NAMMCO

30 Years: 1992 - 2022

SCIENTIFIC COMMITTEE
WORKING GROUP ON BY-CATCH

May 25, 2022
Video Conference

REPORT

Presented to the 29th Meeting of the Scientific Committee as NAMMCO/SC/29/05

© Eve Jourdain / Norwegian Orca Survey

Please cite this report as:

NAMMCO-North Atlantic Marine Mammal Commission (2022). Report of the Scientific Committee Working Group on By-Catch. May 2022, Tromsø, Norway.

Available at https://nammco.no/topics/byc_reports/

DISCLAIMER:

The content of this report contains the views of the Working Group and does not necessarily represent the views of the NAMMCO Scientific Committee, the Management Committees or the Council.

TABLE OF CONTENTS

The NAMMCO Scientific Committee Working Group on By-Catch (BYCWG) held its 7th meeting as a video conference on May 25, 2022, under the chairmanship of Kimberly Murray (NOAA, USA). The list of participants can be found in Appendix 1 to this report.

1.   WELCOME FROM THE CHAIR AND OPENING REMARKS

Murray welcomed all participants and gave them the opportunity to introduce themselves as there were many new participants to this BYCWG meeting. After the round of introductions, Murray reminded the group that the primary aim of the meeting was to discuss a topic that was pending from the last BYCWG meetings held in May 2020 and October 2021, namely, how to assess the risk of by-catch for the fisheries for which there was no by-catch estimates and often no or limited by-catch monitoring.

2.   ADOPTION OF AGENDA

Murray reviewed the draft agenda (available as Appendix 2 to this report) and asked participants if there were additional items for discussion. The agenda was adopted without change. Murray noted that items 5 (Risk for all fisheries) and 7 (Recommendations) were the most important ones and that would be dealt with if time permitted.

3.   APPOINTMENT OF RAPPORTEURS

NAMMCO Scientific Secretary, Albert Chacón, was appointed as rapporteur, with assistance from NAMMCO Secretariat staff, Heleen Middel and Geneviève Desportes, Chair Murray, and other participants as necessary.

4.   REVIEW OF AVAILABLE DOCUMENTS

Murray reviewed the Working and For Information documents available to this meeting (Appendix 3), especially pointing out the working document submitted by Arne Bjørge on the risk of entanglement of harbour seals in Norwegian coastal gillnet fisheries, "Temporal and spatial distribution of harbour seal *Phoca vitulina* risk of entanglement in gillnets at the Norwegian coast" (Document SC/29/BYCWG/04) and the document on logbook underreporting, co-authored by Guðjón Sigurdsson, "Using case studies to investigate cetacean by-catch/interaction under-reporting in countries with reporting legislation" (Document SC/29/BYCWG/FI05).

Murray also noted the existence, within the For Information documents, of many numerical approaches and products regarding the assessment of by-catch in marine mammal populations. Many of the papers are products of the Marine Mammal By-catch Working Group, an international group assembled under the Lenfest Ocean Program to synthesise best practices for how to assess and manage marine mammal by-catch. An overview of the Lenfest Ocean Project can be found at https://www.lenfestocean.org/en/research-projects/developing-recommendations-to-estimate-by-catch-for-the-marine-mammal-protection-act.

5.   RISK ASSESSMENT FOR ALL FISHERIES

5.1   PURPOSE FOR RISK ASSESSMENT

The first Term of References (see Appendix 2) for the BYCWG was defined by NAMMCO SC21 to "identify all fisheries with potential by-catch of marine mammals". So far, the WG has mostly concentrated on reviewing by-catch estimates for harbour porpoises and coastal seals generated from observer monitoring in gillnet fisheries, which are known to have a high probability of by-catch. The

WG has previously endorsed by-catch estimates for marine mammals in the Icelandic lumpsucker fishery and for harbour porpoise and grey and harbour seals in the Norwegian coastal gillnet fisheries.

Desportes indicated that the purpose of a risk assessment was to identify the risk of by-catch occurrence of marine mammals in the other fisheries even in the absence of dedicated monitoring effort, and to identify areas where monitoring efforts should increase or would be necessary. Desportes highlighted the cost benefit of helping countries prioritise their efforts in by-catch monitoring.

5.2   OVERVIEW FROM ICES WGBYC RISK ASSESSMENT

Allen Kingston presented an overview of the risk assessment performed by the ICES Working Group on By-catch of protected species (WGBYC) – (Document SC/29/BYCWG/FI02).

