

**Embarking on a New Voyage:
*Applying Ecosystem-Based Management
within the Albemarle-Pamlico
National Estuary Partnership***

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Science & Technical Advisory Committee

18 March 2014



Albemarle-Pamlico Estuarine System: Nation's Second Largest Estuary

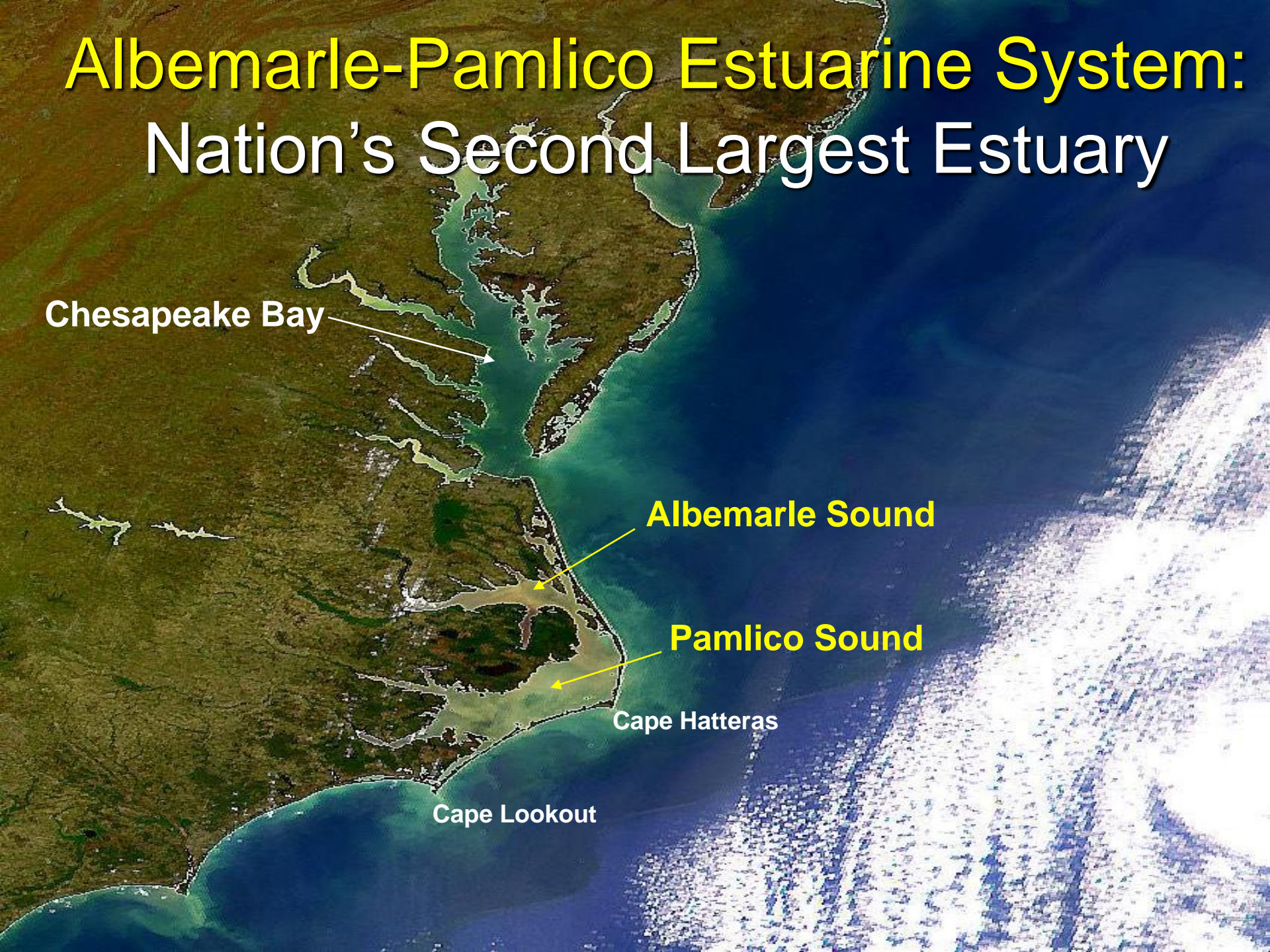
Chesapeake Bay

Albemarle Sound

Pamlico Sound

Cape Hatteras

Cape Lookout



Albemarle-Pamlico Estuarine System:

