



Physical impact of beam trawling revisited

Seabed disturbance and sediment re-suspension

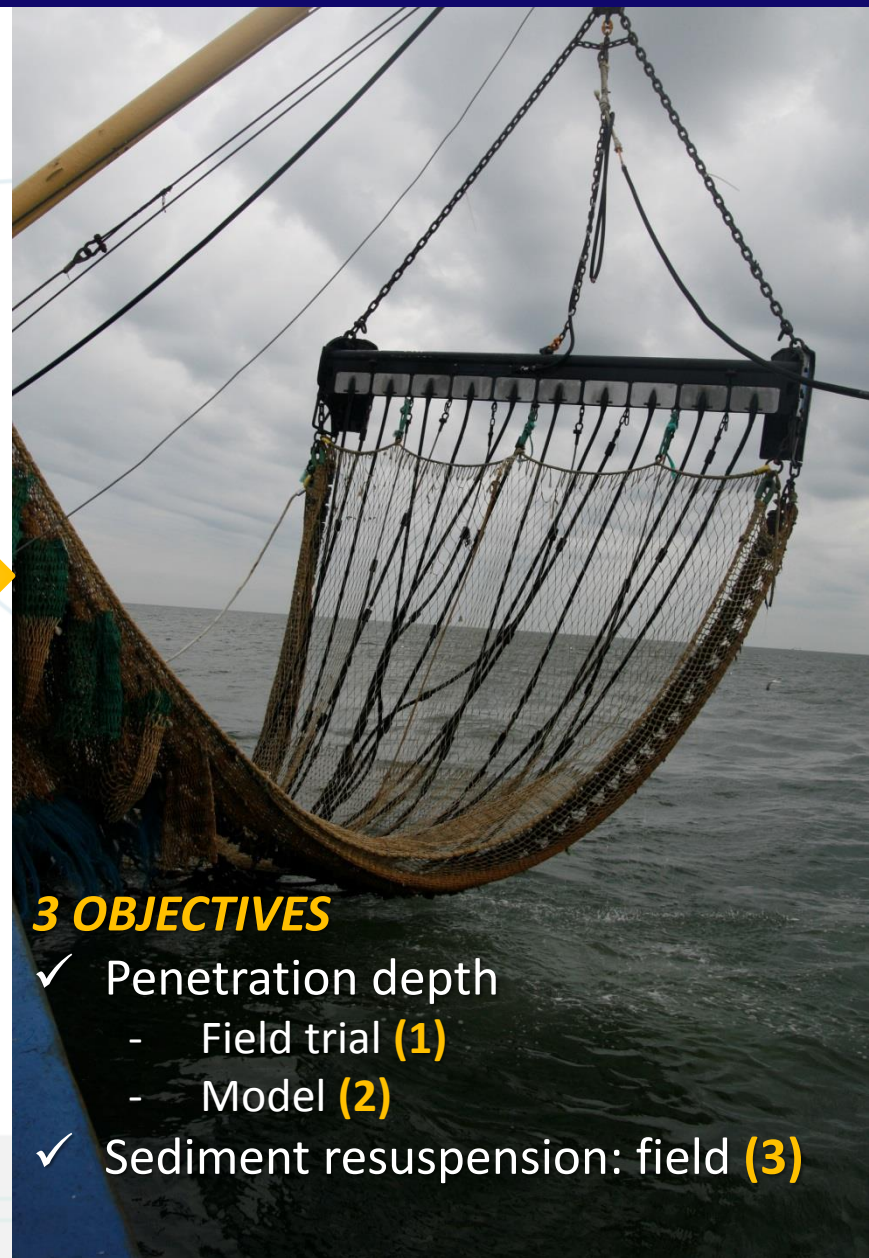
J. Depestele, A. Ivanović, K. Degrendele, M. Esmaeili, H. Polet, M. Roche, K. Summerbell, L. Teal, B. Vanellander and F. G. O'Neill

“Effects of fishing on benthic fauna, habitat and ecosystem function”

ICES Symposium, Tromsø, Norway

16-19 June 2014

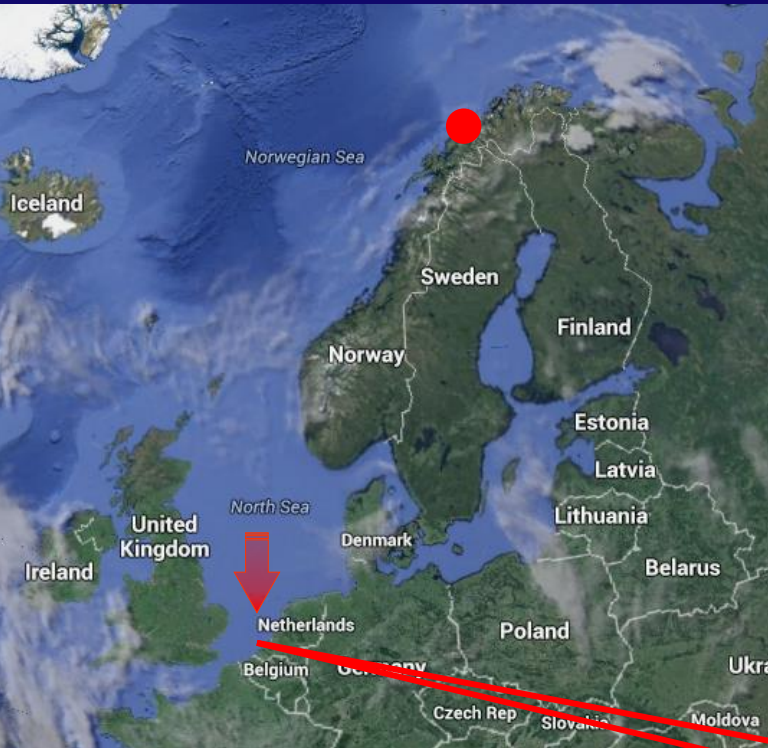
Tickler chain vs Pulse trawling



3 OBJECTIVES

- ✓ Penetration depth
 - Field trial (1)
 - Model (2)
- ✓ Sediment resuspension: field (3)

