Inverts

Matthew Madsen

Why Invertebrate Analysis?

How does invert composition change over time?

Does eelgrass support more species? Role in ecosystem?

Potentially aids in understanding salmon gut content

http://invasions.si.edu/nemesis/calnemo/SpeciesSummary.jsp?TSN=85863 https://nas.er.usgs.gov/queries/SpeciesList.aspx?state=OH https://en.wikipedia.org/wiki/Harpacticoida

Methods

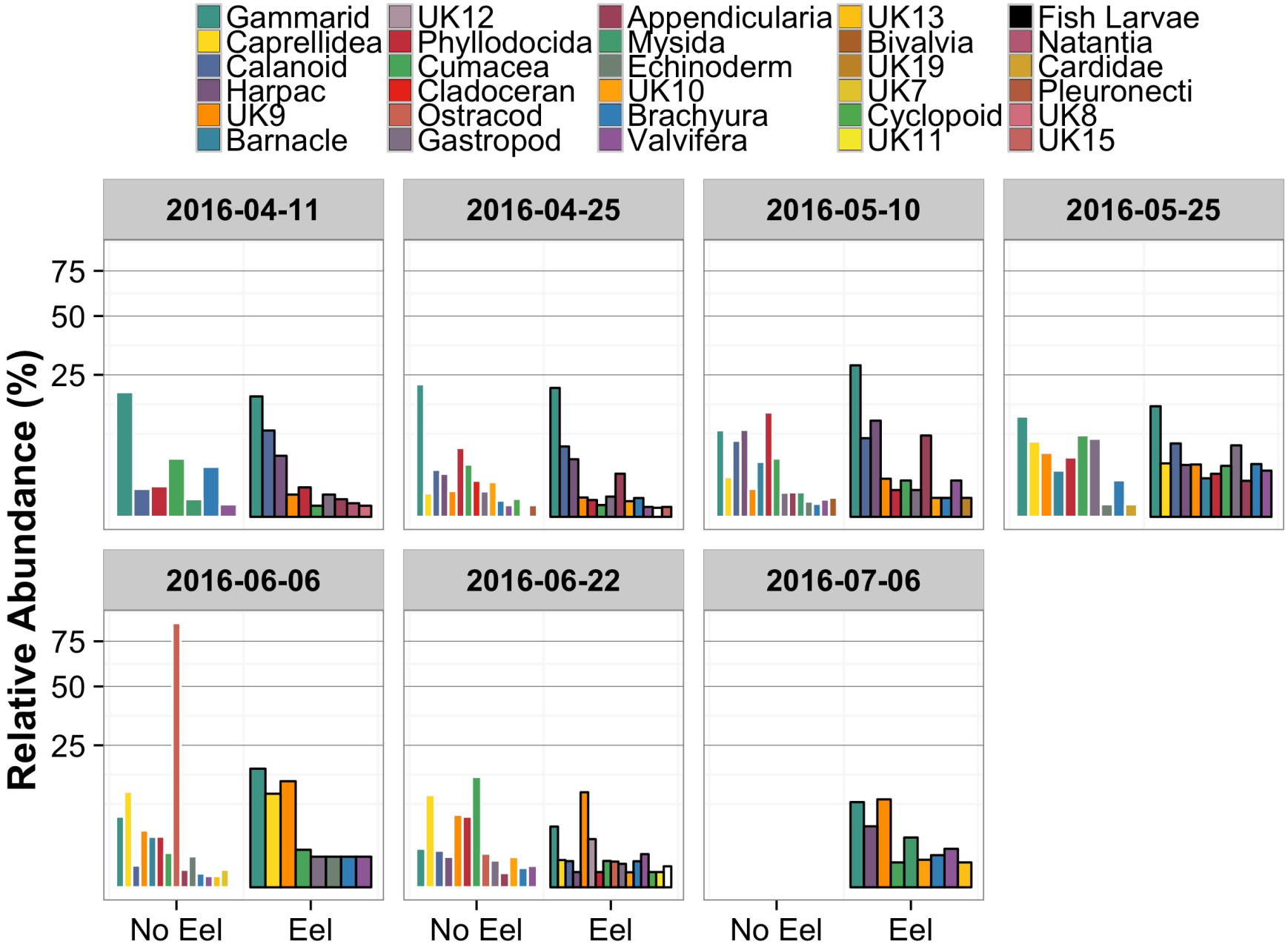
Size fractioned samples (4mm, 1-4 mm, <1 mm)

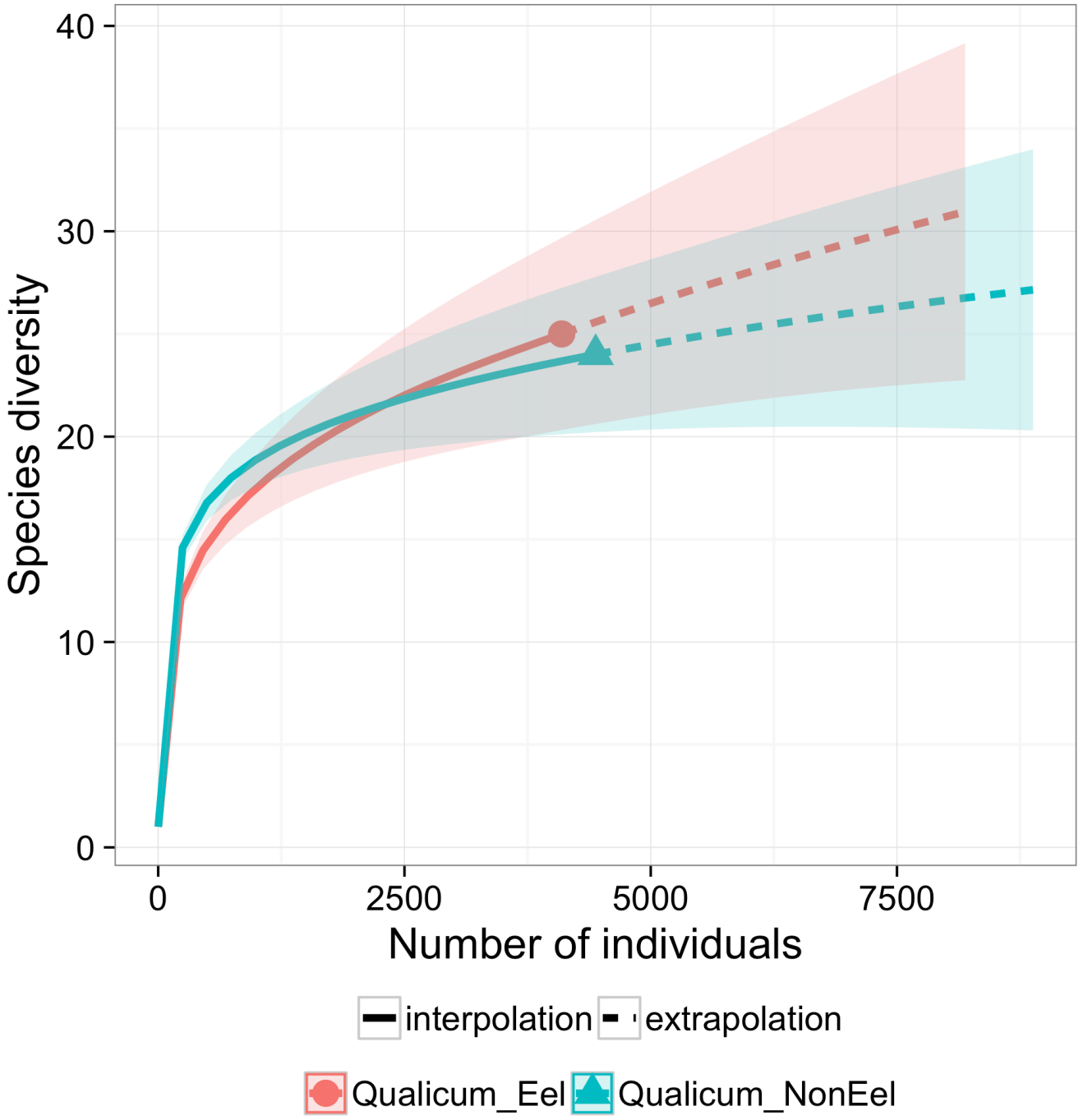
ID with certainty to lowest taxonomic level

