

BSAI Black spotted and Rougheye (BS/RE) rockfish complex spatial issues

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This document provides a brief overview of the Council's spatial management policy and discussions of BSAI BS/RE spatial management considerations and resulting decisions. The BS/RE complex is currently managed under a single OFL and with sub-area ABCs and TACs apportioned to two subareas: the western and central Aleutian Islands, and eastern Aleutian Islands and eastern Bering Sea. Due to catch overages and concerns expressed in the stock assessment for this stock for many years, the Council's Spatial Management Policy has been enacted for this stock resulting in an informal maximum subarea species catch (MSSC) level being specified for the central Aleutian Island (CAI) and western Aleutian Island (WAI) areas. Additional information on the Council's spatial management policy and catch levels in the WAI and CAI as well as a timeline for discussions, recommendations and actions are described in this paper. Detailed recommendations from 2021 discussions at the BSAI Joint Plan Team and SSC are contained in this document while information collated from previous Joint Plan Team and BSAI discussions on spatial management contained in Appendix 1.

1. Council Policy on Spatial management

In October 2013, the Council adopted a policy that established a process for determining spatial management (i.e., subarea allocations of annual harvest specifications (OFL, ABC, and/or TAC)) of stocks and stock assemblages for groundfish, crabs and scallops.

1. As soon as preliminary scientific information indicates that further stock structure separation or other spatial management measures may be considered, the stock assessment authors, plan teams (groundfish, crab, scallop), and SSC should advise the Council of their findings and any associated conservation concerns.
2. With input from the agency, the public, and its advisory bodies, the Council (and NMFS) should identify the economic, social, and management implications and potential options for management response to these findings and identify the suite of tools that could be used to achieve conservation and management goals. In the case of crab and scallop management, ADF&G needs to be part of this process.
3. To the extent practicable, further refinement of stock structure or other spatial conservation concerns and potential management responses should be discussed through the process described in recommendations 1 and 2 above.
4. Based on the best information available provided through this process, the SSC should continue to recommend OFLs and ABCs that prevent overfishing of stocks.

Based upon input from the Joint Plan Teams and SSC, in December 2015 the Council further refined this policy to provide the suggested timeline for action on spatial management changes as it relates to groundfish specifications.

¹ Updated from the paper presented to the BSAI Plan Team September 2021

Month	Action
September/October (year 1)	Notification of strong stock structure concern. SSC indicates to Council that it has 11 months to develop suite of tools and management and economic implications of the application of these tools to the stock/complex in question.
March/April (year 1)	Suite of proposed management tools compiled. One of these would be separate ABCs and/or OFLs per recommendations listed earlier.
March/April-August (year 1)	Evaluation of suite of management tools for consideration of management and economic implications. Note that this does not necessarily mean a comprehensive analysis; this could simply be an informed listing of the likely implications of each tool.
September/October (year 2)	Team/SSC/Council review of suite of tools and selection of approach for use in the coming harvest year (assuming that the approach does not require rulemaking).
2 years later: September/October (year 4)	Update on result of application of tool. If deemed insufficient to address issue, consideration of additional measures (e.g., area split).
Continuing forward annually in September/October	If management tool successful over 2 year time frame, continued annual update on progress. Consideration of performance criteria for continued need for tool.

2. Timeline of spatial management discussions related to BS/RE rockfish

The following table provides a brief overview of the discussions by the BSAI Plan Team on BS/RE rockfish and any associated actions by the Team, SSC and/or Council.

Year	Discussion	Action
2005-2009	Discussions of stock structure as it relates to BS/RE and other groundfish and considerations of whether to split BS/RE between EBS and AI.	BSAI team recommends separate assessments for EBS and AI but to sum for BSAI specs (2008). Development of Stock Structure Working Group and resulting Template.
2010	Initial stock structure analysis by authors indicates stock structure within the BSAI. Author has been providing potential 'subarea ABCs' and noted that catches in the WAI frequently exceed the potential subarea ABC	Team recommends (and SSC concurs) on subarea ABC at the level of 'WAI/CAI and EBS/EAI' combined areas.
2012	Plan Team receives presentation on fishery exploitation rates and comparisons between fishery and survey data	
2013	Council holds Spatial Management Workshop; Joint Teams provide feedback to council on what to consider in developing a spatial management policy and process BSAI PT expresses 'strong concern'. Author provides informal potential WAI ABC to industry as a guide for relative catch level.	Council adopts spatial management policy (as shown in Section 1)

2014	BSAI PT expresses ‘strong concern’ and request for annual reporting of population proportion by area. SSC proposes recommended maximum catch by subarea be included in stock structure policy. Team names ‘maximum subarea species catch’ (MSSC)	
2015	SSC recommends Council initiate Step 2 of policy	RO provides in-season catch reporting of catch accruing to MSSC. Workgroup formed of PT, Council staff, SSC RO. Council requests Stock structure/spatial management workshop with particular focus on BS/RE rockfish.
2016	Council sponsors Stock structure/spatial management workshop with particular focus on BS/RE rockfish.	Continued management of BS/RE with an MSSC-based management
2016-2020	Continued discussions and periodic evaluations of exploitation rates by area and catch > MSSC	Continued management of BS/RE with an MSSC-based management Request for updates on genetic evaluations when available and potentially revisiting issues of subarea ABCs
September 2021	Review timeline of spatial issues and discussions for BS/RE and provide information on potential for genetic diversity	Team reiterates ‘strong concern’ and makes a list of recommendations including more direction from the SSC and Council on how to address these spatial catch issues. Specific recommendations and SSC responses are listed below

3. Current Catch in relation to the Maximum Subarea Species Catch (MSSC)

The ABC and TAC for BSAI blackspotted/rougheye is currently apportioned among two areas: the western and central Aleutian Islands, and eastern Aleutian Islands and eastern Bering Sea. In recent years (2020 and 2022) the subarea ABC for WAI/CAI has been exceeded (see [2021 BS/RE Stock Assessment](#)). An MSSC is established for the WAI and the CAI areas. This MSSC has been exceeded in the WAI in nearly every year since being implemented (note this is a non-regulatory action). The following table (Table 1) provides the catch by year in relation to the MSSC for the areas for which they have been specified.

Table 1 MSSC and catch by sub-area 2015-2022

Year	CAI (Area 542)	Catch	MSSC remaining	WAI (Area 543)	Catch	MSSC remaining
2015	56	258	202	70	46	(24)
2016	50	324	274	40	58	18
2017	118	166	48	35	29	(6)
2018	113	204	91	67	35	(32)
2019	208	167	(41)	104	37	(67)
2020	212	216	4	168	48	(120)
2021	198	138	(60)	120	31	(89)
2022	119	145	26	97	32	(65)

4. 2021 BSAI Team and SSC recommendations and next steps

In relation to continued concerns regarding the harvest of BS/RE specifically in WAI, the BSAI Team made the following recommendations:

- The costs and benefits of a tagging study should be evaluated by the AFSC.
- The costs and benefits of an IBM specific to answering the questions surrounding blackspotted rockfish larval dispersion and potential stock replenishment rates in the Aleutian Islands should be evaluated by the AFSC.
- The Team continues to support the ranking of “strong concern” for this stock.
- The Team’s retains its recommendation from 2020, viz.: “The Team requests guidance from the SSC and Council on how to reduce incidental catch in areas with disproportionate spatial exploitation because the MSSC tool has not provided enough protection.”
- Except for the genetic study, which has now been completed, the other items on the SSC’s list from December 2020 should be pursued, including the convening of another workshop on spatial management, which should address both BSAI blackspotted rockfish in particular and spatial management issues in general. One objective of such a workshop should be the consideration and development of alternative management tools for dealing with stocks or portions of stocks with rankings of “strong concern” due to their prevalence as bycatch.

The SSC in October 2021 recommended the following: “Despite not detecting genetic stock structure, the SSC continues to be concerned about the disproportionate spatial harvest, including catch in excess of the WAI/CAI subarea MSSC in recent years, and the potential vulnerability of this rockfish complex to localized depletion. As noted in the December 2020 SSC report, the SSC recognizes its role in bringing species that are facing potential conservation concerns to the Council’s attention in accordance with the Spatial Management Policy. Therefore, the SSC reiterates its recommendation to the Council to consider moving to Step 2 of the Spatial Management Policy. The SSC recommends reconstituting a spatial management working group to develop a white paper that addresses how the Spatial Management Policy can be used to address conservation and management concerns for BSAI BS/RE. The white paper would explore potential options for management response and identification of a suite of tools that could be used to achieve conservation and management goals as outlined in December 2020. In particular, the SSC recommends the white paper focus on new information and industry avoidance efforts. The SSC also recommends that the white paper explore what level of depletion would be cause for conservation

concern given the lack of genetic structure. These recommendations were reiterated at the December 2021 SSC meeting and the Council requested a discussion paper to evaluate whether and how the spatial management policy can be used to address issues of disproportionate spatial harvesting within the BS/RE complex.

Appendix 1: Compilation of Plan Team discussions on spatial management 2005-2020

November 2005, BSAI Team

The Team had a lengthy discussion of separation of ABCs between the Bering Sea and Aleutian Islands, specifically regarding shortraker and rougheye rockfishes but the discussion broadened to include all BSAI groundfish stocks (including Pacific cod). In response to an SSC request, the authors summarized existing genetic analyses, which suggest that the BS and AI represent separate spawning populations for rougheye rockfish (although the BS fish may be part of a larger group including fish from the Western GOA), but the results are unclear for shortraker rockfish due to lack of sampling in the Bering Sea. The Team also discussed potential management complications that might arise from area-specific quotas for these species. Most of the stocks are on prohibited status from the start of the fishing year and the incidental catch is more likely to be discarded due to regulatory requirements. The MRAs are established at very low levels. Separate trawl and longline MRAs for shortraker and rougheye rockfishes were set closer to their intrinsic bycatch rate. It is unclear if separate ABCs would be an effective management tool by discouraging topping off and would result in closing CDQ fisheries.

Given the information available, the Team could not reach consensus on whether to split ABC or OFL by region. At this point, the primary data gaps are less related to biology than to the distribution of fishery catches by area/target and the ability of the management system to deal with very small, area-specific TACs. The Team therefore requested that the authors present additional information on the distribution of fishery catches at the September 2006 Plan Team meeting and that a full discussion of this issue for all groundfish stocks be scheduled then. The Team recommended no changes in area apportionments for any stocks this year.

September 2008, BSAI Team

Paul Spencer summarized several studies relevant to whether BSAI rougheye rockfish complex management should be split between the Bering Sea and Aleutian Islands. The rougheye complex is composed of two species, (true) rougheye rockfish and blackspotted rockfish. Major results of these studies follow.

- 1) Both species' abundance is low in the Bering Sea, whereas blackspotted rockfish abundance is higher and rougheye rockfish abundance is lower in the Aleutian Islands
- 2) Phenotypic differences occur between regions
 - a. Size at age is larger for intermediate (10-20) ages of blackspotted rockfish in the Bering Sea compared to the Aleutian Islands
 - b. Young, small fish are more abundant in the Bering Sea compared to the Aleutian Islands
- 3) Genotypic differences occur between regions
 - a. Central Aleutian blackspotted rockfish are genetically different from eastern Aleutian blackspotted rockfish
 - b. Eastern Aleutian and western Gulf of Alaska blackspotted rockfish are genetically similar
 - c. Bering Sea and western Gulf of Alaska blackspotted rockfish are genetically similar
 - d. The overlap implies that eastern Aleutians and Bering Sea are somewhat similar
 - e. The only clearly different sample analyzed was that spanning the eastern and central Aleutian Islands

The Team recommends not splitting rougheye complex management between the Bering Sea and Aleutian Islands at this time. Bering Sea blackspotted rockfish appear to be part of a larger area stock that includes the western Gulf of Alaska and possibly the eastern Aleutian Islands. The only clearly different sample analyzed was that spanning the eastern and central Aleutian Islands, where abundance is greater there and presumably less susceptible to overexploitation for the population overall (though local depletion could occur). The Team requested both combined and separate area assessments from the author for November.

