Variability of Lipid Profiles of Pegalic Macrozooplankton of Coastal British Columbia, Canada

Can food quality affect salmon production?

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***Orchomanella* spp.**

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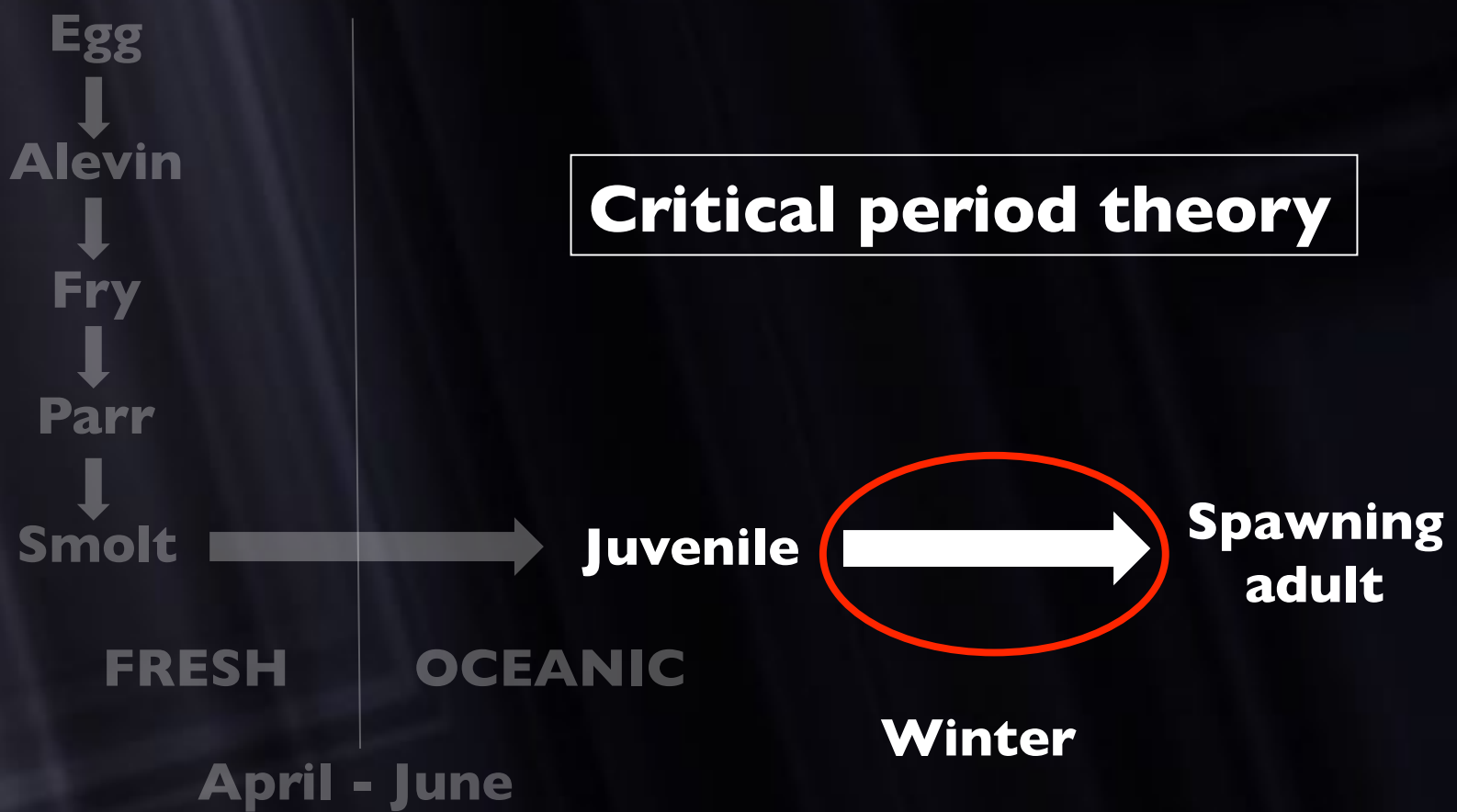
Oceanographic factors affecting salmon production:

Spatial:
Depth, temperature, salinity, nutrient availability, mixed layer depth…

Temporal:
ENSO, Aleutian Low, upwelling index, stormy weather…

food quality…

the extent to which diet maximizes growth and probability of survival to maturity



Critical period theory

Beamish & Mahnken 2001

Juvenile sockeye (8) – July 1995

		Number (%)	Weight (%)
COPEPODA		**79.60**	**43.38**
Calanus marshallae	f	42.38	27.70
	m	7.53	4.07
	v	28.84	11.47
	iv	0.84	0.14
AMPHIPODS		**0.56**	**0.96**
Cranocephalus		0.06	0.32
Themisto pacifica		0.00	0.00
T. pacifica juveniles		0.45	0.29
Hyperoche medusarum		0.06	0.34
EUPHAUSIIDS		**10.85**	**48.18**
Euphausia pacifica		0.34	5.89
Thysanoessa spinifera		0.56	6.95
T. spinifera juveniles		9.95	35.34

***Calanus marshallae* (~2.5 mm)**

	Number (%)	Weight (%)
BRACHYURAN	**2.14**	**0.49**
Cancer zoea	0.96	0.26
Cancer megalops	0.06	0.02
CARIDEA	**0.17**	**0.34**
Caridea mysis	0.06	0.05
Pandalidae mysis	0.11	0.28
CHAETOGNATHS	**0.17**	**0.20**
PISCES	**4.89**	**6.25**
Fish larvae	4.89	6.25

Source: M. Trudel - DFO

Daniel Bevan - University of Victoria

Copepoda:
Calanus marshallae
Neocalanus cristatus
N. plumchrus

Summer
lipid storage
In droplet

Euphausiidae:
Thysanoessa spinifera
'Euphausiid complex'
'Juvenile euphausiids'

Plastic
body size

Amphipoda:
Themisto pacifica

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1 other taxa:
***Cancer* megalops**

A few “fishy” fatty acids

20:4n-6	Arachidonic (ARA)
18:2n-6	Linoleic
20:5n-3	Eicosapentaenoic (EPA)
22:6n-3	Docosahexaenoic (DHA)
18:3n-3	a-Linolenic

Takeuchi and Watanabe (1982)

Tracer	Diet	Source
16:1n-7	Diatoms	Graeve et al. (1994), Viso & Marty (1993)
EPA	Diatoms	Viso & Marty (1993), Graeve et al. (1994, 2005)
16PUFA[a]	Diatoms	Thompson et al. (1992), Graeve et al. (1994, 2005)
DHA	Dinoflagellates	Viso & Marty (1993)
18PUFA[b]	Flagellates	Thompson et al. (1992), Viso & Marty (1993)
DHA/EPA	Flagellates to diatom, carnivory	Budge & Parrish (1998)
16PUFA/18PUFA	Herbivory, diatoms to flagellates	Mayzaud et al. (1989), Budge & Parrish (1998)
18:2n-6	Terrestrial plants/green algae	Dalsgaard et al. (2003)
15:0 + 17:0[c]	Bacteria	Kaneda (1991)
18:1n-9/18:1n-7	Bacteria and omnivory	Stevens et al. (2004a,b)
20-22MUFA[d]	Wax ester synthesis	Sargent & Whittle (1981)
22MUFA/20MUFA[e]	Calorific value	Scott et al. (2002)

El-Sabaawi *et al.* 2009

Research Questions:

Within species, how do lipid indicators vary across different spatial scales? Are there gradient-type trends?

How do taxa differ in lipid profile?

Do some areas demonstrate consistently higher quality (ie. across all species)?

