STREAM ECOSUMMARY

Dean Creek below Power Lines

March 20, 2013

FDEP conducted biological monitoring at Dean Creek in Santa Rosa County on March 20, 2013 in response to a request from Jackson Guard staff (Erosion Control Natural Resource Section - Forestry Element 96CEG/CEVSNF) at Eglin Air Force Base. The purpose of the sampling was to document the stream health before implementation of planned restoration activities (wetland restoration, slope stabilization, and access closure). Based on the BioRecon procedure, the macroinvertebrate community scored 5 points out of 10 (in the "healthy" range). A post-restoration bioassessment is planned for this same site during March 2014 to determine if the restoration resulted in improved BioRecon scores. A 2007 bioassessment in Dean Creek just above the power lines scored in the "exceptional" range.



Figure 1. Dean Creek ford crossing at 90 meter mark under power lines on 03/20/2013. Note tracks from vehicle crossings.

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 03/20/2013 by the FDEP Northwest District Office. Samples were collected 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_2008 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_2008 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: Category 1 "exceptional" [7-10] score, Category 2 "healthy" [4-7), Category 3 "impaired" [0-4). Square brackets indicate a value is included in the range; round brackets indicate a value is not included.

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).



Figure 2. BioRecon Location at Dean Creek on Eglin Air Force Base in Santa Rosa County.

Site Information

Dean Creek (STORET 33030308) at the bioassessment site (**Figure 1 and 2**) (N30^{o} 27' 52.6 " W-86^{o} 53' 19.4") is a stream fed by numerous steephead springs in its headwaters and along its course. It originates just southwest of the Eglin Air Force Base weapons test range A-77.The sample site is about 14 miles southeast of Milton and less than 2 miles northeast of Holley. Dean Creek flows into Pensacola Bay via East Bay River. The site is located in the Gulf Coast Flatwoods ecoregion, Southern Coastal Plain subecoregion (75a). The headwaters are in the Southern Pine Plains and Hills ecoregion, Southeastern Plains subecoregion (65f)., Dean Creek was established as an Ecoregional reference site downstream at Muddy Ford (STORET 33030041) in 1992 by the FDEP and USEPA. It was biologically sampled 15 times from 1992 through 2004. However, the access road was destroyed in 2007 by expansion of a solid waste landfill. A new reference site (STORET 33030179) was established in 2007 upstream of the power line easement.

The Eglin Air Force Base Hiking Trail (West Trail) section of the Florida National Scenic Trail crosses Dean Creek less than 200 meters downstream of the power line right of way. The Eglin Erosion Control Manager plans to get assistance from the Florida Trail Association to clean litter from the Dean Creek watershed. As of late June 2013, Eglin AFB had removed more than 17 tons of garbage from the Holley area including 6 boats and 124 tires from the Dean Creek watershed. Eglin Roads 291,712, 714, 726, and 769 cross or approach Dean Creek and its tributaries. **Figures 3 and 4** show some of the wetland areas destroyed by four-wheel drive vehicles engaged in "mud bogging." Eglin plans to restore these pitcher plant bogs, close the roads, and stabilize gullies. Note in **Figure 4** the blue SUV between the yellow dot and red arrow. Eglin removed this stolen and damaged vehicle (**Figure 5)** from the Creek.



Figure 3. Four-wheeler after fording Dean Creek on 03/20/2013.



Figure 4. Arrows point to "mud bogging" areas and abandoned stolen 4WD vehicle left in Dean Creek.



Figure 5. Stolen and wrecked SUV in Dean Creek on 03/26/2007 before removal by Eglin AFB.



Figure 6. Dean Creek ford crossing at 80 meter mark under power lines on 03/20/2013. Note riparian vegetation killed by herbicide application.

Results

Water Quality

The water quality field parameters met water quality criteria (**Table 1**). The water temperature was 16.06°C. The low pH (4.11 SU) and specific conductance (27µmhos/cm) were typical of the quartz sand and gravel aquifer in the western Florida Panhandle. The percent dissolved oxygen saturation (98.5%) was typical of fast flowing Panhandle streams.

Table 1. Water quality results from 03/20/2013 at Dean Creek below power lines.

