Horse Creek
Watershed Management Plan

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Summary

In 2012, a study was begun on the Horse Creek watershed in Telfair County to follow-up on two previously completed reports in 2007 and 2009 detailing TMDL information. Specifically, this study was to review any current sediment loading, potential sources of loading and possible remedies to prevent future loadings. Sediment has been determined by these studies to be having a negative impact of fish habitat. Legacy sediments, sediments already in the stream from past actions, are recognized in these studies.

Monitoring began in 2013 for turbidity, temperature, settleable solids, and conductivity. Visual stream assessments were also conducted. All data was recorded on the GA Adopt-A- Stream website. Monitoring results overall have indicated very low turbidity, low conductivity, and minimal settleable solids. Temperature has been variable with the season, but not excessive or out of range for conditions.

A review was made on agricultural lands, forestland, residential/urban land and unpaved roads. Agricultural and forest land areas have opportunities for improvement, but they are not the major contributors of sediment in the watershed.

Unpaved roads represent the largest contributors of sediment in the watershed. Many efforts have been made to reduce this impact, but there are many extenuating circumstances and challenges to address before the problems can be resolved.

Stream Selection

The "Total Maximum Daily Load Evaluation for Seventy Stream Segments in the Ocmulgee River Basin for Sediment (Biota Impacted)" was developed in January 2007. This report states that 12 miles of Horse Creek in the lower Ocmulgee Basin is partially supporting its designated use due to stream sedimentation. The report requires a sediment load reduction of 41 .3%. Sources of sediment sited in the plan include agriculture, silviculture, roads, and urban development.

The TMDL Implementation Plan for the Altamaha, Ocmulgee, and Oconee River Basins for sediment dated June 15, 2009 (single document) states that the current loading is above the TMDL. It also states that a more detailed assessment of the potential sources of sediment is needed. The existing TMDL Implementation Plan recommends the formation of a stakeholders group to develop management measures for addressing sediment pollution in the watershed. Monitoring is also recommended to link the water quality impairment to specific sources and source areas in the watershed.

This project will extend the watershed plan that was previously discussed to include all areas of the HUC 10 (0307010407-Horse Creek). As a result, a Comprehensive Watershed Management Plan utilizing the USEPA's *Nine Key Elements of Watershed Planning* will be developed to identify the various sources of impairment throughout the entire watershed and will serve as a guide on how to address them and achieve attainment of the water quality standards for its designated use. Upon completion of the plan, the Pine Country Resource Conservation & Development Council (RC&D) will begin implementation utilizing Best Management Practices as recommended in the plan.

As written, the existing TMDL Implementation Plan dated June 2009 has insufficient information to initiate a successful effort to delist this stream segment

Stakeholder Committee

A stake holder was formed to assist with data collection and evaluation of activities in the watershed.

Members of the committee consisted of local landowners familiar with the watershed and technical specialist with the Natural Resources Conservation Service (NRCS), Georgia Forestry Commission (GFC), Georgia Soil and Water Conservation Commission (GSWCC), Telfair County road superintendent, and others.

An initial meeting was held on June 5, 2012 in McRae to organize the group and explain the activities to be undertaken with the watershed planning process. The EPD grant with Pine country RC&D was explained as well as all deliverables and required water quality monitoring.

There was a discussion about existing data in the watershed, potential sources of new data that could be available for review, and the critical need for local input. Maps of the watershed were reviewed citing the water quality monitoring sites, overall land use in the watershed, and the segments of the stream that are impaired according to current data.

Additionally a presentation of the project was made to the entire Altamaha Soil and Water Conservation District board on October 29, 2012 in Hazlehurst, Georgia.

Members of the Stake Holder Committee are:

Charles White	Telfair County Road Department
Bryan Snow	Snow Forestry Consulting
Keith Granger	NRCS
Zac Railey	NRCS
Jay Foskey	GFC
William Dopson	Landowner
Allison McGee	Nature Conservancy
Doug Williams	Landowner
William Cameron	Landowner
Travis Cook	Pine Country RC&D/Altamaha Soil and Water District/Landowner

Source Assessment

The major impairment in the Horse Creek watershed as described by previous reports and sampling has been determined to be sediment. Fish habitat has been impaired by the amounts of sediment present in the stream according to data in the January 2007 report.

The preliminary assumption is that much of this sediment was a result of agricultural operations in prior years. There is recognition in the report that legacy sediments remain in the stream and continue to have a negative impact on fish habitat.

Stakeholders were advised to assist in identifying any current sources of sediment loading that may be occurring in the watershed area. Additionally, the contractors have undertaken on- the- ground reviews throughout the watershed to determine any current sediment loading sites or potential sites.

Water quality monitoring according to the monitoring plan was anticipated to provide data that would and assist in identifying the impacts of sediment loading. However due to extended drought during the initial monitoring period, there was no streamflow, and therefore no opportunity to collect water quality data for monitoring from June through December 2012. Subsequent rainfall events did generate streamflow and monitoring has progressed normally as initially planned in the monitoring plan.

Drought conditions at the beginning of this project are evidenced by the completely dry streambeds - July 2012

Bo Bannister gathering sample- Jan 2013

David Ferrell recording measurements- Jan 2013

In the absence of water quality monitoring data early in the process, the contractors have relied heavily on visual data in the watershed, photographic evidence of landowner activity, input from natural resource agencies, and various data of activities in the watershed over the last four years. Now that monitoring data is available, this information will be incorporated into the final discussions and conclusions for the overall watershed plan.

Monitoring Results

A specific water quality monitoring plan was developed and approved for this watershed by EPD. Training was provided to the contractors and volunteers by Adopt-A- Stream personnel. Monitoring equipment was procured by Pine Country RC&D per recommendations by Adopt-A- Stream.

Eight monitoring events occurred and were recorded on the Adopt-A- Stream database. Only three of the eight events resulted in water actually being tested due to drought. One of the three events with water was at a full flood stage.

