

**Indicator: Oyster Restoration**Question

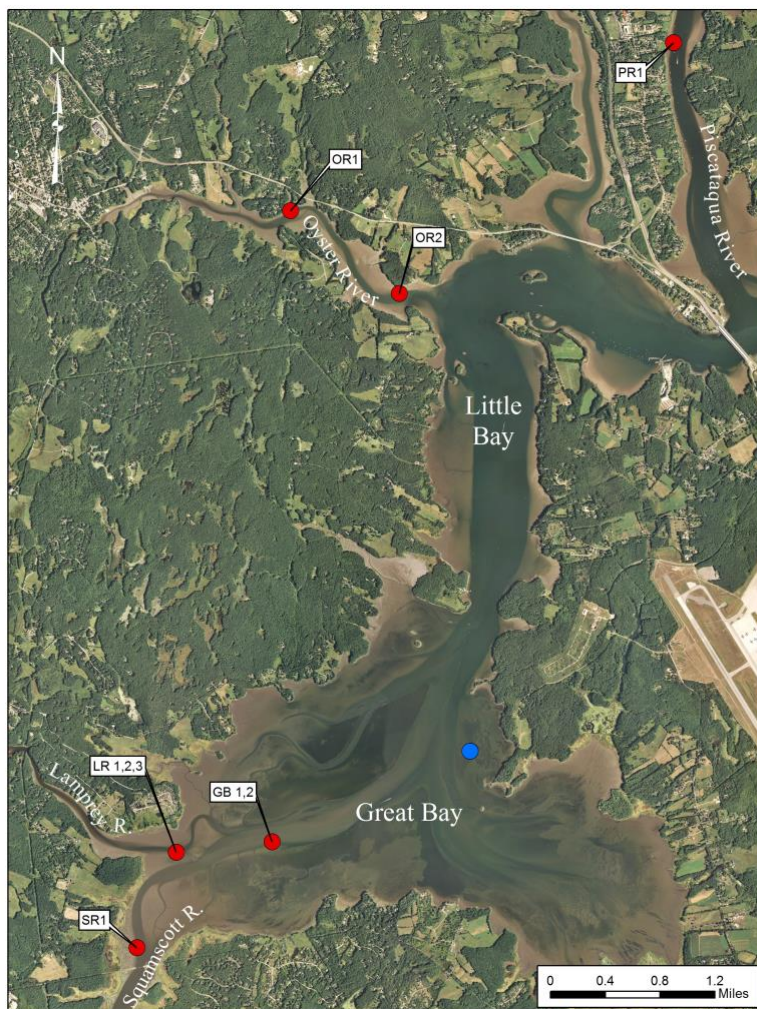
How many acres of oyster restoration have been initiated?

Short Answer

More than 26 acres of oyster restoration have taken place since 2000—15.5 of those acres since 2011. Sedimentation hampers success at most but not all sites.

PREP Goal

Restore 20 acres of oyster reef habitat by 2020 (from the PREP Comprehensive Conservation and Management Plan, PREP 2010).



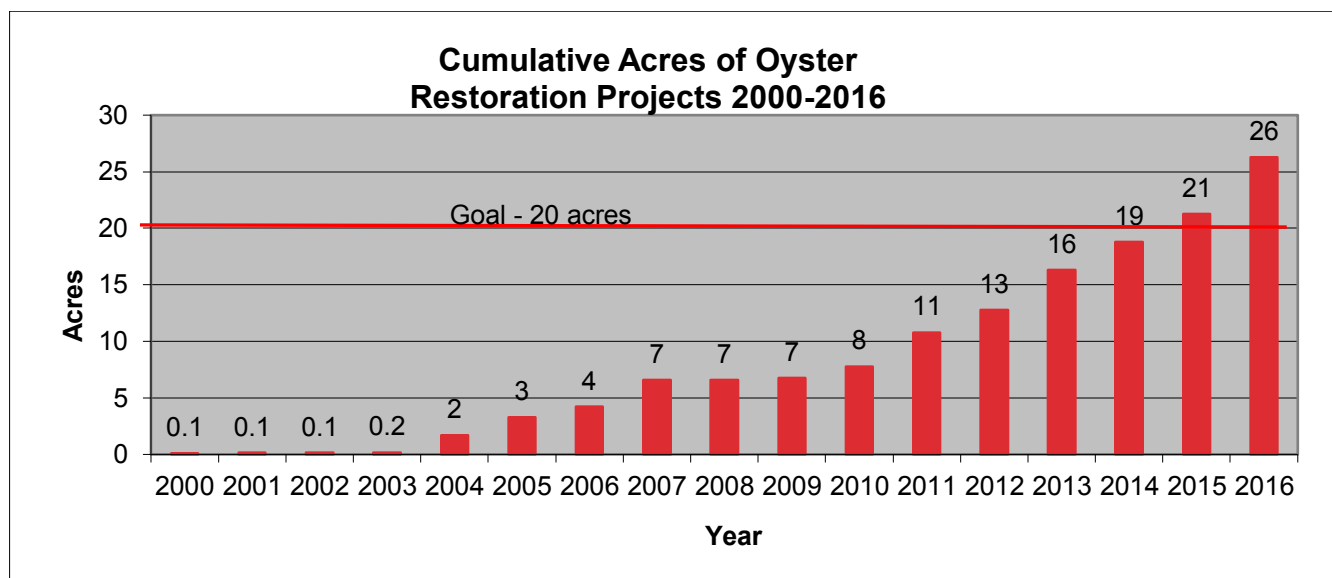
**Figure OR-1. Map showing major oyster restoration activity. The red dots show general location of sites that have been monitored. Note that two of the red dots show the location of multiple sites (in the Lamprey River and in Great Bay). The blue dot shows the most recent restoration site in the Great Bay. Data Source: Grizzle and Ward (2016) and Grizzle and Ward (2017).**

### Why This Matters

The oyster fishery and commercial oyster aquaculture industry support the local economy through jobs and sales. Filter feeding oysters can improve light penetration through the water; they provide critical habitat for many species of invertebrates and juvenile fish and they can sequester nitrogen and carbon. Unfortunately, the Great Bay Estuary has lost 89% of its wild oysters since 1993, which results in less available substrate and, in turn, less available area for juvenile oyster spat to settle.

