Fish Passage Culvert Best Practices – aopMAP and the National Culvert Removal, Replacement, and Restoration Grants

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National Stream Restoration Conference

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NATIONAL CULVERT REMOVAL, REPLACEMENT, AND RESTORATION GRANTS (CULVERT AOP PROGRAM)

- Annual competitive grant program
- Focused on projects for removal, replacement, and repair of culverts that meaningfully improve fish passage

Culvert AOP Program

	FAST Act (extension)	Bipartisan Infrastructure Law (BIL)				
Fiscal year (FY)	2021	2022	2023	2024	2025	2026
Advance appropriation (General Fund)	---	$200M	$200M	$200M	$200M	$200M
Total BIL funding (FY22-26)	**---**	**$200M**	**$200M**	**$200M**	**$200M**	**$200M**
Subject to future appropriation	---	$800M*	$800M	$800M	$800M	$800M

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GRANT ELIGIBILITY

- Project categories

    Culvert replacement, removal or repair

    Weir replacement, removal or repair

    Bridge projects are not eligible (except when replacing a culvert)

- Looking for projects that provide passage for anadromous fish

    +++ Rare, threatened, and endangered species

    +++ Species that could reasonably become listed

    + Prey for endangered, threatened or protected species

    + Species that are identified as climate resilient stocks

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GRANT DETAILS

- $10K < Awards < $20M

  Typical expected award - $100K to $2M

- NMFS and USFWS involved in grant review and selection

- Eligible activities

  Preliminary Engineering

  ROW

  Consultation and Permitting

  NEPA Studies

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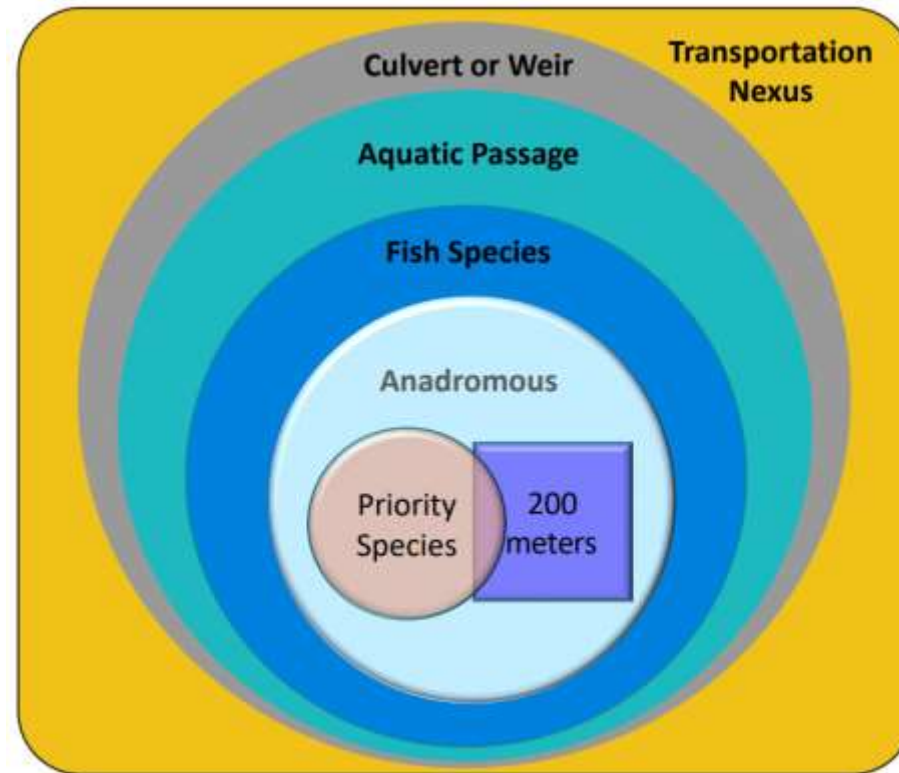
GRANT SCORING CRITERIA

1. Conservation benefits to anadromous fish
2. Regional and watershed context
3. Ecosystem benefits
4. Project design and delivery method
5. Project monitoring and evaluation
6. Climate change, sustainability and resilience
7. Equity and barriers to opportunity

- NOFO advertised in October
- Applications due **Feb. 2024**

aopMAP (AQUATIC ORGANISM PASSAGE MONITORING & ASSESSMENT PROTOCOL)

