HÁSKÓLINN Á AKUREYRI

OCCURRENCE OF MICROPLASTICS IN THE SUBARCTIC WATERS NEAR A WASTEWATER TREATMENT PLANT IN REYKJAVÍK, ICELAND

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BACKGROUND

- WWTPs in Reykjavík have only mechanical waste water treatment.
- Study funded by NORDEN from 2016 showed
  - that MPs is not retained in WWTP in Reykjavík
  - MPs in effluent water measured 1500 MPs/m3, while effluent from Swedish and Finnish plants measured 10-40 MPs/m3
  - However the MPs in sediments nearby was 100 times lower in Reykjavík than in Sweden
- In mussel watch conducted by Veitur (the WWTP company) in 2021, showed
  - low levels of pollutants such as PAH and heavy metals, with exception of Cd probably due to volcanic eruption in Reykjanes.
  - No or neglegible effects from WWTP were observed
- *In this study we analysed the same groups of mussels for MPS content.*

INTRODUCTION

- Blue mussels (*Mytilus edulis*) have been suggested as a global bioindicator of coastal MP pollution including MPs in temperate waters due to their wide distribution
- There are however several challanges when dealing with MPs due to the particulate nature such as egestion or particle selection
- Several studies have shown that MPs content of mussels reflect big differences in concentration in the environment such as close to WWTP
- This is the first study on MPs in mussels near a WWTP in Iceland

THE STUDY

- This study investigated the influence of a municipal WWTP effluent in Reykjavik on MP, located near the WWTP outlets.
- From July to September 2021 a radial sampling grid of caged blue mussels was used to track a potential MPs contamination gradient in the sea in the vicinity of the WWTPs outlets.
- Sampled mussels' soft tissues were processed and the resulting MPs in the samples scored and chemically characterized according to their polymer type, using μ-FTIR spectroscopy.

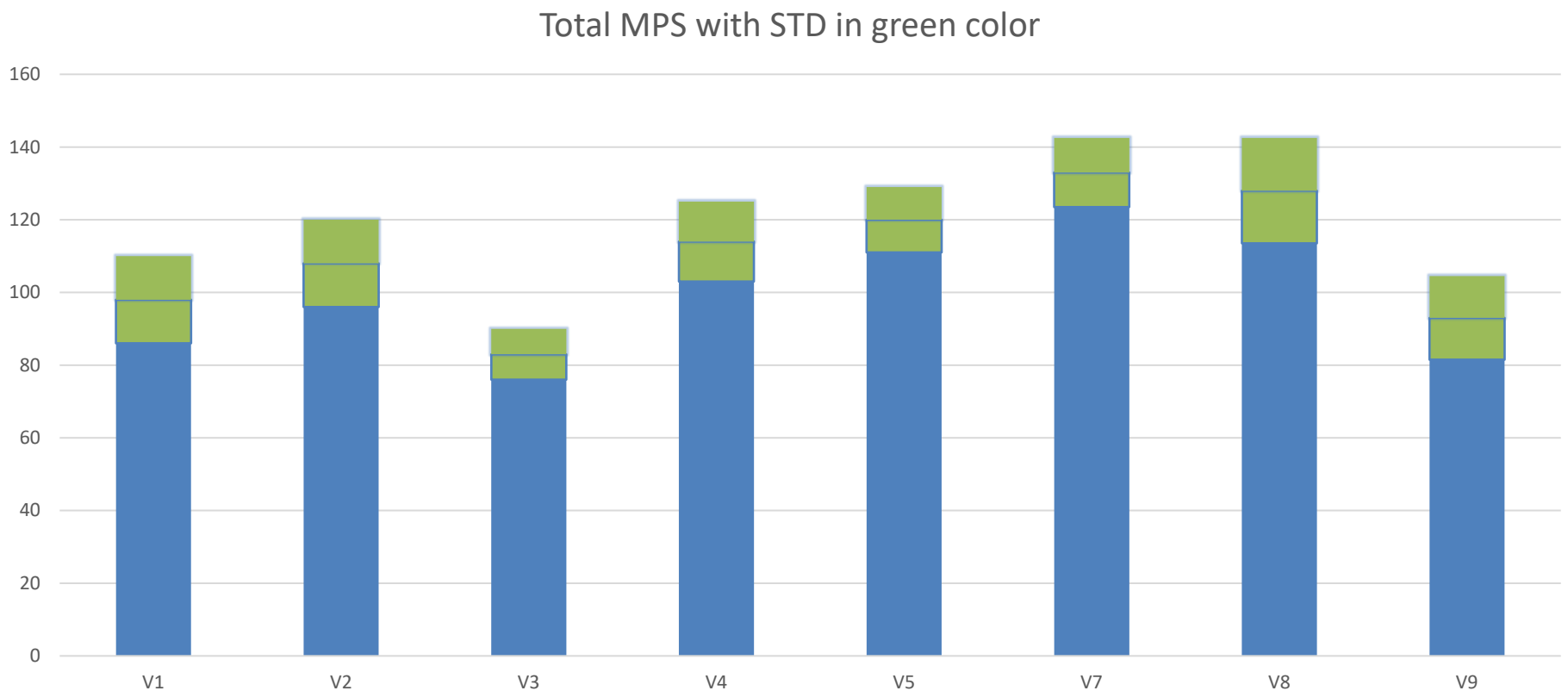
MUSSEL WATCH TRANSPLANTATION PLAN

- Outlet pipes of Klettagarðar and Ánanaust.
- In addition, heavy traffic of fishing and cargo ships, whale watching vessels and cruise ships in the area
- V9 was used as a reference site.

