

# Diverse Estuaries in Your Backyard

HSU MPA Symposium  
May 5, 2017

<sup>1</sup>Frank Shaughnessy, <sup>1</sup>Eric LeBlanc, <sup>1</sup>Katie Osborn, <sup>1</sup>Tim Mulligan,  
<sup>2</sup>Stephen Kullmann, <sup>3</sup>Neil Kalson, <sup>3</sup>Ken Lindke, <sup>4</sup>John Largier

<sup>1</sup> Humboldt State University

<sup>2</sup> Wiyot Tribe

<sup>3</sup> H.T. Harvey & Associates

<sup>4</sup> University of California, Davis



# Acknowledgements



HSU Students  
Zachary Badoui  
Georgia Bennett  
Scott Benson  
Leon Davis III  
Simone Groves  
Mary C. Hannon  
Katie Houle  
Kaitlyn Manishin  
Chad Martel  
Justin Mojonier  
Andrew Perera  
Torre Polizzi  
Johnny Roche  
Ellis Smith  
Cari Williams



Adam Frimodig (CFW)  
Gina De La Rosa (CFW)  
Brian Owens (CFW)  
Margaret Petty (landowner)  
Renee Pasquinelli (CA Parks)  
Bill Pinnix (USFW)  
Dave Farrel (Mad River Alliance)  
Tim Nelson (Wiyot Tribe)  
Eddie Koch (Wiyot Tribe)  
Fiona & Dion Shaughnessy  
Hawk Rosales (InterTribal  
Sinkyone Wilderness Council)



South Humboldt Bay MPA (SMRMA); students processing infaunal samples

## Permitted/prohibited uses and exemptions in the four estuaries used in the present study.

	Estuary	MLPA Permitted/Prohibited Uses	MLPA Exemptions
	Mad River Estuary	<sup>1</sup> None	<sup>1</sup> None
MPA	South Humboldt Bay SMRMA	<sup>2</sup> Take of all living marine resources is prohibited.	<sup>2</sup> Waterfowl, Scientific Collection Permit, Anchoring, Vessel transit, Monitoring, Safety, Tribal take
MPA	Ten Mile Estuary SMCA	<sup>2</sup> Take of all living marine resources is prohibited.	<sup>2</sup> Take pursuant to activities authorized in subsection 632(b)(21)(D) is allowed; Waterfowl, Science Collecting Permit, Anchoring, Vessel transit, Monitoring, Safety, Tribal take
MPA	Big River Estuary SMCA	<sup>2</sup> Take of all living marine resources is prohibited <b>except</b> : -Recreational take of surfperch (family Embiotocidae) by hook and line from shore only. -Recreational take of Dungeness crab by hoop net or hand.	<sup>2</sup> Take pursuant to activities authorized in subsection 632(b)(21)(D) is allowed; Waterfowl, Science Collecting Permit, Anchoring, Vessel transit, Monitoring, Safety, Tribal take

<sup>1</sup> For regulations that apply to all estuaries see: <http://www.dfg.ca.gov/regulations/>.

<sup>2</sup> Text from the Guide to the Northern California Marine Protected Areas by the California Department of Fish and Wildlife

