NAMMCO ANNUAL MEETING 28

22-25 March 2021
Online

DOCUMENT 08	**Summary of Scientific Committee Reports from 2019 - 2021**
Submitted by	**Scientific Committee / Secretariat**
Action requested	**Management Committees**: - Consider the management advice on hunting quota 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. **Council:** - Consider the proposed work plan. - Decide on funding for the super-tag project (a revised project description and budget is presented in document NAMMCO/28/19). - Determine the level of funding support available for NASS-2024 (a proposal for the survey is available in document NAMMCO/28/18).
Background	Due to the cancellation of the NAMMCO Annual Meeting in 2020, two Scientific Committee reports are presented, from SC26 (2019) and SC27 (2021). No SC meeting was held in 2020 due to the change in timeline for NAMMCO meetings agreed by the Council-HoDs in March 2020. This document provides a "Summary for Council & Management Committees" (4 pages) to highlight specific issues of relevance to these bodies from both SC meetings. This is followed by the Executive Summaries of the SC reports from both years. Several hyperlinks are provided throughout to connect to the documents mentioned, and to give direct access to relevant sections of the SC reports where appropriate. Links to the full SC reports are also available here: SC26 and SC27.

SCIENTIFIC COMMITTEE REPORTS FROM 2019 & 2021:
SUMMARY FOR COUNCIL & MANAGEMENT COMMITTEES

The 26th meeting of the NAMMCO Scientific Committee (SC) was held in Tórshavn 29 October–1 November 2019 and the 27th meeting online from 25–29 January 2021. Both were held under the chairmanship of Bjarni Mikkelsen (FO). This summary provides an overview of the most pertinent outcomes from both meetings for the NAMMCO Council and Management Committees. The Executive Summaries of the SC26 and SC27 reports are then provided for a general overview. Links to access the full reports and relevant sections of the reports are provided throughout this summary.

For this meeting, the Management Committees will need to decide on whether or not to endorse the SC proposals for conservation and management, including that on hunting quota.

WORK PROCEDURES

Management Areas and Sub-Areas of Relevance to NAMMCO

SC27 reviewed and agreed on an overview of the regions/management areas and sub-areas of direct relevance to NAMMCO for all cetacean and pinniped species. This provides the basis required to develop additional overview information on management objectives and stock status.

Catch Data

SC26 noted that a searchable online catch database was now available on the NAMMCO website and emphasised the importance of Member Countries notifying the Secretariat of any amendments in catch data to ensure that up to date information is always available. SC26 also answered request R-1.6.4, concluding that the best methods for collecting reliable information on struck and lost were: investments in good time series surveys, independent observer programs in selected hunts, and working with hunters to encourage reliable reporting.

Development of Management Advice

Request R-1.6.6 from Council asked the SC to provide a review of the procedures used for generating management advice and the approach most suitable for each species. SC26 answered this request through a written review (available in section 5.7 of the SC26 report). This review describes the difference between stock assessments and management procedures, outlining key methods of each. The SC noted that the management advice provided by the NAMMCO SC is currently based on a suite of management procedures and assessment models developed and tuned to the knowledge available. The SC agreed that it was appropriate to continue using existing management procedures (e.g., the RMP and AWMP) for those species where they have been implemented. For all other species, it recommended the continued use of stock assessment approaches using population dynamics models for generating advice on sustainable harvest levels.

WORKING GROUP (WG) MEETING

In 2019, WG meetings were held (full reports hyperlinked) on: Harbour Porpoise (HPWG), Narwhal in East Greenland (NEGWG), Harp and Hooded Seals (WGHARP) and Abundance Estimates (AEWG). The reports from these WGs were reviewed by SC26 in 2019. Over the course of 2020 & 2021, meetings were held by the By-catch WG (BYCWG), the Coastal Seals WG (CSWG), and the NAMMCO-JCNB Joint Working Group on Narwhal and Beluga (JWG) (withheld from public release until reviewed by the JCNB). The reports from the WGs held in 2020 and 2021 were reviewed by SC27.

INTERNATIONAL WORKSHOPS

A joint NAMMCO-IMR international workshop on the status of harbour porpoise in the North Atlantic was held in 2018. A report from this workshop was reviewed by SC26 and has now been published. A joint NAMMCO-ICES international workshop on seal modelling was held in 2020 and reviewed by SC27. A report from this meeting is currently available in draft form and will be published in 2021.

MANAGEMENT ADVICE ON HUNTING QUOTA

The SC has recommended the following management advice regarding hunting quota:

Harp seals: The current assessment model provided a poor fit to available data so a conservative PBR approach was applied. On the basis of this, SC26 recommended an upper limit for removals for the White Sea/Barents Sea stock of 21,172 seals, and 11,548 seals for the Greenland Sea stock.

See section 8.1.2 from page 29 of the SC26 report for further information on the assessment.

Hooded seals: For the Greenland Sea stock, SC26 recommended that there be no commercial catch but that scientific and subsistence hunting may continue.

See section 8.2.2 from page 31 of the SC26 report for further information on the assessment.

Beluga: For the North Water stock (north of Cape York), SC27 recommended an annual landed catch of no more than 37 individuals north of Cape York. For the West Greenland stock (south of Cape York and north of 65°), SC27 recommended an annual landed catch of no more than 265 individuals. The SC also reiterated its recommendations that there be seasonal closures and no hunt south of 65˚.

See section 3.2 and the assessment of beluga from page 18 of the SC27 report for further information.

Narwhal in East Greenland*:* SC26 recommended that there be an immediate reduction to 0 catches in all three management areas of East Greenland (i.e., Ittoqqortormiit, Kangerlussuaq, and Tasiilaq), at least until a new abundance estimate is generated.

