

ECOSYSTEM MONITORING PROGRAM
JUVENILE CHINOOK DIET AND
PREY AVAILABILITY

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UPDATE ON DIET AND PREY RESOURCES

➤ Today

- Update on 2017/2018 sample inventory
- Typical pattern in juvenile Chinook diets
- 2017 Diets/Trends in juvenile Chinook diets 2008 – 2017
- 2017 Prey availability (benthic, neuston)
- Energetic consequences of prey availability/selection
- Conclusions/Next Steps

2017 SAMPLE INVENTORY

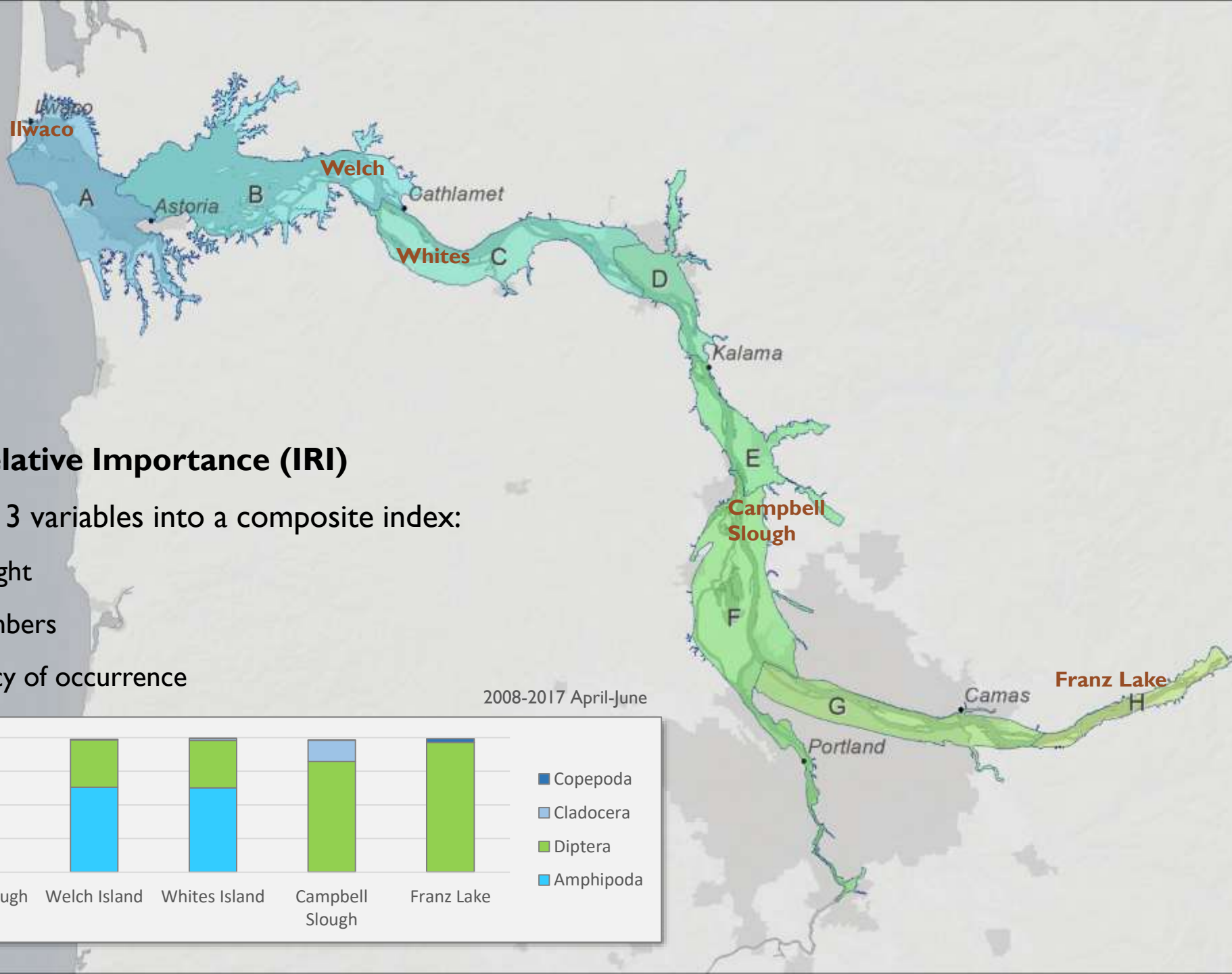
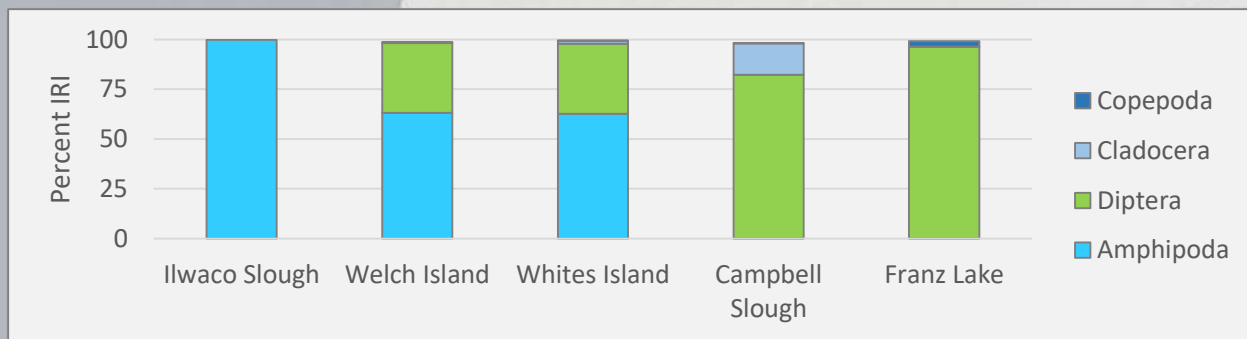


		Ilwaco Slough							Welch Island					Whites Island					Campbell Slough										
		Feb	Mar	Apr	May	Jun	Jul		Mar	Apr	May	Jun	Jul		Feb	Mar	Apr	May	Jun	Jul		Feb	Mar	Apr	May	Jun	Jul		
Fish Fork Length (mm)	30-59 mm	2	1					3		15	20			35	2	1	8	17	4		32				1	1		2	
	60-79 mm										9	20		29				13			13				9	17		26	
	80-99 mm										1	11		12					1		1				24	5		29	
Prey Sample	Benthic			5	5	5	5	20		5	5	5	5	20			5	5	5	5	20				5	5	5	15	
	Neuston	OW	2	2	2	2	2		10	2	2	2	2		8	2	2	2	2	2		10	2	2	2	2	2		10
		EV	2	2	2	2	2		10	2	2	2	2		8	2	2	2	2	2		10	2	2	2	2	2		10

