ICELAND

PROGRESS REPORT ON MARINE MAMMALS IN 2024

Compiled by Sandra M. Granquist, Valerie Chosson, Sverrir D. Halldórsson, Dunja Jusufovski, Christophe Pampoulie, and Guðjón M. Sigurðsson.

Marine and Freshwater Research Institute (MFRI), Hafnarfjörður, Iceland

I INTRODUCTION

The following is a summary of research on marine mammals in Icelandic and adjacent waters in 2024. The studies were conducted by the following research institutes: Marine and Freshwater Research Institute (MFRI), Husavik Research Centre (HRC), Westman Island Research Centre (WIRC), Husavik Whale Museum (HWM), Keldur, Institute for Experimental Pathology (KIEP), The National University Hospital of Iceland, The Icelandic Institute of Natural History (INH), University of Iceland (UI), University of British Columbia in Canada, University of Barcelona in Spain, University of St Andrews in Scotland, The Icelandic Seal Center (ISC), Holar University College, Natural History Museum of Denmark, The Faroese Marine Research Institute, The Institute of Marine Research of Norway, Maine University, College of the Atlantic – Allied whale in Maine, University of Aarhus, University of Copenhagen, RIF research center, Northwest Iceland Nature Research Centre, West Iceland Nature Research Centre, Orca Guardians Iceland (OGI), Greenland Institute of Natural Resources and University of Potsdam. Queries for information on research were sent to all offices, individuals and private commercial platforms such as whaling and whale watching companies known to have been involved in marine mammal research or data collection during the period.

II RESEARCH BY SPECIES 2024

CETACEANS

Fin whale

Studies continued at the MFRI on the biology and ecology of fin whales based on data from commercial catches in 2023 and recent years even though no whales were caught in the 2024 season. Fin whale research conducted at the whaling station in Hvalfjörður is wide ranging and includes e.g. studies on age, reproduction, feeding ecology, energetics, pollutants, genetics, hybridization, anatomy and physiology and involves several research institutions including the University of Iceland, the National University Hospital of Iceland, University of British Columbia in Canada, University of Barcelona and Keldur, Institute for Experimental Pathology. In 2024, ear plugs collected from fin whales in Hvalfjordur were the basis for a new study that validated the use of ear plugs for age determination using radiocarbon methods (Campana et al. 2024). One study used chemical methods to infer the feeding ecology of fin whales. Stable isotope analysis on samples from the baleen of fin whales caught off Iceland revealed some climate-driven behavioural shifts in the distribution and feeding ecology of the whales (Ruiz-Sagalés et al. 2024). The HRC continued work on their fin whale identification in 2024.

Common minke whale

Collaboration between the MFRI and the University of Potsdam on common minke whale genetic research continued during 2024. Population genetics analyses across the entire North

Atlantic were finalized, including samples from Iceland, Greenland, Canada, and the North Sea, while analysis of Norwegian samples is underway. Using the double digest restriction-site associated DNA sequencing (ddRAD) technology over 50,000 new nuclear Single Nucletide Polymorphisms (SNPs) have been developed for 45 North Atlantic minke whales, including 8 samples from Iceland. Further SNPs are currently developed by Whole Genome Resequencing of a representative set of minke whales. These SNPs will form the basis for the development of an informative minke whale SNP panel for population structure assessment across the entire North Atlantic. The HRC continued their long-term photo-identification of minke whales which included student interns assisting with the creation of an updated catalogue through 2024 and a bachelor thesis student analyzing re-sightings and sightings per unit effort over the past 5 years whales.

Blue whale

The HRC continued their long-term photo-identification and sightings studies of blue whales in Skjálfandi Bay and acoustic data was analyzed to investigate the impact of a seismic survey on blue whale calling behaviour.

