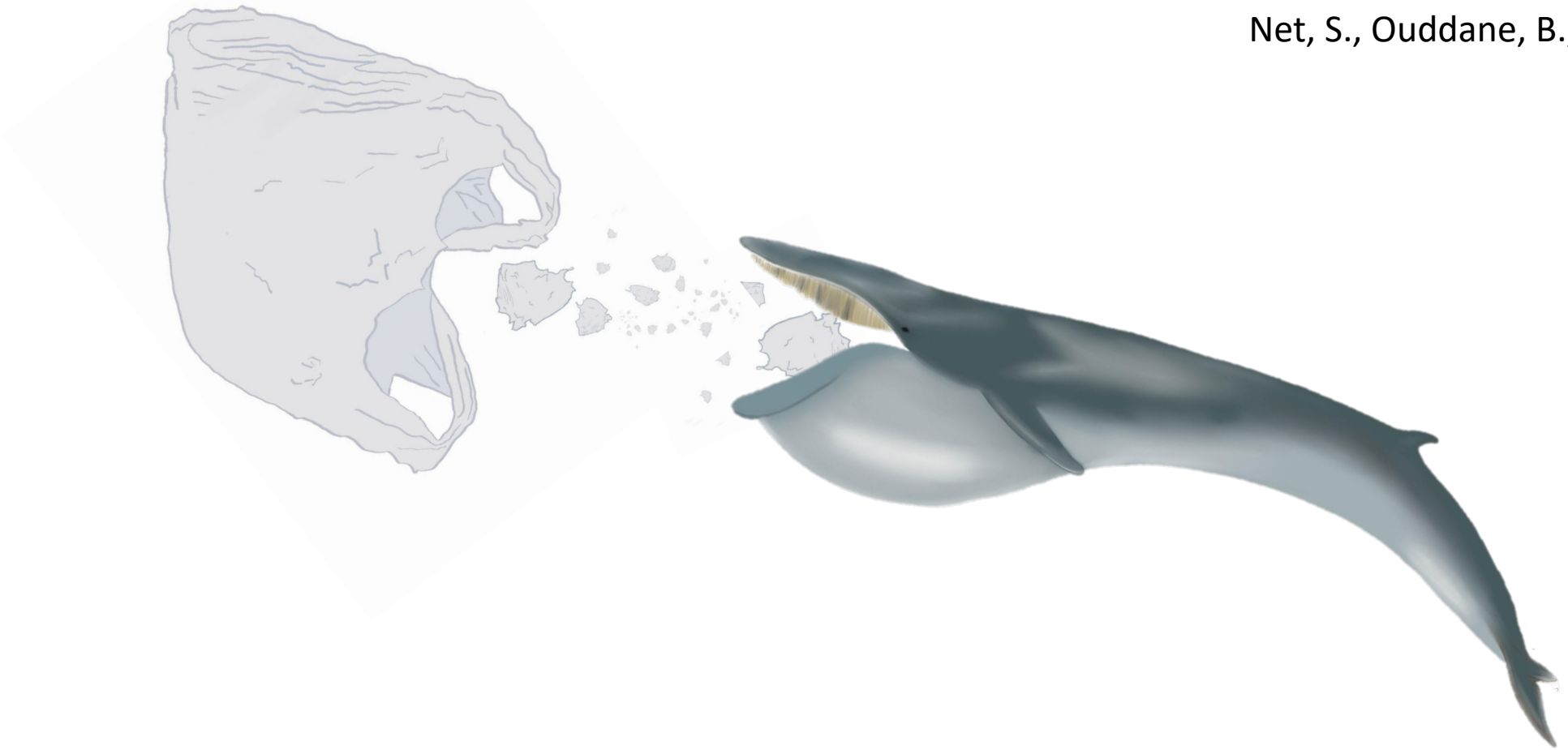
SENTINELS OF PLASTIC

The Team

Chosson, V., Borell, A., Aguilar, A., Vighi, M., Sala, B., Sahyoun, W., Eljarrat, E., Net, S., Ouddane, B., & Garcia-Garin, O.



