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FAROE ISLANDS - PROGRESS REPORT ON MARINE MAMMALS 2020

By Bjarni Mikkelsen and Katrin Hoydal

I. INTRODUCTION

This report summarises research on cetaceans and pinnipeds conducted in the Faroe Islands in 2020, by the Faroe Marine Research Institute and the Environment Agency. By 2020, marine mammal research has moved affiliation from the Natural History Museum to the Marine Research Institute.

II. RESEARCH BY SPECIES 2020

II.a Species/Stocks studied

- Grey seal (*Halichoerus grypus*) – hunting statistics, tagging
- Pilot whale (*Globicephala melas*) – landed animals, tagged animals
- Northern bottlenose whale (*Hyperoodon ampullatus*) – stranded animals

II.b Field work

In 2020, biological samples for age and reproduction were collected from 44 **pilot whales**, by the Faroe Marine Research Institute, in a drive in Hvalvík 16 October. In addition, stomachs and tissues from a few of the same animals were stored for diet, genetic and contaminant studies.

In 2020, the Environment Agency took samples of **pilot whales** in connection with a grind in Hvalvík on 16 October. In all, 23 individual samples of muscle and blubber, and liver and kidney tissue samples were taken.

In 2020 the Marine Research Institute tagged three **pilot whale** pods. On June 6, two animals from a pod of 30 animals were fitted with satellite transmitters at the bay of Bøur. On June 16, four animals in a pod counting 12 animals, were tagged in Tórshavn. And November 13, three animals from a group numbering 10 animals were tagged in Vestmanna. These three tagging bring the total number of tagged groups to ten, in a dedicated tracking programme, with the objective to determine the management unit of pilot whales recruiting to the hunt in the Faroe Islands.

On 17 August, six **bottlenose whales** stranded and ceased in Sandvík, Suðuroy, On 19 August, another five bottlenose whales stranded in the neighbouring village of Hvalba. These stranding events occur almost annually in Suðuroy, with 25 bottlenose whales stranded since 2010. The 11 stranded bottlenose whales in one year is the highest number for the last hundred years.

In July 2020, two **grey seals** were tagged with GPS/GSM transmitters in Vestmannaund, to study potential disturbance from ocean turbines, that were installed in the narrow trait. During

the period June-August, land-based observations of marine mammal occurrence in the area was also performed.

II.c Laboratory work

The biological material collected from **pilot whales** in 2020, together with material collected in previous years, is under processing for finalizing the analysis of age, reproduction, and diet.

The Environment Agency are regularly collecting **pilot whale** samples for a tissue bank, where the aim is to take samples from three schools a year, with generally 25 individuals from each. In 2020 however only one school was sampled, due to very few pilot whale hunts this year because of the covid-19 epidemic. In addition to a monitoring program as outlined in Table 1, research activities are done as projects and when funding allows. Such projects could be to investigate the presence of chemicals of emerging environmental concern and elucidate potential negative impact of pollutants on pilot whales.

Table 1. Pollutants in the pilot whale monitoring program of the Environment Agency.

Matrix (tissue)	blubber & muscle	kidney	liver	blubber / liver ^{*,**}	blubber [*]
Frequency of sampling	yearly, pref. from 3 schools, focus incr. on juv. males for timetrend				
number of samples analysed per year	25	15	15	5	5
Tissue analysed for:	Blubber: Legacy persistent organic pollutants\$ Muscle: metals£	Cadmium, dry mass	Mercury, selenium, cadmium, dry mass	Perfluoroalkyl substances, polybrominated diethyl ethers	hexabromo cyclo-dodecane, Dechlorane plus

*Time trends

** PFAS is analysed in liver

\$ PCB, HCH, HCB, DDT, DDE, and from ca. ½ of the samples even o,p-isomer DDT and metabolites, CHL, Mirex, Toxaphene.

£ Mercury, selenium, dry mass and stable N and C isotopes

II.d Other studies

In the Faroe Islands, it has been legal for salmon farmers to cull **grey seals** interacting with installations, as a protective act. This practice was however banned by law on 14 May 2020. The Marine Research Institute has collected harvest numbers from salmon farmers since 2010.

