

a global assessment of community-wide species interaction strength
in the rocky intertidal

spencer wood

&

stacie lilley, david schiel, jonathan shurin

diversity increases stability

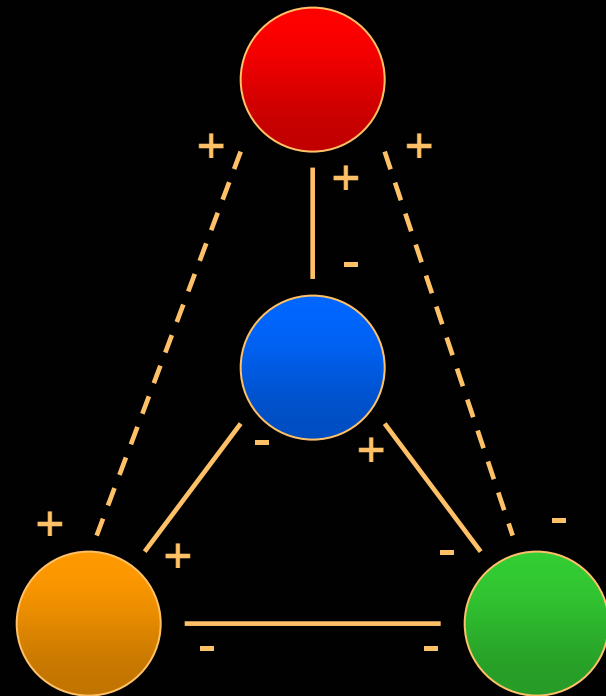
no wait ... diversity decreases stability

stability : related to number and strength of links

negative or positive interactions ?

- + (facilitation)

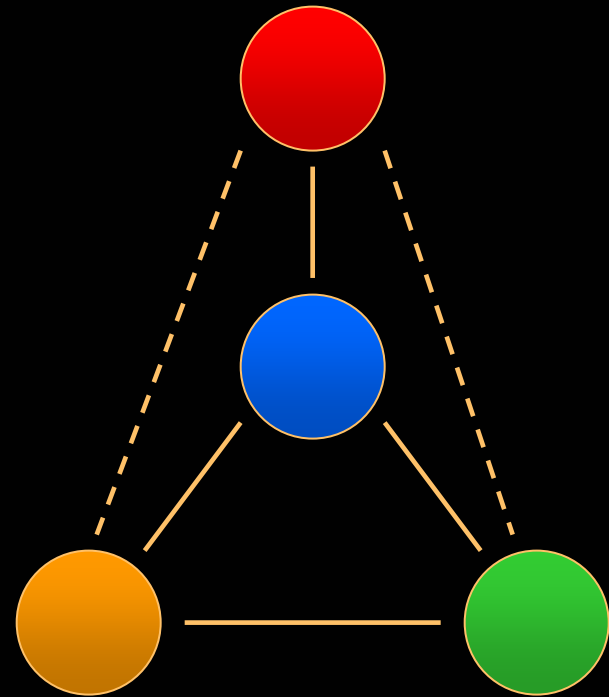
- - (competition)

