2019 Asian Carp Action Plan

Bill Bolen
Senior Advisor
U.S. Environmental Protection Agency
bolen.bill@epa.gov
Partnership Planning

2019 Action Plan

- Comprehensive approach to Great Lakes defense
  - Detection
  - Management (Prevention and Control)
  - Response
- Supports the annual Illinois Waterway Monitoring and Response Plan
- Supports goals of the National Asian Carp Plan
Mission: Prevent the introduction, spread and establishment of Asian carp in the Great Lakes
2019 Action Plan Key Initiatives

**Prevention**
- New Electric Dispersal Barrier
- Potential Future AIS Control Actions at Brandon Road
- Addressing Secondary Interbasin Pathways

**Control Measures**
- Increased Use of Targeted Contract Commercial Harvest
2019 Action Plan Key Initiatives

New Control Technology Development

- Pilot Trials for Underwater Sound Deterrents
- Development of CO2 as an Asian Carp Barrier

Early Detection, Monitoring, and Assessment

- Monitoring Upstream/Downstream of Electric Dispersal Barrier
- Comprehensive eDNA Monitoring
2019 Action Plan Key Initiatives

Rapid Response Actions
- Interagency Contingency Response Planning

Emerging Threats - Black and Grass Carp
- Development of New Prevention and Control Strategies

Interbasin Collaboration
- Coordination and Leveraging Across Basinwide Partnerships
2019 Action Plan Funding

**Prevention**

- Electrical Barrier Dispersal System
- Other Pathway Closures (Little Killbuck Creek)

$2.3M GLRI, $19.0 M Agency Funding

**Control**

- Asian Carp Removal Actions

$2.7M GLRI, $0.3 Agency Funding

**Monitoring**

- Great Lakes Monitoring
- Monitoring Above and Below the EDBS

$6.5M GLRI, $6.4 Agency Funding

**Control Technology**

- Acoustic Deterrents
- CO2

$7.2M GLRI, $2.8M Agency Funding

**Black Carp**

- Monitoring, Assessment and Control

$0.7M GLRI, $0.2 Agency Funding

**Grass Carp**

- Response and Monitoring

$0.9 GLRI, $1.4 Agency Funding
# 2019 Action Plan Funding

<table>
<thead>
<tr>
<th>Agency</th>
<th>Total GLRI Funding</th>
<th>Total Agency Funding</th>
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<td>USACE</td>
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<td>Ohio DNR</td>
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<td><strong>Total</strong></td>
<td><strong>$21,000,000</strong></td>
<td><strong>$30,434,948</strong></td>
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</table>
Entrainment and Deterrent Technologies

Mike Weimer
ACRCC Co-chair
U.S. Fish and Wildlife Service
Midwest Region
Asian Carp Control: Entrainment

- Inadvertent trapping and movement of small fish between transiting barges
- Previous assessments (lab and field studies):
  - Demonstrated potential, including through lock structures
  - Small (<5”) fish (non-Asian carp)
  - 2017 field study – small Asian carp
Asian Carp Control: Entrainment

• Fall 2018 - Used commercial barges and small Asian carp in Illinois Waterway

• Mitigation - Developing potential entrainment mitigation tools
  o Water jet evaluation - 2017
  o Sill bubble curtain - initial lab work in 2019
  o Brandon Road TSP - includes potential entrainment mitigation technology
Asian Carp Control: Acoustic Deterrents

- Potential barrier to fish movement
- Projected underwater sound
- Deployable at lock structures - “pinch point” locations with known Asian carp passage
Asian Carp Control: Acoustic Deterrents

Pilot Projects

Barkley Lock and Dam (Cumberland River in Kentucky)
• Bio Acoustic Fish Fence (sound and bubbles)
• Field trial begins Summer 2019

Mississippi River (proposed for Lock and Dam 19 - KY/IL)
• Proposed site
• Projected sound only
• Project plan being developed for partner review

Pilot Project Goals
• Provide “proof of concept” in a large scale, field setting
• Evaluate effectiveness of acoustic systems as deterrents to Bighead and Silver carp
• Develop technology useable in other river basins
Asian Carp Control: Acoustic Deterrents

Barkley Lock and Dam
- Partnership with Kentucky DFWR, USGS, USACE
- Uses sound and bubble system
- Barges pass safely over system
- Option to trap/remove Asian carp
- 3 year project

Location of deterrent system in lock approach channel
Asian Carp Control: Acoustic Deterrents

