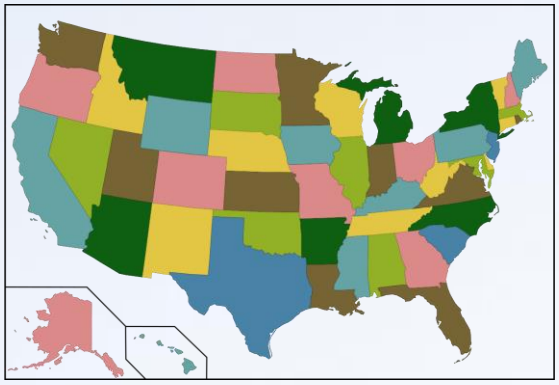

Shellfish restoration plans from other states: can we develop plans for Florida?

One sometimes overlooked context…

Calico scallop fishery:	Peaked in 1984 2600* people involved in harvest and associated works (processing and logistics) $23,000,000 direct; $86,000,000 indirect value
Bay Scallops :	commercial fishery peaked in 1950's 100's of jobs when it was a commercial fishery $100,000 – $ millions / year / co. recreational
Hard Clams:	early records of huge catches in Southwest Florida 1980's and 1990's : 1000 – 1200 clam fishers per day. $8,000,000 / year in direct product value Current aquaculture jobs 500+
Oysters: Franklin County:	At a recent peak ~ 2015, ~ 2000 jobs directly associated with oysters? As early as 1917 the wholesale value was in the $10 - 20,000,000 / year range

Regional Plans for Oysters

GoM , GoM NRDA, MD/VA



Shellfish Management Plans

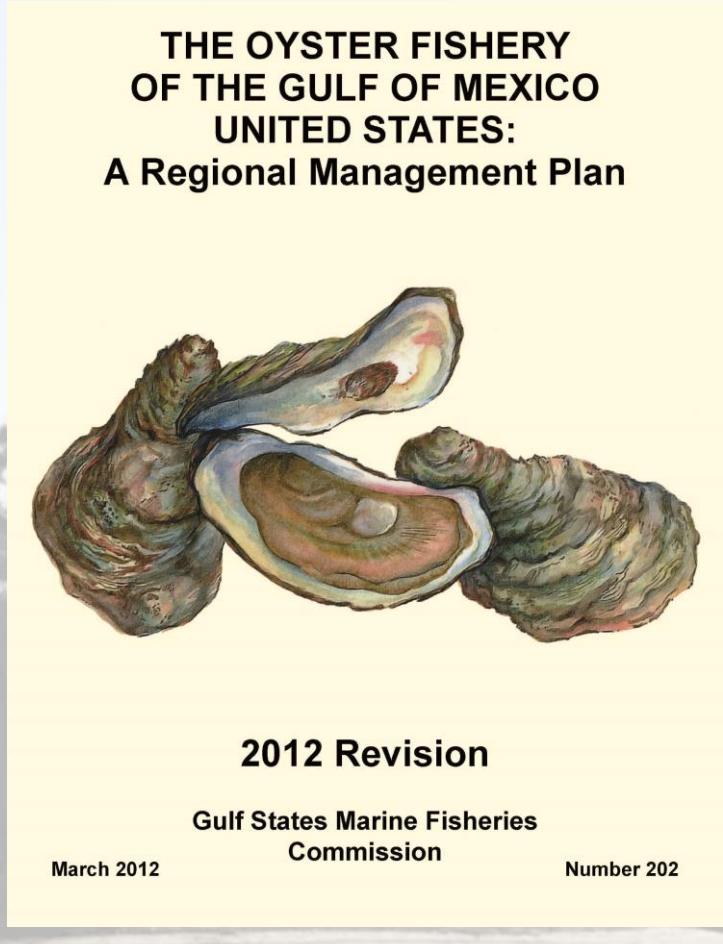
RI, DE, VA$^{\psi}$, NC*, TX $^{\tau}$, BC

