Ecological and Morphological Significance of Old Growth Deadhead Logs in the Chipola River

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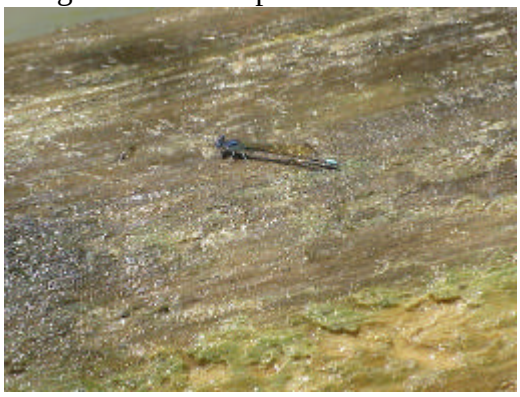
Introduction



Two submerged logs were sampled on April 22, 1999 to determine their habitat value. This monitoring was technical assistance for a Submerged Land and Environmental Resource Program permit application to remove these logs from state waters. The log sample sites were located in the Chipola River (Lat 30° 43′ 53.9″ Long 85° 11′ 57.7″) north of I-10 ~0.3 mile above the Bridge Creek confluence and ~0.5 mile below CR 280 (lat 30° 42′ 40.8″ long 85° 12′ 21.3″) in Jackson County. The Chipola River is designated by Florida Surface Water Quality Standards as "Class III: Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife". It is listed as a "Special Protection, Outstanding Florida Waters, Outstanding National Resource Water" under FAC 17-302.700 (FDEP 1996).

The pine log pictured above (30 feet long and 16 inches in diameter butt end) was located in the middle of the river at the site above I-10. It was winched from a depth of 8 feet and hauled to the bank. The log was then sampled with a dipnet pictured to the right. Caddisflies and midges (dominated by *Hydroptilia* and *Rheotanytarsus*) covered the log. The photograph below showed an adult damselfly *Argia* feeding on aquatic invertebrates which lived on the log. The algae in the foreground of the picture are the main food of *Hydroptilia's* diet. The second sample was a cypress log located 12.5 feet from an outside erosional bend at a depth of 3.3 feet below CR 280. This log measured 17 feet in length and 18 inches in diameter. Both logs had rough ends with no evidence of cutting activities remaining (pictured below). The permit applicant said logs in the Chipola River were not branded historically like in other panhandle rivers.







Results and Discussion

The sampling results from the cypress log indicated a highly productive and diverse aquatic macroinvertebrate community. This log sample from below CR 280 surpassed the thresholds established for a 4 sweep BioRecon of multiple productive habitats (FDEP 1996c). This log also had a more diverse and productive fauna than that found in a 20 sweep Stream Condition Index (FDEP 1996c) at a Chipola River reference site near Altha (ChipoRef). However, only one threshold was met for the pine log above I-10, as the diversity and cleanwater indicators were reduced in comparison to the cypress log. Physical disturbances caused by winching and towing dislodged motile species, which reduced the invertebrates collected. This pine log still had 2 of 3 biometric indicators surpassing the values of the Altha reference site. Also water quality in the area above Bridge Creek appeared to be affected by nutrients as blooms of duckweed, algae, and other vegetation were observed. The Marianna wastewater treatment plant ~ 2 miles upstream, is a source of nutrient discharge (FDEP 1995). Agricultural runoff and groundwater contamination with fertilizers and animal waste has been a historical problem in the area above Marianna (FDEP 1984,1995, 1996b). The biometric value comparisons of the cypress, pine, reference site and western panhandle thresholds are as follows:

Biometrics	Pine log	Cypress log	ChipoRef	Thresholds
Taxa Richness	**28**	43	30	$\geq$ 24
Florida Index	**19**	27	18	$\geq$ 22
EPT	**15**	21	10	$\geq$ 17

Algae, liverworts, and mosses that provide additional habitat were also observed on the logs.

