

Plastic Pollution and Seabirds in the Russian Arctic

Workshop Report, Moscow, 12-14 November 2019



The Conservation of Arctic Flora and Fauna (CAFF) is a Working Group of the Arctic Council.

CAFF Designated Agencies:

- Norwegian Environment Agency, Trondheim, Norway
- Environment Canada, Ottawa, Canada
- Faroese Museum of Natural History, Tórshavn, Faroe Islands (Kingdom of Denmark)
- 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

Funding for the preparation of this document was received from the Arctic Council Project Support Instrument (PSI), managed by the Nordic Environment Finance Corporation (NEFCO).

This publication should be cited as: CAFF (2019). Plastic Pollution and Seabirds in the Russian Arctic, Workshop Report. Arctic Migratory Birds Initiative. Conservation of Arctic Flora and Fauna, Akureyri, Iceland.

Cover photo: Maria Gavriilo

Layout: María Rut Dýrfjörð and Kári Fannar Lárusson

For more information please contact:

CAFF International Secretariat

Borgir, Nordurslod

600 Akureyri, Iceland

Phone: +354 462-3350

Fax: +354 462-3390

www.caff.is

[@CAFFSecretariat](https://www.facebook.com/CAFFS)

This work is licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-sa/4.0/>. All photographs are subject to a separate restricted copyright and may not be reproduced without explicit consent, which should be sought directly from the copyright holder.



— CAFF Designated Area

Contents

1. Background	4
2. Plastic pollution and seabirds in the Russian Arctic: State of knowledge, information exchange and possibilities for collaboration	5
3. Results of the workshop: Regional reports and state of knowledge on plastic pollution in seabirds and their habitats in the Russian Arctic and adjacent seas	6
Reports by regions.....	6
Summary of the discussion on the possibilities for the research and monitoring of plastic litter and microplastic in the Russian Arctic	15
4. References	17
ANNEX 1	19
ANNEX 2	20
ANNEX 3	22
ANNEX 4	23

1. Background

The Arctic Migratory Birds Initiative (AMBI) Work Plan 2019-2023 approved by Arctic Council Ministers in May 2019 identifies on-the-ground actions that will be undertaken over a four-year period to improve the conservation status and secure the long-term sustainability of declining Arctic migratory bird populations. It also aims to enhance cooperation between Arctic and non-Arctic nations that host Arctic migratory birds during the non-breeding season.

AMBI was developed in response to the Arctic Biodiversity Assessment's Report for Policy Makers (CAFF 2013) recommendation #8 to "Reduce stressors on migratory species range-wide, including habitat degradation and overharvesting on wintering and staging areas and along flyways and other migration routes." AMBI appears as actions 8.1 and 8.2 under the Arctic Council approved Actions for Arctic Biodiversity 2013-2021, the implementation plan for achieving the recommendations of the Arctic Biodiversity Assessment (CAFF 2015), and helps the Arctic Council achieve implementation of the Arctic Biodiversity Assessment.

Under AMBI Circumpolar Flyway Work Plan objective 4, action 1, this project, Plastic pollution and seabirds, is focused on supporting work that will increase our understanding and ability to respond accordingly to the distribution and effects of plastic pollution on Arctic seabirds and seabirds.

Three consultants were hired for the project, and Consultant 3, the Interregional Public Organization Russian Society for Conservation and Study of Birds (MOO ROSIP, or BirdsRussia) is responsible for project work in Russia. Task 1 for the Consultant 3 was to:

- ▶ Organise and implement a workshop that will introduce AMBI, its aims and objectives and bring together plastic and seabird experts in Russia to share experiences, data and ideas about currently available plastics data in Russia.

According to this task, a workshop *Plastic pollution & seabirds in the Russian Arctic: State of knowledge, information exchange, possibilities for collaboration* was organized on 12 – 13 November 2019 in Moscow, followed by a round-table discussion *Seabirds, their monitoring and research in the Russian Arctic and adjacent seas*, on 14 November 2019.

The following questions were addressed during the workshop and round-table discussion:

- ▶ Is plastic pollution as an increasing threat for marine Arctic ecosystems?
- ▶ What is the state of knowledge and available information on the problem of plastic pollution and associated risks for seabirds in the Arctic and Russian Arctic and adjacent seas?
- ▶ What further steps towards mitigation of the effects of plastic pollution, monitoring and management should be taken by Arctic states?
- ▶ How can we better integrate Russian marine ornithologists activities into the international processes in CAFF and the Arctic Council (including AMBI)?

This report provides an overview and the outcomes of the workshop and round table discussion.

2. Plastic pollution and seabirds in the Russian Arctic: State of knowledge, information exchange and possibilities for collaboration

The Russian workshop „Plastic pollution & seabirds in the Russian Arctic: State of knowledge, information exchange, possibilities for collaboration“ took place in the Zoological Museum of the Lomonosov Moscow State University, on November 12–13, 2019. There were 30 attendees representing northern and Far East Russian coastal areas, including representatives from eight marine specially protected areas¹, six research institutions and universities as well as NGOs (see Annex 1 for the participant list, fig. 1).

Altogether, 24 talks were presented, including five introductory talks, 16 regional reports, as well as three presentations about ongoing activities related to plastic pollution research and management (see Annex 2 for the workshop agenda). To prepare for the workshop a questionnaire on available information on the plastic pollution and seabirds was distributed to a targeted audience (Annex 3).

On the margins of the seminar, interviews were recorded to provide material for a short film being developed by CAFF and the Cornell Lab of Ornithology focused on developing a circumpolar plastics monitoring framework to improve our understanding of plastics and their effects in the Arctic.

Workshop objectives were to:

- ▶ Provide information about AMBI and Circumpolar Flyway in particular to participants.
- ▶ Provide information on current worldwide and Arctic state of knowledge on the emerging issue of Plastic and seabirds.
- ▶ Report on the results of the *Plastic pollution and seabirds workshop* (Akureyri, March 25, 2019).
- ▶ Share information about the regional status of knowledge and ongoing activities on the problem of plastic pollution of seabirds and their habitats in the Russian Arctic and adjacent northern seas.
- ▶ Discuss possibilities for monitoring of microplastic and marine plastic litter as an emerging threat to seabirds and their habitats in the Russian Arctic and adjacent seas
- ▶ Develop proposals to establish a monitoring network in Russia as a part of the circumpolar process within AMBI.
- ▶ Help implement and provide information to AMBI and its Circumpolar Flyway.



Figure 1. Participants of the Russian seminar and round-table discussion on Plastic and seabirds, Moscow 14 November 2019

¹ Kandalaksha strict nature reserve, Nenets strict nature reserve, Gydanskiy strict nature reserve, Wrangel Island strict nature reserve, Commander Islands strict nature reserve, Beringia strict nature reserve, Magadan strict nature reserve, Onega Pomoriye National Park

3. Results of the workshop: regional reports and state of knowledge on plastic pollution in seabirds and their habitats in the Russian Arctic and adjacent seas

The geographical distribution of the reports covers all Russian Arctic seas as well as some adjacent northern and Far East seas (figure 2). Participants provided information on the presence of plastic litter in their areas, knowledge of any kinds of interaction between seabirds and plastic (ingestion, entanglement and nest incorporation), status of related research seabird and monitoring activities.

Reports by regions:

White Sea

Study area: Kandalaksha Bay (site 2, figure 2).

Reported by: Ekaterina Tolmacheva, Kandalaksha Strict Nature Reserve.

No special studies on plastic pollution and birds have been carried out in this area. Long-term monitoring of seabirds is conducted in the Reserve (main species - gulls, eiders, terns and others) and any data on plastics consists of associated observations collected during population monitoring and diet studies.

Time period: since 1930-s annual monitoring of seabirds.

Plastic ingestion. Data has been collected as a part of diet studies on gulls (analysis of bolus) since the late 1980s. Species reported to ingest plastic are the: herring gull *Larus argentatus*, mew gull *Larus canus*. Demonstrated differences have been found in the occurrence of plastic in bolus on a decreasing gradient with increasing distance from the Kandalaksha town. The occurrence of polyethylene in bolus of herring gulls varied between 30 – 85%.

Nest incorporation. No data has been recorded on the presence of plastic in nests, but occasional observations and photo documentations are available. Species reported to incorporate plastic in their nests are: common eider *Somateria mollissima*, and herring gull *Larus argentatus*.

