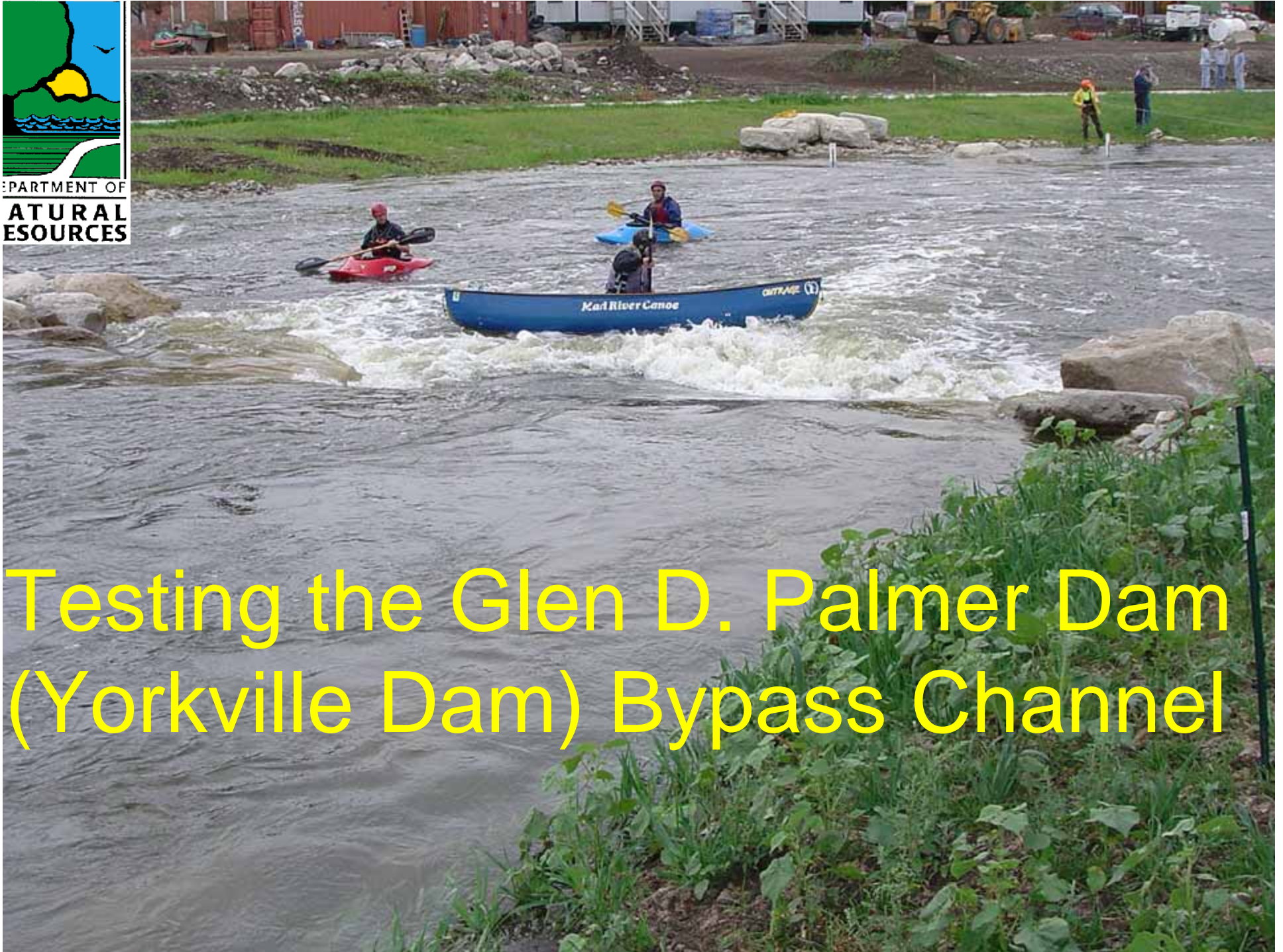




DEPARTMENT OF  
**NATURAL  
RESOURCES**

# Testing the Glen D. Palmer Dam (Yorkville Dam) Bypass Channel



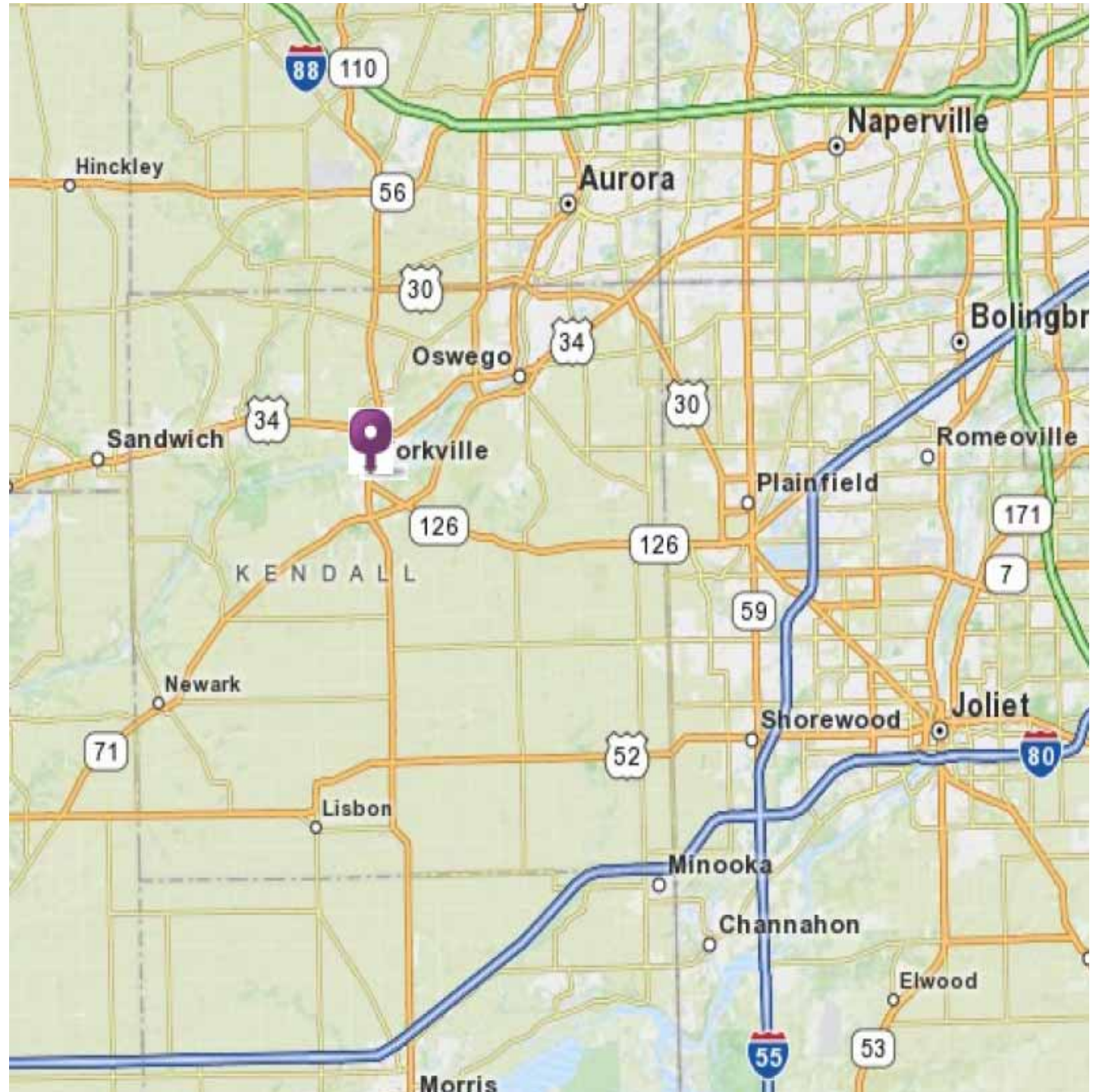
