



**NOAA
FISHERIES**

Southeast
Fisheries Science
Center

Aging at the Beaufort Lab

Life History Group, Sustainable Fisheries Branch

Sea Turtle Team, Protected Resources Branch

Beaufort Lab

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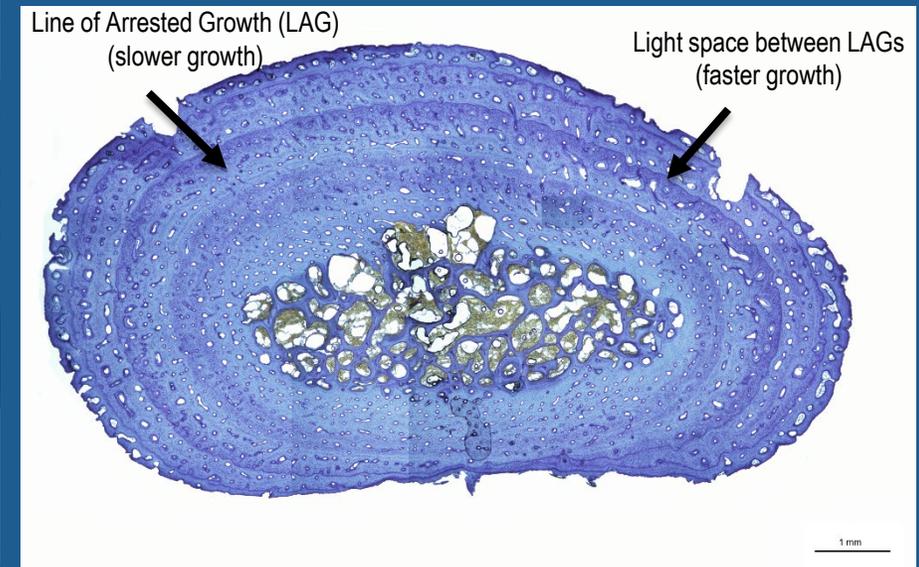
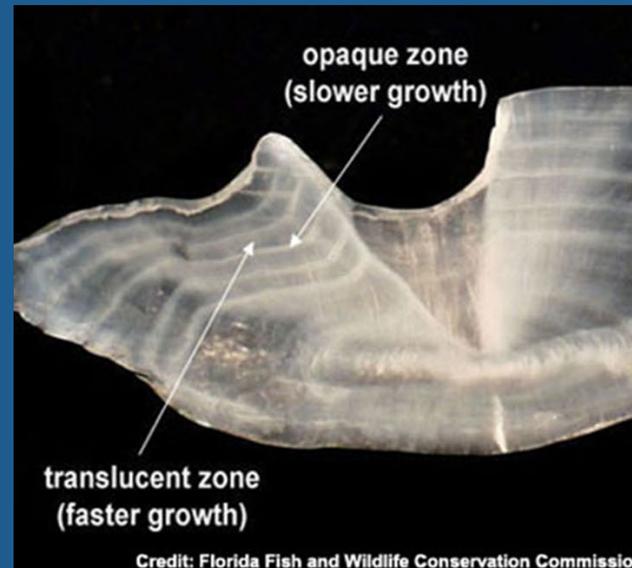
April 4th, 2020

How do we age animals?

Similar to counting tree rings

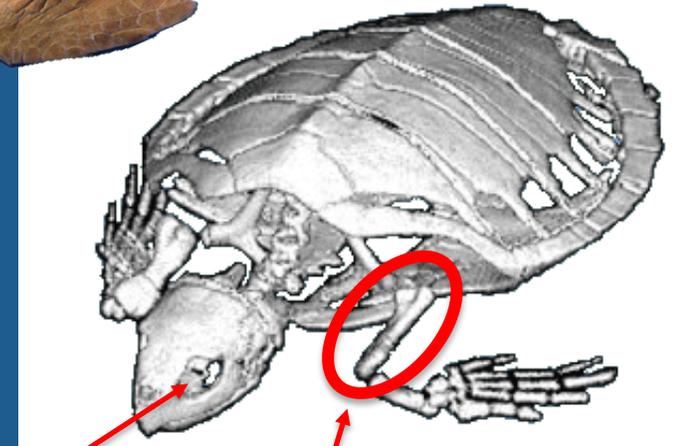
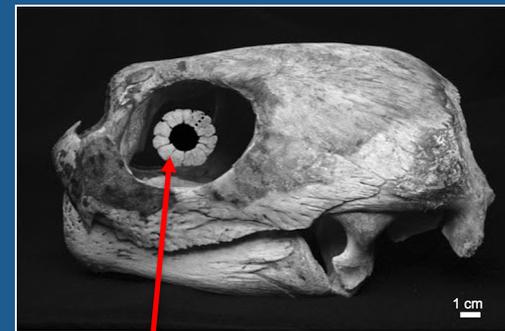
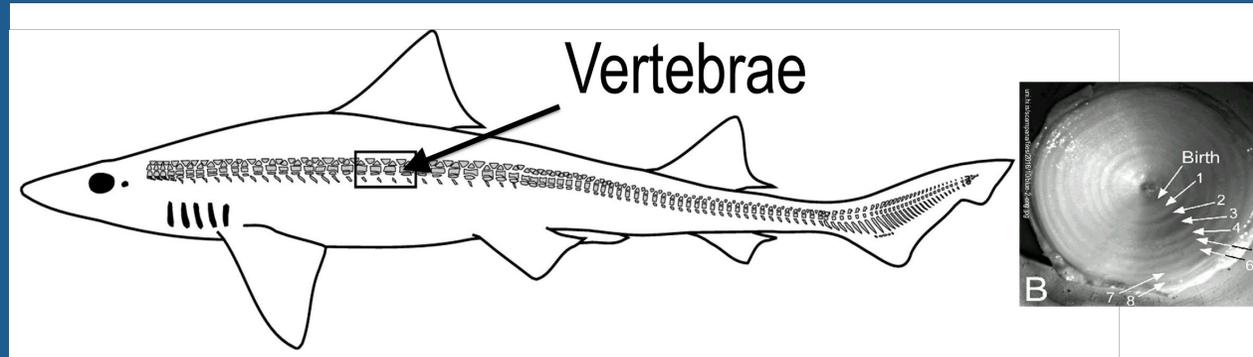
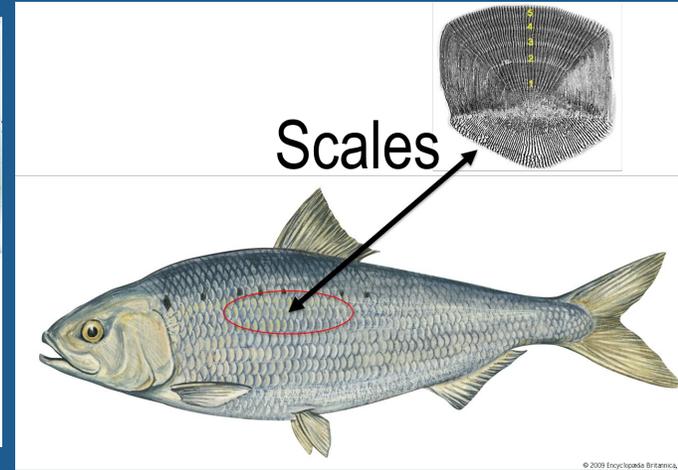
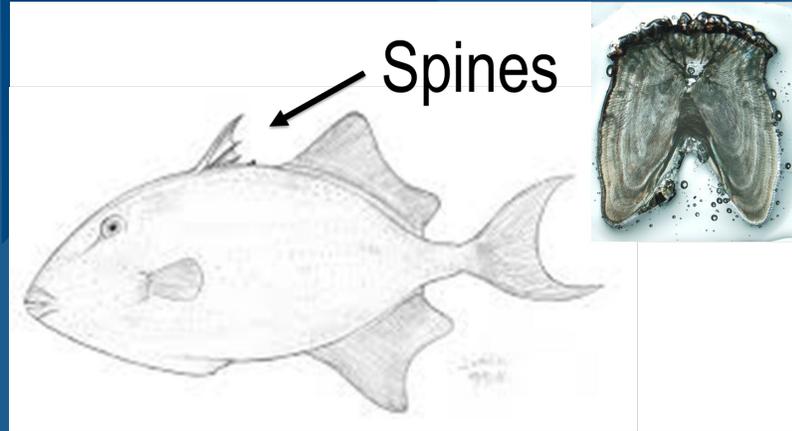
Skeletochronology:

- Analysis of skeletal growth marks to obtain ages and growth rates
- Based on alternating cycles of fast and slow growth (daily, monthly, yearly)



www.mnn.com/earth-matters/wilderness-resources/stories/tree-rings-reveal-our-past-and-our-future