Nation's **Largest** Semi-lagoonal Estuary

Albemarle Sound

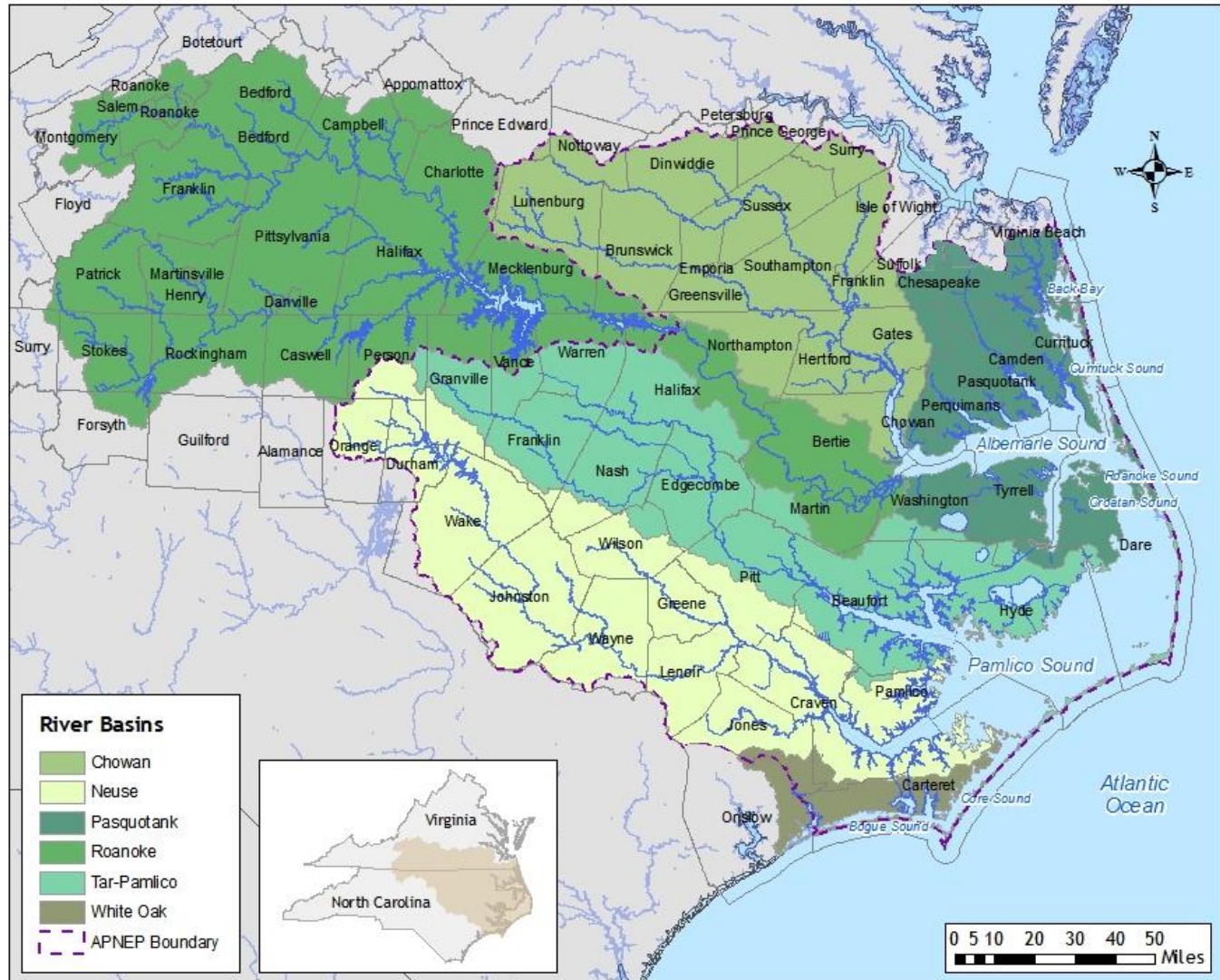
Pamlico Sound

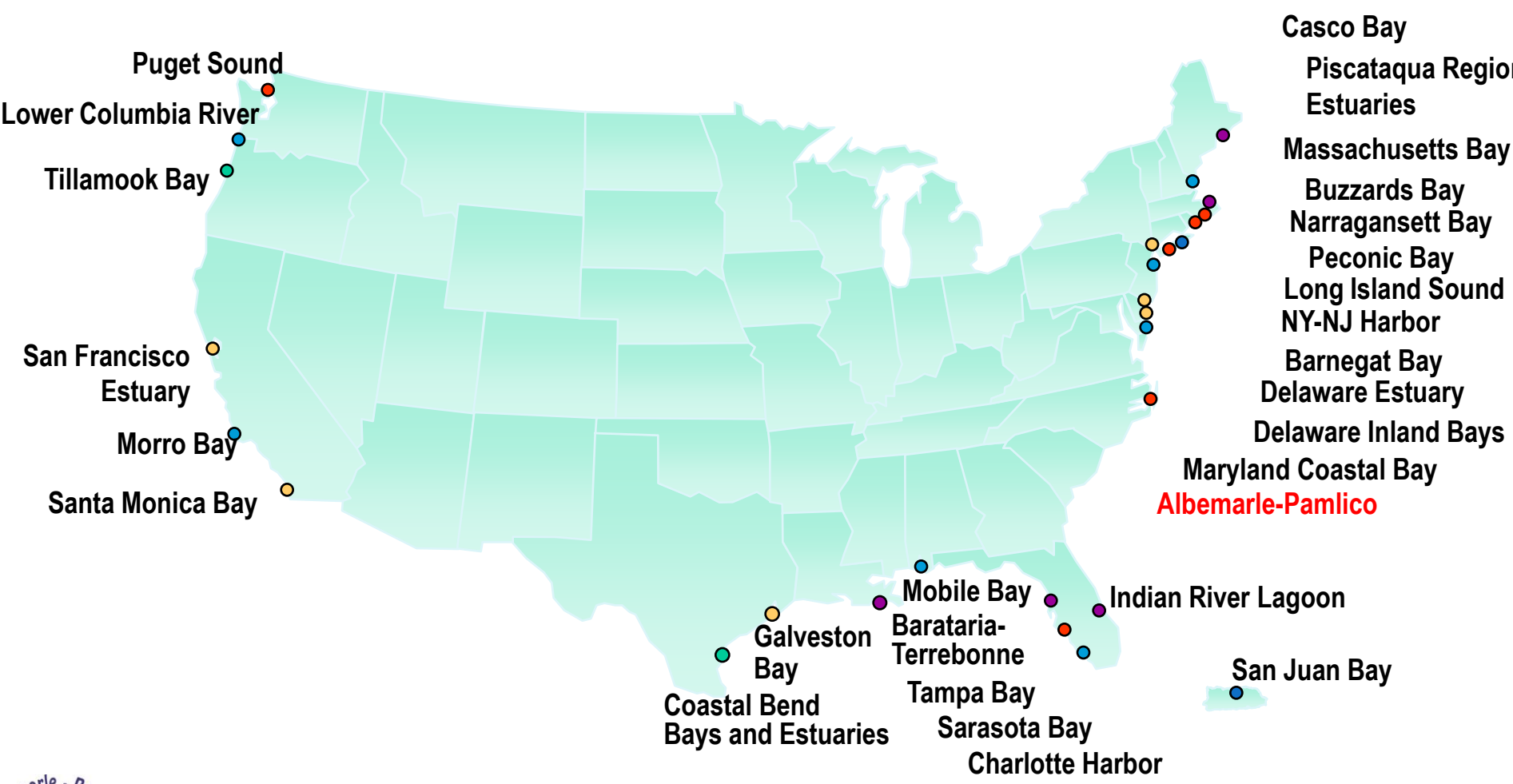
Cape Hatteras

Cape Lookout



APNEP Implementation Area and Management Institutions





NEP Estuaries

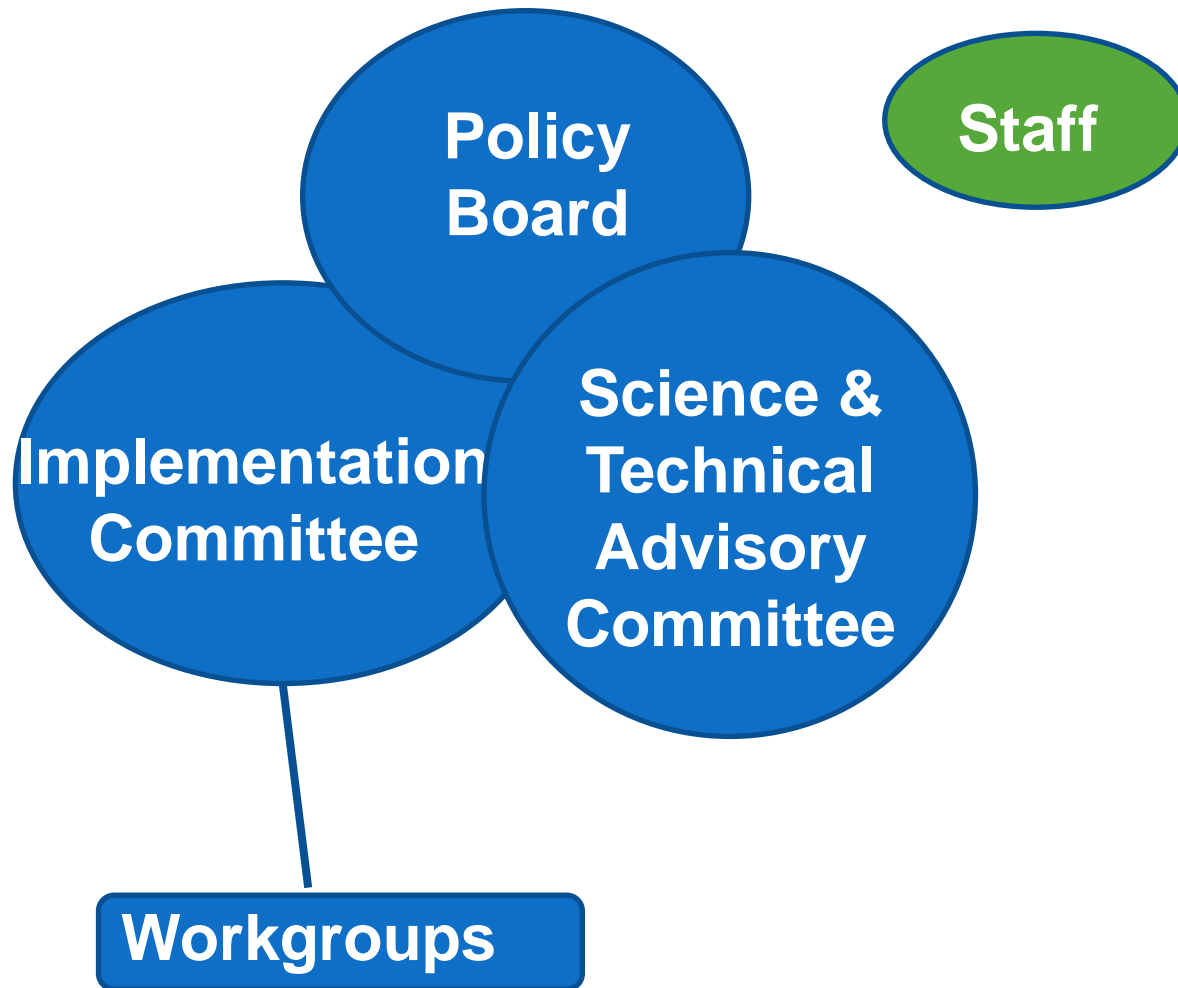


Albemarle-Pamlico National Estuary ~~Program~~ Partnership

- Designated as an estuary of national significance by Congress in 1987.
- Part of the National Estuary Program, under Section 320 of the Clean Water Act.
- Funded through an EPA Cooperative Agreement/ grant to the NC Department of Environment and Natural Resources.
- Management Conference
- Each program establishes a *Comprehensive Conservation and Management Plan* (CCMP).

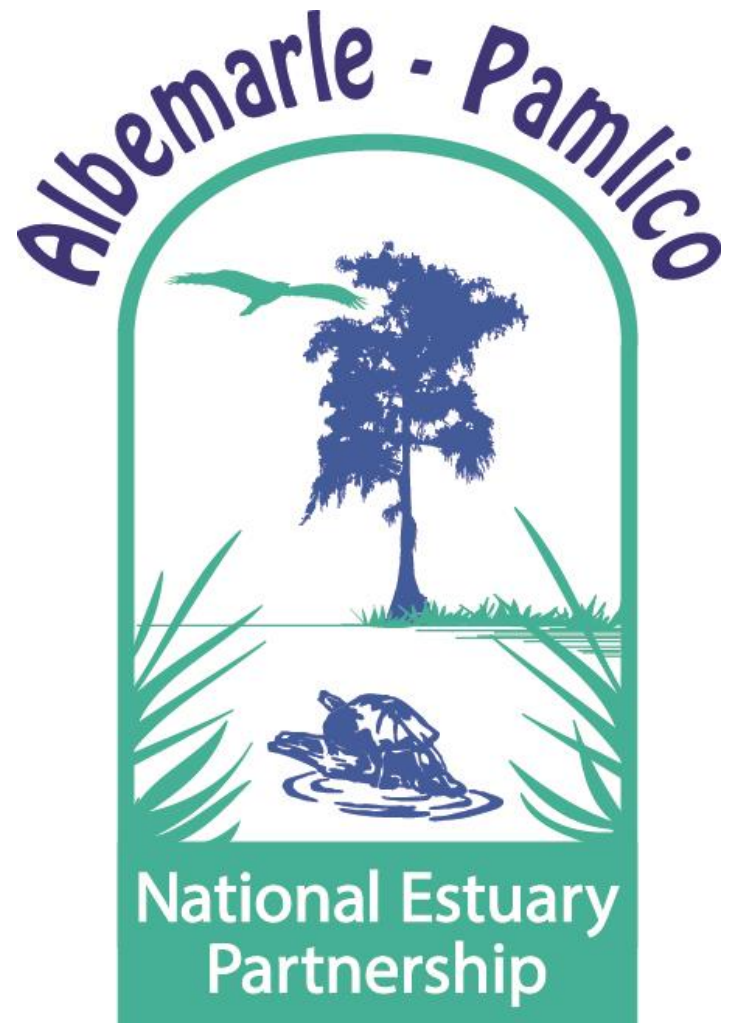


Management Conference



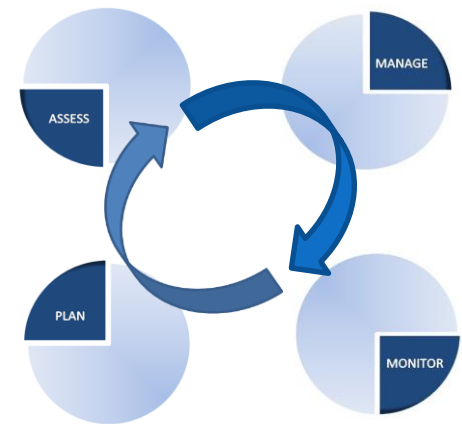
Mission

“To identify, protect, and restore the significant resources of the Albemarle-Pamlico estuarine system.”



