

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

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## Introduction

On June 10, 1999 two submerged logs were sampled to determine their habitat value. This monitoring was technical assistance for a Submerged Land and Environmental Resource Program permit application to remove logs from waters within the Blackwater River State Forest. The log sample sites were located in the Blackwater River above Highway 4 (lat. 30° 50' 17.3" long. 86° 43' 44.6) in Okaloosa County. The Blackwater River is designated by Florida Surface Water Quality Standards FAC 62-302.530 as "Class III: Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife" (FDEP 1996). It is listed as a "Special Protection, Outstanding Florida Waters, Outstanding National Resource Water" under FAC 62-302.700 (FDEP 1996).

The pine log pictured above (19 feet length and 16 inches in diameter) provided fish and wildlife habitat in the river at the site above Highway 4. The Atlantic White Cedar log (25ft. by 16in.) in photograph #2 created a riffle in its mid-stream site. Both logs located in the middle of the channel created habitats in an otherwise relatively unproductive sand bottom. The #3 photograph showed aquatic mosses, liverworts and algae attached to the log. These plants provide additional food and habitat value of the log for fish and wildlife (#4).



#1 Blackwater River above Hwy 4, pine log habitat mid-stream.



#2 Riffle created by cedar log.



#3 Mosses, liverworts, and algae growth.



#4 Hellgrammite.

This area of the Blackwater River State Forest had quite a bit of second growth pine and cedar felled by recent hurricanes. Many of the trees in the river had been cut by canoe livery businesses as they leaned over the river channel (# 7). However, much of the downstream river channel with approximately only 1-% woody debris was shallower and wider (#5). The channel near the sample site with much higher % woody debris was narrower with more stable banks (#6).



#5 Blackwater River at Hwy 4 park < 1 meter depth, 70 meters wide, ~99% sand.



#6 Blackwater River log sample site 1 to >2 meters depth, 20-50 meters wide.

## Results and Discussion

The habitat values were determined by dislodging the stream invertebrates from the two logs with a brush into a driftnet. Sampling results indicated highly productive and diverse aquatic macroinvertebrate communities from both logs. Cleanwater indicators (photograph #4) dominated the logs' healthy well-balanced aquatic communities. The biota of the logs surpassed the thresholds established for a 4 sweep BioRecon of multiple productive habitats (FDEP 1996b). The logs also had a more diverse and productive fauna than that found in a 20 sweep Stream Condition Index (FDEP 1996b) at a Blackwater River reference site at Highway 4. The biometric value comparisons of the logs, Blackwater reference site and western panhandle thresholds are as follows:

<b>Biometrics</b>	<b>pine log</b>	<b>cedar log</b>	<b>BR SCI</b>	<b>Thresholds</b>
<b>Taxa Richness</b>	39	46	28	≥ 24
<b>Florida Index</b>	31	40	29	≥ 22
<b>EPT</b>	21	28	15	≥ 17

Fish (darters, shiners) were observed feeding on the logs. Fish eggs and other invertebrate were observed attached to the logs and the vegetation growing on the wood. Wallace and Benke 1984 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. Wallace and Benke 1984 reported that snag or woody habitat was the major stable substrate in southeastern Coastal Plain sandy-bottom streams and a site of high invertebrate diversity and productivity. 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). They stated the “quantification of wood habitat seems mandatory to assess past or potential impacts of snag removal on ecosystem processes in low-gradient streams”. To evaluate the impacts of log removal to the Blackwater River fishery, compare the 43% woody debris naturally present in coastal streams to the approximately 1% found in the lower River up to Highway 4. A Game and Fish Commission letter (1999) suggested no removal of deadhead logs from the Blackwater River upstream of the State Park at the Deaton Bridge. Rosgen (1993) presented a guideline to assist fisheries biologist to evaluate the suitability of fish habitat structures including logs for stream restoration. Severe erosion caused by increased runoff from landuse activities had created numerous bank failures (photograph #s 7&8).



#7 Recently cut fallen old growth pine and cedar.



#8 Bank sloughing.

Sediments from the bank failures and upland sources had smothered much of the fish and wildlife habitat in the area below Highway 4. Habitat assessments in the lower Blackwater River during December 1998 found only approximately 1 % woody debris as available habitat (FDEP 1999d). Wallace and Benke (1984) found wood has a major influence on the hydrodynamic behavior of the river. Gordon et.al (1994) reported that larger woody debris may play an important part in channel stabilization and removal may have long-term effects on



# 9 New sediment.



# 10 Channel smothering at State Park, woody debris absent.

both a stream's ecology and morphology. Beschta and Platts (1986) reported that researchers have recognized that many streams are relatively "starved" of large organic material in regard to channel stability. 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 (see photograph #10) . 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. Lisle (1983, p.46) stated that riparian trees and large woody debris should be treated as if they "belong to the aquatic ecosystem".

## Conclusions

A more diverse and productive wildlife community was found on the old growth logs than bioassessments of 100 meter reaches of river at the Blackwater River reference site near the Highway 4 wayside park boat ramp. These findings are similar to the results of sampling deadhead logs on the Choctawhatchee River (FDEP 1999a), Chipola River (FDEP 1999b) and the Yellow River (FDEP 1999c). 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 Atlantic sturgeon utilize use the logs for food and the deep holes created by the logs for cover. Bank instability (photograph #8) accelerates when woody debris is removed from the stream channel.

This adds the to habitat smothering (photographs #5& 10) that has already indicated by severe sedimentation problems (FDEP 1999d). Restoration of historic concentrations of woody debris at proper locations in the Blackwater River would enhance fish and wildlife populations. This restoration would also improve channel stability/stream morphology as observed at the sampled log sites (i.e. photograph # 6).

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