Humpback whale

The MFRI's long-term humpback tagging program continued in 2024. The MFRI continued their photo-identification studies and the development of the national humpback whale photo-id database (ISMN Catalogue): https://www.hafogvatn.is/en/research/whale-research/whale-photo-id. This Catalogue is a product of a national collaboration with various contributors, including Universities, whale watching companies, citizen scientists, and dedicated surveys conducted by MFRI. The ISMN catalogue has 1641 unique individuals seen in Icelandic waters (90 of these have also been reported in locations outside of Iceland). Additionally, the ISMN Database also includes 1453 individuals from various international partners (Guadeloupe , Norway, Azores, Ireland, Scotland, Capo Verde , Bermuda/Samana Bay and Greenland. Two papers were published that reported on the migration patterns of humpbacks using photo-id methods. One reports the use of scar from killer whale, on humpback whale fluke to assess their distribution in the North Atlantic (Koilpillai et al. 2024) and the second one reports the first record of movement for an humpback whale individual between the Cabo Verde Islands and the western Greenland feeding ground (Chosson et al. 2024) . Long-term research on humpback whale winter occurrence in Iceland, which started in 2019, continued in 202. The4 study is a collaboration between the University of Iceland, MFRI, University of Barcelona and the University of St. Andrews. Analysis on underwater kinematics and breathing behaviour, skin isotope ratio and blubber endocrinology were done in 2024. A study on diving behaviour and breathing rate of humpback whales during the winter was completed as an MSc thesis. A special effort has been made in comparing the ISMN Catalogue to the North Atlantic Humpback Whale Catalogue (NAHWC) in collaboration with the College of the Atlantic – Allied whale, especially regarding the known breeding grounds population. The HRC continued their long-term photo-identification, sightings and behaviour studies of humpback whales in Skjalfandi Bay. An internship student used this data to analyze humpback whale social structure, while a bachelor student used this data to investigate the observed behaviour of humpback whales and how boat presence may be impacting it. The long-term project on factors affecting humpback whale vocalization rate in Skjalfandi Bay continued in 2024 with a a master's student analyzing past acoustic recording data and the influence of changing daylight and number of whales present. A master's student continued to conduct a biopsy study where kinship of the humpback whales in Skjalfandi Bay is being investigated. Tagging of humpback whales using

CATS tags began at HRC in 2024 for a post-doctoral project investigating humpback whale behaviour in response to entanglement deterrent devices. A master's student is analyzing some of the tag data to compare humpback whale active versus resting behaviour patterns. A master's student also began analyzing entanglement scarring on humpback whales from both drone and boat-based images taken in Skjálfandi Bay as part of the "Scars from Above" project collaboration between HRC and British charity Whale Wise. The WIRC continued studies during the wintertime with humpback whales including photoidentification mainly from land, many of which are contributed by citizen scientists, and sound recordings. The work with passive acoustic monitoring conducted in Vestmannaeyjar resulted in a publication focusing on year-round detections of humpback whales in this region (Chicco et al. 2024). This research helps us better understand the importance of this area for humpback whales. In addition, during the summer, the UI in Vestmannaeyjar conducted photoidentification and tagging studies using suction cup tags (Dtags). Finally, photo-identification data was also collected in Ísafjörður in early September during a field trip as part of a taught course with the University Centre of the Westfjords. The photo-ID data was shared with the Icelandic Humpback Whale catalogue curated by MFRI.

Ongoing research on subarctic humpback whale behavioural ecology called "Icelandic Winter Whales" at the UI continued. Biopsy samples of epidermis and dermis tissue including blubber of life individuals were collected and analysed to investigate the genetics, isotope niche and endocrinology of humpback whales in Iceland. The isotope research is done in collaboration with MFRI and University of Barcelona. The genetic study is done in collaboration with the University of Gronigen and MFRI. The endocrinology study is done in collaboration with the University of St Andrews and MFRI. Behavioural data has also been collected using suction cup digital archival tags and catcam tags, with images and videos from UAVs, from land-based stations and photo-ID data from vessels. Data has been collected in Faxafloi (SW-Iceland), Steingrimsfjordur and Isafjardardjup (Westfiords of Iceland), Eyjafjordur and Skjalfandafloi (NE-Iceland). The photo-ID data has been shared with the Icelandic Humpback Whale catalogue curated by MFRI. A master student is using tag and land-based data to investigate the energy use of humpback whales in the wintertime.

