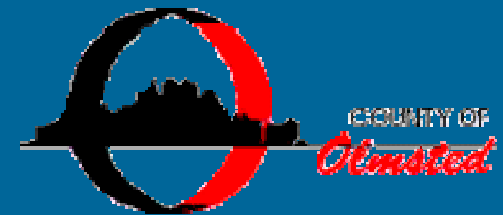


Lake Zumbro Restoration Project Preliminary Engineering Status

Jim Herbert, PE
Barr Engineering Co.
April 28, 2010

Thanks: Grandpa Ed's Restaurant and Event Center

Stakeholder Acknowledgement



Presentation Outline

1. Background

2. Dredging

- General
- Lake Zumbro Restoration Project

3. Disposal

4. Permitting

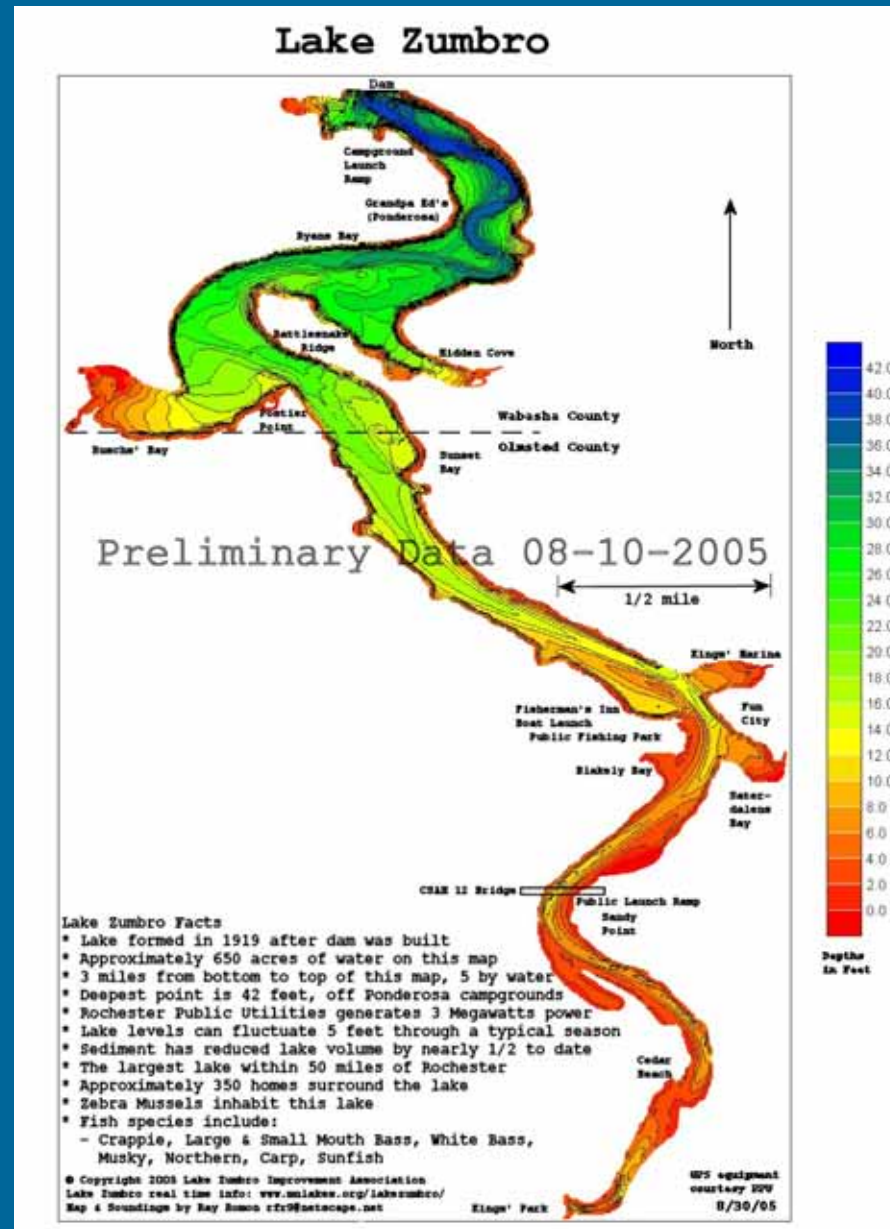
- Agency Coordination
- Sediment Sampling/Stability
- Phosphorus Sampling

