Objectives

- Compare correlative vs. bioenergetic model *predictions*

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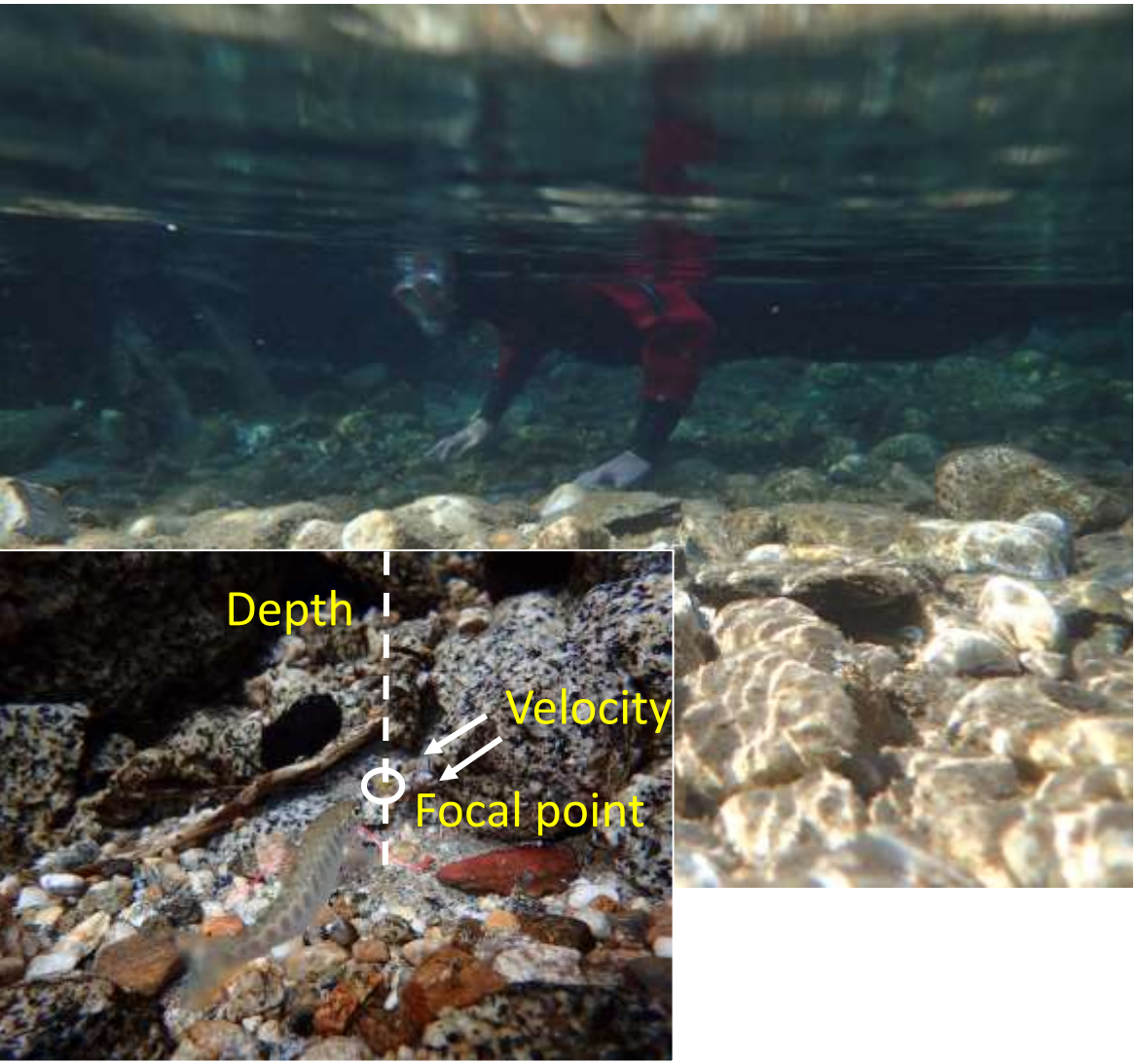
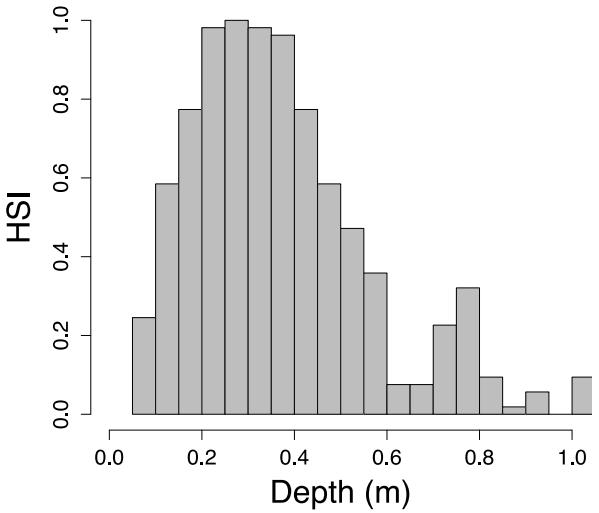
- Compare correlative vs. bioenergetic model *predictions*

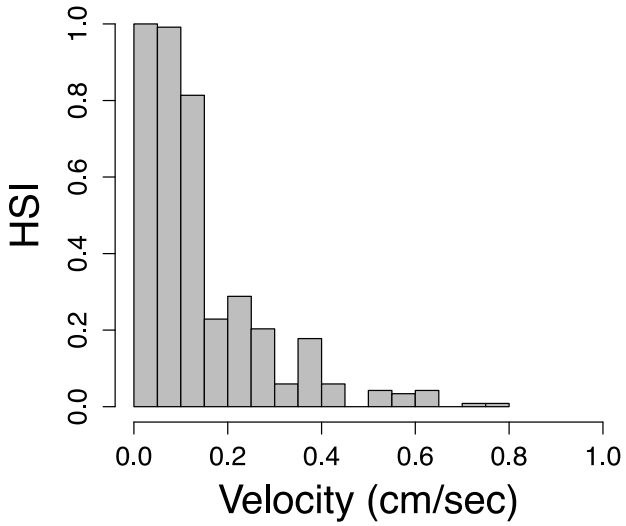
- Evaluate correlative and bioenergetic model *performance*

Correlative vs. bioenergetic predictions



Habitat suitability curves





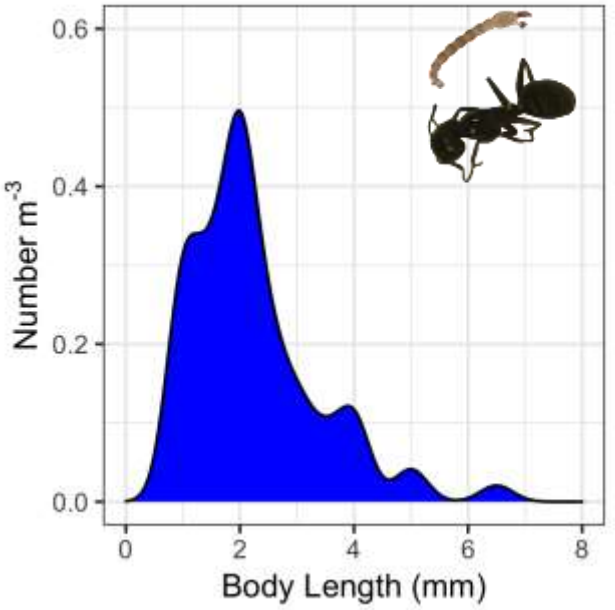
Correlative vs. bioenergetic predictions

Model Inputs:

Drift concentration/size distribution

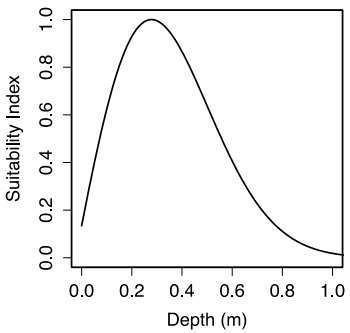
Temperature

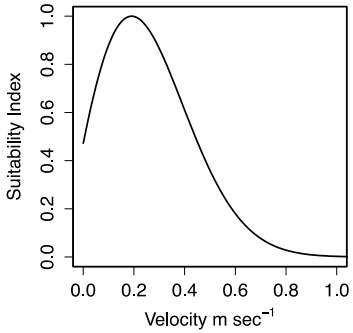
Fish size



Correlative vs. bioenergetic predictions

Correlative habitat suitability model

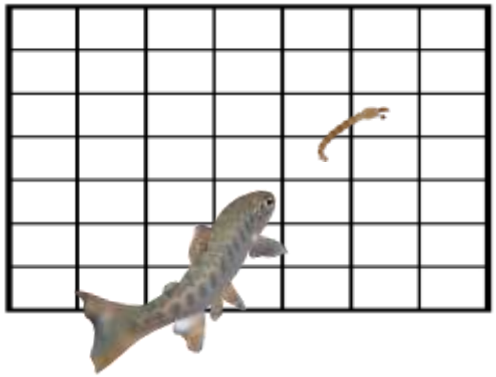




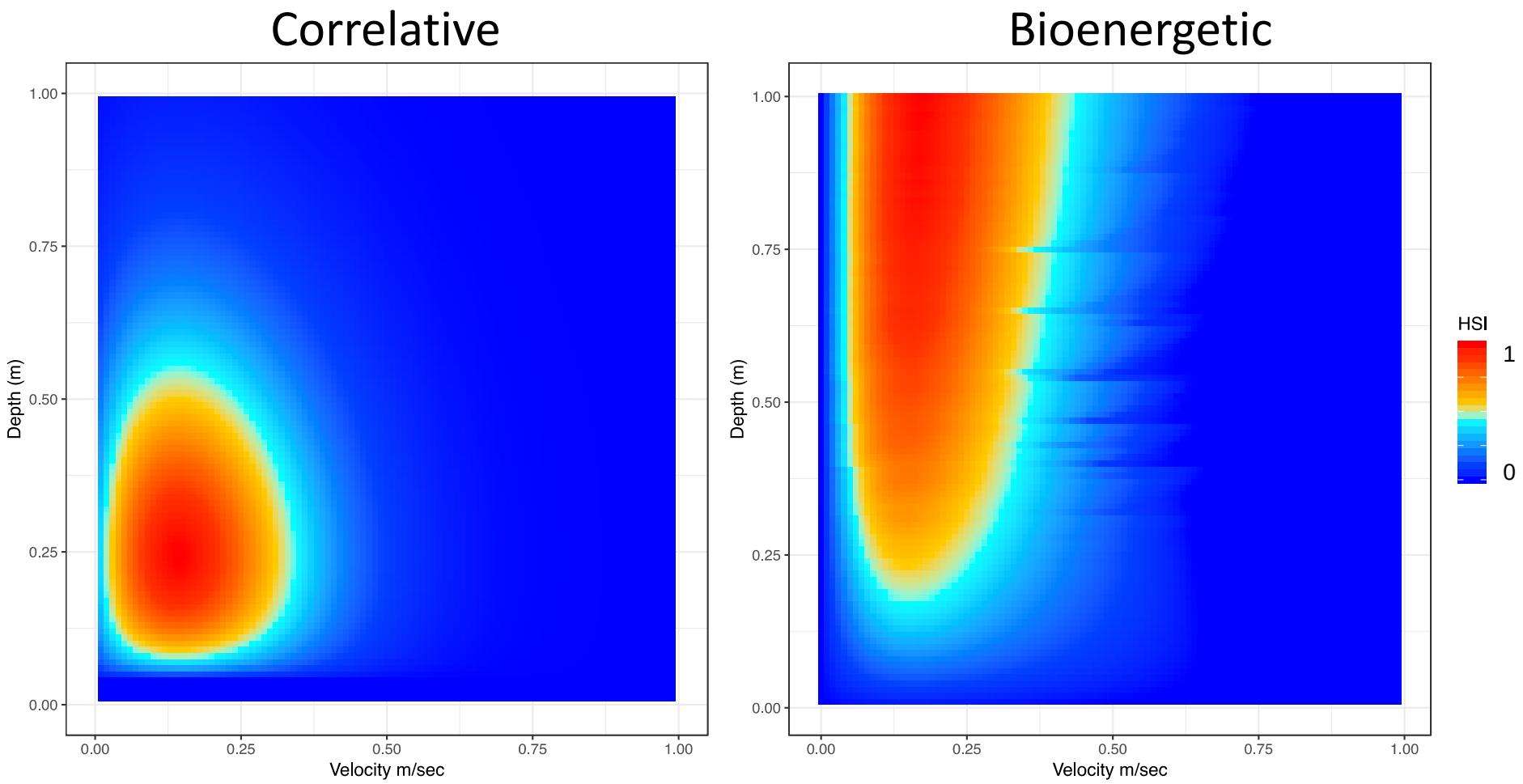
Habitat suitability predictions across range of velocity and depth

Velocity	Depth	HSI (Correlative)	HSI (Bioenergetic)
0	0	...	...
0.1	0.1		
0.2	0.2		
0.3	0.3		
..*n*	..*n*		

