STREAM ECOSUMMARY

Riley Branch below North River Road, February 1, 2006

FDEP conducted biological monitoring at Riley Branch in Santa Rosa County on February 1, 2006 to assess closure of North River Road (**Figure 1)**. This BioRecon monitoring documented stream restoration activities by the Blackwater River State Forest (BRSF) staff in their attempts to close a highly eroded logging road used for recreational off-road driving **(Figures 1)**.



Figure 1. North River Road former crossing site at Riley Branch on February 1, 2006.

Overall, the macroinvertebrate community and water quality data indicated that the stream had improved after restoration activities, but not yet met expectations for a healthy, well-balanced stream. A pre-road closure BioRecon was taken on August 11, 1999 did not meet standards for healthy well-balance fish and wildlife population, an Ecosummary report was written (for a copy of this and other Ecosummary reports contact Devan Cobb Devan.R.Cobb@dep.state.fl.us).

Background

Although healthy, well-balanced stream and river communities may be maintained with some level of human activity, such activities may result in waterbody degradation. Human stressors may include increased inputs of nutrients, sediments, and/or pesticides from watershed runoff, adverse hydrologic alterations, undesirable removal of habitat or riparian buffer vegetation, and introduction of nuisance (generally exotic) plants and animals. FDEP has methods to evaluate if human activities have resulted in the condition where a particular waterbody has exceeded water quality criteria (Chapter 62-302, Florida Administrative Code), including whether adverse impacts to biological communities have occurred. FDEP water quality standards are designed to protect designated uses of the waters of the state (*e.g.*, recreation, aquatic life support), and exceedances of these standards is associated with interference with the designated use. The Biological Reconnaissance (BioRecon) assesses how closely the macroinvertebrate community (e.g., aquatic insects, clams, and crayfish) of a stream resembles the macroinvertebrate community of an undisturbed or "reference" condition. The stream and river habitat assessment evaluates the availability and quality of habitat for macroinvertebrates, and can help diagnose the cause of a low BioRecon score.

Methods

This stream was sampled on 2/1/2006 by the FDEP Northwest District Office following FDEP Standard Operating Procedures (SOPs, see http://www.dep.state.fl.us/water/sas/sop/sops.htm for details). Sampling and analyses met FDEP quality assurance/ quality control standards (see http://www.dep.state.fl.us/water/sas/qa/index.htm) The BioRecon was sampled per FDEP SOP FS7410 and calculated per FDEP BioRecon_2004 scoring (FDEP SOP version LT7100). BioRecon is a rapid community based biological assessment of stream health using benthic macroinvertebrates sampled via four sweeps of a D-frame dip net, with organisms (excluding worms, midges, and mites) identified to

the lowest practical taxonomic level. The BioRecon_2004 is composed of six metrics, which decrease in response to human disturbance. These include Total # of Taxa, Ephemeroptera Taxa, Trichoptera Taxa, Long-Lived Taxa, Clinger Taxa, and Sensitive Taxa. The BioRecon rating categories were: "Pass" 6-10 score, "Fail" 0-5. The Stream and River Habitat Assessment was conducted per FDEP SOP FT 3100. The Habitat Assessment is a rapid field method in which a sampler scores eight in-stream and riparian components to estimate the influence of habitat factors on the resident aquatic organisms. Habitat Assessment scores range from 11-160 and overall habitat quality is assigned to one of four categories: Optimal (120-160 points), Suboptimal (80-119 points), Marginal (40-79 points), and Poor (11-39 points).

Site Information

Riley Branch (STORET #33030107) at the bioassessment site (**Figure 3**) (N 30º 43' 8.2 " W -86º 48' 35.4") is a second order stream. It is a tributary to the Blackwater River, which is classified as Outstanding Florida Waters (OFW).under the State Water Quality Standards. The Blackwater River flows into Pensacola Bay via The Blackwater and East Bays. The Yellow River Marsh along Blackwater Bay is a State Aquatic Preserve and also listed as an OFW as is the Blackwater River State Park located about 3 miles downstream of Riley Branch. The site is located about 13 miles northeast of Milton. Riley Branch drains the southern pine plains and hills of subecoregion. 65f. A FDEP Section 319 grant to the Florida Division of Forestry funded closing and repairing roads to prevent sediment runoff from affecting streams in the BRSF watershed. http://water.epa.gov/polwaste/nps/success319/Section319III_FL.cfm#2. Completion of the restoration work was delayed from 1999 to 2006 by willful damage by locals and BRSF management changes. Previous attempts to do a post-restoration BioRecon had to be aborted because road barriers were destroyed and bypassed. The erosion-causing vehicle traffic across the streambed continued into the summer of 2005 **(Figure 4)**. It was observed that metal road barriers on February 1, 2006 had effectively close the road to four wheel drive vehicles **(Figure 1)**.