# Presentation Purpose –



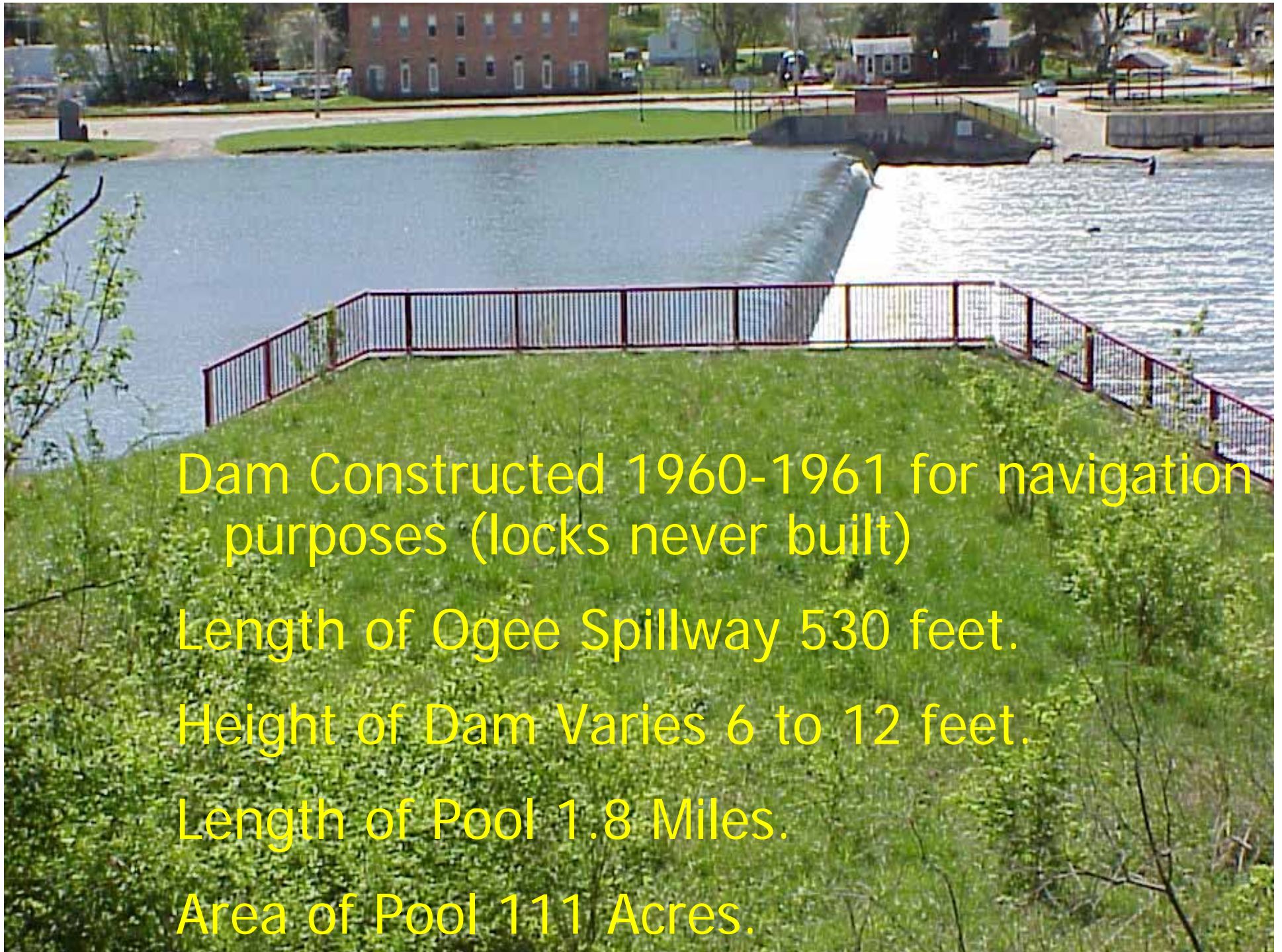
- Where is Yorkville, Illinois and why was the dam improved?
- Dam Modification Objectives
- Dam Modification Construction
- Bypass Testing Plan
- Bypass Testing Results



