

# **Environmental Enhancements and Navigation Infrastructure (EENI)**

## **A Study of Existing Practices, Innovative Ideas, Impediments, and Research Needs**

**Cynthia J. Banks**  
**Engineer Research & Development Center (ERDC)**  
**Environmental Laboratory (EL)**



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# Outline

- **Project Concept**
- **Project Approach**
- **Survey Results**
- **Existing Projects**
- **Next Steps**



# Project Concept

- To identify opportunities to increase environmental enhancements of navigation infrastructure projects



**Enhance for  
shellfish?**

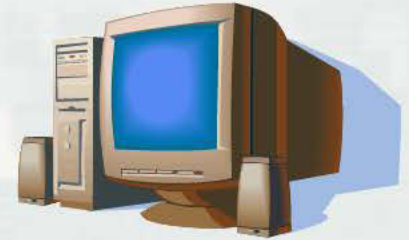
**Crabs?**





# Project Approach

- E-mails
- Webinars
- On-line Survey\*
- Telephone Follow-up
- Meeting/Conference Presentations
- Data Summary
- Report



**\*Initial Target Group: US Federal Agencies (USACE, USEPA, etc.)**



# Information Needs

- Key policies, regulations, & laws
- Things we already do
- Ideas for new possibilities
- Things tried that haven't worked and why
- Impediments
- Potential solutions to impediments
- Items needing further *research* to support use
- Case studies and relevant reports



# EENI Survey Sections

- **Information About You (9 Qs)**
- **Environmental Enhancements: Present and Potential (13 Qs)**
- **Laws, Policies, and Regulations (6 Qs)**
- **Impediments to Use (12 Qs)**
- **Research Needs (8 Qs)**
- **Is There Anything We Missed? (3 Qs)**
- **Invite Others (2 Qs)**





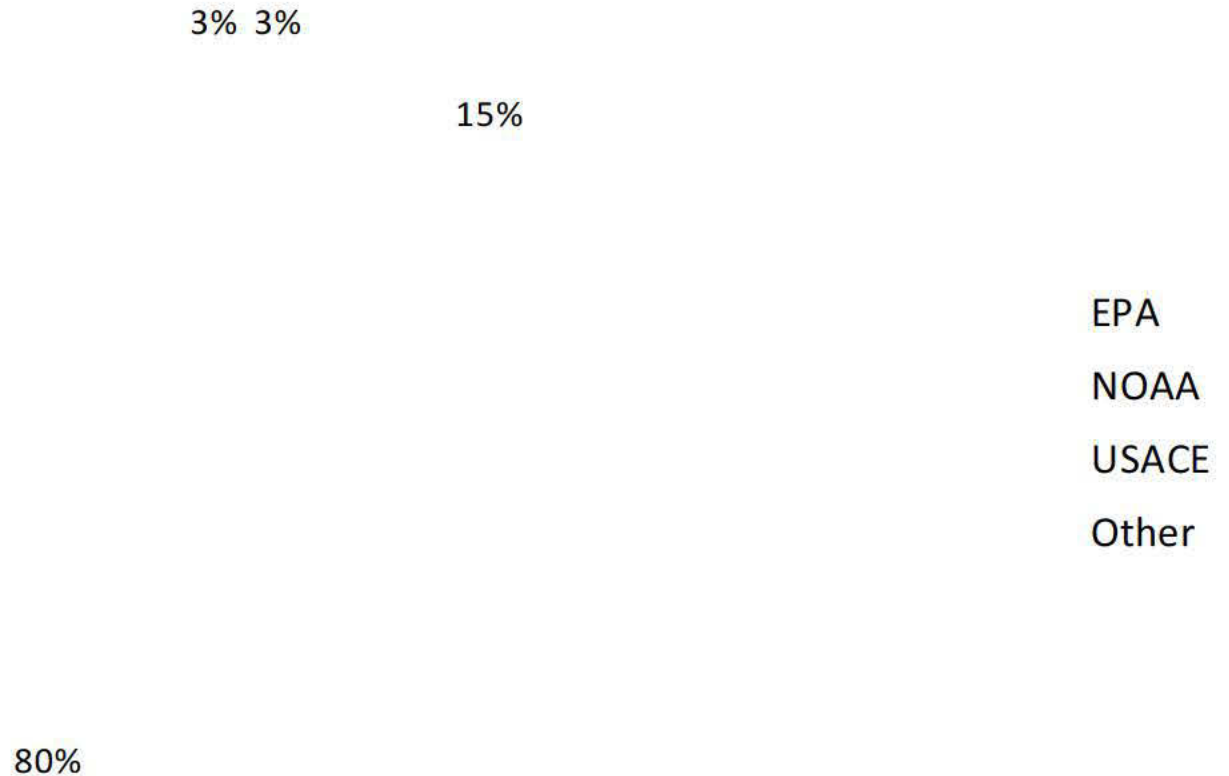
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# Who Took the Survey?

