



Hatchery Creek Stream Restoration— Design/Monitoring Overview of a Unique Project to Create Trout Habitat

Presented by:
George Athanasakes, PE, Vice President

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Agenda

- Background
- Design Approach
- Implementation
- Post-construction Monitoring



HATCHERY CREEK

A stream designed for trout

A HEALTHY STREAM

What creates a healthy stream? A clean watershed feeding it. Trees and plants along the banks to prevent erosion. Stable riffles. Nearby wetlands to filter surface water runoff. All contribute to the stream's ecosystem.

Engineers and biologists designed Hatchery Creek's course with pools, riffles and gravelled areas to provide plenty of oxygenated water for fish – and the insects living on the bottom. Erosion can fill in the spaces between rocks where insects hide. Site can cover the gravel that trout need to lay their eggs. Hatchery Creek is designed to prevent erosion and the problems it causes.

Insects such as mayflies, stoneflies and caddisflies are called macroinvertebrates. The healthiest streams have the greatest variety of them. Macroinvertebrates are an important part of the stream's food web. Anglers using fly fishing gear mimic these insects, such as the caddisfly (right), to catch trout.

CUSTOMIZED FOR TROUT

Streams must have the right mix of cold water, stable flows and clean, rocky bottoms for trout to spawn successfully. This combination is rare in Kentucky. Hatchery Creek is designed to provide the habitat diversity that trout need at all stages of their lives.

Trout need pebbles the size of pennies to lay their eggs. Hatchery Creek includes gravel of this size in its riffles and riffles. Brook, rainbow and brown trout all can use it for spawning.

Shallow shorelines and wetlands can serve as nurseries, offering young trout protection from predators. Hatchery Creek's boulder-strewn riffles and deep pools provide feeding, resting and refuge areas for larger fish.

CREEK FUN FACTS

- The Hatchery Creek project required to install pounds of rock – that's more than 210,000 lbs!
- Each boulder used in the very pools weighed 4,000 pounds. It took 100 boulders to build this feature.
- Trout could bury in a hole! But it's not deep with the amount of dirt removed for the deep pool section.
- Contractors used 3.5 million pounds of gravel to build spawning areas – roughly the weight of 100 full-size pickup trucks.
- About 10 million gallons of water flow through Hatchery Creek in 24 hours. That's enough water to fill 20 Olympic sized swimming pools. The creek could fit one pool in just 15 minutes.
- Most important: the Hatchery Creek team did everything right and kept their eye on the water being flowing.
- Hatchery Creek is built with rock. That's about 210,000 pounds of rock and so on.
- Hatchery Creek design is similar to the Commonwealth's design.

