

Ecosystem Monitoring Program

Macroinvertebrate Monitoring

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October 27, 2015

Sample Inventory

Number of Samples Collected in April

Site	Benthic Core	Neuston	Diet
Ilwaco Slough	5	5 (3 open water, 2 emerg veg)	6
Grays River	5	0	0
Welch Island	0	0	0
Whites Island	0	0	0
Campbell Slough	5	6 (3 open water, 3 emerg veg)	0
Franz Lake	5	6 (3 open water, 3 emerg veg)	0

Number of Samples Collected in May

Site	Benthic Core	Neuston	Diet
Ilwaco Slough	5	0	0
Grays River	5	0	0
Welch Island	5	2 (2 open water, 0 emerg veg)	15
Whites Island	5	4 (2 open water, 2 emerg veg)	15
Campbell Slough	5	2 (2 open water, 0 emerg veg)	15
Franz Lake	5	5 (3 open water, 2 emerg veg)	4

Number of Samples Collected in June

Site	Benthic Core	Neuston	Diet
Ilwaco Slough	5	0	0
Grays River	5	0	0
Welch Island	5	6 (3 open water, 3 emerg veg)	7
Whites Island	5	4 (2 open water, 2 emerg veg)	13
Campbell Slough	5	0	0
Franz Lake	5	0	0

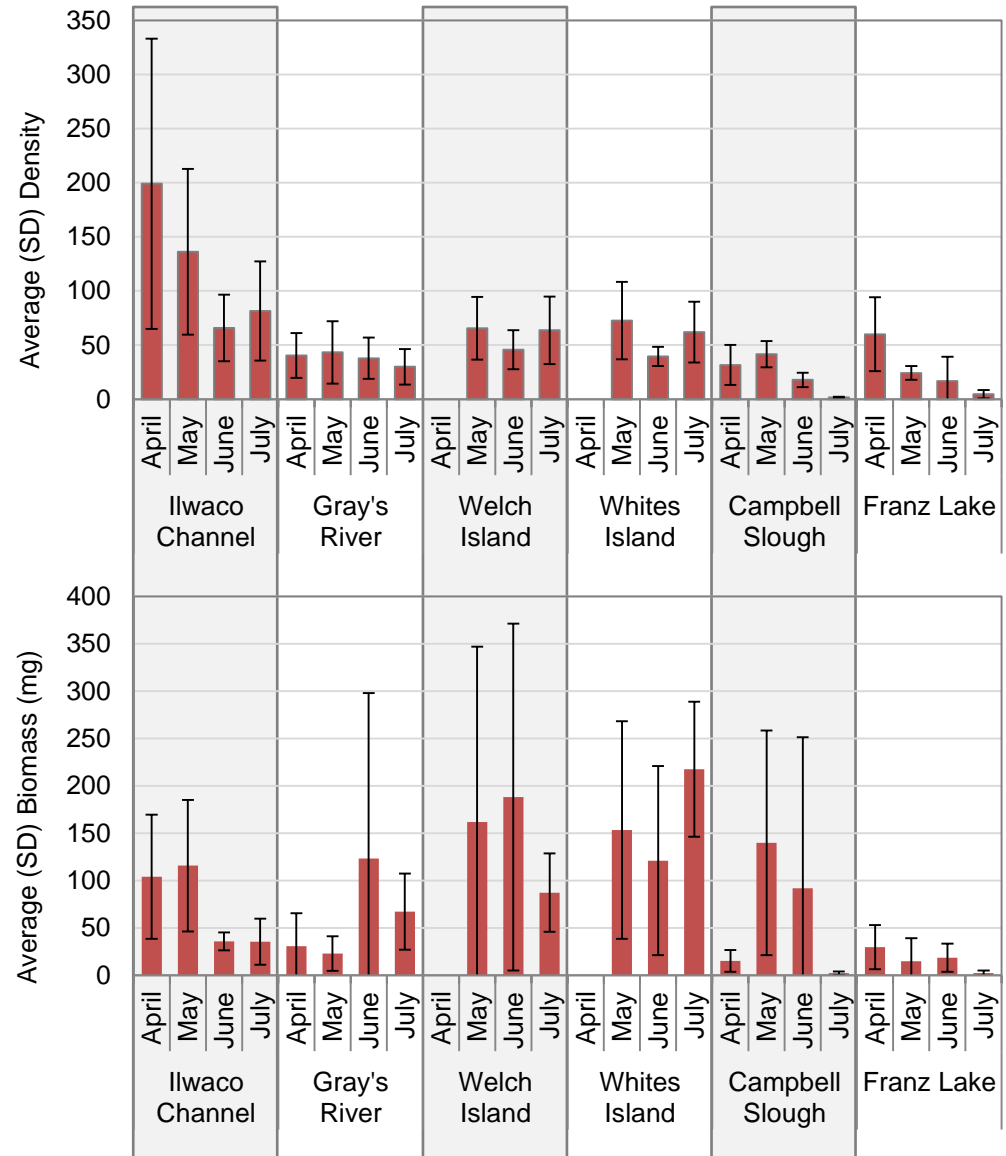
Number of Samples Collected in July

Site	Benthic Core	Neuston	Diet
Ilwaco Slough	5	0	0
Grays River	5	0	0
Welch Island	5	0	0
Whites Island	5	0	0
Campbell Slough	5	0	0
Franz Lake	5	0	0

Benthic Core - All Taxa

Graphs show average density & biomass of all taxa in a sample site, each month.

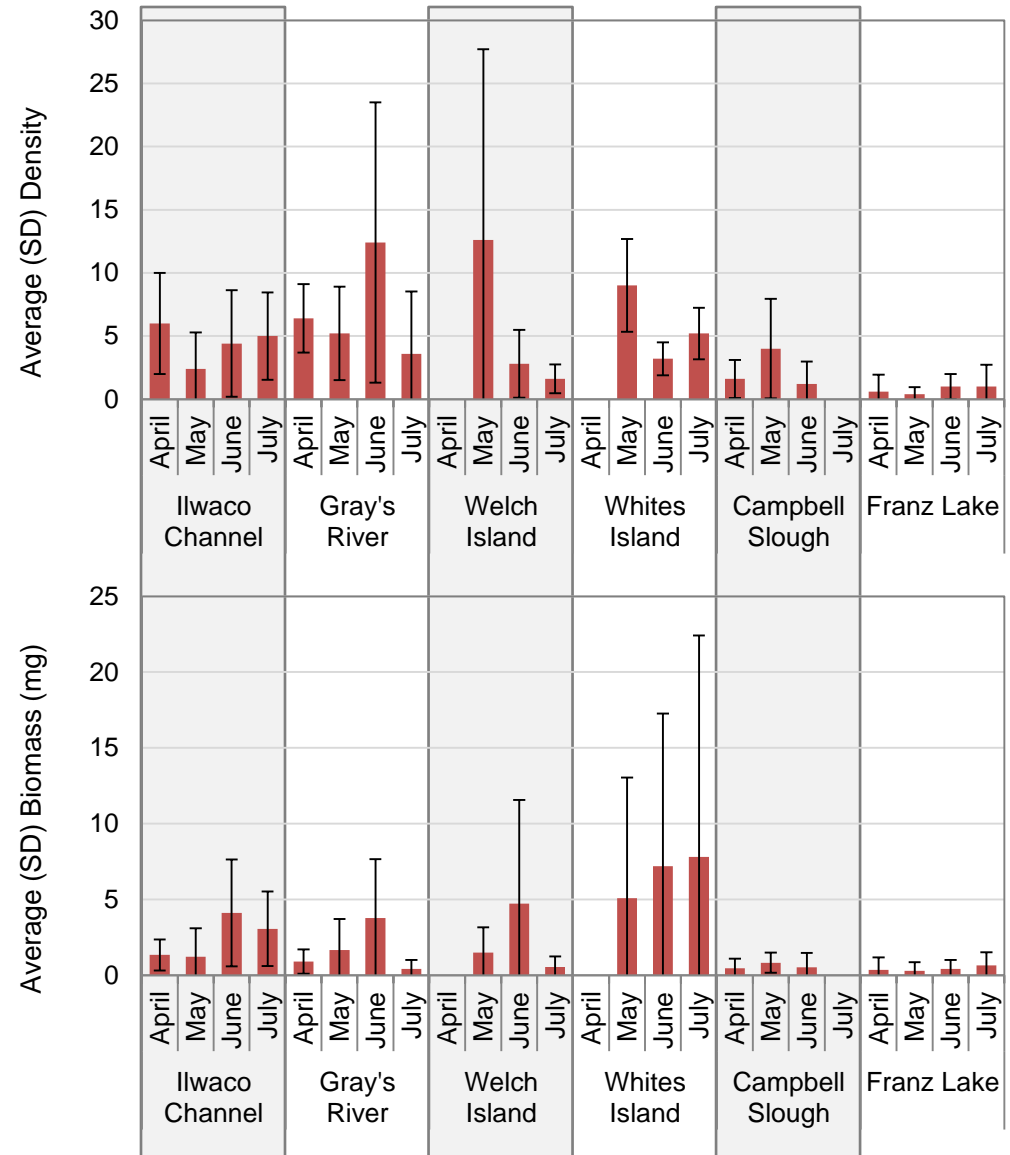
- Average density greatest from Ilwaco Slough
- Average biomass greatest from Welch and Whites Island



Benthic Core - Diptera

Graphs show average density & biomass of all Diptera (including Chironomidae) in a sample site, each month.

