Challenges and opportunities regarding beach litter monitoring in Norway: Lessons learned from three different datasets

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Photo: Marthe Larsen Haarr /SALT

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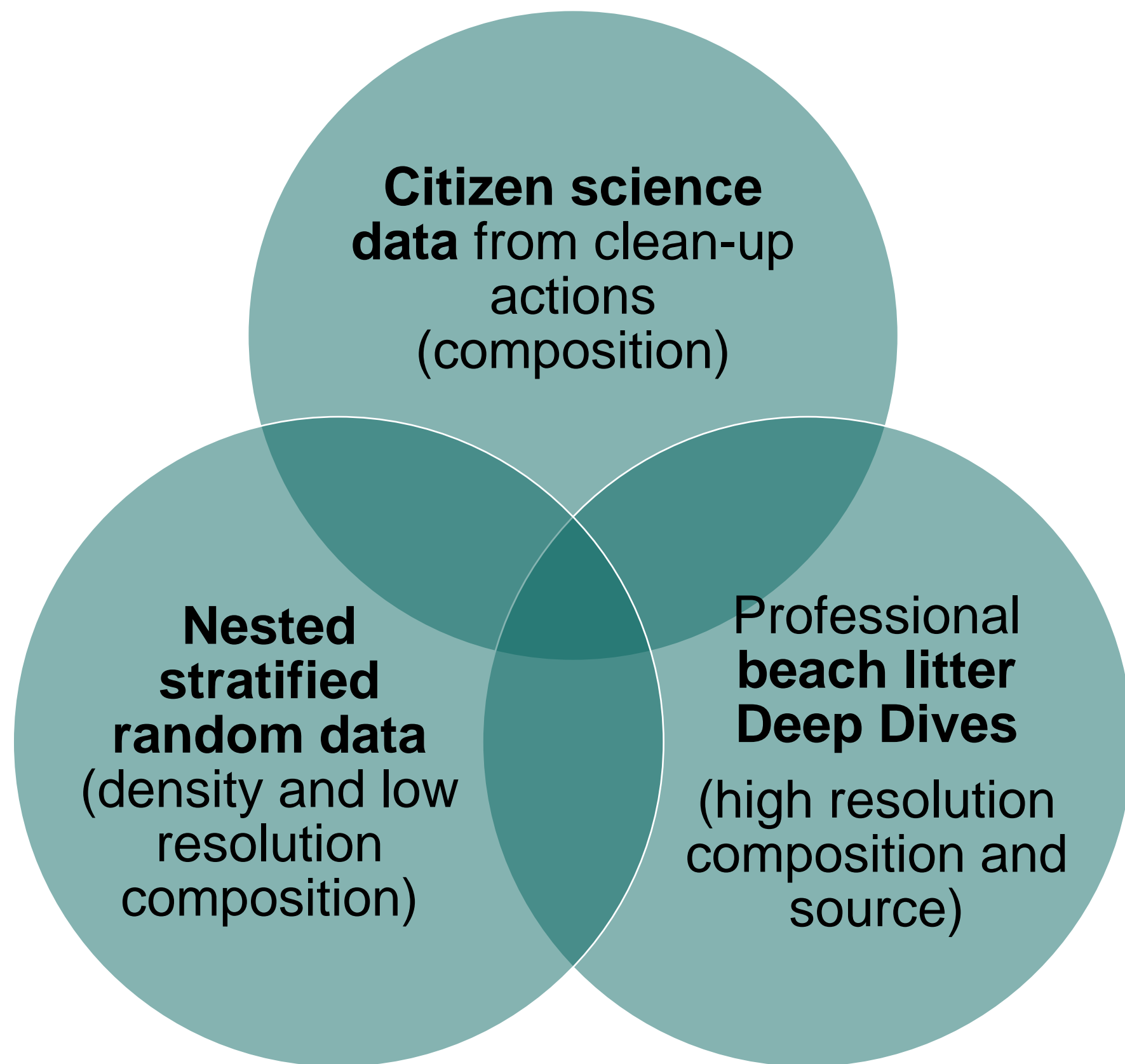
Introduction

Norway has >100,000 km of coastline

Currently 7 OSPAR beaches.

National portal for citizen scientists and professional cleanup crews to record cleanup actions.

However, a holistic national monitoring system currently lacking.

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Beach litter monitoring in Norway

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Tripartite data collection

Three-year study on beach litter.

Used a combination of citizen science data from cleanup actions and two targeted, specially designed sampling designs for additional data:

