

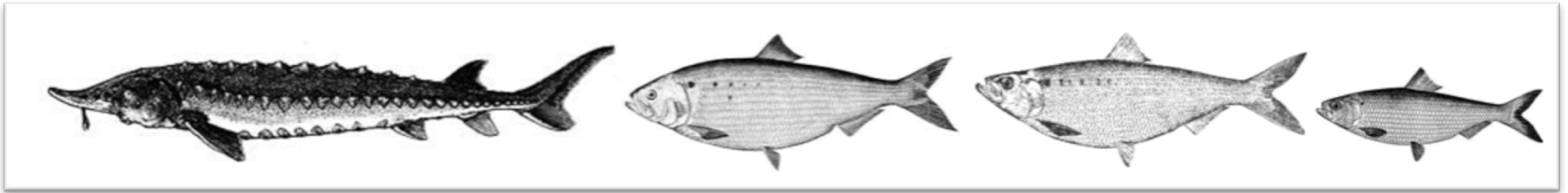
# Family Clupeidae

“River Herring” of the  
James



# ANADROMOUS FISH

- There are 350 species of fish in the Chesapeake Bay!
- About 7 species are anadromous: the adults live in the Atlantic Ocean and migrate to the Chesapeake Bay and spawn upriver.



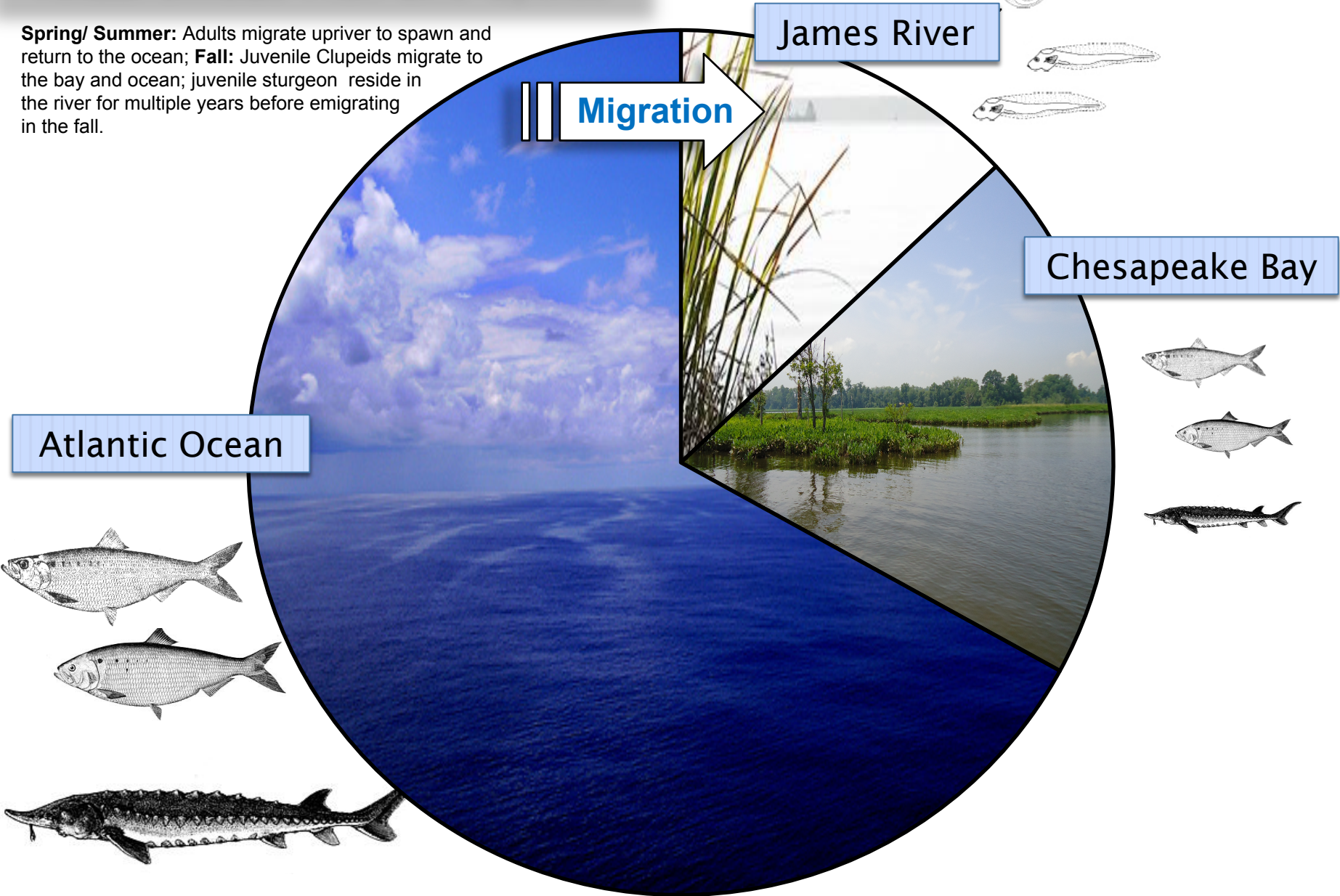
## Causes for population declines in anadromous fish:

- Overharvesting
- Habitat degradation, pollution
- Introduced species
- Damming of spawning grounds
- Boat strikes (sturgeon)
- Loss as bycatch in coastal fisheries



# Anadromous Fish Life Cycles

**Spring/ Summer:** Adults migrate upriver to spawn and return to the ocean; **Fall:** Juvenile Clupeids migrate to the bay and ocean; juvenile sturgeon reside in the river for multiple years before emigrating in the fall.

