



NAMMCO ANNUAL MEETING 30

29-30 March 2023
Rødbanken, Tromsø

MEETING OF THE COUNCIL

DOCUMENT 08	REPORT OF THE SCIENTIFIC COMMITTEE
Submitted by	Scientific Committee (SC)
Action requested	<p>Management Committees:</p> <ul style="list-style-type: none"> - Consider the management advice proposed by the SC and decide whether to forward this to the Member Countries. - Determine whether to endorse new proposals for conservation and management, and recommendations for research. <p>Council:</p> <ul style="list-style-type: none"> - Consider the proposed work plan. - Consider the concerns of the SC pertaining to the situation of narwhal and beluga in Southeast Greenland
Background	<p>The SC held its 29th meeting at the Greenland Representation in Copenhagen the 23-26 January 2023.</p> <p>The SC questioned the credibility of NAMMCO in relation to the narwhal and beluga situation in SE Greenland (item 5.1, see discussion in page 3 of the SC report).</p> <p>This report does not include the Working Groups reports, which were made available, in agreement with the rules of procedures, on the NAMMCO website after completion of the meetings at https://nammco.no/scientific-working-group-reports/.</p>

NAMMCO



30 Years: 1992 - 2022

29TH MEETING OF THE NAMMCO SCIENTIFIC COMMITTEE

*January 23 – 26, 2023
Greenland Representation, Copenhagen*

REPORT

Presented to the 30th Meeting of the Council as NAMMCO/30/08



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NAMMCO

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EXECUTIVE SUMMARY

The 29th meeting of the NAMMCO Scientific Committee (SC) was held at the Greenland Representation in Copenhagen on January 23 – 26, 2023. The meeting was chaired online by Aqqalu Rosing-Asvid (GL) with assistance from vice-Chair Sandra Granquist (IS) and with the participation of observers from Japan.

An overview of all recommendations made by SC29 are compiled in Appendix 5 of the report. This includes recommendations for conservation and management – including those pertaining to sustainable removals, recommendations for research, and procedural recommendations and follow-ups.

Welcome and Opening Remarks (Item 1-4)

The Chair welcomed participants and observers to the meeting and remembered former SC member Gísli A. Víkingsson, who unexpectedly passed away in July 2022. NAMMCO General Secretary, Geneviève Desportes, gave a memorial speech.

National progress reports (NPRs) were received from all NAMMCO countries, as well as written reports from Japan and the Makivik Corporation. Observers from Japan gave a presentation on their satellite tagging experiments. A list of all documents available to the meeting is provided in Appendix 3 to the report, including the reports from two Working Groups (WGs) and a Workshop: The By-Catch Working Group (BYCWG), the Harbour Porpoise Working Group (HPWG), and the Joint NAMMCO-JCNB Disturbance Workshop (JDWS).

Updates from Council (Item 5)

An overview of comments and decisions taken by the NAMMCO Council 29 and relevant to the SC was presented. The SC was surprised to see that both the MCC and the Council were unable to act on the severity of the management situation for narwhals in Southeast (SE) Greenland. The SC was both concerned about the survival of the stock and about the credibility of NAMMCO as a responsible management organization. While recognizing that Greenland had the right not to follow the advice, the SC urged the MCC and Council to find a solution where they could act as a responsible management organization, endorsing the advice from the SC and still respecting the rights of Greenland to adjust the catch according to its domestic situation.

NASS Survey 2024 (Item 6)

In June 2022, the Secretariat applied on behalf of the NASS Scientific Planning Committee (SpC) for funding to the Norwegian Ministry of Foreign Affairs. Norway announced at the Council meeting 29 that the application had been successful, enabling the SpC to proceed with the plans as initially presented in the proposal. The SC recommended the SpC to contact the coordinators of SCANS and other recent Atlantic ship-based surveys to obtain detailed descriptions of the methods and equipment used.

Collaborative projects (Item 7)

During 2022, the MINTAG project made important progress in the design, production and testing of the tags. The project's website was launched in November 2022. Three new proposals of collaboration for additional tests of the MINTAG transmitters in 2024 on narwhal, bowhead and southern right whales were presented, as well as a fourth proposal from Japan to initiate a collaborative study focused on the role of baleen whales in the western North Pacific ecosystem. The SC recommended all collaborations with the MINTAG project be pursued under a contract with NAMMCO and that a group of SC members should discuss ideas and provide advice to Japan on the proposed collaborative study.

Interaction with Other Organisations (Item 8)

Updates were provided on NAMMCO interactions with ASCOBANS, Arctic Council, ICES, OSPAR, IWC, and JCNB. Given that OSPAR was conducting a public consultation regarding the inclusion of additional species and habitats in the NACES MPA, the SC *recommended* the Secretariat to prepare specific answers to the questions formulated by OSPAR based on its discussion and circulate them to the SC.

Environmental and Ecosystem Issues (Item 9)

Marine Mammal / Fisheries Interactions

The SC *recommended* that, after NASS2024, the abundance estimate working group examine the best way of looking at changes in species distribution and abundance using all NASS data.

By-Catch Working Group: The seventh meeting of the BYCWG focused on how best assessing the risk of marine mammal by-catch for the fisheries in the waters of NAMMCO. The SC *recommended* that the BYCWG and the Secretariat continue working in the defined tasks to achieve a by-catch risk assessment, noting that the BYCWG could not progress in its tasks until answers to data requests sent by the Secretariat were provided by Icelandic and Faroese Fisheries Departments.

Multi-species Approaches to Management and Modelling: The SC *recommended* that the MCJ consider responding to both requests R-1.1.9 and R-1.2.1 not a priority, due to the difficulties of implementing available ecosystem models, currently focused on fish, to the study of marine mammals.

Environmental Issues: The SC *recommended* that the MCs consider request R-1.5.4 as answered, as it would remain a standard agenda item in all WG meetings, and it would be regularly revisited by the SC.

Joint NAMMCO-JCNB Disturbance Workshop: The Workshop highlighted the sensitivity of narwhals to noise disturbance and concluded that displacement of any summer aggregation of narwhals could be anticipated if sustained shipping activities were planned in the fjord or inlet of that aggregation, also warning of the negative impacts of shipping on the energy budget and population dynamics of several arctic cetaceans and pinniped species. The SC *endorsed* the recommendations of the Disturbance Workshop and *recommended* that updates on the Mary River (Canada) and Dundas (Greenland) mining projects be reviewed in relevant WGs. The SC also *recommended* that the report of the Disturbance Workshop be circulated to other organisations working in the Arctic and dealing with disturbance effects on wildlife.

Website Review (Item 10)

The SC reviewed the information provided on the NAMMCO website for grey seal, bowhead whale, white-sided and white-beaked dolphins.

Seal and Walrus Stocks (Item 11)

Bearded Seal: The NAMMCO Panarctic Bearded Seal Workshop (BSWS) will be held online the days 21-23 March 2023. The SC agreed that the BSWS should define the area for which an assessment could be conducted, and where abundance data would be most useful to progress with the assessment.

Ringed Seal: Plans for a ringed seal working group (RSWG) meeting in 2023 were presented. These consisted in scheduling several 1-2h online meetings during autumn, focussing on specific aspects required for the review/assessment and involving experts from NAMMCO countries and Canada. The SC agreed with the plan and *recommended* that the catch data be available to the upcoming RSWG meetings. It tasked the RSWG to define the area for which an assessment could be conducted, and where abundance data would be most useful to progress with the assessment.

Harbour & Grey Seal: The next meeting of the Coastal Seals Working Group (CSWG) was scheduled for 8-11 May 2023. The SC agreed on the Terms of Reference for the CSWG meeting.

Harp and Hooded Seal: The next meeting of the ICES/NAMMCO/NAFO WGHARP was planned for September 2023. Prior to this, improvements and advances of assessment models will be made through the planned joint ICES benchmark meeting in May 2023.

Walrus: The SC *endorsed* the recommendations from the Disturbance Workshop regarding walrus in Wolstenholme fjord (Greenland) and *recommended* that request R-2.6.3 be now considered as answered and that the Walrus WG meet in 2024.

Cetacean Stocks (Item 12)

Narwhal:

The next meeting of the Ad hoc Working Group on Narwhals in East Greenland (NEGWG) was scheduled for late autumn 2023. Updates on narwhal surveys conducted in SE Greenland in spring and summer 2022 were presented, and the SC was informed of the quotas given for narwhals in both East and West Greenland. The SC *strongly reiterated* a previous recommendation to implement a reduction to 0 catches of narwhal in all three management areas of East Greenland, firmly stressing the urgency of the situation, and expressing its concerns on the current quotas in West Greenland. Therefore, the SC *recommended* that the catch limits provided by the Joint NAMMCO-JCNB Working Group (JWG) for narwhal and beluga be followed. The SC also *endorsed* all the recommendations from the Disturbance Workshop regarding narwhals in Baffin Bay (Greenland and Canada).

Beluga:

The SC was informed that belugas observed in East Greenland were considered to belong to the Norwegian stock, based on genetic analysis of individuals caught in 2021. The SC was also informed that, starting from 2022, Greenland had introduced an annual quota of 30 landed belugas in East Greenland, and that the quota for 2021-2028 in Qaanaaq (Northwest Greenland) was 29 whales per year. Given that information, SC29 *reiterated* previous recommendations on beluga catches and protection from SC28 and *recommended* that the next NEGWG meeting reviews the situation of belugas in East Greenland with participants from Norway.

Harbour Porpoise: The third meeting of the Harbour Porpoise Working Group (HPWG) took place in Oslo in November 2022 and focused on updating knowledge and producing an assessment of harbour porpoise in Norwegian waters. The WG concluded that Norwegian by-catch of harbour porpoise was unsustainable and recommended Norway to reduce by-catch of harbour porpoises and improve the available data for a new assessment. The SC *endorsed* the recommendations from the HPWG. The SC agreed that catch levels of harbour porpoise in Greenland were deemed unsustainable and noted that previous management advice had not been implemented; the SC *recommended* it be implemented. The SC also strongly encouraged Iceland to conduct a new survey on harbour porpoise as soon as possible.

Dolphins: A Dolphins Working Group (DWG) meeting was scheduled for autumn 2023 and the SC agreed on its Terms of Reference. Available data for the assessment of *Lagenorhynchus* dolphins in all NAMMCO countries had been reviewed at the HPWG meeting in 2022 and the SC *endorsed* the recommendations from the HPWG concerning *Lagenorhynchus* data. The SC urged the Faroe Islands and other involved countries to complete the necessary data analyses ahead of the scheduled DWG meeting.

Pilot Whale: The SC *endorsed* the recommendations from the HPWG concerning pilot whale data needs for the upcoming assessment and noted that the required data should be ready well ahead of the meeting for a successful assessment. The SC *recommended* the PWWG to be further postponed to 2025, so a new abundance estimate from the NASS2024 survey would be available for the assessment.

Northern Bottlenose Whale: Norway informed the SC that an abundance estimate for this species could be expected in April 2023.

Killer Whale: The SC noted that previous management recommendations made by SC25 on killer whales in Greenland were not followed and that the hunt was still not regulated. SC29 *reiterated* those previous recommendations and *recommended* that Greenland regulate the hunt and restrict quotas in a precautionary way. The SC also *recommended* furthering sampling efforts in all NAMMCO countries, as well as further analyses of pollutant levels and genetic analyses to help determine stock structure.

Research updates on **Beaked Whales, Blue Whale, Bowhead Whale, Common Minke Whale, Fin Whale, Humpback Whale, and Sperm Whale** were provided, also in the form of For Information documents submitted to the meeting.

Management Procedures (Item 13)

Following discussions initiated at SC28, the SC29 agreed on 8 principles for the incorporation of a precautionary approach in the management of cetaceans and pinniped stocks within NAMMCO. The SC *recommended* that these principles be adopted by the MCs (Box 1).

Box 1. SC 29 recommendation pertaining to integrating a precautionary approach.

SC 29 principles for integrating a precautionary approach in NAMMCO's management of cetaceans and pinniped stocks:

- 1) Anthropogenic removals of marine mammals should be assessed for sustainability.
- 2) Sustainable management actions should be to maintain or restore stocks at levels ideally above 60% of their equilibrium in the absence of anthropogenic removals, disturbance, and resource competition.
- 3) Stocks that are depleted below 60% should be managed to increase so that they can recover to the 60% level in a reasonable time period. For example, by having total removals that ensure at least a 70% probability of increase.
- 4) Stocks that are small (<1000 individuals, unless there are more than 400 reproductive age females in the population) should be fully protected from exploitation unless a data-based assessment is able to recommend a sustainable hunt.
- 5) Management decisions should be based on the best available science, which may include hunter and user data and observations.
- 6) Where the best available science is insufficient the precautionary approach shall be widely applied, particularly for small stocks. With greater uncertainty more caution is required.
- 7) Acknowledging that halting all hunting of a stock may not be sufficient to promote recovery of a depleted or small stock, additional management actions should be considered.
- 8) All species assessments should include data requirements for future assessments.

Work Procedures (Item 15)

The SC discussed the potential advantage of the establishment of a technical WG on genetics in NAMMCO and agreed that a proper proposal and Terms of Reference be presented at the next SC meeting. Regarding SC meeting format, the SC *recommended* to continue with the current format of annual SC meetings instead of having recurrent shorter SC meetings during the year. Regarding the upcoming staff renewal at the secretariat in 2023, the SC agreed that the position should be filled with scientists having a natural science/marine mammal biology background and knowledge, as well as excellent writing skills.

NAMMCO Scientific Publications Update (Item 18)

Volume 12 “Marine Mammals in the North Atlantic” was published on December 30, 2022, and was dedicated to Gísli A. Víkingsson. It comprised 5 research articles, 2 reviews, 1 workshop report and 1 note. For the next volume, the SC agreed to continue the open call: “Marine Mammals in the North Atlantic Part II”.

Future Workplan, Budget & Other Business (Items 16, 17, 19)

The following workplan was agreed on, and the budget for 2023 and 2024 was revised accordingly.

2023	2024	2025
<p><u>WG and WS meetings:</u></p> <ul style="list-style-type: none">- Panarctic Bearded seal WS March (online)- Ringed seal WG (Several shorter meetings starting early fall, online)- Dolphins WG (Fall 2023)- Coastal seals WG (8-11 May)- Narwhal and Beluga in East Greenland WG (late 2023)- WGHARP (ICES-NAFO-NAMMCO): 4-8 September (Tromsø)	<p><u>WG and WS meetings:</u></p> <ul style="list-style-type: none">- Walrus WG- Harbour porpoise WG (Iceland)- NAMMCO-JCNB Joint WG	<p><u>WG and WS meetings:</u></p> <ul style="list-style-type: none">- Large Whale Assessment- Pilot whale- Abundance Estimate WG
<p><u>Other:</u></p> <ul style="list-style-type: none">- ICES Benchmark meeting on seal modelling: (Denmark) - May 2023- NASS SpC meetings (online)- MINTAG StG meetings (online)- MINTAG: testing on carcasses, Iceland summer- MINTAG: deployment field work, summer	<p><u>Other:</u></p> <ul style="list-style-type: none">- NASS SpC meetings- MINTAG StG meetings (online)- MINTAG: field work and analysis- NASS surveys	<p><u>Other:</u></p>

The 30th SC meeting will be held January 22 – 25, 2024. Iceland will be the host in 2024. The precise location will be determined at a later time.

Meeting Close (Item 20)

The meeting ended at 15:42 CET on January 26, 2023. A draft report was approved during the meeting and following minor revisions by correspondence, the final report was accepted on February 10, 2022.

MAIN REPORT

1. WELCOME FROM THE CHAIR AND OPENING REMARKS

The incoming Chair of the NAMMCO Scientific Committee (SC), Aqqalu Rosing-Asvid, welcomed participants and observers to the 29th meeting of the Committee. He had been unable to join the meeting physically and chaired the meeting online, with assistance from the SC vice-Chair Sandra Granquist. A round of introductions followed. The list of participants and observers to the meeting can be found in Appendix 1.

The Chair remembered former SC member Gísli A. Víkingsson, who unexpectedly passed away in July 2022. NAMMCO General Secretary, Geneviève Desportes, gave a memorial speech. Gísli was a member of the NAMMCO Scientific Committee since its first meeting, in January 1993. He had been an important contributor to the work of the SC, bringing to the Committee his particular interest in the effects of climate and environmental changes on whale distribution and ecology. Gísli was a dearly appreciated member and an entertainer of the Committee with his humour and beautiful and generous piano playing. He is warmly remembered for his personality, both professionally and personally. A minute of silence was shared in his memory.

2. ADOPTION OF AGENDA

Minor points of the draft agenda were modified, and the adopted agenda is available as Appendix 2. As a change to the agenda, the overview of all recommendations made by SC29 are compiled as Appendix 5 (see Item 4.3).

3. APPOINTMENT OF RAPORTEURS

The NAMMCO Scientific Secretary, Albert Chacón, was appointed as rapporteur for the meeting, with the assistance of the other members of the Secretariat (Desportes and NAMMCO intern, Jana Djukarić). All participants were asked to submit written summaries of presentations and interventions on agenda items as relevant.

4. REVIEW OF AVAILABLE DOCUMENTS

4.1 NATIONAL AND ANNUAL PROGRESS REPORTS

The SC welcomed the national progress reports provided by the Faroe Islands, Greenland, Iceland, and Norway, as well as the written reports on activities submitted by Makivik Corporation and Japan.

4.1.1 Updates from observers

The Progress Report 2022 by Japan consisted of four parts: SC/29/NPR/JP-2021-2022 a) on satellite tagging experiments, SC/29/NPR/JP-2021-2022 b) on large cetaceans, SC/29/NPR/JP-2020-2021 c) on small cetaceans. In addition, SC/29/FI26 included a collaborative research proposal to further understand the role of baleen whales in the western North Pacific. The document on satellite tagging experiment was presented and summarized under item 7.2 while the document on collaborative research proposal was summarized under item 7.3. A summary of the full Progress Report can be found in Appendix 4.

4.2 WORKING GROUP REPORTS

The reports of two working group meetings and a workshop that were held in 2022 were available for review of the SC:

- By-catch Working Group (SC/29/05)

- Harbour Porpoise Working Group (SC/29/06)
- Joint NAMMCO-JCNB Disturbance Workshop (SC/29/07). At the time of this SC meeting, the Disturbance Workshop report had not been made publicly available yet and was considered strictly confidential.

The list of documents can be found in Appendix 3.

4.3 OTHER REPORTS AND DOCUMENTS

Reports from the MINTAG Steering Group and the NASS Planning Group were also available, as well as other documents and several For Information documents.

The list of documents can be found in Appendix 3. A complete list of recommendations from this 29th SC meeting is available as Appendix 5. This includes recommendations for conservation and management – including those pertaining to sustainable removals, recommendations for research, and procedural recommendations and follow-ups.

5. UPDATES FROM COUNCIL

5.1 GENERAL COMMENTS

Desportes provided an overview of comments and decisions from Council 29 and from the Management Committee for Cetaceans (MCC), the Management Committee for Seals and Walrus (MCSW) and the Joint meeting of the Management Committees (MCJ) that directly concern the SC.

The Management Committees (MCs) had not been forwarded in 2022 any new recommendation from the SC for conservation and management directly related to sustainable catches. The MCC could not reach consensus on the endorsement of four recommendations from the SC reiterated from previous years on zero catches pertaining to beluga in East and West Greenland and narwhal in Southeast (SE) Greenland.

Other advice for Conservation and Management had been given by the MCJ, the MCC and the MCSW, related respectively to marine mammal - fisheries interactions, beluga and narwhal, and bearded seal. Notably, the Committee endorsed a recommendation on the inclusion of User Knowledge (related to Norway).

The Council endorsed the MCs recommendations for new research or data collection with implication for stock monitoring and management and concerning six topics.

- Marine Mammal - Fisheries Interactions: to Norway (1) and Iceland (2)
- Beluga: to Greenland (5 concerning both EGL and WGL)
- Narwhal: to Greenland (9 concerning both EGL and WGL)
- Killer whale: to NAMMCO (1)
- Long-finned pilot whale: to Faroe Islands (1)
- Bearded seal: Greenland (1)

The Council 29 endorsed one new request from advice from the Scientific Committee:

Request R-1.8.3 (active/ongoing): *Acknowledging the importance of the website as NAMMCO's main dissemination tool, and the value of the species pages, the Council requests the SC to continue its regular review of these pages following the procedure proposed by the SC26 (2019).*

As recommended by the SC, the Council endorsed the splitting of request R-1.1.8 (Ecosystem modelling) in request R-1.1.9 and R-1.1.10, and to rephrase request R-2.1.9 (Harp and hooded seals) and R-2.3.1 (Ringed seal).

