

Chinook salmon diets reveal historical trends in forage fish distribution and availability



May 4-8, 2026

PICES Small Pelagic Fish Symposium

Nathanael Tabert, Wesley Greentree,

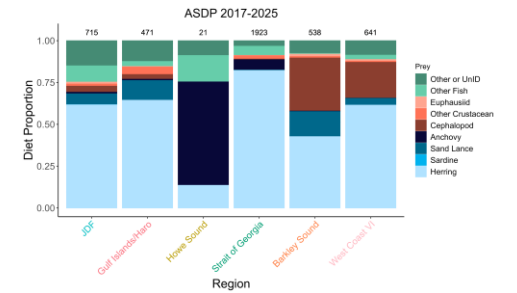
Will Duguid, Francis Juanes



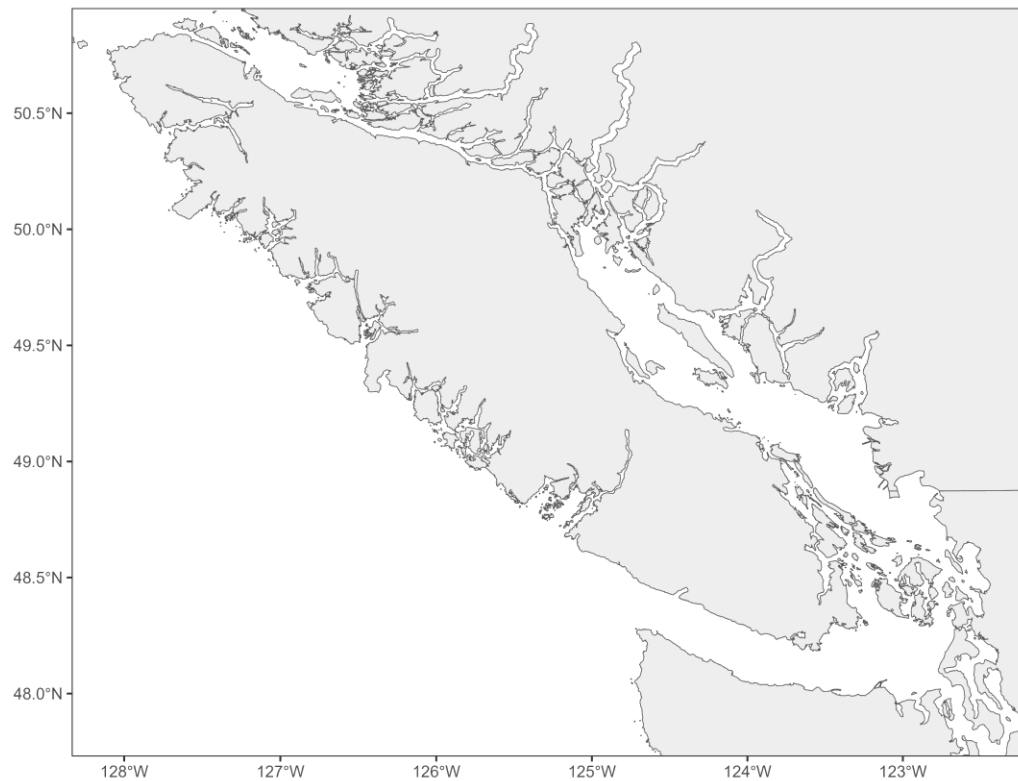
The Adult Salmon Diet Program (ASDP)



Community Science!

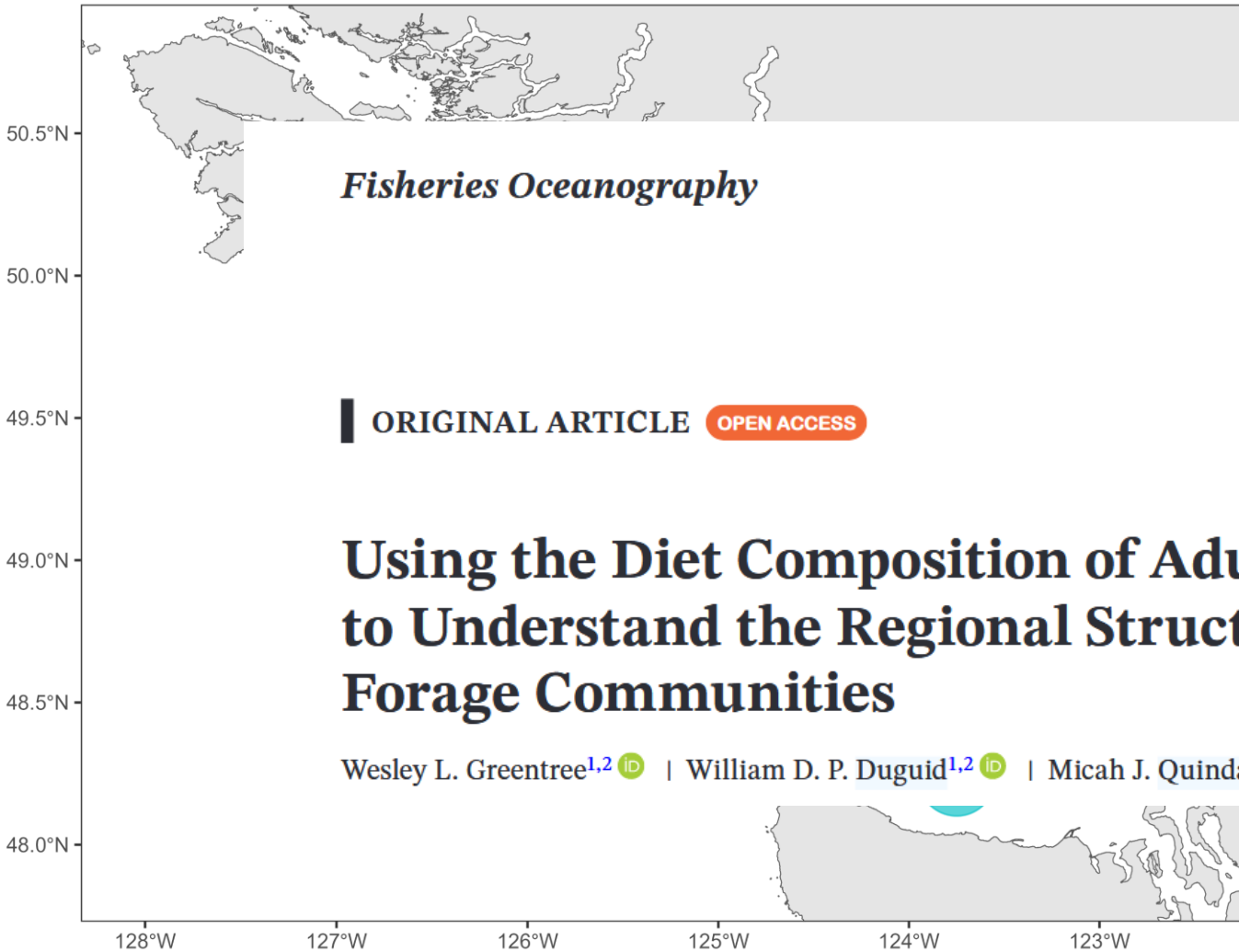


ASDP Study Area



You are here! ★

ASDP Sampling Distribution

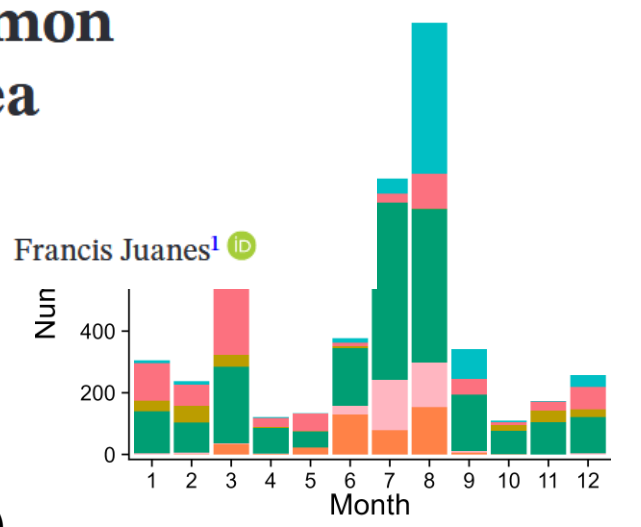
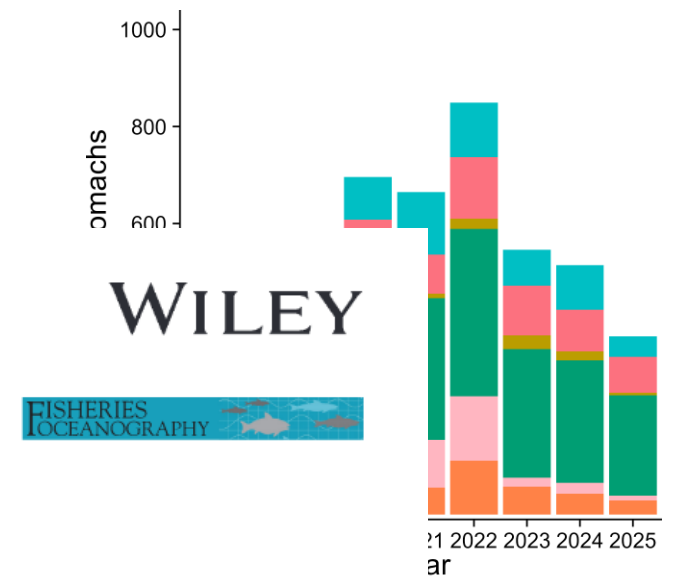


