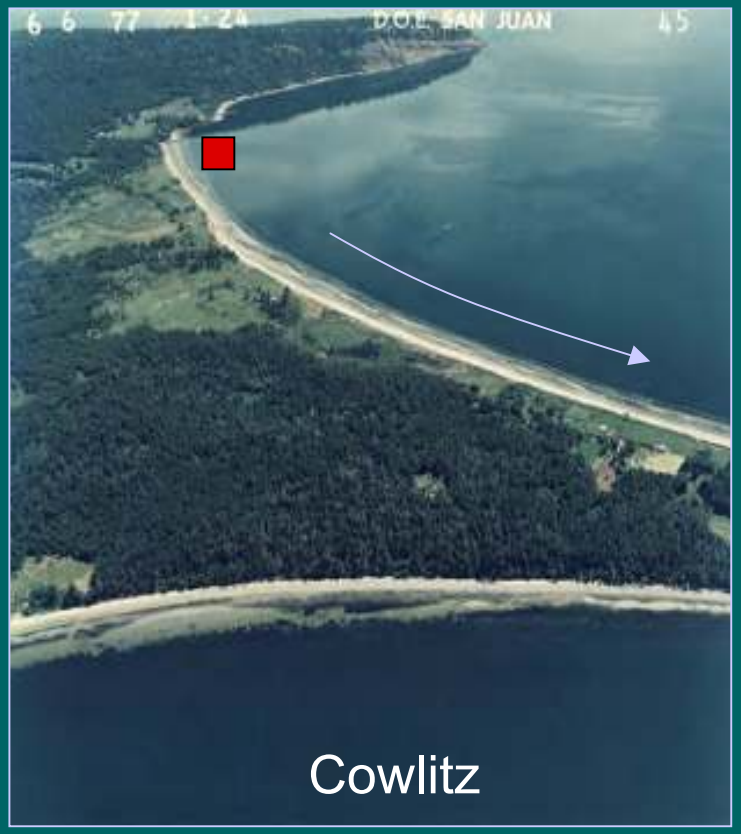
SalmonAtion 2013

FIVE YEARS of COMMUNITY RESEARCH

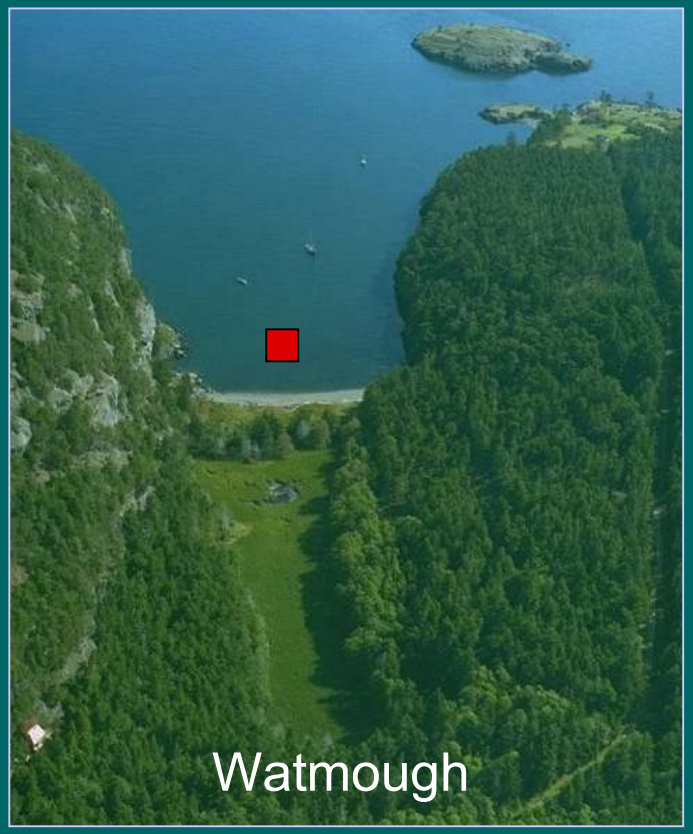
KWIAHT

How does human behavior in the islands affect the growth/survival of Chinook and other migrating salmon?

What can we do to help Chinook and other salmon recover?

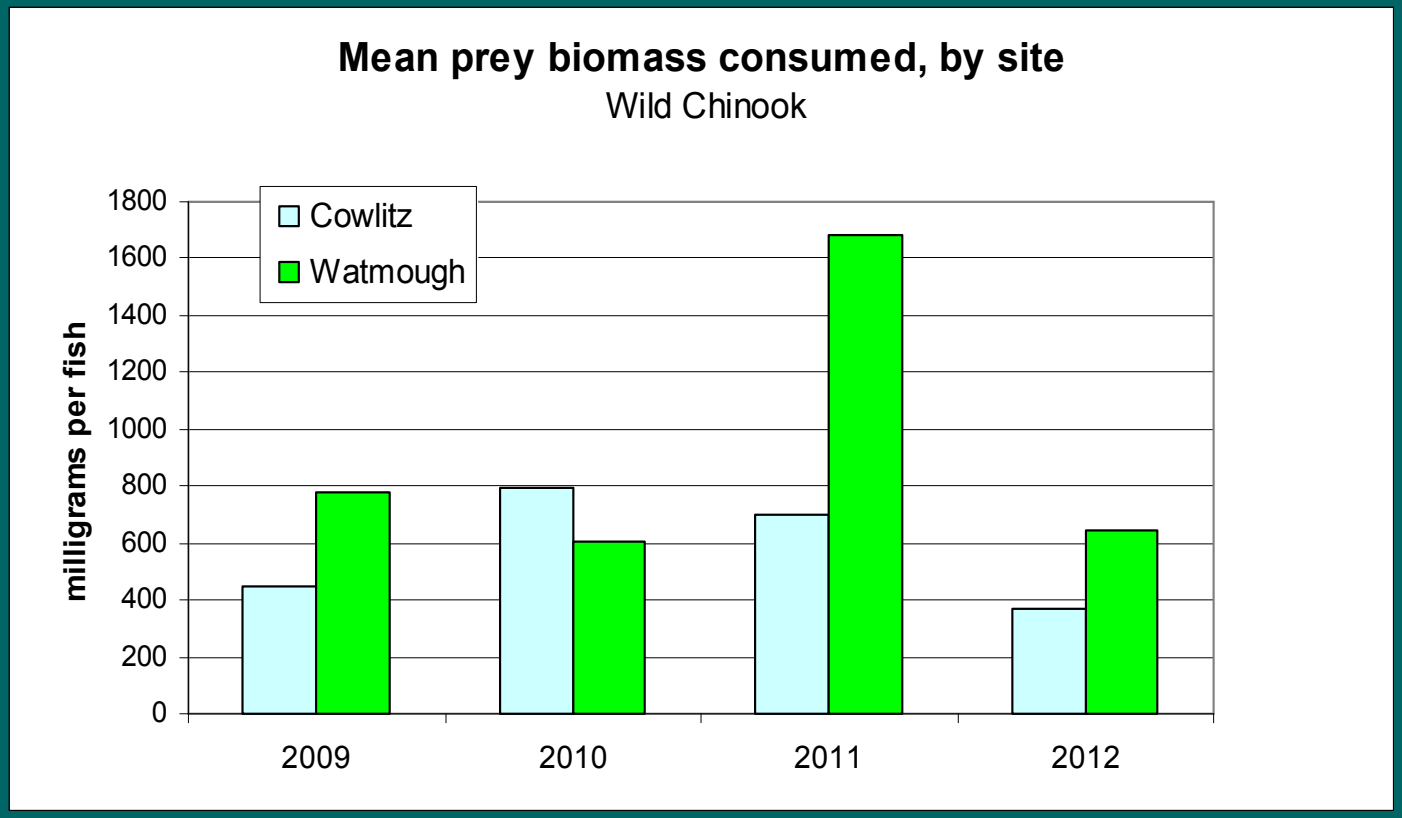


Exposed to SW winds
Sand with cobble fields
Bluff-backed seine site
Rocky shoreline up-drift
Wetlands down-drift
Lower salinity



Exposed to SE winds
Sand with gravel fields
Wetland-backed seine site
Braced by rocky headlands
Pocket beach – no drift
Higher salinity

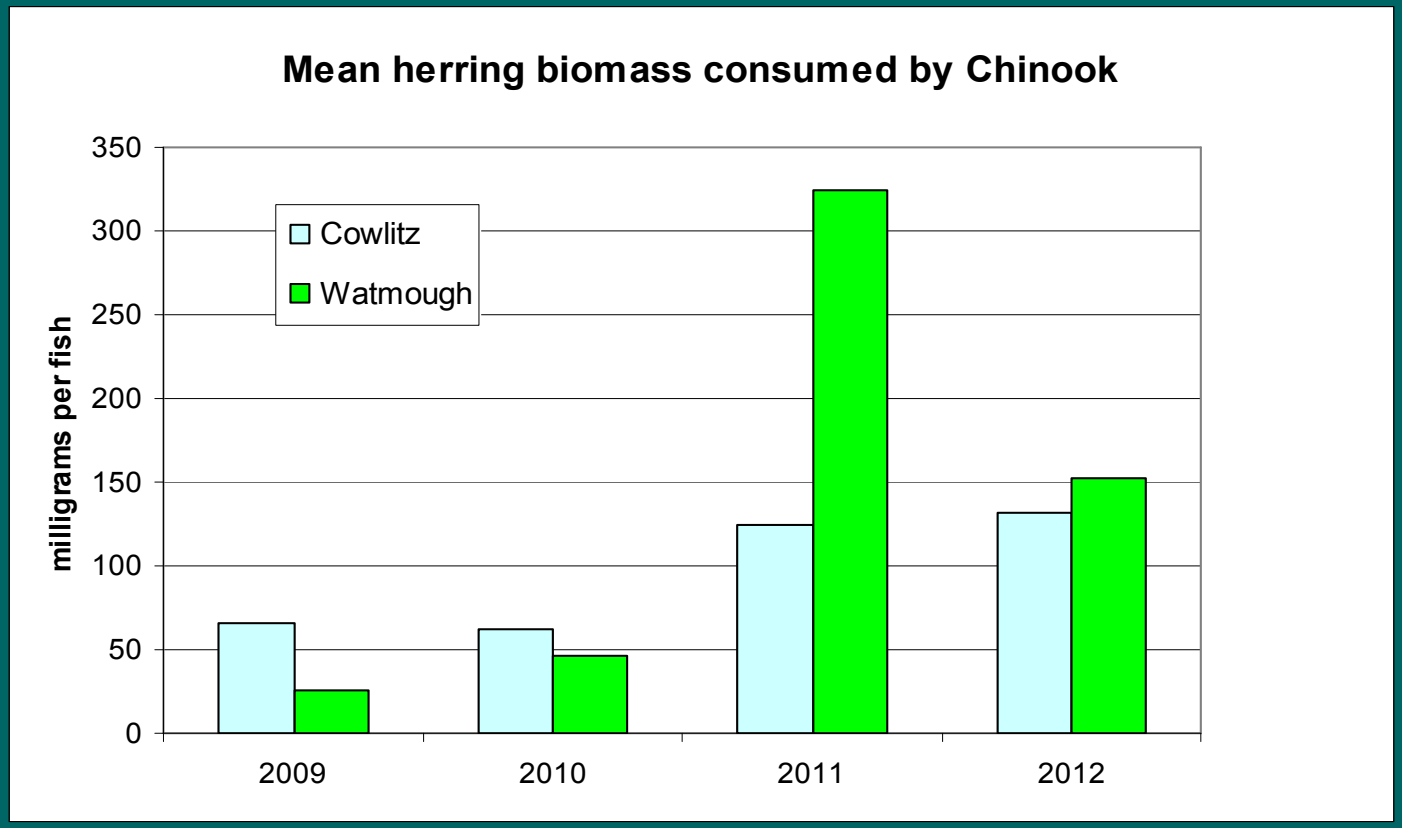
The bottom line…



Chinook ate best in 2011…
and **usually** ate better at Watmough than Cowlitz

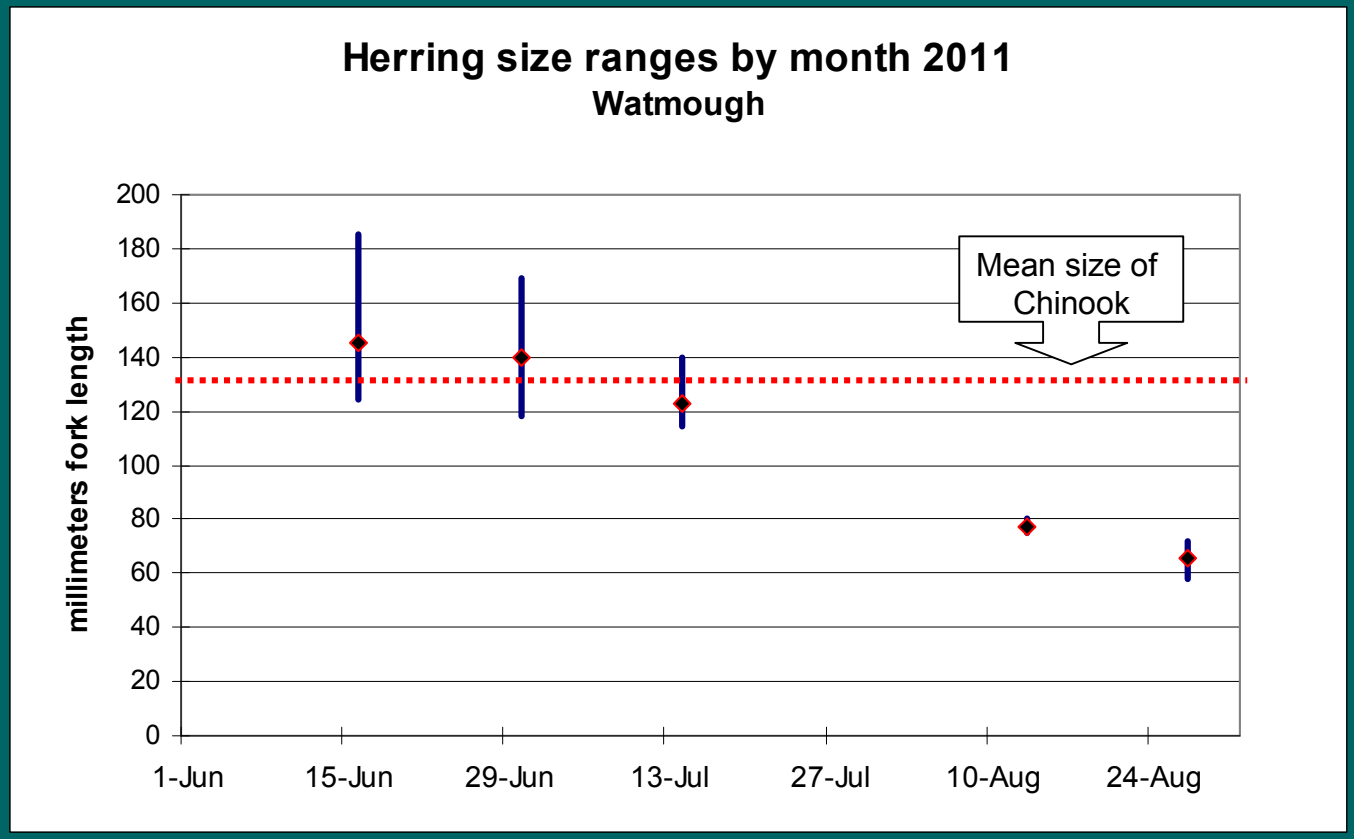
What was different about 2011?