November 2008, BSAI Team

Paul Spencer presented the assessment. Along with developing separate assessments for shortraker rockfish and rougheye rockfish this year, fish previously referred to as “rougheye rockfish” are now recognized as consisting of two species, the rougheye rockfish (*Sebastes aleutianus*) and blackspotted rockfish (*S. melanostictus*). A paper was published by Orr and Hawkins in 2007, and the authors and plan Team applied this new classification in their recommendations. Blackspotted rockfish is the predominant species in the Bering Sea and Aleutian Islands.

The Team accepted the author’s recommendation for a new age-structured model for this complex, and noted that the increase in biomass is a result of using the new model. The Team also briefly discussed the availability of genetic, growth, and demographic information pertinent to whether the blackspotted and rougheye complex in the BS should be considered a distinct complex from that in the AI. The complex primarily consists of blackspotted rockfish in the AI. The Team disagreed with the authors’ recommendation and does not recommend splitting rougheye complex management between the BS and AI at this time. The Team requested that a general discussion of stock structure and management implications for area management, including disproportionate harvest to area ABC be scheduled for joint Team discussion for September 2009; genetic experts will be invited. The Team accepted the author’s recommendation for OFL and ABC: Tier 3b for AI, Tier 5 for EBS.

September 2009, Joint Teams

Paul Spencer summarized the conclusions of a Council working group report on proposed guidelines for how the Plan Teams should determine species and spatial management units for setting annual catch limits. The workgroup discussed management considerations related to both evolutionary and ecological paradigms for stock structure. Paul asked the Plan Teams to consider how to apply a precautionary rationale to stock structure decisions for management. Tony Gharrett and Mike Canino presented several BSAI case studies. Bill Clark and Sarah Gaichas asked the Teams to consider how to distribute harvest spatially relative to the biomass, regardless of genetic or other evidence of stock structure. Jim Ianelli requested that the Plan Teams prepare a summary of the separations by area and species that have been implemented over the years for future consideration. Paul offered to provide that information for BSAI and GOA rockfishes.

Tony Gharrett summarized the materials and methods of marine fishery genetics, and genetic information for BSAI blackspotted rockfish. Mike Canino summarized genetics studies of Pacific cod, walleye pollock, and Atka mackerel. The main questions for genetics are 1) where are population centers located? and 2) how much dispersal occurs? Fishery managers may find it useful to think of genes as tags; however temporal and spatial scales are different than our usual management scales. There is a thousand plus year frame of reference for genetics, but only annual to decadal time scales for

fishery management. The question is how to reconcile potential for populations to maintain/replenish genetic structure in space over generation times with temporal and spatial scale of fishing in the North Pacific. Measuring the dispersal potential of the genes within the population range is difficult, but getting that rate is essential to determining possible fishery impacts. We want to avoid “holes” in the population where genetic structure is separated by fishery removals. Genetic migration rates are per generation, and are not annual rates. Generation time is defined as a population average, and takes into account not just first age at spawning but also the number of years of reproductive activity.

Paul led a discussion of what the next steps would be in forming a Plan Team policy, including the ICES model of a separate stock structure committee, the ESA status review process determining evolutionarily significant units, and an alternative approach proposed by the working group on stock structure. The working group proposed a framework where consistent information types would be examined for each stock in question, including fishery harvest and spatial information, barriers and phenotypic characters, behavior and movement, and genetic information.

The Teams agreed that a consistent process for examining stock structure issues would be helpful for setting ACLs. The teams proposed a three step process for evaluating stock structure within the management context.

- 1) data on stock structure would be reviewed using the working group’s proposed framework (with any modifications suggested by the Teams or SSC).
- 2) relative risks to the stock would be weighed for status quo versus altered spatial management to address stock structure.
- 3) management issues would be considered (such as the feasibility of managing smaller areas, smaller TACs, costs of possible fishery closures, or cryptic species with available data).

The Teams agreed with the working group that the scientific data on stock structure should be evaluated at the September Plan Team meeting rather than in November so that resultant ACLs would not constrain management decisions. If management constraints prevented scientific advice from being fully implemented (such as quotas that are too small to manage), alternative management strategies to address stock structure concerns could be considered in the future.

The Teams suggested that stock assessment authors include the data necessary to make consistent evaluations of stock structure in the introductory section on stock structure. Only authors who plan to suggest spatial or stock splits in their current assessments are required to provide the necessary information to the teams each September, and include that information in their November SAFE Report chapter. In the future, this information may be requested for all chapters. The framework (see table in the working group report) should be provided in the stock assessment template going out to authors to notify them that this information will be required if stock splits are recommended, and may eventually be required in all assessments. Case studies will be selected by the Plan Teams in November 2009 for the November 2010 assessments. Instructions to stock assessment authors will include a consistent set of potential area splits for catch and exploitation rate calculation where possible (e.g., include an EBS vs. AI split in BSAI assessments, except that smaller scale splits may be requested; analyses by 3-digit INPFC management areas was suggested for specific cases). Otherwise, hypothesized stock structure should drive areal analysis. Missing information for the framework should be listed as research priorities for that stock. Finally, if stock identification information shows that very small management scales might be required that are beyond current capabilities for monitoring and enforcement, this information should

still be included in the assessment so that steps can be taken to mitigate any risks the current management might pose to the stock.

November 2009, BSAI Team

The Plan Team encouraged the authors to apply the new stock structure template to the blackspotted/rougheye rockfish complex.

September 2010, Joint Teams

Paul Spencer presented the recommendations of the Stock Structure Working Group. The working group made the following recommendation: “allocate the Acceptable Biological Catch (ABC) across subsets of NMFS areas within the BSAI and GOA management areas as a precautionary measure even in the absence of specific scientific information.” The Teams debated this language and indicated that distinct oceanographic and ecosystem characteristics (e.g., between BS and AI regions) would be a more defensible rationale for default division of quotas between regions than an a priori preference for dividing any given quota into at least two parts. The Teams concurred with the Working Group’s recommendation to divide quotas as a default measure in general but modified the recommendation as follows: “allocate the Acceptable Biological Catch (ABC) across subsets of NMFS areas within the BSAI and GOA management areas as a precautionary measure to the extent practicable”.

The Working Group also proposed two potential processes for determination of stock structure for groundfish stocks. To identify priorities for stock structure evaluation, the group suggested two options: 1) ID only species of highest concern or 2) develop a schedule for evaluating spatial management for all stocks. The group also suggested two options for the evaluation at the Plan Team level (final determination would be made by the SSC): 1) joint PT review each September or 2) separate (non-PT) committee review, which would report to the joint Plan Teams each September.

The Teams discussed: 1) the proposed default policy of ABC allocation by area; 2) ID of stocks for stock structure evaluation; and 3) review of stock structure evaluation report. The Teams discussed the differences in OFL/ABC management between GOA and BSAI. The Teams discussed whether there are valid reasons for these differences or if consistency between FMP areas would be desirable.

The Teams discussed the extent to which a default approach of ABC allocation by area would be recommended. If data are uncertain, it could be possible to allocate stocks inappropriately in some areas and therefore disproportionately concentrate fishing effort. There was some discussion of the differences between the GOA and BSAI in the extent of management areas and the appropriate size for managing ABC by area (different issues in BSAI vs GOA).

Case Study: BSAI rougheye/blackspotted rockfish

Paul Spencer described the distribution and species composition of the two-species complex. The stock structure template was applied and possible management implications were discussed. Four studies have been published that describe the distribution of blackspotted rockfish and rougheye rockfish in the North Pacific. Blackspotted rockfish are found throughout federally managed Alaska waters, whereas rougheye rockfish are found in the Gulf of Alaska and EBS slope but are rare in most of the Aleutian Islands. There is a high error rate for distinguishing blackspotted from rougheye rockfish in the Gulf of Alaska. There is about an order of magnitude difference in rougheye/blackspotted rockfish abundance

between the Aleutian Islands and Bering Sea (higher in the Aleutian Islands). These species are long-lived with low fecundity (generation time of 53 years, based on the standard definition). Some Aleutian passes and along-shore currents may physically limit connectivity between regions of the Aleutian Islands. Some size at age differences occur between the BS and AI rockfishes, which Jon Heifetz pointed out, is a typical finding for between-area differences for rockfish species; the challenge then is determining the biological significance of the differences. Younger fish typically are observed on the Bering Sea slope. Within the BSAI, an isolation by distance test is statistically significant for genetic data. From this data, an estimate of dispersal distance was calculated to be 550 km (maximum of all of the estimates). The author concluded that this information indicates structuring within the BSAI area for blackspotted rockfish. Fish that are located farther apart are less related to one another (isolation by distance).

Paul then provided a table to address the risk (biological and fishery) under alternative hypotheses concerning stock structure (i.e., management implications). The structuring of the population implies that rockfish ABCs should be allocated by area. Given the current management practices (bycatch status, low MRAs), area allocations of ABC appear to be nonlimiting to the fishery (recent catch has been less than potential AI and BS ABCs).

Paul also explored the implication of area ABCs within the AI. In this case, however, the catch has exceeded potential ABC in the western AI but not in the central and eastern AI.

Case Study: GOA rougheye/blackspotted rockfish

Dana Hanselman reviewed the stock structure template for GOA blackspotted/rougheye rockfishes (ftp://ftp.afsc.noaa.gov/afsc/public/plan_team/GOA_RE-BS_Stock_Structure_Report.pdf). There appears to be extensive overlap of the two species in the GOA and difficulty in field identification persists with a mis-identification rate of about 29% in field. An examination of harvest and trends indicates that catch in the WGOA is increasing, but remains below TAC. The survey and fishery distribution are similar. The abundance is greater in the central and eastern areas based on the longline survey. These species are long-lived with a generation time of at least 19 yrs (based on the age at 50% maturity as a proxy). Eggs and larvae have a high dispersal potential. There are significant differences in mean length and age by area and the distributional patterns in species could be contributing to these differences. For example, a lack of recruitment in the WGOA could be contributing to the higher mean age observed there. Some naturally occurring "tags" (parasites) indicate differences by area but isolation by distance is not apparently significant for both species. Hence there is no overarching pattern, but small scale homogeneity tests suggest distinct populations roughly on the scale of NMFS management areas (WGOA, CGOA, and EGOA). In summary, there are signs of population structure by management areas for these stocks. Hence, the current GOA management by areas for ABCs and Gulf-wide OFLs seems appropriate. Differential growth between the western GOA and the eastern GOA could result from a combination of effects, including poorer recruitment in the west and different species proportions between the regions.