## Agency





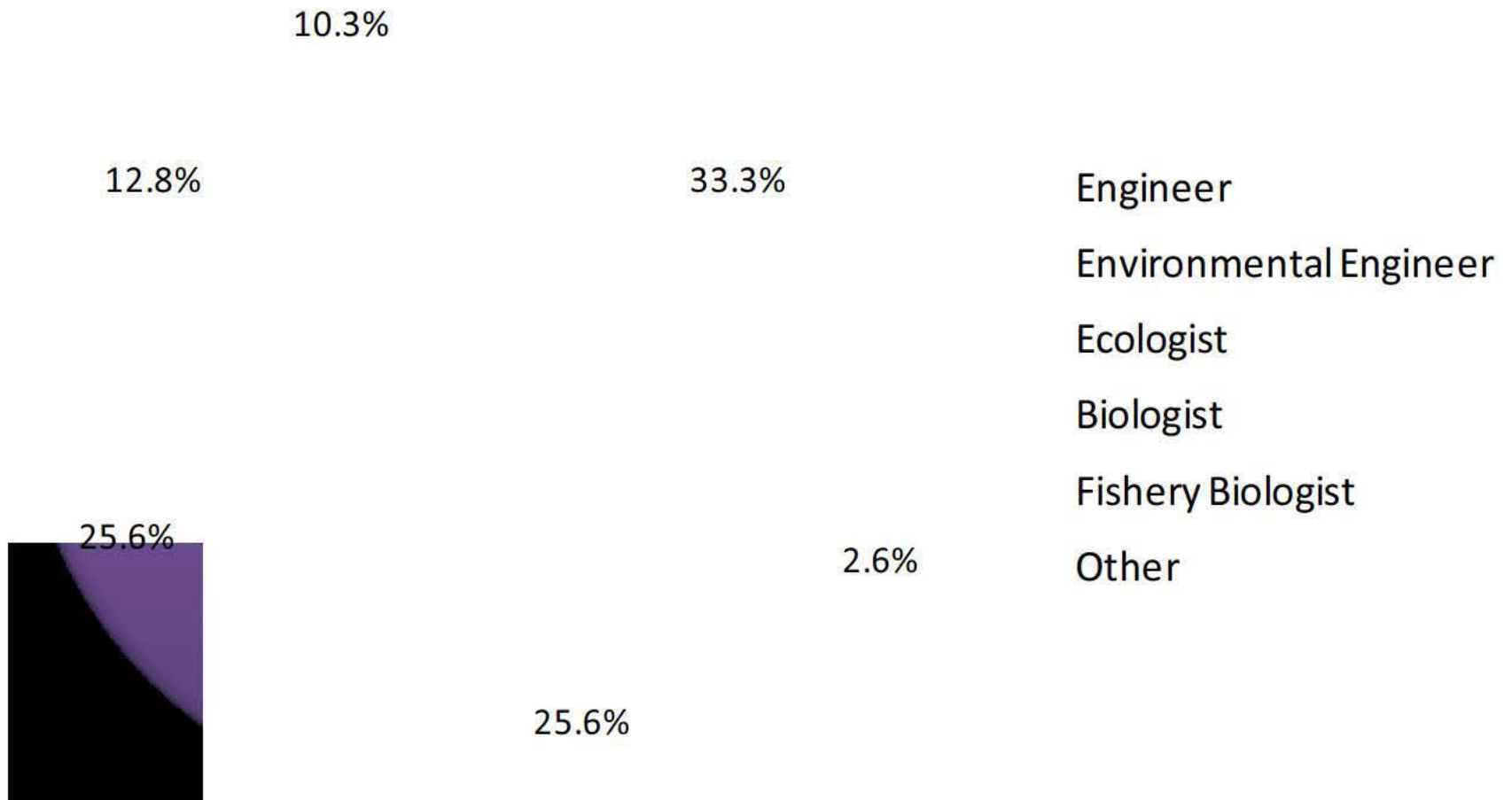
# Who Took the Survey?