Mississippi River (proposed for L/D 19)

- Active navigation lock
- Upstream fish passage only through lock
- Initial project plan developed for agency review
- Sound propagation model (2019)
Asian Carp Control: Carbon Dioxide

New Pesticide Registration

• Carbon Dioxide-Carp now registered:
  1. Asian carp deterrent
  2. Under-ice lethal control for aquatic nuisance species

2019 Field Demonstration

• Feasibility study at navigational lock (Fox River Kaukauna Lock #2)
• Research team to assess:
  • Operating costs, human health risk, water quality, fish behavior, and non-target species toxicity
Ohio
Grass Carp
Response Strategy

Asian Carp and the Great Lakes
Congressional Briefings
April 30, 2019

Ohio DNR Division of Wildlife
John Navarro, AIS Program Administrator
Scott Hale, Chief of Fisheries
Focus Area: Western Basin of Lake Erie

Lake Erie
6.2 M Acres

Ground Zero
• Sandusky River
• Maumee River

Grass Carp Ploidy
- Diploid
- Triploid
- Pre-Testing
Process: Structured Decision Making

1. Trigger
2. Problem
3. Objectives
4. Alternatives
5. Consequences
6. Trade-offs & Optimization
7. Decide & Take Action
8. Values: Preference scales, objective weights, and risk attitudes
9. Mandates: Laws, policies, and preferences
10. Consider: Uncertainty and linked decisions
11. SDM Analysis Toolkit
12. Data
13. Modeling Toolkit

ODNR DIVISION OF WILDLIFE
**Goals**

**Goal 1:** Prevented Expansion Beyond Western Basin of Lake Erie

**Goal 2:** Prevent Population from reaching levels that compromise aquatic communities.

**Goal:** Prevent grass carp from attaining densities that cause adverse impacts
- Science-based adaptive management
- Guide fisheries management agencies
Overarching Approach

Integrate adaptive strategies to eradicate or limit populations to low densities in Western Lake Erie

- Minimize risk
- Control costs
- Avoid collateral damage to ecosystems, stakeholders and agencies
Moving Forward

- Targeted Grass Carp Removal
- Real-time tracking key to success
- Barrier Feasibility Assessment
Key Points

• Effective removal: targeting tributaries during spawning
• Lead agencies: Michigan and Ohio DNR
• Planning & coordination: GLFC Lake Erie Committee
• Essential support: federal and university partners
• Process: SDM, planning and adaptive management
Grass Carp

Cindy Tam, PhD.
Invasive Species and Fish and Wildlife Disease Program Coordinator
U.S. Geological Survey
USGS 2018 Actions – Grass Carp

• Reproduction
  • Eggs collected in the Sandusky and Maumee Rivers; 2 dates on each
  • Ongoing genetic analyses on 2017 eggs suggests at least 250 spawners
  • First GC larvae (just hatched) caught on 2 dates in Maumee

• Ecosystem Impact
  • Assess vegetation throughout Lake Erie to provide baseline
  • Extend genetic analysis of number of spawners with 2018 eggs/larvae
  • Support acoustic telemetry by installing, maintaining, hosting data for real-time receivers
USGS 2019 Actions
Grass Carp

• Control and Removal
  • Continue tributary sampling for spawning
    • Where/when spawn, sample new rivers, number of spawners
    • Incorporating eDNA sampling in 2019
  • Complete research on spawning locations
  • Complete testing of GC-specific toxic bait/registration
  • Research potential barrier/capture methods
    • CO₂, complex sound, pheromone/food attractants, identifying spawning triggers
  • Model Maumee to identify spawning area(s)
  • Continue to support real-time receivers and data
  • Complete 4-year Lake Erie vegetation assessment
  • Collaborate with states on research and removal methods in support of SDM process
Illinois and Kentucky
Expanded Harvesting Efforts

Kevin Irons
Aquatic Nuisance Species Program Manager
Illinois Department of Natural Resources
2019 Enhanced Contract Fishing Program

Key new component of the 2019 MRP

20+ projects support 3 objectives

1) Detection
2) Management and Control
3) Response
Keystone to plan:

Removal (Upper Illinois Waterway)

- Contracted fishers for fish removal
- Approximately **7.7 M pounds to date**
- Multiple gears/strategy: gill/trammel nets, hoop nets, Great Lakes pound nets, and commercial seine hauls, Chinese unified methods
- Little impact to native fishes (< 1% of total catch is game fish, mostly catfishes and put back into waters immediately)