See section 9.5.2 from page 40 of the SC26 report for further information on the assessment, and section 7.5.1 from page 34 of the SC27 report for updated information on current hunt quota and a reiteration of concern.

Harbour porpoise: For West Greenland, SC26 endorsed a recommended annual catch (animals reported landed) of no more than 1,869 harbour porpoises. Given the demonstrated importance of reliable and complete reporting of removals, it also strongly recommended that Greenland work to eliminate underreporting and validate catch statistics.

See section 9.11.4 from page 50 of the SC26 report for further information on the assessment.

ABUNDANCE ESTIMATES

SC27 noted that all the abundance estimates able to be generated from previous NASS have now been completed and published, finalising data analysis from 30 years of survey efforts. SC26 endorsed new estimates for fin, humpback, sei, bottlenose, killer whales, dolphins and harbour porpoise, while SC27 endorsed new estimates for killer whales and bottlenose whales. An overview of the best available abundance estimates for all species and areas has been published as a technical note in Volume 11 of the NAMMCO Scientific Publications series, while an overview of all endorsed abundance estimates (including those now superseded) is available as a living document on the NAMMCO website.

NASS SURVEY

SC27 agreed that 2024 was the most appropriate year for the next coordinated survey in the NASS and a proposal has been submitted to the FAC for consideration at CN28 (document NAMMCO/28/18).

FUTURE WORK PLANS

SC27 agreed to the following work plan for the coming years:

2021	2022	2023
Working Groups: - Narwhal in East Greenland - NAMMCO-JCNB JWG on Narwhal and Beluga - By-catch **Other:** - NASS Planning (online) - Harp & Hooded Seals Benchmark kickoff (online)	**Working Groups:** - Bearded Seal - Ringed Seal - Harbour Porpoise - Coastal Seals - Pilot Whale **Other:** - Harp & Hooded Seals Benchmark Meeting	**Working Groups:** - Harp & Hooded Seals - Dolphins

Although not officially noted in the SC27 workplan, it can be expected that the NASS planning work will continue, and increase, through 2022 and 2023.

Following SC27, the SC submitted a revised project description for the proposed collaborative project "Satellite tracking - A tool for cetacean research in the North Atlantic" (***the super-tag project***) for consideration by the Finance and Administration Committee (document NAMMCO/28/19). If funded, work on this project will also be carried out in 2021, 2022, and 2023.

NEW PROPOSALS FOR CONSERVATION AND MANAGEMENT & RECOMMENDATIONS FOR RESEARCH

A complete overview of SC proposals for conservation and management, and recommendations for research with implications for management or financial implications for the Commission, is available in meeting document NAMMCO/28/MC05. In that document, new proposals and recommendations for endorsement at CN28 are highlighted in green. These new proposals and recommendations from SC26 and SC27 have been extracted and reiterated below. Proposals for conservation and management related to hunting quota have already been highlighted above.

General Procedures

- The NAMMCO Secretariat be informed of any and all revisions of catch statistics taking place at a national level (e.g., revisions of historical data or revisions after submission of national progress reports).

- Member Countries validate all data (direct catch, by-catch or other) before submission to formal databases and repositories.

- NAMMCO develop a principle-based approach to harvest advice for small stocks.

- Management Committees make clear their position on the desirability of having open data archiving for survey data to inform the NAMMCO Scientific Publications data policy.

Environmental/Ecosystem Issues

- Member Countries ensure the availability of relevant information from seismic surveys to allow for proper sound estimation to meet research and management needs.

- An expert workshop be held to review the impacts of noise disturbance on hunted populations of narwhals, belugas, walrus and seals from shipping connected to the Baffinland mine.

By-catch

- Since self-reporting is an insufficient basis for quantifying by-catch, additional sources of information (e.g., independent observation) should always be sought.

- Improving species identification of by-caught seals (e.g. through jaw or flipper collection, DNA analysis and/or photographs) was reiterated.

Harbour seals

- The Commission discuss the proposal that all catch statistics for harbour seals in Greenland be removed from the NAMMCO website due to known errors and a lack of validation.

- Greenland enhance efforts to identify new breeding and moulting sites for harbour seals (particularly in West Greenland) using most feasible methods in the different areas.

- Norway complete the collection and analysis of DNA samples from harbour seal pups to help determine stock structure and propose more scientifically based management units.

Harp seals

- New aerial surveys of harp seal pups in the Greenland Sea be carried out in 2022.

- Norway continue its efforts to obtain reproductive samples, particularly in years when an aerial survey is completed.

Hooded seals

- New aerial surveys of hooded seal pups in the Greenland Sea be carried out in 2022.

Walrus

- Greenland monitor the presence of walrus in Wolstenholme fjord for impacts from shipping and industrial activity and catch levels adjusted if needed.

Beluga

- New surveys for beluga be carried out in Somerset Island in the summer and West Greenland in the winter.

- Hold a half day workshop (in connection with a JWG meeting) to exchange information on effective tagging practices for belugas.

Narwhal

- A new meeting of the Ad hoc Working Group for Narwhal in East Greenland be held in 2021 to review the latest data and update the assessment.

- Abundance estimates in East Greenland be reviewed by the JCNB at the next JWG.

Greenland

- Include information on body length in reports of any landed animals

- Investigate ways to improve reporting of user observations to inform future assessments.

- Recognise and include the negative impact of climate change on narwhals in management decision-making on all stocks.

- Hunters receive payment for assisting scientific research to clarify stock structure and abundance.

