

USACE Aquatic Invasive Species Research Programs

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Environmental Laboratory

ISLT Webinar
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US Army Corps of Engineers
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Corps of Engineers Involvement in Aquatic Invasive Species Research and Management

- Corps of Engineers – first federal agency charged by Congress to address invasive species (River and Harbor Act 1899)
- Current aquatic plant research activities began in 1958
 - ▶ Aquatic Plant Control Research Program (APCRP) - 1973
- Research on aquatic nuisance animals began in 1990 (Non-indigenous Aquatic Nuisance Prevention & Control Act 1990)
 - ▶ Zebra Mussel Research Program (1990-1995)
 - ▶ Aquatic Nuisance Species Research Program (ANSRP) - 1996

USACE Aquatic Invasive Species Research Programs

Aquatic Plant Control Research Program



HQ Program Manager: Mr. Tim Toplisek
EL Technical Director: Dr. Al Cofrancesco
EL Program Manager: Dr. Linda Nelson

Aquatic Nuisance Species Research Program



HQ Program Manager: Mr. Joe Wilson
EL Technical Director: Dr. Al Cofrancesco
EL Program Manager: Dr. Linda Nelson

Research Program Goals

- Provide science-based guidance on the use of new technologies for detecting, managing, preventing, and monitoring aquatic invasive species that impact Corps projects
- Reduce impact of aquatic nuisance species on Corps operations and infrastructure
- Reduce impact of aquatic nuisance species on T&E species
- Reduce O&M expenditures associated with aquatic invasive species management
- Develop solutions regarding aquatic nuisance species based on field needs



