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Proceedings of the Regional Peer Review of the 3Ps White Hake Stock Assessment, and the 3LNOPs Monkfish Stock Assessment

Meeting date: November 1, 2017

Location: St. John's, NL

Chairperson: Katherine Skanes

Editor: Chelsea Boaler

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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

The Regional Peer Review Processes on the status of White Hake and Monkfish were held November 1, 2017, in St. John's, Newfoundland and Labrador (NL). The purpose was to assess the stock status of White Hake (*Urophycis tenuis*) in Northwest Atlantic Fisheries Organization (NAFO) Divisions 3N and 3O and Subdivision 3Ps, and Monkfish (*Lophius americanus*) in NAFO Divisions 3L, 3N, and 3O, and Subdivision 3Ps.

In addition to these Proceedings, publications to be produced from the meeting include a Science Advisory Report and a Research Document for each species, all of which will be made available [online](#) by the Canadian Science Advisory Secretariat (CSAS).

INTRODUCTION

The Regional Peer Review Processes on the status of White Hake and Monkfish were held November 1, 2017, in St. John's, Newfoundland and Labrador (NL). The purpose was to assess the stock status of White Hake (*Urophycis tenuis*) in Northwest Atlantic Fisheries Organization (NAFO) Divisions (Divs.) 3N and 3O and Subdivision (Subdiv.) 3Ps, and Monkfish (*Lophius americanus*) in NAFO Divs. 3N, and 3O, and Subdiv. 3Ps.

In addition to these Proceedings, publications to be produced from the meeting include a Science Advisory Report and a Research Document for each species, all of which will be made available [online](#) by the Canadian Science Advisory Secretariat (CSAS).

OCEANOGRAPHIC CONDITIONS IN NAFO DIVISIONS 3LNO AND SUBDIVISION 3PS DURING SPRING 2017

Presenter: E. Colbourne

ABSTRACT

Oceanographic data from NAFO Divs. 3LNOPs during the spring of 2017 are examined and compared to previous years and the long-term average. Sea surface temperatures across the region decreased over the previous year and were below normal during spring and early-summer of 2017. In 2017, bottom temperatures decreased over 2016 values to slightly above normal in 3Ps and about normal in 3LNO. Bottom temperatures in deeper water of the Laurentian Channel show positive (up to +4°C) anomalies with temperature values up to 9°C in some areas. Deeper slope waters on southeastern St. Pierre Bank were also exceptionally warm during the past four years with values reaching 8°-12°C.

The extent of >4°C water covering the bottom of 3Ps in 2017 was about normal, at about 40% of the total bottom area. In 3LNO, the extent of the bottom area covered by water with temperatures >3°C was also about normal at about 15%, a significant decrease over the peak value observed in 2011. In both regions there has been an increasing trend in the amount of warm slope water since about 1990.

Satellite remote sensing data indicates a reduction in both magnitude and amplitude of the spring bloom in 3Ps and across the Grand Banks during 2015-17. The peak timing of the spring bloom has occurred later by up to two weeks from 2014-17 while the duration has been on the decline in some areas of the Grand Banks.

The trend in zooplankton biomass has been in decline in 3Ps since 2013, showing a substantial reduction (~50 %) from peak levels in 2010. The preliminary biomass data from spring 2017 shows a slight recovery over the 2014-16 values but remain at a low level. Along the standard AZMP sections across the Grand Banks the biomass of marine copepods also show a decline since 2007 while macro-zooplankton show a downward trend beginning in 2012. The large reduction in zooplankton biomass in recent years may influence transfer of energy to higher trophic levels in the ecosystem.

DISCUSSION

There was discussion on the 50% decrease in zooplankton. It was noted that an observed decrease in available nutrients in the area correlates with primary production rates over the entire area. Intrusions of water masses have also changed the zooplankton community. The influx of temperate water has brought smaller species into the area. It was explained that these factors are contributing the reduction of zooplankton biomass.

A participant asked if warming trends in the southern area was related to weak currents. It was explained that in deeper waters (i.e. around the Labrador slope), the temperature is consistent between 3-4°C. It is suspected that some deeper-water species are influenced by the Gulf Stream intrusion, which is contributing to the trends being observed.

