Summary of fisheries assistance project: Shoal Creek mussel project, Talladega National Forest, Alabama, 2003

United States Department of Agriculture Forest Service
Southern Research Station
Center for Aquatic Technology Transfer

1650 Ramble Rd.
Blacksburg, VA 24060-6349

Summary of fisheries assistance project: Shoal Creek mussel project, Talladega National Forest, Alabama, 2003

United States Department of Agriculture Forest Service
Southern Research Station
Center for Aquatic Technology Transfer

1650 Ramble Rd.
Blacksburg, VA 24060-6349

Craig N. Roghair, Fisheries Biologist
Daniel R. Nuckols, Fisheries Biologist

C. Andrew Dolloff, Project Leader
Coldwater Fisheries Unit
Southern Research Station

This report was prepared by:
Craig N. Roghair

January 2004

Background

In August 2003, Mel Warren, Southern Research Station research fisheries biologist contacted the USFS Southern Research Station Center for Aquatic Technology Transfer (CATT) to request assistance with a mussel survey on Shoal Creek, Talladega National Forest, Alabama. Shoal Creek has been the site of a multi-year survey by the Oxford, MS lab of the Southern Research Station and has served as a testing ground for the mussel survey techniques described below. The purpose of the present survey was to further test the methodology and to provide data to describe habitat conditions and mussel distribution and density within a 6 km reach of Shoal Creek (Figure 1). The results of the survey can be compared with past and future surveys and will ultimately provide the basis for a mussel inventory protocol.

Methods

Shoal Creek was surveyed for both stream habitat and mussels. The survey team consisted of a two-person habitat survey crew and a multiple person mussel survey crew. The habitat survey crew proceeded up the stream ahead of the mussel crew and marked habitat units (every 5th non-pool, every 10th pool) for the mussel crews to survey. Non-pools included glides, riffles, and runs.

Habitat Survey

A modified version of the two-stage basin-wide visual estimation technique (BVET) (Hankin and Reeves 1988, Dolloff et al. 1993) was used to inventory stream habitat. During the first stage, one crew member identified each habitat unit by type, measured length, and estimated width, average and maximum depth, dominant and subdominant substrates, and percent fines for each habitat unit. Habitat unit types included pools, glides, riffles, and runs (Table 1). The length (0.1 m) of each habitat unit was measured with a hip chain and wetted width was visually estimated. Average depth of each habitat unit was estimated by taking depth measurements at various places across the channel profile with a graduated staff marked in 5 cm increments. Dominant substrate was the substrate size class that covered the greatest amount of surface area in the habitat unit, subdominant substrate covered the 2nd greatest amount. Substrates were assigned to 1 of 9 size classes based on intermediate axis length (Table 2). Percent fines was the total percent of the substrate consisting of sand, silt, or clay. The second crew member recorded data on a Husky fex21 data logger. LWD was divided into four size classes

The first unit of each habitat type selected for intensive (second stage) sampling (i.e. accurate measurement of surface area) was determined randomly. Additional units were selected systematically (every 5th non-pool and every 10th pool). The width of each systematically selected habitat unit was measured with a 30-m measuring tape at intervals ranging from about 1 m to 15 m. Interval size was determined by the length and the morphology of the unit (i.e. interval of measured width increased with

increasing unit length). In addition, the survey crew hung flags at the upstream and downstream ends of each second stage habitat unit to mark the location of units to be surveyed by the mussel crew.

Mussel Survey

At designated (flagged) habitat units the mussel crew established survey transects. The number of transects to be sampled was based on the length of the unit as follows: For all units 30 meters or less in length, 2 transects were sampled. For units longer than 30 m, one additional transect was added for each additional 20 m of stream length (Table 3). The location of each transect within a habitat unit was determined by drawing a random number between 0 and the length of the unit in meters. The random number specified the distance from the downstream end of the unit to the location of the transect.

