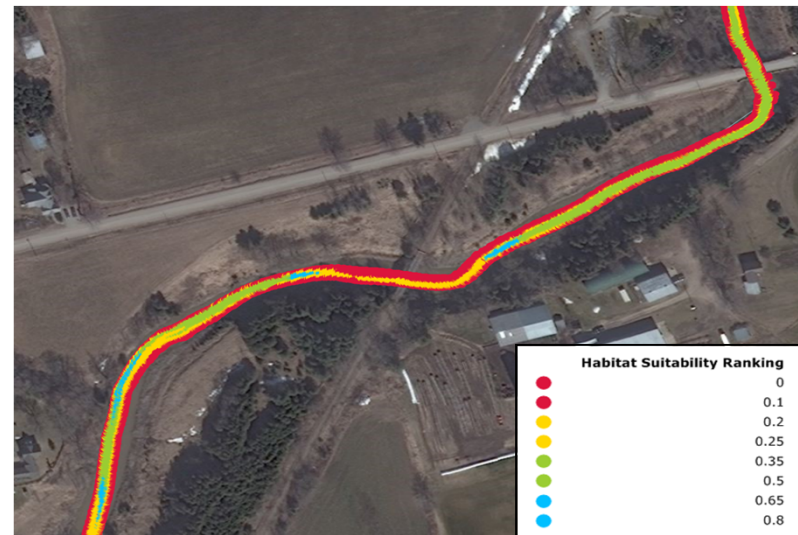


Habitat Suitability Modelling

Amanda McKay EIT

Outline

- What/Why/When - Habitat Suitability Modelling?
- Channel Design
 - Inputs
 - Outputs
 - Results
- Limitations



What is Habitat Suitability Modelling?

- Way to quantify physical habitat
- Evaluate on specific aquatic preferences



Why Quantify?

- Comparable
- Provides Context
- Enhances Qualitative Assessments
- Relatable
- Focus on Design Specifics



Where & When to Quantify?

- Alternative Evaluation
- Channel Design
 - Re-alignments
 - Restoration
 - Stabilization
- Hydrologic Evaluation
 - Water Supply/Water Use
 - Climate Change



