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Proceedings of the Newfoundland and Labrador Regional Peer Review of the Assessment of NAFO Subdivision 3Ps Iceland Scallop, and the Newfoundland and Labrador Snow Crab Assessment

February 20-23, 2018
St. John's, NL

Chairpersons: Christina Bourne and Hannah Murphy
Rapporteur: Tom Fowler

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Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings may include research recommendations, uncertainties, and the rationale for decisions made during the meeting. Proceedings may also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

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TABLE OF CONTENTS

SUMMARY

A meeting of the Newfoundland and Labrador (NL) Regional Peer Review Process to assess the stock status of Iceland Scallop (*Chlamys islandica*) in Northwest Atlantic Fisheries Organization (NAFO) Subdivision 3Ps, and Snow Crab (*Chionoecetes opilio*) in NAFO Divisions (Divs.) 2HJ3KLNOP4R, was held February 20-23, 2018, in St. John's, NL. This Proceedings Report includes an abstract and summary of discussion for each presentation. The meeting terms of reference, agenda, and list of attendees are appended.

The meeting included participation from DFO Science, DFO Fisheries Management, NL Department of Fisheries and Land Resources, the Fish Food and Allied Workers Union, the fishing industry, and academia.

In addition to these proceedings, publications to be produced from the meeting include a Science Advisory Report and a comprehensive Research Document for each species, all to be available online on the Canadian Science Advisory Secretariat website.

INTRODUCTION

The status of Iceland Scallop on the St. Pierre Bank was last assessed in 2010. The status of Divisions 2HJ3KLNO, Subdivision 3Ps and Division 4R Snow Crab was assessed in 2017. The current assessments of the stock components for Iceland Scallop and Snow Crab were requested by Fisheries Management to provide current information on the status of these resources and to provide the data that will be used in the 2018 Scallop Management Plan, and the 2018 Snow Crab Management Plan.

The proceedings include an abstract and summary of discussion for each presentation. Additional information can be found in the Science Advisory Report (SAR) and Research Documents or from references cited therein.

PRESENTATIONS

VARIATIONS IN THE THERMAL HABITAT OF SNOW CRAB ON THE NEWFOUNDLAND AND LABRADOR SHELF, UPDATE FOR 2017

Presenter: E. Colbourne

Abstract

The North Atlantic Oscillation (NAO) Index, a key indicator of the direction and intensity of the winter wind field patterns over the Northwest Atlantic was weakly positive during 2017. The associated atmospheric pressure fields resulted in a reduced arctic air outflow in the northwest Atlantic during the winter months resulting in near-normal winter air temperatures in many areas. Sea ice extent across the Newfoundland and Labrador Shelf, although above normal during late spring and of longer duration in some inshore areas, was below the long-term mean in 2017.

Annual sea-surface temperature (SST) trends on the Newfoundland Shelf, while showing an increase of about 1^{o}C since the early-1980s, were mostly below normal during 2017, driven mostly by very cold spring conditions. In NAFO Div. 4R, SST continued above normal, while bottom temperatures within 100 m depth were about normal. In 2017, the annual bottom (176 m) temperature/salinity at the inshore monitoring site (Station 27) was below normal by -0.6/-1.5 standard deviations (SD), respectively.

The average bottom temperature during the spring in Subdiv. 3Ps remained slightly above normal, a significant decrease over the 33-year record high in 2016. In Divs. 3LNO, spring bottom temperatures were about normal, while during the fall they were 1.2 SD below normal. In Divs. 2J and 3K fall bottom temperatures continued to decrease from the record high in 2011 to about normal conditions in 2017.

A standardized composite climate index for the northwest Atlantic derived from 28 time series of meteorological, ice and ocean temperature and salinity since 1950 reached a record low (cold) value in 1991. Since then it shows a warming trend that reached a peak in 2010 and thereafter decreased to mostly below normal conditions during the past 4 years. The 2015 value was the 7th lowest in 68 years of observations and the lowest value since 1993.

Analyses of research vessel (RV) survey data show that up to 80% of small crabs (<40 mm carapace width (CW)) were caught in bottom water temperatures <2°C. The area of the bottom in this temperature range, referred to here as the ‘Snow Crab Thermal Habitat Index’, has experienced a general decreasing trend since the mid-1990s in most areas, particularly in

Divs. 2J and 3K. These conditions reached a minimum in 2011 but have increased since then to about normal conditions in all areas during 2017.

Discussion

Oceanographic trends (1981-2010) and present conditions were discussed, focusing on thermal habitat preferences for Snow Crab. Record high bottom temperatures across much of the surveyed area were observed in 2011, and bottom temperatures in 2017 continue to average above-normal. However, cold water off the NE Coast of Newfoundland extending to the South Coast is reducing temperatures toward normal conditions which are more favourable to cold water species like crab. Zonal comparisons show these cooling conditions widespread across Divs. 3LNO, less so across Divs. 3K, 3J, 3Ps, and 4R.