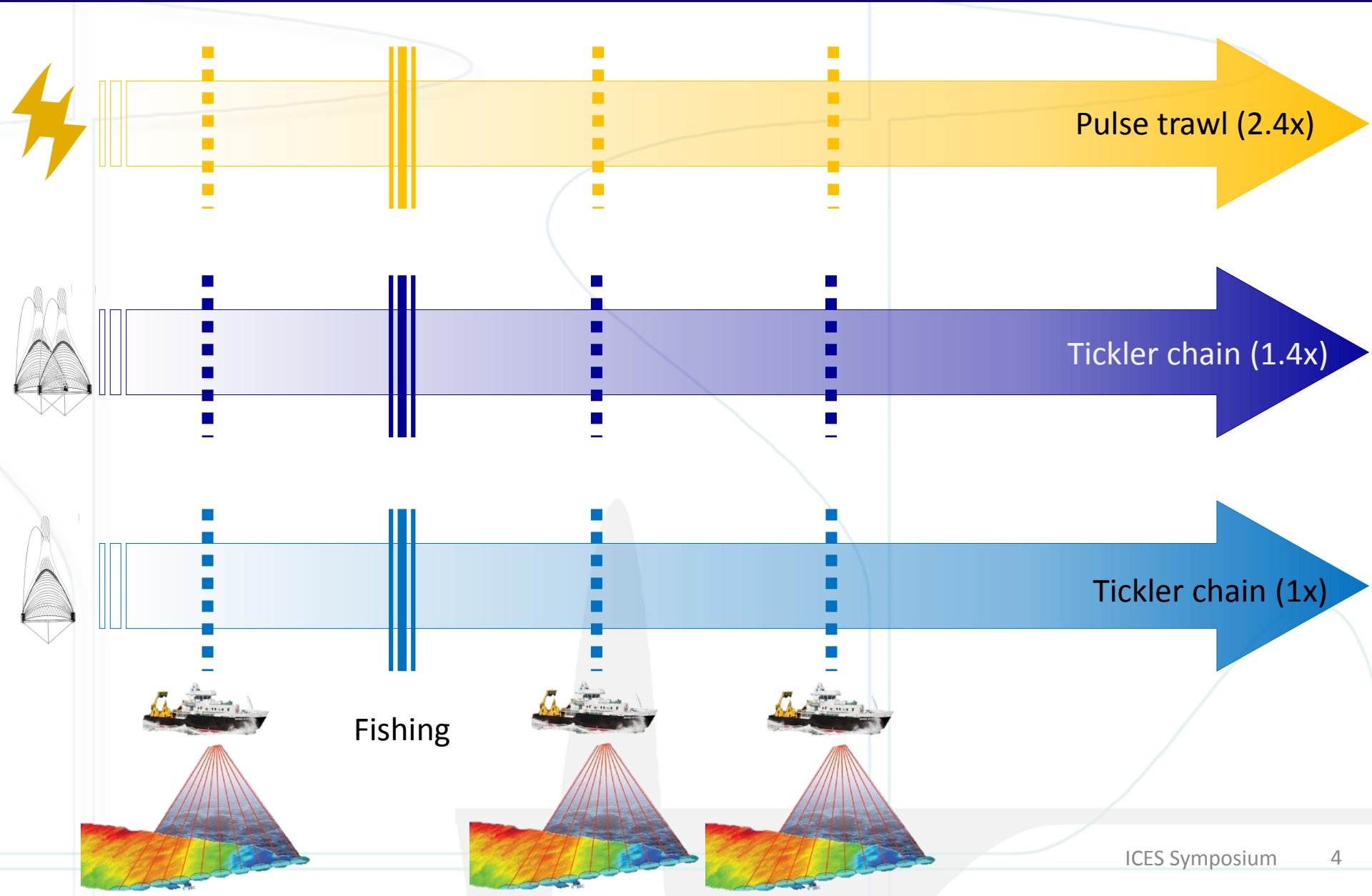
Field trial



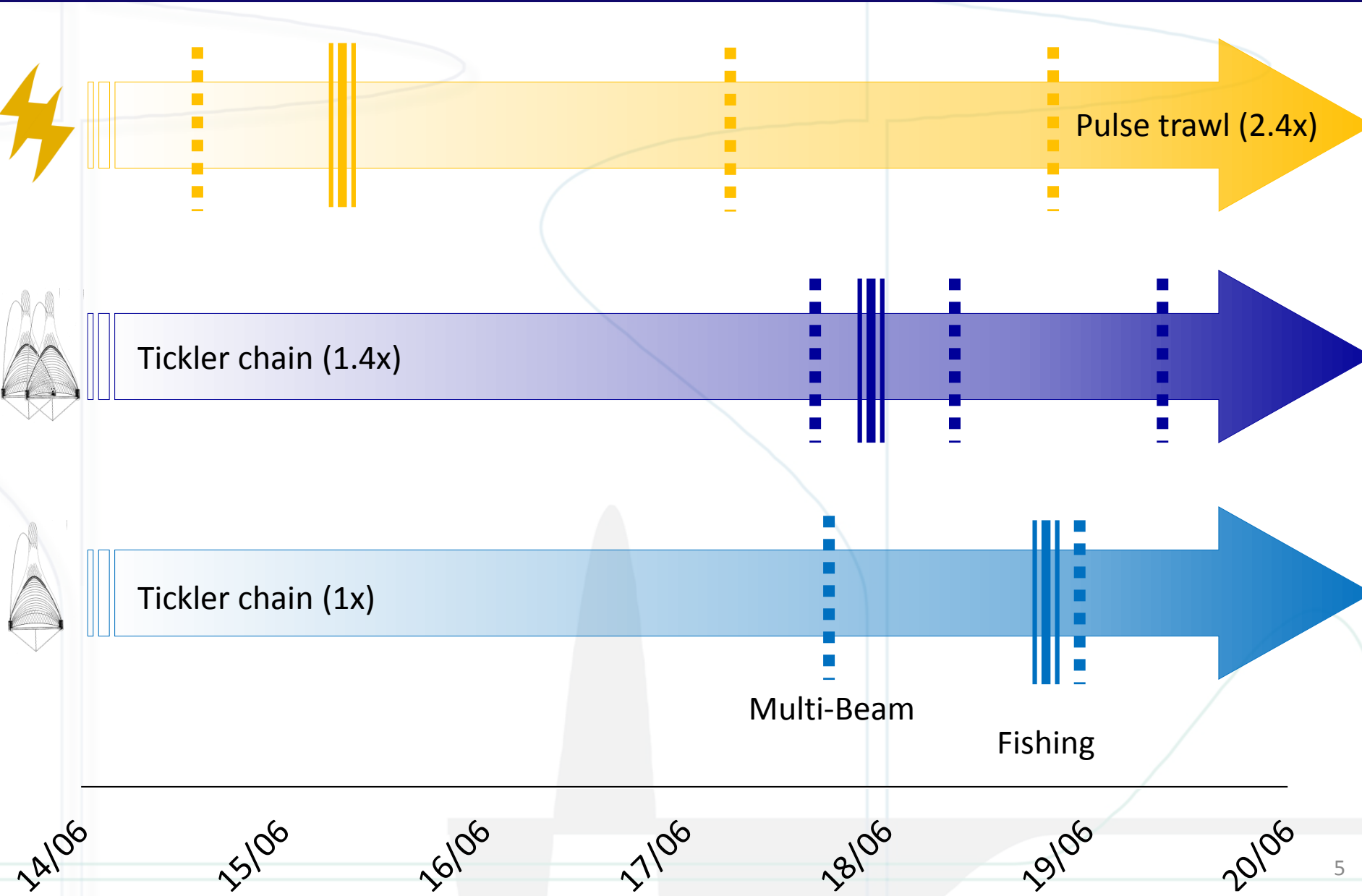
- ✓ southern North Sea
- ✓ No beam trawlers >300HP
 - Shrimp beam trawling
 - Eurocutter (<300HP beam trawlers)
- ✓ 15 – 22m depth
- ✓ fine / muddy sand
(EUNIS 2007-11)



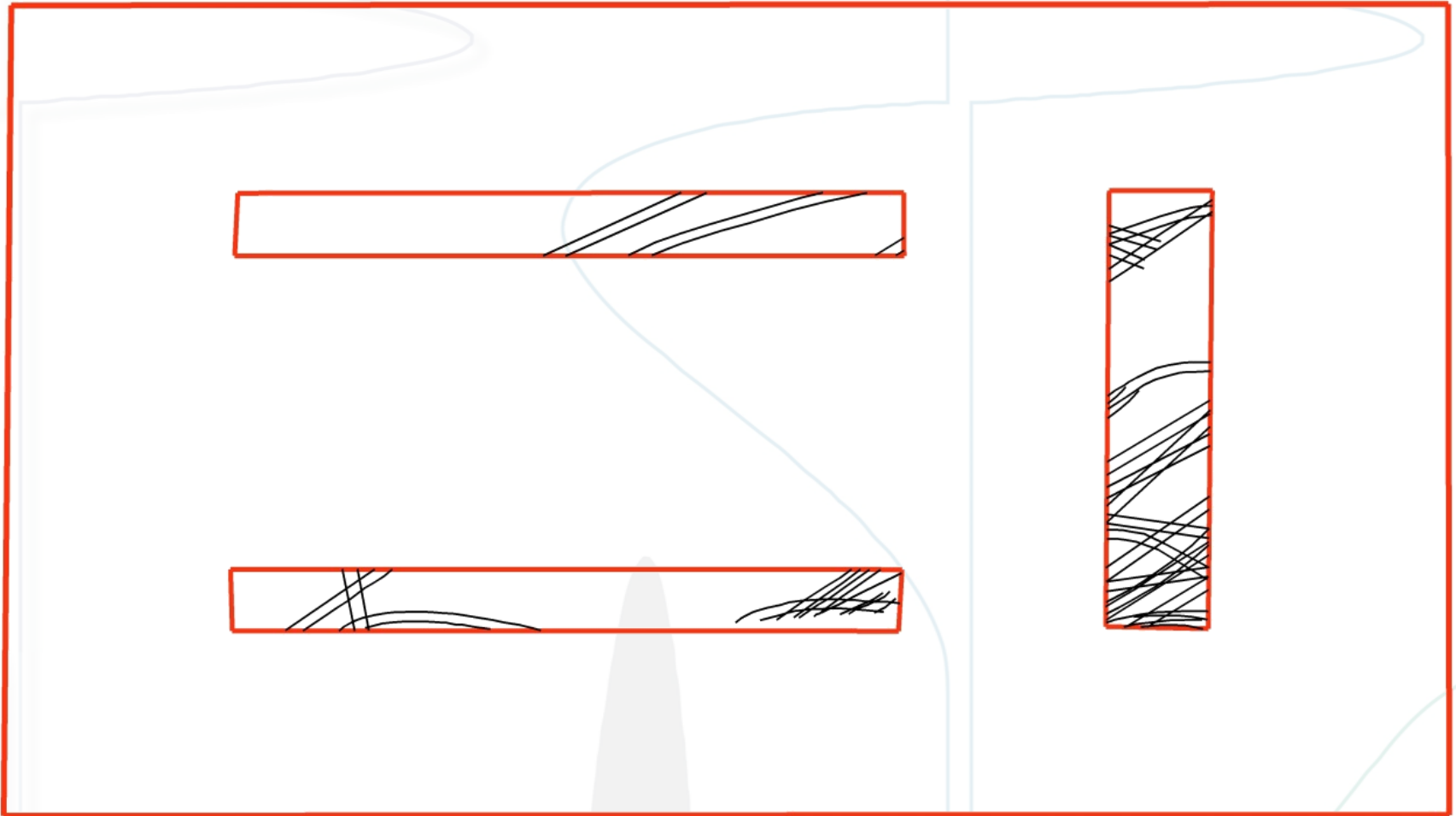
Before – After assessment



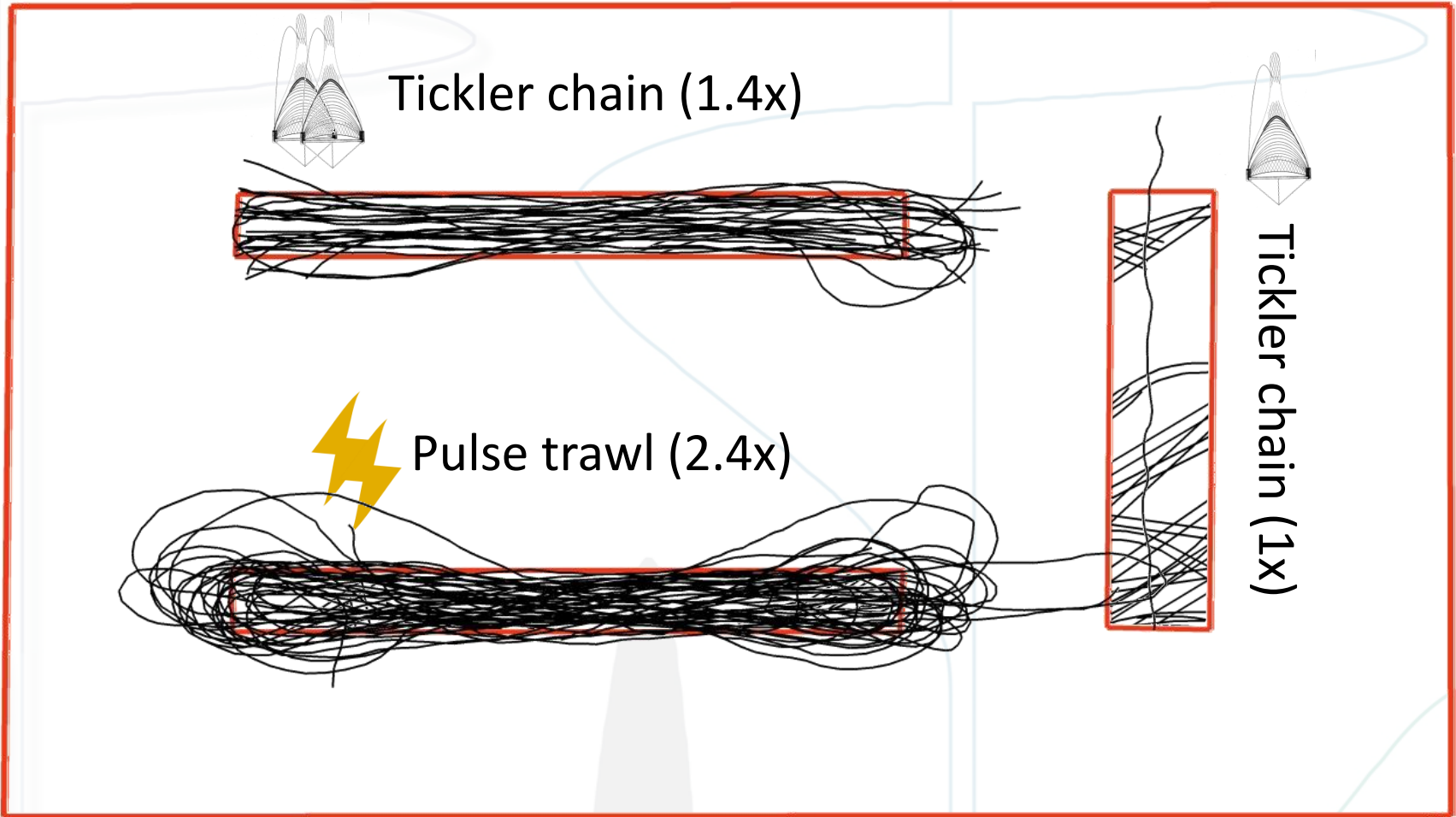
Before – After assessment in practice...