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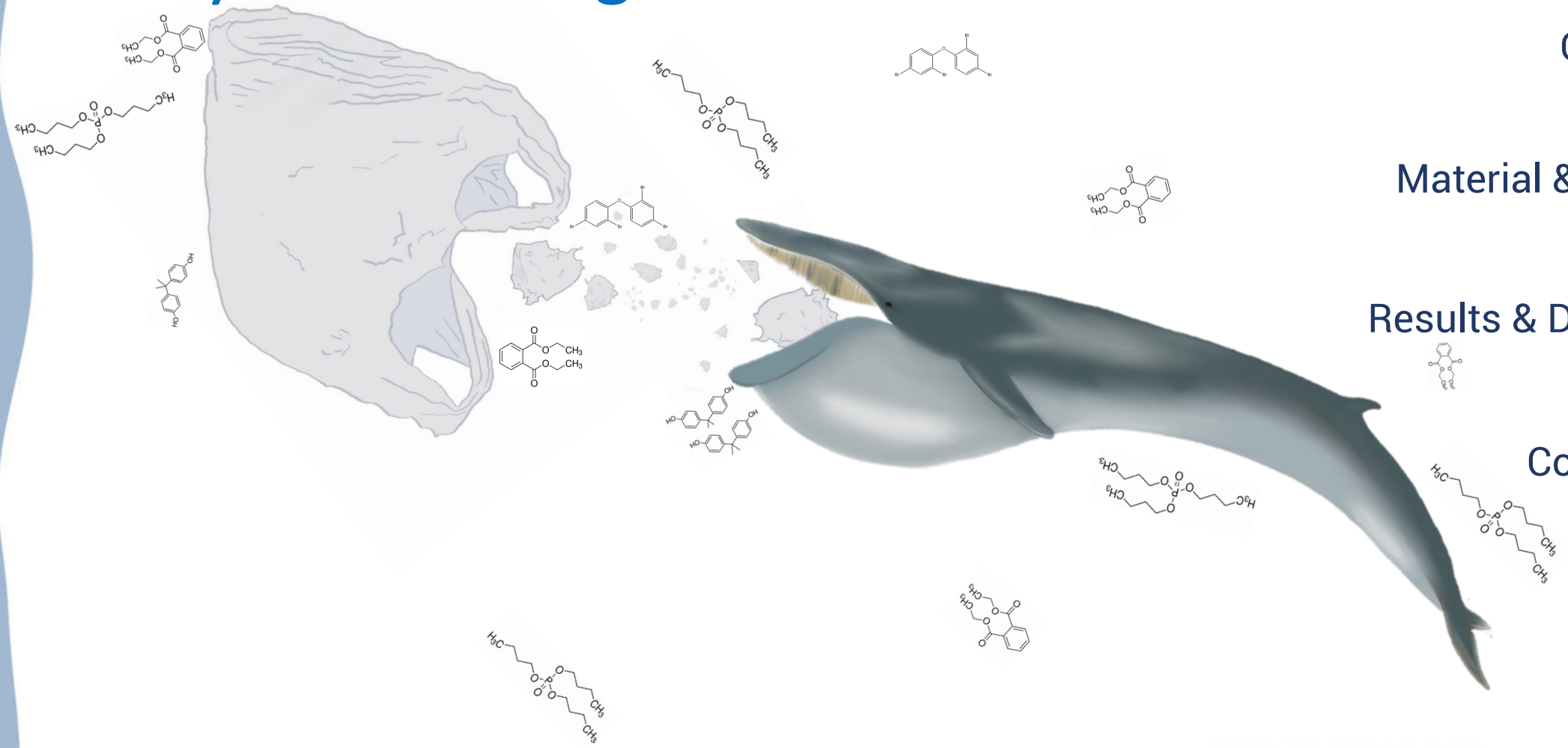
Monitoring plastic pollution in the sub-Arctic ecosystem through fin whales off Iceland



