	0%
Kelp Greenling	118.9	82.5	90%	61%	48%	0%	63%	43%	33%	0%
All other greenlings***	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

*Managed outside of complex

**Trace amount caught; i.e., the average catch does not round to 0.1 mt.

***No estimate of OFL available

Table 10. Coastwide analysis of metrics that may be used to evaluate the risk of overfishing for species in complexes identified to exceed an ABC or OFL in each complex. Metrics include (1) average annual catch (2011, 2009-2011, and 2004-2011) as a percent of the 2013 ABC and the 2013 OFL and (2) percent of years (N = 8 years) that catch would have exceeded the 2013 OFL or the 2013 ABC.

Species	2013 OFL	2013 ABC	Percent ABC 2011	Percent ABC 2009-2011	Percent ABC 2004-2011	Percent Years Over ABC 2004-2011	Percent OFL 2011	Percent OFL 2009-2011	Percent OFL 2004-2011	Percent Years Over OFL 2004-2011
Aurora Data-Poor	41.5	34.5	80%	132%	162%	88%	67%	110%	134%	75%
Aurora Full Assessment 2015	91.67	87.33	32%	52%	64%	0%	30%	50%	61%	0%
Blackgill	134.7	122.6	126%	126%	97%	50%	115%	114%	88%	50%
Rougheye Data-Poor	71.5	59.6	348%	396%	315%	100%	290%	330%	263%	100%
Rougheye Full Assessment 2015	206	197	105%	120%	95%	50%	101%	115%	91%	50%
Shortraker	18.8	15.7	180%	199%	166%	75%	150%	166%	138%	75%
Tiger**	1	0.8	201%	123%	134%	63%	161%	98%	107%	50%
Vermilion	279	232.7	97%	78%	89%	25%	81%	65%	75%	13%
Black and yellow	27.5	23	116%	121%	80%	38%	97%	101%	67%	13%
China	26.4	22	150%	153%	130%	88%	125%	127%	109%	63%
Grass	60.3	50.2	47%	39%	36%	0%	39%	32%	30%	0%
Olive	224.9	187.6	13%	11%	20%	0%	11%	9%	17%	0%
Quillback	12.8	10.7	125%	112%	135%	88%	104%	93%	113%	63%
Treefish	13.4	11.1	123%	90%	70%	13%	102%	75%	58%	13%
Curlfin sole	8.2	5.7	31%	62%	186%	63%	22%	43%	130%	50%
Flathead sole	35	24.3	33%	29%	124%	38%	23%	20%	86%	38%

**Trace amount caught; i.e., the average catch does not round to 0.1 mt.