WATER WORKS & SANITARY SEWER BOARD
of the City of Montgomery

22 Bibb Street, P.O. Box 1631, Montgomery, Alabama 36102-1631 (334) 206-1600 (334) 240-1616 FAX

May 31, 2013

US ACE Mobile District
P.O. Box 2288
Mobile, AL 36628

RE: Draft Environmental Impact Statement and the Draft Water Control Manual for the ACT

To Whom It May Concern:

On behalf of The Water Works and Sanitary Sewer Board of the City of Montgomery, I submit the following comments on the Draft Environmental Impact Statement (EIS) and Draft Water Control Manual for the ACT. The draft EIS and Water Control Manual have numerous procedural, technical and substantive flaws that, if implemented, could seriously affect the water and wastewater operations of the Board.

At the outset, the Board adopts the comments and exhibits of the Alabama Office of Water Resources and the State of Alabama and incorporates these comments as part of the Board's comments. However, the Board first notes that, for reasons in addition to those stated in the comments of the Alabama Office of Water Resources and the State of Alabama concerning cumulative effects, the cumulative effects analysis in the draft EIS does not meet the requirements of 40 C.F.R. § 1508.7 to consider the "incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." Apart from the points raised by the Alabama Office of Water Resources and the State of Alabama, the cumulative effects analysis in the draft EIS is too limited and focuses largely on the effects of constructing dams and reservoirs above 20 acres in size, which ignores the directive in section 1508.7 that "[c]umulative impacts can result from individually minor but collectively significant actions taking place over a period of time." Also, although the analysis in the draft EIS does conclude that the Proposed Action Alternative (as well as Plan D and Plan F) would have cumulative effects on water quality, this is the sum of the analysis. This analysis is too perfunctory and conclusory to be of sufficient benefit as would satisfy the requirements of 40 C.F.R. § 1508.7 and the National Environmental Policy Act, 42 U.S.C. § 4332(2)(C).

Furthermore, the draft EIS understates the adverse effects on downstream water quality and quantity because of the flawed modeling used (including, but not limited to, use of incorrect DSS data), as discussed by the Alabama Office of Water Resources and the State of Alabama in their comments. The Board's operations consist of water treatment facilities and wastewater treatment facilities located on the Tallapoosa and Alabama rivers. The Tallapoosa River Water Treatment Plant requires flows to be greater than 2,400 CFS to maintain a river level of 3 feet at the plant's pump dock. Water levels that go below the required minimum would cause water quality degradation and loss of use of the water plant. The permit requirements for the wastewater treatment plants are as follows:

Towassa permit # AL0022241, TSS 30.0 mg/L, BOD 25.0 mg/L
Econchate permit # AL0022225, TSS 30.0 mg/L, BOD 25.0 mg/L
Catoma permit # AL0027863, TSS 30.0 mg/L, BOD 25.0 mg/L

If the river inflow drops below the current 7Q10 flow requirements at each of the plants, then the Board will be in violation of its permits requirements. Also if the stream inflows by each of the plants are reduced, this will affect the water quality and water quantity (See Board's Exhibit 1). In addition, a reduction of instream flows below 20% will also adversely affect the many endangered species that inhabit these rivers.

However, the draft EIS does not address the Corps' responsibility under ER 1110-2-8154 to ensure suitable water quality, but improperly shifts this responsibility to other parties, as explained in the comments of the Alabama Office of Water Resources and the State of Alabama. The effects on the Board and its operations of the Corps' proposed actions would be amplified by the unique location of the City of Montgomery on the Alabama River near the confluence of the Coosa and Tallapoosa Rivers.*

Sincerely,

Thomas R. Morgan
General Manager

cc: Board of Directors

*The Coosa and Tallapoosa Rivers join just north of Montgomery to form the Alabama River (See Board's Exhibit 2, which is a map of the rivers also showing the location of the water and wastewater plants).

FILED
2005 Nov-15 PM 01:58
U.S. DISTRICT COURT
N.D. OF ALABAMA

FILED
2004 Dec-08 AM 11:09
U.S. DISTRICT COURT
N.D. OF ALABAMA

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ALABAMA
EASTERN DIVISION

STATE OF ALABAMA,	)	
	)	
Plaintiff,	)	
	)	
v.	)	CV NO.: CV-90-BE-01331-E
	)	
THE UNITED STATES ARMY, CORPS OF ENGINEERS, et al.,	)	
	)	
Defendants.	)	

AFFIDAVIT

OF

THOMAS R. MORGAN

STATE OF ALABAMA	)
	)
COUNTY OF MONTGOMERY	)

Before me the undersigned Notary Public, in and for said State and County, appeared Thomas R. Morgan who, after being first duly sworn, deposed and said the following:

1. My name is Thomas R. Morgan. I am over 21 years of age. I have first-hand knowledge of the matters and information testified to in this Affidavit and am otherwise competent to give testimony. I understand these statements made in this Affidavit are to be under oath and are truthful in all respects. I give this Affidavit voluntarily for use in support of the Renewed

EXHIBIT "1"

Motion To Intervene in the above-styled litigation filed on behalf of The Water Works and Sanitary Sewer Board of the City of Montgomery, Alabama, (the "Montgomery Board" or "Board"), and for all other purposes authorized by law.

2. I currently serve as the General Manager of the Montgomery Board, and have served in that capacity since 1991. I served as the Board President of the Association of Metropolitan Sewerage Agencies for the 2003-2004 term. I also served on the EPA Urban Wet Weather Flows Federal Advisory Committee and the SSO Federal Advisory Committee. I am a member of the Water Environment Federation/Water Environment Research Foundation; American Water Works Association; Association of Metropolitan Sewerage Agencies; Association of Metropolitan Water Agencies and the American Public Works Association. I also serve as the Chair of the Tallapoosa River Basin Steering Committee, Chair of the Catoma Creek Watershed Committee, and as a Board Member of the Alabama Clean Water Partnership.

3. The Montgomery Board is a public corporation authorized by and existing under Section 11-50-310 *et seq.* of the Code of Alabama 1975, as amended. The Board's principal place of business is Montgomery, Alabama. The Board provides water consumption, wastewater treatment systems, and other services to the city of Montgomery and numerous neighboring rural communities. The Board's water system consists of the C.T. Perry Water Filtration Plant, the Day Street Pumping Station, the Court Street Pumping Station, 42 wells, seven elevated storage reservoirs, and approximately 1600 miles of water distribution mains. The Board's sewer system is composed of four wastewater facilities, 55 pump stations, approximately 1,000 miles of sewer mains, and approximately 250 square miles of service area.

4. The Montgomery Board's service area is located within the confluence of the

Alabama, Coosa, and Tallapoosa Rivers. Those Rivers combine to form the ACT River Basin, which is made subject of the above-styled lawsuit. As discussed below, the Board relies heavily on waters drawn from the ACT River Basin, and any action that diminishes water flows therein will cause serious harm to the Board and its customers, including, without limitation, the degradation of water quality and impairment of the Board's ability to adequately treat wastewater.

5. By authority of state and local laws, the Montgomery Board has a vested right and duty to acquire, treat, and distribute safe, clean water to its customers. Additionally, the Board has a vested right and duty to treat and recycle the wastewater of its customers. To accomplish its duties, the Board is heavily dependent on reliable water flows in the ACT River Basin. For example, the Board obtains over 60% of its water supply from the Tallapoosa River, which, as noted, is part of the ACT River Basin. Furthermore, three of the Montgomery Board's wastewater facilities are located on and heavily dependent upon the Alabama River, which, as noted, is part of the ACT River Basin. Consequently, the ACT River Basin is critically important to the Montgomery Board, and any action that diminishes water flows therein will cause serious harm to the Board and its customers.

6. As alleged in this lawsuit, the Army Corps of Engineers and other Defendants are attempting to illegally divert headwaters located in Georgia that feed the ACT River Basin to the detriment of downstream users including the Montgomery Board. As a result of this illegal diversion, water flows in the ACT River Basin will be diminished, thereby causing serious harm to the Board and its customers. This harm includes, without limitation, the degradation of water quality and impairment of the Board's ability to adequately treat wastewater. Indeed, the illegal diversion of water from the ACT River Basin which reduces the water flows below the Montgomery

Board's permit requirements would result in changes to the permit requirements for each of the Board's water and wastewater treatment facilities such that the Montgomery Board would have to expend millions of dollars in modifications to those facilities. Therefore, the resolution of the issues raised in this lawsuit have a direct, substantial, and immediate impact on the Board and its customers. Furthermore, the Board's long range planning and analysis are completely jeopardized by the illegal diversion made subject of this case. In short, the Board's future and the future of its customers hinge on the outcome of this lawsuit.

7. The Board's interests in this lawsuit are similar, but not identical those of the State of Alabama. While Alabama's interests are general and concern the management of all of the water resources of the ACF and ACT River Basins, the Montgomery Board's interests are specific and limited to the ACT River Basin – namely the Tallapoosa River. The Board is only interested in the ACF River Basin to the extent that any actions taken with respect to the ACF River Basin could adversely impact the ACT River Basin. Consequently, neither the State of Alabama nor any existing party can adequately represent the Board's interests in this litigation.

8. Because the social and economic well-being of the Board and the area it serves is dependent on the continued availability of adequate, reliable, and safe supplies of water from the ACT River Basin, the Board respectfully requests to join this lawsuit and be heard on these critically important issues.

FURTHER, Affiant saith not.

THOMAS R. MORGAN

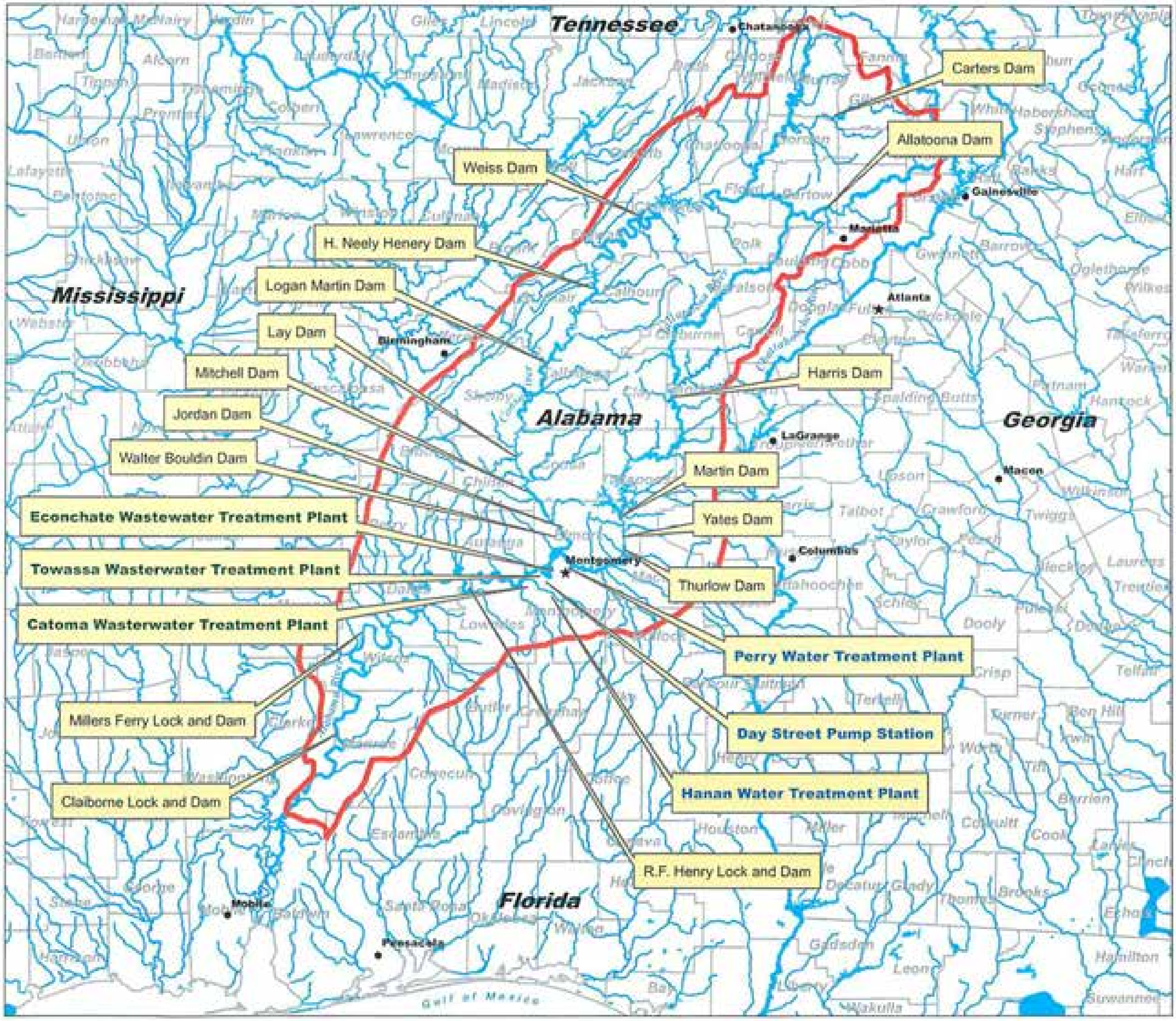
[illegible]

STATE OF ALABAMA)
)
COUNTY OF MONTGOMERY)

SWORN TO and SUBSCRIBED before me this 2nd day of December 2004.

Charlene L. Weeks
Notary Public [Seal]
My Commission expires:
12/9/2006

[illegible]



MONTGOMERY WATER WORKS
AND
SANITARY SEWER BOARD
MONTGOMERY, ALABAMA

Date: 5/31/2013

1 inch = 85,000 feet

N
W E
S

Legend

EXHIBIT 2

From:	Mark Colson
To:	ACT-WCM
Cc:	Anita Archie; "Brian.Atkins@adeca.alabama.gov"; "llefleur@adem.state.al.us"
Subject:	20130531 - BCA Comment on ACT DEIS
Date:	Friday, May 31, 2013 2:28:01 PM
Attachments:	20130531 - Draft BCA Comment on ACT DEIS.pdf

Please find the attached comment letter from the Business Council of Alabama regarding the "Draft Environmental Impact Statement Update of the Alabama-Coosa-Tallaspposa River Basin Water Control Manual."

If you have any questions, please contact BCA Senior Vice President for Intergovernmental Affairs Anita Archie at anitaa@bcatoday.org or 334-240-8775.

Respectfully submitted,

Mark M. Colson

Chief of Staff &
Executive Director of ProgressPAC

Direct: 334-240-8724

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bcatoday.org
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twitter.com/bcatoday

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BUSINESS COUNCIL OF ALABAMA

May 31, 2013

VIA U.S. Mail & E-Mail
Colonel Steven J. Roemhildt
U.S. Army Corps of Engineers
Mobile District
Attention: PD-EI (ACT-DEIS)
P.O. Box 2288
Mobile, AL 36628
act-wcm@usace.army.mil

Re: Draft Environmental Impact Statement
Update of the Alabama-Coosa-Tallapoosa River Basin Water Control Manual

Dear Colonel Roemhildt:

The Business Council of Alabama (BCA) appreciates this opportunity to submit comments on the above referenced Draft Environmental Impact Statement (DEIS). The Business Council of Alabama is Alabama's foremost voice for business. The BCA is a non-partisan statewide business association representing the interests and concerns of nearly one million working Alabamians through its member companies and its partnership with the Chamber of Commerce Association of Alabama. BCA is Alabama's exclusive affiliate to the U.S. Chamber of Commerce and the National Association of Manufacturers.

BCA's members are directly affected by water management decisions implemented by the Corps of Engineers. These members depend on adequate water resources and will be impacted if the Corps operations trigger drought conditions more often and if the Corps operations diminish water quality.

The Corps response to the lower flows during drought conditions under the proposed alternative is that "[w]ater management activities may affect water quality under low flow conditions such that the state regulatory agencies may consider reevaluation of NPDES permits to confirm the system's assimilative capacity." (DEIS p. 6-112, and DEIS Executive Summary p. ES-48). However, the USACOE does not include this consideration as a part of their evaluation of the proposed alternative and does not include the potential costs to NPDES permit holders of complying with new restrictive permit limitations.

Under the discussion of Mitigation the Corps states:

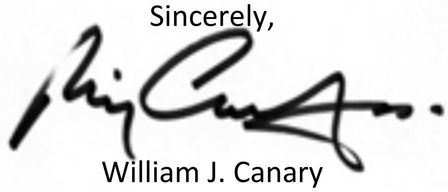
> "Reevaluation of wasteload allocations from point sources in the upper Coosa River and Alabama River may be appropriate to ensure that current discharge permits do not violate water quality standards when in-stream flow changes from the No Action Alternative. Georgia EPD and ADEM base discharge permits on 7Q10 conditions; the system's 7-day minimum flow from the previous 10-year period. In some permits, restrictions are placed on discharges during low-flow conditions. Georgia EPD and ADEM may determine that it would be appropriate to reevaluate stream flows in the upper Coosa River and Alabama River to ensure that NPDES permitted facilities do not violate water quality standards under extreme low-flow conditions. Some current NPDES permits limit or restrict discharges during low-flow conditions similar to what occurred in 2007. The water quality model developed during this EIS made assumptions regarding point source discharges that might not apply during low-flow conditions. The states may elect to update NPDES permits to limit discharges during certain in-stream flow conditions." (DEIS p. 6-196, and DEIS Executive Summary p. ES-70).

This reevaluation of 7Q10 flows is clearly within the responsibility of the USACOE as a part of their evaluation of the alternatives under NEPA. (40 CFR Part 1502.23). The cost of this evaluation should not be placed on the State of Alabama and the cost of any subsequent changes in NPDES permits must be considered as a part of the alternatives analysis.

It is inappropriate for the Corps to not fully consider the impacts of its proposed action and to simply place the burden of diminished water quality on current and future NPDES permit holders.

Thank you for the opportunity to provide these comments. Please do not hesitate to contact us if you have any questions or require any additional information.

Sincerely,



William J. Canary
President and CEO
Business Council of Alabama

cc:
Alabama Office of Water Resources - Brian.Atkins@adeca.alabama.gov
Alabama Department of Environmental Management - llefleur@adem.state.al.us

The Water Works and Sewer Board
of the
City of Gadsden, Alabama

515 Albert Rains Boulevard • P.O. Box [illegible] • Gadsden, AL [illegible]
(256) 543-2884 • FAX: (256) 543-[illegible]

Colonel Steven J. Roemhildt
Mobile District, U.S. Army Corps of Engineers
P. O. Box 2288
Mobile, Alabama 36628-0001

May 30, 2013

Re: Draft Environmental Impact Statement
Update of the Water Control Manual for the Alabama-Coosa-Tallapoosa Basin

Dear Colonel Roemhildt:

The Water Works and Sewer Board of the City of Gadsden, Alabama, appreciates this opportunity to provide comment on the above referenced Draft Environmental Impact Statement (D.E.I.S.) related to the Update of the Water Control Manual for the Alabama-Coosa-Tallapoosa Basin.

We would like to submit the following comments for your consideration:

1. We do not believe adequate time has been allowed for Stakeholders to appropriately review the D.E.I.S. for the following reasons:
   a. Since the conclusion of the Scoping process (approximately five years ago) a new generation of Stakeholders has come into being who were not part of the work that went into developing the updated Manual. I myself am part of this group. For those of us who were not part of the process prior to 2008 the Open Houses that were conducted at four locations along the Basin were excellent, but did little more than introduce the multitude of subjects that the updated Manual addresses.
   b. We believe that the enormous volume of information associated with the D.E.I.S. for the updated Manual would require months to appropriately review. The time that has been allotted for review and comment essentially allows for a review of the Executive Summary. Please understand, we are grateful for the additional 30 days of comment period that the Corps granted in addition to the original 60 day comment period contemplated (extending the comment period from April 30, 2013 to May 31, 2013).
2. We support the continued use of the revised guide curve for operation of the H. Neely Henry Lake (Coosa River) that the Corps is supporting in the revised Manual. We support final approval of this revised guide curve in the Alabama Power Company (APC) Federal Energy Regulatory Commission (FERC) re-licensing of its Coosa River hydro-power projects.