# 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

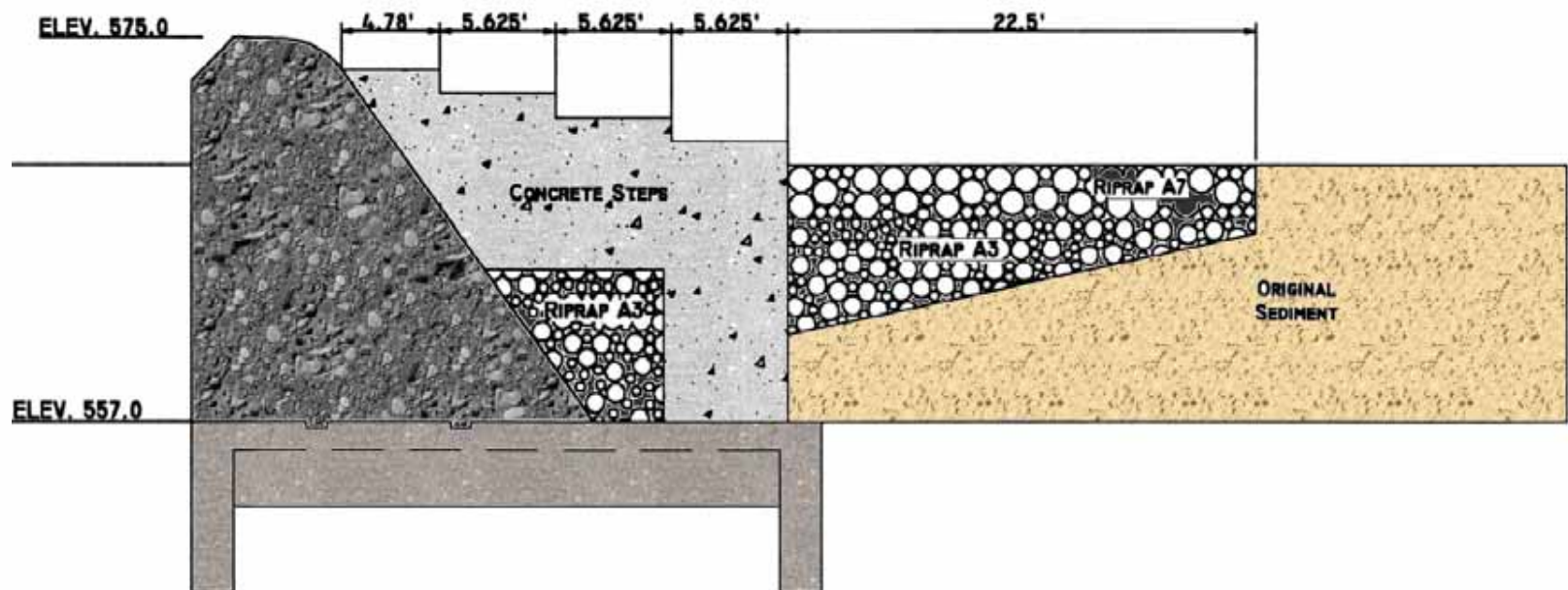


# **Dam Modification: Project Objectives**

- **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

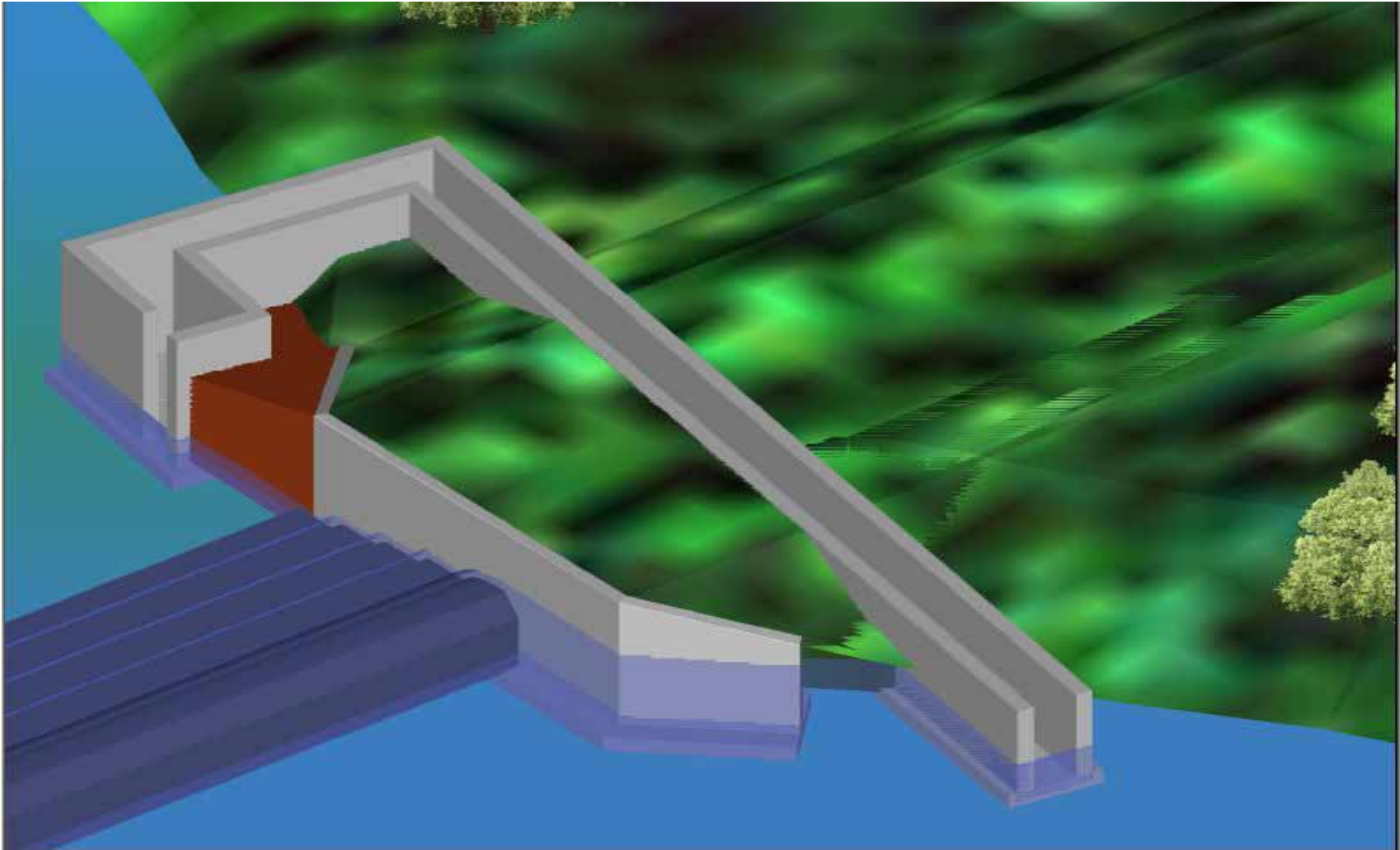


- Passing the Target Species
- Areas within Pools with Velocity  $< 1.5\text{fps}$
- Areas within Riffles with Velocity  $< 3\text{fps}$
- Desirable Conditions at the Downstream Exit
- Passage at Both Ends of the Dam
- Good Hydraulic Conditions for Fish in March, April, May, June, and November