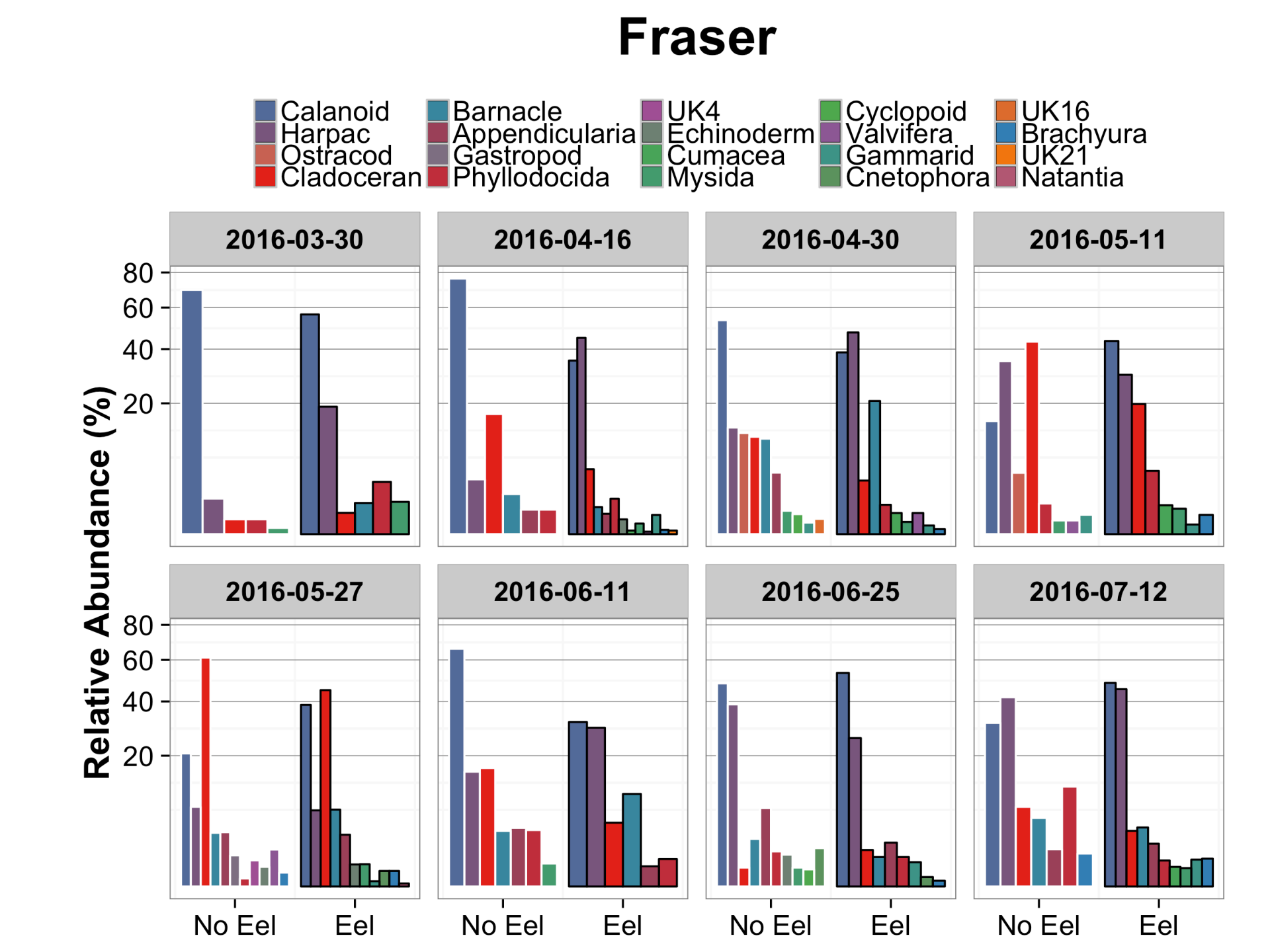
Count and ID 300 individuals per sample when possible