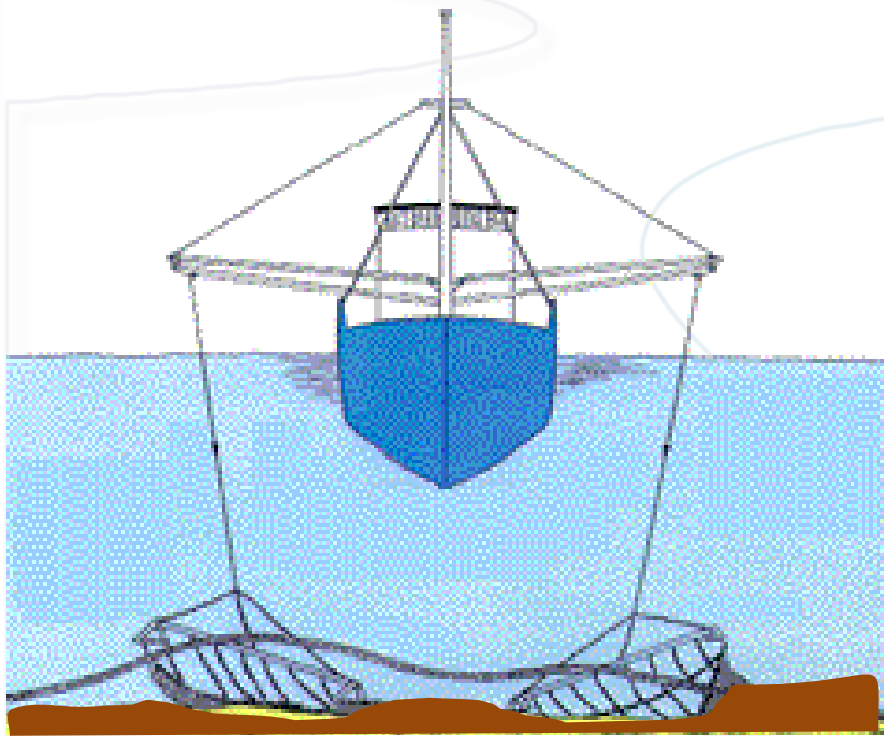
Before Fishing



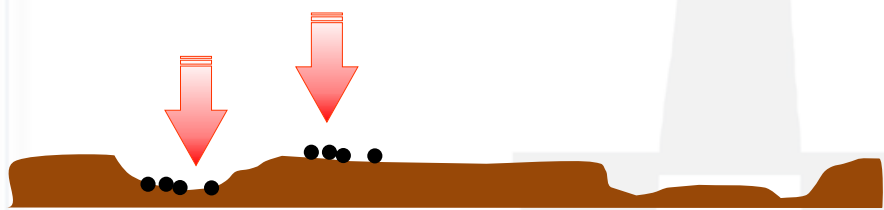
Fishing



After Fishing



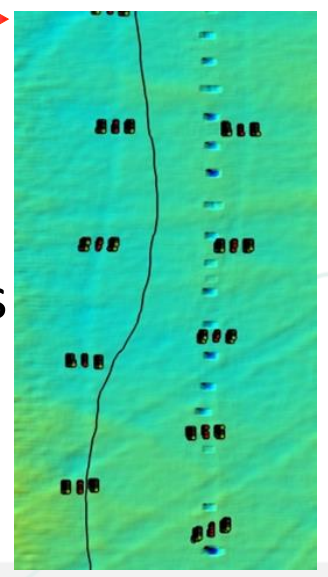
Seabed alteration: differences of depth in and outside the track