# 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



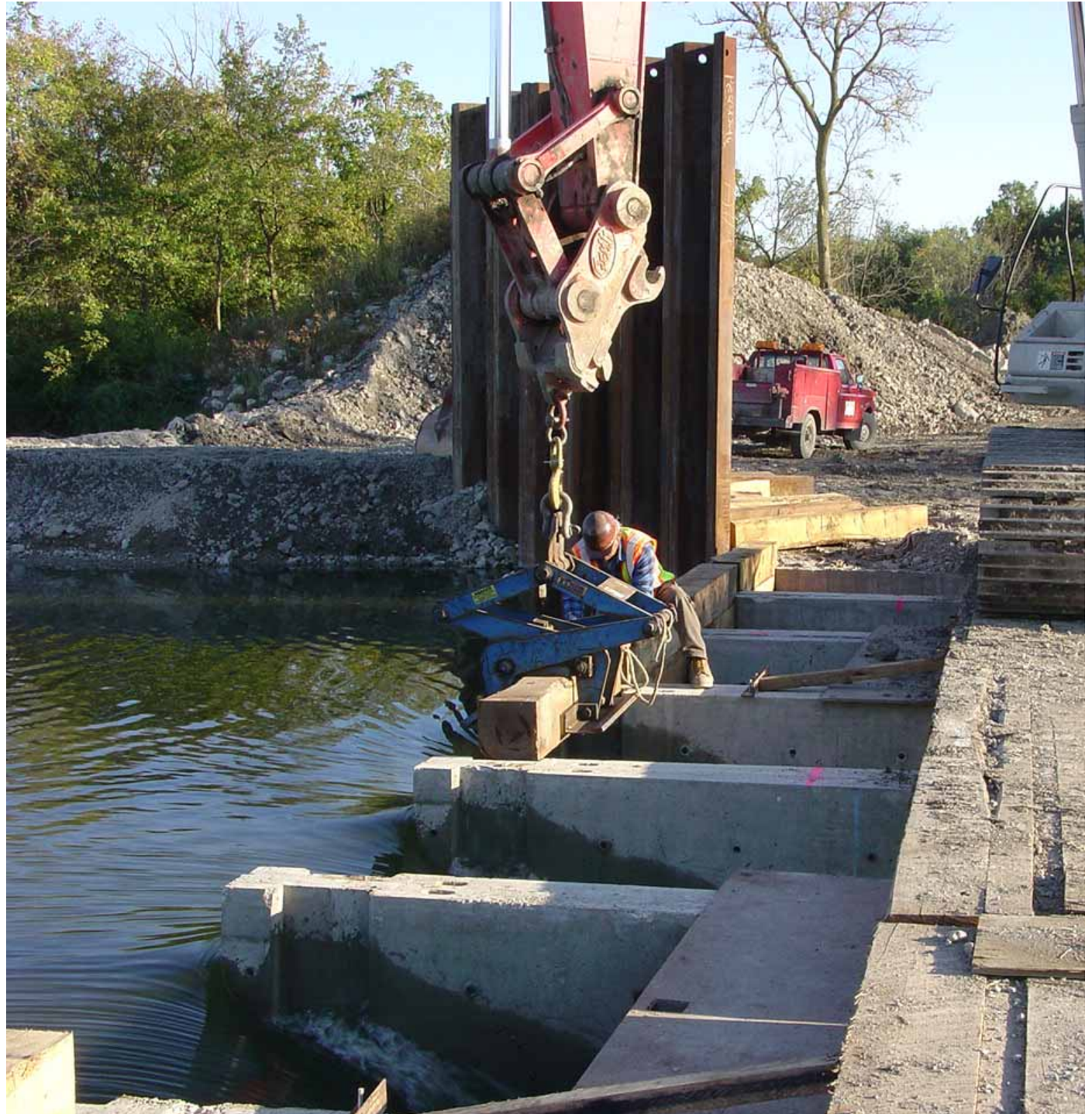
# Bypass Testing Plan Flows

200 cfs

500 cfs

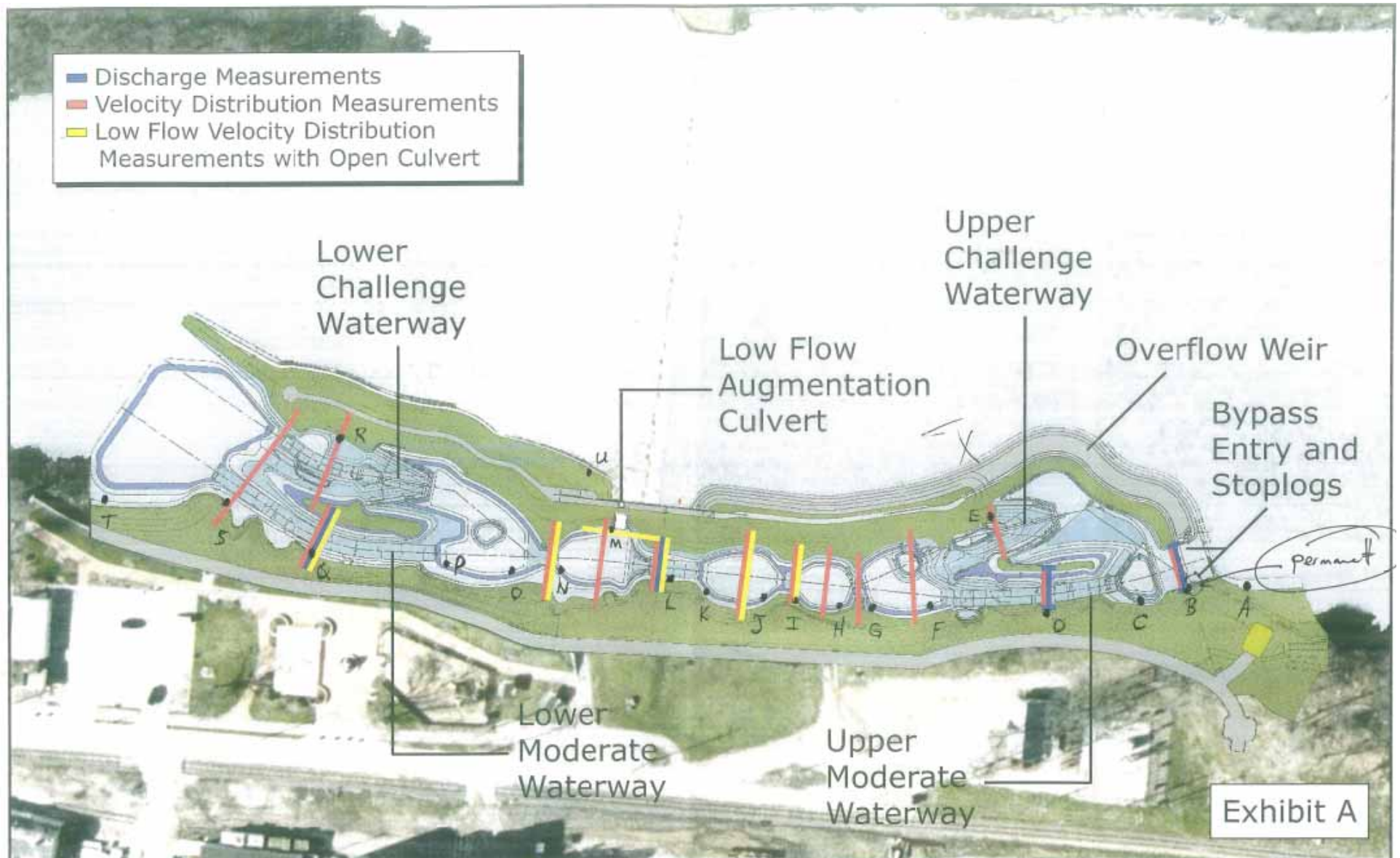
750 cfs

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.

<u>October 4, 2010</u>		<u>October 5, 2010</u>		<u>October 13, 2010</u>	
<u>Time (CST)</u>	<u>Discharge (ft<sup>3</sup>/s)</u>	<u>Time (CST)</u>	<u>Discharge (ft<sup>3</sup>/s)</u>	<u>Time (CST)</u>	<u>Discharge (ft<sup>3</sup>/s)</u>
0930	200	0945	520	0730	500
1430	190	1330	530	0900	480
		1445	550	1030	490



