



Western Washington University
Western CEDAR

Salish Sea Ecosystem Conference

2018 Salish Sea Ecosystem Conference
(Seattle, Wash.)

Apr 5th, 4:30 PM - 4:45 PM

Salmon and jellies and herring, oh my! Abiotic and biotic-dependent trends in abundance and distribution of pelagic critters in Skagit Bay across 17 years

Stuart Harold Munsch

Northwest Fisheries Science Center (U.S.), stuart.munsch@noaa.gov

Correigh M. Greene

Northwest Fisheries Science Center (U.S.), correigh.greene@noaa.gov

Jason Hall

Northwest Fisheries Science Center (U.S.), Jason.Hall@noaa.gov

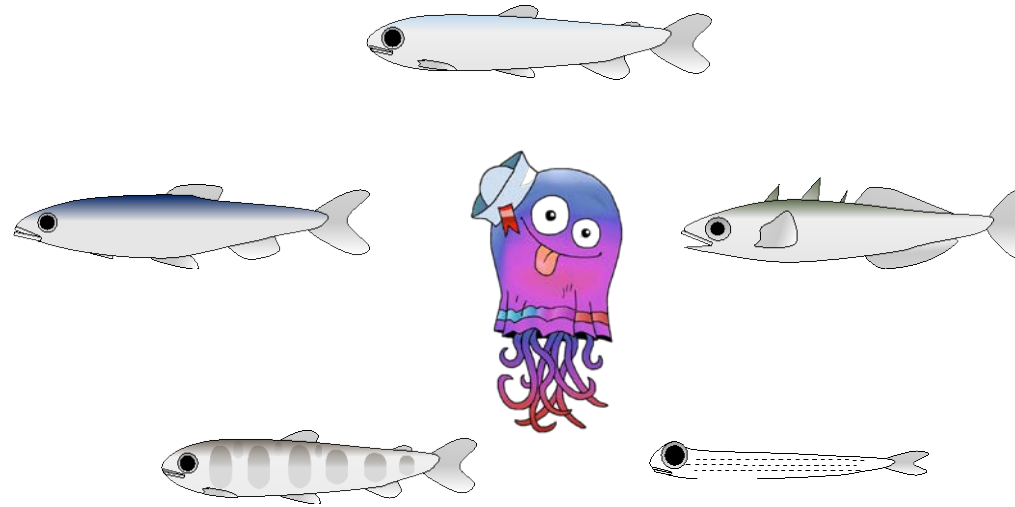
Follow this and additional works at: <https://cedar.wwu.edu/ssec>



Part of the [Fresh Water Studies Commons](#), [Marine Biology Commons](#), [Natural Resources and Conservation Commons](#), and the [Terrestrial and Aquatic Ecology Commons](#)

Munsch, Stuart Harold; Greene, Correigh M.; and Hall, Jason, "Salmon and jellies and herring, oh my! Abiotic and biotic-dependent trends in abundance and distribution of pelagic critters in Skagit Bay across 17 years" (2018). *Salish Sea Ecosystem Conference*. 415.
<https://cedar.wwu.edu/ssec/2018ssec/allsessions/415>

This Event is brought to you for free and open access by the Conferences and Events at Western CEDAR. It has been accepted for inclusion in Salish Sea Ecosystem Conference by an authorized administrator of Western CEDAR. For more information, please contact westerncedar@wwu.edu.



Salmon and jellies and herring, oh my!
Trends in the environment and critters of Skagit Bay's
pelagic waters across 17 years

Stuart Munsch¹

Correigh Greene¹

Jason Hall¹

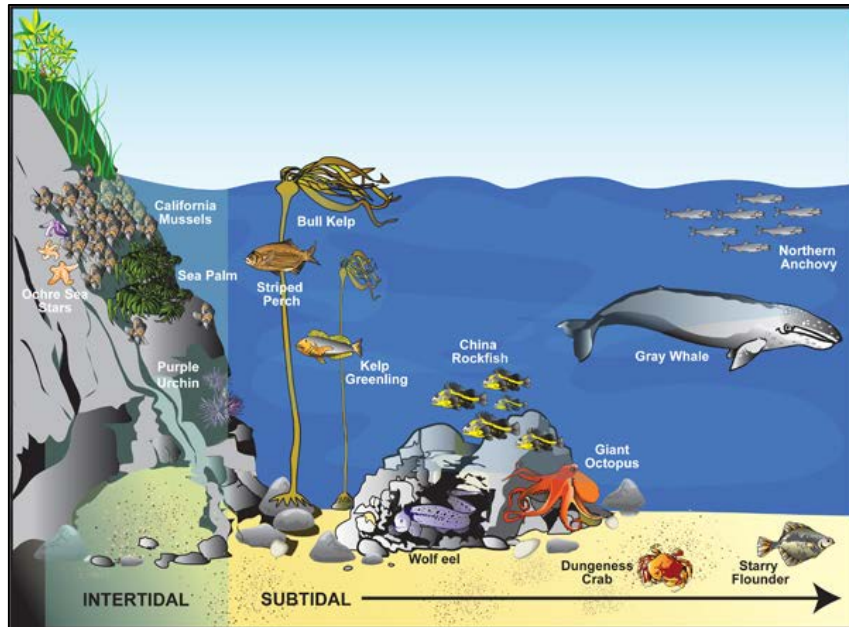
¹NMFS NWFSC

Outline

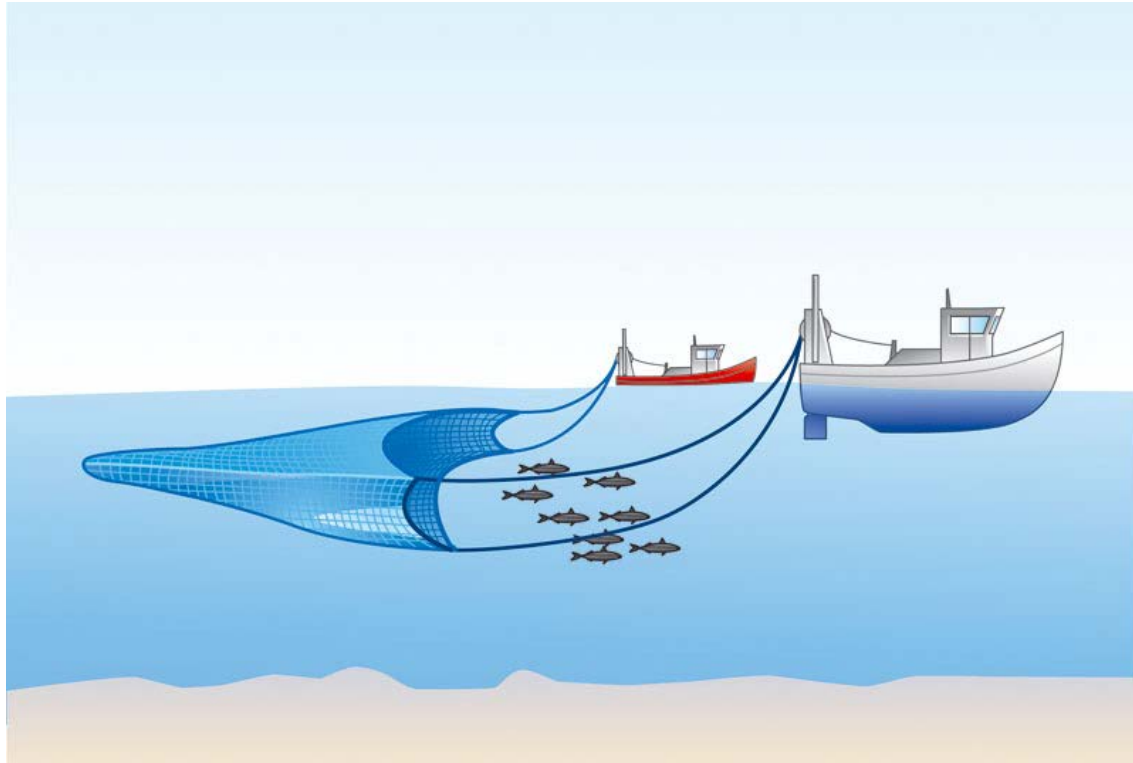
- Prospective talk w/extremely preliminary findings
 - Show & tell
 - I'd appreciate input & ideas
- Describe
 - the monitoring
 - analytical approach
 - time series of environmental conditions & fish abundances
- Examine
 - relationships among species & environmental conditions

