

Georgia's Shrimp Fishery in the Age of Black Gill

New Approaches to Forecast the Georgia Fall White Shrimp Harvest



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Coastal Georgia Colloquium '18

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Coastal Georgia Center, Savannah, Georgia



Shrimp Black Gill

The appearance of black gills in shrimp is a symptom that can be caused by any number of reasons

- Fungi (*Fusarium* spp.)
- Bacteria (*Vibrio*, *mycobacterium*)
- Nutrient deficiencies (ascorbic acid)
- Metal precipitation (copper)
- High sediment loads
- Ciliates (apostome)

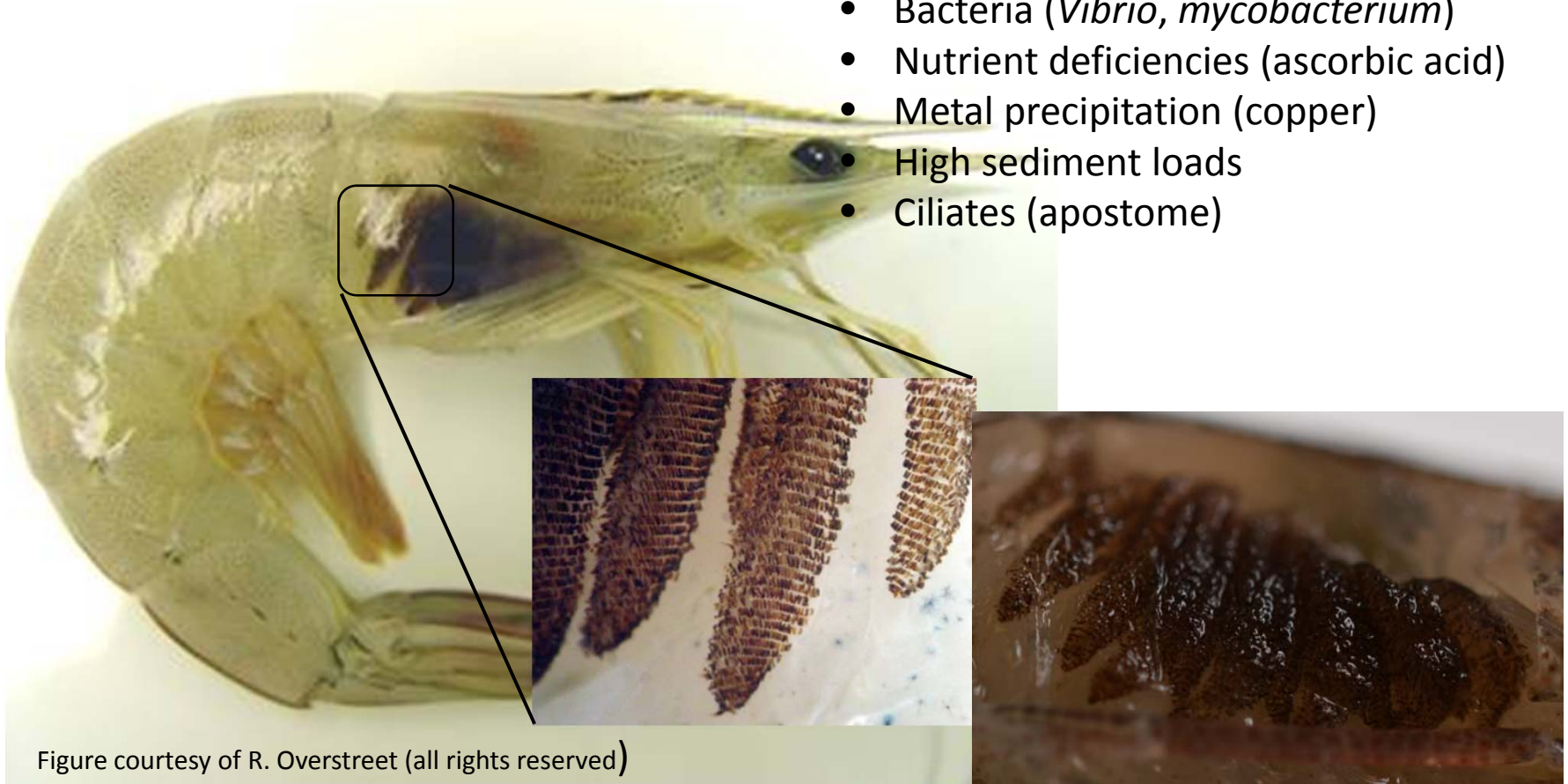
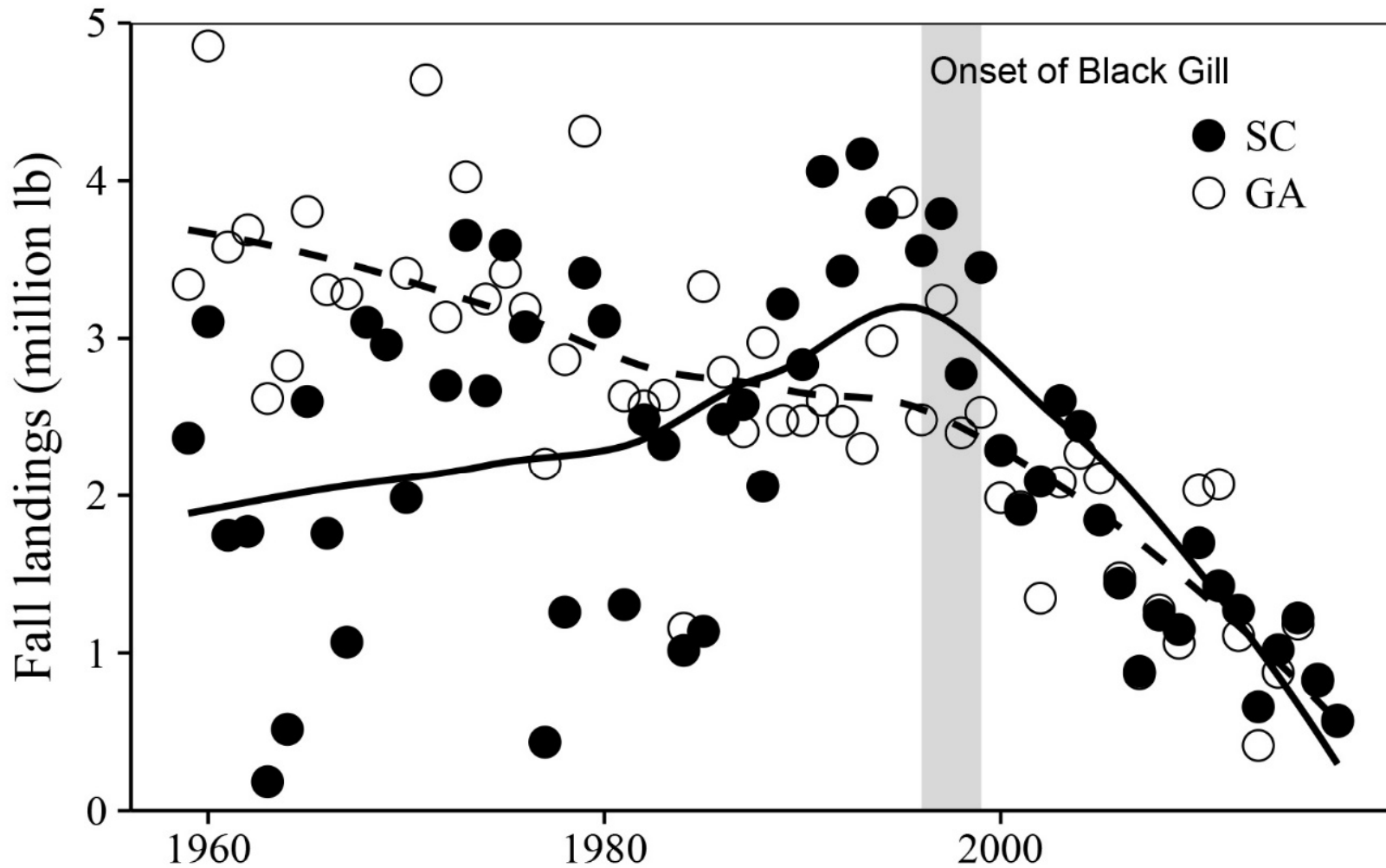
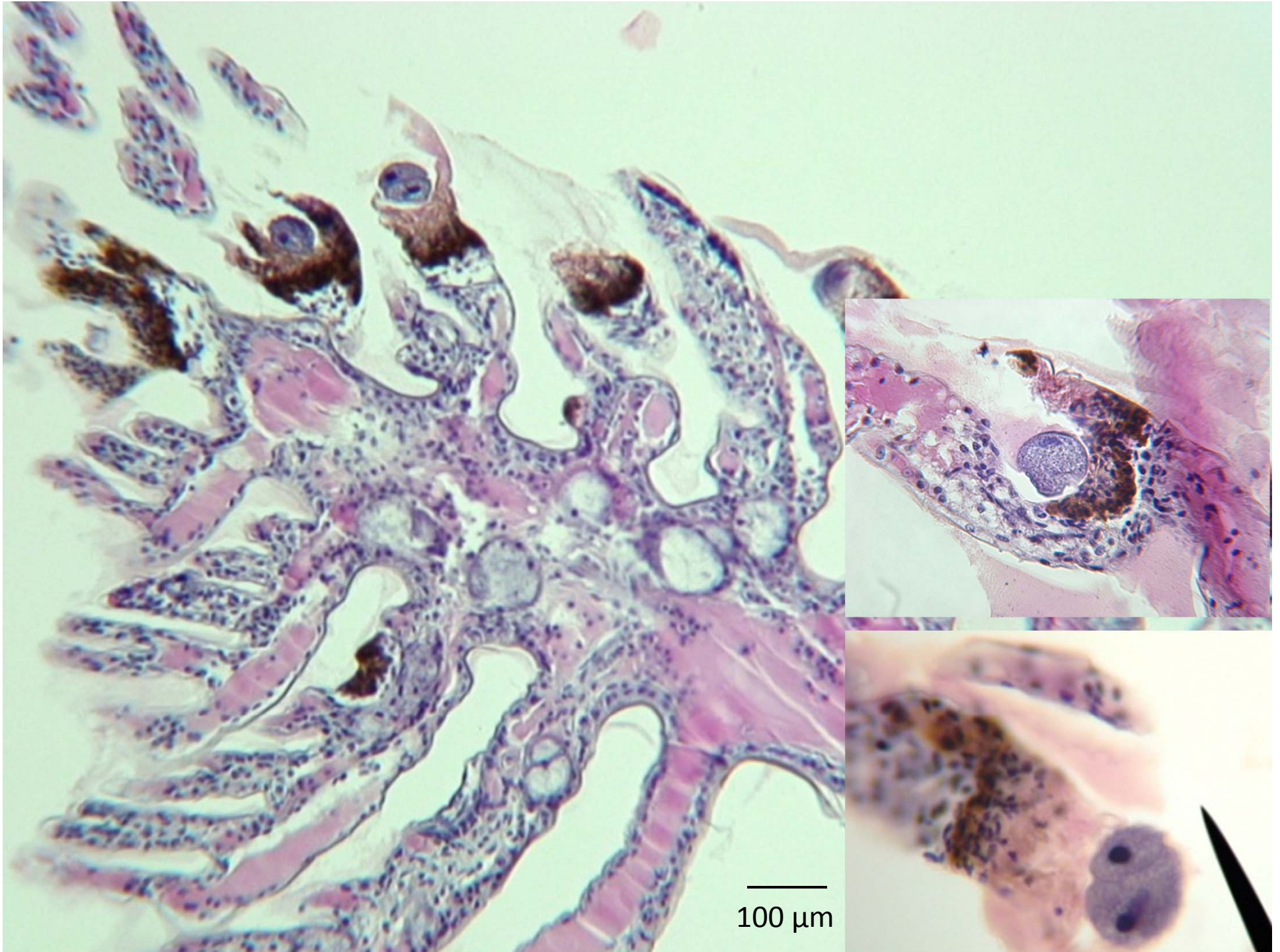


