Environmental RD&T Programs

Briefing For The 2014

Regional Sediment Management & Engineering

With Nature Working Meeting

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July 2014

US Army Corps of Engineers

BUILDING STRONG®

Research Programs

- Aquatic Nuisance Species Research Program (ANSRP)
- Aquatic Plant Control Research Program (APCRP)
- Dredging Operations and Environmental Research Program (DOER)
- Ecosystem Management and Restoration Research Program (EMRRP)

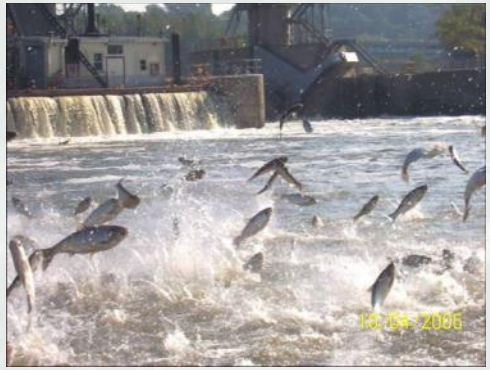
Research Programs

R&D Programs Authorities

- **Aquatic Nuisance Species**
  - **1990 Aquatic Nuisances Species Act**
- **Aquatic Plant Control**
  - **1958 River and Harbor Act**
- **Dredging Operations & Environmental Research**
  - **Navigation Business Line**
- **Ecosystem Management and Restoration**
  - **Ecosystem Restoration Business Line**

Aquatic Nuisance Species

- **Authority:** **Aquatic Nuisance Species Prevention and Control Act of 1990**
- **Products:** **Effective, economical, and environmentally compatible management techniques for problems caused by aquatic nuisance animal species associated with Corps and public facilities**
- **Research Requirements:** **Generated by Headquarters and Invasive Species Leadership Team**



Aquatic Plant Control

- **Authority:** River and Harbor Act of 1958, as amended

  Chief of Engineers directive "the APCRP is responsible for management of the Nation's aquatic plant research program"
- **Products:** Effective, economical, and environmentally compatible techniques for identifying, assessing, and managing invasive aquatic plant problems
- **Research Requirements:** Generated by Headquarters and the Invasive Species Leadership Team and Outside Agencies

Aquatic Plant Control

Focus Areas

- **Biological Control**
- **Chemical Control**
- **Ecology Assessment**

Ecosystem Management and Restoration

- **Authority:** Established to meet the Ecosystem Restoration Needs
- **Products:** The EMRRP provides rapid, cost-effective technology to meet the Corps' most pressing research and development needs in ecosystem management and restoration; e.g., functional assessment, restoration techniques, environmental benefits, and stewardship of high priority ecosystems.
- **Research Requirements:** Generated by Headquarters and the Environmental Research Area Review Group

