North Pacific Fishery Management Council

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Minutes of the Joint Meeting Plan Teams for the Groundfish Fisheries of the Gulf of Alaska (GOA) and Bering Sea Aleutian Islands (BSAI)

North Pacific Fishery Management Council
1007 West Third, Suite 400
Anchorage, Alaska 99501

September 8, 2020

Groundfish Plan Team Membership:

BSAI Team		**GOA Team**	
Grant Thompson	AFSC REFM (co-chair)	Jim Ianelli	AFSC REFM (co-chair)
Steve Barbeaux	AFSC REFM (co-chair)	Chris Lunsford	AFSC ABL (co-chair)
Steve MacLean	NPFMC (coordinator)	Sara Cleaver	NPFMC (coordinator)
Mary Furuness	NMFS AKRO	Obren Davis	NMFS AKRO
Alan Haynie	AFSC REFM	Craig Faunce	AFSC FMA
Allan Hicks	IPHC	Lisa Hillier	WDFW
Lisa Hillier	WDFW	Pete Hulson	AFSC ABL
Kirstin Holsman	AFSC REFM	Sandra Lowe	AFSC REFM
Andy Kingham	AFSC FMA	Nat Nichols	ADF&G
Kalei Shotwell	AFSC ABL	Jan Rumble	ADF&G
Chris Siddon	ADF&G	Paul Spencer	AFSC REFM
Cindy Tribuzio	AFSC ABL	Marysia Szymkowiak	AFSC REFM
vacant	ADF&G	Kresimir Williams	AFSC RACE
vacant	USFWS	vacant	ADF&G
		vacant	USFWS

Administrative/Intro/Council updates

The Joint meeting for the Groundfish Plan Teams ("Teams") began on Tuesday, September 8, 2020 at 9:00am PDT. Participation was remote via Adobe Connect. Roughly 140 people attended the meeting. All documents provided prior to or during the meeting as well as presentations given during the meeting were posted to the Council's electronic agenda.

November Team meeting

The November Groundfish Plan Team meetings will be held November 16-20, 2020. These will likely be remote meetings.

Team members introduced themselves over video, and Sara Cleaver, Diana Stram, and Steve MacLean provided updates on Council activity. Updates included scheduling for upcoming Council meetings, and those on Halibut Abundance Based Management, recent and upcoming GOA and BSAI FMP amendments, and the Halibut Discard Mortality Rate (DMR) Working Group recommendations for in-season management of BSAI and GOA Groundfish fisheries for 2021-2022, which were later approved by the Teams.

Observer Program Updates

Jennifer Ferdinand provided a summary of 2019 fisheries monitoring in Alaska, the 2020 Annual Deployment Plan (ADP), COVID-19 impacts to fisheries monitoring, and expectations for the 2021 ADP. Jennifer also reminded the Teams that the Fisheries Monitoring and Analysis Division administers and supports numerous Alaska groundfish and Pacific halibut monitoring programs and projects, not just the long-established human observer program.

In regards to 2019 fisheries monitoring, Jennifer presented an overview of the two primary observer coverage categories. The full coverage category includes 100 percent observer coverage and the use of various NMFS required technologies such as the Vessel Monitoring System (location monitoring), at-sea flow scales (catch weighing), and video systems (compliance monitoring). This coverage category is applicable to catcher/processors and vessels participating in "limited access privilege programs" for species such as pollock, Pacific cod, Atka mackerel, some rockfish, and some flatfish. Industry participants pay directly for observer coverage and monitoring systems. Observers in this category are able to collect and record species composition, a variety of biological data, special project data, and other tasks. In 2019, this category encompassed 161 vessels, 3,343 trips, and over 36,000 observer days.

The partial coverage category includes vessels in an observer selection pool or the electronic monitoring (EM) pool. Typical fisheries include the open access and Individual Fishing Quota fisheries (i.e., halibut, sablefish). Trips in each pool are randomly selected for monitoring coverage throughout the year. Fishing industry fees, applicable to all vessels in this category, fund this level of monitoring. The ADP establishes the coverage rates for the vessels in these pools. In 2019, there were 684 vessels in the partial coverage category, with a total of 1,160 monitored trips out of 5,021 trips. Vessels in the fixed-gear EM pool yield data that provides catch and discard information, but not biological data. EM data and observer data are combined to provide comprehensive catch estimation for the entire partial coverage fleet.

With respect to the full and partial coverage categories, the 2019 realized coverage rate by stratum essentially met all expected coverage rates. Of course, the no selection pool also met both the expected and realized coverage rate of zero.

The 2020 ADP included the following deployment rates by gear type: trawl – 20 percent, hook-and-line – 15 percent, pot – 15 percent, and fixed gear EM – 30 percent. There is a new EM exempted fishing permit (EFP) that began to assess the practicality of using EM on trawl catcher vessels in the Bering Sea and Gulf of Alaska pollock fisheries. The EM component is used for discard compliance monitoring; biological data is collected at shoreside processors upon delivery. The EFP overestimated how much biological data could be collected shoreside, thus, a 30 percent sampling rate has not been achieved.

