BURIED TREASURES: USE OF A HIGH SITE FIDELITY SPECIES TO INFER REGIONAL OTOLITH MICROCHEMISTRY PATTERNS

PICES 2026

October 27th, 2026

Presented by: Micah Quindazzi

INTRODUCTION

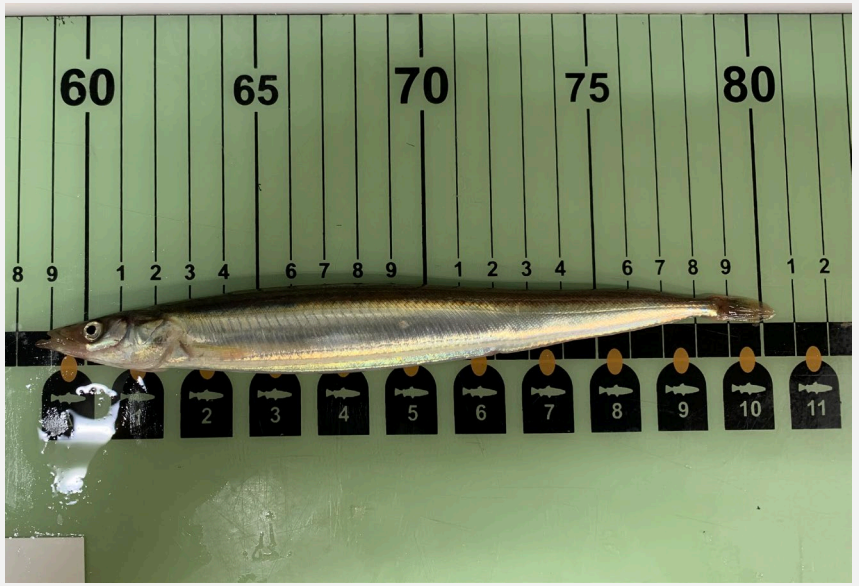
- Within a given species there can be many populations
- Fish populations exchange genetic information in two major ways

Dispersal



Migration





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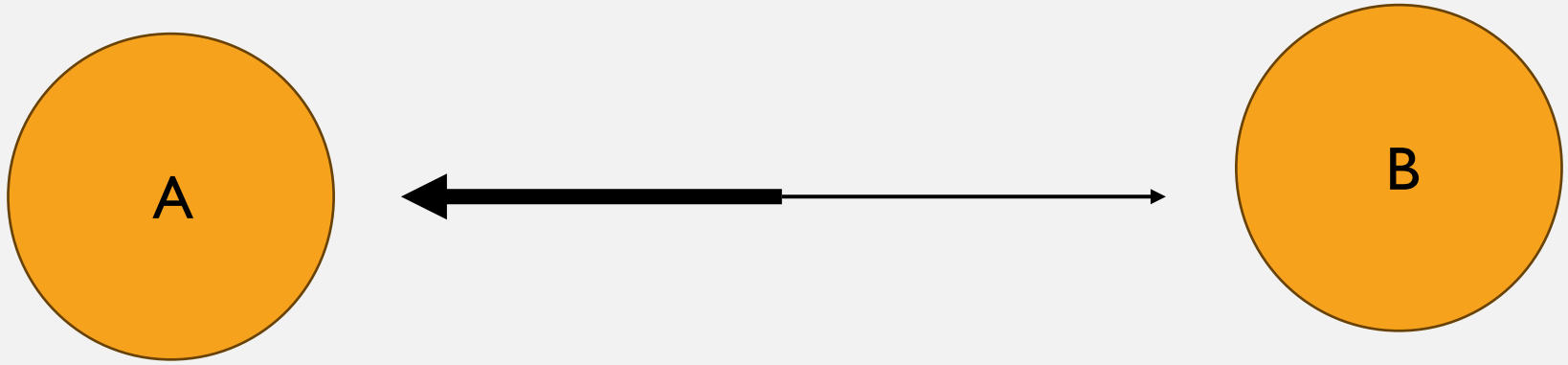
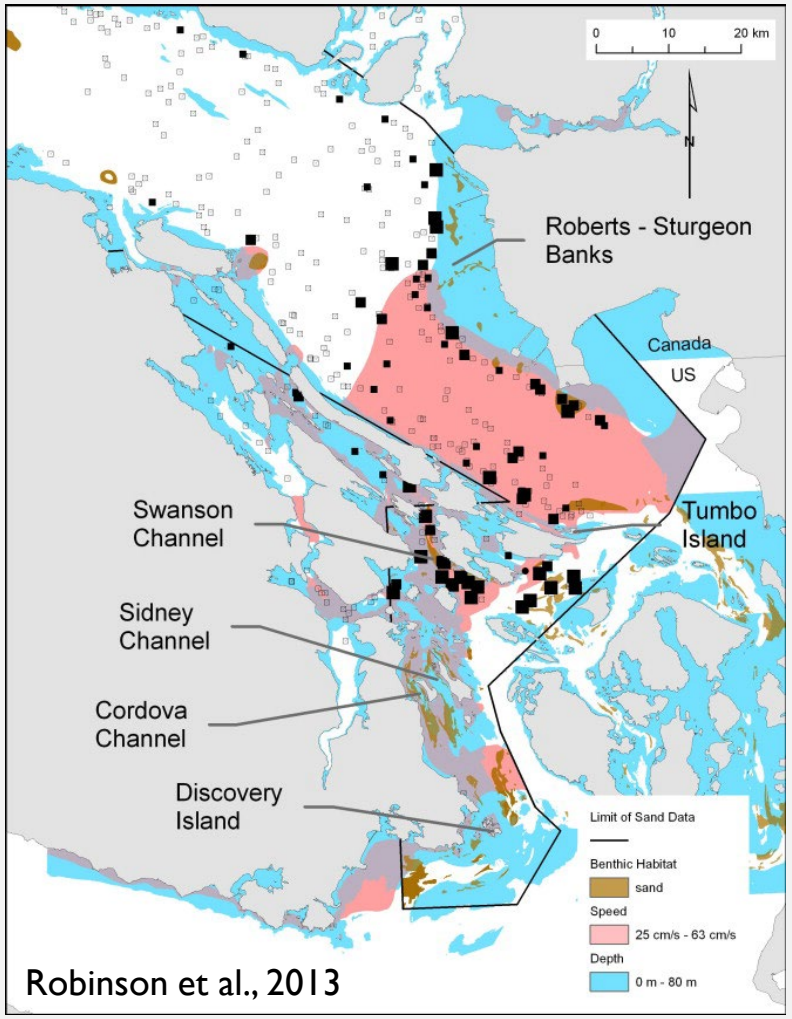


