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Maritimes Region

Proceedings of the Regional Peer Review of the Development of a Monitoring Framework for the Establishment of a Commercial Whelk Fishery in the Maritimes Region (4VS and 4W)

Meeting date: February 19, 2020

Location: Dartmouth, Nova Scotia

Chairperson: Michelle Greenlaw

Editor: Rabindra Singh

Bedford Institute of Oceanography
Fisheries and Oceans Canada
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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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SUMMARY

A regional peer review meeting was held on February 19, 2020, at the Bedford Institute of Oceanography in Nova Scotia to assess current metrics gathered by the Waved Whelk license holders and to establish priority areas for research and analysis that will enable development of a stock assessment framework for offshore whelk. The information will be used by license holders to improve their research and fishing plans, and ultimately to develop an assessment framework for the exploratory fishery that is consistent with Fisheries and Oceans Canada (DFO)'s Precautionary Approach. The results of this review are to provide recommendations for industry research priorities and considerations for management of the resource. Participation in this meeting included DFO, non-DFO scientists, First Nations and Indigenous organizations, the fishing industry, and Nova Scotia Fisheries and Aquaculture. This proceedings document is the record of the meeting discussions and conclusions.

INTRODUCTION

After welcoming participants (Appendix 1) and doing a round of introductions, the meeting chairperson, Michelle Greenlaw, provided a brief introduction to the meeting. While everyone was invited to participate fully in the discussion and contribute knowledge to the process, the intent was to deliver a scientifically defensible product. Following the Chair's introduction, a brief overview of the Canadian Science Advisory Secretariat (CSAS) science advisory process was provided. The Terms of Reference for the meeting (Appendix 2) were reviewed, including the following objectives:

- Review current biological knowledge and fisheries practices for whelk
- Determine indicators of stock status and sampling methods that could be used to develop a monitoring framework for whelk
- Assess the adequacy of current data collection and reporting methods to develop indicators
- Review research priorities of the industry
- Review additional and/or alternative data sources for monitoring stock status
- Identify potential risks to the whelk population(s) when developing management strategies
- Determine the responsibilities of the parties (DFO, Industry) to developing the framework.

The agenda (Appendix 3) was reviewed and no additions were suggested. A working paper was provided to meeting participants for review ahead of the meeting. This document includes a presentation summary and constitutes the record of the meeting discussion and conclusions. A CSAS Research Document and Science Advisory Report resulting from this meeting will be published on the [Fisheries and Oceans Canada \(DFO\) Science Advisory Schedule](#) as they become available.

PRESENTATION AND DISCUSSION

Working Paper: Development of a Monitoring Framework for the Potential Establishment of a Commercial Whelk Fishery in the Maritimes Region (4VS and 4W)

Presenter: Mark Wilcox

Rapporteur: Rabindra Singh

Presentation and Discussion Summary

BIOLOGICAL OVERVIEW

A biological overview of the Waved Whelk, *Buccinum undatum*, including what is known from the literature on their distribution, predators, movement, reproduction, and growth rates, was presented. The history of the commercial fisheries in Canada and other areas around the world was reviewed, including the use of the minimum landing size (MLS). In some countries, there are concerns about whelk overfishing and presently there are no data on long-term recovery. There is no information on marketability and how it affects sizes that are caught. Overfishing is known to lead to reduced size at maturity in other gastropods.

There are presently fisheries in the DFO Newfoundland and Quebec Regions. In both regions there are quotas; however, the quota used in Newfoundland is very high and no quota was reported in 2019. In the Quebec Region the MLS is set at 70 mm and quotas are set for some of the 15 fishing areas. In the Maritimes Region, in 1995 several potential inshore areas for whelk

fishing were identified but there was no directed fishery. In 2006, inshore licenses were issued to encourage data collection and protocol development, and this was followed by a 2008 meeting to discuss management approaches and potential future needs. At that time, there were limited data in MARFIS on landings and not enough to assess these inshore fisheries. In 2009, an offshore fishery started in 4Vs and 4W Banquereau and this evolved to an exploratory fishery in 2011. In 2012, the catch was readjusted and in 2018 the total allowable catch (TAC) increased from 350 t to 700 t with a 350 t cap on Area 1. Science advice was provided on the quota increase. It was **recommended** that wording in the present working paper be changed to reflect the fact that during the industry led exploratory fishery, the data collected were not from scientific surveys.

