

# Physical Properties and Characteristics of Sediments in the East Transect at Dingley Island

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## BACKGROUND

- In 1950, tidal flow was restricted at Dingley Island by a causeway which joined the island to the mainland
- In the summer of 2003, the NMRWP instigated construction to open up the causeway and restore tidal flow
- The restoration project was completed on July 30, 2003, and the NMRWP joined with the Bowdoin College Geology Department to assess the effects of the opening of the causeway.



Causeway 2003



Construction 2003



Bridge 2003

## OBJECTIVE

To determine the effects of tidal flow restoration on the mudflats of Dingley Island, and assess the sustainability of the environment for soft-shell clams.

## METHODS

### Redox Potential Discontinuity (RPD):

- Very thin layers of surface mud were scraped away with a plastic ruler until the layer of darker mud was first visible to the naked eye.
- Depth of the lighter (i.e. oxygenated) mud was measured in centimeters with a ruler.

### Organic Content:

- Mud samples collected in field were weighed, and burned in a muffle furnace in the lab.
- Samples were reweighed to determine organic content.

### Grain Size:

- Mud samples from field were sieved and sorted in five different grain size categories.
- Sizes sorted for: >1mm, 500um-243um, 243um-63um, <63um

### Sediment Depth:

- A long metal probe was stuck vertically into the mud until it hit the resistance of bedrock.
- The length of the probe from bedrock to the surface of the mud was measured in centimeters.

