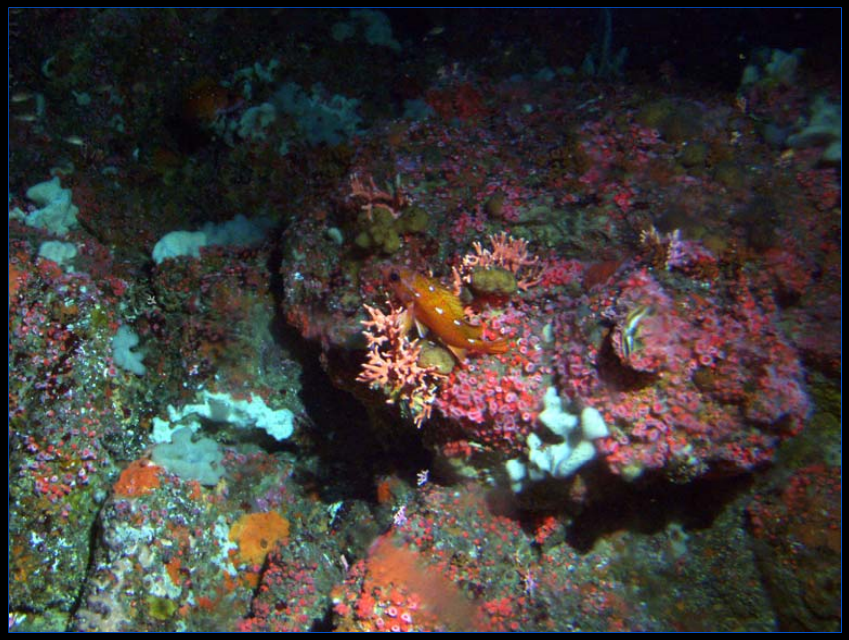
Habitat-Based Assessment of Megafaunal Invertebrates and Fish on Cordell Bank, California

Invertebrates as Living Components of Habitat



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3 Point Reyes National Seashore

Collaborators

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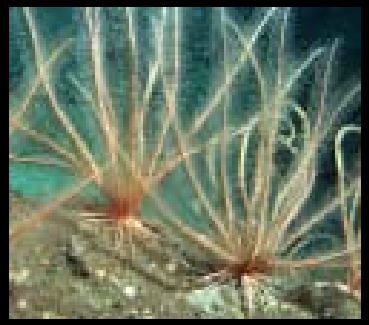
Megafaunal Invertebrates



Epibenthic invertebrates larger than 5cm

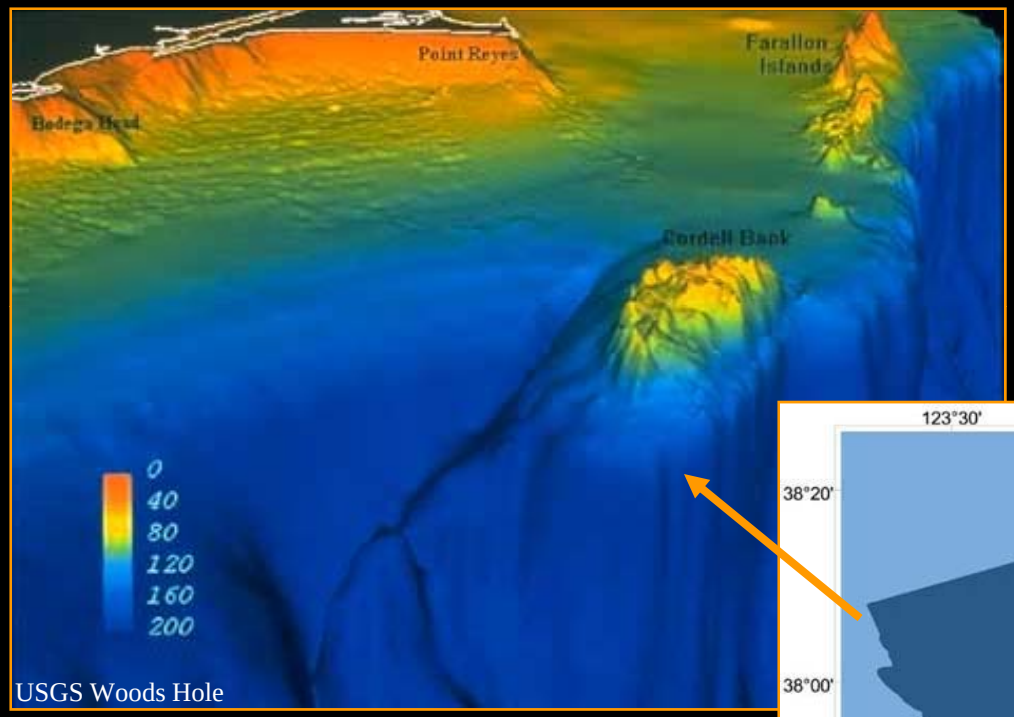
Objectives

- Importance of megafaunal invertebrates
- Distribution of invertebrates and fish
- Cordell Bank communities
- Structure-forming invertebrates and associations

