

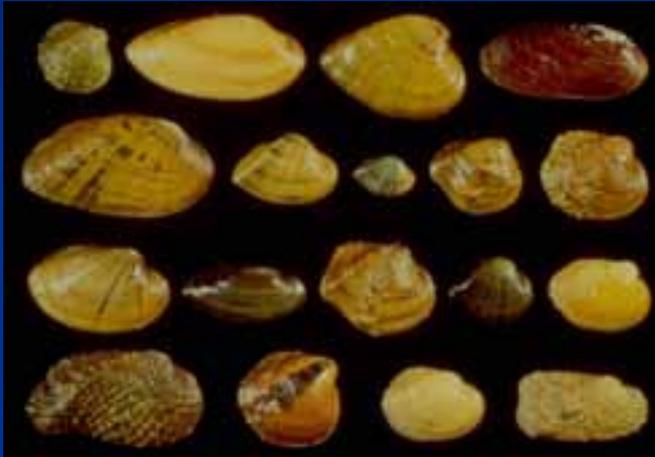
Imperiled Fish and Mussel Management in the Little Tennessee River of Western North Carolina

Applying the Elements of Strategic Habitat Conservation

Asheville NC ES Field Office



High Aquatic Biodiversity

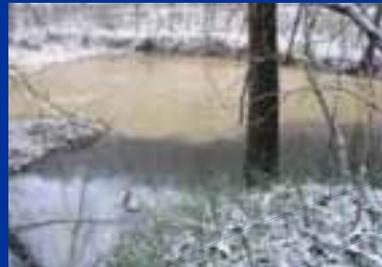


- Aquatic faunas of the eastern US are among the most diverse in the Temperate World

- ~675 fishes
- ~300 mussels
- ~400 snails
- ~365 crayfishes

Threats to Aquatic Ecosystems

- Impoundments
- Contaminants
- Mining
- Sedimentation
- Non-native species
- Poorly buffered landuse
 - Agriculture
 - Development



The Result? Imperiled Faunas

- High Diversity + Threats = High Level of Imperilment
- 30% of fishes are imperiled
- 76% of mussels are imperiled
 - 10% are already extinct
- Population fragmentation from habitat loss is primary cause
- 35% of listed species in R4 are aquatics
 - 20% are mussels (~66 spp.)
 - 10% are fishes (~32 spp.)



And It's Getting Worse...



- Both the total number of imperiled species and level of imperilment per species continue to climb
- We continue to lose species to chronic and episodic events
- Mussel die-offs are thwarting conservation efforts
 - Clinch R.
 - North Fork Holston R.
 - Ohio R.
 - Little Tennessee R.

A Current Conservation Crisis

Regardless of impacts from climate change, a concerted effort is required now to stem further losses of aquatic species

Little Tennessee River

- Five elements of SHC
 - What's been done
 - What needs doing
- Most all of these activities and actions apply elsewhere



Little Tennessee River Basin



Overview of the Faunas

■ Fishes (~55 spp.)

- Spotfin chub T
- Sicklefin redhorse C
- Olive darter
- Wounded darter



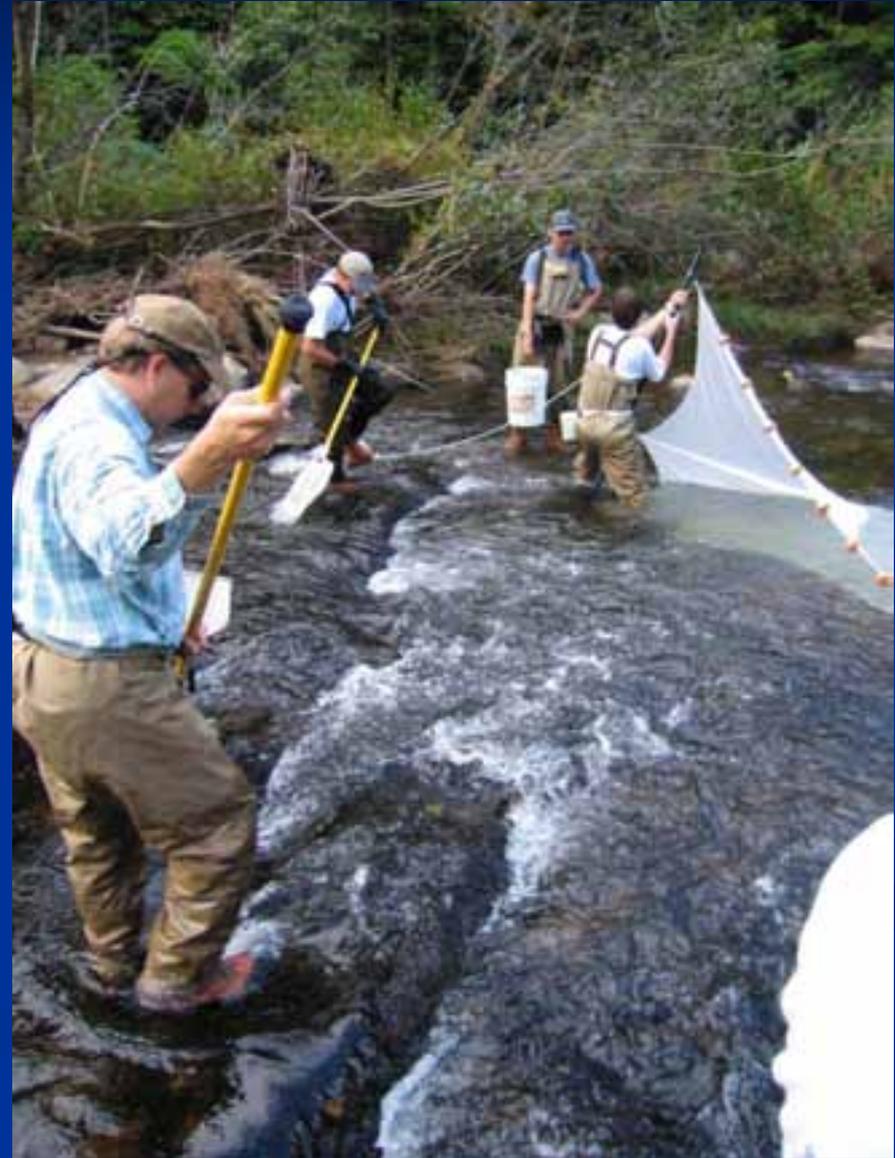
■ Mussels (8 spp.)