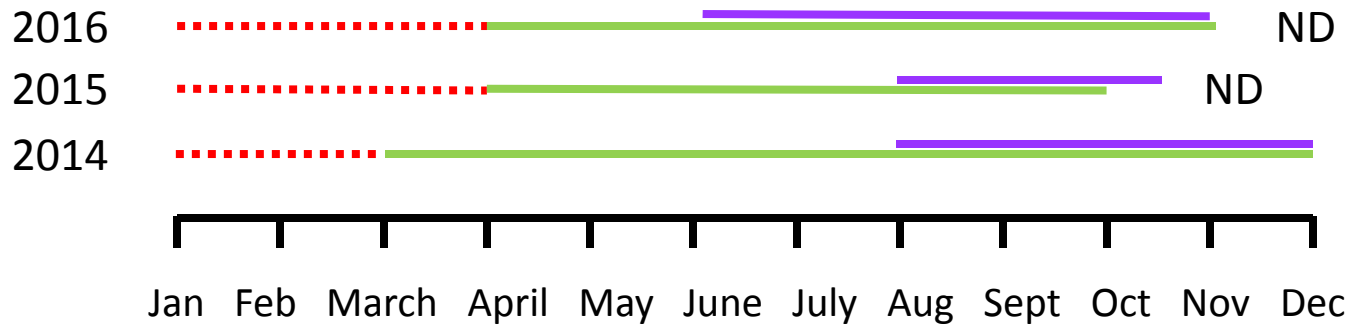
Figure courtesy of R. Overstreet (all rights reserved)

Fall White Shrimp Fishery Performance (Pre- and Post Black Gill)



