



# Duwamish Diagonal: A Comparison of Two Remediation Options

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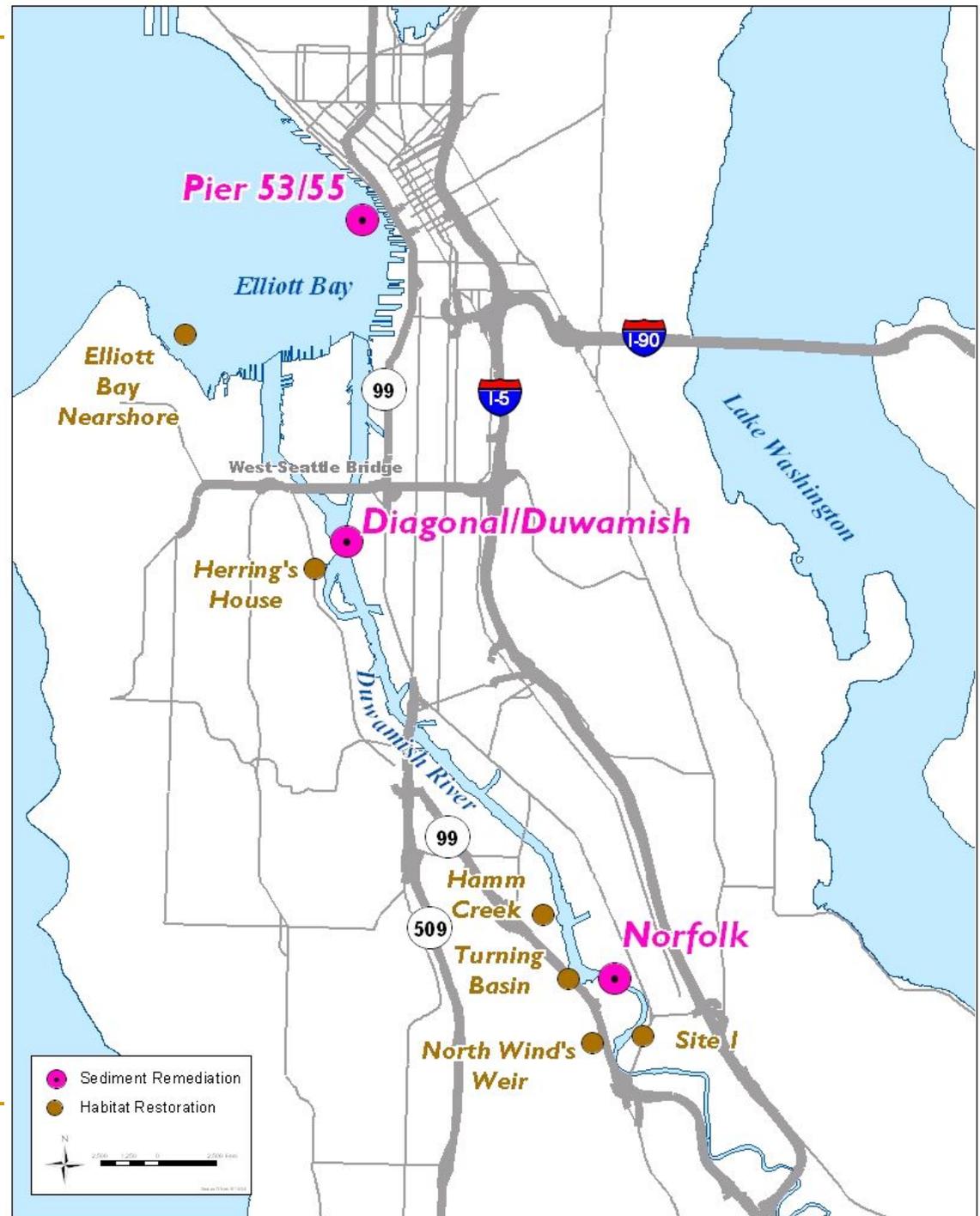
**King County**

