

# North Park Lake Aquatic Ecosystem Restoration Project



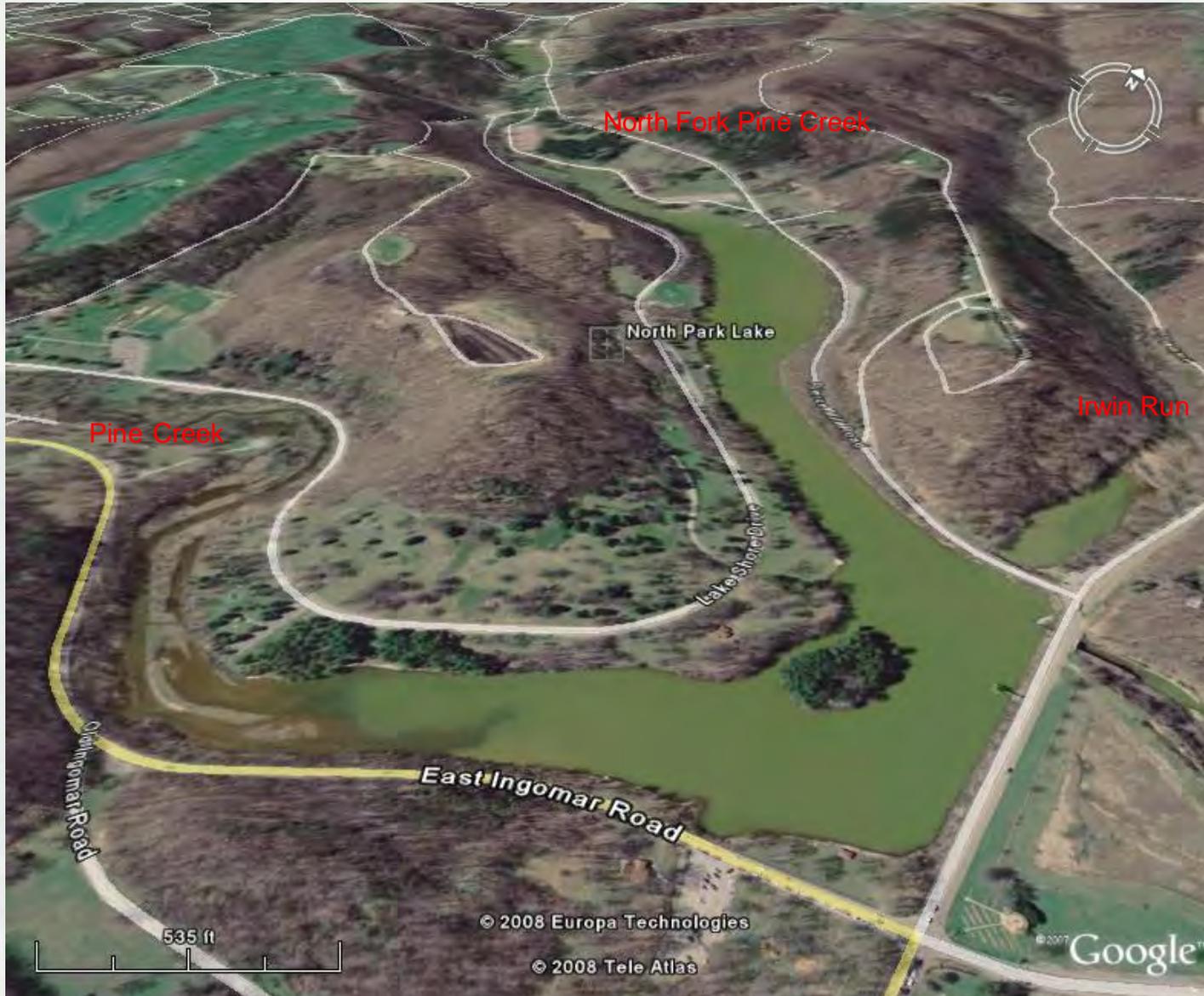
**Presented by:**  
**Jennifer Savitz, P.E.**  
**Craig Carney, P.E.**  
**USACE Pittsburgh District**



---

**BUILDING STRONG®**

# North Park Lake Aquatic Ecosystem Restoration Project



**BUILDING STRONG®**

# North Park Lake Aquatic Ecosystem Restoration Project

## North Park Lake

Pine Creek Dam  
Completed in 1936

Earthen Embankment Dam  
with an impervious  
concrete cutoff wall core –  
1,130 ft long, 33 ft high

Water sources – Pine  
Creek, North Fork Pine  
Creek, Irwin Run

Fixed Crest overflow EL  
960.