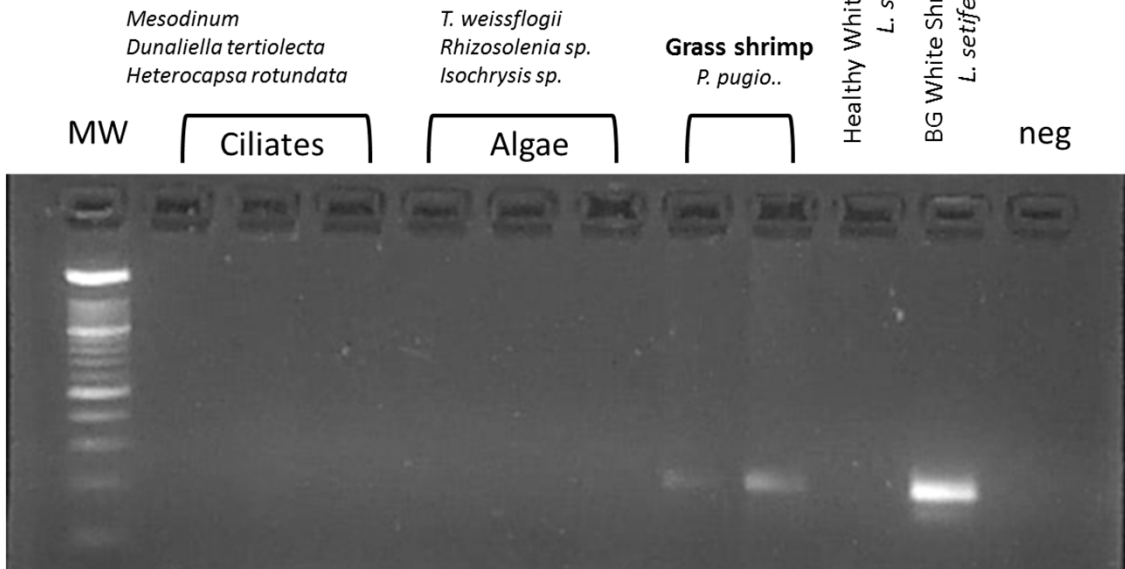


Seasonal Occurrence of sBG Infection & Shrimp Black Gill



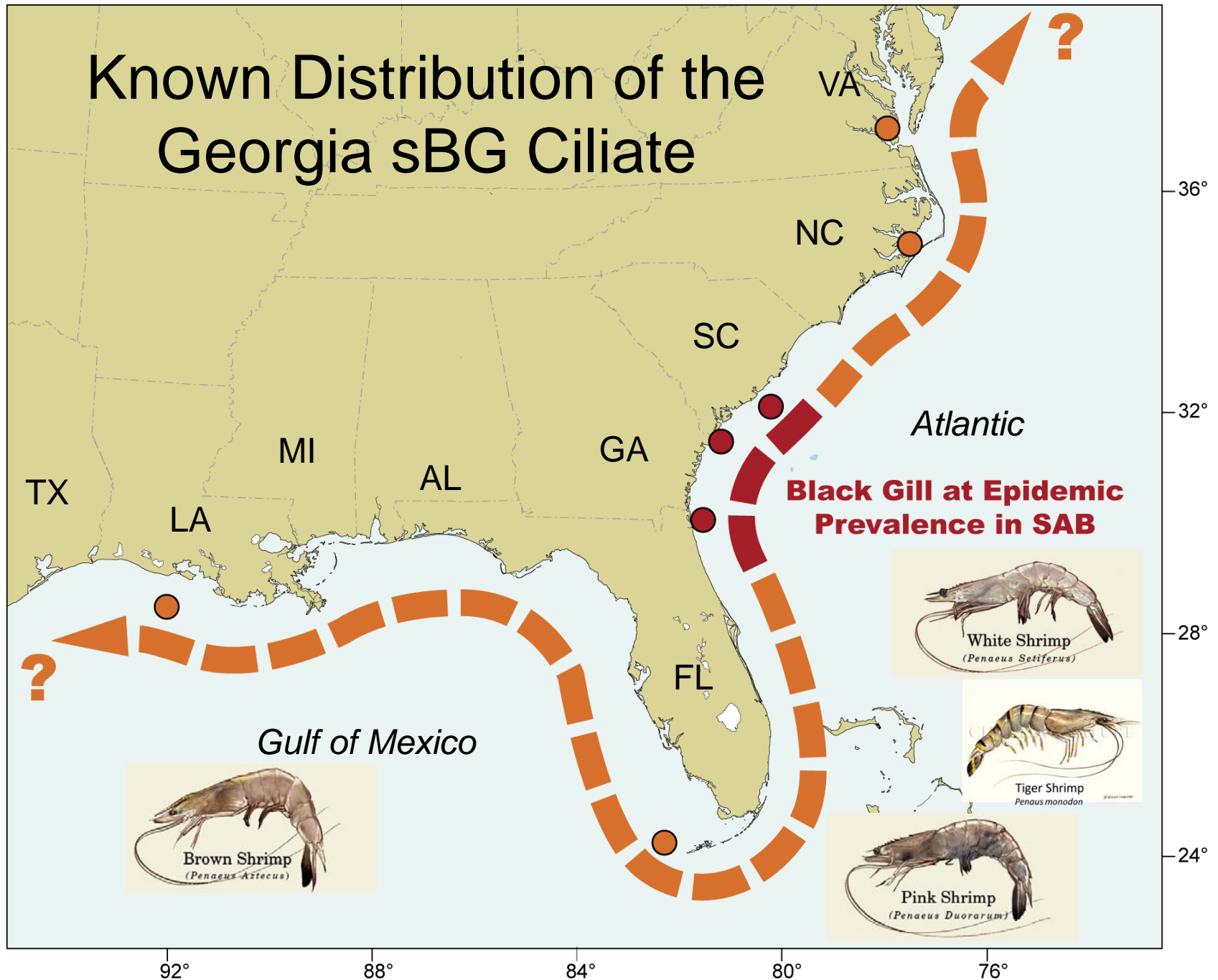
ND: No Data

sBG Absent
 Asymptomatic sBG ————
 Symptomatic sBG ————

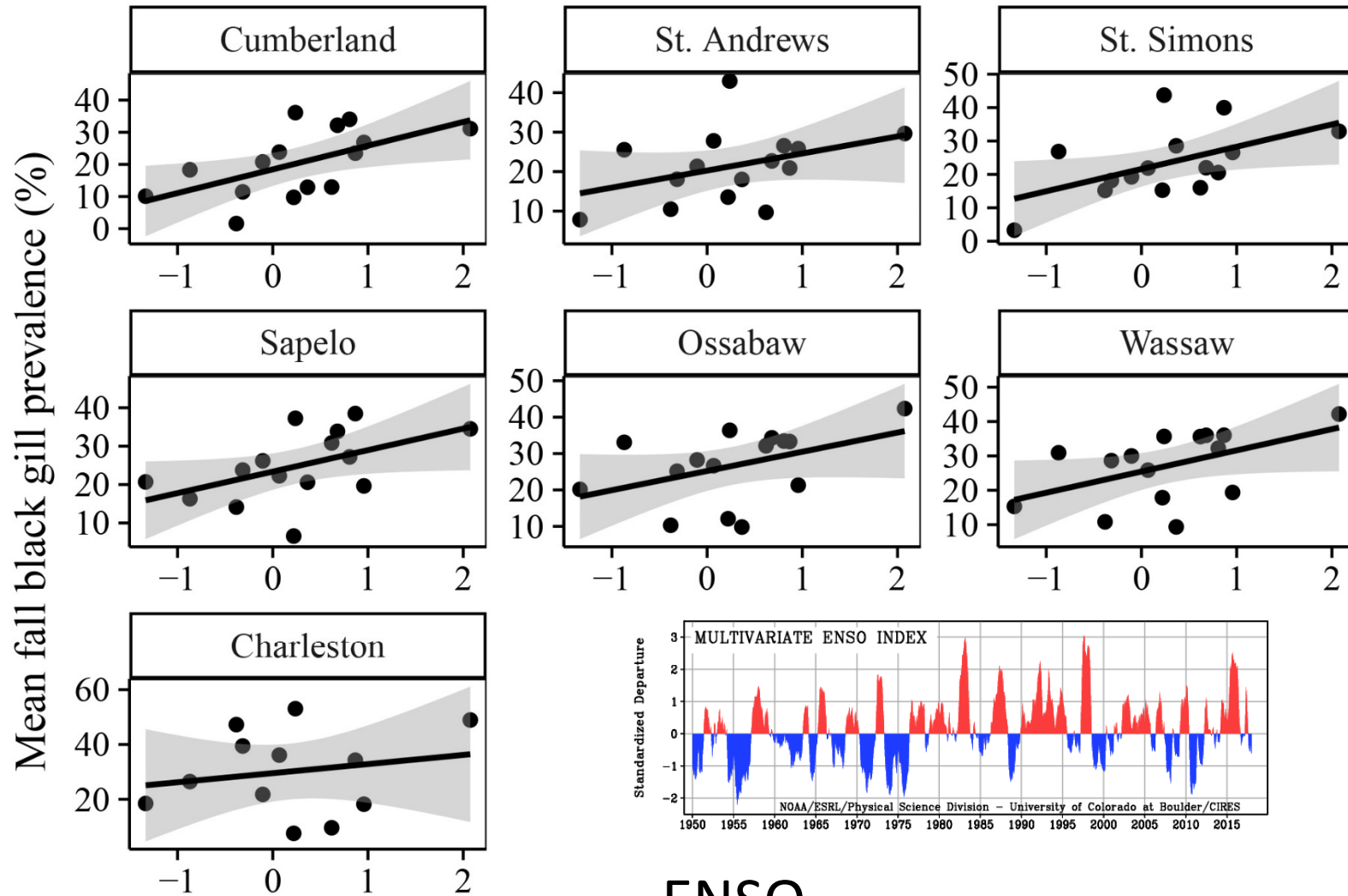


sBG Ciliate-Specific
 Diagnostic PCR
 (18S rRNA)