Dolphins

- Greenland develop a way to distinguish between white-sided and white-beaked dolphins in reporting.

Harbour Porpoise

- *All assessment areas provide samples to support a multidimensional investigation into population structure and stock identity and allow for all datasets to be merged into a common analysis.*

- New surveys for harbour porpoises be carried out in NAMMCO areas, and particularly off Iceland since the last dedicated survey there was now over 12 years old.

- Greenland work to eliminate underreporting and validate the catch statistics for harbour porpoises.

- Greenland conduct follow up research to investigate how widespread underreporting of catches is in the Piniarneq system.

- Greenland support the research required to establish a West Greenland sub-population and take the case forward within the IUCN.

- Greenland ask hunters in East Greenland to provide samples to scientists when harbour porpoises are caught.

- Iceland and Norway carry out tagging and tracking studies to help answer questions about stock identity and the appropriate management units.

- Norway expand its reference fleet as part of an effort to obtain more reliable by-catch estimates.

- Faroe Islands work to obtain reliable removals data, update abundance survey and conduct tagging studies to provide the information required to perform an assessment.

EXECUTIVE SUMMARY - SC27 REPORT (2021)

The 27th meeting of the NAMMCO Scientific Committee (SC27) was held online 25–29 January 2021. It was chaired by Bjarni Mikkelsen and included observers from Japan, Russia and Makivik corporation.

WELCOME & OPENING REMARKS

The Chair welcomed participants and observers to the meeting and noted that due to the pandemic, no meeting of the SC or the NAMMCO Council (CN) had been held in 2020. The reports of both SC27 and SC26 will therefore be reviewed by the NAMMCO Management Committees at the next CN meeting (CN28), scheduled for March 2021.

WORK PROCEDURES & ORGANISATIONAL UPDATES

Updates from Council: The SC was informed that a new time schedule for NAMMCO meetings had been agreed and that the SC meeting would take place early in the year, at least 2 months before the CN meeting. Furthermore, according to revised rules of procedure documents for all NAMMCO meetings now needed to be delivered 2 weeks in advance.

Updates from NAMMCO Scientific Publications: Volume 11 is now complete, which finalises all analyses from the North Atlantic Survey Series (NASS). There is now an open call for Volume 12 ready for circulation amongst relevant networks.

Review of NAMMCO Management Areas: The SC reviewed and agreed upon tabular overviews of the sub-areas the SC uses in its management advice for pinnipeds and cetaceans.

Review of Abundance Estimates Overview: New overview documents for all abundance estimates produced and endorsed within NAMMCO were presented. The SC agreed that estimates endorsed by the SC, which are then revised before being published in the scientific literature should be reviewed in their final form by the abundance estimates working group (AEWG) and the SC for approval, following the same procedure as for new estimates.

Review of NAMMCO website: The SC quality controlled the information provided on the NAMMCO website for the minke whale, pilot whale, harbour seal and walrus. Revisions and updates were provided as necessary and the text endorsed.

Collaboration within the SC: The SC established a sub-group to update the collaborative 'super-tag' project description, including the in-kind contributions from all member countries. The revised description will be submitted for consideration at CN28 and the SC agreed that non-NAMMCO countries were welcome to join as project partners.

WORKING GROUP (WG) & WORKSHOP REPORTS

By-catch Working Group (BYCWG): Online meeting 28 May 2020.

Estimates for by-catch of marine mammals in Icelandic lumpsucker gillnets were reviewed. The SC *endorsed* the stratified estimates and *recommended* the estimates with stratification by management area for use in assessments. Revised estimates for harbour and grey seal by-catch in Norwegian coastal commercial fisheries were also reviewed but not endorsed for use in their current form. Given that the estimates were approaching levels similar to direct catch in some cases, the SC *agreed* that it was crucial that by-catch be included in the upcoming assessments of coastal seals. Noting that generating reliable estimates was challenged by ongoing problems with accurate identification of by-caught seals in Norway and Iceland, the SC *reiterated the recommendation* that this be improved, e.g., through jaw or flipper collection, DNA analysis, and/or photographs. The limitations and lack of reliability of self-reporting for estimating by-catch were again underlined and the SC *endorsed* the BYCWG recommendation that additional sources of information always be sought. The SC also *recommended* that the BYCWG provide to the next SC meeting an update on the effectiveness of video monitoring systems (being trialed in Norway and in use elsewhere), together with an update on the use of pingers as a by-catch mitigation measure. Following a discussion within BYCWG on a corrigendum to the by-catch reported in the Faroe Islands between 2013–2018, the SC *recommended* that data from all member countries on both catch and by-catch be validated before submission to formal databases and repositories. The SC *endorsed* all the recommendations for research from the BYCWG. The SC also agreed with the proposal of the WG to continue fulfilling its ToRs by reviewing the extent of all fisheries and associated by-catch risks. The next meeting of the BYCWG is planned for 2021.

NAMMCO-JCNB Joint Working Group (JWG): Online meeting 26–30 June 2020.