ORIGINAL ARTICLE **OPEN ACCESS**

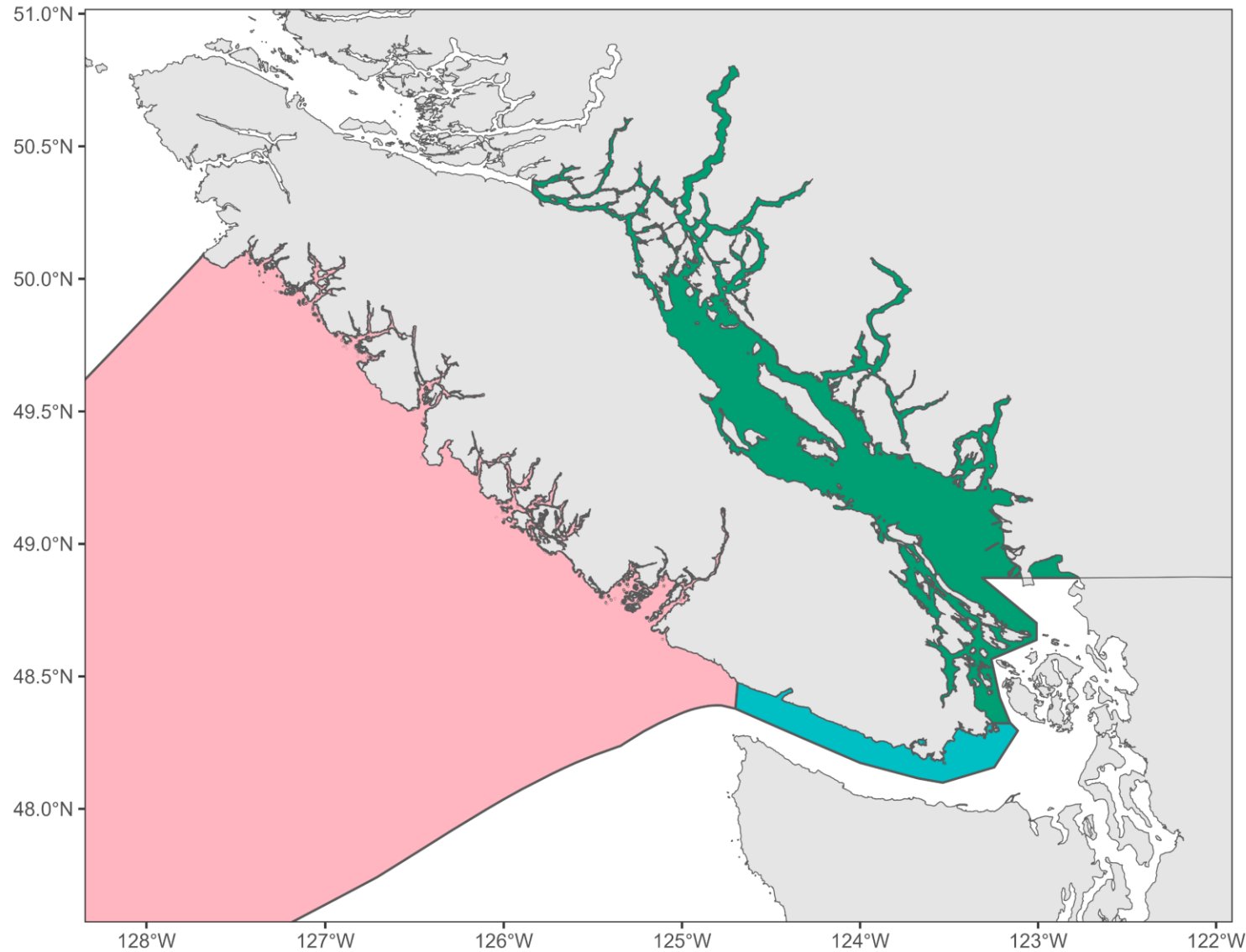
Using the Diet Composition of Adult Chinook Salmon to Understand the Regional Structure of Salish Sea Forage Communities

Wesley L. Greentree^{1,2} | William D. P. Duguid^{1,2} | Micah J. Quindazzi^{1,2,3} | Bridget Maher¹ | Francis Juanes¹

Salish Sea regional groupings based on Greentree et al. 2026 (Fisheries Oceanography)



Regional Groupings



Region

- Strait of Juan de Fuca
- Strait of Georgia
- West Coast Vancouver Island

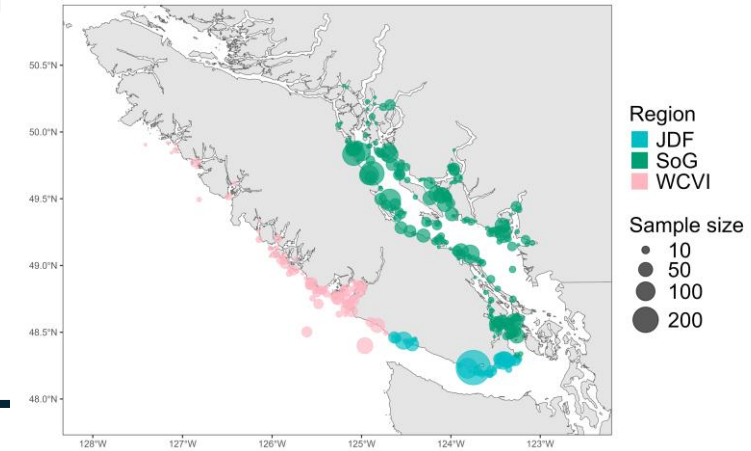
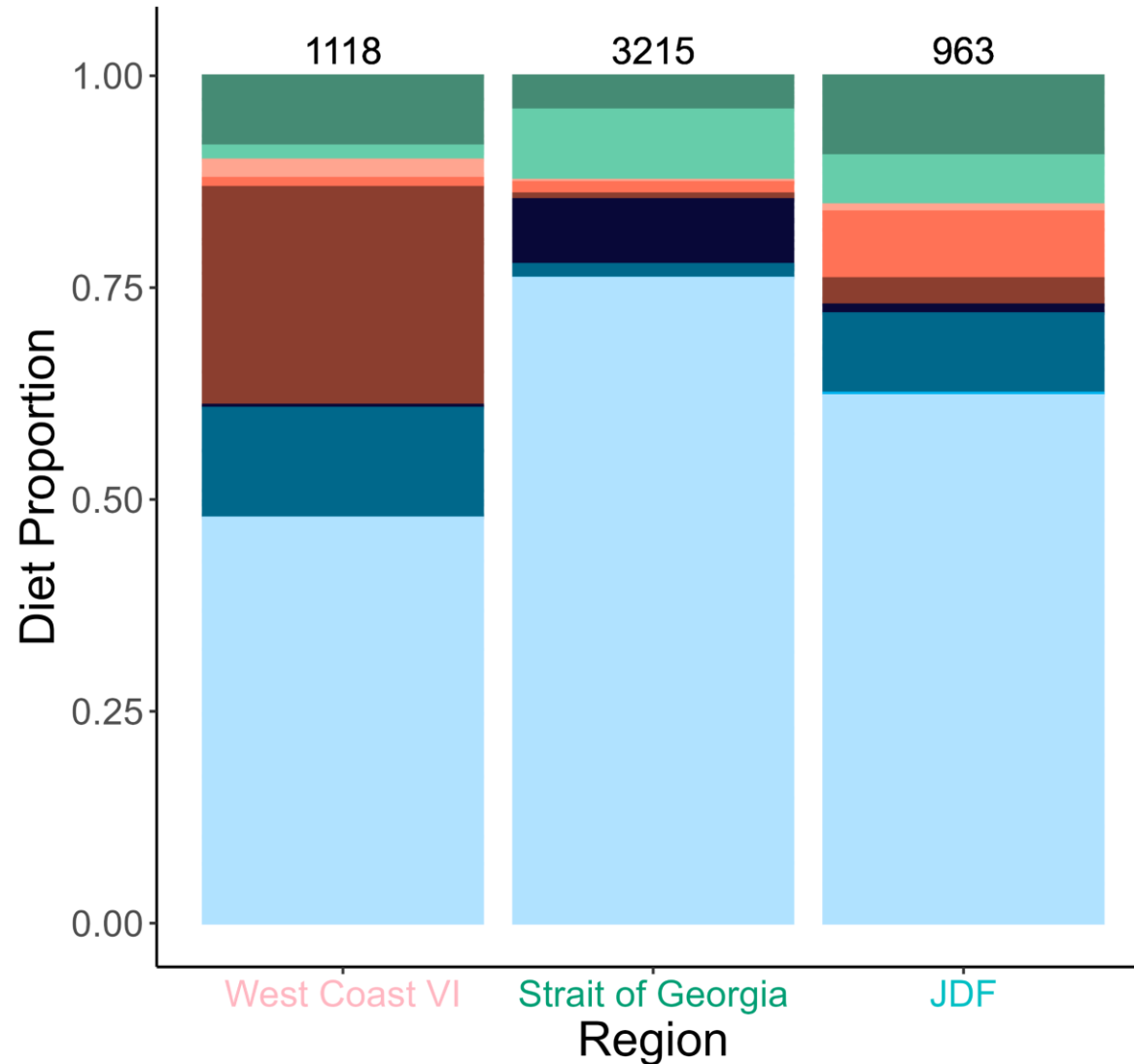
The Stomach Content Continuum *Not to scale



Region								WCVI	Strait of Georgia	Juan de Fuca Strait
Sardine										
Herring										
Sand Lance										
Euphausiids										
Other										

ASDP Data: Diet Proportions

ASDP 2017-2025



The Stomach Content Continuum *Not to scale

ASDP
(2017-Present)



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The Stomach Content Continuum

*Not to scale

Data Gap
(1969-
2016)

ASDP
(2017-Present)



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The Stomach Content Continuum

*Not to scale

Williamson
1930
(1926-1929)

H

Data Gap
(1969-
2016)

ASDP
(2017-Present)



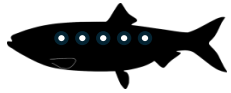
Region								WCVI	Strait of Georgia	Juan de Fuca Strait
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Herring										
Sand Lance										
Euphausiids										
Other										

Historical Data: Williamson 1930

Highlights:



Sand lance



Sardine (1926)



Euphausiids (Spring)