INTRODUCTION

- For many fish species, suitable habitat is patchy
  - Coral reefs
  - Kelp forests
  - Tidal/subtidal, non-coarse, sandy substrate



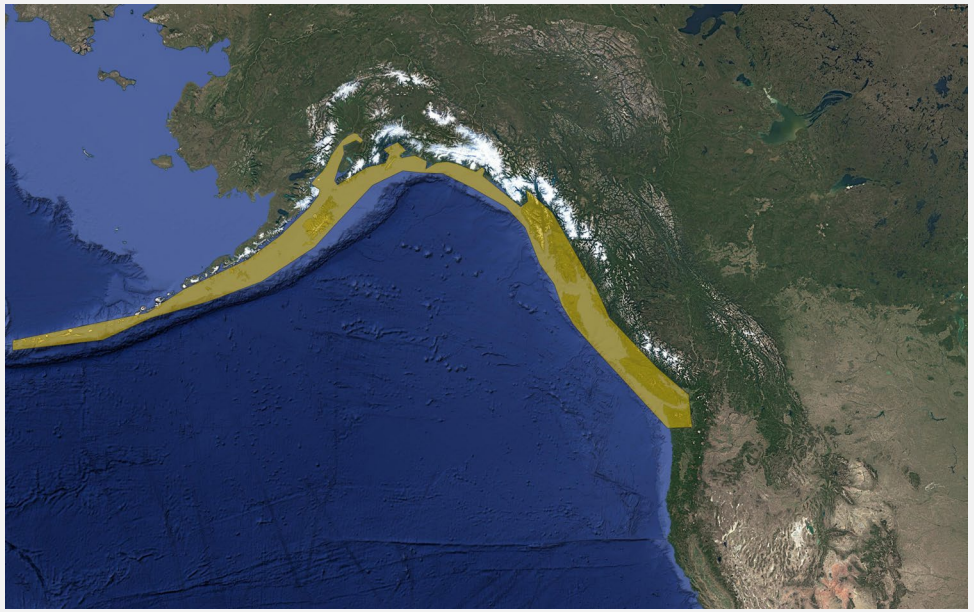


Robinson et al., 2013

INTRODUCTION

- For many fish species, suitable habitat is patchy
- Pacific sand lance (*Ammodytes personatus*) lack swim bladders
- These fish occupy very small home ranges (~5km) and use the same patch of habitat for months at a time

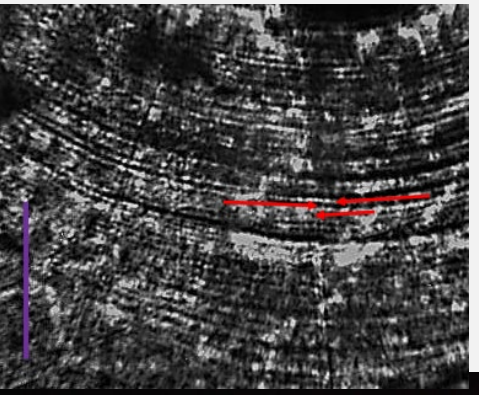
Dispersal

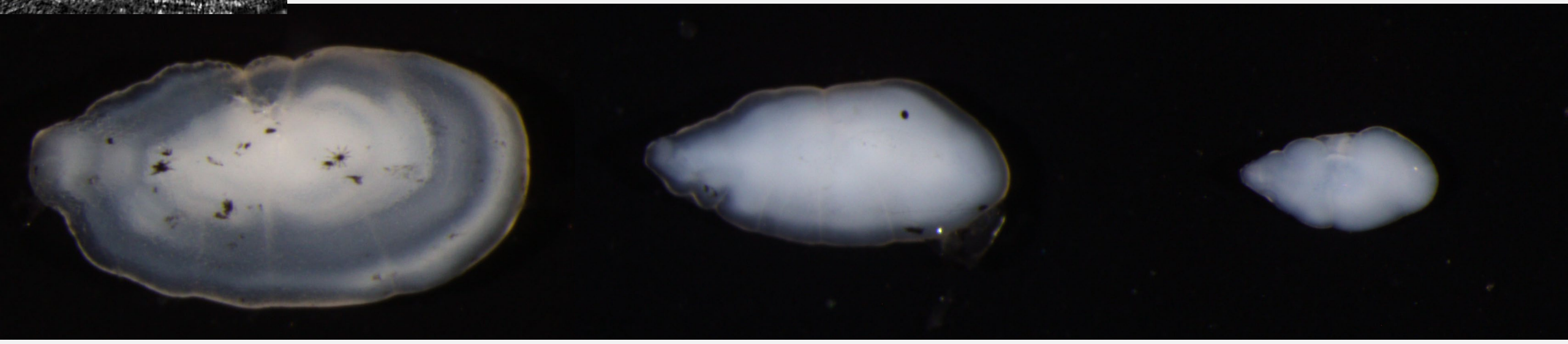




INTRODUCTION

- Difficult to track larval fish movements
- We can use intrinsic or inherent tags
- Otoliths are useful due to the daily accretion of material and their chemical inertness
- We can target layers related to prior stages of their life





