October 30, 2012

Lydia L. Haynes
Haynes Farms, LLC
355 County Road 1662
Cullman, AL 35058

Bennet Bearden
P.O. Box 20276
Tuscaloosa, AL 35402-0276

Dear Mr. Bearden:

Thank you for serving on the Alabama Water Agencies Working Group. My husband, Darrel E. Haynes, and I, along with our two sons, Ben and Bart, are fourth and fifth generation production agriculture farmers in the Duck River Watershed in eastern Cullman County. We have worked in opposition to the City of Cullman's and the USACE's efforts to unnecessarily dam the Duck River for potable water because of the inevitable devastating effect this will have on future of Agriculture and the futures of 227 farm families in the Watershed. We appreciate Governor Bentley's efforts for a comprehensive water plan—we feel his efforts will help prevent the very unjust scenario which is currently unfolding in Cullman County.

We have shared information and joined efforts with the Alabama Rivers Alliance. We have also been helped in our efforts by Dwight B. Thompson, retired TVA Engineer. Your name was given to us, via email, by the Alabama Rivers Alliance as a contact for comments. Due to the volume of information, I appreciate the opportunity to mail this you.

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Cullman County must have relief soon. We strongly support Governor Bentley's efforts and your efforts to assure that the citizens of our County and the State of Alabama have fair and just access to Alabama's abundant water supplies.

Very Sincerely Yours,

Lydia L. Haynes
Cell: (256) 709-1111

October 1, 2012

The Honorable Governor Robert Bentley
State Capitol
600 Dexter Avenue
Montgomery, AL 36130

Subject: Locks, Dams, and Water Management

Reference: Letter from Darrel and Lydia Haynes and myself to you dated 9/11/2012.

Dear Governor Bentley,

Thank you for defending navigation and transportation on Alabama's rivers, and thank you again for your current water management policy and legislation development initiative. The following are some observations and suggestions that may be helpful to you and to your Staff:

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Your objections to the Corps' proposed restrictions on lock usage are ***strongly*** supported by the 1819 Enabling Act for Admission of Alabama to the United States that prescribes:

> *"... and that all navigable waters within the said state shall forever remain public highways, free to the citizens of said state, and of the United States, without any tax, duty, impost or toll therefor, imposed by the said state."*

Based on the above, the State of Alabama enacted statute 33-7-3 that prescribes:

"Any person who dams up or otherwise obstructs a navigable watercourse must, on conviction, be fined not less than $100.00 nor more than $1,000.00."

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There are two exceptions to statute 33-7-3, those being statutes 33-7-30 and 33-7-31, both of which require that a dam *improve* navigation, not *block* navigation.

For more than 50 years the Federal Energy Regulatory Commission (FERC) and the Corps of Engineers have ignored both the above Enabling Act and the above Alabama Laws by allowing the construction of numerous dams on Alabama's navigable streams without including locks. It is noteworthy that the author of a recent (September 2012) "Alabama Living" magazine article, who had canoed the 600-mile long Alabama Scenic River Trail, reported that he had to transport his canoe and gear around ***all six dams*** on the Coosa River, and that his trip would have been impossible in a motorboat.

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The following are observations and recommendations regarding some *critical* issues:

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a *mathematical formula,* developed by the responsible state agencies, that recognizes and factors in to the equation available water *quantities* and reasonable and justifiable water *uses*.

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4. The "Issues" report seems to stress the need for ***more funding*** and ***more data*** before meaningful change can take place. In my opinion, the State has been collecting data for almost 200 years, and existing data could be used to develop an initial (though perhaps rough) ***Allocation Formula*** for the Waters of the State. The initial Allocation Formula (and the associated Allocation Factors for each identified need) could then be gradually and steadfastly ***refined and updated*** by the responsible State agencies as more data is collected and as needs change in the future.

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Thank you again for your current initiatives to identify, address, and resolve Alabama's complex and extremely important water issues.

Sincerely,

Dwight B Thompson 10/2/12

Dwight B. Thompson, Retired TVA Engineer
1258 County Road 1131
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Phone: 256-734-2998

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Darrel E Haynes 10-02-12
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Lydia's Cell: (256) 709-1111
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H.E. "BUD" HAYNES
DARREL E. HAYNES
BEN HAYNES
BART HAYNES

September 11, 2012

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State Capitol
600 Dexter Avenue
Montgomery, AL 36130

Subject: Cullman County Public Water, and the Proposed Water Management Plan

Dear Governor,

We need your help with our public water situation in Cullman County.

The proposed Duck River Reservoir is the last straw in a 55-year long saga of special interests progressively taking ALL of our water and MUCH of our property and associated livelihoods for gain, at the expense of the rural people of Cullman County. Those special interests are Alabama Power Company, The City of Cullman, and wealthy individuals able to buy up land and dam up a major stream for personal use.

We are drawing a line in the dry, sandy soil that is being left in this county, and plead for your assistance in having our concerns addressed (as explained in detail in the attached documents). The preliminary land clearing and excavating that is currently underway on the project needs to STOP until these concerns are adequately addressed.

We recently learned and are DELIGHTED that you have directed several state agencies to develop a water management plan by December 2013, and we APPRECIATE that you directed those agencies to coordinate with stakeholders, of whom we are all a part.

Also, we recently learned that that the Alabama Water Resources Study Commission was formed in 1990. The Duck River project was first conceived in about 1993, and has been in a contentious state since about 1995. We have seen NO evidence that the Commission has done ANYTHING to help our plight. We hope that your directive to state agencies to finalize a plan and propose appropriate legislation has enough impetus to overcome the state bureaucracy that has stagnated the Commission for the last 22 years.

If your directive is implemented, including the FAIR ALLOCATION of water to ALL citizens of this state, then we would be happy, because the need for the Duck River project would immediately disappear, saving us about $200 million in principal and interest, plus the thus far uncalculated (and huge) present and future toll on agriculture and farming in the watershed. However excavation and blasting is underway NOW.

We believe (as described in the attached documents) that EXISTING water sources (currently controlled by special interests) could and should be developed instead of Duck River for the benefit of ALL citizens, for about half the cost of the Duck River project, and that this would result in a MUCH more reliable system than the Duck River project proposes.

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During the last few YEARS we have written MANY letters to state and federal agencies carefully describing in details, supported by evidence, significant concerns we have about the project. Federal agencies do not reply to anything except Freedom of Information requests. State agencies we wrote to include:

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Governor Bentley, will you help put the Duck River project on HOLD until these concerns are addressed? (The attachments describe the concerns in detail.)

Cullman County is not using any more water now than we were 20 years ago when this project started (contrary to the Corps' predictions that we would be using twice as much water by now as we currently are), so there is time to stop and reevaluate the whole project. The Corps never considered (in twenty years of studies and plans) the option to

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dbt/llh

October 30, 2012

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Lance LeFleur
Alabama Department of Environmental Management
P.O. Box 301463
Montgomery, AL 36130-1463

Dear Mr. LeFleur:

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dbt/llh

EXCESSIVE PHOSPHOROUS IN THE DUCK RIVER AND CONSEQUENCES FOR THE PROPOSED RESERVOIR

CULLMAN COUNTY, ALABAMA

October 2012

As defined in Clean Water Act Section 404 and in Department of the Army Draft Permit Number AL96-00912-U, this report contains "significant new information which the Corps did not consider in reaching the original public interest decision," re-identifies the "significant ongoing threat that the project poses to the nation's waters," and offers a "practicable alternative that has never been evaluated," an alternative that would be "less damaging to our aquatic resources."

Dwight B. Thompson
Retired TVA Engineer
Citizen Volunteer

INDEX

ACRONYMS AND DEFINITIONS

ADEM - Alabama Department of Environmental Management.

Anoxic - totally deprived of oxygen.

AWW – Alabama Water Watch

BATHTUB Model - a computer model used from about 1999 to about 2005 by the Corps to predict the effect of water quality conditions on the proposed reservoir.

BMP - Best Management Practice.

CBOD - Carbonaceous Biochemical Oxygen Demand.

CCSWD - Cullman County Soil and Water District.

Corps - The United States Army Corps of Engineers.

D.O. – dissolved oxygen

Eutrophic - water rich in plant nutrient minerals and organisms, but often deficient in oxygen in midsummer. Such water is much more expensive to convert to potable water due to filter clogging, and it may provide inadequate oxygen to support fish and other aquatic organisms.

Hypolimnion - the lower-most, noncirculating layer of cold water in a thermally stratified lake, usually deficient in oxygen.

Impaired Stream – A classification of polluted streams under Clean Water Act Section 303(d). When selected for the Duck River project, the Duck River was a 303(d) impaired stream, but is now classified as a TMDL stream.

mg/L – milligrams per liter (equivalent to ppm).

Mesotrophic - water in the middle range regarding nutrients.

Nitrate – Chemical compounds containing the nitrate radical (NO_3 -). Ammonium nitrate, calcium nitrate, potassium nitrate, and sodium nitrate are used as sources of nitrogen for plant fertilization.

Nitrite – Chemical compounds containing the nitrite radical (NO_2 -). Nitrites are not used as sources of nitrogen for plant fertilization.

Nitrify - to combine with nitrogen or nitrogen compounds.

NRCS – U.S. Department of Agriculture, Natural Resources Conservation Service.

ppm – parts per million (equivalent to mg/L)

TKN - Total Kjeldahl Nitrogen, the sum of total organic nitrogen and ammonia (NH_3), according to the 2011 Annual Water Quality Report.

TMDL- Total Maximum Daily Load. A classification of streams that have been taken off of the Clean Water Act Section 303(d) list of impaired streams, but still require action to address pollution.

TN - Total Nitrogen concentration, expressed in parts-per-million (ppm) or the equivalent, milligrams-per-liter (mg/L), and, specifically, the sum of TKN, nitrate, and nitrite concentrations, according to the 2011 Annual Water Quality Report.

TN loading - the product of flow, TN, and time (expressed in this project as pounds-per-year (lbs/yr)). Initially, in the original Environmental Assessment, the Corps referred to **TN loading** in terms of the rate nutrients entered the river from the watershed area, an amount expressed as grams per square meter per year ($g/m^2/yr$).

TP - Total Phosphorous concentration, expressed in parts-per-million (ppm) or the equivalent, milligrams-per-liter (mg/L).

TP loading – The product of flow, TP, and time, now expressed in this project as pounds-per-year (lbs/yr). Initially, in the original Environmental Assessment, the Corps referred to **TP loading** in terms of the rate nutrients entered the river from the watershed area, an amount expressed as grams per square meter per year ($g/m^2/yr$).

Waters of the State, or State Waters – as defined in Ala. Admin. Code r.335-6-10-.02, means all waters of any river, stream, watercourse, pond, lake, coastal, or surface water, wholly or partially within the State, natural or artificial. This does not include waters which are entirely confined and retained completely upon the property of a single individual, partnership or corporation unless such waters are used in interstate commerce.

WMA – Watershed Management Authority, (Code of Alabama, Title 9, Chapter 10A).

303(d) – The section of the Clean Water Act that addresses pollution impaired streams.

404 Permit – Clean Water Act Section 404 Permit AL96-00912-U for the construction of the proposed Duck River dam and reservoir.

EXCESSIVE PHOSPHOROUS IN THE DUCK RIVER AND CONSEQUENCES FOR THE PROPOSED RESERVOIR

EXECUTIVE SUMMARY

Excessive nutrients (nitrogen and phosphorous) in the Duck River continue to be a significant concern for the viability of the proposed reservoir. With excessive nutrients the reservoir would likely become eutrophic (high in nutrients and organisms but low in oxygen). An eutrophic reservoir would have a greatly increased cost of filtration and treatment to produce potable water and would not provide adequate support for fish and other aquatic organisms that require oxygen in the reservoir and downstream.

Since 1994 when the Corps of Engineers selected the 303(d) impaired Duck River as an alternate potable water source, both federal and state agencies have described the river as unsuitable for a potable water supply due to high nutrient concentrations. Nevertheless, the Corps assured everyone (including federal judges) during 10 years of litigation (from 2000 to 2009), that nutrient loading could be sufficiently reduced by the use of proper watershed management techniques.

Now, in 2012, the success of the past thirteen years of intensive management efforts is highly questionable. The required 60% reduction in phosphorous loading does ***not*** appear to have been achieved, and the nitrogen loading has increased significantly. The methods of data collection and evaluation have been unreliable or even non-existent for ***years*** at a time, and are so inadequate and unscientific that it would be impossible to make a valid conclusion that there has been a substantial decrease in nutrient loading.

The Corps of Engineers seems unwilling to question the situation or to enforce numerous requirements of the current Section 404 permit regarding watershed management. The Alabama Department of Environmental Management (ADEM) has apparently not questioned the water quality results obtained so far, and has issued a permit allowing millions of dollars worth of site excavation to occur for a reservoir that will likely ***fail*** as a suitable potable water supply. Although three ADEM representatives attended the first annual watershed management plan review meeting in 2011, no ADEM representatives, Corps representatives, or even Utility Board members attended the 2012 meeting.

Immediate changes in the collection method and evaluation of sample results is necessary if the project is to legitimately continue with a valid determination of the nutrient status of the river. Almost all of the data currently being collected is useless for that purpose.

In a larger sense, the on-going high levels of nutrients observed in the river emphasize the need to reevaluate the entire basis of this project and to consider a practicable alternative that has never been evaluated, that alternative being the combined use of several existing sources to provide not only an alternate source of raw water, but also a greatly increased capacity of ***potable*** water, which the Duck River project does not provide at all.

DISCUSSION OF PRIMARY CONCERNS

Based on reports available to the public, the three primary water quality concerns for the proposed Duck River reservoir are ***dissolved oxygen***, ***total phosphorous***, and ***total nitrogen***. Proper management of the Duck River watershed to monitor and control these three parameters is a requirement of the permit. The present status of these parameteres is discussed below.

DISSOLVED OXYGEN (D.O.)

In 1999 the Corps issued the original permit to construct the Duck River dam. Three years later, in February 2002, the Final Total Maximum Daily Load (TMDL) report was issued by ADEM for the Duck River (AL/03160109-020-01). The report lists low dissolved oxygen due to organic loading as ***the*** concern, and the specific pollutant of concern is Carbonaceous Biochemical Oxygen Demand (CBOD).

ADEM classifies the river use as Fish and Wildlife, and interestingly expresses no concern about nutrients in the river. Also, it is interesting that the report lists best usages of the waters as fishing, propagation of fish, aquatic life, and wildlife, and any usage ***except*** for swimming and water contact sports ***or as a source of water supply for drinking or food processing purposes.*** (Again, this TMDL was written three years ***after*** the Corps' original 404 permit was issued in 1999 to convert the river to a potable water source, and the TMDL is apparently still in effect.)

The ***only*** TMDL established for the river is that dissolved oxygen (D.O.) be more than 5 mg/L. From the following three reports, D.O. is listed as:

1.	Duck River Clean Water Action Plan, Cullman Alabama, Final Report, November 1999 to September 2005	ADEM 1988..... 6.2 mg/L ADEM 1997..... 6.6 mg/L AWW 2003..... 9.1 mg/L
2.	Duck River Water Supply Project Water Quality Monitoring Plan, Cullman Utilities Board, March 2, 2010	11/1997 thru 8/1998.... 9.6 mg/L 2/2009 thru 1/2010.... 9.6 mg/L
3.	Duck River Reservoir Project, Annual Watershed Management Plan Review Meeting Summary dated June 24, 2011.	1/2010 thru 2/2011....10.6mg/L (at proposed dam site)

Thus there has been a consistent increase in dissolved oxygen, the Duck River is well above the minimum limit of 5 mg/L for dissolved oxygen, the river appears to meet the criteria for a Fish and Wildlife stream (the river's current classification), and the river has been removed from the 303(d) list of impaired streams. But ADEM still does ***not*** recommend use of the stream "as a source of water supply for drinking water or food processing purposes."

TOTAL NITROGEN (TN) AND TOTAL PHOSPHOROUS (TP)

The U.S. Fish and Wildlife Service initially refused to concur with the proposed reservoir in 1996, citing concerns about the over-nitrification of the river as one of the primary reasons. A copy of the letter is attached, and it is just as poignant today as it was 16 years ago.

Over the next ten years (thru 2005) the Corps steadfastly assured everyone (including federal judges during nine years of litigation) that implementation of Best Management Practices could and would resolve the excess nutrient levels (nitrogen and phosphorous) in the Duck River, a river which is located at the center of perhaps the most intense poultry production and agricultural area of Alabama.

In 2005 the Corps established baseline concentrations for 1999 (based on 1997 and 1998 measurements) for both total nitrogen (TN) and total phosphorous (TP), and stated in the Supplement to the Environmental Assessment that nutrients needed to be reduced 60%. The 1999 baseline concentrations are:

Total Phosphorous: ***0.054*** mg/L
Total Nitrogen: ***3.04*** mg/L

A 60% reduction in TP would be down to ***0.022 mg/L*** (0.054 mg/L X 40%).

Note that the TN baseline concentration is about ***56 times higher*** than the TP baseline concentration. In general, plants can only use about eight times more nitrogen than phosphorous, and thus as long as TN remains more than eight times higher than TP, then phosphorous becomes the limiting nutrient, because plants could not use the excess nitrogen. If TN ever becomes less than eight times TP, then nitrogen would become the limiting nutrient. Thus the Corps properly focused on reducing TP, the limiting nutrient at the time, to prevent the reservoir from becoming eutrophic.

The latest (2012) watershed management report was significant and disturbing in that, during a high-flow period, a TP measurement at site 11 (the dam site) of ***2.5 mg/L*** and a **nitrate** measurement of ***2.67 mg/L*** were recorded (nitrate is the largest portion of TN for the Duck River water). This phosphorous reading was extremely high, more than ***100 times higher*** than the goal of less than 0.022 mg/L, and so high that TN would become the limiting nutrient if such high readings persisted.

The high TP readings during the high flow period in early 2012 will be discussed more later. High-flow periods are the mechanisms that would initially fill and then refill the proposed reservoir, and are therefore of great importance in total nutrient loading.

TOTAL PHOSPHOROUS (TP)

According to EPA recommendations, to control eutrophication, total phosphate should not exceed 0.05 mg/L (as phosphorous) in a **stream** at a point where it **enters** a lake or reservoir. (Muller and Helsel, 1999, quoted in "BASIN: General Information on Phosphorous, City of Boulder/USGS Water Quality Monitoring" – copy attached).

Also, eutrophic lakes have phosphorous concentrations exceeding 0.02 mg/L (Muller and Helsel, 1999). This concentration is almost identical to the goal set by the Corps for Duck River (60% of the 0.054 mg/L baseline is 0.022 mg/L).

It is cause for serious concern that during a ***high-flow*** period (the type that would fill and then refill a reservoir), TP measured at the dam site (not at some small, remote tributary) was 2.5 mg/L, a level more than ***100 times higher*** than the 0.022 mg/L goal. ***This should have been the cause for intense, additional follow up sampling at the proposed dam site, but absolutely no change in sampling was directed by those in charge. The Corps, ADEM, and the Utility Board were not even present at the annual watershed management plan review meeting in June 2012 when this high measurement was presented and discussed, some four months after the very high TP period occurred.***

"Phosphate levels greater than 1.0 mg/L may interfere with coagulation in water treatment plants. As a result, organic particles that harbor microorganisms may not be completely removed before distribution." (Ref. "BASIN: General Information on Phosphorous) ***Thus, a high reading of 2.5 mg/L, followed the next month by a reading of 0.70 mg/L should have been followed up by additional sampling, not discounted.***

The 2012 management plan review basically discounted the event as an "outlier," an "anomaly," or a "slug," but a review of data indicates it was probably ***not*** an anomaly, and only appeared to be abnormal due to the faulty method of sample collection since 1999 (ignoring high-flow periods). Specifically, from graphs in the 2011 and 2012 reports:

Date	Flow(cfs)	TP (mg/L)
January 7, 1998	600	>1.0
July 22, 2009	decreasing from 90 on 6/17/09 to <10 on 7/22/09	>0.065
June 8, 2010	decreasing from 20 on 4/20/10 to 10 on 6/8/10	0.08
February 17, 2011	<30	0.04
February 22, 2012	decreasing from 80 on 1/31/2012 to 50 on 2/22/2012	***2.5***
March 16, 2012	almost 40	***0.70***

All of the above measurements are considerably higher than the required 0.022 mg/L goal (60% reduction from 0.054 mg/L), and all of them occurred during or near the end of a moderate-flow to high-flow period. The very high readings on 2/22/12 and 3/16/12 occurred during an unusual, extended, high-flow period lasting from November 2011 to May 2012 during which a lot of phosphorous was apparently flushed from the watershed.

A likely explanation for the high reading is that the no-till and low-till farming methods normally used in modern farming do not turn soil over with a plow, and therefore poultry litter or manure spread on the surface tends to stay near the surface, and is subject to being removed by heavy rainfall. Much higher phosphorous runoff during extended rainfall periods would thus be expected, and not something to be discounted as an "anomaly." A "slug" was a more appropriate description in the annual report, but in this case the "slug" was a high-flow event that lasted for ***months***. For the proposed reservoir, such an event would basically be a high phosphate "charge" that would fill the reservoir, with serious eutrophic consequences, rather than just a brief "slug" to be discounted and minimized.

As described in the Environmental Assessment, Duck River flow is characterized by low base-flow because there are very few springs in the area. Base flow is normally interrupted just a few times per year by very brief periods of high-flow or a very high-flow "flash flood." (See the attached "Mulberry Fork" flow graphs for 1997-98 and 2009-2011.)

Apparently, no special efforts have been made for the last 13 years to capture samples during high-flow events. According to the Clean Water Action Plan Project completed in 2005, the monthly samples were merely taken during the third week of the year, between 10 am and 2 pm. ***It is suspected that this sort of schedule, which would miss almost all high-flow events, has continued to present.***

With about 720 hours in a month, and using the current sampling method, there is only a once in ***720 years*** chance of getting a monthly sample during the monthly or even the yearly high-flow hour. This is not a scientific way to determine the effect of high flow, and ***the sampling protocol needs to be changed immediately to focus on capturing samples during high-flow events, which apparently are also high TP events.***

TOTAL NITROGEN (TN)

Average TN (from January 2010 to February 2011) has risen substantially to about 3.7 mg/L at last report in August 2011 (see attached 2011 Annual Water Quality Report, Figure A-22 for site 11, the dam site). This is about a 22% increase from the 1999 baseline of 3.04 mg/L. However, as long as TP is less than one-eighth of TN (1/8 x 3.7 = 0.5 mg/L) then TP will remain the limiting nutrient.

The recorded "slug" of TP on 2/2/12 measured 2.5 mg/L, was five times more 0.5 mg/L (1/8 of 3.7 mg/L) and thus TN would be the limiting nutrient for that "slug" of river flow.

The subsequent measurement in March 2012 was 0.7 mg/L, still more than thirty times higher than the 0.022 mg/L goal, and still enough to make TN the limiting nutrient.

Subsequent measurements in April, 0.07 mg/L, and May 0.04 mg/L, still triple and double the 0.022 mg/L goal for TP.

HAS THE 60% TP REDUCTION REQUIREMENT BEEN MET?

Consider the following:

1. As described above, high TP readings have occurred repeatedly during high-flow events, but the monthly sampling method almost always misses short-term high-flow events. High TP samples were captured during the high-flow period from February to May of 2012 simply because the period lasted so long, and several consecutive monthly samples were affected.

2. From 1999 until December 2010, TP was not being measured with sufficient accuracy to determine if the 60% reduction goal was being met. In December 2012 the analysis method was finally changed to measure TP down to 0.02 mg/L, which is basically the same concentration as the 60% reduction goal (40% of 0.054 mg/L).

3. The high TP readings in 2012 with high flow increased average TP almost 150% to 0.146 mg/L, about seven times higher than the recommended limit of 0.02 mg/L and the required goal of 0.022 mg/L.

4. The 2012 annual report calls the high reading an "outlier," or an "anomaly" or a "slug." Big "slugs" of high phosphorous during high flow are what could cause the proposed reservoir to become eutrophic. This mechanism of high phosphorous injections into the proposed reservoir during high flows should be thoroughly investigated and analyzed, ***not shrugged off***, as occurred during the annual review meeting on June 19, 2012.

The haphazard method of collecting samples makes it indeterminate if phosphorous has actually decreased, because no effort is being made to collect samples during high flow periods, when it appears that TP is high.

The 2011 annual management plan review claimed a 93% reduction in TP. However the spreadsheet that was produced as evidence of this claim is incomprehensible, somehow assigning "current" values to 15-year old data. TP loading is simply average TP multiplied by average flow for a year, but the spreadsheet purports some other unexplained calculation method, and obviously not the method used by the Corps. With TP only being measured down to 0.02 mg/L, it would be impossible to claim more than a 60% reduction in TP, the analysis method is simply not accurate enough to measure more than a 60% reduction (0.022 mg/L).

The simple formula to calculate ***TP loading change*** is:

$$\frac{-[(\text{1999 Baseline TP loading rate}) - (\text{Present TP loading rate})]}{(\text{1999 Baseline TP loading rate})} \times 100 = \%\ \text{TP loading change}$$

For 2011, at the dam site (sample site 11), using TP and flow values from the "Change in Total Phosphorous" map in the 2011 Annual Management Plan Review Meeting Summary and from the 2005 Environmental Assessment baseline:

$$\frac{-[(0.054\ \text{mg/L} \times 50\ \text{cfs}) - (0.025\ \text{mg/L} \times 46.54\ \text{cfs})]}{(0.054\ \text{mg/L} \times 50\ \text{cfs})} \times 100 = -57\%\ \text{TP loading}$$

For 2012, at the dam site (sample site 11), using TP and flow values from the "Change in Total Phosphorous" map in the 2012 Annual Management Plan Review Meeting Summary and from the 2005 Environmental Assessment baseline:

$$\frac{-[(0.054\ \text{mg/L} \times 50\ \text{cfs}) - (0.146\ \text{mg/L} \times 35.9\ \text{cfs})]}{(0.054\ \text{mg/L} \times 50\ \text{cfs})} \times 100 = +94\%\ \text{TP loading}$$

The simple formula to calculate ***TP change*** is:

$$\frac{-[(\text{1999 Baseline TP}) - (\text{Present TP})]}{(\text{1999 Baseline TP})} \times 100 = \%\ \text{TP change}$$

For 2011, at the dam site (sample site 11), using TP values from the "Change in Total Phosphorous" map in the 2011 Annual Management Plan Review Meeting Summary and from the 2005 Environmental Assessment baseline:

$$\frac{-[(0.054\ \text{mg/L}) - (0.025\ \text{mg/L})]}{(0.054\ \text{mg/L})} \times 100 = -53\%\ \text{TP change}$$

For 2012, at the dam site (sample site 11), using TP values from the "Change in Total Phosphorous" map in the 2012 Annual Management Plan Review Meeting Summary and from the 2005 Environmental Assessment baseline:

$$\frac{-[(0.054\ \text{mg/L}) - (0.146\ \text{mg/L})]}{(0.054\ \text{mg/L})} \times 100 = +170\%\ \text{TP change}$$

The 2011 and 2012 reports used newly calculated baselines for 1997 to 1998 rather than the 1999 baseline specified in the 2005 Environmental Assessment. No justification for changing the baseline or approval by the Corps to change the baseline is evident. Even with the different (unapproved) baseline, the reports showed on a map of the watershed a 59% TP reduction for 2011, and a 147% TP ***increase*** in TP for 2012 (See "Change in Total Phosphorous" maps for 2011 and 2012, copies attached).