Council 29 adopted the following data policy for the NAMMCO Scientific Publication:

NAMMCO Scientific Publications expects that data supporting the results in published articles is made publicly available and accessible through being archived in a public repository. Authors

should provide a data availability statement at the end of their article describing the availability or absence of open access to their supporting data. When data have been shared, authors are asked to include in their data availability statement a link to the repository they have used and the relevant reference number or persistent identifier for the shared data. Whenever possible, the scripts and other artefacts used to generate the analyses presented in the paper should also be publicly archived. If sharing data compromises ethical standards or legal requirements, authors are not expected to share it, although this should be justified and explained in the data availability statement.

The Council also adopted the Communication Plan 2023-2024, which will focus on disseminating how, NAMMCO commits to robust and responsible management through supporting and facilitating:

- High-quality independent scientific research projects, which are essential in generating the knowledge required for a sound management,
- Improved hunters' safety and animal welfare by producing tools contributing to the training of the hunters.

The anchors to the message, that should be rendered visible through the communication work, were:

- The two high quality independent scientific research projects that NAMMCO supports and coordinate, NASS 2024 and MINTAG,
- NAMMCO's continued support and engagement in hunters' training, with the present production of the training video series.

Specific focus groups for this plan will be journalists/media working on Arctic and environmental issues and youth, children and educators, member countries' educational networks.

Discussion:

The SC was surprised to see that both the MCC and the Council were unable to act on the severity of the management situation for narwhals in Southeast (SE) Greenland. As outlined in the SC letter of concern to Council of 28 January 2022, the recommendation of zero removals of narwhals in SE Greenland was strengthened in the last SC report due to the large risks of extirpation of narwhals in SE Greenland if hunting continues.

It is the view of the SC that NAMMCO must continue to strengthen the implementation of the precautionary approach, linking responsibility and precautionary management¹. While the SC is concerned about the survival of the stock it is also concerned that the credibility of NAMMCO as a responsible management organization is at risk unless NAMMCO reacts to the situation with direct management advice. The SC recognizes that Greenland has the right not to follow the advice. However, it urges the MCC and Council to find a solution where they can act as a responsible management organization, endorsing the advice from the SC and still respecting the rights of Greenland to adjust the catch according to its domestic situation.

SC 29 reiterates its recommendation that:

- *Greenland implements an immediate reduction to 0 catches of narwhal in all three management areas of East Greenland.*
- *Greenland implements seasonal closures for the hunt of belugas in West Greenland*
- *Greenland makes sure no hunting of belugas be allowed at any time in the area south of 65 degrees North in West Greenland.*
- *Greenland keeps belugas in East Greenland fully protected, as there is insufficient information to perform an assessment of belugas in East Greenland.*

¹ See under <https://nammco.no/resource-management/> and <https://nammco.no/responsibility/>

5.2 ENDORSED SC WORKPLAN

The Council endorsed the following workplan for the SC for 2022, 2023 and 2024 (Table 1), the meetings that have taken place are indicated in bold, in grey are online meetings). Following budget considerations, the Council limited the number of physical WGs the SC can hold in a year to four.

Table 1. SC Workplan endorsed by the Council 29.

2022	2023	2024 (tentative)
<p>WG & WS meetings:</p> <ul style="list-style-type: none"> - By-catch WG: May (online) - MINTAG design seminar: October (Denmark) - Harbour porpoise WG (NO + review of <i>Lagenorhynchus</i> sp. and pilot whale available data): November (Norway) - JWG WS on disturbance: November (Denmark) - Ringed & Bearded mini WG: November (online) 	<p>WG & WS meetings:</p> <ul style="list-style-type: none"> - Bearded seal WS / Jointly with CAFF/CBMP: March (online) - Ringed seal (tentatively & online) <p>Four of the following meetings in face-to-face</p> <ul style="list-style-type: none"> - Dolphins WG - Coastal seals WG - Narwhal and Beluga in East Greenland WG (late 2023) - Beluga tagging WS - <i>ICES Benchmark meeting on seal modelling: (Denmark) – postponed from Dec 2022 to May 2023 after CN29</i> - WGHARP (ICES-NAFO-NAMMCO): September (Tromsø) 	<p>WG & WS meetings:</p> <p>Four meetings in face to face</p> <ul style="list-style-type: none"> - Walrus WG - Large Whale Assessment WG - Harbour porpoise WG (IS) - Pilot whale WG
<p>Other:</p> <ul style="list-style-type: none"> - MINTAG StG meetings 3 & 4: February & September (online) - MINTAG: testing on carcasses: July (IS) - NASS SpC meeting: fall (online) 	<p>Other:</p> <ul style="list-style-type: none"> - NASS SpC meetings (online) - MINTAG StG meetings (online) - MINTAG: testing on carcasses - MINTAG: deployment field work 	<p>Other:</p> <ul style="list-style-type: none"> - NASS SpC meetings - MINTAG StG meetings (online) - MINTAG: field work and analysis - NASS surveys

5.3 UPDATE ON NAMMCO PROCESSES

Desportes presented a scheme summarizing the process for generating advice to Parties within NAMMCO, as well as a table showing which organisations provide management advice to NAMMCO Parties for the different marine mammal species.

The SC discussed the scheme presented. The SC suggested that NAMMCO mimic the process followed for fisheries. In that case, a Management Committee (MC) would not be needed, and the SC advice would go directly to parties, with the Users involved at that stage, but not before. It was also noticed that User Needs and User Knowledge were not the same and should be treated as separate boxes in the scheme; needs influence parties and MCs and knowledge influence scientific research.

Desportes indicated that each member of the MCs shall be represented by no more than three representatives, they could be accompanied by experts and advisers, and therefore that more scientists could attend the meetings as such; the composition was up to the Countries. The SC noted the scheme presented and the possibility to include more scientists in the country's delegation to the MCs.

6. NASS PLANNING

Rikke Guldborg Hansen presented an update on the planning of NASS 2024 (available as document SC/29/21 and 22).

Summary

The proposal for NASS24 with details on budget posts as requested by Council 28, was presented to the 29th council meeting in September 2022. Council had no further enquiries and noted that of the 9,810,000 NOK requested to conduct the subprojects outside the national monitoring schemes, NAMMCO will fund 580,000 NOK. In June, the Secretariat had submitted an application on behalf of the Scientific Planning Committee (SpC) for the full amount of funding to the Norwegian Ministry of Foreign Affairs in their Norwegian Arktis 2030 call. Norway announced at the Council meeting 29 that the application was successful and that NAMMCO has been granted 9,230,000 NOK. This will enable NASS 2024 to move ahead as planned in the initial proposal. The SpC has had one meeting online (24 November 2022) where the news was shared, and further planning discussed. The SpC agreed to proceed with the plans as initially presented in the proposal. The SpC had a meeting during SC29 and decided to have an online meeting in spring 2024 to discuss equipment review, external expert participation in survey design and analysis, and allocate survey effort to the extended survey areas (Jan Mayen, Faroes, East Greenland). Hansen informed that she had had contact with the coordinator of the SCANS IV survey, A. Gilles. The western block of SCANS IV that was contiguous to the NASS 24 area and should be covered by ship had not been covered in 2022. Funding had now been provided so it would be covered in 2024.

Discussion:

The SC **agreed** that coordination with the SCANS IV surveys was desirable when planning the NASS 2024 surveys and **recommended** that any effort be made for ensuring the NASS 24 survey area is contiguous with the 2024 SCANS IV ship survey block.

The SpC had considered that a review of the methodology and equipment used in surveys since the NASS 2015 survey was not necessary. The SC, however, **recommended** that Hansen contact the coordinator of the SCANS IV survey, Anita Gilles, to obtain the detailed description of the methodology and equipment used on the vessel survey during SCANS III (2016) and SCANS IV (2022, 2024). The SC also **recommended** that Hansen contacts the coordinators of other recent ship-based surveys, e.g., off Ireland, Portugal and off the eastern US coast, to get similar descriptions of the methods applied.

7. COLLABORATIVE PROJECTS

7.1 MINTAG PROJECT

Mads Peter Heide-Jørgensen, project leader, gave an overview of last year's MINTAG project activities and progress. Further updates and information can be found in meeting documents SC/29/16, SC/29/17, SC/29/18, and SC/29/19.

Summary

The MINTAG project passed four major milestones in 2022. First an agreement was reached with Wildlife Computers for a contract about the design and production of two types of satellite transmitters: One for fin whales and one for pilot and minke whales. Secondly, the group had a session at the Icelandic whaling station where different tag models, and carriers could be tested on dead fin whales. The third achievement was a workshop in Copenhagen with the Steering Group and the manufacturer where designs of tags were discussed and decided in detail. Finally, the project launched a website on 1 November that provides information about the initial development of the project.

Discussion

The SC was very pleased that this cooperative project was progressing well and thanked the Secretariat for its dedicated support. The SC was looking forward to the deployment of the first prototypes in 2023. Heide-Jørgensen suggested that internal documents to the MINTAG group be archived in a closed area on the MINTAG website or secretariat's SharePoint to which the StG would have access.

7.2 MINTAG COLLABORATIONS

Heide-Jørgensen presented three proposals of collaboration for additional tests of the MINTAG transmitters in 2024 on three species not targeted by the MINTAG project (available as document SC/29/20).

One proposal aims at using the unique opportunity for resightings of right whales in Argentina for collecting information on retention of the tags and wound healing around the tags (Heide-Jørgensen/Zerbini). Another proposal aims at testing the performance of MINTAG in comparison with previous tag designs on bowhead whales in Greenland (Heide-Jørgensen), and a third proposal aimed at testing the usefulness of the MINTAG on narwhal (Lydersen). All three proposed studies will be conducted in 2024 and all data from the studies will be provided to the MINTAG project for possible inclusion in the description of the performance of the MINTAG.

The three projects cited above would buy their own tags, therefore these collaborations would come with no extra cost to the MINTAG project.

Discussion:

The SC **agreed** that these collaborations were a good idea as long as they would contribute to the assessment of the MINTAG tag performance by the MINTAG project.

The SC therefore **recommended** that all collaborations be only pursued under a contract with NAMMCO, stipulating that all the data gathered which can contribute to the assessment of the MINTAGs performance, be made available to the MINTAG Steering Group (StG) for its assessment. Additionally, no results from these projects should be published until the StG has published the first results, describing the tag and its performance.

It was noted that the NAMMCO FAC and Japan, as funding bodies of the MINTAG project, had to decide on whether to support these collaborations and the form these collaboration should take; NAMMCO has exclusive rights to the tag until the end of Phase 3, i.e., the end of 2025. Luis Pastene, Japanese member of the MINTAG StG, informed that the Japanese observers were not in a position to approve or disapprove of the proposed collaborations. They needed to refer to the Japanese Fishery Agency.

Kenji Konishi present telemetry work conducted by Japan during the period 2021-2022 (available as document SC/29/NPR/JP-2021-2022a).

Summary

Japan presented the results of satellite tagging experiments conducted by the Institute of Cetacean Research (ICR) during 2022. The tagging experiments are conducted to respond to the questions on the movement and stock structure of baleen whales. In the Antarctic, satellite-monitored tags were deployed on the Antarctic minke whales (*Balaenoptera bonaerensis*) and fin whales (*B. physalus*) in the Pacific sector in January and February 2022. Antarctic minke whales showed wide longitudinal movements, and one individual showed a northward migration in the Pacific sector, arriving at a presumed breeding area. Tagged fin whales showed westward longitudinal movements north of the Ross Sea. In the Okhotsk Sea and the North Pacific, fin whales were tagged, and the tracks showed wide-range movements over the Pacific coastal area and Okhotsk Sea. Sei whales (*B. borealis*) were tagged at wide longitudinal range at 40-45°N in the western North Pacific in October and November. Several sei whales showed migration to lower latitude areas, suggesting possible breeding areas of the species. The tracks of two Bryde's (*B. edeni brydei*) and of a common minke whale tagged in the Pacific

coast of Japan were also introduced. Tagging survey plan in 2023 includes the spring MINTAG test deployments in the southern Okhotsk Sea.

Discussion:

The SC asked why blue whales had not been tagged during the presented telemetry studies, and Japan indicated there had been no tagging of this species because of too few sightings. Regarding the tags used, Japan indicated that SPOT177 tags lasted longer (115 days) than limpet tags (50 days), although theoretically the batteries of the limpet tags can last for 100 days.

7.3 OTHER COLLABORATIONS

Tsutomu Tamura presented a proposal for starting a collaborative study to further understand the role of baleen whales in the western North Pacific ecosystem (available as document SC/29/FI26)

Summary

In response to a suggestion from the last year's NAMMCO SC meeting, Japan presented a proposal for starting a collaborative study to further understand the role of baleen whales in the western North Pacific. More specifically, Japan proposed the analyses of long-term available biological and abiotic data for understanding ecosystem functions relevant to large baleen whale behaviour, such as distribution, movement and feeding ecology. Japan provided some background based on previous studies in the western North Pacific and proposed the establishment of a group of specialists to further explore the available data and discuss ideas for specific analyses.

Discussion

The SC welcomed the initiative from Japan and noted that the questions it was addressing were important. Despite the fact that annual surveys of prey species were not available in Japan, the SC considered that a project could be developed where the North Pacific and Northeast Atlantic ecosystems (NEA) could be compared, with the NEA being a good reference area due to the amount of data available. It was suggested that a group of experts from the NAMMCO countries be identified to provide advice to Japan in the development of this research, so a comparative analysis between the North Pacific and the NEA could be conducted. The SC also noted that the IWC was already conducting comparative studies on whale activity in the Arctic and in Antarctic, to compare their role in both ecosystems (i.e., nutrient cycling).

The SC **recommended** that SC members Mette Skern-Mauritzen, Martin Biuw, and Tore Haug from Norway, and Bjarki Elvarsson and Guðjón Sigurdsson from Iceland, as well as scientists Ulf Lindstrøm and Hiroko Solvang, both from Norway, be part of the expert group. It was agreed that Biuw and Tsutomu Tamura would be the contact persons and would arrange online meetings to discuss ideas and provide advice.

8. INTERACTIONS WITH OTHER ORGANISATIONS

8.1 ASCOBANS

Desportes provided an update of activities in relation with ASCOBANS. Only a few agenda items and discussions of the last ASCOBANS Advisory Committee (AC27) in September 2022 were of direct relevance to the work of the NAMMCO SC. Some information relevant to upcoming SC species WG (e.g., Dolphins and Harbour Porpoise WGs) could be found under the Report of the ASCOBANS Resource Depletion Working Group ([August 2022](#)).

Following the hunt of Atlantic white sided dolphins in the Faroe Islands, ASCOBANS AC26 in 2021 established an "Intersessional Working Group on Lagenorhynchus sp." (IWG) to, among others a) Review the available information about the population structures and trends, distributions, abundances, mortalities, reproductive outputs, health, diet, behaviour, and data gaps related to both species in the NE Atlantic; and b) Review issues that pose a conservation threat to the species and their

populations. Contact with the ASCOBANS Secretariat indicated that the IWG had not been active since AC26.

As a fair amount of information dealt with by the IWG will come from the NASS survey series, the studies conducted in the Faroe Islands and the North Atlantic genetic studies based on a large number of Faroese samples, the SC supported an exchange of information between the NAMMCO Dolphin WG (DWG) and the IWG, may be with some common participants (see agenda item 12.4.2 for further information on the DWG).

8.2 ARCTIC COUNCIL

Desportes provided an update of activities in relation with the Arctic Council WGs. Two members of the NAMMCO SC (Hansen and Ugarte) and the NAMMCO Secretariat (Desportes) are active members of the *Conservation of Arctic Flora and Fauna (CAFF) Circumpolar Biodiversity Monitoring Program (CBMP) - Marine and of its Marine Mammal Expert Network (MENN)*.

However due to the war in Ukraine, the AC and its subsidiary paused all their meetings activities in 2022. As a consequence, the Joint CAFF-NAMMCO panarctic workshop on Bearded Seal that was planned for May 2022 was postponed to an undefined date. In a common agreement, it was now planned as a NAMMCO panarctic workshop with similar agenda, co-Chairs (Christian Lydersen, Atlantic side, and Peter Boveng (Pacific side), and participants (although without Russian participation), see under agenda Item 11.1.2 for more details.

8.3 ICES

Haug reported from the 2022 activities in ICES which had some relevance to the work in NAMMCO SC. This included work in the ICES Working Group on Marine Mammal Ecology (WGMME), the Working Group on Bycatch of Protected Species (WGBYC), and the expert Workshop on Seal Modelling (WKSEALS). The ICES Annual Science Conference (ASC) generally includes sessions with marine mammals included as an integral part, occasionally also sessions entirely devoted to marine mammals.

It was also noted that ICES established in 2022 a new working group, the Joint Cetacean Data Programme Working Group, [WGJCDP](#). This WG is responsible for the JCDP database, which contains collated cetacean data from the Northeast Atlantic and works to promote and facilitate cetacean data standardization and maximize value through collation and enabling universal access. WGJCDP will work in collaboration with the WGBYC and the WGMME to provide robust and relevant outputs in support of ongoing priorities and needs such as, e.g., abundance and distribution trends and areas of persistent densities. SC member Biuw is also member of the WGJCDP.

The Chair of the WGJCDP contacted the Secretariat during the meeting to enquire whether any potential surveys or datasets for the NAMMCO region could/would be submitted to the JCDP. The request was forwarded to the members of the SC responsible for survey data, who would then answer directly.

Haug informed that Guðjón Sigurdsson will take over the reporting of ICES interactions with NAMMCO from 2023 on.

8.4 OSPAR

In 2021, OSPAR designated the North Atlantic Current and Evlanov Sea basin (NACES) MPA in its Maritime Area Region V, with the goal of protecting and conserving seabirds and the ecosystems of the waters superjacent to the seabed. Responding to OSPAR request, SC 26 (2019) had provided its comments on the relevance of the proposed NACES MPA to the conservation of cetaceans.

OSPAR is presently conducting a public consultation, focused around three specific questions, on a revised nomination proforma that includes new evidence on the case for the inclusion of the seabed, ocean floor and subsoil thereof and additional species and habitats, within the scope of the NACES MPA. The SC was requested to provide its comments to the revised nomination.

The SC indicated that it has no new information on abundance and distribution of marine mammal species in the focus area since 2019. It noted that the area was not and would not become a whaling/sealing area for any NAMMCO countries in the future. The SC was not aware of new range wide information which would change its assessment of the importance of the proposed marine protected area for cetaceans. It again specifically underlined the lack of distributional and density data for the winter period, which is likely when the area is the most important to large cetacean species as many of them move to northern feeding area in the spring until late autumn. If the area was deemed to be important for birds, this could indicate a level of productivity that may also make it an important area for cetaceans. However, this was not necessarily the case, and the SC was still not aware of any evidence to indicate this. Disturbance to cetacean species is logically reduced in areas where human activities are limited. However, the SC reiterated its inability to draw any conclusion on the specific importance of the NACES area to significantly enhancing the conservation of cetacean species such as blue and sei whales due to the lack of data available to make such an assessment.

The SC **recommended** that, due to the limited time available, the Secretariat should prepare a more specific answer to OSPAR based on the three questions formulated by OSPAR and circulate for approval to the SC.

8.5 IWC

Several members of the SC and the Secretariat attended the meetings of the IWC Scientific Committee (IWC SC) in April-May 2021. Sigurdsson informed the SC on the following points discussed by the IWC SC that were of interest to NAMMCO.

The general reporting of NAMMCO activities (under the item Cooperation with other Organizations) at the IWC SC meeting was very short and general, most likely due to the shortened online only format of the meeting. It was noted that NAMMCO and the IWC share overlapping scientific and programmatic areas of work including cetacean surveys, stock and population assessments, by-catch and entanglement response.

Under other items on the IWC SC agenda, cooperation or overlap of interest with NAMMCO was specifically mentioned in relation to population estimates, and ongoing work on reviewing directed takes of small cetaceans. Population estimates of fin whales, minke whales, and humpback whales in the North Atlantic based on the NASS surveys revised by NAMMCO were endorsed by the IWC SC. Under the agenda item on directed takes of small cetaceans the IWC SC expressed serious concern over the imminent risk of extirpation of the narwhal population present in SE Greenland should the present takes continue, quoting the recommendation formulated by NAMMCO SC.

The RMP/AWMP implementation review for North Atlantic common minke whales was carried out in 2022, where the committee agreed that the new abundance estimates and removals were consistent with older data and provided no reason to pursue new simulation testing. The committee encouraged a more thorough work on stock structure for the minke whales based on SNPs for the 2029 implementation review and the AWMP implementation review for minke whales off west Greenland in 2026. The RMP/AWMP implementation review for fin whales is scheduled to start this year and will require some input from scientists in NAMMCO countries.

At the IWC commission meeting, much of the time focused on the dire financial situation of the organization. As a result, the scientific committee of the IWC will change to biannual meetings from 2025 and onwards. This could have implications for RMP/AWMP implementation reviews, as the schedule will change with the biannual format. The NAMMCO training video on whaling methods was shown and well received. Apart from budget issues, a resolution on marine plastics was adopted by consensus, while other resolutions on food security, end of the moratorium on whaling, or Southern Ocean whale sanctuary were not agreed on.

