A site map can be viewed by clicking on the report site name. [Print Version]

EcoSummary

Big Escambia Creek Restored Channel below Fannie Road

January 5, 2006

FLORIDA AMBIENT

PASS

BioRecon: A rapid, cost-effective screening mechanism for identification of biological impairment

For samples collected before June 8, 2004
All field and laboratory methods followed FDEP Standard Operating Procedures and met FDEP quality assurance/quality control standards.
For samples collected on or after June 8, 2004
All field and laboratory methods followed FDEP Standard Operating Procedures (SOPs) and met DEP quality assurance/quality control standards.

Introduction



This biological assessment in Big Escambia Creek was conducted in support of a request by the United States Fish and Wildlife Service (USFWS) and the Florida Fish and Wildlife Commission (FFWC) as part of a $6.39 million United States Corps of Engineers Section 206 Ecosystem Restoration Project. Historical accounts indicate that gravel mining and clear cutting the riparian zone forest had led to re-routing of the creek channel from Fannie Road to the Escambia River. Big Escambia Creek was directed back into its original channel by construction of an earthen diversion structure below Fannie Road on the south bank of the north channel. About a mile (straight line measurement) of sinuous channel was reconstructed in the vicinity of the original stream bed. Additionally, flooding in Flomaton, Alabama was exacerbated by sediment deposits causing braided conditions near CSX railroad trestle. Some of those sediment deposits were removed and the channel near the trestle was reconfigured. The BioRecon documents the post-restoration condition of the benthic invertebrate community in Big Escambia Creek's reconstructed stream channel just below Fannie Road. This sample site (Latitude 30 degrees 59 minutes 0.09 seconds North, Longitude 87 degrees 13 minutes 59 seconds West) again became the

mainstream channel after construction activities were completed. A BioRecon in 2003 documented the pre-restoration benthic invertebrate community's condition in the Big Escambia Creek's abandoned stream channel http://tlhdwf2.dep.state.fl.us/eswizard/ecosummary.asp?id=574. Previously during July 1998, a BioRecon was conducted in Big Escambia Creek's flowing north channel below the Fannie Road Bridge http://tlhdwf2.dep.state.fl.us/eswizard/esdata/pdfs/377.pdf.

Results and Discussion

Big Escambia Creek passed all 3 biometric thresholds indicating a healthy condition at the site:

Biometrics	Values 2006	1992 Thresholds for impairment ratings
Taxa Richness	50	≥24
Florida Index	49	≥22
EPT	30	≥17

This was an improvement over the summer 1998 BioRecon:

Biometrics	Values 1998	1992 Thresholds for impairment ratings
Taxa Richness	48	≥24
Florida Index	33	≥22
EPT	22	≥17

And as expected a significant improvement over the stagnant abandoned channel:

Biometrics	Values 2003	1992 Thresholds for impairment ratings
Taxa Richness	9	≥24
Florida Index	0	≥22
EPT	2	≥17

The increase in FI and EPT during 2006 versus 1998 may be explained in part by the cooler winter conditions having a more favorable increased flow/stream velocity (0.6 vs. 0.24 meter/sec), lower water temperatures (14.1 vs. 25.2 C), and the resulting higher dissolved oxygen concentration (9.47 vs. 6.5 mg/l). In addition during 1998 much of the flow had been re-routed through the mine pits, which lowered the water velocity in the original channel. This lower stream velocity caused an increase in sediment deposition that smothered fish and wildlife habitat. During 2006 the Big Escambia Creek high gradient stream system's gravel bed was embedded by sand and silt run off from soil exposed by the restoration activities.

The interstitial spaces of gravel are habitat to rare hyperoic taxa like chloroperlid stoneflies *Alloperla* and *Haploperla*. Alabama listed Alloperla *prognoides* (as *furcula*) in

http://www.riversofalabama.org/Conecuh/CON_Species_Diversity.htm as rare in the Conecuh/Escambia watershed. Clean gravel riffles are also habitat to a rare southeastern dragonfly, *Ophiogomphus australis* and many threatened native mussels. Of the 30 taxa of freshwater mussels found in the Escambia/Conecuh River system, one is protected under the Endangered Species Act and twelve other are listed as imperiled or of special concern.