Author's summary

Since 2016 WGBYC has been tasked with developing approaches that can help prioritise areas where additional by-catch monitoring might be needed. In 2020, in response to a request from the EU's Regional Coordination Groups (RCGs) for input into sampling designs, a new Term of Reference was added to WGBYC which explicitly required the working group to review existing monitoring in relation to by-catch risk and fishing effort, to inform coordinated sampling plans. A subgroup in WGBYC used data obtained through an official data call to ICES member states to initiate some work aimed at providing a simple and pragmatic approach for informing sampling designs. As a first step the group began mapping the available fishing effort data, monitoring effort data and calculated monitoring intensities. The mapping exercise provided a useful visual representation of the scale and distribution of fishing activity, data collection activities and was also helpful in highlighting data gaps, but these elements alone do not provide a basis to say where sampling should be prioritised. Consequently, WGBYC also explored the use of metier specific (gear type/ICES division) risk scores from the fishPi project, produced using a largely expert opinion-based approach, to develop a conceptual approach for informing sampling designs. The fishPi metier scores were tabulated alongside recent fishing effort and monitoring data to highlight those metiers with high risk, high effort, and low monitoring coverage. However, existing fishPi scores incorporate elements of perceived by-catch risk based on expert opinion, and fishing and sampling effort levels from the time the project was carried out. This means the scores are essentially fixed at the time they are generated (in this case over a decade ago) and so are of limited use for informing ongoing sampling designs. The subgroup concluded that relative metier risk scores, that only consider the perceived likelihood of by-catch occurring but do not incorporate fishing or sampling effort would be more useful and would allow regular updating of the procedure with recent fishing and monitoring effort. This would be more useful for highlighting high risk metiers that receive little or no monitoring effort. Regular updating would also allow for simple tracking of the development of sampling designs over time in relation to sensitive species by-catch.

Discussion

The Working Group discussed the utility of the WGBYC approach for assessing risk in the NAMMCO countries. One of the main topics of discussion was how to define "risk" – i.e., are we interested in risk to the marine mammal population or the risk of by-catch occurrence to an individual animal – as the level of risk of interest will shape the approach that is developed. Kingston informed that the risk measured by the ICES score system corresponded to risk of by-catch occurrence, also noting that such an approach provided broad indications on where best to focus monitoring efforts.

It was asked how the WGBYC approach would score a large fishery with a low level of existing coverage compared with a small fishery with a high level of coverage, and whether a small fishery with high by-catch would be overlooked. Kingston indicated that if a fishery was known or considered to have high by-catch, its final score would be high as such score would be a combination of the risk score x fishing effort x monitoring coverage. Kingston noted that while both fishing effort and monitoring coverage were considered in the scoring system, additional sources of information were also used when data

for a given fishery was limited or incomplete. The WG agreed that in low data environments the use of expert knowledge and data from similar fisheries can contribute to produce by-catch probabilities and hence direct the sampling framework. Examples of this are included as For Information documents SC/29/BYCWG/FI07, and SC/29/BYCWG/FI04.

It was agreed that, ideally, the group would like to identify the areas where by-catch seems more likely at the individual level (based on the co-occurrence of species distribution and effort) in different fisheries, with the purpose of directing monitoring efforts. Other assessment working groups will later evaluate any impact of that by-catch on the population. As a first step, simply mapping the fishing effort in relation to observer effort would be helpful to visualize the scale of fishing effort and where additional monitoring may be needed based on our existing understanding of the   threat posed by different gear types. This was also a helpful first step for the ICES working group risk assessments.

As a way forward, the WG **recommended** that that the risk of by-catch occurrence be quantified first. Then, the level of monitoring needed to obtain reliable by-catch estimates should be evaluated for each fishery with the aim of eventually assessing the impact of by-catch on the populations affected.