- Standardized monitoring protocol
- Initial Goals: robust monitoring data sets are desired to study effectiveness of different design approaches
  - Facilitate future research
- Monitoring protocol criteria:
  - Applicable to all AOP design crossings
  - Nationwide application - all geomorphic types and all species of concern
  - Flexibility on seasonal flow conditions
  - Consider passage of organisms at all expected movement conditions

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MONITORING PROTOCOL STRUCTURE

- Multi-stage protocol
- Stage 1 – As-Built Information
- Stage 2 – Geomorphic data focus
  - Evidence of channel alterations
  - Channel Characteristics
  - Depositional Features
  - Bed Materials
  - Potential AOP Limiting Features
  - Culvert Interior Features
  - Qualitative visual assessment
- Future Stage – Biological evaluations

COMPARATIVE ASSESSMENT

- Collecting identical pertinent data in the downstream and upstream channel reaches, with those within the water crossing structure, allows for a direct comparative assessment of systems data collected.
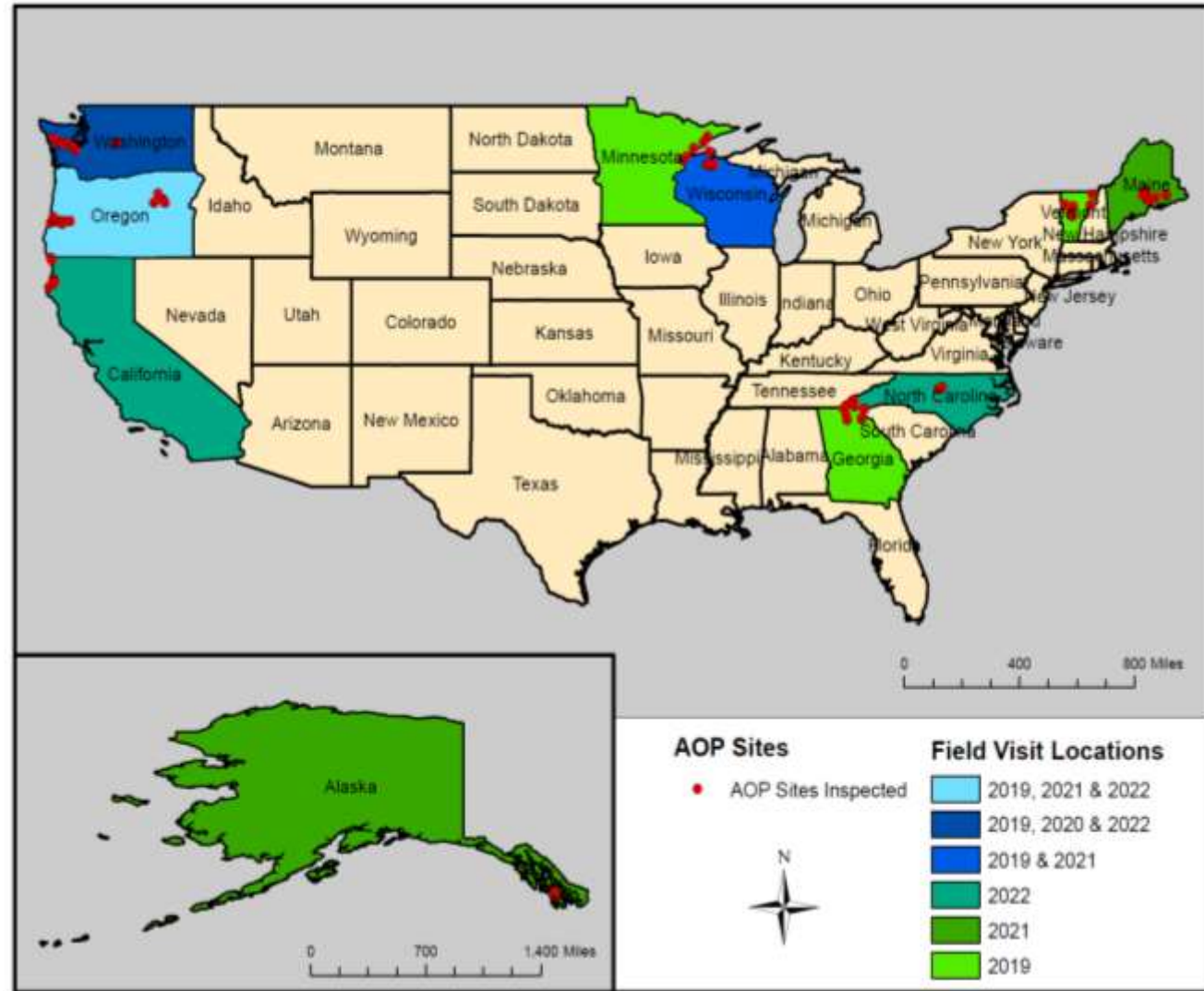