5. Opinion of Cost/Schedule

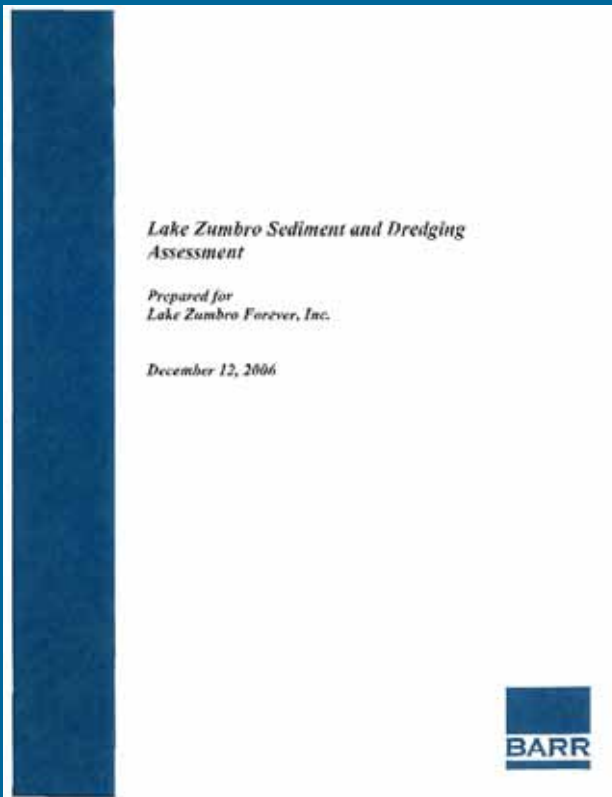
6. Questions

Lake Zumbro

- Located 6 miles north of Rochester
- Formed in 1919 with the construction of a hydropower dam on the Zumbro River
- Covers 650 Acres
- Approximately 5 miles long north to south



Lake Zumbro Sediment & Dredging Assessment



Lake Zumbro Sediment & Dredging Assessment



Why dredge?

1937



2008



Restoration Project Goals

- Primary Goals
 - Restore lake access to property owners
 - Improve navigation and recreation
 - “Turn back the clock”
- Secondary goals
 - Improve Water Quality – TMDL and mobile phosphorus reduction in lake bed
 - To “dredge with nature”
 - Not remove sediments below contours from 1916 pre-dam survey
 - Improve habitat where feasible (with input from DNR)
 - Create and maintain sediment management areas

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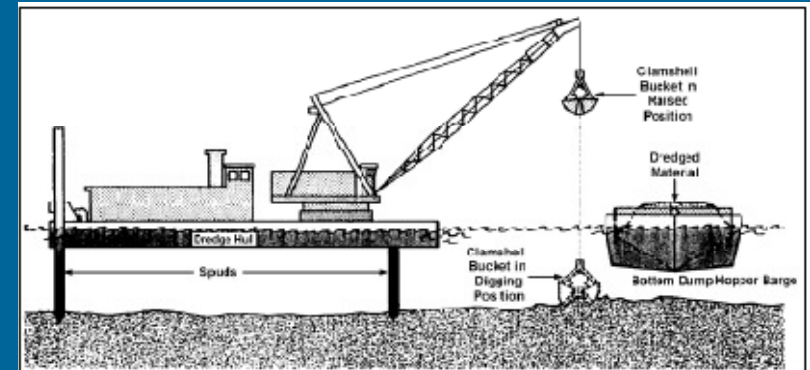
Dredging: General