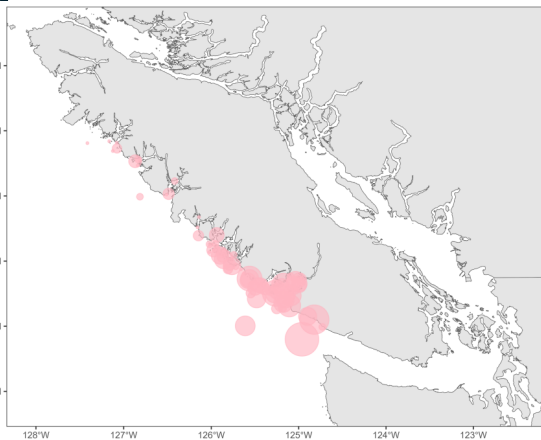


Herring

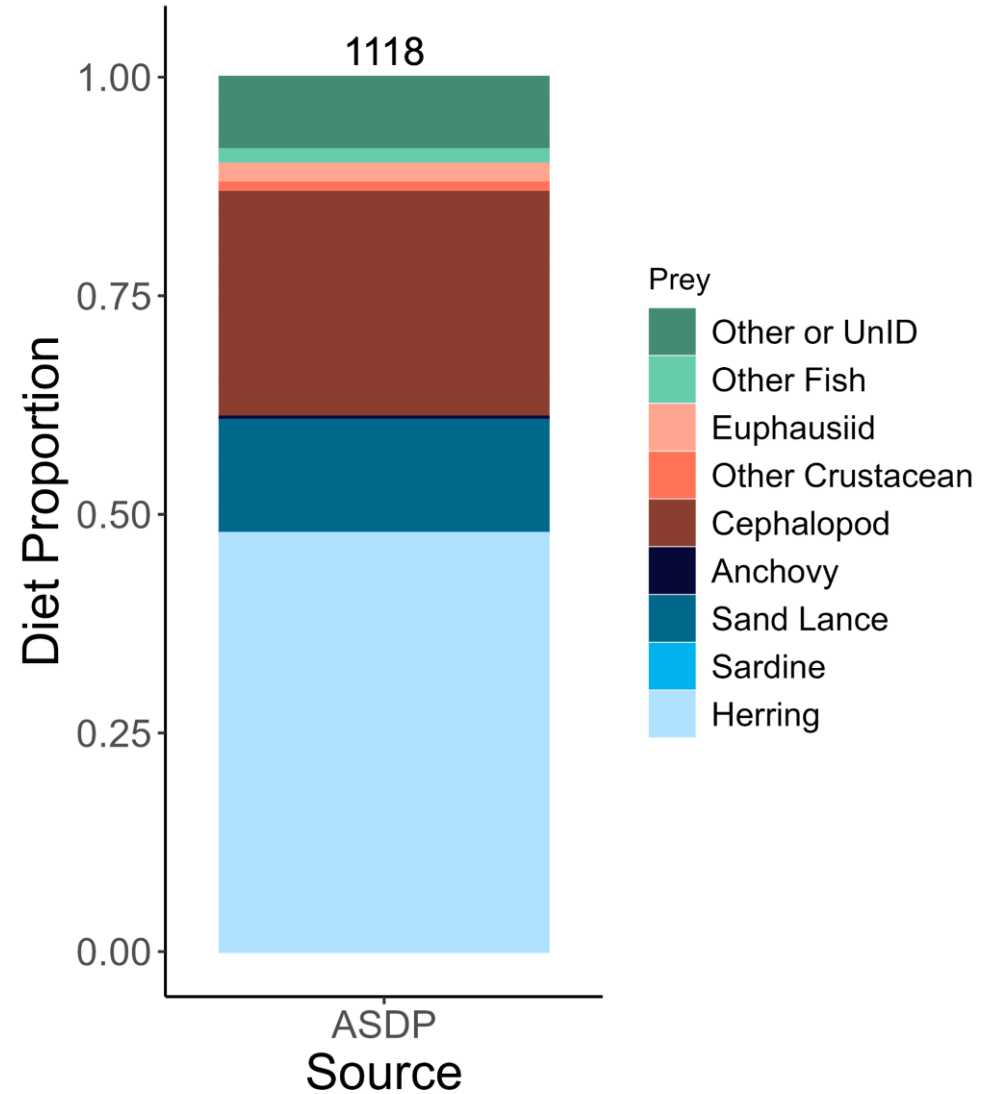


Squid

Inlets



West Coast VI



The Stomach Content Continuum

*Not to scale

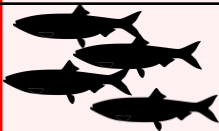

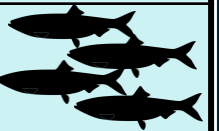
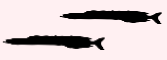





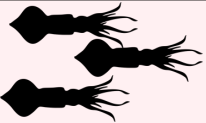

Williamson
1930
(1926-1929)

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ASDP
(2017-Present)



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The Stomach Content Continuum

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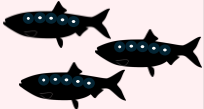

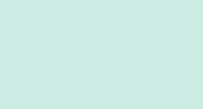
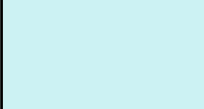
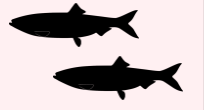



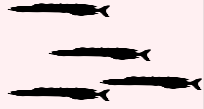
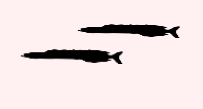

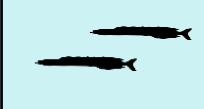




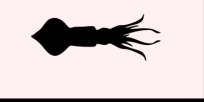


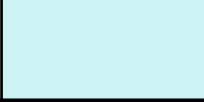
Williamson
1930
(1926-1929)

H

Data Gap
(1969-
2016)

ASDP
(2017-Present)



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The Stomach Content Continuum

*Not to scale

Williamson
1930
(1926-1929)

Chapman
1936
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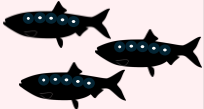

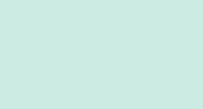
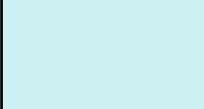




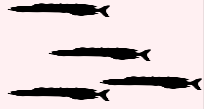
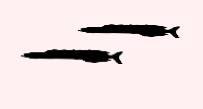

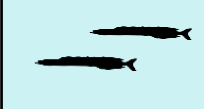







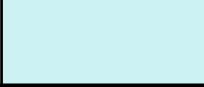
1926  2026

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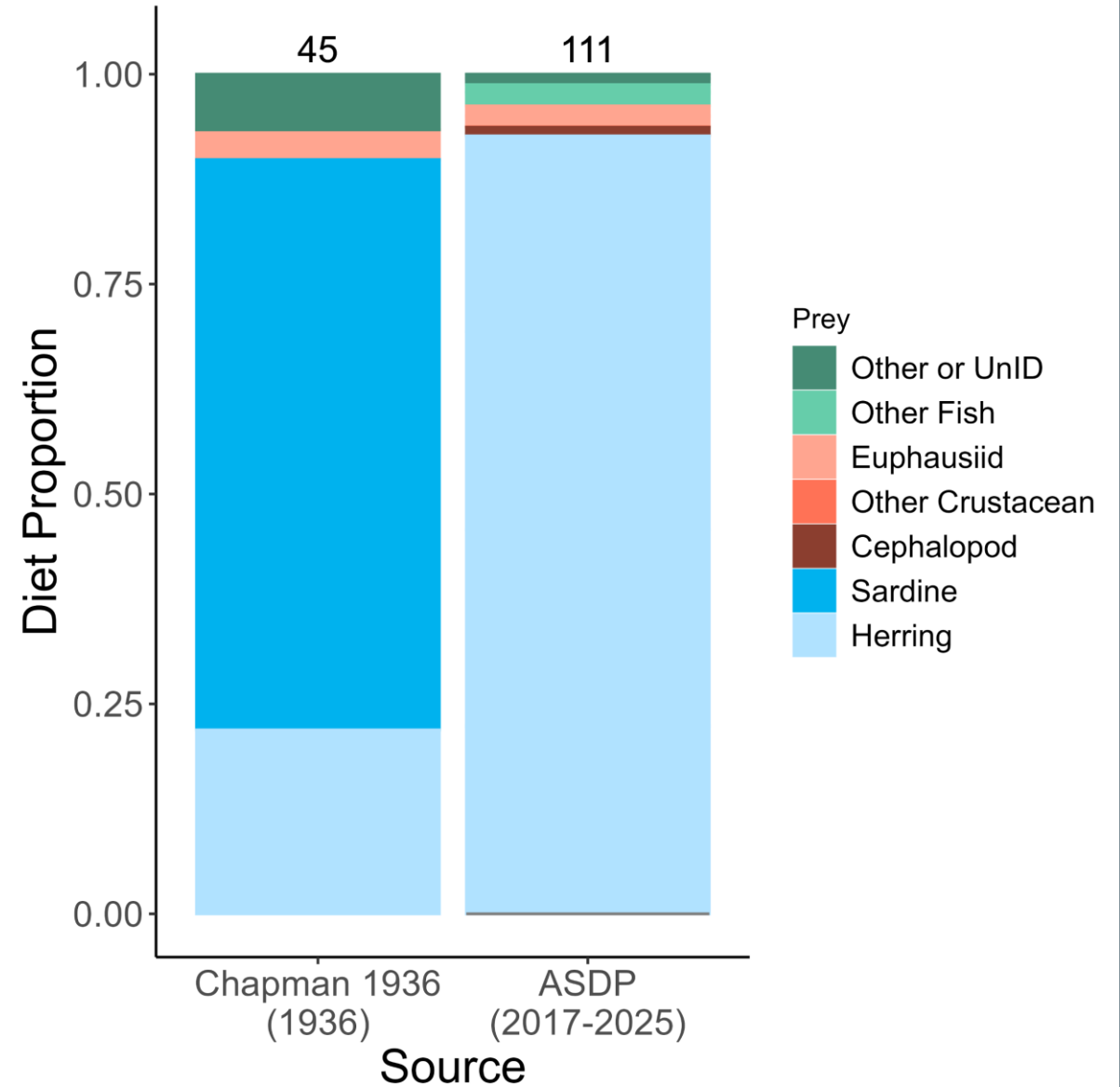
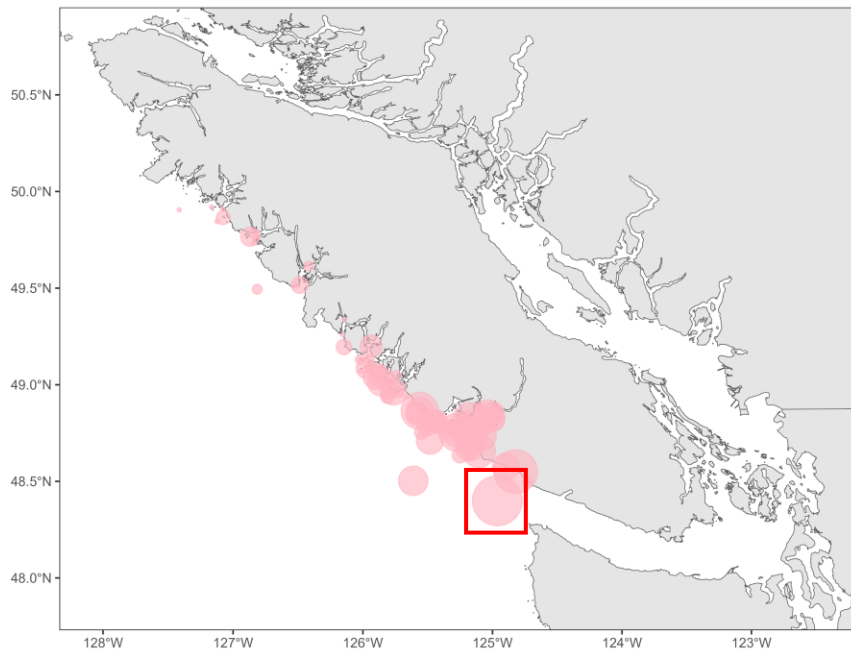
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Region	WCVI						WCVI	Strait of Georgia	Juan de Fuca Strait
Sardine									
Herring									
Sand Lance									
Euphausiids									
Other									

Historical Data: Chapman 1936

Swiftsure Bank only



The Stomach Content Continuum

*Not to scale

Williamson
1930
(1926-1929)