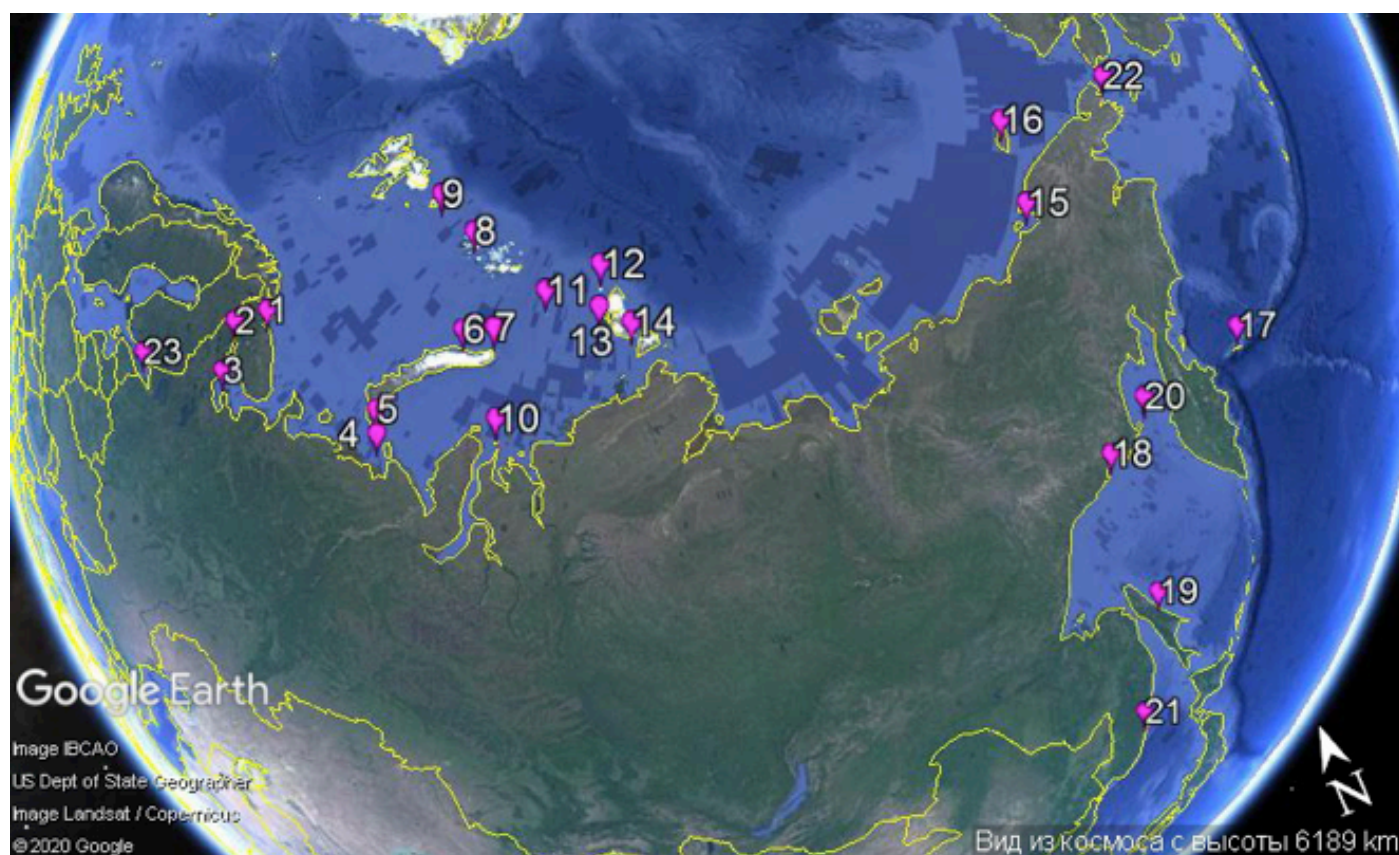


Figure 2. Sites that were reported on marine plastic pollution and seabirds

1 Murman coast, 2 Kandalaksha Bay, 3 Onega Bay and Peninsula, 4 Nenets Reserve, 5 Kara Gate, 6 Russkaya Gavan, 7 Oranskie Islands, 8 Franz-Josef Land, 9 Victoria Island, 10 Gydansky Reserve, 11 Vize Island, 12 Schmidt Island, 13 Sedov Archipelago, 14 Severnaya Zemlya, 15 Chaun Bay, 16 Wrangel Island, 17 Commander Islands, 18 Talan Island, 19 Sakhalin Island, 20 Magadan Reserve, 21 Sikhote-Alin Reserve, 23 SE Chukotka, Lorino, 23 Gulf of Finland

Entanglement: There is a single report of a gull *Larus* sp. dying through entanglement in a beached fishing net.

Plastic litter in coastal seabird habitats. Beach litter counts have been conducted annually by school volunteers. in Kandalaksha Reserve since late 1980s. Irregular local clean-up operations have taken place since the 2000s. The main source of plastic litter on the islands of Kandalaksha Bay is the nearby town of Kandalaksha, most of the plastic is household trash and single-use plastic bottles in particular. The second source is fisheries, mostly lost fishing nets. Data are partly published and are stored in the archive: Natural chronicles of the Kandalaksha Reserve.

The data on plastic ingestion is partly published (Tolmacheva 2013; Turovskaya, Nichkevich 2005), but all primary data on diet is stored in the scientific archive of the Kandalaksha State Nature reserve. Data on coastal litter is presented in Nature chronicles in the scientific archive of the Kandalaksha State Nature reserve (Haitov 2009 – 2017, Koryakin et al. 2008).

Study area: Onega Bay and Onega Peninsula (Site 3, figure 2).

Reported by: Nadezhda Cherenkova, Onega Pomoriye National Park and the research team of the White Sea Biological Station of the Moscow State University (Alexander Cherenkov, Vladimir Semashko and Grigory Tertitskiy).

No special studies on plastic pollution and birds have been carried out by any of the reporters. Monitoring of nesting seabirds has been conducted in Onega Bay annually since 1985 (all seabird species including gulls, eiders, terns, skuas, cormorants and others), but no attention has been given to plastic pollution in relation to seabirds.

Time period: since 1985 annual monitoring of seabirds

Plastic ingestions: No data has been collected, however there are reports of larger gulls *Larus* spp. occasionally taking plastic.

Nest incorporation. Has rarely been observed and no data has been collected.

Entanglement: Has not observed.

Plastic litter in coastal seabird habitats. Beach litter has been observed since the beginning of the monitoring in 1985, and the overall amount is assessed as low. No data quantitative or qualitative data has been developed for Onega Bay.

Along the coastline of the Onega Peninsula the Onega Pomoriye National Park has recently started a project *Separate collection and disposal of solid municipal and hazardous waste* (supported by NEFCO). As part of this initiative, marine litter watch and clean-up operations are being carried out in the Park and an outreach program is under development. So far, these activities have not specifically addressed seabirds.

Barents Sea.

Study area: Pechora Sea, Matveev Island (Site 5, figure 2).

Reported by: Yuliya Bogomolova, Nenets Strict Nature Reserve.

Time period: since 2016 annual monitoring of wildlife.

No special studies on plastic pollution and birds have been carried out. Monitoring of walrus and associated monitoring of seabirds is carried out in the Reserve (main species - gulls, eiders, terns and some waders) and all data on plastic collected consists of associated observations from population monitoring.

Plastic ingestion: No data has been collected.

Nest incorporation: No systematic records of the presence of plastic in nests, but occasional observations and photo documentations are available.

Species reported to incorporate plastic in their nests are: common eider *Somateria mollissima*, glaucous gull *Larus hyperboreus*.

Entanglement: there is a single report of red-throated diver *Gavia stellata* dying in fishing line (not as by-catch). There are also reports of Arctic foxes *Alopex lagopus* dying from entanglement

Plastic litter in coastal seabird habitats. Beach litter counts have been conducted since 2016 as associated observations collected during wildlife monitoring. The density of beach litter is quite high. The main source of plastic litter on the islands is from fishing activities, followed by household trash including local mainland sources.

Data is not published but are stored in the archive (Nature chronicles of the Nenets Reserve).

Study area: Murman coast (Site 1, figure 2).

Reported by: Maria Gavrilov, Association Maritime Heritage.

Time period: 2018 – 2019

Documentation of plastic pollution of the coast and seabird habitats was recorded on opportunistic base during seabird monitoring and research.

Plastic ingestion: No data has been collected.

Nest incorporation: Opportunistic records and photo documentations are available, no quantitative data available.

Species reported to incorporate plastic in their nests are: northern gannet *Morus bassanus* (almost 100% occurrence in both existing colonies on Murman coast), european shag *Phalacrocorax aristotelis*.

Entanglement: no data available.

Plastic litter in coastal seabird habitats. Plastic litter is accumulated in sheltered beaches in some places in high densities. The main source of the plastic litter is marine fisheries, but local household trash including local mainland sources are also present in high numbers. A sandy beach was sampled for microplastic, results are not available yet.

Data is not published.

Study area: Novaya Zemlya, western coast (Sites 5–7, figure 2).

Reported by: Maria Gavrilov, Association Maritime Heritage.

Time period: 2016 – 2019

Documentation of plastic pollution along the coast and in seabird habitats was carried out within the framework of project *Plastic in the High Arctic* run by the Association Maritime Heritage as a community and private initiative.

Plastic ingestion: No data collected and no targeted diet studies are conducted in the area.

Nest incorporation. Associated observations and photo documentations were carried out, no quantitative data available.

Species reported to incorporate plastic in their nests are: kittiwake *Rissa tridactyla*, common eider *Somateria mollissima*. In surveyed nests of other species (barnacle goose, glaucous gull, Arctic terns) no plastic was observed.

Entanglement: a single case of 1 dead kittiwake entangled in plastic rope from fishing gear was observed in the colony. Entanglement and injury of a gannet chick by filaments of fishing nets was observed in the Rybachy Peninsula.