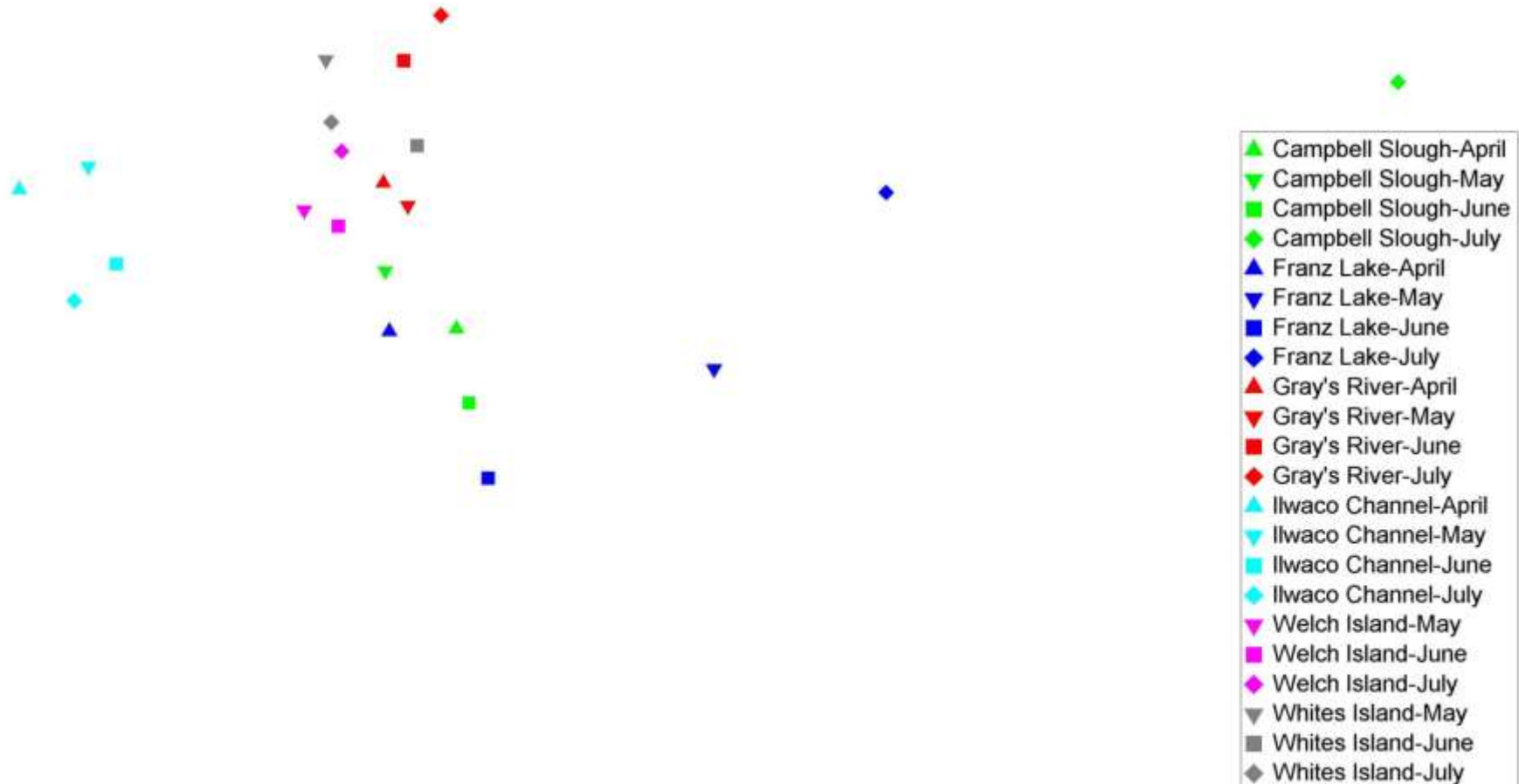
- Average density tends to peak in May/June
- Average biomass tends to peak in June
- Relatively low production of Diptera from Franz Lake