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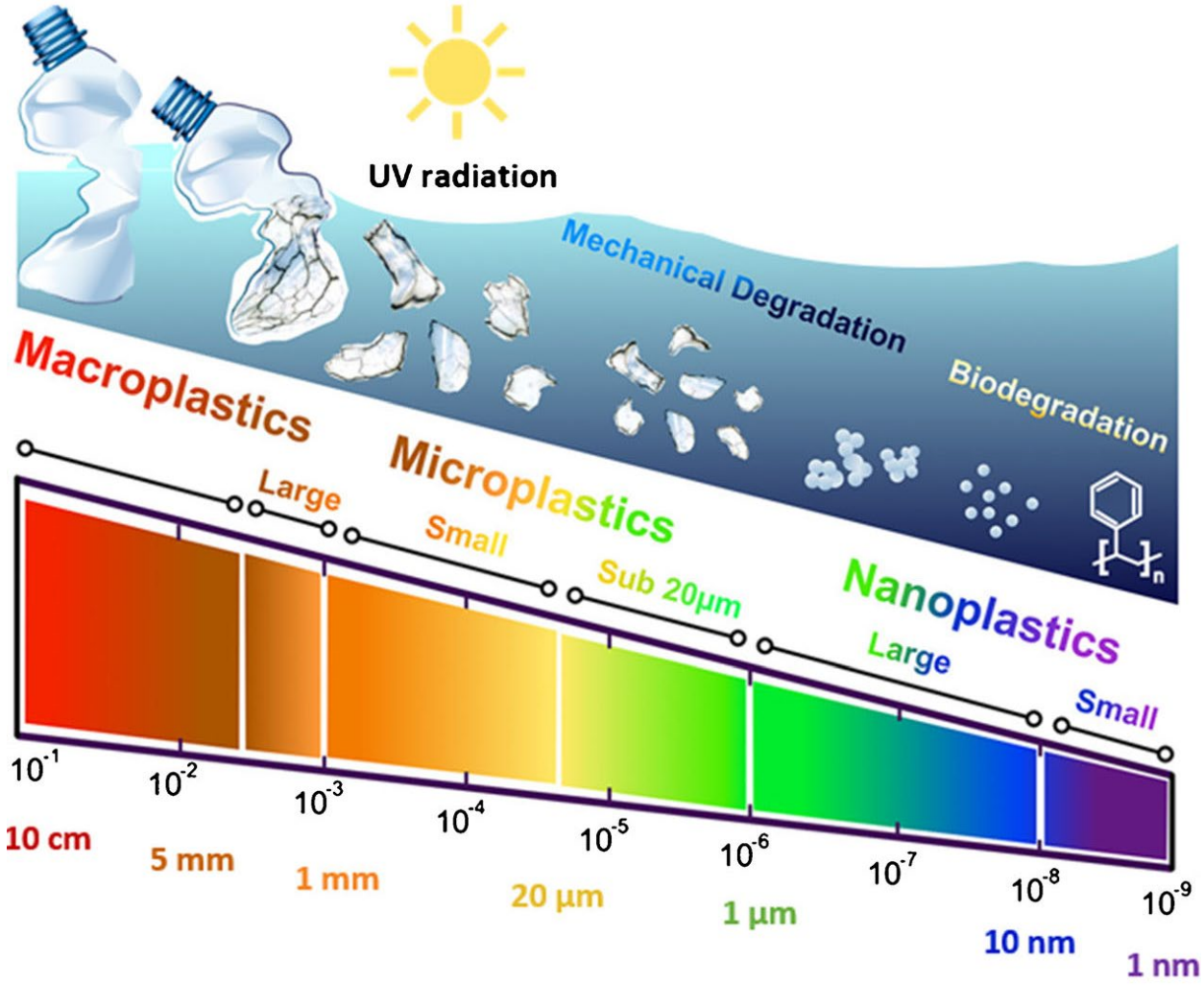
Introduction: Composition, abundance and distribution of Plastic litter

- **Marine / Plastic litter:** definition
- **Types** of plastic litter based on its size
- **Fragmentation** and degradation
- Microplastics of **primary** and **secundary** origin



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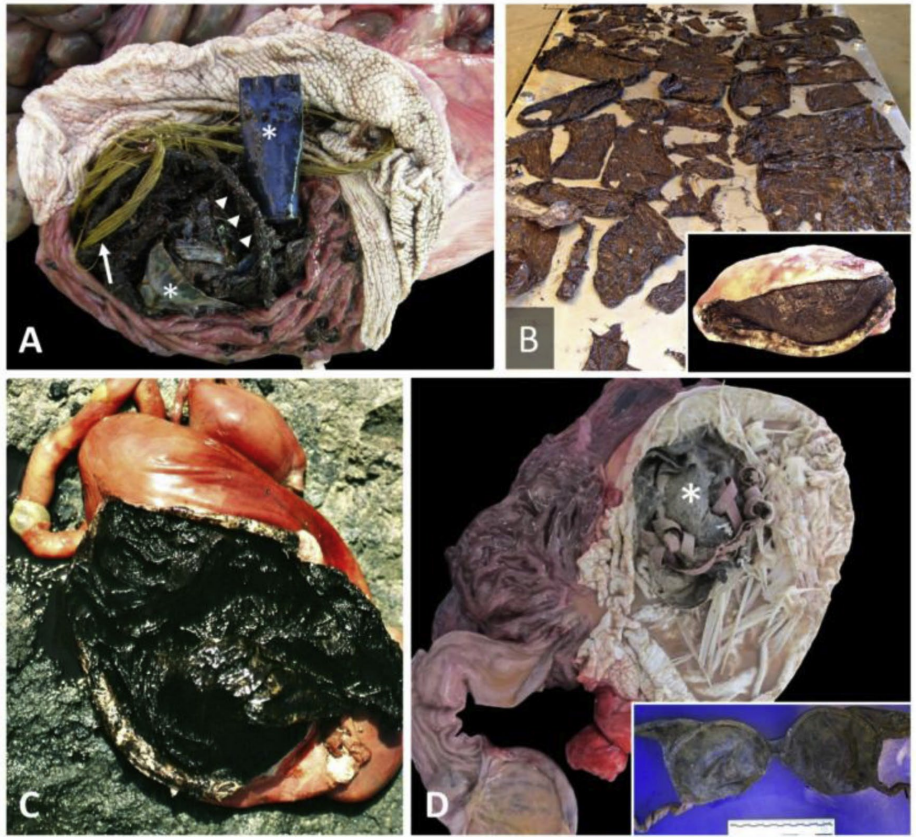
Introduction: Marine litter impact on marine fauna By INGESTION