Once again we appreciate the opportunity to provide comment. If we can be of any further assistance, please let us know.

Sincerely,
WATER WORKS AND SEWER BOARD of GADSDEN, ALABAMA

Frank Eskridge
General Manager

LANCE R. LEFLEUR
DIRECTOR

ROBERT J. BENTLEY
GOVERNOR

ADEM
Alabama Department of Environmental Management
adem.alabama.gov
1400 Coliseum Blvd. 36110-2400 ▪ Post Office Box 301463
Montgomery, Alabama 36130-1463
(334) 271-7700 ▪ FAX (334) 271-7950

May 29, 2013

Colonel Steven J. Roemhildt, Commanding Officer
U.S. Army Corps of Engineers, Mobile District
ATTN: PD-EI (ACT-DEIS)
Box 2288
Mobile, AL 36628-001

Dear Colonel Roemhildt:

The Alabama Department of Environmental Management (ADEM) is pleased to provide the following comments and supporting data regarding the Draft Environmental Impact Statement (DEIS) prepared by the Mobile District of the United States Army Corps of Engineers (USACOE) pursuant to the National Environmental Policy Act (NEPA) for proposed modifications to the Water Control Manual for the Alabama-Coosa-Tallapoosa (ACT) River basin. As the environmental regulatory agency for the State of Alabama, ADEM ensures that activities which have the potential to impact Alabama's surface waters do not cause or contribute to violations of the State's water quality standards found in ADEM Administrative Code Chapter 335-6-10 (Attachment 1). In that regard, the following comments will primarily address impacts to water quality resulting from the proposed alternative and statements in the DEIS related to those impacts. ADEM believes that the USACOE has obligations under the NEPA, the Federal Water Pollution Control Act (Clean Water Act), and the USACOE's own regulations which are not adequately addressed in the DEIS.

1. The USACOE's proposed alternative must comply with the Clean Water Act and USACOE regulations.

   Section 101. (b) of the Clean Water Act states, in part: "It is the policy of the Congress to recognize, preserve, and protect the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution, to plan the development and use (including restoration, preservation, and enhancement) of land and water resources, and to consult with the Administrator in the exercise of his authority under this Act."

   In addition, Section 313. (a) states, in part: "Each department, agency, or instrumentality of the executive, legislative, and judicial branches of the Federal Government (1) having jurisdiction over any property or facility, or (2) engaged in any activity resulting, or which may result, in the discharge or runoff of pollutants, and each officer, agent, or employee

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(256) 353-1713
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Mobile Branch
2204 Perimeter Road
Mobile, AL 36615-1131
(251) 450-3400
(251) 479-2593 (FAX)

Mobile-Coastal
4171 Commanders Drive
Mobile, AL 36615-1421
(251) 432-6533
(251) 432-6598 (FAX)

thereof in the performance of his official duties, shall be subject to, and comply with, all Federal, State, interstate, and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water pollution in the same manner, and to the same extent as any nongovernmental entity including the payment of reasonable service charges. The preceding sentence shall apply (A) to any requirement whether substantive or procedural (including any recordkeeping or reporting requirement, any requirement respecting permits and any other requirement, whatsoever), (B) to the exercise of any Federal, State, or local administrative authority, and (C) to any process and sanction, whether enforced in Federal, State, or local courts or in any other manner. This subsection shall apply notwithstanding any immunity of such agencies, officers, agents, or employees under any law or rule of law."

Federal regulations at 40 CFR §130.12 (c) state: "Each department, agency or instrumentality of the executive, legislative and judicial branches of the Federal Government having jurisdiction over any property or facility or engaged in any activity resulting, or which may result, in the discharge or runoff of pollutants shall comply with all Federal, State, interstate and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water pollution in the same manner and extent as any non-governmental entity in accordance with section 313 of the CWA."

Furthermore, Title 22, Section 22-22-1 et seq., Code of Alabama 1975, includes as its purpose "...to conserve the waters of the State and to protect, maintain and improve the quality thereof for public water supplies, for the propagation of wildlife, fish and aquatic life and for domestic, agricultural, industrial, recreational and other legitimate beneficial uses; to provide for the prevention, abatement and control of new or existing water pollution; and to cooperate with other agencies of the State, agencies of other states and the federal government in carrying out these objectives." (ADEM Administrative Code Chapter 335-6-10).

Under ADEM Administrative Code Chapter 335-6-10, ADEM has promulgated water quality standards, including narrative and numeric criteria, to "protect, maintain and improve the quality" of the waters of the State of Alabama. *Id.*

Corps regulations mandate that "Federal facilities shall comply with all Federal, state, interstate, and local requirements in the same manner and extent as other entities." ER 1110-2-8154 at 2 (Water Quality and Environmental Management for Corps Civil Works Projects). Through these regulations, the USACOE has committed "to develop and implement a holistic, environmentally sound water quality management strategy for each project." *Id.* The regulations recognize that "the management of [Corps] projects affects environments distant from [their] property boundaries and is influenced by actions of others also distant from [their] properties." *Id.* Thus, the regulations dictate that "Corps management responsibilities extend throughout the area influenced by and influencing the water" that the Corps manages. "The thrust of [the Corps'] policy is to protect all existing and future uses including assimilative capacity, aquatic life, water supply, recreation, industrial use, hydropower, etc." *Id.*

Section 8 of the regulation describes the management of USACOE projects and states, in part:

> Divisions should adopt and implement the following general water quality management objectives for all Corps water resources projects:
>
> a. Ensure that water quality, as affected by the project and its operation, is suitable for project purposes, existing water uses, and public health and safety and is in compliance with applicable Federal and state water quality standards."
>
> …
>
> k. Ensure that the project and its operation offer the lowest stress possible to the aquatic environment.

ER 1110-2-8154 at 3-4.

The USACOE's proposed action fails to comply with the foregoing obligations of the Corps. The DEIS details numerous adverse downstream environmental impacts that will result from lower flows under the preferred alternative. Rather than complying with its obligation to "protect all existing and future uses including assimilative capacity," the Corps suggests that the State will dictate that existing permit holders must restrict their discharges in order to alleviate the impacts of the Corps' proposed action. ADEM submits that the Corps is obligated to comply with its own regulations and other applicable law to protect existing uses and to avoid causing or contributing to adverse downstream environmental conditions.

2. The USACOE's proposed alternative (Plan G) will result in reduced river flow into Weiss Lake during critical water quality periods. The reduced flows will cause or contribute to violations of Alabama's water quality standards. (ADEM Administrative Code Chapter 335-6-10).

   Reduced flows downstream of the Carters and Allatoona Projects will have adverse environmental impacts and are not insignificant as characterized by the Corps. The USACOE states: "Operational changes at upstream Corps projects included as part of the Proposed Action Alternative, particularly the water management measure to reduce hydropower generation at Allatoona Lake during the fall drawdown period, would somewhat shift releases in time over the period from September through December. However, on the basis of model runs over the 70-year period of record, those adjustments result in slightly lower flow in the Coosa River at Rome, Georgia, during the September to November period." (DEIS p. 6-58). The USACOE concludes that this lowering of flow in the Coosa River would be insignificant. However, that conclusion is based on a faulty analysis of impacts to downstream water quality resulting from the proposed water management changes at Allatoona Lake. Most significantly, the analyses performed by the USACOE do not include the use of a calibrated water quality model but rely instead on predictions by the HEC-5Q water quality model (with flow input from the HEC-ResSim reservoir operations model) of the 5th percentile, 95th percentile, and median conditions under historical and alternative operations.

The monthly 7-day low flows that would occur under drought conditions with the reservoir system operated under Plan G compared with the historical baseline monthly 7-day low flows would be significantly less during certain critical months. Specifically, the monthly 10th percentile exceedance value for 7-day average flow in June is 16% less under Plan G operations than under the historical model flows (No Action Alternative). In July the monthly 10th percentile exceedance value for 7-day average flow is 12% less under Plan G operations for the period 1980 through 2008. When monthly 7-day 10-year recurrence low flows (7Q10) are calculated for the same period (1980 – 2008) using the Pearson Type III methodology, the monthly 7Q10 is 8% less in August and 15% less in September under Plan G operations compared to historical modeled flow. Regardless of which method is used as the basis for comparison, these declines in 7-day average flow are significant given the water quality considerations in downstream reservoirs during drought conditions.

The Corps recognizes that the reduced flows under its preferred alternative will result in adverse downstream environmental impacts, including but not limited to downstream industrial, municipal, and recreational water uses in the State of Alabama. (DEIS pp. 6-112 — 6-118). The proposed preferred alternative is inconsistent with Corps regulations which require it to "[e]nsure that water quality, as affected by the project and its operation, is suitable for project purposes, existing water uses, and public health and safety and is in compliance with applicable Federal and state water quality standards." ER 1110-2-8154 at 3. The USACOE's response to the lower flows during drought conditions under the proposed alternative is that "[w]ater management activities may affect water quality under low flow conditions such that the state regulatory agencies may consider reevaluation of NPDES permits to confirm the system's assimilative capacity." (DEIS p. 6-112, and DEIS Executive Summary p. ES-48). However, the USACOE does not consider the viability of or potential costs of compliance with more restrictive permit limitations by NPDES permit holders. Further, the Corps' discussion of the effects of reduced flows on fish and wildlife is inadequate to allow comment upon flow regimens for purposes of protecting endangered species, including but not limited to federally listed endangered aquatic species in the Coosa River.

Under the discussion of the proposed action's impact on oxygen demand, the Corps states: "During low-flow conditions, some NPDES permits limit point source discharges, and permit conditions may be temporarily changed during extreme low-flow conditions." (DEIS p. 6-

112, and DEIS Executive Summary p. ES-49). Again, however, the USACOE does not evaluate what those temporary changes to NPDES permit limits might include or what the cost of complying with those conditions might be. Nor does it consider changes to Georgia NPDES permit holders that must and should be made during these conditions to avoid disparate impacts on Alabama NPDES permit holders located downstream.

Under the discussion of Mitigation the Corps states:

> Reevaluation of wasteload allocations from point sources in the upper Coosa River and Alabama River may be appropriate to ensure that current discharge permits do not violate water quality standards when in-stream flow changes from the No Action Alternative. Georgia EPD and ADEM base discharge permits on 7Q10 conditions; the system's 7-day minimum flow from the previous 10-year period. In some permits, restrictions are placed on discharges during low-flow conditions. Georgia EPD and ADEM may determine that it would be appropriate to reevaluate stream flows in the upper Coosa River and Alabama River to ensure that NPDES permitted facilities do not violate water quality standards under extreme low-flow conditions. Some current NPDES permits limit or restrict discharges during low-flow conditions similar to what occurred in 2007. The water quality model developed during this EIS made assumptions regarding point source discharges that might not apply during low-flow conditions. The states may elect to update NPDES permits to limit discharges during certain in-stream flow conditions.

DEIS p. 6-196, and DEIS Executive Summary p. ES-70.

This reevaluation of 7Q10 flows is clearly within the responsibility of the USACOE as a part of their evaluation of the alternatives under NEPA. (40 CFR Part 1502.23). The cost of this evaluation should not be placed on the State of Alabama and the cost of any subsequent changes in NPDES permits must be considered as a part of the alternatives analysis.

Weiss Lake, the first reservoir on the Coosa River downstream of the USACOE-operated Allatoona Lake on the Etowah River and Carters Lake on the Coosawattee River, is currently listed as impaired by ADEM due to excessive nutrient loading. (Attachment 2 – Final Total Maximum Daily Load (TMDL) for Nutrient Impairment - Weiss Lake). In 2001, the State of Alabama adopted numeric nutrient criteria in the form of a growing season average chlorophyll *a* concentration for two locations within Weiss Lake. Historic measurements of chlorophyll *a* in Weiss Lake show that the adopted criteria have been exceeded during a number of years and particularly during drought years. (Attachment 3 – ADEM Water Quality Data for Weiss Lake). The following figures depict growing season (April –

October) mean chlorophyll *a* concentrations in the dam forebay of Weiss Lake (station WEIC-1), near the mid-reservoir upstream of Alabama Highway 9 (station WEIC-2), and near the Alabama-Georgia state line at the upstream end of Weiss Lake (station WEIC-12).

Figure 1.

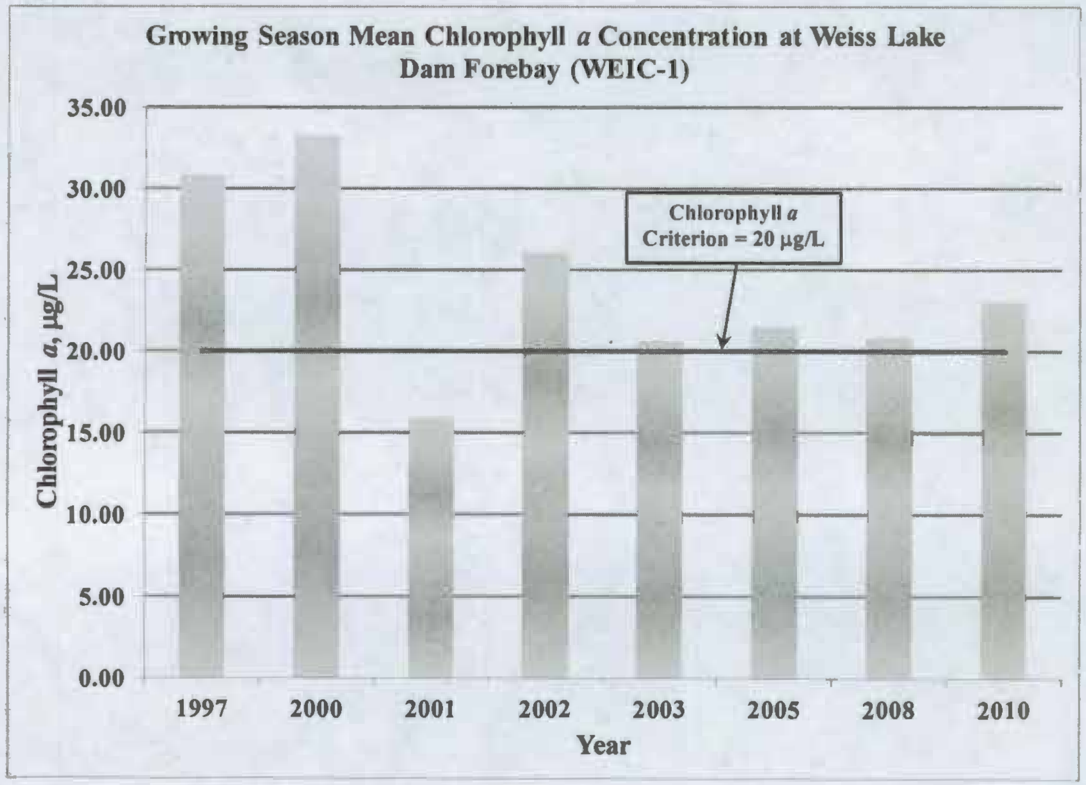


Figure 2.

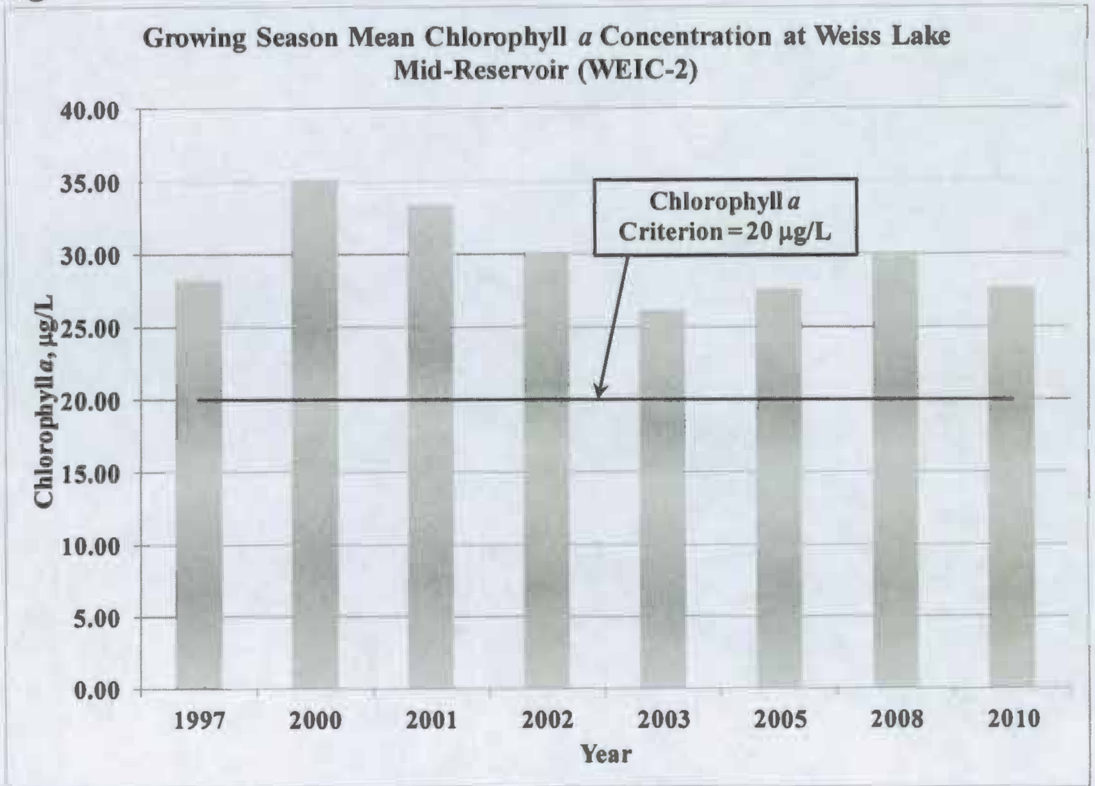
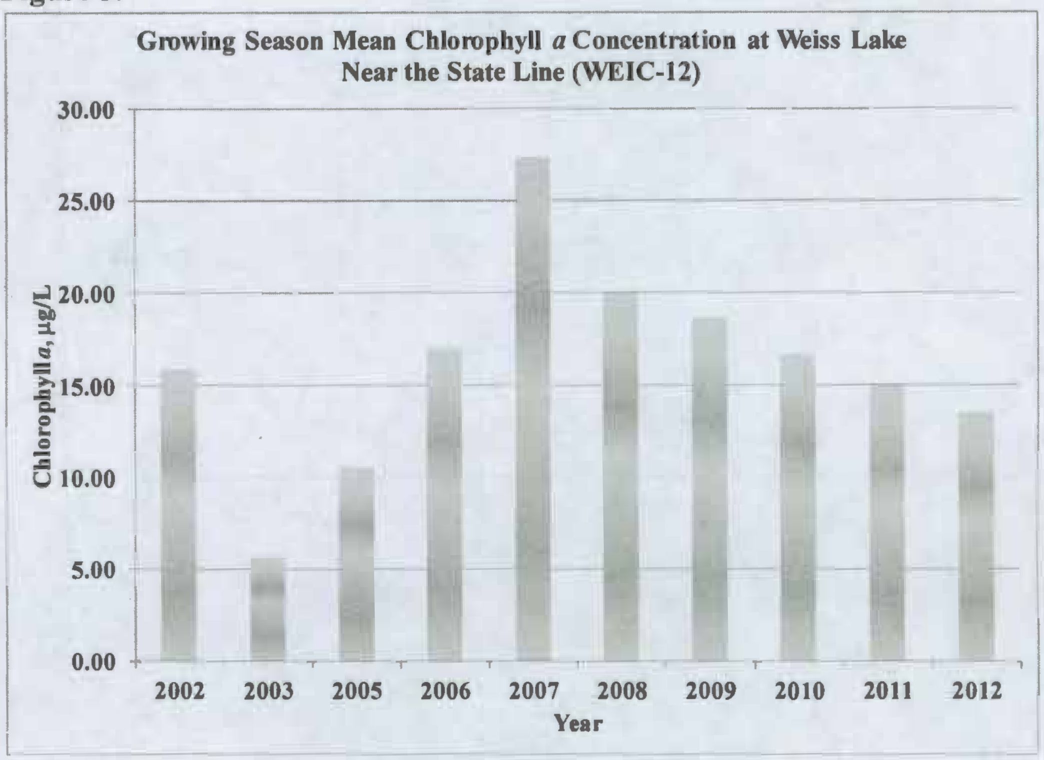


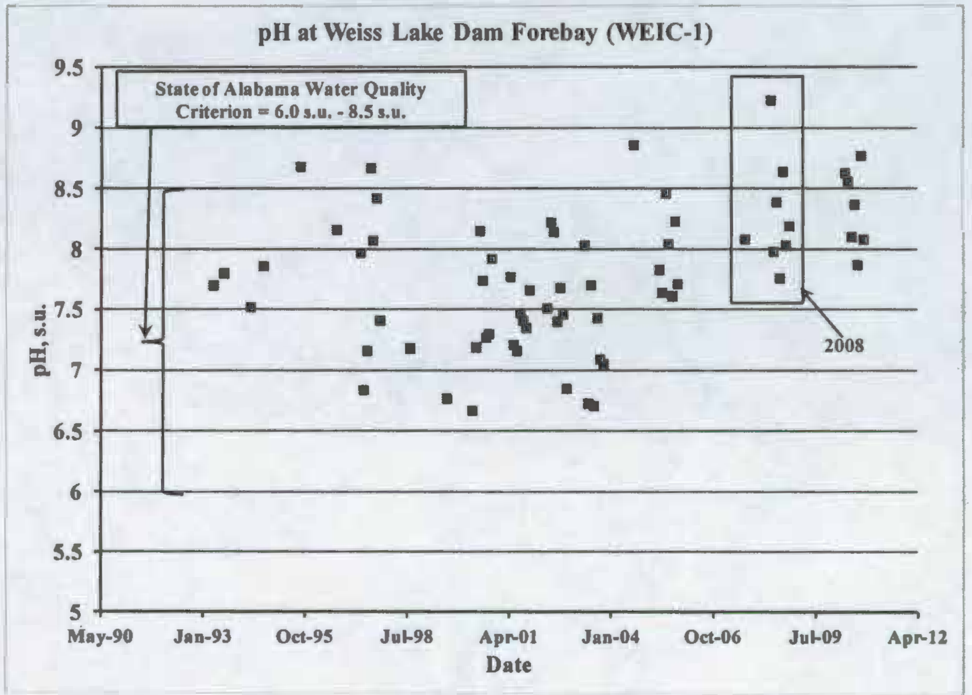
Figure 3.