- Appalachian elktoe E
- Littlewing
pearlymussel E
- Slippershell
- Tennessee pigtoe



Biological Planning

- ~25 yrs fish data
- ~20 yrs mussel data
- Critical habitat
 - spotfin Chub
 - Appalachian elktoe



Biological Planning

Current Needs:

- Identify factors limiting populations
- Map quality habitat for imperiled species
- Develop models for habitat and water quality



Conservation Design

Decision support tools

- USFWS Recovery Plans for listed fish and mussels
- Cumberlandian Region population restoration plan for mollusks
- NC Wildlife Action Plan
- Identification of constituent elements for CH



Conservation Design



Current Needs

- Identify high priority stream reaches
- Watershed land-use data
- Conduct stress analysis
- Identify reaches in need of protection or restoration
- Link imperiled species sites with threats to address management options

Conservation Delivery

- Strong local partnerships – Little Tennessee Watershed Association, Land Trust for the Little Tennessee, RC & D, Eastern Band of Cherokee Indians – plus State and Federal
 - Watershed partnership development
 - Habitat restoration, land purchase, conservation easements, BMPs
 - Public outreach/environmental education
 - Fish passage restoration
- NC Wildlife Resources Commission culture facility for fishes and mussels established



Conservation Delivery

Current Needs

More focused efforts:

- Conservation ownership (easements or fee title)
- BMPs and outreach
- Barrier removals
- Expansion of NCWRC culture facility
- Restore populations



Assumption-Driven Research



- Aspects of life history
 - Fishes much better known thanks to Conservation Fisheries, Inc.
 - Fish hosts for imperiled mussels
- Captive propagation technology
 - Advanced for fishes, infancy for mussels

Assumption-Driven Research

Current Needs

- Scale-up culture and life history studies, particularly for mussels
- Increased Fisheries involvement
- Find cause of catastrophic Appalachian elktoe die-off
- Determine specific effects of contaminants (e.g., ammonia, sedimentation) and Asian clam on imperiled species



Assumption-Driven Research

Current Needs (cont.)

- Taxonomic studies to elucidate biodiversity
- Demographic studies for imperiled species (e.g., population targets, EPS)
- Stocking size needed to sustain populations
- Create GIS for baseline watershed conditions



Outcome-Based Monitoring



- Basic monitoring data collected 20-25 yrs
 - Water quality, major faunal groups
 - LTWA, TVA, NCWRC
- Quantitative data initiated
 - Spotfin Chub transects: yr 3 of 10 completed
 - Mussel quadrats: 2nd of 5-yr intervals completed

Outcome-Based Monitoring

Current Needs

- Reassess environmental conditions at priority sites
- Establish database to monitor priority species, sites, and introduced populations
- Develop GIS-based model to assess population sizes and habitat quality over various climatic conditions
- Perpetuate reference site monitoring of all imperiled fishes and mussels



Thank You

- FWS—Mark Cantrell, Stephanie Chance, Brian Evans, John Fridell, Brent Harrel, Roberta Hylton, Mary Jennings, Jess Jones, Leroy Koch, Gary Peeples, Carolyn Wells
- NCWRC—Steve Fraley, T.R. Russ
- CFI—Pat Rakes, J.R. Shute
- LTWA—Bill McLarney, Jenny Sanders
- TVA—Charlie Saylor, Jeff Simmons
- National Geographic—Joel Sartore
- AL Aquatic Biodiversity Ctr—Paul Johnson
- Marshall University—Tom Jones

