



Scallop Plan Team REPORT

March 6, 2023, Kodiak Fisheries Research Center

Committee Members in attendance:

Tyler Jackson (ADF&G, Co-chair)
Sarah Rheinsmith (NPFMC, Co-chair)
Skylar Bayer (NMFS)
Ryan Burt (ADF&G)

Mike Byerly (ADF&G) *via zoom*
Scott Miller (NMFS)
Andrew Olson (ADF&G)

Others in attendance:

Ben Daly (ADF&G)
Julia Dissen (ADF&G)
Alisha Falberg (NMFS)
Kendall Henry (ADF&G)
Alyssa Hopkins (ADF&G) **
Bobbie Minio (F/V Provider)
Tom Minio (F/V Provider)
Katie Palof (ADF&G)
Jan Rumble (ADF&G) **

Elisa Russ (ADF&G)
Chris Russ (ADF&G)
Mark Stichert (ADF&G)
Jim Stone (AWS)
Miranda Westphal (ADF&G)
Bo Whiteside (ADF&G)
Cassie Whiteside (ADF&G) **
Molly Zaleski (NMFS)
** indicates presenter

Introduction

The 2023 Scallop Plan Team (SPT) meeting was held on March 6, 2023, in Kodiak, AK, and contained a hybrid component online via Zoom. All meeting materials and connection information were posted to the SPT [eAgenda](#). The meeting began at 9:00 a.m., and the SPT began with introductions and briefly reviewed the agenda and minutes report assignments. The Chair (Tyler Jackson) expressed the need for a member to fill an empty Co-Chair and nominated Sarah Rheinsmith (NPFMC). The SPT unanimously agreed with the nomination.

2022 State Dredge Survey Results

Alyssa Hopkins began by giving a brief overview of the recent history (since 2016) of the dredge survey program. ADF&G expanded the original dredge survey from the Cook Inlet and Prince William Sound registration areas to include the Kodiak and Yakutat registration areas. Survey locations have rotated biennially between these areas, and the 2022 survey took place between April 20 and May 12 within the Kodiak Northeast (KNE) and Kodiak Shelikof (KSH) districts of the Kodiak Registration Area and the Kamishak (KAM) district of the Cook Inlet Registration Area. From a total of 506 active stations, 167 were sampled, targeting a 33% sampling rate across all districts – 94 from KNE, 44 from KSH, and 29 from KAM.

She then showed a slide of bed locations, overlying survey grids, and haul track lines of each station sampled in 2022. Four beds in these three districts that have been sampled in previous dredge surveys were not included due to the low frequency with which they are targeted during the commercial fishery (KNE4, KSH2, KSH3, KAMS). The survey uses an 8-foot wide New Bedford style dredge, with a ring bag consisting of 4-inch diameter rings that is fit with a 1.5-inch mesh liner to retain small scallops and the coincident epi-benthic community.

Two new identical survey dredges were purchased in 2021. These dredges are the same design used in Atlantic sea scallop dredge surveys and were built by East Coast Fabrication in New Bedford, MA. This company not only participated in the research process, they now build these dredges commercially for scallop research groups across the entire eastern seaboard. To properly integrate these dredges into the survey, a study is underway to estimate a fishing power correction factor to ensure the catch from past and future surveys will be comparable. This is being executed in three phases to compare the catch between the new and old dredges while maintaining the integrity of the existing survey. During the 2022 survey, Phase 1 was successfully completed by establishing a fishing protocol for the new dredges. It was determined the new dredges fished best using the same conditions used to fish the old dredge but by removing the wheels along the bottom of the dredge. For both dredges, a Notus dredgemaster sensor is used to maintain a 12-degree dredge towing angle at a speed of ~4knots.

Phase 2 has now begun and will continue into the 2023 survey. During this phase, these two dredges will be fished simultaneously on parallel towpaths, one on each side of the vessel. The old dredge will continue to be the primary sampling dredge, fishing the new dredge in tandem after approximately every 5th haul. Catch between the dredges is compared using numbers and round weight of scallops captured and a size frequency subsample. Scallop clappers and predators are also documented.