What is different about Watmough?

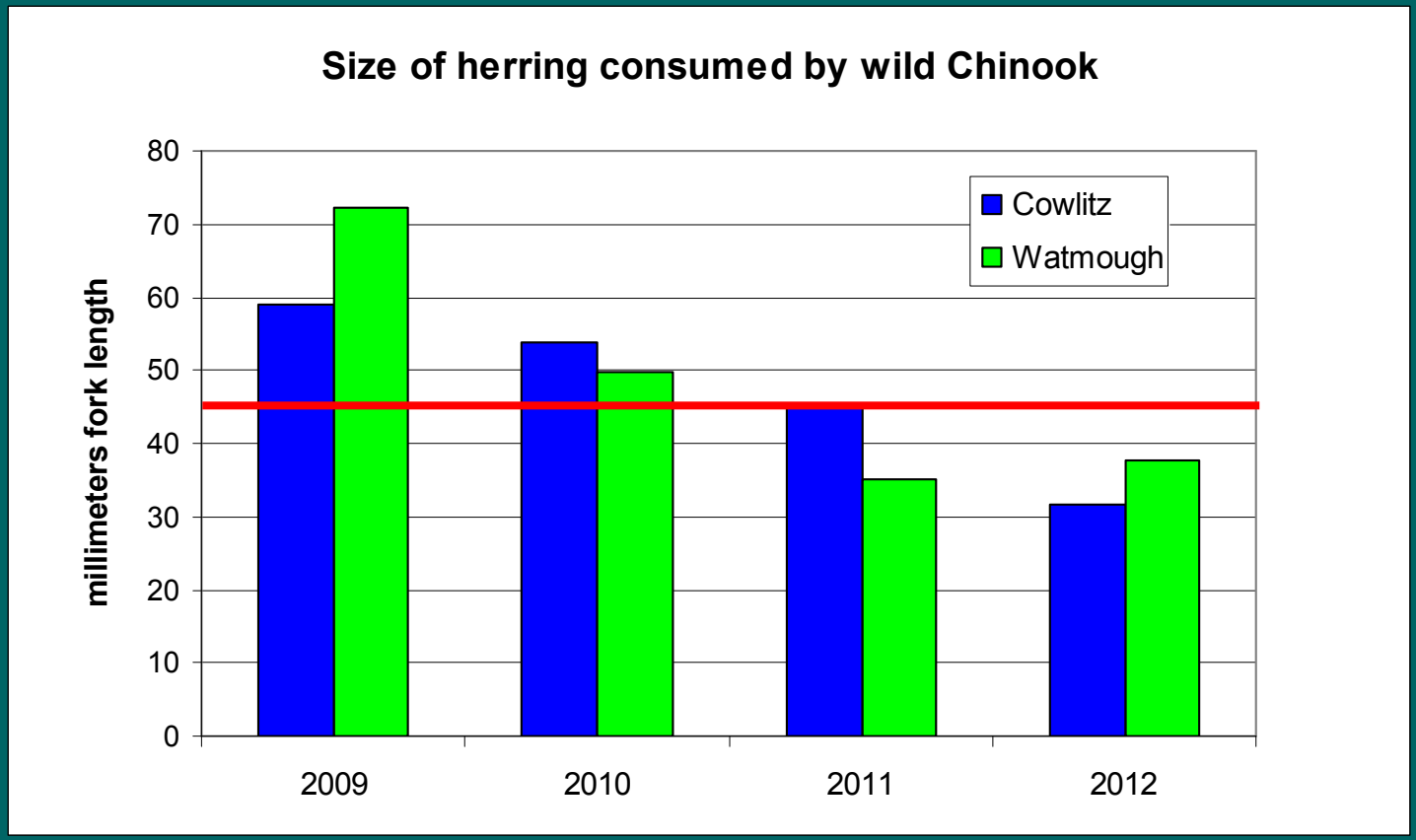


Chinook ate more herring in 2011

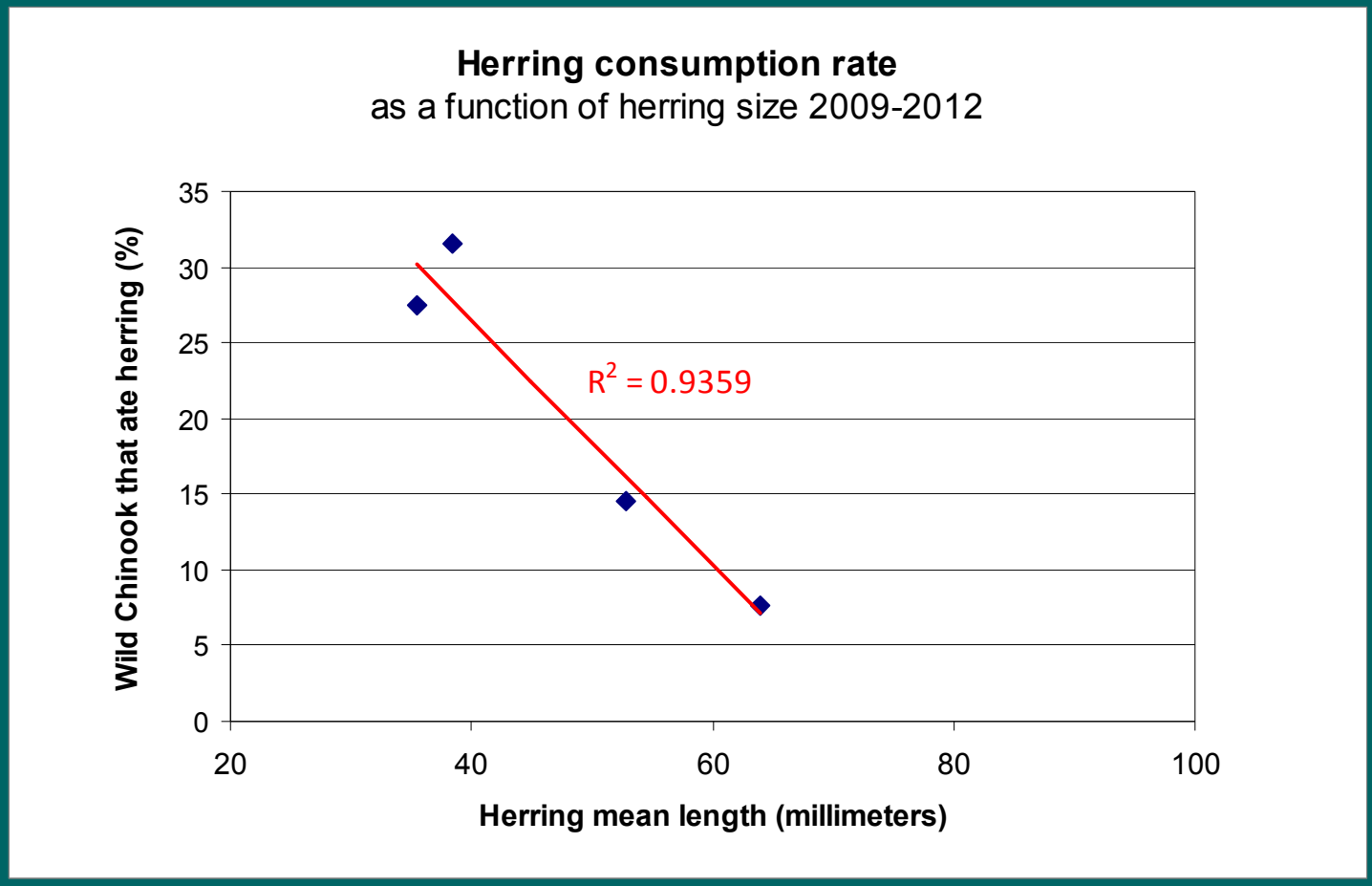
…especially at Watmough!



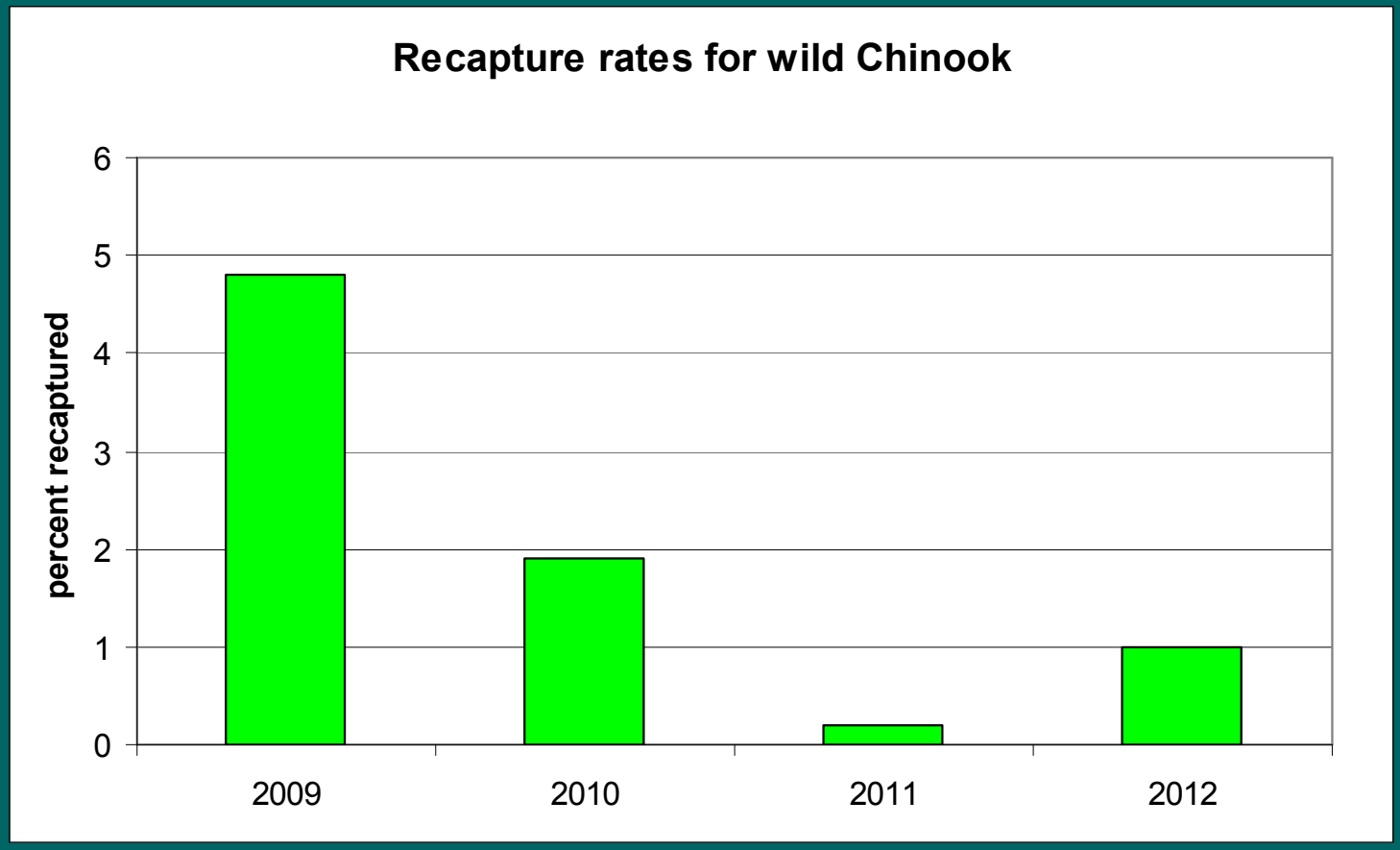
In midsummer 2011, herring fell below the average size of juvenile Chinook