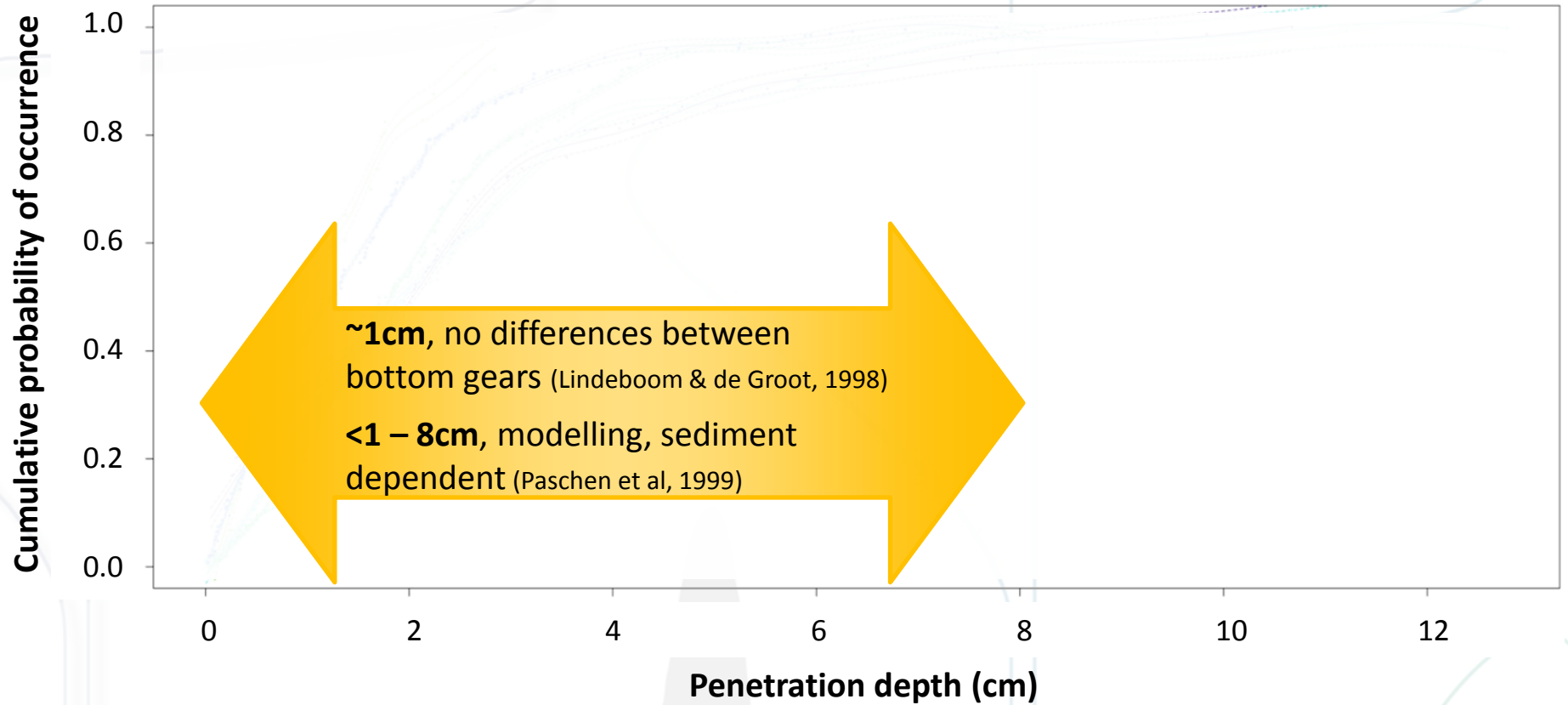
Identification of trawl tracks



Measurements of depths

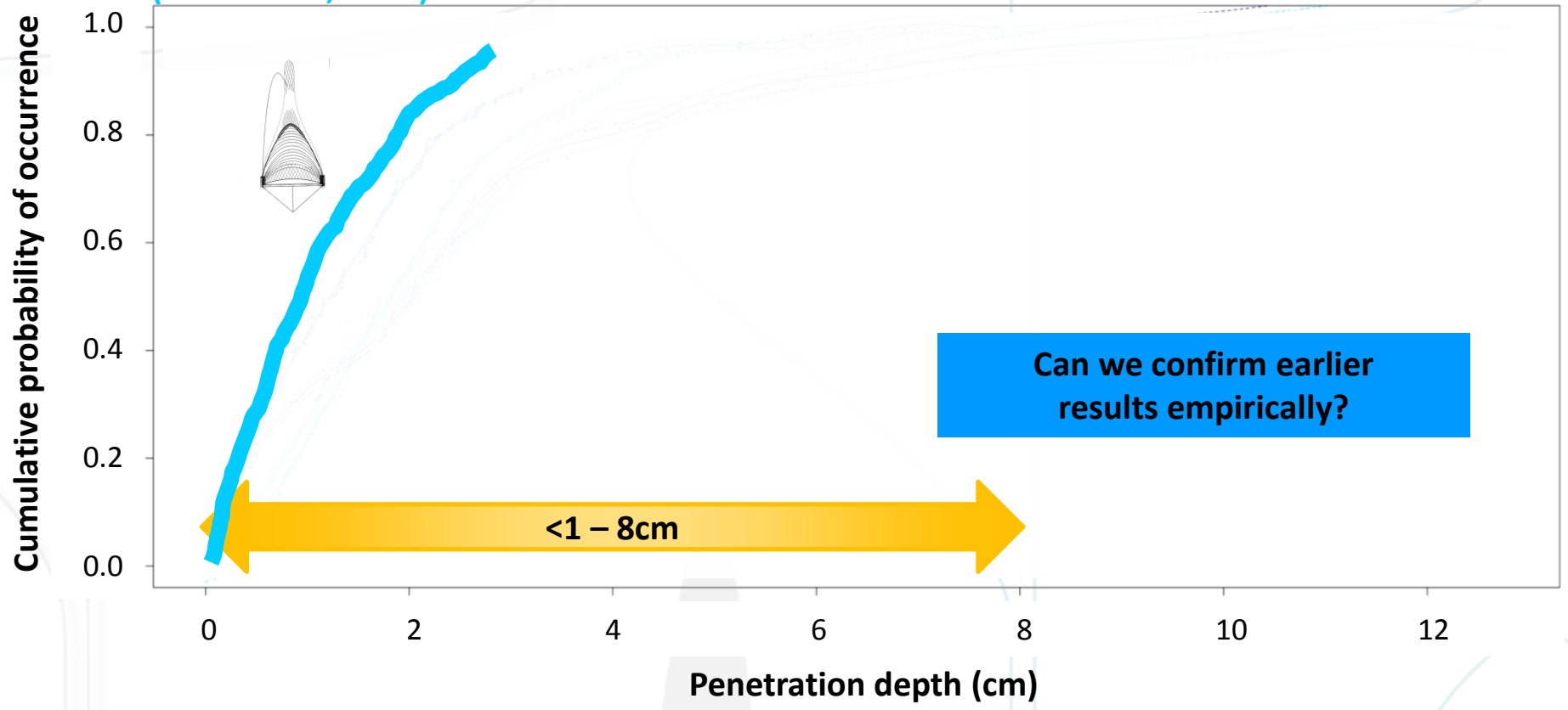


Penetration depth

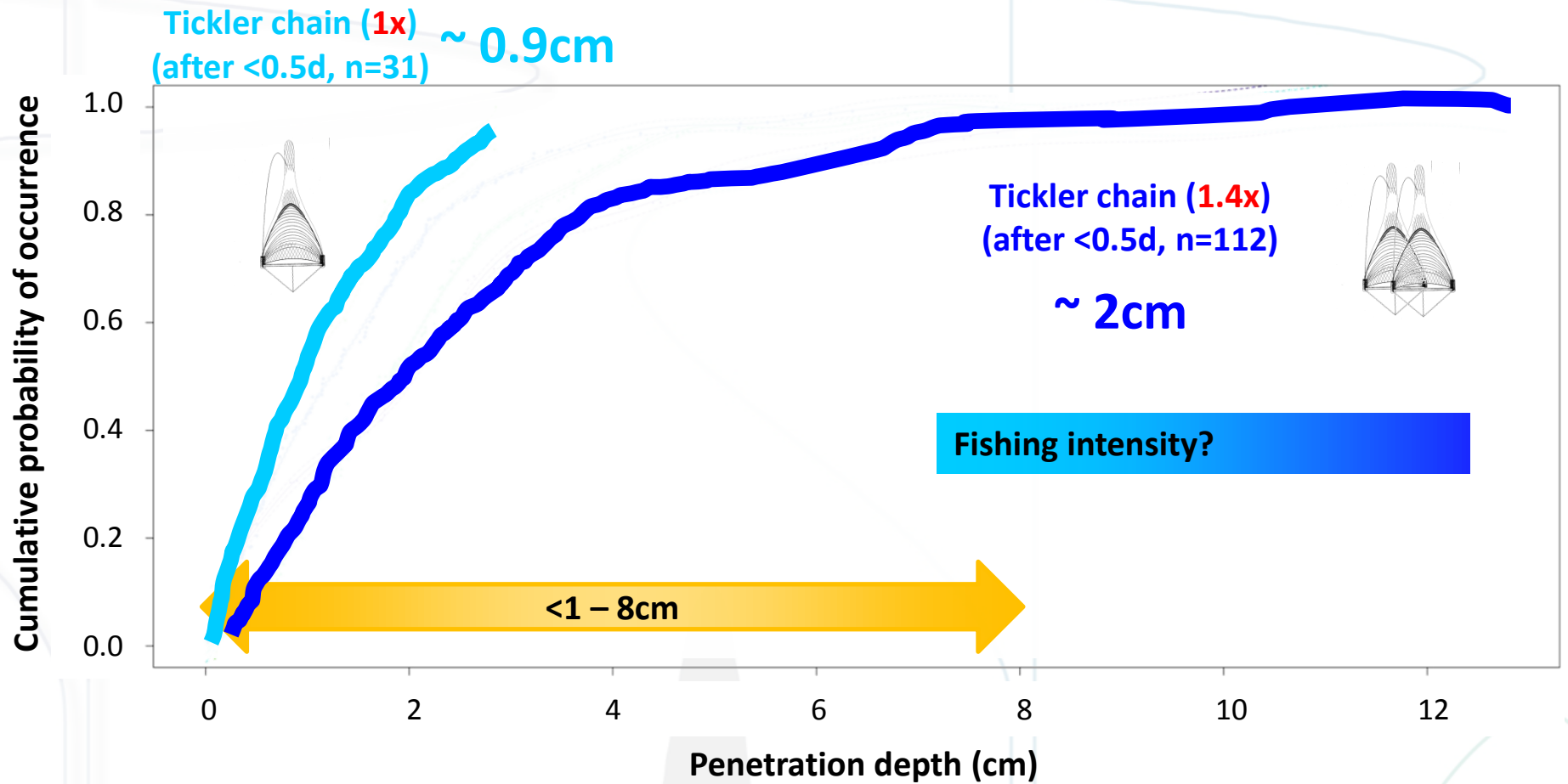


Penetration depth

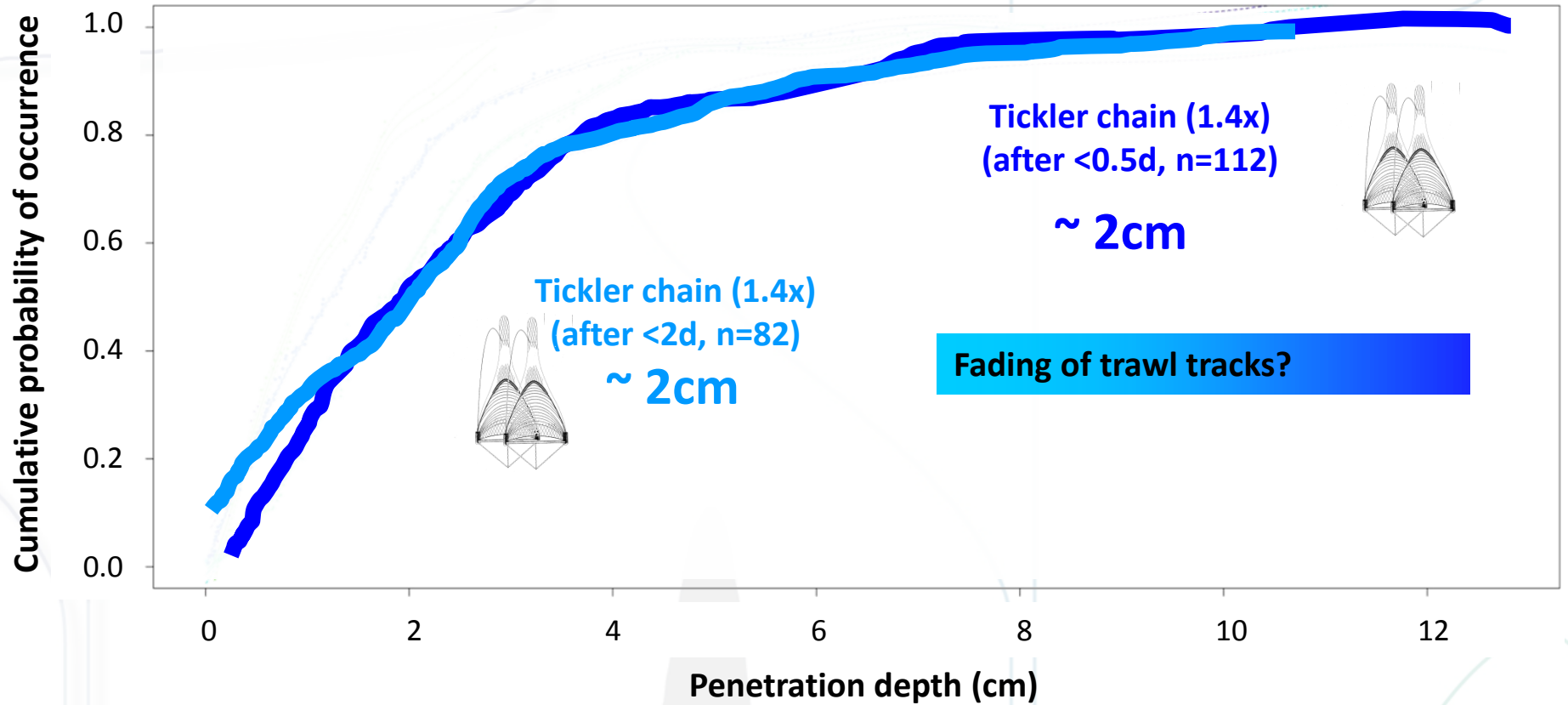
Tickler chain (1x) ~ 0.9cm
(after <0.5d, n=31)