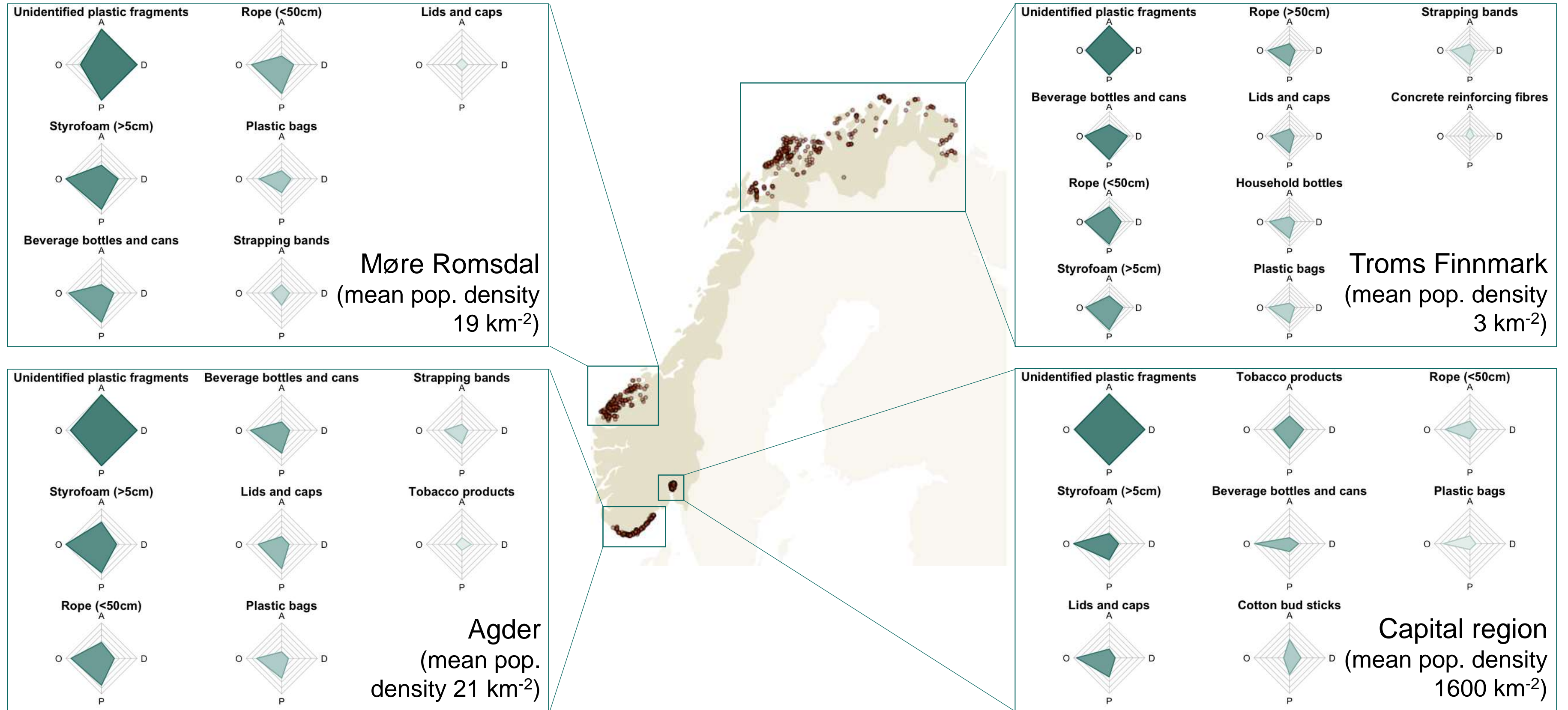One to measure density and one to identify litter sources.
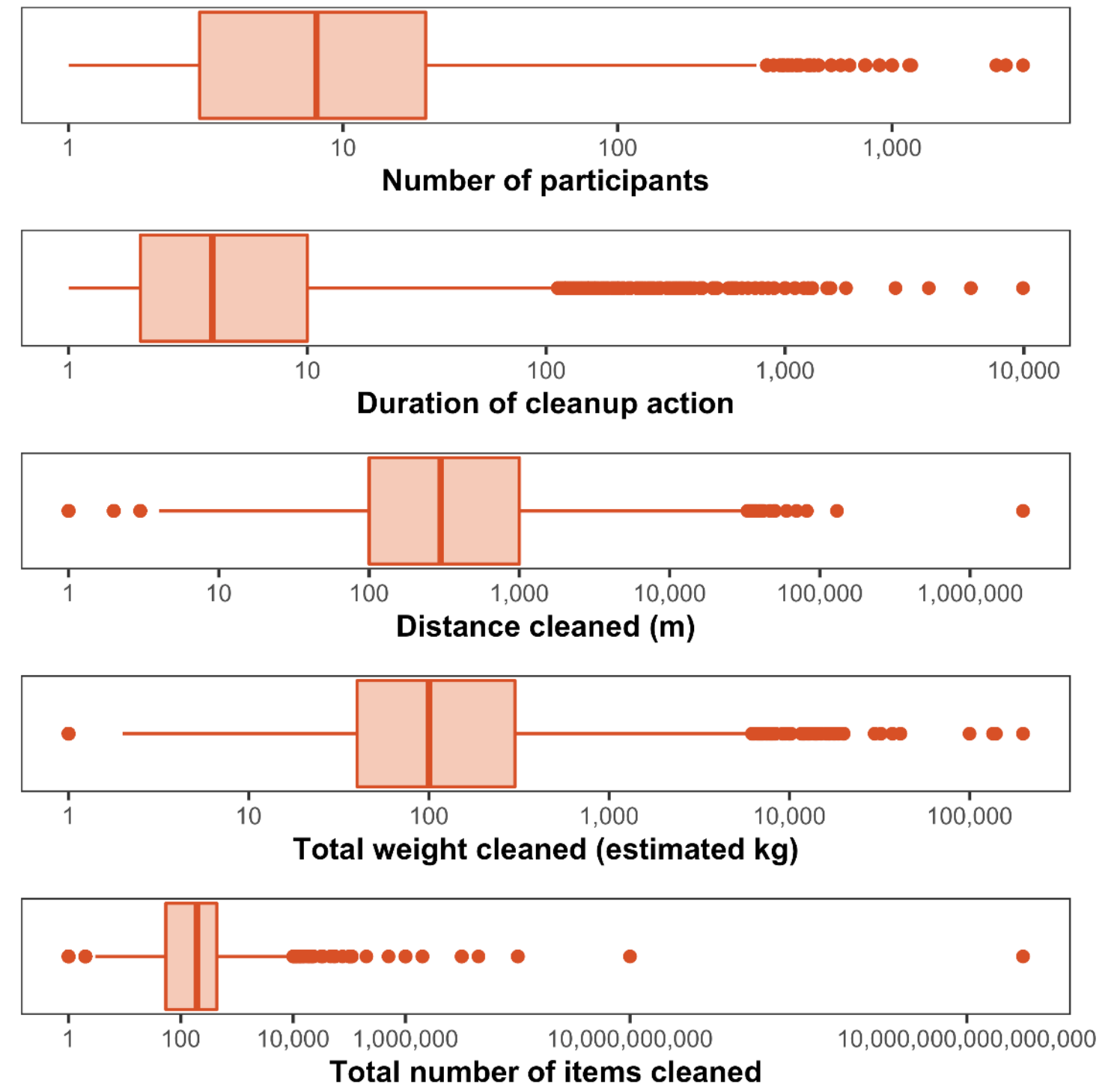
Citizen science data from clean-up actions (composition)