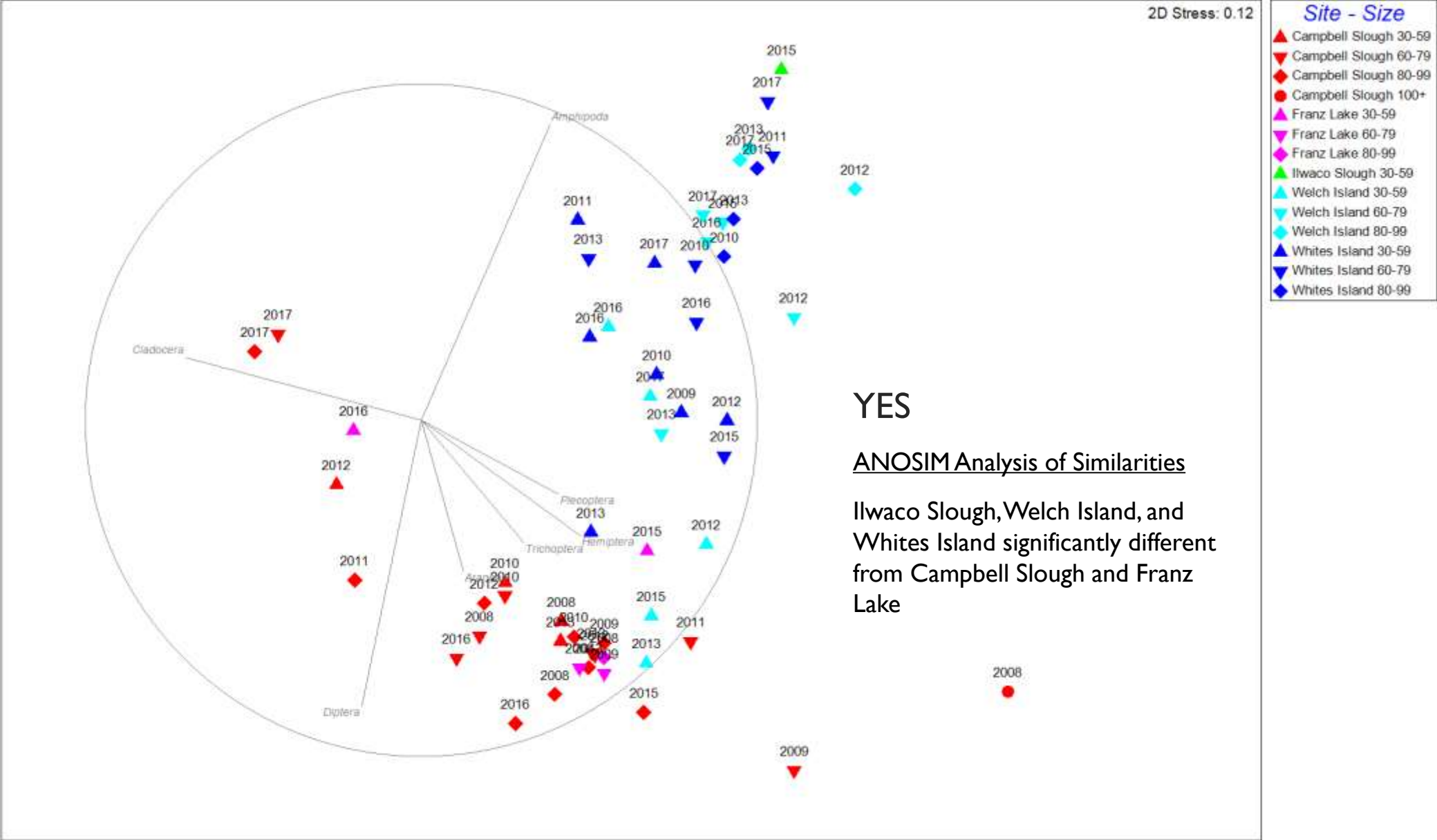
DIET

Index of Relative Importance (IRI)

- Combines 3 variables into a composite index:
 - Prey weight
 - Prey numbers
 - Frequency of occurrence



ARE FISH FEEDING DIFFERENTLY AMONG SITES?