Known Distribution of the Georgia sBG Ciliate



Black Gill Prevalence Correlated with Climate Conditions

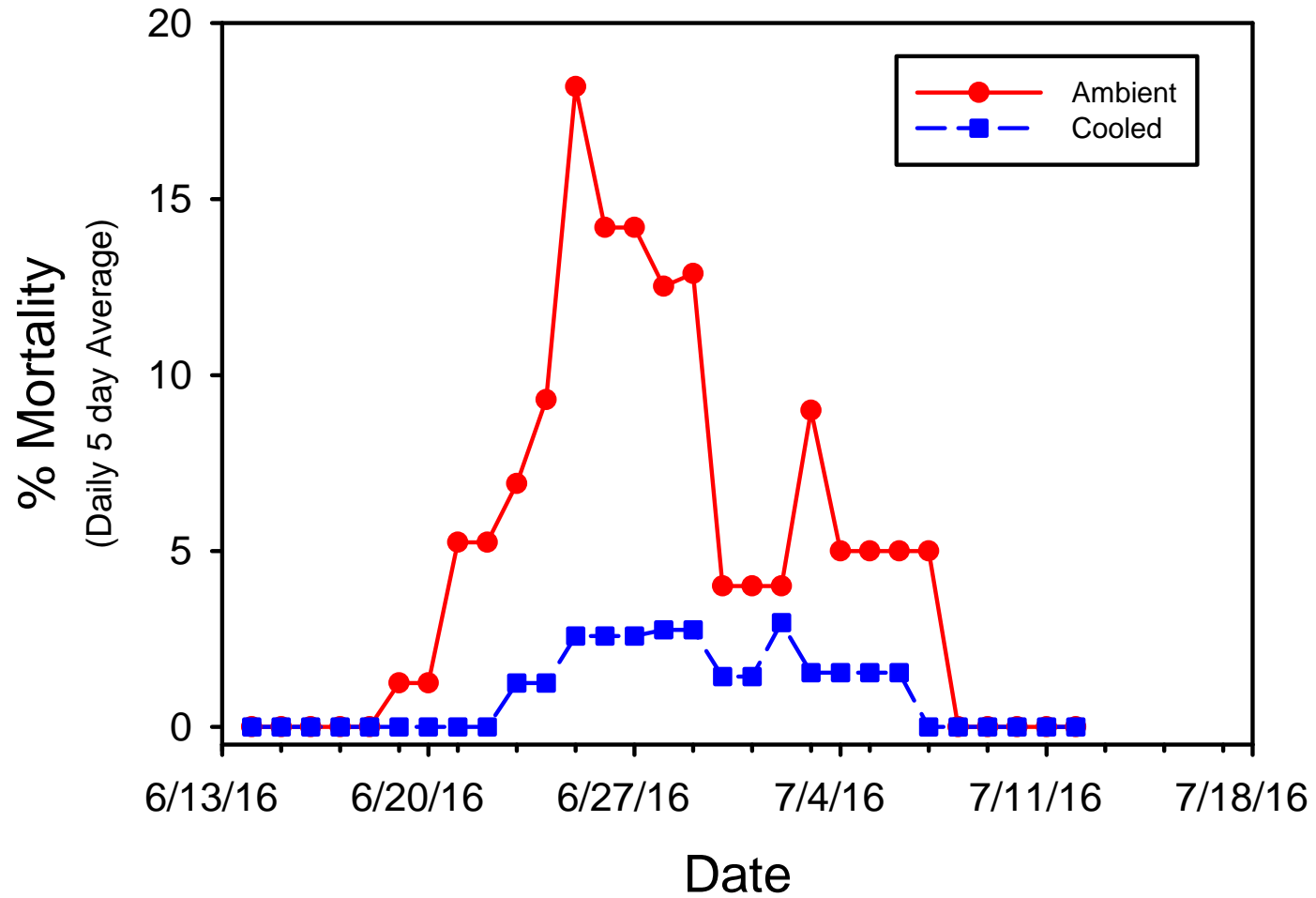


(Drier/Colder Winter)