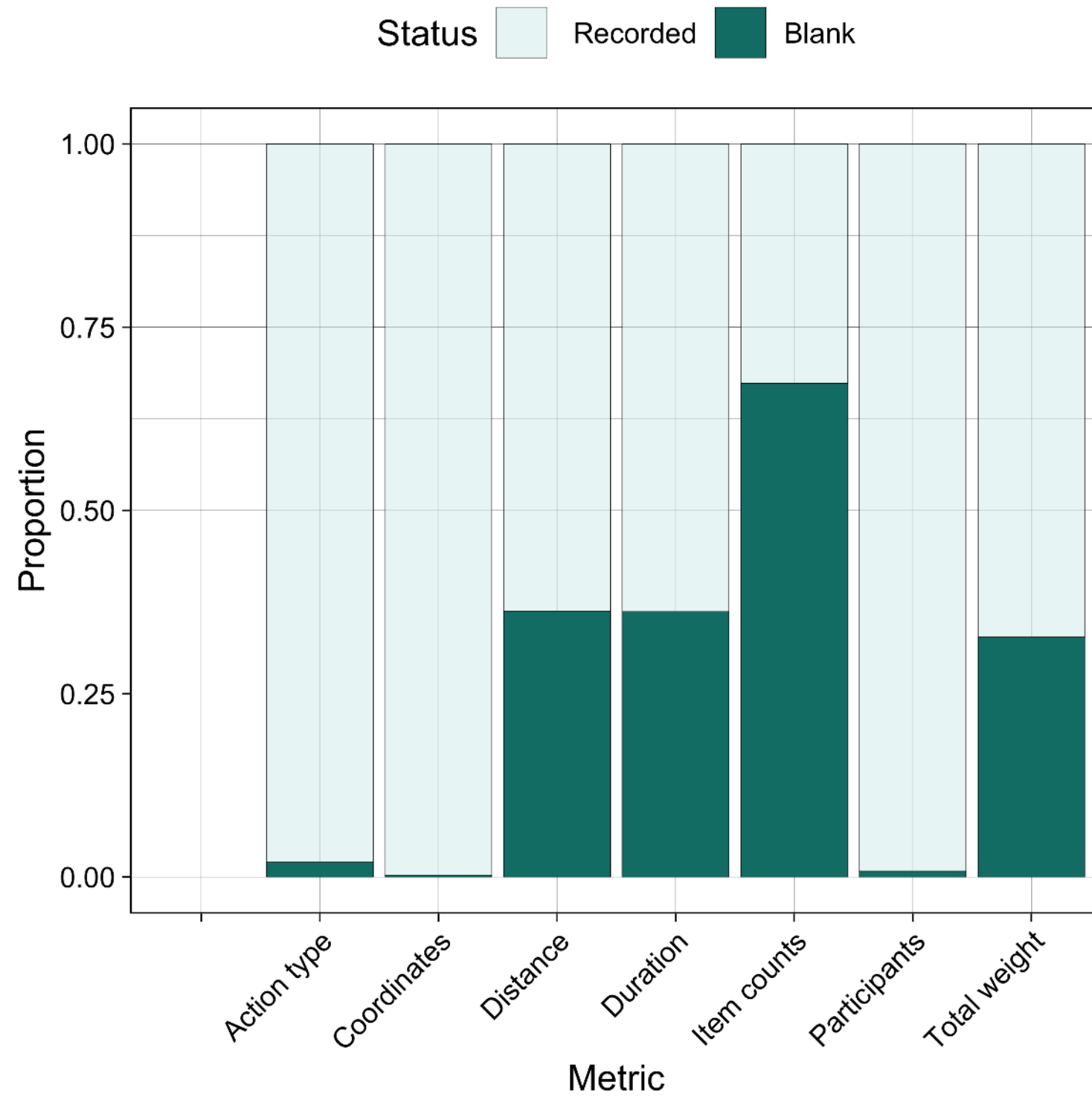Nested stratified random data (density and low resolution composition)

Professional beach litter Deep Dives (high resolution composition and source)

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Scope

Data from 4 counties

Citizen science: 1044 clean-up actions
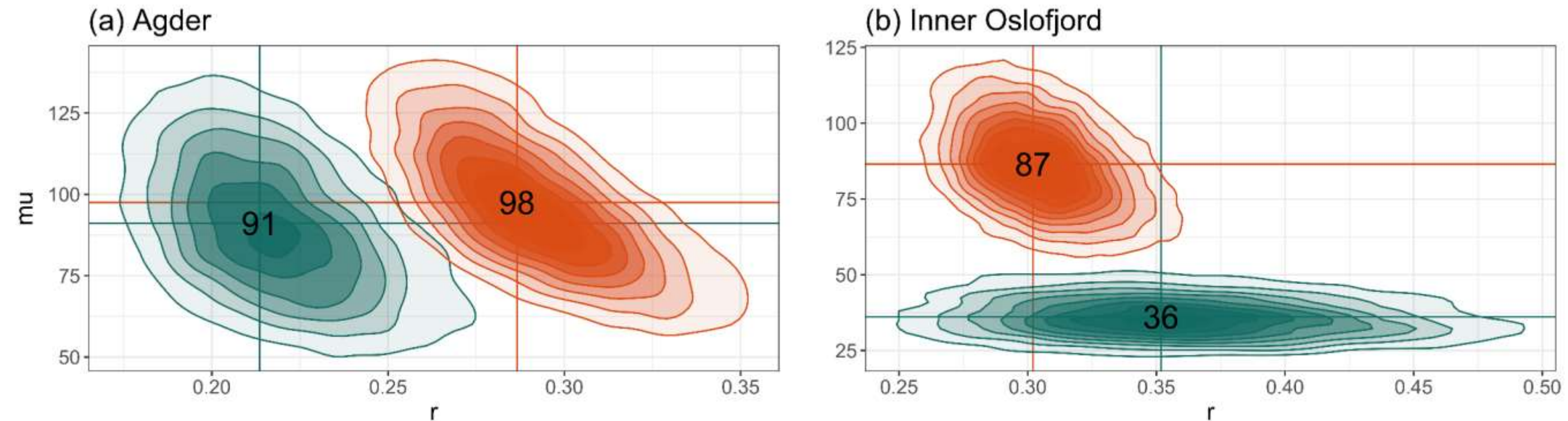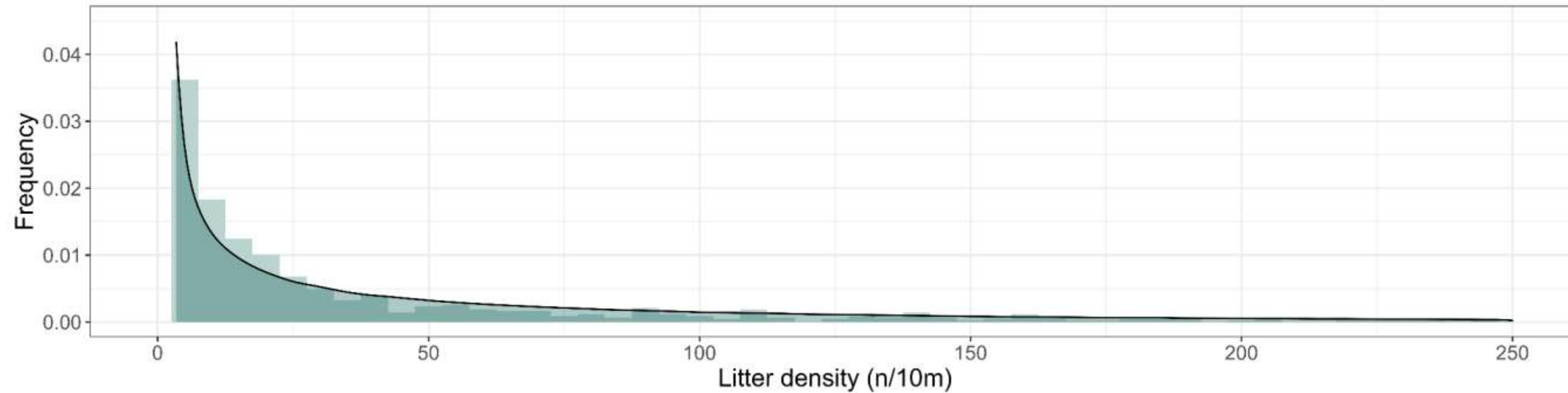
Randomised sampling: 303 beaches