DIXIE COUNTY

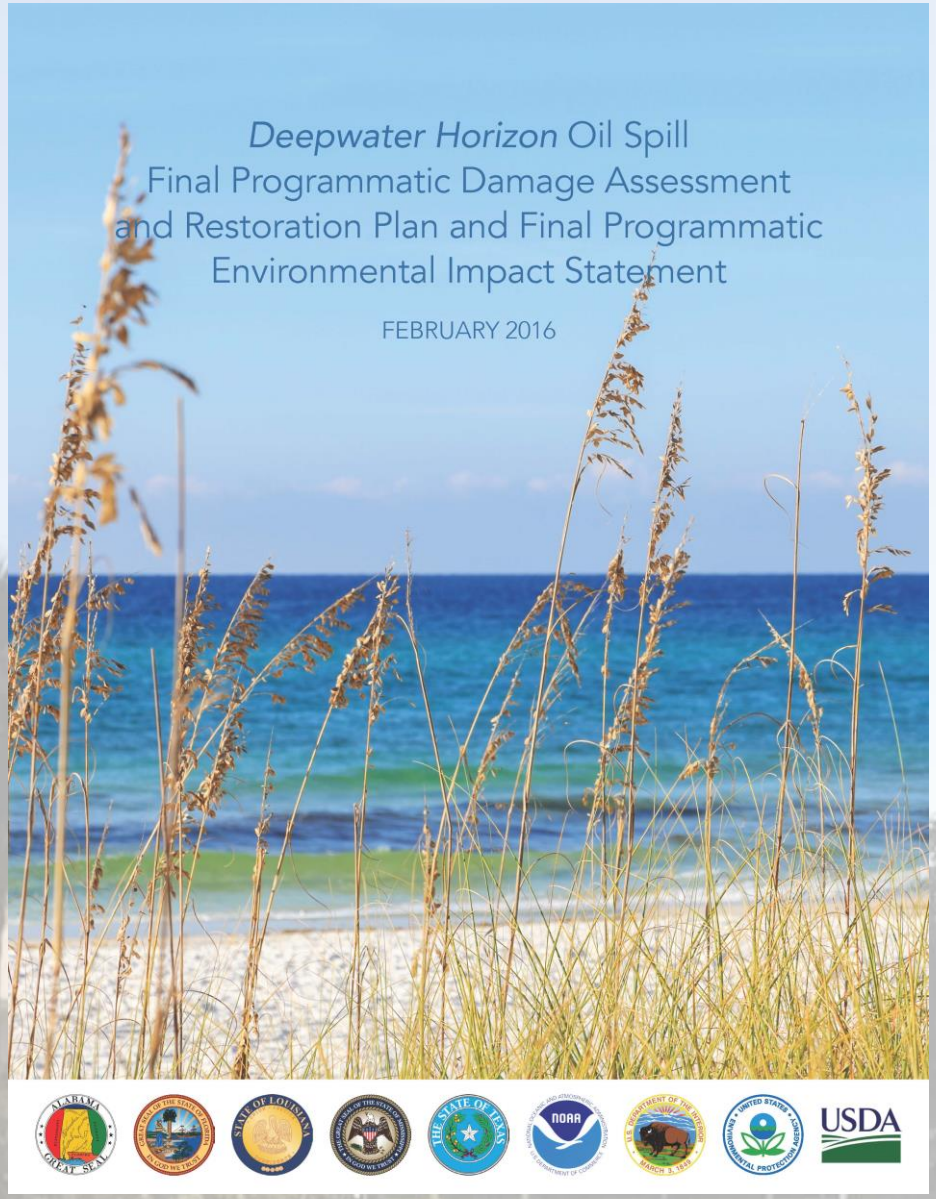
Stock Assessments

ME, MA, NJ, MD*, VA, LA,

* - MD has plans for oysters and clams
* - NC has plans for clams, scallops, oysters
ψ - VA has local MP for some rivers
$^{\tau}$ - TX had a plan in 1988



https://www.gsmfc.org/publications/GSMFC%20Number%20202.pdf



Natural **R**esources **D**amage **A**ssessment

- Restore and Conserve Habitat.
- Restore Water Quality.
- Replenish and Protect Living Coastal and Marine Resources.
- Provide and Enhance Recreational Opportunities.
- Provide for Monitoring, Adaptive Management, and Administrative Oversight to Support Restoration Implementation.

https://www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan

Restore and Conserve Habitat

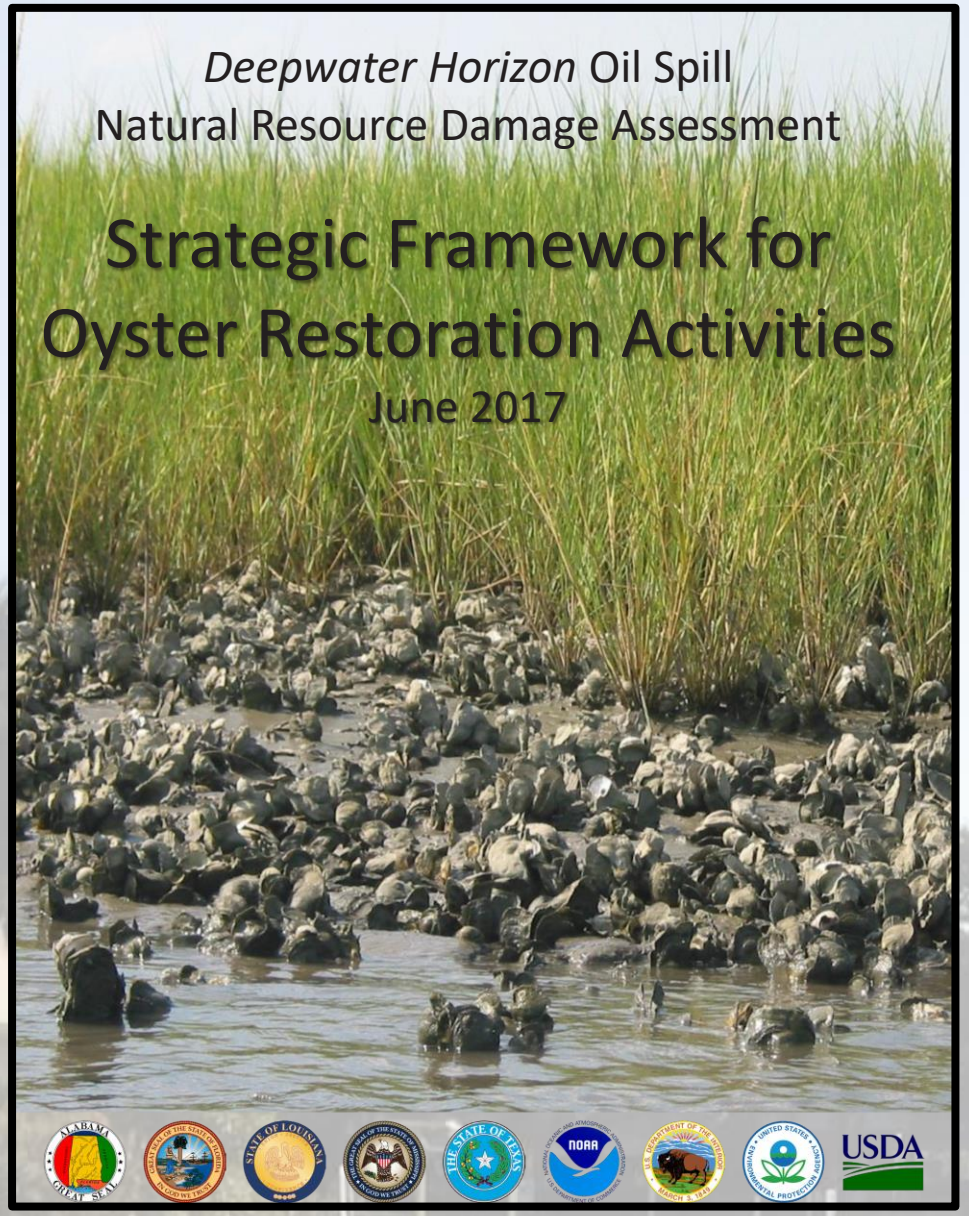
Restore Water Quality and Quantity

Replenish and Protect Living Coastal and Marine Resources

Enhance Community Resilience

Restore and Revitalize the Gulf Economy

https://restorethegulf.gov/comprehensive-plan



Programmatic Damage Assessment and Restoration Plan Programmatic Environmental Impact Statement (PDARP/PEIS) by NRDA TIG

