Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Habitat Suitability Modelling

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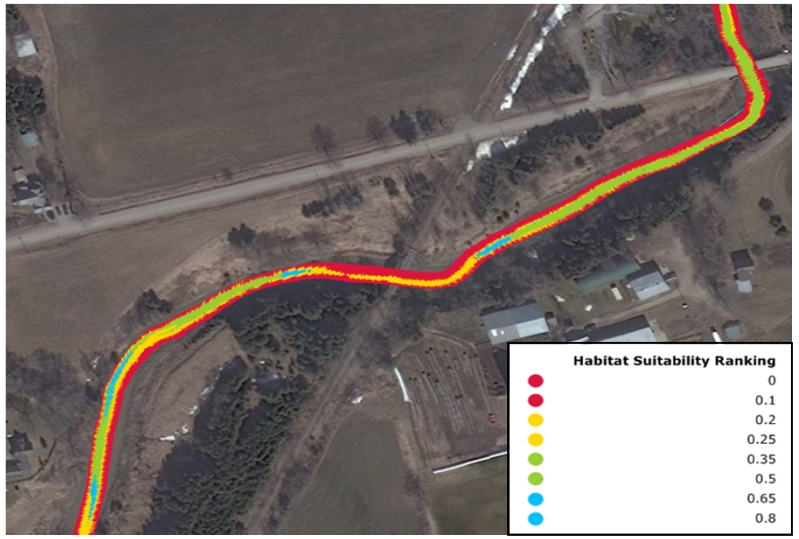
Outline

- 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

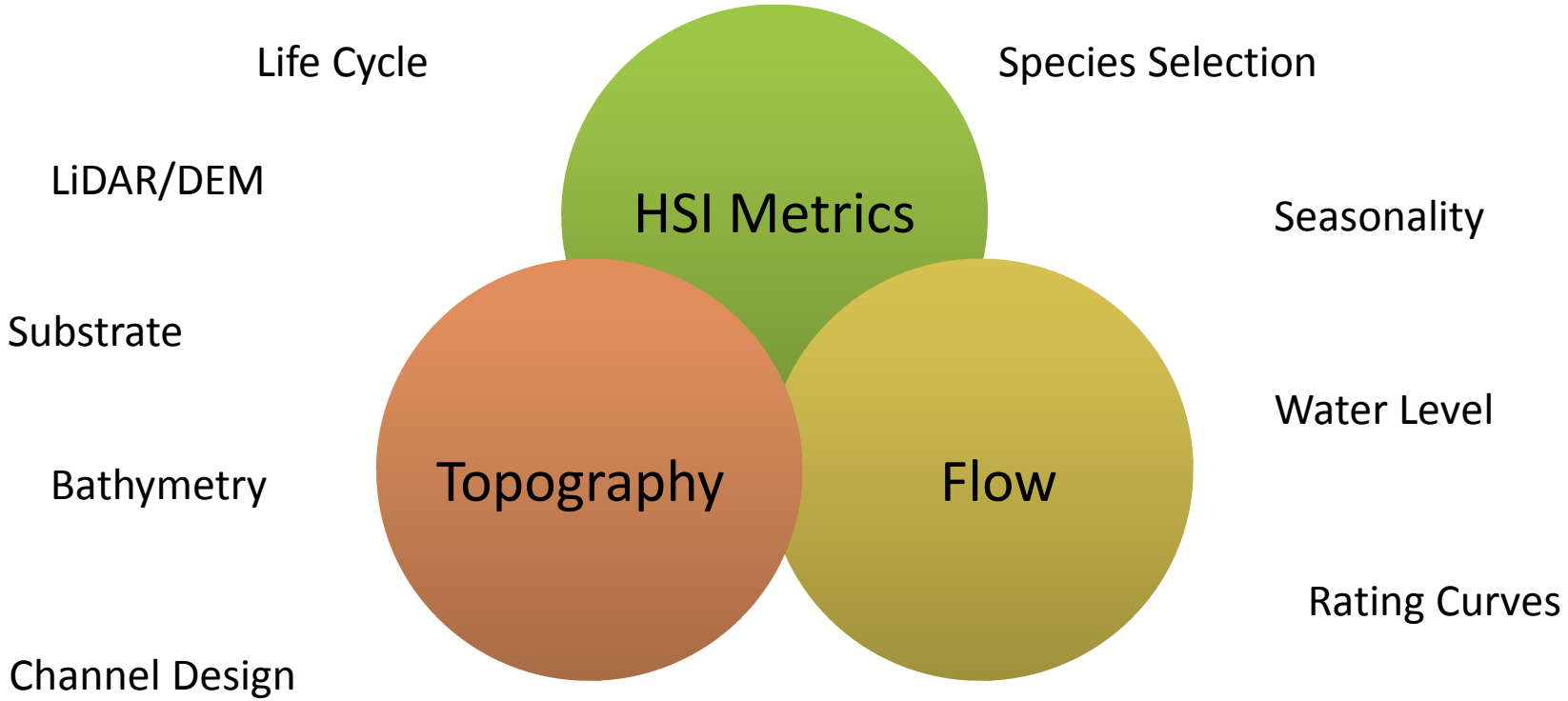
Why Quantify?