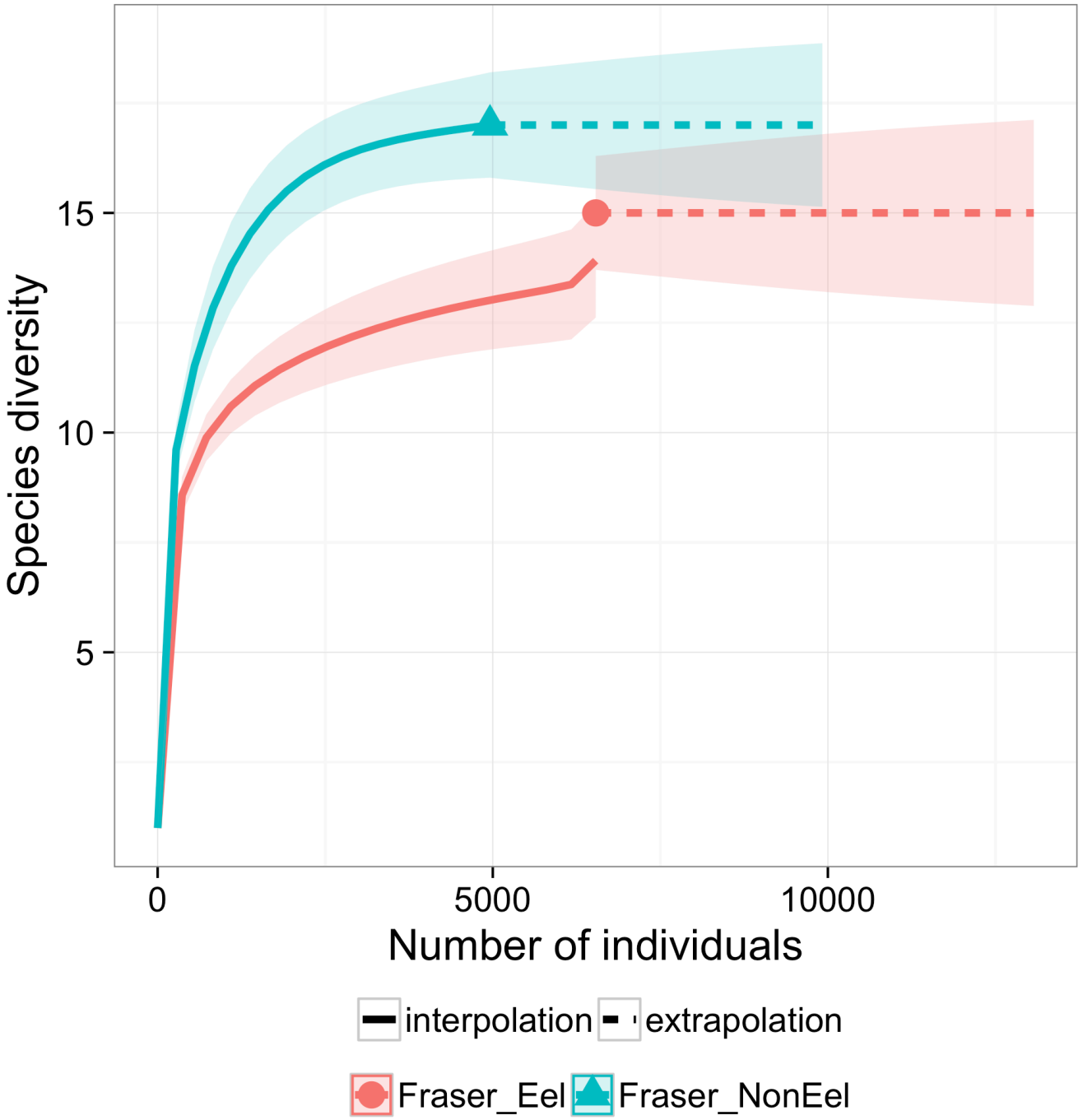
2 Replicates per Site

Qualicum

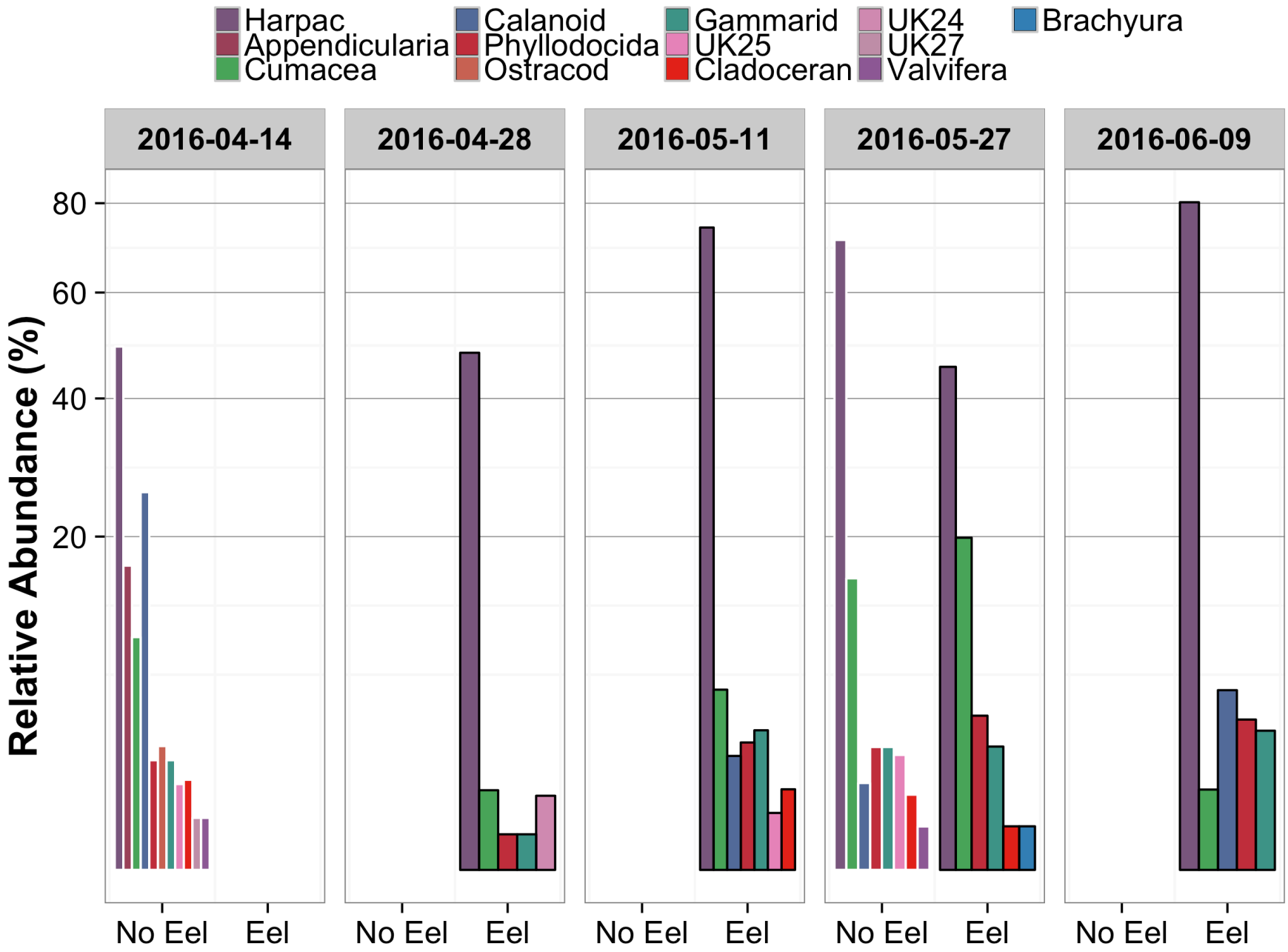

Gammarid
Caprellidea
Calanoid
Harpac
UK9
Barnacle
UK12
Phyllodocida
Cumacea
Cladoceran
Ostracod
Gastropod
Appendicularia
Mysida
Echinoderm
UK10
Brachyura
Valvifera
UK13
Bivalvia
UK19
UK7
Cyclopoid
UK11
Fish Larvae
Natantia
Cardidae
Pleuronecti
UK8
UK15
2016-04-11
2016-04-25
2016-05-10
2016-05-25
2016-06-06
2016-06-22
2016-07-06
Relative Abundance (%)
75
50
25
No Eel
Eel

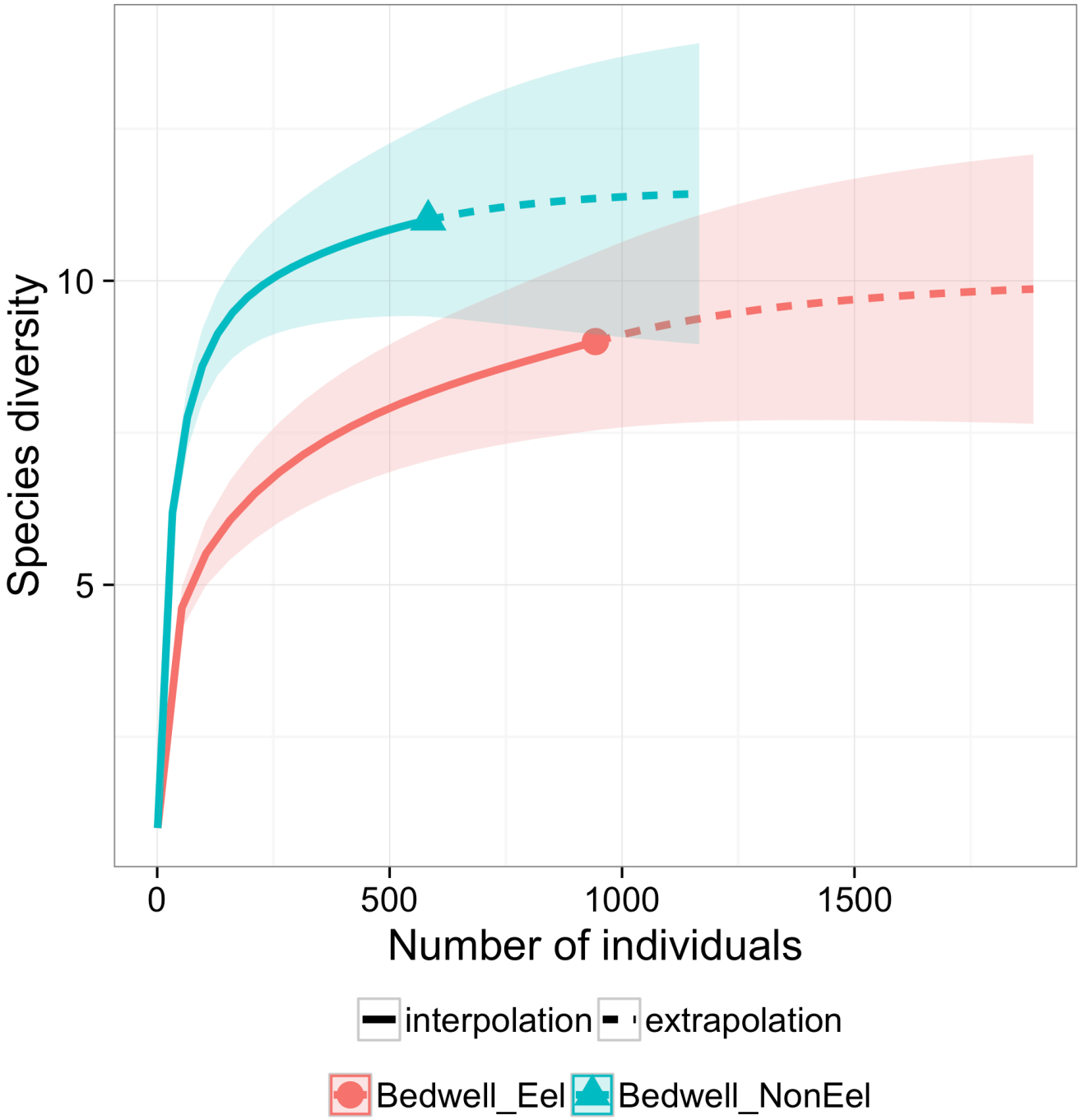

40
30
20
10
0
Species diversity
0
2500
5000
7500
Number of individuals
interpolation
extrapolation
Qualicum_Eel
Qualicum_NonEel

