Bivalve restoration: Scaling up, restoring ecosystem services, and setting goals

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NOAA

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TNC-NOAA Partnership: >150 projects 2001-2012

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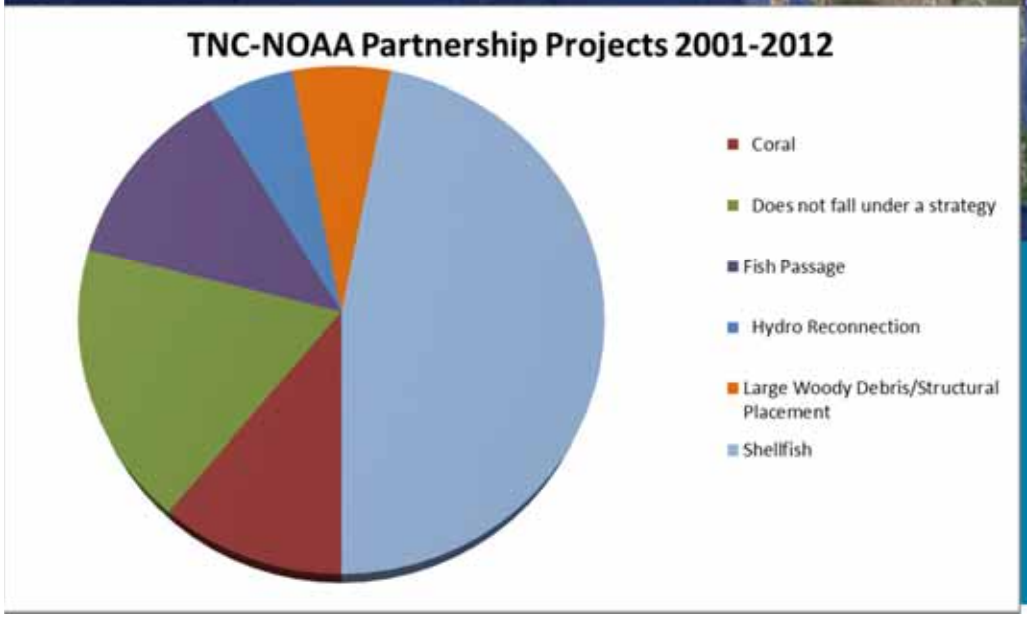
TNC-NOAA Partnership: Shellfish Restoration



Small scale

Conceptual diagram showing shell recycling, bagging, and placement in intertidal waters.