# MPA & non-MPA Estuaries on the North Coast



Point Arena

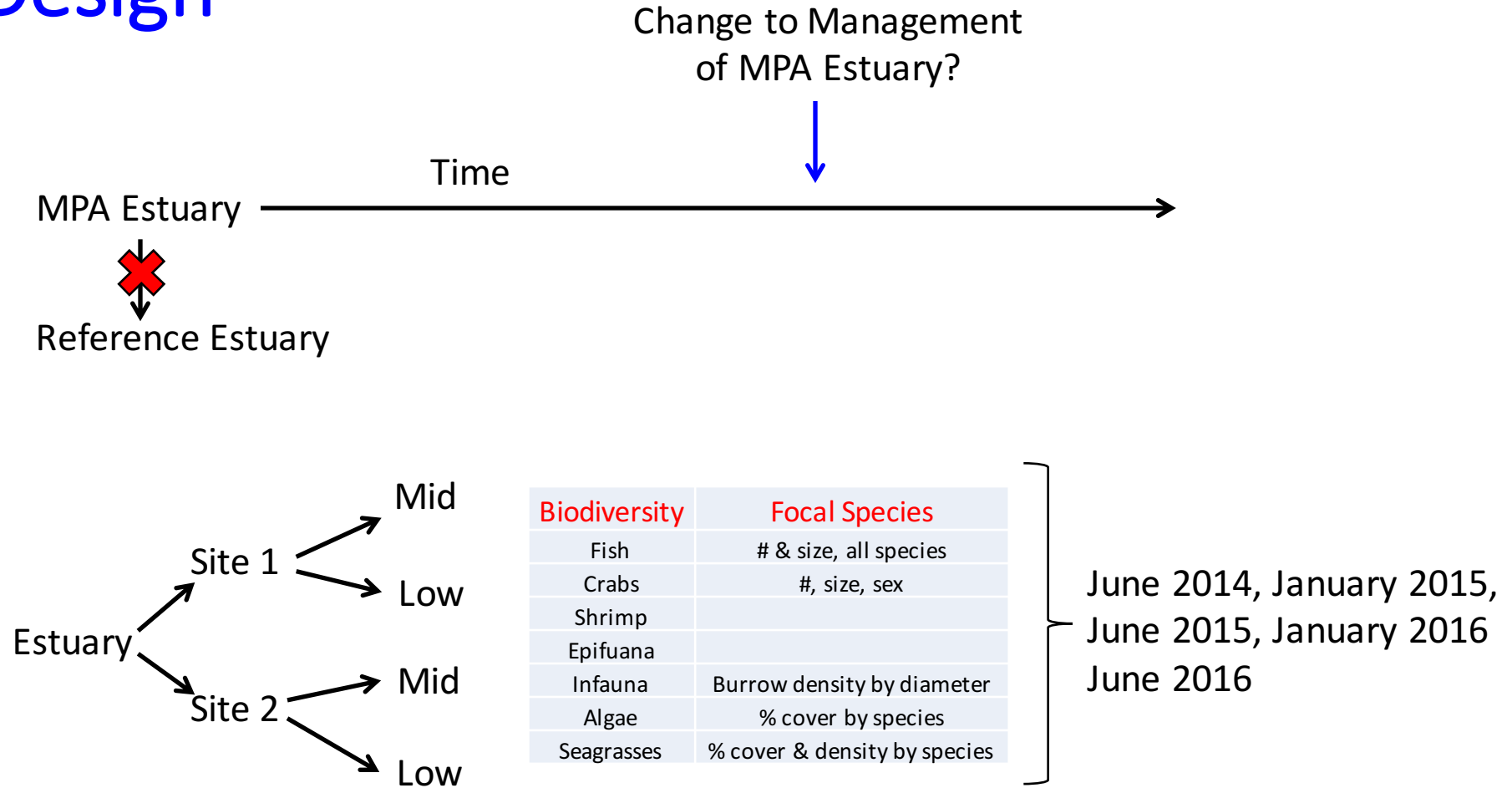
# Objectives of the MPA Estuarine Baseline Study

- To describe the estuarine biodiversity in the North Coast MPA Region
- To provide more detailed information (i.e. abundance, body size) for target species
- To provide contextual descriptions of the physical environment
- To make recommendations on how to focus future monitoring efforts