Department of  
Natural Resources and Parks

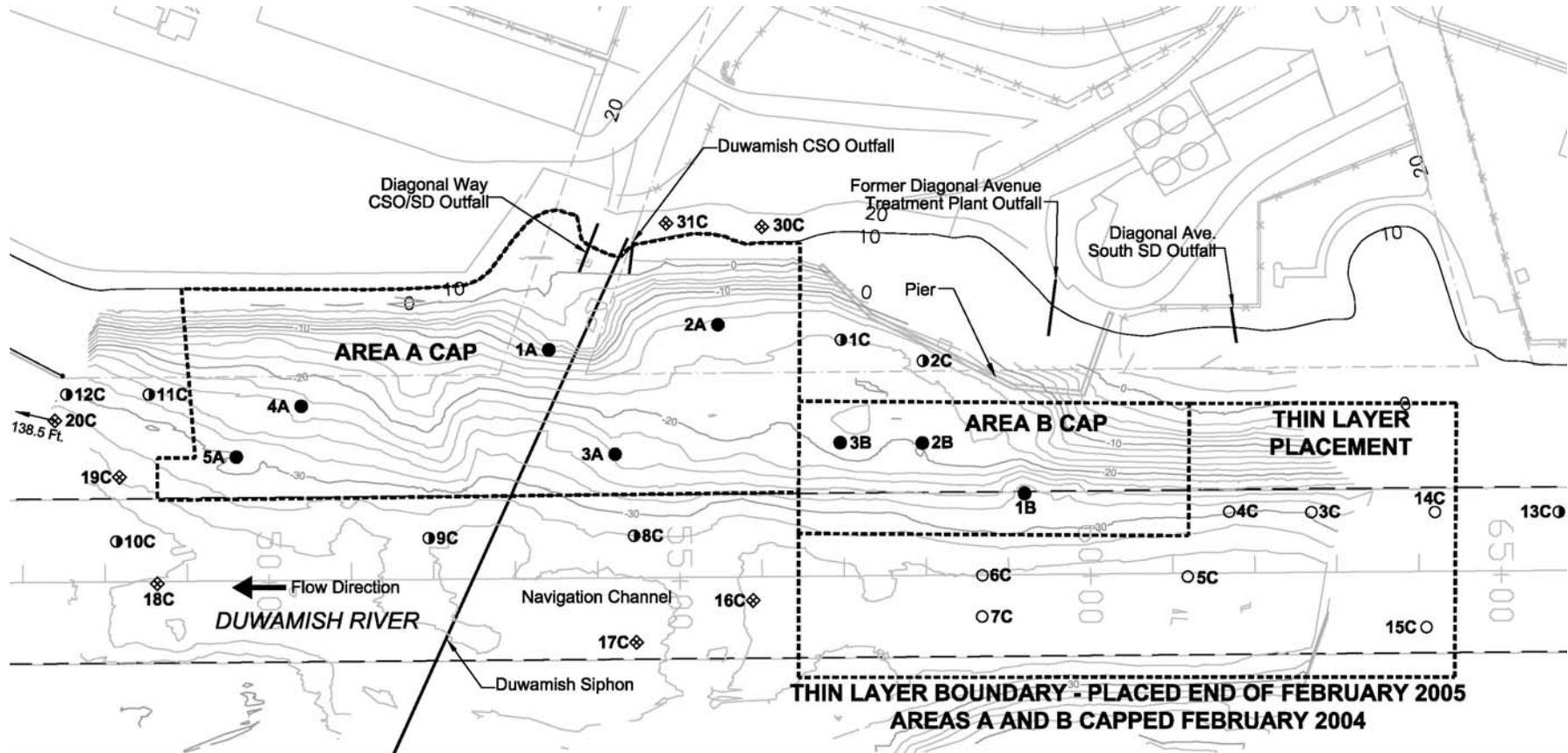
# Purpose

Remediate sediments from CSO/SD, storm drain and old treatment plant outfall

- PCBs and bis(2-ethylhexyl)phthalate
- Elliott Bay/Duwamish Restoration Program
- Interim Remedial Action under the 1991 NRDA Settlement



# Duwamish/Diagonal Remediation Site

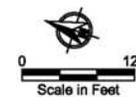


**Legend**

- 1A ● Cap Monitoring Stations
- 14C ○ ENR Monitoring Stations
- 1C ○ Perimeter Monitoring Stations
- 16C ◆ Additional Characterization Stations

