*ERMS final-WS Bryne*

# PNECs and risk functions for non-toxic stressors in the water column and sediment

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# Elaboration of the concept
## 1. Hazard identification

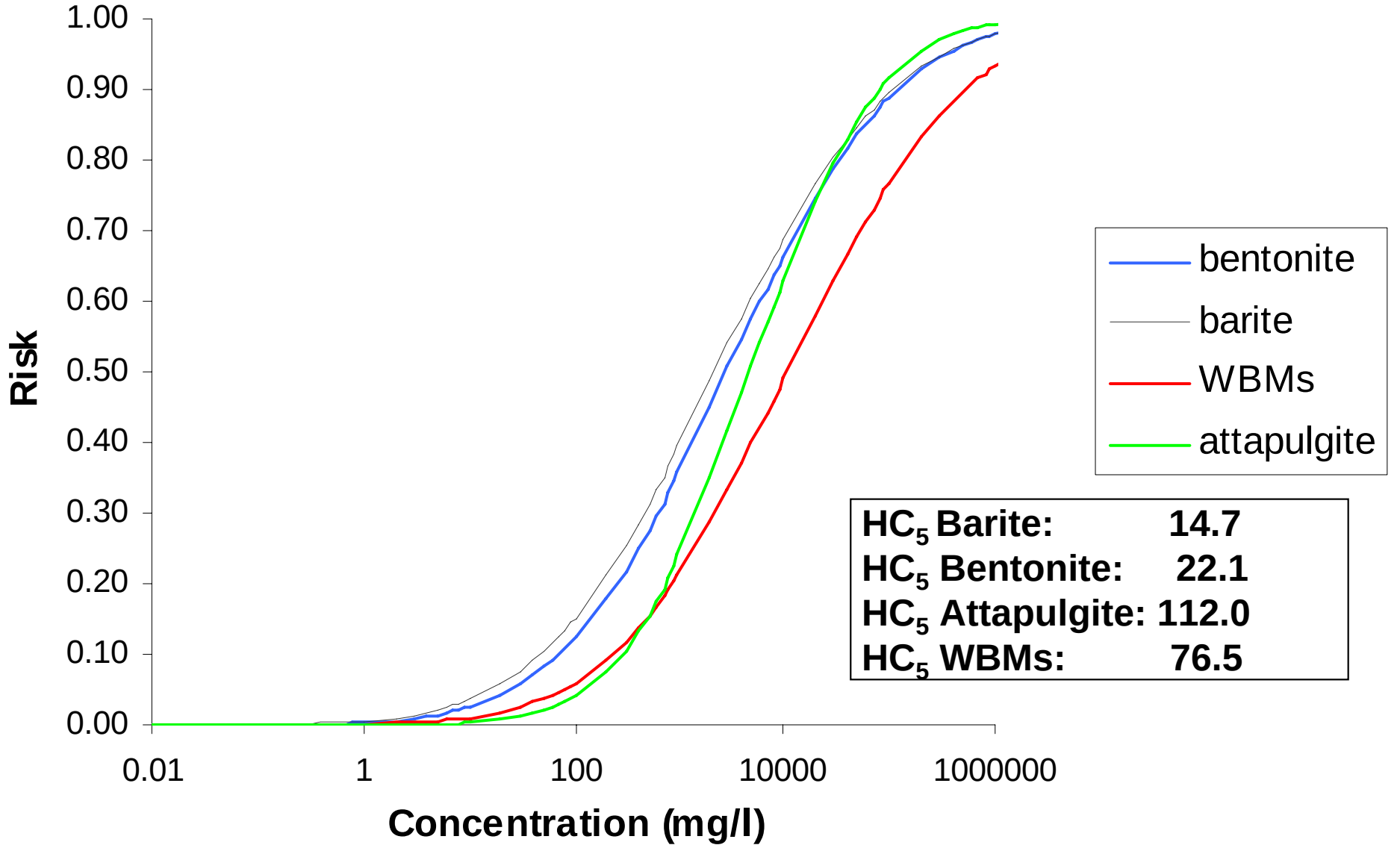
- **Stressors in the water column**
  - Toxicity
  - **Suspended matter**

- **Stressors in the sediment**
  - Toxicity
  - **Oxygen depletion**
  - **Change in grain size**
  - **Burial**

# PNEC and SSDs for weighting agents in drilling muds

- **ERMS report no. 6**
- **TNO report 2006-DH-0044/A**
  ***The derivation of a PNECwater for weighting agents in drilling mud***
- **First results/draft presented at Texel WS 2003**
- **Reviewed by Statoil, Conoco Phillips, TNO.**