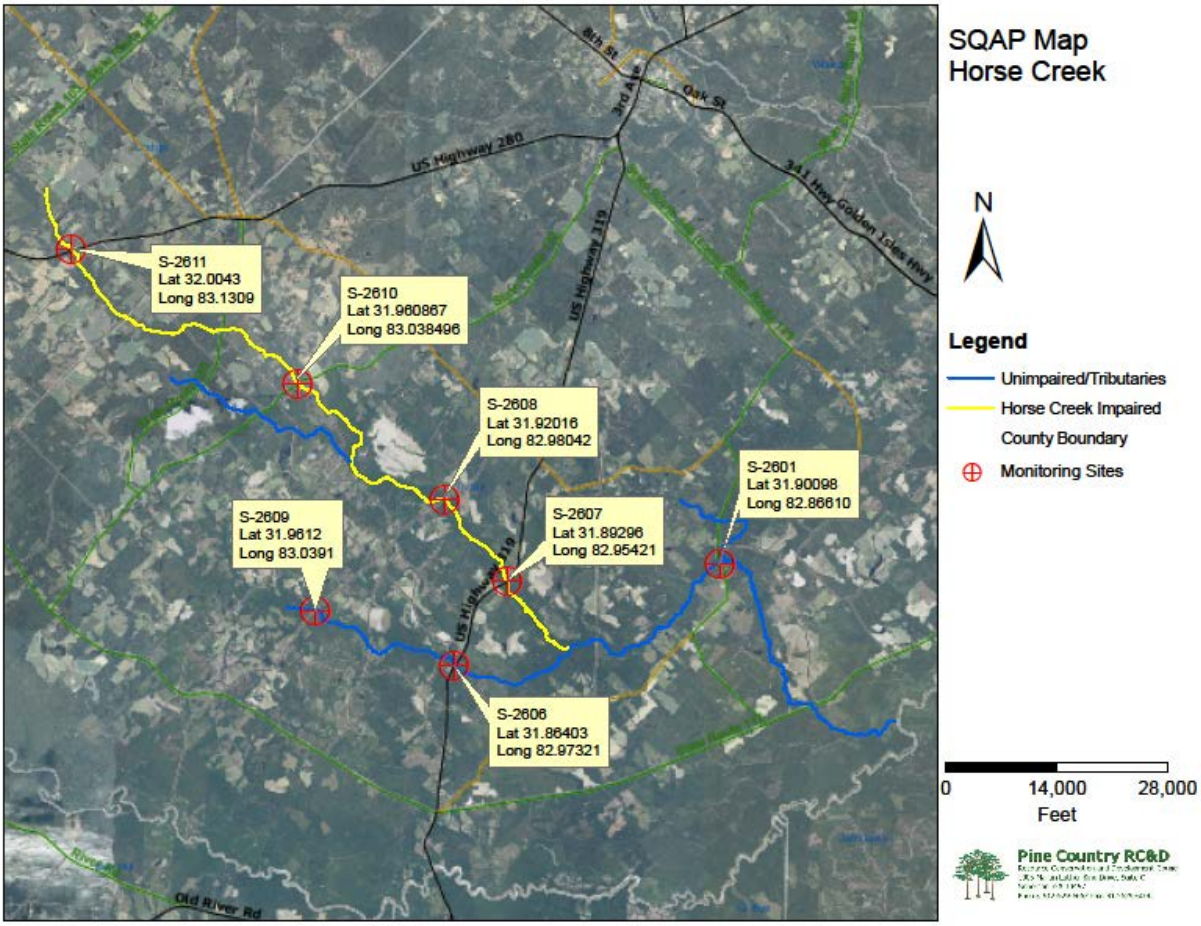
The data recorded indicates minimal levels for all parameters. One parameter, settleable solids, failed to ever result in a measureable quantity. Other parameters are well within tolerable guidelines and none would be considered excessive.

Visual stream assessments were also conducted. No negative items were observed at the sites. All were well vegetated by large trees and had well-protected floodplains. Vegetation generally was generally not diverse in term of height. Forbs and grasses were not prevalent due to shading by the larger trees. Some in-stream annual vegetation was present on sandbars and would be typically subjected to flood events.

Field training being conducted by Adopt-A-Stream personnel

	Horse Creek W/S		inches/ hours	°C		mg/L or ppm	µs/cm	NTU
	Event ID	Event Date	Rain	Air Temp	Water Temp	Settleable Solids	Conduc-tivity	Turbidity
S2601	32088	07/26/12	0.0 / 168					
S2601	33083	09/26/12	0.0 / 168					
S2601	33068	09/26/12						
S2601	33082	11/16/12	0.0 / 168					
S2601	33397	12/18/12	1.0 / 72					
S2601	33878	01/28/13	0.0 / 336	12.6	11.4	0.0	80.0	1.7
S2601	34587	03/26/13	2.0/72	10.1	9.7		40.0	9.7
S2601	35500	06/19/13	0.0 / 168	27.5	25.1	0.0	70.0	4.3
S2601	36240	08/22/13	4.0 / 120	24.8	24.3	0.0	40.0	5.8
S2606	32093	07/26/12	0.0 / 168					
S2606	33093	09/26/12	0.0 / 168					
S2606	33070	09/26/12						
S2606	33092	11/16/12	0.0 / 168					
S2606	33071	11/16/12						
S2606	33402	12/18/12	1.0 / 72					
S2606	33879	01/28/13	0.0 / 336	13.3	11.5		80.0	2.0
S2606	34592	03/27/13	2.0 / 72	10.0	9.6	0.0	50.0	8.9
S2606	35505	06/19/13	0.0 / 168	29.1	24.7	0.0	70.0	5.0
S2606	36241	08/22/13	4.0 / 120	26.1	24.7	0.0	50.0	10.0
S2607	32094	07/26/12	0.0 / 168					
S2607	33095	09/26/12	0.0 / 168					
S2607	33072	09/26/12						
S2607	33094	11/16/12	0.0 / 168					
S2607	33073	11/16/12						
S2607	33403	12/18/12	1.0 / 72					
S2607	33880	01/28/13	0.0 / 336	12.4	10.6	0.0	100.0	1.8
S2607	34593	03/26/13	2.0 / 72	7.8	9.6		50.0	7.8
S2607	35506	06/19/13	0.0 / 168	29.4	25.2	0.0	90.0	4.1
S2607	36242	08/22/13	4.0 / 120	25.8	24.7	0.0	50.0	9.8
S2608	32095	07/26/12	0.0 / 168					
S2608	33097	09/26/12	0.0 / 168					
S2608	33074	09/26/12						
S2608	33096	11/16/12	0.0 / 168					
S2608	33075	11/16/12						
S2608	33404	12/18/12	1.0 / 72					
S2608	33881	01/28/13	0.0 / 336	16.0	12.0		120.0	1.6
S2608	34065	02/19/13	8.0 / 336	13.1	8.8	0.0	80.0	5.8
S2608	34594	03/27/13	2.0 / 72	11.7	10.0		50.0	11.1
S2608	35507	06/19/13	0.0 / 168	27.7	24.5		120.0	10.6
S2608	36243	08/22/13	4.0 / 120	27.8	25.3	0.0	60.0	10.7
S2609	32096	07/26/12	0.0 / 168					
S2609	33099	09/26/12	0.0 / 168					
S2609	33076	09/26/12						
S2609	33098	11/16/12	0.0 / 168					

	Horse Creek W/S		inches/ hours	°C		mg/L or ppm	µs/cm	NTU
	Event ID	Event Date	Rain	Air Temp	Water Temp	Settleable Solids	Conduc-tivity	Turbidity
S2609	33077	11/16/12						
S2609	33405	12/18/12	1.0 / 72					
S2609	33882	01/28/13	0.0 / 336					
S2609	34066	02/19/13	8.0 / 336	13.1	9.2	0.0	60.0	7.0
S2609	34595	03/27/13	2.0 / 72	11.7	9.9		50.0	6.9
S2609	35508	06/19/13	0.0 / 168	30.5	24.7	0.0	70.0	5.4
S2609	36244	08/22/13	4.0 / 120	27.8	25.7	0.0	50.0	8.1
S2610	32097	07/26/12	0.0 / 168					
S2610	33101	09/26/12	0.0 / 168					
S2610	33078	09/26/12						
S2610	33100	11/16/12	0.0 / 168					
S2610	33079	11/16/12						
S2610	33406	12/18/12	1.0 / 72					
S2610	33883	01/28/13	0.0 / 336					
S2610	34067	02/19/13	8.0 / 336	12.7	9.2	0.0	90.0	5.3
S2610	34596	03/27/13	2.0 / 72	12.2	10.2	0.0	60.0	5.5
S2610	35509	06/19/13	0.0 / 168	27.2	24.7	0.0	100.0	5.1
S2610	36245	08/22/13	4.0 / 120	26.7	25.3	0.0	70.0	7.9
S2611	32098	08/16/12						
S2611	33103	09/26/12	0.0 / 168					
S2611	33080	09/26/12						
S2611	33102	11/16/12	0.0 / 168					
S2611	33081	11/16/12						
S2611	33407	12/18/12	1.0 / 72					
S2611	33884	01/28/13	0.0 / 336					
S2611	34068	02/19/13	8.0 / 336	13.7	10.2		110.0	5.1
S2611	34597	03/27/13	2.0 / 72	12.8	10.2		90.0	9.2
S2611	35510	06/19/13	0.0 / 168	25.6	24.7	0.0	130.0	9.3
S2611	36246	08/22/13	4.0 / 120	26.7	25.7	0.0	110.0	7.6