Narwhal: No management advice was given for narwhals at the JWG meeting because the West Greenland abundance estimates and correction factors required a more focused review. Updating the metapopulation and allocation model could therefore not be finalised during the meeting. A quantitative subgroup (QSG) was established to work intersessionally on this review and its advice will be reported at the next meeting of the JWG in autumn 2021. The JWG was informed that preliminary results from ongoing genetic analyses indicate three main populations (West Greenland-Eastern Canada, East Greenland and North-East Greenland-Svalbard) and a possible genetic distinction in East Greenland between narwhals that summer in Scoresby Sound and those that enter in the spring. Information from satellite tracking in Eclipse Sound also indicate that some narwhals are visiting two summering grounds. A new abundance estimate for Eclipse Sound (12,039; 95% CI: 7,768–18,660) was *endorsed* for use in assessment, however the estimates from an aerial survey performed by Golder Associates Ltd. for Baffinland Iron Mines Corporation required further discussion. For Melville Bay and Inglefield Bredning, it was agreed that the choice of models and correction factors required more discussion within the QSG before they could be accepted. A significant decline in the area of narwhal sightings in Melville Bay was noted as indicating a possible population decline. Updated catch statistics were presented and accepted, with the JWG highlighting that the level of hunting in the Melville Bay Nature Reserve had increased. To assist determinations of maturity, the SC *endorsed* the JWG recommendation that hunter reports include the body length of the animal.

Beluga: The JWG was informed that ongoing genetic analysis preliminarily indicates at least 5 genetically distinct groups in the western Atlantic, with finer level structuring possible in some groups. A new abundance estimate for the eastern part of the North Water from the aerial survey in April 2018 (2,063; 95% CI: 513–8289) was *endorsed* for use in assessments, as well as catch statistics from Greenland and Nunavut. Following a precautionary approach and a request from Greenland, the JWG performed an assessment of beluga in the North Water as a separate stock. The placement of a border at Cape York to separate the West Greenland and North Water stocks was deemed most reasonable based on the available evidence from satellite tracking, timing of catches, and genetic data. The population assessment for West Greenland was updated and a new assessment developed for the North Water. *Management Advice-West Greenland:* To maintain a 70% probability for population increase, an annual landed catch of no more than 265 individuals south of Cape York and north of 65° was recommended. *Management Advice-North Water:* To maintain a 70% probability for population increase, an annual landed catch of no more than 37 individuals north of Cape York was recommended. The SC *endorsed* all the recommendations for research and conservation and management from the JWG and *reiterated its recommendations* that there be seasonal closures and no hunt south of 65˚.

Coastal Seals Working Group (CSWG): Online meeting 1 January 2021.

Iceland was unable to attend the meeting, so the focus was on reviewing status updates in other member countries.

Harbour seals: In Norway, the survey cycle will be completed in 2021 when the remaining areas in Finnmark will be covered and a full population assessment will then be performed. From 2016–2020, harbour seals were counted at haul-out sites from the Swedish border to Troms, resulting in a total minimum count of 5,579. This represented a decrease from 6,383 in the same area during the 2011–2015 survey cycle. The largest drop was in Troms and Nordland, with an increase in the Norwegian Skagerrak.

In Greenland, three populations are recognized and monitored. One of them (the population in Kangerlussuaq) is critically endangered while the populations around Majorariaq and Qeqertat are small (likely less than 100 seals each) but show signs of increase. Most of the southeast coast, and some glacier fjords and river systems on the west coast, could potentially host undiscovered population and the SC *endorsed* the recommendation that it was important to further investigate this. The SC also *endorsed* the CSWG recommendation that due to significant errors in the historical catch statistics on harbour seals in Greenland (likely due to inaccurate reporting on the species caught), NAMMCO should consider removing this information from its website.

Grey seals: In Norway, the total number of grey seals was estimated to be 3,850 animals in 2016 (95% CI: 3,504–4,196), which was down from 7,120 (95% CI: 5,710–8,540) in 2011. Surveys in Trøndelag and

the southern part of Nordland in 2014 and northern Nordland (including Lofoten) in 2015 showed a significant decrease in pup production. A small reduction was also observed in Troms in 2016. Pup production in Trøndelag and along the mainland coast in Nordland remained at the same low level in 2018, while pup production in Lofoten (Nordland) had almost doubled in 2020 compared to 2015.
The Faroe Islands counted grey seals at haul-out sites during 2018 and 2019, which yielded a minimum count of 550 animals. More accurate estimates will be generated through tracking data, with two animals tagged in 2020 and plans to increase this up to 10 seals. There are also plans to monitor haul-out and breeding sites by camera to enable comparison with survey data. The level of kill around fish farms levels has steadily declined over the last 10 years (from as high as 200 animals/year to near zero), which the SC agreed should allow the population to recover. The SC noted that killing seals at fish farms is now banned in all member countries. It *endorsed* all of the recommendations for research from the CSWG as well as the recommendation that assessments be performed as soon as the necessary data becomes available. It also *agreed* that developing biologically relevant management units, rather than using county borders in Norway, was important. The next meeting of the CSWG is planned for 2022.

NAMMCO-ICES Joint Workshop on Seal Modelling (WKSEALS): Online meeting 4-6 November 2020.
At the 2019 meeting of the ICES/NAFO/NAMMCO working group on harp and hooded seals (WGHARP), the assessment model used for the NE Atlantic was not able to reproduce observed trends in pup production and could not generate reliable future projections for management advice. To improve the model for future assessments, WGHARP recommended that an expert workshop be held, followed by a full ICES benchmark process. WKSEALS brought together experts on seal population modelling from across the North Atlantic. It focused on harp, hooded and grey seals, for which assessments are all based on estimates of pup production and models that use some form of age-structured population dynamics. The workshop compared the approaches used across species and regions and performed pilot modelling experiments to explore potential solutions to the identified problems. Based on this work, WKSEALS recommended various ways to improve the model used for NE Atlantic populations of harp and hooded seals (e.g., through data and model exchange, reassessing late term abortions, and modifying model structure to include interannual variations in mortality, density dependence on vital rates, and environmental co-variate data). All recommendations from WKSEALS were *endorsed* by the SC. These recommendations for will be further explored and implemented over the coming year, with the results to be used as inputs to the benchmark process in 2022 and WGHARP in 2023.