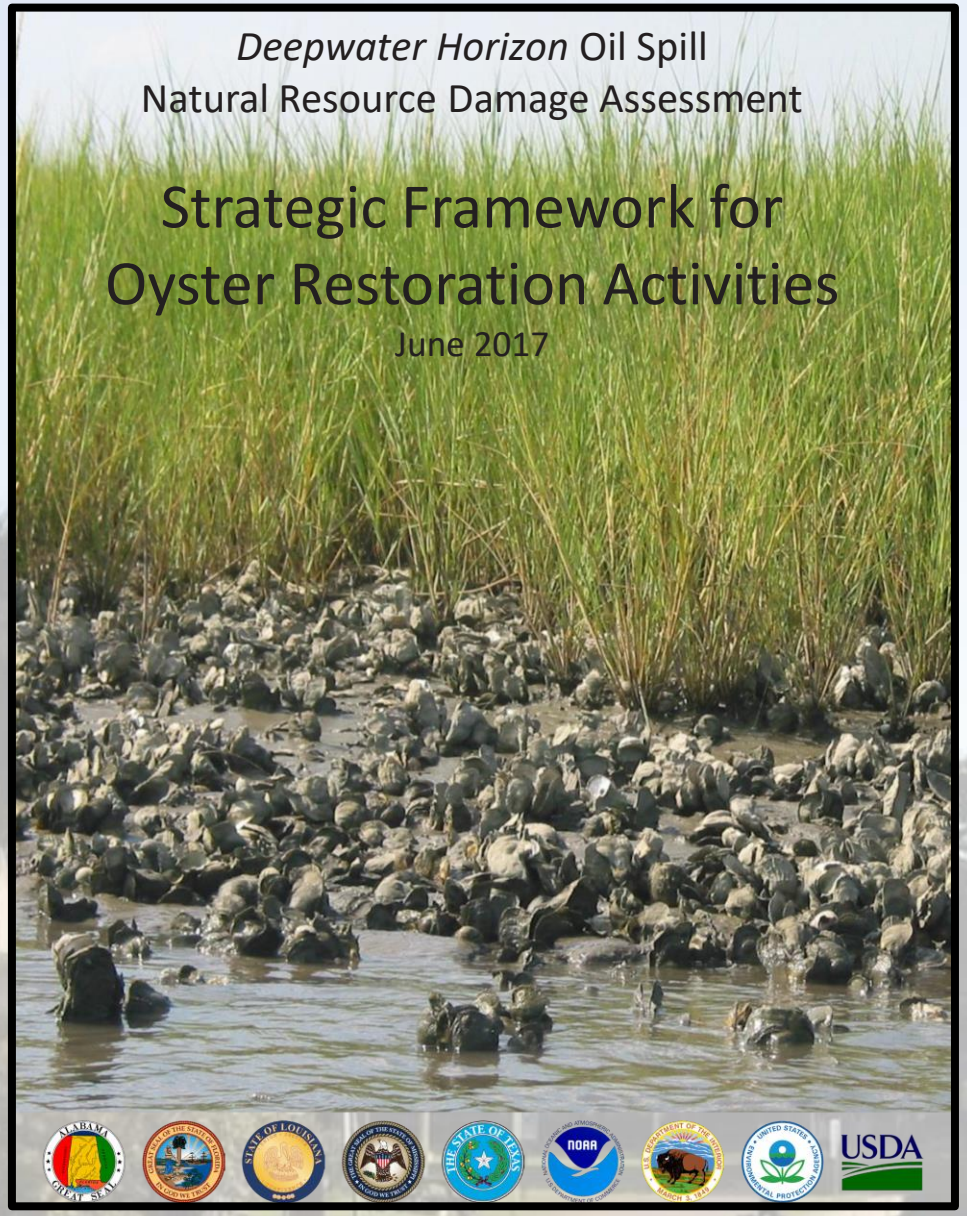
Summary
- Overview of injury
- Goals
- Restoration Approaches
- Monitoring

Biological Information
- Distribution
- Life history
- Threats

Ongoing
- Conservation
- Restoration
- Management
- Monitoring

Prioritization and Selection
- Approaches
- Techniques
- Potential Project Concepts
- Monitoring needs

https://www.gulfspillrestoration.noaa.gov/sites/default/files/wp-content/uploads/Oyster_Strategic_Framework_06.23.17.pdf



Programmatic Damage Assessment and Restoration Plan
Programmatic Environmental Impact Statement
(PDARP/PEIS) by NRDA TIG