- 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

Habitat Suitability Modelling



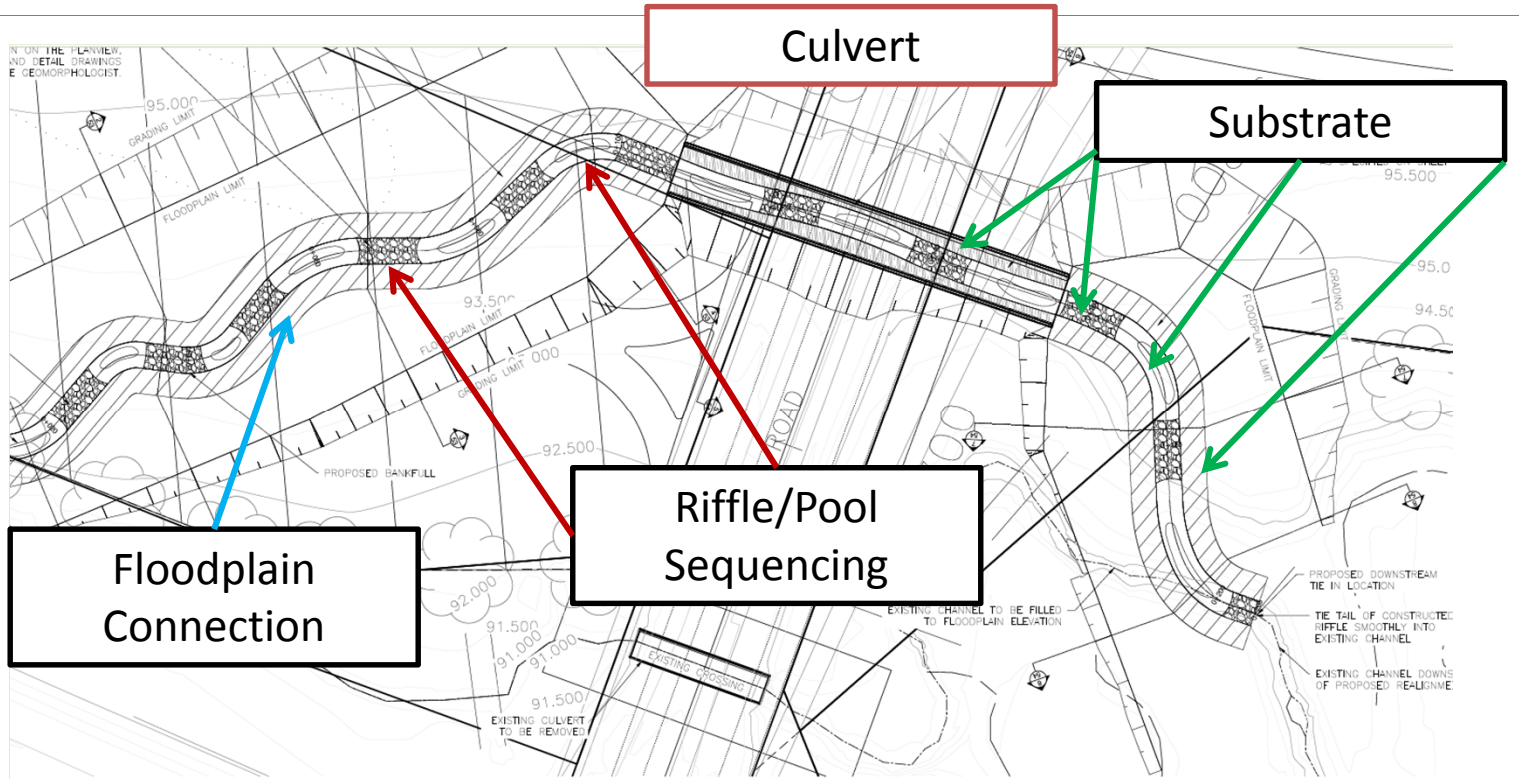
Approach

- 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