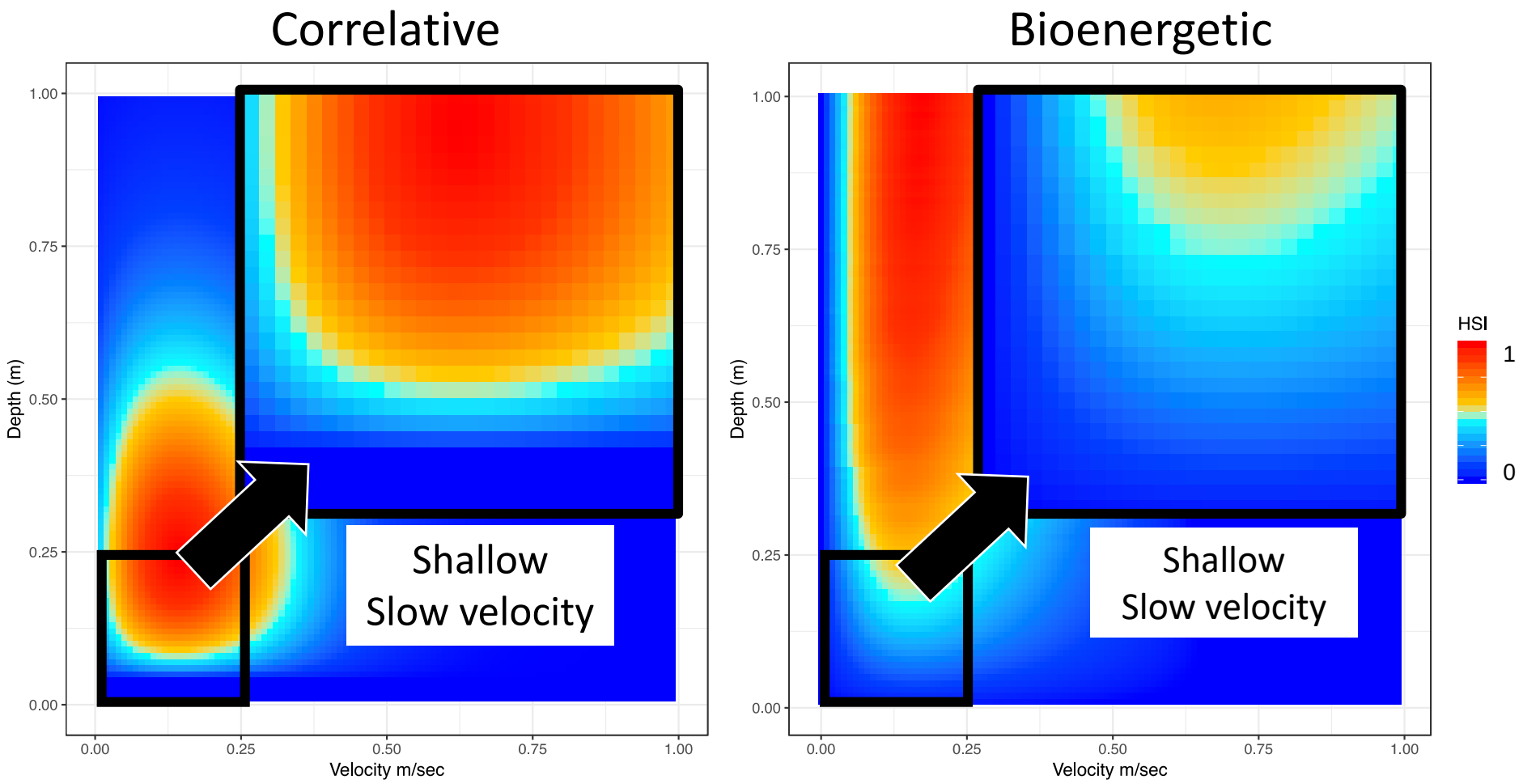
Bioenergetic habitat suitability model



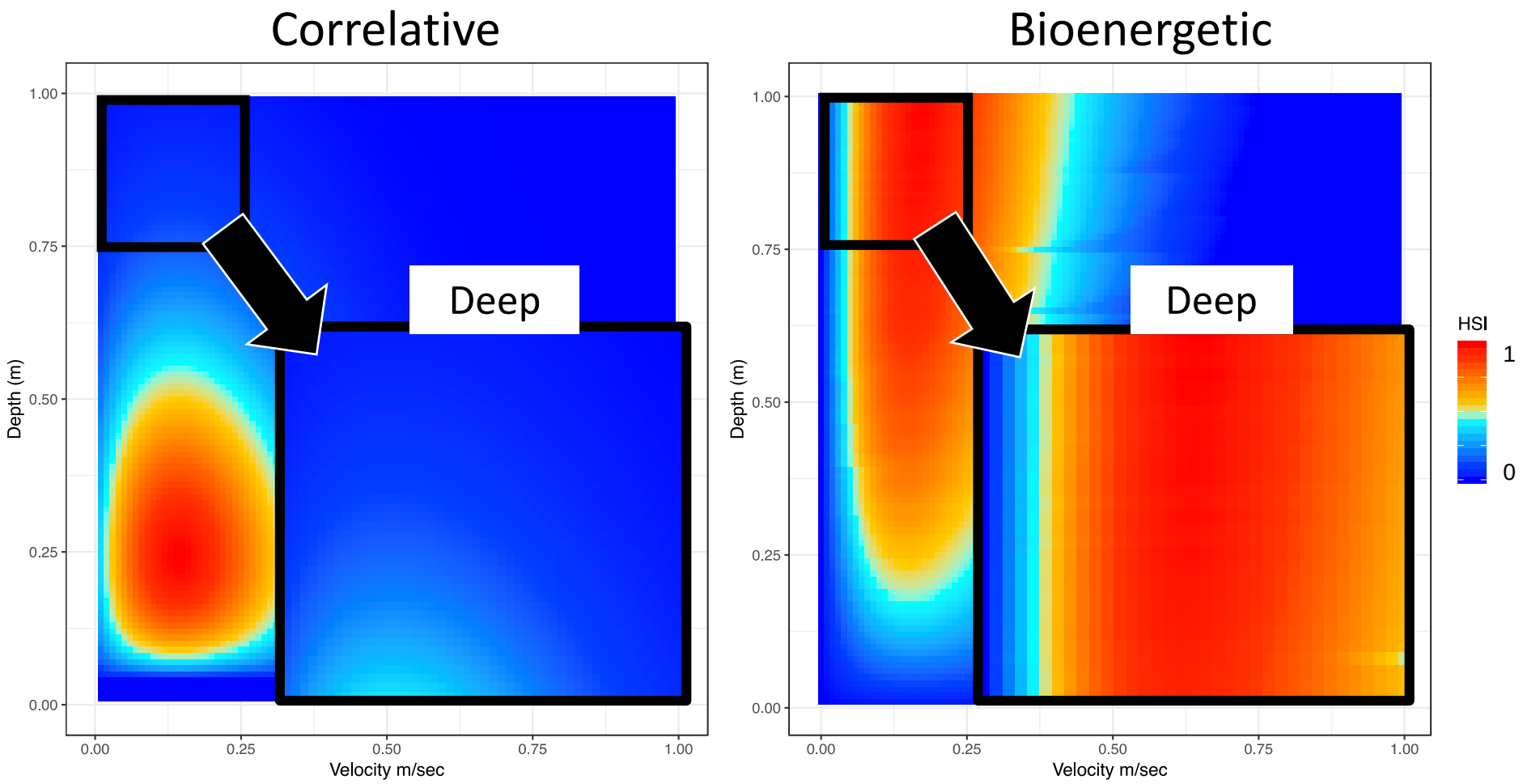
Results – Correlative vs. bioenergetic predictions



Results – Correlative vs. bioenergetic predictions



Results – Correlative vs. bioenergetic predictions



Objectives

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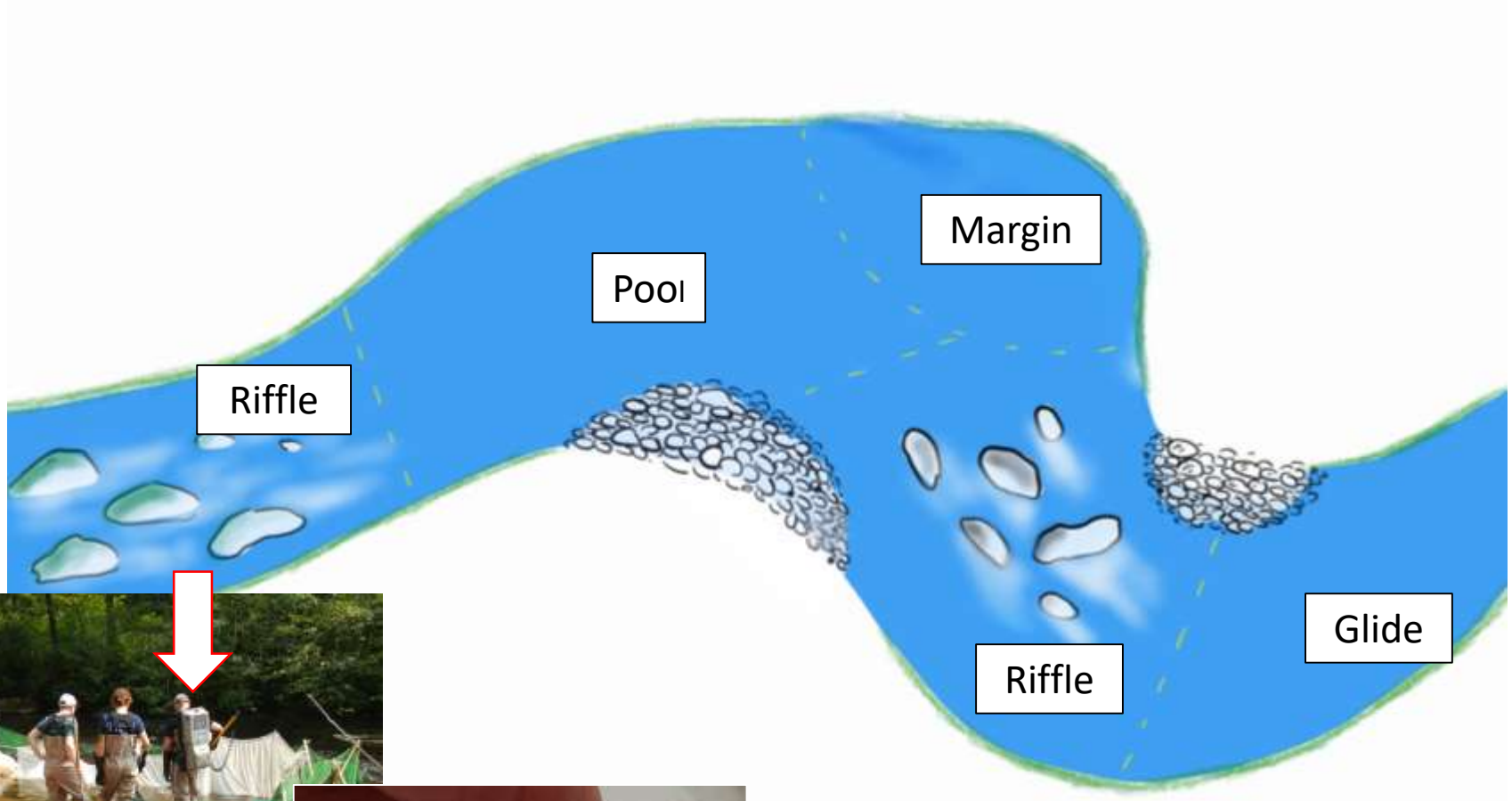
- **Evaluate correlative and bioenergetic model *performance***

