Dirt Gravel and Low Volume Road Program

Stream Crossing Replacement Monitoring

WEBINAR

2/9/23

Starts 11am

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CDGRS

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SCC

PennState Center for Dirt and Gravel Road Studies

Stream Crossing Replacement Monitoring

Purpose

Provide an overview of monitoring of 2019 crossing replacement project

Provide information for CDs who might be interested in implementing monitoring of stream crossing replacement projects

Pennsylvania SCC State Conservation Commission

PennState Center for Dirt and Gravel Road Studies

Stream Crossing Replacement Monitoring

- **Hammond Run Replacement**
- Hammond Run Monitoring
- Monitoring opportunities for CDs

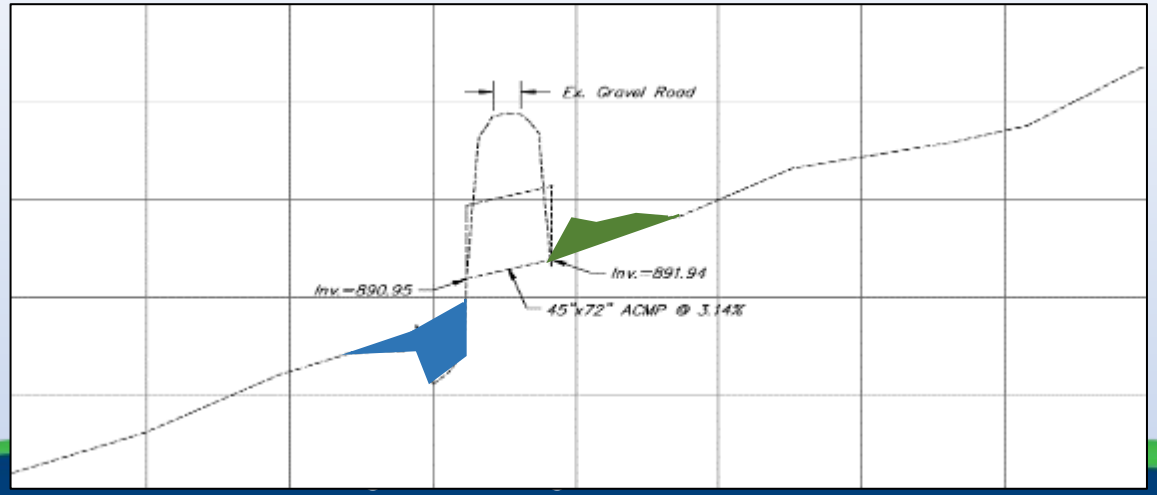
Pennsylvania SCC State Conservation Commission

PennState Center for Dirt and Gravel Road Studies

Hammond Run Replacement

Problem:

- Failing 6’ squash pipe in a headwater stream with a 14’ bankfull channel.
- Undersized crossing had created a significant upstream sediment wedge and downstream scour hole with a ~3’ outlet drop.
- ~5% Slope



Hammond Run Replacement

Fix:

- **15’ x 10’ structural plate pipe arch was assembled and installed with headwall/endwall.**
- Streambed was re-established in the pipe.
- 3 log cross vanes were installed upstream to control the grade.

Hammond Run Replacement

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Timelapse videos:

https://dirtandgravel.psu.edu/education-training/stream-crossings/additional-education-resources/

Stream Crossing Replacement Monitoring

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- **Hammond Run Monitoring**
- Monitoring opportunities for CDs

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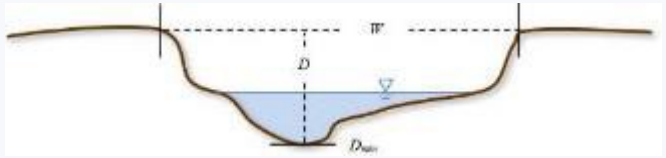
Hammond Run Monitoring

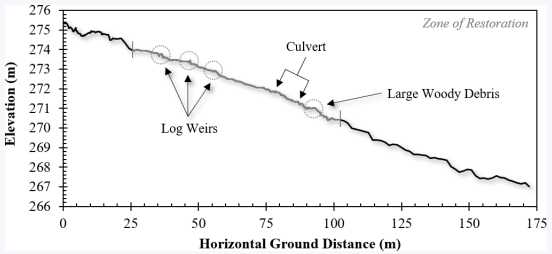
Cross Sections

- Width
- Depth



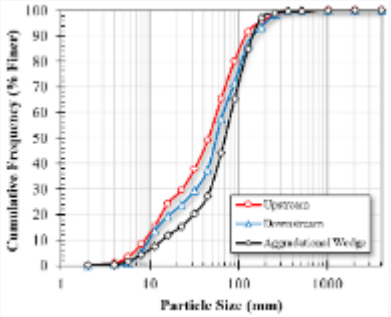
Longitudinal Profile

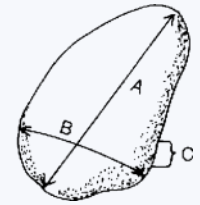
- Change in elevation along downstream gradient



