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Newfoundland and Labrador, Ontario and Prairie, Arctic, Gulf, Maritimes, and Quebec Regions

Proceedings of the Zonal Peer Review of the Updated Assessment of Northern Wolffish, Spotted Wolffish, and Atlantic Wolffish Related to Population Status, Life History, and Habitat

Meeting dates: January 17–18, 2023
Location: St. John's, NL and Virtual Meeting

Chairpersons: James Meade and Erika Parrill
Editor: Roanne Collins

Science Branch
Fisheries and Oceans Canada
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Canada

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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Aussi disponible en français :

MPO. 2024. Compte rendu de l'examen par les pairs zonal sur l'évaluation mise à jour du loup à tête large, du loup tacheté et du loup atlantique en ce qui concerne l'état des population, le cycle biologique et l'habitat; du 17 au 18 janvier 2023. Secr. can. des avis sci. du MPO. Compte rendu 2024/029.

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SUMMARY

This Proceedings Report summarizes relevant discussions, recommendations, and conclusions from the Fisheries and Oceans Canada (DFO) Canadian Science Advisory Secretariat (CSAS) Zonal Peer Review to provide an updated assessment of Northern Wolffish, Spotted Wolffish, and Atlantic Wolffish through analyses of the most recent data on population status, life history, habitat use, and interactions with commercial fisheries.

The hybrid meeting was held January 17–18, 2023 with participants attending in St. John's, Newfoundland and Labrador (NL) and virtually via Microsoft Teams.

The science advice from this process will inform the Aquatic Ecosystem Branch's activities and support the Species At Risk (SAR) Program's development of the five-year progress report (2018–23) on the status of the species and progress on meeting the objectives in the Recovery Strategy and Management Plan for Wolffish.

The conclusions and advice resulting from this meeting will be provided in the form of a Science Advisory Report (SAR) and a supporting Research Document (RES), to be available on the CSAS website.

PRESENTATIONS AND DISCUSSION

NEWFOUNDLAND AND LABRADOR (NL) REGION METHODS AND RESULTS

Presenter: L. Mello

Presentation Summary

The status of the three wolffish species in the NL Region was examined through data obtained from annual DFO research vessel (RV) surveys in spring (1971–2021) and fall (1977–2021), commercial landings from Northwest Atlantic Fisheries Organization (NAFO) STATLANT-21A (1960–2021) and NL-ZIFF (1985–2021) databases, at-sea fisheries observer (ASFO) data (1985–2021), and Species at Risk Act (SARA) logbooks (2008–19).

DFO-NL RV spring surveys covered NAFO Divisions (Div.) 3LNO and Subdivision (Subdiv.) 3Ps, while fall surveys covered Div. 2HJ3KLNO. Changes in both vessel and sampling gear, as well as stratification scheme, have occurred over time, and no conversion factors for wolffish were derived, so each series must be considered independently. These data were used to estimate indices of abundance and biomass, distribution, population size composition, growth, maturity, and an index of physiological condition.

Stratified abundance and biomass indices for both spring and fall were presented for the three wolffish species by bioregion/ecosystem production unit. Northern Wolffish abundance and biomass indices were highest in Div. 2J3K, and have varied without trend in both spring and fall since the introduction of the Campelen trawl in 1995/96. Atlantic Wolffish abundance and biomass indices were highest in 2J3K and 3LNO and have varied without trend in both spring and fall since the introduction of the Campelen trawl in 1995/96. Spotted Wolffish abundance and biomass indices were highest in Div. 2J3K.

Composite maps of wolffish distribution throughout all five DFO Regions were presented. Northern Wolffish tended to be concentrated on the Southern Labrador Shelf and Northeast Newfoundland Shelf, along the edge and the deep channels, as well as Div. 0B, including the slopes of Baffin Basin, suggesting that the stock may continue on the Greenland side of the basin. Atlantic Wolffish was concentrated in the NL Region, but fairly widespread through the other Regions, making it the most broadly distributed of the three species. Spotted Wolffish distribution was very similar to Northern Wolffish, but tended to occur more frequently in Div. 4S than Northern Wolffish.