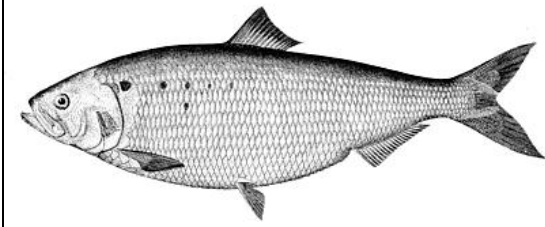


# CLUPEIDAE



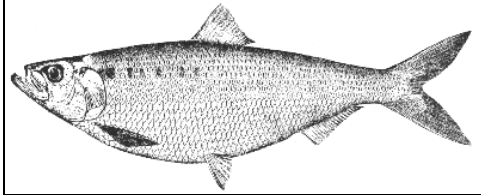
## American shad

*Alosa sapidissima*, "most delicious"



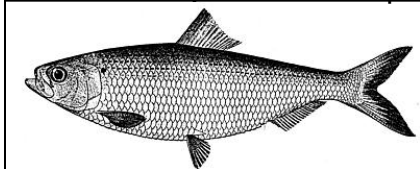
## Hickory shad

*Alosa mediocris*, "ordinary"



## Blueback herring

*Alosa aestivalis*, "arrives in spring"



## MID-ATLANTIC SHAD and HERRING MIGRATION ROUTES

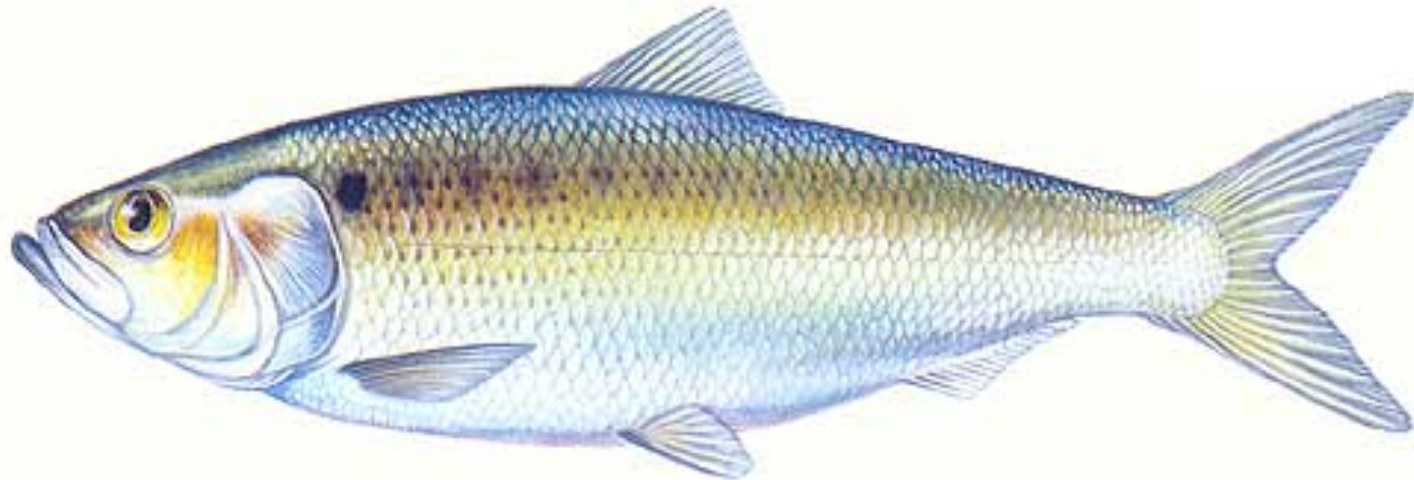


# American Shad (*Alosa sapidissima*)



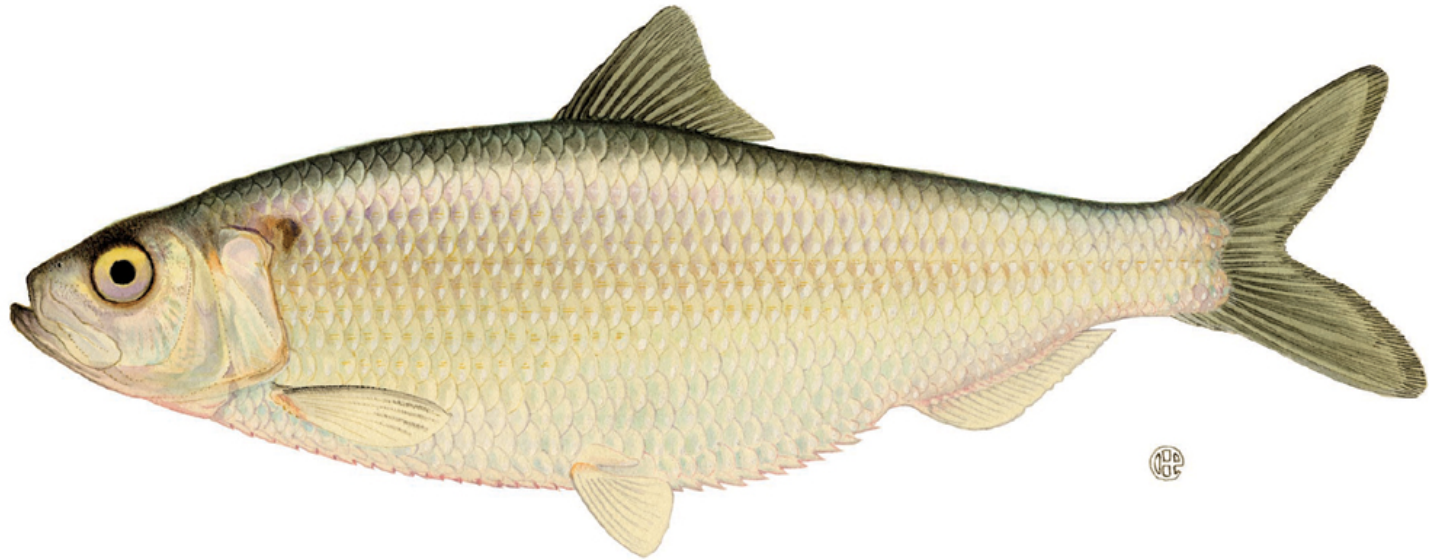
- **Appearance:** silver-sided with greenish-blue back; deep bodied from the side, narrow and symmetrical top to bottom head-on; row of dark spots on the sides; the upper and lower jaws are equal length when the mouth is closed
- **Length:** 20-24 inches (largest of the Clupeid family)
- **Weight:** 5 lb
- **Feeding:** pelagic; feed on plankton and small fish or fish eggs
- **Spawning:** spawn at night in 6-ft deep water; broadcast eggs into the water column; eggs will hatch in 7-10 days; juveniles stay in estuaries for up to a year; over half of the adults die after spawning

