COASTAL RESILIENCE SCHOOL

Sustainable Coastal Growth and Resilience

Webinar: A case study of two dredging projects discussing differences for EIA

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UN Decade Collaborative Centre for COASTAL RESILIENCE

OTG@ OceanTeacher Global Academy

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Introduction

Marie Pendle
I have worked in the marine environment for >30 years
I started at CEFAS, first as a benthic ecologist, secondly giving scientific advice on applications for licensed activities in the marine environment to UK government
I subsequently worked for Royal Haskoning, then HR Wallingford as a marine environmental scientist.
Specialities – marine ecology, water quality and sediment quality.

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Introduction

Environmental aspects – context is everything, a comparison between London Gateway and Darwin Harbour projects.

Two very similar dredging activities in very different environments, as a focused part of the overall projects

Why does this matter in terms of Environmental Impact Assessment?

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London Gateway Port

Project description

New cargo terminal

Capital dredge: 31Mm^3

Dredger: CSD and TSHDs

Temperate climate

Area: Berth, turning circle, channel

Project duration: ~ 4 years

Maintenance dredge: Predicted up to 2.25 Mm^3/yr

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Baseline environment

Location: UK, River Thames

Industrialisation level: High

Tidal range: ~7 metres

River input: Minor

Habitats: Mudflats / saltmarsh

TSS: 50 to >2000mg/l

Water quality (WFD): Moderate to Good

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Biological elements

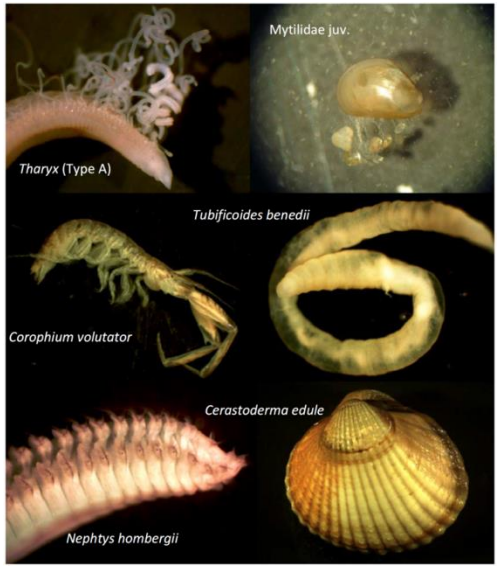
Species adapted for:

- ❖ Low light conditions (eutrophic level c. few meters)
- ❖ High suspended sediment concentrations
- ❖ Dynamic seabed environment
- ❖ Variations in salinity

Typical SSCs approx. 50 to >2000mg/l (peak)

Dredging operations add 100 to 250mg/l (peak)

Equivalent to ~10% increase (peak)