Since the introduction of the Campelen trawl, the majority of Northern Wolffish were caught between 200–1,100 m in all bioregions, at temperatures of 1–5°C. Atlantic Wolffish tended to be caught in shallower water, mostly at depths of 50–350 m, and at temperatures 1–4°C. Most Spotted Wolffish were caught between 200–400 m, at temperatures of 1–4°C. The warmer water captures for both Atlantic and Spotted Wolffish generally occurred in Subdiv. 3Ps.

From 2001–03, almost 1,500 specimens were collected and used to estimate new parameters using models for age- and length-at-maturity, as well as growth. These were generally consistent with the range of values found in published studies.

Commercial fisheries data used in the assessment were largely unspeciated, with the exception of ASFO and SARA logbook data, both of which were inadequate to assess fishing mortality by species. Landings have been negligible since the last assessment. Most interactions with commercial fisheries occurred in areas where the wolffish stocks are centered, primarily along the slopes of the continental shelf and deep channels and, to a lesser extent, over the southern

Grand Bank and the remaining portions of the study area. SARA logbook data suggested that mobile gear fisheries resulted in more wolffish mortality than fixed gear fisheries.

Discussion

- Participants noted that, given that the fall survey is conducted at much greater depths, caution must be employed when comparing data from the two surveys, especially in areas of spatial overlap (i.e., Div. 3LNO). Further adjustments to the manner in which the data are presented, to account for these differences, as well as the changes in survey gear over time, may be useful in terms of identifying trends.
- There was some discussion regarding the possibility that the Northern Wolffish stock continues into Greenland, and one expert felt as though this was likely, though further investigation would be required to confirm.
- It was suggested that future analyses using DFO-NL RV survey data aim to employ novel methods (e.g., the use of extrapolation) to account for the lack of data that has arisen from gaps in survey coverage.
- Participants discussed the inability of the survey to cover inshore areas where water is shallow, which means that abundance and biomass, especially for Atlantic Wolffish, are being slightly underestimated each year. However, this was not thought to be cause for concern when examining survey indices.
- Concerns were raised about the very low levels of ASFO coverage in NL Region commercial fisheries, which were inadequate to assess levels of bycatch and estimate subsequent mortality.
- It was noted that interactions with some fisheries may be limited given the difference between wolffish depth and temperature preferences and those of the targeted species, but more ASFO data would be required to confirm this. While the introduction of the Nordmore grate (i.e., groundfish excluder) in the commercial shrimp fishery in the mid-1990s was intended to exclude larger groundfish species in trawls, ASFO data from this period indicated that a lot of very small wolffish were still being caught in the gear.

MARITIMES (MAR) REGION METHODS AND RESULTS

Presenter: L. Tsitrin

Presentation Summary

The status of the three wolffish species in the MAR Region was examined primarily through catch data from DFO RV surveys, commercial landings from NAFO STATLANT-21A (1960–2021) and DFO-NS MARFIS databases (2002–21), ASFO data (1985–2021), and SARA logbooks (2006–22).

The summer RV survey (1970–2021) covers NAFO Div. 4VWX, as well as some sections of 5Y and the Canadian portion of 5Z inconsistently. The winter survey (1987–2021) covers Div. 5Z, and focuses on the Canadian side of Georges Bank. No conversion factors exist to account for any vessel or gear changes that have occurred over time. Northern Wolffish and Spotted Wolffish are caught infrequently in these surveys, and none have been captured since the last assessment in 2014.

Collectively, RV survey data suggested that the abundance of Atlantic Wolffish in the Region remains low relative to historic values. Average annual abundance since the last assessment in 2014 has been around 1 million individuals for the Scotian Shelf, and around 7 thousand

individuals for Georges Bank. There are two centres of distribution, in Div. 4V and Div. 4X. The RV surveys have predominantly caught specimens smaller than 60 cm, with a possible trend towards decreasing size in recent years, though a survey gear change may be responsible for this. Most wolffish were caught in water temperatures of 2–6°C on the Scotian Shelf and 4–5°C on Georges Bank, with salinity ranges of 32.5–33.5 ppt and 32.6–33.1 ppt, respectively.

Commercial catches of all three species combined averaged less than 3 t per year over the last decade. Mobile gear accounted for the largest proportion of landed wolffish, followed by bottom longline. Wolffish were discarded as bycatch in many groundfish bottom longline and otter trawl fisheries. The return rate of SARA logbooks is low, and accuracy is thought to be lacking. The current levels of ASFO coverage are inadequate for determining the level of fishing mortality.