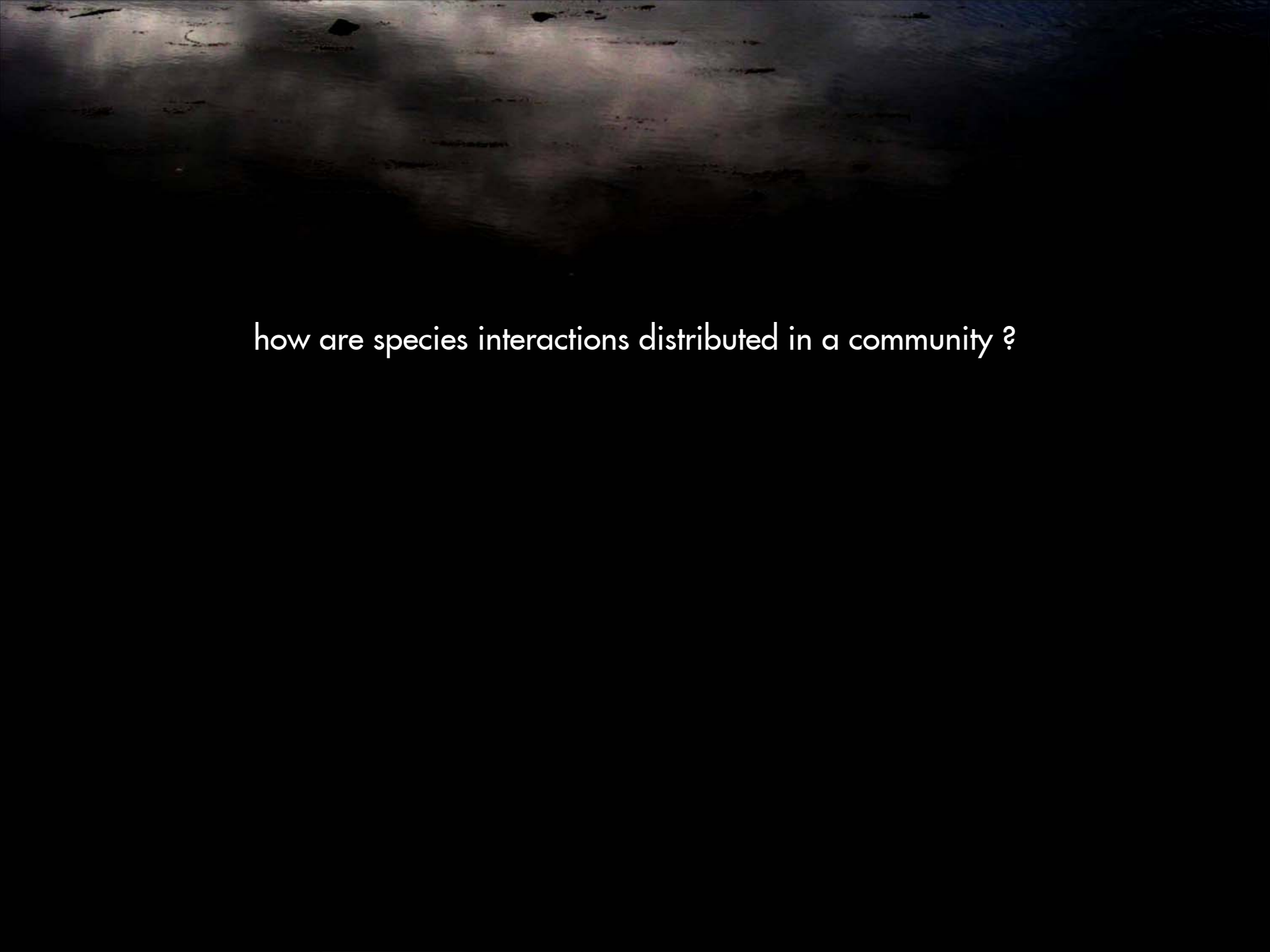


weak or strong interactions ?

strong interactors decrease stability

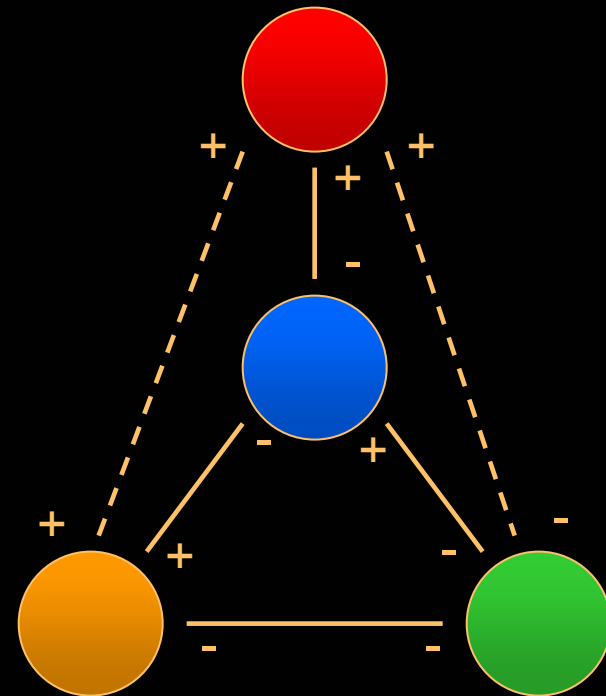
predominance of weak interactions





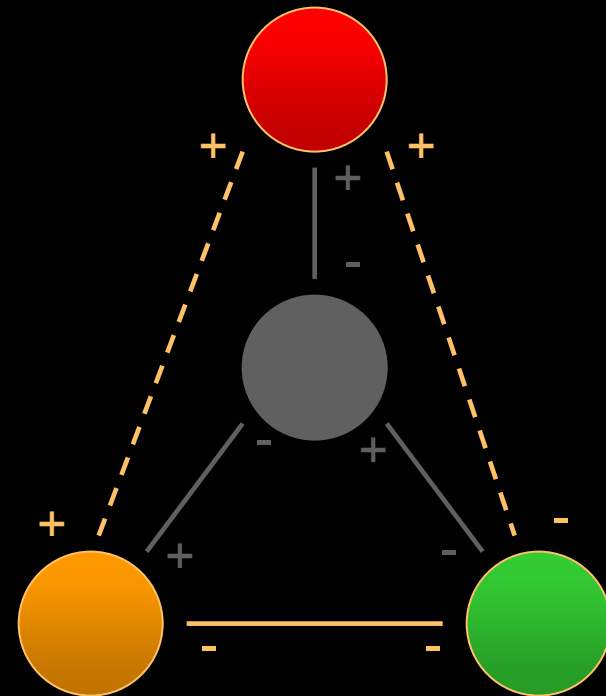
how are species interactions distributed in a community ?

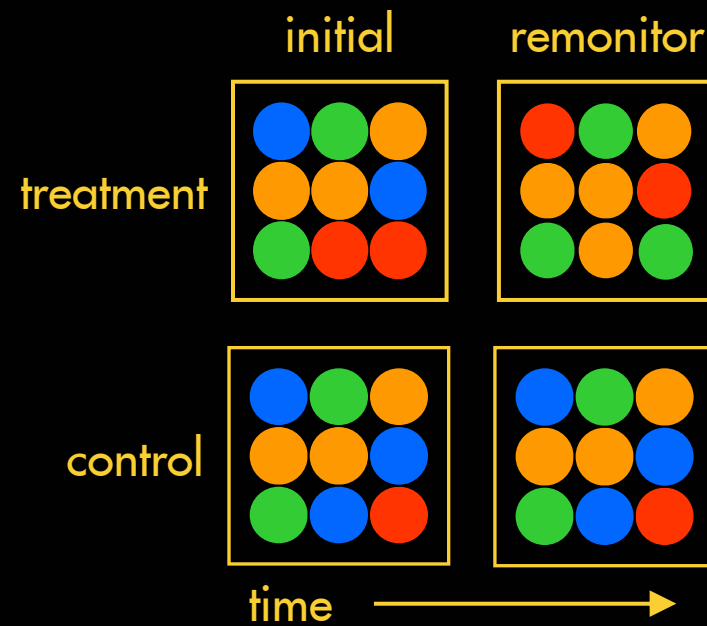
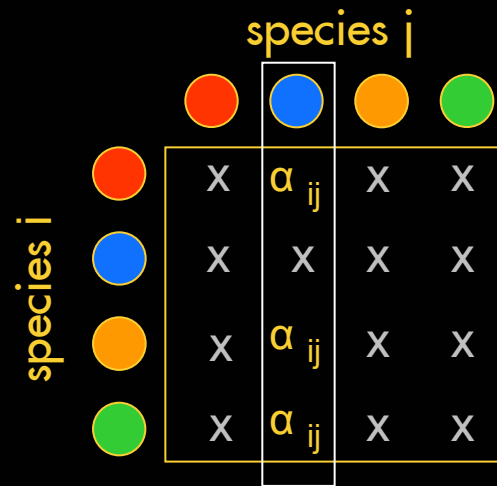
		species j			
					