HCC is part of the e-whale project (e-whale.eu) for that we have sampled water samples of the fluke print of humpback whales. This was done partly from North Sailing whale watching vessel and from their small research boat.

Killer whale

In 2024, the UI and the Icelandic Orca Project conducted a field season in Vestmannaeyjar during June, July and August, continuing the long-term project on killer whales started in 2008. The current focus of the project is to investigate dietary specialization on killer whales, to observe interspecific interactions with pilot whales and to investigate the acoustic behaviour of killer whales. Photo-identification, biopsy sampling and tagging with Dtags was conducted during the summer field season. Land-based observations also allowed for broader monitoring of variations in the occurrence of killer whales and other cetaceans in the local marine ecosystem. One Masters students completed their thesis on killer whale acoustic communication. A former Masters student from UI concluded a research project on killer whale detections using passive acoustic monitoring that resulted in a publication in the journal Marine Mammal Science (Bellon et al. 2024).

In 2024, the West Iceland Nature Research Centre and Orca Guardians Iceland continued their collaboration and year-round systematic data collection on killer whales via photo-identification and behavioral observations in Breidafjordur Bay and along the Snafellsnes Peninsula. The focus is on recognizing individual killer whales and documenting their associations and travel routes. Efforts of comparing identification images of killer whales from Iceland to photographs received from collaborators in other areas of the North Atlantic are ongoing. Data collection and analysis will potentially aid in identifying critical habitat, feeding behavior and prey types, as well as natural mortality and behavioral patterns of Icelandic killer whales. The project started in 2014 in collaboration with Laki Tours whale watching and is conducted both onboard whale watching vessels and via land-based observations.

Northern bottlenose whale

As part of the Hypmo project, University of Iceland's WIRC continued its analyses of photographic and sightings data to understand individual movement and site fidelity, group compositions, and age-sex distributions in the Nordic Seas. A MSc thesis was published on bottlenose whale movements between Iceland and Jan Mayen based on manual and artificial intelligence-aided approaches for photo-identification (Niessen, 2024). Analyses of satellite telemetry and passive acoustic data to study patterns in occurrence and long-distance movements also continued (see conference presentations by Haas et al. and Wensveen et al.). A comparative study of rapid click trains describing signals likely used for communication (rasps') based on Dtags was accepted for publication in Bioacoustics (Haas, in press). WIRC and MFRI are investigating movement and diet of NBWs using a long-term data set of stomach contents (squid beaks) and stable isotopes from stranded individuals. HRC continued to collect photo-identification and sightings data on northern bottlenose whales that have frequented Skjalfandi bay in recent summers.

Long-finned pilot whale

A comprehensive research project on pilot whales that started in 2019 continued compiling photo-identifications, studying their behaviour in Vestmannaeyjar during interactions with killer whales and investigating the ecology of pilot whales through stable isotopes of carbon and nitrogen. The project aims to gather knowledge on this species in Iceland, such as understanding its occurrence in Icelandic coastal waters, their prey and whether that has changed in recent times. The project is conducted by UI in collaboration with MFRI. The project resulted in one publication in the journal Marine Ecology Progress Series (Samarra et al. 2024).

In 2024, efforts on data collection for long-finned pilot whales, conducted since 2019 by Orca Guardians Iceland and the West Iceland Nature Research Centre, and onboard Laki Tours, continued in Breidafjordur Bay and along the Snafellsnes Peninsula. The emphasis is on photoidentification and behavioral observations, with special attention to killer whale – pilot whale interactions, to aid in the understanding of pilot whale behavior and occurrence in the waters of West Iceland, and to potentially identify critical habitat for this species. In 2023, the West Iceland Nature Research Centre and Orca Guardians Iceland published a short note on the observation of a killer whale female with a pilot whale calf.