# Study Estuaries

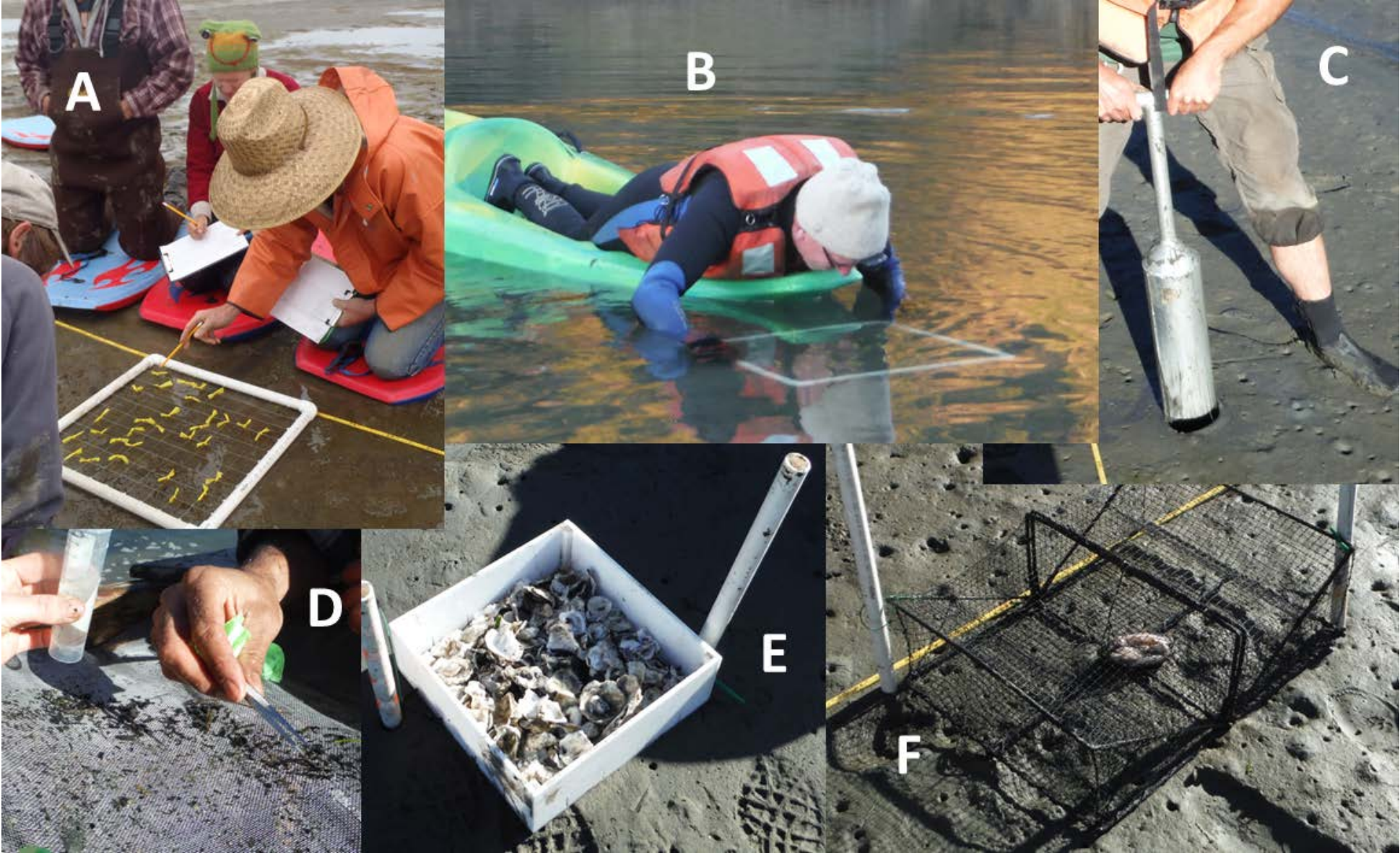


# Study Design





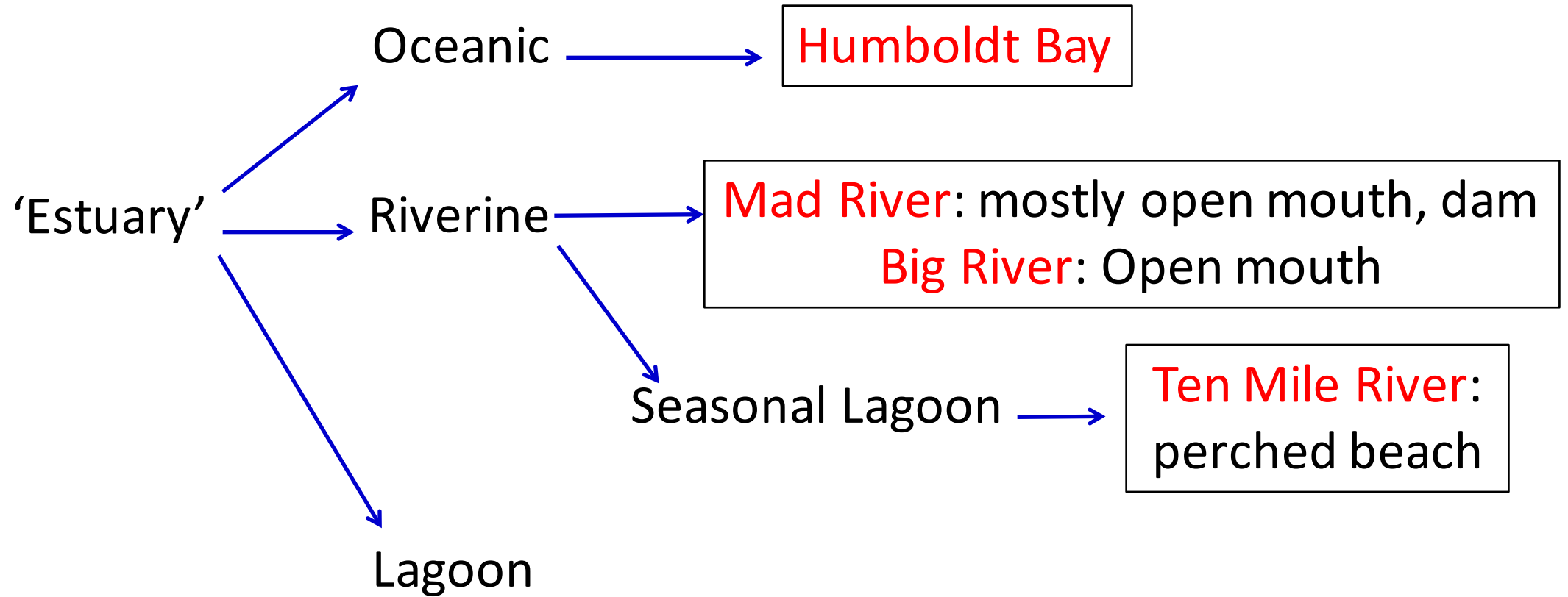
# Sampling of Macrophytes, Infauna & Crabs