Participants asked what the return to normal bottom temperatures means in terms of crab recruitment. Science advised that it was too soon to tell as any influence on commercial catches from this year's cooling will not be observable for 7 or 8 years.

OCEAN PRODUCTIVITY TRENDS IN THE NORTHWEST ATLANTIC

Presenter: G. Maillet

Abstract

Ocean colour data provide good spatial and temporal coverage of near surface dynamics of phytoplankton over the northwest Atlantic. Ocean colour sub-regions ranging from NAFO Div. 2B (Hudson Strait) to Div. 4R (northeast Gulf of St. Lawrence) indicate a reduction in total production and intensity of the spring bloom in 2016-17. The timing indices of the spring bloom indicate earlier blooms on the Labrador and northeast Shelf and Gulf of St. Lawrence compared to later blooms on the Grand Bank in 2016-17. The duration of the spring bloom is longer in recent years reversing a long-term decreasing trend. A zooplankton community shift has been observed in recent years across the northwest Atlantic, characterized by lower abundance of the large energy-rich copepod *Calanus finmarchicus*, higher abundances of small and warm water copepods, and higher abundance of non-copepods. This shift in community composition is consistent with the general reduction in zooplankton biomass observed across the northwest Atlantic. Evaluation of a number of physical indices including sea ice extent, ocean climate indicators, and water temperature, indicates an association with primary and secondary production indices and may represent important drivers in the ecosystem. The key physical drivers indicate reduced primary and secondary inputs that may have impacted transfer of energy to higher trophic levels in recent years.

Discussion

Ocean productivity was discussed, based on chlorophyll concentrations observed between 1998 and 2015. Both the production and intensity of phytoplankton blooms show record highs in 2011 and record lows in 2017. A zooplankton community shift has been observed in recent years across the NW Atlantic, driven by warm water influxes, characterized by lower abundance of the large energy-rich copepods, higher abundances of small and warm water copepods, and higher abundance of non-copepods.

Participants asked about the correlation between Snow Crab recruitment and annual blooms. The response was that crab larvae pass through mesozooplanktonic and macrozooplanktonic life stages, and it remains unclear if the plankton shifts signal improved crab recruitment. However, successful early development of crab does tend to coincide with the trends we are seeing in primary and secondary production. More study is needed to determine whether the

composite indices controlling spring blooms, and the associated drivers affecting zooplankton, are also impacting Snow Crab.

NEWFOUNDLAND AND LABRADOR BIOREGION: ECOSYSTEM SUMMARY

Mariano Koen-Alonso, Nadine Wells, Denise Holloway, Jennifer Mercer, Corinna Favaro, and Pierre Pepin

Presenter: M. Koen-Alonso

Abstract

The ecosystem structure of the NL bioregion can be described in terms of four Ecosystem Production Units (EPUs): the Labrador Shelf (Divs. 2GH), the Newfoundland Shelf (Divs. 2J3K), the Grand Bank (Divs. 3LNO), and southern Newfoundland (Subdiv. 3Ps). These EPUs coarsely represent functional ecosystem units, and have been used as geographic boundaries for the estimation of fisheries production potential (FPP) using ecosystem production potential models. Estimated FPP distributions, together with proxies for the current productivity state of the EPU, have been used to construct guidelines for Total Catch Ceilings (TCCs) for the Newfoundland Shelf (2J3K) and Grand Bank (3LNO) EPUs. TCCs represent an upper limit for sustainable total catches by species aggregates representing functional nodes in the ecosystem. These nodes closely match the fish functional groups used to describe the status and trends of the fish community, but they do not map them perfectly; these nodes represent a higher level of aggregation. Results from comparing catches with estimated TCCs indicate that fisheries in 2J3K are concentrated on the benthivore node (which includes shrimp and Snow Crab), and that even though 2016 catches are below the TCC, recent catch levels have been at or above the guideline limit, suggesting that this EPU may have experienced ecosystem overfishing in recent years. Catches in 3LNO have been more evenly distributed among the piscivore (which includes turbot, cod, redfish), and benthivore nodes, and with a “boom-and-bust” type of dynamics for the suspension feeding (SF) benthos (this node includes species like clams and scallops). Catches on the benthivore node are near its TCC, but catches on piscivores and SF benthos are above. Under current low productivity conditions, the increasing trend in catches could move 3LNO into an ecosystem overfishing state.

Changes in the fish community and trends in the Newfoundland Shelf, the Grand Bank, and southern Newfoundland EPUs were analyzed on the basis of DFO RV surveys during fall and spring. Trends were summarized in terms of fish functional groups defined by general fish size and feeding habits: small, medium, and large benthivores, piscivores, plank-piscivores, planktivores, and shellfish (only commercial species, recorded since 1995). Despite some general correspondence with the aggregate nodes used in the TCC analysis described above, these functional groups provides more resolution in describing fish community structure and trends.

