Fish Utilization of Oyster Restoration Sites Little Choptank and Tred Avon River Oyster Sanctuaries

2014-2017

NOAA Chesapeake Bay Office




Fish Sampling Methods

Trap Lines : Black Seabass, Spot, Eel, Pinfish, & Minnow Pots

Bait : Ground Menhaden & Razor Clams

BACI Design (Before/After-Control/Impact)

Restoration Treatment (Impact) and Reference (Control) Sites

Oyster Sanctuary	Oyster Restoration Method	Treatment	No. Sites	No. Traplines /Site	Total No. Traplines (per sample day)
Tred Avon	Substrate and Seed	Restoration	2	2	4
Tred Avon	Substrate and Seed	Reference	2	2	4
Tred Avon	Seed Only	Restoration	2	3	6
Tred Avon	Seed Only	Reference	2	2	4
			8		18
Little Choptank	Substrate and Seed	Restoration	2	2	4
Little Choptank	Substrate and Seed	Reference	2	2	4
Little Choptank	Seed Only	Restoration	2	2	4
Little Choptank	Seed Only	Reference	2	2	4
			8		16

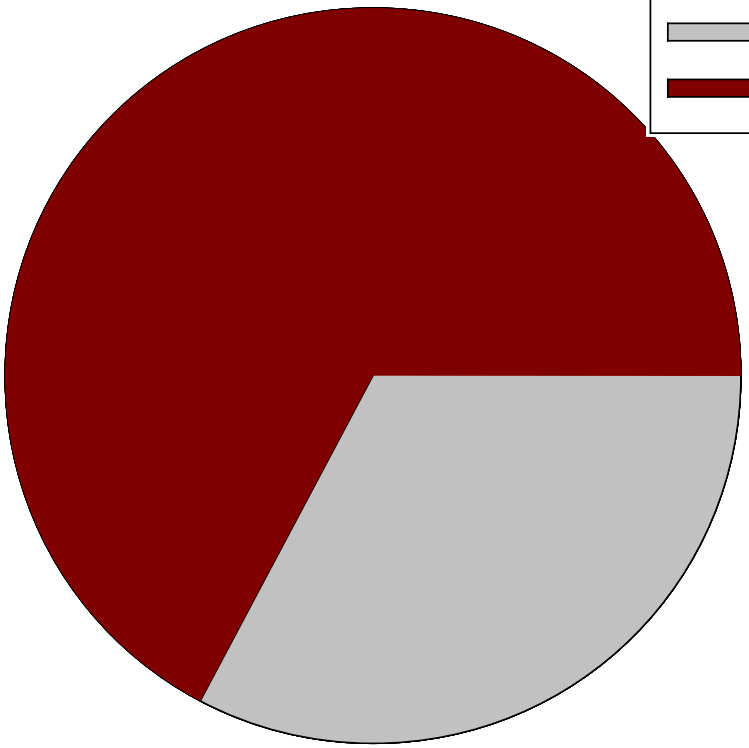
BACI Study Design

Study Chronology (Before/After Restoration)

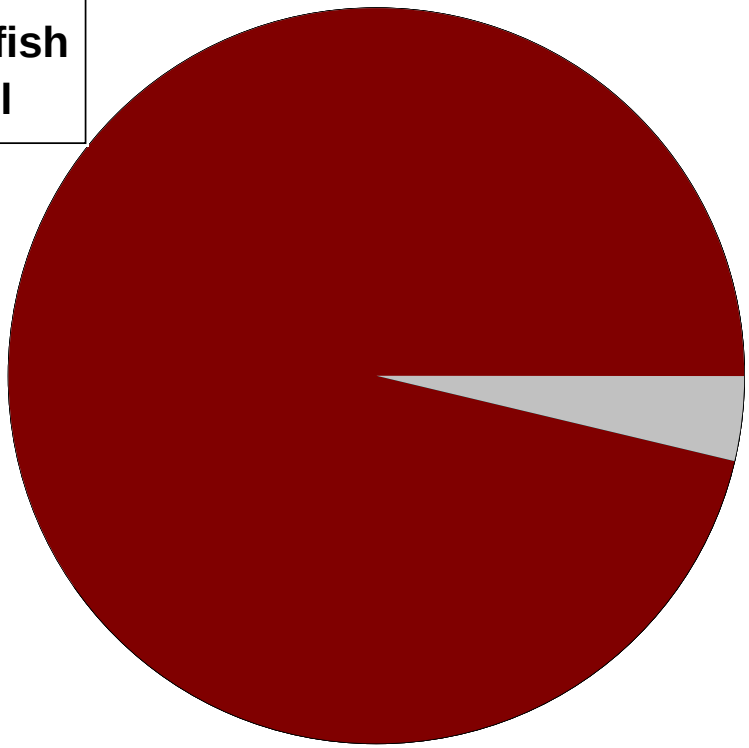
Sampling Year	Restoration Status	Oyster Sanctuary	Monthly Samples
2013	Pre-Restoration (Pilot)	Tred Avon only	July, Sept.(2x), Nov.
2014	Pre-Restoration	Tred Avon & Little Choptank	May-Oct.
2015	Substrate Sites Constructed	Tred Avon & Little Choptank	June-Sept.
2016	All Treatment Sites Seeded	Tred Avon & Little Choptank	June-Sept.
2017	Restoration Complete	Tred Avon, Little Choptank	June-Sept.

