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Arctic Marine Biodiversity Monitoring Plan Annual Report 2016

Annual Report on the Implementation of the Circumpolar Biodiversity Monitoring Program's Arctic Marine Biodiversity Monitoring Plan (CBMP-Marine Plan)



Acknowledgements

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- Norwegian Environment Agency, Trondheim, Norway
- Environment Canada, Ottawa, Canada
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- Finnish Ministry of the Environment, Helsinki, Finland
- Icelandic Institute of Natural History, Reykjavik, Iceland
- Ministry of Foreign Affairs, Greenland
- Russian Federation Ministry of Natural Resources, Moscow, Russia
- Swedish Environmental Protection Agency, Stockholm, Sweden
- United States Department of the Interior, Fish and Wildlife Service, Anchorage, Alaska

CAFF Permanent Participant Organizations:

- Aleut International Association (AIA)
- Arctic Athabaskan Council (AAC)
- Gwich'in Council International (GCI)
- Inuit Circumpolar Council (ICC) – Greenland, Alaska and Canada
- Russian Indigenous Peoples of the North (RAIPON)
- Saami Council

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The Arctic Marine Biodiversity Monitoring Plan (CBMP-Marine Plan)

The Arctic Marine Biodiversity Monitoring Plan (Marine Plan) is a pan-Arctic, long-term, integrated biodiversity monitoring plan produced by the CAFF working group's Circumpolar Biodiversity Monitoring Program (CBMP). Approved by the Arctic Council in 2011, the objectives of the CBMP-Marine Plan are to integrate existing circumpolar monitoring datasets and models to improve the detection and understanding of changes in Arctic marine biodiversity, as well as to initiate policy and management responses to these changes. The Marine Plan represents broad agreement across Arctic States and Permanent Participants on how to generate better results from existing collective monitoring efforts for Arctic marine ecosystems, designed to provide more comprehensive and timely circumpolar information for effective decision-making.

Marine Steering Group

The MSG

- ▶ coordinates the implementation of the Marine Plan;
- ▶ ensures effective communication amongst and between the implementing nations ;
- ▶ coordinates and provides direction to the Marine Expert Networks (MENS);
- ▶ facilitates input from member's own national experts;
- ▶ tracks the implementation of the CBMP-Marine Plan; and
- ▶ provides reports and information derived from monitoring activities to the CAFF working group.

The MSG, currently led by Norway and Russia, is composed of one representative and an alternate from each Arctic marine nation; representatives from interested Permanent Participants; and other members as appropriate, e.g., Arctic Council Working Group representatives. Currently, the Marine Steering Group members include:

- ▶ Norway: Marianne Olsen (Co-chair), Dag Vongraven (alternate)
- ▶ Russia: Vadim Mokievsky (Co-chair)
- ▶ Canada: Jill Watkins, Lisa Loseto (alternate)
- ▶ Iceland: Guðmundur Guðmundsson
- ▶ Kingdom of Denmark: Thomas Juul-Pedersen, Fernando Ugarte (alternate) Jan Sørensen (Faroe Islands)
- ▶ Inuit Circumpolar Council (ICC): Carolina Behe
- ▶ United States: John Bengtson
- ▶ CBMP co-Chair: Tom Christensen, Jason Taylor
- ▶ CAFF Secretariat: Kári Fannar Larusson
- ▶ AMAP: Jason Stow
- ▶ PAME: Elizabeth McLanahan

Further information can be found here: www.caff.is/marine/marine-steering-group



	Tasks	Project Components	Start-end date	Status	Details
1	CBMP-Marine organization	Ensure involvement by all participating countries	2011	Ongoing	
2	State of the Arctic Marine Biodiversity Report	Coordination, drafting, review, graphics and data development	2014-2017	Ongoing and scheduled to be completed for May 2017	
3	Establish coordinated CBMP monitoring in each Arctic Marine Area	Arctic-based monitoring networks adopt parameters and sampling approaches	2011	Ongoing	Funding is a limitation for making progress
4	Coordinated monitoring with non-Arctic states	Building upon CAFFs data sharing partnerships (e.g. GBIF and OBIS) continue to facilitate incorporation of Arctic data from Arctic and non-Arctic states into the Arctic Biodiversity Data Service (ABDS)	2015-	Ongoing	
5	Data management structures	Data process guidelines; development of ABDS; entry of data from ENs, interoperability with relevant data frameworks e.g. GBIF; web analysis tools; metadata added to the Polar Data Catalogue	2013	Ongoing	
6	Focal ecosystem components and headline indicators	Existing data sets identified, aggregated and analysed to establish indicator baselines	2013-	Ongoing	
7	Reporting, communication, outreach	Annual performance report; work plan; CAFF Board memo; National implementation reports; Scientific publications; General communications	Annually	Ongoing	
8	Annual face-to-face meeting of SG and ENs		Annually		October 25-27, Akureyri, Iceland
9	Fundraising and promotion	Actively seek funding and other support/capacity for implementation. One-pagers developed for each country to use to promote the Marine Plan and raise funds/support;	Annually	Ongoing	Application by CAFF to relevant sources
10	Program review & adjustments	Input into the development of the CBMP 2018-2021 strategy	2016-2017	Planned	
11	Links to other Groups	Establishing/strengthening collaboration with relevant organizations e.g. contributing info to CBD, Arctic Council Working Groups and Arctic Council processes, e.g., AACA	Annually	Ongoing	