Ecosystem Management and Restoration

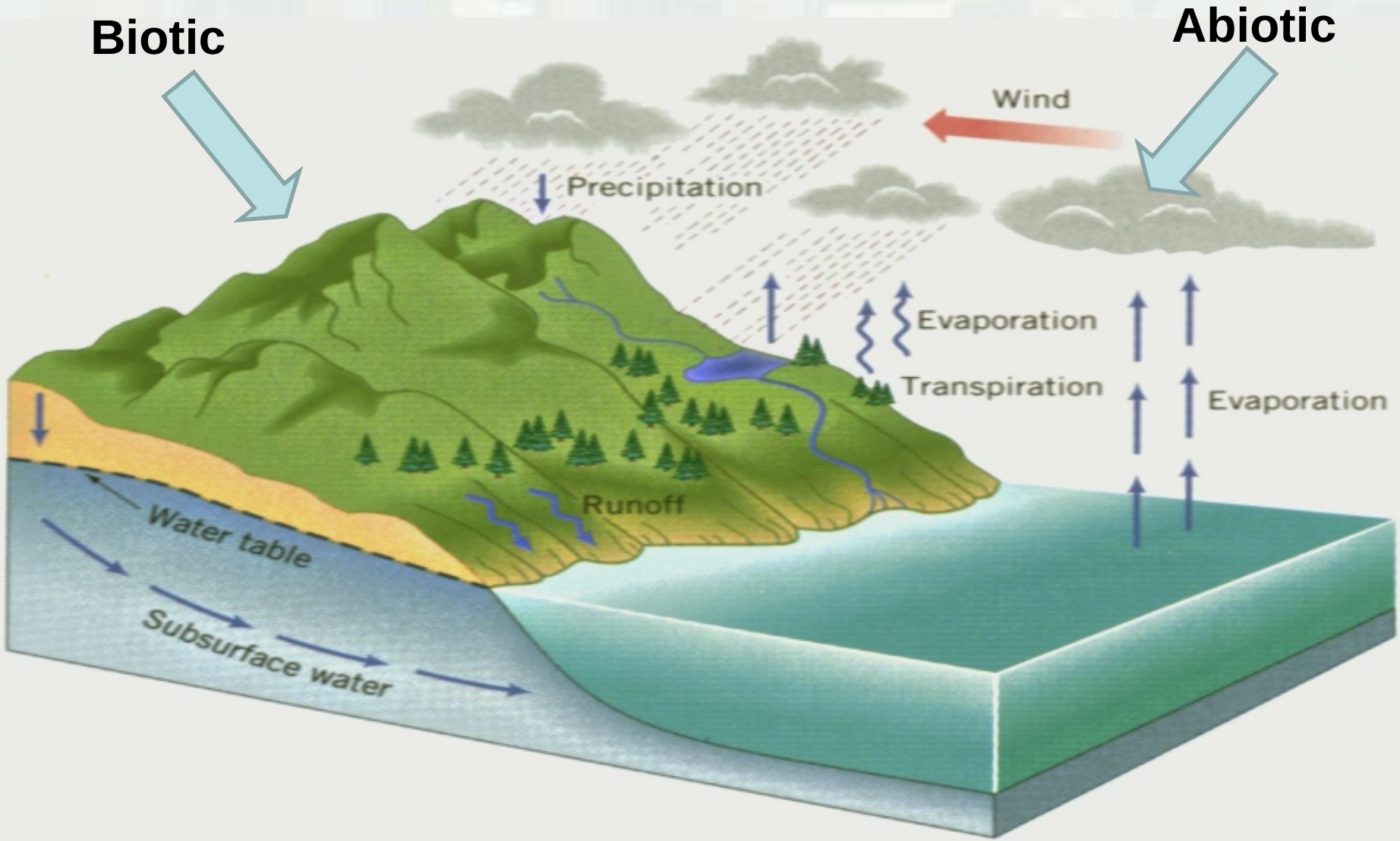
- Maximize Value to the Nation from Ecosystem Restoration and Management (ER&M) Activities
- Ensure Ecological Integrity and Sustainability of ER&M Projects
- Improve Capabilities to Design and Implement ER&M in Urban Settings
- Enhance Resilience and Reliability of Coastal ER&M Projects
- Considerations for T&E and Invasive Species in ER&M Projects

Tech Support Programs

- **WOTS: The Water Operations Technical Support Program was initiated in FY 1985 and provides effective environmental and water management engineering technology for a wide range of water resource management problems at Corps of Engineers reservoir and waterway projects, and in the river systems affected by project operations nationwide.**

- **WRAP: The Wetlands Regulatory Assistance Program was initiated in the 1990 and provides direct scientific and engineering technical support to the Corps' Clean Water Act Jurisdictional duties under the Regulatory Business practice.**