Importance of Megafaunal Invertebrates

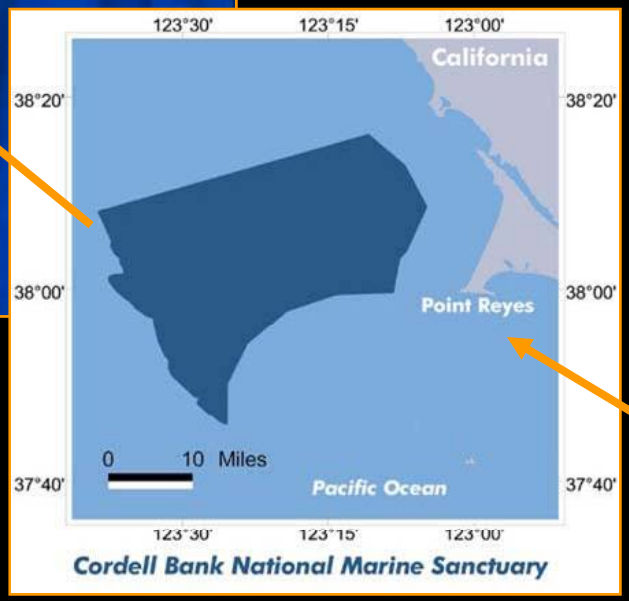
- Biodiversity
- Important ecosystem components
- Indicate environmental conditions
- Potential component of essential habitat for groundfish?
- Unique and beautiful

Cordell Bank Marine Sanctuary



USGS Woods Hole

N



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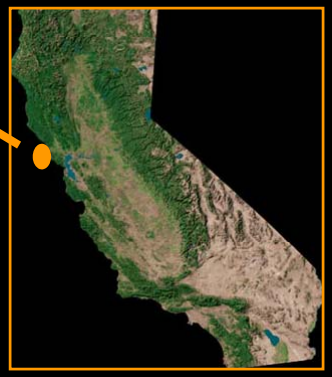
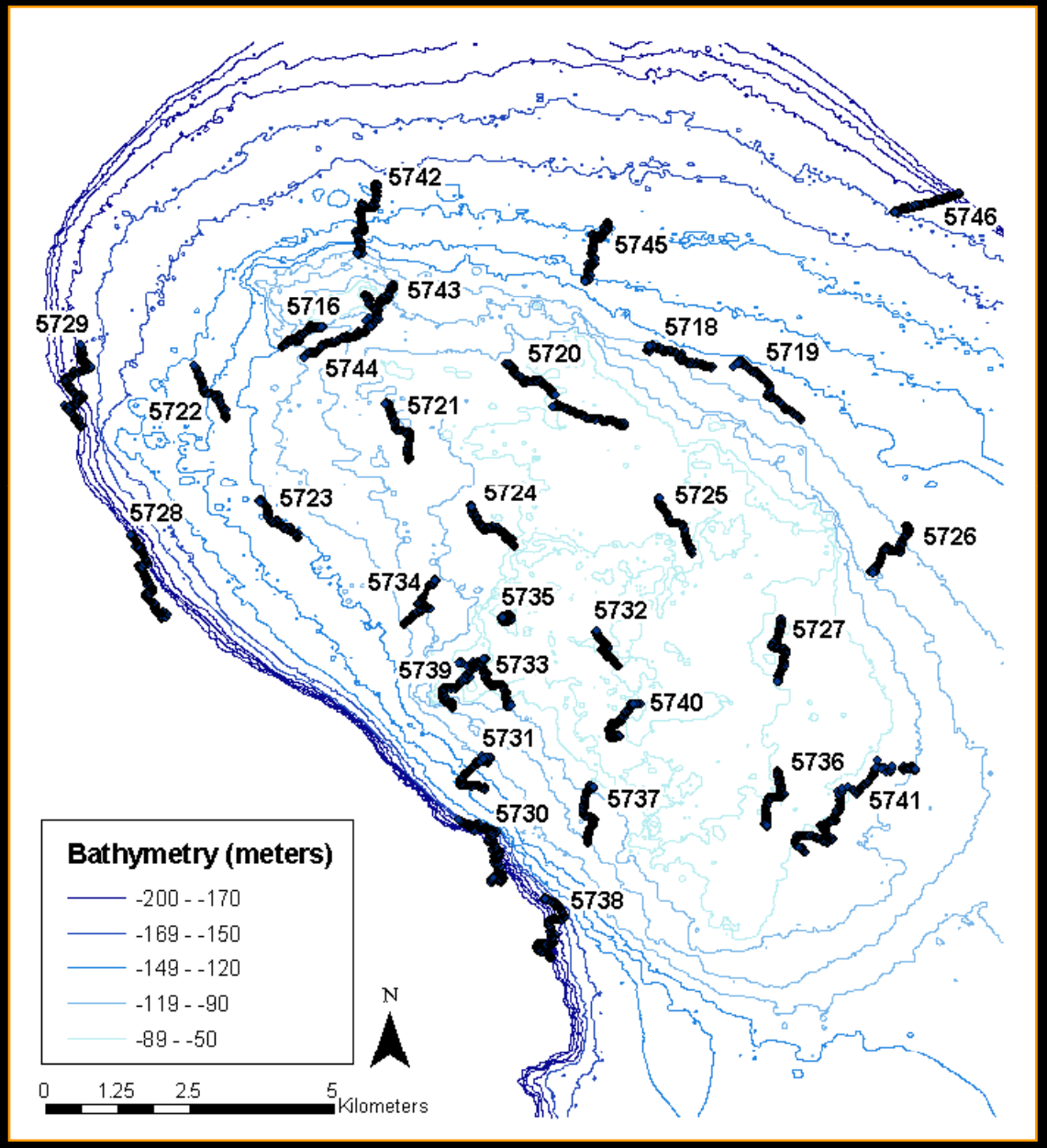