5.3   OTHER EXAMPLES OF MARINE MAMMAL BY-CATCH RISK ASSESSMENT

Bjørge presented document SC/29/BYCWG/04 – *Temporal and spatial distribution of harbour seal Phoca vitulina risk of entanglement in gillnets at the Norwegian coast*

Author's summary

Incidental capture of non-target species by fisheries, also referred to as by-catch, is a major concern for the management of species in the marine megafauna. In Norway, it has been estimated that every year, 555 harbour seals get entangled and drown in gillnets. The majority of these by-catch events occur in large-mesh gillnet fisheries targeting cod (*Gadus morhua*) and monkfish (*Lophius piscatorius*). Pups, especially young-of-the-year individuals, represent the largest proportion of bycaught harbour seals. To increase our understanding of harbour seal by-catch events along the Norwegian coast, times and areas of potential by-catch risk were identified. Seasonal variation in the at-sea distribution of harbour seals was simulated based on movements from their moulting sites to predicted at-sea locations. Relative age-specific by-catch abundances were used to weight the different seasons used based on harbour seal age. The overlap in the distribution of harbour seals and the documented distribution of fishing effort was then used to estimate the relative by-catch risks between seals and coastal gillnet fisheries in defined Statistical Sea Locations (SSLs), in each of four seasons. The method used here provides a general framework for understanding spatial and temporal interaction between harbour seals and coastal gillnet fisheries. The times and areas of high interaction risk that were identified can be used in management practices to increase our understanding of by-catch events, and to ultimately reduce unwanted by-catch of harbour seals in coastal fisheries along the Norwegian coast.

Discussion

It was asked whether an increasing number of nets in the water increased the risk of entanglement. Bjørge indicated that they did not know the number of nets and that data on fishing trips from commercial gillnet fisheries in Norway were used as a proxy of fishing effort to calculate the relative risk of entanglement of harbour seals in the coastal fisheries.

The probability of interactions between seals and fisheries showed both spatial and seasonal variation along the Norwegian coast. Bjørge indicated that the highest interaction risk was found in a location near Trondheim (central Norwegian coast) with both high fishing effort year-round and a large seal colony. However, Bjørge noted that the highest by-catch levels were found when the fishing effort was low, but pups of the year were present. Given that many by-caught harbour seals are young individuals, a question was whether variation in seal-fishery interaction probability could be reflecting variation in pup density in coastal waters. Bjørge requested this and other comments to be sent to him by e-mail, to improve the quality of the manuscript before submission.

5.4   INFORMATION REQUIREMENTS FOR THE MMPA IMPORT RULE
Due to time constraints, agenda item 5.4 was not discussed.

5.5   WAYS FORWARD (INCL. DATA AND TIME AVAILABILITY)

5.5.1   Data availability
The WG discussed the data available in each NAMMCO country on fishery effort, monitoring of by-catch and marine mammal species distribution and abundance.

Sigurdsson informed the WG that in Iceland most fisheries had 1% observer coverage, with the pelagic ones having a coverage of up to 20%. Fishing effort through VMS data, landing statistics, and electronic logbooks are readily available. Sigurdsson also indicated that a considerable amount of data on marine mammal species distribution and abundances was available, thanks to ongoing and long-term monitoring programs (the NASS and the coastal seal survey series plus specific harbour porpoise survey) providing both occurrence and abundance data for multiple species and years.

Bjarni Mikkelsen informed that the Faroe Islands had a complete overview of fishing effort by gear and area but were not in such a good position with observer effort and coverage regarding by-catch, having little to no data from small vessels less than 15 GRT. Mapping by-catch risks in the Faroes could be more challenging than in other NAMMCO countries, due to a small, open, and dynamic oceanic area surrounding the islands. Distribution and abundance data were available from the past NASS surveys, a harbour porpoise survey, as well as recent grey seal surveys. Also, distribution data were available from tracking studies of pilot whales, fin whales and grey seals. More data would become available in the future, via NASS-2024 and research projects like NAMMCO funded MINTAG, aiming at understanding the local distribution of minke whale (*Balaenoptera acutorostrata*) and other cetaceans. Data on the timing and areas used by large baleen whales in Faroese waters was also available from older whaling records and observations. However, it was noted that such knowledge on whale dynamics was likely not enough to quantify risk of by-catch at the population level.

Sofie Abelsen indicated that in Greenland by-catch data for large whales was available. There were also plans to arrange meetings with local municipalities to better monitor and avoid large whale by-catch around Greenland, as well as plans to collaborate between departments to get better data on by-catch. Greenland has no by-catch data for smaller cetaceans and pinnipeds but data (on both catches and by-catch) should be obtained by launching a marine mammal hunting app in 2024. It was unclear which fisheries data (e.g., fishing and observer effort) existed, but the information would be provided to the group.