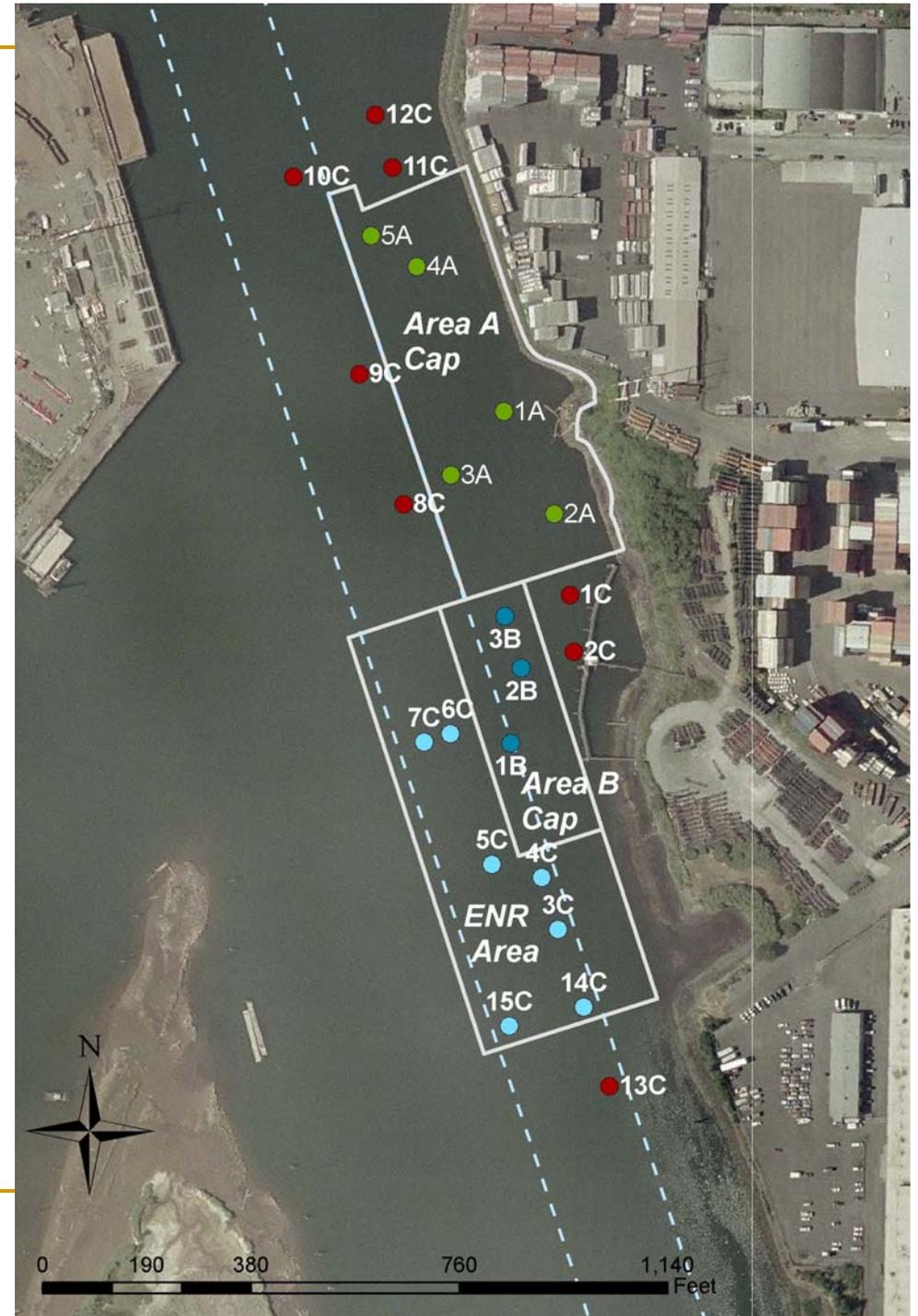
**Notes:**

1. Stations 3C-7C were perimeter stations prior to thin layer placement.
2. 30C and 31C are bank soil stations.



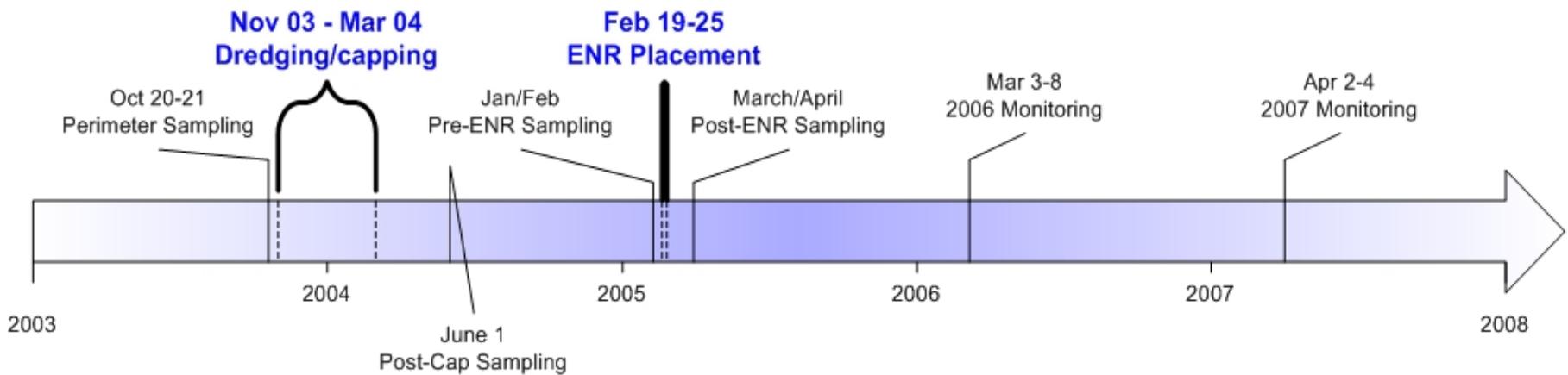
# Duwamish/ Diagonal Remediation Site

- Areas A&B – partial removal and cap in 2004
- Perimeter - sampled pre- and post-cap
- ENR area – 6" to 9" placed in 2005 for residuals mgmt.
- Annual monitoring post-dredge
- Site allows comparison of ENR and MNR remedial options