Life Cycle

Species Selection

LiDAR/DEM

Seasonality

Substrate

Water Level

Bathymetry

Rating Curves

Channel Design

Topography

Flow

HSI Metrics

Approach

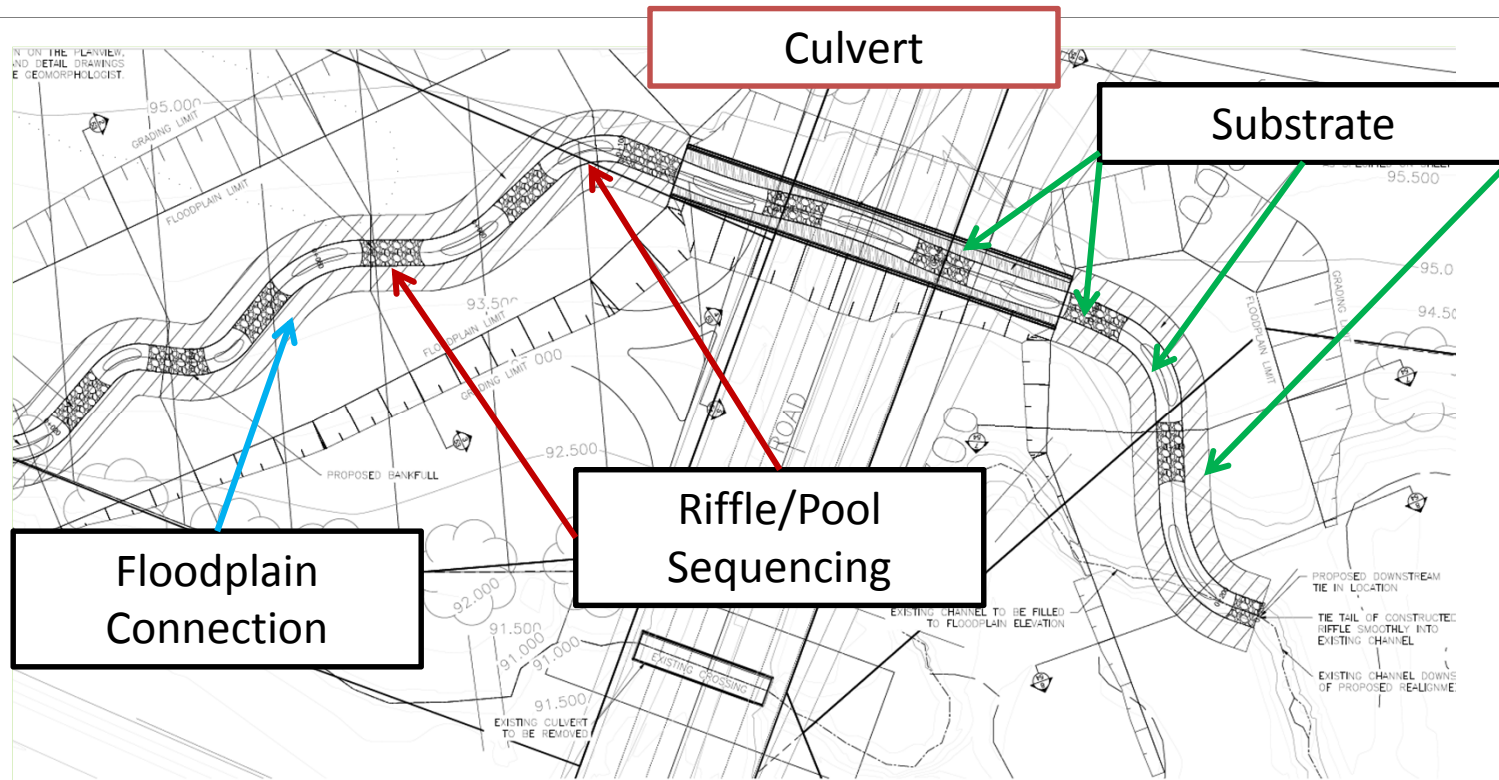
- Field Data Collection
- Channel Design
- Develop Hydraulic Model
- Identify Target Species
- Compile/Develop HSI Metrics
- Determine Flow Conditions
- Run Simulations
- Optimize

Design Comparison/Evaluation



- Pre and Post design evaluation
- Watercourse re-alignment
- Habitat enhancements

