Vitenskapskomiteen for mat og miljø

Norwegian Scientific Committee for Food and Environment

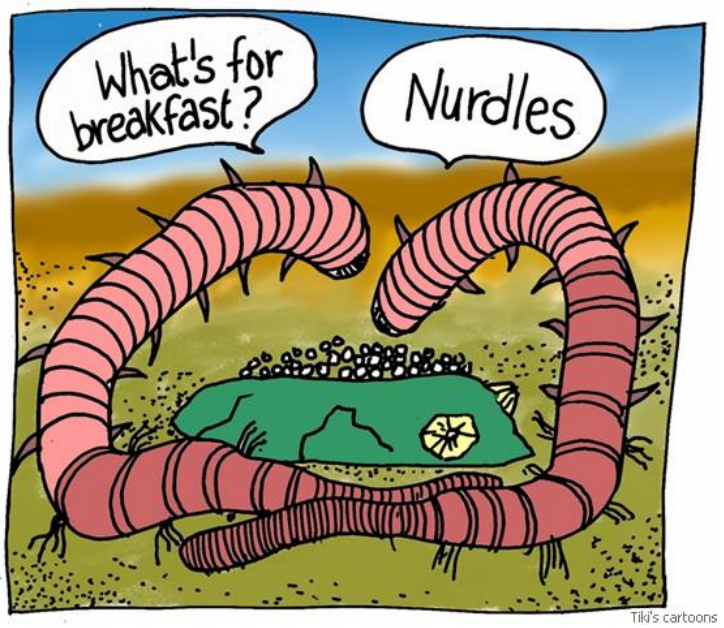
Microplastics; occurrence, levels and implications for environment and food safety in Norway

Project leader: Kirsten E. Rakkestad, ERT, PhD

Advisory Forum 72nd meeting, Reykjavik, July 4th 2019

Outline

- Background, mandate and objectives
- Project group
- Methods
- Major findings/data gaps



Background (2017)

- International and national media, growing concern in the public, concern for fisheries and aquaculture due to impact on fish productivity and physiological processes

- International reviews and risk assessments
  - EFSA 2016
  - FAO 2017

- National implications for food resources, environment and human health?

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The mandate

- an opinion on microplastics (MP)
  - based on recently published international and/or national reports
  - complemented with literature from December 2016
  - The opinion shall:
    - summarise the state of knowledge on the presence of MP in the environment
    - and the implications for the ecosystem, terrestrial and aquatic organisms, food production and human health
    - It will also elucidate any specific Norwegian conditions additional to the information available in the recently published reports

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Objectives

Contribute to improved understanding about sources and effects on microplastic pollution

Provide an overview of main national and international ongoing initiatives, and highlight data gaps where specific Norwegian data is needed

Project group

Chair of the project group

- **Janneche Utne Skaare**
  - Previous chair of VKM's Panel on Contaminants
  - Retired professor in Toxicology

VKM-staff

- **Kirsten E. Rakkestad**
  - **Project leader**
  - Coordinator of VKM's Panel on Contaminants
  - PhD in Toxicology

VKM-members

- **Helle K. Knutsen**
  - Chair of VKM's Panel on Contaminants
  - Senior researcher, National Institute of Public Health
  - Member of EFSA's Panel on Nutrition, Novel Foods and Allergens
  - PhD in Cell biology (human toxicology)
- **Jan Alexander**
  - Chair of VKM's Steeering Committee
  - Retired director and professor in Toxicology (human toxicology)

External experts

- **Amy Lusher**
  - Researcher at the Norwegian Institute of Water Research
  - PhD in Marine Biology
- **Martin Wagner**
  - Associate Professor at NTNU
  - Marine biology, exposure science, toxicology
- **Martin Ogonowski**
  - Researcher at Stockholm University
  - Marine Ecology, ecotoxicology, bioinformatics
- **Marte Haave**
  - Researcher at NORCE Norwegian Research Centre
  - PhD in Biology
  - Marine environmental monitoring
- **Line Sverdrup**
  - Senior Expert at Det Norske Veritas
  - Environmental Risk Assessment and Technology
- **Ignacy Jakubowicz**
  - Associate professor at RISE Research Institutes of Sweeden
  - Chemistry, Materials and Surfaces
- **Ida Skaar**
  - Head of Section at the Norwegian Veterinary Institute
  - Toxinology