# Hickory Shad (*Alosa mediocris*)



- **Appearance:** silver-sided with grayish-green back and a prominent dark spot, followed by a row of lighter spots; body long but compressed, asymmetrical top to bottom and in cross section it is wedge-shaped; the lower jaw protrudes significantly beyond the upper jaw when the mouth is closed; each scale on the sides has a small dark spot
- **Length:** 12-20 inches
- **Weight:** 2 lb
- **Feeding:** pelagic; feed on plankton and small fish or fish eggs
- **Spawning:** spawning occurs at night; adults broadcast eggs into the water column; eggs float downstream and will hatch in 2-3 days; juveniles stay in freshwater a few months until temperatures begin to drop; adults often repeat spawn

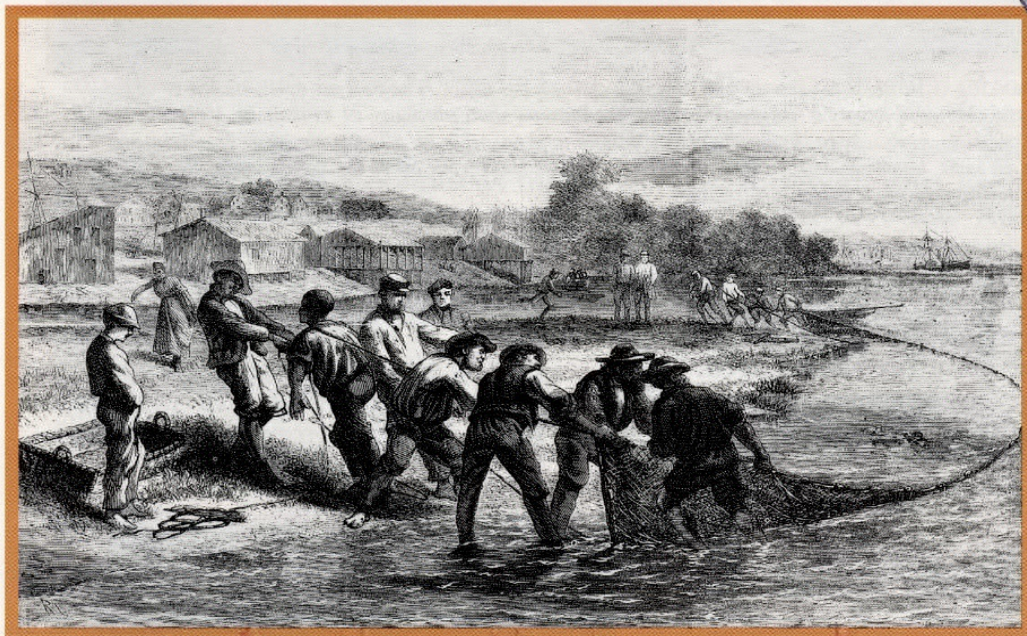
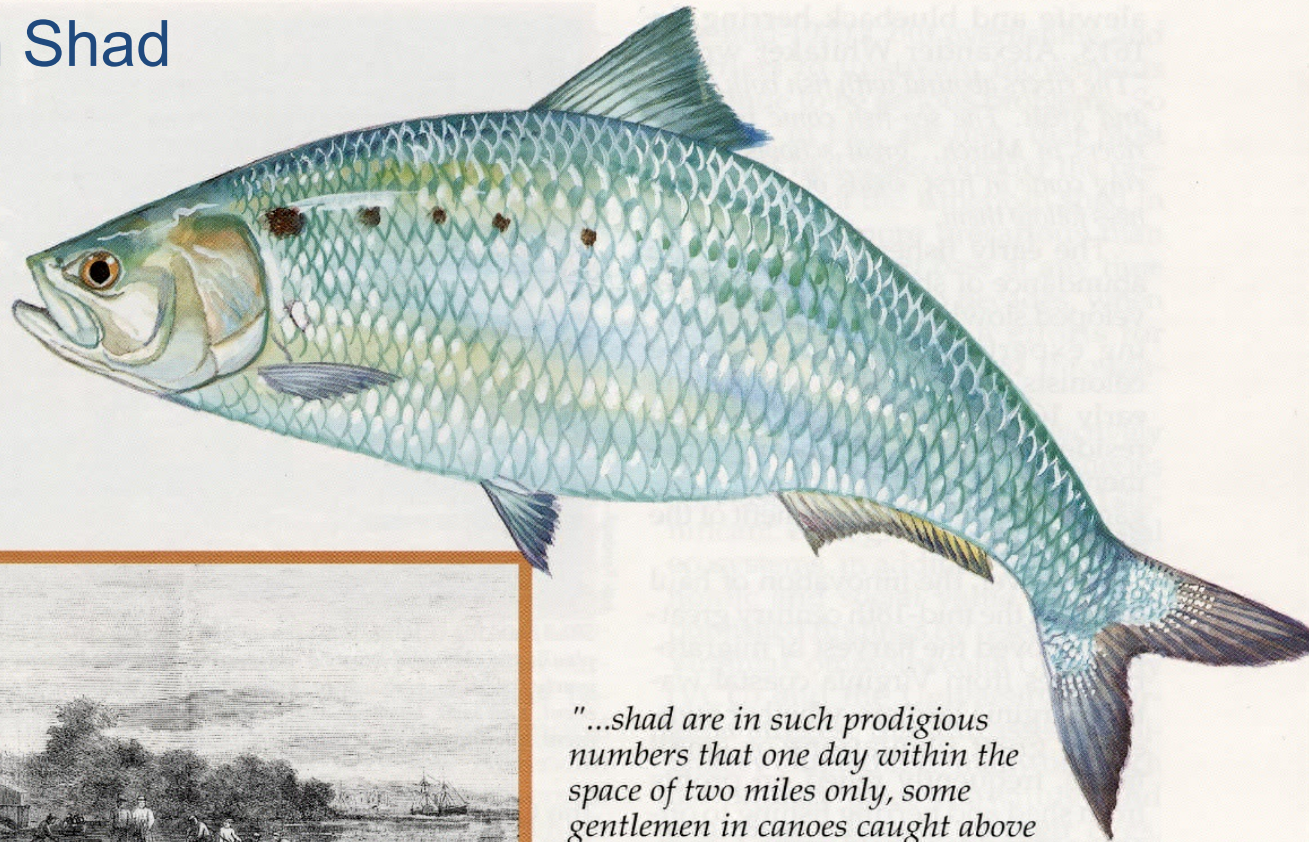
# Blueback Herring (*Alosa aestivalis*)