# Old SSDs and PNEC values

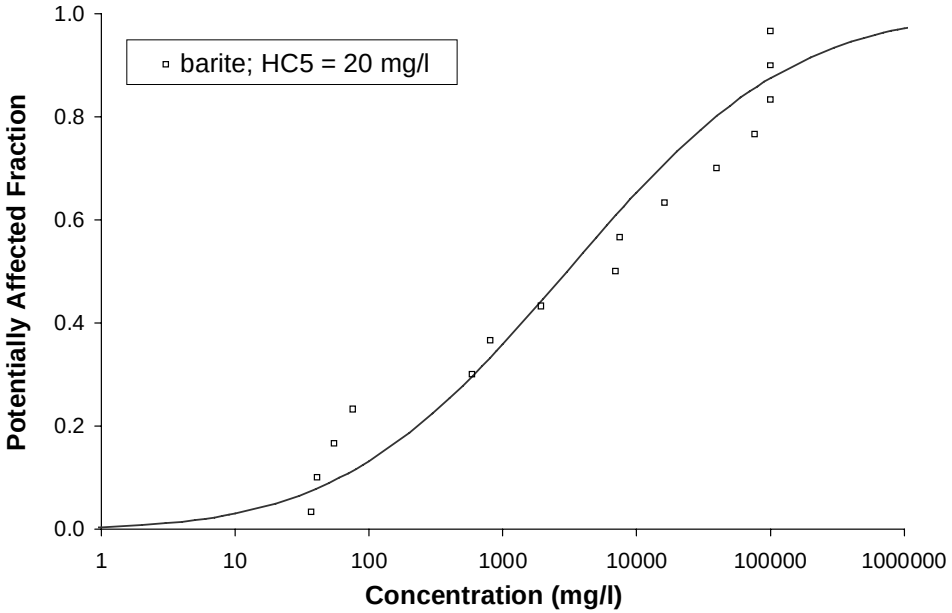


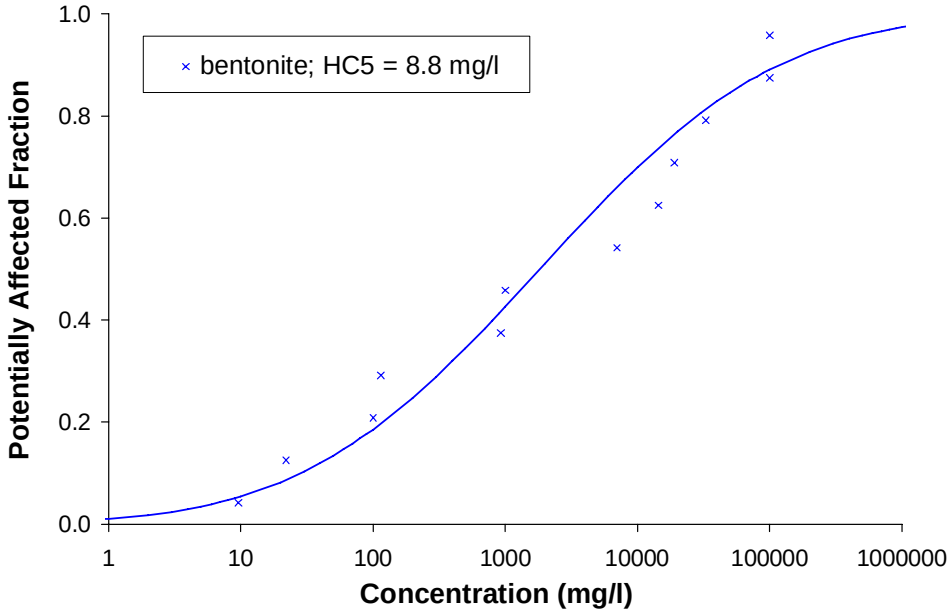
# Results of the reviewing process

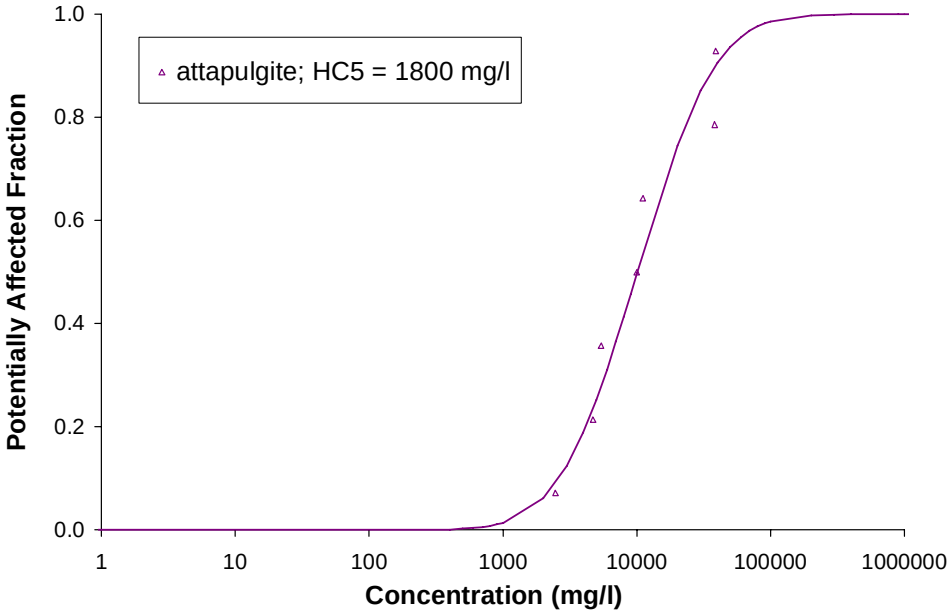
- Weighting agents ≠ suspended matter
- Effect data must be sorted and QA
- Application of safety factors needs to be discussed together with the procedures to derive SSD