II.e Research results

The **pilot whale** pod tagged with satellite transmitters in Bøur on June 6 left the islands in a westward direction. The pod moved west of the Reykjanes ridge, and was distributed mostly west of the mid-Atlantic ridge for the whole tracking period of 185 days. The pod tagged in Tórshavn on June 16 also moved west, towards the Reykjanes ridge. But this pod stayed close to, but east of, the mid-Atlantic ridge for the tracking period, which lasted 75 days. The pod tagged on November 13 in Vestmanna, has stayed close to the banks south-west in Faroese waters, and south to Hatton Bank, for the 95 days with signals so far.

Trends in the abundance of long-finned **pilot whale** was investigated by Pike *et al.*, 2019, based on the North Atlantic Sightings Surveys (NASS) conducted in 1987, 1989, 1995, 2001,

2007 and 2015. Conventional distance sampling was used to develop indices of relative abundance to determine if pilot whale abundance has changed over the 28-year period from 1987 to 2015. Varying spatial coverage of the surveys was accommodated by delineating common regions that were covered by all 6 surveys, and the 3 largest surveys (1989, 1995 and 2007), respectively. These “Index Regions” were divided into East and West sub-regions, and post-stratification was used to obtain abundance estimates for these index areas only. Total abundance in the Index Regions, uncorrected for perception or availability biases, ranged from 54,264 (CV=0.48) in 2001 to 253,109 (CV=0.43) in 2015. There was no significant trend in the numbers of individuals or groups in either the 6 or 3 Survey Index Regions, and no consistent trend over the period. Power analyses indicate that negative annual growth rates of -3% to -5% would have been detectable over the entire period. The Index Regions comprise only a portion of the summer range of the species and changes in annual distribution clearly affect the results.

Pike *et al.*, 2019, estimated the abundance of cetaceans in the central North Atlantic from the North Atlantic Sightings Survey (NASS). The sixth in a series of surveys, done between 1987 and 2015, was conducted in June/July 2015 and covered a large area of the northern North Atlantic. The Icelandic and Faroese ship survey component covered the area between the Faroe Islands and East Greenland from latitude 52° to 72° N. The survey used 3 vessels and an independent double-platform configuration with each platform staffed by a minimum of 2 observers. Both uncorrected abundance estimates derived using Multiple Covariates Distance Sampling, and corrected abundance estimates derived using Mark-Recapture Distance Sampling, were provided for the following species (corrected estimates given): fin (*Balaenoptera physalus*; 36,773, CV=0.17, 95% CI 25,811–52,392), common minke (*B. acutorstrata*; 42,515, CV=0.31, 95% CI 22,896–78,942), humpback (*Megaptera novaeangliae*; 9,867, 95% CI 4,854–20,058), blue (*B. musculus*; 3,000, CV=0.40, 95% CI 1,377–6,534), sei (*B. borealis*; 3,767, CV=0.54, 95% CI 1,156–12,270), sperm (*Physeter microcephalus*; 23,166, CV 0.59, 95% CI 7,699–69,709), long-finned pilot (*Globicephala melas*; 344,148, CV=0.35, 95% CI 162,795–727,527) and northern bottlenose (*Hyperoodon ampullatus*; 19,975, CV=0.06, 95% CI 5,562–71,737) whales as well as white-beaked (*Lagenorhynchus albirostris*; 159,000, CV=0.63, 95% CI 49,957–506,054) and white-sided (*L. acutus*; 131,022, CV=0.73, 95% CI 35,251–486,981) dolphins.

Gilles *et al.*, 2020, presents the first fully corrected abundance estimates for the harbour porpoise (*Phocoena phocoena*) for the Faroe Islands. An aerial survey with harbour porpoise as a main target species were conducted in the summers of 2010. Only part of the area inside the 300 m depth curve could be surveyed and 1,564 km were surveyed in good or moderate porpoise sighting conditions, yielding 39 sightings (49 individuals). The total abundance estimate was 5,175 porpoises (CV=0.44; 95% CI: 3,457–17,637).

