


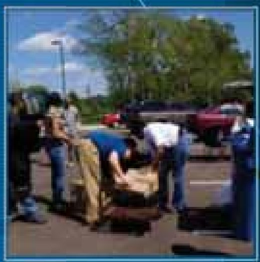


Alcorn State University

Mississippi River Research Center

Center for Ecology & Natural Resources

Technical Report

Submitted to:
US Geological Survey
Mississippi Water Resources Research Institute

COLES CREEK watershed Assessment & Education

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As part of the Coles Creek Watershed Assessment & Education project
sub-award 080600-330919-01

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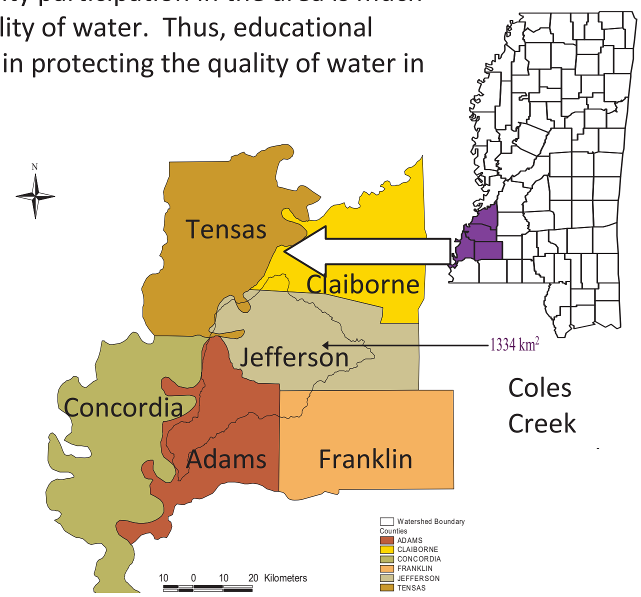
Project Summary

The Coles Creek Watershed, located in the southwestern quadrant of the state of Mississippi, is listed under the US EPA impaired water section 303(d). Degradation of the ponds/lakes and streams/creeks in this watershed is caused mostly by biological impairment, followed by nutrients, organic enrichment or Low Dissolved Oxygen, sediment/siltation, pesticides, and pathogens (US EPA, 2007). These impairments cause the degradation of water quality thus causing euthrophication or algal bloom that can lead to fish kills and can also adversely affect human health. The causes of algal blooms have not been studied; therefore, data is needed to evaluate the quality of water and soil in the surrounding areas of the watershed. The data obtained will be used to analyze and determine the situation and find effective methods to solve the problem. Community participation in the area is much needed to improve, maintain, and restore the quality of water. Thus, educational materials are necessary to engage the community in protecting the quality of water in this area.



Each water body is unique depending upon its geological characteristics such as natural landscape features and human activities related different land uses and land-management practices. In the Coles Creek Watershed, several identified water bodies have been heavily impaired.

Poor water quality can harm fish, wildlife, and their habitats. Many things are known to cause poor water quality including: sedimentation, runoff, erosion, dissolved oxygen, pH, temperature, decayed organic materials, pesticides, and toxic and hazardous substances. Therefore, identifying the cause of degradation and finding the best management practice(s) (BMPs) as well as protection strategies have to be developed for each lake, pond, or river, individually.

The purpose of the study is to investigate, assess, and find solutions to improve the quality of surface water bodies that can be adopted and implemented in the watershed.

The objectives are to:

1) Analyze the quality of water in the ponds
2) Analyze soil samples in the surrounding areas
3) Identify the cause of degradation
4) Find and select the best management practice(s) to restore the ponds' conditions
5) Develop educational materials for the community

Approach and Methods

Students will collect water and soil samples from these ponds to be analyzed for selected chemical, physical and biological parameters. The analysis of the results will help find and determine the best alternative management practices to be adopted and implemented in the community. Based on the results and findings, educational materials will be developed and disseminated to the communities. This effort will help increase the community awareness of their environment and encourage them to adopt and implement BMPs on their land which will lead to promoting environmental health and its sustainability, thereby, having good water quality to support the economic development in the area. In addition, extension agencies will also be engaged in this study to assist communities and be the voice of the university as well as to continue assistance after the funding period.

The associated specific tasks to reach the goals include:

1) Spatially geo-reference water bodies
    a. Students will locate surface water bodies in the Coles Creek watershed and geo-reference their positions.
    b. The locations of these water bodies will be displayed using Geographic Information System (GIS) for visualization and further analysis.
2) Analyze the physico-chemistry of waters.
    a. Soil and water samples from each of the geo-referenced waters will be collected and analyzed for nutrients and pathogens that cause to eutrophication.
3) Spatially identify and inventory landuse/land covers impacting water quality.
    a. Using GIS/ArcView capability, to identify landuse/landcover's surrounding these water bodies.
    b. The landuse/landcover's in the areas will be assessed and evaluated to determine the correlation of impacts.
4) Determine factors that influence contaminant transport in the environment and the spatial correlation of water quality.
    a. Soil samples will be analyzed.
    b. Geologic settings and the soil hydraulic properties as well as the spatial structures will be studied to understand soil-water dynamics of the surface and sub-surface interactions affecting contaminant movement.
5) Identify restoration strategies to improve the quality of water.
    a. Restoration strategies will be formed based on the linkage between impairment and pollutant loading to surface water bodies, which is an essential component of watershed assessment.
    b. Numerical modeling will be used to establish linkages or correlations between impairment and pollutant loading due to the lack of monitoring data.
6) Develop a scientifically- credible watershed restoration plan.
    a. Identify site-related Best Management Practices (BMPs).
7) Encourage implementation of identified best management practices and watershed restoration plan.
    a. Disseminate outreach and educational materials to introduce the concept of pollution prevention to the community.
    b. Conduct workshops or participate in workshops to disseminate information to the public.

8) Develop monitoring database to support the State's database for monitoring the quality of water in the Coles Creek Watershed.
   a. Data collected will be tabulated in a database and analyzed.
   b. Data will be available for future analyses and comparisons to observe changes of water quality over time.

Results

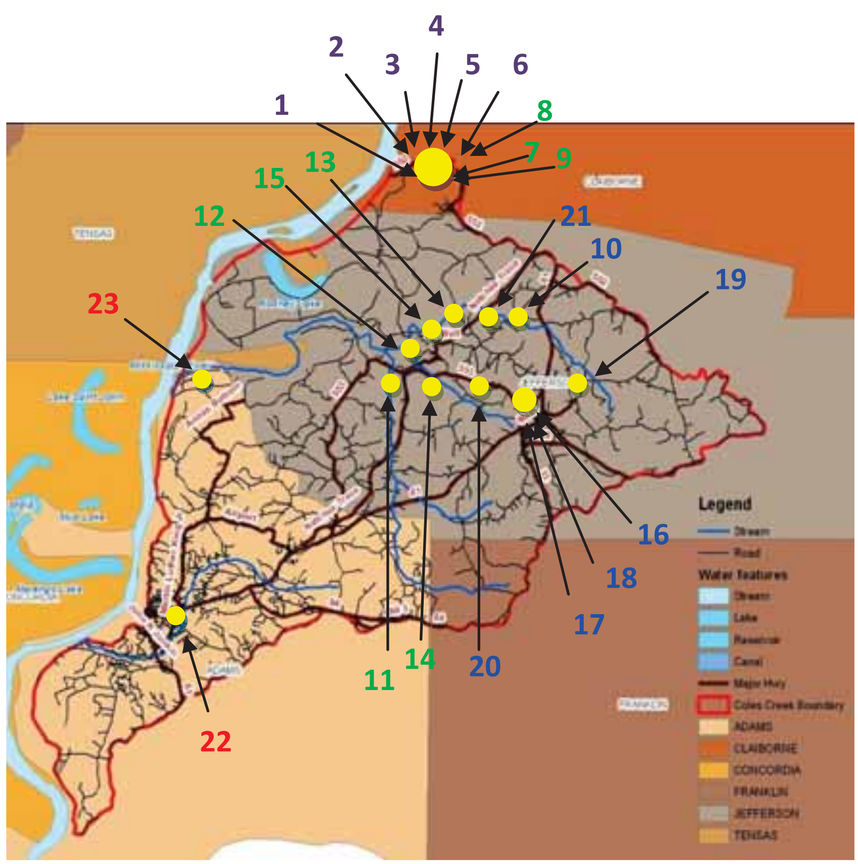
Some of the tasks identified above were able to be completed within the funding period. Data collected and presented below, with the consideration of several circumstances, such as inevitable extreme weather conditions, dried creeks, muddy soil, snakes in the water, etc. along with other technical difficulties and the lack of manpower. Continuous educational programs and analysis of the watershed will continue beyond the duration of the project.