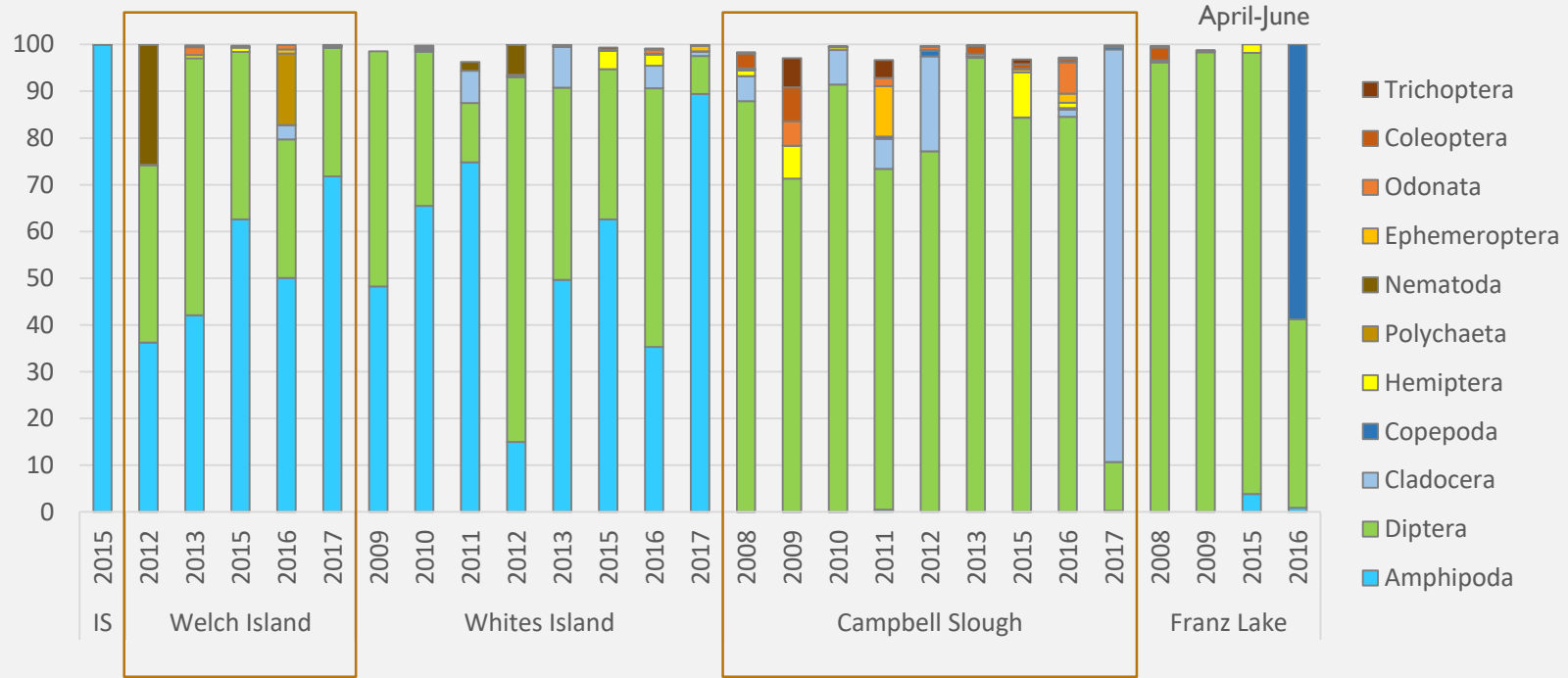


YES

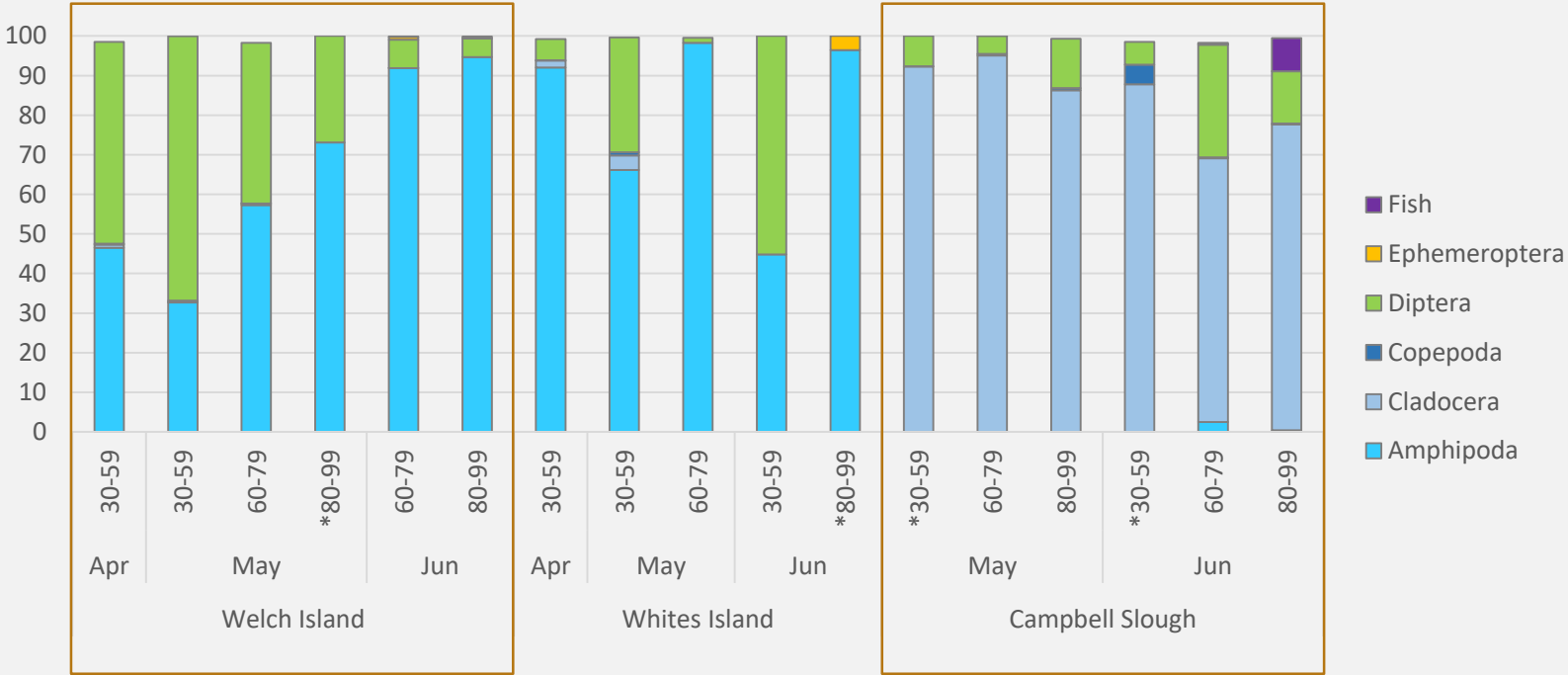
ANOSIM Analysis of Similarities

Ilwaco Slough, Welch Island, and Whites Island significantly different from Campbell Slough and Franz Lake

2008-2017 DIET PERCENT IRI

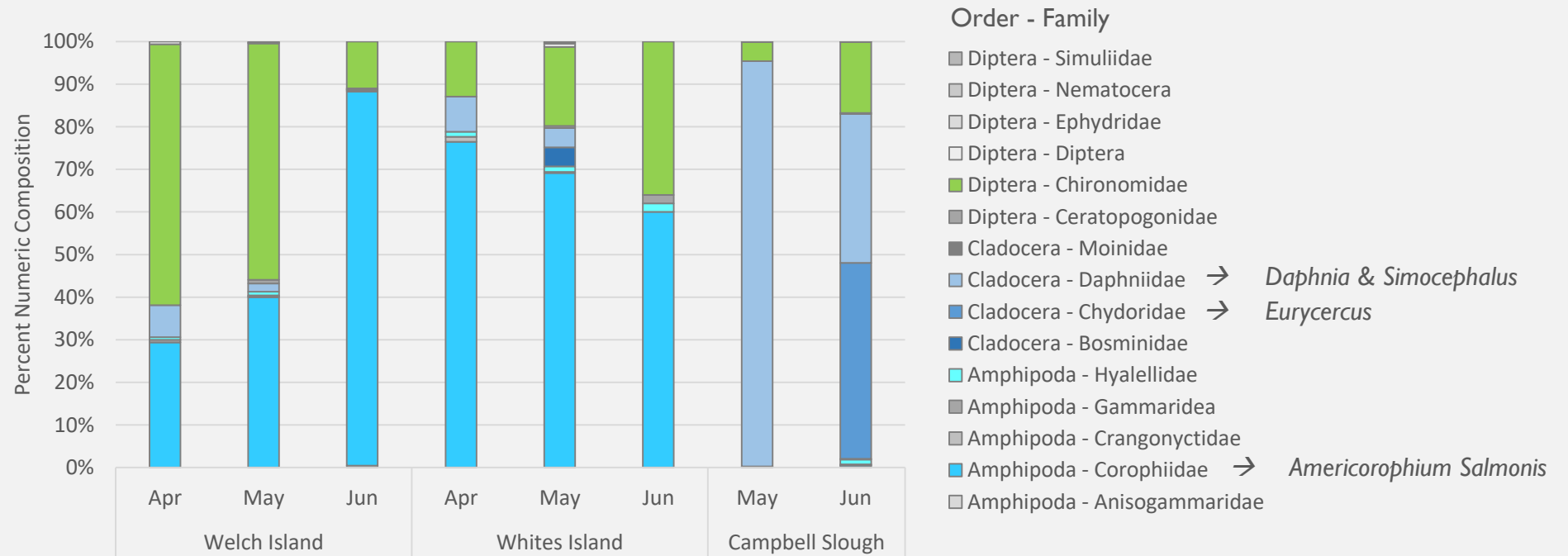


2017 DIET PERCENT IRI



* Only one fish sampled (others range from 4 to 24 fish)