# Bypass Testing Flows

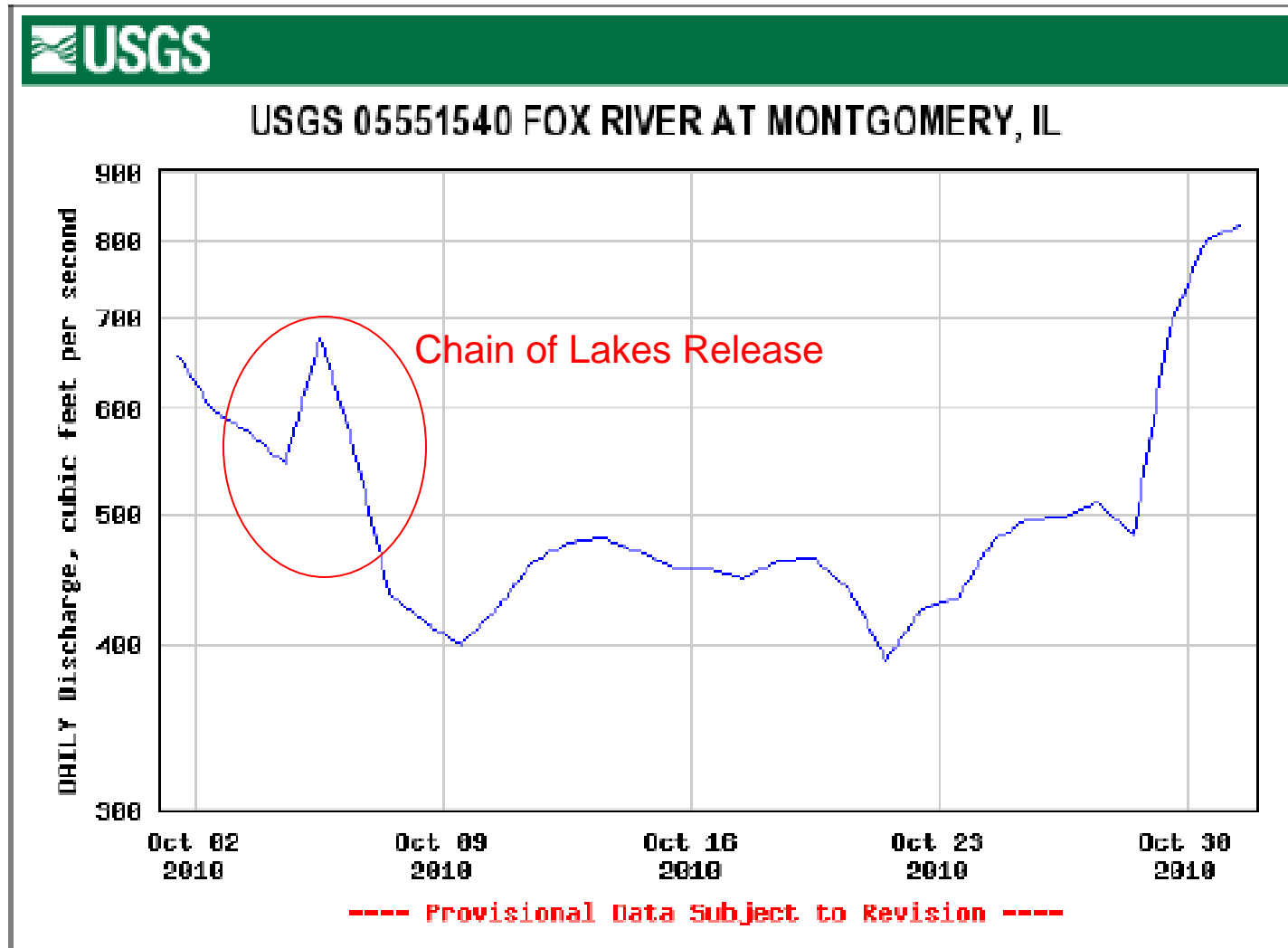


Figure 1. Daily mean discharge at Fox River at Montgomery, IL during October 1 – 31, 2010.



# 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.

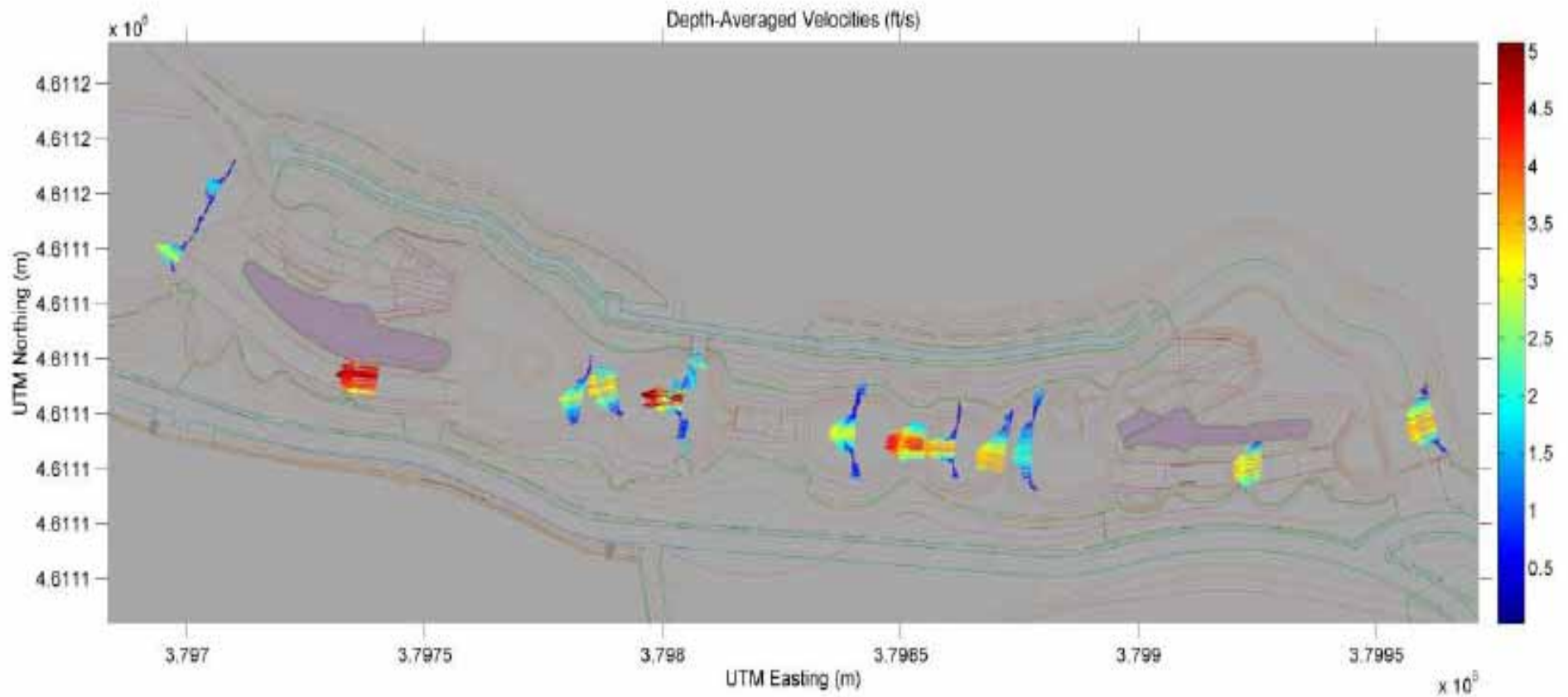
<u>October 4, 2010</u>			<u>October 5, 2010</u>			<u>October 13, 2010</u>		
Location	Discharge (ft <sup>3</sup> /s)	Percent of Total	Location	Discharge (ft <sup>3</sup> /s)	Percent of Total	Location	Discharge (ft <sup>3</sup> /s)	Percent of Total
Total Bypass <sup>1</sup>	195	---	Total Bypass <sup>1</sup>	525	---	Total Bypass <sup>1</sup>	490	---
<u>Upper Section</u>			<u>Upper Section</u>			<u>Upper Section</u>		
Moderate <sup>2</sup>	115	57%	Moderate <sup>2</sup>	230	44%	Moderate <sup>4</sup>	268	55%
Challenge <sup>3</sup>	87	43%	Challenge <sup>4</sup>	295	56%	Challenge <sup>2</sup>	222	45%
<u>Lower Section</u>			<u>Lower Section</u>			<u>Lower Section</u>		
Moderate <sup>2</sup>	132	69%	Moderate <sup>2</sup>	275	52%	Moderate <sup>2</sup>	229	47%
Challenge <sup>3</sup>	60	31%	Challenge <sup>4</sup>	250	48%	Challenge <sup>4</sup>	261	53%

<sup>1</sup> At upstream of the bypass channel, the water is still in the main channel and the bypass channel is not yet open.