Pike *et al.*, 2020, estimated the abundance of killer whales based on the NASS surveys in 1987, 1989, 1995, 2001, 2007 and 2015. Sightings of killer whales (*Orcinus orca*), a non-target species, were relatively rare in the Central Atlantic (Icelandic and Faroese) portions of the survey area. Uncorrected estimates were produced for all surveys, and estimates corrected for perception bias were produced for the 2001 and 2015 surveys. Killer whales were sighted in all areas but were most common in the eastern part of the survey area. Uncorrected abundance in the NASS core area ranged from a low of 4,736 (95% CI: 1,842–12,176) in 1995 to a maximum of 15,142 (95% CI: 6,003–38,190) in 2001. The low precision of the estimates makes the detection of temporal trends unlikely. In 2007 an extension survey revealed relatively high numbers of killer whales to the east of the survey area, in conformity

with Norwegian survey estimates in this area. The NASS and other surveys conducted over the period indicate that killer whales number in the low tens of thousands in the Central and Eastern North Atlantic

Kruger *et al.*, 2020, used an RNA-Seq approach to compare the mRNA levels in the brains of whales with those of cattle, which serves as a terrestrial relative, for studying the physiological adaptations of whales to diving, particularly the molecular mechanisms that enable their brain to survive sometimes prolonged periods of hypoxia. The transcriptomes of the brains from cattle (*Bos taurus*), killer whale (*Orcinus orca*), and long-finned pilot whale (*Globicephala melas*) were sequenced. Further, the brain transcriptomes of cattle, minke whale (*Balaenoptera acutorostrata*) and bowhead whale (*Balaena mysticetus*), which were available in the databases, were included. A high expression of genes related to oxidative phosphorylation and the respiratory electron chain in the whale brains was found. In the visual cortex of whales, transcripts related to the detoxification of reactive oxygen species were more highly expressed than in the visual cortex of cattle. These findings indicate a high oxidative capacity in the whale brain that might help to maintain aerobic metabolism in periods of reduced oxygen availability during dives.

Houghton *et al.*, 2020, investigated the oceanic drivers of sei whale (*Balaenoptera borealis*) distribution in the central and eastern North Atlantic, and explored how distribution may have changed over almost three decades. Cetacean sightings data were available from Icelandic, Faroese and Norwegian surveys conducted throughout the central and eastern North Atlantic during summer between 1987 and 2015. Effective strip half width was estimated from the data to take account of variation in detection probability. Spatially-referenced environmental variables used as predictors in generalised additive models of sei whale relative density included: relief-related variables seabed depth, slope and aspect; monthly-varying physical oceanographic variables sea surface temperature (SST), mixed layer depth, bottom temperature, salinity, and sea surface height anomaly (SSH); and monthly-varying biological oceanographic variables chlorophyll-a concentration and primary productivity. Preliminary analysis considered which month (March-August) in the dynamic oceanographic variables explained most variability in sei whale density. Models including all variables (“full models”) could only be run for 1998-2015 because data for several variables were missing in earlier years. “Simple models” including only relief-related variables and SST were therefore run for 1987-89, and also for 1998-2015 for comparison. The best-fitting full model for 1998-2015 retained the covariates depth, May SST, May bottom temperature, July salinity, July SSH and July primary productivity. Of these, depth, May SST and July SSH were the strongest predictors of sei whale density. In the simple models for both 1987-89 and 1998-2015, depth (especially), May SST and seabed slope were the strongest predictors of sei whale density. The highest densities of sei whales were predicted in the Irminger Sea and over the Charlie-Gibbs Fracture Zone; a pattern driven by large negative SSH, deep water (>1500m) and polar-temperate SST (5-12°C). There was some inter-annual variability in predicted distribution and there appears to be a northward expansion in distribution consistent with prey species responding to ocean warming. The models could potentially be used to predict future distribution of sei whales based on future environmental conditions predicted by climate models.

The two **grey seals** tagged in Vestmannaund in July moved back and forth in the strait for a significant proportion of the time. But both seals also made trips to more distant areas. One seal made several visits to the island of Mykines, west of the tagging site, while the other seal

made longer trips to the southernmost point of the Faroes. The seals never made any offshore movements. The longer lasting tag stopped transmitting in the end of the year.

III. ONGOING (CURRENT) RESEARCH

The Faroe Marine Research Institute has since year 2000 attached satellite transmitters on from 2 to 8 animals from 10 different **pilot whale** pods (48 tags in total), in order to monitor movements and migration, and to determine the distribution area of pilot whales recruiting to the Faroese harvest. The plan is to analyse the data that has been achieved until now, before any new tagging studies are initiated. The collection of samples from the drive hunt will continue.