ECOSYSTEM ISSUES

Marine Mammal-Fisheries Interactions: Updates on recently published research included work on harp and ringed seal diets and determining the trophic position of predators such as these in food web structures. It also included new analyses indicating that harbour seals are not in serious direct competition with local fisheries along the Norwegian coast and that predation by seals is not an important factor preventing the recovery of depleted coastal cod stocks. Plans of the joint Norwegian-Russian research program on harp seal ecology to deploy satellite tags in the White Sea were also presented.
Multi-species Approaches to Modelling: Updates from recently published research on determining the weight of minke whales was presented, as well as ongoing work on an article estimating consumption in the North Atlantic. The SC agreed that updates on work being done within relevant ICES integrated assessments should be presented at its next meeting.
Other Environmental Issues: The SC received an update on the Mary River mine project, noting that Greenland and Denmark had brought issues related to transport and shipping to ESPOO so that transboundary impacts could be considered within the environmental impact assessment. The SC *endorsed* the JWG recommendation that a workshop be held to assess the impacts of disturbance from the Mary River mine on narwhals, beluga and walrus, although it asked the JWG to provide more specific terms of reference. Updates from recently published research on harp seals as monitors of change and ongoing research projects on human activities and stressors in the Barents Sea and along the Norwegian coast were also provided. The SC *recommended* that all NAMMCO member countries ensure that relevant information from seismic surveys be made available to enable proper sound estimation and impact assessment.

PINNIPED STOCKS

The responses of the SC to all species-specific requests from the CN can be found in the report, while any relevant updates that were provided are summarised below.

For ***harp and hooded seals***, updates on relevant advances in the assessment model were presented in the WKSEALS report, while updates on the status of ***grey and harbour seals*** were provided in the CSWG report. For ***ringed and bearded seals,*** the SC noted a recent request from CN that WG meetings to assess the status of these species should not be delayed beyond 2022. The SC agreed that as a first step, an overview of the information required and available to perform assessments should be generated, together with a review of current literature. The new intern starting at NAMMCO in February 2021 will be tasked with producing this overview. No specific updates were presented for ***walrus*** at SC27, although this species was included as a co-target for the endorsed workshop to assess the impacts of disturbance from the Mary River mine project.

CETACEAN STOCKS

The responses of the SC to all species-specific requests from the CN can be found in the report, while any relevant updates that were provided are summarised below.

Humpback whale: An update on the research collaboration on North Atlantic humpback whale satellite tracking was provided. It was noted that tagging and metadata (including biological information) have now been shared within the group and that analysis will begin in spring 2021.

Beluga: Updates for beluga were presented in the JWG report.

Narwhal: In addition to the information provided on narwhals in the JWG report, the SC received a specific update on narwhals in East Greenland. It was noted that the advice from SC26 that harvest in all three management units in southeast Greenland (Ittoqqortoormiit, Kangerlussuaq and Tasiilaq) should be reduced to zero had not yet been reviewed by the Management Committee for Cetaceans (MCC) due to the cancellation of meetings in 2020. The SC was informed that quotas set for these three areas in 2020 totaled over 50 animals. The SC reiterated its concern for the status of narwhals in East Greenland and the high risk of extirpation of the stocks if harvest at any level continues.

Bottlenose whale: The first abundance estimate from the Norwegian mosaic survey 2014–2018 (7,800; 95% CI: 4,400–13,900), was *endorsed*. The SC *recommended* a single estimate for the whole Faroe-Iceland-Norway area be produced.

Killer whale: The first abundance estimates from the Icelandic/Faroes NASS ship surveys were *endorsed*. Due to the low numbers of sightings and high encounter rate variance, estimate precision was low. The SC *endorsed* the 2015 estimate for the Faroe-Iceland-Norway areas as the more robust for use in assessment (22,100; 95% CI: 15,300–32,000).

Pilot whale: The Faroe Islands provided an update on the information available to inform an assessment. Abundance estimates for the Central North Atlantic from the Icelandic and Faroese shipboard surveys in 2007 and 2015, and an analysis of trends in relative abundance in the Northeast Atlantic, are now published. Life history information would be updated in 2021 through an analysis of teeth and ovary samples. Tracking data for 10 pods is also available. Greenland also informed the SC that it had catch statistics and two abundance estimates available, but no biological samples.

Dolphins: The information currently available to inform an assessment was presented by all member countries. In the Faroe Islands, biological samples collected from white-sided dolphins in 2001–2009 have been analysed for sex and age composition, life history, feeding habit and genetics. Abundance estimates of white-sided dolphins from the Icelandic and Faroese components of the 2007 and 2015 NASS have also now become available. Iceland noted that in addition to abundance estimates, it had some information on by-catch and a few biological samples from strandings. Greenland informed that it had abundance estimates and catch statistics available. A dedicated sampling program has also been proposed for white-beaked dolphins in East Greenland and two different names for white-sided and white-beaked dolphins now introduced, which will allow for more specific catch reporting. The SC saw a possibility to assess white-sided dolphins in the Faroe Islands on the basis of the information available, but concluded that there was insufficient information to carry out a full assessment for other species and areas. Work on dolphins was therefore encouraged to continue, with the information available updated and reconsidered at SC28 in 2022.