Case Study: BSAI Atka mackerel

Sandra Lowe provided an evaluation of stock structure for BSAI Atka mackerel following the stock structure template (ftp://ftp.afsc.noaa.gov/afsc/public/plan_team/Atka%20stock%20structure%20table.pdf). The fishery catch has averaged about 3/4 of the ABC. The fishery is highly concentrated. Abundance and recruitment patterns are similar among areas. The generation time is about 10 years

due to a short life span and early age at maturity. The patterns of currents through passes and alongshore currents may provide physical barriers to connectivity. There are significant and consistent differences between areas in size compositions and growth rates, with smaller fish in the western and central areas of the AI. Sandra stated that there is evidence that regional growth differences are due to lower prey quality in the western and central areas. 10 No significant differences in maturity at age are apparent between areas. Tagging results indicate that adults are not highly migratory. Spawning site fidelity is unknown at small scales. Genetic studies found no evidence of discrete stocks, although genetic analyses are generally uninformative due to a recent bottleneck/expansion that removed most of the genetic diversity. Features with implications for stock assessment and management include an extended pelagic phase (~2 years) during which a large amount of mixing occurs. No large-scale movements are evident after the demersal stage begins (~3 years). Differences in regional growth patterns are accounted for in the stock assessment model. The catch is allocated across areas within the AI (the EBS is combined with the eastern AI).

Summary of stock structure discussions

- To what other stocks should this method be applied and what is the process for adding stocks to that list?
- How long does the process take? For some studies, it has been in excess of 2 years but this depends on the level of detail included in the available studies.
- The list for future stocks should be prioritized first by stocks that have a region-wide ABC/OFL and are close to full utilization (i.e., catch is close to ABC).
- It was cautioned that if ACLs are exceeded more than once in 4 years then the entire system of ACLs and accountability measures (which are triggered when an ACL is exceeded) should be re-evaluated and modified if necessary to improve its performance and effectiveness. If multiple spatial ABCs are inappropriately constructed (e.g., if spatial allocation is based on a single highly variable survey estimate) then the likelihood of exceeding an ACL may increase.
- It was recommended that the Working Group synthesize a comprehensive table of area management of all stocks and the criteria for prioritizing stock structure analyses for presentation to the Teams next September. The current specifications tables contain this information. Consideration of this information should aid in development of a Plan Team recommendation regarding appropriate spatial management for these stocks.
- The GOA Team discussed evaluating the current spatially-explicit management of GOA pollock. Also, GOA skates might be considered, since area-specific ABCs are specified and the Team has debated whether area-specific OFLs would be justified.
- Rockfish and flatfish were highlighted as the most likely candidates for future evaluations.
- Once an analysis has been completed, it may be revisited if new information becomes available.
- Schedule and work-load should be considered when making requests of authors (e.g., an “off-year” assessment would be most appropriate, if possible).

September 2010, BSAI Team

Paul Spencer presented results of applying the stock structure working group’s stock structure template to BSAI blackspotted and rougheye rockfish in the September 2010 joint session, which were similar to information presented to the Plan Team in previous years. He provided new information based on questions he received earlier in the week on relative abundances and catch by area in the Aleutian Islands (AI). Central AI has the highest abundance; the western AI came down in the mid 1990s, where it has remained. The western AI error bars were large. The Central and Eastern abundance estimates are imprecise, but relatively stable. He then showed CVs by area and said they were high but comparable to

the Pacific ocean perch CVs, which has 30 area ABCs. One thing to consider when making these subarea calculations is that areas with small abundance often have a high CV. He then showed average survey biomass for recent years (2002-2006) and from 1991-2006 compared to recent catch average. Western GOA had a higher proportion of catch compared to its relative biomass.

The model ABC was apportioned into area ABCs with the different survey biomass series. For each of the AI subareas, the recent catches were compared to the potential subarea ABC based on both of the survey time periods mentioned above. This comparison indicated that the western AI catches would be above the ABC under either of the average survey biomass scenarios.

Most of the fish was caught on trawl gear, mostly rockfish targets (POP) and a little from the Atka mackerel fishery. For the longline fishery, Pacific cod caught most of the RE/BS catch, with a little bit from halibut longlines.

Mike Sigler recommended that the Team consider both the BS v. AI split and the AI subarea splits. The Team discussed the need to identify the species included in the complex. Blackspotted rockfish could be separated from the complex; however, there is no species code for blackspotted in the Catch Accounting System. Some of the boats are 100% observed, but they are not identifying their catch to species. Mary noted that current management is fine as long as the regulations identify what species comprise the complex because the groundfish FMP does not define the complexes. The Teams should be aware that as new species are identified, they may be best managed under the other (flatfish or rockfish) categories. Grant Thompson suggested that a future FMP amendment could clarify existing language regarding the disposition of target species that have been newly identified or split out of existing complexes (i.e., do they necessarily become part of an “other” complex, or can they be managed as individual stocks—the Team has always understood the latter to be the case).

Mike asked about the impacts for commercial fisheries of splitting these stocks, in terms of ACLs and AMs. Mary said that it could result in OFL closures of small areas, if OFLs were also split. In-season management tools allow the agency to first switch to prohibited status and then to shut down the fishery. The POP fishery is already managed in three areas and the fishery is spread; but POP might not be harvested in proportion to the abundance of RE/BS.

Grant reminded the Team of the “at least two areas to the extent practicable” principle that the Teams adopted during the joint Team discussion of the Stock Structure Working Group report. He asked whether it would be appropriate to create one subarea that included the Bering Sea and Eastern Aleutians and another subarea that included the Western and Central AIs; Atka mackerel provides a precedent for combining the EBS and the Eastern AI. Mary suggested it could increase the risk of reaching the OFL and could be complicated to manage. Grant clarified that he intended for this suggestion to apply to the ABC only, not the OFL. Mike asked what would be the biomass proportions would be implied by that split. Paul said ABC, biomass, and catch were all quite small in the Bering Sea. Bill Clark asked how well NMFS could manage a 50 ton catch. Mary responded that management is difficult at low TAC levels. There is also a 31 70/30 gear split in the AI-only areas. Mary will look into whether subareas would be prosecutable or legal.

Industry members asked what the biological urgency is for taking the proposed action. It will require managing more, smaller quotas. The smaller TACs also would have to be split among cooperative companies which could make some portions unmanageable.

Jane reviewed that the purpose of the proposed specifications is a public notice of a potential future action. In that context, the Team can propose an area split, and then the public can comment on it to both the Council during its meetings and to the Secretary during the public comment period on the proposed rule. The Council may or may not approve it. Mike suggested that we ask for more information from the author at the November PT meeting on the 3 options that the Team has discussed: 1) Status quo (no split); 2) split WAI/CAI from EAI/EBS; and 3) split BS from AI. If the Team does not indicate an interest in selecting one of the options now, we cannot do it in November. For the purpose of the table, we either stick with status quo, or indicate a potential action on the proposed ABC splits.

Maura Sullivan explained that the public needs to have access to the analysis when they issue the proposed rule which would be in December when the SAFE Report is available for review. It was asked whether the SSC could decide in October to do the split. Jane stated it could, but it might not choose to do so without the Plan Team recommendation.

The Team agreed that the scientific data are sufficient to indicate stock structure within the BSAI area, and thus to consider splitting the complex by subarea. The discussion in November will focus on the feasibility of managing a split ABC. Paul will present the above options (1, 2, and 3 listed above) in November and possibly an option related to a Western AI only area. Paul will describe proposed ABC levels along with estimated biomasses for potential area splits. Mary will report on the management implications of different area splits. Mary noted some implications. After subtraction of reserves, the TAC of shortraker rockfish and rougheye rockfish specified for the Aleutian Islands subarea would be allocated 30 percent to vessels using nontrawl gear and 70 percent to vessels using trawl gear.

November 2010, BSAI Team

(Under “Blackspotted/rougheye rockfish complex”) The Plan Team recommends allocating the ABC to two areas: 1) a Western and Central AI area, and an 34 Eastern AI and EBS area. The rationale for this recommendation is that the available information on stock structure for blackspotted rockfish indicates an isolation by distance pattern without clear physical breaks in stock structure, and this division of the ABCs results in management areas that are more consistent with the available information on stock structure. Although the current pattern of harvest does indicate disproportionate harvesting within the western Aleutians, the Plan Team did not feel the scale of harvests in this area warranted a separate western AI ABC at this time.

August/September 2011, Joint Teams

A stock structure working group (SSWG) was formed in 2009 to provide guidelines for the evaluation of stock structure and spatial harvest specifications. The SSWG developed a report that contains a “template” of the types of data that may be considered in evaluating stock structure, with some guidelines on interpretation of these data. To assist in the application of this template the Joint Plan Teams requested in the September 2010 meeting: 1) a comprehensive table of area management of all stocks, and; 2) criteria for prioritizing stock structure analyses. Paul Spencer provided tables of BSAI and GOA area harvest specifications, and presented the criteria proposed by the SSWG for prioritizing stocks to analyze, which included region-wide ABC/OFL, high vulnerability scores from PSA analysis, and existing information and/or questions regarding stock structure. Rockfish and elasmobranchs have high vulnerability scores. The Joint Plan Teams also proposed in the September 2010 meeting that high catch levels relative to ABC may also be a criterion, but making this comparison over a large spatial area (i.e.,

BSAI or GOA) may mask subareas where catch is disproportionate to biomass. The SSWG template incorporates detailed examination of catch data, and was thus not viewed by the SSWG as a criterion for application of the template.

Proposed stocks for application of stock structure template: BSAI yellowfin sole, BSAI skates, BSAI northern rockfish, GOA Atka mackerel, GOA Pollock, GOA and BSAI sharks.

The SSWG agreed that using fishery and scientific information on a case-by case basis is preferred, and noted that proposing a protocol for this evaluation has been the focus of the SSWG. The goal was to develop a default policy that would be applied in the absence of a detailed analysis. If the stock structure template was applied and it was determined that sub-area ABCs produced little benefit, then this more detailed analysis would take precedence. To date, many (perhaps most) area harvest specifications are implemented without this detailed analysis. Development of a consistent default policy has been the goal of the group. Paul reviewed previous recommendations from the Plan Team and SSC on the utility of a default guideline on spatial partitioning of ABC. The Plan Team recommended "...allocating the Acceptable Biological Catch across subsets of NMFS areas within the BSAI and GOA management area as a precautionary measure to the extent practicable".

The SSC recommended "...proposals for subdivision of ABCs within a stock, along with supporting scientific and fishery information, should be considered on a case by case basis in the annual stock assessment process." A policy would help avoid inconsistencies between the GOA and BSAI.

The Plan Teams support the application of the stock structure template as a consistent policy for evaluating the spatial partitioning ABC/OFL, and agrees with the initial stocks proposed by the SSWG for application of the SSWG. The Plan Team also noted that a systematic evaluation of stock structure will highlight data gaps, and aid in developing research priorities and planning the collection of additional data. The Teams also discussed the possibility that application of the stock structure template may indicate that management subareas smaller than those currently used may be recommended, and discussed the history of BSAI and GOA spatial allocations.

The Plan Teams thanked the SSWG for development of the template and example applications to various stocks, and will undertake the task of prioritizing stocks for future applications of the template.

September 2012, Joint Teams

BSAI rougheye/blackspotted update

Paul suggested that the BSAI Team reexamine rougheye and blackspotted rockfish due to exploitation rates in the Western AI. Survey data show only about 10% of the biomass occurring in Western AI, but the catch is relatively high in this area. However, the variability in trawl survey biomass estimates makes it difficult to tell if there is a trend by area. In terms of exploitation rates, much higher values are seen in the west, above 0.75M. When the Western AI is combined with the Central AI (low catch/high survey), the pattern in the west (high catch, low survey) is swamped.

Paul recommended subarea ABCs in the BSAI. His rationale was that this approach would provide more effective monitoring, consistency with spatial structure, minimal impact for bycatch fisheries, and consistency with previous recommendations.