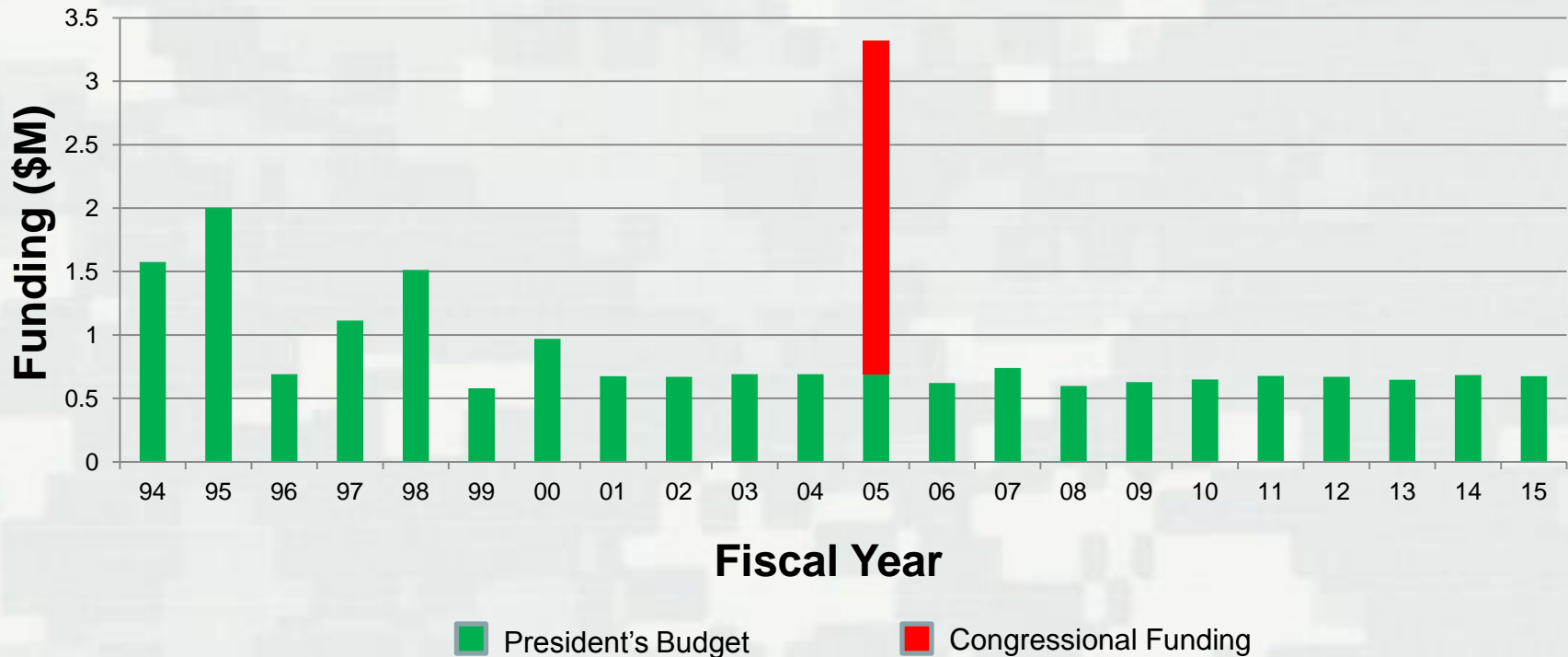


Aquatic Nuisance Species Research Program

- Authorization:
 - ▶ Non-indigenous Aquatic Nuisance Prevention & Control Act, 1990
 - Zebra Mussel Research Program (1990-1995)
 - ▶ National Invasive Species Act, 1996
- Primary R&D program to address aquatic invasive species that impact navigable waters, infrastructure and associated water resource projects
- Funding Source: O&M
- Research Requirements: Generated by USACE-HQ, Corps' Invasive Species Leadership Team, Environmental SONs
- Current Focus Areas: invasive fish and mussels

Funding History

Aquatic Nuisance Species Research Program (O&M)
Authorization: \$3 Million



Funded R&D Projects in FY15

FY15 Budget: 668K

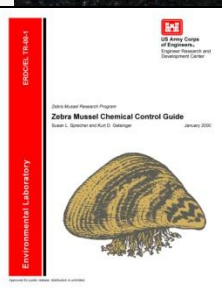
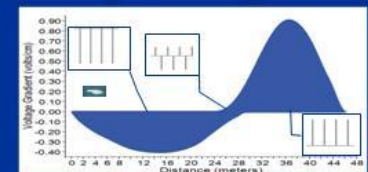
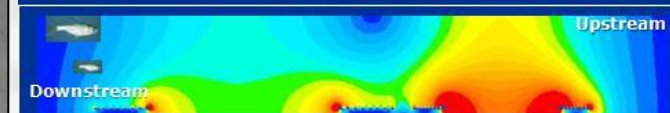
FY16 Budget: 675K

ANSRP Review: February, 2015

1. Predicting Ecological Invasion and Assessing Risks for Dreissenid Mussels (FY13-15)
2. Update of the Zebra Mussel Chemical Control Guide (FY14-15)
3. Development of Electrical Control Methods for Zebra and Quagga Mussels (FY14-16)
4. Efficacy of Barriers to Prevent Passage of Freshwater Invasive Fish Species (FY14-17)