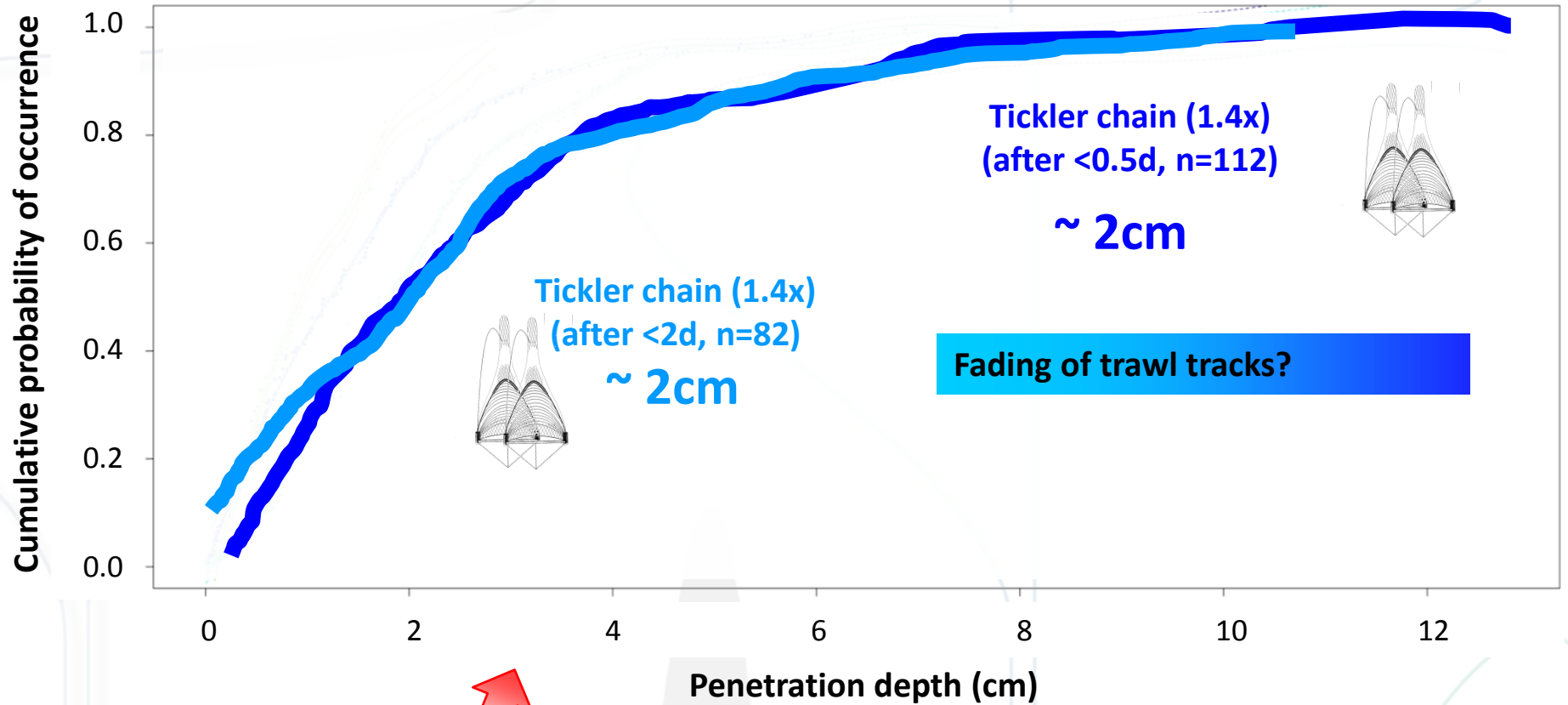
One vs multiple passages?



Fading of trawl tracks?



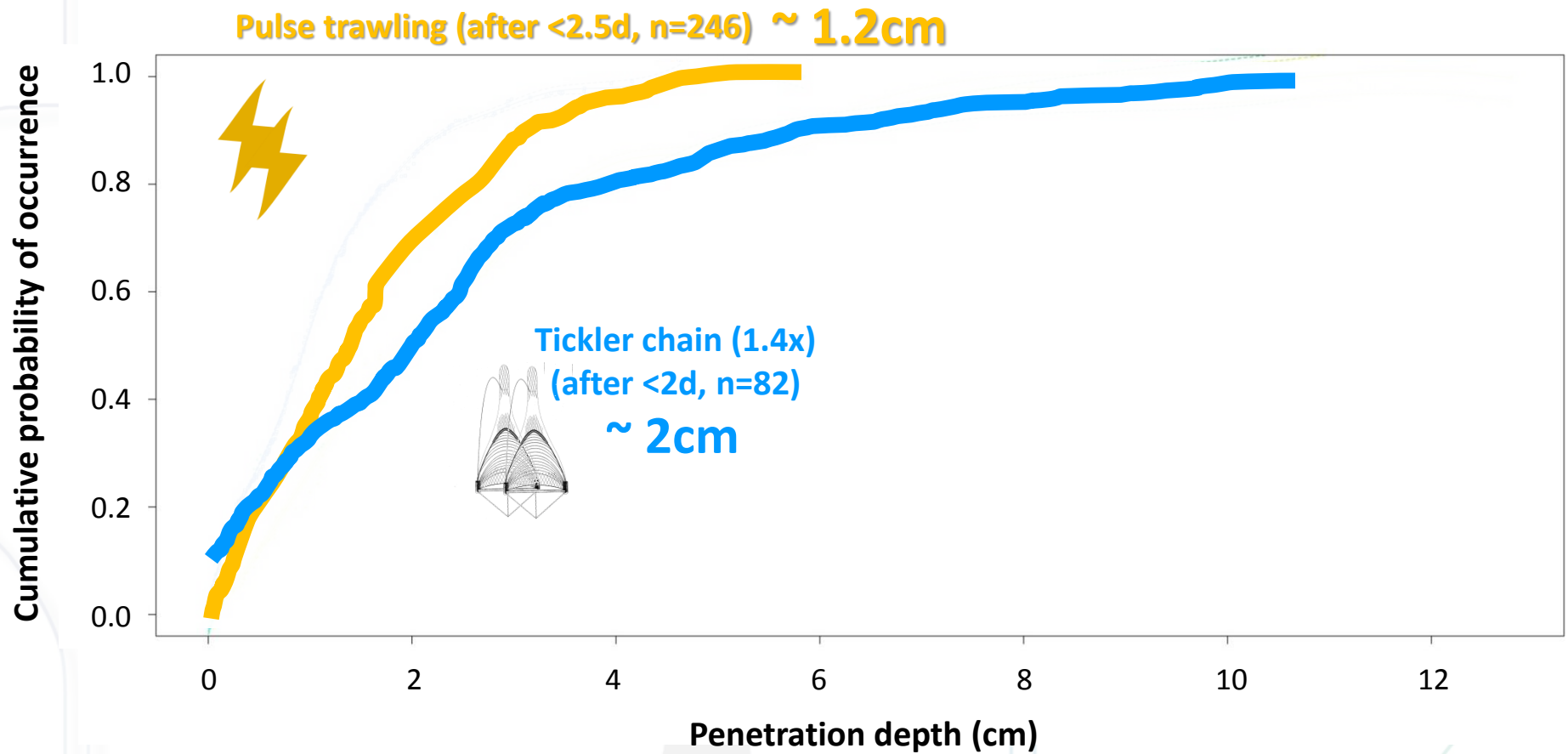
Fading of trawl tracks?



Marks faded <math><0.5d</math> (Fonteyne, 2000)

Fine-medium sand, Scheveningen area
RoxAnn Survey

Gear improvement?

