Environmental Enhancements and Navigation Infrastructure (EENI)

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

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Dredging Operations and Environmental Research

EENI Project Concept (1)

Identify opportunities to increase environmental enhancements of navigation infrastructure projects

[Focus is on infrastructure (channels, anchorages, jetties, locks, etc.) and not beneficial use of sediment]

EENI Project Concept (2)

- **Beneficial Use of Dredged Material is Reasonably Well-established**
  - **Beach Nourishment**
  - **Wetland Restoration**
  - **Land Reclamation**
  - **Construction Material**
- ***We Focused on Environmental Enhancements of Navigation Infrastructure***

Possibilities for Jetties?

Enhance for shellfish?

Crabs?

Example to illustrate concept. Can we make changes in design to build a jetty in ways that will provide enhanced use by shellfish? Add oyster shell to encourage settlement? Create a sinuous toe to provide semi-protected areas? Add caverns? As we maintain these structures can we build in environmental features?

EENI Project Concept (3)

Initially based on PIANC* Paper

PIANC Position Paper

'Working with Nature'

October 2008

What do we mean by 'Working with Nature'?

Maximising opportunities; reducing frustrations. **Working with Nature** is an integrated process which involves working to identify and exploit win-win solutions which respect nature and are acceptable to both project proponents and environmental stakeholders. It is an approach which needs to be applied early in a project[1] when flexibility is still possible. By adopting a determined and proactive approach from conception through to project completion, opportunities can be maximised and - importantly - frustrations, delays and associated extra costs can be reduced.

*The World Association for Waterborne Transport Infrastructure, formerly the Permanent International Association of Navigation Congresses

EENI Project Concept (4)

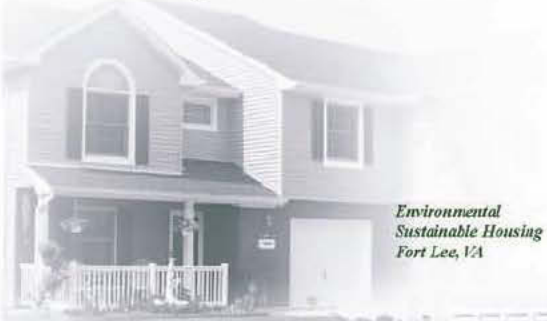
Builds on USACE Goals

US Army Corps of Engineers®

ENVIRONMENTAL OPERATING PRINCIPLES

One Corps Serving The Army and the Nation

Further information is available at: **http://www.usace.army.mil**



Environmental Sustainable Housing Fort Lee, VA

Wetlands at Melvin Price Lock and Dam

Endangered Whooping Crane Aransas National Wildlife Refuge, Texas

1 Strive to achieve Environmental Sustainability. An environment maintained in a healthy, diverse, and sustainable condition is necessary to support life.

2 Recognize the interdependence of life and the physical environment. Proactively consider environmental consequences of Corps programs and act accordingly in all appropriate circumstances.

3 Seek balance and synergy among human development activities and natural systems by designing economic and environmental solutions that support and reinforce one another.

4 Continue to accept corporate responsibility and accountability under the law for activities and decisions under our control that

EOPs especially relevant to the concept

2009
US Army Corps of Engineers' Campaign Plan

Campaign Plan goals especially relevant to the concept

Goal 2: Deliver enduring and essential water resource solutions through collaboration with partners and stakeholders.

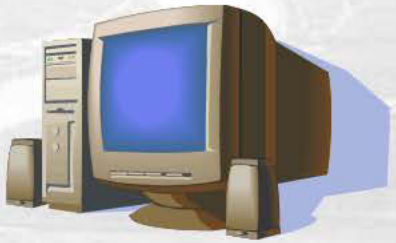
Objective 2a: Deliver integrated, sustainable, water resources solutions.

Objective 2b: Implement collaborative approaches to effectively solve water resource problems.

Objective 2c: Implement Streamlined and Transparent Regulatory Processes to Sustain Aquatic Resources.

Project Approach

- 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 to improvement
- Potential solutions to impediments
- Items needing further *research* to support use
- Case studies and relevant reports

Survey

DOER EENI Survey

2. Environmental Enhancements: Present and Potential

Thank you for your help with this research. Your experiences are critical to the success of the project. What follows is a series of questions organized by topic. In general, we are asking you to supply written responses to the questions. However, a few questions require either a Yes/No or a scaled response. Questions marked with an asterisk (*) require an answer. The topics and questions are organized as follows:

http://www.surveymonkey.com/s/EENI

EENI Survey Sections

- **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)**
- **Information About You (9 Qs)**

EENI Survey Sample

DOER EENI Survey

4. Impediments to Use

A number of potential impediments to incorporating environmental enhancements into USACE navigation features have been identified. These include (1) non-federal cost sharing requirements, (2) institutional resistance within the USACE, and (3) concerns about future maintenance on "enhanced" infrastructure.

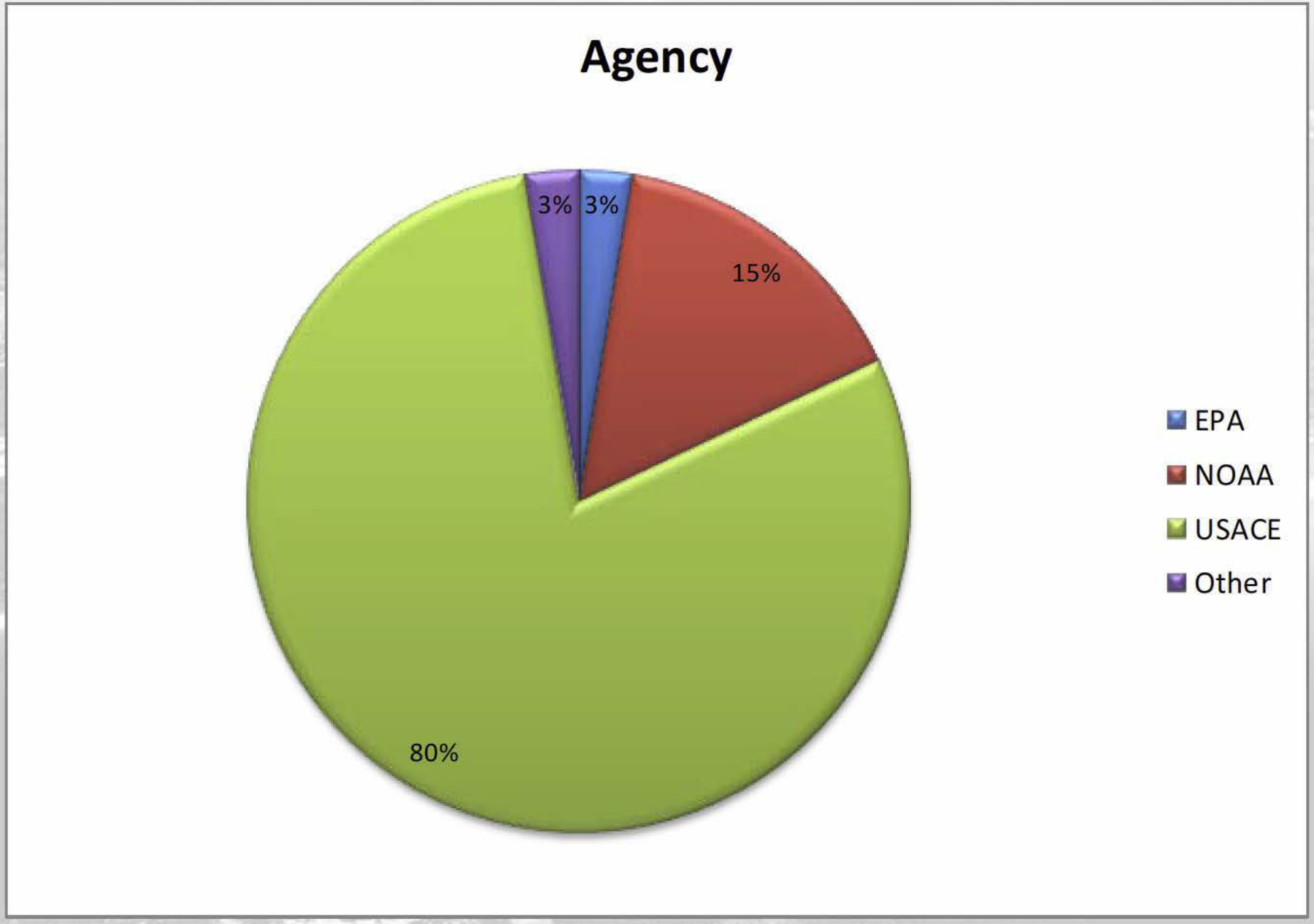
* 1. How high of an impediment do you believe cost sharing is to EENI?