**Electric Barrier
Modeling and Simulation
Scaled Model Approach**



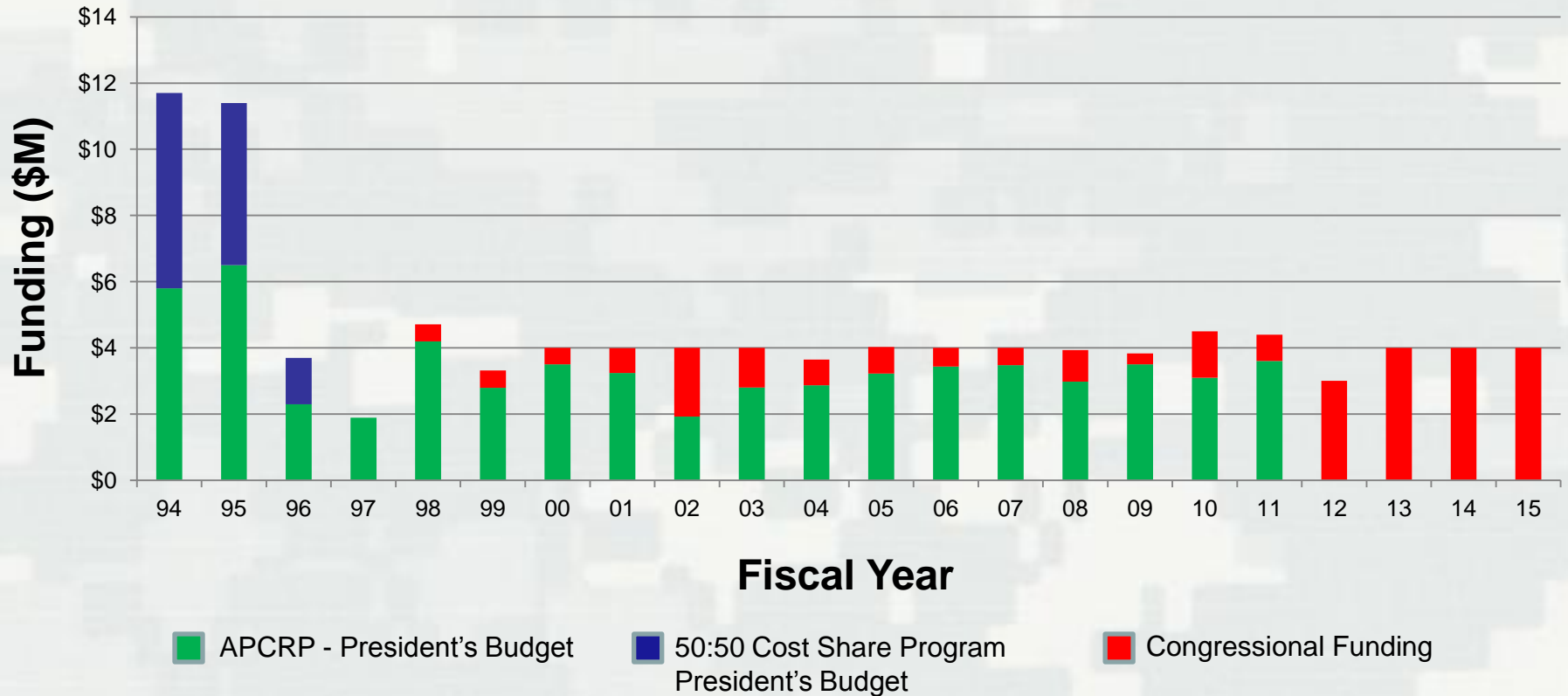


Aquatic Plant Control Research Program

- Authorization:
 - ▶ River and Harbor Act (Section 104), 1958, as amended
 - ▶ Only federally authorized R&D program for aquatic plant management
- Develops effective, economical, and environmentally compatible strategies for identifying, assessing, and managing invasive aquatic plant problems
- Funding Source: CG
- Research Requirements: Generated by USACE-HQ, Corps' Invasive Species Leadership Team, Environmental SONs
- Current Focus Areas:
 - ▶ Biological Control
 - ▶ Chemical Control
 - ▶ Ecological Assessment
 - ▶ Management Strategies & Applications

Funding History

Aquatic Plant Control (APC) Program (CG)
R&H Act Authorization \$15 Million





Aquatic Plant Control Research Program

FY15 Budget: \$4M

FY16 Budget: \$0

APCRP Review: November 2014

FY15 Projects:

Biological Control

1. Identification of New Biocontrol Agents
 - Surveys in China, S. Korea for new hydrilla insects – USDA-ARS
 - In country surveys for flowering rush pathogens
2. Applied Use of Plant Pathogens as Biocontrol Agents
3. Applied Use of Insects as Biocontrol Agents
4. Development of Insect Biocontrols for *Phragmites* and Flowering Rush
 - Surveys in Europe - CABI
5. Improving Biological Control of *Salvinia molesta* and *S. minima*