Transition towards Ecosystem-Based Management

- A **holistic vision and plan** that includes a comprehensive description of the Albemarle-Pamlico system and articulation of multiple management objectives. (**Systems Approach**)
- A community that has **effective engagement** of policy makers, managers, scientists, & stakeholders. (**Accountability**)
- A process that includes effective **adaptive management** to address a changing system.
- A **framework** that includes appropriate authority, implementation area, management institutions, financial resources, and effective communications.



Gaining “Appropriate Authority” to Undertake EBM

- Presentation to Policy Board (May 2009)
- Theme of Science & Technical Advisory Committee meeting (July 2009)
- Formed EBM Proposal Team (August 2009)
- Proposal to Policy Board (December 2009)
- Progress Reports to Policy Board

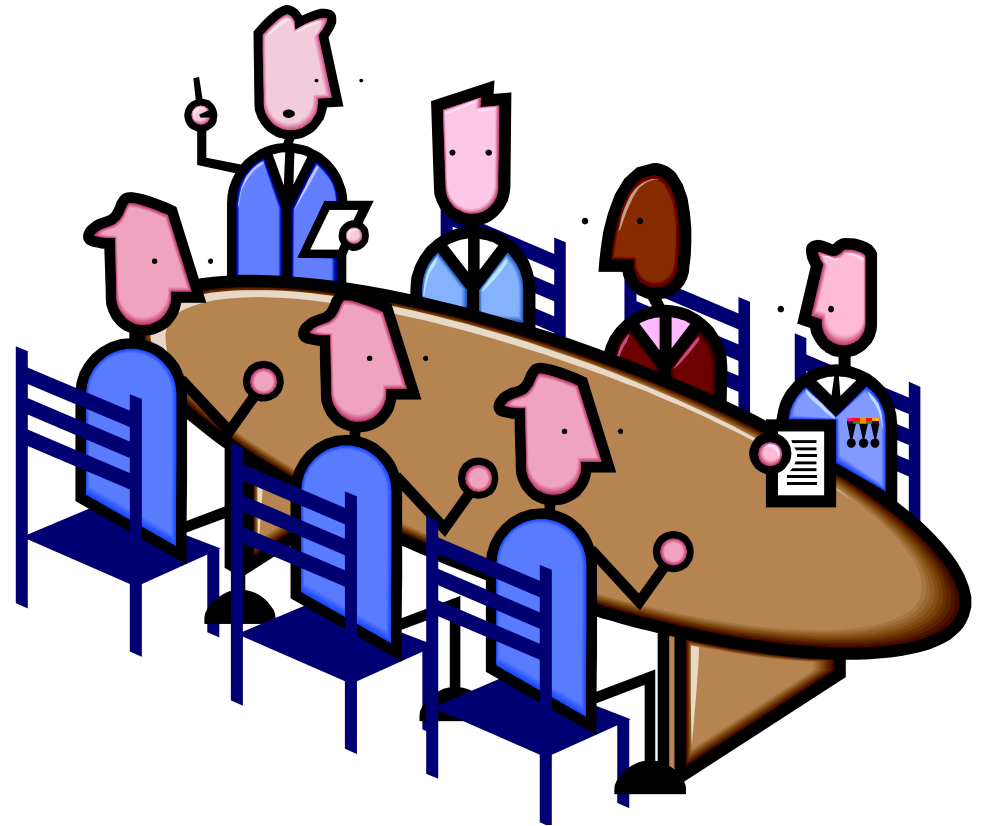


CCMP adopted March 2012

APNEP

EBM Transition Team

- Policy Board
- Science & Technical Advisory Committee
- Citizens Advisory Committee
- State WQ Planner
- Federal Planner
- EBM Tech Transfer
- Staff



Steps towards EBM implementation

1. Articulate **program goals**
2. Develop **system level model** for goal attainment
3. Assess current management efforts –**identify gaps**
4. Develop **management strategy**
5. Develop **monitoring program**
6. **Assess** performance
7. **Manage adaptively**

Step 1: Articulate program goals

- Objectives Hierarchy Structure
 - Goal-Objective-Management Action-Step (1994)
 - Goal-Subgoal-Objective-Management Action (Draft 2008-2010)
 - **Goal-Outcome** + Component-**Objective-Action** (2012)
- Objectives Hierarchy Content
 - Five Goals, 15 Objectives, 49 Actions (1994)
 - **Three Goals, 12 Outcomes** + 5 *Components*, **15 Objectives, 58 Act** (2012)

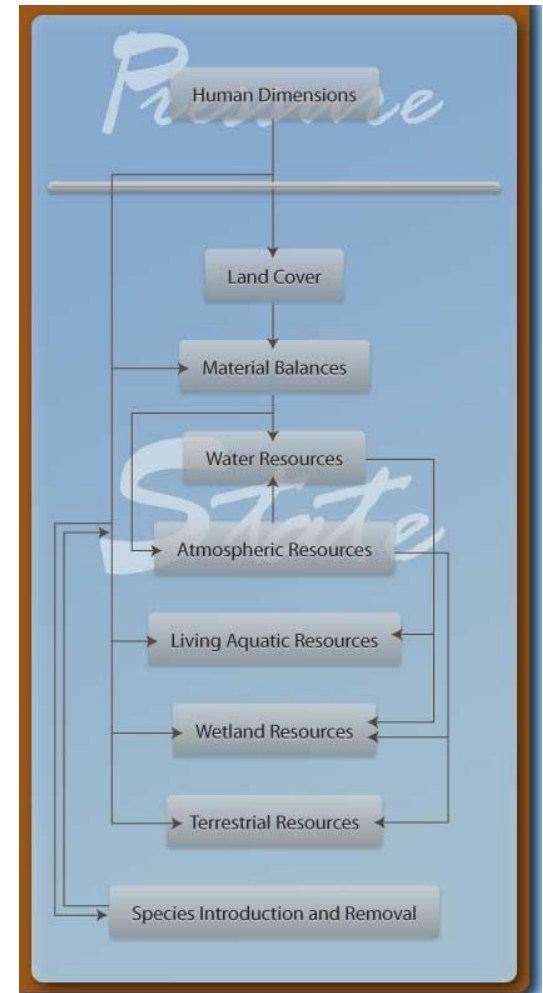
Three Ecosystem Health Goals

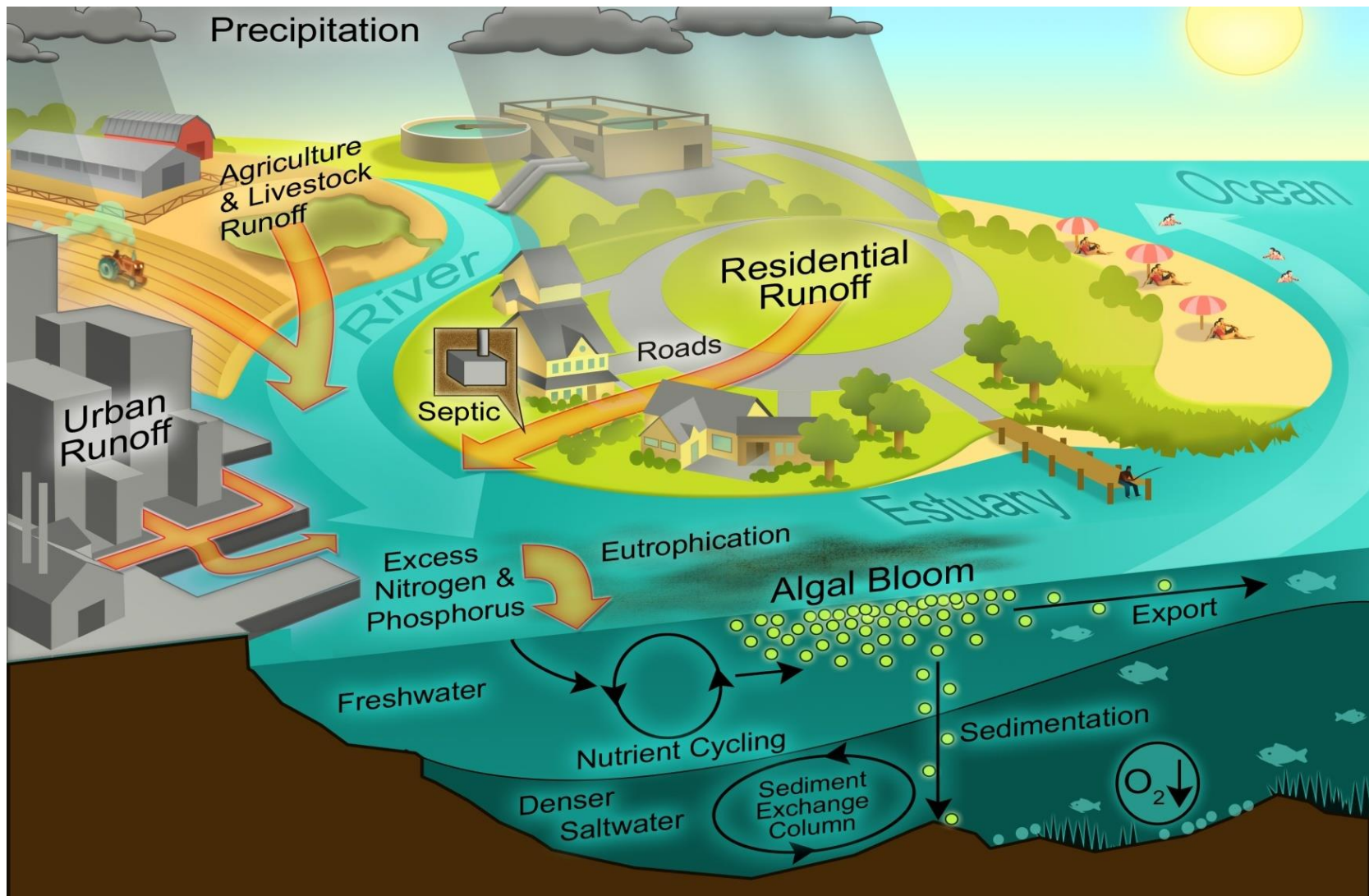
- A region where **human communities** are sustained by a functioning ecosystem
- A region where aquatic, wetland, and upland habitats support viable populations of **native species**
- A region where **water** quantity and quality maintain ecological integrity

