

DATA *Nugget*

Fishy origins

Featured scientists: Carleigh Engstrom, Chelsea Barreto, Megan Phifer-Rixey and John Tiedemann from Monmouth University

Research Background:

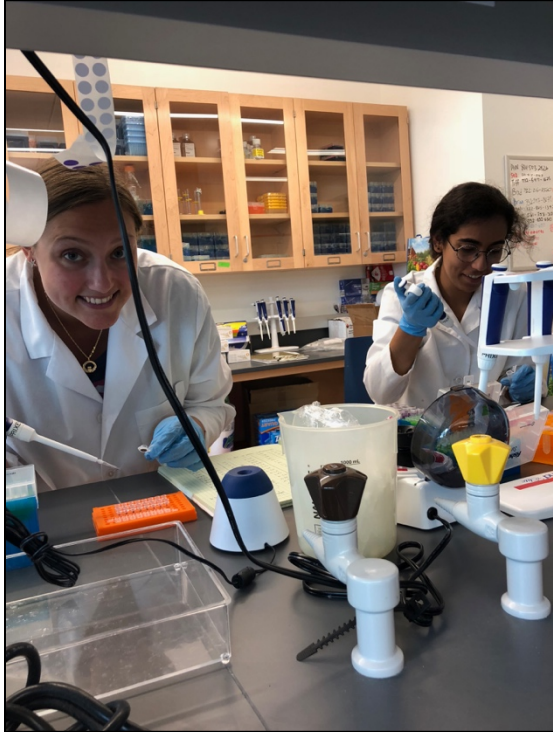
Striped bass, or stripers, make up one of the most important fisheries for seafood and sport fishing on the East Coast of the United States. Carleigh and Chelsea, biology teachers in New Jersey, were at the beach one day when they saw a couple of stripers in the Barnegat Bay Inlet. Both teachers have always been interested in research and even met while participating in a summer research program as undergraduate students. Since then, both have gone on to complete more research projects in biology and education. Their curiosity about striper populations led them to work together yet again!

They headed to Monmouth University in New Jersey, where they began working with two scientists, Megan and John. They learned that locations where fish reproduce are called **spawning grounds**. Young stripers spend 2-3 years developing in the spawning ground before moving downstream. When stripers become adults, they return to the same location to breed.

There are four main spawning grounds for stripers on the East coast: the Hudson River, the Chesapeake Bay, Delaware River, and the Albermarle Sound. Stripers from these areas are considered to be different **stocks**. Stripers are migratory fish, and generally move north in the spring and south in the fall. Because they all migrate to New Jersey, fish from different stocks combine, which results in a **mixed stock**. When there is a population that has a mixed stock, we don't know which spawning ground the fish originally came from. Conservation and management of New Jersey's striper fishery requires knowing where the fish come from. Understanding which spawning grounds stripers are using helps managers make sure we are not overfishing or damaging these important environments. So, Carleigh and Chelsea joined a project that is working to find out how we can identify where mixed stock stripers come from.



John helping students sample the right pelvic fin of a striped bass to be used for DNA extraction.

