Improving seabed impact analysis

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463 licenced marine farms
235 operational in last 3 years
Environmental risks

Large organic carbon inputs
- Concentrations of biomass vastly elevated over “natural” conditions
- Waste feed and faecal material
- Causes oxygen depletion within sediments and in extreme cases in overlying water column

Medicines
- Anti-parasitic treatments
- May be toxic to faunas, particularly crustaceans
Environmental risks

SEPA’s role is to ensure seabed impacts are acceptable

This typically involves defining limits on impacts

- Intensity of impact
- Area of impact
- Absolute physical accumulation
- Ecological response

If these are to be enforced effectively, SEPA needs to understand dynamics of how impacts form
What controls seabed impacts?
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- Farm operation/activities
- Particle properties
- Sediment transport processes
- Complex tidal and meteorological forcings
- Seabed ecology

Impacts are spatially and temporally complicated
How do we understand seabed impacts?

Monitoring

- Current SEPA policy is to monitor the seabed around farms at **2 sampling locations**
  - “cage-edge”
  - “far-field”

- Motivated by license compliance

- Very poor resolution of spatial impact
How do we understand seabed impacts?

Modelling

- Range of modelling techniques available with differing sophistication
- Crucial for risk assessment of proposed, future discharge
- But how well do they perform?
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Problem 1: what is actual impact?

In order to regulate activities effectively we need to know what their impacts are.

Are there statistical approaches that can inform how to optimally sample the seabed to get the best understanding of a complex impact?

When? Where? How many samples?

And what forms of analysis can be used to best characterise the impact?
Problem 2: how good is model?

Robust modelling requires calibration and validation

These involve comparing model results with empirical data

What is the best sample strategy for model calibration/validation?

How can we most effectively summarise the fit between complex real and modelled impacts?
Challenge

- How to best characterise a real seabed impact
- How to best compare real and modelled seabed impacts

Thanks.