Dive Locations

- 28 dives
- Variety of depths and bottom types
- 2 or 3 transects (10-15 min each)



Methods

Submersible Observations:

- Taken off starboard-side
- Transect width delineated with lasers ≈ 2 m
- Fish identified and measured

Video Analysis:

- Invertebrates identified
- Size estimated for large invertebrates

Habitat Classification

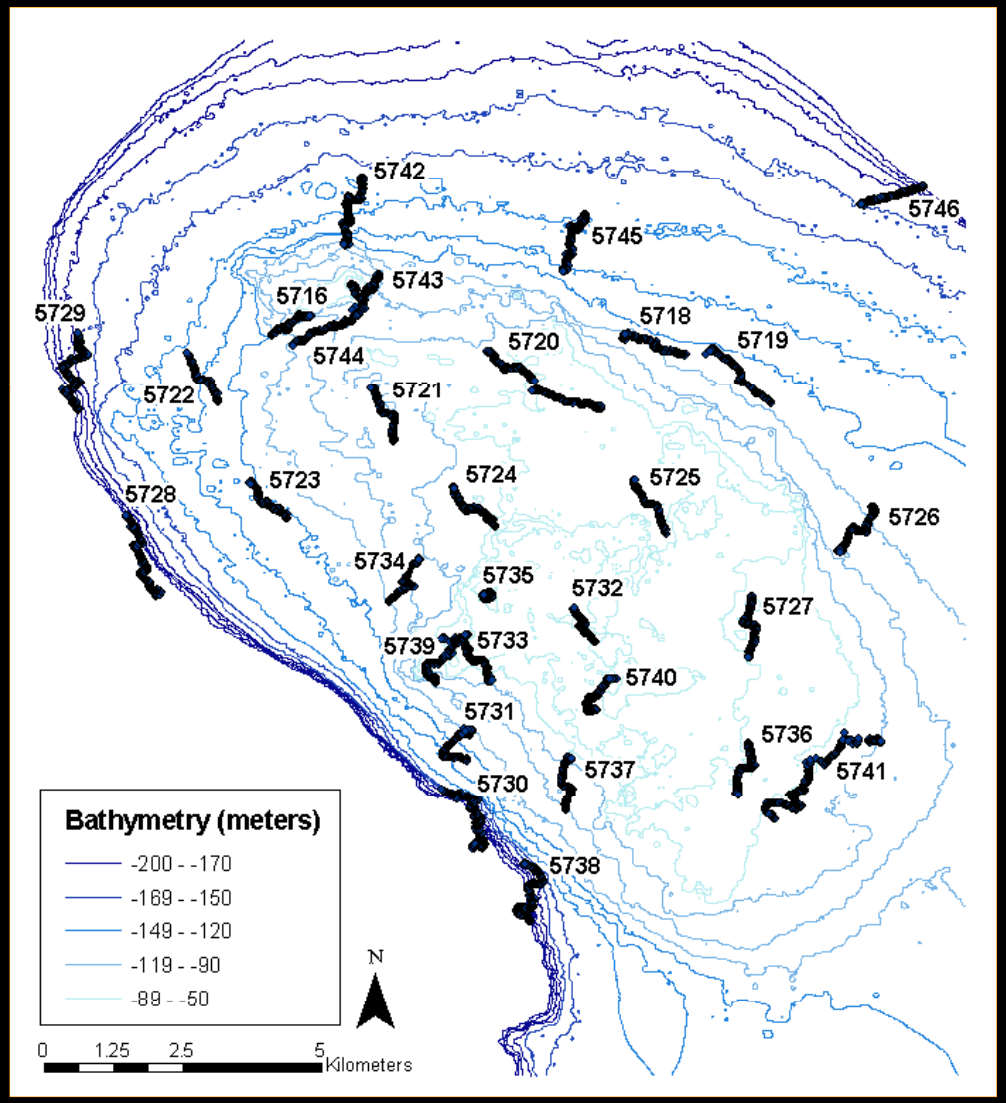
- Classified on video by single observer
- Use binary habitat code combination (R, B, C, P, G, S, M)
- Invertebrates and fish counted within contiguous habitat “patches”

Habitat Codes:

RR, RB, RS, RM, BR, BB, BC, BS, BM, CB, SR, SB, SS, MR, MB, MM

High ← Relief → Low

Cordell Bank Habitats



Pinnacle

Bedrock Ridge

Shallow Rock Reef

Ridge/Large Boulders

Boulder Field

Boulder/Cobble Field

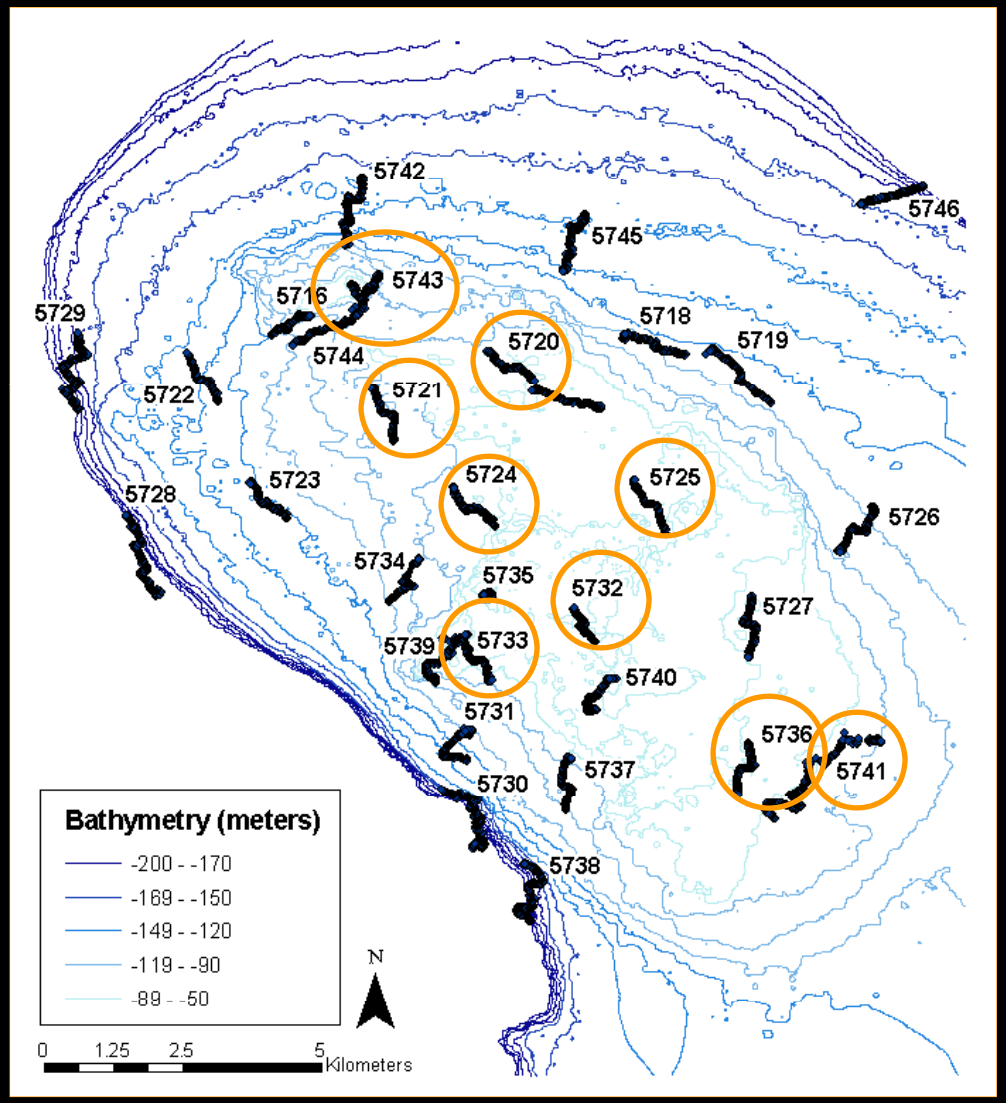
Consolidated Clay

Sand Sand/G

Mud/Rock Mud/B Mud/C

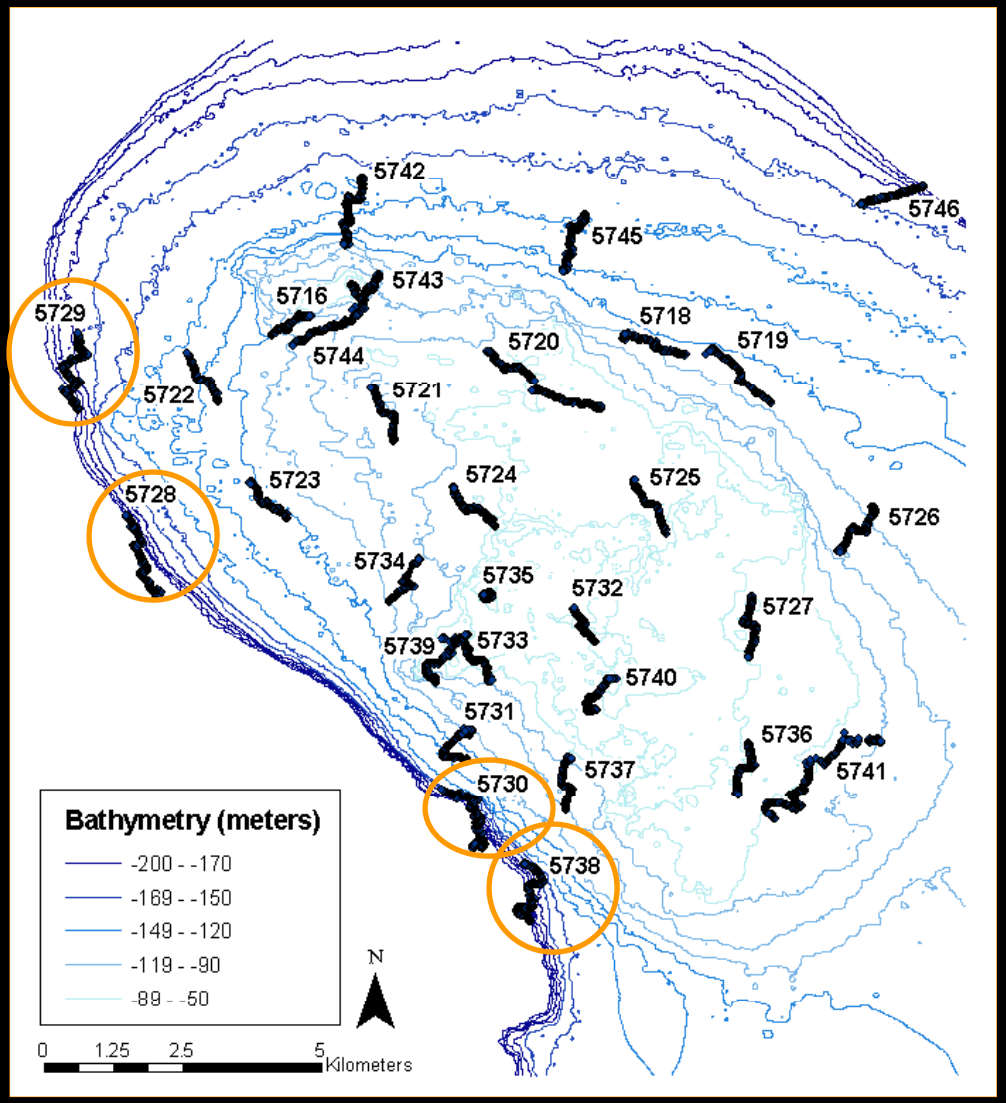
Unconsolidated Sediment

Cordell Bank Habitats



Shallow Rock Reef

Cordell Bank Habitats



Consolidated Clay

Invertebrate Assessment

- 67 taxa from 7 Phyla
- 89,000 invertebrates counted
- Numerically dominated by -
  - Echinoderms: crinoids, brittlestars
  - Cnidarians: cup coral, anemones, sea pens