None of the calculations show that the 60% reduction in TP or the 60% reduction in TP loading required by the permit has been achieved, despite 13 years of intensive management. In fact, the 2012 data shows a huge increase in TP that has not been addressed.

The 2012 report refers to the extremely high (2.5 mg/L) TP sample in February 2012 at the dam site (11) as an "outlier," which means a thing that exists away from the main body or expected place. That would be an accurate description of the sample. The sample is more than 100 times more concentrated than what would be acceptable for a reservoir, and for meeting the 0.022mg/L goal established by the Corps.

The report also said the sample could be an "anomaly" which would mean being, or seeming to be inconsistent, contradictory, or improper. (Webster's New World Dictionary) The report speculated (in a note on the "Long-term Total Phosphorous" graph) that the high reading could be caused by a "slug load or contaminated sample."

Neither cause (slug nor contamination) is consistent with the statement on page 3 that, "The observed TP concentration at SP-11 dropped to 0.70 mg/L in March 2012 and to 0.07 mg/L and 0.04mg/L in April and May 2012, respectively." The 0.70 mg/L sample in March is still more than 30 times more concentrated than the goal, the 0.07mg/L in April is more than 3 times the goal, and the 0.04 mg/L in May is double the goal. This high flow and high TP lasted from at least February to May of this year (2012).

A "slug" is a single drink or a hard hit. The "single drink" of high TP and high flow lasted at least three months. That would be a very long drink for the proposed reservoir and a very injurious hit, in combination with the high TN present also.

The fact that there were four consecutive, monthly, unacceptably high readings, including two consecutive extremely high readings, tends to strongly discredit the "contaminated sample" theory.

OTHER NUTRIENT OBSERVATIONS

All data for ten years (from August 10, 1998 to February 13, 2009) is missing from the two annual reports that have been made so far (2011 and 2012). It is scientifically inexcusable that useable data was not collected and reported during the ten-year period, a period when a full-time watershed manager was working to reduce nutrients entering the river, but no one was apparently measuring the results.

Apparently, the increased and very high nitrogen levels, primarily from nitrates, that have been recorded (see attached pages 16 and 33 of the 2011 water quality report) are the indirect result of the Poultry Litter Distribution Program, which was aimed at reducing phosphorous ***only***. As a result of the program, farmers in the watershed can no longer obtain enough poultry litter to adequately fertilize their crops, and instead are properly applying greatly increased amounts of nitrate fertilizers (which are *much* more expensive, at $500 or $600 per ton now, than poultry litter).

This commercial fertilizer is apparently (and significantly) resulting in the increased nitrate concentrations being observed in the Duck River.

The net result of the last thirteen years of intensive management is that though phosphorous concentration may have changed somewhat (but not decreased the required 60%), nitrogen concentration has definitely ***increased*** significantly. The city's engineer appears to be calculating TP in a manner that differs greatly from the method used by the Corps' to calculate baseline concentrations in the Environmental Assessment of 2005. This is a matter of great concern, because the recent (2011) calculation of TP provides no rational correlation to the 60% TP reduction goal and baseline concentrations specified in the Environmental Assessment of 2005, which were approved by a federal judge.

The two annual reports produced thus far do not even mention the 0.054 mg/L baseline for TP or the 3.04 mg/L baseline for TN that is specified by the Corps in the Environmental Assessment.

Though the U.S. Fish and Wild Life Service's concerns back in 1996 (over-nitrification and excess nutrients) appear to remain valid today, the City of Cullman Utilities Board, the Corps of Engineers, and the Alabama Department of Environmental Management appear to have taken no new actions to address the on-going high TP and increasing TN.

In spite of the dubious suitability of Duck River as a reservoir, hundreds of thousands of cubic yards of earth and rock have now (as of October 2012) been excavated at a cost and at a potential loss to Cullman County citizens of millions of dollars.

DOES THE WATERSHED HAVE AN EFFECTIVE, RESPONSIBLE WATERSHED MANAGEMENT AUTHORITY?

Currently (for more than a year now), the City of Cullman Utilities Board has been promoting itself as equivalent to a watershed management authority (WMA), apparently with the Corp's verbal blessing, though the Corps has provided no documentation of this acceptance. The Utility Board was added as a permitee to the initial 1999 permit for financing reasons (not as a WMA), and was also again added to the current 2006 permit for financing reasons (not as a WMA). Contrary to requirements of the two Section 404 permits the Utility Board:

1. ***Failed*** until December 2010 (a lapse of 11years) to ensure that water quality measurements (phosphorous) were being taken with sufficient accuracy (0.02 mg/L) to determine if the 60% reduction in total phosphorous was being achieved. The required 2005 baseline is 0.054 mg/L and a 60% reduction would be down to 0.022 mg/L, a concentration essentially at the accuracy limit (0.02 mg/L) of even the current measurement method (that has been used for less than two years).

2. ***Failed*** from 2000 until 2010 to produce an annual water quality report.
3. ***Failed*** to require that the annual water quality report be produced and available for review ***prior to*** the annual watershed management plan review meeting. It is impossible for annual meeting participants to review the plan's sufficiency without having the water quality report to review ***before*** the plan review meeting.

4. ***Failed*** from 2000 until 2011 to conduct an annual watershed management plan review meeting.

5. ***Failed*** to update the 1999 Watershed Management Plan for the last twelve years, even though it is required to be reviewed and updated annually.

6. ***Failed*** to conduct public meetings to finalize the Watershed Management Plan.

7. Consistently and persistently have ***withheld*** the Watershed Management Plan from the public, despite repeated verbal requests to Project Coordinator Dale Greer in 2010 and despite a Freedom of Information Request to the City of Cullman in 2012. A copy of the plan had to eventually be obtained from the Corps, since the city would not provide one. This is in direct conflict with requirements of the plan to seek public input on the plan, and is in conflict with the Freedom of Information Act for this project, which was selected, designed, and has been rigorously defended with federal funds expended by the Corps.

8. ***Failed***, except for the Chairman, to attend the 2011 annual watershed management plan review meeting, even though property acquisition was well underway.

9. ***Failed*** (the ***entire*** Utility Board) to attend the 2012 annual watershed management plan review meeting, even though millions of dollars worth of clearing and excavation was underway.

10. ***Failed*** to take any of the new corrective actions recommended in the 2011 annual watershed management plan review meeting and in the 2011 Water Quality Report.

11. ***Failed*** in 2011 to recognize that the phosphorous loading appears to have ***not*** met the 60% reduction goal, and that there is no basis for the claim that phosphorous had been reduced 93%. Using the simple formula that the Corps used (Loading = Average TP concentration X Average flow X one year) the reduction was only about 57% as of 2011. (See previous calculations.)

12. ***Failed*** in February 2012 to recognize and address the large increase in TP, which could significantly impact the project, and went ahead with multi-million dollar contracts in May 2012.

13. ***Failed*** to provide adequate measures to ensure that unbiased water quality evaluations and watershed management evaluations occur, in that these evaluations are conducted by the same firm that has reservoir design and construction responsibilities. The present arrangement produces a severe ***conflicts-of-interest*** for the design and construction engineers. If the firm identifies significant water quality issues that could result in an unacceptable reservoir, then the firm's multi-million dollar design and construction contract would be at risk.

14. ***Failed*** to take any action as a result of the annual review meeting in June 2012, when it was reported that average TP increased 147%, according to the city's engineer's calculations. Using the baseline specified by the Corps in the permit, TP is actually up 170%, rather than down the required 60%. This is even more significant in light of the significantly increasing nitrogen levels reported one year earlier, and should have been cause for great concern and action.

15. ***Failed*** to have the Corps rerun its BATHTUB computer model, a tool highly recommended in the Watershed Management Plan to measure the success of management activities prior to and during construction of the proposed reservoir and during operation of the proposed reservoir. In the present tenuous situation it is noteworthy that the Corps has made no comments about the increased nitrogen or phosphorous levels, or questioned the validity of the 93% phosphorous loading calculation, or even suggested use of the BATHTUB model to evaluate the present circumstances of excessive nutrients in the Duck River.

In summary, the answer to the above question (posed two pages and fifteen failures ago) is ***no***, the watershed does ***not*** have an effective, responsible watershed management authority.

IS THE CORPS FULFILLING ITS CLEAN WATER ACT RESPONSIBLILITES?

The Corps of Engineers has functioned throughout the 20-year history of this project with an extreme ***conflict-of-interests*** by selecting, justifying, designing, defending, and desiring to construct the project, while simultaneously being responsible for permitting the project under Clean Water Act Section 404 and for enforcing Section 404 provisions and other laws. This situation would be analogous to the Nuclear Regulatory Commission selecting, justifying, designing, defending, and desiring to construct nuclear plants for profit, while simultaneously being responsible for regulating and enforcing strict laws and requirements for nuclear plants. Such ***conflicts-of-interest*** do not bode well for public health and safety and especially, in the case of Cullman County, for public financial interests regarding the cost of potable water.

The Corps has been oblivious to the fifteen failures of the Utility Board described above. The Corps has looked the other way while permit requirements to measure water quality,

annually report results, and annually take actions as specified in the Watershed Management Plan have been ignored for many years at a time. There has been virtually no oversight or enforcement of these permit requirements by the Corps. The Corps has never in 13 years even enforced the requirement to keep the Watershed Management Plan up to date, and consequently no update has occurred.

The answer to the above question is ***no***, the Corps is ***not*** fulfilling its Clean Water Act responsibilities.

WHO ***WILL*** ENFORCE CLEAN WATER ACT SECTION 404 FOR THE DUCK RIVER?

In lieu of responsible actions by the Corps, the Alabama Department of Environmental Management and the U.S. Environmental Protection Agency and the Alabama Department of Health and the U.S. Fish and Wildlife Service have a clear responsibility to ensure that Clean Water Act Section 404 is enforced. This responsibility includes ensuring that "all practicable alternatives are considered," which is another responsibility that the Corps has ignored despite repeated, documented admonitions from the public.

Specifically, a multifaceted, ***long-range*** approach connecting the water systems in Cullman County to:

- Super-clean Smith Lake via a package treatment plant,
- and to Lake George, a former 5 MGD source, via a package treatment plant,
- and to existing wells in Blount County and Arkadelphia and perhaps elsewhere,
- and to surrounding water systems via stronger connections and mutual-aid agreements,

appears to be a very viable and obvious alternative that has been stubbornly and unjustifiably excluded from consideration by the Corps of Engineers and by the City of Cullman for the last 20 years.

Note: The Corps improperly de-rated Lake George to 2-MGD by applying an incorrect 3-MGD bypass flow, the same rate applied to the much larger Lake Catoma.

Several county commissioners have attempted to address this issue to some extent in the last 16 years (Chairman Spears in the late 1990s, and Associate Commissioners Williams and Willingham from 2006 to 2010, by proposing a treatment plant at Smith Lake), but the city refuses to even sit down and discuss it, and the Corps of Engineers simply ignores it, in clear violation of Clean Water Act Section 404, ***which requires consideration of practicable alternatives that would be less damaging to our aquatic resources.***

RECOMMENDATIONS

For the Alabama Department of Environmental Management (ADEM)

Because the Corps has failed to enforce Clean Water Act Section 404 on behalf of the United States for this project, ADEM should step forward and begin enforcing Section 404 on behalf of the people of the State of Alabama and. Specifically:

1. ADEM should ***require*** that flow measurements and sampling begin immediately for ***TP*** at the north (upstream) edge of the dam construction area during moderate and high-flow events this fall, winter, and spring, so that a meaningful correlation between flow and TP can be determined, and so that realistic expectations for TP loading can be calculated. There is no need to have these samples analyzed for anything but TP. This sampling is so crucial to determining the expected TP loading of the proposed reservoir, that almost all other sampling for this project could be suspended temporarily (with Corps approval) pending the results of this sampling. Properly focused sampling during the fall, winter, and spring should provide reliable data by the summer of 2013 about TP loading in the Duck River, and allow an official determination of the overall feasibility of the project by the state and federal agencies involved.

2. ADEM should ***require*** a monthly report of TP and flow measurements and trend analysis taken at the north (upstream) edge of the dam construction area until directed otherwise by ADEM. Using this data, ADEM or a responsible unbiased environmental firm should be able to predict the phosphorous loading that will occur for the proposed reservoir.

Note: The current method of merely sampling monthly virtually guarantees an unreliable determination of current nutrient loading, because the Duck River is characterized by very low base flow interrupted by very brief periods of high flow following significant precipitation. Since there are about 720 hours in a month there is only a 1:720 chance that a monthly sample will be taken during the hour that flow is highest during a month (or even that the annual hourly high flow will be sampled.). Thus, on average, a sample taken during the monthly or the yearly high-flow hour would only occur about once every 720 years. High-flow events, which only occur a few times per year, are the type of events that would most likely fill and then refill the proposed reservoir in the future. Currently, the haphazard monthly sampling is usually accomplished during low base-flow periods, and cannot be used to predict nutrient loading of the proposed reservoir with any meaningful accuracy. Based on the Corps' previous studies, and on the sketchy data to date, the apparent high concentration of nutrients during high-flow events may very well result in an unacceptable eutrophic reservoir.

3. ADEM should immediately do a preliminary review of the results of the last 13 years of intensive watershed management, and make a preliminary determination of the present suitability of the Duck River as a reservoir site. The apparent strong correlation between phosphorous concentrations and high-flow events must be thoroughly evaluated in an unbiased manner, uninfluenced by the potential loss of major design and/or

construction contracts. Any phosphorous and flow data that can be located for the missing period between 1999 and 2009 (collected by ADEM or by others) needs to be collected and evaluated to help construct a reliable and meaningful preliminary trend analysis, because such analysis does not currently exist. The analysis can then be adjusted as meaningful data is collected this fall, winter, and spring.

4. Pending repair or replacement of the currently inoperable Duck River flow-monitoring gage, which has apparently been operable since May of 2012, ADEM should immediately ***require*** the permitee to take manual river depth readings at least daily (and more often during moderate and high-flow events) at the north (upstream) edge of the dam construction area, and convert those measurement to approximate flow measurements. These readings should continue until the continuous flow monitoring gage is returned to service, and should be required at any time in the future when the gage is inoperable.

5. ADEM should make a Rule 335-6-7 "Land Application and Manure Management Requirements" determination, consistent with NRCS "Waste Utilization Code 633," as to whether or not the City of Cullman Utilities Board is following best management practices and requirements by not permanently excluding (via an appropriate fenced buffer zone) manure spreading within the acceptable distance of the proposed reservoir. Code 633 recommends a buffer zone up to 300-feet wide, depending on slope and vegetative cover. A one-time determination by ADEM would be a straightforward way to establish an appropriate and permanent buffer for the reservoir to protect it from the numerous surrounding animal feeding operations (AFOs) and concentrated animal feeding operations (CAFOs) and pasturelands and row-crop lands. According to Rule 335-6-7, such a buffer could be ***required*** by ADEM, not merely ***recommended***.

6. ADEM should correct the TMDL for Duck River to delete and correct the considerable amount of information the TMDL includes pertaining to Crooked Creek (which is about 20 miles west and in different watershed) that was apparently mistakenly inserted into the Duck River TMDL.

7. The TMDL for Duck River states that the river is not suitable as a potable water supply stream, and data collected in the last few years seems to confirm the TMDL conclusion is still valid. Therefore ADEM should be acting in a way towards the Duck River project that reflects the TMDL classification of the Duck River as a Fish and Wildlife stream that is not suitable as a reservoir. Until such time as TP is low enough for the river to be converted to a reservoir (less than 0.02 mg/L), ADEM should revoke the current excavation permit for the project.

8. ADEM should require the Utilities Board to act responsibly with regard to TP loading determinations if the Board wishes to pursue the project in the future.

For the U.S. Environmental Protection Agency

If ADEM fails to assume its above responsibilities on behalf of the people of Alabama and on behalf of the Waters of the State, then EPA should step forward on behalf of the people of the United States and on behalf of the Waters of the United States, and take similar actions as described above for ADEM.

For the U.S. Fish and Wildlife Service

Because the Corps has failed to enforce Clean Water Act Section 404 on behalf of the United States for this project, the Fish and Wildlife Service should step forward and enforce Section 404 on behalf of fish and wildlife. The Fish and Wildlife Service should evaluate Duck River water quality data and the data collection methods to determine if the proposed reservoir is likely to be harmful to fish and wildlife, and then act accordingly, pursuant to the Fish and Wildlife Coordination Act.

For the Health Department

1. Page 23 of the 2011 Water Quality Report noted relatively high average fecal coliform at site 9. The recommendation was, "Consider evaluating potential septic tank failures contributing to relatively high fecal coliform levels." This recommendation needs to be addressed, not ignored.

2. Also, statements and graphs on pages 14, 23, and 32 of the report concerning coliform results from the different sampling sites do not appear to be consistent, and should be reviewed by the Health Department. (A copy of these pages is attached.)

For the Corps of Engineers

1. The Corps should stop acting as defender and promoter of this project, and instead immediately begin acting ***solely*** in its ***required*** role of making Clean Water Act Section 404 permit decisions and enforcement actions. The Corps is no longer the Engineer of Record for this project, and it is inconsistent with the Corps' mission to continue to function in an arbitrary, capricious, and biased manner as a project promoter and defender.

2. The Corps should rerun the BATHTUB computer model (last run in about 2005) using actual, current water quality data to determine analytically what the realistic expectations for the proposed reservoir currently are. Data, especially high TP during high-flow events, seems to strongly indicate that the Duck River is still ***not*** suitable for a reservoir. High-flow data ***must*** be used in the BATHTUB model, and not ignored as proposed in the 2012 annual watershed management plan review report.

3. The Corps should modify the permit to require compensatory flow monitoring for periods when the continuous flow gage is inoperable.

4. The Corps should deny the Utilities Board's request to function as the watershed management authority, and require the establishment of a legitimate, functional, responsible, effective watershed management authority that represents the people of Cullman County, not just the City of Cullman. The WMA should include both existing and former water-source watersheds for Cullman County (which are contiguous, a requirement of Title 9, Section 10A). These watersheds include the Duck River watershed and the Broglen River watershed (which contains Lake Catoma, Lake George, Brindley Creek, and Ingram Lake). The WMA should be established under existing Code of Alabama, Title 9, Chapter 10A. By including all of these watersheds, the qualifying minimum of 50 square miles in Title 9, Chapter 10A for an authority would be exceeded, and a much more ***fair*** and ***consistent*** treatment of Cullman County residents in these watersheds would be likely in the future. Farmers in the Duck River watershed are justifiably concerned that the Utility Board, composed of the City of Cullman mayor, two city councilmen and two city-appointed officials, none of whom represent or are accountable to the Duck River watershed residents, may be purposely delaying taking corrective actions to modify sampling, analysis, and evaluation of nutrient concerns until it is too late to stop the project, but not too late to impose restriction that would ***destroy farming*** in perhaps the most productive agricultural area of the most productive agricultural county of Alabama.

5. The Corps should modify the permit to reflect the new rolled concrete design, which greatly impacts the property acquisition requirements and flexibilities for the project.

6. The Corps should stop the Utility Board from abusing the power of eminent domain by purchasing property under threat of eminent domain that is not required for the rolled concrete design.

7. The Corps should audit implementation of the Watershed Management Plan, which is required to be implemented by the 404 permit, and enforce the plan's requirements or require them to be updated.

For the City of Cullman Utilities Board

1. As required by the Watershed Management Plan, the Utilities Board should be involving the public in the finalization/update of the Plan.

2. The Utilities Board claims to have the authority to enforce (otherwise voluntary) best management practices if needed (via exercise of eminent domain). The Board should be applying these best management practices ***consistently*** to its ***own*** actions regarding the recommended (or perhaps required) 300' buffer width for the proposed reservoir. (Ref. attached June 3, 2011 letter from Roy W. Williams, Jr., City of Cullman Attorney, to Thomas G.F. Landry, Assistant District Counsel, Corps of Engineers regarding Requirement for a Watershed Management Authority.)

Pending an ADEM ruling about the buffer width, perhaps it would be sufficient for the Board to merely follow the recommendations of the Health Department, the Corps of Engineers, engineering firm Almon & Associates, and engineering firm St. John, who in the 1990s all recommended a 300' buffer. Again, the Utilities Board expects everyone else to follow best management practices in order to achieve the needed quality of the Duck River to construct a reservoir, and the Board should likewise be **consistent** by following recommended practices also..

With a 300' (or even 200') buffer there would be no need for the additional upland hardwood compensation lands currently being purchased, and hundreds of acres of homesteads and other privately owned lands that are currently being taken from private landowners unjustifiably by the Utilities Board could then be returned to their rightful owners. In large part this land would not be required for the project anyway, because the new rolled concrete design does not require clearing and mining large areas of land to obtain clay, rock and soil to construct the dam. Unfortunately, and inexcusably, the Corps has failed to revise the permit to reflect the new rolled concrete design, and land which has no benefit to the project is being purchased under threat of eminent domain by the Utilities Board. (The land is largely ***downstream*** from the dam and thus as "upland hardwood compensation" lands would not benefit water quality in the proposed reservoir at all.)

For Cullman County

Cullman County (including all its municipalities) should ***strongly*** promote and encourage Governor Bentley's current initiative to establish state control and fair allocation of the "Waters of the State" by the year 2014. The fact that all of Smith Lake water is allocated to Alabama Power Company must not continue if this county is to prosper economically. If and when the state allocates a small portion of Smith Lake to Cullman County (hopefully in the year 2014 when new legislation is scheduled to go into effect), then the purported need for the Duck River reservoir would totally disappear.

The current County Commission signed away control and ownership (for at least 30 years), and eliminated the spending cap on this project. As long as the Utility Board expands the project and issues and reissues bonds, the County will never have any control or ownership or ability to limit what it will have to pay for this open-ended project. Currently the Utility Board only has to pay about 25 cents on the dollar for whatever land it decides to buy or additions it decides to make for the project. It is equivalent to having a 75% grant from the federal government, with the federal government having no control over how much is spent or for how long. But in this case it is the people of Cullman County, not the whole United States who will be paying for the "grant" to the city.

Supporting Governor Bentley's initiative to establish State control and allocation rights for Waters of the State may very well be the way for Cullman County to regain rights to a portion of Smith Lake water that was unjustifiably given to Alabama Power Company by the Federal Energy Regulatory Commission, and to a portion of Lake George water that was taken over by the City of Cullman as a potable water source but then abandoned.

ANALYSIS OF SPECIFIC PROJECT DOCUMENTS

1. The Preliminary Engineering Report by Lockwood Greene Technologies dated June 2, 1994, pages 43, 44, and 45 cited a total nitrogen concentration from the National Water Data Exchange for Duck River in the period April 1988 through October 1988 of 0.1 ppm (mg/L). No data was provided for phosphorous.

Note: At the time, this nitrogen concentration cited was better (less) than the corresponding data for Eight Mile Creek (Lake Catoma) of 0.34 ppm, and water quality was described as "generally good." This "good" evaluation of Duck River was soon ***discarded****, but the Duck River and Tennessee River had already been selected as the preferred choices, and the last 18 years have been a continuous* ***struggle*** *by the Corps to defend its intent to build a dam on Duck River.*

2. In a letter to the Corps dated May 7, 1996, the U.S. Fish and Wildlife Service initially withheld concurrence on the proposed Duck River project in part because:

   "The project area is dominated by agriculture uses, (i.e., chicken production) which, we believe could contribute to a water quality problem from over nitrification."

3. In another document from the 1990s, the Water Supply Assessment for Proposed Water Supply Reservoir, Duck River, Cullman, Alabama, Chapter 6, page 13, Conclusions and Recommendations, the following three paragraphs explain the general situation and proposed plan of action:

   " The proposed project will receive a high nutrient load and will likely exhibit water quality characteristics of a mildly eutrophic system. These characteristics include high chlorophyll concentrations, which will reduce water transparency and could result in taste and odor problems if blue-green algal species occur at elevated concentrations. Increased chlorophyll production can also result in an increase in the utilization of dissolved oxygen in microbial decomposition of organic matter. If the proposed project thermally stratifies, which is likely, then isolation of bottom waters with an increased demand for dissolved oxygen will likely result in hypoxic [abnormally decreased oxygen] or anoxic [total depravation of oxygen] conditions during the summer. Decreased dissolved oxygen in the bottom waters will enhance the mobilization of reduced manganese and iron, which may affect treatment costs at the water treatment plant, and will result in an increase in the contribution of internal nutrient loading. Eutrophication is a natural process that is often accelerated with human activities and is a common occurrence in the southeastern United States. Watershed management plans and flexible reservoir operations are methods that can be utilized to minimize the acceleration of eutrophication associated with human activities.

"Reductions in external sources of nutrient loads associated with the implementation of best management practices will result in improvements in water quality. Predicted changes indicate that the proposed lake would be closer, with respect to water quality, to nearby lakes if nutrient reductions of 60% can be achieved ....

"The current plan for monitoring stream water quality using stations located at the downstream end of each sub-watershed will allow an adequate assessment of external nutrient loading to the proposed project if concentrations are correlated with flows and flows are measured frequently enough to estimate loading. The monitoring will also identify the relative contribution of each sub-watershed to the overall nutrient loading and provide guidance to the watershed management plan."

Note: Nutrient reductions of 60% would include BOTH of the primary nutrients of concern, both nitrogen and phosphorous. Flows have not been measured frequently enough to estimate loading, in that no effort has been made to measure high-flow events. These high-flow events seem to have higher nutrient concentrations and thus should be measured in order to determine loading.

4. Turning to another document (required by the Section 404 permit), the Cullman-Morgan Water District Duck River Water Supply Project Watershed Management Plan dated May 1999 contains the following attributes and requirements:

Section 1 – Page 1: "The purpose of this plan is to reduce the nutrient loading in the proposed impoundment to a level at which the rate of eutrophication will be reasonable and acceptable."

Section 1 – Page 1: The first Goal of the plan is to: "Provide a high quality water supply source that can be treated with reasonable efforts and expense."

Section 1 – Page 1: Under Objectives: "The following objectives are vital components which will collectively support attainment of the goals of this Watershed Management Plan." Following are six of the objectives stated:

- "Reduce and control nutrients loadings in the proposed impoundment."

- "Encourage citizen input, cooperation, and voluntary compliance. This will include public involvement meetings for the final draft of the plan."

- "Promote participation of landowners, public officials, and other citizens through public meetings, educational materials, and personal contacts."

- "Seek additional administrative and regulatory authority if those existing are not adequate to achieve and sustain the goals of this plan."

- "Provide for annual review and update of the management plan."

-"Establish an effective Watershed Management Authority to administer and enforce the plan."

Notes: Contrary to the above objectives:

*A. The 1999 Watershed Management Plan has never been revised, though it was acknowledged in the **first** "annual" review meeting (in 2011, twelve years after the plan was prepared) that revisions are needed. The reissued Section 404 permit (of 2006) requires annual review and update of the plan, and that the plan be revised and updated as necessary to remain current with all BMPs, rules, regulations, an/or required conditions of all applicable federal and/or state agencies. There have been no updates of the plan since it was issued in 1999, and the City of Cullman refuses to provide a copy of it to the public.*

B. Again, no annual review meeting was conducted until 2011, and the public was not invited to that meeting or to the recent 2012 meeting.

C. Apparently, there have been no public involvement meetings for the development of the Watershed Management Plan for thirteen years now. These meetings would advise people of the possibly unique and increased regulations that may be imposed on them for septic systems, animal husbandry, litter spreading and fertilizer spreading.

D. The only public meeting to discuss concerns about aspects of the plan was organized in 2010, not by the permitees, but by a concerned citizen, Ron Stone. That meeting resulted in Haynes Farms becoming very concerned about the future of farming in the Duck River watershed, a concern that continues to grow daily. In contrast, the city has failed to conduct public meetings to discuss and develop the plan.

