



Scallop Plan Team REPORT

February 16, 2022

Online Meeting

Committee Members in attendance:

Tyler Jackson, **Chair** (ADF&G Kodiak)
Sarah Rheinsmith, **Coordinator** (NPFMC)
Ryan Burt (ADF&G Kodiak)
Mike Byerly (ADF&G Homer)

Scott Miller (NMFS AKRO Juneau)
Andrew Olson (ADF&G, Douglas)
John Olson (NMFS AKRO Anchorage)
Jie Zheng (ADF&G Juneau)

Members absent:

Others in attendance:

Sara Cleaver (NPFMC) *
Alyssa Hopkins (ADF&G, Kodiak) *
Miranda Westphal (ADF&G, Dutch Harbor)
Alisha Falberg (NOAA, Juneau)
Bo Whiteside (ADF&G, Kodiak)
Katie Palof (ADF&G, Juneau)
Jan Rumble (ADF&G, Homer)
Cassie Whiteside (ADF&G, Kodiak)
Elisa Russ (ADF&G, Homer)
Chris Hinds (ADF&G, Juneau)
Joe Loboy (ADF&G, Homer)
Jim Stone (Alaska Weathervane Scallop Assoc)
Thomas Minnio (F/V Provider, AWS)

Sarah Labelle (NPFMC)
Kevin McNeel (ADF&G, Juneau)
Mark Stichert (ADF&G, Kodiak)
Kendall Henry (ADF&G, Juneau)
Nat Nichols (ADF&G, Kodiak)
Philip Tscherisich (ADF&G, Kodiak)
Wyatt Rhea-Fournier (ADF&G, Homer)
Joe Loboy (ADF&G, Homer)
Jack Erickson (ADF&G, Anchorage)
Chris Russ (ADF&G, Homer)
Chris Siddon (ADF&G, Juneau)
Ben Daly (ADF&G, Kodiak)

*Gave a presentation to the SPT

Administrative

The February 2022 Scallop Plan Team (SPT) meeting was held online via Zoom. All meeting materials and connection information were posted to the SPT eAgenda. The meeting began at 9:00 a.m. on Wednesday, February 16, 2022. The SPT briefly reviewed the agenda and report assignments. The Chair (Tyler Jackson) expressed the need for a member to fill an empty Co-Chair role, but noted it would be appropriate for the Co-Chair to be a Council staff member. The SPT agreed, and the election of a Co-Chair was tabled until the 2023 meeting.

2021 State Dredge and Trawl Survey Results

Mike Byerly presented results from the 2021 scallop dredge survey that occurred in Prince William Sound, West (WKI) and East Kayak Island (EKI) subsections only, and Yakutat (YAK). The state dredge survey has been occurring since 2016 with the objectives of rotating regional beds with preference given to ADF&G management and if they had any concerns stock health concerns for specific scallop beds. The

dredge survey has a target level $CV < 0.2$ to increase the ability to detect changes in stock health through time; however, in 2020 the Scallop Plan Team (SPT, or “Team”) recommended decreasing some precision to get wider spatial coverage and increase consistency among the beds that are surveyed. For 2021, all scallop beds were surveyed in the WKI and EKI subsections and YAK District except for YAK6 due to travel and logistical challenges in covering the remaining survey areas. Increasing spatial coverage did not result in a drastic loss of survey precision for abundance and biomass estimates where CVs ranged from 0.21-0.35 for small scallops (< 100 mm SH), and from 0.13-0.28 for large scallops (≥ 100 mm SH) except for the YAK3 bed which had the highest CV of 0.78 and 0.42 respectively, which is the largest surveyed bed.

Round weight biomass of small scallops (< 100 mm) improved for WKI and EKI and remained at a similar level across YAK beds. The abundance and round weight biomass of large scallops increased for WKI, which was similar to the previous survey for EKI, and decreased in all YAK beds except EK1 and YAK1. Changes in round biomass are being driven by evidence of consistent recruitment in WKI compared to EKI, where YAK recruitment peaked in 2018 and has declined in magnitude in the following years. Meat weight biomass estimates were consistent with round weight estimates, except for EKI, which saw a decrease from the previous survey. The timing of the survey is close to the spawning period of scallops where a mix of gonad conditions are observed but most scallops that are caught are in the filling condition. Reduction in meat weight may be due to the reproductive timing of scallops, however there is no strong indicator for this in the data.