In the case of Norway, Bjørge indicated that the Norwegian Directorate of Fisheries had both fishing trips and landing statistics providing good spatial and temporal resolution on fishing effort, a situation that offers good opportunities to assess by-catch risk on large (>15m) vessels. Good data exist also for smaller (<15m) vessels in Norway and there are plans to introduce a Remote Electronic Monitoring (REM) system for reporting by-catch on small vessels too. Regarding species distribution in Norwegian waters, there are knowledge gaps on the at sea distribution of coastal seals and also gaps on cetacean distribution and by-catch outside the summer months that are attributed to the migratory behaviour of some species.

The WG reiterated what it, and other expert groups, had stated before that fishermen self-reporting (e.g., through logbook) was not a reliable way of measuring by-catch, but provided only qualitative information. For instance, Basran and Sigurdsson's paper (see SC/29/BYCWG/FI05) quantified under-reporting in various fisheries in New Zealand, United States. and Iceland, and found that overall cetacean by-catch recorded by observers was higher than from fisher logbooks by an average of 774% in trawls, 7348% in nets and 1725% in hook and line gears.

Therefore, in order to identify priority areas where monitoring efforts should increase or commence, the information provided by NAMMCO countries should focus on the size of the fishery (number of

vessels, fishing effort either in landings or trips), and the magnitude and distribution of observer coverage, as well as their co-occurrence with marine mammal species.

5.5.2   Future steps

The WG discussed ways to address the risk assessment in all four NAMMCO countries, recognizing that the major challenge was the exact question to be answered and not necessarily the tools to evaluate the risk, which were numerous. When mentioning "risk", this WG is talking about the potential of by-catch and having unreliable assessments due to lack of monitoring. The goal of the working group is to determine where to focus monitoring effort and on what fisheries. This in turn will enable monitoring programmes to determine more accurate estimates of total marine mammal by-catch by species. Those estimates may then be used by other working groups to evaluate whether such levels of mortality exceed some sustainability threshold.

A data call was suggested to obtain the necessary information on fleet activity and distribution, as well as current levels of monitoring, and the WG discussed the details of such a data call. The group agreed that it was important to be very clear on what they were asking for and to write it in such a way that it was clear to those submitting the data. A common level of effort would need to be identified across the 4 NAMMCO countries. As a first step, the WG **recommended** that the NAMMCO Secretariat conduct initial scoping to each country, with respect to appropriate point of contacts, 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".

Desportes suggested that a NAMMCO data call could be modelled after the data call by the ICES WGBYC used to collect data for risk assessment. The group suggested to use ICES division levels as the spatial resolution level of the data required from the NAMMCO countries, and possibly at a finer resolution in inshore waters that was specific to each country. However, it was noted that for some NAMMCO countries the lower spatial resolution data might have protection issues, making the ICES division level the best choice. Given it is necessary to match the monitoring level to the scale of the data requested, very fine-scale data may not be an option.

Given that Norway and Iceland had already submitted data to previous ICES WGBYC data call, the WG suggested to start using the data that had already been assembled for such purpose. Desportes informed the WG that ICES and NAMMCO had an agreement to cooperate (Letter of Understanding), and that data could likely be requested directly by NAMMCO to the ICES secretariat. As risk assessments are dependent on the time being considered; the WG **recommended** to ask for data covering the last 5-year period and to use ICES division levels as spatial resolution level (unless the initial scoping exercise suggested a more appropriate spatial resolution).

Simon Northridge indicated that Norway had not provided data to ICES in the last 4 years so the most productive way of obtaining recent data for Norway was to make a direct request to the Directorate of Fisheries. Given that the Faroe Islands and Greenland had never provided data to the ICES WGBYC, it was suggested that the NAMMCO secretariat should contact the four fisheries departments for the data call.

The WG agreed the data received from the NAMMCO countries should be processed and analysed within the NAMMCO BYCWG. However, it was noted that in the Roadmap for ICES by-catch advice on protected, endangered, and threatened species (see SC/29/BYCWG/FI02), "ICES recommends sharing risk assessment data with NAMMCO", so if the data in the ICES database (which has already been cleaned and processed) is in a format suitable for NAMMCO risk assessments, it would be advantageous to utilise any of their existing data, and to share any new data processed by NAMMCO. The WG **recommended** that this cooperation be further investigated, as well as how best to integrate data from Faroe Islands and Greenland into the databases.

The WG noted that once the risk of by-catch occurrence was obtained for the different species in the different areas, the assessment of the risk that by-catch represented to the marine mammal populations should be conducted by the WGs conducting stock assessment.

