

ICELAND PROGRESS REPORT ON MARINE MAMMALS IN 2019

Compiled by, Sandra M. Granquist, Þorvaldur Gunnlaugsson, Sverrir D. Halldórsson and Gísli A. Víkingsson

Marine and Freshwater Research Institute (MFRI), Reykjavík Iceland

I INTRODUCTION

The following text reports on studies on marine mammals in Icelandic and adjacent waters in 2019. The studies were conducted by the following research institutes: Marine and Freshwater Research Institute, Reykjavík, Húsavík Research Centre (HRC), Húsavík Whale Museum (HWM); Faxaflói Cetacean Research project (FCR), Innovation Centre, Iceland (ICI); Keldur, Institute for Experimental Pathology (KIEP); The National University Hospital of Iceland; The 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, Icelandic Seal Center (ISC), BioPol, Hólar University Collage, the University of Stockholm, Natural History Museum of Sweden, Natural History Museum of Denmark, Maine University and University of Aarhus, Denmark, 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 2019

Fin whale

Studies continued at the MFRI on the biology and ecology of fin whales based on data from commercial catches in recent years. Fin whale research conducted at the whaling station in Hvalfjörður is wide ranging and includes i.a studies on age, reproduction, feeding ecology, energetics, pollutants, genetics, hybridization, anatomy and physiology and involves several research institutions including the National University Hospital of Iceland, University of British Columbia in Canada, University of Barcelona in Spain, Innovation Centre, Iceland and Keldur, Institute for Experimental Pathology.

Common minke whale

Genetic analyses have been completed for all common minke whale samples received until end of 2018. The dataset encompasses now 737 specimens from Iceland typed at 16 microsatellites and the mitochondrial control region. This data has been analyzed regarding affinity of Icelandic minke whales to other regions of the North Atlantic in an IWC context, i.e., 2014 for the Icelandic RMP implementation review and 2018 for the Greenlandic AWMP implementation review. Microsatellite data are currently used to infer Parent-Offspring (PO) pairs which will inform about regional and ocean-wide movements. Final analyses are to be performed in 2020.

New nuclear Single Nucleotide Polymorphisms (SNPs) have been developed using the ddRAD protocol. Initial analyses were performed on 4 specimens from the North Atlantic, including 2 specimens from Iceland. These analyses yielded 30,861 informative SNPs, of which 20,682 were shared among all specimens. 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 in Húsavík continued their long-term photo-identification and sightings studies of minke whales.

Blue whale

The HRC in Húsavík continued their long-term photo-identification and sightings studies of blue whales in Skjálfandi bay. Acoustic tags were deployed on two blue whales in Skjálfandi Bay and playbacks with low frequency sounds to blue whales.

Humpback whale

Humpback whales were the primary species of a whale observation effort during ecosystem surveys focused on capelin in 2019. The abundance of capelin was low but as in previous years the humpback whales were concentrated in the area where capelin was detected. The MFRI's long-term tagging program continued in 2019. Ten humpback whales were instrumented with satellite tags in Icelandic and adjacent waters in 2019 as a part of the program and additional nine Limpet tags were deployed by Jake Levenson and coworker. The MFRI continued their photo-identification studies and the development of the national humpback whale photo-id database (ISMN Catalog for: ISland Megaptera Novaeangliae Catalog): <https://www.hafogvatn.is/en/research/whale-research/whale-photo-id> Today the ISMN catalog records over 1050 unique individuals seen in Icelandic water, as well as individual from partner's catalog, such are Guadeloupe (500), Norway (880), Azores (70), Irish (60), and Greenland (20)

The HRC in Húsavík continued their long-term photo-identification and sightings studies of humpback whales in Skjálfandi bay.

A PhD. project on humpback whale (*Megaptera novaeanglie*) entanglement monitoring and mitigation in Iceland, conducted by the HRC in Húsavík was conducted in 2019. This project includes entanglement scar analysis, whale pinger testing and questionnaires and interviews with Icelandic fishers. Fieldwork for this project was completed in 2018 and both 2019 and 2020 consist of data analysis and writing. The entanglement scar analysis resulted in an estimate of 25% of the Icelandic humpback whale population having been entangled in fishing gear at least once, and the most accurate estimate is this occurs at a rate of 2% of the population per year. Whale pinger testing results showed that humpback whales in the trials significantly reduced surface feeding behaviour in response to the pingers. Preliminary testing of these devices on capelin purse seines suggest they may be useful for preventing gear damage caused by humpback whales incidentally becoming encircled in the seine.

A research project led by Edda E. Magnúsdóttir investigated the singing behavior, a breeding display, of male humpback whales, in sub-arctic Icelandic waters during the winter breeding period of this species. The findings showed continual singing from Jan. – Mar with song progression like what has been found on breeding grounds.