3828-North Park Lake from No. Ridge Drive-6/23/37 Hefelfinger & Austen

**Historic Photo** – View of the North Fork Pine Creek arm of the lake looking downstream. The boathouse is in the center of the photo.



**BUILDING STRONG®**

# North Park Lake Aquatic Ecosystem Restoration Project

## North Park Lake (cont)

When initially constructed lake was 75 acres in size and approximately 24 feet deep near the face of the dam.



**Historic Photo** – View of the Pine Creek arm of the lake looking downstream toward the dam



# Pine Creek Watershed

- Drainage area of Pine Creek - 67.5 square miles
- Pine Creek upstream of North Park Dam – 14.2 square miles with channel slope of 34 feet per mile
- North Fork Pine Creek – 10 square miles with channel slope of 35 feet per mile



# Problem Statement

- Uncontrolled surface runoff carrying sediment to the lake from development has resulted in a permanent loss of 12 acres of open water
- The 12 acres lost occurred in the Pine Creek arm – receives the highest inflow and the highest suspended sediment loads.



# Problem Statement (cont)

- Due to enrichment from excessive runoff, the lake has become eutrophic and filled with an overgrowth of algae
- Lake not only reduced in size, but also has a severely degraded remaining aquatic habitat.



# Problem Statement (cont)

- PAFBC 1997 and 2002 – Reports classified North Park Lake as a shallow, eutrophic, turbid lake that suffers from a siltation problem.





North Park Lake – North Fork Pine Creek Arm



**BUILDING STRONG®**



North Park Lake – North Fork Pine Creek Arm



**BUILDING STRONG®**



North Park Lake – North Fork Pine Creek Arm



**BUILDING STRONG®**



North Park Lake – Gate House Section



**BUILDING STRONG®**

## Federal Authority

- Federal Authority – Section 206 Aquatic Ecosystem Restoration
- Federal Spending Limit - \$5,000,000
- Total Project Cost Limit - \$7,690,000
- Projects are cost shared with local sponsors. 65% Fed / 35% local
- LOCAL SPONSOR – Allegheny County



# Planning Process

- Project Initiation - 1999
- Planning Process
- Step 1 – Reconnaissance Level  
Preliminary Restoration Plan

Purpose – To determine if there is a project, if there is Federal Interest, and develop a preliminary solution



# Planning Process

## Preliminary Restoration Plan

- USACE 2002 Lake Analysis
- Lake is a warm, shallow, mineralized, nutrient rich, eutrophic impoundment
- Dissolved Oxygen totally depleted at the bottom of the lake
- Also soluble metals and ammonia and hydrogen sulfide has accumulated.



# Planning Process

## Preliminary Restoration Plan

- District considered preserving versus restoring the open water aquatic habitat at North Park Lake
- First alternatives developed were meant to reduce ongoing sedimentation and simply preserve what open water remained within the lake. **COST CONSTRAINTS**



# Planning Process

## Preliminary Restoration Plan

- Alternative 1 - Upstream Sedimentation Basins within the park

Large Sediment Loads and fine sediment would make the size of basins required unpractical

- Alternative 2 - In Lake Sediment Basins Including Marshall Lake



# Planning Process

## Preliminary Restoration Plan

- Proposed constructing a porous rock dike across the Pine Creek arm of the lake.
- Section of the lake upstream of the dike would have been sacrificed to act as a sedimentation basin
- Recommended installing new valve to allow the draining of Marshall Lake