species i		x	α_{ij}	x	x
		x	x	x	x
		x	α_{ij}	x	x
		x	α_{ij}	x	x

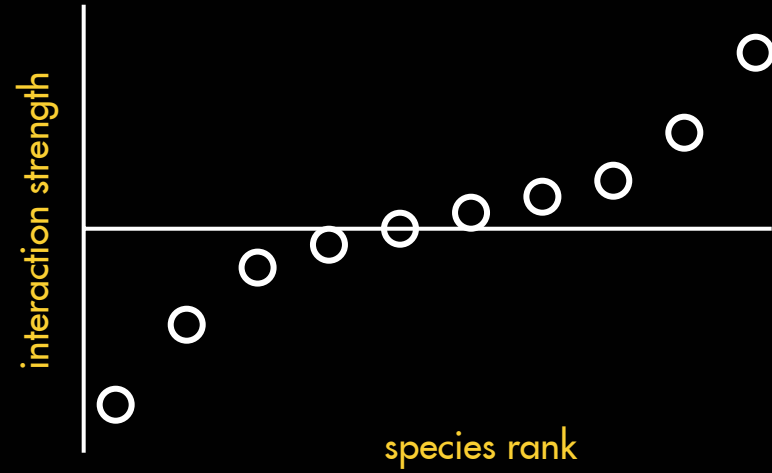
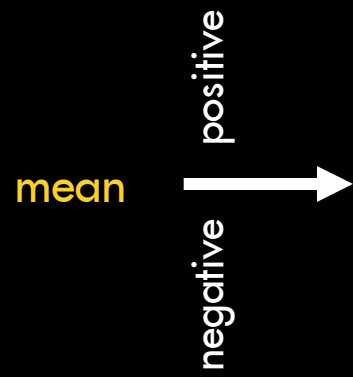