Skagit Bay & its pelagic habitat

- Estuarine bay & strait in the Whidbey Basin
- Fed by Skagit River
- Many local fish use pelagic waters during various life history phases
 - E.g., salmon, forage fish, larval fish
 - These waters allow juvenile fish to grow
 - Species interact (e.g., competition, predation) depending on the life stage
- Many of these fish are of direct value to people or provide important trophic linkages



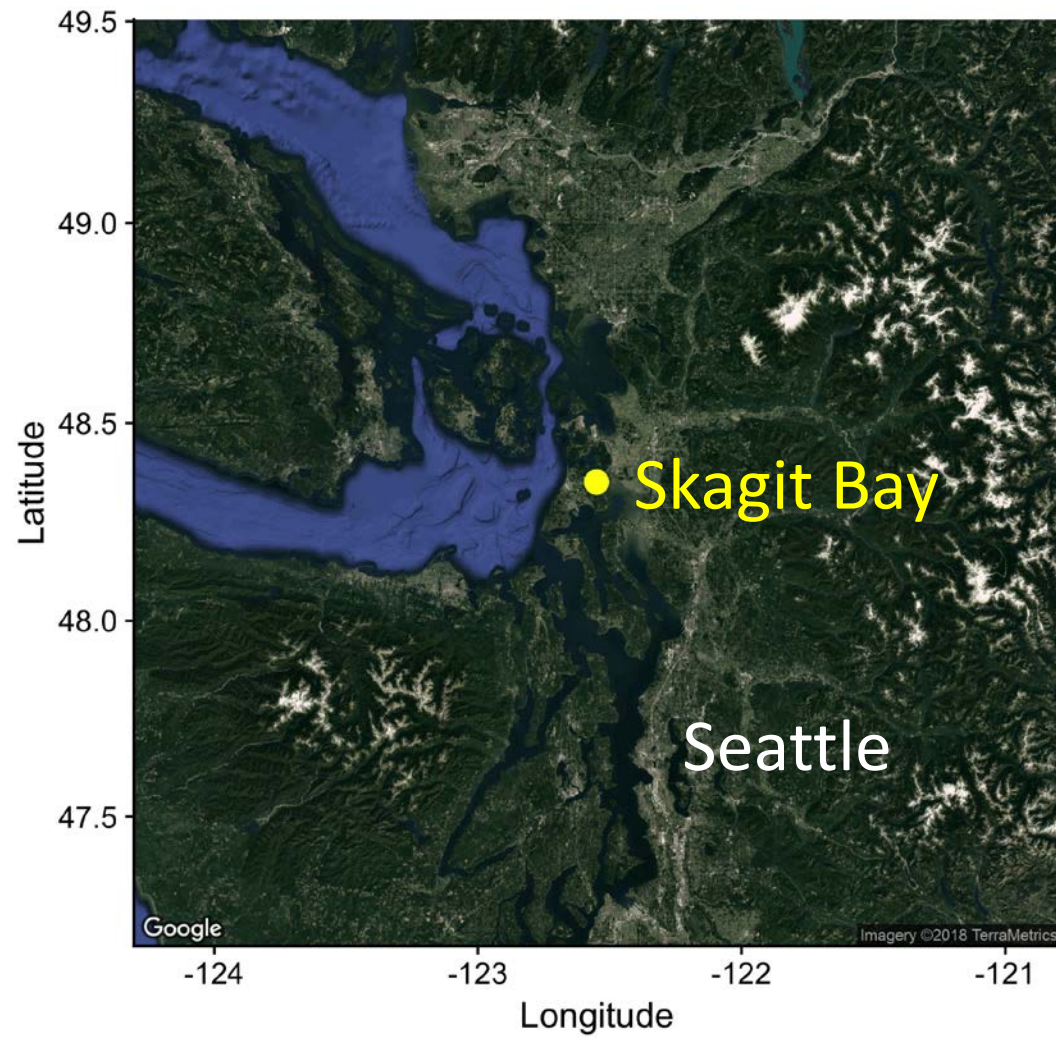
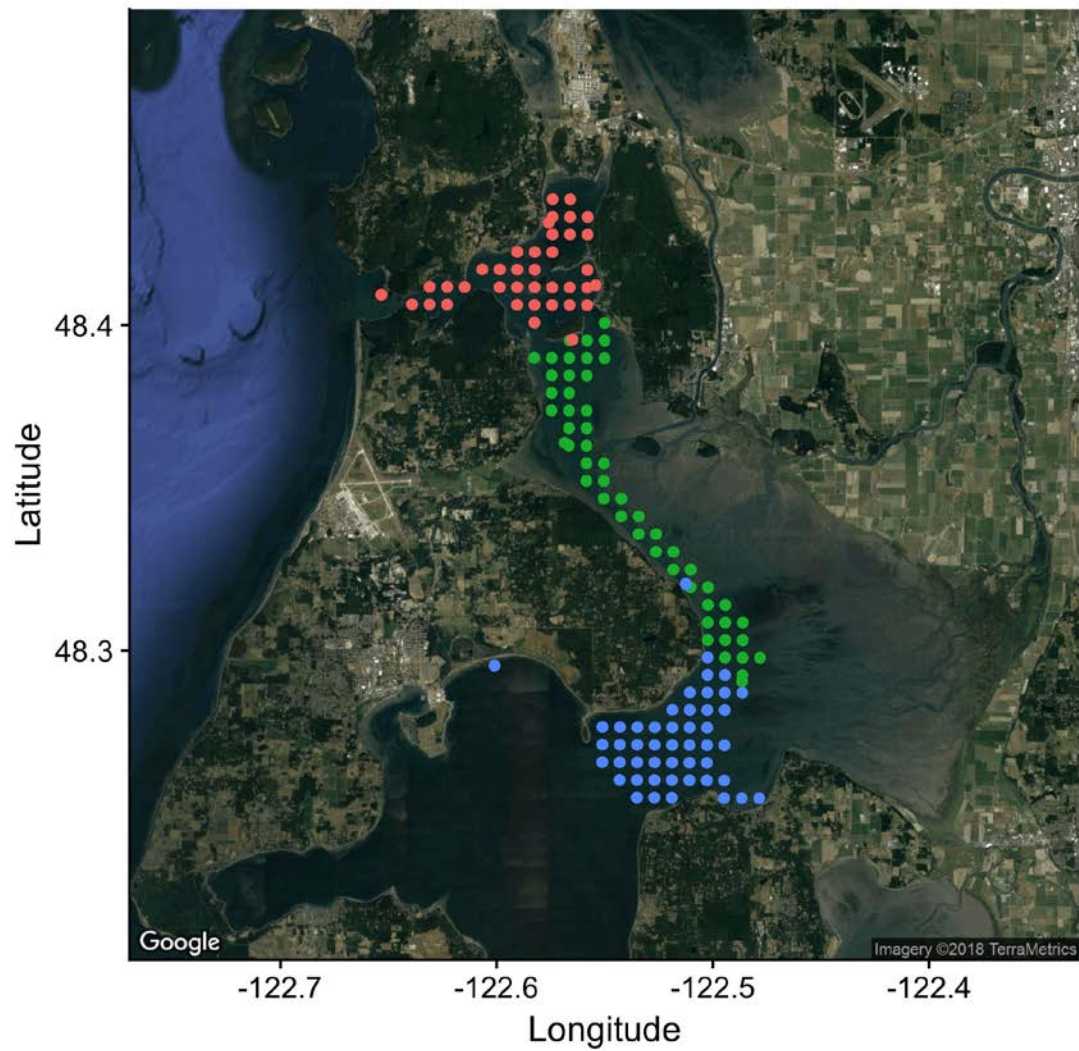
Monitoring