Most Abundant Invertebrate Taxa

Taxa	Sum	%	Cum %
Balanophyllia elegans	*36,016*	*41*	*41*
Florometra serratissima	*30,226*	*34*	*75*
Ophiacanthidae	*10,745*	*12*	*87*
Mediaster aequalis	*1,679*	*2*	*89*
Parastichopus spp.	*1,249*	*1*	*90*
Serpulid worms	*1,228*	*1*	*91*
Unknown anemones	*1,139*	*1*	*92*
Foliose sponges	*1,124*	*1*	*93*
Ceramaster spp.	*964*	*1*	*94*
Unknown sand anemones	*771*	*<1*	*95*
Allocentrotus fragilis	*573*	*<1*	*96*
Subsellaflorae sea pens	*486*	*<1*	*97*

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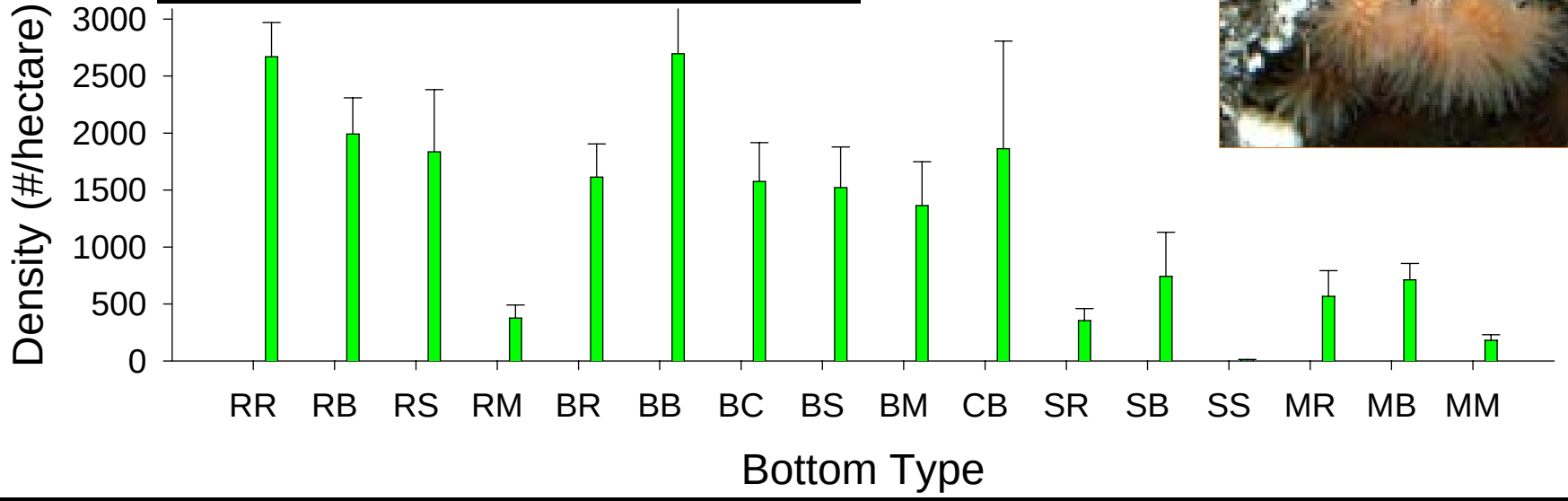
Invertebrate-Habitat Assessment