Clean water indicating stoneflies represented only 2 specimens (2% of individuals collected) in 2 taxa (*Neoperla* and *Paragnetina kansensis*) during the summer 1998 BioRecon. This increased to 16 stonefly specimens (5% of individuals collected) in 10 taxa (*Acroneura arenosa/evoluta*, *Isoperla*, *Leuctra*, *Paragnetina fumosa*, *Perlesta*, *Perlinella drymo*, *Taeniopteryx*, *Helopicus bogaloosa*, *Hydroperla phormidia*, *Nemocapnia carolina*) during winter 2006. This continued low productivity indicated the effects of the sedimentation from the eroding un-stabilized banks of the re-created channel (right side of photo). Another indication of increased 2006 sedimentation was the co-dominance of sediment tolerant taxa, Hexagenia (burrowing mayfly) and chironomidae (midges) in the sample (31% each). During 1998 chironomidae was still dominant, but only at 12%, however Hexagenia was less common at 3%.

The 2006 habitat assessment decreased to 41% compared to 58% in 1998. Substrate Diversity (marginal), Substrate Availability (poor), Water Velocity (optimal), Habitat Smothering (poor), Artificial Channelization (optimal), and Bank Stability (poor) were similar in both 1998 and 2006. However, Riparian Zone Buffer Width and Riparian Zone Quality dropped from optimal in 1998 to poor and marginal in 2006.

Although Habitat Smothering rated poor in both years, it improved to 80% smothered in 2006 from 96% in 1998 because water velocity substantially increased to 0.6 from 0.25 meter/sec. Gravel coverage was reduced to 24% in 2006 from 46% in 1998. Mud and silt decreased to 4% from 40% in 1998 because of the much greater stream velocity in 2006. Sand substantially increased to 68% coverage from 10% in 1998.

Silt smothering was severe as the available substrates were still covered with a thick layer of silt. The stream banks were even more unstable than in 1998 with new raw, eroded sections with bank sloughing in the construction areas. The south riparian zone was completely bare soil and had failed turbidity curtains. The north riparian zone rated marginal because of erosion from a construction access road.

Chinese privet, Chinese tallow and kudzu were observed near the bridge. These invasive plants had colonized the disturbed stream banks from Fannie Road to the railroad trestle upstream in Alabama. The south bank was completely bare and 50% of the north bank was bare or with obvious disruption.

Conclusions

Big Escambia Creek passed all three BioRecon metrics, indicating a healthy condition at this site. However, habitat smothering was still observed as an anthropogenic disturbance. Sediment sources included sand and gravel mining, agriculture, silviculture, urban, and dirt road runoff. However, the flood control/restoration project construct activities exposed acres of riparian soils and had become a major contributor of sediment loading. Excessive clear cutting of the riparian cypress forest and project construction activities caused severe erosion that deposited fine sediment covering former gravel habitat. Additionally sediment accumulation at the lower end of the channel restoration project filled the stream channel for a few hundred meters. This prevented passage of a twelve foot boat that in 1978 navigated Big Escambia Creek from its mouth at the Escambia River to the railroad trestle in Alabama. The heavily forest stream in 1978 was narrower (~10-12 meter width) and deeper (~3-4 meters depth) than the reconstructed channel in 2006 (~30 meters width) and (1.5 meter depth).

Although Big Escambia Creek passed the biometric thresholds with 50 Taxa, 49 FI, and 30 EPT, these numbers were still low compared with BioRecons at Yellow River near Crestview (81 Taxa, 50 Florida Index, and 40 EPT), and Pond Creek near Milton (74 Taxa, 49 Florida Index, and 37 EPT). Water quality expectations are high for the Escambia system as the FFWC reported its fish diversity in Florida as 81 species, second only to the Apalachicola River system. Rare fish such as the threatened Gulf Sturgeon, crystal darter, harlequin darter, Alabama Shad, rough shiner, striped shiner, and bluehead chub may depend on macroinvertebrates in the gravel habitat for food. Hopefully after vegetation cover is re-established and sediment runoff is reduced the macroinvertebrate communities will equal or surpass the other panhandle stream mentioned above. A final BioRecon is planned to document conditions after the stream banks and diversion structure are stabilized by vegetation.

For more information, please contact
Donald H. Ray
Northwest District Office
160 Government Center, Pensacola, FL 32502
(850) 595-8300 (Suncom 695-8300 x 1126)
E-mail: donald.ray@dep.state.fl.us

Published by the Florida Department of Environmental Protection
Tallahassee, Florida
For more information on the DEP Bioassessment programs, please visit our web site at http://www.dep.state.fl.us/water/bioassess