OBJECTIVES

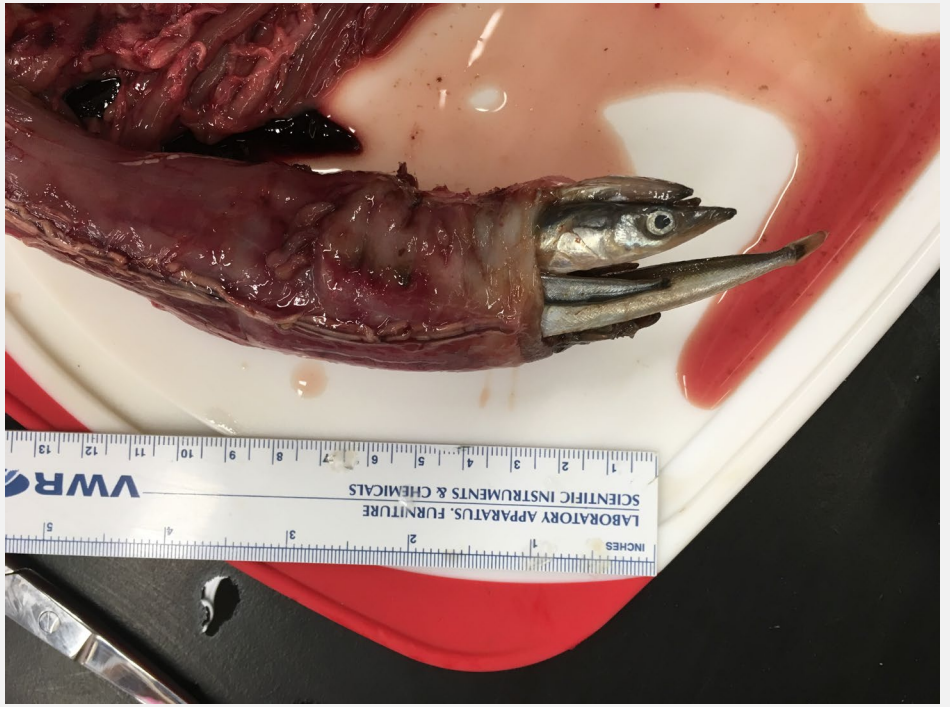
- Determine the differences in microchemistry between regions we collect Pacific sand lance from in Southern British Columbia

- Identify patterns in natal otolith chemistry to highlight larval dispersal pathways

MATERIALS AND METHODS

- Collected otoliths from 2018-2020 using two methods





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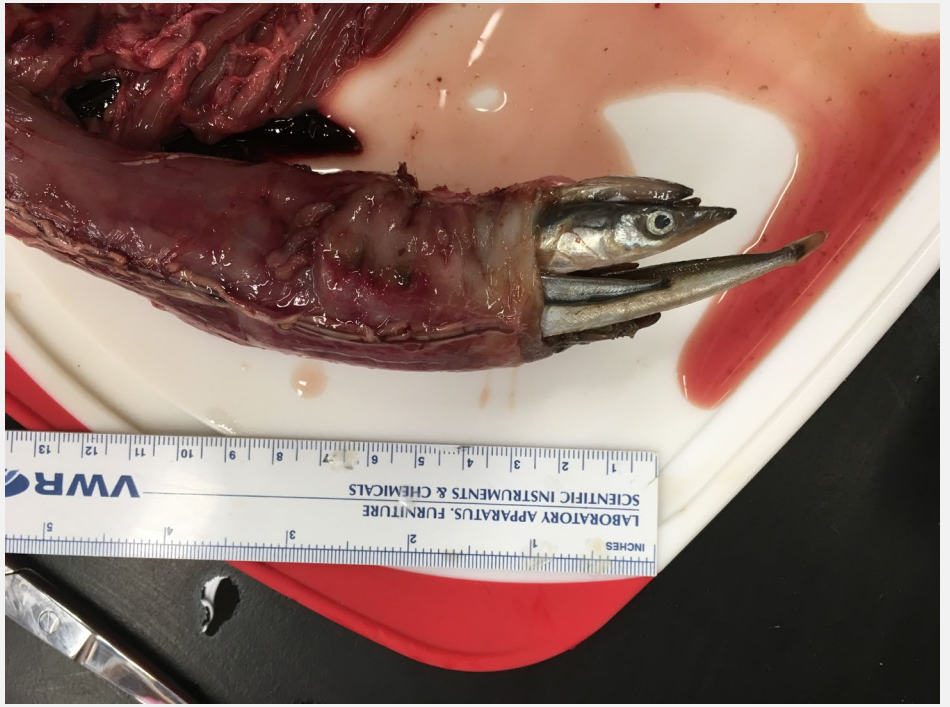
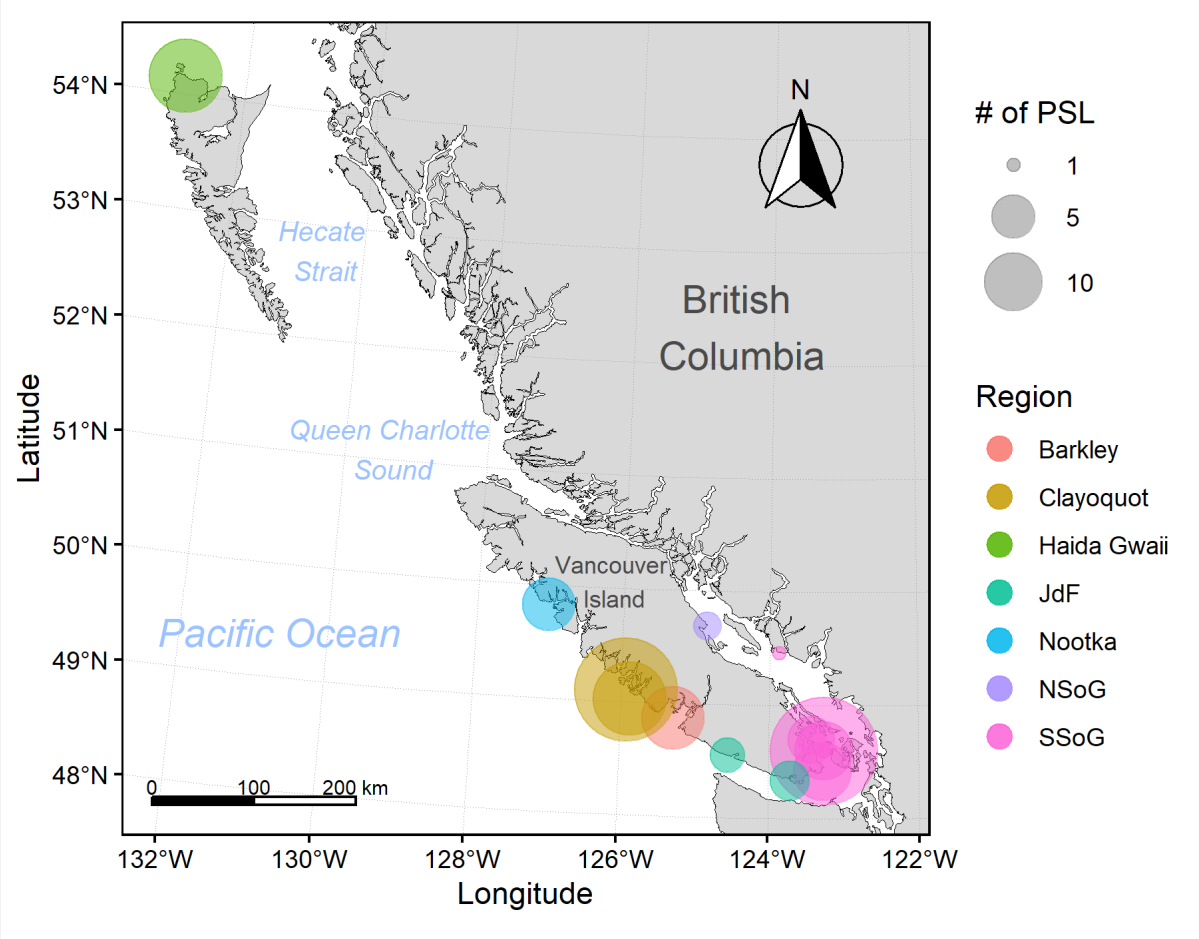