# Planning Process Preliminary Restoration Plan

- Porous Rock Dike



# Planning Process

## Preliminary Restoration Plan

- Pine Creek arm of lake and Marshall Lake to be used as sedimentation basins
- No sediment removal within North Park Lake



# Planning Process

## Post Preliminary Restoration Plan Data

- Sediment Load – 5,200 tons of sediment load into lake per year. 95% deposited
- Original storage capacity of lake was 568 acre-feet down to 297 acre-feet from 2001 data
- Loss of 48% of capacity from 1936-2001
- Sediment removal would be required



# Planning Process

## Feasibility Phase – Detailed Project Report

Feasibility Phase - Commenced in 2003

Purpose – To evaluate alternatives and determine the best alternative for the project within the funding constraints



# Planning Process

## Detailed Project Report

- Determine quantity of sediment to be removed
- Characterize the Sediment to be Removed
- Perform Cultural Resources and HTRW Studies
- Determine Real Estate Requirements
- Determine Best Alternative for Sediment Removal



# Planning Process

## Detailed Project Report

- Identify Disposal Area
- Layout out Aquatic Habitat Enhancement Features
- Determine Aquatic Habitat Benefits
- Develop Total Project Cost Estimate
- Develop Project Schedule
- Determine Permits Required to move forward



# Planning Process

## Sediment Characterization

- Pine Creek Arm

Greenish Gray, Silty Clays with Organics

Extended depths of greater than 10ft

Beneath was a very loose silty sand

High Moisture Content

- North Fork Pine Creek Arm

Two foot or less of very soft sediment

before denser sediment and soils



# Planning Process

## Detailed Project Report – Alternative Analysis

- Quantity of Removal 315,000 cubic yards
- Alternatives –
  - Don't Drain the Lake – Hydraulic Dredging
  - Drain the Lake – Mechanical Excavation
  - Do nothing
- Alternatives reviewed for cost and time



# Planning Process Alternative Analysis

- Do Nothing (Without Project Alternative)

Silt and Sediment will cause lake to become increasingly shallow resulting in increased water temperatures, decreased dissolved oxygen level, increased nutrient enrichment.

Lake will eventually fill in and entire lake will revert to wetlands





Without Project - Pine Creek Wetlands



**BUILDING STRONG®**



Without Project – Lake Reverts to Wetlands



**BUILDING STRONG®**

# Planning Process Alternative Analysis

- Lake Draining

Completely Drain the lake, allow sediment to dry sufficiently to allow land-based equipment to enter the lakebed and excavate accumulated sediment

Would require stream diversions to contain the three tributaries as they flow through the drained lake bed



# Planning Process Alternative Analysis

- Lake Draining – Stream Diversions



**BUILDING STRONG®**

# Planning Process Alternative Analysis

- Stream Diversion designed to hold 2 year storm event due to constraints of the 5x5 outlet culvert.
- 2 year storm event flow rates  
Pine Creek – 690 (cfs)  
North Fork Pine Creek – 420 (cfs)



# Planning Process Alternative Analysis

- Lake Draining – Land-based Equipment and Excavation



**BUILDING STRONG®**

# Planning Process Alternative Analysis

- Lake Draining – Land-based Equipment and Excavation



**BUILDING STRONG®**

# Planning Process Alternative Analysis

- Hydraulic Dredging – No Lake Draining

Utilize floating hydraulic dredging equipment to remove the sediment.

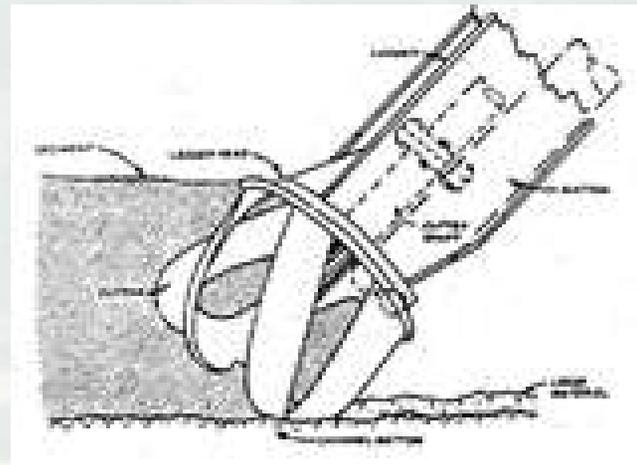
Sediment slurry pumped to dewatering areas.