Particle-Size Distribution

- Size of streambed sediment

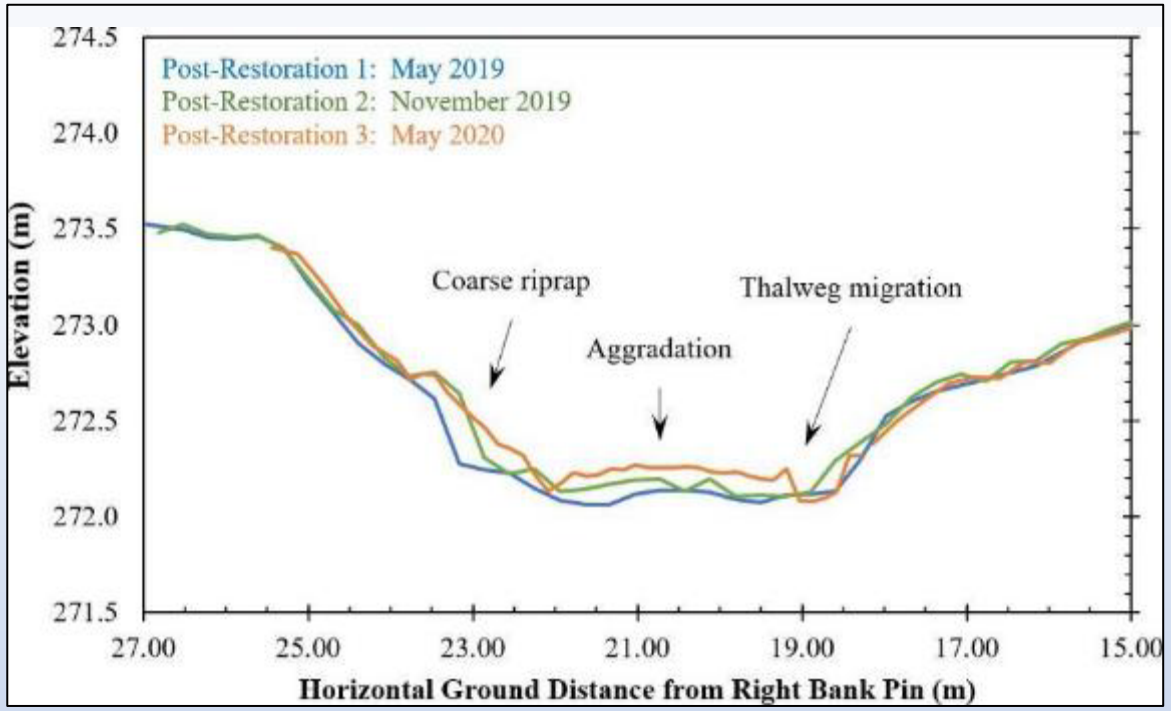




Hammond Run Results

Cross Sections

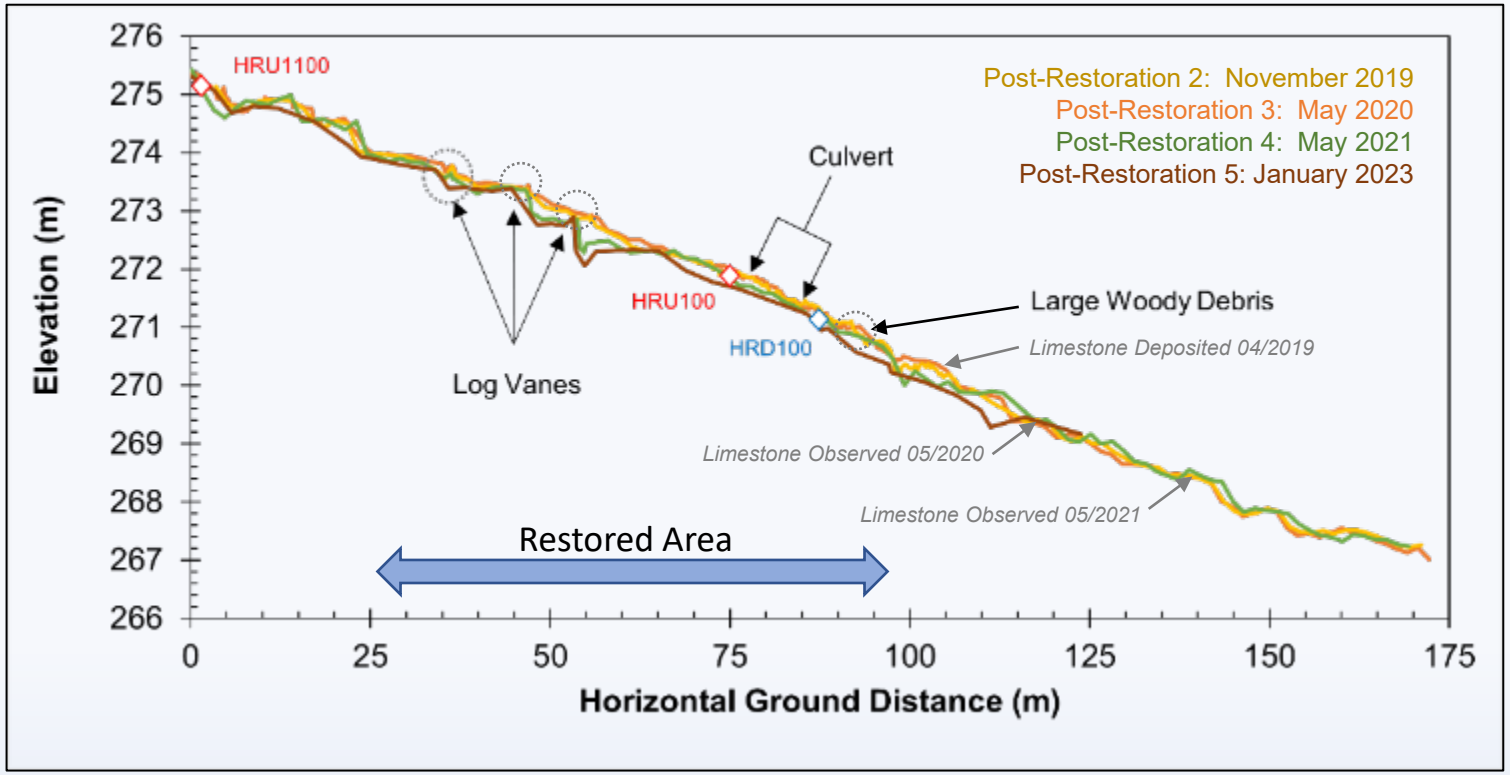
- Channel adjustments through aggradation, degradation and thalweg migration.

