

Biological Assessment of Elevenmile Creek
Below the Klondike Landfill
Escambia County
FDEP File No. 0078440-004-SO
WACS ID No. 1690

Conducted July 1, 2013 and July 2, 2013

June 2014

Division of Environmental Assessment and Restoration

Northwest District

Executive Summary

As requested by the Waste Management/Air Resources Cleanup Section, Department of Environmental Protection (DEP) staff from the Division of Environmental Assessment and Restoration conducted water quality sampling and biological assessments of Elevenmile Creek on July 1, 2013 and July 2, 2013. The assessment locations are located above and below the Klondike Landfill which is located in Escambia County. The objectives of this study were to:

1) Measure the existing water quality and biological health of Elevenmile Creek including a small tributary, Klondike Branch, adjacent to and below the inactive cells of Klondike Landfill as compared to an upstream Control site; and

2) Determine if disposal activities resulted in non-compliance with the biological integrity criterion as referenced in Rule 62-302.530 (10), Florida Administrative Code (F.A.C.).

The Klondike Landfill, which is no longer an active solid waste facility, was in operation from 1976-1982 and was classified as Class II (household and commercial solid waste). The post closure utilization of the facility is an outdoor archery range. Results from this study may be used to determine future permit revisions related to their continuing surface water and groundwater monitoring plan.

Three stream sites were sampled to assess the influence of the Klondike Landfill on water quality in Elevenmile Creek. A Control Site was located upstream from the landfill, a Test Site was downstream from the landfill, and an additional site in Klondike Branch was selected as it was on the landfill property in close proximity to groundwater monitoring wells utilized by the facility. The biological community was evaluated using the Stream Condition Index (SCI) at each location. Overall the biological community of Elevenmile Creek below the landfill was characterized as healthy, achieving a passing SCI score and therefore is meeting expectations for a healthy well-balanced system. However, it should be noted that background conditions prior to disposal activities are not known for this system, and that information would provide a true indication of whether or not the stream's biological community has been negatively altered by anthropogenic impacts.

A review of groundwater monitoring well data (sampled in 2012 by county personnel) revealed elevated levels of ammonia, iron, arsenic and total dissolved solids (TDS). Elevated iron levels were also measured in Elevenmile Creek (July 1, 2013) at the two assessment sites below the landfill. The iron levels at the Test Site and in Klondike Branch measured 1,220 and 2,220 µg/L, respectively, exceeding the surface water quality criteria of 1,000 µg/L. All remaining metals analyses including arsenic were below their respective surface water quality standards (F.A.C. 62-302.530).

Total ammonia is normally very low in western Panhandle streams. Total ammonia was 2.5 times higher at the Test Site (0.28 mg/L) than the Control Site (0.11 mg/L) and 5.4 times higher at Klondike Branch (0.59 mg/L) than the Control Site level. All three locations including the Control Site exceeded the state numeric nutrient threshold of 0.67 mg/L for Total Nitrogen (TN) (Panhandle West).

Introduction

This study was conducted to assess the influence of the Klondike Landfill on water quality and biological communities of Elevenmile Creek. Healthy, well-balanced stream and river communities may be maintained with some level of human activity, but excessive human disturbance may result in waterbody degradation. Human stressors may include increased inputs of nutrients, sediments, metals 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. DEP has field methods to evaluate if human activities have resulted in the condition where a particular waterbody has exceeded water quality criteria of Chapter 62-302, F.A.C., including whether adverse impacts to biological communities have occurred. DEP 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 Stream Condition Index (SCI) 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 habitat assessment evaluates the availability and quality of habitat for macroinvertebrates, and can help diagnose the cause of a low SCI score.