Figures 2 and 3 above highlight Weiss Lake's susceptibility to increased algal productivity during periods of drought (i.e., 2000, 2007) as a result of the reservoir's increased residence time. (See also Attachment 4 – Maceina, M. J. and Bayne, D. R. 2003. "The Potential Impact of Water Reallocation on Retention and Chlorophyll *a* in Weiss Lake, Alabama", *Lake and Reservoir Management* 19(3); pp. 200-207). The reduced flows under the Corps' preferred alternative are going to exacerbate chlorophyll *a* concentrations at Weiss Lake. The DEIS concedes this. (DEIS p. 6-117 ("In periods of dry weather, with low inflows, the Proposed Action Alternative would be expected to increase algal growth in Weiss Lake, and resulting potential updates to discharge permits may have an adverse impact on upstream dischargers.")).

Other water quality parameters are also significantly affected by reduced flow into Weiss Lake and the resulting increase in residence time. These include dissolved oxygen (DO), temperature, and pH. While Alabama's water quality criteria for chlorophyll *a* are expressed as a growing season average concentration, criteria for DO, temperature, and pH are applied instantaneously and not as a daily, weekly, or growing season average. For DO, the criterion is further applied at a depth of five feet below the water surface when the total depth is ten feet or greater. At locations where the water depth is less than ten feet, the criterion is applied at mid-depth. Since DO and pH are both influenced by algal productivity, these parameters often reflect hypereutrophic conditions in the photic zone of the reservoir through an increased diurnal change. Elevated temperatures resulting from decreased flow and increased residence time can further impact DO by decreasing the saturation concentration and increasing biochemical reaction rates. The following figures illustrate the impact of low inflow on pH, DO, and temperature at several locations in Weiss Lake between the dam forebay and the state line. The figures illustrate the fact that Weiss Lake is already experiencing problems with these water quality criteria, especially in times of drought. Just as with chlorophyll *a*, lower flows into Weiss Lake as proposed under the Corps' preferred alternative will only serve to exacerbate these problems.

Figure 4.



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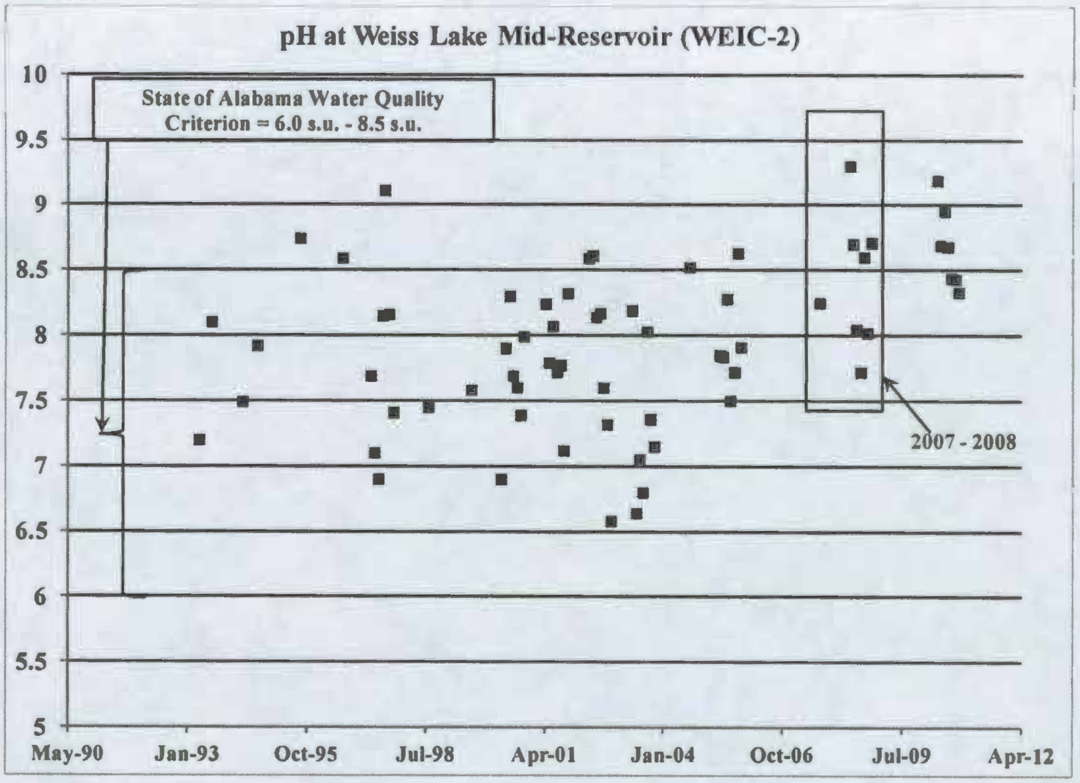

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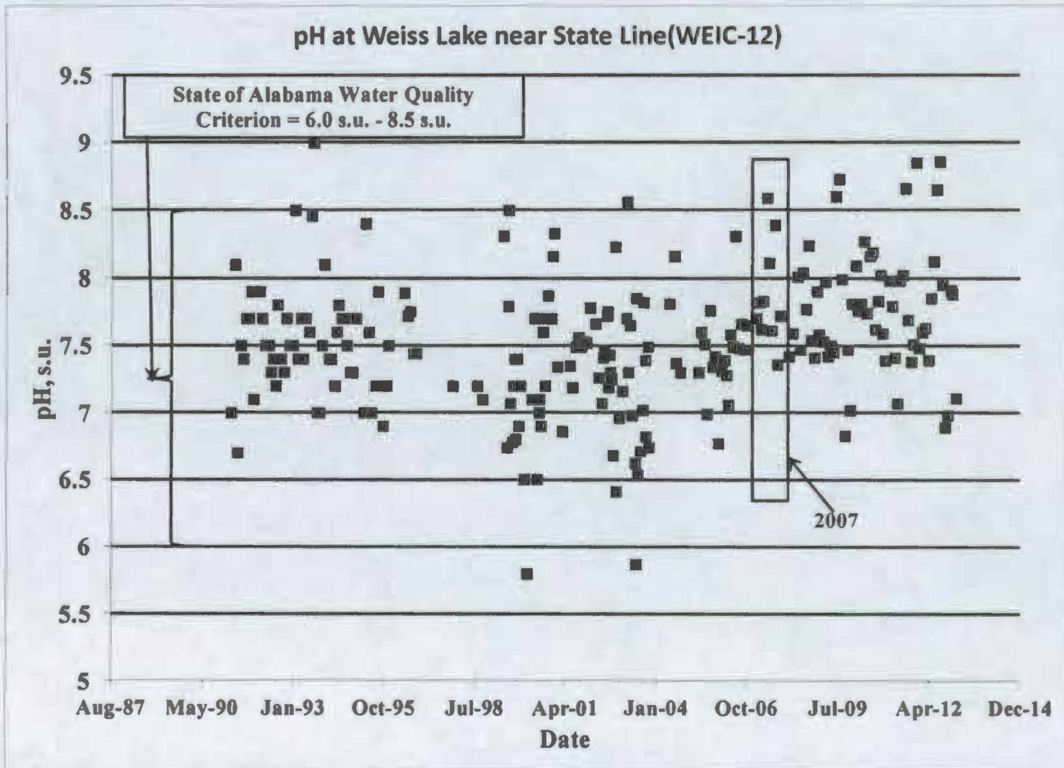


Figure 7.

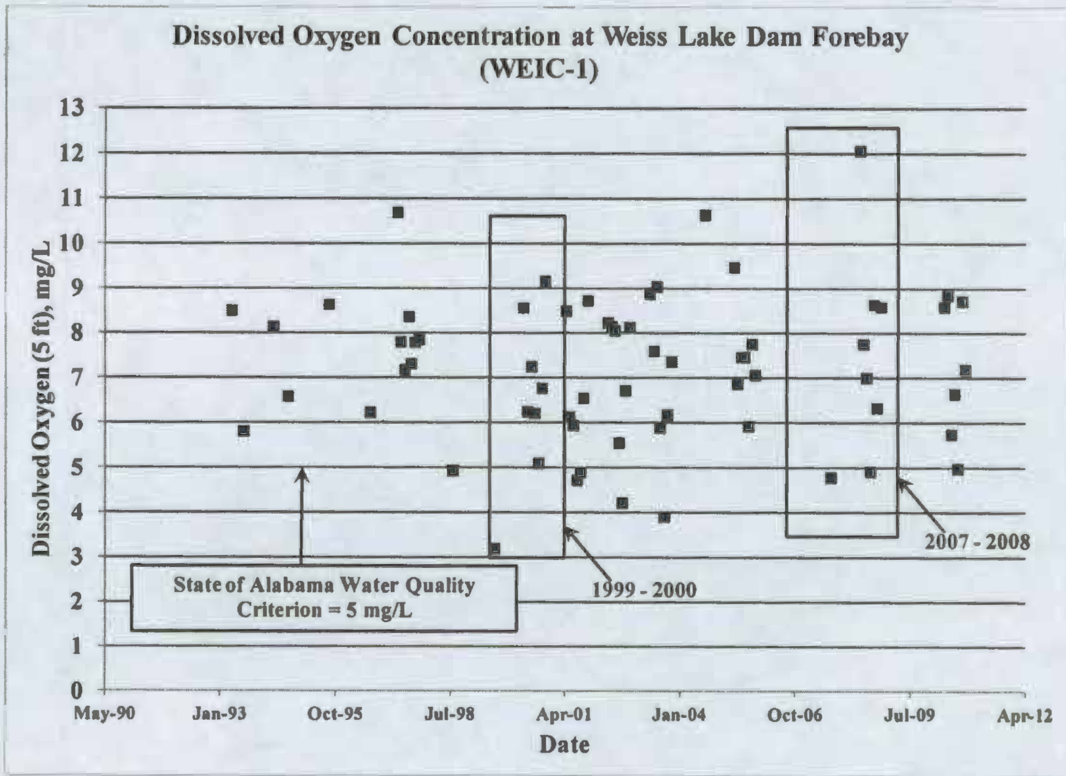


Figure 8.

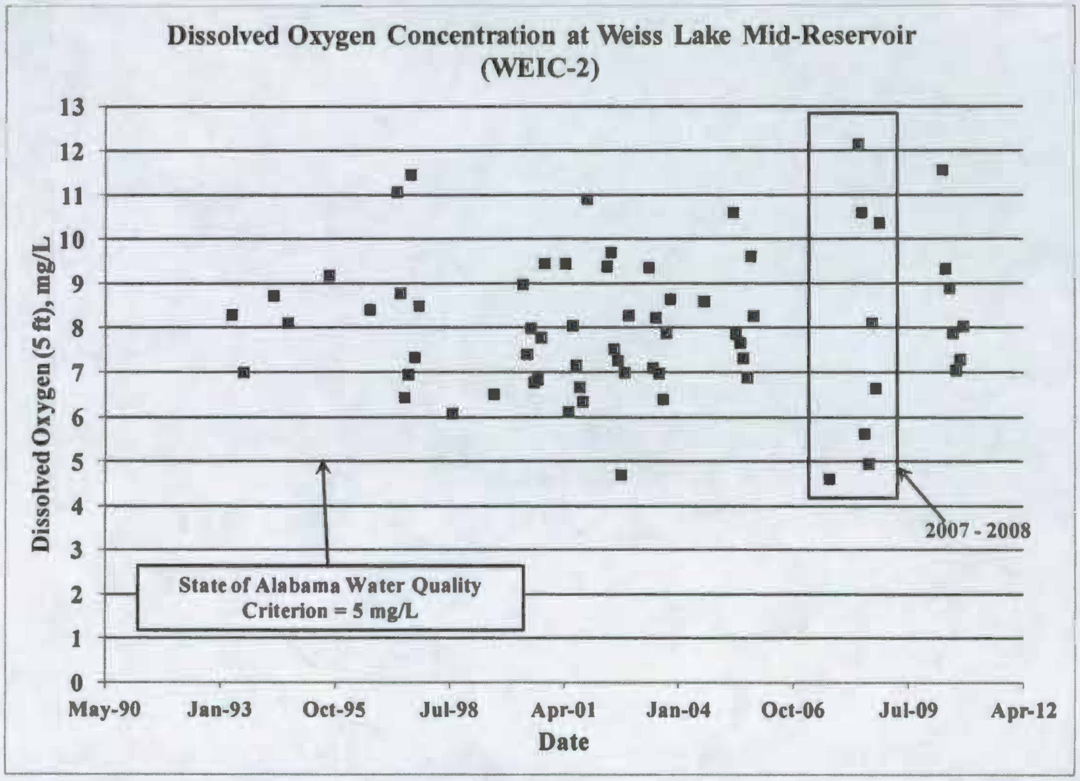


Figure 9.

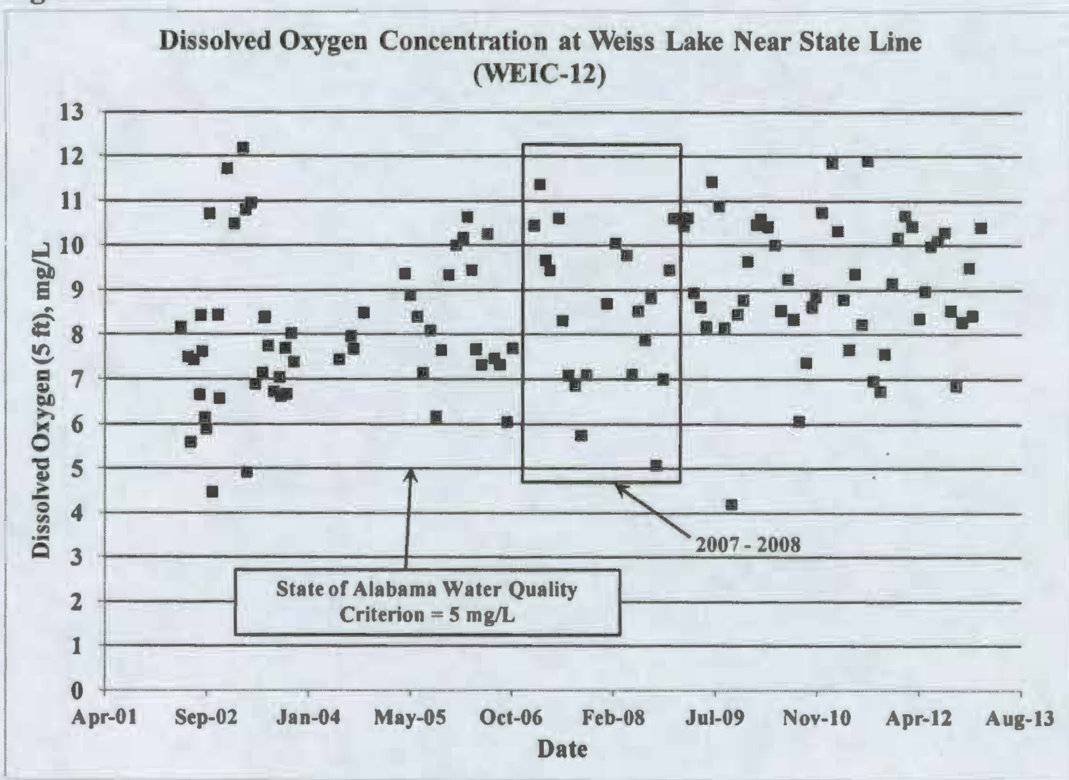


Figure 10.

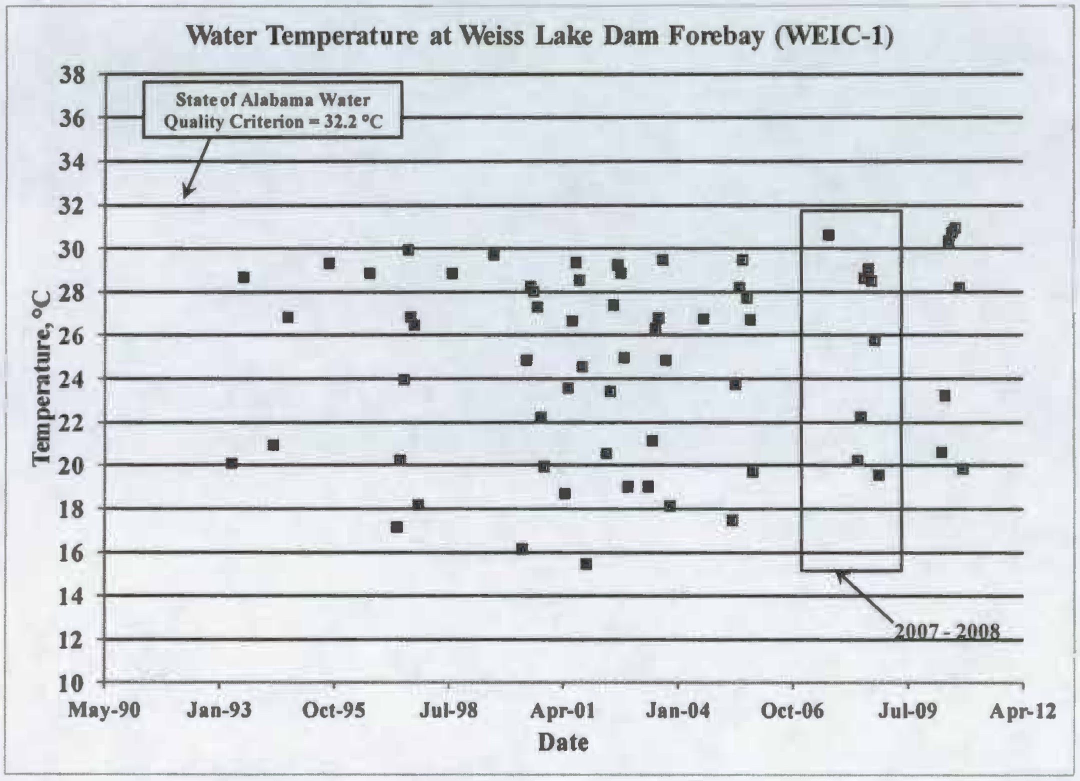


Figure 11.