MATERIALS AND METHODS



MATERIALS AND METHODS

- Used Laser Ablation Inductively Coupled Plasma Mass Spectrometry to measure trace element concentrations

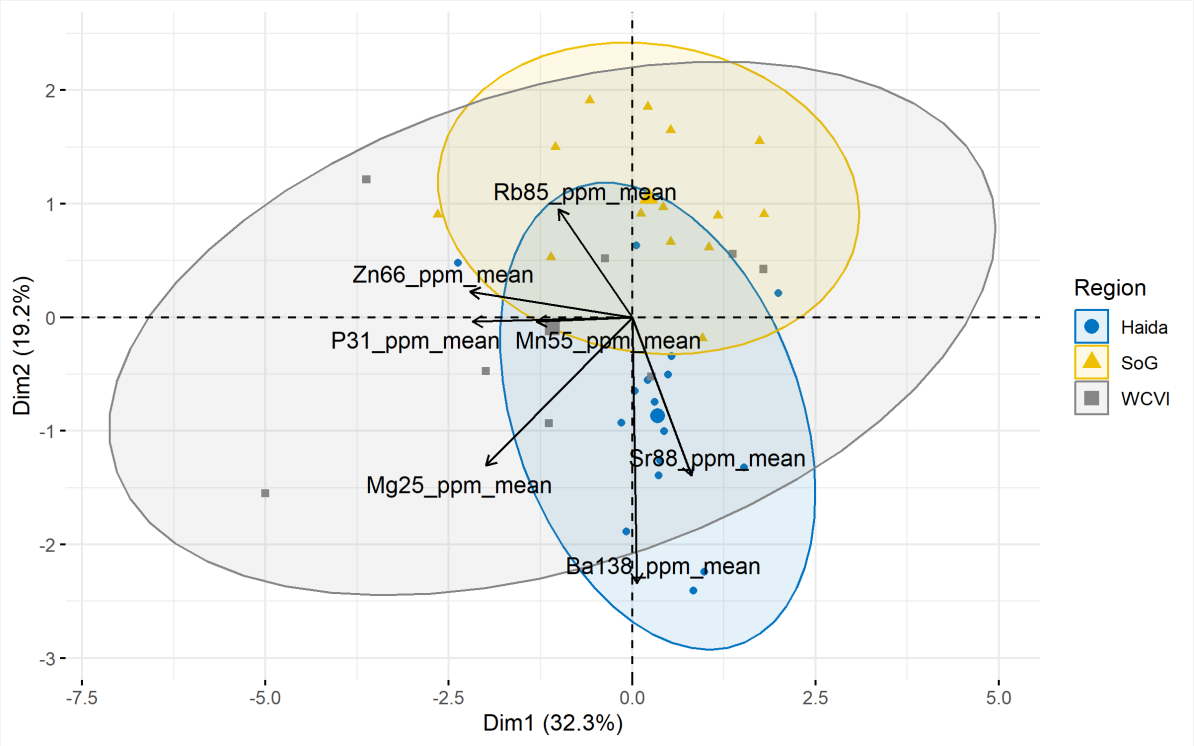


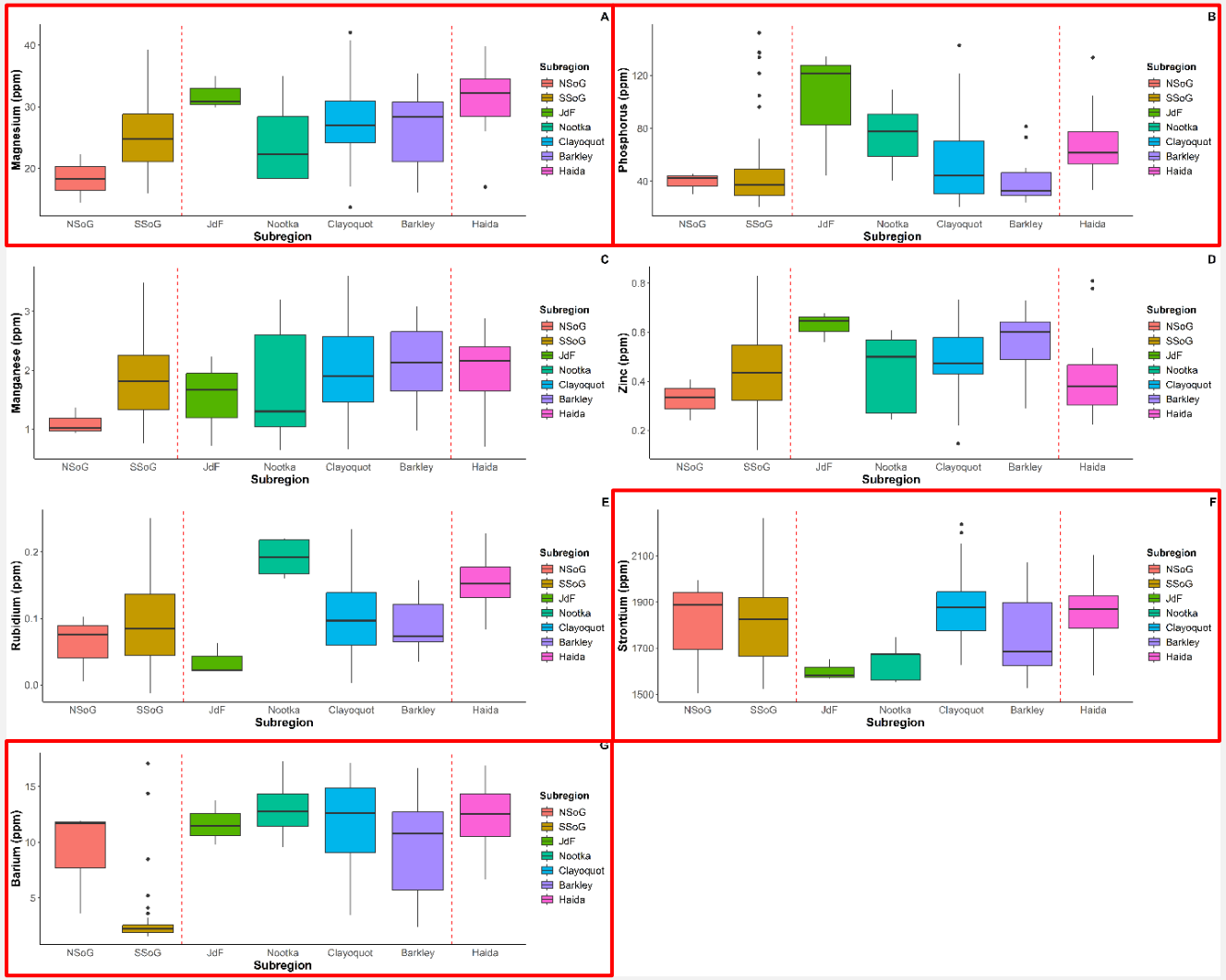
