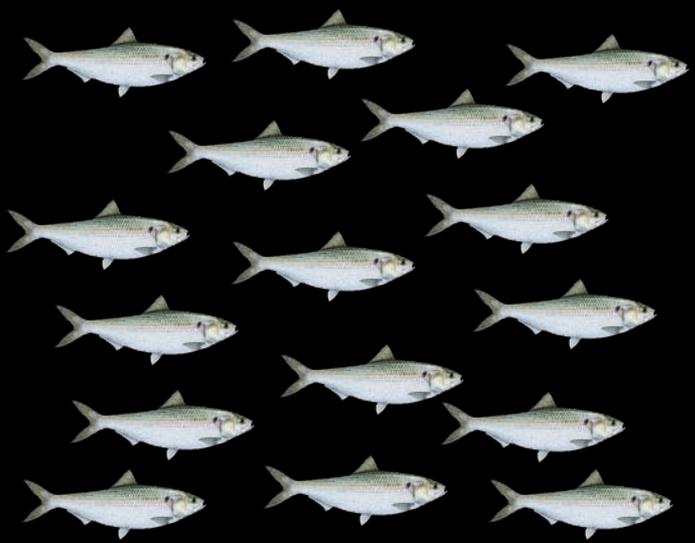


THE LIFE HISTORY OF AMERICAN SHAD

Joshua Raabe
North Carolina State University

Shad in the Classroom Workshop – 20 February 2010



LIFE HISTORY

- Life history:
 - The significant features of the life cycle through which an organism passes, with particular reference to strategies influencing survival and reproduction
- Fish life cycle:
 - egg – larvae (yolk) – fry – juvenile – adult

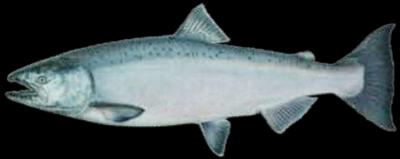


Walleye (*Sander vitreus*)



DIADROMOUS FISHES

- Diadromous:
 - Distinct life stages in both freshwater & saltwater
- Anadromous:
 - Spawn in freshwater, grow and mature in saltwater



Salmon



Herring



Striped Bass



Sturgeon

- Catadromous:
 - Spawn in saltwater, grow and mature in freshwater



American eel

AMERICAN SHAD

Alosa sapidissima

- Family: *Clupeidae* (herring, shads, sardines, menhaden)
- Genus: *Alosa* (hickory shad, blueback herring, alewife)
 - American shad is largest species
 - Hickory shad have “underbite”
- Name: *sapidissima* = delicious
- Common names: white shad
roe shad (females), buck shad (males)



SPAWNING

- Where: Most major Atlantic coast rivers and tributaries
- When: Depends on latitude (water temperature)
 - Dec-Feb (South), Mar-May (Mid), May-Jul (North)
 - Highest activity in evening, early night
- Who: Group of males with one or more females
- How: Group rises to surface, shaking releases eggs & milt
 - Broadcast spawn, no parental care (no nests)
 - Often spawn over sand-rock, moderate river flows

EGGS

- Females deposit 100,000 – 600,000 eggs
- “Batch spawners” – various developmental stages
- Eggs are 2 – 3 mm (~ 0.1 inches) in diameter
- Eggs are transparent, pink, or amber
- Eggs settle into substrates or drift
- Eggs hatch in one to two weeks

YOUNG

- Hatching larvae are around 9 - 10 mm (~0.4 inches)
- Fry / juveniles feed on invertebrates (plankton, benthos)
- 1.5 – 4.5 inches when they leave rivers in fall
- In winter, may reside in estuaries or move into ocean
- Little is known about juvenile biology / habitats