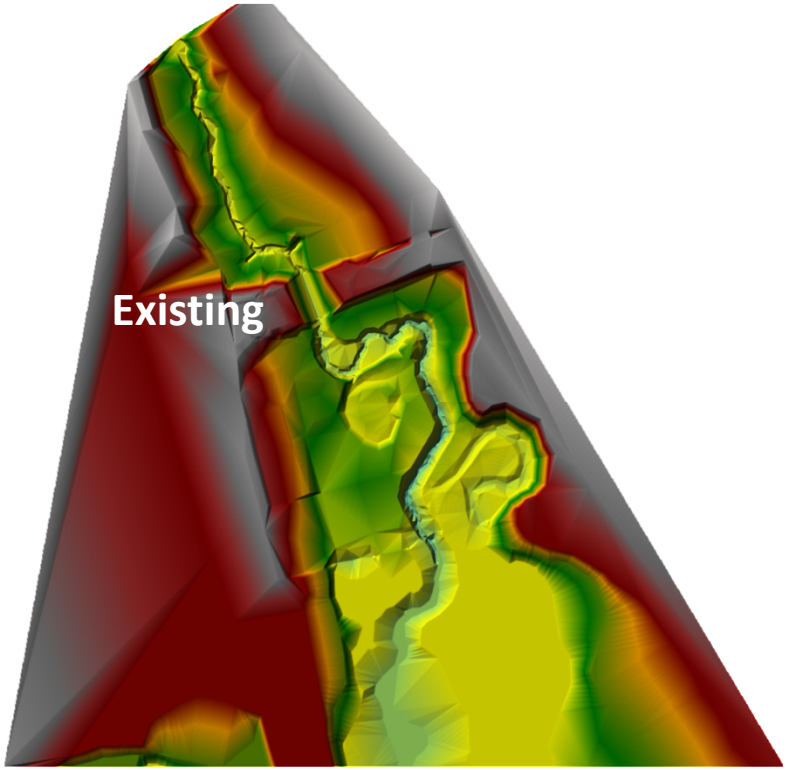
Typical Design

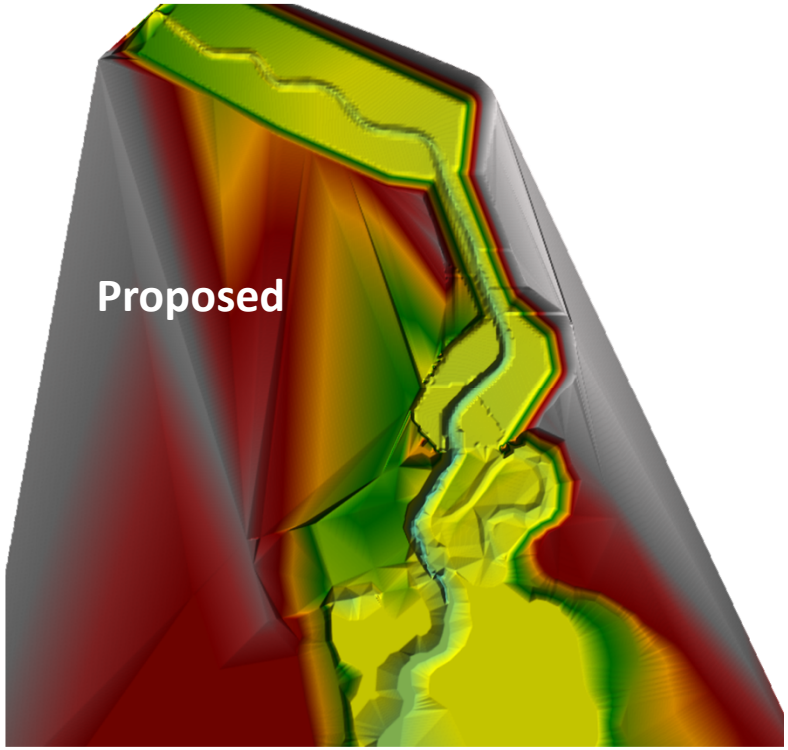


Existing Surface

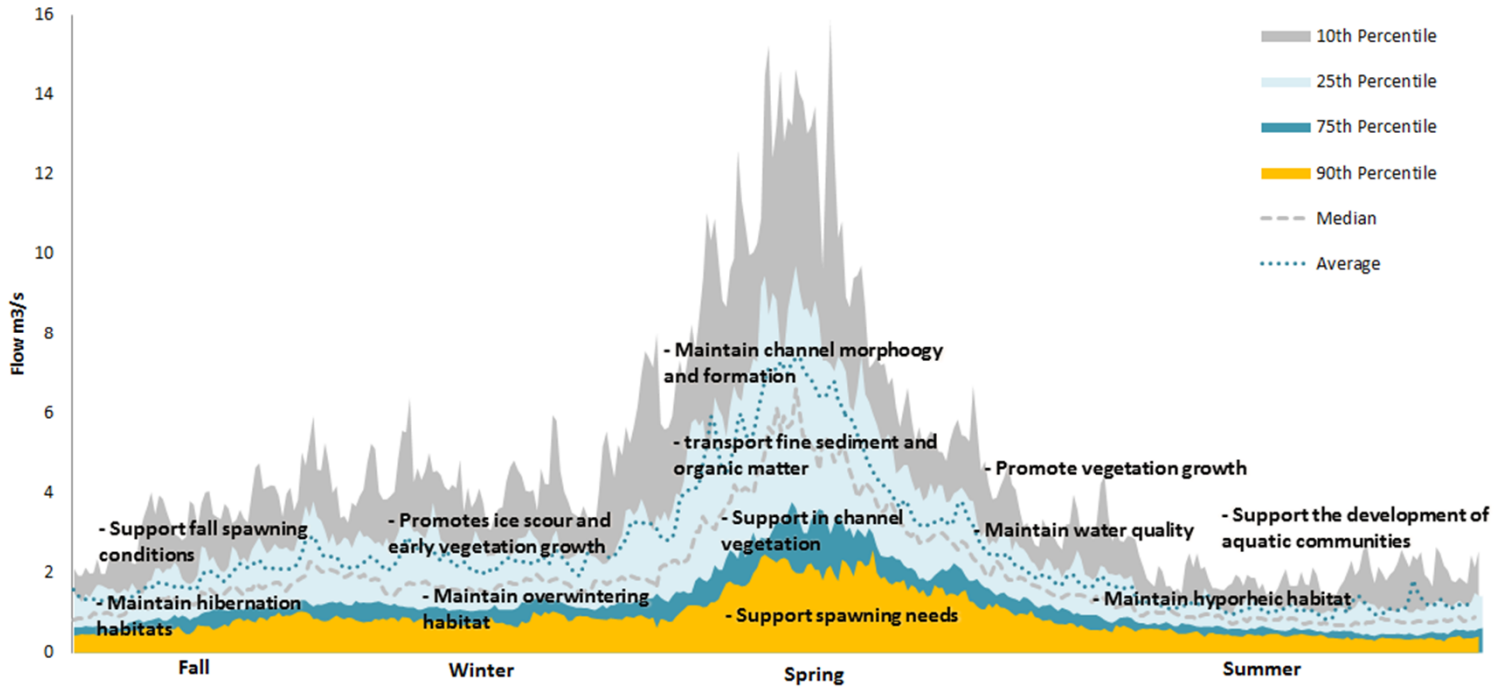
- Existing Cross Section
- Interpolation
- Substrate Estimate