# Bypass Testing Results

## Depth Average Velocities (200 cfs)



Depth-averaged velocities from ADCP data in the Bypass Channel, October 4, 2010.

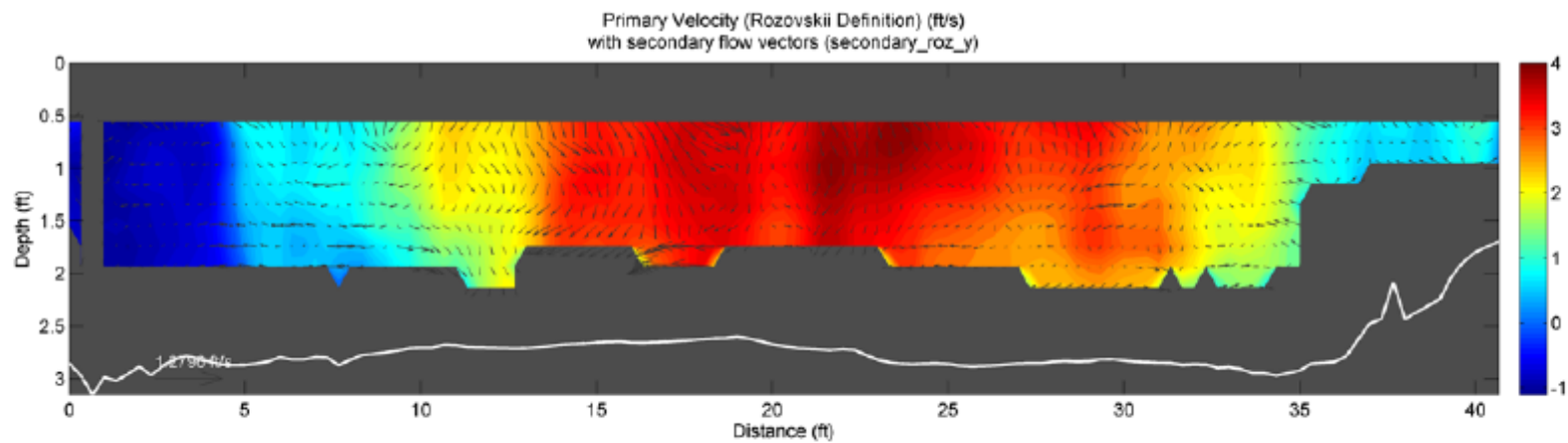
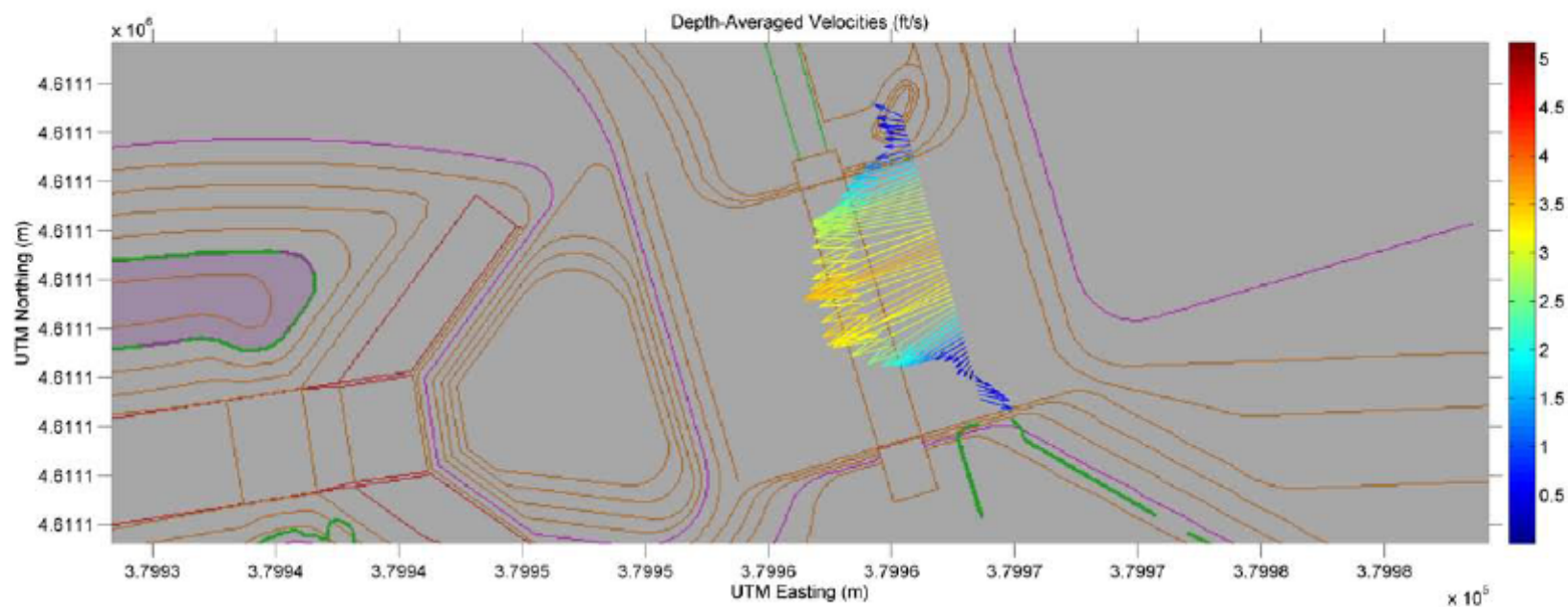
# Bypass Inlet Results