Alaska fisheries monitoring was affected by the impacts of COVID-19 beginning in March 2020. NOAA Fisheries issued an emergency rule that allowed for observer coverage waivers based on a variety of factors such as travel restrictions, social control guidance, or health and safety issues. In Alaska, the observer selection pool of the Partial coverage sector was issued a comprehensive waiver. This waiver was lifted for vessels operating from Kodiak on April 20. This was followed by 13 other ports in late June, after the FMA redesigned the 2020 deployment plan. The full coverage category now provides the majority of observer data, as fisheries data loss has been more profound in the partial coverage sector. The fishing industry has instituted health and safety protocols that have affected observer deployment and monitoring efforts in Alaska. The full coverage fleet has, in general, developed crew health and safety measures that more readily offer the ability to integrate observers into required operational protocols. However, many logistical issues such as travel, quarantine, and debriefing remain challenging.

The expectations for the 2020 observer data set includes: less precise species identification, limited ability to make mid-year sampling changes due to few debriefings, a delay in the completion of 2021 stock assessments, and fewer biological samples for a variety of projects.

Jennifer also reported that the development of the 2021 ADP currently is underway, and will be guided by forthcoming meetings of the Partial Coverage and Trawl EM advisory committees. She expects that there will be a port-based deployment model to allow adherence to state health mandates. Additionally, the trawl EM EFP probably will be expanded, including additional shoreside observers if logistics issues can be addressed.

The Teams thanked the FMA Division for its efforts to revamp its 2020 deployment plan, and redesign its service delivery model on short-notice and under such difficult circumstances.

Ecosystem Status Report (ESR)

Ecosystem Overview

Elizabeth Siddon (AFSC) provided an overview of ecosystem conditions and considerations for the Bering Sea, Gulf of Alaska, and Aleutian Islands on behalf of the Ecosystem Status Report team (which includes E. Siddon (EBS), B. Ferriss (GOA), I. Ortiz (AI) and S. Zador).

General Oceanographic Conditions

Across systems the climate indices can be broadly classified as more like "near normal" with fewer (but not absent) "unprecedented" conditions. Oceanographic and atmospheric indices indicate that in the fall of 2019 there was a positive pressure system in central GOA that brought warm sea surface temperatures (SST) and upwelling favorable winds into the Gulf. During winter this anomaly became very large and was associated with less storminess and transport of water equatorially. In the spring of 2020, there was upwelling in eastern GOA while southerly winds in the EBS contributed to ice retreat in that system. In the summer of 2020, conditions brought warm dry air to the central GOA.

In the summer of 2020 warmer than normal SST (1980-2010 baseline) were also observed in the North Pacific, with warmth east of the dateline and cooling west of the dateline. There was indication that a weak El Nino developed in equatorial regions during the winter 2019/2020 and possibly a weak La Nina, following. The Pacific decadal oscillation (PDO) has been declining (cooling along W coast and warming in North Pacific), the recent cooling in the North Pacific represents a recent return to a relatively neutral PDO. The North Pacific gyre oscillation had been negative relative to average, and continues to trend downward (reflecting high sea surface pressure in the GOA) but there was a very recent trend upward. The Arctic oscillation and North Pacific Index had a winter spike associated with the coldest land temperatures (spikes) since 1989.

EBS-Specific Conditions

Sea ice extent in March 2020 was greater than in March of 2018 or 2019 and was approaching normal. However, the ice that formed was very thin, with community members reporting that it was "rotting from below". This fragile ice was faster to break up and the sea ice retreat index shows that like the previous 4 years, 2020 had lower than normal retreat extent (i.e., melted and retreated faster post-March 2020). The Rick Thoman 2019/2020 seasonal ice index shows delayed freeze up due to residual warmth, a greater than average extent in cold winter, followed by rapid retreat in mid March due to southerly warm winds in spring and thin ice.

The jet stream was located very far south in the EBS in spring 2020, and a low pressure system brought southerly winds to the SEBS and warm air temperatures to NEBS. Summer winds were light in the SEBS, and NEBS had west winds representing near normal summer conditions.

The SST in the NEBS & SEBS was normal/cool in winter 2019/2020 (in contrast to 2018/2019 warm winters). Current (summer/fall) SST temperatures in the NEBS and SEBS are above average and are similar to temperatures observed in 2019.

Bering10K ROMSNPZ model hindcasts of summer bottom temperatures in the Bering Sea match observations closely and while there are no survey observations from 2020, the Bering10K model indicates that 2020 was an average year in terms of cold pool area and size with slightly above average area covered by 2°C water and slightly below average area covered by 0°C water. Cold pool conditions most closely resemble 1997.

There is a coccolithophore bloom forming presently, similar to the bloom which occured in 1997. Coccolithophore blooms are associated with reduced foraging and thought to be associated with a shearwater (seabird) die off event in 1997.