8.6 JCNB

Hansen informed that, since the last JCNB council meeting in Ottawa (2019), there had been an online meeting of the Joint NAMMCO-JCNB scientific WG (JWG) meeting in 2020, followed by an in-person JWG meeting in 2021 in Winnipeg, Canada. A full assessment on sustainable catches of both narwhal and beluga for Canada and Greenland was then produced. This meant that JCNB had not reviewed the conclusion and recommendations provided by the JWG nor provided management advice to Greenland. In addition, a workshop on disturbance of narwhal, beluga and walrus related to mining activities in Canada (Mary River mine) and Greenland (Dundas mine) was held in December 2022 (see agenda items 9.3.2 and 12.1.3). A JCNB council meeting had been planned for May 2022 but was eventually postponed with no new date proposed.

8.7 OTHER

No interactions with other organizations were reported.

9. ENVIRONMENTAL AND ECOSYSTEM ISSUES

9.1 MARINE MAMMAL / FISHERIES INTERACTIONS

9.1.1 Review and status of active requests (R-1.1.5, R-1.1.10)

R-1.1.5 (standing) asks the SC “To periodically review and update available knowledge related to the understanding of interactions between marine mammals and commercially exploited marine resources.”

R-1.1.10 (ongoing) asks the SC “In the light of the distributional shifts seen under T-NASS 2007 and later surveys, the SC should investigate dynamic changes in spatial distribution due to ecosystem changes and functional responses”. (Part from former R-1.1.8)

In response to request R-1.1.5, Haug informed that new information was available on knowledge related to the understanding of interactions between marine mammals and commercially exploited marine resources in SC/29/FI33, where marine mammal consumption was compared with fisheries removals in the Nordic and Barents Sea. Furthermore, SC/29/FI11 illustrated the niches of marine mammals in the European Arctic using stable isotopes and fatty acids, SC/29/FI16 informed about sperm whale diets based on data from stranded whales, while SC/29/FI25 discussed the migration and energy budget of humpback whales based on data from satellite tagging. SC/29/FI17 showed how recent trends in temporal and geographical variation in blubber thickness in common minke whales could be related to possible competition with cod.

In response to request R-1.1.10, Heide Jørgensen presented a recent study on regime shift in SE Greenland, available as For Information document SC/29/FI27.

Authors' summary

Findings of unexpected large numbers of fin and humpback whales in the previously ice infested waters of East Greenland now indicate a tipping point in the marine ecosystem from one regime to another that may be irreversible. A sub-arctic ecosystem off Southeast Greenland dominated by large amounts of drifting pack ice has changed during this century to a more temperate system with less sea ice and warmer ocean temperatures. These changes in summer ocean conditions are making the region more attractive for large numbers of fin and humpback whales, and other new species.

Shifts from one regime to another occur at a tipping point and may be irreversible. The regime shift has cascading effects throughout the ecosystem. The new regime will therefore have new ecosystem and biodiversity properties substantially different from the pre-tipping point regime. The driver of the shift is known as a tipping element and the extent of drifting sea ice is an easily detectable tipping element. The pack ice in the Arctic Ocean is generated in a circulation system north of Alaska from where it, for several years, is pushed by currents towards the north of Greenland. From there, most of

it drifts through the Fram Strait at high speed south along the East Greenland coast before entering the North Atlantic.

For centuries the massive barrier of drift ice precluded exploration of the East Greenland coast and contact with the small group of Inuit that inhabited the coast. The east coast of Greenland was rarely or never visited by whalers or explorers because drifting coastal pack-ice prevented the entry of whalers to the shore. Exploitation has been low also because the region was, and still is, sparsely populated by humans. In the 19th century, the only inhabited area of East Greenland was the Tasiilaq area (latitude ca. 65.50N) that had 413 inhabitants in 1884-85. Regular contact of the local society with non-indigenous humans (e.g., from Denmark) was only established in 1894, before which there is little written quantitative information about marine life in the area.

There is an exceptionally long record of the drifting pack ice in East Greenland. The current brings the ice around the southern tip of Greenland and up along the west coast. Local authorities in West Greenland have recorded since 1820 the latitude to where the drift ice reached. The pack ice from East Greenland was dense and generated over several years and it could easily be distinguished from the locally produced annual sea ice. Since 1980 the sea ice is monitored by satellite and the records are now extended to include the annual export of sea ice from the polar basin through the Fram Strait.

An additional tipping element is the sea temperature that in East Greenland in August increased between 1980 and 2020. This coincides with a similar decline of the amount of pack ice where most of the years after 2007 had no sea ice on the coastal area of Southeast Greenland. The increasing sea temperature is part of a general increasing trend for the North Atlantic.

The long-distance transportation of multi-year pack ice has over the past 20 years declined in extent and volume. In East Greenland the reduction of the ice occurred after 2000 with a decrease by 30-55% during summer and a two month longer ice-free season in the Irminger Sea (from August to October). The continuing warming, decrease in ice volume export, and the decline in the annual local production of sea ice in the Greenland Sea has contributed to the reduction in sea ice in Southeast Greenland and the ecosystem has reached a tipping point where it changed from an Arctic to a more temperate ecosystem.

Mackerel suddenly appeared in East Greenland in 2010 and bluefin tuna were first reported in the area in 2012 as bycatch in the mackerel fisheries and subsequently nearly every year since then until 2019. This was an eyeopener that something dramatic has happened to the subarctic ecosystem. Also, other evidence of ecological changes was accumulating like the unexpected large numbers of fin and humpback whales that were found in the previously ice infested waters of East Greenland. The humpback whales probably followed the capelin that shifted its distribution from north of Iceland to the Southeast Greenland shelf and closer to the Greenland coast after the 2000s. The fin whales could maintain their feeding on krill in the ice-free areas on the shelf. The temperate baleen whales started to occur together with temperate toothed whales like dolphins, killer whales, and pilot whales. The rise in abundance of toothed whales is well documented from the hunting statistics from Southeast Greenland. Catches increased from none before 2000 to several hundred per year in the late 2010's. At the same time catches of high Arctic species, like narwhals and walrus, were dwindling in Southeast Greenland.

The new top predators on the East Greenland shelf are estimated to consume >2 mill tonnes of biomass. Most of the biomass is consumed by fin whales that primarily target krill; the total consumption of fish species is around 750.000 tonnes per year on the East Greenland shelf. This introduces new multispecies interactions in the area and changes the carrying capacity for some of the resident species. If the recent warming trends continue, then the size and duration of the thermal habitats will increase, potentially creating a more permanent summer habitat for species like bluefin tuna, mackerel, herring, and the temperate whale species. At the same time Arctic species like polar cod and narwhals are expected to disappear from the area.

Discussion

The SC noted that shifts in the distribution of Icelandic minke whales, triggered by local shifts in capelin abundance, might also be linked with the regime shift observed in Greenland, but more studies were needed (e.g., satellite tagging) to confirm this. Similar trends as the ones presented for Greenland had been detected in Norwegian waters, with boreal fish species, such as Atlantic cod, moving north and competing with arctic species. This movement of fish was also triggering a movement of whales in the same direction. However, a record high cod stock in 2015 (not seen since the 1950s) may have caused a reduction in the body condition of minke whales back then (due to competition for capelin, a shared prey for minke whales and cods), with the body condition of minke whales increasing again after a decrease in cod stocks (Solvang et al. 2022; SC/29/FI17).

Lydersen informed that non-arctic species were also increasingly observed in Svalbard waters and that breeding conditions were now poor for ringed seals, with almost zero recruitment in West Svalbard. Japan also informed of northern shifts in species distributions seen in the Pacific and involving minke whale and bluefin tuna. It was indicated that many blue fin tunas could now be seen in the Okhotsk Sea but did not occur there before.

The SC **complemented its response** to request R-1.1.10 indicating that there were several studies documenting these distributional shifts and hunters had also documented similar species shifts and changes.

The SC **recommended** that, after NASS2024, the abundance estimate working group examine the best way of looking at distributional shifts using all NASS data, focusing on trends in species distribution and abundance.

Sigurdsson informed that the Icelandic program mentioned at SC28 and focusing on a possible distributional shift of capelin in association with humpback and fin whales, was composed of several studies on capelin distribution using data from 2016-2019. The studies were still ongoing, and details and results would be provided at the next SC meeting.

The SC **sought guidelines from the MCs** on the status of the request, considered as answered or became a standing request. The MC was requested to specify the scope of the response that was expected.

9.1.2 By-Catch Working Group

Convenor of the By-Catch Working Group (BYCWG), Desportes, provided an overview of the report from the meeting held on May 25, 2022 (document SC/29/05), which was the 7th meeting of the Working Group. All four NAMMCO member countries participated in this meeting.

The overall Terms of Reference of the working group (WG) as defined by SC21 are: 1. Identify all fisheries with potential by-catch of marine mammals; 2. Review and evaluate current by-catch estimates for marine mammals in NAMMCO countries; 3. If necessary, provide advice on improved data collection and estimation methods to obtain best estimates of total by-catch over time. To date, the WG has mostly concentrated on reviewing by-catch estimates in gillnet fisheries, which are known to have a high probability of by-catch, for harbour porpoises and coastal seals generated from observer/reference fleet monitoring. It has endorsed by-catch estimates for marine mammals in the Icelandic lump sucker fishery and for harbour porpoise and grey and harbour seals in the Norwegian coastal gillnet fisheries.

Its Terms of Reference for this last meeting, as defined by the SC 28, was to proceed with ToR 1 and determine how best assessing the risk of by-catch for the fisheries in the waters of NAMMCO, focussing on fisheries with no by-catch estimates and no or limited by-catch monitoring.

The WG agreed that, as the fishermen reporting of by-catch is not reliable, the best way to progress with ToR 1 is by performing a risk assessment.

The WG agreed that its role was to define risk of by-catch occurrence to an individual animal while defining the by-catch risk at the population level was within the remit of the species and assessment WGs. The WG should identify the areas where by-catch seems more likely to occur at the individual level in different fisheries (based on the co-occurrence of species distribution and effort), with the purpose of providing advice on the prioritisation of monitoring efforts.

The WG identified the following steps:

- 1) Mapping the fishing effort to visualize its scale in relation with MM distribution/abundance
- 2) Examining observer effort in relation to the above to assess where additional monitoring may be needed based on the existing understanding of the threat posed by different gear types.

The data needed to progress was of three kinds: a) data on the size of the fishery (number of vessels, fishing effort either in landings or trips), b) data on the co-occurrence with marine mammal species (abundance data), c) data on the magnitude and distribution of the existing observer coverage (observer effort).

The WG agreed that a first step towards a risk assessment would be to:

- send a data call to fishery departments of NAMMCO member countries.
- seek cooperation with ICES.

To progress with this task, the WG recommended that the NAMMCO Secretariat:

- identify who to direct this data call to, to ensure most effective responses.
- contact the fisheries department of each member country to conduct an initial scope of the fisheries data available (i.e., resolution of the data, type of effort data available, statistical area of reporting, time period available in the data, and how best to define a “fishery”).
- formulate, under the guidance of the WG, the data call and process the data received.
- contact the ICES datacentre to investigate which data ICES holds, and whether and how NAMMCO and ICES can cooperate.

Discussion

The SC thanked the WG for its work and **recommended** the WG and the Secretariat to go ahead with the defined tasks.

Following the discussion under item 12.4 Dolphins, the SC **tasked** the BYCWG to expand its focus to *Lagenorhynchus* dolphins (See also under item 12.4.1).

The WG noted that there were several scientific papers on by-catch provided as For Information documents to the meeting. Haug informed that results from the pinger experiment performed in Norwegian gillnet fisheries (SC/29/FI18) and from studies of anthropogenic mortality of humpback and killer whales in Norwegian purse seine fisheries (SC/29/FI15) were published. Furthermore, Haug reported that experiments had been carried out in Northern Norway in November/December 2022 to test acoustic deterrent devices (ADDs) to minimize the risk of humpback and killer whales getting entangled in herring purse seines. While data analyses are now ongoing, preliminary results indicate that the ADDs were very effective in scaring away killer whales from fishing vessels.

9.1.2.1 BYCWG Data call for risk assessment

Chacón provided updates on the status of the BYCWG data call (document SC/29/23), indicating that the BYCWG had recommended the secretariat to initiate a scoping of the fisheries data available in the NAMMCO countries, as a 1st step for formulating a more specific data call. Following this recommendation, an e-mail was sent to the fisheries departments of members countries requesting answers to 6 questions formulated by the BYCWG. However, only Greenland and Norway have responded.

The SC **recommended** that the Faroe Islands and Iceland also provided an answer to this preliminary request, so the WG could proceed with the data call. Given that the BYCWG cannot progress in its tasks until answers are provided the Icelandic and Faroese SC members **agreed** to contact their fisheries departments and ask them to provide the requested information to the Secretariat.

9.2 MULTI-SPECIES APPROACHES TO MANAGEMENT AND MODELLING

9.2.1 Review and status of active requests (R-1.1.9 and R-1.2.1)

R-1.1.9 (ongoing) *In addressing the standing request on ecosystem modelling and marine mammal fisheries interaction, to extend the focus to include all areas under NAMMCO jurisdiction.*

R-1.2.1 (ongoing) *To consider whether multispecies models for management purposes can be established for the North Atlantic ecosystems and whether such models could include the marine mammal compartment. If such models and the required data are not available, then identify the knowledge lacking for such an enterprise to be beneficial to proper scientific management and suggest scientific projects which would be required for obtaining this knowledge.*

An extensive review of ecosystem models was presented by Skern-Mauritzen at SC28, but the SC28 recommendation of requesting advice on ICES on the extent of coverage of marine mammals on these models had not yet been followed. Given that the SC was not aware of new models nor advances in this area, the SC **agreed** that SC28 recommendation of planning a workshop to assess the model portfolio for the North Atlantic from a marine mammal perspective should be postponed to the next SC meeting, when experts on modelling would likely be present to help defining the Terms of Reference of the workshop.

Because the best-known ecosystem models are focused on fish and using these models for marine mammals is considered extremely difficult at the moment, the SC **recommended** that responding to both requests 1.1.9 and 1.2.1 not be considered a priority and **request** the guidance of the MCJ on this.

9.3 ENVIRONMENTAL ISSUES

9.3.1 Review and status of active requests (R-1.5.3, R-1.5.4)

R-1.5.3 (ongoing) *asks the SC "To monitor the development of the Mary River Project and assess qualitatively or if possible, quantitatively the likely impact and consequences on marine mammals in the area."*

Responses to R-1.5.3 were provided under sub-item 9.3.2.

R-1.5.4 (ongoing): *"Committed to furthering its ecosystem approach to the management of marine mammals, and recognising the range of anthropogenic pressures facing North Atlantic marine mammals associated with the climate and environmental changes taking place, the Council requests the SC to advise on the best process to investigate the effects of non-hunting related anthropogenic stressors on marine mammal populations, including the cumulative impacts of global warming, by-catch, pollution and disturbance."*

One response of the SC to this request is to require that all WGs systematically include *Other [than removals] anthropogenic impacts* as an agenda item in their consideration.

Haug pointed out that investigating the effects of non-hunting related anthropogenic stressors on marine mammal populations is regularly addressed in many NAMMCO countries, as reflected in the publication of papers such as SC/29/06 on the impact of past global warming on baleen whales and their prey, SC/29/FI21 on the use of harp seal teeth to study multi-decadal environmental changes in the Barents Sea, and SC/29/FI22 which gives a risk assessment review of mercury exposure in Arctic marine and terrestrial mammals. Furthermore, SC/29/FI24 is a baseline study giving pathological findings in bycaught harbour porpoises from Northern Norway.

The SC noted that studying the cumulative impacts of global warming, by-catch, pollution and disturbance, requires long term monitoring studies addressing all effects. Providing a more thorough and detailed response to R-1.5.4 is impaired by the present lack of such studies for many species and areas prevents. Because the impact of non-hunting anthropogenic stressors will remain a standard agenda item in all WG meetings, the issue will be regularly revisited by the SC. Consequently, the SC **recommended** that the MCs consider this request as answered.

9.3.2 NAMMCO-JCNB Joint scientific Working Group (JWG) Disturbance Workshop

Fernando Ugarte presented the report of the Disturbance Workshop available as document SC/29/07.

Summary

In December 2022, the JWG organised a workshop to look at the effects of disturbance on narwhals, belugas, walrus, and other marine mammals of two mining operations in Baffin Bay. The Terms of Reference were 1) to assess the impact of anthropogenic activities of the Mary River project (Canada) on marine mammals, with emphasis on: the behavioural response to noise pollution from shipping and ice breaking, the energetic consequences of behavioural adaptations to noise pollution, population responses including changes in abundance and demography of narwhals in Eclipse Sound and adjacent areas, the possible changes in recommended catch levels for narwhals from Eclipse Sound and disturbance of walrus, belugas and bowhead whales from shipping, anchoring and ice breaking activities and 2) to assess the impact of shipping and mining activities in Wolstenholme Fjord (Greenland) on especially the wintering stock of walrus in the area and the fall migration of belugas.

The first part of the workshop focused on the results of a narwhal study spanning ten field seasons in East Greenland, looking at the effect of ship noise and small seismic air guns. Narwhals proved to be extremely sensitive to disturbance, changing speed and swimming direction at distances of up to 24 km from the moving vessels. Other behavioural responses included a reduction of feeding and cessation of deep dives. Physiological responses included marked cardiovascular, respiratory and locomotor reactions. Some of the reactions were triggered at distances larger than 40 km from the ship. There were no indications of narwhals being habituated on the short term after repeated exposures to ship noise.

For the second part of the workshop, two comprehensive disturbance studies were presented: a) harbour porpoises and windfarms in Europe and b) bowhead whales and seismic air guns in Alaska. This session ended with a presentation and discussion about accounting for multiple stressors in the population models used for assessment of narwhals in Baffin Bay. The metapopulation model was presented, in which Baffin Bay narwhals are divided into populations, with high fidelity to 8 summering grounds in coastal waters of Canada and Northwest Greenland. During winter, as the summer grounds freeze, narwhals gather in central Baffin Bay and West Greenland. Especially relevant for the workshop were the summering stocks of Eclipse Sound and Admiralty Inlet, in North-eastern Baffin Island.

The next part of the workshop concerned with the measured effects of the Mary River mine in coastal areas of Canada. Several presentations described how the mine related shipping has severely increased the traffic and sound levels in Eclipse Sound. This has had a number of effects on the Eclipse Sound narwhal populations, the most serious being a massive displacement of narwhals out of Eclipse Sound and into Admiralty Inlet. Fig. 1 shows the population projections for Eclipse Sound and Admiralty Inlet. It was estimated that a total of 24,640 (90% CI:16,640–35,840) narwhals have so far emigrated from the Eclipse Sound population to Admiralty Inlet, with no more than 2.081 (cv=0.17) narwhals left in 2021. There are no evidence suggesting that the displacement could have other causes like climate changes or increased predation from killer whales.

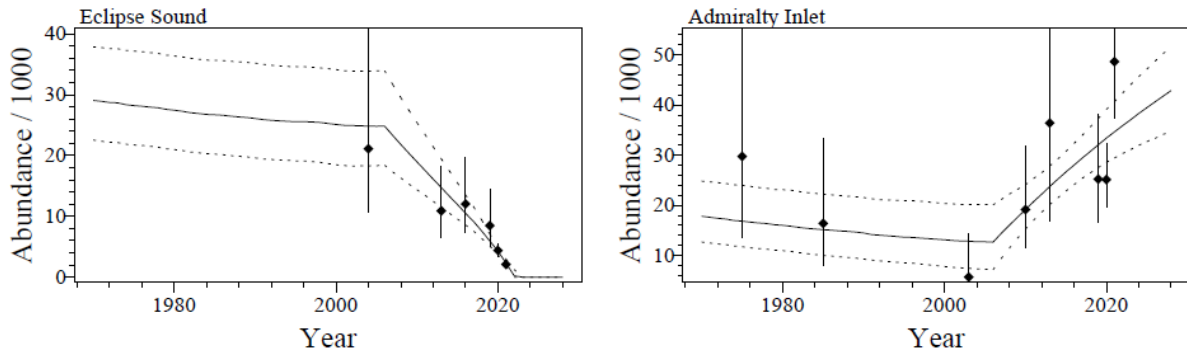


Figure 1 (modified from figure 3, workshop report): Population trajectories derived from the population models of narwhals in Eclipse Sound and Admiralty Inlet: Points with bars are abundance estimates with 90% CI, solid lines are the median of the estimated trajectories, and dotted lines indicate the 90% credibility intervals.