Further information can be found here: www.caff.is/marine/marine-expert-networks

Budget

Estimated costs for implementation CBMP-Marine Plan are presented in the marine monitoring plan and previous annual reports (for further details please see Appendix A. Implementation Schedule and Budget. In: Arctic Marine Biodiversity Monitoring Plan, CAFF Monitoring Series Report No.3, April 2011, ISBN 1. 978-9979-9778-7-2).

Based on this information the 2016 budget for implementing the Marine Plan is estimated at 266,000 USD for programme coordination and implementation. Arctic coastal nations are responsible for 186,000 USD (31,000 USD per country) focusing on participation and work of the MSG and MENs. CAFF is responsible for 75K to ensure the coordination and management of the programme.

Challenges

Ongoing challenges entail securing participation of all six Permanent Participants, securing financial support for work to be conducted by Permanent Participants and ensuring financial support for expert participation (both Traditional Knowledge holders and scientists) in CBMP marine activities.

Sea-Ice Biota Expert Network

- ▶ Norway: Bodil A. Bluhm (Co-lead), Haakon Hop (Co-lead), Mikko Vihtakari, Rolf Gradinger, Cecilie von Quillfeldt
- ▶ Russia: Igor A. Melnikov
- ▶ U.S.: R. Eric Collins
- ▶ Canada: Michel Poulin
- ▶ Kingdom of Denmark: Thomas Juul-Pedersen

Top five needs, estimated cost and contributions (in-kind and otherwise)

Top need	Estimated cost	Contributions to date
Complete ongoing activities, in particular related to SAMBR and related peer-reviewed articles	30,000 USD	2016

Top activities in the previous year

- ▶ Assemble sea ice biota data on microbes, eukaryotes, meiofauna and macrofauna
- ▶ Quality control data and store them in NP-Data base
- ▶ Make maps and tables for pan-Arctic distribution and trends in sea ice biota
- ▶ Write Chapter 3.1. Sea ice biota for the State of Arctic Marine Biodiversity Report (SAMBR) report
- ▶ Make data in SAMBR report available to the Arctic Biodiversity Data Service (ABDS).
- ▶ Initiate draft papers on sea ice biota for publication in scientific journals
- ▶ Present sea ice biota information on national and international meetings
- ▶ Participate in CBMP activities (meetings and reporting)

Main activities to be continued/completed in year ahead

Main activity	To be continued/completed in the year
Finish SAMBR Chapter 3.1.	2016
Write scientific papers on sea ice biota	2016/2017 and beyond
Attend CBMP annual meeting	Oct 2016
Provide updates to CBMP Marine website	2016/2017

Plankton Expert Network

- ▶ Canada: Connie Lovejoy (Co – lead), Michel Poulin
- ▶ U.S.: Russ Hopcroft (Co – lead)
- ▶ Russia: Ksenia Kosobokova
- ▶ Norway: Cecilie von Quillfeldt
- ▶ Iceland: Gudmundur Gudmundsson
- ▶ Kingdom of Denmark: Kristine Arendt (Greenland) and Hogni Debes (Faroe Islands)

Top five needs, estimated cost and contributions (in-kind and otherwise)

Top need	Estimated cost	Contributions to date
Post-doc to collate data, write reports- single celled plankton	50% time 25000 USD	Post-doc currently employed for 25% position however funding needed to allow for continuation.
Support to attend meetings	4000 USD Canada, similar for Russia.	USA, Norway, Iceland, Greenland have been able participate in meetings. A new representative from Canada is needed. Russia needs support to participate in meetings.

Top need	Estimated cost	Contributions to date
National mandate to deliver detailed datasets to centralized data centres	unknown	Few contemporary researchers routinely place their full datasets online, despite agreeing to the process in concept
Post-docs or technicians to assemble data and link to concurrent environmental datasets	50 USD /year (part-time)	Progress has been made in assembling historical metazoan zooplankton data, but not in matching it to temperature and salinity data at the time of collection
Data exploration toolkits	unknown	USA has been making progress, but without such tools, routine updates will be slow

Top activities in the previous year.