Plastic litter in coastal seabird habitats. Plastic litter is accumulated on beaches and spits in some places in high densities. The overwhelming majority of plastic litter comes from fishing activities, followed by a variety of household waste including from long-distant transportation and local sources (vessels and mainland). Several sites along the Novaya Zemlya shoreline were surveyed for marine litter, while surface water and sandy beaches were sampled for microplastic. Results are not available yet.

In 2019 quantitative surveys were conducted within the framework of MALINOR project by Norwegian scientists from SALT AS (Haarr 2019) to assess the amount of plastic pollution in northern Novaya Zemlya. The survey data is currently being analyzed. Several other institutions in 2018 – 2019 sampled water and conducted beach litter surveys in Novaya Zemlya and surrounding seas, but seabirds were not addressed.

No data on seabirds and plastic is not published, preliminary data on coastal litter is partly reported (Haarr 2019).

Study area: Franz-Josef Land and Victoria Island (Sites 8 – 9, figure 2).

Reported by: Maria Gavrilov, Association Maritime Heritage.

Time period: 2012 – 2019.

Documentation of plastic pollution along the coast and in seabird habitats was carried out within the framework of ecological monitoring in the Russian Arctic National Park and within the project *Plastic in the High Arctic* run since 2016 by the Association Maritime Heritage as a community based initiative .

Plastic ingestion. Diet studies and post-mortem necropsies have been conducted. During observations of diet no plastic was observed in the chick meals of little auk *Alle alle* or in the regurgitations of kittiwakes *Rissa tridactyla*. Post-mortem necropsies of fulmar *Fulmarus glacialis*, *Larus hyperboreus*, little auk *Alle alle*, kittiwakes *Rissa tridactyla* and Brunnich's guillemot *Uria lomvia* did not reveal plastic ingestion by these species.

Historically (1990s), plastic ingestion has been reported in fulmar *Fulmarus glacialis*, but not in little auk, common eider, black guillemot, Brunnich's guillemot, arctic tern or kittiwake (Weslawski et al. 1994).

Nest incorporation. Associated observations and photo documentations were carried out, no quantitative data is available.

Species reported to incorporate plastic in their nests are: kittiwake *Rissa tridactyla*, ivory gull *Pagophila eburnea*. In surveyed nests of other species (common eider, brent goose, glaucous gull, Arctic tern, Arctic skua, purple sandpiper) no plastic was observed.

Entanglement: a single case of one dead Brunnich's guillemot *Uria lomvia* entangled in a lost fishing net was observed at sea near Victoria Island.

Plastic litter in coastal seabird habitats. Plastic litter was observed in all visited islands of Franz-Josef Land. The overwhelming majority of plastic litter comes from fishing activities, followed by a variety of household trash including long-distant transportation and local sources (vessels and mainland). Several sites along the Franz Josef Land shoreline were surveyed for marine litter, while surface water and sediments from the tidal zone were sampled for microplastic. Preliminary results revealed very low concentrations of nanoplastic. Most of the samples have not yet been treated. In 2019 season a special citizen study involved tourists from cruise vessels as well as clean-up operations were carried out in Franz-Josef Land within the framework of MALINOR project (<http://www.mynewsdesk.com/no/akvaplan-niva/pressreleases/arctic-cruise-tourists-assist-plastic-scientists-2902872>).

Only historical data on plastic ingestion is published ((Weslawski et al. 1994). Preliminary data on microplastic pollution is partly published (Blinovskaya and Gavrilov 2018, Blinovskaya et al. 2019), data on marine litter and seabirds is not published.

Kara / Laptev Sea

Study area: Gydan Peninsula (Site 10, figure 2).

Reported by: Andrey Gorchakovskiy, Gydanskiy Strict Nature Reserve.

No special studies on plastic pollution and birds have been carried in the Reserve. Opportunistic observations of nesting waterbirds is carried out on Shokalskiy Island north of the Gydan Peninsula since 1998 (species including *Larus* gulls, king eider, terns, brent goose, long-tailed duck, waders), but no attention has been paid to plastic pollution in relation to seabirds.

Time period: since 2016 annual observations on wildlife.

Plastic ingestion: No data collected or available.

Nest incorporation. Not observed, but specifically, this question has not been addressed in any monitoring activities.
Entanglement: not observed.

Plastic litter in coastal seabird habitats. Beach litter was observed during entire observation period, i.e. since 1998. The overall amount is assessed as low but no quantitative or qualitative data has been collected. The majority of the litter is of local origin, i.e. from the mainland sources, fishing activity and vessels.

Study area: Severnaya Zemlya and Kara Sea Islands (Sites 11 – 14, figure 2).

Reported by: Maria Gavrilov, Association Maritime Heritage.

Documentation of plastic pollution along the coast and seabird habitats were carried out within the framework of multidisciplinary ecological expeditions and monitoring of seabirds within the framework of the project *Plastic in the High Arctic* run by the Association Maritime Heritage as a community and private initiative.

Time period: 2019.

Plastic ingestion: No data has been collected. No diet or parasitological studies or necropsy of the seabirds have been carried out.

Nest incorporation. Opportunistic observations and photo documentations were carried out.

Species reported to incorporate plastic in their nests are: ivory gull *Pagophila eburnea* (ca. 10% occurrence in one colony), glaucous gull *Larus hyperboreus*, kittiwake *Rissa tridactyla*.

Entanglement: Not observed.

Plastic litter in coastal seabird habitats. Plastic litter was observed in several places across the study area of the North East Kara Sea. Most of the plastic litter is from marine fisheries, followed by a variety of household trash including long-distant transportation. Several sites along the Severnaya Zemlya shoreline were surveyed for marine litter, while sediments from the tidal zone and bottom were sampled for microplastic. Samples have not yet been analyzed.

The data is not published.

East Siberian / Chukchi Sea

Study area: Wrangel Island (Site 16, figure 2).

Reported by: Uliana Babi, Wrangel Island Strict Nature Reserve.

Time period: since 1976 annual monitoring wildlife.

No special studies on plastic pollution and birds have been carried out. Long-term monitoring of seabirds is carried out in the Reserve (main species – guillemots, kittiwakes, glaucous gulls, eiders and others) and all data on plastic are associated observations collected during population monitoring and occasional observations.

Plastic ingestion:

Method: Diet studies and post-mortem necropsies have been conducted.

Species reported to ingest plastic are the: glaucous gull *Larus hyperboreus*, horned puffin *Fratercula corniculata*, and short-tailed shearwater *Ardenna tenuirostris*.

Nest incorporation. There are no recorded observations of the presence of plastic in nests, but occasional observations and photo documentations are available for the horned puffin *Fratercula corniculata* carrying plastic rope to the nesting site.

Entanglement: not reported.

Plastic litter in coastal seabird habitats. Beach litter has been observed on the seashore since 1980s. No quantitative data are available, but it is estimated that 20 items per 100 m is the average. Most plastic litter comes from fishery and long-distant transport from both land sources and vessels.

The reserve carrying out educational programs and organizing local cleanup actions in the settlement Pevek where office of the Reserve is situated.

The data is not published, all primary data is stored in the Nature chronicles in the scientific archive of the Wrangel Island State Nature reserve.

Study area: Chaun Bay (Site 15, figure 2).

Reported by: Olga Prokopenko, Diana Soloviyeva (in absentia), Institute of Biological problems of the North, RAS.

Time period: 2002 – 2019, annual studies on marine birds biology.

No special studies on plastic pollution and birds have been carried out. Long-term monitoring of waterbirds is carried out in the area (main species – eiders, larger gulls, divers) and all data on plastic are associated observations collected during population monitoring and occasional observations.

Plastic ingestion: Occasional diet observations (bolus of *Larus* gulls), post-mortem necropsies when corps are available.

Species reported to ingest plastic are the: glaucous gull *Larus hyperboreus*, Vega gull *Larus (hueglini) vegae*, and short-tailed shearwater *Ardenna tenuirostris*.

Digestive tract of a beached glaucous gull *Larus hyperboreus* was full of styrofoam particles. Some 60% nests of *Larus* gulls contains bolus with plastic items (2018 – 2019 data) collected likely at the nearby open waste dump. At other site, occurrence of the plastic items in the bolus of *Larus* gulls is some 5%.

Nest incorporation. Plastic is reported in the nests of glaucous gull *Larus hyperboreus*, Vega gull *Larus (hueglini) vegae*, common eider *Somateria mollissima*.

Entanglement: common eider *Somateria mollissima*, two non-lethal cases.

Plastic litter in coastal seabird habitats. Beach litter has been observed on the beginning of work, i.e. from 2012, but obviously, presented there before. No quantitative data are available, but it is not numerous, coincided with zones of drifted wood accumulations and appeared mostly after local floods. Most plastic litter comes from local land sources (nearby villages).

Data is partly published (Solovyeva et al. 2020), most primary data are stored in the scientific archive of the Institute of Biological problems of the North, RAS.

Bering Sea

Study area: south-east Chukotka Peninsula, Mechigmenskiy Bay, Lorino settlement (Site 22, figure 2).