Summary
- Overview of injury
- **Goals**

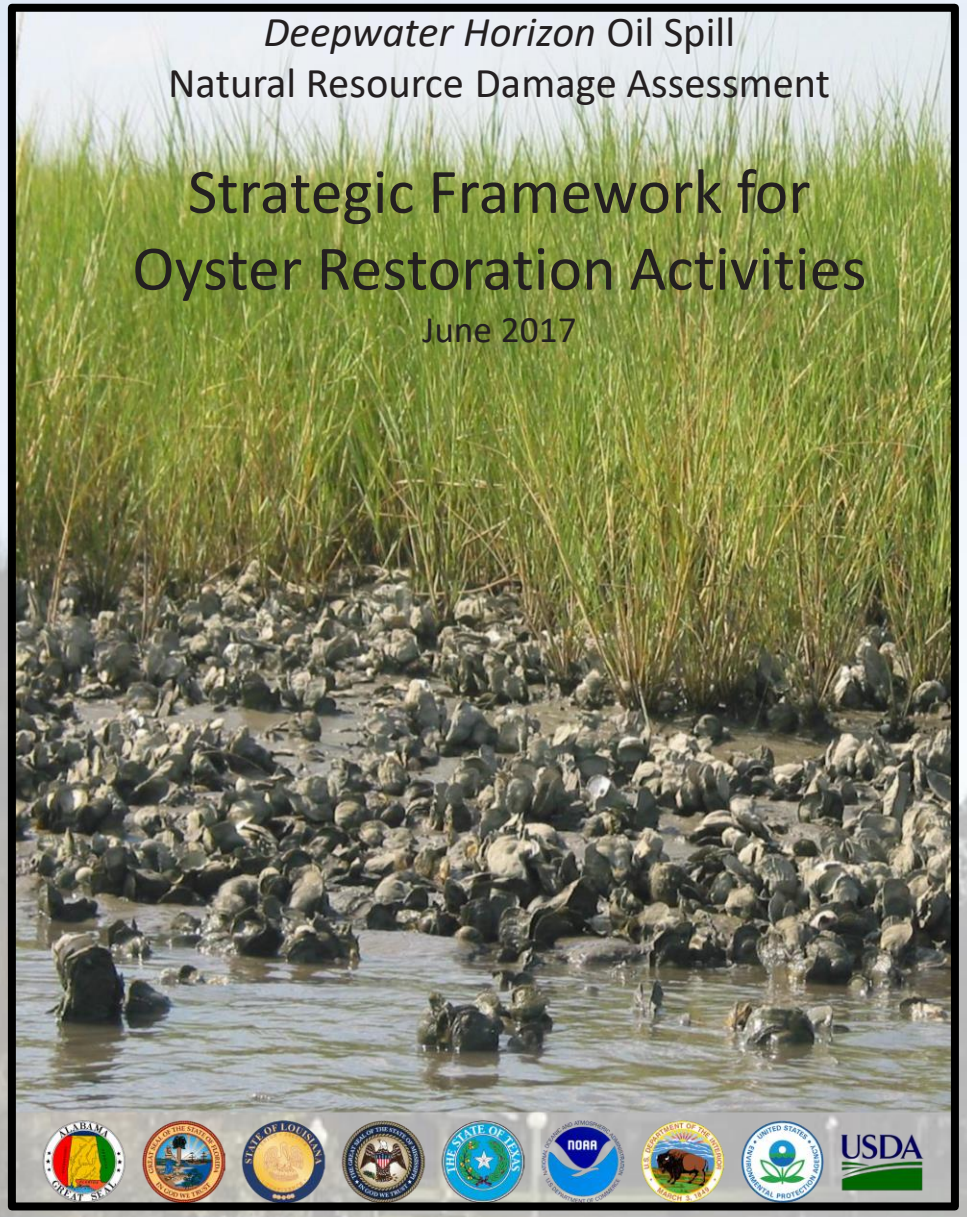
Restore spawning stock sufficient for healthy recruitment
Restore resilience
Restore a diversity of habitats

- Restoration Approaches
- Monitoring

Biological Information
- Distribution
- Life history
- Threats

Ongoing
- Conservation
- Restoration
- Management
- Monitoring

Prioritization and Selection
- Approaches
- Techniques
- Potential Project Concepts
- Monitoring needs



Programmatic Damage Assessment and Restoration Plan Programmatic Environmental Impact Statement (PDARP/PEIS) by NRDA TIG

Summary
- Overview of injury
- Goals

Restoration Approaches

Restore or create reefs	Construct living shorelines
Enhance productivity	Develop a network or reserves

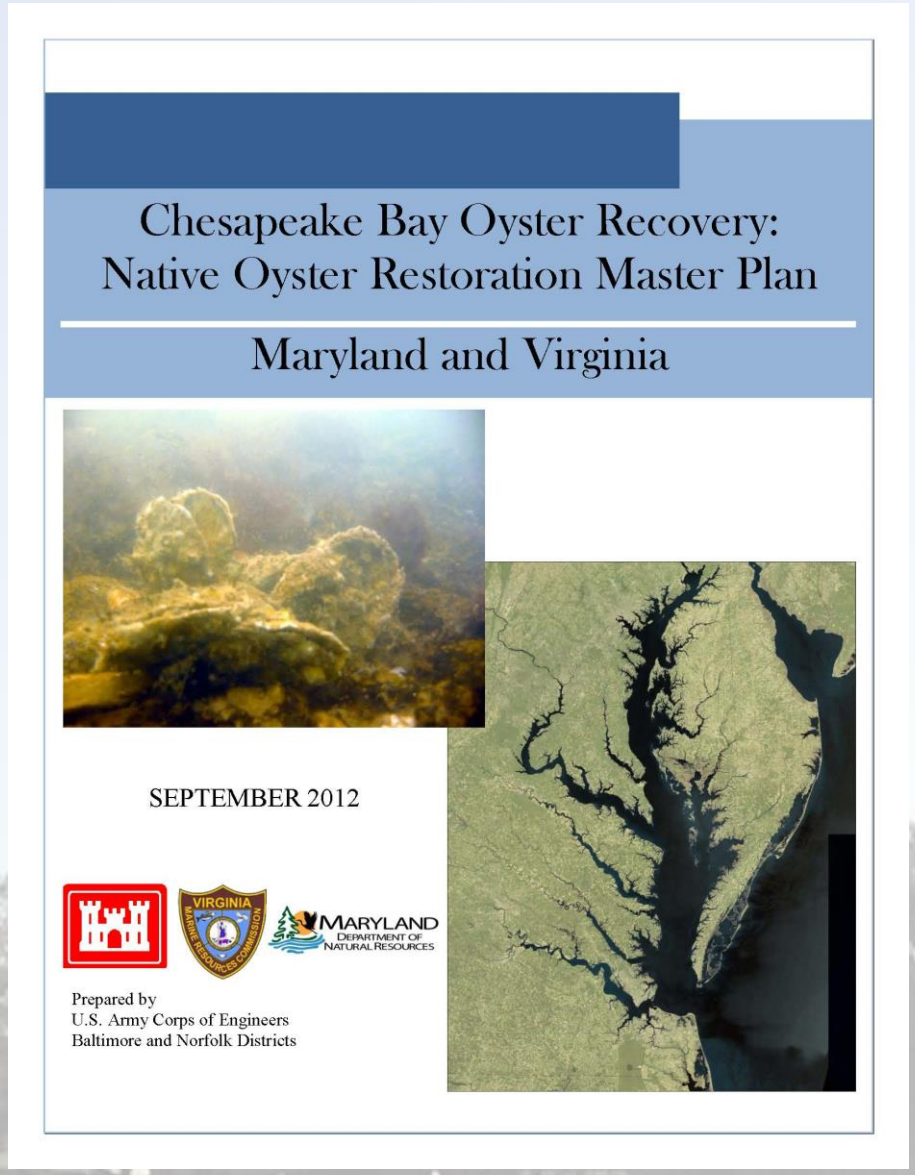
And supporting activities

Establish shell recycling
Enhance regional hatchery capacity
Foster oyster gardening
Build partnerships
- Monitoring