Weak meats were observed to be higher in EKI (12.5%) compared to any other area. The Team discussed the need to collect more quantitative data on weak meats particularly when a management concern is warranted. Weak meats are subjective data that hinge on observer experience. The Team recommends further improving data collection of weak meats for monitoring trends in stock health.

Environmental data collected from a CTD was presented. There was an overall increase in temperature the further east the survey went but it was less than a degree difference. Additionally, measurements of pH exhibited similar trends to temperature, whereas salinity remained consistent.

Tyler Jackson presented the results of the 2021 Westward region large-mesh bottom trawl survey where 372 stations are sampled annually, though only 245 are utilized in the scallop CPUE index as many survey stations are in inside waters where scallop fishing is prohibited or has not recently occurred. The 2021 survey sampled only 203 of these stations due to logistical constraints. The Kodiak Shelikof District was not sampled entirely. Updates were presented for the Kodiak and AK Peninsula only where the overall catch of scallops is small and data are highly variable. Noisy CPUE trends and high uncertainty are likely due to the gear design of the survey as it was not designed for scallops.

2022 State Dredge Survey Plan

Ryan Burt presented details of the 2022 ADF&G dredge survey plan. The survey will take place between April 20 - May 13, 2022. The Request for Quotation process is not fully completed, so the number of survey days is tentative. The survey will sample up to nine beds within the Kamishak District of the Cook Inlet Registration Area (H) and the Northeast District of the Kodiak Registration area (K). A full description of standard survey sampling methods, bed and station descriptions, data management, and data analysis is provided by Burt et al. (2021), found here: <http://www.adfg.alaska.gov/FedAidPDFs/ROP.CF.4K.2021.09.pdf>.

Individual shell heights will be collected by measuring from the base of the umbo to the furthest margin of the bottom valve, which will provide a more consistent measurement, as the bottom valve is less susceptible to damage. The survey will also employ two newly acquired, 8' New Bedford style survey

dredges. New dredges were obtained because 1) the previous dredge was a one-off construction that cannot be easily replicated, and 2) there was no replicate dredge to keep as back-up in the event that the primary dredge was either lost or damaged. Specifications of the new dredges differ from the previously used dredge. ADF&G will conduct a paired tow experiment during the 2022 survey, in which the ‘old’ survey dredge will be towed simultaneously (i.e., on the opposite side of the vessel) with the new dredge at a select number of stations to evaluate differences in fishing power between dredges. During the experiment, estimates of catch in numbers and weight of scallops will be made as well as a complete collection of size composition data.

The 2022 dredge survey will continue to collect vertical profiles of conductivity, temperature, and salinity as during the 2021 dredge survey.

Shell Height Measurement Conversion

Alyssa Hopkins (ADF&G, Kodiak) presented the results from data collected during the 2021 survey to compare shell height measurements of the top and bottom valve of scallops since there was a need to change protocols on shell height measurements. Normally, scallop valves are equal in height, though the top valve is very fragile near the outer margin and is often damaged (i.e., chipped) during dredging, resulting in a variable difference between the bottom and top valve measurement. Historically the ADF&G dredge survey measured a mix of top and bottom valves depending on whether a measuring board or calipers were used, while the observer program has always measured the top valve using calipers. Top valves are retained for aging as annuli are more visible than on bottom shells. While the bottom valve does not directly correspond to age data, it is less fragile and less prone to breakage, so it is assumed that the outer shell margin better represents a scallop’s biological size and is more closely related to gear selectivity. In addition, measuring the bottom valve accommodates the use of measuring boards which improves efficiency and allows for more data collection.

The 2021 dredge survey collected paired shell height measurements from over 500 scallops and estimated a shell height conversion using a linear regression. The intercept coefficient was not significant, resulting in a conversion ratio of 1.02 (bottom: top valve). The results suggest that redefining the shell height from “top valve” to “outer shell margin” is appropriate without using a conversion for survey data, given the mixed history of data collection. There is a plan to continue the data collection during the fishery since those shells may incur more damage on average.