Geo-Reference of Sampling Locations

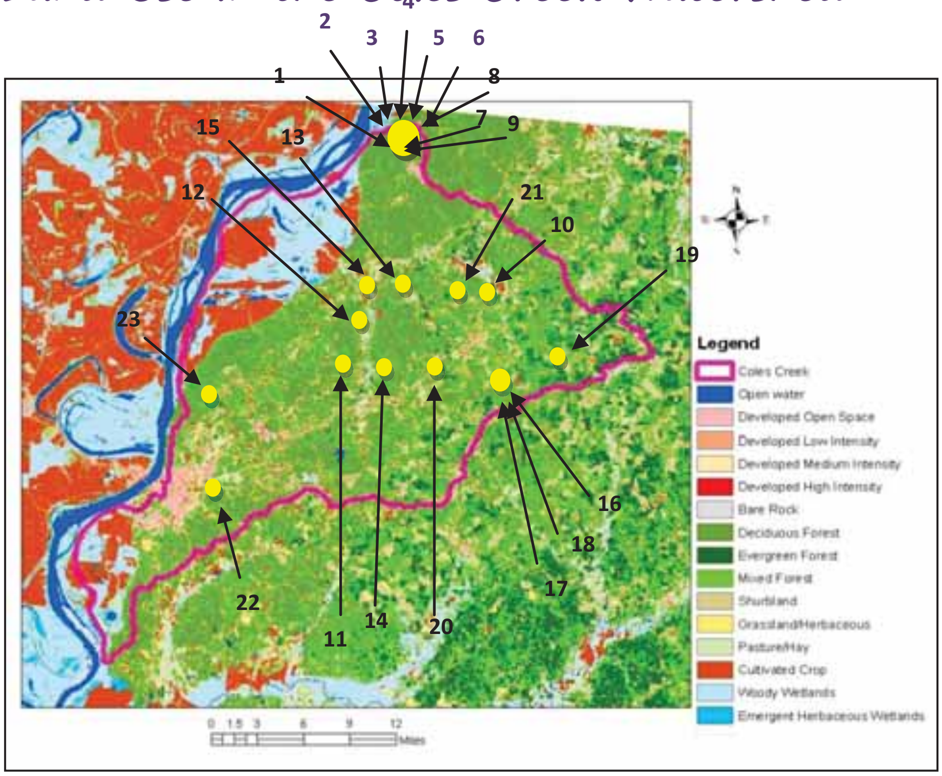
Faculty and students observed potential sampling locations using references from previous sampling locations, maps, USGS Sampling Locations, Google Earth map, ESRI – ArcView map and ground survey. The geo-referenced sites are listed in Table 1.

Table 1. Geo-referenced Sampling Locations

ID	Location
1	ASU Model Farm (p)
2	ASU C-factor (p)
3	ASU Burrus Hall (p)
4	ASU house (p)
5	ASU Gym (p)
6	ASU park (p)
7	Hwy 61S PG 1 (p)
8	Hwy 61S PG 2 (p)
9	Hwy 61S PG 3 (p)
10	Old Hwy 61 S Jeff (p)
11	Fairchild Creek
12	South Fork Coles Creek
13	North Fork Coles Creek
14	Mud Island Creek
15	Dowd Creek
16	Hwy 61 S Jeff 1 (p)
17	Hwy 61 S Jeff 2 (p)
18	Hwy 61 S Jeff 3 (p)
19	Coonbox Rd.
20	Hwy 553 Jeff bridge (p)
21	Coles Creek
22	St. Catherine Creek
23	Anna's Bottom



Land Use in the Coles Creek Watershed



The land-use in the Coles Creek Watershed is predominantly forested areas (mostly deciduous forest, with some mixed and evergreen forest). The watershed also consists of cropland with sparsely located high density areas (rural areas). The landuse information is extracted from the National Land Cover Dataset (NLCD).

Water Quality Physical, Chemical, and Biological Properties

Water quality in the Coles Creek Watershed were collected and analyzed from 23 sampling locations. Samples from these locations were monitored monthly for the duration of 13 months. Collections of samples in several locations (ASU C-factor, Old Highway 61S, and HWY 553 Jeff Bridge) were discontinued because the water bodies have dried up. Sampling and monitoring water from Fair Child Creek and South Coles Creek were started in August 2009. These locations were difficult to reach and were discovered after the initial sampling began. Samples were collected from ponds, lakes, creeks, and streams, with (p) denoting water collected from a pond.

Parameters tested include: pH, temperature, turbidity, total dissolved solid (TDS), dissolved oxygen (DO), nitrate (NO3), total coliform, E. coli, and chlorophyll. Temperature, pH, turbidity, total dissolved solids, dissolved oxygen, nitrate, and chlorophyll were analyzed using YSI Sonde 6000s water monitoring instrument. Total coliform and E. coli were sampled and analyzed using IDEXX Quanti-tray method.

Temperature

The most common physical assessment and basic properties of water quality is the measurement of temperature. Temperature impacts both the chemical and biological characteristics of surface water; the higher the water temperature, the greater the biological activity.

In a warmwater stream temperatures should not exceed 31.7 °C or 89 °F and cold water streams should not exceed 20 °C or 68 °F. Temperature can affect other parameters and is also important because of its influence on water chemistry. The rate of chemical reactions generally increases at higher temperature, which in turn affects biological activity. Temperature on water chemistry affects the impact on oxygen where warm water holds less oxygen than cool water. Also, some compounds are more toxic to aquatic life at higher temperatures. Furthermore, many aquatic organisms are sensitive to high temperatures because solubility of oxygen is lower, thus limiting oxygen supply in the water.

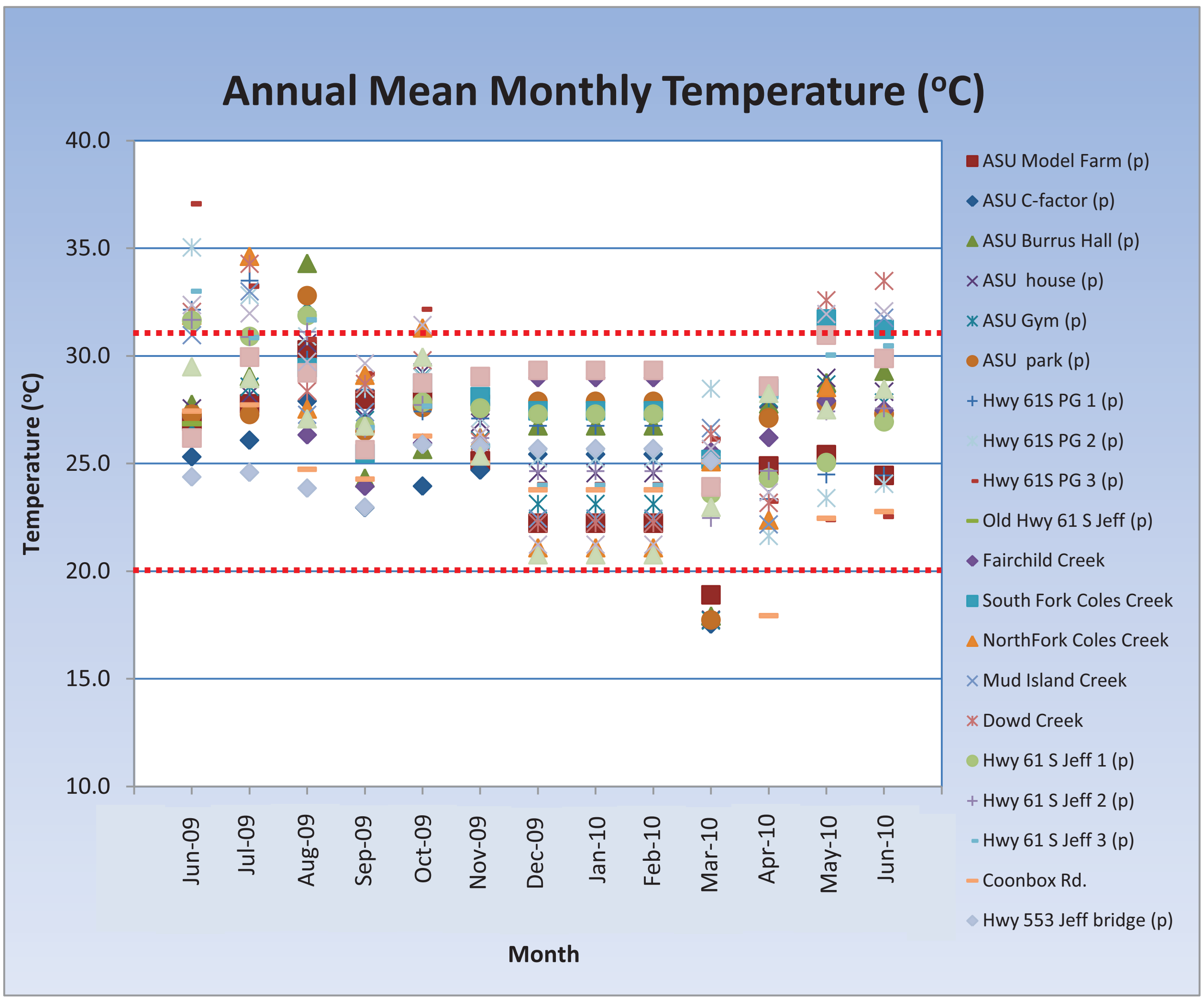


Figure 1. Annual Mean Monthly Temperature (°C)

The mean monthly temperatures in sampling locations vary with June 09 having the highest average temperature and the lowest occurred in November 2009. The water temperatures in most sampling locations fall within the range between 20 and 32^{o}C with higher temperatures in some locations during the summer period and lower temperature in March 2010.