Typical Design

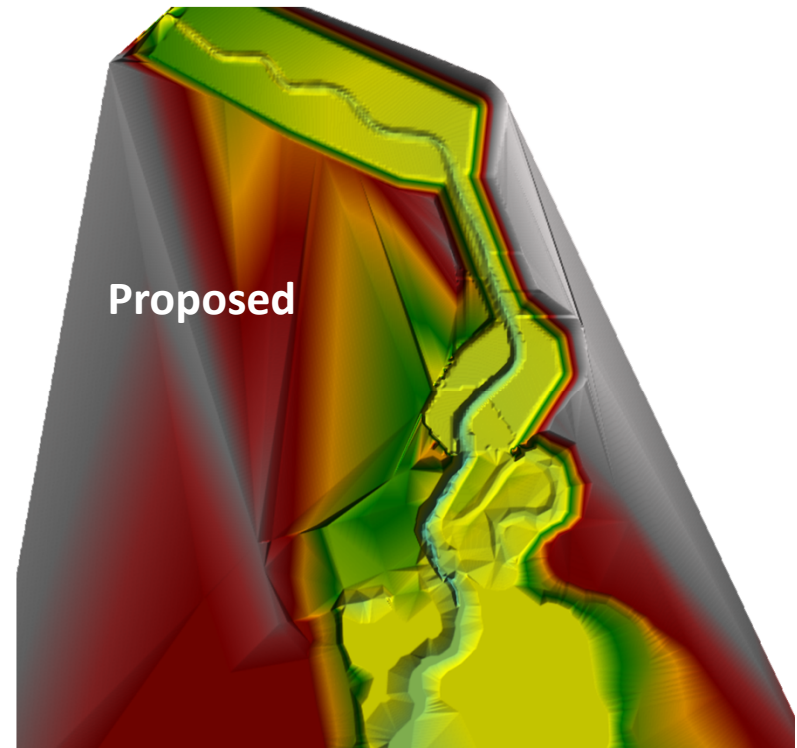
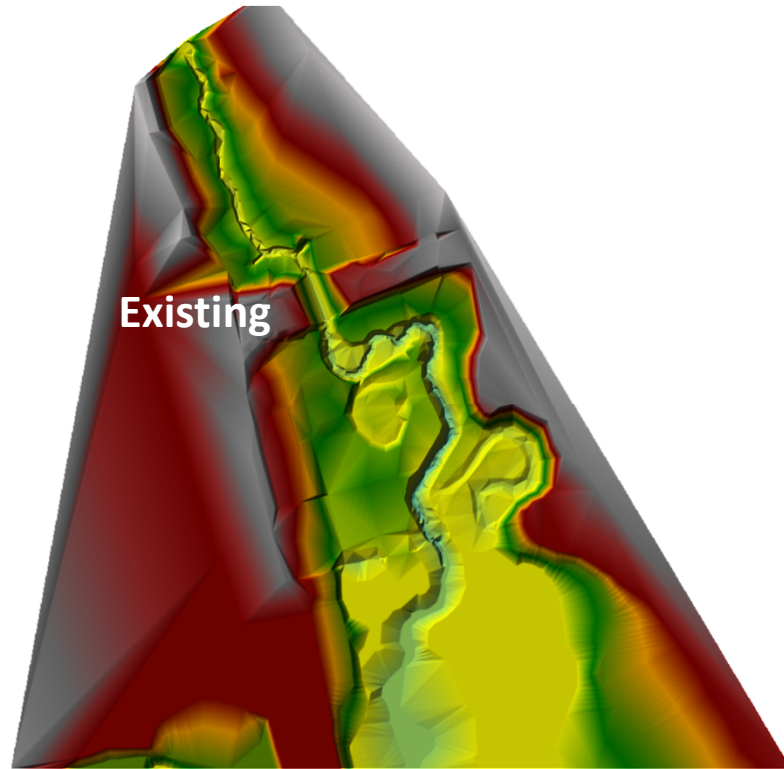


Existing Surface

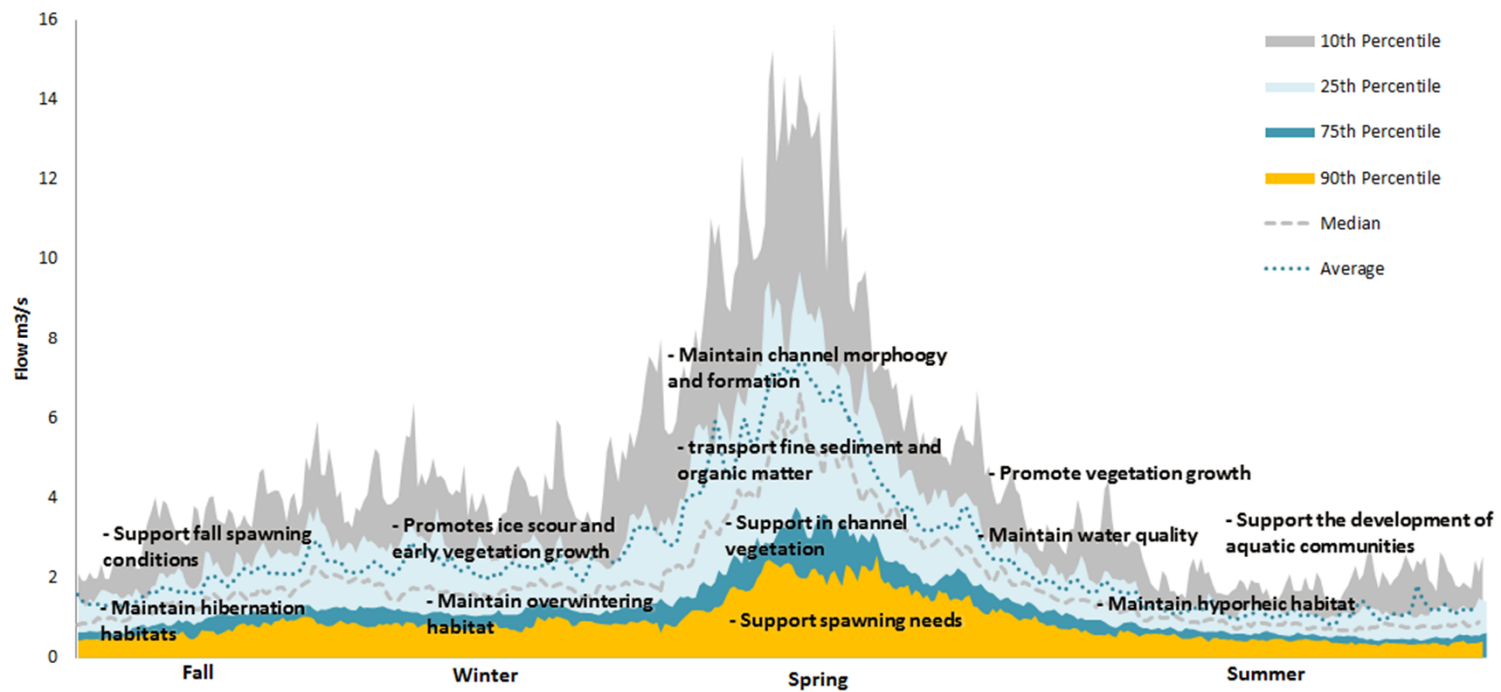
- Existing Cross Section
- Interpolation
- Substrate Estimate