- ☐ Very high
- ☐ High
- ☐ Neither High nor Low
- ☐ Low
- ☐ Very Low
- ☐ No Opinion

2. Can you describe an experience in which cost sharing was the reason an enhancement was not considered?

	Environmental Enhancements: Present and Potential
1	Do you believe there are opportunities to improve the environmental attributes of existing or future navigation infrastructure projects?
2	Are you familiar with any projects in which environmental enhancements have been considered or incorporated?
3	Please identify any relevant project(s), the environmental enhancement(s) and provide links to references as appropriate.
4	How did you find out about designing and implementing these features? What process(es) enabled their consideration?
5	At what stage of the project(s) were these enhancements considered and why? (e.g. problem formulation, reconnaissance study, generation of alternatives, feasibility study, comparison of alternatives, selection of a plan)
6	In cases where these features were incorporated, what were the ultimate benefits to the project? Was there any post-construction monitoring and reporting? Please describe and cite, where possible.
7	In cases where these features were not incorporated, what was the reason?
8	What agencies and stakeholder groups were involved in the investigation and evaluation of these features? How did you work with them? What expertise did they contribute? Was it a collaborative effort?
9	What other specific projects would be helpful to investigate for this survey?
10	Are there (other) environmental enhancements that you believe might be possible to incorporate into existing or future navigation infrastructure projects?
11	If Yes, please describe any environmental enhancements that you envision and on what type of project. Be creative.
12	What information/training would facilitate incorporating these or other environmental enhancements?
13	What training/information or programs have we tried that didn't work? Why do you think it didn't work?

Who Took the Survey?



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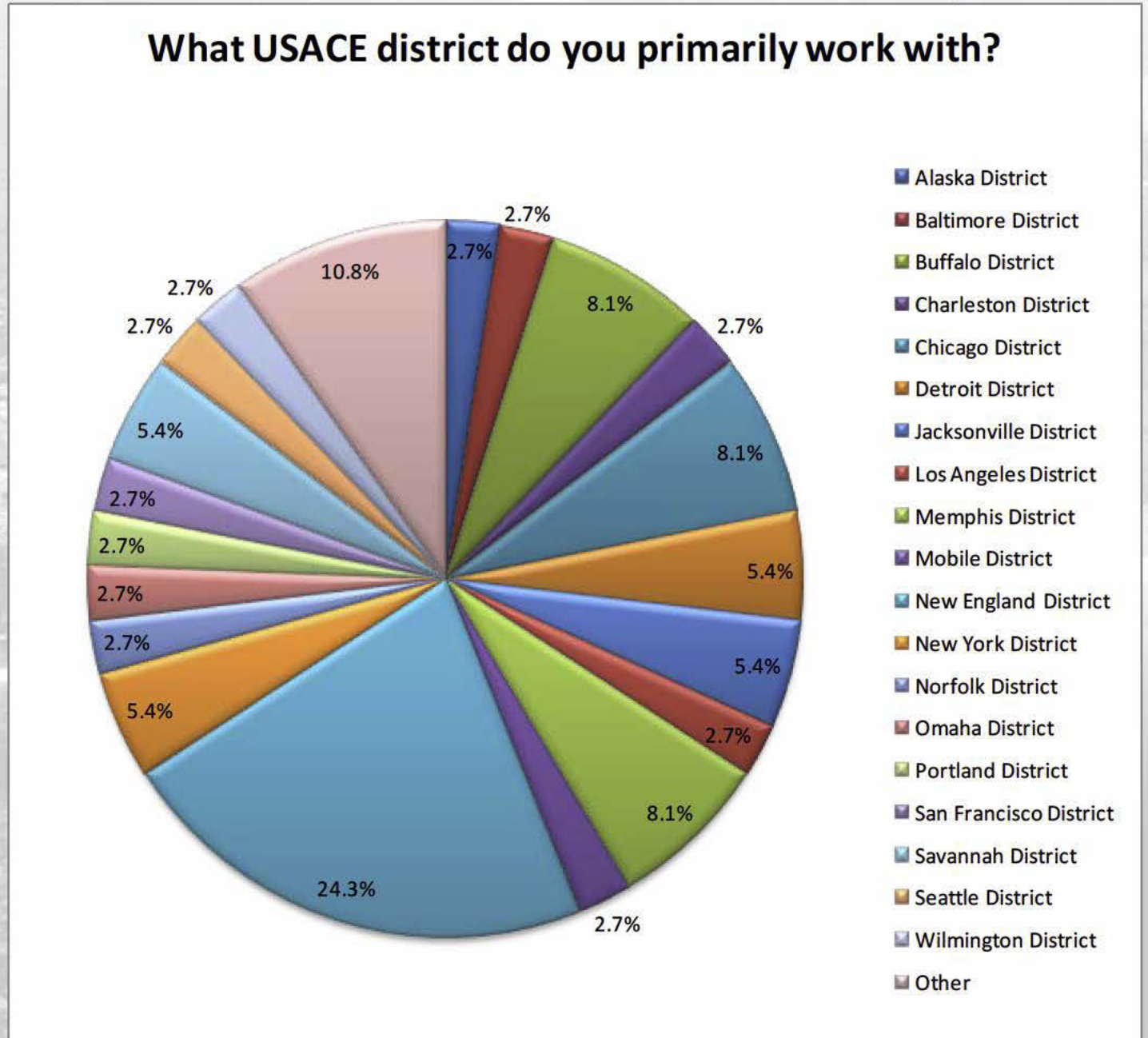