Fish Species Collected on Restoration Sites Little Choptank and Tred Avon Rivers 2016-2017

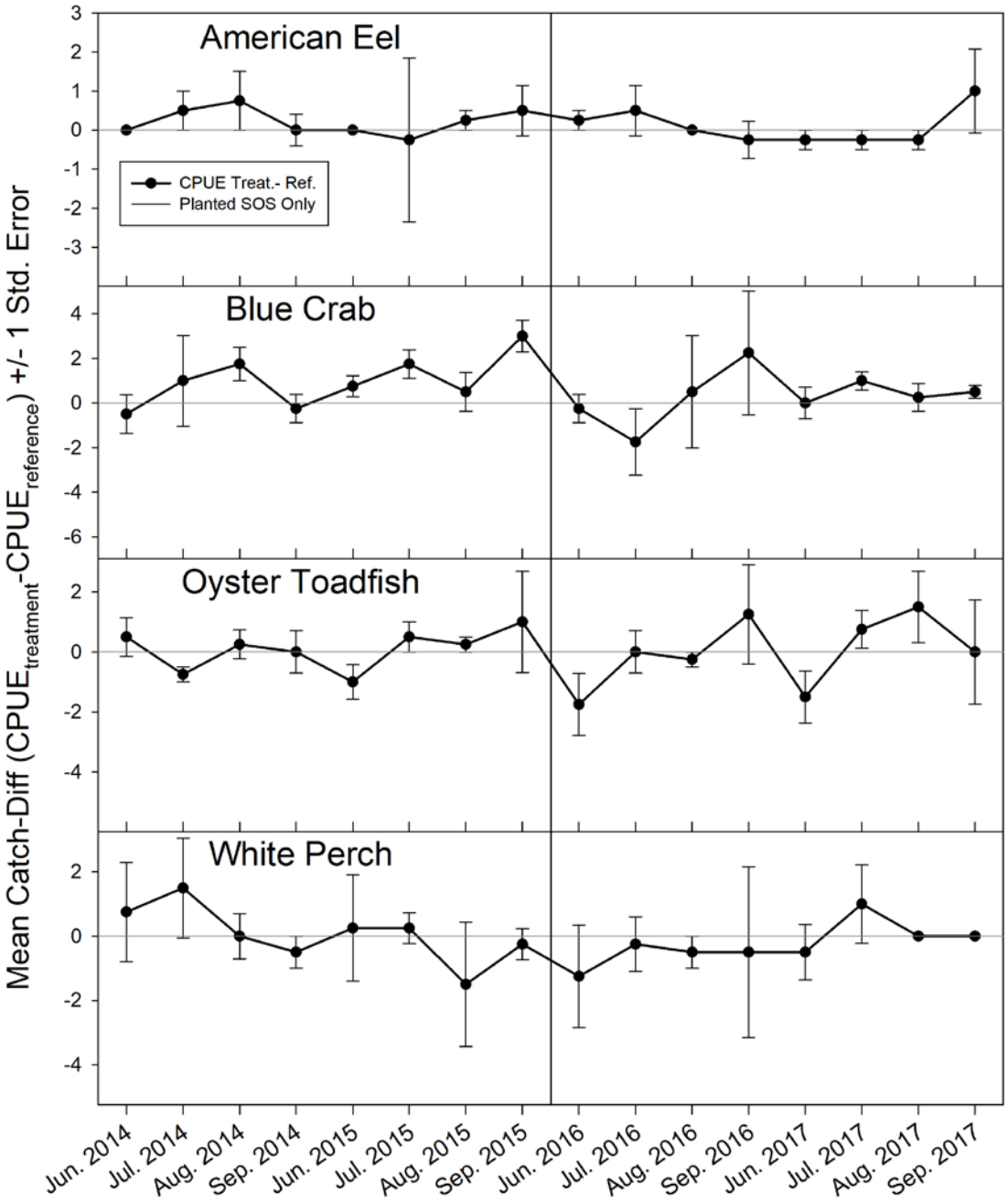
Substrate & Seed Reefs (%)



Seed-Only Reefs (%)