In June, July and August of 2009, the temperature in several water bodies increased to above 32^{o}C. This increase may be caused by several factors. In urban areas, runoff that flows over hot asphalt and concrete pavement before entering a lake will be artificially heated and could cause lake warming, although in most cases this impact is too small to be measured. Consequently, direct, measurable thermal pollution is not common. In running waters, particularly small urban streams, elevated temperatures from road and parking lot runoff can be a serious problem for populations of cool or cold-water fish already stressed from the other contaminants in urban runoff. During summer, temperatures may approach their upper tolerance limit. Higher temperatures also decrease the maximum amount of oxygen that can be dissolved in the water, leading to oxygen stress if the water is receiving high loads of organic matter. The problem of low dissolved oxygen levels is magnified by the fact that the metabolic rates of aquatic plants increase as water temperature rises, thus increasing their biochemical oxygen demand. Low dissolved oxygen levels leave aquatic organisms in a weakened physical state and more susceptible to disease, parasites, and other pollutants. Water temperature fluctuations in streams may be further worsened by cutting down trees which provide shade and by absorbing more heat from sunlight due to increased water turbidity.

Further assessment is needed to observe the fluctuations of temperature and to evaluate the correlations between the water body and the surrounding land-use.

pH

pH determines the acid and base characteristics of water. A pH of 7.0 is neutral; values below 7 are acidic and values above 7 are alkaline. Excessively high or low pH levels are often associated with nutrient deficiencies, metal toxicities, or other problems for aquatic life. High pH makes ammonia more toxic. During algal blooms, photosynthesis increases the water pH, especially in stagnant or slow-moving water.

A pH range of 6.0 to 9.0 provide protection for the life of freshwater fish and bottom dwelling invertebrates. In a lake or pond, the water's pH is affected by its age and the chemicals discharged by communities and industries. Most lakes are basic (alkaline) when they are first formed and become more acidic with time due to the build-up of organic materials. As organic substances decay, carbon dioxide (CO_2) forms, thus lowering the pH.

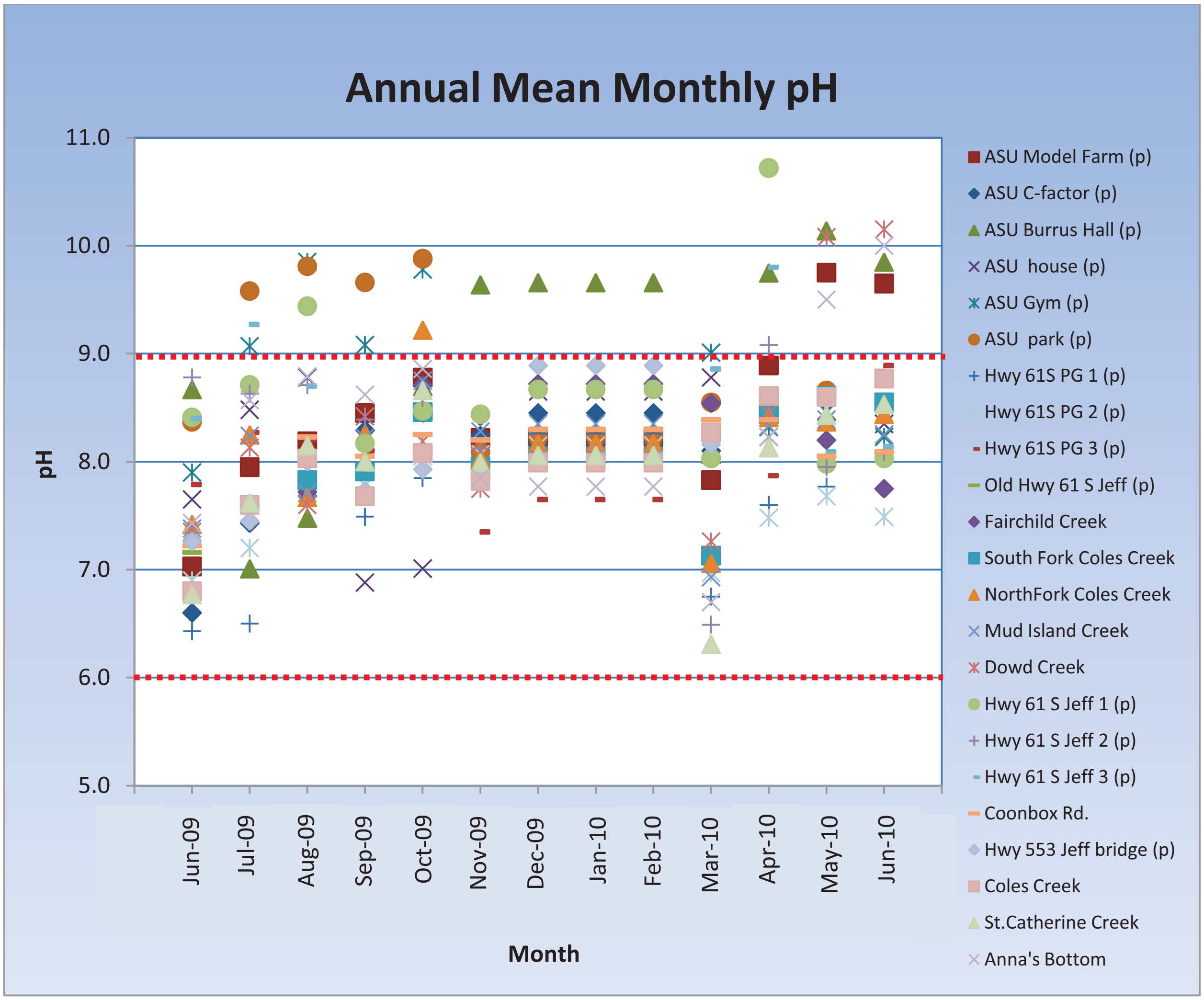


Figure 2. Annual Mean Monthly pH

Most of the pH values in these sampling locations fall within the range of 6 to 9, with 10.8 as the highest and 6.2 as the lowest. Most of the data falls within the neutral to basic ph range. Some pH are higher that may be contributed from liming of cropland, geological setting, runoff from the roads, etc. Further investigation is needed to determine the cause.

Turbidity

Turbidity is the measurement of water clarity. Suspended sediments, such as particles of clay, soil and silt, frequently enter the water from disturbed sites and affect water quality. Suspended sediments can contain pollutants such as phosphorus, pesticides, or heavy metals. Suspended particles cut down on the depth of light penetration through the water, hence they increase the turbidity -- or "murkiness" or "cloudiness" -- of the water. High turbidity affects the type of vegetation that grows in water. The turbidity values are expressed in nephelometric turbidity units (NTUs).