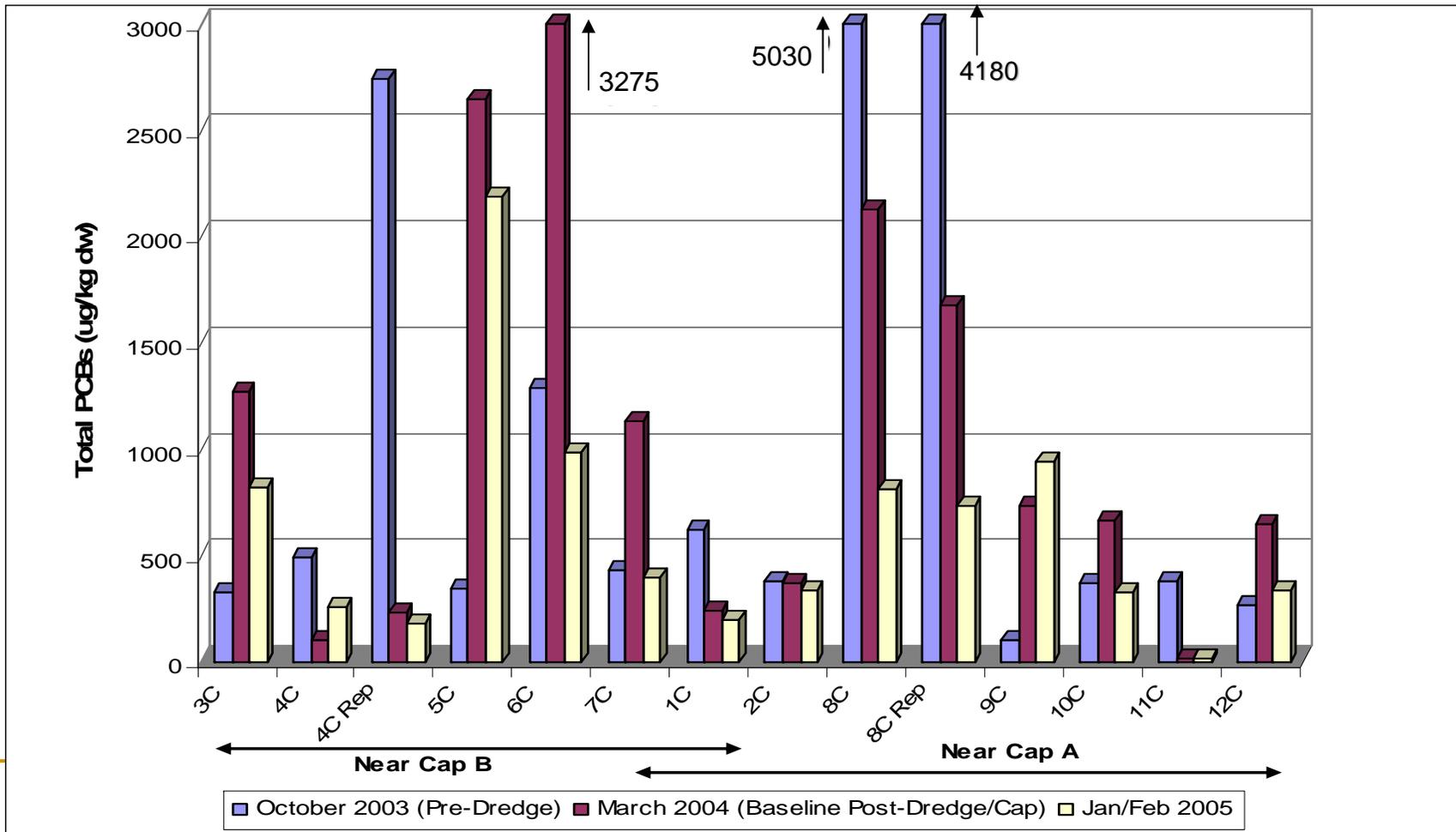


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# Project Timeline