Benthic Core - MDS

ordination plot of square-root transformed monthly abundance

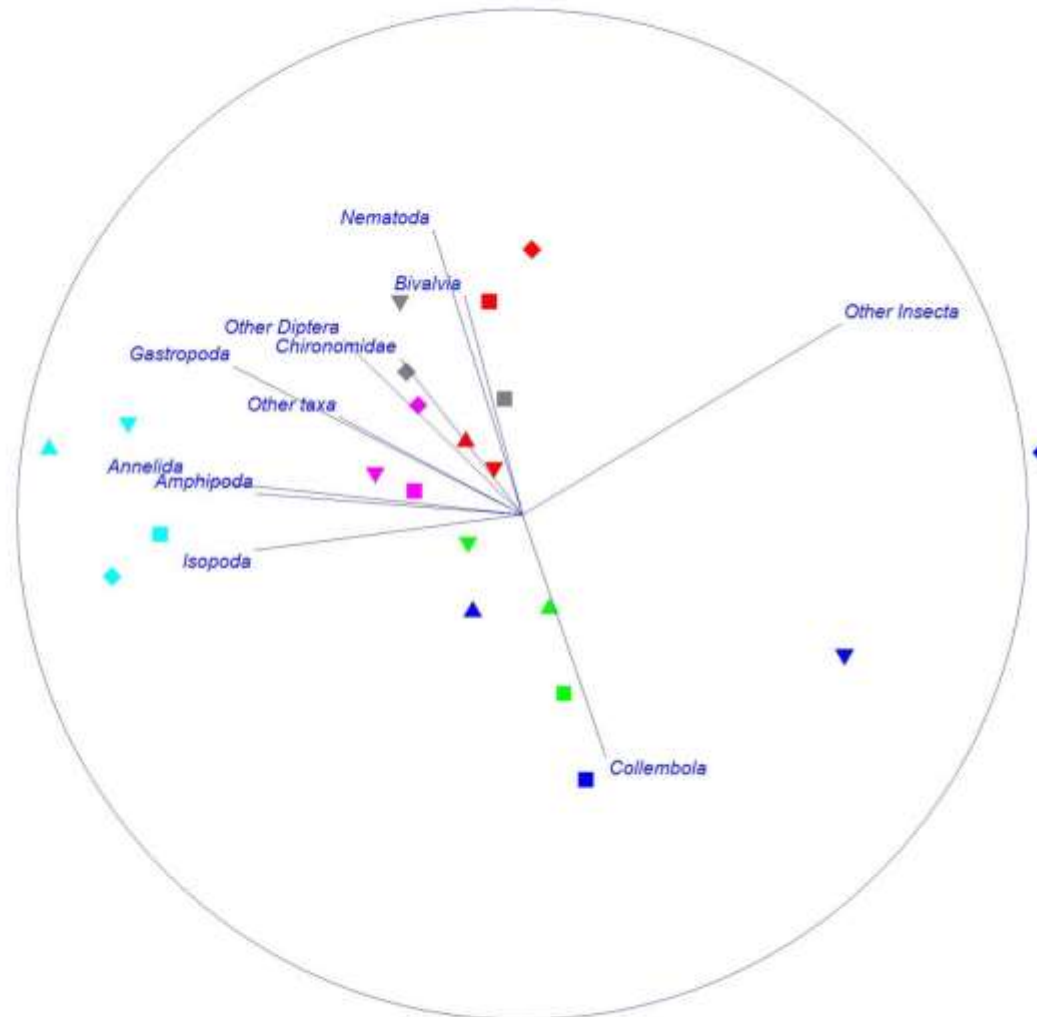
2D Stress: 0.09



Benthic Core - MDS

ordination plot of square-root transformed monthly abundance

2D Stress: 0.09



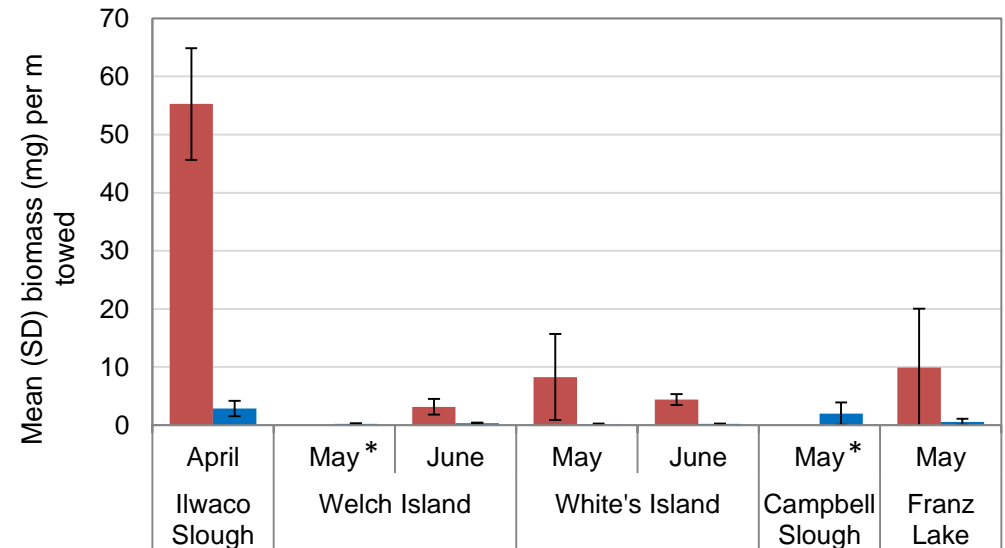
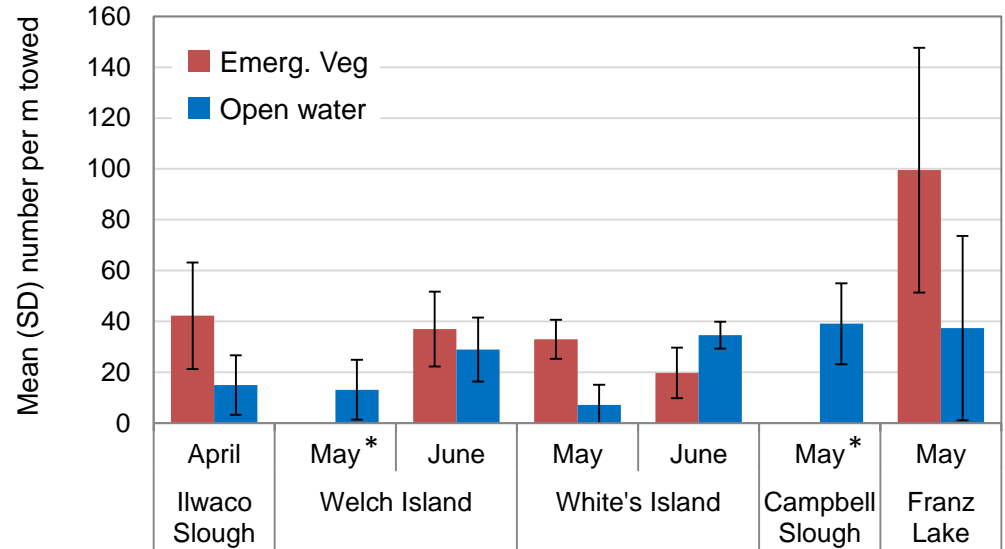
- ▲ Campbell Slough-April
- ▼ Campbell Slough-May
- Campbell Slough-June
- ◆ Campbell Slough-July
- ▲ Franz Lake-April
- ▼ Franz Lake-May
- Franz Lake-June
- ◆ Franz Lake-July
- ▲ Gray's River-April
- ▼ Gray's River-May
- Gray's River-June
- ◆ Gray's River-July
- ▲ Ilwaco Channel-April
- ▼ Ilwaco Channel-May
- Ilwaco Channel-June
- ◆ Ilwaco Channel-July
- ▼ Welch Island-May
- Welch Island-June
- ◆ Welch Island-July
- ▼ Whites Island-May
- Whites Island-June
- ◆ Whites Island-July

Neuston - All Taxa

Graphs show average density & biomass per meter towed of all taxa in a sample site, month.

- Emergent vegetation tends to have greater densities and biomass of all taxa
 - Exception is average density in Whites Island (June)

* Emergent Vegetation not sampled

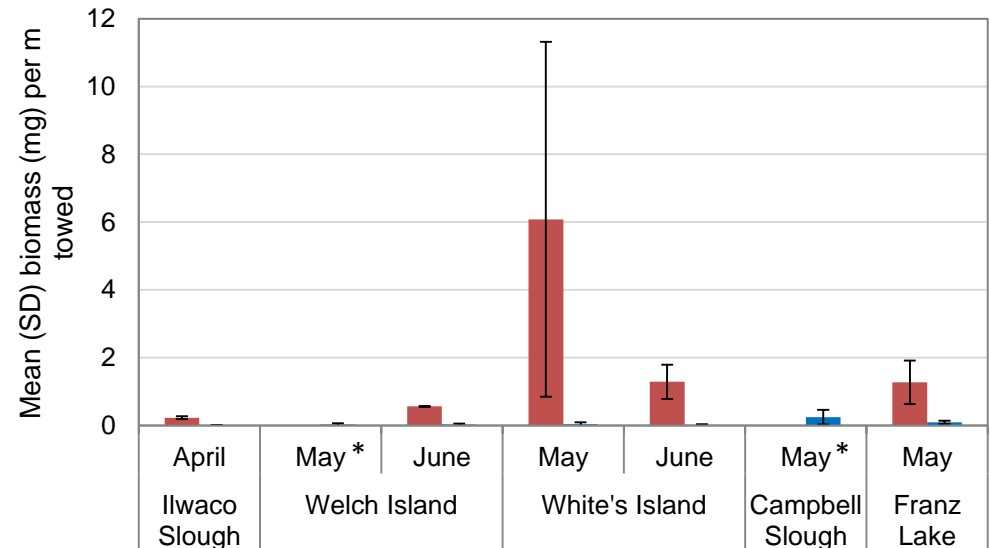
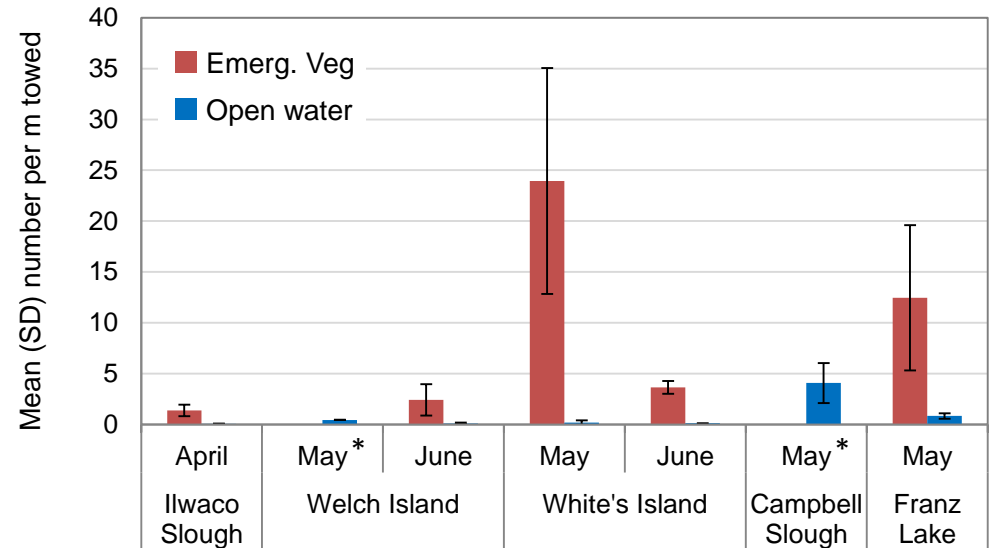