- **Appearance:** bluish along the back with a silvery head and side; compressed body; similar in appearance to Alewife
- **Length:** 12-15 inches
- **Weight:** < 1 lb
- **Feeding:** pelagic; feed on plankton and small fish or fish eggs
- **Spawning:** spawn in quiet, upper portions of streams and creeks; broadcast eggs that stay in the water column; eggs float downstream and will hatch in 2-3 days; juveniles stay in freshwater for a few months until temperatures drop; some juveniles remain in the bay waters for up to 1 year; most adults die after spawning

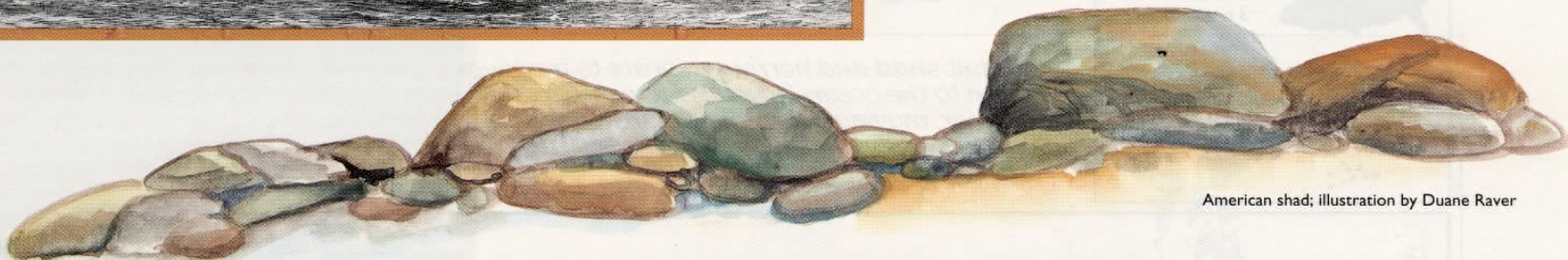


# American Shad



*"...shad are in such prodigious numbers that one day within the space of two miles only, some gentlemen in canoes caught above six hundred...with hooks which they let down to the bottom and drew up at a venture when they perceived them to rub against a fish; and...five thousand have been caught at one single haul of the seine."*

*—Andrew Burnaby, an English traveler in 1759*







# American Shad



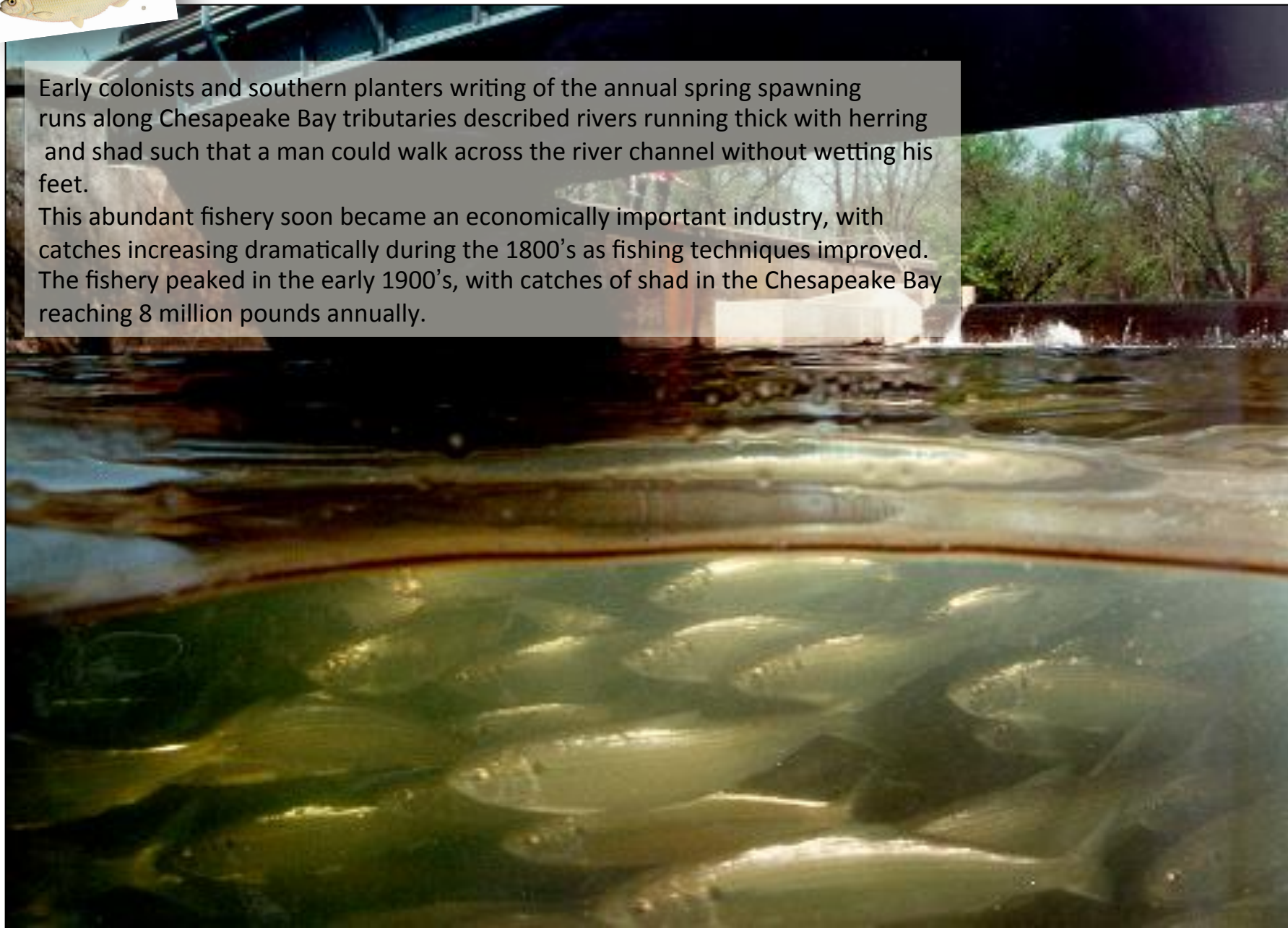
Shad once supported the largest fishery on the East Coast, with up to 20 million shad caught per year in the 1800's!