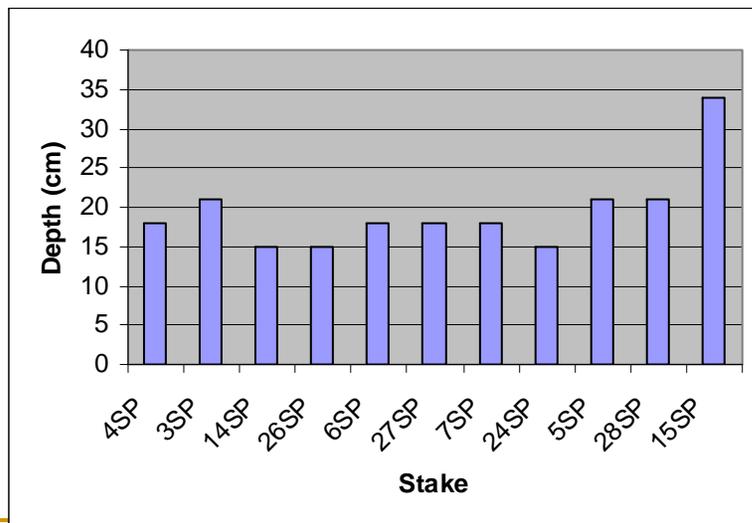


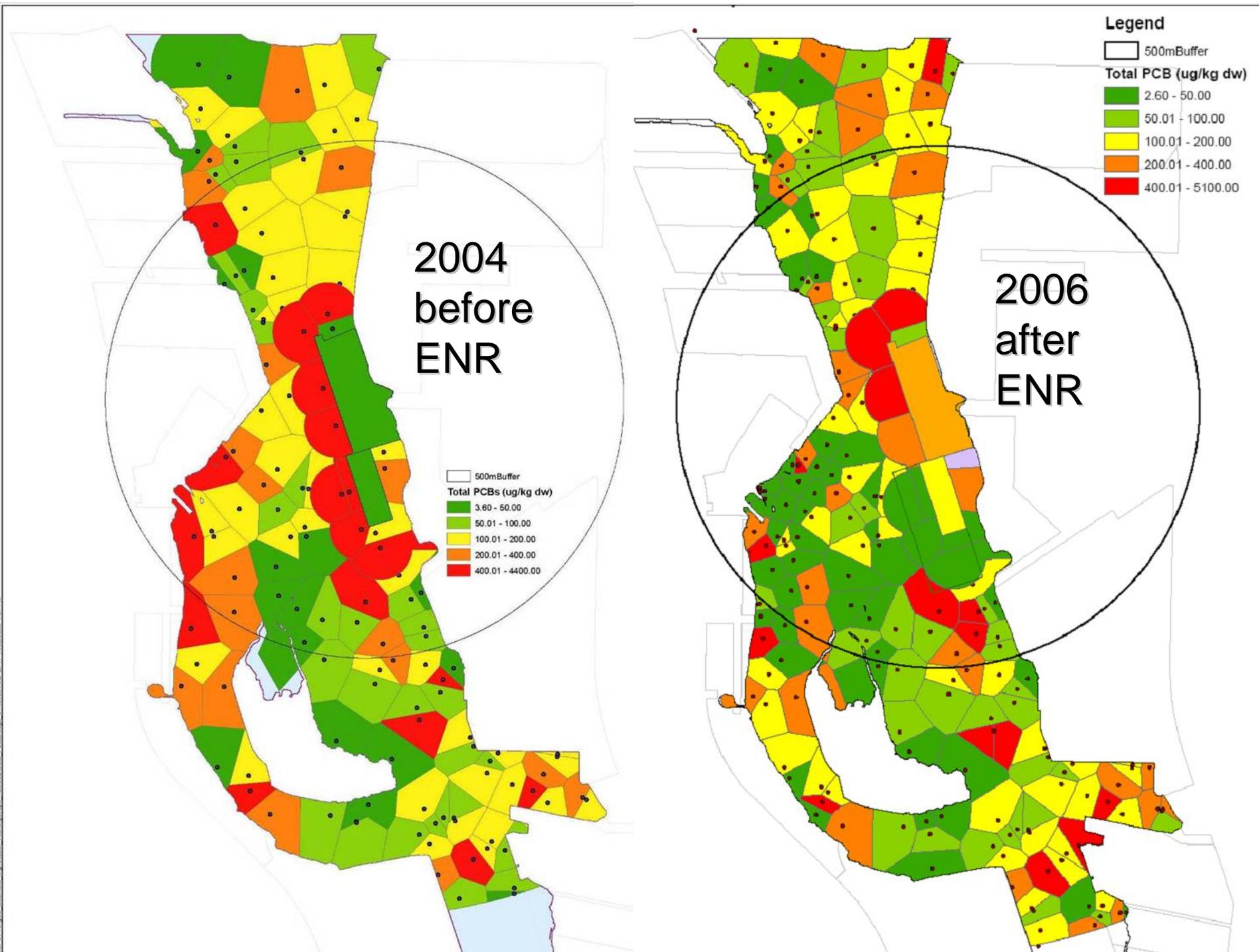
# Comparison of PCBs at Pre- and Post-capping Perimeter Stations



