



Scallop Plan Team

REPORT

March 5, 2024

Kodiak, AK

Plan Team Members in attendance:

Tyler Jackson (ADF&G, Co-chair)
Sarah Rheinsmith (NPFMC, Co-chair)
Mike Byerly (ADF&G) *via zoom*

Ryan Burt (ADF&G)
Scott Miller (NMFS-SF) *via zoom*
Skylar Bayer (NMFS-HCD)

Introductions

The 2024 Scallop Plan Team (SPT) meeting was held on March 5, 2024, 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 by commending Mike Byerly, SPT member, for his contributions and efforts to the SPT as he is retiring this spring.

2023 State Dredge Survey Results

Alyssa Hopkins presented results from the 2023 scallop dredge survey that occurred in the Prince William Sound and Yakutat registration areas. She began by giving a brief history of weathervane scallop surveys, described some specifics of dredge survey catch sampling what kinds of data are collected, noted that during this survey the data collection portion of the fishing power study was completed.

The 2023 survey took place in the Eastern GOA between April 24 and May 15 aboard the F/V Provider. The sampling rate was based on bed specific CVs observed in previous surveys and varied from 25% to 50%.

The survey generates scallop abundance and round weight biomass information by size category, size compositions, meat weight biomass, shell height/meat weight, gonad condition, parasites, and meat conditions. Trends in abundance showed agreement with trends in biomass. Kayak Island beds saw a slight decrease while Yakutat showed a mix of trends with an overall increase. The abundance and round weight biomass of small scallops, in contrast, showed an overall decrease, except for the WK1 bed. Alyssa noted that the continued presence of small scallops in size compositions of WKI and EKI is encouraging. Size composition of YAK beds were missing prominent modes less than 100 mm that have suggested stable recruitment in previous surveys.

Meat weight biomass and round weight biomass trends mirrored each other, except for YAK1. Shell height and meat weight relationships were generally lower than in previous years. Gonad

condition appeared to be in similar stages among beds in the 2023 survey, but less full than in previous survey years. Historically, shell borer and shell blister severity was defined by its percent coverage over the top valve but in 2022 the definitions for each grade of infection were modified and redefined using metrics that align more closely with its pathological progression. WK1 had the lowest infection rates as well as low percentages of weak meats. The survey made 23 CTD casts across all beds. Alyssa is working on best practices for storing and visualizing survey CTD data. This is the second survey with collection of environmental data. The 2024 survey will occur in May in the Kodiak Shelikof, Kodiak Northeast and Kamishak Bay Districts.

Alex Reich then presented results of the fishing power study that was conducted to compare the legacy survey dredge (i.e. 'Homer' dredge) with the new dredge (i.e. 'Kodiak' dredge) purchased in 2021. This study was conducted to determine a fishing power correction (FPC) factor to be applied to survey abundance estimates before 2023. Forty eight paired tows (10 in 2022, 38 in 2023) were made on 7 different scallop beds in 3 different fishery management areas. A complicating factor in the study was the need for repairs to be made to the Homer dredge during the 2023 survey.

Data analysis included analyzing large and small scallops separately, removing paired tows with zero catch, calculating CPUE (in numbers of scallops) for each tow, randomized block ANOVA and mean square error (MSE) simulation to compare the error of the corrected and uncorrected CPUE's. Results suggested that applying a fishing power correction factor is not warranted due to inconsistency of results pre- and post-repair of the Homer dredge. Alex also explained that statistical power to detect fishing power differences was very small when considering data stratified as pre- and post-repair, as sample size was approximately half. It is likely that fishing power of the Homer dredge from 2016-2022 was not consistent, as the dredge was not repaired to standardized specifications before each survey, as the Kodiak dredge will be. Catch size distribution comparison (Kolmogorov-Smirnov test) was also performed and showed very similar distributions between the two dredges.

Statewide Fishery Performance

ADF&G area managers gave an update on scallop fisheries in each region. Joe Stratman presented on Area D (Yakutat). The guideline harvest range (GHR) for Area D is 0 – 285,000 lb shucked meat and the 2023/24 guideline harvest limit (GHL) was set at 145,000 lb shucked meats. Two vessels retained 145,270 lb and catch per unit effort (CPUE) continued to increase since the 2019/20 season. It was noted that the retained catch did not meet the GHL in 2022/23 and Jim Stone (Alaska Weather Scallops) noted that that was due to weather and vessel issues that resulted in forgoing last trip of the season.