# Sampling of Fish



# Large Differences in the Physical Context of Each Estuary



# Ten Mile River: The Seasonal Lagoon



Bushnell

09-27-2014 17:07:37

■  
~ 8/1/2014



Bushnell

12-27-2014 13:10:51

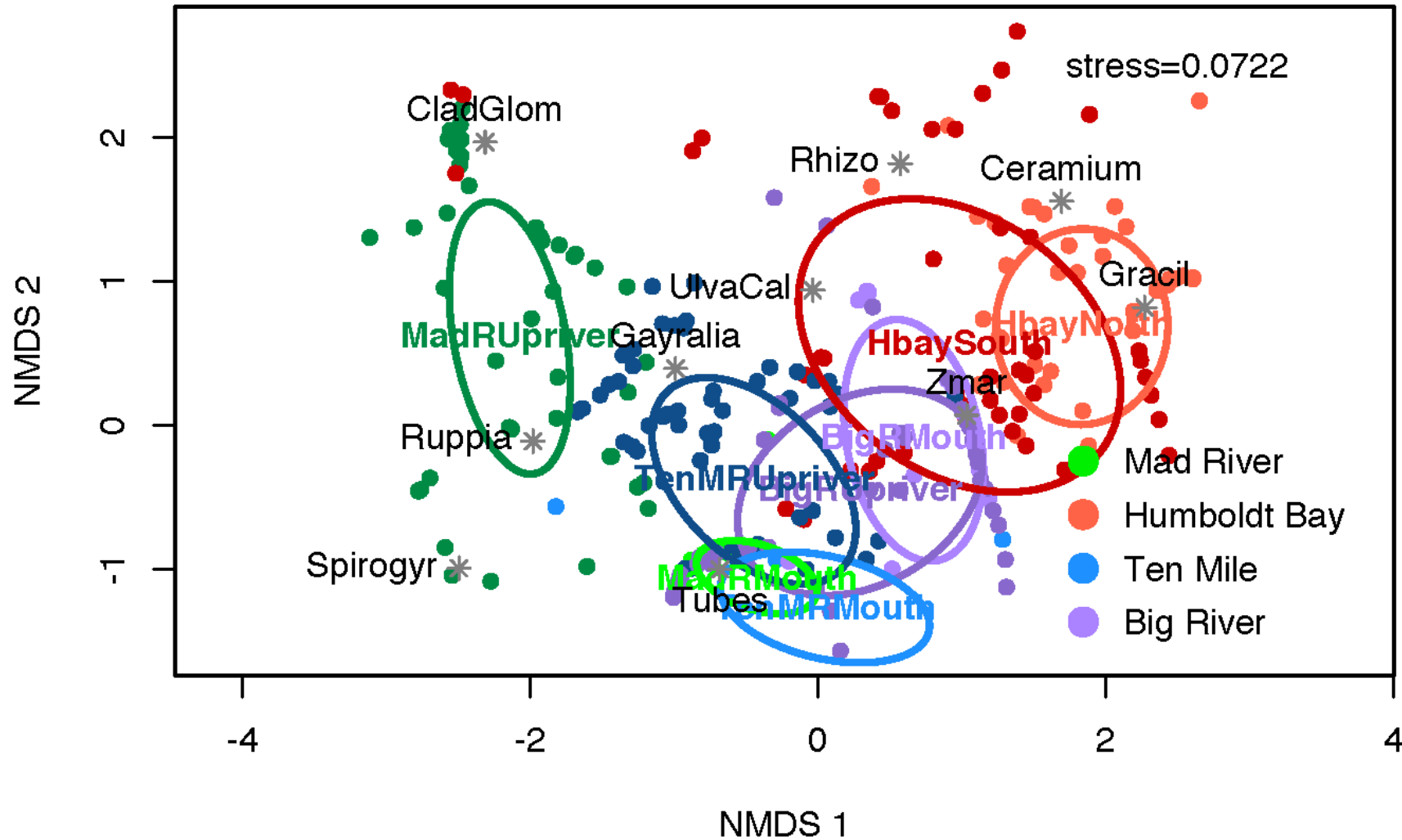
■  
~ 11/1/2014

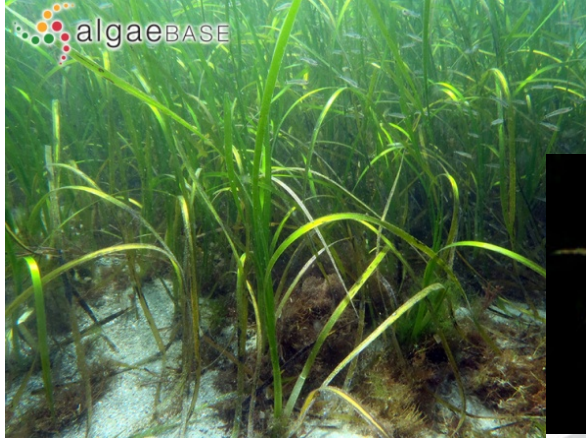
# Environmental Gradients Create Estuarine Habitat Diversity

	Drought (2014, 2015)	El Niño (2016)
North of Cape Mendocino	Mad River (open, dam) Humboldt Bay (oceanic)	Mad River (open, dam) Humboldt Bay (oceanic)
South of Cape Mendocino (upwelling center)	Ten Mile River (perched beach) Big River (open)	Ten Mile River (perched beach) Big River (open)