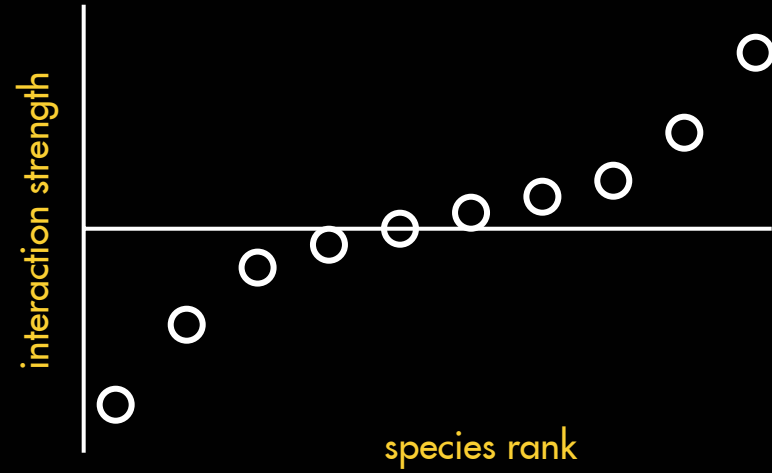
species i

	species j			
	●	●	●	●
●	x	α_{ij}	x	x
●	x	x	x	x
●	x	α_{ij}	x	x
●	x	α_{ij}	x	x









questions

negative vs positive

weak vs strong

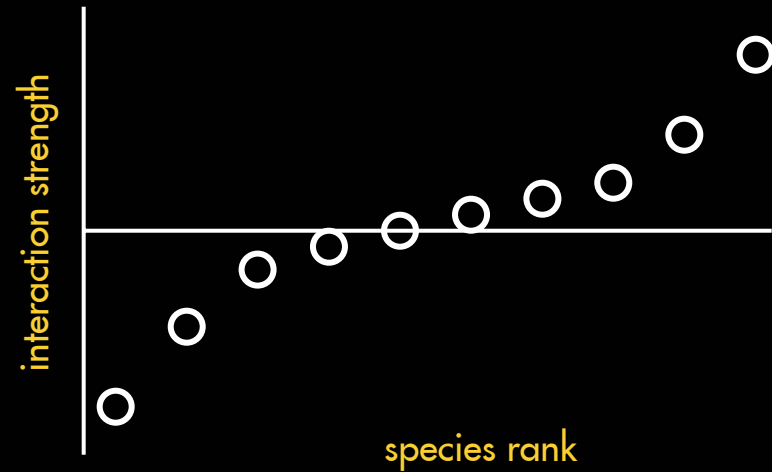
relationship with

zone

scale

region

diversity





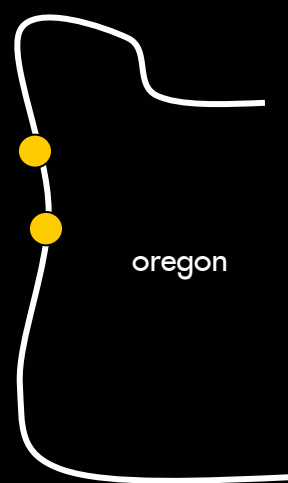
british
columbia

questions

negative vs positive
weak vs strong

relationship with

zone
scale
region
diversity



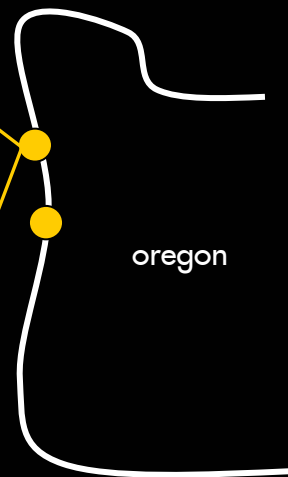
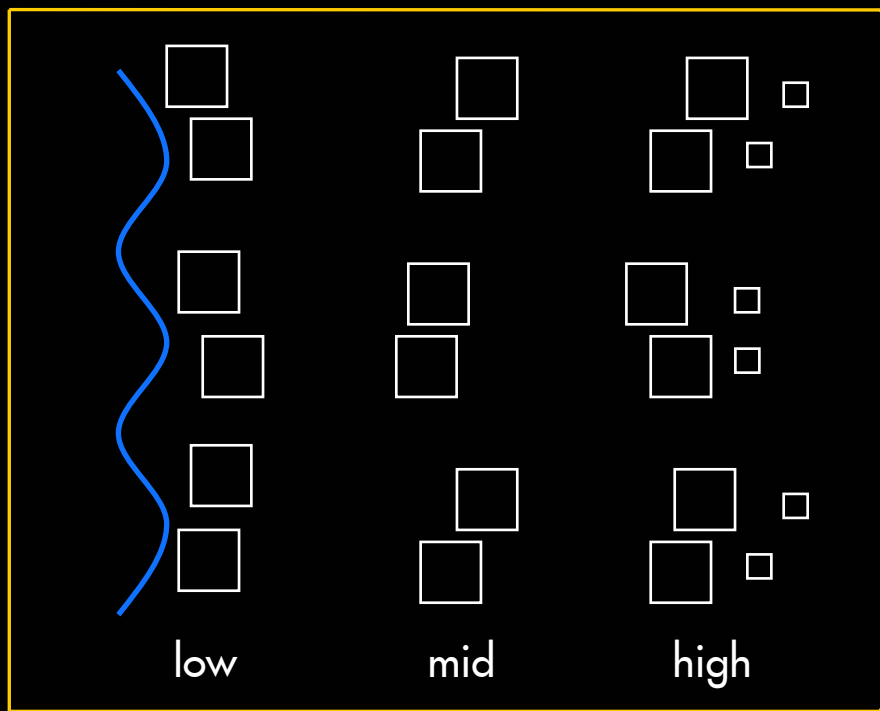
oregon



new zealand



british
columbia



oregon



new zealand

31 experiments

british columbia (13)

oregon (6)

new zealand (12)

sites (6)

habitats (9)

low zone (7)

mid zone (8)

high zone (16)

.025 m² (12)

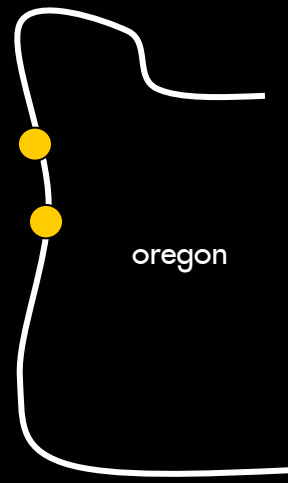
.25 m² (15)

.75 m² (1)

1.0 m² (1)

1.25 m² (2)

replication (x 3-5)

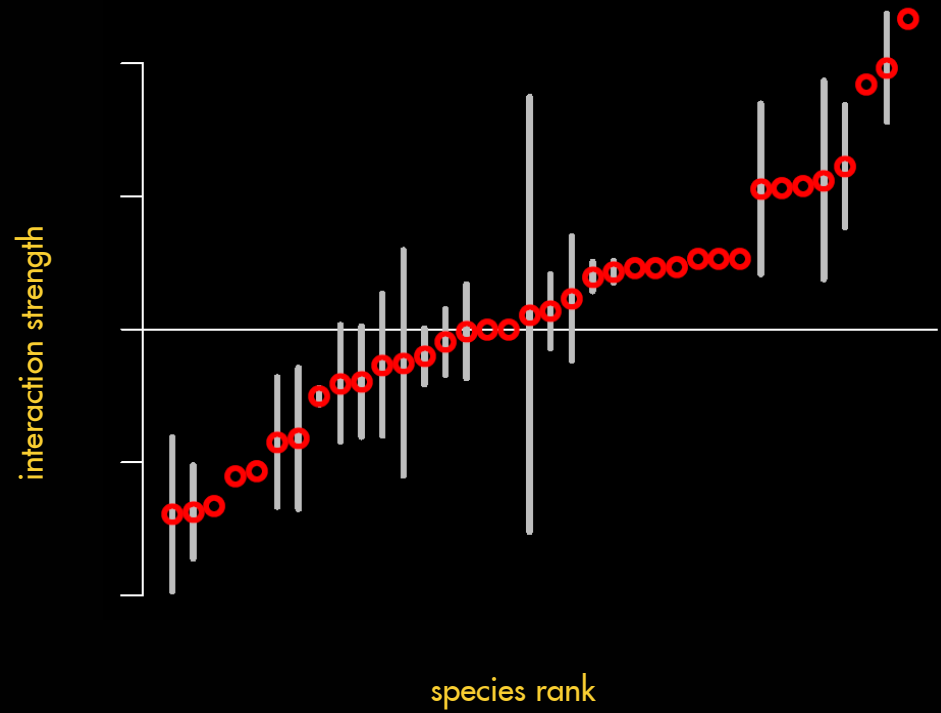
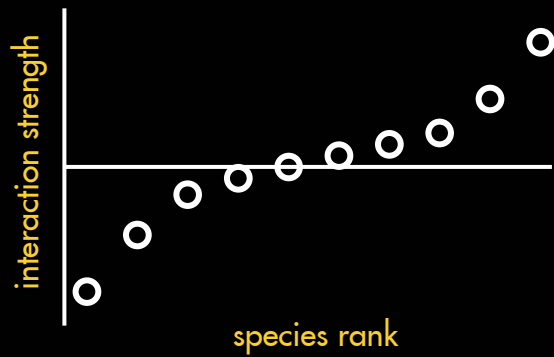