Project Goals

01

Generate Mitigation Credits

02

Stable Stream

- Dimension - Pattern - Profile
- 100-year Flood Event

03

Added Benefit—One of Kentucky's 1st Sustainable Trout Streams

- Spawning
- Rearing
- Fish Passage
- Fishing







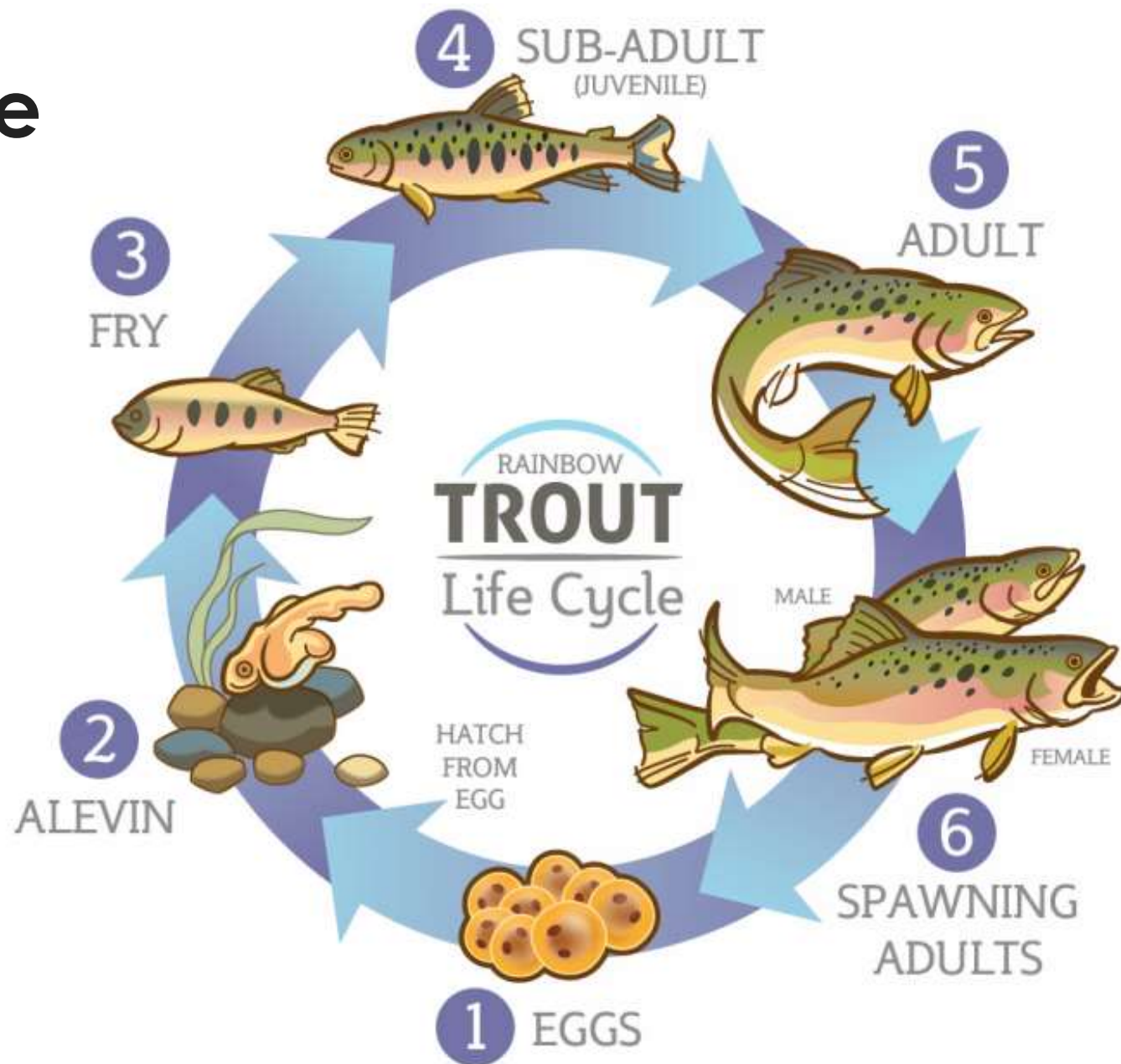