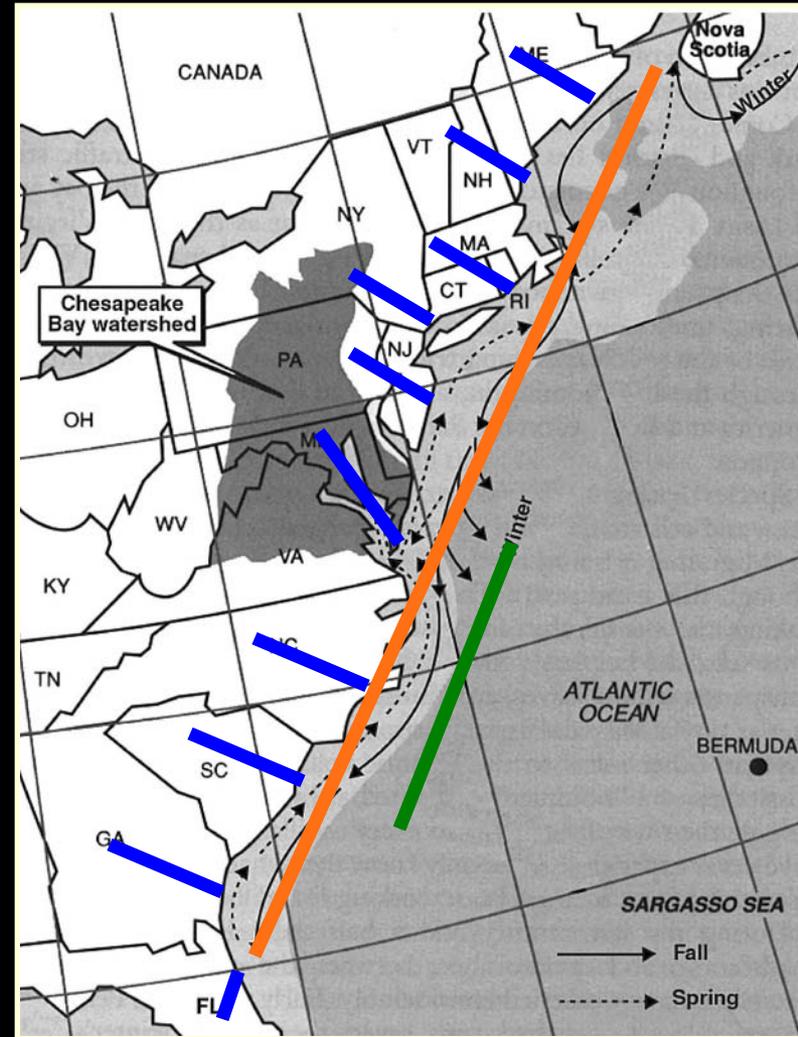


ADULTS

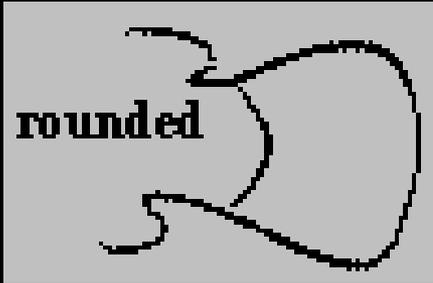
- In ocean, feed on plankton (filter feeders, gill rakers)
- In freshwater, consume very little, if anything
- Mature: males ~ 3-5 years, females mature ~ 4-6 years
- Size: Males ~ 1 – 3 pounds, ~ 16 - 20 inches
Females ~ 3 – 8 pounds, 18 – 24 inches
- Life span: 3 to maximum of ~10 years
 - Southern populations die after spawning
 - Northern populations spawn multiple times
 - North Carolina believe to be a transition zone

MIGRATIONS

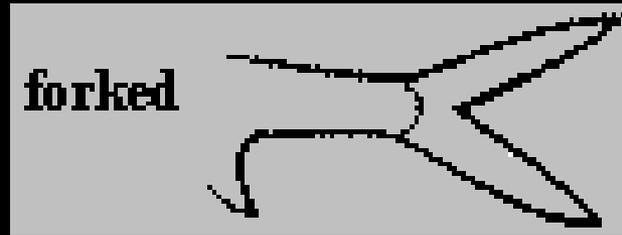
- Winter-early summer (spawning):
 - Home (return) to natal river
 - Olfactory cues, magnetic sense, celestial navigation
 - Historically, 100's of miles
- Summer-fall (post-spawning):
 - All populations - Bay of Fundy
- Winter:
 - Offshore, deeper water
- Up to 12,000 miles!



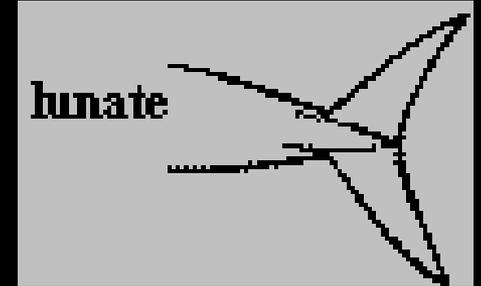
CAUDAL FIN (TAIL)



Strong, slow



Constantly moving



Fast, rapid

American shad?