**What USACE district do you primarily work with?**



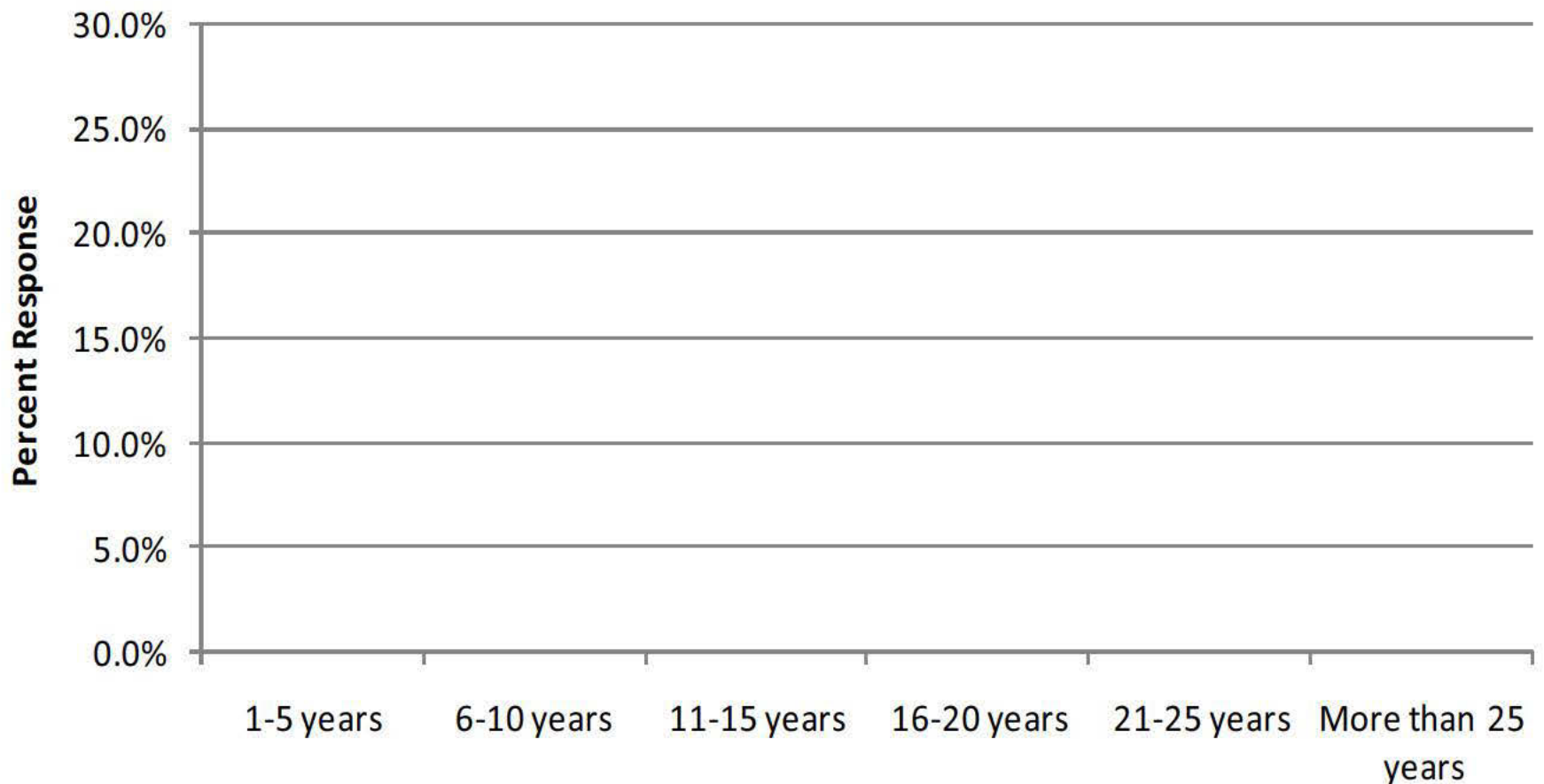
# Who Took the Survey?

