

Ecosystem Monitoring Program

Macroinvertebrate Monitoring

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University of Washington

October 25, 2016

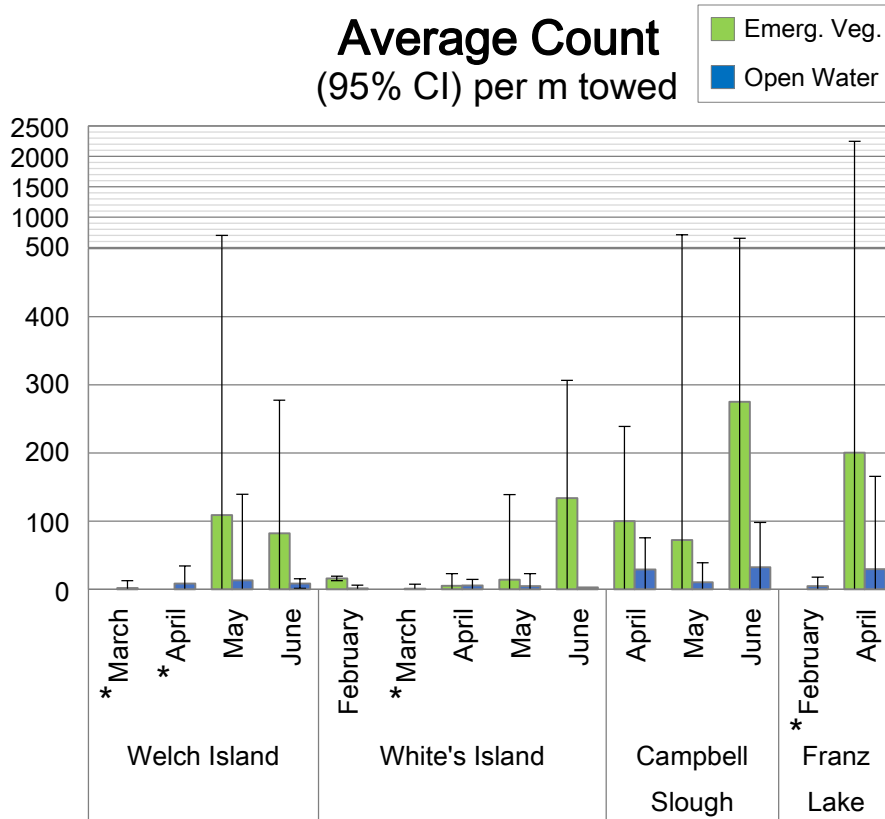
2016 Sample Inventory

	Site	Benthic Core	Neuston (Open Water, Emergent Veg)		Diet
FEBRUARY	Whites Island	--	5 (2 OW, 3 EV)	1 (1 OW)	--
	Franz Lake	--	2 (2 OW, 0 EV)		--
MARCH	Welch Island	--	2 (2 OW, 0 EV)		--
	Whites Island	--	2 (2 OW, 0 EV)		
APRIL	Ilwaco Slough	5	--		--
	Welch Island	--	2 (2 OW, 0 EV)		13
	Whites Island	5	4 (2 OW, 2 EV)		12
	Campbell Slough	5	6 (3 OW, 3 EV)		7
	Franz Lake	5	4 (2 OW, 2 EV)		12
MAY	Ilwaco Slough	5	--		--
	Welch Island	5	4 (2 OW, 2 EV)		15
	Whites Island	5	4 (2 OW, 2 EV)		19
	Campbell Slough	5	4 (2 OW, 2 EV)		13
	Franz Lake	5	--		--
JUNE	Ilwaco Slough	5	--		--
	Welch Island	5	6 (3 OW, 3 EV)		--
	Whites Island	5	3 (1 OW, 2 EV)	1 (1 OW)	--
	Campbell Slough	5	6 (3 OW, 3 EV)		--
	Franz Lake	5	--		--
JULY	Ilwaco Slough	5	--		--
	Welch Island	5	--	4 (2 OW, 2 EV)	3
	Whites Island	5	--	6 (3 OW, 3 EV)	8
	Campbell Slough	5	--		--
	Franz Lake	5	--		--
AUGUST	Welch Island	--	--	4 (3 OW, 1 EV)	--
SEPTEMBER	Welch Island		--	4 (2 OW, 2 EV)	--