2017 DIET NUMERIC COMPOSITION OF MAJOR PREY

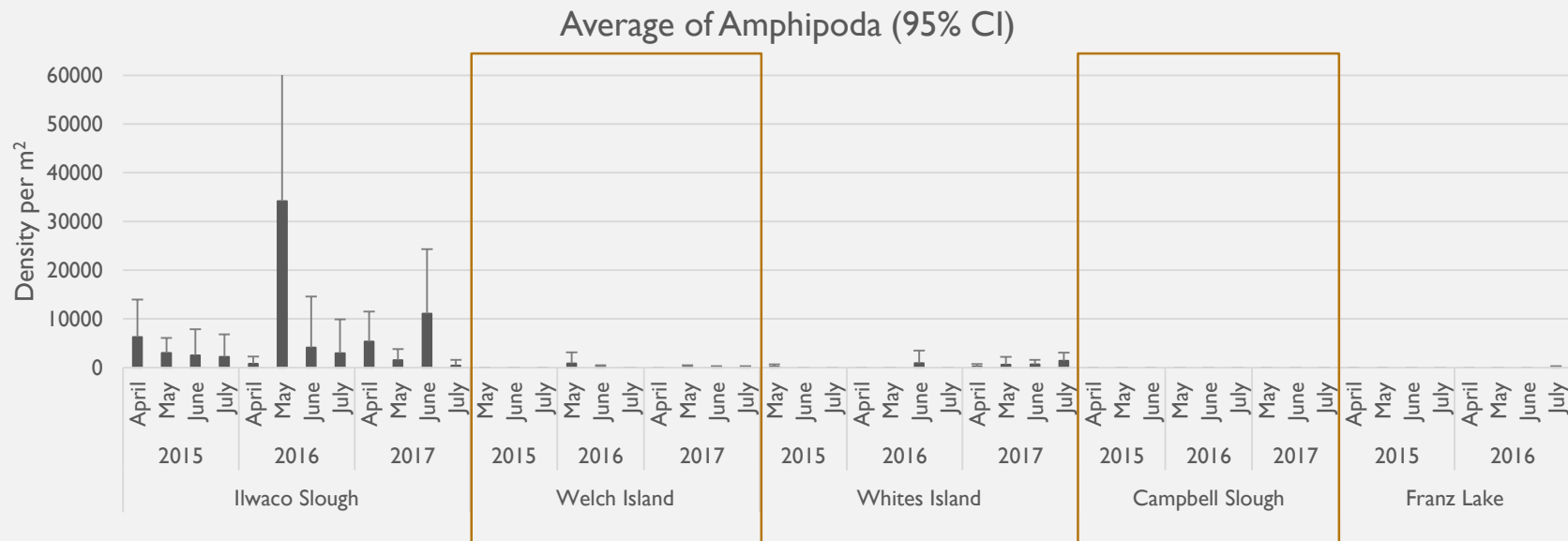


PREY RESOURCES



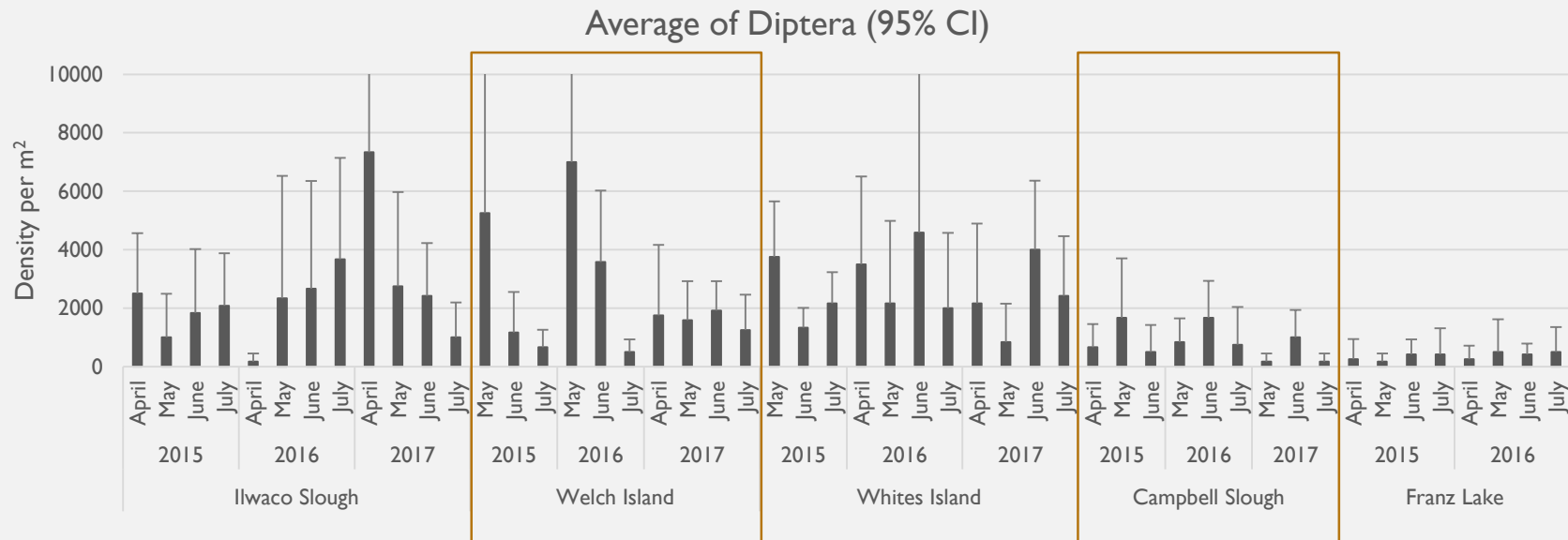
BENTHIC 2015-2017

- Dominated by worms (70-80% of counts)
- Amphipods primarily collected from Ilwaco Slough
- Chironomids and other flies consistently collected from all sites