In the early-1990s, this large marine ecosystem underwent important changes associated with a history of overfishing and a regime shift. The collapse in the 1990s involved the entire fish community. After the collapse, the system was highly dominated by shellfish. The changes observed have a coherent internal structure; increases in small fish and shellfish appear associated with declines in forage and large fishes.

Although these general patterns are observed across all EPUs, the collapse was more severe in the northern area (2J3K) and less severe in southern Newfoundland (3Ps). These ecosystem units also show differences in their internal structure. The Newfoundland Shelf (2J3K) is characterized by a high dominance of shellfish after the collapse, and with piscivores being the

dominant functional group among finfishes. The Grand Bank (3LNO), although it experienced an increase in shellfish after the collapse, this functional group never reached the high dominance observed in the northern area, and medium and large benthivores are the dominant functional groups among finfishes. The southern Newfoundland (3Ps) EPU showed the lowest levels of shellfish after the collapse and its finfish community has a more even distribution of biomass among functional groups.

Consistent signals of rebuilding of the groundfish community appeared in the mid to late-2000s in 2J3K and 3LNO. During this period, shellfish declined and moderate improvements in a key forage species like capelin were also observed. Despite these increases in finfish, overall biomass remained significantly below pre-collapse levels. In 3Ps, notwithstanding the relative stability of the overall biomass level since the mid-1990s, the structure of the fish community changed. For example, the piscivores functional group declined and within it, Silver Hake, a warm water species, increased its dominance to similar levels as Atlantic Cod, which used to be the single dominant species of this functional group.

While total finfish biomass was generally increasing in the mid to late-2000s, total shellfish biomass started to decline in 2006-07. After 2010, finfish biomass in 2J3K and 3LNO was relatively stable until 2014-15, when started to show signals of decline. This signal appeared earlier in the Grand Bank (3LNO), but today is also evident in 2J3K, including an important decline in Atlantic Cod in 2017. When finfish and shellfish biomass are considered together, the overall declines in total biomass in 2J3K and 3LNO are in the 30-35% range from their 2010-13 level. It seems that the conditions that led to the start of a rebuilding of the groundfish community have deteriorated. This may be linked to declines in primary production and large zooplankton in recent years, and the simultaneous reductions in key forage species like capelin and shrimp. However, despite this context of low overall productivity and declining trends, Snow Crab has shown modest positive signals in 2017.

Total food consumption by Snow Crab predators had been relatively stable in the early-2010s, but started to decline after 2013. Estimated consumption of Snow Crab increased since the late 2000s and early 2010 in most EPUs, but in recent years is showing declining signals in the Grand Bank (3LNO) and southern Newfoundland (3Ps) EPUs, and an important spike in the Newfoundland Shelf (2J3K) in 2016, with a subsequent drop in 2017. Despite this drop, consumption in 2J remains high. Unlike previous years, the declines in consumption estimated for 2017 were large enough to drive important reductions in the predation mortality rate. Still, current predation levels remain higher than the ones estimated for the late 2000s and/or early 2010s. The only ecosystem unit where predation mortality seems to have fallen below prior records is 3Ps, but the predation mortality rate in this ecosystem was already orders of magnitude higher than other EPUs.

In summary, ecosystem units in the NL Bioregion are currently experiencing low productivity conditions, impacting the rebuilding process of groundfishes, and leading to important declines in total biomass. However, Snow Crab has shown modest signals of improvement in 2017. Low availability of core prey like capelin and shrimp, can lead to higher fractions of Snow Crab in the diet of predators, but declining predator biomass can drive down the Snow Crab predation mortality rate. Current predation mortality rates remain among the highest in recent years, but have shown important declines. If environmental conditions are favourable, this reduction in predation pressure could indicate less bleak prospects for Snow Crab in the coming years.

Discussion

Ecosystem units, ranging from Large Marine Ecosystems (LMEs) to smaller ecoregions and habitats were described, followed by a discussion on long-term trends as well as historic regime

shifts. Interactions between species groups were discussed in terms of energy transfers within ecosystem units, including primary and secondary production, plankton feeders, filter feeders, and predator-prey relationships. The shellfish-dominated period before 2010 appears to be shifting to a prevalence of piscivores and large benthivores in recent years, both of which prey on Snow Crab. The relationships between crab and specific predator species were also discussed, based on information from diet studies.

Historic fishing effort and catches were discussed, with Science explaining the productivity and biomass required to support these fisheries. Work is underway to determine ecosystem production potential and associated recommended catch ceilings. Reduced productivity is apparent in Divs. 2J3K as well as 3LNO. A penalty factor was suggested as a way to set catch ceilings in cases where ecosystems are not producing at full capacity. In terms of biomass, recent surveys indicate a significant decline in biomass across most areas, with the exception of Subdiv. 3Ps, which has remained relatively stable.