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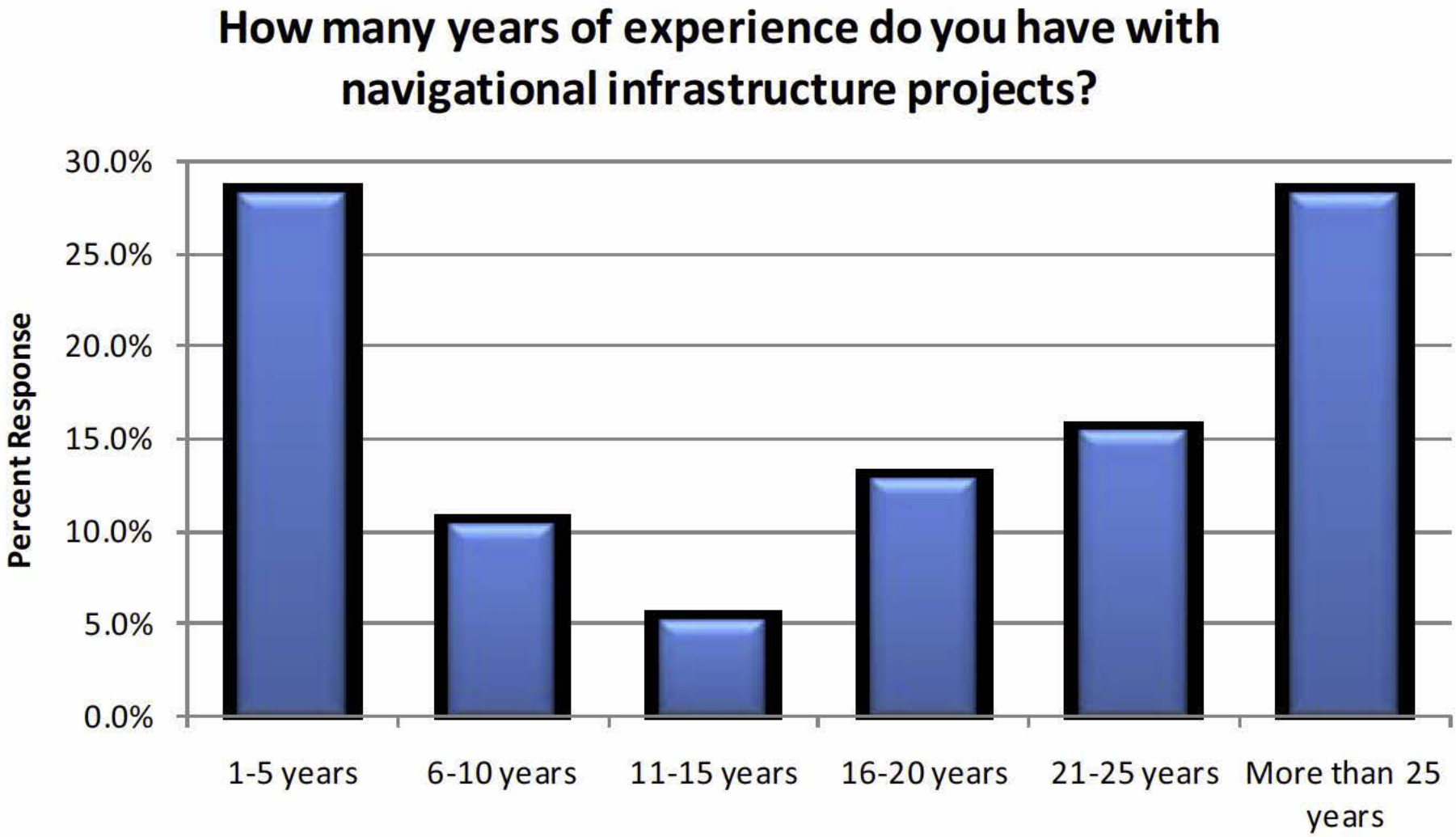

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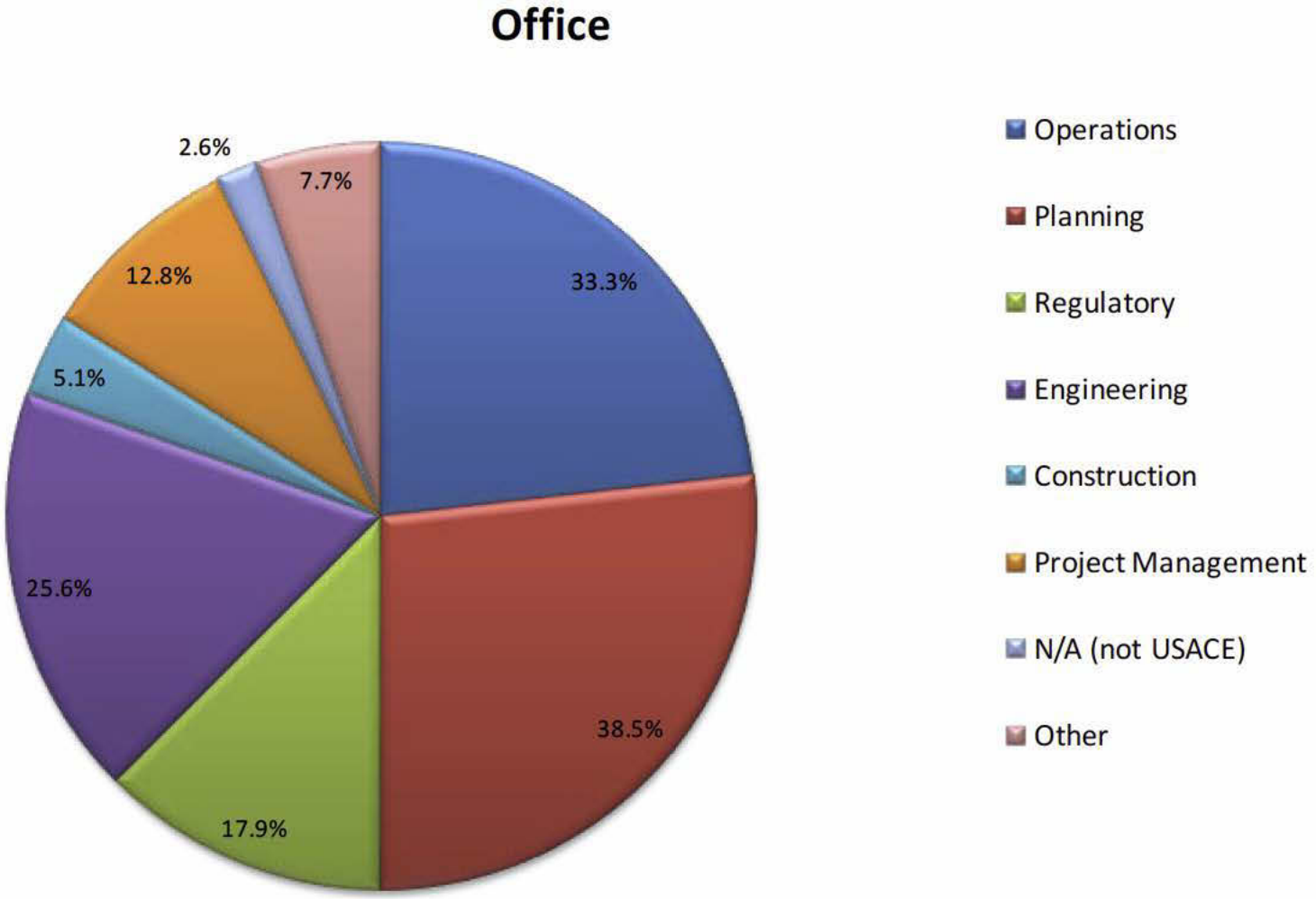

