Estimating the Size of Steelhead Runs by Tagging Juveniles and Monitoring Migrants

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	Nuisance <u>Parameters</u>	<u>Event</u>	Parameter <u>of Interes</u>	s <u>t</u>
Capture Prob.	р	Block-Netted Mark-Recap	N	# Juveniles
			S 1	Transition Prob.
Detection Probs.	d ₁ , d ₂	Monitoring Outmigrants	♥ ●	
		j i i i j	S 2	Marine Survival
		.	↓	
Detection Probs.	d ₃ , d ₄	Monitoring	S	# Spawners



Hierarchical Statistical Model

Estimate the parameters of interest for <u>Unsampled Reaches</u>

from the parameters of interest for <u>Sampled Reaches</u>

using a <u>Second-Level Linear Model</u>

Flow of Information



What are key design parameters limiting precision of estimates?

Best-Case Scenario: Perfect Detection, All Reaches Sampled



Best-Case Scenario: Perfect Detection, All Reaches Sampled



Imperfect Detection, All Reaches Sampled



Perfect Detection, Small Sample of Reaches



Do Covariates Improve Precision?





N = 128 Sites

Summary

30 to 90 Tagged spawners needed for 30% RP

200+ Tagged spawners needed for 10% RP

2 RFID detectors generally sufficient (excludes equipment failure)

Number of sampled reaches is only a secondary limiting factor. Number of tagged spawners is key.

Covariates do not improve precision much