Reported by: Elena Lappo and Eugeniy Syroechkovskiy, BirdsRussia.

Time period: 2019

No special studies on plastic pollution and birds have been carried out. Project studies of Spoon-billed sandpiper and observation of wildlife has been carried out in the area (main species present – kittiwake, pelagic cormorant, eiders, glaucous gull *Larus hyperboreus*, Vega gull *Larus (hueglini) vegae*, divers and others).

Plastic ingestion. No data has been collected.

Nest incorporation. Not observed.

Entanglement: Not observed.

Plastic litter in coastal seabird habitats. Beach litter is present. No quantitative data are available, but it is not numerous, scattered at a distance of some 30 m between items. Beach litter consists both of remains of fishing gear and household plastic of local origin.

The data are not published.

Study area: Commander Islands (Site 17, figure 2).

Reported by: Larisa Zelenskaya, Institute of Biological problems of the North, RAS, Dmitriy Pilipenko, Commander Islands Strict Nature Reserve, Yuriy Artyukhin, Kamchatka Branch of the Pacific Institute of Geography RAS.

Time period: since 1960s annual monitoring of wildlife and targeted studies on selected seabird species.

No special studies on plastic pollution and birds have been carried out. Long-term monitoring of seabirds is carried out in the Reserve and all available historical data on plastic are associated observations collected during population monitoring and occasional observations.

Plastic ingestion: Diet studies and post-mortem necropsies have been conducted.

Species reported to ingest plastic are: fulmar *Fulmarus glacialis*, short-tailed shearwater *Ardena tenuirostris*, glaucous-winged gull *Larus glaucescens*, parakeet auklet *Cyclorhynchus (Aethia) psittacula* (Artyukhin 2014).

Examined species (post-mortem necropsy) with zero results are guillemots *Uria lomvia* and *U.aalge*, tufted puffin *Lunda cirrhata*, least auklet *Aethia pygmaea*, red-legged kittiwake *Rissa brevirostris* (Artyukhin 2014)..

Massive diet studies (bolus analysis) of the glaucous-winged gull *Larus glaucescens* in 1992 – 1993, 1998 – 1999 revealed less than 1% occurrence of anthropogenic items including plastic in the food samples (over 15 000 samples) (Zelenskaya 2003).

Nest incorporation. No data has been collected.

Entanglement: Not reported in birds.

Reported in northern fur seals with 42.5% of seals have been injured with fragments of fishing nets in late 1970s – early 1980s (Nikulín et al., 1982). During period from 1993 to 2008, 1547 seals carrying plastic on their bodies have been observed in

Commander Islands haul outs.

Plastic litter in coastal seabird habitats. Due to location of the Commander Islands at the border of Bering Sea and Pacific Ocean with high cyclonic activity, the area is heavily impacted with plastic litter since long ago. Beach litter is observed all along seashores. No quantitative data are available. Plastic litter is originated mostly from fishery and long-distant transport from both land sources and vessels.

The reserve carrying out educational programs and organizing local cleanup actions in the local. Local Marine Litter museum is organized in settlement Nikolskoe on the islands.

Historical data are published (Mikhtaryantz, 1981; Zelenskaya, 2003, Artyukhin, 2014), no new data has been collected since that.

Sea of Okhotsk

Study area: Talan Island, Magadan area, Tauiskaya Bay, Sakhalin Island (Sites 18, 19, figure 2).

Reported by: Elena Golubova, Laris Zelenskaya, Institute of Biological problems of the North, RAS.

Time period: 1988 – 2019, monitoring and project work on seabirds.

No special studies on plastic pollution and birds have been carried out. Long-term monitoring of seabirds and diet studies are carried out in the area (main species – Alcids, slaty-backed gull, pelagic cormorant) and all data on plastic are associated observations collected during population monitoring and research.

Plastic ingestion: Diet studies (bolus of *Larus* gulls, food loads to chicks, observations of foraging), post-mortem necropsies.

Species reported to ingest plastic are: slaty-backed gull *Larus schistisagus*, parakeet auklet *Cyclorhynchus (Aethia) psittacula*, pelagic cormorant *Phalacrocorax pelagicus*.

Extensive diet studies (bolus analysis) of the slaty-backed gull *Larus schistisagus* in 1993 – 1999 revealed occurrence of anthropogenic items including plastic in the food samples (over 15 000 samples) (Zelenskaya 2019).

Occasional single observation of a lethal case of macroplastic ingestion by pelagic cormorant chick in 2008.

Post-mortem necropsy of a beached parakeet auklet in 1999 on Talan Island revealed 24 microplastic pellets. Historical cases of plastic digestion for this species were also reported.

Nest incorporation. Plastic is reported in the nests of kittiwakes *Rissa tridactyla* and slaty-backed gull *Larus schistisagus*.

Entanglement: guillemot *Uria* sp., ancient murrelet *Synthliboramphus antiquus*.

Monitoring of northern fur seal entanglement on Sakhalin Island revealed decrease in occurrence of fishing gear on injured seals after fishing with drift nets has been banned (Kuzin, Trukhin 2019).

Plastic litter in coastal seabird habitats. Beach litter has been observed since the beginning of the work in the area, but obviously, presented there before. No quantitative data are available. General pattern is that marine litter on the coasts of the Sea of Okhotsk is mostly of land-based sources associated with local settlements, but shores exposed to Pacific Ocean marine litter is mostly from fishery and long-distant transport.

Data is partly published (Zelenskaya, 2019), most primary data are stored in the scientific archive of the Institute of Biological problems of the North, RAS.

Study area: Magadan Strict Nature Reserve, (Konie peninsula, Pyagina Peninsula, Yamskie Islands) (Site 20, figure 2).

Reported by: Larisa Zelenskaya, Institute of Biological problems of the North, RAS, Irina Utekhina, Magadan Strict Nature Reserve.

Time period: since 1993 annual monitoring of the wildlife.

No special studies on plastic pollution and birds have been carried out. Long-term monitoring of seabirds is carried out in the Reserve (main seabird species – guillemots, tufted puffin, auklets, kittiwakes, slaty-backed gull, glaucous gulls, Steller's sea-eagle) and all data on plastic are associated observations collected during population monitoring and occasional observations.

Plastic ingestion: No data has been collected for seabirds, diet studies (bolus analysis) has been carried out on Steller's sea eagle. Species reported to ingest plastic is Steller's sea-eagle *Haliaeetus pelagicus*. A single case of plastic bag out of some 250 food samples has been reported in 1997.

Nest incorporation. Steller's sea-eagle *Haliaeetus pelagicus*. Two case of plastic waste have been reported for the study period.

Entanglement: Not reported in birds.

Widely observed in Steller's sea lion, some 2 – 3 % of the haul-out population is affected (Grachev, Burkanov 2015).

Plastic litter in coastal seabird habitats. Beach litter is observed along the seashore. Single survey of beach litter has been carried out in 2013 within the framework of UNDP/GEF project. Overall density of plastic debris was low, mostly represented by plastic bottles and other household waste of local origin, share of fishing gear was low.

The reserve carrying out educational programs and organizing local cleanup actions.

Data are not published, kept in the archive of the Magadanskiy Nature Reserve in the Nature chronicles available at (<http://magterra.ru/%D0%BF%D1%83%D0%B1%D0%BB%D0%B8%D0%BA%D0%B0%D1%86%D0%B8%D0%B8/chronicle-of-the-nature-of-the-reserve.html>).

Russian Far East seas (Primoriye)

Study area: Sea of Japan, North-West Pacific (Site 21, figure 2).

Reported by: Yuriy Artyukhin, Kamchatka Branch of the Pacific Institute of Geography RAS; Alexander Ivannikov, independent expert on plastic waste.

Plastic ingestion: No data has been collected.

Nest incorporation: No data has been collected.

Entanglement: Species reported are Cormorant *Phalacrocorax capillatus*, goosander *Mergus merganser*, Brunnich's guillemot *Uria lomvia*

Studies in the region was focused on the assessment of impact of the host fishing gear on the seabirds as a study associated with assessment of seabirds bycatch by different kinds of fisheries in the North-West Pacific (Artyukhin et al. 2010). Since 1960s, only several cases of seabird entanglement in the lost fishing gear were reported (Elsukov 2013; <http://fareastru.birds.watch/>, and unpublished data of Sikhote-Alin' Nature Reserve).

Despite the bycatch is the major impact of the commercial fishing upon seabirds in the region, host fishing also poses threat to seabirds. Some experts (Atkins, Heneman, 1987) assess seabird mortality due to host fishing to be up 68000 individuals. Other study reported 99 individuals of 6 species (*Diomedea immutabilis*, *Fulmarus glacialis*, *Puffinus griseus*, *Puffinus (Ardenna) tenuirostris*, *Lunda cirrhata*, Unidentified 12) died due entanglement in 1500 m section of lost net during a month (DeGange, Newby, 1980).

Plastic litter in coastal seabird habitats. Two 100 m beach waste surveys were conducted in Sikhote-Alin' nature reserve in 2019 revealed 664 items of marine litter totaled 79 kg. Plastic comprised some 85% by numbers and some 45 % by mass. Approximately 62% of plastic debris were represented by disposable household plastic dominated by single-use bottles and lids.