## RESULTS

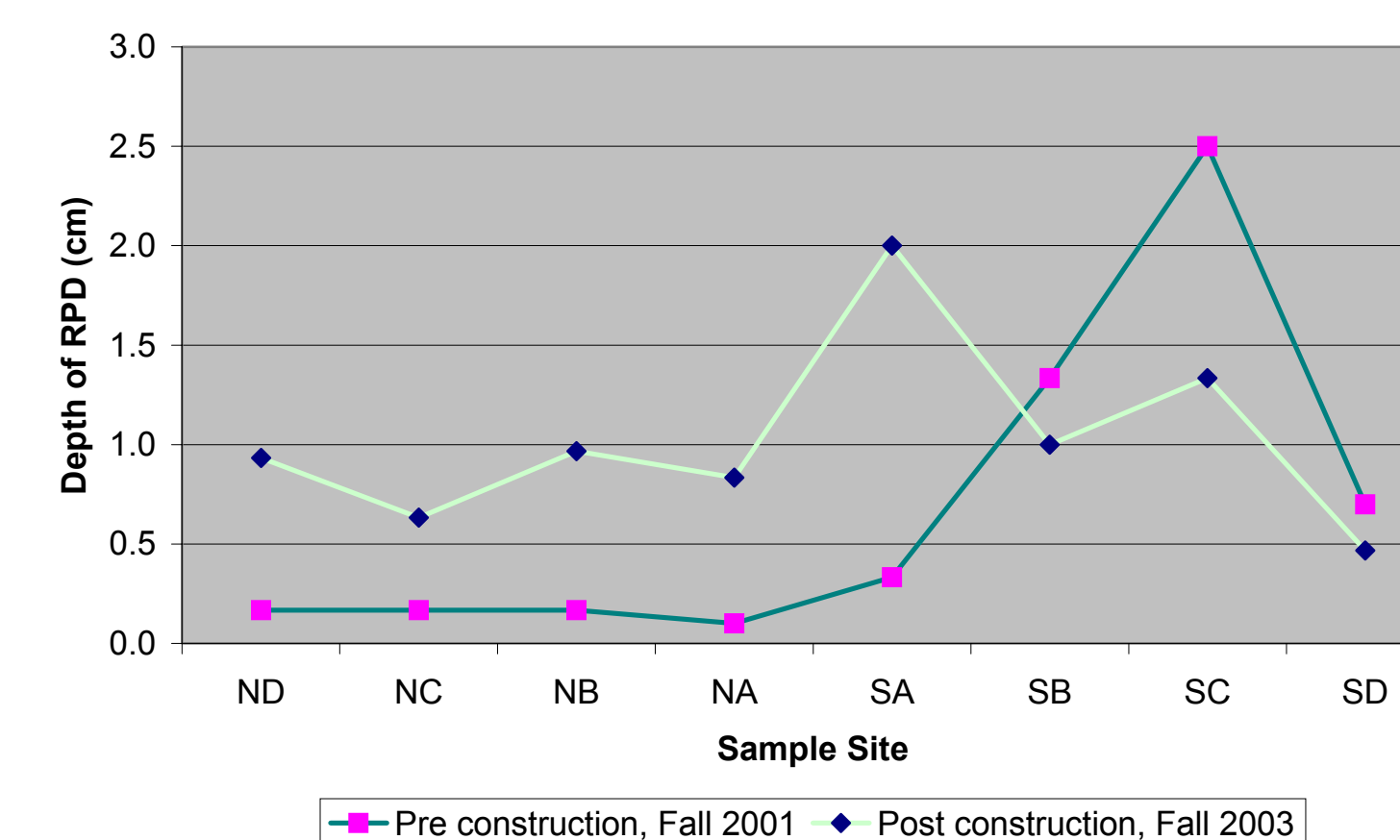


Figure 2: The depth of the layer of oxygenated mud increased at sites ND-SA. The greatest increase in depth was at SA, directly south of the bridge.

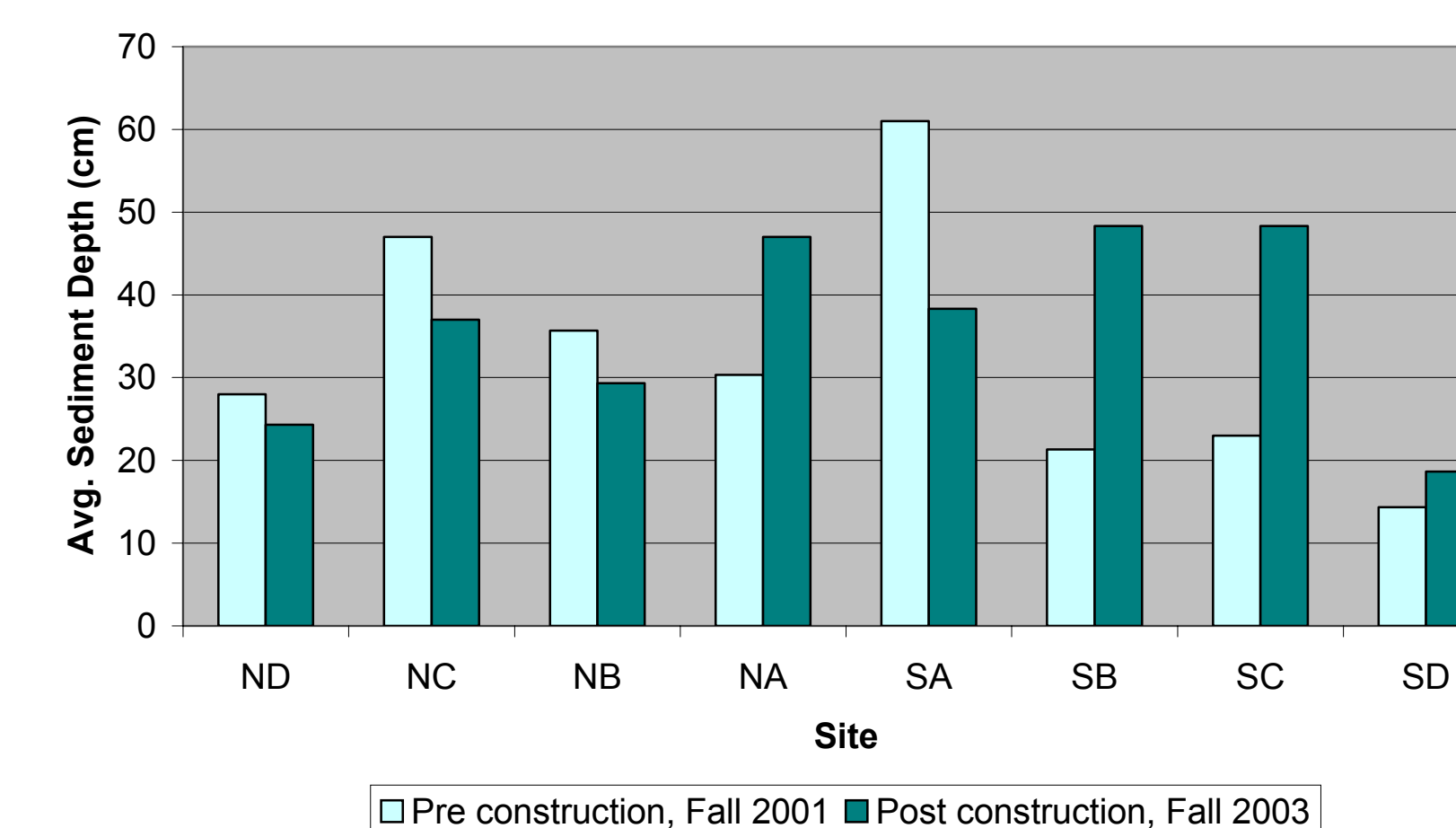


Figure 3: Overall, sediment depth decreased post-construction. The north side showed less change in sediment depth than the south side.