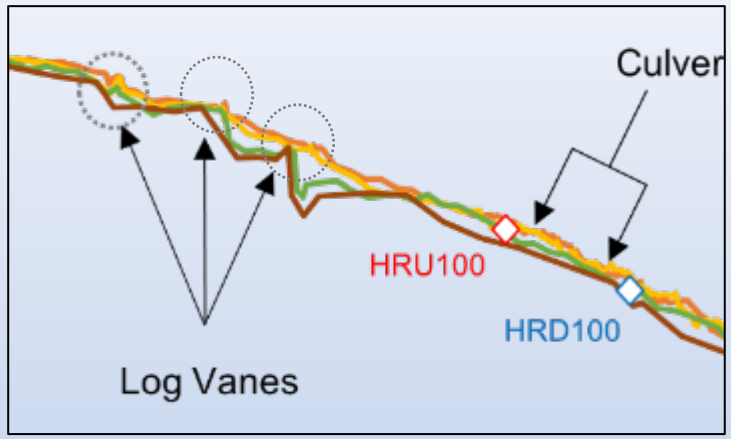


Hammond Run Results

Longitudinal Profiles

- Significant changes at 1st upstream cross-vane
- Some change at 2nd upstream cross-vane
- Stable through crossing
- Moving material larger than 12-18” diameter