POPULATION DECLINES

- Some populations crashed from 100,000s to 1,000s
- Late 1800's, early 1900's
- WHY?
 - Overfishing
 - Habitat degradation (pollution)
 - Habitat loss (dams)



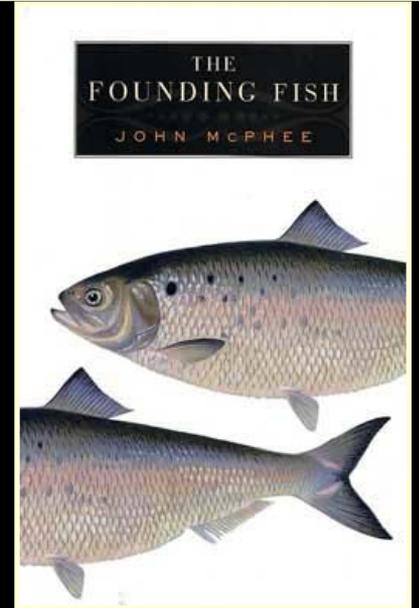
SHAD IMPORTANCE

- Ecological importance:
 - Predators and prey in ocean (system balance)
 - Huge influx of nutrients into freshwater
- Economic importance:
 - Commercial fisheries (historical)
 - Recreational fisheries (emerging)
- Historical importance:
 - Native Americans used rock fish weirs
 - Saved George Washington's troops from starvation in Revolutionary War



SHAD IMPORTANCE

- Cultural importance:
 - Shad bakes / plankings

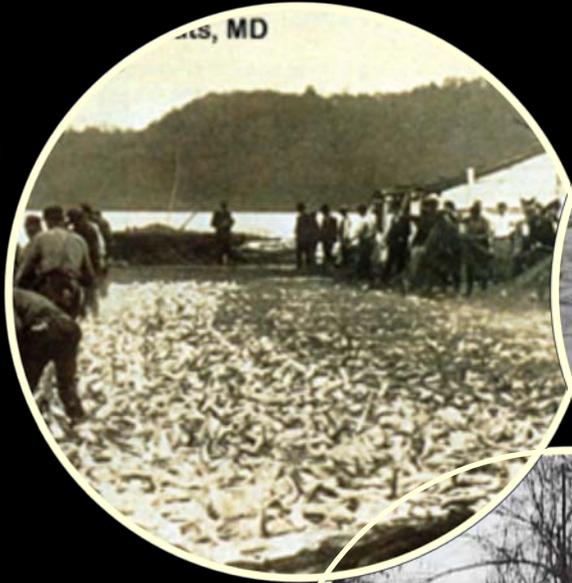


- Other:
 - Healthy, “tasty” food (protein, Omegas)
 - Novels: John McPhee, The Founding Fish
 - Have to rename the “shadbush”
 - They are cool! We learn from them



RESTORATION EFFORTS

PEOPLE
(regulations)



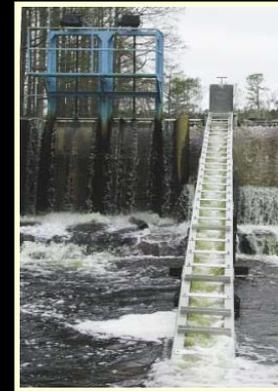
FISH
(stocking)



HABITAT
(fish passage,
dam removals)

RESTORATION EFFORTS

- PEOPLE: Reduce mortality, allow to reproduce
 - Stricter fishing regulations & closures (moratoriums)
- HABITAT: Increase hatching and young survival / growth
 - Dam removals
 - Passage structures at dams
 - Physically transfer upstream (trucks)
- FISH: Stocking of young
 - Marked them with chemicals (OTC) to see if returning
- Minimal success stories so far, but it is possible!
- Potomac River (shad), Roanoke River (striped bass)



RESEARCH

- Evaluate restoration efforts, learn, improve, prioritize
- Little River Study:
 - Tributary to Neuse River w/ 3 dam removals since 1998
 - Capture shad near river mouth with a fish weir



RESEARCH

- Receive a PIT tag – identification number
- Monitor migrations at PIT antennas
- Located at former dam sites and other upstream locations



- Shad are utilizing restored upstream habitat, improving #'s

YOUR SHAD EGGS

1. Collect adults by electrofishing or netting



2. "Strip" eggs and milt



3. Maintained at hatchery



4. Brought to your classroom





•jkraabe@ncsu.edu