Seascape ecology of glass sponge reefs

fine scale measurements of habitat heterogeneity and its relationship to community structure

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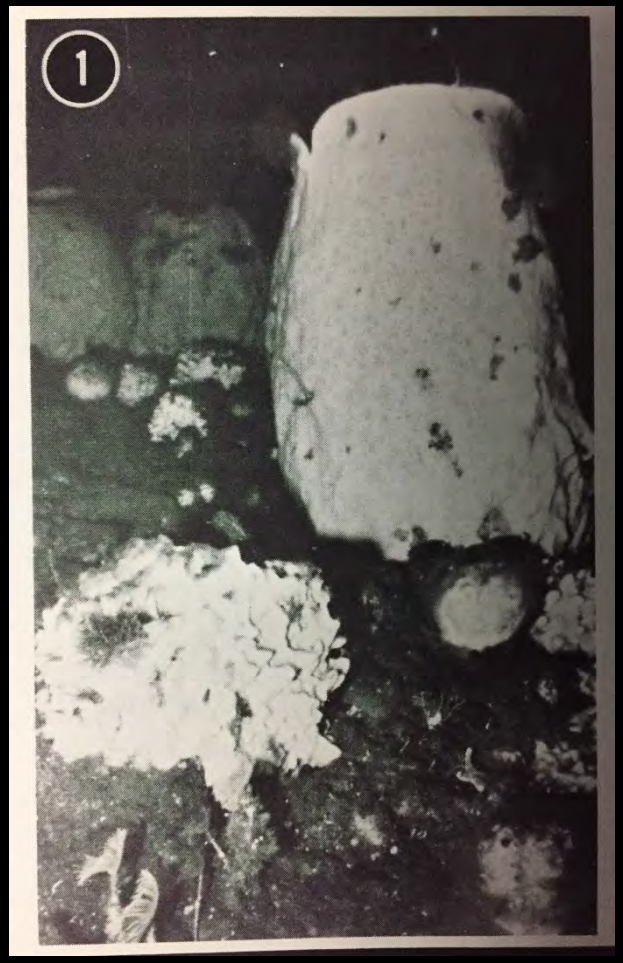
Glass sponge reefs

- Built similarly to coral reefs
- Three species
  - *Aphrocallistes vastus*
  - *Farrea occa*
  - *Heterchone calyx*
- Currently known only in the Northeast Pacific
- In BC
  - Hecate Strait
  - Strait of Georgia
  - Chatham Sound