Modelling Surfaces

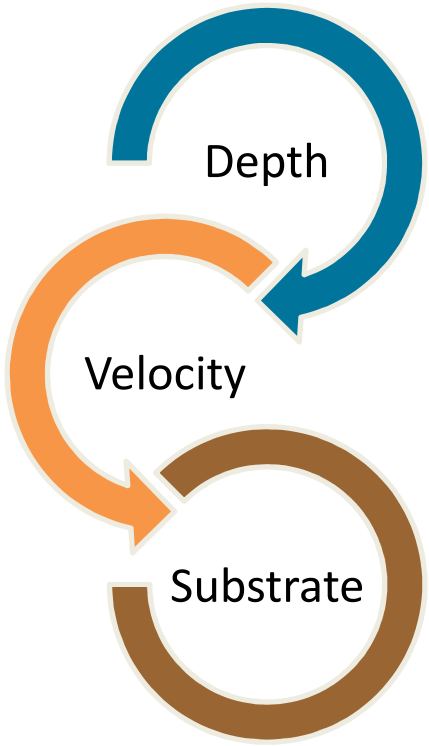




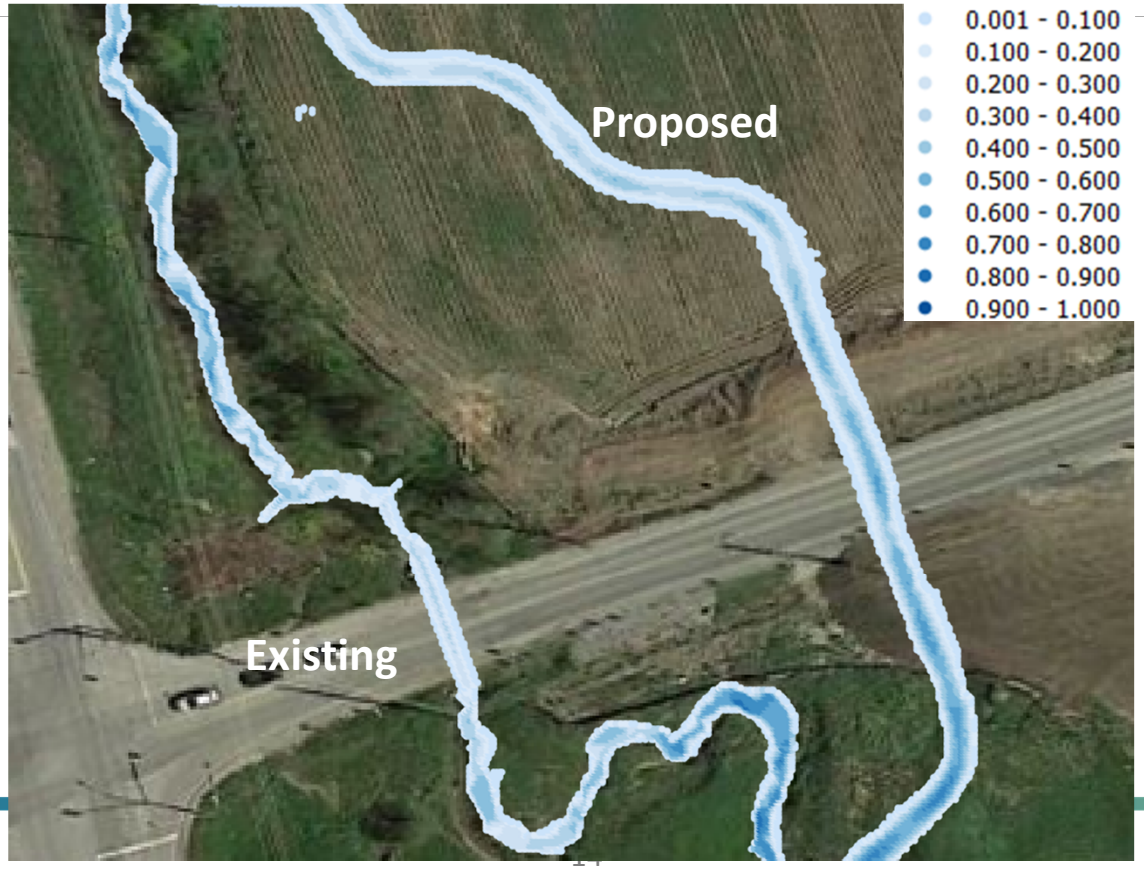