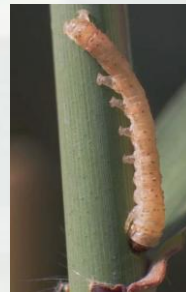
Cyrtobagous salviniae



Bagous nodulosus



Phytoliriomyza ornata



Archanara geminipuncta



Megamelus scutellaris

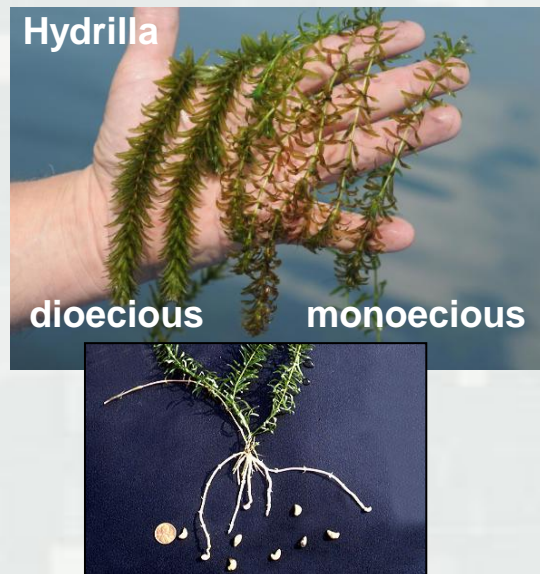


Aquatic Plant Control Research Program

FY15 Projects

Chemical Control

1. Evaluating Grass-specific Herbicides to Enhance Aquatic Restoration Projects
2. Linking Plant Biology with Management Strategies to Improve Control of Monoecious Hydrilla (partnering with GLRI, LRB)
3. Evaluation of New Herbicide Techniques for Management of Giant Salvinia
4. Biology & Management of Crested Floating Heart
5. Biology & Management of Invasive *Ludwigia* species in California and Florida
6. Improving Chemical Control of Flowering Rush Using Phenological Weak Points



Giant salvinia



Ludwigia spp.



Crested floating heart



Aquatic Plant Control Research Program

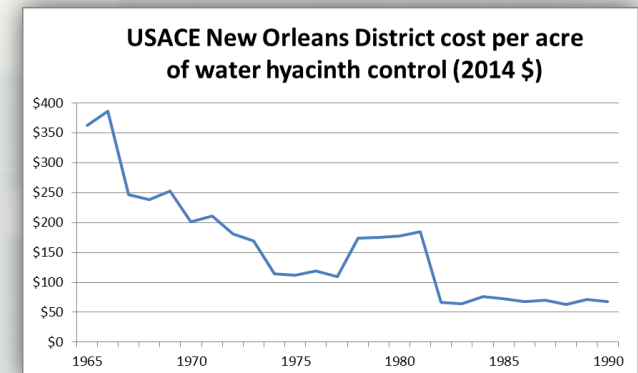
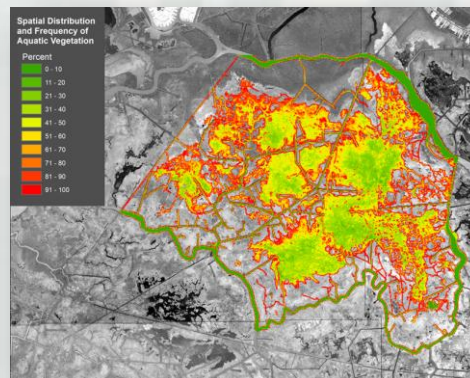
FY15 Projects

Ecological Assessment

1. Seasonal Ecology and Wetland Natural Enemy-Plant Interactions
2. Ecological Habitat Model for Introduced Seagrass, *Zostera japonica*, on Pacific Coast

Management Applications & Strategies

1. Development of a Real-time Acoustic-based SAV Detector-Herbicide Dispensing System
2. Demonstration of New Remote Sensing-GIS Mapping Methods Utilizing Satellite Imagery to Characterize Floating Vegetation in Navigation Channels
3. Economic & Environmental Benefits of Invasive Aquatic Plant Management
4. Reducing Eutrophication and the Prevalence of HAB's
5. Physicochemical Treatment of HABs and Microtoxins using Hydrodynamic Cavitation and Advanced Oxidation
6. Aquatic Vegetation Assessment for Cerillos & Portuguese Reservoirs