GOA-Specific Observations

In winter 2019/2020, SSTs cooled to the long-term mean through April in both the EGOA and WGOA. The WGOA then warmed above the mean, near the MHW threshold, for much of summer 2020. EGOA SSTs remain near-normal through present.

Indices suggest that the eddy kinetic energy (EKE) in the GOA is lower than normal. EKE is a proxy for the combination of upwelling and gap winds and influences water transport through the passes. Central GOA EKE was above average in spring 2020 and below average in summer 2020 indicating favorable conditions for arrowtooth flounder settlement.

The Marine Heatwave (MHW) that had been observed in 2019 dissipated after Dec 23, 2019 but reappeared periodically during multiple MHW events in Jun and Jul 2020.

The PAPA trajectory index for 2020 shows movement of surface waters further south and east than average, and is similar to patterns seen in 2013. The 5 year pattern in this index is also similar to pre-regime shifts in the 1970s.

Near-Term Seasonal Forecasts

Global SST from the North America Multimodal Ensemble (NMME) suggests continued warmth in the Bering Sea and delayed sea ice formation. There is projected cooling in GOA in Feb/April 2021 and near normal conditions nearshore in the GOA but warmer than average offshore.

Other updates include Ecosystem Status Report (ESR) team activities. ESR has been working with the communications team and has been creating story maps for 2019 ESRs. These will be available soon. Story maps will be produced in tandem with the 2020 ESRs.

There was some discussion regarding the skill of the NMME projections. NMME skill is best nearterm (70-90%) and weaker farther out in time and varies spatially. Full skill maps are also available here: https://www.cpc.ncep.noaa.gov/products/NMME/seasanom.shtml and here: https://www.cpc.ncep.noaa.gov/products/NMME/maskseasanom_body.shtml.

There was a comment that a new study from UAF/USGS found that 2018 Bering Sea Ice was the lowest in 5,500 years, based on oxygen stable isotopes in peat on St. Matthew.

Longline Survey

Kevin Siwicke presented preliminary results from the 2020 longline survey, which covered the Aleutian Islands (AI) and GOA shelf/slope break. The 2020 survey was able to be conducted by using a contractor that served as the Chief Scientist for the entire survey, conducting fewer special projects, and tagging about half as many fish as in normal years. Preliminary 2020 Relative Population Numbers (RPNs) that are not corrected for whale depredation for the following species relative to 2019 are:

- Sablefish up 34% (Alaska-wide), up 40% in BSAI and 26% in GOA (increase primarily reflected in Western and Central GOA). Growth in size within population is reflected in 2020 by increase in mean length composition

- Pacific cod up 17% in BSAI and 30% in GOA (first year in 4 years without decline), but still remains at low levels
- Greenland turbot down 3% in BSAI
- Arrowtooth flounder down 37% in GOA
- Rougheye and blackspotted rockfish down 43% in GOA
- Shortraker rockfish down 2% in GOA
- Giant grenadiers down 45% in GOA and down 38% in BSAI
- Thornyheads down 43% in GOA
- Spiny Dogfish down 79% in GOA

The Team noted the consistent decline in the catch of a number of species that coincides with the increase in sablefish and asked about whether hook competition would be investigated. It was noted that the longline survey team has investigated hook competition in the past with mixed results but agrees the increase in the total number of fish caught this year does warrant further research into hook competition. Killer whale depredation was within the variability seen in the time-series as was sperm whale depredation. Temperature profiles were generally cooler in 2020 than 2019 for 50 m depth bins in both the GOA and AI. Overall, it appears sablefish from the 2014 and 2017 year classes still comprise a large component of the catch.

The Teams thanked Jason Wright for stepping up and being willing to serve as Chief Scientist for the entire survey and to the longline survey team for their efforts during the pandemic.

Essential Fish Habitat (EFH)

Dr. Ned Laman (AFSC) and Dr. Jodi Pirtl (AKR) provided a summary of a number of projects in progress that may improve the descriptions of Essential Fish Habitat (EFH) in Alaska. The projects include those by Laman et al. to0 advance EFH for North Pacific species in Alaska, Marsh et al. to create model-based descriptions of EFH for Arctic species, Laurel et al. to describe thermal habitat for juvenile Walleye pollock, and Shotwell et al. to create individual-based models to advance EFH information. The projects may provide information for life stages or times that are currently absent for EFH in Alaska, and model advances proposed have the potential to raise EFH information from the current status of Level 1 (distribution) or Level 2 (habitat-related densities) to Level 3 (habitat-related growth, reproduction, or survival rates). The authors requested input from the Plan Teams about construction of a model ensemble, and how best to map EFH Level 3 data. The authors also requested input from the Plan Teams on ways to visualize uncertainty in EFH maps, how can the research presented inform stock assessments and other parts of Ecosystem-Based Management, and what is the most timely and effective ways to present this information to the Plan Team for the 2022 EFH 5-year review.