Data are partly published (Elsukov 2013), kept in the archive of the Kamchatka Branch of the Pacific Institute of Geography RAS; Sikhote-Alin' nature reserve.

Baltic Sea

Study area: Gulf of Finland (Site 23, figure 2).

Reported by: Yulia Bublichenko, Saint-Petersburg Branch of the RAS.

Time period: since 1994 regular monitoring of seabirds.

No special studies on plastic pollution and birds have been carried out. All data on plastic are associated observations collected during population monitoring and different project studies.

Plastic ingestion: Diet studies (bolus content) have been carried out opportunistically.

Species reported to ingest plastic are: great cormorant *Phalacrocorax carbo*, herring gull *Larus argentatus*, lesser black-backed gull *L. fuscus*, black-headed gull *L. ridibundus*.

Nest incorporation. Affected species are: great cormorant *Phalacrocorax carbo*, mallard *Anas platyrhynchos*, tufted duck *Aythya fuligula*, red-breasted merganser *Mergus serrator*, common eider *Somateria mollissima*, mute swan *Cygnus olor*, herring gull *Larus argentatus*, black-headed gull *Larus ridibundus*, lesser black-backed gull *L. fuscus*, terns *Sterna* sp., razorbill *Alca torda*, common guillemot *Uria aalge*.

The earliest observation is 1994 for the herring gull, but wide distribution of marine litter in the colonies is being observed since 2000s; in the nests – since 2014.

The most impacted is great cormorant (occurrence in the nests 13–65%), followed by herring gull, other species have plastic in their nests occasionally.

By types of plastic debris, the disposable plastic bags of various types are dominated, as well as ropes, remains of fishing gear, pieces of household plastic waste.

Entanglement: Species reported are black-throated diver *Gavia arctica*, great cormorant *Phalacrocorax carbo*, red-breasted merganser *Mergus serrator*, tufted duck *Aythya fuligula*, herring gull *Larus argentatus*, black-headed gull *L. ridibundus*. All above with lethal effect, while herring gulls were also observed live but injured.

Plastic litter in coastal seabird habitats. Plastic litter has been observed in the area since beginning of studies in 1994–1998, but obviously presented there before. Marked increase of the beached plastic is recorded since 2010 – 2014. Most of the plastic litter is represented by polyethylene plastic bags of various size, followed by ropes, fishing gear and some other categories. Main sources are local not authorized open waste disposals nearby villages, as well as fishery and likely shipping.

Data are not published, archived in field observation journals.

Summary of the discussion on the possibilities for the research and monitoring of plastic litter and microplastic in the Russian Arctic

Despite the fact that plastic litter is a global phenomena, the issue has received little attention in the Russian Arctic and adjacent seas, and has not been reported as an important threat. Microplastic studies have been recently initiated in the Russian Arctic seas i.e. since 2017 several expeditions have sampled surface waters and sediments, but seabirds were not addressed in these studies.

Workshop participants agreed that in order to address this issue, there needs to be an evaluation of the status of plastic pollution as a threat to seabirds in the Russian Arctic. However, a challenge to conducting such an assessment is the absence/ scarcity of resources to collect and analyze data. This should be taken into account while planning further monitoring.

A direct outcome of the workshop was agreement to establish a network for further coordination and communication on the problem of Plastic and seabirds. BirdsRussia and its informational resources will be used as informational platform, while fieldwork studies and monitoring can be based on existing network of federal specially protected areas (SPAs) and field bases (for example, Talan Island and Chaun Bay, where long-term studies on seabirds are carried out by the Institute of biological problems of the North), which have representative coverage over the Russian Arctic Seas.

Workshop conclusions and recommendations:

1. Conduct large-scale screening of plastic pollution in seabirds and seabird habitats in coming 2–3 years starting in 2020 season as a baseline study to establish further monitoring. This should include targeted observations of incorporation of plastic in nests, a quantitative survey of beach litter in the most vulnerable seabird habitats using standard international methods (i.e. OSPAR), a post-mortem examination of plastic in digestive tracts in any available occasions, registration of plastic ingestion in all ongoing diet studies. Research and monitoring of plastic ingestion by seabirds should use established standardized protocols (OSPAR 2015; Provencher et al. 2017; Provencher et al. 2019; van Franeker et al. 2011).
2. Further monitoring efforts should take into account, and be based on, ongoing activities of and seabird monitoring programs of the SPAs and other institutions carrying out relevant researches. It should be also harmonized with international processes, i.e. CBird CAFF seabird monitoring framework (Petersen et al. 2008) and plan (Irons et al. 2015).
3. Species to monitor plastic ingestion in Russia with regards to pan-Arctic framework:
 - a. Kittiwakes, as a common and wide-spread species across the most Russian Arctic, and can be included in a plastics monitoring program, as its population is being monitored in several places, including diet studies and parasitological studies at some sites.
 - b. Thick-billed murres are also wide-spread and monitored, but have several weak characteristics: a) there is a distribution gap in the central Russian Arctic, i.e. in the Kara Sea and NW Laptev Sea; b) diet studies of the species when conducted are mostly based on fish loads brought to the chicks, i.e., visual observations of the fishes in the bills, which is not suitable for examination of the plastic digestion. Other methods would require additional efforts/resources.
 - c. Fulmar is the primary candidate for Pan-Arctic plastic ingestion monitoring, but have limited use in the Russian Arctic as the species has a limited nesting range and is restricted to the marginal areas in the very west and very east of the Russian Arctic region (i.e. it nests only in the North East Barents Sea, Bering Sea and Sea of Okhotsk). Moreover, where breeding in Russia, nesting colonies are not accessible for monitoring and sampling, and the species is not monitored and studied, thus there is no historical data for fulmars from the Russian Arctic (except for a single report from Franz Josef Land). All the above indicates that fulmars are not a useful indicator of marine plastics in Russia, i.e. over the large sector from the eastern Barents Sea eastwards to the Bering Strait.
 - d. Larger gulls. The species most suitable to sample for the plastic ingestion in the Russian Arctic are, the larger gulls (*Larus argentatus*, *L. marinus*, *L. fuscus*, *L. hyperboreus*, *L. hueglini*, *L. glaucescens*, *L. schistisagus*). They are the most widely distributed, sampling (bolus) is not invasive and easy and there are historical data on these species in the Russian Arctic.
 - e. Planktivorous Alcids (little auk, parakeet auklet, least auklet). Small abundant Alcids could be useful for microplastic ingestion monitoring with proposed species to be little auk *Alle alle* in Atlantic (west Russian) Arctic; least *Aethia pigmaea* and parakeet *Aethia psitaculla* auklets in the Pacific (Russian Far East) sector. Despite of the distribution gap in the East-Siberian and Chukchi seas, these species inhabit much of the Russian Arctic area including both gateways to the Russian Arctic. These species are monitored in several places, and some historical data exist for the plastic ingestion.

4. Monitoring of entanglement and incorporation plastic into seabird nests. To include into the protocol of seabird nesting surveys registration of plastic incorporation in the nests and report metric "occurrence of plastic in the seabird nests" as well as characteristic of the plastic. Register all cases of marine birds entanglement and injury by plastic litter.
5. Resources and finance. Further monitoring should be based on already existing scientific infrastructure, first of all, marine APAs network and research bases, given existing network has representative coverage of the Arctic and adjacent Russian seas. Since plastic is not the subject of ongoing monitoring programs in Russia, and basic seabirds population monitoring is not well established in Russia, thus having resources and finance limitations, it is necessary to work on the possibilities to seek for the targeted funding for research and obtain baseline information for further monitoring of plastic pollution in seabirds and their habitat.
6. Dissemination of results, communication and outreach. Despite special studies on plastic pollution and seabirds were not conducted in Russia, quite a lot of materials on this topic were presented at the seminar, but most of them were not published, while few data were published in regional sources, or the so-called "grey literature", thus having limited public availabilities. It was also emphasized, that seabirds have great potential for education and outreach activity on plastic pollution in the oceans, this promoting public awareness of the plastic pollution of the World Ocean. Many participants reported on ongoing activities in this field including local displays and museum exhibitions, talks and presentations for younger generations, clean-up operations involving volunteers etc. It was proposed:
 - a. To summarize existing Russian data and publish it in a peer-reviewed journal. In the future, it is recommended to actively publish the results of research and monitoring of plastic and seabirds in easily available sources, including in peer-reviewed and international journals.
 - b. To support and expand regional and municipal initiatives on public awareness about the problem of marine litter and microplastic, especially as a threat to seabirds. In cooperation with educational organizations, organize and conduct exhibitions on the topic of marine plastic and birds and related events. The proposal to organize an exhibition and associated events was supported by the Moscow State University Zoological Museum.