# Blueback Herring

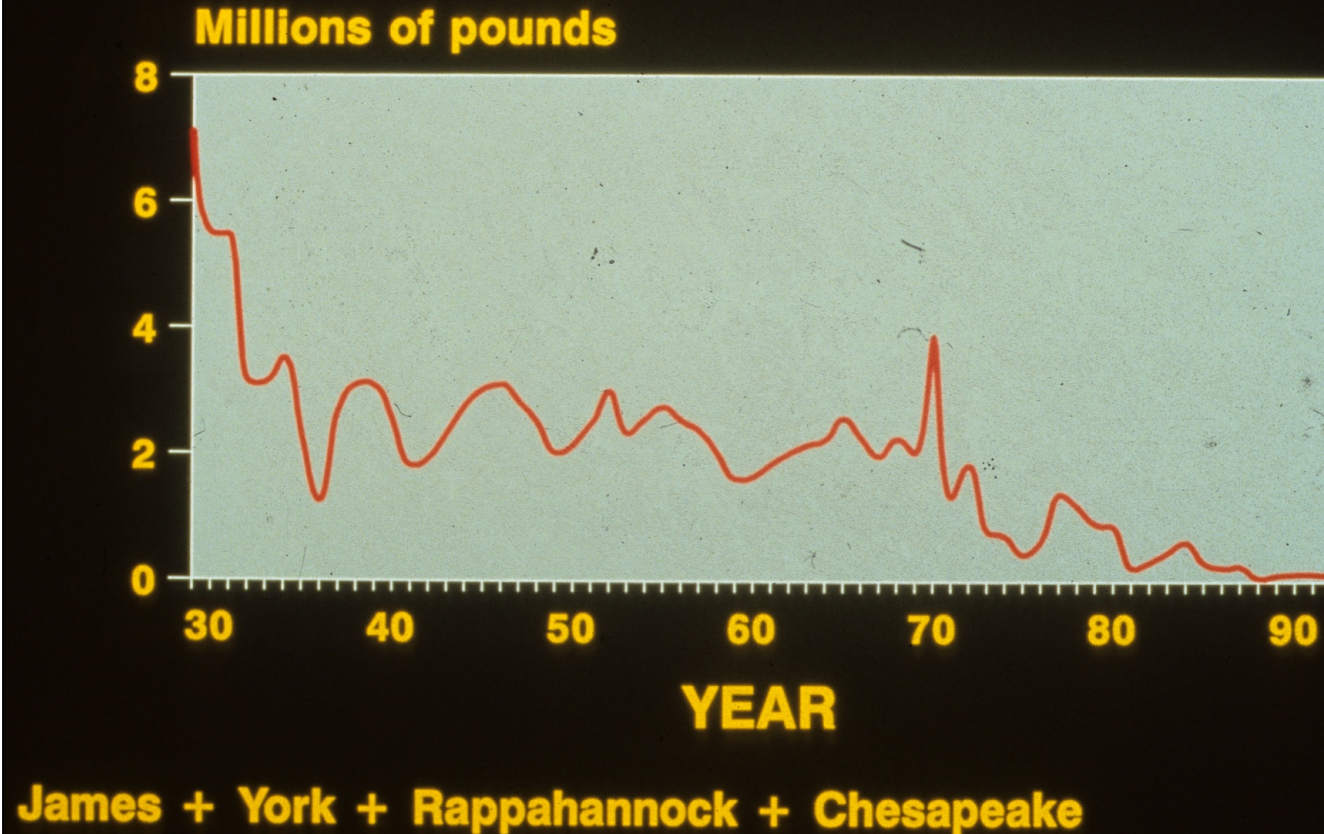
Early colonists and southern planters writing of the annual spring spawning runs along Chesapeake Bay tributaries described rivers running thick with herring and shad such that a man could walk across the river channel without wetting his feet.

This abundant fishery soon became an economically important industry, with catches increasing dramatically during the 1800's as fishing techniques improved. The fishery peaked in the early 1900's, with catches of shad in the Chesapeake Bay reaching 8 million pounds annually.





# AMERICAN SHAD TOTAL CATCH



In 2007, the Atlantic States Marine Fisheries Commission, a panel of state and federal fishery managers responsible for managing migratory fish, completed an American shad stock assessment that concluded that shad stocks along the East Coast were "currently at all-time lows."