Unique Aspects of the Project

- Constant Flow Source
- Minimal Sediment Supply
- Water Temperature Effects
- Design for Various Trout Life Stages
- Protection of Spawning Gravels





Lifecycle



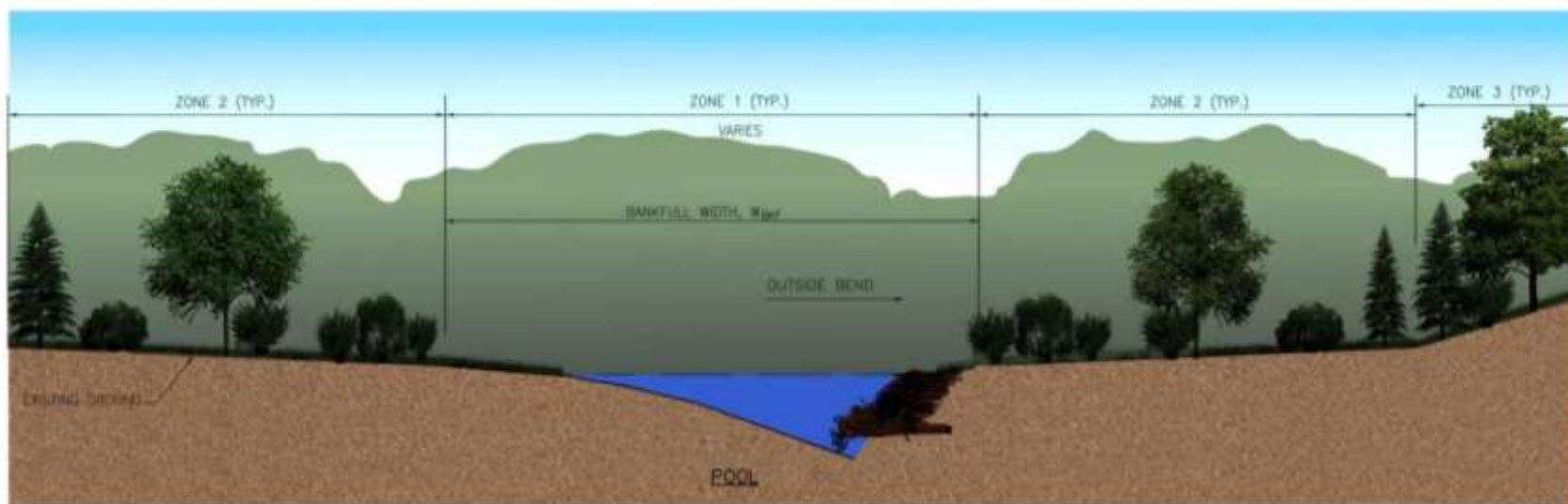
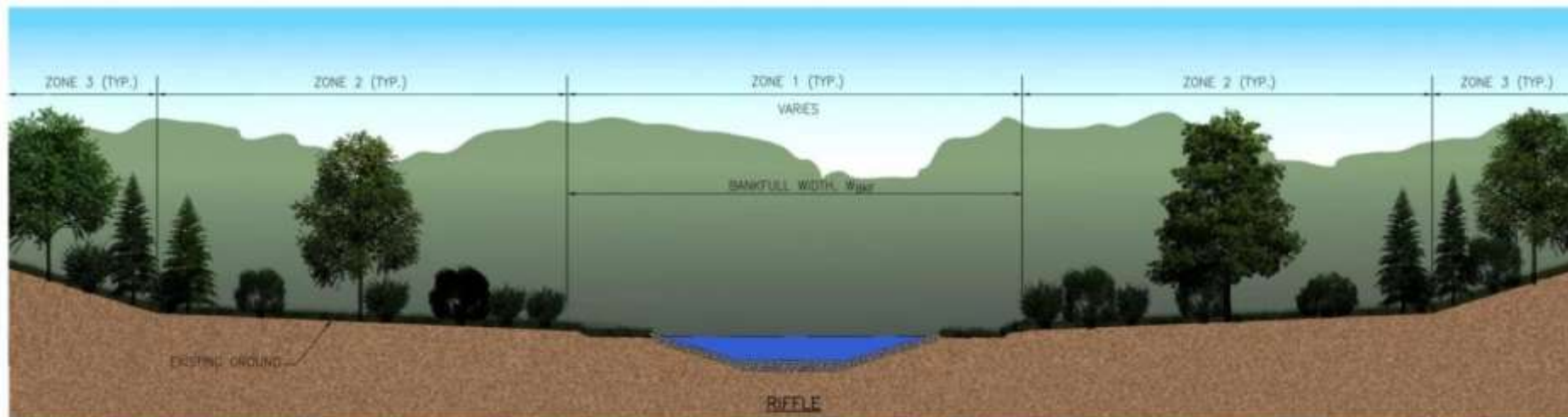