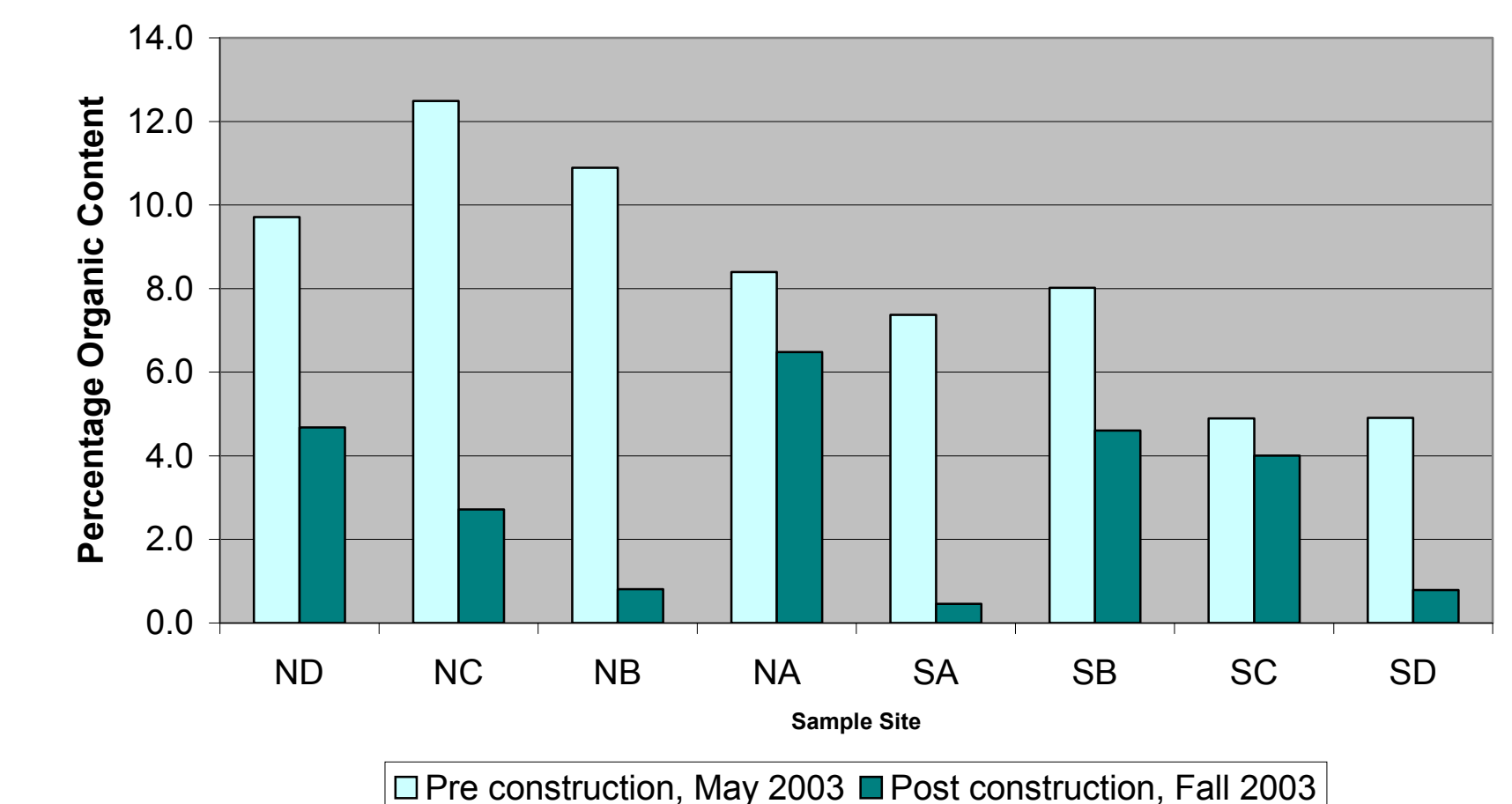


Figure 4: The percentage of organic carbon content decreased at every site along the transect, especially at SA.