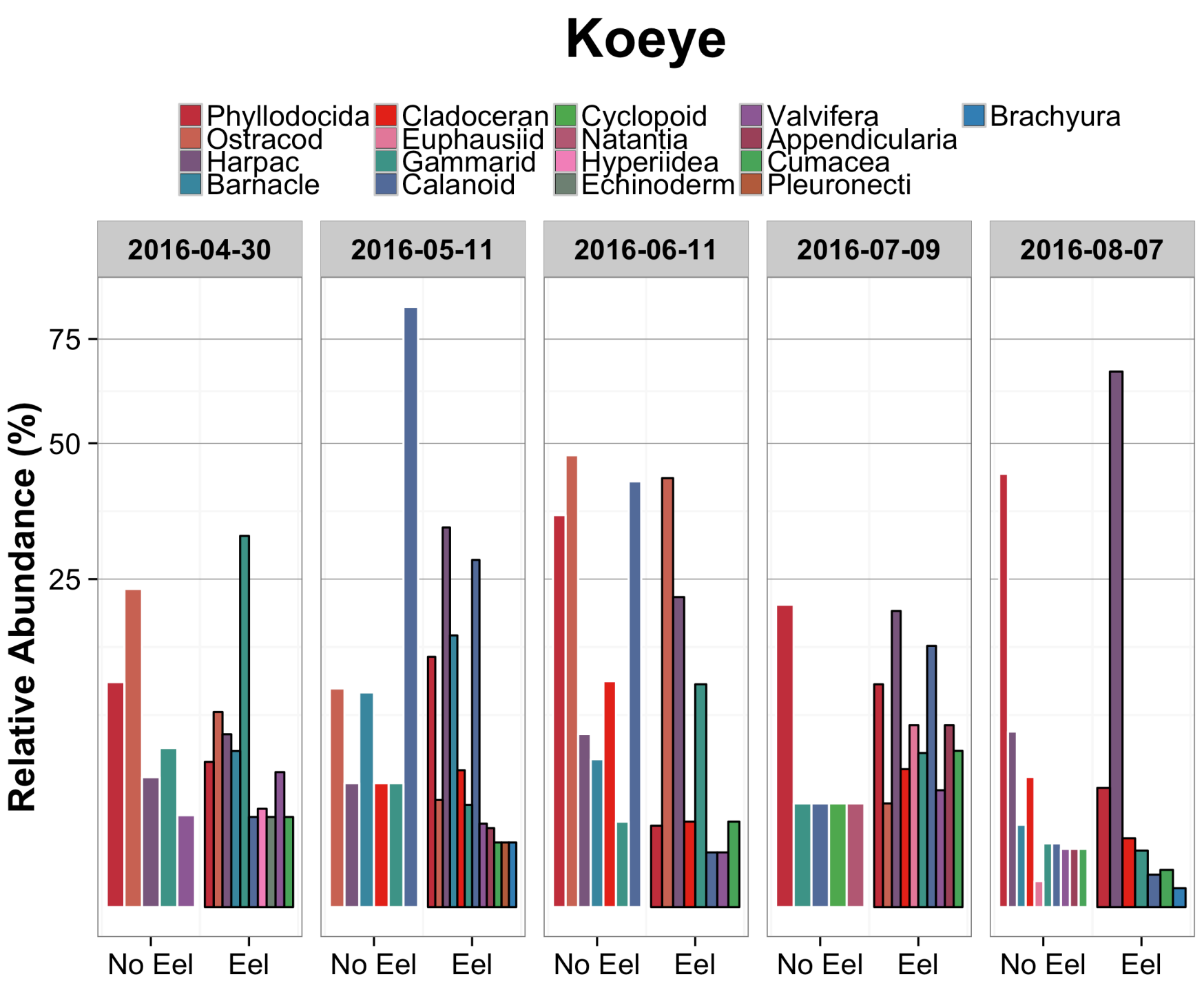

Fraser
Calanoid
Harpac
Ostracod
Cladoceran
Barnacle
Appendicularia
Gastropod
Phyllodocida
UK4
Echinoderm
Cumacea
Mysida
Cyclopoid
Valvifera
Gammarid
Cnetophora
UK16
Brachyura
UK21
Natantia
2016-03-30
2016-04-16
2016-04-30
2016-05-11
2016-05-27
2016-06-11
2016-06-25
2016-07-12
Relative Abundance (%)
80
60
40
20
No Eel
Eel

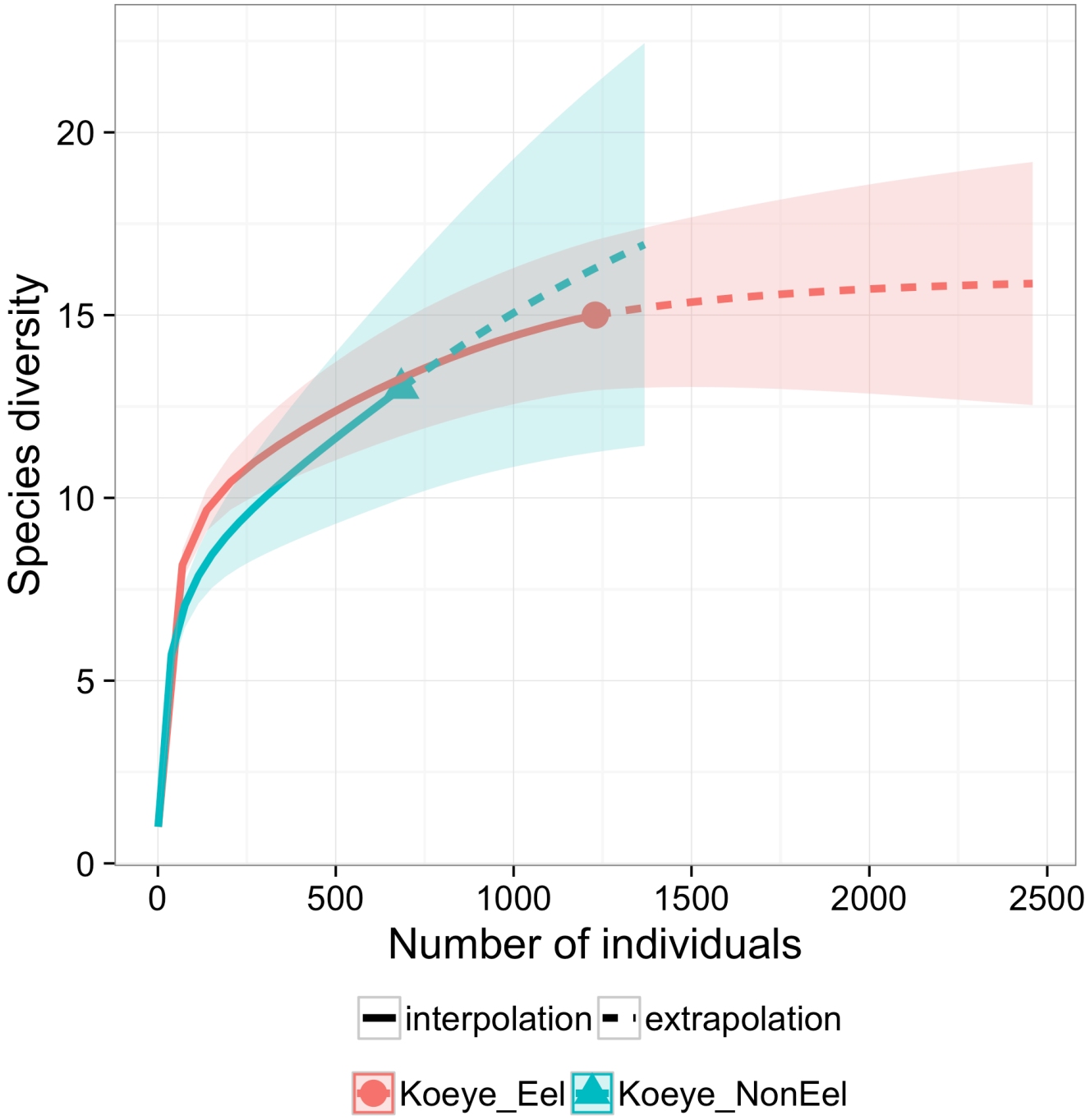

Species diversity
15
10
5
0
5000
10000
Number of individuals
interpolation
extrapolation
Fraser_Eel
Fraser_NonEel