Chapman
1936
(1936)

Data Gap
(1969-
2016)

ASDP
(2017-Present)

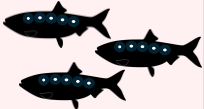

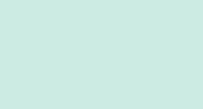
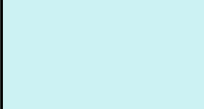
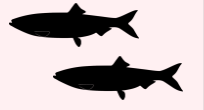



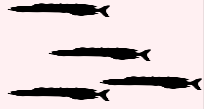
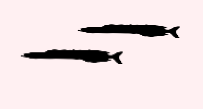

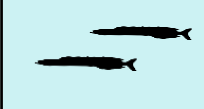




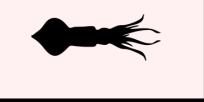


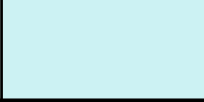
1926  2026

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Euphausiids									
Other									

The Stomach Content Continuum

*Not to scale

Williamson
1930
(1926-1929)

Chapman
1936
(1936)

Data Gap
(1969-
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ASDP
(2017-Present)

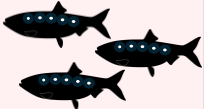
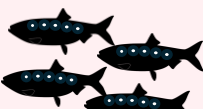

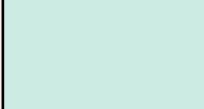
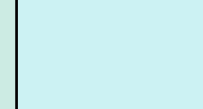





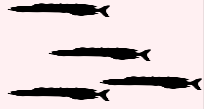
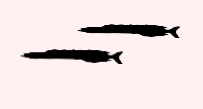










1926  2026

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Williamson
1930
(1926-1929)

Chapman
1936
(1936)

Pritchard and
Tester 1944
(1939-1942)

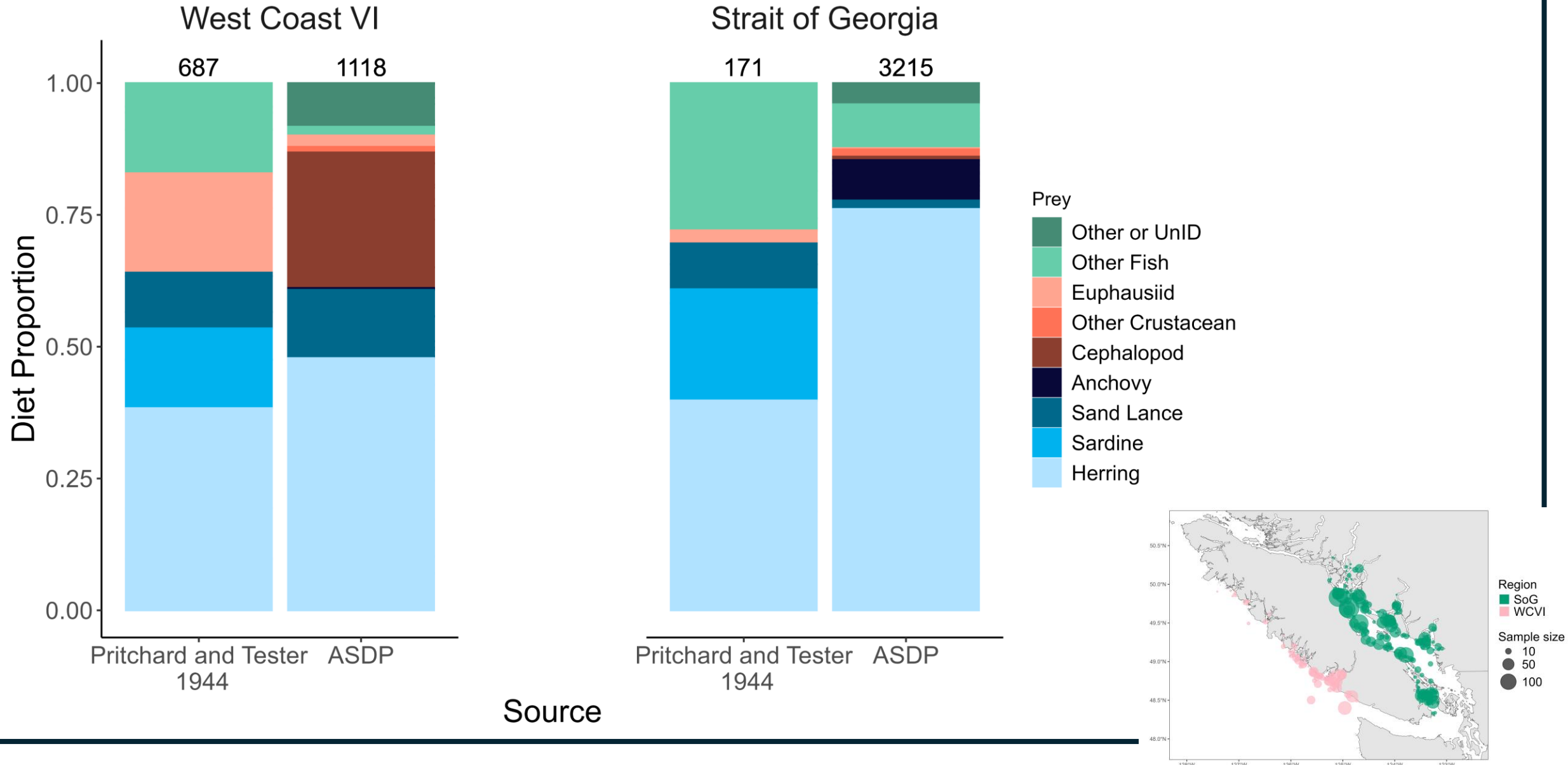
Data Gap
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ASDP
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Historical Data: Pritchard and Tester 1944



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ASDP
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1926



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Chapman
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Pritchard and
Tester 1944
(1939-1942)

Prakash
1962
(1957)

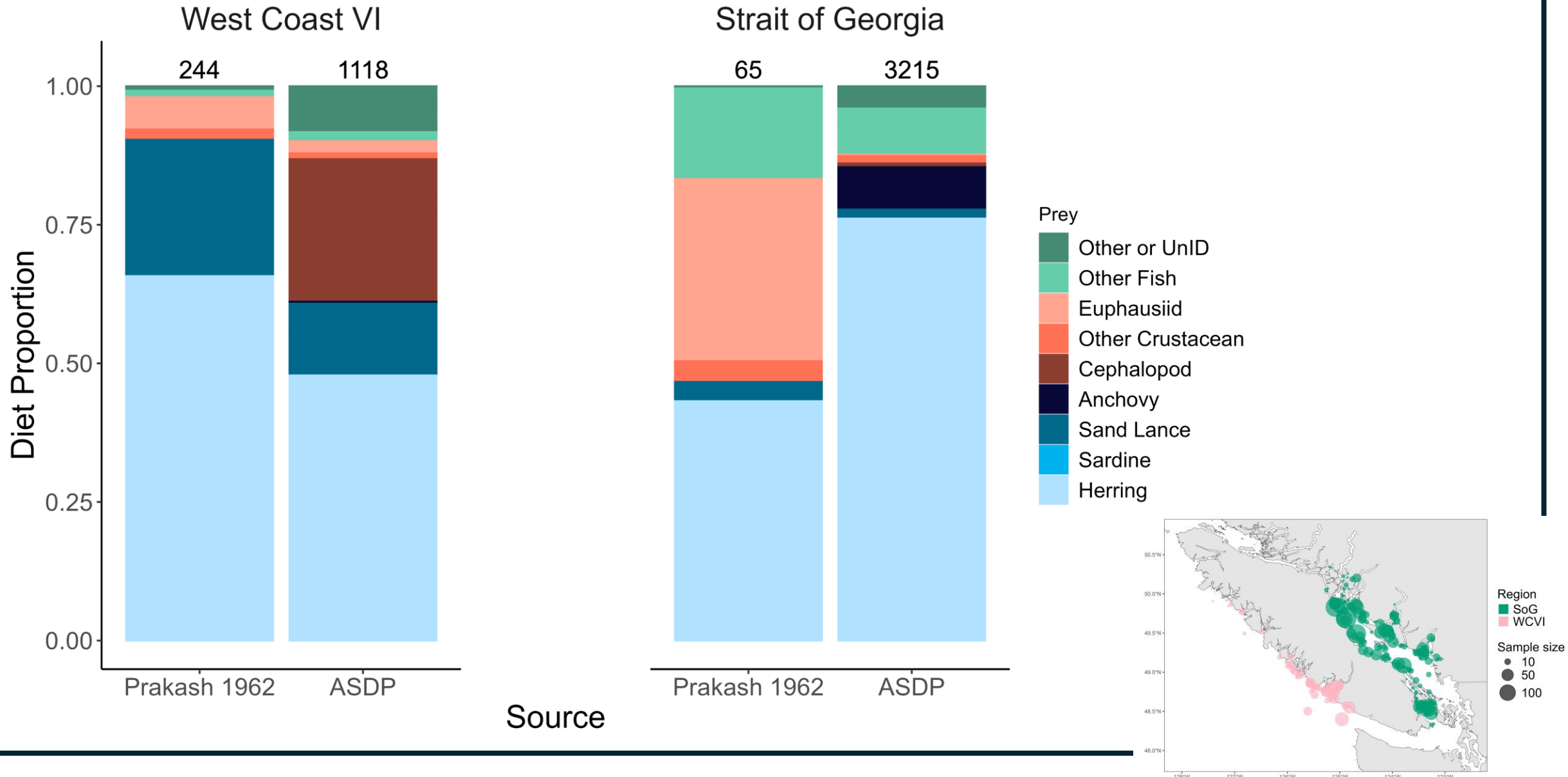
Data Gap
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ASDP
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Historical Data: Prakash 1962



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(1939-1942)

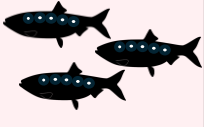
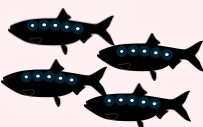
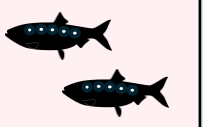
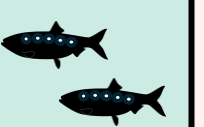

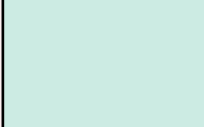
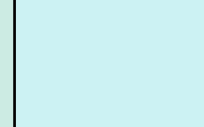
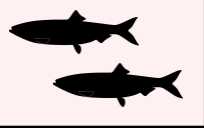
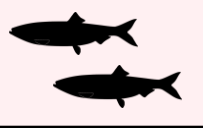
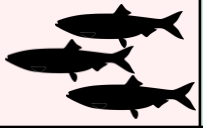
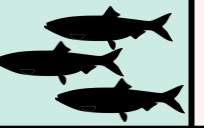
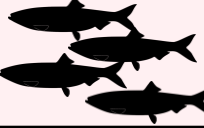

