

# RESTORATION BY DESIGN

A SOCIAL AND ECOLOGICAL APPROACH FOR FUTURE RESTORATION TO BUILD A RESILIENT ECOSYSTEM



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**THE NEED:** Oysters play a critical role in maintaining the health and resilience of an estuary, providing critical ecosystem services such as improving water quality and providing habitat. Historically, the Great Bay Estuary was covered in healthy oyster reefs. Due to disease, environmental stressors, and historical over harvesting, we've lost over 90% of our oyster reefs and the important ecosystem services they provide. The Nature Conservancy and the University of New Hampshire have been working collaboratively since 2009 to conduct oyster reef restoration. In 2016, it was identified that further strategic restoration efforts including a near-term spatial plan were needed to enable a resilient and balanced ecosystem in the Great Bay Estuary.

**THE APPROACH:** "Restoration by Design" was conducted from 2017–2020 and included in water reef restoration and assessment, that produced valuable information for site selection criteria and identification of future sites. Stakeholder feedback was a critical component in building the plan and improving methodologies for future restoration. To develop a set of site suitability criteria and methodologies for "Restoration by Design", we conducted a synthesis and integration of historical and current data on spatial extent, condition and abundance at native oyster reefs, shell persistence, and oyster survival at restoration sites. We augmented our database with spatial layers from sediment maps, eelgrass distribution, shellfish management areas, and research results from oyster population dynamics. We then enhanced our criteria list with social interest layers, on permitting requirements and aquaculture lease areas to generate a comprehensive suite of site suitability criteria.

**THE RECOMMENDATIONS:** We recommend deploying multiple restoration methods within **24–53** acres across seven sites in the Great Bay Estuary System. We propose reef construction nearby native reefs with high density of reproductive adults, to provide substrate for natural recruitment. We suggest planting multiple year classes of oysters as stock enhancement on sites with existing cultch nearby degraded reefs to provide a density of oysters to ensure reproductive success. We advocate for temporary closure to recreational harvest at specific native reefs to allow for populations to rebound to a more normal state. We support and endeavor to experiment with coupled eelgrass and oyster restoration. This multifaceted approach of social and ecological considerations allowed us to best design and recommend sites and methodologies for future restoration.



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# Restoration by Design Recommendations

 Add cultch  Add oysters  Harvest closure  Eelgrass synergy  Native oyster reefs