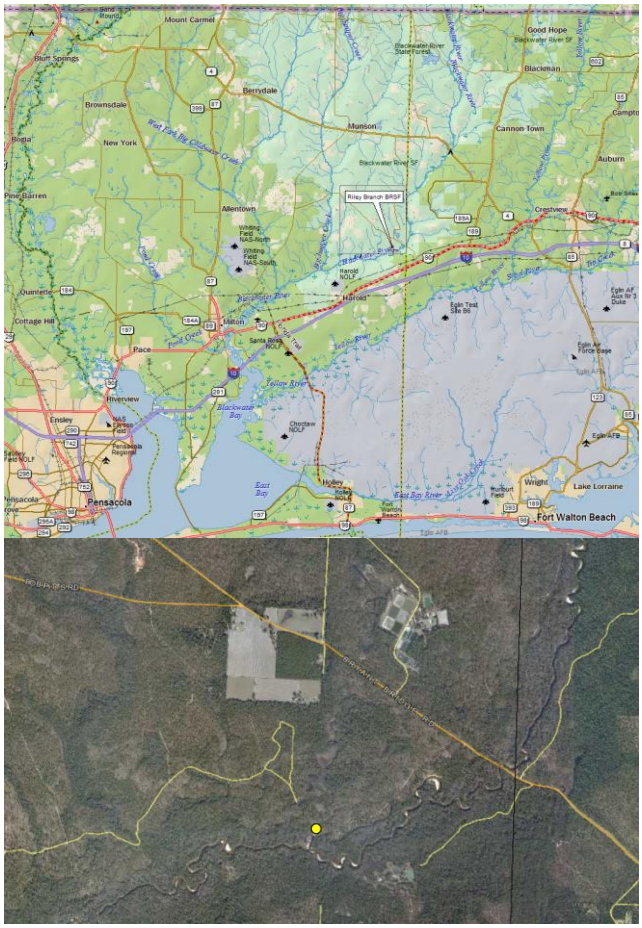


Figure 3. BioRecon Location of Riley Branch (yellow dot) Blackwater River State Forest (shaded blue on topography map) in Santa Rosa County, aerial flight dates November 2006.



Figure 4. Riley Branch stream crossing on 07/05/2005 continued to be use after the road was officially closed in 1999.

Florida Natural Area Inventory (FNAI) listed species of the area include the Diminutive Clubtail *Gomphus westfalli*, and Stonefly *Leuctra cottaquilla* found in the nearbyWolftrap Branch. The FNAI listed Stonefly *Perlinella zwicki*, Zigzag Blackwater River Caddisfly *Agarodes ziczac*, Panhandle Lily *Lilium iridollae*, White-top Pitcherplant *Sarracenia*

leucophylla, Spoon-leaved Sundew *Drosera intermedia*. Florida Flame Azalea *Rhododendron austrinum* Gopher Tortoise *Gopherus polyphemus* and Red-cockaded Woodpecker *Picoides borealis* are found in the local area. Pescador's Bottle-Cased Caddisfly *Oxyethira pescadori*, Peters' Caddisfly Cheumatopsyche *Cheumatopsyche petersi*, Floridian Finger-net Caddisfly *Chimarra florida*, Little-entrance Oxyethiran *Microcaddisfly Oxyethira janella*, Elerob's Microcaddisfly *Oxyethira elerobi*, and Mayfly *Baetisca escambiensis* were found at the Blackwater River State Park. All these FNAI listed species could be expected to be found in the Riley Branch watershed. *Chimarra* larvae were abundant in this sample and could possibly be *C. florida* and *Cheumatopysche*, common in the sample could be *C. petersi*.

Results

Water Quality

The water quality parameter results except for pH were typical of sand and gravel Panhandle streams (Table 1). The pH (7.73 SU) was unusually high for this area. Possibly the filamentous algae bloom had increased the pH by removing carbon dioxide from the water. The water temperature (14.1°C) reflected the influence of groundwater during base flow conditions and the lightly shaded canopy.

The low specific conductance (15 µmhos/cm) was typical of the quartz sand and gravel aquifer in the western Florida Panhandle. The dissolved oxygen had improved from 4.1 mg/L in to 1999 to 9.4 mg/L in 2006 winter conditions. The percent dissolved oxygen saturation (91) was typical of the 90-100% found in fast flowing Panhandle streams. However, this high oxygen saturation in the pool at the stream crossing was generated by abundant algae growth **(Figures 6 and 7)**. Although just below the road crossing, the thalweg stream velocity (0.3 meters/ second) provided good re-aeration. The 2006 fecal and total coliform bacteria (10 and 500 per 100ml) were much lower than during 1999 (fecal coliform 600 per 100ml and total coliform 7500 per 100ml) since range cattle had been removed from the watershed.