Sponges act as foundation species

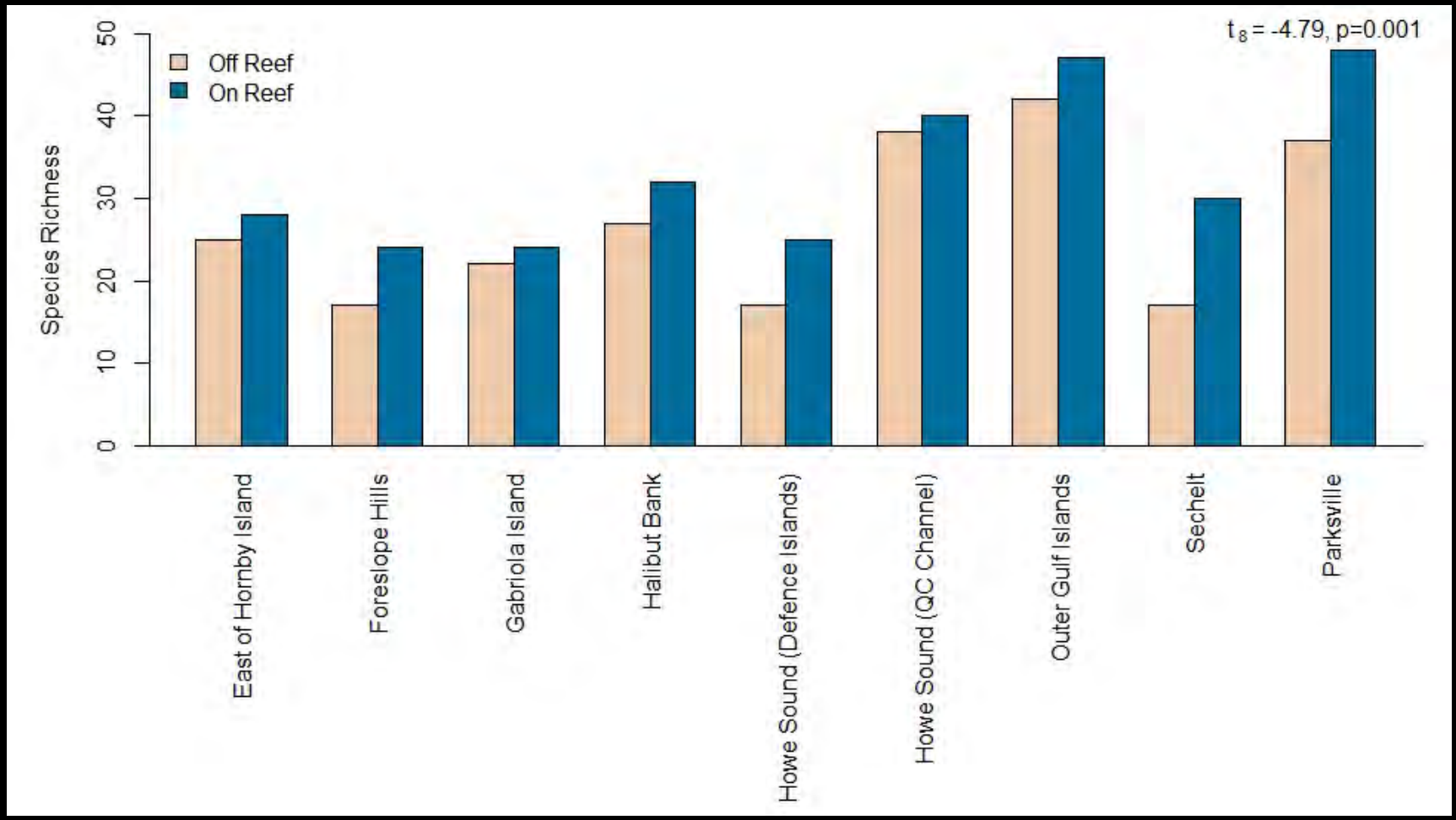


Dayton 1972

Create habitat resulting in

- ↑ Diversity
- ↑ Abundance
- ↑ Distribution

Sponges act as foundation species



Sponges provide structure

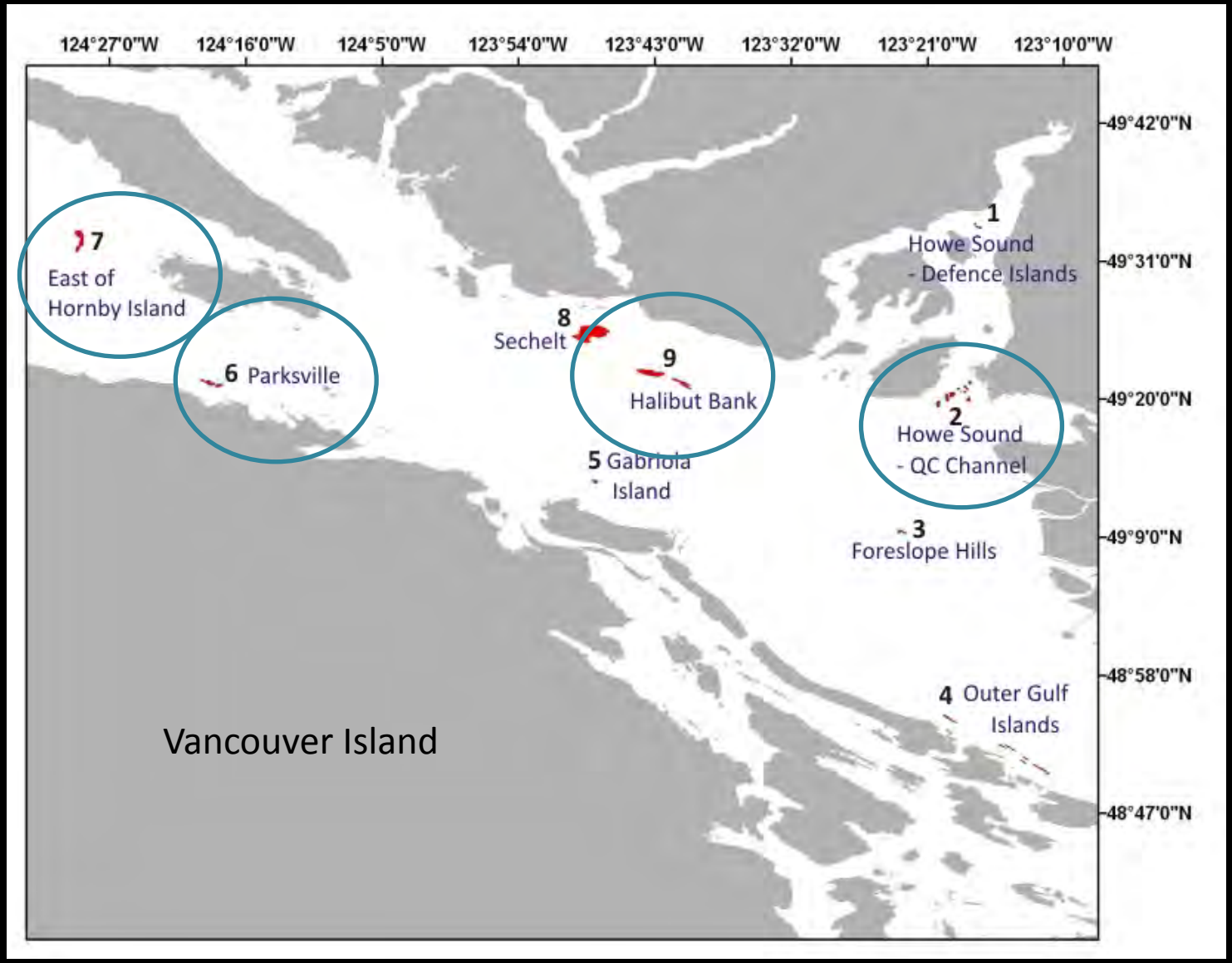
Dead sponges also provide structure

Do sponges interact with the community in other ways?

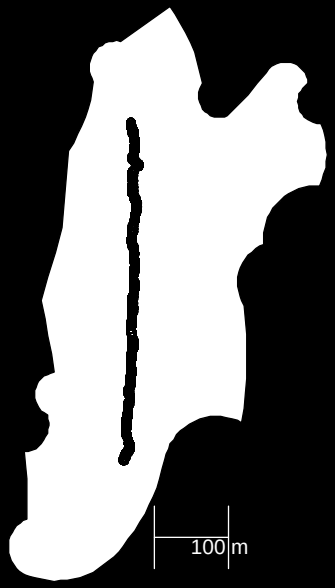