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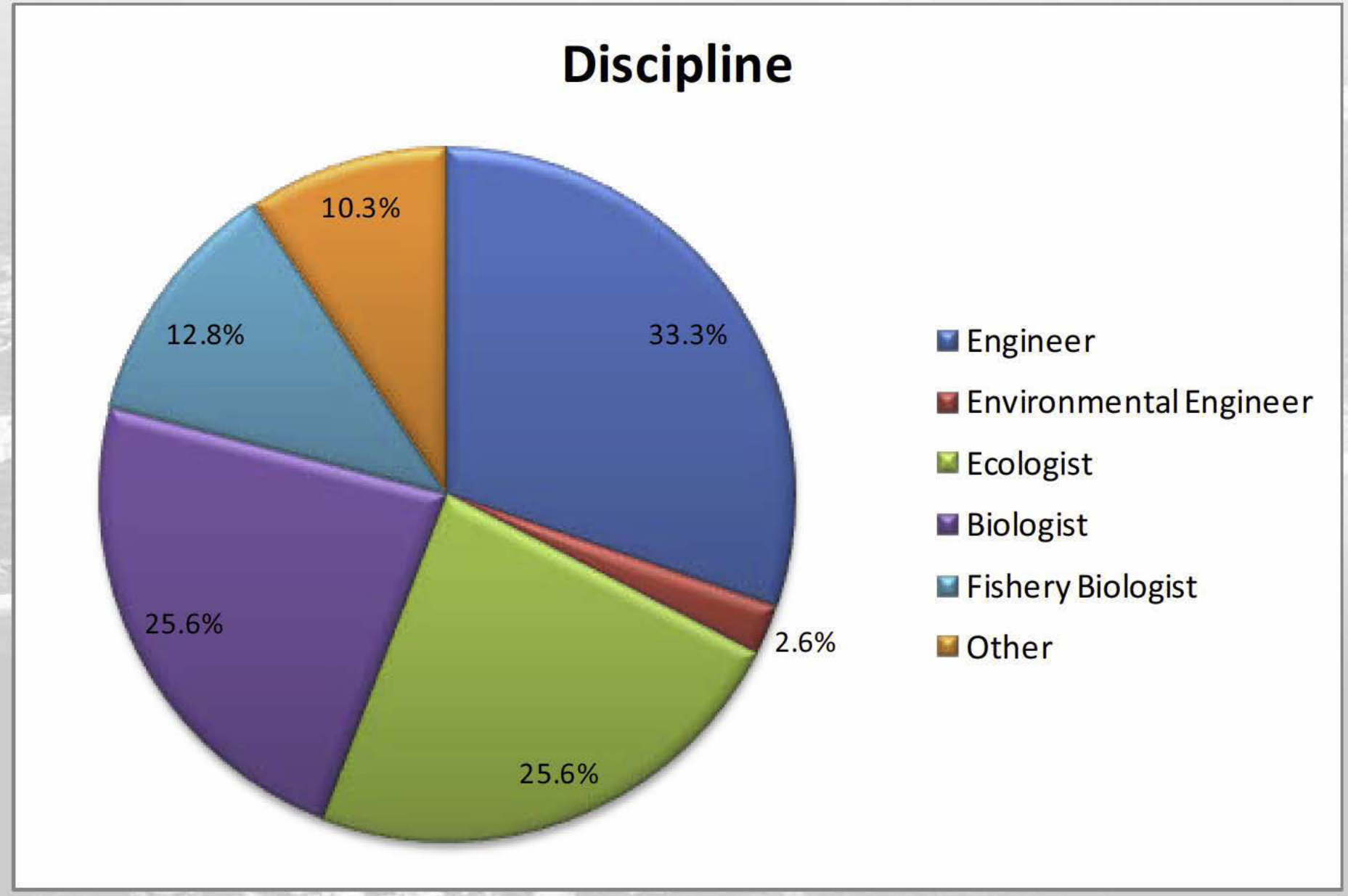

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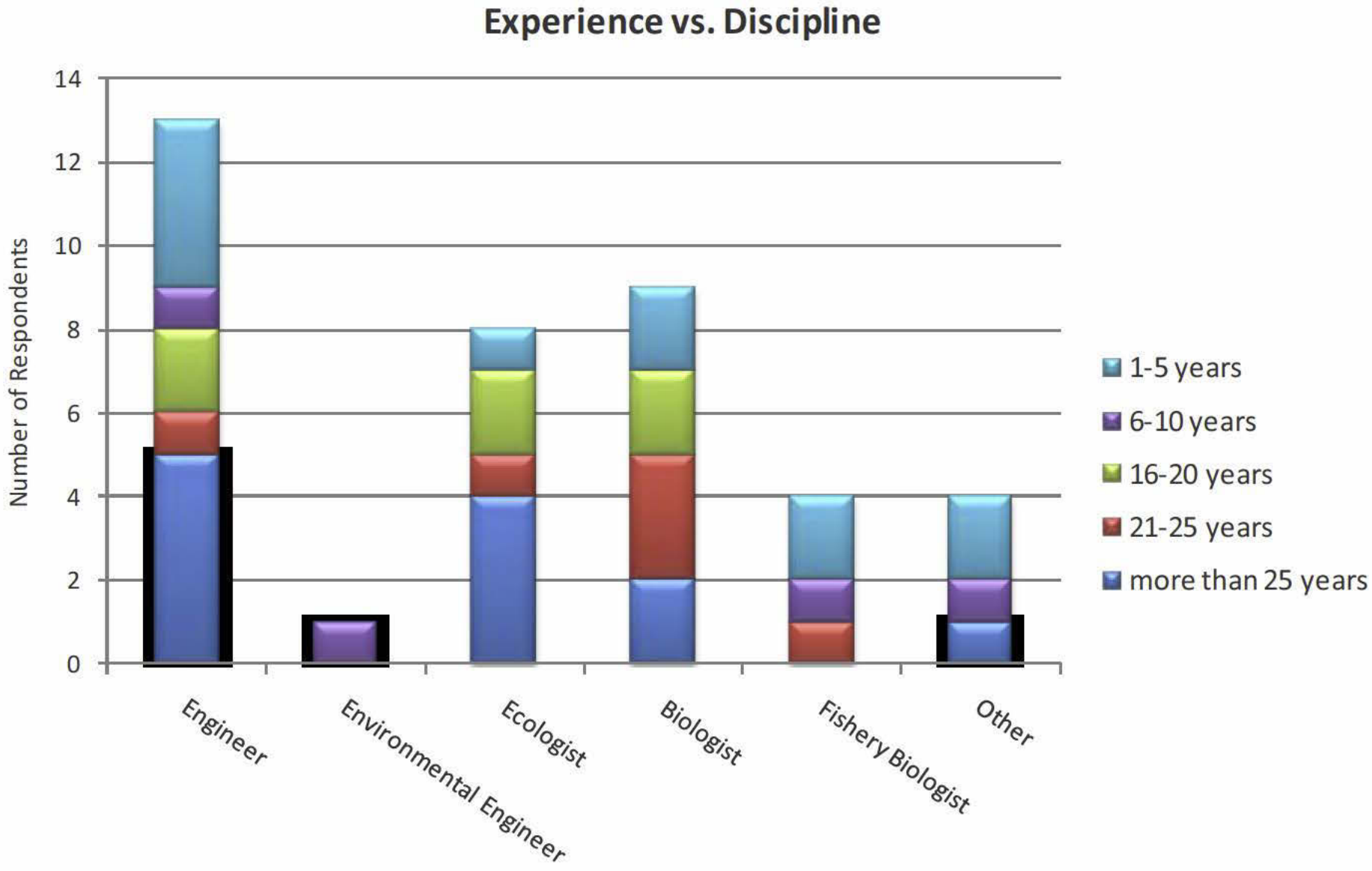
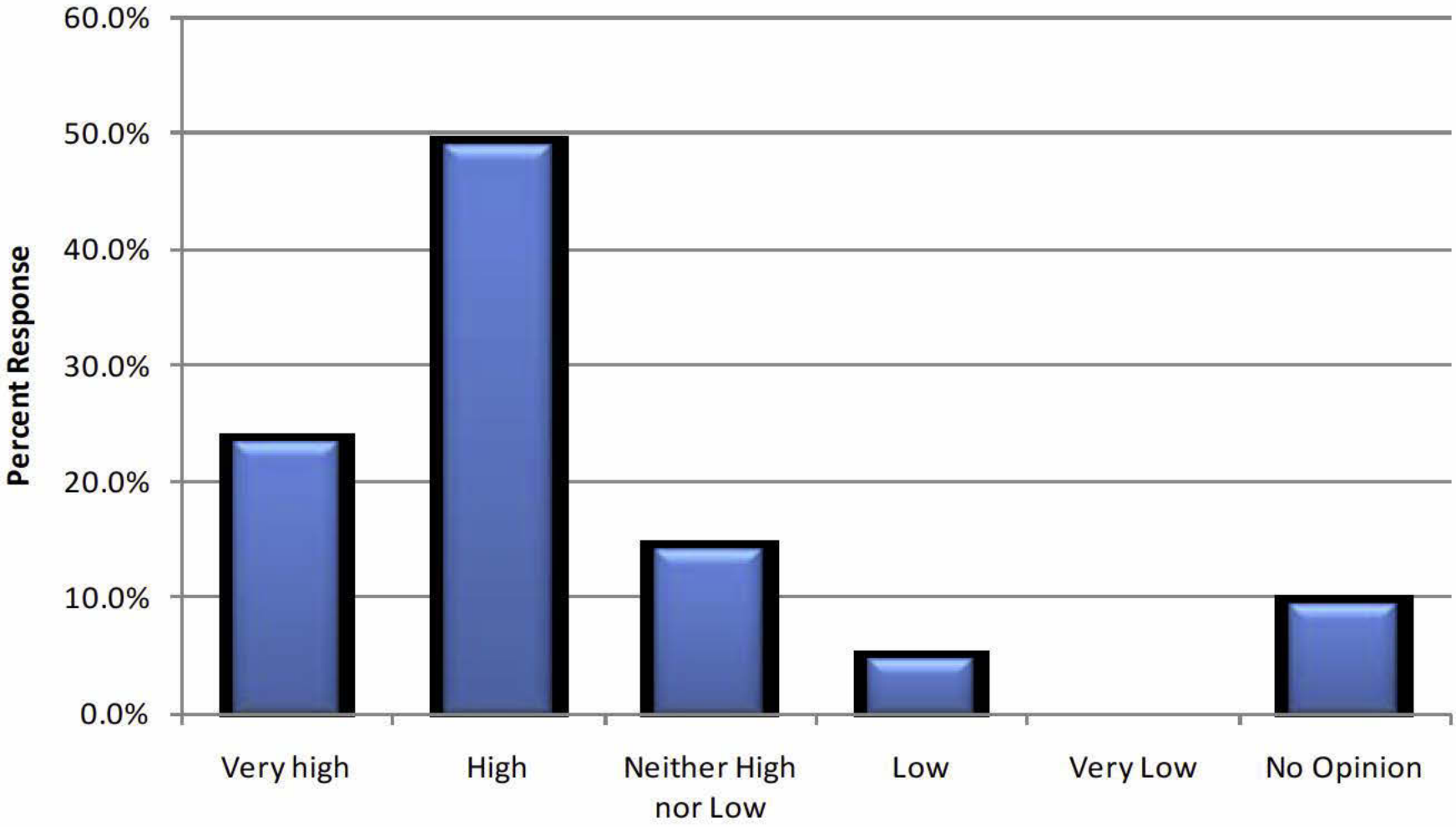