Dredging: General

Mechanical Dredging

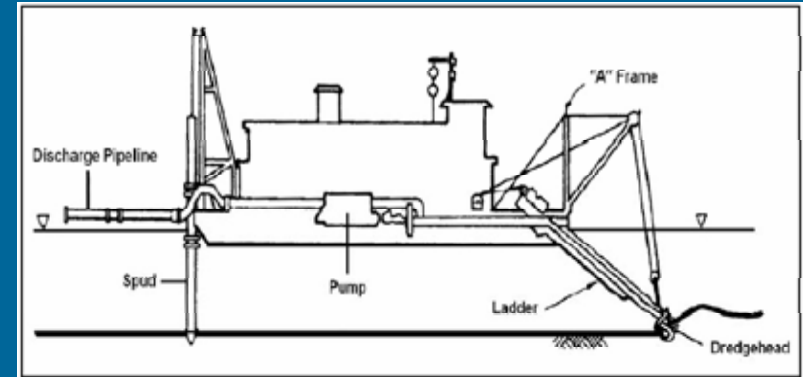
- Shovel it out, leave the water behind
- Can dredge from
 - Shore (access issues)
 - A barge (draft issues)
- Equipment scaled to project
- Issues
 - Bucket type
 - Bucket size
 - transport
 - Transfer



Dredging: General

Hydraulic Dredging

- Swinging ladder, cutter head Dredge
- Cuts, then sucks sediment through a pipeline to disposal site
- Issues:
 - 7,000-21,000 gpm
 - Debris
 - Sloping bottoms



Dredging: General

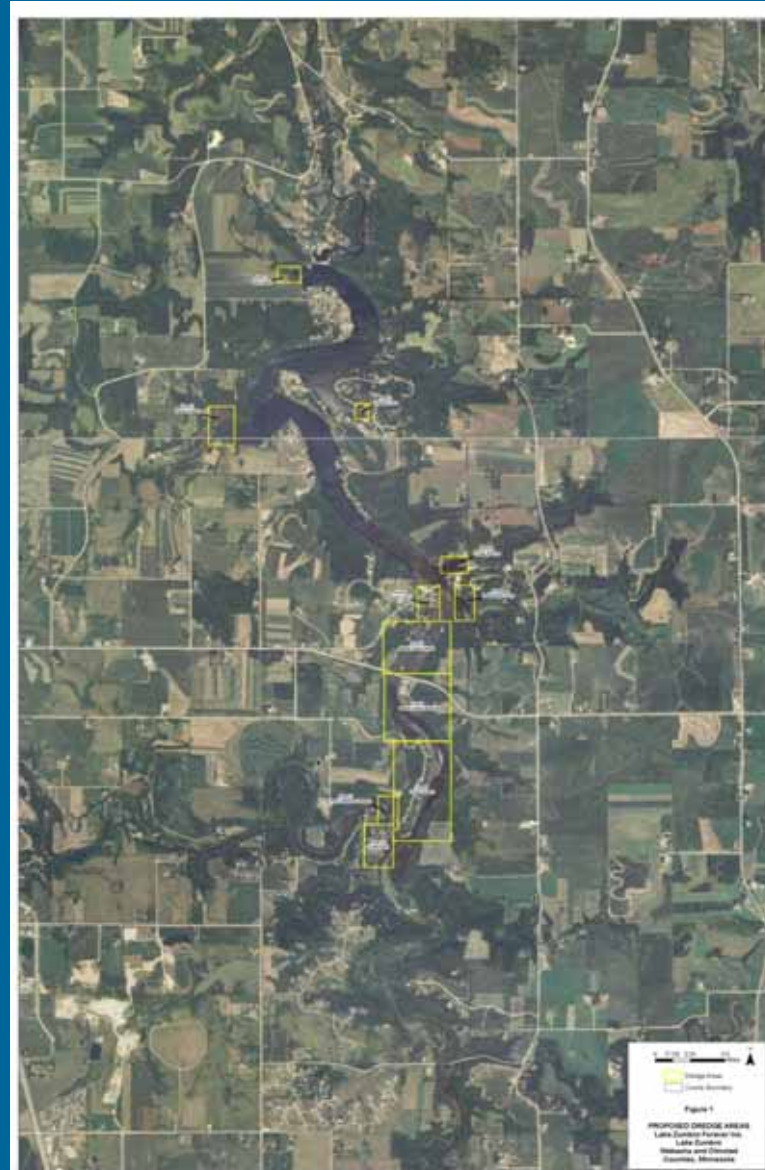
Hybrid Dredging

- Mechanical Dredging
- Hydraulic Transport
- Reduced water with economies of hydraulic transport