MATERIALS AND METHODS

- Compared regional differences in chemistry between the summer and winter layers using PCA and PERMANOVA

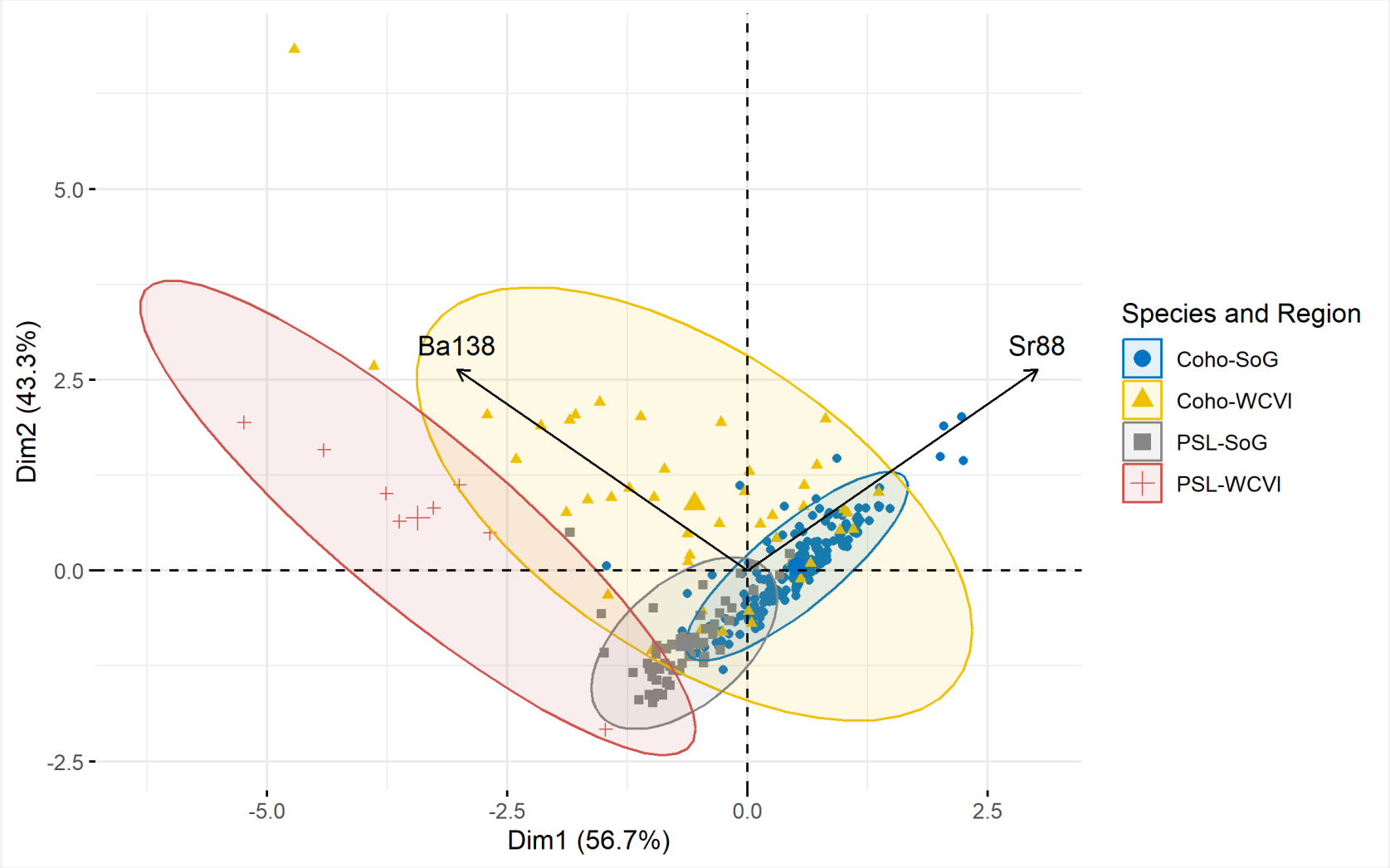
- Identified regional natal signals using RF cluster analysis