CURRENT STATUS OF DATA COLLECTION

The fisheries data recorded on the Whelk Monitoring Document were reviewed. This document is provided by DFO and is required to be filled in by the license holders. Amounts of whelk kept and discarded as well as discards of non-targeted species are recorded. Soak time in number of days is recorded. At this meeting, it was **recommended** soak time per string be recorded in hours not days. Both license holders have developed research plans which are updated every year as required. The plans specify that a subset of whelks be taken for data collection; however, the data collected are not consistent for both industry partners. In some cases, data are recorded opportunistically as time allow. Shell length (important for size-frequency), sex, sexual maturity, imposex evidence, parasitism, genetics, and age are all very useful metrics to collect.

Animals are caught whole and landed whole. There are presently no measurements of environmental factors being done but this has been suggested. No set amount of animals is used in the samples but the larger the samples are better to capture the range and variability in the data. **The reference list should be checked for a missing one.** It is **recommended** that a standardized sampling procedure for whelk be established.

Alternative whelk data sources include the DFO groundfish survey. While the gear used is not selective for whelk, the data could be used for a relative abundance of whelk. The DFO groundfish survey uses a random stratified survey approach and as such does not necessarily go back to same locations every year. The other possible source of data is the Banquereau Arctic Surfclam fishery; however, no whelks are landed from this fishery. There is only one observed surfclam fishery trip per year and whelks may not be identified to species. Diving surveys are limited to inshore and would be influenced by diver experience. Video analysis would be useful but dead whelks may require closer scrutiny to correctly identify them. Video surveys are limited by resolution and highly structured bottoms makes it difficult to distinguish whelks. The Digby scallop dredge is used in the Quebec Region whelk surveys and is efficient at capturing quiescent whelk but a liner may have to be used in the dredge to capture all sizes of whelk.

CPUE AND LANDINGS

The Whelk Monitoring Document captures most of the required data; however, soak time needs to be in hours. In the past, landings may be recorded but no accompanying effort data were recorded in 23.3% and 11.7% across all years in 4Vs and 4W, respectively. This was identified as both an issue with reporting and recording into the Maritimes Fishery Information System (MARFIS) database. The dockside monitoring program data are not in MARFIS. It was **recommended** that this be investigated to improve data entry and recording. There is no evidence of trap saturation, so the data on soak times in hours would be very useful. Calculation of catch per unit effort (CPUE) should be based on appropriate management units.

BIOMASS, ABUNDANCE, AND SPATIAL EXTENT

There is need to have an estimate of the effective area of a trap, that is, the area of influence or attraction. This area of influence varies with depth, and the speed and direction of the current. Studies indicate that the area of influence is limited to approximately 60 degrees downstream. Stock depletion experiments by industry were unsuccessful as the population did not exhibit depletion. It was suggested that a conservative estimate of the effective area is needed but this may not be accurate and can create a risk to both the catch and the population. This issue needs to be explored in greater detail. The determination of the spatial extent of whelk distribution was identified as a priority by both of the licence holders.

BYCATCH, OBSERVER MONITORING, AND SPECIES AT RISK ACT (SARA) LOGS

Bycatch is believed to be negligible. Sometimes whelk egg cases have been observed attached to the traps. No SARA species have been recorded and none of the poisonous Ten-Ridged Whelk were recorded. The amount of Stimpsons Whelk can be as high as 2% of the catch and the monitoring document may need to be modified to make it easier to record bycatch. Observer monitoring document is similar to the fishery monitoring document but observer trips are done only on request by DFO Resource Management. Only 6 trips have been done so far. In 2018, the requirement of one SARA log per season was changed to one log for each trip.

REPRODUCTION, AGE AND GROWTH, AND SIZE STRUCTURE

Reproductive condition was generally determined visually. In the literature, the size at maturity is frequently determined as size at which 50% are sexually mature (L_{50}). This value is typically used to set the MLS. Male maturity was determined by a penis length of $\geq 50\%$ of shell length (PL_{50}), which has a good relationship with L_{50} . Female maturity was less frequently reported in the literature. Closer to spawning time it is easier to determine sexual maturity for females. It was **recommended** that a refinement of female maturity determination was needed to expand our understanding (Ashfaq et al. 2019). The reproductive cycles are not confirmed for 4Vs and 4W divisions but it is defined for the Gulf of St. Lawrence. There is no confirmed reproductive pattern for the area within the Maritimes Region.

