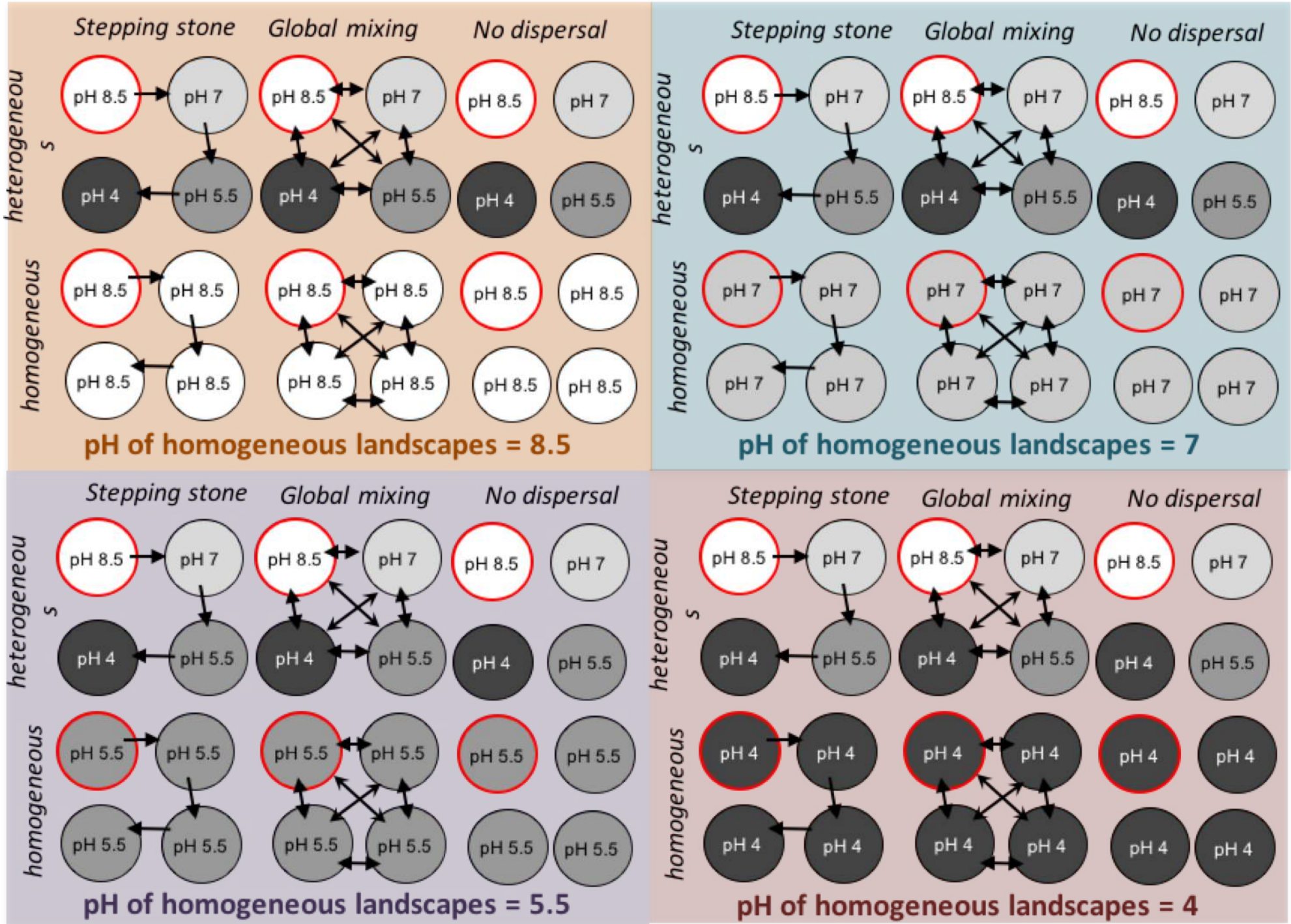
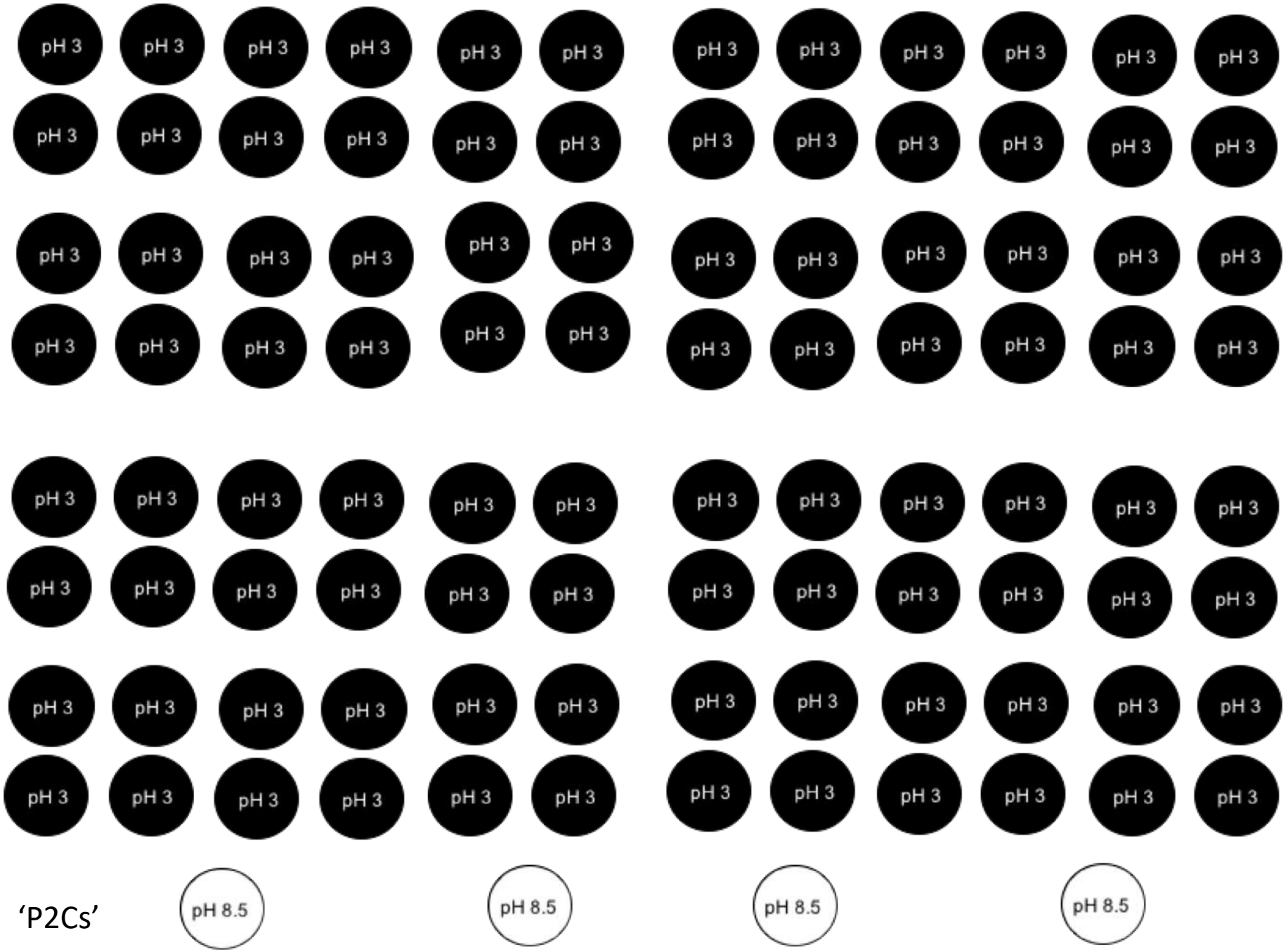
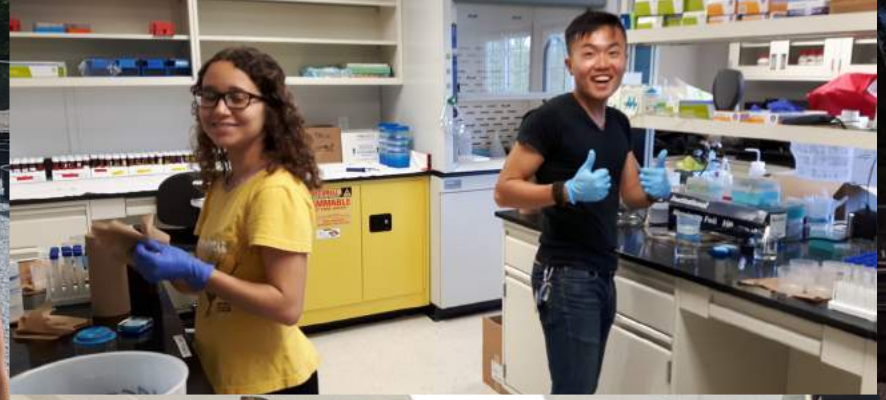
Phase 1

