APNEP Science & Technical Advisory Committee Inaugural

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APNEP Science Coordinator
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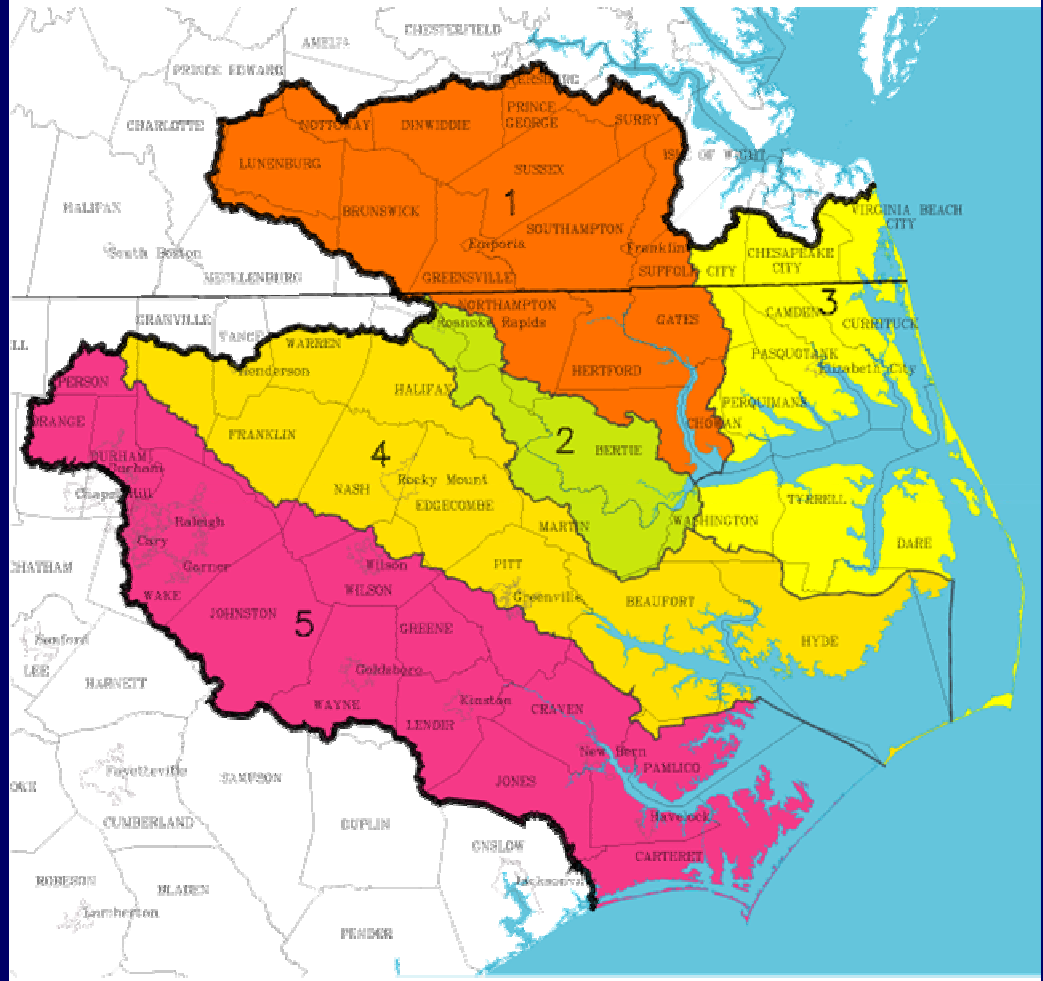
APNEP Science & Technology Overview

- APNEP
- APNEP S&T
- Assessment
- Monitoring
- Interdisciplinarity
- STAC

APNEP Mission

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

ALBEMARLE-PAMLICO NATIONAL ESTUARY PROGRAM REGION



1 - Chowan River Basin
2 - Roanoke River Basin
3 - Currituck Sound & Pasquotank River / Albemarle Sound Drainage Basin
4 - Tar-Pamlico River & Pamlico Sound Drainage Basin
5 - Neuse River Basin & Core Sound / Bogue Sound Drainage Basin