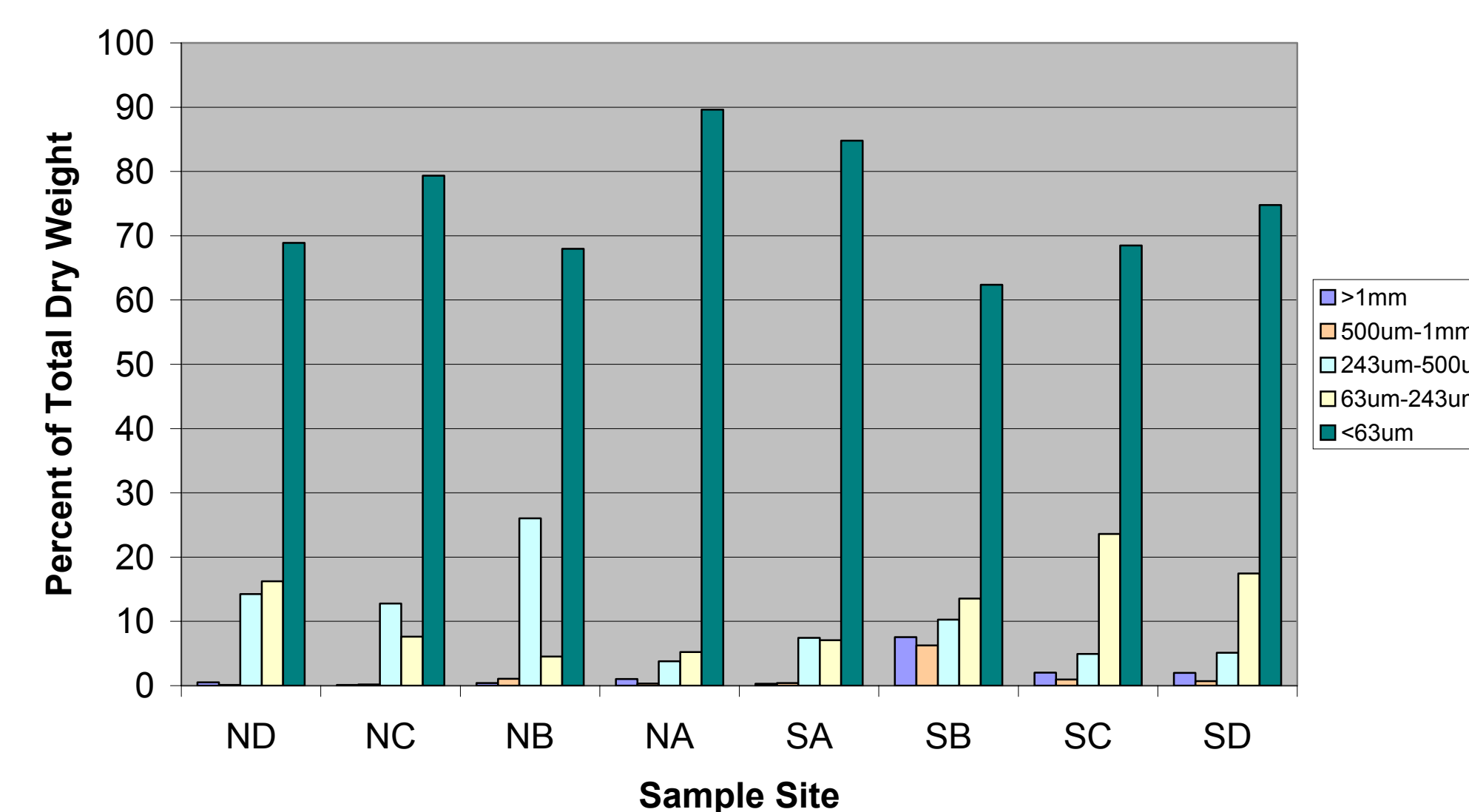


Figure 6: Pre-construction: As in Figure 5, the vast majority of the sediments are of the smallest grain size category of <63um.