Is the community associated with live sponge different than that associated with structure?

Strait of Georgia glass sponge reefs

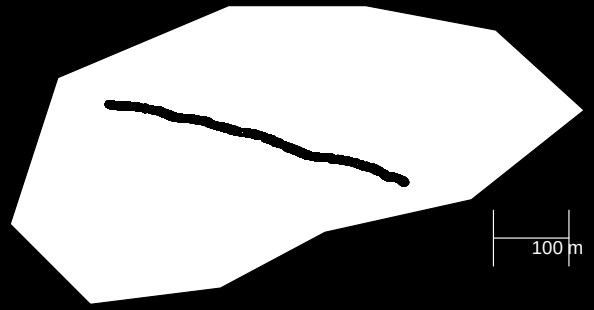
Strait of Georgia glass sponge reefs



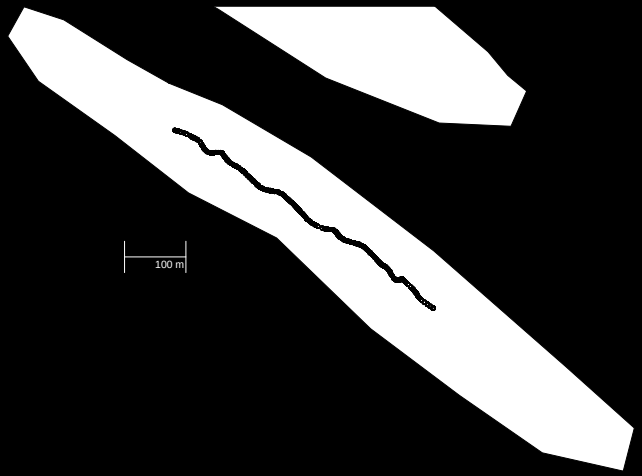
East of Hornby Island



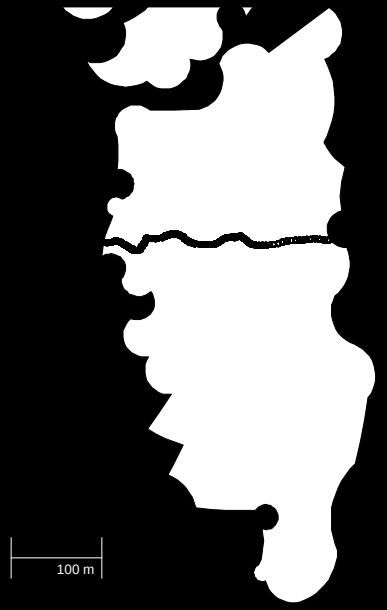
Parksville



Halibut Bank



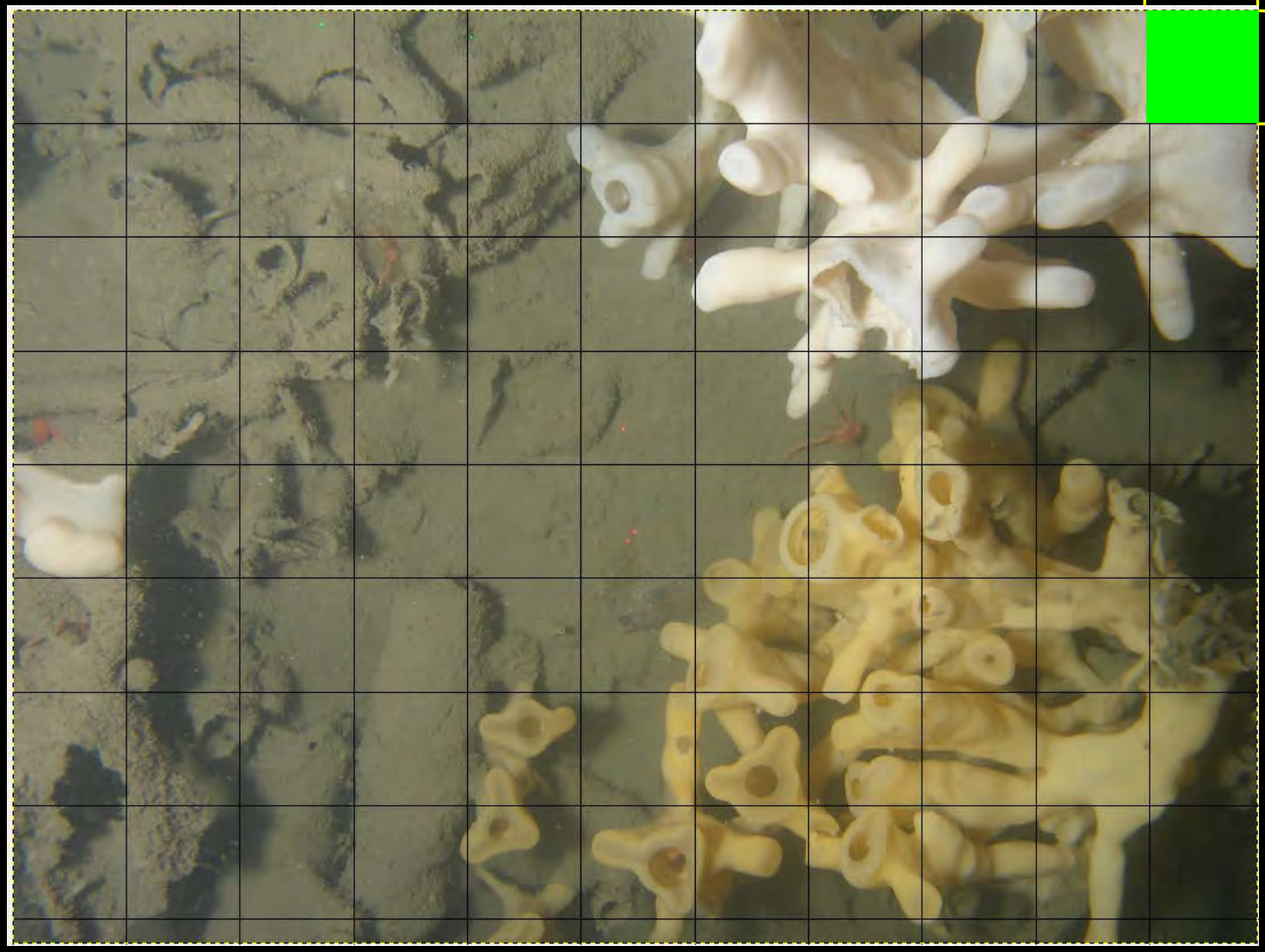
Howe Sound (QC Channel)