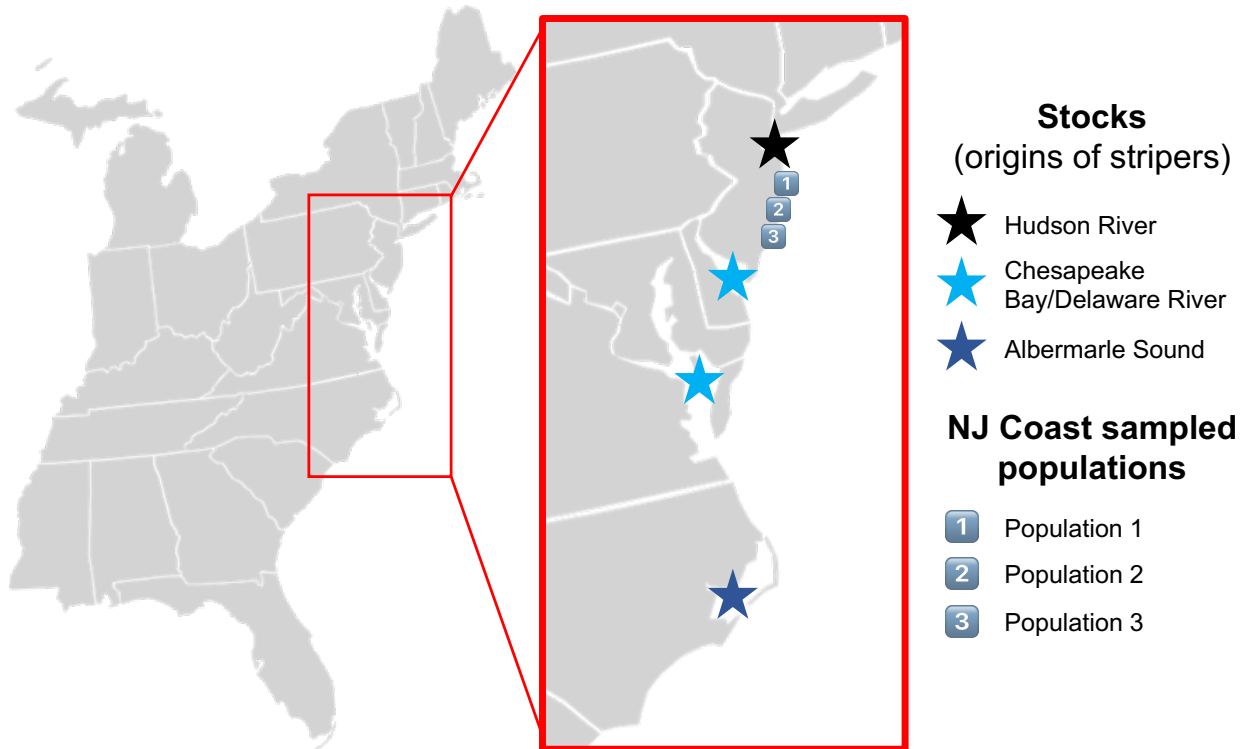


Working in the lab to extract DNA from the pelvic fin samples. This DNA is then used to identify microsatellites, or locations in the DNA that can help determine the stock that a fish came from.

For their study, the scientists caught stripers in three different locations off the New Jersey coast in 2017. The fish were sampled by clipping off a small portion of the right pelvic fin. The scientists then extracted the DNA from each sample in the lab. They used polymerase chain reaction (PCR) to then copy regions of the DNA, called microsatellites.

Microsatellites are small, repeating sections of DNA that can be variable enough to distinguish even close relatives. These data were then used to compare DNA samples from the unknown mixed stocks to the known spawning ground stocks. The scientists also recorded whether each fish was young or mature. The scientists then used the age data to tell whether the spawning grounds might be changing over time.

Scientific Questions: Which spawning grounds do most of the striped bass in New Jersey come from? Does spawning ground use differ for young and adult fish?



Scientific Data:

Use the map and data below to answer the scientific questions:

NUMBER OF FISH				
Stocks (origin of stripers)				
NJ Coast - sampled population	Chesapeake Bay/ Delaware River	Hudson River	Albermarle Sound	TOTAL
Population 1	24	8	3	
Population 2	5	1	2	
Population 3	4	1	0	

PROPORTION OF FISH			
Stocks (origin of stripers)			
NJ Coast - sampled population	Chesapeake Bay/ Delaware River	Hudson River	Albermarle Sound
Population 1			
Population 2			
Population 3			

NUMBER OF FISH				
Stocks (origin of stripers)				
Age	Chesapeake Bay/ Delaware River	Hudson River	Albermarle Sound	TOTAL
Young	23	3	2	
Mature	10	7	3	