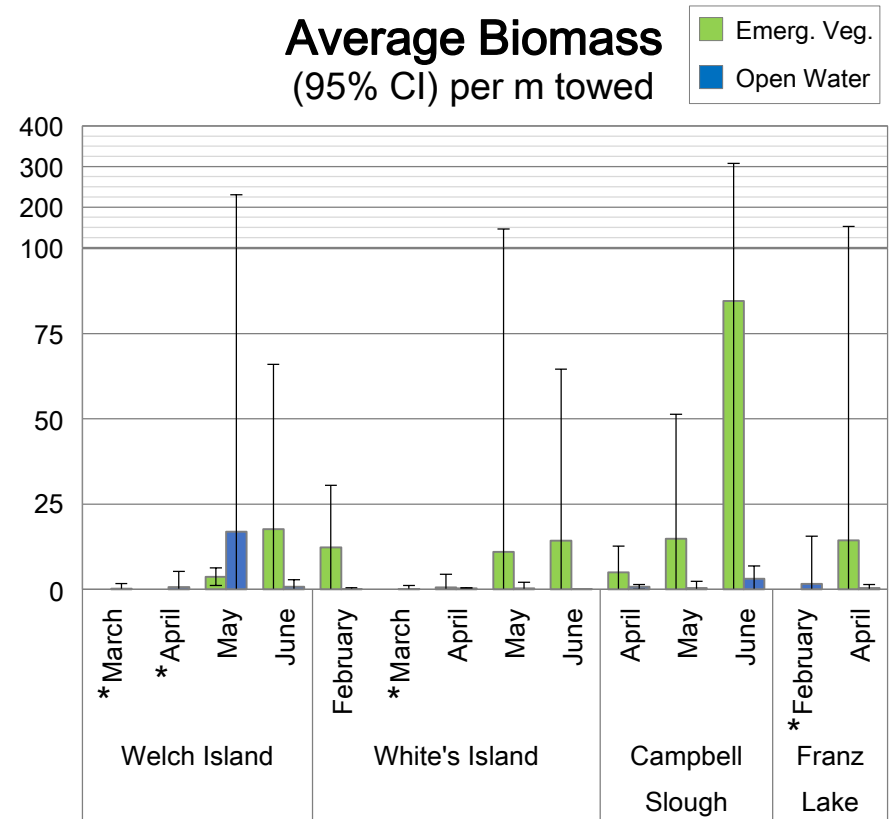
Neuston

2016 All Taxa

Average Count
(95% CI) per m towed



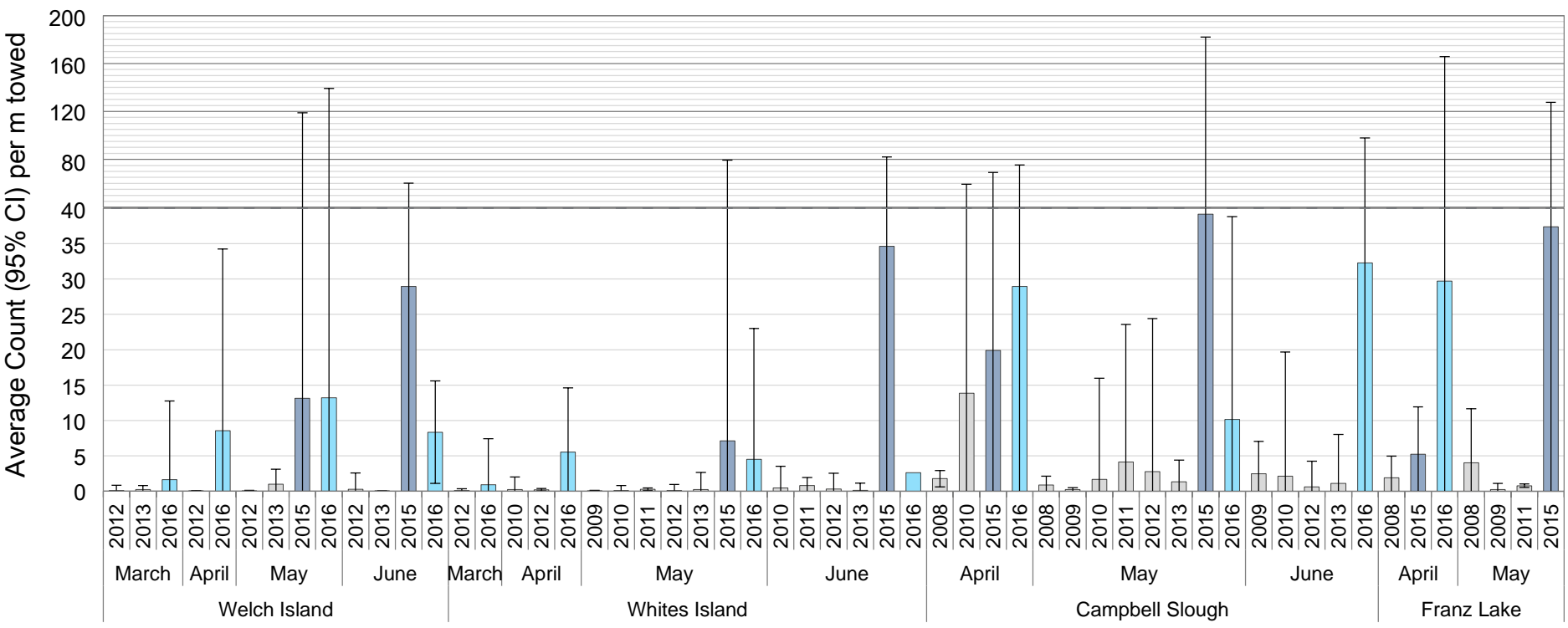
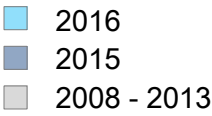
Average Biomass
(95% CI) per m towed



* Emergent vegetation not sampled

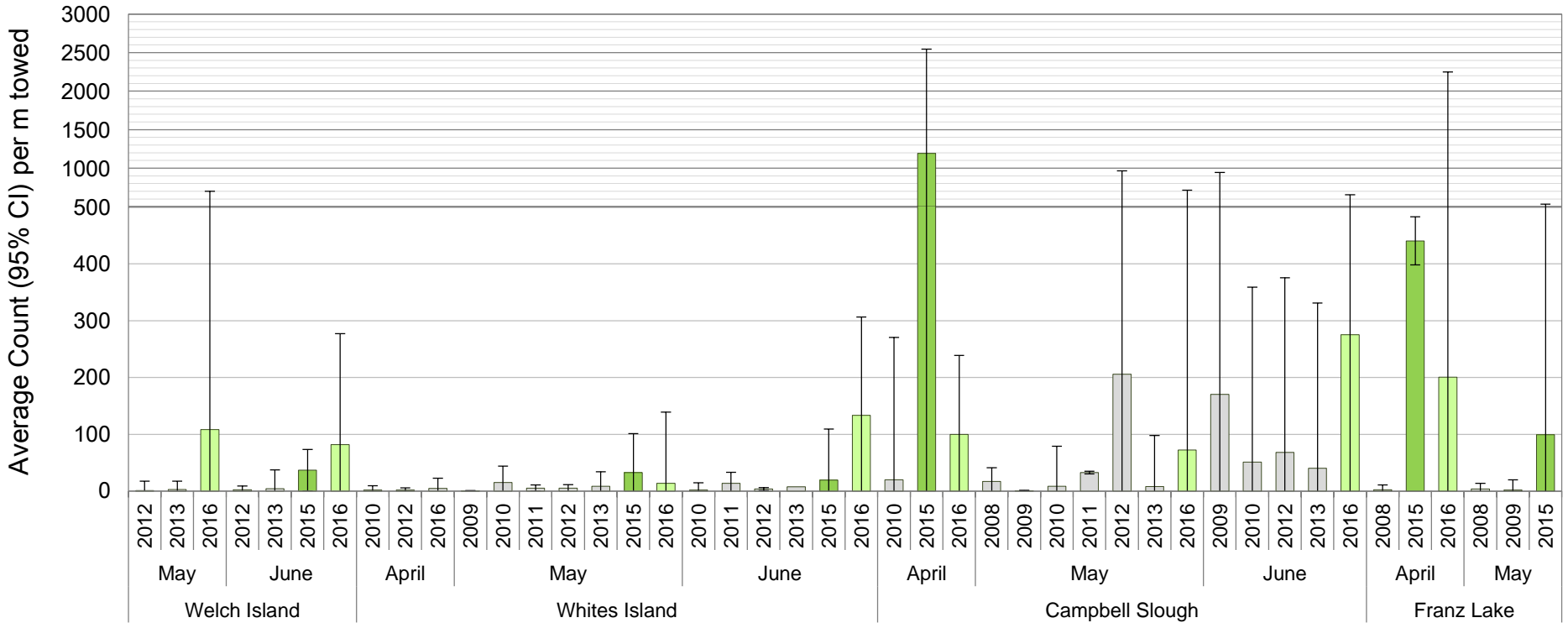
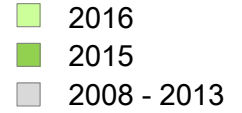
Neuston

