Correcting Bias in Spring Chinook Carcass Surveys

Impacts on Monitoring Metrics

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Outline

- Motivation
  - How are carcasses used?
  - What are current problems?
- Study Objectives & Design
- Model
- Results
- When to use


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Why do we care about carcasses?

Why collect carcasses?

- Reconstruct demographics of spawning population
- Assume it's a random sample

BUT

- Evidence that it's biased by
  - Sex
  - Size

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Study Objectives

- Evaluate carcass recovery rates and the factors that influence them

- Develop a model that predicts carcass recovery probabilities for spring Chinook Salmon in the upper Wenatchee Basin

- Recalculate the demographics of the spawning populations using corrected carcass recovery data

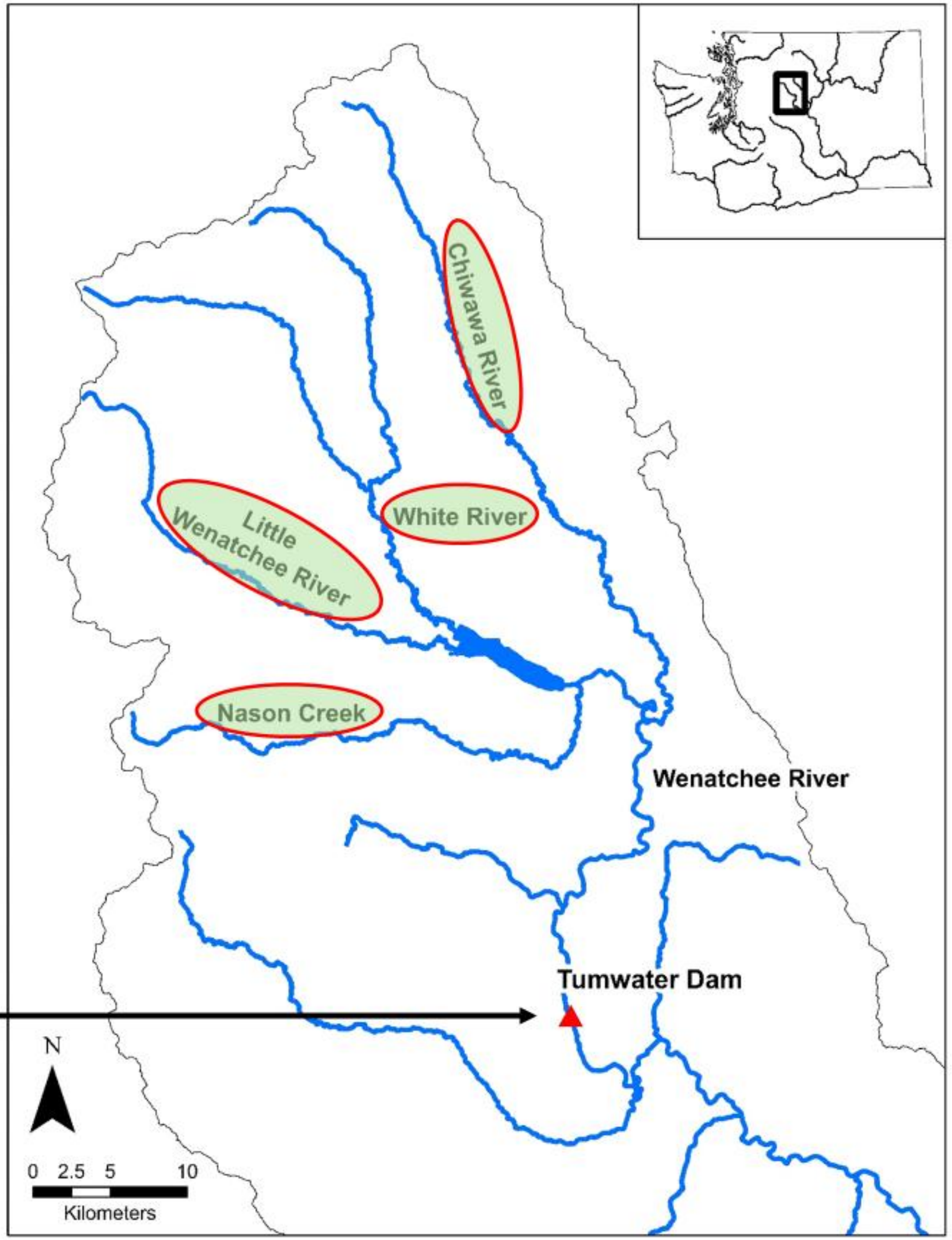
Carcass Recoveries

Current approach

Murdoch et al. 2010

Live detections

Fish PIT tagged at Tumwater Dam



Sample Sizes

	Female	Male
Detected Live	2,555	931
Carcass Recovered	838	126
% Recovered	32.8%	13.5%