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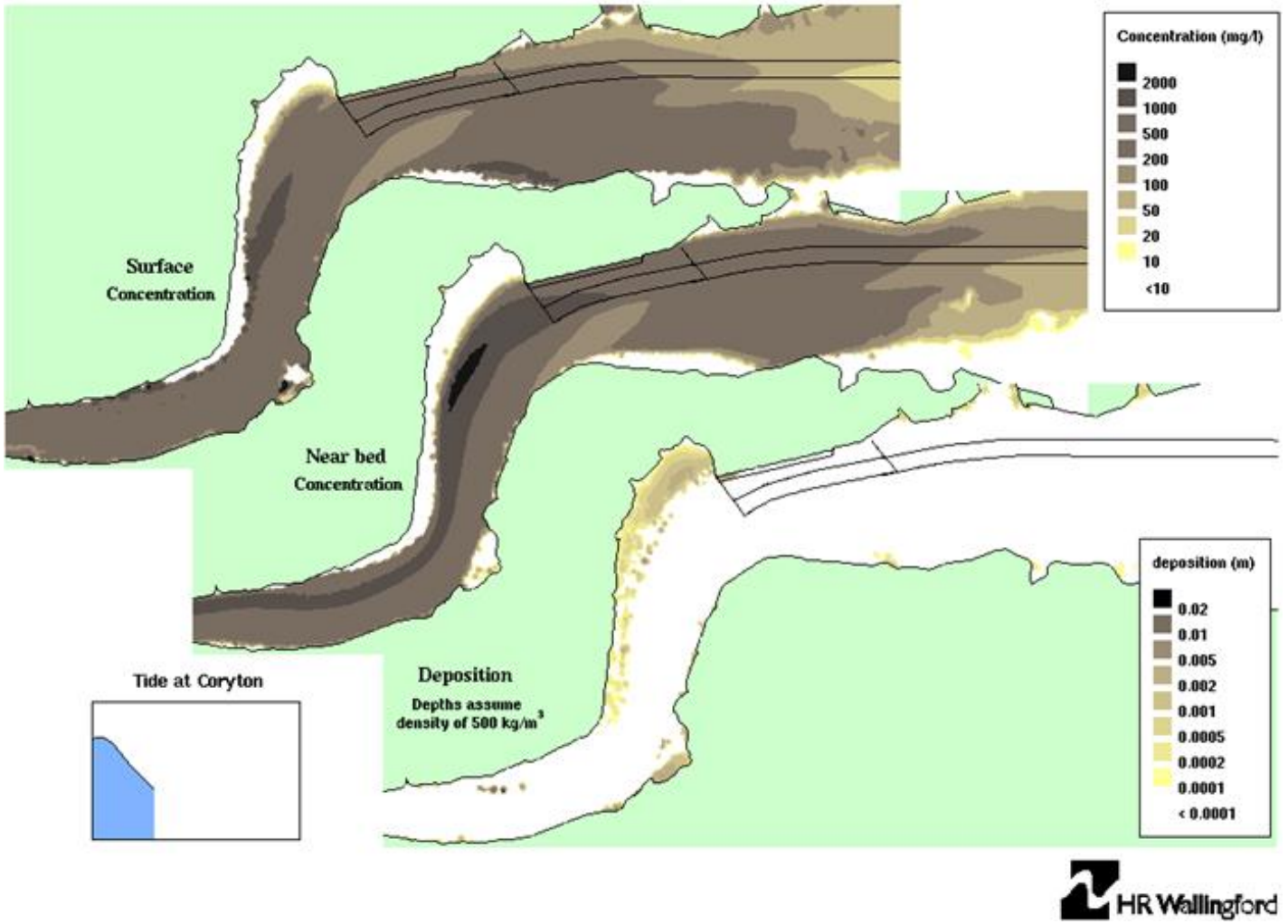
Predicted suspended sediment concentrations



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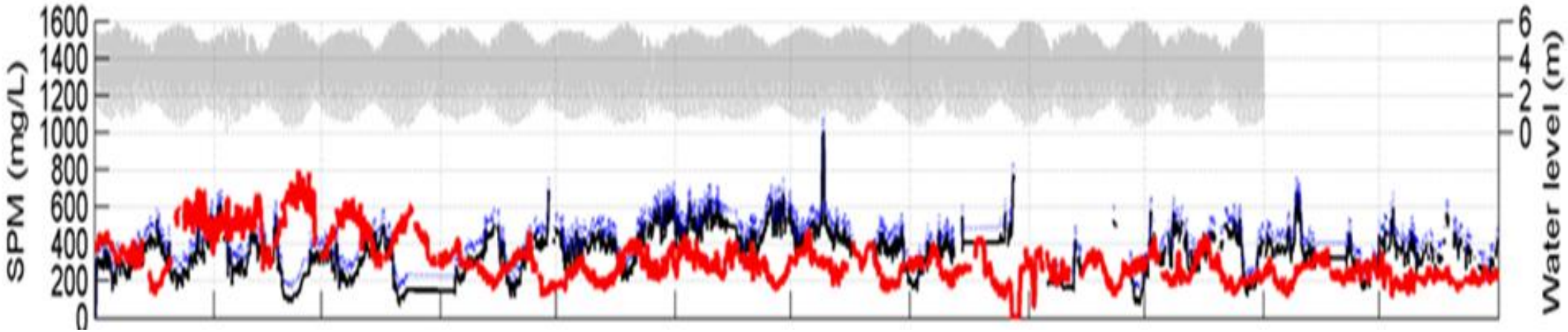
Comparison with observations