Power analysis suggested that 30 tows would provide adequate statistical power for detecting large differences among dredges (i.e., $FPD \leq 0.5$; old dredge CPUE: new dredge CPUE), though a larger sample size may be necessary to detect smaller differences. Comparison tows are a focus of the 2023 survey, but at present, it seems unlikely that additional survey days could be allocated to this project for the 2024 season unless additional funding was acquired. Phase 3 of the transition would involve the new dredge becoming the primary sampling gear, with a fishing power correction applied to time series abundance estimates.

She then moved on to describe scallop abundance and biomass results from the 2022 survey. Relative to previous surveys, the overall abundance and biomass of large scallops (> 100mm shell height) increased in all district-level summaries. The abundance and round weight biomass of small scallops (< 100mm shell height) also increased among all districts.

Regarding scallop size composition, she first highlighted a change in scallop shell height measurement methodology that came to fruition on the 2022 survey which resulted from a multiyear effort to redefine shell height. After executing a shell height measurement study during the 2021 survey, a new definition of shell height was adopted: “The straight-line distance from the umbo to the outer shell margin, perpendicular to the hinge. The outer shell margin is defined as the part of the shell margin farthest away from the hinge and could be either the top or bottom valve”. This allowed the transition away from using calipers to measure the top shell (previous definition of shell height) to using measuring boards designed specifically for scallops. In 2022, size frequency sample size more than doubled which increased the resolution of size compositions. There are a few prominent modes in both large and small scallop size classes that appeared to drive increases in abundance and biomass.

Shell height and meat weight relationships were similar to that observed during the 2020 dredge survey in the KNE and KSH districts but meat weight at size was considerably larger in the KAM district during the 2019 survey in comparison to the 2018 and 2022 surveys. It should be noted, however, that the 2019 KAM district survey occurred in September/October (after the spawning season) and meat weights are known to fluctuate as a function of spawn timing.

Gonad condition tended to be more full or progressing towards spawning, in the KAM district than in either the KNE or KSH districts. In both Kodiak districts, gonad condition showed a similar pattern between the 2020 and 2022 surveys. In Kamishak, gonad conditions were clearly in a post-spawn gonad condition in the 2019 survey compared to the 2022 survey, but as mentioned before, the 2019 survey was conducted much later in the year. Spawn timing has a great deal of influence on a variety of biological metrics, so care is being taken to execute this survey as close to the April/May timing as possible so meat

weight and gonad condition information will be comparable. The formal procedure regarding survey timing has now been clearly documented and will be written into the next Regional Operation Plan.

Since 2016 shell worm and mud blister infections have been recorded as a potential indicator of stress. Historically, the severity of the infection was defined by its' percent coverage over the top valve. At the start of the 2022 survey, the definitions for each grade of infection were modified to include conditions existing on either the top or bottom valves and using metrics that align more closely with its pathological progression rather than a subjective interpretation of the infection's size. The names of these two pathogen categories were also updated; "shell worms" has changed to "shell borers" to encompass all shell-boring organisms and "mud blisters" has changed to "shell blisters" to better reflect their composition throughout the infection. In early stages, blisters present as thin-layered, discolored proteins called conchiolin, and later during advanced stages, becoming hard, raised mounds filled with mucus, rather than mud. The new definitions for both categories range from none, to mild, moderate, and advanced. The specific metrics for each category is documented in detail in the written survey report that is currently in progress. Regarding large scallops, overall rates of infection from both shell borers and shell blisters were low in Kodiak districts, with 99% of these scallops experiencing either mild or no infections at all. In Kamishak however, rates were significantly higher, with 74% of large scallops experiencing mild to no infections, and up to 14% experiencing advanced shell boring infections that seriously compromised shell integrity. The same is also true for shell blisters in Kamishak, with 10% experiencing moderate to advanced infections. Regarding small scallops, there were no animals experiencing more than a mild infection in either Kodiak or Kamishak districts. While not visualized on the slides, it's also worth noting that the percent occurrence of weak meats remains at low levels in the Kodiak districts (<3%) but is up to 8% in the Kamishak district. Given the higher incidence of shell blisters and borers in Kamishak, it's likely the increase in weak meat occurrences is related in some way to the stress caused by these infections.

The dredge survey has also begun building a complimentary environmental data set with the hope that adding these times series to our survey data, we can begin to add context to scallop biological responses against a constantly changing backdrop of ocean conditions. The survey has acquired a CTD and pH logger and vertical temperature, salinity, and pH profiles were conducted at 35 stations in 2022. A slide from the 2022 survey presentation showed the average temperature and salinity at the max depth of each profile, the upper and lower range of max depths sampled across each bed, and the average pH of the water column.

