Summary of fisheries assistance project on the Ouachita National Forest, Arkansas, July 2005

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September 2005

Background

In 2005, resource managers from the Ouachita National Forest contacted the U.S. Forest Service, Southern Research Station, Center for Aquatic Technology Transfer (CATT) to request assistance with stream monitoring surveys. The CATT provided a three-person crew to assist with surveys on long-term monitoring sites on the Mena/Oden and Caddo/Womble Ranger Districts. Data we collected and compiled to facilitate comparisons with data from previous samples to examine changes in stream habitat, biota, or water chemistry over time.

Site descriptions

While established reach length varied depending on width of stream all sites contained at least two pool and two riffle units. All reaches surveyed during our visit were previously visited long-term monitoring sites. Low water levels at some sites prevented us from performing electrofishing, macroinvertebrate sampling, and habitat measurements in some riffles (Table 2).

Methods

The surveys were performed July 11-20, 2005 using methods previously established by the Ouachita National Forest (Hlass 1999). We sampled a total of 19 sites in 17 streams on the two Districts.

Macroinvertebrates

We sampled macroinvertebrates using the Issac Walton League Save our Streams (SOS) protocol and datasheet (Firehock 1994). We sampled macroinvertebrates using a triangular frame dipnet on the Caddo/Womble Districts and a D-frame dipnet on the Mena/Oden District. At each site we collected three combined kick samples in riffle areas, if present, within the long term monitoring sites for a total of five minutes. We field-picked and sorted the samples and recorded organisms to Order. Some sites had no water in riffle areas in which case we sampled for five minutes in any wetted area available. The samples were not preserved.

Physical habitat

Physical habitat was inventoried using modified methods of the Basin Area Stream Survey (BASS)(Clingenpeel 1992). Each reach selected for monitoring was divided into habitat unit types with measurements of channel length, width, depth, substrate composition, bank angle, bank stability, and instream and riparian cover characteristics recorded for each habitat unit.

Water chemistry

We measured and recorded water temperature, conductivity, alkalinity and pH at each site. Some or all of these variables were collected with a Hach kit, paper strips, or an electronic measuring device depending on District and availability of equipment. Some Districts did not have equipment needed to take all measurements.

Fish

We collected fish at each site by making a single pass through each monitoring reach with a Smith Root battery powered DC backpack electrofishing unit. On the Mena/Oden Districts the unit was set to J5, and we used between 600-900V depending on fish response. The Womble/Caddo Districts provided a older model and they were set to a frequency of 60Hz between 700-900V. All shockers had two circular probes, one which was outfitted with a net. The shocking crew on the Mena/ Oden Districts consisted of one shocker, two netters, and one bucket person at all sites. On the Caddo/ Womble Districts we primarily had one shocker and two netters. We did not blocknet the upstream or downstream ends of the monitoring reaches. We identified fish to species and counted the total number of all fish before releasing them back into the monitoring reach. At several sites on the Mena/Oden Districts, fish were collected and preserved for later identification. Preserved specimens were given to Rhonda Huston for identification.

The fish data will be used to calculate an Index of Biotic Integrity (IBI) score. An IBI for the Lower Ouachita Mountains Ecoregion was developed by Lisa Hlass (1998) and includes the following measures or metrics: total number of fish species, number of Cyprinidae (minnow) species, number of sensitive species, proportion of green sunfish, generalist:specialist feeder ratio, proportion of top carnivores, number of fish in sample, and proportion of fish with external disease or anomalies. The higher the IBI score, the less disturbed the site.

In addition, we assisted with a day long snorkeling survey for the Ouachita darter (*Percina* spp) an un-described species during a 3-4 mile canoe float between Shirley Creek and AR Hwy 379 on the Ouachita River. There is limited knowledge about the Ouachita darter, including distribution and habitat use within the Ouachita River. Five persons participated in sampling. Length of time spent snorkeling and number and type of species encountered were recorded for each person. We visited sample areas established during previous trips and we focused effort on areas of riffles and runs including areas immediately upstream and downstream (i.e. the head and tail of runs and riffles). The purpose of the sampling was to locate and document the presence of Ouachita darters and to describe their habitat. During the snorkeling survey we sampled 8 sites, finding a total of 13 Ouachita darters.