Biological Information
- Distribution
- Life history
- Threats

Ongoing
- Conservation
- Restoration
- Management
- Monitoring

Prioritization and Selection
- Approaches
- Techniques
- Potential Project Concepts
- Monitoring needs

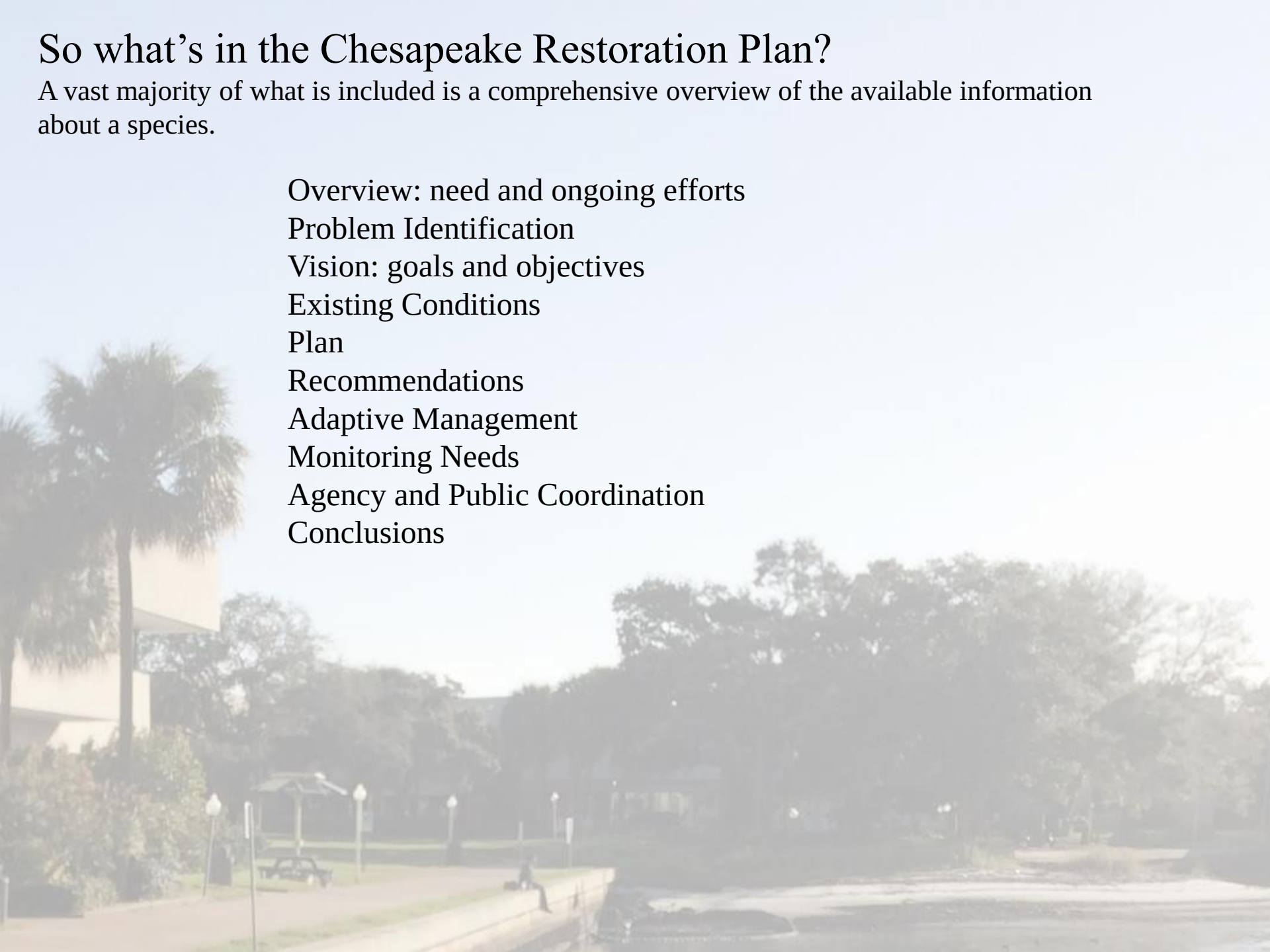


https://dnr.maryland.gov/fisheries/Documents/CB_OysterMasterPlan_Oct2012_FINAL_4print-NObookmarks.pdf

So what's in the Chesapeake Restoration Plan?

A vast majority of what is included is a comprehensive overview of the available information about a species.

Overview: need and ongoing efforts
Problem Identification
Vision: goals and objectives
Existing Conditions
Plan
Recommendations
Adaptive Management
Monitoring Needs
Agency and Public Coordination
Conclusions



So what's in the Chesapeake Restoration Plan?

A vast majority of what is included is a comprehensive overview of the available information about a species.

- Overview: need and ongoing efforts
- Problem Identification
  - Loss of habitat
  - Disease
  - Water Quality Degradation
  - Overharvest
- Vision: goals and objectives
- Existing Conditions
- Plan
- Recommendations
- Adaptive Management
- Monitoring Needs
- Agency and Public Coordination
- Conclusions

So what's in the Chesapeake Restoration Plan?

A vast majority of what is included is a comprehensive overview of the available information about a species.