Successful R&D Solution

Problem: Development of herbicide resistance; loss of management tools

- ▶ Fluridone-resistant hydrilla populations dominate FL waterbodies
- ▶ Fluridone-resistant hybrid milfoil in MI
- ▶ Reduced tolerance of hydrilla to endothall

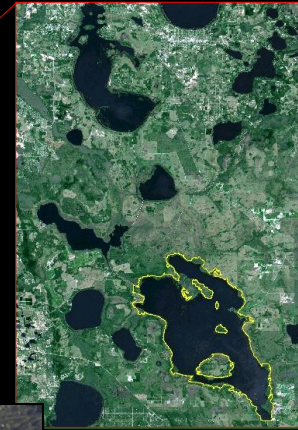
Solution:

- ▶ Developed predictive screening tools for detecting/monitoring herbicide resistance
- ▶ Developed new use patterns for existing herbicides
- ▶ Collaboration with USEPA to develop new herbicide tools; new modes of action
- ▶ Developed BMP guidance for managing and preventing herbicide resistance

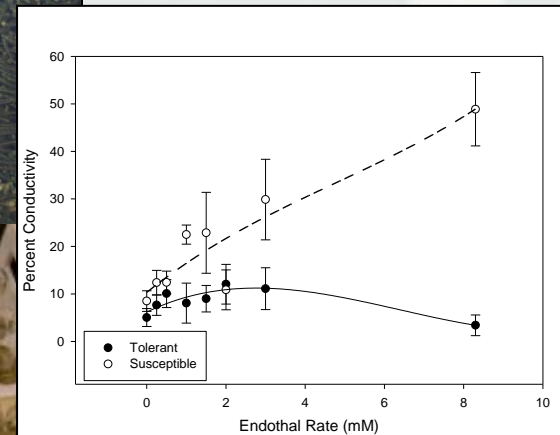
Benefits:

- ▶ Ensures efficient use of viable management strategies
- ▶ Rapid assessment of resistant populations
- ▶ Established USACE as the lead agency for herbicide resistance in aquatic plants
- ▶ Reduced management costs

Kissimmee Chain, Florida



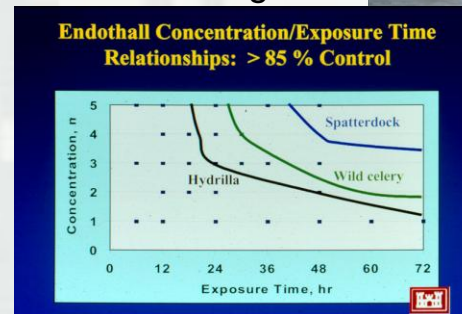
- Resistant Hydrilla in Flood Control Lakes
- ~70,000 surface acres



Bioassay for quick determination of herbicide tolerance/resistance

Successful R&D Solution

- **Problem:** Monoecious hydrilla is expanding in northern U.S.
 - ▶ Recent discovery in high-profile areas: Lake Cayuga Inlet, Erie Canal, Ohio River
 - ▶ Limited information on biology, ecology and effective management options
- **Solution:**
 - ▶ Utilize capabilities on aquatic herbicides/application strategies developed in APCRP to eradicate hydrilla from the Erie Canal/Tonawanda Creek
 - 2014 Treatments reduced hydrilla tuber densities >90%
 - Hydrilla biomass reduced 100% at 4 sample sites
 - Follow-up 2015 herbicide treatments
 - ▶ Organized a Symposium on Biology & Management for Monoecious Hydrilla
 - APCRP Technical Note: “Establishing Research and Management Priorities for Monoecious Hydrilla”
 - <http://el.ercd.usace.army.mil/elpubs/pdf/apcmi-08.pdf>
 - ▶ Ongoing APCRP-funded R&D
 - Identify effective biocontrol agents
 - Improved treatment strategies using herbicides
- **Benefits:**
 - ▶ Established USACE as lead of interagency collaboration on solving
 - Buffalo District and ERDC-EL partnership
 - Public Outreach – positive
 - “Army Corps seeks to avoid spread of invasive hydrilla plant”
 - ▶ Collaboration among agencies to solve problem
 - ▶ Additional funding to expand R&D - GLRI
 - Great Lakes specific Risk Assessment
 - Plant Biology and Phenology



Endothall Concentration/Exposure Time Relationships: > 85 % Control

at Position Sites will be in Place the Canal During the Project?