- ▶ Working with SAMBR:
 - Data aggregation.
 - Map and figure development.
 - Writing and revisions.
 - Attending the CBMP – marine annual meeting 2015
 - Publications:
- ▶ Thalassiosira distribution (Luddington A, Lovejoy, C and Kacmarska, I. 2016) <http://plankt.oxfordjournals.org/cgi/content/full/fbw030?ijkey=rdt5st2M8uWh9Jb&keytype=ref>
- ▶ Arctic Taylored SSU rRNA data base: Lovejoy, C., Comeau, A., Thaler, M. 2015. Curated reference database of SSU rRNA for northern marine and freshwater communities of Archaea, Bacteria and microbial eukaryotes, v. 1.0. Nordicana D23, doi:10.5885/45409XD-79A199B76BCC4110.
- ▶ Preparing Genome Canada proposal for genomic and metagenomic enabled diversity studies.
- ▶ Special issue of Frontiers in Microbiology on Polar Aquatic microbiology (submissions are open) <http://fron.tiers.in/rt/4433>
- ▶ Compilation of Phytoplankton Records
- ▶ Developing partnership with the Canadian High Arctic Research Station for monitoring biodiversity
- ▶ Compilation and aggregation of Zooplankton records
- ▶ Analysis of spatial and temporal trends in metazoan zooplankton– partially published for Chukchi Sea, others in progress
- ▶ Mapping of zooplankton species distributions
- ▶ Main activities to be continued/completed in year ahead

Main activities to be continued/completed in year ahead

Main activity	To be continued/ completed in the year
Ensure effective communication between plankton experts within the network as well as on a national level	Continuing
Collect, aggregate, analyse and report on relevant data in accordance with the priority parameters, indicators and sampling schemes of the plan, and adjust and further develop the plan, to deliver data and reports in accordance with the CBMP data management plan to CAFF Secretariat	Continuing
Deliver this information and analysis to inform future Arctic Council assessments and CBMP indicators	Continuing

Benthos Expert Network

- ▶ US: Katrin Iken (Lead)
- ▶ Norway: Lis Lindal Jørgensen
- ▶ Russia: Nina Denisenko, Stanislav Denisenko
- ▶ Canada: Virginie Roy, Philippe Archambault
- ▶ Iceland: Gudmundur Gudmundson
- ▶ Kingdom of Denmark (Greenland): Martin Blicher
- ▶ Faroe Islands: Jan Sørensen

Top five needs, estimated cost and contributions (in-kind and otherwise)

Top need	Estimated cost	Contributions to date
Funds to attend annual CBMP-Marine Plan meetings: It is vital that all expert members have the opportunity to participate in the annual CBMP face-to-face meeting to discuss plans, and make progress on or complete tasks outlined in work plans	3,000 USD per participant per trip Travel funds needed for participants from: Canada, Russia, US, Greenland	Canada: Canadian Museum of Nature, attendance of 2015 University du Québec – no institutional contributions US: NOAA research grant to Katrin Iken (University of Alaska Fairbanks) paid for Philippe Archambault (Canada) for participation in the 2014 Iceland meeting to represent Pacific Arctic countries at meeting. NOAA Arctic Climate Office for participation of in CBMP benthic meetings, except 2015. Russia: Zoological Institute of the Russian Academy of Sciences, participation in annual meetings, paid by CAFF Greenland: Institute of Natural Resources and research grants; participation in 2015 Pasvik meeting Norway: Institute of Marine Research and grants from Norwegian Environment Agency to participate in benthic CBMP Iceland: Icelandic Institute of Natural History to participate in annual CBMP benthic meetings Faroe Islands: Natural History Museum of Faroe Islands to participate in 2014 and 2015 CBMP benthic meetings
Financial support for time spent on creating and updating biodiversity databases and writing reports for those members where it is not in the primary mandate of the researcher (e.g., University researchers)	Funds needed: 6,000 USD per representative per year Needed for researchers in: Canada - University du Québec à Rimouski (Philippe Archambault) Russia - Zoological Institute of the Russian Academy of Sciences (Nina and Stanislav Denisenko) US – University of Alaska Fairbanks (Katrin Iken) Norway – Institute of Marine Research (Lis Lindal Jørgensen) Greenland – Greenland Institute of Natural Resources (Martin E. Blicher) Iceland – Icelandic Institute of Natural History (Gudmundur Gudmundsson) and Marine Research Institute (Steinunn H. Olafsdottir).	Canada: University du Québec à Rimouski – time volunteered since 2010. Canadian Museum of Nature, time institutionally supported Russia: Zoological Institute of the Russian Academy of Sciences– time volunteered since 2006 Greenland: Greenland Institute of Natural Resources– time and travel institutionally supported or from research grants Norway: Institute of Marine Research – limited time supported institutionally US: University of Alaska Fairbanks– time volunteered since 2006, except for ~5,000 USD in 2016 Iceland: Icelandic Institute of Natural History and Marine Research Institute – time volunteered and partly covered by government grants Faroe Islands: Natural History Museum of Faroe Islands– since 2014
Funds needed for transcription of hand-written data archives since the 18th century (>50,000 records) into electronic format; maintenance of data archive incl. taxonomic updating for synonymy; data analysis and preparing text for reports.	12,000 USD - Zoological Institute of the Russian Academy of Sciences (Russia)	Time volunteered or institutionally supported for benthic MEN members as for previous topic
Grants for defining indicators for multiple impacts and related indices. Information and background to be used in annual CBMP meetings	12,000 USD, Institute of Marine Research (Norway)	Time volunteered or institutionally supported as listed for previous topics