Design Overview

- Threshold Channel
- Reference Reach Parameters
- Combination of Stream Types
 - A
 - High Gradient C
 - Low Gradient C
 - DA



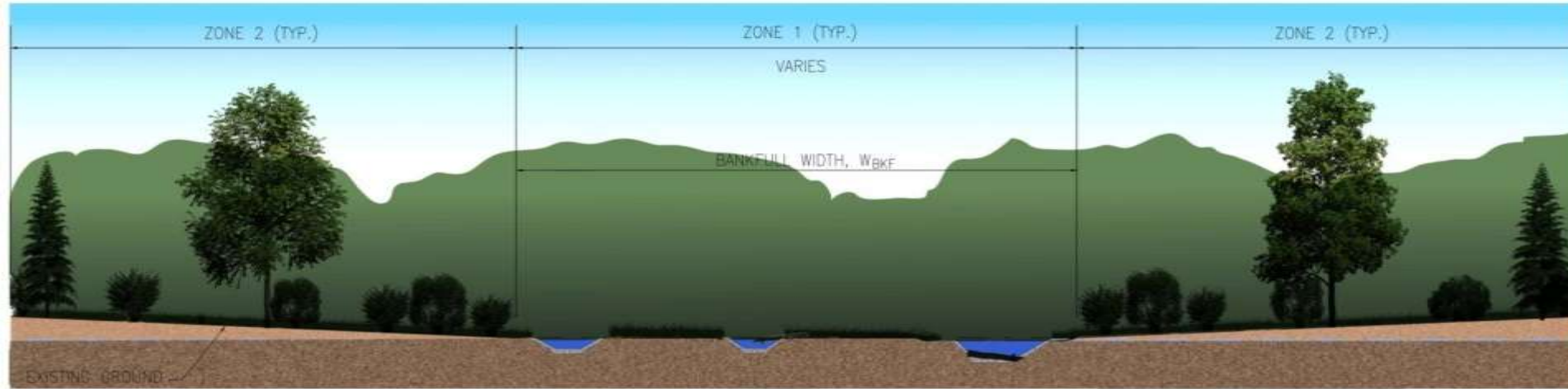
C Stream Type