Outcomes from the workshop and the round table discussion were presented at the BirdsRussia congress (November 15th). Information about a seminar highlighting the problem of plastic pollution and Arctic seabirds was published in social networks e.g.

https://birdsrussia.ru/news/novosti-organizatsii/morskie-ptitsy-i-plastik-o-chem-rasskazali-ornitologi-rabotayushchie-v-arktike-i-na-dalnem-vostoke-/?sphrase_id=1695

<https://www.facebook.com/events/375219253359887/>

<https://greenpeace.ru/blogs/2020/04/01/ptichku-zhalko/?fbclid=IwAR2AcACiahIcFxHOBx9MEQYBB3pL54hniXxl606xTAzL-jlQfLoZcuMcXCI>

4. References

- Artukhin, Yu.B. Ingested plastic pellets in seabirds on the Commander Islands. In Artukhin, Yu.B., Gerasimov, Yu.N. (eds). 2014. The Biology and Conservation of the Birds of Kamchatka, Vol. 10. Moscow, BCC Press: P. 81 (In Russian)
- Artukhin, Yu.B., Burkanov V.N., Nikulin V.S. 2010. Seabirds and marine mammals bycatch at the salmon driftnet fishery in the North-Western Pacific. Moscow: Skorost zvetu Publishers. 264 p. (In Russian)
- Atkins N., Heneman B. 1987. The dangers of gill netting to seabirds. American Birds. Vol. 41. P. 1395-1403.
- Blinovskaya Y.Yu, Gavrilov M.V. Pilot project of the microplastic studies in the Russian Arctic. XXVII International coastal conference. Arctic coasts: towards sustainability. Abstracts. Murmansk 2019. P. 169 – 172 (In Russian)
- Blinovskaya Ya.Yu., Kulikova O.A., Mazlova E.A., Gavrilov M.V. Identification of the microplastic in the coastal ground of the Arctic and Far East seas. Environment protection in the oil and gas industry. 2019. № 1 (292). P. 35 – 38. DOI: 10.33285/2411-7013-2020-1(292)-35-38. (In Russian)
- DeGange A. R., Newby T. C. 1980. Mortality of seabirds and fish in a lost salmon driftnet // Marine Pollution Bulletin. Vol. 11. P. 322-323.
- Elsukov S.V. 2013. Birds of North-East Primoriye. Non-passerines. Vladivostok. 536 p. (In Russian)
- van Franeker, J.A., Blaize, C., Danielsen, J., Fairclough, K., Gollan, J., Guse, N., Hansen, P.-L., Heubeck, M., Jensen, J.-K., Le Guillou, G., Olsen, B., Olsen, K.-O., Pedersen, J., Stienen, E.W.M., and Turner, D.M. 2011. Monitoring plastic ingestion by the northern fulmar *Fulmarus glacialis* in the North Sea. Environ. Pollut. 159(10): 2609–2615. doi:10.1016/j.envpol.2011.06.008.
- Gavrilov M.V. 2008. Seabird harvest in Russia. In: Merkel, F. and Barry, T. (eds.) Seabird harvest in the Arctic. CAFF International Secretariat, Circumpolar Seabird Group (CBird), CAFF Technical Report No. 16. . P. 64 – 71.
- Grachev A.I., Burkanov V.N. Conservation and population status of the Steller's sea lion (*Eumetopias jubatus*) on the Matytil Island in the Sea of Okhotsk. In: Scientific researches in the Magadanskiy strict nature reserve. Moscow: ANO Dom "Nauchnoe obozrenie", 2015. P. 182-199. (In Russian)
- Grémillet D., Fort J., Amélineau F., Zakharova E., Le Bot T., Sala E., Gavrilov M. 2015 Arctic warming: non-linear impacts of sea-ice and glacier melt on seabird foraging. Global change biology doi: 10.1111/gcb.12811
- Haarr M. 2019 MALINOR progress report Workpackage 2: A brief summary of field data collection on Novaya Zemlya, Russia August 2019. SALT Report no 1042. 11 p.
- Haitov V.M. 2017. Litter abundance count on the intertidal zone of Ryzhkov Island in 2008-2016. In: Tolmacheva E.L. (Ed.) Nature chronicles of the Kandalaksha strict nature reserve for 2016. Annual Report. Kandalaksha. V. 1. P. 26-74 (In Russian)
- Haitov V.M. 2009. Anthropogenic litter distribution on the coasts of protected islands in 2008. In: Koryakin A.S. (Ed.) Nature chronicles of the Kandalaksha strict nature reserve for 2008. Annual Report. Kandalaksha. V.1. P. 43-48. (In Russian)
- Haitov V.M. 2010. Anthropogenic litter distribution on the coasts of protected islands in 2009. In: Koryakin A.S. (Ed.) Nature chronicles of the Kandalaksha strict nature reserve for 2009. Annual Report. Kandalaksha. V.1. P. 56-59. (In Russian).
- Haitov V.M. 2011. Anthropogenic litter distribution on the coasts of protected islands in 2010. In: Koryakin A.S. (Ed.) Nature chronicles of the Kandalaksha strict nature reserve for 2010. Annual Report. Kandalaksha. V.1. P. 115-119. (In Russian).
- Haitov V.M. 2012. Anthropogenic litter distribution on the coasts of protected islands in 2011. In: Koryakin A.S. (Ed.) Nature chronicles of the Kandalaksha strict nature reserve for 2011. Annual Report. Kandalaksha. V.1. P. 77-82. (In Russian).
- Haitov V.M. 2013. Anthropogenic litter distribution on the coasts of the Severny and Tarasikha archipelagos in 2012. In: Koryakin A.S. (Ed.) Nature chronicles of the Kandalaksha strict nature reserve for 2011. Annual Report. Kandalaksha. V.1. Part 1. P. 23-27. (In Russian).
- Haitov V.M. 2015. Anthropogenic litter distribution on the coasts of the Severny archipelago in 2013. In: Tolmacheva E.L. (Ed.) Nature chronicles of the Kandalaksha strict nature reserve for 2014. Annual Report. Kandalaksha. V. 1. Part 1. P. 8- 11 (In Russian).
- Haitov V.M. 2017. Anthropogenic litter distribution on the coasts of the Severny archipelago. In: Tolmacheva E.L. (Ed.) Nature chronicles of the Kandalaksha strict nature reserve for 2016. Annual Report. Kandalaksha. V. 1. Part 1. P. 8- 25. (In Russian)
- Irons, D.B., Petersen, A., Anker-Nilssen, T., Artukhin, Y., Barrett, R., Boertmann, D., Gavrilov, M.V., Gilchrist, H.G., Hansen, E.S., Hario, M., Kuletz, K., Mallory, M.L., Merkel, F.R., Mosbech, A., Labansen, A.L., Olsen, B., Österblom, H., Reid, J., Robertson, G.J., Rönkä, M., and Strøm, H. 2015. Circumpolar Seabird Monitoring Plan. CAFF International Secretariat, Akureyri, Iceland.
- Koryakin A.S., Konovalova N.N., Konovalova E.V. 2008. Municipal waste on the coast of Ryazhkov Island, Severny Archipelago in 2003-2007 In: Koryakin A.S. (Ed.) Nature chronicles of the Kandalaksha strict nature reserve for 2007. Annual Report. Kandalaksha. V.1. P. 60-70 (In Russian)
- Kuletz K., Mallory M., Gilchrist G., Robertson G., Merkel F., Olsen B., Hansen E., Rönkä M., Anker-Nilssen T., Strøm H., Descamps S., Gavrilov M., Kaler R., Irons D. Chapter 3.5: Seabirds // State of the Arctic Marine Biodiversity Report. Akureyri, Iceland: CAFF, 2017 P. 128–147
- Kuzin A.E. 1990. Assessment of northern fur seal (*Callorhinus ursinus*) mortality as caused by pollution of the sea by commercial fisheries wastes. Ekologia. № 5: 89-92 (In Russian)