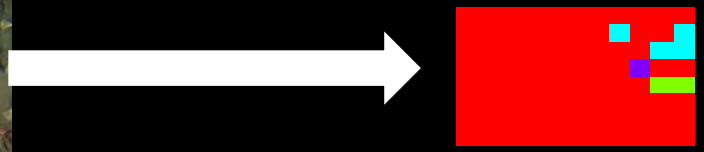


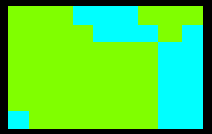

10cm
10cm

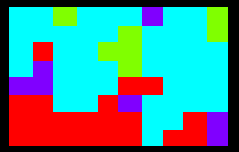
Hard substrate
Mud
Live Reef Sponge
Dead Reef Sponge

Rosellidae sponges
Other sponges
Non-sponge sessile biota









0
None

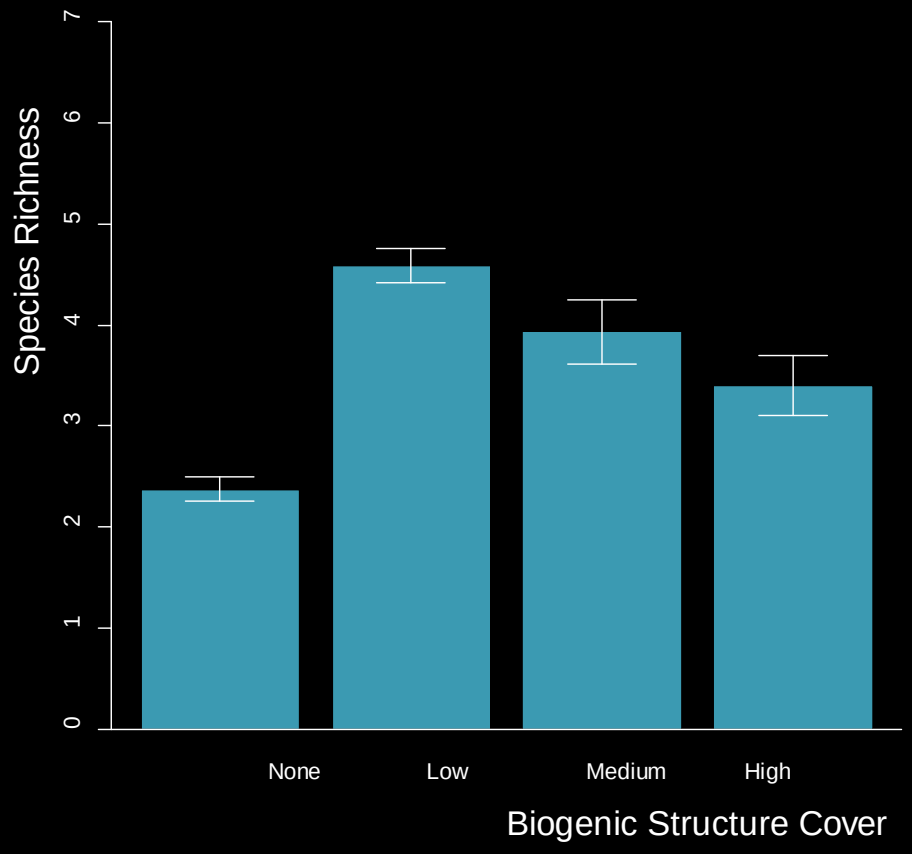
0 < x ≤ 10%
Low

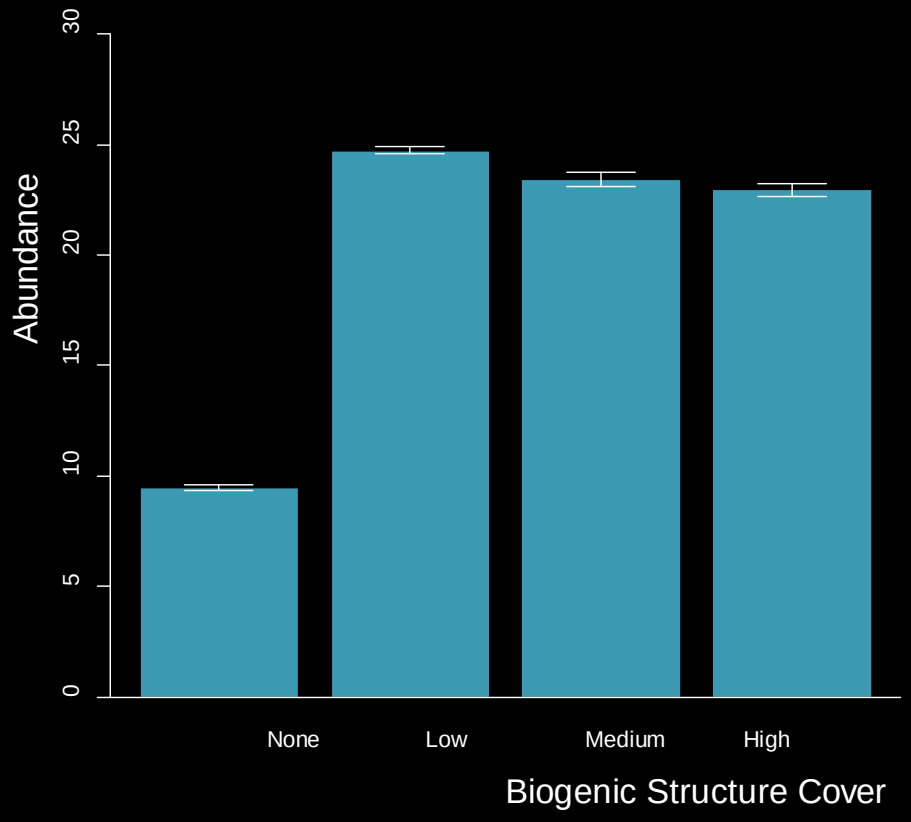
10 < x ≤ 35%
Medium

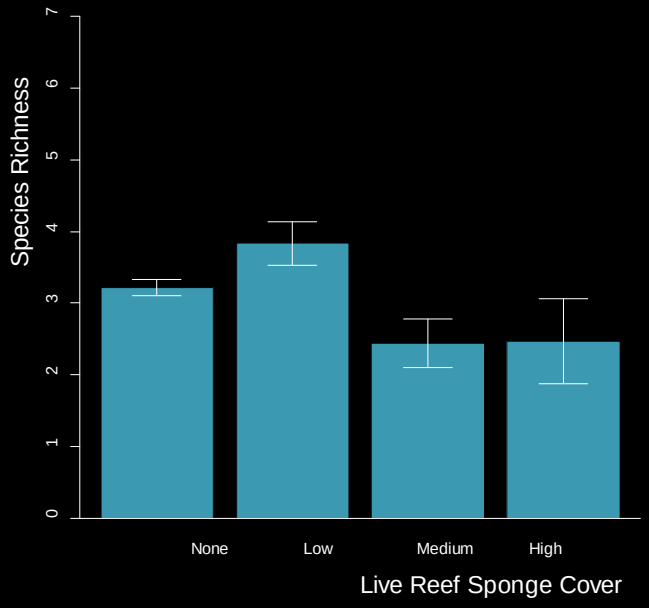
x > 35%
High

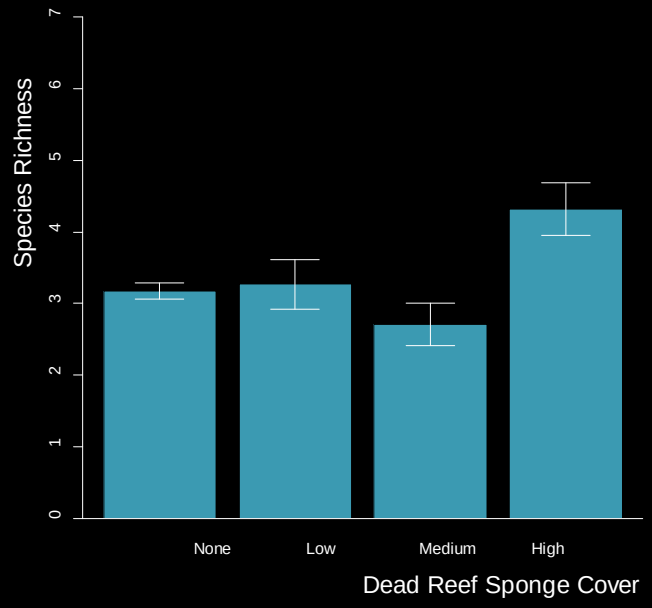
Chu and Leys. 2010. MEPS

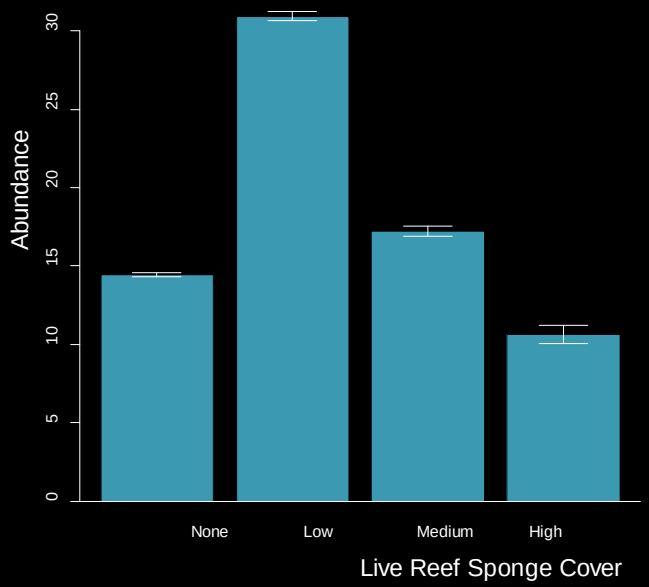
Sponges (live and dead) increase species richness and abundance