Map prepared April 30, 1998 by the NC Center for Geographic Information & Analysis

Albemarle-Pamlico
National Estuary Program
North Carolina

Urban Land Cover Dynamics (1982-1997)

- Chowan = 62.1%
- Albemarle = 86.2%
- Tar-Pamlico = 87.2%
- Neuse = 89.3%
- Bogue-Core Sounds = 102.4%
- Roanoke = 136.1%
- Pamlico Sound = 138.2%

APNEP Staff

- Director: Bill Crowell
- Science Coordinator: Dean Carpenter
- Restoration Specialist: Kelly Williams
- Outreach Coordinator: Joan Giordano
- Citizens Monitoring Network Coordinator: Allen Clark
- Field Representatives: Boyce Hudson (NC), Noah Hill (VA)

How Did We Get Here?

- 1986: Coordinator Rader
- 1987: First and Largest NEP, Coordinator Holman
- 1993?: Coordinator Waite
- 1994: CCMP Completed
- 1995: Coordinator Stefanski
- 1997: Decade Conference
- 2000: Monitoring Conference
- 2001: Acting Coordinator Kuchen
- 2002: Director Crowell

APNEP Administration

- Annual Budget
- Leveraging
- Reporting
- Partnering

Science for Stewardship: Case Study

- "Ecologically Sustainable Water Management: Meeting Human and Ecological Needs for Water in the Twenty-First Century"
  - TNC, New York, July 30
- Discussion Session: Bridging the Science and Management Gap in Ecological Flow Studies

Demand for Science & Technology

" To address water resources problems likely to emerge in the next 10-15 years, decision makers at all levels of government will need to make informed choices among often conflicting and uncertain alternative actions. These choices are best made with the full benefit of research and analysis."

Source: NRC 2004

Core Questions of Science and Technology for Sustainability

- Can scientifically meaningful “limits” or “boundaries” be defined that would provide effective warning of conditions beyond which the nature-society systems incur a significantly increased risk of serious degradation?
- What systems of incentive structures – including markets, rules, norms and scientific information – can most effectively improve social capacity to guide interactions between nature and society toward more sustainable trajectories?

Core Questions of Science and Technology for Sustainability II

- How can today's operational systems for monitoring and reporting on environmental and social conditions be integrated or extended to provide more useful guidance for efforts to navigate a transition toward sustainability?
- How can today's relatively independent activities of research planning, observation, assessment, and decision support be better integrated into systems for adaptive management and societal learning?