Deep Dives: 22 beaches

Arctic Circle

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Results snapshot Citizen Science – "Worst offenders"

Møre Romsdal (mean pop. density 19 km^{-2})

Troms Finnmark (mean pop. density 3 km^{-2})

Agder (mean pop. density 21 km^{-2})

Capital region (mean pop. density 1600 km^{-2})

Results snapshot Citizen Science – 22% of data points retained after cleaning

Beach litter monitoring in Norway

Results snapshot Citizen Science and Randomised Sampling – Biases in citizen science data from clean-up actions
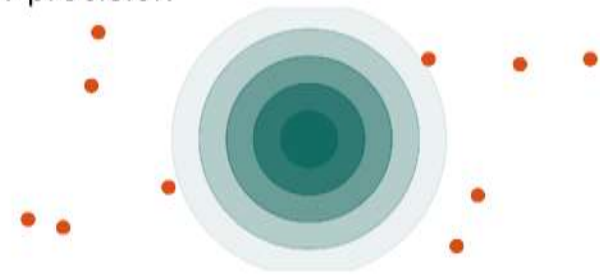
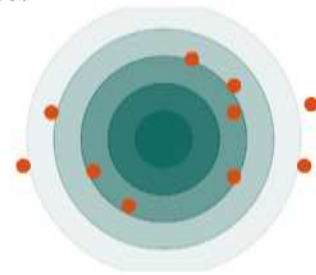# Results snapshot Randomised Sampling – regional trends
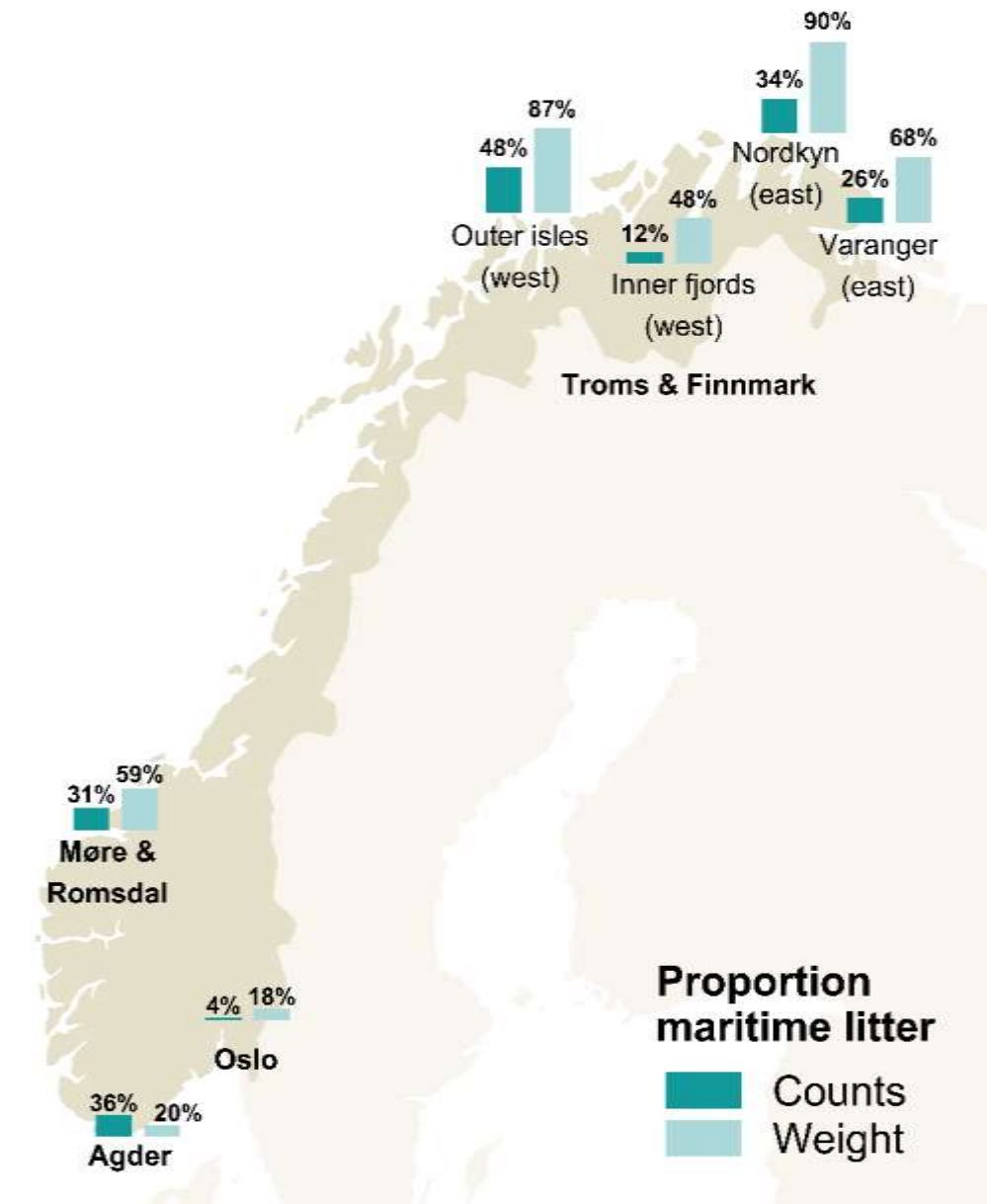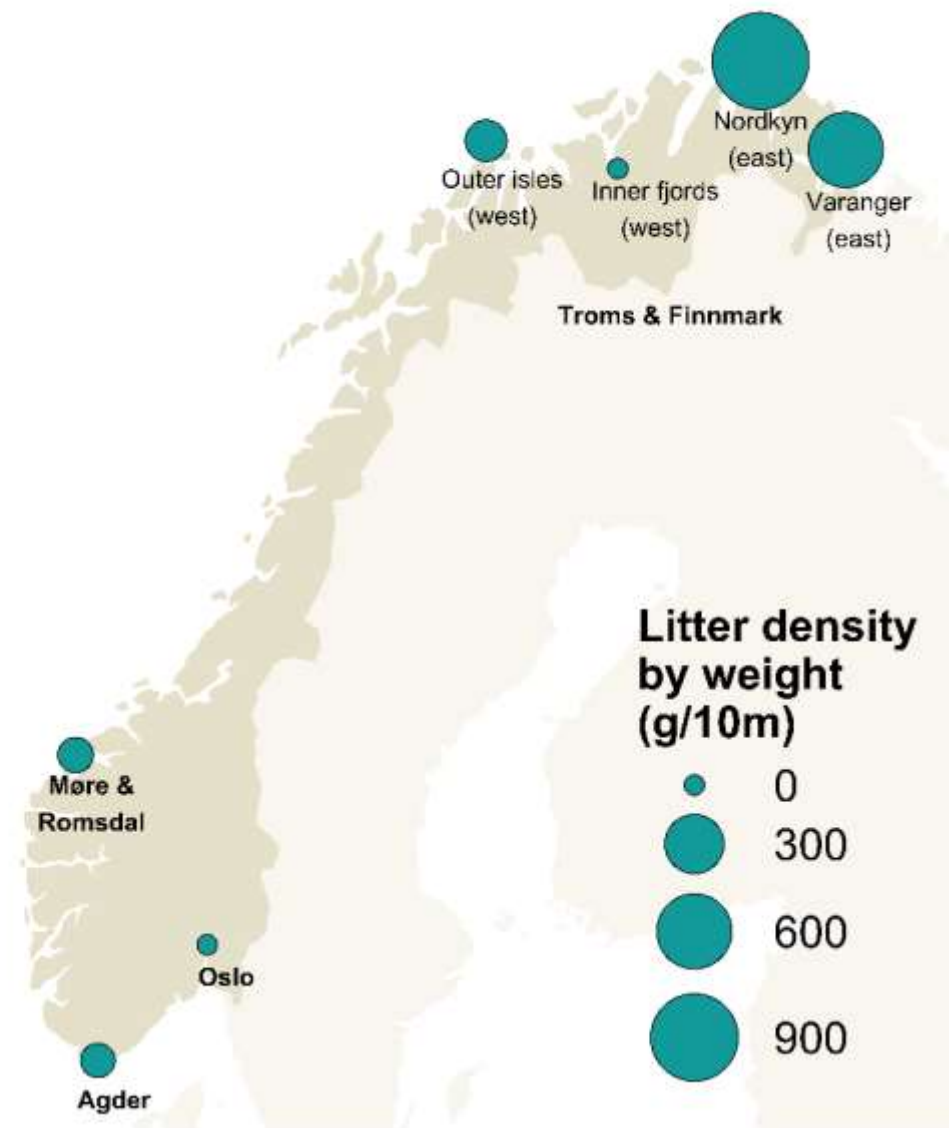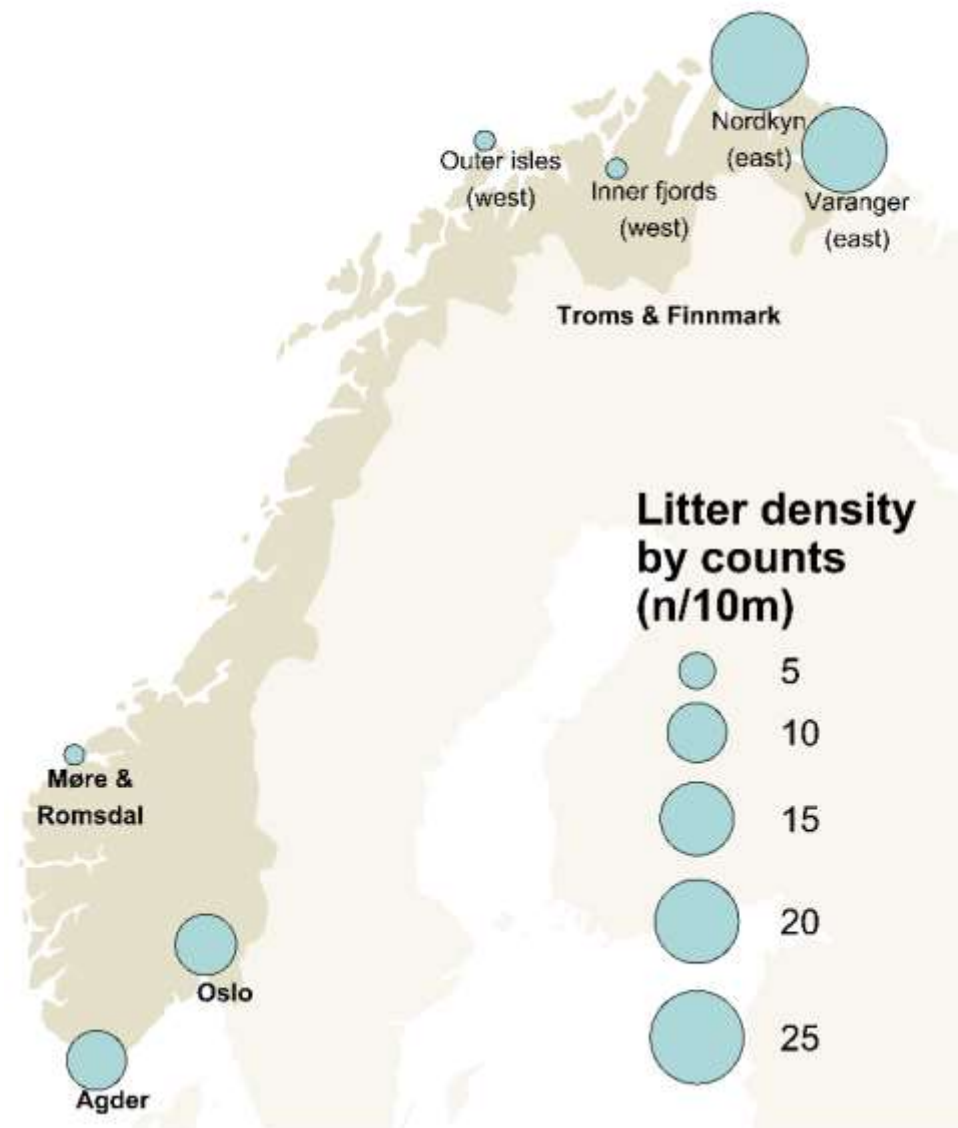
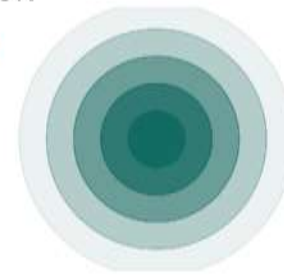# Results snapshot Randomised Sampling – Replication, accuracy and precision
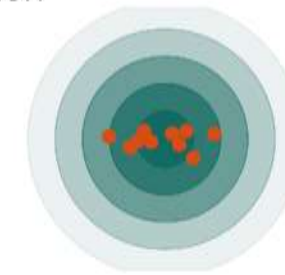