The Museum of Natural History will continue the summer census for monitoring trend and abundance of the **grey seal** population. In 2021, the plan is to expand the study to include camera traps and satellite tracking, to study the behaviour, and to improve the accuracy of the abundance estimate.

The Environment Agency will continue to sample **pilot whales** for pollution monitoring in 2021.

IV. ADVICE GIVEN AND MANAGEMENT MEASURES TAKEN

A new law from 2020 (law no. 65, from 14 May 2020), ban all culling of marine mammals in connection with fish farming activities. Prior to this, fish farmers were allowed to cull seals interacting with their fish farms, but with the new law, this cull has completely ceased.

The Fisheries Inspection has followed the recommendations from NAMMCO, that the Faroes should collect data on bycatch of marine mammals in the pelagic fisheries targeting mackerel, herring, and blue whiting, and has performed opportunistic inspections of the fleet. For all fisheries, fishermen are mandated to deliver this information, both in the electronic and paper logbooks.

V. PUBLICATIONS AND DOCUMENTS

Gilles, A., Gunnlaugsson, T., Mikkelsen, B., Pike, D.G. & Víkingsson, G.A. (2020). Summer abundance of Harbour Porpoises (*Phocoena phocoena*) in the Coastal Waters of Iceland and the Faroe Islands. *NAMMCO Scientific Publications* 11. <https://doi.org/10.7557/3.4939>.

Houghton, L.E., Ramirez-Martinez, N., Mikkelsen, B. Víkingsson, G., Gunnlaugsson, T., Øien, N. & Hammond, P.S. (2020). Oceanic Drivers of Sei Whale Distribution in the North Atlantic. *NAMMCO Scientific Publications* 11. <https://doi.org/10.7557/3.5211>.

Krüger, A., Fabrizius, A., Mikkelsen, B., Siebert, U., Folkow, L. P., Burmester, T. 2020. Transcriptome analysis reveals a high aerobic capacity in the whale brain. *Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology, Volume 240*, 110593, ISSN 1095-6433, <https://doi.org/10.1016/j.cbpa.2019.110593>.

- Mikkelsen, B., and Hoydal, K. 2020. Faroe Islands – Progress report on Marine Mammals 2019. Paper presented to the NAMMCO Scientific Committee, October 29 - November 1, online meeting, Faroe Islands. 6pp.
- Pike, D. G., Gunnlaugsson, T., Mikkelsen, B., Halldórsson, S. D., & 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 Scientific Publications*, 11. <https://doi.org/10.7557/3.4941>.
- Pike, D. G., Gunnlaugsson, T., Mikkelsen, B., Halldórsson, S. D., & Víkingsson, G. 2019. Estimates of the abundance of cetaceans in the central North Atlantic based on the T-NASS Icelandic and Faroese shipboard surveys conducted in 2007. *NAMMCO Scientific Publications*, 11. <https://doi.org/10.7557/3.5269>.
- Pike, D.G., Gunnlaugsson, T., Desportes, G., Mikkelsen, B., Víkingsson, G.A. & 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 Scientific Publications*, 11. <https://doi.org/10.7557/3.4643>.
- Pike, D.G., Gunnlaugsson, T., Mikkelsen, B., Víkingsson, G. & Desportes, G. (2020). Distribution and Abundance of Killer Whales in the Central North Atlantic, 1987-2015. *NAMMCO Scientific Publications* 11. <https://doi.org/10.7557/3.5579>.

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I. INTRODUCTION

This report summarises research on cetaceans and pinnipeds conducted in the Faroe Islands in 2019, by the Museum of Natural History and the Environment Agency.

II. RESEARCH BY SPECIES 2019

II.a Species/Stocks studied

- Grey seal (*Halichoerus grypus*) – abundance, hunting statistics
- Harbour seal (*Phoca vitulina*) – observation
- Pilot whale (*Globicephala melas*) – landed animals, tagged animals
- Northern bottlenose whale (*Hyperoodon ampullatus*) – stranded animals
- Fin whale (*Balaenoptera physalus*) – stranded animal

II.b Field work

In 2019, biological samples for age and reproduction were collected from a total of 154 **pilot whales**, by the Natural History Museum – from the drives in Sandavágur on 29 April (34 samples), Tórshavn on 29 May (76), Hvalvík on 2 August (23) and Vestmanna on 27 August (21). In addition, stomachs and tissues from some of the same animals were stored for diet, genetic and contaminant studies.