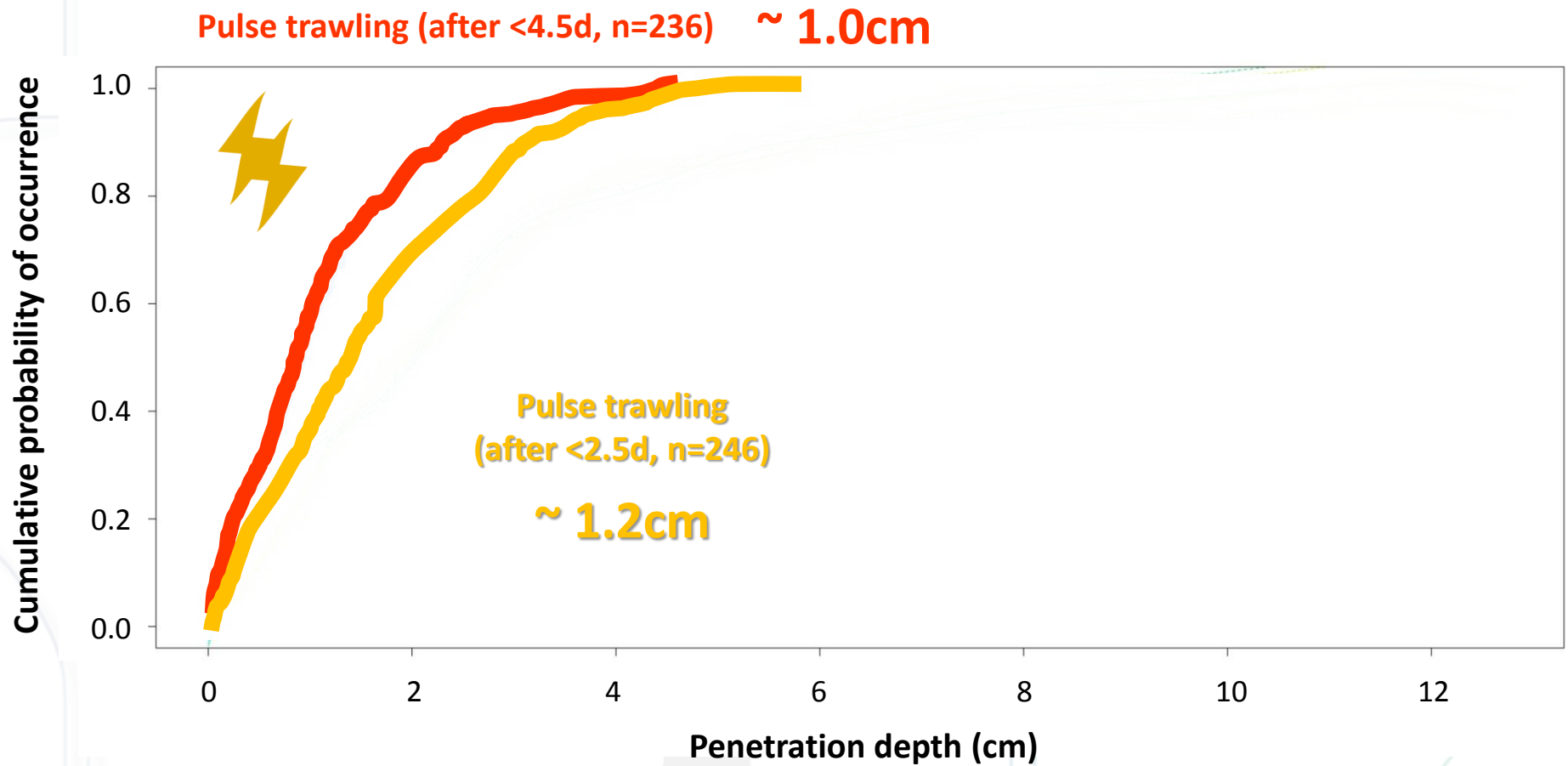


Pulse trawling (after <2.5d, n=246) ~ 1.2cm

Tickler chain (1.4x) (after <2d, n=82) ~ 2cm

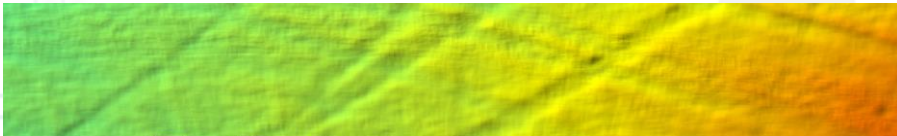
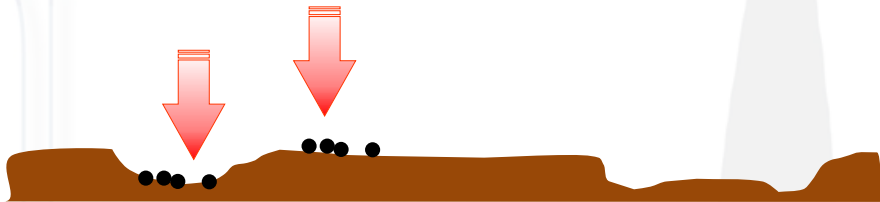
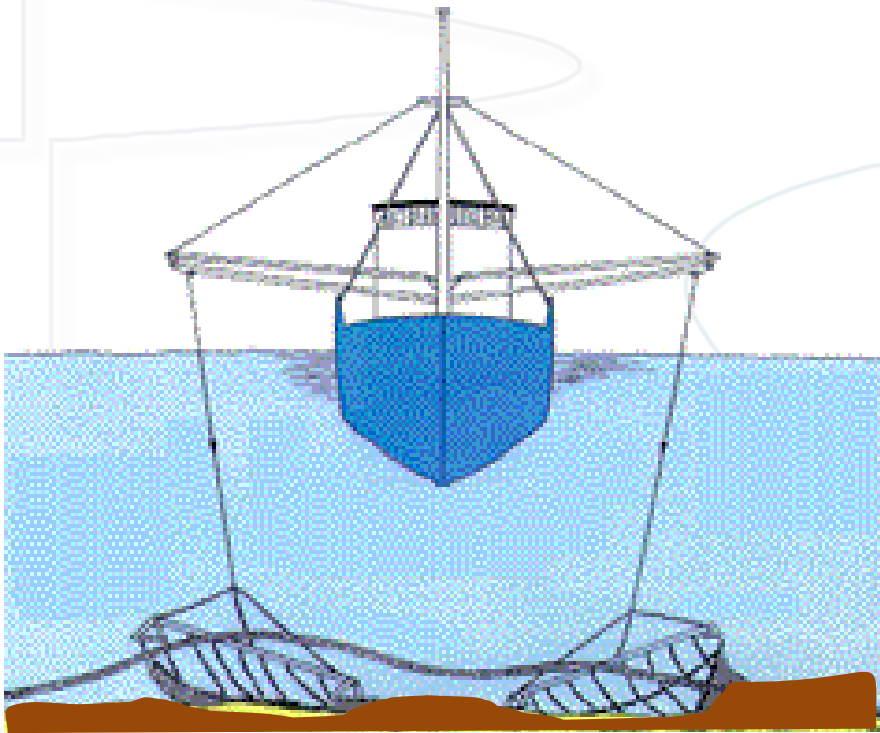
Gear improvement?

Fading of trawl tracks?



Fading of trawl tracks?

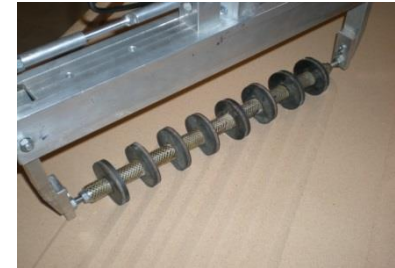
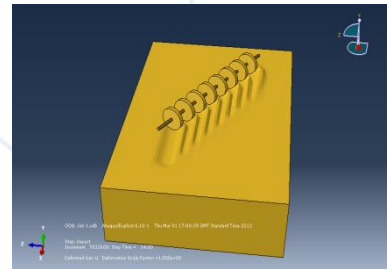
'Generic' trawl tracks (2)



Traits-based gear approach

Which gear element causes differences in trawl tracks from MB?

- Preliminary work . . .
- Based on FE model

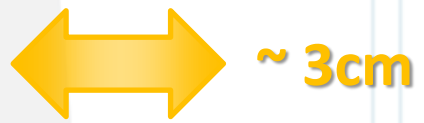
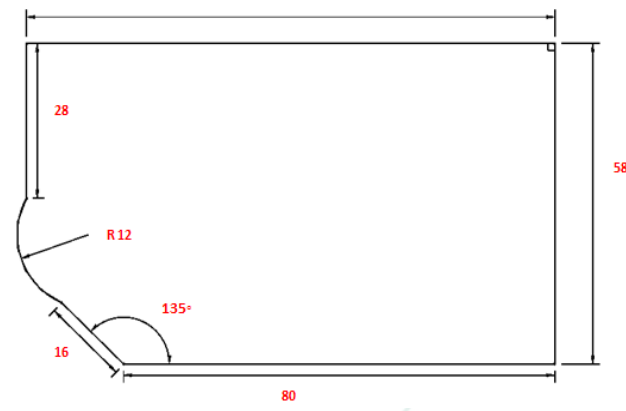
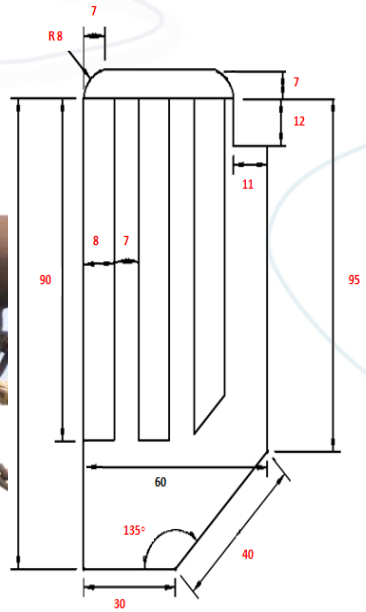


(2)

Trawl shoe



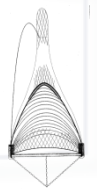
~ 0.5cm



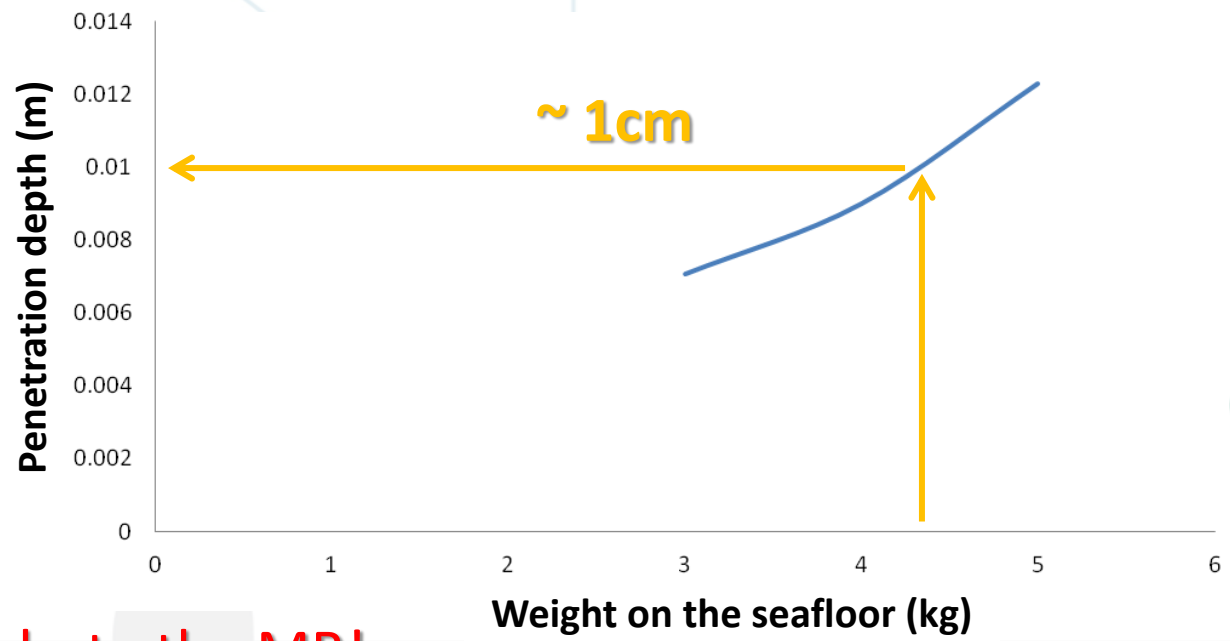
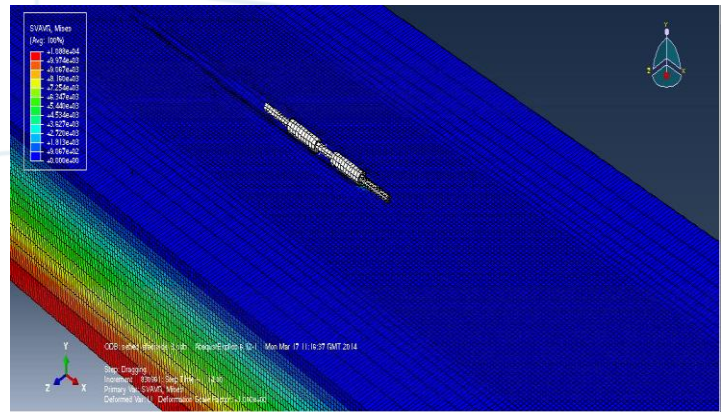
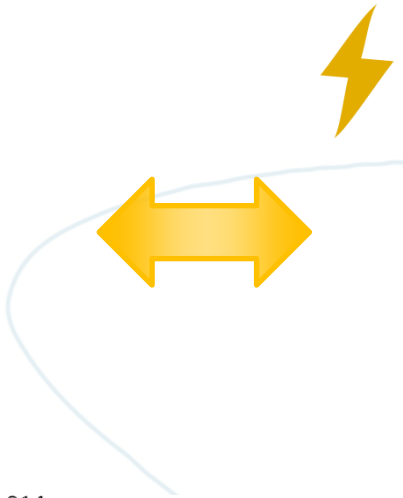
✓ Discrepancy with MBES?

(2)

Tickler chains vs electrodes?



- ✓ Model only a single passage of a chain
- ✓ Ongoing . . .