Statewide Fishery Performance

Andrew Olson provided a general overview of statewide scallop management. Cassy Whiteside gave a fishery update for Westward Region (Areas K, M, O, and Q). For Westward Region, GHLS for each district are set preseason along with crab bycatch limits (CBL). The GHLS are informed using the ADF&G dredge survey results, fishery CPUE, and size/age structure. The CBLs are set in each area or district for both king and Tanner crab.

Though Tanner crab abundance is currently up in the Kodiak area, CBLs were not exceeded in the 2021/22 fishery. In the Kodiak Northeast District, the GHL was reduced in the 2018/19 season and into the 2020/21 season due to low abundance. Due to improving fishery performance and signs of good recruitment, the GHL was increased for the 2021/22 season. During this season, CPUE was at an all-time high (130lb meats/dredge hr). Fishing efforts were concentrated in the southern portion of the area, similar to previous years. In the Kodiak Shelikof District, a series of GHL reductions were made beginning in 2012/13 due to poor fishery performance. Following this, as in the Northeast District, fishery performance and signs of recruitment improved and the GHL was increased for the 2020/21 and 2021/22 seasons. Fishery CPUE was at a time series high for both seasons. Two vessels fished the Shelikof

District this past season. In the Kodiak Southwest District, CPUE has been consistent throughout the time series, increasing slightly in the 2021/22 season. One vessel fished the Southwest District in the past season and caught the GHL while staying below the CBLs. Though the Kodiak Southeast District has been open, it has not seen much effort since 2018. Some exploration has occurred over this time, and what little fishing there was in the 2021/22 season was poor.

Fishing in the Alaska Peninsula Area has historically occurred mostly in the Unimak Bight District. The GHL was reduced for the 2019/20 season but there has been no commercial effort in the past few years. Fishery performance has been in decline in the Bristol Bay, Bering Sea Area since the 2014/2015 season. A small GHL is maintained for this area, but no effort has occurred in the past two seasons. The GHL has increased over the time series in the Dutch Harbor Area, but no effort has occurred in the past two seasons.

Elisa Russ provided a fishery update for Central Region Registrations Areas (Areas E and H). The Prince William Sound, East Kayak Subsection has been closed since 2012 due to low abundance in the dredge survey and lack of recruitment. The West Kayak Subsection has had a series of GHL reductions beginning in 2006 until it was closed in 2010 due to decreasing CPUE in the fishery. This subsection remained closed until 2016 when meat biomass reached the threshold and remained open through 2018. Fishery CPUE was relatively low during this period. The fishery was closed for the 2019 and 2020 seasons, but reopened in 2021. Fishery CPUE increased to ~120lb/dredge hr for the 2021/22 season.

Directed scallop fishing only occurs in the Kamishak Bay District for Area H. There are two beds (north and south) in this district. The north bed has experienced many of closures and has been open for 6 of the last 12 seasons. Fishery CPUE has remained low in this bed since the 2002 season and the bed has been closed since 2018 due to low estimates of meat biomass from the dredge survey. The south bed has only had commercial effort in 3 of the 5 seasons that it has been opened. Due to low meat biomass estimated from the dredge survey, low fishery CPUE, and lack of commercial interest, this bed has been closed since 2009.

Andrew provided a fishery update for Southeast Region Area D. Area D has a regulatory GHR from 0 to 285,000 lb of scallop meats. There are no CBL for this area. Fishing effort has been widely distributed throughout the area going back to the 2009/10 season but has decreased in recent years in the most southern beds. The GHL has been 145,000 lb for the past 2 seasons, of which ~90% was caught in the 2020/21 season and ~100% was caught in the 2021/22 season. Since 2009, there has been a lot of variability in fishery CPUE, but overall there has been an increasing trend. Fishery CPUE was up 28.7% in the 2021/22 season. Bycatch of Tanner and red king crab have been relatively low in the fishery, but there has been an increasing trend in Dungeness crab and halibut bycatch over the past few seasons. There has been a fairly wide distribution in the size of scallops (shell height) captured in the fishery over time and there was a larger mode at the smallest sizes observed in the 2021/22 season.