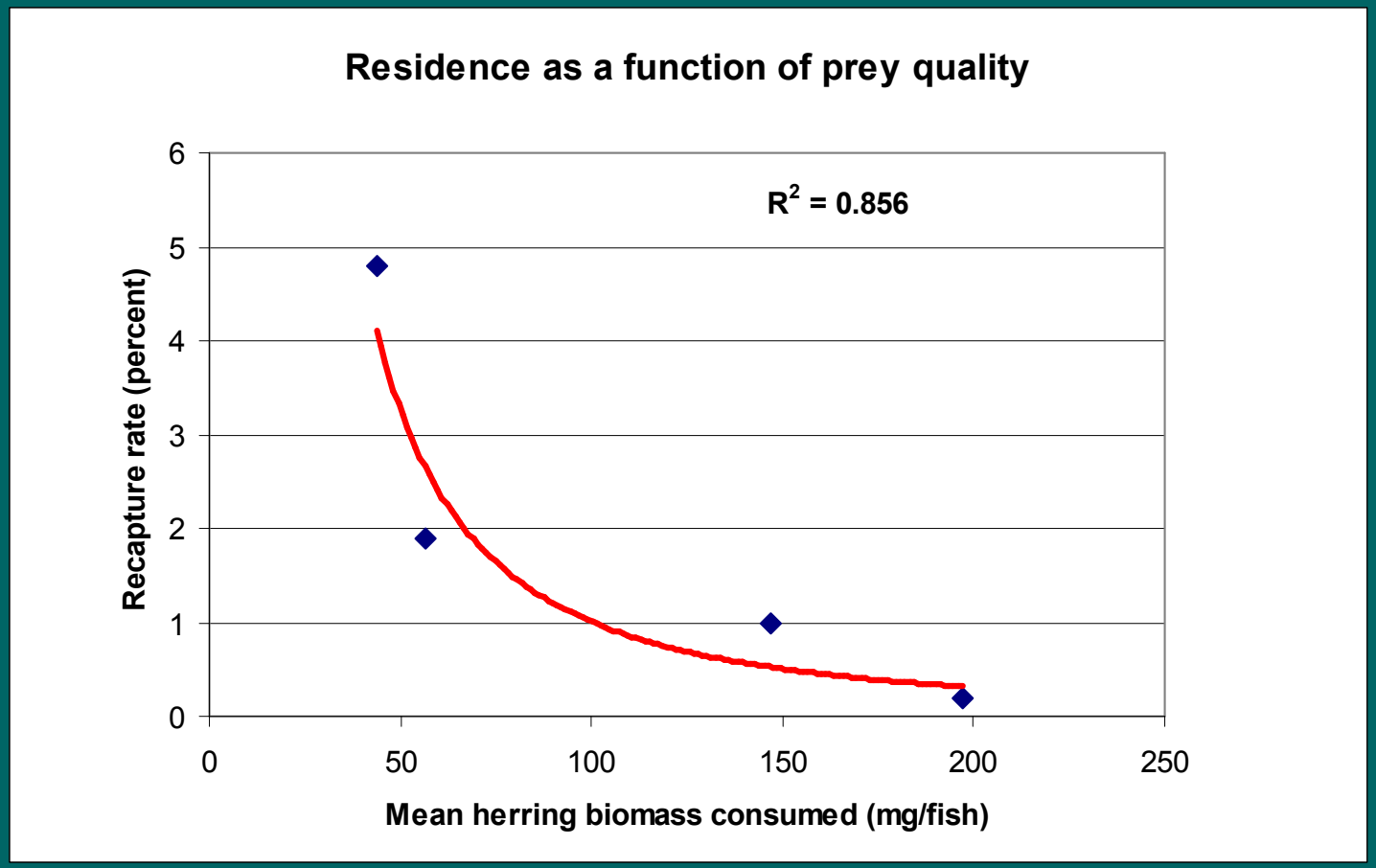
There seems to be a critical threshold for herring at about **45 millimeters length**



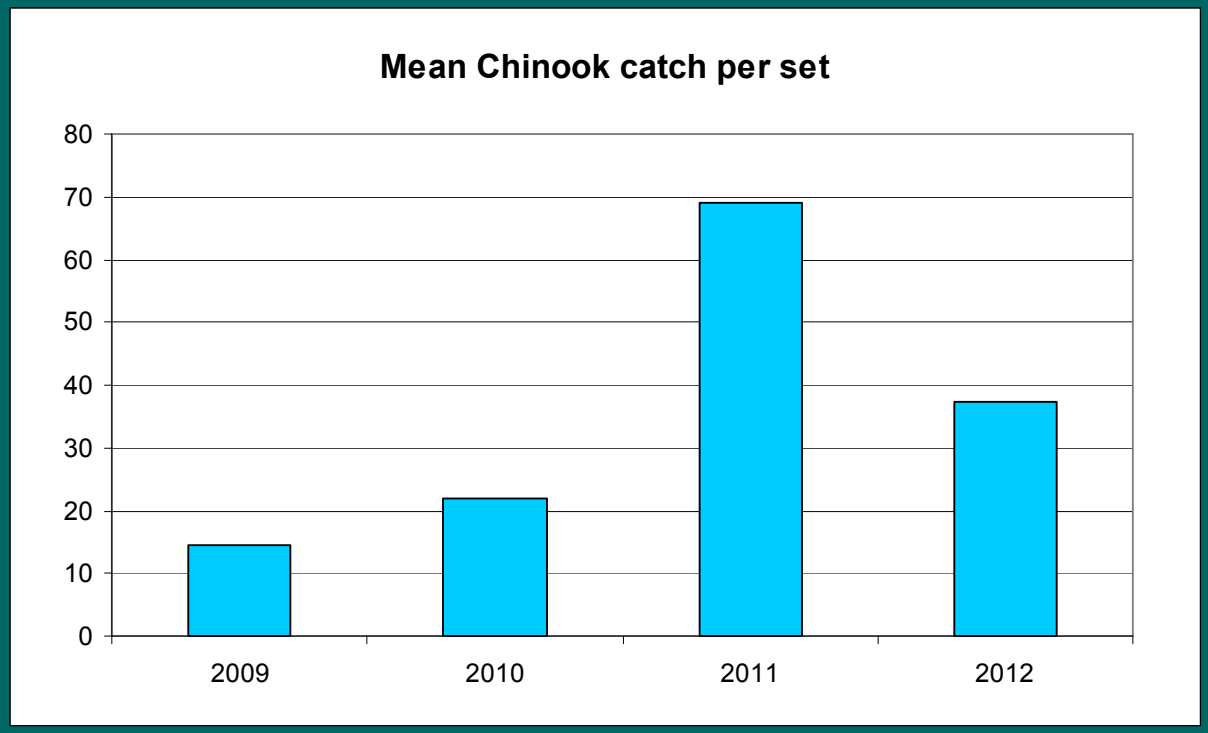
Smaller herring are much more likely to be eaten by juvenile Chinook



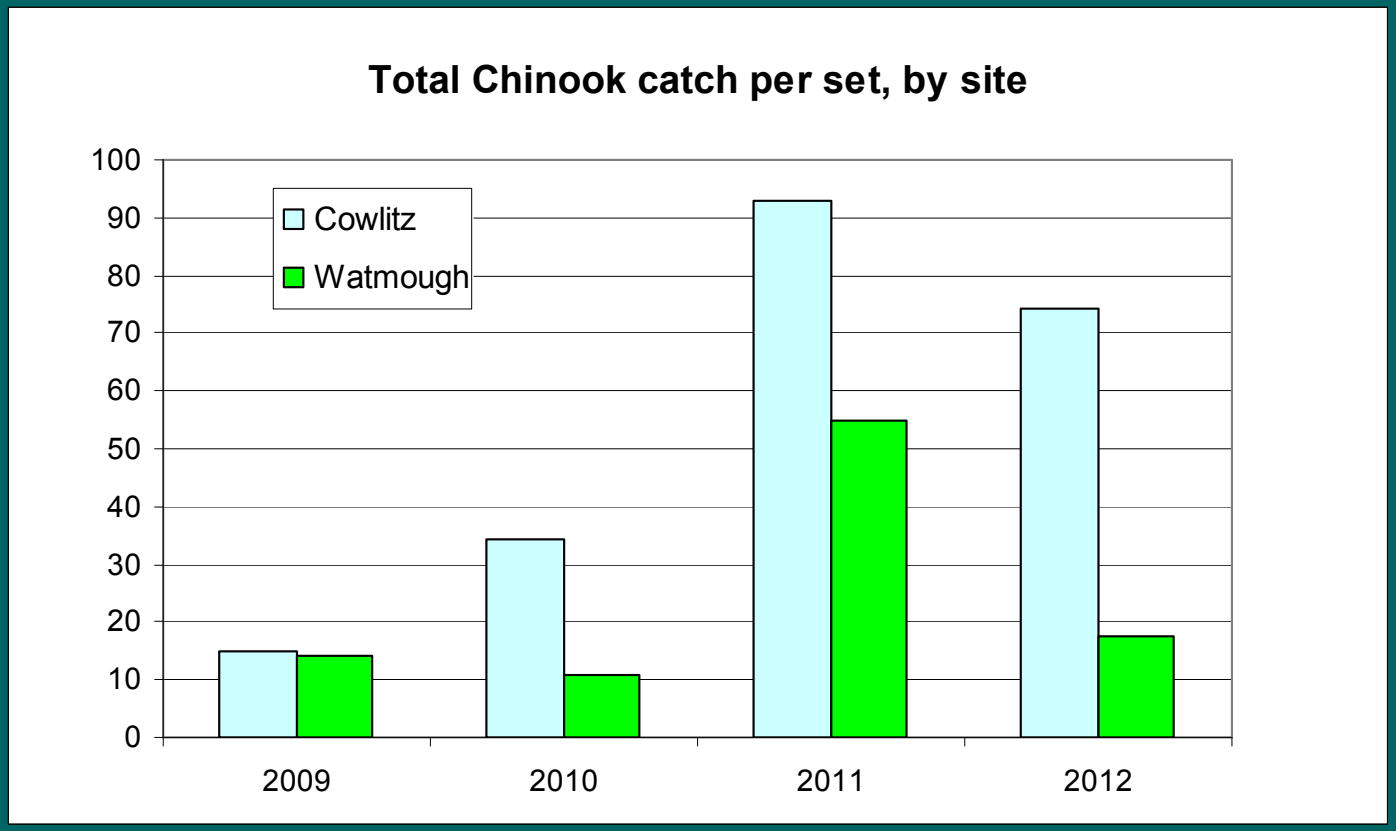
Do Chinook tend to stick around when (small) herring are available?



No! The reverse is true!



We saw more Chinook in 2011
when there more herring to eat



But always more Chinook at Cowlitz Bay

… where they ate less per fish!

There were **more Chinook** at Cowlitz Bay but each of them ate less fish

In the short term…
There could have been more competition for prey at Cowlitz Bay!

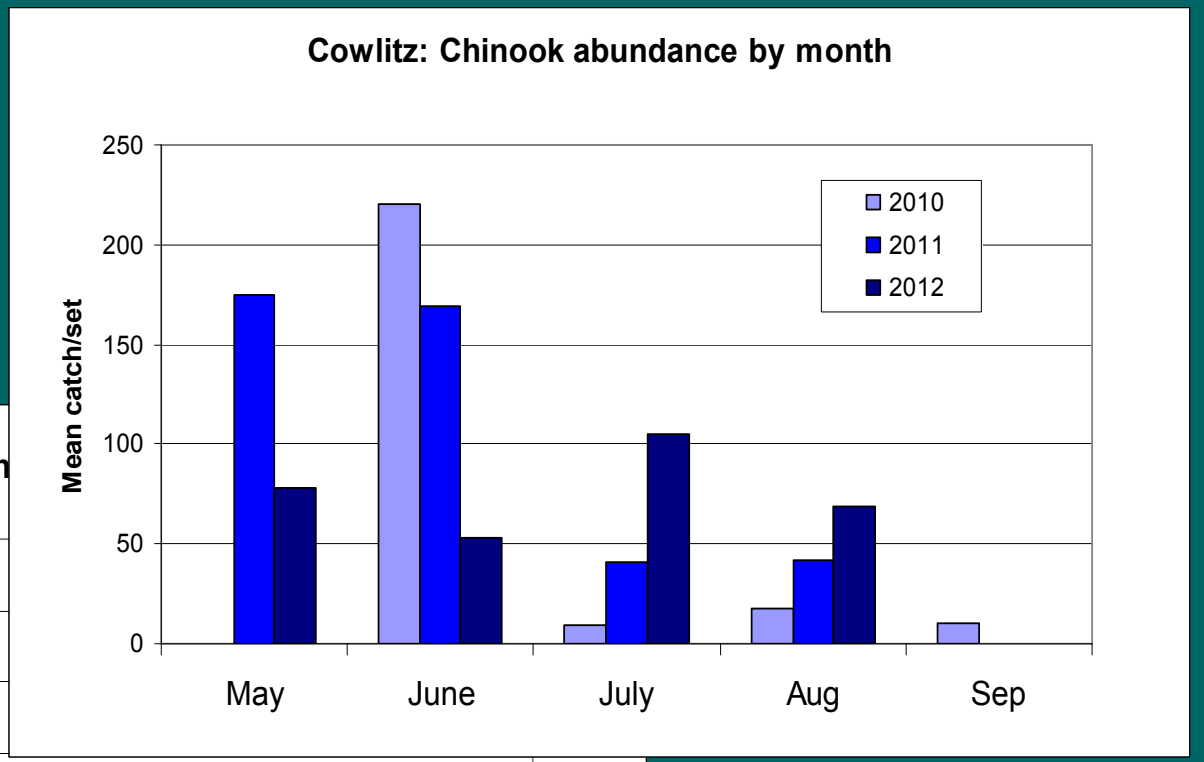
But then why did they stick around… ?