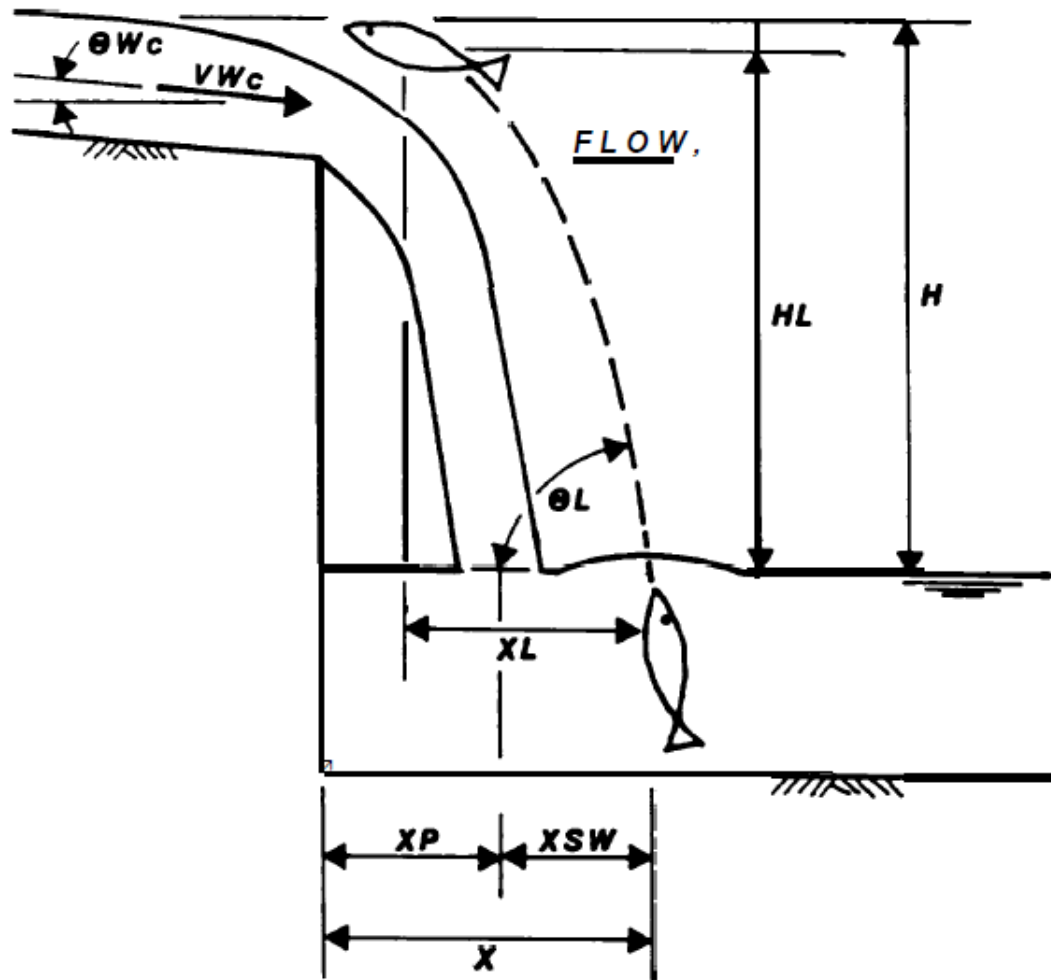


DA/Wetland Enhancement



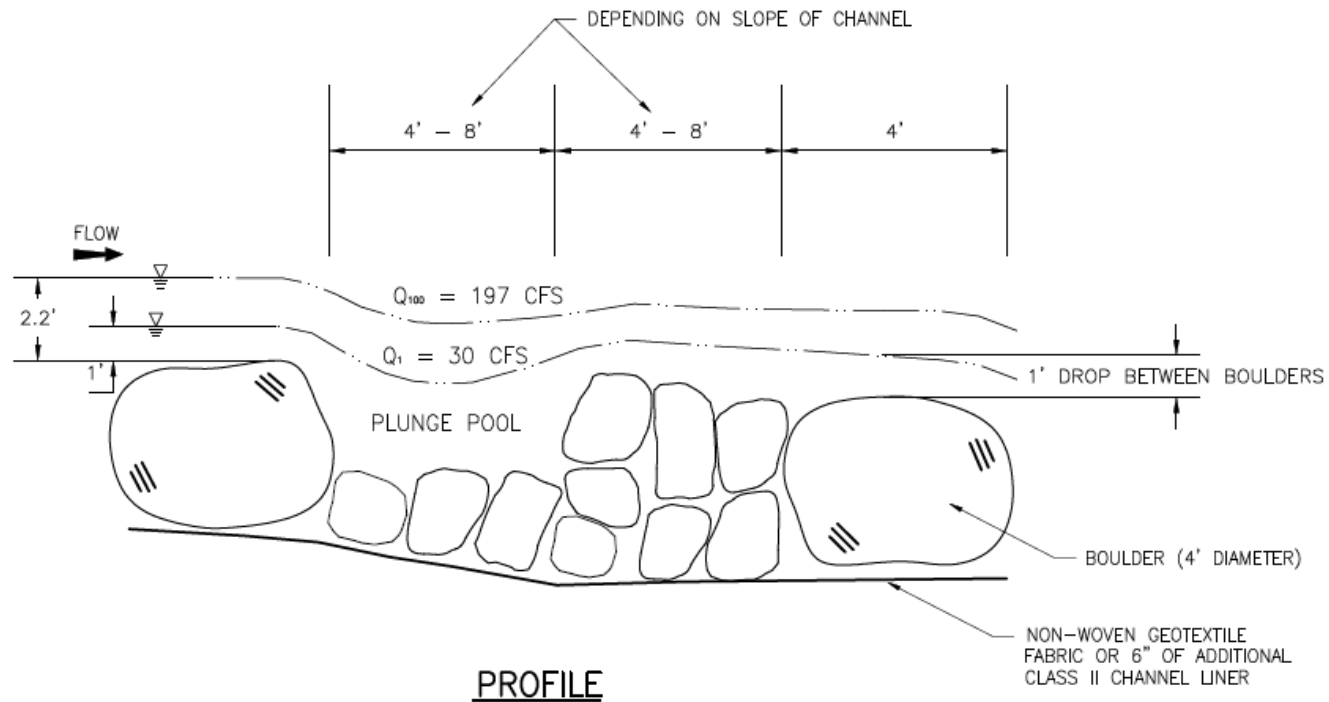


Fish Passage





Fish Ladder-Step Pools



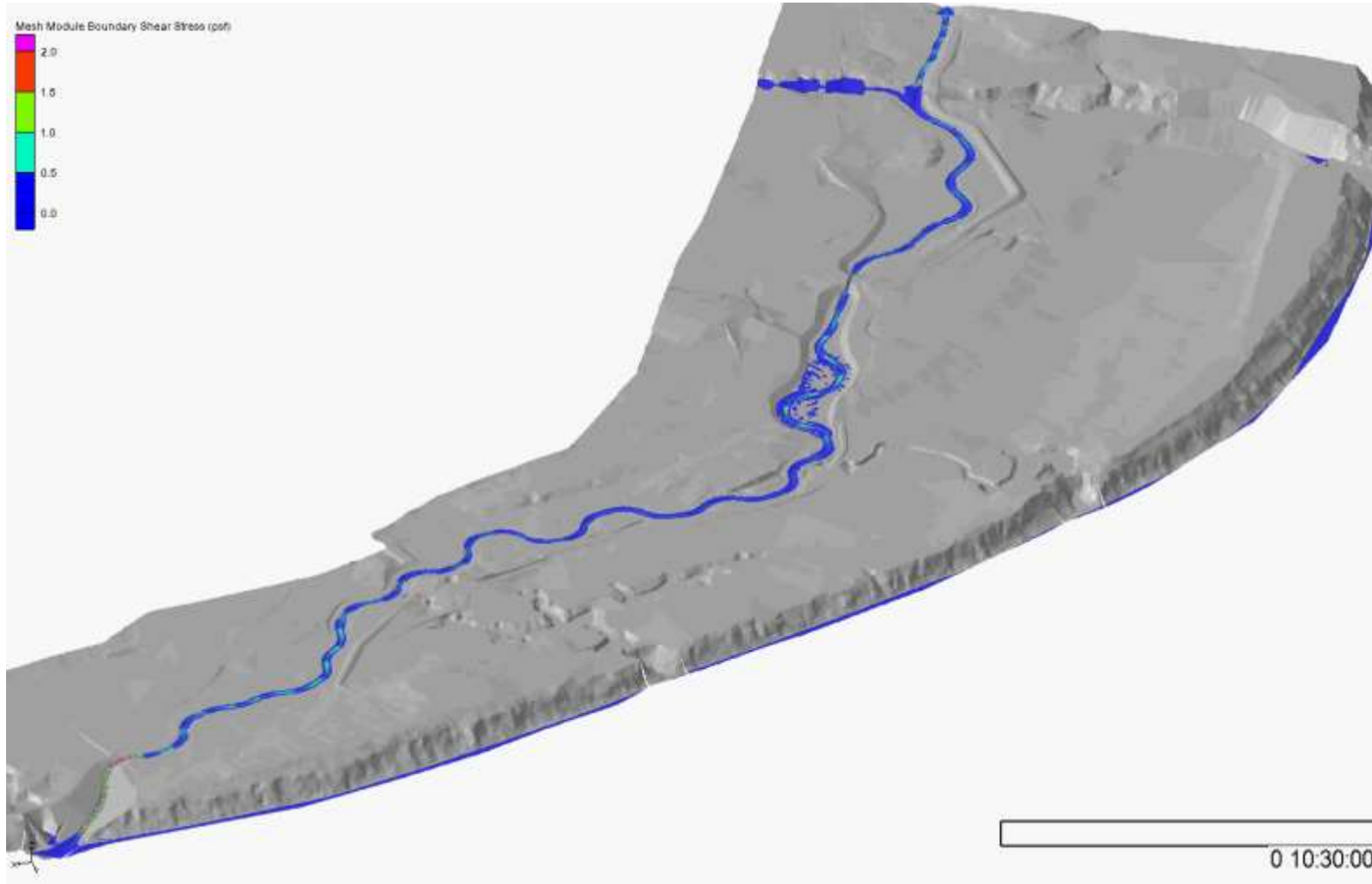