The Workshop concluded that an almost complete displacement of any summer aggregation of narwhals, as has occurred in Eclipse Sound, should be anticipated if sustained shipping activities are planned in the fjord or inlet of that aggregation. It formulated a list of recommendations (Box1).

Discussion

The SC **commended the review** carried out at the workshop and **endorsed** the recommendations of the WS. The general management recommendations endorsed by the SC can be found in Box 1 below.

Box 1. SC 29 general recommendations pertaining to Disturbances and Arctic Marine Mammals.

Recommendations for Management to Greenland

- Shipping traffic and associated ice breaking has caused an unprecedented displacement of narwhals from Eclipse Sound, future developments avoid shipping within the narwhal summering aggregations.
- Ship traffic causes significant disturbance to narwhals (e.g., disruption in foraging) at distances from 0 to 20 km, while icebreaking can cause impacts at distances from 0 to 35 km. The Workshop recommends that these values be used to establish buffer zones around narwhal summer aggregations and establish traffic corridors to protect migration routes and winter foraging grounds.
- No ship anchoring should occur in Store Hellefiske bank, due to its importance as a feeding ground for many Arctic seabirds and marine mammal species.
- Hunt management advice should account for the displacement and possible associated changes in fecundity and survival, both in disturbed summer aggregations as well as in aggregations affected by the displaced animals.

Recommendations for Management also highlighted by the SC

- Greenland invites Canadian experts to participate in reviewing monitoring programs, plans and results of the Dundas mine in Wolstenholme Fjord (See also Item 11.5.1, Box 2).
- Ship speed regulations of 8 knots be extended to south of the beluga migration route passing Cape York in September–October. This recommendation does not include a buffer around the timing of shipping (See also Item 12.2.2, Box 4).

The SC **recommended** reviewing updates on the Mary River and Dundas mining project in relevant WGs. The SC also **recommended** circulating the report of the Workshop to other organisations working in the Arctic and dealing with disturbance effects on wildlife. The SC **highlighted** that narwhals were especially sensitive and vulnerable to shipping and other disturbances associated to these mining projects. More updates on narwhals are provided in section 12.1 of this report.

10. NAMMCO WEBSITE

10.1 WEBSITE UPDATES & QUALITY REVIEW (R-1.8.3)

R-1.8.3 (standing): *Acknowledging the importance of the website as NAMMCO's main dissemination tool, and the value of the species pages, the Council requests the SC to continue its regular review of these pages following the procedure proposed by the SC26 (2019).*

The SC took note of this new request. This year the SC was asked to review the information on the NAMMCO website for four species: grey seal, bowhead whale, white-sided and white-beaked dolphins. This review was done by the species experts within the weeks following the meeting of the SC.

11. SEAL AND WALRUS STOCKS

11.1 BEARDED SEAL

11.1.1 Review and status of active request (R-2.7.1)

R-2.7.1 (ongoing) *asks the SC "To convene a working group in 2022 with the aim of conducting a thorough review of the existing data and to go ahead with the assessment of stocks for which it was possible. If the data required for a full assessment of (some of) the stocks were not available, the WGs and the SC should identify, and prioritise, which specific data essential to their assessments are still needed."*

Responses to R-2.7.1 are provided under next sub-item (11.1.2).

11.1.2 NAMMCO Panarctic Bearded Seal Workshop

Lydersen informed on the planned NAMMCO Panarctic Bearded Seal Workshop.

The WS was initially planned as a Joint NAMMCO/CAFF workshop. However, the work limitation that the Arctic Council and its Working Groups were facing due to the war in Ukraine resulted in the workshop now being organised by NAMMCO. The Bearded Seal Workshop (BSWS) will be held online on 21 to 23 March, 3 hours per day. The purpose of the BSWS is to review new information since 2010 (Cameron et al. 2010), and, based on all the information available from before and since 2010, assess the status and trends of the species throughout its range and identify threats and critical knowledge gaps.

A draft agenda of the workshop has already been sent to all potential participants, asking for their contributions under the different agenda items. The workshop will be co-chaired by Peter Boveng (NOAA) and Christian Lydersen (NPI, NAMMCO).

Discussion

It was noted that a full answer to R-2.7.1 required data on local bearded seal abundance to be analysed and made available to the workshop in March. Survey data from Greenland was available, and the MCSW recommended in September 2022, following the recommendation of SC28, that *Greenland prioritises the analysis of data on local abundance and make it available to the Bearded Seal WG*. The analysis of this data has however not been prioritized and results will not be available to the March WS. Ugarte indicated that results for the most recent surveys could be easily generated but analysing data from older surveys would be more time consuming. The SC **agreed** that the WS should define the area for which an assessment could be conducted, and where the abundance data would be the most useful to progress in assessing the conservation status of a stock. The SC **recommended** that the catch data be available to the upcoming BSWS meeting (Box 2).

Box 2. SC 29 recommendation pertaining to Bearded seal.

Recommendation for Management

- The catch data be available to the upcoming BSWS meeting.

11.1.3 Updates

Morten Tange Olsen presented preliminary results from genetic analyses on Bearded seal.

Preliminary analysis of samples from most parts of the bearded seal's geographic distribution in the Pacific, Atlantic and Okhotsk Sea, with gaps from the Russian range. After a data quality check, a total of 72 bearded seal samples were used in the analyses (2 million SNPs). Results indicate some population structure, separating animals from the Pacific, Atlantic and Okhotsk Sea, as well as NW Atlantic vs. NE Atlantic. Bearded seals in Svalbard clustered with those from South and East Greenland, whereas seals from West and North-West Greenland clustered with those from nearby Canada (Baffin Island, Hudson Bay).

Olsen emphasized the finding of genetic structure even with the small amount of data used and indicated that more data had been received recently and hence that updated results were expected soon.

Discussion

The SC welcomed the preliminary results presented by Olsen. Olsen emphasized that further work was needed to better understand the genetic structure and demographic history of the species, and to determine if there were specific genes linked with special adaptations. Olsen will investigate whether there are possibilities of supplementing the analyses with Russian samples. More results will be available to the BSWS in March.

Granquist informed the SC of some bearded and ringed seals being by-caught in Icelandic fisheries and that samples from by-caught bearded seals could be provided to Olsen to supplement the ongoing genetic analyses. Mikkelsen also indicated that, of all arctic seal species, the bearded seal was the one most frequently observed in the Faroes.

11.2 RINGED SEAL

11.2.1 Review and status of active requests (R-2.3.1, R-2.3.3)

R-2.3.1 (ongoing) asks the SC "To advise on stock identity of ringed seals for management purposes and to assess abundance in each stock area, long-term effects on stocks by present removals in each stock area, effects of recent environmental changes (i.e., disturbance, pollution, climate change) and changes in the food supply, and interactions with other marine living resources."

R-2.3.3 (ongoing) asks the SC "To convene a working group in 2022 with the aim of conducting a thorough review of the existing data and to go ahead with the assessment of stocks for which it was possible. If the data required for a full assessment of (some of) the stocks were not available, the WGs and the SC should identify, and prioritise, which specific data essential to their assessments are still needed."

In response to the above requests, Rosing-Asvid presented plans for a ringed seal working group (RSWG, described under item 11.2.2) and results from seal telemetry studies in the Arctic, with proposed management units for arctic ringed seals based on tracking data.

Tracking results indicated that different groupings of seals could be defined, based on where the seals moved to. Six possible putative management areas could be defined for arctic ringed seals: Svalbard, East and southwest Greenland, Kangia (in a West Greenland fjord), Baffin Bay / Davis Strait / Hudson Strait / Foxe Basin / Lancaster Sound /Smith Sound and Kane Basin, Hudson Bay, and East of the Northwest passage to East Russia.

Discussion

Rosing-Asvid indicated plans for publishing the telemetry results, of which were helpful in defining management areas. However, it was noted that publication of the manuscript could take time and that a document presenting the main results could be presented to the RSWG.

Olsen presented results of ongoing genetic research on ringed seals.

Summary

Rosing-Asvid et al. (in review) generated 92 ringed seal genomes from localities in Canada, Greenland, Svalbard and the Baltic Sea. This study found subtle genetic differences between Canada, West Greenland, East Greenland and Svalbard, although additional studies are needed to assess whether these should be considered separate stocks.

Discussion

Regarding ongoing genetic analyses of arctic ringed seals, Olsen indicated that samples from Alaska were needed to better define the borders between Atlantic and Pacific stocks and that samples covering much of the Canadian arctic as well as some East Greenland localities would be received, with results by the end of this year.

Olsen, however, indicated that available genetic data on ringed seals did not contradict the telemetry results, so there was no need to wait for further analysis to continue with the RSWG plans and define tentative management areas.

11.2.2 Ringed Seal Working Group (RSWG)

Rosing-Asvid, Chair of the RSWG, proposed to follow a “step-by-step” approach for the RSWG. This approach consisted in scheduling several short (1-2h) meetings over the year focussing on specific aspects required for the review/assessment. The first one would focus on discussing management areas for the species and would involve pan Arctic experts. The geographical scope of the following would be reduced to the stocks under the remit of NAMMCO and shared stocks, where East Canadian experts would be involved.

The first meeting could be scheduled no later than October 2023, drawing on the experience of the bearded seal workshop in March.

The SC **agreed** with the plan presented by Rosing-Asvid to conduct several, short online meetings rather than one, longer in-person WG meeting. The SC **recommended** that the catch data be available to the upcoming RSWG meetings (Box 3). The SC also **tasked** the RSWG to define the area for which an assessment could be conducted, and where the abundance data would be the most useful to progress in assessing the conservation status of a stock.

Box 3. SC 29 recommendation pertaining to Ringed seal.

Recommendation for Management

- The catch data be available to the upcoming RSWG meetings.

11.2.3 Updates

Lydersen informed the SC of an ongoing study that includes tagging of ringed, harbour, and bearded seals in Svalbard. He also informed on an annual collection program of ringed seals to the Norwegian Environmental Specimen Bank where tissue samples from hunters could be provided to Olsen for the genetic analysis. He also informed of a new project where drones are used to estimate ringed seal abundance in selected areas in Svalbard.

11.3 GREY AND HARBOUR SEALS

11.3.1 Review and status of active requests (R-2.5.2, R-2.4.2)

R-2.4.2 (ongoing): *To provide a new assessment of grey seal stocks throughout the North Atlantic.*

R-2.5.2 (ongoing): *To conduct a formal assessment of the status of harbour seals in all NAMMCO areas as soon as feasible.*

In response to the above request, a Coastal Seals Working Group (CSWG) meeting is planned for 2023 to produce an assessment for both grey and harbour seals in the NAMMCO countries (see next agenda sub-item, 11.3.2).

11.3.2 Coastal Seals Working Group (CSWG)

A meeting of the CSWG is scheduled for 8-11 May 2023. The meeting will be chaired by Kjell Tormod Nilssen and will be held in hybrid format, with both in-person participants and online experts. Reykjavik or Copenhagen are both considered as potential meeting venues. Sophie Smout (St. Andrews, UK) and Jonas Teilmann (Denmark) were suggested as invited experts.

The SC **agreed** on the following Terms of Reference for the CSWG meeting:

- a) *To provide a new assessment for grey and harbour seals throughout the North Atlantic.*
- b) *To provide guidelines for responsible removals from small coastal seal stocks.*

11.3.3 Updates on grey seal

Iceland informed that a new population estimate was underway. In Iceland, the census is based on pup counts in October and November. An aerial survey was carried out during the pupping period of 2022. Analysis is currently ongoing and will be finalised before the CSWG meeting in 2023. This will be the first population estimate for grey seals in Iceland since 2017.

Mikkelsen informed that the last grey seal count in the Faroe Islands was conducted in 2021, with count data also available for 2018 and 2019.

Haug indicated that the counting in 2017 to 2021 in Norway had resulted in a total number of 770 pups for the entire country. These counts also showed a severe decrease in mid Norway, where quotas have been set to zero for many years. A new survey period was started in 2022. Survey results from 2017 to 2021 will be available for the CSWG meeting in 2023.

Olsen presented updates on stock structure of grey seals from ongoing genetic analyses.

Summary

Previous studies have detected three main genetic populations in the NW Atlantic, NE Atlantic and Baltic Sea, respectively. A preliminary study using more than 1967 RADseq loci genotyped in 192 grey seals supports the existence of three main genetic clusters, but also detects finer scale genetic structure within the NE Atlantic, corresponding to separate populations in Iceland, Wales (and possibly Ireland), the North Sea region, Norway, and Russia. Thus, stock assessments should consider NE Atlantic grey seals as comprising several distinct stocks.

Discussion

Mikkelsen indicated that grey seals in the Faroe Islands seemed to be relatively isolated from other populations, based on movement data, and that Faroese samples would be provided to Olsen, adding further genetic information to improve grey seal stock delineation in the North Atlantic.

Lydersen informed that grey seals were observed in the Pechora Sea during an aerial survey for walrus that was conducted in 2011. Grey seals are distributed further east than currently recognised in the Russian arctic, although samples from these locations were now difficult or impossible to obtain. However, Haug indicated that old samples from grey seal pups provided by Russian scientist were

available at the IMR in Tromsø and recommended Olsen to contact Stine Frie for such samples. It was noted that harp, grey and ringed seals could sometimes be confounded, especially in the case of young individuals.

11.3.4 Updates on harbour seal

Granquist informed there have not been new population estimates on harbour seals in Iceland since 2020. However, a new census is planned for 2023. A paper on trends in harbour seal population over a 40-year period (1980-2020) was published in NAMMCO Scientific Publications in December 2022 (Granquist, 2022).

Haug provided updates from Norway on harbour seal. According to the last 2016-2021 survey, harbour seal abundance in southern Norway has increased, with a total estimate of 6960 harbour seals in Norway, a number considered close to target levels (7000). A new survey period started in 2022 and indicated abundance increase in the eastern part of Skagerrak. The plan is to survey the entire coast of Norway in the next 2-3 years. It was also indicated that results from 2016-2021 were ready for the assessment planned for 2023.

11.4 HARP AND HOODED SEALS

11.4.1 Review and status of active request (R-2.1.9)

R-2.1.9 (ongoing): *possible reasons for the apparent decline of Greenland Sea stock of hooded seals; and assess the status of the stock.*

In response to this request, Haug informed that past attempts by Norway to get funding to study the effects of contaminants on the reproductive biology of the seals were not successful, but biological samples from 2010 were available at IMR and ready for analysis. Published research, provided as document SC/29/FI22, indicates high contaminant levels in hooded seals, among other arctic species. The SC noted that the hooded seal was the most polluted of the seal species, with high levels of PCBs and Hg measured. It was also noted that since the 2004 assessment of NW Atlantic hooded seals, no new assessment had been conducted for this population. New, unpublished data might be available from Canada.

11.4.2 Harp and Hooded Seals Working Group

The next meeting of the ICES/NAMMCO/NAFO WGHARP is planned for September 2023. Prior to this, improvements and advances of assessment models will be made through the planned joint ICES benchmark meeting in May 2023.

John-André Henden gave an update on the benchmark progress on Harp and Hooded Seal.

Summary

The need for a re-evaluation of the assessment models/process for harp and hooded seals in the Greenland Sea and harp seals in the Barents Sea / White Sea came up during the WGHARP meeting in 2019. The current models indeed showed an increasingly poor fit to pup production estimates, especially the steep decline between 2003-2005 in the Barents / White Sea. The WGHARP 2019 meeting hence recommended arranging a workshop to evaluate and compare model structure and data needs for the different assessment models for a selection of seal species in the North Atlantic (NAMMCO/ICES) and, to formally apply for a full ICES Benchmark (WKSEALS). The ToRs from the WKSEALS will, in short, be to evaluate the appropriateness of data and methods to determine stock status and investigate methods for providing harvest advice for the highlighted stocks, agree and document the preferred methods for evaluating stock status and harvest advice, and provide knowledge about potential environmental drivers and ecosystem impacts to be integrated in the methodology. In addition, the methods for setting biological limits for seal harvest (defined by ICES in

2005) should be re-examined and updated, and recommendations developed for future improvements to the assessment methodology. While not everything is done, due to delays in the benchmark process, we have started to modify model structure to include the effects of ex. a late abortion term, inter-annual variability in vital rates through, for instance, modelling vital rates as a function of capelin and cod time series. Hence, we have explored the effect of several different model specifications. In that sense, we are in a good state regarding the upcoming discussions during the benchmark meeting in Mai 22-26 (Copenhagen) and eventually the WGHARP2023 in Tromsø, in September 2023.

Discussion

To the question on how the abortion rate data was gathered, Henden explained that they were based on fertility rates of seals monitored during moulting and after mating. Early abortions can be seen according to data from Canada, where rates were calculated from data taken between November to February.

11.4.3 Updates

Haug reported from SC/29/FI19 about photographic and visual aerial surveys conducted off Newfoundland and Labrador ("Front"), and in the Gulf of St. Lawrence ("Gulf") in March 2017 to estimate pup production of Northwest Atlantic harp seals. Traditionally, harp seals whelp in three general areas; the southern Gulf of St. Lawrence, the northern Gulf of St. Lawrence, and off the east coast of Newfoundland and Labrador. After extensive reconnaissance, four whelping areas were identified: one in each of the southern and northern Gulf, and two at the Front. A total pup production in 2017 of 746,500 (SE=89,900, CV=12%) was estimated, the lowest since 1994. Given the unusual ice conditions, distribution of whelping seals, and timing of pupping, assessing the results of the 2017 surveys relative to other estimates of pup production in the Northwest Atlantic is challenging and indicates the ongoing difficulties of assessing a population that is being impacted by climate change.

Haug also presented information from the Norwegian survey of harp and hooded seal pups in the Greenland Sea in 2018, available in a published paper (SC/29/FI20). Furthermore, he reported from a new (2022) survey of the two species carried out in the same area to obtain updated estimates to be used to assess current status of these two seal stocks. Since the survey in 2018 indicated a 40% reduction in harp seal pup production since the 2012 survey, and the continued lack of increase in pup production of the severely depleted hooded seal stock despite its protection from hunting since 2007, a new survey after a period of only 4 years was urgent. The survey was carried out using well established methodologies for these species, including 1) reconnaissance of the drift ice breeding habitat from a helicopter based on the research icebreaker RV "Kronprins Haakon" and a fixed-wing aircraft stationed at Constable Pynt in East Greenland, 2) deploying GPS beacons around the identified breeding areas to monitor its displacement in the East Greenland Current, 3) carrying out staging surveys to monitor the pup age structure and estimate the optimal day of pup counting as well as correction factors accounting for pups not present on the ice at the time of counting, and 4) conducting aerial photographic surveys using the fixed-wing aircraft. Ice conditions in the Greenland Sea were similar as those experienced in 2018, with a relatively narrow band of pack ice over the shelf break near the coast of East Greenland. Seal whelping patches were initially discovered on March 21 and 22, within an area stretching from 72°53'N / 16°42'W in the north to 71°51'N / 17°30'W in the south. Five GPS beacons were deployed at the main whelping patches within this area, allowing us to track the continuous drift due to strong northerly winds during the period between initial reconnaissance and the final pup counting. Pup staging surveys were carried out on March 22, 23, 25, 28 and 30, providing us with a solid dataset with which to assess the development of pup age dynamics, determine the optimal day for photographic surveys, and to estimate correction factors to account for pups absent from the ice during the photographic surveys. The final photographic surveys were carried out on March 27 in a relatively narrow (20-30 nm) N/S band stretching from 71°00'N / 20°00'W in the NE to 69°34'N / 20°36'W in the SW. In total, 2,463 images were obtained during the aerial photographic survey, and following pre-processing (georeferencing and orthorectification), these have now been analysed both manually and using dedicated machine learning systems, to determine the number of

pups present in images. Results will be used to estimate the total 2022 pup production for each species and will also be combined with estimates from previous years to estimate the population sizes using the dedicated population dynamics model. The entire updated dataset will be made available to the upcoming ICES benchmarking meeting for harp and hooded seal population modelling, and results will finally be evaluated at the upcoming meeting of the ICES WGHARP working group in 2023.

Discussion

Precisions were asked on how the presented survey was performed. Haug indicated such survey was performed every 5 years and each time completed within 4 days, with the survey starting in the South of the study area and continuing up North until no more observations were made. The whole study area is covered with aerial pictures in one day (approx. 8 hours). Weather conditions determine the day when the photographs are taken.

It was noted that more data (e.g., size of the animals) could be obtained from the pictures, although that would depend on the quality of the images. Regarding the logistics, it was also noted that the area could also be covered by helicopter in one day as well.

11.5 WALRUS

11.5.1 Review and status of active requests (R-2.6.3)

R-2.6.3 (ongoing): *Provide advice of the effects of human disturbance, including fishing and shipping activities, tourism, hydrocarbon exploration and mineral extractions on the distribution, behaviour and conservation status of walrus in Greenland.*

One part of the response to this request was provided through the joint NAMMCO/JCNB Disturbance Workshop convened in December 2022. The SC endorsed the recommendations provided by the WS, found in Box 4.