BENTHIC 2015-2017

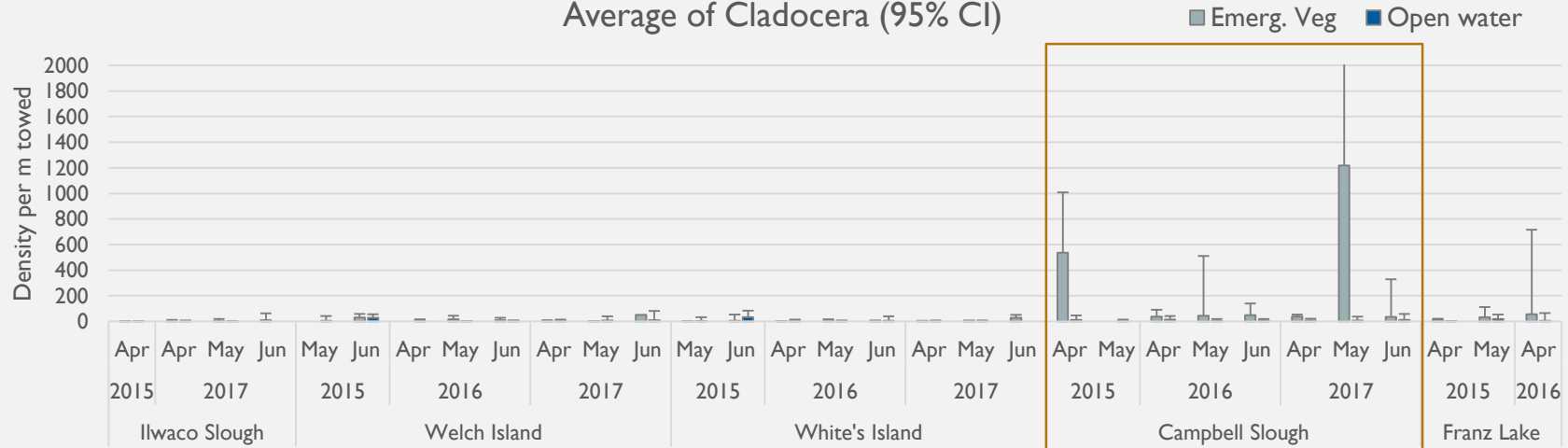
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NEUSTON 2015-2017



Average of Cladocera (95% CI)



Average of Copepoda (95% CI)



ENERGETIC CONSEQUENCES OF PREY SELECTION & AVAILABILITY

Energy ration (ER), was calculated as a measure of energy consumption for each juvenile Chinook salmon and is driven by prey availability and quality.