GOOD NEWS: Leading edge has not moved since 2006 active monitoring began (10 years) OR 1990 (29 years) since first documented in vicinity (Dresden Island Pool)

Analyses document high oxidative stress in genes and liver activity of fish at the leading edge
Monitoring of relative density

Enhanced contract fishing starting 2019

Current contract removal 2010-present
Enhancing Contracted Removal and Guide with Modeling and Data

**Goal:** Efficiently eliminate upstream progression of Asian carp

**Objectives:**
1) Determine most effective locations to target adult mortality
2) Determine required mortality rates and quotas
3) Consider role of deterrence/technology
4) Assist in prioritizing research efforts to reduce uncertainty of risk

**SEAcarP Model**

**Goal:** Efficiently eliminate upstream progression of Asian carp

**Objectives:**
1) Determine most effective locations to target adult mortality
2) Determine required mortality rates and quotas
3) Consider role of deterrence/technology
4) Assist in prioritizing research efforts to reduce uncertainty of risk
Enhanced Contract Fishing Program

**PROGRAM GOALS**

- Removal of Asian carp
- To Start
  - Peoria Pool
  - 4.5 million pounds in 2019
- Study effectiveness – Southern Illinois University
- Long-term goal of 20 – 25 million pounds per year from Illinois waterways
Significant Basin-wide Emphasis

KENTUCKY FISH CENTER COORDINATION

- Announcement of Kentucky Fish Center
  - Operator - Two Rivers Fisheries in Wickliffe, KY
  - Receiving plants in Wickliffe and Eddyville Port of Authority

- Opened this year, 2019

- Two daily website auctions; size-graded supply lines

- Asian carp fishing expanded (include KY bowfishing)

- Tentative 14¢ – 17¢ per lb starting price, plus 5¢ subsidy for Kentucky/Barkley and tailwaters; logistical support

*Mr. Ron Brooks, Kentucky Fish Chief, is present in audience today for questions after this presentation.*
GLMRIS BRANDON ROAD STUDY

Date: April 30, 2019

Col. Aaron Reisinger
U.S. Army Corps of Engineers
Chicago District

Col. Steven Sattinger
U.S. Army Engineer District
Rock Island District
THE GREAT LAKES AND MISSISSIPPI RIVER INTERBASIN STUDY (GLMRIS) OVERVIEW

Section 3061(b)(1)(D) – WRDA 2007

• “The Secretary shall conduct, at Federal Expense, a feasibility study of the range of options and technologies available to prevent the spread of aquatic nuisance species between the Great Lakes and Mississippi River Basins through the Chicago Sanitary and Ship Canal and other aquatic pathways.

Focus Area I - CAWS
• LRC Lead
• GLMRIS Report released Jan 2014
• BR Study ongoing
• PRESBUD / GLRI

Brandon Road
• MVR Lead
• One-way control point identified in three alternatives in GLMRIS Report
• Chief’s Report FEB 2019

ATOS
• LRC Lead
• Aquatic Transfer of Other Species
• Downstream transfer from Lake Michigan
• Not yet funded

Eagle Marsh, IN
• LRL Lead
• Highest risk pathway outside CAWS
• Control implemented by NRCS with USACE support
• Completed Nov 2017

Ohio – Erie Canal, OH
• LRB Lead
• Control implemented by State of Ohio with USACE support
• Complete by Sep 2019

Little Killbuck Creek, OH
• LRB Lead
• Control implemented by State of Ohio with USACE support
• Complete by Dec 2022

Focus Area II – Other Pathways
• LRB Lead
• GLRI through Economy Act
• Pathway assessments by state
• Summary Report released May 2013

GLMRIS Program
• LRC Lead
• Coordination of program elements
• Budget development and defense
• Stakeholder engagement, including ACRCC related activities
• Collaboration with ERDC and other agencies on ANS research, including control measures

FY19: $ 50,000
FY20: $ 50,000

FY19 (FEAS): $150,000
FY20 (PED): $ 0
CSSC ELECTRIC DISPERSAL BARRIERS

National Invasive Species Act of 1996
- Directed construction of electric barrier on CSSC as a demonstration project

Section 3061(b)(1)(D) – WRDA 2007
- Upgrade and make permanent barrier I; construct barrier II; operate and maintain barrier I and II as a system to optimize effectiveness

