Name: _____ Class Period: _____ Date: _____

AGING STURGEON

Step One – Create a Distribution Plot

Directions

1. Using the data found in the "Lake Sturgeon Measurements" chart, plot length on the X-axis and mean age on the Y-axis to create a length vs. mean age line graph in the space below or on graph paper.
2. Following the example your teacher shared with you (demonstrating how to create a distribution plot for a sturgeon that is 20 inches long), for each sturgeon length, add the minimum age and maximum age to the length vs mean age line graph you just created.

Lake Sturgeon Measurements

Length in Inches	Mean Age	Minimum Age	Maximum Age
20	3.5	3	4
25	4.5	3	7
30	5.7	4	9
35	7.5	5	15
40	10.0	8	15
45	15.2	12	19
50	20.4	17	25
55	29.9	25	36
60	39.4	33	47
65	49.0	40	61
70	74.4	56	119

Data: Michigan Dept. of Natural Resources.

https://www.michigan.gov/dnr/-/media/Project/Websites/dnr/Documents/Fisheries/Research/StClair_weight_estimation.pdf?rev=d324e392de9947ddaedb78998eaa27b6&hash=8B9F0DDDB8D936332BBBC43955BD7319

Question

1. Do you think knowing the length of a sturgeon is an accurate measure of the sturgeon's age? Defend your response.

EXTENSION

Students can further explore data about lake sturgeon by creating a box and whisker plot. Using the data they used to calculate mean weight (reproduced below), have students create a box and whisker plot for sturgeon, noting the minimum, first quartile, median, third quartile, and maximum.

Length of lake sturgeon = 45 inches
Recorded weight measurements: 17, 18, 19, 20, 22, 23

Length of lake sturgeon = 53 inches
Recorded weight measurements: 29, 30, 32, 35, 37, 41, 44

Length of lake sturgeon = 55 inches
Recorded weight measurements: 30, 32, 35, 37, 40, 42, 45, 48, 50, 59, 62, 66, 69

Length of lake sturgeon = 64 inches
Recorded weight measurements: 54, 55, 58, 61, 62, 69, 73, 75, 80, 91, 96, 101, 105, 110

Length of lake sturgeon = 73 inches
Recorded weight measurements: 84, 89, 94, 100, 105, 111, 116, 122, 128, 134

To learn more about box and whisker plots, the "Math with Mr. J" YouTube channel has a clear explanation. https://www.youtube.com/watch?v=nV8jR8M8C74

Question

2. Using the box and whisker plot, do you think knowing the length of a sturgeon is an accurate measure of the sturgeon's age? Defend your response.

Step Two – Pectoral Fin Aging

As mentioned in the book, one way fish biologists age lake sturgeon is through pectoral fin cross sections. View these samples, collected from the University of Georgia Fish Age and Growth Lab and provided by the Fish Age website, to estimate age by counting the annuli.