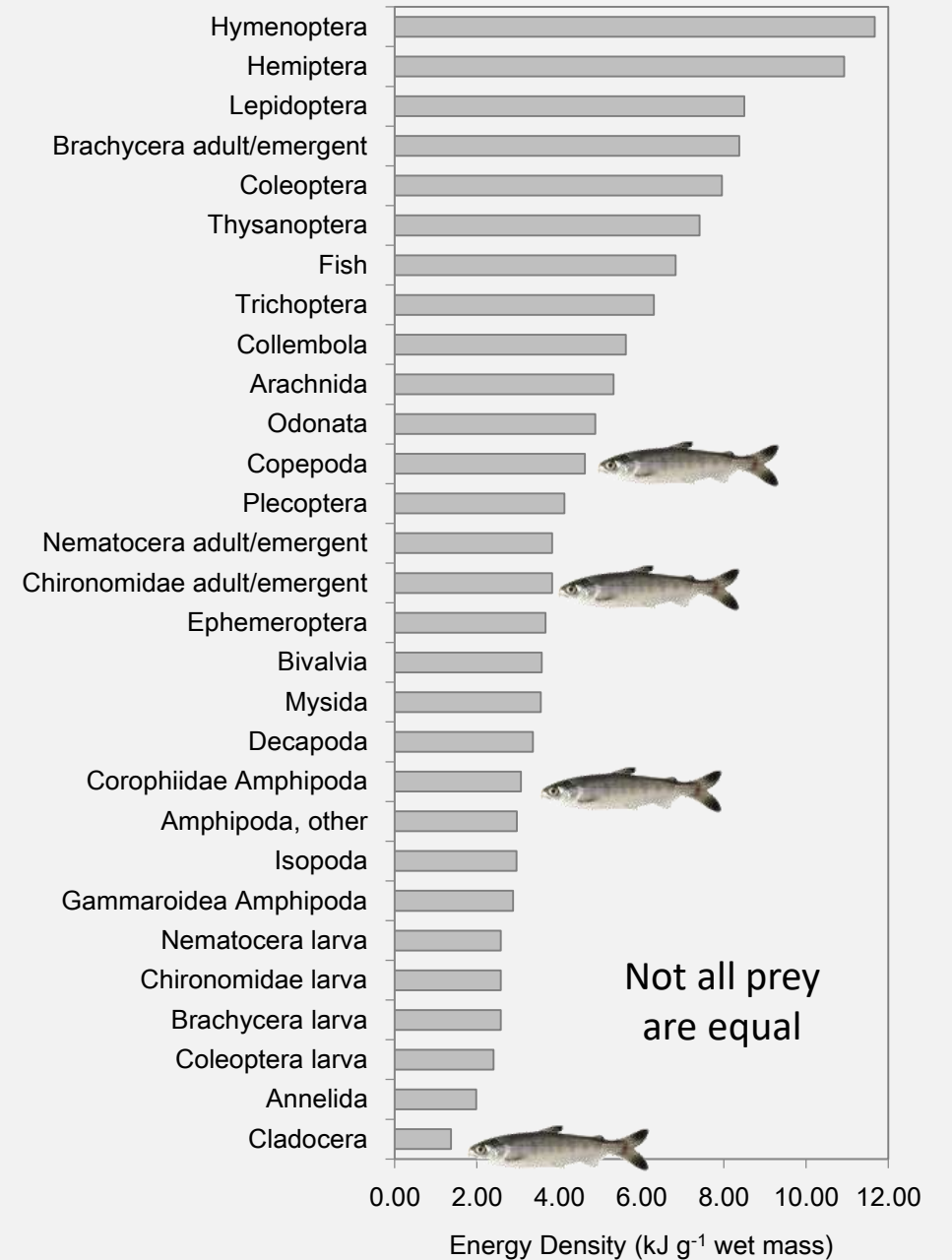
$$ER = \frac{\sum w_i \cdot k_i}{W}$$

w = prey mass consumed of prey taxa i

k = energy density (kJ g^{-1} wet mass) of prey taxa i

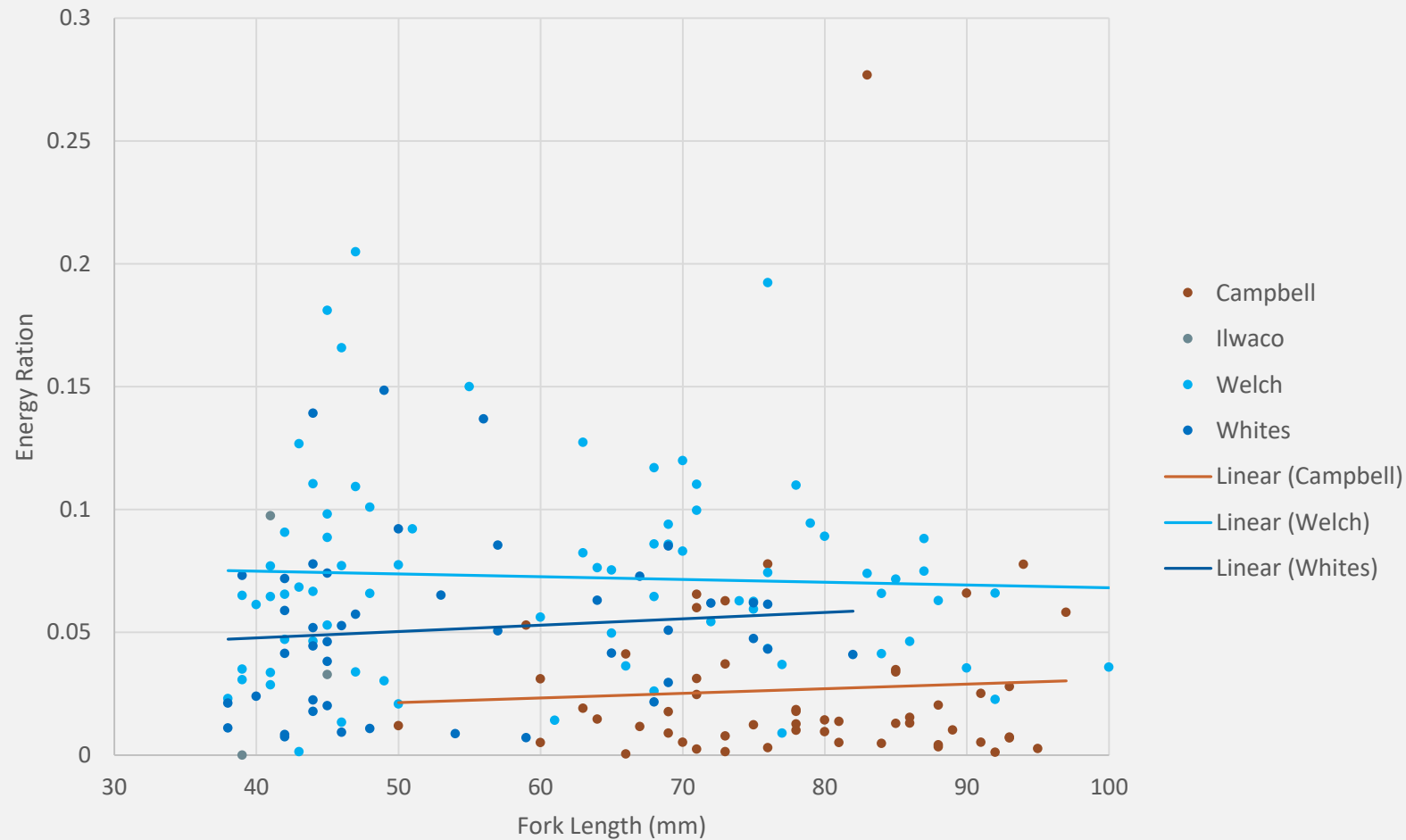
W = total fish mass (g)

Energy Ration equals kilojoules consumed per gram of fish.