Plan Team discussion: The Plan Teams discussed several points: 1) Whether we should consider splitting ABC by area now or in November. 2) There should be an examination of similarity between species stock structures to develop overarching guidelines for all stock structure-related decisions. Stock structure templates have not been completed for many GOA and BSAI stocks. 3) The inconsistency of typically dividing the GOA into smaller areas for ABC management than the AI. 4) Splitting ABCs by area can increase mandatory discards.

Julie Bonney recommended that, prior to implementing spatial TACs, the Plan Teams investigate the management implications.

General discussion

Team members discussed a wide variety of possible next steps, some of which are listed below:

Team members noted that if we are uncertain about stock structure, our policy (adopted in September, 2010) has been to be precautionary in case stock structure actually does exist.

Alaska groundfish have many different life history strategies. Our procedure has been to keep chipping away and getting more stock structure templates completed. These templates provide information, for example, on isolation by distance by species and life history strategy. Having more templates completed will help to determine whether to split or lump ABC or OFL and to be consistent in doing so. We need to put things in context; just because we see higher exploitation in one area does not mean we are going to split the area.

The template lays out a two-step process, the first of which is assessment of the biological data, and the second of which is consideration of the management implications. We need to work more on the second step with fishery managers. Improving the process to provide additional sub-stock protection without just creating more discards would be desirable. Splitting the ABC but not the OFL can promote discards and have costly implications in the BSAI because of the 2 million t OY cap. Julie Bonney: There is a need to add in a discussion of fishery characteristics (MRA, TAC below ABC). Industry may be able to come up with creative solutions to lessen the impact of splitting ABC/OFL. The Plan Teams can identify concerns (if any), then industry can be innovative on how to deal with these.

The Plan Teams recommend that: 1) the separate Teams identify the next set of stocks for application of the stock structure template, to be completed by the September 2013 meeting; 2) metrics be developed (perhaps by a yet-to-be-established Plan Team working group) to help decide when to lump or split areal ABCs and OFLs; and 3) stock structure concerns and management implications (e.g., effects of splitting on discards) be included in these metrics.

Because there may be difficulty with interpretation of areal overages without the context of areal biomass, the Plan Teams also recommend that a detailed discussion of this subject occur next September and that, in the interim, biomass be included as part of the next set of stock structure analyses, similar to what Paul Spencer provided this year for RE/BS and northern rockfish.

September 2012, BSAI Team

Northern rockfish: Paul Spencer suggested that northern rockfish exhibit some degree of stock structure, as evidenced by genetic differences, dispersal distances on the order of 100 km, growth differences, differential bycatch rates in the Atka mackerel fishery, and differential catch/biomass ratios.

Area AGENDA C-2(a) OCTOBER 2012 41 exploitation rates often exceed M, occasionally $1.5 \times M$. Genetics (Gharrett et al. 2012) seem to show differences between WAI/CAI and EAI and also between the AI and the Pribilofs. There is a cline in length-at-age from WAI (lowest) to CAI to EAI (highest).

The Team talked about the possibility of Ingrid Spies applying her genetic individual-based model (currently configured for Pacific cod) to northern (or other) rockfish. Ingrid indicated that this would be a possibility, although computational constraints currently limit the population size to levels far below the population sizes that exist in nature.

Paul showed what the ABCs would be if split according to W/C/E/BS areas, and also W/C/(E+BS). "Current" (but hypothetical) area ABCs would have been exceeded retrospectively only rarely. The Team discussed whether setting area ABCs would be likely to change the amount actually caught. Mary Furuness said that it would not, but it would complicate management. She also suggested that there might be other ways to make area exploitation rates less disproportionate (e.g., getting industry to agree on voluntary measures).

The Team also noted that reference fishing mortality rates will likely increase in November, based on the new maturity schedule and the updated ageing error matrix. It was noted that the ratio of catch to model biomass in each area has been below the likely new FABC of about 0.09 in all areas and years since 2004 (however, this is not quite a valid comparison, because FABC is the full-selection F, not the ratio of catch to biomass).

The Team discussed ABC splits (but not OFL splits) apportioned as W/C/(E+BS) and (W+C)/(E+BS). The Team recalled the September 2010 policy that it adopted jointly with the GOA Team: "The Teams concurred with the Working Group's recommendation to divide quotas as a default measure in general but modified the recommendation as follows: 'allocate the Acceptable Biological Catch (ABC) across subsets of NMFS areas within the BSAI and GOA management areas as a precautionary measure to the extent practicable.'" The Team also recalled that the SSC had disagreed with this policy.

Economic losses, increased regulatory discards, and management difficulty were cited by some Team members as reasons not to split.

Conclusions: 1) We agree that there is evidence of stock structure, but we do not feel that there is an immediate conservation concern. 2) We feel that splitting ABC would not reduce mortality. 3) We are stepping back somewhat from the policy that we adopted together with the GOA Plan Team in September 2010, in part because there is now sufficient information for enough stocks that "default" measures no longer seem necessary; instead, we will proceed, at least for now, on a case-by-case basis, per SSC feedback on the 2010 policy. 4) We feel that recommendations regarding spatial allocation of harvest (either maintaining existing splits, creating new splits, or combining existing splits) should be undertaken in the context of a policy decision made in a larger forum (e.g., getting the SSC to re-engage with the stock structure working group, establishing a mechanism for Council/public involvement, etc.). 5) We would like to receive additional SSC feedback on these issues; in particular, a comparison of evidence and conclusions as they pertain to blackspotted/rougheye rockfish and northern rockfish, and a discussion of if/when it is appropriate to split when there is evidence of stock structure but no immediate conservation concern. 6) We would like to incorporate management considerations more explicitly in the process, to be able to weigh more effectively the costs and benefits of management outcomes.

November 2012, Joint Teams

In response to an October 2012 Council request, the Plan Teams discussed how to improve their consideration of management and policy implications of stock structure when the Teams consider area-specific OFLs and ABCs. The Council specifically requested that the Teams take a broader look at area-specific management. The Teams have not yet directly addressed the management implications of the stock structure templates, but recognized the need to do so in order to provide recommendations to the Council once there is some indication of stock structure. Examples of stocks for which the Teams have found evidence of stock structure include BSAI and GOA blackspotted/rougheye rockfishes, BSAI northern rockfish, GOA Pacific ocean perch, and BSAI Pacific cod.

Paul Spencer clarified that the 2010 Stock Structure Working Group report recognized the management implications of considering stock structure for recommending area-specific OFLs and ABCs. To date, most evaluations of stock structure have not included an examination of management and policy implications of various spatial management options. Jane DiCosimo suggested that one way to respond to the Council request would be to expand the work group membership (which currently includes SSC members, Team members, NMFS staff, and academics) and to reconvene to evaluate management implications of area-specific OFLs and ABCs. The work group would report to the joint Teams in September 2013 to allow the Teams to have a broader discussion on management implications. Mary Furuness suggested that management measures other than area-specific OFLs or ABCs could also be used by NMFS.

The Teams discussed the history of spatial management of harvest specifications in the GOA; regional quotas were established based on historical INPFC areas and maintained due to the relative location of many Alaskan communities, rather than specific biological concerns about the stocks. The Teams acknowledged the need to revisit their September 2010 recommendation regarding stock structure, which states, "The Teams concurred with the Working Group's recommendation to divide quotas as a default measure in general but modified the recommendation as follows: allocate the Acceptable Biological Catch (ABC) across subsets of NMFS areas within the BSAI and GOA management areas as a precautionary measure to the extent practicable."

NPFMC member John Henderschedt commented that it will be important to consider both the in-season management implications as well as broader policy implications regarding the policy trade-offs in recommendations for area-specific management decisions.

The Teams recommended no change in this harvest specification cycle and recognized the need for future considerations that are broader than current considerations. There are two alternatives for moving forward. One is to broaden the membership of the work group. Team members were requested to communicate to Paul Spencer if they wish to participate. Alternatively, the AFSC could host a workshop to develop management and policy metrics for review by the Teams and SSC. Examples of different stock structure results could be presented and discussed (for example, GOA POP, BSAI rockfish stocks). Participants could include Team members, work group members, and fishery managers/Council members. The workshop would be more inclusive than the working group and would be open to the public. Perhaps some combination of a restructured working group and a workshop would best address Council concerns.

Through the Joint Plan Team report at the December 2012 Council meeting, the Teams will request the SSC and Council for more direction on specific task(s) for the work group.

November 2012, BSAI Team

(Under “Blackspotted/rougheye rockfish”) Analysis indicates there is spatial structure in the population, so the BSAI ABC has been partitioned between 2 areas (EAI+EBS and WAI+CAI). Paul extensively discussed area-specific exploitation rates, which were at or above U40% (the exploitation rate which would occur from fishing at F40%, reflecting numbers at age and fishery selectivity) in the WAI each year from 2004 to 2012 except 2011 (often by large amounts). Additionally, the 2012 survey biomass estimate for the WAI is the lowest observed, and the pattern of declining survey biomass estimates in the WAI is consistent with the estimated high exploitation rates.

In the written assessment, Paul noted that “the BSAI Plan Team may wish to consider not increasing the harvest specifications from the 2012 levels due the factors mentioned above...” but he recommended an increase in ABC and OFL based on his preferred model. In the presentation, Paul further emphasized the concerns that he raised and suggested that the most prudent course would be to rollover the current ABC and OFL. This recommendation was largely based upon the inconsistency between the rationale applied in 2010 for excluding large year classes (high CVs) from the computation of mean recruitment and B40% and the increased proportion of the biomass and catch comprised by the large 1998 and 1999 year classes, and the absence of a thoroughly investigated, long-term solution for addressing unusually high recruitment events that can substantially alter perception of stock status (see Team recommendation under AI pollock).

The Team acknowledged Paul’s concerns, but accepted the model recommendation in the document for the values for ABC and OFL that were based on excluding the post-1998 year classes from the estimation of mean recruitment. The Plan Team also noted that rolling over the current harvest specifications would not address the issue of disproportionate harvesting, and the spatial management of this stock will likely be considered in further discussions on stock structure.

April 2013, Council

The Council held a Spatial Management Workshop.

September 2013, Joint Teams

In December 2012 the Council noted its plans to develop a policy for determining spatial management that involves the Council, advisory panel, and public, in addition to the Plan Teams and SSC. Jane DiCosimo presented a summary of the Council’s April 2013 Spatial Management Workshop report, which was convened to explore a wide range of issues and recommend action(s) to the Council. In summary, the workshop recommended the development of a new Council policy for spatial management

of groundfish, crab, and scallop stocks and process for the Plan Teams and SSC for alerting the Council of concerns regarding status quo management of particular stocks/assemblages. One additional management tool (subarea TACs) was identified for Council consideration; additional tools may be identified during public scoping.

One output of the workshop was a request to the Plan Teams to provide comments during their September meetings to the Council regarding next steps for developing the Council policy and process. Jane highlighted several unaddressed issues that were identified during the workshop for future consideration to help formulate the Council policy. Some were related to case studies that were presented during the workshop, while others were more general for development of a new policy.

Under a proposed new policy, the Council would retain the authority to make the decision on whether or not to revise spatial management of stocks based on new information. After identification of a biological concern about a stock/assemblage, the Council may choose to request further information/analysis to evaluate the full range of potential impacts of action as part of its new policy. The Plan Teams emphasized a necessary balance between a general policy and evaluating stocks/assemblages on a case-by-case basis.