Example of upstream reference reach

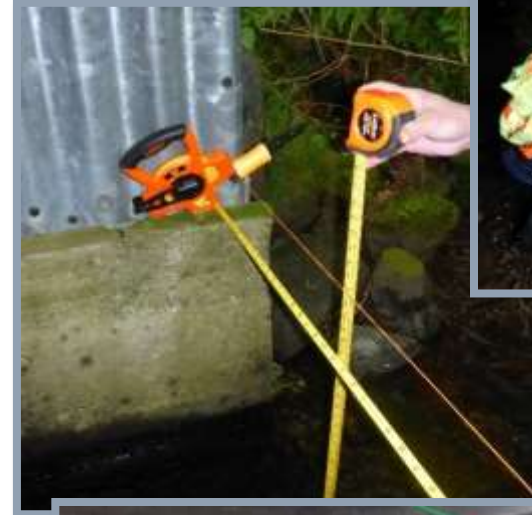Example of a downstream potential limiting feature

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FIELD INSPECTION PROCESS

- Field Crews
  - 2 to 3 trained staff
  - Multi-disciplinary
- Minimal tools needed
- Takes 1 to 2 hours (Initially 3 to 4 hours)

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TYPES OF SYSTEMS ENCOUNTERED

USFS Stream Simulation Moderate Gradient

WDFW Stream Simulation Very Low Gradient

HEC-26 High Gradient

Retrofits

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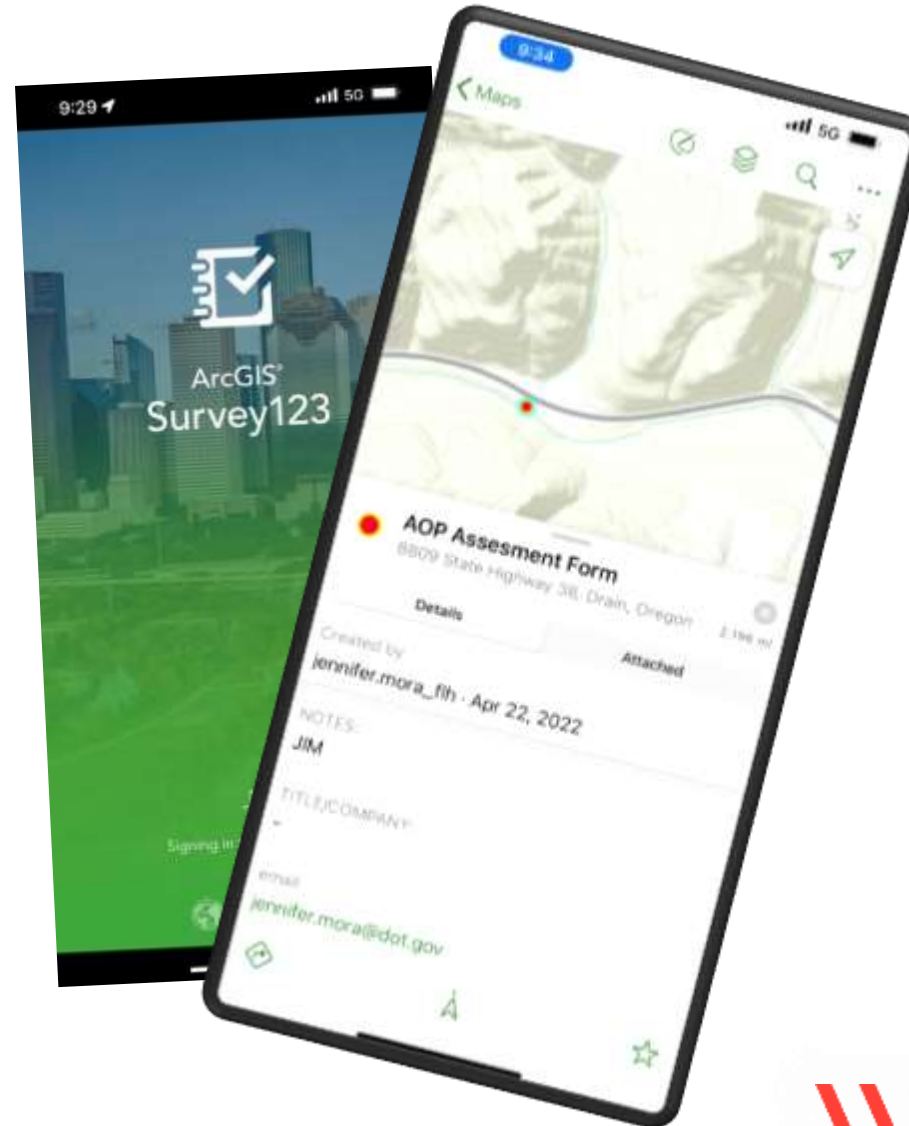
MOBILE APPLICATION FOR DATA COLLECTION