A research project on the life-history strategy of humpback whales in the sub-arctic waters of Iceland investigates the body condition, physical and acoustic behavior of humpback whale in the subarctic waters of Iceland during the winter in comparison to other seasons started in February 2019. This study is done in collaboration between UI, MFRI, the University of St Andrews, Scotland and University of Barcelona, Spain. A total of 40 biopsies (skin/blubber) were collected in four cruises in Icelandic coastal waters in 2019. These are used in a variety of studies including feeding ecology (stable isotopes/fatty acids), stock structure (DNA) and seasonality in reproduction (hormones). The project also involves i.a. tagging, photo-identification and behavioural observations. This study is ongoing until 2022.

Killer whale

In 2019, the MFRI 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 and thus the field work was focused on collecting information on prey targeted and dietary preferences of individual whales by collection of photo-identification, observation of feeding events and collection of skin biopsy samples. There was also the

addition of a land-based station that allowed for broader monitoring of variations in the occurrence of killer whales and other cetaceans in the local marine ecosystem. The first catalogue of stereotyped calls produced by the Icelandic population of killer whales was published as a MFRI report (see section V), which should aid in repertoire comparisons with other areas and ongoing and future passive acoustic monitoring efforts.

Long-finned pilot whale

A comprehensive research project started in 2019 and is currently ongoing compiling photo-identifications from as many locations as possible of pilot whales to produce the first photo-identification catalogue of pilot whales in Iceland. In addition, the behaviour of pilot whales has been studied in Vestmannaeyjar during interactions with killer whales. Finally, studies on the ecology of pilot whales have also started by collecting samples of all available stranded animals in the MFRI tissue bank to analyse for stable isotopes of carbon and nitrogen. The aim is to gather knowledge on this species in Iceland that could help us understand the factors driving the unusually high number of strandings that occurred in 2019, such as understanding its occurrence in Icelandic coastal waters, the prey targeted by the species and whether that has changed in recent times.

White-beaked dolphins

The HRC in Húsavík continued their long-term photo-identification and sightings studies of white-beaked dolphins in Skjálfandi bay. C-PODS were deployed in Skjálfandi Bay for detection of white-beaked dolphins.

Harbour porpoise

Collaboration of the MFRI with the University of Potsdam on harbour porpoise genetic research is ongoing (Lah et al. 2016). Among the objectives of this study is estimation of population size based on close kin analysis. Preliminary results were presented to the workshop *Joint IMR/NAMMCO International Workshop on the Status of Harbour Porpoises in the North Atlantic* in Tromsø in December 2018. Since 2017 fishermen received a payment for each harbour porpoise DNA tissue sample that they sent in to the MFRI, and this resulted in an increased number of samples obtained. In 2019 received samples were 135, which is less than the around 200 samples that were received in the earlier years. No payment will be offered to fishermen in 2020. In addition, samples will continue to be included from bycaught porpoises in the annual gillnet survey around Iceland in the spring (18 in 2019) and occasional samples from stranded animals. The total number of samples collected since 2013 is now similar to the number collected in 1991 to 2001. Genetic analyses have now been completed for the entire set of harbour porpoise samples (2109 specimens typed at 13 microsatellites, one sex-determining locus, and the mitochondrial control region). This data will be analyzed in 2020 regarding affinity of Icelandic porpoises to other regions of the North Atlantic as well as with regard to population structure within Iceland. Towards the latter, microsatellite data are used to infer Parent-Offspring (PO) pairs which will inform about local movements. PO pair inferences will also be used to obtain estimates of population size/abundance and trend by comparison of the two sampling periods.

New analyses on nuclear Single Nucleotide Polymorphisms (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 are currently used for population structure assessment across the entire North Atlantic.

Efforts to estimate bycatch of harbour porpoises in fisheries continued at the MFRI. Status of this work will be reported to the WG on Bycatch in Copenhagen in April 2020.

Acoustic porpoise deterrents (pingers) were tested for the first time in the Icelandic cod gillnet fishery in April of 2017, but their use showed no reduction in porpoise bycatch, as 7 porpoises got caught in nets with pingers, while 5 porpoises got caught in control nets nearby. Another type of porpoise deterrents (PALs)

were tested in the cod gillnet fishery in April of 2018 and like the pingers, showed no reduction in porpoise bycatch as 12 porpoises were caught in nets with the devices, while 11 porpoises got caught in the control nets. A pinger with a different signal was tested in 2019, but no porpoises were caught. Further trials with that pinger will be conducted in April 2020.

C-PODS were deployed in Skjálfandi Bay for detections of harbour porpoises.

Other (multi) cetacean species

A total of 37 stranding events of cetacean was recorded by the MFRI in 2019 whereof 15 were long-finned pilot whales, including three mass stranding, the largest group consisting of 60 animals beached in a remote area at NE-Iceland. Another group of 50 stranded pilot whales were discovered by helicopter pilot in a remote area West-Iceland. One group of around 30 beached in Garður, Reykjanes peninsula. Of that group 14 died on the beach while the rest was pushed out again.