Dredging: Lake Zumbro

- Preliminary dredge area
 - 11 areas considered, 9 are planned to be dredged
 - 0.5M – 1.0M CYD dredge volume
 - 5 ft -10 ft. dredge depth
 - 6h:1v slope dredge cut for stability



Dredging: 9 Sites

- Area 1: Dam West (Removed from Prelim Plan)
- Area 2: Rusch's Bay
- Area 3: Hidden Cove
- Area 4: Kings Marina
- Area 5: Blakely Bay
- Area 6: Saterdalen Cove (Removed from Prelim Plan)
- Area 7, 8: Sandy Point North/South
- Area 9: Cedar Beach
- Area 10, 11 Kings Park

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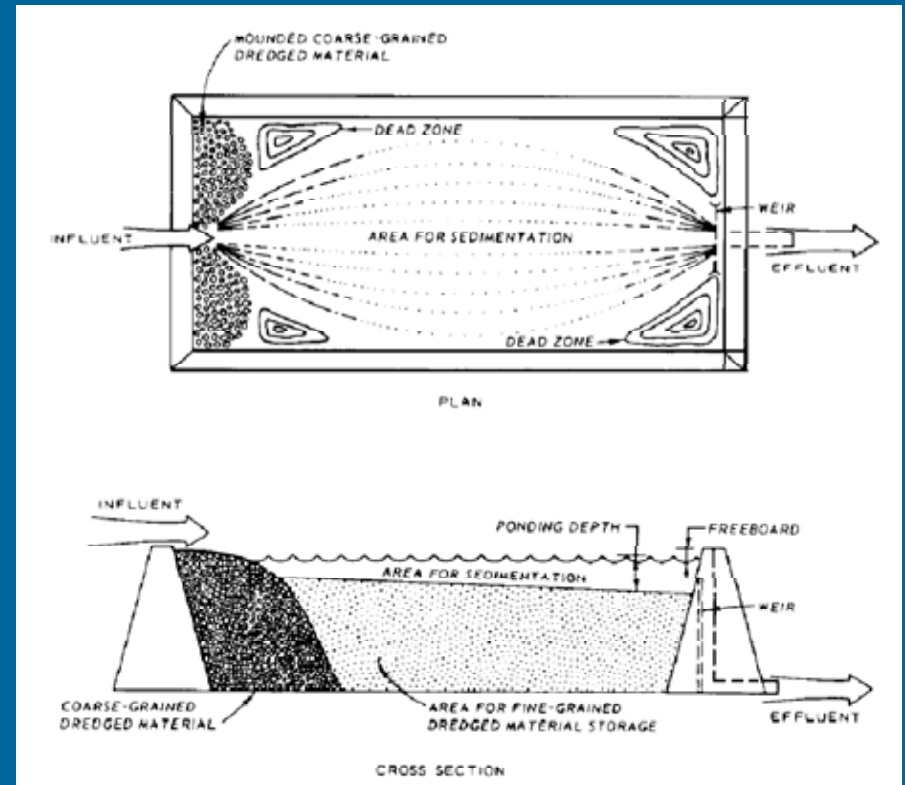
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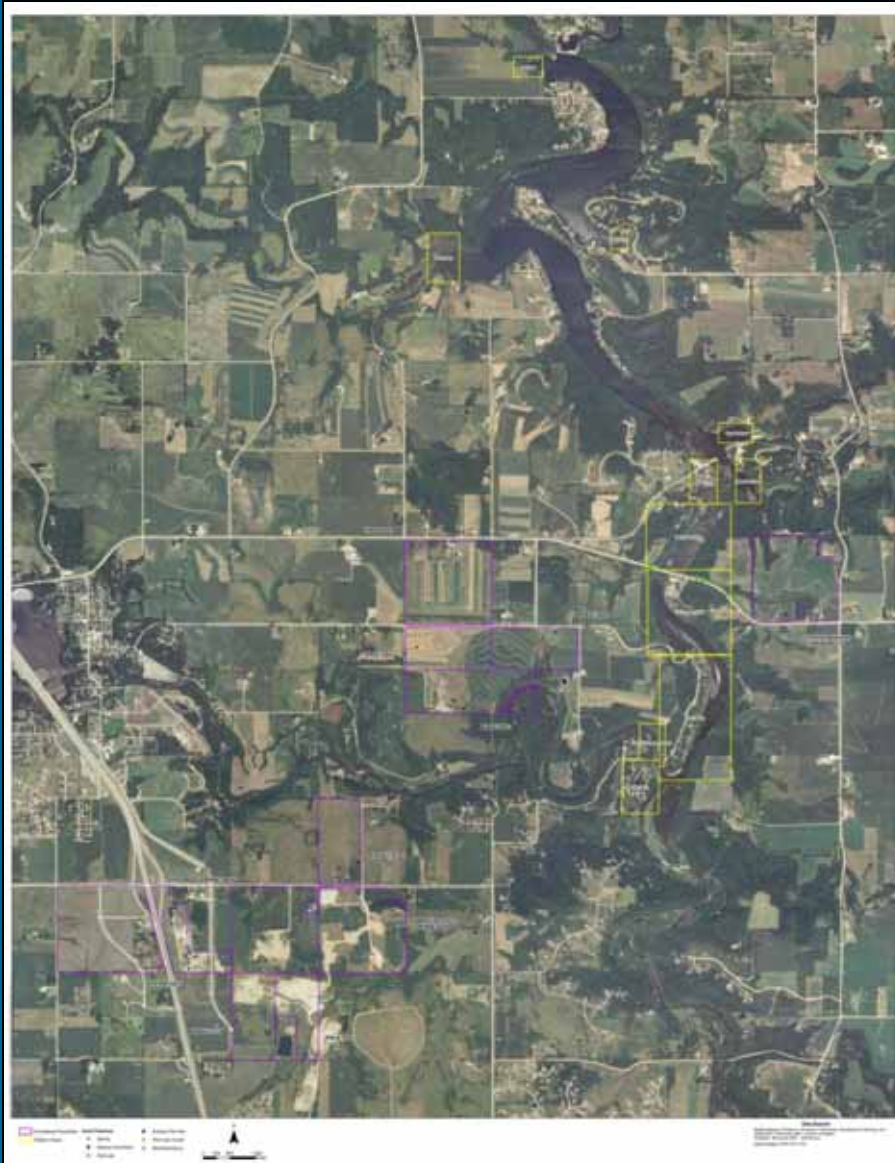
Disposal