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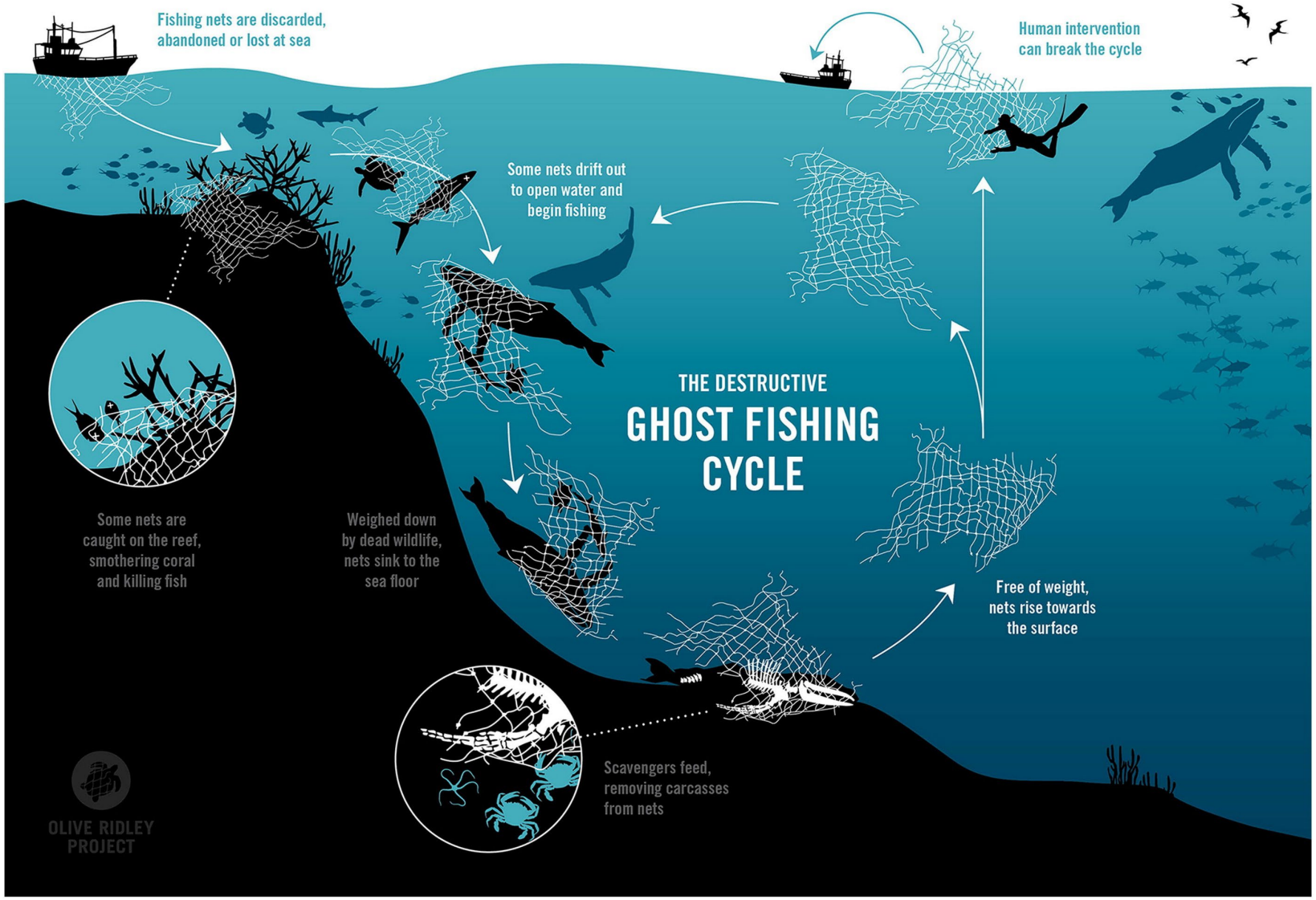
Introduction: Marine litter impact on marine fauna By ENTANGLEMENT