6. BY-CATCH DATA CHALLENGES

Due to time constraints, the WG did not discuss agenda item 6.

7. RECOMMENDATIONS AND ACTION POINTS

7.1 RECOMMENDATIONS FOR RESEARCH

None at this point

7.2 RECOMMENDATIONS FOR CONSERVATION AND MANAGEMENT

- *That, as the fishermen reporting of by-catch is not reliable, the best way to progress with ToR 1: "Identify all fisheries with potential by-catch of marine mammals" is by performing a risk assessment.*
- *That a first step towards a risk assessment would be to send a data call to fishery departments of NAMMCO member countries.*
- *That cooperation with ICES be sought and that the Secretariat contact ICES to see how data cooperation could be developed.*

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

    ➔ *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.*

8. MEETING CLOSE

Murray thanked all the participants for their active participation in the online meeting, and Kingston for his presentation. The WG thanked the Chair for her able chairing.
The WG decided to have a short meeting within the next six months, to provide progress updates regarding the data call and cooperation with ICES.

A draft meeting report was circulated June 7, 2022, and was finalised June 13, 2022.

.

APPENDIX 1: LIST OF PARTICIPANTS

Sofie Abelsen (GL)
Ministry of Fisheries,
Hunting and Agriculture
PO Box 29
GL-3900 Nuuk
Greenland
soab@nanoq.gl

Arne Bjørge (NO)
Norwegian Institute for Marine
Research
Blindernveien 31
NO-0371 Oslo
Norway
arne.bjoerge@hi.no

Albert Fernandez Chacón (NAMMCO Secretariat)
Scientific Secretary
PO Box 6453
NO-9294 Tromsø
Norway
albert@nammco.org

Geneviève Desportes (NAMMCO Secretariat, Convenor)
General Secretary
PO Box 6453
NO-9294 Tromsø
Norway
genevieve@nammco.org

Allen Kingston (Invited Expert)
Co-Chair of ICES Working Group on
By-catch of Protected Species
H. C. Andersens Boulevard 44-46
DK-1553 Copenhagen V
Denmark
ark10@st-andrews.ac.uk

Niels Lyberth (GL)
Ministry of Fisheries,
Hunting and Agriculture
PO Box 29
GL-3900 Nuuk
Greenland
nily@nanoq.gl

Marjorie Lyssikatos (Invited Expert)
NOAA/Northeast Fisheries Science
Centre
166 Water Street
Woods Hole, MA, 02543-1026
USA
marjorie.lyssikatos@noaa.gov

Heleen Middel (NAMMCO Secretariat)
(Interim) Scientific Secretary
PO Box 6453
N-9294 Tromsø
Norway
heleen@nammco.org

Bjarni Mikkelsen (FO, NAMMCO SC Chair)
Faroe Marine Research Institute
Nóatún 1
FO-100 Tórshavn
Faroe Islands
bjarnim@hav.fo

Kimberly Murray (Chair, Invited Expert)
NOAA/Northeast Fisheries Science Centre
166 Water Street
Woods Hole, MA, 02543-1026
USA
kimberly.murray@noaa.gov

Simon Northridge (Invited Expert)
Scottish Oceans Institute
University of St Andrews
Institiud Chuantan na h-Alba
Gatty Marine Laboratory
East Sands St Andrews
KY16 8LB Scotland
United Kingdom
spn1@st-andrews.ac.uk

Guðjón Sigurdsson (IS, SC)
Marine and Freshwater Research Institute
Fornubúðir 5
IS-220 Hafnarfjörður
Iceland
gudjon.mar.sigurdsson@hafogvatn.is

Azin Vedadi (Master student)
Norwegian Centre for the Law of the Sea
UiT The Arctic University of Norway
P.O. Box 6050 Langnes
NO-9037 Tromsø
Norway
azinvedadi@gmail.com

APPENDIX 2: AGENDA

1. **Welcome from the Chair**

2. **Adoption of agenda**

3. **Appointment of rapporteurs**

4. **Review of available documents**

5. **Risk assessment for all fisheries**
   5.1 Purpose for risk assessment
   5.2 Overview from ICES WGBYC risk assessment
   5.3 Other examples of marine mammal by-catch risk assessment
   5.4 Information requirements for the MMPA Import Rule
   5.5 Ways forward (incl. data and time availability)