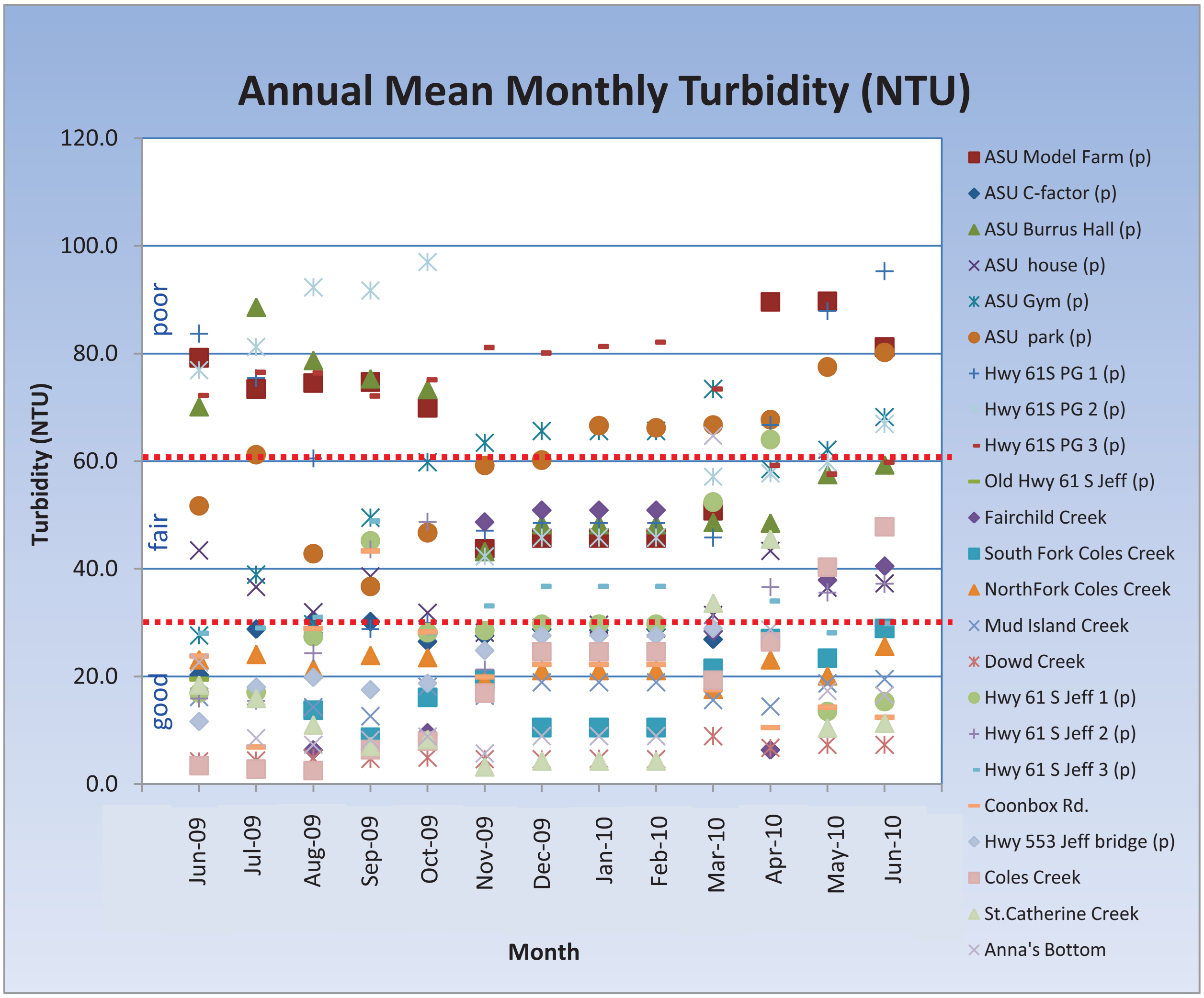


Figure 3. Annual Mean Monthly Turbidity (NTU)

The turbidity of water in the watershed varies from good to poor throughout the year with stream water having better turbidity than pond waters. This could be affected by the types of soil, management practice, or the type of land-use. Studies to understand the spatial and temporal variability will require further investigations that include climate, land-use/land cover, and soil types.

Turbidity levels are much higher in water from surface water sources (e.g. streams, rivers, and lakes) than from groundwater sources. Some surface water sources exhibit high turbidity levels during periods of high precipitation and subsequent runoff from plowing in cultivated farmlands (e.g. spring runoff). River rating scale designates 0-30 NTU as good (low murkiness), 30-

60 as fair (moderate murkiness), and over 60 as poor (high murkiness). For drinking water, turbidity must not exceed 5 NTU.

Total Dissolved Solids

Total dissolved solids is the total amount of dissolved ions in the water. The total dissolved solids concentration is the sum of the cations (positively charged) and anions (negatively charged) ions in the water. This amount is determined by Electrical conductivity (EC). Electrical conductivity is an indicator data that can detect contaminants, determine concentration of solutions, and determine the purity of water. Conductivity meters give readings in micro Siemens per cm (µS/cm) while TDS is measured in parts per million (ppm) or mg/L.

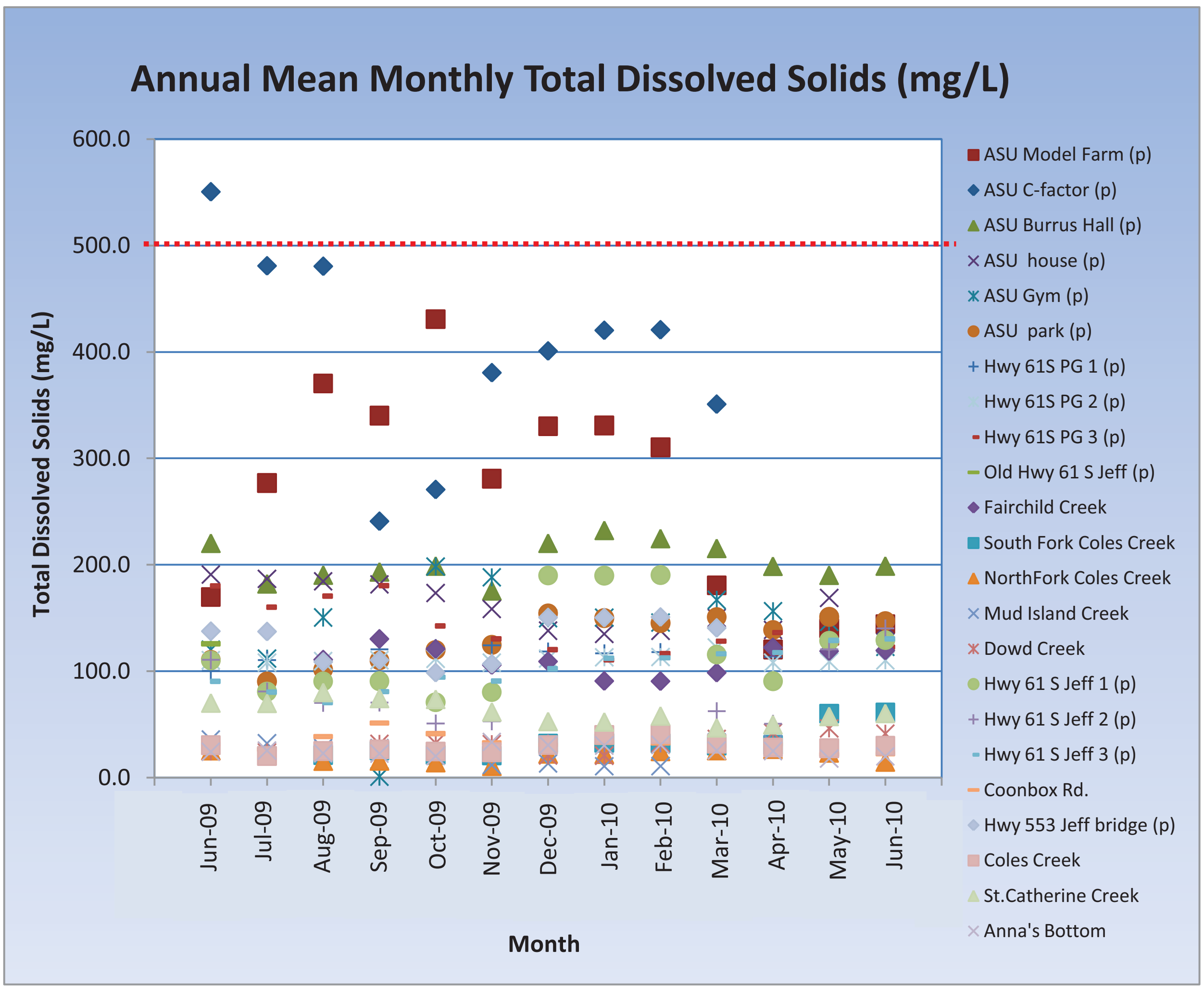


Figure 4. Annual Mean Monthly Total Dissolved Solids (mg/L)

Most fresh drinking water will have less than 100 µS/cm conductivity. Some slightly salty drainage water will have around 1800 µS/cm conductivity. Very brackish water could be about 27000 µS/cm and seawater has conductivity of around 54000 µS/cm. Water with TDS <1500 mg/L is considered fresh water, 1500 to 5000 mg/L as brackish water, and saline water >5000 mg/L. The amount of TDS ranges from 100-20,000 mg/L in rivers and may be higher in groundwater. Seawater may contain 35,00 mg/L of TDS. Lakes and streams may have a TDS reading of 50-250 mg/L**.**

An elevated total dissolved solids (TDS) concentration does not mean the water poses a potential health hazard. For drinking water, TDS is regulated as a secondary standard because it is more of an aesthetic or causes nuisance problems, associated with staining, taste or precipitation.

With respect to trace metals, an elevated total dissolved solids may suggest that toxic metals may be present at an elevated level. On the other hand, water with a very low TDS conce ntration may be corrosive that may leak toxic metals such as: copper and lead from the household plumbing. Toxic or trace metals could be present at levels that may pose a health risk.

Most samples collected from these sites have TDS below 500 mg/L, indicating that aesthetic issues are not a concern in the area during the observation period. One sample from a location has a TDS above 500 mg/L. The probable cause for high TDS reading is unknown and further study will not be possible because the site has dried up.

Dissolved Oxygen

Oxygen is a necessary element to all forms of life and adequate dissolved oxygen is necessary for good water quality. Natural stream purification processes require ade quate oxygen levels in order to provide for aerobic life forms.