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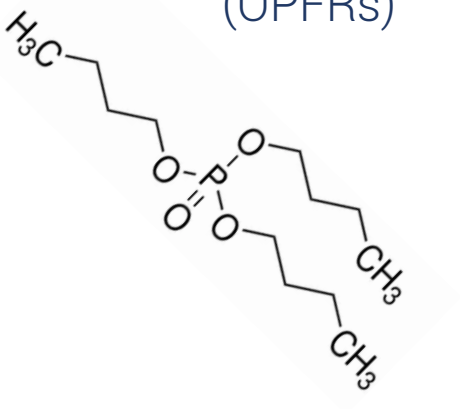
Introduction: Marine litter impact on marine fauna

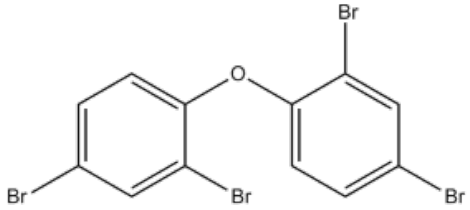
By POISONING
(absorption of additives)

- **Plastic additives**

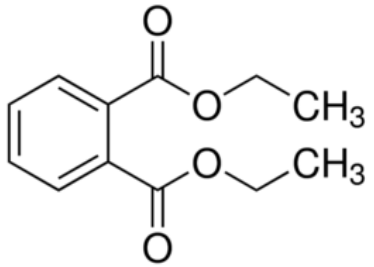
Organophosphate Flame Retardants (OPFRs)



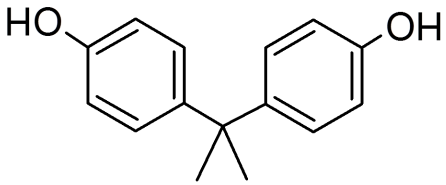
Polybrominated diphenyl ethers (PBDEs)



Phthalates (PAEs)



Bisphenols (BPs)



- **Other contaminants**

Metals

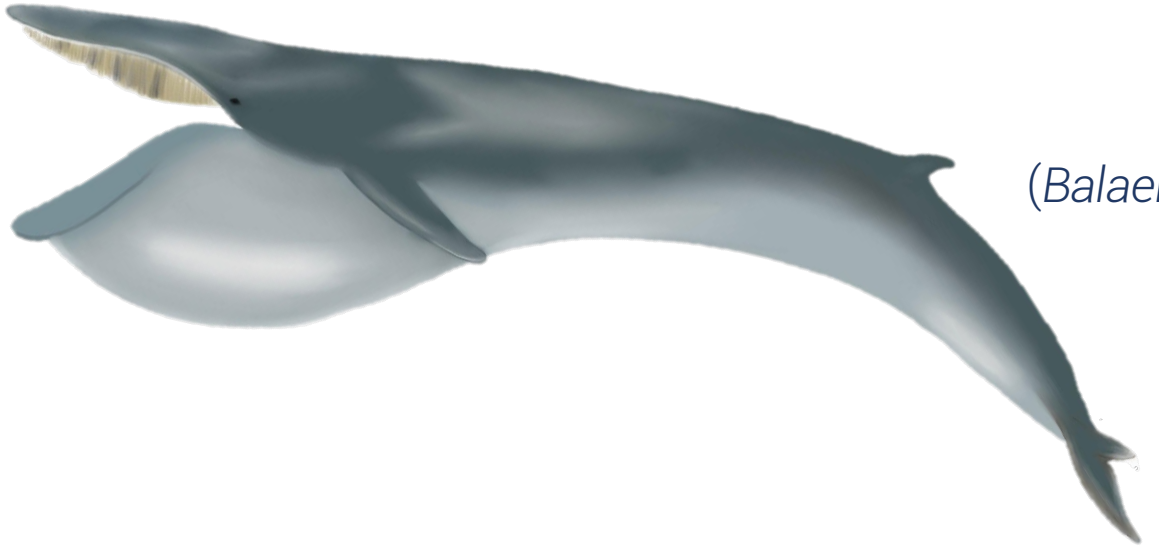
Polycyclic Aromatic Hydrocarbon(PAHs)