Source: Harvard's Forum on S & T for Sustainability

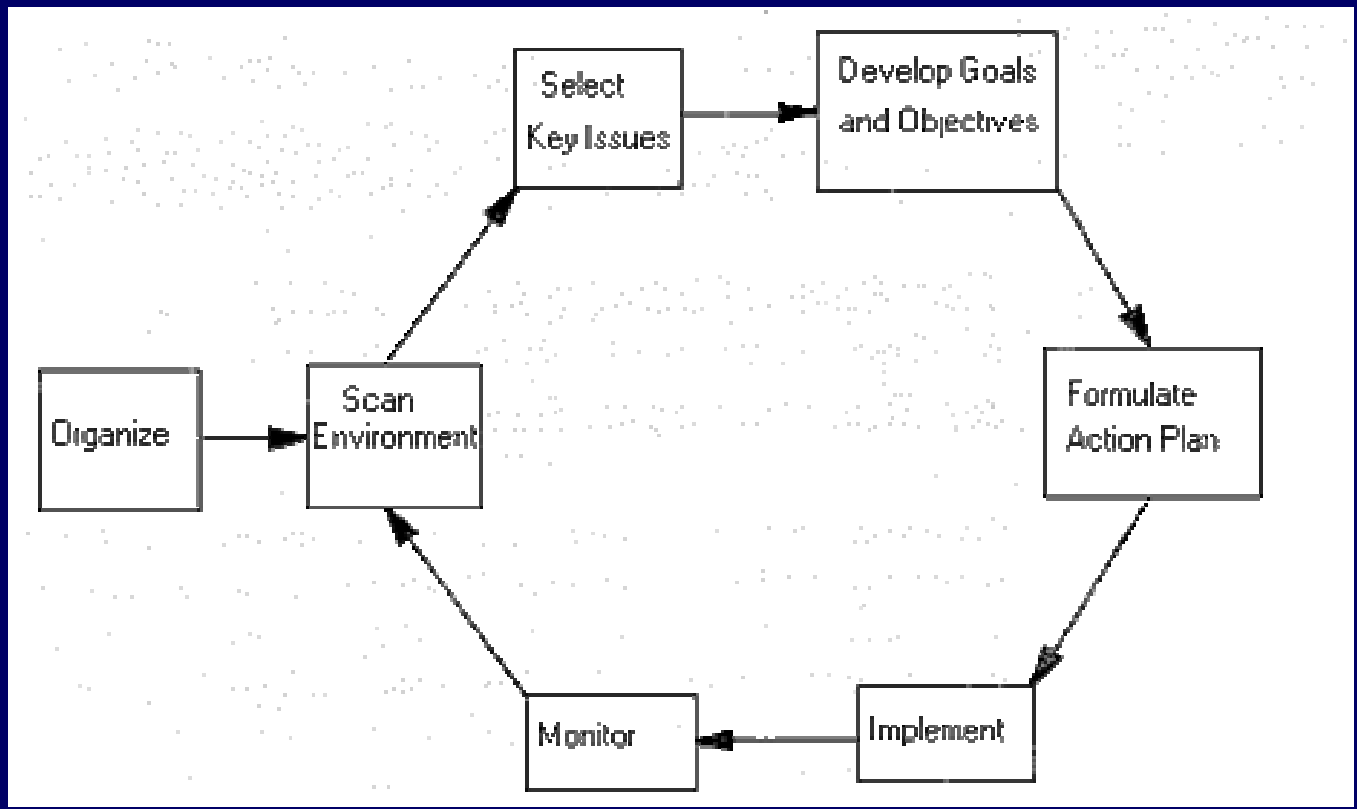
Informing Decisions with Ecological Knowledge

- ESA 2004 Action Plan: Vision 1
  - Integrate advances in ecological knowledge into policy and management decisions that affect ecological sustainability
  - Foster a thoughtful public today and educate generations tomorrow so that the best ecological knowledge informs individual choices about sustainability

APNEP Science & Technology Mission

- To facilitate the effective use of science, technology, training, and information in the planning, management, and evaluation of ecosystems within the APNEP region