Would have to use Geotubes to dry material due to lack of space for large drying areas.



# Planning Process Alternative Analysis

- Hydraulic Dredging – Dredge Equipment



# Planning Process Alternative Analysis

- Hydraulic Dredging – Geotubes



**BUILDING STRONG®**

# Planning Process Alternative Analysis

- Geotubes – Hanging Bag Test
- Combined sediment slurry sample with non-toxic polymer added
- Geotubes with polymer will dry material
- Need low grade laydown areas for geotubes to be effective



# Planning Process

## Detailed Project Report – Alternative Analysis

- Recommended Alternative – Drain the Lake – Mechanical Excavation

- Comparison

Drain the Lake - \$28 / cubic yard removed

12 month construction duration

Hydraulic Dredging - \$35 / cubic yard removed

24 month construction duration



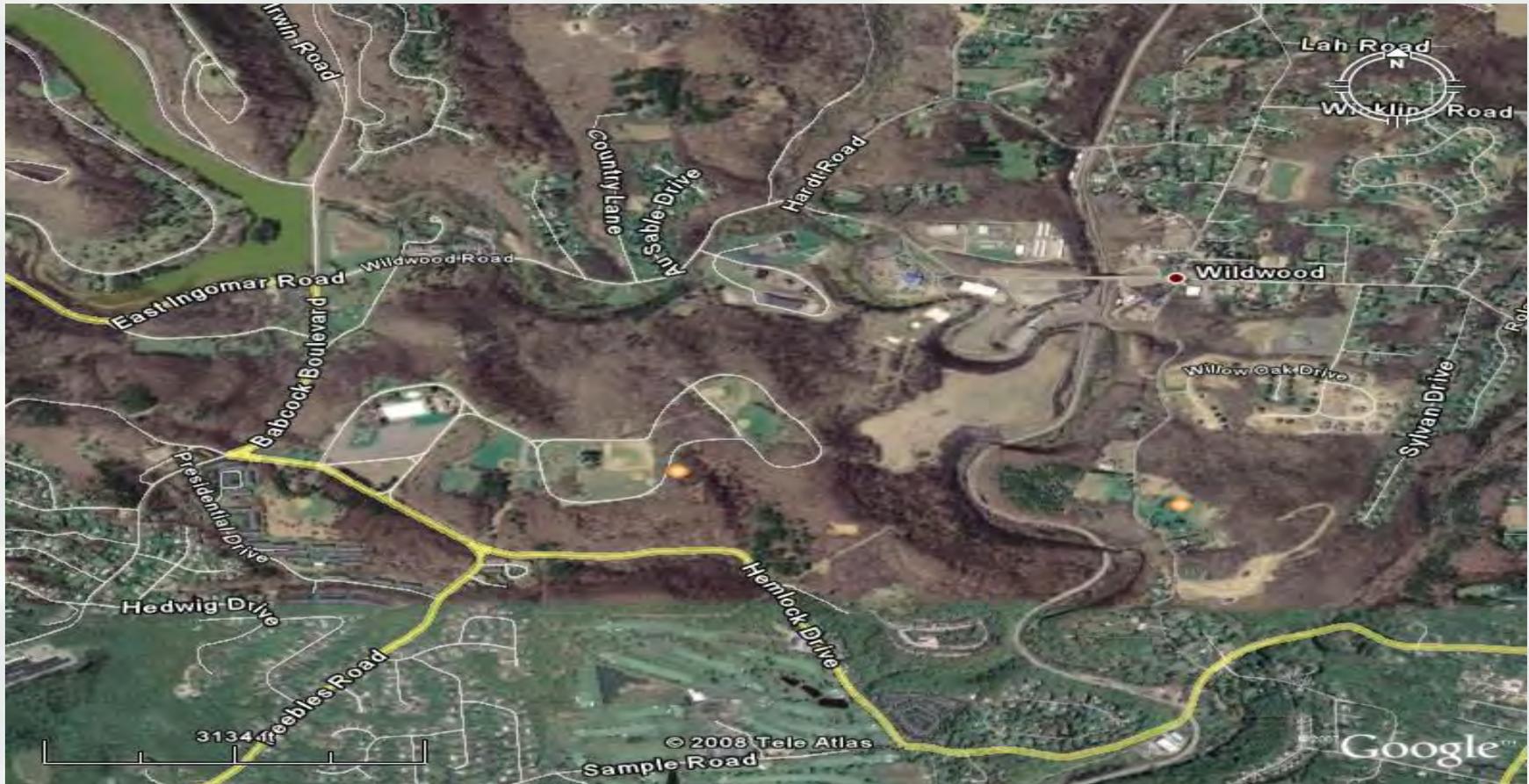
# Planning Process

## Detailed Project Report – Disposal Area

- Wildwood Mine Disposal Site
- 65 Acres
- Site 1.5 miles from Pine Creek Dam
- Reclaimed coal waste pile that was covered with fly ash, heavily fertilized and planted with grass to help prevent erosion



# Planning Process Wildwood Disposal Area



**BUILDING STRONG®**

# Planning Process Wildwood Disposal Area



November 2009

**BUILDING STRONG®**

# Planning Process Wildwood Disposal Area



November 2009

**BUILDING STRONG®**

# Planning Process

## Environmental Features

- Wetland Protection Barrier
- Coir Logs and Shoreline Plantings
- Fish Habitat Structures
- Osprey Nests