(a) Low accuracy, low precision

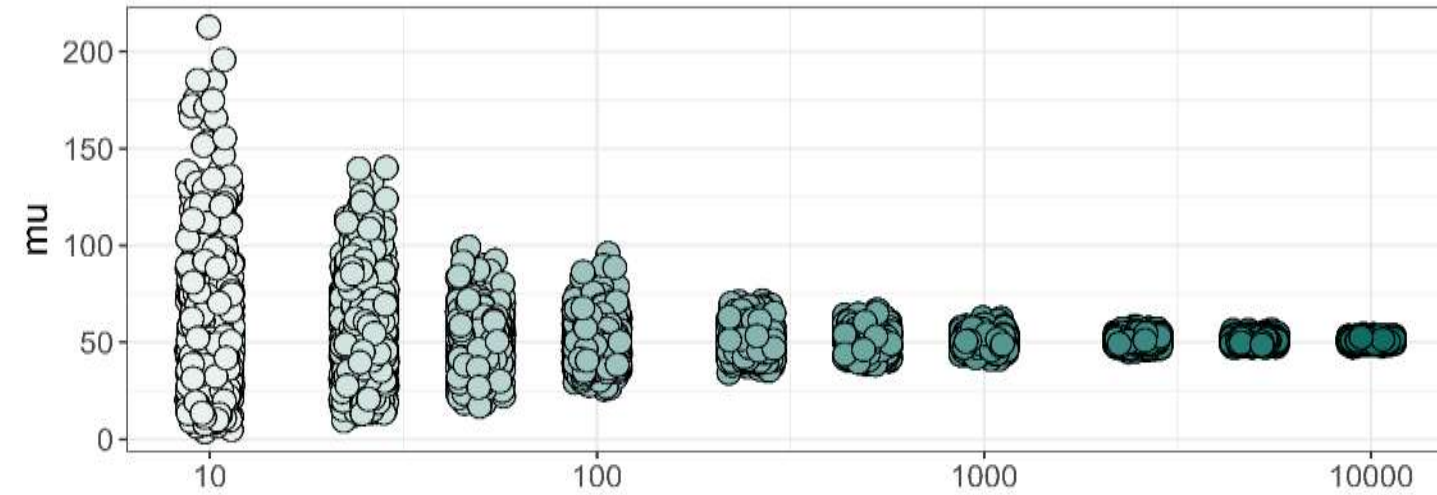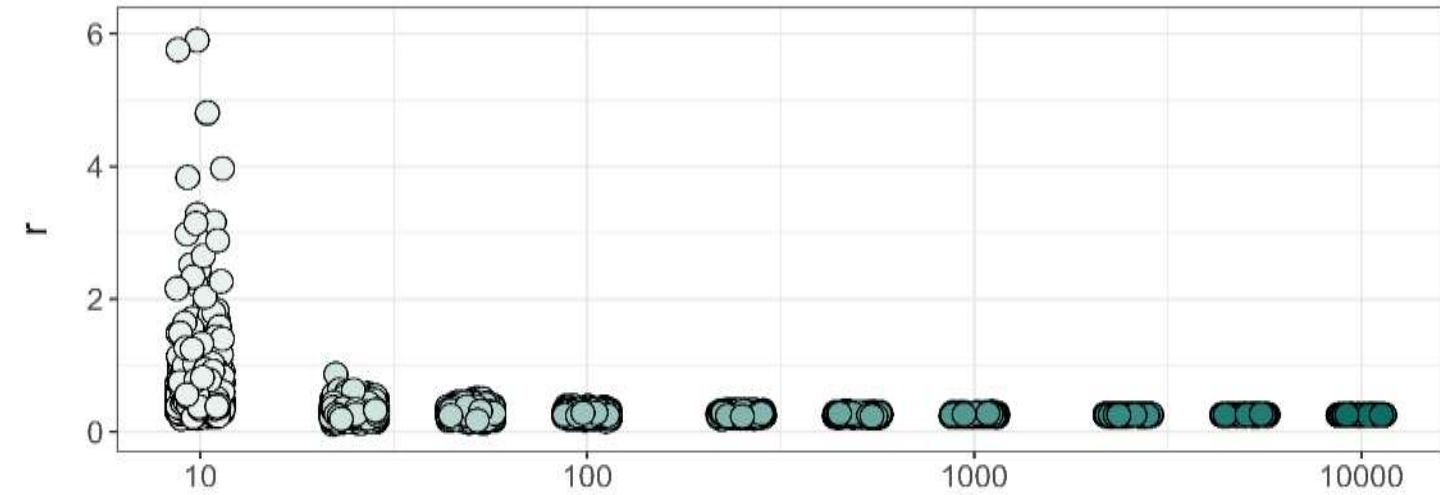(b) High accuracy, low precision
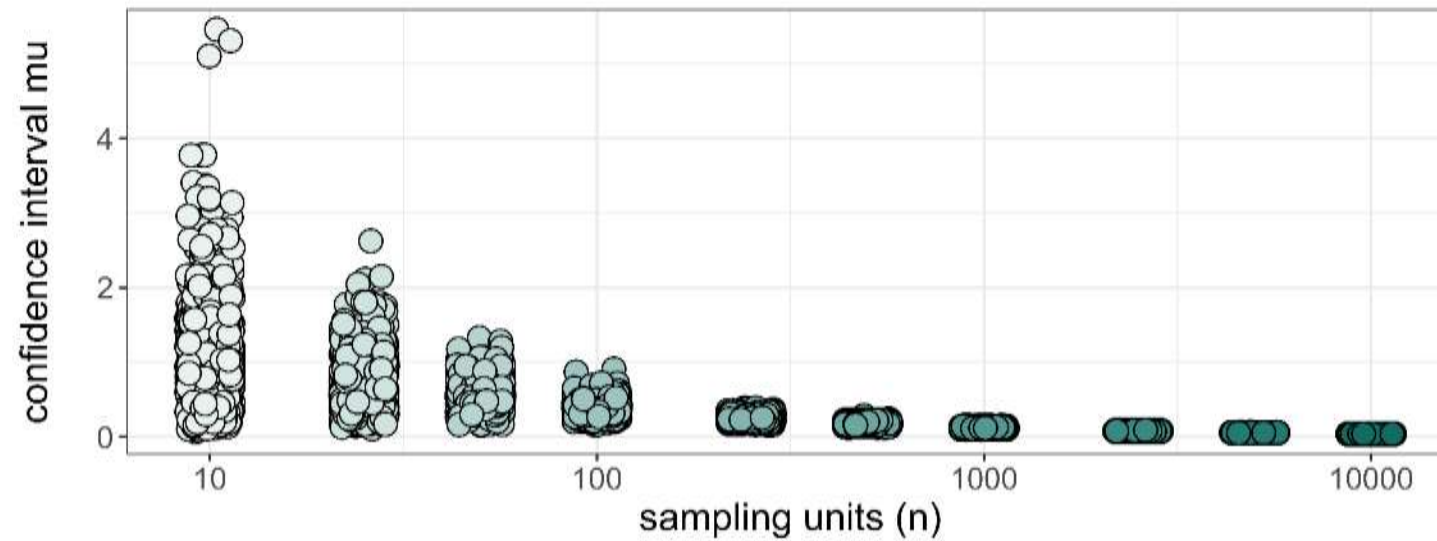
(c) Low accuracy, high precision