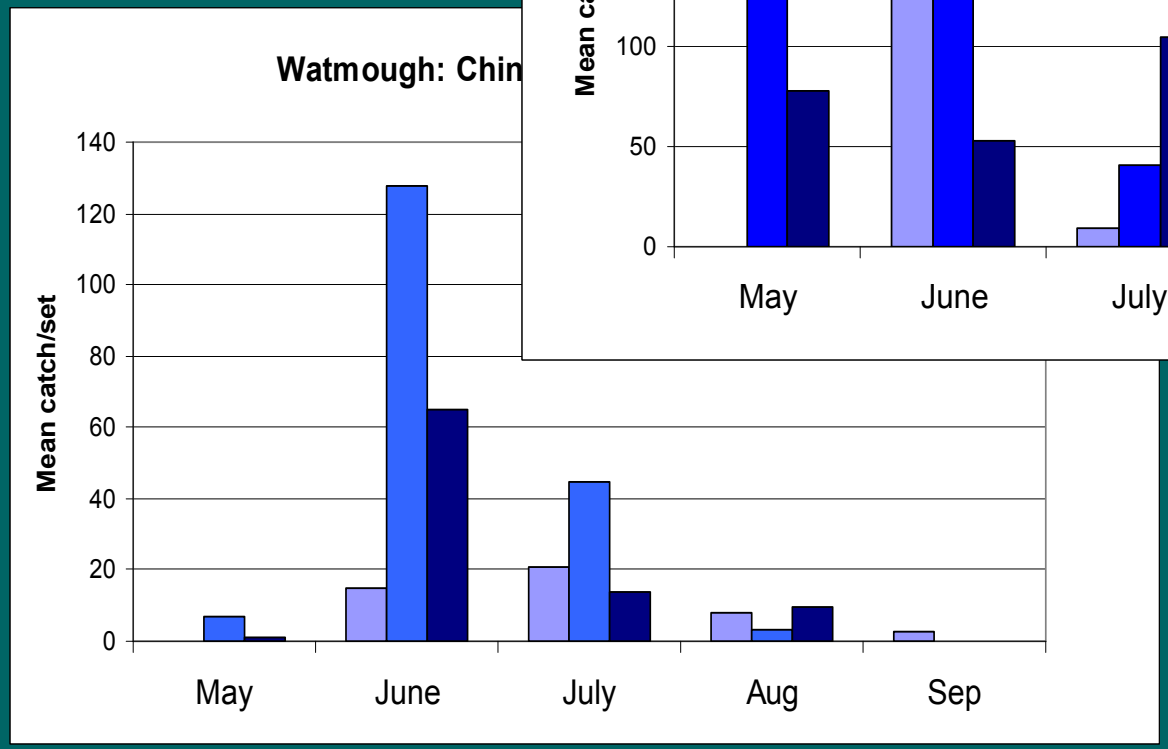
What was different about 2011?

What is different about Cowlitz Bay?

- It's closer to the Fraser River
- It's less salty
- It offers additional prey resources (?)
- It attracts different Chinook stocks
- Waldron is really cool

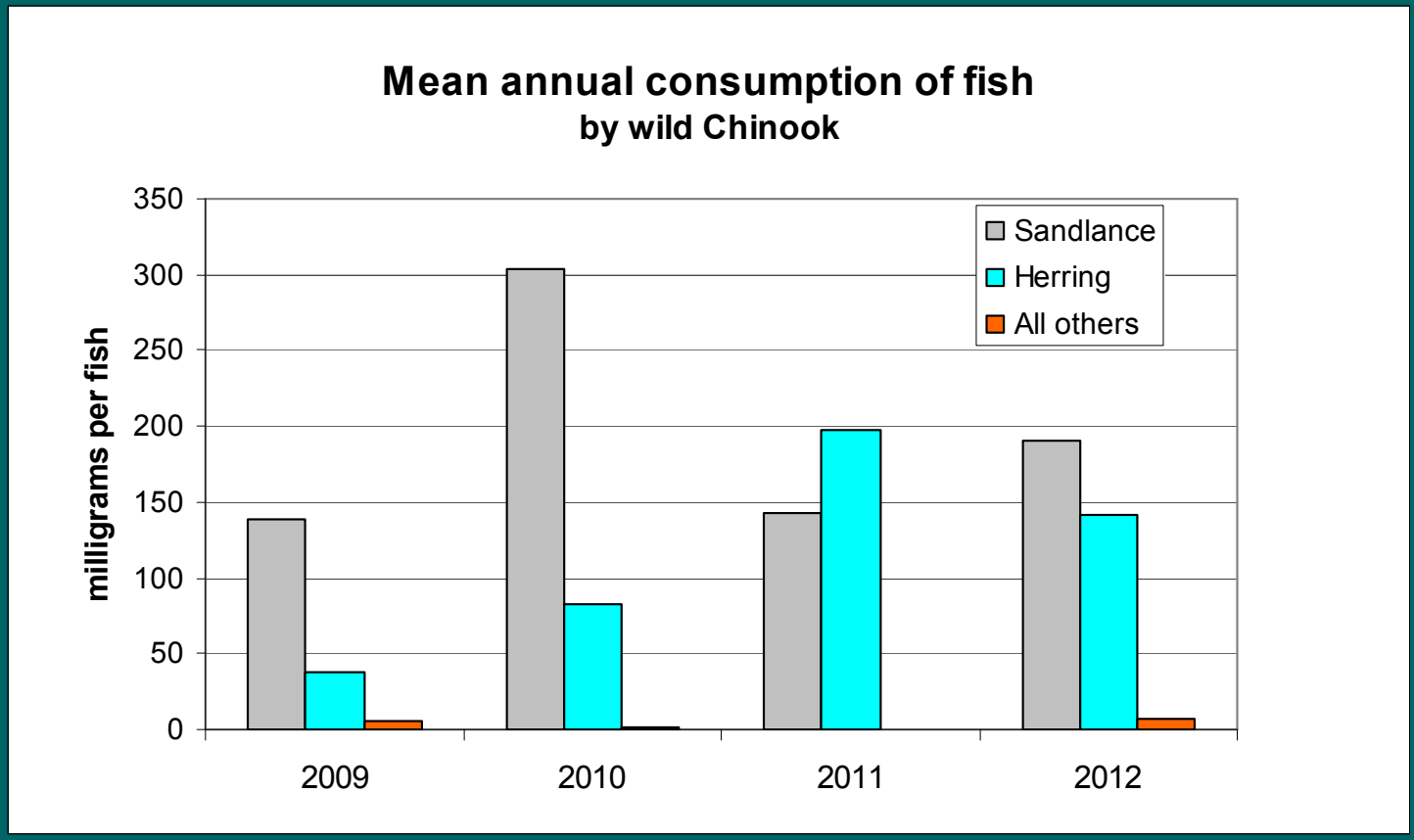
Stocks are the same…
…or are they?



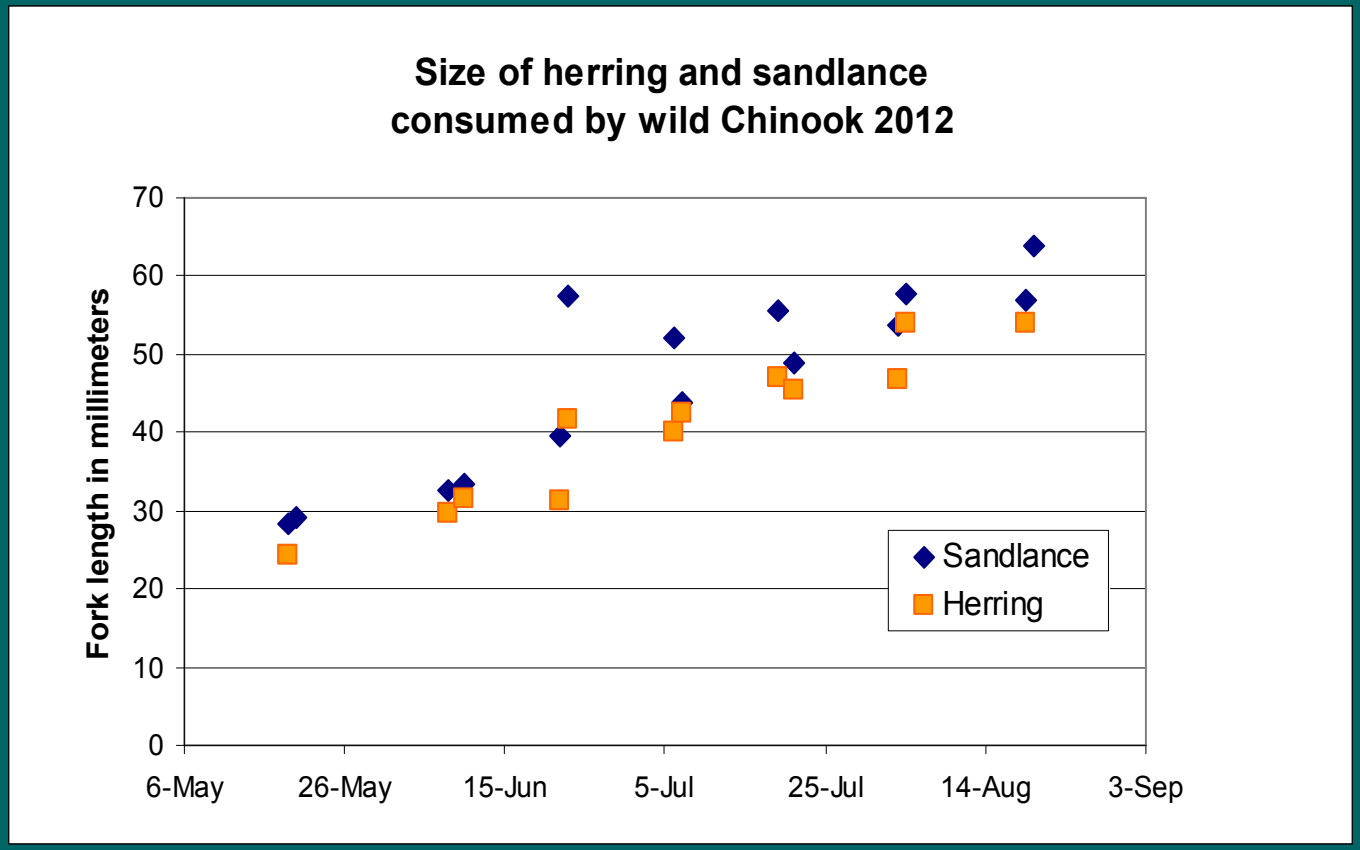


Longer season at Cowlitz

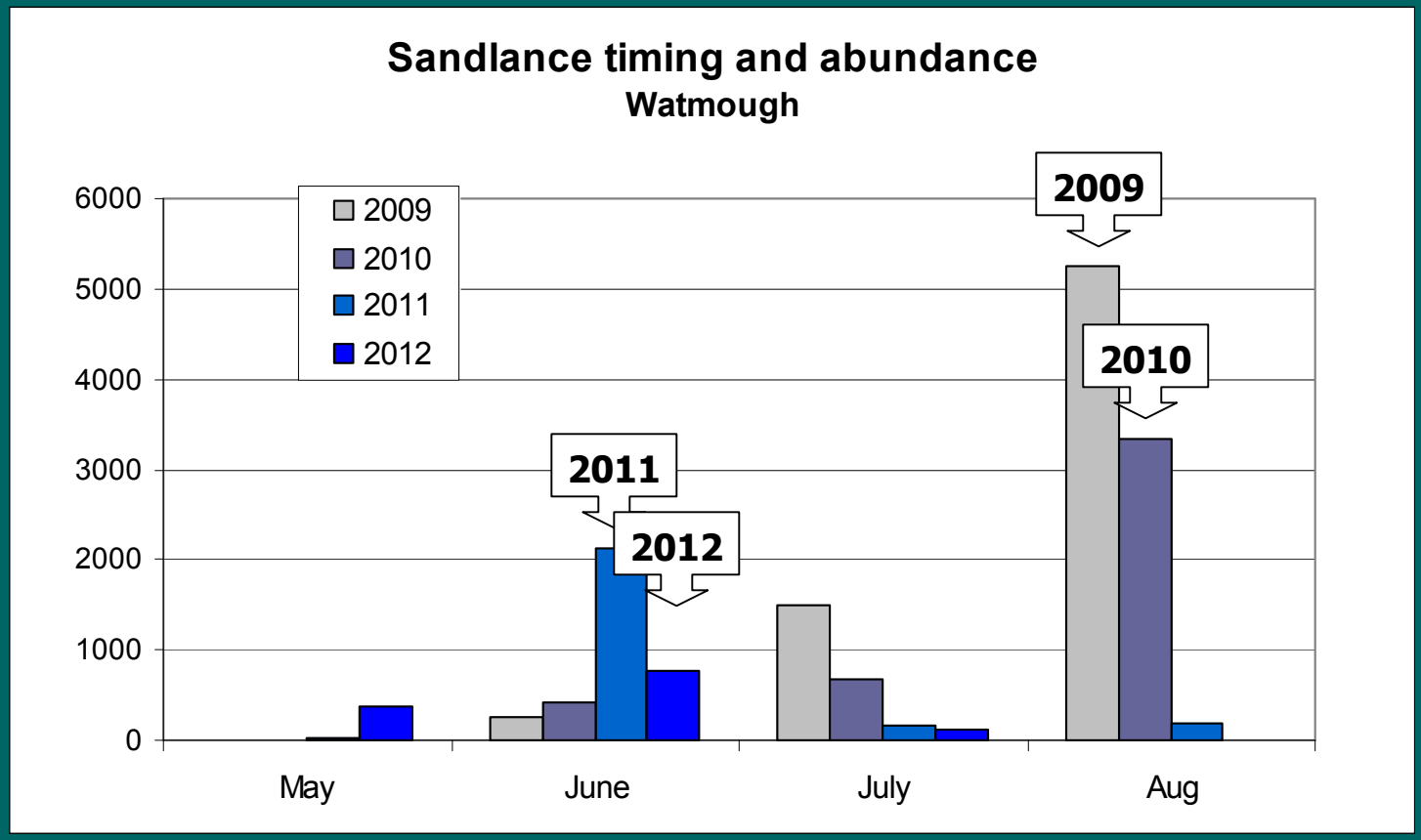
How do Chinook cope without herring?