Harbour seals

A new harbour seal census was conducted by MFRI and ISC during the moulting period of 2018 and the results were published in 2019 (Granquist and Hauksson, 2019a). In total, 4,168 harbour seals were observed, which after correction factors had been applied resulted in an estimated population size of 9,434 (CI 95%= 6,149-12,726). Efforts are taken by MFRI and ISC to improve knowledge on population demographics and factors contributing to mortality and/or affecting the status of the population. Research on timing of pupping period and pup production was initiated in 2009 and analysis and manuscript preparation carried out during 2019. A new project was initiated in 2018, where haul-out behavior was monitored by using camera traps and analysis continued during 2019. The results from the project will increase knowledge in factors affecting haul-out behaviour and will assist in improving census design. Efforts to estimate bycatch of harbour seals in fisheries continued at the MFRI.

A study on the effect of land- and boat-based tourism on the spatial and behavioural haul-out patterns of harbour seals was initiated by ISC and MFRI in 2008 and continued during 2019. The study includes interdisciplinary cooperation with researchers from Holar University Collage, University of Iceland, Griffith University in Australia, Stockholm University in Sweden. The interdisciplinary research focus on research on best practice, management of seal watching and development of an ethical framework.

A study conducted in co-operation between MFRI, ISC, UI and University of Aarhus, Denmark on vocalisations and behaviour of male Icelandic harbour seals during the mating season continued during the year.

A study of harbour seal genetics was initiated in 2016, in cooperation between MFRI, ISC and the Natural history museum of Denmark and analysis continued during 2019.

Efforts to estimate bycatch of harbour seals in fisheries continued at the MFRI. Results of the estimates in the lumpsucker gillnets fishery can be found here: <https://www.hafogvatn.is/is/moya/extras/medaflifugla-og-sjavarspendyra>

Grey seals

To estimate the current status of the Icelandic grey seal population, an aerial census was conducted by MFRI in cooperation with ISC during the pupping period in 2017 and results were published in 2019 (Granquist and Hauksson 2019b). The peak of the pupping period varied from 2 October (Frameyjar in Breiðafjörður, West Iceland) to 24 October (Strandir, North West Iceland). Based on the estimated pup production (1452;

95% CI=1385-1529), the total population size was estimated to be 6269 (95% CI=5375-7181). Breiðafjörður was the most important pupping area in Iceland, with 58% of the total pup production in 2017.

A project was initiated in October 2016 where five grey seal pups were tagged with satellite tags to map habitat use and the results were published in 2019 (Baylis et al. 2019).

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 analysis continued during 2019.

Efforts to estimate bycatch of grey seals in fisheries continued at the MFRI. Results of the estimates in the lump sucker gillnets fishery can be found here: <https://www.hafogvatn.is/is/moya/extras/medafli-fugla-og-sjavarspendyra>

Other (multi) pinniped species

A project investigating environmental toxicants in seals in Icelandic waters was initiated by MFRI during 2017 and analysis continued in 2019. Very little is known about contaminants in Icelandic seal populations. The focus of the project is to investigate the contents of new contaminants of concern in marine mammals, including new brominated flame retardants and PFAS (per- and polyfluoroalkyl substances). The project is an international cooperation between Sweden (Naturhistoriska Riksmuséet and Stockholm University), Greenland (Grönlands Naturinstitut) and MFRI (Iceland).

III ONGOING (CURRENT) RESEARCH

Pinnipeds

A harbour seal aerial census is planned in 2020.

Cetaceans

A new research project on northern bottlenose whales around Iceland has been initiated in Jan 2020 by the University of Iceland in collaboration with MFRI and others. This three-year project will use long-term acoustic monitoring, satellite tags and surface observations to provide new insights into the species' movement ecology (why, when, which and where animals move) and their vulnerability to high-intensity anthropogenic noise, such as seismic airguns and naval sonar.

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 2019-2023 (annual catch of 161 fin whales and 217 common minke whales). Despite the issued quotas, no whaling occurred in Icelandic waters in 2019.

Pinnipeds

Harbour seals: To raise the numbers in the population to acceptable levels MFRI advises that direct hunt should be banned and that actions must be taken to reduce by-catch of seals in commercial fisheries. If limited hunting will be allowed, MFRI advises that a hunting management system should be initiated, and that reporting of all seal hunt should be mandatory. MFRI further advises that attempts to minimize anthropogenic disturbance of harbour seal colonies are initiated, in particular during breeding and moulting seasons between May and August.

Grey seals: The governmental management objective from 2005 states that the Icelandic grey seal population size should be kept above 4100 animals, which corresponds to the observed population size from 2004. The population is currently estimated to 6300 animals, which is above the management objective. If the population decreases significantly measures will be taken to reverse the trend. Close monitoring of the population is advised. MFRI advises that actions must be taken to reduce by-catch of grey seals in commercial fisheries. MFRI also advises that a hunting management system should be initiated, and that reporting of all seal hunt should be mandatory.