Aging Structures

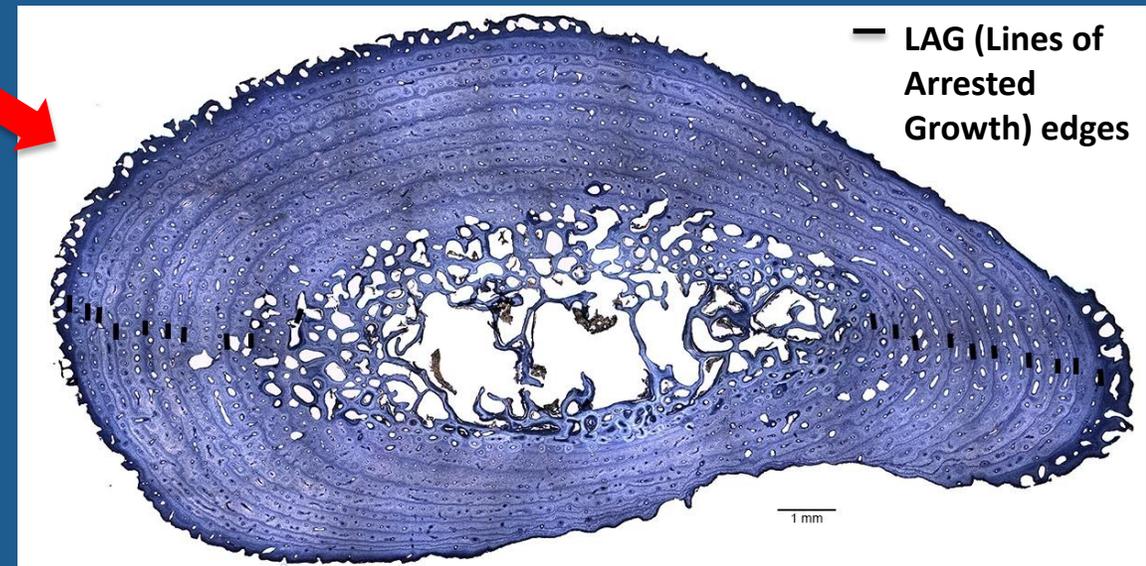
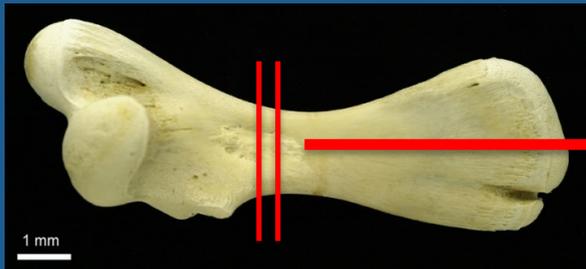


How do we age a sea turtle?



How do we age a sea turtle?

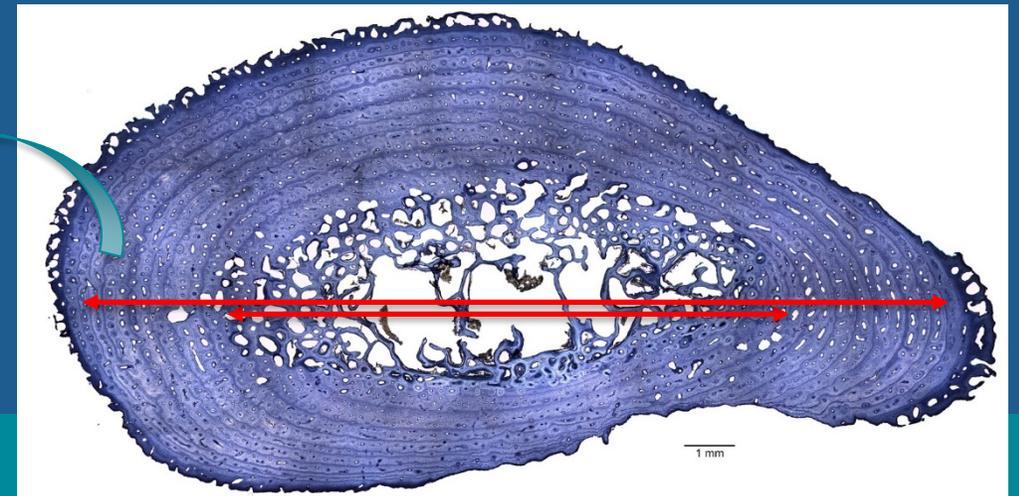
1. Access to samples- Sea Turtle Stranding and Salvage Network
2. Histological Processing



How do we age a sea turtle?

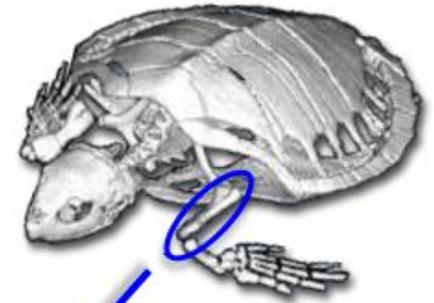
1. Access to samples- Sea Turtle Stranding and Salvage Network
2. Histological Processing
3. Validate frequency of growth marks/LAG addition with known-age samples
4. Account for resorption of the initial growth marks by the spongy bone center
5. Estimate age, age at maturation, and carapace length at maturation by using humerus section diameter: straight-line carapace length relationships