In 2019, the Environment Agency took samples of **pilot whales** in connection with grinds in Sandavágur on 29 April, Tórshavn on 29 May, Hvalvík on 2 August and Vestmanna on 27 August. In all, 81 individual samples of muscle and blubber, and liver and kidney tissue samples were taken. In addition, muscle, blubber, liver and kidney were taken from 6 fetuses from the grind in Sandavágur.

On July 7, the Museum tagged five **pilot whales** with satellite transmitters. A small pod counting sixteen whales was spotted in the fjord of Gøta and driven to the bay of Syðrugøta. The pod was led gently towards the shore, where most animals pertly stranded, and satellite transmitters were attached to the dorsal fin. The operation took one hour, thereafter the pod swam to the fjord again. The second day, the pod left the fjord and archipelago. This is the seventh tagging event in a dedicated tracking programme, with the objective to determine the management unit of pilot whales recruiting to the hunt in the Faroe Islands.

A research programme for estimating the abundance of **grey seals** started in 2018. During the summer of 2019, the total shoreline of the archipelago was surveyed by boat, and all seals hauled-out and in the water were counted. Each island was visited from one to three times; the only area without effort was the east side of Suðuroy. In high-density areas, footages captured from drone were used for the seal counts, which improved accuracy considerable.

By-catch of marine mammals by the Faroese fishing fleet seems not to be a regular event. The main reason for this is the exclusion of gillnet fisheries in waters shallower than 380 meters.

Gillnets are used in the fisheries for monkfish and Greenland halibut, but because of the soaking depth, by-catch is almost absent. From the logbooks, the one to five annual records of by-catches of marine mammals happen mainly in the pelagic fishery for mackerel, herring and blue whiting. The species reported have been the pilot whale and the minke whale. The Fisheries Inspection had observers on board selected pelagic vessels during operation in 2018 and 2019, where no by-catch incidences was observed.

Two **bottlenose whales** stranded and ceased in Froðba, Suðuroy, on 26 August.

Every year floating carcasses of large cetaceans are observed in Faroese waters. In most cases, the carcasses are highly decomposed, and of sperm whales. On two occasions in 2019, however, **fin whale** carcasses were observed close to the archipelago. On 22 march, a 17 meters long male fin whale stranded outside the village of Kirkjubø. The animal had been dead less than a week and was removed by the Fishery Inspection. Again, in August, a newly dead animal was observed just north of the islands.

A **harbour seal** was observed in Tórshavn for a period of a few weeks, in August. This species was extirpated from the islands around one hundred and seventeen years ago and has since been a rare visitor.

II.c Laboratory work

The biological material collected from **pilot whales** in 2019 has been prepared ready for finalizing the analysis of age, reproduction and diet.

The Environment Agency are regularly collecting **pilot whale** samples for a tissue bank, where the aim is to take samples from three schools a year, with generally 25 individuals from each. In addition to a monitoring program as outlined in Table 1, research activities are done as projects and when funding allows. Such projects could be to investigate the presence of chemicals of emerging environmental concern and elucidate potential negative impact of pollutants on pilot whales. In 2019, samples of pilot whales were included in a Nordic Council of Ministers supported study of UV-filters, as arranged and coordinated by the Nordic Screening group, see also www.nordicscreening.org.

Table 1. Pollutants in the pilot whale monitoring program of the Environment Agency.

Matrix (tissue)	blubber & muscle	kidney	liver	blubber / liver ^{*,**}	blubber [*]
Frequency of sampling	yearly, pref. from 3 schools, focus incr. on juv. males for timetrend				
number of samples analysed per year	25	15	15	5	5
Tissue analysed for:	Blubber: Legacy persistent organic pollutants Muscle: metals [£]	Cadmium, dry mass	Mercury, selenium, cadmium, dry mass	Perfluoroalkyl substances, polybrominated diethyl ethers	hexabromo cyclo-dodecane, Dechlorane plus

*Time trends

** PFAS is analysed in liver

\$ PCB, HCH, HCB, DDT, DDE, and from ca. ½ of the samples even o,p-isomer DDT and metabolites, CHL, Mirex, Toxaphene.

