



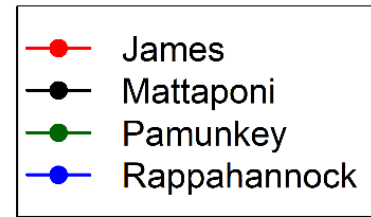
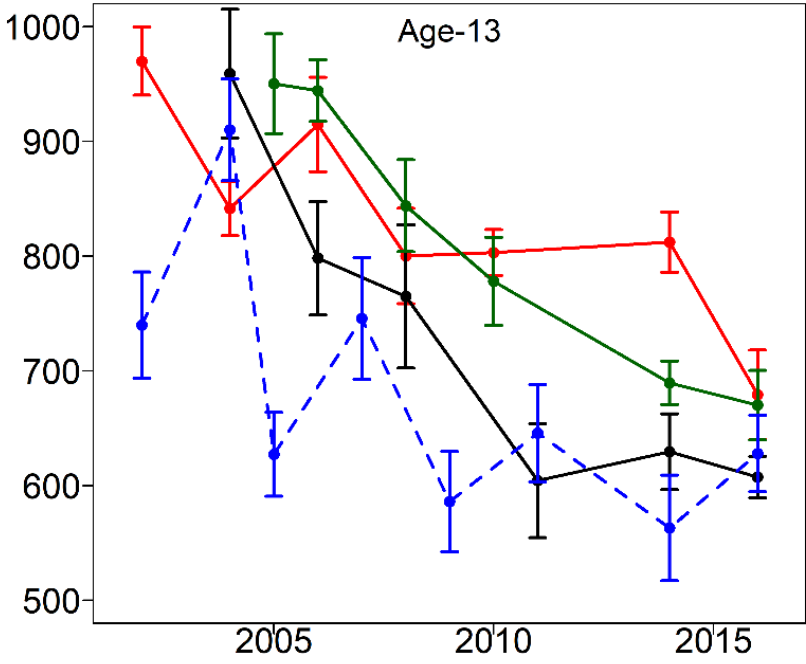
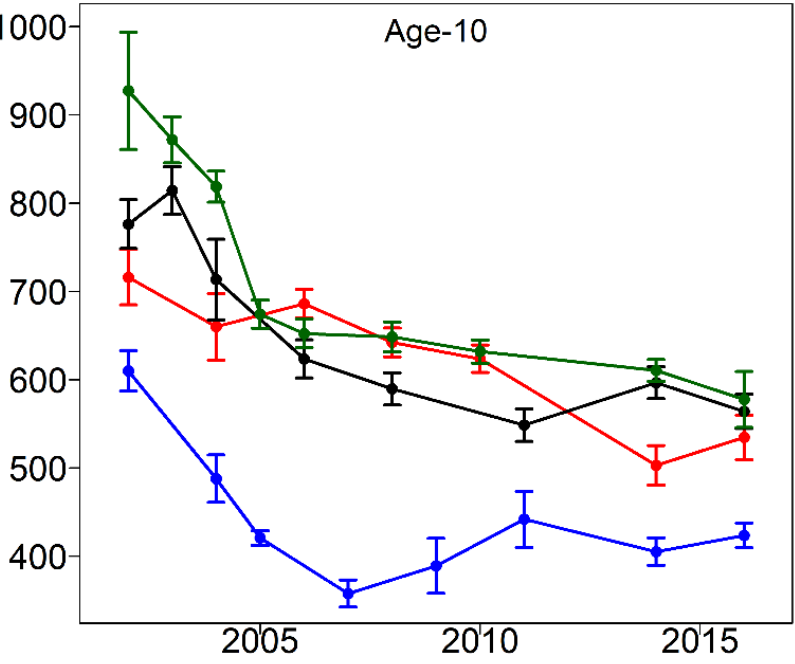
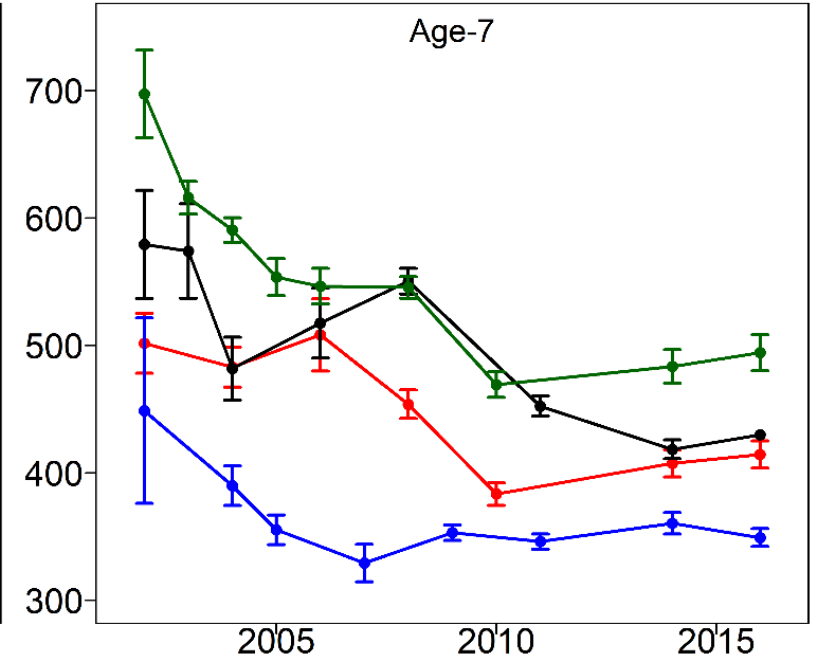
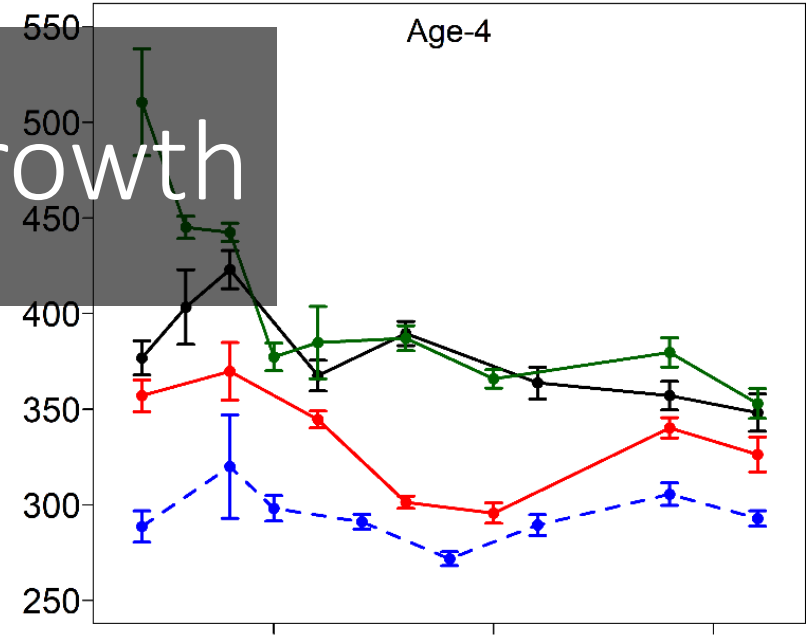
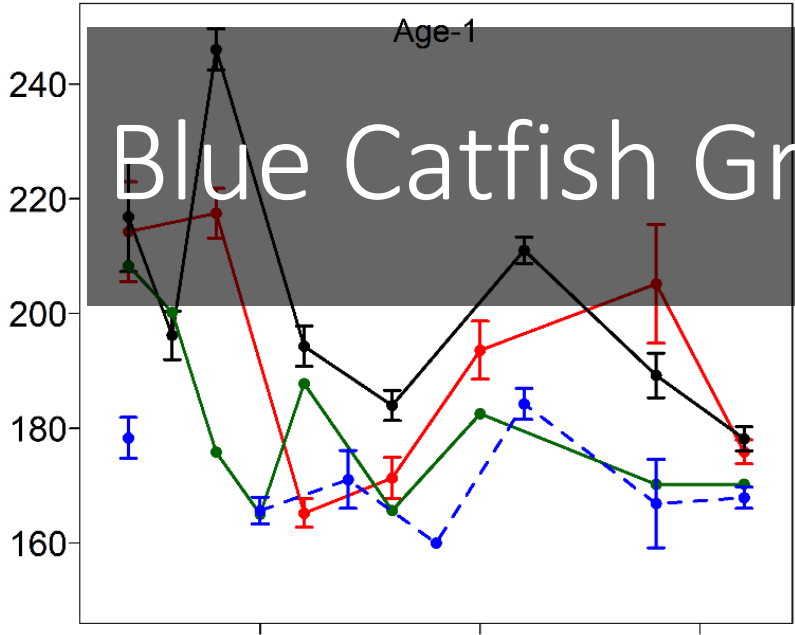
Virginia Tech Science on the Bay's Catfish Conundrum

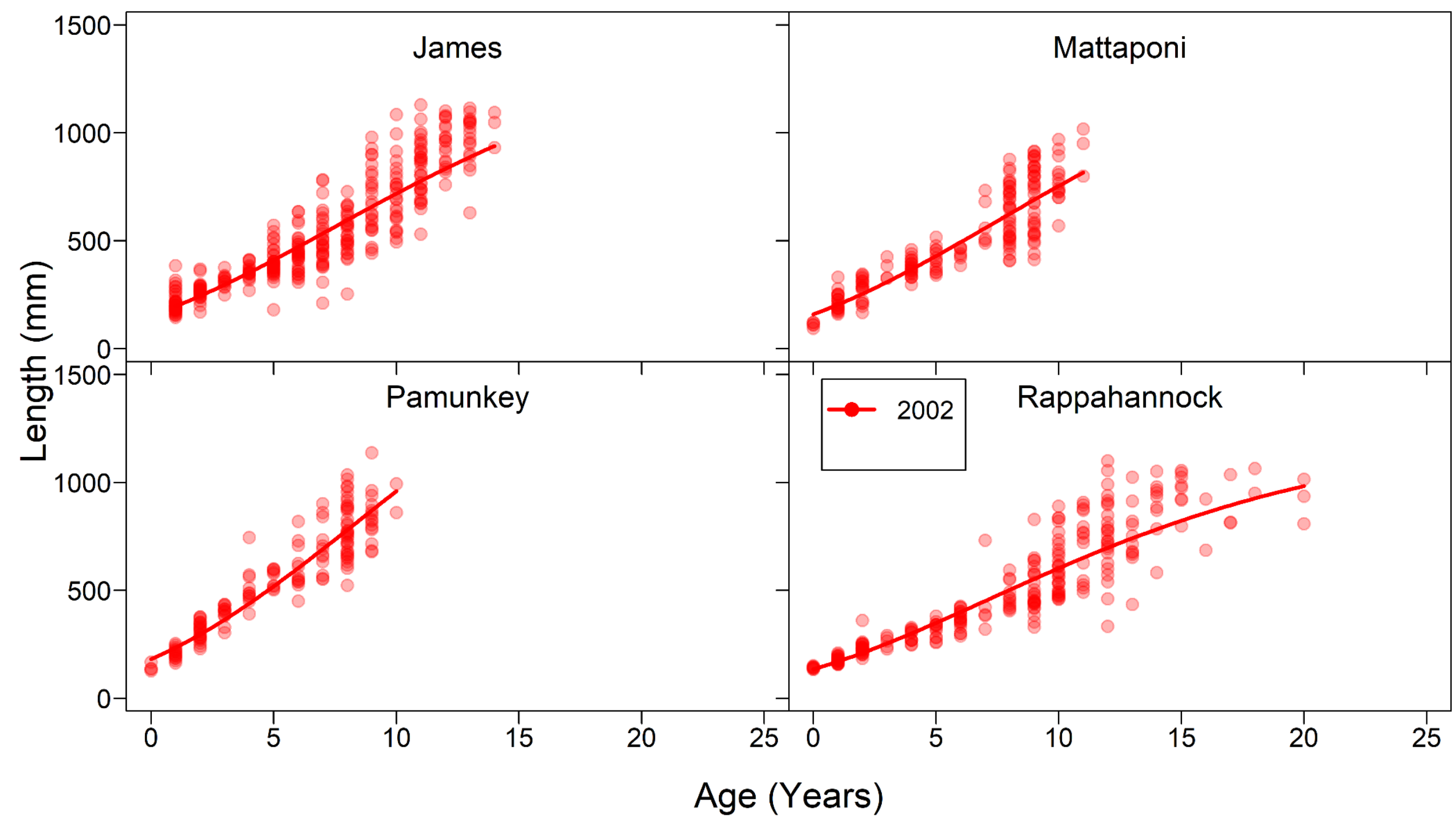
Aaron J. Bunch, Leandro Castello, Jason A. Emmel, Mary C. Fabrizio, Robert S. Greenlee, Eric M. Hallerman, Corbin D. Hilling, Yan Jiao, Zach S. Moran, Donald J. Orth, Brandon K. Peoples, Joseph D. Schmitt