Diameter of annual growth marks correspond to carapace lengths at that age

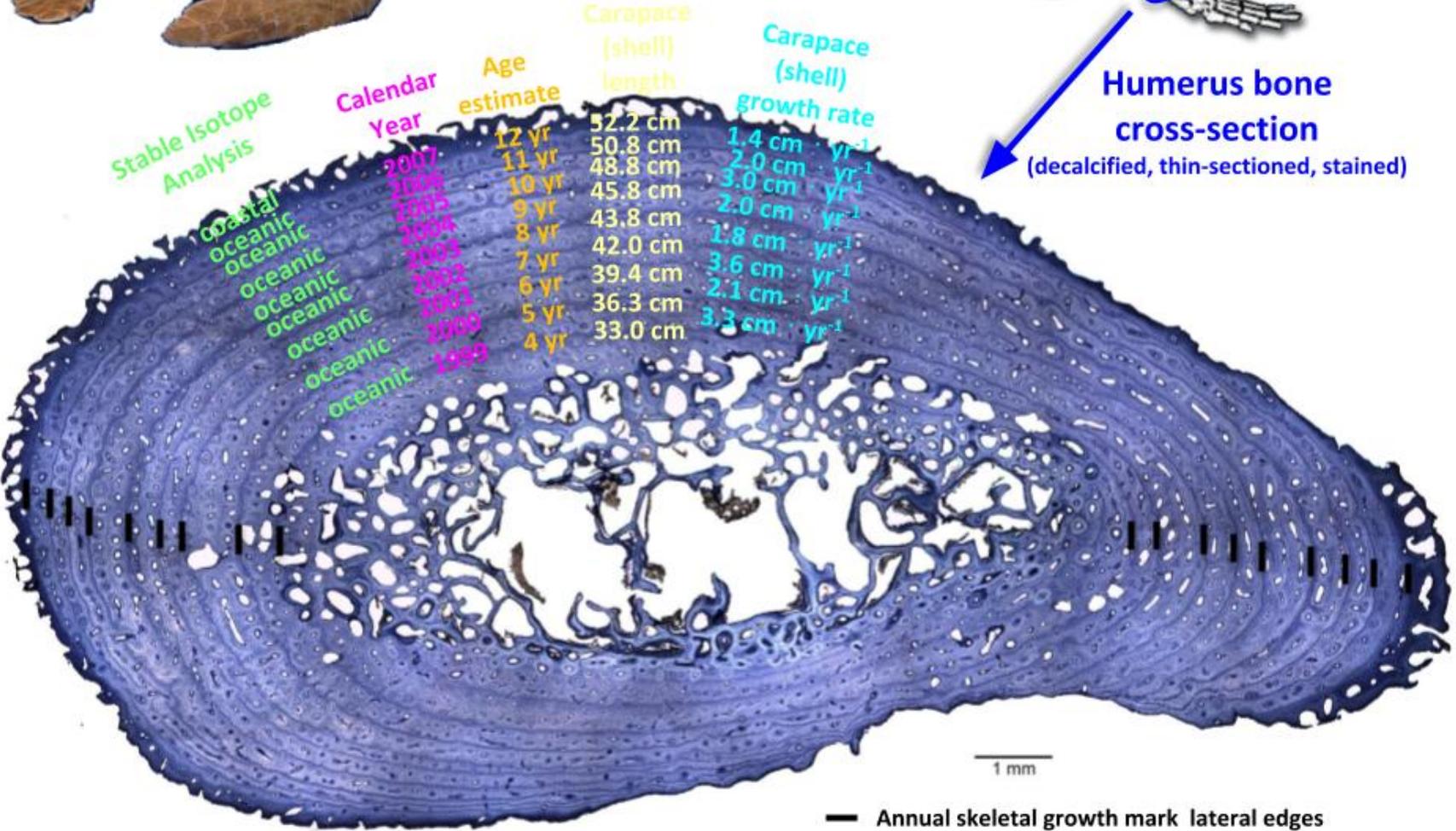




**Loggerhead
sea turtle**



**Humerus bone
cross-section**
(decalcified, thin-sectioned, stained)



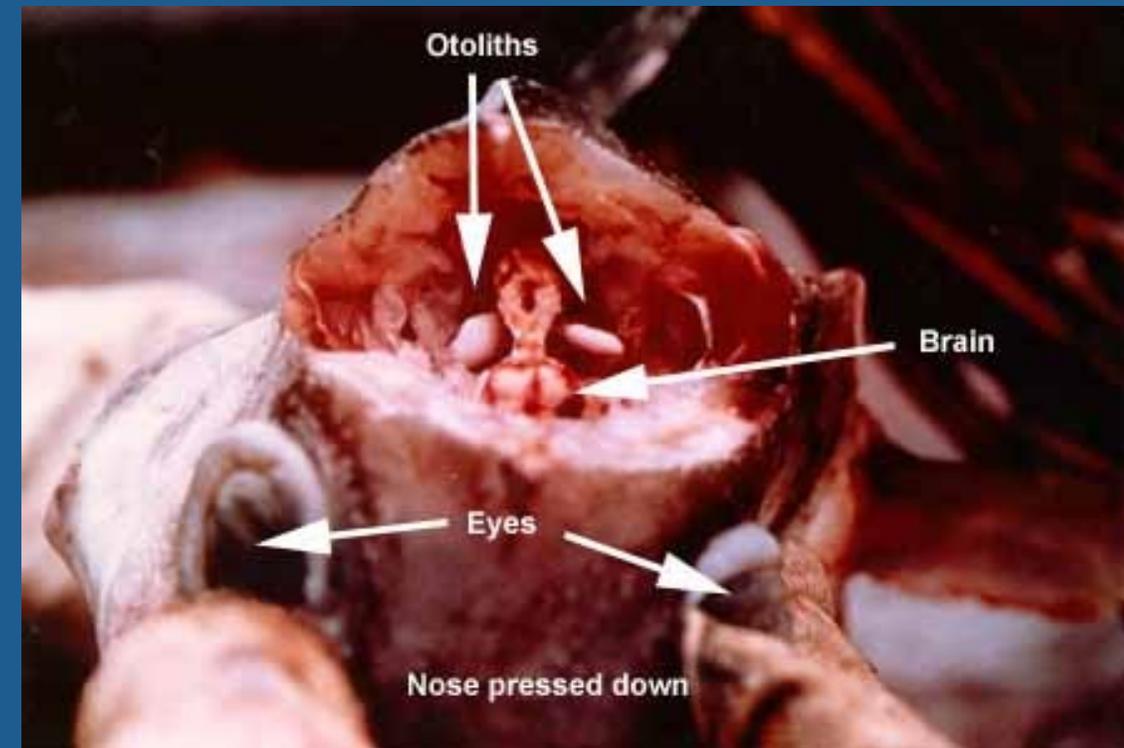
This shows some of the information we can learn from a sea turtle's humerus section.

How do we age a fish?



What is an Otolith?

- Ear bone of fishes made of calcium carbonate
 - 3 pairs: Sagitta, Asteriscus, Lapilus
- Located behind the brain
- Come in different sizes and shapes
 - Red drum versus pelagic species
- Can also use other structures
 - Scales-Menhaden
 - Spines-Triggerfish
 - Vertebrae-Sharks

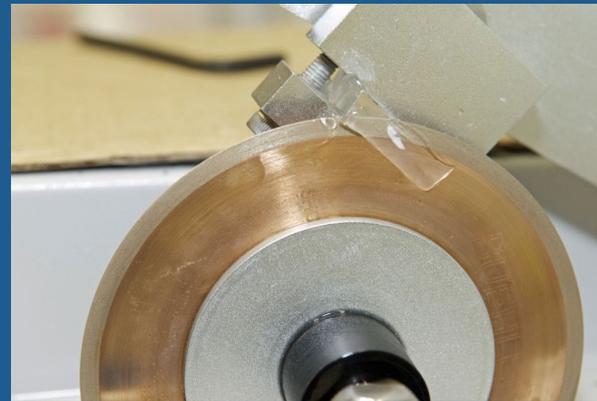


<http://www.dfo-mpo.gc.ca/science/aah-saa/otoliths/students/removal-prelevement-eng.html>



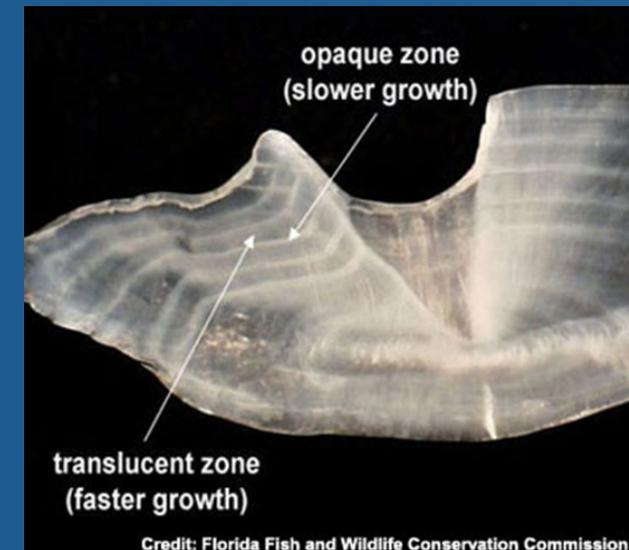
How do we age a fish at the NOAA Beaufort Lab?

1. Access to samples- commercial fisheries, recreational fisheries, independent fisheries
2. Aging:
 - Some can be aged whole (Black Sea Bass, etc.)
 - Some have to be sectioned in order to be aged (Scamp, Triggerfish, Red Snapper, etc.)



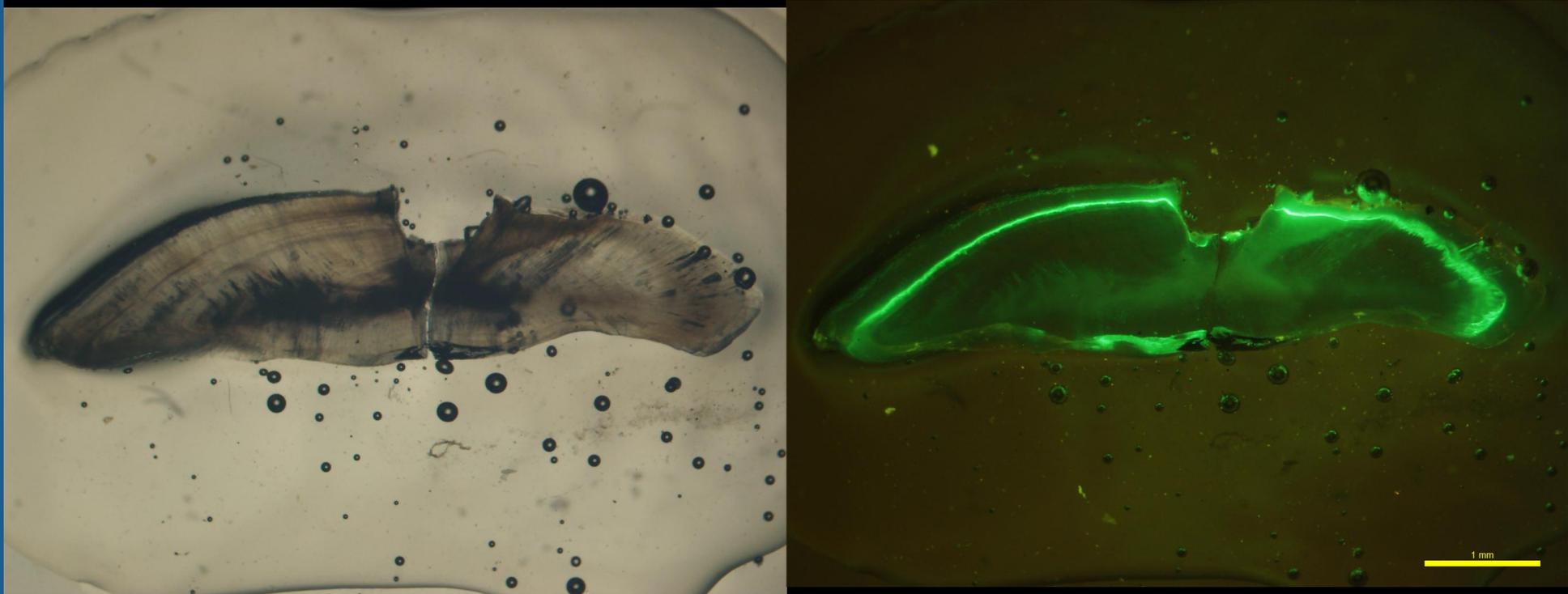
How do we age a fish at the NOAA Beaufort Lab?

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 - Some can be aged whole (Black Sea Bass, etc.)
 - Some have to be sectioned in order to be aged (Scamp, Triggerfish, Red Snapper, etc.)
3. Similar to counting tree rings: periods of slow and fast growth
 1. Count the periods of slow (Opaque zones) growth called annuli
 2. One translucent + one opaque zone= 1 year of growth



Age validation helps to confirm aging

- Must validate ages to show one annulus is truly one year
- (For example: Mark-recapture in wild using OTC- the fluorescent green)



Why we Age sea turtles and fish

Our data estimates...

- Maximum age
- Growth rates
- Maturity
- Cohorts (generations)
- Length at Age

Used for...