£ Mercury, selenium, dry mass and stable N and C isotopes

II.d Other studies

In the Faroe Islands, it is legal for salmon farmers to cull **grey seals** interacting with installations, as a protective act. Since 2018, salmon farmers have been legislated to deliver monthly removal numbers to the authorities. However, the Museum of Natural History have since 2014 had access to these harvest numbers from salmon farmers.

II.e Research results

The **pilot whale** pod tagged with satellite transmitters on July 7 left the islands in a northward direction. After reaching the slope of the Plateau, the group took a westward direction, towards Iceland. During the next month, the group moved on the Ridge, towards the Iceland Shelf and east to the Faroe-Shetland Channel. South in the Channel, one tagged animal retained and left the group, while the other animals moved southward, following the UK Shelf slope. The group finally turned south at 51°4'N, and thereafter moved on the same path north again. Since, the group has moved north and south between 52°N and 60°N, tightly connected to the Shelf break. One tag still transmitted at the end of the year, 178 days after tagging.

The results from the contaminants analyses of **pilot whales** were reported by the Environment Agency in the report Andreasen et al., 2019 “AMAP Faroe Islands 2013-2016: Heavy Metals and POPs Core programme”, Environment Agency, pp.103. Along with the data for heavy metals and legacy POPs, the report includes data from time trend analyses of PBDEs and PFAS in pilot whale. The monitoring of pollutants in pilot whales are focused on juvenile males, so as to minimize variability that stems from sex/age related biological processes. The monitoring results indicate a steadily decreasing concentration of POPs in general (ie PCB and legacy pesticides) including the brominated flame retardants PBDE. For perfluorinated alkyl substances, like PFOS, however, there are no clearly discernible trend, other than that the concentrations appear to have levelled out, or still be on a weekly increasing curve.

Trends in the abundance of long-finned **pilot whale** was investigated by Pike *et al.*, 2019, based on the North Atlantic Sightings Surveys (NASS) conducted in 1987, 1989, 1995, 2001, 2007 and 2015. Conventional distance sampling was used to develop indices of relative abundance to determine if pilot whale abundance has changed over the 28-year period from 1987 to 2015. Varying spatial coverage of the surveys was accommodated by delineating common regions that were covered by all 6 surveys, and the 3 largest surveys (1989, 1995 and 2007), respectively. These “Index Regions” were divided into East and West sub-regions, and post-stratification was used to obtain abundance estimates for these index areas only. Total abundance in the Index Regions, uncorrected for perception or availability biases, ranged from 54,264 (CV=0.48) in 2001 to 253,109 (CV=0.43) in 2015. There was no significant trend in the numbers of individuals or groups in either the 6 or 3 Survey Index Regions, and no consistent trend over the period. Power analyses indicate that negative annual growth rates of -3% to -5% would have been detectable over the entire period. The Index Regions comprise only a portion of the summer range of the species and changes in annual distribution clearly affect the results.

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Atlantic. The Icelandic and Faroese ship survey component covered the area between the Faroe Islands and East Greenland from latitude 52° to 72° N. The survey used 3 vessels and an independent double-platform configuration with each platform staffed by a minimum of 2 observers. Both uncorrected abundance estimates derived using Multiple Covariates Distance Sampling, and corrected abundance estimates derived using Mark-Recapture Distance Sampling, were provided for the following species (corrected estimates given): fin (*Balaenoptera physalus*; 36,773, CV=0.17, 95% CI 25,811–52,392), common minke (*B. acutorstrata*; 42,515, CV=0.31, 95% CI 22,896–78,942), humpback (*Megaptera novaeangliae*; 9,867, 95% CI 4,854–20,058), blue (*B. musculus*; 3,000, CV=0.40, 95% CI 1,377–6,534), sei (*B. borealis*; 3,767, CV=0.54, 95% CI 1,156–12,270), sperm (*Physeter microcephalus*; 23,166, CV 0.59, 95% CI 7,699–69,709), long-finned pilot (*Globicephala melas*; 344,148, CV=0.35, 95% CI 162,795–727,527) and northern bottlenose (*Hyperoodon ampullatus*; 19,975, CV=0.06, 95% CI 5,562–71,737) whales as well as white-beaked (*Lagenorhynchus albirostris*; 159,000, CV=0.63, 95% CI 49,957–506,054) and white-sided (*L. acutus*; 131,022, CV=0.73, 95% CI 35,251–486,981) dolphins.

