

Introduction

- Estimating survival a common objective of telemetry studies
- Easily translated for conservation planning, population monitoring and management
- Accurately estimating survival is not straight-forward, impacted by;

1. Tagging effects

Becoming more clear (standardized techniques, tag-body size ratios)

2. Gear performance (e.g. detection efficiency)

Ever improving understanding of detection efficiency
(see Kessel et al. [OTN](#))

3. Predation of tagged fish not well addressed!



THE PROBLEM:

How to identify predation using non-sensor acoustic tags and incorporate into survival estimates

RESEARCH OBJECTIVES:

1. Propose and test a method to identify predation using non-sensor acoustic tags
2. Examine the impact of this predation on survival estimates

Analytical Methods

Identification of predation

- Premise: Assume that salmon and SB behave differently
- Euclidean distance matrix of movement parameters for each tagged fish
- 11 and 9 parameters in 2008, 2011 (entire track of animal)
- Hierarchical cluster analysis of migratory behaviour data



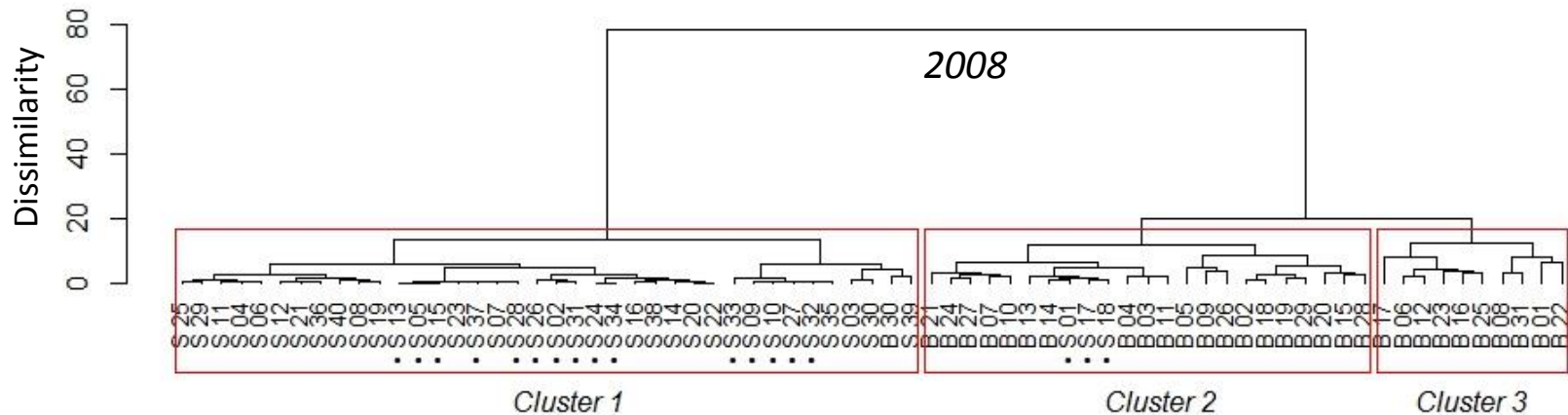
Contrasting survival estimates with / without predation

1. Ratio-based (raw observed data)
2. CJS mark-recapture model (detection efficiency)
3. Cluster analysis (predation)
4. Combined Cluster – CJS (detection efficiency and predation)

Results

- Predation suspected
- Cluster results revealed structuring
- Clustering suggested that three (2008) and six (2011) smolts “behaved” similar to striped bass
- In each year, two were re-assigned from survivors to fatalities
- Impact on survival estimates?

Year	Ratio method	CJS	Cluster analysis-adjusted ratio	Cluster analysis - adjusted CJS
2008	46.3%	51.8%	39.0%	43.6%
2011	27.3%	36.4%	27.3%	24.3%



Conclusions

- Clear that predation can confound survival estimates
- Need to better address predation to provide more reliable survival estimates to resource managers
- Analytical approaches to identifying predation too limited by logistics, precision and assumptions ... technological advancements preferential (i.e. smaller sensors, new sensors)