Seed – Only Restoration



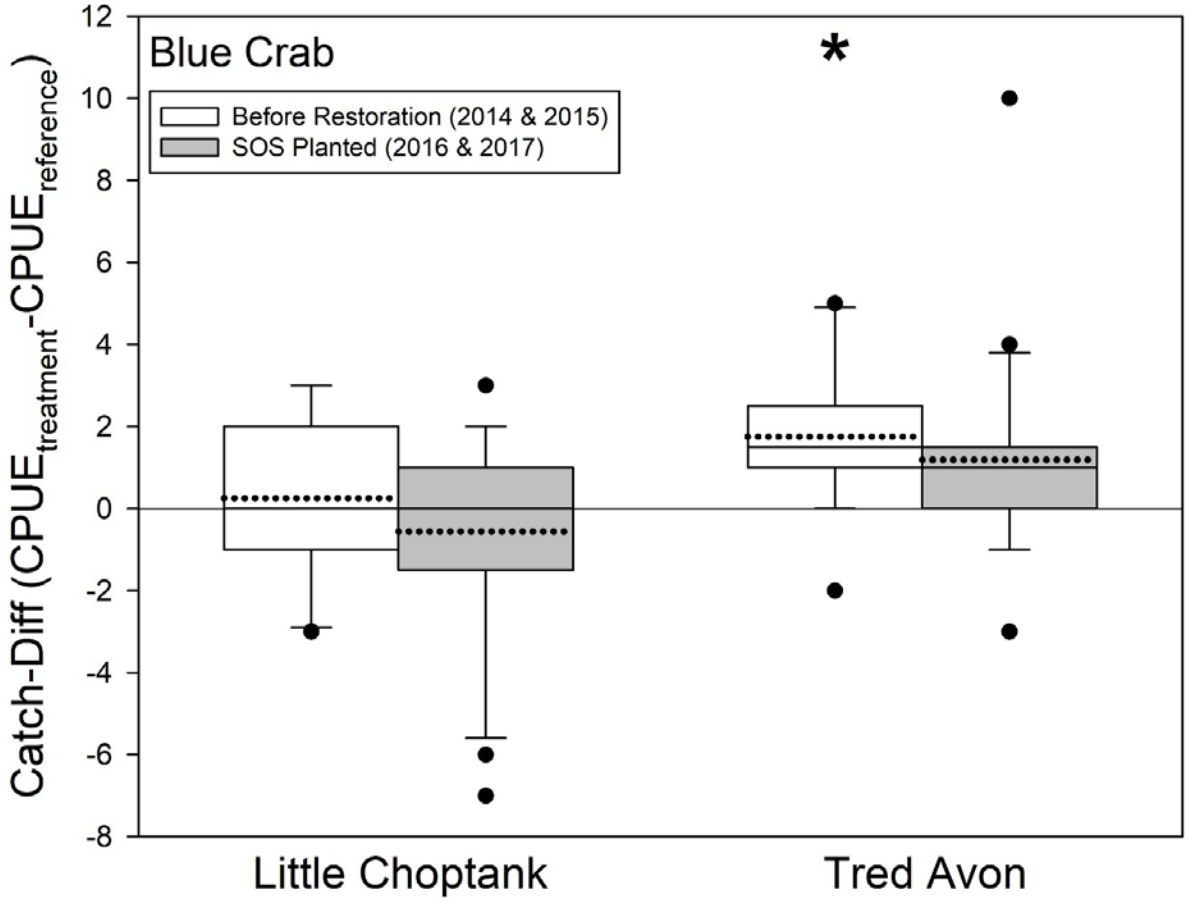
American Eel			
Source	DF	Chi-Square	p
Restoration	2	0.17	0.9185
Location(Restoration)	2	2.55	0.2799

Blue Crab			
Source	DF	Chi-Square	p
Restoration	2	1.48	0.4478
Location(Restoration)	2	7.95	0.0188