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….to medium and large scale






Scale is moving towards meeting society's demands through restoration

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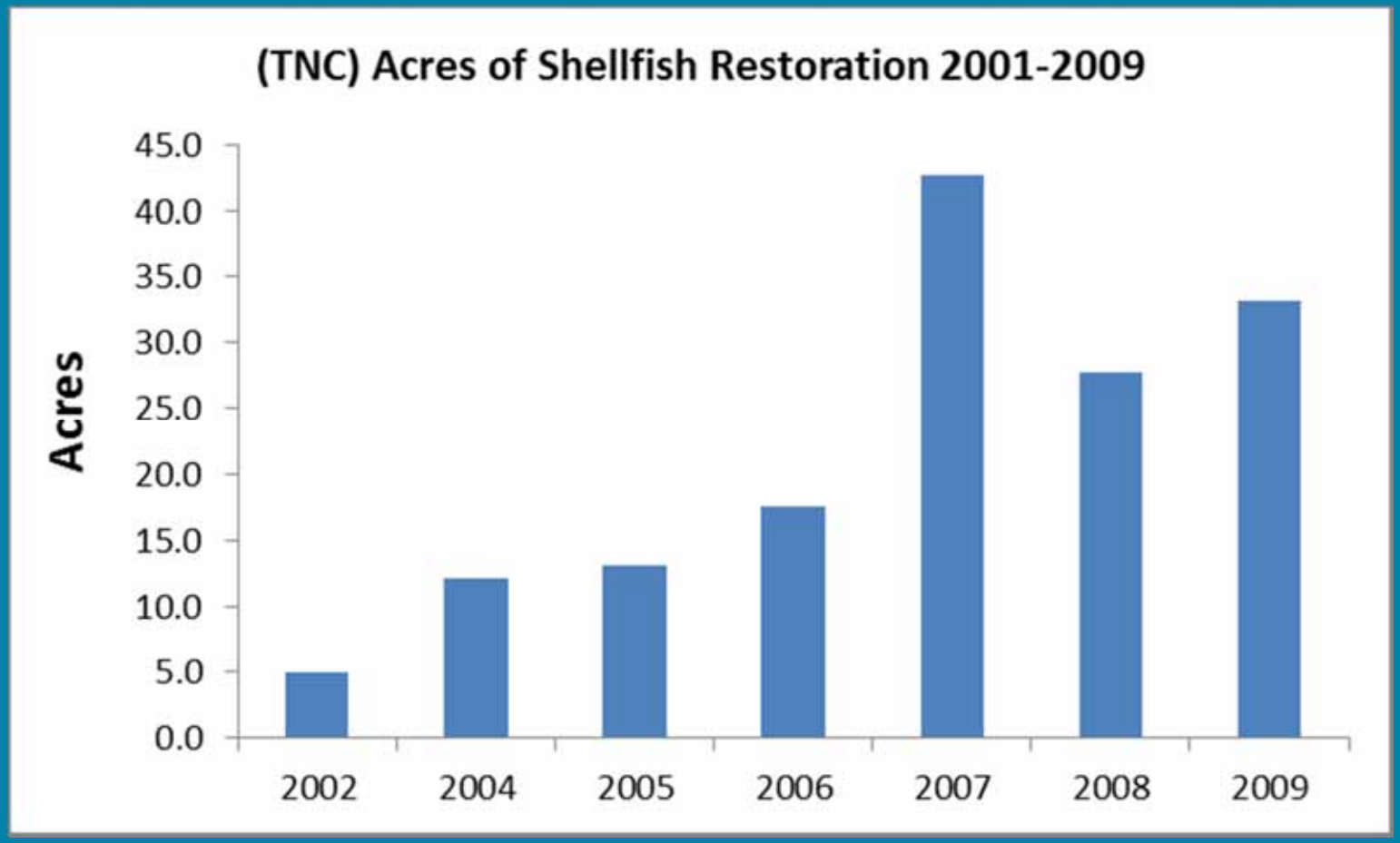

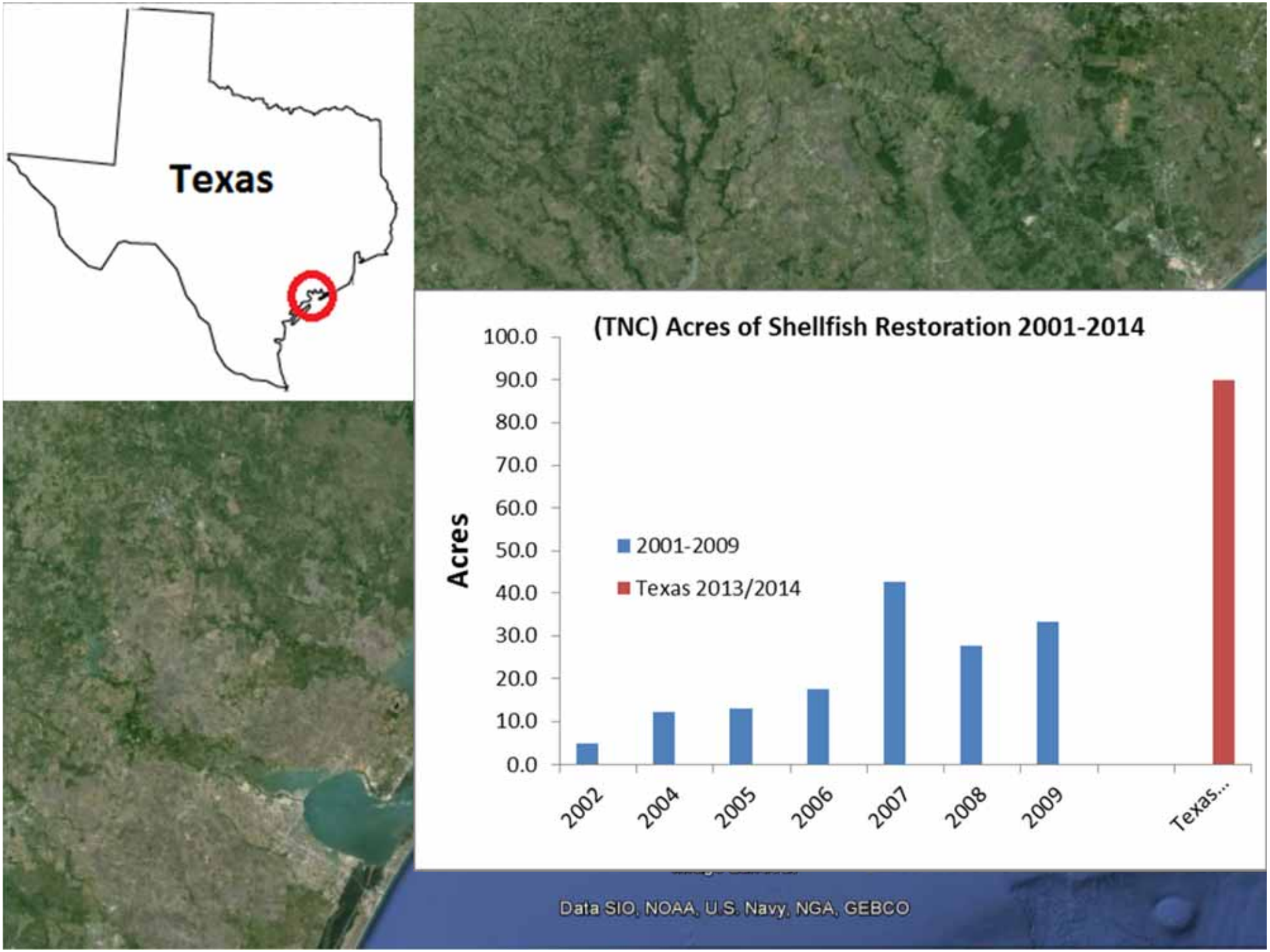
Texas
(TNC) Acres of Shellfish Restoration 2001-2014
Acres
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
2001-2009
Texas 2013/2014
2002
2004
2005
2006
2007
2008
2009
Texas...
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