Strategic Planning Model



S&T's Goal and Objectives

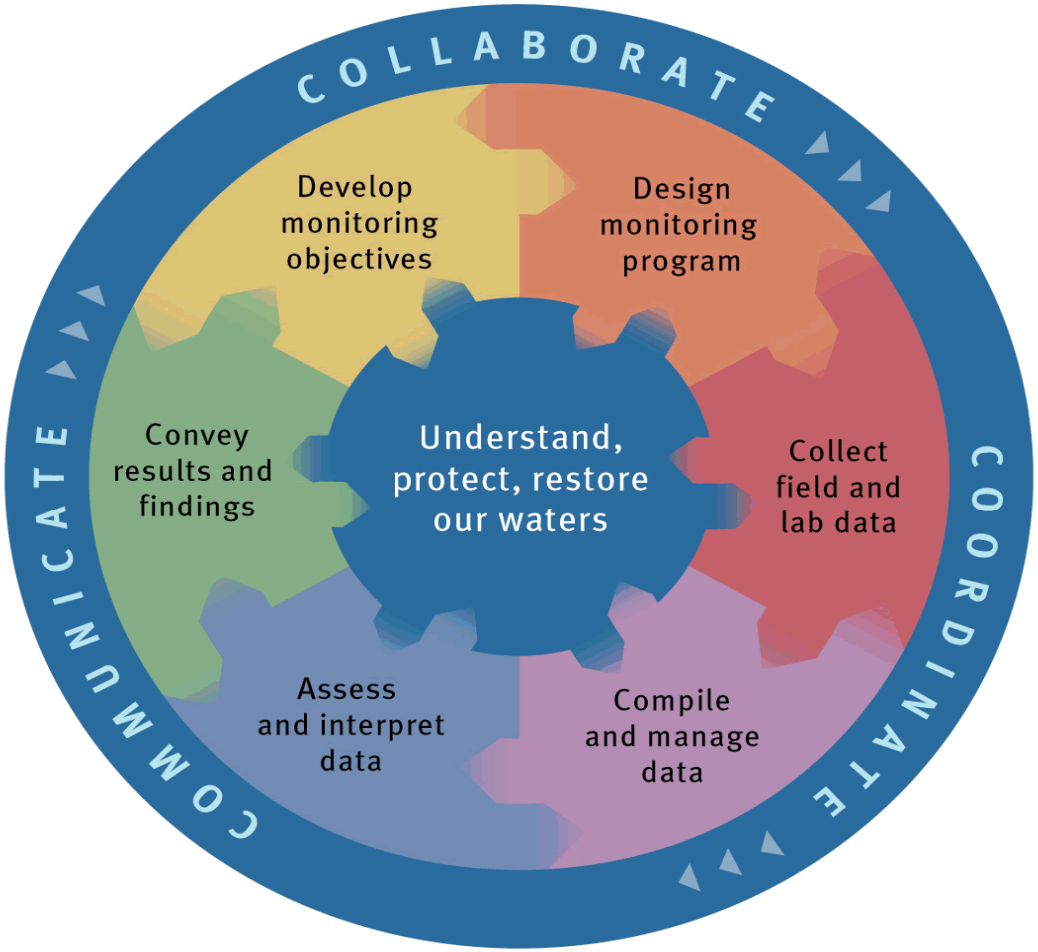
- Goal: "State of the Sounds" periodic assessments
- Initial Objective: APNEP has indicators in place to track key environmental and other trends based on CCMP priorities and emerging issues, and periodically report on status and trends
- Background Objective: Regional Pilot

Current S&T Status

- Half Empty: We're Behind!
  - No Coordinated/Integrated Monitoring Program
  - No Research Prioritization
  - Minimal Research Budget
  - No Science & Technical Advisory Committee < 2004
- Half Full: Regaining Momentum!
  - 2002: APNEP Elevation in DENR
  - 2003: Science and Restoration Coordinators
  - Many NEP case studies
  - Many monitoring & research activities

Technical Guidance for APNEP

- APNEP Publications
  - 130 APES-sponsored publications before CCMP
  - Data Management and Analysis System: Data Requirements (90-06)
- Non-APNEP Publications
  - Monitoring Guidance for the National Estuary Program (EPA 1992)
  - Clean Water Action Plan: Coastal Research and Monitoring Strategy (EPA, NOAA, USDA, USGS 2002)



Framework for Monitoring

Surrogate “Bureau of Environmental Statistics”?

- Improve our monitoring and enforcement of environmental standards
- Satisfy our natural desire to understand broad trends that affect our society and its welfare
- Ability to design better public policies for the environment

Source: Banzaf 2003

Bioregional Assessment Questions

- What were historic ecological, social, and economic conditions, trends, and variability?
- What are current ecological, social, and economic conditions?
- What are trends and risks under current policies and management?
- What policy choices will achieve ecological sustainability consistent with social well-being?
- What are the implications of these choices?

Source: Erman 1999

NC Assessment Needs

- "A process that fully evaluates the cumulative impacts from water withdrawls and other hydrological modifications should be developed and implemented."

  Source: CHPP July 2004 Public Draft

System-Based Assessments

- "We must not only take the vital signs of the [Sounds] but also assess why they are fluctuating and changing. Consequently, the system must embrace comprehensive analysis and assessment as integral components on an ongoing basis, as well as innovate research to better interpret results and improve our diagnostic capabilities. Projections into the future are part of such activity..."

