Testing the Glen D. Palmer Dam (Yorkville Dam) Bypass Channel
Presentation Purpose –

• Where is Yorkville, Illinois and why was the dam improved?

• Dam Modification Objectives

• Dam Modification Construction

• Bypass Testing Plan

• Bypass Testing Results
Glen D. Palmer (Yorkville) Dam on the Fox River
Dam Constructed 1960-1961 for navigation purposes (locks never built)

Length of Ogee Spillway 530 feet.

Height of Dam Varies 6 to 12 feet.

Length of Pool 1.8 Miles.

Area of Pool 111 Acres.
Yorkville Dam Problems
Public Safety
Fish Passage
Boat Passage
Dam Modification:
Project Objectives

- Public Safety: spillway modification
- River ecosystem: fish passage
- Recreation: canoe passage
Public Safety

4 Step Spillway
5:1 step length to height ratio
Four Step Modified Spillway
Fish Passage Criteria

- Passing the Target Species
- Areas within Pools with Velocity < 1.5fps
- Areas within Riffles with Velocity < 3fps
- Desirable Conditions at the Downstream Exit
- Passage at Both Ends of the Dam
- Good Hydraulic Conditions for Fish in March, April, May, June, and November
Provide Adequate Fish Passage

- Denil Fish Ladder
PHASE 1 CONSTRUCTION
Provide safe boat passage for novice boaters
Provide a Challenging Whitewater Recreational Facility
Dual Boating Routes Bypass Channel
Canoe Bypass Design Criteria

- Maximum chute drop = 15”
- Minimum chute water depth = 15”
- Minimum chute bottom width = 15’
- Minimum pool length = 40’
- Minimum pool depth = 4’
- Minimum pool bottom width = 30’
Bypass Divider Island / Class 2 Dam
Bypass Testing

**The Water:**
Flow Split
Velocities
Velocity Distribution

**The Boaters:**
Public Safety
Family Fun
Whitewater Fun
Bypass Testing Plan Flows

200 cfs

500 cfs

750 cfs

Patrick Engineering (Adam James) developed the testing plan control for contractor Albin Carlson.
Bypass Testing Plan
Bypass Testing Staff Gages
(based on as-built HEC-RAS)
USGS Bypass Testing
# Bypass Testing Flows

## Table 1.
Total measured discharge in the Yorkville Dam bypass channel.

<table>
<thead>
<tr>
<th>Time (CST)</th>
<th>Discharge (ft³/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0930</td>
<td>200</td>
</tr>
<tr>
<td>1430</td>
<td>190</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time (CST)</th>
<th>Discharge (ft³/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0945</td>
<td>520</td>
</tr>
<tr>
<td>1330</td>
<td>530</td>
</tr>
<tr>
<td>1445</td>
<td>550</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time (CST)</th>
<th>Discharge (ft³/s)</th>
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</thead>
<tbody>
<tr>
<td>0730</td>
<td>500</td>
</tr>
<tr>
<td>0900</td>
<td>480</td>
</tr>
<tr>
<td>1030</td>
<td>490</td>
</tr>
</tbody>
</table>
Bypass Testing Flows

Figure 1. Daily mean discharge at Fox River at Montgomery, IL during October 1 – 31, 2010.
Bypass Testing Results

Approximate Mean Discharge:

ADCP direct measurement

FlowTracker direct measurement

Challenge Route Flow Computed by subtracting Moderate Route Flow From Total Flow
Table 2. Discharges in the upper and lower splits of the Yorkville Dam bypass channel.

<table>
<thead>
<tr>
<th>Location</th>
<th>Discharge (ft³/s)</th>
<th>Percent of Total</th>
<th>Location</th>
<th>Discharge (ft³/s)</th>
<th>Percent of Total</th>
<th>Location</th>
<th>Discharge (ft³/s)</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>October 4, 2010</strong></td>
<td></td>
<td></td>
<td><strong>October 5, 2010</strong></td>
<td></td>
<td></td>
<td><strong>October 13, 2010</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Bypass¹</strong></td>
<td>195</td>
<td>---</td>
<td><strong>Total Bypass¹</strong></td>
<td>525</td>
<td>---</td>
<td><strong>Total Bypass¹</strong></td>
<td>490</td>
<td>---</td>
</tr>
<tr>
<td><strong>Upper Section</strong></td>
<td></td>
<td></td>
<td><strong>Upper Section</strong></td>
<td></td>
<td></td>
<td><strong>Upper Section</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate²</td>
<td>115</td>
<td>57%</td>
<td>Moderate²</td>
<td>230</td>
<td>44%</td>
<td>Moderate⁴</td>
<td>268</td>
<td>55%</td>
</tr>
<tr>
<td>Challenge³</td>
<td>87</td>
<td>43%</td>
<td>Challenge⁴</td>
<td>295</td>
<td>56%</td>
<td>Challenge²</td>
<td>222</td>
<td>45%</td>
</tr>
<tr>
<td><strong>Lower Section</strong></td>
<td></td>
<td></td>
<td><strong>Lower Section</strong></td>
<td></td>
<td></td>
<td><strong>Lower Section</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate²</td>
<td>132</td>
<td>69%</td>
<td>Moderate²</td>
<td>275</td>
<td>52%</td>
<td>Moderate²</td>
<td>229</td>
<td>47%</td>
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<tr>
<td>Challenge³</td>
<td>60</td>
<td>31%</td>
<td>Challenge⁴</td>
<td>250</td>
<td>48%</td>
<td>Challenge⁴</td>
<td>261</td>
<td>53%</td>
</tr>
</tbody>
</table>

¹ Approximate mean discharge during measurement period.
Bypass Testing Results
Depth Average Velocities (200 cfs)

Depth-averaged velocities from ADCP data in the Bypass Channel, October 4, 2010.
Bypass Inlet Results
Appendix A. Individual velocity plots for October 4, 2010.