Box 4. SC 29 general recommendations pertaining to Disturbances and Walrus.

High priority recommendation for Research

- The regional aerial survey of the east side of Smith Sound be the minimum area that should be covered for monitoring abundance and distribution. Surveys should occur in April, annually during the first 3 years of production, to allow detection of any substantial changes.

Additional Recommendations for Research

- Satellite imagery of Wolstenholme Fjord be collected annually to determine walrus density, and eventually walrus counts if <30 cm resolution imagery becomes available.
- Telemetry data on walrus habitat use, distribution, and migration patterns be combined with a study of benthos covering the foraging areas in Wolstenholme Fjord to improve the assessment of the relative importance of the potential foraging area impacted by the mining operation (disturbance and siltification).
- The hunting effort in Wolstenholme Fjord is at present small. However, the hunting effort may change and may impact walrus numbers and distribution within the Fjord. Therefore, to allow for a cumulative assessment, hunting effort should be monitored in cooperation with local hunters.

Additional recommendations for Management

- Greenland invites Canadian experts to participate in reviewing monitoring programs, plans and results (See also item 9.3.2., Box 1).

The SC **recommended** that request **R-2.6.3 be considered as answered** for the following reasons.

- Results from the above WS.
- Hydrocarbon exploration is not a threat anymore due to the stop of oil exploration in Greenland, and fishing is not considered and issue any longer.
- In general, there is no new data available to respond to this request, apart from specific recommendations to the walrus population near the Dundas Mine in Qaanaaq, which are listed above.
- Hunting is the most important issue impacting walrus populations in Greenland.
- Tourism was shown to have no effect on walrus haul-out behaviour, according to a recent study in Svalbard, and is therefore not considered a factor which could be relevant.

11.5.2 Updates

Hansen informed about a new aerial survey in West Greenland in 2022 that will give a new abundance estimate, and also about a Canadian survey conducted in Smith Sound in 2022.

Lydersen informed of an observation of a walrus at the North Pole (Lydersen et al., 2022, F130).

Lydersen provided an update on the WWF project “Walrus from space”² which aims to carry out the first ever whole population census of Atlantic and Laptev walrus using satellite imagery. It includes a citizen science project and people are able to mark walrus on pictures online.

To address the Greenlandic advice needs, the SC **agreed** that the Walrus WG meet no later than 2024 to address the advice need of Greenland.

To follow up on the issues covered by **R-2.6.3**, the SC **agreed** to add the following Terms of Reference for the Walrus WG:

- a) *To investigate cumulative effects of mining and hunting.*

12. CETACEAN STOCKS

12.1 NARWHAL

12.1.1 Review and status of active request (R-3.4.11)

R-3.4.11 (standing): *To update the assessment of both narwhal and beluga, noting that new data warrant such an exercise.*

This work is done within the context of the NAMMCO-JCNB Joint scientific Working Group (JWG), which met in December 2021, and the Ad hoc Working Group on Narwhals in East Greenland (NEGWG), which met in October 2021. The reports were reviewed by SC 28 in January 2022 and the SC recommendations presented to the MCC in September 2022. The next meeting of the NEGWG is scheduled for autumn 2023.

12.1.2 Narwhals in East Greenland

Updates on narwhal surveys conducted in East Greenland in summer 2022 were presented by Hansen (Working document SC/29/27).

Summary

In 2022, the Government of Greenland tasked the Greenland Institute of Natural Resources (GINR) to conduct an aerial survey of narwhals summering in East Greenland. The survey area was to be decided by using hunter knowledge and representatives from GINR organized a workshop in June with hunters using the three hunt management areas in East Greenland as the area of interest. Scientists from GINR

² <https://www.wwf.org.uk/learn/walrus-from-space>

and hunters more or less agreed on the area of interest but in addition to the traditional survey area covered by the GINR monitoring program for narwhals in East Greenland, the area South of this area was included. Some 50-70 years ago this area used to be a summering ground for narwhals with active hunt from locals, but, according to the hunters at the workshop, no observations have been made there in the last approx. 50 years (during summer).

Transect lines in the fjords were constructed in a zig-zag manner beginning at the outer coast and ending at the glacial front (Figure 2). In most areas a systematic, more intensive coverage than in previous surveys in 2008 and 2016, was attempted. Sightings of narwhals were made in Kangerlussuaq fjord, a single sighting on the Blosseville Coast and in Scoresby Sound (Fig. 2). The distribution of sightings in Kangerlussuaq is similar to the survey in 2016 but in Scoresby Sound, narwhals were only found in Gåsefjord as well as a single sighting in Føn fjord with no observations in Nordvestfjord which used to be a hotspot for narwhals. The overall impression is a continuous decline of the distribution of narwhals in SE Greenland. Abundance estimates will be produced for the next NEGWG.

Discussion

The SC was informed that the cooperation with the hunters had been positive and developed an understanding for the scientists' methodology and work.

To the question on whether narwhals had moved north of the hunting area, Hansen indicated that narwhals from Scoresby Sound did not seem to be going north and that they kept coming back to the same summering ground where they are hunted.

There is no evidence of emigration nor displacement of narwhals in East Greenland, but evidence of decrease in pregnancy rates, decrease in the number of calves and increase in male proportion in the catches. Narwhals in low numbers can be found in the Tasiilaq management area and are occasionally hunted in spring.

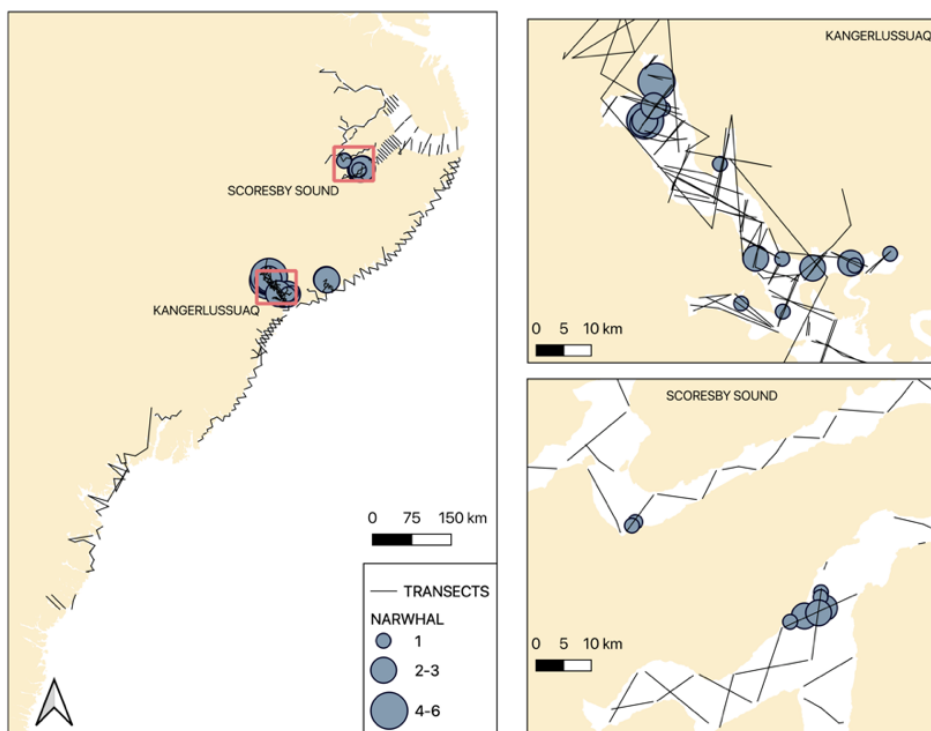


Figure 2. Transects on effort for aerial survey with distribution of sightings of narwhals (blue).

Heide-Jørgensen presented updates on narwhal surveys conducted in East Greenland in spring 2022 (Working document SC/29/28).

Summary

Following the recommendation from NAMMCO's Scientific Committee, an aerial survey of narwhals in the area outside Scoresby Sound was conducted in May 2022. The survey covered both the wintering area of the Scoresby Sound summer stock and the potential wintering area of the northern stock that is hunted in spring in Scoresby Sound. The purpose was to gain insight into whether the two putative stocks are separated in space, and what the abundance of whales is in the two areas. A total of nine sightings were collected during the survey that covered 3398 linear km. Abundance was estimated at 103 (cv=0.55, 95%CI: 38-282) in the area that covered the range of the northern stock, and 171 (cv=0.97, 95%CI: 35-843) in the winter ground of the stock that is summering in Scoresby Sound.

Discussion

The SC welcomed both presentations and the updates provided by both surveys, concluding that the spring survey supported the segregation observed from satellite tracking, genetic studies and hunting records. It was noted that animals could be also present in northern areas but not accessible to hunters. The survey did not support the hypothesis of large numbers of narwhals available for the spring hunt in Ittoqqortoormiit.

12.1.3 NAMMCO-JCNB JWG Disturbance Workshop

In addition to the general management recommendations for narwhals in all areas, presented in section 9.3.2 of the report, the following recommendations for narwhal research and management in Baffin Bay were provided at the Workshop and **endorsed** by the SC (Box 5).

Box 5. SC 29 recommendations pertaining to Disturbances and Narwhals.

Recommendations for Research	
•	Conduct tagging studies to determine impacts of shipping in Baffin Bay.
•	Obtain biological samples (brains, organs etc.) and morphometrics from the narwhal winter hunt in Disko Bay and the spring hunt in other areas of West Greenland.
Recommendations for Management (See Item 9.3.2, Box 1)	
•	Establish a buffer zone of 35 km from ship routes to sensitive areas.
•	No ship anchoring should occur in Store Hellefiske bank, due to its importance as a feeding ground for many Arctic seabirds and marine mammal species.

12.1.4 Updates

Ugarte informed of the quotas given for narwhals in East Greenland (Table 2).

Table 2. Narwhal advice vs quota in East Greenland.

Management area	Advice 2022	Quota 2023
Ittoqqortoormiit	0	20
Kangerlussuaq	0	20
Tasiilaq	0	10

Given that the narwhal stocks in SE Greenland are severely depleted, and at a very high risk of extinction if hunting continues, the SC **strongly reiterated** its management recommendation to reduce the hunt to 0 in all three management areas. The SC **firmly stressed the urgency of the situation** and the need for immediate management action to secure the presence of narwhal in SE Greenland in the future.

The SC **underlined** that an immediate reduction to zero catches is required and cannot wait for further economic/social assessment.

Regarding narwhals in West Greenland, Ugarte informed the SC of new quotas (Table 3).

Table 3. Narwhal advice vs quota, West Greenland. Models 1, 2, and 3 are catch scenarios developed by the JWG.

Area	Smith Sound	Inglefield B.	Melville Bay	Uummannaq	Disko Bay
Model 1	38	55	24	0	0
Model 2	38	52	12	54	31
Model 3	38	52	0	123	54
Quota 2023	5	98	110	154	88

The SC **expressed its concerns** on the current quotas in West Greenland being higher than the advice, especially in relation to the small stock in Melville Bay. The cumulated removals across hunting areas (367) were much larger than the cumulated recommended catches (respectively, 117, 156 and 213). The SC **recommended** that the catch limits provided by the JWG be followed.

Ugarte informed of new surveys planned this year (August 2023) in Melville Bay and Inglefield breeding areas.

12.2 BELUGA

12.2.1 Review and status of active request (R-3.4.11)

R-3.4.11 (standing): *To update the assessment of both narwhal and beluga, noting that new data warrant such an exercise.*

This work is done within the context of the NAMMCO-JCNB Joint scientific Working Group (JWG) and the Ad hoc Working Group on Narwhals in East Greenland (NEGWG), see under agenda item 12.1.1.

12.2.2 Updates

Belugas are occasionally observed, caught, and by-caught in East Greenland (3 by-caught in sealnet in September 2020), but no population has been identified. Based on preliminary genetic analyses from belugas caught in 2021, these animals are considered to belong to the Norwegian (Svalbard) stock. Lydersen informed that a 2018 survey yielded an estimate of 549 belugas (95% CI: 436–723) in Svalbard (Vacquie-Garcia et al. 2020).

Given the above information, SC29 **reiterated the recommendations** pertaining to Beluga from SC28 and added one recommendation endorsed from the Disturbance Workshop (Box 6). The SC **tasked the NEGWG** to include the following item to its Terms of Reference for the next meeting:

- a) *To review the situation of belugas in East Greenland with participants from Norway.*

Starting from 16 December 2022, Greenland introduced a ‘technical’ quota for the period 2022-2027 of in total 30 landed belugas in East Greenland (Table 4). On 21 December 2022, 16 belugas were recorded caught. In addition, 12 had been caught illegally in May 2022 in Tasiilaq - Kuummiut area. Hansen provided updates regarding belugas in West Greenland. The current quota of 37 landed whales per year in Qaanaaq (North Water) is following the JCNB-JWG/NAMMCO SC advice. Due to an overharvest of 64 whales in 2019, the annual quota is subtracted 8 whales per year, so the quota 2021-2028 is 29 whales per year (Table 4), thus compensating for the overharvest of 2019.

Box 6. SC 29 recommendations pertaining to Belugas.

Recommendations for Management	
<ul style="list-style-type: none"> To implement seasonal closures for the hunt of belugas in West Greenland. To make sure no hunting of belugas be allowed at any time in the area south of 65 degrees North in West Greenland. Belugas in East Greenland remain fully protected, as there is insufficient information to perform an assessment of belugas in East Greenland. Documentation of hunter observations of belugas in East Greenland is collected in a structured manner, including photographs or video footage of the animals, information on where and when the sighting took place, and how many individuals were seen. Any by-catch of belugas in East Greenland be documented in the Special Reports. In case of live by-caught belugas in East Greenland, all efforts be made to release the animal. Additional samples be taken from all dead by-caught belugas in East Greenland, and all caught belugas in West Greenland, besides the already mandatory information (date and location of the by-catch, sex, presence/absence of a foetus). This additional information includes skin biopsy sample, length, a tooth, girth measurements, and whether there is milk in the mammary glands of females. 	
Additional recommendation for Management pertaining to disturbances (See Item 9.3.2, Box 1)	
<ul style="list-style-type: none"> Ship speed regulations of 8 knots be extended to south of the beluga migration route passing Cape York in September-October. This recommendation does not include a buffer around the timing of shipping. 	

Table 4. Beluga advice vs. quota 2023.

Management area	Advice	Quota 2023
North Water	37	29
West Greenland north of 65°N	265	265
West Greenland south of 65°N	0	
East Greenland	0	30 for 16/12/22 to 31/12/27

12.3 HARBOUR PORPOISE

12.3.1 Review and status of active request (R-3.10.1)

R-3.10.1 (Ongoing): *To perform such an assessment, which might include distribution and abundance, stock identity, biological parameters, ecological interaction, pollutants, removals, and sustainability of removals.*

12.3.2 Harbour Porpoise Working Group

Mikkelsen presented the report of the Harbour Porpoise Working Group (HPWG) meeting that took place in Oslo in November 2022 (available as working document SC/29/06).

Mikkelsen indicated this was the 3rd meeting of the HPWG and was intended to update knowledge and produce an assessment of harbour porpoise in Norwegian waters. Available information for future assessments was also presented from Greenland, Faroe Islands, and Iceland. Invited external experts were Phil Hammond (UK) and Mathieu Authier (France).

The Terms of Reference of the meeting were:

- Conduct an assessment of the sustainability of the removals of harbour porpoise in Norway.
- Identify knowledge gaps and needs for further research.
- Assess impacts from non-hunting related anthropogenic stresses (pollution, climate change, noise etc).

Additionally, the SC decided that this WG should:

- d) Review the information available on the genus *Lagenorhynchus* in the NAMMCO area and advise on how progressing towards and preparing of an assessment of the species in 2023.
- e) Review the information available on pilot whales in the NAMMCO area and advise on how progressing towards and preparing of an assessment of the species in 2023.

WG summary

There is currently lack of scientific evidence of genetic structure in the population, yet the WG agreed to split the stock in 4 regions, based on fishery areas (North, North-West, West and South). Recent abundance estimates were included in the assessment and showed smaller numbers in the Northern regions compared to the Southern regions. Biological parameters, estimated from by-caught individuals, and by-catch estimates recalculated for each assessment region were also provided. Available information on the impact of non-hunting anthropogenic stressors on harbour porpoise was also reviewed.

The results of the population dynamics model used for the assessment (Figure 3) showed projected abundance declines in the North and North-West regions due to unsustainable removal levels in these regions. The WG concluded that Norwegian by-catch of harbour porpoise is unsustainable, especially in the North-Western and Northern area. Recognising that this conclusion reflects both uncertainty in the stock structure and the limited data available, the WG recommended that Norway reduces the by-catch of harbour porpoises and improves the available data for a new assessment.

The HPWG formulated recommendations for research and recommendations for conservation and management of harbour porpoise in Norway, as well as recommendations before future assessments of harbour porpoise be performed in other NAMMCO countries (See Box 7).

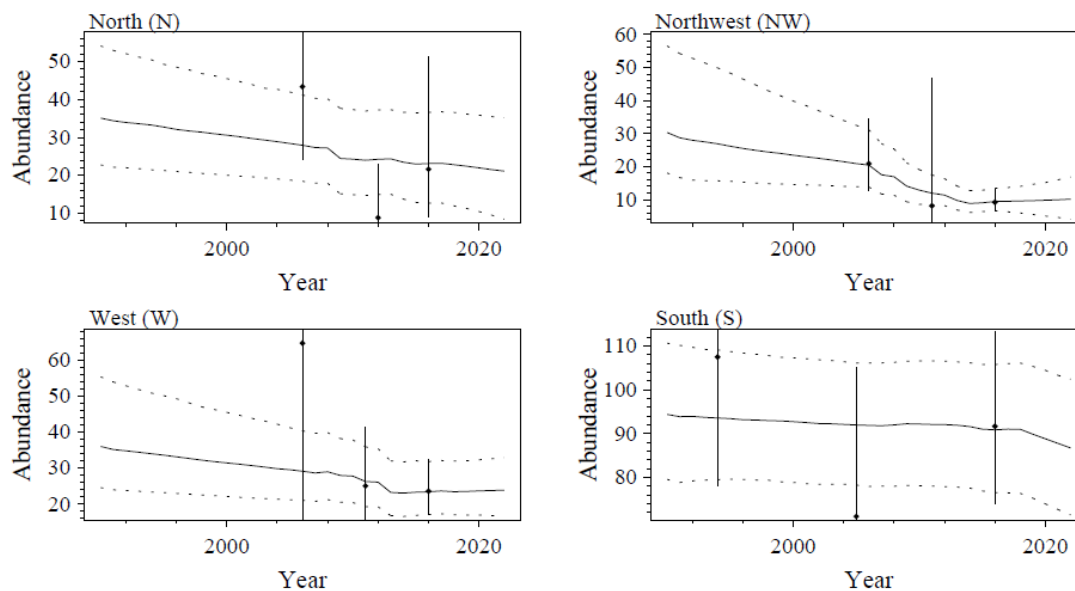


Figure 3. Projections of harbour porpoise from the agreed assessment. The solid curve is the median, the dotted lines the 90% credibility intervals, and the dots with bars the agreed abundance estimates and their 90 % confidence interval.

Discussion

The SC welcomed the work of the WG and agreed with the conclusion from the harbour porpoise assessment, that the Norwegian by-catch of harbour porpoise was unsustainable. It **endorsed** the recommendations from the WG (Box 7), also noting that available data on harbour porpoise in all NAMMCO countries had been reviewed at the HPWG meeting. The SC was informed that data to conduct a future assessment for Iceland was available and that Iceland was also planning a harbour porpoise survey in 2023. Regarding efforts in Norway to reduce by-catch, Haug indicated there were pinger experiments planned in the Lofoten area.

Box 7. SC 29 recommendations pertaining to Harbour porpoises.

Recommendations for Research to Norway

- By-catch estimates be back-calculated as far back as possible (e.g., until 1970) using landings and included in future assessments.
- To use REM and/or other methods to get estimates of harbour porpoise dropout rates in gillnets.
- To improve the age-structured population dynamics simulation model by constraining the simulations, i.e., narrow down the underlying assumptions behind the simulations and processes (e.g., density dependent mortality).
- To integrate harbour porpoises in ecological models and run risk assessment with respect to changes in by-catch rates and various ecosystem properties.
- Increase tagging efforts to inform on movements, distribution, and stock delineation of harbour porpoise in Norwegian waters.
- Collect more biological samples to increase the life history information feeding the population models.
- Look into potential by-catch of porpoises in recreational fisheries to potentially include recreational fisheries in future by-catch estimates.
- Include by-catch data from larger (>15m) vessels into the by-catch estimates used for the assessment.
- Look into the effects of ghost nets on harbour porpoise mortality dynamics and, if a concern, increase efforts in removing ghost nets in areas of high porpoise density.