- Population modeling
- Determining population status
- Predicting effects of management decisions
- Fishery closure decisions

Overall, aging dead samples helps us predict the health of the currently existing population of that species

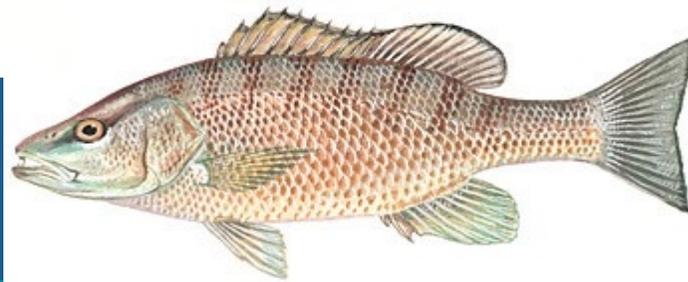
Fish Life History Program: by the numbers

- Receive 25K samples per year and have samples dating back to 1970's (numbers as of 8/19)

Total number of samples received: 428163

Total number of samples aged: 229000

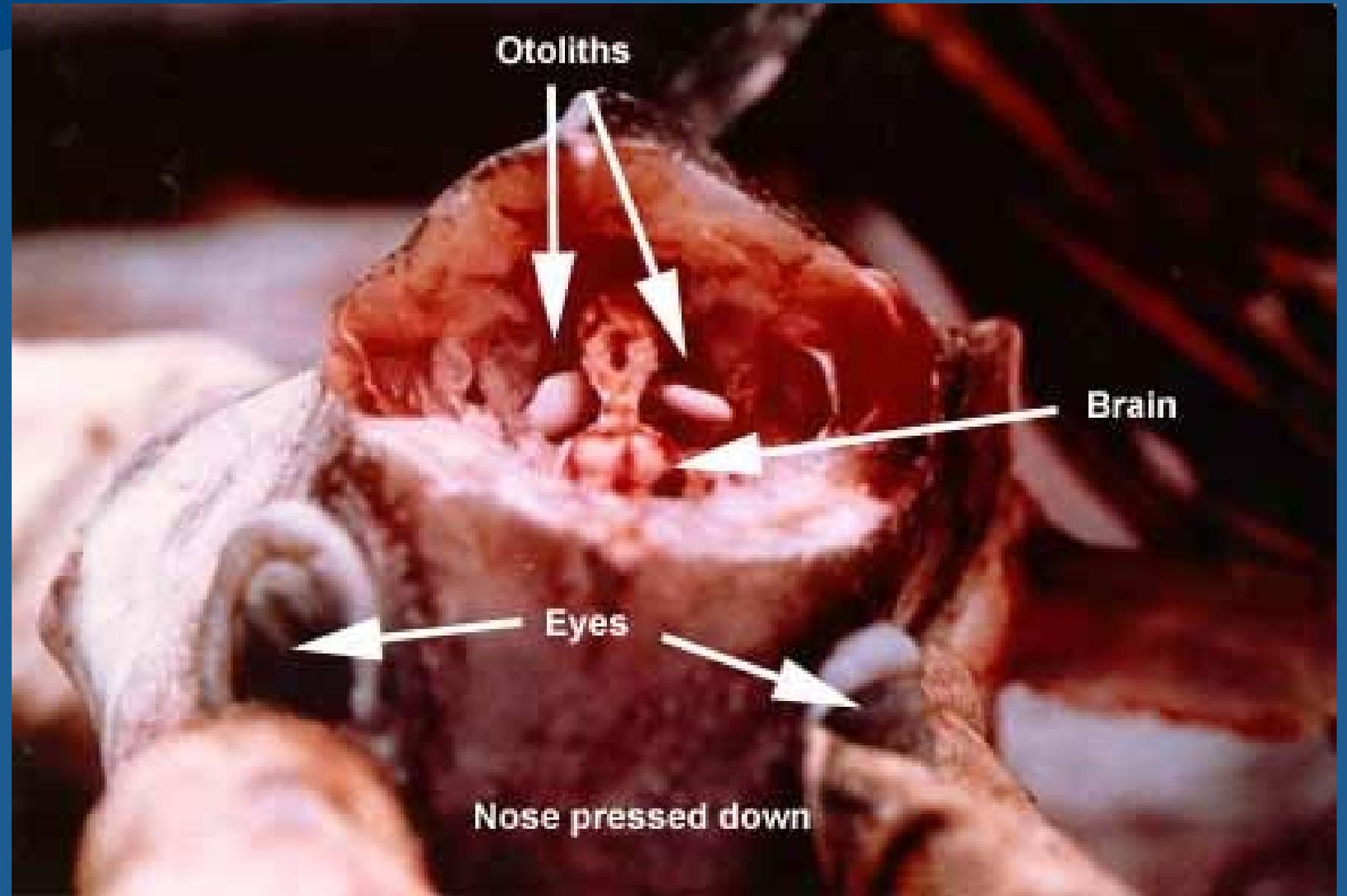
Total number of different species: 165



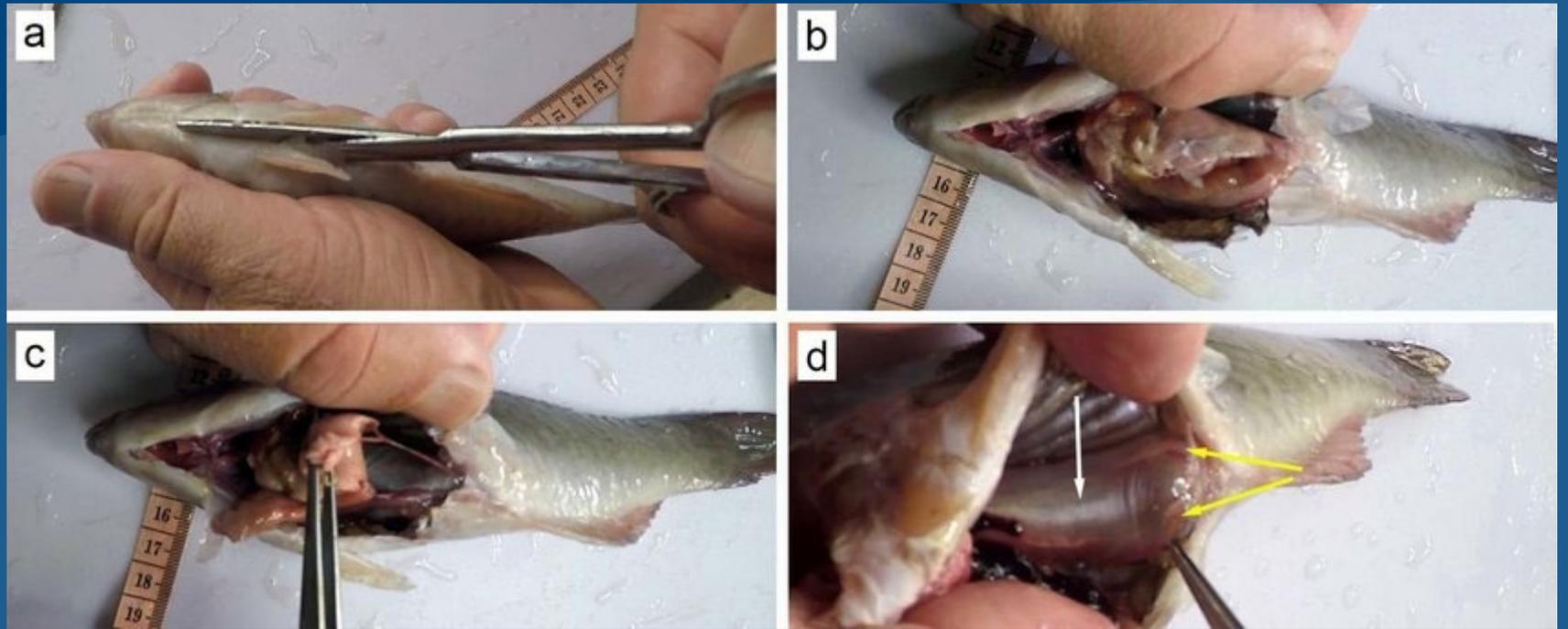
<https://safmc.net/regulations/regulations-by-species/>



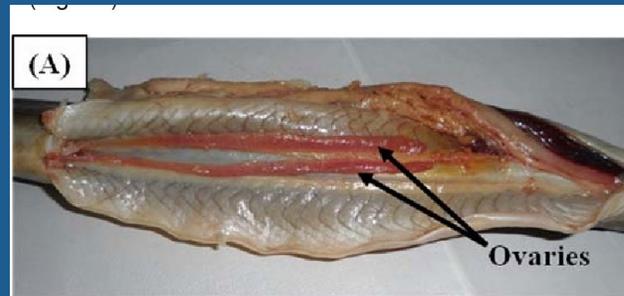
Where are the otoliths?



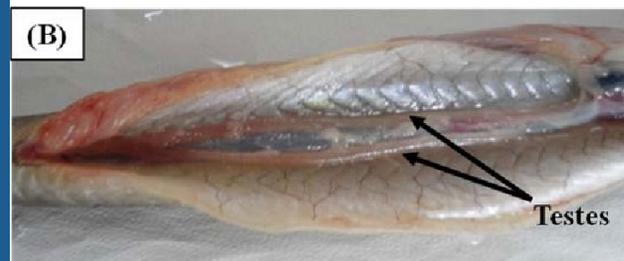
Where are the gonads?



Female



Male



Activity:

Try to guess how old each animal is. The answer is on the following slide.



How old is this fish by looking at this section of an otolith?



How old is this fish by looking at this section of an otolith?

4 Years old
Black Sea Bass
8/19/2010
The fish was 392
millimeters in total
length



How old is this fish by looking at this section of an otolith?



How old is this fish by looking at this section of an otolith?

