An Ecosystem Services Approach to Setting Restoration Objectives

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• TNC staff leading shellfish restoration projects in 11 U.S. states: Anne Birch, Marci Bortman, Cindy Brown, Rafael Calderon, Chris Clapp, Jeff DeBlieu, Mark Dumesnil, Patrick Ertel, Jared Laing, Carl LoBue, Betsy Lyons, Wayne Grothe, Aaron McCall, Jay Odell, Adam Starke, Barry Truitt, Dick Vander Schaaf, Nicole Vickey, Jacques White;

• Projects funded in part through a National Partnership with NOAA’s Community-based Restoration Program and The Kabcenell Foundation;

• Many partners in public management agencies, conservation organizations and academic research institutions who contribute to the Shellfish Restoration Network;
New handbook summarizes lessons learned and provides advice on:

- The case for restoration
- Identifying target species
- Site selection
- Monitoring approaches
- Forming effective partnerships

Advancing Oyster Restoration in Puget Sound

The Nature Conservancy, working with the Puget Sound Restoration Fund, recently implemented Phase II of a three-phase effort to restore habitat for the native Olympia oyster in Wooded Bay, an embayment within Puget Sound. Phase I involved surveys to establish baseline conditions and experiments to quantify local oyster recruitment and survival rates. These results were used to identify specific locations with high local supply and the appropriate habitat characteristics for successful restoration.

Phase II, a pilot-scale habitat enhancement involving placement of bagged oyster shell culch in 21 plots at 4 locations varying in tidal elevation from -1 to -7 MLLW. Most were 1 square meter in size and shell depth in bags was approximately 6". Weekly monitoring was conducted through summer 2006 to quantify recruitment and survival, and will continue at less frequent intervals through Spring 2007. The monitoring of post-settlement survival by location and elevation will help guide decisions about locations/elevations for expanded restoration.

Phase III, planned for 2007, includes expanded habitat restoration over approximately 5 acres and will be informed by all the monitoring data collected to date. This phased “build it and they will come” strategy in Puget Sound will focus restoration in areas with known local supply and help protect and enhance remnant populations of oysters.

Funding for the project was provided through the TNC-NOAA Community- based Restoration Program.

Contact: Betty Lyons, blyons@tnc.org
“The nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased and not impaired in value.”

- Theodore Roosevelt
Our challenge

1) Recognize that oyster reefs are an ecosystem;

2) Better describe ALL of the value (ecosystem services) provided by oyster reefs;

3) Manage for ALL of those services;
Regime Shift

Sunlight

Healthy System

Eutrophic System

Balanced Algae Growth

Minimal Nutrient Inputs

Excessive Nutrient Inputs

Healthy Bay Grasses Reduced

Bay Grasses

Algae Die-off

Algae Decomposition

Adequate Oxygen No / Low Oxygen

Algal Bloom

Reduced Bay Grasses

Eutrophic System

Depleted oysters

Adapted from Chesapeake Bay Program
State-managed program for sanctuary-based restoration

Spawner sanctuaries guard against recruitment failure
Bivalve Shellfish - Ecosystem Services Valued

- **Provisioning – shellfish landings**
  > Lots of information on landings, economic impact of fisheries, etc. (e.g., US $69M / year for eastern oyster)

- **Regulating – nursery habitat**
  > Grabowski and Peterson (2007): $3,700/year/hectare for fish and crab production from restored reefs in SE U.S.

- **Cultural – tourism, recreation**
  > License revenue and numbers of participants

- **Supporting - filtration and nutrient cycling**
  > Doug Lipton, University of MD (pers. comm.): $818M in N-removal as avoidance-cost for restored oyster population (i.e., in lieu of payment for other N-removal approaches);
Fin-fish and crab fisheries production value of restored oyster reef along the southeast coast of U.S.

From Grabowski and Peterson, 2007 (in press)
Fin-fish and crab fisheries production value of restored oyster reef along the southeast coast of U.S.

20 year management goal:
$60,000 cumulative fisheries productivity/ hectare

From Grabowski and Peterson, 2007 (in press)
WATER QUALITY “REGULATION” BY SHELLFISH IS FUNCTION OF ABUNDANCE

15 - 86 Acres of restored reefs required to filter Lynnhaven River within residence time of river

Low Risk-- Intact Shellfish Reefs & Beds

- No synthesis of distribution, condition or threats (risk)
- No compelling case for action
Assembling global dataset on distribution, abundance, condition & threats
Conclusions

• A lot of projects underway - some real progress, new and innovative partnerships have elevated restoration, novel monitoring and assessment approaches;

• Tremendous value in sharing outcomes!

• Need to sharpen focus on ecosystem services and manage for these services;

• TNC has Shellfish Restoration Network to connect projects and practitioners;

• Global Reefs at Risk Assessment underway - seeking your involvement!  
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