Jun 6th, 10:30 AM - 10:50 AM

Session B4 - An Exploratory Evaluation of the Swim Path Selection of Western Blacknose Dace in a Modified Flow Field

Michael Goettel

Follow this and additional works at: http://scholarworks.umass.edu/fishpassage_conference


This Event is brought to you for free and open access by the The Fish Passage Community at UMass Amherst at ScholarWorks@UMass Amherst. It has been accepted for inclusion in International Conference on Engineering and Ecohydrology for Fish Passage by an authorized administrator of ScholarWorks@UMass Amherst. For more information, please contact scholarworks@library.umass.edu.
Exploratory Observation and Evaluation of the Swim Path Selection of Blacknose Dace in a Modified Flow Field

By: Michael T. Goettel
(contact: mtgoette@buffalo.edu (pref.) or mtgoettel@gmail.com)

Civil, Structural and Environmental Engineering
State University of New York at Buffalo

Advisement:
Dr. Joseph Atkinson
Dr. Sean Bennett
Dr. Igor Jankovic

Data Collection:
William Seychew
Sarah Whiteway
Samson Gondwe
Fish Passage Barriers:

How does one modify traditional infrastructure in order to effectively facilitate fish movement and still meet the other competing criteria?

Photo credits: Wisconsin DNR, 2000
Conceptual idea: fill in the fine scale fish/hydraulics relationship data gap

Goal: design with empirical evidence, moving to path prediction, decision theory or agent based models
Trappers: Let the animal’s tracks show you how they behave for the given conditions – then you can predict future movement
Data Collection Aims:

1) Swim Paths of Small Fish:
   - Distance to solid surface
   - Exposure to water velocities
   - Exposure to turbulent kinetic energy
   - Exposure to Reynolds stresses
     - Measured at many discrete positions along entire swim path for each fish

2) Qualitative Analysis: Possible observation of novel fish behaviors
Western Blacknose Dace (R. obtusus)

- UB Institutional Animal Care and Use Committee Authorization: #CEE01041N
- NYS DEC Permit: Scientific #1520
Trial 11 Bailout
X vel = 25 cm/sec
TKE = 23.2 cm²/sec²
Qualitative Analysis I

Holding Strategies

Flow
Stream-wise Velocity Contours with Swim Paths (cm/s)
Only 40% of time chose lower turbulence, analysis ongoing, conclusions forthcoming.
Summary

- Observed novel fish behaviors that should be followed up with quantitative studies

- Developed an approach to investigate the relationship of turbulence and velocity on fish swim paths

- Completion of data analysis will become the basis for more comprehensive studies
Future Studies: Multiple Variables and Physical Conditions

Possible parameters/metrics:

- X Vel
- TKE
- Shade
- Cover

Weight Adjusted Combinations:

- 2X Vel and TKE
- 4X Vel and TKE
Thank you!

http://vimeo.com/michael.goettel