Environment- Ecosystems



Corps of Engineers Business Areas

Navigation

Flood Risk Management

Hydropower

Ecosystem Restoration

Recreation

Regulatory

Corps of Engineers

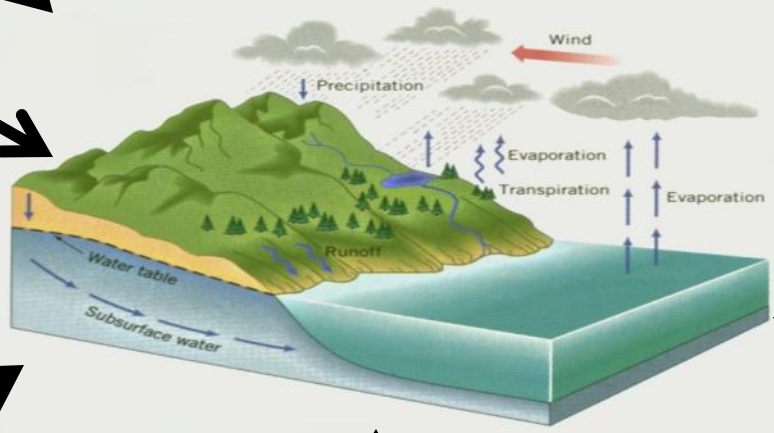
Columbia River

Hudson/Raritan Bay

Puget Sound

California Bay Delta

Chesapeake Bay



Missouri River

Upper Miss

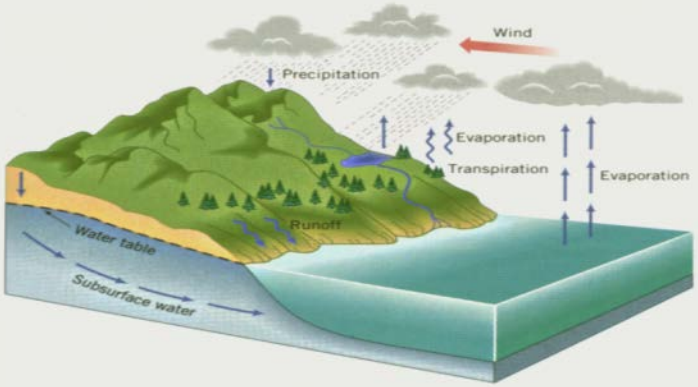
Great Lakes Restoration Initiative

Gulf Coast

Comprehensive Everglades Restoration Plan

ECOSYSTEM RESTORATION RESEARCH

- **Maximize Value of the Corps' Aquatic Ecosystem Restoration Program**
- **Ensure Ecological Integrity and Sustainability of Restoration Projects**
- **Improve Capabilities to Design and Implement Restoration in Urban Settings**
- **Enhance Resilience and Reliability of Coastal Ecosystem Restoration**
- **Impact and Relationship of Species (T&E and Invasive) on Ecosystem Restoration**



Maximize Value of the Corps' Aquatic Ecosystem Restoration Program to the Nation

Purpose: Advance the Corps' capabilities to maximize beneficial socioecological outcomes of aquatic ecosystem restoration at regional and national levels.

Products:

- Provide tools to evaluate and forecast project impacts and environmental benefits at a watershed scale.
- Provide structured decision making tools and capabilities to quantitatively address risk and uncertainty in planning and design of ecosystem restoration projects.
- Develop technical guidelines for monitoring and adaptive management of ecosystem restoration projects.
- Provide Ecosystem Restoration and Management Manual to assemble and organize state-of-the science tools

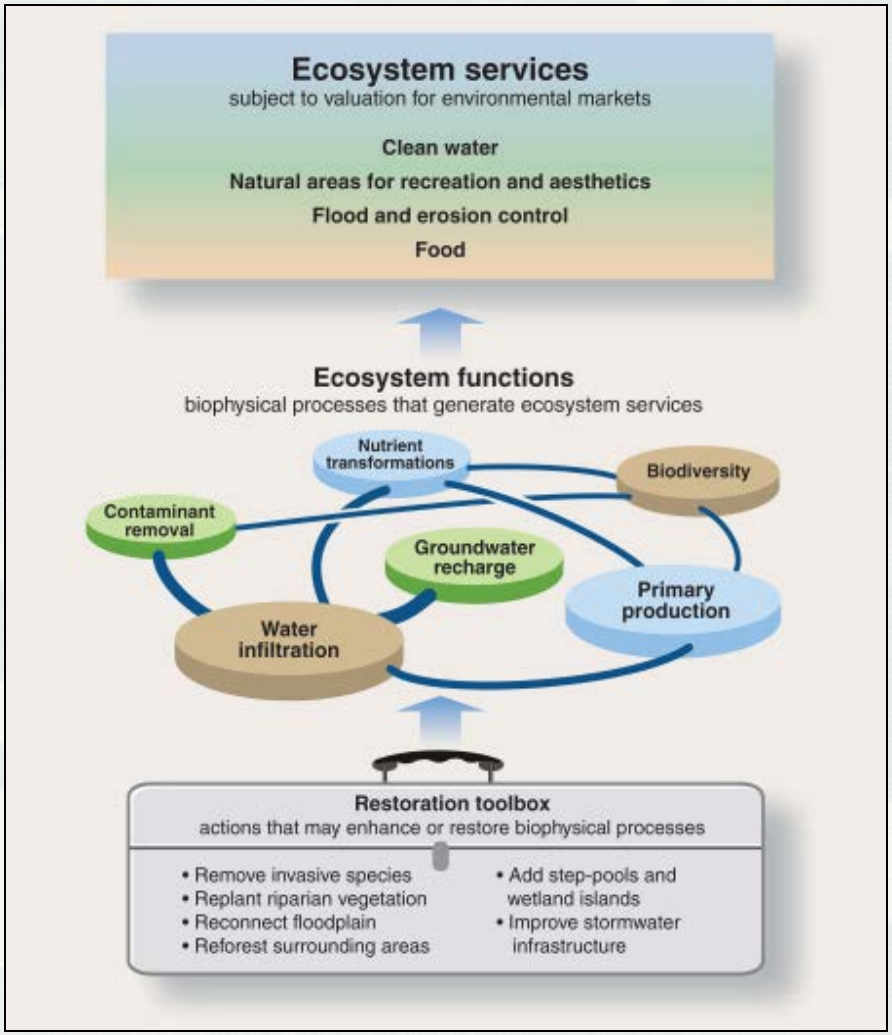
Payoff:

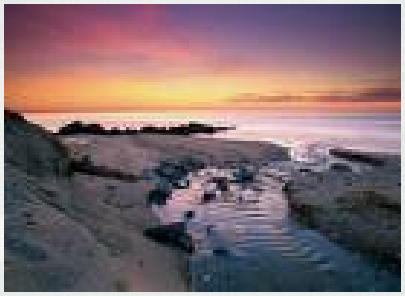
- Provide resource managers, planners and restoration practitioners with effective and cost-efficient tools, techniques and analytical methods to assess, forecast, monitor, and adaptively manage Corps ecosystem restoration projects
- More fully account for the wide range of environmental benefits and losses that result from Corps projects

Applicability:

- All Districts with lakes, rivers, streams, levees, flood control structures and coastal ecosystems.
- In ERDC with Districts and NGO's
- Other Federal and State Agencies, NGO's etc.

Establish and Incorporate Ecosystem Goods and Services in Corps Planning and Environmental Benefits Evaluation – Past Work

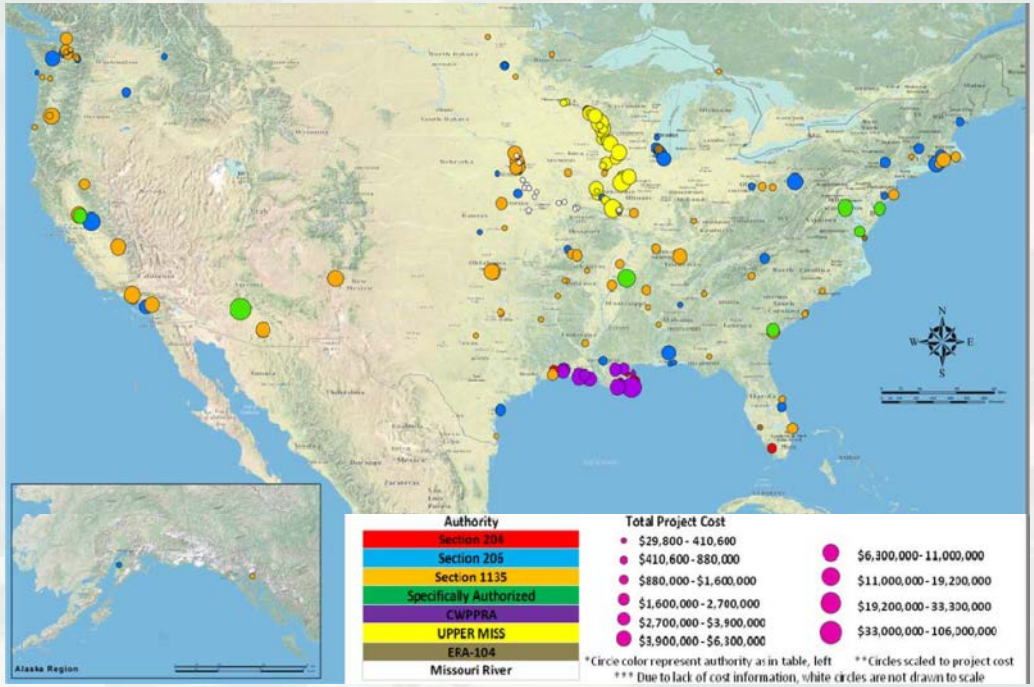




Retrospective Evaluation of Corps Aquatic Ecosystem Restoration Projects

Project Options:

Project Home
General Information
Project Overview
Partners
Project Planning
Restoration Measures & Engineering
Restoration Monitoring
Project Evaluation
Adaptive Management
Project Review
References
Corps Information



Over 200 Projects from 38 Districts

Ensure Ecological Integrity and Sustainability of Aquatic Ecosystem Restoration Projects

Purpose: Develop new ecosystem science and engineering tools to substantially improve and apply theoretical and practical knowledge of hydro-geomorphic dynamics and biotic response to promote the integrity and sustainability of Corps ecosystem restoration, mitigation and management projects .

Products:

- Models linking biotic response to hydrologic and geomorphic changes and dynamics
- Tools and capabilities to design and forecast dynamic response trajectories of selected ecosystems at a watershed scale
- Project success evaluations based on ecosystem functions assessment

Payoff:

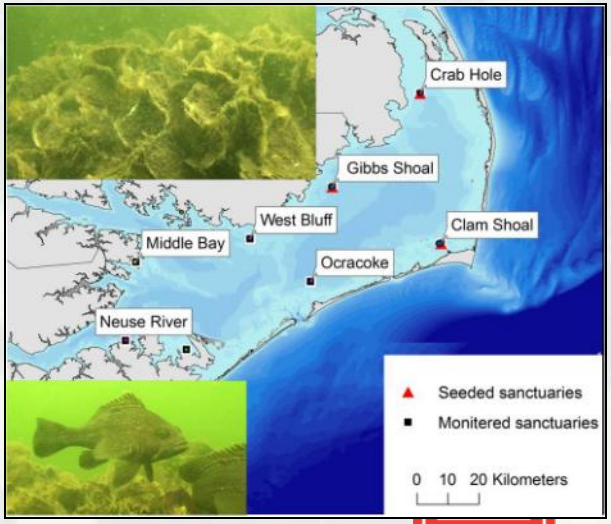
- *Measurable increase in projected ecological functions and longevity of Corps ecosystem restoration projects*
- *Provide models and other analytical tools needed to support assessments of ecosystem goods and services*

Applicability:

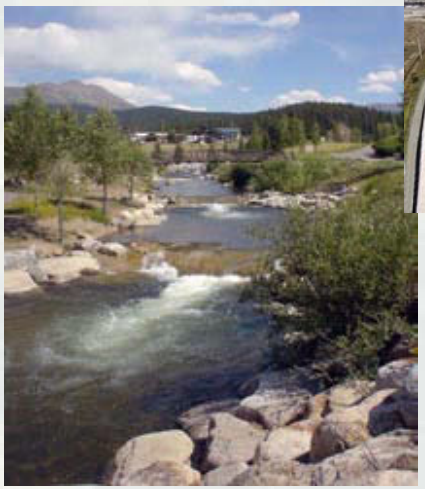
- All Districts with lakes, rivers, levees, flood control structures and coastal ecosystems.
- In ERDC with Districts and NGO's
- Other Federal and State Agencies, NGO's etc.

Assessing Hydrologic Connectivity

- Develop two case studies addressing the importance of connectivity for non-fish species
- Seek out locations that demonstrate generalized principles from Task 2 and have readily-available data / resources, such as:
  - Migratory fauna (shrimp, fish, and snails) in Puerto Rico
    - **Status**: Initiated partnership with University of Georgia at the Luquillo Long-Term Ecological Research (LTER) site
  - Multi-reef connectivity for eastern oyster
    - **Status**: Literature review of reef connectivity mechanisms completed to guide quantitative analyses in FY14 (draft document available upon request)
  - Indirect effects of fish passage on mussel populations
- Products
  - Conference Presentation or Webinar – Aug 2014
  - Report – Feb 2015



Improve Capabilities to Design and Implement Aquatic Ecosystem Restoration and Management in Urban Settings