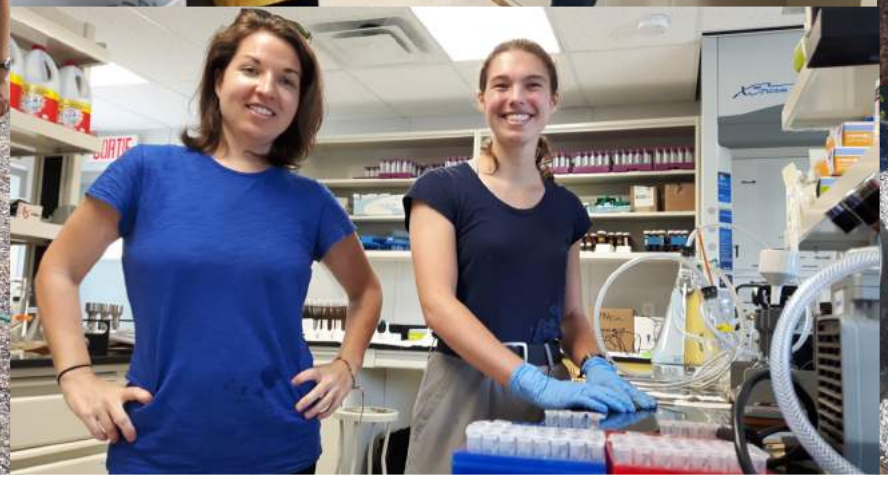

Stepping stone
Global mixing
No dispersal
heterogeneous
homogeneous
pH 8.5
pH 7
pH 4
pH 5.5
pH of homogeneous landscapes = 8.5
pH of homogeneous landscapes = 7
pH of homogeneous landscapes = 5.5
pH of homogeneous landscapes = 4

Phase 2



- May 16-June 06: Cleaning and filling ponds, added valves, volume & buckets for disp treatment, deployed T loggers

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  - 13 time points for YSI, depth, FLP, Lugol-preserved phytoplankton, zoops and filtrations (duplicate, all ponds)
  - 9 time points for ecosystem metabolism (all ponds) and bacterial abundance.
  - 2-4 measurements of nutrients (TN&TP), water colour, periphyton biomass, and ‘mini-phase II’
  - Continuous measurement throughout: temp/light (50 ponds) & ecosystem metabolism (one MC, changing)

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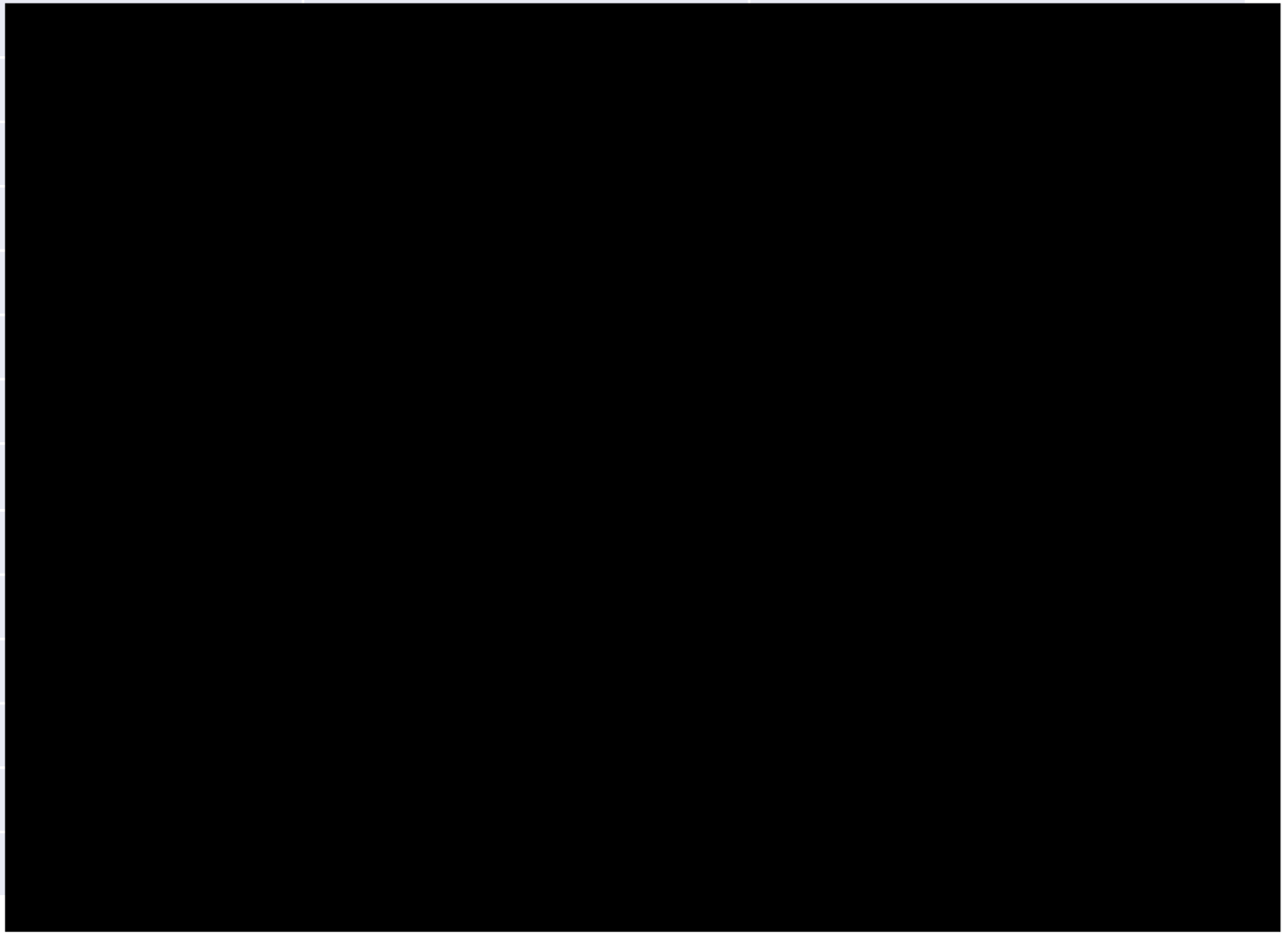
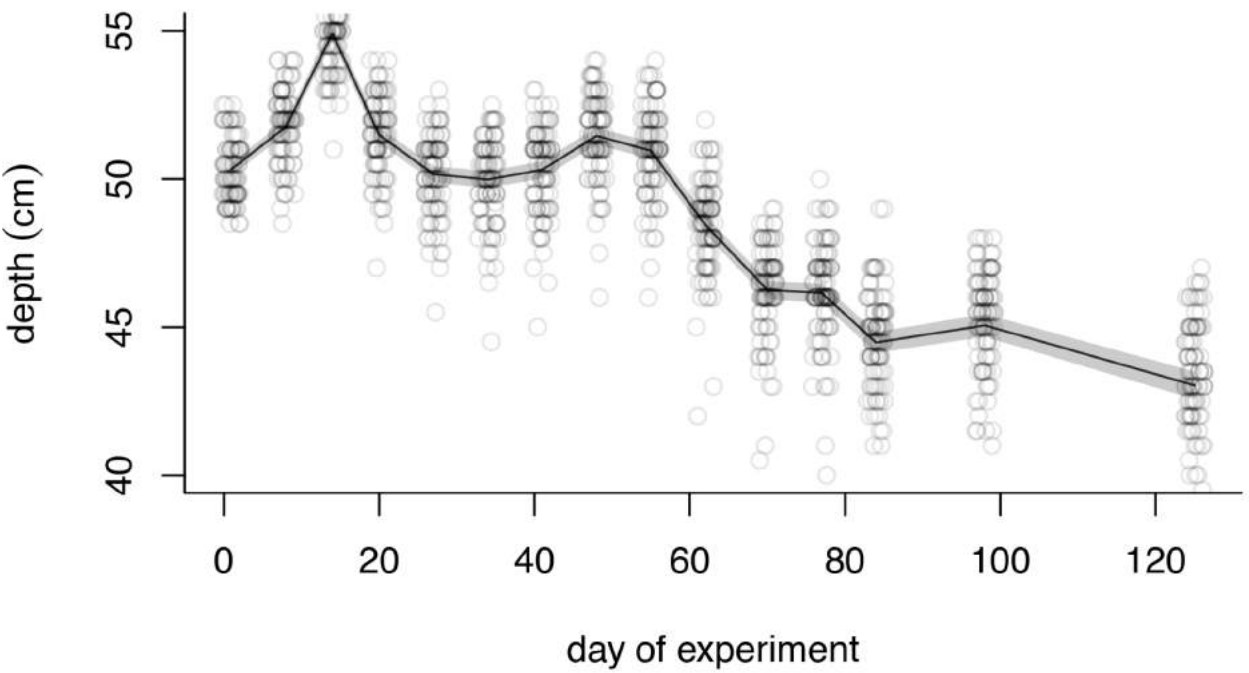
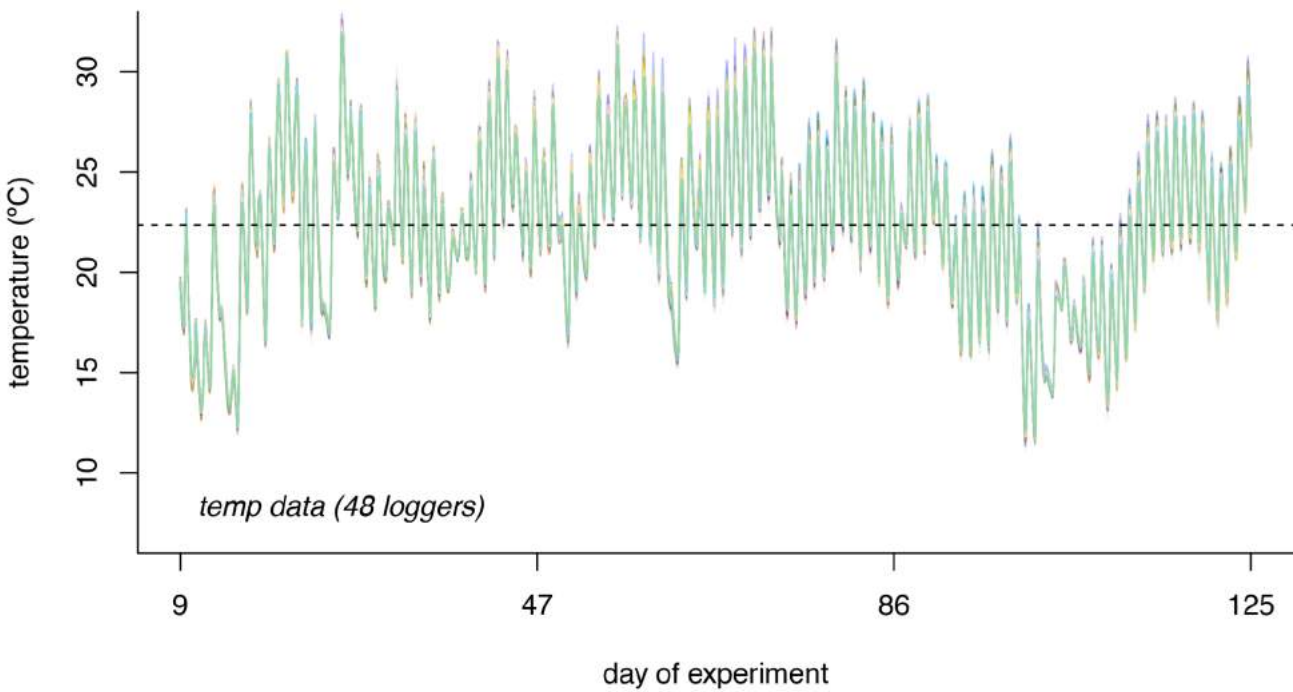
  - 13 time points for YSI, depth, FLP, Lugol-preserved phytoplankton, zoops and filtrations (duplicate, all ponds)
  - 9 time points for ecosystem metabolism (all ponds) and bacterial abundance.
  - 2-4 measurements of nutrients (TN&TP), water colour, periphyton biomass, and 'mini-phase II'
  - Continuous measurement throughout: temp/light (50 ponds) & ecosystem metabolism (one MC, changing)
- October 30th: cleanup. Other: poster, drone, outreach, twitter. Problems: temp & pollen input, squirrels