Site Information and Sampling Locations

The landfill is located approximately 5 miles southeast of Beulah, 1 mile south of Highway 90, in Escambia County. Elevenmile Creek flows along the landfill’s western border and is located in the Gulf Coast Flatwoods, Southern Coastal Plains 75a Ecoregion (Figure 1). Elevenmile Creek is a fourth order stream at this location and for more than 70 years received pulp mill effluent until the end of 2012. Biological background conditions are not known prior to landfill activities or industrial pulp mill waste discharge; therefore a SCI Control Site located 2 miles upstream was selected as a comparison to the SCI Test Site (Figures 2 & 3). The Test Site was located below the southwestern property line on Elevenmile Creek and downstream from the permitted surface water location SW-2. An additional assessment site in Klondike Branch was located below 3 active monitoring wells where elevated TDS, ammonia, iron and arsenic levels were measured in 2012.

Methods

Water Chemistry and Stream Condition Index

These site were assessed on June 1 and 2, 2013 by the DEP’s Northwest District Office. Surface water and biological samples were collected following DEP Standard Operating Procedures (SOPs, see http://www.dep.state.fl.us/water/sas/sop/sops.htm for details). Sampling and analyses met DEP quality assurance/ quality control standards (see http://www.dep.state.fl.us/water/sas/qa/index.htm). The SCI was conducted per DEP SOP FS7420 and calculated per DEP SOP LT7200. The SCI consists of collecting macroinvertebrates via 20 D-frame dip-net sweeps (0.5 m in length) in the most productive habitats in a 100 m reach of the

stream. The organisms are sub-sampled, and identified to the lowest practical taxonomic level. The SCI is composed of ten metrics (Table 2), eight of which decrease in response to human disturbance, with two metrics (% very tolerant and % dominant) increasing in response to human disturbance. According to DEP SOP LT 7000, the SCI score ranges and categories are: (68-100) Exceptional; (35-67) Healthy; and (0-34) Impaired. EPA approved biological health assessment criteria state that a Site is considered to meet designated uses if the average of the two most recent SCI scores is 40 or higher and neither of those scores is less than 35.

Floral Assessment

Evaluations of stream flora include the Rapid Periphyton Survey (RPS, DEP SOP FS 7230), community composition information associated with dominant algal taxa, Linear Vegetation Survey (LVS, DEP SOP 7320), and chlorophyll *a*. The RPS assesses the extent and thickness of algae in the stream reach by making 99 observations within the 100m reach, while the LVS assesses how closely the in-stream plant community resembles a minimally disturbed condition. Results are assessed as described beginning on page 8 of "*Implementation of Florida's Numeric Nutrient Standards*," dated April 2013, using evidentiary thresholds derived from a population of minimally disturbed reference Sites.

Habitat Assessment

The Stream and River Habitat Assessment was conducted per DEP 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).

Results and Discussion

Water Chemistry

Field measurements were within normal ranges of western Panhandle streams; however, conductivity was slightly elevated, ranging from 57 µmhos/cm at the Control site to 74 µmhos/cm at the Test site. Turbidity measured at the Test Site was 1.2 NTU higher than the Control Site and 7.5 NTU higher at Klondike Branch and therefore complies with turbidity standards (≤29 NTU above natural background conditions). Iron levels were elevated in all three sampling locations including the Control Site (840 µg/L) but exceeded the water quality criterion of 1,000 µg/L at the Test Site and in Klondike Branch. All arsenic concentrations (0.46 - 0.82 µg/L) were low, measuring between the method detection limit (MDL – 0.25 µg/L) and laboratory practical quantitation limit (PQL – 1.0 µg/L). Mercury levels were below the water quality criterion of 0.012 µg/L, ranging from 0.0024 µg/L at the Control Site to 0.0052 µg/L and 0.0090 µg/L at the Test Site and Klondike Branch, respectively. Unionized ammonia values were elevated at all locations but were below the Class III water quality criterion of 0.02 µg/L. Total nitrogen exceeded the state numeric nutrient threshold of 0.67 mg/L for the Panhandle West region (Table 1).