RESULTS

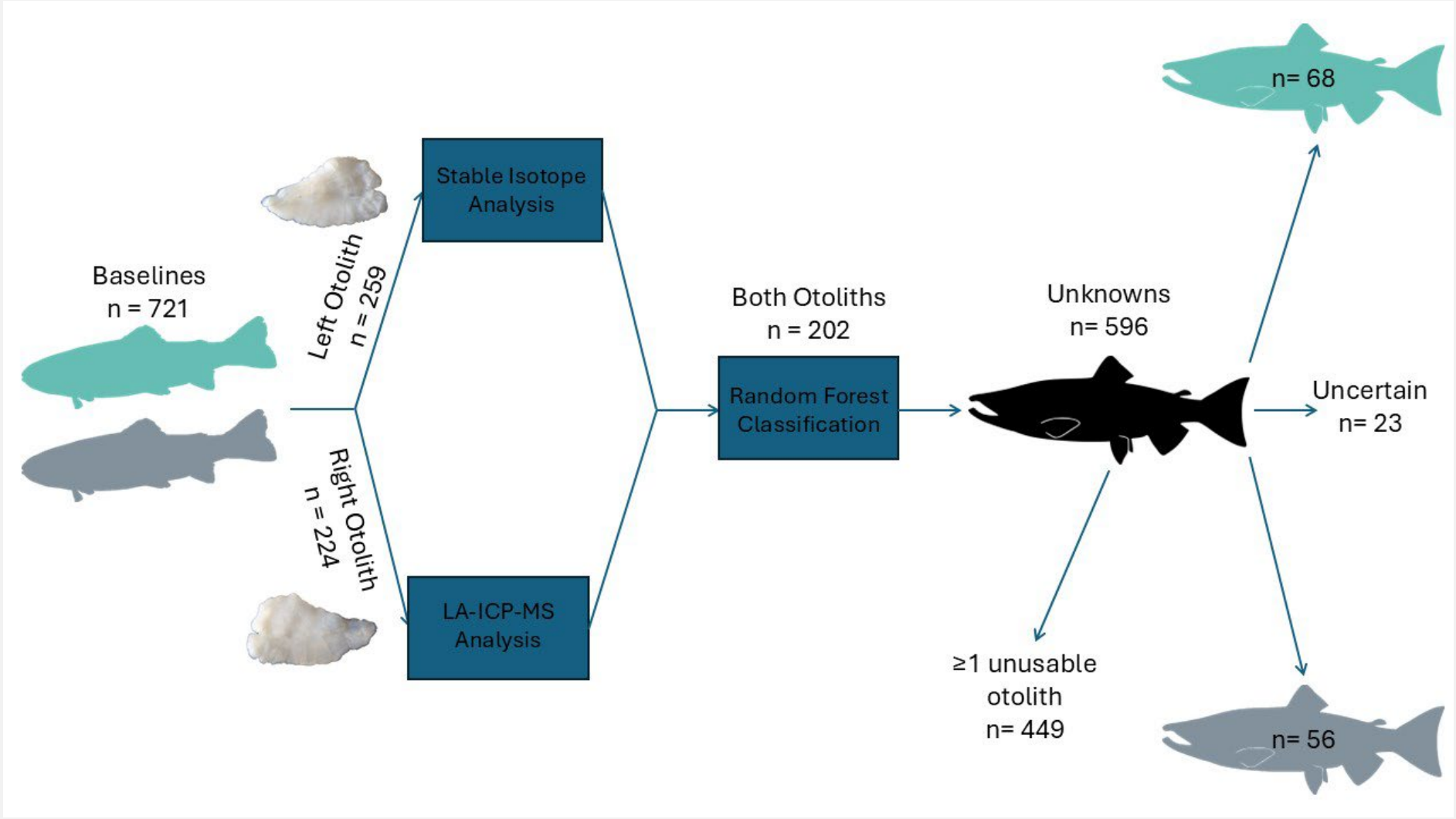

Rb85_ppm_mean
Zn66_ppm_mean
P31_ppm_mean
Mn55_ppm_mean
Sr88_ppm_mean
Mg25_ppm_mean
Ba138_ppm_mean
Dim1 (32.3%)
Dim2 (19.2%)
Region
Haida
SoG
WCVI