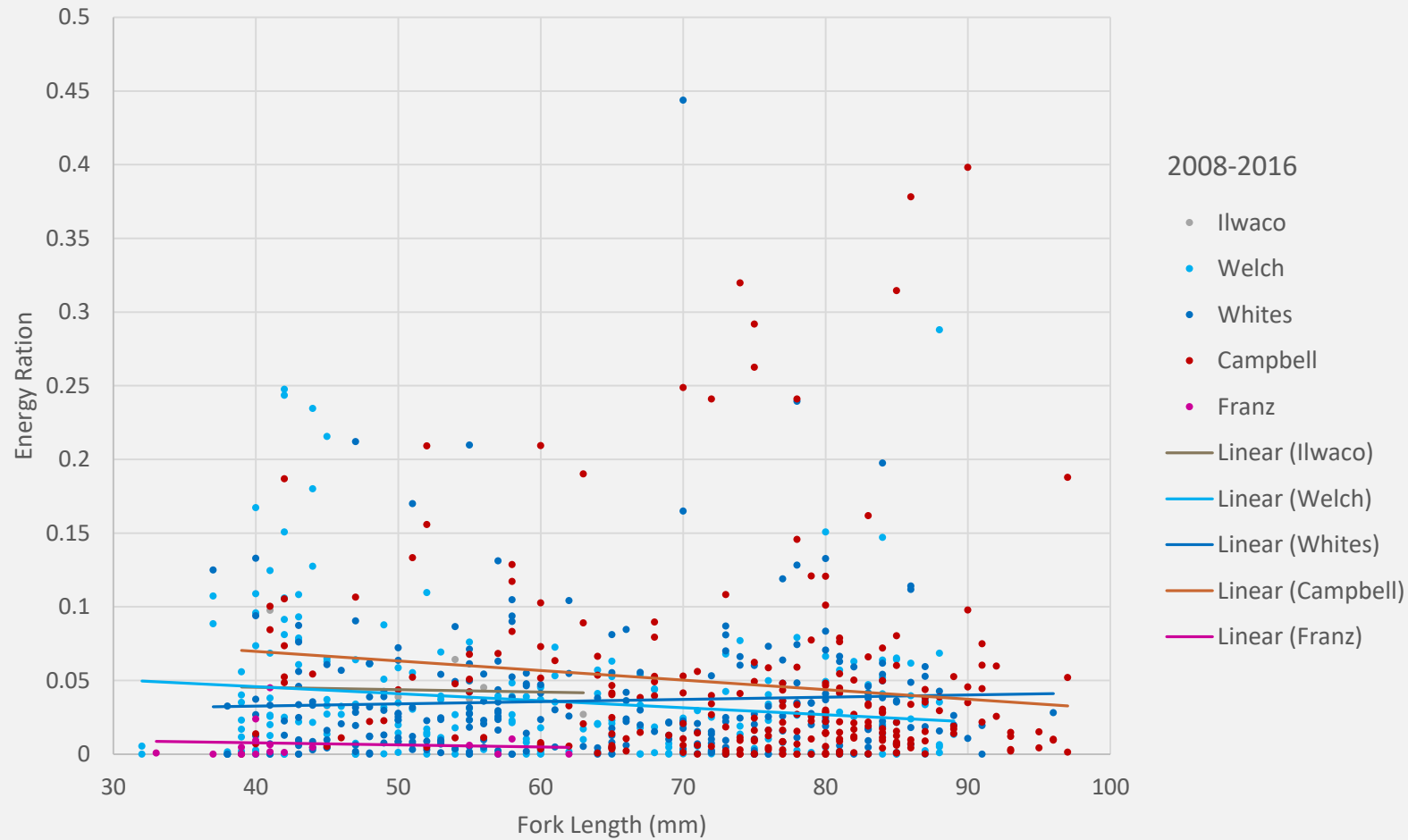


Energy densities were acquired from the literature and compiled in David et al. (2016)

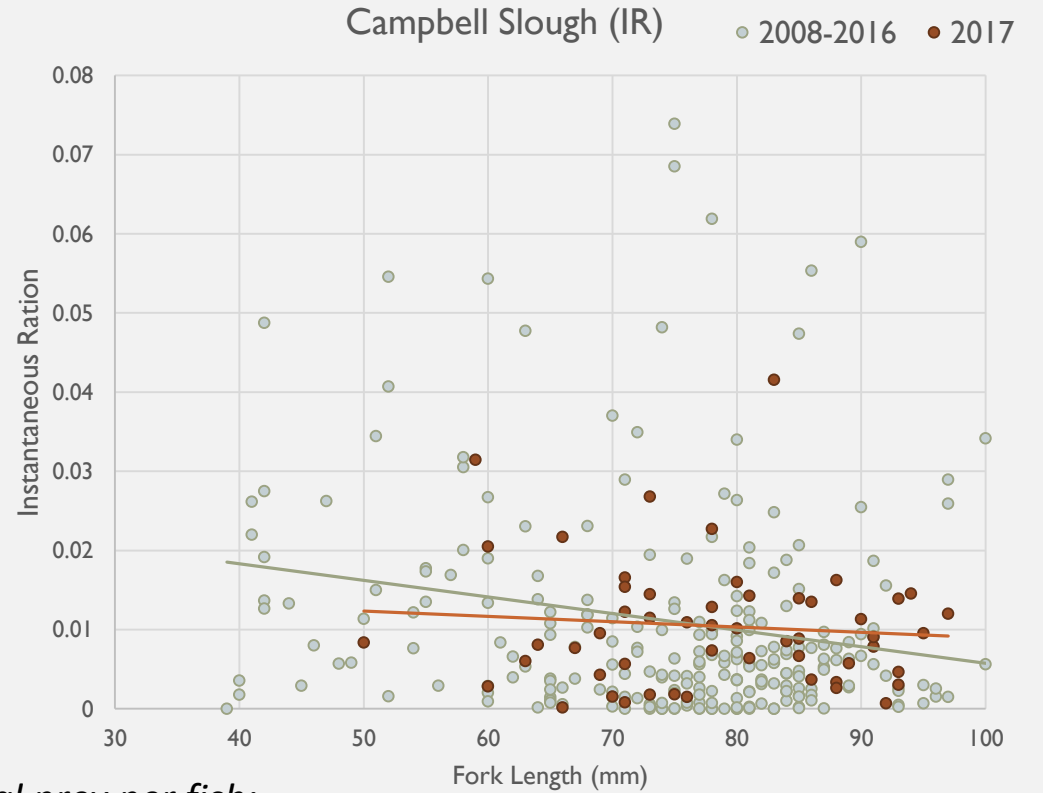
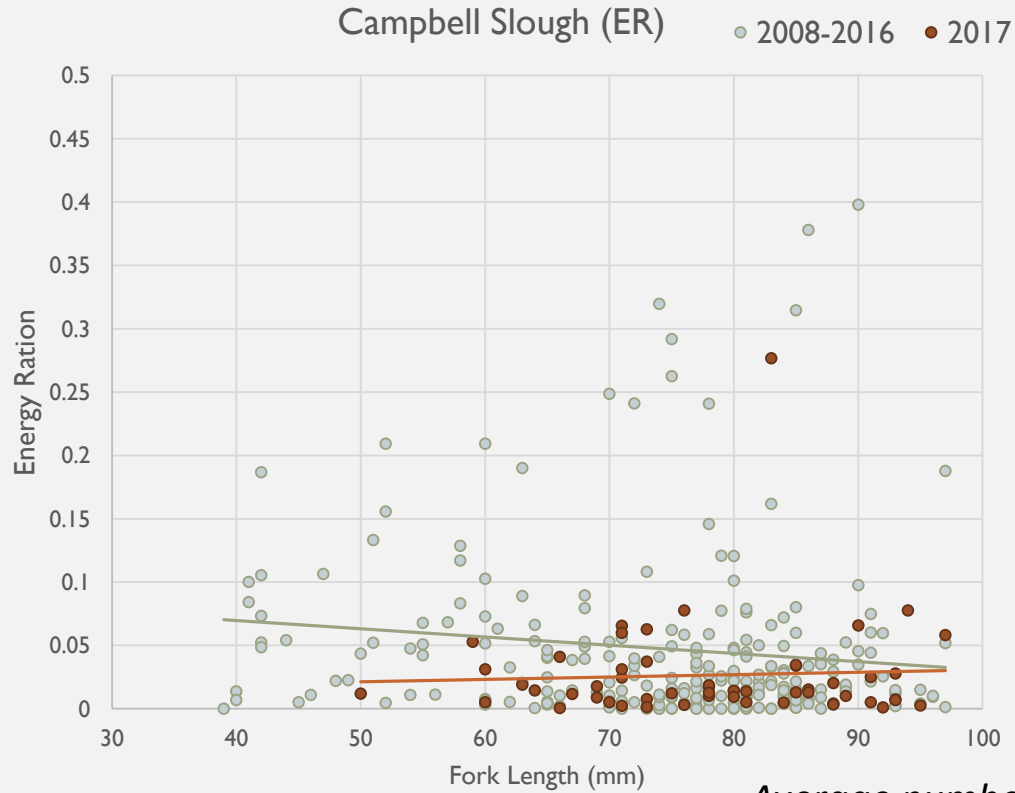
ENERGY RATION 2017