SQAP Map
Horse Creek
N
Legend
Unimpaired/Tributaries
Horse Creek Impaired
County Boundary
Monitoring Sites
S-2611
Lat 32.0043
Long 83.1309
S-2610
Lat 31.960867
Long 83.038496
S-2608
Lat 31.92016
Long 82.98042
S-2601
Lat 31.90098
Long 82.86610
S-2609
Lat 31.9612
Long 83.0391
S-2607
Lat 31.89296
Long 82.95421
S-2606
Lat 31.86403
Long 82.97321
US Highway 280
US Highway 319
Oak St
3rd Ave
8th St
Old River Rd
0
14,000
28,000
Feet
Pine Country RC&D

Assessment and Characterization of Current Conditions

As previously mentioned, in the absence of water quality monitoring data in the first six months of the project, the contractors undertook a detailed on- the- ground review of activities within the watershed. The purpose of this review was to define visually those activities in the watershed that may be contributing to current sediment loading. Also, the review would document activities that may have been undertaken since the January 2007 report to prevent sediment loading.

Physical Features

Soils

USDA-Natural Resources Conservation Service completed a soil survey of this county and data is available online and at local field offices. Soils in this watershed consist mainly of a Tifton-Fuquay association. These are well drained soils that have a sandy or loamy sand surface layer and a loamy subsoil or that have a sandy surface layer and a thick sandy subsurface layer. Floodplain soils are comprised of the Kinston-Bibb association and are nearly level and poorly drained. The soils are loamy throughout or have a loamy surface layer and sandy subsoils. Inclusions of minor soils occur throughout both associations in the watershed.

Climate

Average annual rainfall in the watershed is 46.4 inches. Of this, about 66 percent falls in March through October. Thunderstorms occur about 55 days each year, mostly between the months of May and August. The winter average temperature is 48.2 degrees with an average minimum temperature of 36.8 degrees. Summer average temperature is 79.7 degrees with an average maximum temperature of 90.9 degrees. Growing seasons can range from 250-275 days depending on temperature extremes.

Physiography

The watershed is located in the Southern Coastal Plain Major Land Resource Area. Elevations range from 120 feet at the southern end of the watershed to approximately 250 feet at the northern end. The area consists of mostly broad nearly level soils on ridgetops and gently sloping soils on the hillsides. Slopes are irregular and both concave and convex. Drainage patterns are dendritic, and there are numerous small drainageways. Floodplains are generally narrow, but increase in width as one moves downstream. The floodplains commonly overflow in the spring and winter months for brief periods of time.
As previously mentioned, in the absence of water quality monitoring data in the first six months of the project, the contractors undertook a detailed on- the- ground review of activities within the watershed. The purpose of this review was to define visually those activities in the watershed that may be contributing to current sediment loading. Also, the review would document activities that may have been undertaken since the January 2007 report to prevent sediment loading.

Habitat

The habitat in the watershed supports a diverse mix of wildlife and plant species. Game species include deer, dove, duck, turkey and quail. Wild hogs are an increasing problem throughout the area. Threatened species in the watershed include the gopher tortoise and the indigo snake. Local residents fish in the stream and harvest bream and catfish

Wetlands

Wetlands occur in the watershed mainly adjacent to the drainiageways. There are very few, if any, isolated wetlands in the watershed. Numerous ponds occur throughout the watershed on the tributaries and their headwaters.

Conservation Activity

Data from NRCS was utilized to document conservation practices that were installed by farmers in the watershed area utilizing farm bill conservation programs.

Data from 2009 through 2013 is shown below. The data is from the 8- digit hydrologic unit boundary and is the most detailed available on a hydrologic unit basis from the NRCS reporting system.

HC											
Year	Location	0.10 - Conservation plans written (Ac.)	1.10 - Cropland with conservation applied to improve soil quality (Ac.)	2.10 - Land with conservation applied to improve water quality (Ac.)	2.11 - CNMP written (No.)	2.12 - CNMP applied (No.)	2.20 - Land with conservation applied to improve irrigation efficiency (Ac.)	3.11 - Grazing land with conservation applied to protect and improve the resource base (Ac.)	3.21 - Non-Federal land with conservation applied to improve fish and wildlife habitat quality (Ac.)	3.40 - Forest land with conservation applied to protect and improve vegetative condition (Ac.)
										*
2009	03070104	12,609	10,986	14,594	1		2,826	4,905	2,332	*
2010	03070104	20,817	11,646	14,194	1		5,174	817	4,445	2,269
2011	03070104	22,545	11,724	13,406	1	1	2,777	955	4,758	6,514
2012	03070104	19,439	12,808	15,419	2	2	4,527	2,216	4,631	1,437
2013**	03070104	16,600	15,674	19,819			3,591	2,415	7,184	8,122

* - NRCS did not report this data in these years.
**- Data current through July 22, 2013. Official reporting period ends Sept. 30, 2013
Source: NRCS Progress Reporting System (PRS)

Conservation tillage with a good crop residue cover.

Information from the GFC was utilized to determine BMP compliance on forestry activities within the watershed. Since the watershed area is approximately 75% forest land use, this information is significant.
http://www.gfc.state.ga.us/forest-management/water-quality/bmps/2011BMPSurveyResults.pdf

Information from the 2011 Regional Water Council meetings was also reviewed for the regional area that includes the Horse Creek watershed. This review was conducted to determine if there was any information revealed by the contractors or the public during various meetings that would be significant to this watershed planning process. No significant new information was revealed from this source.

Land Use

Land use changes within the watershed have not been significant over the last 10 years. The land use continues to be approximately 75% forest land, 15% agricultural land, and the remainder in rural infrastructure and residences. There are no EPD permitted point sources of discharge into Horse Creek.

Agricultural lands

Agricultural lands have the potential to be a source of sediment load since there is activity on them on an annual basis for the production of crops. However, over the last 10 years there has been an emphasis by farmers towards reduced tillage operations and cover crops as components of crop production. These activities have the effect of reducing sediment loading, not increasing it. Additionally, since the 1985 farm bill, there have been significant constraints related to impacts and clearing of wetlands related to agricultural activities. Therefore minimal acres have been cleared that would have the potential to negatively impact water quality.

However, agricultural production is a dynamic and constantly changing process necessary to incorporate cultural and technological changes. In the last three years, there has been the discovery and confirmation of a glyphosate- resistant pigweed. This event has caused some producers to revert back to a clean-tillage regimen until the weed is back under control. Other producers are investing in new crop varieties that have different weed control protocols to assist with pigweed control.

More producers are adopting GPS technology in their operations. This technology has the effect of reducing excessive overlap in the application of chemicals and fertilizers.

There has been some increase in agricultural acres to facilitate the presence of center pivot irrigation and also crop production due to recent increases in crop prices. However, these acres have been minimal in number and have been located away from stream banks and wetlands. At least one situation was observed where there was a major impact to a county unpaved road that contributed to additional runoff and sediment. The county is working with the landowner on this situation.