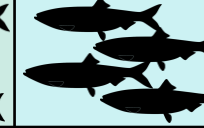
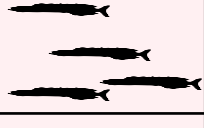
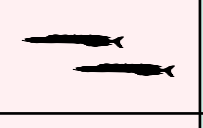
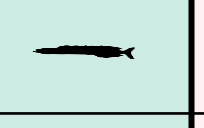
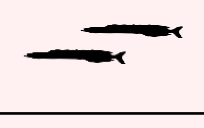
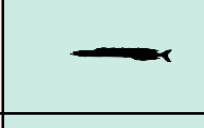
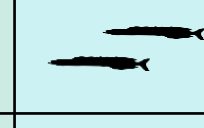











Prakash
1962
(1957)

Data Gap
(1969-
2016)

ASDP
(2017-Present)

1926  2026



Region	WCVI	WCVI (Swiftsure)	WCVI	Strait of Georgia	WCVI	Strait of Georgia		WCVI	Strait of Georgia	Juan de Fuca Strait
Sardine										
Herring										
Sand Lance										
Euphausiids										
Other										

The Stomach Content Continuum

*Not to scale

Williamson
1930
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Chapman
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Pritchard and
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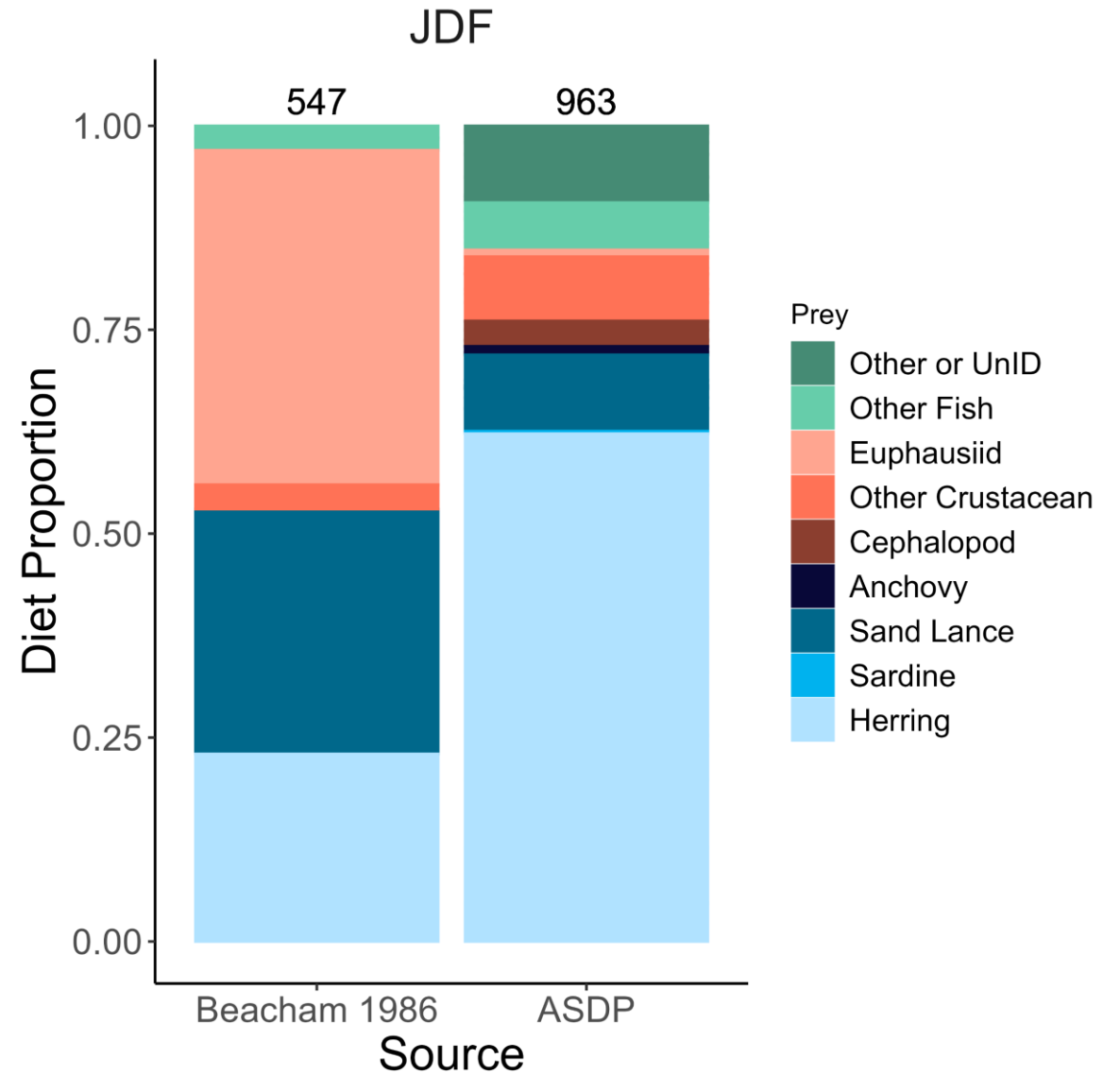
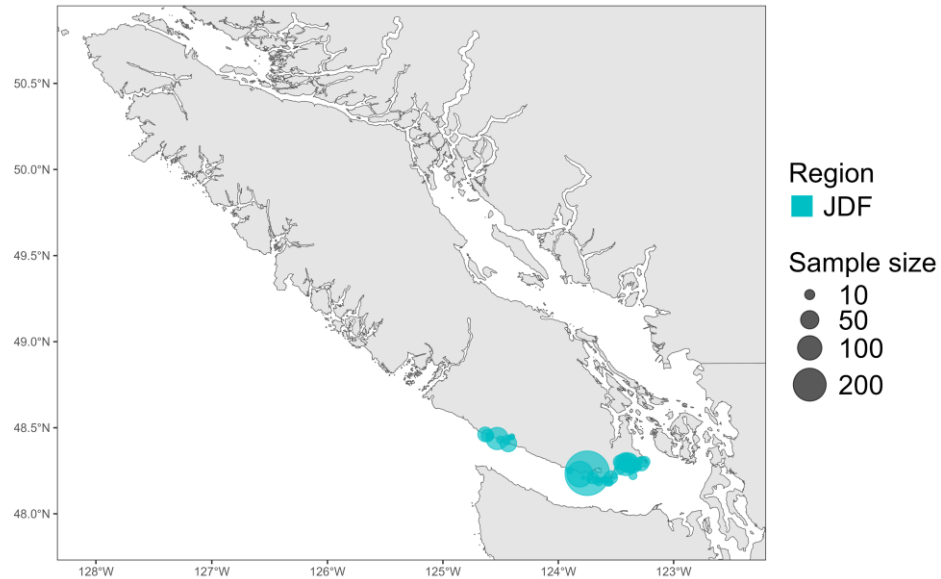
Data Gap
(1969-
2016)

ASDP
(2017-Present)



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Other										

Historical Data: Beacham 1986



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Herring										
Sand Lance										
Euphausiids										
Other										

Herring Spawn Biomass

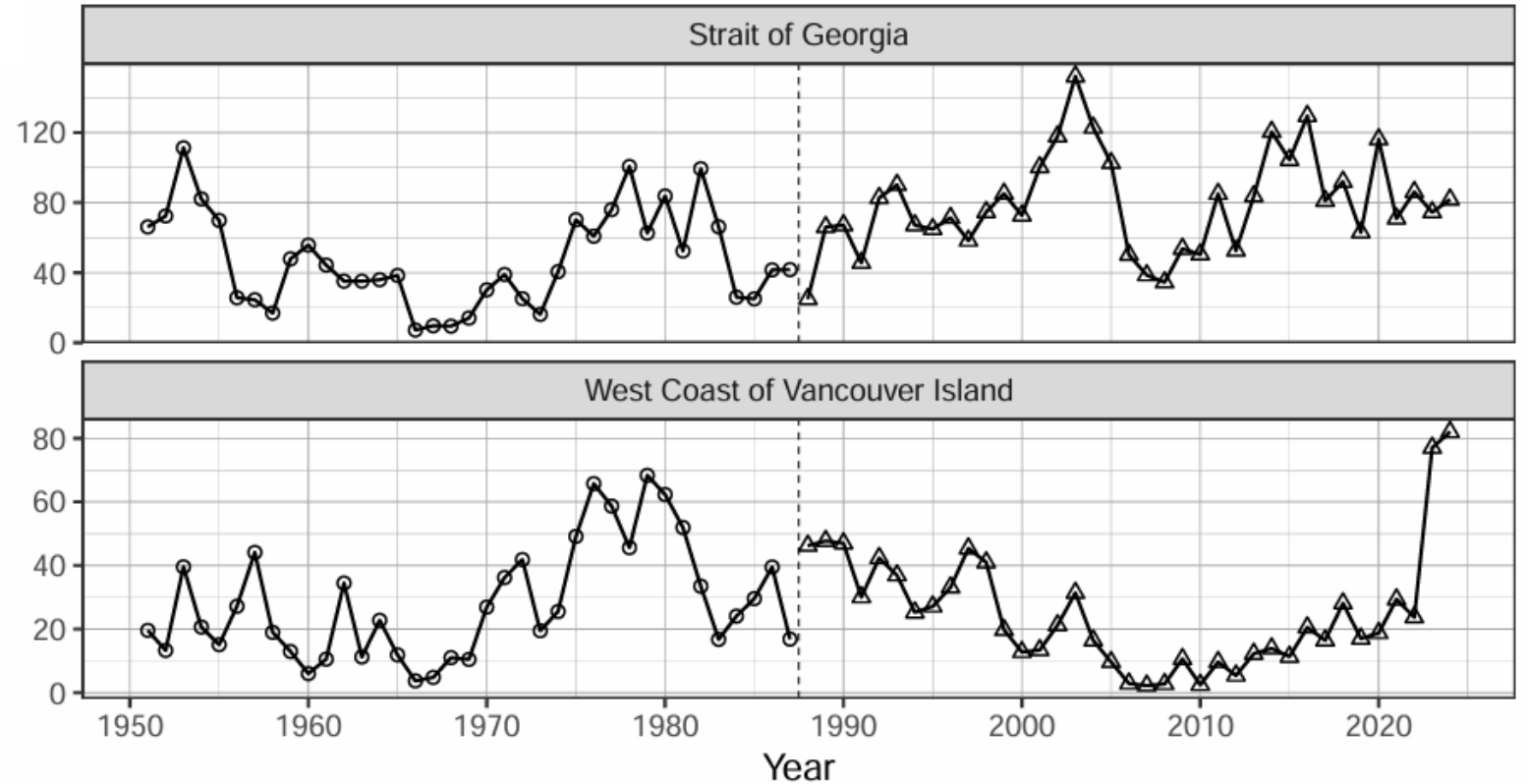
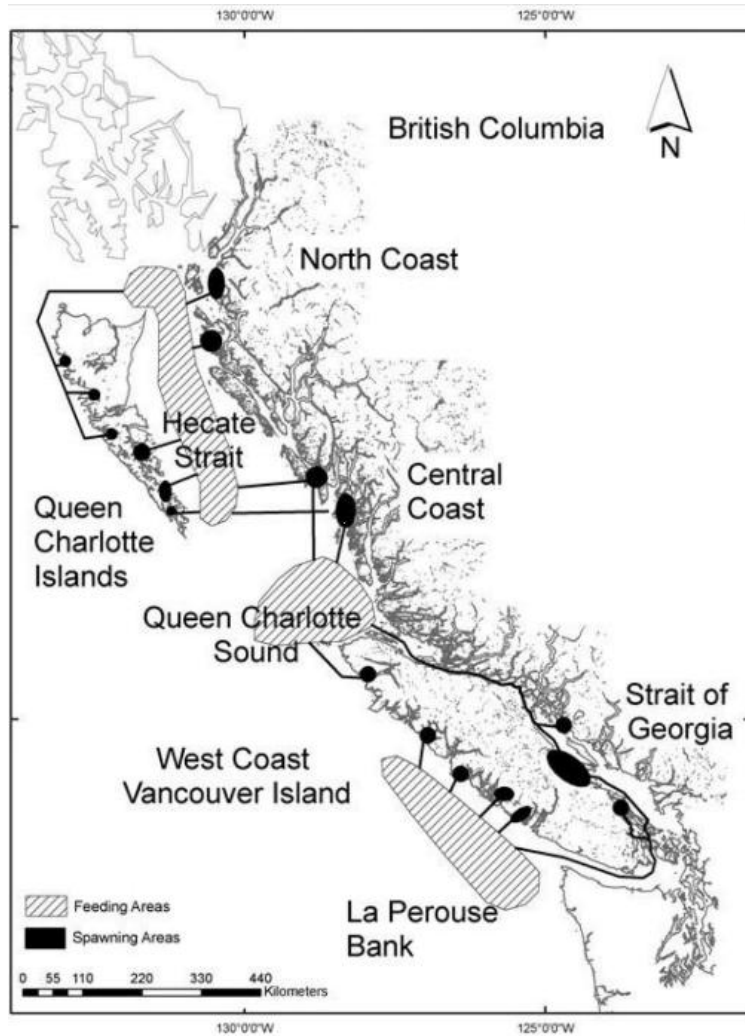