Neuston - Diptera

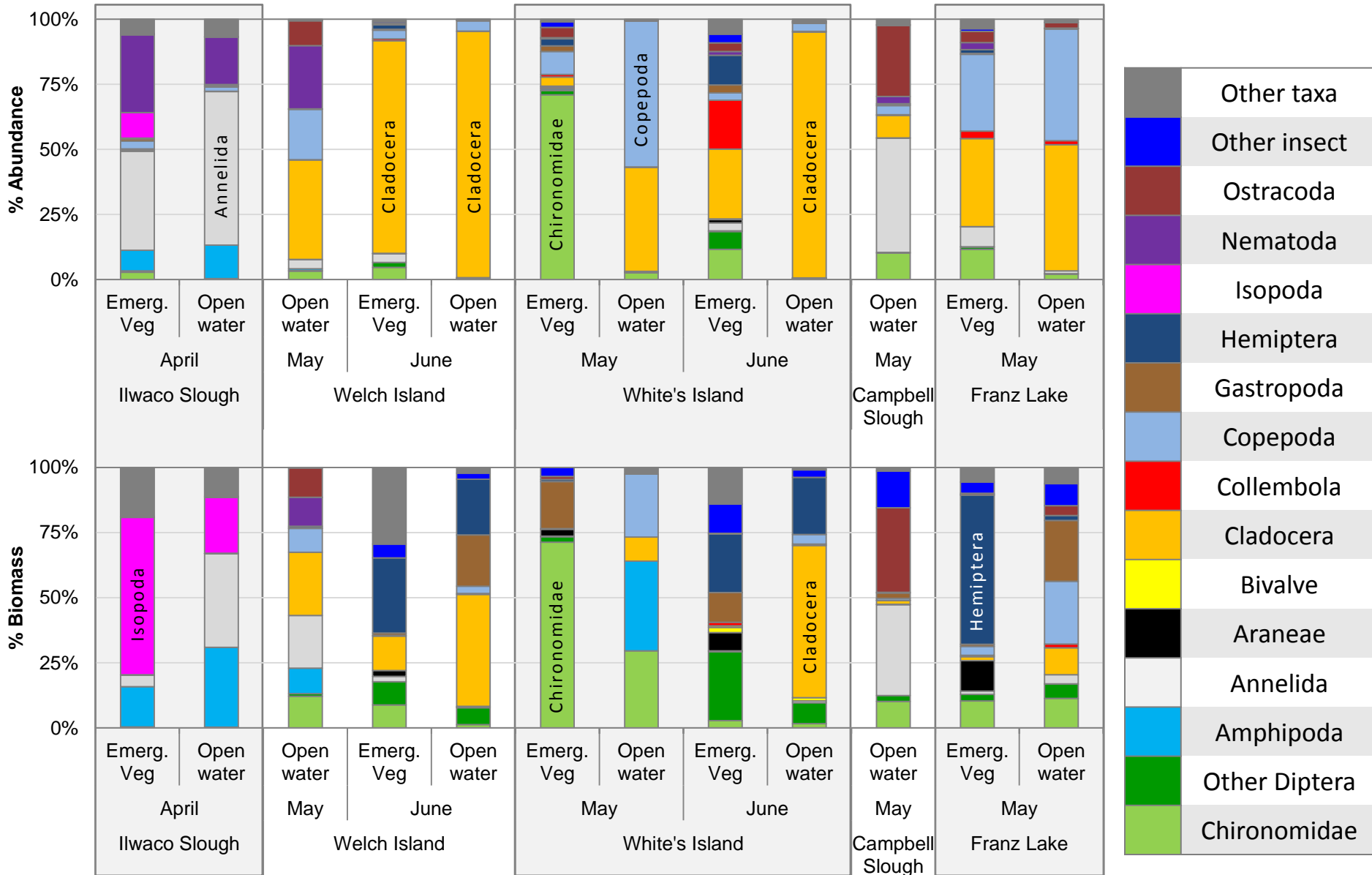
Graphs show average density & biomass of all Diptera (including Chironomidae) in a sample site, month.

- Average density and biomass of Diptera consistently greater in the emergent vegetation habitat