# What are we doing to combat the decline of anadromous fish populations?

- Large-scale stocking efforts
- Fish passage projects
- Fishing regulations along the coast

# What are we doing to combat the decline of anadromous fish populations?

- Large-scale stocking efforts
- Fish passage projects
- Fishing regulations along the coast

## Rearing Herring and Shad

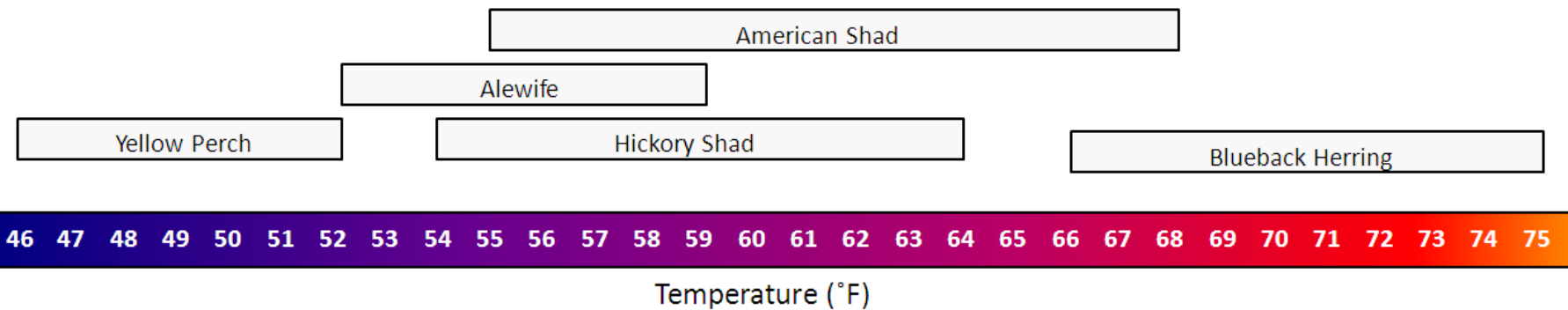
Scientists collect eggs from adult females and milt (sperm) from adult males and mix the reproductive material together. Fertilized eggs are then taken to the hatchery to incubate and develop into fish fry. Larval fish are released at various tributaries along the James River.



Adult Blueback Herring



## Fish Spawning Temperatures



46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75

Temperature (°F)



Eggs are incubated in the tubes along the tanks. Once eggs mature, fish fry travel up the tube and into the large silver tank.

At Harrison Lake National Fish Hatchery, American shad have been intensively stocked since **1992**. Since then, biologists have stocked millions of shad fry!





American Shad Fry

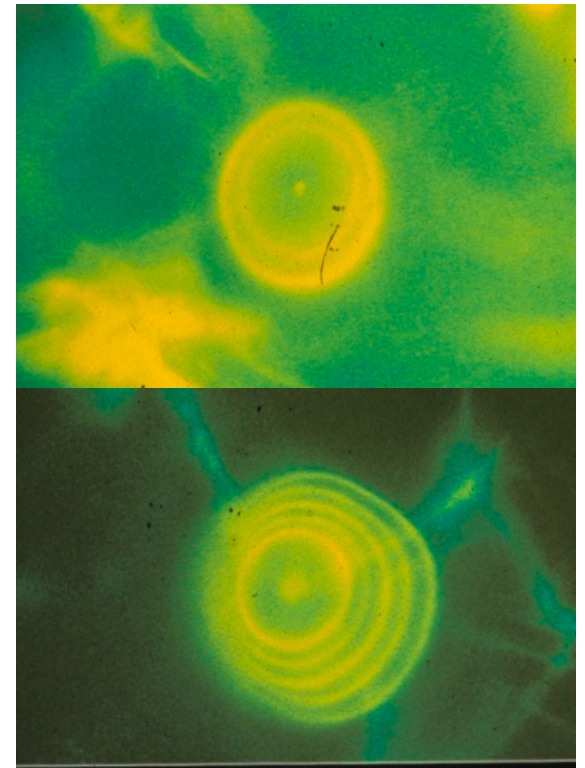


American Shad Fry



Biologists release larval fish into the river.

Fish from the hatchery are tagged with a special OTC marker so adults can be identified when they return during their migration. OTC is a chemical that gets incorporated into the fish ear bones (called otoliths) and can be viewed under a fluorescing microscope.