It was also explained to participants that the timing of annual Atlantic Zone Monitoring Program (AZMP) surveys and multi-species surveys occurs in April and November-December.

3PS WHITE HAKE

Presenter: C. Miri

ABSTRACT

White Hakes in NAFO Subdiv. 3Ps and Divs. 3NO constitute one biological stock that inhabits the southern Grand Bank and St. Pierre Bank of NL. White Hake is subject to ongoing mortality in directed and bycatch fisheries conducted by Canada and other countries. Annual NAFO-reported landings from Subdiv. 3Ps for Canada averaged 603 tons in 1994-2002, increased to an average of 1,364 t in 2003-07 (following recruitment of a large Divs. 3NOPs 1999 year-class to the fishery), then decreased to a 306 t average since 2009. The DFO-NL spring research survey abundance index for Subdiv. 3Ps ranged from 4.0 million (in 2008) to 15.1 million (in 2002) White Hakes over 1996-2016; averaging 7.6 million. In this period, biomass estimates ranged from 2,582 t (in 2009) to 10,294 t (in 2000); averaging 5,737 t. In 2017, the abundance index was 7.1 million, and the biomass index was 4,848 t. Although large episodic recruitment of Divs. 3NOPs White Hake was observed in 2000, recruitment remained at much lower levels since 2001. The relative fishing mortality index for Subdiv. 3Ps remained below its 1996-2016 average since 2010. White Hake biomass and abundance indices for Subdiv. 3Ps increased over the past two years, and Canadian average landings below 400 t in this Subdivision in 2009-16 did not seem to negatively impact the Div. 3P portion of the Divs. 3NOPs stock.

Ecosystem signals observed in Subdiv. 3Ps in recent years indicated that structural changes are occurring, and overall ecosystem productivity may be low. Although the direct impacts of these changes on White Hake life stages (i.e., pelagic eggs and larvae, bottom-dwelling juveniles and adults) are unknown, they imply that at least some aspects of White Hake productivity may be affected.

Investigations of Limit Reference Points (LRPs) for this species were previously conducted using several models on the Divs. 3NOPs White Hake stock. During its June 2015 Meeting (and reiterated in June 2017), NAFO Scientific Council concluded that none of these assessment models were acceptable in capturing the episodic character of this White Hake population and, therefore, resultant LRPs were not adopted. It was thus inappropriate to establish them for Subdiv. 3Ps (or for any subcomponent of this stock).

DISCUSSION

Participants asked several questions regarding White Hake growth rate, generation time, and recruitment years. It was explained that White Hake grow quickly, are age 3 to 4 when first

targeted by the fishery, and live to about nine years old. It was also explained that the effects of the large recruitment event in 1999 lasted approximately three years. The NL Region has not aged White Hake, and it was highlighted that aging work from the Gulf Region could not be successfully reproduced.

The timing of targeted versus bycatch fisheries in Divs. 3PN were questioned and noted to be variable over the years. However, in recent years, the fishery has been primarily a targeted fishery. It was also noted that the spring research vessel survey has not occurred since 2012 due to operational issues with the vessel breakdown and insufficient survey time.

Participants discussed why NAFO has been unsuccessful in establishing reference points for 3Ps White Hake. Possible reference points presented at the meeting were produced through empirical survey methods, a catch-resilience MSY model, and a stock-production model incorporating covariates. Due to challenges, these models were rejected by participants and could not be used as a proxy. Modeling is expected to be further refined. Reference points should be further explored and modeling using empirical points should to be re-visited.

It was noted by participants that 3NOPs White Hake is a single stock, and juveniles move across borders. It was explained that there is a NAFO Total Allowable Catch (TAC) for 3NO White Hake, but DFO doesn't implement a TAC for Subdiv. 3Ps White Hake. Participants also expressed moderate confidence in catch data, as there are gaps within historical catch data and low observer coverage (less than 1%).

WHITE HAKE RESEARCH RECOMMENDATIONS

- Age determination should be conducted on otolith samples collected during annual Canadian surveys (1972-2017); thereby allowing age-based analyses.
- The collection of commercial catch data on White Hake should continue and be expanded to include age, sex and maturity data. These data will help determine if this is a recruitment fishery.
- Survey conversion factors between the Engel and Campelen gear should be investigated.
- Continue work on the development of population models for this stock to help quantify B_{lim} and provide short-term biomass projections.
- Investigate a fishable biomass index.