Nutrients were reported to be a major concern of a basin study of the Chipola River conducted during 1984 (FDEP 1984). Habitats such as logs in the middle of the stream channel provide areas for periphyton, moss and liverwort to convert nutrients to plant growth. Wallace and Benke 1984 found wood enhances the ability of a stream to process and conserve nutrient and energy inputs and has a major influence on the hydrodynamic behavior of the river. Vegetation growth on logs provides additional food and habitat for the invertebrates that become potential prey for fish. Wallace and Benke 1984 reported that snag, or woody, habitat was a major stable substrate and a site of high invertebrate diversity and productivity. Gordon, McMahon, and Finlayson 1994 reported organic (woody) debris is the foodstuff of decomposers and some aquatic invertebrates. Additionally Wallace and Benke found wood is important to fishes, providing a rich source of invertebrate food, habitat, and cover. Benke et al (1979) reported several species of game fish forage almost exclusively on invertebrates associated with these woody substrates. The Chipola bass (*Micropterus coosae*), a threatened species was fairly common in the rapids of this area below Marianna (FFWFGC 1978) under consideration for log removal. This bass is a favored game species in the areas where it occurs, and is the only large game fish found in rapids of the lower Apalachicola drainage (FFWFGC 1978). Little wood habitat was observed during this low river stage investigation on the Chipola River from just above Spring Creek to a half-mile below CR 280. A Marianna wastewater treatment plant study (in progress) by the FDEP Bureau of Laboratories found only 1% woody debris at sites above and below the discharge pipe. Beschta and Platts (1986) reported that researchers have recognized that many streams are relatively "starved" of large organic material in regard to channel stability. Wood was found to be a major structural feature (43%) in a study of middle-order streams (fourth to seventh) of the southeastern Coastal Plain (Wallace and Benke 1984). Wallace and Benke stated the "quantification of wood habitat seems mandatory to assess past or potential impacts of snag removal on ecosystem processes in low-gradient streams". Gordon et. al reported that larger woody debris may





play an important part in channel stabilization and removal may have long term

effects on both a stream's ecology and morphology. A 6-year study (Megahan 1982) concluded that logs were the most important type of obstruction in stream channels because of their longevity and the large volume of sediments trapped behind them. Megahan's study found only large stable obstructions remained in the channel during a high-flow year and fifteen times more sediment was stored behind obstructions than was delivered to the drainage outlets. Larger old growth timbers such as the deadhead logs remain in the water as habitat during high flow periods. Gordon et. al stated "when organic debris no longer enters a stream the banks become unstable, streamside erosion accelerates and the channel topography can be smothered from the filling of pools and flattening of riffles. FDEP has observed limestone outcrop riffle habitat and pools in the upper Chipola River buried by sediment. Lisle (1983, p.46) stated that riparian trees and large woody debris should be treated as if they "belong to the aquatic ecosystem". Rosgen 1993 presented a guideline to assist fisheries biologist to evaluate the suitability of fish habitat structures for restoration of different morphological stream types.

Conclusions

A more diverse and productive wildlife community was found in these 2 samples of old growth logs than bioassessments of 100 meter reaches of river at the Chipola River reference site near the Altha boat ramp. These finding are similar to the results of sampling a deadhead log on the Choctawhatchee River the previous month (FDEP 1999). Removal of an unquantified amount of the few remaining logs would have a negative impact to the river's fish and wildlife community.

Threatened fish species such as the Chipola bass and the Atlantic sturgeon utilize these habitat for food and cover.

Nutrients were a major concern in the Chipola River (FDEP 1984). Old growth logs in this usually clear spring fed river provide excellent sites for plant growth. These plants aid nutrient removal and its conversion to fish productivity through the invertebrate community.

Bank instability accelerates when woody debris is removed from the stream channel. This adds the to habitat smothering from the 8.8 tons/acres of eroded soil reported from Jackson County (Cobb and Green 1985) in the Chipola River watershed.

Restoration of historic concentrations of woody debris at proper sites in the Chipola River would enhance fish and wildlife populations along with improving channel stability/stream morphology.

References

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STORET Station 31020049	**Location Chipola River 0.5 miles below CR 280**
Latitude: N30 ° 42 ' 40.8 " Longitude: W85 °12 ' 21.3 "	**Watershed / Basin Chipola River/ Apalachicola Bay**
Date/Time Collected 04/22/99 1300-1330	**Collected & ID'ed By Donald Ray and Laurence Donelan**
Taxa found in 4 sweeps: types of habitats sampled; Cypress log	20 hours picking & ID time.