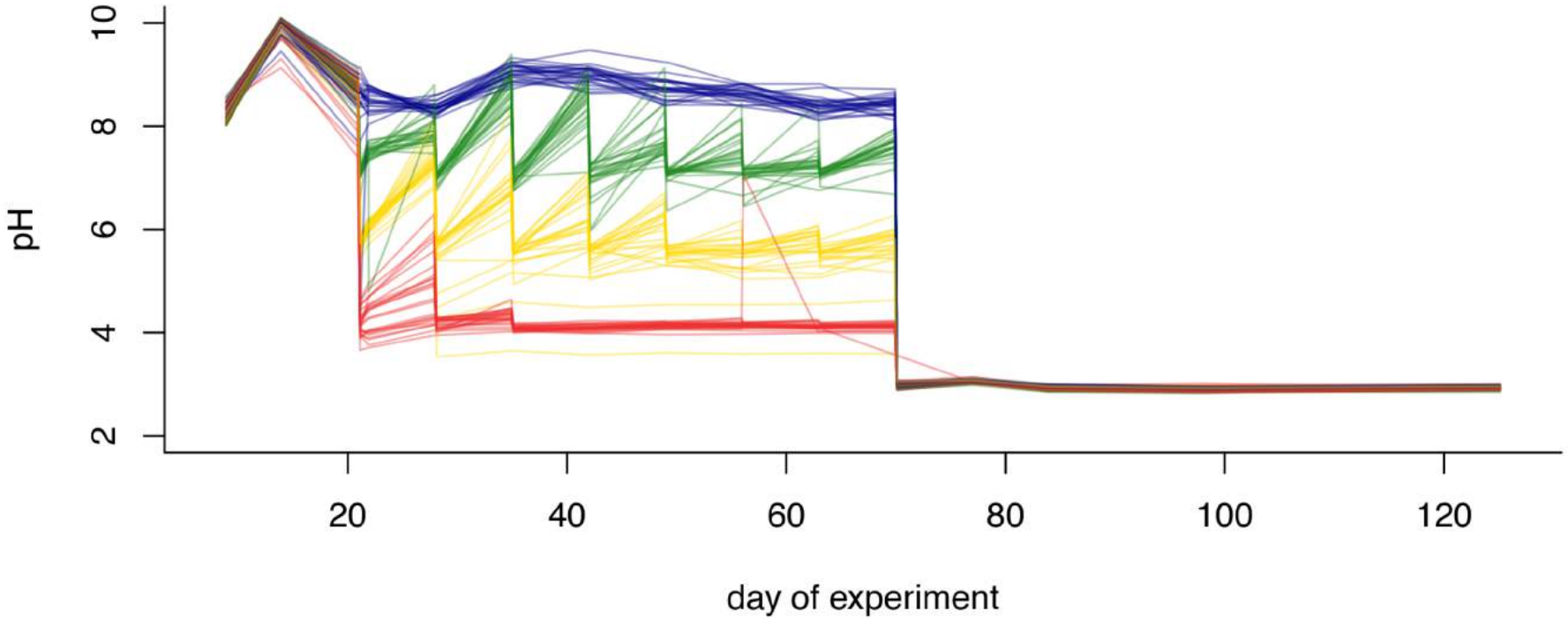
Budget

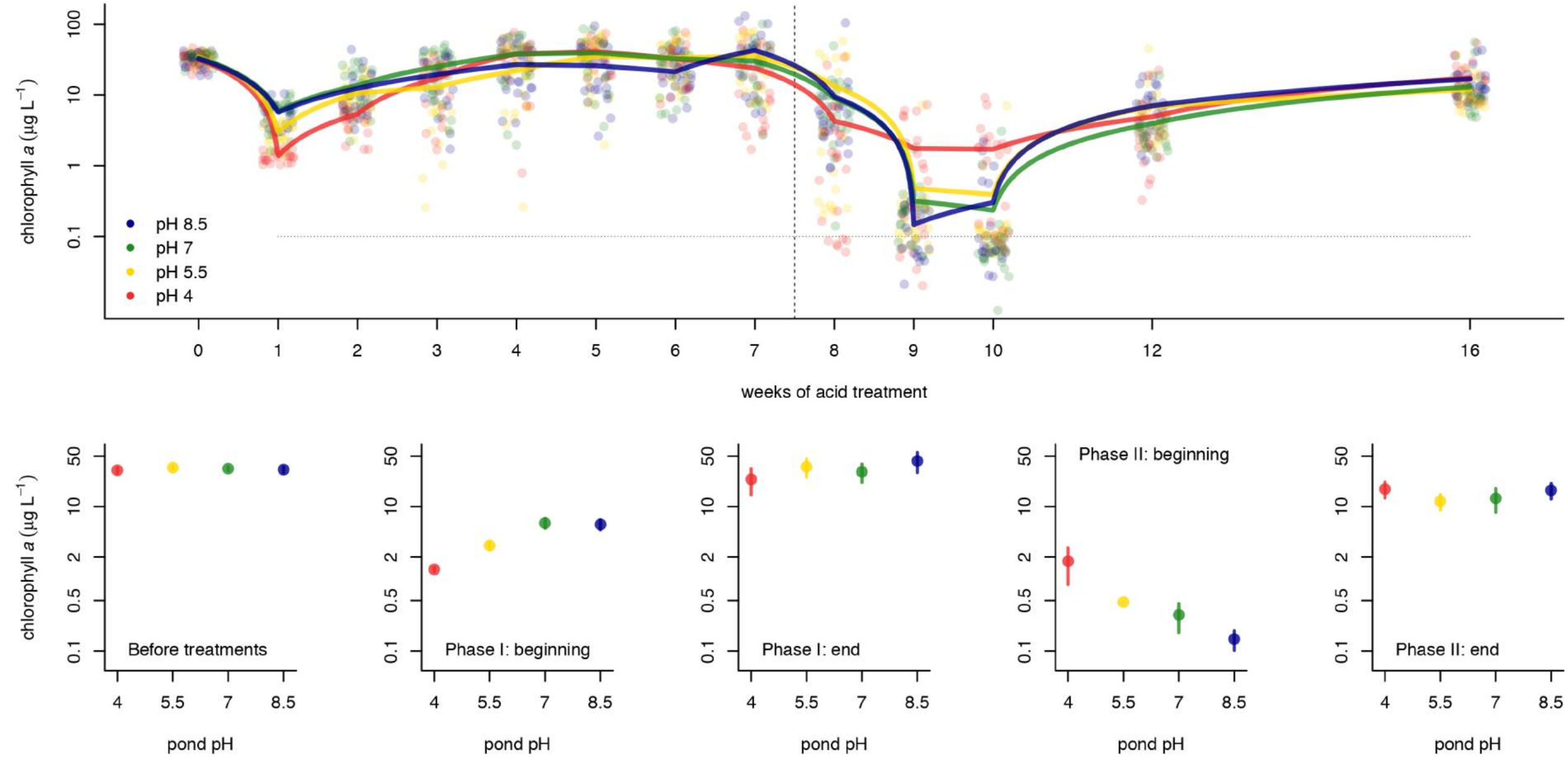
Item	Budgeted	Spent	Paid by
Equipment and infrastructure			
Consumables			
3 full-time undergraduate field assistants			
Housing at the field station for 5 people			
UQAM Truck + gas			
Nutrient measurements			
DNA/RNA extraction, sequencing			
LOPC user fee			