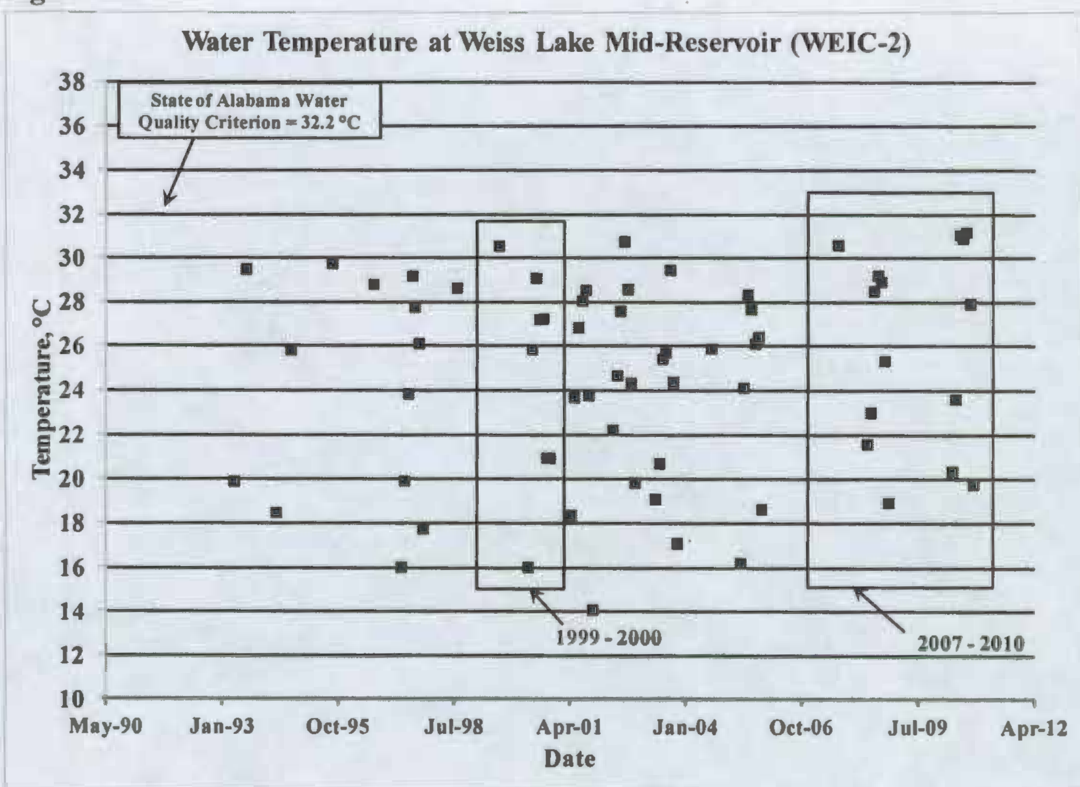
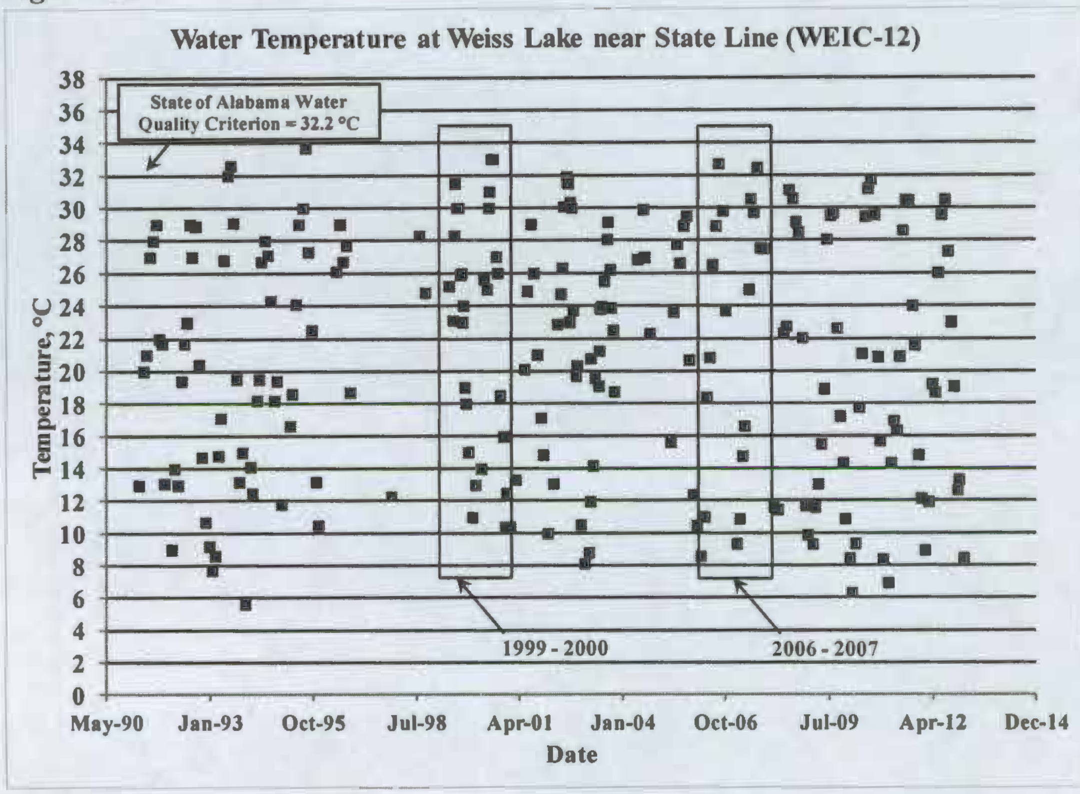


Figure 12.

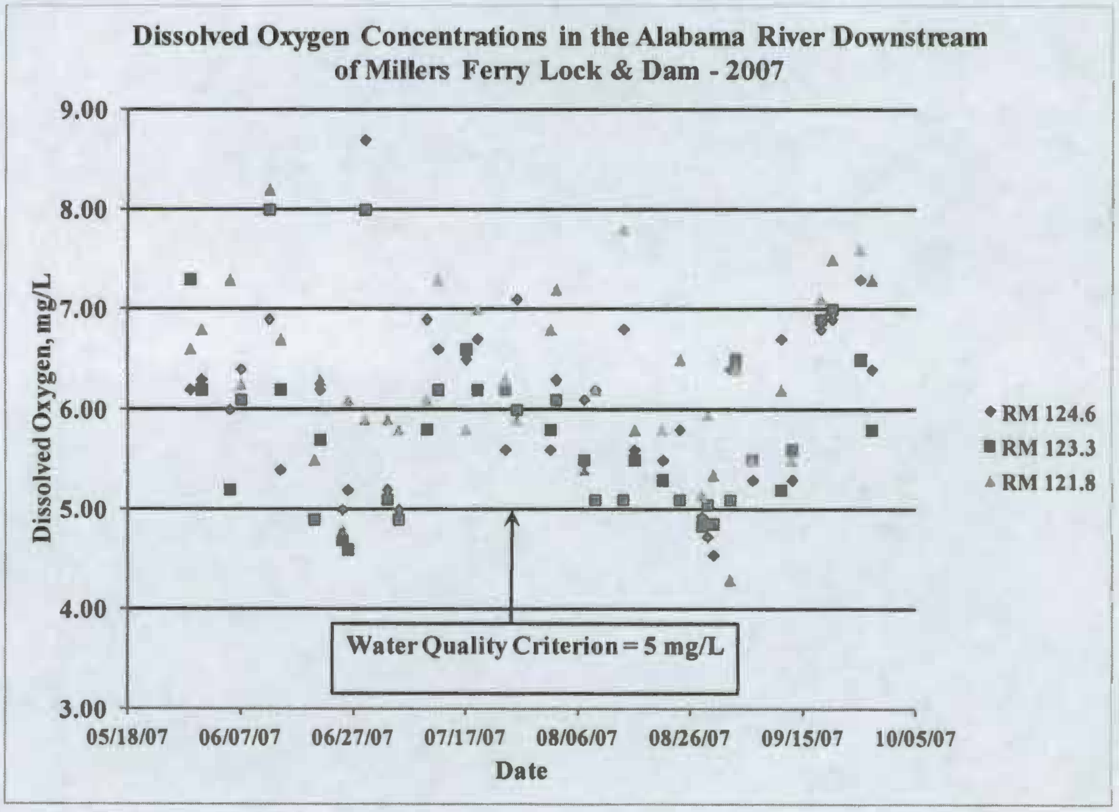


(Water quality data for other reservoirs in the Coosa, Tallapoosa, and Alabama River basins is included as Attachment 5.) The historical water quality data demonstrates that reductions in flows as proposed under the preferred alternative are likely to adversely impact downstream water quality and result in violations of water quality standards. The DEIS concedes this point. (DEIS pp. 6-112 — 6-118). The Corps is thereby violating its obligation to "[e]nsure that the project and its operation offer the lowest stress possible to the aquatic environment" and to "[e]nsure that water quality, as affected by the project and its operation, is suitable for project purposes, existing water uses, and public health and safety and is in compliance with applicable Federal and state water quality standards." ER 1110-2-8154 at 3-4.

3. The importance of a routine water quality monitoring and reporting program was highlighted during the 2007 drought when water quality concerns on the Alabama River below the Millers Ferry Lock and Dam resulted in changes to the USACOE's operation of the hydropower facility.

These changes became necessary after low dissolved oxygen conditions in the Alabama River upstream of the International Paper mill threatened to require the mill to curtail operations pursuant to requirements in the facility's NPDES permit. (See Part IV of Attachment 6 – Final NPDES Permit AL0002674 – International Paper Company – Pine Hill Containerboard Mill). (Dissolved oxygen data collected by International Paper during 2007 are shown in Figure 13). If the USACOE had been routinely monitoring water quality conditions (DO and temperature) in the Millers Ferry Dam tailrace during the summer of 2007, a more complete understanding of the factors affecting DO resources in the downstream river segment would have been possible, and management actions could have been initiated sooner.

Figure 13.



The USACOE has proposed no water quality monitoring plan (as required by ER 1110-2-8154) to ensure that Plan G does not cause or contribute to violations of Alabama's water quality standards or otherwise result in adverse downstream environmental impacts.

Although the DEIS recognizes that changing conditions may necessitate updates to the Water Control Manual for the ACT, there is no mention of specific monitoring plans to detect these changes. USACOE regulations at ER 1110-2-8154 (Water Quality and Environmental Management for Corps Civil Works Projects) describe specific management objectives for all USACOE projects, including the development and implementation of a water quality data collection program for each project.

Section 8 of the regulation provides:

> Division-wide water quality management programs are required. Specific water quality management objectives must be developed by the districts for each project, and procedures must be outlined and implemented to meet those objectives. These objectives will be included in the project water control plans. These plans must be reviewed and updated as needed but not less than every 10 years. The plans must achieve environmentally sustainable overall use of the resource. The water quality management plans should be scoped to include all areas influencing and influenced by the project. Divisions must ensure that water quality management is an integral part of the water control management program. Division water control/quality elements are responsible for approval of deviations from water control manuals and should provide guidance in developing water quality data collection activities. Divisions should adopt and implement the following general water quality management objectives for all Corps water resource projects:
>
> a. Ensure that water quality, as affected by the project and its operation, is suitable for project purposes, existing water uses, and public health and safety and is in compliance with applicable Federal and state water quality standards."
>
> …
>
> k. Ensure that the project and its operation offer the lowest stress possible to the aquatic environment.

ER 1110-2-8154 at 3-4.

This regulation provides additional detail on the necessary elements of a water quality data collection program and states: "A continuing water quality data collection program is necessary for each Corps project. This data collection is essential in order to understand and manage the environmental resources of the Corps' water projects effectively." *Id.* at 4. Objectives of the water quality data collection program are detailed in Section 10. *Id.* at 4-5. The Corps' preferred alternative fails to include an adequate water quality management program as Corps regulations require. *Id.* at 3.(The full text of ER 1110-2-8154 is included as Attachment 7).

In summary, the Corps' proposed action in the DEIS directly conflicts with the Corps' regulations. As noted above, the Corps' "management responsibilities extend throughout the area influenced by and influencing the water [it] manage[s]." ER 1110-2-8154 at 2. In fulfilling those responsibilities, the Corps has committed to a policy of "protect[ing] all existing and future uses including assimilative capacity, aquatic life, water supply, recreation, industrial use, hydropower, etc." *Id.* Rather than "[e]nsur[ing] that water quality, as affected by the project and its operation, is suitable for project purposes, existing water uses, and public health and safety and is in compliance with applicable Federal and state water quality standards," *id.* at 3, the DEIS concedes that the preferred alternative will have adverse downstream environmental consequences but leaves it to others to deal with those consequences. Such an approach is contrary to the Corps' obligation to comply with its regulations and to "manage its projects in accordance with all applicable Federal and state environmental laws, criteria, and standards." *Id.* at 2.

ADEM appreciates the opportunity to provide comments on the DEIS developed for the ACT Water Control Manual revisions. ADEM stands ready to cooperate in any way possible to ensure that the updated manual provides protection of Alabama's water quality standards while maintaining the necessary flexibility to operate the very complex system of reservoirs in the ACT River basin. ADEM looks forward to assisting where needed in additional efforts to implement an effective water quality monitoring program to ensure that USACOE operation of the ACT system complies with Alabama's water quality regulations.

If there are questions regarding these comments or a need for additional clarification, please contact Mr. Lynn Sisk of the Department's Water Division at (334)271-7826.

Sincerely,

Lance R. LeFleur
Director

LRL/LS/ghe

Enclosures

Affidavit

cc: Glenda Dean, Chief, ADEM Water Division
Lynn Sisk, Chief, ADEM Water Quality Branch
Jim Giattina, Director, EPA Region IV Water Management Division
Linda MacGregor, Chief, Watershed Protection Branch, GA Environmental Protection Division
Bill Pearson, Field Supervisor, Daphne Field Office, US Fish and Wildlife Service

Attachment 1

ADEM Admin Code Chapter 335-6-10

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
WATER DIVISION - WATER QUALITY PROGRAM

CHAPTER 335-6-10
WATER QUALITY CRITERIA

TABLE OF CONTENTS

335-6-10-.01 **Purpose.**

(1) Title 22, Section 22-22-1 et seq., Code of Alabama 1975, includes as its purpose "... to conserve the waters of the State and to protect, maintain and improve the quality thereof for public water supplies, for the propagation of wildlife, fish and aquatic life and for domestic, agricultural, industrial, recreational and other legitimate beneficial uses; to provide for the prevention, abatement and control of new or existing water pollution; and to cooperate with other agencies of the State, agencies of other states and the federal government in carrying out these objectives."

(2) Water quality criteria, covering all legitimate water uses, provide the tools and means for determining the manner in which waters of the State may be best utilized, provide a guide for determining waste treatment requirements, and provide the basis for standards of quality for State waters and portions thereof. Water quality criteria are not intended to freeze present uses of water, nor to exclude other uses not now possible. They are not a device to insure the lowest common denominator of water quality, but to encourage prudent use of the State's water resources and to enhance their quality and productivity commensurate with the stated purpose of Title 22, Section 22-22-1 et seq., Code of Alabama 1975.

(3) Water quality criteria herein set forth have been developed by the Commission for those uses of surface waters known and expected to exist over the State. They are based on present scientific knowledge, experience and judgment. Characteristics or parameters included in the criteria are those of

fundamental significance to a determination of water quality and are those which are and can be routinely monitored and compared to data that are generally available. It is the intent that these criteria will be applied only after reasonable opportunity for mixture of wastes with receiving waters has been afforded. The reasonableness of the opportunity for mixture of wastes and receiving waters shall be judged on the basis of the physical characteristics of the receiving waters and approval by the Department of the method in which the discharge is physically made.

Author: James E. McIndoe.
Statutory Authority: Code of Alabama 1975, §§ 22-22-9, 22-22A-5, 22-22A-6, 22-22A-8.
History: May 5, 1967. **Amended:** June 19, 1967; July 17, 1972; February 26, 1973; May 30, 1977; December 19, 1977; February 4, 1981; March 2, 1990; April 3, 1991.

335-6-10-.02 Definitions.

(1) "Commission" means the Environmental Management Commission, established by the Environmental Management Act, Code of Alabama 1975, §§ 22-22A-1 to 22-22A-16.

(2) "Department" means the Alabama Department of Environmental Management, established by the Alabama Environmental Management Act, Code of Alabama 1975, §§ 22-22A-1 to 22-22A-16.

(3) "Existing Uses" means those legitimate beneficial uses of a water body attained in fact on or after November 28, 1975, whether or not they are included as classified uses in ADEM Administrative Code rule 335-6-11-.02.

(4) "Industrial Waste" means liquid or other wastes resulting from any process of industry, manufacture, trade or business or from the development of natural resources.

(5) "NPDES" means National Pollutant Discharge Elimination System.

(6) "Other Wastes" means all other substances, whether liquid, gaseous or solid, from all other sources including, but not limited to, any vessels, or other conveyances traveling or using the waters of this State, except industrial wastes or sewage, which may cause pollution of any waters of the State.

(7) "Pollutant" includes but is not limited to dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. Pollutant does not mean (a) sewage from vessels; or (b) water, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in

association with oil or gas production and disposed of in a well, if the well used either to facilitate production or for disposal purposes is approved by authority of the State, and if the Department determines that such injection or disposal will not result in the degradation of ground or surface water resources.

(8) "Pollution" means the discharge of a pollutant or combination of pollutants.

(9) "Sewage" means water-carried human wastes from residences, buildings, industrial establishments or other places including, but not limited to, any vessels, or other conveyances traveling or using the waters of this State, together with such ground, surface, storm or other waters as may be present.

(10) "State Waters" or "Waters of the State" 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.

Author: James E. McIndoe.
Statutory Authority: Code of Alabama 1975, §§ 22-22-9, 22-22A-5, 22-22A-6, 22-22A-8.
History: May 5, 1967. **Amended:** June 19, 1967; July 17, 1972; February 26, 1973; May 30, 1977; December 19, 1977; February 4, 1981; March 2, 1990; April 3, 1991.

335-6-10-.03 Water Use Classifications.

(1) Outstanding Alabama Water

(2) Public Water Supply

(3) Swimming and Other Whole Body Water-Contact Sports

(4) Shellfish Harvesting

(5) Fish and Wildlife

(6) Limited Warmwater Fishery

(7) Agricultural and Industrial Water Supply

Author: James E. McIndoe.
Statutory Authority: Code of Alabama 1975, §§ 22-22-9, 22-22A-5, 22-22A-6, 22-22A-8.
History: May 5, 1967. **Amended:** June 19, 1967; July 17, 1972; February 26, 1973; May 30, 1977; December 19, 1977; February 4, 1981; December 30, 1992; September 7, 2000.