Flow Selection



Metrics

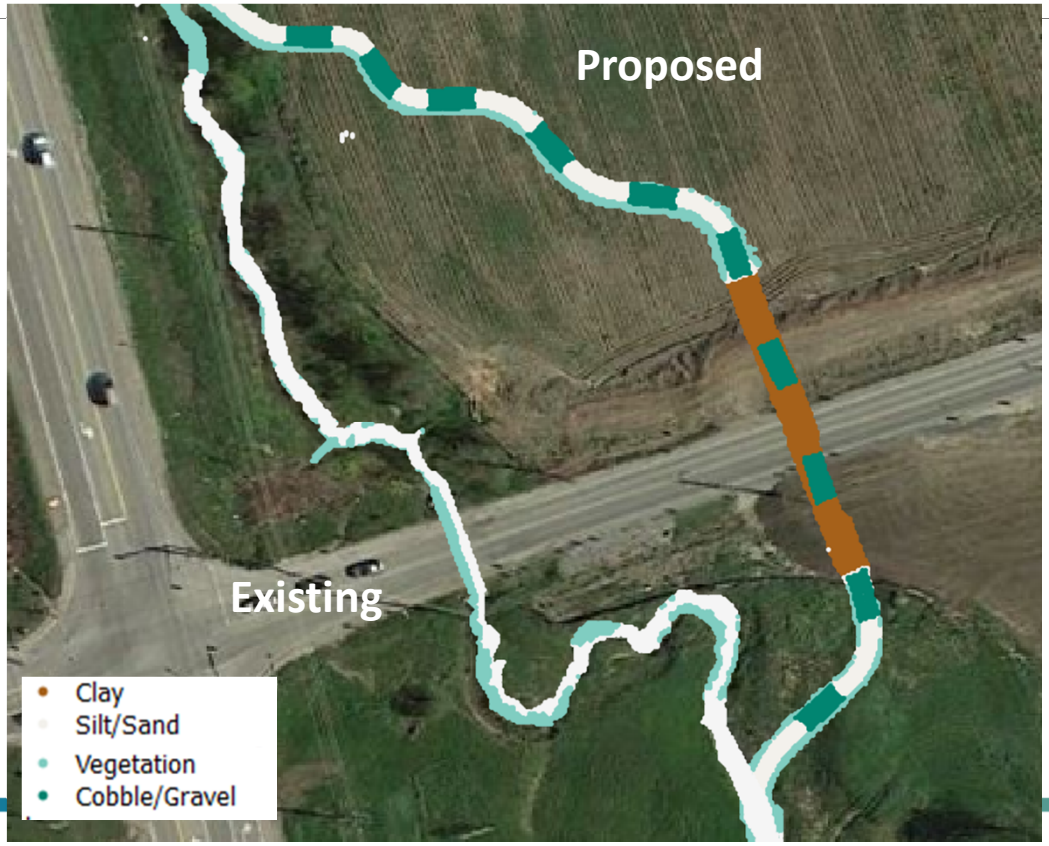


Depth Comparison (m)