Flow cytometry consumables & user fee			
Phytoplankton counts (100$ per sample)			
TOTAL			

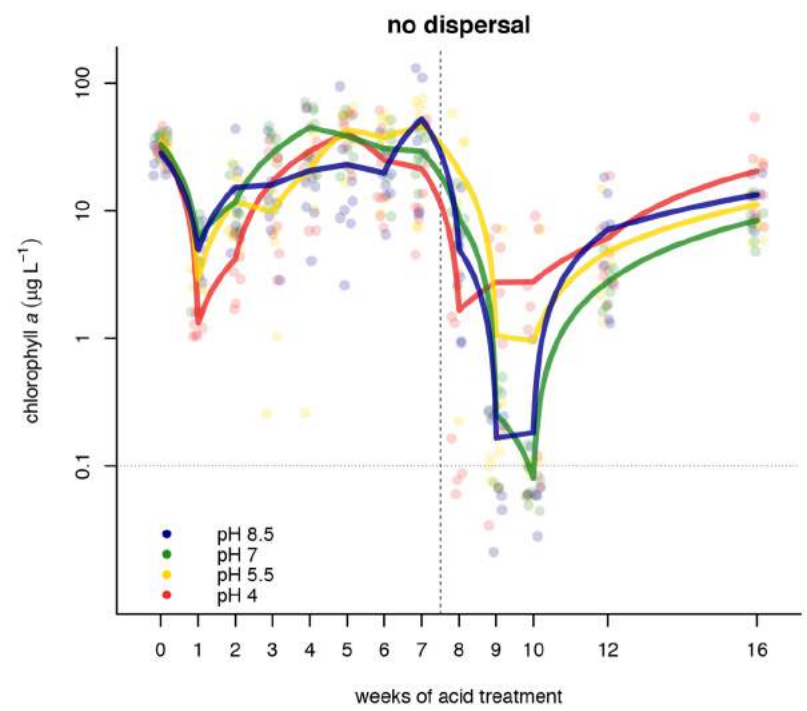


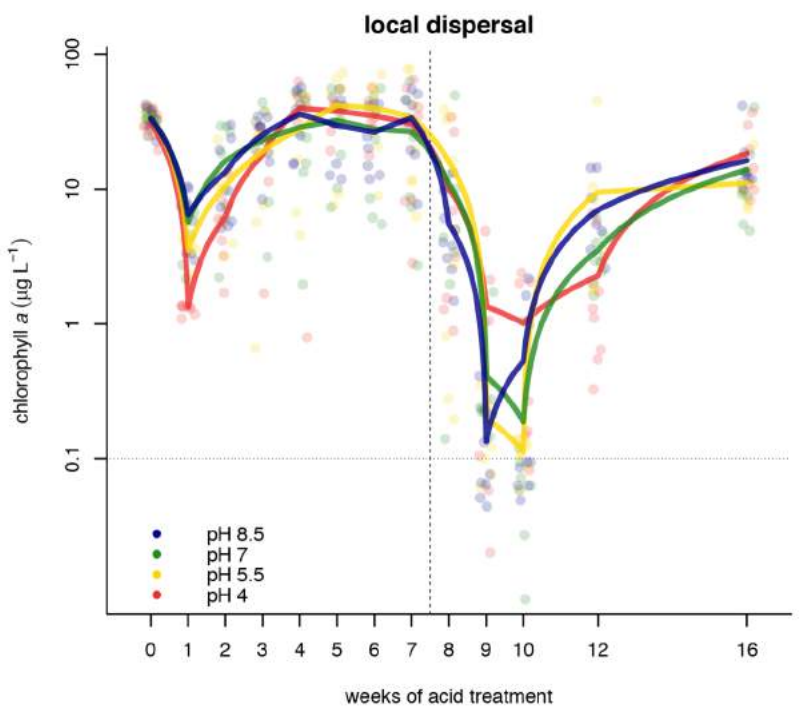

depth (cm)
55
50
45
40
0
20
40
60
80
100
120
day of experiment

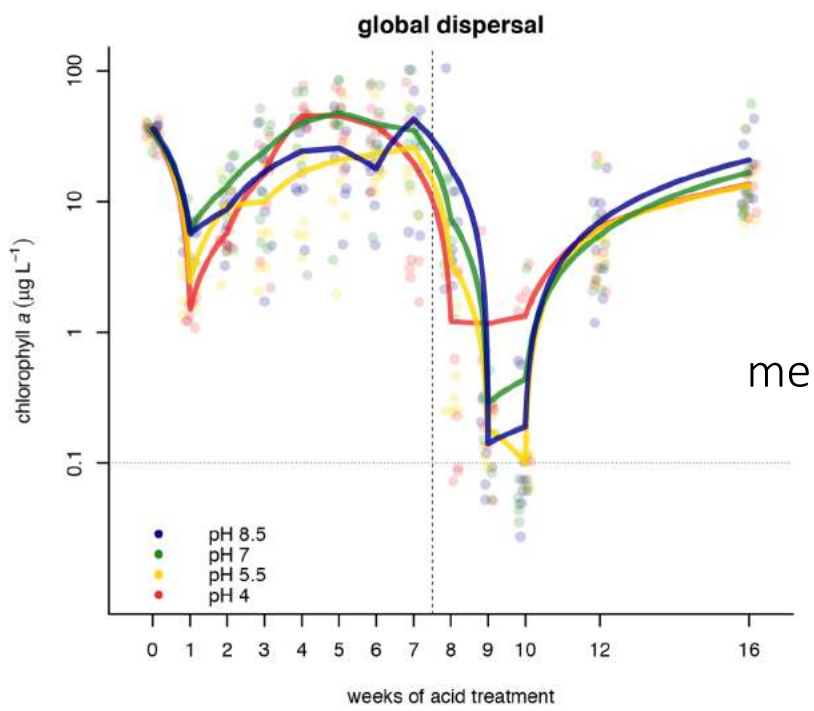

temperature (°C)
30
25
20
15
10
temp data (48 loggers)
9
47
86
125
day of experiment