Harbour porpoise: Updates were provided from three published papers based on analyses of samples from by-caught harbour porpoises in Norway. This research suggested that harbour porpoises in Norway likely belong to a single population, that the species can potentially be used as tracers for plasticisers in marine environments, and that mercury concentrations were in the no risk category. The SC noted that the advice for West Greenland from the harbour porpoise WG in 2019 had not yet been reviewed by the MCC due the cancellation of meetings in 2020 but would be done in 2021.
Sperm whale: An update from a new tagging study of sperm whales in Svalbard was presented.
Bowhead whale: Information on the status of the East Greenland-Svalbard-Barents Sea stock was presented, indicating that this stock may now be recovering from commercial exploitation. Large abundance estimates over the past decade indicate a healthy stock of at least several hundred bowhead whales between East Greenland and Franz Josef land.

SURVEYS

All the abundance estimates that could be generated for species covered by the previous NASS have now been completed and published, finalising data analysis from 30 years of survey efforts. The SC *agreed* that based on the new information provided by member countries, 2024 was now the most appropriate year for the next coordinated survey. The established planning sub-group agreed to draft a proposal for the new coordinated survey, circulate this to SC members for review by correspondence, and then submit it for consideration at CN28.

FUTURE WORK PLANS

The SC again highlighted the technical difficulties with generating formal assessments for very small populations, and the high risks associated with continued exploitation of populations too small to be properly assessed. The SC therefore *reiterated its recommendation* from 2019 that the NAMMCO Management Committees support the development of a standard or principle-based approach for how to manage small and/or depleted stocks. The SC also suggested that this be a topic on the agenda for SC28 to begin the discussion and advance the development of such an approach.

Based on the information presented as SC27, the following workplan was agreed and the budget reviewed and revised accordingly. While no workshops were scheduled in the coming years, plans for addressing the endorsed workshop topics within WGs are outlined in the report.

2021	2022	2023
Working Groups: - Narwhal in East Greenland - NAMMCO-JCNB JWG on Narwhal and Beluga - By-catch **Other:** - NASS Planning (online) - Harp & Hooded Seals Benchmark kickoff (online)	**Working Groups:** - Bearded Seal - Ringed Seal - Harbour Porpoise - Coastal Seals - Pilot Whale **Other:** - Harp & Hooded Seals Benchmark Meeting	**Working Groups:** - Harp & Hooded Seals - Dolphins

ANY OTHER BUSINESS

It was agreed that since SC27 took place online, Greenland would remain the host for SC28 in 2022, with the precise date and location for the meeting to be determined at a later time.

MEETING CLOSE

The Chair drew attention to plans of long-term SC member Tore Haug to retire in 2021. The SC thanked Tore for his extensive contributions to NAMMCO and wished him well in his retirement.

The full report from SC26 is available on the NAMMCO website here:

https://nammco.no/wp-content/uploads/2017/01/final_report_sc27_2021.pdf

EXECUTIVE SUMMARY - SC26 REPORT (2019)

The 26th meeting of the NAMMCO Scientific Committee took place in Tórshavn, Faroe Islands from October 29th to November 1st 2019 under the chairmanship of Bjarni Mikkelsen (FO).

National progress reports (NPRs) were received from all NAMMCO countries prior to the meeting, as well as written reports from Russia, Canada and Makivik Corporation. Three observers from Japan attended the meeting and gave presentations on their research programs and the new whaling policy.

A list of all documents available to the meeting is provided in appendix 3 of the report. This includes the reports of four working groups (WGs): The Harbour Porpoise Working Group; ICES/NAFO/NAMMCO Working Group on Harp and Hooded Seals; *Ad hoc* Working Group on Narwhal in East Greenland; Abundance Estimates Working Group. Each WG report is reviewed below under the relevant species/agenda item.

Work Procedures (Item 5)

Updates from Council: The General Secretary of NAMMCO provided the SC with an update on key decisions from the Council meeting (NAMMCO 27), which was held in Tórshavn, Faroe Islands, in April 2019.

Population estimates: The overview tables used by NAMMCO (both within the Secretariat and on the website) were discussed. The current assessment/conservation status tables were viewed as problematic and it was agreed they be removed from the website and revised versions prepared by the Secretariat. A new overview table describing the management areas/sub-areas of relevance to NAMMCO was agreed (see appendix 4).

Catches: The best methods for collecting reliable information on struck and lost were emphasised as: investments in good time series surveys, independent observer programs in selected hunts, and working with hunters to encourage reliable reporting. The development of a searchable online catch database was welcomed. It was, however, noted that this database currently uses information from the NPRs, which is not always the most up to date. The SC therefore *recommended* that the Secretariat be informed of any and all revisions of catch statistics. Inputs for a common reporting format were provided and following other NAMMCO committees, February 1st was *recommended* as the new deadline for reporting.

***Furthering cooperation in the SC*:** Information was provided that Norway is investigating avenues for funding the 'Supertag' project and all SC members were encouraged to talk to their managers about the possibility to contribute some level of financial support to this common research and development project.

***NAMMCO Scientific Publications*:** A presentation on the Plan S initiative for open access publishing was given and an offer to host an open data archive presented. The SC agreed that working towards being Plan S compliant was important, however, it *recommended* that clarity on the desirability of open data archiving be sought from the NAMMCO management committees (MCs). An update on volume 11 was provided and it was agreed that volume 12 would be pursued through an open call for submissions.

Work flow: A desire to have the SC meet in the spring and Council in the fall was reiterated. An additional option of holding the SC meeting shortly before the Council meeting was also outlined. A workflow for updating scientific information on the NAMMCO website and performing a quality control check was agreed.