- Overview: need and ongoing efforts
- Problem Identification
- Vision: goals and objectives
  - Restore self-sustaining oyster sanctuaries
  - In low salinity areas restore habitat, larval transport connections
  - In high salinity areas restore and maintain habitat
  - Restore resilience
  - Create a network over the whole salinity range
  - Build reefs that support diversity and sequester nutrients
  - Create sanctuaries for larval supply in multiple estuaries
- Existing Conditions
- Plan
- Recommendations
- Adaptive Management
- Monitoring Needs
- Agency and Public Coordination
- Conclusions

So what's in the Chesapeake Restoration Plan?

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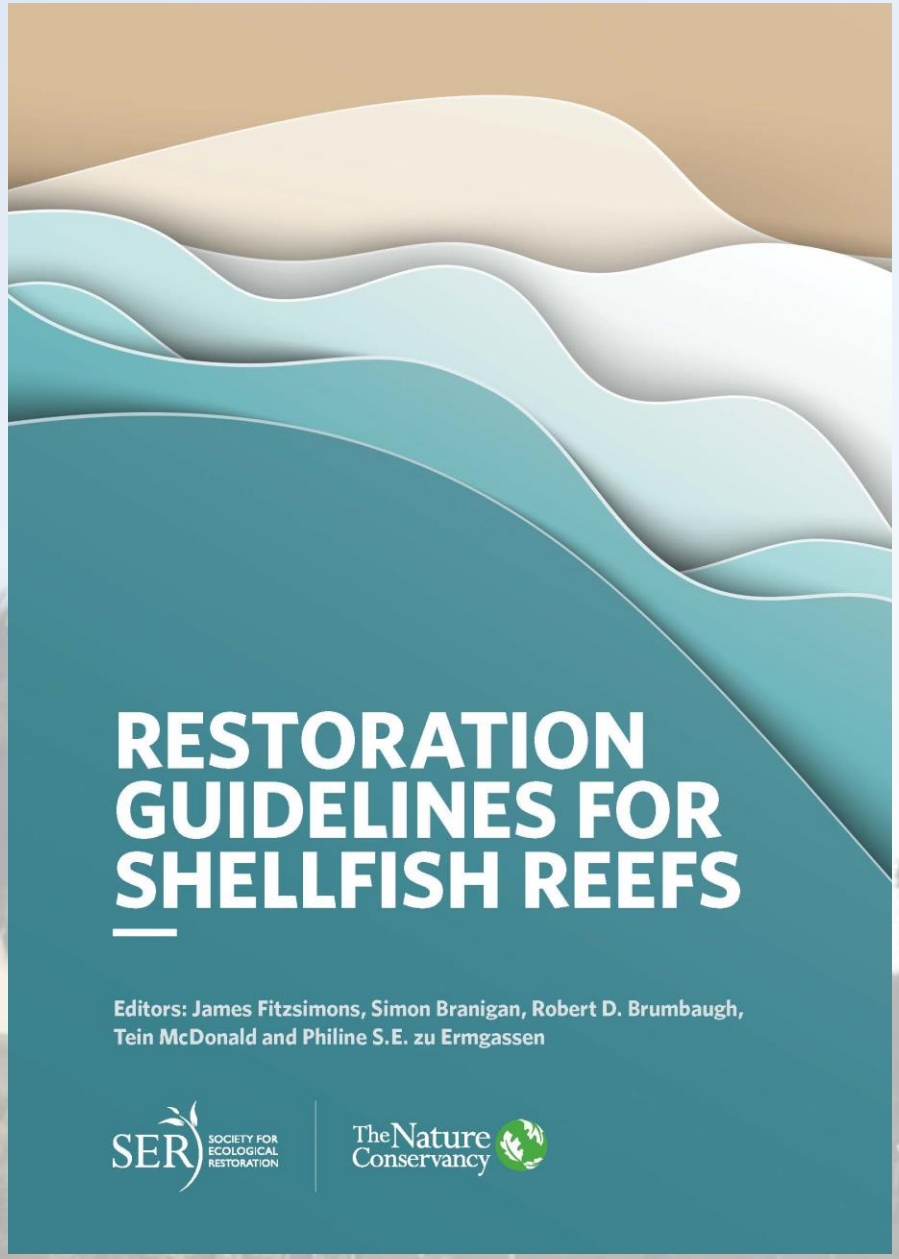
- Overview: need and ongoing efforts
- Problem Identification
- Vision: goals and objectives
- Existing Conditions
- Plan
- Recommendations
  - Survey individual estuaries: bottom, density, larval model, settlement
  - Reef designs: morphology, fragmentation, topography, flow, depth, nearest neighbors, predator exclusion, poaching deterrent
  - Identify local sponsors
  - Identify research needs
- Adaptive Management
- Monitoring Needs
- Agency and Public Coordination
- Conclusions

So what's in the Chesapeake Restoration Plan?

A vast majority of what is included is a comprehensive overview of the available information about a species.

- Overview: need and ongoing efforts
- Problem Identification
- Vision: goals and objectives
- Existing Conditions
- Plan
- Recommendations
- Adaptive Management (success criteria / metrics)
  - Survival rates
  - Density & fecundity
  - Settlement
  - Substrate / reef accretion
  - Growth rates
  - Disease (*for selective stocks and seed source?)*
- Monitoring Needs
- Agency and Public Coordination
- Conclusions