(d) High accuracy, high precision

(e) Precision mu
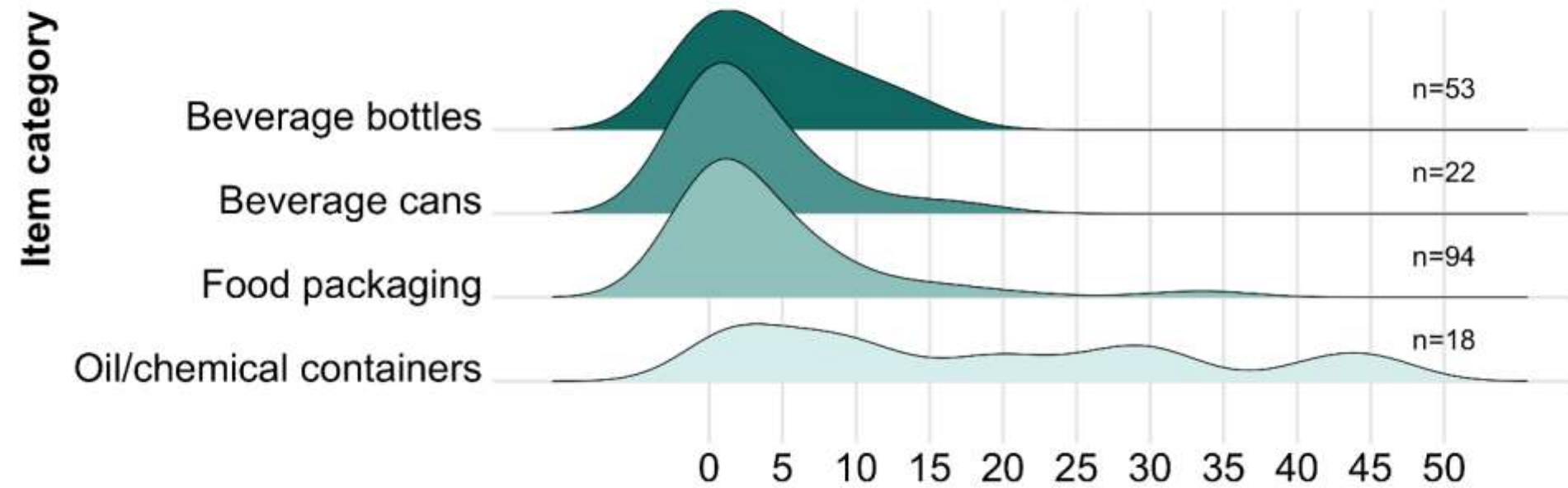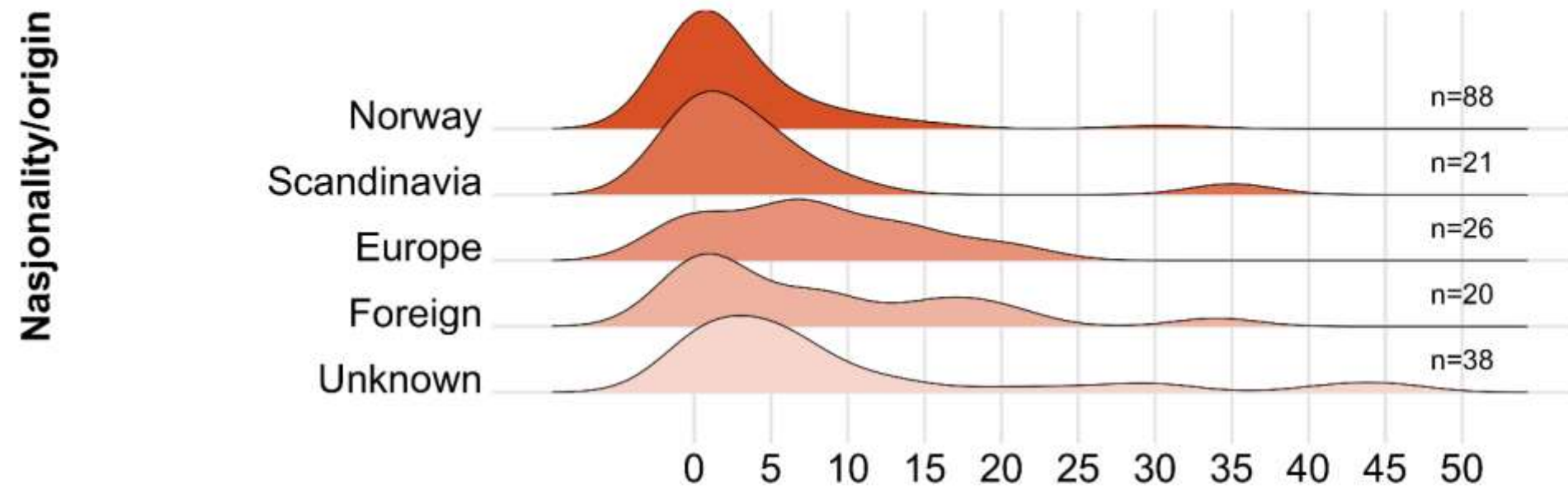
(f) Precision r