Source: Karl and Trenberth 2003

Systems-Based Assessments II

- "Over the long haul, the success of [Sounds] restoration depends on a much more seamless integration of research, resource monitoring, and [stressor I] management across the entire ecosystem. This integration must have the same funding status as [stressor II] issues, thereby forcing the integration of stressor management decisions."

  Source: Lockwood et al. 2003

Assessment Planning

- "The greatest challenge in developing a large-scale biogeographic assessment is the synthesis and subsequent analysis of spatial data collected at different scales for varied objectives."

  Source: NOAA 2003, citing Gotway and Young 2002

Surveillance: Change Detection

"Major exporting nations currently have no effective monitoring or management. International markets can develop rapidly in the modern world, which means that wild populations can be decimated before regulatory agencies see any need to protect them."

Source: Chivian et al. 2003

Surveillance: Forecast Verification

- “Bay Pollution Progress Overstated: Government Program's Computer Model Proved Too Optimistic”

  Source: Washington Post, July 18

Biased Surveillance

"Because much problem-oriented funding has a specific focus that is not scientifically neutral, this has the potential to skew the sampling in either direction—either by oversampling [the endpoint] or by providing incentives to seek out examples of preservation or recovery."

Source: Buddemeier and Ware 2003

APNEP Monitoring Plan Workshop 2000: Issues

- Highest priority of Coordinating Council
- Challenge: Sufficient scientific data to determine status & trends of water quality and biological resources?
- NEP monitoring plan requirements
- APNEP monitoring, assessment, and research program survey Oct ‘00

APNEP Monitoring Plan Workshop 2000: Participants

- Academia: Duke, ECU, NCSU, UNC-CH, WRRI
- State: DAQ, DCM, DEH, DFR, DMF, DWQ, NERR, WRC, VA-DCR
- Federal: EPA-OA-OAQPS, EPA-OW-OPCD, EPA-ORD, EPA-Region 4, FWS, NOAA-NOS, USGS
- Basin Associations: Cape Fear, Tar-Pamlico, Roanoke
- Industry: Greenville Utilities, Weyerhaeuser

APNEP Monitoring Plan Workshop 2000: Findings

- Water and Sediment Quality
  - Rivers adequately monitored with the exception of storm events
  - More monitoring needed in estuaries and coastal regions
  - Automated sampling and measurement systems recommended

APNEP Monitoring Plan Workshop 2000: Findings II

- Atmospheric Deposition
  - DAQ monitoring appears adequate for APNEP needs but requires further evaluation and discussion
- Vital Habitat
  - Little habitat monitoring being conducted in APNEP area
  - Monitoring programs for SAV and other vital habitats need to be refined and increased
  - Remote sensing as a means for SAV monitoring

APNEP Monitoring Plan Workshop 2000: Findings III

- Fisheries and Wildlife
  - Monitoring of fisheries stock throughout APNEP is quite extensive
  - No additional fisheries monitoring suggested
  - Additional shellfish and wildlife monitoring may be necessary
- More Findings in Packet

NC Coastal Monitoring

- "There is a need to coordinate and enhance water quality, physical habitat, and fisheries resource monitoring efforts by DWQ, DMF, WRC, USFWS, USGS, NMFS, DEH, and others to determine status and trends of coastal waters and resources."

  Source: CHPP Jul 2004 Public Draft

Tactics for Success

- Interdisciplinary
- Integration, systems
- Sustainability science
- Stakeholder involvement
- Risk, uncertainty
- Adaptive co-management

Disciplinary Focus: Organizations

"...presents a meticulously researched narrative about how insulated bureaucracies charged with complex, technical missions become trapped by their own biases ('organizational frames'). This is especially true when the work being conducted is specialized and highly valued (knowledge-laden environments)."