Step 2: Develop System Level Model for Goal Attainment

Ecological management actions (stressor mitigation) can impact multiple ecosystem endpoints

Multiple stressors (including other endpoints) impact directly and indirectly ecosystem endpoints





Modified from H. Paerl

Conceptual Model of Nutrient Cycle

Outcome: Nutrients and pathogens do not harm the species that depend on the waters

- ***Biological Factors***
 - *Fauna*
 - *Flora*
 - *Microorganisms*
 - pathogen source control
 - human (septic)
 - animal (pasture, CAFO manure management)
 - wildlife population (?)
- ***Physical Factors***
 - *Structure*
 - *Hydrology*
 - *Temperature*

Outcome: Nutrients and pathogens do not harm the species that depend on the waters

- ***Chemical Factors***

- *Salinity*
- *pH*
- *Nutrients*
 - Load controls for nitrogen and phosphorus (air deposition, runoff, groundwater, point source)

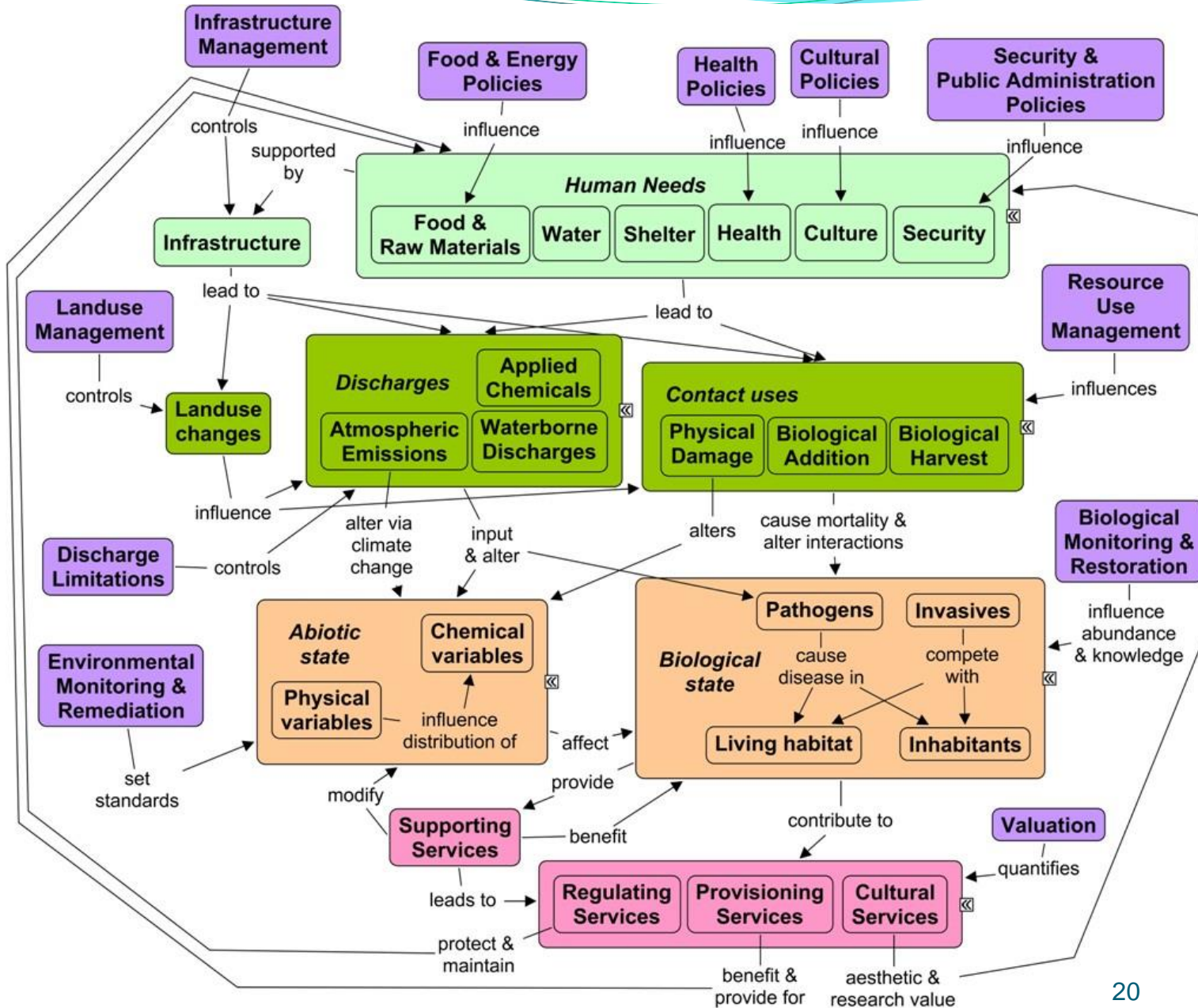
- ***Human Factors***

- *Use objectives*
 - Management of agricultural pollutant sources
 - Management of developed land pollutant sources (stormwater)
 - Water body use designation (WQ standard development)
- *Modification of system*
 - Land-use management (particularly riparian lands)
- *Knowledge*
 - Technical understanding of Contaminant Management Strategies to meet WQ standards
 - Public appreciation of risks and need for management
 - Policy appreciation of regulatory needs

DPSER Modeling

Lt. green = Drivers
 Dk. Green = Pressure
 Orange = State
 Red = Ecosystem Services
 Purple = Response

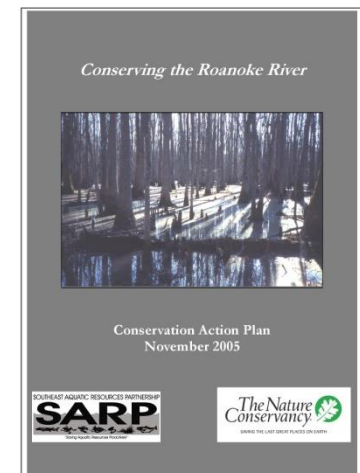
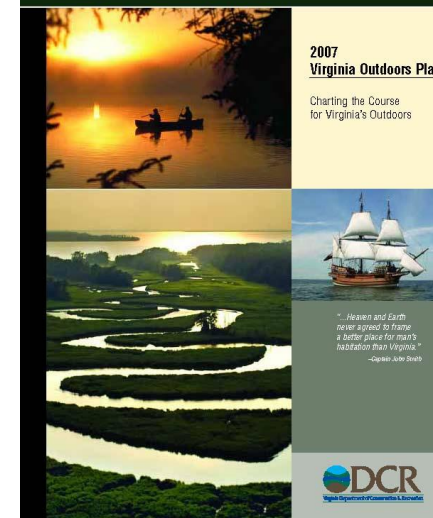
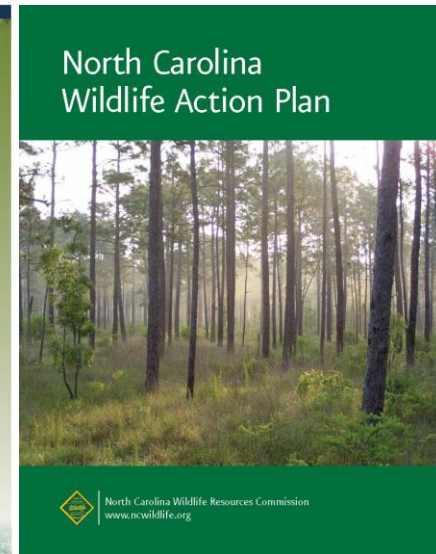
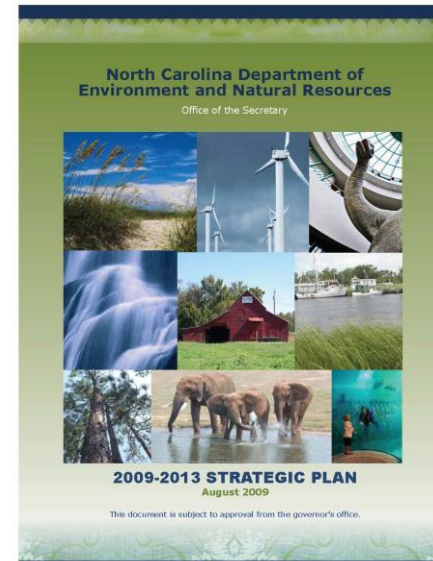
EPA-ORD-ESRP 2010



Step 3: Assess Current Management Efforts

– identify gaps

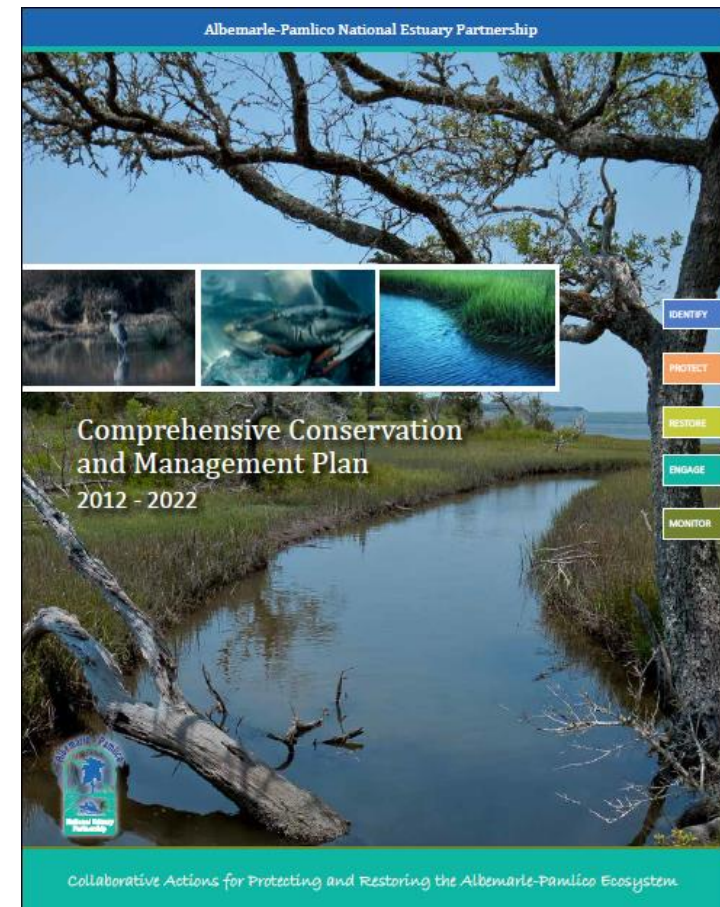
- Directed by conceptual models
- Review of partners' strategic/action plans
 - Specificity and publication date
 - Action extraction
 - Align with APNEP outcomes/strategies
- Interactions w/ **senior management**
- Interactions w/ **staff**