Participants asked how a penalty factor for Snow Crab, or any one species, can be calculated. The response was that there is no penalty correction for cases like crab where data is inadequate for accurate biomass estimates.

Participants asked why the 2016 and 2017 crab science advice included positive messages regarding Snow Crab recruitment when many areas (e.g., Area 2J north of 54 degrees Latitude) did not see improved harvest levels. Science cautioned that the improved conditions/survey results from those years showed relatively modest indicators of improved recruitment, and that recruitment of small crab into the fishery is only one contributor to improved stock status. The data continue to show high mortality, with 2017 showing the third-highest mortality in the time series. The good news is that mortality, while still high, appears to be declining. It is expected that the coming years will show more concrete evidence of strong recruitment (e.g., abundance of small crab) combined with a continued decline in natural mortality, resulting in more crab available for the fishery.

ASSESSMENT OF SUBDIVISION 3PS ICELAND SCALLOP

Presenter: E. Coughlan

Abstract

The directed fishery for Iceland Scallops (*Chlamys islandica*) started on St. Pierre Bank in 1989 and peaked at 6,000 t in 1992. Populations off NL are normally found in waters from 50-200 m, usually on hard bottom with variable substrate composition, consisting largely of sand, gravel, shell fragments, and stones.

Prior to 1996 the entire catch was taken by Canada. A decision by an International Court of Arbitration in 1992 resulted in jurisdictional changes over the disputed waters to the south of Newfoundland and St. Pierre and Miquelon. Following that decision, an annual total allowable catch (TAC) level has been established for an area called the “Transboundary Zone” or simply the “CORE”. Joint TACs have been in place for the CORE since 1995. France and Canada are allocated a fixed percentage of the TAC, 70% and 30% respectively.

A Canadian research survey in September 2017 resulted in a minimum dredgeable biomass estimate of 1,200 t which is among the lowest in the survey time-series, and a decrease of approximately 60% since 2009. The mean shell height was found to be consistently higher in Canadian waters than in French waters, and an average meat count of 85 scallop/500 g from the 2017 survey was the highest in the survey time-series. Predatory sea stars were observed

at the lowest level and the annual natural mortality estimate was also the lowest in the survey time-series.

Discussion

Preferred habitat, life stages, Canadian and French allocations, and fishing effort were discussed for Subdiv. 3Ps Iceland Scallop. 1990-93 seasons had good catches, peaking at 6,000 t in 1992, followed by a decline from 1996 to 2009, and an additional decrease in biomass by ~50% since 2009. The Canadian survey in 2017 provided a minimum dredgeable biomass of 1,379 t, the lowest in the time-series.

Survey methods and results were discussed, including the gear and vessels used. The “commercial strata” on the northern St. Pierre Bank, historically representing approximately 90% of the biomass and most of the historic fishing effort, has represented only 60-80% of the fishing effort in recent years. Biomass has not declined as quickly as abundance, which could indicate increased individual sizes. Science should have a better estimate of size composition in the coming years with the recent switch to STRAP/OGMAP biomass estimates. Mean shell height was discussed, with the data showing higher values in the Canadian strata as compared to the French.

Discussion of starfish predation focused on the significant decline among predatory starfish between 2005 and 2009. However, it was explained that this decline was not accompanied by any significant change in scallop biomass, so scallop decline does not appear to be linked to predation mortality. In fact, the (natural) mortality index is now at 7% which is lowest in the time-series.

Participants asked why the French survey shows such a large discrepancy in estimated biomass in some areas, particularly stratum 25, and whether they used the same tools for biomass estimates. Science confirmed that France is using STRAP, however the estimate for stratum 25 appears to have been based on one particularly high catch, which may not be representative of the area sampled.

NAFO DIVISIONS 2HJ3KLNOP4R SNOW CRAB

Presenter: D. Mullowney

Abstract

Resource status is evaluated based on trends in fishery catch per unit of effort (CPUE), exploitable biomass indices, recruitment prospects, and mortality indices. Data are derived from multi-species bottom trawl surveys in Divs. 2HJ3KLNOP, DFO inshore trap surveys in Divs. 3KLPs, fishery data from logbooks, observer catch-effort data, industry-DFO collaborative trap survey data from all divisions, as well as biological sampling from multiple sources.

Data availability varied among divisions and between inshore and offshore areas within divisions. Despite a modest increase in 2017, the trawl survey exploitable biomass index has remained at its lowest observed level for the past three years. Meanwhile, the trap survey index has been at its lowest observed level for the past two years. Overall recruitment into the exploitable biomass has been very low in recent years and survey data suggest recruitment available to the 2018 fishery will remain low in most divisions. However, survey and environmental data suggest modest increases in recruitment could occur in some divisions over the next two to four years. Trends in indices are described in detail for each division and conclusions are presented with respect to the anticipated effects of short-term changes in removal levels on fishery-induced mortality.