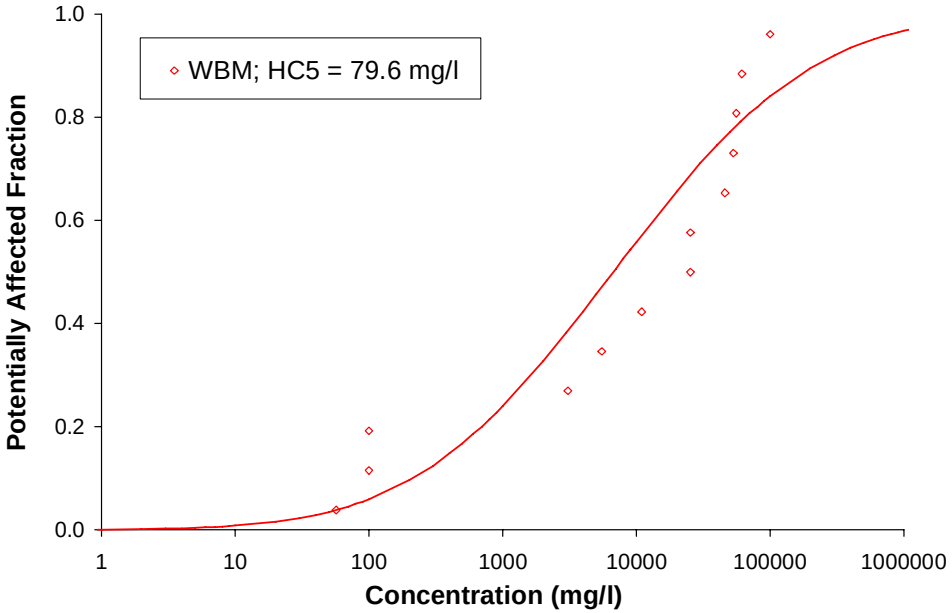
**THIS RESULTED IN AN UPDATE OF THE SSDs AND CORRESPONDING PNEC VALUES**

# Updated SSDs and PNEC values



# From $HC_5$ to PNEC

| Type of weighting material | barite | bentonite | attapulgite | WBMs |
|---|---|---|---|---|
| $HC_5$ (mg/l) | 20.0 | 8.8 | 1800 | 79.6 |
| Proposed assessment factors | | | | |
| $EC_{50}$ to NOEC level | 10 | 10 | 10 | 10 |
| Lab to field & acute to chronic translation | 10 | 10 | 10 | 10 |
| Lack of data on different taxa | - | - | 10 | - |
| ***PNEC (mg/l)*** | ***0.20*** | ***0.088*** | ***1.8*** | ***0.8*** |

- **PNEC values in line with field relevant exposure values**
- **Ongoing long term studies (NFR)**

# PNEC and SSDs for non-toxic stressors in the sediment

- **ERMS report no. 9**

- **TNO report 2006-DH-0046/A**
  ***Threshold levels and risk functions for non-toxic sediment stressors: burial, grain size changes, and hypoxia***