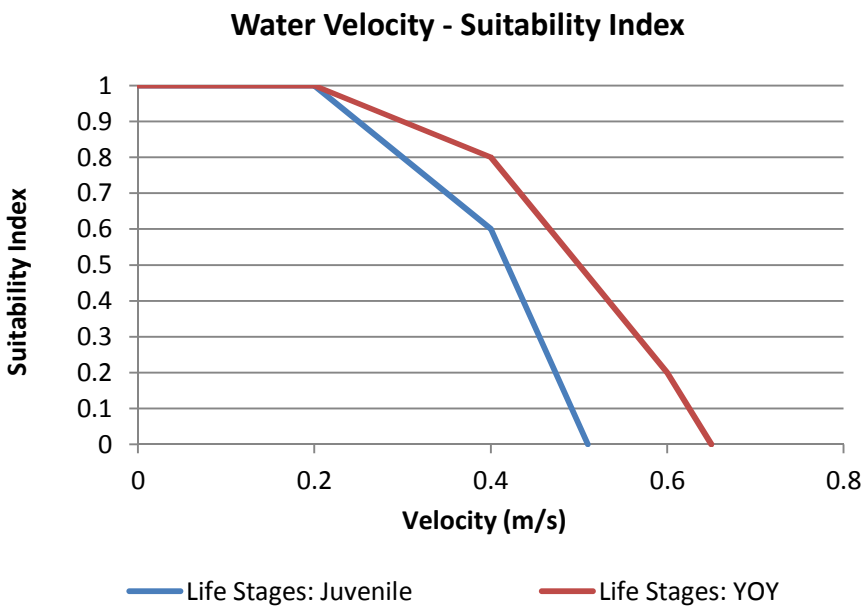


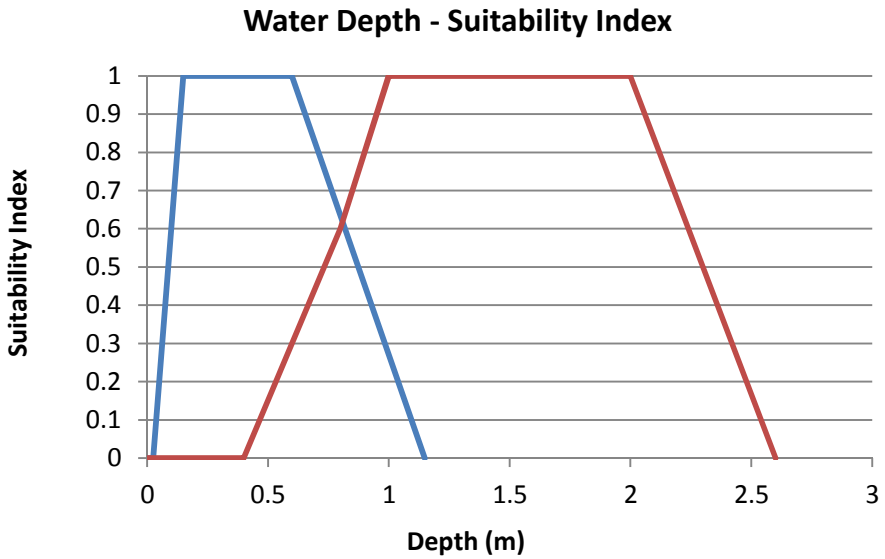
Velocity Comparison (m/s)