Issues

- Access
- Availability of land
- Pretreatment?
- Infiltration
- Water depth
- Freeboard
- Grades
- Adequate area
- Transport
- Recycle sand?
- Mixing for soil properties
- Clarifying return water

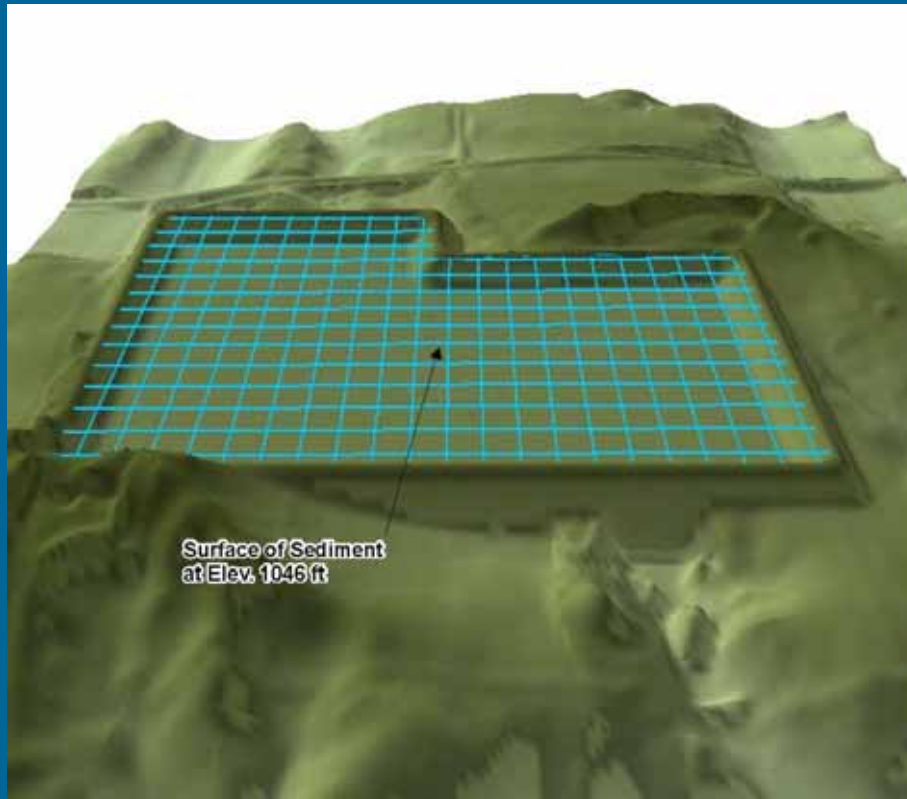


Potential Disposal Areas



- Parcels identified for proposed disposal areas
- LZFI contacted landowners
- Sites evaluated based on landowner interest
- Preliminary Site Evaluation

Preliminary Disposal Site Evaluation



- Agency guidance/rules
- Topography
- Geology
- Karst features
- County Well Index
- Wetlands
- Site Restoration
- Preliminary volume requirements



Clear Lake Containment Site

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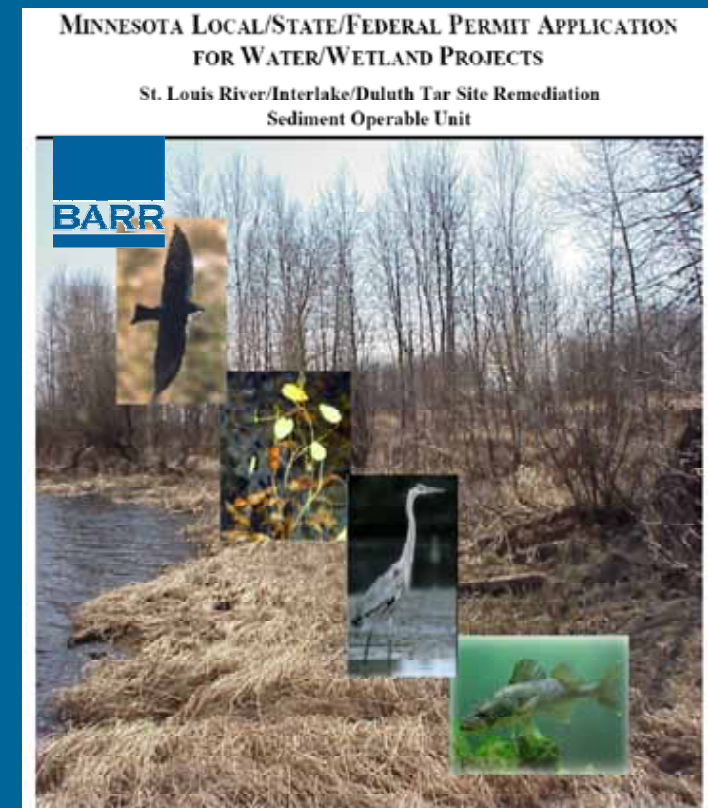
- Agency Coordination
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5. Opinion of Cost/Schedule

6. Questions

Permitting

- Very Public Process
- Lots of interested parties
- State, Federal and local permits:
 - EAW - EQB
 - State Disposal System – MPCA
 - TMDL - MPCA
 - NPDES - MPCA
 - Working in Public Waters – DNR
 - Section 404 – USACE (wetlands/fill)
 - Section 10 – USACE (waters)
 - Shoreland Protection – Local
- Land ownership
- Functions and values assessment
- Mitigation requirements



Agency Coordination: DNR

- Recognize need for improving navigation
- State goals/objectives at each dredge site
- Dredge with nature
 - Maintain shoreline and littoral zone stability
 - 30' +/- littoral buffer @ unoccupied shoreline
 - Maintain emergent vegetation w/buffer
 - Discourage bank to bank dredging
 - Utilize natural river dynamics



Agency Coordination: DNR (cont.)