Upcoming plans for the 2023 survey include sampling Prince William Sound and Yakutat registration areas scallop beds, continuing with Phase 2 of the fishing power study, and continuing environmental data collection.

Statewide Fishery Performance

Cassie Whiteside, Jam Rumble and Andrew Olsen reported on the statewide fishery performance for each of their regions.

Westward Region presented by Cassie Whiteside

The Westward region includes Kodiak (K), Alaska Peninsula (M), Dutch Harbor (O), and Bering Sea (Q) registration areas, with large portions closed to scallop fishing. Guideline Harvest Limits (GHLs) and Crab Bycatch Limits (CBLs) are set preseason. GHLs are set using fishery catch per unit effort (CPUE), survey results, and size and age structure. CBLs are set using historical bycatch rate in the fishery, survey estimated Tanner crab abundance, and MSST using a Tier 3 approach for the Bering Sea. In season management can close the fishery if harvest achieves GHL, crab bycatch exceeds the CBL, or if the fishery performs below minimum performance standards of CPUE.

In the Kodiak Northeast District fishery performance is improving with harvest rising to 40,000 lb. CPUE also rose every season since 2016 and CPUE was a record high of 131 lb of scallop meats per dredge hour

in the 2022/23 season. Effort distribution in 2022-23 was similar to previous years with most effort in the southern portion of the district. The GHL was achieved with 8 percent of the tanner crab CBL used.

The Kodiak Shelikof District, also saw increasing performance since 2016 and a record high CPUE of 111 lb / dredge hr this last season and new CPUE records set consecutively in the last three seasons. The fishery achieved its 100,000 GHL. Effort distribution for the Shelikof district has been consistent over the last several years and 27 percent of the tanner crab CBL was used.

In the Southwest Kodiak District the GHL has remained at 35,000 lb for the past four years. GHL has been achieved in all but the 2020/21 season. Fishery performance is stable but did drop to 44 lb / dredge hr in 2020/21 and has since risen to a new time series high of 68 lb / dredge hr in 2022/23. The distribution of effort has been consistent over the years and tends to occur in two fairly distinct locations with a break between the beds. Red king crab bycatch was zero last season, but 36 percent of the Tanner crab CBL was used. The fishery was closed when GHL was achieved.

The Kodiak Southeast District was reopened in 2018/19 with a GHL of 15,000 lb. The 2018/19 harvest was 470 lb with 60 tows but a CPUE of just 8 lb / dredge hr. This shows that there was lots of prospecting for very little harvest. There has been no effort in the district since the 2018/19 season.

The Alaska Peninsula District fishery occurs within Unimak Bight. The GHL was lowered in 2020, and since 2020, there has been no effort in the district until the 2022/23 season. The 2022/23 GHL (7,500 lb) was achieved with a CPUE of 35 lb / dredge hr and 24% of Tanner crab CBL was used. Effort this season was most similar to the 2018/19 season effort and no effort occurred outside of Unimak Bight.

The fishery in the Bering Sea registration area has been in decline since 2016, and there was no effort in the 2019/2020 or 2020/21 seasons. The 2022/23 GHL of 7,500 lb was achieved in the 2022/23 season with a CPUE of 23 lb / dredge hr. Effort distribution has remained consistent in the area over the time series.

The Dutch Harbor registration area did not have effort in 2020/21. The Pacific side was reopened in 2021/22, but all effort was on the Bering Sea side. The 2022/23 GHL was 10,000 lb; however, high crab bycatch closed the fishery at 2,600 lb with a CPUE of 20 lb / dredge hr. The fishery was closed due to exceeding the Tanner crab CBL. The effort distribution this season is most similar to the 2019/20 season.

Central Region (Areas H and E) presented by Jan Rumble

The Cook Inlet registration area, Kamishak District North and South Beds are fished between August 15 and October 31 with a single 6-foot dredge, bringing in between 10 and 20,000 lbs of scallop which can be delivered live. Bycatch limits were set by the dredge survey to be 0.5% for Tanner crab and 30 red king crabs. Observers are not required on every trip, but daily reporting and logbooks are required. The north bed was last harvested in 2016, the south bed has been closed since 2009 and both beds have been closed since 2017. In 2018 both North and South beds had the lowest levels in the history of the ADF&G survey and were closed. In 2019, the north bed showed continued low abundance and was closed.