A
Magnesium (ppm)
B
Phosphorus (ppm)
C
Manganese (ppm)
D
Zinc (ppm)
E
Rubidium (ppm)
F
Strontium (ppm)
G
Barium (ppm)
NSoG
SSoG
JdF
Nootka
Clayoquot
Barkley
Haida
Subregion

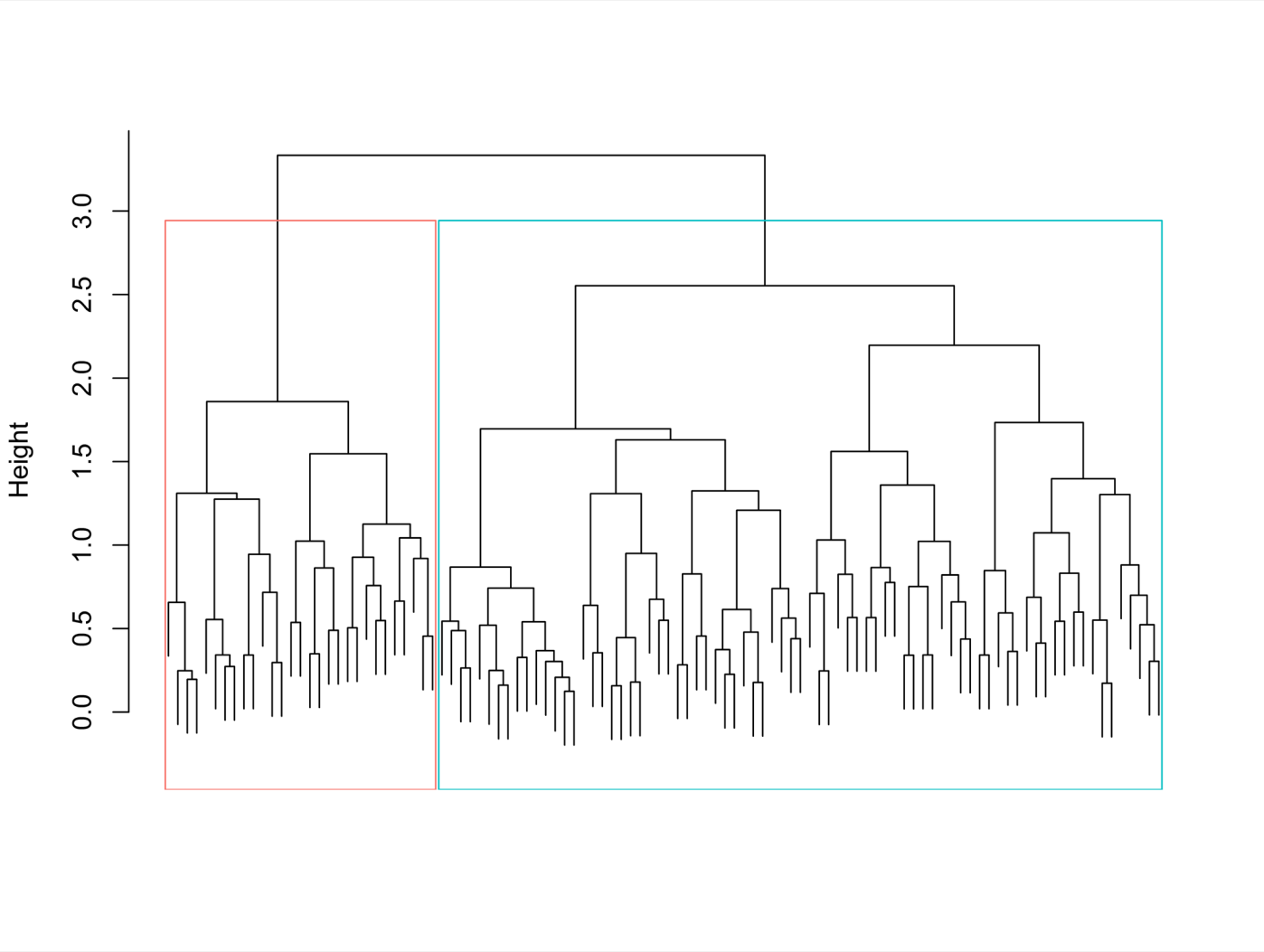
RESULTS


Ba138
Sr88
Species and Region
Coho-SoG
Coho-WCVI
PSL-SoG
PSL-WCVI
Dim2 (43.3%)
Dim1 (56.7%)
5.0
2.5
0.0
-2.5
-5.0
-2.5
0.0
2.5