Views on Impediments



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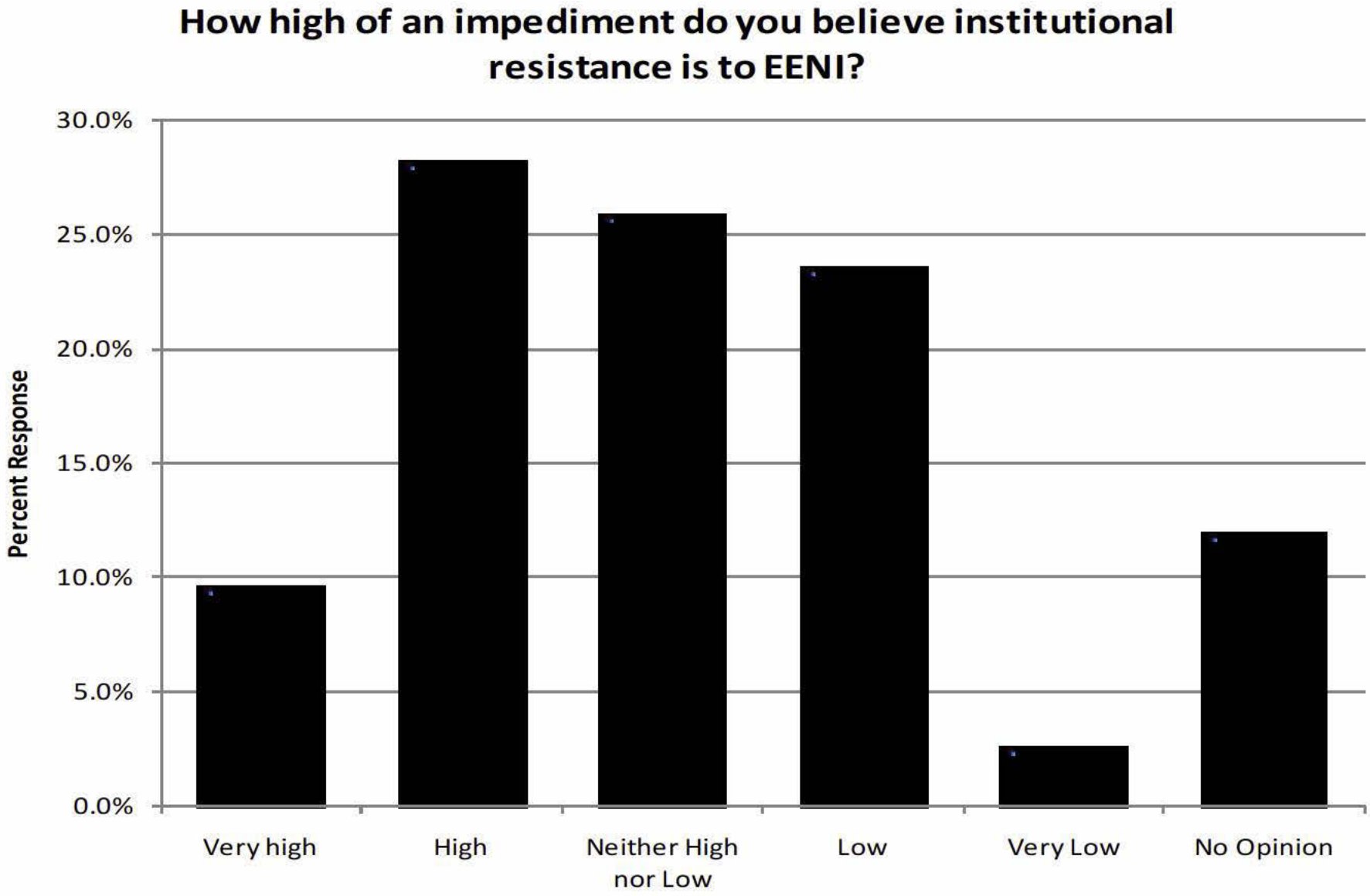