Andrew provided a statewide summary of fishery performance trends and harvest for the two most recent seasons. For the 2020/21 season, all of the GHL was allocated to Areas D and K with a total GHL of 277,500 lbs of meats of which 227,270 lb was caught. The fishery has been and is currently well below the ABC and OFL. There has been a lot of within-year variation in CPUE among management districts over a time series beginning in 2009/10, but on average, CPUE has remained stationary statewide. There was an increase in statewide fishery CPUE in the past season. The species composition of commercial bycatch has been similar temporally from the 2009/10 to 2020/21 seasons and is similar between the eastern and western GOA. Bycatch in the eastern Bering Sea has been composed of higher proportions of commercial crab species than in the GOA. For the 2021/22 season, the statewide GHL was 337,500 lb of meats with a preliminary retained catch of 298,770 lb.

Fishing Effects Modelling

John Olson provided an overview and updates on developments of the fishing effects modeling effort. The presentation was a synopsis of a much larger presentation recently provided to the Council's Scientific and Statistical Committee (SSC). The larger presentation is available on the Scallop Plan Team meeting e-agenda platform.

An updated scallop EFH map was presented. The previous map was originally developed in 2005 and last updated in 2010. John also reviewed the habitat assessment tables that were used to develop the map. In April of 2016, in its five-year EFH review, the SSC commented that delaying updating of weathervane scallop EFH mapping would benefit from the implementation of new statewide surveys and identified some additional research that could be applied to scallop EFH definition.

EFH objectives in the Scallop Fisheries Management Plan were highlighted, specifically the habitat objective (objective 4). The primary objective is to protect, conserve, and enhance adequate quantities of EFH to support scallop populations and maintain a healthy ecosystem. The objective also includes the statement that "it is also important to consider the potential impact of scallop fisheries on other fish and shellfish populations." It was noted work that has been done (2019 Scallop SAFE) to develop species distribution models; however, scallops were not included previously due to a lack of data. Similarly, work done to develop a fishing effects model did not include scallops, as historic catch data was not available at that time. The intent was to include scallop in the modeling effort for the 2022 EFH 5-year review.

The model has developed a total footprint of the scallop fishery of 382 square nautical miles. This footprint is very small in comparison to other fisheries. The presentation provided an overlay of scallop beds and the output of the fishing effects model. This overlay tends to show little impact of fishing effects in designated areas of scallop fishing beds. Some impacts were identified around Kodiak Island, mainly in the Chiniak and Barnabus gullies. Additional areas of relatively high impacts that do not overlap with scallop beds were identified. The model output shows that there may be some localized impacts, but areas where scallops are known to be located do not experience a high level of habit disturbance.

Stock Synthesis 3.30 trial models

Tyler Jackson presented a summary of work on the size and age-structured modeling of Alaska weathervane scallops using the stock synthesis model (v3.30). A full description is found in Section 9 of the 2022 SAFE. The age-structured assessment for scallops began in 2000 for the Kamishak district (KAM), was updated in 2015 using the latest survey information, and was upgraded in 2018 using stock synthesis in order to integrate size and age structures into the modeling framework. Models utilized fishery-dependent and independent data including: fishery catch, fishery CPUE, dredge survey biomass, length and age compositions, and mean length-at age. A model for KSH also utilized trawl survey CUPE in addition to the aforementioned data.