The easiest way to age whelks seems to be counting the striae on the operculum. This is reported in Ashfaq et al. (2019) but it is not documented as to whether the dorsal side of the operculum was used. Counting of striae on the ventral surface has been proven to be unreliable due to the adventitious layers that constitute the rings accumulating as a function of growth to strengthen the opercula rather than as a function of age. If the dorsal side is to be used it needs to be consistent for the sites and sexes to assist in determining any spatial patterns.

Size distribution in other fishing areas was determined using traps where selectivity was removed by adjusting trap structure. The available data did not indicate whether the adjustment was made during collection but this is a possible approach that can be used in the Maritimes Region.

PARASITE LOAD, POPULATION STRUCTURE, AND CATCH LIMITS

The parasite load of whelks could be used to indicate potential isolation of populations. The literature indicates that understanding the population structure is very important as there can be risks to overfishing due to low dispersal. Whelks are usually locally adapted and there are genetic differences and complex population structure even within specific fishing areas. There is some research underway on genetic structure. There is also risk from other fishing gear types that cause rolling of whelks. This has been shown to decrease survivability and increase damage to whelks.

The Whelk Monitoring Document provides a number of metrics needed for a monitoring framework. There is need to identify breakdowns in reporting/recording to ensure that the complete data set are available specifically on effort and soak time. There is need to ensure consistency in metrics between license holders as there is variability associated with different methods used to measure/record the data. Determining the temporal patterns in the reproductive cycle and determining the spatial extent of sub-populations are also required. There is need to further refine the methods used in the assessment of life history traits to characterize size structure and extent of subpopulations. Establishing standardized protocols for assessing these metrics and a sampling design will help determine subpopulation structure.

FISHERY INDEPENDENT SURVEYS AND ASSESSMENT FRAMEWORK

Since there is presently no fishery-independent survey, there is a need to use some other indicator to assess the population. In the absence of such data, management would need to err on the side of caution. Presently, CPUE is the only indicator of population and there are no management units. Setting managements units is possible as they will provide some boundaries and as well as help in setting possible catch limits. Establishing catch areas that are fixed will allow for assessment based on these areas. The criteria used to establish areas in the Quebec Region, and how fishery-independent surveys are conducted there, could be used to inform the establishment of management areas in the Maritimes Region. Industry may be willing to conduct such fishery independent surveys and the feasibility of this should be explored. DFO Science could work with, and provide advice to industry, to set up a fishery independent survey. Any assessment framework that is needed would be based on existing data and, or any additional data sets that may become available. Presently, there would be a simple approach with recommendations for moving towards a better framework assessment.

CONCLUSIONS

Going forward DFO will develop an indicator of population status likely a CPUE based indicator depending on the resources of the Secondary Species Unit. The development of a fishery independent survey is needed. DFO would collaborate on the sampling procedure but the survey would be undertaken by industry and any stock assessment model would be developed by industry. DFO would collaborate on the proposed approached and this assessment model would be peer-reviewed by DFO.

REFERENCES CITED

Ashfaq, U., Mugridge, A., and Hatcher, B.G. 2019. Size at sexual maturity of waved whelk (*Buccinum undatum*) on the Eastern Scotian Shelf. Fish. Res. 212: 12-20.

APPENDIX 1. LIST OF PARTICIPANTS

Name	Affiliation
Allan MacLean	Louisburg Seafoods Ltd.
Kurt Simmons	Louisburg Seafoods Ltd.
Wayne Fowlie	Premium Seafoods Ltd.
James Meade	Fisherman
Berkeley Dixon	Fisherman
Vanessa Mitchell	Maritimes Aboriginal Peoples Council
Mark Lundy	Industry Scientist
Adam Mugridge	NS Fisheries and Aquaculture
Mark Wilcox	DFO Science - Lead
Leslie Nasmith	DFO Science - Reviewer
Kira Krumhansl	DFO Science
Michelle Greenlaw	DFO Science
Rabindra Singh	DFO Science
Ryan Martin	DFO Science
Justin Schaible	DFO Resource Management
Kathy Cooper-MacDonald	DFO Resource Management
Janet Langille	DFO Resource Management