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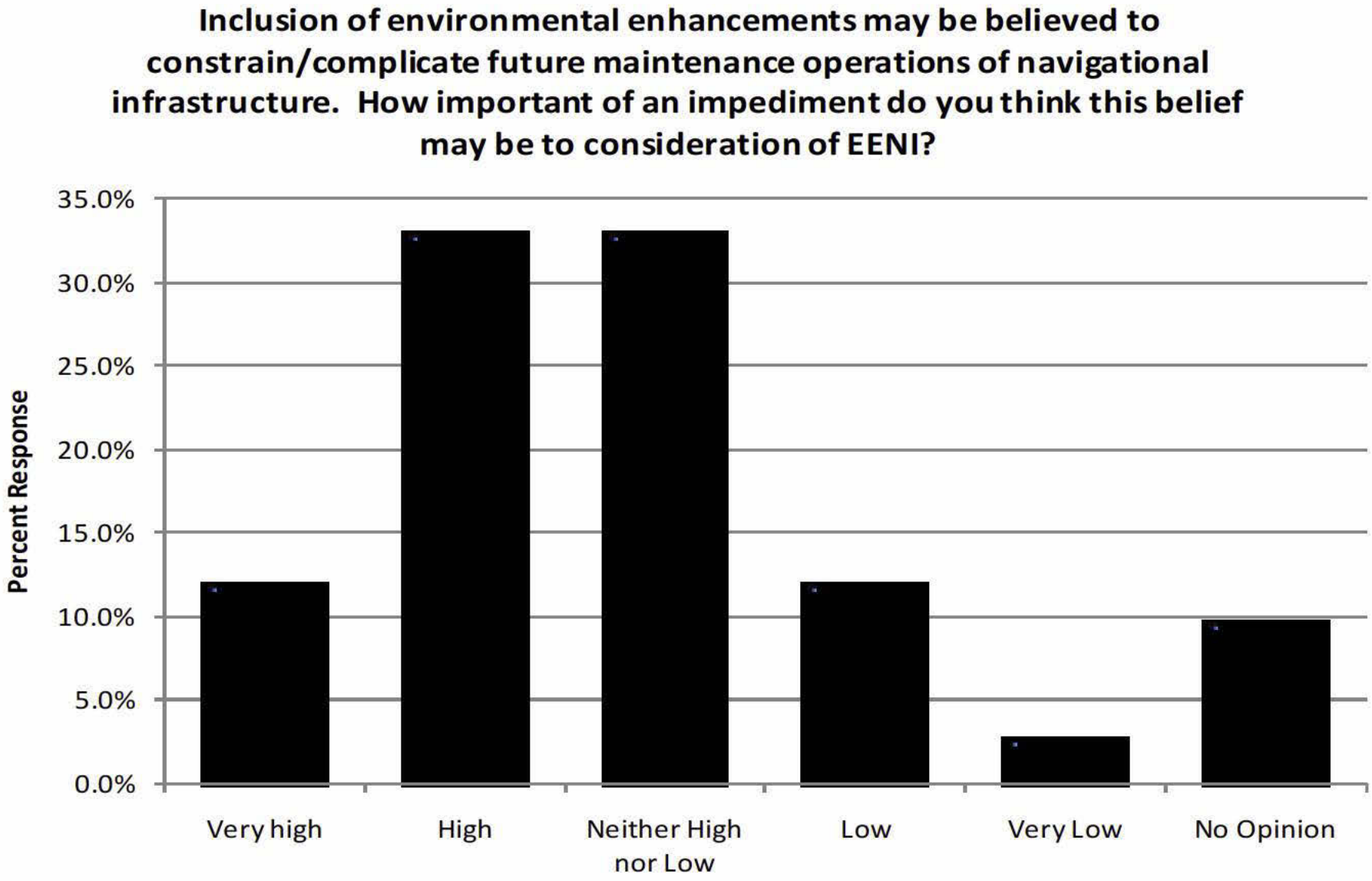
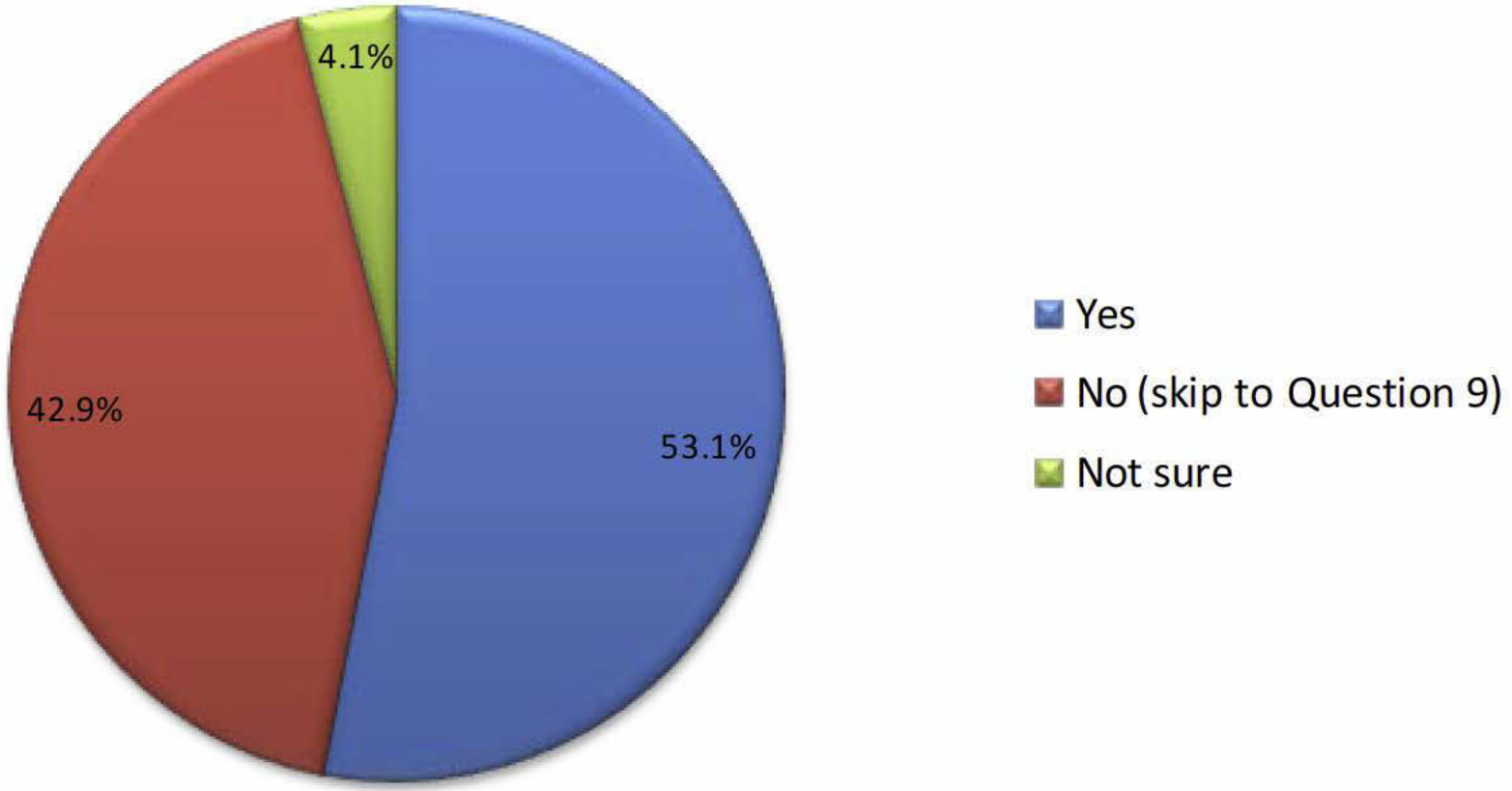


Suggestions to Reduce Impediments

- Greater stakeholder interaction
- Interagency agreements
- Special program funding
- Promote the EENI concept
- Document case studies
- Develop agency goals/metrics

Are you familiar with any projects in which environmental enhancements have been considered or incorporated?