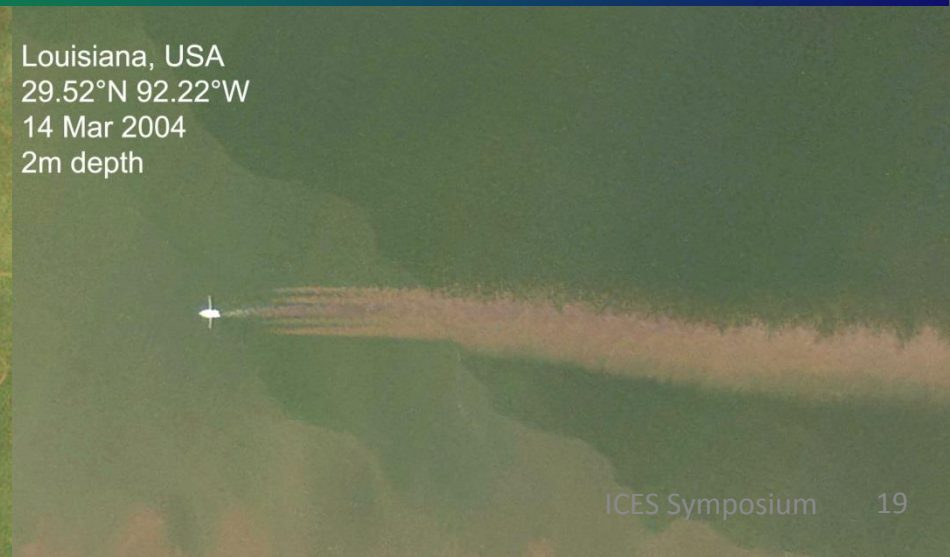
Links to the MB!

Sediment re-suspension (3)

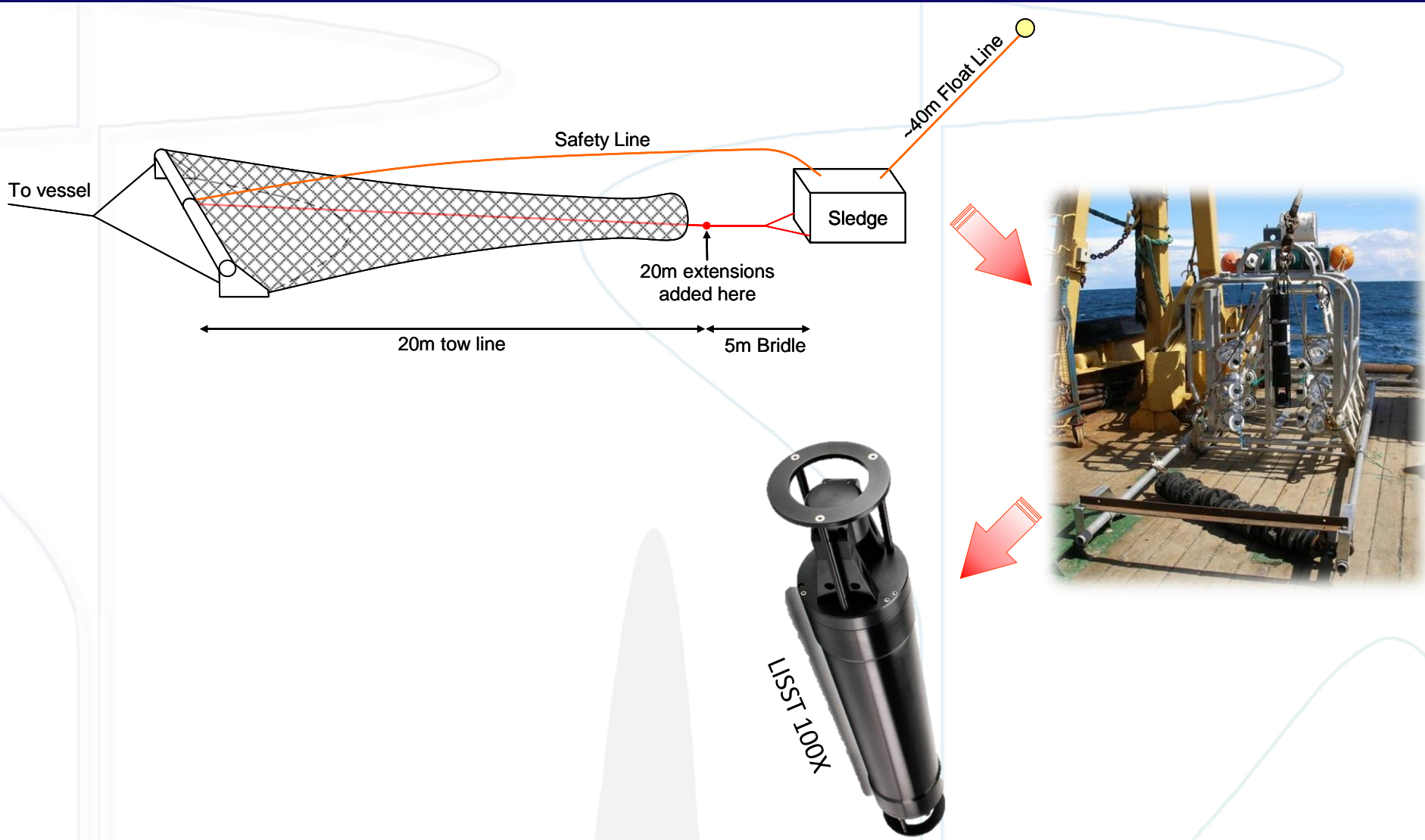
- ✓ What happens to the sediment that is disturbed?
- ✓ Re-suspension
- ✓ Also depending on turbulence...
- ✓ Proxy for nutrient displacement, turbidity changes...



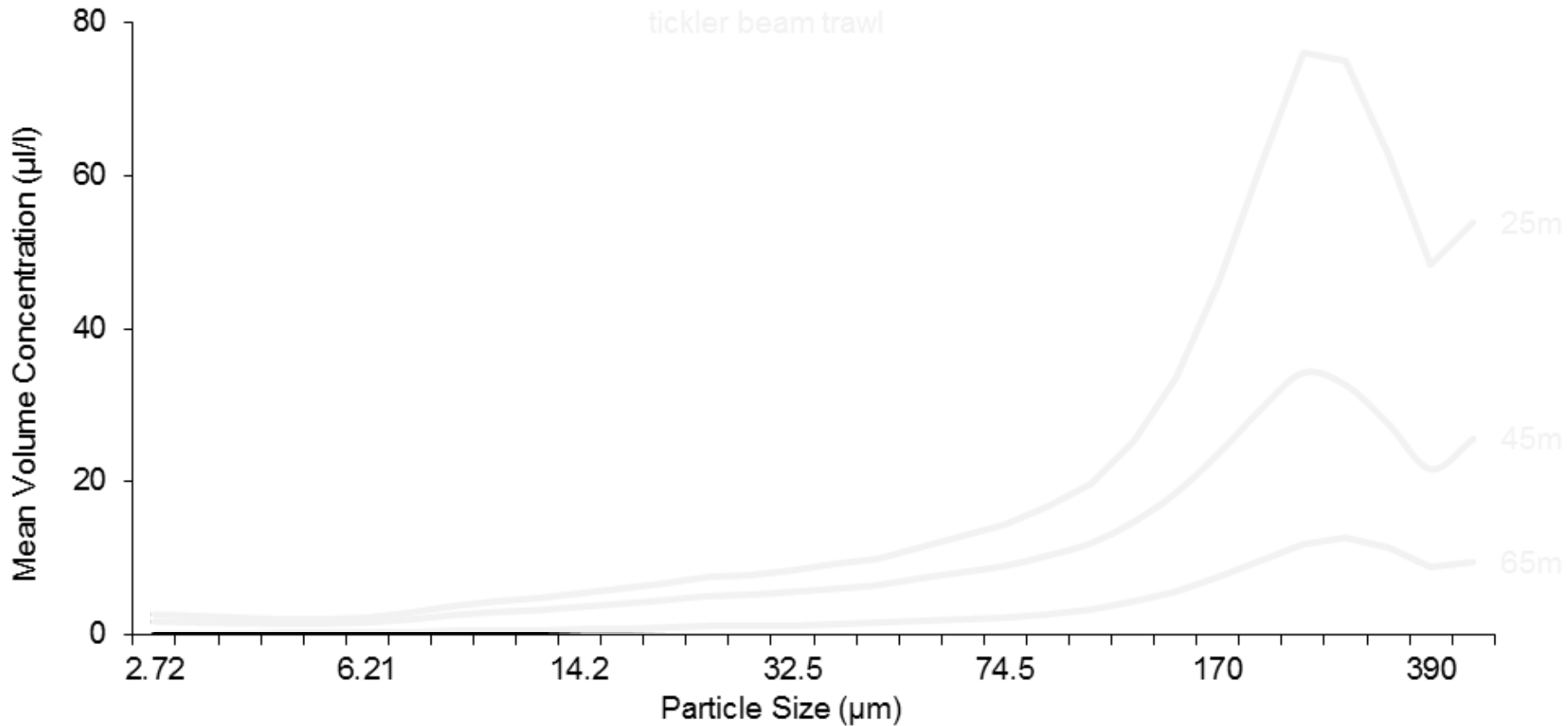
Louisiana, USA
29.52°N 92.22°W
14 Mar 2004
2m depth