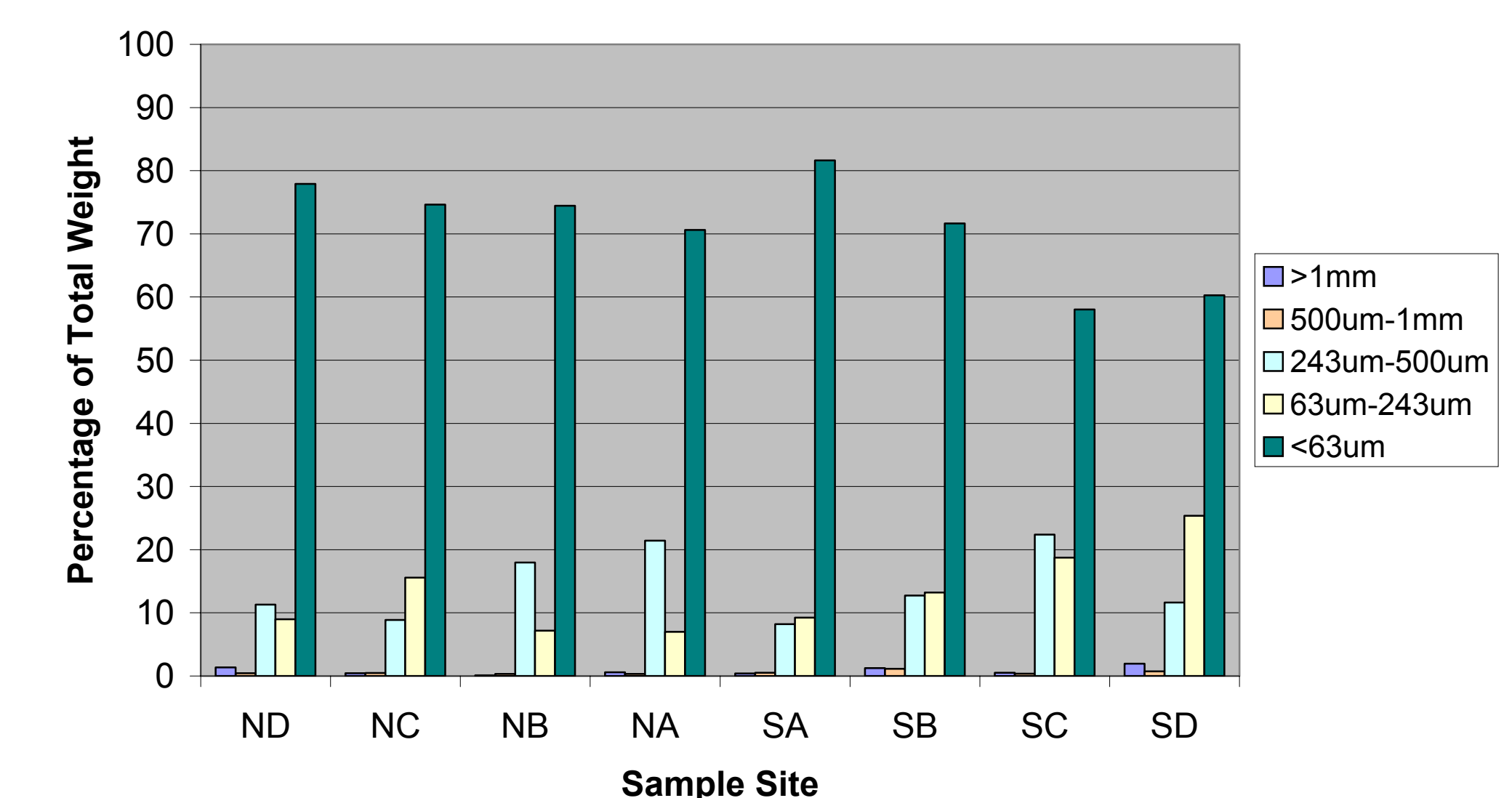


Figure 5: Post-construction: The vast majority of sediments are in the smallest grain size category, <63um. Very few sediments of the largest size were found, and when compared to Figure 5, a rise in sediments size 243um-500um from pre- to post-construction is apparent.

## CONCLUSIONS

- Decreased sediment depth and increased RPD shows that the oxygenated layer of mud is taking up a greater percentage of the total sediments in the East transect.
- An increase in the oxygenated layer makes the mud more suitable for clam populations, which require oxygen-rich sediments.
- Decreased organic content also indicates that the mud is becoming healthier for clams; fewer microorganisms require less oxygen, leaving more oxygen available for clams.
- Though the majority of sediments are still in the finest grain size category, post-construction data show an increase in medium-sized sediment grains. This indicates that the mud may be becoming more porous, and thus more oxygenated. This is in accordance with our RPD data.
- Based on our RPD data and its influencing characteristics, we conclude that the restoration of tidal flow has been successful in improving the health of the mudflats. However, mudflats are extremely sensitive to environmental and physical disturbances. The Dingley Island mudflats may still be in a state of transition, and therefore further studies are required to determine the definite effect of tidal restoration.