** **R**are (1-3), **C**ommon (4-10), **A**bundant (11-100), **D**ominant (>100).

Taxa	Fl	Tally	Abun Code	Taxa	Fl	Tally	Abun Code	Taxa	Fl	Tally	Abun Code
Diptera				**Trombidiformes**				**Ephemeroptera**			
Ceratopogonidae				Acarina			**C**	Baetis sp. intercalaris			**R**
Culicidae				**Oligochaeta**			**C**	Baetisca sp.			
Empididae			**R**	Naiidae				Caenis sp.			
Other Chironomidae			**D**	Tubificidae				Callibaetis sp.			
Rheotanyarsus sp.	2		**D**	Hirudinea				Centroptilum sp.			
Simulium sp.	2		**R**	**Pelecypoda**				Heptagenia sp.			
Stenochironomus sp.	2		**R**	Corbicula sp.			**R**	Hexagenia sp.			
Stratiomyidae				Elliptio sp.				Isonychia sp.			**R**
Tipulidae				Pisidiidae				Leptophlebia sp.			
								Neoephemera sp.			
								Stenacron sp.interpunctatum	1		**A**
Gastropoda				**Megaloptera**				Stenonema sp. exiggum	2		**A**
Ancylidae				Corydalus cornutus	2		**part**	Tricorythodes sp.	1		**R**
Elimia sp.	2		**A**	Sialis sp.				Baetis sp.			**R**
Physella sp.				Nigronia sp.				Baetis bimaculatus			**R**
Planorbella sp.				**Hemiptera**				Ephemerellidae			**R**
Hydrobiidae				Belostoma sp.				Baetis puntiventris			**R**
Viviparus			**R**	Corixidae							
Eliminia sp. 2			**R**	Hydrometra sp.				**Plecoptera**	2		**R**
				Pelocoris sp.				Acroneuria sp.	2		
				Pleidae				Amphinemura sp.	2		
				Ranatra sp.				Hydroperla sp.	2		
Odonata				Veliidae				Isoperla sp.	2		
Argia sp.	2		**R**					Leuctra sp.	2		
Boyeria sp.	2							Neoperla sp.	2		**R**
Calopteryx sp.	2			**Other (name groups)**				Paragnetina sp.	2		
Enallagma sp.				**Porifora**			**R**	Perlesta sp.	2		
Gomphus sp.	1			**Leptodoptera**				Perlinella sp.	2		
Hetaerina sp.	2			Petrophila sp.			**R**	Pteronarcys sp.	2		
Ischurna sp.								Taeniopteryx sp.	2		
Libellulidae								Talloperla sp.	2		
Macromia sp.	2			Nematoda			-				
Neurocordulia sp.	1		**R**						2		
Progomphus sp.	2								2		
									2		
								Trichoptera			
								Micresema sp.			**R**
Coleoptera								Psychomia flavida			**C**
Ancyronyx variagatus				**Decapoda**				Cheumatopysche sp.	1		**D**
Curculionidae				Palaemonetes sp.	1			Chimarra sp.	2		
Dineutes				Procambarus sp.				Diplectrona sp. Oecetis sp.			
Dubiraphia sp.			**R**					Hydroptila sp.	2		**D**
Dytiscidae			**R**					Hydropsyche sp.	2		
Gyretes sp.				**Amphipoda**				Lype diversa			**C**
Microcylloepus sp.				Gammarus sp.	1			Macrostemum sp.	2		
Stenelmis sp.			**R**	Hyalella azteca			**C**	Nectopysche sp.	1		**C**
Ectopria nervosa			**R**	Crangonyx sp.				Oecetis sp.	1		**R**
Macronychus glaberatus			**A**					Oxyethira sp.	2		**R**
				Isopoda				Polycentropus sp.	2		
				Caecidotea (Asellus)	1		**A**	Triaenodes sp.			**R**
								Mayatrichia sp.			**R**
								Paranyctiophlax sp.			**R**
Column Total: FI/Taxa	**13**	**15**		**Column Total: FI/Taxa**	**1**	**7**		**Column Total: FI/Taxa**	**13**	**21**	
				Thresholds for impairment rating:				If 3metrics are > target values, site is			

BIOMETRICS	Value	Panhandle		Peninsula	NE	Healthy ☒
		West	East			If 2metrics are within target values, site is
Site Total Taxa Richness	**43**	≥24	≥24	≥18	≥17	**Suspect** ☐
Site Total Florida Index	**27**	≥22	≥19	≥10	≥6	If less than 2 metrics are within target values, site is
Site Total EPT	**21**	≥17	≥9	≥4	≥3	**Impaired** ☐

State of Florida Dept. of Environmental Protection

BioRecon Assessment (5-21-98)

STORET Station 31020048	**Location Chipola River 0.3 miles above Bridge Creek**
Latitude: N30 ° 43 ’53.9” Longitude: W 85 ° 11 ’57.7”	**Watershed / Basin Chipola River / Apalachicola Bay**
Date/Time Collected 04/22/99 1100 - 1130	**Collected & ID’ed By Donald Ray Laurence Donelan**

Taxa found in 4 sweeps: | Pine log was type of habitats sampled; | 21 hours picking & ID time.