* Emergent Vegetation not sampled



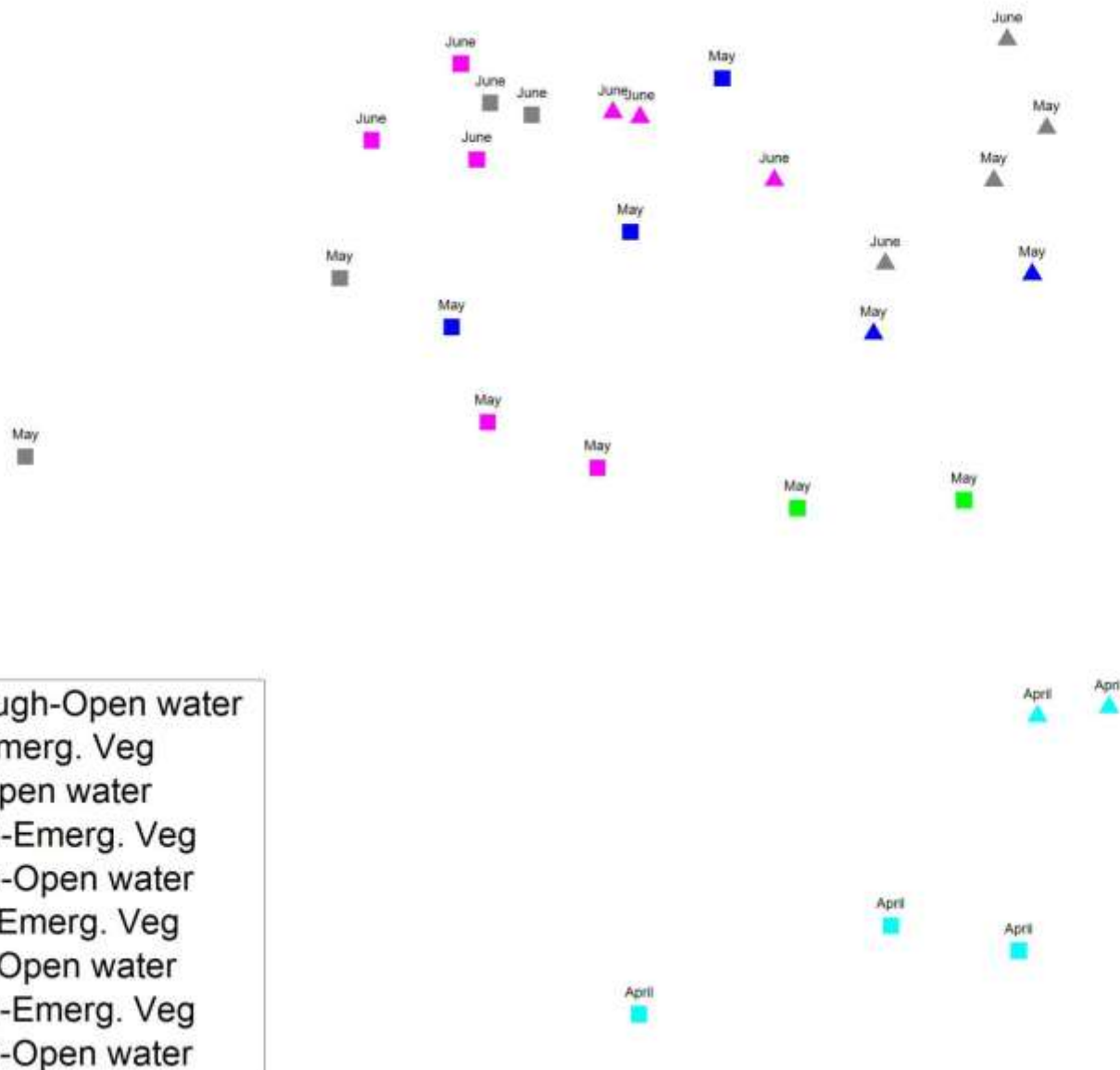
Neuston Composition



Neuston - MDS

ordination plot of square-root transformed monthly abundance

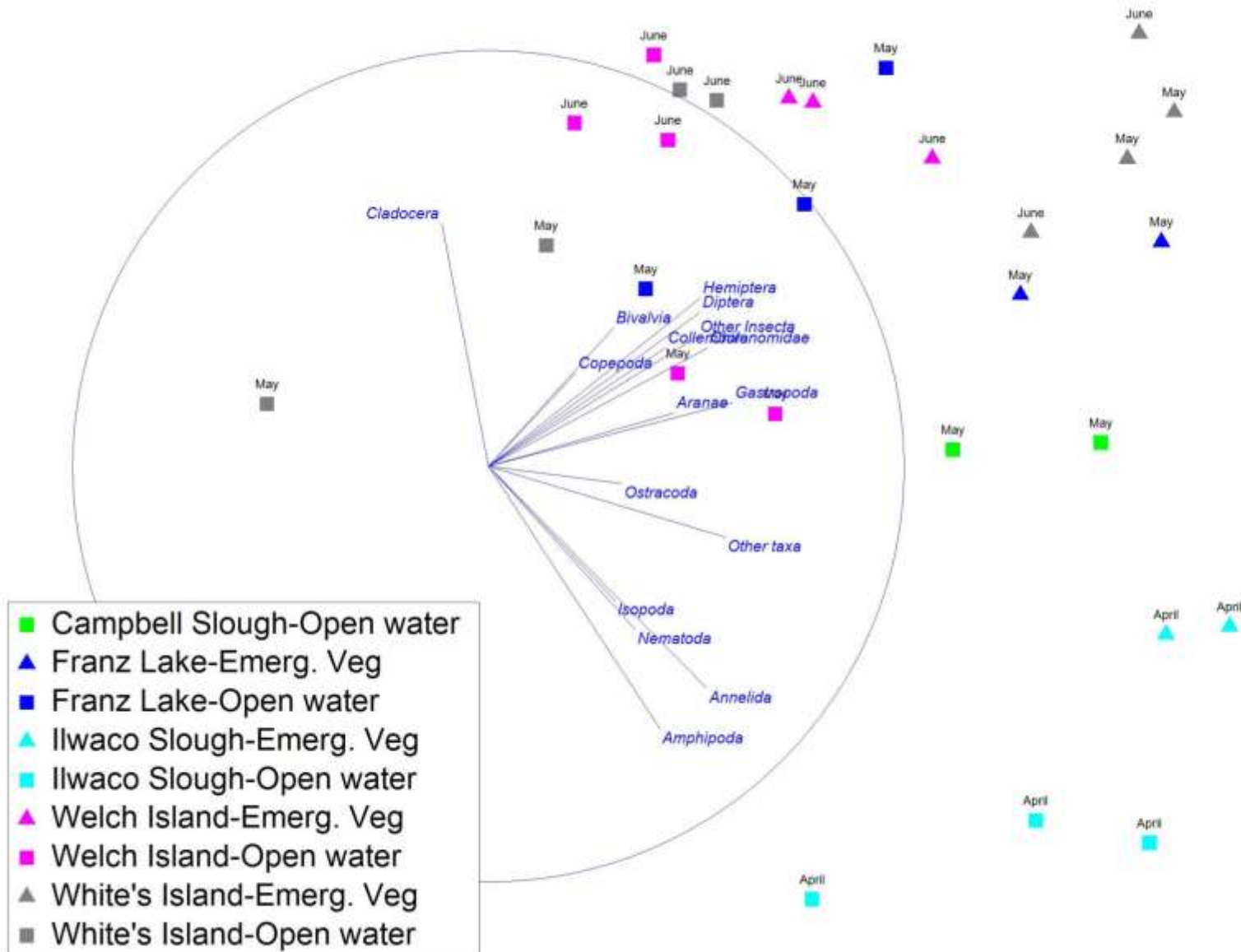
2D Stress: 0.12



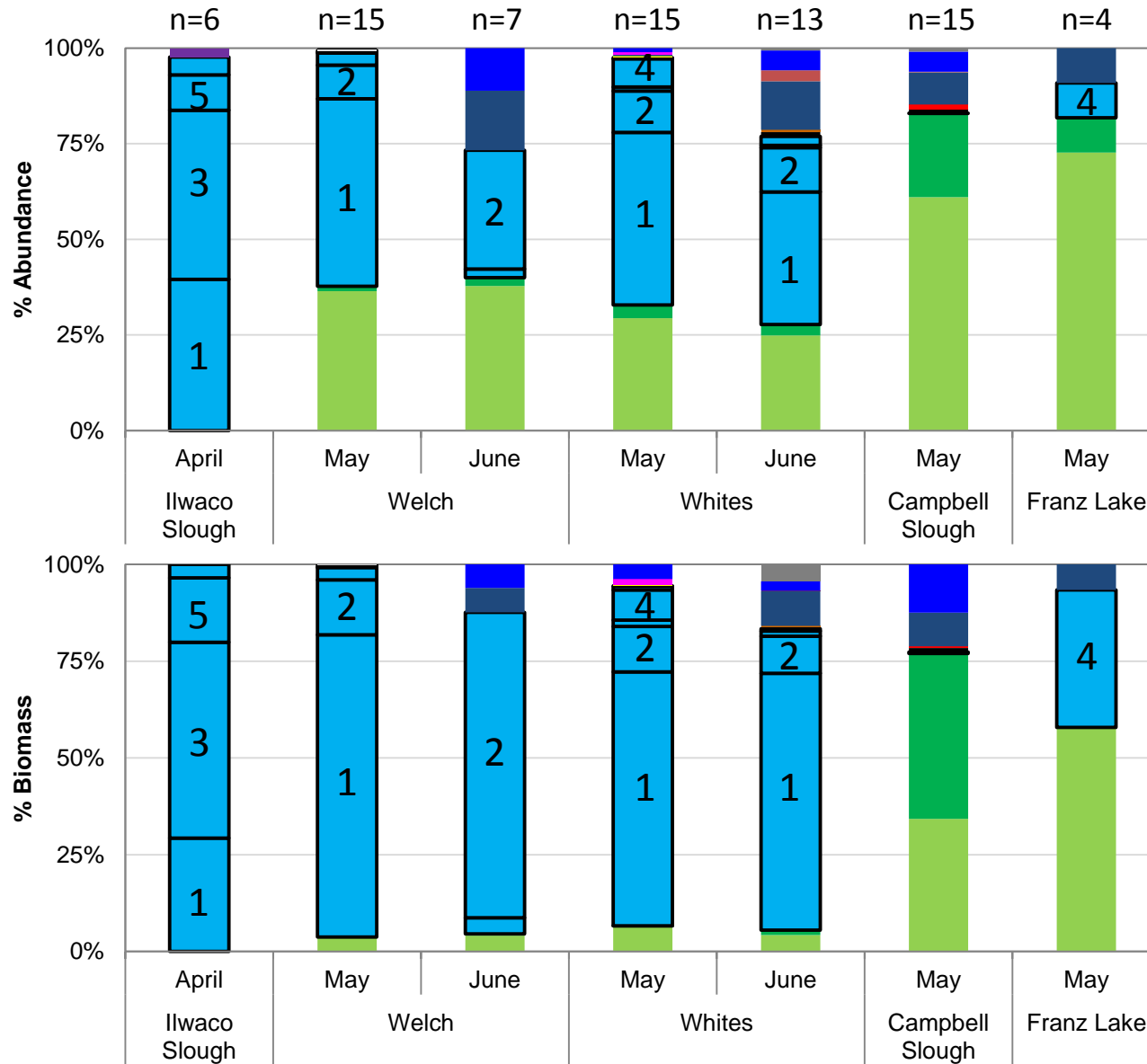
Neuston - MDS

