***Comments from Kingdom of Denmark (1st May)***

We have some additional comments based on a review of the draft zero by Katrin Vorkamp. I hope they can be taken into consideration by PAME though the deadline was yesterday:

* We would like to support the comment on p. 33 on the need for a distinction between ingestion and impact. Further to this, we suggest a differentiation between impacts related to the material itself and impacts related to associated chemicals. The latter has been widely discussed in the scientific literature and elsewhere and may deserve a more prominent place in the review. The review currently cites the study by Herzke et al. (2016) on effects of plastic-associated contaminants on seabirds. A relevant study on fish is that by Koelmans et al. (2014) Environ. Pollut. 187, 49-54. The paper by Lohmann (2017) Integr. Environ. Assess. Manag. 13, 460-465 includes a list of bioaccumulation studies involving microplastics and contaminants and provides its own assessment of contaminant uptake via plastic ingestion.
* OSPAR has conducted beach litter monitoring for several years. We wonder if relevant data exist that allows for the description of a temporal development of beach litter amounts. Furthermore, OSPAR’s work on plastics in Northern fulmars and the related Ecological Quality Objectives might be suitable for the assessment of temporal developments if such data have been collected over time. Both beach litter and fulmar data can provide geographical trends, which are described in the review to some extent. It would be helpful for the reader if maps were created to present this information.
* There are a number of new publications dealing with risk assessment and risk communication (e.g. Rist et al. (2018) Sci. Total Environ. 626, 720-726; Koelmans et al. (2017) Environ. Sci. Technol. 51, 11513-11519). These topics are not covered in the current draft, but might be worth considering even though the current publications do not specifically address the Arctic.

***Comments to the draft from Geir Wing Gabrielsen (30/4-2018)***

* The draft has a big focus on the background (many pages) but few recommendations. This will probably be solved in the last part “Gap Analysis” which is in preparation?
* Page 39. Hallanger and Gabrielsen is not a correct sitation here. “Hallanger and Gabrielsen (2018) report that plastic debris (fishing gear or line) has been found in stomach analyses of Greenland shark (Somniosus microcephalus) from south Greenland with a frequency of 8.3% (Nielsen et al., 2013), and 3% from Svalbard (Leclerc et al., 2012).”
* Table:Little auks in paper by Amelineau. The frequencies given in the table are for fragments of plastic. Amelineau also reportet filaments which were 100% detected in all gular poaches.  This should be specified in the table.Also, Svalbard should not be geographically placed in “Greenland sea”. It should be written “Fram Strait”
* Page 32 in the comment there, Svalbard is again but in the Greenland Sea, geographically this can’t be right. No information exists on sediments from the Greenland Ssea, the studies referred to are from the Fram Strait.
* Page 38, why are sharks with marine mammals and not fish (heading)?
* In the monitoring section, page 48, the text doesn’t mention the difference between the processing of macroplastics and microplastics. Microplastics processing is certainly more difficult to achieve than macroplastics. Indeed, macroplastics can be collected by tourists each year, as suggested in the text, but this is not the case for microplastics. Also, while spectroscopic analyses of macroplastics is not necessarily needed to confirm their chemical composition, further analyses on the chemical composition of MPs are required, at least on a subsample. Simply, I think that monitoring microplastic pollution, whatever the type sample (biota, sediment, water…) is really complicated. It needs a lot of people or less samples in a same time, …
* Regarding the cleanings, these actions are really great but the majority of marine plastics are at the bottom of the sea and hardly reachable. Seeing that we can act on a small proportion of discarded plastics, maybe the focus should be the production and waste management, to act at the source.

*Date: 30 April 2018*

***Stefano Aliani comments to***

***Marine Litter Desktop Study - Draft zero (edits suggested by Lauren Divine accepted/discarded for simplicity)***

**Background**

In the Background there is logical passage from Marine Litter to Marine Plastic but a definition of “plastic” is missing. Therefore, the concept of Plastic Litter is vague to the opposite of the concept of Marine Litter which is well defined.