Five model scenarios were evaluated for Kamishak District scallops:

- KAM 22.0: Base model, $M = 0.19 \text{ yr}^{-1}$ and includes fishery catch data from 1983 – 2016, fishery CPUE from 1983 – 2016, and dredge survey data from 1996 – 2018.
- KAM 22.0a: Base model + $M = 0.14 \text{ yr}^{-1}$
- KAM 22.0b: Base model + $M = 0.17 \text{ yr}^{-1}$
- KAM 22.0c: Base model + $M = 0.21 \text{ yr}^{-1}$
- KAM 22.0d: Base model + $M = 0.24 \text{ yr}^{-1}$

Five model scenarios were evaluated for Kodiak Shelikof scallops:

- KSH 22.0: Base model, $M = 0.19 \text{ yr}^{-1}$ and includes fishery catch data from 1993 – 2020, fishery CPUE from 2009– 2020, and dredge survey data from 2016 - 2020.
- KSH 22.1: Base model + fishery CPUE data 1993 – 2008
- KSH 22.1a: KSH 22.1 + $M = 0.14 \text{ yr}^{-1}$
- KSH 22.1b: KSH 22.1 + $M = 0.24 \text{ yr}^{-1}$
- KSH 22.2: KSH 22.1 + trawl survey CPUE from 1992 - 2020 and trawl survey shell height compositions from 1999 – 2020.

Due to the lack of data for standardization, nominal fishery CPUE values were used for the Kamishak and pre-2009 seasons of Kodiak Shelikof. Kodiak Shelikof fishery CPUE estimates from 2009 to 2020 were standardized using the general additive model structure and specified as a separate fleet from pre-2009 season data.

Generally, the dredge survey biomass and fishery CPUE varied greatly over time, and the base models fit dredge survey biomass and fishery CPUE for the Kodiak Shelikof stock better than for the Kamishak stock, likely due to less dredge survey data for the Kodiak Shelikof stock. Considering the variations of data, the models fit the dredge survey biomass and fishery CPUE reasonably well. The addition of trawl survey data resulted in a poorer overall fit to the KSH model. Although the models tend to estimate higher proportions of large shell height groups and large ages than the survey and fishery data for both stocks, the models fit the composition data moderately well.

Shell height was very similar for the fishery whereas selectivity in the dredge survey differed among scenarios, increasing with M . KAM model scenario suggested very low selectivity for the dredge survey, though estimates were likely confounded by catchability that was not correctly specified to the model.

Higher M values result in high biomass estimates (to an unrealistic scale) and higher likelihood values. The retrospective analysis for spawning biomass seems to be reasonable for the Kamishak stock with a Mohn's rho value of -0.139, but badly for the Kodiak Shelikof stock with a Mohn's rho value of 0.972.

Overall, SS appears to be a viable tool for the scallop assessment however, there are likely model mis-specifications that need to be investigated and refined. Further work is needed to refine an appropriate based value of M , recover pre-2009 observer data, estimate bycatch discard mortality, and improve fishery CPUE standardization. The trawl survey is specifically designed for commercial crab species and does not necessarily overlap well with scallop beds. More research is needed to examine trawl survey data before being re-incorporated into stock assessment models.

The Team recommends working on the following areas for the development of an integrated stock assessment model:

1. Examining retrospective results of the Kodiak Shelikof stock in detail to find out why the spawning biomass estimates in terminal years spiked up greatly and changing the model specifications as necessary to reduce retrospective biases.
2. Improving the selectivity/catchability estimates of dredge surveys for the Kamishak stock. The current estimates have only a part of the logistic curve within the shell height range.
3. Recovering and adding complete bycatch data to the models.
4. Improving the fishery CPUE standardization, which may be used for the current fishery management (GHL settings) as well as future model development. It seems that fishing locations have a big impact on CPUE values. Fishing spatial locations should be incorporated into the fishery CPUE standardization.
5. Comparing model assessments by Stock Synthesis and GMACS. Stock Synthesis uses both age and size data while GMACS uses only size data. Since size data are available for all scallop beds, GMACS may be used for beds that age data are very limited or not available.

The Team highly commended Tyler for this work and discussed what a realistic timeline would look like to refine the SS model and extend it to other regions, considering the limited time and resources available to scallop assessment and the amount of data required – at least several years, but potentially a decade. Some areas also have limited age data and an informed definition of scallop stocks in Alaska is lacking. For OFL settings, weathervane scallops in Alaska are considered as a single stock, while the state manages the scallop fishery by district. The current model results could inform discrete GHGs since the models regard a bed as a stock, but much work is needed to develop a statewide model to inform an OFL.