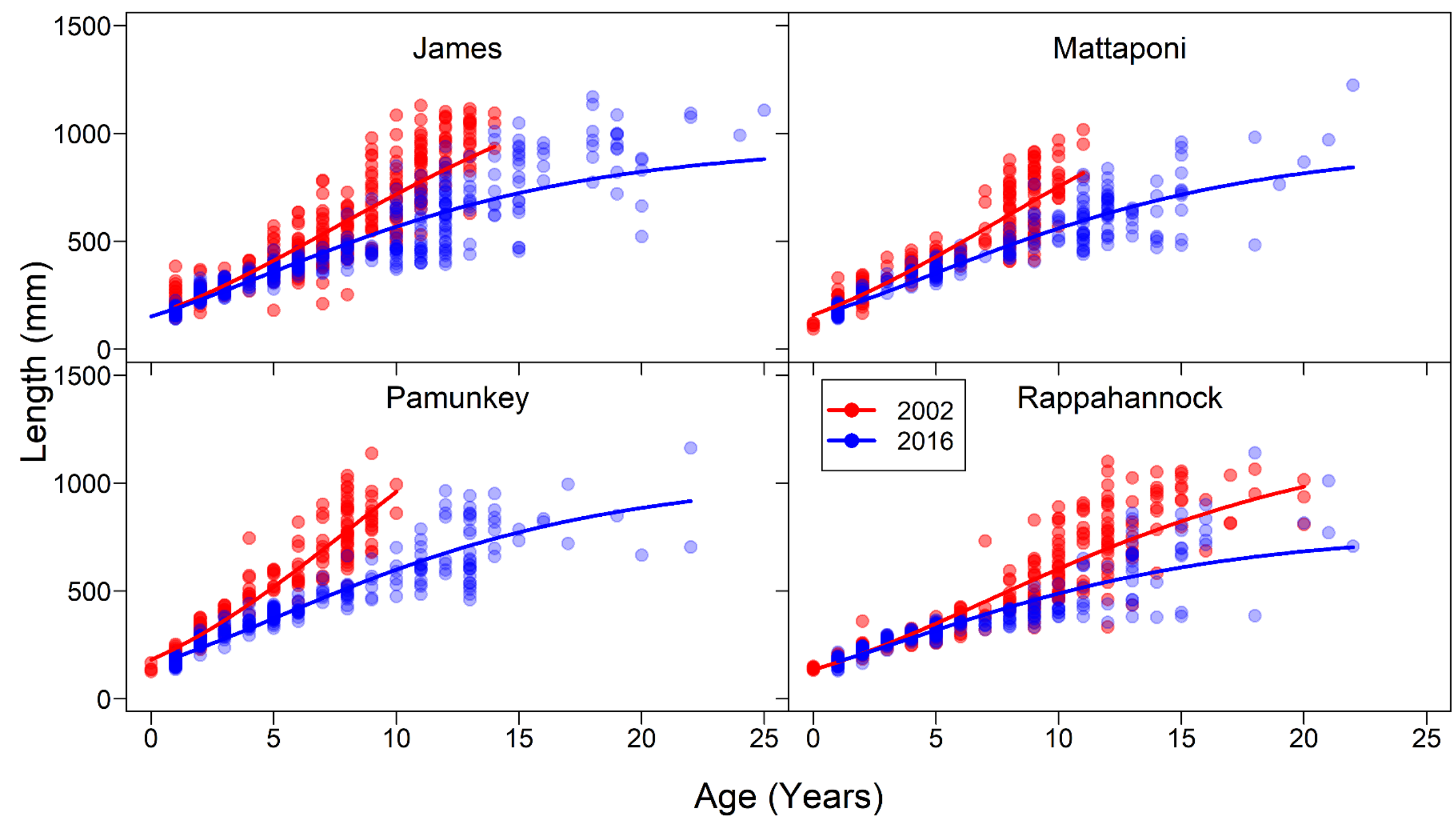


Blue Catfish Growth

Mean Length (mm)