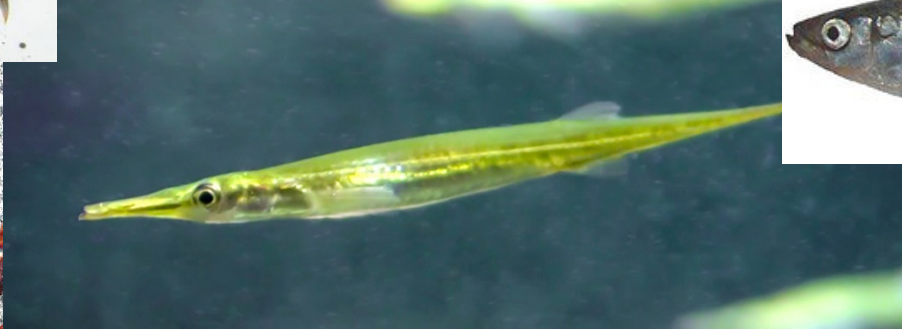
# Spatial Differences in Biodiversity - Yes

## Macrophyte Communities by Estuary Site

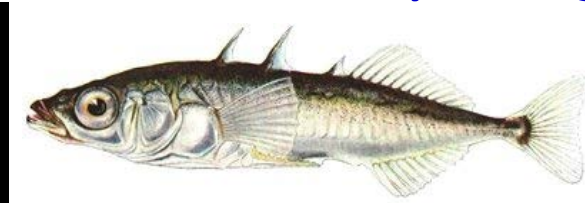




# Meet Your Humboldt Bay MPA Neighbors



# Meet Your Mad River Estuary Neighbors



algaeBASE



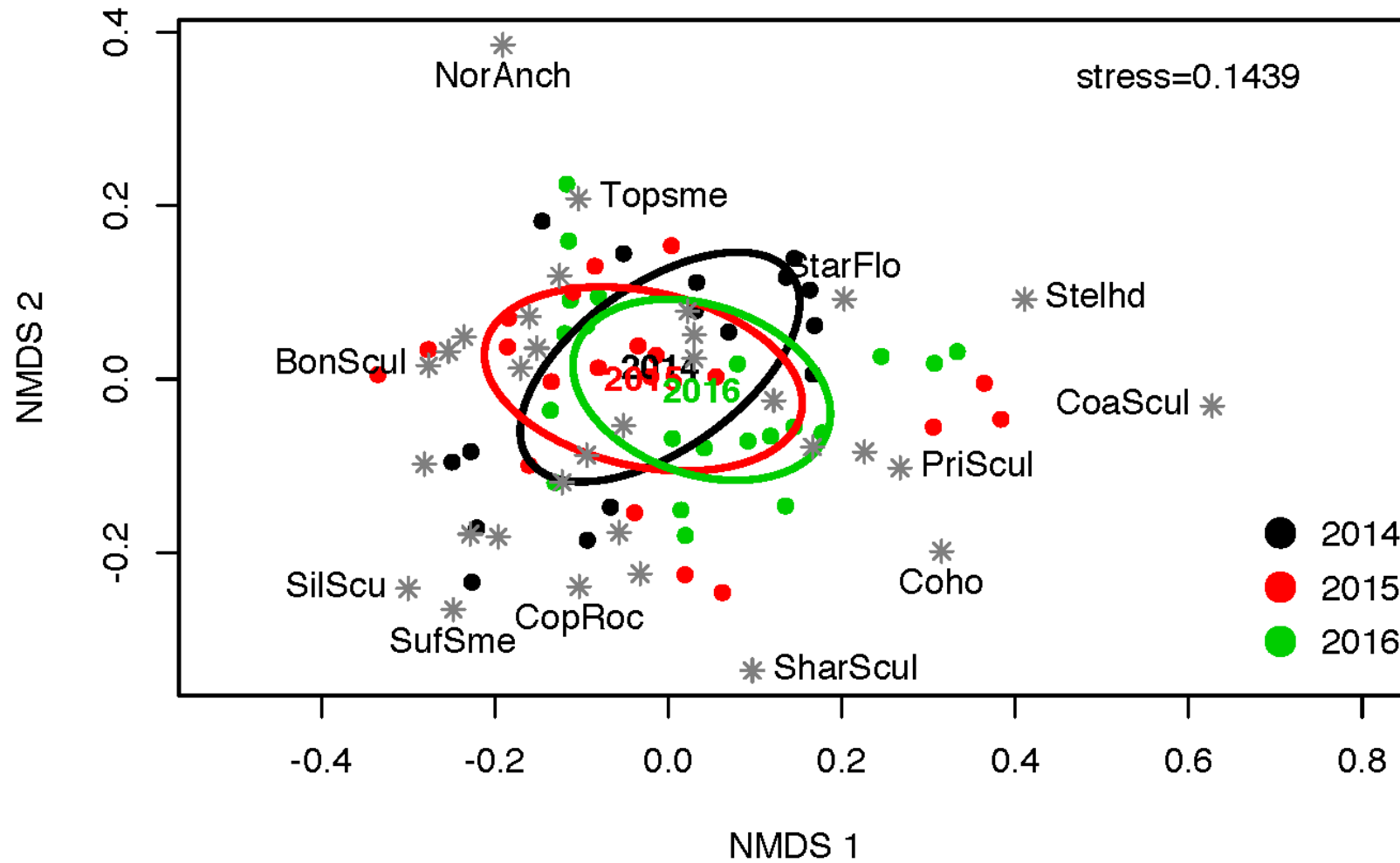
algaeBASE





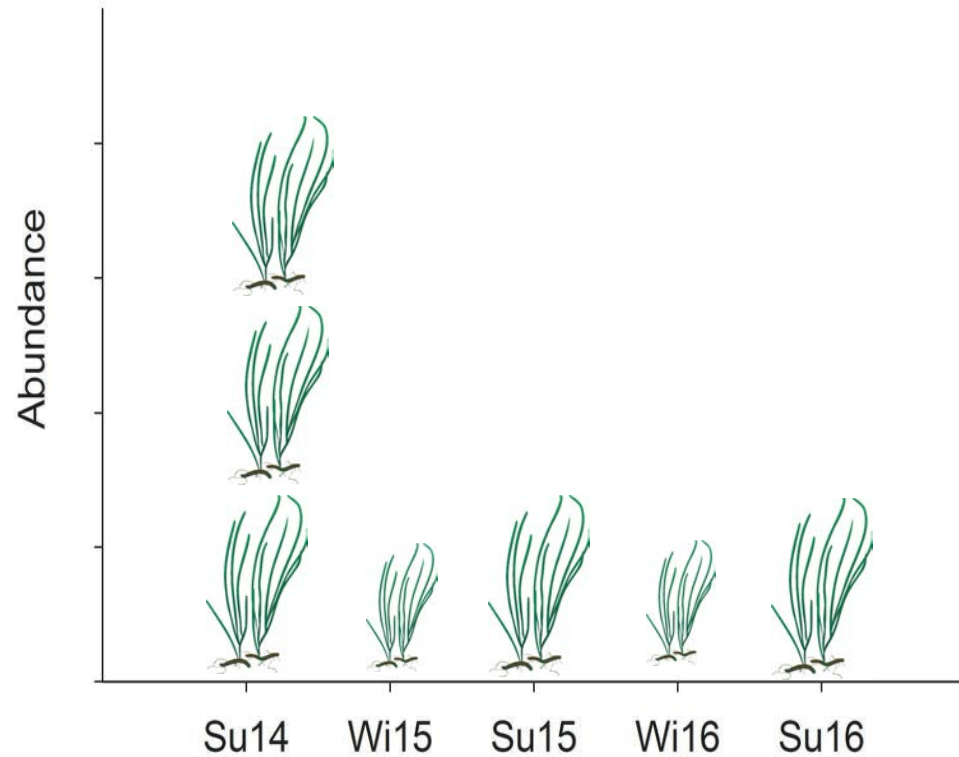
# Drought to El Niño Biodiversity Change - No