- Kuzin, A. E., & Trukhin, A. M. (2019). Entanglement of northern fur seals (*Callorhinus ursinus*) in marine debris on Tyuleniy Island (Sea of Okhotsk) in 1998–2013. *Marine Pollution Bulletin*, 143, 187–192. doi:10.1016/j.marpolbul.2019.04.051
- Macfayden, G., T. Huntington, and R. Cappell. 2009. Abandoned, lost or otherwise discarded fishing gear. UNEP Regional Seas Reports and Studies 185, FAO Fisheries and Aquaculture Technical Paper 523, United Nations Environment Programme, Food and Agriculture Organisation of the United Nations, Rome.
- Mikhtaryantz E.A. 1981. Distribution and biology of Parakeet auklet – *Cyclorhynchus psittacula* (Pall.). In: *Rare birds of the Far East*. Vladivostok: Russian Academy of Sciences Publisher. P. 80 – 96. (In Russian)
- Moseev D.S., Gavrilov M.V. Anthropogenic impact on the coasts of the Franz-Josef Land Archipelago. XXVII International coastal conference. Arctic coasts: towards sustainability. Abstracts. Murmansk 2019. P. 253 – 257 (In Russian)
- Nikulin V.S., Vertyankin V.V., Fomin V.V. 1982. Effect of the ocean littering upon fur seals of the Commander Islands. Abstracts of VIII All-Union conference on studies, conservation and rational use of the marine mammals. Astrakhan. P. 261 – 263. (In Russian)
- OSPAR. 2015. Guidelines for Monitoring and Assessment of plastic particles in stomachs of fulmars in the North Sea area. OSPAR, Texel, the Netherlands. Available from <https://www.ospar.org/convention/agreements?q=Guidelines%20for%20Monitoring%20and%20Assessment%20of%20plastic%20particles%20in%20stomachs%20of%20fulmars%20in%20the%20North%20Se> [accessed 19 October 2019].
- Petersen A., Irons D., Anker-Nilssen T., Artukhin Yu., Barrett R., Boertmann D., Egevang C., Gavrilov M.V., Gilchrist G., Hario M., Mallory M., Mosbech A., Olsen B., Osterblom H., Robertson G., Strom H. 2008. CAFFs Circumpolar Biodiversity Monitoring Program: Framework for a Circumpolar Arctic Seabird Monitoring Network. CAFF CBMP Report # 15. 84 pp.
- Provencher, J.F., Borrelle, S.B., Bond, A.L., Lavers, J.L., van Franeker, J.A., Kühn, S., Hammer, S., Avery-Gomm, S., and Mallory, M.L. 2019b. Recommended best practices for plastic and litter ingestion studies in marine birds: Collection, processing, and reporting. *FACETS* 4(1): 111–130. doi:10.1139/facets-2018-0043.
- Provencher, J.F., Bond, A.L., Avery-Gomm, S., Borrelle, S.B., Bravo Rebolledo, E.L., Hammer, S., Kühn, S., Lavers, J.L., Mallory, M.L., Trevaill, A., and van Franeker, J.A. 2017. Quantifying ingested debris in marine megafauna: a review and recommendations
- Solovyeva D. V., K.V. Regel, K. G. Pavluykov, G. K. Pavluykov 2020 Case of mass mortality of Short-tailed shearwater *Puffinus tenuirostris* (Temminck, 1835) in West Chukotka. *Herald of the North-East Scientific Center of the Far East Branch of the Russian Academy of Sciences* (in press) (in Russian with summary in English)
- Tolmacheva E.L. 2012 Food and feeding of herring gull (*Larus argentatus* Pontopp.) in the Kandalaksha Bay, the White Sea. *Scientific annals of Petrozavodsk state university*. N 6. P. 32 – 34. (in Russian with summary in English)
- Turovskaya M., Nichkevich M. 2005 Study of herring gull (*Larus argentatus* L.) diet in the Kandalaksha Bay using bolus collected in 2003/04. *Anichkovskiy vestnik*. Saint-Petersburg. N 48. P. 114–117. (in Russian with summary in English)
- Weslawski, J.M., Stempniewicz, L., Galaktionov, K., 1994. Summer diet of seabirds from the Frans Josef Land archipelago, Russian Arctic. *Polar Res*. 13, 173–181. <https://doi.org/10.1111/j.1751-8369.1994.tb00447.x>
- Zelenskaya L.A. Feeding ecology of the nesting slaty-backed gulls *Larus schistisagus* of the Ol'skaya Lagoon (Tauyskaya Bay, Sea of Okhotsk). *Russian j. of ornithology*. 2019, V. 28, Express-issue 1764: 1957–1971 (in Russian with summary in English)
- Zelenskaya L.A. 2003. Feeding strategy of Commander Island population of the glaucous-winged gulls *Larus glaucescens*. *Zoologicheskii zhurnal*. 82(6): 694 – 707 (in Russian with summary in English)

ANNEX 1

List of participants

1.	Andreev Alexander	Institute of biological problems of the North, Russian Academy of sciences
2.	Antipin Maxim	Nizhne-Svirskiy Strict Nature Reserve
3.	Artyukhin Yuriy	Kamchatka Branch Pacific institute of Geography Russian Academy of sciences
4.	Babiy Ulyana	Wrangel Island Strict Nature Reserve
5.	Bogomolova Yulia	Nenetsky Strict Nature Reserve
6.	Bublichenko Yulia	Saint-Petersburg Scientific Center Russian Academy of sciences
7.	Cherenkov Alexander	White Sea biological station named after Nikolay Pertsov MSU
8.	Cherenkova Nadezhda	Kenozerskiy National Park
9.	Gavrilo Maria	Association Maritime Heritage: Sustain & Explore
10.	Gerasimov Yuriy	Kamchatka Branch Pacific institute of Geography Russian Academy of sciences
11.	Golubova Elena	Institute of biological problems of the North, Russian Academy of sciences
12.	Gorchakovskiy Andrey	Gydanskiy Strict Nature Reserve
13.	Gruzdev Alexander	Wrangel Island Strict Nature Reserve
14.	Ivannikov Alexander	Independent expert
15.	Kalyakin Mikhail	Zoological Museum MSU, Birds Russia
16.	Kantakov Gennadiy	Scientific and industrial unity DEKO
17.	Konyukhov Nikolay	Severtsov Institute for Ecology and Evolution Russian Academy of sciences
18.	Krasnov Yuriy	Murmansk Marine biological institute Russian Academy of sciences
19.	Krasnova Elena	White Sea biological station named after Nikolay Pertsov MSU
20.	Krutikov Ivan	Saint-Petersburg State Pedagogical University
21.	Lappo Elena	Institute of Geography Russian Academy of sciences
22.	Nesterov Dmitry	Greenpeace Russia
23.	Pilipenko Dmitry	Komandorskiy Strict Nature Reserve
24.	Prokopenko Olga	Institute of biological problems of the North, Russian Academy of sciences
25.	Semashko Vladimir	Independent expert
26.	Syroechkovskiy Eugene	Birds Russia
27.	Tolmacheva Ekaterina	Kandalaksha Strict Nature Reserve
28.	Utekhina Irina	Magadanskiy Strict Nature Reserve
29.	Yakovlev Vladimir	BirdsRussia/ROSIP
30.	Zelenskaya Larisa	Institute of biological problems of the North, Russian Academy of sciences

Additional list for Round-table discussion, 14 November

31.	Glazov P.M.	Institute of Geography Russian Academy of sciences
32.	Gopeko A.A.	Caucases Scientific research center «Wildlife of Caucasus»
33.	Ivanov .M.N.	State Biological Museum
34.	Lokhman Yu. V.	Caucases Scientific research center «Wildlife of Caucasus»
35.	Loshchagina V.A.	Institute of Geography Russian Academy of sciences
36.	Masterov V.B.	Moscow State University (MSU)
37.	Melekhova E.V.	VNII Ecology
38.	Nikolaeva N.G.	Moscow State University (MSU)
39.	Pokrovskaya Irina	Institute of Geography Russian Academy of sciences, National Park Onega Pomoriye
40.	Revyakina Z.V.	Scientific research center Fauna
41.	Semenov L.R.	Research Center Finwhale
42.	Shenyakin E.V.	ИБПК СО РАН
43.	Tarasov V.V.	Institute for ecology of plants and animals
44.	Tomkovich P.S.	Zoological Museum MSU
45.	Vinogradov G.M.	Institute of Geography Russian Academy of sciences
46.	Yakushev V.V.	BirdsRussia / ROSIP
47.	Zvey A.L.	ZIN RAS
48.	Zykov V.B.	Scientific research center Fauna

ANNEX 2

Venue: Zoological Museum Moscow State University, (<http://zmmu.msu.ru/contacts>)

Workshop

PLASTIC POLLUTION & SEABIRDS IN THE RUSSIAN ARCTIC:

State of knowledge, information exchange, possibilities for collaboration

Agenda (actual)

11 November

Arrival

12 November

Morning arrival

10:00 - 11:00

Registration

11:00 – 11:15

Welcome and Opening

Dr. sci. Mikhail Kalyakin, Director of the Museum, Chief of the Birds Russia Board, Dr. Eugene Syroechkovskiy, Director Birds Russia, Russia's representative to CAFF

11:15 – 11:30

Adoption of the Agenda

Presentations of the participants – 15 min

11:30 – 12:00 Morning session

- ▶ CAFF of the Arctic Council and AMBI – introduction. Dr. Eugene Syroechkovskiy (20 min)
- ▶ CAF and CBird: seabirds and Circumpolar FlyWay – Dr. Maria Gavrilov (10 min)
- ▶ Introduction to the problem «Seabirds & plastic»: plastic – new hazard for the Arctic marine ecosystem and seabirds. Dr. Maria Gavrilov (30 min)
- ▶ Project CAFF/AMBI: PLASTICS POLLUTION AND SEABIRDS: Habitat mitigation. Information on the project and results of the workshop, March 25, Akureyri, Iceland. Dr. Maria Gavrilov (30 min)

13:00 – 14:00 lunch

14:00-14:30 Afternoon session

- ▶ Plastic pollution (plastic litter & microplastic) in the Russian Arctic – state of knowledge, ongoing projects and initiatives, involved parties (introduction). Dr. Maria Gavrilov (10 min)

1430 – 1530 Afternoon session continuation:

- ▶ Inventory of existing knowledge on the problem «Plastic pollution and seabirds», ongoing observations, studies and projects: information exchange from the Russian Arctic and neighboring regions. (Round-table presentations)
- ▶ South-Eastern Barents Sea and Nenets Strict Nature Reserve. Yulia Bogomolova
- ▶ Monitoring of Larids diet and plastic pollution in Kandalaksha Strict Nature Reserve. Dr. Ekaterina Tolmacheva
- ▶ Plastic pollution and birds in the National Park Onezhskoe Pomorye, White Sea. Nadezhda Cherenkova
- ▶ Plastic pollution and birds in Onega Bay of the White Sea, Vladimir Semashko & Alexander Cherenkov

15:30 – 16:00 coffee break

16:00-17:00 Evening session.