## Discipline



# Who Took the Survey?

**How many years of experience do you have with navigational infrastructure projects?**



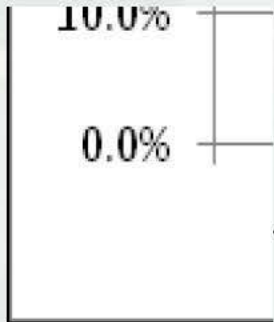
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# Existing EENI Inland River Systems

- **Dike notching/chutes**
- **Nature-inspired fish ladders**
- **Groove articulated concrete mats**
- **Chevron notching**



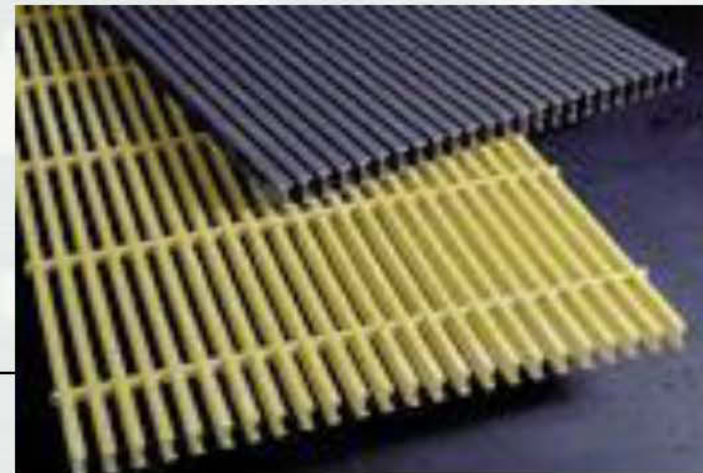
**Upper Mississippi River  
Restoration Environmental  
Management Program  
(UMRR-EMP)**

<http://www.mvr.usace.army.mil/EMP/default.htm>  
[signhandbook.htm](http://www.mvr.usace.army.mil/EMP/default.htm)



# **Existing EENI Coastal Systems**

- **Pea gravel around toe of breakwater for fish spawning**
- **Eelgrass planting in anchorage**
- **Shaped breakwater to create habitat variety**
- **Light transmitting dock materials**



# **Innovative EENI Ideas**

- **Modify breakwater toe, rock sizes, cross section, etc. to create habitat variety**
- **Glue oyster shell to hard structures to encourage colonization**
- **Add structural modifications (e.g., large woody debris) to provide habitat depth**
- **Construct nesting platforms for shore birds**