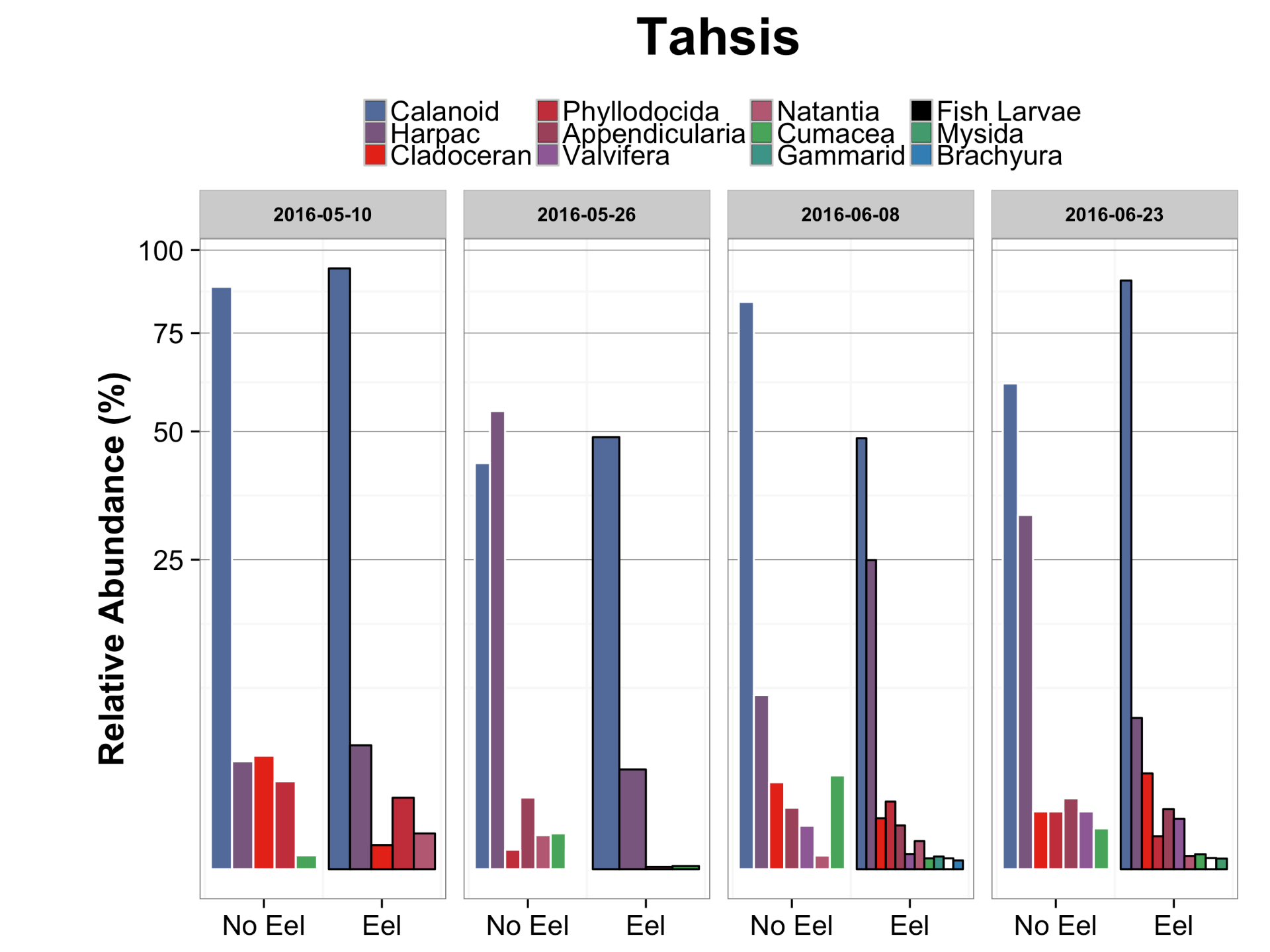
Bedwell

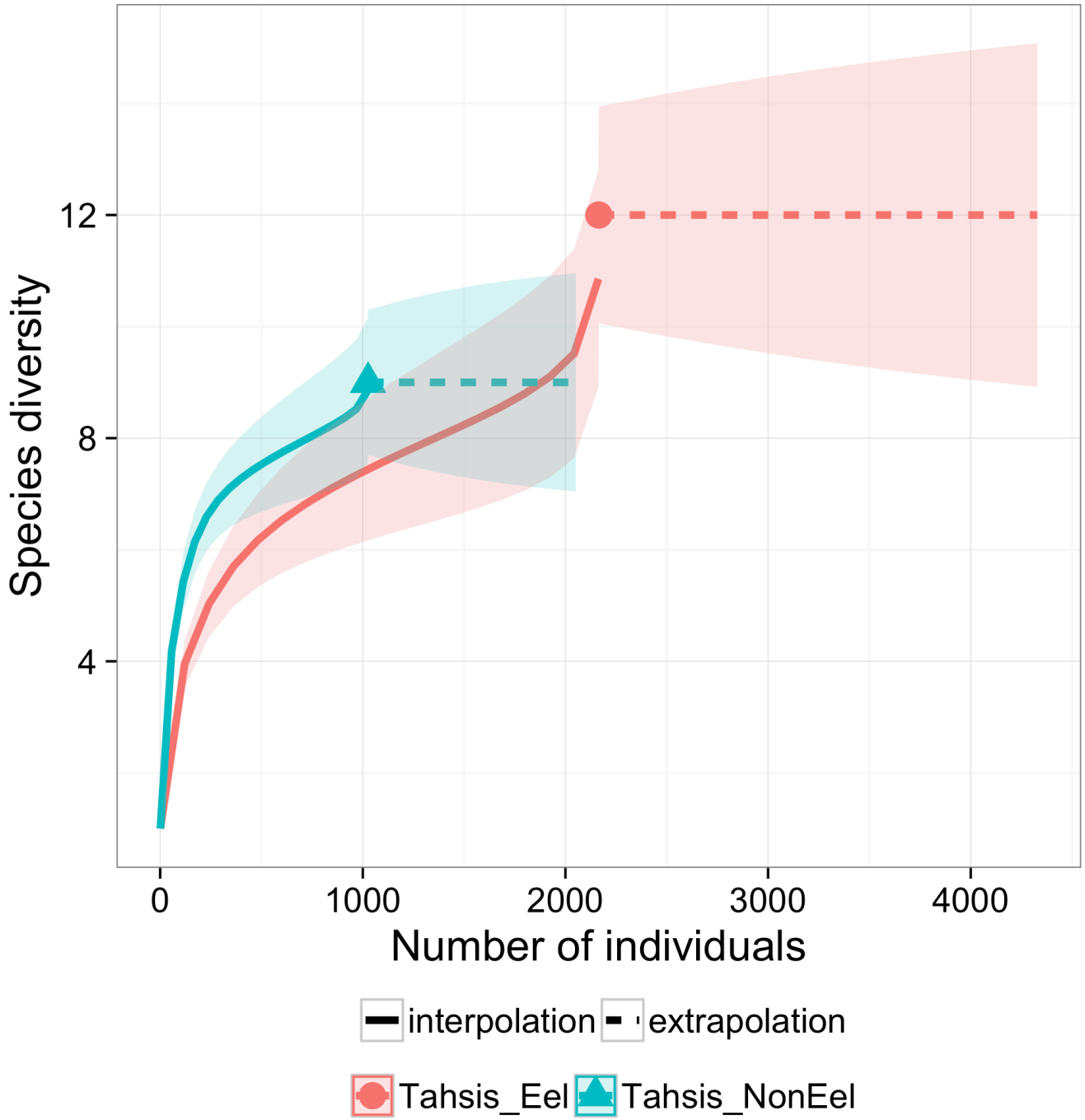

Harpac
Appendicularia
Cumacea
Calanoid
Phyllodocida
Ostracod
Gammarid
UK25
Cladoceran
UK24
UK27
Valvifera
Brachyura
2016-04-14
2016-04-28
2016-05-11
2016-05-27
2016-06-09
Relative Abundance (%)
80
60
40
20
No Eel
Eel

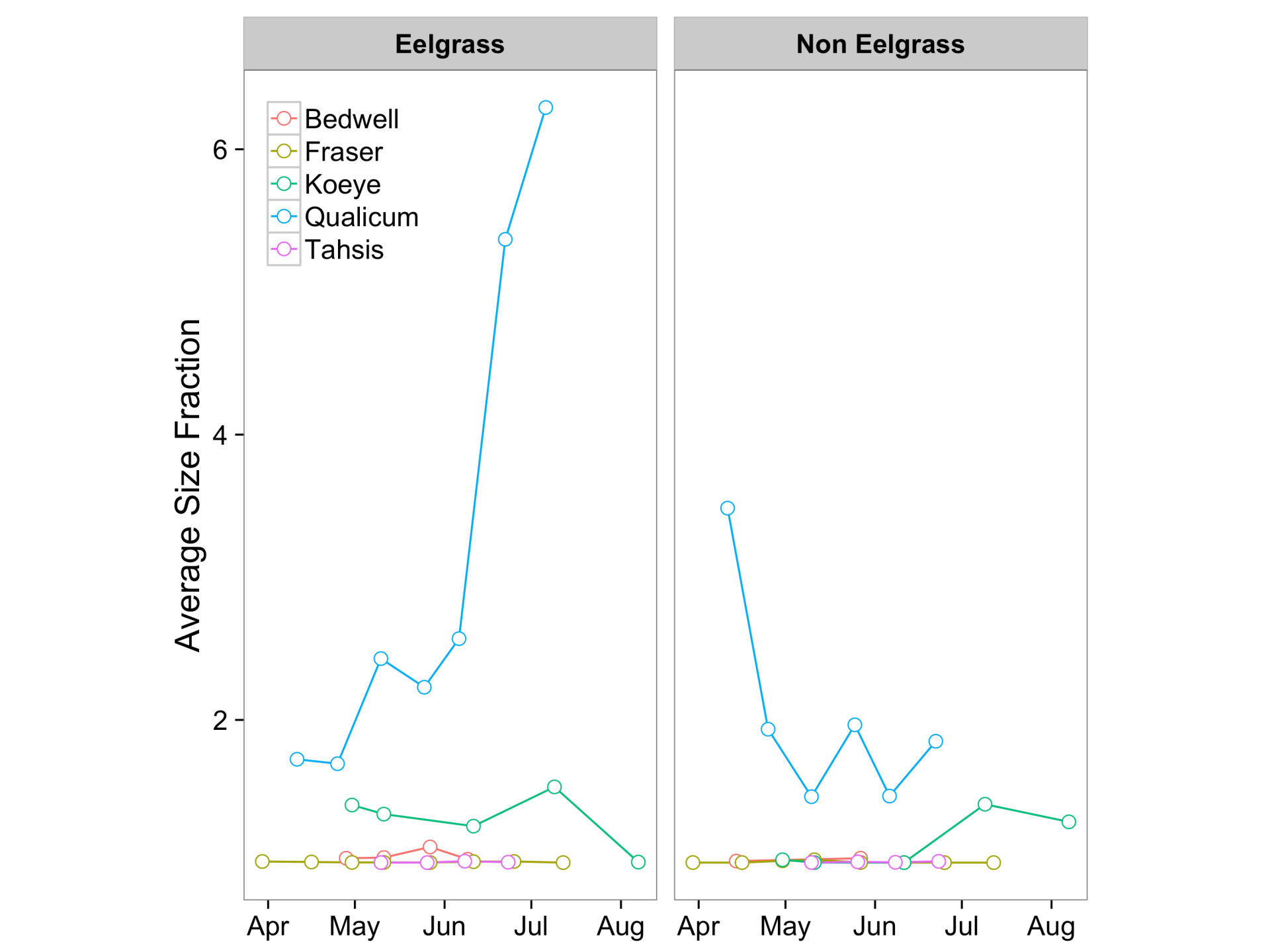

Species diversity
10
5
0
500
1000
1500
Number of individuals
interpolation
extrapolation
Bedwell_Eel
Bedwell_NonEel