Discussion

- Participants noted some changes in the patterns of fisheries interactions over time, with more trawl catches earlier in the time series, and more longline catches later. This is likely due to inconsistent, and declining, ASFO coverage over time.
- There was some discussion about potential distribution changes as a consequence of climate change/ocean warming, which may be pushing wolffish into more northern waters, out of the survey area, as well as a general caveat about comparing survey data from different Regions when examining distributions. The MAR Region is traditionally thought of as the southern limit of distribution for Atlantic Wolffish, based on survey data from U.S. and Canadian waters that were combined in the late-1990s. Catches on Georges Bank are generally low, but the MAR RV surveys, and especially those conducted on Georges Bank, trawl in relatively shallow water, unlike the NL Region surveys for example, which go to depths of up to about 750 m in spring and 1,500 m in fall.

ARCTIC REGION METHODS AND RESULTS

Presenter: S. Fulton

Presentation Summary

Information on the three wolffish species in the Arctic was obtained from two surveys: a DFO multispecies survey in NAFO Div. 0AB and an industry shrimp survey in Shrimp Fishing Areas 2 and 3, also known as the Eastern and Western assessment zones. Commercial fisheries data from ASFOs were also available; the fisheries in this Region are characterized by a relatively high level of ASFO coverage.

Overall, absolute catches of all three species of wolffish in both surveys were low. Northern Wolffish were the largest species on average and, although they were consistently encountered in both surveys, catch varied without a clear trend. Spotted Wolffish were encountered more frequently in the shrimp survey, and found in higher densities at shallower depths than the other two species. Atlantic Wolffish were encountered only in the shrimp survey, and had the lowest average biomass for all three species, along with the smallest average size per individual.

There were no clear trends in biomass for any of the three wolffish species in the Arctic, but the survey timeseries were relatively short compared to other Regions and did not provide sufficient information to calculate historic biomass.

ASFO data for mobile gear indicated increasing reports of Northern Wolffish catch in more recent years, although absolute reported catch was low relative to other areas. Reported catches of Spotted and Atlantic Wolffish were less than 10 t annually since 2000, and often below 2 t.

Discussion

- A general discussion of data limitations for the three wolffish species occurred, based on what had been presented from three DFO Regions. In the case of the Arctic, data from both surveys are complicated by a relatively short time series and somewhat inconsistent coverage, both spatially and temporally. This is in contrast to both the MAR and NL Regions, which have lengthy time series for their respective DFO RV surveys, but very low ASFO coverage. Consequently, serious thought should be given to the extent to which DFO Science can adequately address the Terms of Reference (ToR) objectives. Fishing mortality is not being effectively monitored, limiting the ability to draw meaningful conclusions about the impact of bycatch. Since this was also raised in the last assessment, it was thought important to reiterate, and emphasize this concern.

QUEBEC REGION METHODS AND RESULTS

Presenter: M. Beaudry-Sylvestre

Presentation Summary

Information on wolffish in the estuary and northern Gulf of St. Lawrence (NAFO Div. 4RST) was obtained from the annual DFO RV survey conducted each August (1990–2021). Vessel/gear changes have occurred over time, but a conversion factor to account for changes in wolffish catchability were derived. Commercial fishing data were obtained from NAFO STATLANT-21A (1960–2021) and NL-ZIFF (1985–2021) databases, as well as the ASFO program (1989–2021).

Estimates of abundance and biological status were derived from the RV surveys, and corrected for differences in survey catchability between the two different vessels used. Since the last assessment in 2014, the RV-based indices of stock size have remained stable at around 2.0 and 0.1 individuals/tow for Atlantic and Spotted Wolffish, respectively; no new captures have been reported for Northern Wolffish.

Biological results were generally consistent with observations made in the NL Region, with Atlantic wolffish having exhibited a narrower length distribution (dominant: 15–25 cm; full range: 5–89 cm) in comparison with the less frequently observed Spotted Wolffish (dominant: 10–100 cm; full range: 8–151 cm).