Recommendations for Conservation and Management to Norway

- Continue its efforts to reduce by-catch of harbour porpoises, deemed unsustainable.
- Assess the compliance of the fleet to the pinger regulations in Vestfjorden as a basis for evaluating the efficacy of the pinger mandate.
- Consider expanding the use of pingers to areas north and west of Vestfjorden.
- Due to the present unsustainable level of by-catch, consider the best way of ensuring that the mandatory use of pingers is enforced.
- Implement the use of REM systems in fishing vessels outside the CRF, to complement the by-catch data from the CRF.
- The assessment for Norway should be updated with the requested new information at the next HPWG meeting.

Recommendations for Conservation and Management to Greenland

- Plan to conduct a new assessment on harbour porpoise when new abundance estimates are available.
- Implement previous management advice given on harbour porpoise in West Greenland (i.e., no more than 2900 total removals, i.e., included unreported individuals).

Recommendations for Conservation and Management to the Faroe Islands

- Support the creation of an App where users of coastal areas (i.e., fishers, recreational boats) can report observations, catch, and by-catch of harbour porpoises.
- Initiate the collection of biological data on harbour porpoise.

Recommendation for Research to Iceland

- Generate the best back-calculated by-catch estimates (i.e., a time series going back to the beginning of the fishery) for the upcoming Icelandic assessment.

Recommendations for Conservation and Management to Iceland

- An assessment of harbour porpoise be made when the new abundance estimate becomes available after the aerial survey planned for 2023.

The SC was informed that reported catches of harbour porpoises in Greenland were probably an underestimate and already higher than the advice given, so efforts were crucially needed in improving the catch reporting. The SC noted that a new executive order would make reporting of the catch more reliable. The SC **agreed** that catch levels of harbour porpoise in Greenland were deemed unsustainable and noted that previous management advice had not been implemented; the SC **recommended** it be implemented (Box 7). The SC also **strongly** encouraged Iceland to conduct a new survey on harbour porpoise as soon as possible. The SC also noted that updated information on population structure and back-calculated by-catch estimates for Norway were needed as soon as possible to update the results of the Norwegian assessment and **recommended** this be done (Box 7).

12.3.3 Updates

Sigurdsson informed of a recent paper looking at trophic ecology of harbour porpoise in Iceland (available as document SC/29/FI29). This research based on stable isotopes and fatty acids indicated that harbour porpoise almost exclusively feed on capelin in Iceland, whereas *Lagenorhynchus* dolphins feed on gadoids, so there were no indications of competition between these species there.

12.4 DOLPHINS**12.4.1 Review and status of active request (R-3.9.6)**

R-3.9.6 (pending): *To carry out assessments of dolphin species for which there are removals.*

In response to this request, Mikkelsen informed that available data on *Lagenorhynchus* dolphins in all NAMMCO countries had been reviewed at the HPWG meeting in 2022 (SC/29/06) and that a Dolphin Working Group meeting was scheduled for 2023 (see agenda item 12.4.2).

The HPWG formulated several recommendations needed to be fulfilled before an assessment of *Lagenorhynchus* dolphins be carried out by NAMMCO (Box 8).

Discussion

The SC **endorsed** all the recommendations from the HPWG concerning *Lagenorhynchus* data (Box 8). It was noted that external expertise in modelling was needed for the Faroe Islands to follow the recommendations on *Lagenorhynchus* given by the HPWG.

Box 8: SC 29 recommendations pertaining to *Lagenorhynchus* dolphins.

Recommendation for Research to Greenland

- Increase effort in collecting samples for genetic analysis.
- Prepare catch statistics separating both species, where possible.

Recommendation for Research to the Faroe Islands

- Age determination from random teeth samples from different periods of time should be added to the age structure information on *Lagenorhynchus acutus*.
- Investigate any changes in age structure over different years to resolve whether some cohorts are underrepresented in the samples.
- Complete the analyses of life history parameters.
- Together with Greenland, collect data for genetic analyses and make sure they are integrated within the current European genetic analyses for *Lagenorhynchus* sp. coordinated by ASCOBANS.

Recommendation for Research to Iceland

- Provide a table with the by-catch information available for each *Lagenorhynchus* species.

General recommendation

- The By-Catch Working Group expand its focus to *Lagenorhynchus* dolphins.

12.4.2 Dolphins Working Group

The SC has scheduled a Dolphin Working Group (DWG) for 2023 in the workplan. It was noted that the NAMMCO Council had strongly recommended this Working Group meeting not be delayed. Potential invited experts to this DWG meeting were Phil Hammond (UK), Mathieu Authier (France) and Anita Gilles (Germany), with competence on modelling. It was noted that an ASCOBANS scientist should be also invited to this meeting, as well as genetics expert Marc-Alexander Gose (Edinburgh, UK).

The SC defined the following Terms of Reference for this DWG:

- Conduct an assessment of the sustainability of the removals of Lagenorhynchus dolphins in the Faroe Islands, Iceland and Greenland.*
- To review available information in other areas and identify knowledge gaps and needs for further research.*
- Assess impacts from non-hunting related anthropogenic stresses (pollution, climate change, noise etc).*

12.5 PILOT WHALE

12.5.1 Review and status of active request (R-3.8.6)

R-3.8.6 (ongoing): *To continue work to complete a full assessment of pilot whales in the North Atlantic and provide advice on the sustainability of catches, as soon as necessary further information becomes available, with particular emphasis on the Faroese area and East and West Greenland.*

In response to this request, Mikkelsen informed that available data on long-finned pilot whales in all NAMMCO countries had been reviewed at the HPWG meeting in 2022 (SC/29/06) and that a Pilot Whale Working Group (PWWG) meeting was scheduled for 2024 (see agenda item 12.5.2). The HPWG had formulated several recommendations for the upcoming assessment on pilot whale (Box 9).

Discussion

The SC **endorsed** the recommendations from the HPWG concerning pilot whale data needs for the upcoming assessment (Box 9), noting that the required data should be ready well ahead of the meeting for a successful assessment. Mikkelsen indicated that the collection and analysis of genetic samples on pilot whales will be coordinated with Greenland and Iceland as soon as possible.

Mikkelsen also informed of a new collaborative project initiated between Greenland and the Faroe Islands involving tracking to look into the behaviour of pilot whales.

Box 9. SC 29 recommendations pertaining Pilot Whales.

Recommendation for research to the Faroe Islands

- Given the high number of available data (2000+), 150+ teeth samples collected randomly at the end and at the beginning of the 2013-2022 period be aged and the corresponding reproductive data analysed to obtain a long-term trend in life history parameters.
- To collect and analyse genetic samples together with Iceland and Greenland, to get better knowledge on stock identity.
- To investigate the potential relationship between pollutants and life history parameters of pilot whales between the first sampling period (1986-1989) and the present one (2013-2022).

12.5.2 Pilot Whale Working Group

Mikkelsen informed the SC that the PWWG meeting, initially planned for 2023, had been re-scheduled to 2024 during the 29th meeting of the NAMMCO Council, due to new restrictions on the number of in-person WG meetings per year (maximum 4).

The SC **recommended** that the PWWG be further postponed to 2025, so a new abundance estimate from the NASS2024 survey be available for the assessment.

12.6 NORTHERN BOTTLENOSE WHALE

12.6.1 Review and status of active request (R-1.7.11)

R-1.7.11 (ongoing): *To develop estimates of abundance and trends as soon as possible once the survey has been completed, with the primary target species (fin, minke and pilot whales) as a first priority, and secondary target species as a second priority.*

All abundance estimates from the NASS surveys have been completed and published in 2013 and 2019 (Lockyer and Pike, 2013; Desportes et al., 2019), except for an overall Northeast Atlantic estimate for northern bottlenose whales. SC28 indicated that Norway was progressing with the task and that sighting data from a 2021 survey would be added to the dataset, when a high number of bottlenose whales were sighted in the Jan Mayen area. (SC/28, 2022).

Nils Øien informed the SC that this abundance estimate could be expected in April 2023.

The SC welcomed the progress in the analysis and was looking forward to the results.

12.7 BEAKED WHALES

Olsen informed of a genetic study on Cuvier's and Blainville's beaked whales (Onoufriou et al. 2022), led by researchers in Scotland, Denmark, USA and New Zealand.

Mikkelsen reported of a stranded Sowerby's beaked whale in the Faroe Islands. It is the second most common species in Faroe waters and a review might be initiated in the future. Olsen expressed interest in beaked whale samples for genetic analyses, in particular Sowerby's beaked whale and northern bottlenose whale.

12.8 BLUE WHALE

Lydersen informed that niches of marine mammals in the European Arctic, including blue whales, were described in a recent paper by Mackenzie et al. (2022), and available as document SC/29/FI11.

12.9 BOWHEAD WHALE

Heide-Jørgensen informed of a paper by Chambault et al. 2022 (available as document SC/29/FI08) which focuses on habitat reduction due to ocean warming for three arctic whale species: narwhals, belugas and bowhead whales. The habitat of bowhead whales will probably be reduced, and shift northwards, resulting in less available area for bowheads in the future.

Sightings of bowhead whale calves were made off Scoresby Sound during the narwhal survey in May 2022.

12.10 COMMON MINKE WHALE

An article examining trends in blubber thickness of minke whale in the Northeast Atlantic (available as document SC/29/FI17) was recently published in Volume 12 of NAMMCO Scientific Publications.

12.11 FIN WHALE

Sigurdsson and Granquist informed the SC that advice on fin whale for Iceland was needed before spring 2026. The SC **agreed** that the Large Whale Assessment WG should meet no later than winter 2025-2026 to address the advice need of Iceland.

12.12 HUMPBACK WHALE

Haug informed that the migration and energy budget of humpback whales based on data from satellite tagging is presented in SC/29/FI25.

12.13 KILLER WHALE

The SC 25 recommended that existing catch records should be validated and reporting on catches (including struck and loss rates) be improved. It also noted that killer whales should be included in existing mandatory reporting schemes. SC 25 also recommended that Greenland be advised to regulate the hunt and restrict quotas in a precautionary way. These recommendations were endorsed by MCC 27 and forwarded to Greenland. The SC noted that these recommendations were not followed and that the hunt was still not regulated. The SC **reiterated those recommendations** (Box 10).

The SC is not able to generate advice on sustainable catch levels of killer whales in Greenland at this point and is concerned that continued harvest may risk the local presence of killer whales in some areas. The SC also **expressed** concerns on the high struck and lost rates.

It was stated that a significant number of samples from historical hunts in Norway had been collected but were no longer available. Analysis of these samples is reported in the published literature, although an assessment of pollutant levels was not a part of this work. It was noted that for the current by-catch of killer whales in fisheries in Norway, no samples are currently being collected. Samples are being collected in Greenland when possible. The SC **recommended** furthering sampling efforts in all NAMMCO countries, as well as further analyses of pollutant levels and genetic analyses to help determine stock structure.

In discussing the recommendations proposed in the review, the SC proposed that it would be valuable for Council to provide clarification on the management objectives for killer whales.

The SC **recommended** that Greenland be advised to regulate the hunt and restrict quotas in a precautionary way (see also agenda item 13).

Box 10. SC 29 Recommendations pertaining to Killer Whales.

Recommendation for Management to Greenland

- To regulate the hunt of killer whales and restrict quotas in a precautionary way.
- That existing catch records be validated and reporting on catches (including struck and loss rates) be improved.
- Killer whales be included in existing mandatory reporting schemes.

Recommendation for research to All Countries

- To further sampling efforts in all NAMMCO countries, as well as further analyses of pollutant levels and genetic analyses to help determine stock structure.

12.13.1 SLICE project (Akvaplan-NIVA)

Pierre Blévin (Akvaplan NIVA-Tromsø) presented the SLICE and Marma-detox projects which will run over the next 4-years and will involve an international research consortium dispatched across 5 countries, as well as include post-doctoral researchers, PhD candidates and MSc students.

Summary

SLICE - Moving from field studies to ex vivo models for understanding and predicting toxicological responses to multiple stressors in marine mammals

Marine mammals are relevant sentinels of oceans and human health. Arctic top predators, such as killer whales and polar bears, are among the most polluted species on Earth. They are also exposed to additional anthropogenic stressors such as climate change, resource limitations, habitat loss, and human coastal activities. However, cause effect and mechanistic understanding in pollutants response in marine mammals remain poorly understood, and there is a lack of knowledge on the combined effects of multiple stressors. There is a need to develop alternative solutions and move from a reductionist perspective to a holistic and integrative strategy to understand the complex patterns of responses. In SLICE, we will combine experimental and field-based studies, together with the application of toxicogenomic approaches to advance the knowledge on toxicological responses to multiple stressors in killer whales and polar bears. We will develop an alternative methodology through an ex vivo adipose tissue slices model for both species and use it to characterize genome-wide transcriptional and lipidomics responses to pollutants and stress. This novel cost-effective ethically sustainable tool enables to test responses to pollutants and stress separately or simultaneously, which is an important step forward to deepen our understanding of toxicological responses to multiple stressors in marine mammals. In parallel, we will conduct correlative field studies to assess potential combined effects with pollutants and stress related to climate change for polar bears and whale tourism for killer whales. As charismatic megafauna, polar bears and whales have a strong potential to raise environmental awareness. Scientific knowledge generated by the project (and beyond) on threats of anthropogenic stressors will be communicated to the scientific community, the public (focusing on young) and relevant stakeholders.

Marma-detox - Whales and polar bear in a petri dish: decoding marine mammal toxicology through in vitro and in silico approaches

Large marine mammals, including polar bear and whales, fill important niches as mid or top predators in marine food chains. Their high energy intake is often accompanied with elevated levels of contaminants having bioaccumulating and biomagnifying properties. Although receiving a lot of public attention, the massive hunting of large marine mammals over the last centuries turned these into threatened, rare, and, as a result, poorly studied animals. Further research investigating the individual and collective consequences of contaminant exposure is needed and would help to better understand effects of contaminants on population dynamics and help the resurgence of these large and important animals. To date, only a handful of studies have given mechanistic insights in contaminant response in

marine mammals²⁴. Over the last couple of years, we have established alternative approaches to overcome these hurdles through a unique collaboration between marine mammal scientists, environmental chemists, bioinformaticians, and molecular toxicologists. In this project we want to exploit our position at the leading edge of this research to go deeper and wider into the field of marine mammal toxicology. Furthermore, we want to communicate scientific knowledge about the threats of anthropogenic stressors, with a focus on environmental pollution, to marine mammals to the public and to stakeholders via existing communication platforms (web, social media, conferences, press) and displays at relevant museums and science centres.

Discussion

The SC thanked Blévin for the interesting presentation and asked how NAMMCO can be involved in these projects. Blévin answered that the dissemination of the projects results on NAMMCOs platforms would be a great contribution.

12.13.2 Updates

Norway informed the SC of an ongoing tracking project of killer whales conducted by the University of Tromsø, as well as the continuation of the photo identification project under the Norwegian Orca Survey in connection with the University of Oslo which also look at the effect of multiple stressors on Norwegian killer whales and the impact of orcas as predators.

The secretariat informed that the International Killer Whale Symposium in Spain would be postponed to 2024, due to a pause in the activity of the committee organizing this international symposium.

12.14 SEI WHALE

No research or management updates were presented for this species.

12.15 SPERM WHALE

Lydersen informed of an ongoing tracking study on sperm whales, involving 20 animals and conducted by the Norwegian Polar Institute and the University of Tromsø.

13. MANAGEMENT PROCEDURES

13.1 PRECAUTIONARY APPROACH (R-1.6.7)

R-1.6.7 (ongoing): *To explain how and at what level the precautionary approach is, or can be, integrated into advice provided by the SC for use in conservation and management, with a particular focus on depleted stocks.*

To support its work, the JWG 2021 had also requested the SC “That definitions be developed for what constitutes small stocks, depleted stocks and stocks at risk of extirpation, and that frameworks for advice and management then be articulated for what actions should be taken for these different categories.”

The SC was further asked by the HoDs to answer the following two questions:

- Advice on how to prioritize the assessment of marine mammal species.
- Provide advice on whether NAMMCO needs within a precautionary framework some rules on regularity of surveys, assessments, etc.

Discussion

The SC continued discussing the reference points for a principle-based precautionary approach provided at SC28 (Working document SC/29/25). It **agreed** on 8 principles (Box 11) for better integrating and enhancing a precautionary approach in its management recommendations and, consequently, in the management advice of NAMMCO.

Box 11. SC 29 recommendation pertaining to integrating a precautionary approach.

SC 29 principles for integrating a precautionary approach in NAMMCO's management of cetaceans and pinniped stocks:

- 1) Anthropogenic removals of marine mammals should be assessed for sustainability.
- 2) Sustainable management actions should be to maintain or restore stocks at levels ideally above 60% of their equilibrium in the absence of anthropogenic removals, disturbance and resource competition.
- 3) Stocks that are depleted below 60% should be managed to increase so that they can recover to the 60% level in a reasonable time period. For example, by having total removals that ensure at least a 70% probability of increase.
- 4) Stocks that are small (<1000 individuals, unless there are more than 400 reproductive age females in the population) should be fully protected from exploitation unless a data-based assessment is able to recommend a sustainable hunt.
- 5) Management decisions should be based on the best available science, which may include hunter and user data and observations.
- 6) Where the best available science is insufficient the precautionary approach shall be widely applied, particularly for small stocks. With greater uncertainty more caution is required.
- 7) Acknowledging that halting all hunting of a stock may not be sufficient to promote recovery of a depleted or small stock, additional management actions should be considered.
- 8) All species assessments should include data requirements for future assessments.

The SC **recommended** that these principles be adopted by NAMMCO.

Principles 3 and 4 also address the question of definitions of what constitutes small stocks.

The SC discussed the criteria used for prioritising the assessment of stocks with removals and **recommended** that one or more of the criteria shown in Box 12, without any order of priority, be used.

Box 12. SC 29 recommended criteria for prioritising the assessment of stocks.

SC 29 criteria for prioritising the assessment of marine mammal stocks with removals:

- Stocks with concerning population status.
- Stocks for which no assessment has been conducted.
- Assessments should be conducted at a minimum of every 5-10 years, or more frequently if there is concern on population status.

The needed regularity of surveys and assessments are stock specific and is depending on the conservation status. Therefore the SC choose not to provide a general recommendation but **agreed** to set as a standard term of reference in any assessment to define the regularity of abundance surveys and assessment for each specific case (species/stock)..

14. ABUNDANCE / ASSESSMENT / CONSERVATION STATUS TABLES

The SC **agreed** this item will be dealt with at the next SC meeting.

15. WORK PROCEDURES

15.1 WORKING GROUP ON GENETICS

The SC discussed the potential advantage of the establishment of a technical WG on genetics in NAMMCO.

Witting raised the concern that it could be a disadvantage to have to go through another WG to get genetic results and asked what the advantage is of a WG compared to invited geneticists to existing WG? Olsen and Desportes explained, that the WG could increase transparency, ensure a standard within NAMMCO for genetic studies and would minimize bias due to personal research interests. Genetic studies are important as they provide the data which is used to decide on stock structures for NAMMCO-relevant species. In addition to stock structure, genetic data can be used to i) identify populations with low diversity, ii) assess demographic histories in response to climate and human impacts, iii) identify local genetic adaptations e.g. to salinity, iv) to determine the diet of marine mammals, v) detect pathogens and characterise microbiomes, vi) study changes in gene expression in response to stressors, and vii) to monitor their distribution through eDNA analyses. Genetics cover very different techniques answering questions at different levels, and it is important that results of studies be discussed by several experts. However, NAMMCO does not have the budget to invite several geneticists to each WG meeting. A genetics WG could assess the needs and the results presented to the WGs by correspondence and forward its answer to the WG. The genetic WG would be a technical WG, as is the Abundance Estimate WG or the By-Catch WG, supporting the work of the species/assessment WG.

The SC **agreed** that Olsen and the Secretariat would reach out to geneticists that have worked with NAMMCO before to see if there is interest in the community to form such a WG. It would be an ad hoc group, which would not meet regularly and can respond by correspondence to the questions of WGs. The group members will be agreed upon by correspondence and presented with a proper proposal and Terms of Reference at the next SC meeting.

15.2 SCIENTIFIC COMMITTEE AND WORKING GROUP MEETINGS

The Working Document SC/29/26 provided by the Secretariat with suggestions to improve SC meetings was presented by Desportes.

Discussion

The members discussed the suggestions and emphasized, that an annual meeting was preferred to biennial meetings due to the concern of too many points of discussion in a two-year rhythm. The suggestion of having recurrent shorter SC meetings during the year to review WG reports was rejected as members were concerned about scheduling problems and low attendance rates of these meetings. Therefore, the SC will continue with the present format of annual SC meetings.