<table>
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<tr>
<th>Barrier</th>
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<th>Construction Cost*</th>
<th>Voltage (volts/inch)</th>
<th>Frequency (Hz)</th>
<th>Pulse Duration (ms)</th>
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<td>$2M</td>
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<td>PB1</td>
<td>2021</td>
<td>$65M**</td>
<td>2.7(+)***</td>
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<td>II IIA</td>
<td>2009</td>
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<td>34</td>
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<td>IIB</td>
<td>2011</td>
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<td>2.3</td>
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* Placement totals ** Does not include options ($14M) *** Barrier I will have the ability to operate at higher parameters
• The Corps is working with the State of Illinois (the non-Federal Sponsor) to complete the Chief’s report as soon as possible.

• Coordination with Illinois may require additional time to allow their new administration time to provide feedback.

• The Recommended Plan is the Technology Alternative Acoustic Fish Deterrent with Electric Barrier, which includes the following measures: nonstructural measures, acoustic fish deterrent, bubble curtain, an engineered channel, an electric barrier, a flushing lock, and boat launches.

• Federal Partners and several Great Lakes States and the Great Lakes Commission fully support implementation of the recommended plan as soon as possible.

• The Corps recommends an Incremental Risk Reduction approach to implement control measures that are further developed while design continues on remaining measures.
BRANDON ROAD STUDY RECOMMENDED PLAN

- **Boat Launches**: Provides access for nonstructural measures, safety and OMRR&R.
- **Flushing Lock**: Flushes floating life stages from the Lock.
- **Acoustic Fish Deterrent**: Underwater sounds to deter targeted fish.
- **Engineering Channel**: Creates a concrete channel without fish habitat. Increases the effectiveness and reduces the impacts of some measures and is a platform for future technologies.
- **Electric Dispersal Barrier**: Creates an electric field that deters fish.
- **Fish Entrainment Deterrent**: Bubble curtain removes small and stunned fish entrained in spaces between barges.
- **Support Facilities**: Infrastructure to support operations and maintenance of controls.
### Brandon Road Cost Apportionment

#### Recommended Plan

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<tr>
<th>Contributor</th>
<th>Estimated Project First Costs&lt;sup&gt;a&lt;/sup&gt;</th>
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<tr>
<td>USACE (65%)</td>
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<tr>
<td>Non-Federal (35%)</td>
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<td><strong>Total Federal Contribution</strong></td>
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<tr>
<td><strong>Total Non-Federal Contribution</strong></td>
<td><strong>$290,775,000</strong></td>
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<tr>
<td><strong>Total Project First Costs</strong></td>
<td><strong>$830,784,000</strong></td>
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**Nonstructural Measures (Equivalent Average Annual Cost)<sup>b</sup>**

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<tr>
<th>Project</th>
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<th>Non-Federal sponsor</th>
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<td><strong>OMRR&amp;R (Equivalent Average Annual Cost)&lt;sup&gt;c&lt;/sup&gt;</strong></td>
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<td><strong>Total OMRR&amp;R</strong></td>
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#### Increment

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<td>$534,945,000</td>
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<td>3</td>
<td>$90,140,000</td>
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<tr>
<td><strong>Total Project First Costs</strong></td>
<td><strong>$830,784,000</strong></td>
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<sup>a</sup> All costs are presented at the FY19 price level and rounded to the nearest thousand. Costs of increments may not sum to total due to rounding.

<sup>b</sup> Nonstructural measures commence in 2022. For nonstructural measures costs, USACE’s portion (e.g., monitoring) pertains to monitoring of the control point. That yearly estimate will be cost-shared 65% Federal and 35% non-Federal. Average annual costs were estimated using a base year of FY22, 50-year period of analysis, and the FY 2019 Federal discount of 2.875%.

<sup>c</sup> OMRR&R activities commence in FY29. OMRR&R costs are 100% Federal for the flushing lock, and 80% Federal and 20% non-Federal for the remaining features. Average annual costs were estimated using a base year of FY 2022, 50-year period of analysis, and the FY 2019 Federal discount of 2.875%.
**Key Schedule Drivers**

- Completion of Chief’s Report
  - Internal & external reviews
- Non-federal sponsor/cost share agreements (DA/PPA)
- Availability of PED funds in FY 20
- Complex innovative designs increase PED duration
- Construction authorization & appropriation
- Real Estate Acquisition/HTRW
- Maintaining navigation during construction extends duration
Questions?

