Case Study: 2-D Hydraulic Modelling of Proposed Fish Ramp to Design for Fish Passage Potential

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Presenter: Bradley Burrows
Outline

1. Introduction
2. Methods of Design
3. Application of Methods
4. Model Results
5. Conclusions
6. Next Steps
Problem Statement:
Simulate fish ramp design that promotes fish passage that could aid in overcoming limitations imposed by urbanization.
Methods of Design

• Theoretical Approach
• Physical Models
• Hydraulic Models
Theoretical Approach

• Design manuals (e.g. Introduction to Fishway Design, Katopodis, 1992)

• Publications (e.g. Passive propulsion in vortex wakes, Beal et al., 2006)
Physical Model

• Scaled model of design concept
• Simulate physical properties
• Test principals in flume
Hydraulic Model

• Virtual model
• Simulate physical characteristics
• Steady vs unsteady flow series
• 1D vs 2D/3D
Application to Problem Statement

• Design concept based on publication by Beal et al, 2006
• Physical model could be built to simulate design concept
• Virtual model to further validate design principals
Fish Ramp Design Concept

Ramp Design:
• 12m length with 1.2m drop (10% Slope)
• Offset flow path
Model Results

Fish Ramp Simulation:
Flow = 0.05 m³/s
Model Results

Fish Ramp Simulation:
Flow = 1.0 m³/s
Model Results

Comparison of Fish Ramp Simulation to 10% sloped ramp with channel through center

- Flow = 0.05 m$^3$/s
Model Results

Comparison of Fish Ramp Simulation to 10% sloped ramp with channel through center
• Flow = 1.0 m3/s
Conclusions

• Design a fish ramp concept to overcome urban limitations
• 2-D hydraulic simulations
• Model results
Next Steps

1. Further Iterations on Design Concept
2. Sensitivity Analysis
Thank you.