Koeye
Phyllodocida
Ostracod
Harpac
Barnacle
Cladoceran
Euphausiid
Gammarid
Calanoid
Cyclopoid
Natantia
Hyperiidea
Echinoderm
Valvifera
Appendicularia
Cumacea
Pleuronecti
Brachyura
2016-04-30
2016-05-11
2016-06-11
2016-07-09
2016-08-07
Relative Abundance (%)
75
50
25
No Eel
Eel


Species diversity
0
5
10
15
20
0
500
1000
1500
2000
2500
Number of individuals
interpolation
extrapolation
Koeye_Eel
Koeye_NonEel


Tahsis
Calanoid
Harpac
Cladoceran
Phyllodocida
Appendicularia
Valvifera
Natantia
Cumacea
Gammarid
Fish Larvae
Mysida
Brachyura
2016-05-10
2016-05-26
2016-06-08
2016-06-23
Relative Abundance (%)
100
75
50
25
No Eel
Eel


Species diversity
12
8
4
0
1000
2000
3000
4000
Number of individuals
interpolation
extrapolation
Tahsis_Eel
Tahsis_NonEel


Eelgrass
Non Eelgrass
Bedwell
Fraser
Koeye
Qualicum
Tahsis
Average Size Fraction
6
4
2
Apr
May
Jun
Jul
Aug

Summary

Site	Dominant Species	Richness*	Evenness*	Avg. Size (mm)	Shift w/ time	Eelgrass effect?
Qualicum	Gammarid?	1	1	>2	?	?
Fraser	Calanoid	2	3	~1	?	?
Bedwell	Harpacticoid	3	3	~1	?	?
Koeye	Phyllodocida	2	2	1-2	?	?
Tahsis	Calanoid	3	5	~1	?	?

Notes and Future Directions

Are species richness/evenness actually low?

Details/Time Spent Trade-Off

NMDS

Replicates available for further evaluation

More statistical tests to determine relationships

Use Pet Jars, more Ethanol, consistent labelling

Resources Used

Al Lewis Key to Harpacticoids associated with Eelgrass in Lower Mainland

Light and Smith Manual

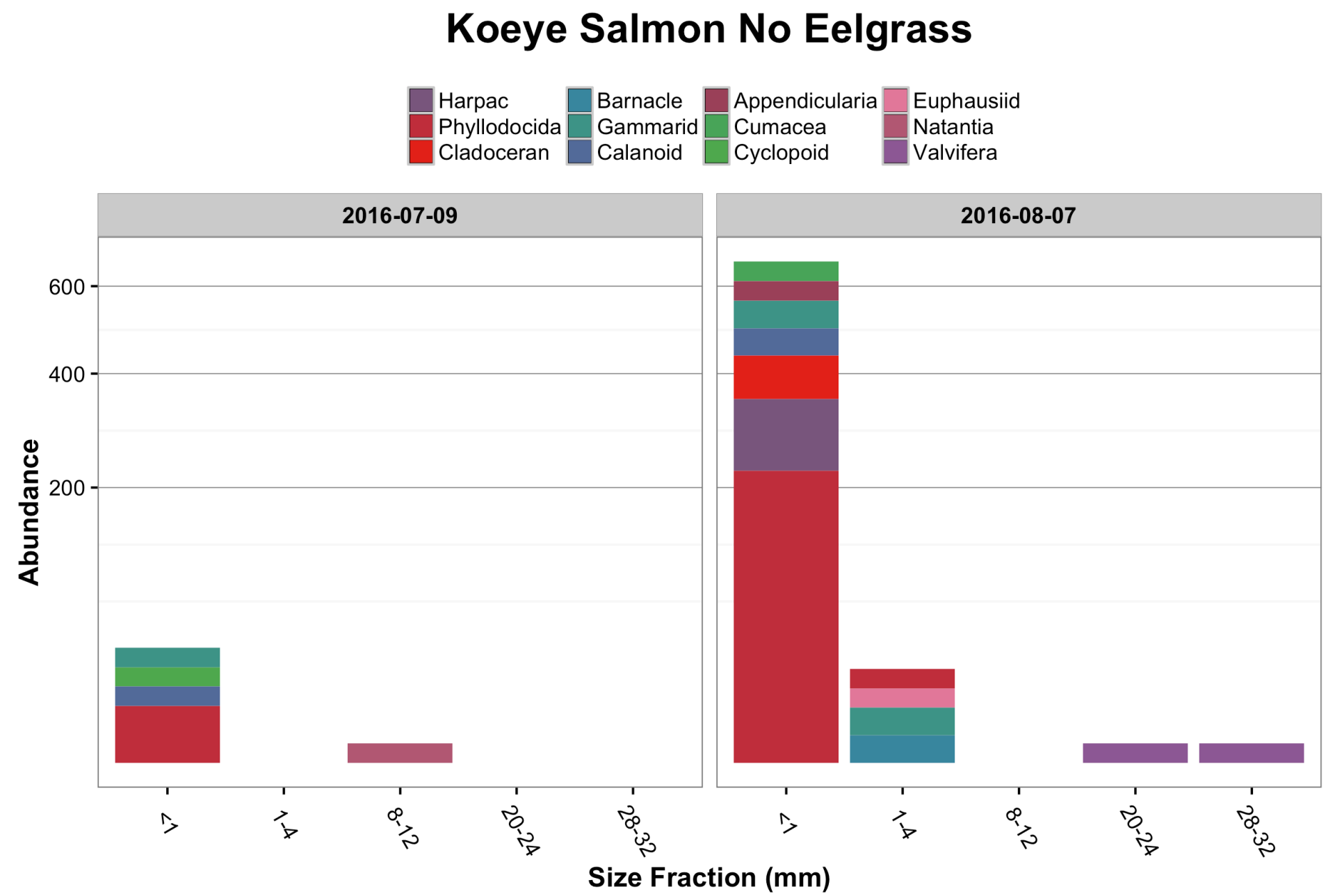
Amphipacifica

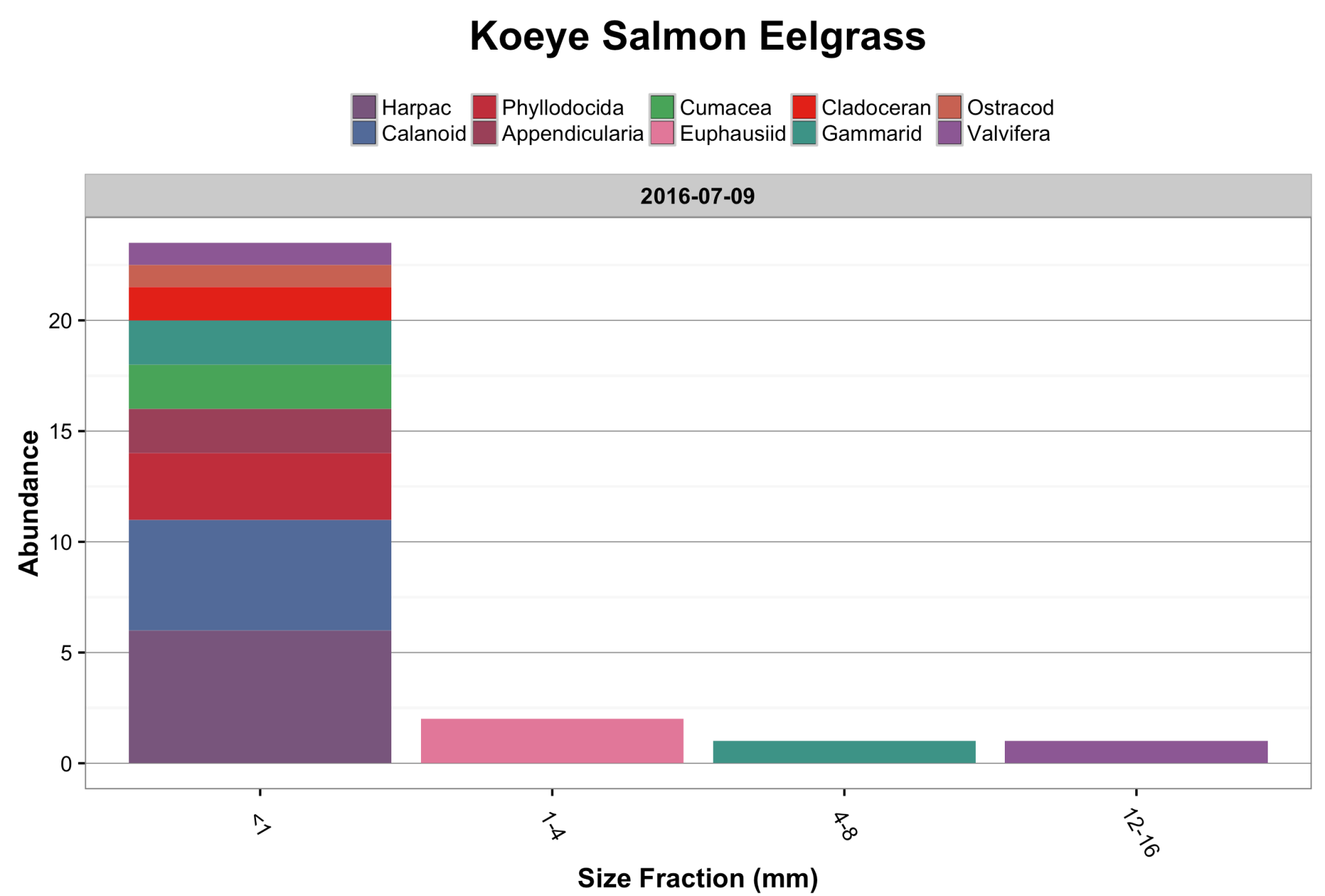
Nicole Knight Guide to Fauna Associated with Eelgrass (O'Connor Lab)