3LNOPS MONKFISH

Presenter: M. Simpson

ABSTRACT

Monkfish in NAFO Subdiv. 3Ps and Div. 3LNO is considered a single stock, and encounters ongoing mortality in directed and bycatch fisheries conducted by Canada. Annual NAFO-reported landings from Divs. 3LNOPs indicated that the Monkfish-directed gillnet fishery averaged 1,664 t in 2001-06, declined to 255 t over 2007-14, then were 160 and 374 t in 2015 and 2016 (respectively); with the majority of landings from Div. 3O. In DFO-NL spring surveys, NAFO Divs. 3LNO Monkfish abundance and biomass indices were lower in recent years (2014-17) relative to 2008-12, with 2017 indicating their smallest estimates since 1998. Based on Divs. 3LNO fall surveys, Monkfish generally declined in abundance and biomass after their peaks over 2007-08; reaching their lowest estimates since 1998-99 in 2017. Using NAFO average landings for 2013-15 as *status quo*, total landings from Divs. 3LNOPs in 2016 were 374 t: greater than twice the *status quo* of 160 t. In addition, recent declines in spring survey abundance and biomass in Divs. 3LNO causes concern for the future of this stock when combined with recent low recruitment. For 2017, Monkfish in Divs. 3LNO and Subdiv. 3Ps are currently estimated to be above the proposed proxy Limit Reference Point.

DISCUSSION

Reported landings in 2016 were 2.3 times larger than the Monkfish *status quo* over 2013-15 and drivers behind this change were questioned. It was highlighted that there is a dramatic increase in 12-20 cm fish in the 2017 biomass survey. It was further explained that distribution around the edge of the shelf is extremely variable, and results may be largely influenced by 1-2 large tows increasing estimates.

Stock delineation was examined by participants. There were few catches from Divs. 3LN, and so there is no reason to separate catch data from 3OPs. Furthermore, there is no reason to believe that there are two separate stocks within 3OPs (i.e. 3O and 3Ps evaluated separately). It was noted that tagging, aging, or genetics studies have not been completed by the NL Region.

Participants discussed reference points and the modelling work that was conducted. It was clarified that survey based proxy reference points are currently used, for example NAFO Divs. 3LNO Thorny Skate uses the reference point B_{loss} , whereas NAFO Divs. 3NO Witch Flounder uses 85% of the highest value in the survey series. Although there is no gear conversion factor for Monkfish, participants agreed on a survey based proxy reference point.

MONKFISH RESEARCH RECOMMENDATIONS

- Sampling for age, maturity and length during spring and fall multi-species surveys and in commercial catches should be conducted.
- Spatial dynamics should be examined in relation to environmental and fishery related influences.
- Further investigation of quantitative assessment models should be explored.
- LRP to be based on geometric mean ($B_{msy}=5,020$ t), where $LRP=2,000$ t.

APPENDIX I: TERMS OF REFERENCE - 3PS WHITE HAKE STOCK ASSESSMENT

Regional Peer Review - Newfoundland and Labrador Region

November 1, 2017

St. John's, NL

Chairperson: Katherine Skanes

Context

The status of the White Hake stock in Northwest Atlantic Fisheries Organization (NAFO) Subdivision 3Ps was last assessed in 2015 ([DFO 2016](#)). The current assessment is requested by Fisheries Management to inform the development of management measures for the stock.

Objectives

- Assess and report on the status of the stock based on commercial fishery statistics (overall landing distribution, breakdown by fishing gear and directed species) and biological data resulting from the commercial sampling program (size structure).
- Analyze historical data from the research surveys up to 2017 (abundance index, biomass, recruitment, size structure and geographical distribution of catches).
- Provide qualitative descriptions of risks (including uncertainties and limitations) associated with current and potential interim proxy reference points, recognizing that there is no model for this stock.
- Evaluate the impact of maintaining and increasing current harvest levels.
- Establish a full assessment review period as well as interim-year guidance.
- Provide guidance on inter-framework review activities.