Step 4: Develop Management Strategy

Comprehensive Conservation and Management Plan (CCMP)

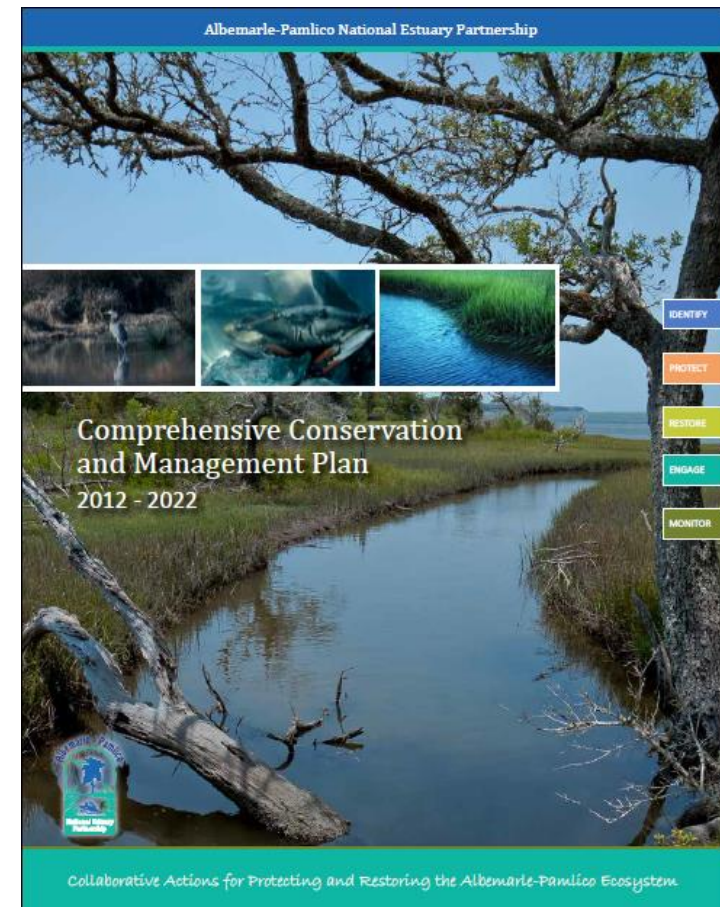
- Development Team
- Stakeholder Questions
- Management Objectives
- Actions with Partner Responsibilities
- APNEP Management Conference Review (CAC, STAC)
- Partner Review
- Public Input
- Policy Board Approval
- Agency Review
- CCMP Publication



Step 4: Develop Management Strategy

Comprehensive Conservation and Management Plan (CCMP)

- Development Team
- Stakeholder Questions
- Management Objectives
- Actions with Partner Responsibilities
- **edit**
- APNEP Management Conference Review (CAC, STAC) - **edit**
- Partner Review - **edit**
- Public Input - **edit**
- Policy Board Approval
- Agency Review
- CCMP Publication



CCMP's Four Questions

- What is a **healthy** Albemarle-Pamlico Estuarine System?
- What is the **status** of Albemarle-Pamlico Estuarine System?

2012 Ecosystem Assessment

- What are the **biggest threats** to Albemarle-Pamlico Estuarine System?
- What **actions** should be taken that will move us from where we are today to a healthier Albemarle-Pamlico Sounds by 2020?



Indicator Planning Decisions

- **What indicator(s) map to each environmental outcome?**
- **What are the fair, good, and excellent health **target values** for each ecosystem outcome indicator?**
- **What is the expected trajectory of an indicator value, based on how CCMP actions are implemented?**
- **What is the “trigger” value for a given interval since action steps are implemented, outside of which means the system is not behaving as forecast and change in business (e.g., research, revised action step, partner commitment) is required?**

Goal	Environmental Outcome	Outcome Type	Provisional Indicator
1: Human Communities	1A: Waters are safe for personal contact.	Swimming	Beach Action Days/Closings by Water Body Type Sounds, Freshwater River, Lake, Brackish River)
	1B: Designated surface and ground water supplies are safe for human consumption.	Potable Surface Waters	WQ Standard Violations (Surface)
		Potable Groundwaters	Drinking Water Standard Violations (Water-supply Aquifers) Nutrient Concentrations in Land Use Categories (Shallow Aquifer)
	1C: Surface hydrologic regimes sustain regulated human uses.	Water Supply	Flows, Severity, Frequency, Duration of Droughts & Floods
	1D: Fish and game are safe for human consumption.	Edible Harvest	Fish Consumption Advisories Shellfish (& Swimming) Area Closures
	1E: Opportunities for recreation and access to public lands and waters are protected and enhanced.		Access, Water Trails Number of Visitations & People Who Use Coastal Areas Number of Tourists to Coastal Regions Water Access Number & Location



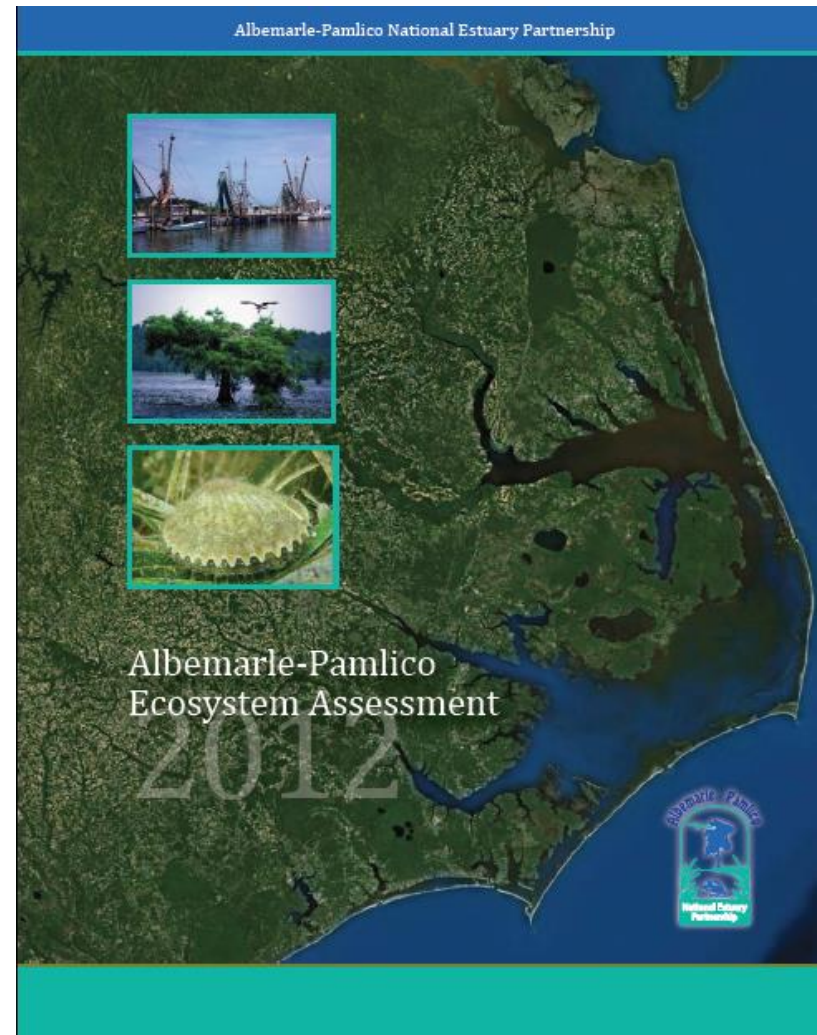
Step 5: Develop & Implement a Monitoring Program

- Linking candidate indicators to CCMP outcomes
- Indicator-specific monitoring strategies
 - Justification for indicator
 - Goal of sampling/monitoring program
 - Existing sampling/monitoring program
 - Enhanced sampling/monitoring program
 - Reference(s)
- Development of Integrated monitoring strategy



Step 6: Assess Performance

- “Interim” regional ecosystem assessment (2012)
 - Select provisional indicators
 - Status & trends from 1995 to present
 - Heinz Center document format
- Phase 2 assessment
 - Diagnosis
- Phase 3 assessment
 - Forecasting



Ecosystem Assessment

Coasts, Sounds, Near Marine: Extent & Pattern

- *Phragmites australis*
 - Why Is the Extent of the Wetland Plant Species *Phragmites australis* Important?
 - What Will This Indicator Report?
 - What Do the Data Show?
 - Why Can't This Entire Indicator Be Reported at This Time?
 - Discussion
 - Technical Notes