V PUBLICATIONS AND DOCUMENTS

Peer-reviewed publications in 2019

Baylis, A. M., Þorbjörnsson, J. G., dos Santos, E., & Granquist, S. M. (2019). At-sea spatial usage of recently weaned grey seal pups in Iceland. *Polar Biology*, 42(11); 2165–2170. DOI: [10.1007/s00300-019-02574-5](https://doi.org/10.1007/s00300-019-02574-5)

Basran, C. J., Bertulli, C. G., Cecchetti, A., Rasmussen, M. H., Whittaker, M. & Robbins, J. 2019. First estimates of entanglement rate of humpback whales *Megaptera novaeangliae* observed in coastal Icelandic waters. *Endangered Species Research* 38: 67–77. <https://doi.org/10.3354/ESR00936>

Basran, C.J., Woelfing, B., Neuman, C., Rasmussen, M. H. 2019. First analysis of behavioural responses of humpback whales (*Megaptera novaeangliae*) to two acoustic alarms in a northern feeding ground off Iceland. Unpublished preprint. Available from: <https://www.biorxiv.org/content/10.1101/741553v1>

Cabrera, A. A.; Hoekendijk, J. P. A.; Aguilar, A.; Barco, S. G.; Berrow, S.; Bloch, D.; Borrell, A.; Cunha, H. A.; Dalla Rosa, L.; Dias, C. P.; Gauffier, P.; Hao, W.; Landry, S.; Larsen, F.; Martín, V.; Mizroch, S.; Oosting, T.; Øien, N.; Pampoulie, C.; Panigada, S.; Prieto, R.; Ramp, C.; Rivera-Léon, V.; Robbins, J.; Ryan, C.; Schall, E.; Sears, R.; Silva, M. A.; Urbán, J.; Wenzel, F. W.; Palsbøll, P. J.; Bérubé, M. 2019: Fin whale (*Balaenoptera physalus*) mitogenomics: A cautionary tale of defining sub-species from mitochondrial sequence monophyly. *Molecular Phylogenetics and Evolution*, 135: 86–97.

Dietz R, Letcher RJ, Desforges J-P, Eulaers I, Sonne C, Wilson S, Andersen-Ranberg E, Basu N, Barst BD, Bustnes JO, Bytingsvik J, Ciesielski TM, Drevnick PE, Gabrielsen GW, Haarr A, Hylland K, Jenssen BM, Levin M, McKinney MA, Nørregaard RD, Pedersen KE, Provencher J, Styrishave B, Tartu S, Aars J, Ackerman JT, Rosing-Asvid A, Barrett R, Bignert A, Born EW, Branigan M, Braune B, Bryan CE, Dam M, Eagles-Smith CA, Evans M, Evans TJ, Fisk AT, Gamberg M, Gustavson K, Hartman CA, Helander B, Herzog MP, Hoekstra PF, Houde M, Hoydal K, Jackson AK, Kucklick J, Lie E, Loseto L, Mallory ML, Miljeteig C, Mosbech A, Muir DCG, Nielsen ST, Peacock E, Pedro S, Peterson SH, Polder A, Rigét FF, Roach P, Saunes H, Sinding M-HS, Skaare JU, Søndergaard J, Stenson G, Stern G, Treu G, Schuur SS, Víkingsson G (2019) Current state of knowledge on biological effects from contaminants on arctic wildlife and fish. *Sci Total Environ* 696:133792. <https://doi.org/10.1016/j.scitotenv.2019.133792>

Foote AD, Martin MD, Louis M, Pacheco G, Robertson KM, Sinding M-HS, Amaral AR, Baird RW, Baker CS, Ballance L, Barlow J, Brownlow A, Collins T, Constantine R, Dabin W, Dalla Rosa L, Davison NJ, Durban JW, Esteban R, Ferguson SH, Gerrodette T, Guinet C, Hanson MB, Hoggard W, Matthews CJD, Samarra FIP, de Stephanis R, Tavares S*, Tixier P, Totterdell JA, Wade P, Gilbert MTP, Wolf JBW and Morin PA 2019 Killer whale genomes reveal a complex history of recurrent admixture and vicariance. *Molecular Ecology* 28(14): 3427-3444

Granquist, S.M., Nilsson, P.Å., and Angerbjörn, A. 2019. From Eco-Tourism to Ego-Tourism: Fluctuations in human view on nature over time. *Athens Journal of Tourism*. 6(3), 195-210. DOI: 10.30958/ajt.6-3-4

Jourdain E, Ugarte F, Víkingsson G, Samarra F, Ferguson SH, Lawson J, Vongraven D and Desportes G 2019 North Atlantic killer whale *Orcinus orca* populations: a review of current knowledge and threats to conservation. *Mammal Review*, doi: 10.1111/mam.12168.

Magnusdottir, E.E. and Lim, R., 2019. Subarctic singers: Humpback whale (*Megaptera novaeangliae*) song structure and progression from an Icelandic feeding ground during winter. *PloS one*, 14(1).