Analyte	Result	Remark	Applicable Class III Water Quality Criteria
Field Temperature (°C)	16.06		
Field pH (SU)	4.11		
Field Dissolved Oxygen (mg/L)	9.71		≥5.0
% Dissolved Oxygen Saturation	98.5		67
Field Specific Conductance (µmhos/cm)	27		Not to exceed 50% of background or 1275 µmhos/cm

Habitat Assessment

The stream habitat assessment scored 99 in the suboptimal range. The 2007 stream habitat score above the power lines was 123 in the optimal range. Water Velocity and Artificial Channelization were optimal. Bank Stability, Riparian Buffer Zone Width, Riparian Zone Vegetation Quality (trees/shrubs killed by herbicides in power easement- was suboptimal (**Figures 3 and 6**). Substrate Availability (small amount of leaf pack//mat) Substrate Diversity, Habitat Smothering (sand, algae) were marginal **(Figure 7)**.



Figure 7. Sand buried logs smothered by algae.

BioRecon Index

The BioRecon_2008 score for this site was 5 out of a possible 10 points. It rated a Category 2 “healthy” designation. This site showed a decrease in Taxa (24), Sensitive Taxa (9), and EPT (14) compared to sampling above the power lines (STORET 33030179) conducted on 03/26/2007 (Taxa 61, Sensitive Taxa 17, and EPT 18). The Dean Creek site just above the power line easement rated Category 1

"exceptional". The EPT, mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera) are the more sensitive orders of the stream community. Thirteen caddisfly and mayflies listed by Florida Natural Area Inventory (FNAI) were found in the Dean Creek watershed. These include the caddisflies *Oxyethira janella, Agarodes ziczac, Hydroptila okaloosa, Nyctiophylax morsei, Cheumatopsyche gordonae, Hydroptila bribriae, Oxyethira kelleyi*, for this site. FNAI listed species at other sites in the Dean Creek watershed include the caddisflies *Hydroptila eglinensis, Hydroptila sarahae*, the mayflies *Attenella attenuate, Dannella simplex, Baetisca becki, Stenacron floridense*, the dragonfly *Progomphus alachuensis*, the Pine Barrens Tree frog *Hyla andersonii*, *Florida Bog Frog Rana Okaloosae*, the One-toed salamander, *Amphiuma pholeter*, the Silky Camellia *Stewartia malacodendron* the sedge *Carex baltzellii*, and the Spoon-leaved Sundew *Drosera intermedia*. The Panhandle Lily *Lilium iridollae and* White-top Pitcherplant *Sarracenia leucophylla* are FNAI listed plants from the adjacent watershed to the east.

Periphyton

The attached algal community in the stream consisted of primarily filamentous algae on wood and sand over buried leaf mat (**Figures 7 & 8**) with some diatoms. The open canopy of the young riparian forest and power line easement allowed sunlight to increase the algal growth. 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 8. Filamentous algae on sand smothered wood.

Conclusions

It is expected that Jackson Guard's planned Dean Creek watershed erosion control project, which includes wetland restoration, slope stabilization, and access closure, will be associated with improved stream health by preventing sediment runoff and bank erosion. Securing entrances to Eglin roads in the Dean Creek watershed with concrete barricades and pole and cable barriers will prevent much of the recreational four-wheel drive activity that created hillside gullies. Vehicle traffic-eroded hillsides and banks had caused severe sand sediment deposition in the sample reach. Closing access to Eglin road crossings in the Dean Creek watershed will also prevent destruction of the riparian wetlands by 'mud bogging" and allow the denuded stream bank crossings to re-vegetate and stabilize. Fine organic particulate matter (FPOM) runoff from the adjacent wetlands had resulted in moderate silt sediment deposition in the sample reach. Herbicide application for power line easement maintenance prevents the natural shading of the stream, as would occur with a mature riparian forest. A mature riparian forest provides needed shade, wood and leaves for habitat and food to the stream wildlife. Downstream of the power line the riparian forest was young with less canopy than above the easement. The clean up of discarded litter, garbage, and a vehicle from the stream by Eglin AFB has been a good start to restoring this Dean Creek site back to the Category 1 "exceptional" status as found just upstream of the power line easement.

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. Previous Ecosummary Reports on Eglin stream restoration efforts by this author are available from Devan Cobb devan.r.cobb@dep.state.fl.us

Contact and resources for more information

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