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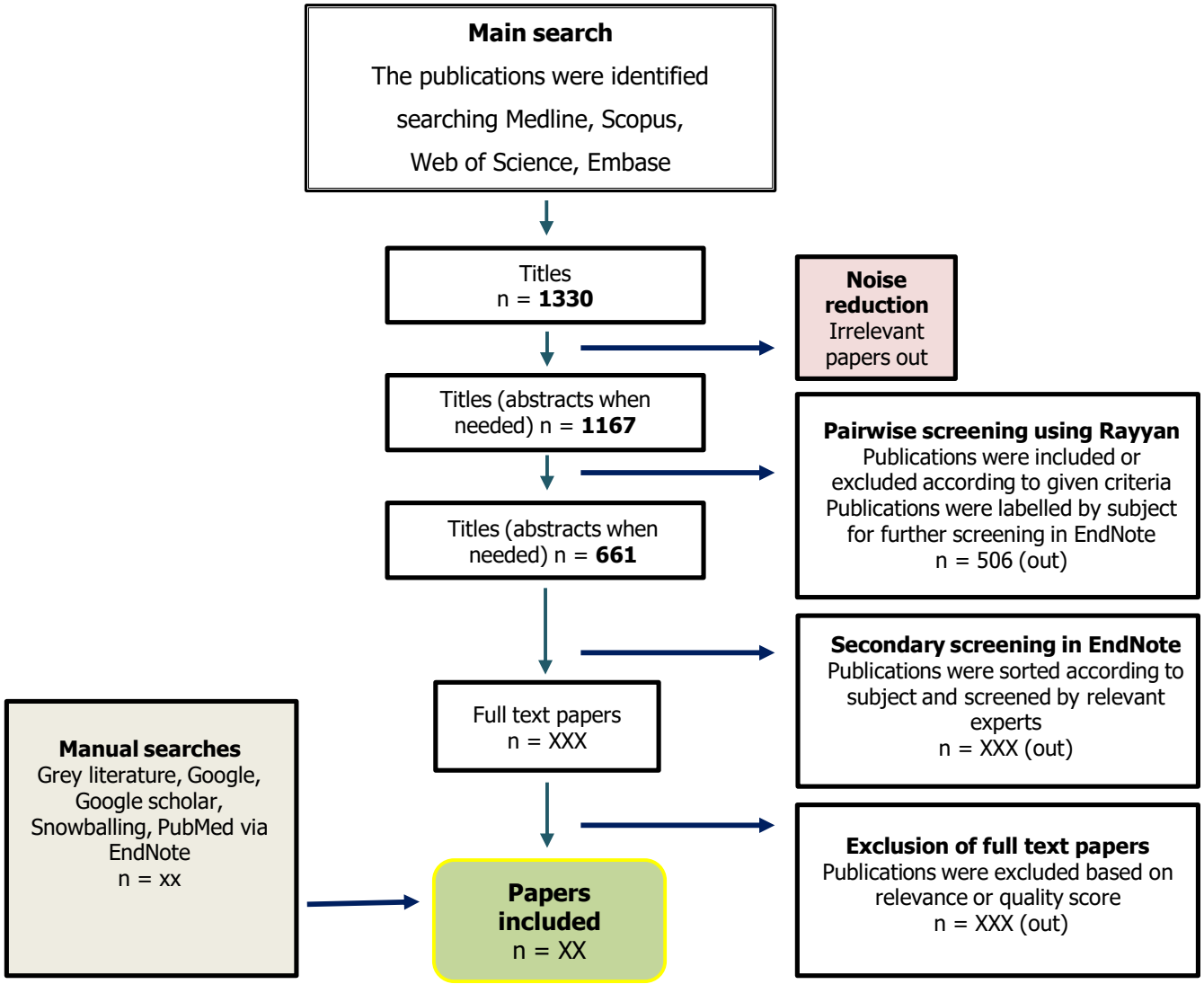
Methods – literature search (2016 – 2019)



Quality Assessment

- Ecotox-papers were given a quality score based on the following 6 criteria (modified from Connors et al., 2017)
  - Use of appropriate control (reference particle other than plastic)
  - Are test particles well characterized (size distribution, surface charge, confirmation of polymer type by e.g. FT-IR, if commercial plastic used)?
  - Has particle preparation technique and stability of suspensions been reported?
  - Has sedimentation of dense particles been considered when filter-feeding organisms have been used? For example, has sedimentation been controlled for by use of e.g. a rotating plankton wheel?
  - Analytical verification of test concentrations?
  - Have findings been reported accurately, without conjecture beyond experimental limits?

Data extraction

- Levels/Methods
  - Location
  - Environment (marine, freshwater etc.)
  - Compartment
  - Biota
  - Feeding strategy
  - Sampling method
  - Tissue/organ
  - Sample preparation
  - Polymer identification
  - Lowest/max size limit
  - Metric/unit
  - Concentration reported (min/mean/max)
  - Main particle type
- Ecotox/Human tox
  - Main finding
  - Species
  - Life stage
  - Organ/tissue/cell type
  - Feeding strategy
  - Exposure method
  - Exposure duration
  - Food present
  - Reference particle
  - Endpoint
  - Endpoint direction
  - Polymer type
  - Particle size
  - Concentration range
  - Metric/unit
  - LOEC

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Main findings/major data gaps

- Very little data on human toxicology
- Little data on levels/presence in food

- Lelvels in environment (ca 150 papers)
  - About 50% of papers were on marine environment
  - A considerable number of studies were categorised as «poor quality»
  - Fibres seems to be the dominating plastic type
- Ecotoxicological studies (ca 250 papers)
  - Sphereical, polystyrene particles are dominating, especially in the smallest size range (<1 µm)

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