Pesticides

Polychlorinated Biphenyls (PCBs)

Marine litter impact on marine fauna: absorption of additives

Objectives



Fin whale
(*Balaenoptera physalus*)

We investigate the occurrence and the magnitude of **plastic pollution** in the **sub-Arctic ecosystem** and its potential long-term impact through a **sentinel organism**, the **fin whale** (*Balaenoptera physalus*) summering in the waters off western Iceland

1.1

Chemosphere 279 (2021) 130564

Contents lists available at ScienceDirect

Chemosphere

journal homepage: www.elsevier.com/locate/chemosphere

Ingestion of synthetic particles by fin whales feeding off western Iceland in summer

Odei Garcia-Garin [a], Alex Aguilar [a], Morgana Vighi [a], Gísli A. Víkingsson [b], Valérie Chosson [b], Asunción Borrell [a,*]

Use the fin whale as a bioindicator species for synthetic particles and at the same time determine their impacts on the population in Icelandic waters.

1.2

Science of the Total Environment 721 (2020) 137768

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv

Organophosphate contaminants in North Atlantic fin whales

Odei Garcia-Garin [a], Berta Sala [b], Alex Aguilar [a], Morgana Vighi [a], Gísli A. Víkingsson [c], Valerie Chosson [c], Ethel Eljarrat [b,*], Asunción Borrell [a]

Analyse organophosphate contaminants in fin whale muscle tissue and in their stomach contents (krill) to investigate their potential bioaccumulation or biomagnification throughout the food web.

1.3

Chemosphere 300 (2022) 134453

Contents lists available at ScienceDirect

Chemosphere

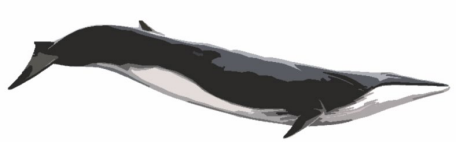
journal homepage: www.elsevier.com/locate/chemosphere

Intrapopulation and temporal differences of phthalate concentrations in North Atlantic fin whales (*Balaenoptera physalus*)

Odei Garcia-Garin [a,*], Wissam Sahyoun [b], Sopheak Net [b], Morgana Vighi [a], Alex Aguilar [a], Baghdad Ouddane [b], Gísli A. Víkingsson [c], Valerie Chosson [c], Asunción Borrell [a]

Analyse phthalate contaminants in fin whale muscle tissue to investigate individual differences and temporal trends.

Methods



Extreme precautions were taken, and blanks were processed to prevent and determine external contamination.

1.1 Stomach content from 25 fin whales

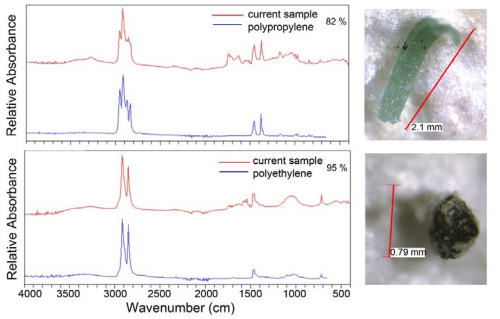
1.2 Muscular tissue from 20 fin whales and 10 samples from stomach content.

1.3 Muscular tissue from 31 fin whales

Digestion by H_2O_2 and filtration

Extraction and purification

Detection of synthetic particles using a stereomicroscope and µFT-IR analysis to determine the type of polymer



Synthetic particles = microplastics + modified or pigmented cellulose fibres (Lusher et al., 2020)

Instrumental analysis:

- 1.2: Liquid chromatography coupled to a mass-mass spectrometer (LC-MS/MS).

- 1.3: Gas chromatography coupled to a mass spectrometer (GC-MS).