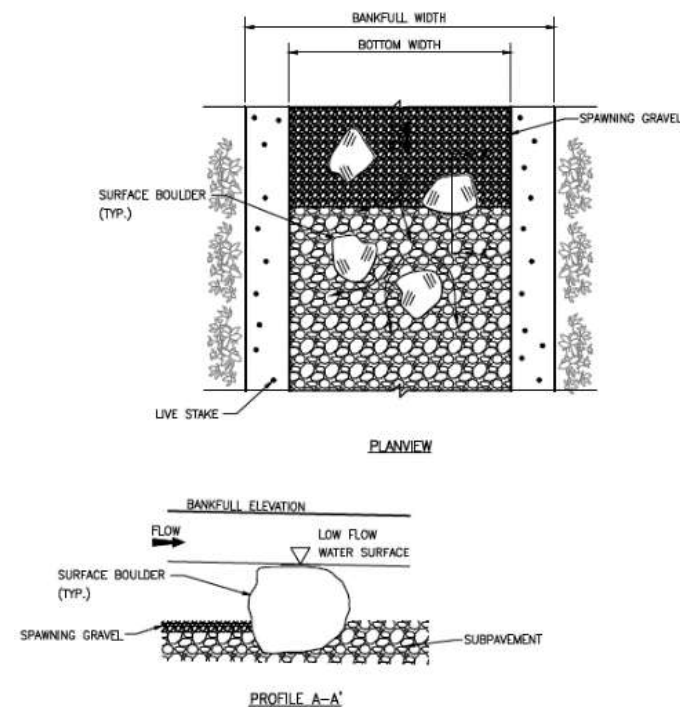
2-D Hydraulic Modeling





Riffle Design

- Four Different Types of Riffles
- Rock Sizing
 - Low Flow
 - 100-year Storm
- Spawning Gravels Used in Glide and Top of Riffle