Top need	Estimated cost	Contributions to date
Grant in form of work-hours spent on extracting/compiling data-sets on species diversity patterns in Icelandic waters for Marine Expert Monitoring Group related work	5,300 USD - Icelandic Institute of Natural History	Time volunteered or institutionally supported as listed for previous topics

Top activities in the previous year.

- ▶ Collating pan-Arctic data on the relative benthic species richness by major taxa and creating comparative map for the State of the Arctic Marine Biodiversity Report (SAMBR)
- ▶ Collating pan-Arctic data on total epibenthic species richness by trawl stations and creating comparative map (SAMBR)
- ▶ Tabulating information on driver's impact on benthos for all CBMP Arctic regions (SAMBR)
- ▶ Synthesizing information on spatial and temporal patterns in benthic biodiversity, with focus on epibenthos (SAMBR)
- ▶ Development and implementation of protocol for benthos monitoring in Greenland shelf waters (INAMon), and setting up an Arctic benthos expert-knowledge exchange program.
- ▶ Second "pilot" cruise completed for megabenthos monitoring as part of the annual ground fish trawl survey in Greenland and Icelandic waters; in collaboration with the benthos expert group, and participation in Arctic benthos expert-knowledge exchange program. Continuation of the joint Russian (PINRO) and Norwegian (IMR) megabenthos monitoring (trawl) in the Barents Sea.
- ▶ First cruise of the new Arctic Marine Biodiversity Monitoring Network (AMBON) cruise in the Chukchi Sea, which feeds into CBMP-benthic network
- ▶ Compilation of maps of distribution of most dominant benthic species in the Chukchi Sea (published in Denisenko et al. 2015, see below)
- ▶ Several important peer-reviewed publications in 2015 in regards to Arctic benthic biodiversity and trends published:
 - Yesson C, Simon P, Chemshirova I, Gorham T, Turner CJ, Hammeken Arboe N, Blicher ME, Kemp KM. 2015. Community composition of epibenthic megafauna on the West Greenland Shelf. *Polar Biology* 38(12): 2085-2096, DOI 10.1007/s00300-015-1768-y
 - Sigler MF, Mueter FJ, Bluhm BA, Busby MS, Coker ED, Danielson SL, De Robertis A, Eisner LB, Farley EV, Iken K, Kuletz KJ, Lauth RR, Logerwell EA, Pinchuk AI, Wilson CD. Summer zoogeography of the northern Bering and Chukchi seas. *Deep-Sea Res II*, in press
 - Grebmeier JM, Bluhm BA, Cooper LW, Denisenko SG, Iken K, Kedra M, Serratos C. 2015. Time-series benthic community composition and biomass and associated environmental characteristics in the Chukchi Sea during the RUSALCA 2004–2012 Program. *Oceanography* 28: 116-133. <http://dx.doi.org/10.5670/oceanog.2015.61>
 - Pisareva MN, Pickart RS, Iken K, Ershova EA, Grebmeier JM, Cooper LW, Bluhm BA, Nobre C, Hopcroft RR, Hu H, Wang J, Ashjian CJ, Kosobokova KN, Whitley TE. 2015. The relationship between patterns of benthic fauna and zooplankton in the Chukchi Sea and physical forcing. *Oceanography* 28: 68-83. <http://dx.doi.org/10.5670/oceanog.2015.58>
 - Degen, R., Jørgensen, L.L., Ljubin, P., Ellingsen, I.H., Pehlke, H., Brey, T., 2016. Patterns and drivers of megabenthic secondary production on the Barents Sea shelf. *Marine Ecology Progress Series*, 546, pp.1-16.
 - Jørgensen, L.L., Ljubin, P., Skjoldal, H.R., Ingvaldsen, R.B., Anisimova, N., Manushin, I., 2015. Distribution of benthic megafauna in the Barents Sea: baseline for an ecosystem approach to management. *ICES Journal of Marine Science: Journal du Conseil*, 72(2), pp.595-613.
 - Johannesen, E., Jørgensen, L.L., Fosheim, M., Primicerio, R., Greenacre, M., Ljubin, P.A., Dolgov, A.V., Ingvaldsen, R.B., Anisimova, N.A., Manushin, I.E., 2016. Large-scale patterns in community structure of benthos and fish in the Barents Sea. *Polar Biology* DOI: 10.1007/s00300-016-1946-6
 - Jørgensen, L.L., Planque, B., Thangstad, T.H. and Certain, G., 2015. Vulnerability of megabenthic species to trawling in the Barents Sea. *ICES Journal of Marine Science: Journal du Conseil*, p.fsv107.
 - Roy, V., Iken, K., Gosselin, M., Tremblay, J.É., Bélanger, S., Archambault, P., 2015. Benthic faunal assimilation pathways and depth-related changes in food-web structure across the Canadian Arctic. *Deep Sea Research Part I: Oceanographic Research Papers*, 102, pp.55-71.