Discussion

Participants discussed the survey efforts undertaken for each NAFO division, namely the DFO surveys (random stratified samples of major inshore bays using crab traps, and fall/spring bottom trawl surveys for the offshore), the Industry surveys (e.g., via agreement with Torngat Fisheries and the Collaborative Post Season (CPS) Survey). All are used to estimate crab biomass. Both commercial-sized and small-mesh traps are used in all surveys, but their use in the CPS survey is only at-present increasing toward all stations.

The continued decline across all divisions was discussed, with results from recent surveys compared with previous years. Decline was initially seen in the in Labrador and Subdiv. 3Ps surveys, but similar declines are now apparent throughout the northeast coast including the southern portions in Div. 3L. This trend can also be seen in landings and logbook information; showing landings at a two-decade low for both offshore and inshore areas and overall catch rates at a two-decade low. It was noted that there was a high return rate of logbooks in 2017.

At the Divisional level, historic lows in catch rates in all Divisions were discussed, with the exception of Divs. 2HJ, which has remained relatively stable. Div. 3K shows a similar declining trend as with most other divisions, despite good catches at the start of the season. Divs. 3L and 3NO both show minimal “recharging” between seasons, and appear to be in a depleted state. Subdiv. 3Ps shows the lowest catch rates, with no apparent recharging between seasons and a strong, steady decline. Science advised that that catch rates may be underestimated in some areas due to trap saturation, which is being investigated. Discussion of the exploitable biomass index revealed there is little change for Div. 2J, some modest improvement for Divs. 3LNO, and somewhat more improvement for Subdiv. 3Ps. An overarching trend is a lack of residual biomass, an indicator of high exploitation.

There was significant discussion on the findings from the DFO inshore trap survey, showing an increasing abundance of small crab in the small-mesh pots, particularly in Subdiv. 3Ps and Divs. 3LNO. This may signal improved long-term recruitment prospects. Declines in abundance of small crab in the DFO fall bottom trawl surveys between 1996 and 2015, followed by some improvement in 2016 and 2017, was discussed. Spring bottom trawl survey results were found to be less informative, possibly due to problems related to catchability and crab biology. There is some evidence of increased pre-recruits and females from the 2016 and 2017 surveys which is encouraging.

Cooling and warming bottom temperatures were discussed, with Science explaining how these are influenced by positive (cold, fresh water) and negative (warm, salty water) phases of the NAO atmospheric/ oceanographic system. These appear to correlate to periods of increased and decreased abundance of Snow Crab, respectively. Science advised this is a “lagged correlation”, with data showing a seven-year or longer lag between the onset of cooling and increased crab biomass. Thus while a positive NAO effect has been creating cooling conditions for the past 5 years, it is too early to estimate the effect on crab biomass due to recent cooling.

A participant suggested that the NAO – biomass correlation be investigated more closely, e.g., using a shorter data series covering the dramatic spikes. It would be useful to know whether the effect is at the larval / settlement stage, in which case a stronger, positive effect could be expected, compared with later stages

NAFO SUBDIVISION 3PS SNOW CRAB

Presenter: K. Baker

Abstract

Landings declined from a recent peak of 6,700 t in 2011 to a time-series low of 1,200 t during the past two years. Effort has declined by 44% since 2014 to be near its lowest level in two decades and the TAC has not been taken in eight years. CPUE has steadily declined since 2009 to a record low in the past two years, reflecting precipitous declines throughout the major fishing areas of the Subdivision in recent years. Overall recruitment into the exploitable biomass has been at its lowest observed level in recent years but increased slightly in 2017 and prospects for recruitment into the exploitable biomass in 2018 have improved from the lowest levels experienced in recent years. Discards comprised half the catch in the past two years and this is concerning as fishing under elevated mortality levels on small and pre-recruit crab could impair reproductive capacity or yield from forthcoming recruitment.

Discussion

Size frequencies from the observer data were discussed showing the characteristic “knife edge”, or sudden drop in size frequency, as the legal size-limit is approached. This is evidence of high exploitation rates. Modest recruitment signals seen in Subdiv. 3Ps must be considered in the context of the CPUE, which remains at the lowest level in the data series. The CPUE in Fortune Bay, in particular, averages less than 1 kg per trap. Science noted that providing advice for Subdiv. 3Ps is difficult given that reliable biomass estimates are not available.

Participants inquired about crab movement and whether the results showing low CPUE could be a result of outmigration as opposed to high exploitation. Science responded that crab movement (estimated at between 50 and 60 km over the course of an individual’s life) has been studied and resulting effects on populations within specific management areas are accounted for to some extent.