335-6-10-.04 **Antidegradation Policy.**

(1) The purpose and intent of the water quality standards is to conserve the waters of the State of Alabama and to protect, maintain and improve the quality thereof for public water supplies, for the propagation of wildlife, fish and aquatic life, and for domestic, agricultural, industrial, recreational and other legitimate beneficial uses; and to provide for the prevention, abatement and control of new or existing water pollution.

(2) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected. Uses and the water quality to support such uses were established through public participation in the initial establishment, and periodic review, of water quality standards. Should the Department determine that an existing use is not encompassed in the classification of a waterbody, that use shall be recognized.

(3) Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected, except that a new or increased discharge of pollutants may be allowed, after intergovernmental coordination and public participation pursuant to applicable permitting and management processes, when the person proposing the new or increased discharge of pollutants demonstrates that the proposed discharge is necessary for important economic or social development. In such cases, water quality adequate to protect existing uses fully shall be maintained. All new and existing point source discharges shall be subject to the highest statutory and regulatory requirements, and nonpoint source discharges shall use best management practices adequate to protect water quality consistent with the Department's nonpoint source control program.

(4) Where high quality waters constitute an outstanding National resource, such as waters of national and state parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

(5) Developments constituting a new or increased source of thermal pollution shall assure that such release will not impair the propagation of a balanced indigenous population of fish and aquatic life.

(6) In applying these policies and requirements, the State of Alabama will recognize and protect the interests of the federal government. Toward this end the Department will consult and cooperate with the Environmental Protection Agency on all matters affecting the federal interest.

Author: James E. McIndoe.
Statutory Authority: Code of Alabama 1975, §§ 22-22-9, 22-22A-5, 22-22A-6, 22-22A-8.
History: May 5, 1967. **Amended:** June 19, 1967; July 17, 1972; February 26, 1973; May 30, 1977; December 19, 1977; February 4, 1981; March 2, 1990; April 3, 1991.

335-6-10-.05 General Conditions Applicable to All Water Quality Criteria.

(1) The quality of any waters receiving sewage, industrial wastes or other wastes, regardless of their use, shall be such as will not cause the best usage of any other waters to be adversely affected by such sewage, industrial wastes or other wastes.

(2) Tests or analytical procedures to determine compliance or noncompliance with water quality criteria shall be in accordance with the methods specified in 40 CFR 136.3 (2003). Where other tests or analytical procedures are found to be more applicable and satisfactory, these may be used upon acceptance and approval by the Department.

(3) In making any tests or analytical determinations to determine compliance or noncompliance with water quality criteria, samples shall be collected in such manner and at such locations approved by a duly authorized representative of the Department as being representative of the receiving waters after reasonable opportunity for dilution and mixture with the wastes discharged thereto. Mixing zones, i.e., that portion of the receiving waters where mixture of effluents and natural waters take place, shall not preclude passage of free-swimming and drifting aquatic organisms to the extent that their populations are significantly affected.

(4) Natural waters may, on occasion, have characteristics outside of the limits established by these criteria. The criteria contained herein relate to the condition of waters as affected by the discharge of sewage, industrial wastes or other wastes, not to conditions resulting from natural forces.

(5) All waters, where attainable, shall be suitable for recreation in and on the waters during the months of June through September except that recreational use is not recommended in the vicinity of discharges or other conditions which the Department or the Department of Public Health does not control.

(6) Where necessary to attain compliance with a new water quality standard, existing permits for the discharge of wastewaters shall be modified or reissued to limit the discharge of a substance causing or contributing to the failure of a water of the state to meet the new standard. Compliance with the modified limit shall be required as soon as practical, but in all cases within three years of the adoption of the new standard.

Author: James E. McIndoe.
Statutory Authority: Code of Alabama 1975, §§ 22-22-9, 22-22A-5, 22-22A-6, 22-22A-8.
History: May 5, 1967. **Amended:** June 19, 1967; July 17, 1972; February 26, 1973; May 30, 1977; December 19, 1977; February 4, 1981; March 2, 1990; April 3, 1991; January 14, 2005.

335-6-10-.06 Minimum Conditions Applicable to All State Waters. The following minimum conditions are applicable to all State waters, at all places and at all times, regardless of their uses:

(a) State waters shall be free from substances attributable to sewage, industrial wastes or other wastes that will settle to form bottom deposits which are unsightly, putrescent or interfere directly or indirectly with any classified water use.

(b) State waters shall be free from floating debris, oil, scum, and other floating materials attributable to sewage, industrial wastes or other wastes in amounts sufficient to be unsightly or interfere directly or indirectly with any classified water use.

(c) State waters shall be free from substances attributable to sewage, industrial wastes or other wastes in concentrations or combinations which are toxic or harmful to human, animal or aquatic life to the extent commensurate with the designated usage of such waters.

Author: James E. McIndoe.
Statutory Authority: Code of Alabama 1975, §§ 22-22-9, 22-22A-5, 22-22A-6, 22-22A-8.
History: May 5, 1967. **Amended:** June 19, 1967; July 17, 1972; February 26, 1973; May 30, 1977; December 19, 1977; February 4, 1981.

335-6-10-.07 Toxic Pollutant Criteria Applicable to State Waters.

(1) The U. S. Environmental Protection Agency has listed the chemical constituents given in Table 1 as toxic pollutants pursuant to Section 307(a)(1) of the Federal Water Pollution Control Act (FWPCA). Concentrations of these toxic pollutants in State waters shall not exceed the criteria indicated in Table 1 to the extent commensurate with the designated usage of such waters.

(a) The freshwater and marine aquatic life criteria for certain of the pollutants are dependent on hardness or pH. For these pollutants, the criteria are given by the following equations. In the hardness-dependent equations for metals, a conversion factor converts the total recoverable value to a criterion expressed as the dissolved fraction in the water column. All numeric values listed for metals in Table 1 at the end of this chapter are expressed as dissolved metals unless otherwise noted.

1. Cadmium

(i) freshwater acute aquatic life:

$$\text{conc. } (\mu g/l) = (e^{(1.0166[\ln(\text{hardness in mg/l as } CaCO_3)]-3.924)})(CF); \quad \textbf{(Eq. 1)}$$

conversion factor (CF) = 1.136672-[ln(hardness)(0.041838)]

(ii) freshwater chronic aquatic life:

conc. (µg/l) = $(e^{(0.7409[\ln(\text{hardness in mg/l as } CaCO_3)]-4.719)})(CF)$; **(Eq. 2)**

conversion factor (CF) = 1.101672-[ln(hardness)(0.041838)]

2. Chromium (trivalent)

(i) freshwater acute aquatic life:

conc. (µg/l) = $(e^{(0.8190[\ln(\text{hardness in mg/l as } CaCO_3)]+3.7256)})(CF)$; **(Eq. 3)**

conversion factor (CF) = 0.316

(ii) freshwater chronic aquatic life:

conc. (µg/l) = $(e^{(0.8190[\ln(\text{hardness in mg/l as } CaCO_3)]+0.6848)})(CF)$; **(Eq. 4)**

conversion factor (CF) = 0.860

3. Copper

(i) freshwater acute aquatic life:

conc. (µg/l) = $(e^{(0.9422[\ln(\text{hardness in mg/l as } CaCO_3)]-1.700)})(CF)$; **(Eq. 5)**

conversion factor (CF) = 0.960

(ii) freshwater chronic aquatic life:

conc. (µg/l) = $(e^{(0.8545[\ln(\text{hardness in mg/l as } CaCO_3)]-1.702)})(CF)$; **(Eq. 6)**

conversion factor (CF) = 0.960

4. Lead

(i) freshwater acute aquatic life:

conc. (µg/l) = $(e^{(1.273[\ln(\text{hardness in mg/l as } CaCO_3)]-1.460)})(CF)$; **(Eq. 7)**

conversion factor (CF) = 1.46203-[ln(hardness)(0.145712)]

(ii) freshwater chronic aquatic life:

conc. (µg/l) = $(e^{(1.273[\ln(\text{hardness in mg/l as } CaCO_3)]-4.705)})(CF)$; **(Eq. 8)**

conversion factor (CF) = 1.46203-[ln(hardness)(0.145712)]

5. Nickel

(i) freshwater acute aquatic life:

conc. (µg/l) = $(e^{(0.8460[\ln(\text{hardness in mg/l as } CaCO_3)]+2.255)})(CF)$; **(Eq. 9)** conversion factor (CF) = 0.998

(ii) freshwater chronic aquatic life:

conc. (μg/l) = $(e^{(0.8460[\ln(\text{hardness in mg/l as } CaCO_3)]+0.0584)})(CF)$; **(Eq. 10)**

conversion factor (CF) = 0.997

6. Pentachlorophenol

(i) freshwater acute aquatic life:

conc. (μg/l) = $e^{[1.005(pH)-4.869]}$ **(Eq. 11)**

(ii) freshwater chronic aquatic life:

conc. (μg/l) = $e^{[1.005(pH)-5.134]}$ **(Eq. 12)**

7. Silver

(i) freshwater acute aquatic life:

conc. (μg/l) = $(e^{(1.72[\ln(\text{hardness in mg/l as } CaCO_3)]-6.59)})(CF)$; **(Eq. 13)**

conversion factor (CF) = 0.85

8. Zinc

(i) freshwater acute aquatic life:

conc. (μg/l) = $(e^{(0.8473[\ln(\text{hardness in mg/l as } CaCO_3)]+0.884)})(CF)$; **(Eq. 14)**

conversion factor (CF) = 0.978

(ii) freshwater chronic aquatic life:

conc. (μg/l) = $(e^{(0.8473[\ln(\text{hardness in mg/l as } CaCO_3)]+0.884)})(CF)$; **(Eq. 15)**

conversion factor (CF) = 0.986

(b) The marine aquatic life criteria apply only to interstate and coastal waters of the Mobile River - Mobile Bay Basin and interstate and coastal waters of the Perdido River Basin, as identified in rule 335-6-11-.02 of the Department's regulations. The acute aquatic life criteria apply to all waters of the State. The chronic aquatic life criteria apply only to waters classified Outstanding Alabama Water, Public Water Supply, Swimming and Other Whole Body Water-Contact Sports, Shellfish Harvesting, Fish and Wildlife, and Limited Warmwater Fishery, as identified in rule 335-6-11-.02 of the Department's regulations.

(c) For the purpose of establishing effluent limitations pursuant to chapter 335-6-6 of the Department's regulations, the minimum 7-day low flow that occurs once in 10 years ($7Q_{10}$) shall be the basis for applying the chronic aquatic life criteria, except as noted in rule 335-6-10-.09(6), and the minimum 1-day low flow that occurs once in 10 years ($1Q_{10}$) shall be the basis for applying the acute aquatic life criteria, except as noted in rule 335-6-10-.09(7)(c)(5). Where a permit specifies a minimum flow greater than $7Q_{10}$, the specified minimum flow may be used as the basis for applying the acute and chronic aquatic life criteria for that permit.

(d) Except as noted in Table 1, two human health criteria are provided for each pollutant--a criterion for consumption of water and fish, and a criterion for consumption of fish only. For certain pollutants, the human health criterion for consumption of water and fish may represent a maximum contaminant level (MCL) developed under the Safe Drinking Water Act.

1. For pollutants classified by the U.S. Environmental Protection Agency as non-carcinogens, the criteria shall be given by the following equations, except where numeric values are given in Table 1.

(i) Consumption of water and fish:

conc. (mg/l) = (HBW x RfD x RSC)/[(FCR x BCF) + WCR] **(Eq. 16)**

(ii) Consumption of fish only:

conc. (mg/l) = (HBW x RfD x RSC)/(FCR x BCF) **(Eq. 17)**

where (in Equations 16 and 17):

HBW = human body weight, set at 70 kg

RfD = reference dose, in mg/(kg-day)

RSC = relative source contribution

FCR = fish consumption rate, set at 0.030 kg/day

BCF = bioconcentration factor, in l/kg

WCR = water consumption rate, set at 2 l/day

(iii) The values used for the reference dose (RfD) shall be values available through the U.S. Environmental Protection Agency's Integrated Risk Information System (IRIS), and values used for the bioconcentration factor (BCF) and relative source contribution (RSC) shall be values contained in ambient water quality criteria documents published by the U.S. Environmental Protection Agency, except where other values are established pursuant to subparagraph (1)(g). The RfD, RSC, and BCF values for specific pollutants are provided in Appendix A.

2. For pollutants classified by the U.S. Environmental Protection Agency as carcinogens, the criteria shall be given by the following equations, except where numeric values are given in Table 1.

(i) Consumption of water and fish:

conc. (mg/l) = (HBW x RL)/(CPF x [(FCR x BCF) + WCR]) **(Eq. 18)**

(ii) Consumption of fish only:

conc. (mg/l) = (HBW x RL)/(CPF x FCR x BCF) **(Eq. 19)**

where (in Equations 18 and 19):

HBW = human body weight, set at 70 kg

RL = risk level, set at 1×10^{-6} (except for arsenic which is set at 1×10^{-5})

CPF = cancer potency factor, in (kg-day)/mg

FCR = fish consumption rate, set at 0.030 kg/day

BCF = bioconcentration factor, in l/kg

WCR = water consumption rate, set at 2 l/day

(iii) The values used for the cancer potency factor (CPF) shall be values available through the U.S. Environmental Protection Agency's Integrated Risk Information System (IRIS), and values used for the bioconcentration factor (BCF) shall be values contained in ambient water quality criteria documents published by the U.S. Environmental Protection Agency, except where other values are established pursuant to subparagraph (1)(g). The CPF and BCF values for specific pollutants are provided in Appendix A.

(e) The criteria given in Table 1 for consumption of water and fish, or computed from equation 16 or equation 18 for consumption of water and fish, shall apply only to those waters of the State classified Public Water Supply, as identified in rule 335-6-11-.02 of the Department's regulations. The criteria given in Table 1 for consumption of fish only, or computed from equation 17 or equation 19 for consumption of fish only, shall apply to all waters of the State.

(f) For the purposes of establishing effluent limitations pursuant to chapter 335-6-6 of the Department's regulations, the minimum 7-day low flow that occurs once in 10 years ($7Q_{10}$) shall be the basis for applying the human health criteria for pollutants classified as non-carcinogens, and the mean annual flow shall be the basis for applying the human health criteria for pollutants classified as carcinogens; except that where a permit specifies a minimum flow greater than $7Q_{10}$, the specified minimum flow may be used as the basis for applying the human health criteria for pollutants classified as non-carcinogens for that permit.

(g) Numeric criteria may be computed by the Department from equations 16, 17, 18, and 19 using values for the reference dose (RfD), relative source contribution (RSC), cancer potency factor (CPF), and bioconcentration factor (BCF) determined by the Department in consultation with the State Department of Public Health after review of information available from sources other than the U.S. Environmental Protection Agency's Integrated Risk Information System (IRIS) or ambient water quality criteria documents. Such criteria, or the RfD, RSC, CPF, and BCF values used to compute criteria, shall not be effective until adopted following established rulemaking procedures.

Author: James E. McIndoe.
Statutory Authority: Code of Alabama 1975, §§ 22-22-9, 22-22A-5, 22-22A-6, 22-22A-8.
History: March 2, 1990. **Amended:** April 3, 1991; May 28, 1992; August 29, 1994; May 30, 1997; September 7, 2000; January 12, 2001; January 14, 2005; September 21, 2005; May 29, 2007; May 27, 2008; November 25, 2008.

335-6-10-.08 **Waste Treatment Requirements**. The following treatment requirements apply to all industrial waste discharges, sewage treatment plants, and combined waste treatment plants:

(a) As a minimum, secondary treatment or "equivalent to secondary treatment" as provided for in rules and regulations promulgated by the U.S. Environmental Protection Agency at 40 CFR Part 133 (1990), shall be applied to all waste discharges. The term "secondary treatment" is applied to biologically degradable waste and is interpreted to mean a facility which at design flow is capable of removing substantially all floating and settleable solids and to achieve a minimum removal of 85 percent of both the 5-day biochemical oxygen demand and suspended solids which, in the case of municipal wastes, is generally considered to produce an effluent quality containing a BOD_5 concentration of 30 mg/l and a suspended solids concentration of 30 mg/l. For municipal waste treatment facilities with effluent concentration limitations that are more stringent than secondary treatment, minimum removal of 85 percent of both the 5-day biochemical oxygen demand and suspended solids shall be at the Department's discretion. Disinfection, where necessary, will also be required. Waste treatment requirements also include those established under the provisions of Sections 301, 304, 306, and 307 of the Federal Water Pollution Control Act (FWPCA). In addition, the Department may require secondary treatment of biologically degradable industrial wastewaters when the application of guidelines published under federal law do not produce a similar reduction in the parameters of concern. In the application of this requirement, consideration will be given to efficiencies achieved through in-process improvements.

(b) In all cases an analysis of water use and flow characteristics for the receiving stream shall be provided to determine the degree of treatment required. Where indicated by the analysis, a higher degree of treatment may be required.

(c) The minimum 7-day low flow that occurs once in 10 years shall be the basis for design criteria.

Author: James E. McIndoe.
Statutory Authority: Code of Alabama 1975, §§ 22-22-9, 22-22A-5, 22-22A-6, 22-22A-8.
History: May 5, 1967. **Amended:** June 19, 1967; July 17, 1972; February 26, 1973; May 30, 1977; December 19, 1977; February 4, 1981; March 2, 1990; April 3, 1991; January 14, 2005.

335-6-10-.09 Specific Water Quality Criteria.

(1) **OUTSTANDING ALABAMA WATER**

(a) Best usage of waters: activities consistent with the natural characteristics of the waters.

(b) Conditions related to best usage:

1. High quality waters that constitute an outstanding Alabama resource, such as waters of state parks and wildlife refuges and waters of exceptional recreational or ecological significance, may be considered for classification as an Outstanding Alabama Water (OAW).

(c) Specific criteria:

1. Sewage, industrial wastes, or other wastes:

(i) Existing point source discharges to an Outstanding Alabama Water shall be allowed; however, within three years of assignment of the OAW classification or at permit renewal, whichever is later, existing point sources shall be required to meet the effluent limitations specified for new point source discharges in subparagraph (ii) hereof.

(ii) New point source discharges or expansions of existing point source discharges shall not be allowed unless a thorough evaluation of all practicable treatment and disposal alternatives by the permit applicant has demonstrated to the satisfaction of the Department that there is no feasible alternative to discharge to the waters classified OAW. At a minimum, domestic wastewater discharges shall be required to meet monthly average effluent limitations of 15 mg/l biochemical oxygen demand (5-day), 3 mg/l ammonia nitrogen, and 6 mg/l dissolved oxygen, and shall be required to provide disinfection of the effluent. Non-domestic wastewater discharges shall be required to provide a comparably stringent level of treatment as determined by the Department.

(iii) Effluent limitations for new point source discharges or expansions of existing point source discharges to waters upstream of, or tributary to, waters classified OAW shall be established by the Department such that the impact of the discharge within the waters classified OAW is no greater than if the discharge occurred at the OAW boundary at the treatment levels specified in subparagraph (ii) hereof.

(iv) All NPDES permits shall contain toxics limits that will ensure compliance with all applicable water quality standards. Such limits shall be acute and chronic toxicity limits for individual toxic substances, whole effluent toxicity limits, or both. For permittees subject to whole effluent toxicity limitations, both acute and chronic testing will be required. Whole effluent acute toxicity will be demonstrated if the effluent causes more than 10 percent mortality of test organisms when tested at an effluent concentration of 100 percent. For permittees whose discharge will result in an in-stream waste concentration of 10 percent or more, whole effluent chronic toxicity limits will be based on an in-stream concentration of 100 percent; for permittees whose discharge will result in an in-stream waste concentration of less than 10 percent, whole effluent chronic toxicity limits will be based on the in-stream waste concentration.

(v) Nonpoint source discharges shall use best management practices adequate to protect water quality consistent with the Department's nonpoint source control program.