- Developed in ESRI Survey 1-2-3 platform
- Allows for offline data collection and automated download to online database
- Viewer options with other ESRI software packages
- Automated report development tools
- iPhone, Android, and iPad compatibility

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MOBILE APPLICATION – FIELD ASSESSMENT

Cloud based database upload

Screen capture project team member using mobile application.

Color Coded Sections

Geolocation of data points

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CHANNEL CHARACTERISTICS

- Geomorphic Channel Type
- Channel Slope
- Typical Cross-Section Data (Width & Depth)
  - Flow at Inspection
  - Active Channel
  - Floodprone
- Characteristic Bed Material

Channel Features

- Not asking assessment team to determine if a feature is a blockage
- Judgement is limited to logging typical and unique channel features
- Numerous features can be documented
- Research: compare natural occurring to constructed features to biological data

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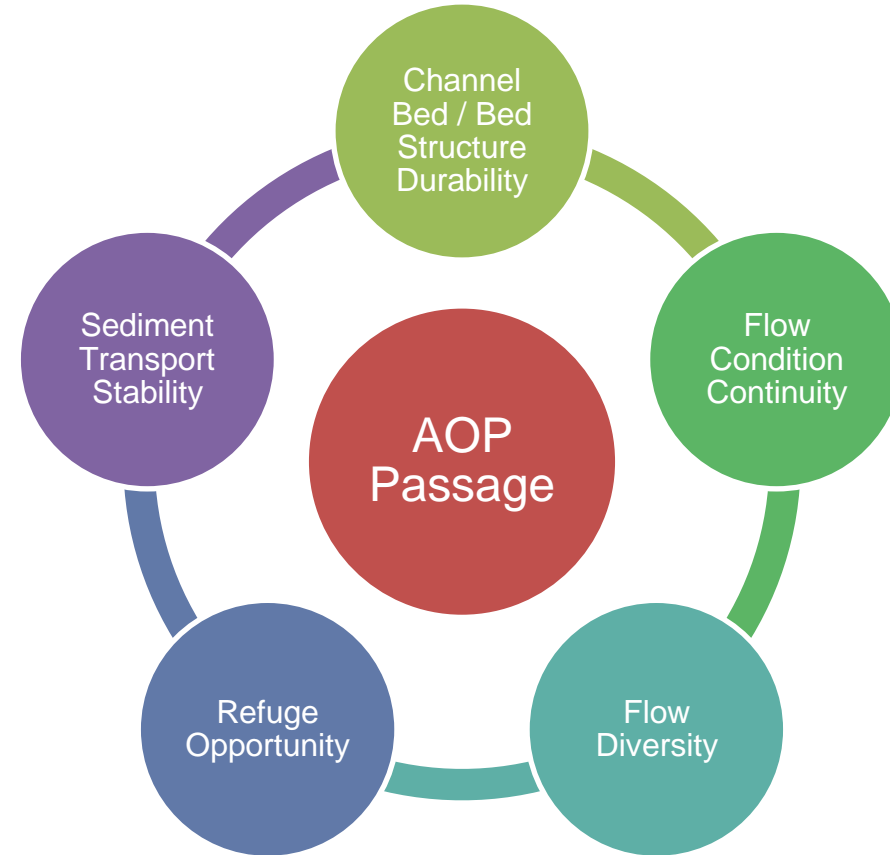NATURAL WATERS

INTERNAL CULVERT DATA

- Culvert Interior Banks & Large Roughness Features
  - Presence & Frequency
  - Stability

- Scour and Bed Stability
  - Evidence of loss of fines
  - Exposure of foundations

- Qualitative rankings
- Intended to capture nuances that qualitative metrics may miss
- Relative rankings versus absolute rankings
  - Accuracy v. consistency