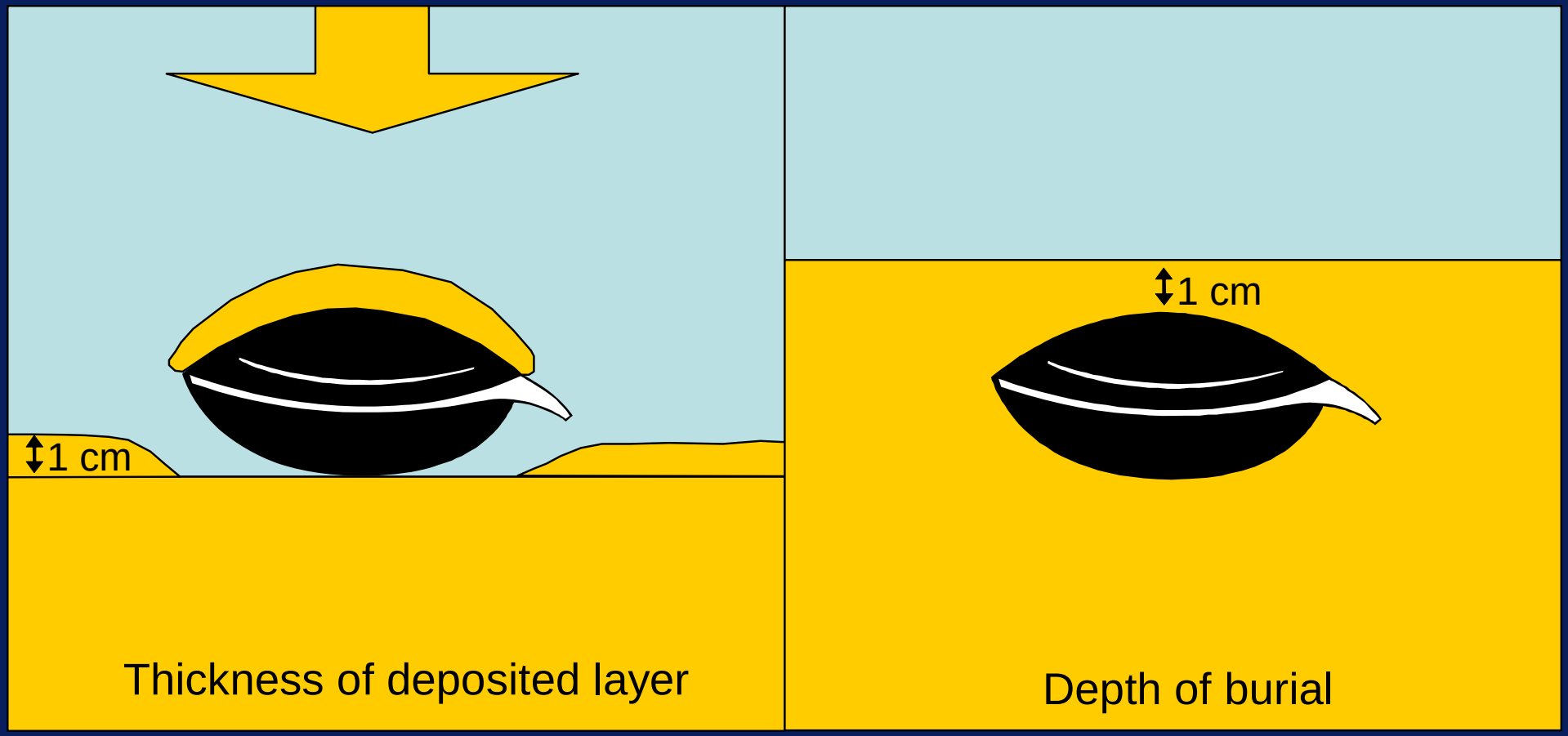
- **Reviewed by Total, TNO.**

# Overview of contributions

- **Burial**
  - Literature report on burial (Kjeilen-Eilertsen *et al*., 2004)
- **Changes in grain size**
  - Calculation of PNEC for changed grain size based on MOD (Trannum, 2004)
- **Oxygen depletion**
  - Background document for the establishment of Non-Toxic (Sediment Disturbance) Thresholds for Drilling Muds and Cuttings - Oxygen Depletion (Beardsley and Neff, 2004)