White-beaked dolphins

HRC continued their long-term photo-identification and sightings studies of white-beaked dolphins in Skjalfandi bay. Two master students were using the data, one from University of the Westfjords and one enrolled at University of Copenhagen. One master student compared the

photo-identification pictures from different regions in Iceland to look at movements within Iceland. MFRI participated in a large-scale genetic study on the population structure of white-beaked dolphins in the North Atlantic (Gose et al. 2024).

Harbour porpoise

Collaboration between the MFRI and the University of Potsdam on harbour porpoise genetic research is ongoing (Lah et al. 2016), where samples of bycaught and stranded animals are used. New analyses on nuclear SNPs have been performed on 150 harbour porpoise specimens from the North Atlantic, including 12 specimens from Iceland. These analyses yielded 26,320 informative SNPs which were used for population structure assessment across the entire North Atlantic. The results show Icelandic harbour porpoises to be part of a large North Atlantic population, yet there is some indication for isolation-by-distance across the North Atlantic. The results have been published in Conservation Genetics (Autenrieth et al. 2024). Genes of the adaptive immune system (MHCII) have been analyzed in 94 Harbour porpoises across the North Atlantic, adjacent waters, and the Black Sea, including 5 samples from Iceland. These results have been compiled in a manuscript which is currently in revision in Molecular Ecology (Celemín et al., in revision). Efforts to estimate bycatch of harbour porpoises in fisheries continued at the MFRI. HRC deployed C-PODS as part of a PhD project in Skjalfandi Bay. Harbour porpoise diet study has been re-initiated and 9 bycaught harbour porpoise were necropsied in 2024. Stomach content analyses were performed, and stable isotope ratio analyses are currently on-going in collaboration with the University of Barcelona.

Other (multi) cetacean species

A total of 11 stranding events of cetacean were recorded by the MFRI. Northern bottlenose whales and other toothed whales are of interest in two ongoing EU projects (SUMMER and MESO) on the ecology and potential utilization of resources of the mesopelagic zone which the MFRI is a part of. The HRC is partner in a Biodiversa funded EU-project called e-Whale and has taken water samples for environmental DNA (E-DNA) analyses. A master's student from the University Centre of the Westfjords, working in collaboration with the HRC and Ocean Missions NGO, investigated the theoretical direct ingestion of microplastics by baleen whales in Skjalfandi bay. The MinTag project, which is a collaboration within NAMMCO that aims to develop tags to be able to track large and fast swimming whale species (fin whale and mike whales) continued and deployment of 1 tag into a minke whale took place in Eyjafjörður in September 2024. A postdoctoral study was funded by the Faroese Research council and has started in 2024. The objective is to develop reference genome for three species: the white-sided dolphin, white-beaked dolphin and the long-finned pilot whale. The work is done in collaboration with Iceland, Greenland, Faroese Islands, Denmark and Norway.

Work on analysis of the NASS2024 cetacean survey is ongoing, and will continue in 2025.

PINNIPEDS

Harbour seals

No new harbour seal census has been conducted in Iceland since 2020, when the population size was estimated to 10,319 (CI 95%= 6.733-13.906) (Granquist, 2022). A partial population estimate is planned by MFRI for 2025. The survey will be based on drone photography instead of manned single engine airplanes, since such surveys pose a large risk under Icelandic

