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FAROE ISLANDS
PROGRESS REPORT ON MARINE MAMMALS 2020

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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 Vestmannasund, 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 mowed 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 taggen 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 detectible 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 providedfor 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 base 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 Vestmannasund 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

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