The Team recommended Tyler explore more data-limited options as an intermediate step to an integrated age and size-structured assessment that can be applied more broadly in a shorter time frame.

Socioeconomic Considerations

Scott Miller (NMFS SFD) provided an overview of the socioeconomic considerations appendix, including scallop market conditions in 2021. Scott noted that scallop harvest tables will be finalized for the final SAFE document. Total 2021 landings (298,755 lbs) increased from a near-historical low in 2020 and prices were up a preliminary 6% at 11.06/lb. This is an assumed 6% increase, based on the Atlantic Sea scallop increase. The total value of landings also increased from 2.4 to 3.3 million dollars.

Data on Atlantic Sea scallops were presented to exhibit the differences in scale between scallop harvest in our region and the East Coast fishery. There was a dramatic increase in East Coast imports following a significant reduction due to tariffs and supply chain interruptions during the Covid-19 pandemic in 2020.

In 2022, there was no known change in cooperative membership or LLP ownership shares, although one LLP permit was transferred to the East Coast. Scott detailed upcoming changes to the socioeconomic appendices based on SSC recommendations from 2018, 2019, and 2020, and noted that there may be a possibility to develop a fishery report card for scallop if the SSC chooses to move forward with this option. In addressing these recommendations, Scott expressed concern over updates involving extensive data from communities due to limited data availability and data confidentiality agreements.

In the past, the SSC has recommended the authors illustrate changes that have resulted in the lack of sustained participation in this fishery (sustained community participation falls under National Standard 8). It is clear that consolidation has occurred in this fishery, and Steve plans to present a regulatory timeline that illustrates historical changes to the management structure in the fishery. Additionally, while it could not be addressed in 2020, there are plans to look back to the original analysis for the LLP and the Council's rationale and document the Council's intent of consolidation in dealing with the race for fish and overcapitalization in the fishery.

The Team expressed that prioritization of SSC recommendations is a major component moving forward with socioeconomic issues. The Team added that while the historical data add context, the most value is in contemporary issues and data that reflect current management of the fishery and that those could be prioritized ahead of historical ones. The Team emphasized that the Scallop SAFE is hindered by a lack of data collection being conducted and data availability. Team efforts will continue to move forward with ASA models and are hopeful that "big picture" elements of the fishery are considered moving forward with further socioeconomic analyses.

Stock Status, OFL

The SPT recommended maintaining the stock status, OFL and ABC as described in the scallop FMP. The stock status remains "unknown", yet since total removals were only 19.9% of the OFL during the 2020/21

it is assumed overfishing did not occur. Per the FMP, OFL will be set equal to OY (1.284 million lb shucked meats; 582 t) and the ABC will be set at 1.156 million lb (524 t) consistent with the maximum ABC control rule (90% of the OFL).

Research Priorities

Sara Cleaver (Council staff) updated the Team on changes to the research priorities process and provided the Team with the most recent list of scallop priorities (coming out of the Team's February 2021 meeting). Sara highlighted that the last Council review of research priorities was at the 2021 NPFMC April meeting, and the SPT will undergo the formal research priorities process in 2024. The Plan Teams can review provide updates to the projects on the research priorities list, but are not required to do so annually. During the next review, Plan Teams will select their top three research priorities and provide an abstract of how the research needs to address NPFMC objectives for the specific stock. The research priorities subgroup of the SCC is working with Council staff to continue to refine the process between now and 2024. Specific methods by which public opinion is incorporated into the Plan Team review of research priorities are still being considered. Sara listed the current research priorities for scallops and noted that they could be updated should anyone have new information. Alyssa Hopkins (ADF&G, Kodiak) noted that research priority 362 (Monitoring potential water quality impacts on scallops) is underway as the ADF&G dredge survey now collects oceanographic information from vertical CTD casts. Sara invited anyone with other updates to follow up with her for tracking purposes as needed.

Review/Respond to SSC comments

Scallop Plan Team discussion of SSC comments is provided in the SAFE report.

SPT Meeting 2023

The next Scallop Plan team meeting has been tentatively scheduled for February 22, 2023, in Kodiak.