

Harnessing the Potential of Reef Balls in Shellfish Restoration and Species Migration due to Sea Level Rise

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Background:

Shellfish populations are declining globally, threatening the health of marine ecosystems and the livelihoods of communities that depend on them. Habitat loss and degradation are major contributors to this decline, exacerbated by climate change and its associated impacts on ocean temperatures and acidification. Restoration efforts are underway, but they often neglect the importance of habitat complexity and vertical structure in supporting shellfish populations.

Methods:

The study consisted of a combination of field experiments and laboratory analyses. Reef Balls were deployed in a degraded shellfish habitat, and shellfish settlement, growth, and survival were monitored over 20 years. Control sites without Reef Balls were also established for comparison. Laboratory experiments were conducted to investigate the effects of Reef Balls on shellfish behavior and physiology. The study also examined the impact of Reef Balls on the surrounding ecosystem, including changes in water quality, sediment composition, and biodiversity.

Results:

The results show that Reef Balls significantly enhanced shellfish settlement, growth, and survival compared to control sites. The structures provided a complex habitat that supported a diverse range of species, including commercially important shellfish. Laboratory experiments revealed that Reef Balls also influenced shellfish behavior, with individuals exhibiting increased feeding activity and reduced stress levels in the presence of the structures. The study also found that Reef Balls improved water quality, reduced sedimentation, and increased biodiversity in the surrounding ecosystem. Additionally, Reef Balls were found to calm wave action, reducing erosion and sediment transport, and enhancing the overall restoration project.



Sea Level Rise



From Oysters to Corals

Conclusion:

Incorporating Reef Balls in shellfish restoration and species migration planning is a timely necessity. The structures offer a cost-effective and efficient solution for supporting shellfish populations and enhancing the health of marine ecosystems. As the world grapples with the challenges of climate change, habitat degradation, and biodiversity loss, the use of Reef Balls can play a critical role in maintaining the health and productivity of marine ecosystems. As we plan projects we must anticipate and plan for sea level rise of three foot to ten foot. Planning structure that will meet the need of essential fish habitat and the change of salinity at the selected site.

Recommendations:

1. Integrate Reef Balls into oyster restoration efforts to enhance habitat complexity and provide a suitable substrate for oyster settlement.
2. Harness the transformative capacity of Reef Balls to provide habitat for other species as sea levels rise, without the need for relocation.
3. Design Reef Balls to persist in their original location, adapting to changing environmental conditions and supporting ecosystem resilience and biodiversity.
4. Monitor and maintain Reef Balls over time, ensuring their continued effectiveness in supporting shellfish populations and ecosystem health.
5. Explore the use of Reef Balls in other marine ecosystems, such as coral reefs and estuaries, to enhance biodiversity and ecosystem resilience.
6. Utilize Reef Balls to mitigate wave action, reducing erosion and sediment transport, and enhancing the overall restoration project.
7. Install Reef Balls along docks and seawalls in urban environments to enhance habitat complexity, improve water quality, and increase biodiversity in urban coastal areas.