Table 1. Water quality results at Riley Branch below North River Road on 02/01/2006.

Analyte	Result August 1999	Result February 2006	Applicable Class III Water Quality Criteria
Field Temperature (°C)	28.3	14.1	
Field pH (SU)	5.87	7.33	
Field Dissolved Oxygen (mg/L)	4.12	9.42	≥5.0
% Dissolved Oxygen Saturation	51	91.4	67
Field Specific Conductance (µmhos/cm)	NA	15	Not to exceed 50% of background or 1275 µmhos/cm
Fecal Coliform Bacteria (#/100m/L)	600	10	
Total Coliform Bacteria (#/100m/L)	7500	500	

Habitat Assessment

The stream habitat assessment scored 110 in the lower suboptimal range (**Figure 5**). This was an improvement over the 69 marginal rating of the 1999 stream habitat score. Water Velocity, Artificial Channelization, and Bank Stability were Optimal. Substrate Diversity and Riparian Zone Vegetation Quality were Suboptimal. Substrate Availability (16%), and Riparian Buffer Zone Width were Marginal. Habitat Smothering (84%) from silt was Poor.



Figure 5. Riley Branch riffle habitat below the former road crossing 02/01/2006.

Habitat smothering decreased from 97% during 1999 in the sample reach below North River Road to 84% in 2006 about 6 months after the road closure. The 2006 silt sedimentation was still severe as it will take time for the silt to be assimilated or flushed downstream after heavy rains. Vegetation and leaf material was beginning to cover the former road approach reducing sediment runoff. (**Figure 1)** compared to the exposed soil before road closure (**Figure 4)**.

BioRecon Index

The 2006 BioRecon_2004 score for this site recovered to 5 out of a possible 10 points from 0 of 10 in 1999. The 2006 BioRecon 2004 score resulted in a "Fail" designation compared to "Impaired" in 1999. The available substrate increased from 3% in 1999 to 15% in 2006. The Total Taxa productivity almost doubled form 67 in 1999 to 127 in 2006 with the improvement of water quality and increase of habitat. The 2006 BioRecon biometrics also showed improvement (Taxa 28, Sensitive Taxa 10, EPT 11) compared to the sampling conducted on 08/11/1999 (Taxa 19, Sensitive Taxa 4, EPT 6). The filter-feeders decreased (39% in 1999 to 26% in 2006) after the reduction of suspended solids and bacteria from road runoff and cattle waste. The EPT, mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera) are the more sensitive orders of the stream community. The EPT made up 51% of the 2006 sample compared to 43% in 1999. The EPT normally comprise about 50% of the aquatic macroinvertebrate in the healthiest Panhandle streams. Stoneflies, the most sensitive to pollution were missing during both 2006 and 1999 samples. Mayflies, sensitive to silt smothering gills, had their productivity increased from 10% in 1999 to 28% in 2006.

Periphyton

The attached algal community in the stream consisted of mainly filamentous Cyanobacteria **(Figures 6 and 7)**. The abundant growth of algae (mainly filamentous green *Cladophora*) found during August 10, 1999 had been replaced by the blue green Cynobacteria.

Some growth of algae (typically diatoms) is expected in a fully functioning stream, but an over abundance of algae (especially filamentous algae) may reduce habitat quality (from smothering) and lead to excess organic matter production (and decomposition), which can harm fish and invertebrates.



Figure 6 and 7. **Filamentous algae (with some iron/sulfur bacteria in Figure 7) below road crossing 02/1/2006.**

Conclusions

Although still not back to a healthy condition, the closing of the North River Road over Riley Branch (**Figure 1**) was a positive benefit to the health of the stream biota. The stream macroinvertebrate community had improved after the dirt road sediment runoff that smothered habitats had been reduced with the road closure and "mudding/mud bogging" by four-wheel drive recreational vehicles discontinued

by BRSF oversight. Because of the heavy anthropogenic sediment loading it would take additional time for the accumulated to silt and algal growth to be assimilated or flushed downstream. Silt sediment and filamentous algae bloom had still smothered most of the streambed below the former road crossing at the time of sampling on February 1, 2006. The fish and wildlife community should continue to recover. The smothered habitats will again become available over time after the significant reduction of sediment runoff. Leaves, wood, and some vegetation were starting to cover the bare soil on the closed road approach to Riley Branch (**Figure 1)**.

Thank you for your interest in maintaining the water quality of Florida's streams and rivers. Please feel free to contact us if you have any questions.

Contact and resources for more information

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FDEP biological assessment resources:
http://www.dep.state.fl.us/water/bioassess/index.htm