The Prince Williams Sound Outside District, West and East Kayak Subsections are open from July 1 through February 15 using statewide regulation gear and a guideline harvest range (GHR) of 0-50,000 lb of shucked meats. Crab bycatch limit is set to 0.5% Tanner crabs. Prince Williams Sound was last surveyed in 2021, and West Kayak was open for the 2021/22 and 2022/23 seasons. The GHL was met in both those seasons. East Kayak has been closed for 11 years, from 2021-2023 and the CPUE has varied a lot prior to the closure.

Southeast Region (Area D - Yakutat) presented by Andrew Olsen

The GHR for the Southeast Region is 0 to 285,000 lb shucked scallop meats, with the season lasting from July 1 to February 15 and there are no crab bycatch limits for this area. In the 2021/22 season, 145,000 lbs of scallop meats were landed, increasing the CPUE from previous years. In the 2022/23 season, the GHL remained the same as the previous season and the CPUE also increased.

Statewide Harvest - 2021/22

The Yakutat and Kodiak regions had the most effort and West Kayak subsection Areas had the lowest effort. There was no effort in Areas M, O, and Q. Overall, the harvest has been stable during the last few years, increasing a little bit in the most recent fishing seasons. The CPUE shows some increase in certain areas over others, but overall, it's a positive trend, however, these don't include the most recent season (2022/23). Tyler noted that it was good to see fishing effort in the areas M, O, and Q during the 2022/23 season, as these areas rely solely on fishery-dependent information since the survey is unlikely to reach them in the foreseeable future.

Retained- Not-Landed meats

Tyler Jackson presented a summary of the work he has produced on estimating retained-not-landed (RNL) meats in the scallop fishery to gain Plan Team feedback on whether the methodology is sound and if the estimates are a realistic representation. RNL meats are the meats of scallops which are shucked as part of the retained catch, but subsequently discarded due to the meat not being marketable (poor color, texture), being damaged during shucking, or otherwise lost during processing RNL do not count against the GHM and constitute a source of unquantified fishing mortality. There have been no attempts to estimate RNL meats to date; however, observer data such as shell height, meat condition, and shell age may aid in estimating RNL meats. Since RNL meats are directly related to market quality, an index of RNL meats may provide insight to the portion of commercially viable biomass.

Tyler detailed the methods for estimating RNL meats which involved: 1) estimating total meats caught in the fishery and 2) subtracting landed meats from total meats. Estimates of total meats caught could be estimated by either scaling the total meats per retained basket to the total number of baskets in the fishery, or by scaling the total meats per dredge hour by the total dredge hours in the fishery. Both estimation methods resulted in a similar trend, though estimates using dredge hours tended to be greater. Comments from Tom Minio (F/V Provider) and Jim Stone (AWS) suggested that this scale of estimates (up to tens of thousands of pounds in some districts/seasons) did not appear realistic. RNL meat trends corresponded with observer collected data on the prevalence of weak meats in some districts/seasons, though Ryan Burt commented on the uncertainty in observer collected weak meat data given the relatively small sample size.

It is important to note that the estimates of RNL meats are not currently included in managing the fishery, such as setting guideline harvest levels or estimating total fishery removals. The plan team and industry indicated that the estimated RNL meats may be inflated, and ultimately not an accurate representation of RNL meats in the fishery. Tyler noted he will revisit his methodology, and report back to the Plan Team once he has a better representation of RNL meats within the fishery.

The Plan Team noted that it may be useful for observers to potentially collect targeted RNL meat data if there is bandwidth within the observer program to allow for such sampling. Another approach may be to compare meat size category (number of scallop meats per pound) data reported on fish tickets to the number of scallops counted on deck by observers within the retained baskets of scallops.