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HOW MUCH IS ENOUGH??

Q1: What have we LOST?
A1: Historic baselines

zuErmgassen et al. 2012a

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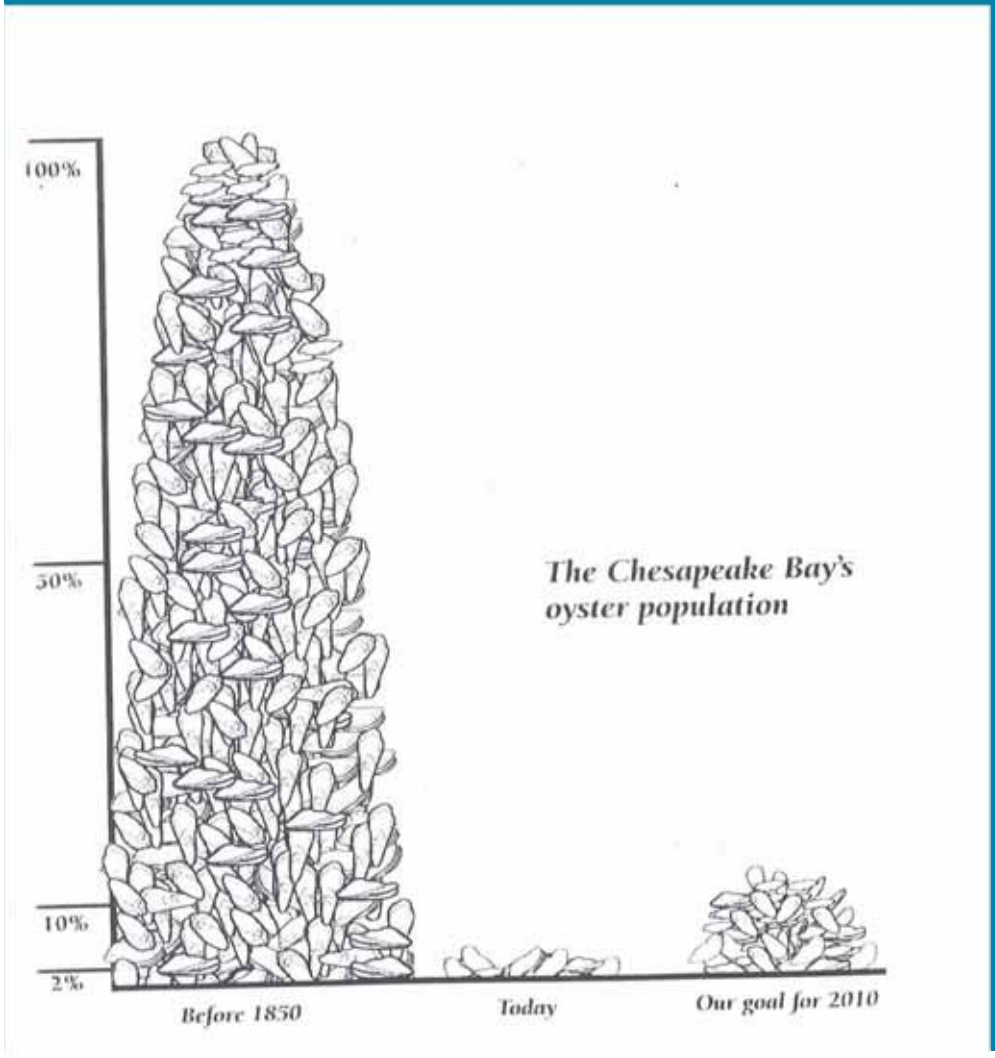
HOW MUCH IS ENOUGH??