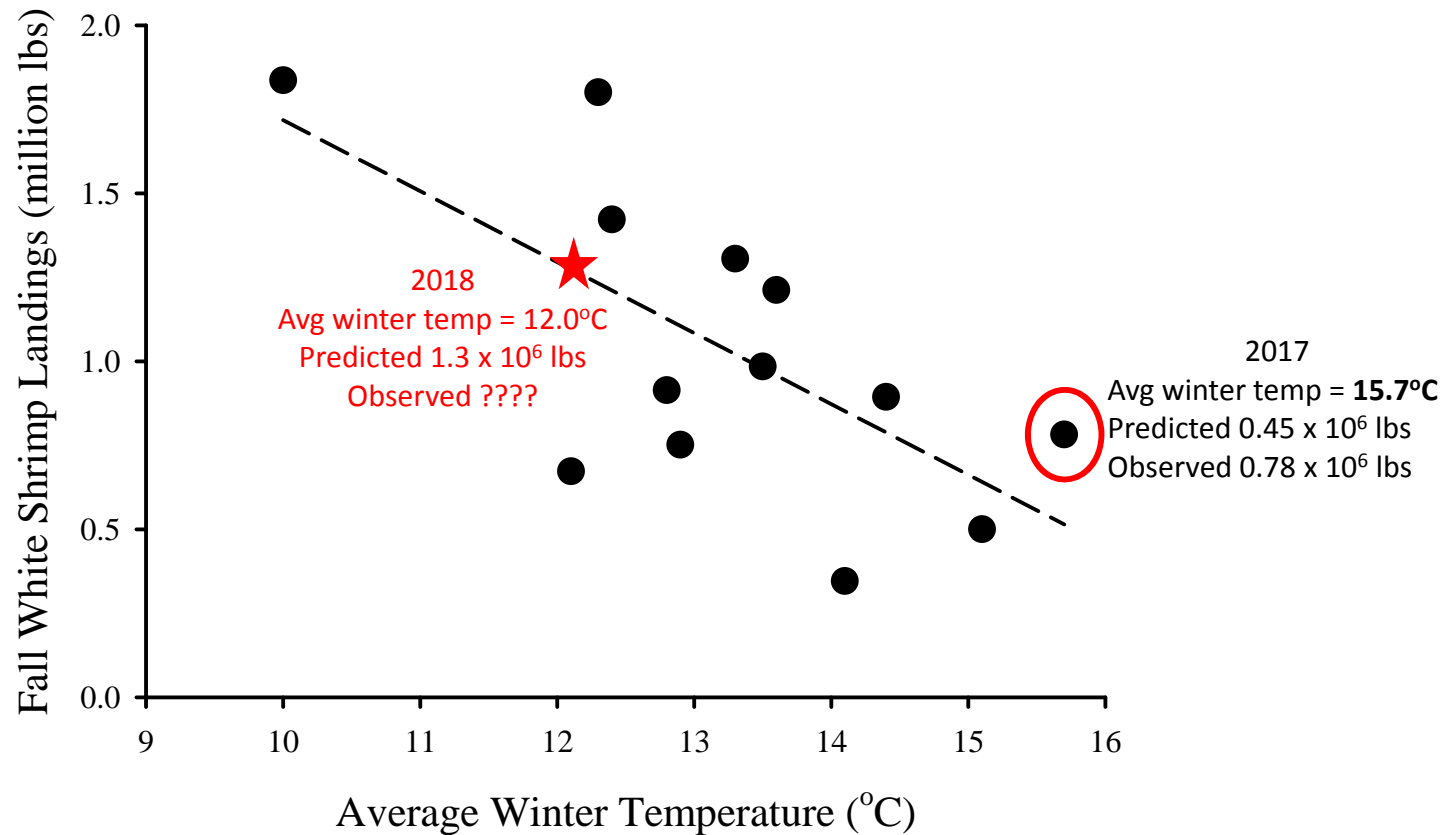
← ENSO →

(Wetter/Warmer Winter)

Mortality is mitigated by temperature

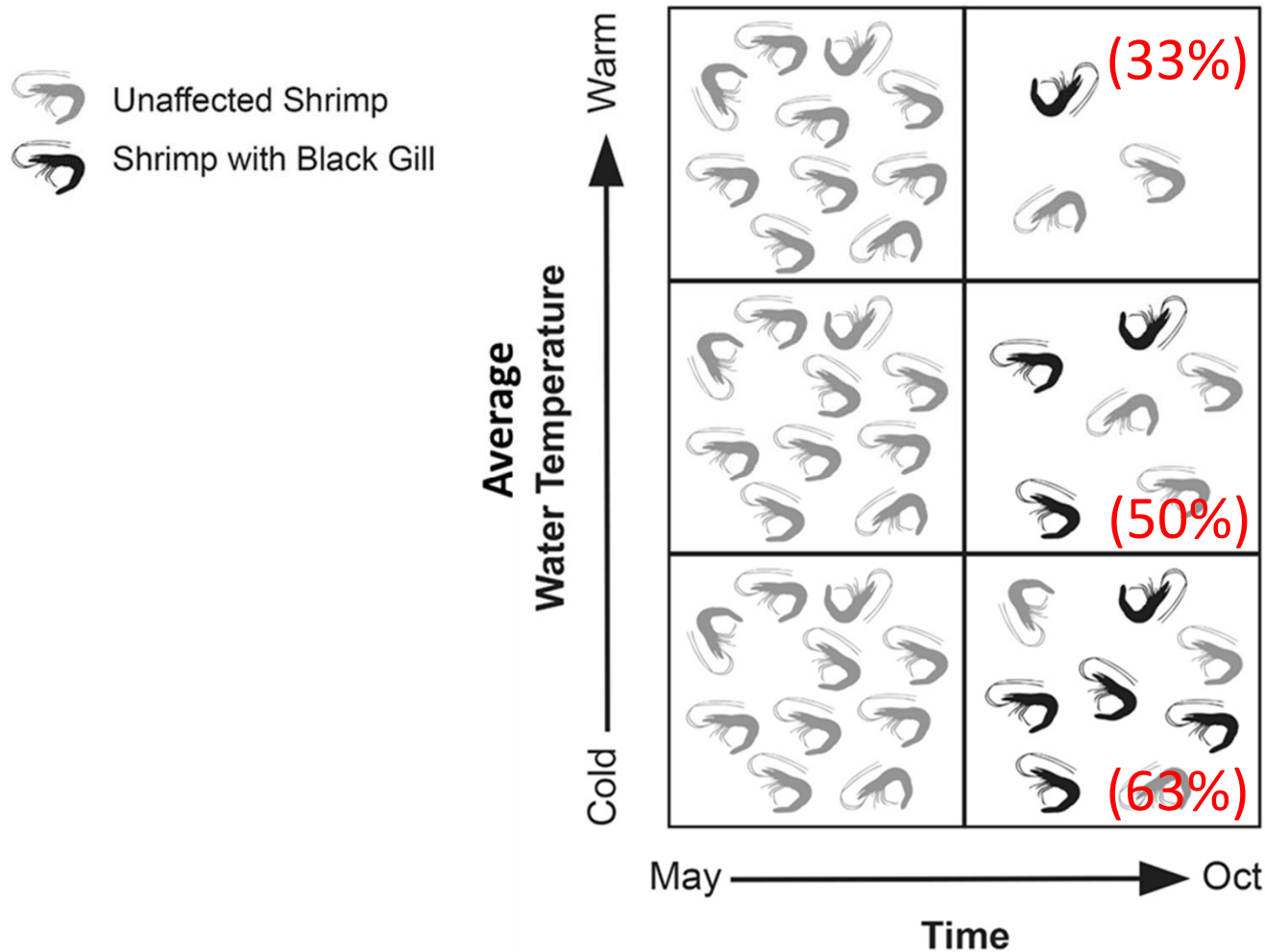


Previous Year Winter Temperature Correlated With the Fall Harvest the Following Year