pH
10
8
6
4
2
20
40
60
80
100
120
day of experiment

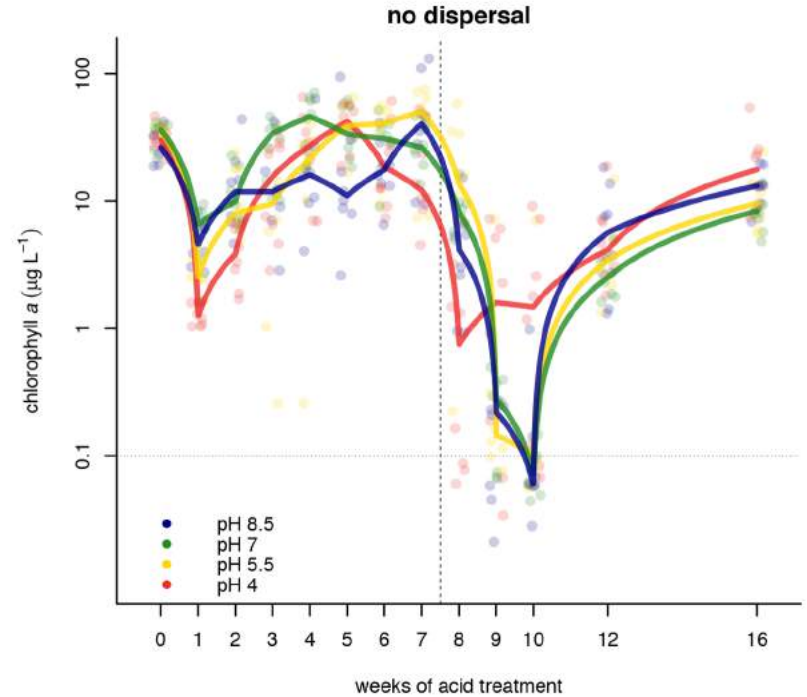

chlorophyll a (µg L⁻¹)
100
10
1
0.1
pH 8.5
pH 7
pH 5.5
pH 4
0
1
2
3
4
5
6
7
8
9
10
12
16
weeks of acid treatment
chlorophyll a (µg L⁻¹)
50
10
2
0.5
0.1
Before treatments
Phase I: beginning
Phase I: end
Phase II: beginning
Phase II: end
4
5.5
7
8.5
pond pH

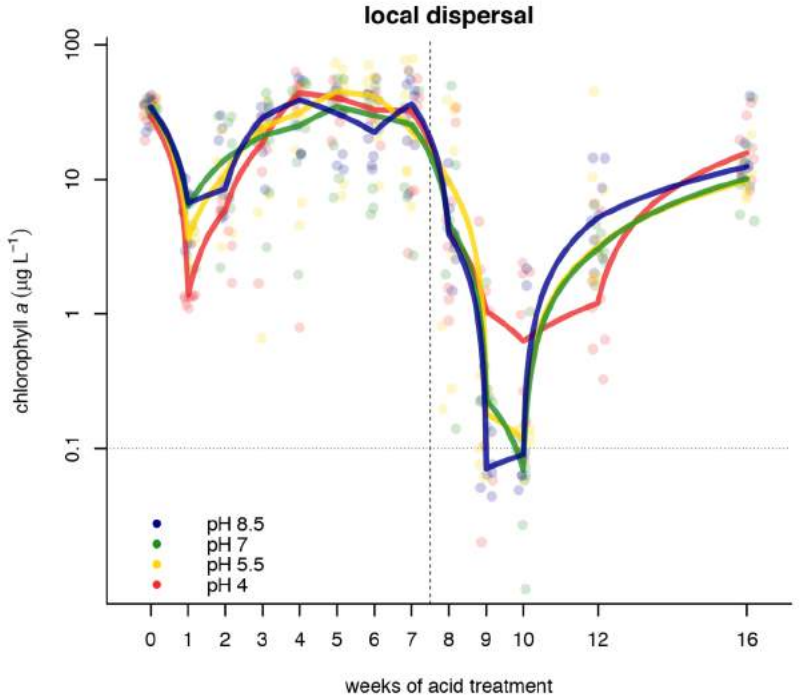

no dispersal
chlorophyll a (µg L⁻¹)
100
10
1
0.1
pH 8.5
pH 7
pH 5.5
pH 4
0 1 2 3 4 5 6 7 8 9 10 12 16
weeks of acid treatment

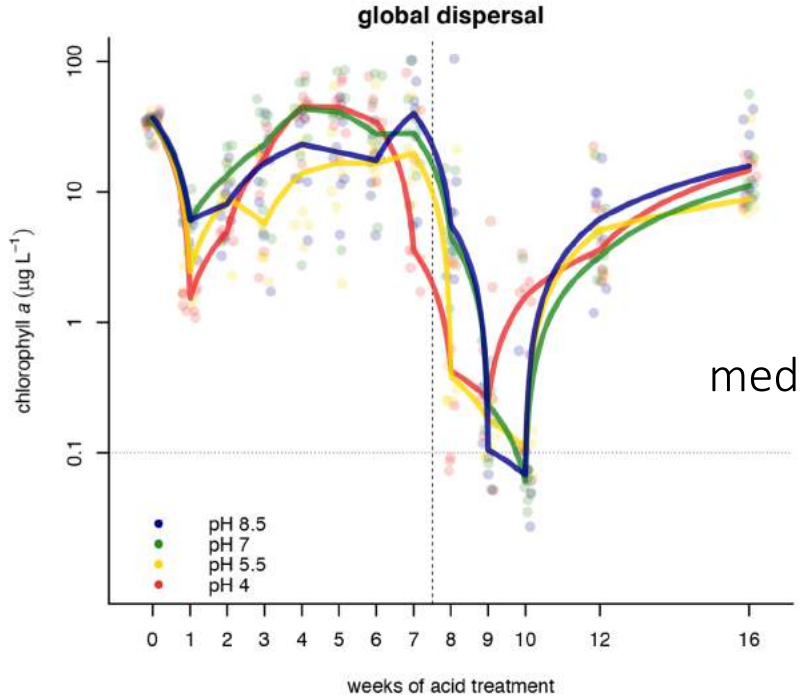

local dispersal
chlorophyll a (µg L⁻¹)
100
10
1
0.1
pH 8.5
pH 7
pH 5.5
pH 4
0 1 2 3 4 5 6 7 8 9 10 12 16
weeks of acid treatment


global dispersal
chlorophyll a (µg L⁻¹)
100
10
1
0.1
pH 8.5
pH 7
pH 5.5
pH 4
0 1 2 3 4 5 6 7 8 9 10 12 16
weeks of acid treatment