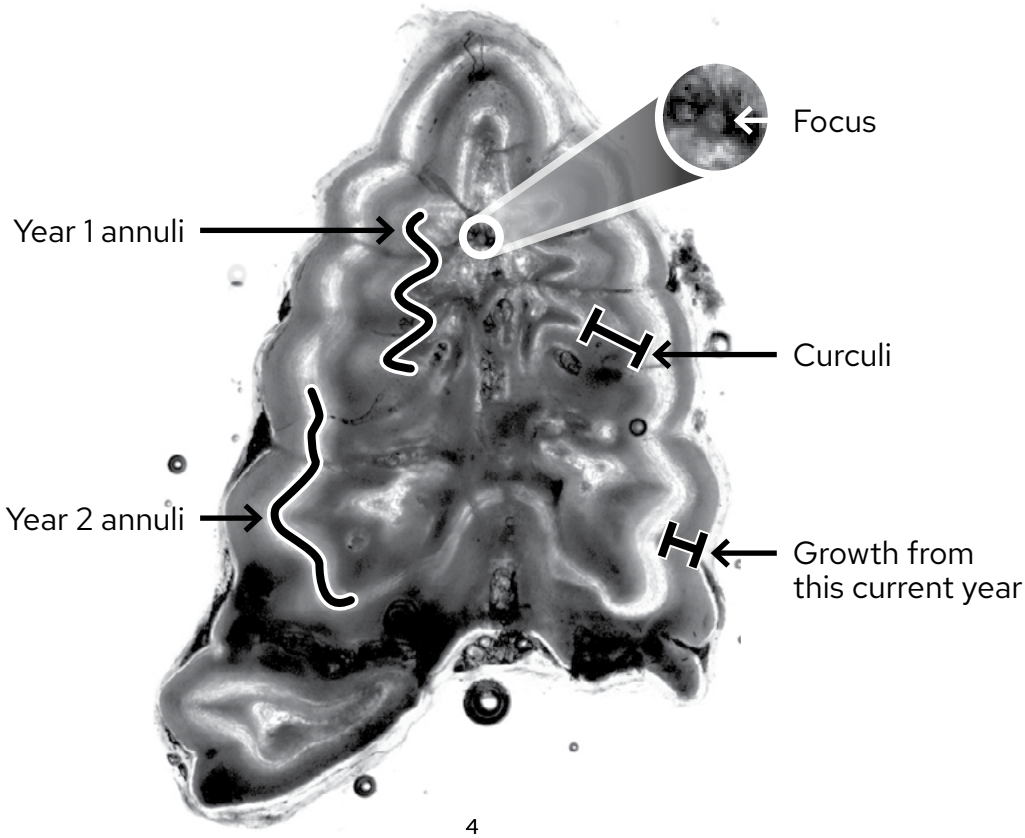
Cross section of a tree

You can imagine these cross sections of sturgeon fins as like a cross section of a tree. As the fish grows, it adds material to its body, including the fins. The result is a growth ring. During the warmer parts of the year, the fish will grow faster and add more material. Then in the colder parts of the year, growth slows, and added material is closer together.

On the fin below, look for the center of the innermost circle. This is called the focus. To help you find it, we enlarged it for you. That is where growth begins, and material is added around it. The bright lines indicate a slow season (i.e., winter), so we can count that line as a year. Scientists called the line an annulus and it counts from spring to spring. To help you find the annuli, we marked a portion of the year 1 annuli and a portion of the year 2 annuli with thick black lines. The individual gradations that make up the whole fin (close together during winter and farther apart during summer) are called circuli. In other words, the circuli are the dark spaces between two annuli. To help you locate the circuli, we marked them using a black solid-line bracket.