ENERGY RATION 2008-2016

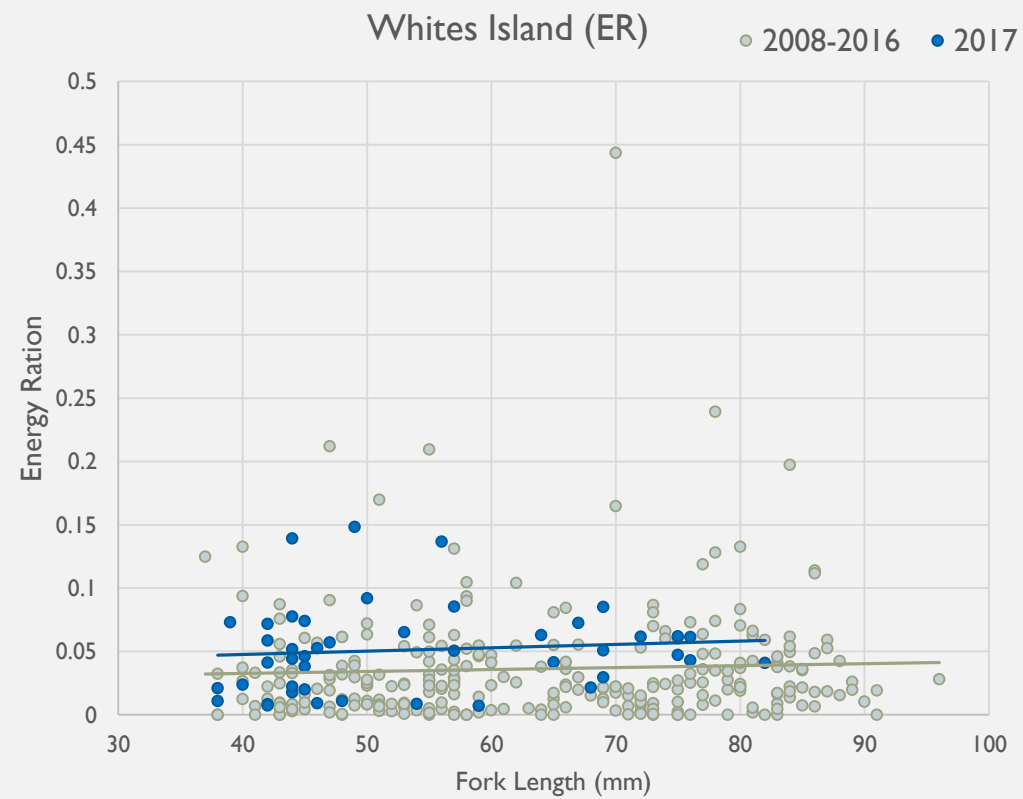
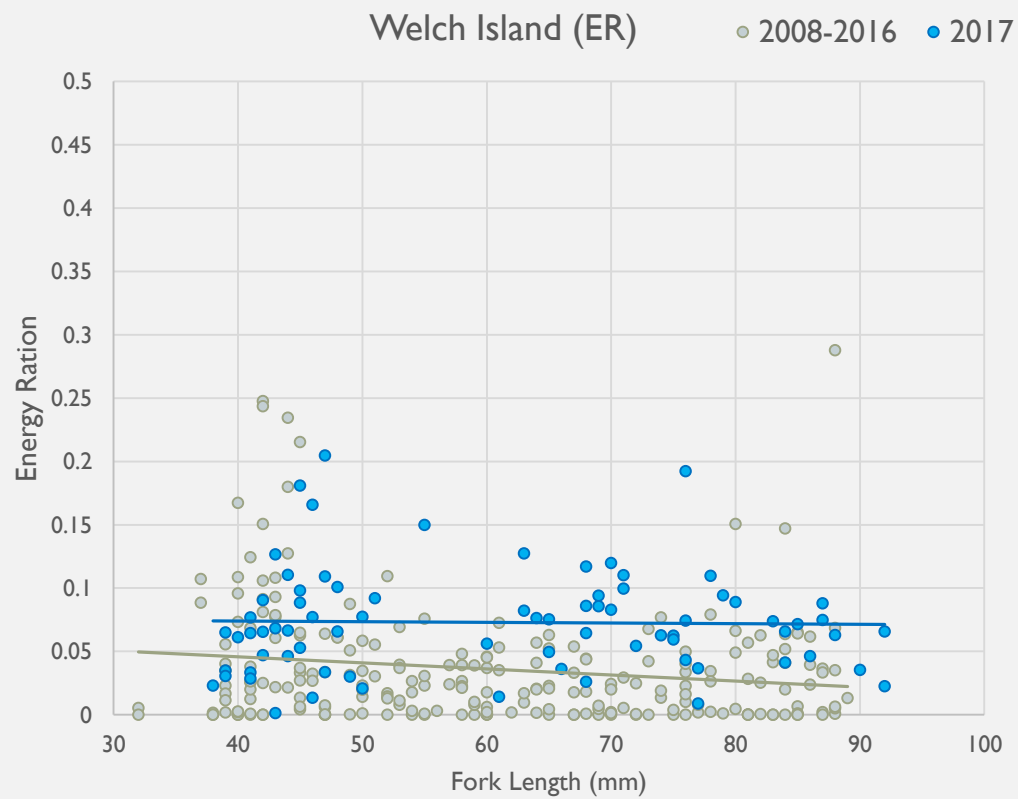


ENERGY RATION 2008-2017



Average number of individual prey per fish:
2008-2016: 40 2017: 118

ENERGY RATION 2008-2017



CONCLUSIONS

1. Juvenile Chinook diets at the emergent wetland and backwater slough trend sites are typically dominated by amphipods and dipterans.
2. Dietary transition from wetland insects to amphipods as juvenile chinook grow and move toward the estuary mouth
3. This pattern will vary at times: increased zooplankton abundance found to be reflected in juvenile Chinook diets

ZOOPLANKTON IN THE ENVIRONMENT AND DIETS

- Seasonality in river discharge and water elevation is associated with changes in zooplankton abundance and composition
- Zooplankton abundance increases following spring growth of phytoplankton
 - Chlorophyll a concentration spiked at Campbell Slough in April 2017 (Kidd et al. 2017)
 - During the summer zooplankton abundance increased substantially at Campbell Slough where connectivity to the mainstem is relatively low (Kidd et al. 2017)
- Cladocerans are a relatively energy-poor prey item – potential energetic consequences to the observed change in prey consumption
 - Juvenile Chinook will need to eat more individual prey per fish compared to diets dominated by amphipods and insects

NEXT STEPS

- Process 2018 samples
- Compare 2018 availability of chironomids/dipterans and amphipods (and zooplankton?!) among sites and to past years
- Compare 2018 IRI and Energy Ration among sites and to past years