http://projectzosteraubc.weebly.com/invertebrate-identification-key.html

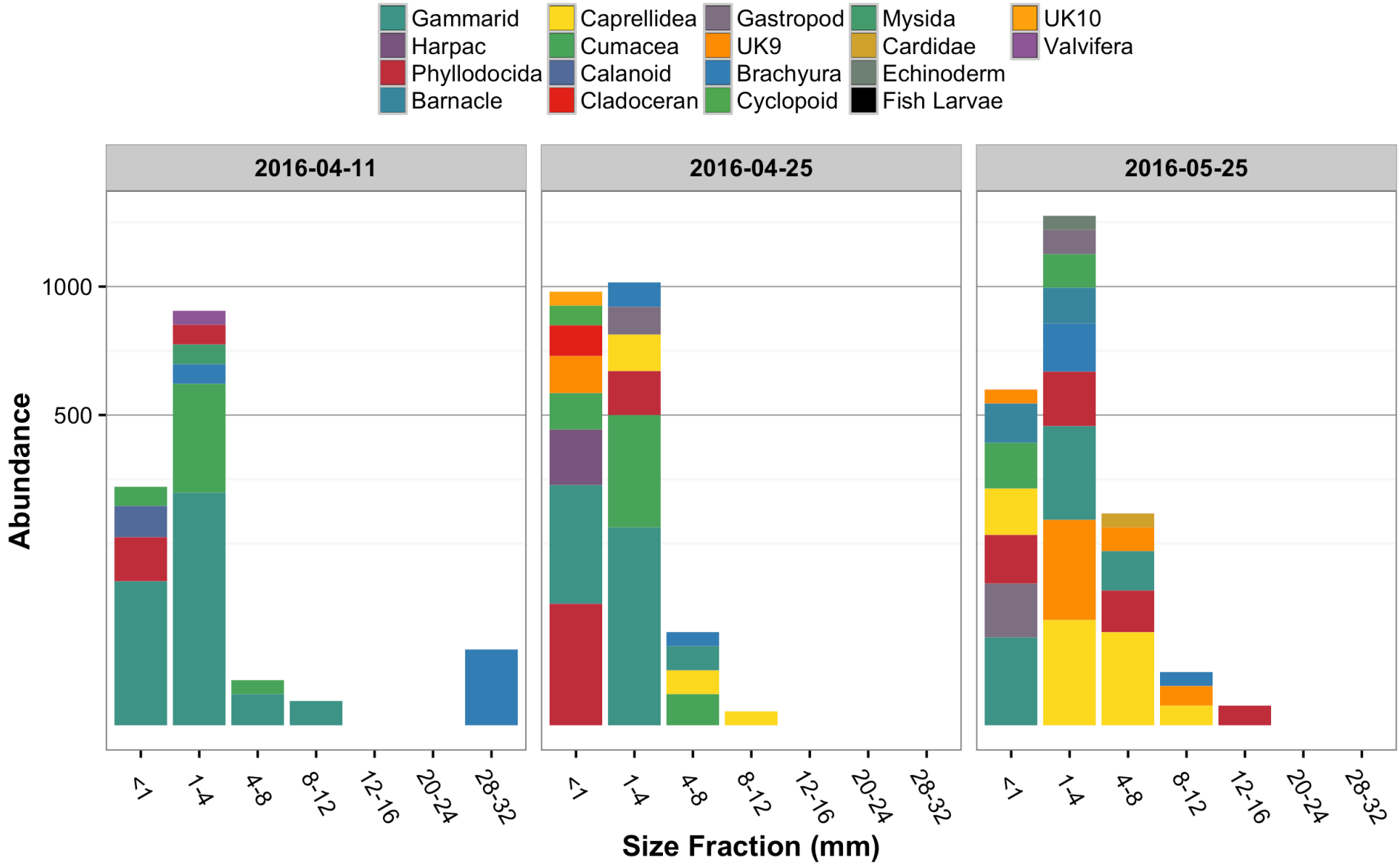
Mysids and Euphausids of the Pacific

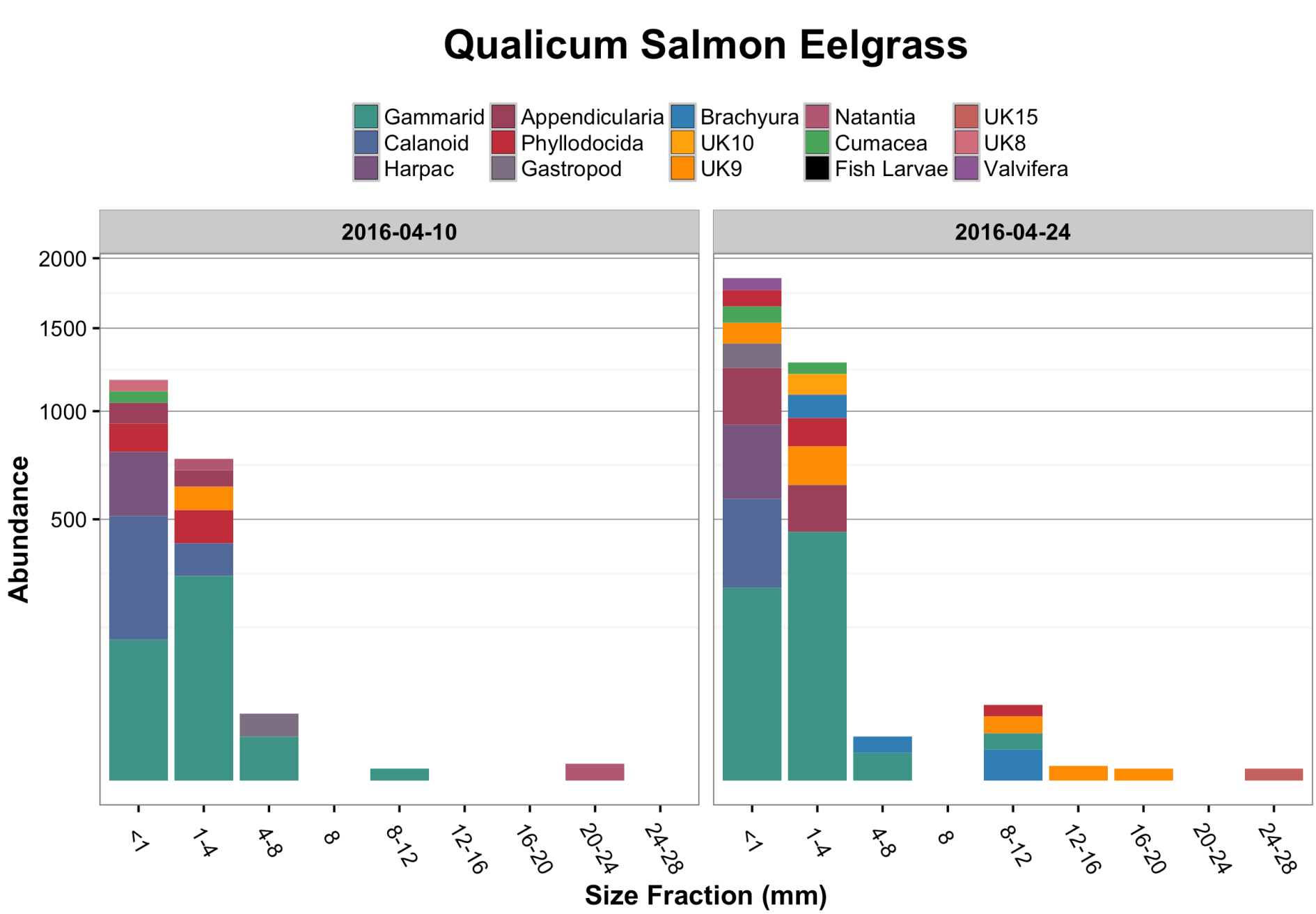
Thank you to Brian Hunt and Josie Iaceralla for the support!