Dissolved oxygen (DO) analysis measures the amount of gaseous oxygen (O_2) dissolved in an aqueous solution. Oxygen gets into water by diffusion from the surrounding air, by aeration (rapid movement), and as a waste product of photosynthesis. DO in a stream may vary from 0 mg/l to 18 mg/l. The DO level in good fishing waters generally averages about 9.0 parts per million (ppm) and 4-5 ppm of DO is the minimum amount that will support a large, diverse fish population. As dissolved oxygen levels in water drop below 5.0 mg/l, aquatic life is put under stress. Oxygen levels that remain below 1-2 mg/l for a few hours can result in large fish kills.

Most water in the watershed have relatively acceptable dissolved oxygen level throughout the year. Although a few water bodies have low level of DO, none of them are low enough to cause fishkill.

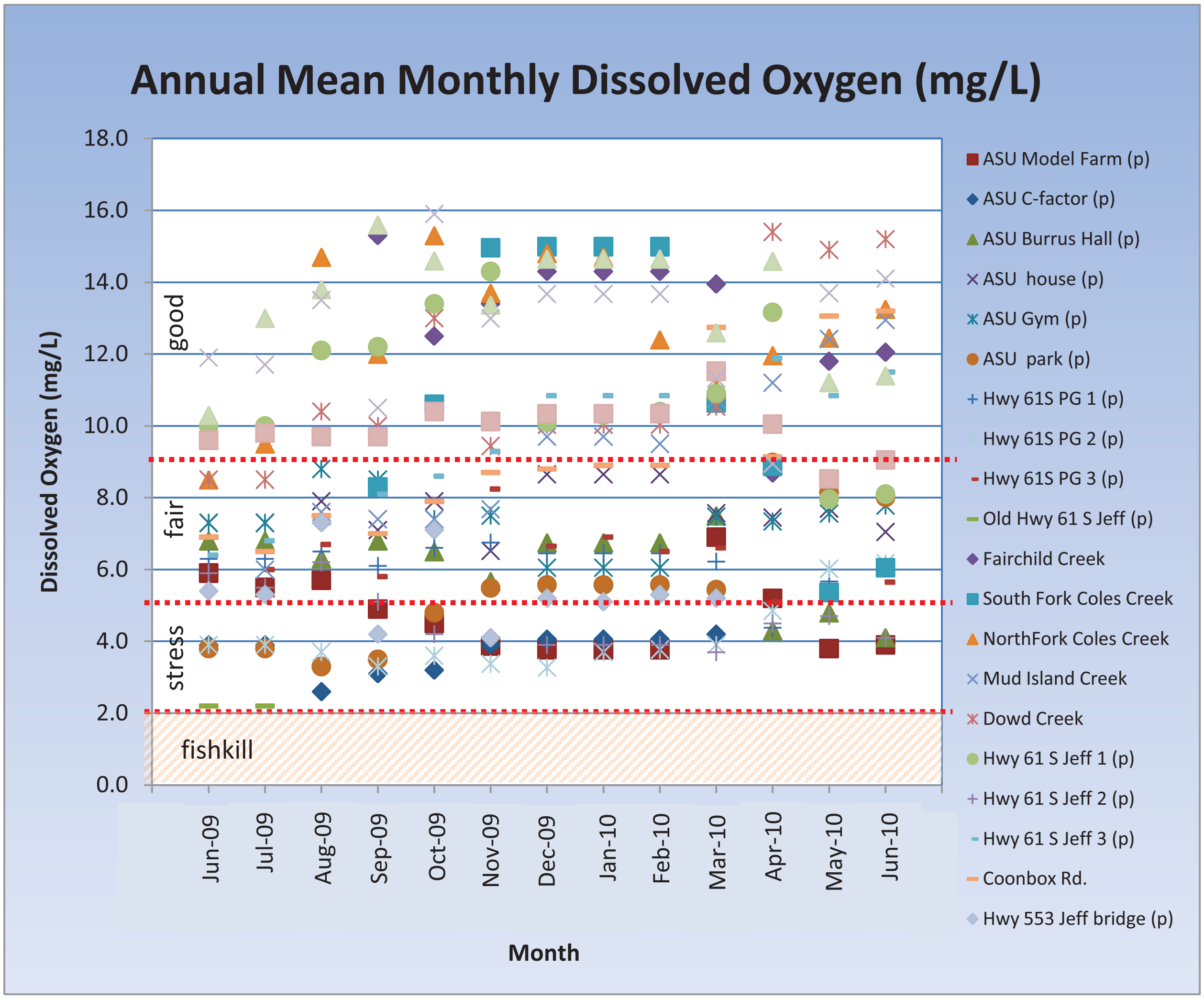


Figure 5. Annual Mean Monthly Dissolved Oxygen (mg/L)

Nitrate

Nitrate (NO_3^-) forms in water when bacteria use dissolved oxygen to oxidize ammonium. Nitrate is mobile and may seep into streams, lakes and estuaries from ground water enriched by animal or human wastes or commercial fertilizers. High concentrations of nitrate can enhance the growth of algae and aquatic plants.

Nitrate is considered as a contaminant that may pose an adverse health effect. Therefore, nitrate is regulated as a

Primary Standard for safe drinking water that allowing the maximum contaminant level (MCL) to be 10 ppm or mg/L as nitrate-N.

Throughout the year, nitrate (NO3-) levels in several locations are found to be below 10 mg/L. Nitrate enters the water bodies through municipal and/or industrial wastewater, septic tanks, feed lot discharges, animal wastes (including birds and fish) and discharges from car exhausts. Many of these sample sites are located in rural and undisturbed areas. Factors that may contribute to the nitrate level in the water could be from animal wastes, vegetation decomposition, and applications from agricultural lands.

Nitrogen-containing compounds acts as nutrients in streams and rivers. Bacteria in water convert nitrites (NO2-) to nitrates (NO3-). Nitrate reactions in fresh water can cause oxygen depletion. Thus aquatic organisms depending on the supply of oxygen in the stream can be adversely affected.

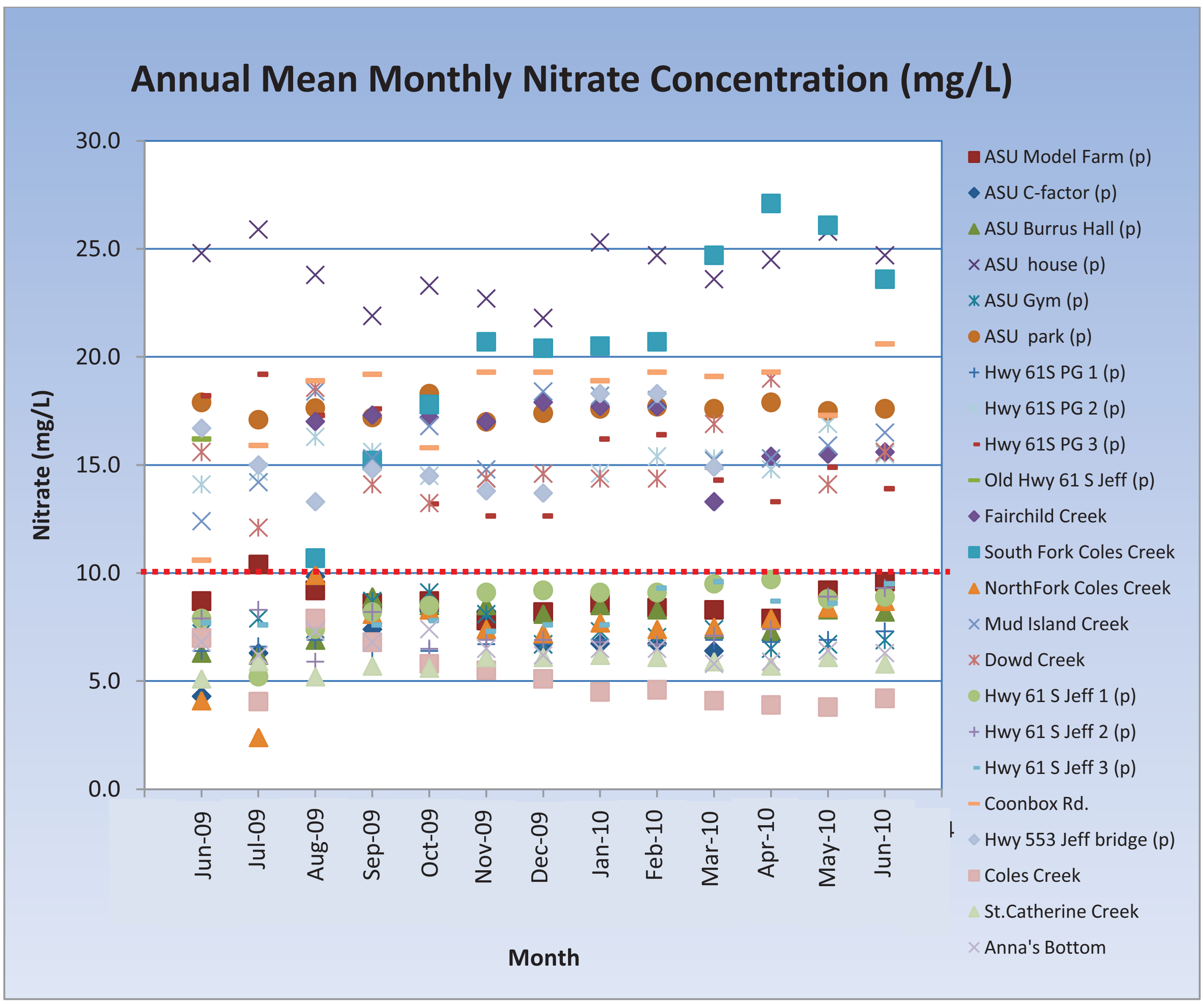


Figure 6. Annual Mean Monthly Nitrate (mg/L)