Moore SE, Haug T, Víkingsson GA, Stenson GB (2019) Baleen whale ecology in arctic and subarctic seas in an era of rapid habitat alteration. *Prog Oceanogr* 176:102118. <https://doi.org/10.1016%2Fj.pocean.2019.05.010>.

Pike DG, Gunnlaugsson T, Desportes G, Mikkelsen B, Víkingsson GA & Bloch D (2019) Estimates of the relative abundance of long-finned pilot whales (*Globicephala melas*) in the Northeast Atlantic from 1987 to 2015 indicate no long-term trends. *NAMMCO Sci Publ* 11.

Pike D, Gunnlaugsson T, Mikkelsen B, Halldórsson SD, Víkingsson G (2019) Estimates of the abundance of cetaceans in the central North Atlantic based on the NASS Icelandic and Faroese shipboard surveys conducted in 2015. NAMMCO Sci Publ 11: . <https://doi.org/10.7557/3.4941>.

Pinfield R, Dillane E, Runge AKW, Evans A, Mirimin L, Niemann J, Reed TE, Reid DG, Rogan E, Samarra FIP, Sigsgaard EE and Foote AD (2019) False negative detections from environmental DNA collected in the presence of large numbers of killer whales (*Orcinus orca*). Environmental DNA, doi: 10.1002/edn3.32

Rita D, Borrell A, Víkingsson G, Aguilar A (2019) Histological structure of baleen plates and its relevance to sampling for stable isotope studies. Mamm Biol 99:63–70. <https://doi.org/10.1016/j.mambio.2019.10.004>.

Vighi M, Borrell A, Víkingsson G, Gunnlaugsson T & Aguilar A (2019) Strontium in fin whale baleen: A potential tracer of mysticete movements across the oceans? Sci Total Environ 650:1224–1230.

Wensveen, PJ, Isojunno, S, Hansen, RR, von Benda-Beckmann, AM, Kleivane, LK, van IJsselmuide, S, Lam, FPA, Kvaldheim, PH, DeRuiter, SL, Cure, C, Narazaki, T, Tyack, PL & Miller, PJO (2019). Northern bottlenose whales in a pristine environment respond strongly to close and distant navy sonar signals. Proceedings of the Royal Society B: Biological Sciences 286, 20182592. [link](#)

Von Benda-Beckmann, AM, Wensveen, PJ, Prior, M, Ainslie, MA, Hansen, RR, Isojunno, S, Lam, FPA, Kvaldheim, PH & Miller, PJO (2019). Predicting acoustic dose associated with marine mammal behavioural responses to sound as detected with fixed acoustic recorders and satellite tags. Journal of the Acoustical Society of America 145, 1401-1416.

Thesis

Brown, Justin (2019). Abundance and distribution shifts of humpback whales (*Megaptera novaeangliae*) in Ísafjarðardjúp. Master thesis. University of the Westfjord.

Gose, Marc-Alexander (2019) Population genetic analyses of north-east Atlantic humpback whales (*Megaptera novaeangliae*) on the coast of Iceland. MS thesis Ruhr-Universität Bochum. 86 pp.

Morin, KP (2019). Investigating the Migratory Movement of Humpback Whales (*Megaptera novaeangliae*) between Husavik, Iceland and Greenland using Photo-identification. Master thesis. University of the Westfjord, 70pp

Reports/Conference abstracts

Albrecht, S and Rasmussen, MH (2019). Habitat use of minke whales in Skjálfandi Bay, North Iceland. Worlds Marine Mammal conference, Barcelona, Spain.

Aquino, J.F., Granquist, S.M. and Burns, G.L. (2019) An Ethical Framework for Seal Watching Management Development. Seals and society in Húnaflói, past and present: Interdisciplinary seminar at the University of Iceland Research Centre in Northwestern Iceland. 13 April 2019. Skagaströnd, Iceland.

Autenrieth, Marijk, Katja Havenstein, Ljerka Lah, Josefin Saeurich, Julia Ucar, Aylin Savas, Stefanie Hartmann, Harald Benke, Iwona Pawliczka, Anna Roos, Ursula Siebert, Thorvaldur Gunnlaugsson, Gisli Víkingsson, Alice B. Dennis, Ralph Tiedemann (2019). A genomic approach to contemporary local adaptation in a marine mammal, the harbour porpoise (*Phocoena phocoena*) in the Baltic Sea SMBE conference 2019 (abstract).

Autenrieth, Marijke, Katja Havenstein, Binia De Cahsan, Morten Tange Olsen, Harald Benke, Iwona Pawliczka, Anna Roos, Ursula Siebert, Thorvaldur Gunnlaugsson, Gísli Víkingsson, Alice Dennis, Ralph Tiedemann Nynne Nielsen, Vincent Biard, Jonas Teilmann, Gísli Víkingsson, Garry Stenson, Jack Lawson, Ljerka Lah, Ralph Tiedemann, Manh Cuong Ngo, Mads Peter Heide-Jørgensen, Morten Tange Olsen. 2019. Bridging population genomics and conservation for harbour porpoises (*Phocoena phocoena*) in the North Atlantic and adjacent waters. World Marine Mammal Conference Barcelona, Spain, 9-12 Dec 2019 (abstract).