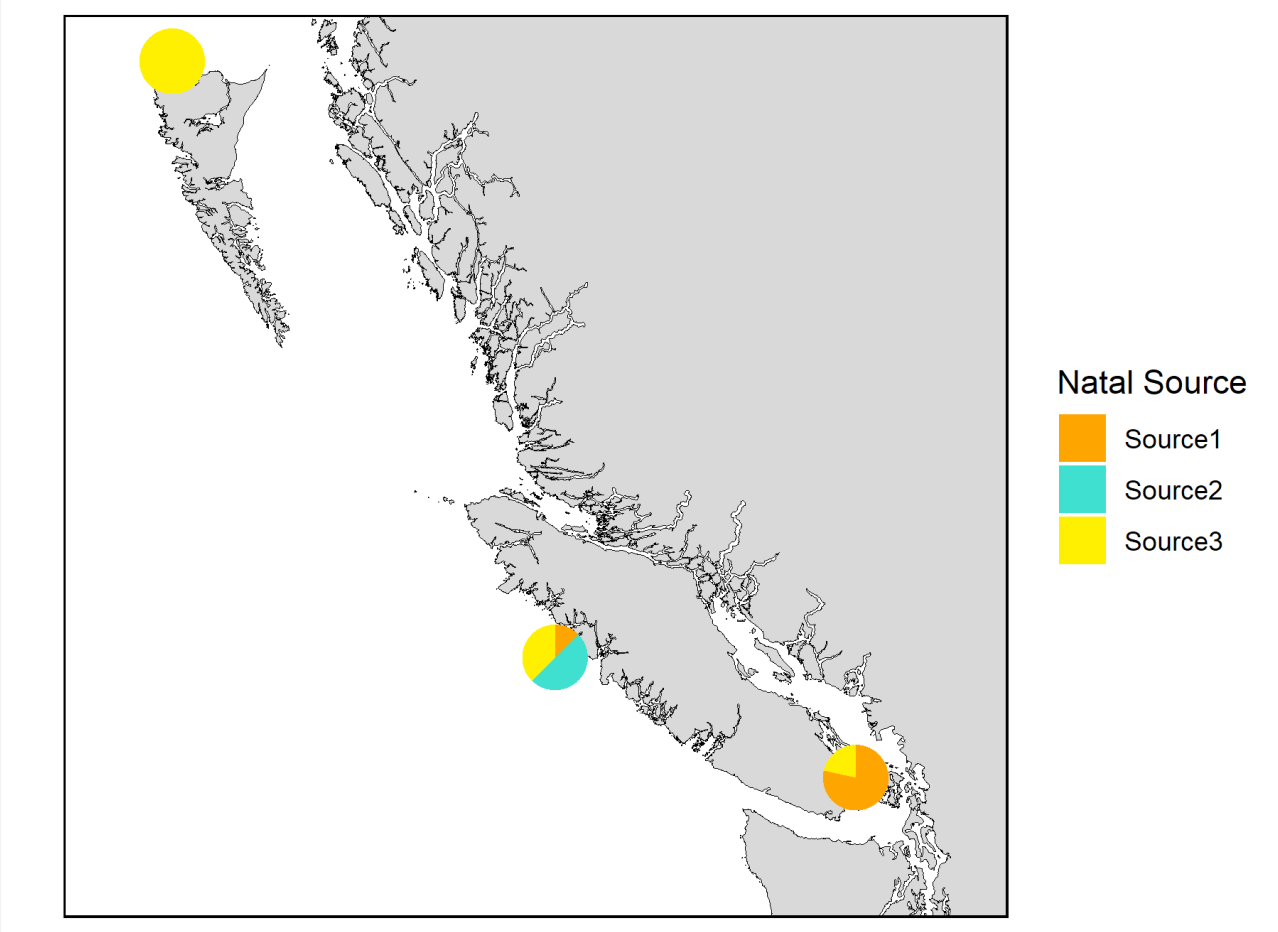
RESULTS


Baselines
n = 721
Left Otolith
n = 259
Right Otolith
n = 224
Stable Isotope Analysis
LA-ICP-MS Analysis
Both Otoliths
n = 202
Random Forest Classification
Unknowns
n= 596
n= 68
Uncertain
n= 23
≥1 unusable otolith
n= 449
n= 56

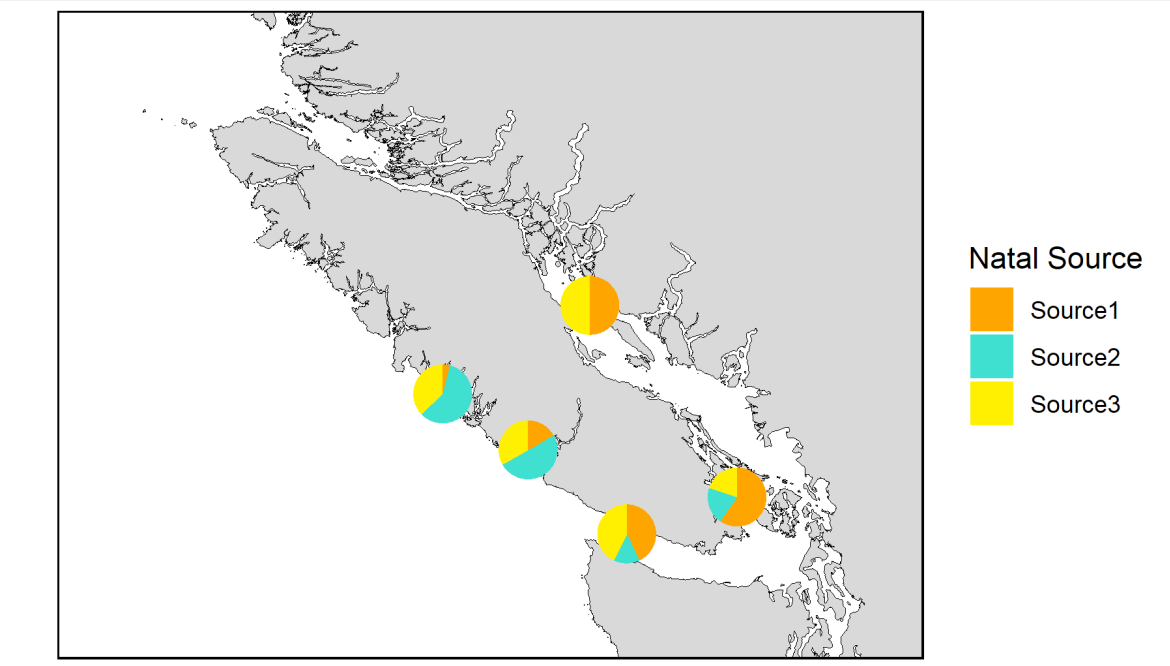
RESULTS



RESULTS



2018



2020

CONCLUSIONS

- Otolith microchemistry can be used to identify Pacific sand lance from different regions
- Chemical patterns appear to be more related to individuals captured at a small spatial scale
- Natal chemistry indicates there is a flow of larvae out of the Strait of Georgia each year and some flow of WCVI individuals in just one year

ACKNOWLEDGEMENTS

- My collaborators on this work
  - Dr. Doug Bertram
  - Dr. Cliff Robinson
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- Project funders





PACIFIC SALMON FOUNDATION

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Pêches et Océans Canada