Channel Bed / Bed Structure Durability

Flow Condition Continuity

Flow Diversity

Refuge Opportunity

Sediment Transport Stability

AOP Passage

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LESSONS LEARNED

- Some states require banks to be comprised of same material as channel bed (mobile)
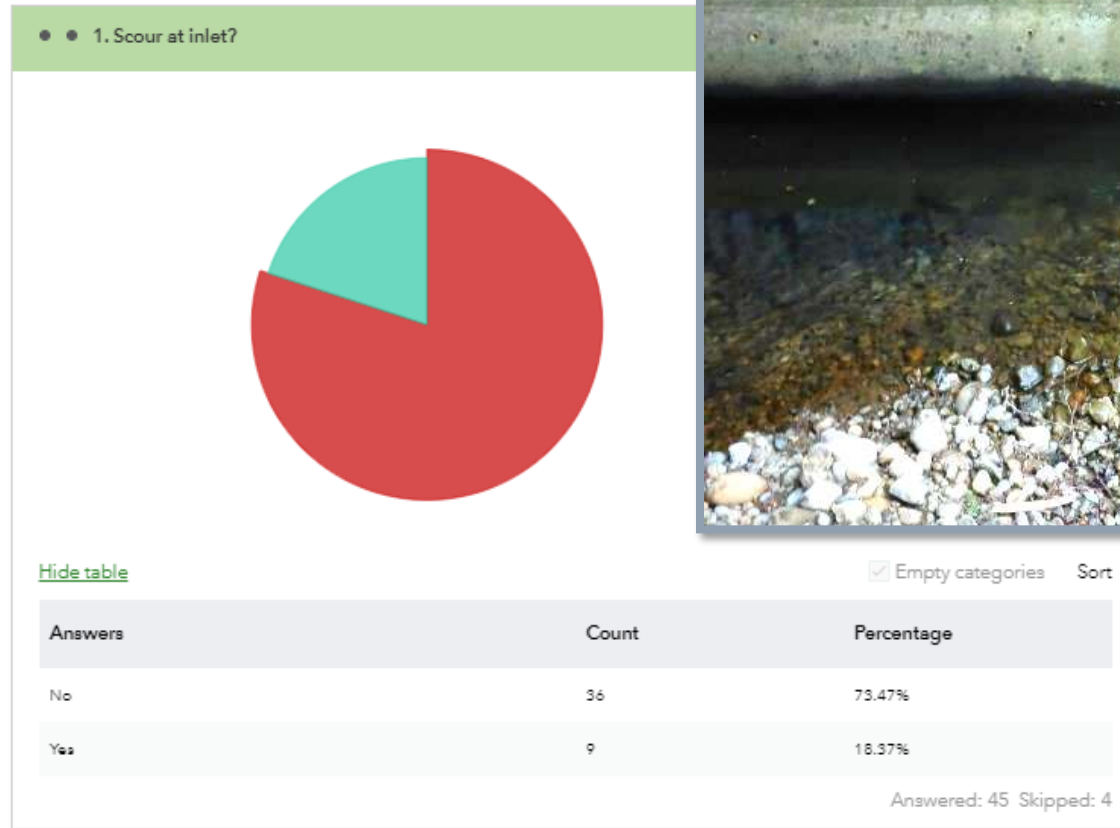

Little Skookum Creek, WA

Plane Bed

Frick Creek, GA

- Other states allow for placement of large rocks or boulders to promote bank stability and enhance flow diversity

BEST PRACTICES – CHANNEL ALIGNMENT

- Inlet scour is not commonly seen at traditional hydraulically sized culverts

- AOP culverts are showing to be prone to inlet scour
  - Analogous to bridge abutment scour

- Similar consideration to upstream approaches as would be applied to bridges

● ● 1. Scour at inlet?