Recommendations

1. The Save our Streams (SOS) monitoring program was developed to allow volunteers to contribute information on the ecological condition of streams in addition to the information collected by professional biologists. Recognizing that the resources of professional biologists are limited, the US EPA (1999) states that such data may be used in 303(d) designation for listing of impaired and threatened waterways. Quality assurance/quality control measures must be in place to assure that data are suitable for making regulatory and management decisions. Such measures include annual review of macroinvertebrate identification, providing macroinvertebrate field guides, annual review of field protocols (e.g. only collecting samples from riffle/run areas), and validation of qualitative SOS methods by standard quantitative methods. The SOS and other volunteer methods have often been found to overrate ecological condition (DeWalt 1999, Dilley 1991, Engel 2000), thus it is essential that the Forest validate its SOS results against standard quantitative methods. Engel and Voshell (2002) provide detailed information on program validation. They reviewed the Virginia SOS program and found that with slight modification in procedures the SOS program could provide results consistent with professional biologists using standard quantitative methods. Their primary modification was to keep individual counts of <u>all</u> macroinvertebrates captured in the <u>entire</u> sample to provide relative abundance data for metric calculations. Field picking biases results towards the largest and most active individuals in the sample. Until the Forest validates their SOS program they should archive the entire sample collected at each site, not just the bugs included in the SOS counts. Samples can easily be stored for long periods of time with minimal maintenance.

2. In its original form the BASS habitat inventory was designed to provide estimates with a high degree of precision. The scaled-down version of BASS used here still provides precise estimates, but only over small areas. While this approach can provide good information for monitoring projects focused in small areas (e.g. culvert installation), for more general Forest-wide monitoring we recommend surveys performed at the original basin-wide scale.

3. We collected and identified 32 species of fish from 11 families (Table 3). Some additions or omissions may be necessary after voucher specimens are positively identified. We were able to identify the majority of fishes encountered; fishes that we failed to identify were preserved for later identification. Fish identification training during the first few days remains a critical cornerstone and should not be overlooked.

4. Water chemistry test strips are inexpensive and simple to use, however they can be difficult to read which adds an uncontrolled variability into water chemistry results. We recommend using Hach kits, or better yet digital meters, which when properly calibrated generally provide more reliable readings.

Acknowledgements

The Oden/Mena District provided field equipment and Rhonda Huston who lent great help. Rich Standage led the Ouachita darter snorkeling survey. The Caddo/Womble District provided field equipment, Laura Edwards and Jason Amos also helped out on the Womble during a day of sampling.

Table 1. Site locations and access points for streams sampled on Ouachita National Forest, Arkansas, summer 2005.

District / Site	Date	Access
Mena/Oden		
Brushy Creek	7/13	end of FS Rd. 7162
Cossatot River	7/11	FS N47A
Irons Fork	7/16	north of 27, county 15 to FS 17 and FS 491
Johnson Creek	7/14	north of state 270 off of county 49
Mill Creek	7/15	FS Rd. 930
Muddy Creek	7/16	off of county 149, west of state 27
Ouachita River	7/14	north of state 270 off of FS 750
Rainy Creek	7/15	down small trail Northeast of bridge on Route 88
Two-mile Creek	7/14	FS Rd. 173 and 176 above ford
West Gafford Creek	7/16	Yell County, south of Bogus Ridge off of FS 776
Caddo/Womble		
Braylock Creek upper	7/18	Athens Big Fork trailhead on FS Rd. 106
Braylock Creek lower	7/18	Winding Stairs trailhead on FS Rd. 106
Caney Creek	7/20	east from Womble RD on US 270, to 47 to 47A, stream on left
Lick Creek	7/19	off of Lick Creek road (151) west of county 92
Long Creek upper	7/18	FS Rd. 512 at trail head and parking area
Long Creek lower	7/20	FS Rd. 512 upstream of forth ford from county 73
Shirley Creek	7/19	off of 518 past private drive to next ford crossing where water flows over road.
South Fork Ouachita River	7/19	across from Alexander Road intersection and county 92
Williams Creek	7/19	east of county 27 off of Harris Hock Lane, walked over ridge to stream