Chlorophyll

Chlorophyll in various forms is bound within living cells of photosynthetic organisms, such as phytoplankton and cyanobacteria (blue-green algae). The amount of chlorophyll found in a water sample is used as a measure of the concentration of phytoplankton. These measurements contribute to the understanding of the general biological "health" of the system, such as its trophic status or primary production.
Chlorophyll measurements can also identify algal bloom events and their effects on
water quality and anticipate toxic algal blooms.

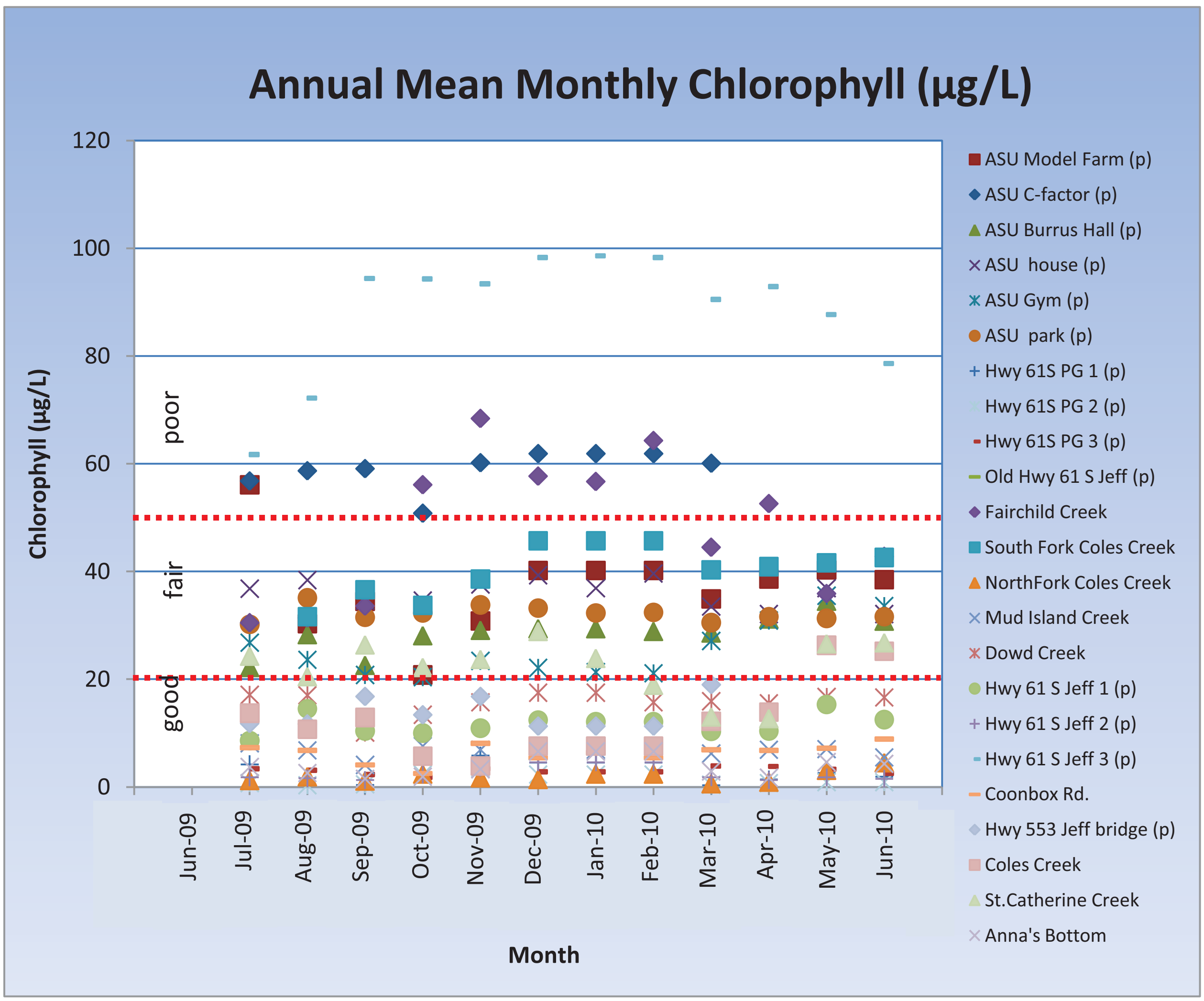


Figure 7. Annual Mean Monthly Chlorophyll (µg/L)

Chlorophyll fluoresces when irradiated with light of a particular wavelength (435-470 nm). For field measurements, in-situ fluorometers induce chlorophyll to fluoresce by shining a beam of light of the proper wavelength into the water and then measuring the higher wavelength light which is emitted. In general, the amount of chlorophyll in a collected water sample is used as a measure of the concentration of suspended phytoplankton.

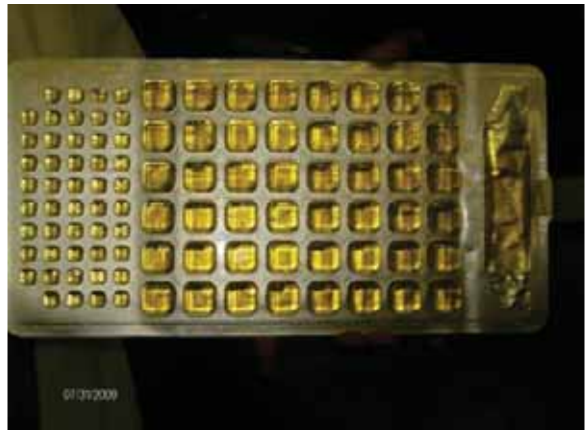
Advances in fluorescence technology have lead to the capability of semi-quantitative measurement of chlorophyll in water, without extraction or chemical treatment, thereby allowing in situ (in-place) measurements.

From the results, it can be seen that most of the chlorophyll levels in the watershed are found to be relatively good to fair. These measurements can be used as an indicator of phytoplankton or algal biomass in the water column. Further study will be needed to correlate the chlorophyll concentration and the column or depth of the sampling.

Chlorophyll in the water are not harmful to human health, but may cause adverse environmental impact, such as reduced water clarity, low dissolved oxygen due to decaying phytoplankton, food supply imbalances, proliferation of species that may potentially be harmful to aquatic or human life, and or causes aesthetic conditions that are unsuitable for designated uses. Increased nutrient availability, for example from human activity (e.g. agricultural runoff, soil erosion, discharges of sewage and aquaculture waste), usually leads to a rise in chlorophyll concentrations in the waters because of the increased phytoplankton biomass.

Total Coliform

Total Coliform Test-theoretically indicates the presence of all coliform group bacteria, both vegetative and fecal in origin. Total coliform bacteria are a collection of relatively harmless microorganisms that live in large numbers in the intestines of man and warm- and cold-blooded animals. They aid in the digestion of food. Total coliform test indicates the presences of all coliform group bacteria, both vegetative and fecal origin. A specific subgroup of this collection is the fecal coliform bacteria, the most common member being Escherichia coli. These organisms may be separated from the total coliform group by their ability to grow at elevated temperatures and are associated only with the fecal material of warm-blooded animals. 60% to 90% of total coliforms are fecal coliforms and more than 90% of fecal coliforms are usually Escherichia coli (E. coli).



The presence of fecal coliform bacteria in aquatic environments indicates that the water has been contaminated with the fecal material of man or other animals. At the time this occurred, the source water may have been contaminated by pathogens or disease producing bacteria or viruses which can also exist in fecal material. Some waterborne pathogenic diseases include typhoid fever, viral and bacterial gastroenteritis and hepatitis A. The presence of fecal contamination is an indicator that a potential health risk exists for individuals exposed to this water. Fecal coliform bacteria may occur in ambient water as a result of the overflow of domestic sewage or nonpoint sources of human and animal waste. Immersion in bacteria-contaminated water can result in infections of the eyes, ears, nose, and throat (Mueller *et al*., 1987).