Hide table   ☑ Empty categories   Sort

Answers	Count	Percentage
No	36	73.47%
Yes	9	18.37%

Answered: 45   Skipped: 4

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Source: FHWA

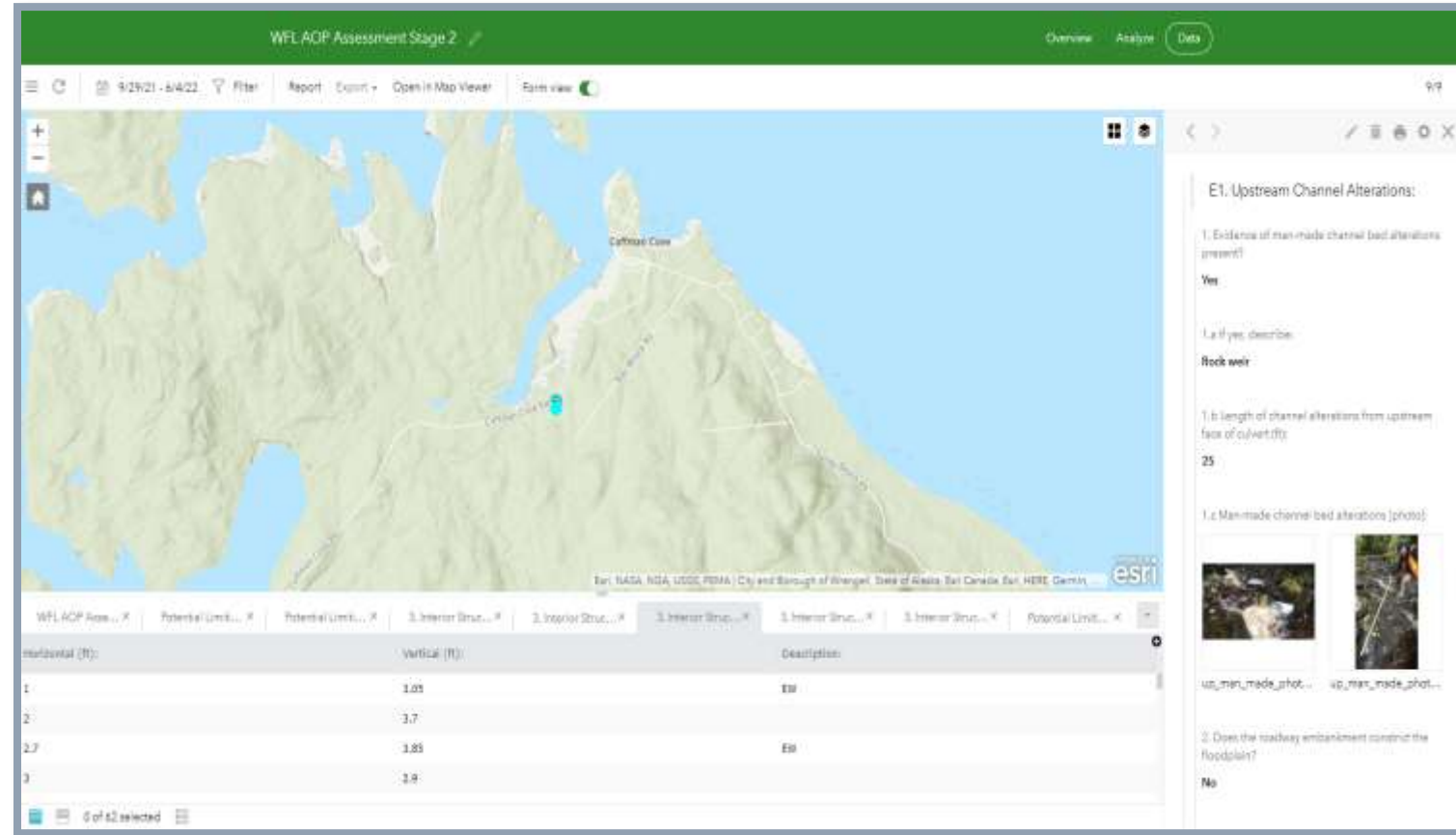NATURAL WATERS

OTHER OBSERVATIONS

- Use of rock or log weirs if not designed correctly may create a potential barrier
- Some biologists have concerns of increased predation when habitat features are placed within a crossing
- Monitoring protocol a valuable tool for AOP design
  - Documentation of best practices
- Discrepancies between what is designed and what is constructed
- General lack of as-built information

Survey 1-2-3 Mobile App and Online Database

- Survey is publicly available for all users

- Database maintained in ESRI ArcGIS Online

- 2023/24 Migration to USGS

- Next steps
  - aopMAP Hub website launch
  - Added training resources
  - Interim scoring system
  - eDNA biological integration
  - **Looking for Additional Collaborators!**

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ON-LINE TRAINING

- 2022 Training session focused on field data collection procedures and working with the mobile application

- In-Development
  - YouTube Training Shorts
  - Updated Field Procedures Manual
  - Workshop at TRB 2024

discover.wsp.com/WFLHDOnlineTraining

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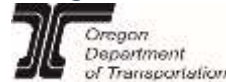
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Thank You!

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