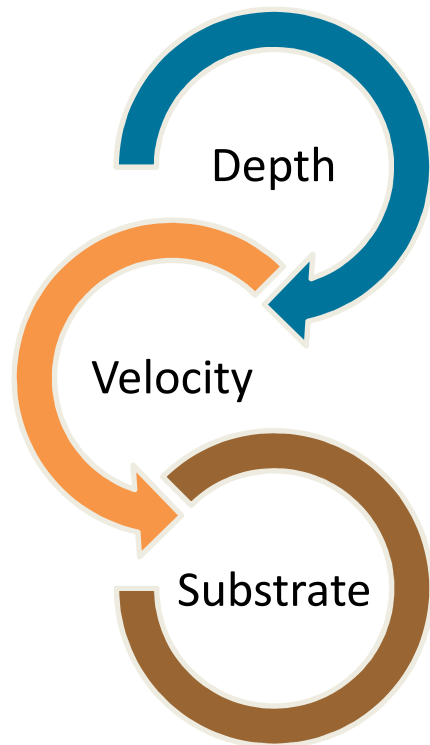
Modelling Surfaces



Flow Selection



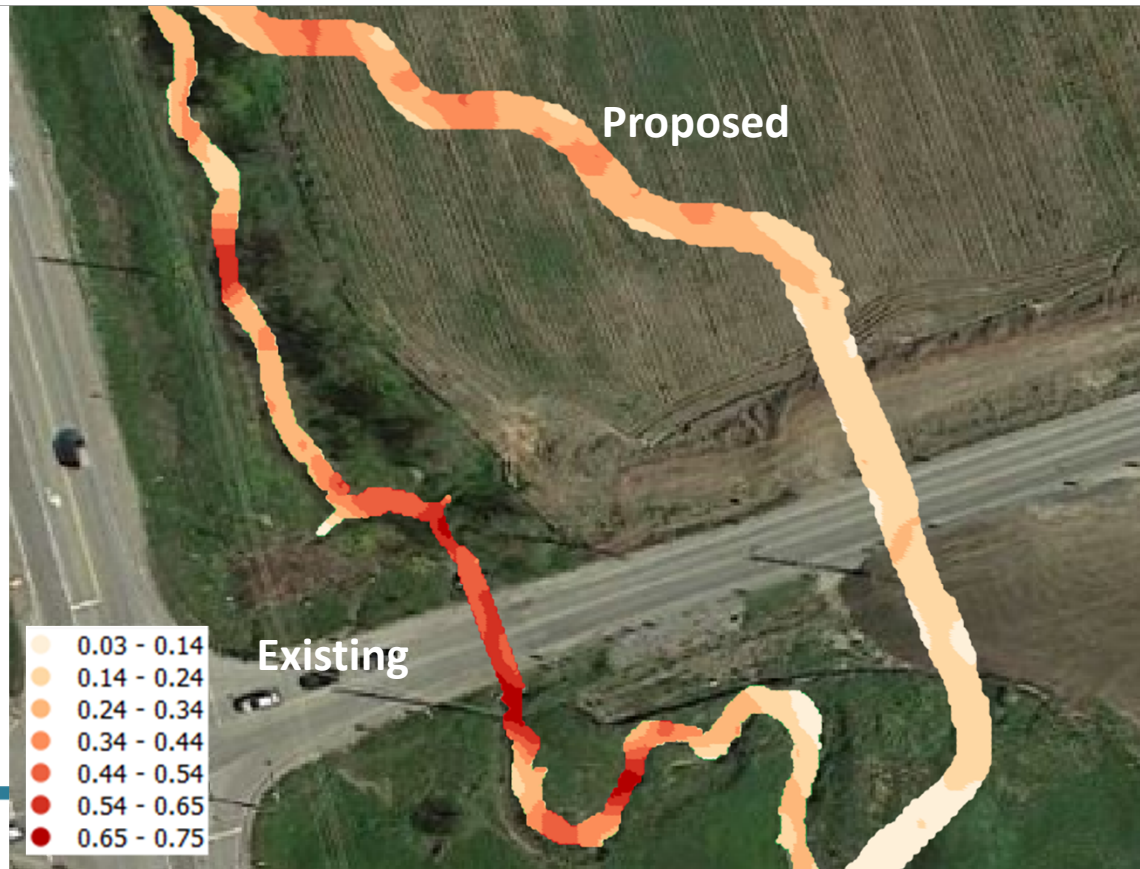
Metrics