It was suggested that WG meetings could be composed of several shorter meetings each focussing on specific points of an agenda. Hansen gave an example of technical JCNB sub working group which had many small meetings over a longer period and emphasized, that this was not a format she would recommend. Rosing-Asvid will lead the Ringed Seal WG with shorter meetings distributed over the year which can be seen as a test run of this format. The SC members will continue with the current format of WG meetings but in specific cases might use several, shorter meetings.

15.3 MEETING ETIQUETTE

After comments of meeting participants over the years about improper behaviour in the meetings, the Secretariat considered appropriate to discuss meeting Etiquette and provided in support of the discussion example from ICES code of conduct and etiquette (SC/29/FI04ab and SC/29/FI5ab).

The SC acknowledged the issue and the information provided and **agreed** to keep the issue in mind for future meetings.

15.4 STAFF RENEWAL AT THE SECRETARIAT

Chacón and Charlotte Winsnes (Deputy Secretary) will leave the Secretariat in summer 2023 and Desportes will stay for two more years. Desportes informed the SC about the plans of the HoDs to restructure the Secretariat. The decision was to have, besides a General Secretary, two Scientific Secretary positions to cover the work of the Scientific Secretary and the work of the Deputy Secretary (presently in charge of the Committee of Hunting Methods and the Committee on Inspection and Observation, as well as administrative matters), plus a part time administrative position. This would alleviate the present workload of the two secretaries, would liberate time to participate in some research or outreach projects, and would provide more flexibility in task sharing. The intern position will remain.

Desportes asked the SC what qualifications the Scientific Secretaries should have to best accommodate the needs of the SC.

Discussion

The SC discussed about qualities needed and **agreed**, that the positions should be filled with scientists having a natural science background and knowledge about marine mammal biology. This was deemed as fundamental. Additionally, excellent writing skills were required. The SC also **agreed** to come with further suggestions for qualifications.

The SC also **agreed**, that opportunistically and based on the profiles of the persons hired, they could be included in projects of SC members to reinforce their interest and commitment to the position.

16. FUTURE WORKPLAN

The schedule **recommended** by SC for 2023 is presented in Table 5 below, together with a provisional schedule for 2024 and 2025 (in grey, meetings to be held online). The 30th SC meeting will be held on January 22 – 25, 2024. Iceland will be the host in 2024. The precise location will be determined at a later time.

Table 5. Future workplan recommended by SC 29.

2023	2024	2025
<p><u>WG and WS meetings:</u></p> <ul style="list-style-type: none"> - Panarctic Bearded seal WS March (online) - Ringed seal WG (Several shorter meetings starting early fall, online) - Dolphins WG (Fall 2023) - Coastal seals WG (8-11 May) - Narwhal and Beluga in East Greenland WG (late 2023) - WGHARP (ICES-NAFO-NAMMCO): 4-8 September (Tromsø) 	<p><u>WG and WS meetings:</u></p> <ul style="list-style-type: none"> - Walrus WG - Harbour porpoise WG (Iceland) - NAMMCO-JCNB Joint WG 	<p><u>WG and WS meetings:</u></p> <ul style="list-style-type: none"> - Large Whale Assessment WG - Pilot whale WG - Abundance Estimate WG
<p><u>Other:</u></p> <ul style="list-style-type: none"> - ICES BWKSEALS – May (hybrid) - NASS SpC meetings (online) - MINTAG StG meetings (online) - MINTAG: testing on carcasses, Iceland summer - MINTAG: test tags deployment work, summer 	<p><u>Other:</u></p> <ul style="list-style-type: none"> - NASS SpC meetings - MINTAG StG meetings (online) - MINTAG: deployment field work and analysis - NASS surveys 	<p><u>Other:</u></p>

17. BUDGET 2023-2024

The SC budget for 2022 was NOK 170,000 and the SC expenses for 2022 amount to NOK 133,921. NOK 45,000, that was originally allocated to a WG meeting postponed to 2023, will be transferred to 2023.

The SC budget 2023 and the draft budget 2024 adopted by Council 29 are NOK 211,000, plus NOK 45,000 transferred from 2022, i.e., a total of NOK 256,000, and NOK 256,500 respectively. However, following the present SC workplan proposal, the forecasted expenses for 2023, NOK 305,000 (including the transferred 45,000), are over the present budget.

The budget and accounting for the NASS and MINTAG projects are kept separate from those of the SC, under their specific items in the budget of the Commission. They are therefore not included in the numbers given above.

18. NAMMCO SCIENTIFIC PUBLICATIONS UPDATE

18.1 VOLUME 12

Chacón presented the Volume 12 of NSP, which is dedicated to Gísli A. Víkingsson. It comprises, besides an In Memoriam to Víkingsson, 5 publications, 2 reviews, 1 workshop report and 1 note. The SC thanked Chacón and all other editors for their dedicated work, as well as Desportes for taking the initiative of the In Memoriam.

18.2 VOLUME 13

Chacón opened the discussion about a theme for the next Volume and the SC **agreed** to continue the open call “Marine Mammals in the North Atlantic Part II”.

It was suggested that the report of the Bearded seal WS, which will take place in March 2023, could be published in Volume 13.

19. OTHER BUSINESS

The way dinners in meetings are organized by NAMMCO was discussed. The SC considered important to keep social dinners in SC and WG meetings, regardless of how they are covered, but more important to have invited external participants than free meals during NAMMCO meetings. The SC **agreed** that only covering the cost for local scientists (who do not receive a per diem from their institutions) was a good approach.

The SC **agreed** that more assistance from the scientists was needed in taking notes of the discussions during WG meetings, especially in those meetings with only one rapporteur from the secretariat.

The SC also **agreed** to request that the deadline for the submission of the annual progress reports (APR) from countries be extended beyond 1st of February. The APR should, however, not be submitted later than early March, to be available as documents to that year’s Council meeting.

20. MEETING CLOSE

The Chair thanked all the participants for their input to the discussions and Greenland for hosting SC29. Special thanks were addressed to the Secretariat for the work done in preparation for and during this meeting.

The meeting was closed at 15:42 CET on Thursday January 26, 2023.

A draft report was accepted before the close of the meeting on January 26, 2023. The final report was accepted by correspondence at 12:00 on February 10, 2023.

REFERENCES

Cameron, M. F., Bengtson, J. L., Boveng, P. L., Jansen, J. K., Kelly, B. P., Dahle, S. P., ... & Wilder, J. M. (2010). Status review of the bearded seal (*Erignathus barbatus*). U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-211.

Desportes, G., Guldborg Hansen, G. And Pike, D. 2019. Sightings Surveys in the North Atlantic: 30 years of counting whales. *NAMMCO Scientific Publications*, 11. <https://doi.org/10.7557/3.11>

Granquist, S. M. (2022). The Icelandic harbour seal (*Phoca vitulina*) population: trends over 40 years (1980–2020) and current threats to the population. *NAMMCO Scientific Publications*, 12. <https://doi.org/10.7557/3.6328>

Lockyer, C. and Pike, D. 2013. North Atlantic Sightings Surveys: Counting whales in the North Atlantic, 1987-2001. *NAMMCO Scientific Publications*, 7. <https://doi.org/10.7557/3.7>

Onoufriou, A. B., Gaggiotti, O. E., de Soto, N. A., McCarthy, M. L., Morin, P. A., Rosso, M., ... & Carroll, E. L. (2022). Biogeography in the deep: Hierarchical population genomic structure of two beaked whale species. *Global ecology and conservation*, 40, e02308. <https://doi.org/10.1016/j.gecco.2022.e02308>

Vacquié-Garcia, J., Lydersen, C., Marques, T. A., Andersen, M., & Kovacs, K. M. (2020). First abundance estimate for white whales *Delphinapterus leucas* in Svalbard, Norway. *Endangered Species Research*, 41, 253-263. <https://doi.org/10.3354/esr01016>

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APPENDIX 2: AGENDA

- 1. Welcome from the Chair & Opening Remarks**
- 2. Adoption of Agenda**
- 3. Appointment of Rapporteurs**
- 4. Review of Available Documents and Reports**
 - 4.1. National and annual progress reports
 - 4.1.1. Updates from observers
 - 4.2. Working group reports
 - 4.3. Other reports and documents
- 5. Updates from Council**
 - 5.1. General comments
 - 5.2. Endorsed SC workplan
 - 5.3. Update on NAMMCO processes
- 6. NASS Planning**
- 7. Collaborative projects**
 - 7.1. MINTAG Project
 - 7.2. MINTAG collaborations
 - 7.3. Other collaborations
- 8. Interactions with other organisations**
 - 8.1. ASCOBANS
 - 8.2. CAFF
 - 8.3. ICES
 - 8.4. IUCN
 - 8.5. IWC
 - 8.6. JCNB
- 9. Environmental/Ecosystem Issues**
 - 9.1. Marine Mammal / Fisheries Interactions
 - 9.1.1. Review and status of active requests (R-1.1.5, R-1.1.9, R-1.1.10)
 - 9.1.2. By-Catch Working Group
 - 9.1.2.1. BYCWG Data call for risk assessment
 - 9.2. Multi-species approaches to management and modelling
 - 9.2.1. Review and status of active request (R-1.2.1)
 - 9.3. Environmental issues
 - 9.3.1. Review and status of active requests (R-1.5.3, R-1.5.4)
 - 9.3.2. NAMMCO-JCNB Joint scientific Working Group (JWG) Disturbance Workshop
 - 9.3.3. Updates
- 10. NAMMCO Website**
 - 10.1. Website Updates & Quality Review (R-1.8.3)
- 11. Seals & Walrus Stocks – Status and Advice to the Council**
 - 11.1. Bearded seal
 - 11.1.1. Review and status of active request (R-2.7.1)
 - 11.1.2. NAMMCO Panarctic Bearded Seal Workshop
 - 11.1.3. Updates
 - 11.2. Ringed seal
 - 11.2.1. Review and status of active requests (R-2.3.1, R-2.3.3)
 - 11.2.2. Ringed Seal Working Group
 - 11.2.3. Updates
 - 11.3. Grey and Harbour seals
 - 11.3.1. Review and status of active request (R-2.5.2)
 - 11.3.2. Coastal Seals Working Group
 - 11.3.3. Updates on grey seal

- 11.3.4. Updates on harbour seal
- 11.4. Harp and Hooded seals
 - 11.4.1. Review and status of active request (R-2.1.9)
 - 11.4.2. Harp and Hooded Seals Working Group
 - 11.4.3. Updates
- 11.5. Walrus
 - 11.5.1. Review and status of active request (R-2.6.3)
 - 11.5.2. Updates
- 12. Cetacean Stocks – Status and Advice to the Council**
- 12.1. Narwhal
 - 12.1.1. Review and status of active request (R-3.4.11)
 - 12.1.2. Narwhals in East Greenland
 - 12.1.3. NAMMCO-JCNB JWG Disturbance Workshop
 - 12.1.4. Updates
- 12.2. Beluga
 - 12.2.1. Review and status of active request (R-3.4.11)
 - 12.2.2. NAMMCO-JCNB JWG Disturbance Workshop
 - 12.2.3. Updates
- 12.3. Harbour porpoise
 - 12.3.1. Review and status of active request (R-3.10.1)
 - 12.3.2. Harbour Porpoise Working Group
- 12.4. Dolphins
 - 12.4.1. Review and status of active request (R-3.9.6)
 - 12.4.2. Dolphins Working Group
 - 12.4.3. Updates
- 12.5. Pilot whale
 - 12.5.1. Review and status of active request (R-3.8.6)
 - 12.5.2. Pilot Whale Working Group
 - 12.5.3. Updates
- 12.6. Northern bottlenose whale
 - 12.6.1. Review and status of active request (R-1.7.11)
 - 12.6.2. Updates
- 12.7. Beaked whales - update
- 12.8. Blue whale - update
- 12.9. Bowhead whale - update
- 12.10. Common minke whale – update
- 12.11. Fin whale- - update
- 12.12. Humpback whale - update
- 12.13. Killer whale - update
 - 12.13.1. SLICE project (Akvaplan-NIVA)
 - 12.13.2. International Killer Whale Symposium
- 12.14. Sei whale - update
- 12.15. Sperm whale – update
- 13. Management Procedures (R-1.6.7)**
- 14. Abundance / Assessment / Conservation status tables**
- 15. Work procedures**
- 15.1. Working Group on Genetics
- 15.2. Scientific Committee and Working Group meetings
- 15.3. Meeting etiquette
- 15.4. Staff renewal at the Secretariat
- 16. Future Workplans**
- 17. Budget 2022-23**

18. NAMMCO Scientific Publications Update

18.1. Volume 12

18.2. Volume 13

19. Any Other Business

20. Review of Report

21. Meeting Closure

APPENDIX 3: LIST OF DOCUMENTS

Working Documents

Doc. number	Name/Description	Agenda item
SC/29/01a	Draft Agenda	2
SC/29/01b	Draft Agenda Annotated	2
SC/29/02	Draft List of Participants	1, 4
SC/29/03	Draft List of Documents	4
SC/29/04	List of Active Requests to SC from Council	several
SC/29/05	Report from the By-Catch Working Group	9.1.2
SC/29/06	Report from the Harbour Porpoise Working Group	12.3.2
SC/29/07	Report from the Joint NAMMCO-JCNB Disturbance Workshop	9.3.2, 11.5.1, 12.1.3, 12.2.2
SC/29/08	Report from the preparatory meeting of the Bearded and Ringed seals WGs	11.1.2, 11.2.2
SC/29/09	Report from the 2022 activities in ICES	8.3
SC/29/10	NAMMCO website species pages for review: grey seal	10.1
SC/29/11	NAMMCO website species pages for review: white-sided dolphin	10.1
SC/29/12	NAMMCO website species pages for review: white-beaked dolphin	10.1
SC/29/13	NAMMCO website species pages for review: bowhead whale	10.1
SC/29/14	Updates from Council	5
SC/29/15	SC Accounts and Budget	17
SC/29/16	MINTAG Annual Report	7.1
SC/29/17	MINTAG Tag Design meeting report	7.1
SC/29/18	MINTAG StG meeting minutes, September 2022.	7.1
SC/29/19	MINTAG Phase 1 acceptance document	7.1
SC/29/20	Proposals for collaboration on the MINTAG project	7.2
SC/29/21	Update to SC 29 on the proposal for a North Atlantic survey of selected cetaceans (NASS-2024)	6
SC/29/22	NASS Planning meeting minutes. November 2022.	6
SC/29/23	BYCWG scoping of fisheries data available in the NAMMCO countries: responses from Norway and Greenland.	9.1.2.1
SC/29/24	SLICE project summary	12.13.1

SC/29/25	A principle-based approach to setting management objectives for removals of small-cetaceans and pinnipeds	13
SC/29/26	Suggestions to improve NAMMCO SC and WG meetings	15.2
SC/29/27	Aerial survey of narwhals in East Greenland	12.1.2
SC/29/28	Analysis of a winter survey of narwhals off Scoresby Sound	12.1
SC/29/29	Document for OSPAR review of NACES MPA	8.4

For Information Documents

Doc. number	Name/Description	Agenda item
SC/29/NPR/FO-2021	National Progress Report 2021 – Faroe Islands	4
SC/29/NPR/GL-2021	National Progress Report 2021 – Greenland	4
SC/29/NPR/IS-2021	National Progress Report 2021 – Iceland	4
SC/29/NPR/NO-2021	National Progress Report 2021 – Norway	4
SC/29/NPR/JP-2021-2022a	Telemetry Work Progress Report 2021-2022 – Japan	4
SC/29/NPR/JP-2021-2022b	Large Cetaceans Progress Report 2021-2022 – Japan	4
SC/29/NPR/JP-2021-2022	Small Cetaceans Progress Report 2021-2022 – Japan	4
SC/29/NPR/CA-2021	National Progress Report 2021 – Canada	4
SC/29/NPR/MA-2022	National Progress Report 2022 – Makivik	4
SC/29/FI01	Report of SC28 (2022)	several
SC/29/FI02	NAMMCO 29 Report of Council	5
SC/29/FI03	NAMMCO 29 Report of Management Committees (MCJ + MCC + MCSW)	4
SC/29/FI04	ICES Meeting and Activities etiquette	15.3
SC/29/FI05	Bengtsson, O., Lydersen, C., Kovacs, K. (2022). Cetacean spatial trends from 2005 to 2019 in Svalbard, Norway. <i>Polar Research</i> 2022, 41, 7773. http://dx.doi.org/10.33265/polar.v41.7773	12
SC/29/FI06	Cabrera, A. A., Schall, E., Bérubé, M., Anderwald, P., Bachmann, L., Berrow, S., Best, P. B., Clapham, P. J., Cunha, H. A., Dalla Rosa, L., Dias, C., Findlay, K. P., Haug, T., Heide-Jørgensen, M. P., Hoelzel, A. R., Kovacs, K. M., Landry, S., Larsen, F., Lopes, X. M., Lydersen, C., Mattila, D.K., Oosting, T., Pace, R.M., Papetti, C., Paspatis, A., Pastene, L.A., Prieto, R., Ramp, C., Robbins, J., Sears, R., Secchi, E.R., Silva, M.A., Simon, M., Víkingsson, G., Wiig, Ø., Øien, N. & Palsbøll, P. J. (2022). Strong and lasting impacts of past global warming on baleen whales and their prey. <i>Global Change Biology</i> , 28, 2657–2677. https://doi.org/10.1111/gcb.16085	9, 12
SC/29/FI07	Cerca, J., Westbury, M. V., Heide-Jørgensen, M. P., Kovacs, K. M., Lorenzen, E. D., Lydersen, C., ... & Bachmann, L. (2022). High genomic diversity in the endangered East Greenland Svalbard Barents Sea stock of bowhead whales (<i>Balaena</i>	12.9

	<i>mysticetus</i>). <i>Scientific reports</i> , 12(1), 1-11. https://doi.org/10.1038/s41598-022-09868-5	
SC/29/FI08	Chambault, P., Kovacs, K. M., Lydersen, C., Shpak, O., Teilmann, J., Albertsen, C. M., & Heide-Jørgensen, M. P. (2022). Future seasonal changes in habitat for Arctic whales during predicted ocean warming. <i>Science Advances</i> , 8(29), eabn2422. https://doi.org/10.1126/sciadv.abn2422	9.3.3
SC/29/FI09	Lippold, A., Harju, M., Aars, J., Blévin, P., Bytingsvik, J., Gabrielsen, G. W., ... & Routti, H. (2022). Occurrence of emerging brominated flame retardants and organophosphate esters in marine wildlife from the Norwegian Arctic. <i>Environmental Pollution</i> , 315, 120395. https://doi.org/10.1016/j.envpol.2022.120395	9.3.3
SC/29/FI10	Liu, X., Rønhøj Schjøtt, S., Granquist, S. M., Rosing-Asvid, A., Dietz, R., Teilmann, J., ... & Tange Olsen, M. (2022). Origin and expansion of the world's most widespread pinniped: Range-wide population genomics of the harbour seal (<i>Phoca vitulina</i>). <i>Molecular Ecology</i> , 31(6), 1682-1699. https://doi.org/10.1111/mec.16365	11.3.3
SC/29/FI11	MacKenzie, K.M., Lydersen, C., Haug, T., Routti, H., Aars, J., Andvik, C.M., Borgå, K., Fisk, A.T., Meier, S., Biuw, M., Lowther, A.D., Lindstrøm, U. & Kovacs, K.M. (2022). Niches of marine mammals in the European Arctic. <i>Ecological Indicators</i> 136 (March 2022), 108661. https://doi.org/10.1016/j.ecolind.2022.108661	9.1
SC/29/FI12	Orgeret, F., Thiebault, A., Kovacs, K. M., Lydersen, C., Hindell, M. A., Thompson, S. A., ... & Pistorius, P. A. (2022). Climate change impacts on seabirds and marine mammals: The importance of study duration, thermal tolerance and generation time. <i>Ecology Letters</i> , 25(1), 218-239. https://doi.org/10.1111/ele.13920	9.3.3
SC/29/FI13	Skern-Mauritzen, M., Lindstrøm, U., Biuw, M., Elvarsson, B., Gunnlaugsson, T., Haug, T., Kovacs, K.M., Lydersen, C., McBride, M.M., Mikkelsen, B., Øien, N., & Víkingsson, G. (2022). Marine mammal consumption and fisheries removals in the Nordic and Barents Seas. <i>ICES Journal of Marine Science</i> 79: 1583-1603. https://doi/10.1093/icesjms/fsac096	9.1
SC/29/FI14	Hamilton, C. D., Lydersen, C., Aars, J., Acquarone, M., Atwood, T., Baylis, A., ... & Kovacs, K. M. (2022). Marine mammal hotspots across the circumpolar Arctic. <i>Diversity and Distributions</i> . https://doi.org/10.1111/ddi.13543	9
SC/29/FI15	Bjørge, A., Moan, A., Ryeng, K. A., & Wiig, J. R. (2022). Low anthropogenic mortality of humpback (<i>Megaptera novaeangliae</i>) and killer (<i>Orcinus orca</i>) whales in Norwegian purse seine fisheries despite frequent entrapments. <i>Marine Mammal Science</i> , 1–11. https://doi.org/10.1111/mms.12985	9.1
SC/29/FI16	Similä, T., Haug, T. Lindblom, L., Lockyer, C. & O'Callaghan, S.A. (2022). Stomach contents of three sperm whales (<i>Physeter macrocephalus</i>) stranded on Andøya, North Norway. <i>Aquatic Mammals</i> 48: 449-455. https://doi/10.1578/AM.48.5.2022.449	9.1