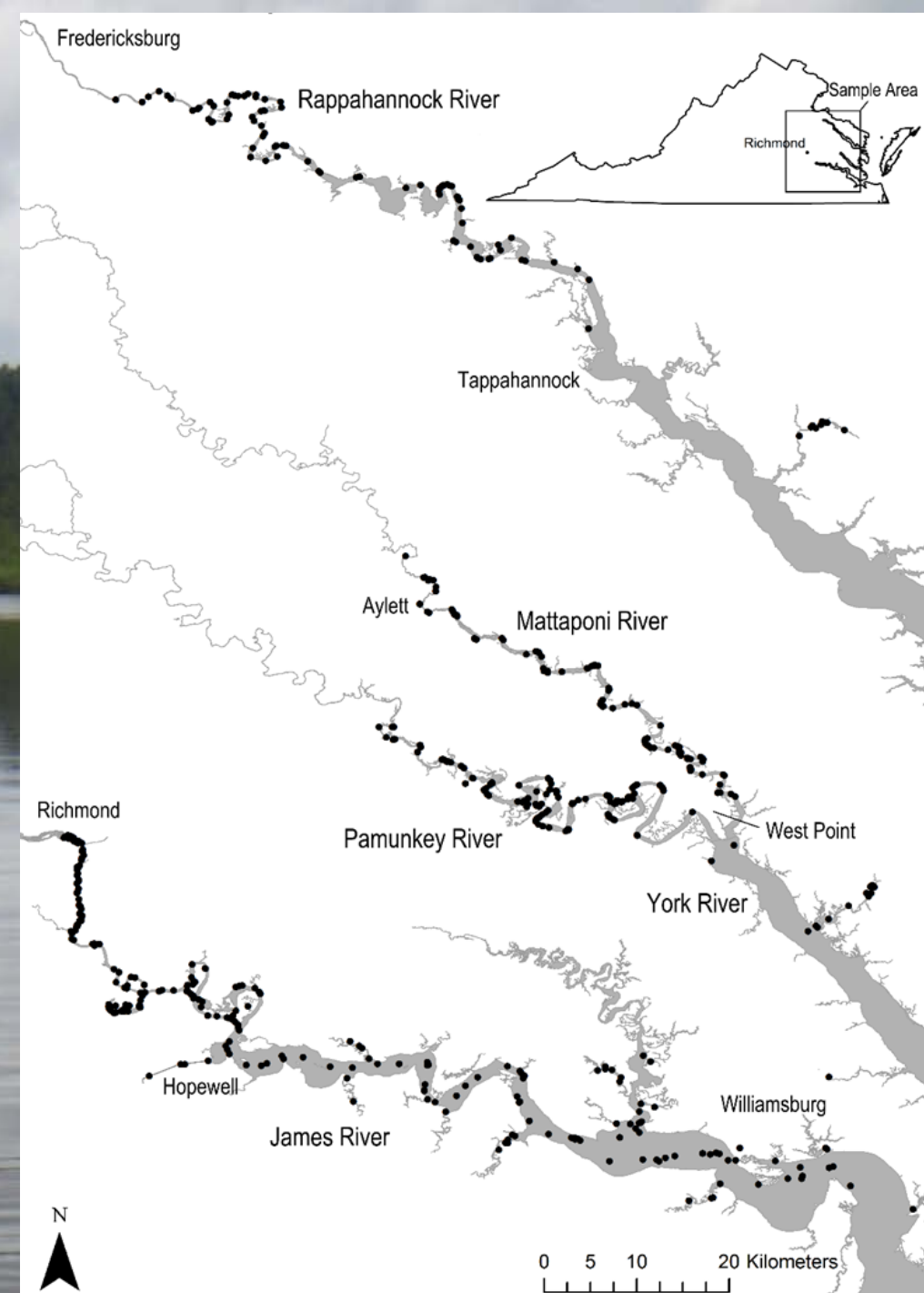


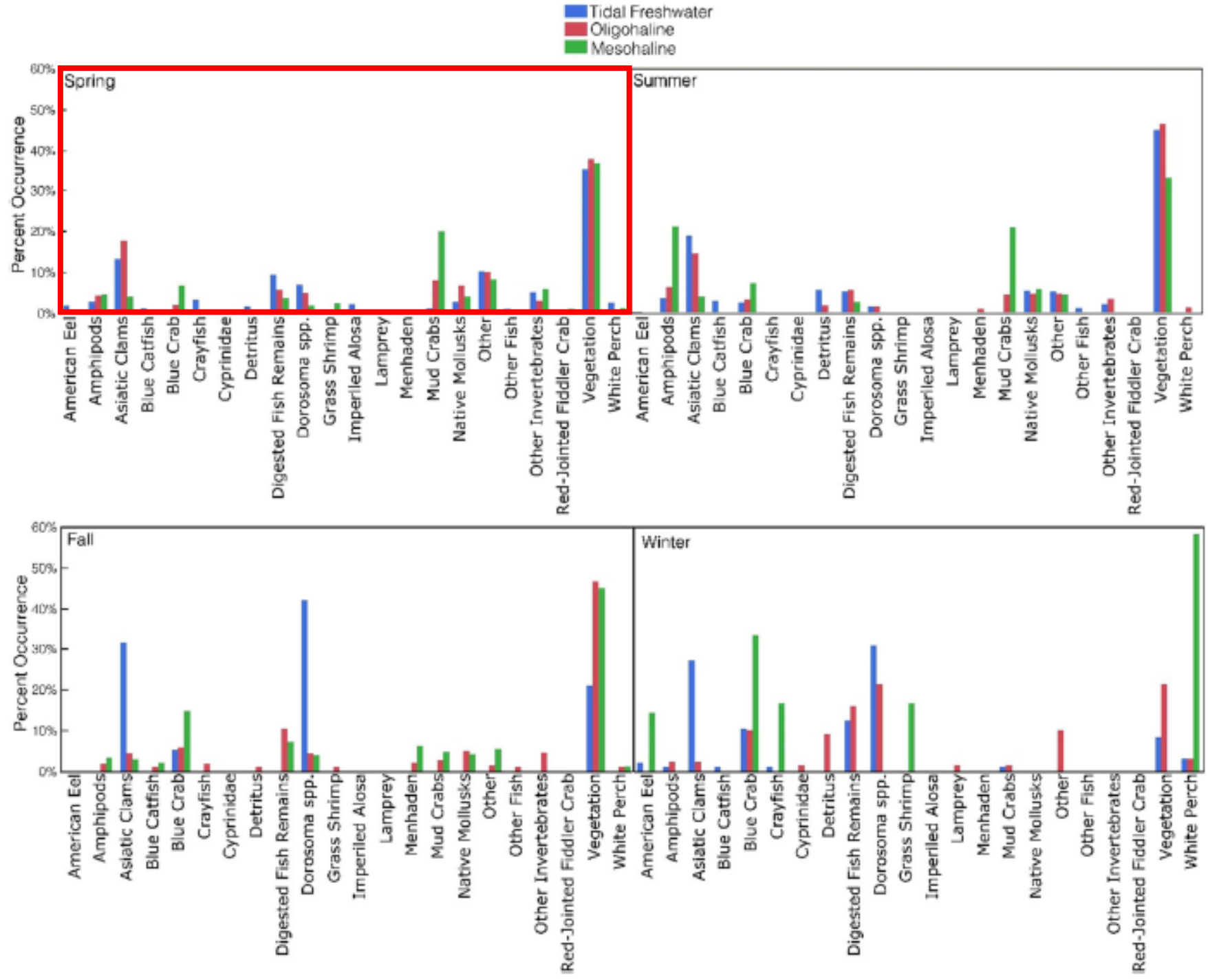


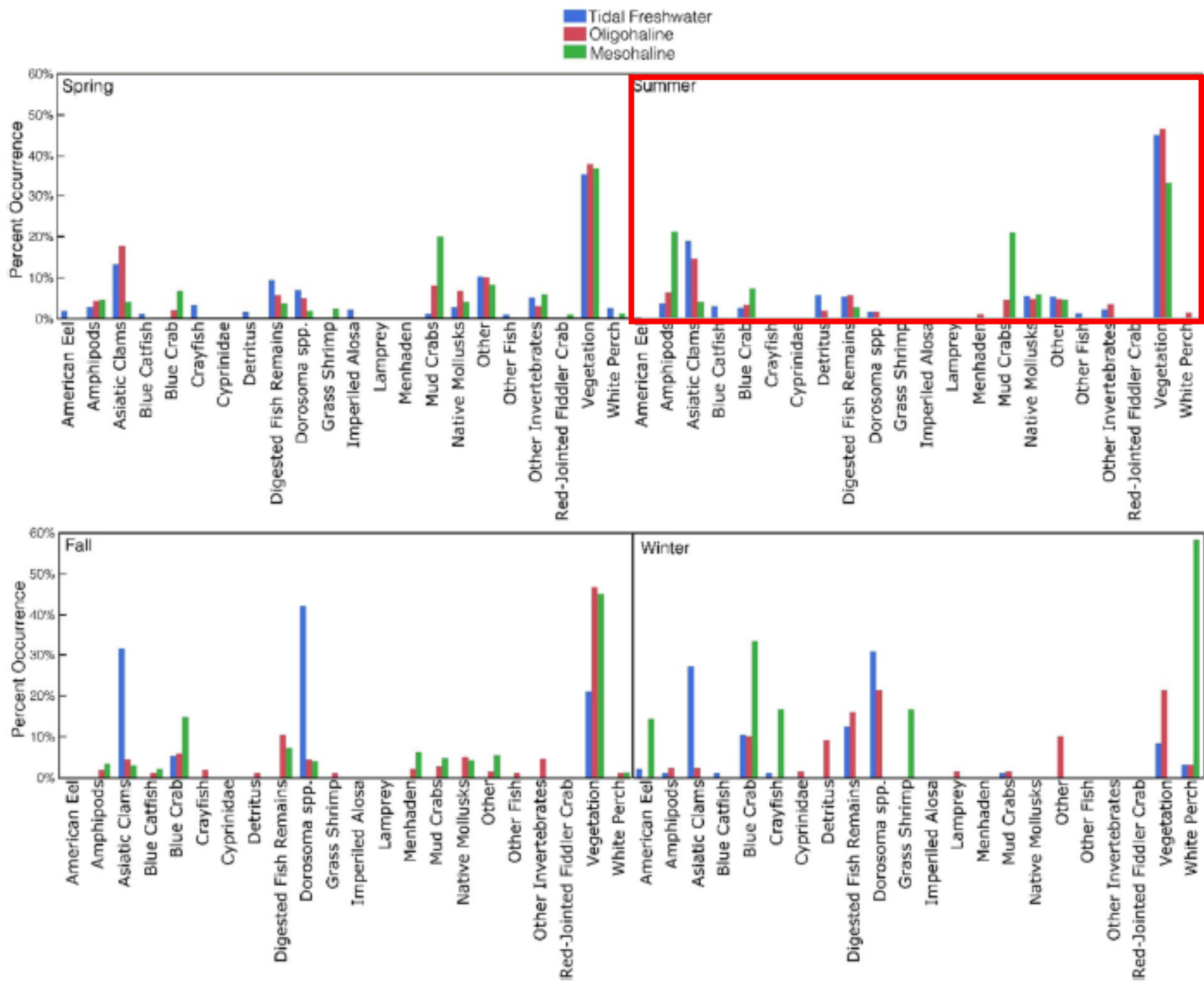


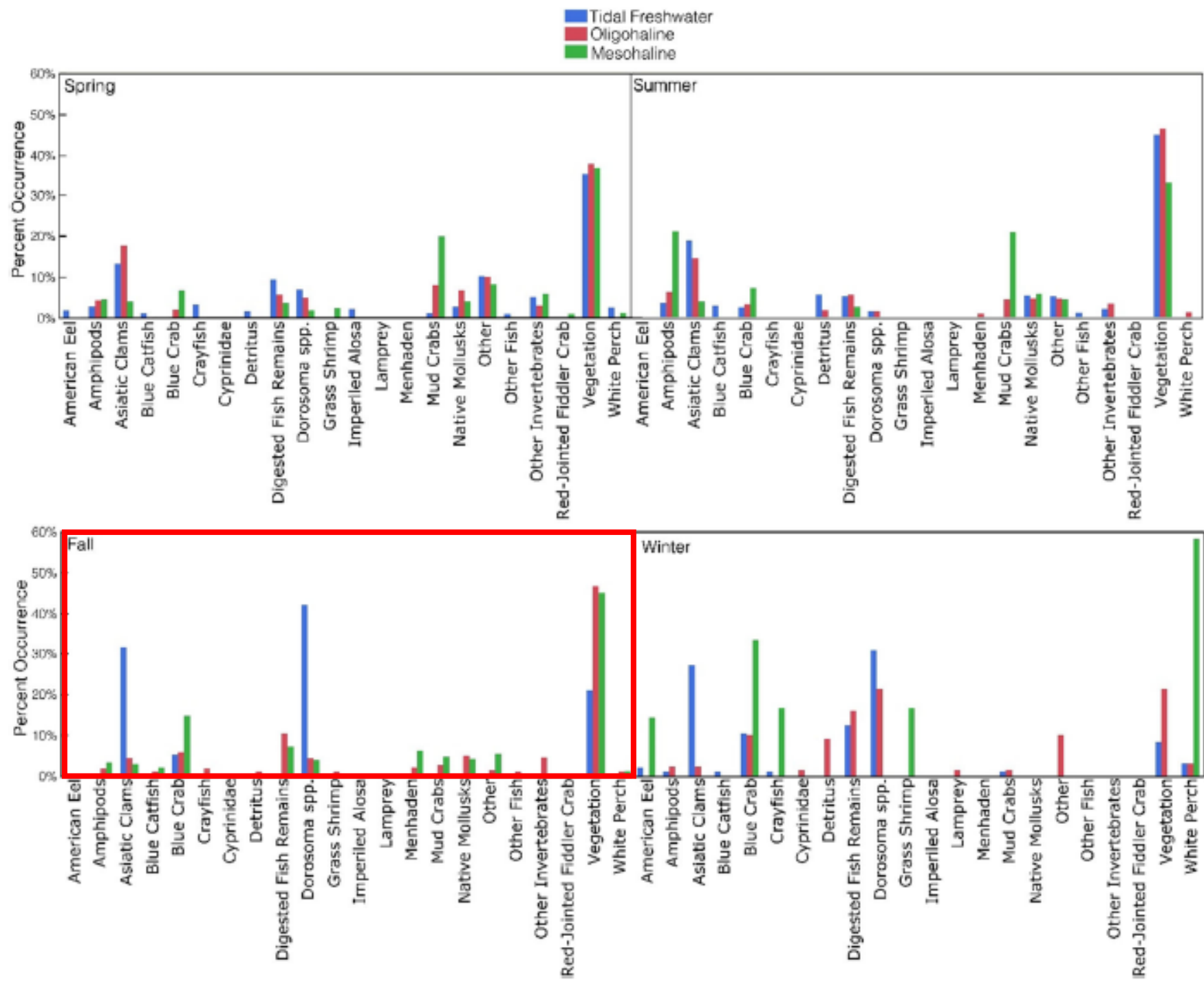
Blue Catfish Diet

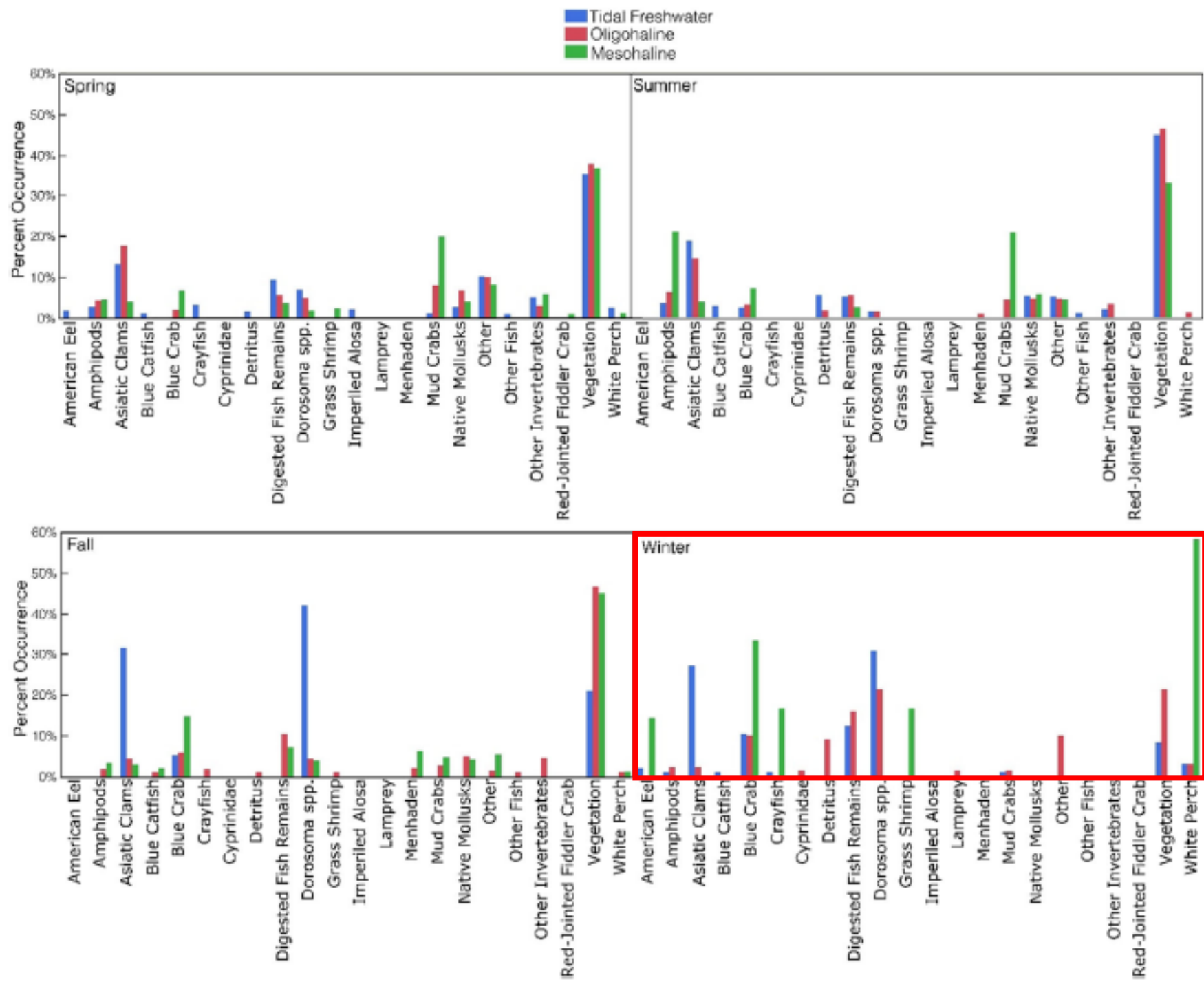
- Boat electrofishing
- Stratified random sampling
- Tidal freshwater – mesohaline
- Seasonal differences in dataset
 - James: Every Month
 - Rappahannock: March – October
 - York: March – December