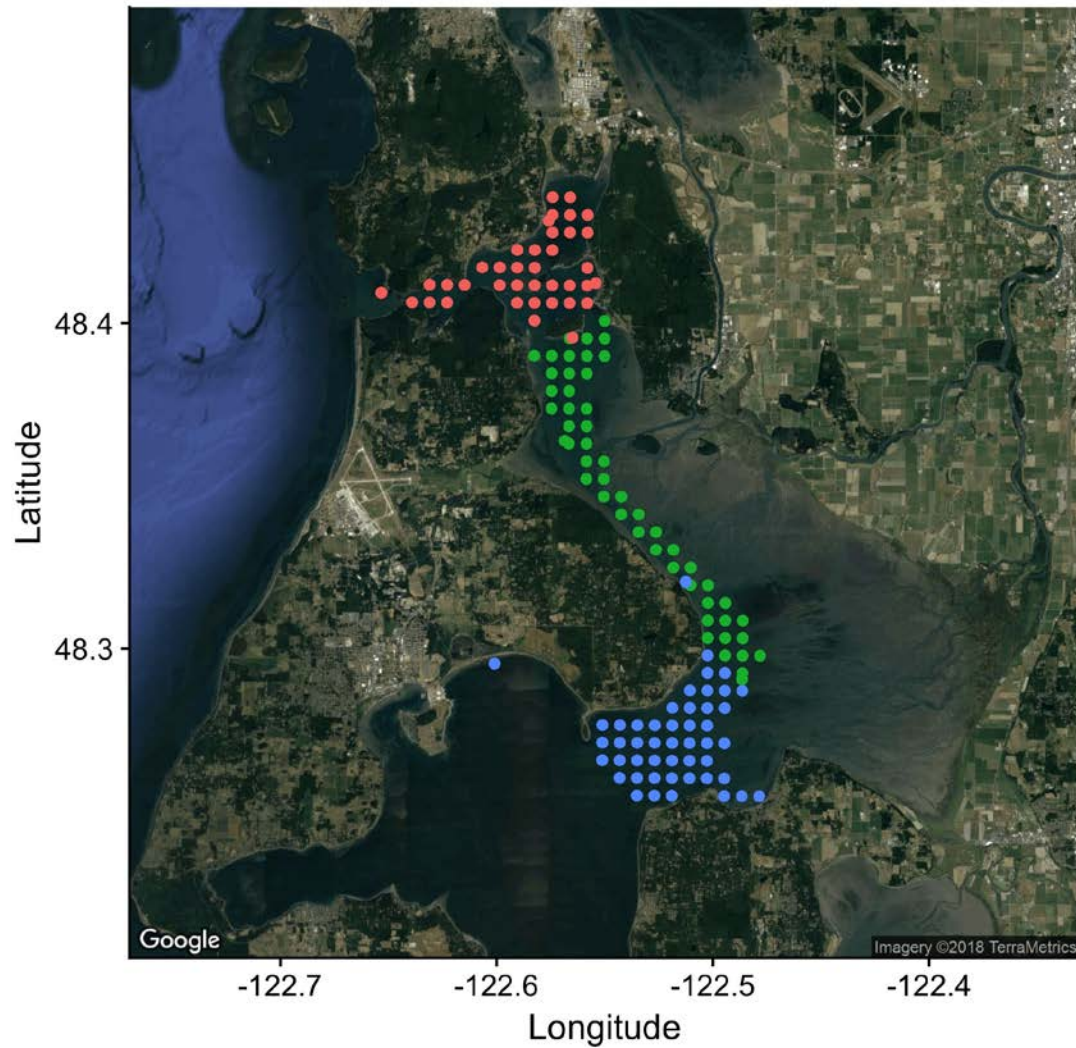


- Tow netting & water quality measurements
- 2001 – present (>2,250 sampling events)
- April – October (mostly)





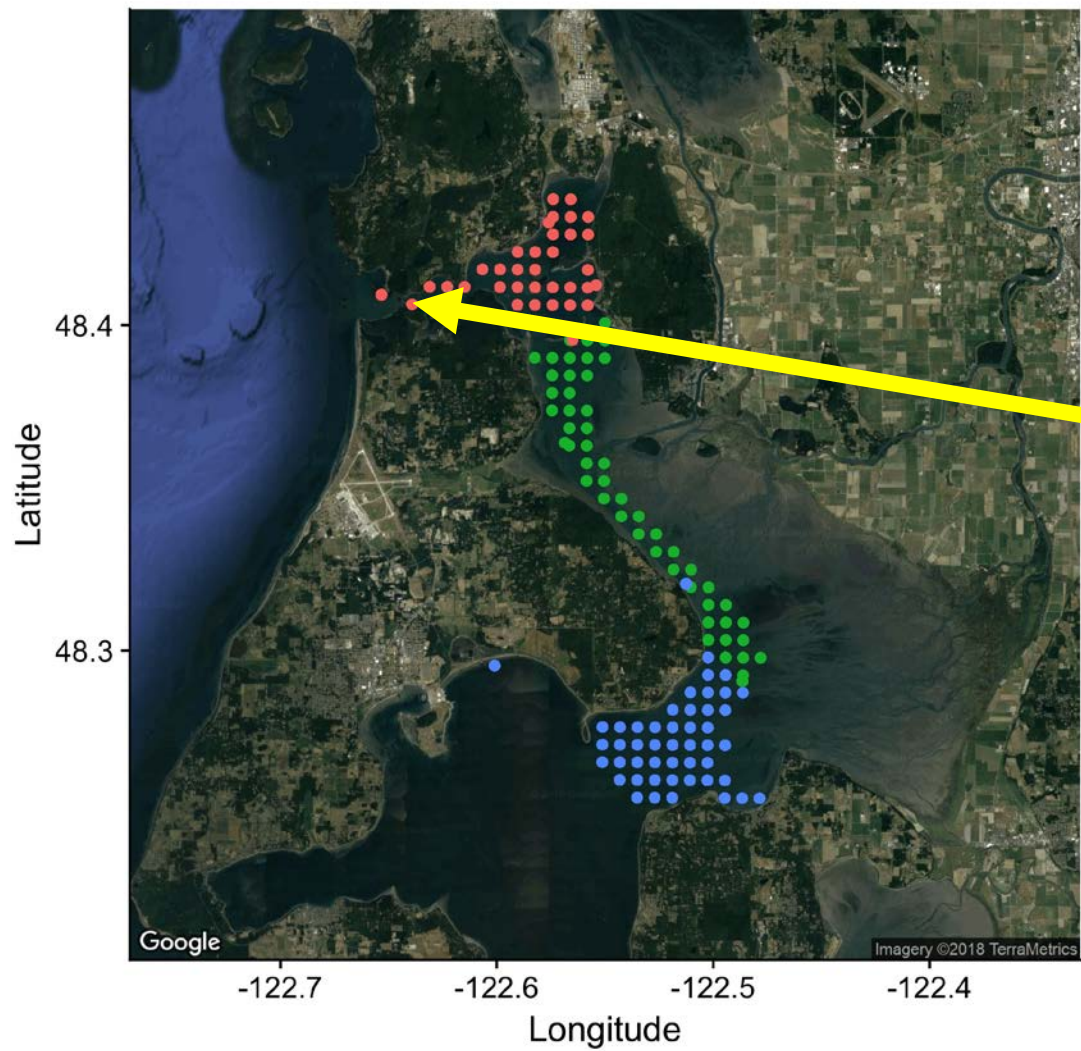




Marine, mixed by sills & narrows
(Straight outta the Straits)