Open Water – All Taxa



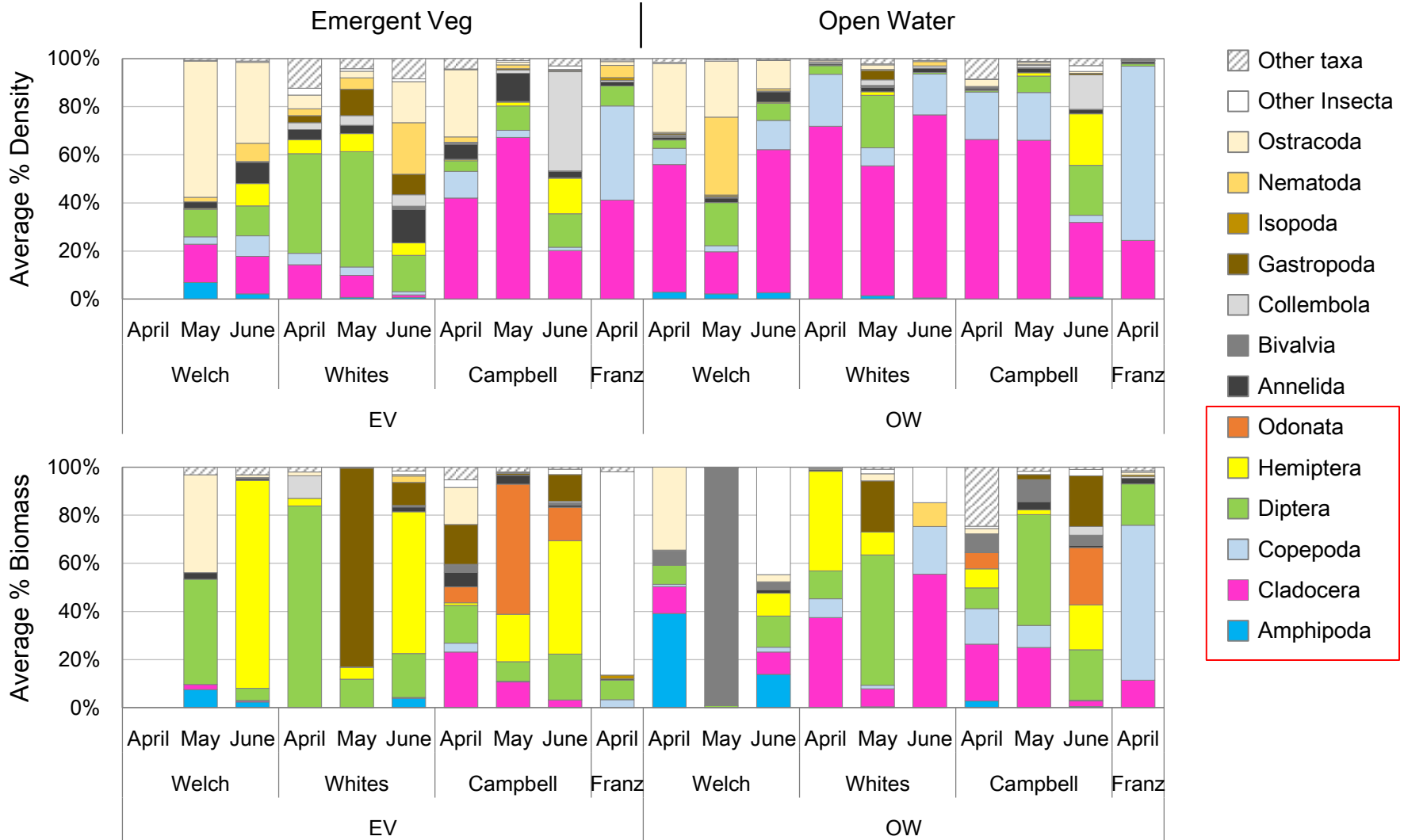
Neuston

Emergent Vegetation – All Taxa



Neuston

2016 Composition





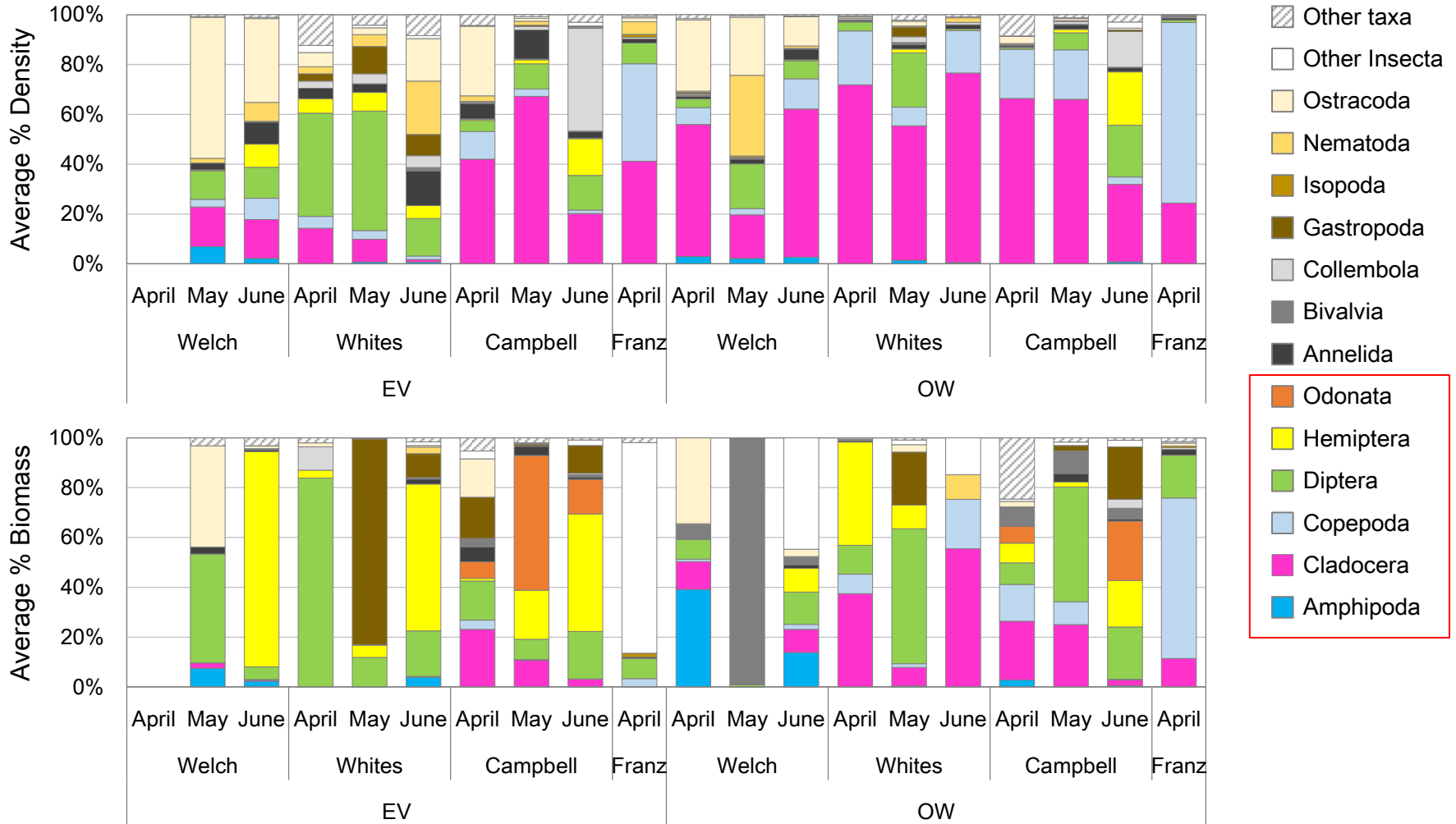
Cladocera
(water fleas)
Daphnia

- Plankton
- Open water



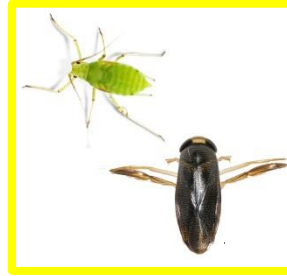
Copepoda
Cyclopoid

- Plankton
- Open water





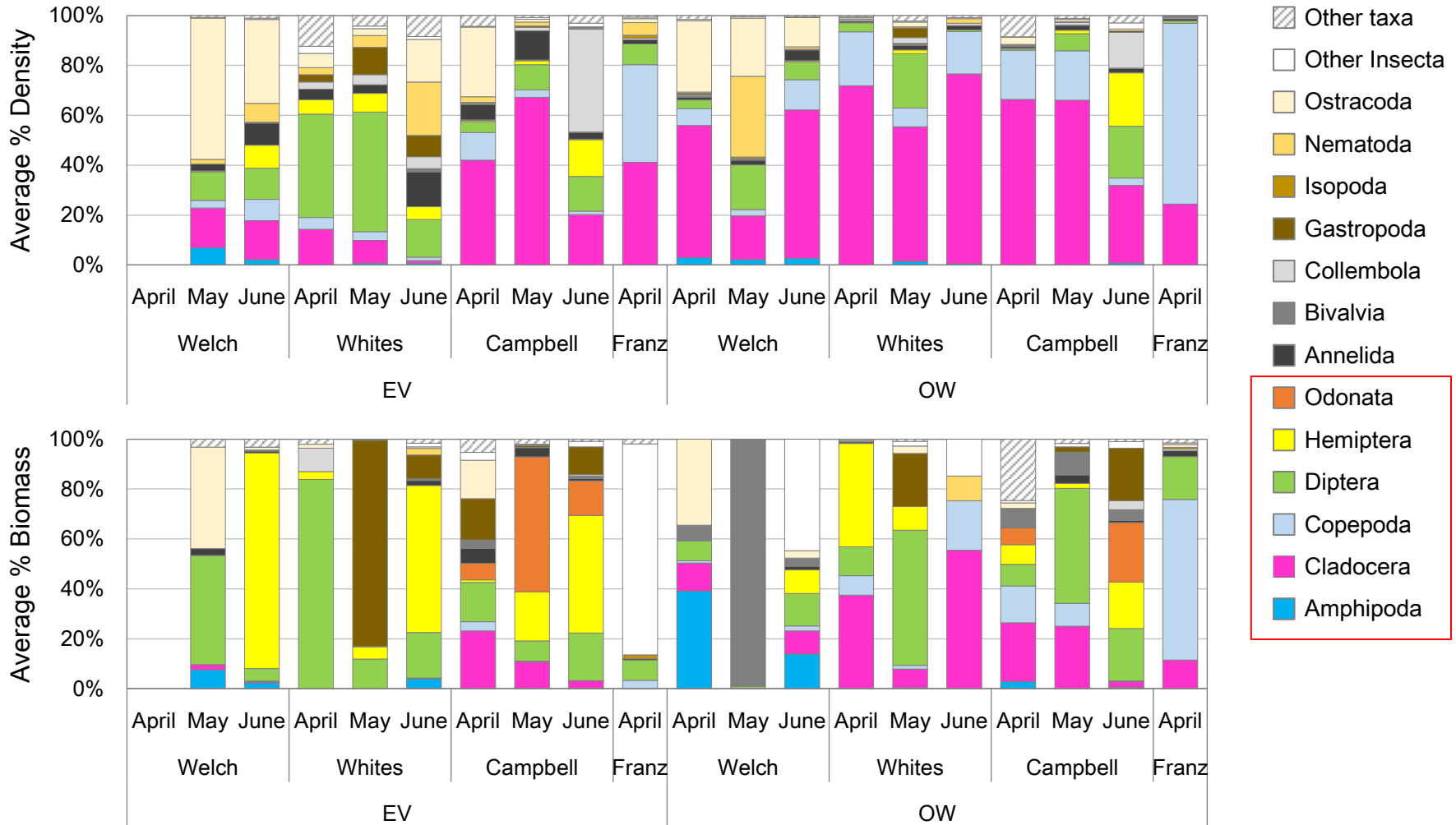
Diptera
Chironomidae
• Flies



Hemiptera
Aphididae (top)
Corixidae (bottom)
• True bugs
• Large organisms (biomass)



Odonata nymph
Coenagrionidae
• Damselflies
• Large organisms (biomass)
• Campbell