Figure 5. Spawn index in thousands of tonnes (t) for Pacific Herring from 1951 to 2024 in the major SARs. Note that the SoG stock is assessed in DFO (2025) but SoG data is included in this figure for completeness. The dashed vertical line delineates between two periods defined by the dominant survey method: surface surveys (1951 to 1987), and dive surveys (1988 to 2024). Note: the 'spawn index' is not scaled by the spawn survey scaling parameter q .

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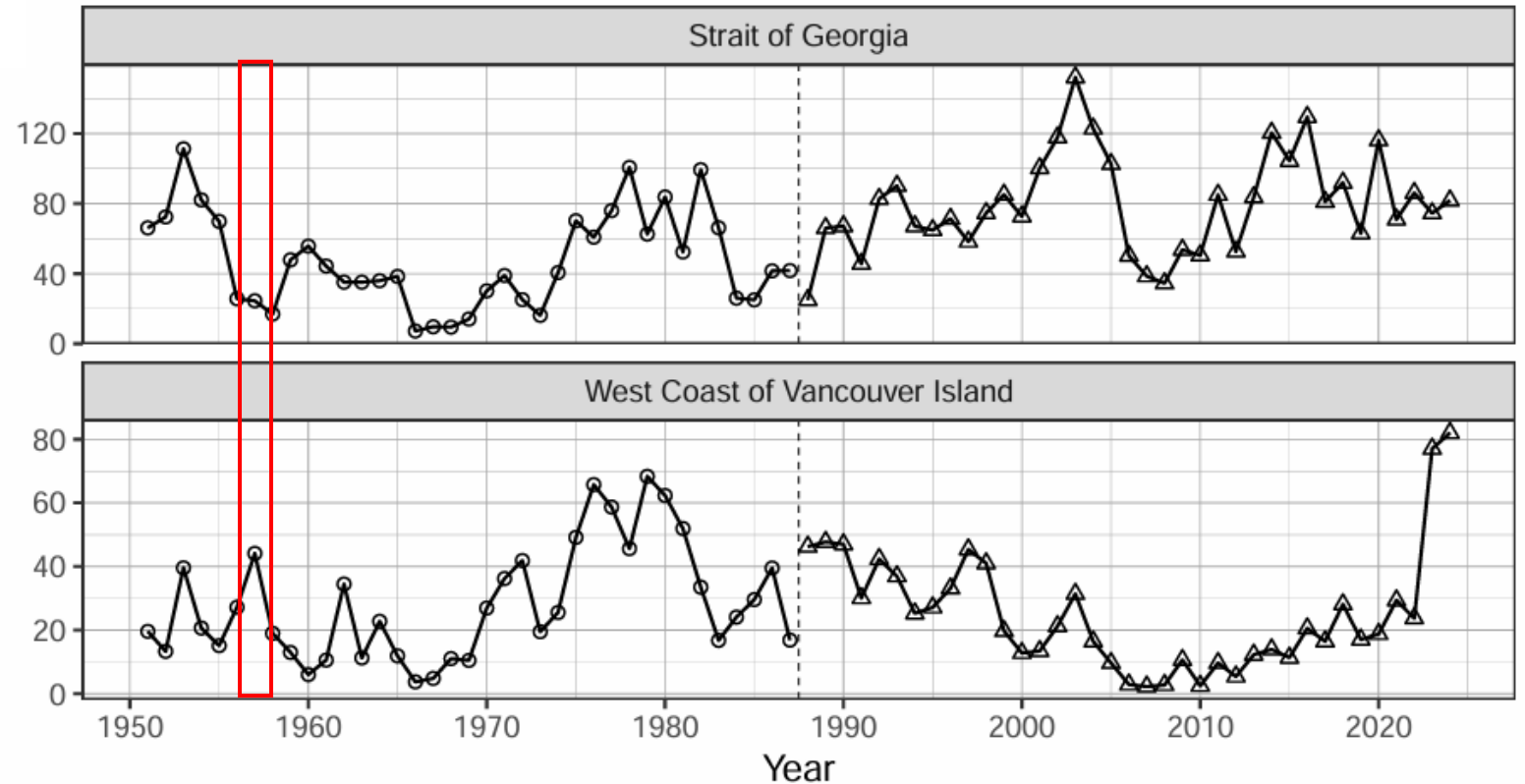
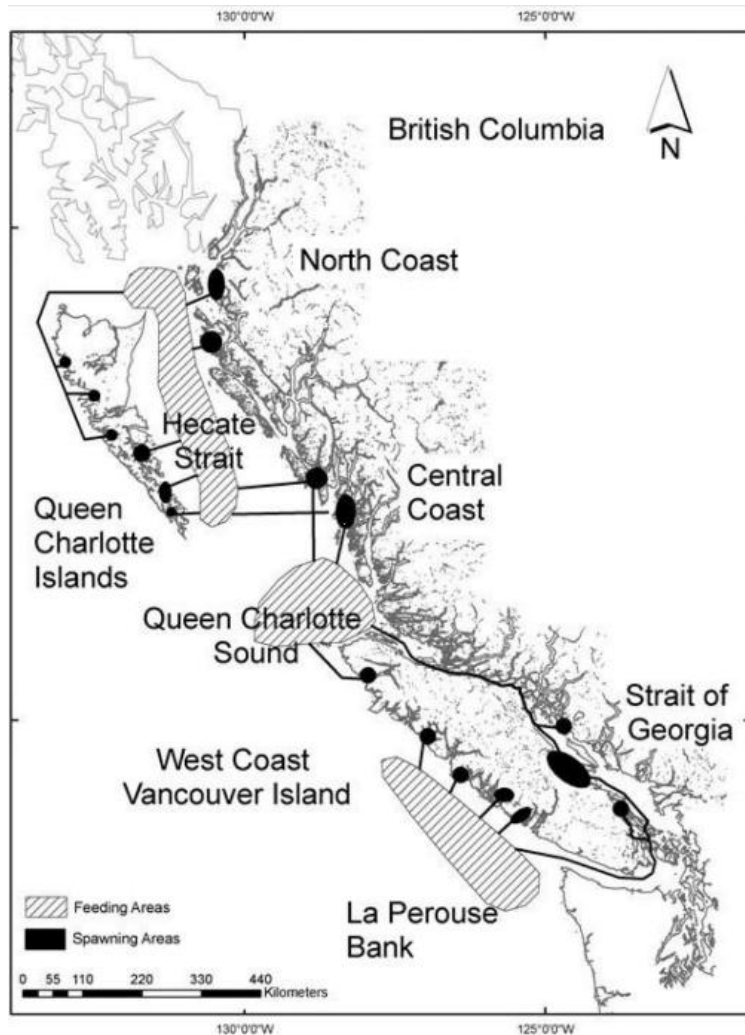