Dominated by Skagit River plume
(Fresh outta Skagit)

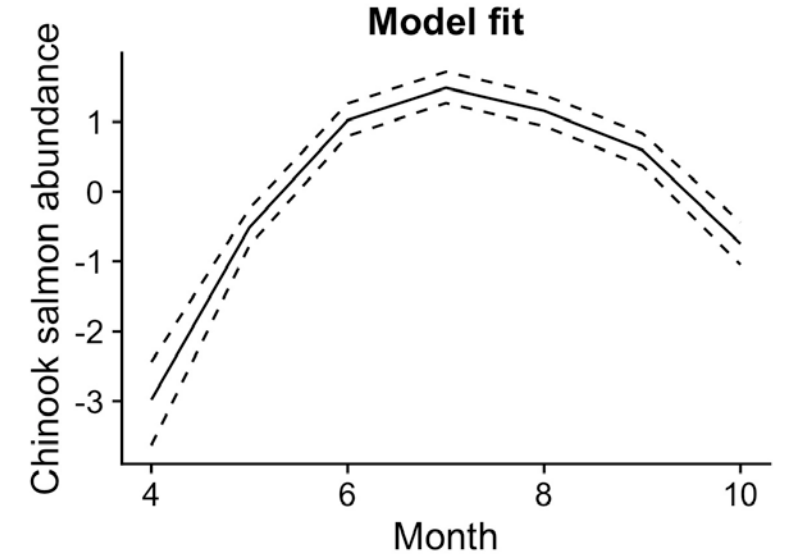
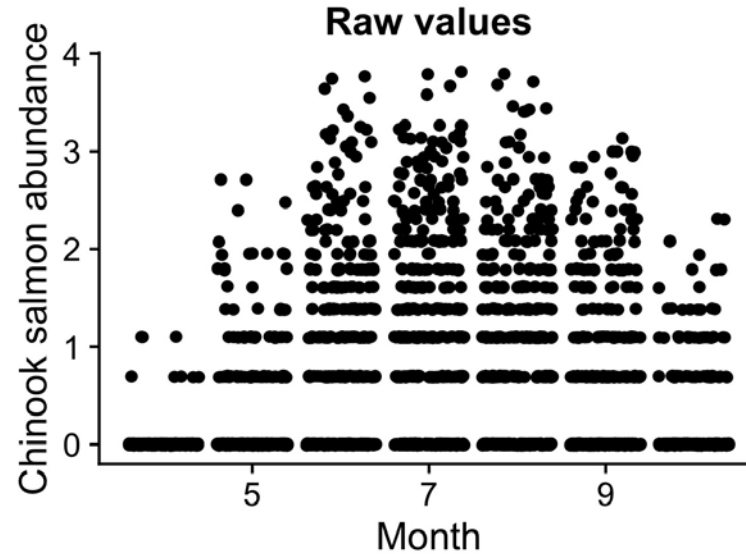
Stratified
(Fresh Skagit meets salty Saratoga)



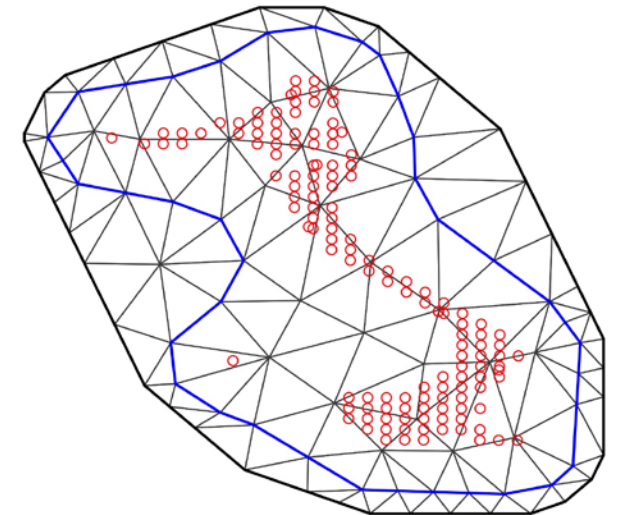
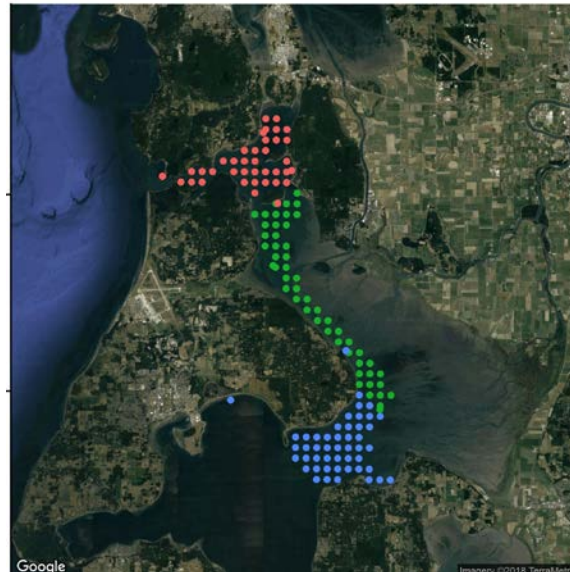
Deception pass