## Appendix A. Individual velocity plots for October 4, 2010.

Site B – Bypass inlet

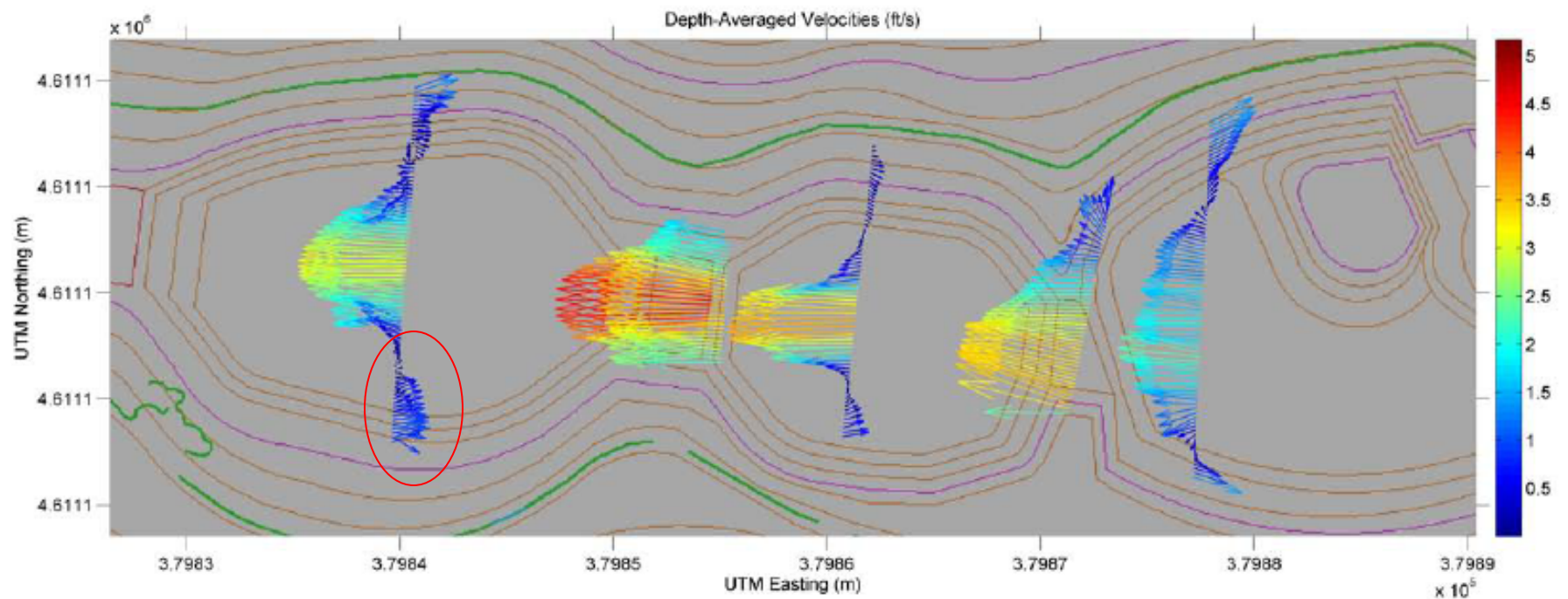






# Bypass Testing Results

Sites F to K – plan view



J

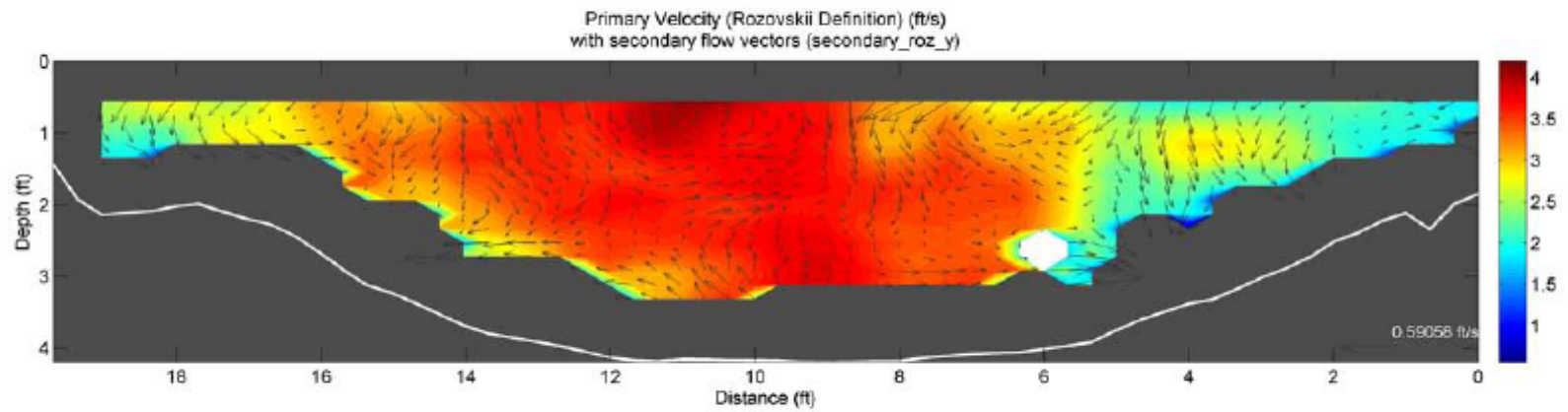
I

H

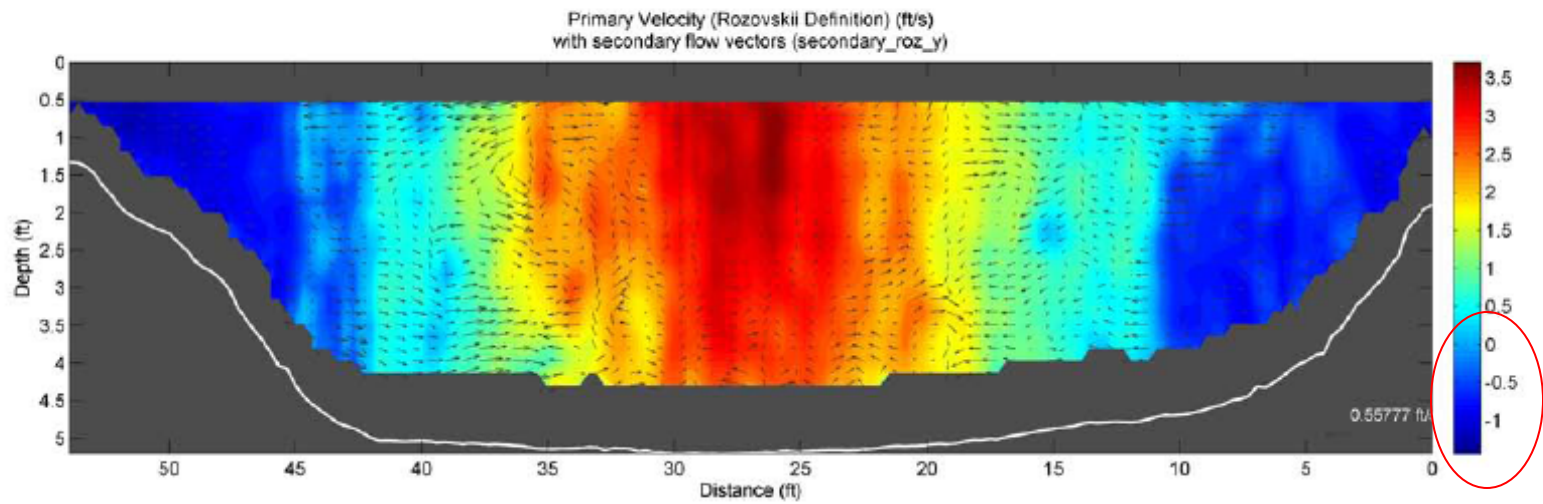
G

F

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 assignors, 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 \_\_\_\_\_ Date \_\_\_\_\_