Hydrilla and wild celery will be applied to the section of the Canal to be treated in an Endothall spray. The herbicide application will be limited to the water and to a depth of 1-2 feet. The spray will be applied to the water and to a depth of 1-2 feet. The spray will be applied to the water and to a depth of 1-2 feet.

Wild celery and spatterdock will be applied to the section of the Canal to be treated in an Endothall spray. The herbicide application will be limited to the water and to a depth of 1-2 feet. The spray will be applied to the water and to a depth of 1-2 feet.

TONAWANDA CREEK/ERIE CANAL HYDRILLA CONTROL DEMONSTRATION PROJECT

Stop hydrilla from expanding further into other areas of New York State and the Great Lakes!

Why Can't I Contact My State's Department of Environmental Conservation?

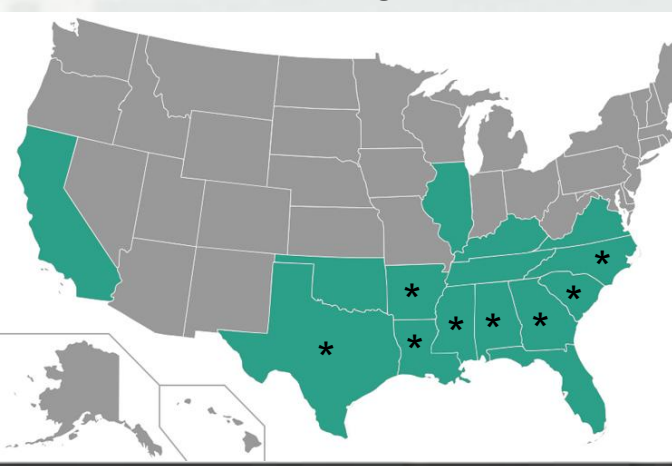
Michael Green, U.S. Army Corps of Engineers, Buffalo District, 4225 Tonawanda Avenue, Buffalo, NY 14226

720.235.4225
michael.g.green@usace.army.mil
www.usace.army.mil

JULY 21 OR 28

Successful R&D Solution

- **Problem:** Alligatorweed expansion on CE projects throughout the U.S.; hinders navigation, clogs water intakes, disrupts water flow, outcompetes native vegetation.
- **Solution & Benefits:**
 - ▶ Developed an effective insect biocontrol agent: alligatorweed flea beetle
 - ▶ Insect release significantly reduced plant populations; reduced cost of herbicide use by 75%; restored function
 - ▶ Annual field collection/distribution program
 - Partner with the SAJ Aquatic Plant Control Operations Support Center
 - FY15 – flea beetles (>100,000) shipped to federal, state and county agencies in 8 states



Successful R&D Solution

- **Problem:** Movement of Asian carp species; effective operation of the CSSC electric barriers is critical to prevent dispersal into Great Lakes
- **Solution:**
 - ▶ Identified swim performance and burst speeds of Asian carp species; different ages
 - ▶ Determined effect of varying environmental conditions (water temperature, conductivity, and velocity) on barrier performance
 - ▶ Data used to optimize electric barrier operating parameters for immobilizing Asian carp
- **Benefits:**
 - ▶ Refinement operating parameters under varying seasonal environmental conditions
 - ▶ Inform future dispersal barrier design and operation