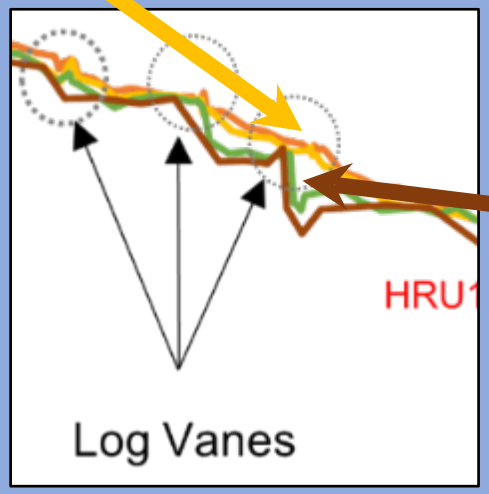



April 2019


October 2019


May 2020


January 2021
After 4 ~bankfull events

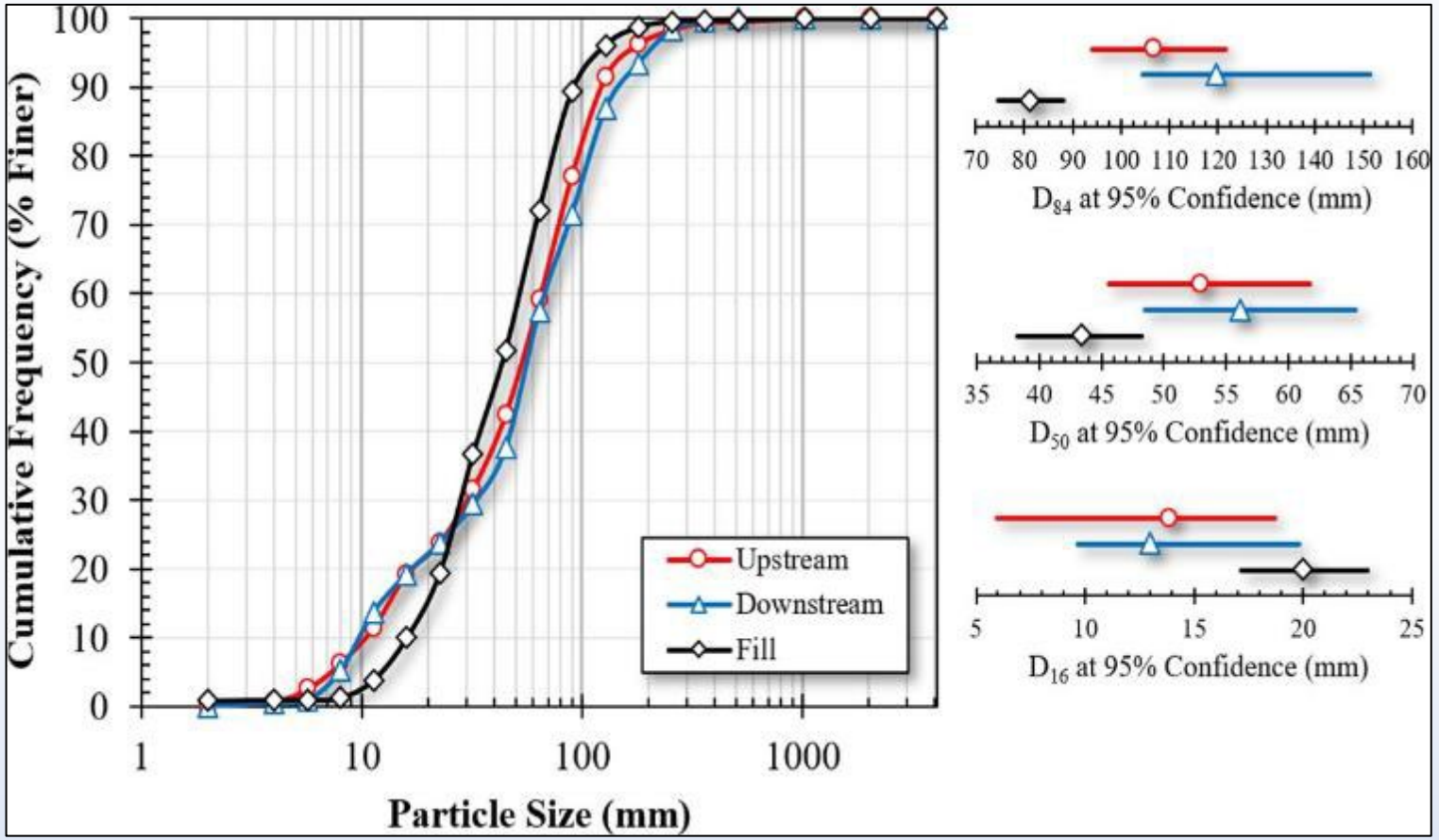

HRU
Log Vanes


September 2021
After Hurricane Ida

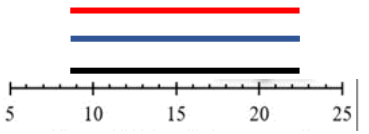
Hammond Run Results

Pebble Counts

- Fill material has less fine material and is smaller on the upper end.
- Upstream and downstream outside restored reach are similar.
- Subsurface flow during summer low-flows around crossing.