Bacterial contamination falls under the category of pathogens. The EPA Maximum Contaminant Level (MCL) for coliform bacteria in drinking water is zero (or no) total coliform per 100 ml of water. The recommendation for body-contact recreation is fewer than 100 colonies/100 mL; for fishing and boating, fewer than 1000 colonies/100 mL; and for a source of domestic water supply to be treated, fewer than 2000 colonies/100 mL.

The results from samples show that all of the water bodies contain total coliform that may contain pathogens. Further assessment is necessary to determine the correlation between fecal coliforms, E. coli, and the types of land-use. Furthermore, additional frequent sampling is necessary to determine the presence of the coliform. Although these water bodies are not designated for recreational use, the high concentration of coliform should be monitored.

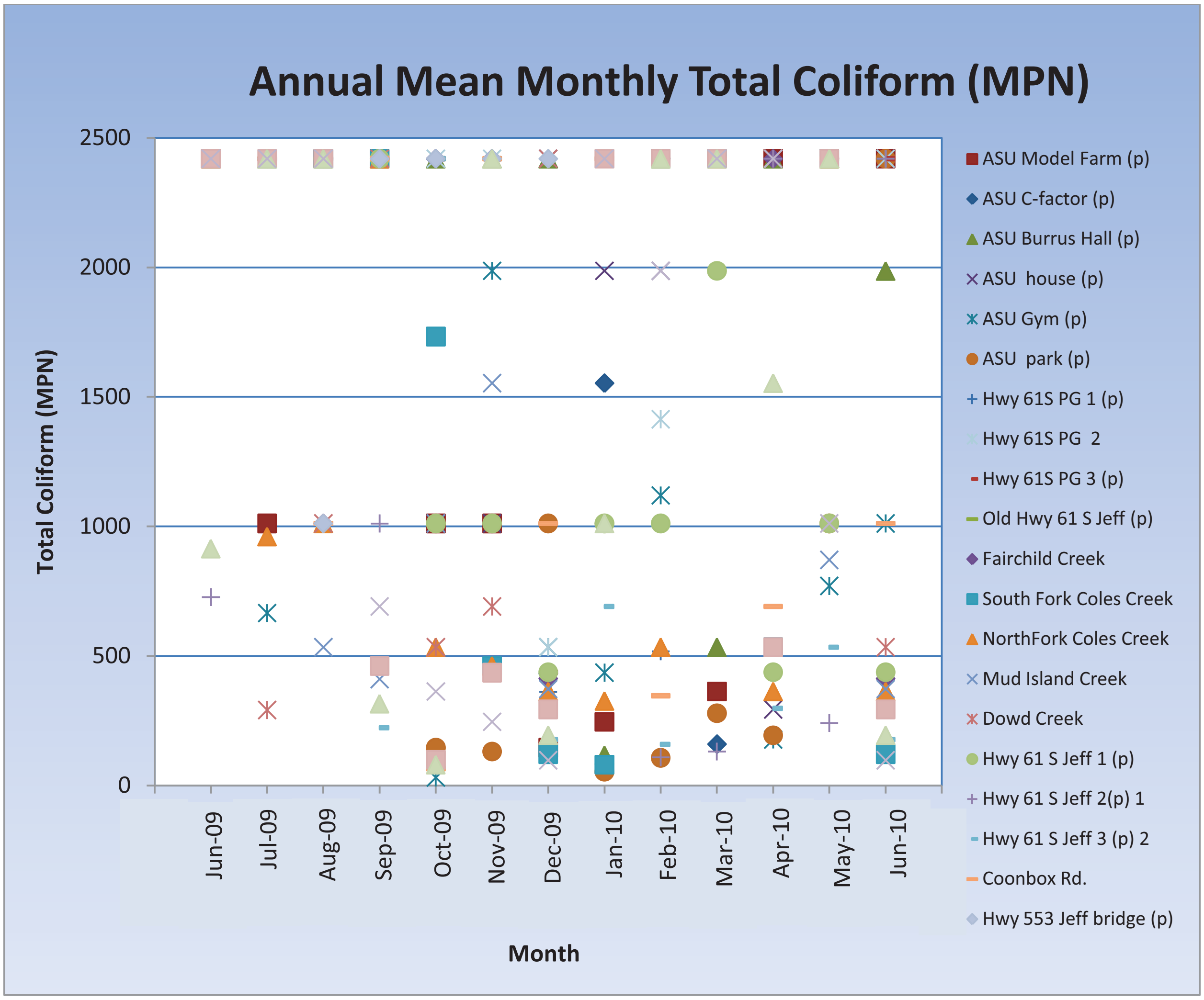


Figure 8. Annual Mean Monthly Total Coliform (MPN)

Escherichia coli

Escherichia coli is a rod-shaped bacteria that lives in the lower intestines of warm-blooded mammals. It is necessary for the proper digestion of food but its presence in surface water indicates fecal contamination. E.coli belongs to a group of bacteria (some of which are harmful) known as fecal coliform bacteria.

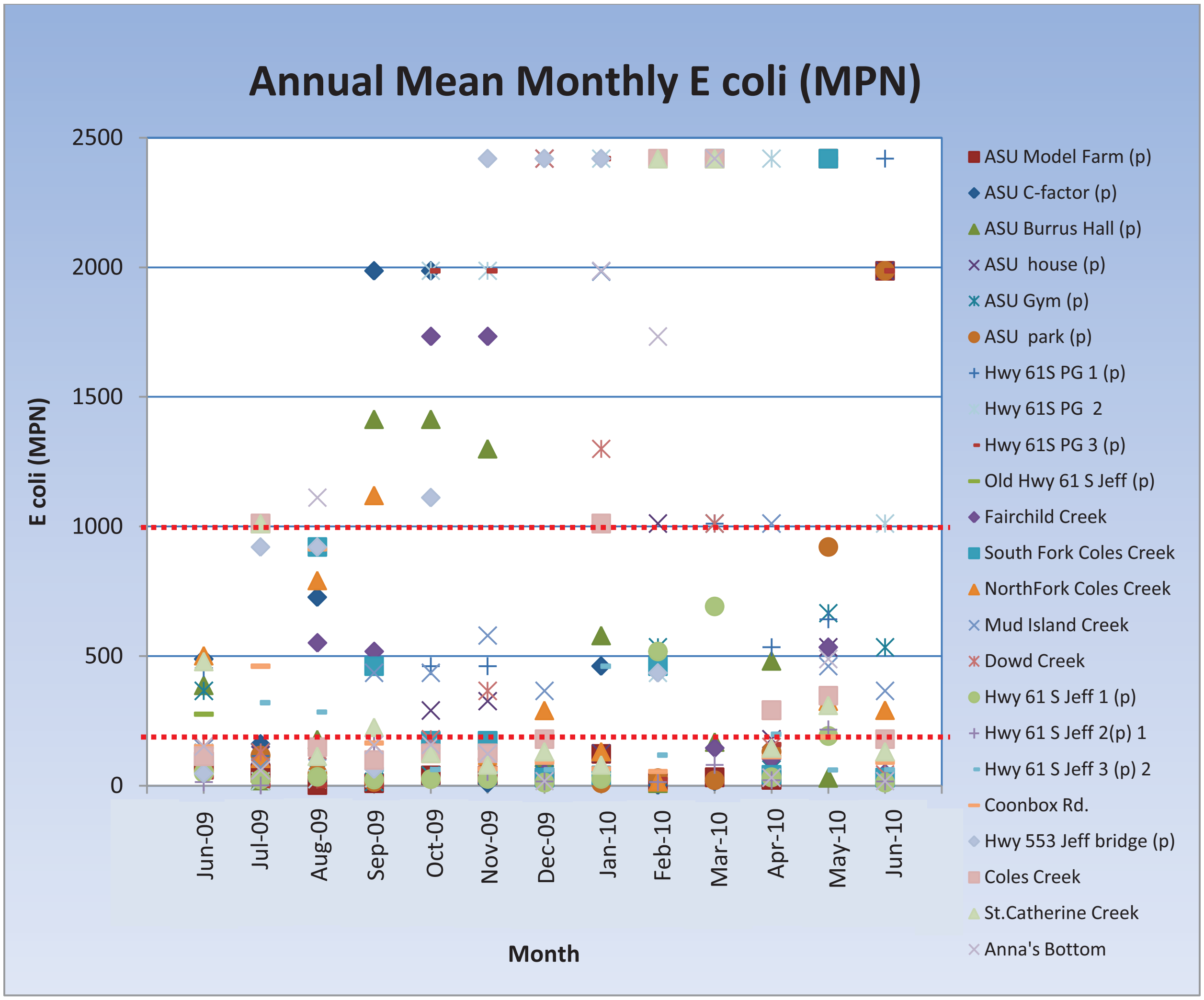
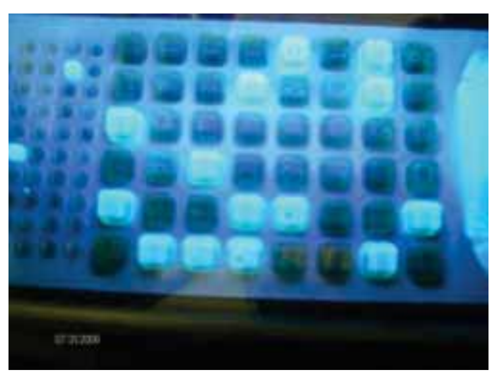


Figure 9. Annual Mean Monthly E. coli (MPN)

Certain strains of *E.coli* can be toxigenic, meaning they create a toxic by-product, causing severe bloody diarrhea and abdominal cramps that can harm humans and can be fatal to children and seniors The EPA recommended criteria for E. coli is 235 MPN/100 mL.