Plan Team members expressed their support for an ensemble modelling approach, but requested that authors also present each of the ensemble members so reviewers can see the influence or contribution of each ensemble member, and the variability associated with each. Plan Team members also noted that in the example of sablefish EFH, it would be useful to see the iterative changes that result from each change or addition. Plan Team members also noted that all the information should be available to the stock assessment authors, in an easily accessible way (e.g., AKFIN). It was noted that the models may reveal interactions that may matter to specific species in different degrees.

When asked about how products could be mapped (co-mapping vs. product of two attributes), Plan Team members responded that it may be too early for the Plan Teams to make a recommendation without specific examples for the Teams to review and base their recommendations upon. Plan Team members noted that it would be important to see those examples so they can see how different those methods are, and how to make the results most available for stock assessments and other uses. A Plan Team member suggested that a kernel density approach might be useful to mapping and get closer to providing one-

dimensional indices for stock assessments. One Plan Team member warned of the "illusion of precision" in some methods, and how to propagate the error through the process.

The authors asked the Plan Teams when they would next like to receive an update on the process, and suggested next September as an opportunity to review the specific examples that were requested by the Plan Teams. The Joint Plan Team chair agreed to that proposed schedule.

Ecosystem and Socioeconomic Profiles (ESP)

The Ecosystem Socioeconomic Profiles (ESP) update was presented by Kalei Shotwell. The presentation provided an overview of the ESP developments, SSC and Team comments, and the two workshops completed to date. A document and presentation were provided detailing the update. The ESP team requested feedback on four questions:

1. Do the Teams support the 3-stage indicator analysis concept and scoring methods?

The Teams discussed concerns of over-emphasizing the 1:1 weighting on the first stage. In the absence of information to indicate an appropriate weighting strategy, it is recommended to not rely too heavily on the uninformed 1:1 weighting to select appropriate indicators. The Teams also requested that the ESP team/authors consider appropriately caveating the indicators to ensure they are interpreted species-specific and not over generalized. The Teams support continuing with the current 3-stage indicator analyses for now, and re-evaluate as the ESP process develops, recognizing that the actual value of the integrated index is yet to be clearly demonstrated although it is one high-level summary statistic that may be valuable to examine.

2. Are the one-day discussion topics sufficient?

The Teams support the proposed one-day ESP discussion agenda, and requests that linkages to the EFH be included in the last two discussion topics planned: Coordinating data and Indicator Analyses

3. Do the Teams support the ESP dashboard on AKFIN?

The Teams fully support the development of the ESP dashboard hosted on AKFIN with the following considerations:

- Include metadata for each data source as well as the queries or traceability to those data.
- While a one-stop-shop for finding and downloading indicator data is useful and will help authors, the Teams suggest a staged approach for including data sources on AKFIN. The indicator data sets that are publicly available, thoroughly vetted and published can be included/linked on AKFIN, many are currently linked on the ESR websites. The ESP dashboard can either mirror or link to the data source, as per the preferences of the data provider. Indicators that are still in development, those that are "for use with permission only" indices are important for authors to be able to access and providing those indices on AKFIN would be helpful. However, until ready for public distribution, the ESP and assessment authors should work with the index developers. Thus, for those indices, AKFIN may need to only list and describe the index with contact information.

4. Do the Teams support the existing standard template formats for both full and partial ESP? Is the timing of reports reasonable?

The Teams support the current formats and timelines for now. This question may need to be revisited as the ESP process develops.

Economic SAFE

Ben Fissel of AFSC presented the September draft of the Economic SAFE Report. The Report updates available economic information for 2019; as always there is a one-year delay in most economic data. Ben will provide a fuller presentation of trends at the November Joint Team meeting.

Ben provided a brief summary of groundfish economic activity changes from 2018 to 2019. In the aggregate for Alaska groundfish, there was a decrease in total catch which largely drove a decrease in ex-vessel values (down by 3% to $980.8 million) and wholesale values (down by 3% to $2.50 billion). The drop in volume was driven mainly by Pacific cod and Atka mackerel. Pollock and flatfish catch were fairly stable, while rockfish and sablefish catch increased. Proportionally, the GOA had a greater decline in total catch than BSAI, contributing to a more pronounced drop in ex-vessel values in the Gulf as well. Values dropped substantially in 2019 in the GOA, driven by both a drop in catch volume (largely from Pacific cod) as well as a drop in prices largely due to sablefish.

The content of the September Economic SAFE Report will be similar to previous years, inclusive of the executive summary, the economic data tables and economic indices. Ben also covered where to access ECON SAFE data using VPN, which is currently available to AFSC only. Ben discussed new items that are being provided in the ESRs including extensions of ex-vessel price projections and a new section providing year-to-date information on catch and production. Only limited economic information is available mid-year because comprehensive data collection of revenues are provided after the end of the year. This year, the AFSC Economic and Social Science Research (ESSR) Program has developed routines for reporting year-to-date information based on available data. Ben also discussed the types of COVID-19 related information that ESSR has been providing to NMFS S&T and the work of a national working group on trade impacts since COVID. There have been large value decreases in both exports and imports of fresh product and shelf stable products are generally doing relatively better, as there has been a shift from the food service sector to retail. Ben also provided an overview of how socioeconomic information is being updated within ESPs and ESRs.