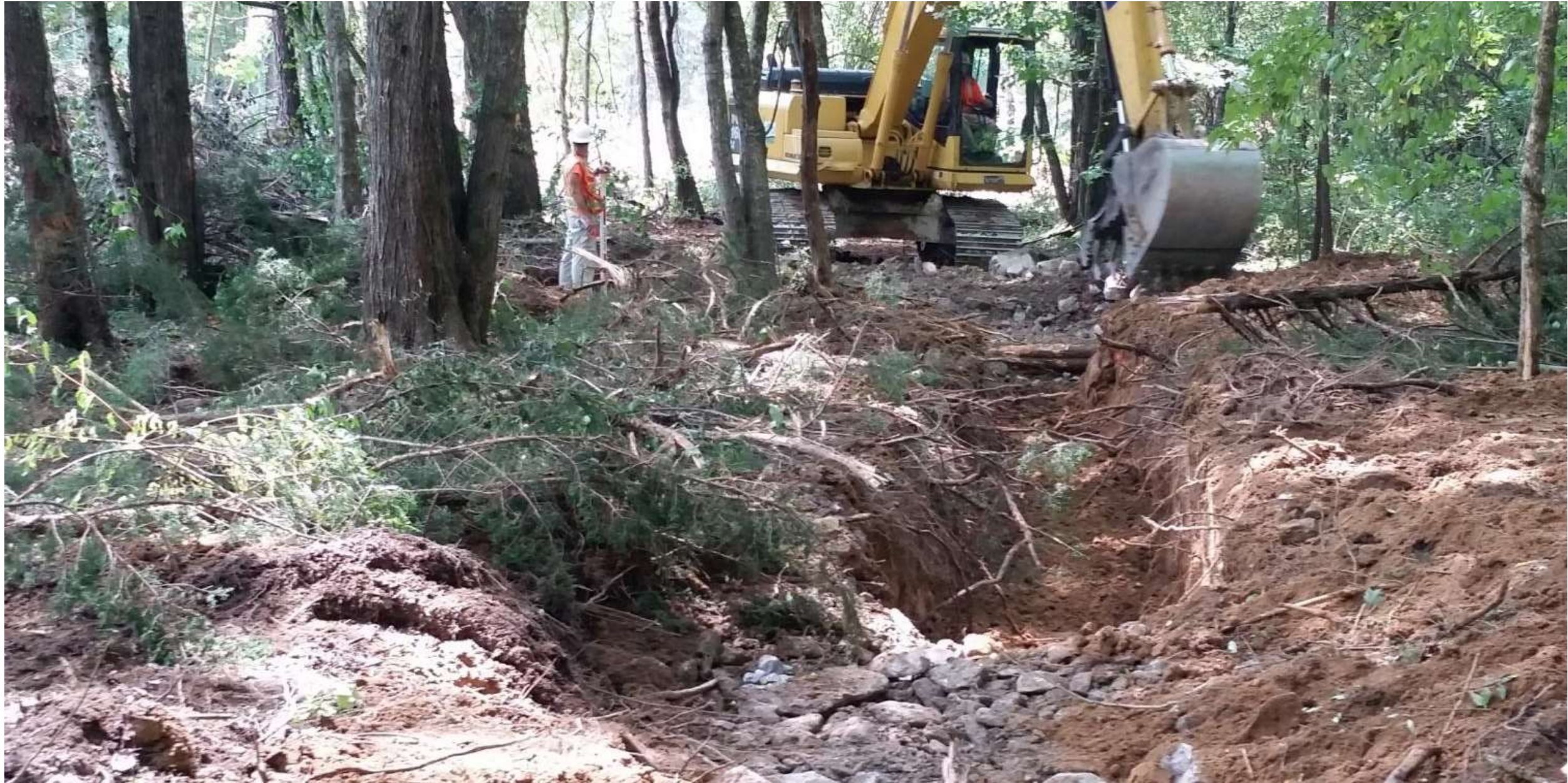
















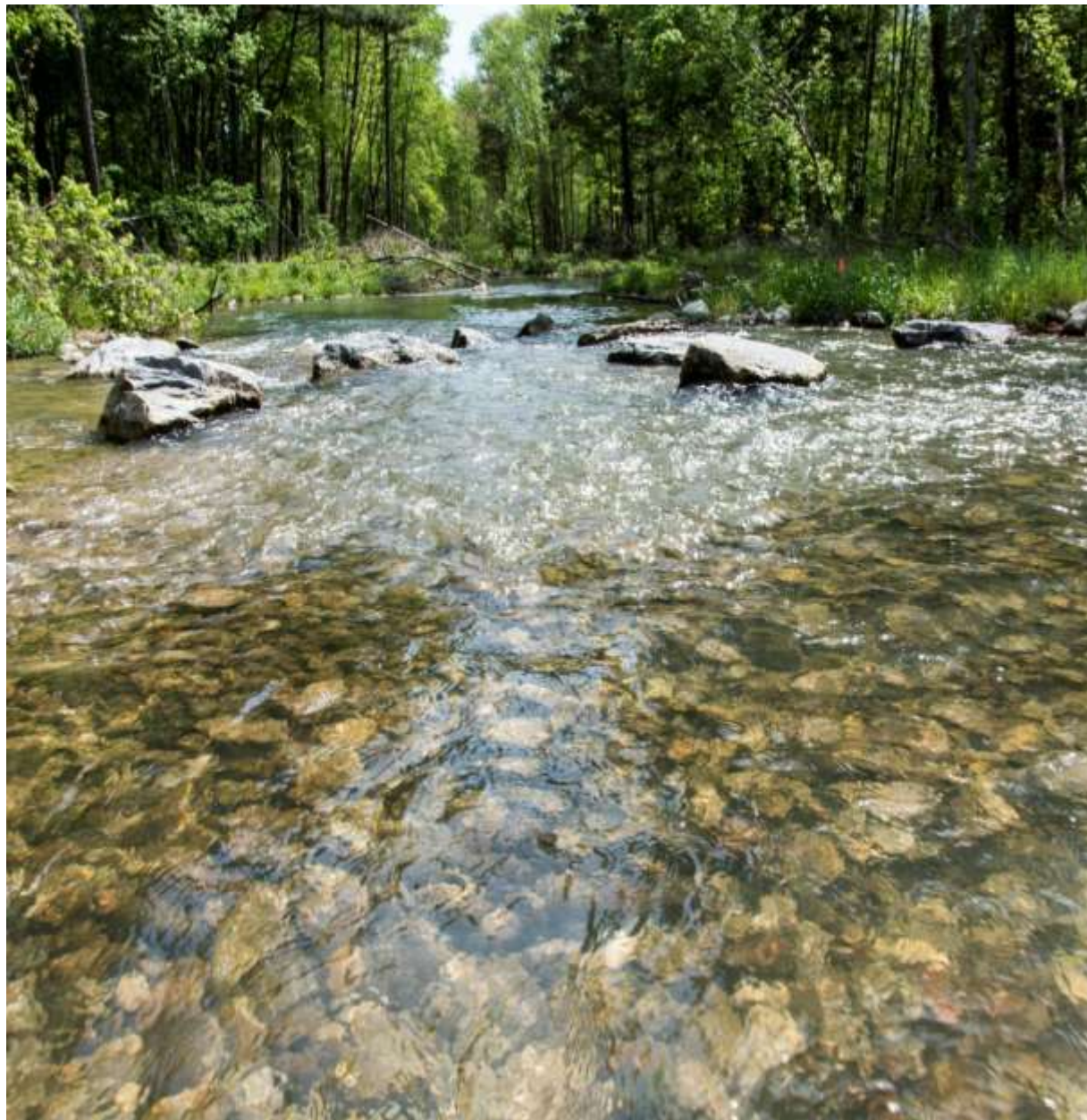






Important Dates

- November 20, 2015
 - Flow Released into New Channel
- April 29, 2016
 - Grand Opening
 - Open for Fishing
- December 31, 2020
 - Released from Monitoring