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Darwin Harbour

Project description

New LNG site

Capital dredge: 16.7Mm^3

Dredger: BHD, CSD & TSHDs

Tropical climate

Area: Berth and shipping channel

Project duration: 5 years

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Baseline environment

Location: NW. Australia

Industrialisation: Low

Tidal range: 8m

Freshwater input: Minor

Habitats: Mangroves / corals / Seagrass

TSS: 3 to 73mg/l

Water quality: Excellent

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Biological elements

High profile species:

- Mangroves / seagrasses / corals
- Marine mammals
- Turtles

Species typically adapted for:

- Low turbidity
- High light levels
- Consistent salinity

Typical SSCs approx. 2 to ~50mg/L (peak)

Dredging operations add 100 to 200mg/l (peak)

Equivalent to ~2 to 100 times more!

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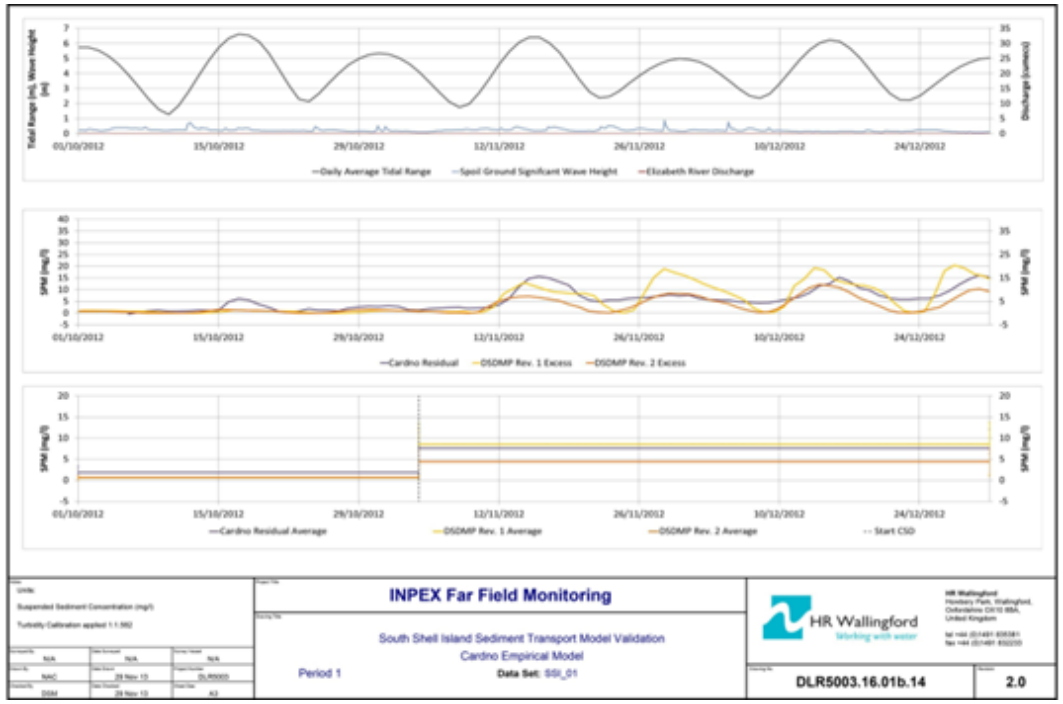
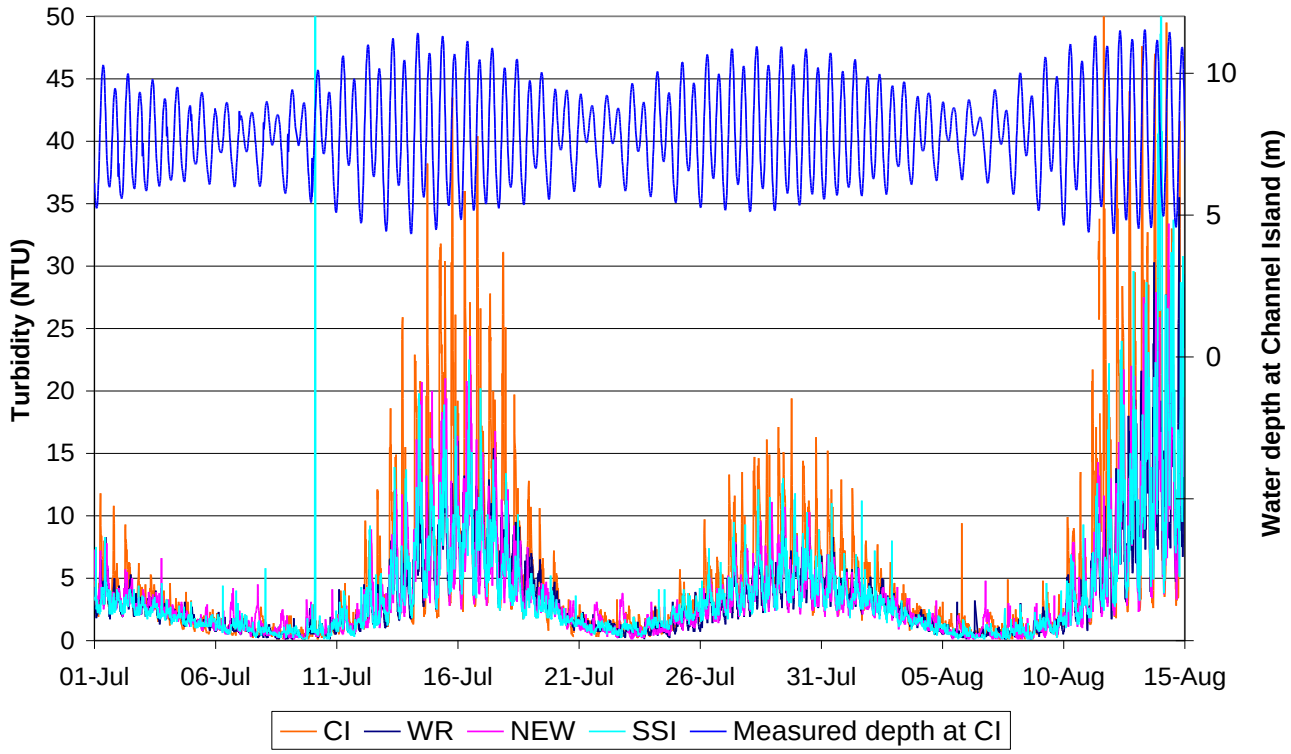
Observed and predicted suspended sediment concentrations