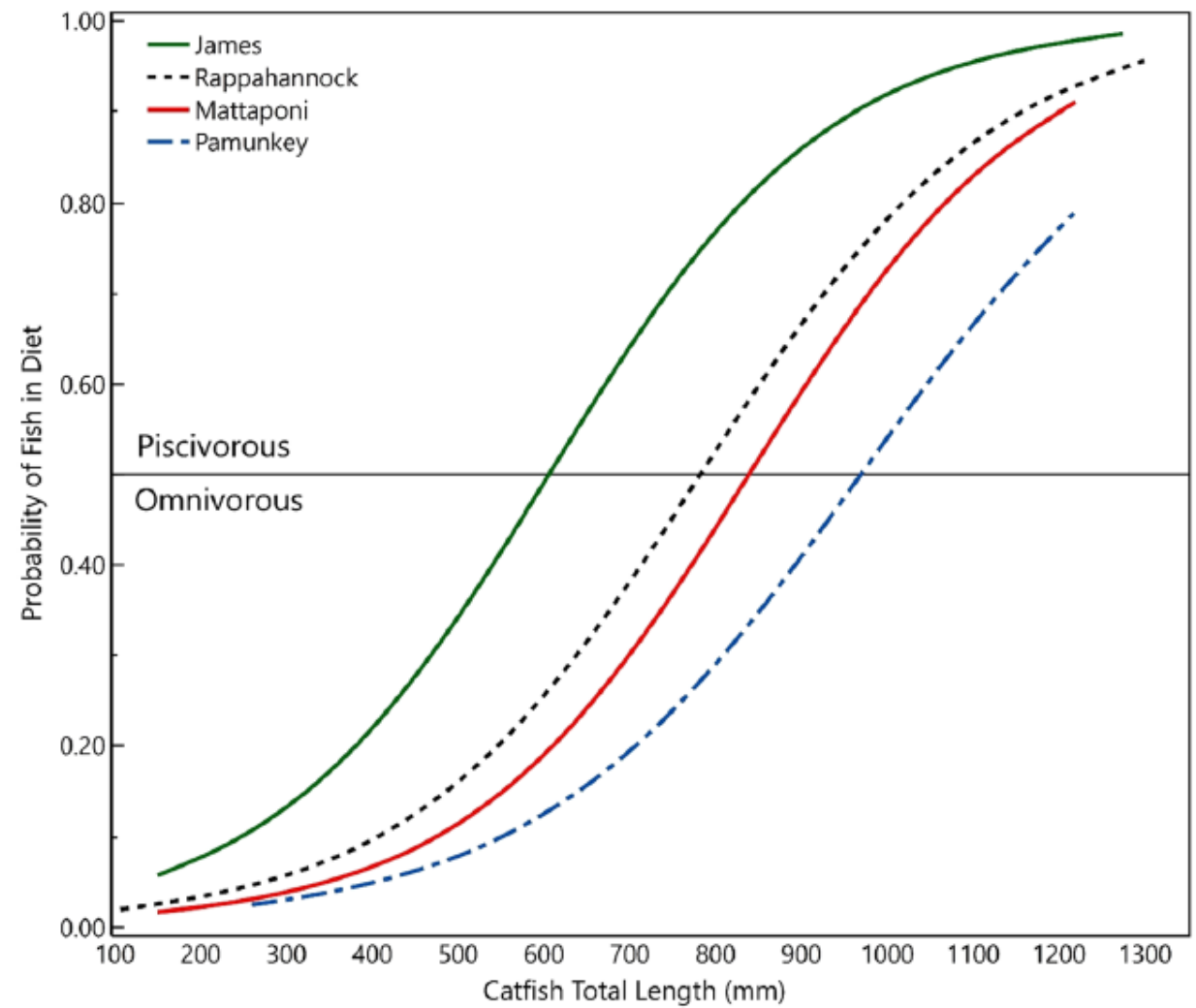
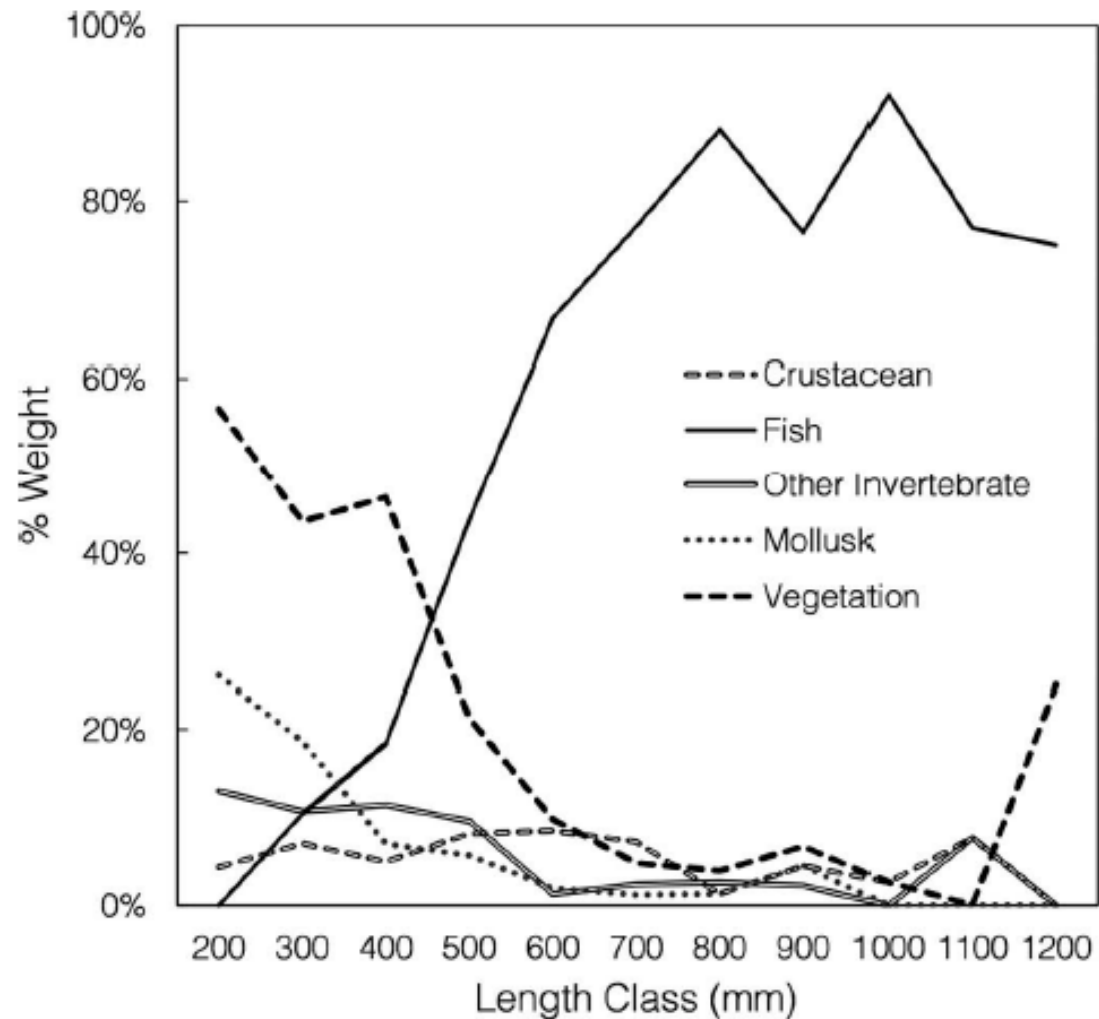