NAFO DIVISIONS 2HJ SNOW CRAB

Presenter: K. Baker

Abstract

Landings have remained at 1,700 t for the past four years while effort has remained at its lowest level in two decades. CPUE has remained near the decadal average in recent years, reflecting trends throughout the division. The exploitable biomass index has changed little during the past decade and recruitment into the exploitable biomass has changed little during the past decade with the exception of a 2014 spike. The 2017 trawl and trap surveys suggest recruitment will remain unchanged in 2018. The exploitable biomass has consisted largely of incoming recruits for the past six years (75%) with few old-shelled crab, which suggests high mortality of large adult male crab.

Discussion

This subdivision shows relatively constant landings in recent years, however declining catch rates have been apparent since 2015. Observer data show stable size frequencies for the overall series, but a drop in residuals is seen towards 2017, indicating high exploitation. Also, very few soft-shell crabs were caught in 2017, indicating lower recruitment. Post-season trap

survey was used to give an exploitable biomass index, which shows a stable biomass and even some increase in 2017, however this needs to be considered with caution.

Participants asked about the level of uncertainty in the recent increase. It was explained that the survey for 2J is not centered on the primary fishing grounds and, in missing some key crab areas, the survey may be underestimating biomass. Also, there were some gaps in the survey - the post-season trap survey for 2HJ is the only one that was not complete enough to confidently predict 2018 biomass.

NAFO DIVISION 3K SNOW CRAB

Presenter: D. Mullowney

Abstract

Landings declined by 66% since 2009 to a time-series low of 5,450 t in 2017. Meanwhile, effort has been maintained near a two-decade low for the past five years. CPUE has been low for the past seven years reflecting trends in most management areas. The post-season trawl survey exploitable biomass index increased in 2017 from a historic low in 2015-16. Although the post-season trap survey(s) index has remained near a historical low for the past three years, slight improvements were seen in some nearshore management areas in 2017. Recruitment increased from time-series lows in both the post-season trawl and trap survey(s) from 2016 to 2017. The 2017 trawl and trap surveys suggest recruitment should increase in 2018. The exploitable biomass has consisted largely of incoming recruits throughout the time-series (50-75%) with few old-shelled crab, which suggests high mortality of large adult male crab.

Discussion

All areas are showing marked declines over past decade, with catch rates in offshore areas (3A, 3B and 4) particularly low. Some crab is still available in area 3C, though catch rates are low compared to historic catches.

A graph showing CPUE fluctuations throughout the season was presented, which showed some “recharging” between years, but also signs that the stock is being heavily fished down. Observer data on carapace widths and shell condition were presented, which showed some modest signs of improvement (more older crab and more soft shell crab) in 3B and 3C. Area 3K (White Bay) shows little improvement on prime fishing grounds. Science did point out a spike in catch rates in 2012 following the voluntary cessation of fishing to avoid large amounts of soft shell from two years previous. Post-season trap surveys using small mesh are showing some modest signs of recruitment.

NAFO DIVISION 3L INSHORE SNOW CRAB

Presenter: K. Baker

Abstract

Landings declined by 29% from a historical high in 2015 to 6,000 t in 2017. Effort has nearly doubled since 2013 to a historical high in 2017. Overall CPUE has declined by 56% since 2013 to its lowest level in 28 years. The post season trap survey exploitable biomass index has declined by 73% since 2012, reaching a time-series low in 2017. The 40% overall change from 2016 to 2017 reflects declines to time-series lows in all management areas. Overall recruitment has steadily declined for the past three years to a time-series low in 2017, and recruitment indices from DFO and CPS trap surveys in all management areas were at or near their lowest

levels in 2017. No major improvements in biomass available to the fishery are expected in the short-term. The overall trap survey-based exploitation rate index has increased from 2013 to a time series high in 2017. The scenario of a depleted exploitable biomass coupled with low recruitment prospects and high exploitation rate indices suggests minimal potential for improvements in the short term.

Discussion

This division has seen a sharp reduction in landings since 2015, with precipitous declines in catch rates across all areas. Catch rates at the opening of the fishery start at or below where the previous season left off, and there is little evidence of recruitment in Trinity and Conception Bays. Presence of adolescents in Bonavista Bay in 2015 and 2016 may signal potential recruitment, but these individuals need to survive two to three years to enter the fishery. Div. 3L Inshore areas show characteristic “knife edge” drop in size frequency at the minimum size limit indicating high fishing effort, concurrent with a plummeting exploitable biomass index.

NAFO DIVISIONS 3LNO OFFSHORE SNOW CRAB

Presenter: D. Mullowney

Abstract

Landings declined by 26% from 2016 to 18,050 t in 2017, the lowest level in two decades. Effort expanded rapidly from 1992 to the mid-2000s and has oscillated at a similar level since. Overall CPUE most recently peaked near a time-series high in 2013 and has since declined by 41% to its lowest level since 1992. Substantial declines have occurred in all management areas in recent years, although catch rates remain relatively high in the central portions of the division. The exploitable biomass index remains at or near time-series lows in both the trawl and trap surveys. Overall recruitment into the exploitable biomass has been at or near time-series lows in both the trawl and trap surveys in the past two years which reflects low levels throughout all management areas. No major increases in the exploitable biomass are expected in 2018.