conditions (harsh weather, narrow bays, steep mountains and open waters). Efforts are made by MFRI and ISC to improve knowledge on population demographics and factors contributing to mortality and/or affecting the status of the population. Long term monitoring of timing of pupping period and monitoring of local pup production at important sites in Northwest Iceland, South Iceland and Northeast Iceland was initiated in 2009 and continued during 2024. A new project was initiated in 2018, where haul-out behaviour was monitored by using trail cameras. The results from the project will increase knowledge on factors affecting haul-out behaviour and will assist in improving census design. Analysis and manuscript preparation continued during 2024. Efforts to estimate bycatch of harbour seals in fisheries and research on mitigation methods continued by MFRI and the Directorate of Fisheries and a technical report with new bycatch estimates in the lumpsucker fishery was published in 2024 (MFRI, 2024). A study on the effect of land- and boat-based tourism on harbour seals was initiated by ISC and MFRI in 2008 and continued during 2024. The study is carried out in several areas of Iceland including important haul-out sites in Northwest Iceland and the Westfjords and focuses on how anthropogenic disturbance impact the spatial and behavioural haul-out patterns of harbour seals. Further, interdisciplinary research on how to reduce potential impacts, best practice on management of seal watching and development of an ethical framework continued. Two citizen science projects where volunteers take part in seal counting in specific areas continued in 2024. The projects are in co-operation between MFRI, ISC, Youth for arctic nature (YAN) and various landowners. The aim of these projects is to educate about seal conservation issues and to increase the understanding of the importance of seal research. A project in collaboration between MFRI, ISC and HRC investigating harbour seal pup growth using drones continued during the year.

Grey seals

A new population estimate for the Icelandic grey seal population, based an aerial census carried out by MFRI in cooperation with ISC during the pupping period in 2022 was published in 2024. The total pup production was estimated to be 1551 pups (95% CI= 1486-1613). Based on the pup production, the total grey seal population size was estimated to be 6697 animals (95% CI = 5576-7841). The population was approximately 27% smaller than when the first census was conducted in 1982 and corresponds to an increase of 6.8% since the census in 2017. However, trend analysis for the period 2005–2022 revealed no statistically significant trend for the total population size. As for the harbour seal census, the grey seal survey will in the future be based on drone photography instead of manned single engine airplanes. A test survey was carried out during 2023, where drones were used to census important grey seal breeding areas.

Monitoring of the effect of grey seals and seabirds on plant succession on the volcanic island Surtsey in the southern archipelago of Iceland carried out in cooperation with the MFRI, ISC and Icelandic Institute of Natural History will continue the following years.

A study of grey seal genetics was initiated in 2016, in cooperation between MFRI, ISC, the Natural history museum of Denmark and Main University, and a paper is under review (McCarthy, et al 2024).

Efforts to estimate bycatch of grey seals in fisheries and research on mitigation methods continued by MFRI and the Directorate of Fisheries.

Other (multi) pinniped species

A project investigating environmental toxicants in pinnipeds in Icelandic waters was initiated in 2017 and continued during 2024. The project is an international cooperation between The Swedish Museum of Natural History, Stockholm University, Greenland Institute of Natural Resources and MFRI.

III ONGOING (CURRENT) RESEARCH

Pinnipeds

A partial harbour seal census is planned in 2025. The survey will be based on drone photography instead of manned single engine airplanes.

Cetaceans

The HRC will begin an entanglement mitigation project in 2024 where they will attach suction cup tags to humpback whales and conduct "whale pinger" behavioural response experiments.

The MFRI will continue work on mitigation measures for bycatch of small cetaceans in gillnets as part of the EU Life funded CIBBRiNA project. They will also start working on bycatch risk assessments for selected marine mammals as part of the EU Horizon funded Marine Beacon project.

IV ADVICE GIVEN AND MANAGEMENT MEASURES TAKEN

Cetaceans

Based on assessments conducted by the Scientific Committees of NAMMCO and the IWC, the MFRI recommended in 2017 that annual catches in 2018-2025 do not exceed 161 fin whales on the East Greenland – West Iceland management area and 48 fin whales in the East Iceland-Faroes management area. On the same basis the MFRI recommended in 2018 maximum annual takes of 217 common minke whales in the Icelandic continental shelf (CIC) area during 2018-2025. In 2019, Icelandic authorities issued a regulation on catch limits according to this advice for the period 2019-2025 (annual catch of 161 fin whales and 217 common minke whales). In 2023, 25 fin whales were caught in Icelandic waters, but no minke whales were caught.