Steve Kasperski, Program Manager of the ESSR Program at AFSC, presented on the fishery performance and community information that are provided by ESSR to inform stock assessments and the social science information that the group provides for the NPFMC process more generally. Steve highlighted several key products that are informed by data and information from ESSR including Economic and Socioeconomic Profiles (ESPs), Ecosystem Status Reports (ESRs), and Economic Performance Reports (EPRs). The group annually also develops the Economic SAFE report, led by Ben Fissel (groundfish) and Brian Garber-Yonts (crab), and is developing new webtools and a new summary of community participation in groundfish and crab fisheries in AK that will be called the Annual Community Engagement and Participation Overview (ACEPO). ESSR staff also participate on the Council's Social Science Planning Team (SSPT), the Groundfish Plan Teams and provide public testimony to the Council SSC's. The information provided by ESSR into the EPRs focuses on a summary of key economic data covering three broad market categories, and providing a narrative for the state of the markets. The ESPs were built off of the EPRs, but include revisions of the economic sections and more of a community focus. ESSR is currently working on a new fishing communities of Alaska website, focused on updating community snapshots, data maps, and story maps with integration of FEPs. The group also provides a number of indicators for the annual ESRs, including ex-vessel and wholesale values of landings, K-12 school enrollment, and human population.

Steve discussed the types of indicators that ESSR provides and their ties to MSA stated fishery management objectives. Generally the Human Dimensions indicators can be categorized into the following: seafood provisioning indicators (% utilization, catch, vessel characteristics, etc.), commercial profits indicators (aggregate revenues, ex-vessel prices, revenue per active vessel, etc.), employment indicators (crew weeks, fishing weeks, vessel counts and permits), recreational opportunity indicators (which have been removed from ESRs due to data lags), community resilience indicators (K-12 school

enrollment, trends in human population, number of active processors, etc.), fishery sustainability indicators (active vessels, season length index, discards and PSC), and stability indicators (real effective exchange rate index, AK resident share of shoreside ex-vessel value, and share of shoreside value to top 5 communities).

Ecosystem Surveys: 2020 Recruitment Processes Alliance (RPA) surveys

RPA: Ecosystems and Fisheries-Oceanography Coordinated Investigations (EcoFOCI), Ecosystem Monitoring and Assessment (EMA), Recruitment, Energetics & Coastal Assessment (RECA), Fisheries Behavioral Ecology (FBE). Presenters: Rob Suryan, Ellen Yasumiishi, Lauren Rogers

The goal of this presentation was to provide recent information on ecosystem conditions affecting recruitment processes, with the following objectives: 1) provide updates on RPA-related surveys that occurred in 2020; 2) encourage discussions of data/indicators most useful for stock assessments, ESRs, and ESPs; and 3) update on efforts to integrate recruitment models and indicators into stock assessments.

This survey year, 2020, was a Bering Sea year, an even year. Most of the surveys that were scheduled for this year were canceled due to COVID-19, but the Distributed Biological Observatory ("DBO") survey was conducted, along with collecting information gathered from monitoring moorings. They combined these two surveys with a reduced crew during August and September (still in progress). Surface and subsurface moorings were monitored along with CTDs, bongos, and pop-up floats. The only NOAA GOA ecosystem survey conducted this year was the beach seine survey, with coverage focused in WGOA.

Gulf Watch Alaska and NGOA Long Term Ecological Research Surveys also occurred with environmental drivers, pelagic, and nearshore components. Environmental components included oceanographic sampling, plankton recording, and seabird/mammal observations. Pelagic sampling included forage fish, seabirds, and humpback whale studies. Also, research involving seabirds as forage fish samplers, seabird surveys, and killer whales contributed to the pelagic component. The nearshore component used a sampling block approach for research and monitoring. Most of this survey coverage was in the Central Gulf of Alaska (CGOA), with a focus in PWS and Kachemak Bay, with long term monitoring offshore from Cape Suckling to the north end of Afognak Island near Kodiak.

The beach seine survey occurred in Kodiak, and on the Aleutian chain. Also, there was Southeast coastal monitoring and long-term monitoring with sampling on the Seward and Middleton Island lines (the Kodiak lines were not done). The WGOA beach seine surveys focus on YOY gadids (Pacific cod, pollock, saffron cod) in Kodiak in July/Aug from 2006-2020 (4 surveys, 16 sites across 2 bays) and were expanded into the WGOA with 75 sites across 14 bays from 2018-2020. Operations include beach seine, CTD, and baited cameras.

For Kodiak sampling, there were high catches of age-0 Pacific cod with the beach seine (not all of the hauls were done, though); baited camera results are pending. The survey has also captured strong year classes of pollock. 2020 CPUE was similar to 2012 but lower than 2018. For the expanded WGOA beach seine, there were high catches of YOY cod and pollock abundance, similar to 2018.