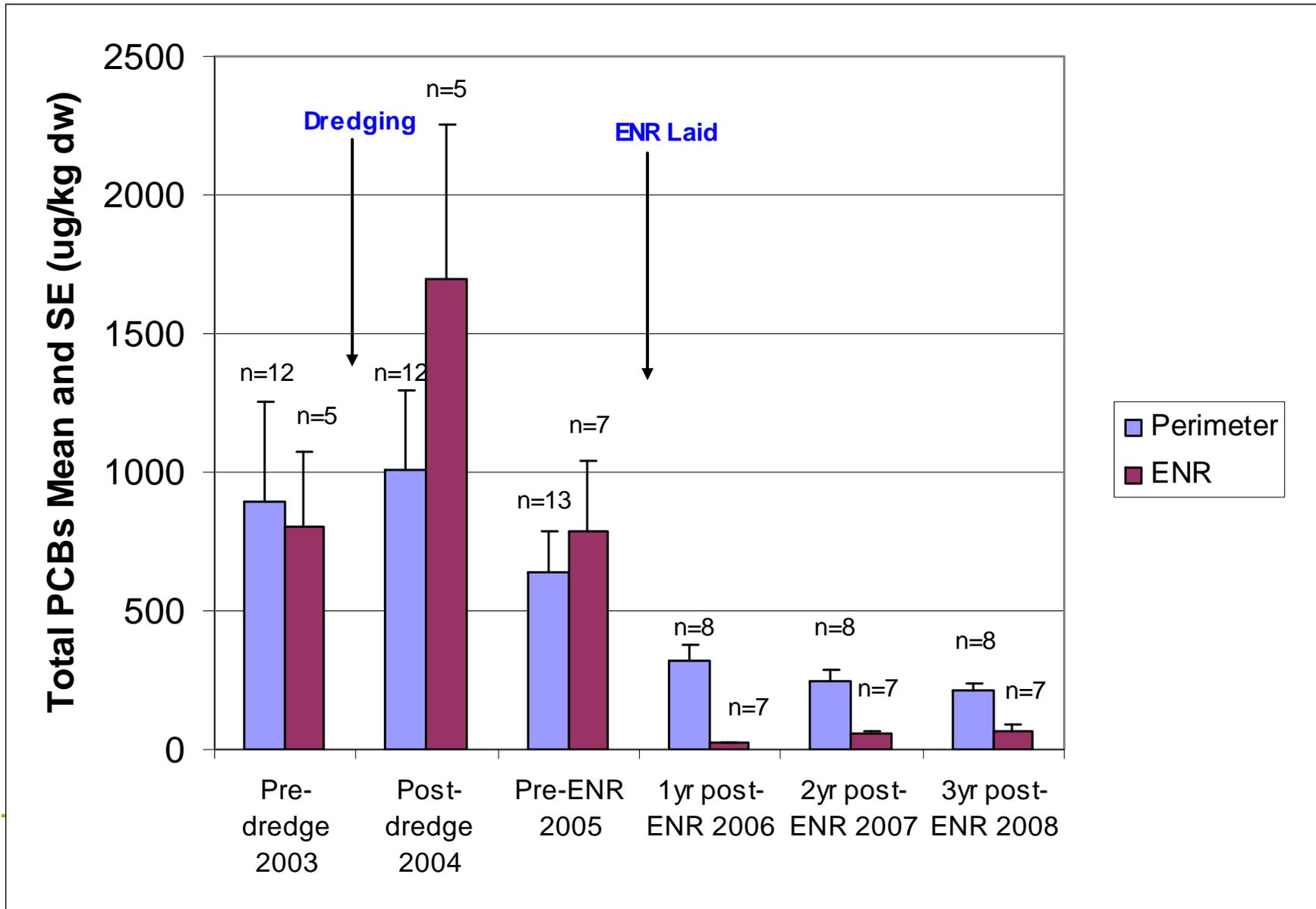
# Short-term Residuals Management

- Enhanced Natural Remediation (ENR)
- Thin layer placement strategy in 2-12 m of water
  - 15 cm minimum target (6 “)
  - 22 cm average (9”)
- Decreased PCB concentrations to < area background