Commercial fisheries removal data from NAFO STATLANT-21A and DFO-ZIFF databases were largest for unspeciated wolffish along the west coast of Newfoundland (Div. 4R), but reported removals have remained negligible since the early 2010s. Existing data from the ASFO program indicated wolffish interactions with bottom trawl and longline fisheries targeting co-occurring groundfish species (e.g., Atlantic cod, redfish, and Atlantic Halibut), though neither the extent of coverage nor the quality/representativeness of available trips were known.

Discussion

There were no follow up questions, and no discussion ensued from this particular presentation.

GULF REGION METHODS AND RESULTS

Presenter: F.-É. Sylvain

Presentation Summary

Information on wolffish in the Southern Gulf of St. Lawrence (NAFO Div. 4T) was obtained from a DFO RV survey conducted annually in September (1971–2022). Vessel/gear changes have

occurred in the RV survey over time, and no conversion factor to account for changes in wolffish catchability were derived, due to low abundance/catches of wolffish species in this area. Commercial fishing data were obtained from the ASFO program.

Based on RV survey data, Atlantic Wolffish were about 10 times more abundant than the other two wolffish species combined. In total, 667 Atlantic Wolffish were caught in the RV survey since its inception, compared to 25 Spotted Wolffish and 41 Northern Wolffish. Most Atlantic Wolffish were caught in water temperatures of 0–6°C and at depths between 100 and 175 m. The average size of Atlantic Wolffish in the RV surveys was 37 cm; most specimens ranged from 25–55 cm.

ASFO data indicated that catches of Northern Wolffish in commercial fisheries were generally higher than catches of Atlantic Wolffish or Spotted Wolffish.

Discussion

- Participants noted that wolffish were caught relatively infrequently in the RV survey, compared to commercial fisheries in this area. This was likely because the survey is conducted in shallow waters, and many commercial fisheries operate in deeper waters where wolffish are more likely to be found.
- The extent of ASFO coverage in this Region was discussed. It was mentioned that ASFO coverage ranges from 5–10%, depending on the fishery.

THREATS

- Changes to thermal habitats can have direct and indirect effects. Wolffish have fairly narrow thermal tolerances and a large number of positive anomalies in seafloor temperature have been frequently recorded over the past decade or so. Ocean warming is forecasted as climate change intensifies, which may render some existing habitats unusable. Ocean warming may also change, or expand the distribution of other species, including aquatic invasive species, which may colonize wolffish habitat and consume them, or compete for resources.
- Commercial fisheries are probably still the most significant threat to all three species, as they can result in bycatch mortality. Existing data gaps make it impossible to assess impacts in any meaningful way.
- Other potential threats such as seismic programs, oil and gas exploration and development drilling projects, aquaculture activities, and pollution have the potential to negatively impact wolffish and their habitats (e.g., habitat degradation, mortality of prey species).

CONCLUSIONS

The majority of the Northern Wolffish and the Spotted Wolffish stocks are centered in Div. 2J3K; the Atlantic Wolffish stock is concentrated in both Div. 2J3K and Div. 3LNO. These divisions include the broadest range of sizes and the largest proportion of adults and spawner components of the respective stocks for the entire study area and therefore likely contain optimal habitat for wolffish stocks.

There was a noticeable increase in stock size in the NL Region when the three wolffish species became protected under SARA legislation; Atlantic Wolffish and Spotted Wolffish stocks in the Quebec Region also improved. In general, this increase was not sustained, however Spotted

Wolffish in Div. 2H and 2J3K appear to have experienced some sustained increase based on recent RV survey data.

Most wolffish interactions with commercial fisheries occurred in the bioregions where the stocks are centered (i.e., primarily along with the slopes of the continental shelf and deep channels on the shelf). Based on SARA logbooks, the majority of wolffish species captured by mobile gears in the NL Region were recorded as dead upon release, whereas the opposite was observed in the case of the fixed gears.