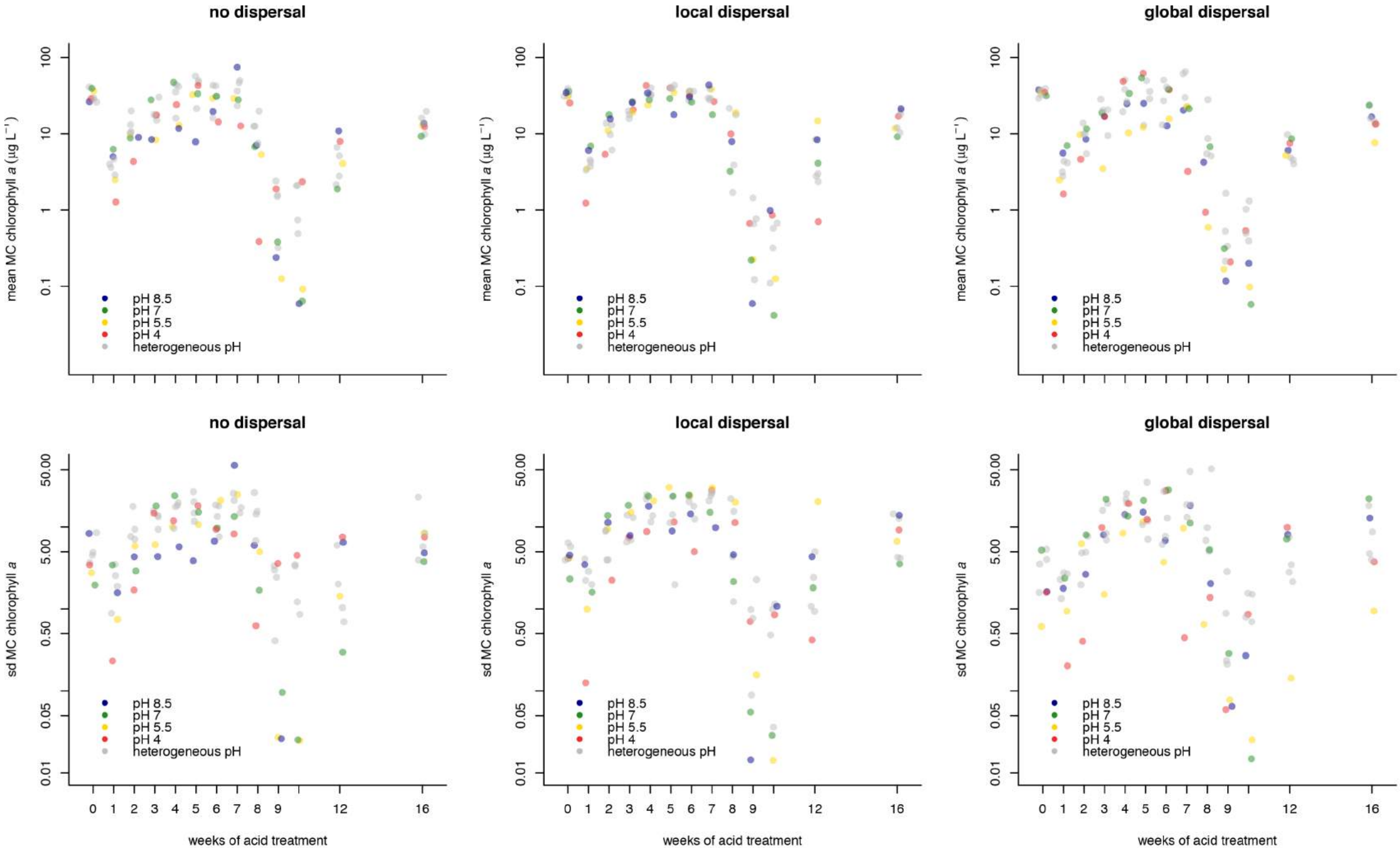
mean

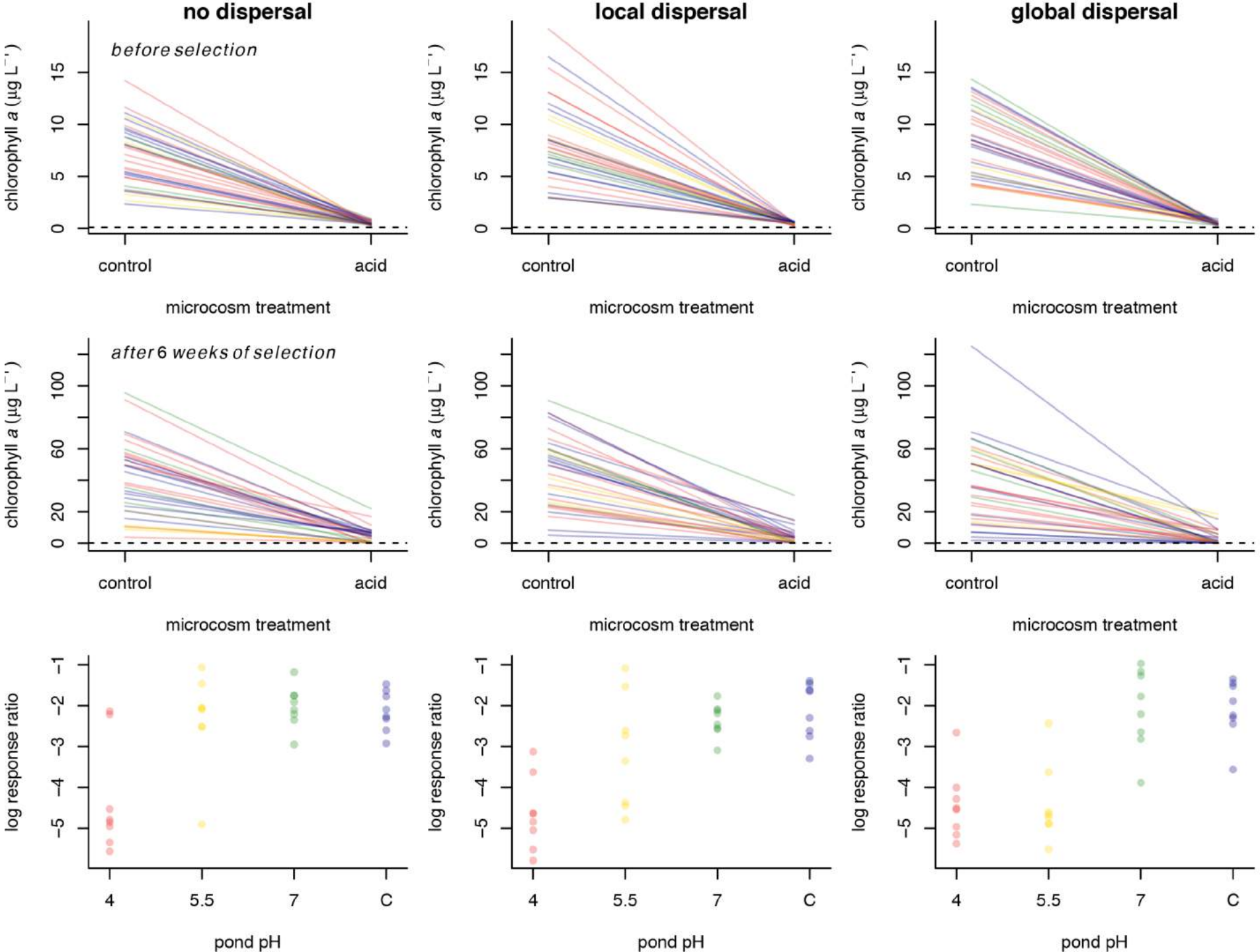

no dispersal
chlorophyll a (µg L⁻¹)
100
10
1
0.1
pH 8.5
pH 7
pH 5.5
pH 4
0 1 2 3 4 5 6 7 8 9 10 12 16
weeks of acid treatment


local dispersal
chlorophyll a (µg L⁻¹)
100
10
1
0.1
pH 8.5
pH 7
pH 5.5
pH 4
0 1 2 3 4 5 6 7 8 9 10 12 16
weeks of acid treatment