Martin Schuster presented on ADF&G's Central Region which includes Prince William Sound and Cook Inlet scallop fisheries. Area H (Cook Inlet) contains two scallop beds in the Kamishak District and has a GHR of 5,000 – 20,000 lb. The north bed has been closed to fishing since 2018 and the south bed has been closed since 2008. When open, Area H is subject to different season and gear regulations than other harvest areas. The season is open from August 15 –

October 31 and vessels may use only a single 6 ft dredge. Area H does employ crab bycatch limits when open. Area E (Prince William Sound) consists of the West Kayak Island (WKI) and East Kayak Island (EKI) subsections. The GHR is 0 – 50,000 lb and crab bycatch limits are set at 0.5% Tanner crab abundance as estimated by the scallop dredge survey. In Area E vessels are required to produce fishing logs to ADF&G and report daily. The EKI subsection has been closed since 2012, but WKI was open for a GHL of 7,200 lb during the 2023/24 season. Retained catch was 7,380 lb and CPUE slightly increased.

Nat Nichols presented on Westward Region scallop fisheries which includes Kodiak, the Alaska Peninsula, Dutch Harbor, and the Bering Sea. Area K (Kodiak) contains five districts, three of which were fished in 2023/24. Kodiak Northeast District (KNE) has had a trend of increasing CPUE over the last several years and GHLS have increased over that period in response. The 2023/24 GHL in the KNE District was 40,000 lb shucked meats and 40,385 lb were retained. CPUE decreased considerably from the 2022/23 season, though Nat attributed decreased CPUE to be more related to an increase in exploratory efforts than a population decrease. Kodiak Shelikof District (KSH) has undergone a similar increase in GHLs following a low period in the mid-2010s and was set at 100,000 lb for the 2023/24 season. The retained catch was 100,285 lb and CPUE decreased for the first time in seven years. Kodiak Southwest District (KSW) only has a harvest history going back to 2009/10 and has been somewhat consistent in recent years. The GHL has been set at 35,000 lb since the 2019/20 season. The GHL was not met in 2023/24, with only 25,327 lb retained catch. CPUE remained similar to the 2022/23 season. The vessel stopped fishing prior to meeting the GHL voluntarily, perhaps due to the rate of crab bycatch. The Kodiak Southeast District (KSE) was opened for the first time in 2018/19 and has had a GHL of 15,000 lb through 2023/24. KSE had a retained catch of 470 lb and very low CPUE in that year, and has not received any fishing effort since. Area K has seen a substantial increase in clappers (intact empty shells; sign of natural mortality) in the past two seasons. Managers are concerned with the apparent increase in mortality, but are unclear what the impact is on the stock, since catch rates appear unaffected. It was noted that clappers may most likely be indicative of disease, since most large predators would break shells. Nat mentioned that several 'unhealthy' scallops with small snails inside their shells were observed during the 2023 ADFG large mesh bottom trawl survey. Area M (Alaska Peninsula), Dutch Harbor (Area O), and Bering Seas (Area Q) were open in 2023/24, but there was no effort.

Hyperstability is an ongoing concern in several harvest areas for which CPUE has increased, while fishing effort has become more concentrated. Nat reaffirmed this concern and noted that management decisions have not rewarded high CPUE with increasing GHLs very recently due to the fishing footprint contracting. Jim Stone mentioned that fishing effort has become more concentrated as the fleet follows good fishing performance and marketable meat quality, and avoids crab bycatch (crab abundance is currently high in Area K) and weather. Current management practices allow them to concentrate their effort, and ADF&G would have to force their hand to spread out if it were desired.

Research Update: *Merocystis*

Jayde Ferguson from the ADF&G Fish Pathology Lab in Anchorage presented on weak meats in Alaska Weathervane scallops due to the Apicomplexan protist *Merocystis kathae*. When the infection is intense, it causes the “weak meat” phenomena where the adductor muscle is brownish in coloration and has a stringy texture, with the whole tissue either slipping off the shell with viscera attached or ripping apart when shucked. This was first reported in 2002 alongside a decline in catch per unit effort and an increase in “clappers” in Kamishak Bay. Initially food quality tests and nutrition stress was tested (Brenner et al. 2012), but similar phenomena in the northern Atlantic (eastern USA and Canada) have been found in sea scallops (*Placopecten magellanicus*) described as “gray meat” (Stevenson 1936). Initially thought to correlate with parasite burden it wasn’t until recently that it was determined that *M. kathae* was the cause of the gray meats as well as disease outbreak in Iceland scallop (*Chlamys islandica*) populations in 2014.

Ferguson et al. (2021) tested weak meat samples from the Bering Sea in 2015 and found massive disseminated apicomplexan infections and severe tissue changes across tissues. These results looked remarkably similar to the diseased *C. islandica* samples from Iceland and it was determined to be *M. kathae*. With DNA testing, it was shown that it was the same protist species infecting Weathervane, Sea, and Iceland scallops. The study also evaluated the distribution of the parasite. They found limited evidence of weak meats, but very high infection rates in Dutch Harbor and SW Kodiak - in some places 100% of the samples were infected. There was no correlation with other parasite abundance.