DISCUSSION

- Participants discussed the extent to which SARA could be credited with any changes in wolffish stock status, and were generally reluctant to attribute with certainty any improvements in biomass or abundance indices to the legislation given that, a) the survey trawl data were characterized by a great deal of variability, and large error bars around annual estimates of abundance and biomass made it difficult to infer trends in any direction, and b) the life history of wolffish species is characterized by slow growth and late maturity, so any measurable response to management interventions would be slow to become apparent.
- Participants also noted that the most noticeable increases in biomass and abundance appeared to happen earlier in the NL Region (i.e., the mid to late-1990s), and were associated with the switch to the Campelen trawl in the survey. The lack of survey conversion factors for wolffish in the NL Region make it impossible to determine if any increases in this period truly reflected a change in stock size.
- Given the large, often overwhelming, amount of data from various sources that were assembled for this CSAS process, it was suggested that a synthesis of sorts be prepared, based on the traffic light approach, in order to efficiently summarize the various data sources and WP authors' level of confidence in them.

RESEARCH RECOMMENDATIONS

1. Explore biomarkers to track larval wolffish dispersal.
2. Collect life history and trophic data from wolffish during RV surveys to compare to the 2001–03 data set in order to work toward a stock assessment model (may require science experimental licence/SARA permit to retain dead wolffish specimens).
3. Evaluate the association of the NL Climate Index and large-scale indices of community composition with wolffish biomass and abundance.
4. Conduct a genetic analysis of Regional populations of wolffish to determine stock structure and subpopulations (see Johnstone et al. 2007).
5. Conduct a tagging study to evaluate post-release mortality.
6. Investigate possible connections between prey availability and wolffish biomass and abundance.
7. Complete a quantitative analysis of trends in RV data over time; plot these data with standardized means.
8. Conduct an age verification study using wolffish otoliths.

SOURCES OF UNCERTAINTY

- The lack of detailed fishery monitoring data, whether due to the absence of speciation in NAFO STALANT, DFO-ZIFF, and DFO-MARFIS databases, or the very limited ASFO coverage in most Atlantic Canadian fisheries, precludes a comprehensive understanding of the extent of ongoing fishing mortality of the three wolffish species that occur as bycatch in both fixed and mobile gear fisheries targeting a variety of other fish and invertebrate species. SARA requires release of both Northern and Spotted Wolffish when they are caught, but the extent and frequency of post-release mortality is poorly understood.
- There is no assessment model for wolffish in Canada, due to a lack of understanding of life history (e.g., growth, recruitment).
- There is no knowledge regarding the potential use of breeding or nursery areas by any of the wolffish species.

REFERENCES CITED

Johnstone, K.A., Marshall, H.D., and Carr, S.M. 2007. Biodiversity genomics for Species At Risk: patterns of DNA sequence variation within and among complete mitochondrial DNA genomes of three species of Wolffish (*Anarhichas* spp.). Can. J. Zool. 85(2): 151–158.

APPENDIX 1: TERMS OF REFERENCE

Updated Assessment of Northern Wolffish, Spotted Wolffish, and Atlantic Wolffish Related to Population Status, Life History, and Habitat

Zonal Peer Review - Newfoundland and Labrador, Ontario and Prairie, Arctic, Gulf, Maritimes, and Quebec Regions

January 17–18, 2023
St. John's, NL and Virtual Meeting

Co-Chairpersons: James Meade and Erika Parrill

Context

A request was submitted by the Ecosystems Management Branch for an analysis of the most recent data on the status of Northern, Spotted, and Atlantic Wolffish populations and life history (i.e., relevant and available updates since the last recovery strategy/management plan progress report (2013–18) (Fisheries and Oceans Canada in approvals). The recovery strategy and management plan (Fisheries and Oceans 2020) identifies the following science-related recovery objectives, which are relevant to impacts of activities that may be mitigated through human intervention: enhance knowledge of the biology and life history of wolffish species; identify, conserve, and/or protect wolffish habitat required for viable population sizes and densities; reduce the potential of wolffish population declines by mitigating human impacts; and promote wolffish population growth and recovery.

Fisheries and Oceans Canada (DFO) is responsible for reporting on the progress every five years from the date of posting a final recovery strategy. The information will be used by the Species At Risk (SAR) Program to support development of the five-year progress report (2018–23) on the status of the species and progress on meeting the objectives in the Recovery Strategy/Management Plan for wolffish.

Objectives

Update the assessment of Northern Wolffish, Spotted Wolffish, and Atlantic Wolffish through analyses of the most recent data on population status, life history, habitat use, and interactions with commercial fisheries.