# Environmental Features Wetland Protection Barrier



**BUILDING STRONG®**

# Environmental Features

## Fish Habitat Structures



**BUILDING STRONG®**

# Environmental Features Fish Habitat Structures



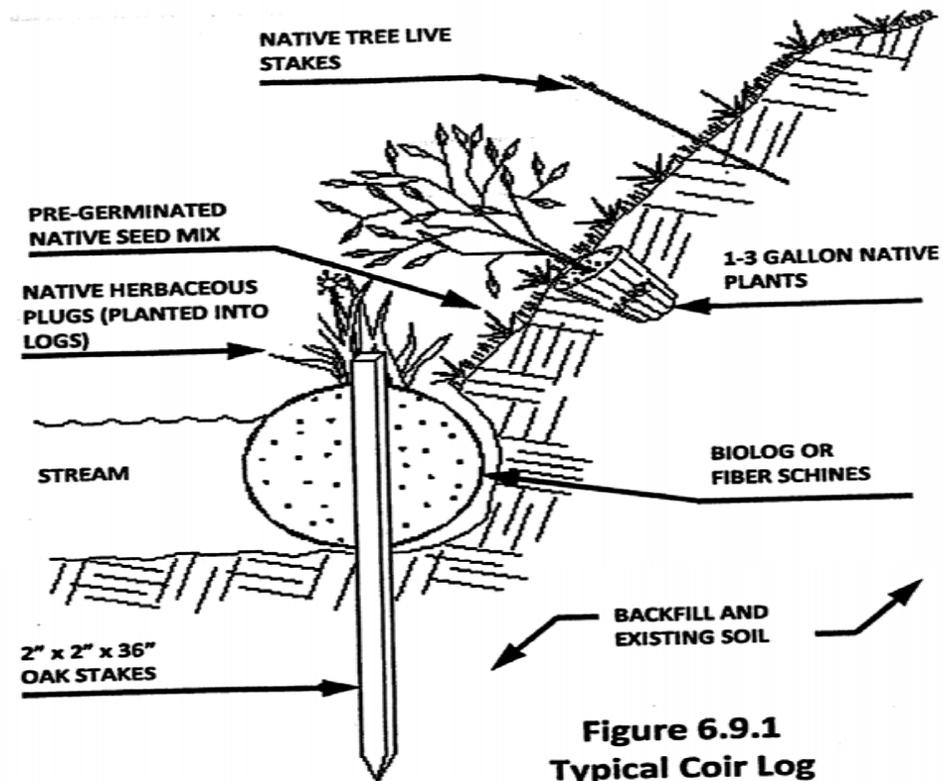
11-01-2010



**BUILDING STRONG®**

# Environmental Features

## Coir Logs and Shoreline Plantings



# Environmental Features

## Osprey Nests



**BUILDING STRONG®**

# Construction Phase

- Three Contracts
- Site Preparation Contract – Allison Park Contractors Inc. (Allegheny County Contract)
- Phase I Sedimentation Removal – CJ Merlo – (Federal Contract)
- Phase II Sedimentation Removal – CJ Merlo – (Allegheny County Contract)



# Construction Phase Timeline

- Lake Drained – October 2009
- Fish Rescue October 2009
- Wildwood Disposal Site Prep Work – January 2010
- Lake redrained – April 2010
- Stream Diversion Installation – May 2010
- Sediment Removal Commences – June 30, 2010