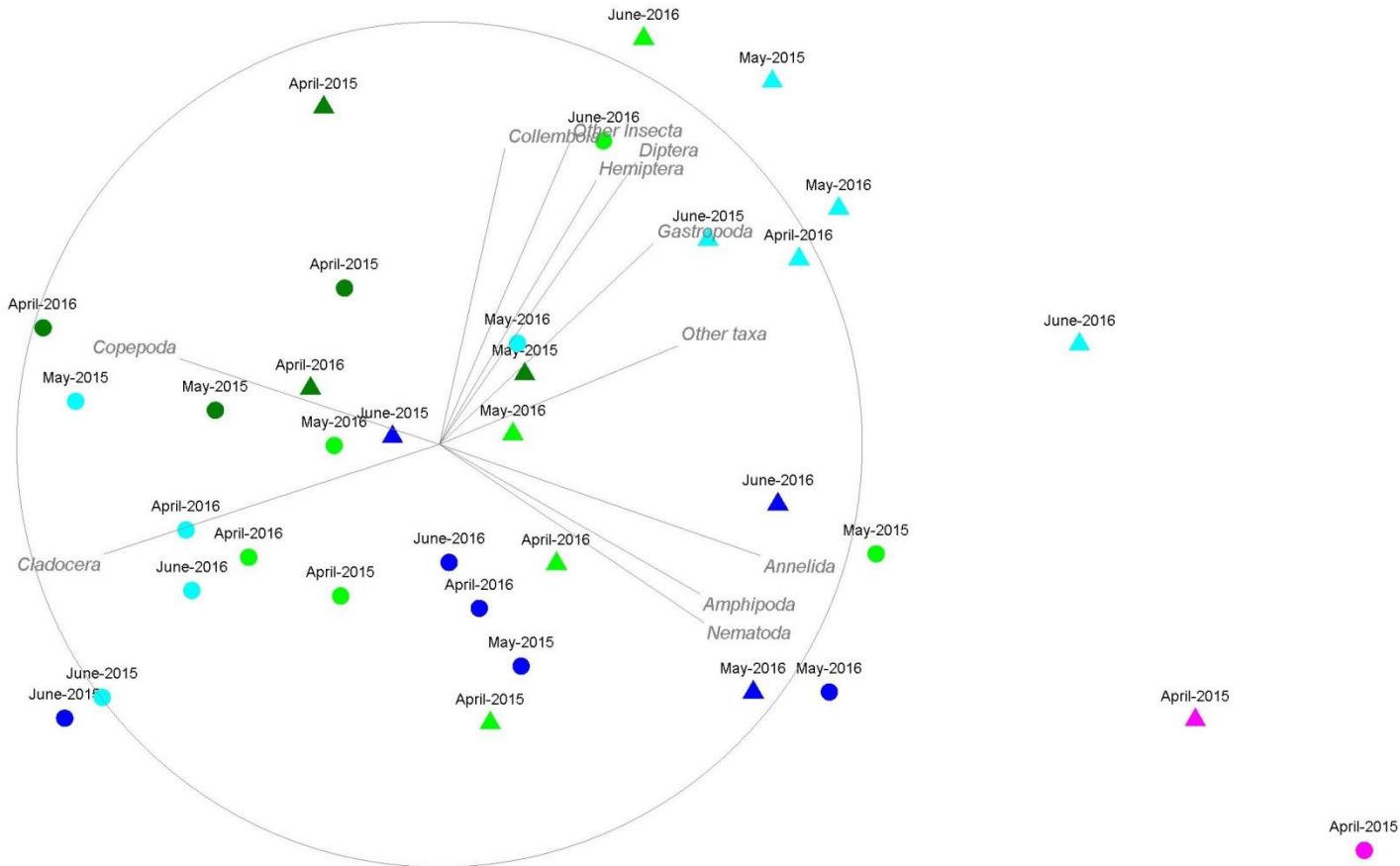
Neuston 2015/2016

Transform: Square root
Resemblance: S17 Bray Curtis similarity

2D Stress: 0.14

Site-Habitat

- ▲ Ilwaco Slough-EV
- Ilwaco Slough-OW
- ▲ Welch Island-EV
- Welch Island-OW
- ▲ Whites Island-EV
- Whites Island-OW
- ▲ Campbell Slough-EV
- Campbell Slough-OW
- ▲ Franz Lake-EV
- Franz Lake-OW



- MDS based on proportional composition
- Vector lines (gray) show taxa driving similarities/differences

Neuston 2015/2016

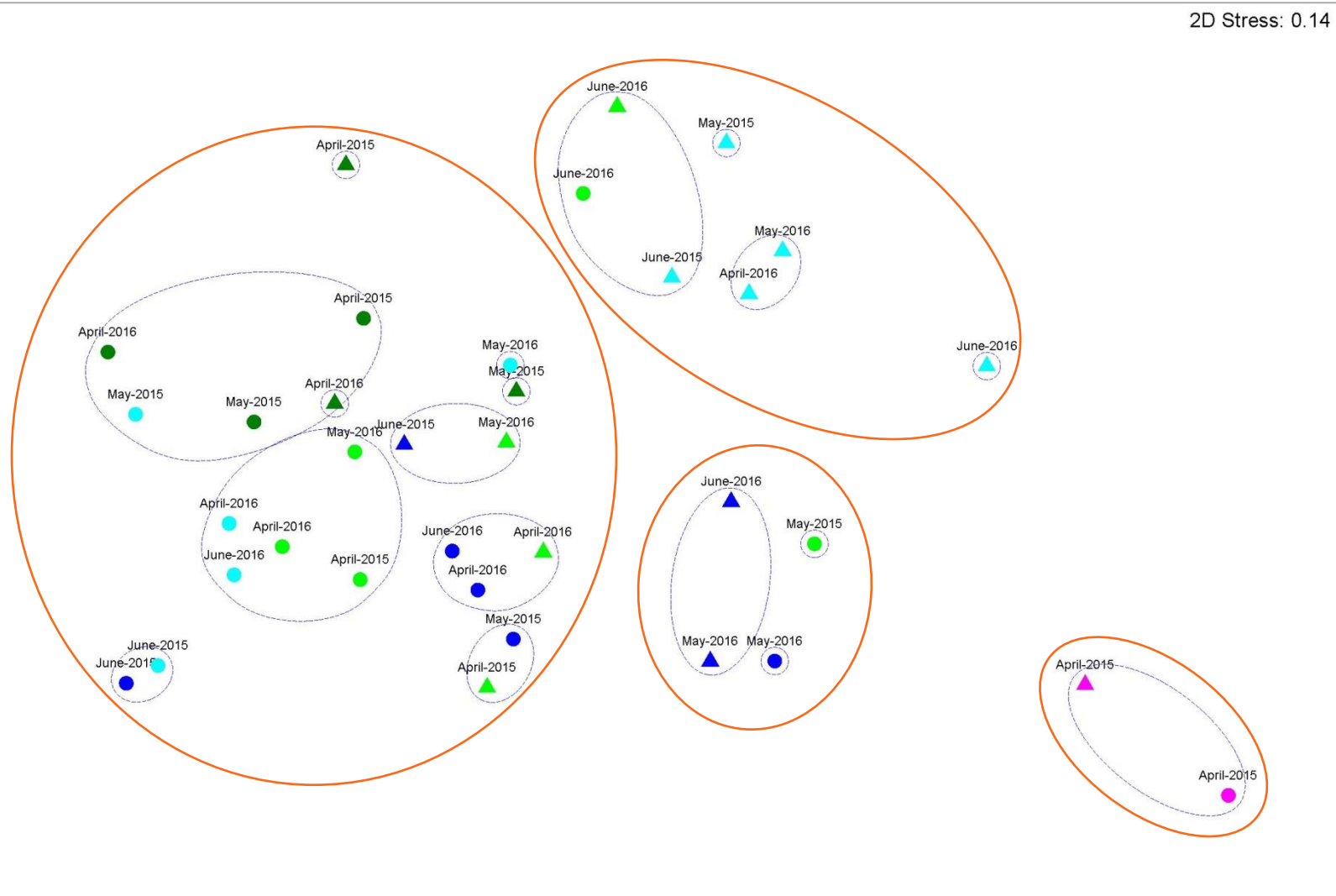
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Similarity