Transects were sampled by placing a 0.25 m^2 quadrat next to the shore at the flag, searching the quadrat thoroughly, then flipping the quadrat end-over-end, perpendicular to the thalweg. Every quadrat (one flip) was searched in non-pools, whereas every 2nd quadrat (two flips) was searched in pools. This was continued until the opposite shore was reached. The total number of quadrats searched and the total number of mussels captured per species was recorded separately for each transect. Quadrats that ended up on dry land (gravel bars, etc.) were not searched but were included in the count of total quadrats searched.

Quadrats were first searched by careful visual inspection of the substrate. Next flat rocks, sticks, etc. were removed and leaves and surface sediments were swept away by fanning with hands, and the quadrat was inspected again. The substrate was then disturbed with hands to a depth of about 5 cm, and when the water cleared the transect was inspected again. A combination of mask and snorkel and plexiglas-bottomed view buckets were used to search quadrats.

Results

Habitat Survey

Habitat surveys were completed September 30 – October 2, 2003 on over 6 km of stream, starting near the end of Forest Road 546 and ending 225 m upstream of the confluence with the Coleman Lake outlet.

Mussel Survey

Mussel surveys were completed September 30 – October 2, 2003 on 6 km of stream totaling 22 non-pools and 9 pools. No mussels were found upstream of the confluence of the Coleman Lake outlet and the mainstem of Shoal Creek.

Discussion

The ultimate success of the survey will be determined by the quality of results obtained from data analyses performed by Wendell Haag and Mel Warren at the Oxford, MS lab. We won't know the status of the mussel populations until the analyses are completed, however we did find several size classes of mussels and the number of live mussels and relic shells found was relatively high (Wendell Haag, personal observation).

The methods used for this survey are an improvement over past survey techniques in that they provide a quantitative and statistically valid estimate of mussel population density using a repeatable method. Important observations during surveys included the upstream extent of mussel distribution in the mainstem and input of warm water into mainstream from Coleman Lake outlet. The outlet had orange precipitate coating its substrate and was 7 C warmer (14 C vs 21 C) than the mainstem at their confluence. These results highlight the ability of BVET type surveys to provide useful habitat and mussel information to both researchers and fisheries managers.

Literature Cited

Dolloff, C. A., D. G. Hankin, and G. H. Reeves. 1993. Basinwide estimation of habitat and fish populations in streams. U.S. Forest Service General Technical Report SE-83.

Hankin, D. G., and G. H. Reeves. 1988. Estimating total fish abundance and total habitat area in small streams based on visual estimation methods. Canadian Journal of Fisheries and Aquatic Sciences 45:834-844.