Kodiak Shelikof Stock Synthesis Analysis

Tyler Jackson presented updates to the catch per unit effort (CPUE) standardization index and stock synthesis evaluation for the Kodiak Shelikof scallop bed. The current CPUE standardization employs a general additive model (GAM) that incorporates multiple variables (e.g., depth, bed, longitude, month, vessel, and season). Tyler noted that the current model selection criteria (AIC) likely result in an overfit model, since any addition seems to improve AIC. Instead, Tyler proposed following CPUE standardization methods used for Aleutian Islands golden king crab (Siddeek et al. 2016) which utilizes a general linear model (GLM) that includes smoothed terms for continuous variables with fixed degrees of freedom, and employs model selection criteria that include both AIC and an approximate R^2 statistic. Tyler evaluated both gamma and log normal error distributions and concluded that gamma distributed

models provided marginally better performance based on residual diagnostics. The final model carried forward for use in Stock Synthesis standardized retained catch CPUE as a function of depth, total dredge width, month, and season.

Tyler explained that development of a scallop population dynamic model using Stock Synthesis will continue focusing on Kodiak Shelikof District since it appears to consist of a single continuous population which has the longest Statewide dredge survey history. Model structure was the same as previous models, though Tyler noted that age data are input as length-conditional age compositions, which is consistent with the stratified sampling design by which age data are collected. Natural mortality was fixed at 0.19 which was based on analyses completed in 2022. There was a comment that $M = 0.20$ in the FMP and Tyler mentioned that he plans on completing a more detailed analysis of an appropriate natural mortality rate in the future.

Tyler evaluated six model scenarios, including the best model from the 2022 analysis (22.1a). All 23.x models included discard mortality. Model descriptions are on page 2 of the 2023 SAFE: Appendix B.

The time-series trajectories of estimated spawning stock biomass (SSB) generally followed similar trends but had large differences in scale. Fits from all the models to the early (1992-2008) and late (2009-2022) fishery CPUE captured general trends in the data but diverged in periods. Models 23.0a1 and 23.3 showed a greater lack of fit to fishery CPUE. All models captured the general trend in the dredge survey index. Fits to all fishery size composition data were generally good and similar for all models. Tyler indicated that all models appeared to overestimate the proportion of scallop in the largest size classes, suggesting some misspecification of mortality of larger scallops. For all models, fits to the survey size composition data were poor from 2016-2018 and improved for the 2020 and 2022 surveys. Tyler noted that the survey was still somewhat under development in the early years, and thus those size compositions may be suspect. Fishery selectivity was similar among all models and appeared appropriate - though maybe higher than expected. On the other hand, estimates of dredge survey selectivity were problematic (either remaining very low or going to 1 across all size sizes). Tyler noted that selectivity should be fairly high given the 38 mm mesh liner used within the survey dredge, though probably not truly full as model 23.3 assumed. Estimated dredge survey selectivity had a large impact on the scale of recruitment and SSB.

The author recommended carrying forward models 23.0a3 and 23.3 based on their overall fit to the data and retrospective analysis. Tyler did note, however, that 23.3 had an issue fitting to fishery CPUE data in comparison to other models. Tyler also noted that the next round of model development would explore estimating dredge survey catchability, which has been assumed to be $Q = 1$ within the model and constant across years, while a dredge efficiency coefficient of 0.83 is applied outside the model. The current dredge efficiency was estimated using a different survey dredge configuration, on a different vessel, in a different region. Lastly, Tyler emphasized the need for recovery of 1992 - 2008 fishery data to better inform the CPUE index and size compositions supplied to the model. The Plan Team appreciates the author's continued work and supports the author's model recommendations for further exploration and development.

Socioeconomic considerations

Scott Miller provided a socioeconomic update for the 2023 SAFE. He noted that we are in our executive summary year, so most of the socioeconomic information remains largely the same as reported in the 2022 SAFE. Scott detailed Limited License Program (LLP) transfer information, and two known LLPs were transferred in 2022: LLP 004 was transferred twice, ultimately ending with ownership by Provider Fisheries LLC, a cooperative member. LLP 003 was transferred from Atlantic Capes Fisheries Inc. to Arctic hunter LLC, a cooperative member. There was no known change in cooperative membership or affiliated LLP ownership shares in 2022. Co-op members own three vessels that are qualified to fish their LLPs: The Polar Sea, the Provider, and the Ocean Hunter. The Provider is the only vessel used to fish scallops exclusively. Only two cooperative vessels fished during both the 2021/22 and 2022/23 seasons.