Fieldwork:

DFO La Perouse Trip

May 26 – June 7
35 stations

Sept 4 – Sept 13
38 stations

CCGS John P. Tully

Fieldwork:

Viking Storm Cruise
June 17 – July 1
30 stations

July 3 – July 7
21 stations

FV Viking Storm

Methods:

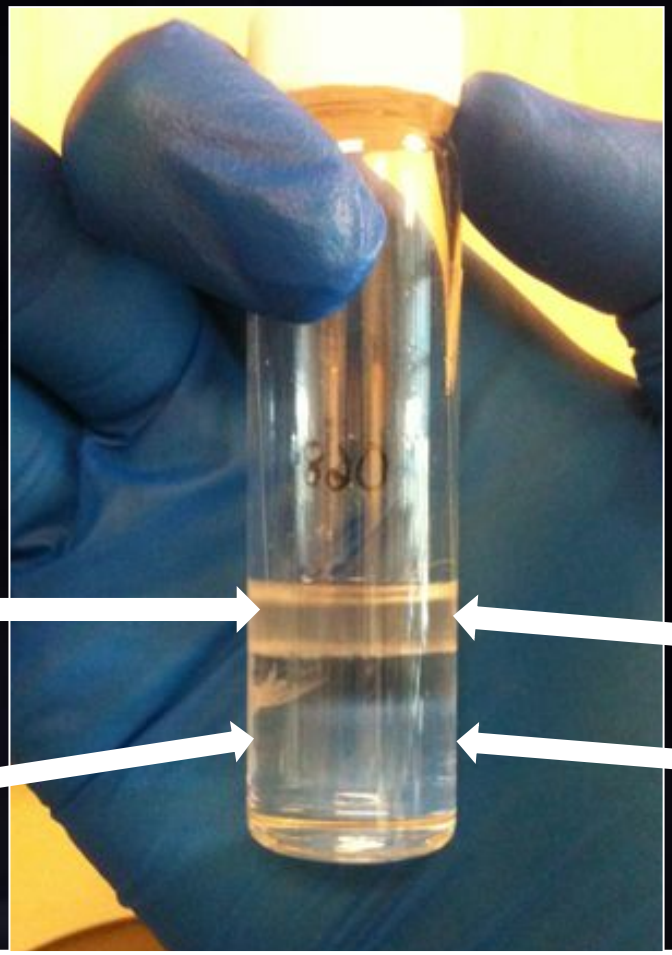
Bongo vertical net haul (depth 50-400 m)

Picking from bulk sample
Identifying to species
Storage in -80

Lipid extraction
GC analysis

Methods:

Folch *et al* (1957) lipid extraction



Water + methanol
Sample

Chloroform

Other residue

Lipids

Preliminary Results:

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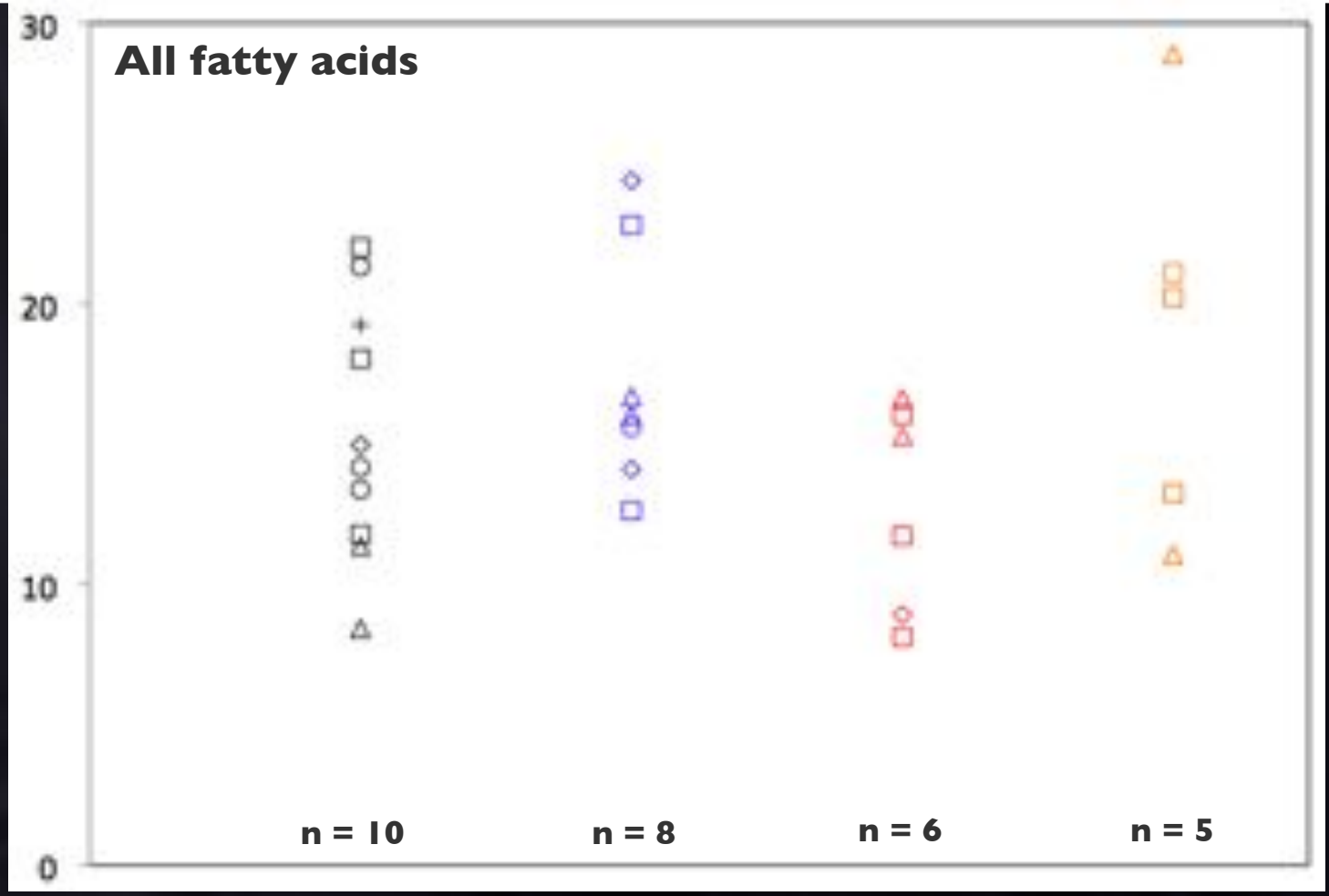
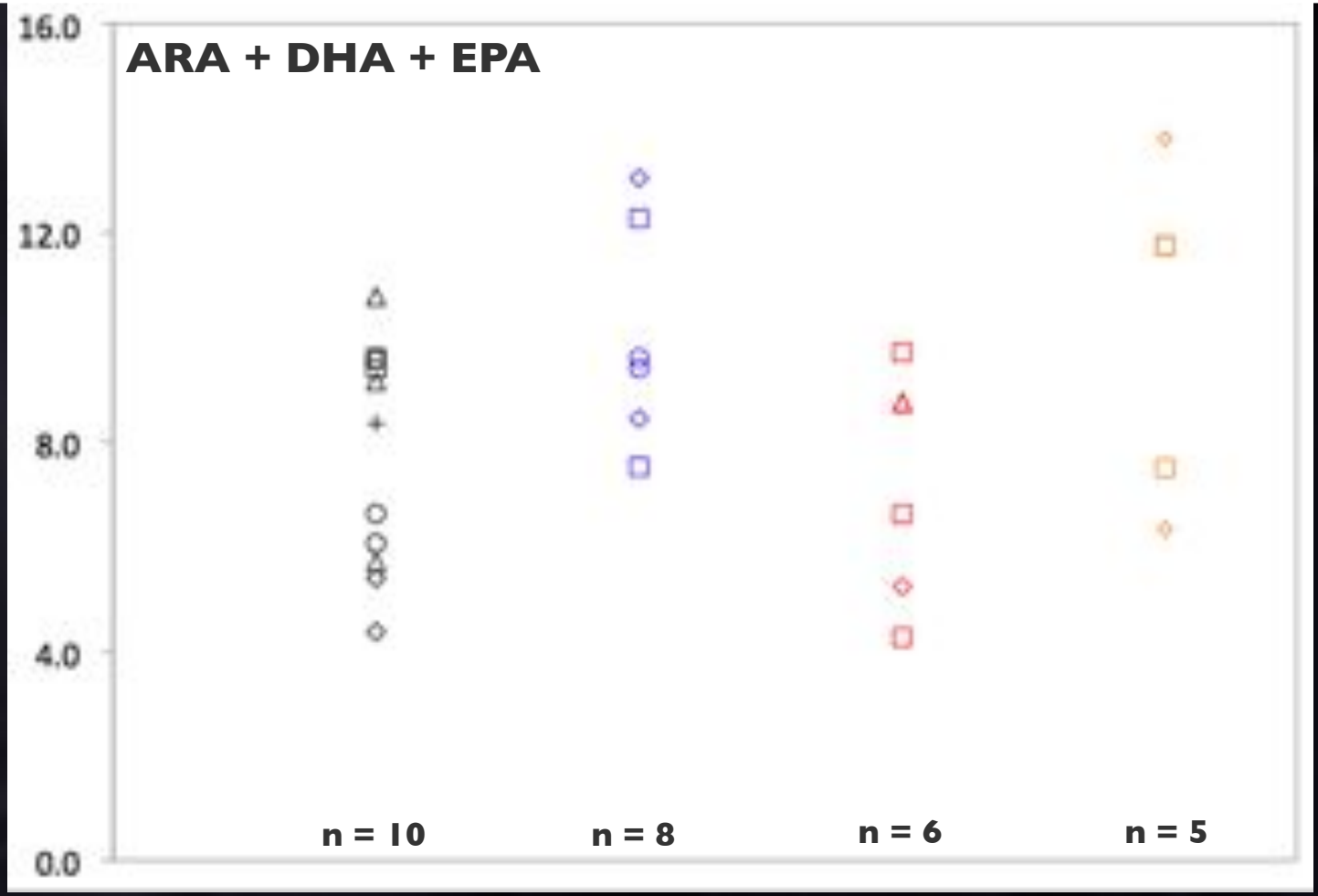
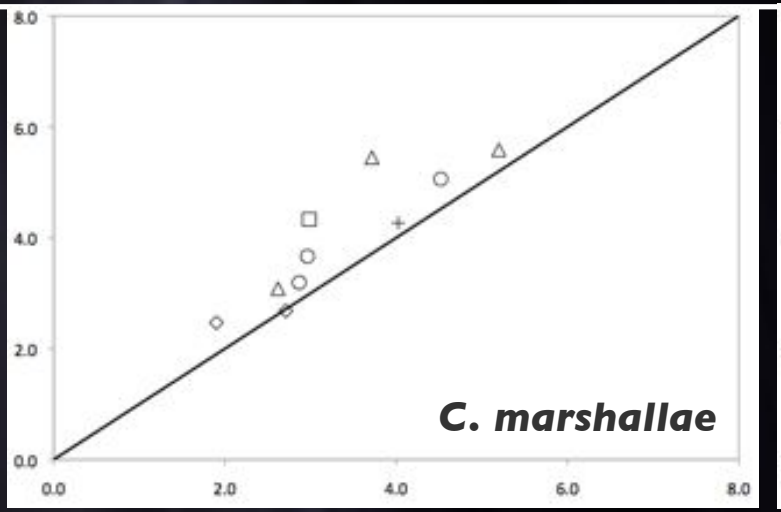