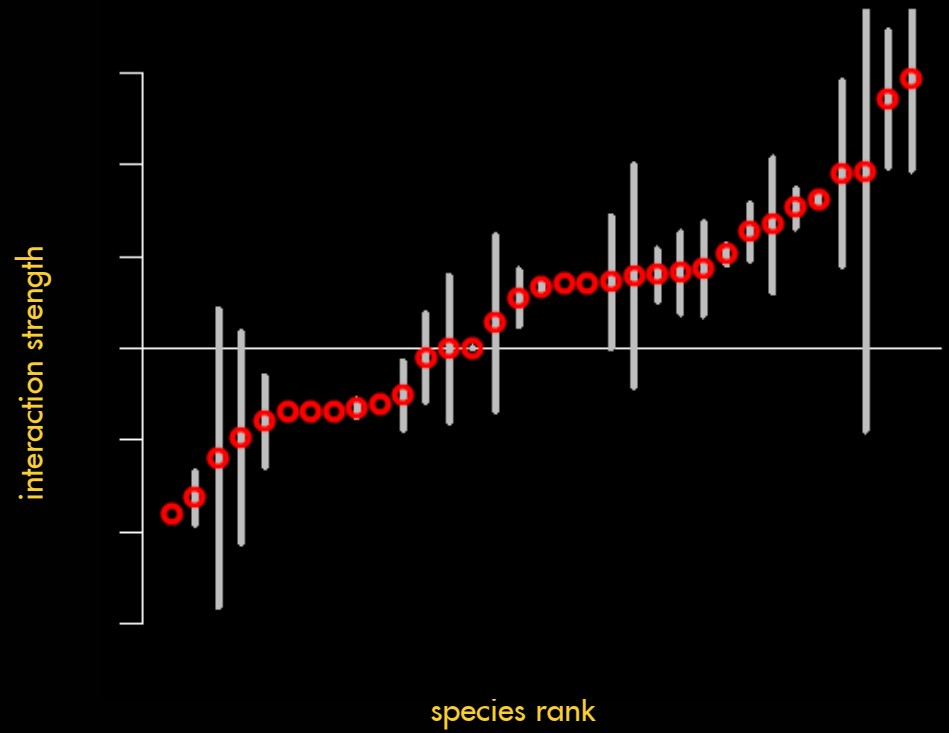
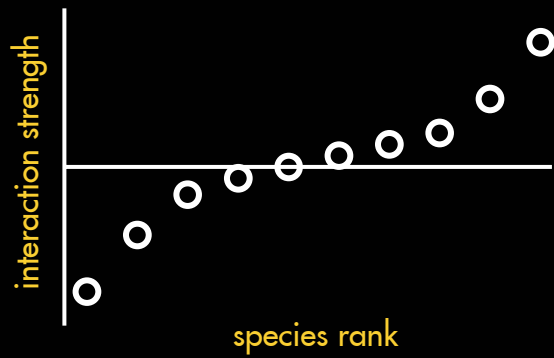
1 species removed
remonitored every 3-6 months
for 1-3 years

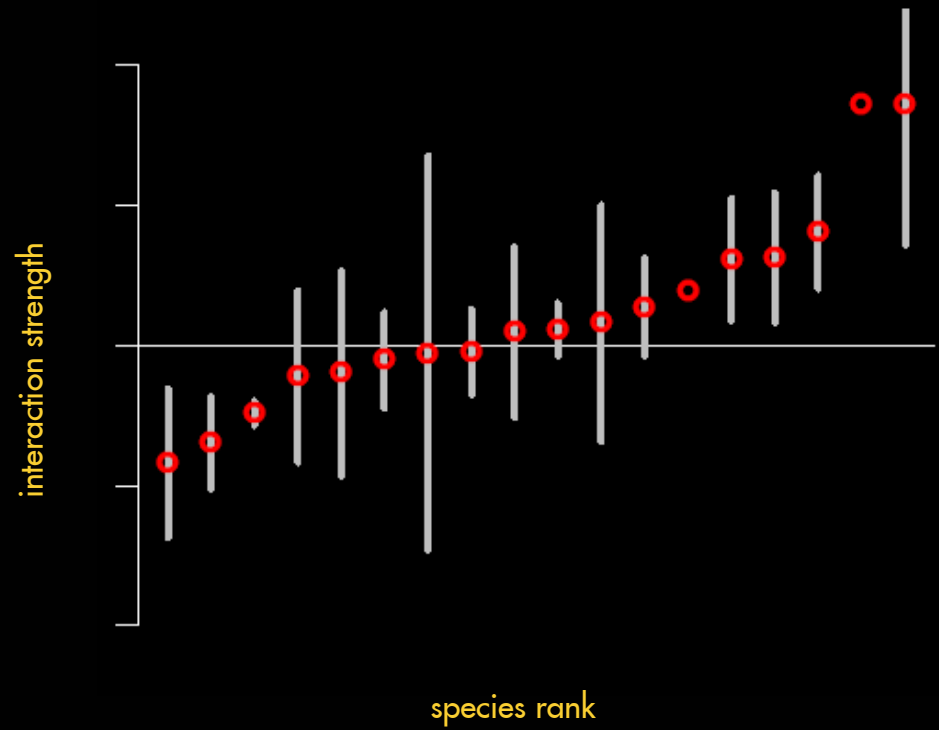
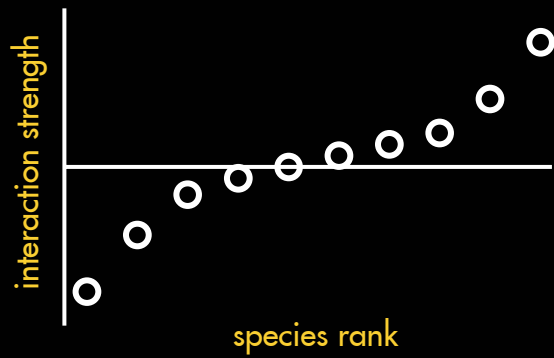