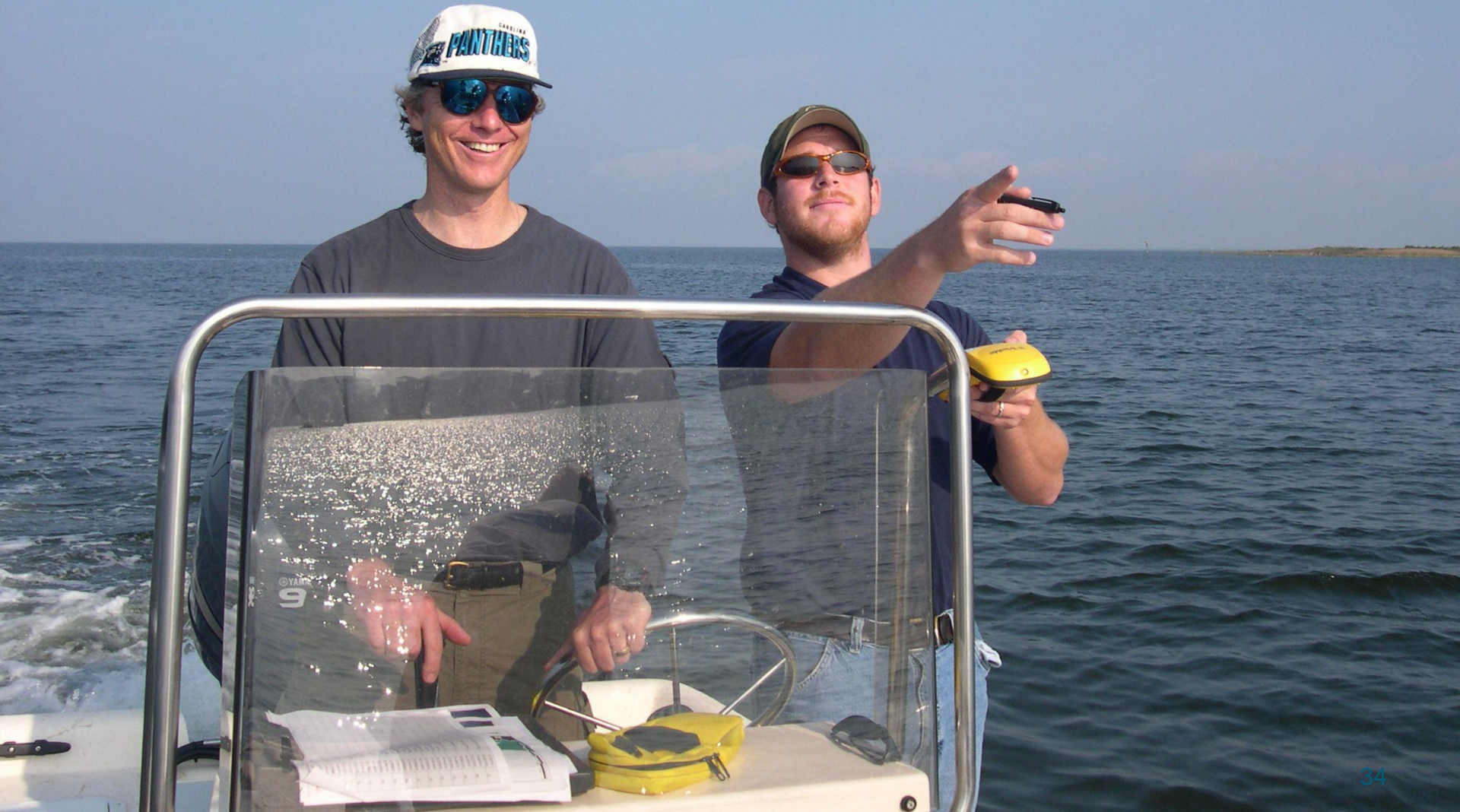
Example

Step 7: Manage Adaptively



- Meaningful Targets
- Trigger levels ?
- Reliable Monitoring Data
- Continued Senior Management Engagement
- **Ability to Change Course?**

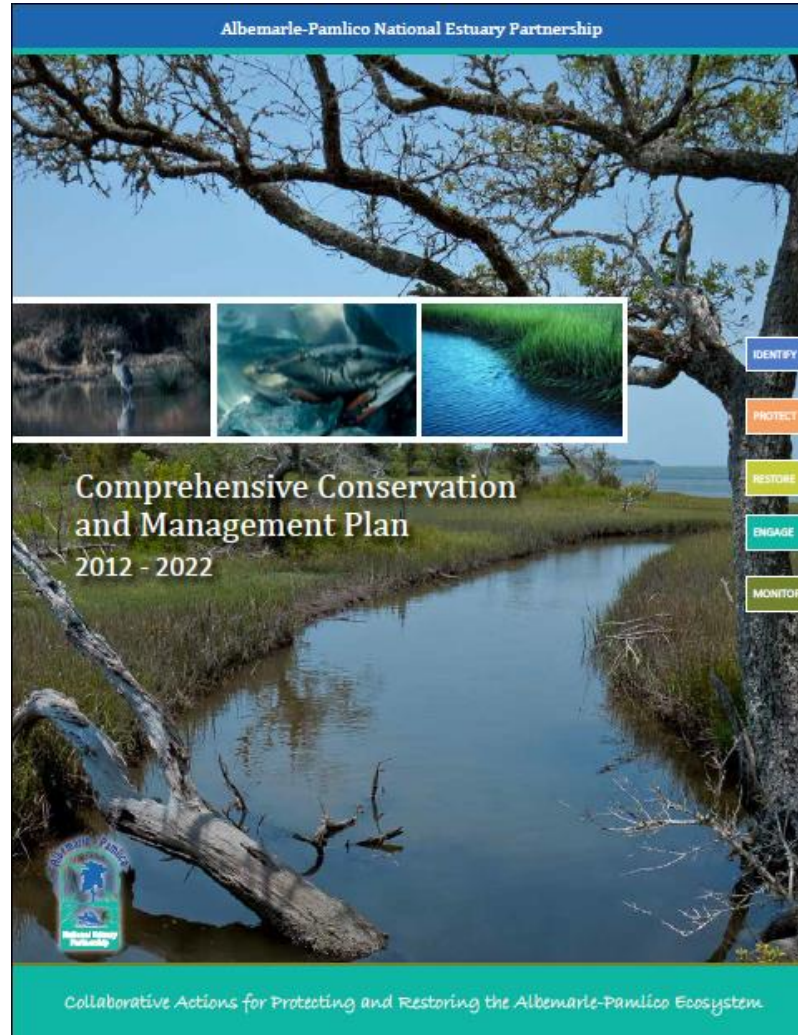
On Course?