#1: Eat more sandlance! (if they are available)



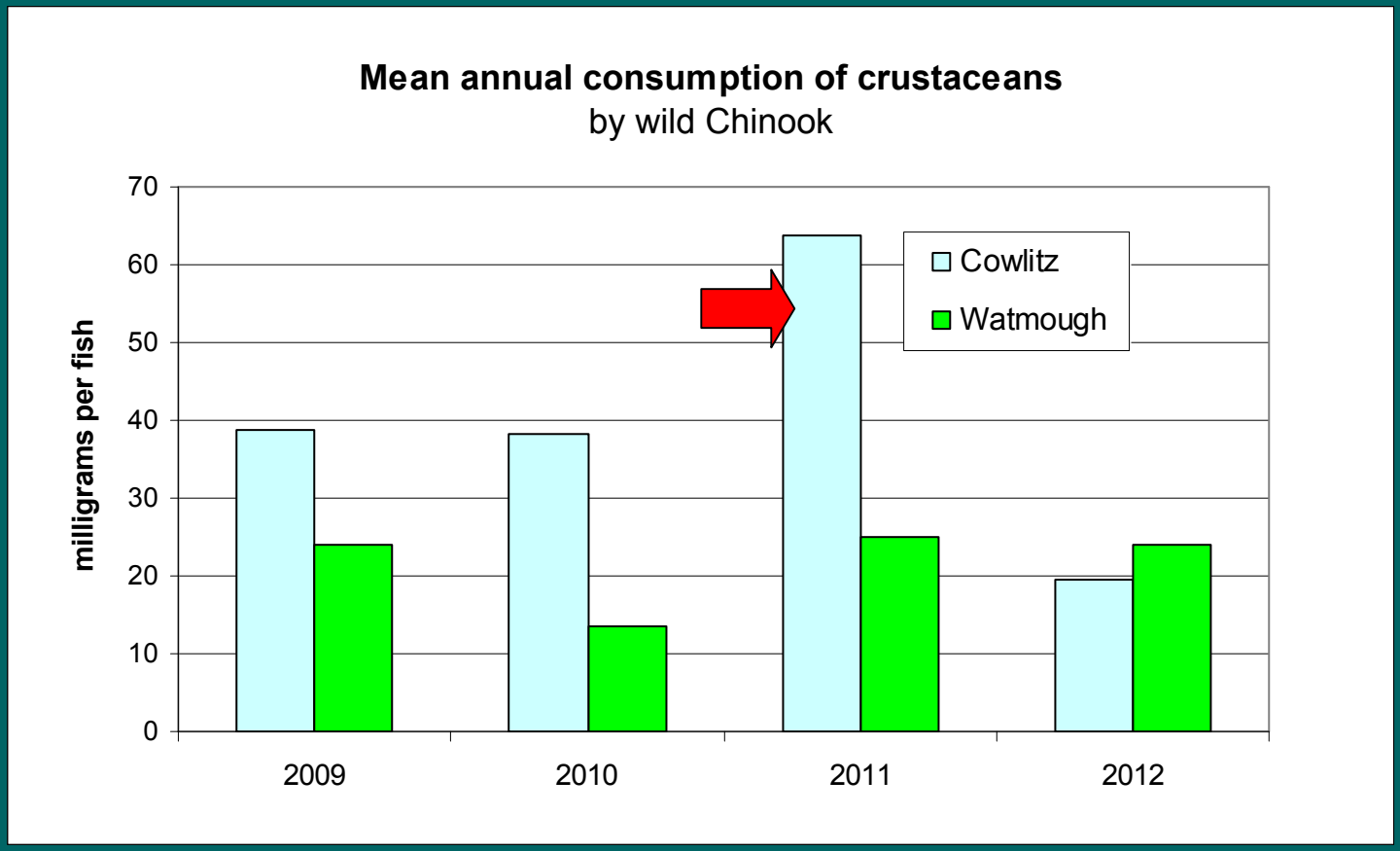
Chinook can eat Sandlance a bit larger than the herring they eat – but at any given size herring are a richer meal



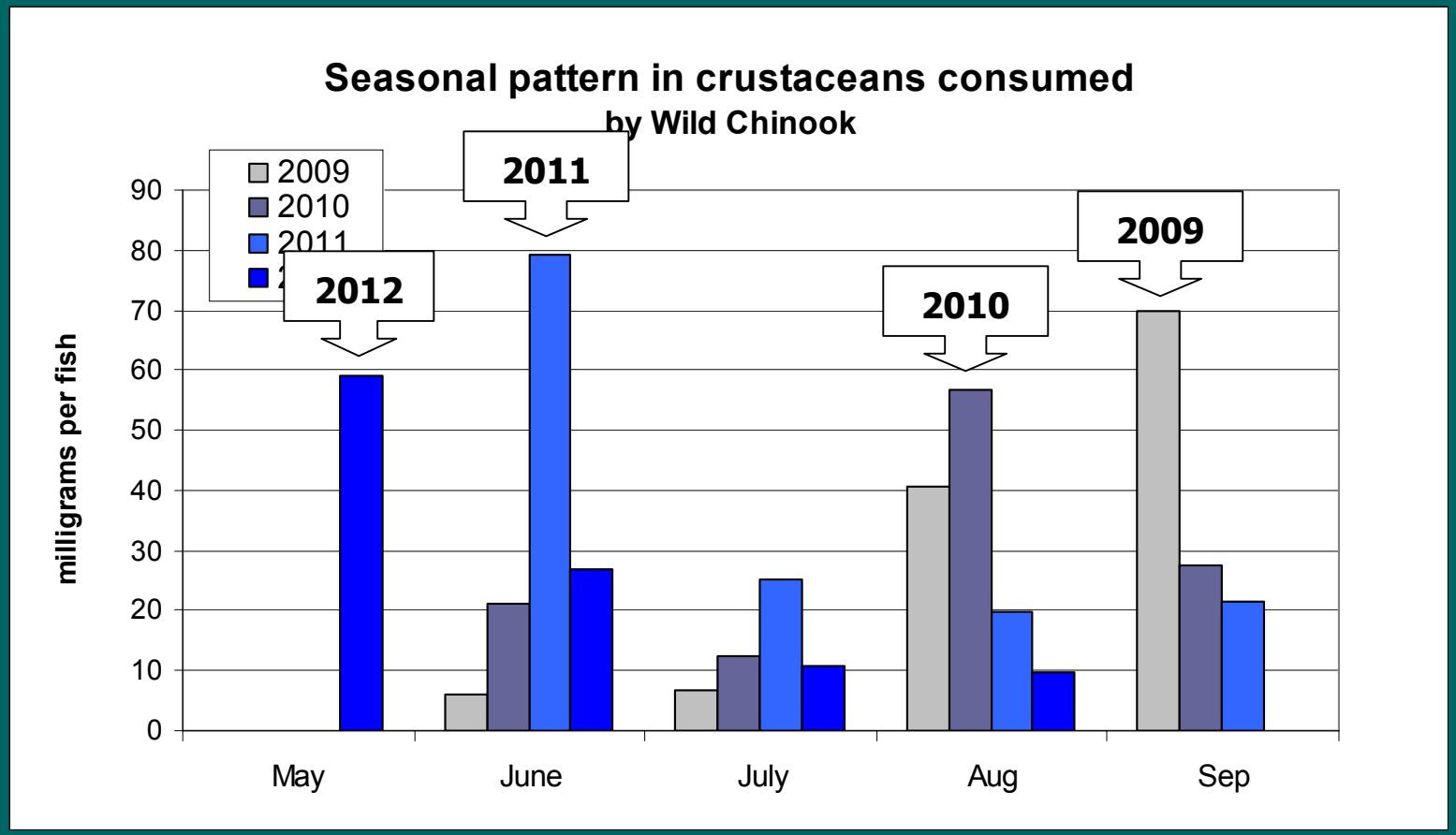
Sandlance seasonal timing varies, however

Ocean cyclical conditions (ENSO)? Ocean warming?

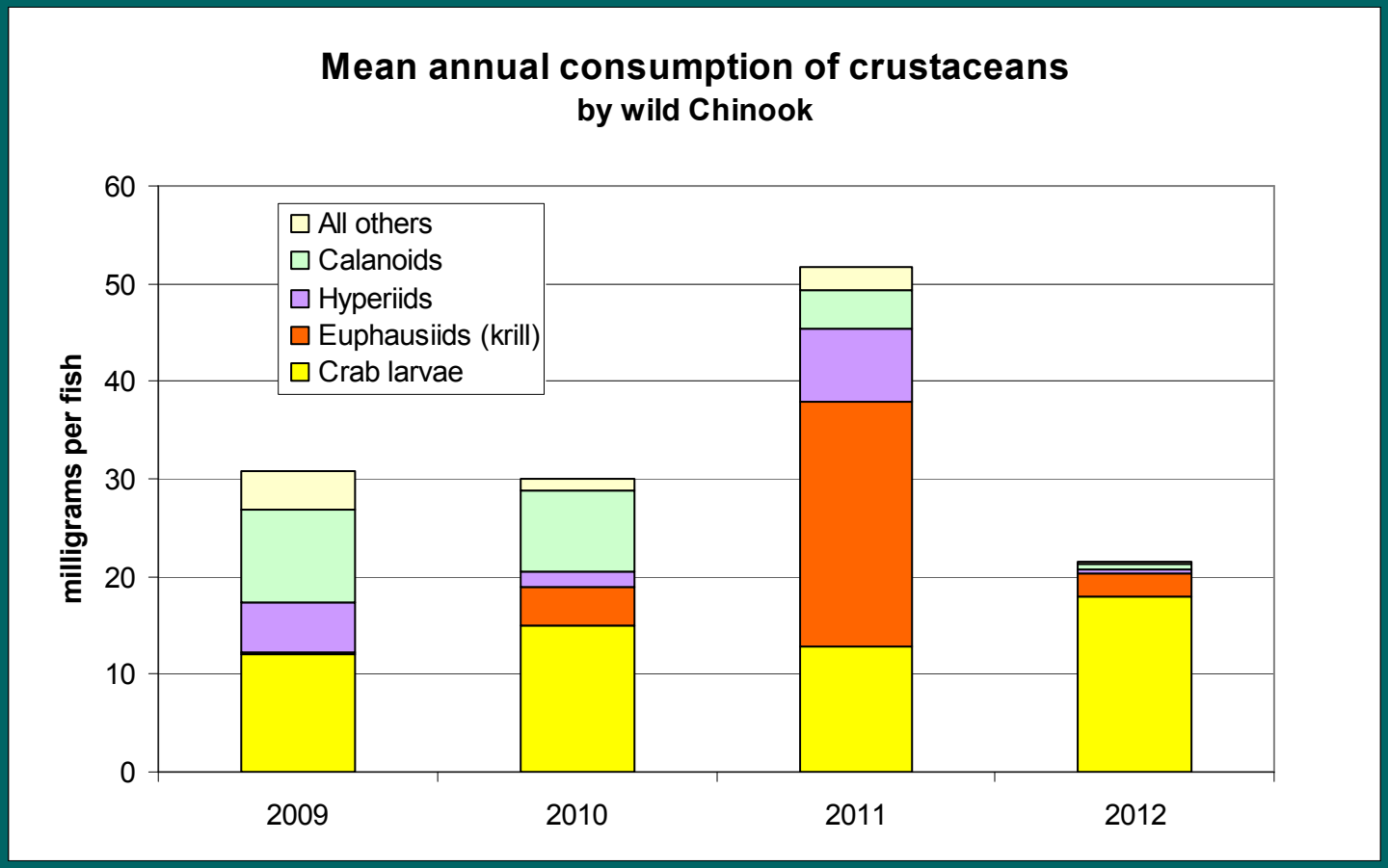
How do Chinook cope without herring?