Conceptual Model

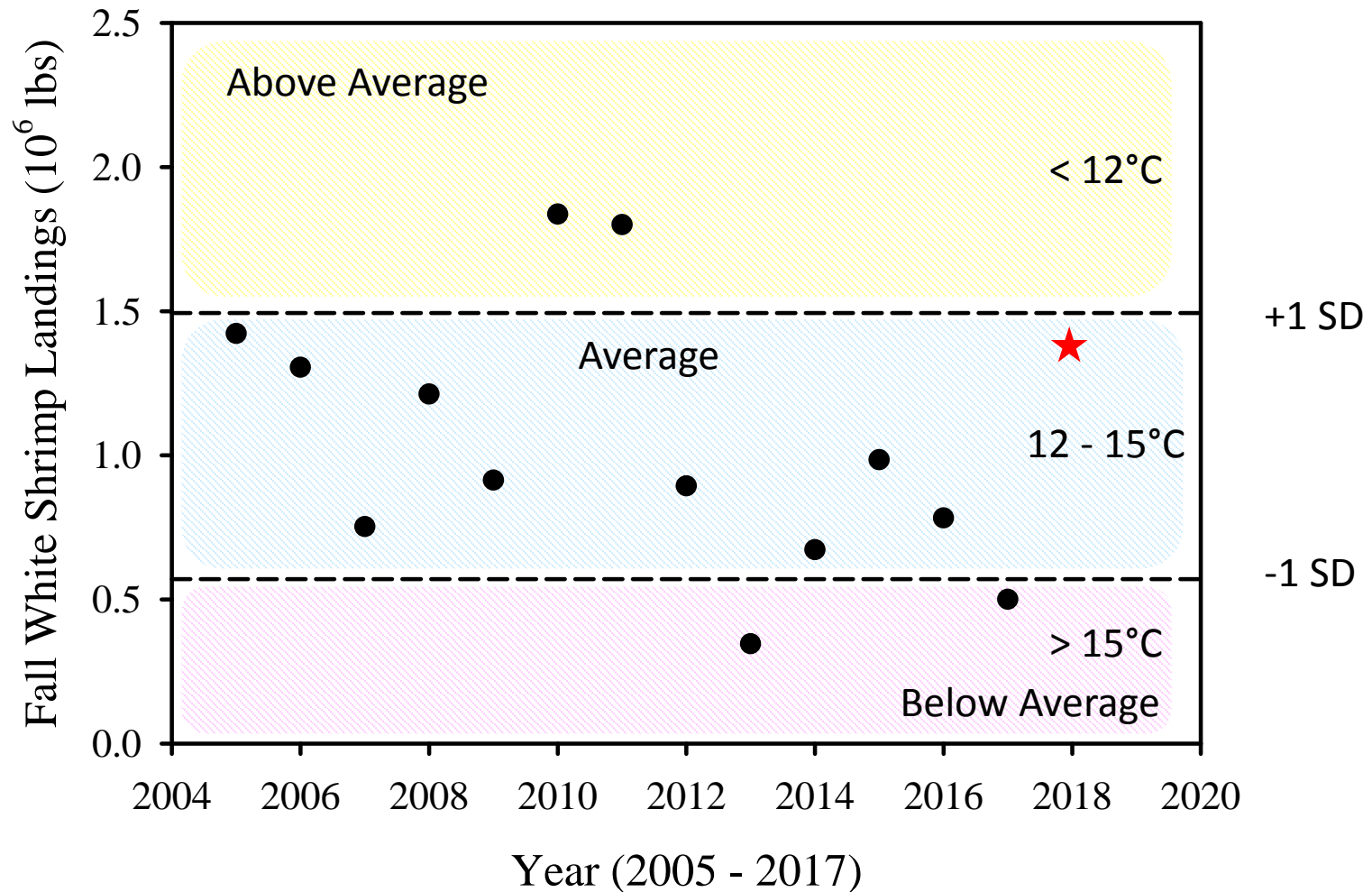
Relationship Between Winter Temp and Fall Harvest



In the Age of Black Gill

Possible Forecast Product

GA Fall White Shrimp Harvest Based on Previous Winter (Avg) Temperature



Predictability = Stability

Engagement With Extension

- 2018 Annual Stakeholder Cruise
- October 10, 2018
- frischer@uga.edu or fluech@uga.edu

(GA should be leading this effort)



2016 Annual Stakeholders Shrimp
Black Gill Research Cruise



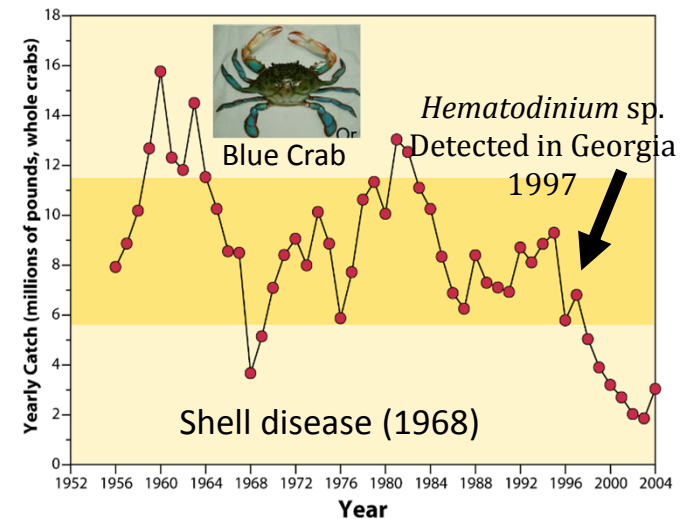
2018 Louisiana
Fisheries Forward Summit

Parasites are not rare in nature

The Shrimp Gill “Microbiome” What’s next?