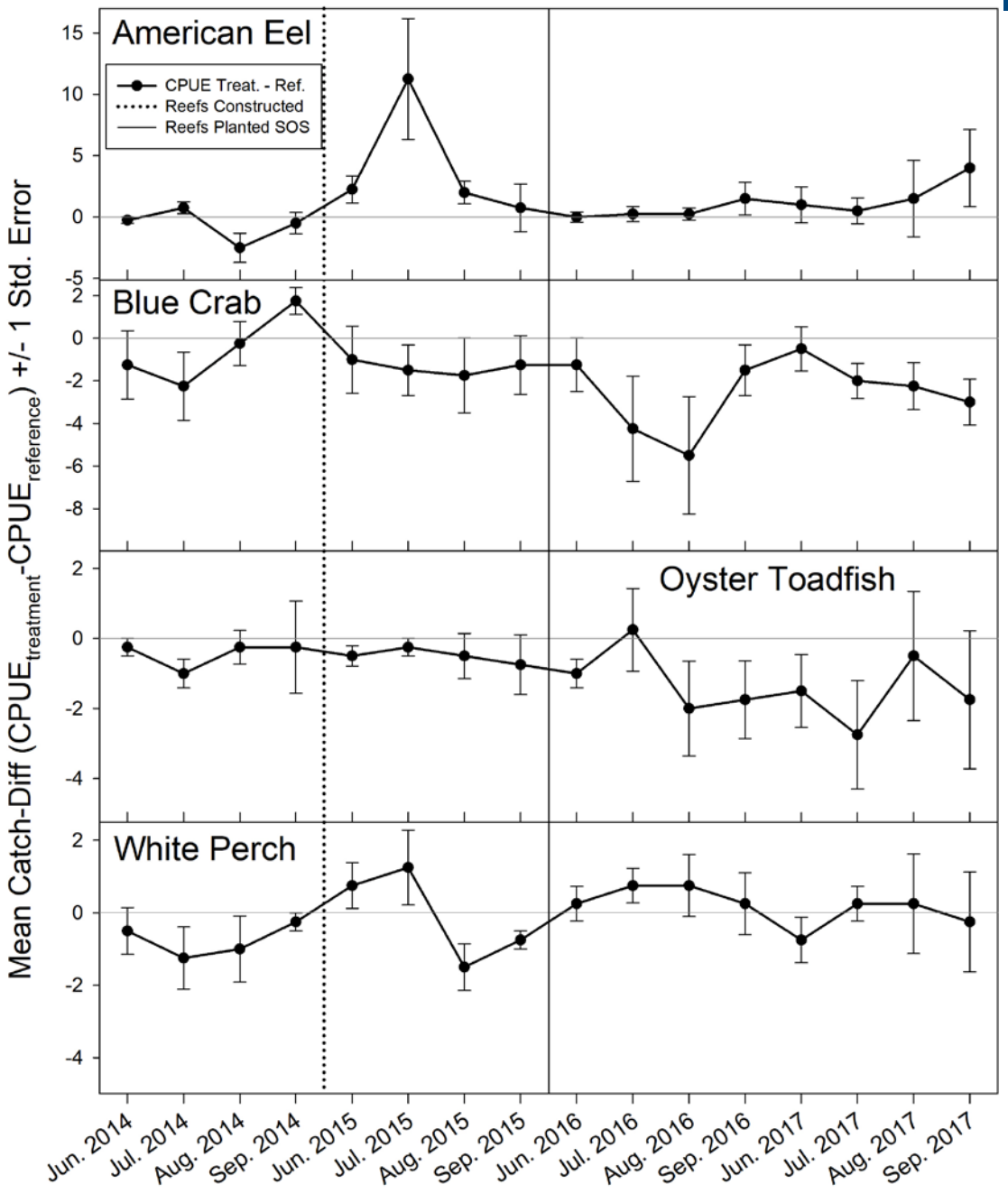
Oyster Toadfish			
Source	DF	Chi-Square	p
Restoration	2	3.08	0.2149
Location(Restoration)	2	1.74	0.4195

WhitePerch			
Source	DF	Chi-Square	p
Restoration	2	2.91	0.2336
Location(Restoration)	2	0.85	0.6551