- Cluster analysis divides samples into “natural groups” based on Similarity values
- 4 distinct groups at 60% Similarity (orange circles)

Neuston 2015/2016

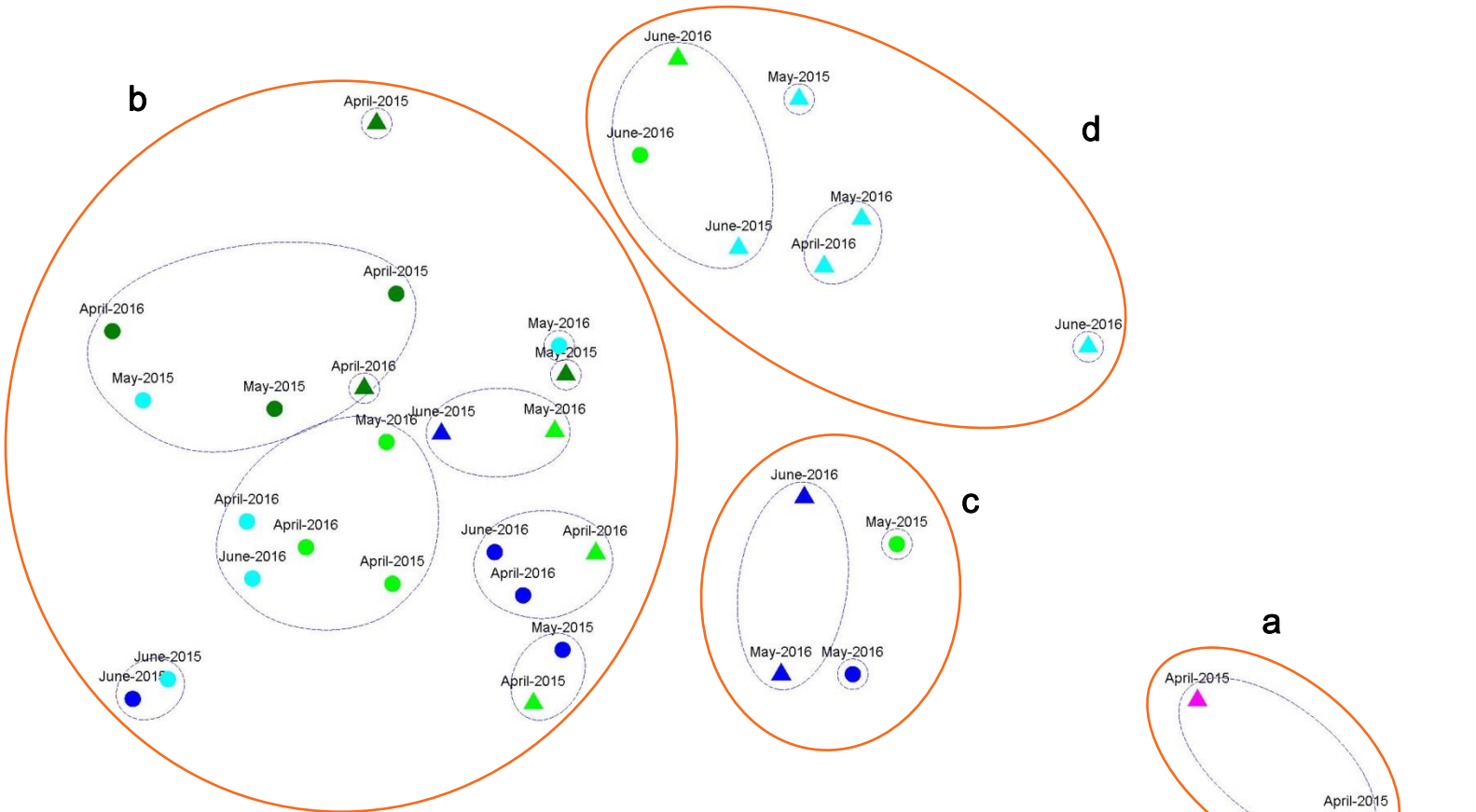
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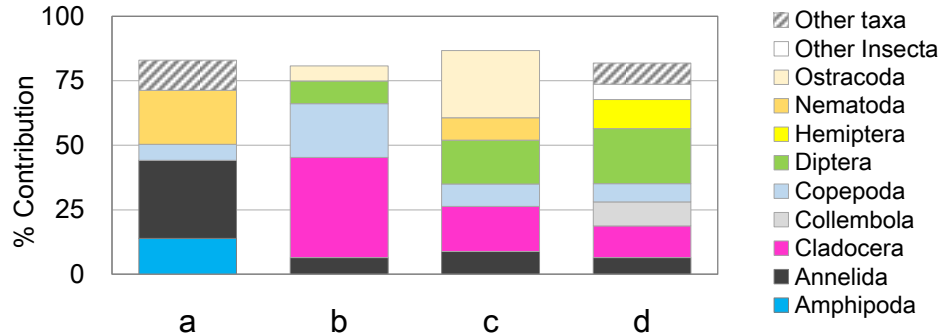
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- Whites Island-OW
- ▲ Campbell Slough-EV
- Campbell Slough-OW
- ▲ Franz Lake-EV
- Franz Lake-OW

Similarity



Simper: Contribution to Group Similarity



ANOSIM Test Results

- No sig. difference between EV and OW across all samples
- Only Whites Island with a sig. difference between EV and OW within site
- Ilwaco only site distinct from all others