ordination plot of square-root transformed monthly abundance

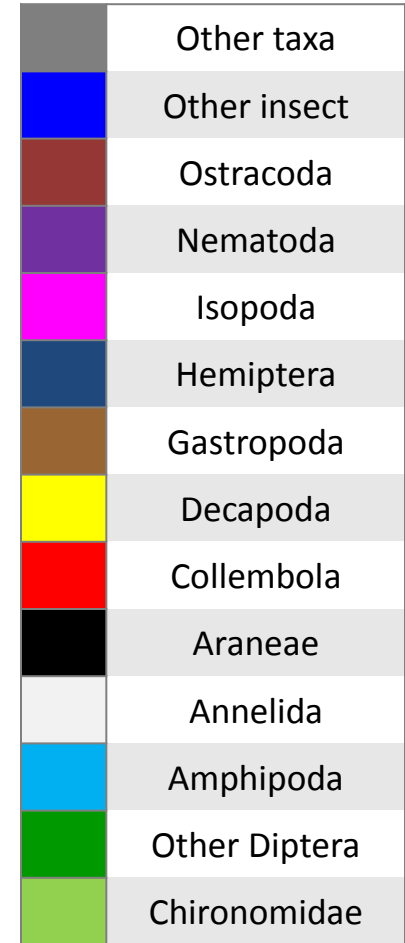
2D Stress: 0.12



Diet Composition



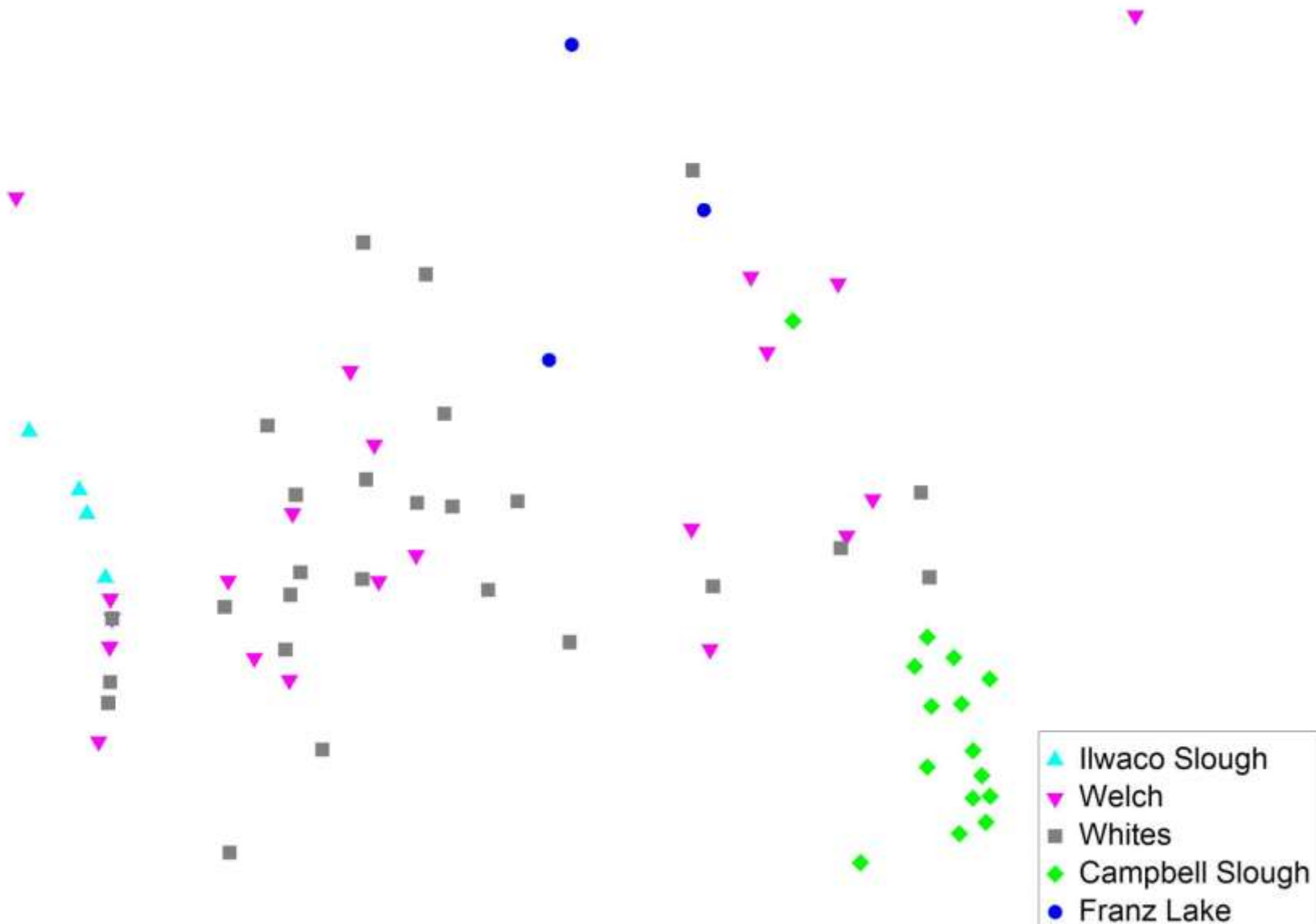
- AMPHIPODA TAXA**
1. *Americorophium salmonis*
 2. *Americorophium* sp.
 3. Corophiidae
 4. *Crangonyx*
 5. *Grandidierella japonica*