#2: Eat crustaceans, such as crab! (when available)

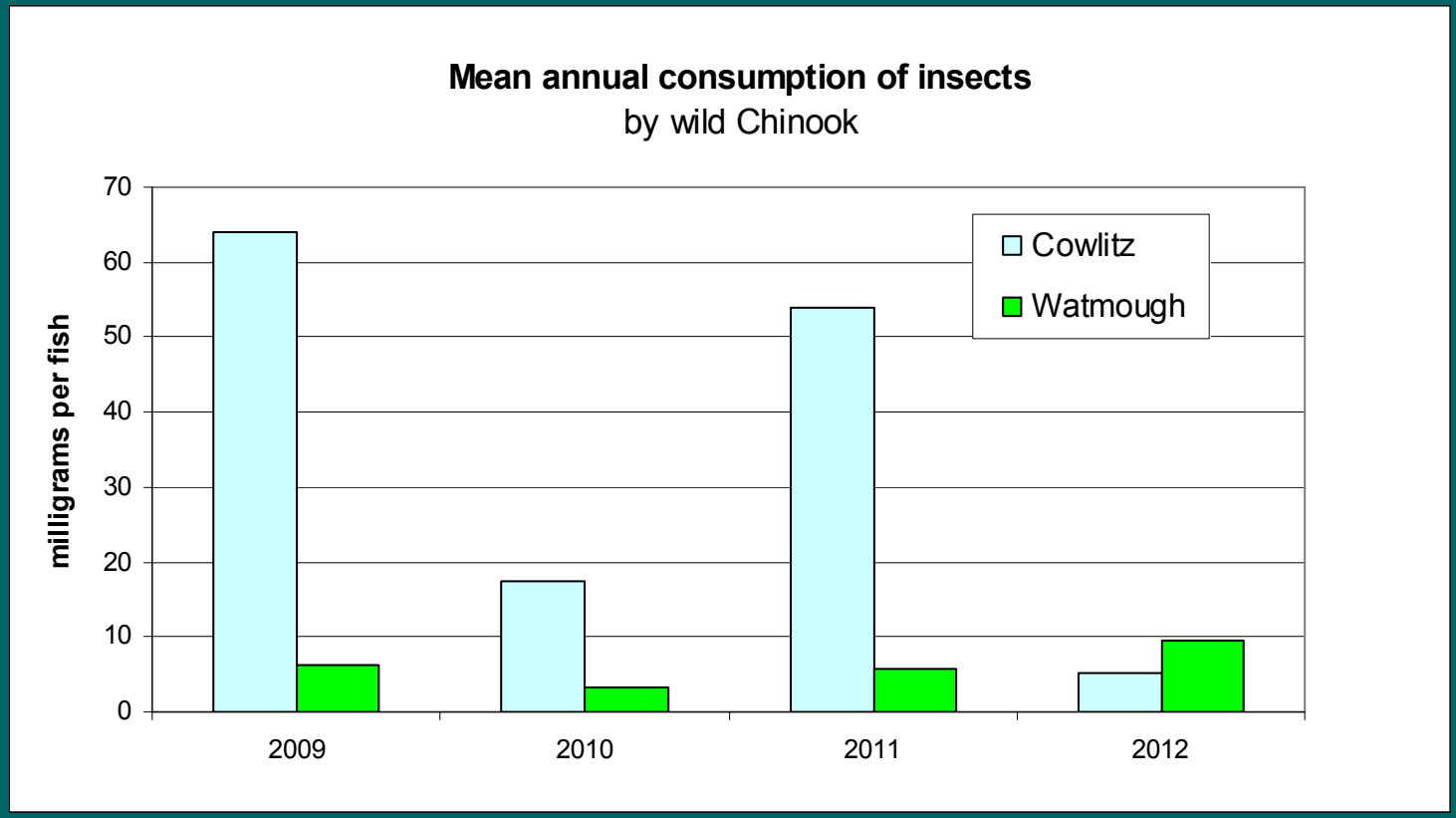


Crustaceans can be important early or late

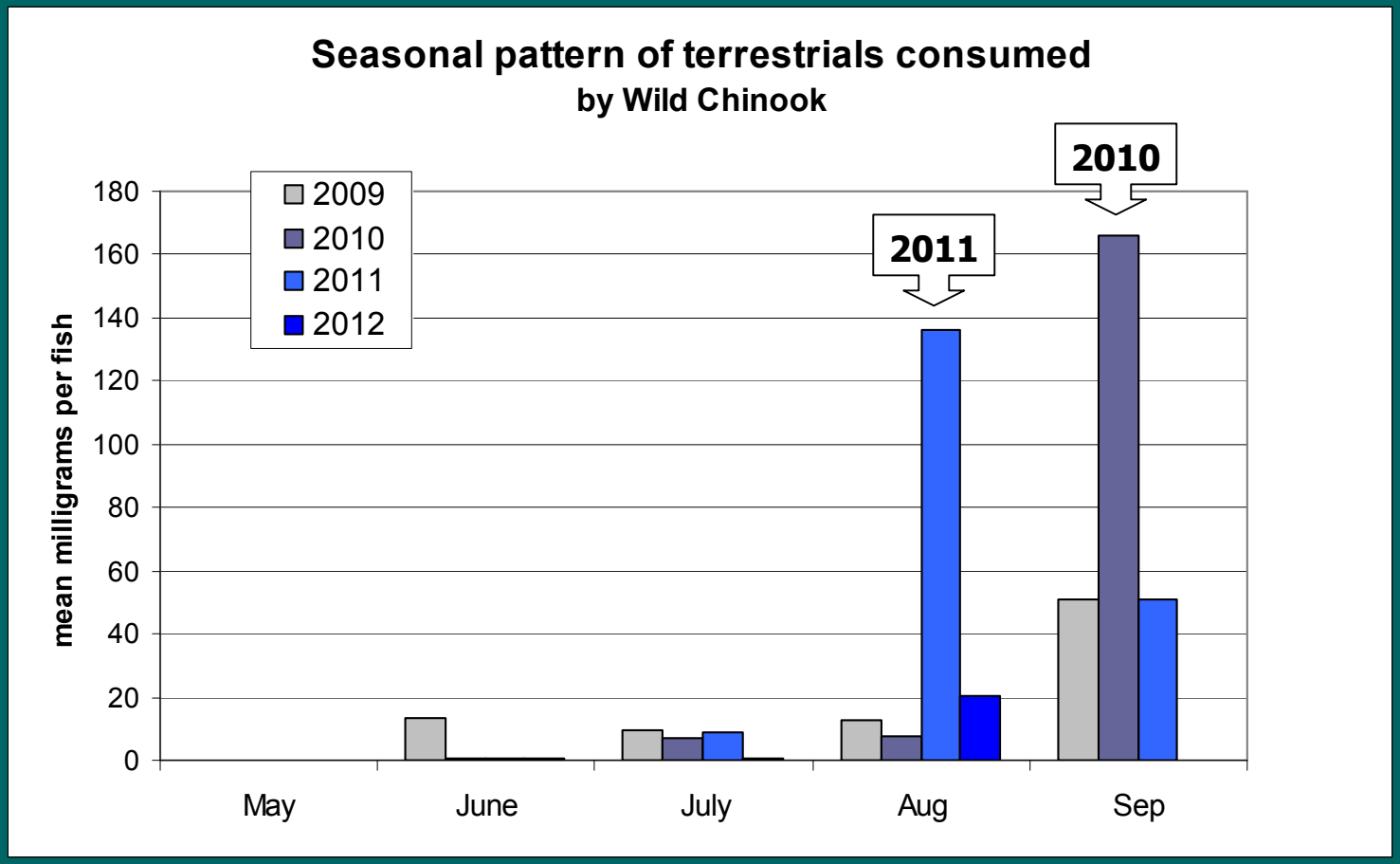


Crab are the most consistent crustacean prey

How do Chinook cope without herring?

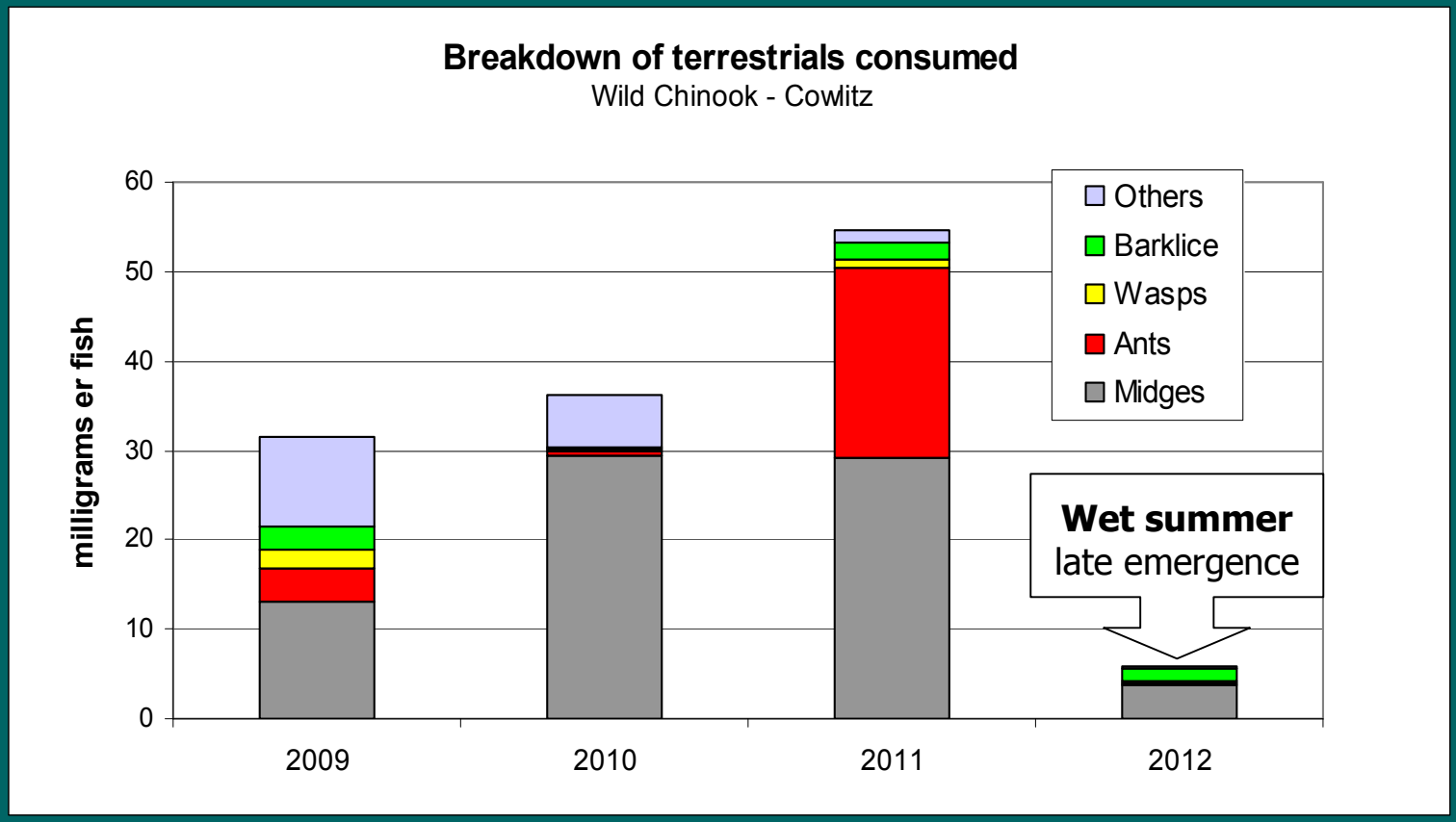


#3: Eat insects - especially at Cowlitz!

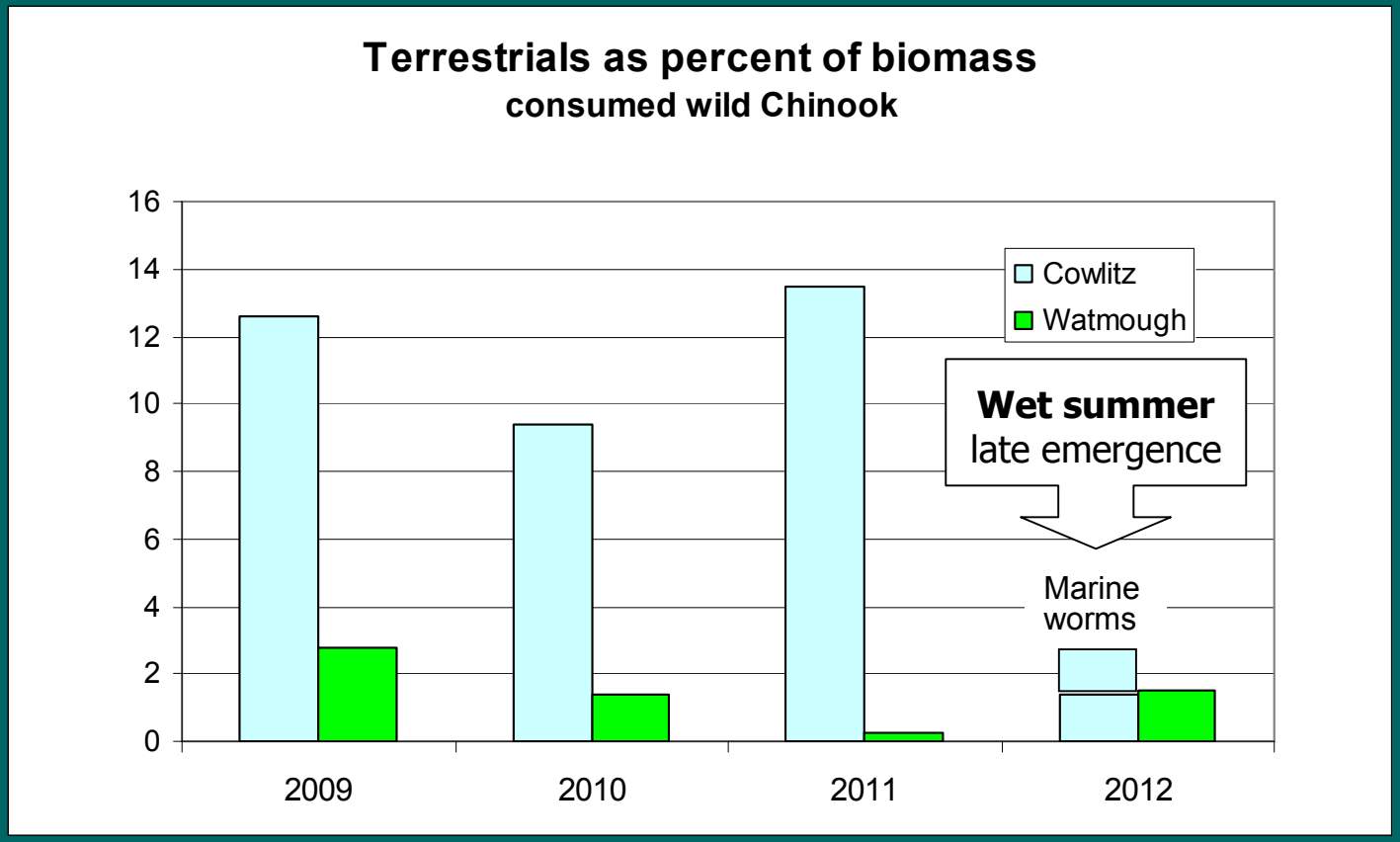


Insects tend to be important in late summer

– when we have a summer!