*E. In 2009 and 2010 the permitees refused to even discuss concerns about the project from a **majority** of the County Commission (Associate Commissioners Doug Williams and Wayne Willingham). The permitees even **refused** to discuss the commissioner's concerns through a **mediator**. An effort by these two commissioners (over the objection of the chairman) to establish a Government Utilities Services Corporation and associated board in accordance with state law ensued but failed.*

F. In 2011, the permitees attempted to create a Watershed Management Authority, without soliciting public input, and contrary to the pattern and precedent of existing state laws in Title 9 Chapter 10A. Existing law could have been followed, simply by including the contiguous watersheds of Lake Catoma and Lake George (current and emergency water sources) in the proposed

authority in order to meet the minimum 50 square-mile watershed size required for such an authority.

*G. Attempts by several **county** residents to comment on the proposed WMA at a hastily called special meeting of the County Commission were quashed by the Commission Chairman. Only three of the numerous residents present who wanted to speak were allowed to speak, and the Chairman made absolutely no response to their concerns and arguments. Fortunately, the State Legislature listened to concerned citizens from throughout the State (not just Cullman County) and quashed the misguided legislation.*

*H. Now, the permitees are attempting an even more bizarre perversion of existing legislative precedent, by attempting to convince the Corps of Engineers to designate the City of Cullman Utility Board as an authority that would be sufficiently like a watershed management authority, even though the Duck River watershed is some **six miles outside** the city limits. Again, no public input has been solicited for this proposal, and public concerns about this proposal have not been addressed by the Corps. Only through protracted Freedom of Information Requests (which take months to obtain even partial responses from the Corps) can the public obtain a highly edited (redacted or mostly blacked out) version of what is going on regarding this subject (and other subjects) related to the permit. This exclusion of the public is not accomplishing the public involvement that the Watershed Management Plan clearly specifies and requires, and that is required by the Section 404 permit.*

5. Also, Section 2.2.1 on page 2-8 of the Cullman-Morgan Water District Duck River Water Supply Project Watershed Management Plan dated May 1999 states:

"All residences in the watershed utilize septic systems for the treatment and disposal of household sanitary wastes. Malfunctioning or improperly designed systems could impact the Duck River. There is one small wastewater plant at Fairview High School, which discharges into Duck Creek."

Note: Residents, businesses, and the school in the watershed have not been informed that their septic systems may come under increased scrutiny and regulation by the City of Cullman Utilities Board. Some of these residents live under the jurisdiction of the towns of Fairview, Holly Pond, or Baileyton, and all of them live far outside the city limits of Cullman.

6. Also, Section 3.4 on Page 3-6 of the Cullman-Morgan Water District Duck River Water Supply Project Watershed Management Plan dated May 1999 states for nutrient loading, "…it appears that nutrient loadings are relatively high."

Furthermore the following measurements and comparative evaluations are presented:

Average Duck River phosphorous loading.....0.94 grams/square meter/year
Vollenweider allowable loading.....0.10 grams/square meter/year
Possible eutrophication at 2X Vollenweider.....0.20 grams/square meter/year

Average Duck River nitrogen loading.....52.3 grams/square meter/year
Vollenweider allowable loading.....1.5 grams/square meter/year
Possible eutrophication at 2X Vollenweider.....3.0 grams/square meter/year

Due to concerns about the applicability of Vollenweider limits, the Corps produced the BATHTUB model results instead.

Note: Observed nitrogen loading was about 35 times higher than the Vollenweider allowable level, and phosphorous loading was over nine times higher than the Vollenweider allowable level.

Note: The above loadings are expressed as export rates from the watershed to the river. Later the Corps referred to loading of the river in pounds per year, calculated from flow and nutrient concentration values of the river itself.

7. Then, Section 3.5 of the Cullman-Morgan Water District Duck River Water Supply Project Watershed Management Plan dated May 1999 discussed the BATHTUB model and on page 3-8 states:

"Application of BMPs in the watershed will reduce nutrient loadings. Present loadings need to be reduced approximately 60% in order to achieve water quality characteristics associated with nearby lakes of acceptable water quality."

and,

"The report recommended a reservoir water quality monitoring program to assess and document actual water quality conditions and the use of the BATHTUB model as an operational tool to assist in developing and refining reservoir operational techniques. The BATHTUB model can be verified and/or adjusted to reflect any differences between the predicted and observed conditions."

Note: As of October 2012 the latest water quality report (issued in 2011) indicates nitrogen levels have increased significantly, and phosphorous levels have not decreased the required 60%, but intense excavation is underway anyway, and there has apparently been no attempt to use the BATHTUB model to reevaluate the present tenuous water quality situation, or to take any other new actions to address the high levels of nutrients.

8. Also, Section 3.6 on Page 3-8 thru 3-11 of the Cullman-Morgan Water District Duck River Water Supply Project Watershed Management Plan dated May 1999 states for "Control Measures and Best Management Practices":

That for Animal Waste Handling and Disposal, "Depending upon slope and vegetative cover, buffer widths from 50-feet to 300-feet from a water body are recommended…Pasture land represents the largest contributor of nutrient loadings to existing streams and to the proposed impoundment…Implementation of BMP's together with educational and enforcement programs, are expected to produce an overall 30 percent reduction in nutrients contributed from pasture lands."

That for Stream Buffer Zones, "It is estimated that the following reductions in nutrient loading will be realized for the entire watershed:

Years from Implementation:	3 years	10 years	20 years
Percent Reduction:	10%	45%	60%

And, "These reductions are in addition to those realized from the improved land waste application practices."

Note: After 13 years of intensive BMP implementation, phosphorous and nitrogen appear to have both increased rather than decreased.

9. Also, Section 3.7 on page 3-14 of the Cullman-Morgan Water District Duck River Water Supply Project Watershed Management Plan dated May 1999 states:

"The Cullman-Morgan Water District, or its successor, will take any future steps that may be needed to maintain and improve water quality in the proposed reservoir and streams. If necessary, a legislative act will be developed that will grant the district additional regulatory authority."

Note: The CMWD has not met or functioned since 2003. The 2011 Water Quality Report listed no data for the ten years from 1999 thru 2008, and no annual watershed management plan annual meetings were conducted until 2011. Now (in October 2012), intensive construction activities are underway with no clear evidence that the watershed management plan has succeeded in reducing nutrient loading.

10. Also, Section 4.1.12 on page 4-6 of the Cullman-Morgan Water District Duck River Water Supply Project Watershed Management Plan dated May 1999 states regarding ADEM Administrative Code Rule 335-6-7 (which was expected to be finalized in 1999), and specifically regarding Land Application and Manure Management Requirements:

"It **requires** that land application of waste be made no closer than 50-feet to surface waters or within 100-feet of wells or **water supplies. Additionally, buffer distances in excess of 50 or 100-feet may be required according to specific site conditions or according to NRCS guidelines.**"

Note: It would appear that ADEM requirements may not have been followed by the Utility Board in choosing the narrow 100' buffer for the steep, highly erodible soils surrounding the proposed Duck River reservoir. However, the Utility Board expects farmers to follow Best Management Practices or be dealt with as a threat and an eminent domain prospective victim. (See attached letter from City of Cullman Attorney Roy Williams to the Corps dated June 3, 2011). A one-time determination by ADEM would be straightforward way to establish an appropriate and permanent buffer for the reservoir to protect it from the many surrounding animal feeding operations (AFOs) and concentrated animal feeding operations (CAFOs) and pasturelands and row crop land. According to the above Rule 335-6-7, such a buffer could be ***required*** *by ADEM, not merely recommended.*

SUGGESTION: Perhaps it is time for ADEM to make a 335-6-7 ruling regarding the adequacy of the 100' buffer.

11. Also, Section 4.2.1 on page 4-7 of the Cullman-Morgan Water District Duck River Water Supply Project Watershed Management Plan dated May 1999 states regarding 1997 NRCS "Waste Utilization Code 633":

    "This publication also describes recommended buffer widths for the location of waste application from a water body. Depending upon slope and vegetative cover, buffers ranging from 50 to 300-feet are recommended."

Note: Again, it would appear that NRCS recommendations were not followed by the Utility Board in choosing the narrow, 100' buffer for the steep, highly erodible soils surrounding the proposed Duck River reservoir. However, the Utility Board expects farmers to follow Best Management Practices or be dealt with as a threat to the project, subject to seizure of their property. As long as the Utility Board is only paying about 25 cents on the dollar for land it seizes, controls, and owns there is no limit to how much land they can seize in the watershed, and make others pay most of the cost.

12. Also, Section 4.4 on pages 4-8 and 4-9 of the Cullman-Morgan Water District Duck River Water Supply Project Watershed Management Plan dated May 1999 states that once the project has been developed, the CMWD will be succeeded by a water authority which will be incorporated as a political subdivision of the State of Alabama under either Chapter 88 (water authorities) or Chapter 89 (water districts) of the Code of Alabama.

Note: No mention is made of Title 9 Chapter 10A (initially Act 91-602), which specifically addresses establishment of Watershed Management Authorities.

Section 4.4 goes on to describe the powers that can be created under Chapter 88 or Chapter 89, which are almost identical. Then the following statement is made (back in 1999):

"The project attorney is currently determining procedures that the Cullman-Morgan Water District or its successors will use to ensure that it has powers (above and beyond those previously discussed) to enforce rules and guidelines that will prohibit or regulate activities that would result in water quality impacts to the proposed reservoir."

*Note: The above concern (about **enforcement** of normally voluntary guidelines) has still not been answered in the last 13 years. It is the basis for the concern of Haynes Farm and other farmers in the Duck River watershed. Currently, the City of Cullman Utilities Board is claiming to have those powers for the Duck River watershed, which is some six miles outside the city limits, and to have the authority to use those powers on residents it does not represent, who neither elected the Board members, nor were the Board members appointed by officials that the residents elected.*

13. Also, Section 6.1 on page 6-1 of the Cullman-Morgan Water District Duck River Water Supply Project Watershed Management Plan dated May 1999 states regarding Adoption of the Plan:

"Once a permit for the Duck River Impoundment Project is obtained from the U.S. Army Corps of Engineers and the Alabama Department of Environmental Management, and the Watershed Management Authority is established under Alabama law, this watershed management plan will be formally adopted."

Note: Some thirteen years later a huge gash has now been excavated in the hillsides surrounding the Duck River to carve out the "footprint" of the proposed dam, but no Watershed Management Authority exists, and apparently the management plan has not been "formally adopted." The public meetings required to finalize the plan have not occurred, the city will not even give the public a copy of the plan, and the Corps of Engineers continues to look the other way and fail to enforce the permit.

14. Also, Section 6.2 on page 6-1 of the Cullman-Morgan Water District Duck River Water Supply Project Watershed Management Plan dated May 1999 states regarding Water Quality Monitoring:

"The water quality monitoring program will begin immediately upon establishment of the Watershed Management Authority in order to establish baseline conditions prior to construction of the reservoir."

Note: It is now thirteen years later, and there is still no Watershed Management Authority, and the baseline concentrations for nitrogen and phosphorous specified in the 2005 Supplement to the Environmental Assessment are not even being acknowledged in the two annual reports that have been presented to date.

15. Also, Section 6.3.2 on page 6-2 of the Cullman-Morgan Water District Duck River Water Supply Project Watershed Management Plan dated May 1999

states regarding Water Quality Testing:

"The results of this testing program **will** be used as input for the BATHTUB model. This **will** provide for calibration of the model, documentation of changes in water quality, and assessment of the effectiveness of the BMPs which have been instituted."

Note: Again, to date there is no indication that this commitment to rerun the BATHTUB model has been satisfied in the last six years.

16. Also, Section 7.0 on page 7-1 of the Cullman-Morgan Water District Duck River Water Supply Project Watershed Management Plan dated May 1999 states regarding the Annual Watershed Management Review and Update:

"After biological and water quality monitoring has been completed for each calendar year there will be a **thorough** review of the results. This review will compare results with previous year's and baseline conditions and will be conducted in consultation with ADEM and any other appropriate agencies.

"An assessment will be made as to the success of the management plan and obtaining the reduction of nutrients estimated in Section 3.6.4 of this plan. Based upon the effectiveness of BMPs in meeting management goals, the plan **will** be revised accordingly."

*Note: Contrary to the above, the Water Quality Report has not been presented until some months **after** the annual review meeting, and the meeting itself does not occur until the next year is half over. There have only been two meetings since 1999, and a current Water Quality Report was not presented to participants prior to either meeting, and thus participants were unable to review water quality results prior to the meeting, and not even until months later. Thus the only two meetings conducted in **13 years** were more a "dog and pony show" that diverted attention away from the fact that the 60% reduction in nutrients has not been achieved. As previously stated, not a single Utility Board member (of the "watershed management authority") even bothered to attend the 2012 meeting.*

17. Turning to another document, the original 1999 Environmental Assessment, Sections 4, pages 6 thru 8 the following data is presented:

Duck River Flow:
Mean Annual Flow.....52.8 cfs
Median Annual Flow.....29.4 cfs

Duck River Total Kjeldahl Nitrogen:
TTL, Inc 1999 study range.....0.28 to 3.13 ppm (mg/L)
ADEM 1997 study range.....0.015 to 3.163 ppm (mg/L)

Duck River Total Phosphorous at the dam site:
TTL, Inc 1999 study range……..less than 0.05 up to 0.90 ppm (mg/L) (during a flood event on 1/6/98 and 1/7/98)
ADEM 1997 study range……0.018 to 0.145 ppm (mg/L)

Note: As of 1999 it appeared that phosphorous concentration was extremely high during flood events. Since the base flow of the Duck River is extremely low (normally approaching zero in the summer and early fall) it is very probable that flood events would be the primary mechanism that would initially fill and then refill the proposed reservoir, and would result in a high concentration of phosphorous in the reservoir.

Note: At that point it time (1999) it should have been acknowledged by the Corps that the Duck River was a highly questionable choice for a reservoir due to high nutrient inflow during high precipitation events. The project should not have proceeded without additional nutrient sampling during future high-flow events to determine whether or not the January 6, 1998 to January 7, 1998 flood event phosphorous reading was typical of high-flow events or if it was an anomaly. The current engineer of record is attempting to unjustifiably call such events anomalies, ignoring the 1998 flood, and also ignoring other high readings after 2/2/12 that indicated the extremely high reading was not an anomaly. (See the 2012 annual report comments that follow.)

Also, it is noteworthy that the following statement is made in the 1999 environmental assessment regarding other potential water sources:

"Testing on Smith Lake generally indicates a high level of quality."

Note: However, no data for Smith Lake was supplied.

18. Also, the original 1999 Environmental Assessment, Section 5.1.5, pages 2 thru 4 provides the following:

Duck River Flow:
Average Monthly Flow……53.0 cfs (this is nearly identical to the 52.8 cfs mean annual flow listed above.)

and, "…it appears that nutrient loadings are relatively high…"

and, average phosphorous loading……..0.94 grams/square meter/year
Vollenweider allowable loading……..0.10 grams/square meter/year

and, average nitrogen loading……52.3 grams/square meter/year
Vollenweider allowable loading……1.5 grams/square meter/year

and, "[Vollenweider] also reported that eutrophication can occur when levels are about double their allowable values."

Note: Rather than just being DOUBLE their allowable loading, the average nitrogen loading in the Duck River was THIRTY FIVE times the allowable loading. (The above 52.3 average grams divided by the 1.5 Vollenweider grams = 35 times more)

and, "Other researchers (Henderson-Sellers, et al. 1987) developed a probabilistic classification that was used to estimate that, based upon phosphorous loading, there is a 65% probability that the proposed reservoir would be eutrophic."

and, "The models used by Vollenweider and Henderson-Sellers were developed from data obtained from lakes in northern Europe and northern U.S. Because of concerns about the indicated eutrophication potential and the possibility that these models are not applicable, a special and more comprehensive eurtrophication evaluation was conducted using the BATHTUB model."

Note: Following a subsequent discussion of how the BATHTUB model was used to estimate long-term water quality conditions based upon observed and also hypothetical nutrient loadings, the following conclusions regarding proposed corrective actions are stated:

"Application of BMPs (Best Management Practices) in the watershed will reduce nutrient loadings. Present loadings need to be reduced approximately 60 percent in order to achieve water quality characteristics associated with nearby lakes of acceptable water quality.

Note: Later, in the 2005 Supplemental Environmental Assessment, it was determined that TP was the limiting nutrient, the one that could most easily be reduced 60%.

and, "Reservoir operations utilizing the selective withdrawal capability together with judicious balancing of flow allocations between the Duck River and Catoma impoundments can also assist in improving reservoir water quality."

and, The report recommended a reservoir water-quality monitoring program to assess and document actual water quality conditions and the use of the BATHTUB model as an operational tool to assist in developing and refining reservoir operational techniques.

SUGGESTION: Perhaps it is high time to rerun the BATHTUB model using the actual data from the 2011 and 2012 Water Quality Reports and see what washes out.

and finally, on page 4, "In a letter dated September 23, 1999, ADEM requested a number of permit conditions related to maintenance and improvement of water quality. Many of these conditions will be incorporated into the NPDES Permit to be obtained prior to construction."

19. Also, the original 1999 Environmental Assessment, Section 5, page 11, provides

the following:

"Runoff from agricultural operations appears to be the major source of nutrients in the Duck River. The Alabama Department of Environmental Management has adopted rules which will be used to regulate discharge from many of these farm operations."

20. Also, the original 1999 Environmental Assessment, Section 9.4, pages 3 and 4, describes the Watershed Management Plan, including the 5-year Clean Water Action Plan, to be administered by a full-time project coordinator through the Cullman County Soil and Water District. The goals of this 5-year plan included reducing nutrient loadings, and providing a reasonably treatable, high quality water supply.

Note: So far, as of October 2012, the full-time coordinator has completed, in 2005, the 5-year (extended to 6-year) plan and has been working for more than 12 years now to implement Best Management Practices to help improve water quality.

Section 9.4 on page 3 also describes two successful watershed management projects, one for the Bear Creek Floatway in northwest Alabama, and one for the Sand Mountain/Lake Guntersville Watershed. "Agricultural agencies assisted farmers in implementing BMPs while the Alabama Department of Public Health worked with rural residents to improve septic systems. An eight-year water quality monitoring program revealed **an improvement in all parameters except phosphorous."**

Note: Thus the Corps acknowledged in 1999 the demonstrated ineffectiveness of BMPs to reduce phosphorous, but has nevertheless steadfastly promoted, since 1999, that single, failed approach as the way to make Duck River suitable for construction of a reservoir. What is going on????

Note: The involvement by Public Health elsewhere is also noteworthy, but apparently no action by Public Health or others has been initiated to address the concerns about elevated fecal coliform expressed in the 2011 annual water quality report for the Duck River.

21. Following additional studies ordered by a federal court, a Supplement to the Environmental Assessment was issued on June 7, 2005 and the following statements appear on Executive Summary page IV:

"In general, the Corps' work:

(i) confirmed that a 60 percent reduction in nutrient loading was indeed required;

(ii) identified and quantified the known and suspected sources of such nutrient loading within the Duck River sub-watershed;

(iii) identified and evaluated methods of controlling such sources and reducing the associated loadings;

(iv) confirmed that those methods would indeed achieve the necessary 60 percent reduction;

and (v) identified contingent controls and adaptive management measures that could and would be employed should monitoring of the Duck River sub-watershed indicate that the requisite reductions are not being achieved.

"Furthermore, as this Supplement notes, the measures required to achieve such reductions will be mandated by the terms of the Section 404 permit required for the reservoir's construction."

Note: The 60% reduction statement in (i) above applies to nutrients in general, not just to phosphorous alone.

22. Also, page V of the Executive Summary of the 2005 Supplement to the Environmental Assessment further states:

"The additional BATHTUB modeling confirmed that a 60 percent reduction in nutrient loading – specifically, a reduction in total phosphorous (TP), which was identified as the limiting nutrient with respect to algal growth – from the surrounding watershed would have to be achieved in order to prevent the reservoir from becoming eutrophic. In terms of specific quantity, this 60 percent reduction represented a reduction in potential TP loading of approximately 3,300 lbs/year."

Note: TP LOADING is based on concentration, which human activity affects significantly, and flow, which is due to both precipitation variables and human activities such as land clearing and paving. Changes in land uses can significantly affect water runoff rates. Because the Utility Board is establishing only a 100' buffer around the proposed reservoir, it can be safely predicted that residential and other development spawned by the new reservoir (and just outside the100' buffer) will soon destroy much of the surrounding forest that currently protects, filters, and moderates flow into the Duck River. Such forest destruction and residential development has occurred around the City of Cullman's Lake George (a former, but now untapped water source) and Lake Catoma (the current water source) in the last 60 years. The net result would most likely be increased nutrient loading of the proposed reservoir due to additional runoff. In 1998 the CMWD (a now defunct advisory board) and the City of Cullman failed to consider the effect of this likely development when approving the very narrow 100' buffer for the then 303(d) impaired stream. The Health Department, the Corps, engineering firm Almon & Associates, and engineering firm St. John all recommended a 300' buffer, but the public outcry of residents who owned property adjacent to the proposed reservoir regrettably prevailed.

Note: While the City of Cullman was ignoring these buffer recommendations, the permit was proposing to force farmers to follow recommended Best Management Practices if needed. The City wants to be able to force OTHERS to follow recommendations, but simultaneously ignores the strong recommendations of numerous agencies and engineers.

Note: Most of the land that the Utility Board has purchased for upland hardwood compensation is outside the 100' buffer, and is DOWNSTREAM of the proposed reservoir. Thus, these "compensation" lands will provide ***no benefit*** *to water quality in the proposed reservoir. Just providing a 200' buffer would have eliminated the need for these additional hardwood compensation areas, would have actually benefited the water quality of the proposed reservoir, and would have prevented the unnecessary and unjustified removal of more than a dozen families from their homesteads and other landowners from their property to "compensate" for the proposed reservoir. Running these people out of their lands and homes, under threat of condemnation is a* ***travesty*** *yet to be remedied, because a wider buffer or even the purchase of existing hardwood forestland from* ***willing*** *owners* ***upstream*** *of the proposed reservoir is a clearly obvious and much more project-beneficial alternative. The City of Cullman Utility Board is simply a bunch of out-of-control bullies, enabled by the Corps of Engineers, and both must be brought under control.*

23. Also, page 2-3 of the 2005 Supplement to the Environmental Assessment lists the revised nutrient baseline concentrations for year 1999 that were used for input to the BATHTUB model as the following:

    TP..... 0.054 mg/L (coefficient of variation, 0.32)
    TN.... 3.04 mg/L (coefficient of variation, 0.52)

    The subsequent discussion then describes that "for example" with a typical flow of 50 cubic-feet per second and with other typical water conditions, that a 60% reduction of TP loading would be needed, "to achieve a mesotrophic status similar to that of other reservoirs in the Southeast."

Note: No reduction for TN was specified, apparently because it was assumed that TN concentration would never be less than eight times TP concentration, and thus TN would never be the limiting nutrient.

24. Also, page 2-13 of the 2005 Supplement to the Environmental Assessment states the following:

    "Thus the desired 60 percent reduction in phosphorous load requires that the TP export rate for the overall watershed of the proposed reservoir (now about 0.24 lbs/acre/year) be reduced to about 0.1 lbs/acre/year. This target rate is typical for **woodlands** (although lower levels have been reported), and provides a reasonable limit for expected results of watershed management."

*Note: The above statement begs the question, how is it "reasonable" that management of **pastureland** and **row-crop land** typical of the Duck River watershed could be expected to achieve an export rate typical of **woodlands**, especially when the only woodlands left in the near future could be the narrow, 100-foot wide buffer zone around the edge of the reservoir? Unlike woodlands, the existing pasture and row-crop lands, which cover two-thirds of the watershed, must be fertilized once or twice a year in order to make them productive and economically profitable. Also, considering the additional precipitation runoff rate from these agriculture lands compared to woodlands, the "reasonable" conclusion quoted above is, in fact, a totally **"unreasonable"** conclusion.*

25. Also, Section 2.4 of the 2005 Supplement to the Environmental Assessment addresses ways to reduce phosphorous loading, with no mention of reducing nitrogen loading.

Note: Again, it was assumed that TP would always be less than eight times TN, and thus never be the limiting nutrient. The extremely high TP readings during sustained high flows during the winter of 2012 appear to prove otherwise.

26. Also, section 2.5 of the 2005 Supplement to the Environmental Assessment summarizes watershed management measures for "nutrient" control, but again establishes no separate goal or methods for reducing nitrogen loading.

27. Also, section 2.6 of the 2005 Supplement to the Environmental Assessment states that "Cullman-Morgan Water District – CMWD will have the authority to enforce watershed management recommendations within the Duck River sub-watershed. As such, CMWD will be able to remove potential sources of excess nutrients from the watershed."

Note: The above statement is not correct, since the CMWD only has an advisory function, and it has not met (or functioned in any other manner) since 2003.

Also, section 2.6 states that, "[A]n adaptive management approach will be used to monitor water quality, evaluate monitoring and management results, and adjust the watershed management program accordingly."

Note: Contrary to the above statement, there have apparently been NO adjustments to the plan since 1999, and apparently there has been only two "annual" meetings (one in 2011 and one in 2012). To date there is no evidence (despite Freedom of Information Requests to the Corps and to the City of Cullman seeking such evidence) that any adjustments to the program have been made to implement the recommendations of the first "annual" (2011) review (listed and discussed later below).

28. Also, Table 5 (page 2-22) of the 2005 Supplement to the Environmental Assessment erroneously states that, " CMWD can require local property owners to comply with recommendations in the watershed management plan," and that,

"CMWD has local government authority and has the authority to remove a pollutant source from the watershed."

Note: Again, the CMWD is advisory only, has not functioned since 2003, and has no such authorities. In Judge Bowdre's opinion in 2005 these erroneous statements that were apparently supplied to the judge about the CMWD were cited as some of the reasons the judge allowed the 404 permit to be reissued.

29. Turning to the Final Report of the Duck River Clean Water Action Plan Project dated September 2005, the report lists and describes a large number of efforts that were made to implement Best Management Practices during the project period from November 22, 1999 when Tim Scott began as Watershed Coordinator until the project ended in September 2005. The report indicates that the watersheds of 303(d) impaired streams north of Highway 69 and management practices that would be most beneficial to water quality were given priority for program delivery. The report also indicates that the effort "resulted in approximately $400,000 of federal cost-share money being obligated to land users in the watershed for Best Management Practices installation." Unspecified funds from several state programs were also mentioned.

and,

"According to load reduction models we were able to reduce Nitrogen and Phosphorous loading about 60% to 70% in the watershed."

*Note: The loading reductions were **calculated** using an EPA Region V computer model (but **not measured** from water samples and flow data). Water samples were taken the third week of the month between 10 a.m. and 2 p.m. rain or shine, and analyzed using the Alabama Water Watch parameters. The data is included in the report, but **nitrogen and phosphorous were not parameters analyzed**. Thus, the only nutrient reduction results from the almost six-year long intensive effort to reduce nutrients were **calculated** based on what the efforts **should have** accomplished, **but results were not actually measured** by water samples. That is remarkable.*

29. Turning to the Department of the Army Draft Permit Number AL96-00912-U, Cullman-Morgan Water District/ City of Cullman, dated November 9, 2006, Special Conditions:

"a. …The WMA must insure enforcement of and compliance with the Cullman-Morgan Water District, Duck River Supply Project, Watershed Management Plan, May 1999…, and also with the FY99 Clean Water Action Plan, Work Plan Project #24…. The Watershed Management Plan shall be enforced concurrent to and in cooperation with the Clean Water Action Plan. Both plans are to be **revised and updated**, as necessary, to remain current with all BMPs, rules, regulations and/or required conditions of all applicable federal and/or state agencies."