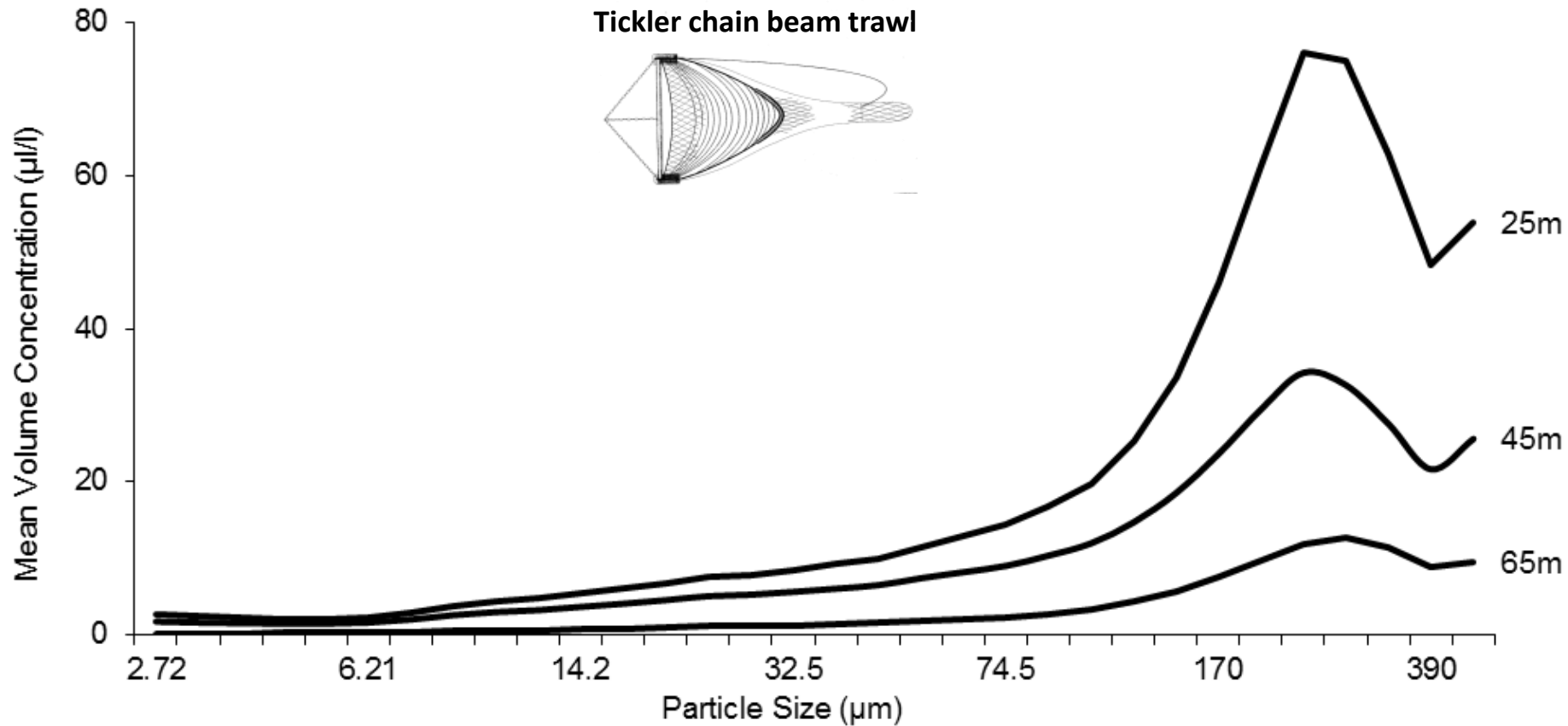
Equipment



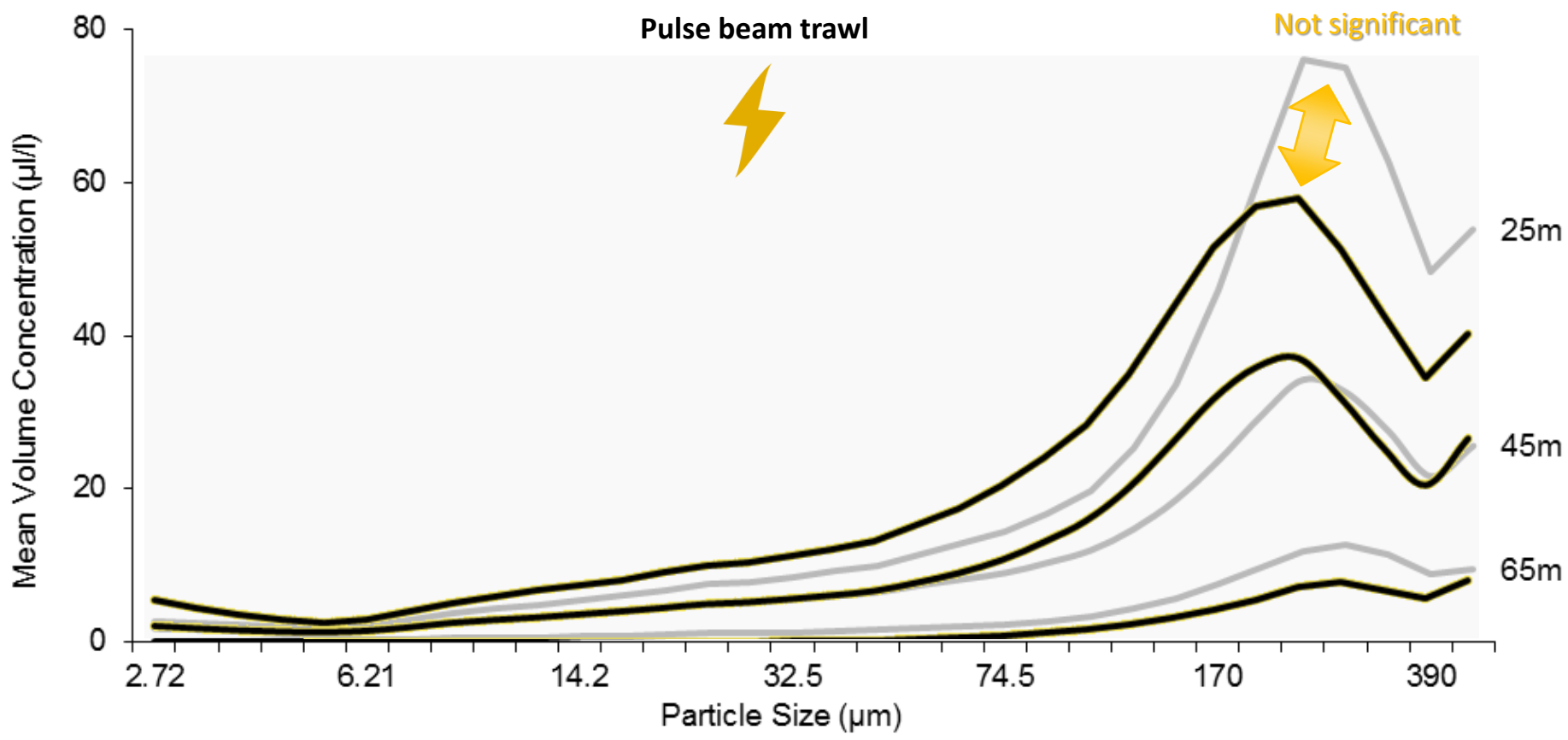
Particle size and concentration



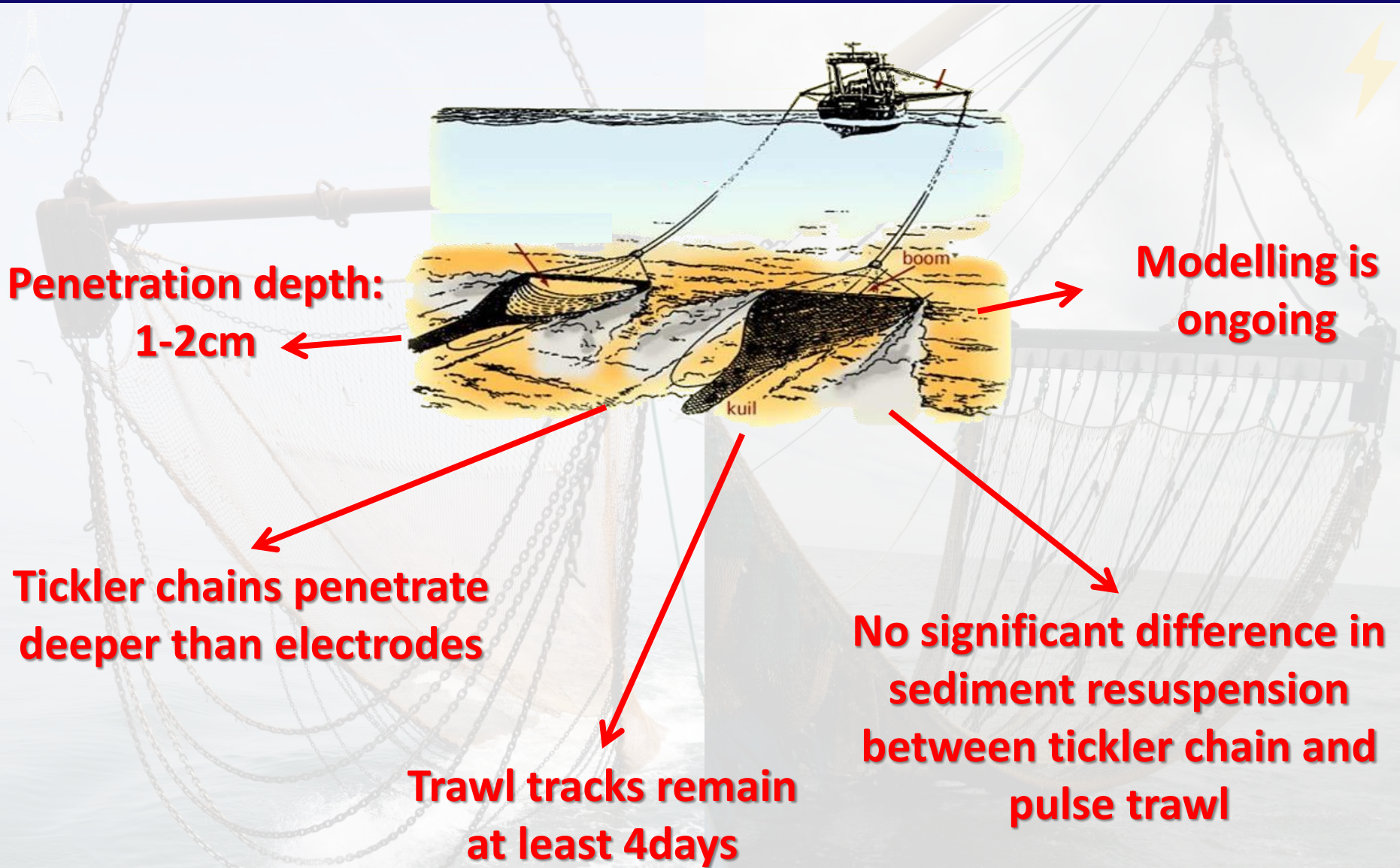
Particle size and concentration



Particle size and concentration



Conclusion field trial



Future perspectives . . .

✓ **Trial 1: high** natural disturbance

- Bottom shear stress: up to 1.5N/m^2
- Physical impact!
- Biological impact?



✓ **Trial 2: low** natural disturbance

- Different sediment
- 12m beam trawls



✓ Question: How to move **from empirical BACI-study to predictions?**

- Based on literature + **trial 1** + **trial 2**
- Traits-based approach of beam trawls  modelling





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Thanks!

More @

www.benthis.eu



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