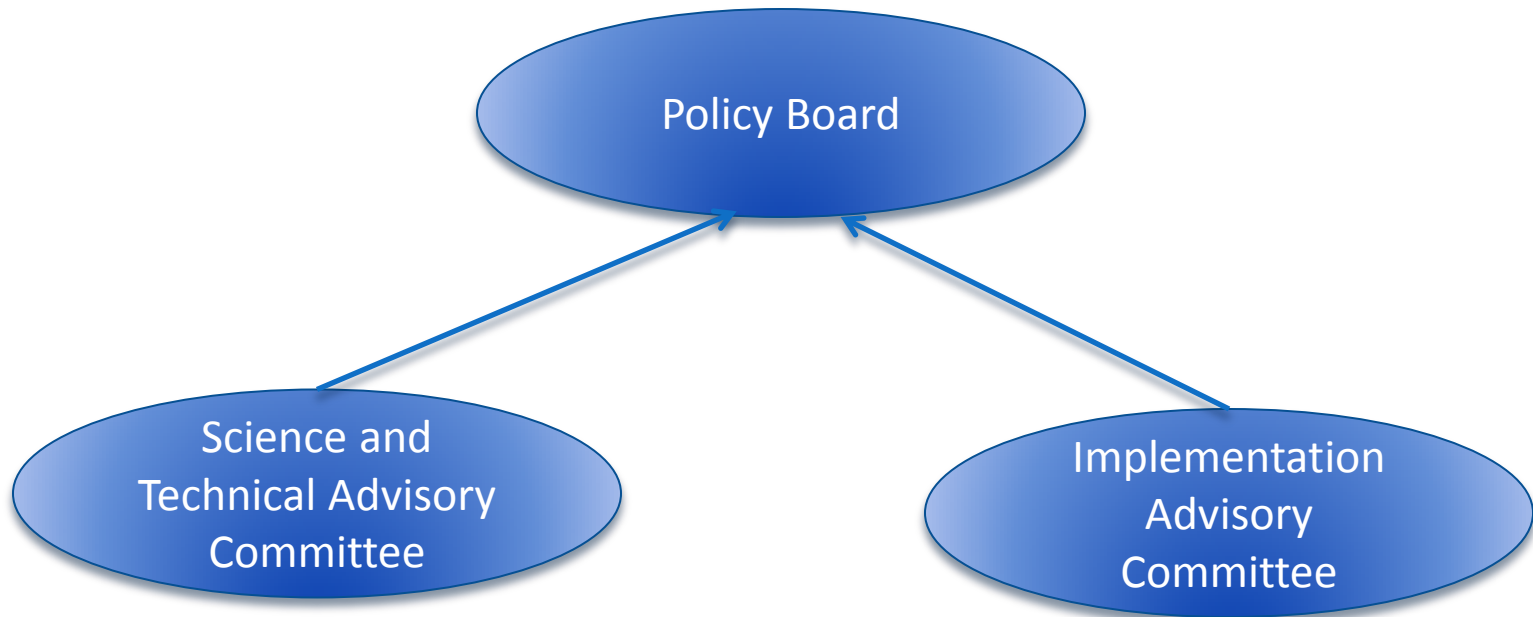




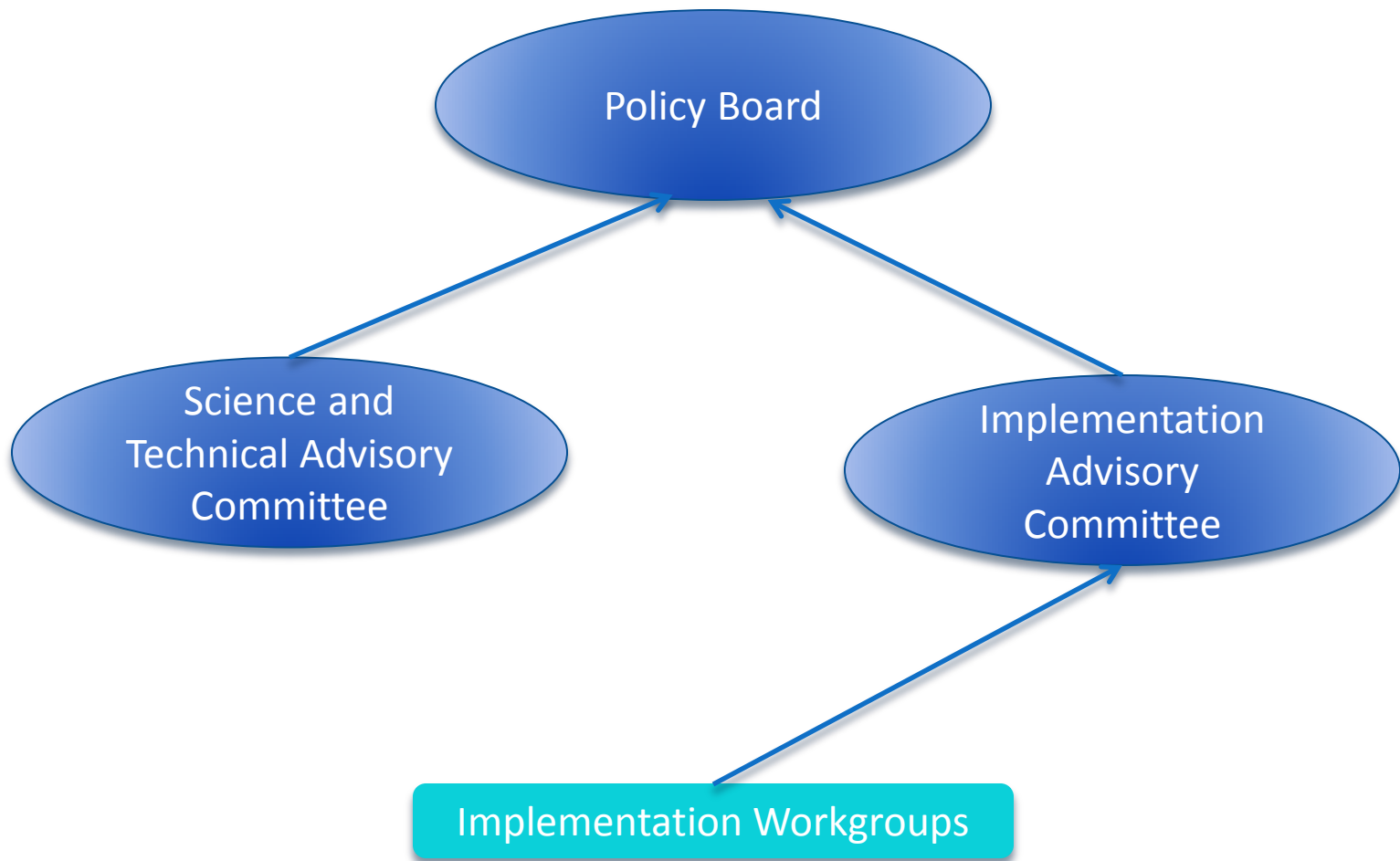
Implementation of 2012-2022 CCMP



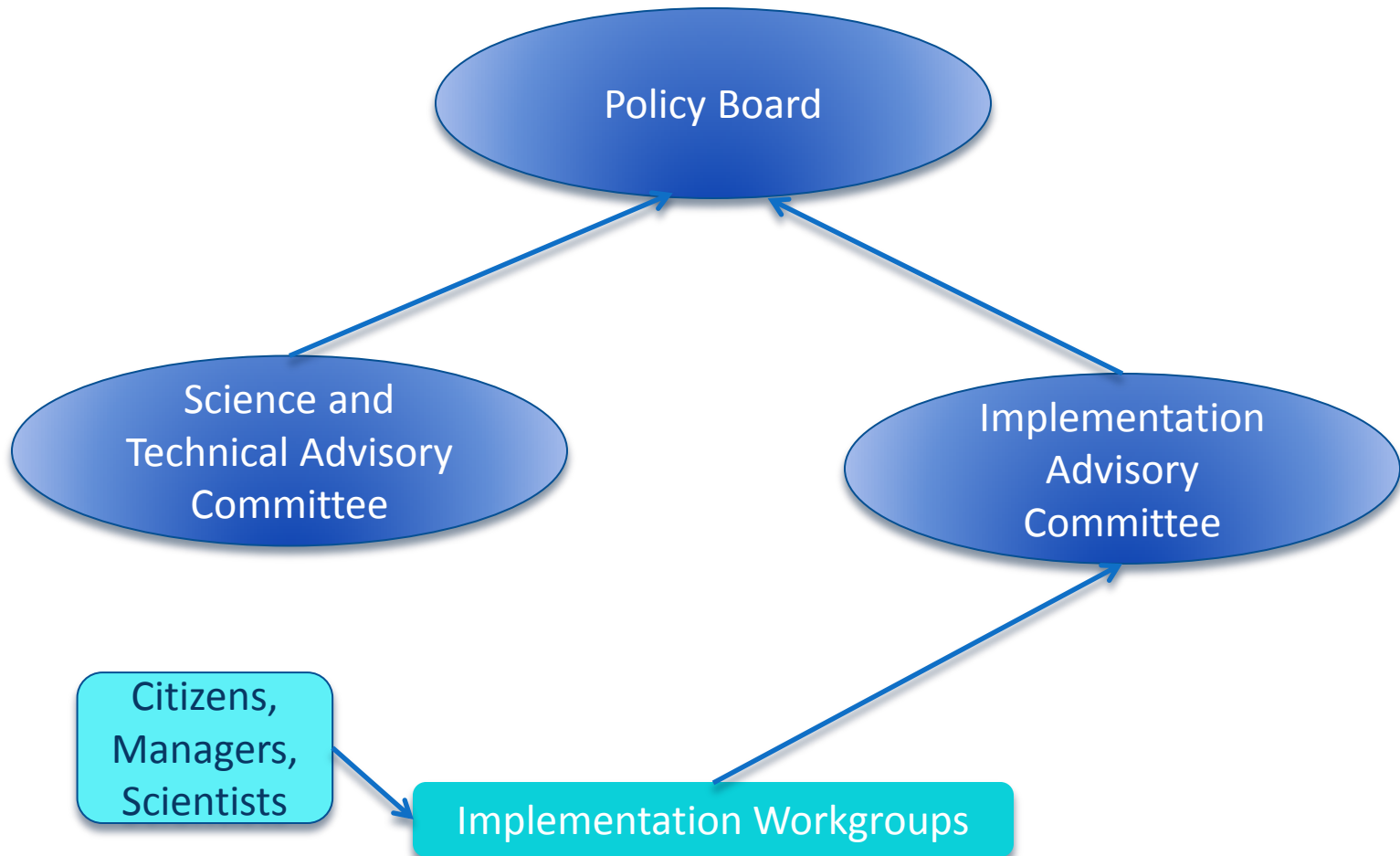
Advisory Committee Structure



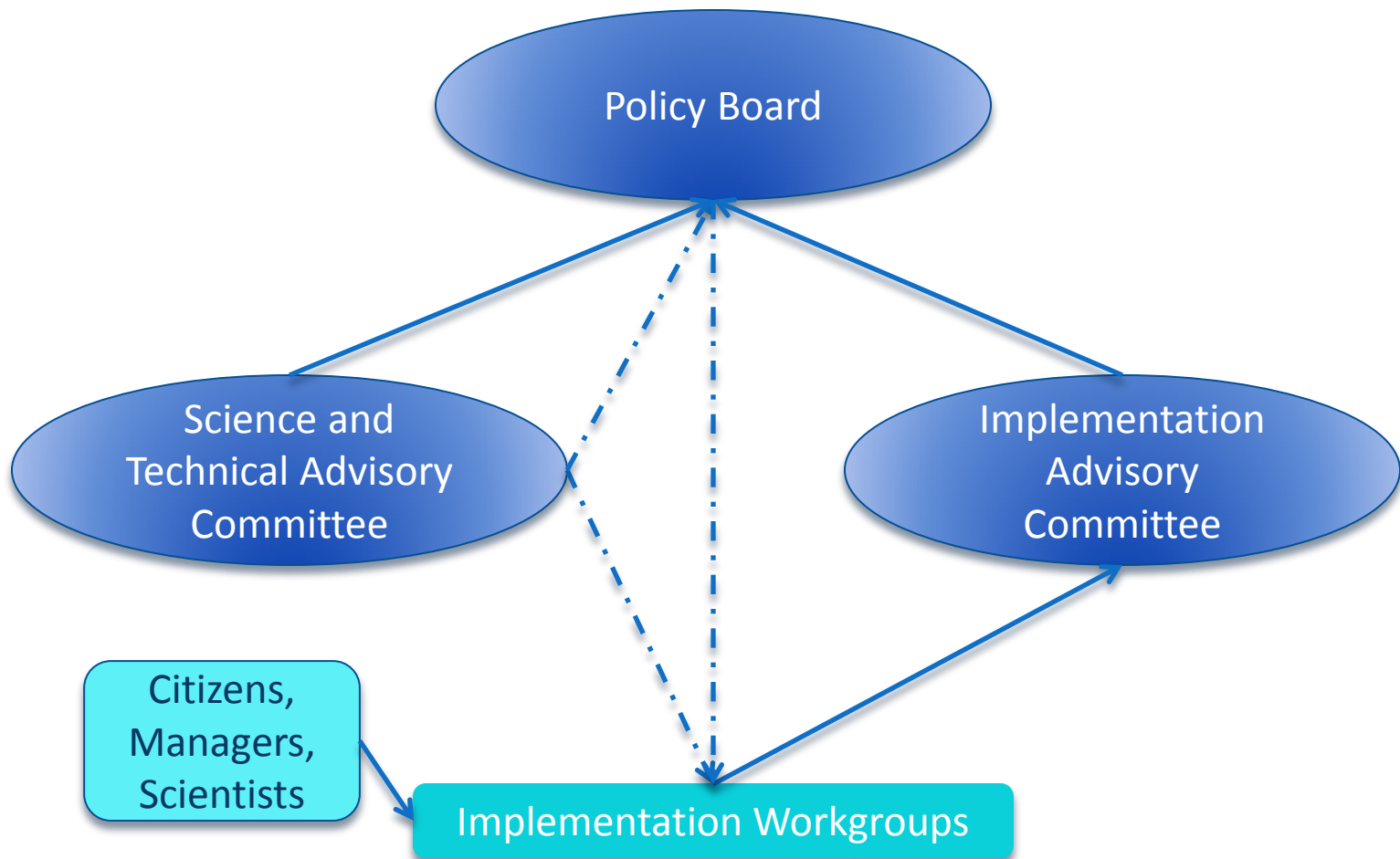
Advisory Committee Structure



Advisory Committee Structure



Advisory Committee Structure



Workgroups

- Freshwater Habitats
- Policy & Economics
- Decision Support Tools
- Education & Engagement
- Water Quality Improvements
- Shorelines
- Contaminant Management
- Invasives
- Restoration Strategies
- Monitoring Networks
- Oysters
- Hydrologic Regimes
- Public Access
- Submerged Aquatic Vegetation



Contaminant Management Strategies Workgroup

APNEP Lead: Dean Carpenter → **APNEP staff contact**
PB Contact: Todd Miller (interim)
Chair: → **Workgroup Chair**
STAC Reps: Hans Paerl, Rich Whittecar

Decision-Support Tools Workgroup

APNEP Lead: Lindsey Smart
PB Contact: Tom Allen → **Policy Board Contact**
Chair:
STAC Reps: Tom Crawford, Rua Mordecai, Dean Urban ➤ **STAC Contacts**

Education & Engagement Workgroup

APNEP Lead: Bill Crowell
PB Contact: Willy Phillips
Chair:
STAC Reps: Randy Swilling, Jess Whitehead



Contaminant Management Strategies Workgroup

Albemarle-Pamlico National Estuary Partnership

Sunday, March 16, 2014

CONTACTS:

- APNEP Lead:** Dean Carpenter
- Policy Board Contact:** Todd Miller (interim)
- Chair:**
- Members:**

WORKGROUP PRIORITIES (CCMP ACTIONS):

Identify

- **A2.4** Facilitate risk assessments of targeted personal care and pharmaceutical products in the aquatic system.

Identify

- **A2.5** Facilitate risk assessments of heavy metals and other toxic contaminants in sediments.

Restore

- **C1.1** Establish contaminant management strategies for waters not meeting water quality standards.