"Perfect continuity" means particle sizes upstream, downstream and through structure would be the same



Hammond Run Monitoring

Ecological Assessment (Juniata College)

Conducted pre- and post-restoration

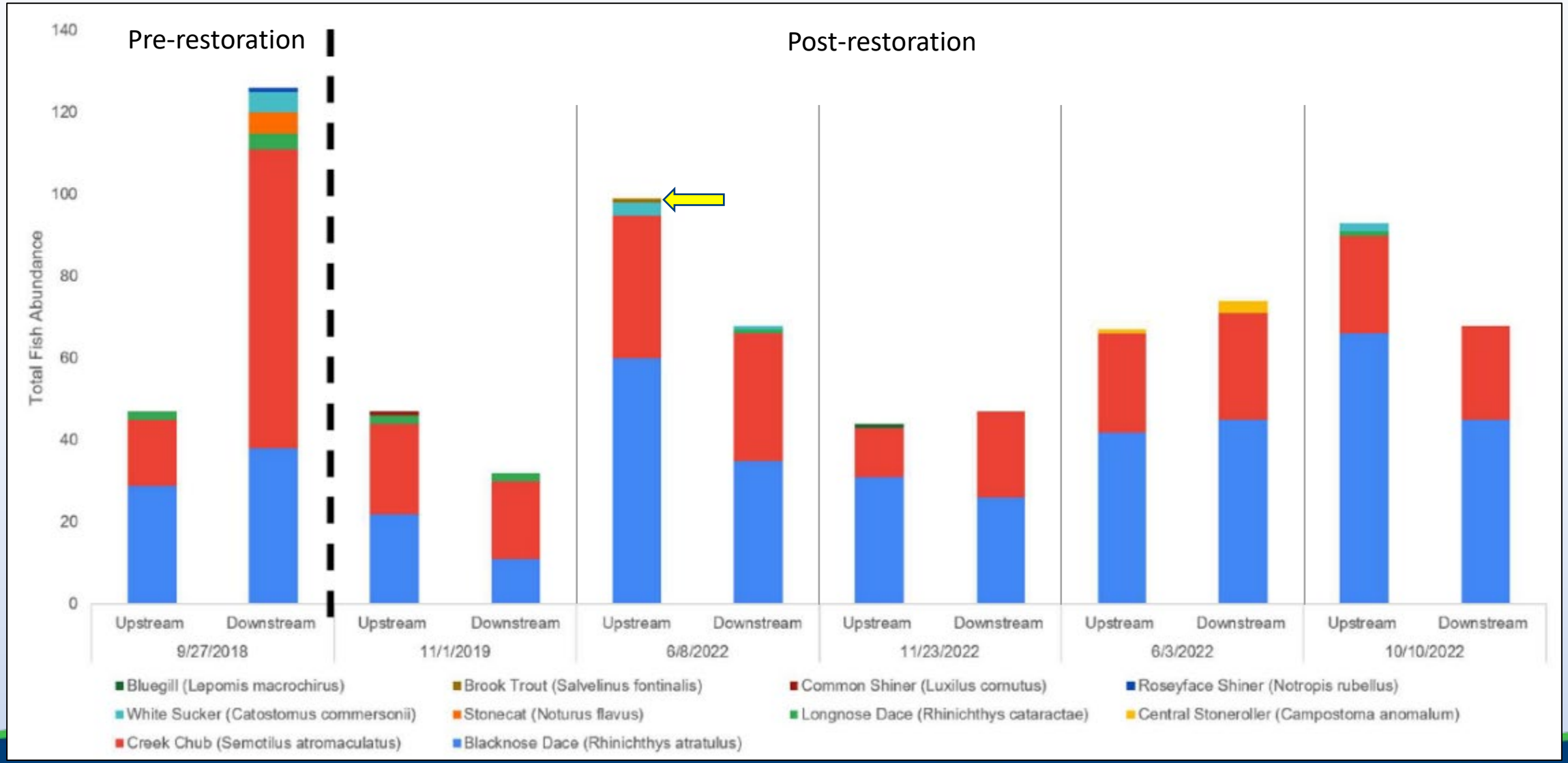
- Fish assemblage analysis (electrofishing)
- Benthic Macroinvertebrate community composition (kick-netting)
- Stream water quality testing