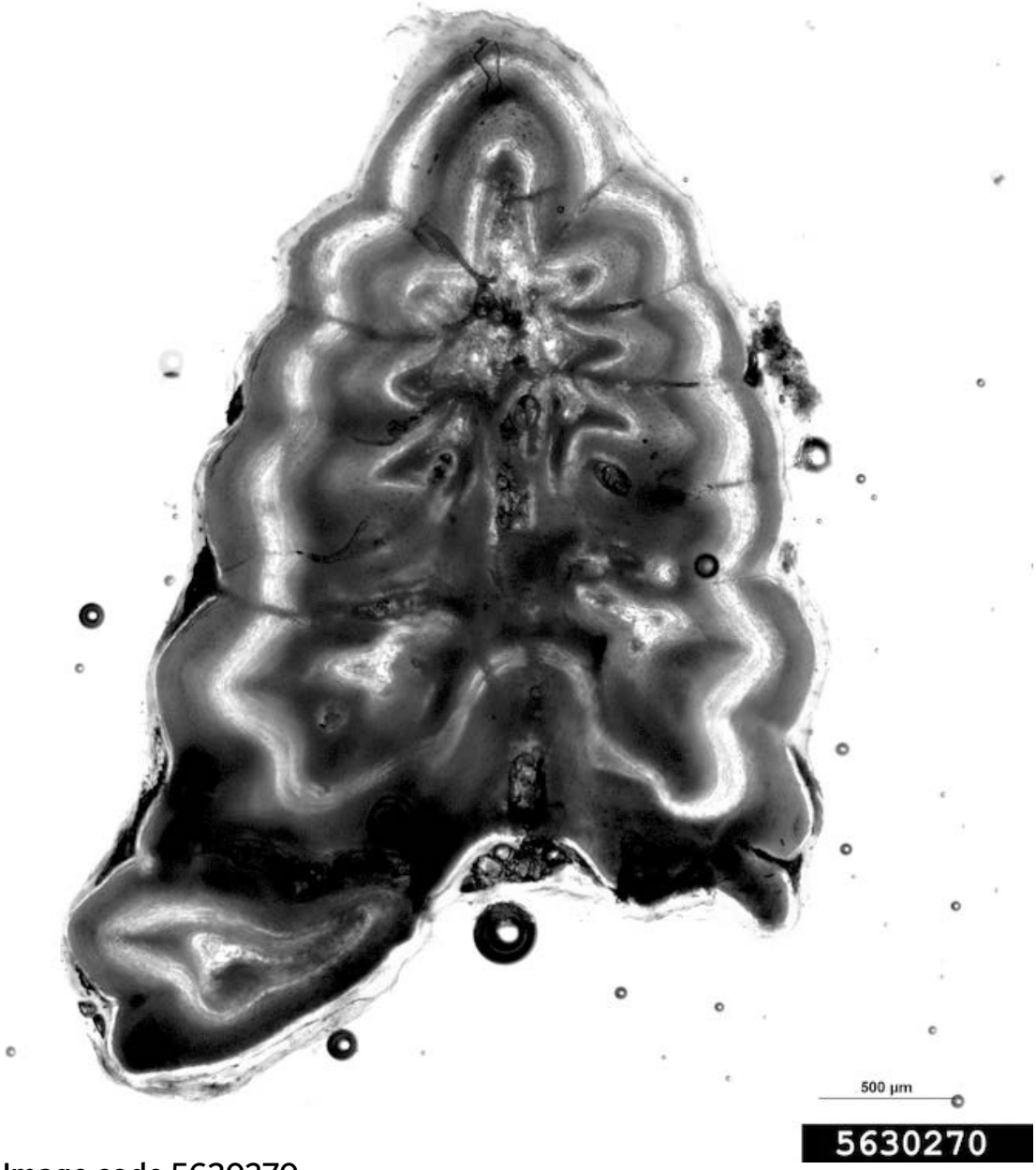
Pectoral Fin

This fish has had 2 birthdays, so it is 2.
Fish biologists would call them a 2+ year old fish.
The plus sign is for the current year.



Pectoral Fin Aging

Using your knowledge about the relationships between length, weight, and age, as well as your analysis of the number of annuli and circuli, take your best guess at aging these fish. Follow the example below for guidance. For a closer look (magnified view) of each image, go to the Fish Age website (fishage.org), select "Image Database," "Freshwater Species," and then "Lake Sturgeon." Select the image using the code on the bottom-right corner of the image and click to enlarge.



Example: Image code 5630270

Counted Rings (Age): **2**

Notes:

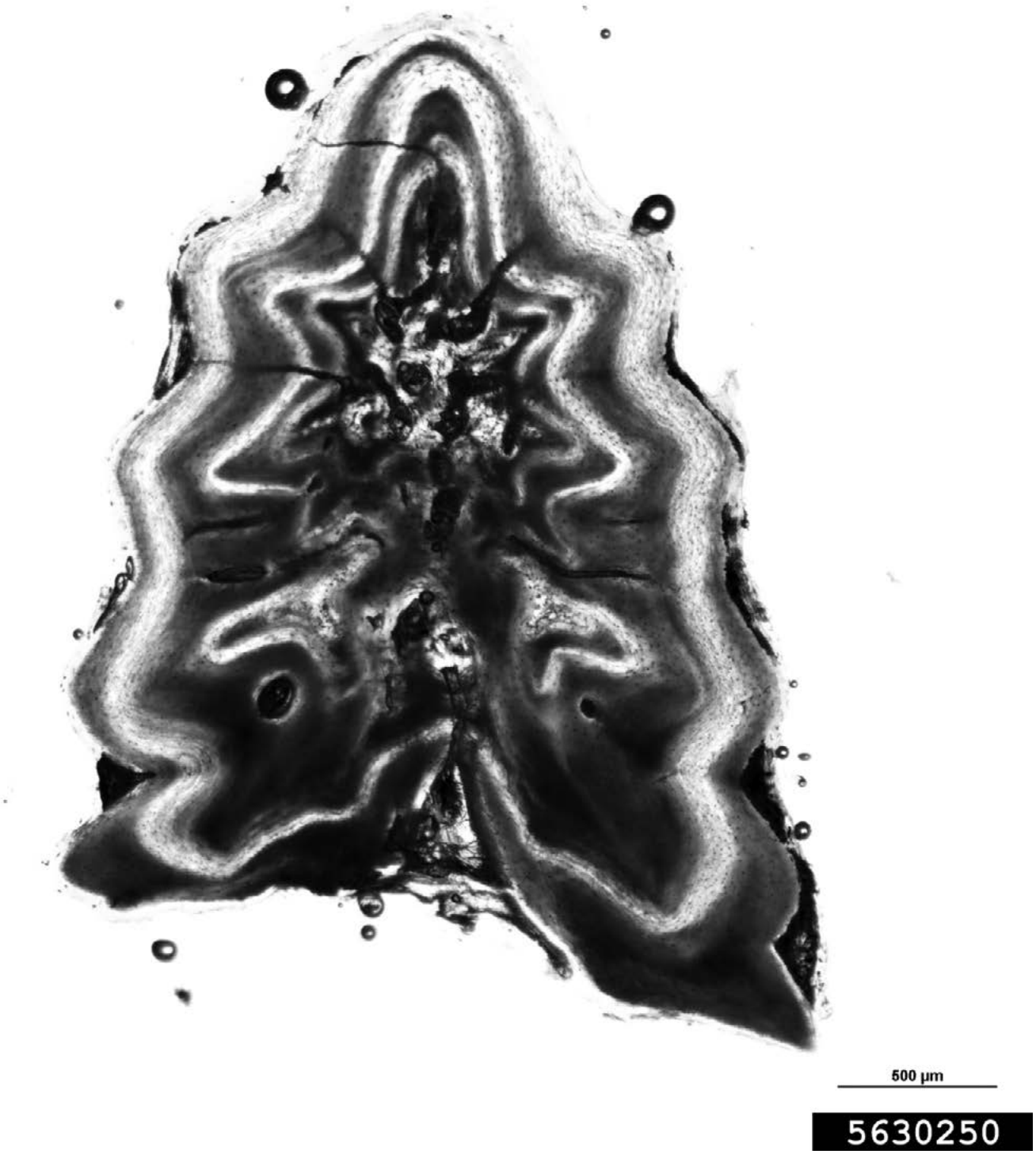
Subject Name: Lake Sturgeon

Structure: Pectoral Fin Spine

Total Length (mm): 517

Weight (g): 462

Image Citation: UGA Fish Age and Growth Lab, Bugwood.org



A. Image code 5630250

Counted Rings (Age):

Notes:

Subject Name: Lake Sturgeon

Structure: Pectoral Fin Spine

Total Length (mm): 539

Weight (g): 562

Image Citation: UGA Fish Age and Growth Lab, Bugwood.org

B. Image code 5630248

Counted Rings (Age):

Notes:

Subject Name: Lake Sturgeon

Structure: Pectoral Fin Spine

Total Length (mm): 658

Weight (g): 1202

Image Citation: UGA Fish Age and Growth Lab, Bugwood.org

C. Image code 5630261

Counted Rings (Age):

Notes:

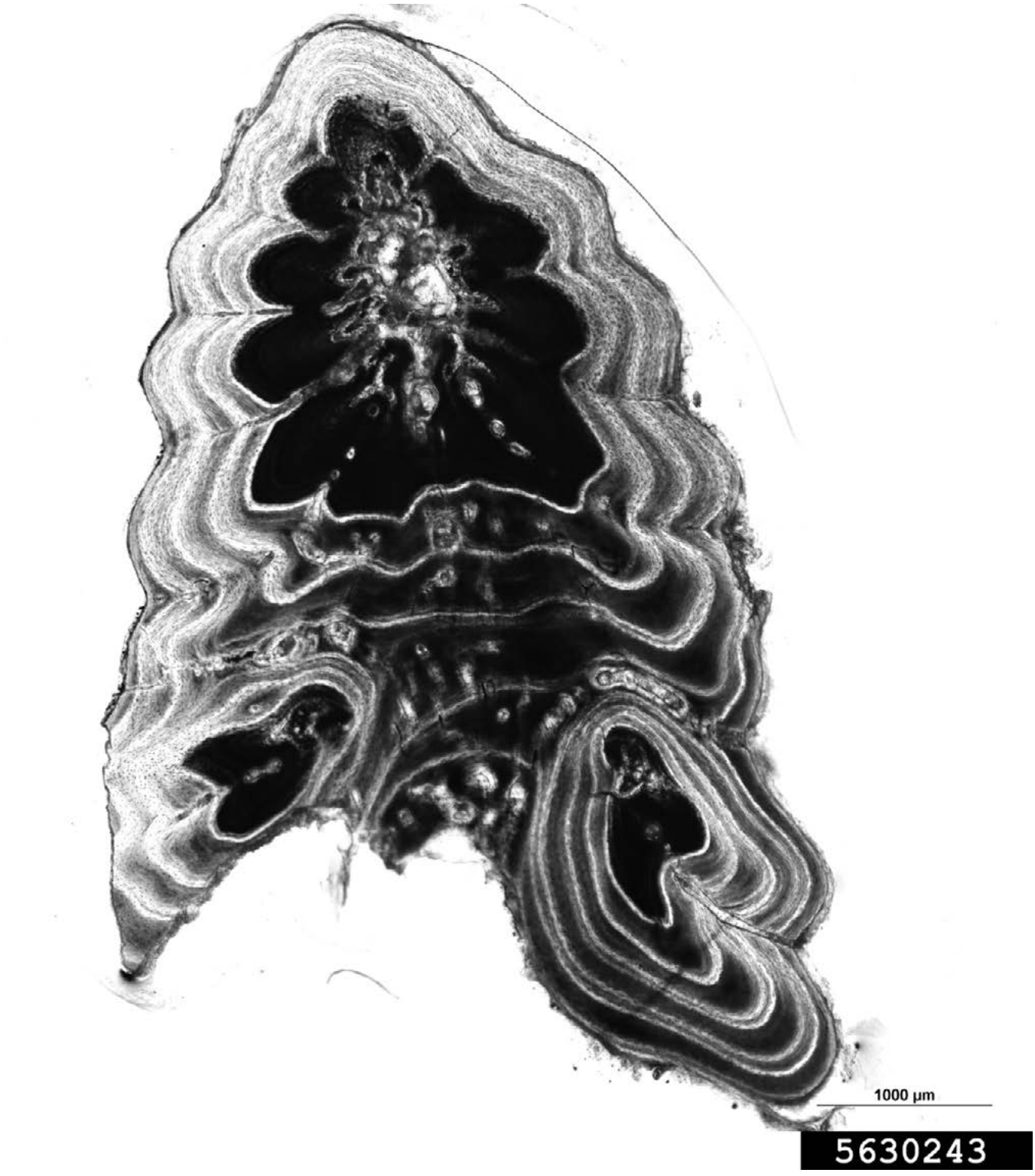
Subject Name: Lake Sturgeon

Structure: Pectoral Fin Spine

Total Length (mm): 845

Weight (g): 2536

Image Citation: UGA Fish Age and Growth Lab, Bugwood.org



D. Image code 5630243

Counted Rings (Age):

Notes:

Subject Name: Lake Sturgeon

Structure: Pectoral Fin Spine

Total Length (mm): 729

Weight (g): 1552

Image Citation: UGA Fish Age and Growth Lab, Bugwood.org

E. Image code 5630244

Counted Rings (Age):

Notes:

Subject Name: Lake Sturgeon

Structure: Pectoral Fin Spine

Total Length (mm): 313

Weight (g): 92

Image Citation: UGA Fish Age and Growth Lab, Bugwood.org

Step Three – Create a Line Graph

1. Create a graph (here or on graph paper) with length on the X-axis and their estimated sturgeon ages as generated in part 2 of the activity (through pectoral fin aging) on the Y-axis.

2. Compare your age estimation data and graph to another student's age estimation data and graph. Which rows in their table are different from yours? Which rows are similar? Why might this be so? Describe.

3. Create a second line graph on the same piece of paper that plots length on the X-axis and actual sturgeon ages as provided in the pectoral fin age answer key of the activity on the Y-axis.

4. Explain what might have caused any differences between your original pectoral fin age estimate graph and the second graph based on the pectoral fin answer key data.

5. How reliable do you feel examining the length of a sturgeon is as a technique for aging sturgeon?

6. Compare your pectoral fin age estimation graph to the graph you created in step 1 that used Michigan Department of Natural Resources data. Are the graphs similar to each other?
Explain any similarities and differences.