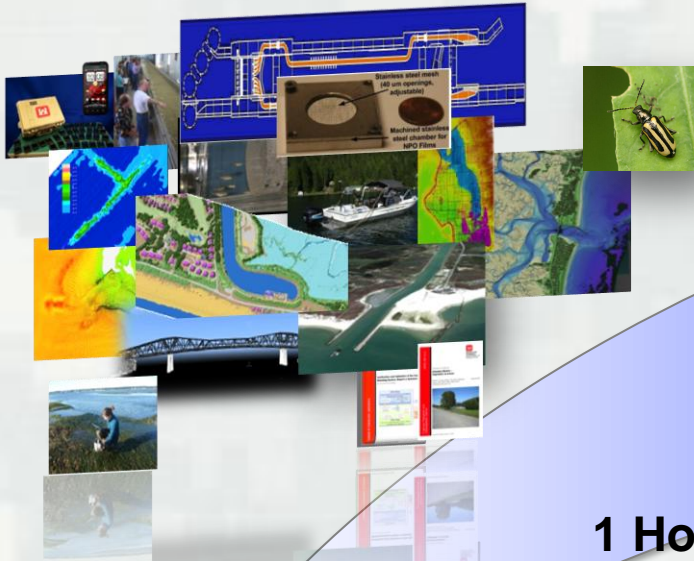


ERDC Swim Tunnel



APCRP & ANSRP Technology Transfer

Summary of FY14 Products



>2.7M Website Hits

7 Conferences & Workshops Attended

12 Technical Reports, Technical Notes

14 Journal Articles, 2 Book Chapters

1 Hosted Workshop on HAB

12 University Collaborations

22 Federal, State, and Other Stakeholder Collaborations

8 International Collaborations

19 USACE District Collaborations

7 Webinars; > 150 Participants

> 76,000 alligatorweed flea beetles distributed to 21 agencies

52 R&D Facility Tours

Get involved...

Submit a “Statement of Need” for R&D

<http://cw-environment.usace.army.mil/needs.cfm?CoP=Env>

Civil Works Environment Gateway
US Army Corps of Engineers

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Help * Contact Us

Communities of Practice

- USACE CoPs
 - Planning CoP
 - Civil Works Environment
 - Ecosystem Restoration
 - Environmental Benefits Assessment
 - Environmental Stewardship
 - Regulatory

Key Environmental Links

- Budget
- Research & Development
- Ecosystem Restoration PCX
- Institute for Water Resources
- Environmental Laboratory

Statements of Need

The Corps of Engineers Research Directorate, a part of Corps Headquarters, has initiated a new process for developing R&D programs. That process starts with statements of need (SONs) prepared by Corps field offices. Those needs become requirements for research and development. The needs are ultimately prioritized by headquarters and given to the Research Directorate to tackle.

Within the environmental area, we are soliciting SONs to:

- Maximize Value of the Corps' Aquatic Ecosystem Restoration Program to the Nation
 - Advance the Corps' capabilities to maximize beneficial socioecological outcomes of aquatic ecosystem restoration at regional and national levels.
- Ensure Ecological Integrity and Sustainability of Aquatic Ecosystem Restoration Projects
 - Develop new science and engineering tools to substantially improve and apply hydro-geomorphic and biotic components of ecosystem restoration projects and to promote ecosystem integrity and sustainability of Corps ecosystem restoration projects.
- Improve Capabilities to Design and Implement Aquatic Ecosystem Restoration in Urban Settings
 - Develop ecological engineering tools and capabilities to maximize restoration benefits, including multi-purpose benefits, in urban settings.
- Enhance Resilience and Reliability of Coastal Ecosystem Restoration
 - 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.
- Impact and Relationship of Species (Threatened and Endangered and Invasive) on Ecosystem Restoration and Operations
 - Advance the Corps' capabilities to detect, monitor and evaluate key species that significantly influence restoration activities and/or operations.

Point of Contact: Dr. Al Cofrancesco, Technical Director, Civil Works Environmental Engineering and Science

- Existing Statement of Needs [View](#) [Comment](#) [Print](#)
- Submit a Statement of Need [Link](#)

Civil Works Environment Gateway
US Army Corps of Engineers

Statements of Need

Please provide your name and e-mail address below to begin the submission process.

Please enter your name and e-mail address to begin:

Submitter's Name:

E-mail Address:

Writing a Statement of Need (SON)

- Use the SON template
- Clearly identify the problem and impact to USACE Mission
- Identify extent of the problem; national or regional focus carries more weight
- Identify yourself – USACE POC, provide contact information
- Identify expected outcome/product if possible (e.g., report, BMP, database, model, tool, etc.)
- Review the list of “Existing/Archived SONs”

SON Review Process



Contact Information:

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