Blue Crab
Catch Data Distributions by Location
Seed - Only Restoration



Substrate and Seed Restoration



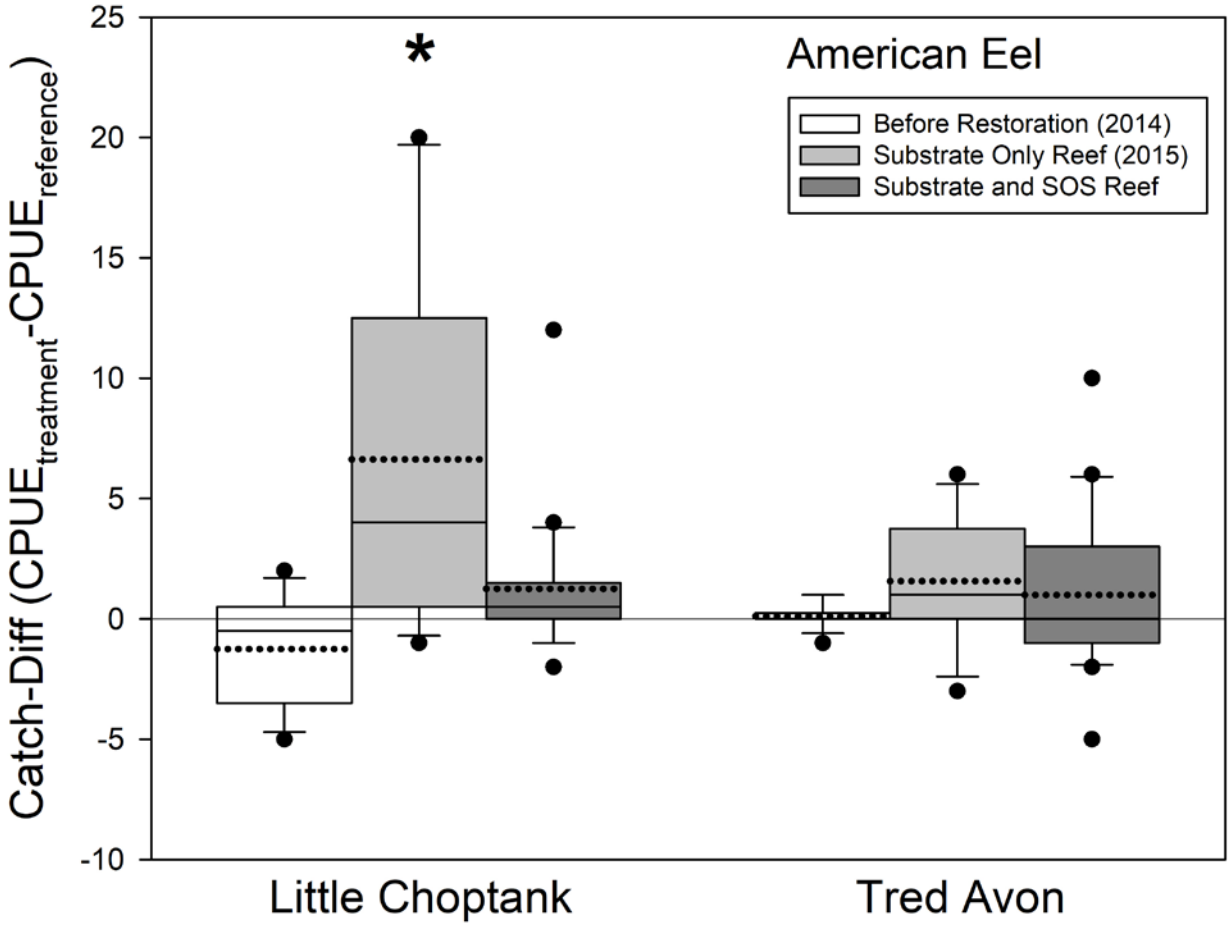
American Eel			
Source	df	Chi-Square	p
Restoration	3	6.14	0.1049
Location(Restoration)	3	6.44	0.0922

Blue Crab			
Source	DF	Chi-Square	p
Restoration	3	7.03	0.071
Location(Restoration)	3	42.44	<0.0001

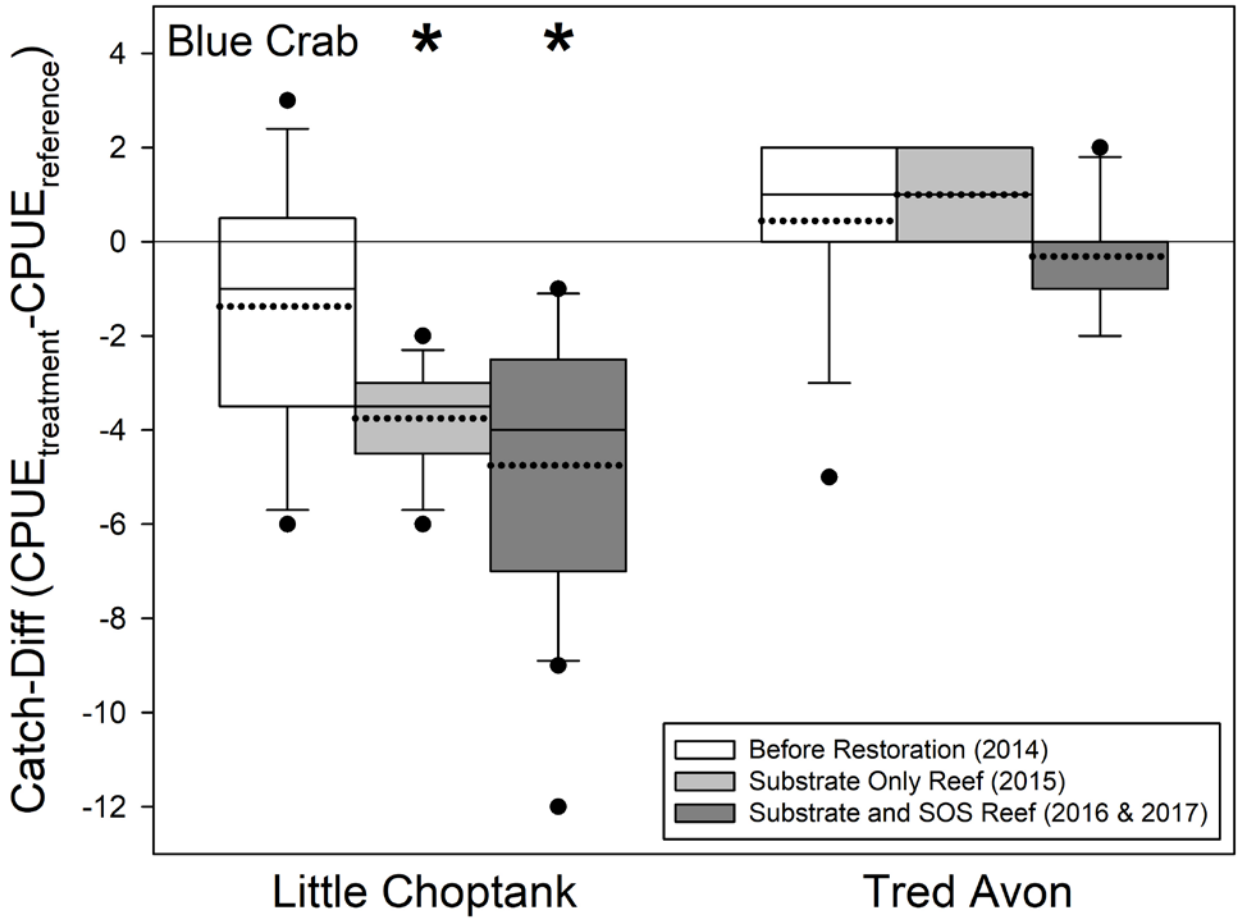
Oyster Toadfish			
Source	DF	Chi-Square	p
Restoration	3	0.49	0.9206
Location(Restoration)	3	38.5	<0.0001