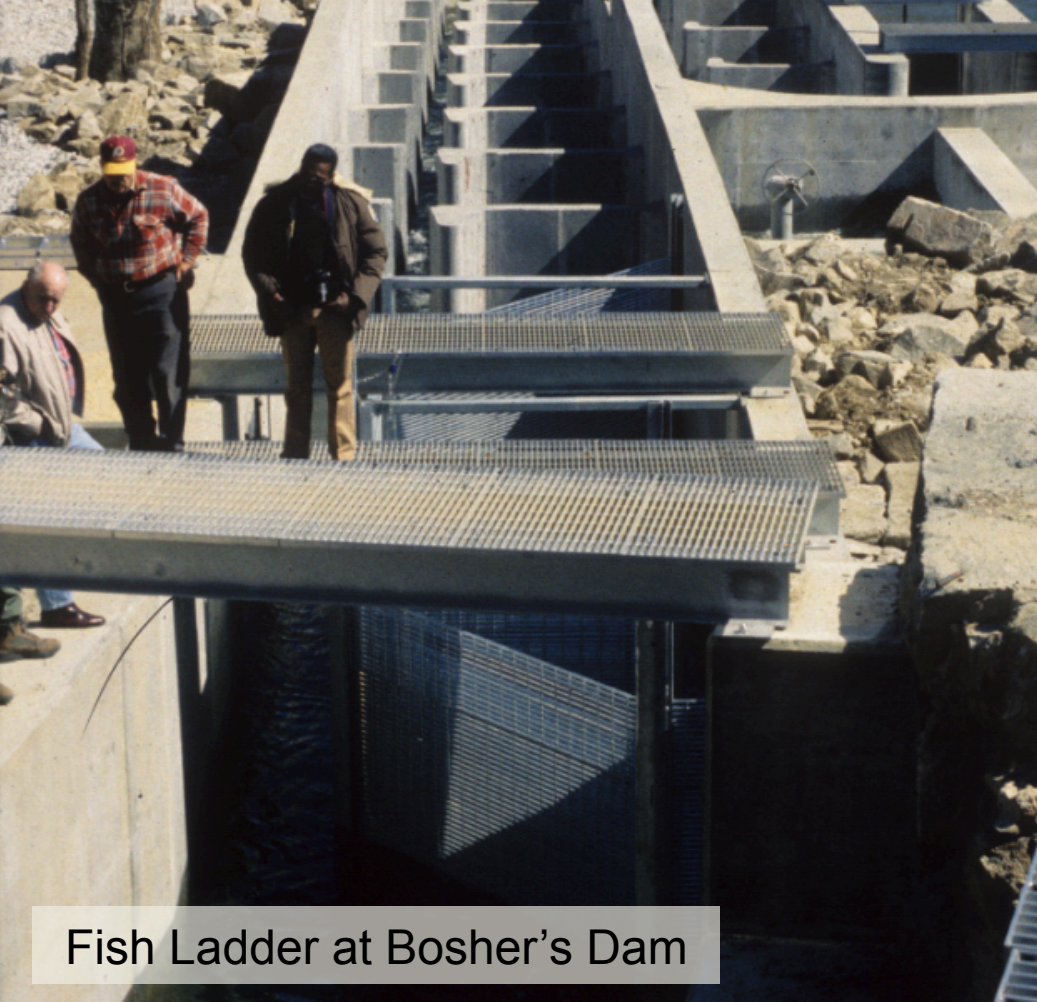


# What are we doing to combat the decline of anadromous fish populations?

- Large-scale stocking efforts
- **Fish passage projects**
- Fishing regulations along the coast



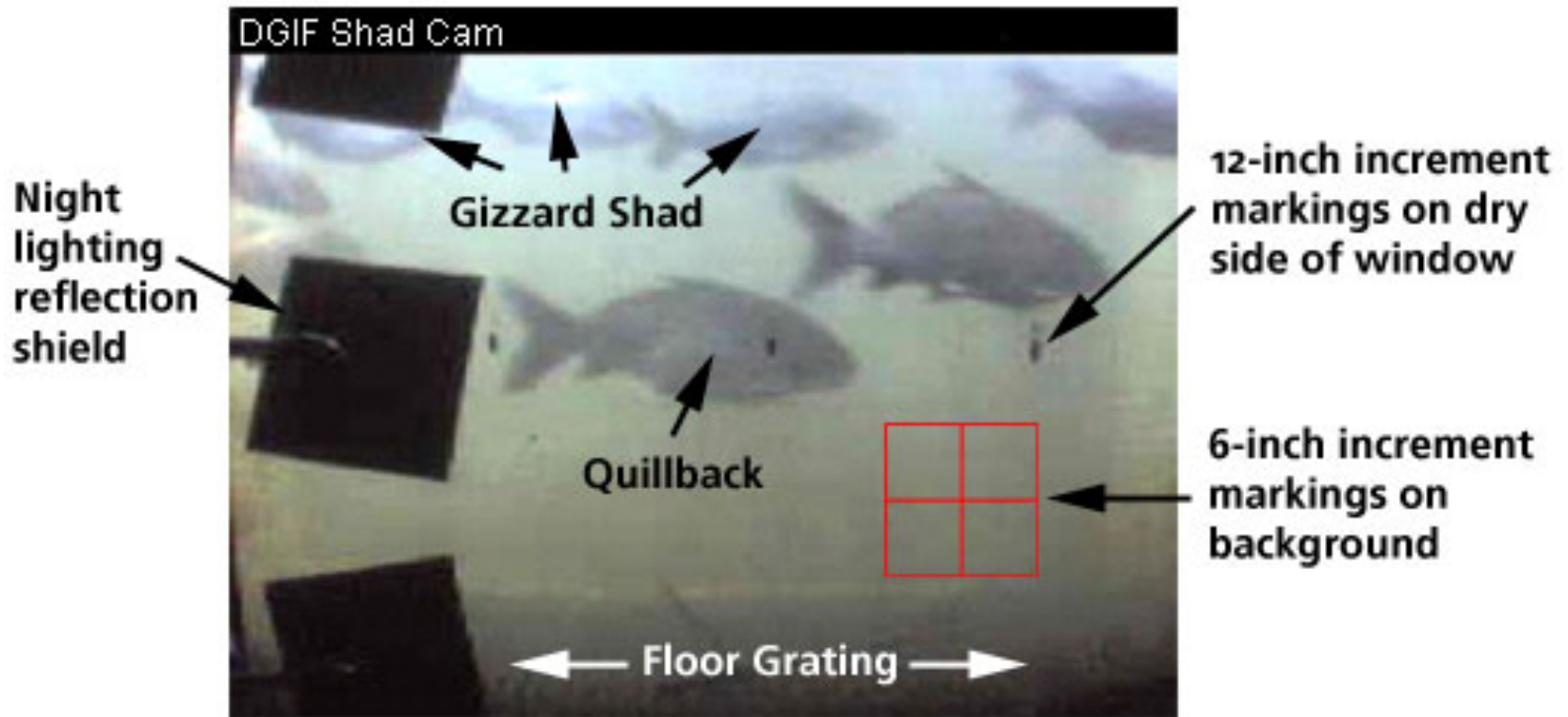
Fish ladders provide a means for fish to move beyond dams.



Fish Ladder at Boshers Dam



The fish ladder at Boshers Dam has a viewing window to monitor migration of anadromous fish.