- Roy, V., Iken, K., Archambault, P., 2015. Regional Variability of Megabenthic Community Structure across the Canadian Arctic. *ARCTIC*, 68(2): 180-192.
- Denisenko, N., 2015. New species of the genus *Parasmittina* (Bryozoa: Cheilostomata: Smittinidae) from the Chukchi Sea. *ZOOSYSTEMATICA ROSSICA*, 24(2): 303-306.
- Denisenko, N.V., Elsebeth Thomsen, Ole S. Tendal. 2015. Bryozoan epifauna on brachiopods from the Faroe Islands (NE Atlantic). *Fróðskaparrit-Faroese Scientific Journal* 60: 96-113.
- Denisenko, N.V., 2016. Two new species of the genus *Turbicellepora* Ryland, 1963 (Bryozoa: Celleporidae) found on *Lophelia* coral from the Greenland slope. *Zootaxa*, 4066(2), 177-182.
- Denisenko, S.G., Grebmeier, J.M. and Cooper, L.W., 2015. Assessing bioresources and standing stock of zoobenthos (key species, high taxa, trophic groups) in the Chukchi Sea. *Oceanography*, 28(3): 146-157.

Main activities to be continued/completed in year ahead

Main activity	To be continued/completed in the year
Continuing acquiring and integrating historical Arctic datasets from grey literature (e.g., historical governmental reports) and natural history museum collections (e.g. Canadian Museum of Nature, National Museum of Natural History, Swedish Museum of Natural History, etc.)	Continued throughout 2016
Continuing translating Arctic identification keys to English language (e.g., Russian identification keys)	Continued throughout 2016
Sharing pan-Arctic knowledge and expertise on benthos biodiversity for long-term monitoring. (1) Organizing workshops with experts on the identification of difficult benthos groups (e.g., bryozoans, sponges, meiofauna: foraminiferans, ostracods, etc.).	Planning in 2016/ Seeking funding/ Continued throughout 2016
Linking benthos biodiversity and higher trophic levels: Overlapping Arctic benthos data with bottom-fish data and benthic feeder mammals. Increase collaboration with other CBMP marine expert groups.	Initiating in 2016
Compiling pan-Arctic species list using modern synonymy and species occurrence in each sea.	Continued throughout 2016
Continuing long-term monitoring of the Atlantic Arctic (Blicher, Gudmundson, Sørensen, Roy, Archambault, Jørgensen) and the expert exchange programme to increase high quality species identification across the Arctic.	Continued throughout 2016
Building a catalog of species that could be used by all countries to standardize taxonomy, participate in common field sampling to also help taxonomic standardization among countries. This also builds on continuously developing regional Arctic benthic photo catalogs.	Continued throughout 2016

Marine Fish Expert Network

- ▶ Canada: Kevin Hedges (Lead)
- ▶ Russia: Vadim Mokievsky
- ▶ U.S.: Catherine Mecklenburg
- ▶ Norway: Edda Johannesen
- ▶ Iceland: Hreidar Tór Valtýsson
- ▶ Kingdom of Denmark: Helle Siegstad (Greenland) and Jakup Reinert (Faroe Islands)
- ▶ Inuit Circumpolar Council: Carolina Behe

Top five needs, estimated cost and contributions (in-kind and otherwise)

Top need	Estimated cost	Contributions to date
Preparation and publication of pan-Arctic marine fish atlas and identification guide	~140,000 USD per year	~\$140K USD in 2015 from the Norwegian Ministry of Foreign Affairs ~\$140K USD in 2016 from the Norwegian Ministry of Foreign Affairs

Top need	Estimated cost	Contributions to date
Meeting travel	3,000 USD per participant per meeting	Funding generally provided by home institutions for Canadian and Norwegian members. Funding is often provided by NOAA for USA and ICC member. Members from Russia, Iceland, Greenland and the Faroe Islands are new to the network and have not travelled to meetings to date; funding may be required for some or all of these new members.