Practitioners Guide

Introduction

Making the case for restoration

Plans, Goals and Feasibility

Biosecurity and Permitting

Practical considerations and techniques

Scaling up

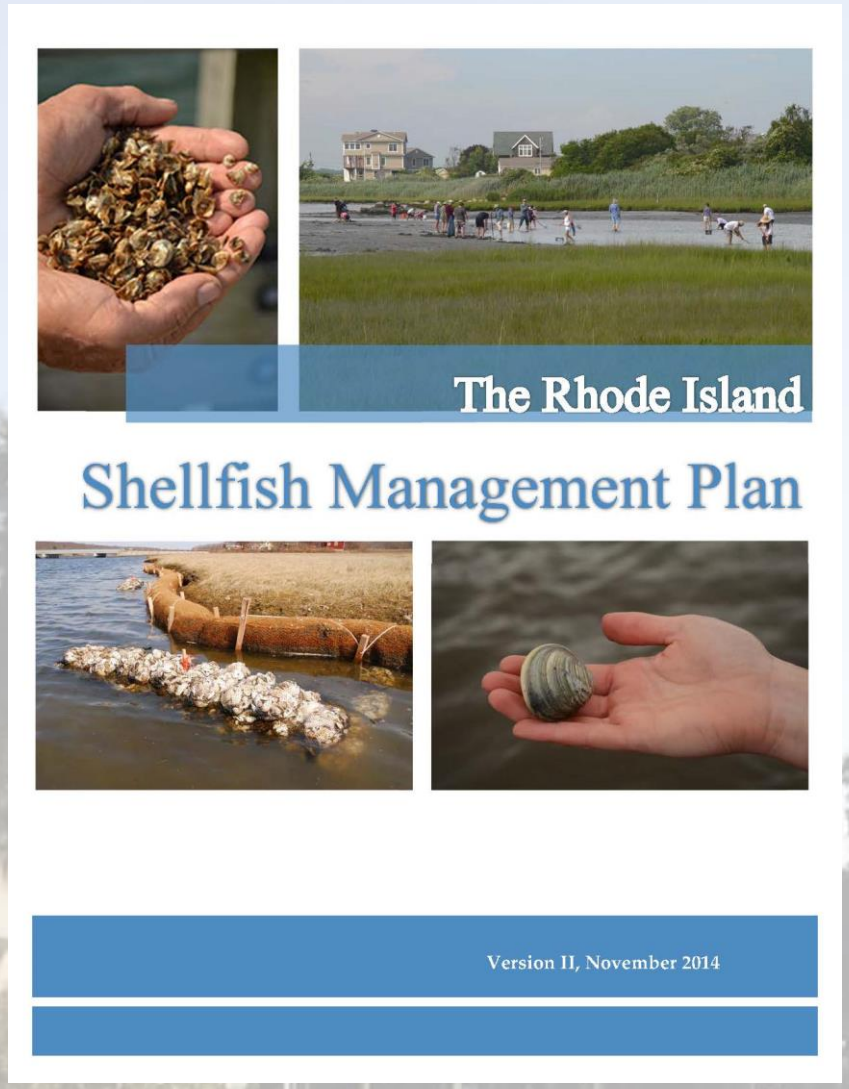
Monitoring

Other Shellfish?

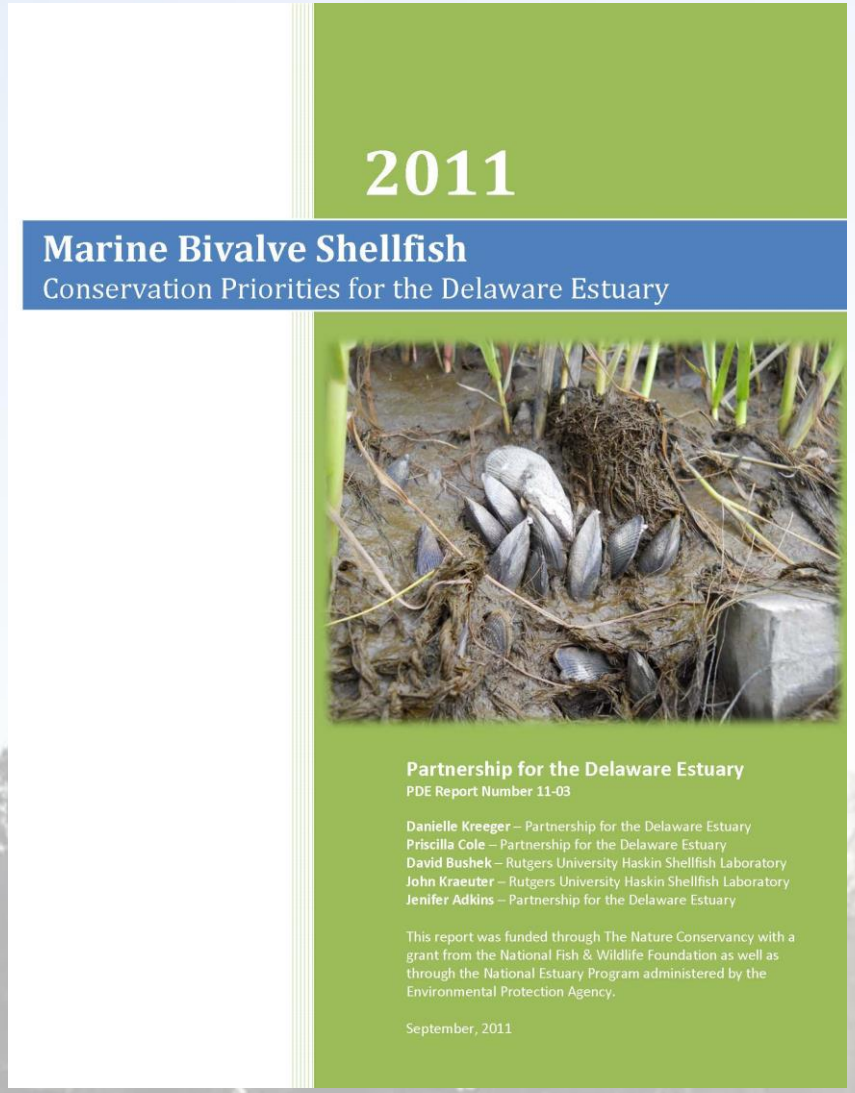
Communication

https://www.natureaustralia.org.au/what-we-do/our-insights/scientific-papers/shellfish-reef-restoration-guildelines/?vu=restoration-guidelines.s_australia

Two states with actual Shellfish Management plans



Rhode Island



Delaware

http://www.rismp.org/wp-content/uploads/2014/04/smp_version_2_11.18.pdf

So what's in some state's Shellfish Management Plans?

A vast majority of what is included is a comprehensive overview of the available information about a species.