Farm Bill programs have provided significant funding to undertake other activities such as fencing out livestock from stream areas and providing alternative water sources. Removing livestock from stream areas can have a positive effect on stream bank stabilization and vegetation. Additionally, there are other reductions related to nutrients and fecal coliform.

Livestock watering facility to meet water requirements and get livestock out of the stream.

The Conservation Reserve Program (CRP), administered by the Farm Service Agency (FSA), has had the effect of removing some agricultural lands from production. These acres have been planted to pines and/ or native grasses for a minimum of 10 years and a maximum of 15 years. Sediment yield from these acres has essentially been reduced to almost zero as calculated by RUSLE. For established forestland, RUSLE generally calculates a value less than one ton per acre of soil loss.

Forestlands

Forestland constitutes approximately 75% of the watershed area. It is predominantly owned by private individuals, but there are some corporate and state-owned lands as well. The forests are generally managed with an economic motive that includes site preparation, planting, thinning and clearcutting. These activities occur on a 20 to 40 year rotation, depending on landowner objectives and economic drivers. Activity on any given acre is generally very intermittent, possibly once in every 5-10 years.

The single activity that has the most potential to contribute sediment loading on forest land is crossing streams during road construction or timber harvesting. Another activity that moves sediment is the tracking of material by vehicles from an unpaved woods road onto a paved surface during wet periods.

The GFC is the lead State agency responsible for monitoring non-point source pollution on forestland and addressing complaints from the public related to forestry activities. GFC has produced a Best Management Practices (BMP) manual for forestry activities that describes practices to minimize negative impacts to water quality. Additionally, they

conduct training courses throughout the state to train Master Timber Harvesters, foresters and landowners. Registered foresters licensed by the Secretary of State are also required to follow BMP's in the course of their activities.

GFC conducts BMP surveys every two years to assess compliance of forestry activities to BMP's. Typically there is a very high compliance rate, generally in the 98% range for most practices according to the most recent 2013 report. The practice in least compliance is stream crossings. However, it is still in 92.5% compliance and has improved three percent since the 2011 survey. According to the 2013 report, most deficiencies occurred in north Georgia, and the use of skidder fords and debris crossings, which are not approved BMP's, has decreased. Opportunities exist to improve culvert sizing, culvert placement, and stream approach design according to the report. Some opportunities exist as well to improve forest roads with proper installation of water diversions and reshaping of roads following harvesting operations.

http://www.gfc.state.ga.us/forest-management/water-quality/bmps/2013BMPSurveyResults.pdf

None of the 2013 sites surveyed in Telfair County occurred in the Horse Creek watershed.

Pine trees planted on a site that has received minimal site preparation activity to disturb the soil.

This clearcut forestland has been chemically site prepared and planted with a V-blade dozer with minimal soil disturbance.

Due to both economic demand and the prevalence of dry weather, there has been harvesting in the watershed area of hardwoods in some of the floodplain areas. The dry weather has allowed harvesting to take place with minimal impacts, and the use of track equipment has minimized rutting. Additionally, streamside management areas (SMZ's) have been maintained per BMP protocol on sites that were observed.

Overall, forest activities have a very minimal impact on sediment loading in the watershed. As described above, there is some opportunity to improve stream crossings and forest roads.

Residential/Urban

There are no urban areas in this watershed. There are several concentrated residential areas that don't present any sediment related issues, but may pose other water quality issues. There are no public sewer or wastewater treatment facilities in the watershed.

Unpaved Roads

There are over 100 miles of unpaved roads in the Horse Creek watershed. Many of these roads have been in place since the county was settled, and have eroded to grades below the elevation of adjacent lands. When a runoff event occurs, oftentimes water and sediment cannot be diverted off of the road until it approaches a stream crossing. Typical maintenance of the road surface involves the use of motor graders to reshape ditches, bring soil material up onto the road surface, and re-crown the road. Where possible, turnouts are used to try and get water and sediment off of the road before it reaches the stream, but this is not always possible.

Another source of sediment is improperly sized culverts at road crossings. When a storm event takes place, and a culvert is too small, water overtops the road and in some cases washes the road away. The resultant sediment then becomes part of the load in the stream as it is generally infeasible to try and recover it.

Another source of sediment that is most evident on high-clay-content sites is tracking of material from an unpaved surface to a paved surface during wet periods. Once material is on the paved surface, it is easily moved downhill by water. This movement does not always result in direct entry into a stream as some of the material is intercepted by roadside vegetation.

Telfair county road maintenance personnel did participate in a statewide Better Back Roads program. The purpose of the program was to inform and educate operators about BMP's that could be used in unpaved road maintenance to improve and protect water quality. Pine Country hosted two workshops. The May 30, 2012 workshop held in McRae, Georgia included two employees of the Telfair County Road Department.

The spring of 2013 yielded several rainfall events in close proximity dumping approximately 15 inches of rain in the county. A review of some of the unpaved roads with the county road superintendent on April 9, 2013 revealed specific problems in the watershed that contribute to sediment loading. Most of these situations were not "new" problems, but rather have been repetitive issues with major rainfall/runoff events. Lack of right-of-way and private property concerns severely limit potential solutions in many cases. Some other situations can be improved with properly sized culverts, rip rap, and protected outflows.

Water traveling down a long slope will be discharged at the stream channel

This pipe was recently placed after this crossing washed out following a storm event.

The pipe is currently undersized, but represents a typical "fix".

The county road is receiving sediment from an adjacent land clearing operation. The landowner and county are working to resolve the problem.

An example of a water turnout at the bottom of the hill that directs the water into the stream.

Like many roads, the roadbed elevation is lower than the surrounding area. Water and sediment can only travel in the ditches until it reaches the steam at the bottom of the hill.

Recommended Management Measures

Agricultural Land

Cropland represents a potential source of sediment because it is disturbed annually and is subject to impacts by high intensity summer rainfall events. Basic science indicates that erosion is a three-step process, detachment of soil particles, transport, and deposition. Any conservation measure that prevents one of these steps is useful in controlling sedimentation.

Many conservation measures are very effective at controlling sedimentation and are utilized by farmers. Practices such as conservation tillage, crop residue management, cover crops, field borders and contour farming offer many benefits.

The use of cover crops and crop residue are effective methods to control erosion.

Field borders, especially along county unpaved roads, could provide extensive benefits. However, there are very few examples of where this practice is in place at the present time. Some barriers to implementation may be crop prices, land rents, practice establishment, or lack of desire.

Borders along woodland areas are already effective as evidenced by a sediment build-up at the field edge. Sediment is being trapped before it can get to the stream. Likewise, many nutrients are also being trapped at this same edge and are being utilized by the vegetation.

As mentioned earlier, many producers have fenced livestock out of the streams and have installed alternative watering facilities for livestock. NRCS cost-share programs have been effective and useful in this effort. There are other producers who have not taken these steps yet for whatever reason. They represent a pool of potential adopters of this practice if they can be educated and if the practice fits their farming operation.

In some situations, a land use change may be the best option to prevent erosion. Planting a field to grass or trees may be the best solution.

Forestland

As previously mentioned, forestland is the largest land use in the watershed by area. However, soil disturbing activity on forestland generally occurs on a fairly wide time interval, maybe only two or three times in a 30-year period.

Site preparation for tree planting is generally regarded to be the most soil disturbing activity on forestland. However, recent trends would suggest that the amount of soil disturbance may be diminishing. Chemical site preparation is very common, and the use of V-blade equipped dozers for planting is not uncommon.