## Fish Communities by Year



# But Some Target Species did Shift Across Years

Eelgrass: Humboldt Bay & Big River

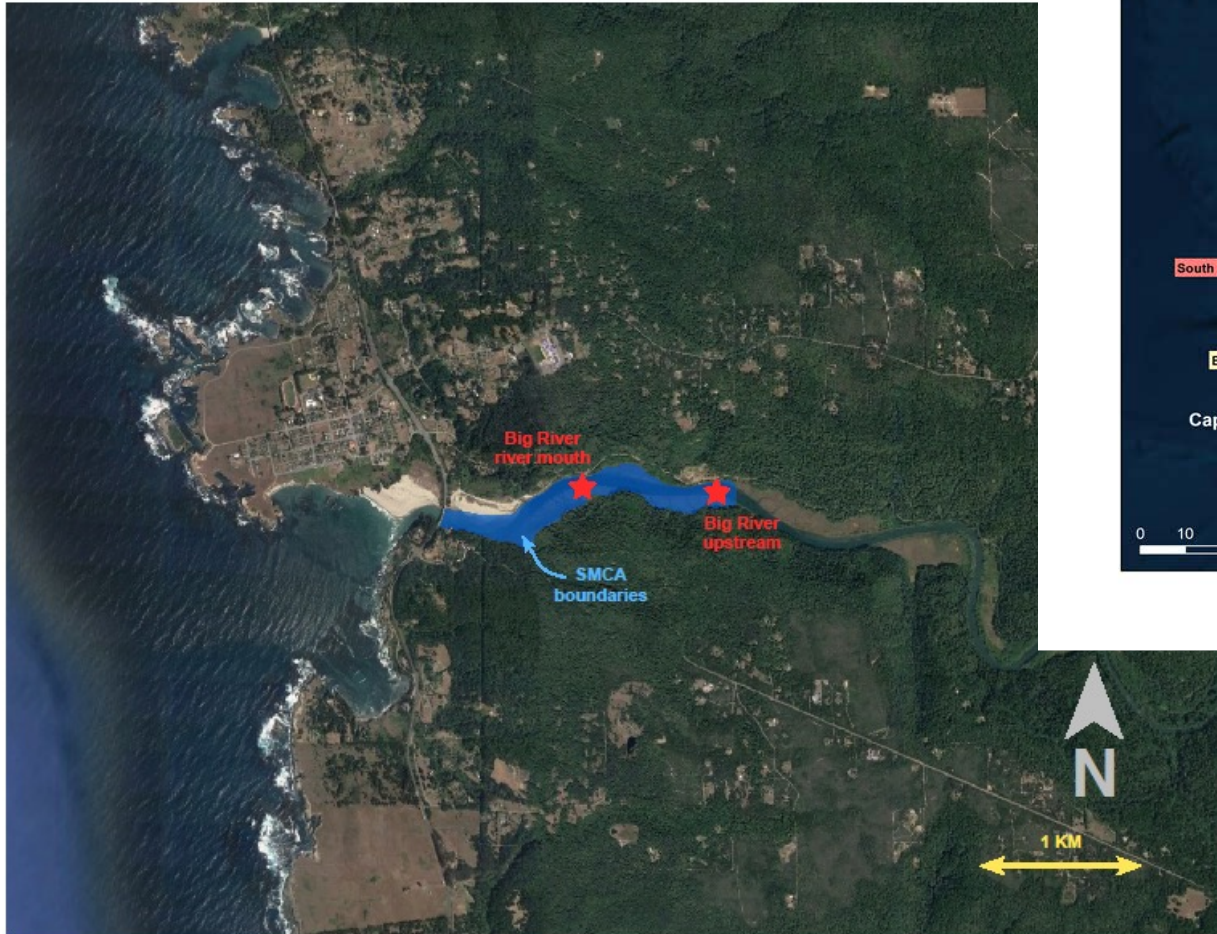