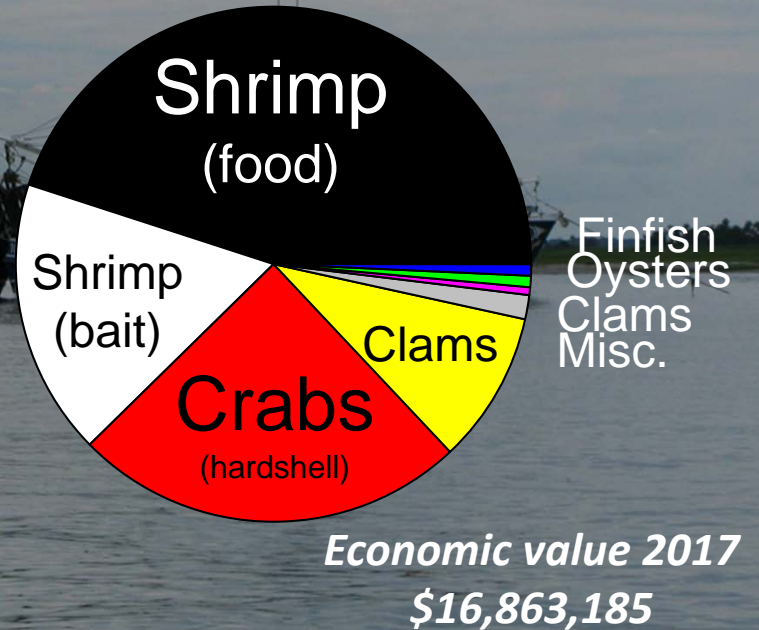
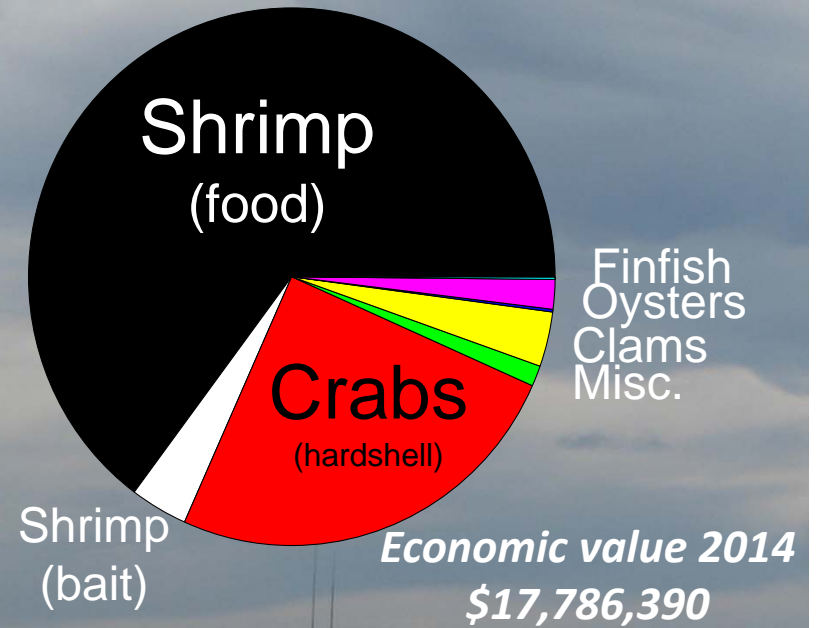
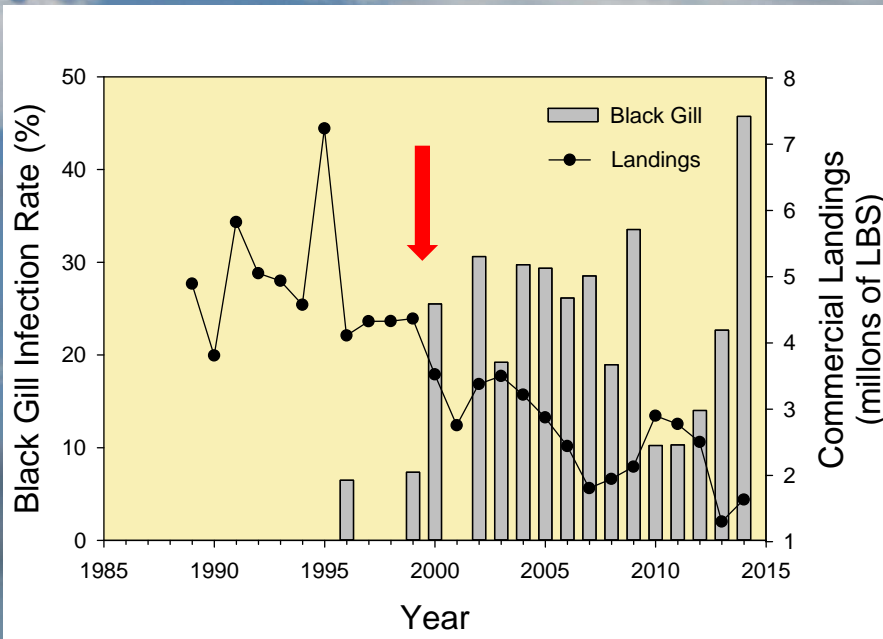
Group	# Unique Groups	# Sequences	Most Common Replicates	# Sequences
Potential Microparasites				
Ciliophora	38	176315	<i>Hyalophysa</i> sp.	114640
			<i>Zoothamnium</i> sp.	54990
Fungi	64	2051	<i>Malassezia</i> sp.	608
			Capnodaes	607
Apicomplexa	8	21	Cardisporidium	7
			Gregarinasina	3
Cercozoa	28	1066	Protasps	284
			Unidentified	286
Retaria	5	388	Spumellaria C1-E045	220
Choanomonada	6	75	Lagenocea	62
Dinoflagellata	22	1894	Gyrodinium	1290
			Protoperidinium sp.	171
Euglenozoa	6	128	Petalomonas	107
MAST	4	21	MAST-3J	14
Animalia				
Plathelminthes	6	90587	Digenea	90546
Annelida	5	54	Unidentified	36
Nematoda	3	3	Phanodermatidae	1
			Trichuridae	1
			Tripylidae	1

195 Distinct Groups of Potential Shrimp Parasites Detected in 13 Specimens (March – December 2014)



**Proactive Management Requires
Proactive Science**

Georgia's Fisheries



Commercial Trawling Licenses

1980 - 1,360
 2006 - 307
 2016 - 261