Estimating conditions of fish & the environment

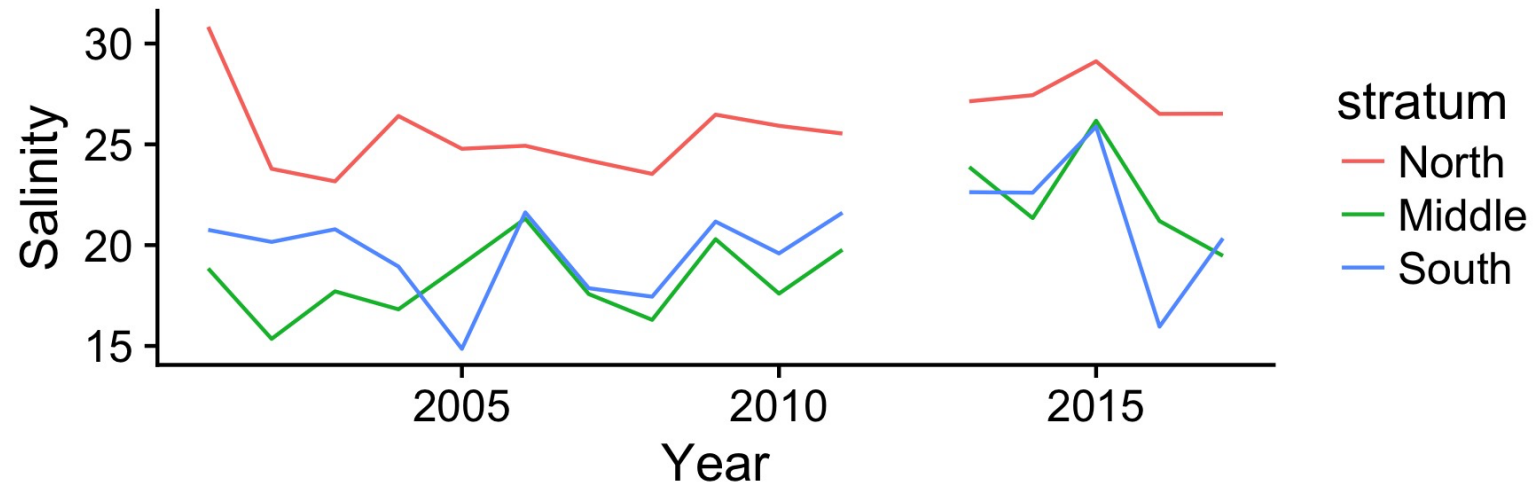
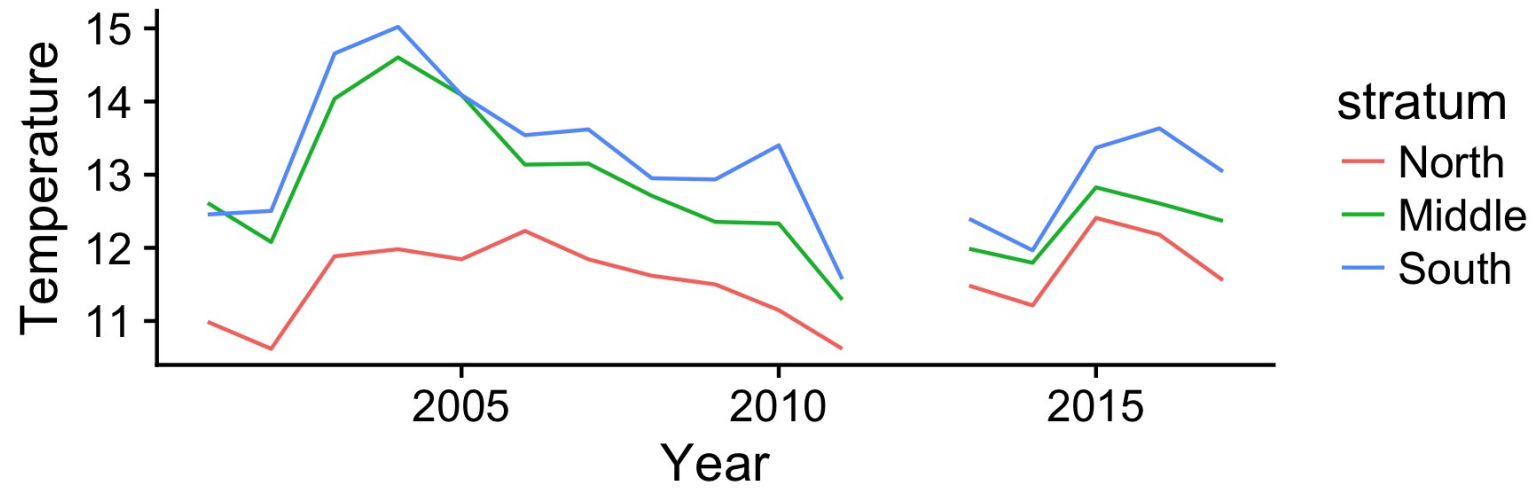
Seasonality in fish abundance & environment



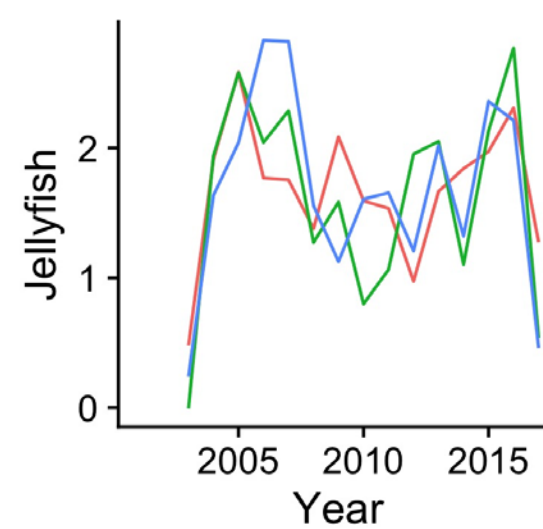