Stream crossings on forestland have yet to be adopted on a wide scale, and they are the practice that can be most closely associated with steam impacts. Timber companies have been the early adopters of this practice in the watershed. Private landowners have been less eager to install the practice due to cost and the lack of available cost-share funding. However, the practice is extremely important as part of an overall road maintenance program that will enhance access for harvesting, site prep, recreation and routine inspection.

Residential/Urban

There is little residential and/or urban expansion in this watershed. Single family residences are the norm. Other than insuring proper septic system installation and proper erosion control during construction, there are no recommended specific measures for this land use.

Unpaved Roads

By far, unpaved roads represent the largest contributors of sediment in the watershed. They also represent the largest challenges in terms of specific solutions. Many of the situations reviewed can be improved upon with technical solutions such as larger culverts, plunge pools, culvert headwalls and such. Other conditions will require political effort such as securing proper right-of-ways, and deciding where to spend public finds for paving of repetitive problem areas. Additional coordination may need to be undertaken with GADOT and others for specific financial and technical assistance.

There is evidence in the watershed of specific effort to improve conditions where possible. The use of recycled asphalt road millings has had a positive impact in specific areas where it has been placed. Cleaning out culverts to improve water flow has prevented road blowouts. There even has been an attempt to remove sediment out of the stream in certain locations.

Recycled asphalt road millings placed on this steep clay slope have improved access and reduced sedimentation and maintenance requirements.

In the near term, specific BMP's such as plunge pools, culvert headwalls, proper culvert sizing, and road surface treatments could provide positive examples of potential solutions to some of the problems. However, the long-term solution will have to be a more comprehensive review of specific problem locations and a plan to commit necessary resources to solve the problems.

Management Measure Selection

A variety of practices were reviewed where the primary purpose is sediment control or reduction. These practices are applicable sometimes to specific land uses and other times across a broad spectrum of land uses. The following table was constructed to provide specific information and limitations for the various practices. A numeric ranking method

of 1-5 was utilized, with 1 representing the best or most positive and 5 representing the least desirable condition. Practices selected for use cannot always have a "1" rating in all categories. Cost, maintenance, or other on-site conditions may cause a practice to have some ratings less than 1, but when considered overall, the practice may be the most effective over time and for the condition being treated.

The practices listed in the table below represent practices that could be used by landowners in the watershed and adjacent areas. They have various levels of adoption by land users depending on their objectives, costs, management skills and other variables. The practices are effective in controlling sediment when properly installed and maintained, and sometimes there are additional added benefits.

Management Measures Ranking

Management measure and Practice number	Estimated Effectiveness (Rank 1-5) *	Cost Effectiveness (Rank 1-5) *	Maintenance (Rank 1-5) *	Added Benefits (Rank 1-5) *	Additional Comments
Access Road (560)	1	4	3	2	Good access provides other opportunities for positive management
Conservation Cover (327)	1	1	1	2	Additional cover for wildlife
Contour Farming (330)	2	1	1	3	May still require measures to address concentrated flow.
Critical Area Planting (342)	1	5	4	3	May provide additional wildlife and /or pollinator habitat
Diversion (362)	1	2	3	5	
Field Border (386)	2	2	2	2	May provide additional wildlife and /or pollinator habitat
Grassed Waterways (412)	1	5	5	4	Difficult to establish and maintenance is critical for success. Very effective at controlling sheet and rill erosion.
Pasture Planting (512)	1	2	2	2	Provides options for both hay and grazing.
Residue and Tillage Management (329)	2	2	1	2	May provide additional wildlife and /or pollinator habitat. Requires a

					high level of timeliness and management. Effective at the point of collection.
Sediment Basin(350)	2	4	4	2	Maintenance required to ensure effectiveness.
Stream Crossing (578)	1	3	2	2	Durable practice with only minor maintenance required
Structure for water Control (587)	1	3	2	2	Properly installed structures will protect road crossings and prevent sediment delivery from blowouts.
Terraces (600)	3	3	4	5	Only reduces slope length and slows watr velocity.
Tree planting (612)	1	2	2	1	Additional water quality and wildlife habitat benefits

* Rank
1=best
5=worst

Implementation Plan

Task	Responsible Agency	Measure	Milestone
Goal: Implement Best Management Practices to reduce sedimentation loading by 41% in order to meet water quality standards.			
Objective 1: Reduce sedimentation loading at agricultural sites			
Task 1: Identify additional critical areas in watershed	NRCS/GFC/Telfair County Commissioners/Pine Country RC&D	BMP's installed	All new producers identified.
Task 2: Contact producers for participation in cost-share programs	NRCS	Increase in applications received for NRCS cost share programs	50% increase in applications
Task 3: Install BMP's	NRCS	Number of BMP's installed	50% increase in BMP installation as a result of NRCS cost share programs
Objective 2: Reduce sedimentation loads from forestry sites			
Task 1: Identify timber producers in watershed	GFC/NRCS	Percentage of producers identified	All landowners identified.
Task 2: Contact producers for participation in cost-share programs	NRCS	Increase in applications received for NRCS cost share programs	50% increase in applications
Task 3: Install BMP's	NRCS	Number of BMP's installed	50% increase in BMP installation as a result of NRCS cost share programs
Objective 3: Reduce sedimentation loading unpaved roads.			
Task 1: Identify critical unpaved roads	Telfair County Commissioners/Pine Country RC&D	BMP's installed	All roads identified.
Task 2: Install BMP's.	Telfair County	Number of BMP's installed	50% increase in BMP's installed
Objective 4. **Monitor water quality to determine priority areas**.			
Task 1: Continue annual AAS training for watershed volunteers	Pine Country RC&D/GA EPD	Percentage of members attending training	All members certified.
Task 2: Conduct pre and post BMP monitoring by AAS qualified volunteers	Pine County RC&D	Number of Samples collected	50 samples tested

PUBLIC INVOLVEMENT

The public has been involved in this watershed planning process since the first organizational meeting of the steering committee. Additionally, the public was invited to participate in water quality monitoring training sessions conducted by Adopt-A-Stream personnel. During monitoring events, interviews were conducted with landowners who were inquisitive about the monitoring activities. Specific presentations have been made to the local Soil and Water Conservation District Board, the Rotary club and the Altamaha Regional Water Council and the Pine Country RC&D Council. As the plan is implemented, additional outreach efforts will be conducted to both explain the findings and encourage involvement. Specific outreach partners will include USDA-NRCS, Altamaha Soil and Water Conservation District, Georgia Forestry Commission, Telfair County Young Farmers, Telfair County Farm Bureau, Georgia Soil and Water Conservation Commission and the Telfair County Commission.

Additional efforts will be undertaken to share the plan findings and future milestones. Groups that will respond to this information will include the local Soil and Water Conservation District, the local county commission, Extension Service, Young Farmers, Farm Bureau, FFA, NRCS and others. The general public will be made aware of the process and plans through meetings with civic organizations such as Rotary, Lions, and Exchange clubs.

Through these meetings and events, it is anticipated that the volunteers will be recruited to continue conducting monitoring, and that support will be generated for additional funding to install management measures.

WATERSHED MANAGEMENT PLAN

The watershed management plan is viewed as a roadmap, based on science and current data, which can be used to encourage changes on the landscape to improve and protect water quality. This document will be distributed widely at the local level, and will assist in training the public and possibly securing funds to address items referred to in the plan. It is not the end, but rather the beginning, of improvement actions for the future.