PROPORTION OF FISH			
Stocks (origin of stripers)			
Age	Chesapeake Bay/ Delaware River	Hudson River	Albermarle Sound
Young			
Mature			

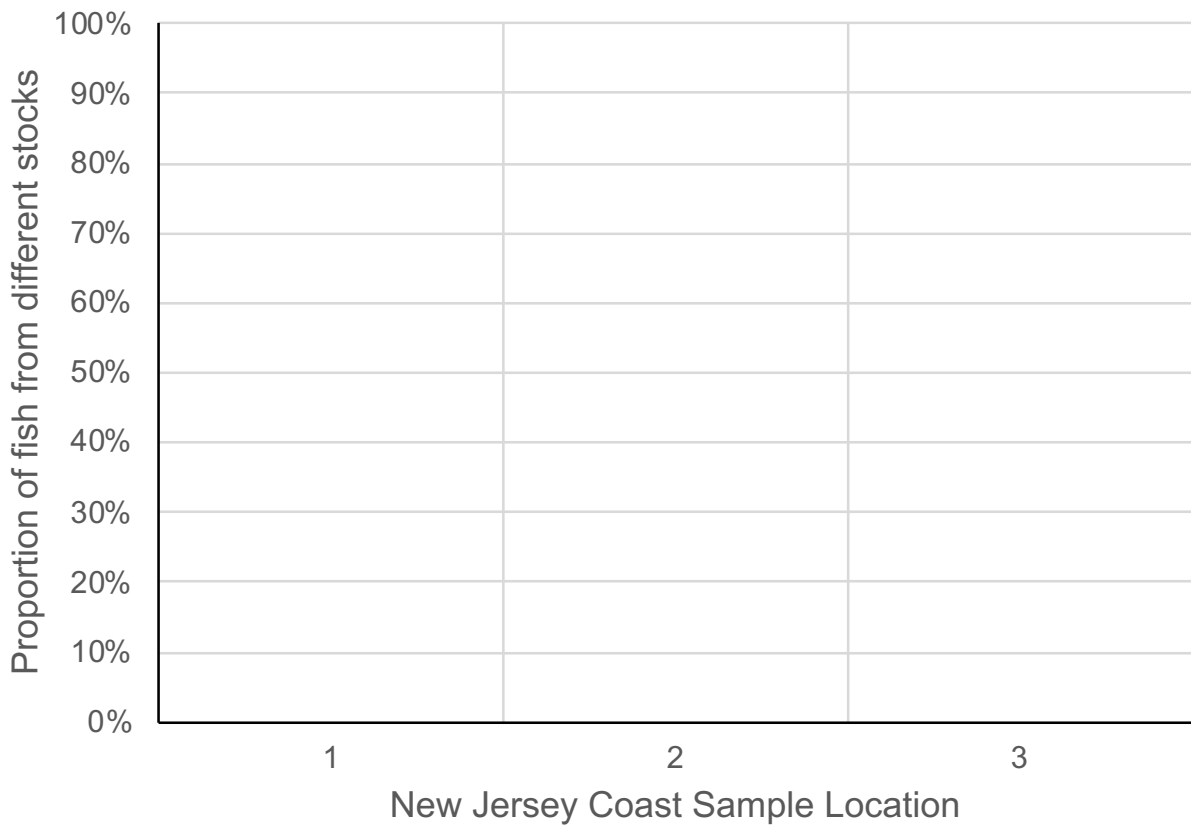
* Data for the Chesapeake Bay and Delaware river stocks are combined due to the similar genetics shared between these two stocks.

Which data will you graph to answer the questions?