Habitat Assessment

The Habitat Assessment results for all three locations were similar, scoring in the mid-suboptimal range. Five productive habitats may be present in Florida streams; snags or woody material, leaf pack, submersed roots, submersed aquatic vegetation and rocks. A habitat is considered a major productive habitat when ≥ 2 m^2 is present and a minor habitat when ≤ 2 m^2 is present within the 100 m assessment reach. A diversity of habitat, as well as the quality and availability of the habitat, is the key to a more diverse aquatic macroinvertebrate community. Two productive habitats were observed at the Test Site (snags & leaf packs) and Control Site (snags & roots) giving both sites a marginal score for substrate diversity. There were also two major habitats (snags & roots) in Klondike Branch. Submerged aquatic vegetation was observed within the Control

Site reach but contained less than 2 m^2 and sampled as a minor habitat. Unstable banks can cause sand and silt smothering, which makes habitat unavailable for aquatic insects and fish. Moderate to severe sand smothering was observed at the Control and Test sites resulting in a marginal score for substrate availability (Figure 4). Severe silt smothering was observed in Klondike Branch (Figure 5). In addition, bank stability for all three locations scored in the sub-optimal category. Water velocities scored in the optimal range at all three locations. Fish and sensitive aquatic insects require sufficient water velocity to maintain high dissolved oxygen concentrations. Riparian zone vegetation quality received a marginal rating because several exotic species were observed.

Floral Assessment

The floral assessments did not indicate an imbalance of the floral community. Although there were some algal mats observed, the Rapid Periphyton Survey did not show signs of excessive eutrophication. The RPS results for the Control Site and Klondike Branch were 8 and 11%, respectively, composed mainly of diatoms with algal thicknesses less than 0.5 mm. The RPS results of the Test Site was 33%, however only 7% ranked with algal thickness of > 1 mm - < 6 mm. Chlorophyll-a results were well below the impairment thresholds of 20 µg/L. Some growth of algae (typically diatoms) is expected in a fully functioning stream, but an overabundance 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. There were 0.5 and 1.0 m of submerged aquatic vegetation (SAV) at the Test and Control Site, respectively. Calculating the LVS requires the SAV to be ≥ $2m^2$. Therefore, < $2m^2$ indicates there are no floral imbalances attributable to aquatic vegetation as stated in the document, *Implementation of Florida's Numeric Nutrient Standards.* The Linear Vegetative Survey (LVS) at all three sites indicated there were no excessive nuisance plants. It should be noted the aquatic plant community was partially composed of invasive exotic species, *Colocasia esculenta* (wild taro)*, Hygrophila polysperma* (East Indian hygrophila) and *Alternanthera philoxeroides* (alligator weed) (Figure 7).

Stream Condition Index

The SCI scores for all three locations on Elevenmile Creek were in the Healthy category; see Appendix A for a brief explanation of these results. The Test Site SCI (43) was 23% lower than that of the Control Site (56). There were 50% fewer taxa collected at the Test Site (27) than the Control Site (48). In addition, only one species of mayfly was collected at the Test Site compared to 5 species at the Control Site. It should be noted that stoneflies, a sensitive group of taxa normally found in Panhandle streams, were absent from all three sampling sites. The score for Klondike Branch was 55, similar to the Control Site (see Table 4).

Conclusions

This assessment was initiated to determine if water quality violations found in nearby ground water monitoring wells were affecting downstream surface waters. Total nitrogen, although elevated did not appear to impact the downstream biological community. However a second temporally independent assessment would need to be conducted to determine if the Numeric Nutrient Criteria is achieved as stated in the following document, *Implementation of Florida's Numeric Nutrient Standards*. Elevated iron levels also did not appear to impact the biological community at the Test Site below the landfill.

The most obvious adverse impact to the biological community in Elevenmile Creek is sedimentation which was observed below the landfill (Figure 4). Since this was also observed at the Control Site this is most likely due to historical silviculture, previous industrial discharges, dirt roads and storm water inputs in the upper watershed.

Table 1. Physical/Chemical Water Quality and Stream Condition Index (SCI) results for Klondike Landfill Facility study sites collected July 01, and July 2, 2013.