LONG-TERM MONITORING PLAN

Pine Country RC&D has committed to working with local groups to encourage some level of monitoring at the sites established for this study. Data can continue to be compared to data secured during this planning process to ensure there is not degradation of water quality.
The equipment necessary to do the work is available without further cost. Access to the on-line database has been secured for reporting purposes. Adopt-A-Stream trained individuals exist in the watershed area who could be encouraged to undertake this activity.

HORSE CREEK WATERSHED
TELFAIR COUNTY, GA
(HUC 0307010407)
Long-Term Monitoring Plan
JUNE 2014

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Watershed Description and Reason for Monitoring

Pine Country RC&D, under contract with GAEPD, is required to develop a watershed plan for Horse Creek in Telfair County. The watershed is listed as impaired due to sediment and poor fish habitat. The following plan will be used for future monitoring in order to obtain trend data that can be used to determine future BMP implementation efforts.

Pollutants or Indicators to be Monitored

The proposed sampling for this project will consist of the following items at each sampling site:

Targeted / BMP Monitoring Pollutants or Indicators

Pollutant or Indicator	Recommended Water Quality Criteria	Required Number of Samples
Temperature	90º F (maximum)	20 measurements within a 12-month period (1-2 measurements per month)
Conductivity	Georgia freshwater streams supporting mixed fisheries range from 50 to 500 mS/cm	1 measurement per site every month (12 measurements per year) Establish normal background levels Follow up any deviations
Habitat Assessment	All waters shall be free from substances that interfere with legitimate water uses or are harmful to humans, animals or aquatic life.	Quarterly assessments at each site 4 pre-BMP and 4 post-BMP installation (8 measurements per year)
Turbidity	All waters shall be free from turbidity that causes a substantial visual contrast in a water body.	3 pre- and post-BMP wet weather samples per season (May-October / November-April) (6 wet weather samples per year)

Sites will be monitored at least quarterly. Additionally, if there are occurrences of significant rainfall events that caused or increased stream flow, efforts will be undertaken to secure additional data within a 24-hour window of time.

Volunteers will physically visit each monitoring site to ensure access, obtain baseline photos, physically mark the location, and determine that the sites are in-fact suitable locations. Data collection and sampling will begin approximately Sept. 2014 for all sites. All data for all sites will be recorded, consolidated, and supplied to Pine Country RCD for maintenance and distribution as necessary. The volunteers will coordinate at least quarterly with Pine country RC&D on the progress of monitoring and data collection according to the following schedule.

Participants	Data Collection 2014 and beyond	Data Review 2014 and beyond
Pine Country RC&D	September,December,March,June	October,January,April,July
Contractors		
GA- EPD		
GA- Adopt-A-Stream		

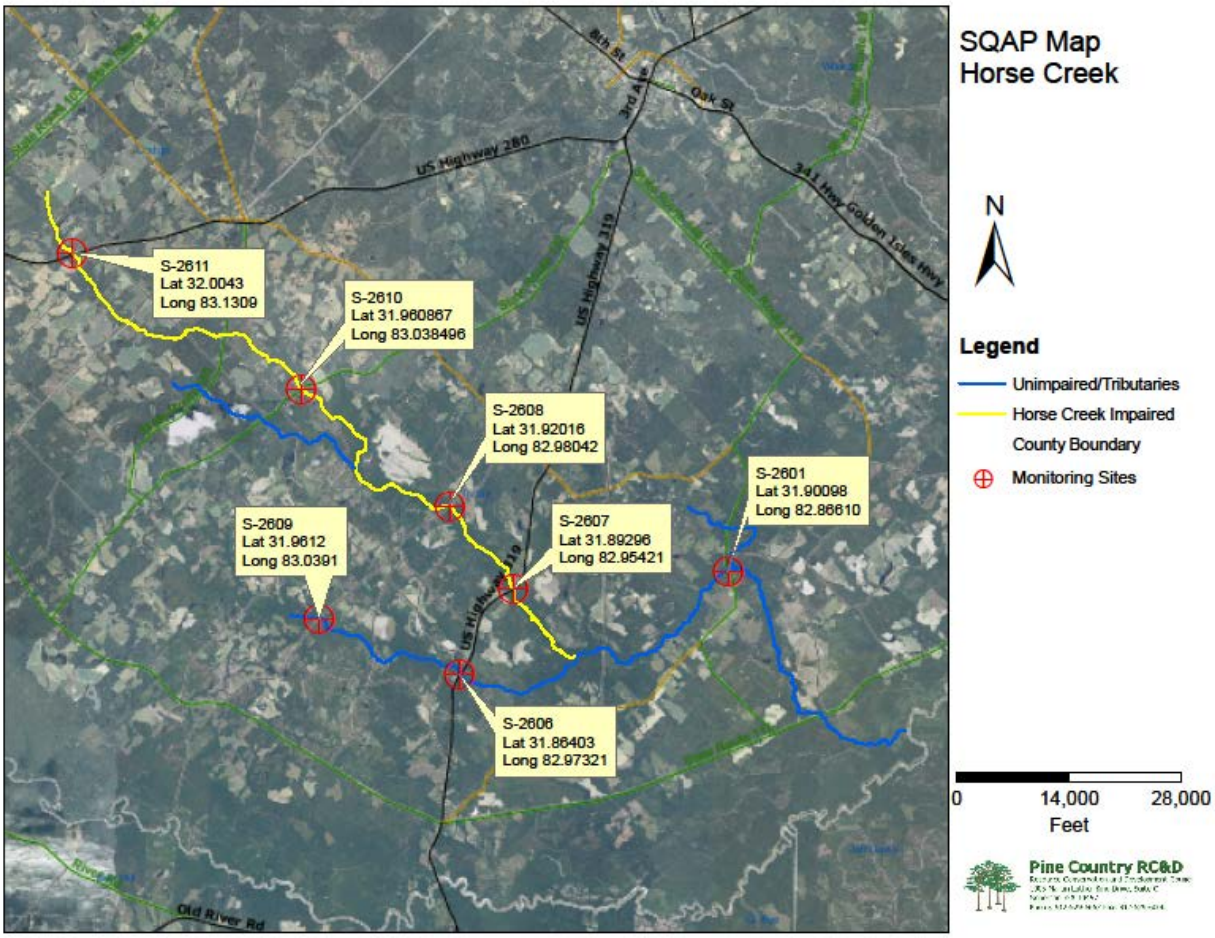
Equipment to conduct sampling will be readily available and will not be a constraint to the process.

Monitoring Locations

Proposed monitoring points are as follows, moving upstream from the outlet end:

S-2601. Horse Creek at Hwy 149
S-2606. Alligator Creek at Hwy 441
S-2607. Horse Creek at Hwy 441
S-2608. Horse Creek at China Hill Road
S-2609. Alligator Creek at China Hill Road
S-2610. Horse Creek at Hwy 132
S-2611. Horse Creek at Hwy 280 – Dodge County

Additional points may be added depending on volunteer input and/or participation. Specific GPS information will be collected at the time of sampling and GA-Adopt-A-Stream will assign unique monitoring identification numbers for each location. Personnel and resources are available to conduct the sampling on the proposed points above. The monitoring points above do not replicate previous sampling points used in this watershed. The points for this activity were selected because of accessibility, but also to segregate various stems of flow in the watershed for comparison. Sampling of both impaired sections and non-impaired sections will provide comparative information useful in the final analysis of activity in the watershed.