In 2020, GOA nearshore habitat sampling was reduced and only occurred in Kachemak Bay, but other areas have been sampled in the past and have long time series. The results show macroalgal cover continues to be reduced. In Kachemak Bay, rock weed was reduced with a huge increase in mussels, most likely affected by the heatwave.

Gulfwatch has been collecting prey information from rhinoceros auklets and has also been using sablefish information summarized in the SAFE report, to look at trends. There was an increase in age-0 sablefish coupled with an increase in age 2+ sablefish from 2015 to the present. For auklets, there has been a decrease in capelin in warm years, and there has been no return to previous levels in their diets after the heatwave. Capelin disappeared in the auklet diets with sand lance increasing.

Environmental driver information includes: PWS temperature surface anomaly and GAK1 (200-250 m), which is a 50-year monthly time series tracking trends and the Seward Line, which is a cross shelf transect temperature anomaly profile. The PWS temperature information shows warm temperatures from 2015 to 2020. The Seward Line shows warm water offshore moving onshore in September for 2020.

Eastern Gulf of Alaska (EGOA) Southeast Alaska (SE) coastal monitoring has been conducted from 1997 to 2020, collecting oceanographic indices (temp, chlorophyll, zooplankton) in Icy Strait, and also uses surface trawls for catch/abundance information. This information is used to predict SE pink salmon harvest and also to analyze salmon bioenergetics. Southeast Coastal Monitoring observations show temperatures below average, zooplankton density average, and juvenile salmon catches below average with pink and chum salmon trending up.

A summary of research from the Gulf of Alaska shows no return of the "blob," with some warming, average zooplankton densities, improved prey abundance, and a strong Pacific cod age-0 year class. There are still potential recruitment carry-over effects of the 2019 heatwave with implications for near-average conditions for feeding and growth.

Possible inputs or potential analysis to aid in stock assessment include: 1) an artificial intelligence machine learning and stock assessment project, 2) a new 70 m isobath copepod index, 3) prey limitation for large copepods, 4) estimating phytoplankton from satellite data, 5) pop-up floats and Pacific cod spawning habitat, 6) pollock spawn timing and survey catchability, and 7) indicators for ESPs.

The Machine Learning and Artificial Intelligence project is exploring possibilities to use these tools for pink salmon forecasts. The next step is to include groundfish. Also, new inputs include a large copepod index from the 70 isobath survey to predict EBS pollock recruitment. It is important to fill in some of the gaps when we do not have annual information, to be able to forecast. Phytoplankton biomass is being predicted with satellite chlorophyll a. Analysts are trying to find a way to fill in gaps, using chlorophyll as a proxy for phytoplankton biomass. There have been low levels of chlorophyll a in the most recent 5 years, below the historic average. Other new projects include pop-up floats and Pacific cod spawning habitat, looking for certain water column characteristics. Pop-up floats will record bottom temps for 1 year and then pop-up to transmit information. These are going to be dropped off by NOAA and the Coast Guard to start collecting data. Other analyses include attempting to predict GOA pollock spawn timing to ensure their availability to the winter acoustic survey, and identifying indicators of spawn activity.

The author wants to know: 1) What is most useful for the Teams to see/hear from the RPA at September meetings? 2) Are survey updates useful? 3) Are science updates useful?

Team discussion touched upon the following: 1) What indicators could be used in the different assessments? 2) What would be required in order to develop a conceptual model that would track things through time? 3) Indices would need to be specific to the assessment. 4) What is important to each of the life stages? 5) Beach seines show some kind of shift, from shrimp to gadid dominated regime, but it may not capture larger trends.

The author said that there was a concerted effort to make this presentation different. A Team member wondered if changing the presentation is good or if we should keep it the same.

Other discussion: 1) Team members liked the way the information was presented and summarized this year, but future presentations might want to highlight some of the more interesting things and focus on those projects that are most important to management. 2) This is going in the right direction and is more helpful with these focuses. 3) In the presentation, making the important connections between research and trends would be helpful. 4) Another member encouraged authors to really communicate the important aspects of their work and what they want us to take home. 5) Communication about research is so important and having authors get feedback is very important.

A non-Team member suggested that it would be very useful if the Teams would discuss what diagnostics regarding predictive performance are needed in order to accept an indicator as a candidate for inclusion in the ESP. This would save time for the people constructing the ESP and would serve as a target for the folks conducting the process-oriented research. There was some resistance for the Teams to direct researchers and research.

Still other discussion revolved around the risk table. Questions included how the risk table is developed and used with reference to this information. Right now, we have a traffic light system, but it has been suggested that scoring may be better, but this is really difficult and very qualitative. It is hard to weight these different pieces of information and if each one is weighted the same, it is problematic because some things really are more important than others. We can use weighting depending on how well each of the indices can predict. The Teams do not want to weight indices arbitrarily. If we take a quantitative approach, weighting is important.