	Control	Test	Klondike Branch	Applicable Class III Water Quality Criteria
SCI Score (Panhandle West)	56 A	43 A	55 A	
Habitat Score	92	95	101	
Temperature Field (˚C)	22.42	23.25	26.6	
Specific Conductance Field (µmhos/cm)	57	65	74	Shall not be increased more than 50% above background or to 1275, whichever is greater.
Dissolved Oxygen Field (mg/L)	7.59	6.96	6.89	
Dissolved Oxygen Field (%)	87.5	81.8	85.8	No more than 10% of the daily average percent DO saturation values shall be below 67%
pH Field	6.40	6.96	6.41	
Turbidity, Nephelometric Turbidity Units (NTU)	3.5 A	4.7	11	≤29 above natural background conditions
TDS (mg/L)	41	48	48	
TSS (mg/L)	4 I	6	11	
Organic Carbon (mg C/L)	2.7	3.2	3.5	
Biochemical Oxygen Demand-5 Day (mg/L)	0.99 I	1.2 I	1.0 I	
Chlorophyll-a Corrected (µg/L)	1.1 I	1.8 I	2.0 I	
Total Phosphorus (mg/L)	0.014	0.019	0.029	* ≤ 0.06
Ortho-Phosphate (mg P/L)	0.004 I	0.010 I	0.006 I	
Nitrate+Nitrite (mg/L)	0.58	0.53	0.52	
Total Ammonia (mg/L)	0.11	0.28	0.59	
Total Kjeldahl Nitrogen (mg/L)	0.28	0.46	0.80	
Total Nitrogen (mg/L)	0.97	1.27	1.91	* ≤ 0.67
Un-ionized Ammonia (mg/L as NH_3)	0.000158	0.00155	0.001166	≤ 0.02
Sulfate (mg SO4/L)	2.4 A	2.7	2.5	
Chloride (mg Cl/L)	7.0 A	7.4	8.1	
Fluoride (mg F/L)	0.035 U	0.035 U	0.035 U	
Color (PCU)	31 A	38 A	41	

Alkalinity (mg CaCO3/L)	8.9	11	15	
Calcium (mg/L)	3.76	4.27	4.41	
Iron (ug/L)	840	1,220	2,220	≤ 1,000
Magnesium (mg/L)	1.26	1.38	1.56	
Potassium (mg/L)	0.65	0.82 I	1.0 I	
Sodium (mg/L)	4.9	4.9	5.4	
Zinc (mg/L)	5.0 U	5.0 U	5.0 U	
Arsenic (µg/L)	0.46 I	0.58 I	0.82 I	≤ 50
Cadmium (µg/L)	0.050 U	0.050 U	0.050 U	
Chromium (µg/L)	0.30 U	0.31 I	0.57 I	
Copper (µg/L)	0.77 I	1.71	0.67 I	
Lead (µg/L)	0.43 I	0.94	0.52 I	
Nickel (µg/L)	0.85 I	1.18	0.94 I	
Silver (µg/L)	0.025 U	0.033 I	0.25 U	
Mercury (µg/L) [EPA 1631E MDL 0.1ng/L]	0.0024	0.0052	0.0090	.012
Fecal Coliform (MF) CFU/100 ml	149	136	96	MPN or MF counts shall not exceed a monthly average of 200, nor exceed 400 in 10% of the samples, nor exceed 800 on any one day. Monthly averages shall be expressed as geometric means based on a minimum of 5 samples taken over a 30 day period.

* Panhandle West nutrient region. **U** – Analyzed for but not detected. **A** – Mean of two or more determinations. **I** – Reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
Values do not comply with Class III Fresh water quality standards, 62-302, F.A.C.

Table 2. Stream Condition Index metric score results, Elevenmile Creek above and below Klondike Landfill, July 1 and 2, 2013. Note: results are an average of 2 replicates except Ephemeroptera, Trichoptera taxa and Total Taxa.