Quality Assurance / Quality Control

All sample collection, field parameters, and lab analysis will be conducted in accordance with the GAEPD Adopt-A-Stream Program's Quality Assurance Project Plan (QAPP) and Quality Monitoring Plan (QMP) developed and maintained by GAEPD Adopt-A-Stream and previously approved by USEPA. Copies of the QAPP and QMP will be provided by GAEPD and will be kept on site to be used as reference and provide future guidance on water quality monitoring procedures. Any additional agencies, organizations, or subcontractors that participate in the aforementioned water quality monitoring activities shall also adhere to GAEPD Adopt-A-Stream procedures and this guidance. Collectors of data will primarily be local volunteers. Other participants may include certified volunteers and NRCS staff members.

Collections of samples will follow approved Adopt-A-Stream protocols. Equipment will be supplied by Pine Country RC&D (as recommended by GA Adopt-A-Stream). Required cleaning and calibration will take place prior to sampling on appropriate instruments. These protocols are further described in the attached Appendix 1.

All sampling and readings will be taken on-site. No samples will be taken off-site or sent to labs or other parties. It is anticipated that all samples will be taken at mid-stream and at mid-depth. If for some reason these points are not accessible, at least two samples will be

taken as far as possible from the bank and at least 50 feet apart to obtain data. Specific notation will be made on the data collection form that the sample taken was not according to the primary protocol.
GA Adopt-A-Stream field sheets (or close facsimiles) will be used to record sample data. Each site will have a unique site number and each sample taken at that site will also be dated and numbered to maintain the integrity of each sample. Data sheets will be maintained by Pine Country RC&D for submission to GAEPD.
All data collected will be entered into the GAEPD Adopt-A-Stream database. GA Adopt-A-Stream will assign specific numbers to each site to be monitored and these will be entered in the database for use. Any material (physical or electronic) that cannot be entered into the database will be provided to Pine Country RC&D for maintenance in the project records. Pine Country RC&D will maintain all data sheets and other pertinent materials at their office location at 1905 Martin Luther King Drive, Soperton, GA 30457 for a period of two years after completion of this project.

Data collection results will be discussed at least quarterly with Pine Country RC&D as indicated previously in the schedule above.
Should a situation arise that causes a change in protocol, process or site location, the contractor will notify all parties to discuss options and agree on a suitable process forward.

Training

Annual training will be conducted in September . The purpose of the training is to ensure that volunteer collectors are knowledgeable in the correct processes and methods to do the required collections and sampling. Satisfactory completion of this training is recognized by GAEPD, and the sampling done by the volunteers will be considered to be valid. Participants received training on the following monitoring methods:

- Visual Assessment
- Conductivity
- Settleable Solids
- Pebble count

GA-Adopt-A-Stream representatives have indicated a willingness to come on-site during monitoring to assist with any questions and to validate sampling protocols when actual sampling begins.

Monitoring Equipment

Equipment which will be used for sampling:

(1) Imhoff Cone
(2) Conductivity Meter
(3) Turbidity Meter
(4) Thermometer (degree C)

Details on the use, care, and calibration of this equipment is found in the appendix.

Proposed Monitoring Schedule- HORSE CREEK WATERSHED

Site	Location	DATE 2014 and beyond	PARAMETERS TO BE SAMPLED
S-2601	Horse Creek at Hwy 149	September,December ,March,June	Turbidity,Temp,Conductivity, Habitat, Solids, Photos
S-2606	Alligator Creek at Hwy 441	September,December ,March,June	Turbidity,Temp,Conductivity, Habitat, Solids, Photos
S-2607	Horse Creek at Hwy 441	September,December ,March,June	Turbidity,Temp,Conductivity, Habitat, Solids, Photos
S-2608	Horse Creek at China Hill rd.	September,December ,March,June	Turbidity,Temp,Conductivity, Habitat, Solids, Photos
S-2609	Alligator Creek at China Hill Rd. above Hwy 117	September,December ,March,June	Turbidity,Temp,Conductivity, Habitat, Solids, Photos
S-2610	Horse Creek at Hwy 132	September,December ,March,June	Turbidity,Temp,Conductivity, Habitat, Solids, Photos
S-2611	Horse Creek at Hwy 280	September,December ,March,June	Turbidity,Temp,Conductivity, Habitat, Solids, Photos

Pine Country RC&D will be responsible for compiling data and releasing it to appropriate agencies and personnel. No data is expected to contain any personally identifiable information, so it should be available for review by any one requesting it. Pine Country RC&D will maintain all data sheets at their office location at 105 Martin Luther King Drive, Soperton, GA 30457 for a period of two years after completion of this project.

DATA VALIDATION

Pine Country RC&D will be responsible for the integrity of data submitted. Prior to data collection, instruments will be calibrated and collection processes followed as outlined in the table below and in the appendix.

Parameter	**Calibration Method**	**Frequency**
Temperature	Ice Bath or Certified Thermometer	As needed

Conductivity	Chek-Mite 30 – 84 µS/cm Standard Solution ECTester – 100 µS/cm Standard Solution ECTester 11 – 250 µS/cm Standard Solution	Prior to each sampling event

Data parameters and acceptable ranges are shown below. Any data collected outside these ranges will be investigated thoroughly for equipment and/ collector error. Data collected at each event will also be compared to data on file for the site. Anomalies in data will be reviewed, re-sampled if necessary, and described on the data collection forms. Any physical changes at the data collection site will also be documented since the condition may impact future data.

PARAMETER	**METHOD/ RANGE**	**UNITS**	**DUPLICATE PRECISION**	**ACCURACY** (allowable range comparing monitor value to QA value)	**SENSITIVITY**	**CALIBRATION**
Temperature	Thermometer -5.0 to 50.0	Degrees Celsius (°C)	N/A	+/- 1.0 (°C)	0.1(°C)	Certified Thermometer Fisher #15-043D Ice bath
Conductivity	Meter 0-1999 µS/cm	µS/cm	N/A	+/- 1% of Full Scale	10 µS	Standard of 250µS

Data from the Imhoff cone and turbidity will be most impacted from rain events and the proximity of the sampling time to the rain event itself. Efforts will be undertaken to sample following a significant rain event that causes runoff within 24 hours. These readings will not represent the "norm", but will provide valuable information related to runoff transport of materials.

All data collected will be entered into the GAEPD Adopt-A-Stream database. Data validation protocols for this site will provide a second-level review of data submitted to ensure that it is reasonable and in the correct units of measurement. Any data appearing to be erroneous can be questioned and reviewed for further explanation, correction, or deletion.

The data collected for this project has specific limitations. It will not be used for water quality listing purposes by GA-EPD. It will be used to obtain insight into the effectiveness of BMP's installed in the watershed, and also to determine if specific areas of the watershed are more in need of treatment than other areas. The project manager will include the data in the final project report to GA-EPD along with a discussion of the findings.

GEORGIA ADOPT-A-STREAM
Monitoring Data Form

Pine Country RC&D Council
1905 Martin Luther King Drive
Soperton, Georgia 30457

Project Watershed:			**Coordinator:**
Stream Name:			**County:**
Sampling Site Lat/Long:			**Round Trip Distance (miles):**
Site Description:			
Certified QA/QC Investigators:			
Date:	**Time:**	**Total Time (minutes):**	**Photos (circle): Yes No**

Basic Tests	**Test 1**	**Test 2**	**Units**	**Basic Tests**	**Test 1**	**Test 2**	**Units**
Air Temp			ºC	Pebble Count			mm
Water Temp			ºC	Imhoff cone			ml / L
pH			Standard Units				
Dissolved Oxygen			mg / L or ppm				
Conductivity			µS /c m				
Other Tests							
Amount of rain, if known?			inches in last			hours/days	
Name of Person performing tests: _____					_____		

Rain in last 24 hours

☐ heavy rain ☐ steady rain ☐ intermittent rain ☐ none

Present conditions

☐ heavy rain ☐ steady rain ☐ intermittent rain ☐ overcast ☐ partly cloudy ☐ clear/sunny

Appendix 1

Stream Survey Test Instructions

Revised 2/12/03

Conductivity
Settleable Solids
Temperature
Habitat Assessment
Turbidity

Supplies to have when conducting these tests:

Conductivity Meter
Imhoff cone
Visual Habitat Survey form
Thermometer
Nephelometer

CONDUCTIVITY TEST

CALIBRATION

To be conducted each time the instrument is used.