Source: Nolan (2004)

Disciplinary Focus: Organizations II

"Without systematic oversight by outside authorities...bureaucracies cannot be expected to assimilate information that challenges the way people are used to doing business. Organizations, in other words, solve the problems that have identified and discount the importance of problems that they do not understand..."

Source: Nolan 2004

Disciplinary Focus: Research

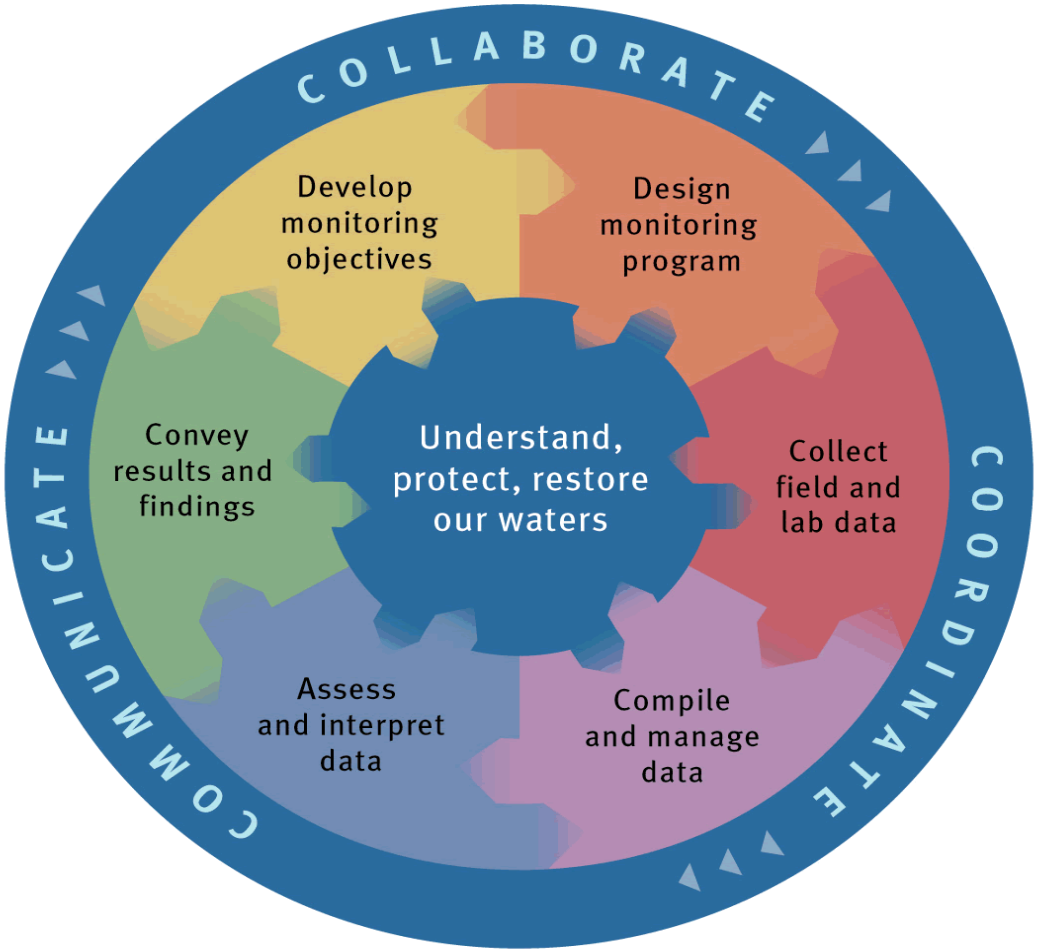
"...water research is accomplished in a highly decentralized fashion with numerous federal agencies setting research agendas independently of each other."

"In recent years, the limitations of discipline-based perspectives have become clear, as researchers and managers alike have recognized that water problems relevant to society necessarily integrate across physical, chemical, biological, and social sciences."

