Single-pass backpack electrofisher use for estimation of juvenile coho salmon abundance

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Reliable methods

Where?

How many?

Reliable sampling methods needed to assess abundances of stream fishes

Standard sampling practices

Backpack electrofishers

Validation of methods is essential

Sampling efficiency affected by habitat

Standard sampling is NOT validation!

How do we validate?

Measure Sampling Efficiency (SE) =

Use a “reliable” method as abundance baseline
(e.g., known number of ‘marked’ fish)

$$\text{Percent efficiency} = \frac{\text{Total marked fish captured in a single-pass}}{\text{Total number marked fish released into a site}}$$

Abundance: Model percent of the “True” population captured

Our method

Establish a closed population

Capture and mark fish

Search for marked fish

Measure habitat features

What to do

Develop models to estimate sampling efficiency

$$\frac{\text{Number marked recaptured}}{\text{Number marked}} = f(\text{environmental features})$$

Model using linear regression

Objectives

Estimate juvenile coho salmon abundance

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Measure features that may affect sampling efficiency (SE)

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Measure features that may affect sampling efficiency (SE)

Develop models to estimate single-pass SE

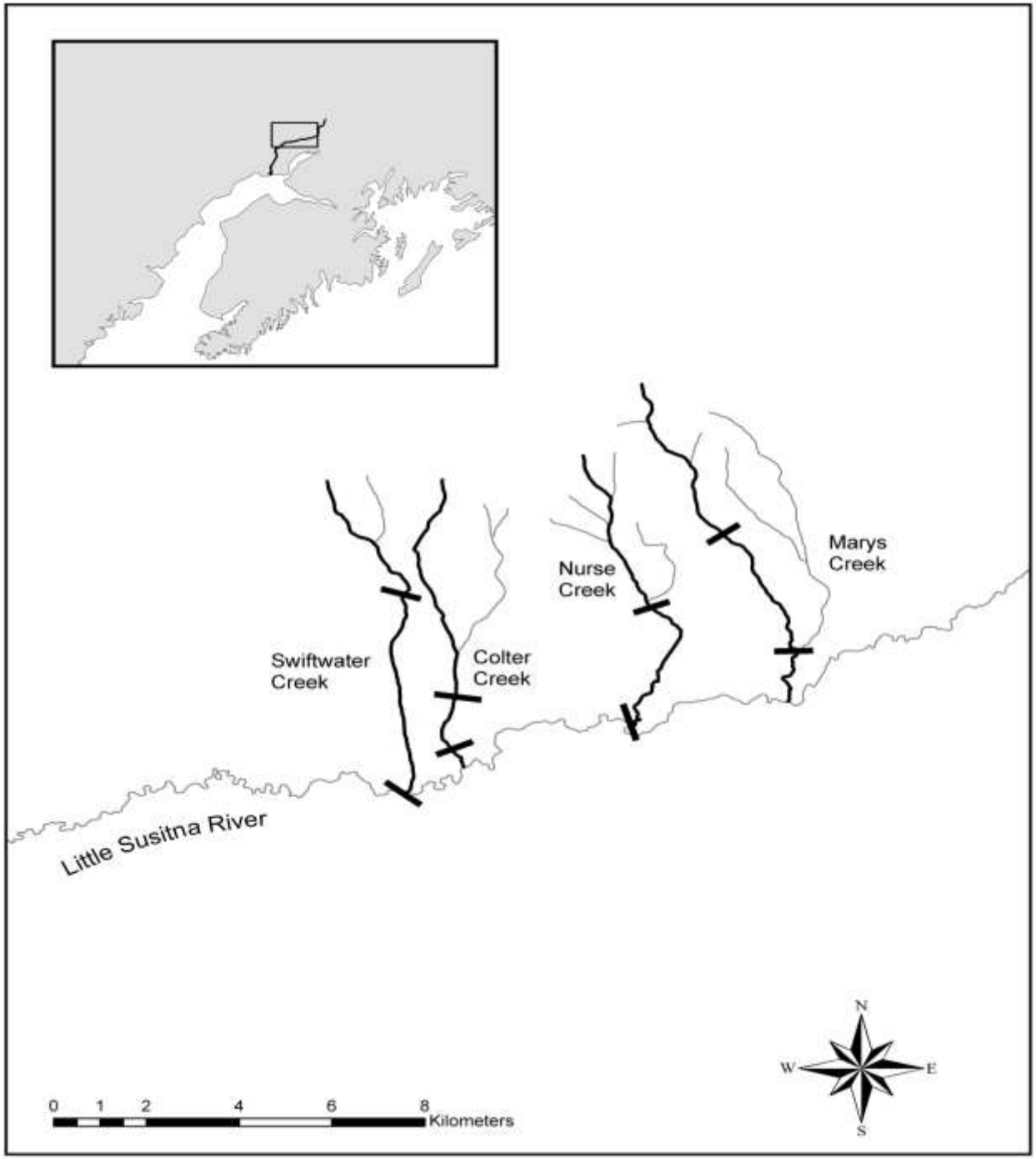
Objectives

Estimate juvenile coho salmon abundances

Measure features that may affect SE

Develop models to estimate single pass SE

Create models that approximate mark-recapture population estimates


Swiftwater Creek
Colter Creek
Nurse Creek
Marys Creek
Little Susitna River
0 1 2 4 6 8
Kilometers
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E
S

Sampling design

Mark-recapture techniques

Environmental variables measured:

Sampling design

Mark-recapture techniques

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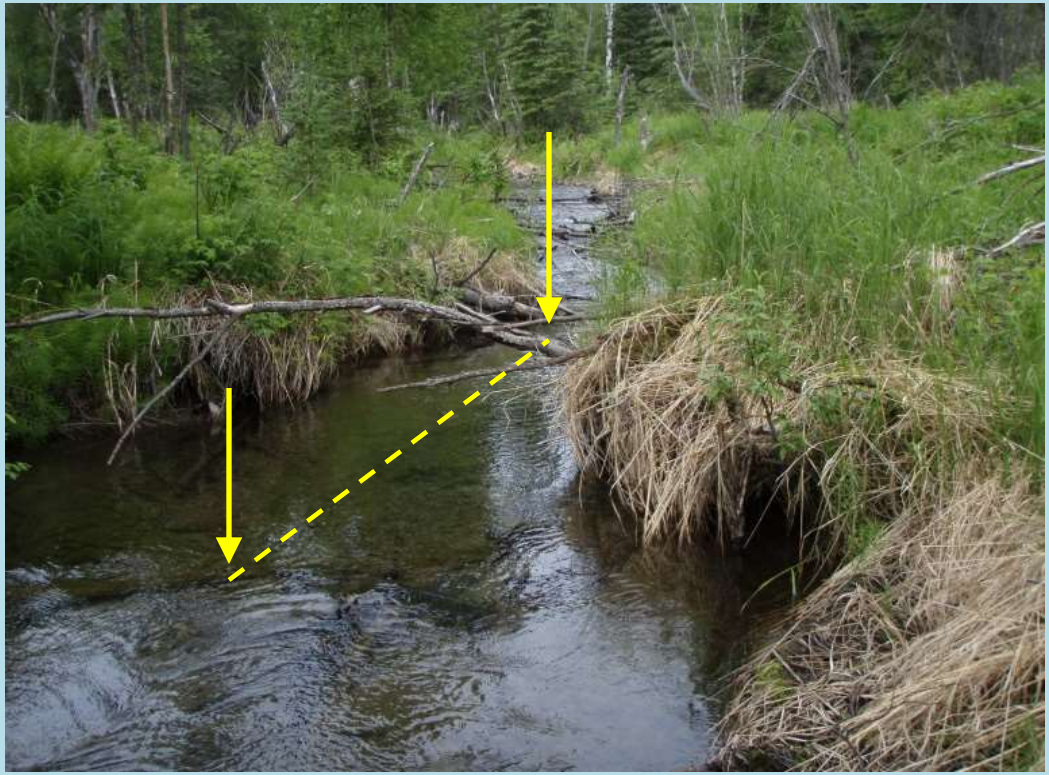
Environmental variables measured:



Sampling design

Mark-recapture techniques

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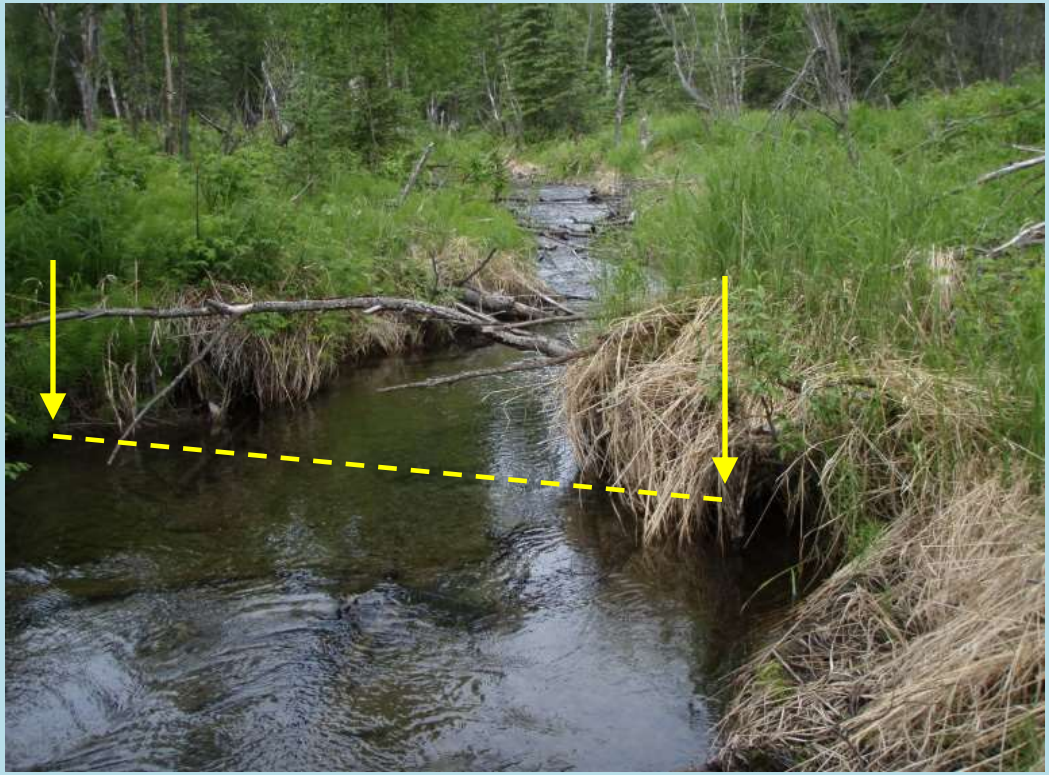

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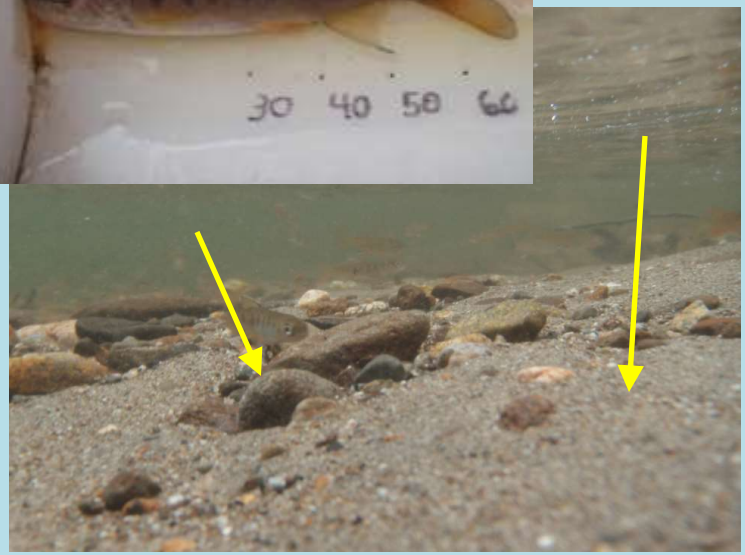