Top activities in the previous year.

- ▶ Working on SAMBR.
 - Data aggregation.
 - Map and figure development.
 - Writing and revisions.
- ▶ Working on pan-Arctic marine fish atlas.
- ▶ Attending the CBMP – marine annual meeting in Pasvik, Norway.
- ▶ Publications
 - Mecklenburg, C.W., T.A. Mecklenburg, B.A. Sheiko, and D. Steinke. 2016. Pacific Arctic Marine Fishes. Conservation of Arctic Flora and Fauna, Akureyri, Iceland. 398 pp. ISBN: 978-9935-431-55-4.
- ▶ Ensure effective communication among marine fish experts within the network as well as on a national level.

Main activities to be continued/completed in year ahead

- ▶ Revisions of SAMBR marine fish chapter.
- ▶ Working on pan-Arctic marine fish atlas.
- ▶ Attending the CBMP – marine annual meeting in Akureyri, Iceland.
- ▶ Ensure effective communication among marine fish experts within the network as well as on a national level.

Seabird Expert Network

- ▶ U.S.: Kathy Kuletz (Co-lead), Robert Kaler (U.S. Fish and Wildlife Service, U.S.)
- ▶ Canada: Grant Gilchrist (Wildlife Research Division, Canada – CBird/Lead), Mark Mallory (Acadia University, Nova Scotia, Canada)
- ▶ Russia: Maria Gavrilov (Arctic and Antarctic Research Institute, Russia), Yuri Artukhin (Kamchatka Branch of Pacific Institute of Geography, Russia)
- ▶ Norway: Hallvard Strøm (Norwegian Polar Institute, Norway), Tycho Anker-Nilssen (Norwegian Institute for Nature Research, Norway).
- ▶ Iceland: Erpur Hansen (South Iceland Nature Research Centre, Iceland), Ævar Petersen (retired)
- ▶ Kingdom of Denmark: Flemming Ravn Merkel (Aarhus University, Denmark), Bergur Olsen (Faroese Fisheries Laboratory, Faroe Islands)
- ▶ Finland: Mia Rönkä (University of Turku, Finland)
- ▶ Sweden: Henrik Osterblom, Martina Kadin, Jonas Sundberg (Stockholm University)

Top five needs, estimated cost and contributions (in-kind and otherwise)

Top need	Estimated cost	Contributions to date
Continue research on threats and produce reports	>300,000 /year	Key project underway examining threats from industrial shipping on marine birds in Canadian Arctic; ongoing annual work on threats from contaminants; analyses continue looking at climate change effects.

Top need	Estimated cost	Contributions to date
Increased, consistent monitoring at key colony sites, with full implementation of Circumpolar Seabird Monitoring Plan (see Irons et al. 2015, CAFF report No. 17)	>100,000/year Per country	Major national avian monitoring review has taken place for Canada, but commitment to support not completed yet and no funds committed presently for monitoring. In US, Fish & Wildlife Service has minimal monitoring in Arctic, most resources in southern Bering Sea and Gulf of Alaska. Atlantic has good coverage, but more colonies need full implementation of CBird plan. Russia is most lacking in resources and effort, lack of funding.
Development and maintenance of Circumpolar Seabird Data Portal under the Seabird Information Network (SIN)	\$100,000/year	Under the Seabird Information Network (SIN) each country is encouraged to establish a national colony registry that contributes to this web-accessible tool. CBird's goal is to make a Seabird Population Trend Index and a Seabird Productivity Index part of the Circumpolar Seabird Data Portal. Personnel (time and money) have not been acquired to fully implement this objective.
Compilation, analysis, and report on conservation implications of seabird bycatch in commercial fisheries, with management plan	200,000 USD	At the 2015 CBird meeting, it was recognized that an update and comprehensive analysis of conservation impacts of seabird bycatch in fisheries was warranted (all countries provided presentations on this issue). Also relevant for AMBI. EMs discussed countries and fisheries of particular interest, and propose meetings and data compilation/analysis begin in 2016/2017.
Increased participation in CBMP workshops, and attendance at CBird meetings	50,000 USD/year	Most countries face continued reduction in funds to facilitate travel of EMs to attend meetings and workshops. Participation in CBMP has been particularly lacking for CBird members. Reports to CAFF, publications, relevant data compilation and database maintenance have depended on volunteer time and use of each country's base program funds.