Objectives

- Compare correlative vs. bioenergetic model *predictions*

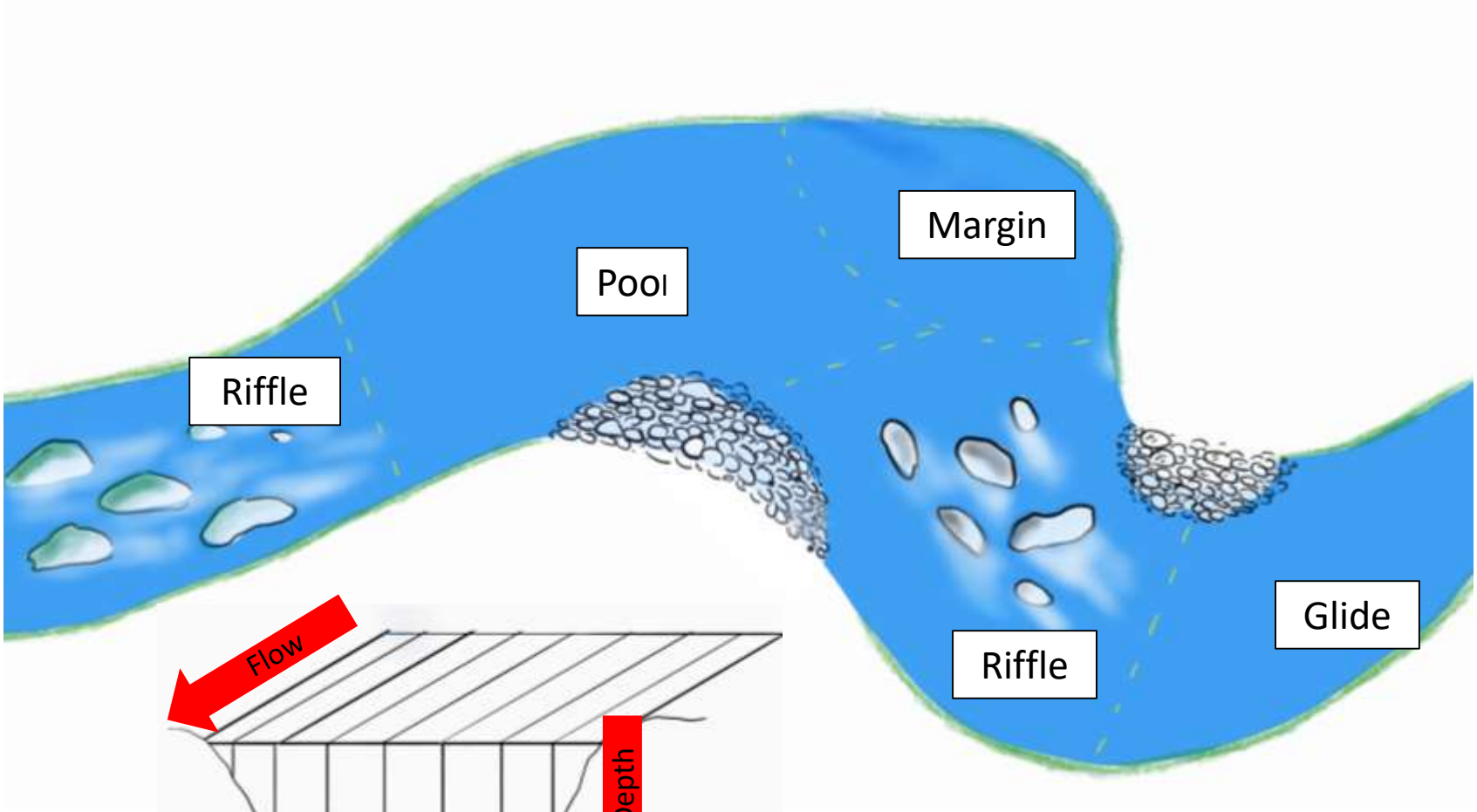
- **Evaluate correlative and bioenergetic model *performance***
  - **Channel unit scale densities of juvenile steelhead**
  - **Growth rates of cutthroat trout**

Steelhead density estimation



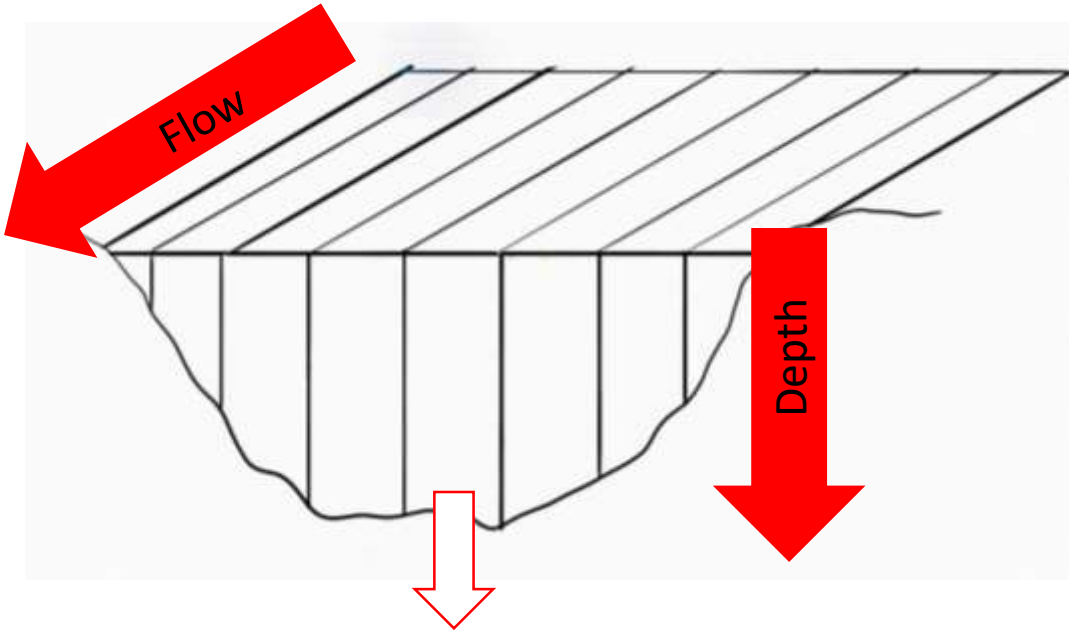
Juvenile steelhead abundance in channel units with contrasting habitat conditions