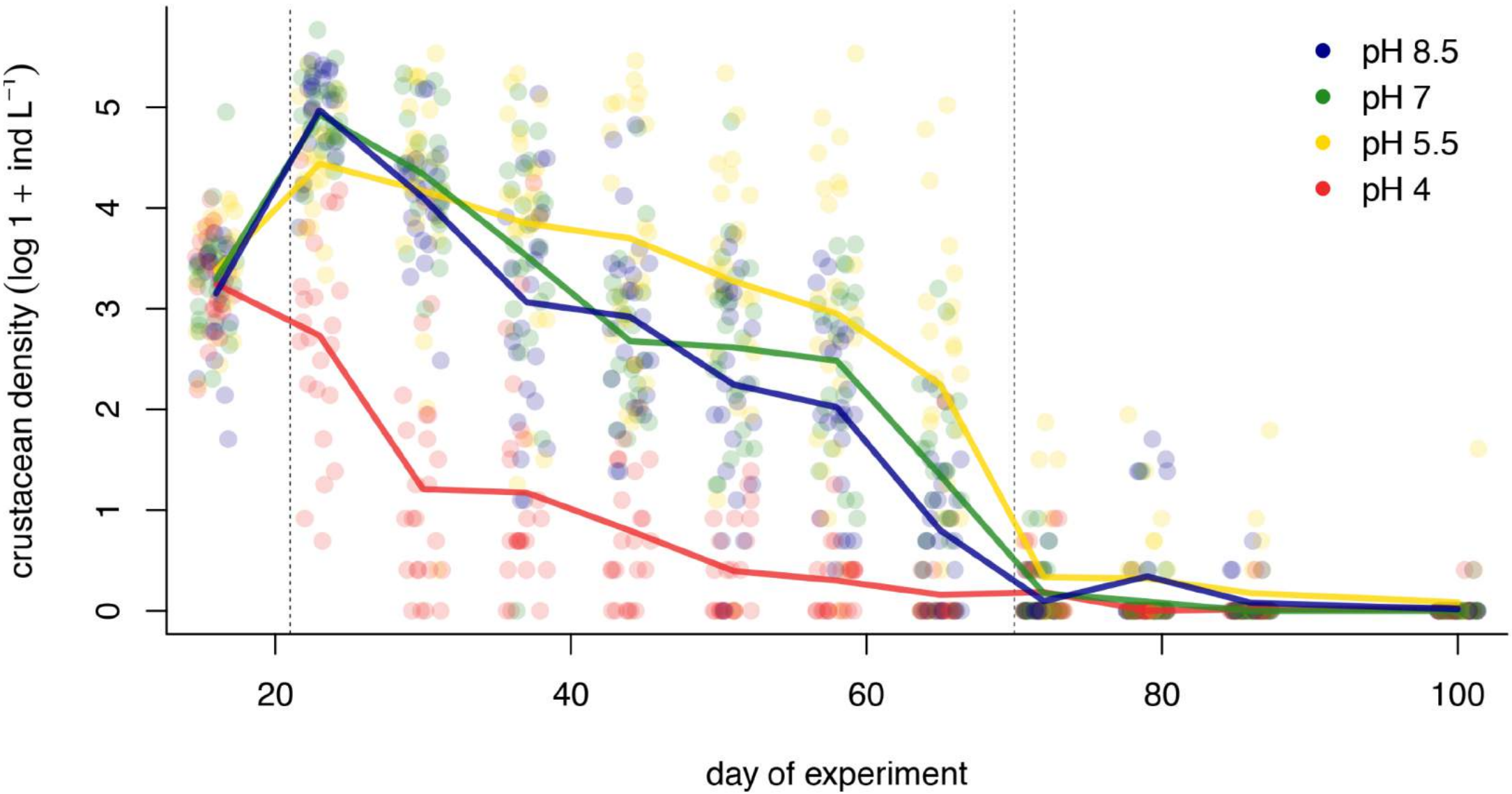

global dispersal
chlorophyll a (µg L⁻¹)
100
10
1
0.1
pH 8.5
pH 7
pH 5.5
pH 4
0 1 2 3 4 5 6 7 8 9 10 12 16
weeks of acid treatment

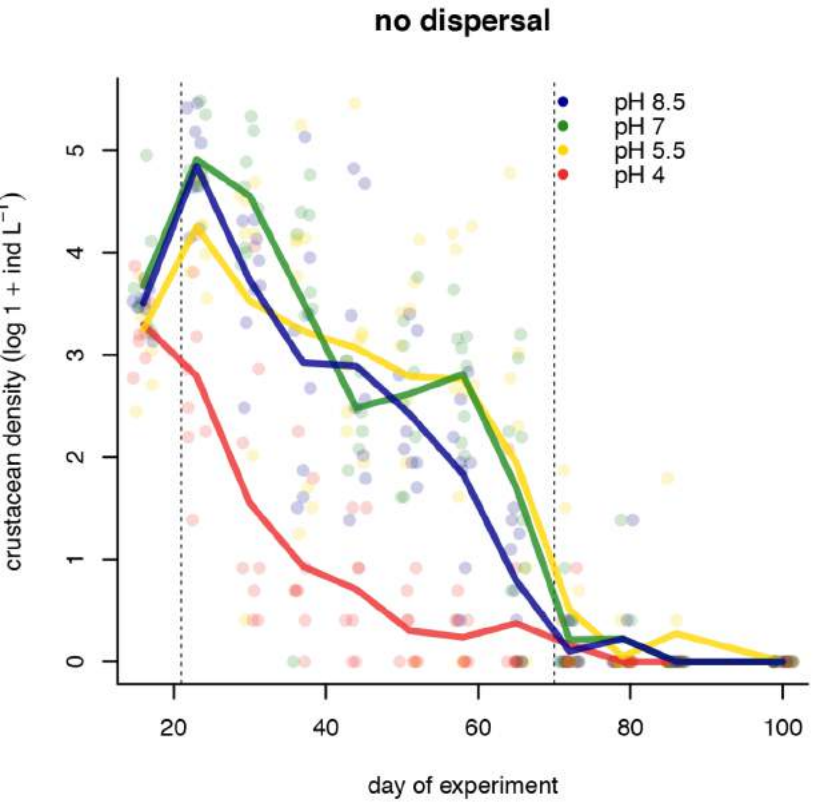
median

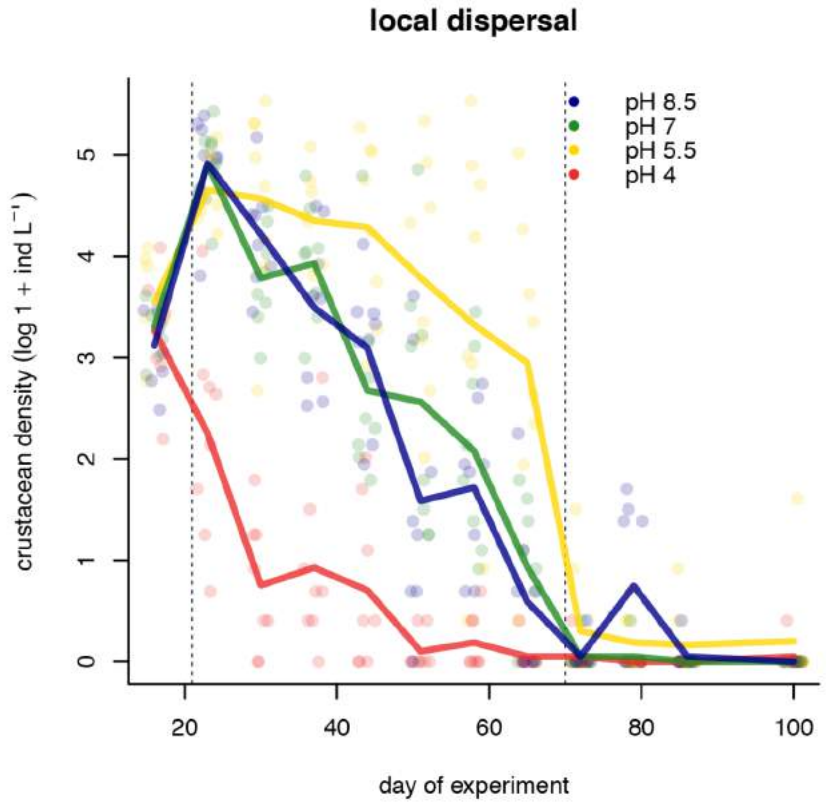

no dispersal
local dispersal
global dispersal
mean MC chlorophyll a (µg L⁻¹)
sd MC chlorophyll a
pH 8.5
pH 7
pH 5.5
pH 4
heterogeneous pH
weeks of acid treatment

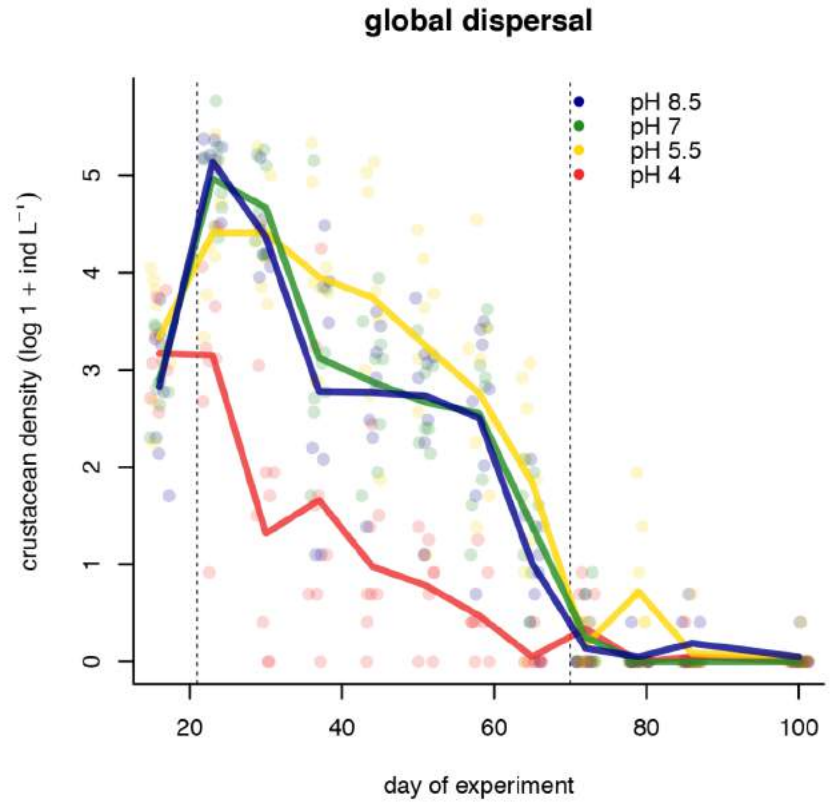


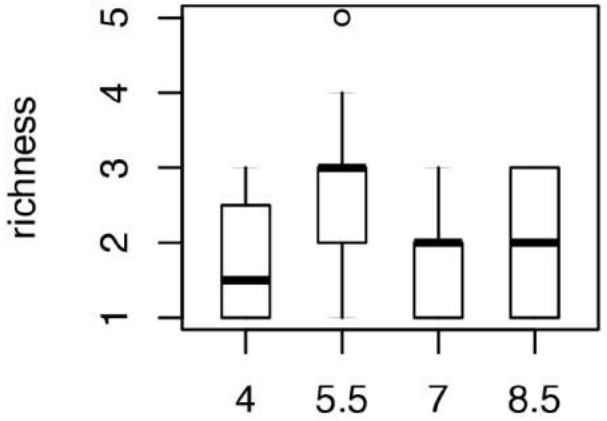
- Comparison across TP
- Get reaction norm for all/dominant species.
- Do the same in pond, looking at initial vs. later response to pH for all species