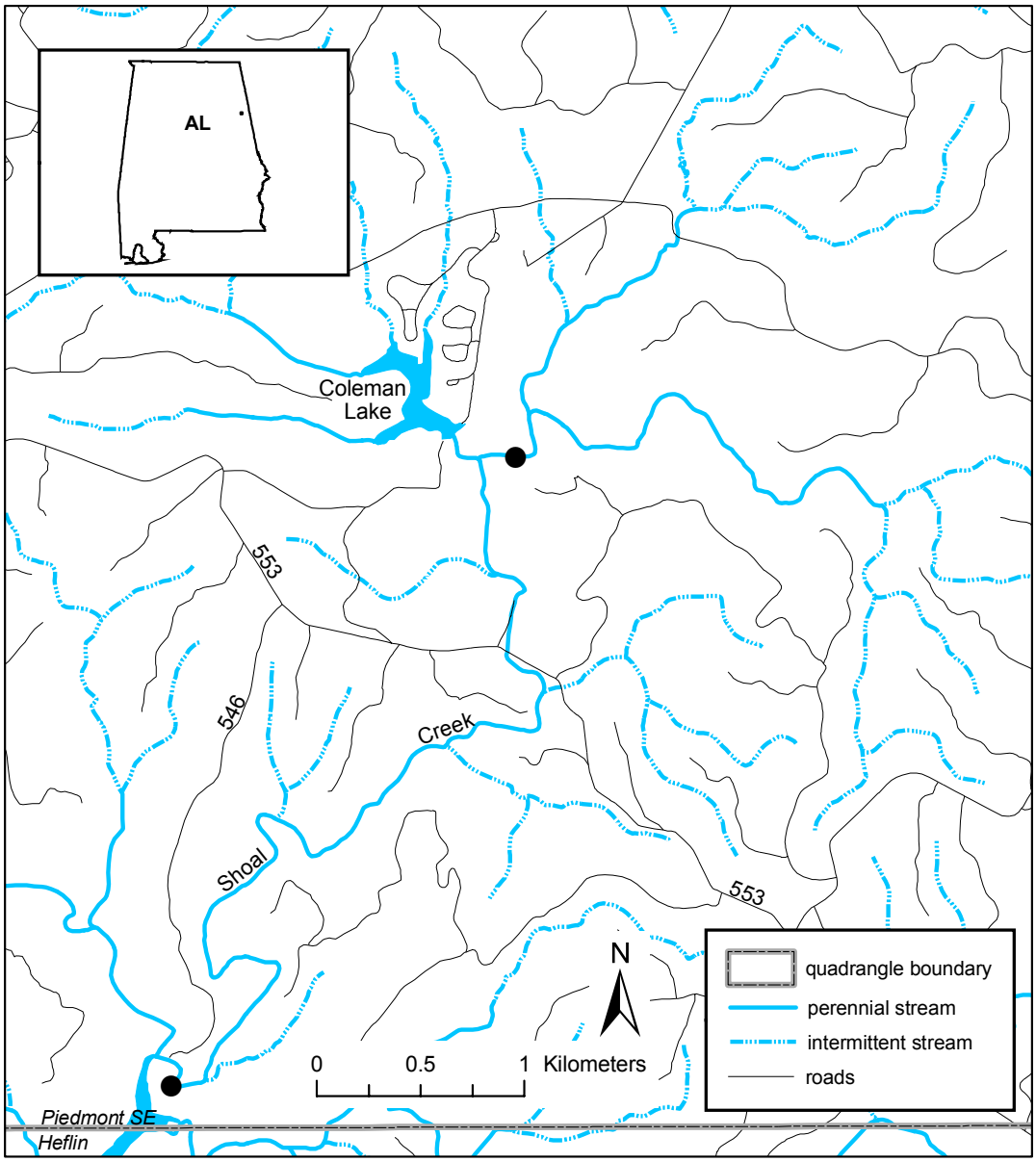

Figure 1. Shoal Creek mussel survey area, September 29 – October 3, 2003. Closed circles represent the downstream and upstream extents of the survey.

Table 1. Habitat unit types used during habitat surveys on Shoal Creek, September-October 2003. Riffles, runs, and glides were 'non-pool' habitat unit types.

Habitat Type	Stream Bed Profile	Gradient (%)	Surface Turbulence	Water Velocity
Riffle	convex	>1	moderate to high	high
Run	flat	>1	low to none	high
Glide	flat	<1	none	low
Pool	concave	<1	none	low

Table 2. Substrate size classes used during habitat surveys on Shoal Creek, September-October 2003.

Size Class	Name	Size (mm)	Description
1	Organic	--	Dead organic matter, leaves, detritus, etc.
2	Clay	< 0.00024	Sticky
3	Silt	0.00024-0.0039	Slippery
4	Sand	0.0039-2	Gritty
5	Small Gravel	3-16	Sand to thumbnail
6	Large Gravel	17-64	Thumbnail to fist
7	Cobble	65-256	Fist to head
8	Boulder	>256	Larger than head
9	Bedrock	--	Solid parent material

Table 3. Number of transects per habitat unit used during mussel surveys on Shoal Creek, September-October 2003.

Length of habitat unit (m)	Number of transects
0-30	2
31-50	3
51-70	4
71-90	5