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/designhandbook.htm

River Training Structures

Center section of chevron at lower elevation (e.g., notched)

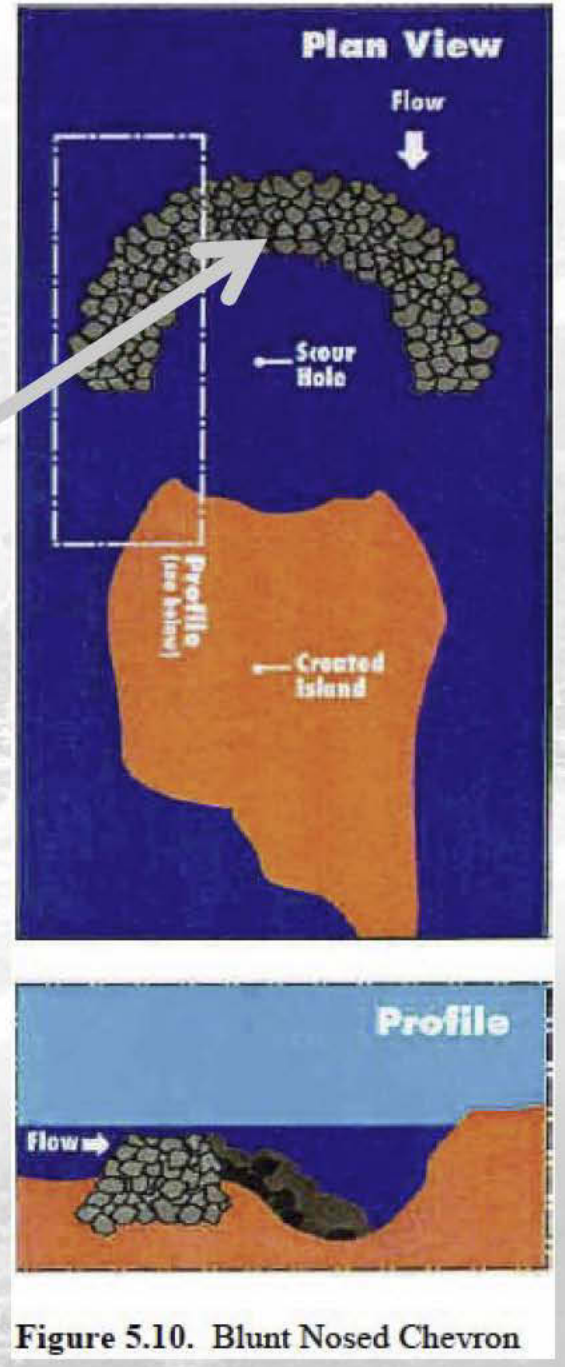


Figure 5.10. Blunt Nosed Chevron

River Training Structures

Photograph 2.12. A Series of Chevrons on the Mississippi River

Photograph 2.13. A Series of Chevrons Aligned To Split Flow Between the Main Channel and a Side Channel, While Protecting the Existing Shoreline

River Training Structures

Off-Bankline Revetment

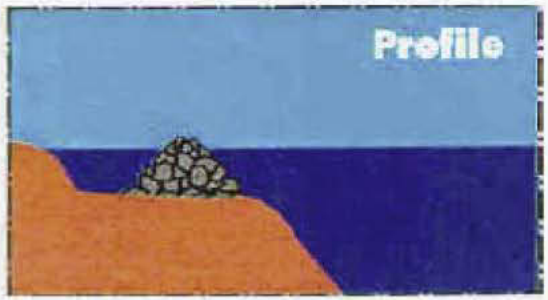
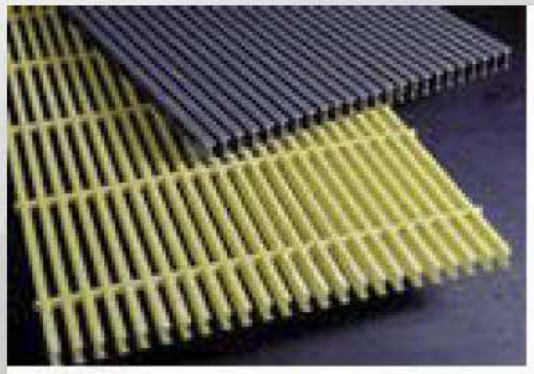


Figure 5.11. Off-Bankline Revetment

Existing EENI Coastal Systems

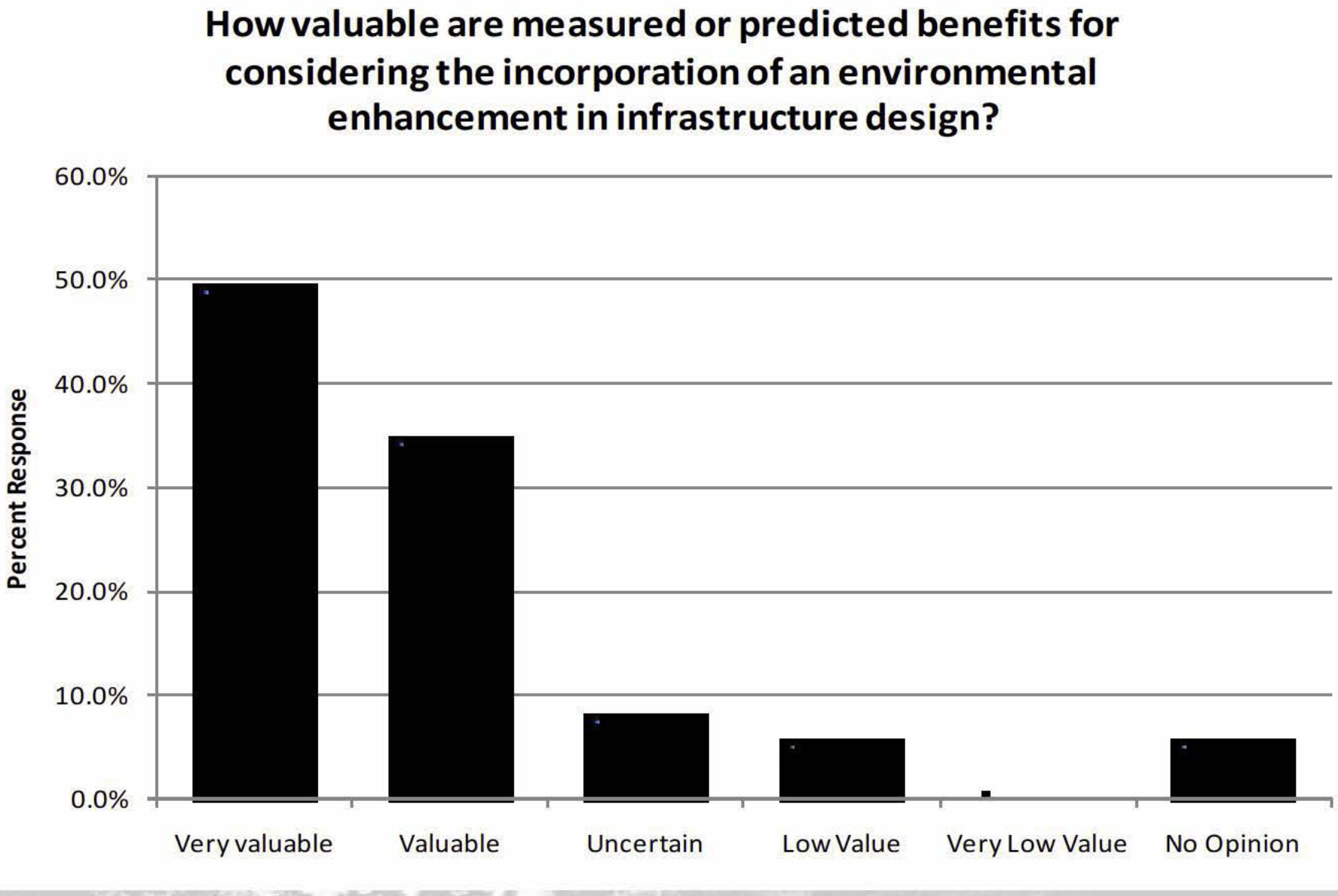
- Pea gravel around toe of breakwater for fish spawning
- Eelgrass planting in anchorage
- Shaped breakwater to create habitat variety
- Light transmitting dock materials
- Dredged material island topped with oyster shell for tern habitat



EENI Ideas

- **Modify breakwater toe, rock sizes, cross section, etc. to create habitat variety**
- **Glue oyster shell to hard structures to encourage colonization**
- **Create terraces in channel side slopes for sea grass**
- **Add marine mammal haul-out shelves to jetties**
- **Add osprey nesting platforms to structures**