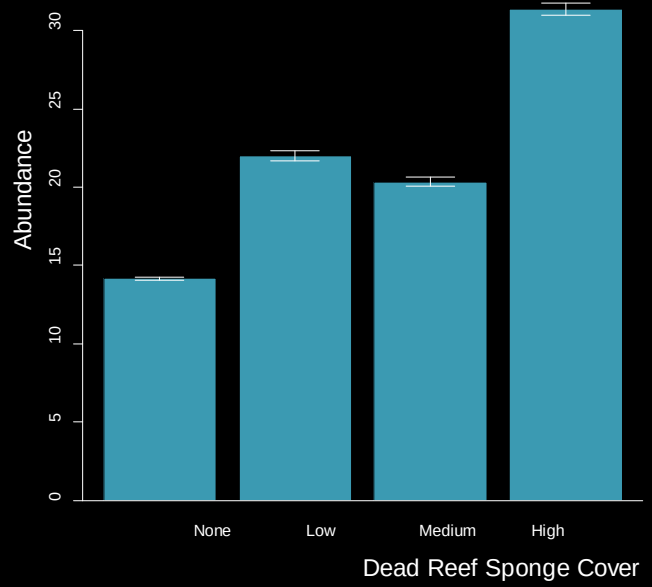


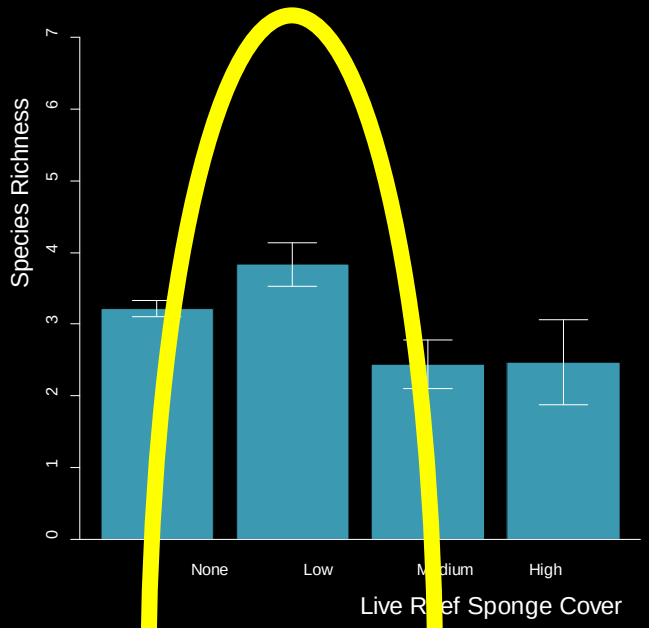


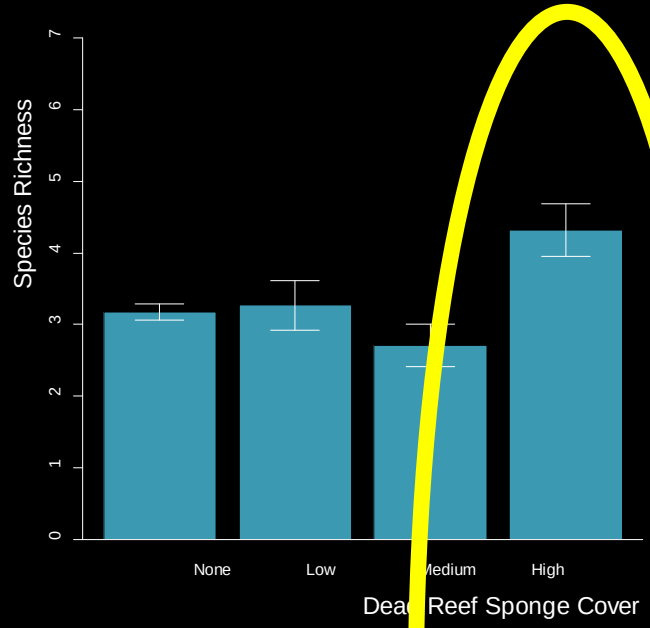

Species Richness
0
1
2
3
4
5
6
7
None
Low
Medium
High
Live Reef Sponge Cover

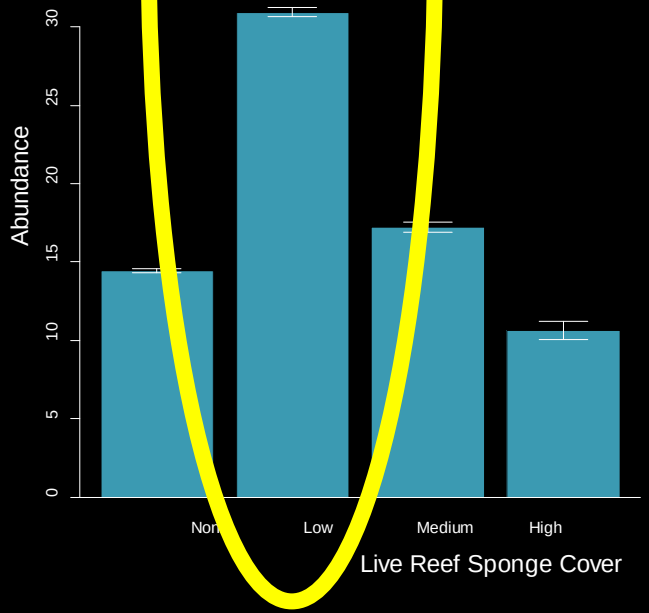

Species Richness
0
1
2
3
4
5
6
7
None
Low
Medium
High
Dead Reef Sponge Cover

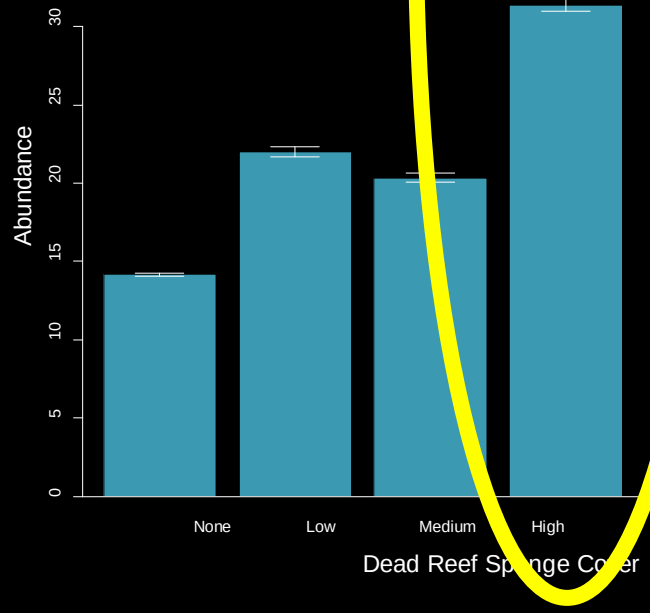

Abundance
0
5
10
15
20
25
30
None
Low
Medium
High
Live Reef Sponge Cover


Abundance
0
5
10
15
20
25
30
None
Low
Medium
High
Dead Reef Sponge Cover


Species Richness
0
1
2
3
4
5
6
7
None
Low
Medium
High
Live Reef Sponge Cover


Species Richness
0
1
2
3
4
5
6
7
None
Low
Medium
High


Abundance
0
5
10
15
20
25
30
None
Low
Medium
High
Live Reef Sponge Cover


Abundance
0
5
10
15
20
25
30
None
Low
Medium
High

Detection rates in high sponge cover

Detection rates in high sponge cover

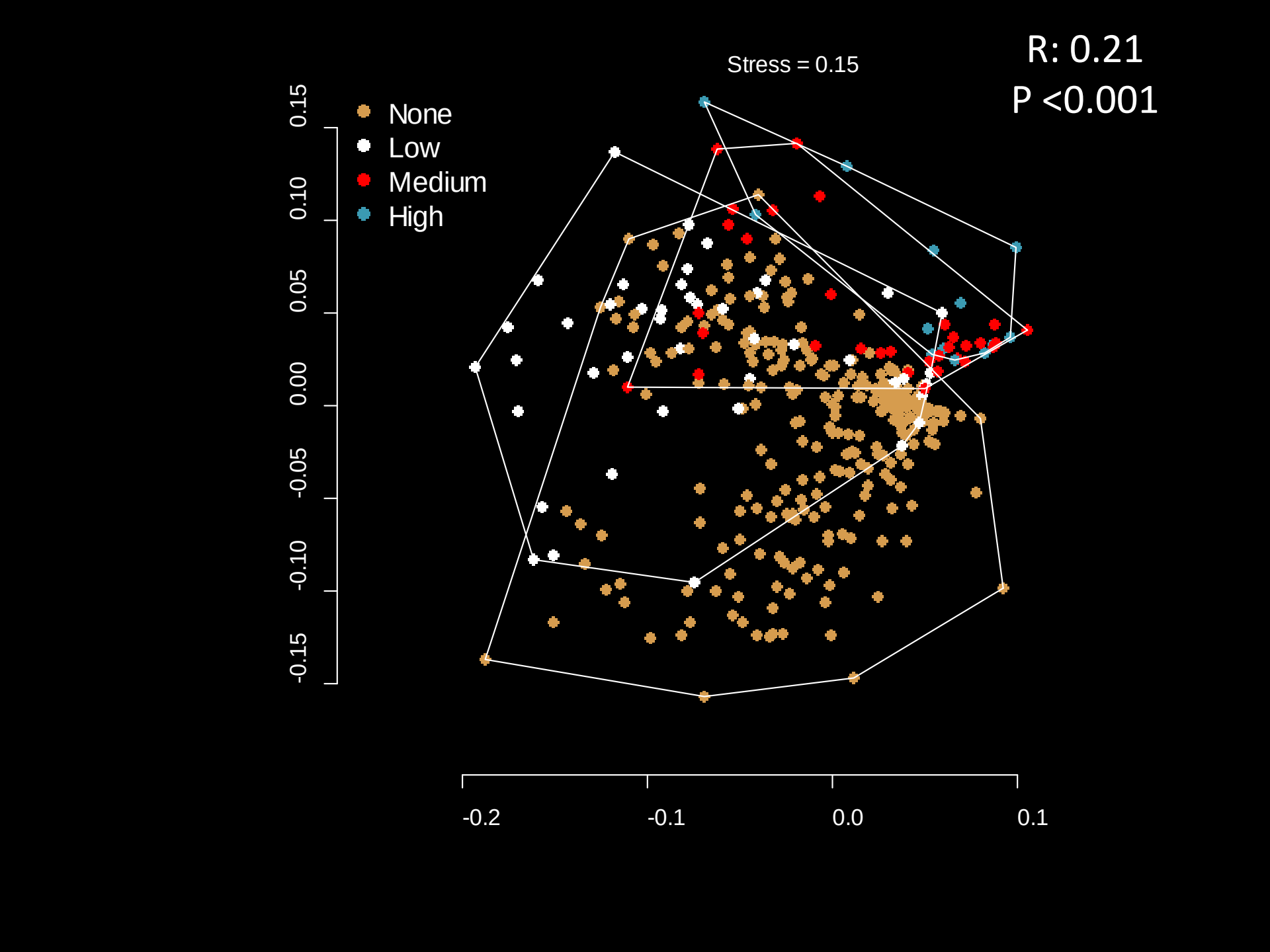
Average Image larger when sponge is present