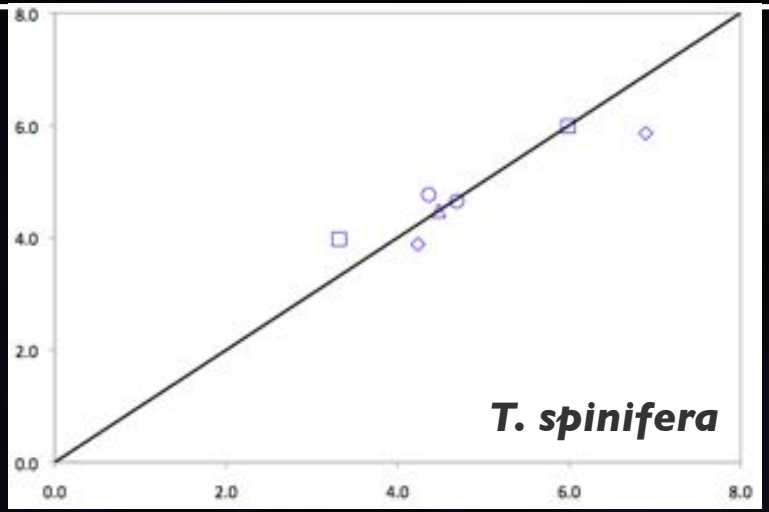
Preliminary Results:

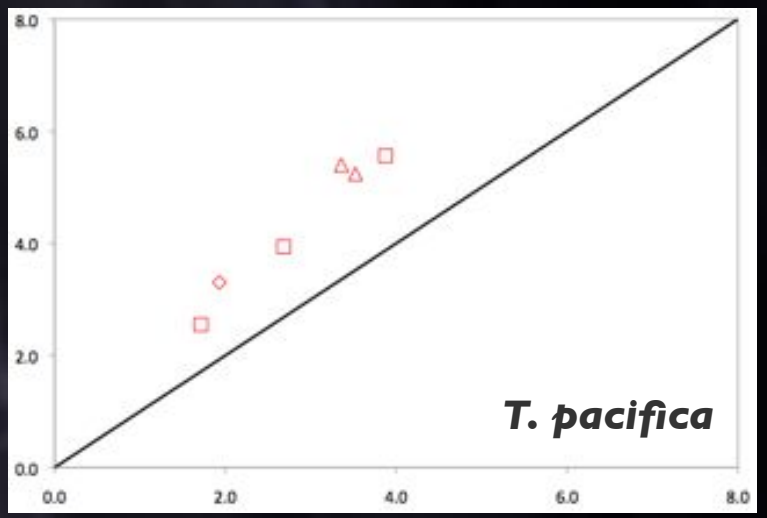


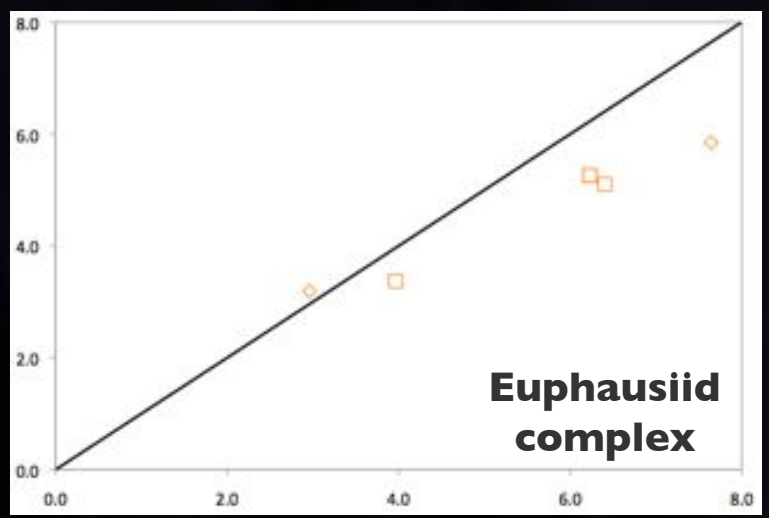
Preliminary Results:

DHA









EPA

Next Steps:

- Complete fatty acid work
    - Apply MDS, cluster analysis

- Connect food quality to growth and feeding data

- Compare with oceanographic variables

- Compare with lipid content of juvenile salmon

Acknowledgments

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