experimentation









DI ~ zone + scale + region; random block/time

questions

negative vs positive

weak vs strong

relationship with

zone

scale

region

diversity

DI ~ zone + scale + region; random block/time

interaction sign

	p
intercept	.2659
zone	.8790
scale	.9032
region	.3030

relationship with

zone

scale

region

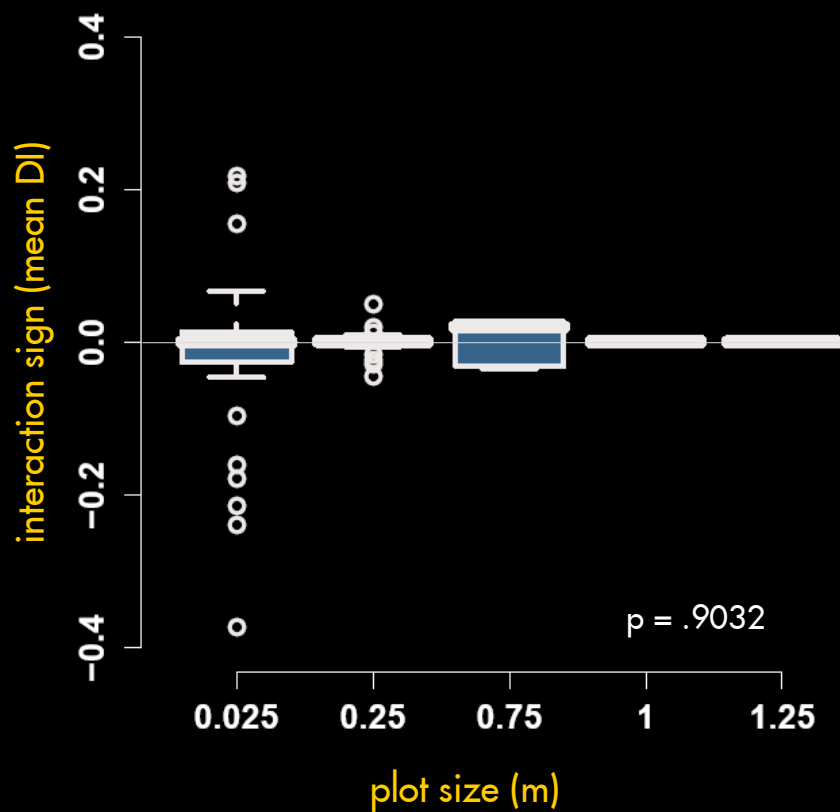
diversity

interaction strength

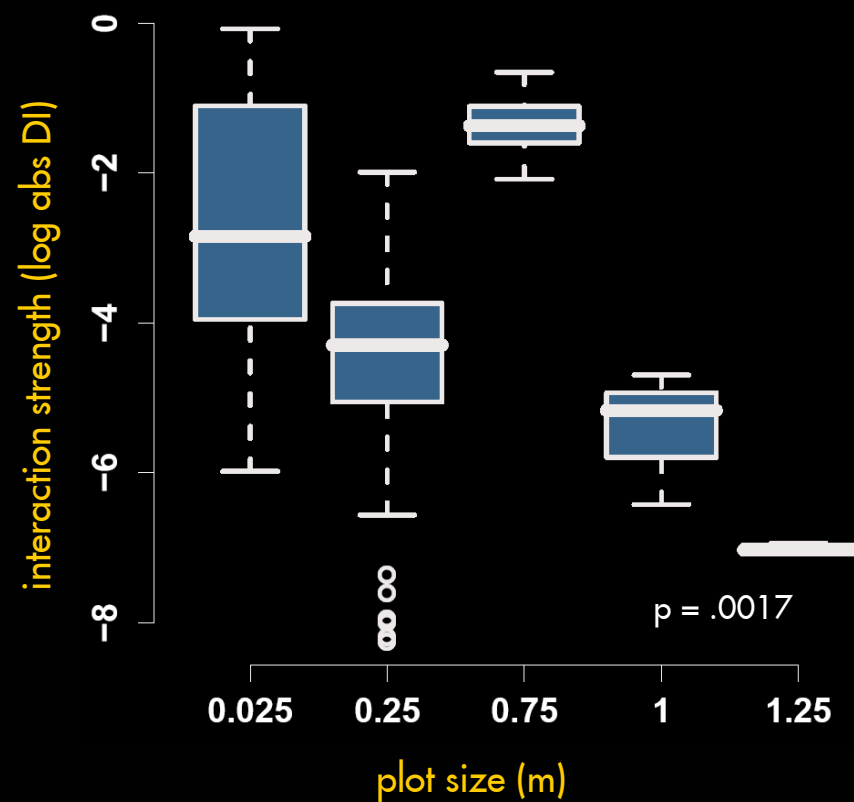
	p
intercept	< .0001*
zone	.9831
scale	.0017*
region	.0001*