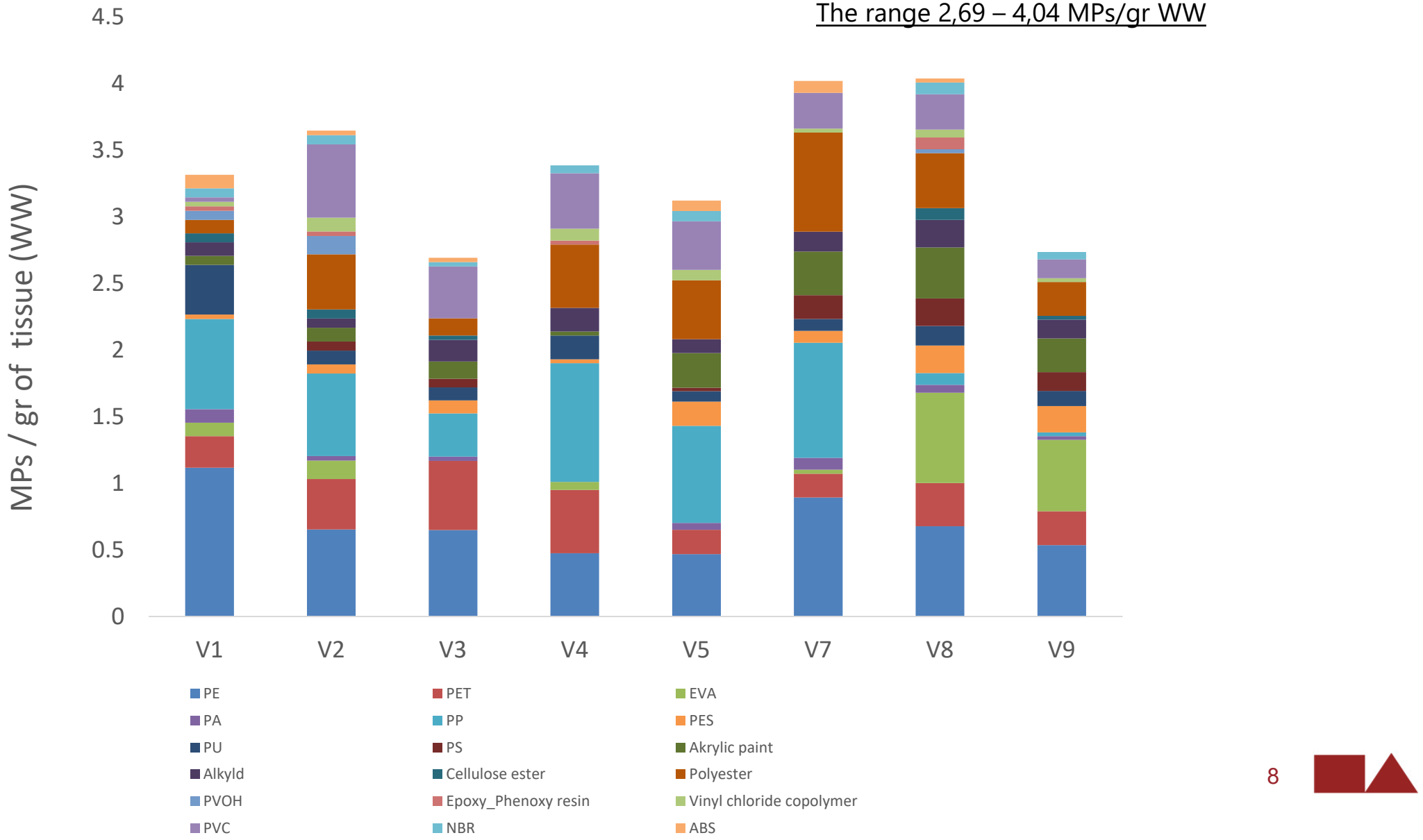
METHODS

- Mussels were collected in Hvalfjörður
- Caged for three months at 8 sampling sites
- Triplicate samples (6 mussels/sample, totally 18 mussels/site) were treated with SDS solution → Protease → Lipase → Peroxide solution to isolate the MPs from the mussels' tissue.
- MPS was characterized by a Nicolet iN10 Thermofisher μ-FTIR system. The entire surface of each filter was inspected.
- Lab and procedural controls were performed