- **Mike Weimer**, Co-Chair of the ACRCC, USFWS
- **Bill Bolen**, Co-Chair of the ACRCC and USEPA
- **Kevin Irons**, Illinois DNR
- **John Navarro**, Ohio DNR
- **Cindy Tam**, USGS
- **Col. Aaron Reisinger**, USACE Chicago District
- **Col. Steven Sattinger**, USACE Rock Island District
Thank you!
BACKUP SLIDES
Asian Carp Range from Lake Michigan

Legend
- River
- Asian carp eggs detected
- Lock and Dam/Water Control Structure
- 2017: Single Silver Carp captured below T.J. O'Brien Lock at RM 324.2
- 2015: 3 larval fish detections, none before or after 2015.
- 2010: Single Bighead Carp captured in Lake Calumet
- 2009: Single Bighead Carp captured during rotenone action

Distances from Lake Michigan
- 37 miles: Electric Barrier System
- 47 miles: Dresden Island Pool: Adult Population Front; Three larval Silver Carp captured in July 2015
- 62 miles: Marseilles Pool: Adult presence and potential spawning, Asian carp eggs detected
- 88 miles: Starved Rock Pool: Adult abundance, Asian carp >6 inches captured in 2015 only, Asian carp eggs detected
- 102 miles: Peoria Pool to Mississippi River: Established population with ALL life stages detected

Note: All distances measured in river miles from Lake Michigan (Chicago Harbor).
Source: US Army Corps of Engineers Illinois Waterway Navigation Charts

Date Issued: 12/14/2018
# BRANDON ROAD PRECONSTRUCTION ENGINEERING & DESIGN

## POTENTIAL RISK INCREMENT I ACTIVITIES

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<tr>
<th>Activities to Support Design</th>
<th>Engineering &amp; Design</th>
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<tr>
<td>Phase II HTRW Investigation</td>
<td>Engineered Channel Design</td>
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<tr>
<td>Geotechnical Exploration</td>
<td>Air Bubble Curtain Design</td>
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<tr>
<td>Topographical, Boundary, Utility Surveys</td>
<td>Acoustic Deterrent Design</td>
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<td>Waterway Numeric Model for Flood Flows &amp; Navigation Conditions</td>
<td>Control Building Design</td>
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<td>Initiate Physical Modeling of the Flushing Lock</td>
<td>Upstream Boat Ramp Design</td>
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<tr>
<td>Physical Modeling of the Channel</td>
<td>Initiate Flushing Lock Design</td>
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<td>Bubble Curtain Research</td>
<td>Engineering Charrette</td>
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<td>ANS Control Research/Testing &amp; ANS Control Interaction Studies</td>
<td>Value Engineering</td>
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<td>Concept Studies, Engineered Channel Wall, Channel Floor</td>
<td>Permit Coordination</td>
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<tr>
<td>Shallow Electric Barrier Research, (Stray Current Numeric Model for Insulation Termination &amp; Channel Length Shortening)</td>
<td>Engineering Specifications &amp; Drawings, Risk Reduction Increment I</td>
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<tr>
<td>30% PED &amp; Drawings for Risk Reduction Increments II &amp; III</td>
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</table>
Risk Reduction Increment I
- Prep NRG Site
- Channel Rock Excavation
- Air Bubble Curtain
- Narrow Acoustic Deterrent Array
- Control Building
- Upstream Boat Launch
Cost $205.700,000
Design & Const. Duration 4-5 yr.
Timeline for structural implementation will be further developed in the PED phase.

Initial Risk Reduction – Nonstructural Measures begin upon appropriation of funding

Blast channel bottom. Reuse rock right descending bank property and if enough, left descending bank.
Risk Reduction Increment II
- Electric Barrier
- Wide Acoustic Deterrent Array
- Complete Control Building
- RDB wall connect to lower guidewall
- Flushing Lock
- Downstream Boat Launch

Cost $534,945.00
Design & Const. Duration 3-4 yr.

Timeline for structural implementation will be further developed in the PED phase.

Initial Risk Reduction – Nonstructural Measures begin upon appropriation of funding
Risk Reduction Increment III

- Finish Engineered Channel
  Cost $90,140,000
  Design & Const. Duration 2-3 yr.

Timeline for structural implementation will be further developed in the PED phase.

Initial Risk Reduction – Nonstructural Measures begin upon appropriation of funding.

Blast channel bottom. Reuse rock right descending bank property and if enough, left descending bank.