Printed Name \_\_\_\_\_ Title \_\_\_\_\_

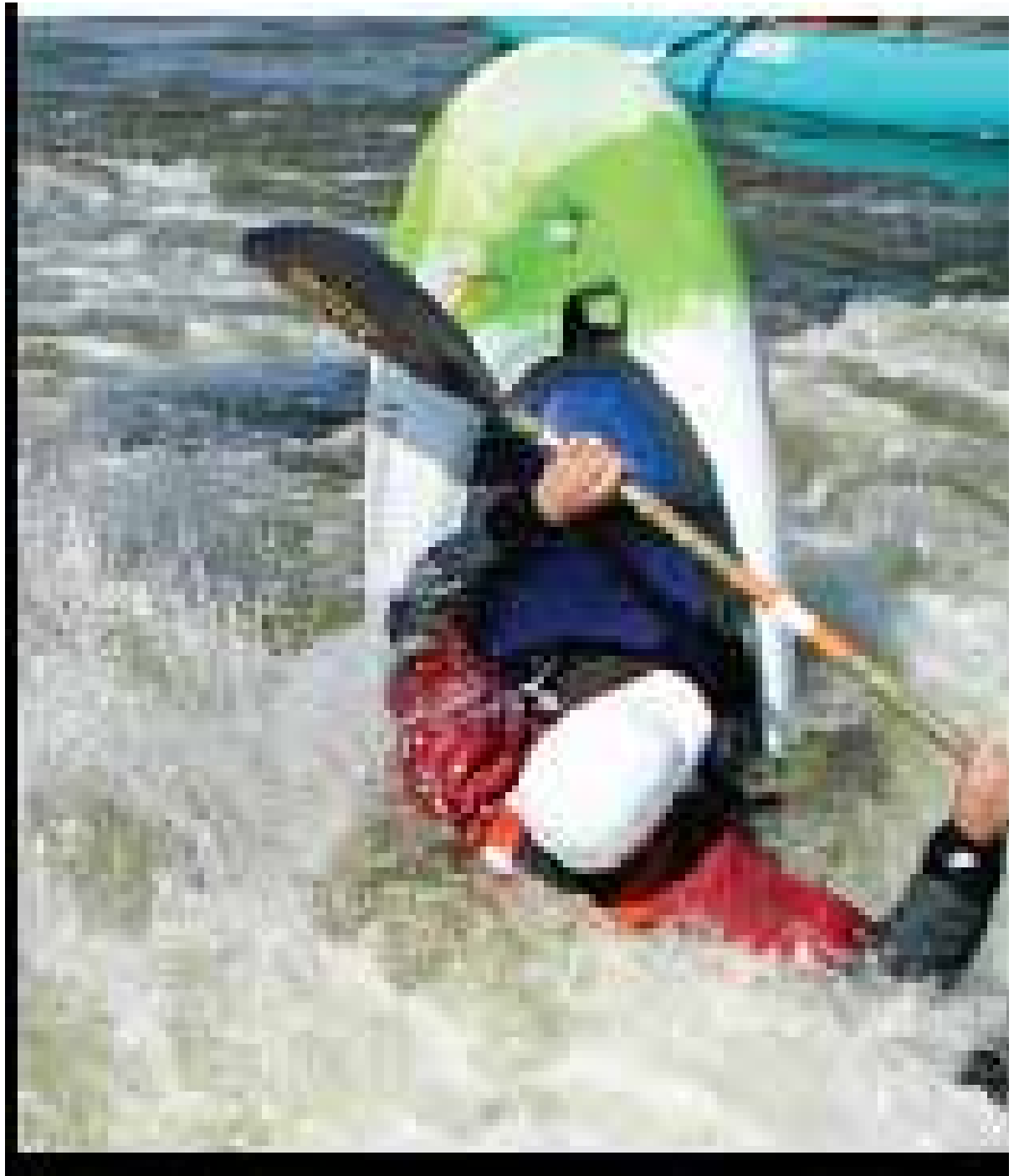


# Illinois Paddling Council & Chicago Whitewater Association





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





# Bypass Open For Play



# Thank You





**ILLINOIS**



**DEPARTMENT OF**  
**NATURAL**  
**RESOURCES**

# LIMITED PUBLIC FUNDS = STAGED CONSTRUCTION

PHASE 1-  
STEPS  
\$3.6 MILLION

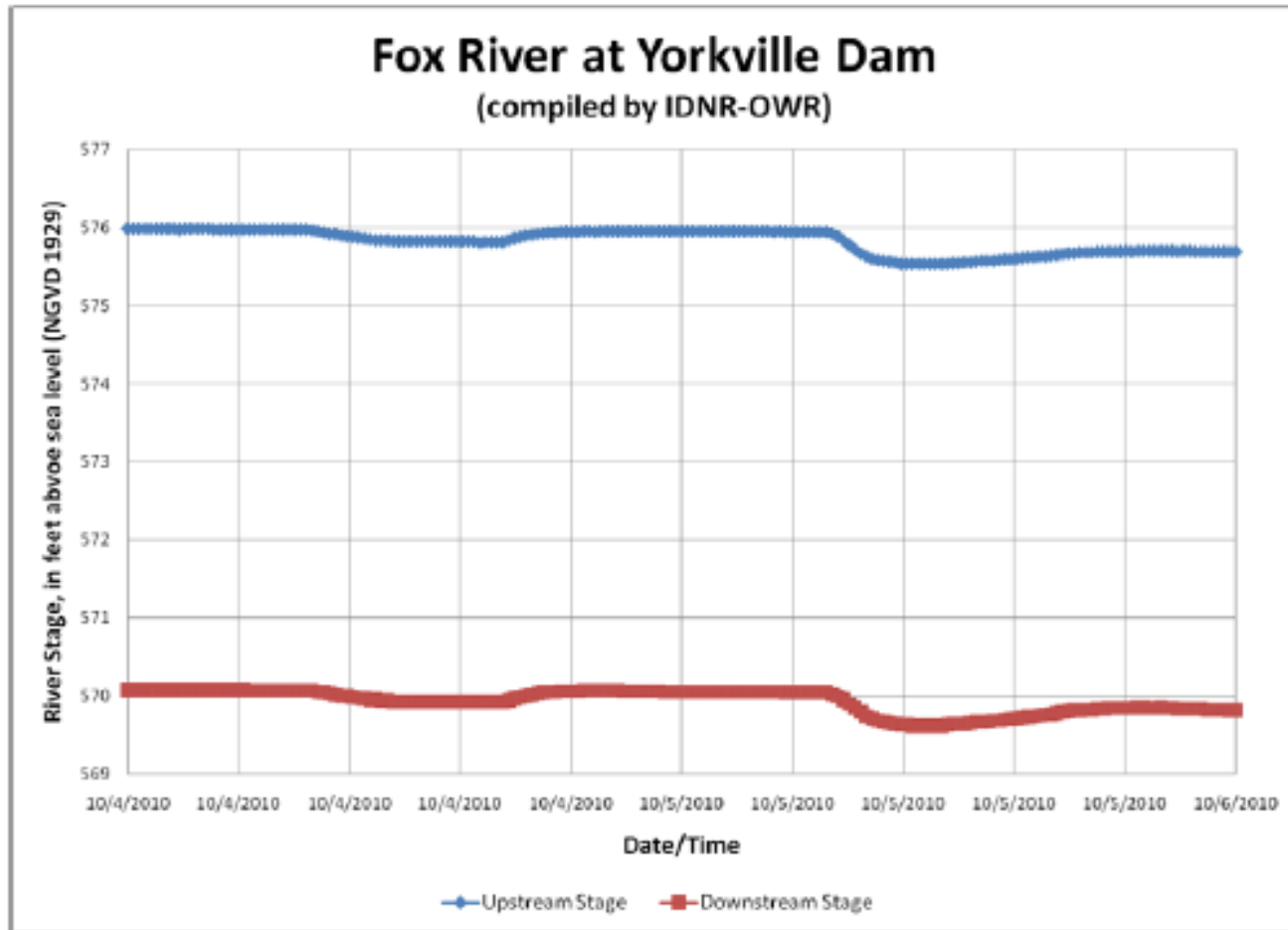
PHASE 2-BYPASS  
4.4 MILLION +/-

PHASE 3— BRIDGE & GAGE STATION  
Going out for bid

NOV 15 2006



# 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).**