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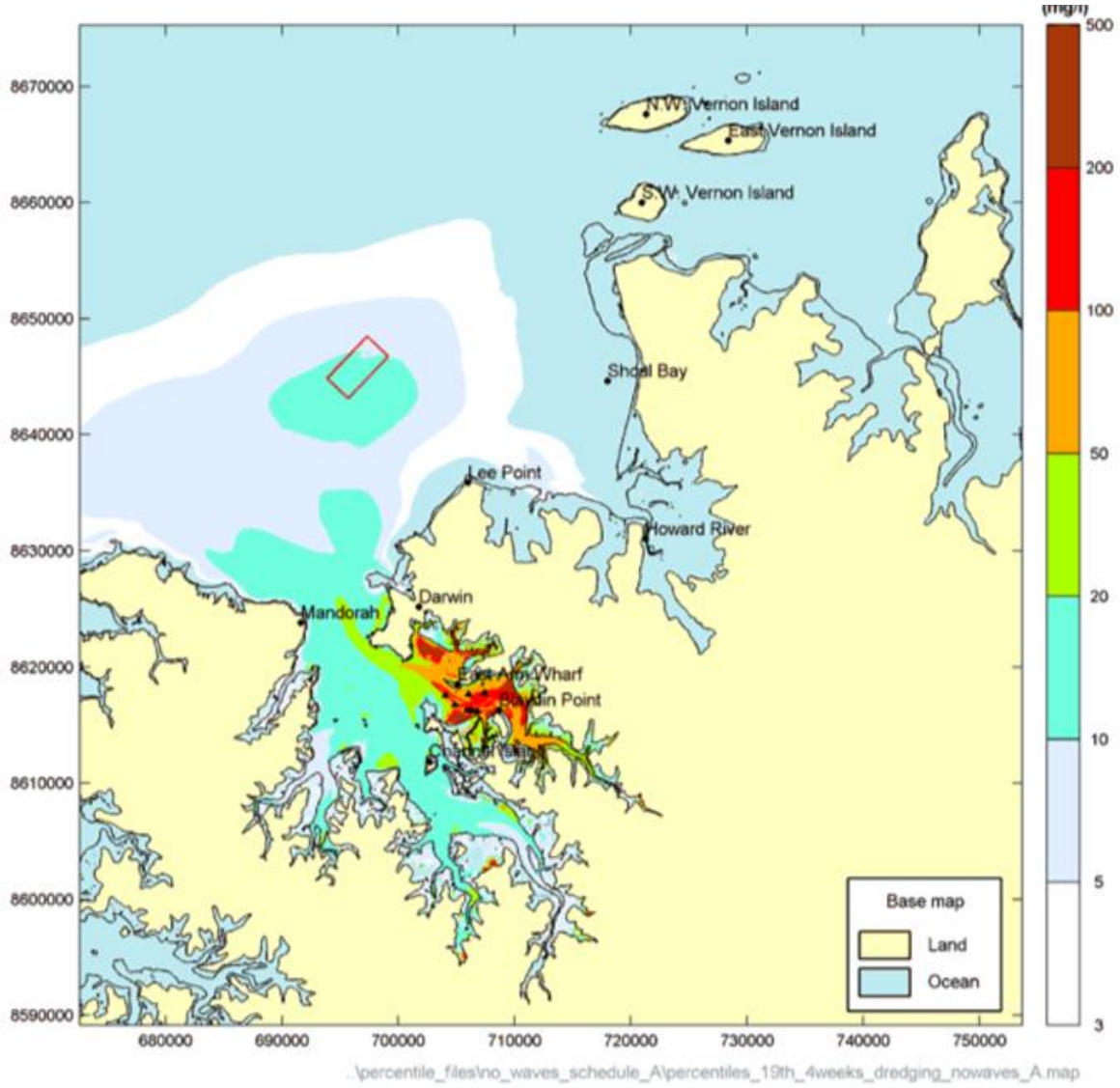
Comparison with observations