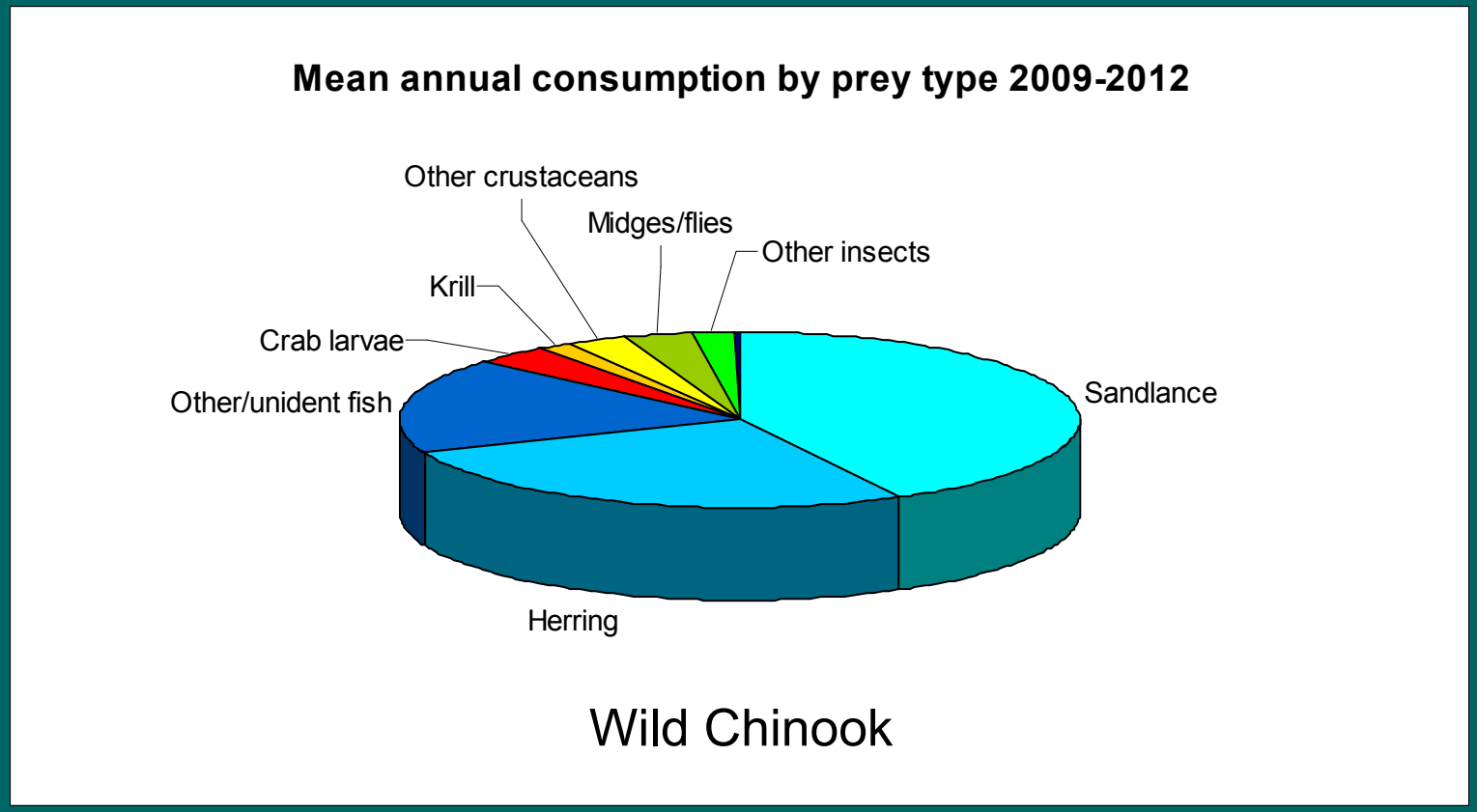


Mainly flies! (when available)



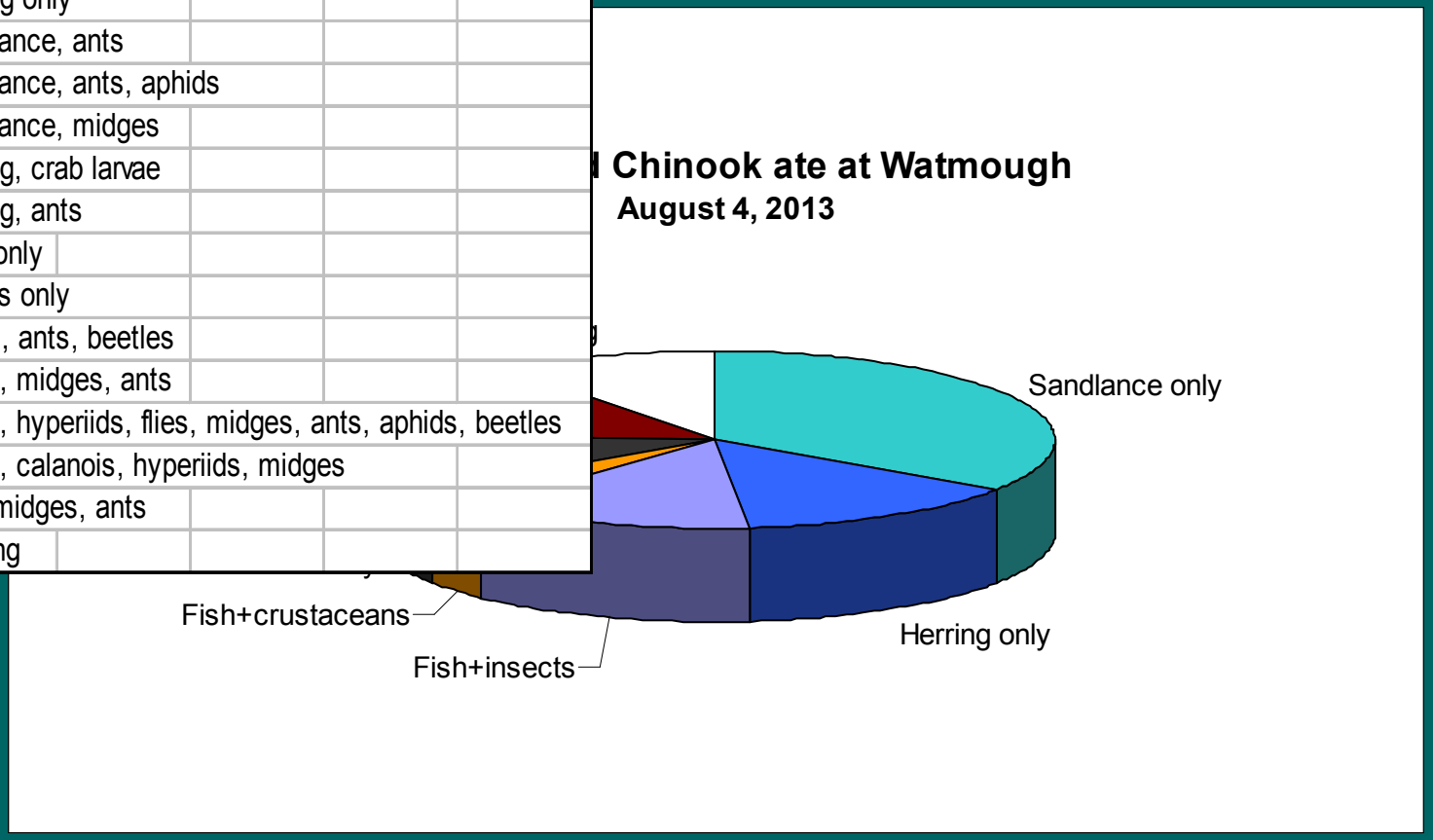
Cowlitz is generally “buggier”

On the whole, wild Chinook have been relying on **Sandlance**, **herring**, and about 16% **invertebrates**

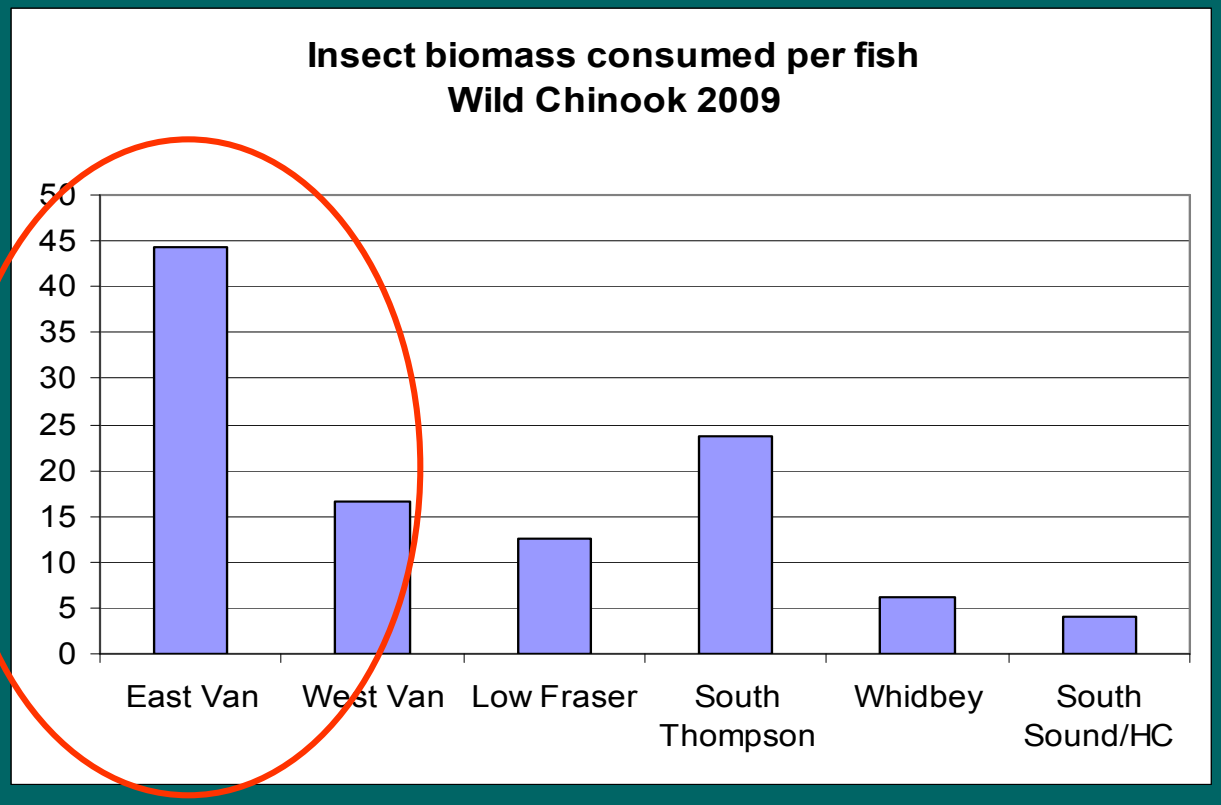


Wild Chinook

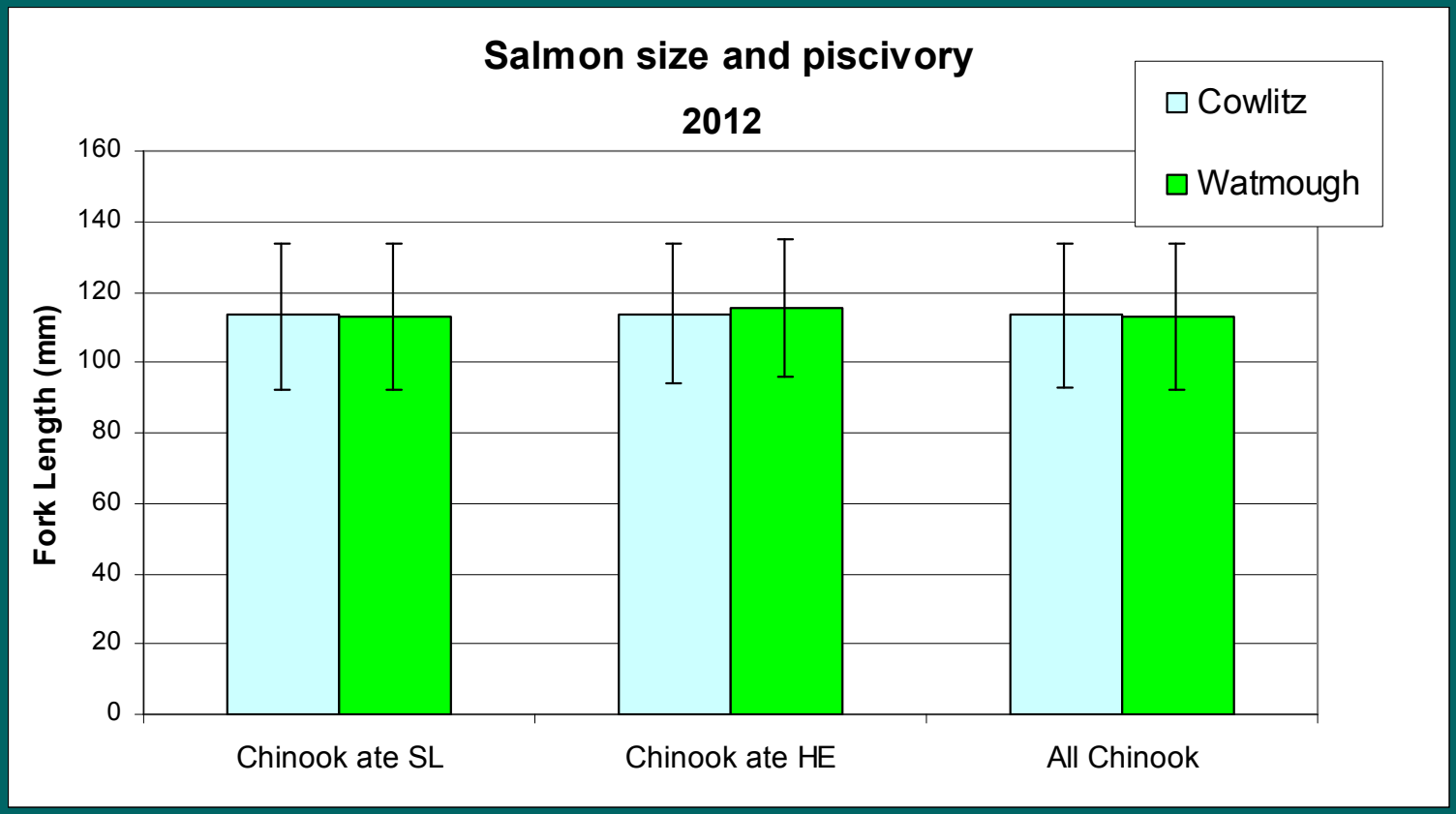
Sandlance only
Herring only
Sandlance, ants
Sandlance, ants, aphids
Sandlance, midges
Herring, crab larvae
Herring, ants
Ants only
Aphids only
Miges, ants, beetles
Crabs, midges, ants
Crabs, hyperiids, flies, midges, ants, aphids, beetles
Crabs, calanois, hyperiids, midges
Krill, midges, ants
Nothing