No sponge: 0.72 m^2

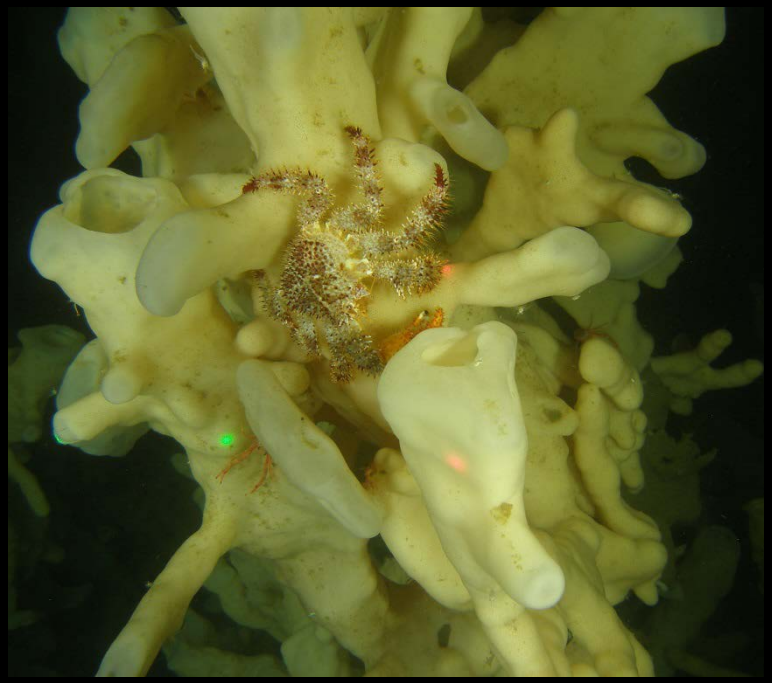
Dead Sponge: 1.16 m^2

Live Sponge: 1.23 m^2

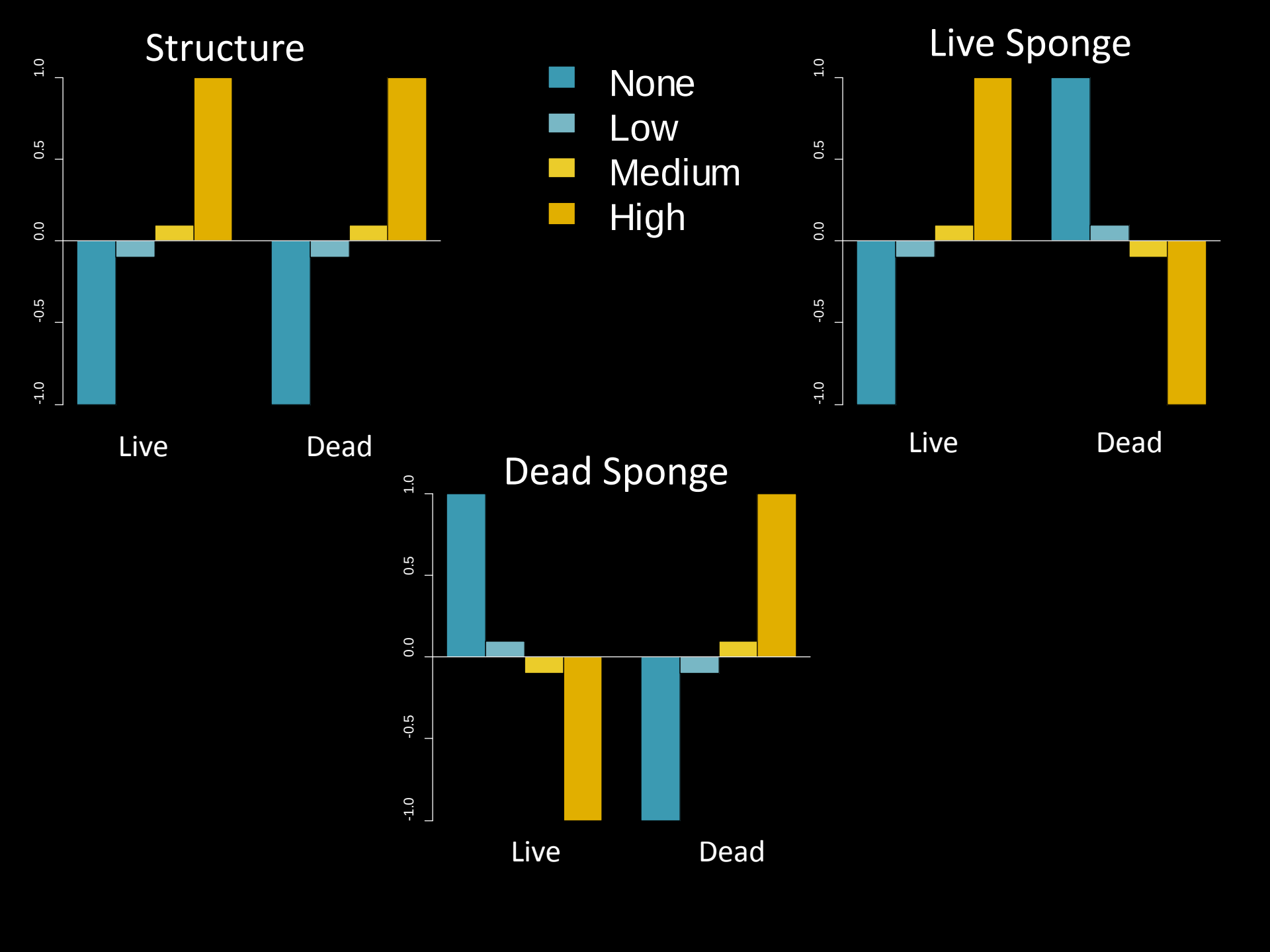
ROV further off bottom in areas of sponge cover


Stress = 0.15
R: 0.21
P <0.001
None
Low
Medium
High
0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15
-0.2
-0.1
0.0
0.1

Species Associations



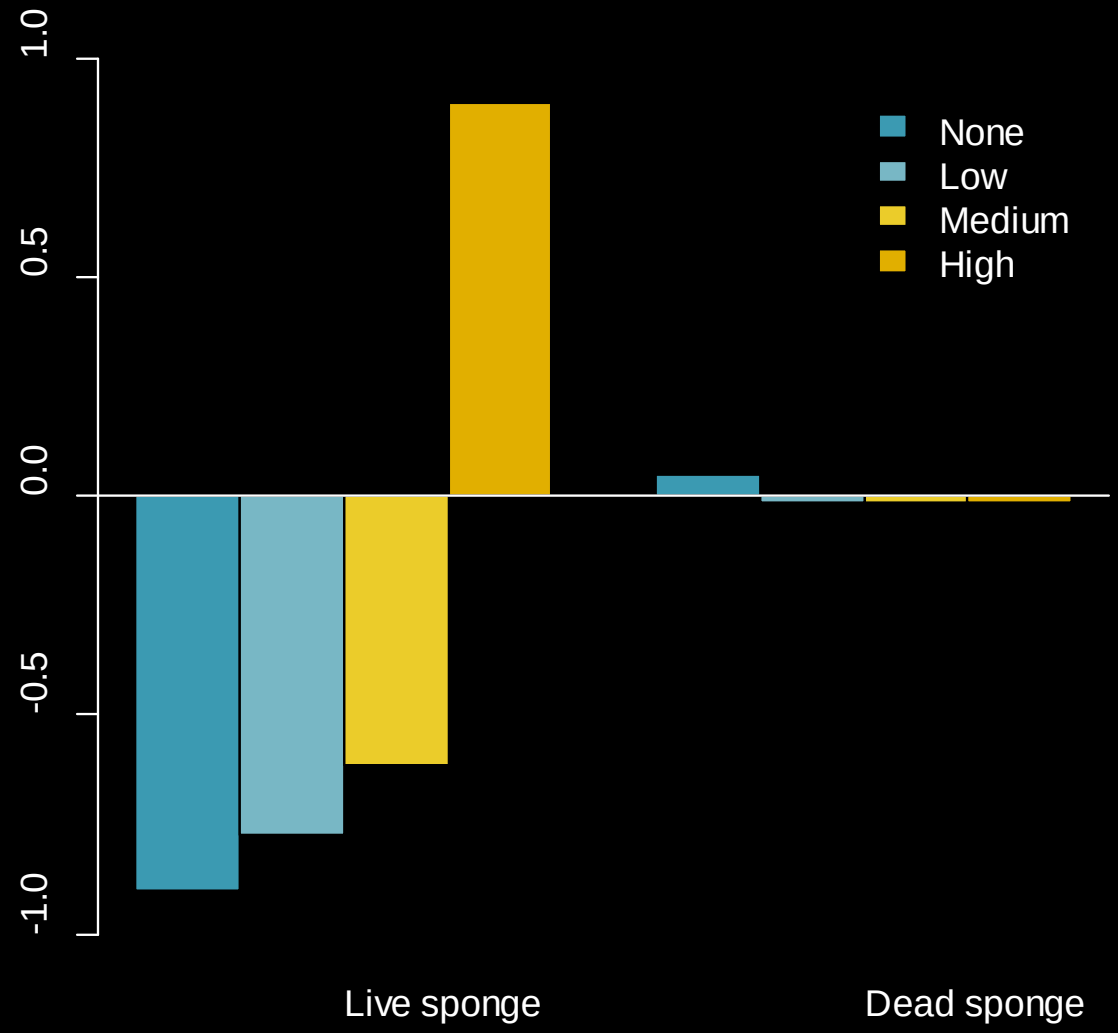
- "Species" observed ≥ 5 individuals
- Group-standardized correlation of general abundance (Cáceres and Legendre 2009)
  - -1 to 1, 0 = no preference
  - Comparable across groups of different sizes