Substrate Comparison



Suitability Indices





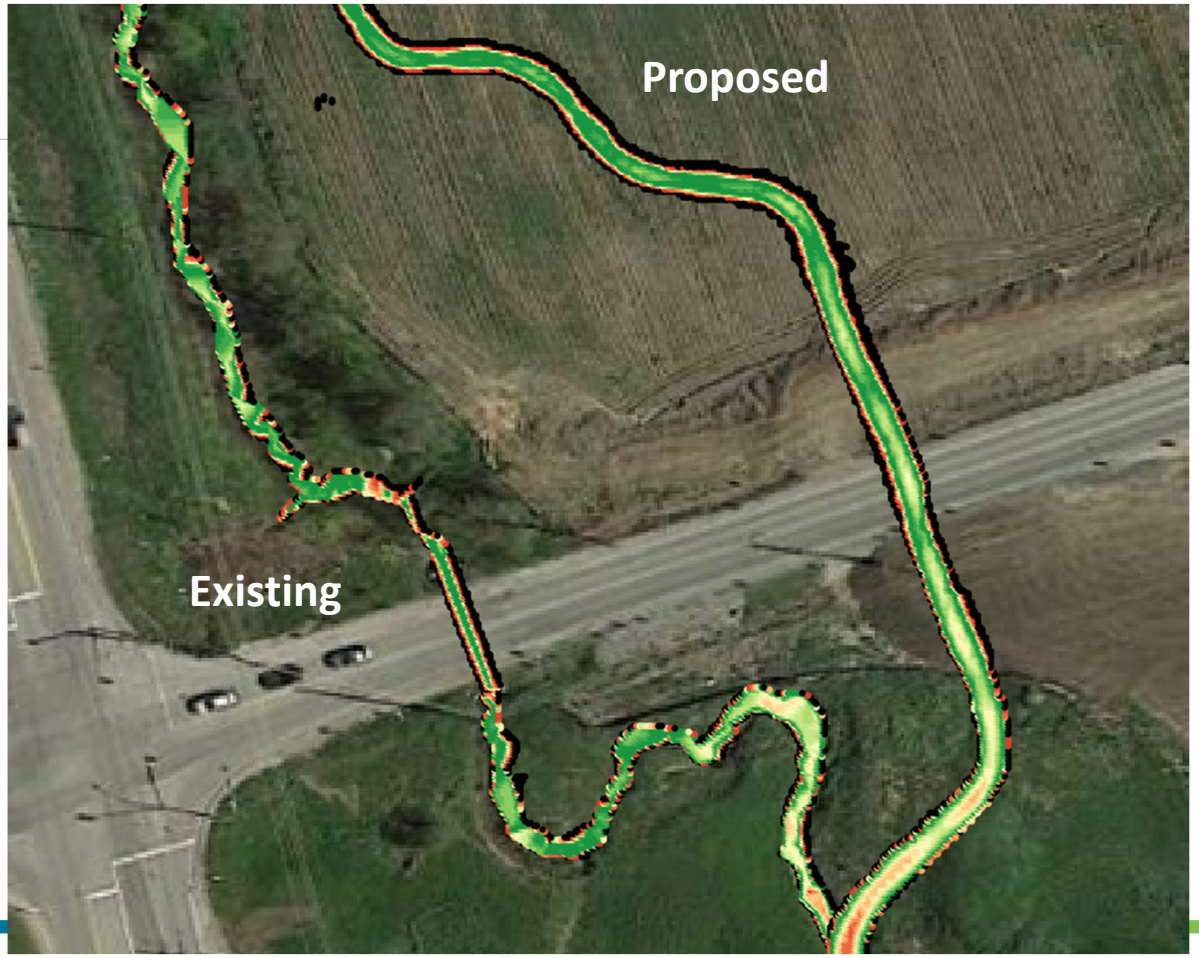
Cambria Gordon Ltd. (2007)