Balanophyllia elegans



Invertebrate-Habitat Assessment

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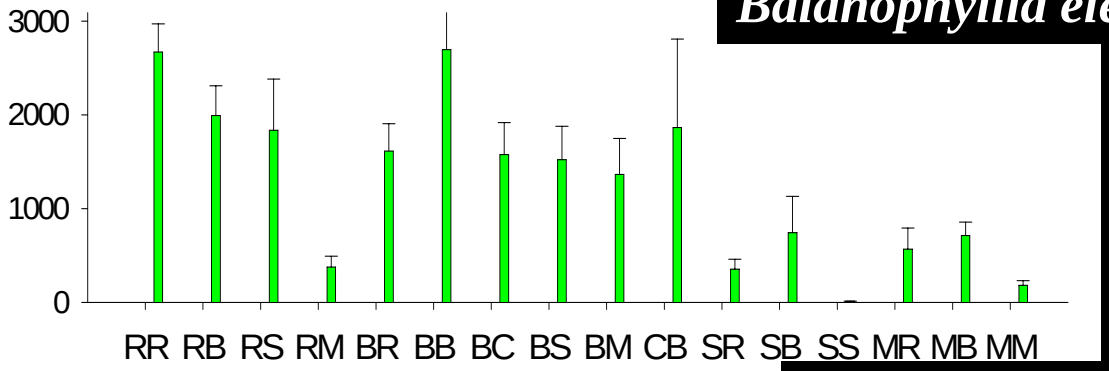
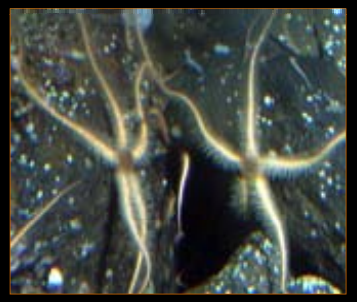
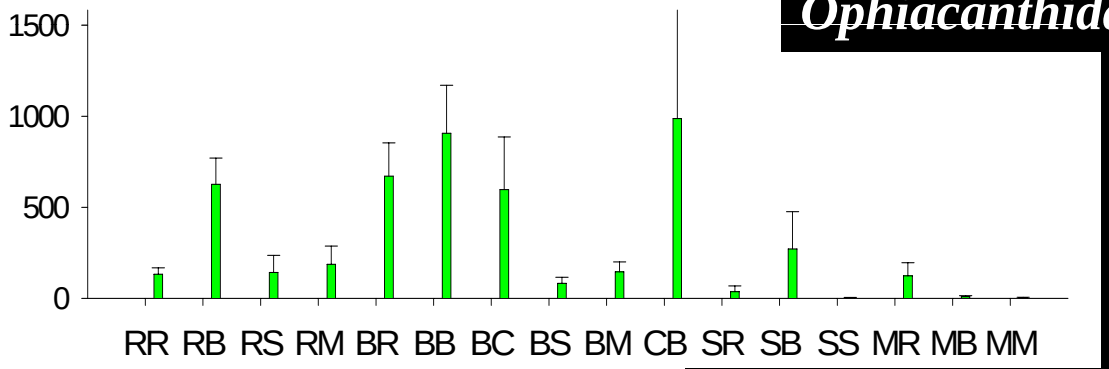
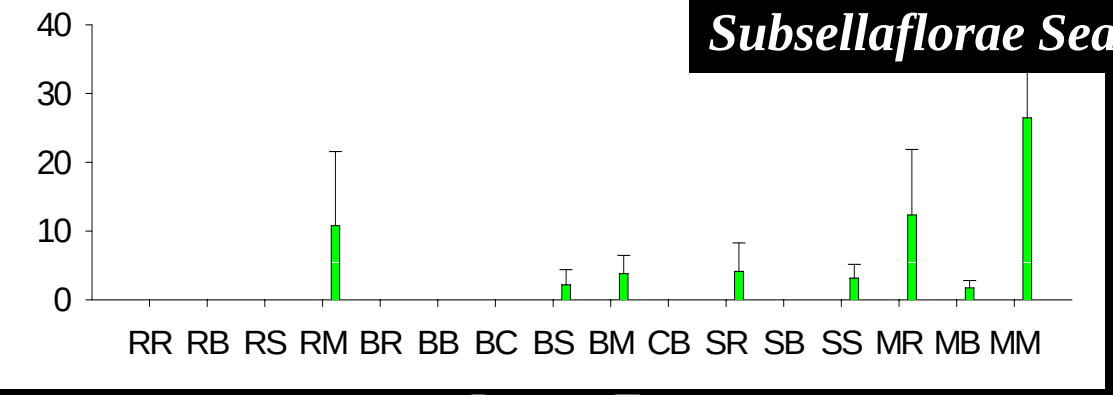