Structure
1.0
0.5
0.0
-0.5
-1.0
Live
Dead
None
Low
Medium
High
Live Sponge
1.0
0.5
0.0
-0.5
-1.0
Live
Dead
Dead Sponge
1.0
0.5
0.0
-0.5
-1.0
Live
Dead

Species Associations

- 27 “species” observed ≥ 5 times
- 13 groups exhibited significant habitat associations
- Ophiuroidea significantly associated with no structure
- 5 groups associated with structure
- 3 groups associated with live sponges
- 2 groups associated with dead sponges
- Spot prawns and small shrimp associated with low live sponge & high dead sponge cover

Sebastes sp.

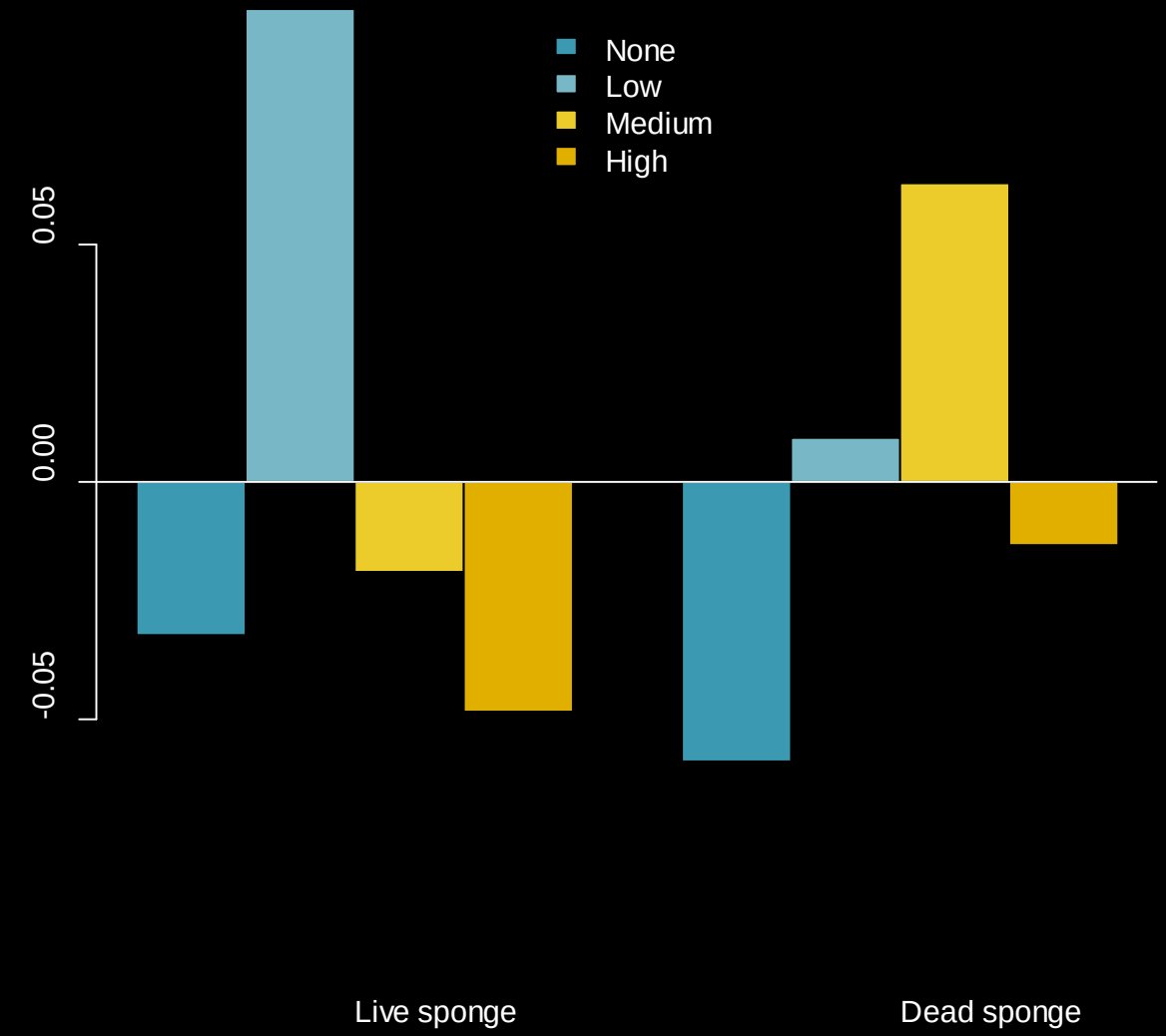


Live sponge Associations

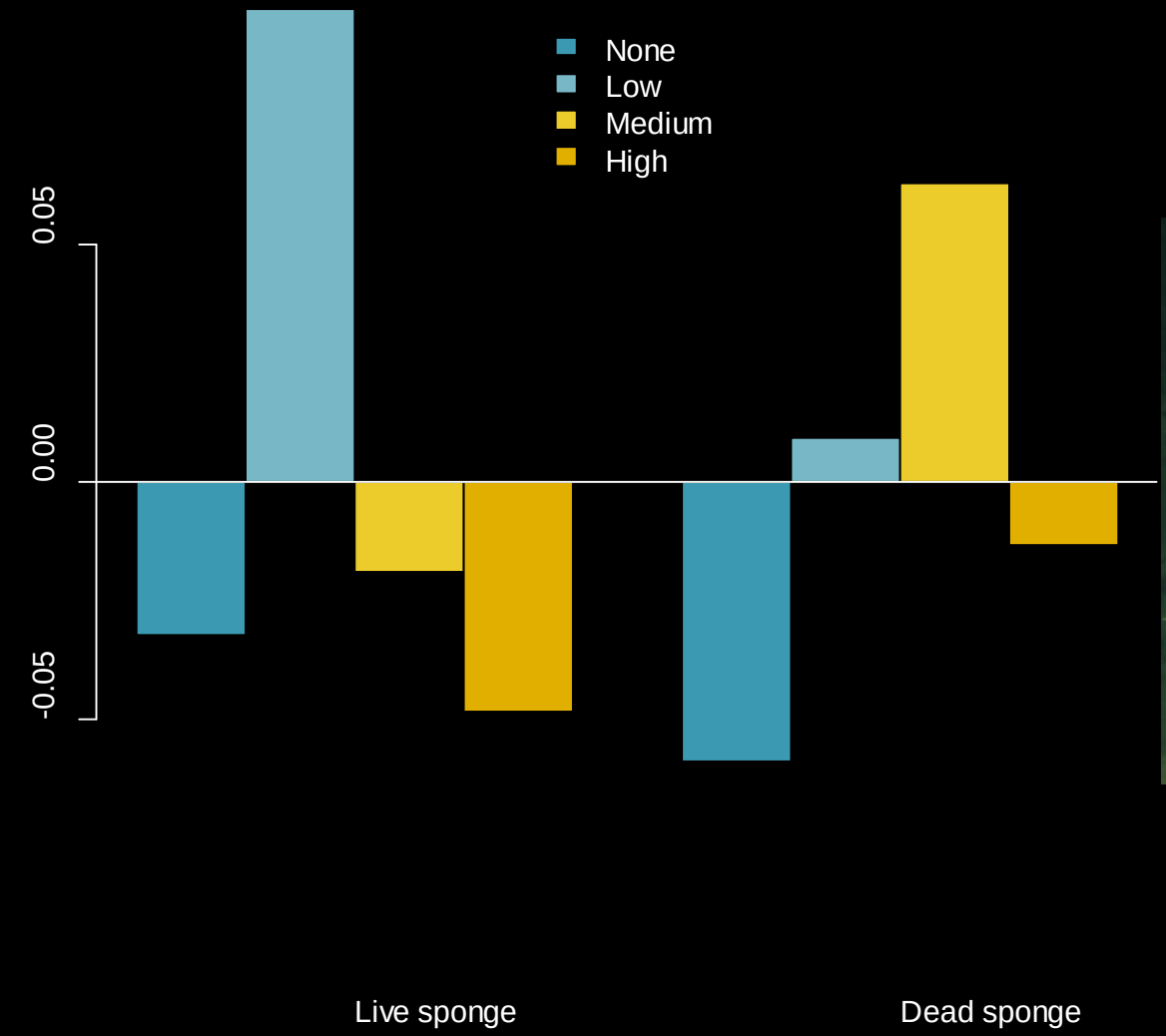