(vi) All NPDES permits and nonpoint sources shall incorporate or employ water pollution prevention or waste reduction measures as established by the Department.

2. pH: sewage, industrial wastes or other wastes shall not cause the pH to deviate more than one unit from the normal or natural pH, nor be less than 6.0, nor greater than 8.5. For salt waters and estuarine waters to which this classification is assigned, wastes as herein described shall not cause the pH to deviate more than one unit from the normal or natural pH, nor be less than 6.5, nor greater than 8.5.

3. Temperature:

(i) The maximum temperature in streams, lakes, and reservoirs, other than those in river basins listed in subparagraph (ii) hereof, shall not exceed 90 °F.

(ii) The maximum temperature in streams, lakes, and reservoirs in the Tennessee and Cahaba River Basins, and for that portion of the Tallapoosa River Basin from the tailrace of Thurlow Dam at Tallassee downstream to the junction of the Coosa and Tallapoosa Rivers which has been classified by the Alabama Department of Conservation and Natural Resources as supporting smallmouth bass, sauger, or walleye, shall not exceed 86 °F.

(iii) The maximum in-stream temperature rise above ambient water temperature due to the addition of artificial heat by a discharger shall not exceed 5 °F in streams, lakes, and reservoirs in non-coastal and non-estuarine areas.

(iv) The maximum in-stream temperature rise above ambient water temperature due to the addition of artificial heat by a discharger shall not exceed 4 °F in coastal or estuarine waters during the period October through May, nor shall the rise exceed 1.5 °F during the period June through September.

(v) In lakes and reservoirs there shall be no withdrawal from, nor discharge of heated waters to, the hypolimnion unless it can be shown that such discharge or withdrawal will be beneficial to water quality.

(vi) In all waters the normal daily and seasonal temperature variations that were present before the addition of artificial heat shall be maintained, and there shall be no thermal block to the migration of aquatic organisms.

(vii) Thermal permit limitations in NPDES permits may be less stringent than those required by subparagraphs (i) - (iv) hereof when a showing by the discharger has been made pursuant to Section 316 of the Federal Water Pollution Control Act (FWPCA), 33 U.S.C. § 1251 et seq. or pursuant to a study of an equal or more stringent nature required by the State of Alabama authorized by Title 22, Section 22-22-9(c), Code of Alabama 1975, that such limitations will assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife, in and on the body of water to which the discharge is made. Any such demonstration shall take into account the interaction of the thermal discharge component with other pollutants discharged.

4. Dissolved oxygen:

(i) For a diversified warm water biota, including game fish, daily dissolved oxygen concentrations shall not be less than 5.5 mg/l at all times; except under extreme conditions due to natural causes, it may range between 5.5 mg/l and 4 mg/l, provided that the water quality is favorable in all other parameters. The normal seasonal and daily fluctuations shall be maintained above these levels. In no event shall the dissolved oxygen level be less than 4 mg/l due to hydroelectric turbine discharges from existing hydroelectric generation impoundments. All new hydroelectric generation impoundments, including addition of new hydroelectric generation units to existing impoundments, shall be designed so that the discharge will contain at least 5.5 mg/l dissolved oxygen where practicable and technologically possible. The Environmental Protection Agency, in cooperation with the State of Alabama and parties responsible for impoundments, shall develop a program to improve the design of existing facilities.

(ii) In coastal waters, surface dissolved oxygen concentrations shall not be less than 5.5 mg/l, except where natural phenomena cause the value to be depressed.

(iii) In estuaries and tidal tributaries, dissolved oxygen concentrations shall not be less than 5.5 mg/l, except in dystrophic waters or where natural conditions cause the value to be depressed.

(iv) In the application of dissolved oxygen criteria referred to above, dissolved oxygen shall be measured at a depth of 5 feet in waters 10 feet or greater in depth; and for those waters less than 10 feet in depth, dissolved oxygen criteria will be applied at mid-depth.

5. Toxic substances attributable to sewage, industrial wastes, or other wastes: only such amounts, whether alone or in combination with other substances, as will not exhibit acute toxicity or chronic toxicity, as demonstrated by effluent toxicity testing or by application of numeric criteria given in rule 335-6-10-.07, to fish and aquatic life, including shrimp and crabs in estuarine or salt waters or the propagation thereof.

6. Taste, odor, and color-producing substances attributable to sewage, industrial wastes, or other wastes: only such amounts, whether alone or in combination with other substances, as will not exhibit acute toxicity or chronic toxicity, as demonstrated by effluent toxicity testing or by application of numeric criteria given in rule 335-6-10-.07, to fish and aquatic life, including shrimp and crabs in estuarine and salt waters or adversely affect the propagation thereof; impair the palatability or marketability of fish and wildlife or shrimp and crabs in estuarine and salt waters; or unreasonably affect the aesthetic value of waters for any use under this classification.

7. Bacteria: in non-coastal waters, bacteria of the *E. coli* group shall not exceed a geometric mean of 126 colonies/100 ml nor exceed a maximum of 235 colonies/100 ml in any sample. In coastal waters, bacteria of the enterococci group shall not exceed a geometric mean of 35 colonies/100 ml nor exceed a maximum of 104 colonies/100 ml in any sample. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours.

8. Radioactivity: the concentrations of radioactive materials present shall not exceed the requirements of the State Department of Public Health.

9. Turbidity: there shall be no turbidity of other than natural origin that will cause substantial visible contrast with the natural appearance of waters or interfere with any beneficial uses which they serve. Furthermore, in no case shall turbidity exceed 50 Nephelometric units above background. Background will be interpreted as the natural condition of the receiving waters without the influence of man-made or man-induced causes. Turbidity levels caused by natural runoff will be included in establishing background levels.

(2) **PUBLIC WATER SUPPLY**

(a) Best usage of waters: source of water supply for drinking or food-processing purposes.*

(b) Conditions related to best usage: the waters, if subjected to treatment approved by the Department equal to coagulation, sedimentation, filtration and disinfection, with additional treatment if necessary to remove naturally present impurities, and which meet the requirements of the Department, will be considered safe for drinking or food-processing purposes.

(c) Other usage of waters: it is recognized that the waters may be used for incidental water contact and recreation during June through September, except that water contact is strongly discouraged in the vicinity of discharges or other conditions beyond the control of the Department or the Alabama Department of Public Health.

(d) Conditions related to other usage: the waters, under proper sanitary supervision by the controlling health authorities, will meet accepted standards of water quality for outdoor swimming places and will be considered satisfactory for swimming and other whole body water-contact sports.

(e) Specific criteria:

1. Sewage, industrial wastes, or other wastes: none which are not effectively treated or controlled in accordance with rule 335-6-10-.08.

2. pH: sewage, industrial wastes or other wastes shall not cause the pH to deviate more than one unit from the normal or natural pH, nor be less than 6.0, nor greater than 8.5.

3. Temperature:

(i) The maximum temperature in streams, lakes, and reservoirs, other than those in river basins listed in subparagraph (ii) hereof, shall not exceed 90 °F.

(ii) The maximum temperature in streams, lakes, and reservoirs in the Tennessee and Cahaba River Basins, and for that portion of the Tallapoosa River Basin from the tailrace of Thurlow Dam at Tallassee downstream to the junction of the Coosa and Tallapoosa Rivers which has been designated by the Alabama Department of Conservation and Natural Resources as supporting smallmouth bass, sauger, or walleye, shall not exceed 86 °F.

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* **NOTE:** In determining the safety or suitability of waters for use as sources of water supply for drinking or food-processing purposes after approved treatment, the Commission will be guided by the physical and chemical standards specified by the Department.

(iii) The maximum in-stream temperature rise above ambient water temperature due to the addition of artificial heat by a discharger shall not exceed 5 °F in streams, lakes, and reservoirs in non-coastal and non-estuarine areas.

(iv) The maximum in-stream temperature rise above ambient water temperature due to the addition of artificial heat by a discharger shall not exceed 4 °F in coastal or estuarine waters during the period October through May, nor shall the rise exceed 1.5 °F during the period June through September.

(v) In lakes and reservoirs there shall be no withdrawal from, nor discharge of heated waters to, the hypolimnion unless it can be shown that such discharge or withdrawal will be beneficial to water quality.

(vi) In all waters the normal daily and seasonal temperature variations that were present before the addition of artificial heat shall be maintained, and there shall be no thermal block to the migration of aquatic organisms.

(vii) Thermal permit limitations in NPDES permits may be less stringent than those required by subparagraphs (i) - (iv) hereof when a showing by the discharger has been made pursuant to Section 316 of the Federal Water Pollution Control Act (FWPCA), 33 U.S.C.§ 1251 et seq. or pursuant to a study of an equal or more stringent nature required by the State of Alabama authorized by Title 22, Section 22-22-9(c), Code of Alabama, 1975, that such limitations will assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife, in and on the body of water to which the discharge is made. Any such demonstration shall take into account the interaction of the thermal discharge component with other pollutants discharged.

4. Dissolved oxygen:

(i) For a diversified warm water biota, including game fish, daily dissolved oxygen concentrations shall not be less than 5 mg/l at all times; except under extreme conditions due to natural causes, it may range between 5 mg/l and 4 mg/l, provided that the water quality is favorable in all other parameters. The normal seasonal and daily fluctuations shall be maintained above these levels. In no event shall the dissolved oxygen level be less than 4 mg/l due to discharges from existing hydroelectric generation impoundments. All new hydroelectric generation impoundments, including addition of new hydroelectric generation units to existing impoundments, shall be designed so that the discharge will contain at least 5 mg/l dissolved oxygen where practicable and technologically possible. The Environmental Protection Agency, in cooperation with the State of Alabama and parties responsible for impoundments, shall develop a program to improve the design of existing facilities.

(ii) In coastal waters, surface dissolved oxygen concentrations shall not be less than 5 mg/l, except where natural phenomena cause the value to be depressed.

(iii) In estuaries and tidal tributaries, dissolved oxygen concentrations shall not be less than 5 mg/l, except in dystrophic waters or where natural conditions cause the value to be depressed.

(iv) In the application of dissolved oxygen criteria referred to above, dissolved oxygen shall be measured at a depth of 5 feet in waters 10 feet or greater in depth; and for those waters less than 10 feet in depth, dissolved oxygen criteria will be applied at mid-depth.

5. Toxic substances; color producing; heated liquids; or other deleterious substances attributable to sewage, industrial wastes, or other wastes: only such amounts, whether alone or in combination with other substances, and only such temperatures as will not render the waters unsafe or unsuitable as a source of water supply for drinking or food-processing purposes, or exhibit acute toxicity or chronic toxicity, as demonstrated by effluent toxicity testing or by application of numeric criteria given in rule 335-6-10-.07, to fish, wildlife and aquatic life, or adversely affect the aesthetic value of waters for any use under this classification.

6. Taste and odor producing substances attributable to sewage, industrial wastes, or other wastes: only such amounts, whether alone or in combination with other substances or wastes, as will not cause taste and odor difficulties in water supplies which cannot be corrected by treatment as specified under subparagraph (b), or impair the palatability of fish.

7. Bacteria:

(i) In non-coastal waters, bacteria of the *E. coli* group shall not exceed a geometric mean of 548 colonies/100 ml; nor exceed a maximum of 2,507 colonies/100 ml in any sample. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours. In coastal waters, bacteria of the enterococci group shall not exceed a maximum of 275 colonies/100 ml in any sample.

(ii) For incidental water contact and recreation during June through September, the bacterial quality of water is acceptable when a sanitary survey by the controlling health authorities reveals no source of dangerous pollution and when the geometric mean *E. coli* organism density does not exceed 126 colonies/100 ml nor exceed a maximum of 487 colonies / 100 ml in any single sample in non-coastal waters. In coastal waters, bacteria of the enterococci group shall not exceed a geometric mean of 35 colonies/100 ml nor exceed a maximum of 158 colonies/100 ml in any sample. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours. When the geometric mean bacterial organism density exceeds these levels, the bacterial water quality shall be considered acceptable only if a second detailed sanitary survey and evaluation discloses no significant public health risk in the use of the waters. Waters in the immediate vicinity of discharges of sewage or other wastes likely to contain bacteria harmful to humans, regardless of the degree of treatment afforded these wastes, are not acceptable for swimming or other whole body water-contact sports.

8. Radioactivity: no radionuclide or mixture of radionuclides shall be present at concentrations greater than those specified by the requirements of the State Department of Public Health.

9. Turbidity: there shall be no turbidity of other than natural origin that will cause substantial visible contrast with the natural appearance of waters or interfere with any beneficial uses which they serve. Furthermore, in no case shall turbidity exceed 50 Nephelometric units above background. Background will be interpreted as the natural condition of the receiving waters, without the influence of man-made or man-induced causes. Turbidity levels caused by natural runoff will be included in establishing background levels.

(3) **SWIMMING AND OTHER WHOLE BODY WATER-CONTACT SPORTS**

(a) Best usage of waters: swimming and other whole body water-contact sports.*

(b) Conditions related to best usage: the waters, under proper sanitary supervision by the controlling health authorities, will meet accepted standards of water quality for outdoor swimming places and will be considered satisfactory for swimming and other whole body water-contact sports. The quality of waters will also be suitable for the propagation of fish, wildlife and aquatic life. The quality of salt waters and estuarine waters to which this classification is assigned will be suitable for the propagation and harvesting of shrimp and crabs.

(c) Specific criteria:

1. Sewage, industrial wastes, or other wastes: none which are not effectively treated or controlled in accordance with rule 335-6-10-.08.

2. pH: sewage, industrial wastes or other wastes shall not cause the pH to deviate more than one unit from the normal or natural pH, nor be less than 6.0, nor greater than 8.5. For estuarine waters and salt waters to which

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* **NOTE**: In assigning this classification to waters intended for swimming and water-contact sports, the Commission will take into consideration the relative proximity of discharges of wastes and will recognize the potential hazards involved in locating swimming areas close to waste discharges. The Commission will not assign this classification to waters, the bacterial quality of which is dependent upon adequate disinfection of waste and where the interruption of such treatment would render the water unsafe for bathing.

this classification is assigned, wastes as described herein shall not cause the pH to deviate more than one unit from the normal or natural pH, nor be less than 6.5, nor greater than 8.5.

3. Temperature:

(i) The maximum temperature in streams, lakes, and reservoirs, other than those in river basins listed in subparagraph (ii) hereof, shall not exceed 90 °F.

(ii) The maximum temperature in streams, lakes, and reservoirs in the Tennessee and Cahaba River Basins, and for that portion of the Tallapoosa River Basin from the tailrace of Thurlow Dam at Tallassee downstream to the junction of the Coosa and Tallapoosa Rivers which has been designated by the Alabama Department of Conservation and Natural Resources as supporting smallmouth bass, sauger, or walleye, shall not exceed 86 °F.

(iii) The maximum in-stream temperature rise above ambient water temperature due to the addition of artificial heat by a discharger shall not exceed 5 °F in streams, lakes, and reservoirs in non-coastal and non-estuarine areas.

(iv) The maximum in-stream temperature rise above ambient water temperature due to the addition of artificial heat by a discharger shall not exceed 4 °F in coastal or estuarine waters during the period October through May, nor shall the rise exceed 1.5 °F during the period June through September.

(v) In lakes and reservoirs there shall be no withdrawal from, nor discharge of heated waters to, the hypolimnion unless it can be shown that such discharge or withdrawal will be beneficial to water quality.

(vi) In all waters the normal daily and seasonal temperature variations that were present before the addition of artificial heat shall be maintained, and there shall be no thermal block to the migration of aquatic organisms.

(vii) Thermal permit limitations in NPDES permits may be less stringent than those required by subparagraphs (i) - (iv) hereof when a showing by the discharger has been made pursuant to Section 316 of the Federal Water Pollution Control Act (FWPCA), 33 U.S.C. § 1251 et seq. or pursuant to a study of an equal or more stringent nature required by the State of Alabama authorized by Title 22, Section 22-22-9(c), Code of Alabama, 1975, that such limitations will assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife, in and on the body of water to which the discharge is made. Any such demonstration shall take into account the interaction of the thermal discharge component with other pollutants discharged.

4. Dissolved oxygen:

(i) For a diversified warm water biota, including game fish, daily dissolved oxygen concentrations shall not be less than 5 mg/l at all times; except under extreme conditions due to natural causes, it may range between 5 mg/l and 4 mg/l, provided that the water quality is favorable in all other parameters. The normal seasonal and daily fluctuations shall be maintained above these levels. In no event shall the dissolved oxygen level be less than 4 mg/l due to discharges from existing hydroelectric generation impoundments. All new hydroelectric generation impoundments, including addition of new hydroelectric generation units to existing impoundments, shall be designed so that the discharge will contain at least 5 mg/l dissolved oxygen where practicable and technologically possible. The Environmental Protection Agency, in cooperation with the State of Alabama and parties responsible for impoundments, shall develop a program to improve the design of existing facilities.

(ii) In coastal waters, surface dissolved oxygen concentrations shall not be less than 5 mg/l, except where natural phenomena cause the value to be depressed.

(iii) In estuaries and tidal tributaries, dissolved oxygen concentrations shall not be less than 5 mg/l, except in dystrophic waters or where natural conditions cause the value to be depressed.

(iv) In the application of dissolved oxygen criteria referred to above, dissolved oxygen shall be measured at a depth of 5 feet in waters 10 feet or greater in depth; and for those waters less than 10 feet in depth, dissolved oxygen criteria will be applied at mid-depth.

5. Toxic substances; color producing substances; odor producing substances; or other deleterious substances attributable to sewage, industrial wastes, or other wastes: only such amounts, whether alone or in combination with other substances or wastes, as will not render the water unsafe or unsuitable for swimming and water-contact sports; exhibit acute toxicity or chronic toxicity, as demonstrated by effluent toxicity testing or by application of numeric criteria given in rule 335-6-10-.07, to fish, wildlife, and aquatic life or, where applicable, shrimp and crabs; impair the palatability of fish, or where applicable, shrimp and crabs; impair the waters for any other usage established for this classification or unreasonably affect the aesthetic value of waters for any use under this classification.

6. Bacteria:

(i) Waters in the immediate vicinity of discharges of sewage or other wastes likely to contain bacteria harmful to humans, regardless of the degree of treatment afforded these wastes*, are not acceptable for swimming or other whole body water-contact sports.

(ii) In all other areas, the bacterial quality of water is acceptable when a sanitary survey by the controlling health authorities reveals no source of dangerous pollution and when the geometric mean *E. coli* organism density does not exceed 126 colonies/100 ml nor exceed a maximum of 235 colonies/100 ml in any sample in non-coastal waters. In coastal waters, bacteria of the enterococci group shall not exceed a geometric mean of 35 colonies/100 ml nor exceed a maximum of 104 colonies/100 ml in any sample. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours. When the geometric mean bacterial organism density exceeds these levels, the bacterial water quality shall be considered acceptable only if a second detailed sanitary survey and evaluation discloses no significant public health risk in the use of the waters.

(iii) The policy of nondegradation of high quality waters shall be stringently applied to bacterial quality of recreational waters.

7. Radioactivity: the concentrations of radioactive materials present shall not exceed the requirement of the State Department of Public Health.

8. Turbidity: there shall be no turbidity of other than natural origin that will cause substantial visible contrast with the natural appearance of waters or interfere with any beneficial uses which they serve. Furthermore, in no case shall turbidity exceed 50 Nephelometric units above background. Background will be interpreted as the natural condition of the receiving waters, without the influence of man-made or man-induced causes. Turbidity levels caused by natural runoff will be included in establishing background levels.

(4) **SHELLFISH HARVESTING**

(a) Best usage of waters: propagation and harvesting of shellfish for sale or use as a food product.