2 Years old
Black Sea Bass
6/8/2010
The fish was 230
millimeters in Total
Length.

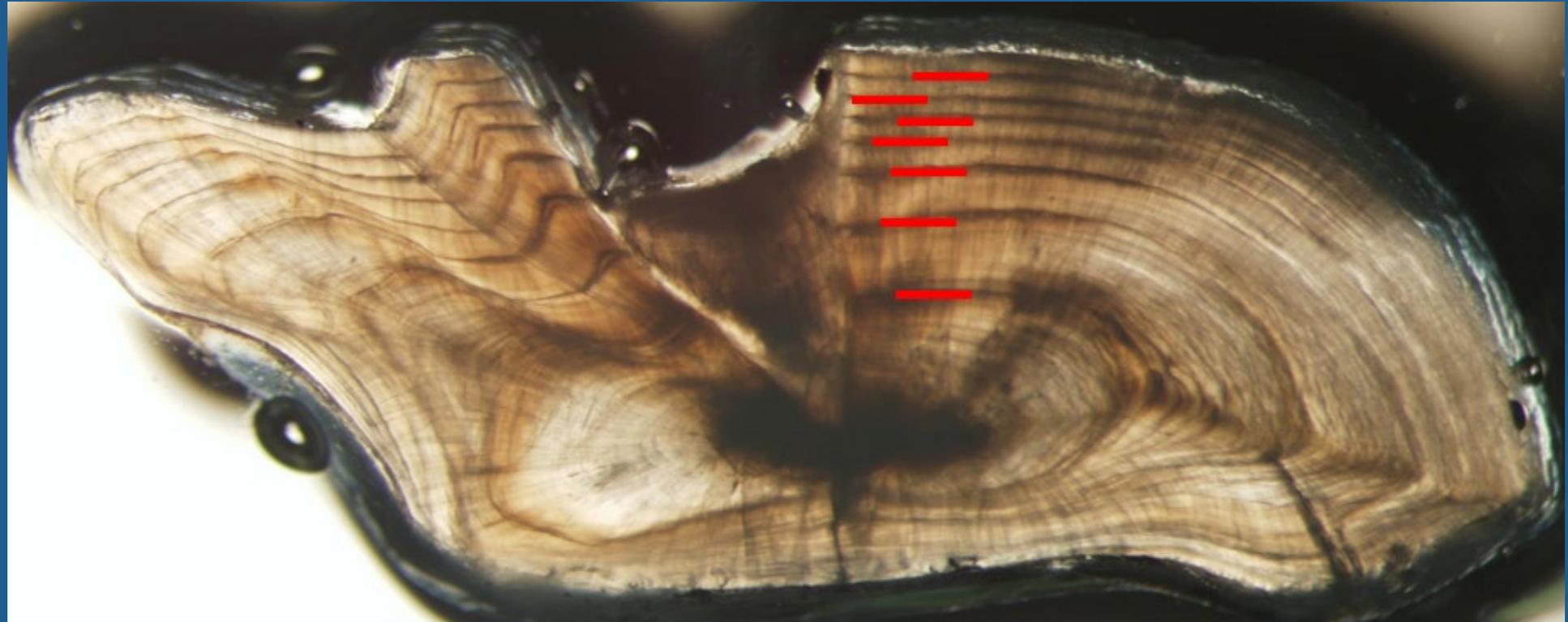


How old is this fish by looking at this section of an otolith?

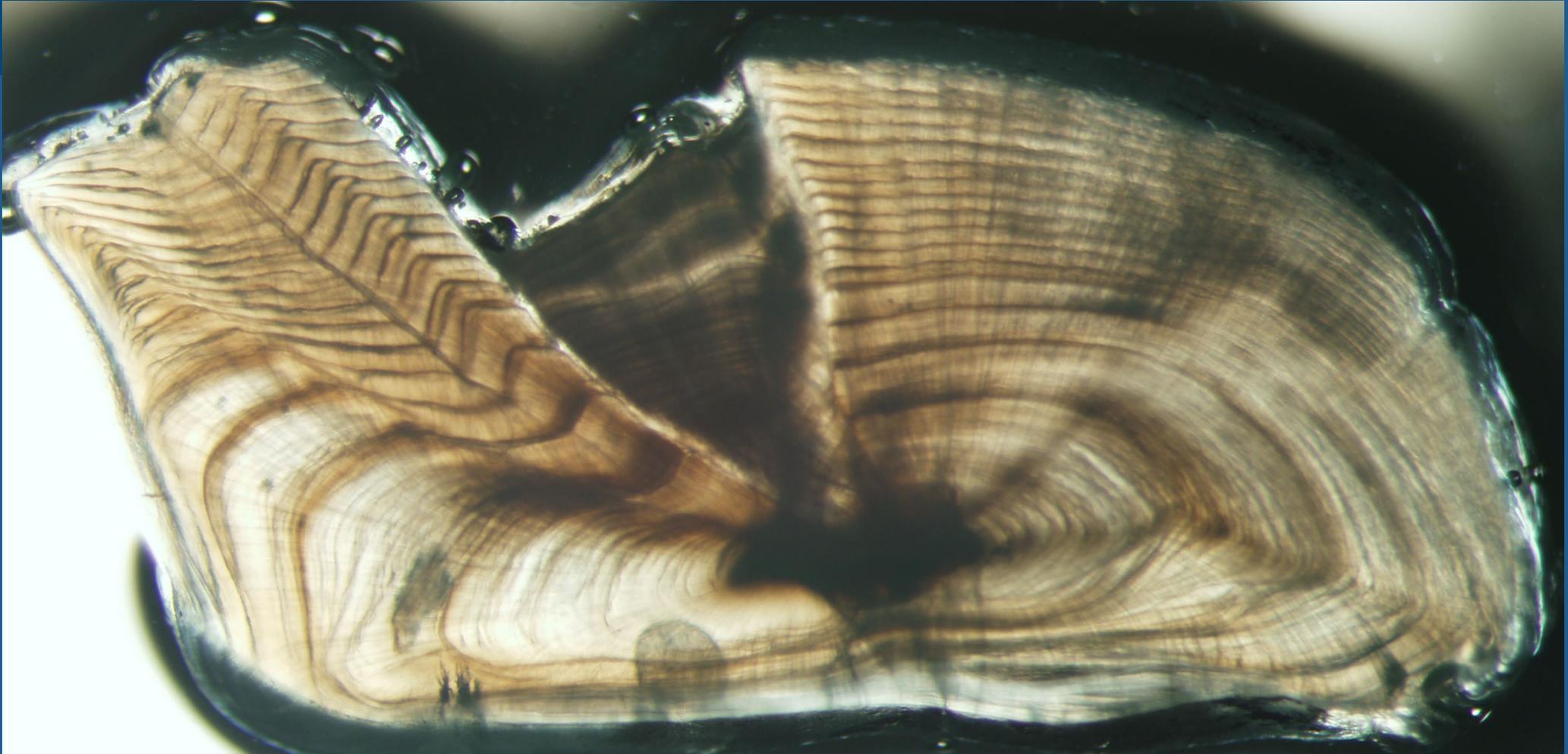


How old is this fish by looking at this section of an otolith?

Whitebone Porgy
7 Years old
This fish was 372
millimeters in Total
Length.

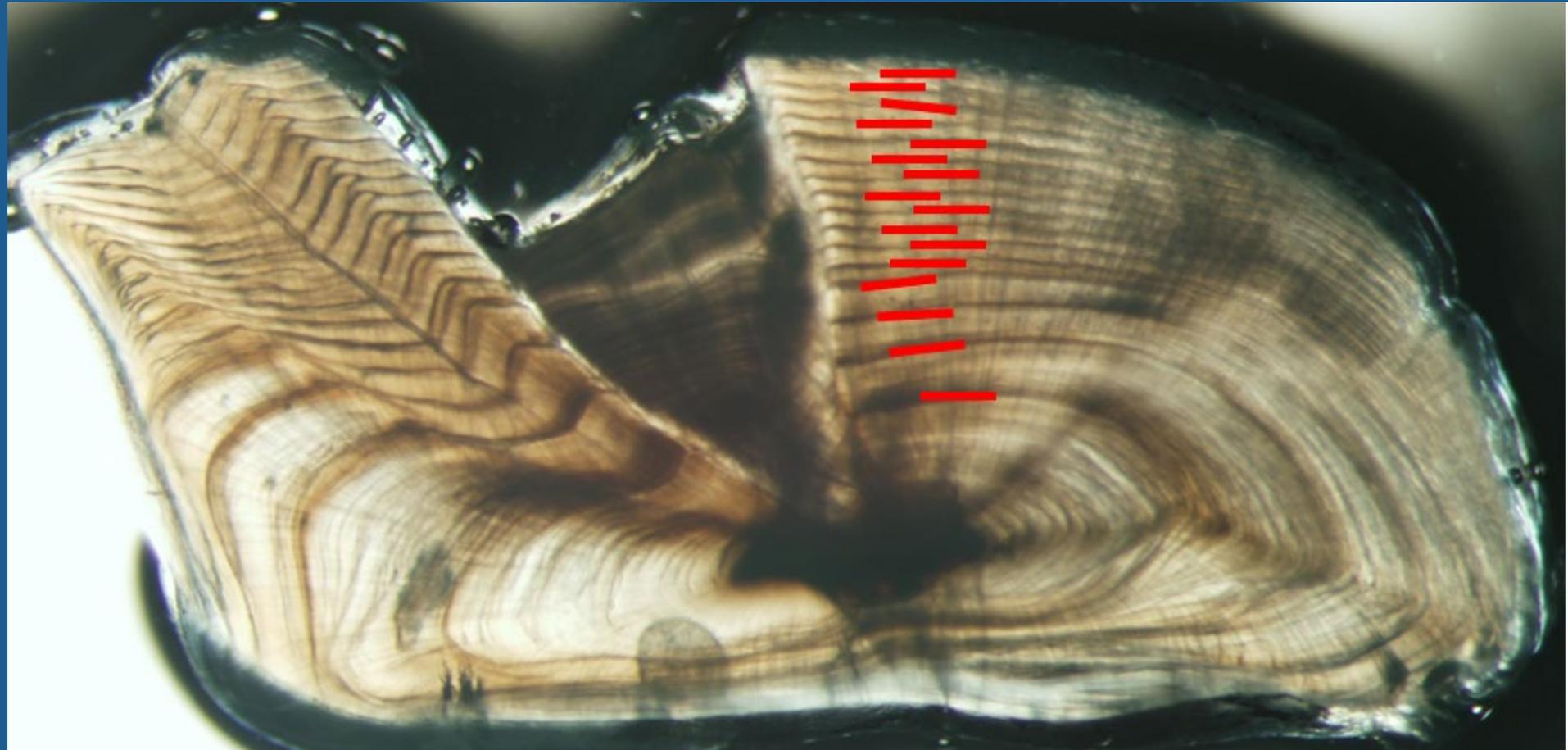


How old is this fish by looking at this section of an otolith?