Ophiacanthidae



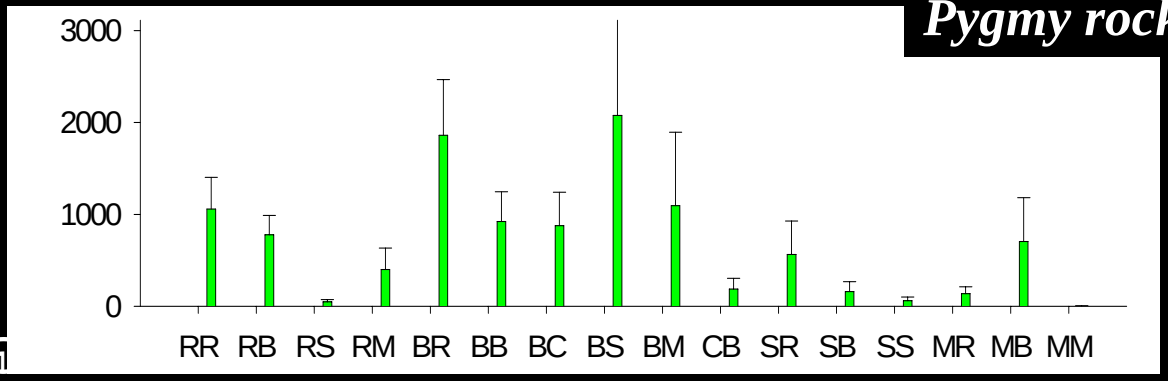


Subsellaflorae Sea Pens

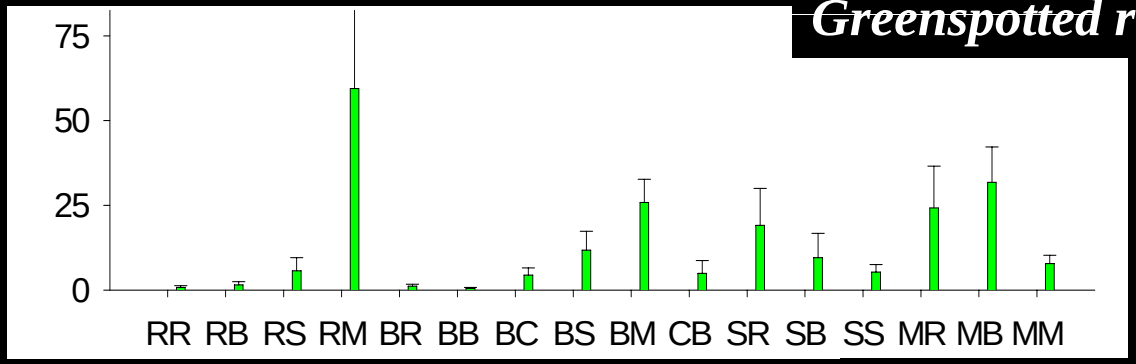


Fish-Habitat Assessment

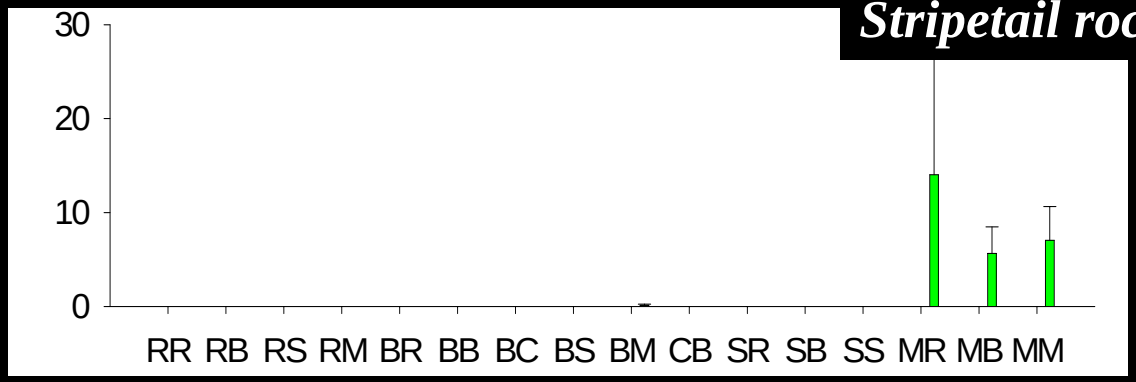
Pygmy rockfish



Greenspotted rockfish



Stripetail rockfish



Density (#/hectare)

Bottom Type

Cordell Bank Communities

RR/DR(cyn/sp)/602/600/ytail/wdo/rosy

Cordell Bank Communities

RR/SRT(sty/cyn/z/sp)/rosy/ytail/byg

Cordell Bank Communities

MR/R/14/45/stripe/sharp/flat

Cordell Bank Communities

BC/R/51/54/20/pygmy/yoy/ling

Structure-forming Invertebrates

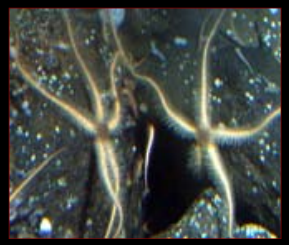
- Add structure, relief, and complexity to abiotic habitat
- Biological component of benthic habitat in continental shelf communities

Classification Criteria

- Large size > 30 cm =

- Complex Morphology =

- Density Aggregations =



Structure-forming Invertebrates

Taxa	Criteria		
	Size	Complex Morphology	Density
Shelf sponge	x		
Barrel sponge	x		
Foliose sponge	x	x	
Vase sponge	x		
White-plumed anemone	x		
Flat sponge	x		
Sea pen	x		x
Mound sponge	x		
Crinoid		x	x
Round sponge			x
Gorgonian		x	
Brittlestar			x
Sea urchin			x
Cup coral			x