(b) Conditions related to best usage: waters will meet the sanitary and bacteriological standards included in the *National Shellfish Sanitation Program (NSSP) Guide for the Control of Molluscan Shellfish: 2007 Revision*, published by the Food and Drug Administration, U.S. Department of Health and Human Services and the requirements of the State Department of Public Health. The

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* **NOTE**: In assigning this classification to waters intended for swimming and water-contact sports, the Commission will take into consideration the relative proximity of discharges of wastes and will recognize the potential hazards involved in locating swimming areas close to waste discharges. The Commission will not assign this classification to waters, the bacterial quality of which is dependent upon adequate disinfection of waste and where the interruption of such treatment would render the water unsafe for bathing.

waters will also be of a quality suitable for the propagation of fish and other aquatic life, including shrimp and crabs.

(c) Other usage of waters: it is recognized that the waters may be used for incidental water contact and recreation during June through September, except that water contact is strongly discouraged in the vicinity of discharges or other conditions beyond the control of the Department or the Alabama Department of Public Health.

(d) Conditions related to other usage: the waters, under proper sanitary supervision by the controlling health authorities, will meet accepted standards of water quality for outdoor swimming places and will be considered satisfactory for swimming and other whole body water-contact sports.

(e) Specific criteria:

1. Sewage, industrial wastes, or other wastes: none which are not effectively treated in accordance with rule 335-6-10-.08.

2. pH: sewage, industrial wastes or other wastes shall not cause the pH to deviate more than one unit from the normal or natural pH, nor be less than 6.5, nor greater than 8.5.

3. Temperature:

(i) The maximum temperature in streams, lakes, and reservoirs, other than those in river basins listed in subparagraph (ii) hereof, shall not exceed 90 °F.

(ii) The maximum temperature in streams, lakes, and reservoirs in the Tennessee and Cahaba River Basins, and for that portion of the Tallapoosa River Basin from the tailrace of Thurlow Dam at Tallassee downstream to the junction of the Coosa and Tallapoosa Rivers which has been designated by the Alabama Department of Conservation and Natural Resources as supporting smallmouth bass, sauger, or walleye, shall not exceed 86 °F.

(iii) The maximum in-stream temperature rise above ambient water temperature due to the addition of artificial heat by a discharger shall not exceed 5 °F in streams, lakes, and reservoirs in non-coastal and non-estuarine areas.

(iv) The maximum in-stream temperature rise above ambient water temperature due to the addition of artificial heat by a discharger shall not exceed 4 °F in coastal or estuarine waters during the period October through May, nor shall the rise exceed 1.5 °F during the period June through September.

(v) In lakes and reservoirs there shall be no withdrawal from, nor discharge of heated waters to, the hypolimnion unless it can be shown that such discharge or withdrawal will be beneficial to water quality.

(vi) In all waters the normal daily and seasonal temperature variations that were present before the addition of artificial heat shall be maintained, and there shall be no thermal block to the migration of aquatic organisms.

(vii) Thermal permit limitations in NPDES permits may be less stringent than those required by subparagraphs (i) - (iv) hereof when a showing by the discharger has been made pursuant to Section 316 of the Federal Water Pollution Control Act (FWPCA), 33 U.S.C. § 1251 et seq. or pursuant to a study of an equal or more stringent nature required by the State of Alabama authorized by Title 22, Section 22-22-9(c), Code of Alabama, 1975, that such limitations will assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife, in and on the body of water to which the discharge is made. Any such demonstration shall take into account the interaction of the thermal discharge component with other pollutants discharged.

4. Dissolved oxygen:

(i) For a diversified warm water biota, including game fish, daily dissolved oxygen concentrations shall not be less than 5 mg/l at all times; except under extreme conditions due to natural causes, it may range between 5 mg/l and 4 mg/l, provided that the water quality is favorable in all other parameters. The normal seasonal and daily fluctuations shall be maintained above these levels. In no event shall the dissolved oxygen level be less than 4 mg/l due to discharges from existing hydroelectric generation impoundments. All new hydroelectric generation impoundments, including addition of new hydroelectric generation units to existing impoundments, shall be designed so that the discharge will contain at least 5 mg/l dissolved oxygen where practicable and technologically possible. The Environmental Protection Agency, in cooperation with the State of Alabama and parties responsible for impoundments, shall develop a program to improve the design of existing facilities.

(ii) In coastal waters, surface dissolved oxygen concentrations shall not be less than 5 mg/l, except where natural phenomena cause the value to be depressed.

(iii) In estuaries and tidal tributaries, dissolved oxygen concentrations shall not be less than 5 mg/l, except in dystrophic waters or where natural conditions cause the value to be depressed.

(iv) In the application of dissolved oxygen criteria referred to above, dissolved oxygen shall be measured at a depth of 5 feet in waters 10 feet or greater in depth; and for those waters less than 10 feet in depth, dissolved oxygen criteria will be applied at mid-depth.

5. Toxic substances attributable to sewage, industrial wastes, or other wastes: only such amounts, whether alone or in combination with other substances, as will not exhibit acute toxicity or chronic toxicity, as demonstrated by effluent toxicity testing or by application of numeric criteria

given in rule 335-6-10-.07, to fish and aquatic life, including shrimp and crabs; or affect the marketability of fish and shellfish, including shrimp and crabs.

6. Color, taste, and odor-producing substances and other deleterious substances attributable to sewage, industrial wastes, or other wastes: only such amounts, whether alone or in combination with other substances, as will not exhibit acute toxicity or chronic toxicity, as demonstrated by effluent toxicity testing or by application of numeric criteria given in rule 335-6-10-.07, to fish and shellfish, including shrimp and crabs; adversely affect marketability or palatability of fish and shellfish, including shrimp and crabs; or unreasonably affect the aesthetic value of waters for any use under this classification.

7. Bacteria:

(i) Not to exceed the limits specified in the *National Shellfish Sanitation Program (NSSP) Guide for the Control of Molluscan Shellfish: 2007 Revision,* published by the Food and Drug Administration, U. S. Department of Health and Human Services.

(ii) For incidental water contact and recreation during June through September, the bacterial quality of water is acceptable when a sanitary survey by the controlling health authorities reveals no source of dangerous pollution and when the geometric mean *E. coli* organism density does not exceed 126 colonies/100 ml nor exceed a maximum of 235 colonies/100 ml in any sample in non-coastal waters. In coastal waters, bacteria of the enterococci group shall not exceed a geometric mean of 35 colonies/100 ml nor exceed a maximum of 104 colonies/100 ml in any sample. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours. When the geometric mean bacterial organism density exceeds these levels, the bacterial water quality shall be considered acceptable only if a second detailed sanitary survey and evaluation discloses no significant public health risk in the use of the waters. Waters in the immediate vicinity of discharges of sewage or other wastes likely to contain bacteria harmful to humans, regardless of the degree of treatment afforded these wastes, are not acceptable for swimming or other whole body water-contact sports.

8. Radioactivity: the concentrations of radioactive materials present shall not exceed the requirements of the State Department of Public Health.

9. Turbidity: there shall be no turbidity of other than natural origin that will cause substantial visible contrast with the natural appearance of waters or interfere with any beneficial uses which they serve. Furthermore, in no case shall turbidity exceed 50 Nephelometric units above background. Background will be interpreted as the natural condition of the receiving waters without the influence of man-made or man-induced causes. Turbidity levels caused by natural runoff will be included in establishing background levels.

(5) **FISH AND WILDLIFE**

(a) Best usage of waters: fishing, propagation of fish, aquatic life, and wildlife, and any other usage except for swimming and water-contact sports or as a source of water supply for drinking or food-processing purposes.

(b) Conditions related to best usage: the waters will be suitable for fish, aquatic life and wildlife propagation. The quality of salt and estuarine waters to which this classification is assigned will also be suitable for the propagation of shrimp and crabs.

(c) Other usage of waters: it is recognized that the waters may be used for incidental water contact and recreation during June through September, except that water contact is strongly discouraged in the vicinity of discharges or other conditions beyond the control of the Department or the Alabama Department of Public Health.

(d) Conditions related to other usage: the waters, under proper sanitary supervision by the controlling health authorities, will meet accepted standards of water quality for outdoor swimming places and will be considered satisfactory for swimming and other whole body water-contact sports.

(e) Specific criteria:

1. Sewage, industrial wastes, or other wastes: none which are not effectively treated in accordance with rule 335-6-10-.08.

2. pH: sewage, industrial wastes or other wastes shall not cause the pH to deviate more than one unit from the normal or natural pH, nor be less than 6.0, nor greater than 8.5. For salt waters and estuarine waters to which this classification is assigned, wastes as herein described shall not cause the pH to deviate more than one unit from the normal or natural pH, nor be less than 6.5, nor greater than 8.5.

3. Temperature:

(i) The maximum temperature in streams, lakes, and reservoirs, other than those in river basins listed in subparagraph (ii) hereof, shall not exceed 90° F.

(ii) The maximum temperature in streams, lakes, and reservoirs in the Tennessee and Cahaba River Basins, and for that portion of the Tallapoosa River Basin from the tailrace of Thurlow Dam at Tallassee downstream to the junction of the Coosa and Tallapoosa Rivers which has been designated by the Alabama Department of Conservation and Natural Resources as supporting smallmouth bass, sauger, or walleye, shall not exceed 86 °F.

(iii) The maximum in-stream temperature rise above ambient water temperature due to the addition of artificial heat by a discharger shall not exceed 5 °F in streams, lakes, and reservoirs in non-coastal and non-estuarine areas.

(iv) The maximum in-stream temperature rise above ambient water temperature due to the addition of artificial heat by a discharger shall not exceed 4 °F in coastal or estuarine waters during the period October through May, nor shall the rise exceed 1.5 °F during the period June through September.

(v) In lakes and reservoirs there shall be no withdrawal from, nor discharge of heated waters to, the hypolimnion unless it can be shown that such discharge or withdrawal will be beneficial to water quality.

(vi) In all waters the normal daily and seasonal temperature variations that were present before the addition of artificial heat shall be maintained, and there shall be no thermal block to the migration of aquatic organisms.

(vii) Thermal permit limitations in NPDES permits may be less stringent than those required by subparagraphs (i) - (iv) hereof when a showing by the discharger has been made pursuant to Section 316 of the Federal Water Pollution Control Act (FWPCA), 33 U.S.C. § 1251 et seq. or pursuant to a study of an equal or more stringent nature required by the State of Alabama authorized by Title 22, Section 22-22-9(c), Code of Alabama, 1975, that such limitations will assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife, in and on the body of water to which the discharge is made. Any such demonstration shall take into account the interaction of the thermal discharge component with other pollutants discharged.

4. Dissolved oxygen:

(i) For a diversified warm water biota, including game fish, daily dissolved oxygen concentrations shall not be less than 5 mg/l at all times; except under extreme conditions due to natural causes, it may range between 5 mg/l and 4 mg/l, provided that the water quality is favorable in all other parameters. The normal seasonal and daily fluctuations shall be maintained above these levels. In no event shall the dissolved oxygen level be less than 4 mg/l due to discharges from existing hydroelectric generation impoundments. All new hydroelectric generation impoundments, including addition of new hydroelectric generation units to existing impoundments, shall be designed so that the discharge will contain at least 5 mg/l dissolved oxygen where practicable and technologically possible. The Environmental Protection Agency, in cooperation with the State of Alabama and parties responsible for impoundments, shall develop a program to improve the design of existing facilities.

(ii) In coastal waters, surface dissolved oxygen concentrations shall not be less than 5 mg/l, except where natural phenomena cause the value to be depressed.

(iii) In estuaries and tidal tributaries, dissolved oxygen concentrations shall not be less than 5 mg/l, except in dystrophic waters or where natural conditions cause the value to be depressed.

(iv) In the application of dissolved oxygen criteria referred to above, dissolved oxygen shall be measured at a depth of 5 feet in waters 10 feet or greater in depth; and for those waters less than 10 feet in depth, dissolved oxygen criteria will be applied at mid-depth.

5. Toxic substances attributable to sewage, industrial wastes, or other wastes: only such amounts, whether alone or in combination with other substances, as will not exhibit acute toxicity or chronic toxicity, as demonstrated by effluent toxicity testing or by application of numeric criteria given in rule 335-6-10-.07, to fish and aquatic life, including shrimp and crabs in estuarine or salt waters or the propagation thereof.

6. Taste, odor, and color-producing substances attributable to sewage, industrial wastes, or other wastes: only such amounts, whether alone or in combination with other substances, as will not exhibit acute toxicity or chronic toxicity, as demonstrated by effluent toxicity testing or by application of numeric criteria given in rule 335-6-10-.07, to fish and aquatic life, including shrimp and crabs in estuarine and salt waters or adversely affect the propagation thereof; impair the palatability or marketability of fish and wildlife or shrimp and crabs in estuarine and salt waters; or unreasonably affect the aesthetic value of waters for any use under this classification.

7. Bacteria:

(i) In non-coastal waters, bacteria of the *E. coli* group shall not exceed a geometric mean of 548 colonies/100 ml; nor exceed a maximum of 2,507 colonies/100 ml in any sample. In coastal waters, bacteria of the enterococci group shall not exceed a maximum of 275 colonies/100 ml in any sample. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours.

(ii) For incidental water contact and recreation during June through September, the bacterial quality of water is acceptable when a sanitary survey by the controlling health authorities reveals no source of dangerous pollution and when the geometric mean *E. coli* organism density does not exceed 126 colonies/100 ml nor exceed a maximum of 487 colonies/100 ml in any sample in non-coastal waters. In coastal waters, bacteria of the enterococci group shall not exceed a geometric mean of 35 colonies/100 ml nor exceed a maximum of 158 colonies/100 ml in any sample. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours. When the geometric bacterial coliform organism density exceeds these levels, the bacterial water quality shall be considered acceptable only if a second detailed sanitary survey and evaluation discloses no significant public health risk in the use of the waters. Waters in the immediate vicinity of discharges of sewage or other wastes likely to contain bacteria harmful to humans, regardless of the degree of treatment afforded these wastes, are not acceptable for swimming or other whole body water-contact sports.

8. Radioactivity: the concentrations of radioactive materials present shall not exceed the requirements of the State Department of Public Health.

9. Turbidity: there shall be no turbidity of other than natural origin that will cause substantial visible contrast with the natural appearance of waters or interfere with any beneficial uses which they serve. Furthermore, in no case shall turbidity exceed 50 Nephelometric units above background. Background will be interpreted as the natural condition of the receiving waters without the influence of man-made or man-induced causes. Turbidity levels caused by natural runoff will be included in establishing background levels.

(6) **LIMITED WARMWATER FISHERY**

(a) The provisions of the Fish and Wildlife water use classification at rule 335-6-10-.09(5) shall apply to the Limited Warmwater Fishery water use classification, except as noted below. Unless alternative criteria for a given parameter are provided in paragraph (e) below, the applicable Fish and Wildlife criteria at paragraph 10-.09(5)(e) shall apply year-round. At the time the Department proposes to assign the Limited Warmwater Fishery classification to a specific waterbody, the Department may apply criteria from other classifications within this chapter if necessary to protect a documented, legitimate existing use.

(b) Best usage of waters (May through November): agricultural irrigation, livestock watering, industrial cooling and process water supplies, and any other usage, except fishing, bathing, recreational activities, including water-contact sports, or as a source of water supply for drinking or food-processing purposes.

(c) Conditions related to best usage (May through November):

1. The waters will be suitable for agricultural irrigation, livestock watering, and industrial cooling waters. The waters will be usable after special treatment, as may be needed under each particular circumstance, for industrial process water supplies. The waters will also be suitable for other uses for which waters of lower quality will be satisfactory.

2. This category includes watercourses in which natural flow is intermittent, or under certain conditions non-existent, and which may receive treated wastes from existing municipalities and industries. In such instances, recognition is given to the lack of opportunity for mixture of the treated wastes with the receiving stream for purposes of compliance. It is also understood in considering waters for this classification that urban runoff or natural conditions may impact any waters so classified.

(d) Other usage of waters: none recognized.

(e) Specific criteria:

1. Dissolved oxygen (May through November): treated sewage, industrial wastes, or other wastes shall not cause the dissolved oxygen to be less than 3.0 mg/l. In the application of dissolved oxygen criteria referred to above, dissolved oxygen shall be measured at a depth of 5 feet in waters 10 feet or greater in depth; and for those waters less than 10 feet in depth, dissolved oxygen criteria will be applied at mid-depth.

2. Toxic substances and taste-, odor-, and color-producing substances attributable to treated sewage, industrial wastes, and other wastes: only such amounts as will not render the waters unsuitable for agricultural irrigation, livestock watering, industrial cooling, and industrial process water supply purposes; interfere with downstream water uses; or exhibit acute toxicity or chronic toxicity, as demonstrated by effluent toxicity testing or by application of numeric criteria given in rule 335-6-10-.07, to fish and aquatic life, including shrimp and crabs in estuarine or salt waters or the propagation thereof. For the purpose of establishing effluent limitations pursuant to chapter 335-6-6 of the Department's regulations, the minimum 7-day low flow that occurs once in 2 years ($7Q_2$) shall be the basis for applying the chronic aquatic life criteria. The use of the $7Q_2$ low flow for application of chronic criteria is appropriate based on the historical uses and/or flow characteristics of streams to be considered for this classification.

3. Bacteria: In non-coastal waters, bacteria of the *E. coli* group shall not exceed a geometric mean of 548 colonies/100 ml; nor exceed a maximum of 2,507 colonies/100 ml in any sample. In coastal waters, bacteria of the enterococci group shall not exceed a maximum of 275 colonies/100 ml in any sample. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours.

(7) **AGRICULTURAL AND INDUSTRIAL WATER SUPPLY**

(a) Best usage of waters: agricultural irrigation, livestock watering, industrial cooling and process water supplies, and any other usage, except fishing, bathing, recreational activities, including water-contact sports, or as a source of water supply for drinking or food-processing purposes.

(b) Conditions related to best usage:

(i) The waters, except for natural impurities which may be present therein, will be suitable for agricultural irrigation, livestock watering, industrial cooling waters, and fish survival. The waters will be usable after special treatment, as may be needed under each particular circumstance, for industrial process water supplies. The waters will also be suitable for other uses for which waters of lower quality will be satisfactory.

(ii) This category includes watercourses in which natural flow is intermittent and non-existent during droughts and which may, of necessity, receive treated wastes from existing municipalities and industries, both now and in the future. In such instances, recognition must be given to the lack of opportunity for mixture of the treated wastes with the receiving stream for purposes of compliance. It is also understood in considering waters for this classification that urban runoff or natural conditions may impact any waters so classified.

(c) Specific criteria:

1. Sewage, industrial wastes, or other wastes: none which are not effectively treated or controlled in accordance with rule 335-6-10-.08.

2. pH: sewage, industrial wastes or other wastes shall not cause the pH to deviate more than one unit from the normal or natural pH, nor be less than 6.0, nor greater than 8.5. For salt waters and estuarine waters to which this classification is assigned, wastes as herein described shall not cause the pH to deviate more than one unit from the normal or natural pH, nor be less than 6.5, nor greater than 8.5.

3. Temperature: the maximum temperature rise above natural temperatures due to the addition of artificial heat shall not exceed 5 °F in streams, lakes, and reservoirs, nor shall the maximum water temperature exceed 90 °F.

4. Dissolved oxygen: sewage, industrial wastes, or other wastes shall not cause the dissolved oxygen to be less than 3.0 mg/l. In the application of dissolved oxygen criteria referred to above, dissolved oxygen shall be measured at a depth of 5 feet in waters 10 feet or greater in depth; and for those waters less than 10 feet in depth, dissolved oxygen criteria will be applied at mid-depth.

5. Color, odor, and taste-producing substances, toxic substances, and other deleterious substances, including chemical compounds attributable to sewage, industrial wastes, and other wastes: only such amounts as will not render the waters unsuitable for agricultural irrigation, livestock watering, industrial cooling, industrial process water supply purposes, and fish survival, nor interfere with downstream water uses. For the purpose of establishing effluent limitations pursuant to chapter 335-6-6 of the Department's regulations, the minimum 7-day low flow that occurs once in 10 years ($7Q_{10}$) shall be the basis for applying the acute aquatic life criteria. The use of the $7Q_{10}$ low flow for application of acute criteria is appropriate based on the historical uses and/or flow characteristics of streams to be considered for this classification.