Pinnipeds

Preparatory work with initiating an exhaustive management plan for pinnipeds in Iceland will continue 2025. In 2019, a seal hunting ban was enacted. However, seal hunters can be granted exemption from this ban from the Directorate of Fisheries, to hunt seals for own utilization while the hunt in considered sustainable. The current governmental management objective from 2006 states that the Icelandic harbour seal population should be kept above 12.000 animals. Based on the population assessment carried out in 2020 which resulted in an estimated population size of 10.319 animals, MFRI advised that direct hunt should be limited and that actions must be taken to reduce by-catch of seals in commercial fisheries to enable the population size to reach management objective. MFRI further advised that attempts to minimize anthropogenic disturbance of harbour seal colonies are initiated, in particular during breeding and moulting seasons between May and August. A new partial population estimate is planned for 2025.

The current governmental management objective from 2006 states that the Icelandic grey seal population size should be kept above 4100 animals.

New advice for the Icelandic pinniped populations will be released after the new pinniped population management plans have been finalized.

V PUBLICATIONS AND DOCUMENTS

Peer-reviewed publications in 2024

Bellon G, Wensveen PJ, Rasmussen M, Laute A, Mouy X, Selbmann A and Samarra FIP (2024). Killer whale (*Orcinus orca*) occurrence in Icelandic waters and potential connectivity with Norway revealed by passive acoustic monitoring. Marine Mammal Science doi: 10.1111/mms.13211

Campana, S.E., Finnsdottir S. V., & Sigurdsson, G. M. (2024). Bomb radiocarbon determines absolute age of adult fin whales, and validates use of earplug growth bands for age determination. *Front. Mar. Sci*. 11:1327752. doi: 10.3389/fmars.2024.1327752

Celemín E, Gusev N, Domínguez M, Havenstein K, Berggren P, Heide-Jørgensen MP, Lesage V, Lockyer C, Pampoulie C, Pawliczka I, Roos A, Siebert U, Sigurðsson G, Öztürk A, Öztürk B, Tiedemann R (in revision) Evolution and organization of MHC II genes in Harbour porpoises: insights from long-read cetacean genome assemblies, whole genome re-sequencing and locus-specific genotyping. Molecular Ecology, in revision, preprint available at https://www.authorea.com/users/566979/articles/1217756.

Chicco C, Papale E, Wensveen PJ, Mouy X and Samarra FIP (2024). Seasonal acoustic occurrence and behaviour of humpback whales (*Megaptera novaeangliae*) in southern Iceland. Marine Mammal Science doi: 10.1111/mms.13198

Chosson, V., Wyss, V., Jann, B., Wenzel, F. W., Sigurðsson, G. M., Simon, M., Hansen, R. G., Jones, L. S. (2024). First documented movement of a humpback whale between the Cape Verde Islands and West Greenland. Ecology and Evolution, 14, e11152.

Gose, M. A., Humble, E., Brownlow, A. et al. (2024). Population genomics of the white-beaked dolphin (Lagenorhynchus albirostris): Implications for conservation amid climate-driven range shifts. *Heredity*, 1-10. https://doi.org/10.1038/s41437-024-00672-7

Granquist, S. M. 2024. Population estimate of grey seals (Halichoerus grypus) in Iceland 2022 [Stofnstærðarmat á útsel (Halichoerus grypus) við Ísland árið 2022] (HV 2024-43). Reykjavík: Marine and Freshwater Research Institute.