Koeye Salmon No Eelgrass
Harpac
Phyllodocida
Cladoceran
Barnacle
Gammarid
Calanoid
Appendicularia
Cumacea
Cyclopoid
Euphausiid
Natantia
Valvifera
2016-07-09
2016-08-07
Abundance
600
400
200
<1
1-4
8-12
20-24
28-32
Size Fraction (mm)

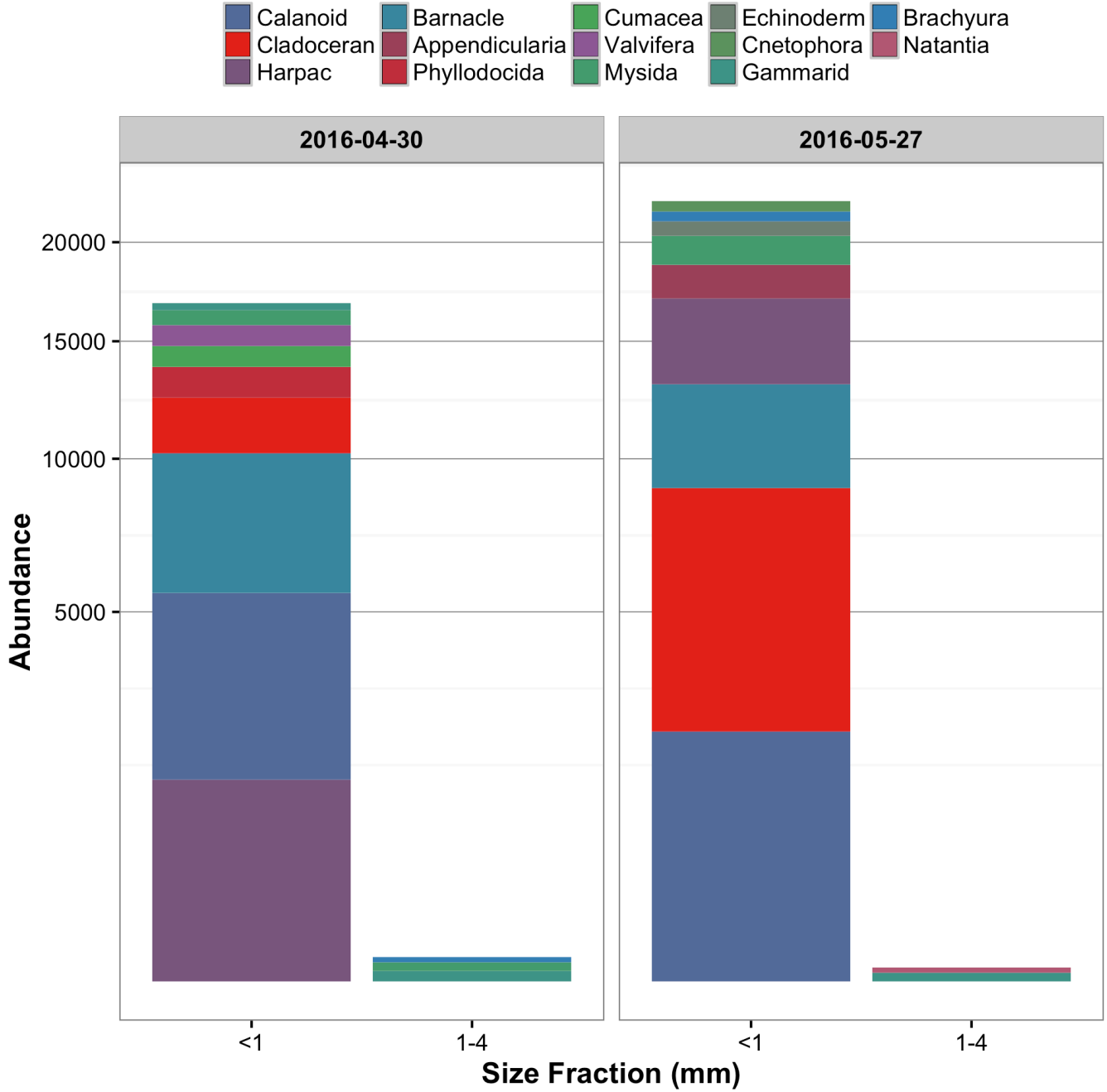

Koeye Salmon Eelgrass
Harpac
Calanoid
Phyllodocida
Appendicularia
Cumacea
Euphausiid
Cladoceran
Gammarid
Ostracod
Valvifera
2016-07-09
Abundance
0
5
10
15
20
<1
1-4
4-8
12-16
Size Fraction (mm)

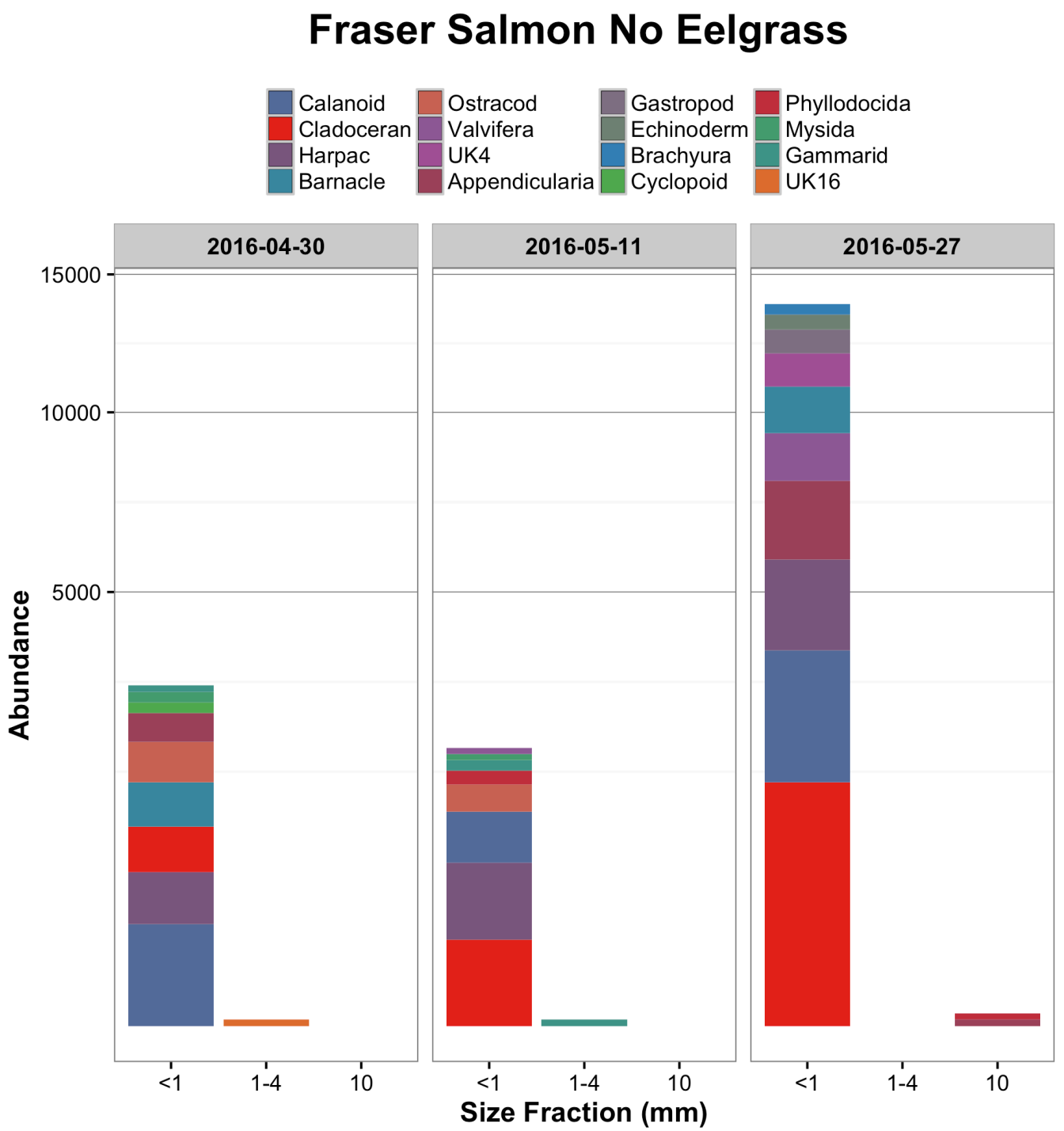
Qualicum Salmon No Eelgrass




Qualicum Salmon Eelgrass
Gammarid
Calanoid
Harpac
Appendicularia
Phyllodocida
Gastropod
Brachyura
UK10
UK9
Natantia
Cumacea
Fish Larvae
UK15
UK8
Valvifera
2016-04-10
2016-04-24
Abundance
2000
1500
1000
500
<1
1-4
4-8
8
8-12
12-16
16-20
20-24
24-28
Size Fraction (mm)

Fraser Salmon Eelgrass




Fraser Salmon No Eelgrass
Calanoid
Cladoceran
Harpac
Barnacle
Ostracod
Valvifera
UK4
Appendicularia
Gastropod
Echinoderm
Brachyura
Cyclopoid
Phyllodocida
Mysida
Gammarid
UK16
2016-04-30
2016-05-11
2016-05-27
15000
10000
5000
Abundance
<1
1-4
10
Size Fraction (mm)