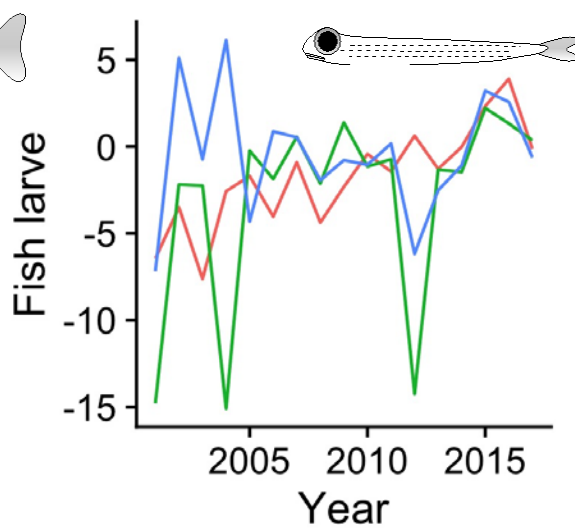
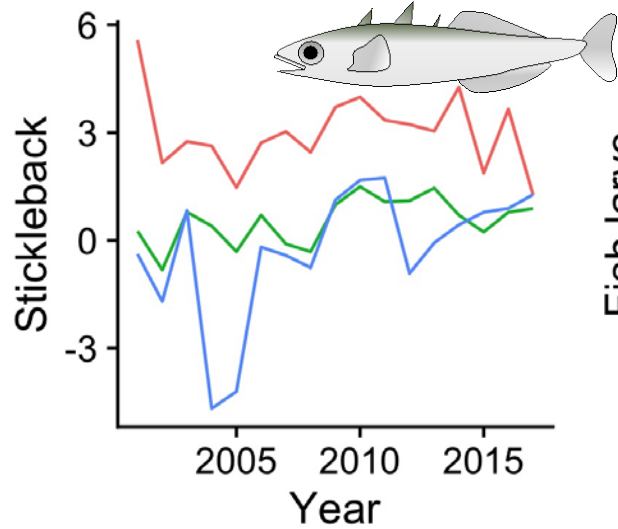
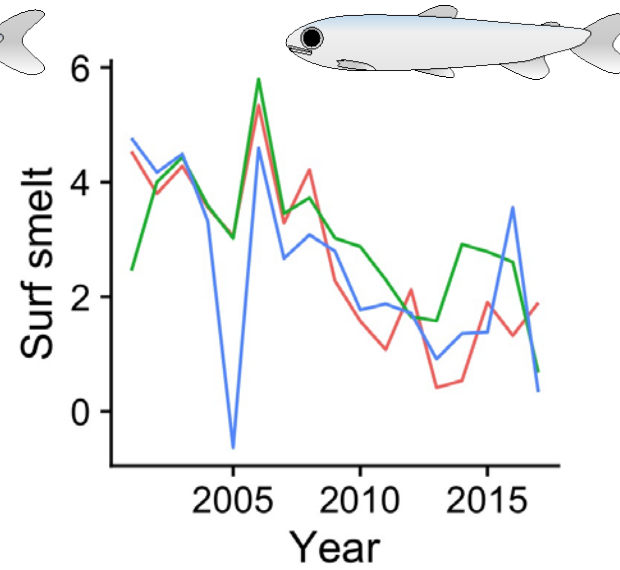
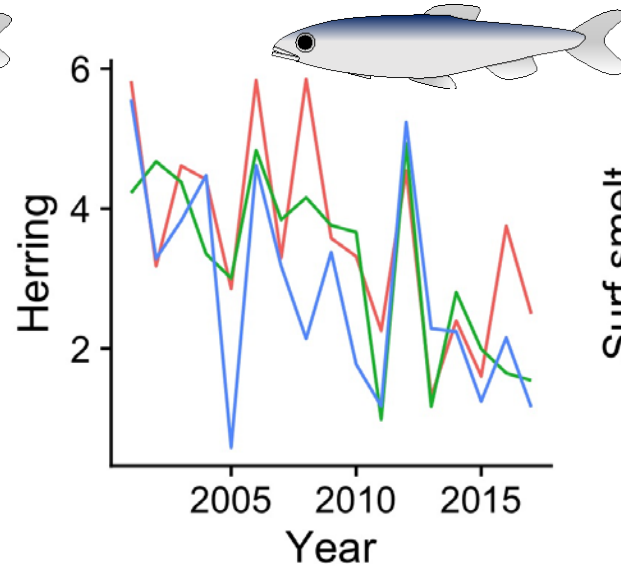
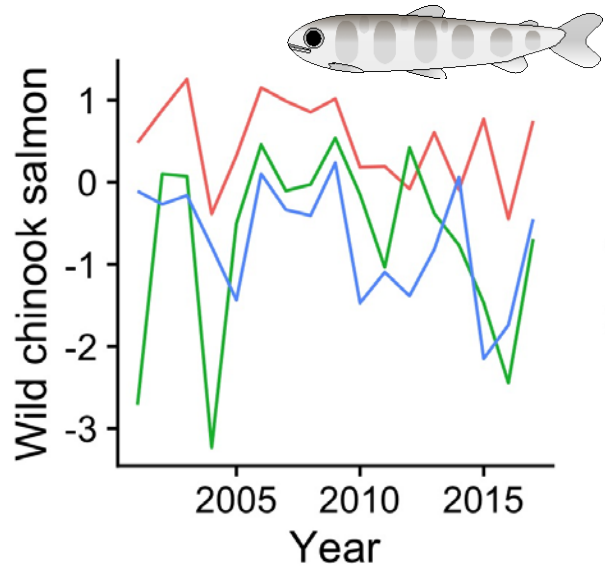
Proximate observations will be similar