Discussion

Landings and catch rates from the outermost and fringe areas of the Grand Banks including 3LX are at their time series lows, with the midshore and central areas remaining relatively stable. Little evidence of soft shell crab indicating a lack of recruits. Small mesh trap survey results show a localized pulse of recruitment in 8B which is promising as this has been tracking through since 2012. Area 3L200 is another bright spot, with a marked upswing in exploitable biomass in 2017. Science advised that the continued reduction in exploitation rate in this area may be responsible for this improvement.

Participants noted that crab harvesters have already implemented major restructuring, enterprise pooling, etc. in response to poor forecasts and resulting cuts to TAC, leaving many discouraged and pessimistic about the industry’s ability to absorb further cuts. Participants discussed how 3Ps has taken more cuts than other areas, and that we are seeing signs of increased biomass. It is critical to leave the recruits in the water and not take them as soft shell.

NAFO DIVISIONS 4R3PN SNOW CRAB

Presenter: K. Baker

Abstract

Landings have steadily declined since a recent peak in 2013. Meanwhile, effort has remained at a low level. CPUE has declined since 2013 to below the long-term median, reflecting trends throughout all major fishing areas. The trap survey exploitable biomass index most recently peaked in 2012 and has since declined to a time-series low in 2017, reflecting trends in all surveyed areas. Recruitment into the exploitable biomass has been very low for the past four years and survey data from 2017 suggest no improvements are expected in 2018. The overall exploitation rate index has increased since 2013, reflecting trends in all surveyed areas. The scenario of a low exploitable biomass and CPUE, coupled with an approaching pulse of pre-recruit crab in crab management area (CMA) 12EF suggests that excessive fishing in 2018 could be detrimental to yield in subsequent years due to associated high soft-shell mortality.

Discussion

The data presented showed a CPUE peak in 2013, followed by steady decline. 12D and 12F show similar rates at the start of the season to what the rates were at the end of the previous season, suggesting minimal recharging is happening. Small mesh traps in 12C and 12D are showing very low catch rates for adolescents as well as adults.

2017 INTERNAL MEAT YIELD STUDY

Presenter: K. Baker

Abstract

Soft-shelled and very new-shelled exploitable-sized Snow Crab were sampled during Fisheries and Oceans Canada (DFO) multi-species trawl, DFO inshore trap, and CPS trap surveys to access relative meat content throughout the year. A total of 2,530 Snow Crab were sampled from May to December 2017 across all Assessment Divisions. High percentages of crab with full or near full (>75%) meat content were recorded in May, June, and December, while crab sampled from July to November generally had relatively low meat content.

Discussion

The goal of the project was to understand how meat content changes throughout the year. Only new shelled crabs of legal size were sampled, sample size was over 2,500 crabs. Their legs were cut and a score was given (0 to 5) based on % fullness. “Month” turned out to be a significant predictor of meat yield, with December, May and June showing the highest meat yield, while July to November showed low yield. Bitter crab disease (BCD) was found to peak in the Fall.

Participants asked about the Marine Institute (MI) study that was commissioned through DFO Resource Management on BCD and Meat Yield. Science advised that DFO’s survey was more comprehensive, considering that the MI study was done with relatively few samples and representing only a snapshot in time.

Participants noted that it would have been good to see the 75-100 % fullness quartile broken down. In the processing plants, percent fullness is closely monitored, and they aim for 90% or higher.

APPENDIX I: TERMS OF REFERENCE – ICELAND SCALLOP

ICELAND SCALLOP ASSESSMENT ON ST. PIERRE BANK

Regional Peer Review Process - Newfoundland and Labrador Region

February 20, 2018
St. John's, NL

Co-Chairs: Christina Bourne and Hannah Murphy

Context

The status of Iceland Scallop on the St. Pierre Bank was assessed in 2010. The current assessment of the stock components was requested by Fisheries Management to provide current information on the status of the resource and to provide the data that will be used in the 2018 Scallop Management Plan.

Objectives

To assess the status of Iceland Scallop resource on St. Pierre Bank; and
To determine the impact of maintaining the current harvest level.

Expected Publications

- Science Advisory Report
- Proceedings[1]
- Research Document

Participation

- Fisheries and Oceans Canada (DFO) Science and Fisheries Management
- French Research Institute for Exploitation of the Sea (IFREMER)
- Province of Newfoundland and Labrador Department of Fisheries and Aquaculture
- Academia
- Aboriginal Groups
- Fishing Industry
- Other invited experts

[1] Joint Proceedings with the February 20-23, 2018 Newfoundland and Labrador Snow Crab Assessment

APPENDIX II: TERMS OF REFERENCE – SNOW CRAB

NEWFOUNDLAND AND LABRADOR SNOW CRAB ASSESSMENT

Regional Peer Review Process - Newfoundland and Labrador Region

February 20-23, 2018
St. John's, NL

Co-Chairs: Christina Bourne and Hannah Murphy

Context

The status of Divs. 2HJ3KLNO, Subdiv. 3Ps and Div. 4R Snow Crab was assessed in 2017. The current assessment of the stock components was requested by Fisheries Management to provide current information on the status of the resource and to provide the data that will be used in the 2018 Snow Crab Management Plan.