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Herring Spawn Biomass

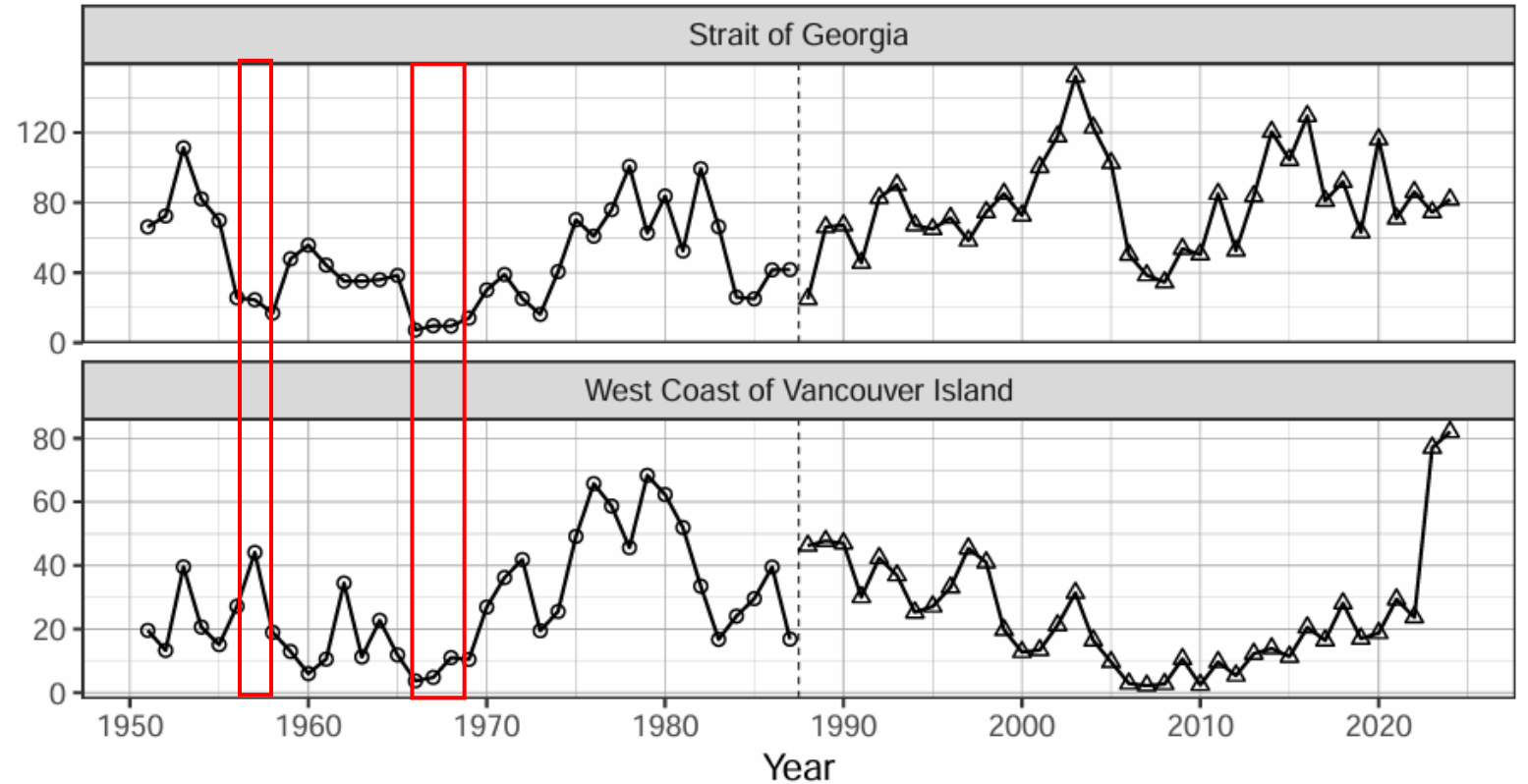
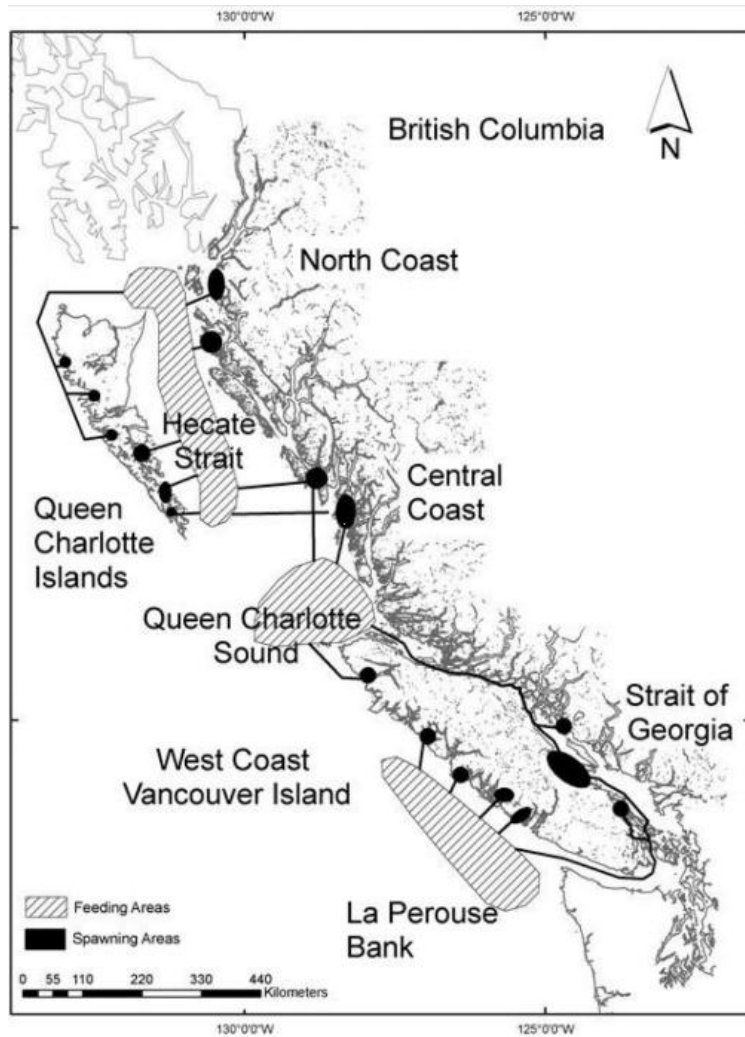


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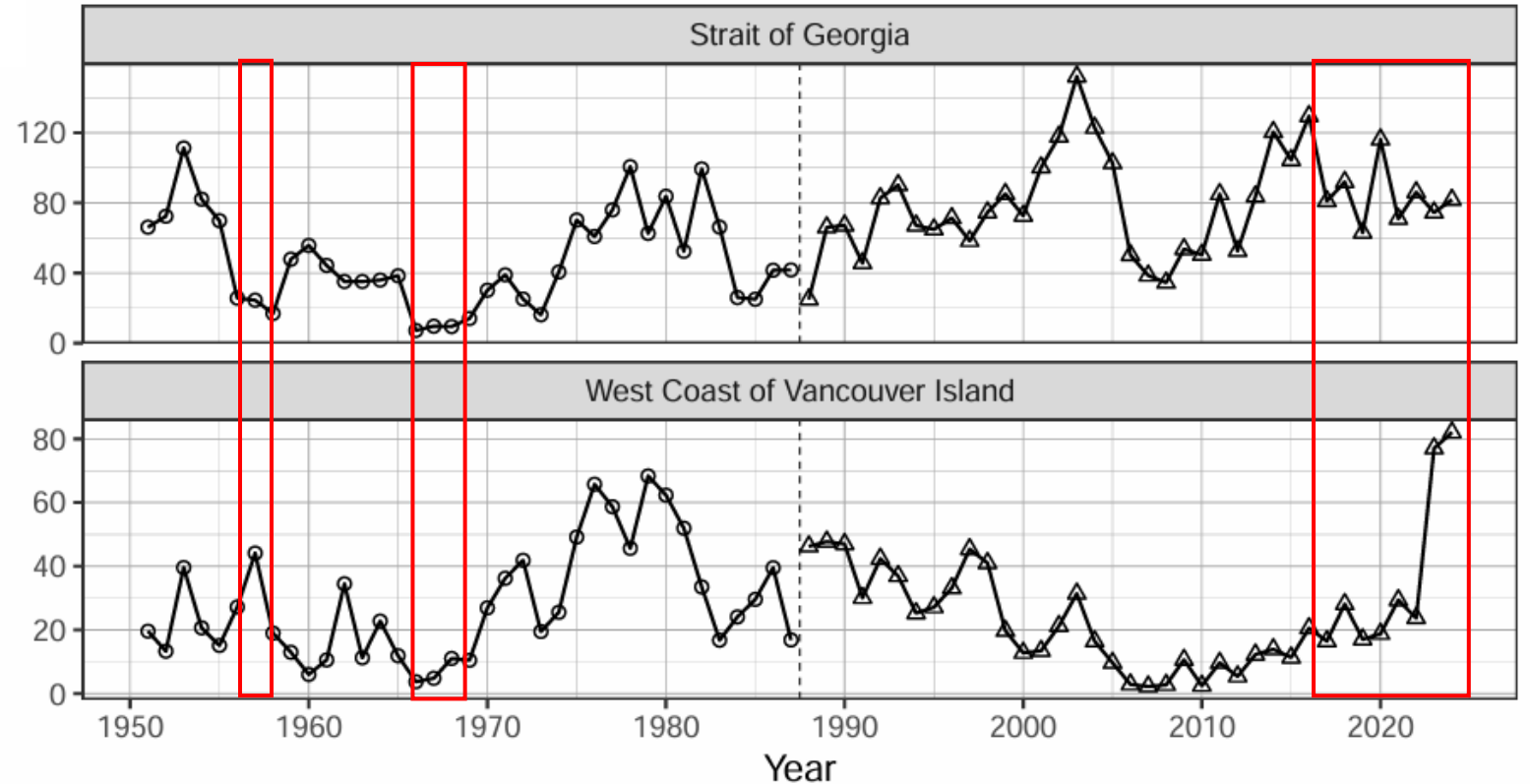
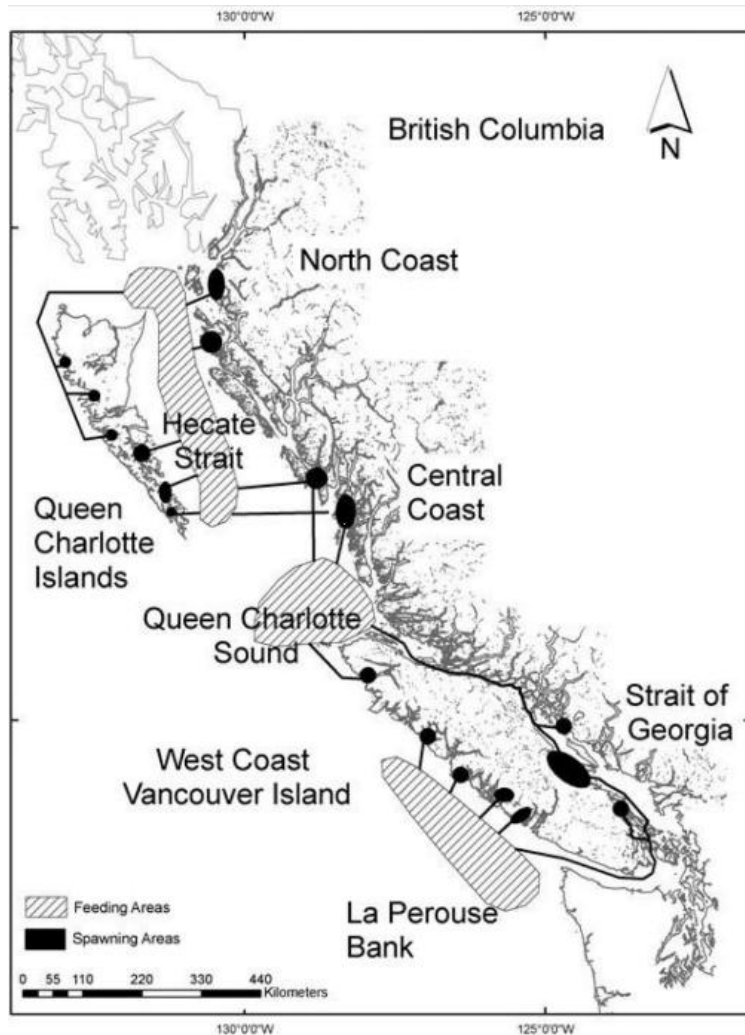