Monitoring Partnership

Kentucky Department of Fish & Wildlife Resources

- Fish Population Studies
 - Backpack Electroshocking
 - Fin-Clipping
- Temperature Variability

Murray State University

- Macroinvertebrates
- Fish Population Studies

Stantec

- Geomorphic and Vegetation Monitoring
- Wood Loading Survey
- 2-D Modeling
- Snorkel Survey to Document Fish Usage of Wood Structures



Monitoring Photos (2015)



Monitoring Photos (2016)



Monitoring Photos (2017)



Monitoring Photos (2018)



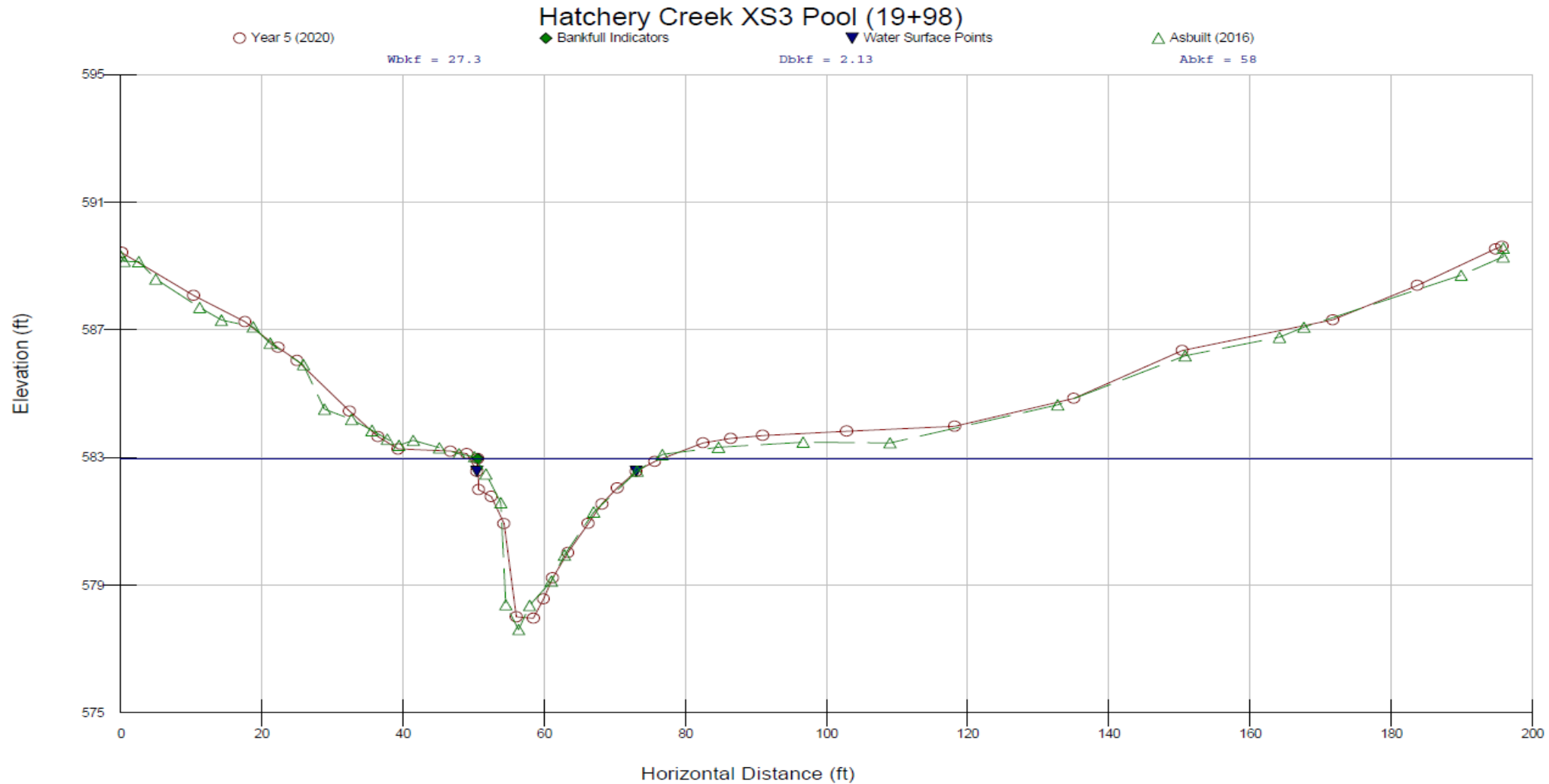
Monitoring Photos (2019)



Monitoring Photos (2020)



Geomorphic Monitoring





Fish Snorkel Surveys

- Assess Habitat Utilization
- 2016, 2018, 2019
- Record Fish Observations and Associated Habitat:
 - Depth
 - Velocities
 - Substrate Type
 - Cover Type



Dominant Cover





Questions?

George Athanasakes, PE, Vice President

Louisville, Kentucky

george.athanasakes@stantec.com

(502) 727-7144