Depth Comparison (m)



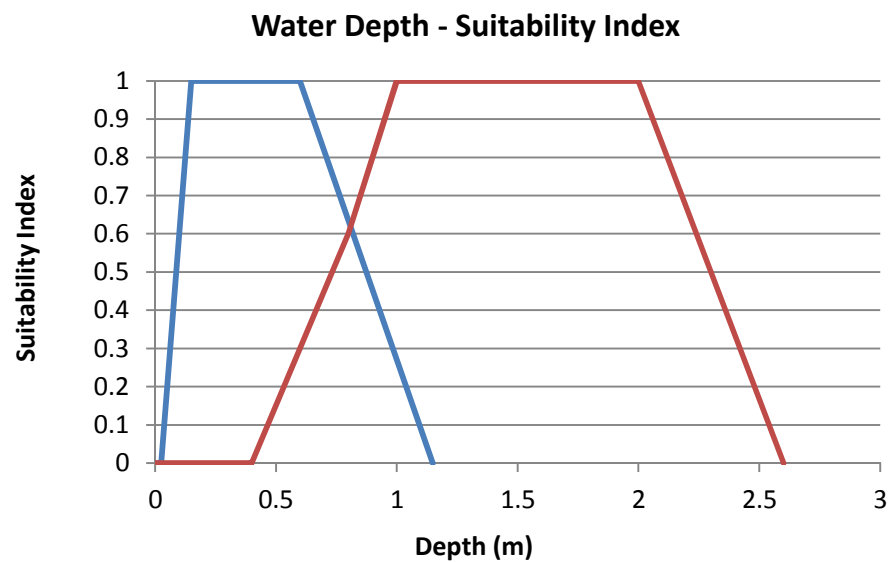
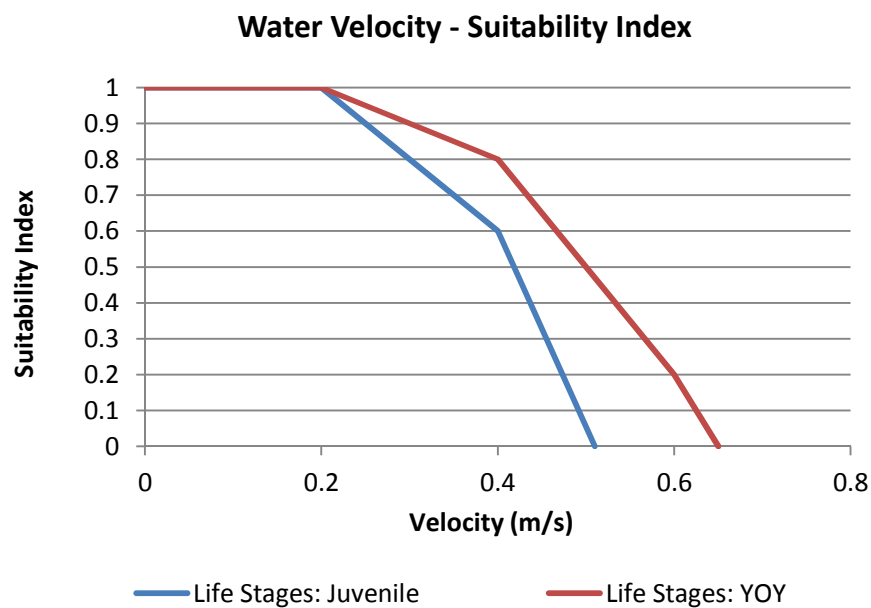
Velocity Comparison (m/s)



