

SUMMARY REPORT ON THE 2013 LTLT AQUATIC BIOMONITORING SEASON

By Dr. Bill O. McLarney and Jason Meador

We have received questions regarding the biological effects of the constant high flows. The most obvious effect was scarcity of fish at many sites as smaller individuals or weak swimming species were washed downstream. This is not necessarily a bad thing, and in fact is a consequence of a good thing. Inconvenient as we may find them, occasional periods of sustained high flow are part of nature's "reset" mechanism. During drought years, in a watershed like ours with multiple land disturbances, short, periodic rainstorms result in accumulation of excess sediments in streams and sometimes a buildup of "weedy" fish species. Sustained high flows perform a flushing function, leaving a healthier river. Below are the highlights of what we found during the 2013 season.

By virtue of heroic volunteer effort and with help from the Tennessee Valley Authority's shocker boat crew, we were able to complete one sample on the Little Tennessee River mainstem, at Iotla Bridge. While all nine shiner species known from that site were at record lows, there were high numbers of most of the larger species, including the endemic sicklefin redhorse. The Index of Biotic Integrity¹ (IBI) score determined for this site was 56. Based on this score, the Bioclass Rating for the river downstream of Franklin remains between Good and Excellent.

Of the tributary sampling sites, one site (lower Tellico Creek) was rated Excellent, 13 rated Good, 10 rated Fair and 4 rated Poor. None of our 2013 sites rated Very Poor, though a few such streams exist in our watershed (Table 1). In terms of our long term objectives, no rating below Good is acceptable, so we have plenty of room for improvement.

Two of the streams that rated Poor were found to be suffering from human activity. Rocky Branch (IBI 36) was down from a previous rating as a direct result of massive sedimentation originating at a NC Department of Transportation culvert replacement on NC Highway 28. The second Poor rating, Cat Creek (IBI 36), is more complicated. Much of the length of that stream has been restored to something resembling its natural state in a collaborative project between the NC Department of Natural Resources and Equinox Environmental, an Asheville based environmental consulting firm. However, much of the effect of that work has been offset by agricultural activity on the lower end of Cat Creek where all vegetation has been removed from nearly a half mile of the stream, leaving both banks susceptible to massive erosion every time it rains. This is discouraging to say the least, and we cannot over emphasize the need for education about the necessity of having adequate stream bank vegetation for maintaining cool, clean water and creating valuable habitat for wildlife.

As for LTLT's own restoration work, the good news from an ongoing effort on Watauga Creek is that replacement of a failing culvert is having one of the desired effects of restoring the continuum – the assemblages of fishes above and below the culvert are now essentially the same. Restoration takes time, even when we help it along. This year we confirmed positive results from natural, or passive, restoration in three more streams.

First, ever since this program began, Cartoogechaye Creek has been characterized by a high degree of parasitization of fish in our samples, particularly with the trematode parasite known as "blackspot". In the last several years, we have perceived the degree of parasitization as dropping drastically. This year, because of our unplanned emphasis on Cartoogechaye Creek and its tributaries (seven samples in all) we can confirm that tendency. This seems to be a direct consequence of fewer cattle

¹ The Index of Biotic Integrity (IBI) is a 'scale' to calculate the health of the stream sampled. The scale range is from 12 to 60. Bioclass Ratings, from Very Poor (12 to 24) to Excellent (58 to 60), are assessed based on the numerical IBI value.

having unrestricted access to the creeks. This should be particularly interesting to Franklin residents as this is their water source.

Secondly, is Peeks Creek following the 2004 disaster. Except for early cleanup and hydroseeding along the Peek's Creek Road bank, no deliberate attempt has been made to restore this stream. But nature is at work; every year there is more and taller vegetation along the banks, and 2013 marks the first year that we have recorded the presence of all the native fish species which inhabited the creek prior to 2005 – including a rebounding rainbow trout population. Peeks Creek had an IBI score of 52 (Good).

The third and best restoration results story comes from Wayah Creek. Physically, Wayah Creek has always looked good, with abundant shade, clear water, and a lower sediment load than most valley streams of its size. Yet, since we first monitored Wayah Creek in 1990, several species have been absent, and there were occasional reports of fish kills. Bioclass ratings have been Fair, with IBI scores of 39-47. This was circumstantially related to the presence of a package waste water treatment plant at the Lyndon B. Johnson Job Corps facility. Once the LBJ center was connected to the Franklin sewer line in 1999 species began to come back. Warpaint shiner, Tennessee shiner, mirror shiner and rock bass became regular members of the lower Wayah Creek fauna at various points post-1999. But consistently missing was the gilt darter, one of our most beautiful fish, and notoriously sensitive to chemical toxins. Our hypothesis, which will never be proven, is that gilt darters were reacting to residues of chlorine compounds remaining in Wayah Creek sediments. Finally, in 2012 one gilt darter appeared in our sample, corresponding with an improvement in IBI to 52 (Good). And this year we detected a small population, including one large, very gravid female. It has taken more than a decade, but it appears that for the first time since we have known it, Wayah Creek has its full complement of native fishes and will likely retain its Good rating.