Basran, C, Woelfing, B, Neumann, C and Rasmussen, MH (2019). Analysis of humpback whale (*Megaptera novaeangliae*) behavioural response to two acoustic deterrent devices (ADDs) in their Icelandic feeding ground. Worlds Marine Mammal conference, Barcelona, Spain.

Calvo, MO and Rasmusen, MH (2019). Harbor porpoise (*Phocoena phocoena*) annual and seasonal distribution in Skjálfandi Bay, Iceland. Using opportunistic data over the past 10 years (2009-2018) collected from whale watching platforms. Worlds Marine Mammal conference, Barcelona, Spain.

Dodds, F, Grove, T, Tan, B, Rasmussen, MH and Henry, L-A (2019). Assessing summer body condition of humpback and blue whales using an Unmanned Aerial System (UAS) in Skjálfandi Bay, Northern Iceland. Worlds Marine Mammal conference, Barcelona, Spain.

Fontaine, M. C., Chehida, Y.B., Aguilar, A., Borrell, A., Marisa, F., Taylor, B., Rojas-Bracho, L., Robertson, K., Thumloup, J., Schumacher, C., Harkins, T., Víkingsson, G., Romiguier, J., Sabot, F., Morin, P., 2019. The evolutionary history of the porpoise family across the speciation continuum through the lens of a comparative genomic approach: Putting conservation issues into an evolutionary framework. World Marine Mammal Conference Barcelona, Spain, 9-12 Dec 2019 (abstract).

- Garcia-Garin, Odei, Asunción Borrell, Ethel Eljarrat, Berta Sala, Morgana Vighi, Gísli Víkingsson, Valérie Chosson, Alex Aguilar. 2019. First evidence of OPFRs presence in fin whales. Poster at World Marine Mammal Conference Barcelona 2019 (abstract).
- Garcia-Vernet, Raquel Alex Aguilar, Gísli Víkingsson, Sverrir Halldorsson, Asunción Borrell 2019. Resource partitioning between five species of mysticeti inhabiting Icelandic waters. Poster at World Marine Mammal Conference Barcelona, Spain, 9-12 Dec 2019 (abstract).
- Gauffier, Pauline, Asunción Borrell, Monica Silva, Gísli Víkingsson, Alfredo López Fernández, Joan Giménez, Ana Colaço, Sverrir Halldorsson, Morgana Vighi, Renaud de Stephanis, Rui Prieto, Alex Aguilar. 2019. Further insight into fin whale subpopulation structure in the eastern North Atlantic. Poster at World Marine Mammal Conference Barcelona, Spain, 9-12 Dec 2019 (abstract).
- Gose, Marc-Alexander, Christophe S. Pampoulie, Sverrir Halldorsson, Marianne Helene Rasmussen, Gísli Víkingsson, Maximilian Schweinsberg, Ralph Tollrian. 2019. Genetic variability and social structure in north-east Atlantic humpback whales (*Megaptera novaeangliae*) off the Icelandic coast. Poster at World Marine Mammal Conference Barcelona, Spain, 9-12 Dec 2019 (abstract).
- Granquist, S.M. and Hauksson, E. 2019a. Population estimate, trends and current status of the Icelandic harbour seal (*Phoca vitulina*) population in 2018 [Landselstalning 2018: Stofnstærðarmat, sveiflur og ástand stofns]. Marine and Freshwater Research Institution, HV 2019-36. Reykjavík 2019. 22pp.
- Granquist, S.M. and Hauksson, E. 2019b. Aerial census of the Icelandic grey seal (*Halichoerus grypus*) population in 2017: Pup production, population estimate, trends and current status [Útselstalning 2017: Stofnstærðarmat, sveiflur og ástand stofns]. Marine and Freshwater Research Institution, HV 2019-02. Reykjavík 2019. 19 pp. <https://www.hafogvatn.is/static/research/files/1549015805-hv2019-02pdf>
- Granquist, S. (2019). The triangle drama; an ecological perspective of anthropogenic interactions with seal populations in Iceland. Seals and society in Húnaflói, past and present: Interdisciplinary seminar at the University of Iceland Research Centre in Northwestern Iceland. 13 April 2019. Skagaströnd, Iceland.
- Groove, T, Homer, N, Romanov, M, Henry, L-A and Rasmussen, MH (2019). Estimating circulating concentrations of cortisol in large whales via blow sample collection with an unmanned aerial vehicle. World Marine Mammal Conference Barcelona, Spain, 9-12 Dec 2019 (abstract).
- Halldórsson, Sverrir Daníel, Thorvaldur Gunnlaugsson, Valérie Chosson, Gísli Víkingsson 2019. Cetacean strandings in Iceland 1980-2018. Poster at World Marine Mammal Conference Barcelona, Spain, 9-12 Dec 2019 (abstract).