Note: As of October 2012, the 1999 Watershed Management Plan has not been updated or revised by the Utilities Board or enforced by the Corps. (Refer back to the detailed list of obsolete and/or unenforced provisions of the plan several pages ago.) The Corps of Engineers has been extremely remiss in allowing the current lackadaisical situation to continue for the last six years.

Note: In 2010 Darrel Haynes asked Project Coordinator Dale Greer several times for a copy of the Watershed Management Plan, but Mr. Greer never produced a copy. Finally, Mr. Greer told Mr. Haynes that ***there was no Watershed Management Plan****. In 2012 Lydia Haynes submitted a written Freedom of Information Act request for a copy of the plan to City Attorney Roy Williams. In reply, Mr. Williams provided a copy of the final report of the Clean Water Action Plan, but no copy of the Watershed Management Plan. Thus it has been impossible to obtain a copy of the plan from the city, but Mrs. Haynes was able to obtain one from the Corps of Engineers. Thirteen years after the plan was written and made a part of the 404 permit, the City of Cullman will not provide a copy to the public. What is going on????*

And permit Special Conditions also state:

"f. Water Quality monitoring reports must show a minimum 60 percent reduction in total phosphorous before any water can be impounded."

30. Turning to another document, a June 20, 2011 e-mail from CH2MHill Program Manager Steve Newton to Corps project manager Courtney Shea, et.al. states:

"Based on the results to-date of the water quality and biological monitoring programs and other information, we do not believe any significant changes need to be made to the 1999 Watershed Management Plan to specifically address problem areas. This plan does need to be updated to make it current."

31. Turning to the meeting summary document itself, the 2011 Annual Watershed Management Plan Review Meeting Summary dated June 24, 2011 focused on total phosphorous (TP) concentrations and loadings. No other water quality parameters were mentioned in the meeting summary. The Annual Water Quality Report was not available to the meeting participants, but they were promised that it would be provided to the Corps and to ADEM in July of 2011.

Note: It is astounding that this was the ***first*** *Management Plan Review Meeting since such meetings were required by the permit reissued in 2006, but only phosphorous was addressed, and the participants were not provided water quality data or graphs to review before the meeting.*

Note: Graphs presented at the meeting omitted all data between August 10, 1998 and February 18, 2009, a huge gap of more than 10 years. The data also indicated a huge spike in TP on January 7, 1998, which was during a flood event. (See attached

graphs, "Long-Term Total Discharge" and "Long-Term Total Phosphorous".)

Note: The significant increase in total nitrogen (up about 50% since the 1999 baseline) is not even mentioned in the meeting summary (see page 2 attached), nor is it mentioned in the slide presentation of graphs and charts that is attached to the summary.

Note: Also, no mention is made in the meeting summary of the baseline concentrations for TP and TN established in the 2005 Supplement to the Environmental Assessment for either nitrogen (3.04 mg/L) or phosphorous (0.054 mg/L).

Note: All of the above begs the question, how could the participants in the meeting adequately and meaningfully review the effect of the last 10 years of Watershed Management Plan implementation without the opportunity to review the 2011 annual water quality report (the first such report) prior to or even during the meeting?

Note: Significantly, the only Corps representative present at the meeting had no comments or questions recorded in the meeting summary.

Note: Also, and very significantly, the Corps' project manager was not present at the meeting (the first of such "annual" meetings) required by the 2006 permit, five years prior.

Note: Also, and extremely significantly, only the chairman of the Cullman Utilities Board was present, at the very time when the Utilities Board was trying to convince the Corps that it could function as the watershed management authority. The other four board members were not present at this, the FIRST "annual" meeting regarding the status of the watershed that they were now newly professing to manage.

32. Also, the 2011 Annual Watershed Management Plan Review Meeting Summary listed the following recommendations for updates to the plan:

    a. Update goals and objectives.

    b. Identifiy successes and deficiencies since 1999.

    c. Provide consistency with current regulatory requirements.

    d. Source reduction and education **consistent** with current non-point source programs.

    e. Incorporate current monitoring programs.

Note: No specific actions were recommended to address TP or TN, and no explanation was presented to support the claim that phosphorous loading had been reduced 93%. Likewise there was no mention of the baseline concentrations for TP and TN specified in the 2005 Supplement to the Environmental Assessment.

33. Turning to another document, the 2011 Annual Water Quality Report (which described itself as the second such report) was issued in August of 2011, but was not received by the Corps until November 4, 2011 (several months after the June meeting and the promise of delivery in July).

A comparison of nitrogen concentrations listed in the report to the required 1999 baseline is as follows:

1999 baseline TN..... 3.04 mg/L (coefficient of variation, 0.52)

2009-2011 TN.....(amazingly, TN is not listed in the report)

2009-2011 Nitrates at the dam (site 11).....from 0.050 to 5.34 mg/L

EPA Ecoregion 68 typical range.....from 0.003 to 1.754 mg/L
(MUCH lower than for site 11)

Recommendations from the report (pages 21, 21, and 23 are attached):

a. The summary on page 21 basically lists the same recommendations for Management Plan updates as listed above in the annual meeting summary.

b. The summary on page 21 reported elevated nitrate concentrations though out the watershed. TN levels have increased at many sites. Site 2 shows a large increase in TN compared with historical levels, despite a substantial decrease in discharge.

c. Page 22 lists high nitrate and sulfate concentration for all sites, but makes no actionable recommendations for what to do about the increases.

d. Page 22 lists high nitrates for site 2, a relatively high increase in nitrate over time, elevated ammonia on three occasions. TN levels have increased sharply at this site compared to1997-1998 levels despite a decrease in overall discharge. The only recommendation is:

"Consider coordinating with the high school to identify potential pollutants and, if necessary, identify resources (such as NRCS) for additional treatment options (e.g., constructed wetlands)."

e. Page 23 list high nitrates and a relatively high increase in nitrates at site 2 and 7 since 1997 – 1998. Heavy cattle operation and timber harvesting were noted. The only recommendation was:

"Coordinate with planning assistance organizations to identify resources for forestry and agriculture BMPs."

f. Page 23 noted relatively high average fecal coliform at site 9. The recommendation for this was, "Consider evaluating potential septic tank failures contributing to relatively high fecal coliform levels."

In response to the report, a December 6, 2011 e-mail from Project Manager Courtney Shea to CH2MHILL Program Manager Steve Newton states:

"Steve, I have reviewed the Annual Water Quality Report and the Annual Biological Monitoring Report received in our office on November 4, 2011. I do not have any comments. Thank you!"

Note: Amazingly, the Corps' Project Manager had "no comments" on the report.

Note: No documentation that Fairview School has been contacted about pollutants or that septic tanks have been evaluated has been produced by the Corps or by the Utilities Board as of October 2012.

*Note: This water quality report was made **months** after the annual review meeting, and apparently no action was assigned for any of the recommendations. Having the water quality report **after** the annual meeting is ridiculous and assures few or no comments or actions occur.*

34. Turning to two other documents, an e-mail on June 25, 2012 from the Corps' Project Manager Courtney Shea to CH2MHILL Program Manager Steve Newton apologetically requested the 60% calculations for TP and TP loading as follows:

"One additional item that I want to point out, I have the information that was presented at last year's WMP review meeting in June 2011 regarding the reduction in TP. I do want to point out that not only does the permit state that there should be a minimum of 60% reduction in TP (condition f), it also states there should be a 60 percent reduction in phosphorous loading (condition a), which, I believe, is a different calculation. Has this phosphorous loading calculation been done? If so, we will have to have this information for the file. We may have already discussed this and if so, I apologize. But sometimes I need a little refresher…"

Here is Steve Newton's e-mail response on June 27, 2012:

"The total phosphorous reduction of 60% in the Duck River watershed is based on concentration and loading. As part of our WQ and biological data review during our June 2011 watershed meeting, we prepared a spreadsheet to see where we are. I have attached that spreadsheet for your review and files. Our calculations at the time showed a 93% reduction and we are now updating this for the data collected to date. I will send the updated spreadsheet to you when completed. The presentation provided to the group last week (which I will send the meeting

minutes and supporting documents by one day next week) focused on TP concentration."

*Note: The spreadsheets provided are **incomprehensible** as to how CH2MHILL calculated a 93% TP loading reduction (copy attached). Data from 1999 thru 2003 was on the spreadsheet, but was not presented in the 2011 meeting or in the 2011 water quality report. The spreadsheet fails to provide the **calculations** that the Corps' Project Manager requested. Whether or not the Project Manager realized this or merely filed the document without evaluating it is currently indeterminate from the documents provided by the Corps in response to the Freedom of Information Request that obtained the above e-mails.*

35. Turning to another document, a June 28, 2012 letter from J. Steve Newton, Program Manager, CH2MHILL to Lynn Sisk, Chief, Water Quality Branch, Water Division, Alabama Department of Environmental Management, reports that the new flow-monitoring gage, Hydrologic Unit 03160109, owned by the Utilities Board (which replaced an operable USGS flow gage on March 6, 2012) has been inoperable since May 2012 and is expected to be inoperable perhaps until October 2012.

*Note: The Corps provided this letter under a general FOIA request but provided no response letter from the Corps or from ADEM. This letter and the lack of compensatory action by the Utility Board, by the Corps, and by ADEM is particularly **disturbing**, because the extended flow gage outage is coincidental with much of the excavation that is occurring for the proposed dam's footprint, and because it is occurring at a time when the nutrient loading goals for the proposed reservoir project appear to be failing. The gage is supposed to be a **continuous** monitor with measurements **accessible to the public** on-line. The 404 permit says the flow should be measured continuously, not ignored for months. Someone who is responsible for this project should have directed that as a minimum a river depth reading be taken at least daily until the gage is operable. One wonders if anyone in a position of responsibility (in the Corps, in ADEM, or in the Utilities Board, or the Project Manager) is even trying to fulfill their responsibilities regarding the nutrient loading concerns for Duck River.*

36. Turning to another document, the 2012 Annual Watershed Management Plan Review Meeting Summary dated July 9, 2012 shows that this year's review meeting was even more poorly attended than the 2011 meeting, TP is now up significantly, and no mention was made of TN, which was up noted as being up significantly in 2011.

*Note: **Not a single** Utility Board member attended the 2012 annual meeting, yet the Utility Board is still seeking to be recognized as the watershed management authority. If they do not even attend the annual management plan review meeting, how could they possibly be acceptable to the Corps as a legitimate watershed management authority?*

*Note: No representatives of the Corps and **no** representatives of ADEM attended the 2012 annual meeting either.*

*Note: Again, as in 2011, TP was the primary topic, but no statement about meeting the 60% TP loading reduction goal was made, and instead TP was reported **up 147%.***

Note: Again, no water quality report was provided for review before the meeting. It would be impossible to have a valid, comprehensive, meaningful review meeting without the participants having the water quality report to thoroughly review first.

The Meeting Summary listed the following recommendations:

a. Continue to periodically perform a reconnaissance of the watershed to identify NSP [sic] practices or situations that could result in water quality concerns.

b. Continue monthly water quality sampling and annual biological sampling.

c. Continue public and land user education programs.

d. Complete annual water quality and biological monitoring reports this fall with 2012 data.

Note: Thus, even though a strong indication of flow-related, highly-elevated phosphorous concentrations were detected and discussed, no increased flow monitoring was implemented for future high-flow events to determine if the high TP readings were typical of high-flow events. An extremely similar event on January 6-7, 1998 had been reported in the 2011 water quality report, but amazingly, the chart was not updated and carried over and included in the 2012 plan review meeting. Instead, this new, similar event was written off in 2012 as a "slug" or "anomaly." Of course, as previously discussed, short-term high-flow events, "slugs," are typical of the Duck River, and would be the typical mechanism to initially fill and then refill the proposed reservoir in the future. Thus, the annual meeting did not appear to be an unbiased review of results, did not identify an obvious concern, and failed to provide directions for obtaining needed high-flow data. Again, the Corps and the Utility Board "watershed management authority" did not even see fit to attend the 2012 meeting, while millions of dollars worth of excavation was underway, and the project was at risk of a failing nutrient reduction program.

CONCLUSION

Thirteen years of intensive watershed management appears to have failed to reduce phosphorous loading in the Duck River by the required 60%, and the proposed reservoir is very likely to be unacceptably eutrophic.

For thirteen years a very inadequate sampling regime has failed to reflect the fact that phosphorous concentration is closely related to flow, and efforts should have been made to take samples during periods of moderate and high flow. A large amount of useless data is still being collected at high cost to water customers. Merely sampling for phosphorous just upstream of the proposed dam site during ***high-flow*** periods would provide immeasurably better data than the data now being collected. If TP at that location is unacceptable, then upstream sampling to identify the source would be in order.

The Corps properly focused on phosphorous loading as the limiting nutrient, but failed to address nitrogen reduction in the 404 permit. Consequently, a massive effort to remove poultry litter from the watershed has resulted in a large increase in the amount of nitrogen, in the form of nitrate fertilizers, being applied to fields to compensate for the loss of nitrogen from poultry litter. (See attached letter dated October 27, 2011 from Darrel, Ben, and Bart Haynes to Whom It May Concern .) The high cost to farmers of this program was not addressed in the Needs Assessment. Nitrogen levels are now significantly higher than the 1999 baseline established by the Corps in their 2005 Environmental Assessment. When phosphorous is very high, as in February and March 2012, the high nitrogen concentration becomes significant and possibly limiting.

The City of Cullman Utility Board claims to be functioning as a watershed management agency, but appears to be ***avoiding*** any corrective actions until the construction of the Duck River dam is too far along to turn back. The Utility Board exhibits a severe ***conflict-of- interest***, a severe lack of interest in watershed management, and needs to be replaced by a legitimate watershed management authority, one that would ***consistently*** and ***fairly*** manage all of the watersheds that supply potable water to Cullman County residents.

The Corps seems oblivious to highly questionable calculations regarding phosphorous levels, to the many years of city failures to conduct the annual review meetings, to the many years of failure to present annual water quality reports, to high fecal coliform levels, and to the many years of failures to even collect water samples for nutrient analysis. The Corps simply attended the first review meeting on record (in 2011) and had "no comments" for either the meeting or for the water quality report that followed several months later. The Corps seems oblivious to the fact that the annual water quality report should be presented for review ***before*** the annual management review meeting, not afterwards. The Corps did not even attend the 2nd annual review meeting (in 2012), even though excavation for the proposed reservoir was well underway.

Thus the Corps' fulfillment of its role as enforcer of Clean Water Act Section 404 is highly questionable.

Based on all of the information presented in this report, the concerns and fears of farmers in the Duck River watershed are well-founded as follows:

1. That the cost of properly and adequately applying nutrients to fields has greatly increased due to this project, but this extremely high cost to farming was not addressed in the Needs Assessment for the project.

2. That farmers will soon be prohibited from spreading adequate nutrients on the lands they farm by the City of Cullman Utilities Board, a board of city-elected and city-appointed officials who represent ***only*** the City of Cullman, and not the watershed residents and watershed farmers at all.

3. That the Duck River project will soon put farmers in the Duck River watershed out of business.

Immediately, the Utility Board should be required by ADEM or by EPA or by the Corps to sample for TP during future high-flow events. The results of the last thirteen years of intensive watershed management to reduce TP should then become much clearer.

It is time for the Corps to immediately run the BATHTUB model again using actual water quality and flow data that has been collected in the last few years. Nutrient concentrations typical of high-flow events should be used in the model, rather than normal low-flow measurements, because high-flow events would most likely be the primary mechanism to fill and refill the proposed reservoir.

Contrary to unjustified speculation in the 2012 watershed management plan review, high TP inflows during ***high-flow*** events are apparently NOT an anomaly, have repeatedly occurred, and can be easily explained by the high concentration of agricultural activities in the watershed.

Meanwhile, using water from super-clean Smith Lake and from existing Lake George (a former source) and from existing wells in Blount County and Arkadelphia (all with known and measurable quality), and strengthening connections and agreements to obtain potable water as needed from surrounding water systems continues to be a viable and obvious alternative that has been unjustifiably excluded from consideration for the last 20 years by the Corps of Engineers. This is a practicable alternative that could be less damaging to our aquatic resources, in that it would avoid the degradation to the Duck River that the Duck River project promises. Therefore, this is an alternative that should have been considered and still remains to be considered by the Corps of Engineers under Section 404 of the Clean Water Act.

There is only one WMA in Alabama, it is located in southeast Alabama, and is called The Cochtawhatchee, Pea, and Yellow Rivers Watershed Management Authority. It was established in the early 1990s, at about the same time that the Duck River project was conceived. A year ago this WMA was considering the need to construct a dam to meet its water needs, because the water levels of existing ground water sources were dropping significantly. The WMA enlisted the Geological Survey of Alabama and others to help locate other sources. Sufficient sources were identified, and now in 2012 (one year later), this legitimate WMA sees no need to build a dam for the foreseeable future.

For Cullman County, the alternate sources are already identified, and we just need to use them in a way that benefits the whole county fairly. Clean Water Act Section 404 ***requires*** that we responsibly consider this alternative, in spite of the Corps of Engineers' and the City of Cullman's refusal thus far to do so.

Cullman County needs the Alabama Department of Environmental Management, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the Health Department, and any other responsible agency or authority to enforce Clean Water Act Section 404, since the Corps thus far will not.

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May 13, 2011 letter from Dale Greer, City of Cullman, to Cindy House-Pearson, Chief, Inland North Section, Mobile District, U.S. Army Corps of Engineers.

June 3, 2011 letter from Roy W. Williams, Jr., City of Cullman Attorney, to Thomas G.F. Landry, Assistant District Counsel, Corps of Engineers regarding Requirement for a Watershed Management Authority.

June 20, 2011 e-mail from CH2MHill Program Manager Steve Newton to Corps Project Manager Courtney Shea, et.al., stating that no significant changes are needed to the watershed management plan to address problem areas.

Duck River Reservoir Project, Annual Watershed Management Plan Review Meeting Summary dated June 24, 2011.

Duck River Watershed Management Plan Annual Water Quality Report dated August 2011.

October 27, 2011 letter from Haynes Farms, LLC to whom it may concern regarding the effect to date of the Duck River project on farming in the watershed.

December 6, 2011 e-mail from Corps Project Manager Courtney Shea to CH2MHILL Program Manager Steve Newton stating "no comments" on Annual Water Quality Report received on November 4, 2011.

June 25, 2012 e-mail from Corps' Project Manager Courtney Shea to CH2MHILL Program Manager Steve Newton requesting the 60% calculations for TP and TP loading.

June 27, 2012 e-mail from CH2MHILL Program Manager Steve Newton to Corps Project Manager Courtney Shea stating that TP reduction is based on concentration and loading and that the 93% reduction for 2011 was addressed on an attached spreadsheet. The calculation was being updated for 2012 and would be sent when completed.

June 28, 2012 letter from J. Steve Newton, Program Manager, CH2MHILL to Lynn Sisk, Chief, Water Quality Branch, Water Division, Alabama Department of Environmental, reporting that the new flow-monitoring gage has been inoperable since May 2012 and is expected to be inoperable perhaps until October 2012.

Duck River Reservoir Project, 2nd Annual Watershed Management Plan Review Meeting Summary dated July 9, 2012.

August 16, 2012 e-mail from Corps' Project Manager Courtney Shea to CH2MHILL Program Manager Steve Newton requesting the first water quality report, that is mentioned in the second (2011) report.

August 16, 2012 e-mail from CH2MHILL Program Manager Steve Newton to Corps' Project Manager Courtney Shea stating that the first report "was more of a data download to ADAM [sic] for the first year of sampling," and promising to send it to her.

September 13, 2012 letter from Lydia L. Haynes to Mayor Max Townson requesting, under the Freedom of Information Act and the Alabama Sunshine Laws, eleven documents relating to the Duck River Project.

September 20, 2012 letter from City of Cullman Attorney Roy W. Williams, Jr. to Lydia L. Haynes stating that the information request of September 13 does not fall under FOIA or the Alabama Sunshine Law, but that he had been instructed to provide what information the city has.

October 1, 2012 letter from City of Cullman Attorney Roy W. Williams, Jr. to Lydia L. Haynes providing some of the information requested on September 13, 2012.

"Where Nutrients Come From and How They Cause Eutrophication," United Nations Environment Programme, Division of Technology, Industry and Economics, undated.

ATTACHMENTS

(in chronological order)

Letter dated May 7, 1996 to the Mobile Corps District Engineer from Larry E. Goldman, Field Supervisor, U.S. Department of the Interior, Fish and Wildlife Service declining concurrence with permit. (4 pages) (A)

"BASIN: General Information on Phosphorous, City of Boulder/USGS Water Quality Monitoring" last updated April 23, 2007. (4 pages) (B)

June 3, 2011 letter from Roy W. Williams, Jr., City of Cullman Attorney, to Thomas G.F. Landry, Assistant District Counsel, Corps of Engineers, claiming Utilities Board suffices as a Watershed Management Authority. (3 pages) (C)

Annual Watershed Management Plan Review Meeting Summary, dated June 24, 2011: (D)
- Page 2, Water Quality Monitoring Results
- Graph: "Mulberry Fork" flow, November 1997 – November 1998
- Graph: "Mulberry Fork" flow, February 2009 – April 2011
- Graph: "Long-Term ~~Total~~ Discharge"
- Graph: "Long-Term Total Phosphorous"
- Map: "Change in Total Phosphorous"

Annual Water Quality Report, dated August 2011, pages: (E)
- 14, Fecal Coliform
- 16, Nitrate
- 21,22,23. Summary and Recommendations
- 32 (Figures A-6A and A-6B), Fecal Coliform
- 33 (Figures A-7A and A-7B), Nitrate Concentrations
- 37 (Figures A-11A and A-11B), Total Phosphorous Concentrations
- 44 (Figures A-17A and A-20), Stream Discharge
- 45 (Figures A-21 and A-22), Flow-Weighted Total Phosphorous & Total Nitrogen

Letter dated October 27, 2011 from Darrel, Ben, and Bart Haynes to Whom It May Concern (2 pages) (F)

E-mail dated June 27, 2012 from Steve Newton, CH2MHILL, to Courtney M. Shea, SAM, and three summary pages of a spreadsheet from CH2MHILL purporting a 93% TP reduction calculation as of June of 2011. (4 pages) (G)

2nd Annual Watershed Management Plan Review Meeting Summary, dated July 9, 2012: (H)
- Pages 2 and 3, Water Quality Monitoring Results
- Graph: "Long Term Total Phosphorous" (2 graphs)
- Map: "Change in Total Phosphorous (Concentrations)"

United States Department of the Interior

FISH AND WILDLIFE SERVICE
2001-A Highway 98
P. O. Drawer 1190
Daphne, Alabama 36526

IN REPLY REFER TO

May 7, 1996

District Engineer
U.S. Army Corps of Engineers
P.O. Box 2288
Mobile, AL 36628

Dear Sir:

This is the report of the U.S. Fish and Wildlife Service (Service) concerning Public Notice AL96-00912-U in which the applicant, Cullman-Morgan Water District/City of Cullman, is proposing to construct a 2,100-foot-long rock-filled dam to an elevation of 745 feet, National Geodetic Vertical Datum (NGVD). A 650-acre water supply reservoir with a pool elevation of 732 feet NGVD would be impounded by the dam. The dam is located on the Duck River, Cullman County, Alabama, about .4 mile north of the U.S. Highway 278 crossing. The purpose of this project is to provide an emergency/alternative water supply source for nine existing water systems within the Cullman-Morgan Water District. The proposed reservoir would inundate 6.8 miles of Duck River and 5.4 miles of smaller tributaries. The majority of this reservoir would be located in what is currently upland hardwood habitat. The dam site is about 11.4 miles upstream from the mouth of the river where it enters the Mulberry Fork. This report is prepared in accordance with the requirements of the Fish and Wildlife Coordination Act (16 U.S.C. 661-667e) and is to be used in your determination of 404(b)(1) guidelines compliance (40 CFR 230) and in your public interest review (33 CFR 320.4) as they relate to protection of fish and wildlife resources.

The Service conducted an onsite inspection of the project site on April 23, 1996 with the applicant's consultants, Corps of Engineers (Corps), and Alabama Department of Conservation and Natural Resources. To date, the acreage of wetlands to be affected has not been specifically identified. Our major concerns involve wetland impacts, natural stream habitat losses, impacts to downstream habitat(i.e., flows), quality upland

MAY [illegible]

hardwood losses, and possible impacts to Federally listed species.

Wetland and upland forested habitat provide food and cover for wildlife resources such as deer, turkey, squirrel, raccoon, small mammals, raptors, songbirds, reptiles, and amphibians. Wetlands and other riparian vegetation also assimilate pollutants, stabilize the shoreline and when inundated provide habitat for fishery resources.

Duck River is a free flowing stream with an average width in the project area of about 40 to 50 feet. The riffles and pools provide excellent fishery habitat. Some of the major tributaries, i.e., Henderson Branch, Rock Creek, Dry Branch, etc., also appear to provide quality food and cover for fishery resources. Natural stream habitat in Alabama is unique, has severely decreased in extent, and is extremely difficult to replace. The Service is also concerned about downstream impacts resulting from alteration of physical and biological parameters from water released from the dam. This includes potential impacts on temperature, dissolved oxygen, flow rates, sedimentation, etc. The project area is dominated by agriculture uses,(i.e., chicken production) which, we believe could contribute to a water quality problem from over nitrification.

The Service is also concerned about the impact this project could have on Federally listed species within and downstream from the reservoir site. The threatened flattened musk turtle (Sternotherus depressus) is known to occur downstream from Highway 278. It appears that this reach of the river could also be suitable for mussels such as Alabama moccasinshell (Medionidus acutissimus), orange-nacre mucket (Lampsilis perovalis), and triangular kidneyshell (Ptychobranchus greeni). We recommend that the areas within the reservoir site, as well as upstream and downstream of the reservoir be thoroughly surveyed. The method of survey, specific area to be surveyed, species to be surveyed, and persons doing the survey should be specifically coordinated and approved by the Service before such work starts. If surveys indicate Federally listed species could be affected, the Corps should enter into Section 7 consultation with the Service. A biological assessment is required for "major construction activities" considered to be Federal actions significantly

affecting the human environment. It is required if federally listed species or critical habitat are in the action area. If a biological assessment is required, formal consultation cannot be initiated until the biological assessment is completed. The Corps and applicant should closely coordinate this matter with the Service.

The Service is not only concerned about the direct impacts of this single reservoir but the cumulative impacts of other similar projects. Several reservoirs are currently in the Black Warrior drainage basin and five new sites (Locust Fork, tributary to Locust Fork, Fayette County, Lamar County and Duck River) including this one are being proposed. The potential cumulative impacts of these dams have not been adequately addressed by the appropriate agencies.

In view of these reasons, the Service recommends this permit as proposed be denied. This is a major project which we believe deserves a more detailed review under the National Environmental Policy Act (NEPA). An Environmental Impact Statement (EIS) should be prepared which will evaluate features such as other alternatives, reduction in reservoir size, impacts from altered flows released from the dam, fish and wildlife impacts, water quality, cumulative impacts, and effects on Federally listed species.

If the Federally listed and proposed species issues are adequately resolved, the alternative analysis completed, and the avoidance, minimization, and compensation phases of aquatic and terrestrial mitigation all adequately addressed through the EIS process, we would lift our objections provided the applicant submits and implements a mitigation plan acceptable to the Service.