Stream Condition Index Metric	Control Site	Test Site	Klondike Branch
Total taxa	48	27	42
Ephemeroptera taxa	5	1	5
Trichoptera taxa	7	7	6
% Filterer	26	29	38
Long-lived taxa	1	0	1

Clinger taxa	6	6	6
% Dominance	26	27	34
% Tanytarsini	6	1	4
Sensitive taxa	7	6	7
% Very tolerant	3	1	2

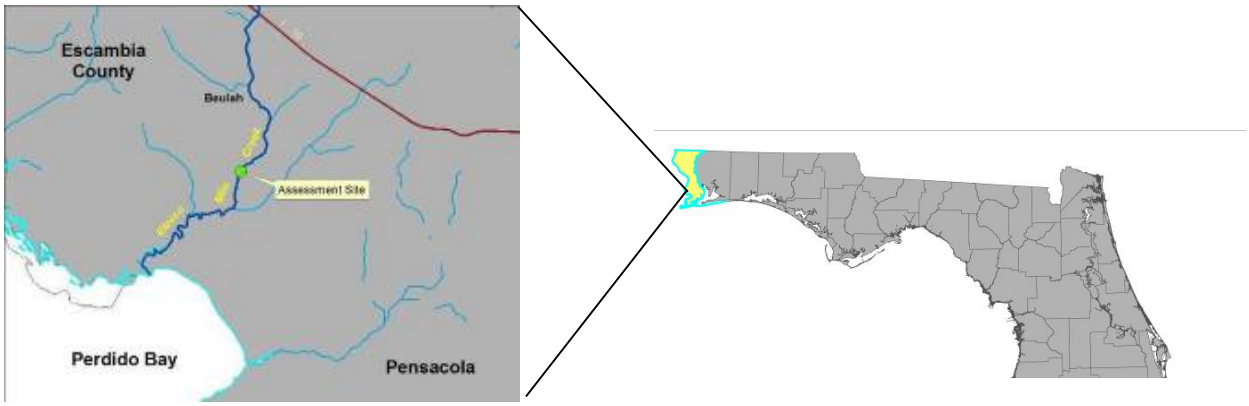


Figure 1. Overview map of study area.

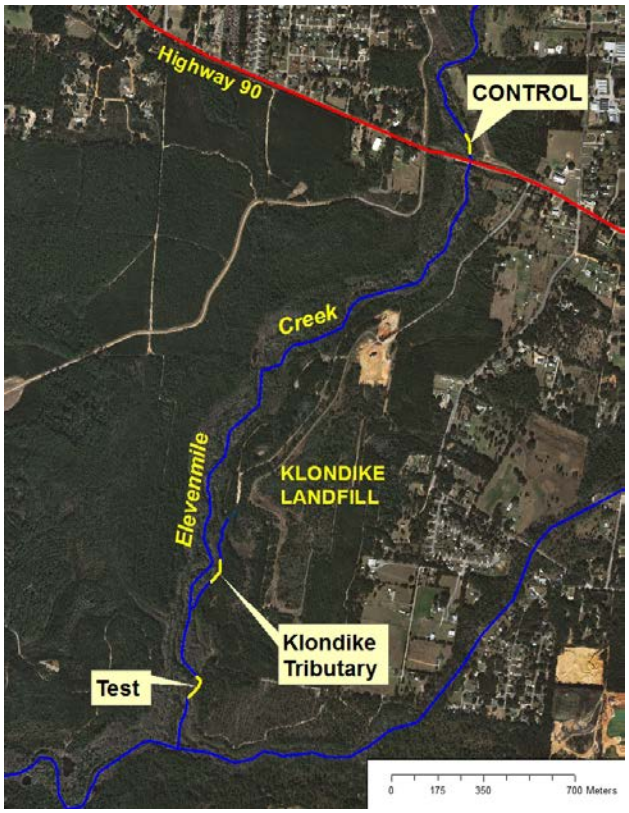


Figure 2. Map of study site and sampling locations on Elevenmile Creek and Klondike Landfill in Escambia County.



Figure 3. SCI site at Elevenmile Cr below Klondike Landfill (Test), July 1, 2013.



Figure 4. SCI location of Elevenmile Cr above Hwy. 90 (Control), July 2, 2013.



Figure 5. Elevenmile Creek SCI Test site July 1, 2013, showing partially buried log.



Figure 6. SCI location of Klondike Branch below monitoring wells, July 1, 2013.



Figure 7. Groundwater iron leachate down gradient of Klondike Landfill on Klondike Branch, July 1, 2013



Figure 8. Wild taro (*Colocasia esculenta*) at the Control Site, July 2, 2013.