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

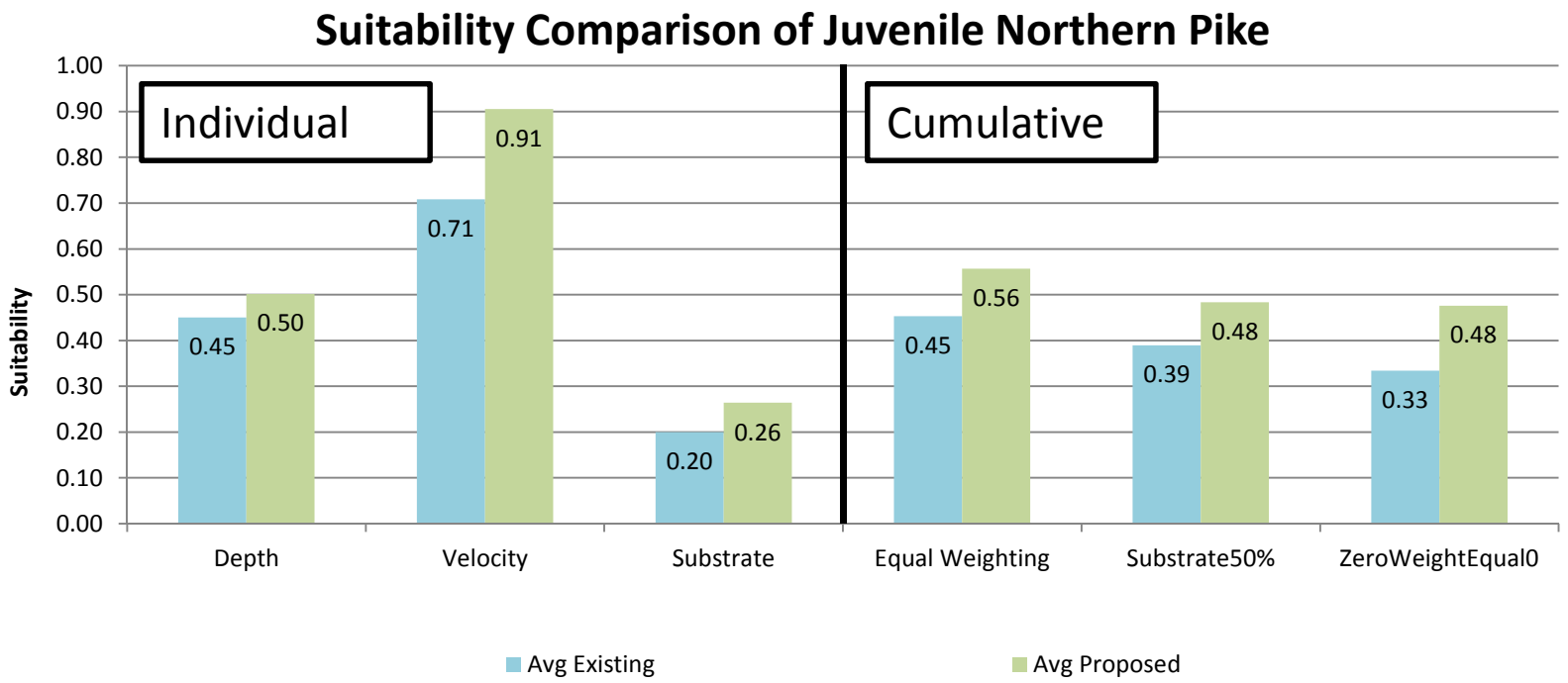
Combined Suitability

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! (3x1x3x2) = 18 – 21 (for both conditions)

Overall

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


Thank-you!