The Teams understood that a new process would involve the Plan Teams and/or SSC alerting the Council of stock concerns on a case by case basis following application of the stock structure template. Then the Council would consider those concerns in a wider policy and management context, including economic effects on the commercial industry and the Nation. This is similar to the current scientific process but removes the prescriptive approach of setting spatial ACLs prior to Council consideration and public comment on the potential effects of such an action.

Additional questions/issues raised by the Teams for Council clarification in its future spatial management policy follow. Should a default policy exist for either or both of the following two cases: 1) data are insufficient to determine whether a biological concern exists, and 2) sufficient data exist to make such a determination but time or other resource constraints are anticipated to prevent those data from being analyzed for several years? What defines sufficient evidence? Should this be a judgment call on the part of the scientists or should objective criteria be developed? Have risks been appropriately characterized? Management (e.g., economic) costs are difficult to evaluate under current practices during the Plan Team meetings.

The stock structure template and the work of the Teams characterize the biology of a subject stock/assemblage, but further work is needed to address economic and/or management impacts. Risk considerations should include the probability of exceeding biological benchmarks. Mitigating any lack of information on stock structure is particularly important for stocks with less spatial movement, to prevent loss of stock productivity. Having sufficient data to estimate risk thresholds continues to be a challenge. The Teams propose to continue to apply the stock structure template on a case by case basis and raise conservation concerns, as needed. The Teams should strive for consistency across stocks under an FMP and across FMP areas. Additional information could be included in the stock structure template to allow

for better consideration of risk (e.g., variability in spatial biomass estimates from the survey), understanding that information is lacking on explicit quantification of risk.

The Teams recommend that the Council consider the following in developing new policy and process for determining spatial management of stocks/assemblages.

- Provide specific guidance on the role of the Teams;
- Develop a proactive default policy that covers both of the following cases: 1) data are insufficient to determine whether a biological concern exists, and 2) sufficient data exist to make such a determination but time or other resource constraints are anticipated to prevent those data from being analyzed for several years;
- Clarify whether the current inconsistencies in spatial management between the two FMP areas that were summarized by the Stock Structure Working Group should be further examined or revised (and to whom such a charge would be assigned);
- Two potential pathways for the role of the Teams in the Council's future policy:
 1. One approach would have the Plan Team(s) alert the Council when either Team or both Teams identify a biological concern about a stock/assemblage; it then would await direction from the Council on next steps (i.e., the default policy would be triggered or specific direction to the Teams by the Council would be provided).
 2. Another approach would have the Team(s) consider economic and management issues when it identifies a biological concern for a particular stock/assemblage:
 - a) By adding new members with in-season management and economic expertise to the stock structure working group (and possibly renaming the working group) so that biology, economics, and management implications are included in the determination of whether the Team(s) have a concern regarding status quo management of a stock/assemblage; or
 - b) The Team(s) would discuss the biological, economic, and management implications at the full Plan Team meeting. If stock assessment authors identify biological concerns in their application of the stock structure template to their stock/assemblage, then they would initiate a request for economic and in-season management effects when determining whether to raise concerns for a stock/assemblage.

September 2013, BSAI Team

The Team reviewed application of the stock structure template to three BSAI groundfish stocks: shortraker rockfish, Aleutian Islands pollock, and the blackspotted/roughey rockfish assemblage. The Team referenced its earlier discussion with the GOA Plan Team (see joint Team minutes) to guide its reviews. The Team identified issues regarding stock structure, and raised concerns where appropriate, while awaiting future guidance on the Council's future spatial management policy. The following stocks provide good examples for Council consideration of the range of cases to which the future policy and process would need to apply: 1) *monitor* (no concern at this time due to other fishery constraints): AI pollock; 2) *alert*: shortraker rockfish; and 3) *concern*: blackspotted/roughey rockfishes. Under the status quo process for spatial management, the BSAI Team may have recommended subarea splits for the latter assemblage; but, due to the pending development of new Council policy for spatial management of all stocks, the Team only recorded its evaluations of stock structure and its concerns regarding status quo management. The Team awaits policy guidance, but notes the need for clear direction on how to proceed,

including cases for which limitations on data or other resources do not permit determination of concern (or lack thereof).

Paul Spencer reported consistent high bycatch of blackspotted/rougheye rockfish complex in directed commercial trawl fisheries that would amount to overages of the potential ABC in the western Aleutian Islands (WAI), if spatial management had previously been implemented for the assemblage. Although blackspotted/rougheye rockfish are managed in a two-species complex in the BSAI, rougheye rockfish are rarely found west of the eastern Aleutians; thus, the concern in the WAI pertains to blackspotted rockfish.

The Team found the quantity and quality of the information presented to be compelling and commended the author for compiling the information to document concerns regarding status quo management of the assemblage.

The Team concurred with the author's conclusions (as revised below) that the species has been reduced in the WAI.

- 1) Genetic information showing spatial structure at scales < 500 km, which is roughly the scale of one of AI subareas.
- 2) High catch levels in the 1990s in the WAI that were followed by a sharp decline in WAI survey biomass estimates.
- 3) Estimated exploitation rates have exceed $U_{F35\%}$ (the exploitation rate that would result from applying a fishing rate of $F_{35\%}$ to the estimated beginning-year numbers at age) in 6 out of 10 years in the WAI from 2004-2013.
- 4) Overall, an 85% decline in survey biomass estimates in the WAI from 1991-2012, as estimated by a random effects time series model.
- 5) An increase in the proportion of survey tows which have not caught blackspotted/rougheye in the WAI, and within each WAI survey stratum deeper than 100 m.
- 6) A large percentage of the total harvest occurring in the WAI.
- 7) A decline in mean size in the WAI but not in other BSAI subareas.

The Team has more concern over local overexploitation of this assemblage than other stocks that have been subjected to the stock structure template. The Team recommended that the Council consider this information under its proposed spatial management policy.

The Team awaits further direction from the Council for next steps under its proposed process for addressing spatial management concerns for this assemblage. It will continue to monitor the status of the stock in the current context.

October 2013, Council

The Council adopted the following policy on stock structure and spatial management:

1. As soon as preliminary scientific information indicates that further stock structure separation or other spatial management measures may be considered, the stock assessment authors, plan teams (groundfish, crab, scallop), and SSC should advise the Council of their findings and any associated conservation concerns.
2. With input from the agency, the public, and its advisory bodies, the Council (and NMFS) should identify the economic, sociological, and management implications and potential options for management response to these findings and identify the suite of tools that could be used to achieve conservation and management goals. In the case of crab and scallop management, ADF&G needs to be part of this process.
3. To the extent practicable, further refinement of stock structure or other spatial conservation concerns and potential management responses should be discussed through the process described in recommendations 1 and 2 above.
4. Based on the best information available provided through this process, the SSC should continue to recommend OFLs and ABCs that prevent overfishing of stocks.

November 2013, Joint Teams

Grant Thompson relayed the Council's October 2013 policy on stock structure and spatial management of North Pacific stocks and stock complexes.

Prior to The Team meeting, discussions between Council member John Henderschedt and members of the SSC, Plan Teams, and Council staff focused on three questions:

- A. Are the steps in the Council process in chronological order? The answer appears to be, "Yes," except as noted immediately below.
- B. Can the order of the steps be changed in the event of an emergency? The answer appears to be, "Yes."
- C. What is the Council's expectation as to the typical amount of time that Steps 2 and 3 will take? The answer appears to be, "About a year."

Grant presented the following two interpretations of the Council policy stemming from these discussions.

Interpretation #1

1. The SSC will discuss the available evidence for stock structure each December
2. The SSC will then rule on whether or not there is compelling evidence to necessitate separate stock management
3. If the Council wanted to try to continue to manage the separate stocks under a single ABC, then it would request a management response from industry that would demonstrate how the separate stocks could be managed sustainably under a common ABC
4. The SSC would review this plan in February:
 - If the proposed management response does achieve the goal of maintaining catch at a sustainable level for both stocks, then management would continue under a single ABC
 - If success cannot be demonstrated within a reasonable period of time, then the SSC would manage separate stocks

Interpretation #2

1. When the Team receives new information regarding the existence of stock structure or the impacts of fishing on stock structure, the Team would evaluate the extent to which this

information causes concern about the way the stock/s is/are being managed (this is Step 1 in the Council's process)

2. A possible scale of concern (all actions are contingent on SSC concurrence):
 - a. Little or no concern, in which case no action needs to be taken
 - b. Moderate concern, in which case special monitoring (e.g., frequent updating of the template) is required at a minimum and Steps 2 and 3 of the Council's process *may* be activated
 - c. Strong concern, in which case Steps 2 and 3 of the Council's process *must* be activated
 - d. "Emergency," in which case the Team will recommend separate harvest specifications at the ABC level, the OFL level, or both, for the next season (straight to Step 4 of the Council policy)

The Teams discussed how well the two interpretations mesh with the Council policy, given the answers to questions A-C above:

- A. Interpretation #1 does not follow the chronological order of the Council policy, whereas Interpretation #2 does.
- B. Both interpretations allow for moving straight to specification of separate ABCs, OFLs, or both in the case of an emergency.
- C. Interpretation #1 does not allow for Steps 2 and 3 of the Council process to take the anticipated time of approximately one year, whereas Interpretation #2 does.

Team members suggested that the following issues merit further clarification or guidance:

- How much time is allowed for acceptance (by the Council or SSC) of an industry response to a management concern? Interpretation #1 sets a hard deadline of two months for submission of a management response, but the only limit on the amount of time required for demonstrating the plan's success is that it be "reasonable." Interpretation #2 sets no limit on the amount of time taken by Steps 2 and 3 in the Council policy. Either interpretation could be amended by specifying a limit on the amount of time. Also, both interpretations allow for moving directly to separate harvest specifications at any time, in the event that the SSC determines the rate of progress to be insufficient.
- What is the relationship between evidence of stock structure and degree of concern? One possibility, which is most consistent with Interpretation #1, is that degree of concern is synonymous with strength of evidence of stock structure. Another possibility, which is most consistent with Interpretation #2, is that degree of concern is a function of both the strength of evidence of stock structure and the extent to which the fishery is impacting that structure.
- How can the process for passing stock structure information to the SSC be improved? The Team minutes attempt to document all presentations made at the Team meetings, but it is not always clear which other documents from the September Team meetings get forwarded to (or reviewed by) the SSC, and the time available for the Team report at the October SSC meeting is sometimes short. Moreover, to keep the Team reports of reasonable length, they tend to focus on those items for which the Team(s) made some sort of recommendation, so it is possible that stock structure information is not being emphasized in those cases (if any) where the Team made no recommendation. It would be helpful if the SSC minutes consistently acknowledged receipt of information on stock structure.

The procedure used by the BSAI Team in evaluating stock structure information during this year's September meeting was similar to that described in Interpretation #2. In following this procedure, the BSAI Team communicated to the SSC both the evidence of stock structure and the rationale for the Team's determination of the associated level of conservation concern.

November 2013, BSAI Team

Paul Spencer revisited the spatial stock structure discussion that he had presented in September and in several previous Plan Team meetings.

The Team reiterated its key message from its September 2013 meeting minutes:

The Team found the quantity and quality of the information presented to be compelling and commended the authors for compiling the information to document concerns regarding status quo management of the assemblage. The Team concurred with the authors' conclusions that the blackspotted/rougheye rockfish abundance has been reduced in the WAI. The Team has more concern over local overexploitation of this assemblage than other stocks that have been subjected to the stock structure template.