Neuston

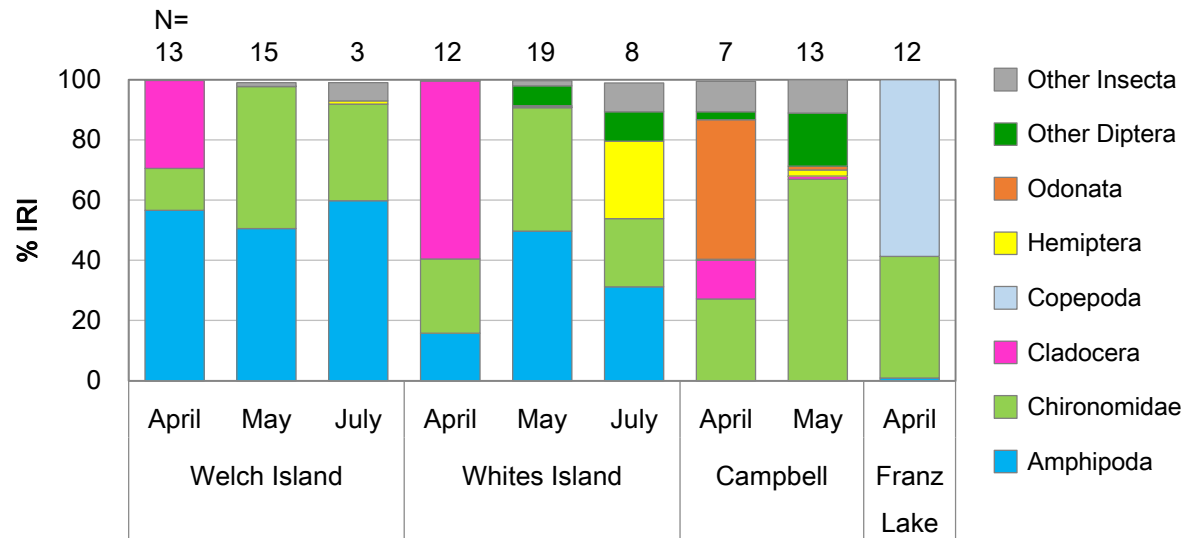
Conclusions (so far...)

- Emergent vegetation supports higher densities of macroinvertebrates than open water habitat
- Interannual variability?
- Proportional community composition is not significantly different between emergent vegetation and open water habitats
 - except at Whites Island

Juvenile Chinook Diets

2016

Index of Relative Importance for each taxon – accounts for both prey weight and numbers, and likelihood of taxa appearing in the diet of individual fish.



Amphipoda
Americorophium



Cladocera
Daphnia



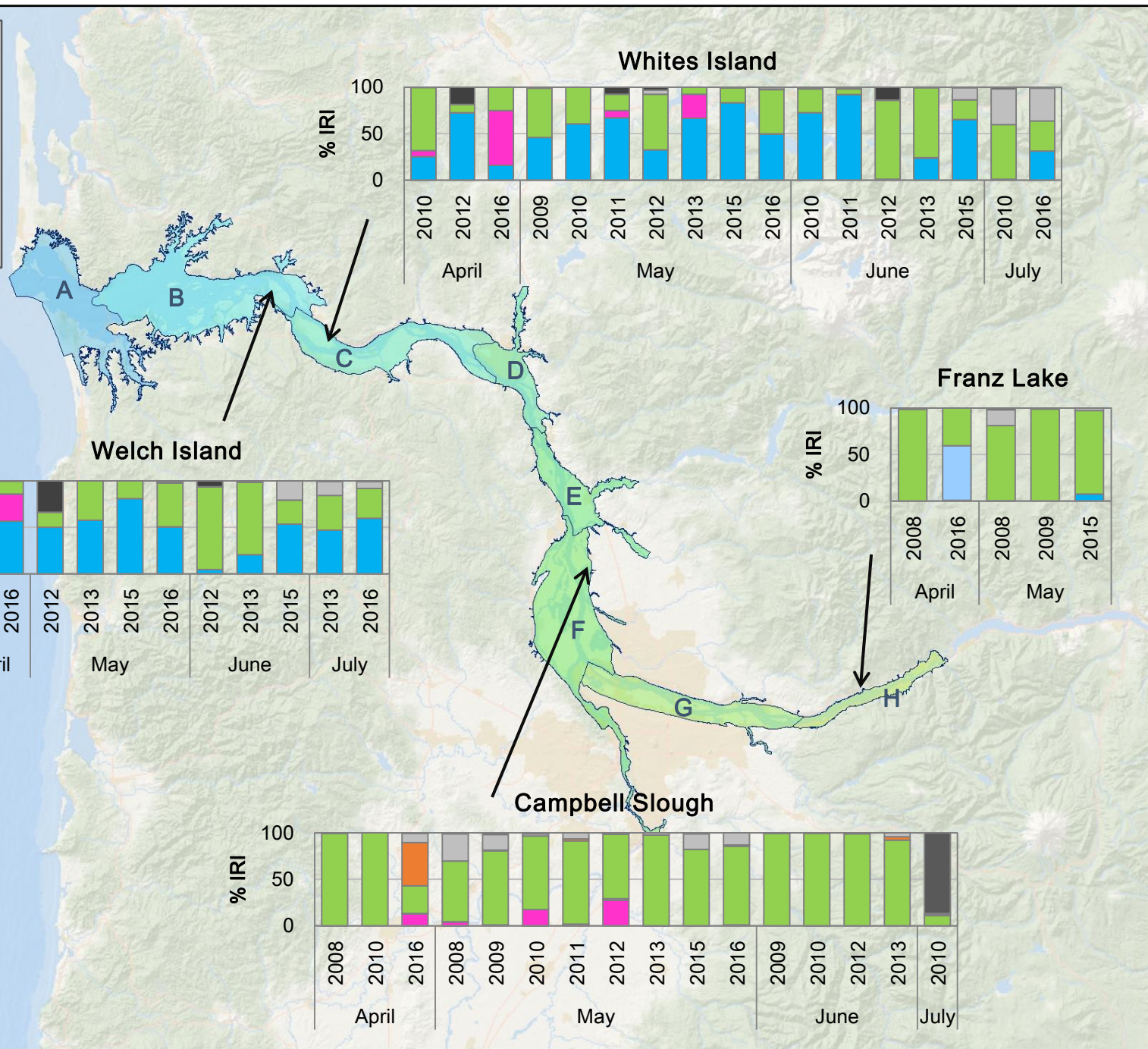
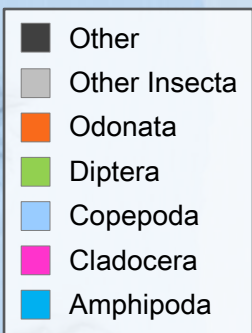
Chironomidae