Objectives

To assess the status of snow crab resource: Divisions 2HJ3KLNOP4R; and
To determine the impact of maintaining the current harvest levels.

Expected Publications

- Science Advisory Report
- Proceedings[2]
- Research Document

Participation

- Fisheries and Oceans Canada (DFO) Science and Fisheries Management
- Province of Newfoundland and Labrador Department of Fisheries Forestry and Agrifoods
- Academia
- Aboriginal Groups
- Fishing Industry
- Other invited experts

[2] Joint Proceedings with the February 20, 2018 Assessment of 3Ps Iceland Scallop

APPENDIX III: AGENDA

Regional Peer Review Process: Stock Assessments of Subdivision 3Ps Iceland Scallop and Snow Crab in Divisions 2HJ, 3KLNO, 3Ps & 4R

Memorial Meeting Room, NAFC, St. John's, February 20-23, 2018

Chairpersons: Hannah Murphy and Christina Bourne

Tuesday, February 20 (0900-1700)

Agenda	Presenter
Opening/Co-Chair remarks (0900)	Co-Chairs
Introductions/ ToR	Co-Chairs
Physical Oceanography Update	E. Colbourne
Biological Oceanography Update	G. Maillet
Ecosystem Overview Update	M. Koen-Alonso
Subdivision 3Ps Iceland Scallop	E. Coughlan
Divisions 2HJ3KLNOP4R Snow Crab Overview	D. Mullowney
Subdivision 3Ps and Science Advisory Report Bullets	K. Baker

Wednesday, February 21 (0900-1700)

Agenda	Presenter
Divisions 2HJ and Science Advisory Report Bullets	K. Baker
Division 3K and Science Advisory Report Bullets	D. Mullowney
Division 3L Inshore and Science Advisory Report Bullets	K. Baker
Divisions 3LNO Offshore and Science Advisory Report Bullets	D. Mullowney
Division 4R and Science Advisory Report Bullets	K. Baker

Thursday, February 22 (0900-1700)

Agenda	Presenter
Final Update of 2017 Meat Yield Project	K. Baker
Research Recommendations	ALL
ADJOURN	Co-Chairs

Friday, February 23 (0900-1700)

Storm/ weather back-up, if required

APPENDIX IV: LIST OF PARTICIPANTS

NAME	AFFILIATION
Aaron Adamack	DFO Science-NL Region
Krista Baker	DFO Science-NL Region
Brittany Beauchamp	DFO Science-NCR
David Belanger	DFO Science-NL Region
Christina Bourne	DFO Science-NL Region
Todd Broomfield	Nunatsiavut Government
Derek Butler	Association of Seafood Producers
Andy Careen	Harvester
Brian Careen	Harvester
Ellen Careen	DFO Fisheries Management
Erin Carruthers	Fish, Food and Allied Workers Union (FFAW)
William Coffey	DFO Science-NL Region
Eugene Colbourne	DFO Science-NL Region
Elizabeth Coughlan	DFO Science-NL Region
Frederic Cyr	DFO Science-NL Region
Andrew Daley	Harvester
Kate Dalley	DFO Science-NL Region
Tony Doyle	Harvester
Jennifer Duff	DFO Communications
Geoff Evans	DFO Science-NL Region
Eric Foucher	IFREMER
Tom Fowler	Contractor/Rapporteur
Mike Hurley	DFO Science-NL Region
Elaine Hynick	DFO Science-NL Region
Rick Kean	Harvester
Calvin Kerrivan	Harvester
Mariano Koen-Alonso	DFO Science-NL Region
Gary Maillet	DFO Science-NL Region
Jim Meade	DFO Science-NL Region (CSAS)
Darrell Mullowney	DFO Science-NL Region
Hannah Murphy	DFO Science-NL Region
Derek Osborne	DFO Science-NL Region
Julia Pantin	DFO Science-NL Region
Eric Pedersen	DFO Science-NL Region
Nancy Pond	NL Government -Fisheries and Land Resources
Alton Rumbolt	Harvester
Annette Rumbolt	DFO Fisheries Management
Katherine Skanes	DFO Science-NL Region
David Small	DFO Fisheries Management (Grand Falls-Windsor)
Roger Sterling	Seafood Producers Association of Nova Scotia
Craig Taylor	Torngat Secretariat
Albert Wells	Harvester
Calvin Young	Harvester