Jayde provided mitigation options including fishery closures, retention of suspected definitive host (*Buccinum* sp.), and retaining infected individuals to reduce the amount of parasite present in the scallop bed. Other options could include freshwater dips before disposing of shucked viscera and shells overboard. The SPT discussed the various environmental conditions that may be affecting the host and pathogen and how that may be exacerbated under changing environmental conditions.

AM 18- Assessment Cycle Timing

Sarah Rheinsmith and Tyler Jackson provided an update on Amendment 18, which removed the requirement for the SPT to submit an annual SAFE report, and set specifications on an annual basis. The SPT recommended a biennial cycle for SAFE production and will set specifications on a biennial basis. In 2025, the SPT will meet virtually to discuss fishery performance and receive an update on survey information. In the off-cycle years, the SPT will report the total catch, determine the status of the stock, and report as to whether overfishing occurred. The executive summary and total catch report is not required to be reviewed by the SSC/Council in off years.

Stock Status and Total Catch OFL

Tyler Jackson provided a major update of the Scallop SAFE with many changes since 2022. This new version adopts a format consistent with the formatting of the crab and groundfish SAFE reports and is substantially pared down to contain the most pertinent information on biology and management as well as status of data types. There have been no changes in assessment methods, as the FMP stipulates OFL and ABC in the absence of a stock biomass estimate. New observer and survey data have been incorporated; however, as we do not have a stock biomass estimate or biomass target, the stock status remains unknown.

The OFL= 1.284 million lb, with a 10% ABC buffer = 1.156 million lb, as specified in the FMP. Combined GHGs totaled 374,000 lb in 2023/24 and retained catch was 318,647 lb and total fishery removals (retained catch + discard mortality) was 328,112 lb. This represents approximately a third of ABC, thus overfishing did not occur. Total mortality has never approached ABC at any point in the time series.

In 2022, the SSC recommended considering more recent data, such as CPUE trends and average weight, to evaluate the appropriateness of the current OFL reference period. Tyler provided a detailed history of basis for the current reference period, 1990-1997, excluding 1995. The early 1990's fishery expansion and resulting large harvests raised concerns about sustainability, as large harvests were not sustained and ADF&G observed a decrease in mean scallop age in several beds. ADF&G developed a State FMP in 1994, the fishery was closed due to unregulated and unreported harvests in 1995, and Federal management was implemented in 1996. Thus, post 1996 there was a management structure in place; however, prior to this time, the fishery was largely not limited by management. Since the 1990s, catches have been lower than historically and well below the average catch used in the reference point time period. Catches have decreased while federal thresholds have remained the same. Average catch during the current reference period also includes ~20% of catch from Bering Sea, Adak, Dutch Harbor, and Area M during a time when those areas were first being prospected.

Currently, none of these harvest areas are considered core to the fishery. The Bering Sea bed crashed in 2014/15 and has not recovered, Adak was only fished once in 1993, and Area M was closed from 2000 - 2012, and has only re-opened for a very minor proportion of catch. Since 2020, there has only been scant fishing effort west of Kodiak. In addition, Kodiak Southwest District has become a consistently harvested area, but was not fished during the reference period. Given the changes in the fishery operations, location, and changes in management activity, the SPT concluded that the 1990-1997 may not best represent the current productive capacity of the stock and discussed what may be a more appropriate reference period.

Tyler suggested that a more appropriate reference period would start with 1999-2000 following the last peak in catch in 2000; this is when Bering Sea catches stabilized and were still large relative to after the crash. However, the ending year is unclear, as the fishery is currently rebounding from the mid-2010s slump and the ocean environment is rapidly changing. The SPT noted that given that there are multiple harvest areas, any specific reference period may not be appropriate for the entirety of the stock. The Plan Team; however, recognizes the concerns on

the part of SSC that biological reference points do not align with the status of the stock inferred by the State's GHL levels.

The SPT recommended maintaining the status quo reference period, relying on conservative state management, and focusing assessment efforts on developing a biomass estimate and biomass target-based reference points.

Socioeconomic Considerations

Scott Miller provided a socioeconomic update for the 2024 SAFE. There was no known change in cooperative membership or affiliated LLP ownership shares in 2023. Co-op members own three vessels that are qualified to fish their LLPs: The Polar Sea, the Provider, and the Ocean Hunter. Two cooperative vessels fished during the 2022/23 and 2023/24 season.