In Dassuncao *et al.*, 2019, the role of phospholipids for PFAS accumulation was investigated by analyzing associations among concurrent measurements of phospholipid, total protein, total lipid, and 24 PFASs in the heart, muscle, brain, kidney, liver, blubber, placenta, and spleen of North Atlantic **pilot whales** (*Globicephala melas*). The sum of 24 PFASs (Σ 24 PFAS) was highest in the liver [median of 260 ng g⁻¹; interquartile range (IQR) of 216–295 ng g⁻¹] and brain (86.0 ng g⁻¹; IQR of 54.5–91.3 ng g⁻¹), while phospholipid levels were highest in the brain. The relative abundance of PFASs in the brain greatly increases with carbon-chain lengths of ≥ 10 , suggesting shorter-chain compounds may cross the blood–brain barrier less efficiently. Phospholipids were significant predictors of the tissue distribution of the longest-chain PFASs: perfluorodecanesulfonate (PFDS), perfluorododecanoate (PFDoA), perfluorotridecanoate (PFTrA), and perfluorotetradecanoate (PFTA) ($r_s = 0.5–0.6$). In all tissues except the brain, each 1 mg g⁻¹ increase in phospholipids led to a 12–25% increase in the concentration of each PFAS. The conclusion was that partitioning to phospholipids is an important mechanism of bioaccumulation for long-chain PFASs in marine mammals.

In Li *et al.*, 2020, Hg stable isotopes, total Hg, MeHg and selenium (Se) concentrations measured in multiple tissues of North Atlantic **pilot whales** (*Globicephala melas*) was used to investigate processes affecting the distribution and accumulation of Hg^{II} and MeHg. It was found that simple mixing of two distinct isotopic end-members: MeHg (1.4‰) and Hg^{II} (–1.6‰) can explain the observed variability of $\delta^{202}\text{Hg}$ in brain tissue. A similar isotopic composition for the MeHg end-member in the brain, muscle, heart, and kidney suggests efficient exchange of MeHg in blood throughout the body. By contrast, the Hg isotopic composition of the liver of adult whales was different from younger whales and other tissues that follow the two-end member mixing model. Measured Se:Hg ratios were lowest in adult whales with the highest levels of MeHg exposure. In these individuals, Se availability was likely reduced by complexation with demethylated Hg^{II}. It was speculated that this could result in a higher fraction of labile Hg^{II} eliminated from the liver of adult whales compared to young whales and subsequent redistribution to other tissues, potentially affecting toxicity.

III. ONGOING (CURRENT) RESEARCH

The Museum of Natural History will continue to track **pilot whales** by satellite telemetry, in order to monitor migration and determine the distribution area of pilot whales recruiting to the Faroese harvest. In addition, collection of samples from the drive hunt will continue.

The Museum of Natural History will continue the summer census for estimating the abundance of the **grey seal** population. In 2020, the plan is to expand the study to include camera traps and satellite tracking, in order to improve the accuracy of the estimate.

The Environment Agency will continue to sample **pilot whales** for pollution monitoring in 2020.

IV. ADVICE GIVEN AND MANAGEMENT MEASURES TAKEN

In a new amendment, from 2018, to the legislation regulating fish farming activities in the islands, farmers are demanded to deliver statistics to the authorities, once a year, on monthly removals of grey seals, for each farming locality separately. This is based in a recommendation from NAMMCO, to collect statistics of the removals of grey seals around fish farms.

The Fisheries Inspection has followed the recommendations from NAMMCO, that Faroes should collect data on bycatch of marine mammals in the pelagic fisheries targeting mackerel, herring and blue whiting, and has performed opportunistic inspections of the fleet. For all fisheries, fishermen are mandated to deliver this information, both in the electronic and paper logbooks.