To date the specific acres of wetlands, bottomland hardwoods, upland hardwoods, etc., within the impact area have not been provided. This information will be needed for a complete environmental evaluation and mitigation proposal. An instream flow evaluation is necessary since a key issue relating to fishery resources would be maintaining instream habitat quality and determining any mitigation possibilities in the streams downstream of the proposed dam.

The above findings and recommendations constitute the report of the Department of the Interior. In accordance with the procedural requirements of the 1992 404(q) Memorandum of Agreement, Part IV.3(a), we are advising you that the proposed work advertised in this public notice may result in substantial and unacceptable impacts to aquatic resources of national importance.

Sincerely yours,

Larry E. Goldman
Field Supervisor

cc: EPA, Atlanta, GA
NMFS, Panama City, FL
ADCNR, Montgomery, AL
ADCNR, Spanish Fort, AL
ADCNR, Dauphin Island, AL
ADEM, Montgomery, AL
ADEM, Mobile, AL

City of Boulder/USGS Water Quality Monitoring

General Information on Phosphorus

by Sheila Murphy

Phosphorus is a nutrient required by all organisms for the basic processes of life. Phosphorus is a natural element found in rocks, soils and organic material. Phosphorus clings tightly to soil particles and is used by plants, so its concentrations in clean waters is generally very low. However, phosphorus is used extensively in fertilizer and other chemicals, so it can be found in higher concentrations in areas of human activity. Many seemingly harmless activities added together can cause phosphorus overloads.

Phosphorus exists in water in either a particulate phase or a dissolved phase. Particulate matter includes living and dead plankton, precipitates of phosphorus, phosphorus adsorbed to particulates, and amorphous phosphorus. The dissolved phase includes inorganic phosphorus and organic phosphorus. Phosphorus in natural waters is usually found in the form of phosphates (PO_4^{-3}). Phosphates can be in inorganic form (including orthophosphates and polyphosphates), or organic form (organically-bound phosphates).

Organic phosphate is phosphate that is bound to plant or animal tissue. Organic phosphates are formed primarily by biological processes. They are contributed to sewage by body waste and food residues, and also may be formed from orthophosphates in biological treatment processes or by receiving water biota. Organic phosphates may occur as a result of the breakdown of organic pesticides which contain phosphates. They may exist in solution, as loose fragments, or in the bodies of aquatic organisms.

Inorganic phosphate is phosphate that is not associated with organic material. Types of inorganic phosphate include orthophosphate and polyphosphates. **Orthophosphate** is sometimes referred to as "reactive phosphorus." Orthophosphate is the most stable kind of phosphate, and is the form used by plants. Orthophosphate is produced by natural processes and is found in sewage. **Polyphosphates** (also known as metaphosphates or condensed phosphates) are strong complexing agents for some metal ions. Polyphosphates are used for treating boiler waters and in detergents. In water, polyphosphates are unstable and will eventually convert to orthophosphate.

Phosphates are not toxic to people or animals unless they are present in very high levels. Digestive problems could occur from extremely high levels of phosphate.

In freshwater lakes and rivers, phosphorus is often found to be the growth-limiting nutrient, because it occurs in the least amount relative to the needs of plants. If excessive amounts of phosphorus and nitrogen are added to the water, algae and aquatic plants can be produced in large quantities. When these algae die, bacteria decompose them, and use up oxygen. This process is called eutrophication. Dissolved oxygen concentrations can drop too low for fish to breathe, leading to fish kills. The loss of oxygen in the bottom waters can free phosphorus previously trapped in the sediments, further increasing the available phosphorus.

Measurement of Phosphorus

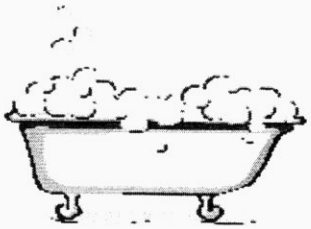
There are several forms of phosphorus which can be measured.

Total phosphorus (TP) is a measure of all the forms of phosphorus, dissolved or particulate, that are found in a sample. Soluble reactive phosphorus (SRP) is a measure of orthophosphate, the filterable (soluble, inorganic) fraction of phosphorus, the form directly taken up by plant cells.

Both phosphorus and orthophosphate are often measured using a colorimetric method, which means the color of treated sample reflects the concentration of the parameter. If total phosphorus is being measured, all forms of phosphorus are converted to dissolved orthophosphate with acid, persulfate, and heat. A chemical is then added to the water sample. The darker the color of the sample becomes, the more phosphorus present. This test can be done visually, comparing the treated sample to a set of reference colors. However, it is more accurate to use an electronic colorimeter, which uses a light source and a photodetector to find the concentration based on how much light is absorbed by the sample.

Factors Affecting Phosphorus Concentrations

Wastewater and Septic System Effluent



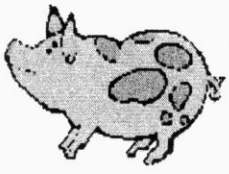
Domestic and industrial sewage are very important sources of phosphorus to surface water. Organic phosphates are formed primarily by biological processes. They are contributed to sewage by body waste and food residues. Phosphorus is essential in metabolism so is always present in animal waste. Orthophosphates and polyphosphates can be contributed by detergents, as discussed below.

Detergents

Orthophosphates and certain polyphosphates are major constituents of many commercial cleaning preparations. In the 1950s and 1960s, sodium phosphate was used often as a "builder" in households detergent to increase cleaning power. The extensive use of detergents led to major eutrophication problems, and in the 1960s efforts were made by governments, detergent manufacturers, and consumers to reduce the use of phosphates in detergents. As a result, phosphorus concentrations in many streams and lakes decreased. This was due to limits on the phosphate content of detergent, and also additional treatment used in waste water treatment plants to remove phosphorus. Many states have a ban on phosphates in detergents.

Fertilizers

Fertilizers generally contain phosphorus in the form of orthophosphate. Phosphate is not very mobile in soil; it tends to remain attached to solid particles rather than dissolving in water. However, if too much fertilizer is applied, the phosphates are carried into surface waters with storm runoff and also with melting snow. Soil erosion of fertilized fields and lawns can also carry a considerable amount of particulate phosphate to streams.



Animal Waste

Phosphorus is essential in metabolism, so is present in animal waste. Therefore, phosphate runoff can be an issue in waters near cattle feedlots, hog farms, dairies, and barnyards.

Development/Paved Surfaces

Development can cause soil erosion, which will release phosphorus. If swamps and wetlands are drained for development, phosphorus that was buried can be exposed. During the building phase, and after everything has stabilized, phosphorus concentrations in stormwater can increase because natural filters such as trees, shrubs, and puddles have been eliminated.

B

Industrial Discharge

Polyphosphates are often added to water to prevent iron oxides or calcium carbonates from forming. If this water is released to streams or lakes, polyphosphates can enter the water body, and will convert to orthophosphate.

Phosphate Mining

Phosphate mining, concentrating, and processing are sources of phosphate to rivers in some areas. The most common phosphorus-containing mineral is apatite ($Ca_5F(PO_4)_3$). There are no significant sources of phosphate minerals in the Boulder Creek Watershed, so this is not a problem in our area.

Drinking Water Treatment

Small amounts of orthophosphates or certain polyphosphates are added to some water supplies during treatment.

Forest Fires

Forest fires can cause soil erosion, which will release phosphorus bound to soil particles.

Synthetic Materials

Organophosphates are commonly used as construction materials, flame retardant and plasticizers.

Reduced forms of phosphorus are present in certain synthetic organic chemicals, including some that are used in insecticides.

Water Quality Standards and Other Criteria Regarding Phosphorus

No national or state criteria have been established for concentrations of phosphorus compounds in water. However, to control eutrophication, the EPA makes the following recommendations: total phosphate should not exceed 0.05 mg/L (as phosphorus) in a stream at a point where it enters a lake or reservoir, and should not exceed 0.1 mg/L in streams that do not discharge directly into lakes or reservoirs (Muller and Helsel, 1999).

Phosphate levels greater than 1.0 mg/L may interfere with coagulation in water treatment plants. As a result, organic particles that harbor microorganisms may not be completely removed before distribution.

Other Information about Phosphorus

For more information on nutrients in water, see http://water.usgs.gov/nawqa/circ-1136.html.

EUTROPHICATION

Eutrophication is a process that results from accumulation of nutrients in lakes or other water bodies. Eutrophication is a natural process, but can be greatly accelerated by human activities that increase the rate at which nutrients enter the water.

Algae growth is limited by the available supply of phosphorus or nitrogen, so if excessive amounts of these nutrients are added to the water, algae and aquatic plants can grow in large quantities. When these algae die, they are decomposed by bacteria, which use dissolved oxygen. This process is called "eutrophication." Dissolved oxygen concentrations can drop too low for fish to breathe, leading to fish kills. Excessive amounts of algae grow into scum on the water surface, decreasing recreational value and clogging water-intake pipes. Rapid decomposition of dense algae scums with associated organisms can give rise to foul odors.

In freshwater lakes and rivers, phosphorus is often the growth limiting nutrient, because it occurs in the least amount relative to the needs of plants. In estuaries and coastal waters, nitrogen is generally the growth limiting nutrient.

"Eutrophic" waters are characterized by high nutrient concentrations, resulting in high productivity of plant growth. Such waters are often shallow, with algal blooms and periods of oxygen deficiency. Slightly or moderately eutrophic water can support a complex web of plant and animal life. However, such waters are generally undesirable for drinking water and other needs. Waters with extreme nutrient concentrations are called "hypereutrophic."

"Oligotrophic" waters are characterized by extremely low nutrient concentrations, resulting in moderate plant productivity. Oligotrophic lakes are those low in nutrient materials and consequently poor areas for the development of extensive aquatic plants and animals. Such lakes are often deep, with sandy bottoms and very limited plant growth, but with high dissolved-oxygen levels.

Some scientists have categorized trophic status according to phosphorus concentration. Lakes with phosphorus concentrations below 0.010 mg/L are classified as oligotrophic, phosphorus concentrations between 0.010 and 0.020 mg/L are indicative of mesotrophic lakes, and eutrophic lakes have phosphorus concentrations exceeding 0.020 mg/L (Muller and Helsel, 1999).

Select here for a list references used in the preparation of this information
Select here for general information about other water quality parameters.
Select here for interpretation of Phosphous data in the Boulder Creek Watershed

INVITATION: BASIN is a community project actively seeking public participation. We appreciate all feedback and welcome comments, suggestions and contributions. To find out more about how you can be involved, click here.

JACKSON & WILLIAMS

ATTORNEYS AT LAW

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roywwilliamsjr@bellsouth.net

June 3, 2011

Thomas G. F. Landry
U.S. Army Corps of Engineers
Assistant District Counsel
P.O. Box 2288
Mobile, AL 36628-0001

RE: Requirement for Water Management Authority (WMA)

Dear Mr. Landry:

In making your review of the permit to the Duck River project, I request you consider the following points:

1. The language in the permit states (a) before project commencement, the permit must be transferred to a permittee SUCH AS A WMA. In 2001 and 2008, the Corps added (transferred) the permit to the Utilities Board of the City of Cullman, an entity that is a subdivision of the State that has the same or similar authority (greater authority than a Chapter 88 or 89 Authority under State statute) to regulate water quality. Since the Duck River Basin does not meet the requirements of Chapter 88 or 89, the Utilities Board is the only entity which meets the purpose of a WMA.

2. As set out in the Watershed Management Plan, Section 4.4, the powers and requirements of the WMA are as follows:

    1. Must be a political subdivision of the State having the following powers:

        A. To sue and be sued in its own name in civil matters;
        B. To acquire, receive, and take property of every description;

C. To make, enter into and execute contracts and other legal instruments necessary for the function of the authority;
D. To develop and construct water systems and supplies;
E. To distribute and sell water;
F. To exercise the power of imminent domain;
G. To cooperate with the United States of America, any agency, or instrumentality thereof.

The Utility Board has all of these powers and meets all of these requirements. It has the right to enforce all Federal and State regulations through the civil process as any other entity would have and can refer violations to appropriate Federal or State agencies for criminal prosecution or by civil action. The Utilities Board's power can be expanded just as a WMA through legislative acts.

3. The Utilities Board has already identified and implemented programs which have substantially complied with Section 5.0, et seq., and Section 6.0, et seq., of the Watershed Management Plan.

A WMA cannot improve or expand the program any more than the Utilities Board can identify or implement.

In essence, there is no need for a WMA because the Utility Board is performing the functions of a WMA, has the same powers to manage the water quality, and has shown so by its activities in the Duck River Basin.

4. The Utility Board is a political subdivision of the State (*Hutto v BlueCross, 1997, U.S., District M.D. Alabama*), has the authority to enforce regulations; can sue and be sued; and, is already a co-permittee as authorized by the Corps in 2000 and again when the permit was re-instated by the courts in 2008. This transfer meets the WMA requirements as originally intended.

The Cullman Morgan Water District (CMWD) was an "advisory committee" established to evaluate materials, alternative analysis, and other recommendations by the Corps. The CMWD then made a recommendation to support the Corps' determination that Duck River was the best alternative

to meet the community's water needs and recommended (in consultation with the city, county, and independent water systems) that the Utilities Board was the entity to finance the project and oversee the reservoir. After all, the Utilities Board has successfully managed a public water supply reservoir (Lake Catoma) and drainage basin for over 50 years, essentially performing the function of a WMA.

5. The Utilities Board has met every environmental, regulatory, and monitoring condition to date (and can continue to meet those conditions) in the permit. The Utility Board has proven its ability to meet that responsibility, in partnership with ADEM, the Soil and Water Conservation District, Office of Water Resources, and other Federal and State agencies. The Utilities Board will be the owner of the Duck River Reservoir and is using water sales revenue to repay the debt. Unusable water translates into zero water sales. No one has more incentive than the Utility Board to make sure the water quality meets and exceeds permit requirements.

6. Everything in the permit's language suggests that water quality is the reason the WMA is set as a permit condition. The water quality of Duck River (through our local water quality efforts) already exceeds the quality of the water from Lake Catoma. We have met the standard. The final guarantee for water quality is the Alabama Department of Environmental Management that oversees water quality statewide.

   Any further entity created or legislated still will have to adhere to ADEM and EPA mandates and will rely on their enforcement since a WMA cannot circumvent their authority.

It is our position that we proceed with construction under the permittee (Utility Board) as already granted since no further transfer is required.

Sincerely,

Roy W. Williams, Jr.
RWWjr/ps

- Demonstration projects for best management practice (BMP) implementation, including new techniques for litter management
- Public education activities with school groups and local farmers regarding water quality, nutrient management, and agricultural practices

Tim noted that over the past few years, significant progress has been made in assisting land owners and farmers in the watershed and that most are implementing the recommended BMPs on their properties. *(Note: Many of the photo slides in Tim's presentation were removed to reduce the file size. If you would like the full presentation, please contact Tim.)*

Water Quality Monitoring Results

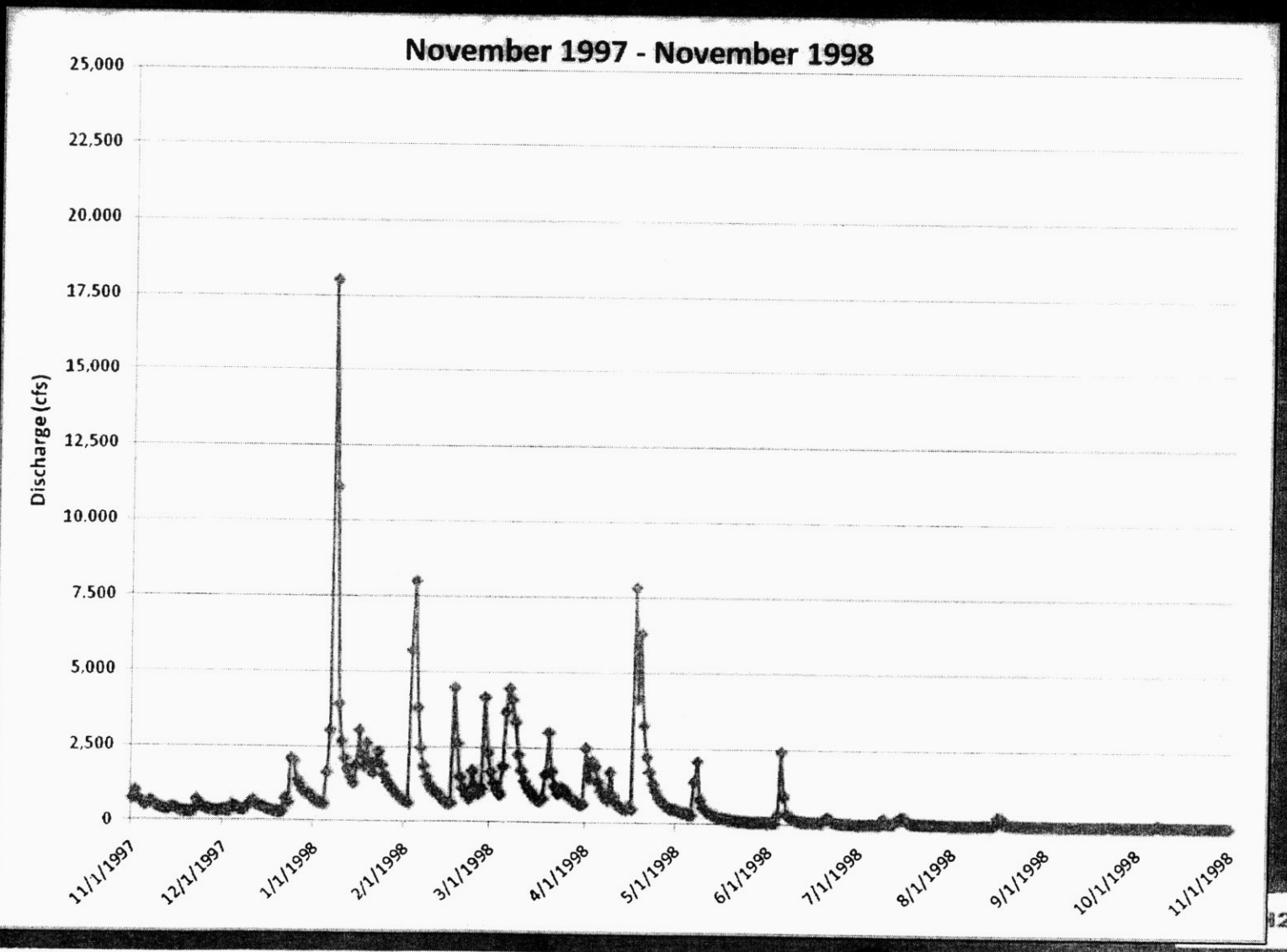
Doug Baughman summarized the results of the water quality monitoring and biological monitoring activities. The continuing water quality monitoring has been conducted over the last 2 years on a monthly basis when water was flowing at the sample stations. Monthly samples were collected at all 11 stations from February 2009 to June 2010 and at the 5 stations on the main stem of Duck River from December 2010 to present. Doug noted that water quality samples have been analyzed for a full suite of parameters, but the focus of today's presentation was on total phosphorus (TP) concentrations and loadings.

The original concern during the planning phase of this project was on the potential for eutrophication of the proposed Duck River reservoir due to excessive nutrients in the watershed runoff which was documented in the initial water quality sampling program that was completed in 1997-1998. A60-percent reduction in TP loading was recommended in previous water quality evaluations and set as a required goal in the CWA Section 404 permit. This goal was established to help maintain future water quality in the new drinking water supply.

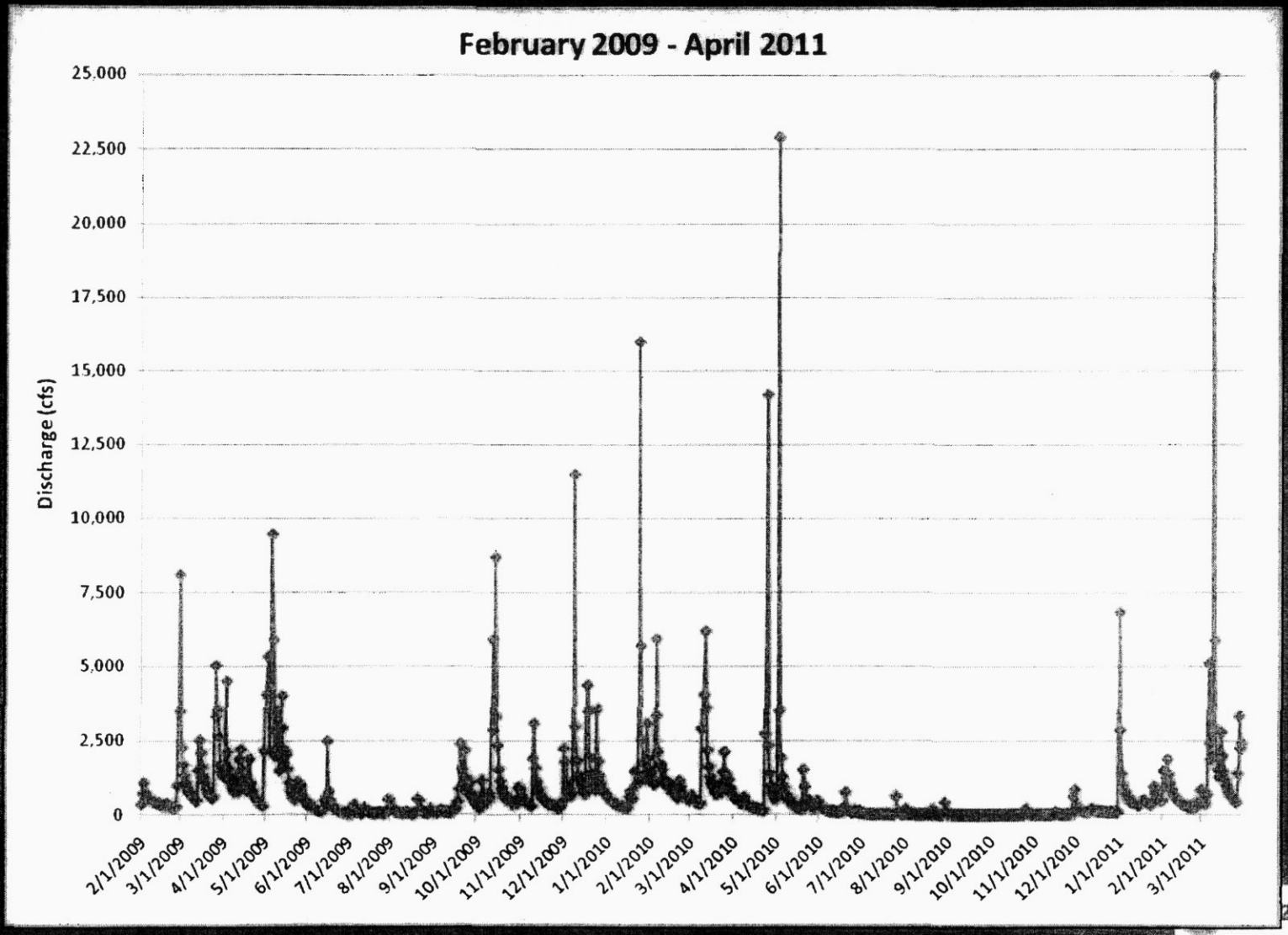
Doug noted that TP loadings are based on a combination of TP concentrations and the corresponding flow rates at the sample locations in the Duck River and its tributaries. A review and comparison of the flow rates when the original sampling was conducted (1997 and 1998) and the most recent period (2009 through 2011) was graphically presented to demonstrate that a range of high and low stream flow conditions have been captured. This range of flow conditions demonstrates that the reductions in TP loadings were not simply related to reduced rainfall, rather than TP concentration reductions due to the implementation of effective nonpoint source management practices.

Most of the measured TP concentrations at the 11 stations were below the Method Detection Limit (MDL) of 0.05 mg/L from April 2009 to November 2010. From December 2010 to the present when the MDL was changed to 0.02 mg/L, TP concentrations ranged from 0.02 mg/L to 0.04 mg/L. The average TP concentration reduction ranged from 36 percent to 98 percent. Doug noted that the station with the lowest TP concentration reduction (36 percent) was located in a subwatershed where the initial TP concentrations were lower than those measured in other subwatersheds. Based on the calculated TP loadings, the average annual percent reduction in TP loading from that calculated in 1997-1998 is 93 percent. The TP loading reduction goal is 60 percent.

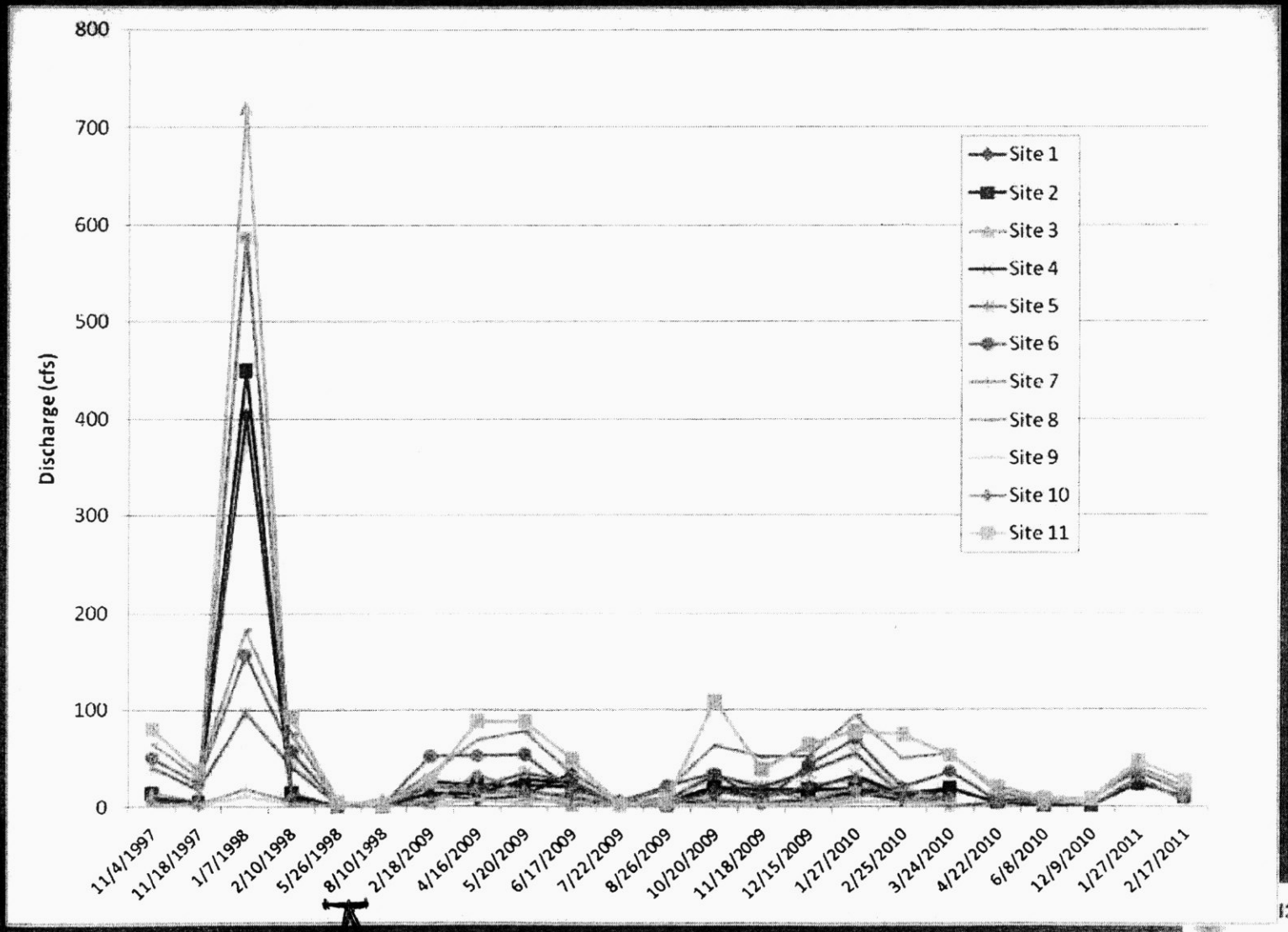
USGS 02450000 - Mulberry Fork, Garden City, Al.