** **R**are (1-3), **C**ommon (4-10), **A**bundant (11-100), **D**ominant (>100).

Taxa	Fl	Tally	Abun Code	Taxa	Fl	Tally	Abun Code	Taxa	Fl	Tally	Abun Code
Diptera				**Trombidiformes**				**Ephemeroptera**			
Ceratopogonidae				Acarina			**C**	Baetis sp.			**R**
Culicidae				**Oligochaeta**			**A**	Baetisca sp.			
Empididae			**R**	Naiidae				Caenis sp.			**A**
Other Chironomidae			**D**	Tubificidae				Callibaetis sp.			
Rheotanytarsus sp.	2		**D**	Hirudinea				Centroptilum sp.			
Simulium sp.	2		**R**	**Pelecypoda**				Heptagenia sp.			
Stenochironomus sp.	2		**D**	Corbicula sp.			**A**	Hexagenia sp.			
Stratiomyidae				Elliptio sp.				Isonychia sp.			
Tipulidae				Pisidiidae				Leptophlebia sp.			
								Neoephemera sp.			
								Stenacron sp.	1		**R**
Gastropoda				**Megaloptera**				Stenonema sp. exiguum	2		**A**
Ancylidae				Corydalus cornutus	2			Tricorythodes sp.	1		**A**
Elimia sp.			**R**	Sialis sp.				Cercobrachys etowah			**C**
Physella sp.											
Planorbella sp.				**Hemiptera**							
Hydrobiidae				Belostoma sp.							
Viviparus			**R**	Corixidae							
				Hydrometra sp.				**Plecoptera**	2		
				Pelocoris sp.				Acroneuria sp.	2		
				Pleidae				Amphinemura sp.	2		
				Ranatra sp.				Hydroperla sp.	2		
Odonata								Isoperla sp.	2		
Argia sp.	2							Leuctra sp.	2		
Boyeria sp.	2							Neoperla sp.	2		
Calopteryx sp.	2			**Other (name groups)**				Paragnetina sp.	2		
Enallagma sp.								Perlesta sp.	2		
Gomphus sp.	1							Perlinella sp.	2		
Hetaerina sp.	2							Pteronarcys sp.	2		**R**
Ischnura sp.								Taeniopteryx sp.	2		
Libellulidae								Tallaperla sp.	2		
Macromia sp.	2										
Neurocordulia	1								2		
Progomphus sp.	2								2		
									2		
								Trichoptera			
								Hydroptiliidae sp.			**R**
Coleoptera								Brachycentrus sp.	2		
Ancyronyx variagatus				**Decapoda**				Cheumatopysche sp.	1		**A**
Curculionidae				Palaemonetes sp.	1			Chimarra sp.	2		
Dineutes				Procambarus sp.				Diplectrona sp.			
Dubiraphia sp.								Hydroptila sp.	2		**D**
Dytiscidae								Hydropsyche sp.	2		
Gyretes sp.				**Amphipoda**				Lype diversa			**C**
Microcylloepus sp.				Gammarus sp.	1			Macrostemum sp.	2		
Stenelmis sp.			**R**	Hyalella azteca			**C**	Nectopysche sp.	1		**R**
Macronychus glaberatus			**C**					Oecetis sp.	1		**C**
								Oxyethira sp.	2		
				Isopoda				Polycentropus sp.	2		
				Caecidotea (Asellus)	1			Triaenodes sp.			
								Ceraclea flava			**C**
								Psychomia flavida			**R**
Column Total: FI/Taxa	**8**	**9**		**Column Total: FI/Taxa**	**0**	**4**		**Column Total: FI/Taxa**	**11**	**15**	

BIOMETRICS	Value	Thresholds for impairment rating: Panhandle		Peninsula	NE	If 3metrics are > target values, site is **Healthy** ☐
		West	East			If 2metrics are within target values, site is

Site Total Taxa Richness	**28**	≥24	≥24	≥18	≥17	**Suspect** ☐
Site Total Florida Index	**19**	≥22	≥19	≥10	≥6	If less than 2 metrics are within target values, site is
Site Total EPT	**15**	≥11	≥9	≥4	≥3	**Impaired** ☒