Habitat characterization



Transects of depth and velocity

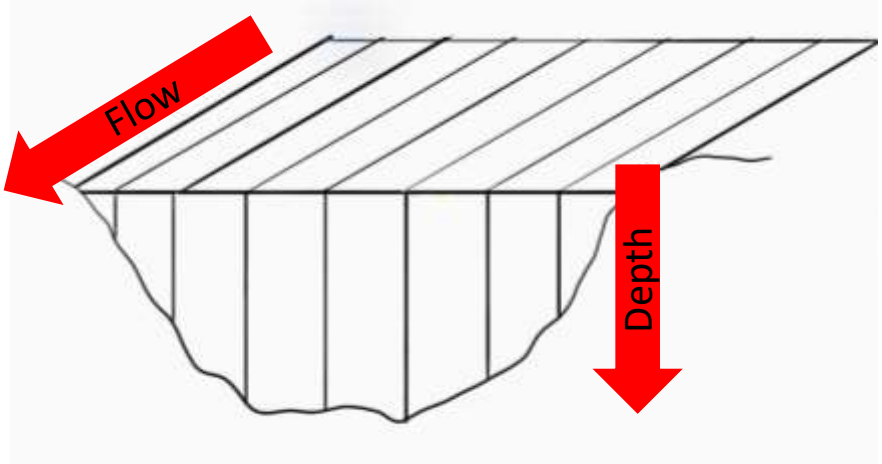
Habitat suitability index comparison



Suitability Index$_{Correlative}$ vs. Suitability Index$_{Bioenergetic}$

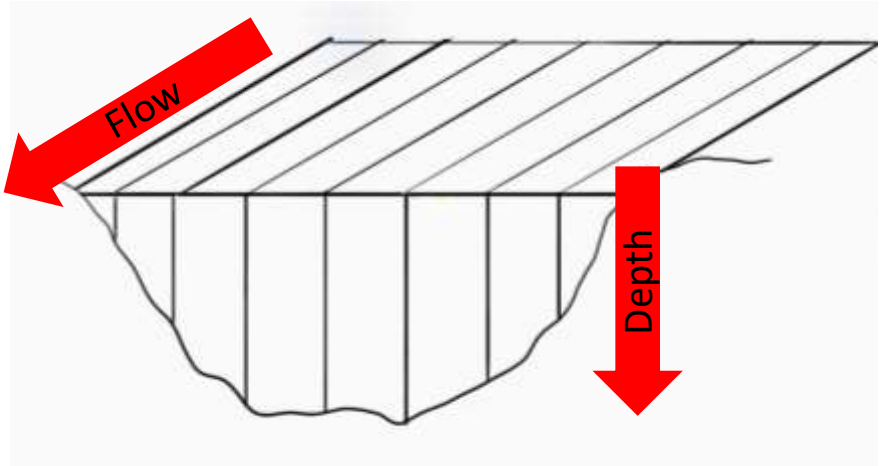
Aggregated habitat suitability metrics

1. Average suitability of all cells in each channel unit

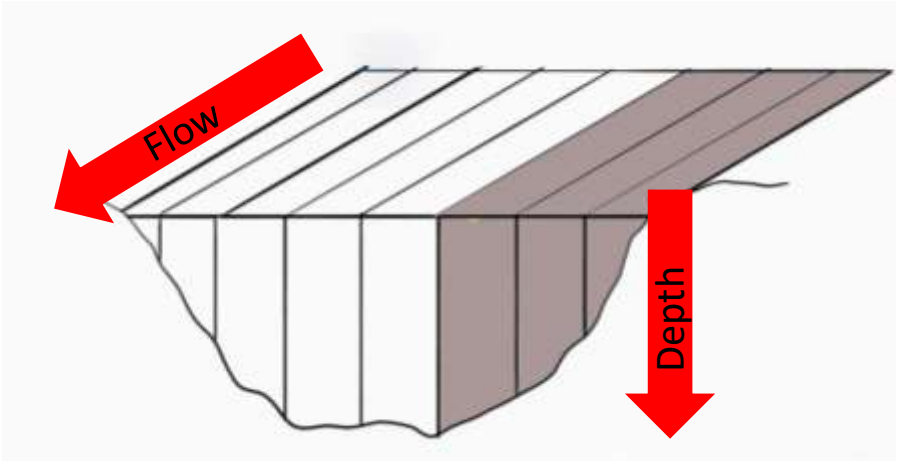


Aggregated habitat suitability metrics

1. Average suitability of all cells in each channel unit

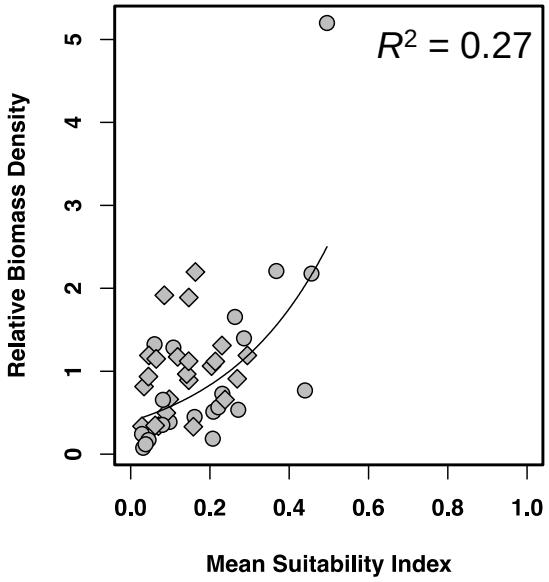


2. Proportion of cells in a channel unit with suitability > 0