### Explanation (from the 2018 State of Our Estuaries Report)

10.8 acres of oyster restoration was initiated between 2000 and 2012. Between 2012 and 2016, an additional 15.5 acres of oyster restoration were established in the Great Bay Estuary (Figure OR-1 and OR-2) through collaborations between the University of New Hampshire (UNH) and The Nature Conservancy (TNC). The cumulative total for oyster restoration sites is now over 26 acres, above the PREP goal of 20 acres. Although 26 acres of restoration area exists, each site is only partially covered by oyster shell. For example, a common design is to establish multiple small circles of shell for oysters to settle on.



**Figure OR-2. Cumulative Acres of Oyster Restoration Projects 2000-2016.** Data pertain to the total areas of a restoration site, not necessarily the area covered by oysters. Data Source: UNH Jackson Estuarine Laboratory.

Unfortunately, in many cases, these restoration sites have struggled to remain viable, primarily due to burial by fine sediments (Grizzle and Ward 2016). Table OR-1 shows monitoring results for seven different restoration sites; in four of the seven sites, shell cover has decreased since initial construction. Only one site (Lamprey River #2) showed an increase in shell cover.

Monitoring of these sites suggests several keys to successful future restoration, including: 1) build reefs to achieve greater vertical height to guard against burial by sediments and 2) select sites as close as possible to a natural reef. Recent NH Fish and Game/UNH research showed that recruitment (new oyster larvae settling) decreased significantly as distance from a native natural reef increased (Eckert 2016).

Oyster aquaculture (i.e., oyster farms) in the Great Bay Estuary has increased steadily since 2011, with 22 aquaculture harvest licenses issued in 2016, as compared to only five in 2011. In 2016, NH Fish and Game estimates that over 180,000 oysters were harvested from aquaculture activities.

**Table OR-1: Change in shell cover after initial construction. Data Source: UNH Jackson Estuarine Laboratory.**

	Date Constructed	Shell Cover Initial (% of total area)	Shell Cover 2015 (% of total area)
Lamprey River #1	2011	60	3
Lamprey River #2	2011	20	26
Squamscott River	2012	20	5
Lamprey River #3	2013	38	25
Piscataqua River	2013	54	23
Great Bay #1	2014	25	1
Great Bay #2	2015	21	4

### Methods and Data Sources

The total acres of oyster beds that have been restored since January 1, 2000 was recalculated each year and compared to the goal. The oyster beds were considered “restored” at the conclusion of the restoration project. Only projects that actively transplant oysters to reefs or otherwise enhance oyster populations were considered restoration projects. The total area of each restored oyster bed was determined by the restoration project manager.

For more on methods and data collection, please see the following reports:

“2016 Oyster Reef Restoration Project Funded by the Aquatic Resources Mitigation Program” by Grizzle and Ward. (<http://scholars.unh.edu/prep/368/>)

“Assessment of recent eastern oyster (*Crassostrea virginica*) reef restoration projects in the Great Bay Estuary, New Hampshire: Planning for the future” by Grizzle and Ward (<http://scholars.unh.edu/prep/353/>)

### Data Sources

Data on oyster restoration projects was gathered from The Nature Conservancy and the UNH Jackson Estuarine Laboratory staff leading oyster restoration work in the Great Bay Estuary.

### Technical Advisory Committee (TAC) Discussion Highlights

As part of the January 2017 TAC meeting, participants discussed oyster restoration (PREP 2017c). Complete notes are available at: <http://prepestuarines.org/prep-technical-advisory-committee/>

One of the most salient issues brought up at the meeting was a need for more strategic and explicit long-term monitoring plan. This long-term plan would, ideally, include mapping of both natural and restored beds every 5 years. In addition, as part of this plan, more nuanced metrics would be introduced. Currently, the number of “acres restored” is tracked; however, acres restored actually combines and confuses two separate metrics: 1) the two-dimensional footprint of the restoration site (measured in acres) and 2) the amount of area within the greater footprint that has actual oyster habitat.

### References Cited

Eckert RL. 2016. Oyster (*Crassostrea virginica*) Recruitment Studies in the Great Bay Estuary, New Hampshire. *PREP Publications*. 371. <http://scholars.unh.edu/prep/371>

Grizzle R, Ward K. 2016. Assessment of recent eastern oyster (*Crassostrea virginica*) reef restoration projects in the Great Bay Estuary, New Hampshire: Planning for the future. *PREP Publications*. 353. <http://scholars.unh.edu/prep/353>

Grizzle R, Ward K. 2016. Oyster Reef Restoration Project Funded by the Aquatic Resources Mitigation Program. *PREP Publications*. 368. <http://scholars.unh.edu/prep/368>

PREP 2010. Piscataqua Region Comprehensive Conservation and Management Plan, Piscataqua Region Estuaries Partnership: D.B. Truslow Associates, Mettee Planning Consultants, 2010, Durham, NH. <http://scholars.unh.edu/prep/22/>

PREP. 2017c. Technical Advisory Committee Meeting, January 6th, 2017: Slides Presented and Notes of Discussion. Accessed 25 September 2017. <http://prepestuaries.org/01/wp-content/uploads/2017/01/tac-meeting-jan6-2017-slides-and-notes.pdf>