Top activities in the previous year

- ▶ Working on SAMBR:
 - Data aggregation.
 - Map and figure development.
 - Writing and revisions.
- ▶ Circumpolar Seabird Group (CBird) meeting held (21 attendees) to discuss common, circumpolar issues and review progress towards implementing monitoring plan (South Africa, Oct 2015, prior to World Seabird Conference in Cape Town).
- ▶ Eight priority species selected (at the 2015 CBird meeting), from original 23 species, to best focus efforts and represent foraging guilds across circumpolar regions (see SAMBR, seabird section).
- ▶ Presented monitoring plan at CAFF meeting in Tromsø in Sep 2015. Final draft published:
 - Irons, D. B., A. Petersen, T. Anker-Nilssen, Y. Arthukin, R. Barrett, D. Boertman, M. Gavrilov, H. G. Gilchrist, E. S. Hansen, M. Hario, K. Kuletz, M. L. Mallory, F. Merkel, A. Mosbech, A. L. Labansen, B. Olsen, H. Österblom, J. Reid, G. Robertson, M. Rönkä & H. Strøm (2015). Circumpolar Seabird Monitoring Plan. CAFF Monitoring Report No. 17. Akureyri, Iceland, CAFF International Secretariat: 70.
- ▶ CBird collaborative publications (many others relevant to Arctic seabirds published by individual EMs – can provide on request):
 - Petersen, A., D. B. Irons, H. G. Gilchrist, G. Robertson, D. Boertmann, H. Strøm, M. Gavrilov, Y. Artukhin, D. S. Clausen, K. J. Kuletz, and M. L. Mallory. 2015. The Status of Glaucous Gulls *Larus hyperboreus* in the Circumpolar Arctic. *Arctic* 68 (1): 107–120. <http://dx.doi.org/10.14430/arctic4462>.
 - Yannic G, Yearsley J, Sermier R, Dufresnes C, Gilg O, Aebischer A, Gavrilov MV, Strom H, Mallory ML, Morrison RIG, Gilchrist HG, Broquet T. 2015. High connectivity in a long-lived, high arctic seabird, the ivory gull *Pagophila eburnea*. *Polar Biology*. In Press.
 - Descamps et al. In review. Circumpolar dynamics of black-legged kittiwakes track large-scale environmental shifts and oceans' warming rate.
- ▶ Ecosystem Services Provided by Arctic Seabirds
 - A symposium convened for World Seabird Conference (2015), led by CBird member M. Rönkä.
 - Goal is to produce a publication from the symposium, which will highlight ecological, socio-economic and cultural benefits humans obtain from seabirds.

Main activities to be continued/completed in year ahead

Main activity	To be continued/completed in the year
Monitor populations of seabirds at key monitoring sites in Arctic (e.g., Canada: East Bay, Coats Island, Nasaruvaalik Island; US: Cape Lisburne, Pribilof Islands, other Bering Sea/ Aleutian island colonies; Atlantic Arctic: SEAPOP efforts concentrated at 17 key sites.	Progress reports to be completed by December 2016 through spring 2017 (varies by country). CBird sub-committee to work on exactly what and how monitoring and trends should be reported – what is needed for performance reports and accomplishments with respect to CBMP work plans.
Meet to discuss common marine bird issues with other CBird members, collaborative efforts	Scheduled CBird meeting now for February 2017 in Faroes
Complete analysis and writing of circumpolar population status for ivory gull and black-legged kittiwake.	Kittiwake manuscript now in review. Ivory gull manuscript expected submission in winter 2016/2017.
Data base compilation and management	On-going as personnel and time allows. (lead R. Kaler, U.S.)
At-sea surveys to document seabird community composition, distribution, and relative abundance at sea have been conducted by scientists in Canada, U.S., Greenland, and Norway. Goal is to link seabird distribution at sea with physical and biological variables.	At-sea surveys scheduled to continue through 2017 or 2019 (varies by country). Largely funded via regulatory agencies in conjunction with industries involved in oil exploration and extraction activities. In the Pacific Arctic (US), at-sea surveys for seabirds are established components of several ecosystem studies, all of which include coverage of the 'Distributed Biological Observatory' (DBO; www.arctic.noaa.gov/dbo/). These are Arctic sampling stations relying on international collaborations, facilitated by 'Pacific Arctic Group' (PAG; www.arcticobserving.org/).
SEAPOP: Atlantic Arctic long-term monitoring and mapping program (established in 2005).	Norway maintains colony-based monitoring for a variety of species, with the most fully implemented monitoring program in the Arctic. Its comprehensive program collectively called 'SEAbird POPulation' (SEAPOP; www.seapop.no/en/)
SEATRACK: a cooperative venture with Norway, Russia, Iceland, the Faeroe Islands and Great Britain to track seabirds throughout the Atlantic. Eleven species at >30 colonies are being tagged and tracked during 2014-2016.	SEATRACK (SEAbird TRACKing) uses geolocators to describe migratory routes, wintering areas, and the variation in these between years. The goal is to link these with population dynamics, migration routes and wintering areas with marine environmental and anthropomorphic factors. Analysis and publications planned for subsequent years.
Conservation Strategy and Action Plans for (1) Black-legged Kittiwake and (2) Murre harvest	To continue into 2017-2018. First draft for kittiwake plan expected in late 2016 (Led by Irgens). To evaluate and provide management guidelines for murre harvest, (conservation planning document is goal). Frederiksen and Mosbech will expand model, Robertson to convene sub-committee.
CBird Arctic Tern Status Review	CBird collaborative status review (lead, Mark Mallory, Canada) will continue to collate data and observations through 2016.
Conduct final field season of examining potential effects of industrial shipping traffic on marine birds in Arctic Canada	Analysis and write up expected to be completed around late 2017 or early 2018