Substrate Comparison



Suitability Indices



Cambria Gordon Ltd. (2007)

Depth Suitability

●	0.000 - 0.010
●	0.010 - 0.200
●	0.200 - 0.350
●	0.350 - 0.400
●	0.400 - 0.450
●	0.450 - 0.500
●	0.500 - 0.550
●	0.550 - 0.600
●	0.600 - 0.650
●	0.650 - 0.700
●	0.700 - 0.750
●	0.750 - 0.800
●	0.800 - 0.850
●	0.850 - 0.900
●	0.900 - 0.950
●	0.950 - 1.000



Decreasing
Suitability

Increasing
Suitability



Velocity Suitability

●	0.000 - 0.010
●	0.010 - 0.200
●	0.200 - 0.350
●	0.350 - 0.400
●	0.400 - 0.450
●	0.450 - 0.500
●	0.500 - 0.550
●	0.550 - 0.600
●	0.600 - 0.650
●	0.650 - 0.700
●	0.700 - 0.750
●	0.750 - 0.800
●	0.800 - 0.850
●	0.850 - 0.900
●	0.900 - 0.950
●	0.950 - 1.000



Decreasing
Suitability

Increasing
Suitability



Substrate Suitability

●	0.000 - 0.010
●	0.010 - 0.200
●	0.200 - 0.350
●	0.350 - 0.400
●	0.400 - 0.450
●	0.450 - 0.500
●	0.500 - 0.550
●	0.550 - 0.600
●	0.600 - 0.650
●	0.650 - 0.700
●	0.700 - 0.750
●	0.750 - 0.800
●	0.800 - 0.850
●	0.850 - 0.900
●	0.900 - 0.950
●	0.950 - 1.000



Decreasing
Suitability

Increasing
Suitability



Combined Suitability

●	0.000 - 0.010
●	0.010 - 0.200
●	0.200 - 0.350
●	0.350 - 0.400
●	0.400 - 0.450
●	0.450 - 0.500
●	0.500 - 0.550
●	0.550 - 0.600
●	0.600 - 0.650
●	0.650 - 0.700
●	0.700 - 0.750
●	0.750 - 0.800
●	0.800 - 0.850
●	0.850 - 0.900
●	0.900 - 0.950
●	0.950 - 1.000