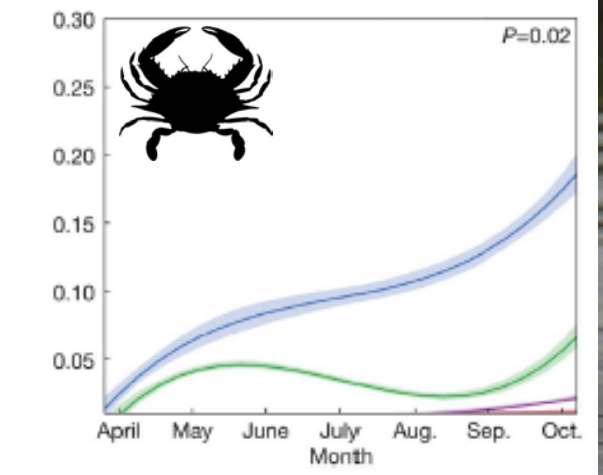
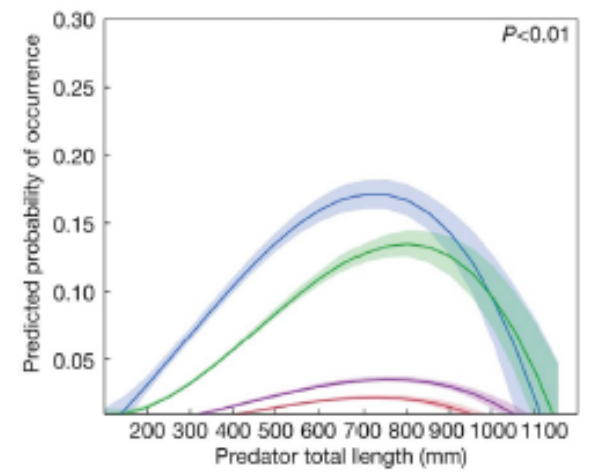
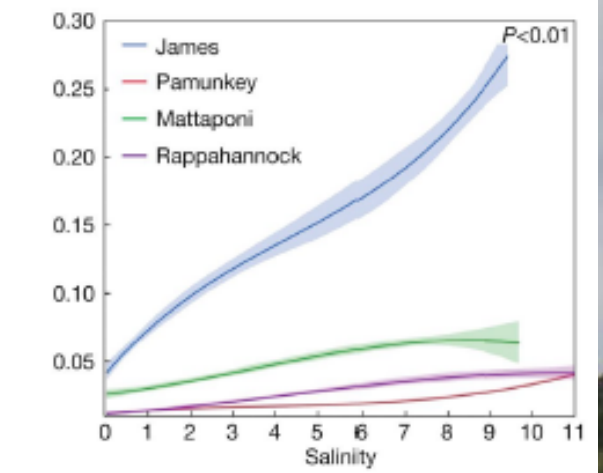
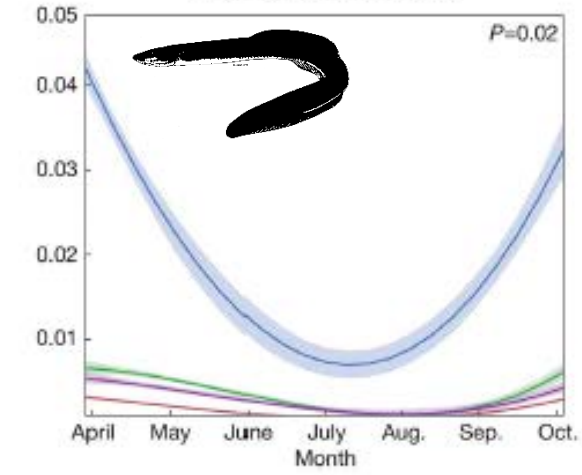
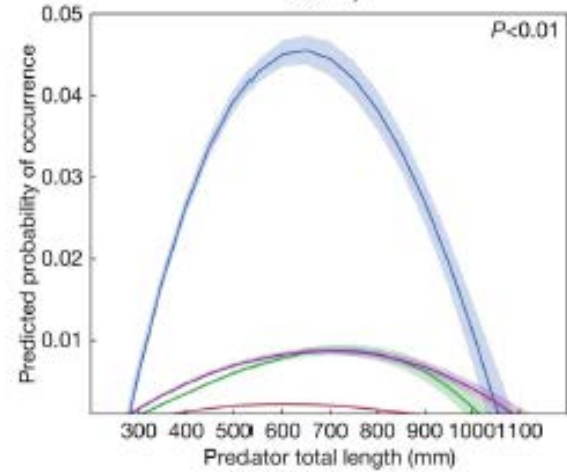
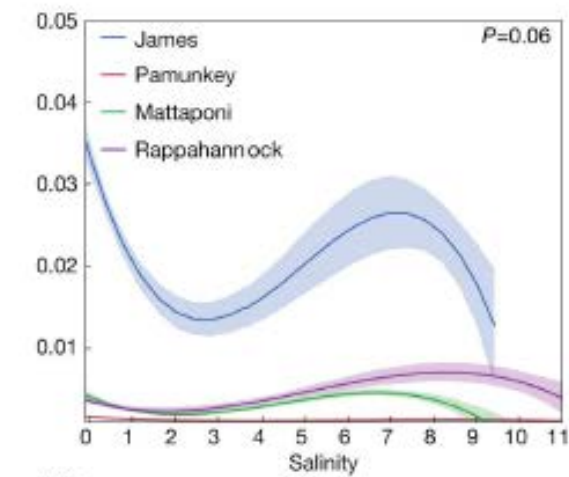
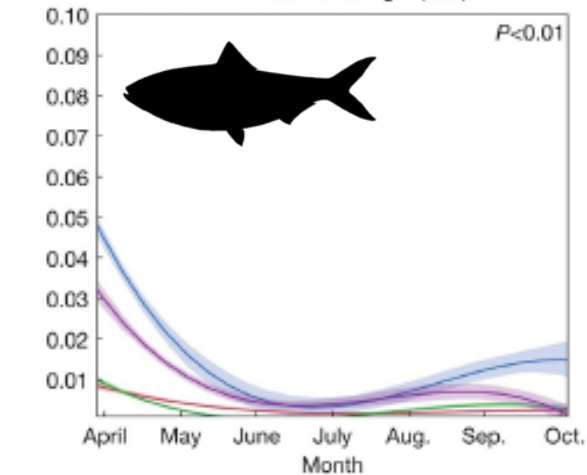
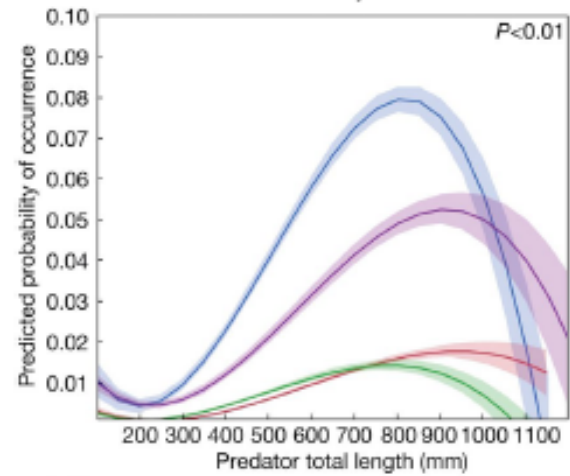
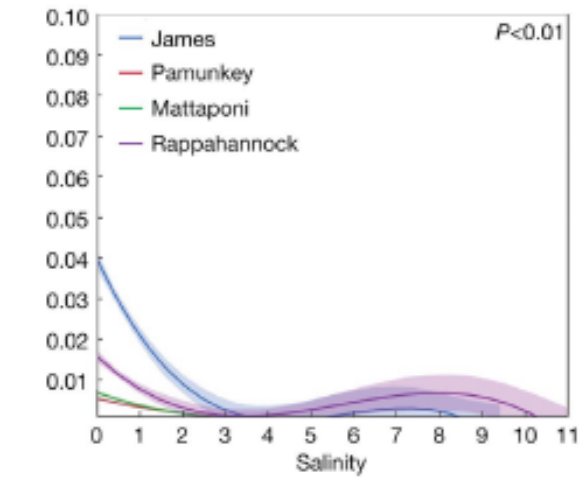






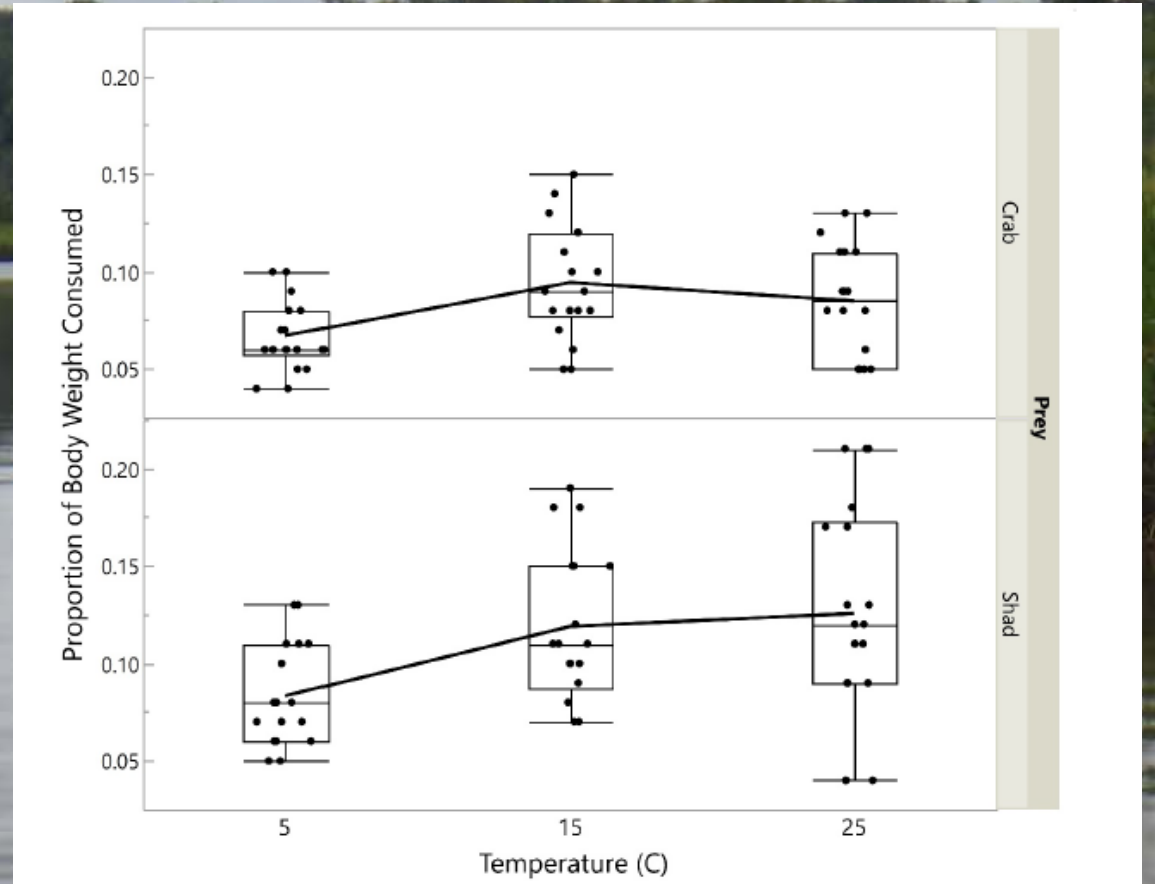
Blue Catfish Diet





Consumption

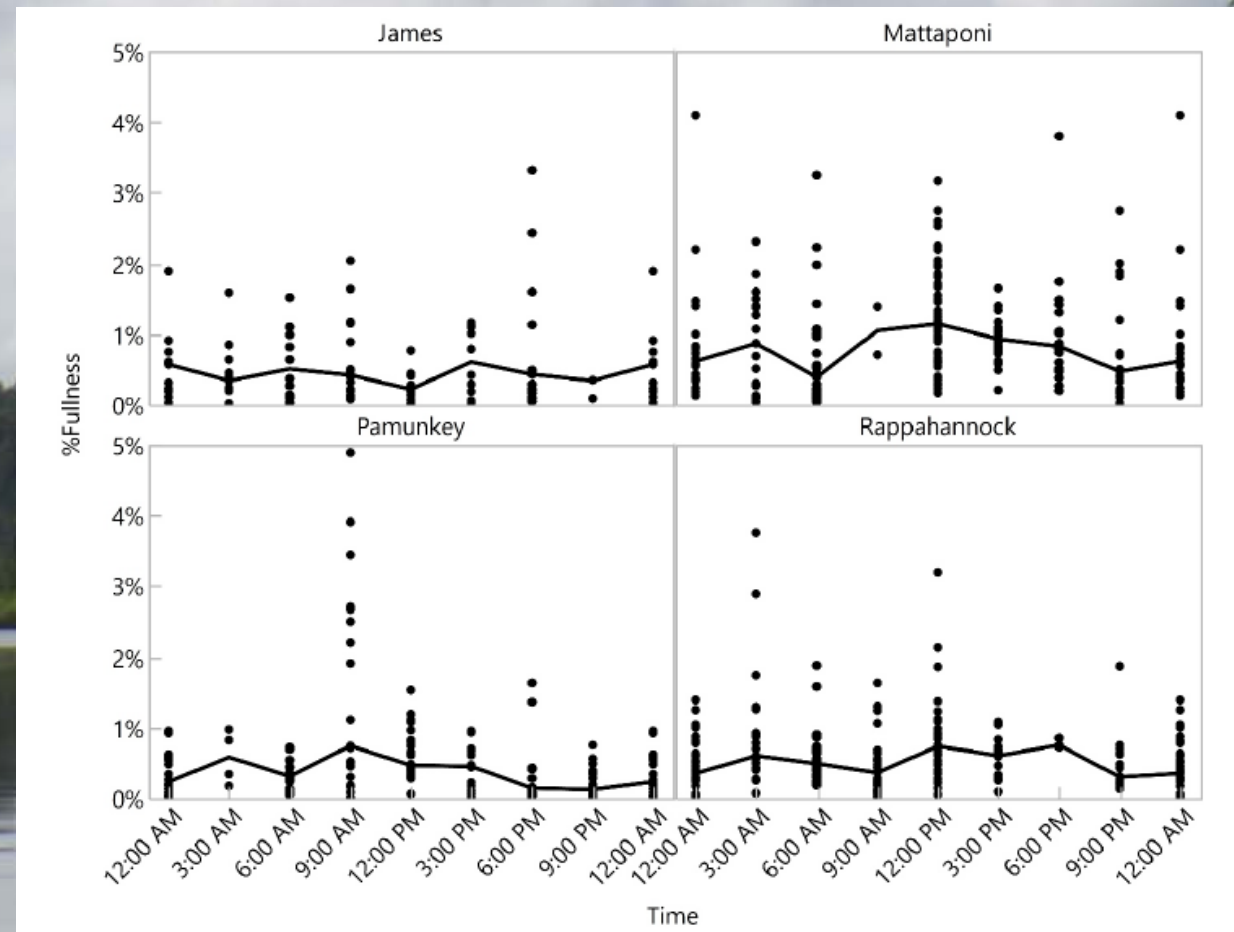
- Lab Experiment
 - Looked at fish size, prey type, water temperature
 - 41, 59, 77°F
 - Fed every 3 hours ad libitum
 - 4 to 21% of body weight per day (average 9.56% per day)
 - 7.53% at 5 C, 10.66% at 15 C, 10.55% at 25C