Koilpillai, H. A., Basran, C. J., Berrow, S., Broms, F., Chosson, V., Gowans, S., Jones, L. S., Kempen, R., López-Suárez, P., Magnúsdóttir, E., Massett, N., Prince, K., Rasmussen, M. H., Robbins, J., Sears, R., Simard, P., Simon, M., Whooley, P., & Wenzel, F. W. (2024). Geographic distribution of North Atlantic humpback whales (Megaptera novaeangliae) with fluke scars caused by killer whales (Orcinus orca). Aquatic Mammals, 50(4), 342-351. https://doi.org/10.1578/AM.50.4.2024.342

McCarthy, M., Cammen, K., Granquist, S., Dietz, R., Teilmann, J., Thøstesen, C., ... & Olsen, M. T. (2024). Range-wide population structure and recent evolutionary history of the grey seal. Pre-print DOI: 10.22541/au.173400685.52876660/v1

MFRI 2024. Meðafli fugal og sjávarspendýra í grásleppuveum árin 2020-2023. Technical report. https://www.hafogvatn.is/static/extras/images/taekniskyrsla-medafli-fugla-og-spendyra-i-grasleppuveidum-20231429811.pdf

Ryan Charles, Niall McGinty, Marianne H Rasmussen, Chiara G Bertulli (under review) Key cetacean feeding habitats identified in Iceland: a multi-model ensemble approach using opportunistic behavioural and ecogeographical data. Ethology Ecology & Evolution.

Ruiz-Sagalés, M., García-Vernet, R., Sanchez-Espigares, J., Halldórsson, S.D., Chosson, V., Sigurdsson, G.M., Vighi, M., Lloret-Cabot, R., Borrel, A., Aguilar, A (2024). Baleen stable isotopes reveal climate-driven behavioural shifts in North Atlantic fin whales. Science of the Total Environment 177164. https://doi.org/10.1016/j.scitotenv.2024.177164

Samarra FIP, Borrell A, Selbmann A, Chosson V, Chicco C, Haas CE, Basran CJ, Smith A, Ovide BG, Einarsson GÞ, Halldórson SD, O'Brien ES, Eleman A, Sigurðsson GM and Aguilar A (2024). Carbon and nitrogen stable isotopes of long-finned pilot whales (*Globicephala melas*) stranded in Iceland. Marine Ecology Progress Series 748: 163-174

Thesis (PhD, MS)

Mauro, N. 2024. Environmental and anthropogenic factors influencing the conservation of seal populations in Iceland. Master thesis, Université catholique de Louvain (UCLouvain)

Lau, C. 2024. Assessing the Impact of Climate Change on Harbor Seals Haul-out Sites Suitability in Iceland using IPCC CMIP6 models. Bachelor thesis, University center of the Westfjords, Iceland (SIT Semester Program).

Dorn, L. (2024). Behavioural context of biphonic call production in Icelandic killer whales (*Orcinus orca*). Master thesis in Developmental, Neural, and Behavioural Biology, University of Göttingen, Germany.

Niessen, S (2024). Assessing movements of northern bottlenose whales north of Iceland using manual and artificial intelligence-aided approaches for photo-identification. MSc thesis in Freshwater and Marine Biology, University of Amsterdam, the Netherlands.

Poster/ Conference abstracts/unpublished reports

Jakobsdóttir, H. Randhawa, H., dos Santos, E. and Granquist, S. M. Effect of wildlife-tourism on behaviour and spatial distribution of harbour seals (*Phoca vitulina*) estimated based on trail camera photos. The annual meeting of the Icelandic Ecological Society 2024. 5 April 2024, Reykjavík, Iceland.

Granquist, M. (2024, May 17). Monitoring the Icelandic Seal Populations: Research carried out by the ISC Seal Research Department in cooperation with Marine and Freshwater Research Institute. [Conference presentation]. Icelandic Seal Center Symposium on nature research, Hvammstangi, Iceland.