- Iwate, T, Akamatsu, T, Schnitzler, J, Rasmussen, MH, Baltzer, J, Lucke, K, Aogi, K, Sato, K, Wahlberg, M and Sibert, U (2019). Growls and downsweeps: Foraging ground vocalisations of blue whales. World Marine Mammal Conference Barcelona, Spain, 9-12 Dec 2019 (abstract).
- Kyhn, L, Beedholm, K, Rasmussen, MH, Amundin, M and Madsen, PT (2019). Do porpoises (Phocoena phocoena) have an acoustic fovea? World Marine Mammal Conference Barcelona, Spain, 9-12 Dec 2019 (abstract).
- Madsen, R, Rasmussen, MH, Olsen, MT, Lydersen, C, Vikingson, GA, Kovacs, KM, Palner, MKH Bertelsen, JL, Jacobsen, JS, Jørgensen, MS, Whittaker, M, Jacobsen, T, Scott, J and Iversen, MR (2019). The migratory movements of blue whales (Balaenoptera musculus) inhabiting Arctic and Sub-Arctic areas of the Northeast Atlantic. Dansk Havpattedyr Symposium, Odense, Denmark
- Magnúsdóttir, Edda Elísabet Ailsa Hall, Christophe S. Pampoulie, Gísli Víkingsson, Patrick Miller. 2019. Subarctic winter whales: An overwintering strategy of humpback whales in Icelandic waters. Poster at World Marine Mammal Conference Barcelona, Spain, 9-12 Dec 2019 (abstract).
- McGinty, N, Rasmussen, MH and Bertulli, C (2019). Using multi-model ensemble forecasting to identify key feeding habitat for four cetacean species in Icelandic coastal waters. World Marine Mammal Conference Barcelona, Spain, 9-12 Dec 2019 (abstract).
- Neyman, Lisa, Nadya Ramirez-Martinez, Gísli Víkingsson, Bjarni Mikkelsen, Philip Hammond. 2019. Cetacean habitat use in the Central North Atlantic: A comparison between baleen whales and deep-diving odontocetes. Poster at World Marine Mammal Conference Barcelona, Spain, 9-12 Dec 2019 (abstract).
- Nielsen, N.E.H., Biard, V., Teilmann, J., Víkingsson, G. Stenson, G., Lawson, J., Lah, L., Tiedemann, R., Ngo, M.C., Heide-Jørgensen, M.P, Olsen, M.T. 2019. The Greenlandic harbour porpoise – a separate ecotype? World Marine Mammal Conference Barcelona, Spain, 9-12 Dec 2019 (abstract).
- Petitguyot, M, Groove, T, Senglat, C, Koshiha, D and Rasmussen, M (2019). Mass stranding and unusual sightings of northern bottlenose whales (Hyperoodon ampullatus) in Skjálfandi Bay, Iceland. World Marine Mammal Conference Barcelona, Spain, 9-12 Dec 2019 (abstract).
- Pike, D., Víkingsson, G.A., Gunnlaugsson, Th., and Elvarsson B.Þ. (2019). Comments on document SC/68A/ASI/07 regarding the assessment of North Atlantic fin whales. International Whaling Commission (IWC) document SC/68A/ASI/16 6pp.