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Pacific Sardine in Chinook Salmon Diets

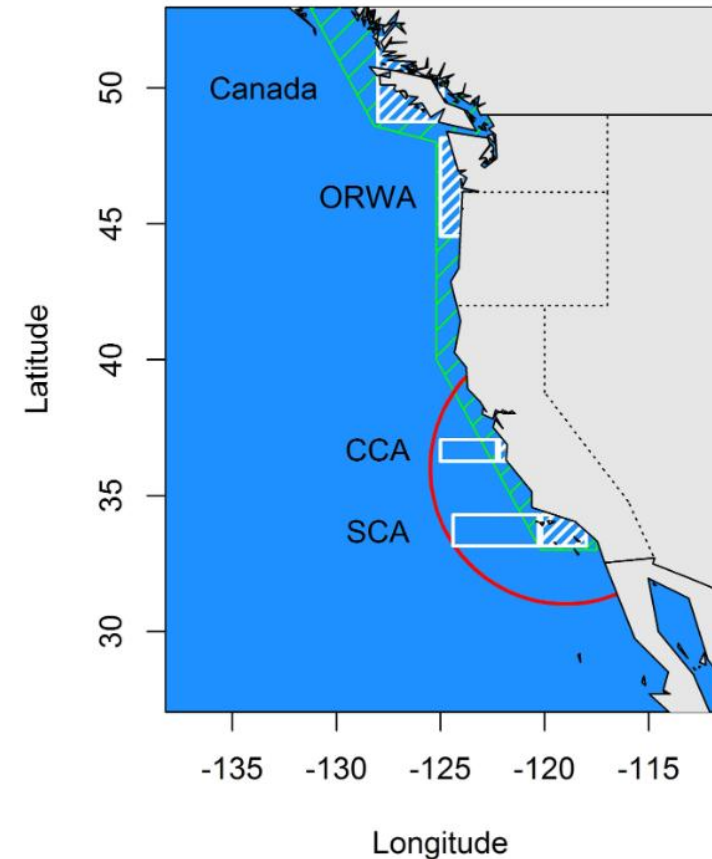
Availability of sardine depends on the extent of the migration of the northern subpopulation

Population has fluctuated historically

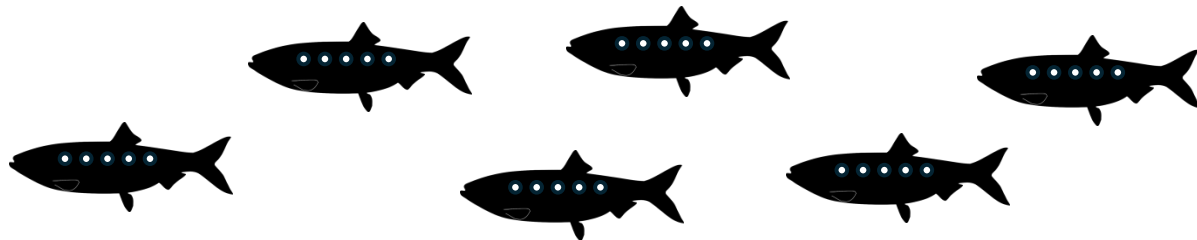
- Abundant in the 1920'-1940's and 1990's-2014
- Recent population crash

BC sardine fishery existed 2002-2012 (DFO 2018)

Sardine are important to Chinook salmon off Vancouver Island when present



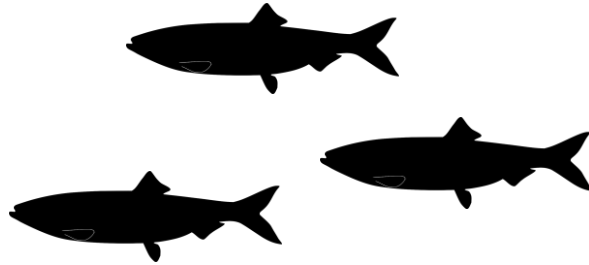
McDaniel et al. 2016



Conclusions

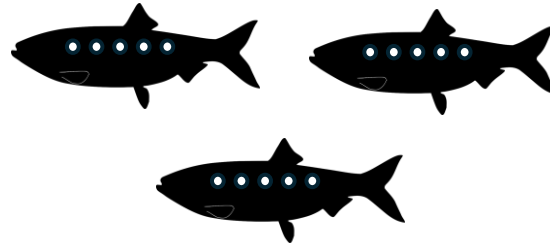
Herring

- Important prey through time
- Availability likely linked to spawning biomass



Sardine

- Important in the past
- Availability depends on migrations of northern sub-population



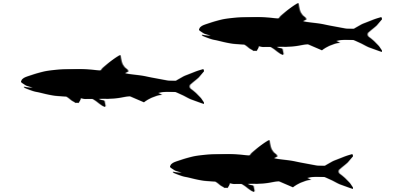
Chinook as opportunistic piscivores

- Target fish, feed on what's available
- Will switch to invertebrates



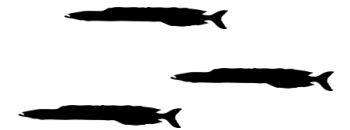
Predator diets as ecosystem samplers

- Can be used to understand patterns in distribution and availability of SPF



Future work

- Need for ongoing monitoring to detect shifts
- Spatiotemporal models of feeding intensity and prey distributions



Funding and Partners



Environment and
Climate Change Canada
Environnement et
Changement climatique Canada



**PACIFIC SALMON
FOUNDATION**



**University
of Victoria**

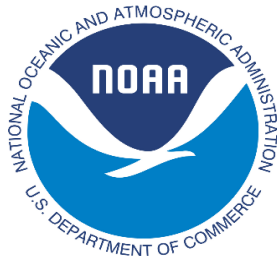


Fisheries and Oceans
Canada
Pêches et Océans
Canada



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EDUCATION SOCIETY



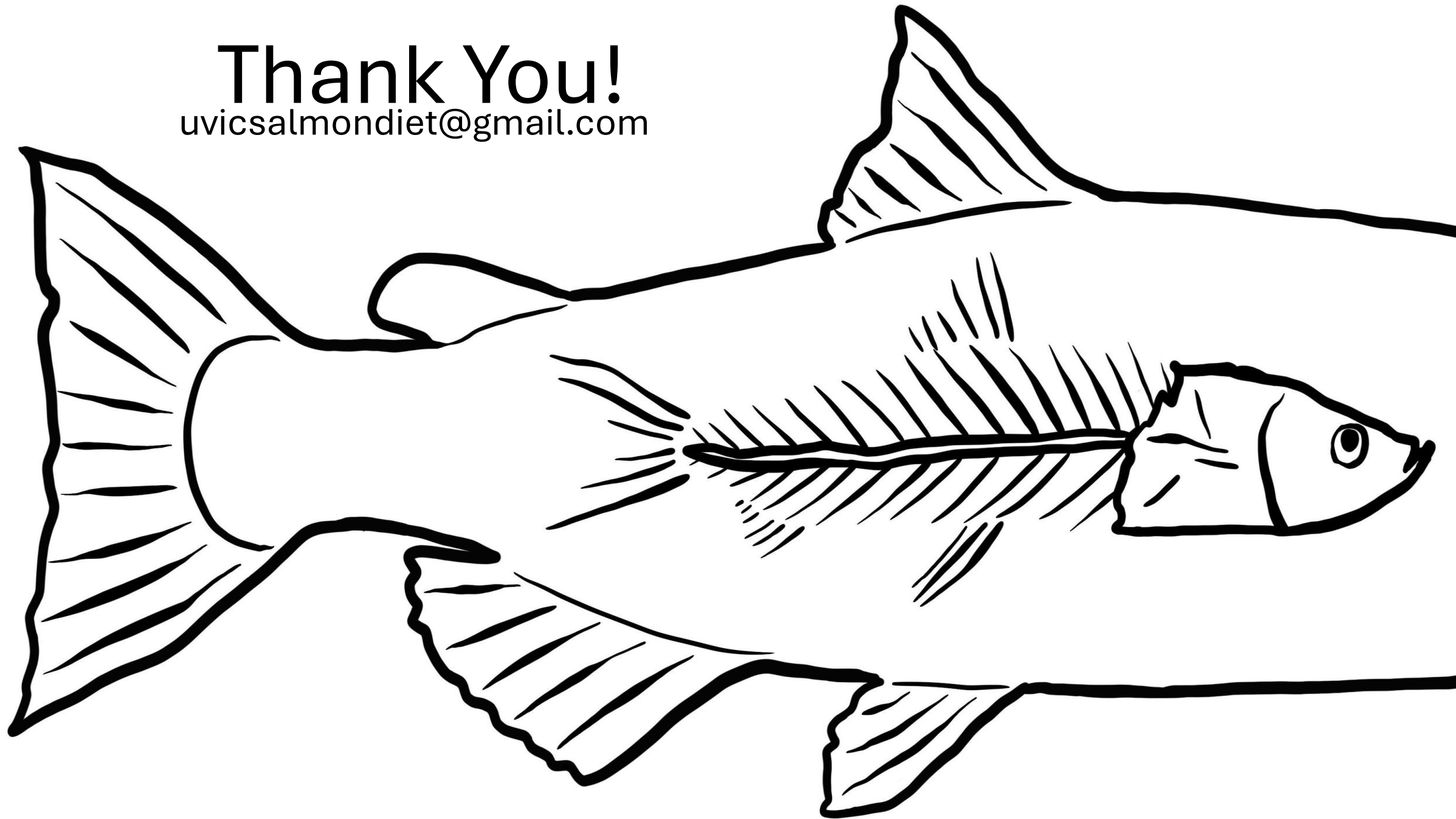
**ISLAND
Fisherman**
MAGAZINE



AP Tackleworks



Thank You!
uvicsalmondiet@gmail.com



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Greentree WL, Duguid WDP, Quindazzi MJ, Maher B, Juanes F. 2026. Using the diet composition of adult chinook salmon to understand the regional structure of salish sea forage communities. Fisheries Oceanography. doi:[10.1111/fog.70038](https://doi.org/10.1111/fog.70038).

McDaniel, J., Piner, K., Lee, H.-H., & Hill, K. (2016). Evidence that the Migration of the Northern Subpopulation of Pacific Sardine (*Sardinops sagax*) off the West Coast of the United States Is Age-Based. *PLoS ONE*, 11(11), e0166780. <https://doi.org/10.1371/journal.pone.0166780>