It was agreed that both the surveys and the science updates are useful. We will probably have a lot more surveys next year, but if we go through them like last year, we will not be able to get through them all. Maybe we should decide some core things that we want to see every year. We could have some hot topics that are reported on.

It may be hard to provide the individual researchers with a list of priorities, and may instead want to defer prioritization to the presenters. We do not want to miss anything, and we want to make sure that everyone is seeing the same information. Maybe the Teams could allocate more time to this topic and have a small group get together in advance of the meeting to talk about what will be presented in September. Ecosystem Status Report (ESR) and Ecosystem and Socioeconomic Profile (ESP) groups meet in the spring; perhaps they could help identify what will be presented in September.

There is an Ecosystem Committee advising the Council that can also comment about what research to pursue, and the researchers can react to the Teams' recommendations.

The Teams recommended that the Ecosystem Status Report (ESR) and Ecosystem and Socioeconomic Profile (ESP) committees provide a prioritized list of ecosystem information to be reported to the Teams for the September meeting.

VAST Applications in Survey Group

Jason Conner (AFSC RACE) presented an overview of the Groundfish Assessment Program's (GAP) work in producing model-based abundance indices using the Vector Autoregressive Spatio-Temporal (VAST) model, including benefits, drawbacks, responses to drawbacks, and proposed terms of reference for using VAST in 2020 SAFE reports. VAST is a "delta" model fit to biomass sampling data through an equation modeling the probability of encountering the species and the abundance if the species is encountered. Two linear predictors (with link functions) estimate annual intercepts, spatial variation, and spatio-temporal variation (an interaction term) to connect data to predictions across space and time. The VAST model was selected based on available staff expertise, the growing body of research surrounding it, and the SSC's familiarity with it based on James Thorson's work at the Northwest Fisheries Science Center.

GAP staff prepared hindcast models, through 2019 using VAST, for 16 different species in the GOA, EBS, and EBS/NBS. These hindcast models were intended to be used by authors in conjunction with 2020 bottom trawl survey data. However, given the absence of 2020 bottom trawl survey data, the results of the hindcast model fits are all that are available to stock assessment authors. Methods for these model runs were described, including standard settings (terms of references) and exceptions (non-standard settings). In general, the VAST point estimates track the design-based indices well and have less standard error. However, some exceptions were noted where 2020 VAST indices cross or diverge from earlier

VAST models or design-based indices (e.g., GOA Dusky Rockfish, GOA Pacific Ocean Perch) or had more standard error than design-based indices (e.g., EBS Greenland Turbot).

Joint Team recommendations related to "Questions for the Plan Team" slide (page 4) of presentation:

Q1: Do the Teams want indices extrapolated to deep stations (>700m) in the GOA?

A1: The Teams support extrapolating indices to deep strata (>700m) in the GOA and recommend exploring the sensitivity of using depth as a covariate. However, the Teams also recommend that author's use discretion when extrapolating to deep strata as life history characteristics of some species may not support this (e.g., northern rockfish).

Q2: What other products should be developed based on these fits?

A2: The Teams support development of a suite of standardized outputs (e.g., center of area, effective area occupied) for use in ESPs and recommend that auxiliary products selected for inclusion be discussed in more detail at the 2021 Hindcast Meeting (Feb 2021). The Teams also recommend that developing a more streamlined process for uploading results into AKFIN be discussed at the 2021 Hindcast Meeting.

Q3: Do the Teams recommend including a spatially varying response to cold-pool extent for those indices using Northern Bering Sea (NBS) and Eastern Bering Sea (EBS)?

A3: The Teams discussed the utility of including a cold-pool covariate for indices using NBS and EBS data but made no formal recommendations. Jim Ianelli and James Thorson both recommended that this covariate be included, however The Teams agreed that it was a topic for the BSAI Team to discuss, not the Joint Teams.

Q4: How should untrawlable habitat in the GOA be addressed in VAST?

A4: The Teams briefly discussed this but made no recommendations. Lewis Barnett noted that GAP staff are aware of this issue and that it is a good candidate for future VAST work in survey optimization. The general thought is that it is best not to predict densities for untrawlable habitat.

Q5: Are there specific research questions the Teams would prioritize to support stock assessments?

A5: The Teams support the progress of GAP staff in developing new facilities in VAST to better evaluate model fit for a given data set (i.e., proxies for cross validation) There is a plan in process to have this ready prior to the 2021 Hindcast Meeting (Feb 2021).

General Joint Team recommendations:

The Teams are encouraged by the standardizations in VAST indices that have occurred across species and support the continuation of that effort.

Survey Prioritization Update

Jim Ianelli presented a draft summary of the August 28, 2020, SSC sub-group meeting with NMFS on survey planning. The summary reviewed the responses to the five questions the AFSC asked the SSC. The Teams are encouraged that the SSC is engaged in helping the ASFC meet their survey needs. One question was whether there was consideration of calibration changes in sampling designs. The SSC report encouraged bridge exercises if there are changes from the systematic design.