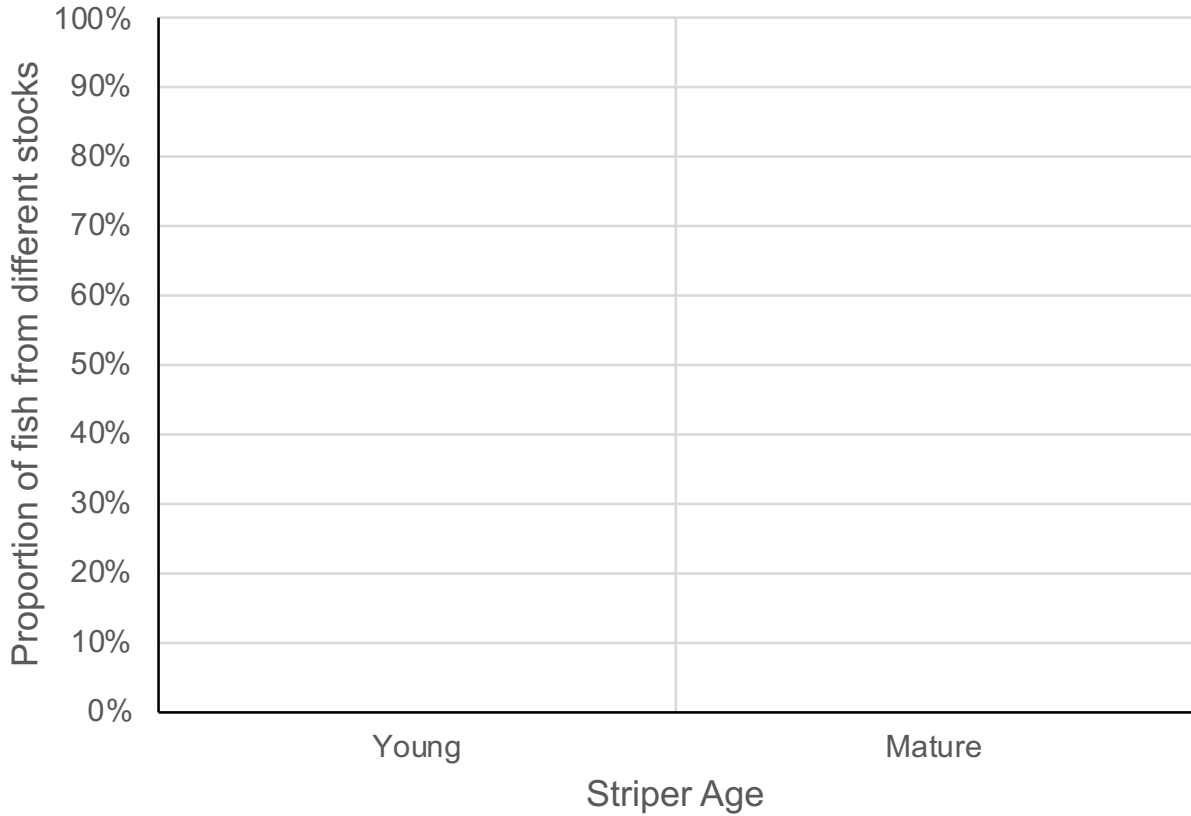
Independent variable(s): _____

Dependent variable(s): _____

Draw your graph(s) below: Identify any changes, trends, or differences you see in your graph(s). Draw arrows pointing out what you see, and write one sentence describing what you see next to each arrow.



Name _____



Interpret the data:

Make a claim that answers each of the scientific questions.

What evidence was used to write your claims? Reference specific parts of the table(s) or graph(s).

Name _____

Explain your reasoning and why the evidence supports your claim. Connect the data back to what you learned about the importance of understanding where striped bass come from in the New Jersey mixed stock.

Your next steps as a scientist:

Science is an ongoing process. What new question(s) should be investigated to build on Carleigh and Chelsea's research? How do your questions build on the research that has already been done?

What future data should be collected to answer your question?

Independent variable(s): _____

Dependent variable(s): _____

Name _____

For each variable, explain why you included it and how it could be measured.

What hypothesis are you testing in your experiment? A hypothesis is a proposed explanation for an observation, which can then be tested with experimentation or other types of studies.