A Function of History



- Chesapeake Bay Exec. Order;
  Restore 20 tributaries by 2025
- Chesapeake 2010
  10 x increase over 1994 by 2010
- Puget Sound Washington
  100 acres by 2020
- Hudson Raritan NY/NJ
  500 acres by 2015
  5000 acres by 2050
- Tampa Bay Florida
  Preservation of 44 acres
- Great Bay New Hampshire
  20 acres by 2010
- Context ‘What is possible’

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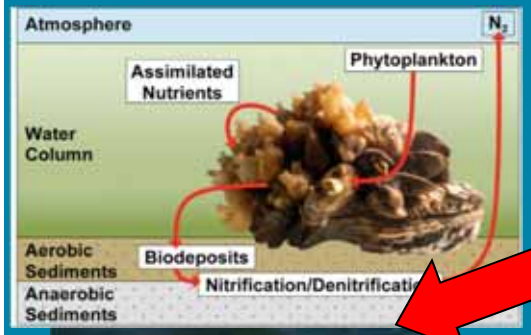
HOW MUCH IS ENOUGH??

Regulating

Provisioning

Q2: What do we gain?
A2: Ecosystem services

Supportive



Cultural

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Oyster Goal-setting Initiative

Provide the scientific background to allow projections of the amount of a service provided for a given area or reef restored

Provide the information that will allow practitioners to seek the policy changes that will support the restoration of oyster habitat.

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Loren Coen
Brett Dumbauld
Steve Geiger
Jonathan H. Grabowski
Raymond Grizzle
Lisa Kellogg
Mark Luckenbach
Kay McGraw
Michael F. Piehler
Sean Powers
Bill Rodney
Jennifer Ruesink
Philine zu Ermgassen
Rob Brumbaugh
Mike Beck
Boze Hancock
Mark Spalding

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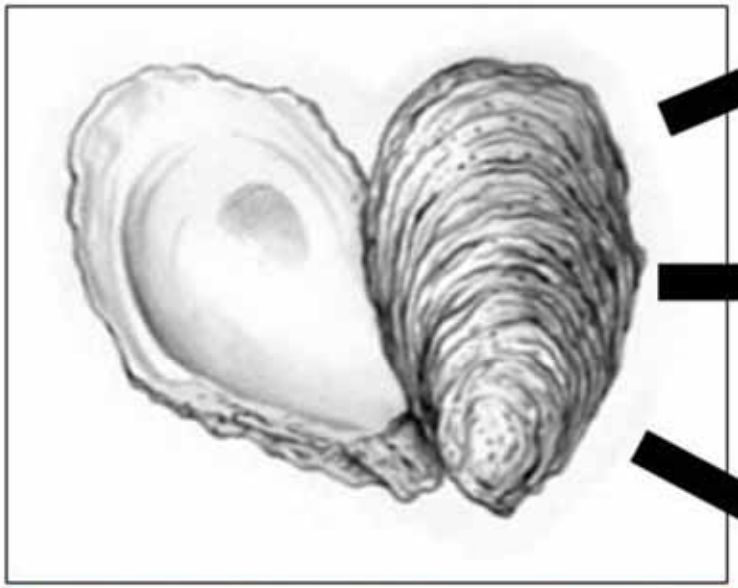
...ster Goal-setting In...