(g) Accuracy mu

(h) Accuracy r
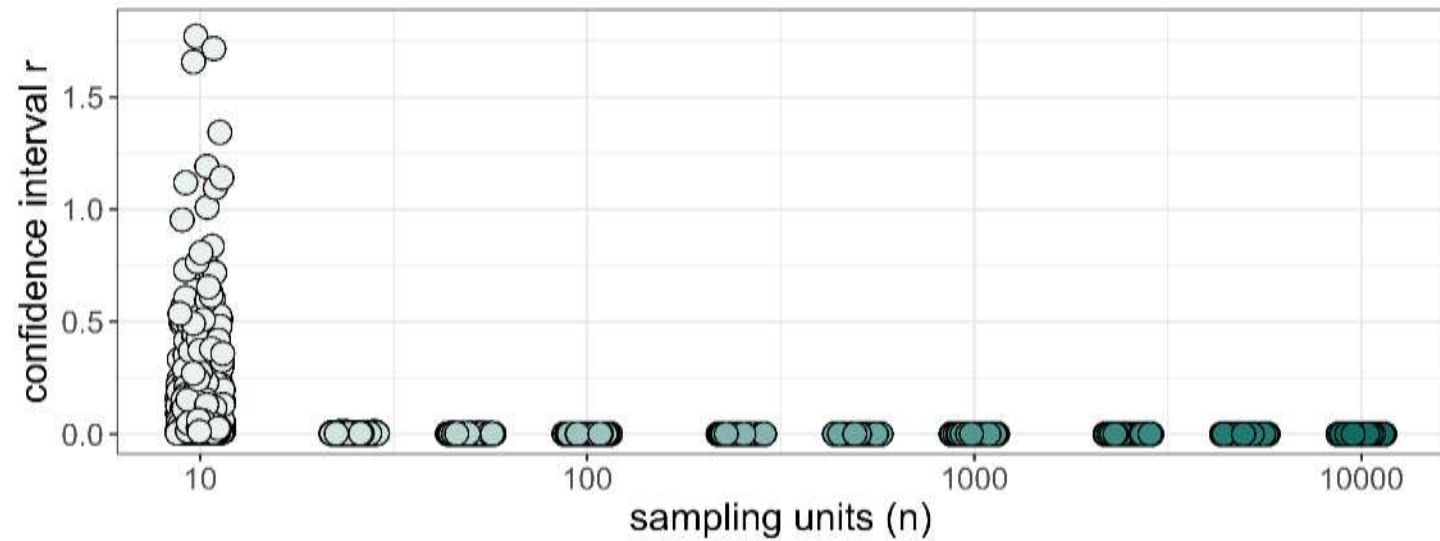
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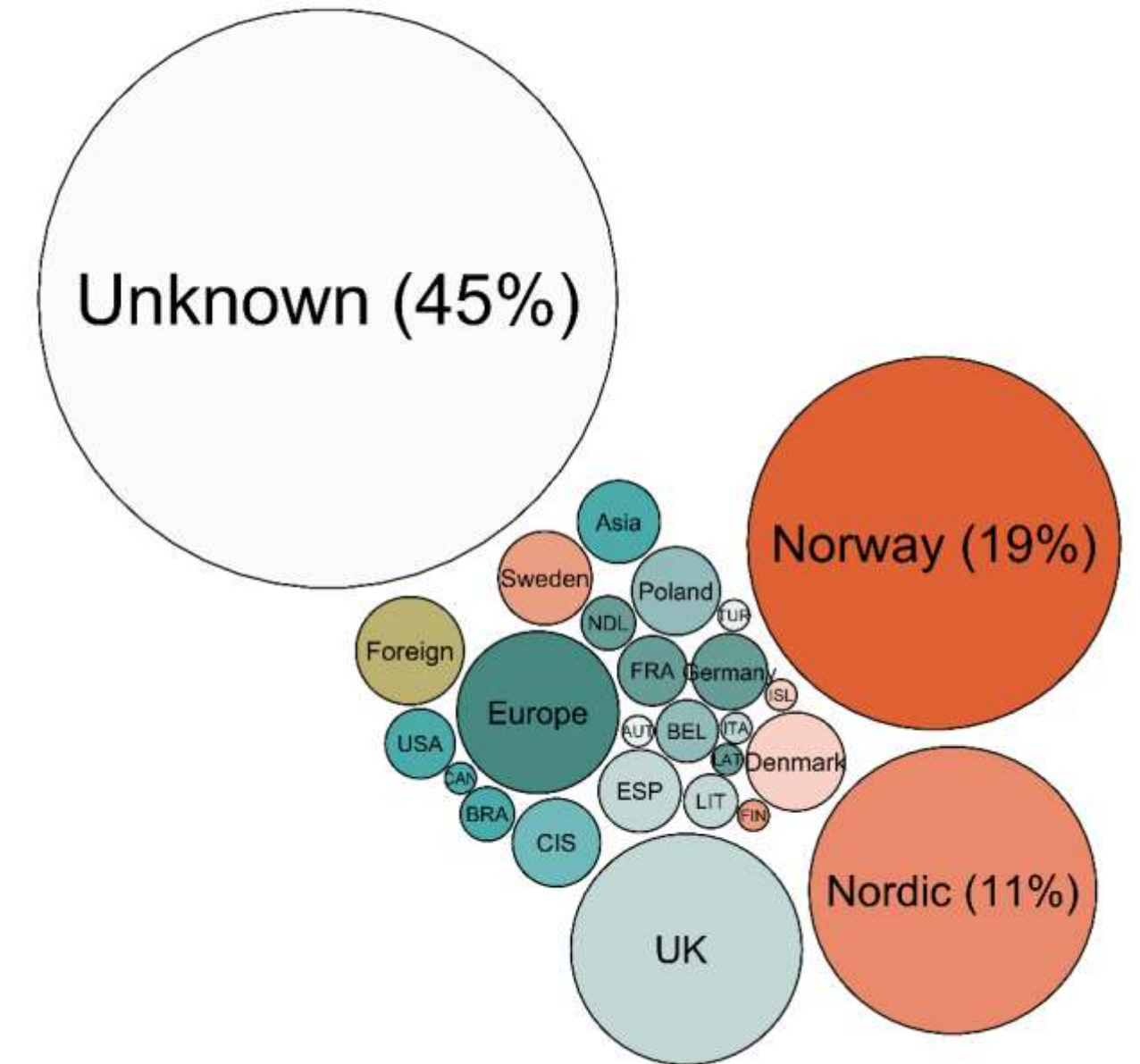# Results snapshot Deep Dives – origin and age of litter

Photo: Marthe Larsen Haarr/SALT

Moving forward

Consider both regional differences and local small-scale variability → **within-region replication**

Increase power through within-subject designs → **repeated sampling of the same beaches to parameterise seasonal variability**

Increase power by increasing replication of lower resolution data → **collect a limited subset of data from more locations (more often)**

Consider implications of site selection protocols

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Foto: Erling Svensen