Results & Discussion

1.1

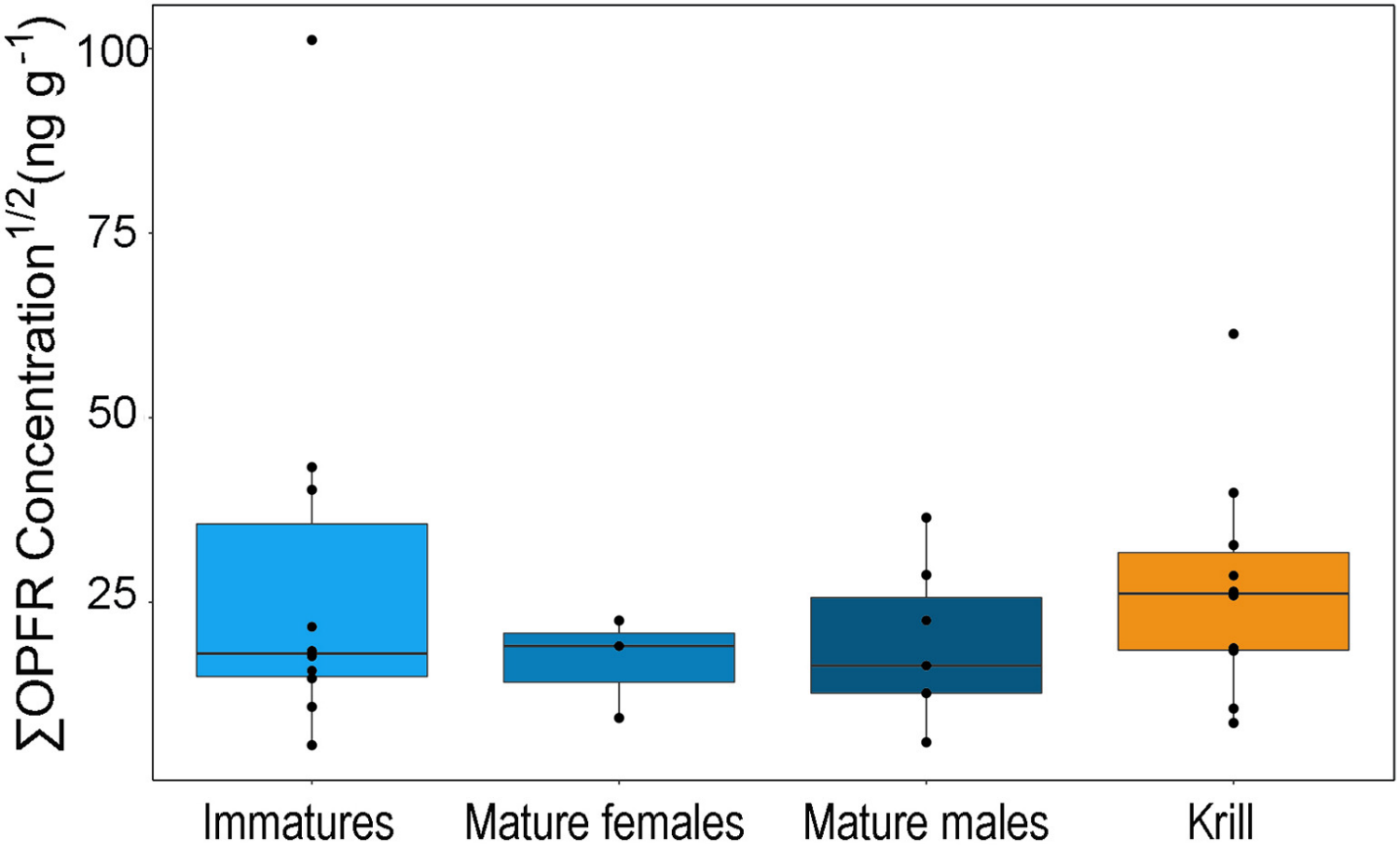
Parameter	Value
Number of samples with synthetic particles (SP)	13
Frequency of occurrence of SP (%)	52
Number of SP	16
Estimates of SP ingested:	
Krill ingested daily (kg) (Víkingsson, 1997)	678-1356
SP per Kg of Krill (mean ± SD)	57 ± 64
SP ingested daily (min. ± SD)	38646 ± 43392
SP ingested daily (max. ± SD)	77292 ± 86784

- The average concentration in stomach contents was 0.057 **synthetic particles** (SP) per gram.
- The number of SP ingested daily by fin whales was estimated to be in the **tens of thousands**.