- ▶ Inventory of existing knowledge - continuation
- ▶ Barents Sea and arctic archipelagos Dr. Maria Gavrilov
- ▶ Kara Sea, Gydanskiy Strict Nature Reserve Andrey Gorchakovskiy
- ▶ East-Siberian and Chukchi seas, Wrangel Island Strict Nature Reserve, Ulyana Babiy, Dr. Alexander Gruzdev
- ▶ Bering and Chukchi seas, Beringia National Park, Maxim Antipin

13 ноября

10:00 – 11:30 Morning session

- ▶ Inventory of existing knowledge on the problem «Plastic pollution and seabirds», ongoing observations, studies and projects: information exchange from the Russian Arctic and neighboring regions. Continuation
- ▶ Sea of Okhotsk, Dr. Larisa Zelenskaya
- ▶ Sea of Okhotsk, Magadanskiy Strict Nature Reserve. Dr. Irina Utekhina

- ▶ Seas of Russian Far East. Dr. Yuri Artyukhin
- ▶ North Pacific, Komandorskiy Strict Nature Reserve. Dmitriy Pilipenko
- ▶ Sea of Japan, Sikhote-Alin Strict Nature Reserve. Alexander Ivannikov
- ▶ Baltic Sea, Gulf of Finland, Dr. Yulia Bublichenko

11:30 – 12:00 coffee break

12:00 – 13:00 Afternoon session

- ▶ Round-table discussion of the possibilities of plastic litter and microplastic researches and monitoring in context of its hazard to seabirds in the Russian Arctic seas.

13:00- 14:00 Lunch

14:00-15:30 Evening session.

- ▶ Round-table discussion of the possibilities of plastic litter and microplastic researches and monitoring in context of its hazard to seabirds in the Russian Arctic seas.

15:30- 16:00 coffee break a

16:00-17:00 Evening session: continuation.

- ▶ Wrap up results of the seminar, planning of Russian national input in the Pan-Arctic report, resolution of the seminar.

18:00 Workshop Dinner.

Round-table discussion

SEABIRDS, THEIR STUDIES AND MONITORING IN THE RUSSIAN ARCTIC AND ADJACENT SEAS

Agenda

14 November

1. Syroechkovskiy Eugene. We need to meet more often: Birds Russia as a communication platform for Russian marine ornithologists.
2. Krasnov Yuriy Current population status and state of knowledge of the mass seabird species in the Barents Sea.
3. Artyukhin Yuriy Current problems and threats to seabirds of the Far East region
4. Andreev Alexander, Golubova Elena, Zelenskaya Larisa Seabirds of the islands and coasts of the northern Sea of Okhotsk
5. Gavrilov Maria Ivory gull – endemic of the ice zone of the Arctic: preliminary results of the first pan-Arctic survey in the context of the modern environmental processes in the Arctic marine ecosystems.
6. Prokopenko Olga, Solovyeva Diana, Makarenko Yu.N. Current seabird studies of IBPN RAS in West Chukotka
7. Konyukhov Nikolay How need not to shoot birds. Seabird photocounts: pro and contra.
8. Zelenskaya Larisa, Utekhina Irina Seabird monitoring and studies in the Magadanskiy Strict Nature Reserve.
9. Tolmacheva Ekaterina Seabird monitoring in the Kandalaksha Strict Nature Reserve (Kandalaksha Bay, White Sea)
10. Pokrovskaya Irina Seabird monitoring and studies in the National Park Onega Pomoriye
11. Gorchakovskiy Andrey Seabird monitoring and studies in the Gydan Strict Nature Reserve.
12. Babiy Ulyana Monitoring of seabirds in the Wrangel Island Strict Nature Reserve: presence and future, perspectives and problems.
13. Artyukhin Yuriy Ornithological works in Penzhina Region

ANNEX 3

АНКЕТА / INVENTORY

ПЛАСТИК И МОРСКИЕ ПТИЦЫ / PLASTIC AND SEABIRDS

Уровень знаний об угрозе птицам и их местообитаниям

в российской Арктике и в сопредельных морях

State of knowledge on the plastic threats to seabirds and their habitats in the Russian Arctic and adjacent seas

- ▶ Просим Вас по возможности подробно ответить на вопросы, для каждого района исследований заполнить отдельную анкету.
- ▶ Под «морскими птицами» в данном анкетировании подразумеваются морские и околоводные птицы: гагары, трубконосые, веслоногие, чистиковые, чайки, крачки, поморники, морские утки.
- ▶ Если у Вас есть данные, даже напрямую не связанные с морскими птицами, о загрязнении морских прибрежных местообитаний пластиком или об угрозах иным видам птиц, обитающих на морских побережьях, просим также заполнить эту анкету.

1	Район исследований (в т.ч. море и географическая привязка района)	
2	Наличие морского мусора на побережье в районе гнездования морских птиц, его характер (происхождение, состав, тип объектов)	
3	При наличии морского мусора просьба полуколичественно оценить его обилие и распространение	
4	С какого времени регистрируется морской мусор?	
5	Свидетельства взаимодействия морских птиц с морским мусором: использование в гнёздах, наличие морского мусора непосредственно в колониях или поселениях морских и околоводных птиц и т.п. При наличии – описать подробно, указать виды птиц и отмеченные факты (характер мусора, цвет, обилие и т.п.). Попытаться оценить долю гнёзд, подвергающихся воздействию морского мусора (встречаемость)	
6	С какого времени регистрируется наличие морского мусора непосредственно в колониях	
7	Свидетельства прямых угроз морского мусора для морских птиц: случаи запутывания, гибели, повреждений и т.п. При наличии – описать подробно, указать виды птиц и отмеченные факты, дату (период) наблюдений	
8	С какого времени регистрируются случаи запутывания, гибели, повреждений и т.п.	
9	Свидетельства прямых угроз морского мусора и микропластика для морских птиц: случаи заглатывания, обнаружение пластика при анализе питания, наличие пластика при вскрытии ЖКТ, наличие в погадках и т.п. При наличии – описать подробно, указать виды птиц и отмеченные факты наличия пластика (размеры, обилие, частота встречаемости, характер частиц), дату (период) наблюдений/сбора проб	
10	С какого времени регистрируются случаи заглатывания	
11	Общий период наблюдений в данном районе	
12	Виды морских птиц, гнездящихся в районе исследований	
13	Наличие программы (проекта) наблюдений, мониторинга, исследований, касающихся пластикового загрязнения и морских птиц, при наличии – период, название проекта, ведущая организация	Мониторинг морских птиц (да / нет, какие виды) Мониторинг, наблюдения, проектные исследования диеты (виды, методы) Мониторинг, наблюдения, проектные исследования загрязнения морским мусором и / или микропластиком
14	Наличие фото- или видеоматериалов	
15	Наличие публикаций, отчётов по тематике (при наличии – указать полную ссылку, по возможности приложить копию или ссылку на интернет-ресурс)	
16	Фамилия, имя, отчество	
17	Организация	
18	Контактные данные	

Анкеты и дополнительные материалы просим направлять до 30 сентября в адрес консультанта по проекту «Пластик и морские птицы» по России m_gavrilo@mail.ru, +79219216213

- ▶ Спасибо за сотрудничество!

ANNEX 4

Questions for plastic workshop attendees in St. Petersburg

Interviews conducted in association with video produced by CAFF and the Cornell Lab of Ornithology

- ▶ Why is plastic a problem in the Arctic?
- ▶ What is the extent of the plastic problem in the Russian Arctic?
- ▶ Has the problem of plastic affected subsistence communities in the Russian Arctic?
- ▶ Describe the size of the Russian Arctic territory as compared to the rest of the Arctic.
- ▶ Describe how plastic from the rest of the world is finding its way to the Russian remote waters and communities.
- ▶ Why do we need to monitor plastic in the Arctic?
- ▶ What are some of the options for monitoring plastic in remote places?
- ▶ Why are birds - specifically seabirds like the Northern Fulmar - such a good tool for creating a circumpolar monitoring effort?
- ▶ What data does monitoring seabirds provide that other types of monitoring (ie from ships or sampling along beaches) do not?
- ▶ Why do we need all the countries of the Arctic to work together in this monitoring effort? (Or, why is it important to have coordinated monitoring across the Arctic as opposed to every country conducting independent projects?)

People been interviewed

Artyukhin Yuriy

Gavrilo Maria

Ivannikov Alexander

Kantakov Gennadiy

Syroechkovskiy Eugene

CAFF INTERNATIONAL SECRETARIAT
Borgir , Nordurslöd
600 Akureyri
ICELAND

Telephone: +354 462 3350
Fax: +354 462 3390
E-mail: caff@caff.is
Website: www.caff.is
Facebook: www.facebook.com/CAFFS
Twitter: @CAFFSecretariat