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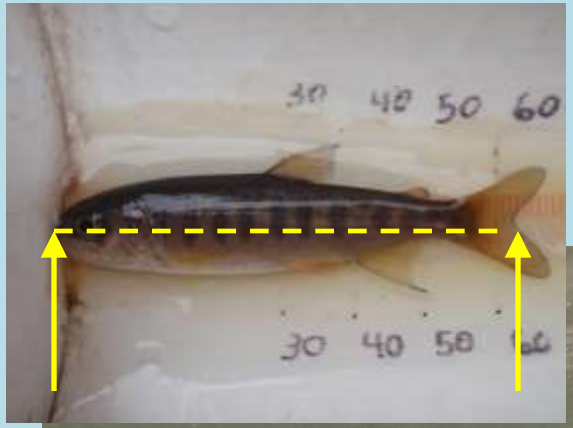


Results

Estimates based on *n*= 27 MR stream segments

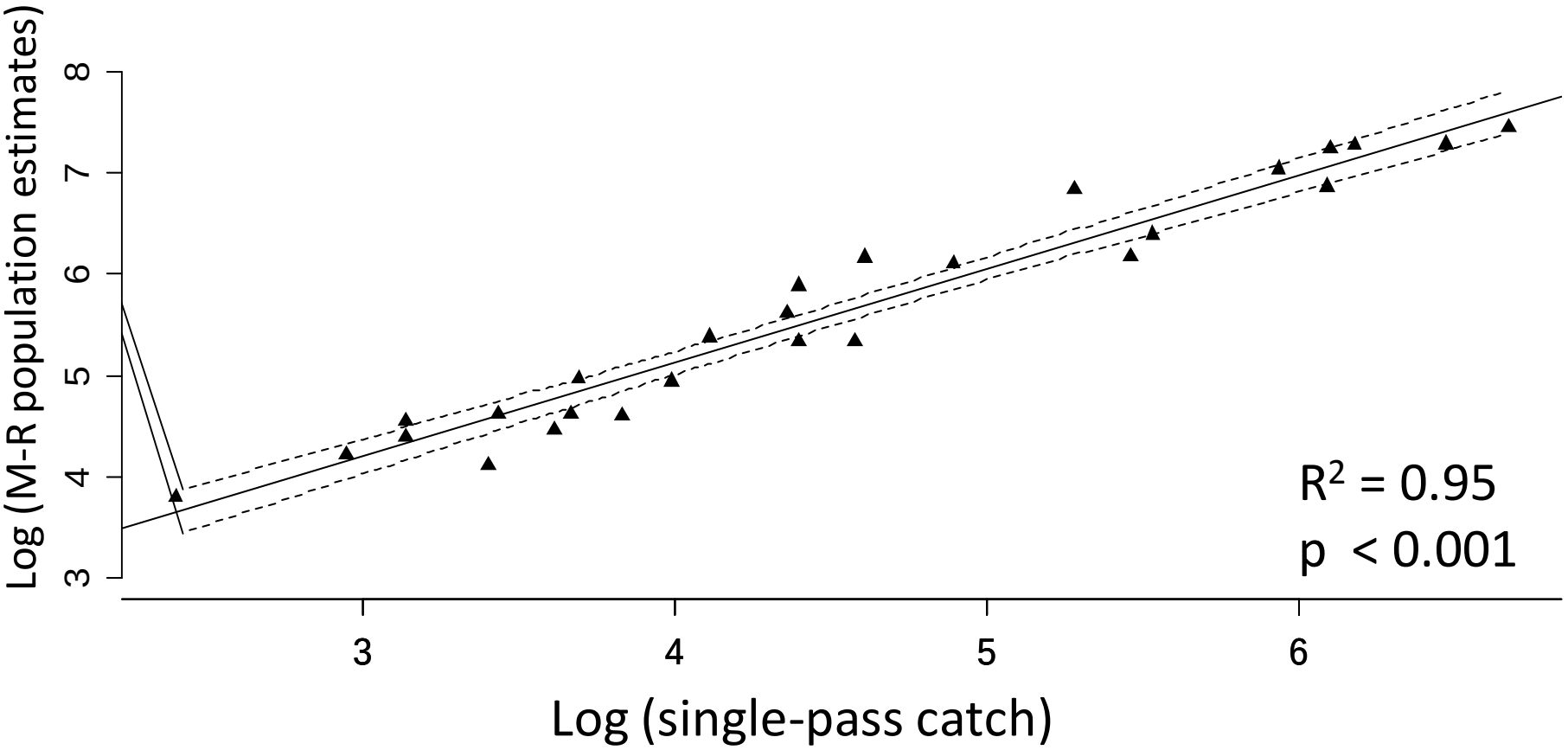
Removed from model:

- Dominant substrate
- Wood pieces size class F (“wood aggregates”)

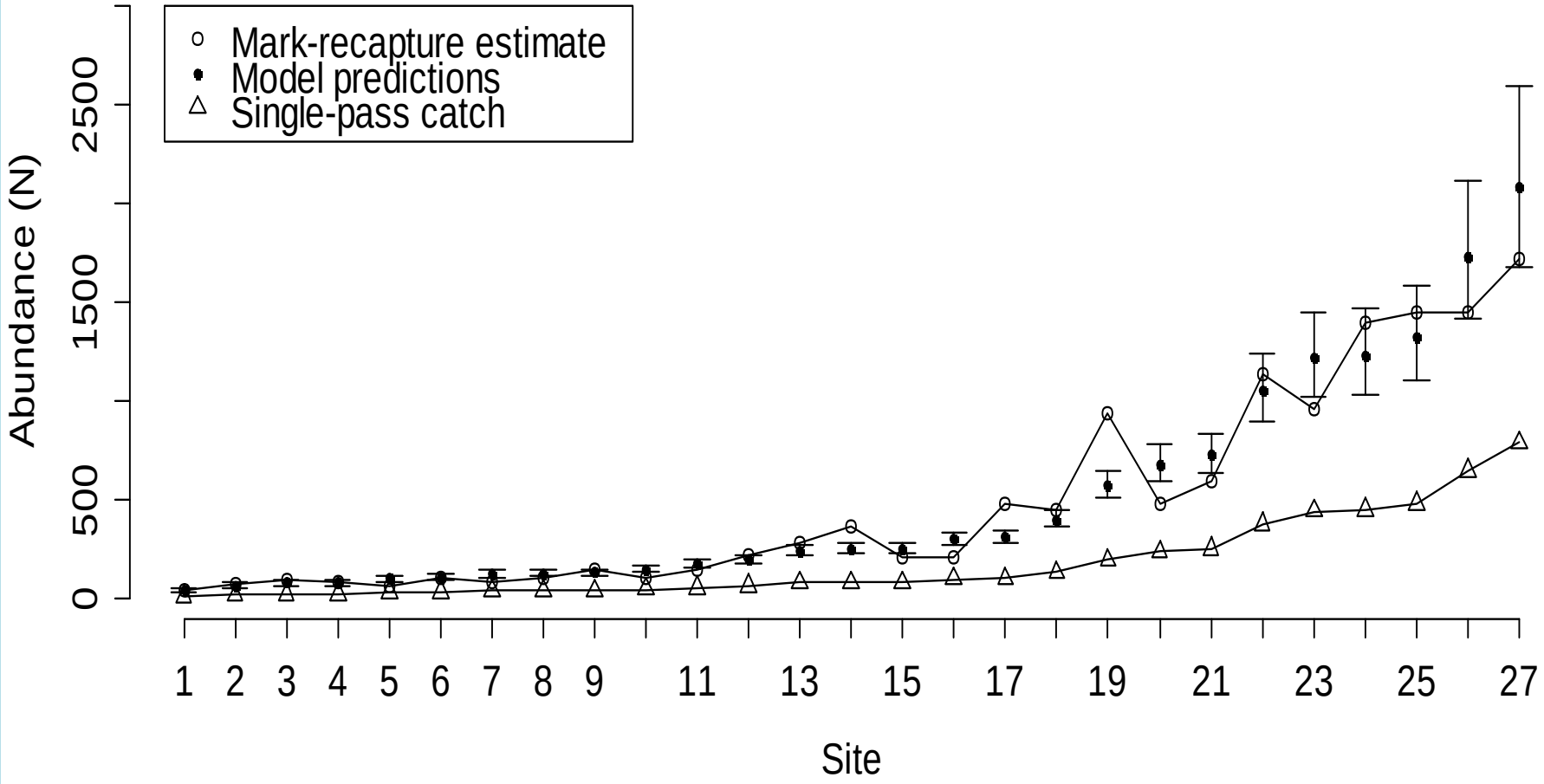
Global model was not significant at 0.05 alpha level (R^2 = -0.0018, *p*-value: 0.447)