Purpose: Develop ecological engineering tools and capabilities to maximize restoration and management benefits, including multi-purpose benefits, in urban settings

Products:

- Urban Stream Restoration Planning Toolbox
- Urban Stream Engineering and Design Toolbox
- Develop a set of technical guidelines detailing principles and standards of practice for urban stream restoration

Payoff:

- Provides desired aquatic ecosystem restoration benefits that are compatible with typical flood damage reduction channels in urban setting.
- Provides the ability to quantify benefits of stream restoration, riparian enhancements, and storm water management options

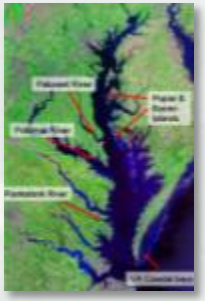
Applicability:

- All Districts with lakes, rivers, levees, flood control structures and coastal ecosystems.
- In ERDC with Districts and NGO's
- Other Federal and State Agencies, NGO's etc.

Aquatic Ecosystem Restoration and Management in Urban Settings

Unique Challenges

Enhance Resilience and Reliability of Coastal Ecosystem Restoration



Purpose: Develop tools, guidelines and capabilities to incorporate risk and uncertainties associated with climate change and sea level rise on coastal ecosystem restoration and multi-purpose projects that include restoration and coastal flood damage reduction

Products:

- Tools to assess project performance relative to potential Climate Change & Sea Level Rise
- Ecosystem restoration techniques to promote primary production of wetlands and thereby offset effects of Sea Level Rise

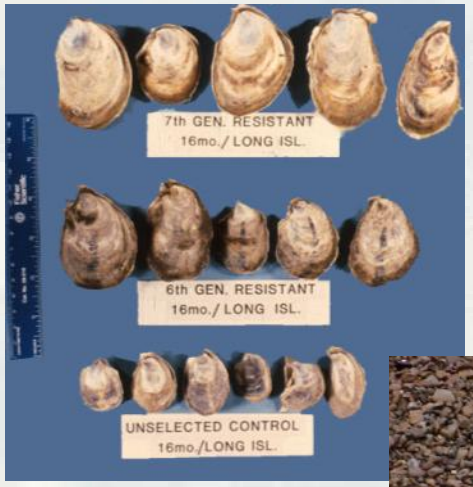
Payoff:

- Future designs for coastal projects will maximize potential longevity and improve sustainability
- Provide information to effectively evaluate alternatives for coastal system restoration, flood damage reduction and navigation
- Ability to quantify the effects of Sea Level Rise on costal features

Applicability:

- All Districts with levees, flood control structures and coastal ecosystems.
- In ERDC with Districts and NGO's
- Other Federal and State Agencies, NGO's etc.

Impact and Relationship of Species on Ecosystem Restoration



Purpose:

Advance the Corps' capabilities to detect, monitor and evaluate key species that significantly influence restoration activities.

Products:

- Identification of critical organisms and habitat requirements of species impacted during restoration projects
- Develop predictive models to assist in the planning, construction and operation of CE projects
- Guidance on approaches to enhance native species during ecosystem restoration projects

Payoff:

- Reduced maintenance and operational costs
- Use of "green" technology to assist populations
- Reduce risk of invasive species transfer/spread
- Optimize /expand current capabilities for effectively managing oyster populations

Applicability:

- All Districts with lakes, rivers, streams, levees, flood control structures and coastal ecosystems.
- In ERDC with Districts and NGO's
- Other Federal and State Agencies, NGO's etc.

Technology Transition

Eco-Restoration Gateway: *web-based repository for available tools, databases, standard methods, protocols, policies, lessons learned…*

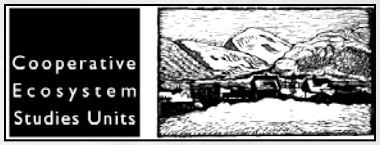
Demonstrations: *successful, low maintenance techniques and approaches to ecosystem restoration *

Knowledge Hub: factsheets on all current research activities

Training/ Webinars: *all aspects of Corps ecosystem restoration process*

Technical Support Program: *support districts in model applications, model certification, plan formulation, engineering and ecological design, etc*

Restoration Research Network: *geographically dispersed network of demonstration/ training/ research sites*



Questions