Microplastics contamination in blue mussels (Mytilus edulis (L.)) and marine sediments along the coast of British Columbia, Canada

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Microplastics contamination in blue mussels (*Mytilus edulis* (L.)) and marine sediments along the coast of British Columbia, Canada - Preliminary results

Mégane Néauport
Marie Noel, Anahita Etemadifar and Peter Ross

Salish Sea Ecosystem Conference, April 5th 2018
Microplastics…?

- Plastic particle < 5 mm
- Different polymers
- Different shapes: fibre, fragment, pellet, sheet...

Primary microplastics and Secondary microplastics

Manufactured as such

From the fragmentation of larger plastic items
Microplastics…?

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Primary microplastics and Secondary microplastics

- Manufactured as such
- From the fragmentation of larger plastic items

Threats?

- Found everywhere
- Can serve as a matrix to bind and transport chemicals
- Ingested by organisms
- Accumulate up the food chain

Cole et al., 2013
Microplastics are found in all ecosystems

(modified from Ross et al., 2011)
Mussels and sediments were collected for the *PollutionTracker* project

**SEDIMENTS**
- A sink for contaminant
- Sediment Quality Guidelines
- Links to food web
- Management tool

**MUSSELS**
- Filter large volumes of water
- Bio indicator for pollution
- Used internationally for coastal monitoring

**COLLECTION**
Sediments from 5-20 m depth in nearshore waters with a petit ponar

Mussels within 2 km of the sediment sites

pollutiontracker.org
Samples were collected at 55 sites along the BC coast:

51 sediment samples and 33 mussel samples.
1) Microplastic extraction

Contamination

- Reduction
  (flowhood, cotton coveralls, all liquid filtered, glassware rinsed, strict cleaning protocol)

- Assessment
  Procedural blanks + Background blanks
1) Microplastic extraction

Contamination

- Reduction
  (flowhood, cotton coveralls, all liquid filtered, glassware rinsed, strict cleaning protocol)

- Assessment
  Procedural blanks + Background blanks

Sediments
- 50 g
- Oil extraction
Crichton et al., 2017

Mussels
- 4 mussels/site
- Enzymatic digestion – Corolase
2) Microplastic identification

Visual inspection → **light microscopy**

*Shape
*Size
*Colour

Confirmation plastic or not ? + particle identification

\[\text{FTIR (Fourier-Transform Infrared Spectrometry)}\]

37% of the anthropogenic particles were actually plastics
2) Microplastic identification: FTIR

IR beam → IR absorption → Molecular specific bonds vibrations → IR spectrum

Modified from Vianello, 2017
2) Microplastic identification: FTIR

IR beam → IR absorption → Molecular specific bonds vibrations → IR spectrum

Absorbance vs. Wave number for Cotton fiber and Polyester fiber.

Modified from Vianello, 2017.
Microplastics in sediments were dominated by fibres and fragments.
On average mussels have < 3 microplastics per individual.
Conclusion

- Higher concentration in urban sediment compared to remote areas
- Low concentration compared to global trends

- Low number in mussel similar to global trends (Catarino et al. 2018)

- Fibres and fragments are the most common microplastics found in sediments and mussels

- **Further steps:**
  - More mussels to be analyzed per site
  - Further polymer identification
Thank you for your attention

Thank you to *PollutionTracker* partners, funders and everyone from the OPRP laboratory
• Catarino Ana I., Macchia Valeria, Sanderson William G., Richard C. Thompson and Henry Theodore B., 2018. Low levels of microplastics (MP) in wild mussels indicate that MP ingestion by humans is minimal compared to exposure via household fibres fallout during a meal. Environmental Pollution 237 (2018) 675e684.

