Anadromous Fisheries Management in North Carolina

Connection to Shad in the Classroom















Anadromous Species

Iteroparous (spawning multiple years) populations in order of appearance according to water temperature:

- Blueback and alewife
- Hickory shad
- American shad
- Striped bass
- Atlantic sturgeon





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Management challenges.....

- Multiple management entities
 - NCWRC
 - NCDMF
 - ASMFC
- **Angler Preferences**
- **Recreational and commercial interests**
- **Conservation of the resource is paramount**





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Population Declines

Often a result of:

- Poor water quality
- Insufficient flows
- Lost or degraded spawning and nursery habitats
- Recreational or commercial overharvest
- Industrial impingement and entrainment
- Combination of these factors



Sport Fish Restoration Program











Electrofishing Sampling

To determine:

- Size Distribution
- Condition
- Sex ratios
- Abundance
- Catch at age
- Stock health









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Restoration Efforts

- Regulate harvest
- Habitat protection and spawning flow regimes
- Stocking of fry, juveniles, or advanced fingerlings





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American shad restoration program

Roanoke River (1998) and Neuse River (2012)







Hatcheries are a critical component of the program



Roanoke River American Shad Neuse River American Shad





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Circular shad spawning tank containing 40 males and 40 females.

Eggs are siphoned off the bottom of the tank and placed in aquaria. The fry swim out of the aquaria into smaller circular tanks, and are stocked a few days after hatching.

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Evaluation of Stocking Contribution

- All fish stocked must be marked
- Contribution of hatchery fish to the wild population must be estimated
- Success Criteria is based on numbers of returning adults to the spawning grounds





Use of Genetic Markers to Evaluate Stocking Contribution

ADVANTAGE: GENETICS

- Fin Clips (size of a fingernail)
- Genetic code retained
- 'Marks' read 20 years later
- Fish released
- High cost per sample (\$30-40)
- Origin certainty: We can track returning adults conclusively to their original parents in the hatchery.









Parentage Analysis - approach

- Genetic integrity is the highest priority
- Endemic broodstock source
- Each batch of broodstock provides unique cohort mark
- Fry stocked back into natal river
- Chain of custody vital to success!







Genetics in a nutshell: take fin clips from all broodfish, and send to a genetics lab for analysis of their microsatellite markers for establishment of "parentage". This becomes the "mark". The fry any returning adults will match their parents conclusively from these stockings. Fin clips are being collected from fish on the spawning grounds, and their genetic "mark" compared with broodfish to measure hatchery contribution.







WRC's entire anadromous stocking program will utilize parentage analysis in 2013

Neuse River – American Shad and Striped Bass Roanoke River – American Shad Tar River – Striped Bass Cape Fear River – Striped Bass Chowan River – Blueback Herring







The Commission stocked approximately 1,184,303 fry in the Neuse River in 2013. We hope to stock similar numbers in 2014.

You are part of the program! Shad in the Classroom program become a legitimate part of the Commission's American sh restoration efforts on the Neuse River





- Neuse Fry used as part of the Shad in the Classroom program can be stocked anywhere in the Neuse basin in 2014.
- 20,000 eggs are available
 to be stocked in the Neuse
 River.
- 15,000 eggs are available for stockings only at the Weldon boat ramp on the Roanoke River.