# Comparison of Area Responses

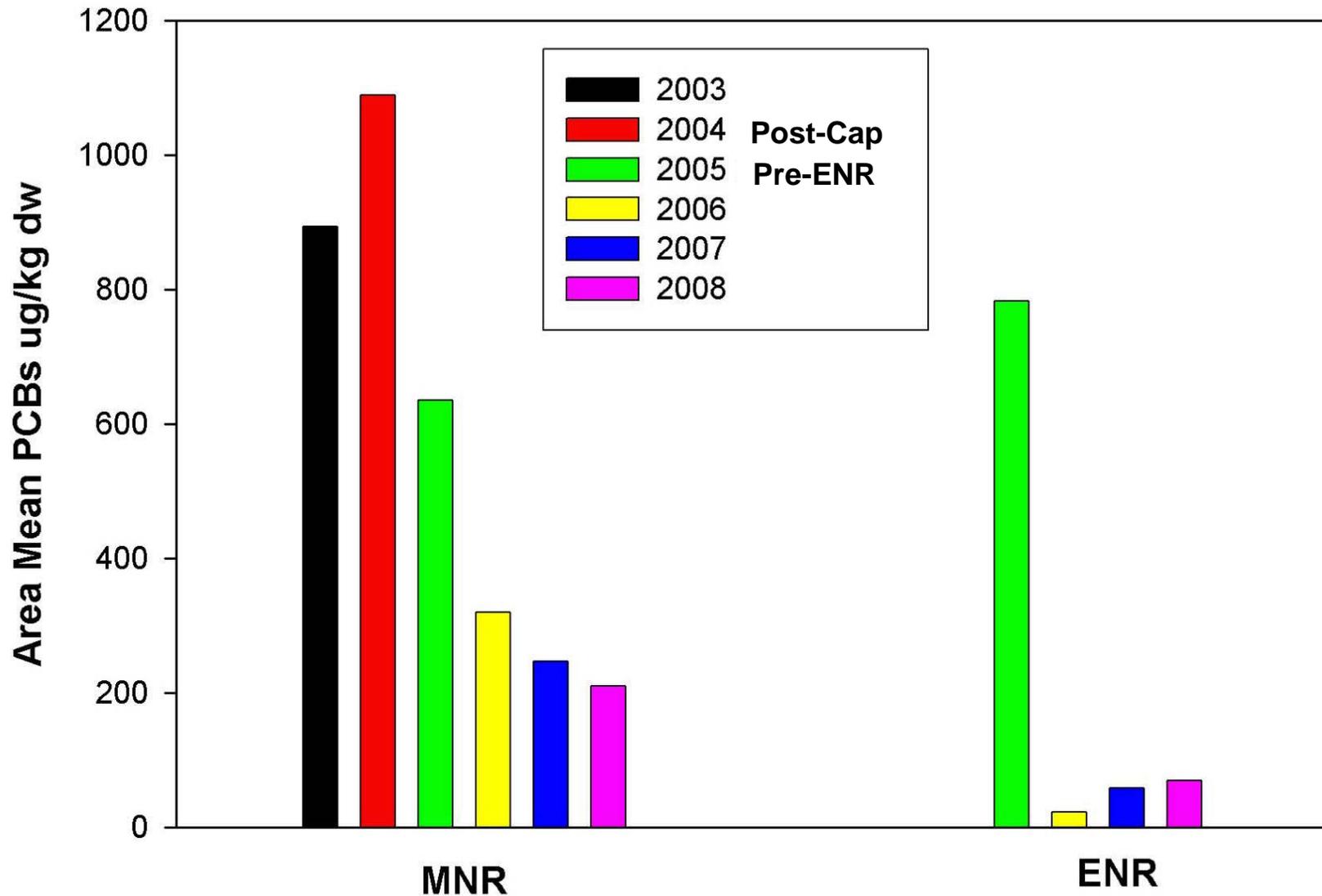


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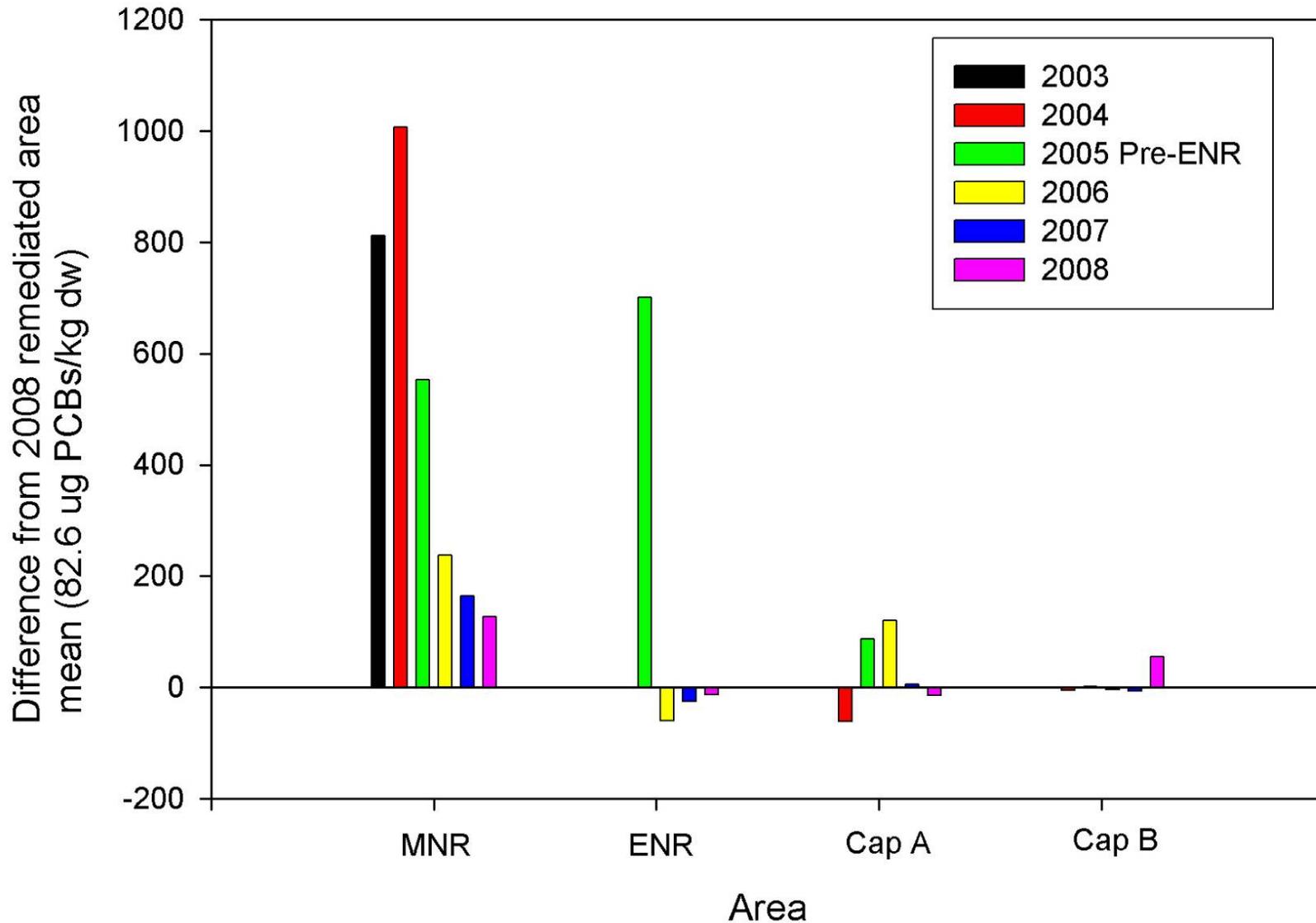
## Were Short-term Remedial Goals Met?