Consumption

- Field Study

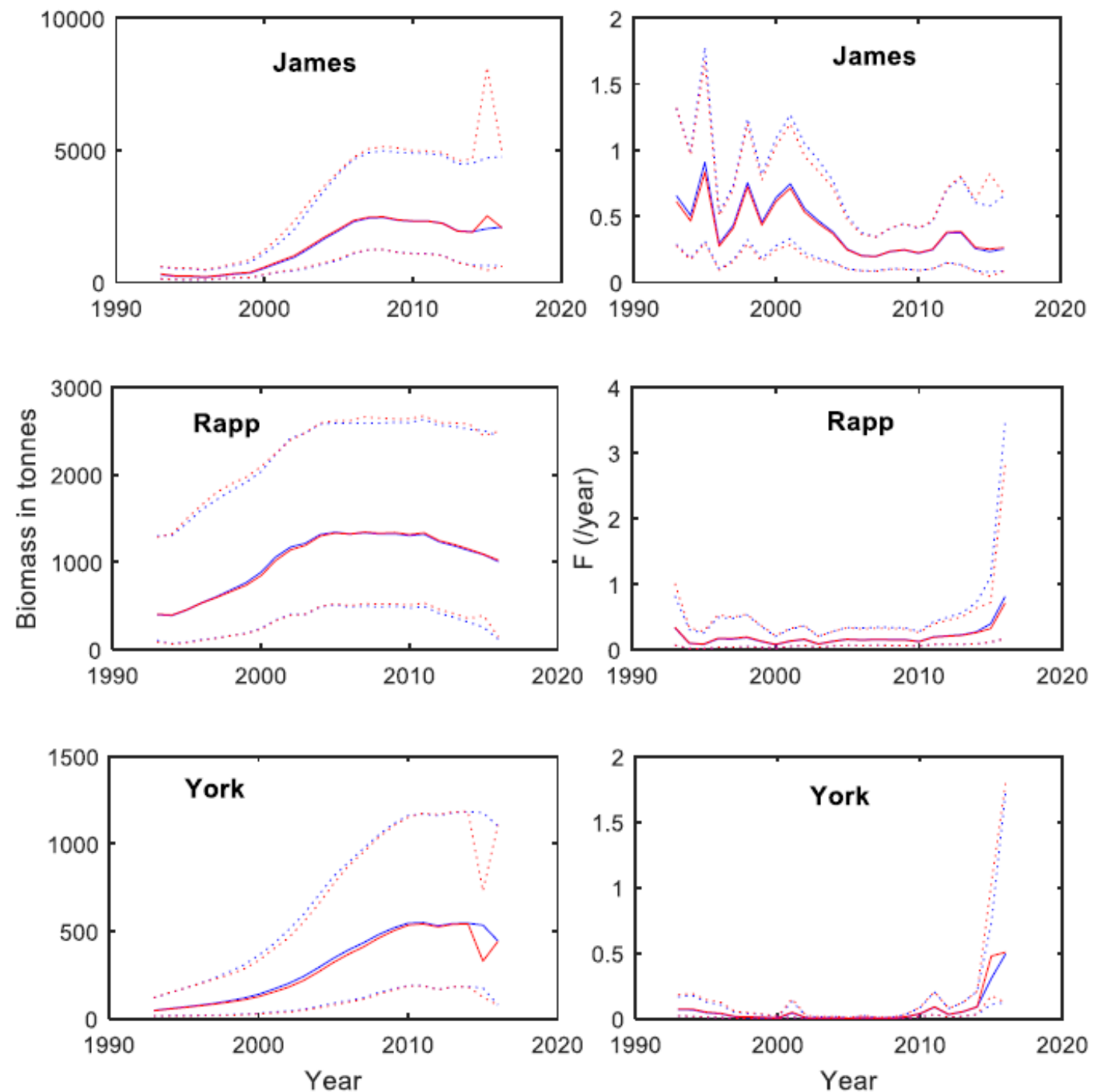
- 24 hr feeding chronology sampling every 3 hrs
- 1,226 blue catfish
- August (22.3 C to 29.6 C)
- C_{max} = 4.34% to 15% body weight (8.76%)
- Mean daily ration 3.6% (2.27-5.22% range)



River	Daily Ration (C_{24})	Max Daily Ration (C_{max})
James	3.520%	10.320%
Mattaponi	2.270%	4.343%
Pamunkey	5.220%	15.004%
Rappahannock	3.390%	5.371%
All Rivers	3.600%	8.760%

Biomass

- Dr. Jiao-led effort
- Hierarchical Bayesian non-stationary age-aggregated model
- Two indices of relative abundance
- Included prior information from VDGIF tagging data (blue lines)



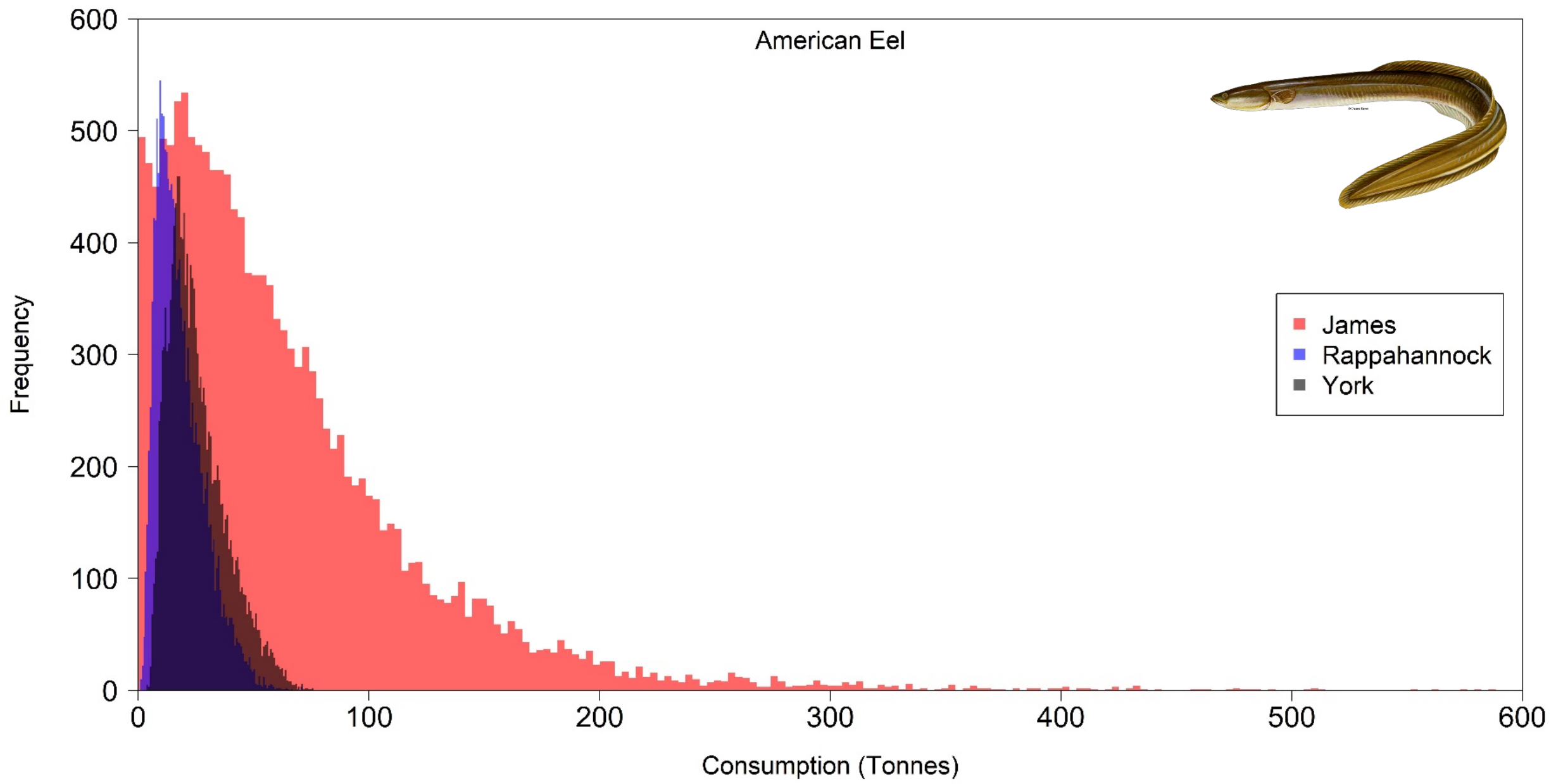
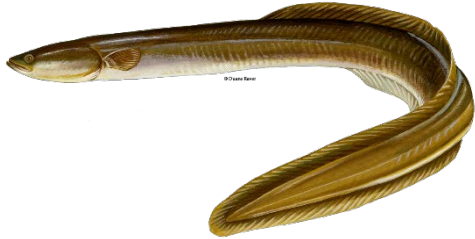
Blue Catfish Impacts

$$Q_{p,i} = B_p \cdot (Q/B)_p \cdot \%W_{p,i}$$

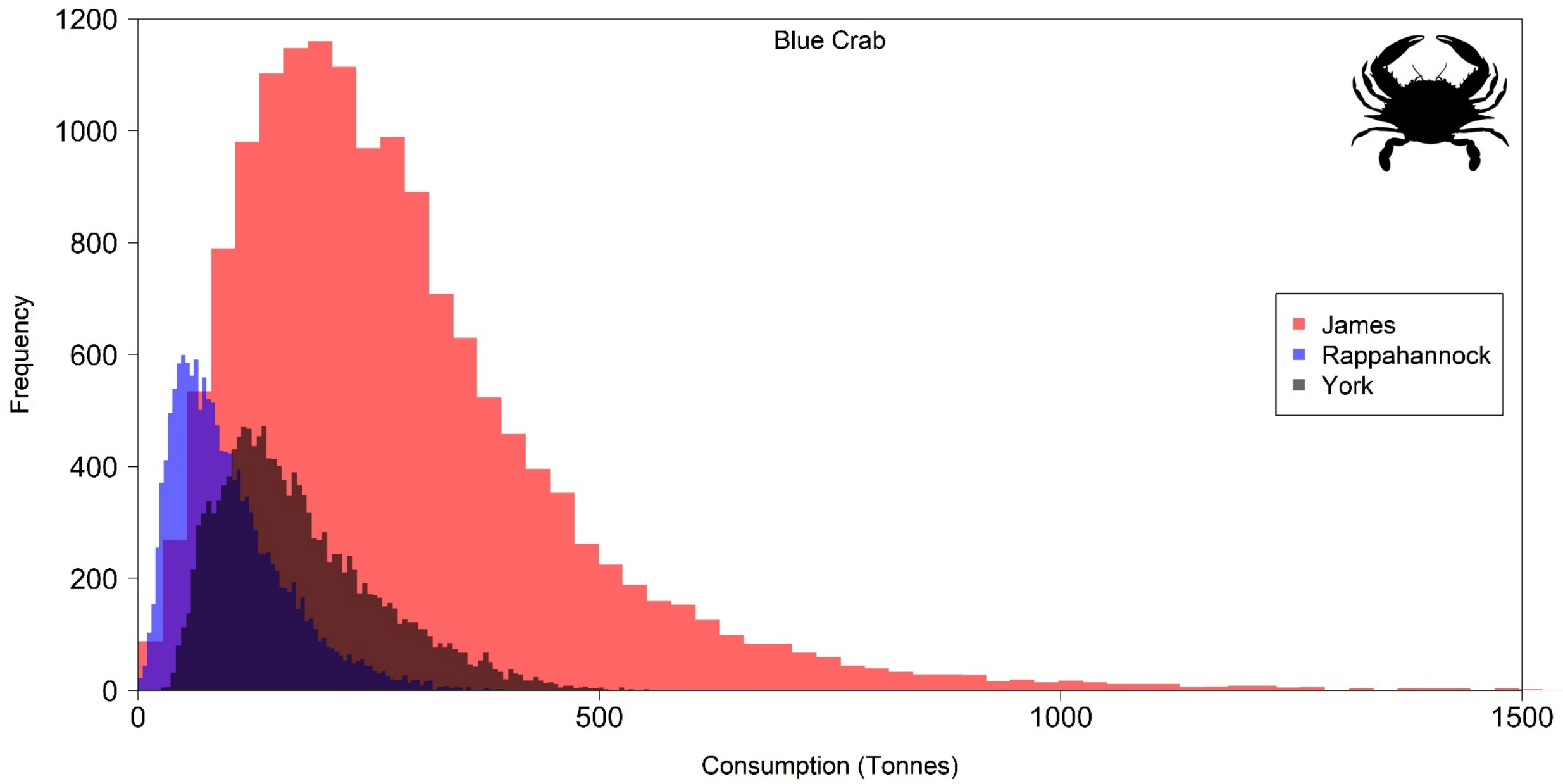
- Monte Carlo Simulation
- Preliminary estimates of consumption
- Assumptions:
 - Size structure of sample(s) approximates population
 - Constant density
 - Diet (Seasonal/Spatial) represented