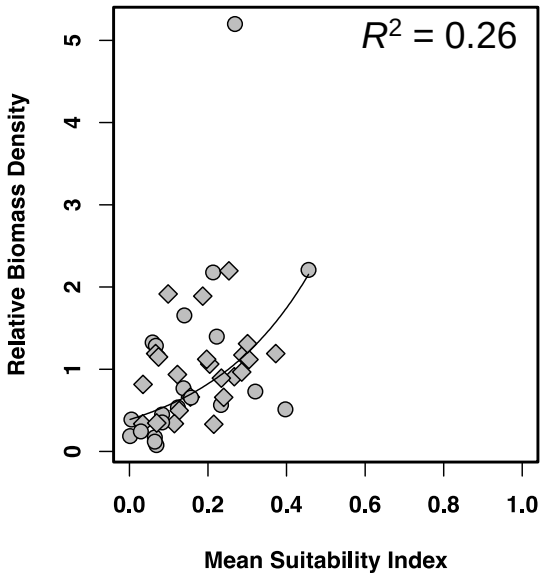


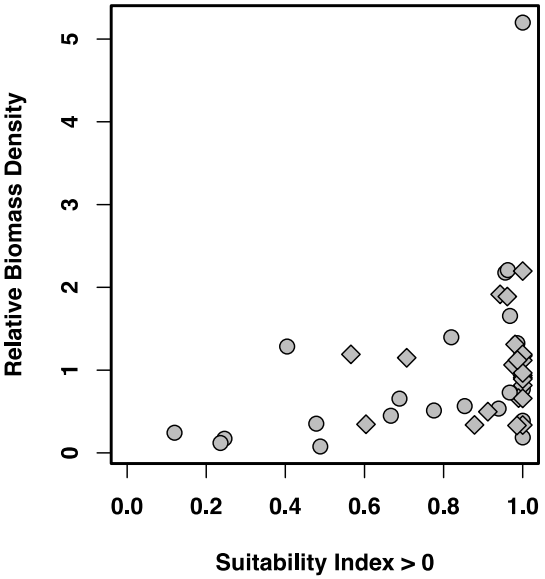
Results

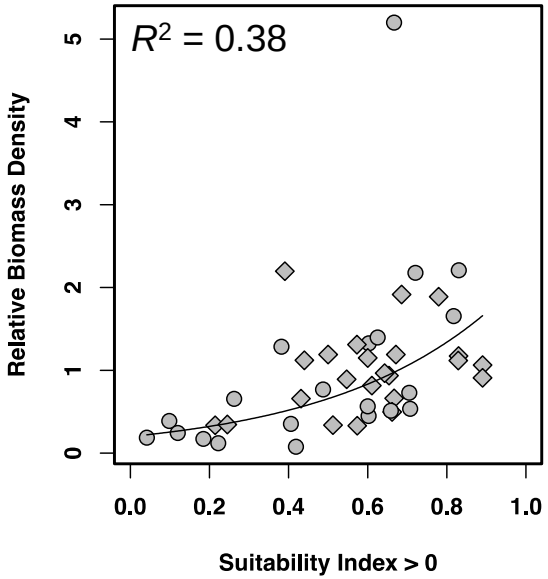
Correlative



Bioenergetic







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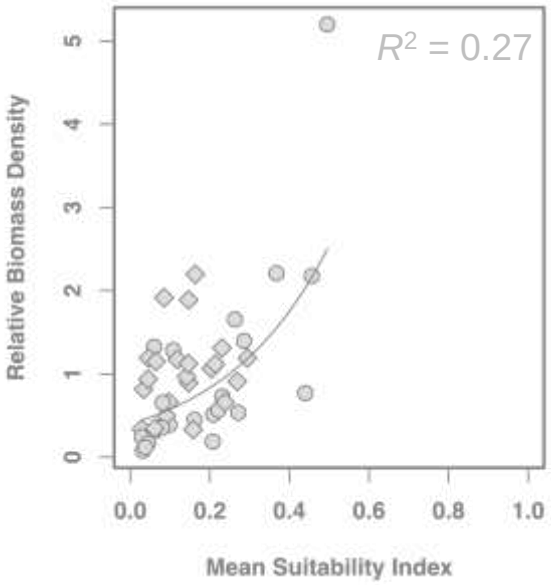
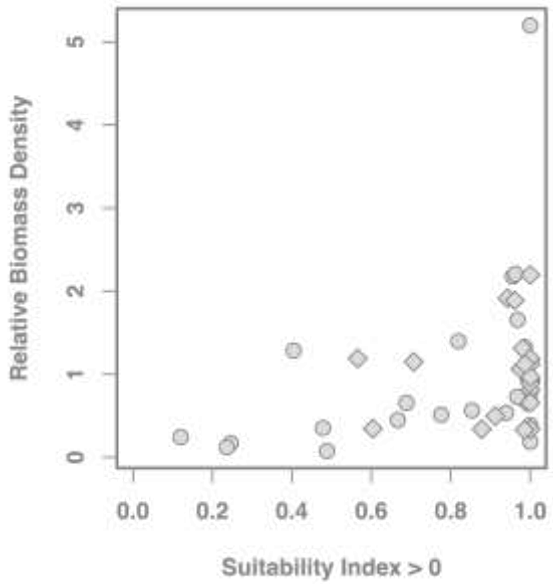
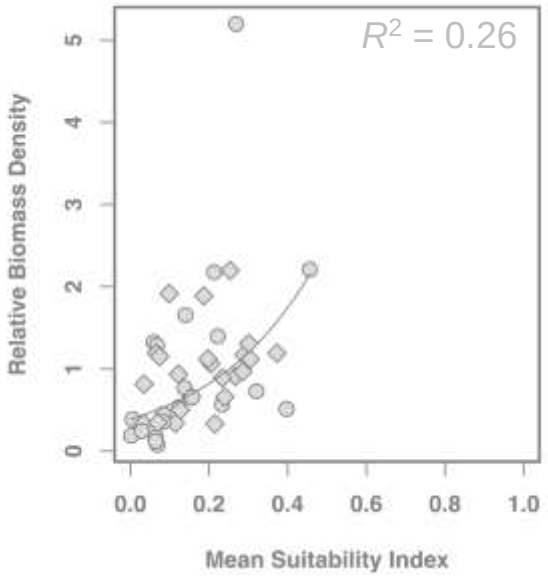
Results

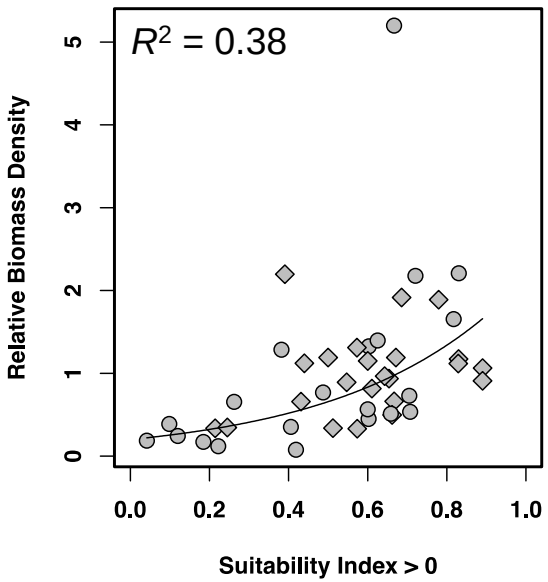
Correlative





Bioenergetic





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Model performance predicting cutthroat growth

Density-independent growth of coastal cutthroat trout across contrasting habitat conditions