V. PUBLICATIONS AND DOCUMENTS

Andreasen, B., Hoydal, K., Mortensen, R., Erenbjerg S.V., and Dam, M. 2019. AMAP Faroe Islands 2013 – 2016: Heavy Metals and POPs Core Programme, Umhvørvisstovan, Argir, Faroe Islands, x + 103 pp

Dassuncao, C., Pickard, H., Pfohl, M., Tokranov, A. K., Li, M., Mikkelsen, B., Slitt, A. and Sunderland, E. M. 2019. Phospholipid Levels Predict the Tissue Distribution of Poly- and Perfluoroalkyl Substances in a Marine Mammal. *Environ. Sci. Technol. Lett.* 2019, 6, 119-125. DOI: 10.1021/acs.estlett.9b00031

Dietz, R., Letcher, R.J., Desforges, J.-P., Eulaers, I., Sonne, C., Wilson, S., Andersen-Ranberg, E., Basu, N., Barst, B.D., Bustnes, J.O., Bytingsvik, J., Ciesielski, T.M., Drevnick, P.E., Gabrielsen, G.W., Haarr, A., Hylland, K., Jenssen, B.M., Levin, M., McKinney, M.A., Nørregaard, R.D., Pedersen, K.E., Provencher, J., Styriehave, B., Tartu, S., Aars, J., Ackerman, J.T., Rosing-Asvid, A., Barrett, R., Bignert, A., Born, E.W., Branigan, M., Braune, B., Bryan, C.E., Dam, M., Eagles-Smith, C.A., Evans, M., Evans, T.J., Fisk, A.T., Gamberg, M., Gustavson, K., Hartman, C.A., Helander, B., Herzog, M.P., Hoekstra, P.F., Houde, M., Hoydal, K., Jackson, A.K., Kucklick, J., Lie, E., Loseto, L., Mallory, M.L., Miljeteig, C., Mosbech, A., Muir, D.C.G., Nielsen, S.T., Peacock, E., Pedro, S., Peterson, S.H., Polder, A., Rigét, F.F., Roach, P., Saunes, H., Sinding, M.-H.S., Skaare, J.U., Søndergaard, J., Stenson, G., Stern, G., Treu, G., Schuur, S.S., Víkingsson, G., 2019. Current state of knowledge on biological effects from contaminants on arctic wildlife and fish. *Science of the Total Environment*, 696, 133792. <https://doi.org/10.1016/j.scitotenv.2019.133792>

Kärrman, A., Wang, T., Kallenborn, R., 2019. PFASs in the Nordic Environment. TemaNord 2019:515. Nordic Council of Ministers, Copenhagen, Denmark.

- M. Li, C.A. Juang, J.D. Ewald, R. Yin, B. Mikkelsen, D.P. Krabbenhoft, P.H. Balcom, C. Dassuncao, E.M. Sunderland. Selenium and stable mercury isotopes provide new insights into mercury toxicokinetics in pilot whales. *Science of the Total Environment* 710 (2020). <https://doi.org/10.1016/j.scitotenv.2019.136325>
- Mikkelsen, B., Dam, M. and Hoydal, K. 2019. Faroe Islands – Progress report on Marine Mammals 2018. Paper presented to the NAMMCO Scientific Committee, October 29 - November 1, Tórshavn, Faroe Islands. 4pp.
- Pike, D. G., Gunnlaugsson, T., Mikkelsen, B., Halldórsson, S. D., & 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 Scientific Publications*, 11. <https://doi.org/10.7557/3.4941>
- Pike, D.G., Gunnlaugsson, T., Desportes, G., Mikkelsen, B., Víkingsson, G.A. & 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 Scientific Publications*, 11. <https://doi.org/10.7557/3.4643>
- Rigét, F., Bignert, A., Braune, B., Dam, M., Dietz, R., Evans, M., Green, N., Gunnlaugsdóttir, H., Hoydal, K.S., Kucklick, J., Letcher, R., Muir, D., Schuur, S., Sonne, C., Stern, G., Tomy, G., Vorkamp, K., Wilson, S., 2019. Temporal trends of persistent organic pollutants in Arctic marine and freshwater biota. *Sci. Total Environ.* 649, 99–110. <https://doi.org/10.1016/j.scitotenv.2018.08.268>