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Comparison between projects

Suspended sediment concentrations

The SSC at London Gateway mostly stayed within the natural variation that could be caused by storms. The geology of the Thames is clay, so the seabed is muds and fine sand, which are much more prone to suspension during heightened weather events than at Darwin, where the geology is rocks and coarse sand. Thus the SSC at Darwin repeatedly exceeded the natural variation by up to 100 times.

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Biological elements - flora

The flora of the Thames is mainly seaweeds and saltmarsh plants that live in the intertidal zones, where the flora of Darwin Harbour has both seagrasses which live in the subtidal, and mangroves within the intertidal zone. Seaweeds are not impeded by sediment movements and saltmarsh plants rely on sediment deposition, whereas both seagrasses and mangroves can be adversely affected by excess sediment deposition

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Biological elements - fauna

The fauna of the Thames are used to perturbation, even those that live within the seabed, and the benthic populations shift position with the sediments. The fauna of Darwin Harbour are more reliant on stability, such as the coral reefs and associated fauna. Thus dredging activity in these habitats will result in much longer recovery time for the populations of Darwin Harbour fauna than the populations of the Thames fauna.

Monitoring regimes

The EIA process needed to take into account the very different baseline environments and biological receptors in order to forecast impacts.

Both ports had extensive monitoring regimes as mitigations from the EIA process, to compare predictions against real outcomes, with adaptive management built into the monitoring. However, the adaptive management for Darwin was far more sensitive, to account for potentially more major impacts

Despite the EIAs being undertaken in different regulatory regimes (UK and Australia), similar methods result in similar requirements.

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Conclusions

Similar project elements can have different effects (and thus different impacts) – this is dependent upon the environment that the project occurs within

Focussed on a brief comparison of suspended sediment concentrations – for similar scale and methodology of dredging:

- Within the Thames the effect is relatively minor;
- Within Darwin Harbour the effect is relatively major;

The ecology is adapted to the respective environments; therefore the magnitude of effect will be higher where the increase over baseline is higher.

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Thank you!

Questions?

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