Great Bay, NH
Oyster Paths & Goals For Nitrogen Control



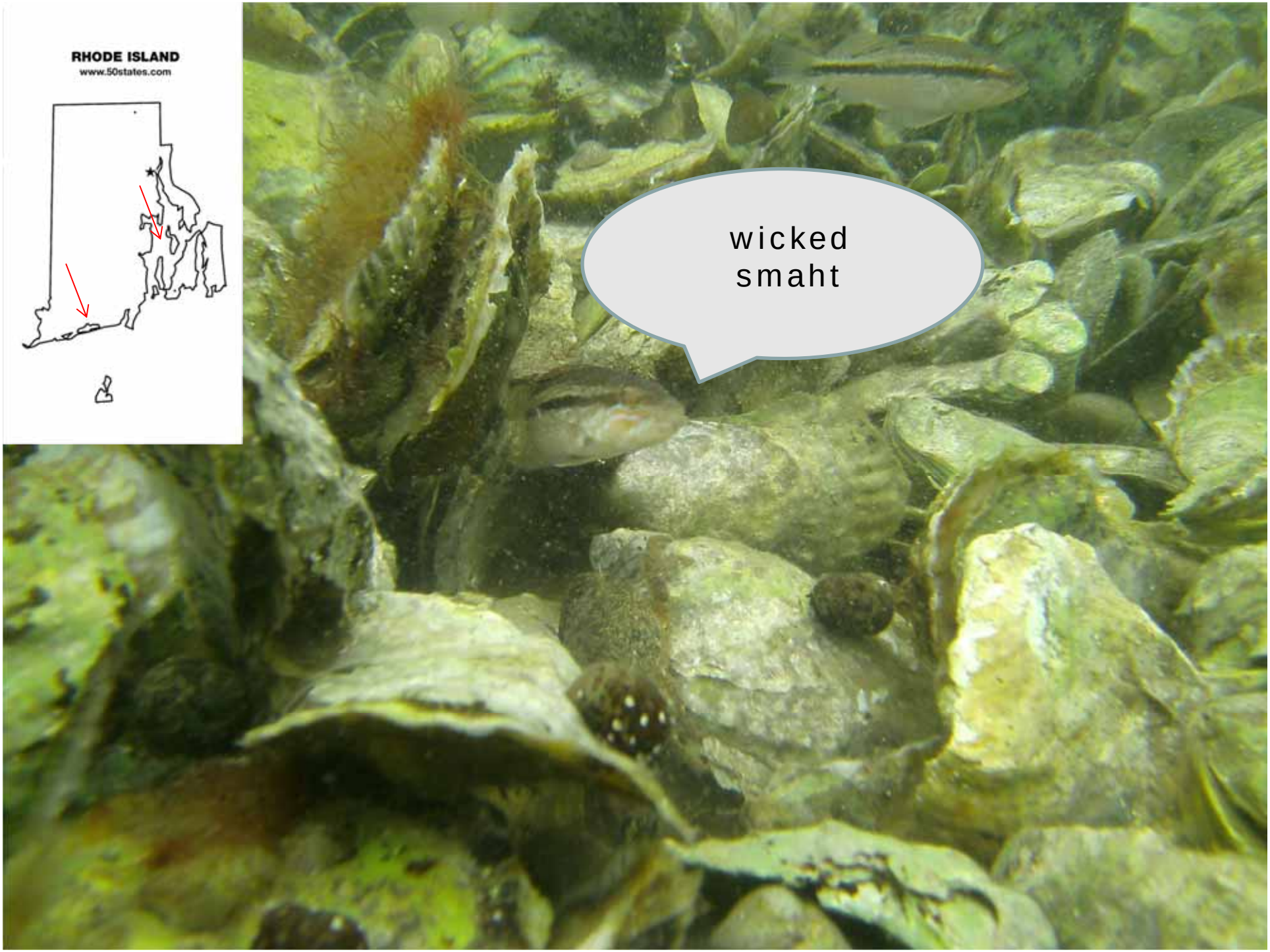
0.25	Released to Atmosphere (Denitrification) — Piehler and Smyth (2011)
0.02	Sequestered in Shell and Tissue — Higgins et al. (2011); Grizzle & Ward (2011)
0.13	Buried in Sediments — Newell et al. (2005)

0.40 Tons N per yr per ac of Oysters (50/m^2)

2011 Total N Load in Great Bay Estuary, NH: 1250 Tons
2022 Goal: 775 Tons

200 ac of Oyster Reefs & 100 ac of Oyster Farms = 14% N Control
Carmichael et al. (2012)

Oyster Filtration Capacity = Great Bay Estuary Residence Time
zu Ermgassen et al. (2012)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