USGS 02450000 - Mulberry Fork, Garden City, Al.

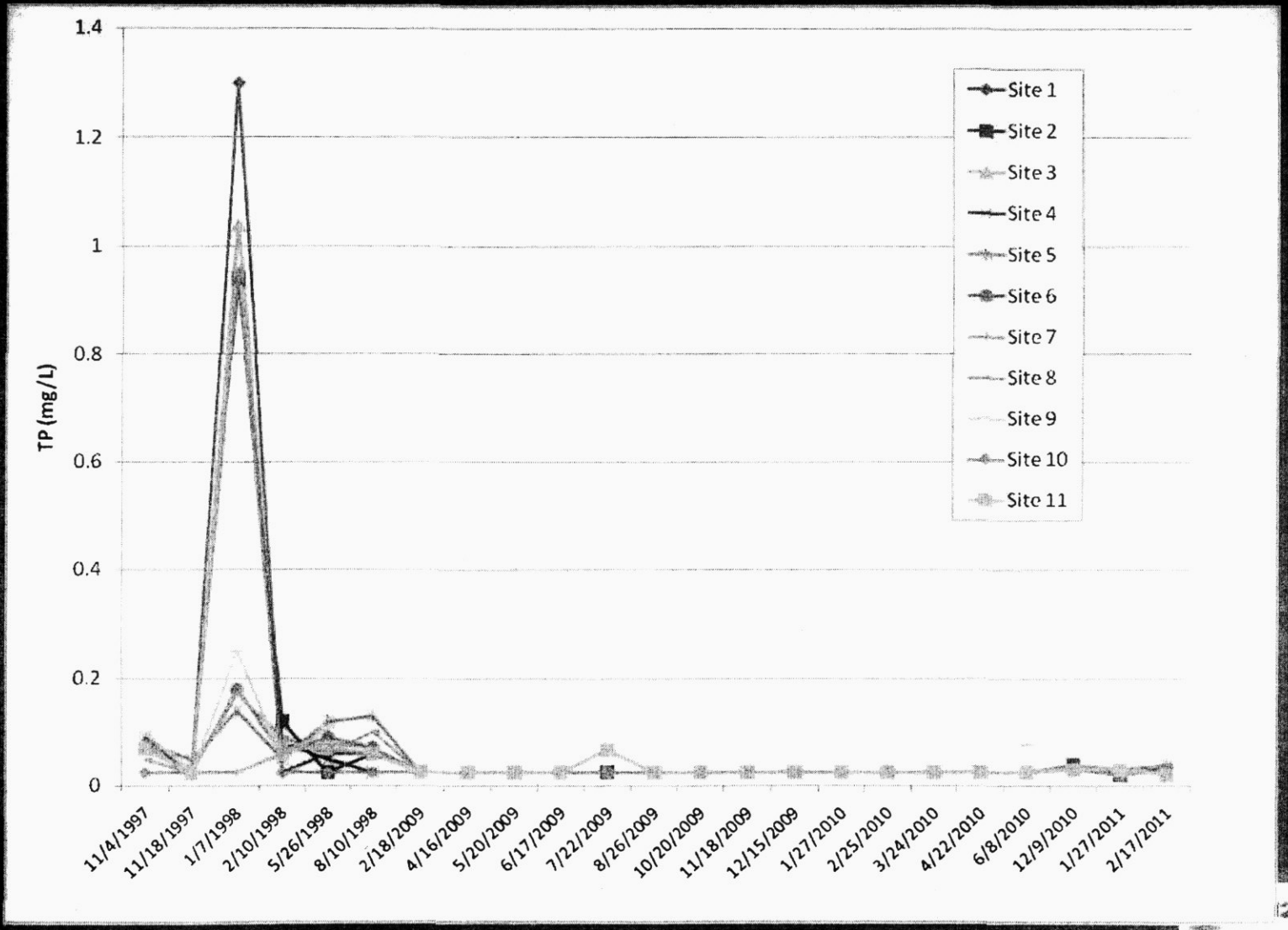


Long-term Discharge

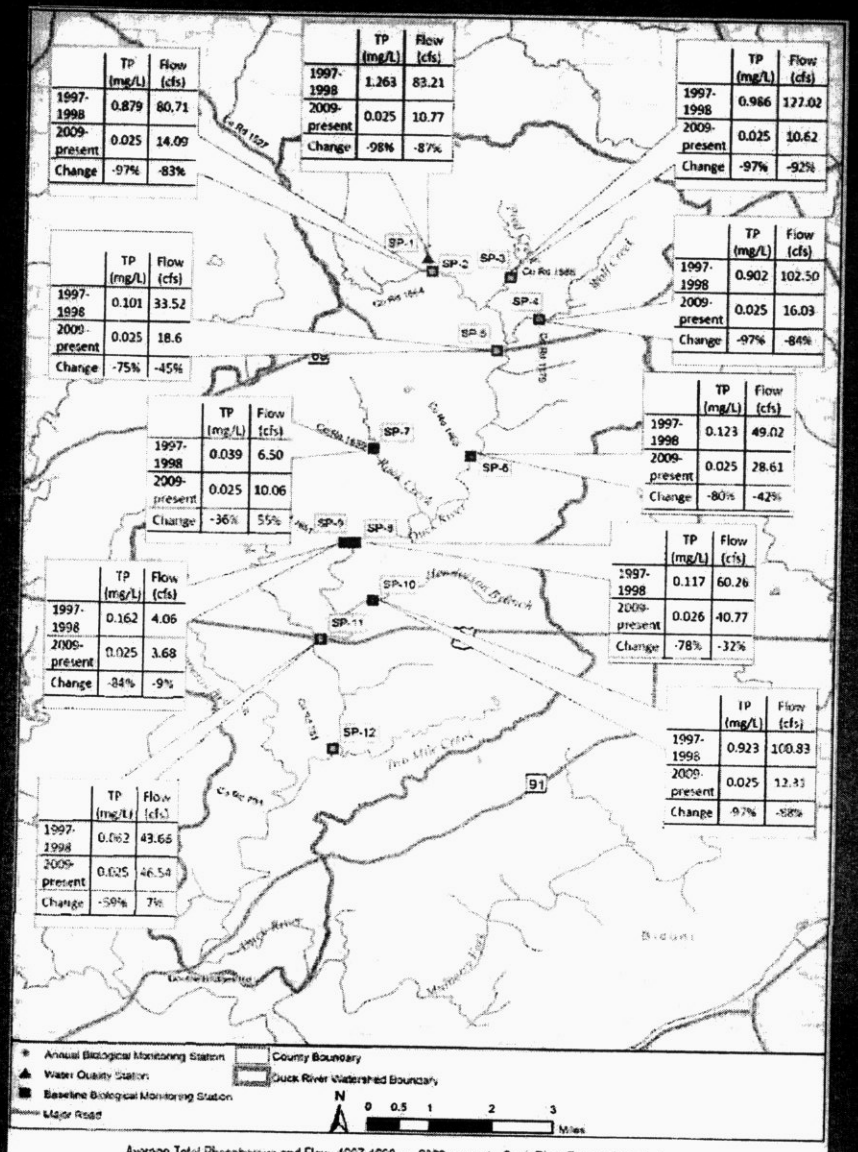


BIG gap, over 10 years.

Long-term Total Phosphorus



Change in Total Phosphorus



	TP (mg/L)	Flow (cfs)
1997-1998	0.879	80.71
2009-present	0.025	14.09
Change	-97%	-83%

	TP (mg/L)	Flow (cfs)
1997-1998	1.263	83.21
2009-present	0.025	10.77
Change	-98%	-87%

	TP (mg/L)	Flow (cfs)
1997-1998	0.986	127.02
2009-present	0.025	10.62
Change	-97%	-92%

	TP (mg/L)	Flow (cfs)
1997-1998	0.101	33.52
2009-present	0.025	18.6
Change	-75%	-45%

	TP (mg/L)	Flow (cfs)
1997-1998	0.902	102.50
2009-present	0.025	16.03
Change	-97%	-84%

	TP (mg/L)	Flow (cfs)
1997-1998	0.039	6.50
2009-present	0.025	10.06
Change	-36%	55%

	TP (mg/L)	Flow (cfs)
1997-1998	0.123	49.02
2009-present	0.025	28.61
Change	-80%	-42%

	TP (mg/L)	Flow (cfs)
1997-1998	0.162	4.06
2009-present	0.025	3.68
Change	-84%	-9%

	TP (mg/L)	Flow (cfs)
1997-1998	0.117	60.26
2009-present	0.026	40.77
Change	-78%	-32%

	TP (mg/L)	Flow (cfs)
1997-1998	0.923	100.83
2009-present	0.025	13.81
Change	-97%	-86%

	TP (mg/L)	Flow (cfs)
1997-1998	0.062	43.66
2009-present	0.025	46.54
Change	-59%	7%

Average Total Phosphorous and Flow, 1997-1998 vs. 2009-present - *Duck River Reservoir Project*

CH2MHILL

ONLY THE SECOND ANNUAL REPORT since WMP was developed in 1999 file #5"

Draft

Duck River Watershed Management Plan Annual Water Quality Report

August 2011

Prepared for

Cullman Utilities Board

Prepared by

CH2MHILL

(Figures A-5A). Site 6 consistently has higher conductivity levels than other sites; however, these levels are very low in comparison to historical conditions. Average conductivity measured in 1997 and 1998 ranged between 0.070 and 0.120 mS/cm for all sites except Site 8, which was historically low and has increased slightly over time (Figure A-5B).

3.2 Bacteriological Data

Fecal Coliform

The state of Alabama imposes criteria on *E. coli* for the F&W designation but does not have a standard for fecal coliform. The following observations were made from bacteriological data:

- Fecal coliform concentrations ranged from 0 to 560 colonies per 100 milliliters (col./100 mL) during the reporting period (Figure A-6B).
- During this reporting period, average fecal coliform concentrations were lowest at Sites 2 and 11 and highest at Sites 7 and 10 (Table 3-3).
- Concentrations of fecal coliform were lower in samples collected during the current reporting period than those collected during 2009, which ranged from 28 col./100 mL to 4,800 col./100 mL. The average concentration for all sites during 2009 was 505 col./100 mL; whereas, average concentration for all sites during 2010 and 2011 was 116 col./100 mL.
- The highest reported concentration of fecal coliform since February 2009 (4,800 col./100 mL) was reported during the June 2009 event at Site 4 (While no precipitation occurred on this day, a substantial amount of rain (approximately 3.8 inches) had occurred at a nearby rain gauge over a period of 6 days prior to the sampling visit. Elevated fecal coliform levels were reported at most sites on this sampling date.

TABLE 3-3
Average Fecal Coliform Concentrations (January 2010—February 2011)
Duck River Watershed Management Plan Annual Water Quality Report, August 2011

Station ID (number of samples)	Average Fecal Coliform (col./100 mL)
1 (n=3)	79
2 (n= 8)	66
3 (n= 4)	143
4 (n= 4)	109
5 (n= 8)	81
6 (n= 8)	119
7 (n= 4)	241
8 (n= 8)	139
9 (n= 4)	150
10 (n= 4)	173
11 (n= 8)	70

- Historical data from 1997 and 1998 indicate that fecal coliform concentrations in the Duck River watershed have increased substantially over time; however, data collected during 2010 and 2011 are similar to 1997 and 1998 data. The decrease in fecal coliform concentrations, suggest that BMPs put into place prior to 2010 have greatly reduced nonpoint source pollution to the streams when compared to 1999 sample results.

3.3 Water Chemistry

Tables 3-4A and 3-4B summarize the average water chemistry results, for each station, during the period January 2010 through February 2011. Observations for individual parameters are discussed below.

Nitrate

Due to the natural nitrogen cycle, nitrate (NO_3) and nitrite (NO_2) do not naturally accumulate excessively in the environment. However, human activities have increased environmental nitrate concentrations, with agriculture being the major source. This includes increased use of nitrogen-containing fertilizers as well as concentrated livestock and poultry farming.

As previously discussed, the Duck River watershed is located in Ecoregion XI, subecoregion 68 (EPA, 2000). Nitrate concentrations for this region typically range from 0.003 mg/L to 1.754 mg/L with a 25th percentile based on all season's data of 0.059 mg/L (Table 3-5). Nitrate maximum concentrations for all sites in the Duck River watershed are substantially higher than EPA nutrient criteria for the same region.

NO_3 concentrations for each sampling station in the Duck River watershed are shown in Figure A-7A and A-7B and indicate the following:

- Nitrate concentrations ranged from 1.1 mg/L to 7.24 mg/L during the reporting period with the highest concentrations recorded on the January 2011 event at Sites 2 and 5.
- During the current reporting period, NO_3 concentrations remain highest at Sites 2 and 7 with averages of 4.4 mg/L and 3.7 mg/L respectively. NO_3 levels appear seasonal in nature and concentrations are typically lower during the summer and elevated during winter months.
- Nitrate concentrations are consistent with 2009 data with regards to seasonal variability.
- Nitrate concentrations are typically higher at Sites 2 and 7 when compared with other sites during the reporting period.
- Compared to 1997 and 1998 historical data, average nitrate concentrations have increased substantially at Site 2 and Site 7, decreased at Sites 3, 5, and 6, and remained relatively stable at all other sites.

TABLE 3-5
Nitrate Levels in EPA Ecoregion XI (68) and the Duck River Watershed (2009-2011)
Duck River Watershed Management Plan Annual Water Quality Report, August 2011

Location	Nitrate (mg/L)		
	Minimum (2009-2011)	Maximum (2009-2011)	25th percentile (2009-2011)
EPA Ecoregion 68 [a]	0.003	1.754	0.059
Site 1	BRL	3.10	2.53
Site 2	BRL	7.22	2.94
Site 3	0.60	3.90	1.87
Site 4	BRL	2.56	1.28
Site 5	BRL	7.24	1.82
Site 6	BRL	5.69	1.97
Site 7	BRL	4.90	2.56
Site 8	0.69	5.41	1.95
Site 9	0.60	3.29	1.71
Site 10	BRL	2.64	1.45
Site 11	0.50	5.34	1.93

[a] Source: EPA, 2000

4.0 Summary and Recommendations

A summary of water quality observations during the reporting period is provided in Table 4-1. Between 1998 and 2009, there was an increase in fecal coliform and turbidity levels throughout the watershed. However, these levels have shown a decreasing trend since 2009, which suggests that BMPs being put in place by the farmers in the project watershed have had a positive effect on water quality. Additionally, TP concentrations are mostly at or below the reporting limit, indicating a significant reduction in TP since implementation of the WMP. Recommendations to the Board include continuing encouraging land owners to apply best management practices throughout the watershed which will help ensure water quality conditions continue to meet standards in the future. Monthly sampling will be ongoing at the 5 remaining site locations throughout the remainder of the project.

Nitrates make up the largest proportion of nitrogen in the watershed and concentrations appear elevated throughout the watershed. Flow-weighted concentrations show that a decrease in discharge throughout the watershed is likely the main reason TP levels have decreased. TN levels have increased at many sites. Site 2 shows a large increase in TN compared with historical levels, despite a substantial decrease in discharge. Some sites show occasional elevated concentrations of iron, manganese and magnesium. Other water quality results indicate adequate conditions throughout the entire watershed.

Recommendations for updates to the WMP include:

- Update goals and objectives based on successes and deficiencies in the watershed since 1999 (including those identified in Table 4-1),
- Provide consistency with current regulatory requirements (e.g., ADEM General National Pollutant Discharge Elimination System Permit for Construction Stormwater program [effective as of April 1, 2011]),
- Provide consistency with current nonpoint source programs (source reduction and education), and
- Incorporate current water quality monitoring and biological monitoring plans.

TABLE 4-1
Water Quality Observations from Historical and Current Data and Recommended Management Approaches
Duck River Watershed Management Plan Annual Water Quality Report, August 2011

Sampling Station	Water Quality Observations	Notes/Recommendations
All Sites	Since 1997-1998: decrease in conductivity and turbidity; increase in fecal coliform; increase in DO upstream of Site 6 (Co. Road 1669); decrease in DO downstream of Site 6; decreased BOD High nitrate and sulfate concentrations. Low TP concentrations. Decreasing trend in fecal coliform and turbidity since February 2009. Range of sulfate concentrations increased since February 2009.	BMPs implemented as part of the WMP have significantly reduced TP concentrations in the watershed. Continue to implement watershed management activities that have improved water quality since 2009.
Site 1	Elevated ammonia concentration during one event (2/25/2010). Higher average fecal coliform levels relative to other Duck River stations. Levels not of concern, however.	No immediate concern. Continue to implement BMPs.
Site 2	Relatively high nitrates, hardness, and metals including iron, manganese, calcium, and magnesium compared with other sites. Relatively high increase in nitrate over time. Elevated calcium during 4/16/2009 event. Elevated levels of ammonia on three occasions (4/16/2009, 6/17/2009, and 11/18/2009). Elevated levels of magnesium and hardness on 2 occasions (4/16/2009 and 12/9/2010). TN levels have increased sharply at this site compared with 1997-1998 data despite a decrease in overall discharge. Relatively low fecal coliform concentrations. Elevated magnesium concentrations on 4/16/2009 (11.9 mg/L) and 12/9/2010 (11.1 mg/L).	Drainage area includes onsite wastewater treatment at Fairview High School (Minor National Pollutant Discharge Elimination System Permit AL-0051098). Consider coordinating with the high school to identify potential pollutants and, if necessary, identify resources (such as NRCS) for additional treatment options (e.g., constructed wetlands).
Site 3	Increase in pH since 1997-1998.	Drainage area includes forestry/timber harvesting. Coordinate with planning assistance organizations to identify resources for forestry and agriculture BMPs.
Site 4	Relatively low nitrate. Higher average fecal coliform levels relative to other Duck River stations. Levels not of concern, however.	No immediate concern. Continue to implement BMPs.
Site 5	Elevated concentrations of total iron (0.81 mg/L) and manganese (0.30) mg/L on 3/24/2010.	No immediate concern. Continue to implement BMPs.
Site 6	Increase in temperature since 1997-1998. Increase in pH since 1997-1998. Relatively high sulfate. Elevated conductivity during one event (3/24/2010).	No immediate concern. Continue to implement BMPs.

TABLE 4-1
Water Quality Observations from Historical and Current Data and Recommended Management Approaches
Duck River Watershed Management Plan Annual Water Quality Report, August 2011

Sampling Station	Water Quality Observations	Notes/Recommendations
Site 7	Relatively high temperature, sulfate, nitrates, alkalinity, hardness, and metals including manganese, calcium, and magnesium compared to other sites. Relatively low conductivity. Relatively high increase in nitrate at Sites 2 and 7 since 1997-1998. Only site with increase in turbidity since 1997-1998.	Drainage area has had heavy cattle operation over the last 5 years. Drainage area includes forestry/timber harvesting. Coordinate with planning assistance organizations to identify resources for forestry and agriculture BMPs.
Site 8	Increase in temperature since 1997-1998.	No immediate concern. Continue to implement BMPs.
Site 9	Relatively high average fecal coliform	No immediate concern. Continue to implement BMPs. Consider evaluating potential septic tank failures contributing to relatively high fecal coliform levels.
Site 10	Relatively low nitrates, calcium, and magnesium concentrations. Relatively high conductivity.	Continue to implement BMPs that have improved water quality at this location.
Site 11	Elevated level of manganese (2.2 mg/L) during November 2009 event	Single-event elevation does not indicate an immediate concern. Continue to implement BMPs.

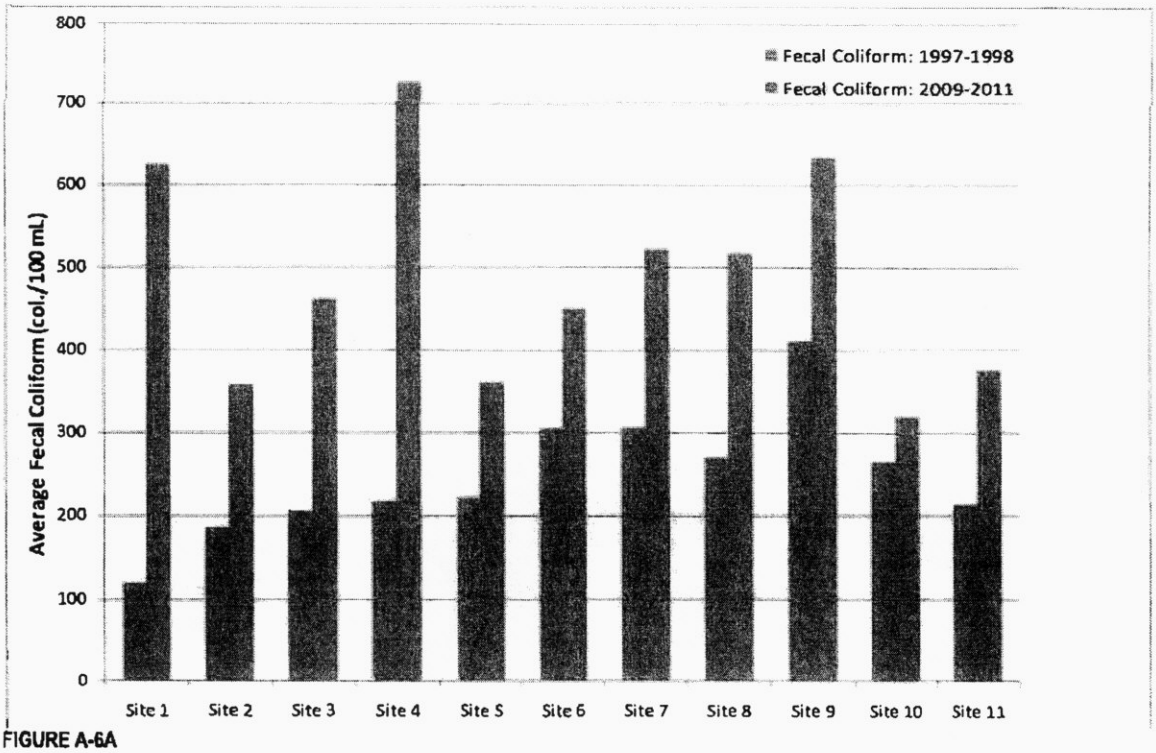


FIGURE A-6A
Average Fecal Coliform Concentrations, 1997-1998 vs. 2009-2011

Reporting Limit = 20 (2009-2011)

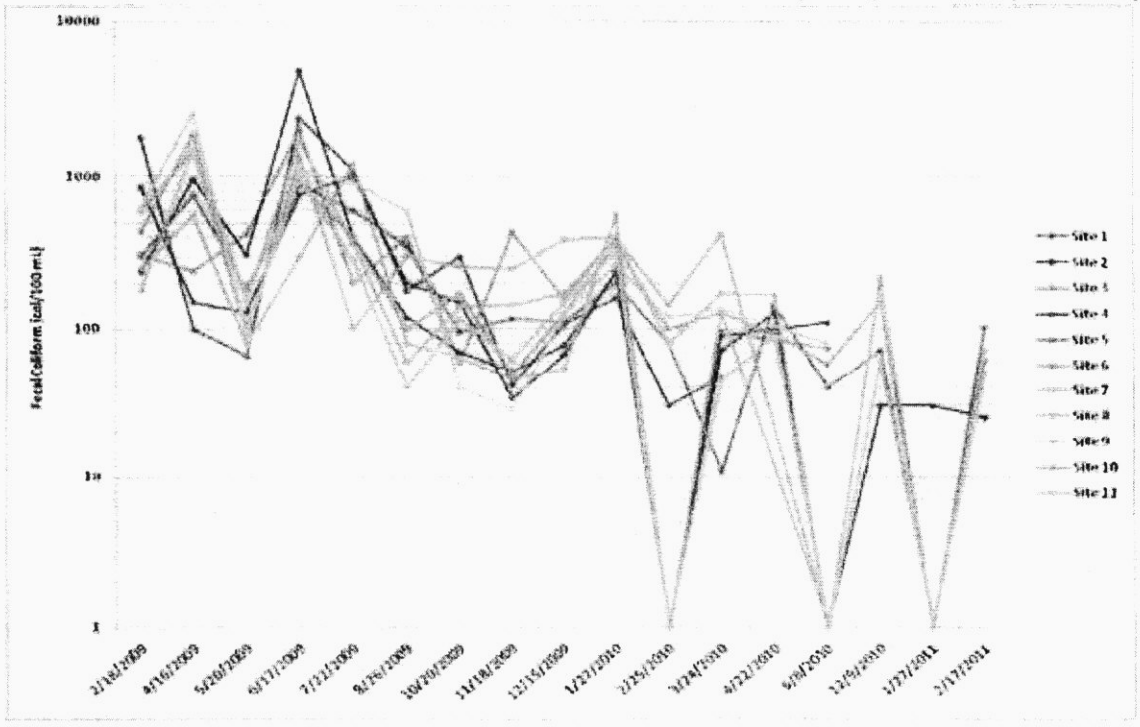


FIGURE A-6B
Fecal Coliform Concentrations, 2009-2011

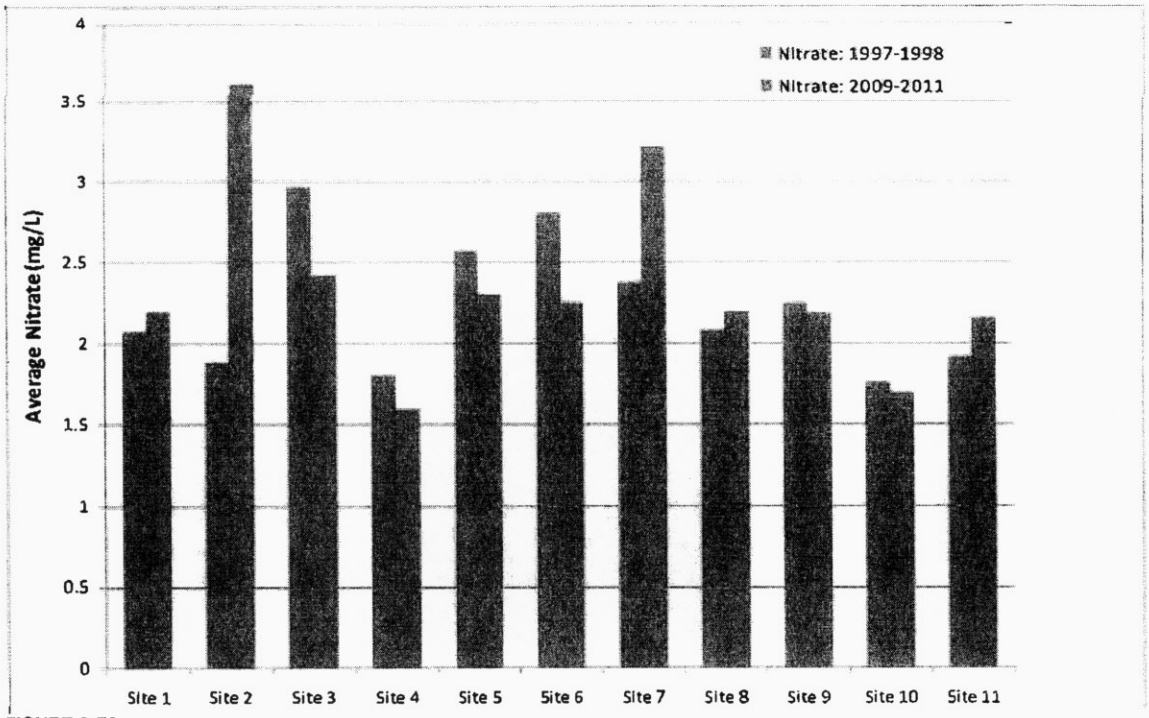


FIGURE A-7A
Average Nitrate Concentrations, 1997-1998 vs. 2009-2011

Reporting Limit = 0.5 (Feb. 2009 – Dec. 2010)
Reporting Limit = 0.05 (Jan. 2010 – Feb. 2011)