Chorilia longipes

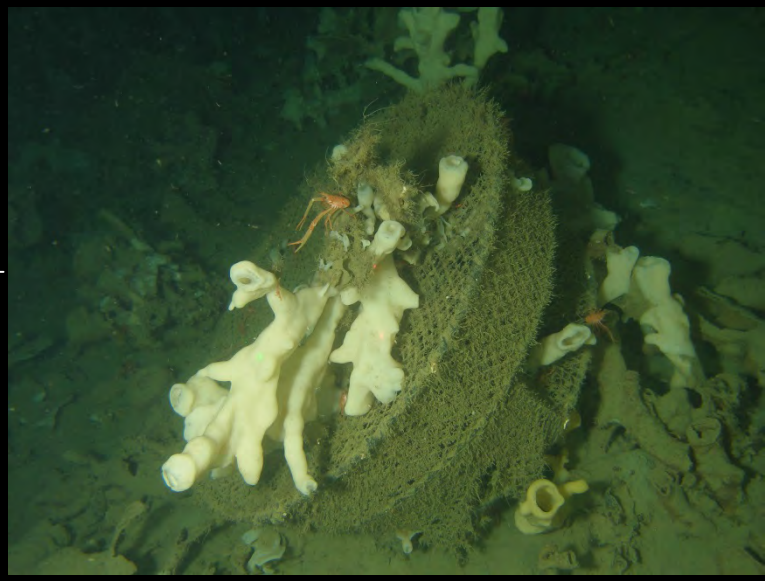
Ceramaster patagonicus

Pandalus platyceros

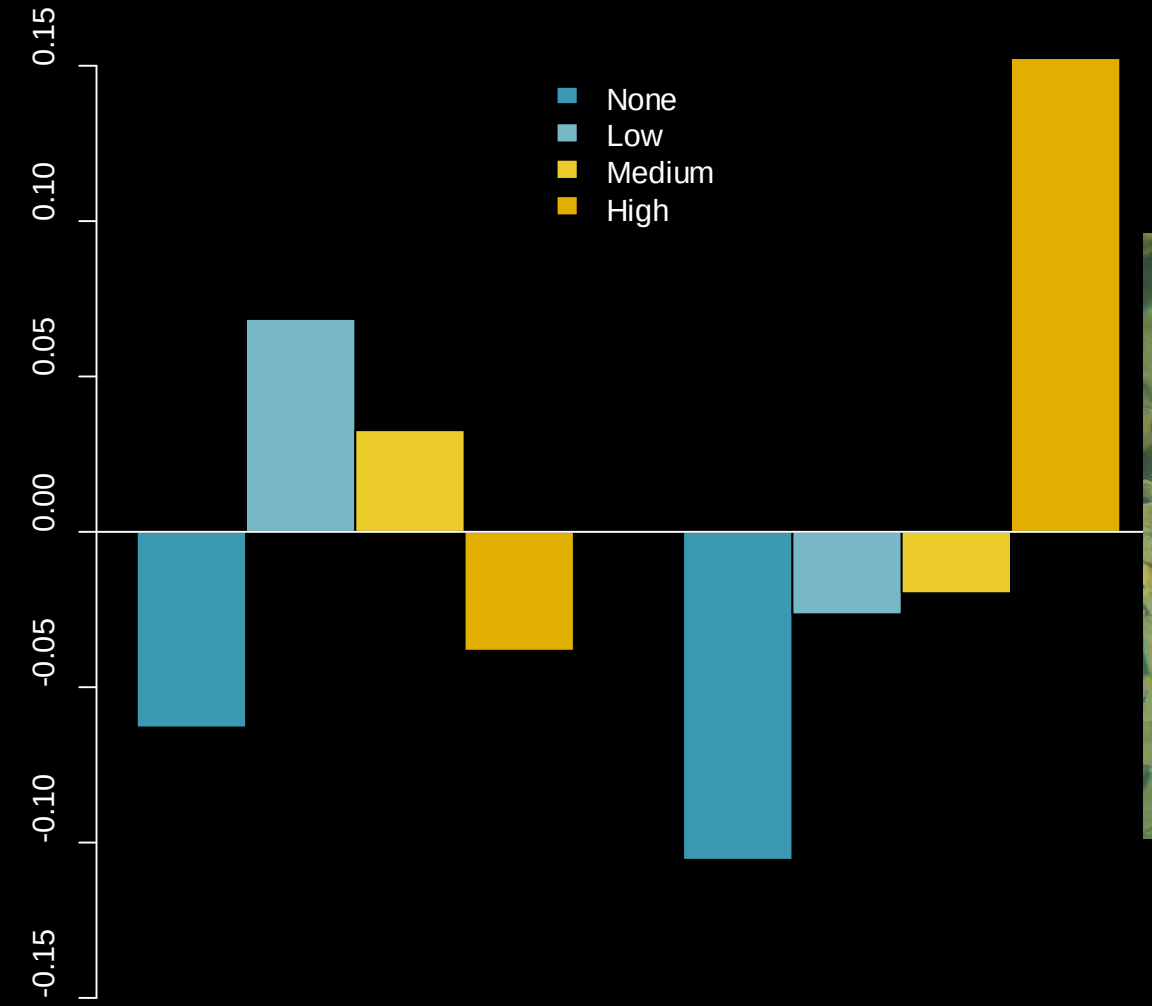


Pandalus platyceros





Munida quadrispina



Conclusions

- Characterizing the community structure in high complexity areas difficult
- Biogenic structure does influence community structure
- Live sponges influence community structure beyond influence of structure provided

Conclusions

- Rockfish display a strong preference for live sponge
- Squat lobsters are common
  - Significant preference for dead sponge
- Spot Prawns not associated with areas of high sponge cover

Questions?