Expected Publications

- Science Advisory Report
- Research Document
- Proceedings

Expected Participation

- Fisheries and Oceans Canada (DFO) (Science, Fisheries Management)
- Provincial Department of Fisheries and Land Resources
- French Research Institute for Exploitation of the Sea (IFREMER)
- Academia
- Indigenous groups
- Fishing Industry
- Non-government organizations

References

DFO. 2016. [Stock Assessment of NAFO Subdivision 3Ps White Hake \(*Urophycis tenuis*\)](#). DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2016/009.

APPENDIX II: TERMS OF REFERENCE - 3LNOPS MONKFISH STOCK ASSESSMENT

Regional Peer Review - Newfoundland and Labrador Region
November 1, 2017
St. John's, NL
Chairperson: Katherine Skanes

Context

The status of the Monkfish stock in Northwest Atlantic Fisheries Organization (NAFO) Divisions 3L, 3N, 3O and Subdivision 3Ps was last assessed in 2003 ([2003/045](#)). There is a directed fishery for Monkfish in Divisions 3L, 3N, 3O and Subdivision 3Ps with no associated Total Allowable Catch (TAC). The current assessment is requested by Fisheries Management to inform the development of management measures for the stock.

Objectives

- Assess and report on the status of the stock based on commercial fishery statistics (overall landing distribution, breakdown by fishing gear and directed species) and biological data resulting from the commercial sampling program (size structure).
- Analyze historical data from the research surveys up to 2017 (abundance index, biomass, recruitment, size structure and geographical distribution of catches).
- Provide qualitative descriptions of risks (including uncertainties and limitations) associated with current and potential interim proxy reference points, recognizing that there is no model for this stock.
- Evaluate the impact of maintaining and increasing current harvest levels.
- Establish a full assessment review period as well as interim-year guidance.
- Provide guidance on inter-framework review activities.

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- Provincial Department of Fisheries and Land Resources
- French Research Institute for Exploitation of the Sea (IFREMER)
- Academia
- Indigenous groups
- Fishing Industry
- Non-government organizations

References

DFO. 2003. [Monkfish in Divisions 3L, 3N, 3O and Subdivision 3Ps](#). DFO Can. Sci. Advis. Sec. Stock Status Rep. 2003/045.

APPENDIX III: AGENDA
REGIONAL PEER REVIEW – 3LNOPs MONKFISH AND 3Ps WHITE HAKE STOCK ASSESSMENTS

Chair: Katherine Skanes
November 1, 2017
Memorial Room, Northwest Atlantic Fisheries Centre

| Time | Topic |
|-------------|--|
| 09:00 | Opening remarks and overview of Regional Peer Review Process |
| - | Environmental/Oceanographic Overview |
| - | 3Ps White Hake <ul style="list-style-type: none">• Review of commercial data• Review of survey data• Proxy reference points• Drafting of summary bullets for Science Advisory Report |
| 12:00 | LUNCH |
| 13:00 | 3LNOPs Monkfish <ul style="list-style-type: none">• Review of commercial data• Review of survey data• Proxy reference points• Drafting of summary bullets for Science Advisory Report |
| - | Conclusions and Research Recommendations |
| - | Upgrading of Working Paper to Research Document |
| - | Closing remarks |

Notes:

- Health breaks will occur at 10:30 a.m. and 2:30 p.m.
- Lunch (not provided) will normally occur 12:00-1:00 p.m.
- Agenda remains fluid and may change.

APPENDIX IV: LIST OF PARTICIPANTS

| Name | Affiliation |
|-------------------|---|
| Erika Parrill | DFO – Centre for Science Advice |
| Shelley Dwyer | Provincial Department of Fisheries and Land Resources |
| Chelsea Boaler | Rapporteur |
| Katherine Skanes | Chair |
| Mark Simpson | DFO – Science |
| Carolyn Miri | DFO – Science |
| Divya Varkey | DFO – Science |
| David Coffin | DFO – Resource Management |
| Gary Maillet | DFO – Science |
| Eugene Colbourne | DFO – Science |
| Chelsea Karbowski | Ecology Action Centre |
| Brian Healey | DFO – Science |
| Bob Rogers | DFO – Science |
| Danny Ings | DFO – Science |
| Fran Mowbray | DFO – Science |