# Construction Phase Initial Lake Draining



**BUILDING STRONG®**

# Construction Phase Fish Rescue



**BUILDING STRONG®**

# Construction Phase Fish Rescue



**BUILDING STRONG®**

# Construction Phase Fish Rescue



**BUILDING STRONG®**

# Construction Phase Trouble Keeping Lake Drained



**BUILDING STRONG®**

# Construction Phase Platform to Clear Debris



**BUILDING STRONG®**

# Construction Phase Drained Lake



**BUILDING STRONG®**

# Construction Phase

## Rosebarn Access Area – Pre Construction



**BUILDING STRONG®**

# Construction Phase Rosebarn Lake Access Construction



**BUILDING STRONG®**

# Construction Phase Rosebarn Access Ramp Extension



05-10-2010



**BUILDING STRONG®**

# Construction Phase Temporary Access Road Construction



**BUILDING STRONG®**

# Construction Phase Temporary Access Ramp – Pierce Mill



**BUILDING STRONG®**

# Construction Phase Excavation for Stream Diversion



# Construction Phase Excavation for Stream Diversion



**BUILDING STRONG®**

# Construction Phase Stream Diversion Liner Placement



**BUILDING STRONG®**

# Construction Phase North Fork Pine Creek Stream Diversion



**BUILDING STRONG®**

# Construction Phase North Fork Pine Creek Stream Diversion



**BUILDING STRONG®**

# Construction Phase Sediment Removal



**BUILDING STRONG®**

# Construction Phase Sediment Removal



**BUILDING STRONG®**

# Construction