Staghorn Sculpin: All Estuaries

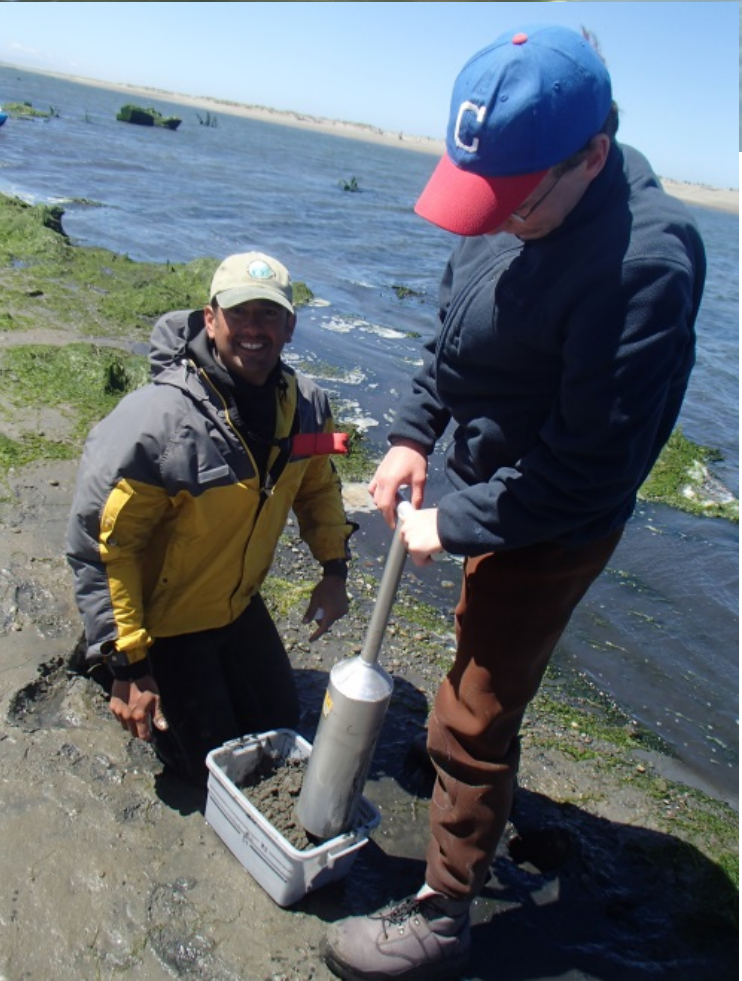
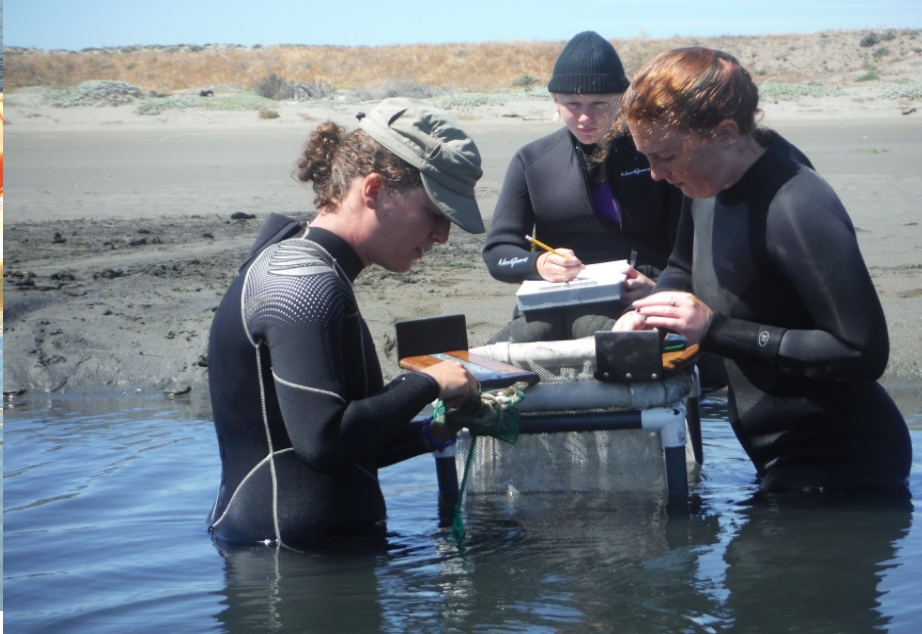