R

Results & Discussion

1.2

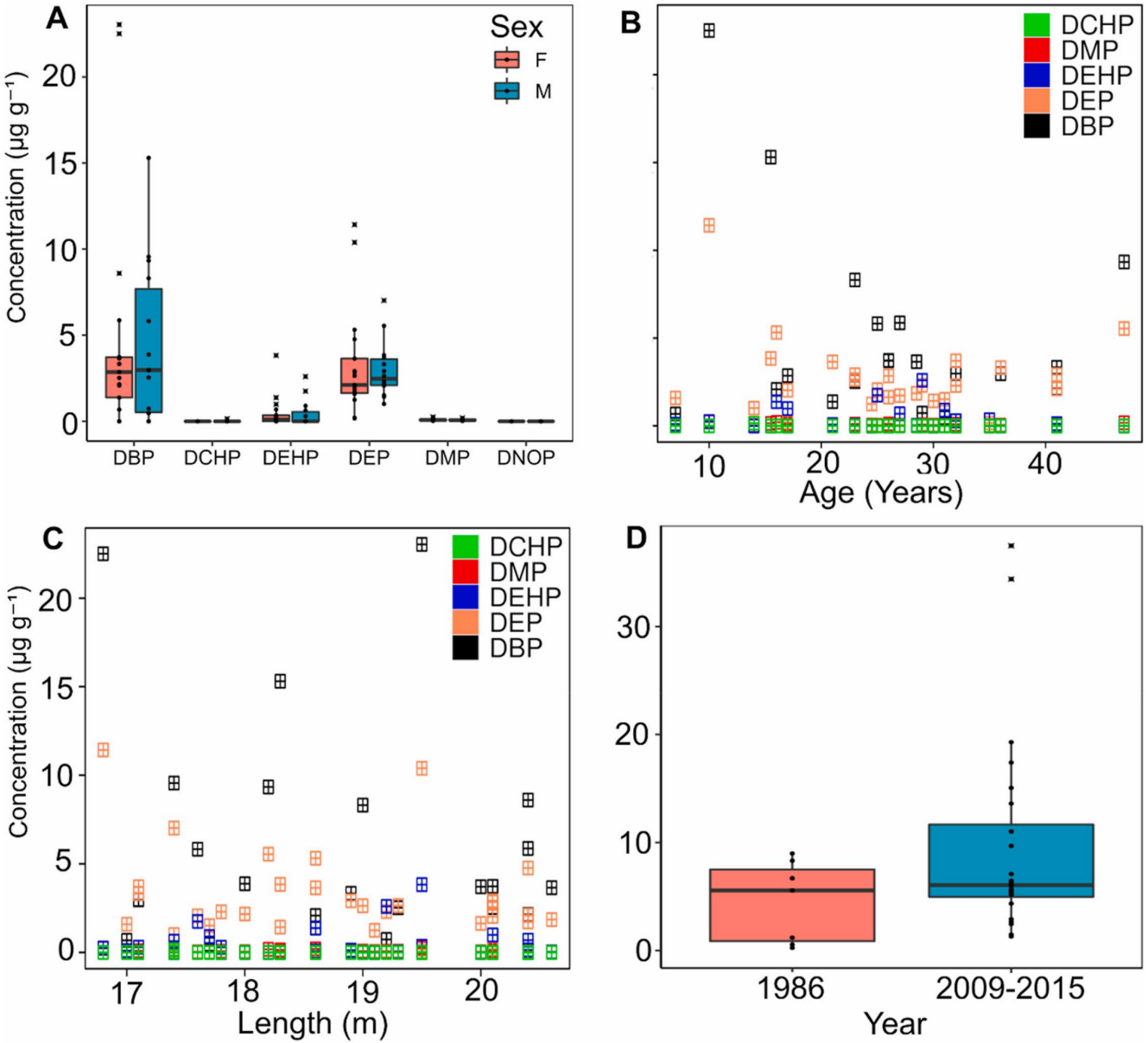


- **No differences** were found between stages of maturation or between sexes (Kruskall-Wallis test, p = 0.9).
- **No differences** were found between fin whales and their diet (krill) (Kruskall-Wallis test, p = 0.29).
- OPFRs do not appear to **bioaccumulate** or **biomagnify**.

R

Results & Discussion

1.3



- **DBP, DEP and DEHP** were the most abundant phthalates.
- **Phthalate** concentrations were not significantly different between **sexes** (PERMANOVA test, $p > 0.05$).
- **Phthalate** concentrations were not significantly different between Whale **age classes,** nor **Length** (PERMANOVA test, $p > 0.05$).
- Phthalate concentrations did not show **temporal differences** (PERMANOVA test, $p = 0.08$).

Conclusions

1. The large number of synthetic particles detected in the stomachs of sub-Arctic fin whales showed that this species may be vulnerable to this type of pollution.

2. The results obtained from the analysis of the muscle of fin whales and their prey (krill) indicate that organophosphate flame retardant do not appear to biomagnify or bioaccumulate.

3. Concentrations of phthalates in the muscle of sub-Arctic fin whales have not increased in the last 30 years, and therefore do not seem to pose an imminent danger to the sub-Arctic fauna by themselves, but multi-contaminants synergies will have to be explored.

For further (Clearer) information, read the papers!

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Thank you!

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