Site B – Bypass inlet
Bypass Testing Results

Sites F to K – plan view
Site I – profile view

Site below J – profile view
Volunteer Whitewater Boating Safety Associate

ILLINOIS DEPARTMENT OF NATURAL RESOURCES
Office of Water Resources

VOLUNTEER JOB DESCRIPTION/WAIVER

Volunteer Job Description

JOB TITLE: Volunteer Whitewater Boating Safety Associate

COUNTY OR SITE:

Region #

Volunteer Name:
________________________________________________________________________________

Name of Group (attach Roster)
_________________________________________________________________

Address:
___________________________________________________________________________________

City: __________________________________

State:__________________

Zip:_________________________

Email address (important)
_____________________________________________________________________

Phone: (h) __________________________________________

(cell) _______________________________________

OBJECTIVE - To assist Department of Natural Resources personnel in the inspection of whitewater recreation facility construction and testing to share observations, and to identify potential whitewater boating hazards and concerns.

RESPONSIBILITIES TO BE PERFORMED BY VOLUNTEER – Tasks include assisting Department personnel in the inspection of whitewater recreation facility construction and testing, and assisting Department personnel in the assessment of whitewater recreational facilities.

PREFERRED QUALIFICATIONS - Volunteer must be 18 and able to follow directions with minimal direct supervision; be in overall good physical health; possesses knowledge, skills and experience in whitewater boating; be able to provide own boat, safety equipment and life jackets when necessary, and be comfortable working out-of-doors.

TRAINING AND PREPARATION - Orientation to the site and to the above volunteer responsibilities will be provided. Specific training will occur for the above responsibilities and for any additional activities that may arise during volunteer activities at the site as determined by the Volunteer Supervisor. Depending on Volunteer interests, some research on the site may be necessary.

FREQUENCY OF SERVICE - When available, and as requested by the Department.

BENEFITS PROVIDED BY THE DEPARTMENT OF NATURAL RESOURCES - Opportunity to enjoy the outdoors while actively contributing to the successful implementation of a whitewater recreational facility in Illinois. Personal Liability insurance provided, if all forms signed, while performing volunteer duties

NOTE - Volunteer services may be terminated if the volunteer fails to perform job duties at an acceptable level or fails to comply with Department rules, regulations, policies, and procedures.

Waiver and Release of Liability

The Volunteer does hereby agree to perform volunteer work for the ILLINOIS DEPARTMENT OF NATURAL RESOURCES (Department) as a Volunteer Whitewater Boating Safety Associate and does hereby waive all manner of action or actions, causes of action, damage, claims or demands, holding the State of Illinois, the Department, their agents or employees harmless from any and all claims, demands and liabilities on account of any injuries, losses, or damages to his/her person or property which might be caused, or may at any time arise, by reason of his/her orientation, training, duties or temporary assignment for any purpose whether or not under the supervision of agents or employees of the Department.

This WAIVER AND RELEASE OF LIABILITY is freely given with full knowledge and intention to absolve completely, absolutely and finally, the State of Illinois, the Department and its agents and employees from any claim of loss, injury or liability resulting or arising from work as a Volunteer Whitewater Boating Safety Associate.

I certify that I am _____ years of age, having read and understand all of the above, do hereby understand the risks involved, and agree that this waiver and release shall be binding upon my heirs, executors, administrators, and assigns, and by affixing my signature below, agree to all preceding provisions. This agreement shall be in effect from this day forth, until revoked in writing or until the volunteer status is rescinded.

I certify that I have read and understand the above terms and provisions:

Signature of Volunteer
___________________________________________________

Date
___________________

IL DEPARTMENT OF NATURAL RESOURCES

IDNR Volunteer Supervisor

Printed Name

Title

Date

B 1-10
Illinois Paddling Council & Chicago Whitewater Association
Bypass Evaluated for Novice and Experienced Boaters Alike
Both Open and Closed Deck Boats Used to Test the Bypass
Bypass Performance Discussed With USGS and Test Boaters After Each Test Flow = Improvements
Bypass Adjustments Implemented
Phase 3 Bypass Bridge  2011
Thank You
LIMITED PUBLIC FUNDS = STAGED CONSTRUCTION

PHASE 1 - STEPS $3.6 MILLION

PHASE 2 - BYPASS 4.4 MILLION +/-

PHASE 3 – BRIDGE & GAGE STATION
Going out for bid
Bypass Testing Flows

Figure 2. River stages upstream and downstream of Yorkville Dam on the Fox River at Yorkville, IL during October 4 – 6, 2010 (provided by IDNR-OWR).