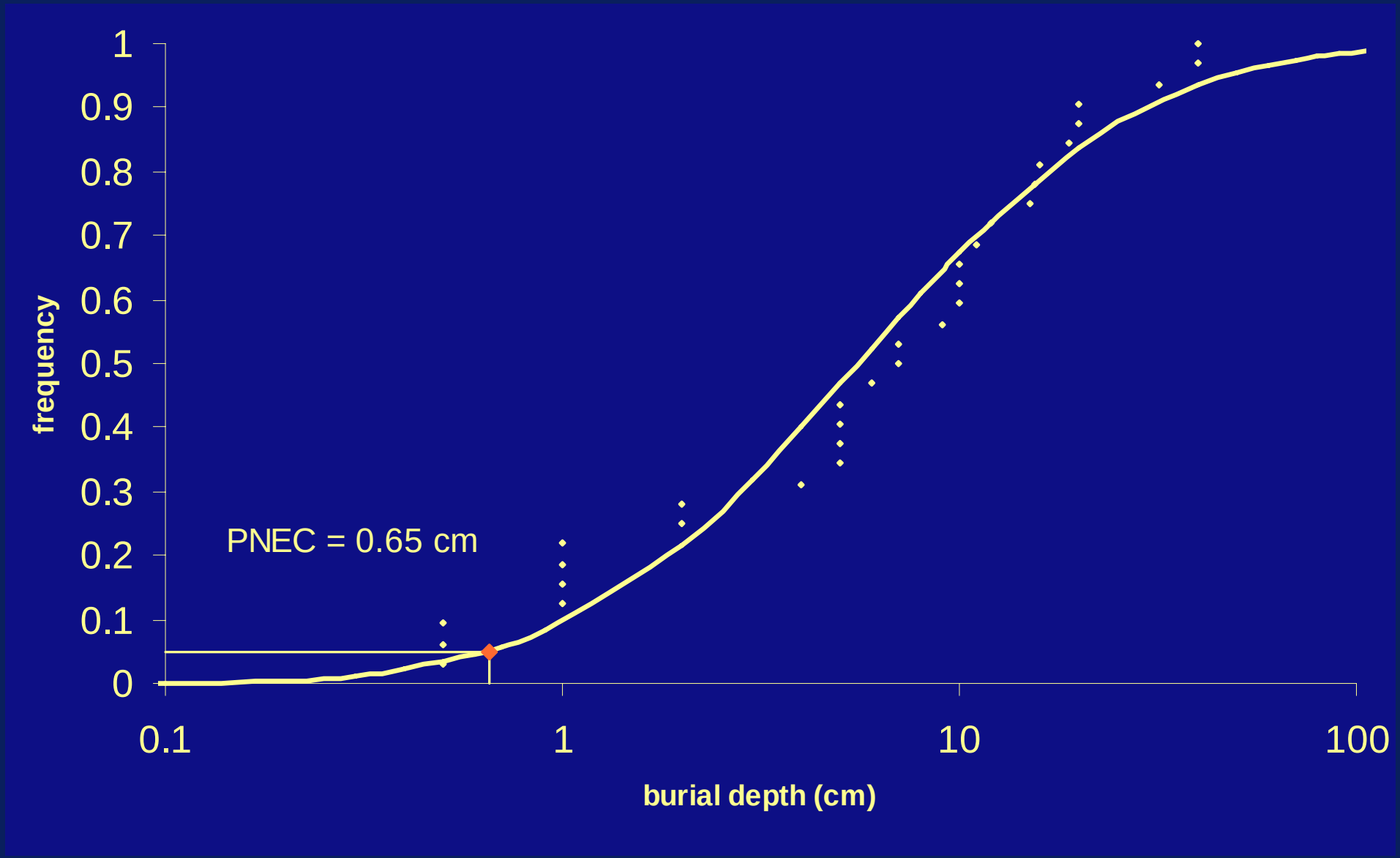
# Burial

- **Uncertainties in effect data**
  - particle nature & exposure definition

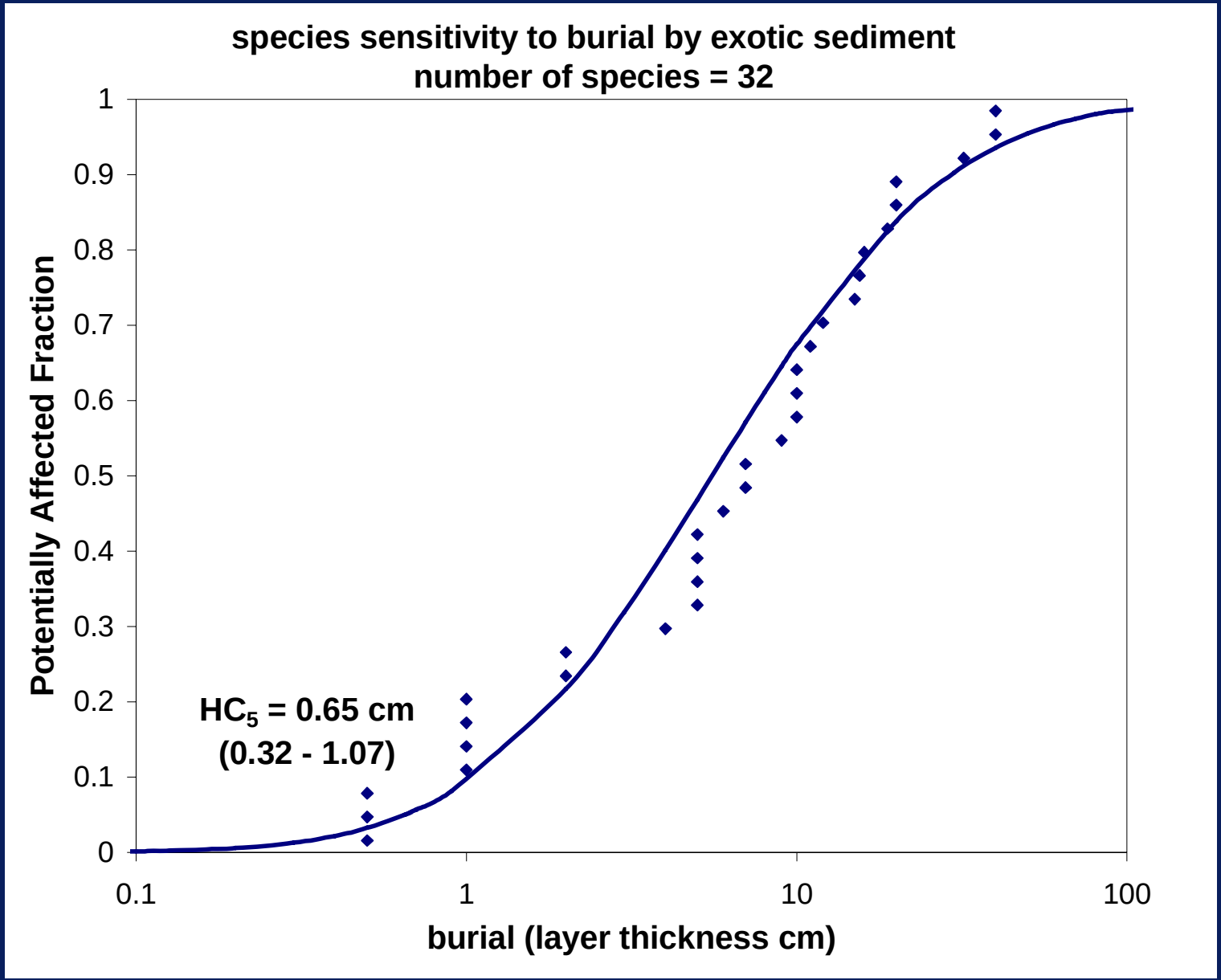



- **Uncertainties in deposition rate**
  - Instantaneous vs gradually increasing