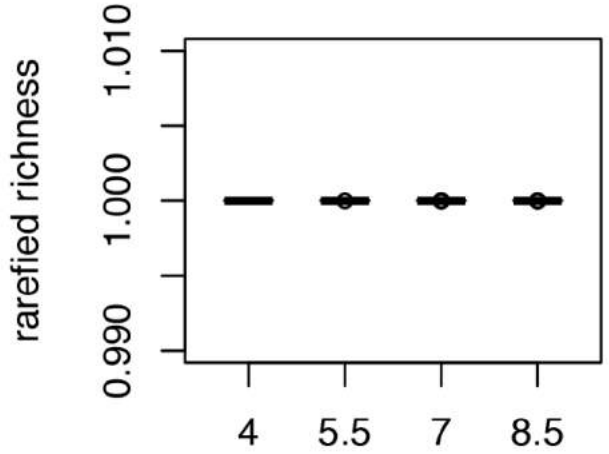

crustacean density (log 1 + ind L^{-1})
0
1
2
3
4
5
20
40
60
80
100
day of experiment
pH 8.5
pH 7
pH 5.5
pH 4

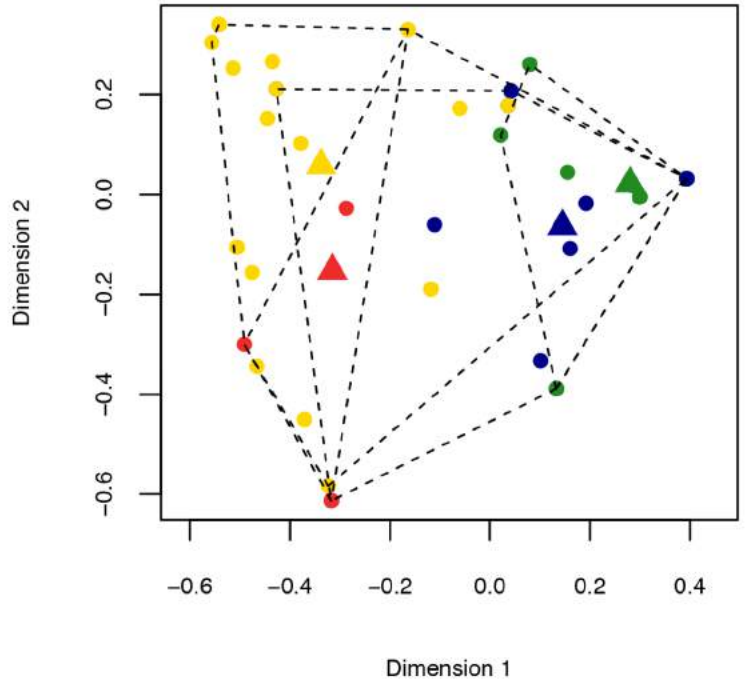

no dispersal
pH 8.5
pH 7
pH 5.5
pH 4
crustacean density (log 1 + ind L⁻¹)
day of experiment
0
1
2
3
4
5
20
40
60
80
100

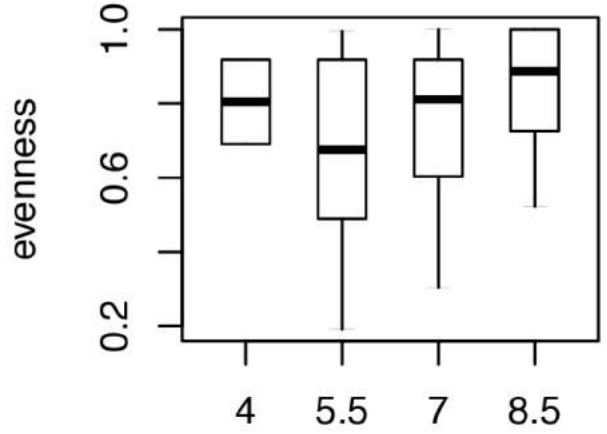

local dispersal
pH 8.5
pH 7
pH 5.5
pH 4
crustacean density (log 1 + ind L⁻¹)
day of experiment
0
1
2
3
4
5
20
40
60
80
100

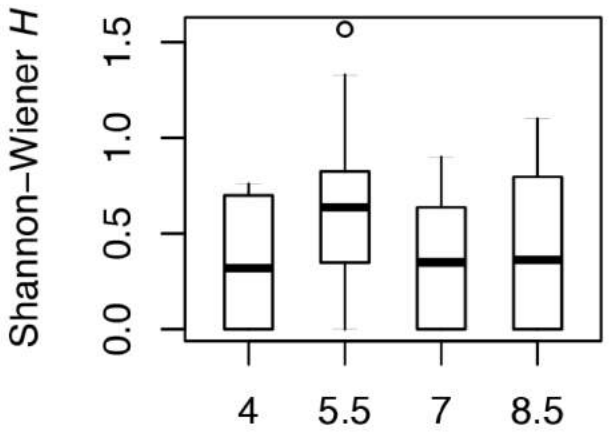

global dispersal
pH 8.5
pH 7
pH 5.5
pH 4
crustacean density (log 1 + ind L⁻¹)
day of experiment
0
1
2
3
4
5
20
40
60
80
100

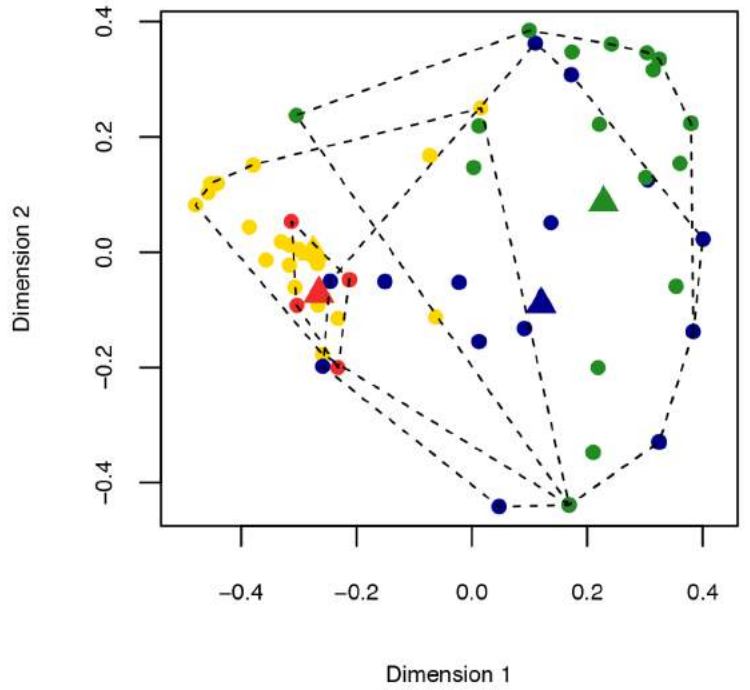












Sig effect of pH (but not dispersal) on both composition and dispersion

- To do list, data collection:
  - Flow cytometry. Me @ UQAM this winter. Anyone else?
  - Modelling ecosystem metabolism using YSI & minidot data
  - Phytoplankton counts: how many? 6-8 months delay, 100$ a piece
  - Genetics?
- Possible extensions:
  - LOPC & FlowCam. Community size spectra from bacteria to largest metazoan
- Paper plan
  - Metacommunity rescue using abundance (3 groups) & functioning time series, diversity metrics end of phase 1 and phase 2. Response at the local and meta-community scale. Microcosm results & in-pond reaction norm of dominant taxa as evidence of adaptation.
  - Phase I data: effect of dispersal, priority effects, local disturbance, and habitat heterogeneity on MC assembly/composition, multiple dimensions of diversity (eg ß div), and stability
  - Whole lake experiments & mesocosms: evidence of ER in time series? Same taxa resistant/resilient?
  - Wrap-up of 2016/2017 experiment – 4 stressors, same source community. Always the same taxa resistant/evolvable? Do these taxa have particular traits eg small body size, rapid life history, etc.