At this meeting, the Team repeated its "strong concern" about the WAI component of the stock (see Interpretation #2 in the Joint Team minutes on "Stock structure and spatial management policy"). If the SSC concurs with this level of concern, the Team anticipates a management response in 2014. The Team recommended that the authors update the 7 metrics (shown above) in time for the September 2014 meeting. At that meeting, the Team will review the WAI stock status again and evaluate the effect of any management response in 2014.

September 2014, BSAI Team

Paul Spencer presented an update on the spatial analysis of BSAI blackspotted/rougheye rockfish catch in fishery and trawl survey tows. Additional genetic samples were collected since the last analysis in 2010 primarily from the from BS slope and AI surveys, and commercial fisheries. This increase in samples ($n \sim 1,000$) resulted in the relationship between genetic distance and geographic distance being no longer statistically significant ($P = 0.113$). However, the non-genetic information supporting spatial fishery management units includes high rates of exploitation of blackspotted rockfish in the Western AI occurring in the 1990s, followed by decreasing abundance and no replenishment of blackspotted rockfish from neighboring areas. This suggests some population structure on temporal scales of interest relevant to fisheries management.

The Team reminded itself of the categories it adopted last September "while awaiting future guidance on the Council's future spatial management policy." These (including the examples given last September) were: 1) *monitor* (e.g., AI pollock); 2) *alert* (e.g., shortraker rockfish); and 3) *concern* (e.g., blackspotted/rougheye rockfishes).

Although an increased number of genetic samples no longer showed statistically significant isolation by distance in the BSAI, the Team recommends continued annual reporting on the status of the population in each AI management area. The Team continues to express concern regarding this stock complex.

November 2014, Joint Teams

Grant Thompson presented an update on recent Team and SSC comments regarding stock structure. He reviewed two "scales of concern:" 1) a three-level scale, which was adopted for provisional use by the BSAI Team in September 2013; and 2) a four-level scale (shown below), which was discussed but not

adopted by the Joint Teams in November 2013, but which was used at the same meeting by the BSAI Team.

The Teams recommend that the following scale of concern be adopted in the context of the Council's stock structure and spatial management policy (with the understanding that all actions described here would be contingent on SSC concurrence):

1. *Little or no concern*, in which case no action needs to be taken
2. *Moderate concern*, in which case special monitoring (e.g., frequent updating of the template) is required at a minimum and Steps 2 and 3 of the Council's process may be activated
3. *Strong concern*, in which case Steps 2 and 3 of the Council's process must be activated
4. *Emergency*, in which case the Team will recommend separate harvest specifications at the ABC level, the OFL level, or both, for the next season (straight to Step 4 of the Council policy)

In October of this year, the SSC requested that the Teams assign a level of concern to all stocks for which the stock structure template has already been completed.

The Teams recommend assigning the following levels of concern to stocks for which the stock structure template has already been completed (shaded cells indicate levels established at this meeting):

FMP	Chapter	Stock	Author	Level
BSAI	1A	AI pollock	Barbeaux	Little
BSAI	2	BS Pacific cod	Thompson	Little
BSAI	4	Yellowfin sole	Wilderbuer	Little
BSAI	6	Arrowtooth flounder	Spies	Little
BSAI	13	Northern rockfish	Spencer	Little
BSAI	14	Blackspotted/rougheye rockfish	Spencer	Strong
BSAI	15	Shortraker rockfish	Spencer	Moderate
BSAI	16	Other rockfish	Spies	Moderate
BSAI	17	Atka mackerel	Lowe	Little
BSAI	18	Skates	Ormseth	Little
BSAI	21	Sharks	Tribuzio	Little
GOA	1	Pollock	Dorn	Little
GOA	7	Arrowtooth flounder	Spies	Little
GOA	9	Pacific ocean perch	Hanselman	Little
GOA	12	Dusky rockfish	Lunsford	Little
GOA	13	Rougheye/blackspotted rockfish	Shotwell	Little
GOA	17	Atka mackerel	Lowe	Little
GOA	18	Skates	Ormseth	Strong
GOA	20	Sharks	Tribuzio	Little

The Teams noted that, in some cases, "little" concern was identified in part because sufficient data were lacking to indicate otherwise.

In October 2014, the SSC also made the following recommendation:

"The SSC recommends that the current stock structure policy include a requirement for a recommended maximum area specific catch level when a stock or stock complex is elevated to the level of 'concern.'

This would provide a clear guide to industry regarding what reductions in catch would be needed to alleviate the ‘concern.’ This area specific catch level would likely be estimated by the assessment author with review and comment by the Plan Teams and SSC.”

The above request was prompted by the case of BSAI blackspotted/rougheye, in which the fishing fleet expressed an interest in voluntarily taking steps for reducing incidental catch in the WAI for 2014, but a WAI ABC had not been adopted. In fall of 2013, a representative of the fishing fleet obtained an unofficial potential WAI catch level directly from the assessment author, and interpreted this number as a *de facto* ABC to guide fishing operations. Team members felt that it is laudable for the fishing industry to have taken steps to reduce catch. However, the process followed in 2013 resulted in a recommended harvest level that was not scientifically reviewed and was inaccessible to the general public.

The Teams noted that, since the policy in question is a Council policy, it will be up to the Council to consider the SSC’s request for an amendment to that policy. However, the Teams did discuss some features that such an amendment might include.

The Teams recommend that any suggested subarea catch level be reviewed by the respective Team, be obtained in a transparent process, and be accessible to the public so that progress in meeting management goals can be easily monitored. The term “maximum subarea species catch” was proposed as a label for subarea harvest recommendations that are not included in the OFL/ABC specifications.

The Teams also noted that several of the outstanding issues and questions of clarification identified at the November 2013 Joint Team meeting do not appear to have been addressed.

The Teams recommend that the following outstanding issues and questions of clarification be forwarded to the appropriate body (SSC, Council, or both):

- Does the Council’s policy apply only to spatial structure, or does it also apply to stock structure? For example, does it apply to the process of splitting a stock out from a complex, or only to spatial management of the complex?
- Need for specific guidance on the role of the Teams.
- Need for a proactive default policy that covers both of the following cases: 1) data are insufficient to determine whether a biological concern exists, and 2) sufficient data exist to make such a determination but time or other resource constraints are anticipated to prevent those data from being analyzed for several years.
- Clarification of whether the current inconsistencies in spatial management between the two FMP areas that were summarized by the Stock Structure Working Group should be further examined or revised (and to whom such a charge would be assigned).
- How much time is allowed for acceptance (by the Council or SSC) of an industry response to a management concern?
- What is the relationship between evidence of stock structure and degree of concern? Two possibilities have been discussed: 1) degree of concern is synonymous with strength of evidence of stock structure, and 2) degree of concern is a function of both the strength of evidence of stock structure and the extent to which the fishery is impacting that structure.

September 2015, BSAI Team

Paul Spencer presented a follow-up report to his 2013 and 2014 reports to the Team. The Team previously determined there to be “strong concern” regarding the fishery’s impact on the structure of this stock complex, and recommended that the report be updated annually for as long as this determination holds.

New in this year’s update is an analysis of mean age by area and an additional exploitation rate reference point, along with some updates on management activities. The 2015 WAI catch was 62 t, which was over the “maximum subarea species catch” (MSSC) of 46 t. Catches in the EBS are also slowly rising. The proportion of catch in the EAI has been increasing.

The mean age and length are declining in the western areas. Paul introduced a new measure in this update, called U_ABC, which is the exploitation rate that would have resulted from taking the AI ABC for a given year from the *current* estimate of the AI biomass for that year. Since 2009, the WAI and EBS catches have exceeded U_ABC in all but one (WAI) or two (EBS) years.

Paul reviewed the Team and SSC minutes from 2013 and 2014 indicating, among other things, the need for a “scientifically-based and transparent process for determining subarea harvest recommendations and allow better tracking in meeting the management goals” (SSC, December 2014). Given the complex’s “strong concern” designation, the Team’s and SSC’s understanding is that steps 2 and 3 of the Council’s process must be implemented.

The maximum subarea species catch is not reported in the harvest specifications table; thus comparisons between MSSC and harvest are not easily available to the public. Concerns were expressed that the Council’s process for spatial management was not adequately followed. Paul stated that he didn’t think we have clarified what tools or actions, if any, are available to us under such a situation because the Council has yet to explicitly define them.

The Regional Office intended to add this MSSC to the weekly catch reports, and is willing to do so in future years. The SSC minutes refer to this number and the industry was aware of it as a guideline limit. The industry may not be able to avoid rougheye. There are currently no additional management measures triggered nor an in-season response mechanism when this MSSC is exceeded. Paul was asked if anything happens if MSSC is exceeded. At this point, there is no effect. If there were an area ABC, there would be an area TAC which, if exceeded, would move the complex to PSC status and the additional catch would be forced to be discarded. If the ACL is exceeded more than once in 4 years it would trigger re-evaluation of accountability measures (in this context, ACLs are evaluated at the OFL scale of management). If catch approaches an OFL, then closures designed to prevent overfishing will be issued. Currently MSSC has no management measures associated with it to prevent it from being exceeded.

Paul stated that it does not seem clear what the management response is or could be when MSSC is exceeded. It is also not clear if everyone would view the MSSC as a management goal. The Team’s role in implementing the Council policy could be better defined and the terminology is problematic as to whether exceeding MSSC is really an overage, since it is not an FMP policy.

Amendment 80 cooperatives that were aware of the MSSC caught only 44 t, which was their lowest since 2008, but other fisheries removed more than usual in 2015. The MSSC for the WAI was obtained

by apportioning the recommended 2014 ABC among subareas in accordance with stock distribution (as obtained from applying the random effects smoother to subarea survey biomass estimates). It was suggested that some additional effort may have resulted from re-opening the Pacific cod fishery in the WAI.

A Team member noted that the industry has been taking some steps, but steps 2 and 3 were not fully followed. The Team discussed the possibility that the Council could implement step 2 more fully by establishing additional tools and examining management implications of the options. An SSC member present mentioned the desire for establishment of a group to work on this, consistent with the previous SSC and Team recommendations, but the Council has not formed one yet.

Paul was asked where/when the rougheye were caught, and Paul said that it was quite patchy across time and that any potential rougheye subarea OFL might limit the POP and other fisheries. If there were a sub-area ABC/TAC, there would be an increase in discards if catch exceeds the TAC.

The Team recommends that the Council process be followed more closely and endorses the SSC's recommendation that a subgroup of Team, SSC, and Council members be formed to address the questions regarding stock structure and spatial management posed in both the November 2013 and November 2014 Team minutes, as well as to work on additional tools or potential management actions to address findings of "moderate" or "strong" concern.

November 2015, Joint Teams

Diana Stram reported on a workgroup of Plan Team, Council staff, SSC, and NMFS RO staff requested by the Council in October 2015 to address outstanding issues of stock structure/spatial management from the Joint Plan Team minutes of November 2014 with a particular focus on addressing issues with respect to BSAI blackspotted/rougheye rockfish. The workgroup met once prior to the Plan Team meeting and will meet again following the meeting and prior to the Council meeting in December. The workgroup mentioned alternative management tools for BSAI BS/RE, including subarea TACs, OFL/ABC, or separate ABCs. The workgroup also addressed several overarching questions remaining from the Team minutes in 2014. These questions are as follow:

- Does the Council's policy apply only to spatial structure, or does it also apply to stock structure? For example, does it apply to the process of splitting a stock out from a complex, or only to spatial management of the complex?
- Need for specific guidance on the role of the Teams.
- Need for a proactive default policy that covers both of the following cases: 1) data are insufficient to determine whether a biological concern exists, and 2) sufficient data exist to make such a determination but time or other resource constraints are anticipated to prevent those data from being analyzed for several years.
- Clarification of whether the current inconsistencies in spatial management between the two FMP areas that were summarized by the Stock Structure Working Group should be further examined or revised (and to whom such a charge would be assigned).
- How much time is allowed for acceptance (by the Council or SSC) of an industry response to a management concern?
- What is the relationship between evidence of stock structure and degree of concern? Two possibilities have been discussed: 1) degree of concern is synonymous with strength of evidence

of stock structure, and 2) degree of concern is a function of both the strength of evidence of stock structure and the extent to which the fishery is impacting that structure.