White Perch			
Source	DF	Chi-Square	p
Restoration	3	5.7	0.1272
Location(Restoration)	3	1.47	0.6903

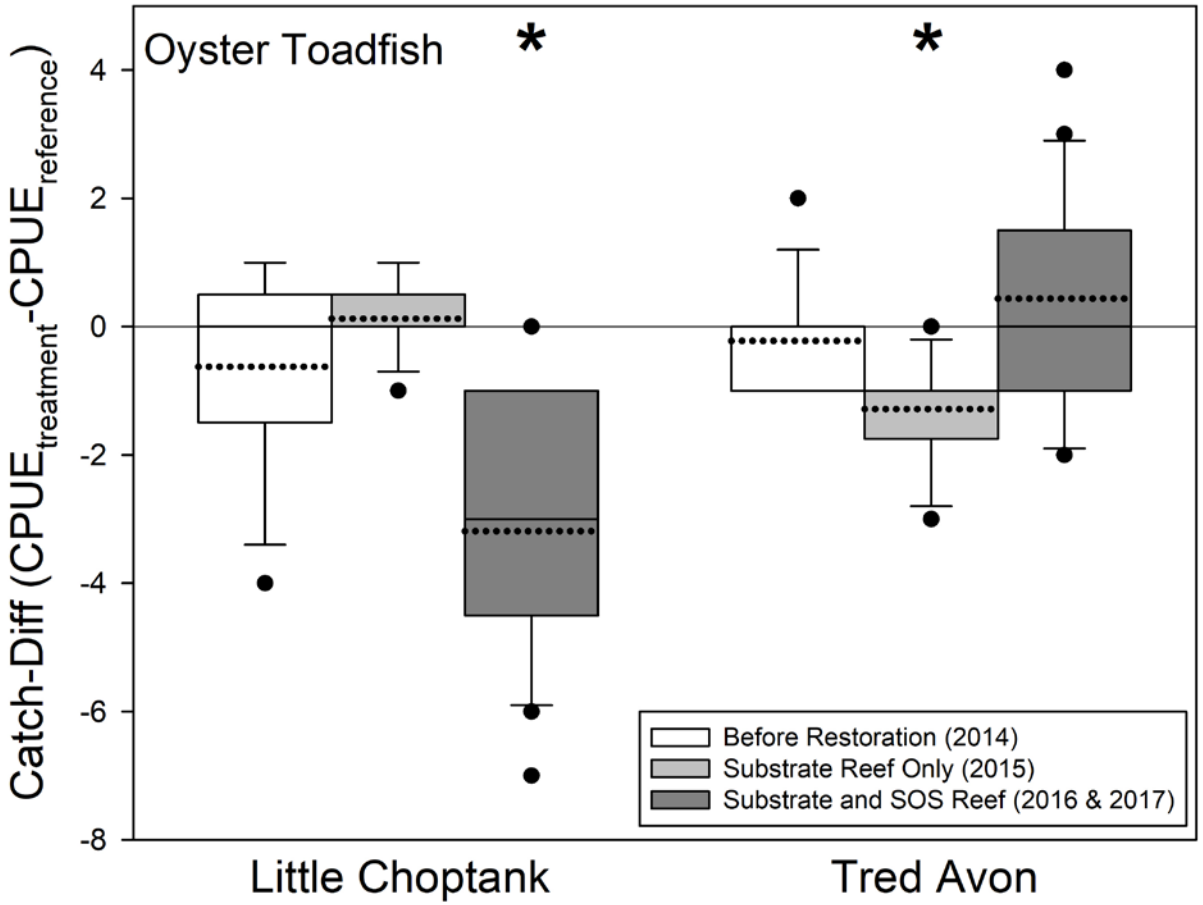
American Eel
Catch Data Distributions by Location
Substrate & Seed Restoration