6. **By-catch data challenges**
   6.1 Logbook underreporting
   6.2 Tier Classification System by NOAA
   6.3 Alternative way of estimating by-catch

7. **Recommendations**
   7.1 Recommendations for research from this WG
   7.2 Recommendations for conservation and management from this WG

8. **Other business**

9. **Adoption of report**

10. **Next meeting**

For information:

Terms of Reference of the Scientific Committee By-catch Working Group established by SC 21:

   1. Identify all fisheries with potential by-catch of marine mammals

   2. Review and evaluate current by-catch estimates for marine mammals inNAMMCO countries.
   3. If necessary, provide advice on improved data collection and estimationmethods to obtain best estimates of total by-catch over time

Specific topics/tasks for the BYCWG meeting in 2022 include:

- Assess the overall risk of by-catch in the fisheries in the waters of NAMMCO member countries.

APPENDIX 3: LIST OF DOCUMENTS

Working Documents

Doc. No.	Title	Agenda item
SC/29/BYCWG/01	Draft Agenda	2
SC/29/BYCWG/02	Draft List of Participants	1
SC/29/BYCWG/03	Draft List of Documents	4
SC/29/BYCWG/04	Elnes, J.O., Moan, A., Nilssen, K.T., Vøllestad, A., Bjørge, A. Tempo-spatial distribution of harbour seal *Phoca vitulina* risks of entanglement in gillnets at the Norwegian coast	5.3

For Information Documents

Doc. No.	Title	Agenda item
SC/29/BYCWG/FI01	Report of NAMMCO Scientific Committee Working Group on By-Catch – October 2021	Several
SC/29/BYCWG/FI02	ICES (2021): Working Group on By-catch of Protected Species (WGBYC). ICES Scientific Reports. Report. https://doi.org/10.17895/ices.pub.9256	5.2
SC/29/BYCWG/FI03	Verutes, G.M., Johnson, A.F., Caillat, M., Ponnampalam, L.S., Peter, C., Vu, L., et al. (2020) Using GIS and stakeholder involvement to innovate marine mammal by-catch risk assessment in data limited fisheries. PLoS ONE 15(8): e0237835	5.3
SC/29/BYCWG/FI04	Hines, E. et al. (2020). Getting to the bottom of by-catch: a GIS-based toolbox to assess the risk of marine mammal by-catch. *Endangered Species Research*, 42, 37-57.	5.3
SC/29/BYCWG/FI05	Basran, C. J., & Sigurðsson, G. M. (2021). Using Case Studies to Investigate Cetacean By-catch/Interaction Under-Reporting in Countries With Reporting Legislation. Frontiers in Marine Science, 8.	6.1
SC/29/BYCWG/FI06	Benaka, L. R., Chan, A. N., Kennelly, S. J., & Olsen, N. A. (2021). Using a tier classification system to evaluate the quality of by-catch estimates from fisheries. Reviews in Fish Biology and Fisheries, 31(3), 737-752.	6.2
SC/29/BYCWG/FI07	Punt, A.E. et al. (2021). Can we manage marine mammal by-catch effectively in low-data environments? *Journal of Applied Ecology*, 58(3), 596-607.	6.3
SC/29/BYCWG/FI08	Punt, A.E. et al. (2020). Evaluating management strategies for marine mammal populations: an example for multiple species and multiple fishing sectors in	6.3

	Iceland. *Canadian Journal of Fisheries and Aquatic Sciences,* 77(8), 1316-1331.	
SC/29/BYCWG/FI09	Punt, A.E. et al. (2021). Assessing pinniped by-catch mortality with uncertainty in abundance and post-release mortality: A case study from Chile*. Fisheries Research*, 235, 105816.	6.3
SC/29/BYCWG/FI10	Punt, A.E. et al. (2020). Robustness of potential biological removal to monitoring, environmental, and management uncertainties*. ICES Journal of Marine Science* 77(7-8), 2491-2507.	6.3
SC/29/BYCWG/FI11	Bjørge, A., Moan, A., Ryeng, K.A., Wiig, J.R. (2021). Estimates of humpback, minke, and killer whale fishing gear interactions in Norwegian fisheries suggest low anthropogenic mortality – IWC/SC/68C/HIM/13	5
SC/29/BYCWG/FI12	Manlik, O., Lacy, R.C., Sherwin, W.B., Finn, H., Loneragan, N.R., Allen, S.J. (2022). A stochastic model for estimating sustainable limits to wildlife mortality in a changing world.	