Marine Mammal Expert Network

- ▶ U.S.: Rosa Meehan (Lead), Peter Thomas
- ▶ Russia: Stanislav Belikov
- ▶ Canada: Steve Ferguson, Garry Stenson
- ▶ Norway: Kit Kovacs, Dag Vongraven
- ▶ Kingdom of Denmark: Fernando Ugarte, Kristin Laidre (Greenland)
- ▶ Geneviève Desportes, NAMMCO

Top five needs, estimated cost and contributions (in-kind and otherwise)

Top need	Estimated cost	Contributions to date
Fine scale habitat change – ice analysis update – incorporate rate of change (faster than predicted)	70,000 USD	Current regional analysis
Circumpolar bearded seal ecology study	250,000 USD	50 k plus in kind
Focus on key health not comprehensive health parameters	10,000 USD to organize and catalogue existing efforts	Ongoing efforts in US and other jurisdictions, not catalogued
Existing circumpolar plans need implementation – e.g. ringed seal, beluga, polar bear	Needs support from all jurisdictions – amount will vary by species	Piecemeal efforts in all jurisdictions – need coordinated evaluation and focus
Catalogue passive acoustic monitoring time series in Arctic	30,000 USD	

Top activities in the previous year

- ▶ Working with SAMBR:
 - Data aggregation.
 - Map and figure development.
 - Writing and revisions.
- ▶ Attending the CBMP – marine annual meeting in Pasvik, Norway
- ▶ Presentation on the Marine CBMP at the Arctic Science Summit Week in Fairbanks, Alaska. March 2016
- ▶ Update and expansion of the Population Status table to include current status information for Beluga, narwhal, Bowhead whale, and polar bear stocks.
- ▶ Additional parameters added to Status table to include harvest meta data (e.g., subsistence/commercial; quota)
- ▶ Publications:
 - Laidre, K.L., H. Stern, K.M. Kovacs, L. Lowry, S. Moore, E. Regehr, S. Ferguson, O. Wig, P. Boveng, R. Angliss, E. Born, D. Litovka, L. Quakenbush, C. Lydersen, D. Vongraven, F. Ugarte. 2015. Arctic marine mammal population status, sea ice habitat loss, and conservation recommendations for the 21st century. Conservation biology, Volume 00, No. 0, 1-14
- ▶ Development of the circumpolar bearded seal ecology project.
- ▶ Climate change impact focal points - developed with respect to Arctic Marine Mammals in co-operation with the International Union for the Conservation of Nature (IUCN)
- ▶ Numerous population surveys, some of which include: ice associated whales in the Barents Sea; polar bears in the Barents Sea region; ongoing Pacific walrus mark/recapture survey in the Chukchi sea; narwhal surveys in the Canadian Arctic; Polar Bear surveys in the Chukchi; ongoing ice seal surveys in the Bering/Chukchi region; Bowhead whale population evaluations.

Main activities to be continued/completed in year ahead

Main activity	To be continued/ completed in the year
Evaluate health parameters and identify parameters to include in database	2016-2017
Attending workshop hosted by NAMMCO and contributing to the Global Review of Monodontids (Beluga and narwhal)	2016-2017
Harvest information - Identify harvest monitoring information sources; incorporate harvest numbers where available	2016-2017
Identify strategies for developing detailed ice dynamics and effects analysis	2016-2017
Compile existing data and samples and conduct field work within the bearded seal programme	2016-2018
Finalize analyses for Barents Sea polar bear and ice whales survey	2016



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