## Summary:

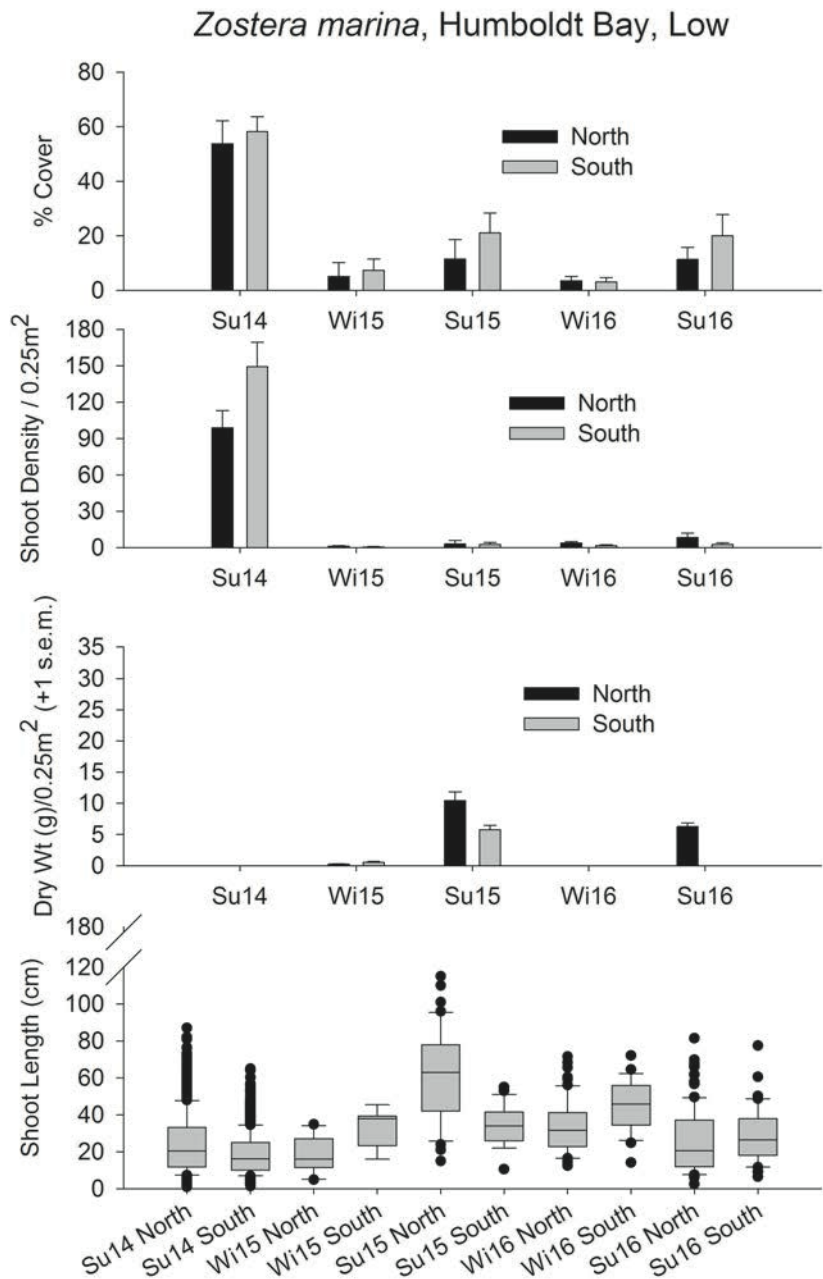
- \* Large spatial differences in biodiversity
- \* No annual differences in biodiversity, but some target species did change



Given the diverse estuaries of the North Coast Region, there is likely far more estuarine biodiversity than this study has described.



# Some Target Species did Shift Across Years



Abundance of Staghorn Sculpin for each Estuary & Site