First, I would introduce the term plastic after the first citation to UNEP2009:

 *“Plastic includes any synthetic or semi-synthetic organic*[*polymer*](https://www.thoughtco.com/definition-of-polymer-605912)*. They are typically*[*organic polymers*](https://en.wikipedia.org/wiki/Organic_polymer)*of high*[*molecular mass*](https://en.wikipedia.org/wiki/Molecular_mass)*and often contain other substances. They are usually synthetic, most commonly derived from*[*petrochemicals*](https://en.wikipedia.org/wiki/Petrochemical)*, however, an array of variants is made from other sources including renewable materials such as polylactic acid from corn or cellulosics from cotton linters. When discarded at sea these polymers became Marine Plastic Litter.”*

**Objectives**

* To evaluate the scope of marine litter in the Arctic, and its effects on the Arctic marine environment;

**Page 6**

At that sixth meeting, the U.N. General Assembly recognized that “[m]arine debris is a global transboundary pollution problem that constitutes a serious threat to human health and safety, endangers fish stocks, marine biodiversity and marine habitats and has significant costs to local and national economies...”

**Page 19-20**

**Shipping**

The potential contribution from shipping to marine plastic pollution in the Arctic has been highlighted in several studies (Shaw 1977; Bergmann and Klages, 2012; Bergmann et al., 2017; Buhl-Mortensen and Buhl-Mortensen, 2001; Tekman et al., 2017) but as is the case for aquaculture it is difficult to ascertain its relative contribution to marine plastic pollution as…

**Gap Analysis**

 [Each of the sections above could include a concluding paragraph on the knowledge gaps identified in order to have a good understanding of each of the themes addressed, but we would like to recommend including a subsection to jointly analyze the major knowledge gaps that would need to be addressed by future monitoring and research efforts in order to further guide and inform policy development.]

***Comments from China (1st May)***

## 1. Sources and Drivers

* Sources will be split between sea-based and land-based sources.
* Shall we consider river-based sources? Or it is included into the land-based sources?

## 2. Pathways and Distribution

* Sea ice will be another important pathway for microplastic transportation just published in Nature communication.
* For the references of the distribution of the microplastic in different regions should carefully considering the size of the microplastic and the variation counting method of the microplastic. The international guidelines for sampling, monitoring and analyzing is important before we can have some conclusion.

**Monitoring:**

* “To our knowledge there are no other extensive monitoring programs targeting marine plastic pollution in the Arctic. Based on the experience of Clean-Up Svalbard, Bergman et al., 2017x suggests that there is an opportunity to use regular visits by tourist to gather data on marine litter from remote, poorly sampled areas.”
* We are willing to participate more in the section of monitoring, we now have a joint research project with Norway focusing on the methodology of microplastic and new analysis methods.
* In the section reviewing the distribution of microplastic in sea ice, the data of micro plastic concentration from Obbard et al. (2014) and Bergmann et al. (2017b) are cited. It is pointed out,“these concentrations are several orders of magnitude higher than concentrations reported for surface and subsurface waters in the Arctic and even in the most polluted oceanic gyres”. However, it is important to know that the minimum size of the micro plastics concerned in these studies can reach 0.00022 mm, far smaller than the smallest size (0.3 mm) of the surface and subsurface water in previous studies. So it does not necessarily indicate that the MP concentration of sea ice must be higher than that of other water samples.

**VII. National Efforts (To be included in an Annex)**

* If the Desktop Study is to include national efforts, we would ask the each member provide a short section on what its respective country has adopted or implemented to prevent, mitigate, manage, and/or reduce marine litter from its boundaries.

**Some information from China**

* Published: Marine litter monitoring and evaluation technical guideline, October, 2015, by SOA. As attached.
* On research: Marine microplastic monitoring technical guideline, by SOA. (part 1: General principles, part 2 Microplastic in the seawater, part 3 Microplastic on the beach, part 4, Microplastic in the sediment, part 5, Microplastic in the species, part 6, Laboratory analysis methods).
* Since 2007, SOA has organized marine litter monitoring in more than 50 coastal regions of China. And since 2016, the nearshore microplastic monitoring has been implemented.
* The SOA began monitoring microplastic materials in offshore China in 2016 and started conducting monitoring in Arctic and oceanic environments since 2017.
* In 2017 summer, China's icebreaker Xuelong completes 8th Arctic expedition, the microplastic samples in Arctic ocean has been collected.