Calibration of single-pass catches

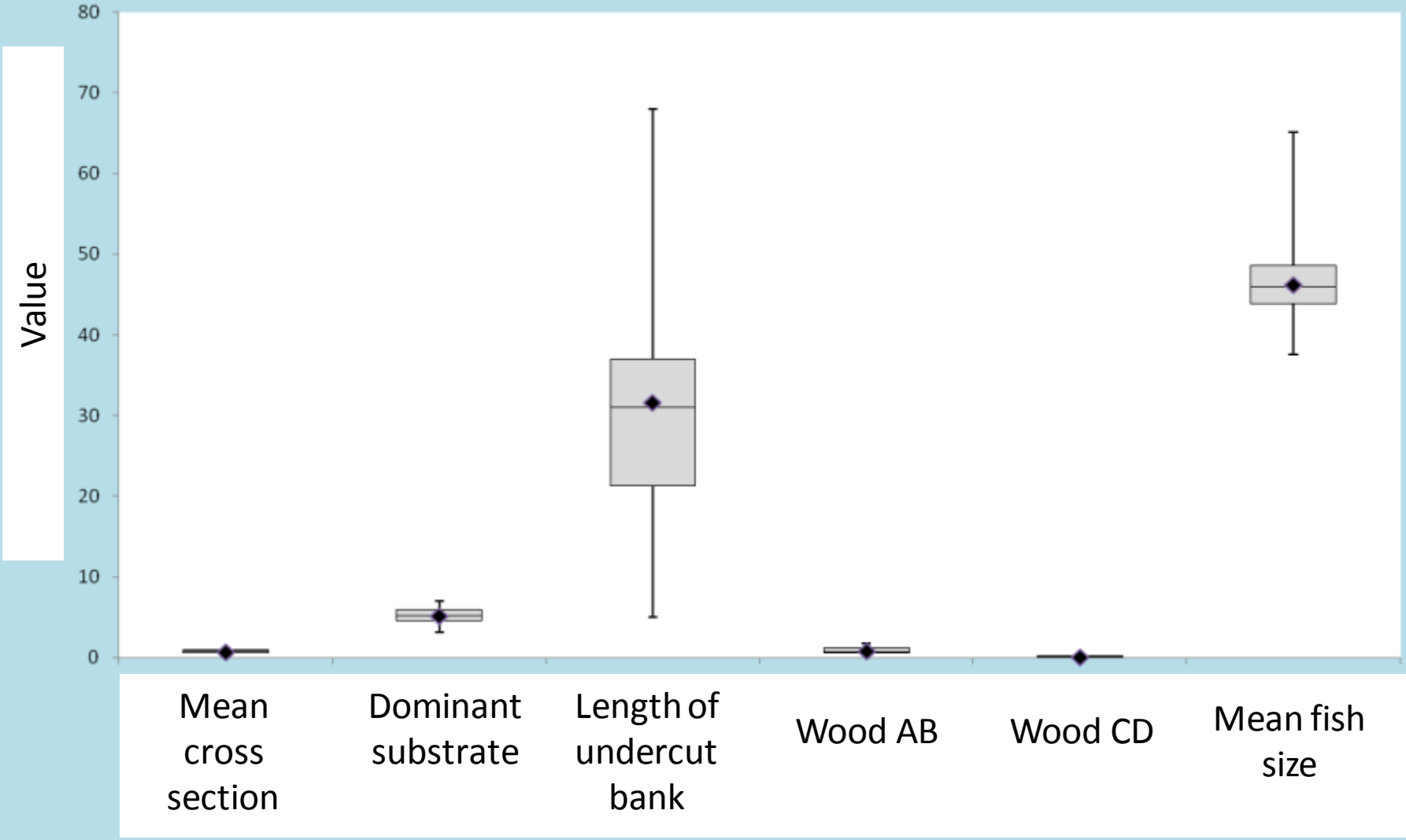
Single best model of abundance estimates



Single-pass numbers reflect prediction estimates



Narrow range of conditions



Conclusions

Failure to validate may lead to inaccurate population estimates

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Low-effort sampling can approximate actual fish numbers

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Low-effort sampling can approximate actual fish numbers

Transferable model to other areas with similar habitat conditions

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