Development of management advice

Request R-1.6.6 asked the SC to provide a review of the management procedures used for generating management advice, as well as which procedure is most suitable for each species. The SC answered this request through the provision of a written review. This review describes the difference between stock assessments and management procedures and outlines key methods of each. For stock assessments, this includes a description of HITTER FITTER methods and Bayesian assessment. Under management procedures, a description is provided for: a) the Revised Management Procedure (RMP)

for commercial whaling and its catch limit algorithm (CLA), b) the Aboriginal Whaling Management Procedures (AWMP) for subsistence whaling and its strike limit algorithms (SLAs), and c) the approach of Potential Biological Removal (PBR).

The review concludes that there is no biological reason why the advice on a particular species is given through a management procedure or stock assessment calculations. Both approaches can be used for all species and their use within the NAMMCO SC has to a large degree been determined by historical conditions. Management procedures (such as those used by the IWC) are costly to develop (in time and resources) but once available have the advantage of having simple data requirements. Stock assessments models can, however, be tailored to relevant stocks and species using less time and resources than developing a management procedure requires. Bayesian models are best able to incorporate a range of parameters and their uncertainty, while PBR is only recommended in exceptional cases where there is little data or the models are not fitting the data well.

Management advice provided by the NAMMCO SC is currently based on a suite of management procedures and assessment models developed and tuned to the knowledge available on marine mammal stocks in the North Atlantic. Given the effort required, the SC sees it unlikely that it will develop new management procedures and *recommended* the continued use of stock assessment approaches using population dynamics models as appropriate for generating advice on sustainable harvest levels.

Response to the Performance Review: Following a request from the *ad hoc* performance review working group, all of the recommendations related to the SC were considered and discussed in terms of their relevance, priority and possible pathways for implementation. A full report on the outcomes of this discussion is provided in appendix 5 of the report.

Interactions with Other Organisations (Item 6):

Updates were provided on NAMMCO interactions with the IWC, ASCOBANS, ICES, Joint Commission on Narwhal and Beluga (JCNB), Arctic Council & Subsidiary Bodies, FAO, and OSPAR. The SC *recommended* the Council provide advice on the scope of the collaboration with the IWC (e.g. on small cetaceans) and nominated a representative to participate in all future IWC meetings on abundance estimates. It also *recommended* that a response be sent to OSPAR regarding the proposed NACES marine protected area stating that there was insufficient data to draw a conclusion on the importance of the proposed area for cetaceans.

Environmental/Ecosystem Issues (Item 7)

Marine mammal-fisheries interactions: Updates on recent research on grey and harbour seals in Norway was provided, indicating that consumption by seals is low compared to fishery takes. It was also noted that this topic will be investigated as part of the Joint Norwegian-Russian Research program on Harp Seal Ecology.

By-catch: An update on a workshop held in Ålesund in June 2019 was provided, together with a status report from Norway on by-catch of harbour porpoises, coastal seals, and the mitigation efforts using pingers. The next meeting of the NAMMCO BYCWG was scheduled for spring 2020 to review the new/revised estimates for Norway and Iceland, as well as relevant reports from ICES, OSPAR-HELCOM, and the Norwegian workshop.

Multi-species approaches to management and modelling: NAMMCO participation in the planned ICES WG on Integrated Ecosystem Assessment in the Greenland Sea was encouraged.

Other environmental issues: A recently published review of baleen whale ecology in high-latitude marine ecosystems was presented. An update on the Mary River project was also provided. Concern was reiterated regarding the potential impact of the Mary River project and particularly the impact of disturbance from increased shipping traffic on walrus and narwhal populations. The SC *recommended* that the JCNB propose guidelines for monitoring the response of the narwhal stocks in Eclipse Sound and noted that monitoring of other species wintering in west Greenland would also be important.

Seal and Walrus Stocks – Status & Advice to Council (Item 8)

All of the research updates presented for the different species can be found in the full report.

Harp seal: The results of aerial surveys in the Greenland Sea pack ice (18-31 March 2018) to assess pup production were presented, together with the results of the Joint ICES/NAFO/NAMMCO working group on Harp and Hooded Seals (WGHARP), which met in Tromsø September 2019.

White Sea/Barents Sea: The last pup production estimate is from 2013 (more than 5 years old), making this a data poor population according to ICES rules. The assessment model provided a poor fit to the survey data. A conservative PBR approach was therefore applied and estimated an upper limit for removals of 21,172 seals.

Greenland Sea: This is a data rich population. However, a drop of almost 40% in pup production between 2018 and 2012, combined with a poor fit between the model and the available data, meant that the use of model projections to generate management advice was not recommended. The PBR approach was therefore applied and estimated an upper limit for removals of 11,548 seals.

The SC endorsed the assessments and recommendations from WGHARP, including that NAMMCO and ICES convene a workshop to improve population assessment models for seals. This was scheduled for fall 2020.

Hooded seal: All model runs conducted by WGHARP on hooded seals in the Greenland Sea indicated that the population remains well below N30 (30% of the largest observed population size). The SC *recommended* that there be no commercial catch from this stock but that scientific and subsistence hunting can continue.

Ringed seal: Since there are ongoing studies within Greenland and studies planned within Norway, it was proposed that the ringed seal WG be postponed and a new date set by SC/27 based on an assessment of the sufficiency of the data available at that time.

Grey & Harbour seal: The coastal seals WG will meet in Copenhagen 27-30 April 2020, with aims to: 1) Assess the status of harbour and grey seal populations in NAMMCO and adjacent waters, 2) Assess the status of population modelling for coastal seals, 3) Review by-catch issues in NAMMCO countries, 4) Review new research on ecology and telemetry. This meeting is planned to be held back to back with the by-catch WG.

Bearded seal: It was proposed that the bearded seal WG be delayed (until 2022 at the earliest) to allow for ongoing research to be finalised and additional data to be made available.