Decreasing size

Sponges of Cordell Bank

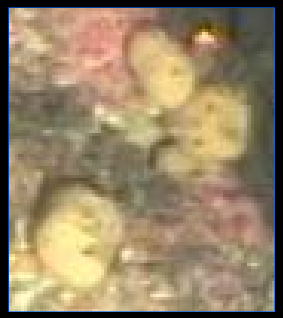
Foliose

Mound

Not pictured -
Flat and Vase

Barrel

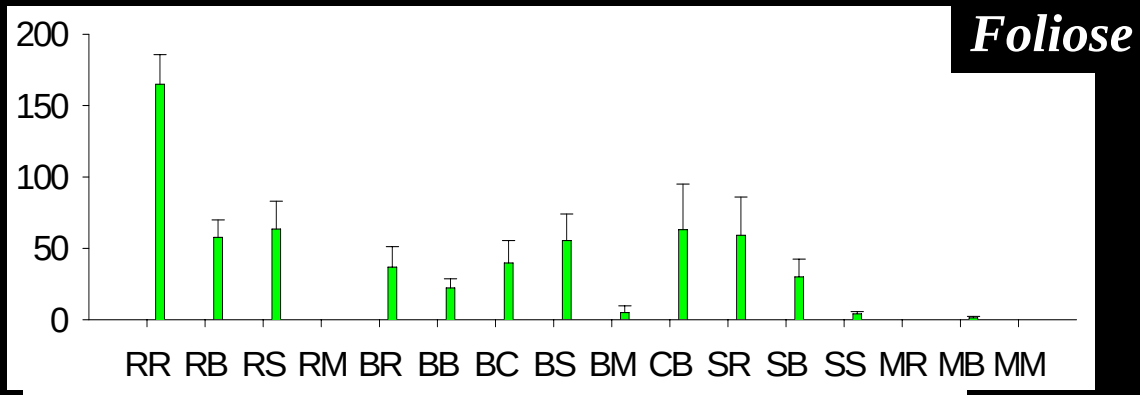
Round

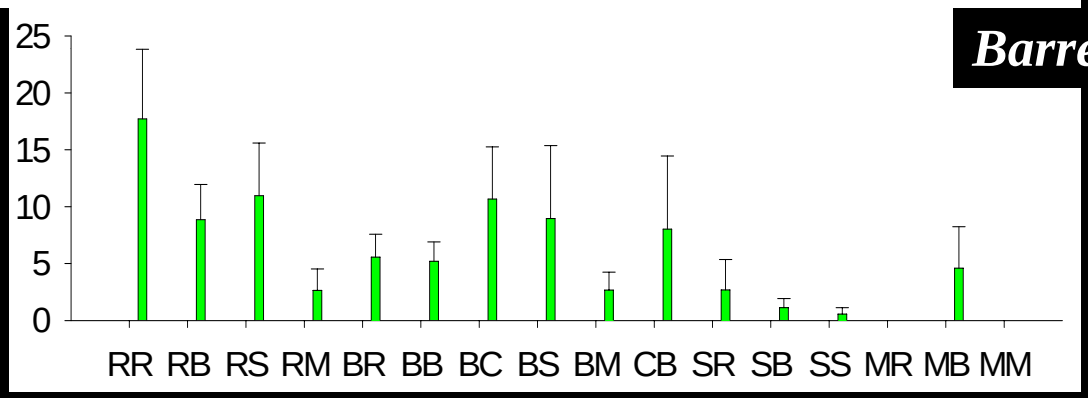


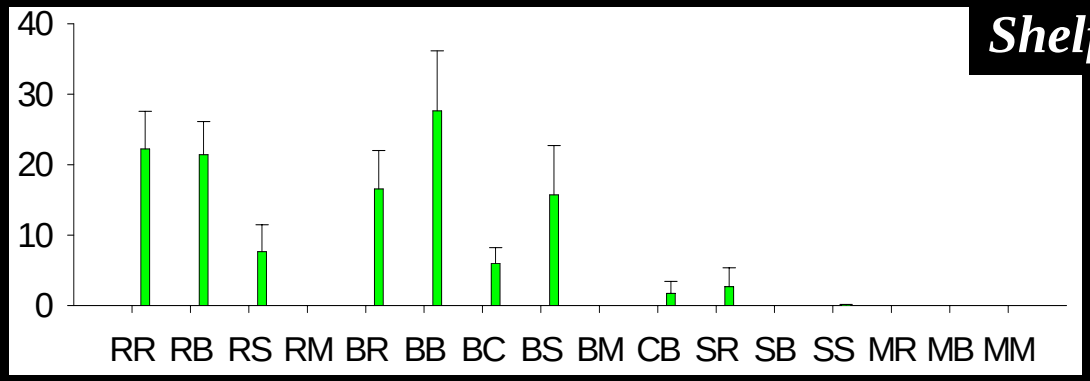
Shelf

Classification based on morphology

Sponge Habitat







Density (#/hectare)

Bottom Type

Sponge Associations

Perching

Shelter

Perching

Predator/Prey

Other Associations

Conclusions

- Invertebrates and fish distributed across distinct habitats
- Co-occur in unique communities
- Certain invertebrates may be biological components of habitat
- Functional relationship of associations needs to be further investigated

Where we go from here

- Habitat in greater detail and relief analysis
- Percent cover of encrusting species
- Examine functional relationship of associations
  - Index of activity
  - Spatial analysis