The workgroup will continue to discuss recommendations to the SSC and Council on approaches for BSAI BS/RE and the remaining questions at its next meeting. The workgroup will also outline a potential approach for additional meetings and work products from the workgroup and others over the next year. Recommendations and discussions will be reflected in the workgroup report. The workgroup will provide a report of its meetings and recommendations to the SSC and Council prior to the specifications process in 2016. The Teams did not provide any recommendations on suggested approaches or direction at this time without a written report of the workgroup's deliberations. An update on the workgroup's recommendations will be provided to the Teams in September 2016.

November 2015, BSAI Team

Paul Spencer provided the overview of the executive summary assessment for 2016-2017 specifications. He noted that catch rates have been declining due to increased awareness of the fleet, however the MSSC estimated for WAI was nonetheless exceeded for the second year in a row.

He provided an overview of some analyses of depth of fishing in recent years that indicated a decline in fishing depth as well as an overview of the catch of BS/RE by target fishery by area. Graphs of bycatch rates by target fishing rate were shown. The BSAI trawl limited access sector (non-Amendment 80 fleet) has had increased catch rates in the Pacific ocean perch fishery in recent years.

Members of the public suggested additional analyses on the relative size at age in recent years, as well as extending the analysis of fishery bycatch rates to pre-2014 years in order to better characterize historical bycatch rates.

The Team recommends that next year's assessment include separate tables of historical bycatch rates of BS/RE by fishery and area.

The Team discussed the role of the BSAI Team relative to that of the spatial/stock structure working group in recommending catch levels. The Team will forward a recommendation for the maximum subarea species catch (MSSC) for 2016, but defers to the workgroup to develop new tools and potential management actions for consideration next year.

The Team recommends that the 2016 MSSC in the WAI be set at a value of 58 t, as calculated in this year's assessment. If the MSSC is exceeded again next year, the Team anticipates evaluating alternative management tools for use in 2017 (e.g., subarea TACs, ABCs, or OFLs).

September 2016, Joint Teams

Diana Stram presented the report of the Stock Structure and Spatial Management workshop that was held in July. The report includes a PowerPoint presentation by Paul Spencer that provided an overview of BSAI blackspotted/rougheye (BS/RE) rockfish stock structure and spatial harvest, and the background for the recommendations for the maximum subarea species catch (MSSC) beginning in 2014. The report also includes a proposed timeline of actions related to stocks where the Team(s)/SSC have expressed "strong concern" regarding stock structure, and a summary of the benefits and drawbacks to the two main approaches considered at the workshop: 1) subarea ABC and TAC, and 2) MSSC (including a multi-

year average MSSC). Diana listed the following “Plan Team considerations:” and comments on following the spatial management process:

- Ad hoc approach for BSAI BS/RE
- Lacks analytical impact assessment
- What type of additional analyses needed before or after management recommendations
- What are the specific recommendations for BSAI BS/RE in 2017
- Other stock implications:
 - Spatial issues as with northern rockfish (catch and assessment structure)
 - Is localized depletion an issue if longer lag times between assessments (possibly off-cycle considerations?)

Paul Spencer then gave a presentation describing analyses that were prompted by some issues raised during the July workshop, including:

1. possible complication of the TAC-setting process caused by subarea management;
2. possible reductions in flexibility caused by subarea management;
3. possible effects of managing one particular subarea (specifically, the western AI) on the remainder of the stock; and
4. the distribution of fishing effort relative to the border between the western and central AI.

His main conclusions were, respectively:

1. The number of stocks for which TAC has been set lower than ABC has increased in recent years, although the number of species/area combinations has barely changed. If simplicity in TAC-setting is the goal, this could be achieved by setting $TAC=ABC$ for more of the small stocks, which would require only small (in proportionate terms) changes in TAC for the large stocks.
2. Substantial flexibility exists whenever $TAC < ABC$, because TAC can be exceeded as long as ABC is not exceeded. Also, precedents exist for in-season reallocation of TACs between sectors or even between species.
3. Even if a subarea ABC in the western AI were to result in shifting some effort into the central AI, it appears unlikely that this would have a deleterious impact on the portion of the stock in the central AI, as catches for the last 10 years in that subarea have averaged only 49 t, compared to this year’s MSSC of 324 t.
4. Between 2008 and 2015, the percentages of observed BS/RE catch in Atka mackerel hauls and rockfish hauls near the border between the western and central AI have never exceeded 2.8% and 16.2%, respectively.

The 2016 BS/RE catch in the western AI through September 3 was 34 t, compared to the 2016 MSSC of 58 t. Unless catch in the remainder of the year increases unexpectedly, it appears that 2016 catch will not exceed MSSC.

Representatives from the fishing industry commented that they were appreciative of the work on stock structure and spatial management, and because of their ongoing efforts to reduce incidental catch with the MSSC they did not see the need for subarea ABCs/TACs. Alternatively, some Plan Team members noted that because the subarea ABC would be equal to the MSSC, the recent catches below the MSSC could be obtained under the subarea ABC/TAC framework without expected regulatory discards or resorting to an alternative management structure. This led to a discussion of the benefits and drawbacks of the two alternatives (both in general and for BSAI BS/RE in particular), as tabulated in the report from the July workshop.

Comments related to subarea ABCs include:

1. Transparency and familiarity with a well-established management system and a clear disincentive to harvest fish when the subarea ABC is reached
2. Potential for regulatory discards if the bycatch species cannot be avoided by the target fishery.

Comments related to use of the MSSC include:

1. It provides flexibility to exceed subarea harvest goals without requiring discarding,
2. It may be less transparent since the MSSC does not appear in the harvest specification table or the Federal Register, but is readily available online
3. Requires additional work to maintain separate category of management advice
4. An MSSC has could be removed at any time by the PT and SSC

Other general Plan Team comments included: Perhaps MSSC should be the default tool for subarea management rather than subarea ABC/TAC, given the bullets above. Use of MSSC for BSAI BS/RE does not imply that MSSC would automatically be the preferred tool for all future applications of subarea management. It would be good to determine whether the costs associated with subarea ABC/TAC exceed the costs associated with MSSC. The Council policy is now working better than in previous years. The Teams have previously identified GOA skates and BSAI BS/RE as the only stocks or stock complexes where “strong concern” regarding stock structure is warranted, but it is unclear that this conclusion was appropriate in the case of GOA skates.

The Teams recommend that MSSC-based management of BS/RE continue in the western AI during 2017 and that catch continue to be monitored relative to the MSSC.

The Teams also recommend that the Region prepare a white paper discussing the details of the management and regulatory implications of subarea ABCs/TACs using BS/RE or other relevant case in the BSAI as an example for illustration.

November 2016, BSAI Team

Paul Spencer provided the overview of the full assessment for 2017-2018 specifications. He noted that bycatch catch rates have been declining due to increased avoidance by the fleet, and that catch for the WAI was significantly below the MSSC after having exceeded it the last two years. The Team commended industry for cooperating to ensure that catch did not exceed the WAI MSSC. A larger portion of the catch occurred earlier in the year in 2015 and 2016.

There was a meeting held this year to discuss possible new tools to address the management of the WAI component of this stock (Report available here: <http://npfmc.legistar.com/gateway.aspx?M=F&ID=f6432459-1231-4b60-9c60-852e43859c26.pdf>). This built upon a 2013 workshop on stock structure.

The Team recommends that the 2017 MSSC in the WAI be set at a value of 31 t, as calculated in this year’s assessment. In September, the Team recommended that catch continue to be monitored relative to the MSSC.

Members of the public expressed that it may be difficult stay under the further reduced MSSC. There was extensive discussion regarding the objective of the MSSC, whether genetic studies would provide more insight into whether the current split between the WAI and CAI is appropriate, and whether other options or tools should be considered in advance in case the MSSC is exceeded. If the MSSC is exceeded next year, the Team anticipates that alternative management tools for use in 2018 will need to be evaluated (e.g., subarea TACs, ABCs, or OFLs).

The Team recommends that the Council task staff with further analysis of possible alternative management measures if such analysis is desired.

September 2017, BSAI Team

Paul Spencer presented some responses to a December 2016 SSC request for further analyses on the biological basis for spatially dividing the species catch and how it relates to MSSC. The presentation summarized an analysis to evaluate alternative boundaries for the subareas for BS/RE. A “management unit estimator” from Cope and Punt (2009) was applied to trawl survey data and he also looked at the fishery catches of BS/RE by 0.5 degree longitudes. Survey biomass estimates were produced for seven areas covered by the AI trawl survey after subdividing each of the WAI, CAI, and EAI into 2 parts (e.g., WAI -W, and WAI – E), for a total of seven areas (including the southern Bering Sea area). Some of the divisions corresponded nicely with the survey strata longitudinal division lines. Most of the biomass is in the CAI areas although there is a relatively large amount in the Eastern part of the Eastern AI. The trends in the WAI are similar among the two areas, and show a decline. In the 1990s the WAI-E and CAI-W (i.e., either side of the current WAI/CAI boundary) showed similar levels of biomass, whereas in the 2000s, the ratio of CAI-W biomass to WAI-E biomass was much higher. The management unit estimator is a pattern recognition tool, based on clustering similar patterns in catch CPUE or abundance data. This tool involves a two-stage clustering process. Simulated data sets are generated based on sampling from distributions of survey biomass estimates with that same mean and variances as the observed survey biomass estimates. Each of the simulations is clustered to group areas with similar trends, and a second stage of clustering is applied to the set of assigned areas. This procedure accounts for the underlying variability in the points estimates, as higher levels of input variances on the point estimates would reduce the similarity of areas within the cluster and thus produce clusters with less statistical “strength”, where “strength” is measured by the silhouette width (a function of the relatively dissimilarity of a given area to potential cluster groups).

Paul said that a rule of thumb is that a silhouette width of 0.5 or greater is strong evidence of a similar index. A Team member asked if that rule of thumb depended on sample size or length of time series. Paul said it did not.

It was asked if there was measurement error on the dissimilarity index. Because this is a stochastic simulation, there is uncertainty in each set of draws. Paul said that the average silhouette width was 0.74 for the Western AI areas using the clustering, which is pretty high despite the large CVs of the time series used.

Paul provided cumulative catch graphs to show that there was not a lot of catch in the near the WAI-CAI border (i.e., within 0.5 longitude on either side of the border), and most of the catch in the WAI occurs between 174.5 E and 176 E, which is 1 degree or more separated from the border at 177E. In Zador and Ortiz (2016), the boundary between the western and eastern ecoregions also occurs at 177E.

Paul suggested that the decline in WAI survey biomass is probably related to historical fishing because fishing effort was high in the 1990s. Estimated exploitation rates have been reduced since the late 1990s, but the survey biomass estimates have not shown a population recovery.

A member of the public said that they have been successful in bringing down catches once they were aware of the concern. The point of discussing the 177 line was that there was a fairly large estimated ABC on one side of that line and a really small one on the other side, and whether that was a biologically reasonable thing to do.