Differences in Post-Spawning Behavior

Female

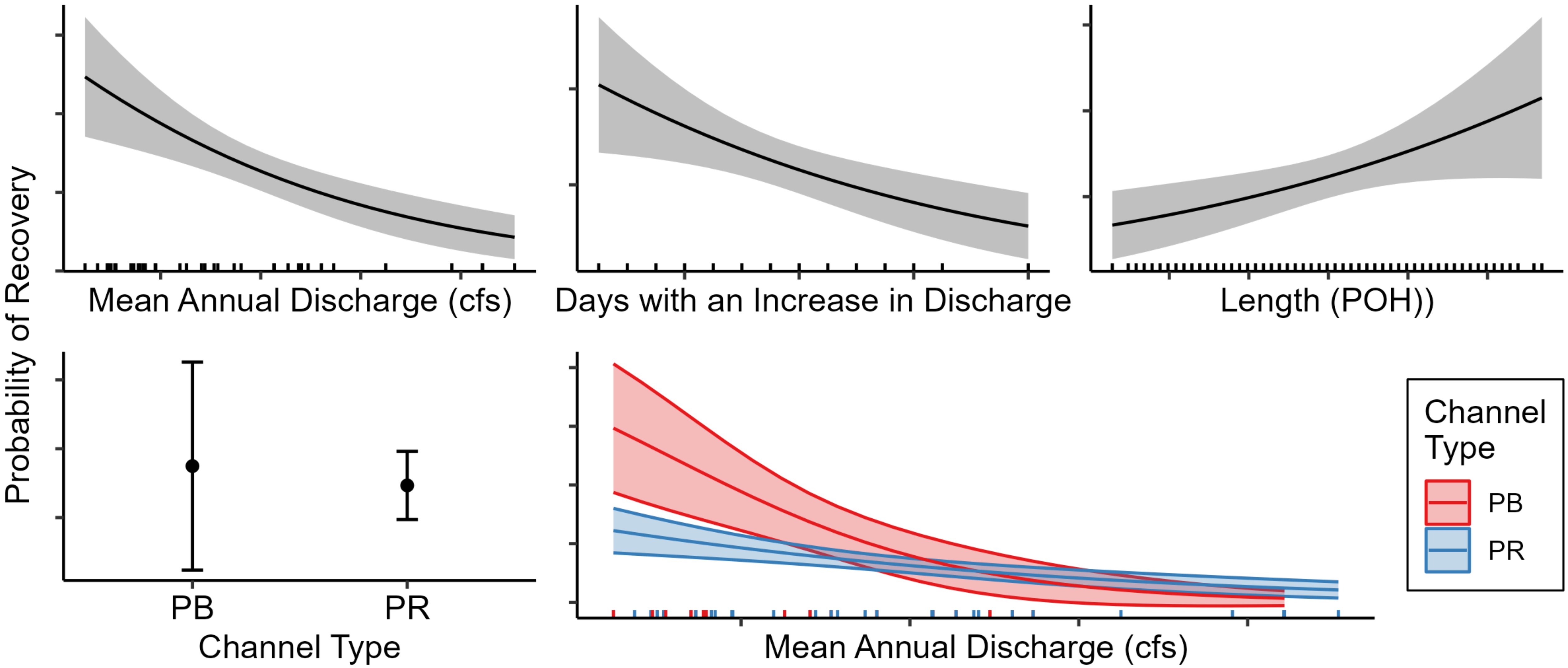
WDFW

Male

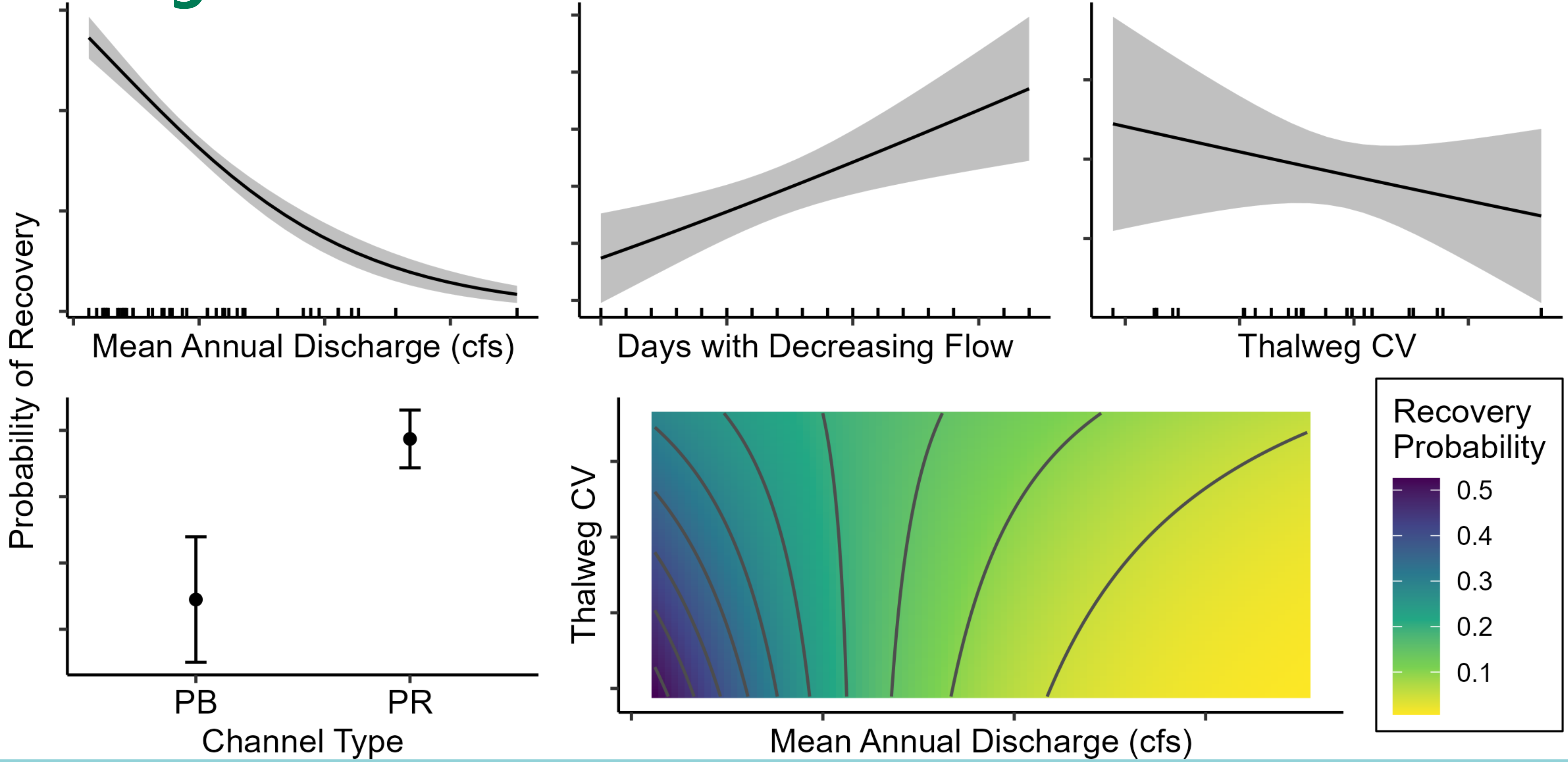
Animalia

Probability of Carcass Recovery Model

Marginal Effects for Male Carcasses



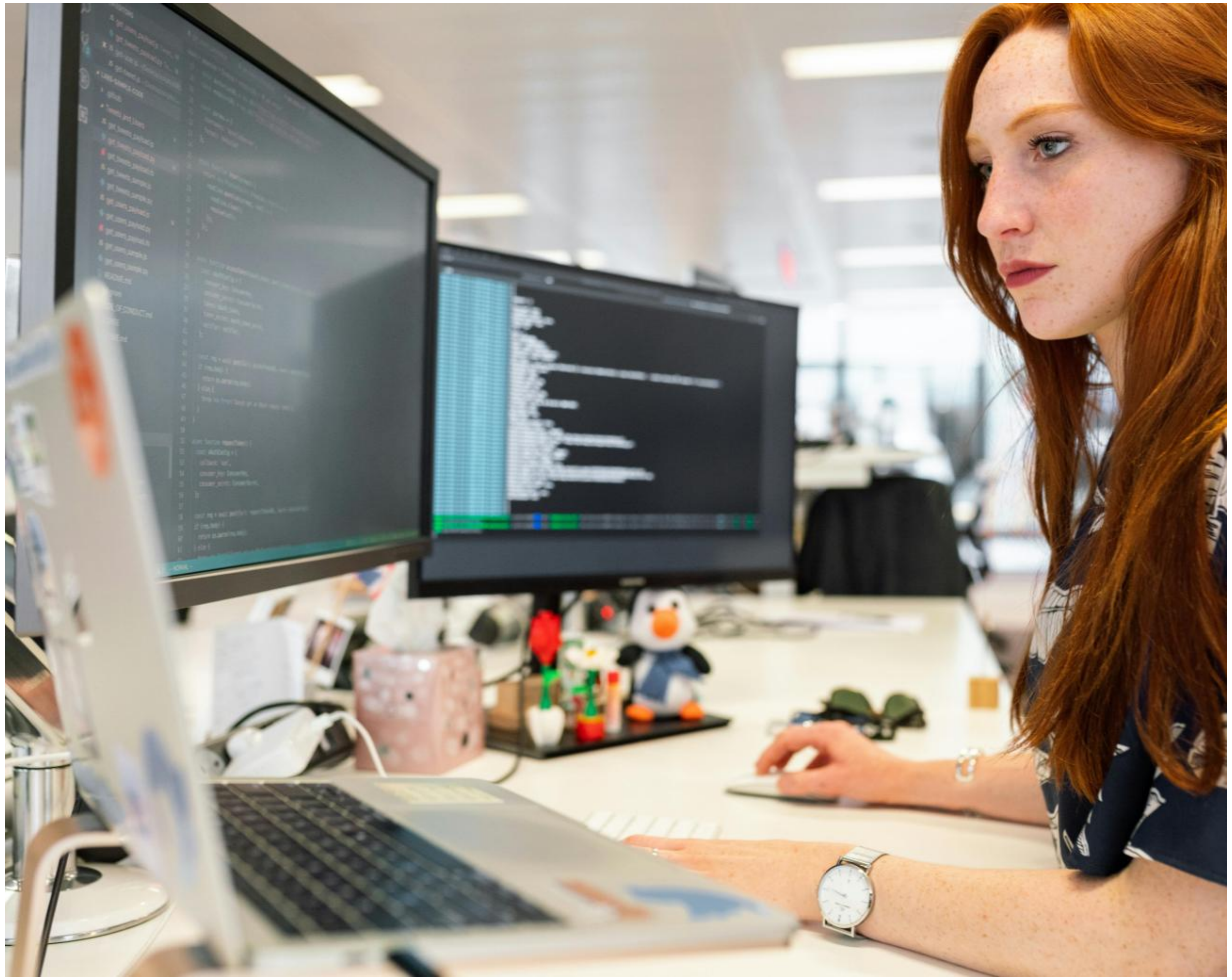