Lau, C. and Granquist, S.M. (2024, May 17). Impact of climate change on harbour seal haul-out patterns- Predictions using CMIP6 models. [Conference presentation]. Icelandic Seal Center Symposium on nature research, Hvammstangi, Iceland.

Poldner, A., Henneman, J., Glarou, M., Rasmussen, M. And Granquist, S. M. (2024, May 17). Estimating growth in Icelandic harbour seal pups (Phoca vitulina) using aerial photogrammetry. [Conference presentation]. Icelandic Seal Center Symposium on nature research, Hvammstangi, Iceland.

Collaboration towards seal citizen science and education in Snæfellsnes: pilot project and future prospectives. [Conference presentation]. Icelandic Seal Center Symposium on nature research, Hvammstangi, Iceland.

Baumgartner C, Jourdain E, Bonhoeffer S, Borgå K, Heide-Jørgensen MP, Karoliussen R, Laine J, Rosing-Asvid A, Ruus A, Tavares S, Ugarte F, Samarra FIP, Foote AD (2024) Ecological and spatial correlates in a metapopulation of North Atlantic killer whales. 35th Annual Conference of the European Cetacean Society, Catania, Italy, 10-12th April 2024 (oral)

Kagerer, P, Dutro, M & Wensveen, PJ (2024). Passive acoustic monitoring provides first insights into the behaviour of sperm whales off eastern Iceland. Cachalote Consortium Workshop 2024, Society for Marine Mammology Conference, Perth, Australia. (oral presentation)

Haas, C, Wensveen, P, Hooker, S & Miller, P (2024). Characteristics and functionality of northern bottlenose whales' (*Hyperoodon ampullatus*) buzzes and rasps. 25th Biennial Conference on the Biology of Marine Mammals, Perth, Australia. (oral presentation)

Haas, CE, Miller, PJO, Hooker, SK, Svavarsson, J & Wensveen, PJ (2024). Using passive acoustic monitoring to investigate northern bottlenose whale (*Hyperoodon ampullatus*) migration theories within the eastern North Atlantic. The biannual Detection, Classification, Localisation and Density Estimation (DCLDE) of Marine Mammals Workshop, Rotterdam, the Netherlands. (speed talk and poster)

Wensveen, PJ, Neubarth, BK, Miller, PJO & Svavarsson, J (2024). Satellite tagging of northern bottlenose whales off Iceland documents long-distance movements. 8th International Bio-logging Science Symposium, Tokyo, Japan. (poster)

VI APPENDIX 1 - CATCH DATA

Catch data for pinnipeds are under re-evaluation and should not be considered reliable at this stage.

VII APPENDIX 2 - BY-CATCH DATA

a. Short narrative

Bycatch of marine mammals was monitored in all major fisheries in Icelandic waters in 2024, through logbook submissions, reports from onboard inspectors from the Directorate of Fisheries and in the MFRI annual gillnet survey. By-catch in research surveys and when observed by inspectors on fisheries vessels is reported in Appendix 2. By-catch by fishermen now comes from electronic logbooks only. It should be noted that reported numbers of by-catch is underrepresented to an uncertain extent and hence numbers should not be regarded as reliable. There may be some overlap in the by-catch reported by fishermen and reports from the inspection. Numbers are given as requested in a separate sheet.

VIII APPENDIX 3 - STRANDINGS

a. Short narrative

According to the Icelandic stranding protocol, the MFRI is responsible for documentation and biological investigations related to cetacean standings. Therefore, all strandings should be

reported to the MFRI, that subsequently organizes autopsies and/or biological sampling depending on circumstances. Genetic samples are stored in the genetic database at the institute and other biological samples stored at the MFRI or sent to cooperating institutes/scientists. Live-strandings and associated actions (rescue/euthanasia etc) are managed by the Veterinary Authorities (MAST). Stranding numbers for 2024 are given as requested in a separate sheet. No systematic records are kept of pinniped strandings at the MFRI.