View [LIVE ShadCam footage](#) in the spring!





# What are we doing to combat the decline of anadromous fish populations?

- Large-scale stocking efforts
- Fish passage projects
- **Fishing regulations along the coast**

American shad:  
No Restrictions

Hickory shad:  
No restrictions

Blueback Herring:  
Moratorium.

The VA Marine Resources Commission issued a moratorium during spring 2012 and remains in effect today (2017) making it illegal to catch or possess blueback herring or alewives in the James River.





# American Shad

In the effort to restore fish populations, abundance goals were set. The figure shows what percentage of this goal was met in 2008.

The Rappahannock has had a small and slightly increasing population over the last decade. The Potomac, has shown a marked increase over the past 15 years. The York, Susquehanna, and James have showed little to no improvement.

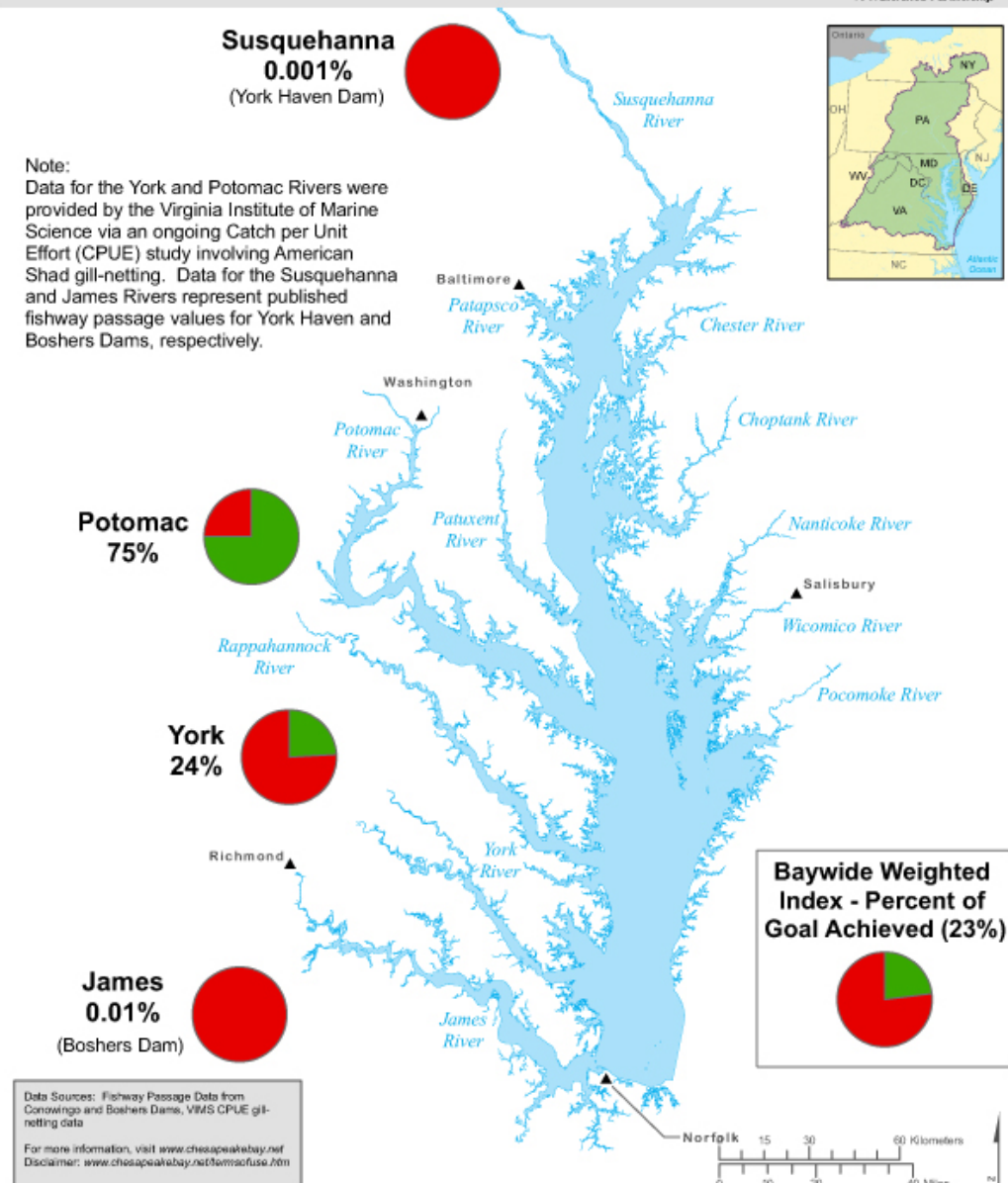
The populations have not rebounded.

## Shad Abundance (2008)

Ecosystem Health Assessment



Chesapeake Bay Program  
A Watershed Partnership



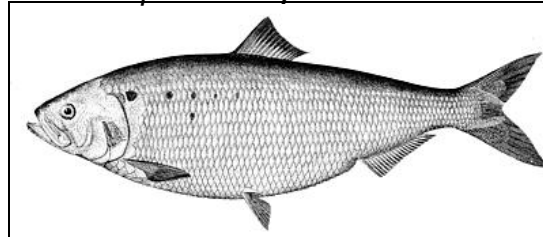
# CLUPEIDAE



## ANY QUESTIONS???

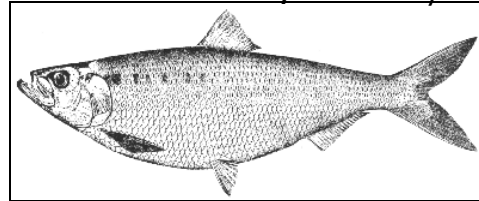
### American shad

*Alosa sapidissima*, "most delicious"



### Hickory shad

*Alosa mediocris*, "ordinary"



### Blueback herring

*Alosa aestivalis*, "arrives in spring"