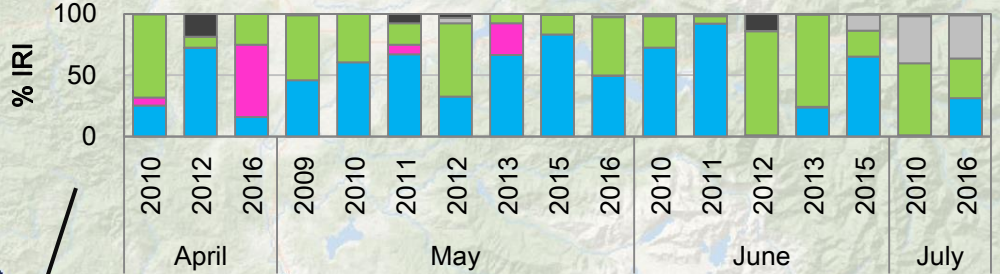
Odonata
Coenagrionidae nymph



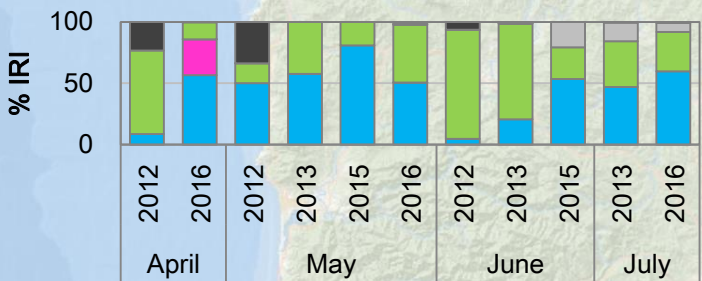
Copepoda
Cyclopoid



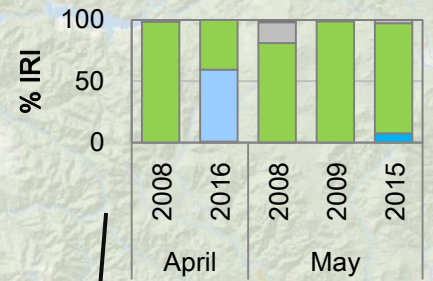
Whites Island



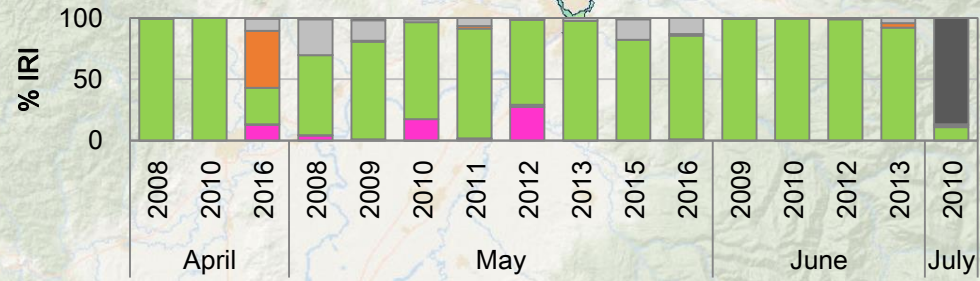
Welch Island

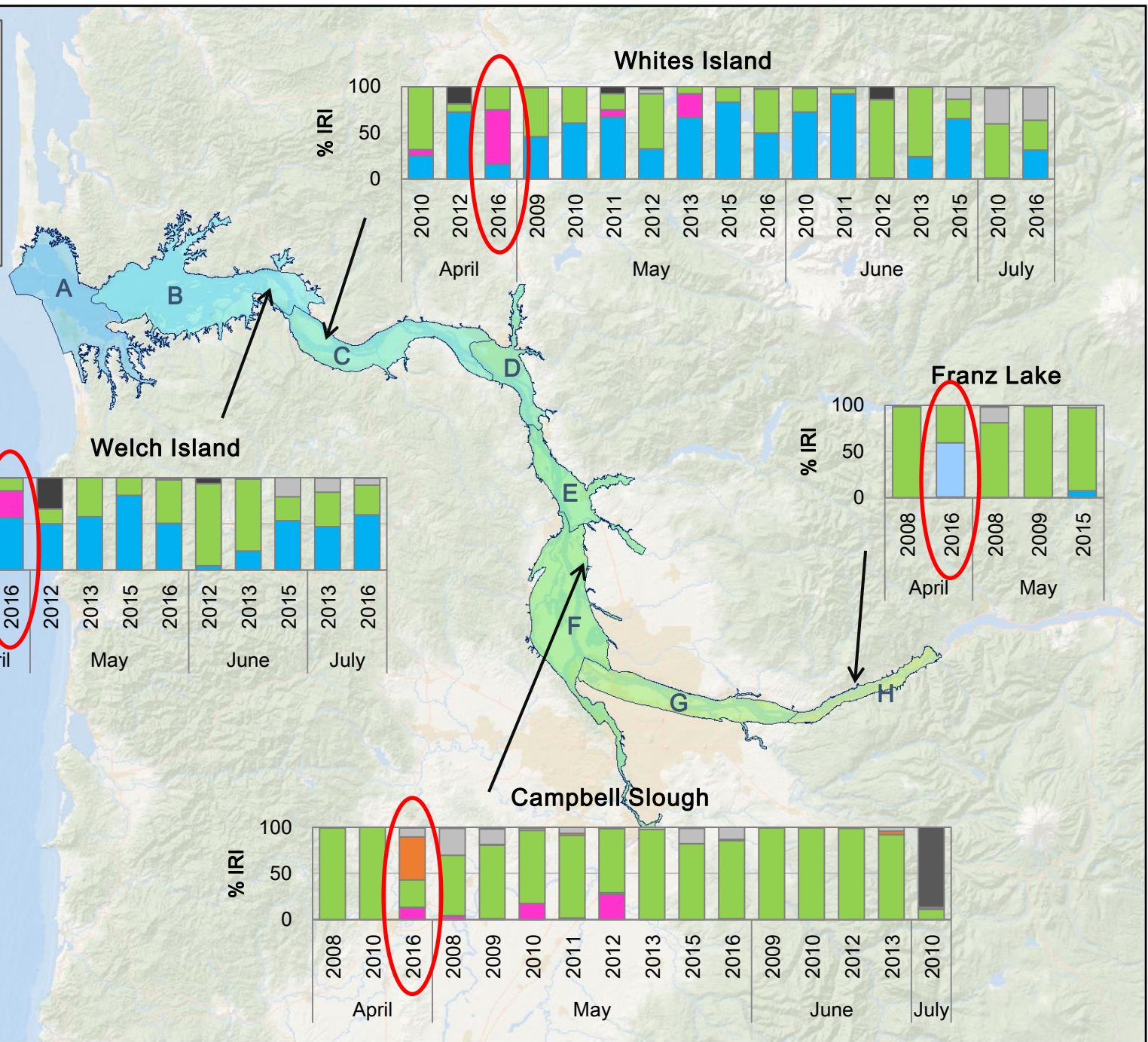
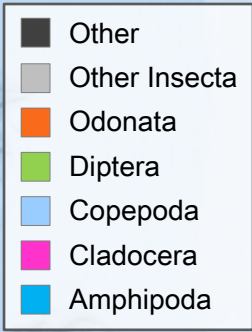


