

Transport of suspended sediment in ports, due to propeller activity.

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Introduction: In the Norwegian risk assessment guideline for sediments [1], standard parameter values for the transport of sediments due to boat activity are listed. Experience in the field indicates that standard values can be quite conservative. Therefore, an alternative method to calculate the value of amount sediments re-suspended and potentially spread as a result of boat activity in a specific harbor has been developed and tested in the field.

Methods: The objective was to quantify the amount of sediments re-suspended during a boat's propeller activity. This was accomplished by measuring the turbidity in two crossing transects in the area of the boat's turning operations, fig. 1. The volume of the affected water mass spreads as a result of the currents in the water body. In order to capture both this movement and the deposition of the re-suspended sediment over time, turbidity was also measured at fixed stations, where several measurements were carried out throughout the day. In addition, water current was measured in the area.



Fig. 1: Map of Horten harbor, where the measurements has been performed.

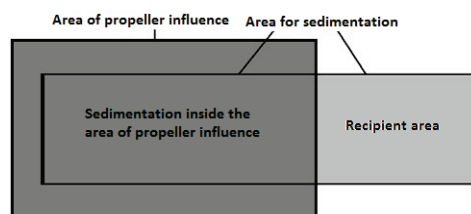


Fig. 2: Movements of re-suspended sediments

Results: We use a conceptual model that it is shaped like a rectangular box and decreases in volume over distance and time. The movements of the suspended sediments are illustrated in Fig.1.

At one harbor location, turbidity was measured in the two transects during navigation operations as illustrated in Fig. 1.

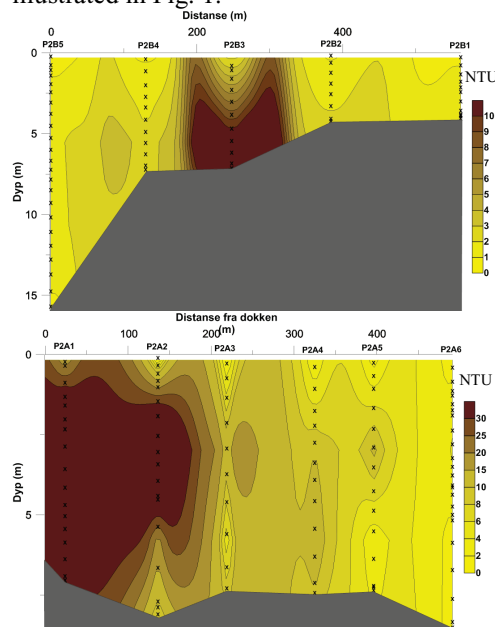


Fig. 3: Contour plot of turbidity in the two transects. The brown areas indicate high turbidity.

Discussion: The standard values listed in the risk assessment indicate the transport of 1000 kg sediments out of the area influenced by propeller activity per call of port. The turbidity calculations presented here indicate a transport of 260 kg sediments by the pier whereas a second simulation conducted south west of the pier indicated spreading of 680 kg.

This method will make it possible to decide which docking areas have unacceptable transport of pollutants, from the ones that have acceptable, using simple in-situ measurements, instead of complicated calculations with a high element of uncertainty.

References: [1] Miljødirektoratet (2012) Risikovurdering av forurenset sediment. TA2802/2011.