# Research Needs

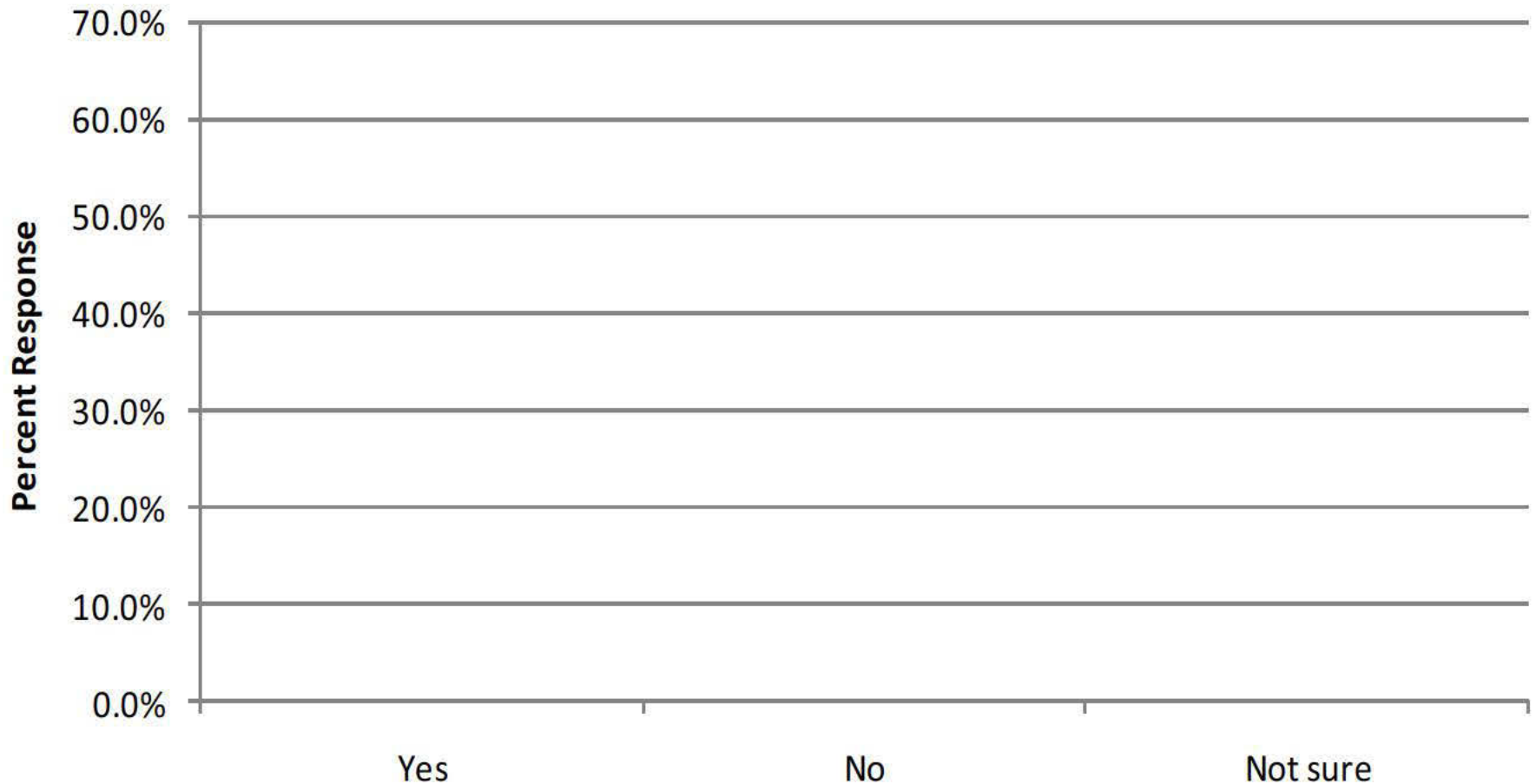
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# Research Needs

**Are there other EENI-related items which you believe need further research?**



# Research Needs

- **Document case studies and benefits**
- **Conduct demonstration projects**
- **Develop success assessment tools**
- **Prioritization of sites where EENI might work**
- **Reduce impediments to implementation**



# Next Steps

- **Promote the EENI concept**
- **Consider establishing EENI goals**
- **Conduct national workshop to exchange ideas (August 2011)**
- **Develop pilot projects of innovative ideas**





# Products in Progress

- **Technical Note: ERDC-EL (Internal)**
- **Technical Report: ERDC-EL (Internal)**
- **Journal Article: Integrated Environmental Assessment and Management (IEAM)**



# ERDC Project Team

- Tom Fredette, PhD, 978-318-8291 [thomas.j.fredette@usace.army.mil](mailto:thomas.j.fredette@usace.army.mil)
- Christy Foran, PhD, M.P.A., 978-318-8267  
[christy.m.foran@usace.army.mil](mailto:christy.m.foran@usace.army.mil)
- Burton Suedel, PhD, 601-634-4578 [burton.suedel@usace.army.mil](mailto:burton.suedel@usace.army.mil)
- Sandy Brasfield, PhD, 601-634-3669 [sandra.m.brasfield@usace.army.mil](mailto:sandra.m.brasfield@usace.army.mil)
- Cynthia Banks, 601-634-3820 [cynthia.j.banks@usace.army.mil](mailto:cynthia.j.banks@usace.army.mil)
- Jay Lindsay, 601-634-3126 [james.h.lindsay@usace.army.mil](mailto:james.h.lindsay@usace.army.mil)



# Thanks for your attention!