Phase Sediment Removal



**BUILDING STRONG®**

# Construction Phase Wetland Protection Barrier



**BUILDING STRONG®**

# Construction Phase Wetland Protection Barrier



**BUILDING STRONG®**

# Construction Phase

## Long Arm Excavators – Sediment Removal



**BUILDING STRONG®**

# Construction Phase Sediment Removal



# Construction Phase Temporary Road in Lake Bed



**BUILDING STRONG®**

# Construction Phase Hay Truck?



**BUILDING STRONG®**

# Construction Phase Truck Wash



**BUILDING STRONG®**

# Construction Phase Wildwood Disposal Site E&S



**BUILDING STRONG®**

# Construction Phase Wildwood Disposal Site E&S



**BUILDING STRONG®**

# Construction Phase Sediment Removal



**BUILDING STRONG®**

# Construction Phase Phase I Aerial Photo



**BUILDING STRONG®**

# Construction Phase Aerial Photo – Phase I



**BUILDING STRONG®**

# Construction Phase

## Phase I Sediment Removal Wrapping Up



**BUILDING STRONG®**

# Construction Phase Aerial Photo North Fork Pine Creek



**BUILDING STRONG®**

# Construction Phase Phase II In Progress



**BUILDING STRONG®**

# Construction Phase Phase II In Progress



**BUILDING STRONG®**

# Construction Phase Fish Habitat



11-01-2010



**BUILDING STRONG®**

# Construction Phase Fish Habitat

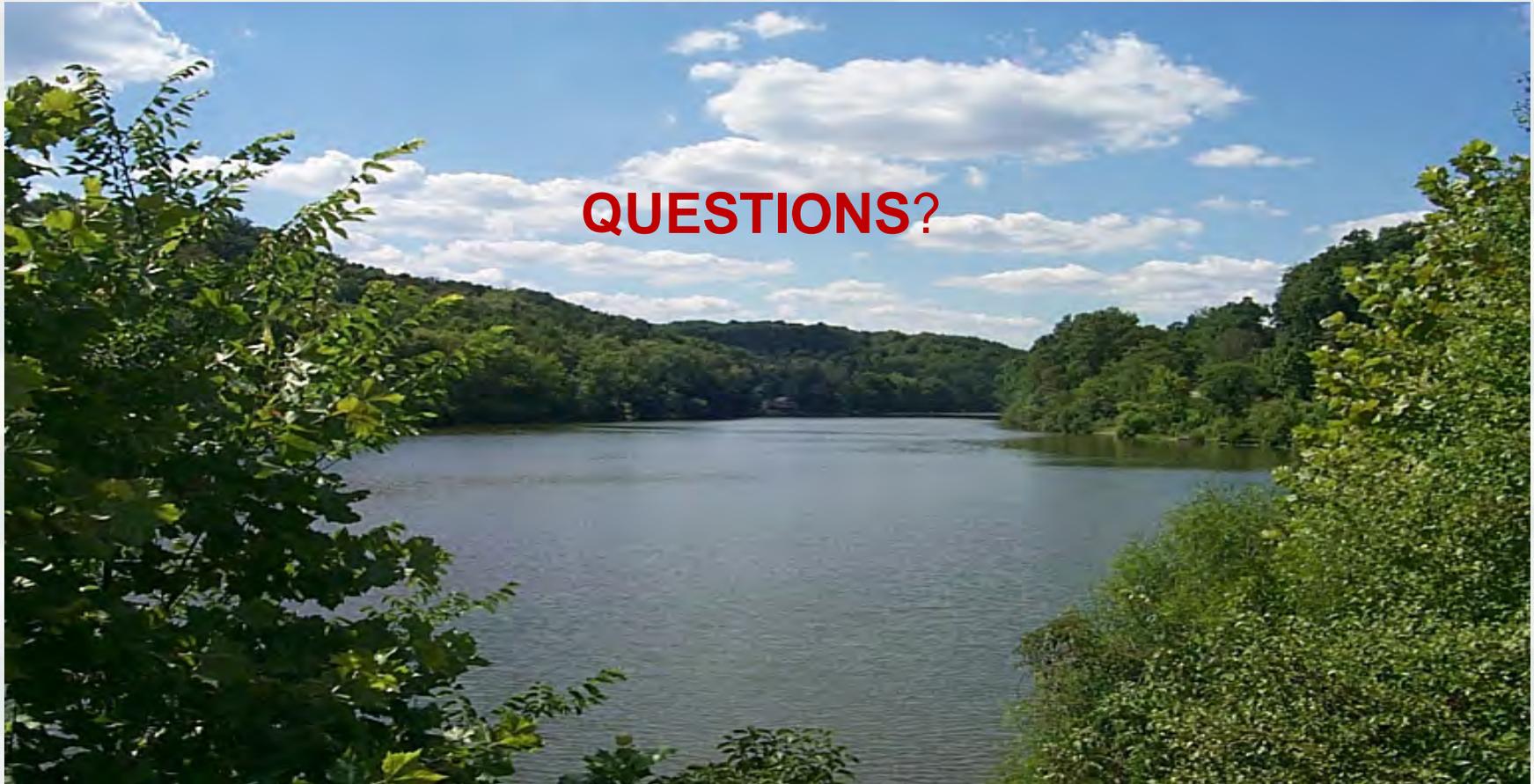


11-01-2010



**BUILDING STRONG®**

# SPRING 2011



**BUILDING STRONG®**