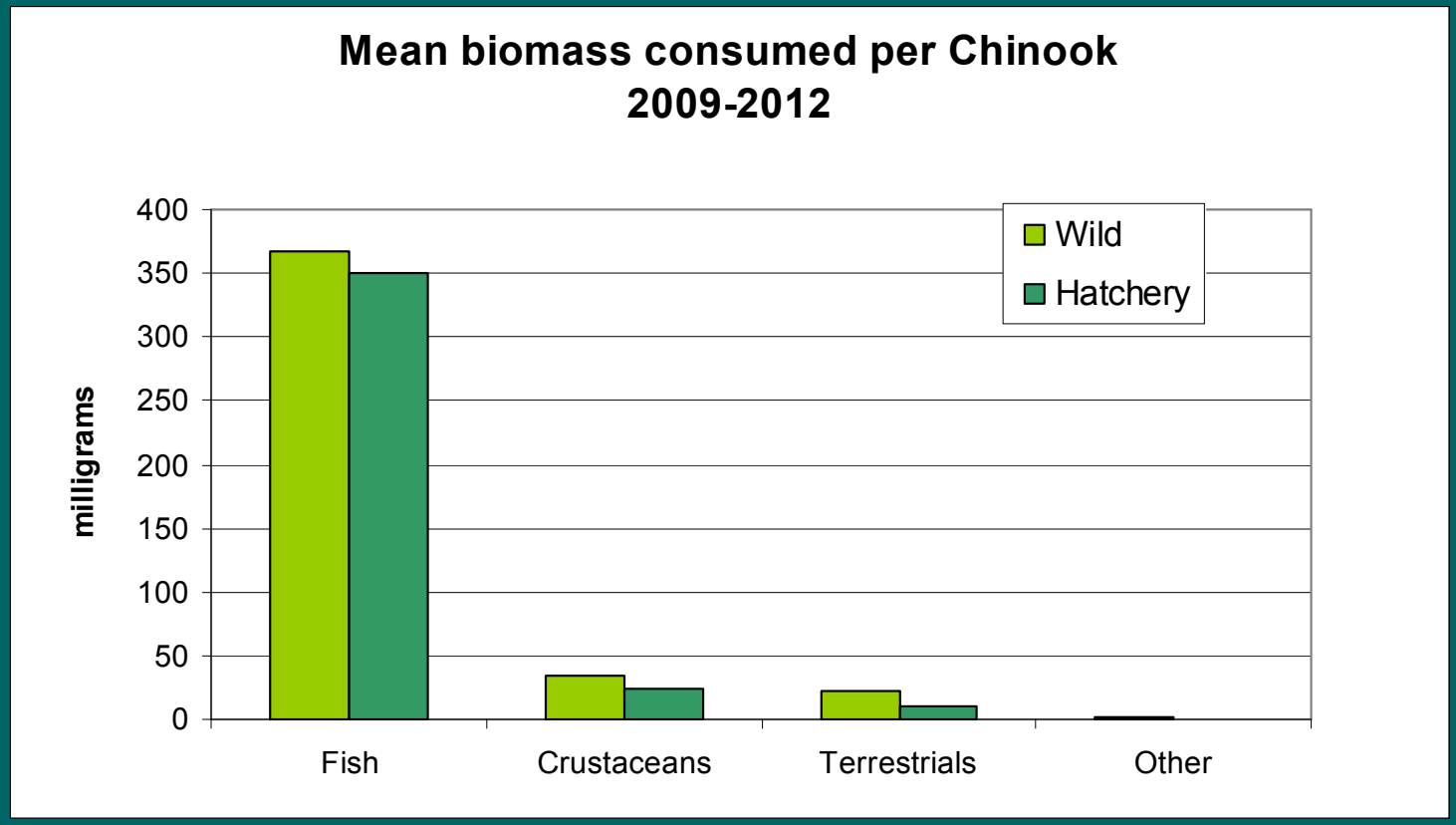
Individual-level variation is significant, however: a “portfolio” strategy



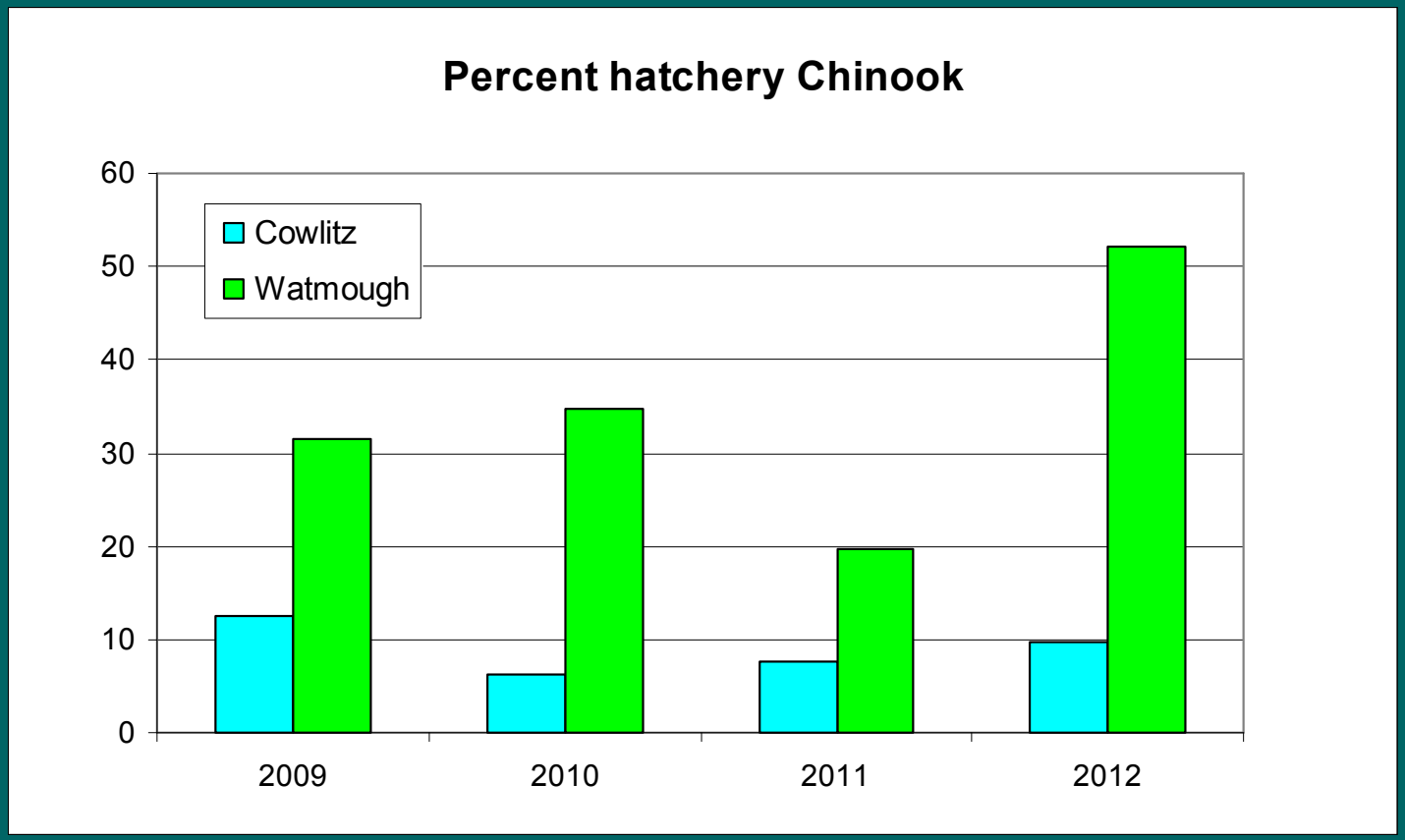
Like piscivory, residence time may also vary individually, and/or by stock



But piscivory is evidently not just a function of the size of individual Chinook



On average, Hatchery Chinook compete for the same resources



More **hatchery** fish use Watmough than Cowlitz

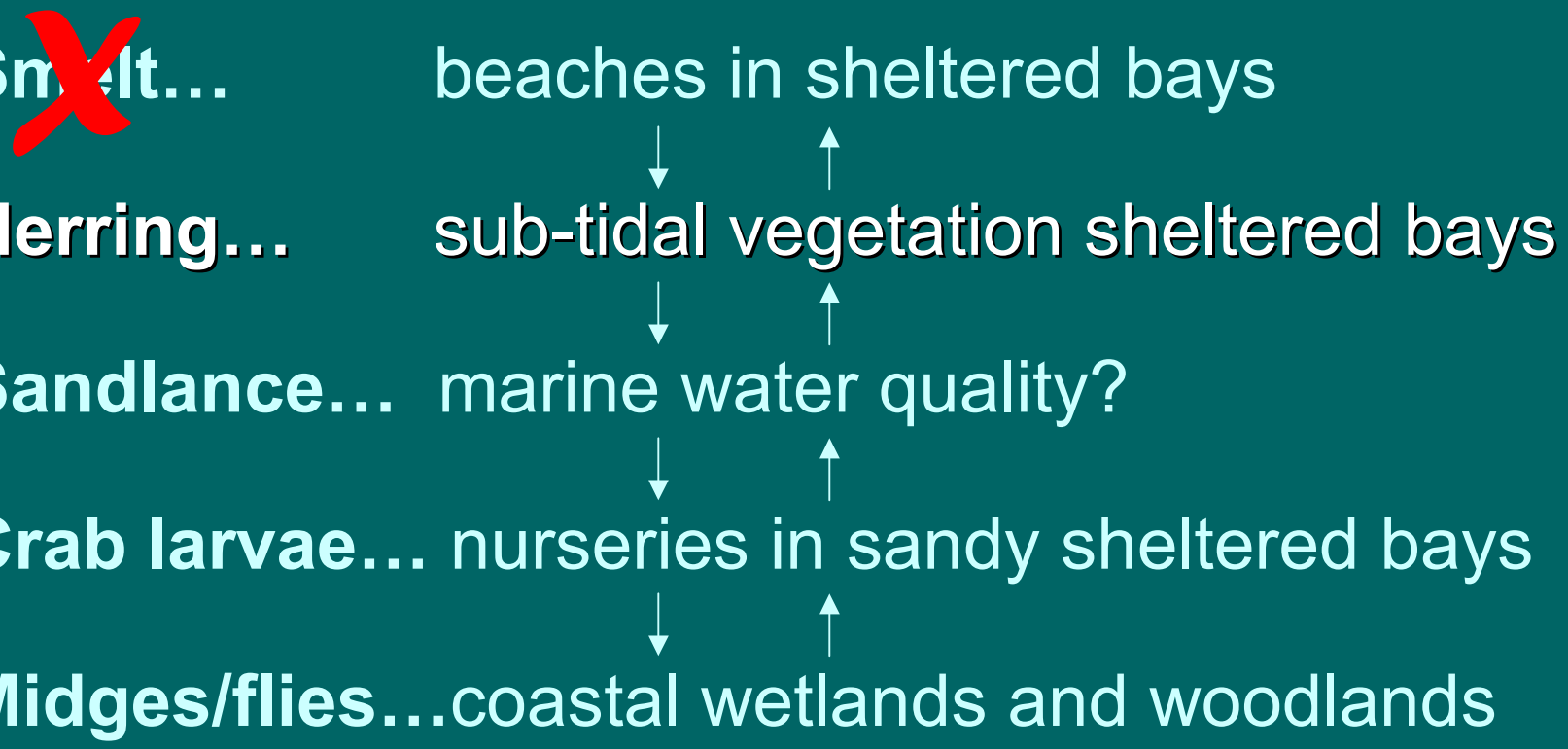
Seabirds also rely on local herring!
(including Marbled Murrelets)

Especially on south Lopez!

THE BOTTOM LINE:

LOCAL HERRING and SANDLANCE

Policy implications:
What do we protect/restore?



What we still need to know:

- Current extent of herring spawning in WRIA2
- Role of disease in herring recovery (USGS)
- Inventory/assess sandlance spawning habitats
- Are sandlance more than one (sub-) species?

- Which of our salmon become Blackmouth?

What we need to do:

- Identify all remaining island herring grounds
- Protect remaining island herring grounds from physical disturbance and contamination
- Restore/enlarge vegetated shallows

Sargassum, narrow-bladed seaweeds, eelgrass
1-3 fathoms

Climate change affects prey availability
(relative size at time of arrival)

- Juvenile Chinook departure from rivers
- Sandlance and herring spawning times
- Crab spawning and larval dispersal times
- Insect emergence and mating swarms

Acknowledgments

Bureau of Land Management
San Juan County Land Bank
Lopez and Waldron volunteers
Waldron Community