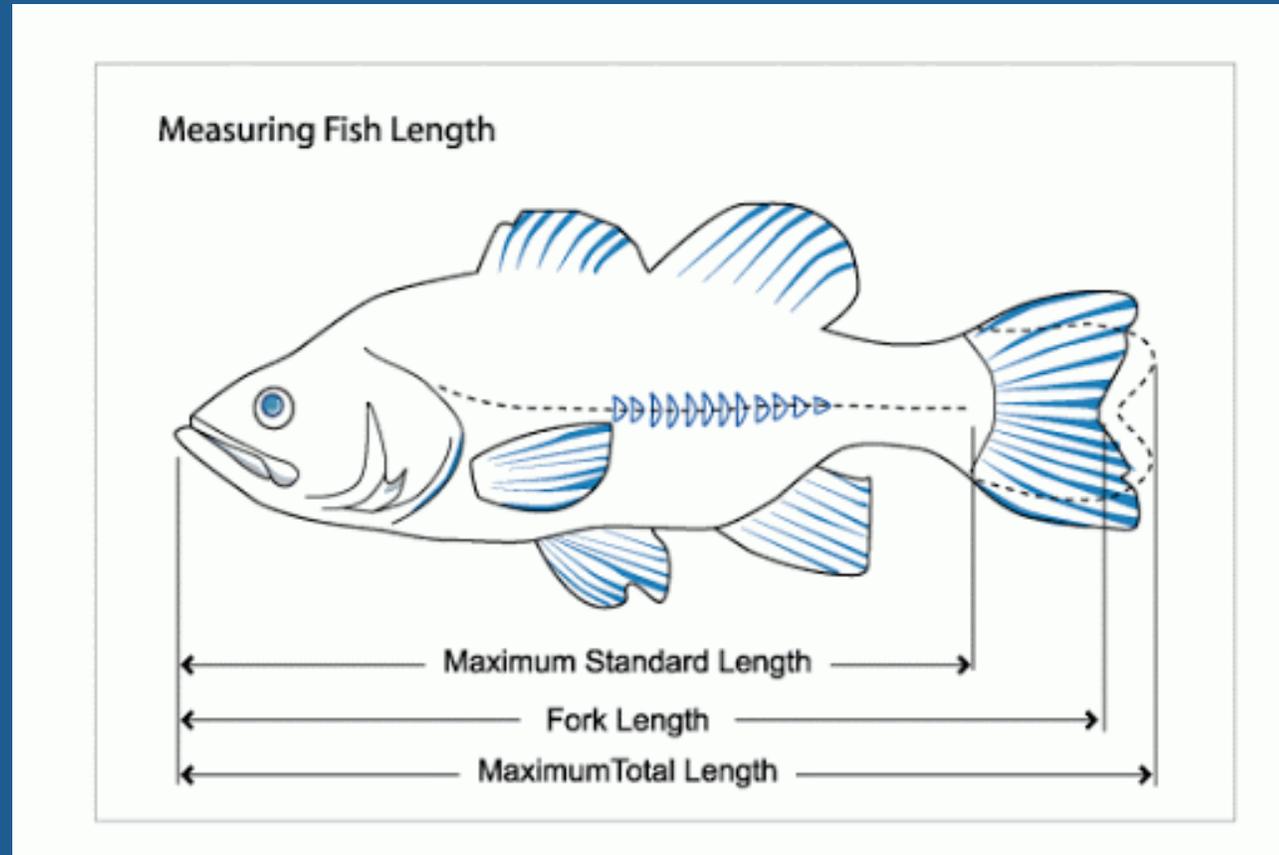
How old is this fish by looking at this section of an otolith?

Whitebone Porgy
16 Year old
This fish was 380
millimeters in Total
Length.

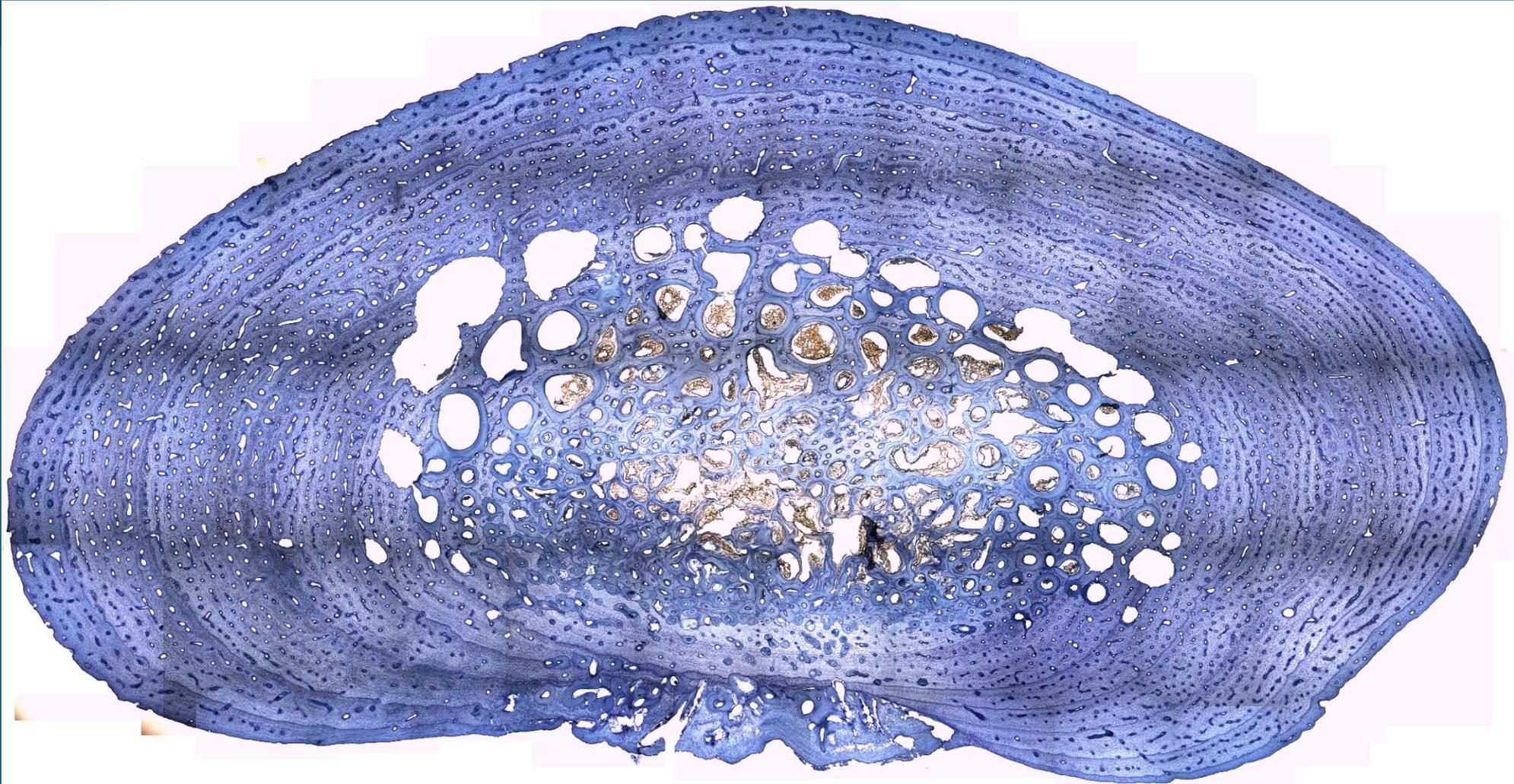


How do we measure a fish?

The provided measurements are given in millimeters of 'Maximum Total Length'.