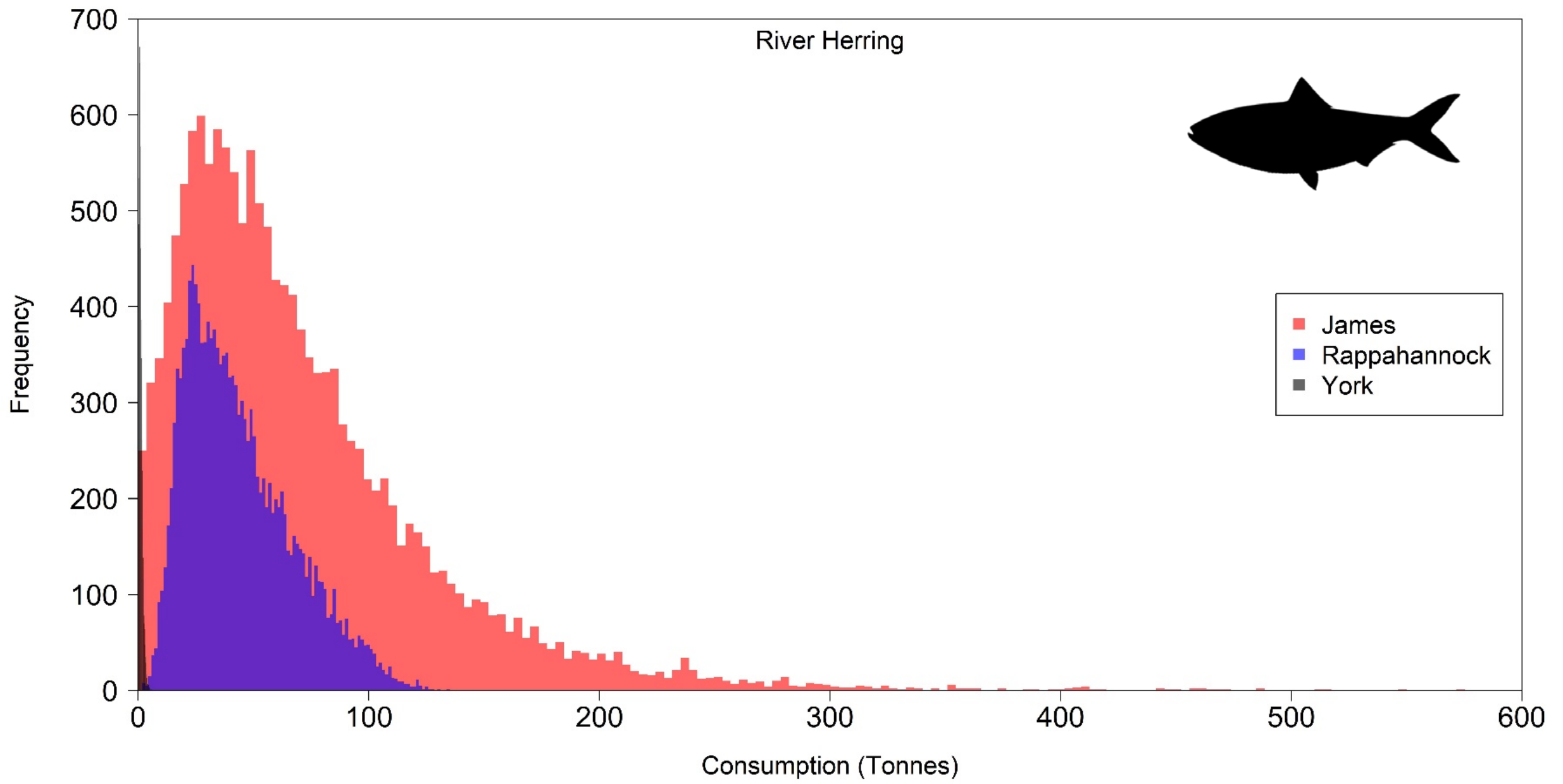
American Eel



Blue Crab



River Herring



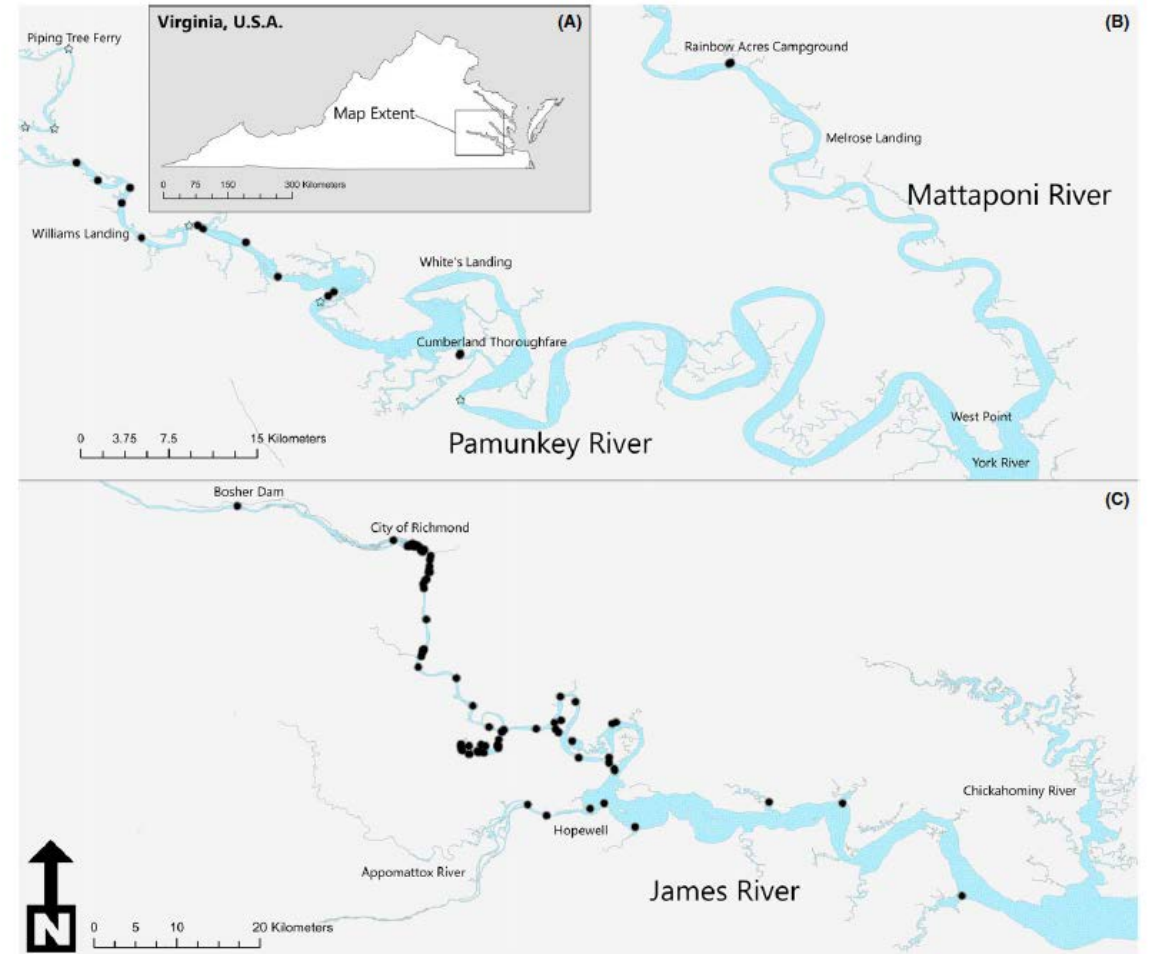
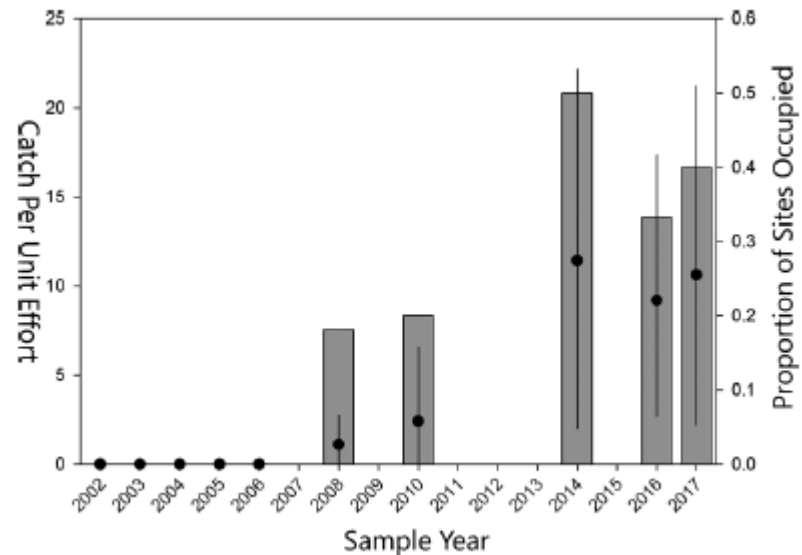
What do these estimates mean?

- American Eel
 - VA commercial harvest (2014) ~48 tonnes
- Blue Crab
 - 560 tonnes = 4% of Virginia harvest (CBSAC 2017)
 - 136 tonnes die in derelict fishing gear (Sheld et al. 2016)
- River Herring
 - ?