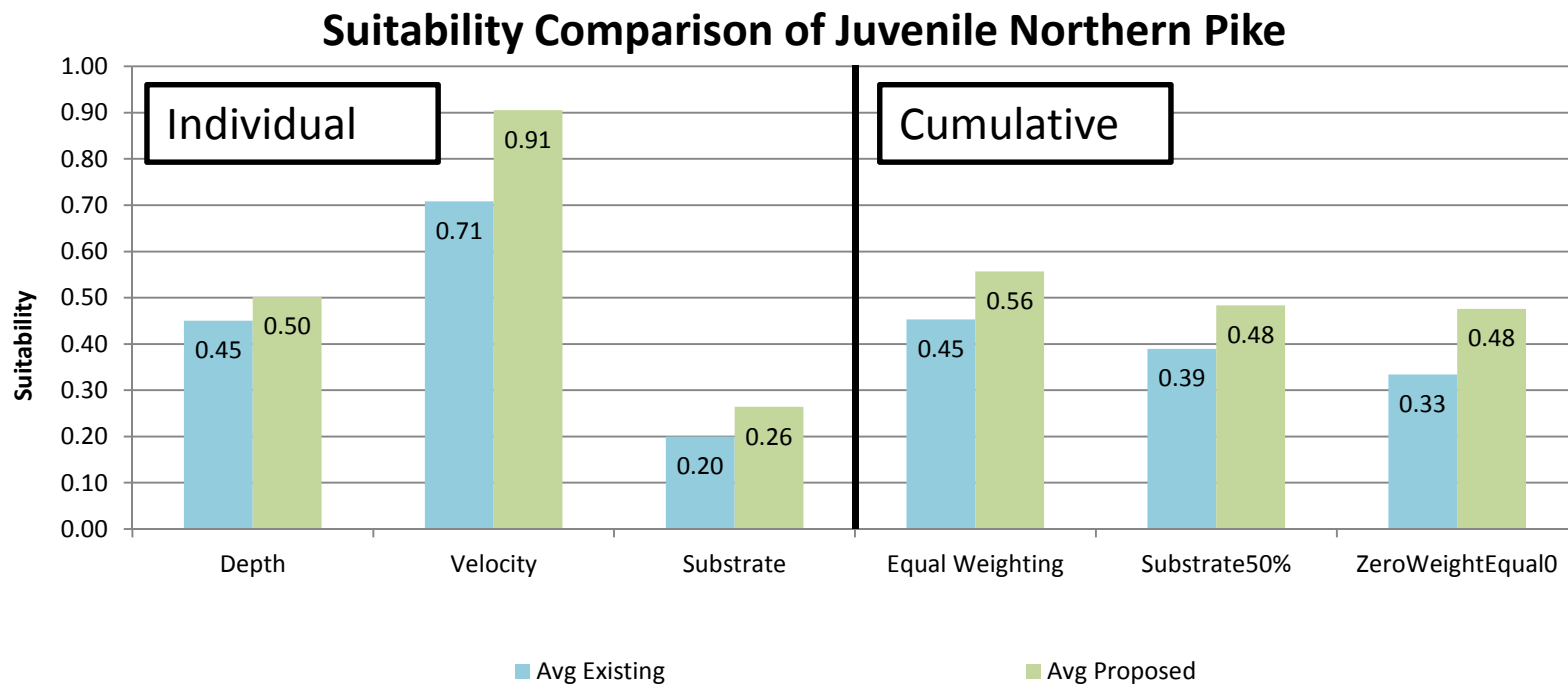


Decreasing
Suitability

Increasing
Suitability



Numerical Assessment



Relative % Change - Suitability

Parameters	% Change
Depth	11%
Velocity	28%
Substrate	23%
Equal Weighting	23%
Substrate 50%	22%
ZeroWeightEqual0	42%
Total Suitable Area	10%

Limitations

- Simplified Approach
- Small set of physical parameters
- Dependent on the inputs
- Assumes HSI for indicator species are representative
- Data! $(3 \times 1 \times 3 \times 2) = 18 - 21$ (for both conditions)



Overall

- Benefit to Channel Design
- Provides a tool for habitat assessment
- Can be easy to implement

A photograph of a river flowing through a dense forest. The river is turbulent, with white water rapids cascading over dark, jagged rocks. The banks are lined with lush green trees and foliage, creating a sense of being deep in a wilderness. The sky is overcast and grey. A semi-transparent, textured rectangular box is overlaid on the left side of the image, containing the text 'Thank-you!' in a white, sans-serif font.

Thank-you!