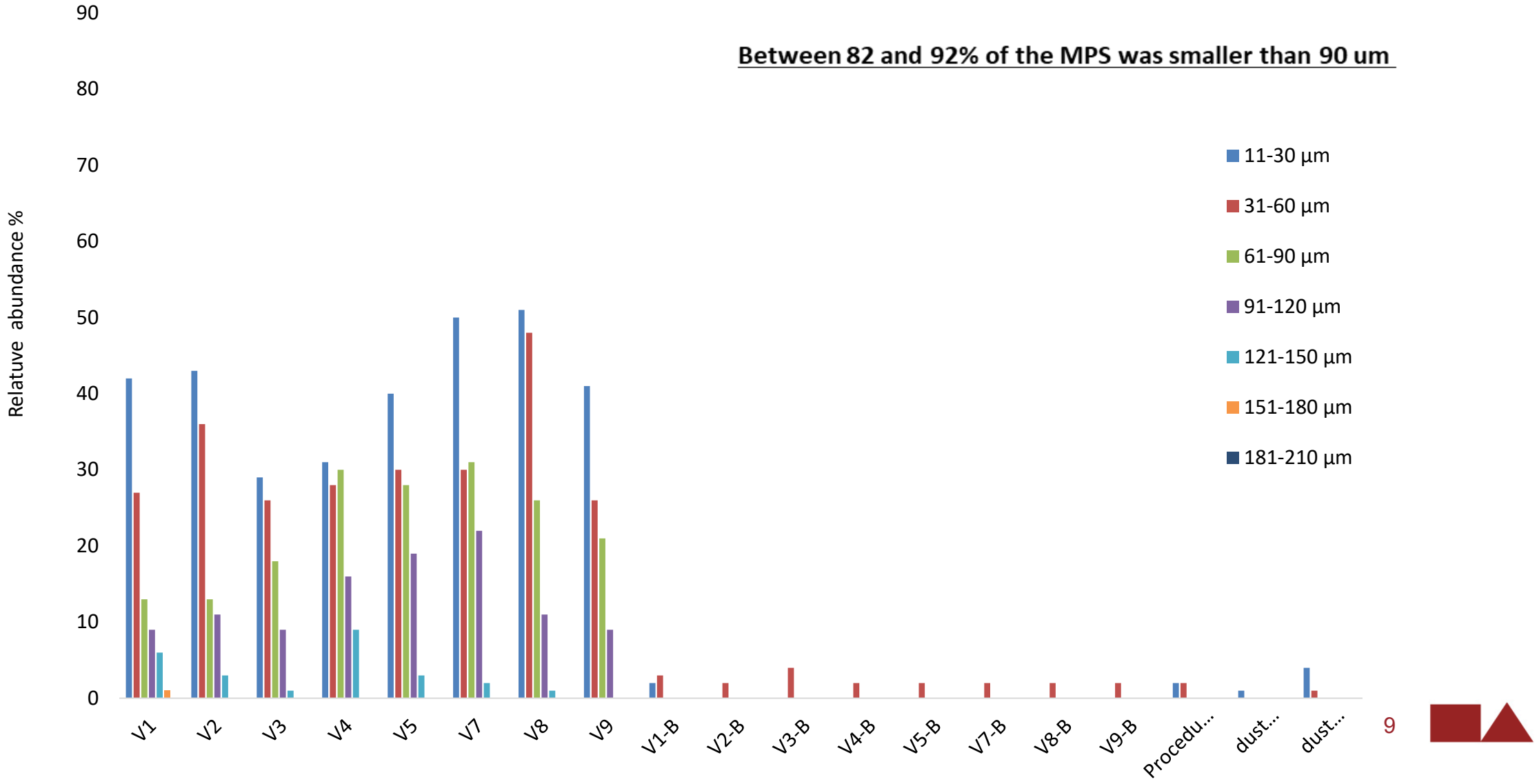
TOTAL MPS


Total MPS with STD in green color
160
140
120
100
80
60
40
20
0
V1
V2
V3
V4
V5
V7
V8
V9

The range 2,69 – 4,04 MPs/gr WW



SIZE DISTRIBUTION OF MPS IN MUSSELS



CONCLUSIONS

- The most recurring polymer type in analyzed organisms was PE followed by PP, PET, Epoxy Phenoxy resin and PVC and at site V8 and V9 EVA.
- No obvious correlation between MPs content and distance from the WWTP outlets was observed.
- MPs in mussels at reference site was the second lowest while the two highest values were observed at the eastern Klettagarðar WWTP outlet sites .
- Strong ocean currents seem to distribute MPs in the area.

THANK YOU FOR YOUR ATTENTION

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COMPARISON WITH PREVIOUS STUDY USING THE SAME METHOD.

- The observed amounts range 2,69 – 4,04 MPs/gr WW, were:
  - higher than mussels in the costal area of the N-Adriatic sea (1.06–1.33 MPs/g WW, Gomiero et al. 2019).