A Team member asked which combinations of these subareas were considered, because if we do not see all of the combinations, we do not know if the next best is very similarly matched when clustering occurs. Paul responded that the program will choose the optimum clustering for the number of clusters specified, but it will not give the scores of all the other possible combinations. It was asked whether he had looked at the patterns in the EAI as well. Paul responded that the analysis with all seven areas showed two clusters that separated the WAI and CAI areas, with the remaining three areas interspersed within the two clusters.

An audience member said that he had seen the core habitat for rougheye in the AI identified by the EFH review. If we are not surveying the right habitat, then the trends in the poor habitat might not be representative of what the larger population does. It was asked if the authors thought that the trawl survey was trawling in the best habitat for rougheye, and if not, are the data we are looking at really a good index to consider for these analyses?

Paul said that there were other bits of evidence that he had brought forward in other years that also showed that fishing had some effects, such as on the age compositions. A Team member suggested that the trends seemed to be stable since that early period.

A Team member asked how to interpret these results and whether they could occur by chance. Paul responded that the lack of recovery from fishing is an indication that the fish are not moving into the WAI from the CAI.

Mary Furuness gave an overview of how WAI BS/RE has been managed over the last several years.

The management workload for doing an ABC or an MSSC is about the same. An MSSC from the stock assessment and SSC is administered by an information bulletin at the beginning of the year and in the catch reports. An advantage of MSSC is that the fleet is able to react more quickly than NMFS because they can communicate among themselves and avoid hot spots and fishing depths where BS/RE are being encountered. The number of vessels involved in catching BS/RE is limited, with 7 vessels catching less than a ton, and 18 total vessels fishing catching BS/RE.

If there had been a WAI ABC/TAC equal to the MSSC this year, this would have required more than 5 t of regulatory discards, because management would probably would probably have to prohibit retention before the TAC was reached.

Mary noted that this is now a truly incidental catch fishery, and fishermen are intentionally not taking up to their MRAs. There are other limits to the BS/RE catch. Two of the main WAI directed fisheries that take BS/RE, Atka mackerel and Pacific cod in 2016 and 2017, are limited by Steller sea lion protection measure regulations. The WAI Atka mackerel TAC is limited to 65% of the ABC. The WAI Pacific cod

catch limit is based on the Pacific cod abundance in the WAI established in the stock assessment (2017 is 25.6% or 4,018 mt).

Retention rates for BS/RE have increased in recent years and were at 97% in 2014, which shows they are not reaching their MRAs that would require regulatory discards and that the species is valuable for retention. There are a lot of similarities between an ABC and an MSSC. The fleet has continued to reduce catches in the WAI.

The Team reviewed the 2016 November meeting recommendations. The Team had anticipated that if the MSSC were exceeded in 2017, subarea ABCs or some other management measures “would need to be evaluated.” No other management tools that would reduce catch were identified by the Alaska regional office for BS/RE. Other than allocations by gear type, only the MSSC and sub-area ABC were considered in Mary’s evaluation.

There was a discussion about the incentives to the industry of using an ABC or an MSSC.

An industry participant pointed out that they had negotiated a POP TAC lower by around 4,000 t in the Western Aleutians Islands in an effort to help keep the BS/RE incidental catch low. The main issue is that an ABC would cause regulatory discards that are wasteful, given that all discards for BS/RE are likely dead.

There was a discussion about how MRAs work. Mary and a member of the public stated that MRAs are instantaneous, so if you hauled in a large catch of BS/RE on board without having enough of the basis species (i.e., target) on board, you might have to discard it.

Paul said that POP management reduced the MRAs beginning in 1998 in responses to high catches in the 1990s. However, high exploitation rates (relative to the exploitation rates corresponding to a subarea ABC) consistently occurred after the MRA change in 1998, so MRAs alone are not necessarily a sufficient protective measure.

A Team member asked why, if MSSCs are better than sub-area ABCs, they are not used in more situations. Another Team member mentioned that there are not many other cases where the sub-area ABCs are as small as the one under consideration here. Another Team member said that in this case BS/RE are truly incidental catch and the industry is trying to avoid them.

A member of the public commented that these are really noisy survey data, particularly when divided up into smaller areas, and that we would not be setting an ABC on a reliable piece of data. It was reiterated that the industry has successfully decreased catches in response to concerns and MSSC.

Mary said it was likely that under an MSSC or an ABC, the catch would remain similar, but under an ABC the amount of discards would likely increase.

A Team member said that we need to keep MSSC around, but we need to be careful that we say why. One reason discussed was that management and stakeholders prefer it, and there was not a major biological concern given the decreasing catch and recent stable biomass estimates. A Team member also expressed that there is value in having opportunities like this for industry to self-organize that may have other benefits.

Mary said that in the last 10 years we have had a lot of changes to fishery management in the WAI. She says the process is working, as catches are indeed declining, so we might as well keep using MSSC. A Team member noted that the MSSC value will likely change in November, although that change may be small.

An audience member noted that the EBS slope biomass was one of the causes of the sharp decline in the MSSC. Paul noted that it was more of an EAI issue than an EBS slope issue, but the Team minutes from November 2016 also (perhaps incorrectly), implicated the addition of the EBS slope survey as causing much of the large drop in MSSC.

A Team member asked if we should make any recommendations or statements about what we would do next year if the MSSC is again exceeded. Generally, Team members thought that they would prefer to evaluate how much catch was obtained relative to biomass at that time before making any recommendations.

The Team generally agreed that the MSSC had reduced catches of BS/RE in the WAI over the last few years, despite a small (in absolute terms) overage of the MSSC in 2017. For 2018, given the recent reduction in overall catches and the lack of evidence for further decline in biomass in the WAI, the Team will continue to request an MSSC so that catches in the WAI are encouraged to be minimized. In the absence of a conservation emergency, this avenue will continue to allow the industry and management to determine how to constrain the catches of BS/RE in the WAI.

November 2017, BSAI Team

(Under “BSAI Blackspotted and Rougheye rockfish”) Paul showed exploitation rates by area. The area that has been of concern (WAI) has shown a considerable decrease in annual exploitation rate since 2013, and for 2017 the WAI exploitation rate was near the reference rate $U_{F40\%}$ (the exploitation rate obtained from fishing at $F_{40\%}$).

November 2018, BSAI Team

(Under “BSAI Blackspotted and Rougheye rockfish”) Additionally, the utility of the MSSC as a guideline for fishery removals on a finer spatial scale was discussed. The industry generally liked having a guideline to work towards, but the Team was mixed regarding its utility and discussed whether or not these should just be set as subarea ABCs rather than MSSCs. While there was no consensus, the Team recommended maintaining the same process in setting MSSCs across the subareas.

In light of continued discussion of the low abundance in the WAI, catches exceeding the MSSC specified for that area and available management tools to address this, **the Team recommends that Council staff provide the author’s previously written analyses on regional ABCs for discussion and Team consideration in September 2019.**

September 2019, BSAI Team

Diana Stram and Mary Furuness presented the issue of spatial management of blackspotted/rougheye (BSRE) rockfish in the Aleutian Islands (AI). This stock is managed with a combined Western and Central AI ABC. Additionally, a Maximum Subarea Species Catch (MSSC) is used to guide the industry regarding subarea catches in the WAI and CAI. The MSSC is computed in an identical manner as a subarea ABC. In

all but one year since MSSC has been provided, the catches in the WAI have exceeded the MSSC, and in 2019 the WAI catch exceeded 100 tons whereas the MSSC was 37 tons.

The BSAI Plan Team has expressed “strong concern” regarding stock structure, based largely on stock status and demographic information. Further genetic research with advanced methods may help elucidate spatial population connectivity.

The Team recommends that BSRE stock structure research, specifically the planned genetics work outlined in the AFSC Genomics Activity Plan, be highlighted in the Council’s Research Priorities.

The Team discussed reviewing subarea ABCs in the future in response to the SSC request to no longer include this portion of the analysis. The Team recognized that the AKRO already prohibits directed fishing for the species in the WAI/CAI when the TAC is reached and a WAI ABC could serve to increase discards, but potentially not reduce catch. Of note, catches of these species are generally retained at high levels, but in 2019 there have been increased discards due to large catches of that are too small to process.

The Team expressed concerns that the use of MSSC is inconsistent with other species where conservation concerns exist and that the use of MSSC has not resulted in achieving its stated purpose. The Team also expressed concerns over the choice between MSSC and subarea ABC prioritizing economics (i.e., forcing regulatory discards) over conservation concerns. The author and members of industry pointed out that fishery data collection methods have changed and may provide improved information to the assessment; however, the age data will not be available for the next full assessment. The Team looks forward to updated research (i.e., modern genomics) to help inform the discussion of the conservation concern, at which time the Team will further continue discussions of subarea ABC.

November 2019, BSAI Team

(Under “Blackspotted/rougheye”) Overall exploitation rates were low, but higher in the WAI and EBS. MSSC was exceeded in the WAI again in 2019 even though members of the fishing industry at the meeting indicated that the fleet was actively trying to avoid them in the POP fishery. Members of the fishing industry at the meeting reported their belief that the increase in catch was due to an increase in abundance of small fish. It was noted that the survey selectivity on these small fish (which comprise 80% of the stock, as estimated from the 2018 model) is 20% or lower, and therefore have had limited observations in our survey data and may not provide a reliable basis for estimating recruitment for the most recent time period.

November 2020, Joint Plan Team

Under “sablefish”, the Joint Plan Team recommended applying the Council Spatial Management Policy and holding a Council workshop. The suggested topics for the workshop was further extended to further evaluate “other” stocks with spatial management issues, namely BSAI blackspotted/rougheye rockfish which were named specifically:

The Teams recommend that the SSC and Council consider application of the Spatial Management Policy and thus host a Council workshop in 2021 to evaluate both the fishing mortality rates by gear associated

with different apportionment schemes as well as the management and socio-economic considerations of alternatives. This workshop would satisfy step 2 of the policy, which is to “identify the economic, social, and management implications and potential options for management response”. . . . A Council-led workshop might also benefit other stocks that have spatial management issues, and could clarify general questions regarding application of the policy. For example, although the Spatial Management Policy was applied to BSAI blackspotted/rougheye rockfish in 2016, disproportionate harvesting has continued and grown worse since then, and discussions of spatial management have been a near-annual event at BSAI Team meetings. Some general guidance on application of the Spatial Management Policy could address the following issues: 1) What are the criteria for assessing whether a spatial management tool has been effective? 2) What are the specific criteria for when the Policy should be applied (either for the first time for a stock, or follow-up applications)? 3) Are there criteria for balancing conservation concerns (i.e., stock biomass and productivity) vs socio-economic concerns, and do these vary between target and bycatch stocks?

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November 2020, BSAI Team

(Under “Rougheye and blackspotted rockfish”) The Team is highly concerned over the disproportionate spatial harvesting of this stock. The “maximum subarea species catch” (MSSC) level was intended to help guide the fleet to voluntarily reduce catch in the WAI, but *catch has exceeded the MSSC for 5 out of the past 6 years, with “overages” increasing to 3 times the MSSC in recent years. The Team is extremely concerned with the effectiveness of the MSSC tool.* An industry representative commented that it has been useful for the fleet. Although several members of the Team noted the ineffectiveness of the MSSC, the Team does not recommend removing the MSSC because a superior alternative has not yet been clearly identified, and the MSSC may have some positive influence (relative to the absence of any spatial management measures).

The Team requests guidance from the SSC and Council on how to reduce incidental catch in areas with disproportionate spatial exploitation because the MSSC tool has not provided enough protection.