# Old SSD and $HC_5$ for Burial



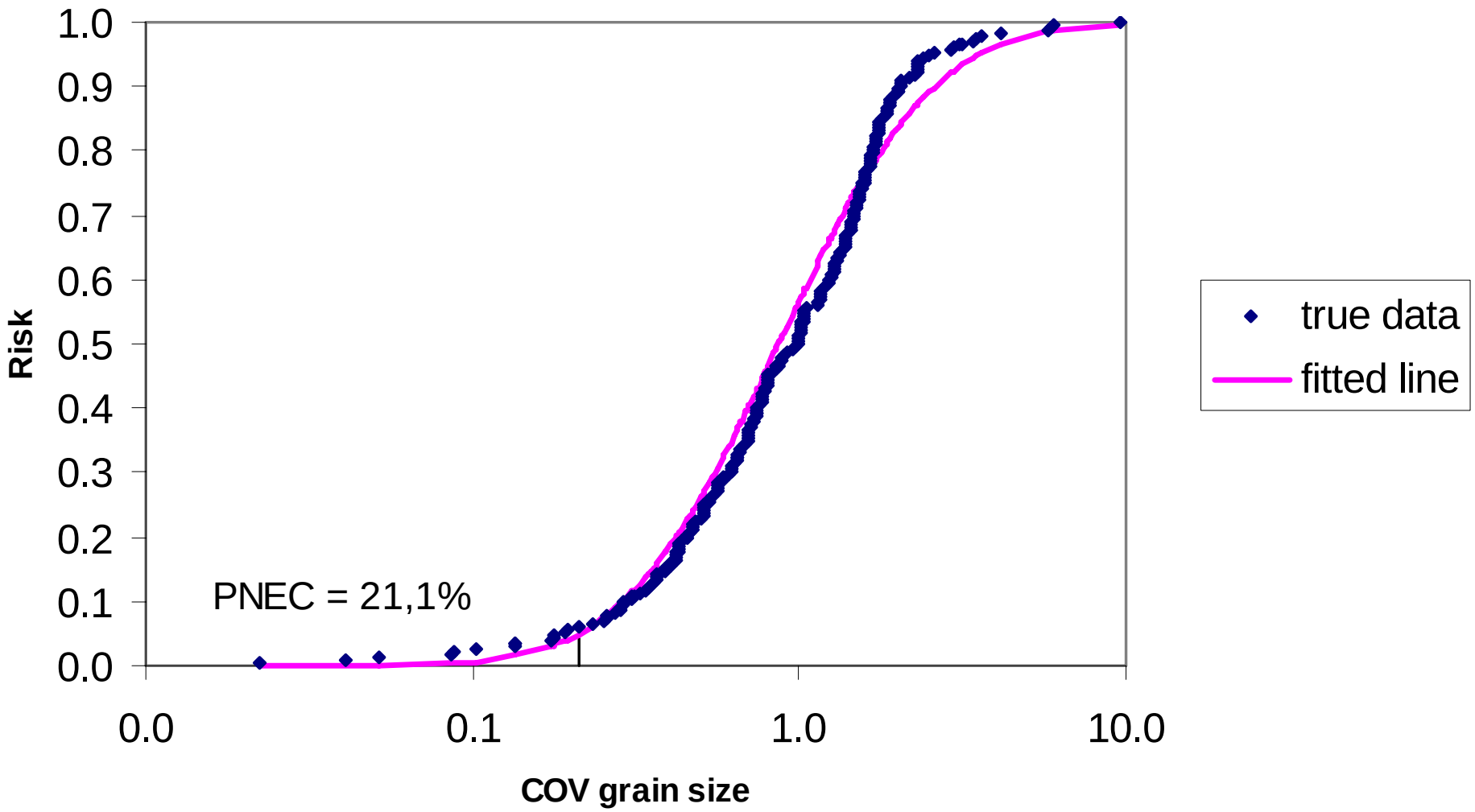
# Updated SSD and $HC_5$ for Burial



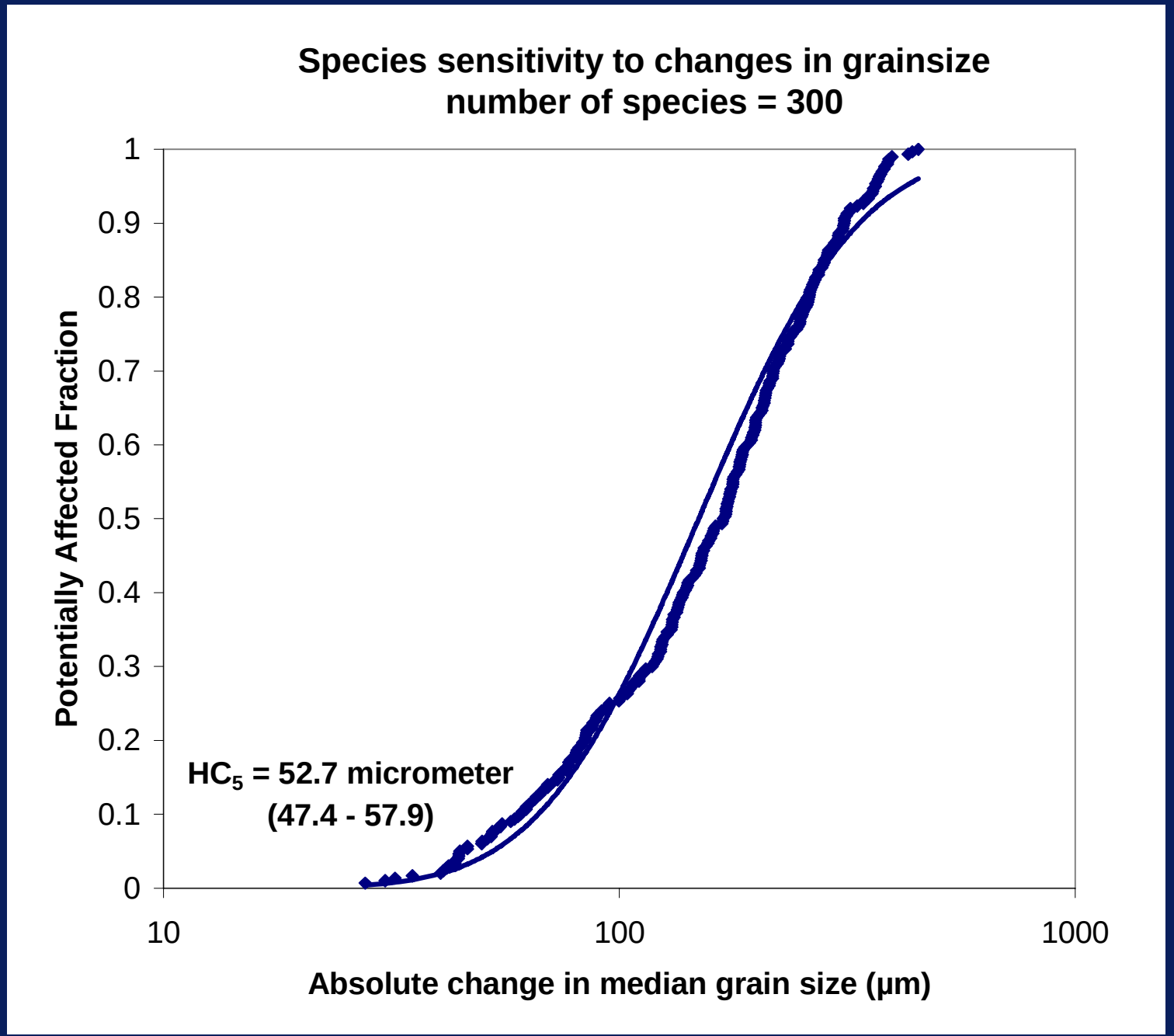
# Changes in grain size

- PNEC should be derived not only from the most sensitive set (North Sea species) but from the whole set of species (North Sea, Norwegian Sea and Barents Sea)
- PNEC not as percentage of change but absolute change
- Window-of-occurrence not as StDev but as 95% interval
- Exclude species with limited recordings (<10)