Table 2. Description of data collected at each site, and number of fish species captured in streams sampled on Ouachita National Forest, Arkansas, 2005. 'X' represents data collected.

	Methods				
District/ Site	Fish	Habitat	Macroinvertebrates	Water chemistry	# of fish species
Mena/Oden					
Brushy Creek	X	X	X	X	10
Cossatot River	X	X	X	X	9
Irons Fork	X	X	X[++]	X	12
Johnson Creek	X	X	X[++]	X	9
Mill Creek	X	X	X[++]	X	7
Muddy Creek	X	X	X[++]	X	10
Ouachita River	X	X	X[++]	X	7
Rainy Creek	X	X	X[++]	X	16
Two-mile Creek	X	X	X	X	6
West Gafford Creek	X	X	X	X	13
Caddo/Womble					
Braylock Creek lower	X	X	X	X*	11
Braylock Creek upper	X	X	X	X*	12
Caney Creek	X	X	X	X	8
Lick Creek	X	X	X	X	13
Long Creek lower	X	X	X	X*	11
Long Creek upper	X	X	X	X*	10
Shirley Creek	X	X	X	X	10
South Fork Ouachita River	X	X	X	X	18
Williams Creek	X	X	X	X	18

* conductivity was not measured

[++] riffle areas nearly no flow or dry, sampled macroinvertebrates in other wetted areas

Table 3. Fish identified from 19 electrofishing sites in Ouachita National Forest, Arkansas, summer 2005.

Family	Species	Common name
Aphredoderidae	*Aphredoderus sayanus*	Pirate perch
Atherinidae	*Labidesthes sicculus*	Brook silverside
Catostomidae	*Erimyzon oblongus*	Creek chubsucker
	Hypentelium nigricans	Northern hogsucker
	Moxostoma spp.	Golden redhorse*
Centrarchidae	*Lepomis cyanellus*	Green sunfish
	Lepomis megalotis	Longear sunfish
	Lepomis macrochirus	Bluegill
	Micropterus dolomieui	Smallmouth bass
	Micropterus punctulatus	Spotted bass
Cyprinidae	*Campostoma anomalum*	Central stoneroller
	Nocomis asper	Redspot chub
	Notropis boops	Bigeye shiner
	Notropis chrysocephalus	Striped shiner
	Notropis ortenburgeri	Kiamichi shiner
	Notropis snelsoni	Ouachita Mountain shiner
	Notropis umbratilis	Redfin shiner
	Pimephales notatus	Bluntnose minnow
	Semotilus atromaculatus	Creek chub
Esocidae	*Esox americanus*	Grass pickerel**
Fundulidae	*Fundulus catenatus*	Northern studfish
	Fundulus olivaceus	Blackspotted topminnow
Ictaluridae	*Ameiurus natalis*	Yellow bullhead
	Ameiurus nebulosus	Brown bullhead
	Noturus exilis	Slender madtom
	Noturus nocturnus	Freckled madtom
Percidae	*Etheostoma blennioides*	Greenside darter
	Etheostoma radiosum	Orangebelly darter
	Etheostoma whipplei	Redfin darter
	Percina caprodes	Logperch
Petromyzontidae	*Ichthyomyzon spp.*	Lamprey (ammocete)
Poeciliidae	*Gambusia affinis*	Mosquitofish

* identification not verified, all specimens < 45 mm
** not captured, visual identification

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