- Ramirez-Martinez, N., Víkingsson, G., Öien, N, Mikkelsen, B. Gunnlaugsson, Th., Hammond, P. 2019. Decadal-scale changes in deep diving cetacean distribution in the central and North-East Atlantic. World Marine Mammal Conference Barcelona 2019 (abstract).
- Rasmussen, MH, Wahlberg, M, Schack, HB, Bircher, N, Iversen M and Siebert U (2019). Source levels of blue whales (*Balaenoptera musculus*) in Iceland measured with a hydrophone array. Dansk Havpattedyr Symposium, Odense, Denmark
- Remili, A., Dietz, R., Sonne, C., Letcher, R.J., Blair, D., Samarra, F., Víkingsson, G., Eulaers, I., M. A. McKinney, M.A. (2019). Blubber persistent organic pollutant levels in Icelandic killer whales (*Orcinus orca*), 2014-2016. Society of Environmental Toxicology and Chemistry North America 40th Annual Meeting. 3–7 November 2019 | Toronto, Ontario, Canada
- Rößler, H. Tougaard, J., Rasmussen, M.H., Granquist, S.M. and Wahlberg, M. (2019). Under water vocalisations of harbour seals in Húnaflói. Seals and society in Húnaflói, past and present: Interdisciplinary seminar at the University of Iceland Research Centre in Northwestern Iceland. 13 April 2019. Skagaströnd, Iceland.
- Samarra, Filipa, Ayça Eleman, Roisin Pinfield, Anna Ólafsdóttir, Guðmundur Óskarsson, Thorvaldur Gunnlaugsson, Gísli Víkingsson. 2019. Killer whale dietary preferences during a period of contrasting availability of prey resources. Poster at World Marine Mammal Conference Barcelona, Spain, 9-12 Dec 2019 (abstract).
- Samarra, Filipa (2019). A decade investigating a top marine predator: the Icelandic Orca Project. ICEBio conference, Reykjavík 17-19. October 2019 (abstract).
- Samarra, Filipa, Halldórsson, S.D., Víkingsson, G.A. Feeding ecology of Icelandic killer whales. ICEBio conference, Reykjavík 17-19. October 2019 (abstract).
- Schleimer, A., Aguilar, A., Barco, S.G., Degollada, E., Berrow, S., Bloch, D., Borrell, A., Cristina, F.M., Gauffier, P., Giard, J., Hao, W., Heide-Jørgensen, M.P., Kovacs, K., Landry, S., Larsen, F., Lydersen, C., Martin, V., Michaud, R., Mikkelsen, B., Pampoulie, C., Panigada, S., Panti, C., Prieto, R., Raga, J.A., Ramp, C., Leon, V.E.R., Robbins, J., Ryan, C., Sears, R., Sigurjónsson, J., Silva, M., Simon, M., Renaud, de S., Urban, J., Víkingsson, G., Wenzel, F., Witting, L., Öien, N., Palsböll, P., Bérubé, M. 2019. Population structure characterised by high within-area relatedness in North Atlantic and Mediterranean Sea fin whales (*Balaenoptera physalus*). World Marine Mammal Conference Barcelona, Spain, 9-12 Dec 2019 (abstract).
- Selbmann, Anna, Jörundur Svavarsson, Patrick Miller, Volker B. Deecke, Olga A. Filatova, Ivan D. Fedutin, Edda E. Magnúsdóttir, Claire Lacey, Filipa Samarra (2019). Variation in killer whale call types around Iceland. ICEBio conference, Reykjavík 17-19. October 2019 (abstract).

Selbmann A, Deecke VB, Fedutin ID, Filatova OA, Miller PJO and Samarra FIP (2019) A catalogue of pulsed calls produced by killer whales (Orcinus orca) in Iceland 2008-2016. Report of the Marine and Freshwater Research Institute HV2019-23, ISSN 2298-9137

Shaw, S.D., Berger, M.L., Chen, D., Rosing-Asvid, A., Granquist, S.M. and Roos, A. (2019). Assessing Global Threats of Pollution and Climate Change to Marine Mammals Across Three Oceans. Gulf of Maine 2050 International Symposium. Portland, Main, USA. November 4 – 8, 2019. (Poster).

Spaan, K., Noordenburg, C., Schultes, L., Roos, A., Shaw, S.D., Berger, M.L., Heide-Jørgensen, M.P., Laidre, K., Granquist, S.M., Plassmann, M.M. and Benskin, J.P. (2019) Spatial trends and tissue distribution of per- and polyfluoroalkyl substances, extractable organic fluorine and total fluorine in marine mammals. Extended abstract. SETAC Europe 29th annual meeting. Helsinki, 26-30 May 2019. Extended abstract.

Suarez, Marcos, Vania Elizabeth Rivera Leon, Anna Schleimer, Xênia Moreira Lopes, Alex Aguilar, Susan G. Barco, Simon Berrow, Asunción Borrell, Dorete Bloch, Phil Clapham, Eduard Degollada, Fossi Maria Cristina, Pauline Gauffier, Janie Giard, Wensi Hao, Tore Haug, Mads Peter Heide-Jørgensen, Kit M. Kovacs, Scott Landry, Finn Larsen, Christian Lydersen, Vidal Martin, David Mattila, Bjarni Mikkelsen, Tom Oosting, Richard M Pace, III, Christophe S. Pampoulie, Simone Panigada, Cristina Panti, Rui Prieto, Juan Antonio Raga, Christian Ramp, Jooke Robbins, Conor Ryan, Richard Sears, Jóhann Sigurjónsson, Monica Silva, Malene Simon, Renaud de Stephanis, Hans J. Skaug, Jorge Urban, Jurjan van der Zee, Yvonne I. Verkuil, Gísli Víkingsson, Lars Witting, Frederick Wenzel, Nils Øien, Martine Bérubé, Per Palsbøll. 2019. Heteroplasmy; Detection, verification and recurrence in baleen whales. Poster at World Marine Mammal Conference Barcelona, Spain, 9-12 Dec 2019 (abstract).

Víkingsson, G.A. (2019) Marine Mammals in the Northeast Atlantic Ecosystems. EUfishmel conference. 29.August 2019 (abstract).

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 2019, 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 are 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 strandings. 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 2019 are given as requested in a separate sheet.

No systematic records are kept of pinniped strandings at the MFRI.