In 2023/24, compared to 2022/23, pounds of scallop meats landed decreased 3% from 329,095 to 318,647. Price per pound was not available for the Plan Team presentation, but will be incorporated for the SSC/Council presentation. 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 with a comparison of Atlantic Scallop market to the Alaska market, noting that Atlantic Scallops is one of the most economically viable fisheries in the United States. It was highlighted that the import of scallop products increased drastically from 55.4 million pounds to 232.6 million pounds. It should be noted that scallop products includes shucked meats, and all other scallop products combined.

Status of Assessment Development

Tyler Jackson provided an update on stock assessment development as provided in Appendix B. This effort was first undertaken (Bechtol, 2000, Zheng 2014) with exploration of bespoke models for the Kamishak area. Age structured models using Stock Synthesis were explored and expanded efforts to the Kodiak and Shelikof Districts (Zheng 2018, Jackson and Zheng 2022), and this work was further expanded in the Kodiak and Shelikof District (Jackson 2023).

This modeling effort uses the full complement of available catch and size composition data. It is noted; however, that model development is slow, and given additional tasking constraints, the assessment author may be able to devote limited time throughout the year to the scallop assessment development. This effort is also data limited with regard to spatiotemporal life history variations. Thus we can extend models only where data are sufficient, which represents approximately 80% of the harvested stock. This data limitation creates the potential to spend a lot of time pursuing development of district specific models that may suffer from model misspecifications.

The SPT discussed the purpose of trying to pursue an integrated age-structured model and the desired end-products. It was noted that the assessment author could apply results for the Shelikof district to other parts of the state; however, there is some question regarding whether that is beneficial solely to the State, and not as beneficial in the federal process. Additionally, the

full range of management advice that would be provided by an age-structured model may not be required to sustainably manage this stock. Given the current status of the stock, data deficiencies, the relatively conservative ADF&G management of the stock, and limited participation in the fishery, this fishery may have a lower priority for additional analytical and research support at the moment.

In 2022, the Plan Team recommended that we 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. The Plan Team recommended this approach, and Tyler detailed it more in-depth later in the meeting through the description of Appendix B.

Appendix B: Draft assessment using data-limited harvest control rules

Tyler Jackson detailed the proposed assessment modeling approach to explore more data-limited options as a means to developing an assessment model that can be used in the federal management process. This approach uses a simple modeling approach for surveyed core areas. It provides an example of how output would inform a stock wide harvest control rule with the caveat that it is not yet ready for use. This model uses 2016-2023 survey round biomass estimates of exploitable-sized scallops (> 100 mm) as a proxy for mature biomass and standardized fishery CPUE from 2009-2023. Fishery CPUE index was standardized using a GAM and similar model selection criteria as previously used in age structured model development (2023 SAFE appendix C).

Tyler modeled population biomass among four districts using REMA (Sullivan et al, 2022), a state-space random walk model that is often used for NPFMC data limited groundfish assessment, but also for Pribilof Islands Blue king crab. Four different model scenarios are developed and described in the appendix. Model 24.2 estimates different process errors by area and downweights fishery CPUE data. The model fit survey biomass best and resulted in a biomass trajectory that is most consistent with the biology of weathervane scallops (i.e. long-lived, less erratic trend). Tyler noted some of the assumptions and issues associated with using REMA for weathervane scallops.

Tyler exemplified how model outputs could be used in reference point estimation, for which he used BSAI crab tier 4 F_{OFL} harvest control rules. It is a three stage harvest control rule using a survey biomass proxy as a biomass target.

Tyler expressed that estimation of 'stock-wide' biomass may only be possible for the surveyed portion of the stock (80% of the harvested stock), given the disparity of data limitation between core and non-core areas. He suggested considering the stock as two components, with surveyed areas being the 'core' area and non-survey areas being the 'non-core' area. Biomass-based reference points for the core area could be calculated using the estimated biomass trajectory and harvest control rules similar to other NPFMC stocks, whereas reference points for the non-core area could be computed using a total catch approach, as is the status quo. This approach would allow for use of the best available data by harvest area. At this point Tyler is most interested in receiving feedback on the core/non-core concept, rather than the

modeling exercise, and conveyed that partitioning the stock may be the only way to advance the assessment. The Plan Team had limited initial response, but noted that setting core/non-core reference points would require an amendment to the current definition of stock structure.

Others in attendance: **indicates presenter*

Todd Anderson*
Asia Beder
Damien Catala
Ben Daly
Maria Davis
Julia Dissen
Amand Dorner
Alisha Falberg
Jayde Ferguson
Liza Hasan
Kendall Henry
Alyssa Hopkins

Annie Looman*
Kevin McNeal
Ethan Nichols
Nat Nichols*
Katie Palof
Alex Reich*
Janet Rumble
Martin Schuster
Kally Spalinger
Mark Stichert
Jim Stone
Joe Stratman

Jared Weems*
Bo Whiteside*
Carrie Worton