Rosenfeld and Boss (2001) *CJFAS*

Image: Wild Fish Conservancy

Cutthroat growth experiment

Small and large trout enclosed in pools or riffles

Observations of focal depth and velocity

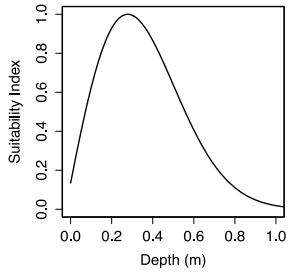
Invertebrate drift and temperature

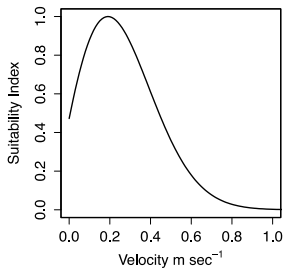
Growth (% day^{-1}) over 1 month

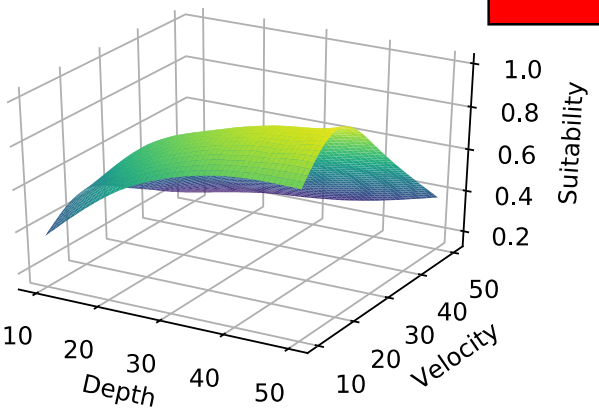
Cutthroat growth analysis

Focal point
depth and velocity

Habitat suitability
model predictions



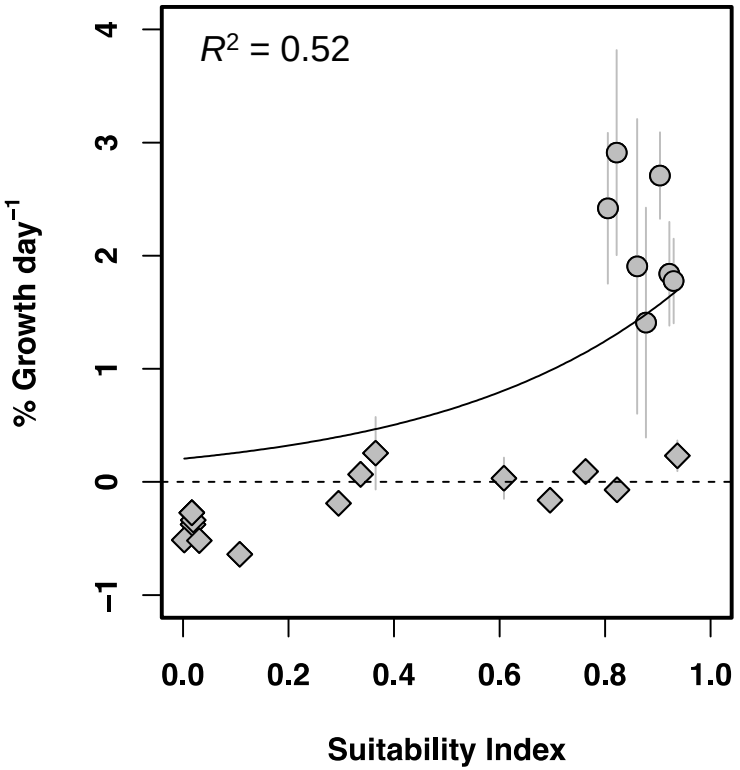




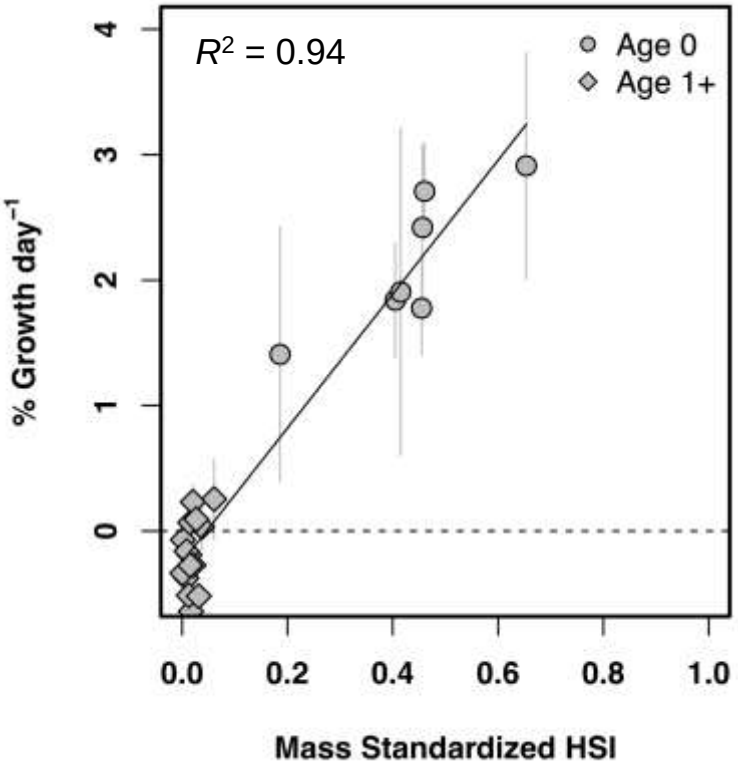
Test if suitability
predicts growth

Results – Model performance predicting growth

Correlative model



Bioenergetic model



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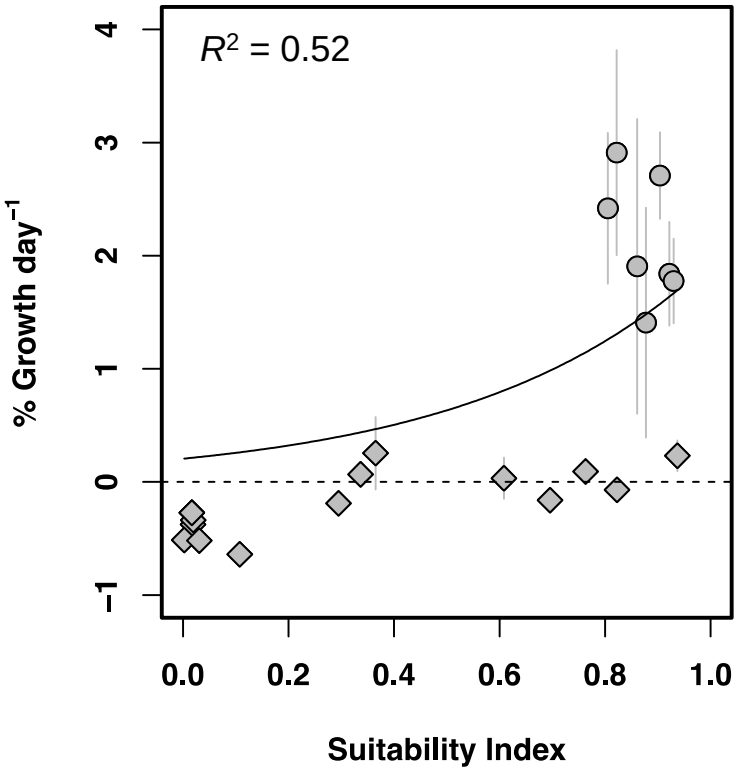
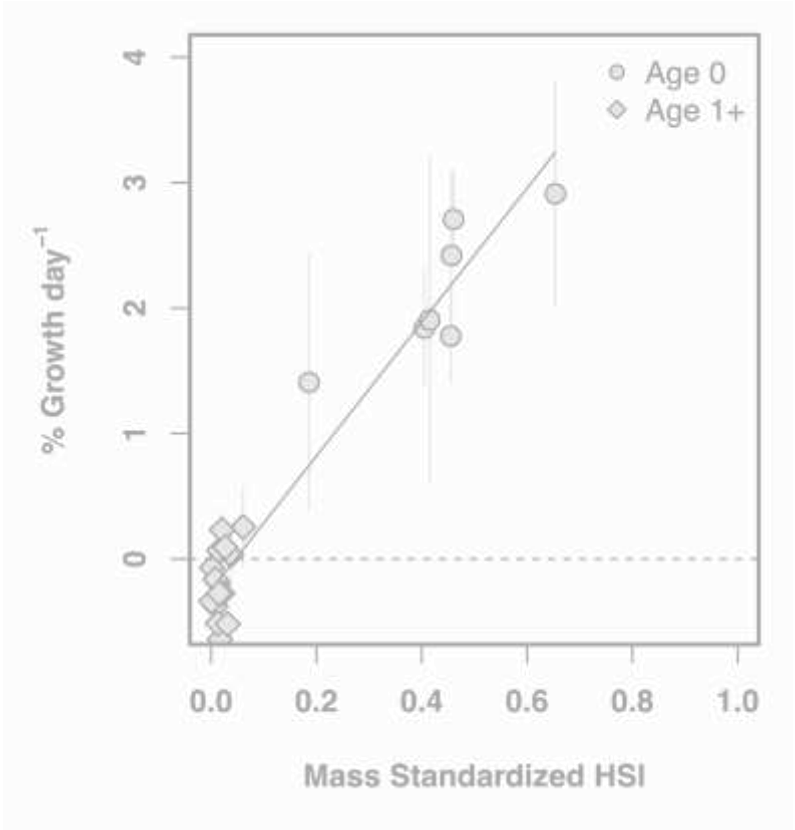
Results – Model performance predicting growth