Literature Cited

Florida Department of Environmental Protection. Standards and Assessment Section Bureau of Assessment and Restoration Support DEP-SAS-003/1. 2011. Development of Aquatic Life Use Support Attainment Thresholds for Florida's Stream Condition Index and Lake Vegetation Index

http://www.dep.state.fl.us/water/bioassess/docs/attainment-thresholds-sci-and-lvi.pdf

Implementation of Florida's Numeric Nutrient Standards. April 2013. Document Submitted to EPA in Support of the Department of Environmental Protection's Adopted Nutrient Standards for Streams, Spring Vents, Lakes, and Selected Estuaries *Implementation of Florida's Numeric Nutrient Standards*

Appendix A

Table LT 7200-2 Determination of Biological Indices

SCI Score	SCI 2007 Category Name	Example Description
68–100	**Category 1 ("exceptional")**	Higher diversity of taxa than for Category 2, particularly for Ephemeroptera and Trichoptera; several more clinger and sensitive taxa than found in Category 2; high proportion for Tanytarsini; few individuals in the dominant taxon; very tolerant individuals make up a very small percentage of the assemblage.
48–67	**Category 2 ("healthy")**	Diverse assemblage with 30 different species found on average; several different taxa each of Ephemeroptera, Trichoptera, and long-lived and, on average, 5 unique clinger and 6 sensitive taxa routinely found; small increase in dominance by a single taxon relative to Category 1; very tolerant taxa represent a small percentage of individuals, but noticeably increased from Category 1.
35-47	**Category 2 ("healthy")**	Diverse assemblage with 30 different species found on average; several different taxa each of Ephemeroptera, Trichoptera, and long-lived and, on average, 5 unique clinger and 6 sensitive taxa routinely found; small increase in dominance by a single taxon relative to Category 1; very tolerant taxa represent a small percentage of individuals, but noticeably increased from Category 1. **Note:** any score of 35 and above is not impaired using the current interpretation categories.
0–34	**Category 3 ("impaired")**	Notable loss of taxonomic diversity; Ephemeroptera, Trichoptera, long-lived, clinger, and sensitive taxa uncommon or rare; half the number of filterers than expected; assemblage dominated by a tolerant taxon; very tolerant individuals represent a large proportion of the individuals collected.

Appendix B

Macroinvertebrate Taxa List

Control

STORET station	33010013
Sample date	7/2/2013
BenID	42619

Order	Taxon Name	Rep 1NCounted	Rep 2NCounted
Acariformes	Hygrobates	0	1
Amphipoda	Hyalella azteca	14	35
	Crangonyx	1	1
Bivalvia	Sphaeriidae(mollusca)	7	2
Coleoptera	Stenelmis	40	28
	Dubiraphia vittata	2	2
	Microcylloepus pusillus	1	0
	Ancyronyx variegatus	4	4
Diptera	Chironomidae	1	1
	Ablabesmyia hauberi	0	1
	Ablabesmyia mallochi	3	1
	Labrundinia	2	0
	Procladius	0	3
	Cricotopus bicinctus	0	1
	Cryptochironomus	0	1
	Dicrotendipes	0	1
	Paracladopelma	1	0
	Saetheria hirta	0	1
	Stenochironomus	1	0
	Tribelos jucundum	2	2
	Rheotanytarsus pellucidus	0	1
	Palpomyia/bezzia grp.	0	1
	Thienemannimyia grp.	5	2
	Dicrotendipes sp. a epler	0	1
	Polypedilum illinoense grp.	0	1
	Rheotanytarsus exiguus grp.	5	6
	Tanytarsus sp. c epler	1	1
	Cricotopus or orthocladius	0	1
	Tvetenia tshernovskii	4	4
Ephemeroptera	Baetis intercalaris	1	1
	Caenis	1	1
	Acerpenna pygmaea	1	6
	Labiobaetis propinquus	2	0
	Pseudocentroptiloides usa	0	1
Gastropoda	Planorbidae	2	0