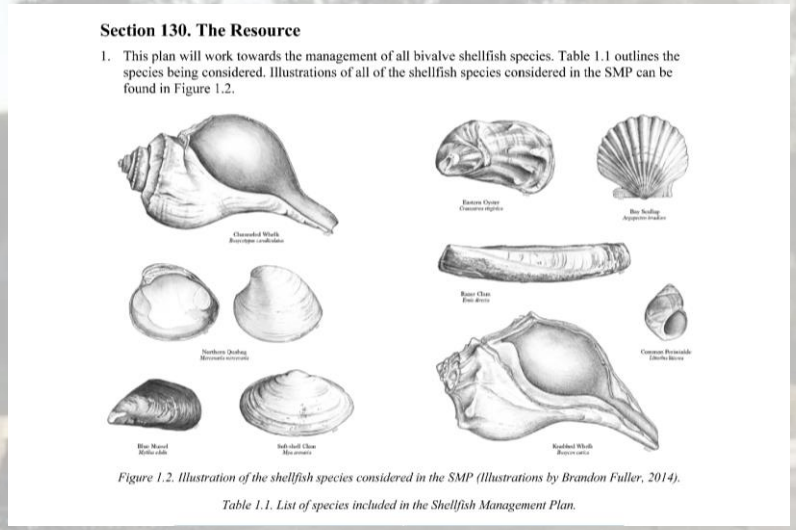
Rhode Island

200+ participants
Ecology of RI
Biology of Shellfish
Overview of Harvest and Aquaculture
Stock Assessment
Economic Assessment
Human Health overview
Risks
Rules
Conclusion
Recommendations

Appendix: History of fishery
Appendix: Stakeholder concerns
Appendix: Available commercial infrastructure
Appendix: Water quality and open/closed areas
Appendix: Market analysis
Appendix: Principals, Vision, Goals, Objectives

Delaware

Technical Advisory Committee
Overview of Species
Conservation Strategies
Culture Methods
Stock Enhancement Options
Commercial Options
Management Perspectives
Policy
Funding Sources
Inventory of ongoing projects

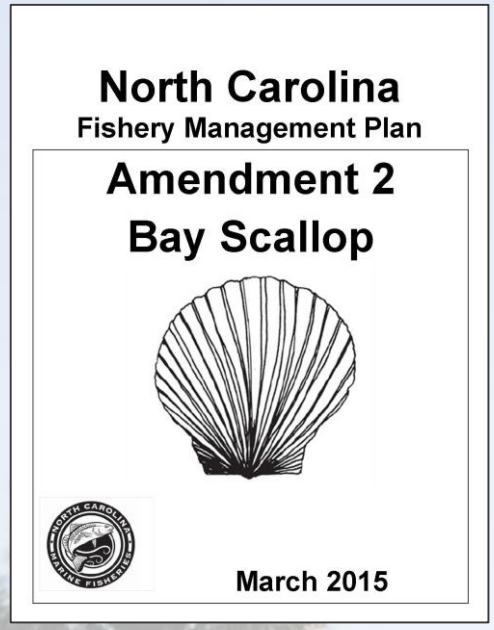


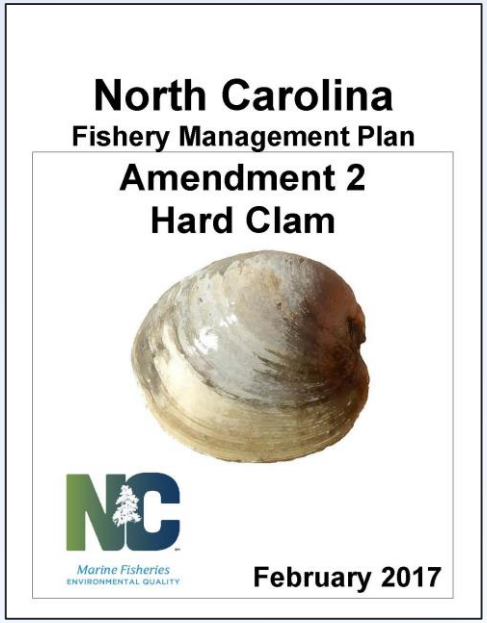
Section 130. The Resource

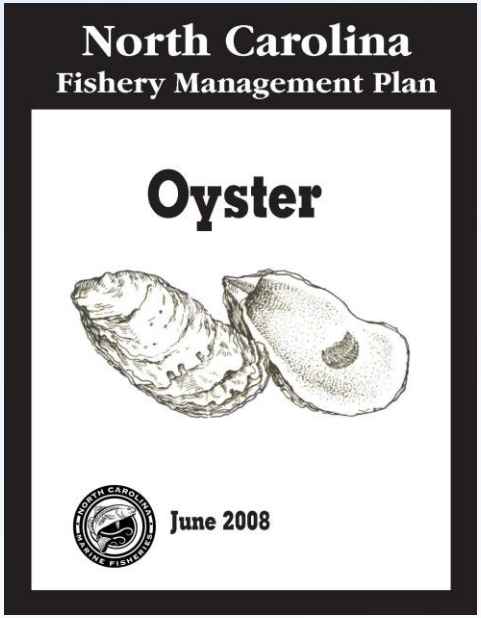
1. This plan will work towards the management of all bivalve shellfish species. Table 1.1 outlines the species being considered. Illustrations of all of the shellfish species considered in the SMP can be found in Figure 1.2.

Figure 1.2. Illustration of the shellfish species considered in the SMP (Illustrations by Brandon Fuller, 2014).

Table 1.1. List of species included in the Shellfish Management Plan.







- Goals
- Introduction
  - Authority
  - Problem
  - Management Unit
  - Plans and Rules
- Stock Status
- Fishery Status
- Protected Species Interactions
- Aquaculture and Stock Enhancement
- Socioeconomic Aspects
- Environmental Factors
- Management Options
- Recommendations
- Appendices (supporting documents and studies)

Summary

Restoration Plans and Management Plans have broadly similar structure

Identify a problem
Lots of information about status, biology, rules, etc.
Set Goals
Methods
Define Risks
Recommendations and / or Conclusions