Restore

- **C1.2** Facilitate the implementation of existing contaminant management strategies.

Workgroups



RESTORE

C1.5

Restore

Facilitate voluntary retrofitting of existing development and infrastructure to reduce runoff.

This action targets existing storm water systems that are to be improved to reduce runoff. Where development or infrastructure has a high percentage of impervious surfaces, implementation of low impact development practices will be encouraged.

STATUS INFORMATION

Status:

In Progress

Current Action:

LID State Technical Review Team Meetings

Next Step:

LID Summit March 2014



Implementation

CONTACTS:

<p>Lead: Sea Grant</p>	<p>APNEP Lead: Jimmy Johnson</p>	<p>Key Partners: EPA, NCDWR, VADCR, NOAA, NCCWMTF, VAWQIF, NCCF, Sea Grant, CSI, Cooperative Extension</p>
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IMPLEMENTATION WORKGROUP: Water Quality Improvements

Contacts:
Todd Miller

A region where water quantity and quality maintain ecological integrity.

Sediments do not harm species that depend on the waters.

Nutrients and pathogens do not harm species that depend on the waters.

Appropriate hydrologic regimes support ecological integrity.

A region where aquatic, wetland, and upland habitats support viable populations of native species.

The extent and quality of upland, freshwater, estuarine, and near-shore marine habitats fully support biodiversi

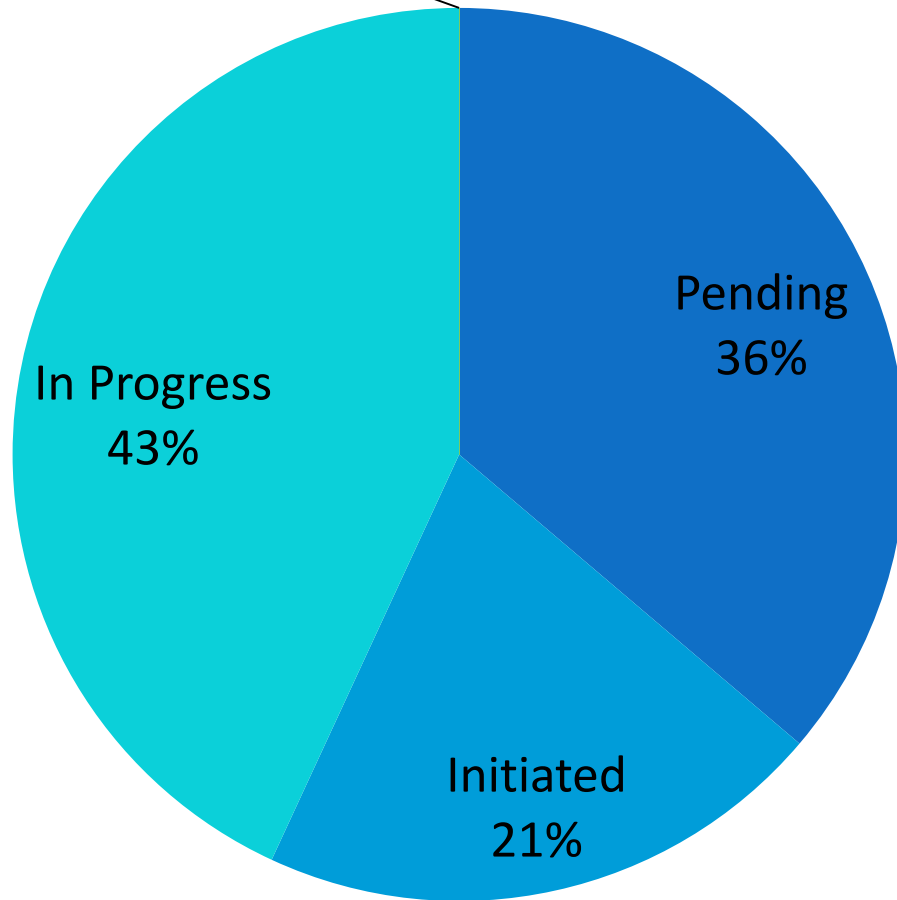
The biodiversity, function, and populations of species in aquatic, wetland, and upland communities are protecte



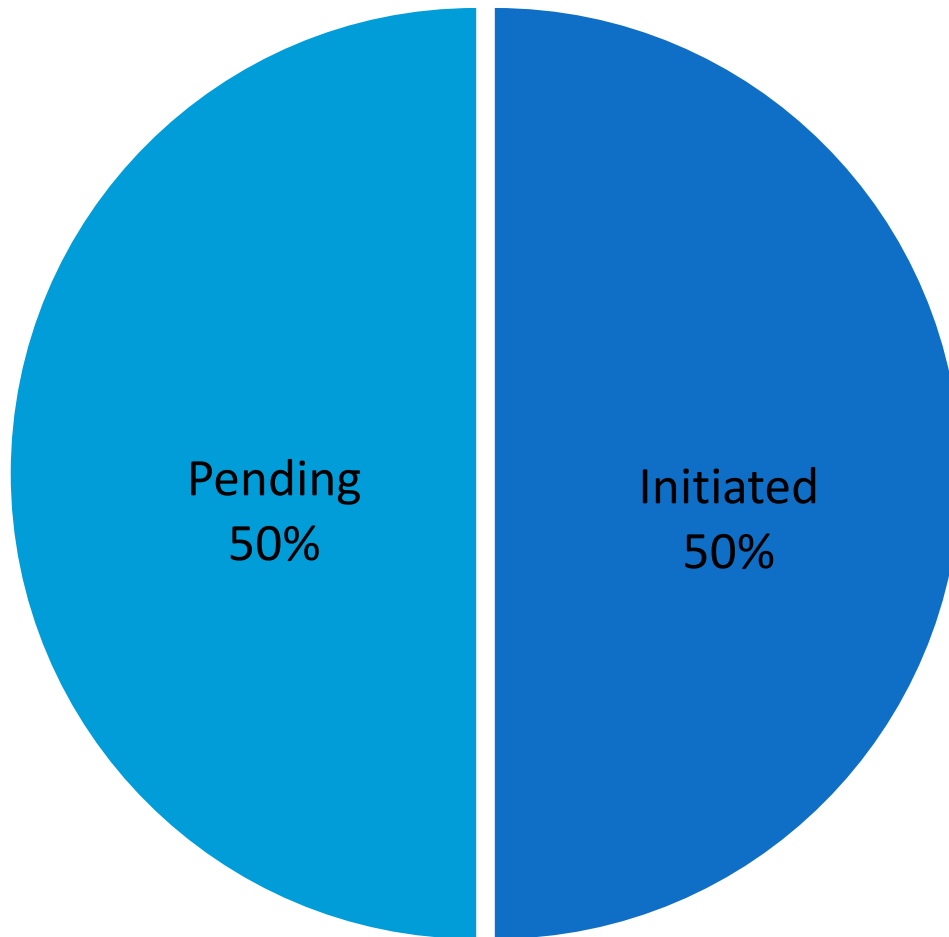
CCMP Action Status

Final Stages
0%

Complete
0%



Workgroup Status



Implementation



Questions?