Trends in temperature & salinity



Trends in fish abundances

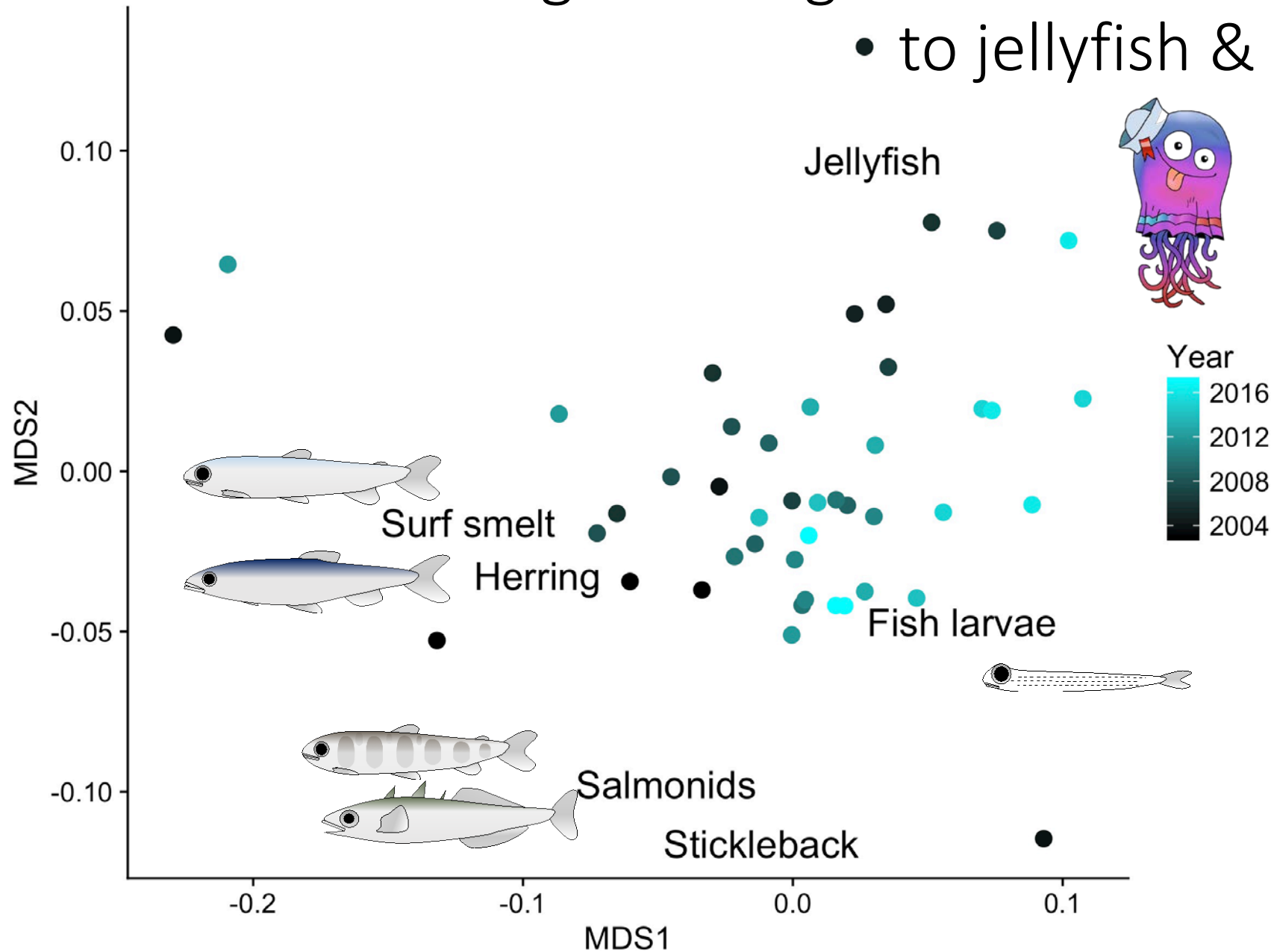


North
Middle
South

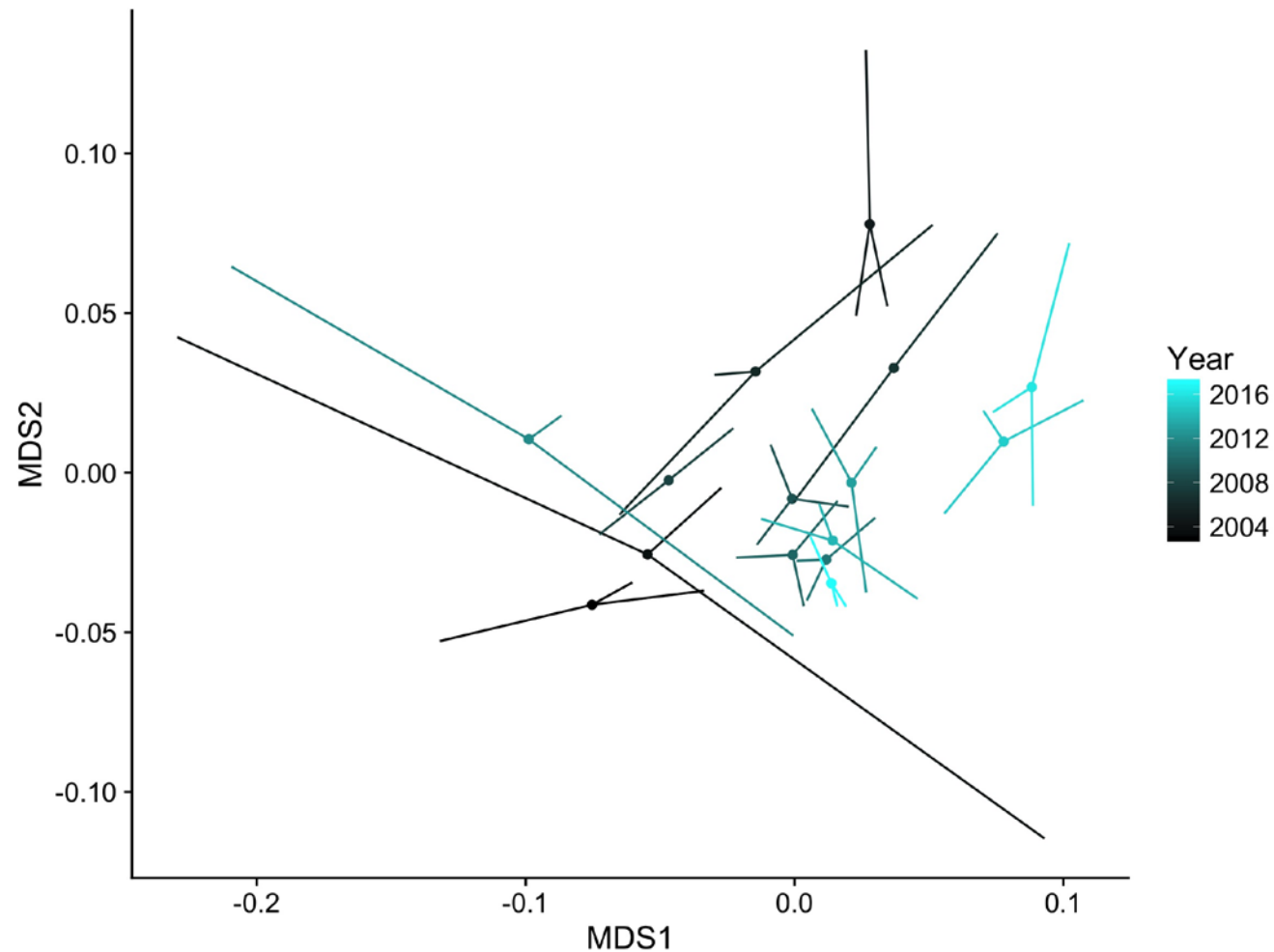


Is the fish assemblage shifting from salmon & forage fish

- to jellyfish & fish larvae?



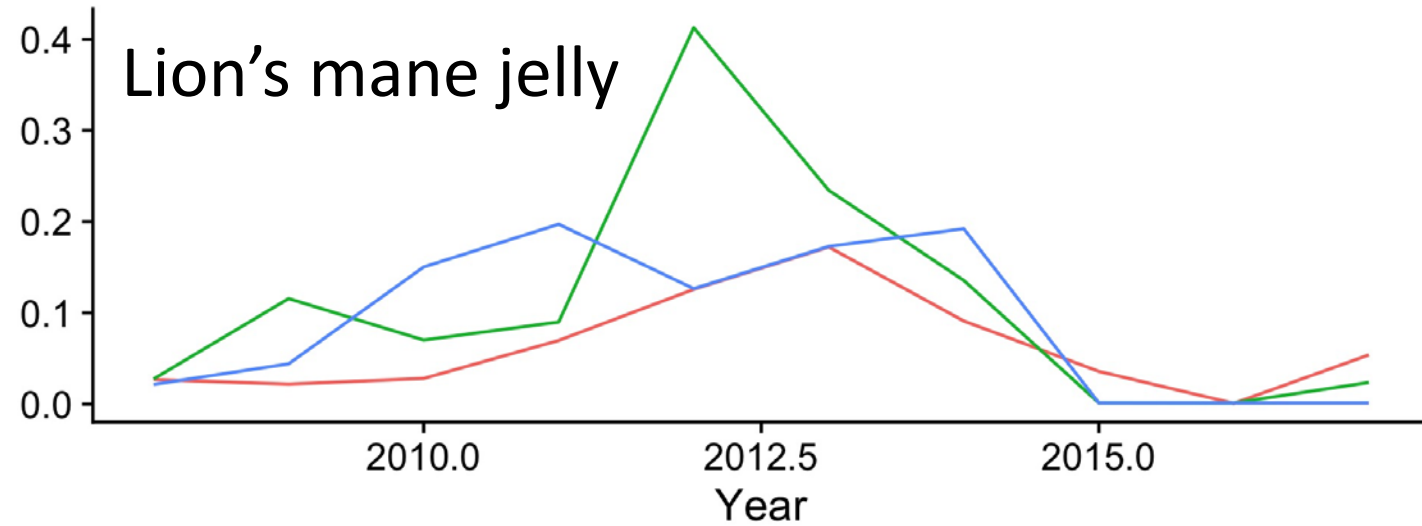
Is the fish assemblage becoming more homogenous among regions of Skagit Bay?