Other highlights of this year's sampling include the not so good news from Caler Fork but good news from Tessentee Creek. Between 2004 and 2005 Caler Fork was the victim of massive sedimentation resulting from a mega-development upstream. This led to the worst one year drop in biotic integrity we have measured – from 51 (Good) to 33 (Poor). Since then ecosystem health in Caler Fork has yo-yo'd up and down as each successive rain moved more and more sediment slowly downstream. It rated Good in 2012 but dropped back to Fair (IBI score 42) this year. This disappointment was countered by our pride in Tessentee Creek at the Ed Haight property. Our visit to this site coincided with the visit of a distinguished visitor, Mexican ichthyologist Rocio Rodiles (see The Franklin Press – July 26, 2013). Despite adverse conditions of water level and turbidity, Tessentee Creek scored Good (IBI score 52), a result largely attributable to the landowner's persistence in protecting and expanding the riparian vegetative buffer on his property (further protected by a conservation easement held by LTLT).

Our work is mostly about detecting and, hopefully, correcting problems of local origin, but there is another problem we cannot avoid – the gradual warming of our streams related to global climate trends. Adult smallmouth bass competing with trout in medium size creeks, "big river" species like whitetail shiners appearing for the first time in small tributaries, various species of darters in small streams where they are "not supposed to" occur, proliferation of the algae-feeding central stoneroller - we are seeing all of these trends at many places – this year notably in Brush, Lakey, Bradley, Matlock, Mill, and Jones Creeks. There is only so much we as individuals can do about global warming, but one thing we can do is to emulate what individuals like Ed Haight have done and preserve or restore riparian shade. Our research suggests that this is the single most important thing we can do to protect the health of our aquatic ecosystems.

Table 1. Results from the 28 sites sampled during the 2013 LTLT Aquatic Biomonitoring season.

Site	IBI Score	Bioclass	Change since last visit	Comments
Brush Creek at old Hampton farm (Needmore)	47	GOOD	Positive	-Increased riparian cover -Small positive changes in most indicators
Brush Creek at upper end of Needmore Game Lands	51	GOOD	Stable	-Strong population of smoky dace
Tellico Creek above Needmore Rd.	60	EXCELLENT	Stable	-Impressive recovery between upstream site -High diversity of darters
Tellico Creek across from Tellico Baptist Church	44	FAIR	Unstable	-Alarming absence of benthic fish
Lakey Creek at Morrison farm, below culvert barrier	41	FAIR	Stable	-Improvement expected with correction of culvert barrier
Lakey Creek at Morrison farm, above culvert barrier	41	FAIR	Stable	
Bradley Creek above mouth along NC 28	48	GOOD	Stable	-Limited by lack of pool habitat -Suggestion of reduced organic contamination
Caler Fork below Ruby Mine Rd.	42	FAIR	Unstable	-Still recovering from development in 2005 -Unstable, shifting substrate
Matlock Creek below Snow Hill Rd.	48	GOOD	Stable	-Species composition may reflect climate change
Rocky Branch above Nettie Hurst Rd.	36	POOR	Negative	-Heavily impacted by new crossing upstream on NC 28
Watauga Creek above Jim Berry Rd.	50	GOOD	Positive	-Culvert replacement has facilitated movement between sites
Watauga Creek at old Lyle Mill site	44	FAIR	Positive	
Little Tennessee River at Iotla Bridge	56	GOOD	Stable	-Excellent mix of large pool fish
Rabbit Creek above Rabbit Creek Rd.	36	POOR	Negative	-Consistently poor due to development history -Invasive yellowfin shiners hybridizing with native Tennessee shiners -Longnose dace have disappeared
Cat Creek above mouth at Rabbit Creek	36	POOR	Negative	-Recent channelization has completely destroyed riparian zone -Unusually high water temperature
Cat Creek restoration site along Ferguson Rd.	36	POOR	Positive	-Strong improvement in riparian zone -Full complement of native fish species
Peeks Creek along Peeks Creek Rd.	51	GOOD	Positive	-Recovery from 2005 disaster continues -All native species have returned -Healthy rainbow trout population
Cartoogechaye Creek at Macon County Rec Park	41	FAIR	Negative	-Excess of pollution tolerant fish -Build-up of sediment along shoreline

Table 1 continued.

Site	IBI Score	Bioclass	Change since last visit	Comments
Mill Creek above Old Murphy Rd.	39	FAIR	Positive	-Reduced sediment levels -Species composition may reflect climate change
Wayah Creek below Crawford Rd.	52	GOOD	Positive	-Reestablishment of gilt darter demonstrates reduction of toxic inputs -Full native fish species complement for first time
Poplar Cove Creek above Corpening Rd.	42	FAIR	Negative	-Danger of bank failure along pasture -Large but few brown trout -Strong population of endemic smoky dace
Allison Creek below Allison Creek Rd.	45	FAIR	Stable	-Excellent brown trout population -Abundance of stonerollers suggests organic input
Cartoogechaye Creek above Cartoogechaye Baptist Church	47	GOOD	Positive	-Clear reduction of livestock pollution -Well balanced fish assemblage -Would benefit from more shade
Jones Creek below N. Jones Creek Rd.	48	GOOD	Unstable	-Suggestion of increased organic pollution
Skeenah Creek at NC Welcome Center	33	POOR	Negative	-Suggestion of increased organic pollution
Tessentee Creek above Buckeye Branch	48	GOOD	(New site)	-Excellent riparian zone -Species list indicates absence of contamination
Middle Creek above W. Middle Creek Rd.	52	GOOD	Positive	-Suggests reduced organic contamination
Betty Creek above Barkers Creek	51	Good	Stable	-Sample and algal growth suggest organic pollution