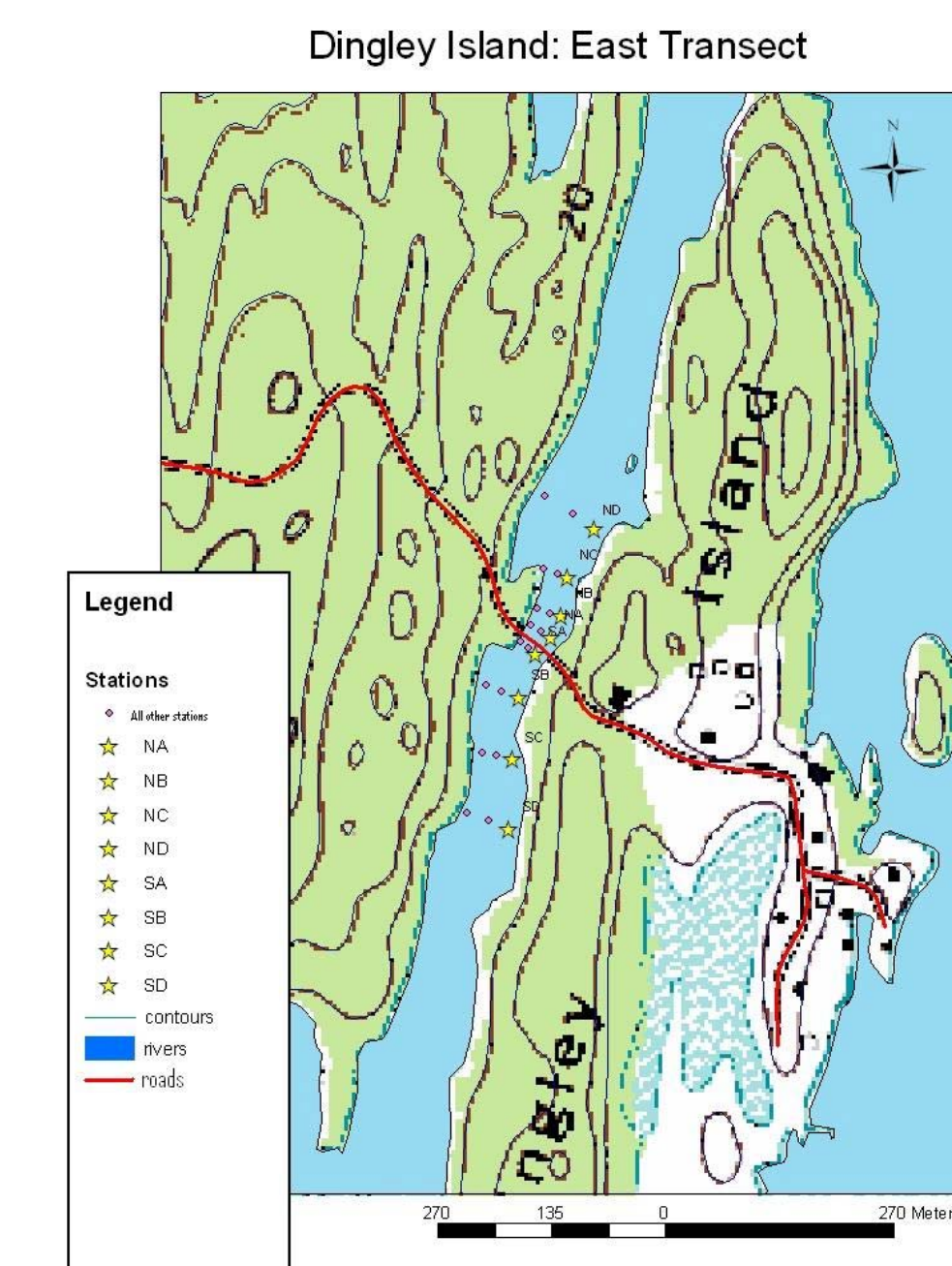


Figure 1: Map of East transect sample sites.