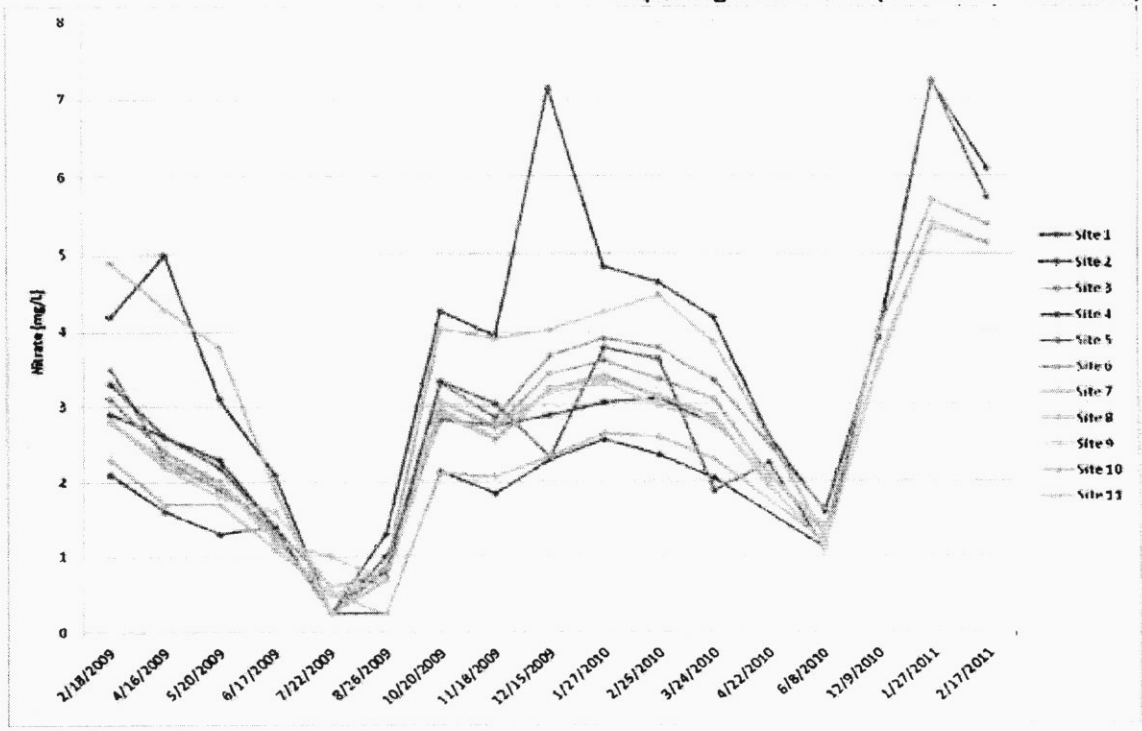


FIGURE A-7B
Nitrate Concentrations, 2009-2011

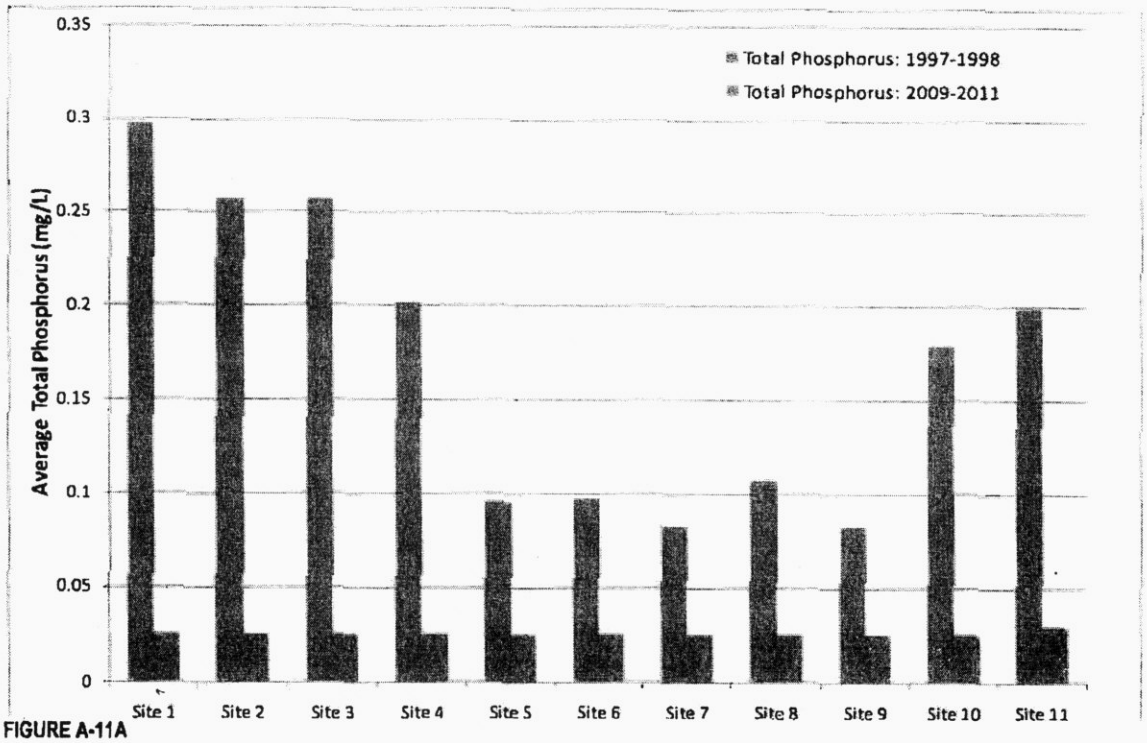


FIGURE A-11A
Average Total Phosphorus Concentrations, 1997-1998 vs. 2009-2011

Reporting Limit = 0.05 (Feb. 2009 – Dec. 2010)
Reporting Limit = 0.02 (Jan. 2010 – Feb. 2011)

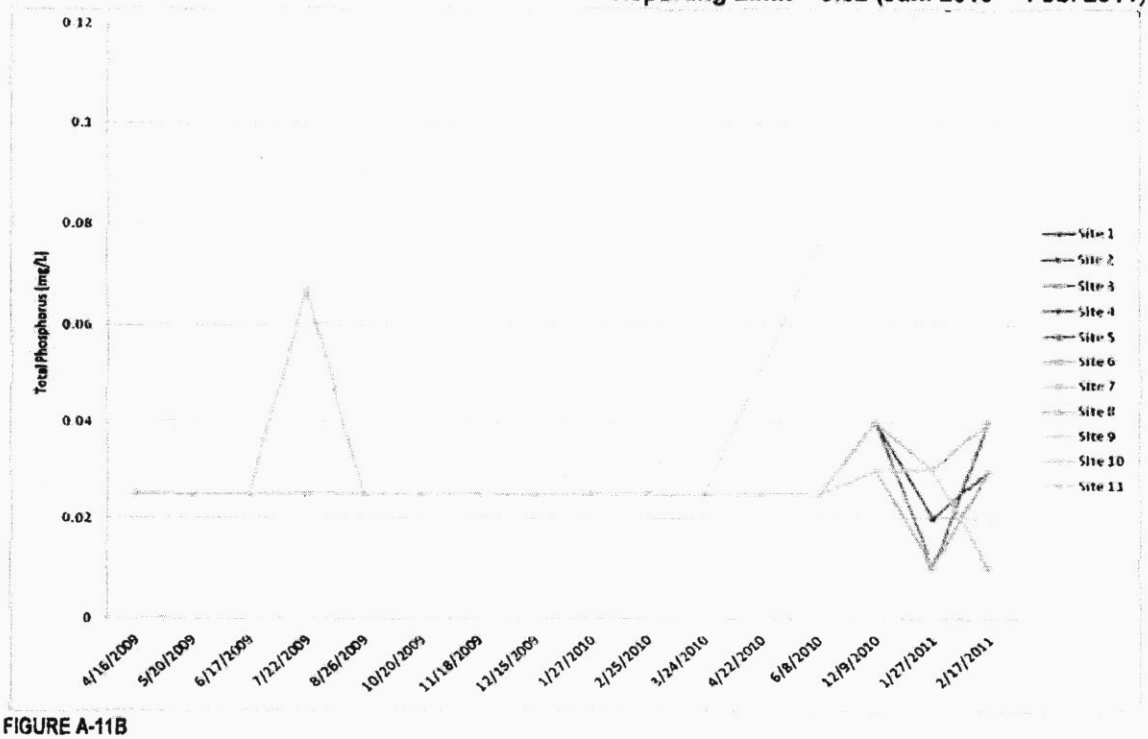


FIGURE A-11B
Total Phosphorus Concentrations, 2009-2011

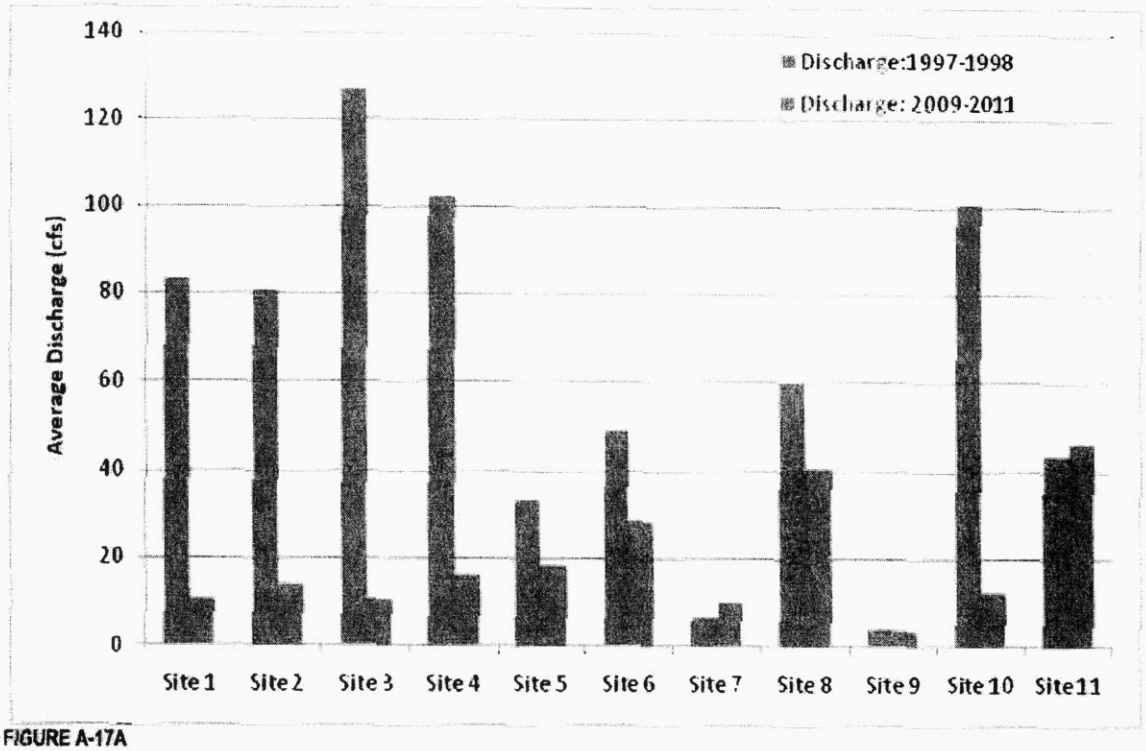


FIGURE A-17A

Average Stream Discharge, 1997-1998 vs. 2009-2011

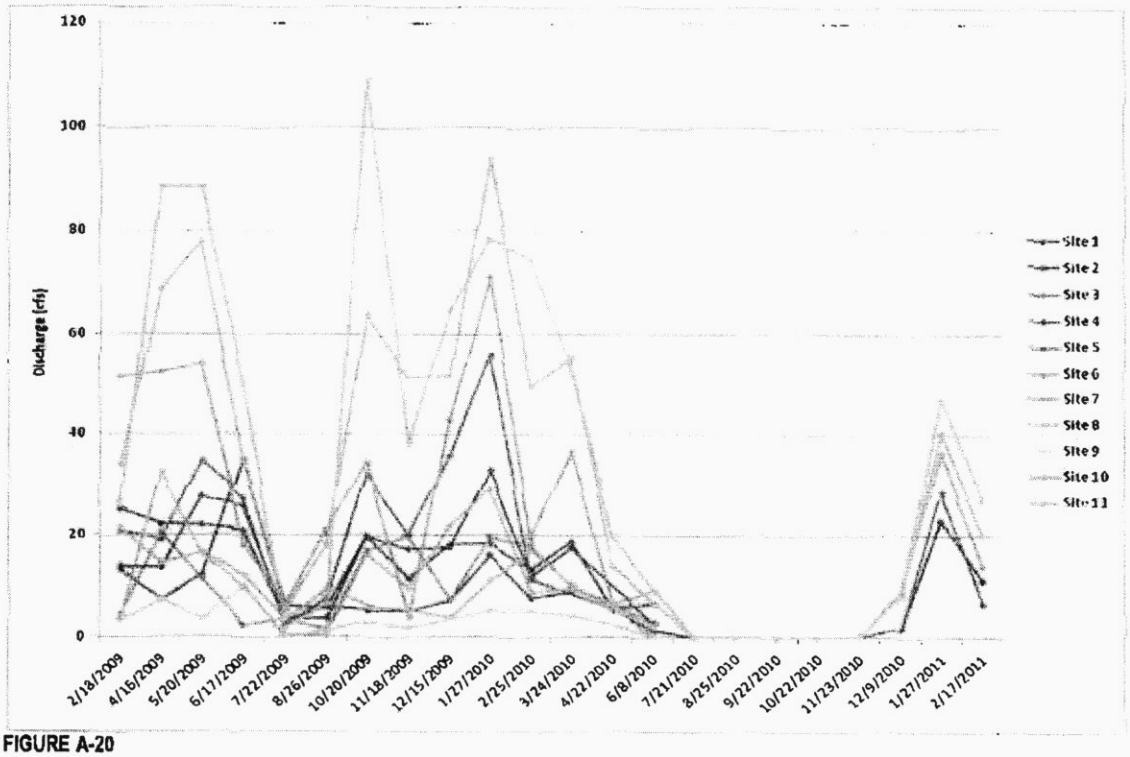


FIGURE A-20

Stream Discharge, 2009-2011

How can phosphorus go down so much with nitrogen going up??

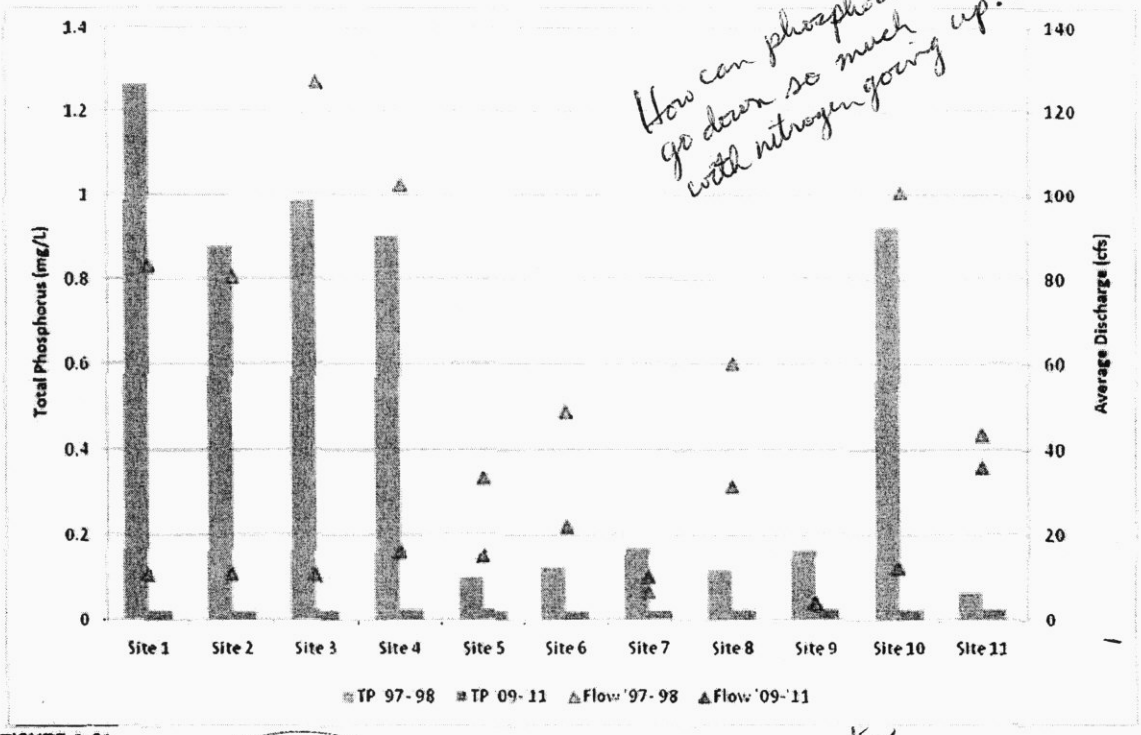


FIGURE A-21
Flow-Weighted Average Total Phosphorus, 1997-1998 vs.2009-2011

The only parameter recalculated as flow-weighted

(E)

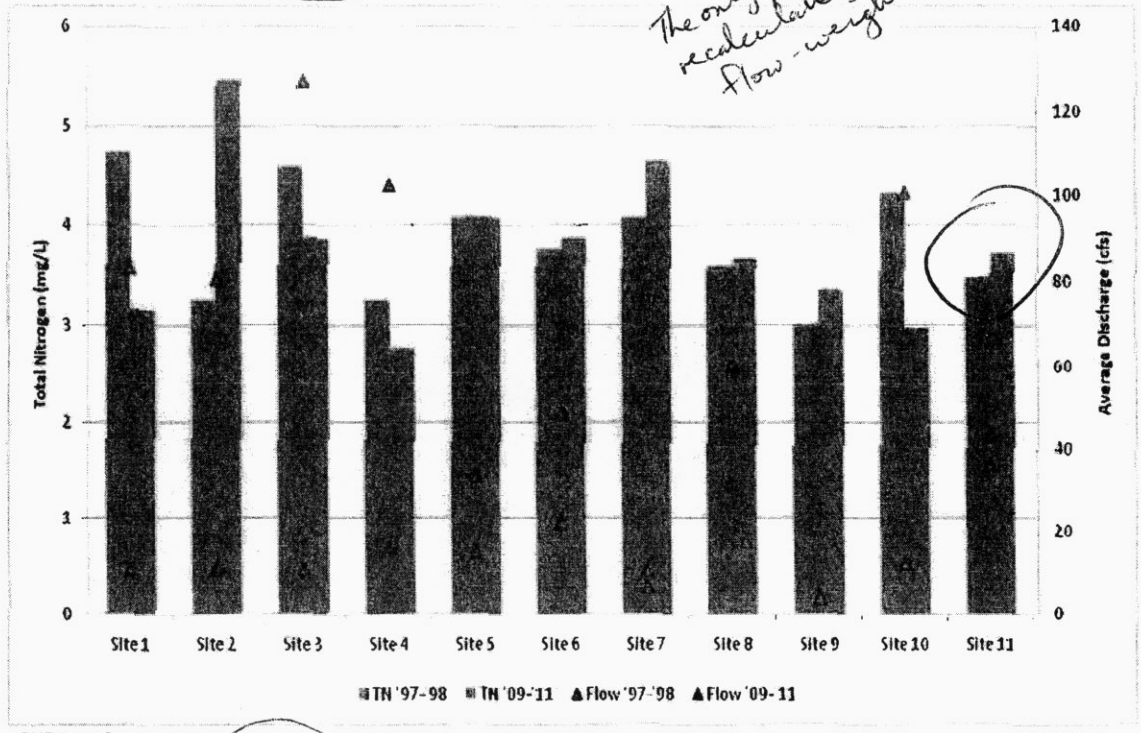


FIGURE A-22
Flow-Weighted Average Total Nitrogen, 1997-1998 vs.2009-2011

COST TO FARMING

October 27, 2011

Haynes Farms, LLC
355 County Road 1662
Cullman, Alabama 35058

To whom it may concern:

Haynes Farms LLC is a fifth generation family cattle and grain farm located in the Fairview community of eastern Cullman County. The farm is comprised of approximately 2500 acres of owned and rented land, of which roughly 80% lies within the Duck River watershed.

We pride ourselves in being good stewards of the land and resources that God and our landlords entrust us with, and best management practices are used daily to ensure that those resources are preserved for future generations. Practices such as the application of animal waste and commercial fertilizers based on soil tests, contour farming, no-till planting, cross fencing and rotational grazing have been used for decades in order to best utilize and preserve those resources.

In an effort to improve water quality in the Duck Creek watershed, which consists of many cattle and poultry farms, the Natural Resource Conservation Service (NRCS) utilized a government grant to subsidize the cost of transportation of poultry litter leaving Cullman County bound for parts of the state where the poultry industry doesn't exist. According to Murray Griffin with the NRCS, this grant/subsidy lasted for three years (2007-2009) and had numerous detrimental consequences: First, it created an entire sub-industry of commercial poultry litter haulers, removing litter from the watershed while taking advantage of this government subsidy to offset their transportation costs. This in turn drastically reduced the supply of litter (and increase the cost) for local farmers like us who rely on poultry litter as a fertilizer source. Therefore, we were forced to turn to other sources of fertilizer-namely ammonium nitrate-to fertilize our pastures and crops at a much greater cost. We typically use 100-150 tons of ammonium nitrate annually in order to offset this loss of poultry litter. This year (2011) the cost of ammonium nitrate exceeded $500 per ton. Another result is that we have resorted in hauling litter from other out-of-county sources, again at a much higher cost than we would normally incur, as the average cost of diesel fuel over the 2011 growing season was $4.00 per gallon.

How much commercial phosphate and potash in fields of chicken litter?

Therefore the cost is in excess of $50,000 just for nitrogen in ammonium nitrate.

(F)

Any agricultural enterprise operates on an extremely thin margin between profit and loss. As you can see, this government subsidy program, begun for the purpose of "cleaning-up" the Duck River watershed has already had an extremely detrimental financial impact on our farm and countless others like it. While this has occurred during the planning stages of the Duck River Project, we can only assume that once the project begins in earnest, the regulatory burden on farmers within the watershed will only increase as will

the financial burden. Our fear is that this increased financial hardship will result in all production agriculture in the Duck Creek watershed, including Haynes Farms, being forced out of business.

Sincerely,

Darrel E Haynes
256-385-1819

Ben R Haynes
256-709-4007

Bart R Haynes
256-385-5918

(F)

2011 WQ Spreadsheet

#7 on CD2

TP

6/27/12

Promises 2012 WQ spreadsheet

From: Steve.Newton@CH2M.com
To: Shea, Courtney M. SAM
Subject: Additional Information
Date: Wednesday, June 27, 2012 9:10:58 AM
Attachments: Duck River TP Load Calc.xlsx

Morning Courtney – Hope you are well.

The total phosphorus reduction of 60% in the Duck River watershed is based on concentration and loadings. As part of our WQ and biological data review during our June 2011 watershed meeting, we prepared a spreadsheet to see where we are. I have attached that spreadsheet for your review and files. Our calculations at that time showed a 93% reduction and we are now updating this for the data collected to date. I will send the updated spreadsheet to you when completed. The presentation provided to the group last week (which I will send the meeting minutes and supporting documents by one day next week) focused on TP concentration.

Also, we have been coordinating with the Alabama Office of Water Resources throughout this project. Under their current regulations, the OWR cannot accept the application for a Certificate of Use until our project is within 90 days of actually using the water (in the 2015 – 2016 range). So, nothing is needed at the current time with the OWR.

Thanks.

Steve

J. Steve Newton, P.E.

CH2M HILL

2112 Eleventh Avenue South

Suite 320

Birmingham, Alabama 35205

Telephone: 205-326-8912 ext. 59388

Fax: 205-326-8878

G

? Current What?

Date	Q (cfs)	Q (mgd)	Load TTL Data	Load Current Data (kg/day)
Nov-97	33.11	21.36	59.12	3.99
Dec-97	59.44	38.35	106.15	7.17
Jan-98	181.80	117.29	324.66	21.93
Feb-98	137.72	88.85	245.95	16.61
Mar-98	107.35	69.26	191.70	12.95
Apr-98	110.16	71.07	196.72	13.29
May-98	31.68	20.44	56.57	3.82
Jun-98	11.29	7.28	20.16	1.36
Jul-98	4.27	2.76	7.63	0.52
Aug-98	1.93	1.25	3.45	0.23
Sep-98	0.01	0.00	0.01	0.00
Oct-98	0.01	0.00	0.01	0.00
Nov-98	0.01	0.00	0.01	0.00
Dec-98	30.13	19.44	53.81	3.63
Jan-99	86.38	55.73	154.26	10.42
Feb-99	101.45	65.45	181.17	12.24
Mar-99	92.35	59.58	164.91	11.14
Apr-99	66.90	43.16	119.47	8.07
May-99	32.09	20.70	57.31	3.87
Jun-99	55.29	35.67	98.73	6.67
Jul-99	24.12	15.56	43.08	2.91
Aug-99	0.01	0.00	0.01	0.00
Sep-99	0.01	0.00	0.01	0.00
Oct-99	0.01	0.00	0.01	0.00
Nov-99	0.01	0.00	0.01	0.00
Dec-99	0.01	0.00	0.01	0.00
Jan-00	56.14	36.22	100.26	6.77
Feb-00	31.86	20.55	56.89	3.84
Mar-00	107.20	69.16	191.44	12.93
Apr-00	159.89	103.16	285.54	19.29
May-00	6.64	4.28	11.86	0.80
Jun-00	1.92	1.24	3.43	0.23
Jul-00	0.44	0.28	0.79	0.05
Aug-00	0.01	0.00	0.01	0.00
Sep-00	0.01	0.00	0.01	0.00
Oct-00	0.01	0.00	0.01	0.00
Nov-00	75.34	48.60	134.54	9.09
Dec-00	60.81	39.23	108.59	7.33
Jan-01	88.33	56.99	157.75	10.66
Feb-01	110.57	71.33	197.46	13.34
Mar-01	180.28	116.31	321.94	21.75
Apr-01	49.39	31.86	88.20	5.96
May-01	16.69	10.77	29.81	2.01
Jun-01	18.50	11.94	33.04	2.23
Jul-01	24.56	15.85	43.86	2.96
Aug-01	40.81	26.33	72.88	4.92
Sep-01	54.94	35.45	98.12	6.63
Oct-01	19.81	12.78	35.37	2.39
Nov-01	15.19	9.80	27.13	1.83
Dec-01	119.14	76.86	212.76	14.37
Jan-02	100.80	65.03	180.01	12.16
Feb-02	41.42	26.73	73.98	5.00
Mar-02	74.37	47.98	132.82	8.97

G

Apr-02	27.81	17.94	49.67	3.36	
May-02	48.05	31.00	85.81	5.80	
Jun-02	7.35	4.74	13.12	0.89	
Jul-02	5.29	3.41	9.45	0.64	
Aug-02	0.16	0.10	0.28	0.02	
Sep-02	12.66	8.17	22.61	1.53	
Oct-02	43.46	28.04	77.60	5.24	
Nov-02	87.52	56.47	156.30	10.56	
Dec-02	97.42	62.85	173.97	11.75	
Jan-03	46.57	30.04	83.16	5.62	
Feb-03	204.61	132.00	365.39	24.68	
Mar-03	74.47	48.05	132.99	8.98	
Apr-03	46.84	30.22	83.64	5.65	
May-03	152.08	98.12	271.59	18.35	
Jun-03	29.15	18.81	52.05	3.52	
Jul-03	12.35	7.97	22.05	1.49	
Aug-03	4.40	2.84	7.86	0.53	
Sep-03	8.07	5.21	14.42	0.97	
		Average Daily Load (kg/	88.81	6.00	
		Annual Load	32,415		2,190
			12,966		

G

Average Concentration

TTL Data	0.73	mg/L
Current Data	0.05	mg/L

1 gal	3.785	L

	TTL	Current Data	% Removal
Average Daily Load (kg/day)	88.81	6.00	7%
Annual Load (kg/year)	32415.17	2189.52	7%

#1, CUC ... 2012 Mtg

Duck River Reservoir Project, 2nd Annual Watershed Management Plan Review Meeting

ATTENDEES: See Attached Attendance List

FROM: CH2M HILL

MEETING DATE: June 19, 2012

SUMMARY DATE: July 9, 2012

Purpose and Introductions

The purpose of this meeting was to continue the review the status of the ongoing watershed management and monitoring activities in the Duck River Reservoir watershed. The initial annual meeting was held on June 21, 2011. These annual meetings are listed among the objectives in the original 1999 Watershed Management Plan (WMP) and referenced as a requirement in the Clean Water Act (CWA) Section 404 Permit Number AL96-00912-U for construction of the Duck River dam. Representatives of the U.S. Army Corps of Engineers (USACE), Alabama Department of Environmental Management (ADEM), Alabama Department of Conservation and Natural Resources (ADCNR), Alabama Office of Water Resources (OWR), Cullman Soil & Water Conservation District, and the Natural Resources Conservation Service (NRCS) were invited to attend. Copies of the meeting agenda, attendance list and presentations are attached to this meeting summary.