1. Press the on/off switch once to turn the tester on.

2. Remove protective cap from the bottom.

3. Check LCD to see which unit of measure you are in. Make sure you are in μS mode. Press the mode key to change to and from μS and mS mode.

4. Make sure tester is in Auto Read mode. *In Auto-Read mode, the endpoint detection software in the meter will automatically take the reading and beep once the sensor is stable.* To switch to this mode press and hold the READ key for three (3) seconds. The letter A in a circle should appear on the screen indicating you are in this mode.

5. Immerse the bottom of the meter into a known Calibration Standard 1.0 to 3.5 inches.

6. Press the CAL key. A beep will sound and the CAL icon will flash to indicate that calibration is in progress.

7. Once calibrated, the display will freeze and you should hear a beep (if you are in Auto-Read mode). The CAL icon will also stop flashing and remain on the screen when the instrument is calibrated.
8. Rinse sensor tip with distilled water and blot tip.

** Please note – for new meters repeat steps 1-7 at least three times to get the meter calibrated to the known standard.

** If the meter is turned off, you should recalibrate it.

INSTRUCTIONS

Taking field measurements.

1. Once calibrated, immerse the sensor tip into the sample 1.0 to 3.5 inches.

2. Press the read button.

3. Using the tester, gently stir the sample for several seconds. Readings could take up to 2 minutes.

4. When the digital display stabilizes, the tester will beep. Read the conductivity value and record. Repeat and record second reading. *Remember: if values differ greatly, you may be required to take three or four measurements.*

5. Rinse the sensor tip with distilled water. Blot tip to remove excess water.

MAINTENANCE

Please clean tester after each use.

1. Rinse the tip of the sensor in a solution of half distilled water and half isopropyl alcohol (rubbing alcohol).

2. Rinse the tip of the sensor with distilled water.

3. Blot or shake off excess water and allow sensor to completely dry.

AUTO –READ or MANUAL

Always take measurements in the Auto-Read mode.

The meter offers two ways to take a reading.
To select between the two modes:

- Press and hold the READ key for three (3) seconds. This will switch you to Auto-Read which is indicated by a letter A within a circle.

Note: do not remove sensor tip unless it is damaged. For more information contact Costumer Service.

SETTLEABLE SOLIDS

INSTRUCTIONS

Taking field measurements

1. *Fill Imhoff cone to 1 liter mark. Set aside and wait 45 minutes.*

2. *Take direct reading in ppm (mg/L) from scale on side of cone.*

TEMPERATURE

INSTRUCTIONS

Taking field measurements

1. *Air temperature – place thermometer in shady area and record temperature after reading stabilizes. Record temperature as degrees C.*

2. *Water temperature – take temperature reading of the water in the shade. It is best to take the temperature reading directly in the stream, but if you cannot, place thermometer directly into a bucket of sample water (in the shade) and record temperature. Take reading after temperature has stabilized (about 2 minutes). Record temperature as degrees C.*

VISUAL HABITAT SURVEY

INSTRUCTIONS
Taking field measurements

1. *Score each parameter, choosing a value between 0-10, and in some cases 0-5.*

2. *Note numbers 8-10 ask you to evaluate each bank separately.*

3. *Record the points in the first column and sum the points at the end for your total stream habitat score.*

4. ***You are encouraged to complete this survey at your site at least four times per year.***

Turbidity

A nephelometer/turbidimeter is used in comparing the turbidity of liquids by viewing light through them and determining how much light is scattered from the light path. Some WPB multiparametric sonde units are furnished with a turbidity probe. Calibration checks against the WQL turbidimeter are recommended in conjunction with the use of latex sphere standards.

Operational check:
1. Periodically check the turbidity meter by using the standards provided.
2. Perform a post calibration at the end of the day and record all findings.

Units:
Turbidity measurements are reported in nephelometric turbidity units (NTUs).

GLOSSARY OF TERMS
Use these definitions when conducting a survey

BANKFULL: The flow level that just fills the channel to the top of its banks and at a point where the water begins to overflow onto a floodplain.

BUFFER: A vegetated area near a stream, usually forested, which helps shade and partially protect a stream from the impact of adjacent land uses.

CHANNELIZATION: Straightening of a stream channel to make water move faster.

CHANNEL SINUOSITY: The frequency that bends occur in a stream.

EMBEDDEDNESS: The amount of silt and sand that surrounds the gravel, cobble, and boulders usually found in a stream. The more of the bottom is covered in silt/sand, the more embedded it is.

EPIFAUNAL SUBSTRATE: The habitat that is available within the stream for organisms to live in or on.

POOL: A deeper area of a stream with slow moving water.

RIFFLE: A shallow section in a stream where water is breaking over rocks, wood, or other substrate causing surface agitation.

RIPARIAN VEGETATIVE ZONE: The land along either side of a body of water.

RUN: These areas differ from riffles in that depth of flow is typically greater and slope of the bed is less than that of riffles. Runs will often have a well-defined thalweg.

SUBSTRATE: The mineral or organic material that forms the bed (bottom) of a stream.

THALWEG: The middle of the main navigable channel of a waterway.

UNDERCUTTING: A type of erosion which occurs when fine soils are swept away by the action of the stream, especially around curves. The result is an unstable overhanging bank.

IMPLEMENTATION, EVALUATION, and REVISION

Funds exist for the implementation of BMP's in the watershed area. Sites will be selected and BMP's will be installed for the improvement of water quality. Following installation of the BMP's, efforts will be undertaken to showcase the practices to the public and explain the water quality improvement benefits.

Additionally, NRCS and GFC will be encouraged to use this plan as a basis to direct any available funding to landowners willing to install conservation practices beneficial to water quality improvement efforts in the watershed. NRCS, interacting with the local work group on existing Farm Bill Programs, has the opportunity to direct funding toward practices to improve water quality. Funding is variable from year to year, but being aware of a targeted need can assist in the allocation of funding.

To address unpaved roads, local county commissioners and leaders will need to interact with the public, landowners, legislators, DOT and possible funding sources for solutions. There are many products and tools available to develop final solutions to problem sites once funding and right-of-way issues are addressed.

Appendix

Pine Country Resource Conservation and Development
http://www.pinecountryrcd.org/Home.aspx

Georgia's Best Management Practices for Forestry Manual
Results of Georgia's 2011 Silvicultural Best Management Practices Implementation and Compliance Survey

Results of Georgia's 2009 Silvicultural Best Management Practices Implementation and Compliance Survey

Horse Creek Water Quality Monitoring Plan

USDA-Natural Resources Conservation Service
Soil Survey Of Bleckley, Dodge and Telfair Counties, GA 2003

Georgia Better Back Roads Manual
https://epd.georgia.gov/sites/epd.georgia.gov/files/related_files/site_page/Better_Back_Roads_Field_Manual_May_2009.pdf

Natural Resources Conservation Service
Performance Results System (PRS)