APPENDIX 2. TERMS OF REFERENCE

Development of a Monitoring Framework for the establishment of a Commercial Whelk Fishery in the Maritimes Region (4VS and 4W)

Regional Peer Review - Maritimes Region

Location: Bedford Institute of Oceanography

Date: February 19th, 2020

Chairperson: Michelle Greenlaw

Context

Buccinum undatum, the waved whelk, is a ubiquitous marine gastropod within the North Atlantic. They are distributed from the low water mark to depths of up to 600 m but are most abundant in the shallower portion of that range (Hansson 1998; Weetman et al. 2006; Włodarska-Kowalczyk 2007; Heude-Berthelin et al. 2011). Their reproductive cycle involves internal fertilization and direct development of larvae within demersal egg capsules. This lack of planktonic larvae coupled with limited adult movement (Pálsson et al. 2014, Lapointe and Sainte-Marie 1992; Hancock, 1963; Himmelman and Hamel 1993) results in a limited dispersal in this species. A growing body of research has shown whelk to exhibit variation in shell morphology, size at sexual maturity, and size frequency as well as genetic differentiation over relatively small spatial scales (Weetman et al. 2006; Shelmerdine et al. 2007; Pálsson et al. 2014; McIntyre et al. 2015; Valentinsson et al. 1999), representing different populations as a result of low dispersal. This makes whelk populations vulnerable to local depletion or even extirpation (Gendron 1991; de Jonge et al. 1993), and slow to recover from their removal.

There is currently an exploratory whelk fishery in NAFO Divisions 4W and 4Vs with commercial quantities being found in the offshore 4Vs area and increased landings in 4W. Developing an assessment of stock, however, is hampered by limited information with regards to natural density of whelks within fished areas and spatial variation in whelk abundances. Currently, there are no independent surveys and thus information on these stocks is based on data collected by the exploratory license holders (Louisbourg Seafoods Ltd. and Premium Seafoods Ltd.). Fisheries Management has requested advice from DFO Science on assessing current metrics gathered by the license holders and establishing priority areas for research and analysis that will enable development of a stock assessment framework if a commercial fishery is to be established for Offshore 4Vs and/or 4W whelk. The information will be used by license holders to improve their research and fishing plans and ultimately to develop an assessment framework for the fishery to move to commercial status that is consistent with DFO's Precautionary Approach Policy.

Objectives

1. Review current biological knowledge and fisheries practices for whelk
2. Determine indicators of stock status and sampling methods that could be used to develop a monitoring framework for whelk
3. Assess the adequacy of current data collection and reporting methods to develop indicators
4. Review research priorities of the industry
5. Review additional and/or alternative data sources for monitoring stock status
6. Identify potential risks to the whelk population(s) when developing management strategies
7. Determine the responsibilities of the parties (DFO, Industry) to developing the framework

Expected Publications

- Avis scientifique
- Document de recherche
- Compte rendu

Expected Participation

- DFO Science
- DFO Resource Management
- Provinces of Nova Scotia and New Brunswick
- Academics
- Aboriginal communities/organizations
- Fishing industry
- Non-government organizations

References

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APPENDIX 3. AGENDA

Maritimes Region Science Advisory Process on **Development of a Monitoring Framework for the Establishment of a Commercial Whelk Fishery in the Maritimes Region (4VS and 4W)**

Wednesday, 19 February 2020

Lewis King Boardroom
Bedford Institute of Oceanography (BIO)
Dartmouth, Nova Scotia

- 0900 Welcome and Introductions (Chair)
- 0915 Review Terms of Reference & Meeting Structure/Agenda (Chair)
- 0945 Biological Overview (Science Lead)
- 1030 Break
- 1045 Overview of Current Data and Recommendations (Science Lead)
- 1145 Group Discussion (All)
- 1200 Lunch Break
- 1300 Discussion continued (All)
- 1400 Review SAR (All)
- 1600 Group Discussion (All)
- 1700 Adjourn for the Day