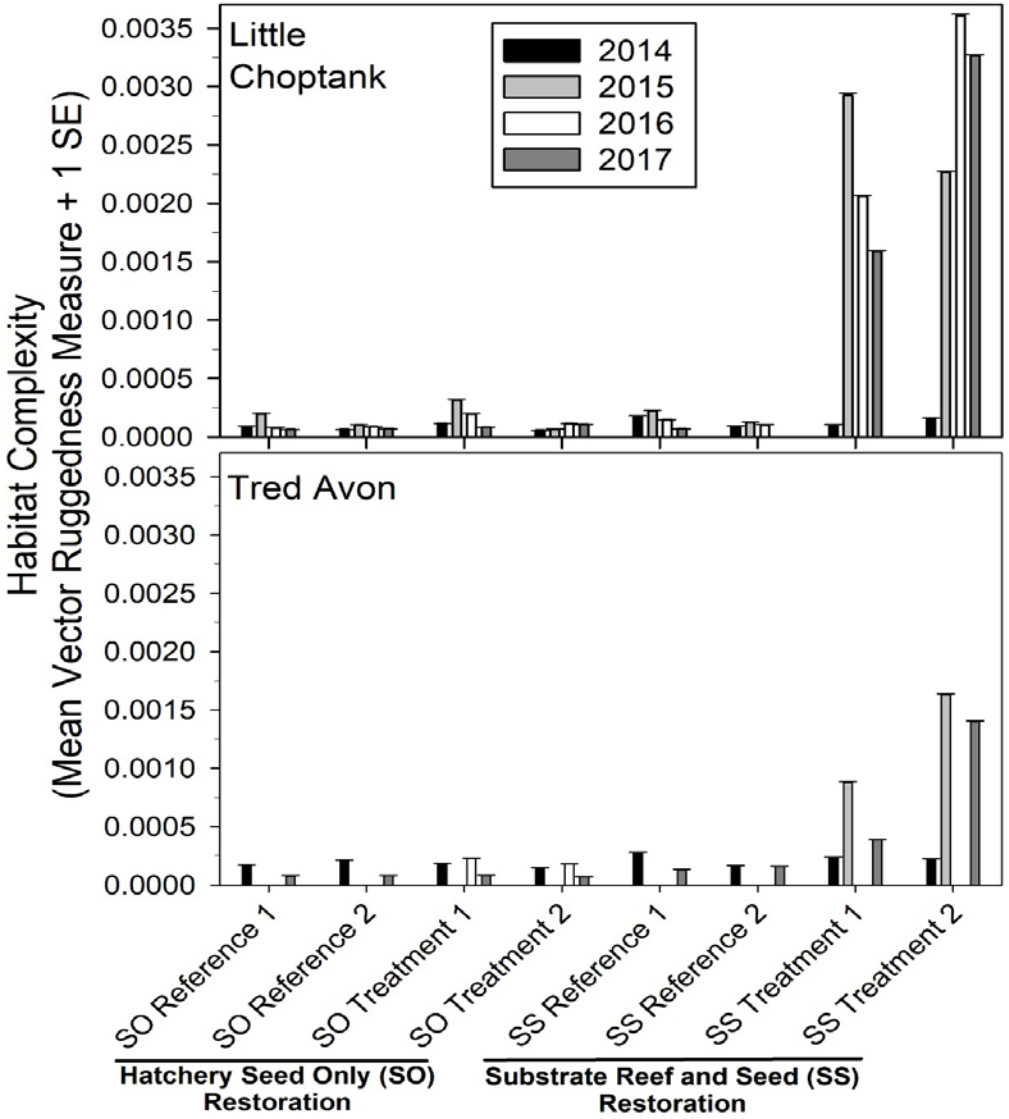
Blue Crab
Catch Data Distributions by Location
Substrate & Seed Restoration