Research Needs



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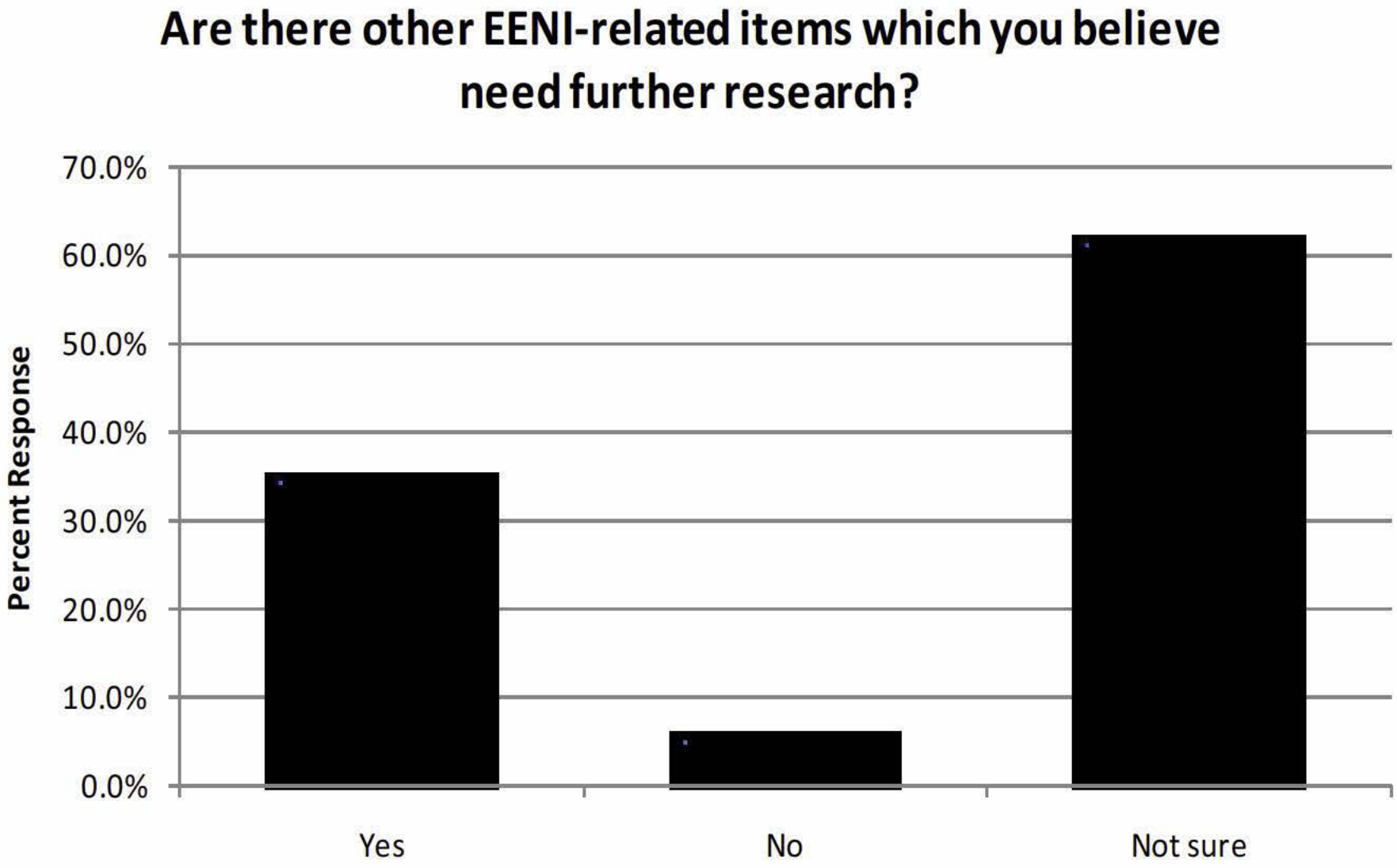
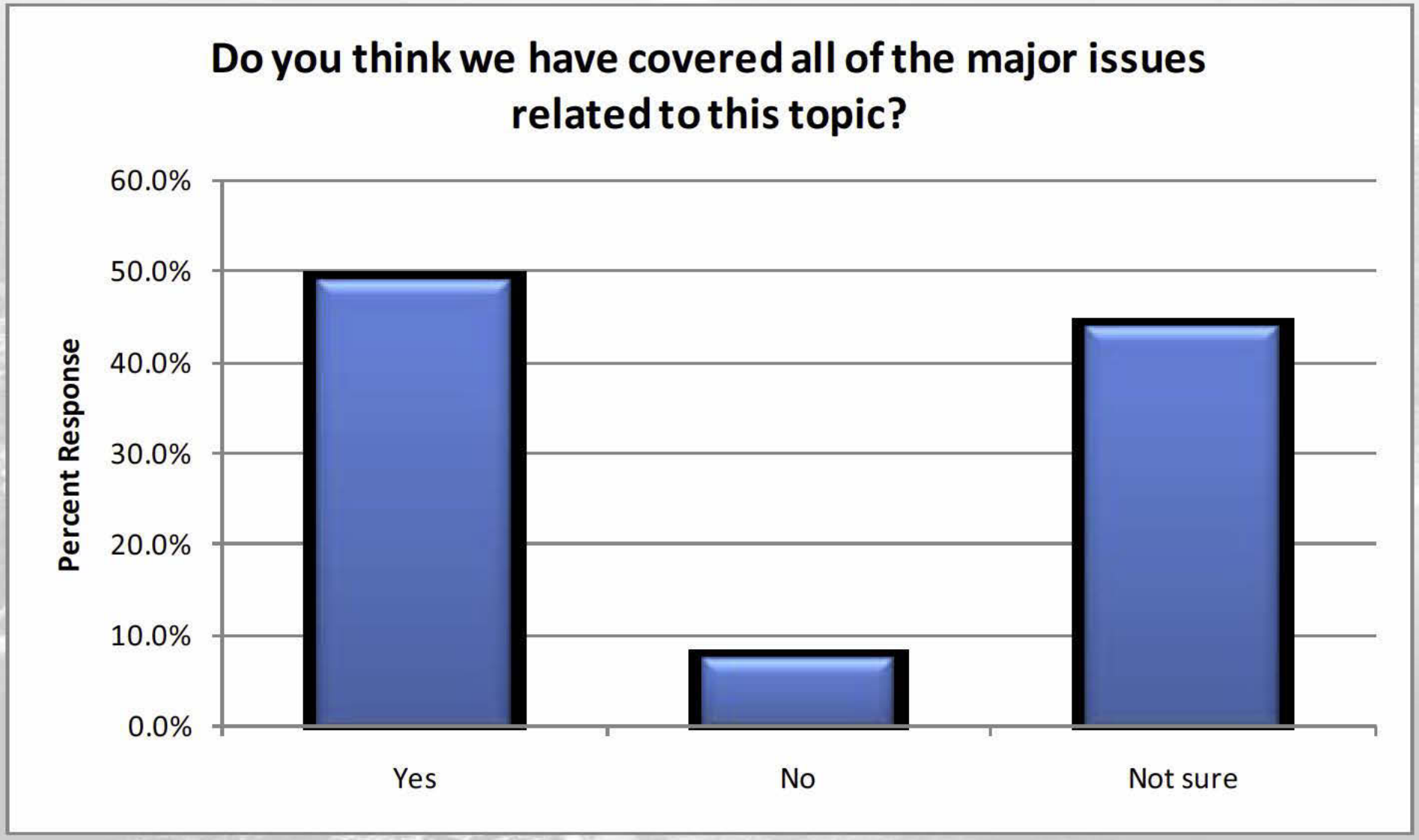


Research Needs

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


Do you think we have covered all of the major issues related to this topic?
Percent Response
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Yes
No
Not sure

Next Steps

- Promote concept
- Consider establishing goals
- National workshop
- Pilot projects of innovative ideas

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Thanks for your attention!