zone
scale
region
diversity

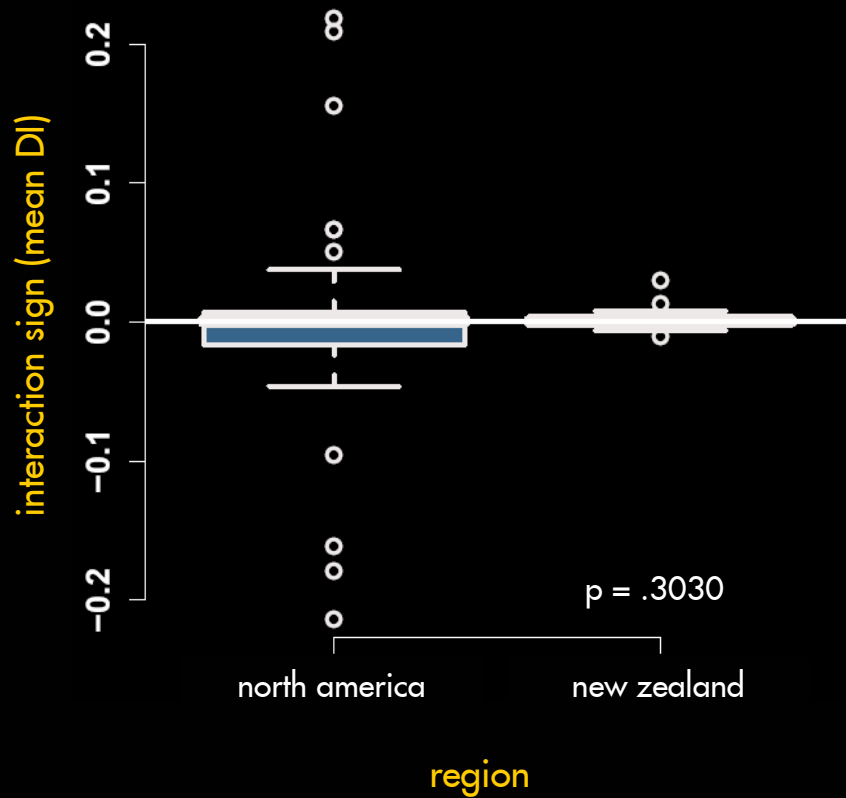
negative vs positive



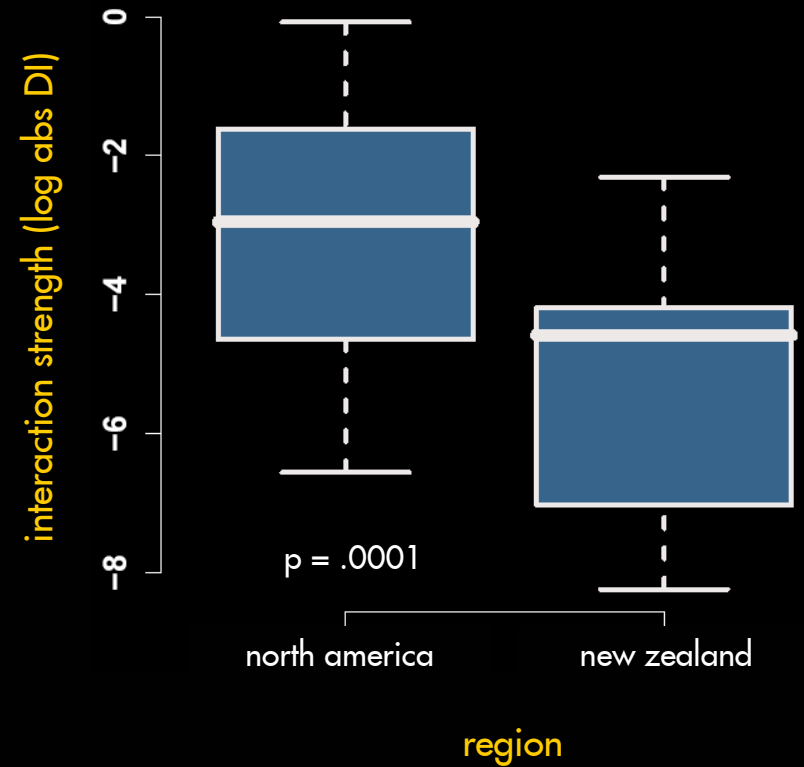
weak vs strong



negative vs positive

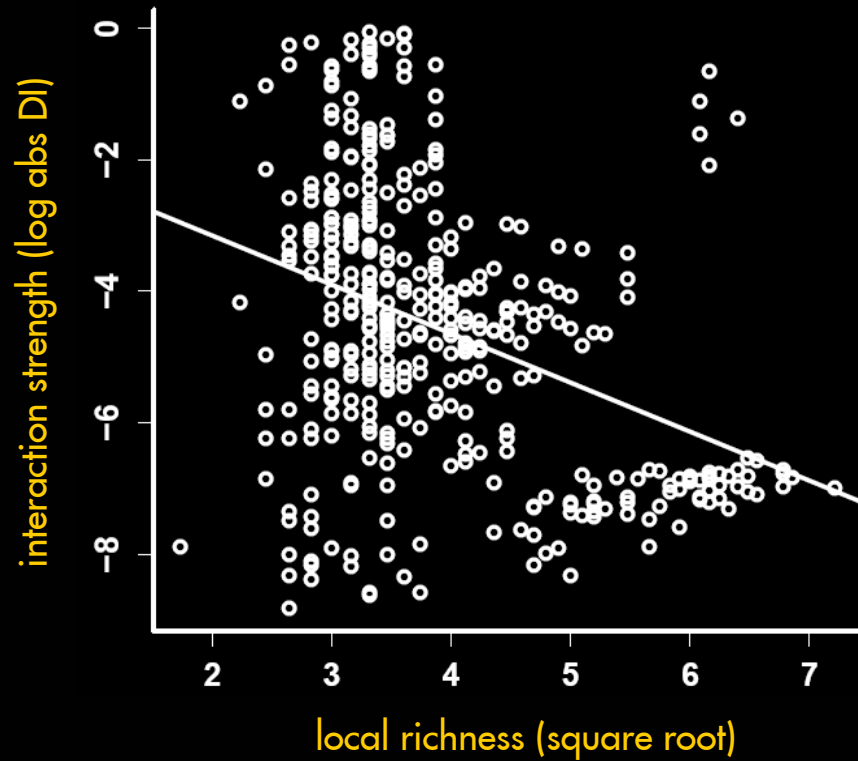


weak vs strong

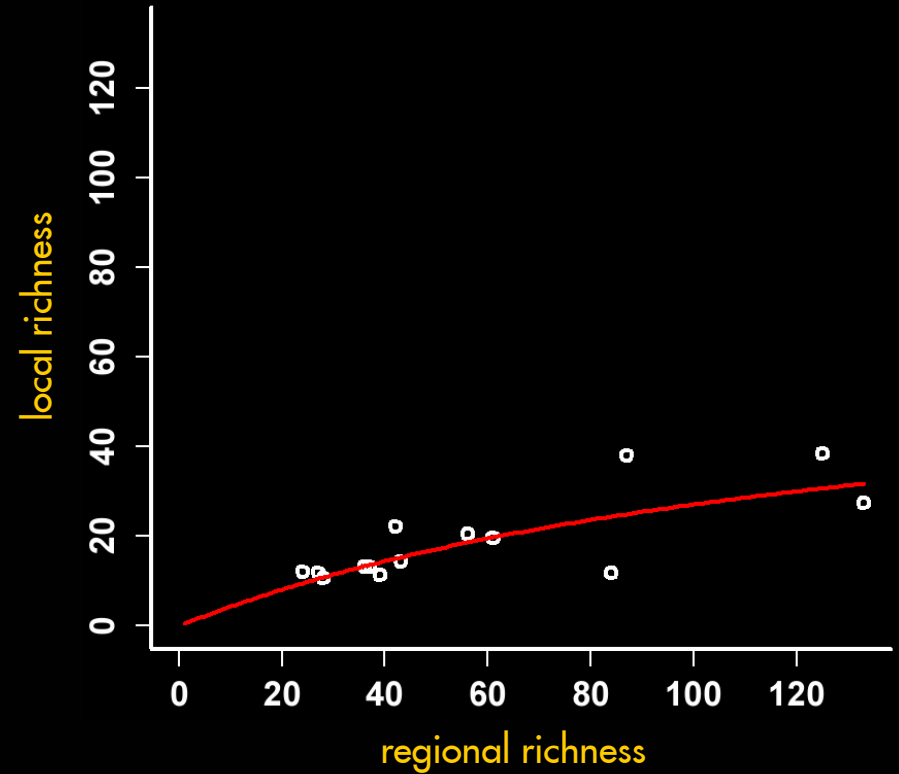


zone
scale
region
diversity

local vs strength



local vs regional



questions

answers

negative vs positive	both
weak vs strong	weak (but not disproportionately so)

relationship with

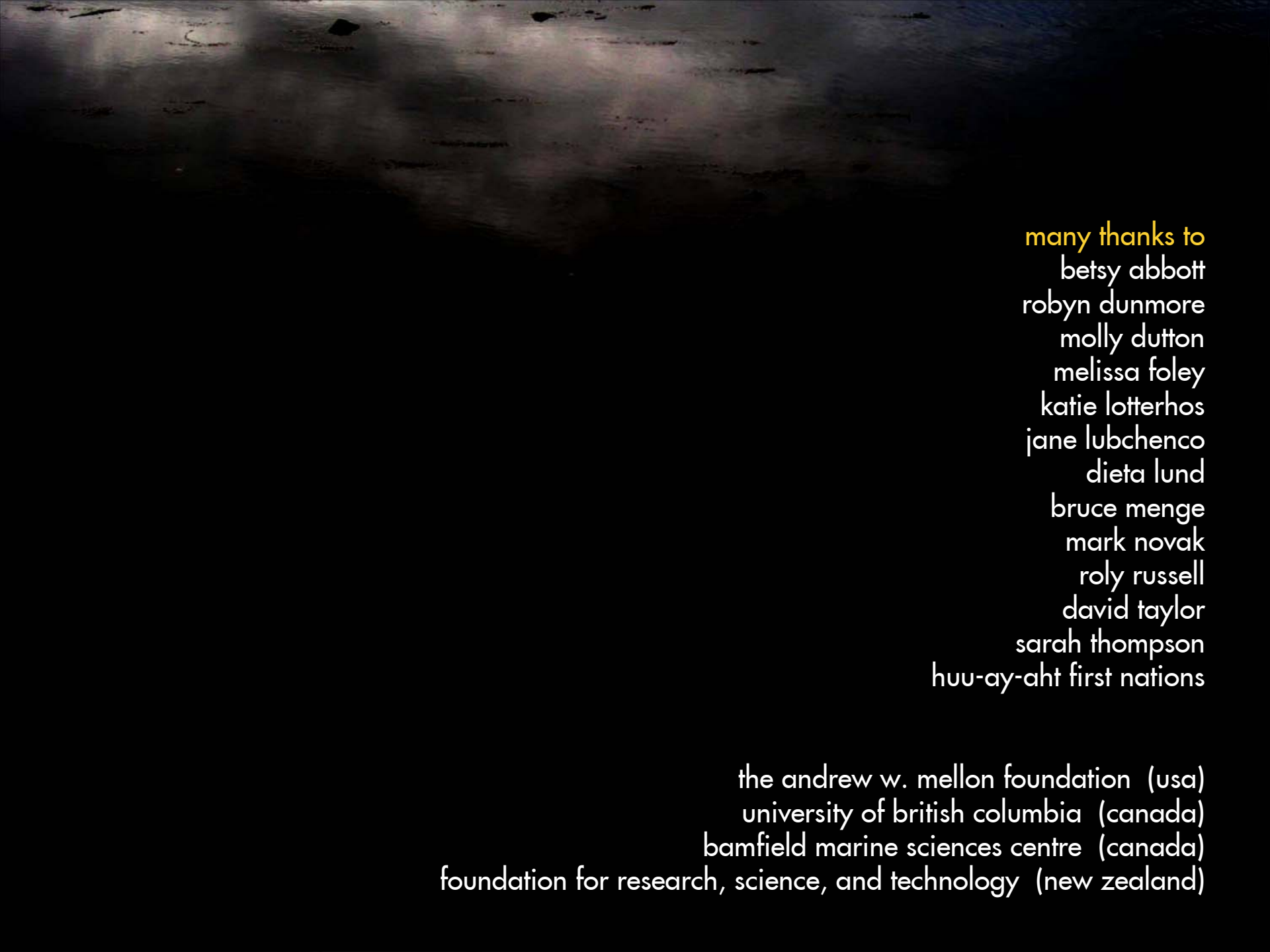
negative vs positive

weak vs strong

stress (zone)	no	no
scale	no	yes
region	no	yes
diversity	no	complex

- ~ interactions of all signs & strengths ~
- ~ expected prevalence of weak interactions ~
- ~ equal interactions across environmental stress gradient ~
- ~ limitations to local species richness ~
 - ~ more species : less stable ~

interactions ~ diversity ~ stability



many thanks to
betsy abbott
robyn dunmore
molly dutton
melissa foley
katie lotterhos
jane lubchenco
dieta lund
bruce menge
mark novak
roly russell
david taylor
sarah thompson
huu-ay-aht first nations

the andrew w. mellon foundation (usa)
university of british columbia (canada)
bamfield marine sciences centre (canada)
foundation for research, science, and technology (new zealand)