Oyster Toadfish
Catch Data Distributions by Location
Substrate & Seed Restoration

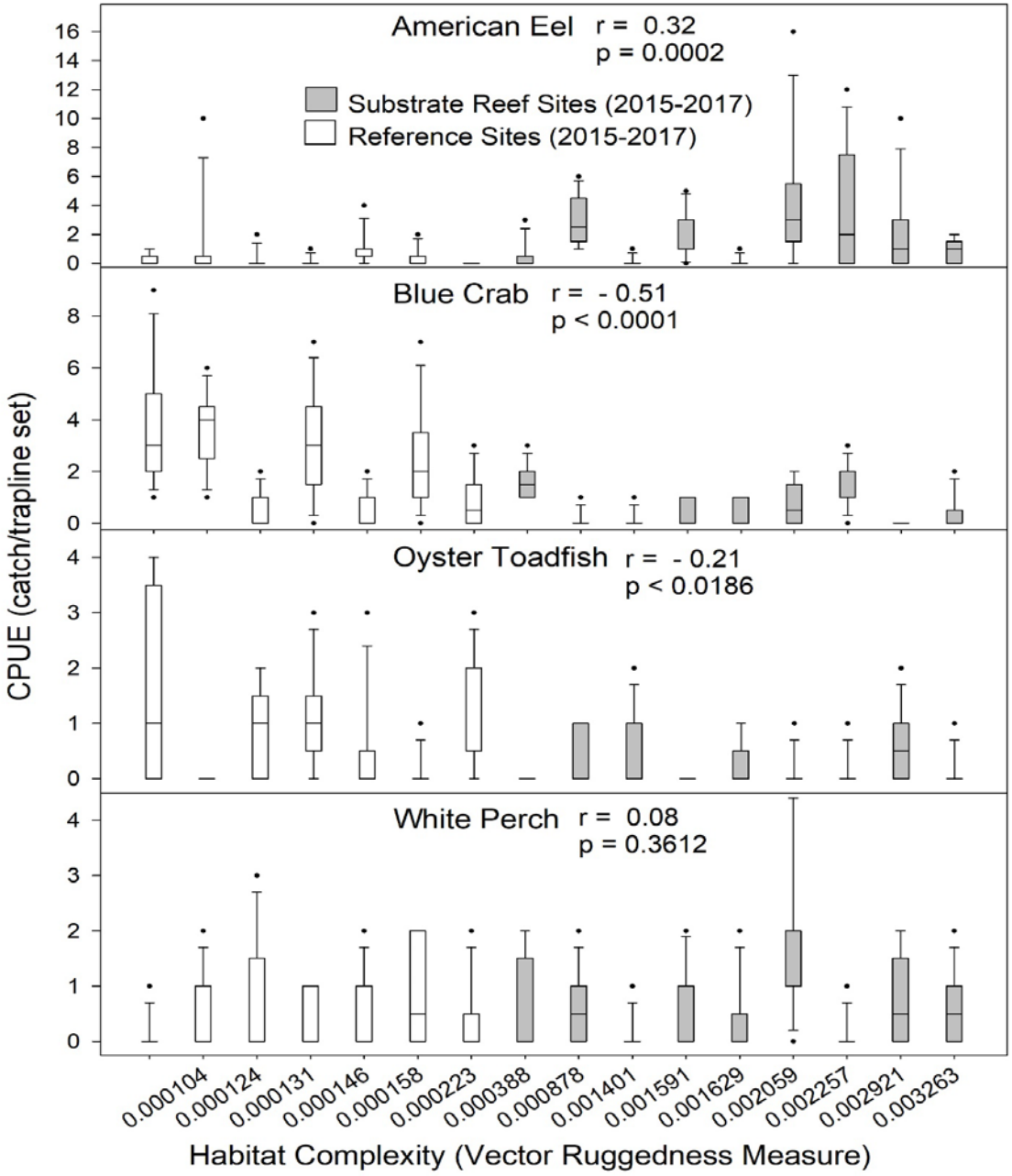


Habitat Complexity of Sampled Restoration Sites



Derived from Multibeam Sonar Bathymetry Survey Data

Catch Data Distributions Relative to Habitat Complexity



Summary

- Identified most common resident and transient demersal fish species that may utilize mesohaline oyster restoration sites
- Observed mixed results in abundance relative to the two restoration treatments
- Abundance on restoration sites may vary by species, location, and restoration type.
- Affinity of transient fishes to restoration sites is difficult to quantify and likely related to relative mobility, foraging behavior, and sampling gear selectivity

Management Implications: Not All Restoration Sites are Created Equal

Ecosystem services provided by restored oyster reefs may vary by material and by structural complexity