AGING STURGEON

Step One – Create a Distribution Plot

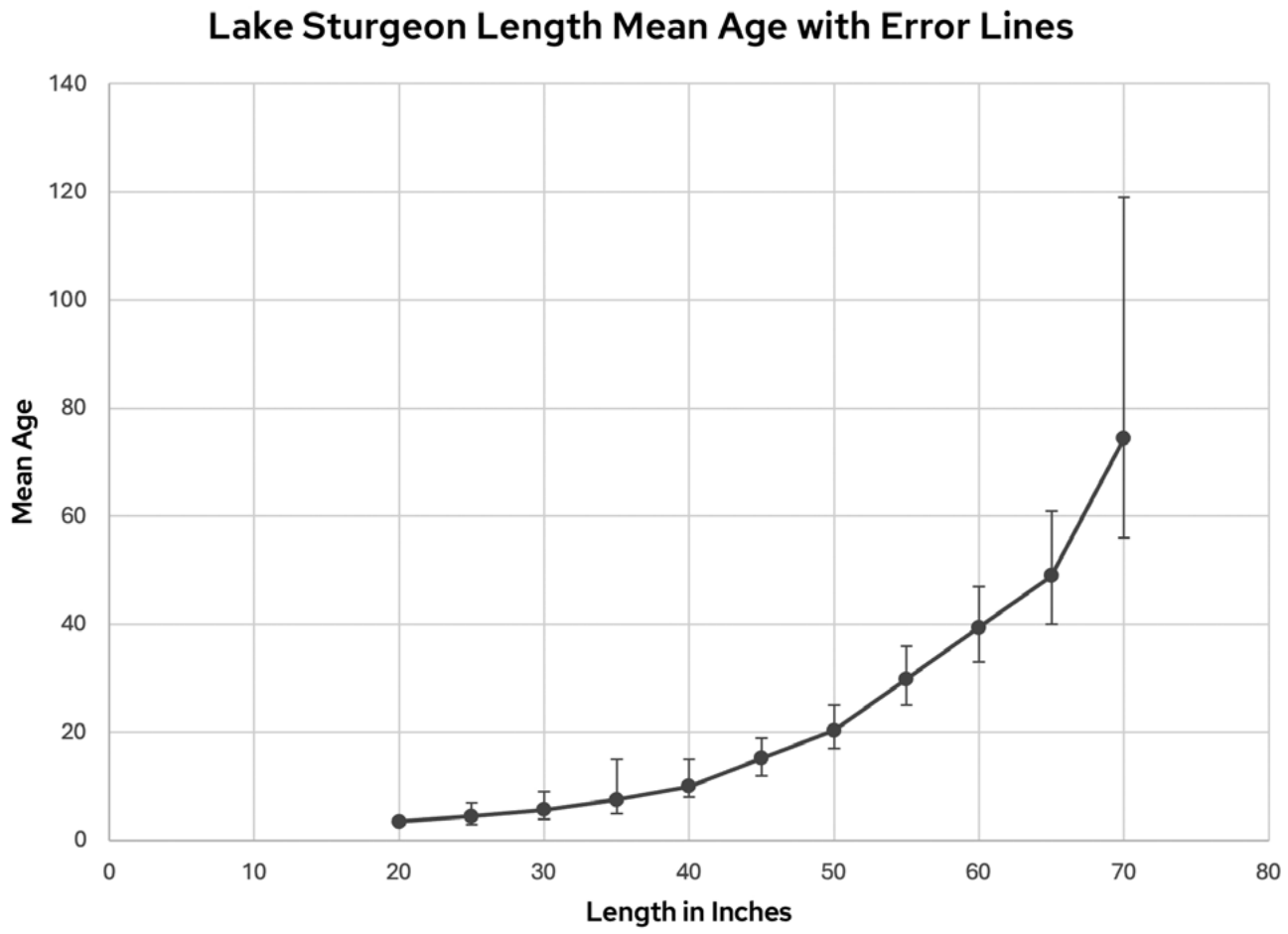
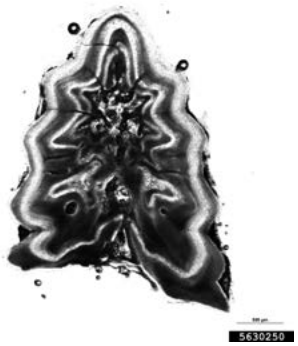


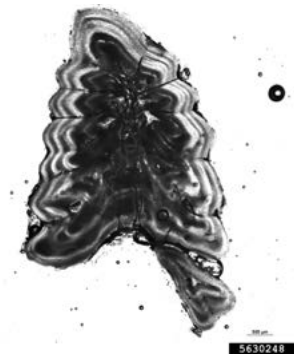
Figure 1. Distribution Plot - Lake Sturgeon Measurements

Step Two – Pectoral Fin Aging

A. Image code 5630250
Counted Rings (Age): 2

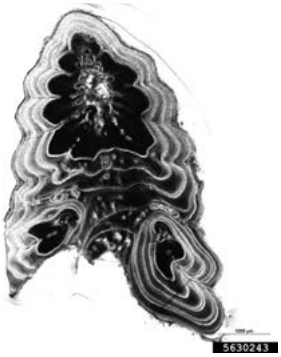


B. Image code 5630248
Counted Rings (Age): 4



C. Image code 5630261
Counted Rings (Age): 7

D. Image code 5630243
Counted Rings (Age): 5



E. Image code 5630244
Counted Rings (Age): 1