Correlative model



Bioenergetic model



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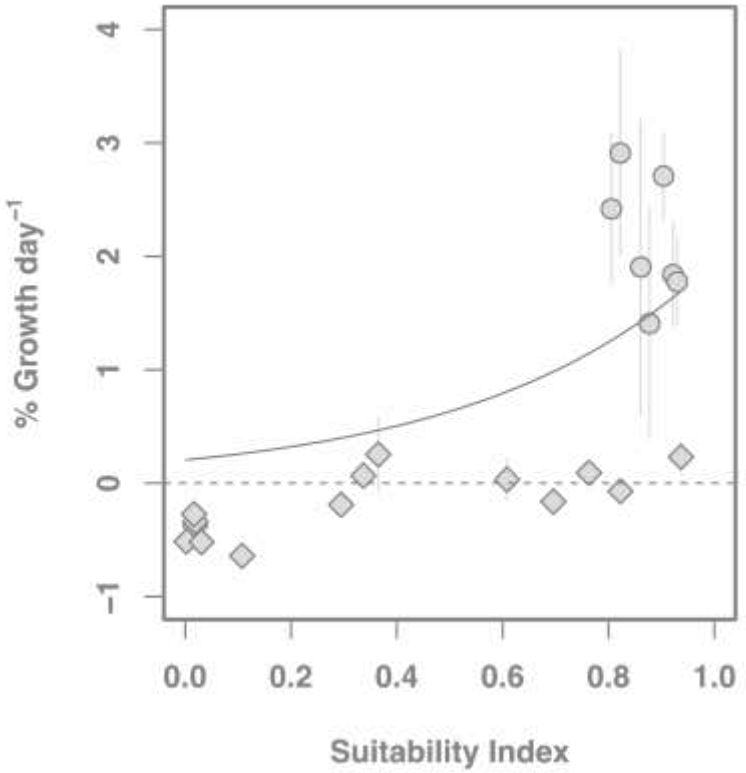
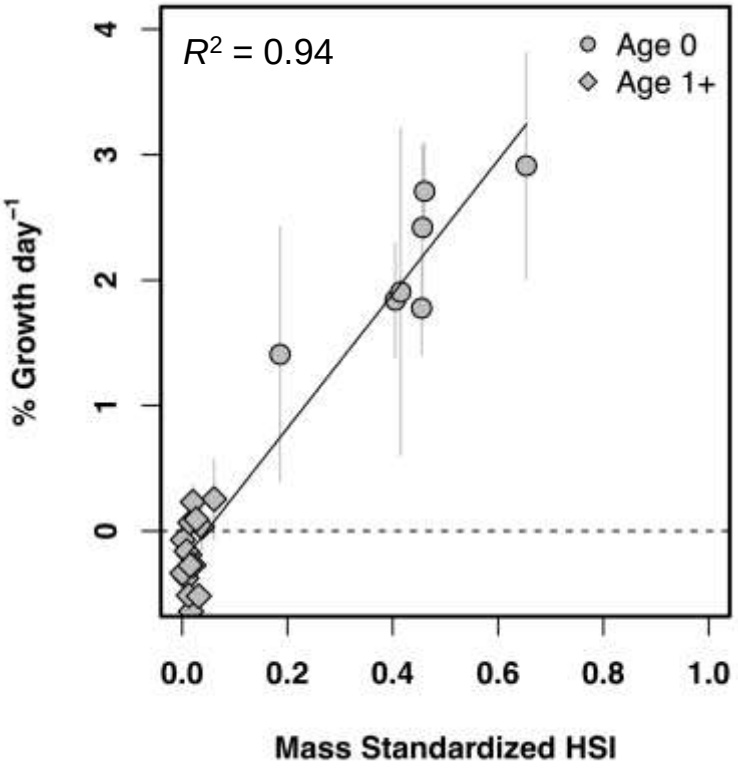
Results – Model performance predicting growth

Correlative model



Bioenergetic model



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Key messages

- Correlative and mechanistic models make different predictions of habitat suitability

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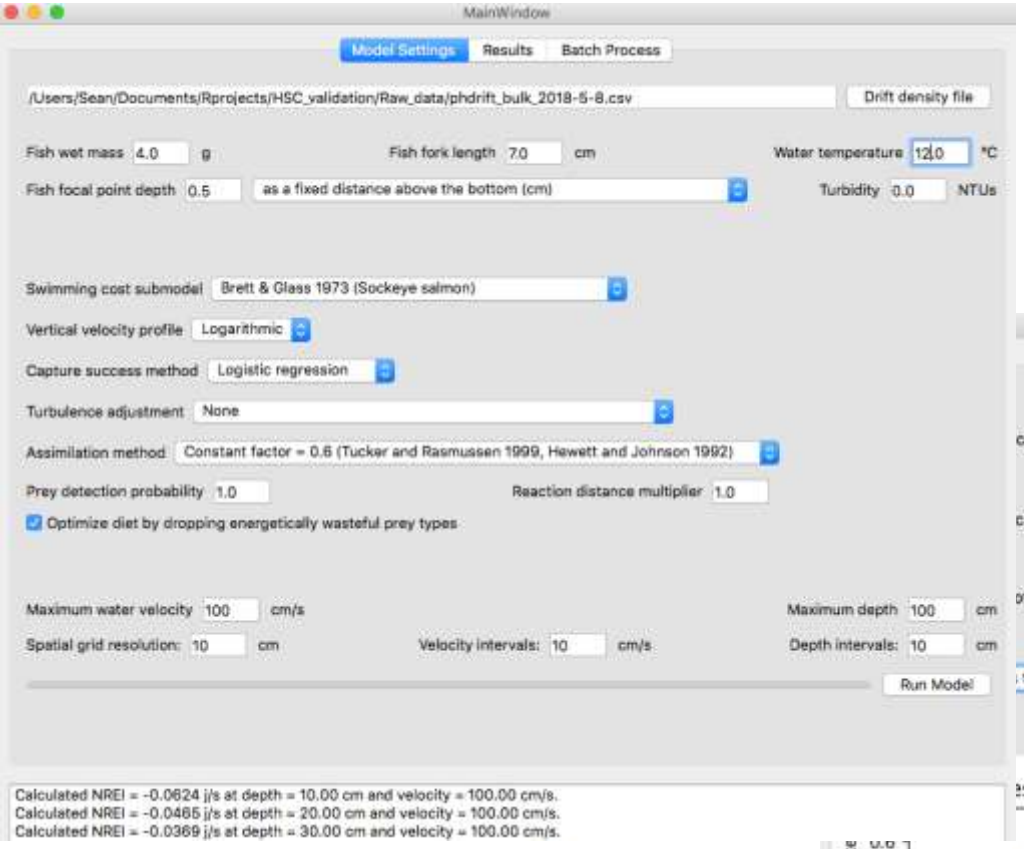
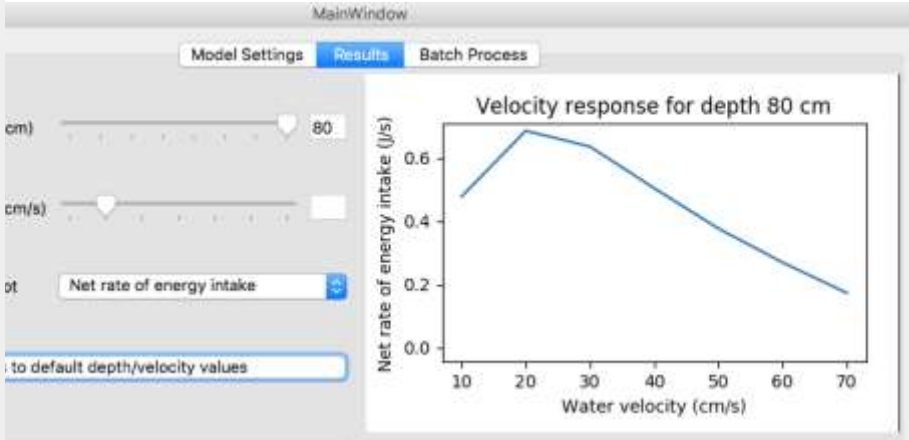
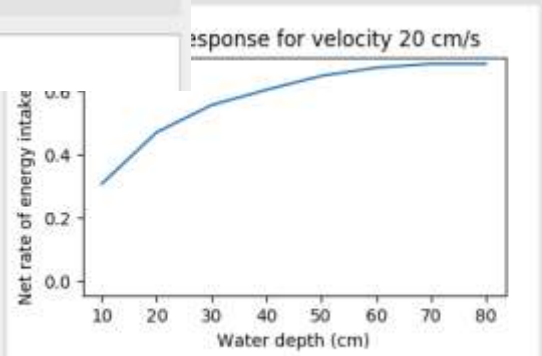
- Correlative and mechanistic models make different predictions of habitat suitability

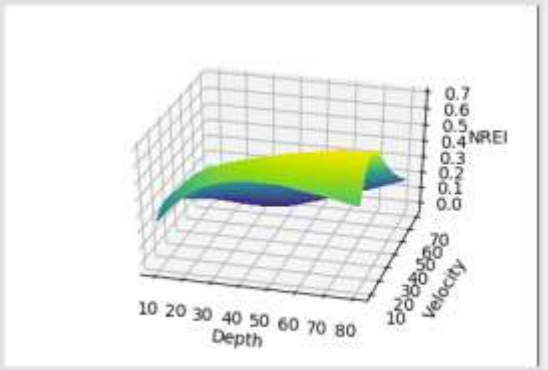
- Improved performance using mechanistic bioenergetic habitat suitability models

User-friendly software for bioenergetic habitat suitability criteria









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- Logistics and advice – Kristin Gale, Josh Korman, Alexis Hall, BC Provincial Parks

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