Marginal Effects for Female Carcasses



Impacts on Abundance Monitoring

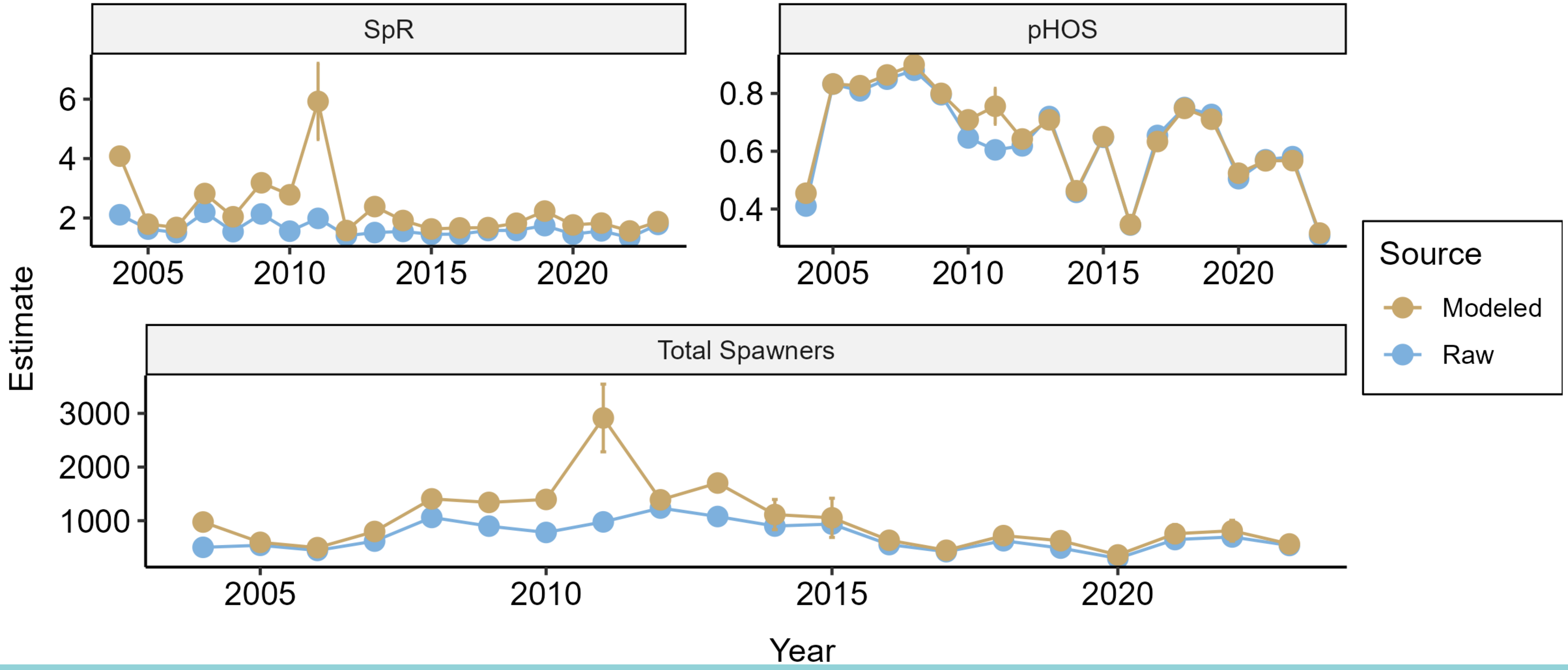
How to Apply?

- Assign a “weight” to each carcass found
- Inverse of the probability of recovery for that carcass
  - Small p ⟶ large weight
- Recalculate metrics like SpR and pHOS using weights



ThisIsEngineering

Chiwawa Estimates 2004 – 2023



When to use?

When can we apply this approach?

Standard carcass survey goals:

- Collect a sufficient number of carcasses
- Survey throughout the spawning season
- Survey all spawning habitats

Katy Shelby (WDFW)

Take Home Messages

Mike Hughes (WDFW)

- Carcass recovery is impacted by
  - Sex
  - Size
  - Habitat
  - Flows
- Accounting for that bias improves estimates of
  - pHOS
  - Spawner abundance

Questions?