The recreational water guideline is less than 126 MPN/100 ml, averaged from 5 samples during a 30-day period. The single sample guideline is less than 235 MPN/100 mL. An advisory is recommended between and 235 MPN/100 mL and 1000 MPN/ 100 mL. A closure is recommended at greater than 1000 / 100 mL.

The observed data shows that while most of the water sampled have E. coli concentrations that are below and within the advisory guidelines for recreational use, many are found to be in the higher concentration limit. Further study will be needed to observe the correlations between land-use and the presence of E. coli.

Watershed Education and Stewardship

As part of the educational outreach and stewardship effort to promote preservation of water quality in the Coles Creek Watershed, several activities have been conducted as listed below. Some of workshops and activities performed were in conjunction with other events or ongoing activities to maximize our effort in reaching students and people from different communities, including limited-resource farmers and under-served communities. These outreach efforts are:

Storm Water Management Project

In June 2009, tThe Mississippi River Research Center in collaboration with the Mississippi Department of Environmental Quality (MDEQ) conducted a Stormwater Protection Educational Workshop to increase public awareness about the importance of protecting our water resources. Opening and welcoming remarks were given by Dr. Barry Bequette (Dean of School of Agriculture, Research, Extension, and Applied Sciences) and Dr. Alton Johnson (Interim Research Director), followed by educational information delivery by Mr. Johnny Biggert (MDEQ). There were approximately 55 participants; consisting of 15 faculty, staff, and students from the Departments of Agriculture and Chemistry; 22 students from the Summer Apprenticeship program; and 18 students Ag Academy program. Students learned how to preserve water resources by turning off the faucet in between brushing their teeth and not to litter as they will end up in the rivers, creeks, etc. Students from the Summer Apprenticeship program then continued with marking storm drains, a total of 102 across campus. The markings of the drains will notify others not to dump into these drains and avoid water pollution.

Non-Point Source Education Tour of the Mississippi River

On Thursday, October 1, 2009, The Mississippi River Research Center- Center for Ecology & Natural Resources in collaboration with the Mississippi Department of Environmental Quality/Non-point Source Division conducted a nonpoint source educational tour. This tour provided experience for students to cruise the majestic Mississippi River, the 3rd largest river in the world. During this event, students were exposed to non-point source pollution – pollutions from diffused or unknown sources such as agricultural practices. Students learned that the Mississippi River watershed collects water from 31 states in the U.S.

They now have a better understanding of non-point source pollution, how it can degrade the quality of the water, and how they can help protect water resources. As part of their educational experience, students also learned about the disciplines that support environmental science, a multidisciplinary approach to solve complex environmental issues. Areas covered include basic applied sciences such as biology and chemistry; natural resource economics; watershed assessment and analysis that support environmental decision making and policy development; math and physics in computational modeling; and geographic information systems. There were about 35 participants, which include students from programs in Plant & Soil Science, Agriculture Economics, Agriculture Business, Biology, Chemistry and Advanced Technology.

The trip increased the students' awareness of the importance of protecting water quality and how they can contribute by not littering, washing their cars on the road, dumping into waterways, etc. Furthermore, the tour with a boat ride offered a different experience for the majority of the students.

Earth Day Recycling Competition

The Mississippi River Research Center – Center for Ecology & Natural Resources conducted a Recycling Competition as part of the ASU Earth Day Celebration in April 2009 and April 2010. The events were organized by students of Plant & Soil Science – Environmental Science program, from the Department of Agriculture. During these events, several student organizations registered to participate, including ROTC, Agribusiness & Economics Club, SIFE, ASU Softball Team, Delta Mu Delta Business Honor Society, Zeta Chapter of Zeta Phi Beta Sorority, Alpha Kappa Mu, and Alpha Phi Alpha. Collectively, about 1700 lbs of papers, 200 lbs of aluminum cans, and 200 lbs of plastic bottles were accumulated in 2009 and increased to about 1850 lbs in 2010.

The winners of these competitions were announced during the ASU Earth Day Celebration seminar. Students and other seminar participants learned how a community can become together in the effort to preserve the environment.

Participants learned how everyone lives in a watershed. They also become aware that their daily activities can have an impact to others, not just their neighbors, but others in the Coles Creek Watershed, and ultimately outside the watershed. The recycling program is anticipated to increase awareness of more people in the community and encourage them to participate in the future or even implement recycling and preservation of the environment.

Drinking Water Quality and Human Health

During the Small Farmers Conference in March 30, 2010, the Mississippi River Research Center – Center for Ecology & Natural Resources participated in conducting an educational presentation to address non-point source pollution that can directly and indirectly affect drinking water and human health.

At this venue, approximately 60 participants of the conference attended this workshop. Some of the participants live in the Coles Creek Watershed while others live outside the watershed. However, the concept of living in a watershed was introduced to them. In addition, they also learned about the difference between tap and bottled water. Participants were provided with information about the source of their drinking water and how individual activities can directly and indirectly affect the quality of their drinking water supply. In this workshop, participants were given samples of water to taste; ASU tap water, ASUS tap water filtered, and bottled water. After tasting the water samples, they were asked to rank their preferences. The audience was split in their preference between bottled water and filtered ASU tap water. In either situation, they were more alert about protecting their source of water.

What You Dump is What You Drink

The Department of Agriculture, School of Agriculture, Research, Extension, and Related Sciences have sponsored Summer Apprenticeship Programs that were administered by the ASU Experiment Station. The purposes of these programs are to introduce the field of Agriculture and related sciences to students and attract them to join the program. Students were assigned with different faculty of different areas. At the end of their curriculum, students were required to prepare power point presentations to be shared with other students, faculty, staff, parents, and others.

In 2009, three (3) students were assigned to the Environmental Science program. These students were engaged in projects related to water quality issues. The topic of their project was “What You Dump is What You Drink”. They learned about watershed, non-point source pollution, and surface and groundwater relationship. They also identified storm water drainage throughout the area. From this experience, they have a better understanding about water cycle and how they can participate and protect their water resources. About 80 participants of students, faculty, staff, parents, and others attended during their presentation.

Going with the Flow in the Coles Creek Watershed

In 2010, two (2) high school students were assigned to the environmental science program. These students, along with undergraduate and graduate students of Alcorn were introduced to related watershed studies and were taken on a trip to tour the Coles Creek Watershed and sampling locations. During this trip, they were given assignments and training to use Global Positioning System (GPS) to locate potential sources of contaminants and sampling locations, deploy YSI Sonde water quality monitoring instrument and read the results, how to collect water sample to test for pathogens, how to identify potential sources of contaminants and tabulate the data, and test and analyze biological parameters of water quality they collected. Photos of students in the field and in the lab are shown below.

Examples of Identified Potential Sources of Contaminants in the Coles Creek Watershed

Ag Field Day

The School of Agriculture, Research, Extension, and Applied Sciences hosts an Ag Field Day annually. During this event, many small and limited-resource farmers come to visit the campus. In this venue, participants interact with scientists and learn about new and ongoing research that can be adopted by them. This year, there were about 350 participants.

Participants were asked to locate their residence to identify whether or not they live in the Coles Creek Watershed. Approximately 70 of them are from the vicinity while others come from other counties in Mississippi.

Regardless, they were exposed to the Coles Creek Watershed. They learned about the concept of watershed and how they all live in a watershed. The concept of watershed management and education in the Coles Creek can also be applied to other watersheds.

Ag High School Day

To promote the Environmental Science Program at Alcorn State University – Department of Agriculture, current ongoing research or projects are being exposed to potential students during the Ag High School Day. The Coles Creek Education Project was included in this venue.

They were informed about the sciences involved in Environmental Science and also the types of work or possible projects in this field. The graduate students of Plant & Soil Science/Environmental Science encouraged the potential students by explaining to them how water moves in the environment, including ground and surface water.

Approximately 150 high school students visited the Department of Agriculture and were exposed to the new program, a program that is not commonly found within the under-served communities.

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This project was funded by the U.S. Geological Survey and the Mississippi Water Resources Research Institute

The project was executed in collaboration with Alcorn State University – Mississippi River Research Center/Center for Ecology & Natural Resources. Several activities conducted were supported and partially funded by the USDA-NIFA Southern Region Water Program and USDA Forest Service, and the Mississippi Department of Environmental Quality.