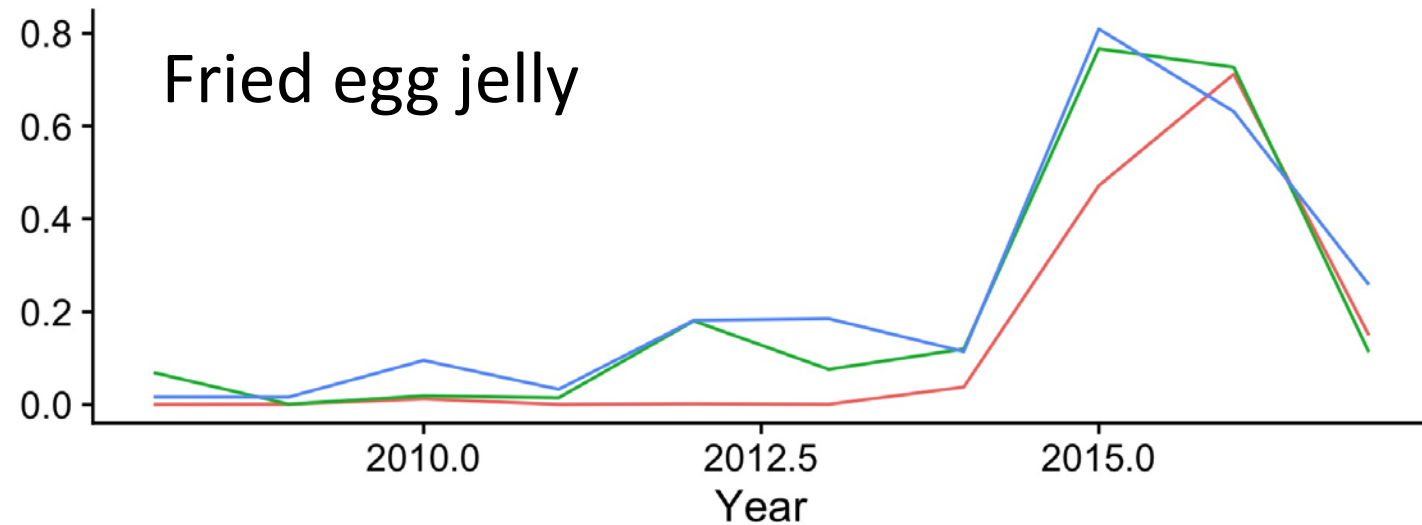
Trends in jellyfish abundances



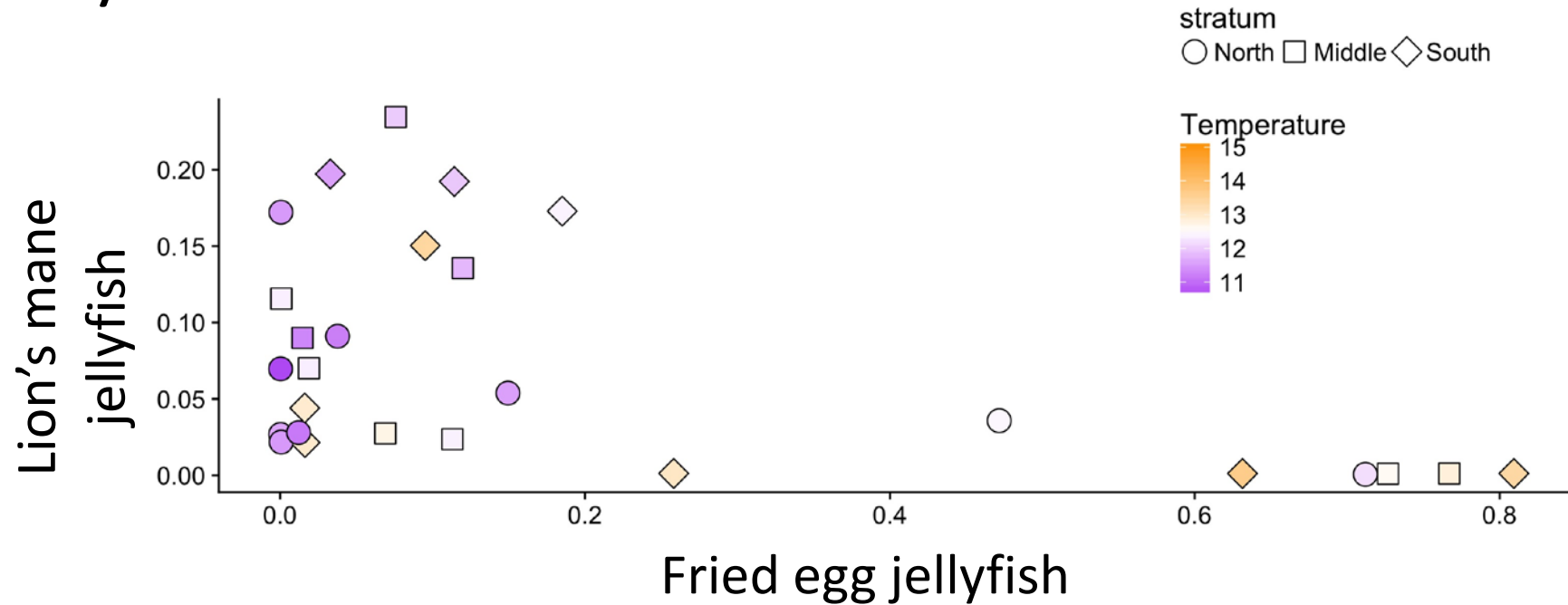
Probability of presence



North
Middle
South



Temp & jellyfish

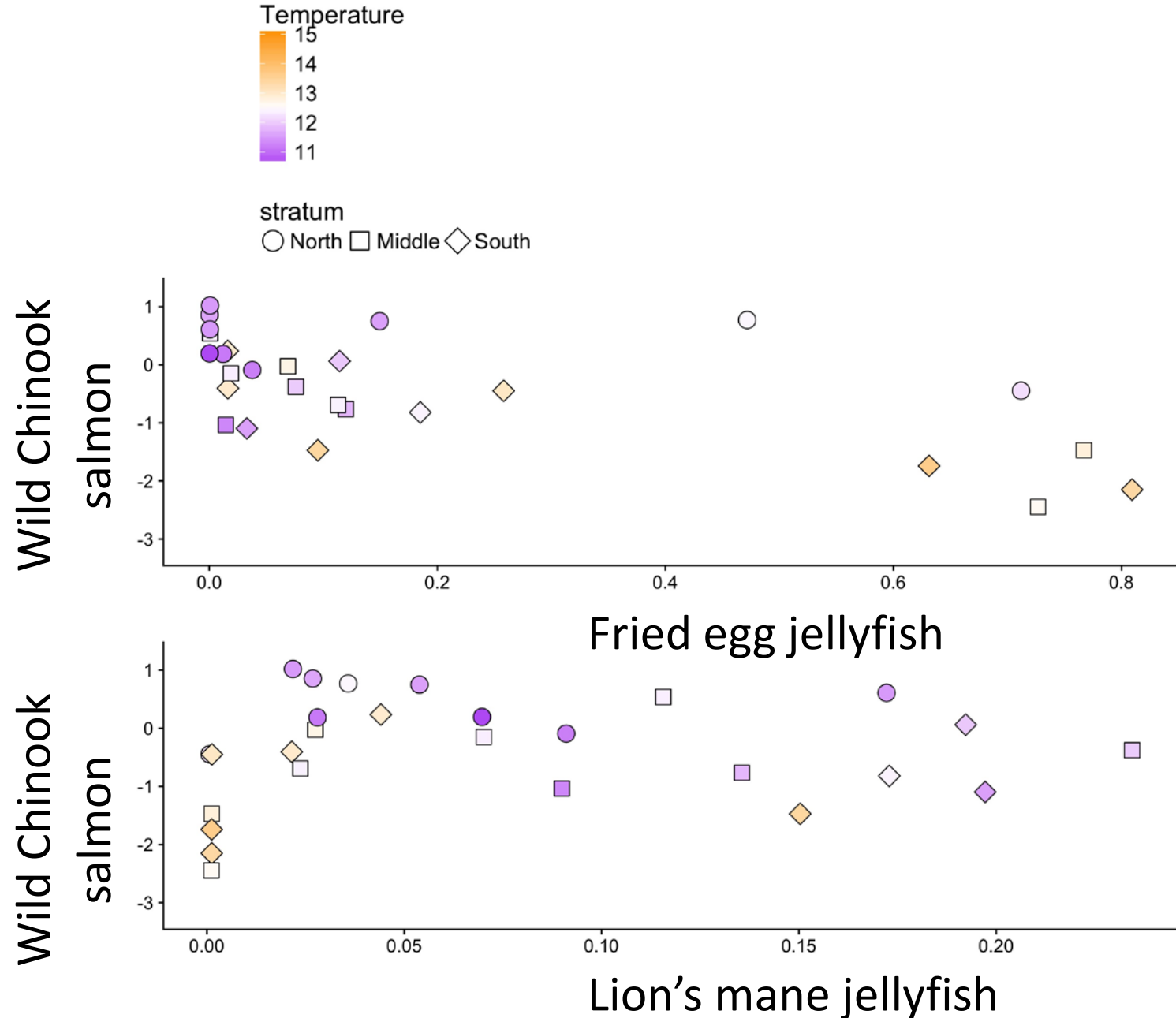


Lion's mane & fried egg jellyfish tend not to co-occur.
Cool waters appear to favor lion's mane jellyfish

Salmon & jellyfish

Appears that cool waters favor Chinook salmon & lion's mane jellyfish while warm waters favor fried egg jellyfish

Water	Warm	Cool
Salmon	-	+
Lion's Mane	-	+
Fried Egg	+	-



Moving forward

- Assess potential for interactions among species & environmental conditions (e.g., predation x metabolism, competition)
 - What relationships appear to be driven by species → species interactions and which are mediated by the environment?
- Incorporate fish condition (e.g., mass at length)
 - Recent warm waters increased growth of (surviving) Chinook salmon
 - see Josh's talk
- Examine relationships between environment & fish in context of long terms changes in water condition

Acknowledgements & questions

- **Funding**

- WA Department of Ecology
– Skagit IMW

- **Partners**

- Skagit River System
Cooperative



Brainstorm w/me during a
coffee break!

Tons of people

Craig Wollam!
Jason Hall
Joshua Chamberlin
Anna Kagley
Dan Lomax
Jen King
Wes Parker
Heather Jackson
Kathryn Sobocinski
Casey Rice
Eric Beamer

And many
volunteers!