Diet Prey Taxa - MDS

ordination plot of square-root transformed abundance

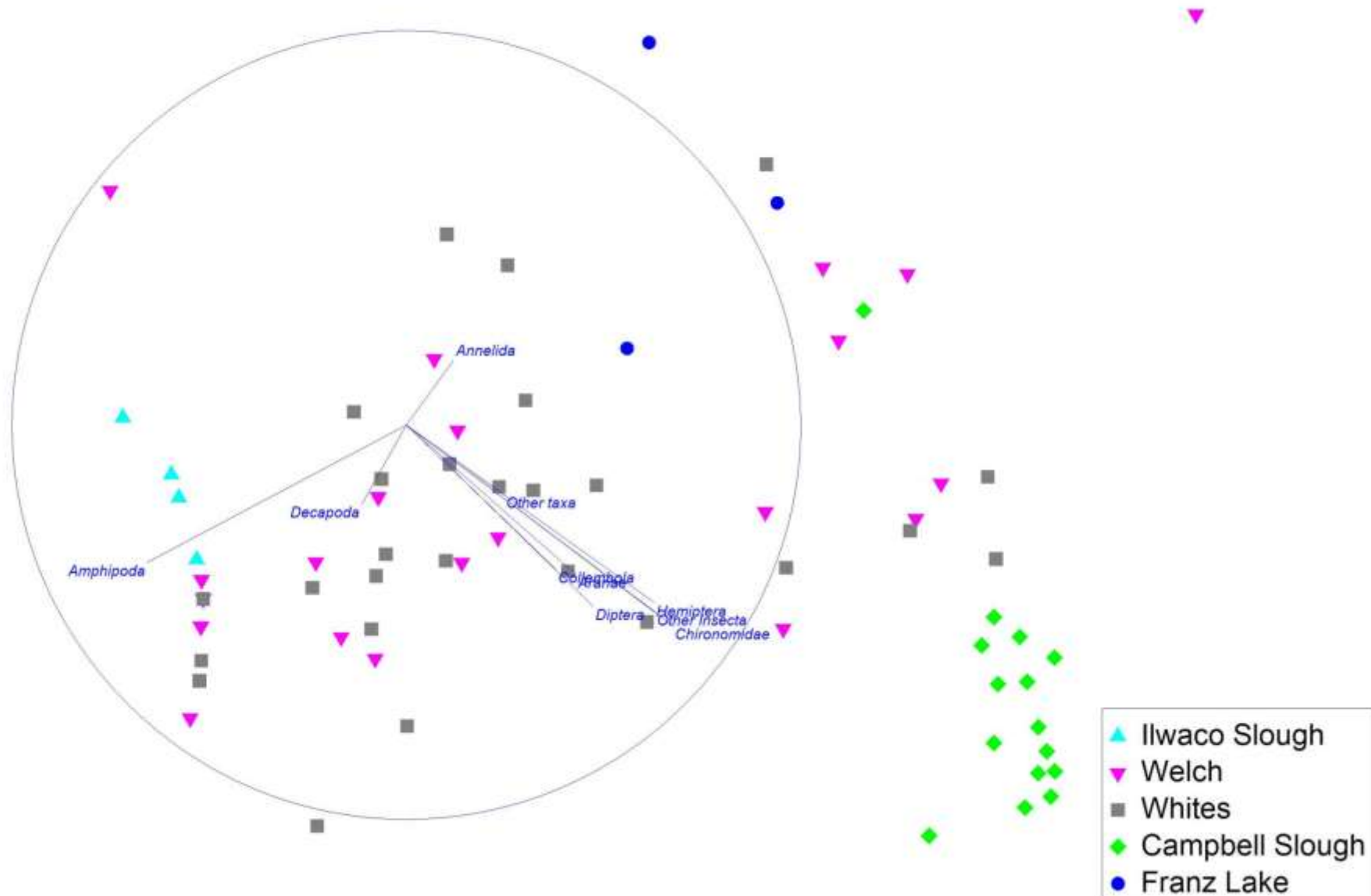
2D Stress: 0.11



Diet Prey Taxa - MDS

ordination plot of square-root transformed abundance

2D Stress: 0.11

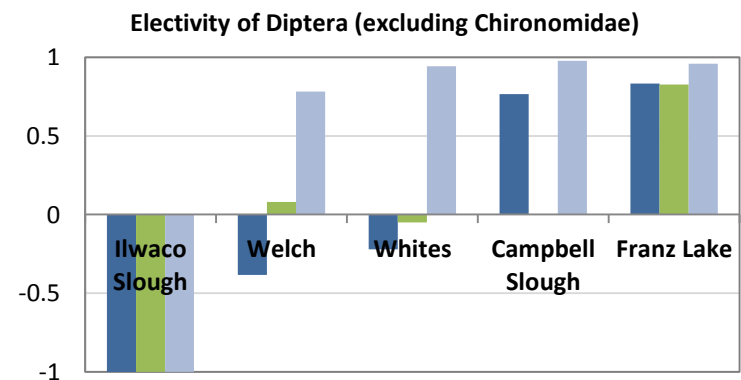
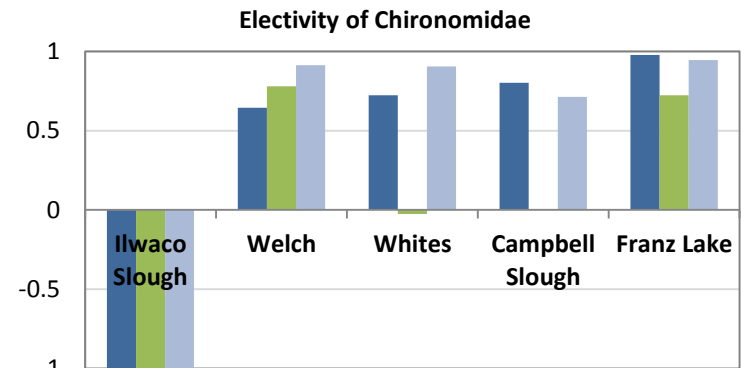
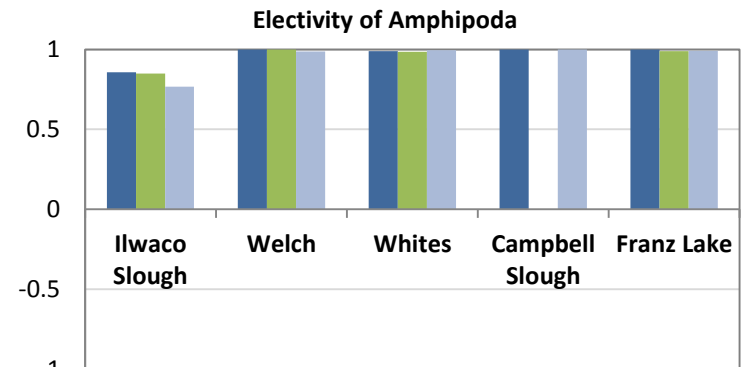


Diet Electivity

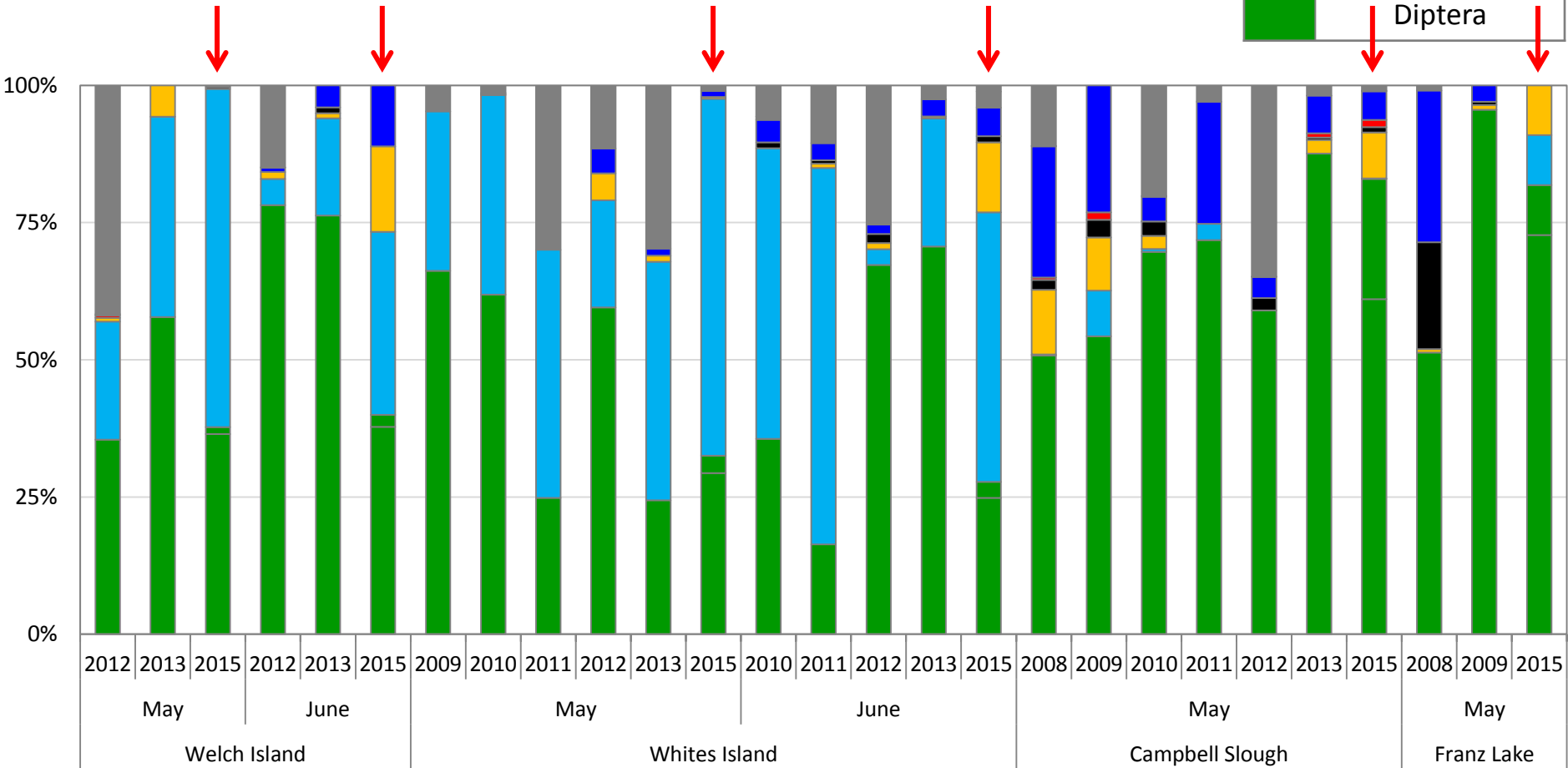
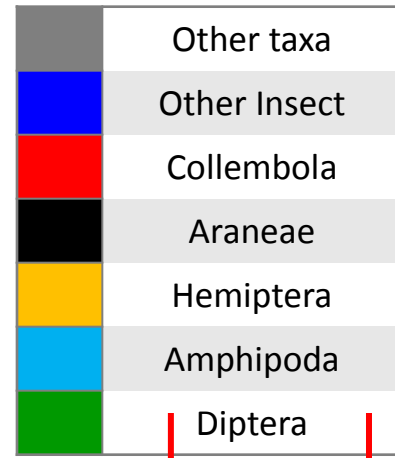
Ivlev's Index of Electivity

- -1: total avoidance of a prey
- 0: prey is taken in proportion to its abundance in the environment
- 1: total preference for a prey