Dale Greer, Duck River Reservoir Project Manager, gave an introduction and welcomed to the meeting participants. He emphasized the importance of this project to the future and sustainable growth of the Cullman regional area.

Project History and Implementation Status

Steve Newton provided a general overview of the project history and current implementation status. The purpose of the project is to provide a sustainable water supply for the Cullman Regional Area. He also noted that the project is on schedule and the dam design has modified since our last meeting. Instead of using the original earth core rock fill (ECRF) dam approach, the Duck River Dam will be a roller-compacted concrete (RCC) gravity dam. Compared with the original ECRF approach, the RCC dam will help control environmental and cost risks in the following ways:

- Eliminate the need for the large, east abutment spillway – the spillways will be built integrally with the dam
- Large soil borrow pit operations and stockpiling will not be required
- Significantly smaller dam footprint
- Can be built faster than an ECRF dam.

Steve discussed the need and rationale for moving sampling station SP-11 to a location further downstream since SP-11 was located within the dam footprint. This sampling station is redesignated SP-11a.

Steve noted again that the focus of this meeting is:

- Review of Source Control and Educational Programs related to the WMP
- Discussions related to the results and trends of the annual water quality and biological monitoring data
- Identification of watershed issues that need to be addressed to improve water quality
- Status of achieving the nutrient removal goal of 60 percent before beginning reservoir filling operations (Summer 2015) as required by the CWA Section 404 permit

Source Control and Educational Programs

Tim Scott, with the Cullman County Soil and Water Conservation District, summarized the ongoing source control and public education programs that he has been involved with. Key accomplishments and observations included the following:

- Continues to help coordinate and participate in public education activities with school groups and local farmers regarding water quality, nutrient management, and agricultural practices
- During each monthly sampling event, makes observations related to land activities that could affect water quality
- On a regular basis, Tim completes a reconnaissance of the watershed to observe non-point source (NPS) management practices, construction activities, maintenance activities and other landuser actions that may affect water quality

Based on his experience, Tim continues to observe that landusers in the watershed are generally using appropriate best management practices (BMPs) on their properties to protect water quality.

Water Quality Monitoring Results

Doug Baughman summarized the results of the water quality monitoring and biological monitoring activities. The continuing water quality monitoring has been conducted over the last 3 years on a monthly basis when water was flowing at the sample stations. Monthly samples were collected at all 11 stations from February 2009 to June 2010 and at the 5 stations on the main stem of Duck River from December 2010 to present. Doug noted that water quality samples have been analyzed for a full suite of parameters, but the focus of today's presentation was on total phosphorus (TP) concentrations.

The original concern during the planning phase of this project was on the potential for eutrophication of the proposed Duck River reservoir due to excessive nutrients in the watershed runoff which was documented in the initial water quality sampling program that

was completed in 1997-1998. A 60-percent reduction in TP loading was recommended in previous water quality evaluations and set as a required goal in the CWA Section 404 permit. This goal was established to help maintain future water quality in Cullman's new drinking water supply.

As noted on the attached PowerPoint presentation, Doug summarized the water quality data collected over from 2009 to the present (May 2012). The TP concentrations ranged from less than 0.02 mg/L to 0.75 mg/L at all stations except for the sample collected at station SP-11 (the most downstream sample location) on February 22, 2012. That sample had a TP concentration of 2.5 mg/L. Based on its review, the team has concluded that this elevated TP sample appears to be an outlier or anomaly but the cause(s) of this could not be explained. As shown in the table below, the other key water quality parameters from the same sample were not elevated further suggesting that this TP concentration is likely an outlier.

SP-11 Sample Results for February 22, 2012

Nitrogen, Nitrate	2.67 mg/L
Nitrogen, Nitrite	<0.1 mg/L
Nitrogen, Ammonia	<0.1 mg/L
Nitrogen, Kjeldahl	<0.5 mg/L
Nitrogen, Total Organic	<0.5 mg/L
Phosphorus, Ortho Phosphate	<0.02 mg/L
Phosphorus, Total Reactive	<0.02 mg/L
Alkalinity, Total	15 mg/L

The observed TP concentration at SP-11 dropped to 0.70 mg/L in March 2012 and to 0.07 mg/L and 0.04 mg/L in April and May 2012, respectively.

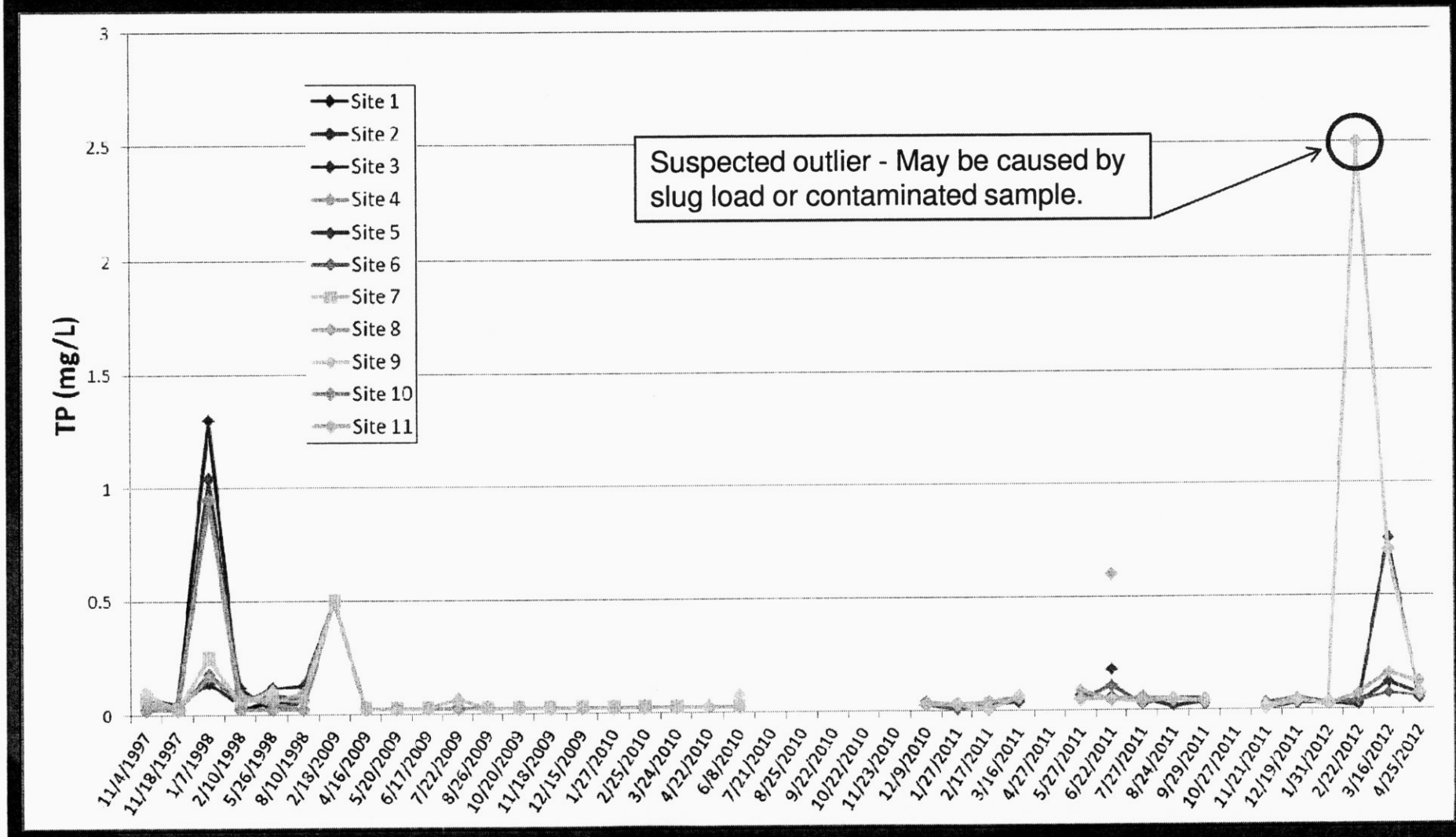
Except for the SP-11 which includes the suspected outlier, average TP concentration reduction from the average TP concentrations collected in 1997-1998 ranged from 41 percent to 91 percent.

Doug discussed the importance of TP loadings (combination of TP concentrations and flow at the corresponding sample locations) as related to the compliance with the 60-percent reduction. During our meeting on June 21, 2011, Doug discussed that the calculated TP loadings based on current water quality data and corresponding flows shows that the average percent reduction in TP loading from that calculated with 1997-1998 water quality data is 93 percent. Using all the water quality data and corresponding flow information collected to-date, CH2M HILL is in the process of updating the TP loading comparison and will provide that information to the group as soon as it has been completed.

Biological Monitoring Results

Doug further provided a summary of the 2011 biological monitoring results that were submitted to the agencies in September 2011 in the annual report. The habitat ranked "Optimal" at 4 of the 6 sites. The 2 stations rated as "Suboptimal" habitat are located at the upper reaches of the watershed (SP-2 and SP-3). The fish ranked "Poor" at all sample locations except SP-12 which ranked "Fair". The benthic invertebrates ranked "Poor" at all stations except SP-3 and SP-5 where they were ranked "Fair". The weather conditions prior

Long-term Total Phosphorus



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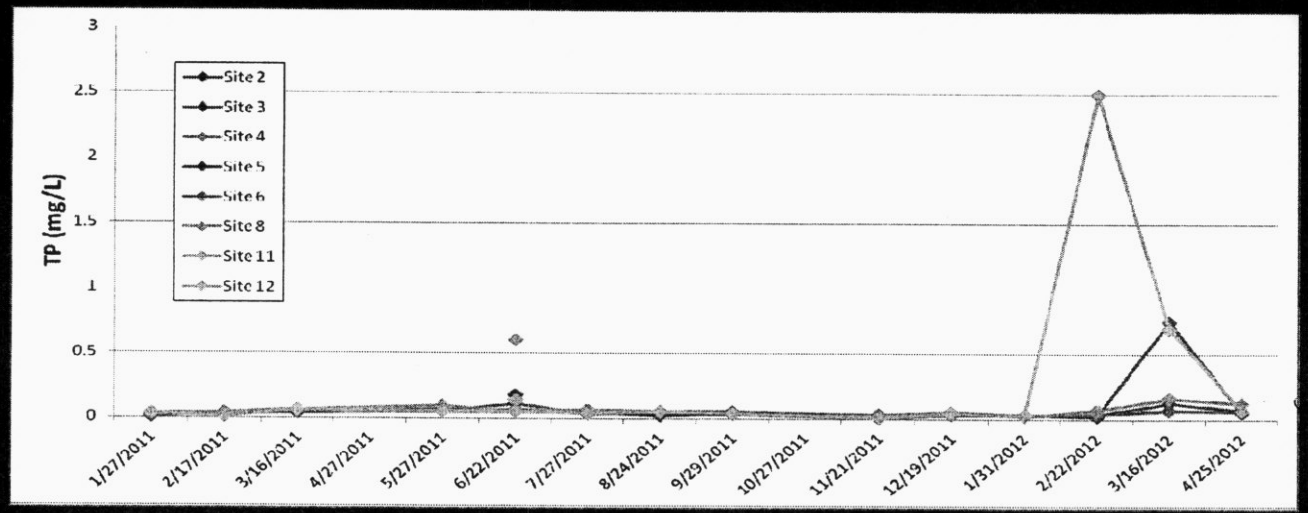
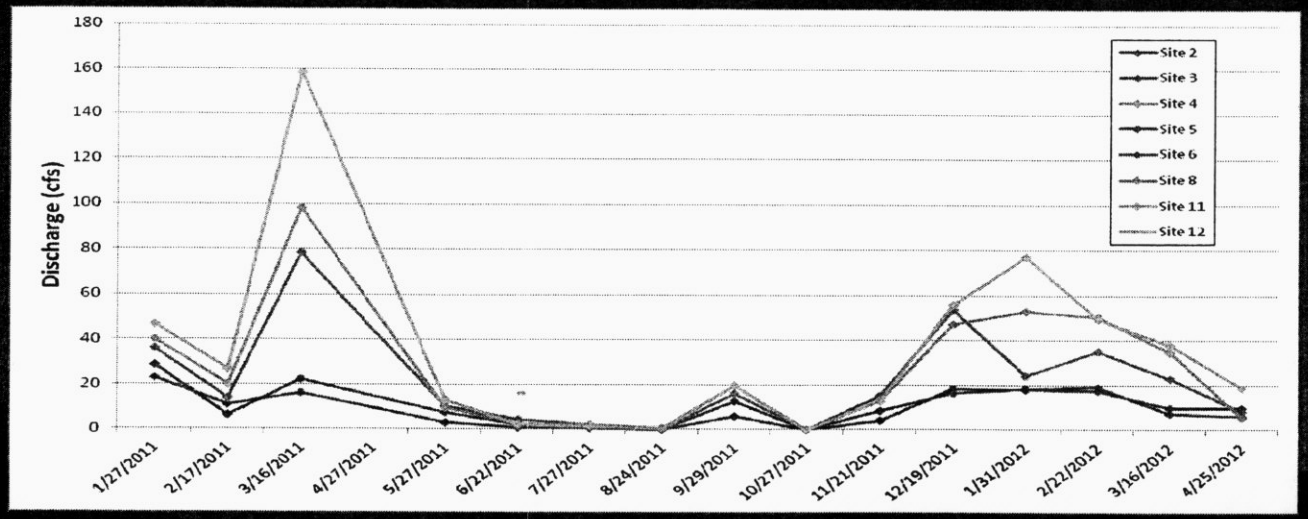
Long-term Total Phosphorus





Station 11	2/22/2012
Water Quality Parameter	mg/L
Total Phosphorus	2.5
Nitrate	2.67
Nitrite	< 0.1
Ammonia	< 0.1
TKN	< 0.5
TON	< 0.5
Orthophosphate	< 0.02
Total Reactive Phosphorus	< 0.02
Alkalinity	15

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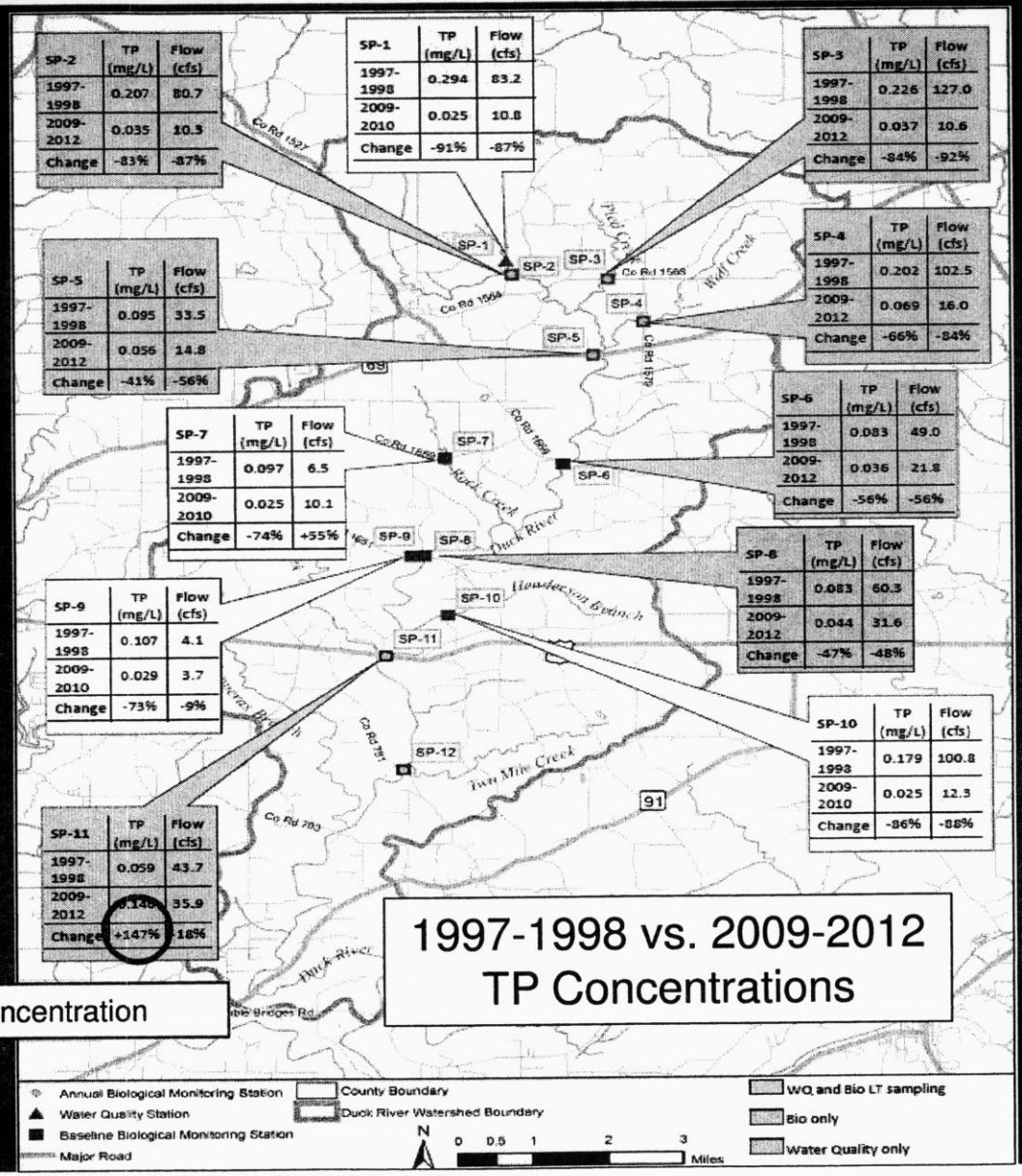
Change in Total Phosphorus

(Concentrations)



SP-2	TP (mg/L)	Flow (cfs)
1997-1998	0.207	80.7
2009-2012	0.035	10.3
Change	-83%	-87%

SP-1	TP (mg/L)	Flow (cfs)
1997-1998	0.294	83.2
2009-2010	0.025	10.8
Change	-91%	-87%

SP-3	TP (mg/L)	Flow (cfs)
1997-1998	0.226	127.0
2009-2012	0.037	10.6
Change	-84%	-92%

SP-4	TP (mg/L)	Flow (cfs)
1997-1998	0.202	102.5
2009-2012	0.069	16.0
Change	-66%	-84%

SP-5	TP (mg/L)	Flow (cfs)
1997-1998	0.095	33.5
2009-2012	0.056	14.8
Change	-41%	-56%

SP-6	TP (mg/L)	Flow (cfs)
1997-1998	0.083	49.0
2009-2012	0.036	21.8
Change	-56%	-56%

SP-7	TP (mg/L)	Flow (cfs)
1997-1998	0.097	6.5
2009-2010	0.025	10.1
Change	-74%	+55%

SP-8	TP (mg/L)	Flow (cfs)
1997-1998	0.083	60.3
2009-2012	0.044	31.6
Change	-47%	-48%

SP-9	TP (mg/L)	Flow (cfs)
1997-1998	0.107	4.1
2009-2010	0.029	3.7
Change	-73%	-9%

SP-10	TP (mg/L)	Flow (cfs)
1997-1998	0.179	100.8
2009-2010	0.025	12.3
Change	-86%	-88%

SP-11	TP (mg/L)	Flow (cfs)
1997-1998	0.059	43.7
2009-2012	0.145	35.9
Change	+147%	-18%

1997-1998 vs. 2009-2012
TP Concentrations

Includes suspected outlier concentration

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From: Lydia Haynes <LHaynes@cpc-pc.com>
Date: November 1, 2012, 8:15:04 AM CDT
To: Bennett Bearden <BBearden@gsa.state.al.us>
Subject: Comments on Alabama Water Agencies Working Group

Dear Mr. Bearden,

First, thanks are due to GSA for helping the Choctawhatchee, Pea, and Yellow Rivers WMA identify additional water sources so that the need to dam one of their rivers has been postponed indefinitely. If we had such a responsible WMA in Cullman County, then the last 20 years of expensive delay and litigation could have been avoided, and about $100 million that our local bureaucracy plans to spend on the Duck River could be saved. For us, the additional sources are already identified, but how to make special interests agree to use them remains to be seen.

Second, some of our comments have already been delivered via letters to Gov. Bentley and the various state agencies involved, but here are additional comments that relate to the State's general situation:

1. The primary issue to be resolved is OWNERSHIP of the surface Waters of the State. Unless an entity owns the entire watershed for a stream or body of water, then clear and legal OWNERSHIP of the water by the State must be proclaimed. Otherwise, one or more entities is likely to exercise unfair control of the water. For many years, powerful or wealthy entities have been buying up property around segments of streams and then assuming control of the water that passes through the segment. Until that process is stopped and overturned (now, not later), there is little hope for the State to effectively manage Waters of the State. These special interests are currently exercising effective ownership of waters in manners which preempt the State's good intentions.

2. OWNERSHIP of ground water is much less clearly definable, but perhaps it could be addressed based on State intervention when ground water levels fall or threaten to fall below acceptable levels.

3. Once OWNERSHIP has been established, then the State can address fair ALLOCATION of water. Development, frequent updating, and application, of a mathematical ALLOCATION FORMULA based on recognized needs, priorities, and water availability could then be an on-going process.

4. The initial ALLOCATION FORMULA should be developed immediately, using existing known needs, priorities and water availabilities. DO NOT wait for more precise data to draft the first formula, but establish a practical way to update the formula as needed. The formula should then be frequently revised and fine tuned as circumstances change and better data is collected.

5. Development of the ALLOCATION FORMULA should be at the State Level, because downstream concerns are normally affected, and because there is typically a local entity that seeks unfair advantage.

6. No one should be charged a fee for extraction of raw Waters of the State. Currently Alabama Power Company and perhaps others want to charge a fee for such raw waters. This must stop soon, by Executive Order if necessary. When it does stop, then there will be no need for the proposed Duck River reservoir, and Cullman County residents will be saved about $100 million over the next 30 years. When the State ALLOCATES waters, then Alabama Power Company will be able to use their fair share of ALLOCATED water, and the residents of a watershed will be able to use their fair share also.

7. To address ALLOCATION, a complete list of water demands must be developed, for starters:
   a. Stream flow to maintain stream health.
   b. Potable water requirements for the general population.
   c. Power generation
   d. Animal husbandry

e. Fish and other aquatic creatures
f. Wildlife
g. Irrigation
h. Industry
i. Recreation
j. Flood control
k. Navigation (a requirement of the Enabling Act for establishment of the State of Alabama)
l. Existing transfers of water (potable and raw) between watersheds.

8. To address ALLOCATION, a list of available water supplies at various locations must be developed. The list could initially be for each river in the state, and later be refined for each creek, stream, or whatever level of detail becomes necessary. Ground water, and water currently available from other watersheds should be included. Available water would include normal and drought conditions.

9. ALLOCATION FACTORS should be developed for each need based on such considerations as:
a. Population in a watershed.
b. Industry in a watershed.
c. Identified water quality improvements needed.
d. Current demands on the watershed.

10. ALLOCATION FACTORS must include variables that reflect drought, reservoir levels, seasonal expectations, and other important factors that are identified in the future.

11. Water policy documents need a definitions and acronyms section. For example, the difference between a "basin" and a "watershed" is currently unclear.

12. Transfers of potable water between watersheds is widespread due to the way pipelines, municipalities, and county lines have been established. This should not be a problem unless the source watershed experiences a shortage. Again the State (rather than the judicial system or local entities) should normally step in and determine fair ALLOCATION.

13. Transfers of raw water between watersheds pose a host of biological concerns, and the State should prohibit or carefully restrict such transfers.

14. Page 2 of the "Water Management Issues In Alabama" states under "Water Availability" that water should be allocated during water shortage periods. However, water should be allocated ALL the time, in order to prevent the type of mess we are experiencing in Cullman County. Our whole problem stems from the Smith Lake water being virtually 100% allocated to Alabama Power Company, and some 300 square miles in Cullman County being left high and dry.

15. On pages 4 and 16 "off-stream storage" is mentioned. This is a concept with great potential value. Water could be pumped to a high elevation reservoir during off-peak electrical usage hours, thereby helping the power companies meet demand more efficiently. Treatment of the water at the high elevation via package plants could then occur, and distribution requiring a minimum of electrical power would occur. This would make water distribution during power outages easier too. The concept is similar to TVA's Racoon Mountain storage facility. Large volumes of water could be pumped and stored during high flow periods, minimizing the need for dams that would interrupt the stream flow and aquatic life migration.

16. On page 5 "regional cooperation" is mentioned. This is essential to avoid the type of mess that has developed in Cullman County. Attempts by the county commission to establish regional cooperation were stedfastly resisted with dire consequences.

17. The ability of the Federal Energy Regulatory Commission and the Corps of Engineers to preempt state allocation of waters must stop. Currently, FERC and the Corps have made Alabama Power Company more powerful than the State of Alabama. The State must overturn and reverse this federal intervention and the unfair allocation of water that now exists.
The federal actions actually violate the Enabling Act for the state that requires that navigable waters FOREVER be public highways, free to citizens.

18. Page 6 mentions a "cornerstone" of statewide water management. Two other cornerstones should be state OWNERSHIP and state ALLOCATION of Waters of the State.

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