- ENR successfully covered residuals
    - provided immediate elimination of increased exposure to biota
    - reduced sediment concentrations to below area background (cleanup goal) immediately
  - MNR reduced sediment concentrations to pre-remedial levels within 1 year
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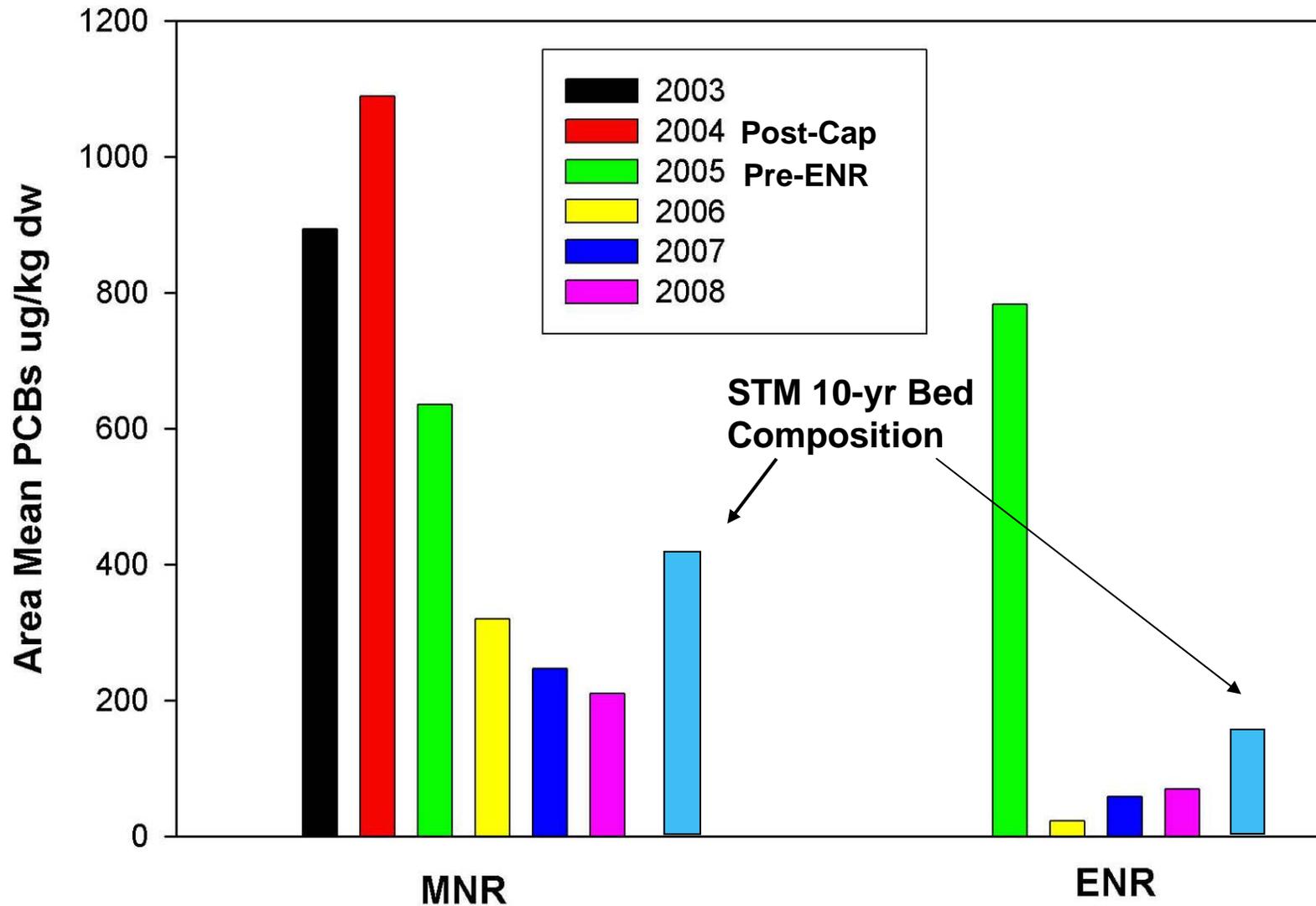
# Response of MNR and ENR



# Area Responses Relative to Remediated Areas



# Comparison with Year 10 Model Estimates



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## Will Long-term Recovery Goals be Met?

- ENR remains below area background (cleanup goal)
    - Suggests that underlying sediments have not mixed in
    - Consistent with measured bioturbation depths
  - PCB concentrations in MNR at recent higher sedimentation rate will reach background ~10 years
  - Recovery in MNR at site's long term net rate will take longer but approaches goal in 20 years
  - The thin layer (ENR) rapidly reduced the contribution from this area to site risks
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## Conclusions

- ENR helps reduce short term risk
  - Recovery is occurring
  - ENR has accelerated attainment of cleanup goals by 10-20 years
  - The results are in agreement with the numerical sediment transport model
  - ENR can accelerate exposure reductions and reductions of site risks
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## Acknowledgements

Bruce Nairn Fiona McNair John Toll Kirk Ziegler Earl Hayter