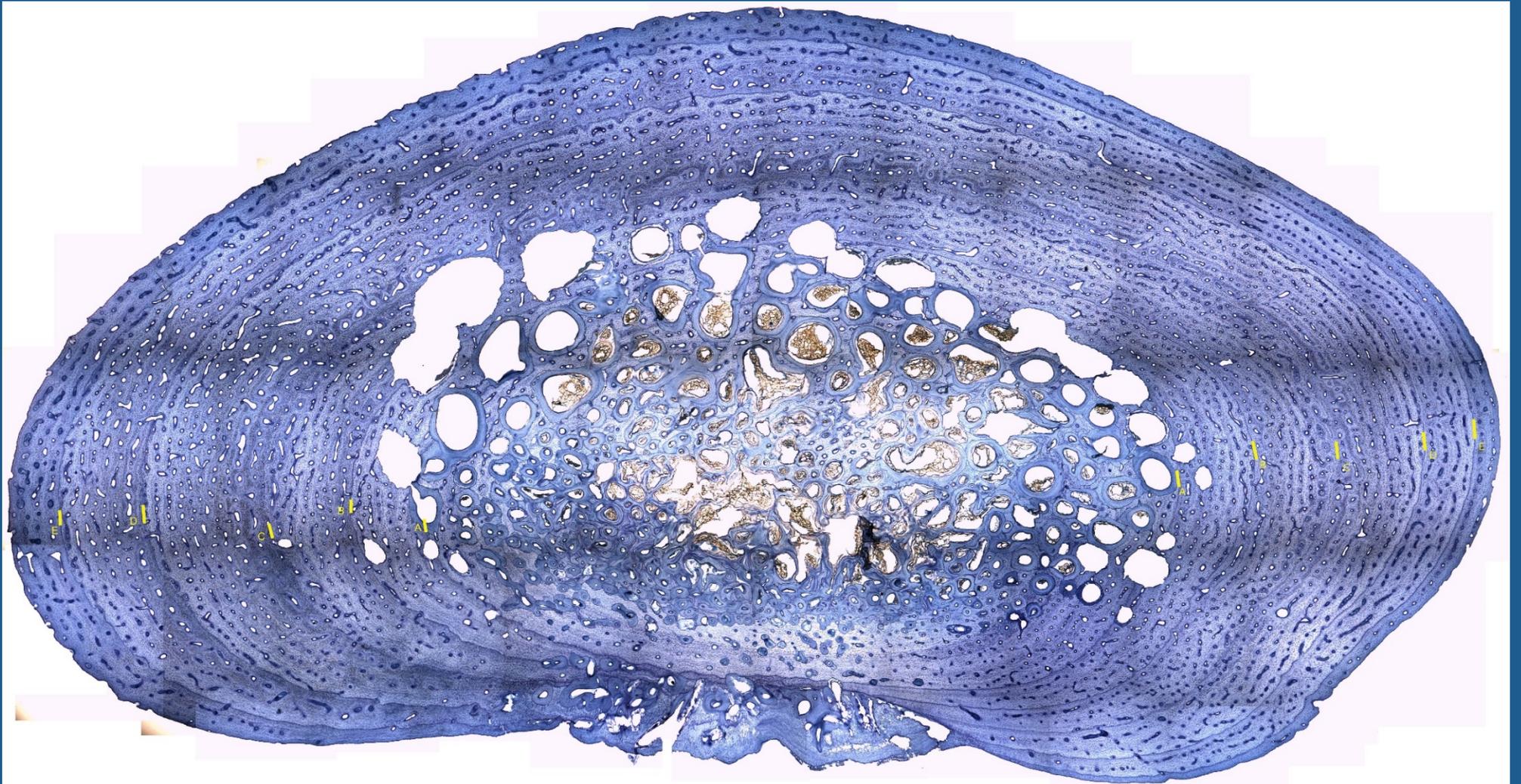


How old is this sea turtle by looking at this stained section of humerus bone?

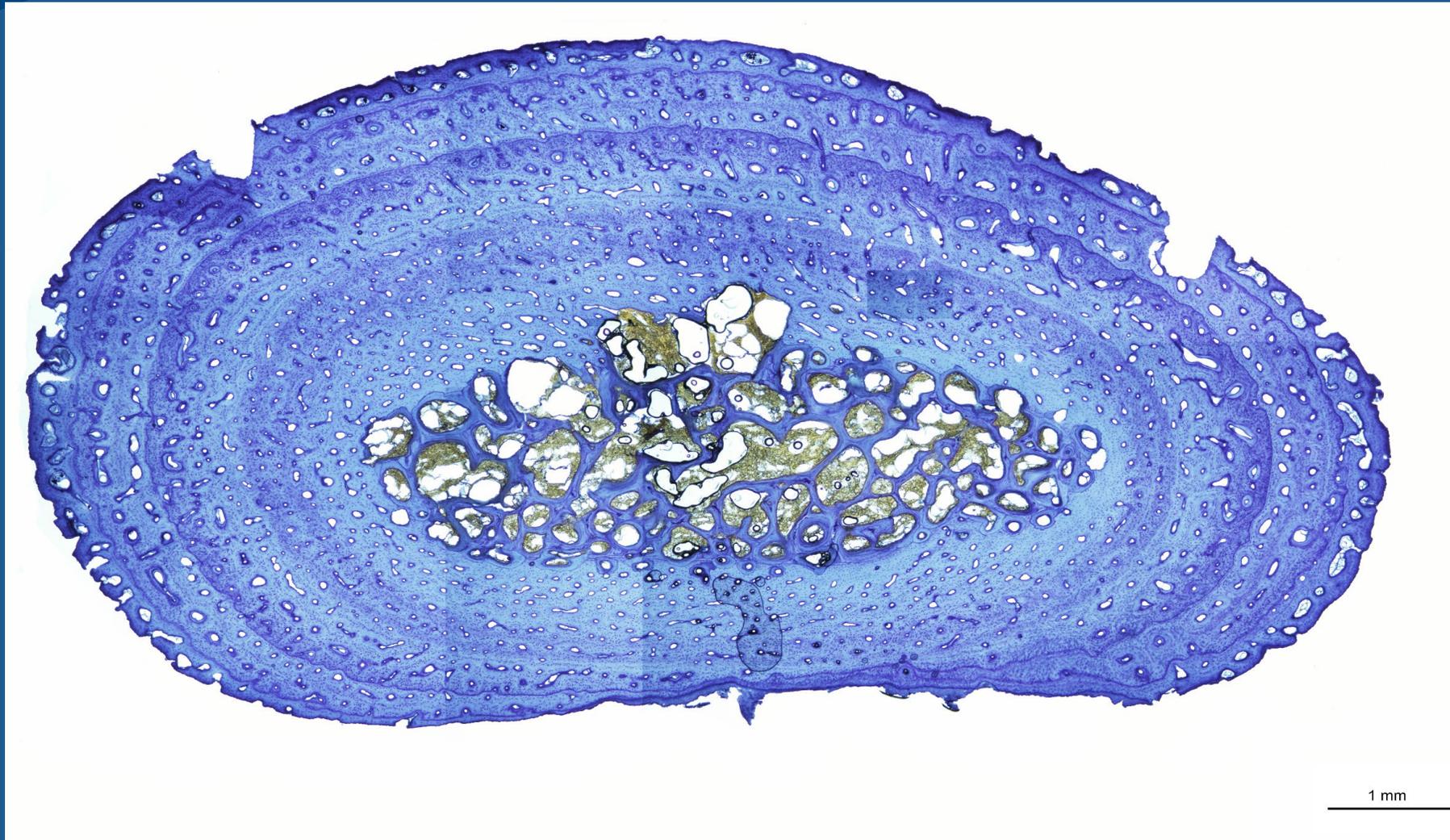


How old is this sea turtle by looking at this stained section of humerus bone?