Large creek chub caught 100m upstream post restoration

Hammond Run Results

Ecological Assessment (Juniata College)

- Positive trends were observed within the local fish community post-restoration



Hammond Run Results

Ecological Assessment (Juniata College)

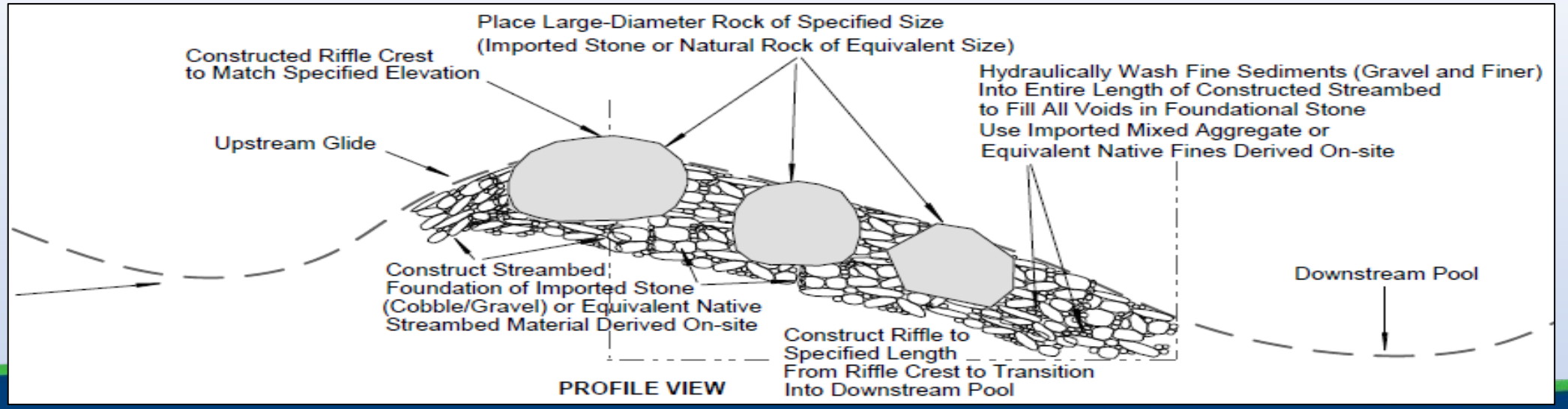
- Positive trends were observed within the local fish community post-restoration
- Presence of a brook trout upstream of the culvert post-restoration

9-inch Brook trout caught 100m upstream post restoration

Hammond Run Results

Lessons Learned

- Structure and inlet/outlet stable through multiple bankfull and greater events
- Expect channel changes post replacement
- Pebble counts would have better informed bed material as excavation spoils did not contain enough fine material
- Grade controls need “length” associated with them – constructed riffle



Stream Crossing Replacement Monitoring

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- Hammond Run Monitoring
- **Monitoring opportunities for CDs**

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CD Monitoring opportunities

Implementing monitoring of stream crossing replacement projects

- Conducted pre- and post-restoration monitoring
- Longitudinal Profile
- Cross sections
- Pebble Counts

CD Monitoring opportunities

Longitudinal profile monitoring

- Immediately survey post-restoration
- Two surveys per year minimum
- Survey after bankfull event
- Use benchmarks established during stream crossing replacement project
- Use geomorphic assessment form for survey data

CD Monitoring opportunities

Cross section monitoring

- Immediately survey post-restoration
- 3 cross sections - reference reach and upstream/downstream of crossing
- Establish permanent cross section pins
- Use geomorphic assessment form for survey data

CD Monitoring opportunities

Pebble Counts

- Identify pool/riffle sequence in reference reach and reconstructed reach
- Collect multiple transects and measure 100-400 particles
- Use pebble count form for data

CD Monitoring opportunities

CD Time Investment:

- Expect one full day for setup of long-pro, cross-sections and pebble counts
- Subsequent monitoring ~1/2 day twice per year and after any bankfull event
- Center staff will train first round of surveying and pebble counts – assist as needed after

CD Monitoring opportunities

<u>Poll Question:</u> Would you be interested in monitoring your stream crossing projects?

<u>Polls are limited to multiple choice, so Please put in the Chat:</u>

- Any comments based on “rough” monitoring requirements
- Your name and e-mail if you are interested in post-replacement monitoring