Source: NRC 2004

Disciplinary Focus: Research II

- "My greatest concern is that our scientific institutions are not well positioned to promote the interdisciplinarity that characterizes so much of science at the leading edge. Academic programs are still organized primarily in discrete fields of learning...In many government agencies, the processes and committees that help decide which projects will receive support are also heavily disciplinary in character..."
  Source: Leshner 2004



Framework for Monitoring

Near-Term S&T Activities

- Establish & Support STAC
- S&T Presence on Web Site
- Information Survey
- Monitoring Strategy
- Indicators

APNEP Technical Web Site

- WebGIS
  - Aerial Photography Archive
  - Natural Resource Mapping
- Environmental Monitoring
  - A-P Ambient Monitoring Network
    - Citizens Monitoring Network
  - Directory of Monitoring Information Sources
  - Laboratory Support (Protocols & Guidelines)

APNEP Technical Web Site II

- Research
  - APNEP-Funded Research
  - Key Accomplishments (Project Summaries)
  - Current Projects
  - Other Research in A-P Basin
- Workshops & Conferences
  - Agendas
  - Minutes & Proceedings

APNEP Technical Web Site III

- Assessments (Linked to APNEP Technical Publications Page)
  - APEP-Funded Assessments
    - Indicators
    - Indices
  - Other Assessments in A-P Basin
- Links to Technical Partner Websites

Mid-Term S&T Activities?

- Science & Technology Consortium MOU
- Annual Interagency Ecological Program Conference
- Annual S&T Report
- Biannual APNEP S&T Conference

A-P Research Consortium!

- “The addition of the [A-P] Institute is seen as important for the coordination of organizations working to further [estuarine] conservation and [ecosystems] science.”
- “We are committed to bringing [estuarine] issues to the forefront and supporting collaborative work that will make a difference.”
- “...ability to produce the new and rigorous science needed by policy makers to help stop the precipitous decline in living [estuarine] resources.”

A-P Consortium Partners?

- NC Water Resources Research Institute (WRRI)
- NC Coastal Habitat Protection Planning (CHPP)
- Atlantic Coast Environmental Indicator Consortium (ACE INC)
- Southern Center for Sustainable Forests
- Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET)

Scientific Peer Review of Agency-Produce Science

- The first priority in choosing reviewers should be to engage the most competent scientists
- Scientific peer review should be insulated from politics as much as possible
- Scientific peer review must maintain programmatic flexibility

Source: ESA (July 2004)

Science & Technology Advisory Committee (STAC)

- By-Laws
- Operational Guidelines
- Other APNEP Committees

STAC Challenge?

"Serious issues about how water resources are to be protected and managed are not confined to one or several regions; the are found nation-wide. Increasingly, the science need to resolve these water issues in workable ways is not available."

Source: NRC 2004

STAC Strategy?

- "Mercury Strategy for the Delta-Bay Ecosystem: A Unifying Framework for Science, Adaptive Management, and Ecological Restoration"

  Source: Wiener et al. 2003

Best Scientific Information

- Procedural Consistency
  - Relevance
  - Objectivity
  - Transparency and Openness
  - Timeliness
  - Peer Review
- Identify the level of uncertainty in results, provide explanations of the sources of uncertainty, and assess the relative risks associated with a range of management options

Best Scientific Information II

- Develop and implement a plan to systematically improve the quality of "best scientific information available" that includes regular assessments of the outcomes of management actions and evaluation of the predictive quality of the scientific information supporting those actions

Source: NRC 2004b

Policy-Driven Research: Prehistoric Case Study

- "[Dionysius in 339 B.C.] gathered skilled craftsman, commandering them from the cities under his control and attracting them by high wages...his purpose was to make weapons in great numbers and every kind of projectile...the catapult was invented at this time..., since the best craftsman had been collected from everywhere into one place. The high wages as well as the numerous prizes offered to the craftsman who were judged to be the best stimulated their zeal. Moreover, Dionysius circulated daily among the workers...and rewarded the most zealous with gifts and invited them to his table."

Potential Benefit!

"Scientific progress is based ultimately on unification rather than fragmentation of knowledge."

Source: Kafatos and Eisner 2004