Kemps Ridley
5 Years old

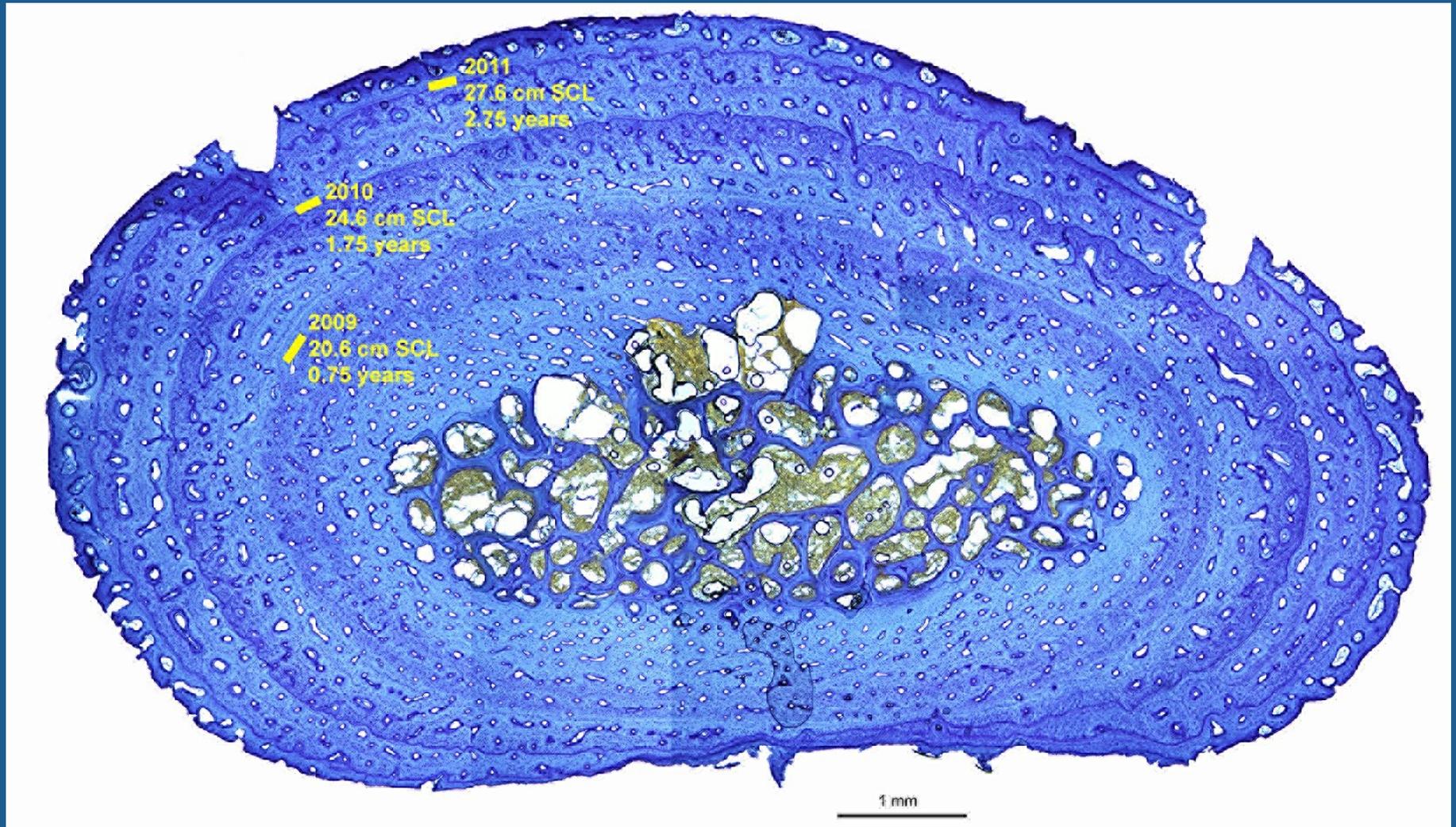


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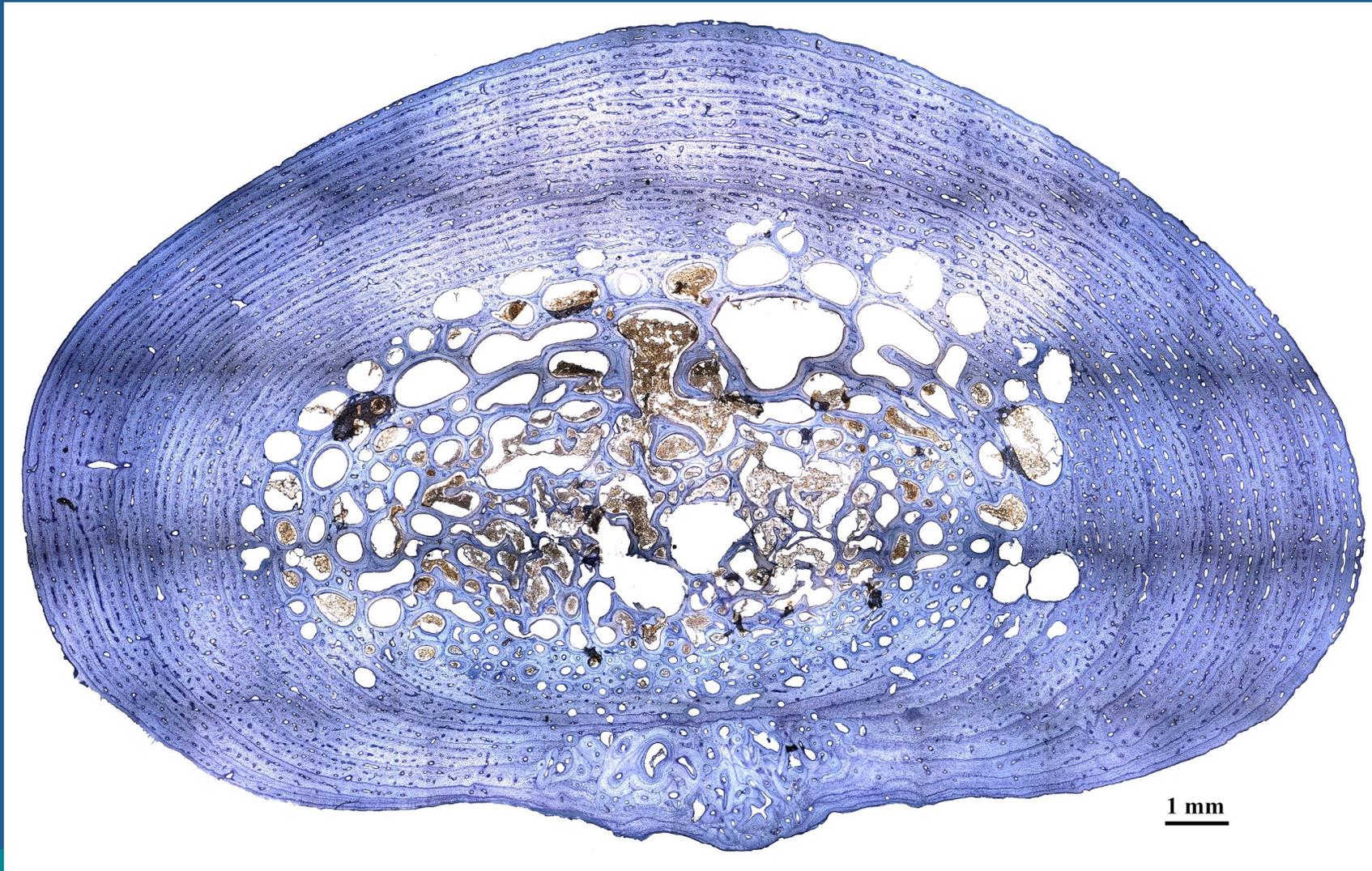


How old is this sea turtle by looking at this stained section of humerus bone?

Kemps Ridley
3 Years old

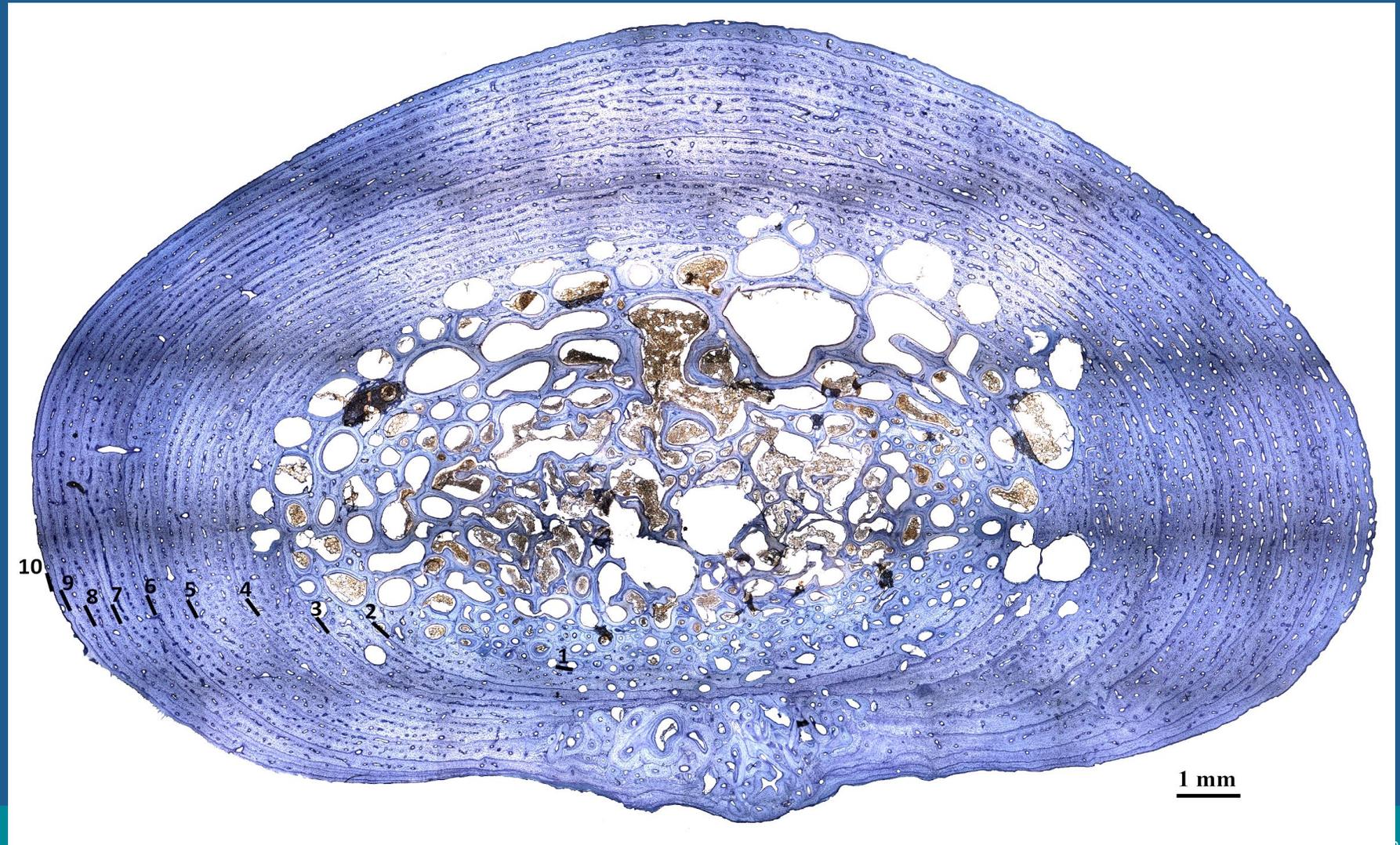


How old is this sea turtle by looking at this stained section of humerus bone?



How old is this sea turtle by looking at this stained section of humerus bone?

Kemps Ridley
10 Years old



Why are the sea turtle humeri images all splotchy?

- We take high-definition images of the section on a 40X microscope.
- Once we get these images, we stitch them back together in Photoshop to create the mosaic of each humeri section.

Any Questions?

Feel free to email me
with any questions:

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