In 2022, compared to 2021, pounds of scallop meats landed increased by 10.16%, price per pound increased by 22.6%, value increased by 35.05%, and potential crew shares increased from \$57,824 to \$78,094. During the 2022/23 season, 15 landings were completed in the ports of Dutch Harbor, Kodiak, Yakutat, and one unknown port. Scott concluded his presentation by detailing the revisions to be completed for the next full SAFE iteration and detailing the response to SSC comments from the 2022 SAFE review.

EFH Update

Sarah Rheinsmith presented an update on the 2023 essential fish habitat EFH 5-year review and highlighted the eight main components included in the 5-year review, detailing the updated information incorporated into EFH for 5 FMPs, excluding Scallop and Salmon. Additionally, Sarah detailed the current essential fish habitat (EFH) definitions for scallops, including descriptions and identification, fishing and non-fishing effects, conservation and enhancement, prey species, habitat areas of concern, and EFH research priorities. The scallop EFH definition is based on late juveniles and adults, and information is lacking on early juveniles, larvae, and eggs. There is currently no SDM to provide more information for scallop maps. Sarah requested suggestions from the SPT on other data sources that could be included in the new analysis. The plan team discussed information that may be useful in improving EFH definitions. Such as eggs and larvae are often in the water column, and to improve our understanding of where they might be, is to look to oceanographic modeling to determine a source bed and what might be important spawning grounds.

The plan team noted that it might be helpful to have an EFH update at the next SPT meeting review methodology in improving scallop EFH definitions for the next EFH 5-year review.

Stock Status, OFL

Tyler Jackson provided an overview of total fishery removals from the 2021/22 and 2022/23 seasons relative to the ABC and OFL. Briefly, estimated total fishing removals (retained and discarded) for the 2021/22 and 2022/23 seasons were 311,978 lb (141.5 t) and 345,690 lb (156.8t) of shucked meats, respectively (Table 1). Estimates from both seasons were less than 30% of the ABC and OFL. Therefore, overfishing did not occur.

The plan team recommended that 2023/24 harvest specifications remain consistent with the current status quo. Specifically, OFL should remain at 1.284 million lb (582 t) shucked meats, and ABC should continue to follow the ABC control rule (i.e., 90% of OFL), which equates to 1.156 million lb (524 t). The SPT acknowledged that it would be worthwhile to evaluate alternative reference time series, which may be more representative of current stock trends, though it would be best to consider such alternatives in a full-SAFE year.

FMP Amendment Analysis

Sarah Rheinsmith presented the progress of a proposed amendment to allow flexibility in the harvest specification process in the scallop FMP. Currently, the FMP requires that the SPT produce an annual SAFE report, though there has not been any change to harvest specifications as prescribed by the FMP since Amendment 13 (2012). Subsequent scallop harvests have not exceeded or approached reference points since they were established.

The draft amendment proposes two alternatives: 1) no action; status quo, or 2) to revise the scallop FMP to remove language regarding requirements for annual specifications. Sarah explained the effects that each alternative would have on the annual scallop assessment cycle. Naturally, continuing with the status quo would result in no change to the assessment timing or review. A revision would grant the Council the ability to modify the assessment cycle as it sees fit, potentially setting multi-year harvest specifications. Multi-year harvest specifications are used in other data-deficient stocks such as Pribilof Islands golden king crab and Western Aleutian Island red king crab, which set their specification on a triennial basis. The

SPT suggested that a biennial or triennial cycle would be a reasonable time frame for setting harvest specifications and that a full SAFE would be produced in those years, while an executive summary could be produced in ‘off’ years (i.e., similar to the SAFE reporting process in place since 2021). If in the future, the Council determined it was necessary to return to an annual basis due to the development of more informative stock assessment methods or conservation concerns; they could request to do so without an additional FMP amendment.

Sarah highlighted excerpts in the FMP that would need to be revised by removing the specificity of reporting timing. The SPT supported the proposed amendment and noted that a change in the timing of the assessment cycle may also elicit a change in meeting format (i.e., in-person vs. remote meetings could be held every other year in a biennial cycle).

Review/Respond to SSC comments

Tyler Jackson reviewed responses to comments on the scallop SAFE from the 2022 April SSC meeting. Responses are detailed in Appendix D of the 2023 SAFE.

Future Planning

The 2024 SPT meeting will be held on March 5, 2024, in Kodiak, AK.