## Cumulative distribution of species sensitivity to altered grain sizes - region I-IV (based on um)



# Change in grain size

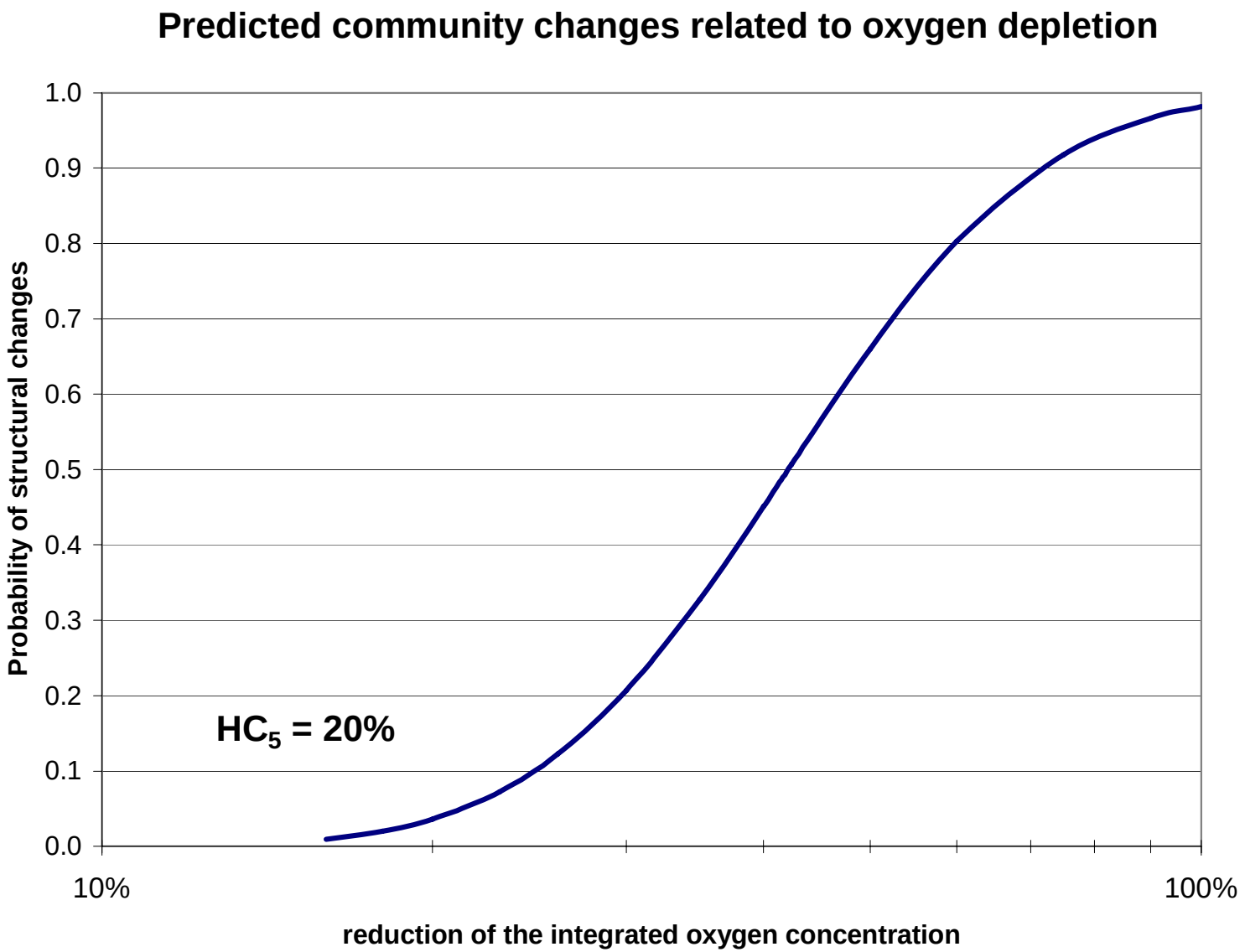


# Change in oxygen content

- PNEC should be around 20% in stead of 15% (Schaaning and Bakke, 2005)

- V.Forbes:
  Define the impact in terms of the reduction in volume of oxygenated sediment. Assuming that the majority of benthic invertebrates require some oxygen in the sediment, the reduction in oxygenated volume is in a sense equivalent to a loss of habitat. If loss of habitat can be assumed to be approximately linearly related to loss of species (or if some other function can be justified), then thresholds can be defined on the basis of habitat loss (=percent reduction in volume of oxygenated sediment)

# Change in oxygen content



# Towards finalization of this task – non-toxic disturbances

- Manuscript