- Dredge cut/shoreline stability
- Prioritize dredge areas
- Not convinced of value of sediment management area (maintenance)
- LZFI should identify sites to incorporate shoreline restoration
- Additional study regarding sediment deposition rates

Agency Coordination: MPCA & Corps

- MPCA:
 - Consider watershed wide improvements
 - Shoreline stabilization
 - Buffer enhancements
 - Septic system upgrade
 - Regulate disposal facility “return water”
 - Address cause of impairment if water quality is project objective
- Corps of Engineers:
 - Wetland issues @ disposal facility
 - Regulate disposal facility “return water”

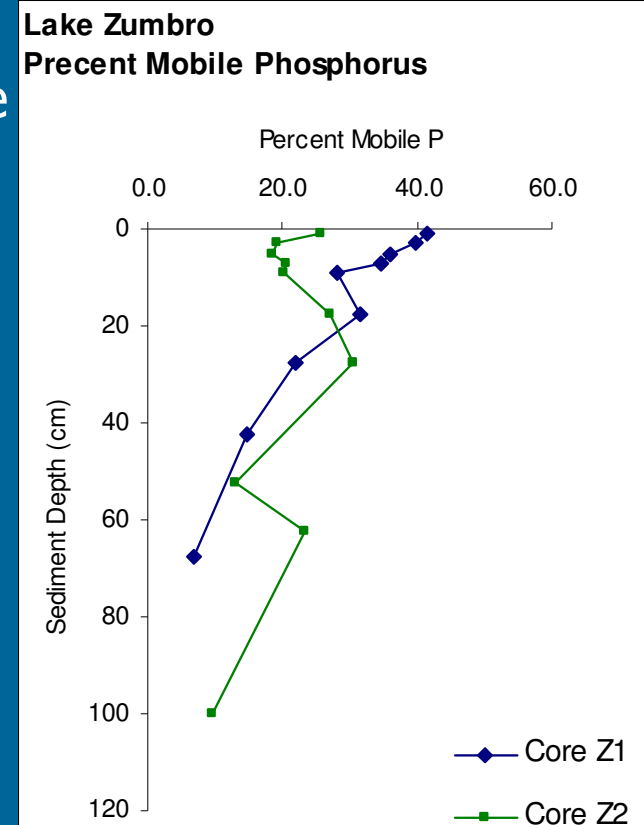
Sediment Sampling

- Sediment characterization
 - Samples collected in July 2006
 - Analyzed for parameters outlined in the Dredged Material Guidance document (physical properties and contaminants)
- Dredge Cut Slope Stability
 - Requested by DNR to ensure stable sediments
 - Collected sediment samples (November, 2009)
 - Geotechnical Testing: (Grain Size, Atterberg Limits, Specific Gravity, Moisture Content, Consolidation Tests, Triaxial Extension Tests)
 - Geotechnical Modeling: Evaluate Slope Stability
 - Current conditions
 - Rapid drawdown conditions
 - Recommended Dredge Cut Slopes: 6H:1V



Phosphorus Sampling

- Evaluation of Potential Phosphorus Release
 - Collected two sediment cores (November, 2009)
 - Evaluated for Total Phosphorus (TP) and Mobile Phosphorus (Mobile P)
 - TP consistent from top to bottom of core
 - Mobile P decreased significantly from top to bottom of core
 - Summary: project will not further degrade water quality



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Preliminary Opinion of Cost

- \$10 - \$15/ CYD dredged and disposed
- Preliminary drawings: 1,200,000 CY
- \$6M Project: 400,000 CY – 600,000 CY
- \$10M Project: 600,000 CY – 1,000,000 CY

Project Outlook and Schedule

- 2010: Preliminary engineering; disposal site investigation
- Project Funding (LID, public bonding bill, Etc.)
- Final Design/Permitting
- Bidding/Construction

Lake Zumbro Restoration Project Preliminary Engineering Status

An aerial photograph of Lake Zumbro, showing the water's surface, surrounding trees with autumn foliage, and distant hills. The text is overlaid on the image.

Questions?

Thanks: Grandpa Ed's Restaurant and Event Center