	Physa	0	2
Isopoda	Caecidotea	0	2
Lepidoptera	Petrophila	1	0
Odonata	Gomphus dilatatus	0	1
	Neurocordulia molesta	1	0
	Enallagma	2	0
Oligochaeta	Tubificidae	1	1
	Eclipidrilus	1	0
Platyhelminthes	Platyhelminthes	1	2
Trichoptera	Chimarra	0	1
	Cheumatopsyche	14	5
	Hydropsyche mississippiensis	16	13
	Hydroptila	0	1
	Triaenodes	0	1
	Oecetis	0	1
	Nectopsyche candida	3	2

Test

STORET station	33010151
Sample date	7/1/2013
BenID	42649

Order	Taxon Name	Rep 1NCounted	Rep 2NCounted
Acariformes	Hygrobates	2	0
Amphipoda	Amphipoda	1	0
	Hyalella azteca	4	9
Coleoptera	Dineutus	2	1
	Scirtidae	0	1
	Elmidae	21	21
	Stenelmis	20	23
	Ancyronyx variegatus	5	4
Diptera	Simulium	3	2
	Atrichopogon	3	6
	Ablabesmyia mallochi	2	0
	Pentaneura inconspicua	1	1
	Tribelos jucundum	1	0
	Hemerodromia	2	3
	Thienemannimyia grp.	3	0
	Rheotanytarsus exiguus grp.	0	2
	Cricotopus or orthocladius	0	2
	Tvetenia tshernovskii	9	10
Ephemeroptera	Baetidae	5	7
	Acerpenna pygmaea	6	3

Heteroptera	Mesovelia	0	2
Odonata	Gomphidae	1	1
	Coenagrionidae	6	1
Trichoptera	Trichoptera	1	0
	Chimarra	0	2
	Hydropsychidae	2	0
	Cheumatopsyche	39	35
	Hydropsyche	1	0
	Hydroptila	7	6
	Oecetis persimilis	2	1
	Oecetis georgia	0	2
	Nectopsyche	5	4

Klondike Branch

STORET station	33010152
Sample date	7/1/2013
BenID	42658

Order	Taxon Name	Rep 1NCounted	Rep 2NCounted
Acariformes	Hygrobates	0	2
	Acariformes	0	1
Amphipoda	Amphipoda	2	0
	Hyalella azteca	3	2
	Crangonyx	1	0
Bivalvia	Sphaeriidae(mollusca)	0	1
Coleoptera	Dineutus	2	5
	Scirtidae	2	0
	Elmidae	21	12
	Stenelmis	33	30
	Dubiraphia vittata	0	1
	Ancyronyx variegatus	1	0
Decapoda	Cambaridae	1	0
Diptera	Simulium	10	13
	Atrichopogon	1	0
	Chironomidae	2	1
	Ablabesmyia mallochi	0	1
	Stenochironomus	1	3
	Tribelos jucundum	5	1
	Paratanytarsus	0	1
	Rheotanytarsus pellucidus	2	1
	Thienemannimyia grp.	1	6
	Polypedilum scalaenum grp.	0	1
	Polypedilum illinoense grp.	1	2

	Rheotanytarsus exiguus grp.	5	2
	Tvetenia tshernovskii	3	3
Ephemeroptera	Baetidae	2	1
	Caenis	0	1
	Acerpenna pygmaea	2	2
	Labiobaetis propinquus	0	1
	Maccaffertium exiguum	1	0
	Maccaffertium smithae	1	0
Isopoda	Caecidotea	6	3
Nemertea	Prostoma	0	1
Odonata	Boyeria vinosa	0	1
	Libellulidae	0	1
	Coenagrionidae	0	1
	Enallagma	2	0
Oligochaeta	Tubificidae	1	1
Platyhelminthes	Platyhelminthes	0	1
Trichoptera	Chimarra	1	1
	Hydropsychidae	0	3
	Cheumatopsyche	28	47
	Oecetis georgia	1	0
	Nectopsyche exquisita	3	4
	Nectopsyche pavida	0	1
	Oecetis inconspicua cmplx.	1	1