Flathead Catfish Distribution

- Established in Lower James
- Likely established in Pamunkey
- New population in Mattaponi
- Record from Rappahannock



Flathead Catfish Diet



		All sizes <i>n</i> = 731		<400 mm TL <i>n</i> = 51		400–800 mm TL <i>n</i> = 387		>800 mm TL <i>n</i> = 293	
		53.1% empty		51.0% empty		55.0% empty		50.9% empty	
		TROPH = 4.21		TROPH = 4.23		TROPH = 4.27		TROPH = 4.13	
		DB = 0.12		DB = 0.47		DB = 0.13		DB = 0.14	
		OI = 0.32		OI = 0.29		OI = 0.25		OI = 0.39	
Prey family	Species	%FO	%PSIRI	%FO	%PSIRI	%FO	%PSIRI	%FO	%PSIRI
Achiridae	<i>Trinectes maculatus</i>	0.3	0.3	4.0	4.0				
Anguillidae	<i>Anguilla rostrata</i>	0.3	0.3			0.6	0.6		
Atherinopsidae	<i>Menidia beryllina</i>	0.6	0.6			1.1	1.1		
Centrarchidae	<i>Lepomis</i> spp.	0.9	0.7			1.7	1.4		
Clupeidae	<i>Alosa aestivalis</i>	6.7	6.6			2.9	2.9	12.5	12.2
	<i>Alosa mediocris</i>	0.3	0.3					0.7	0.7
	<i>Alosa pseudoharengus</i>	2.0	1.6			1.7	1.6	2.8	1.9
	<i>Alosa sapidissima</i>	0.6	0.6					1.4	1.4
	<i>Alosa</i> spp.	1.2	0.8					2.8	1.9
	<i>Brevoortia tyrannus</i>	0.3	0.3	4.0	4.0				
	<i>Dorosoma cepedianum</i>	28.3	27.7			12.6	12.3	52.1	51.1
	<i>Dorosoma petenense</i>	1.7	1.7			3.4	3.4		
	<i>Dorosoma</i> spp.	0.6	0.6			1.1	1.1		
Cyprinidae	<i>Cyprinus carpio</i>	0.6	0.6			0.6	0.6	0.7	0.7
	<i>Cyprinus</i> spp.	2.0	2.0	16.0	16.0	1.1	1.1	0.7	0.7
	<i>Hybognathus regius</i>	2.9	2.4	16.0	16.0	3.4	2.4		
	<i>Nocomis micropogon</i>	0.3	0.3					0.7	0.7
Fundulidae	<i>Fundulus heteroclitus</i>	0.6	0.6	8.0	8.0				
Ictaluridae	<i>Ictalurus furcatus</i>	2.0	1.8			2.9	2.4	1.4	1.4
	<i>Ictalurus punctatus</i>	0.9	0.9			1.1	1.1	0.7	0.7
	<i>Pylodictis olivaris</i>	0.3	0.1					0.7	0.3
Moronidae	<i>Morone americana</i>	36.2	33.9	36.0	34.2	50.0	48.1	19.4	16.8
	<i>Morone saxatilis</i>	0.6	0.6			0.6	0.6	0.7	0.7
Percidae	<i>Etheostoma flabellare</i>	0.9	0.3	4.0	0.8	1.1	0.5		
Unidentified	Unidentified fish	15.2	13.5	20.0	17.0	19.0	16.8	9.7	8.9
Teleostei									
Veneroida	<i>Corbicula fluminea</i> ^a	0.9	0.9			1.7	1.7		
	Unidentified Sphaeriidae ^a	0.3	0.2					0.6	0.3



^aMay have been in the stomachs of piscine prey consumed by Flathead Catfish.

Flathead Catfish Diet

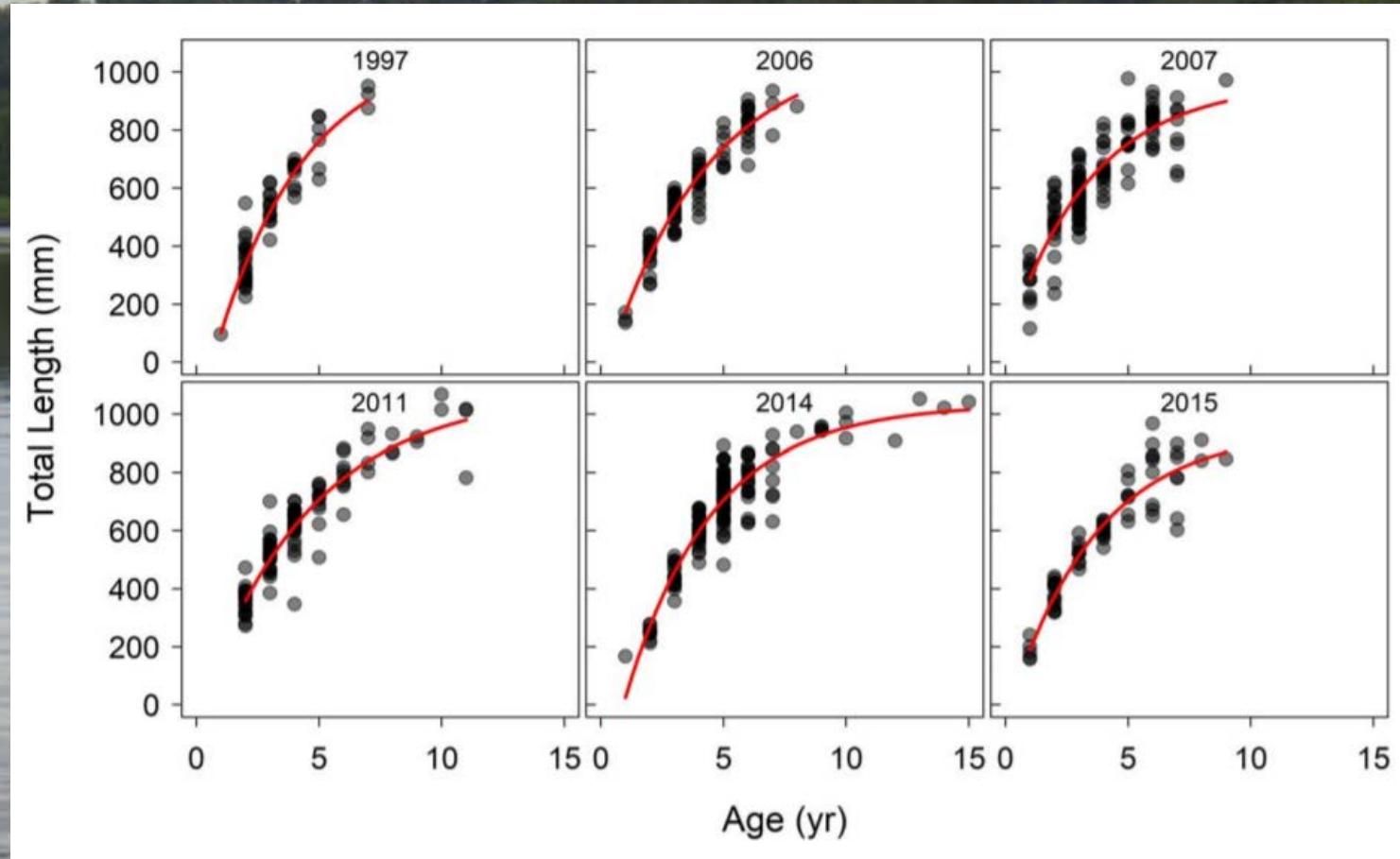


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	<i>Cyprinus</i> spp.	2.0	2.0	16.0	16.0	1.1	1.1	0.7	0.7
	<i>Hybognathus regius</i>	2.9	2.4	16.0	16.0	3.4	2.4		
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Unidentified	Unidentified fish	15.2	13.5	20.0	17.0	19.0	16.8	9.7	8.9
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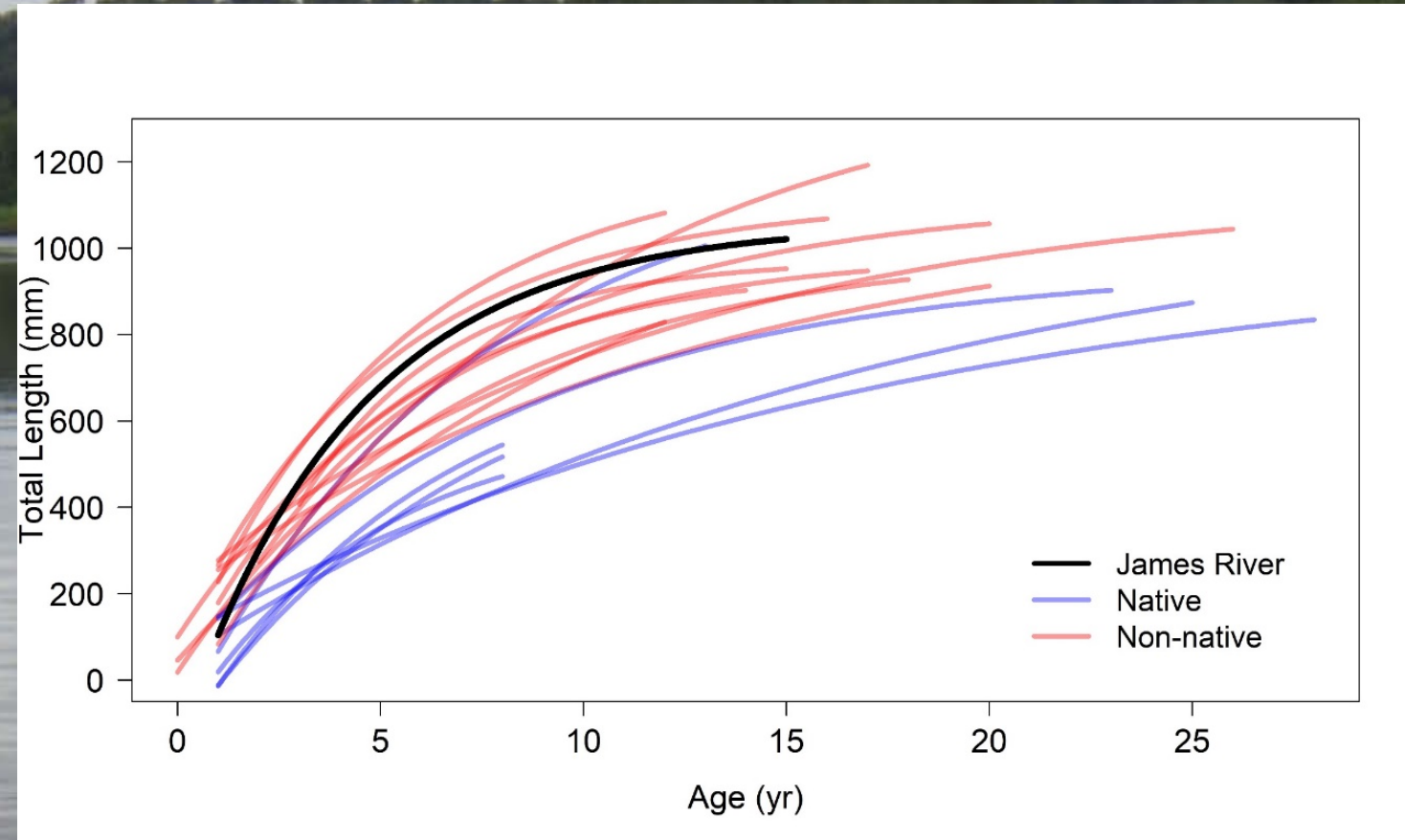


^aMay have been in the stomachs of piscine prey consumed by Flathead Catfish.

Flathead Catfish Life History



Flathead Catfish Life History



Research Gaps

- Maturity at size/age
- Size/age-structure of harvest
- Species composition of harvest
- Where harvest comes from spatially
- Diet in areas not conducive to electrofishing
- Human dimensions
- Population sizes of species of concern

chesapeakecatfish.com

VMRC Proposes Commercial Electrofishing for Non-native Catfishes

December 12, 2019 | Corbin D. Hilling, Ph.D Candidate, Virginia Tech



The Virginia Marine Resources Commission (VMRC) is proposing a commercial electrofishing fishery for non-native catfishes in Virginia portions of Chesapeake Bay ([Click here for notice](#)). At the Finfish Management Advisory Committee (FMAC) meetings on November [14th](#) and [2...](#)

[Read More](#)

Study Finds Non-native James River Flathead Catfish Are Fast Growers

November 20, 2019 | Corbin D. Hilling, Ph.D Candidate, Virginia Tech

Virginia Tech scientists present an impressive Flathead Catfish from the James River during an electrofishing survey. Although Blue Catfish receive a lot of attention



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@CorbinHilling Wed Jan 15 2020

RT @SEFishesCouncil : #LunchTime ! This Banded Sculpin is already stuffed! (Note the little darter tail?) <https://t.co/6aBrBHxwpb>



@CorbinHilling Sun Dec 15 2019

Thank you MS Word for putting a little blue squiggle under "asses" when I wanted to write "assess" <https://t.co/NeGFpdPrwC>



@CorbinHilling Thu Dec 12 2019

Commercial electrofishing proposed to reduce non-native catfish abundances in Virginia tribs of Chesapeake Bay @vaseagrnt <https://t.co/HlknGi33ff> <https://t.co/YLTkgnIRhe>



@CorbinHilling Wed Dec 11 2019

Questions?