Franz Lake

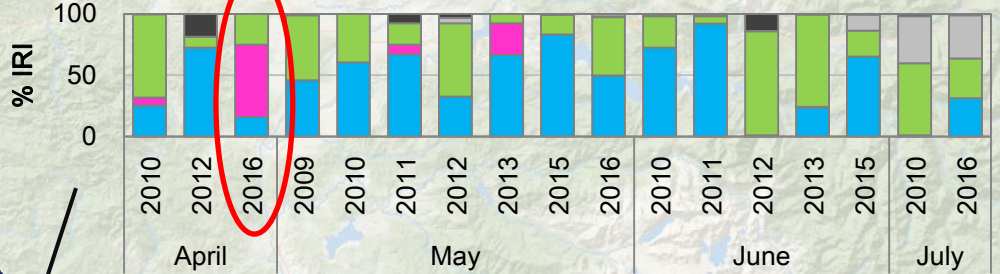


Campbell Slough

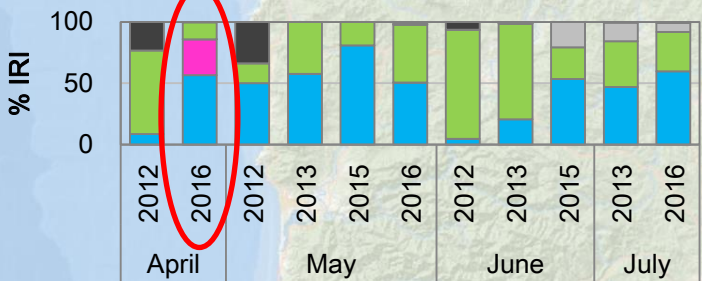




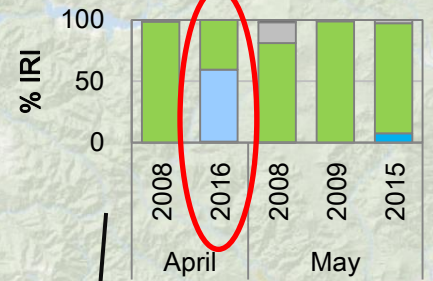
Whites Island



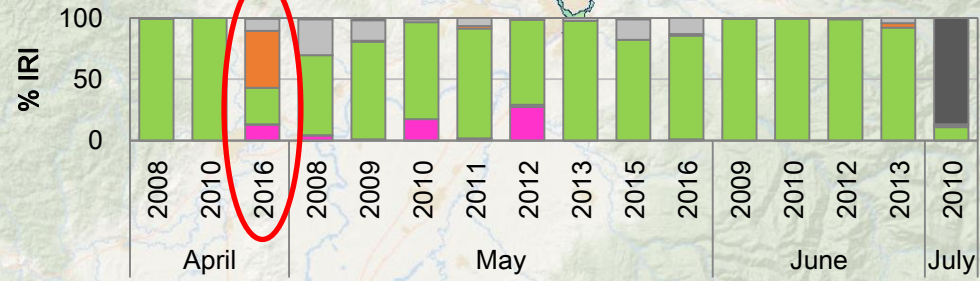
Welch Island



Franz Lake

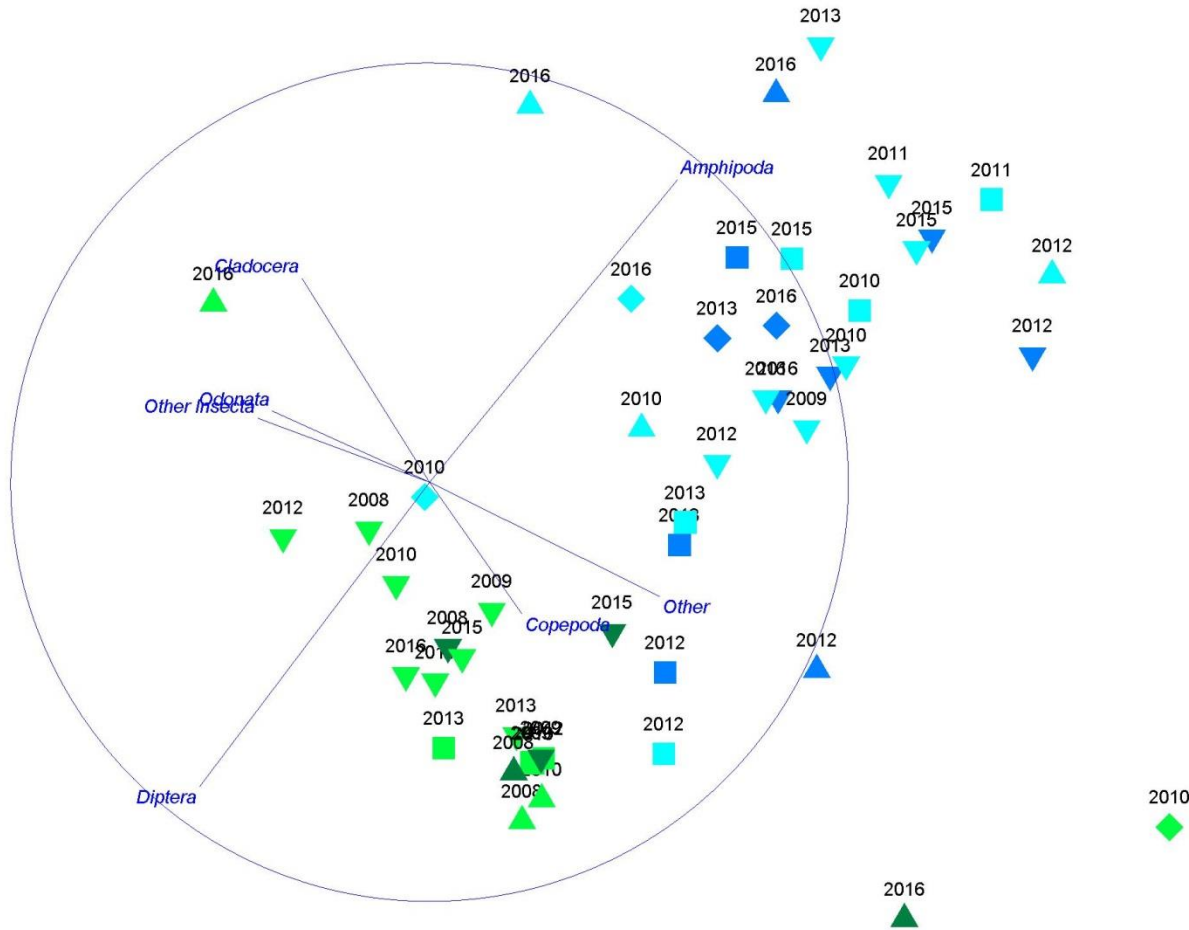


Campbell Slough



Diets 2008 – 2016

2D Stress: 0.13

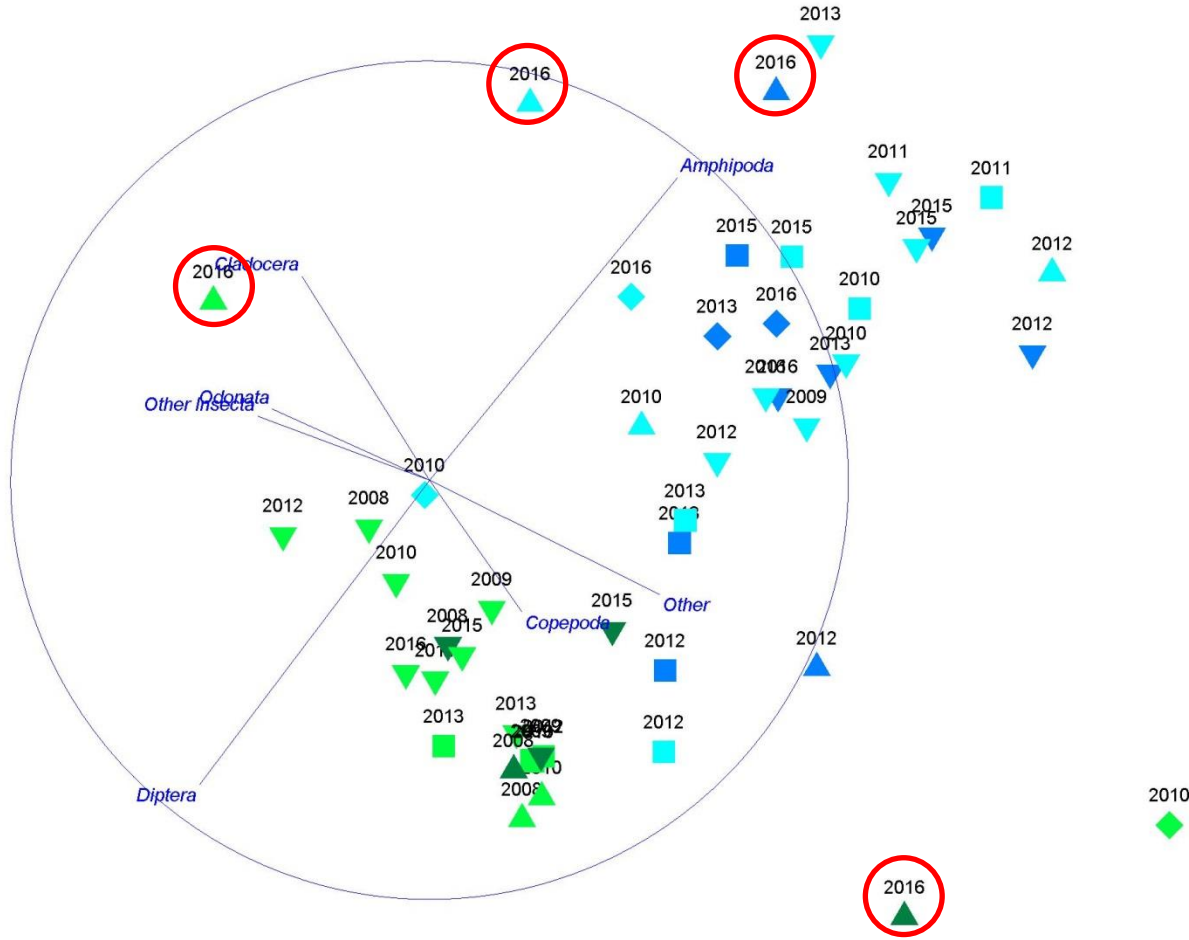


ANOSIM Test Results

- Sig. difference between lower sites and upper sites

Diets 2008 – 2016

2D Stress: 0.13



ANOSIM Test Results

- Sig. difference between lower sites and upper sites

Juvenile Chinook Diets

Conclusions (so far...)

- Amphipods and flies dominate diets at lower sites
- Flies and other insects dominate diets at upper sites
- Composition of diets fairly consistent across years, though 2016 had a few outliers

Still to do:

Instantaneous ration (measure of fish condition/fitness)

Electivity index (assess selection of prey items)