Expected Publications

- Science Advisory Report
- Proceedings
- Research Document

Expected Participation

- DFO (Ecosystems and Oceans Science, Species At Risk, Ecosystems Management, Fisheries Management)
- Fisheries, Forestry and Agriculture NL
- Academia
- Aboriginal communities/organizations
- Fishing Industry
- ENGOs

- Other invited experts

References

Collins, R.K., Simpson, M.R., Miri, C.M., Mello, L.G.S., Chabot, D., Hedges, K., Benoît, H., McIntyre, T.M. 2015. Assessment of Northern Wolffish, Spotted Wolffish, and Atlantic Wolffish in the Atlantic and Arctic Oceans. DFO Can. Sci. Advis. Sec. Res. Doc. 2014/034. iv + 86 p.

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Fisheries and Oceans Canada. 2020. Recovery Strategy for Northern Wolffish (*Anarhichas denticulatus*) and Spotted Wolffish (*Anarhichas minor*), and Management Plan for Atlantic Wolffish (*Anarhichas lupus*) in Canada. Fisheries and Oceans Canada, Ottawa. vii + 81 p.

APPENDIX 2: AGENDA

Zonal Peer Review Meeting – Newfoundland and Labrador, Ontario and Prairie, Arctic, Gulf, Maritimes, and Quebec Regions

Updated assessment of Northern Wolffish, Spotted Wolffish, and Atlantic Wolffish related to population status, life history, and habitat

January 17–18, 2023; 11:00-5:00 NST

Memorial Room, NAFC, St. John's, NL and Virtual Meeting

Co-Chairpersons: James Meade and Erika Parrill

Tuesday, January 17

Time	Activity	Presenter
11:00	Newfoundland and Labrador A/RDS Opening Remarks	*B. Healey*
11:15	Introduction/Review Terms of Reference	*Co-chairs*
-	RV Surveys • Indices of stock size and distribution • Habitat and biological characteristics of wolffish inferred from RV Survey catch • Commercial Fisheries • Landings/bycatch by fleet and gear • SARA logbooks	*L. Mello*
-	Maritimes Survey Results	*L. Tsitrin*
-	Arctic Survey Results	*S. Fulton*
-	Gulf Survey Results	*F.-E. Sylvain*
-	Quebec Survey Results	*M. Beaudry-Sylvestre*
-	Threats and Decline	*All*
-	Data limitations for estimating Total Allowable Harm	*All*
-	Discussion	*All*

Wednesday, January 18, 2023

Time	Activity	Presenter
11:00	Conclusions and Summary Bullets	*All*
-	Research Recommendations	*All*
-	Upgrading of Working Paper and Next Steps	*H. Rockwood*
-	Adjourn	-

APPENDIX 3: LIST OF PARTICIPANTS

Name	Affiliation
Erika Parrill	DFO-NL – Science (Co-chair)
James Meade	DFO-NL – Science (Co-chair)
Hilary Rockwood	DFO-NL – Centre for Science Advice
Luiz Mello	DFO-NL – Science (Lead)
Carolyn Miri	DFO-NL – Science
Daphne Themelis	DFO-MAR – Science
Emilie Novaczek	DFO-NL – Science
Eugene Lee	DFO-NL – Centre for Science Advice
François-Étienne Sylvain	DFO-Gulf – Science
Frédéric Cyr	DFO-NL – Science
Hannah Munro	DFO-NL – Science
Jenni McDermid	DFO-Gulf – Centre for Science Advice
Koren Spence	DFO-MAR – Resource Management
Liza Tsitrin	DFO-MAR – Science
Manon Cassista-Da Ros	DFO-MAR – Science
Manuelle Beaudry-Sylvestre	DFO-Quebec – Science
Mark Simpson	DFO-NL – Science
Paige Crowell	DFO-MAR – Ecosystems Management
Pierre Pepin	DFO-NL – Science
Roanne Collins	DFO-NCR – Science
Robert Deering	DFO-NL – Science
Samantha Fulton	DFO-O&P – Science
Sean Macneill	DFO-NL – Ecosystems Management
Sue Forsey	DFO-NL – Ecosystems Management
Ian Ivany	Fish, Food and Allied Workers Union
Rob Coombs	NunatuKavut Community Council
Brynn Devine	Oceans North
Rasmus Nygaard	Greenland Institute of Natural Resources