One comment received from the industry was that, of the 43 groundfish stocks, only 2 stocks (BS Pacific cod and BSAI yellowfin sole) that are normally surveyed and assessed on an annual basis will not be fully surveyed in 2020.

Survey Loss Uncertainty

Meaghan Bryan conducted an evaluation of the impacts of a lack of recent survey data in AFSC groundfish and crab stock assessment models. The objectives were to 1) better understand the expected uncertainty with the loss of the most recent survey data for a number of groundfish and crab species, and 2) identify species that would be more sensitive to the loss of data. The analysis consisted of a standard retrospective analysis and a retrospective in which the most recent survey data (and associated composition data) are missing. This was accomplished by down-weighting the survey data in the terminal year. Statistics calculated to assess uncertainty were: model estimated CV, Mohn's rho, Ralston sigma, and an additional variance term. Female spawning biomass and overfishing limits were compared for the "with survey" and "without survey" projections from the retrospective peels.

The analysis was conducted with models using annual surveys (EBS Pacific cod, BSAI yellowfin sole, BSAI northern rock sole, BSAI flathead sole, BSAI Greenland turbot, EBS Tanner crab, and EBS snow crab), and for assessment models using biennial surveys (GOA Pacific cod, BSAI Atka mackerel, and BSAI Pacific ocean perch). A key finding of the analysis was that the assessments with the consistent retrospective patterns, EBS snow crab and BSAI Pacific ocean perch, exhibited the greatest uncertainty in stock assessment outputs and management quantities when the most recent survey data were not included in the assessment model. The distribution of CVs for spawning stock biomass showed the biggest differences for POP and Atka mackerel without survey data. Both assessments use biennial survey data and removing a survey creates a greater gap. This was not the case for GOA Pacific cod, which may be because the assessment uses multiple survey indices. In general, the CVs were similar for stocks with annual surveys, with only slight differences noted for northern rock sole and EBS Pacific cod.

The analysis indicates that the magnitude of uncertainty is species specific, dependent on assessment model specification and historical retrospective patterns, and to some degree survey frequency. It was noted that this analysis was reliant on existing survey data and did not take into account the unknown stock dynamics for 2020.

Questions:

Is there any indication of life history or stock trends that contribute to patterns of OFL differences? No, there was no clear pattern for biomass trends (increasing or decreasing).

Is the OFL bias directly related to the retrospective bias rather than missing the survey? Not entirely. The analysis indicated that the magnitude of uncertainty is species specific, dependent on assessment model specification and historical retrospective patterns, and to some degree survey frequency.

Should these statistics, for example the Ralston sigma, be in the risk table? How should these numbers be interpreted for use in the risk table? There was considerable discussion on this topic. It was pointed out that this analysis did not include updated data that would be used in the 2020 assessments. Thus, would the Teams want to require that authors re-do the analysis, or that all authors conduct the analysis?.

The Teams recommend that, to the extent practicable, authors consider these analyses, or analyses like them, for incorporation in the risk table.

The Teams also discussed the possibility of prescribing a formulaic reduction from maxABC based on analyses such as this, but no specific alternatives were suggested and the discussion ended without any further action by the Teams.

Comments:

EBS Pacific cod are relatively unbiased, but, depending on peel, some source of additional variation can be seen.

Lots of stocks are on a biennial cycle and we do not put that in the risk table.

The loss of survey data is an assessment related issue. There are options for including these concerns in the risk table. Preliminary indications are that they do not pose major concerns for the stock assessment.

From the perspective of the model's performance in terms of bias and precision of estimates, whether a survey's absence was anticipated or unanticipated makes no difference.

Noting that the risk table columns are separate, should we consider interactions of columns? That is, if other column(s) in the risk table are of concern, the assessment concern might be increased if a survey is missed. There are interactions with ecosystem conditions. This is an inherent problem for the risk tables, but missing a survey is dependent on what else is going on in the environment and it is particularly relevant for this specific case.

A letter submitted by industry for public comment referred to SSC guidance stating that the risk tables are for capturing uncertainty outside of the assessment; i.e., what the model doesn't capture and isn't quantitatively accounted for.

It is important to look carefully at the pattern of changes with Mohn's rho and the directionality of change.

Grant Thompson presented a summary of an analysis he conducted comparing model biomass coefficients of variation in "on" and "off" survey years. He examined two statistics: the average CV computed separately for "on" years and "off" years, and the ratio of the CV in each "on-year-plus-one" to the CV in the preceding "on" year. This analysis included both Tier 3 and Tier 5 stocks. Results were varied, although, by all measures presented, model biomass CVs for Tier 5 stocks were appreciably higher in "off" years.

Halibut Discard Mortality

The Team approved the Halibut Discard Mortality Rate (DMR) Working Group recommendations for in-season management of BSAI and GOA Groundfish fisheries for 2021-2022.

Adjourn

The Joint Plan Team meeting adjourned at 12:15pm Pacific time.