Walrus: Concern was expressed that shipping and industrial activity linked to the planned Ilmenite mine in Wolstenholme Fjord, NW Greenland, may impact the small population of walrus using this fjord. The SC *recommended* that the presence of walrus in the area be monitored and catch levels adjusted if needed. The new request from Council (*R.2.6.8 Provide assessments of, and advice on the sustainability of allowing walrus hunt all year round in Greenland, on all stocks*) was noted. The SC did not see any particular problems with allowing a hunt all year round but emphasised the importance of reporting any catch of a female with a calf as two animals (regardless of whether the calf is retrieved or not).

Cetacean Stocks - Status & Advice to Council (Item 9)

All of the research updates presented on the different species can be found in the full report.

AEWG: The AEWG met from 8-10 October in Tromsø under the chairmanship of Daniel Pike. The WG finalised estimates from the last 30 years of Icelandic coastal aerial surveys; Icelandic/Faroese ship surveys from 2007 and 2015; and Norwegian mosaic surveys over the last three survey cycles (spanning 2002-2018). New abundance estimates were made available for fin, humpback, sei, bottlenose, and killer whales, as well as for dolphins and harbour porpoise. An overview of all endorsed abundance estimates is available in appendix 6. The SC *recommended* that the final remaining estimate (killer whales in Iceland/Faroes) also be generated.

Fin whale: Information was given that there were no catches of fin whales in Iceland this year.

Beluga: The previous *recommendation* for seasonal closures in Greenland was reiterated with further explanation given. The next meeting of the NAMMCO-JCNB JWG will be in Winnipeg Canada, May 26-29 2020.

Narwhal: The *Ad hoc* Working Group on Narwhal in East Greenland (NEGWG) met in Copenhagen from 24-27 September 2019. It reviewed data on stock structure, abundance, distribution, impacts from hunting and climate change, and assessed the future sustainability of catches (full details on each item given in the report).

The borders for the three management areas in East Greenland were agreed as: *Area 1* = Ittoqqortormiit/ Scoresby Sound south to 68°30'N; *Area 2* = Kangerlussuaq 68°30'N to 67°N; *Area 3* = Tasiilaq, south of 67°N.

The SC endorsed the assessments performed by the NEGWG and given that catches at the current level for even one year would have a significant negative impact, *recommended* that there be an immediate reduction to 0 catches in East Greenland, at least until a new abundance estimate is generated.

An historical overview of the management of narwhal in East Greenland and the new scientific information that informed the 2019 assessment are provided in Tables 3 & 4 in the narwhal section of the report.

Furthermore, the SC *recommended* NAMMCO develop a principle-based approach to harvest advice for small stocks and hold another meeting of the NEGWG in 2021 to review new data and update the assessment.

Pilot whale: It was proposed that the pilot whale WG be delayed until 2021 to allow time to gather more data.

Harbour porpoise: The report of the Joint IMR/NAMMCO International Workshop (WS) on the Status of Harbour Porpoises in the North Atlantic (held in Tromsø in December 2018) was presented. The SC welcomed the impressive compilation of data and overview of knowledge gaps provided by the WS but agreed that further work was required to generate reliable assessments for the NAMMCO areas.

The report of the Harbour Porpoise Working Group (HPWG), held from 19-22 March 2019 in Copenhagen, was also presented. This WG performed an assessment for West Greenland and the SC endorsed a *recommended* annual catch (animals reported landed) of no more than 1,869 harbour porpoises. Given the demonstrated importance of reliable and complete reporting of removals, it also *strongly recommended* that Greenland work to eliminate underreporting and validate catch statistics. It also endorsed the recommendation that new surveys for harbour porpoises be carried out in NAMMCO areas, and particularly off Iceland since the last dedicated survey there was 12 years old.

Surveys (Item 10)

The SC established a planning committee for the next NASS, which will meet by correspondence in 2020. The target species for the 2023 NASS will be the same as previous surveys – fin, minke and pilot whales.

Future Work Plans (Item 11)

Greenland will host the 2020 meeting of the SC, with the exact date and location to be decided.

There were some changes to the endorsed work plan and a new plan from SC26 is presented below.

2019 (COMPLETED)	2020	2021	2022
Working Groups: - Harbour porpoise - ICES/NAFO/NAMMCO on Harp and Hooded seals - Narwhal in East Greenland - Abundance Estimates	**Working Groups:** - By-catch - Coastal Seals - NAMMCO/JCNB JWG on Narwhal and Beluga (Planning meeting for next NASS via correspondence) **Workshops:** - Model development for assessment of seals (collaboration with ICES) - North Atlantic humpback whale tagging workshop/collaboration	**Working Groups:** - Pilot Whale - Narwhal in East Greenland (spring) - Abundance Estimates (for killer whales)	**Working Groups:** - Bearded seal - Ringed seal - Harbour porpoise

Expenses and Budget (Item 12)

The previously agreed total budget for 2020 remained applicable. The reallocation of funding required for the new work plan is described in the report.

Any Other Business (Item 13)

It was agreed that next year's SC meeting will separate administrative and scientific components in the agenda and reporting to allow scientific issues to be prioritised and handled first, which is not currently the norm.

Meeting Closure & Acceptance of Report (Items 14 & 15)

The meeting ended at 17:50 on 1 November 2019. A draft version of the report was accepted during the meeting and following a second round of editing and integration of further feedback, the final report was accepted on 15 November 2019.

The full report from SC26 is available on the NAMMCO website here:

https://nammco.no/wp-content/uploads/2017/01/final-report_sc26-2019_rev230120.pdf