SC/29/FI17	Solvang, H., Haug, T. & Øien, N. (2022). Recent trends in temporal and geographical variation in blubber thickness of common minke whales (<i>Balaenoptera acutorostrata acutorostrata</i>) in the Northeast Atlantic. NAMMCO Scientific Publications 12. https://doi.org/10.7557/3.6308	9.1
SC/29/FI18	Moan, A. & Bjørge, A. (2022). Pingers reduce harbour porpoise bycatch in Norwegian gillnet fisheries, with little impact on day-to-day fishing operations. Fisheries Research 259 (106564). 8 pp. https://doi.org/10.1016/j.fishres.2022.106564	9.1
SC/29/FI19	Stenson, G., Gosselin, J.-F., Lawson, J., Buren, A., Goulet, P., Lang, S., Nilssen, K. T., & Hammill, M. (2022). Pup production of Harp Seals in the Northwest Atlantic in 2017 during a time of ecosystem change. NAMMCO Scientific Publications 12. https://doi.org/10.7557/3.6214	11.4.3
SC/29/FI20	Biuw, M., Øigård, T.A., Nilssen, K. T., Stenson, G., Lindblom, L., Poltermann, M., Kristianssen, M. & Haug, T. (2022). Recent harp and hooded seal pup production estimates in the Greenland Sea suggest ecology-driven declines. NAMMCO Scientific Publications 12. https://doi.org/10.7557/3.5821	11.4.3
SC/29/FI21	de la Vega, C., Buchanan, P. J., Tagliabue, A., Hopkins, J. E., Jeffreys, R. M., Frie, A. K., Biuw, M., Kershaw, J., Grecian, J., Norman, L., Smout, S., Haug, T. & Mahaffey, C. (2022). Multi-decadal environmental change in the Barents Sea recorded by seal teeth. Global Change Biology, 28, 30545–3065. https://doi.org/10.1111/gcb.16138	9.3.3
SC/29/FI22	Dietz, R., Letcher, R.J., Aars, J., Andersen, M., Boltunov, A., Born, E.W., Ciesielski, T.M., Das, K., Dastnai, S., Derocher, A.E., Desforges, J.-P., Eulaers, I., Ferguson, S., Hallanger, I.G., Heide-Jørgensen, M.P., Heimbürger-Boavida, L.-E., Hoekstra, P.F., Jenssen, B.M., Kohler, S.G., Larsen, M.M., Lindstrøm, U., Lippold, A., Morris, A., Nabe-Nielsen, J., Nielsen, N.H., Peacock, E., Pinzone, M., Rigét, F.F., Rosing-Asvid, A., Routti, H., Siebert, U., Stenson, G., Stern, G., Strand, J., Søndergaard, J., Treu, G., Víkingsson, G.A., Wang, F., Welker, J.M., Wiig, Ø., Wilson, S.J. & Sonne, C. (2022). A risk assessment review of mercury exposure in Arctic marine and terrestrial mammals. Science of the Total Environment, 829, 154445. 1-13. http://dx.doi.org/10.1016/j.scitotenv.2022.154445	9.3.3
SC/29/FI23	Grecian WJ et al. (2022). Environmental drivers of population-level variation in the migratory and diving ontogeny of an Arctic top predator. R. Soc. Open Sci. 9:211042. https://doi.org/10.1098/rsos.211042	11.4.3
SC/29/FI24	Ryeng, K.A., Lakemeyer, J., Roller, M., Wohlsein, P. & Siebert, U. (2022). Pathological findings in bycaught harbour porpoises (<i>Phocoena phocoena</i>) from the coast of Northern Norway. Polar Biology 45: 45-57. https://doi.org/10.1007/s00300-021-02970-w	9.3.3
SC/29/FI25	Kettner, L.E., Rikardsen, A.H., Biuw, M., Broms, F., Mul, E. & Blanchet, M.-A. (2022). Round-trip migration and energy budget of a breeding female humpback whale in the	9.1

	Northeast Atlantic. PLoS ONE 17(5): e0268355. https://doi.org/10.1371/journal.pone.0268355	
SC/29/FI26	Proposal for starting a collaborative study to further understand the role of baleen whales in the western North Pacific ecosystem. Konishi & Tamura.	7.3
SC/29/FI27	Heide-Jørgensen, M. P., Chambault, P., Jansen, T., Gjelstrup, C. V., Rosing-Asvid, A., Macrander, A., ... & MacKenzie, B. R. (2023). A regime shift in the Southeast Greenland marine ecosystem. <i>Global Change Biology</i> , 29(3), 668-685. https://doi.org/10.1111/gcb.16494	9.1.1
SC/29/FI28	OSPAR – Revised NACES nomination proformat	8.4
SC/29/FI29	Samarra, F. I. P., Borrell, A., Selbmann, A., Halldórson, S. D., Pampoulie, C., Chosson, V., Gunnlaugsson, T., Sigurðsson, G. M., Aguilar, A., & Víkingsson, G. A. (2022). Insights into the trophic ecology of white-beaked dolphins <i>Lagenorhynchus albirostris</i> and harbour porpoises <i>Phocoena phocoena</i> in Iceland. <i>Marine Ecology Progress Series</i> , 702, 139–152. https://doi.org/10.3354/MEPS14208	12.3.3
SC/29/FI30	Lydersen, C., Lindgren, Å., Alfredsson, K., Kovacs, K.M. (2022). A Walrus (<i>Odobenus rosmarus</i>) at the North Pole. <i>Aquatic Mammals</i> , 48(6), 513-516. https://doi.org/10.1578/AM.48.6.2022.513	9.1.1

APPENDIX 4: JAPAN PROGRESS REPORT 2022 – SUMMARY

Documents SC/29/NPR/JP-2021-2022 b) and SC/29/NPR/JP-2020-2021 summarized the following research projects/activities: 1) collection of biological samples and data from commercial whaling on common minke, Bryde's and sei whales in Japan's Exclusive Economic Zone (EEZ); and from fisheries of small cetaceans. These samples and data are being analyzed in contribution to the stock assessment and management of large and small cetaceans in the North Pacific Ocean; 2) dedicated sighting surveys for large and small cetaceans under the programs Japanese Abundance and Stock structure Surveys in the Antarctic (JASS-A) in the Southern Ocean, International Whaling Commission-Pacific Ocean Whale and Ecosystem Research (IWC-POWER) in the North Pacific (mainly in the central North Pacific) and ten national sighting survey programs in the North Pacific Ocean. These programs involved sighting activities, oceanographic and marine debris surveys, and photo-id, biopsy sampling and satellite tagging for large and small whale species; 3) DNA register and molecular monitoring in the retail market for large whales; and 4) records and analyses (mainly on population genetic structure) of by-catches and strandings including large and small cetaceans. Several research institutes and universities participated or contributed to the research in each project. The biological samples and data collected using both lethal and non-lethal techniques in the period mentioned above are being used in analyses relevant to the research objectives of each research project/activity. A total of 16 scientific documents for large cetacean and their environment were published in peer-reviewed journals in 2022 while three papers were published on small cetaceans in 2020—2021.

APPENDIX 5: SC 29 RECOMMENDATIONS AND FOLLOW-UPS

1. RECOMMENDATIONS FOR CONSERVATION AND MANAGEMENT PERTAINING TO SUSTAINABLE REMOVALS

Harbour porpoise

Norway

- Continue its efforts to reduce by-catch of harbour porpoises which is deemed unsustainable.

Greenland

- That previous management advice given on harbour porpoise in West Greenland be implemented (i.e., no more than 2900 total removals, i.e., included unreported individuals).

Narwhal

Greenland

- Implement an immediate reduction to 0 catches of narwhal in all three management areas of East Greenland. (*Strongly reiterated*). The SC underlined that an immediate reduction to zero catches is required and cannot wait for further economic/social assessment.
- The catch limits provided by the Joint NAMMCO-JCNB Working Group (JWG) on narwhal in West Greenland be followed.

Beluga

Greenland

- Implement seasonal closures for the hunt of belugas in West Greenland. (*Strongly reiterated*)
- Make sure no hunting of belugas be allowed at any time in the area south of 65 degrees North in West Greenland. (*Strongly reiterated*)
- Keep belugas in East Greenland fully protected, as there is insufficient information to perform an assessment of belugas in East Greenland. (*Strongly reiterated*)

Killer whale

Greenland

- Regulate the hunt of killer whales and restrict quotas in a precautionary way. (*Reiterated*)

2. RECOMMENDATIONS FOR CONSERVATION & MANAGEMENT

Integrated precautionary approach to marine mammal management

Management procedures

- The 8 principles for the incorporation of a precautionary approach in the management of cetacean and pinniped stocks be adopted by NAMMCO.
- The following criteria be used for prioritising the assessment of stocks with removals, without any order of priority, be used:
 - Stocks with concerning population status.
 - Stocks for which no assessment has been conducted.
 - Assessments should be conducted at a minimum of every 5-10 years, or more frequently if there is concern on population status.

Bearded and Ringed seal

Greenland

- The catch data be available to the upcoming BSWS and RSWG meetings.

Narwhal

Greenland

- Due to the observed displacement of narwhals from Eclipse Sound caused by shipping traffic and associated ice breaking, future developments avoid shipping within the narwhal summering aggregations.
- Because ship traffic causes significant disturbance to narwhals at distances from 0 to 20 km, while icebreaking can cause impacts at distances from 0 to 35 km, these values be used to

establish buffer zones around narwhal summer aggregations and establish traffic corridors to protect migration routes and winter foraging grounds.

- Due to its importance as a feeding ground for many Arctic seabirds and marine mammal species, no ship anchoring should occur in Store Hellefiskebank.
- Hunt management advice should account for the displacement and possible associated changes in fecundity and survival, both in disturbed summer aggregations, as well as in aggregations affected by the displaced animals.

Beluga

Greenland

- Ship speed regulations of 8 knots be extended to south of the beluga migration route passing Cape York in September-October. This recommendation does not include a buffer around the timing of shipping.
- The documentation of hunter observations of belugas in East Greenland is collected in a structured manner, including photographs or video footage of the animals, information on where and when the sighting took place, and how many individuals were seen. *(Reiterated)*
- Any by-catch of belugas in East Greenland be documented in the Special Reports. *(Reiterated)*
- In case of live by-caught belugas in East Greenland, all efforts be made to release the animal. *(Reiterated)*
- Additional samples be taken from all dead by-caught belugas in East Greenland, and all caught belugas in West Greenland, besides the already mandatory information (date and location of the by-catch, sex, presence/absence of a foetus). This additional information includes skin biopsy sample, length, a tooth, girth measurements, and whether there is milk in the mammary glands of females. *(Reiterated)*

Harbour porpoise

Norway

- Assess the compliance of the fleet to the pinger regulations in Vestfjorden as a basis for evaluating the efficacy of the pinger mandate.
- Consider expanding the use of pingers to areas north and west of Vestfjorden.
- Due to the present unsustainable level of by-catch, consider the best way of ensuring that the mandatory use of pingers is enforced.
- Implement the use of REM systems in fishing vessels outside the CRF, to complement the by-catch data from the CRF.

Killer whale

Greenland

- Existing catch records be validated and reporting on catches (including struck and loss rates) be improved. *(Reiterated)*
- Killer whales be included in existing mandatory reporting schemes. *(Reiterated)*

3. RECOMMENDATIONS FOR RESEARCH WITH IMPLICATIONS FOR PARTIES

Walrus

Greenland

- The regional aerial survey of the east side of Smith Sound be the minimum area that should be covered for monitoring walrus abundance and distribution. Surveys should occur in April, annually during the first 3 years of production, to allow detection of any substantial changes.
- The satellite imagery of Wolstenholme Fjord be collected annually to determine walrus density, and eventually walrus counts if <30 cm resolution imagery becomes available.
- The telemetry data on walrus habitat use, distribution and migration patterns be combined with a study of benthos covering the foraging areas in Wolstenholme Fjord to improve the assessment of the relative importance of the potential foraging area impacted by the mining operation (disturbance and siltification).

- The walrus hunting effort in Wolstenholme fjord be monitored in cooperation with local hunters, so to allow for a cumulative impact assessment.

Narwhal

Greenland

- Conduct tagging studies to determine impacts of shipping in Baffin Bay.
- Obtain biological samples (brains, organs etc.) and morphometrics from the narwhal winter hunt in Disko Bay and the spring hunt in other areas of West Greenland.

Harbour porpoise

Norway

- Increase tagging efforts to inform on movements, distribution, and stock delineation of harbour porpoise in Norwegian waters.
- Collect more biological samples to increase the life history information feeding the population models.
- Look into potential by-catch of porpoises in recreational fisheries to potentially include recreational fisheries in future by-catch estimates.
- Include by-catch data from larger (>15m) vessels into the by-catch estimates used for the assessment.
- Look into the effects of ghost nets on harbour porpoise mortality dynamics and, if a concern, increase efforts in removing ghost nets in areas of high porpoise density.

Faroe Islands

- Support the creation of an App where users of coastal areas (i.e., fishers, recreational boats) can report observations, catch and by-catch of harbour porpoises.
- Initiate the collection of biological data on harbour porpoise.

Iceland

- Generate the best back-calculated by-catch estimates (i.e., a time series going back to the beginning of the fishery) for the upcoming Icelandic assessment.

Dolphins

Greenland

- Increase effort in collecting samples for genetic analysis.
- Prepare catch statistics separating both species, where possible.

Faroe Islands

- Age determination from random teeth samples from different periods of time should be added to the age structure information on *Lagenorhynchus acutus*.
- Investigate any changes in age structure over different years to resolve whether some cohorts are underrepresented in the samples.
- Complete the analyses of life history parameters.
- Together with Greenland, collect data for genetic analyses and make sure they are integrated within the current European genetic analyses for *Lagenorhynchus* sp. coordinated by ASCOBANS.

Iceland

- Provide a table with the by-catch information available for each *Lagenorhynchus* species.

Pilot whale

Faroe Islands

- Given the high number of available data (2000+), 150+ teeth samples collected randomly at the end and at the beginning of the 2013-2022 period be aged and the corresponding reproductive data analysed to obtain a long-term trend in life history parameters.
- Collect and analyse genetic samples together with Iceland and Greenland, to get better knowledge on stock identity.
- Investigate the potential relationship between pollutants and life history parameters of pilot whales between the first sampling period (1986-1989) and the present one (2013-2022).

Killer whale

All Countries

- To further sampling efforts in all NAMMCO countries, as well as further analyses of pollutant levels and genetic analyses to help determine stock structure.

4. PROCEDURAL RECOMMENDATIONS AND FOLLOW-UPS

To the Council

Pilot whale WG

- The PWWG meeting be postponed to 2025, so a new abundance estimate from the NASS2024 survey would be available for the assessment.

MINTAG funders

- The 3 collaborations presented to the SC were a good idea, but should only be pursued under a contract with NAMMCO, stipulating that all the data gathered which can contribute to the assessment of the MINTAGs performance, be made available to the MINTAG Steering Group (StG) for its assessment.

To the MCs

Multispecies approaches to management and modelling

- The MCJ consider responding to both requests 1.1.9 and 1.2.1 not a priority, due to the difficulties of implementing available ecosystem models, focused on fish, to the study of marine mammals.

Environmental issues

- The MCs consider request R-1.5.4 (Non-hunting related anthropogenic stressors) as answered, as it will remain a standard agenda item in all WG meetings, and it will be regularly revisited by the SC.
- The MCs consider the status of request R-1.1.10: answered or becoming a standing request? In the latter, the MC was requested to specify the scope of the response that was expected.

Walrus

- The request R-2.6.3 (Walrus) be considered as answered for the following reasons:
 - a) Results from the Disturbance WS.
 - b) Hydrocarbon exploration is not a threat anymore due to the stop of oil exploration in Greenland, and fishing is not considered and issue any longer.
 - c) In general, there is no new data available to respond to this request, apart from specific recommendations to the walrus population near the Dundas Mine in Qaanaaq provided at the Disturbance WS.
 - d) Hunting is the most important issue impacting walrus populations in Greenland.
 - e) Tourism was shown to have no effect on walrus haul-out behaviour, according to a recent study in Svalbard, and is therefore not considered a factor which could be relevant.

To the Parties

Iceland and Faroe Islands

- Provide and answer to the preliminary request [from the Secretariat/BCWG regarding their fisheries], so the WG can proceed with the data call.

Greenland

- Greenland invites Canadian experts to participate in reviewing monitoring programs, plans and results of the Dundas mine in Wolstenholme Fjord.

To the Secretariat

- The report of the Disturbance Workshop be circulated to other organisations working in the Arctic and dealing with disturbance effects on wildlife.
- To prepare specific answers to the questions formulated by OSPAR regarding the NACES MPA, and circulate them to the SC.

- Together with M. T. Olsen, reach out to geneticists that have worked with NAMMCO before to see if there is interest in the community to form such a technical WG on genetics.
- The two upcoming positions should be filled with people having a natural science background and knowledge about marine mammal biology. Additionally, excellent writing skills were required.

To the SC and its WGs/SpCs/StGs

Scientific Committee

- SC28 recommendation of planning a workshop to assess the model portfolio for the North Atlantic from a marine mammal perspective be postponed to the next SC meeting.
- Deal with the conservation status tables at its next meeting.
- Keep the issue of meeting etiquette in mind for future meetings.
- Opportunistically and based on the profiles of the coming secretaries at the Secretariat, they could be included in projects of SC members to reinforce their interest and commitment to the position.

Abundance Estimate WG

- After NASS2024, the abundance estimate working group examine the best way of looking at distributional shifts using all NASS data, focusing on trends in species distribution and abundance.

Large Whale Assessment WG

- The WG meet no later than winter 2025-2026 to address the advice need of Iceland.
- When an assessment is conducted, a standard term of reference shall be to define the regularity of abundance surveys and assessment for each specific case (species/stock).

By-catch WG

- The BYCWG and the Secretariat go ahead with the defined tasks to achieve a by-catch risk assessment.
- The BYCWG expand its focus to *Lagenorhynchus* dolphins.

NASS 24 / SpC

- Coordinate the survey with the SCANS IV 2024, so the survey areas are contiguous.
- Hansen contact the coordinator of the SCANS IV survey and other recent ship-based surveys, to obtain the detailed description of the methodology and equipment used.

All species WGs

- Non-hunting related anthropogenic stressors remain a standard agenda item in all WG meetings.
- Updates on the Mary River and Dundas mining projects be reviewed in relevant WGs.
- When an assessment is conducted, a standard term of reference for the WG shall be to define the regularity of abundance surveys and assessment for each specific case (species/stock).

Bearded & Ringed seal WS/WG

- Define the area for which an assessment could be conducted, and where the abundance data would be the most useful to progress in assessing the conservation status of a stock.

Coastal Seal WG

- Consider the following ToR:
 - To provide a new assessment for grey and harbour seals throughout the North Atlantic.*
 - To provide guidelines for responsible removals of small coastal seal stocks.*

Walrus WG

- The WG meet no later than 2024 to address the advice need of Greenland.
- Add the following ToR to its tasks: "Investigate cumulative effects of mining and hunting".

Harbour porpoise WG

- **Norway:** The assessment be updated with the new information requested from Norway at its next HPWG meeting.

- **Greenland:** Plan to conduct a new assessment on harbour porpoise when new abundance estimates are available.
- **Iceland:** An assessment of harbour porpoise be made when the new abundance estimate becomes available after the aerial survey planned for 2023.

Dolphin WG

- Not be delayed.
- Consider the following ToR:
 - a) Conduct an assessment of the sustainability of the removals of *Lagenorhynchus dolphins* in the Faroe Islands, Iceland and Greenland.*
 - b) To review available information in other areas and identify knowledge gaps and needs for further research.*
 - c) Assess impacts from non-hunting related anthropogenic stresses (pollution, climate change, noise etc).*

Narwhals in East Greenland WG

- The next NEGWG meeting add the following ToR to its tasks: “Reviews the situation of belugas in East Greenland with participants from Norway”.

Collaboration with Japan

- SC members and some national experts in modelling be part of the expert group looking at the feasibility of a project comparing the North Pacific and Northeast Atlantic ecosystems (NEA) – including the cetacean component.

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- Continue with an open call “Marine Mammals in the North Atlantic Part II”.