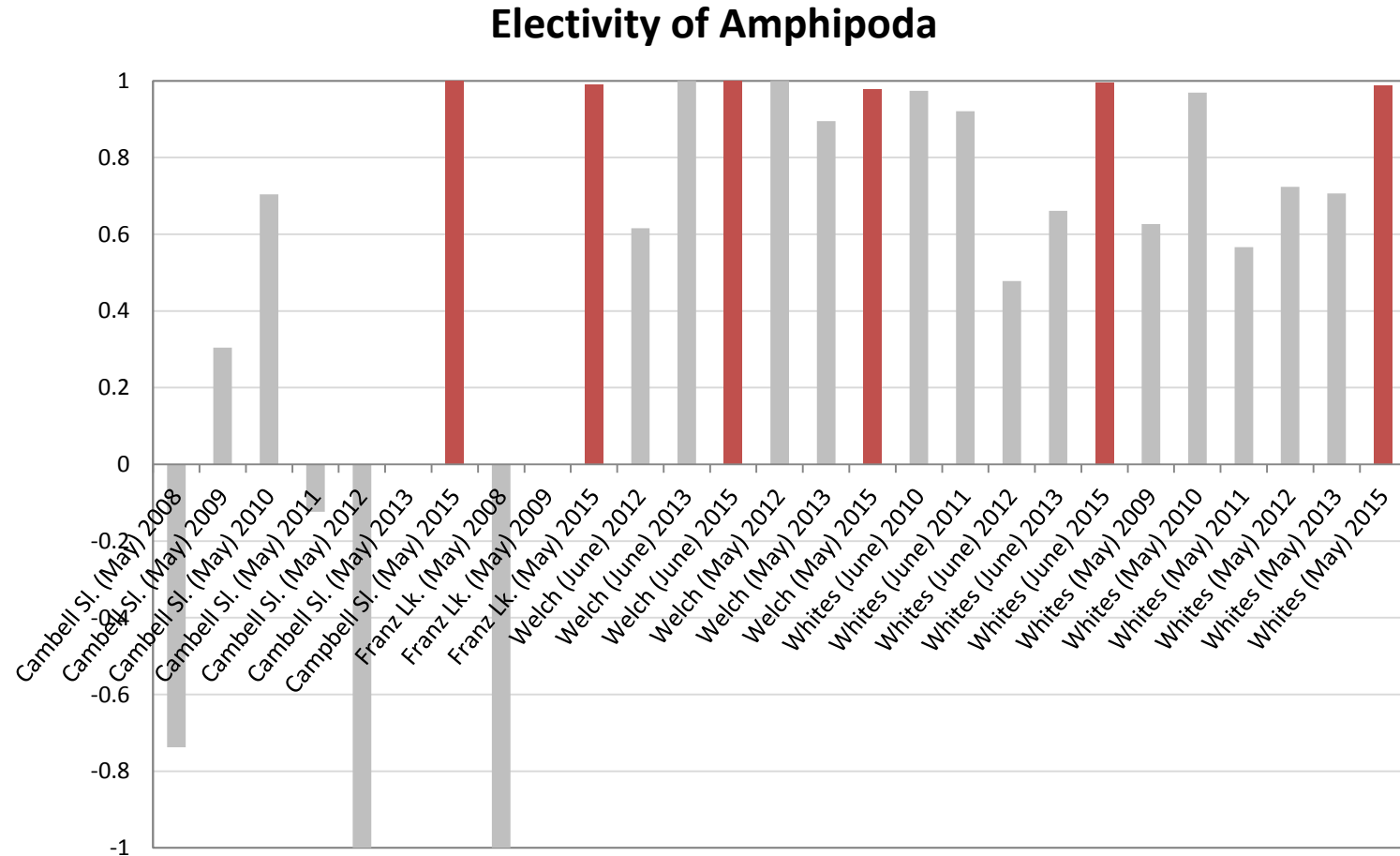
Source of Prey	
	Benthic
	Emergent Veg. Neuston
	Open Water Neuston



Diet Composition - Trends



Diet Electivity - Trends

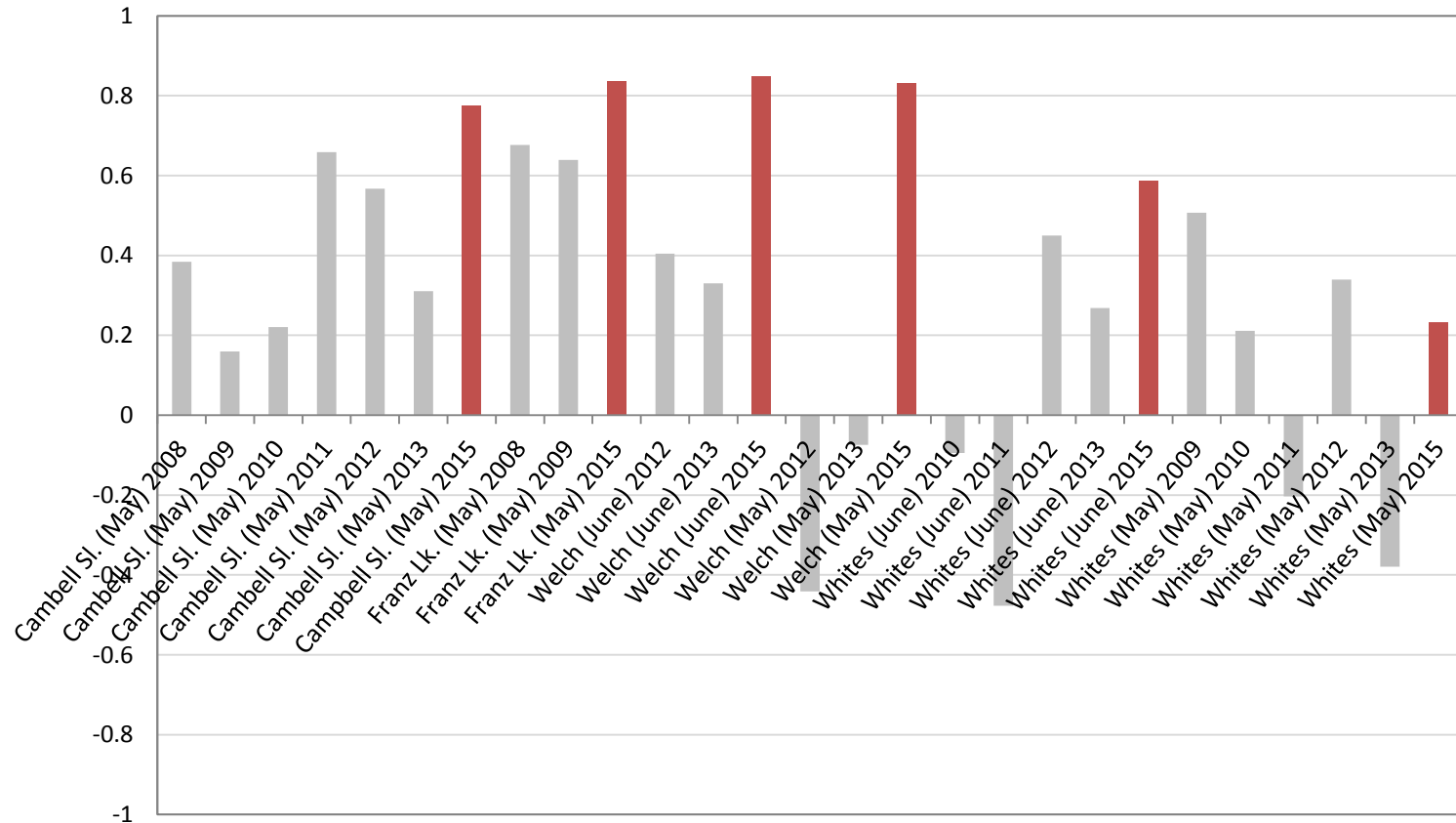


Graph shows selection of Amphipoda given proportional abundance in nuston tows by site, month, and year.

Current year (2015) in red.

Diet Electivity - Trends

Electivity of Diptera (including Chironomidae)



Graph shows selection of all Diptera given proportional abundance in nuston tows by site, month, and year.

Current year (2015) in red.

Next Steps

- Incorporate past years into multivariate analysis of community compositions
- Incorporate fish lengths in diet analysis to investigate shifts in feeding as the fish grows
- Trends in stomach fullness?