6. Bacteria: In non-coastal waters, bacteria of the E. coli group shall not exceed a geometric mean of 700 colonies/100 ml; nor exceed a maximum of 3,200 colonies/100 ml in any sample. In coastal waters, bacteria of the enterococci group shall not exceed a maximum of 500 colonies/100 ml in any sample. The geometric mean shall be calculated from no less than five samples

collected at a given station over a 30-day period at intervals not less than 24 hours.

7. Radioactivity: the concentrations of radioactive materials present shall not exceed the requirements of the State Department of Public Health.

8. Turbidity: there shall be no turbidity of other than natural origin that will cause substantial visible contrast with the natural appearance of waters or interfere with any beneficial uses which they serve. Furthermore, in no case shall turbidity exceed 50 Nephelometric units above background. Background will be interpreted as the natural condition of the receiving waters without the influence of man-made or man-induced causes. Turbidity levels caused by natural runoff will be included in establishing background levels.

Author: James E. McIndoe.
Statutory Authority: Code of Alabama 1975, §§ 22-22-9, 22-22A-5, 22-22A-6, 22-22A-8.
History: May 5, 1967. **Amended:** June 19, 1967; July 17, 1972; February 26, 1973; May 30, 1977; December 19, 1977; February 4, 1981; March 2, 1990; April 3, 1991; December 30, 1992; September 7, 2000; May 27, 2004; January 14, 2005; January 19, 2010; January 18, 2011.

335-6-10-.10 Special Designations.

(1) **OUTSTANDING NATIONAL RESOURCE WATER**

(a) Designation:

1. High quality waters that constitute an outstanding National resource, such as waters of national and state parks and wildlife refuges and waters of exceptional recreational or ecological significance, may be considered for designation as an Outstanding National Resource Water (ONRW). For waters designated as ONRW, existing water quality shall be maintained and protected.

(b) Specific Criteria:

1. Sewage, industrial wastes or other wastes:

(i) No new point source discharges or expansions of existing point source discharges to Outstanding National Resource Waters shall be allowed.

(ii) Existing point source discharges to the Outstanding National Resource Water shall be allowed provided they are treated or controlled in accordance with applicable laws and regulations.

(iii) New point source discharges or expansions of existing point source discharges to waters upstream of, or tributary to, Outstanding National Resource Waters shall be regulated in accordance with applicable laws and regulations, including compliance with water quality criteria for the use classification applicable to the particular water. However, no new point source discharge or expansion of an existing point source discharge to waters upstream of, or tributary to, Outstanding National Resource Waters shall be allowed if such discharge would not maintain and protect water quality within the Outstanding National Resource Water.

(iv) Nonpoint source discharges shall use best management practices adequate to protect water quality consistent with the Department's nonpoint source control program.

(2) **TREASURED ALABAMA LAKE**

(a) Designation:

1. High quality waters within impoundments and natural lakes that constitute an exceptional resource, such as waters of state parks and wildlife refuges and waters of exceptional whole body water-contact recreation, water supply or rare and extraordinary ecological significance, may be considered for designation as a Treasured Alabama Lake (TAL); provided that such waters are fully supporting their classified uses at the time of the TAL designation. For waters designated as TAL, existing water quality shall be maintained and protected pursuant to the State's Antidegradation Policy and Implementation Procedures in rules 335-6-10-.04 and 335-6-10-.12.

(b) Specific Criteria:

1. Sewage, industrial wastes or other wastes:

(i) Existing point source discharges to a TAL shall be allowed.

(ii) New point source discharges or expansions of existing point source discharges shall not be allowed unless a thorough evaluation of all practicable treatment and disposal alternatives by the permit applicant has demonstrated to the satisfaction of the Department that there is no feasible alternative to discharge to the waters designated TAL. Continuous point source wastewater discharges shall be required to meet water quality based effluent limitations necessary to protect the designated uses of the waters, and shall provide disinfection of the effluent to achieve bacteria levels consistent with the swimming use when the discharge contains domestic sewage. New major continuous point source wastewater discharges or expansions of existing major continuous point source wastewater discharges shall, at a minimum, be required to meet a monthly average effluent limitation of 1.0 mg/l total phosphorus. Stormwater discharges subject to the Department's NPDES regulations shall employ best management practices adequate to protect water quality. Applications for construction stormwater permits shall include a Construction Best Management Practices Plan (CBMPP).

(iii) Nonpoint source discharges shall use best management practices adequate to protect water quality consistent with the Department's nonpoint source control program.

Author: James E. McIndoe; Lynn Sisk.
Statutory Authority: Code of Alabama 1975, §§ 22-22-9, 22-22A-5, 22-22A-6, 22-22A-8.
History: April 3, 1991. **Amended:** May 23, 2011.

335-6-10-.11 Water Quality Criteria Applicable to Specific Lakes.

(1) For certain lakes and reservoirs, waterbody-specific criteria are appropriate to enhance nutrient management. The response to nutrient input may vary significantly lake-to-lake, and for a given lake year-to-year, depending on a number of factors such as rainfall distribution and hydraulic retention time. For this reason, lake nutrient quality targets necessary to maintain and protect existing uses, expressed as chlorophyll *a* criteria, may also vary lake-to-lake. Because the relationship between nutrient input and lake chlorophyll *a* levels is not always well-understood, it may be necessary to revise the criteria as additional water quality data and improved assessment tools become available.

(2) The following lake-specific criteria apply to the waters listed below, in addition to any other applicable criteria commensurate with the designated usage of such waters.

(a) **The Alabama River Basin**

1. Claiborne Lake: those waters impounded by Claiborne Lock and Dam on the Alabama River. The lake has a surface area of 5,930 acres at full pool.

(i) Chlorophyll *a* (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll *a* samples collected monthly April through October shall not exceed 15 μg/l, as measured at the deepest point, main river channel, dam forebay.

2. Dannelly Lake: those waters impounded by Millers Ferry Lock and Dam on the Alabama River. The lake has a surface area of 17,200 acres at full pool.

(i) Chlorophyll *a* (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll *a* samples collected monthly April through October shall not exceed 17 μg/l, as measured at the deepest point, main river channel, dam forebay.

(b) **The Cahaba River Basin**

1. Lake Purdy: those waters impounded by Lake Purdy Dam at the headwaters of the Cahaba River. The lake has a surface area of 1,050 acres at full pool.

(i) Chlorophyll *a* (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of photic-zone composite chlorophyll *a* samples collected monthly April through October shall not exceed 16 µg/l, as measured at the deepest point, main river channel, dam forebay; or 18 µg/l, as measured at the deepest point, main river channel, immediately upstream of the Irondale Bridge.

(c) **The Chattahoochee River Basin**

1. Walter F. George Lake: those waters impounded by Walter F. George Lock and Dam on the Chattahoochee River. The lake has a surface area of 45,181 acres at full power pool, 18,672 acres of which are within Alabama. The Alabama-Georgia state line is represented by the west bank of the original river channel, and the points of measurement for the criteria given below are located in Georgia waters.

(i) Chlorophyll *a* (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of photic-zone composite chlorophyll *a* samples collected monthly April through October shall not exceed 15 µg/l, as measured at the deepest point, main river channel, dam forebay; or 18 µg/l, as measured at the deepest point, main river channel, approximately 0.25 miles upstream of U.S. Highway 82.

2. Lake Harding: those waters impounded by Bartletts Ferry Dam on the Chattahoochee River. The lake has a surface area of 5850 acres at full pool, 2,176 acres of which are within Alabama. The point of measurement for the criterion given below is located in Georgia waters.

(i) Chlorophyll *a* (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll *a* samples collected monthly April through October shall not exceed 15 µg/l, as measured at the deepest point, main river channel, dam forebay.

3. West Point Lake: those waters impounded by West Point Dam on the Chattahoochee River. The lake has a surface area of 25,864 acres at full power pool, 2,765 acres of which are within Alabama. The point of measurement for the criterion given below is located in Georgia waters.

(i) Chlorophyll *a* (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of photic-zone composite chlorophyll *a* samples collected monthly April through October shall not exceed 27 µg/l, as measured at the LaGrange, Georgia Water Intake.

(d) **The Coosa River Basin**

1. Weiss Lake: those waters impounded by Weiss Dam on the Coosa River. The lake has a surface area of 30,200 acres at full pool.

(i) Chlorophyll _a_ (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of photic-zone composite chlorophyll _a_ samples collected monthly April through October shall not exceed 20 μg/l, as measured at the deepest point, main river channel, power dam forebay; or 20 μg/l, as measured at the deepest point, main river channel, immediately upstream of causeway (Alabama Highway 9) at Cedar Bluff. If the mean of photic-zone composite chlorophyll _a_ samples collected monthly April through October is significantly less than 20 μg/l for a given year, the Department will re-evaluate the chlorophyll _a_ criteria, associated nutrient management strategies, and available data and information, and recommend changes, if appropriate, to maintain and protect existing uses.

2. Neely Henry Lake: those waters impounded by Neely Henry Dam on the Coosa River. The lake has a surface area of 11,235 acres at full pool.

(i) Chlorophyll _a_ (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of photic-zone composite chlorophyll _a_ samples collected monthly April through October shall not exceed 18 μg/l, as measured at the deepest point, main river channel, dam forebay; or 18 μg/l, as measured at the deepest point, main river channel, immediately upstream of Alabama Highway 77 bridge.

3. Logan Martin Lake: those waters impounded by Logan Martin Dam on the Coosa River. The lake has a surface area of 15,263 acres at full pool.

(i) Chlorophyll _a_ (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of photic-zone composite chlorophyll _a_ samples collected monthly April through October shall not exceed 17 μg/l, as measured at the deepest point, main river channel, dam forebay; or 17 μg/l, as measured at the deepest point, main river channel, approximately 1.5 miles downstream of Alabama Highway 34 bridge.

4. Lay Lake: those waters impounded by Lay Dam on the Coosa River. The lake has a surface area of 12,000 acres at full pool.

(i) Chlorophyll _a_ (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of photic-zone composite chlorophyll _a_ samples collected monthly April through October shall not exceed 17 μg/l, as measured at the deepest point, main river channel, dam forebay; or 17 μg/l, as measured at the deepest point, main river channel, immediately downstream of Peckerwood Creek/Coosa River confluence.

5. Mitchell Lake: those waters impounded by Mitchell Dam on the Coosa River. The lake has a surface area of 5,850 acres at full pool.

(i) Chlorophyll _a_ (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of photic-zone composite chlorophyll _a_ samples collected monthly April through

October shall not exceed 14 μg/l, as measured at the deepest point, main river channel, dam forebay; or 16 μg/l, as measured at the deepest point, main river channel, downstream of Foshee Islands.

6. Jordan Lake: those waters impounded by Jordan Dam on the Coosa River. The lake has a surface area of 6,800 acres at full pool.

(i) Chlorophyll a (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of photic-zone composite chlorophyll a samples collected monthly April through October shall not exceed 14 μg/l, as measured at the deepest point, main river channel, dam forebay.

(e) **The Escatawpa River Basin**

1. Big Creek Lake (J.B. Converse Lake): those waters impounded on Big Creek. The lake is a tributary-storage reservoir and has a surface area of 3,600 acres at full pool.

(i) Chlorophyll a (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of photic-zone composite chlorophyll a samples collected monthly April through October shall not exceed 11 μg/l, as measured at the deepest point, main river channel, dam forebay.

(f) **The Lower Tombigbee River Basin**

1. Coffeeville Lake: those waters impounded by Coffeeville Dam on the Tombigbee River. The lake has a surface area of 8,500 acres at full pool.

(i) Chlorophyll a (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of photic-zone composite chlorophyll a samples collected monthly April through October shall not exceed 10 μg/l, as measured at the deepest point, main river channel, upstream of the lock canal.

(g) **The Perdido/Escambia River Basin**

1. Lake Jackson: This natural lake, located in Florala, Alabama, has a surface area of 256 acres at full pool.

(i) Chlorophyll a (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll a samples collected monthly April through October shall not exceed 7 μg/l, as measured at mid-lake.

2. Point A Lake: those waters impounded by Point A Dam on the Conecuh River. The lake has a surface area of 900 acres at full pool.

(i) Chlorophyll a (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll _a_ samples collected monthly April through October shall not exceed 9 μg/l, as measured at the deepest point, main river channel, dam forebay.

3. Gantt Lake: those waters impounded by Gantt Dam on the Conecuh River. The lake has a surface area of 2,767 acres at full pool.

(i) Chlorophyll _a_ (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll _a_ samples collected monthly April through October shall not exceed 11 μg/l, as measured at the deepest point, main river channel, dam forebay.

(h) **The Tallapoosa River Basin**

1. Thurlow Lake: those waters impounded by Thurlow Dam on the Tallapoosa River. The reservoir has a surface area of 574 acres at full pool.

(i) Chlorophyll _a_ (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll _a_ samples collected monthly April through October shall not exceed 5 μg/l, as measured at the deepest point, main river channel, dam forebay.

2. Yates Lake: those waters impounded by Yates Dam on the Tallapoosa River. The lake has a surface area of 2,000 acres at full pool.

(i) Chlorophyll _a_ (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll _a_ samples collected monthly April through October shall not exceed 5 μg/l, as measured at the deepest point, main river channel, dam forebay.

3. Lake Martin: those waters impounded by Martin Dam on the Tallapoosa River. The lake has a surface area of 40,000 acres at full pool.

(i) Chlorophyll _a_ (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll _a_ samples collected monthly April through October shall not exceed 5 μg/l, as measured at the deepest point, main river channel, dam forebay; or 5 μg/l, as measured at the deepest point main river channel, immediately upstream of Blue Creek embayment; or 5 μg/l as measured at the deepest point, main creek channel, immediately upstream of Alabama Highway 63 (Kowaliga) bridge.

4. R.L. Harris Lake: those waters impounded by R.L. Harris Dam on the Tallapoosa River. The lake has a surface area of 10,660 acres at full pool.

(i) Chlorophyll _a_ (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of photic-zone composite chlorophyll a samples collected monthly April through October shall not exceed 10 µg/l, as measured at the deepest point, main river channel, dam forebay; or 12 µg/l, as measured at the deepest point, main river channel, immediately upstream of the Tallapoosa River - Little Tallapoosa River confluence.

(i) **The Tennessee River Basin**

1. Pickwick Lake: those waters impounded by Pickwick Dam on the Tennessee River. The reservoir has a surface area of 43,100 acres at full pool, 33,700 acres of which are within Alabama. The point of measurement for the criterion given below is located in Tennessee waters.

(i) Chlorophyll a (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll a samples collected monthly April through September shall not exceed 18 µg/l, as measured at the deepest point, main river channel, dam forebay.

2. Wilson Lake: those waters impounded by Wilson Dam on the Tennessee River. The lake has a surface area of 15,930 acres at full pool.

(i) Chlorophyll a (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll a samples collected monthly April through September shall not exceed 18 µg/l, as measured at the deepest point, main river channel, dam forebay.

3. Wheeler Lake: those waters impounded by Wheeler Dam on the Tennessee River. The lake has a surface area of 67,100 acres at full pool.

(i) Chlorophyll a (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll a samples collected monthly April through September shall not exceed 18 µg/l, as measured at the deepest point, main river channel, dam forebay.

4. Guntersville Lake: those waters impounded by Guntersville Dam on the Tennessee River. The lake has a surface area of 69,700 acres at full pool, 67,900 of which are within Alabama.

(i) Chlorophyll a (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of photic-zone composite chlorophyll a samples collected monthly April through September shall not exceed 18 µg/l, as measured at the deepest point, main river channel, dam forebay.

5. Cedar Creek Lake: those waters impounded by Cedar Creek Dam on Cedar Creek. The reservoir has a surface area of 4,200 acres at full pool.

(i) Chlorophyll a (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll a samples collected monthly April through October shall not exceed 8 μg/l, as measured at the deepest point, main creek channel, dam forebay.

6. Little Bear Creek Lake: those waters impounded by Little Bear Dam on Little Bear Creek. The reservoir has a surface area of 1,600 acres at full pool.

(i) Chlorophyll a (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll a samples collected monthly April through October shall not exceed 8 μg/l, as measured at the deepest point, main creek channel, dam forebay.

(j) **The Upper Tombigbee River Basin**

1. Demopolis Lake: those waters impounded by Demopolis Dam downstream of the confluence of the Tombigbee and the Black Warrior Rivers. The lake has a surface area of 10,000 acres at full pool.

(i) Chlorophyll a (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of photic-zone composite chlorophyll a samples collected monthly April through October shall not exceed 10 μg/l, as measured at the deepest point, main river channel, dam forebay.

2. Gainesville Lake: those waters impounded by Gainesville Dam on the Tombigbee River. The lake has a surface area of 6,400 acres at full pool.

(i) Chlorophyll a (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of photic-zone composite chlorophyll a samples collected monthly April through October shall not exceed 14 μg/l, as measured at the deepest point, main river channel, dam forebay.

3. Aliceville Lake: those waters impounded by Tom Bevill Dam on the Tombigbee River. The lake has a surface area of 8,300 acres at full pool.

(i) Chlorophyll a (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of photic-zone composite chlorophyll a samples collected monthly April through October shall not exceed 18 μg/l, as measured at the deepest point, main river channel, dam forebay.

(k) **The Warrior River Basin**

1. Warrior Lake: those waters impounded by Warrior Lock and Dam on the Black Warrior River. The lake has a surface area of 7,800 acres at full pool.

(i) Chlorophyll _a_ (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll _a_ samples collected monthly April through October shall not exceed 12 μg/l, as measured at the deepest point, main river channel, dam forebay.

2. Oliver Lake: those waters impounded by William Bacon Oliver Lock and Dam on the Black Warrior River. The lake has a surface area of 800 acres at full pool.

(i) Chlorophyll _a_ (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll _a_ samples collected monthly April through October shall not exceed 12 μg/l, as measured at the deepest point, main river channel, dam forebay.

3. Holt Lake: those waters impounded by Holt Lock and Dam on the Black Warrior River. The lake has a surface area of 3,200 acres at full pool.

(i) Chlorophyll _a_ (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll _a_ samples collected monthly April through October shall not exceed 16 μg/l, as measured at the deepest point, main river channel, dam forebay.

4. Lake Tuscaloosa: those waters impounded by Lake Tuscaloosa Dam on the North River. The lake has a surface area of 5,885 acres at full pool.

(i) Chlorophyll _a_ (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll _a_ samples collected monthly April through October shall not exceed 8 μg/l, as measured at the deepest point, main river channel, dam forebay.

5. Bankhead Lake: those waters impounded by John Hollis Bankhead Lock and Dam on the Black Warrior River. The lake has a surface area of 9,200 acres at full pool.

(i) Chlorophyll _a_ (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll _a_ samples collected monthly April through October shall not exceed 16 μg/l, as measured at the deepest point, main river channel, dam forebay.

6. Smith Lake: those waters impounded by Lewis M. Smith Dam on the Sipsey Fork River. The lake has a surface area of 21,200 acres at full pool.

(i) Chlorophyll a (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll a samples collected monthly April through October shall not exceed 5 μg/l, as measured at the deepest point, main river channel, dam forebay; 5 μg/l, as measured at the deepest point, main river channel, at Duncan Creek/Sipsey River confluence (downstream of the Alabama Highway 257 bridge); and 5 μg/l, as measured at the deepest point, main river channel, immediately downstream of Brushy Creek confluence.

7. Inland Lake: those waters impounded by Inland Lake Dam on the Blackburn Fork of the Little Warrior River. The lake has a surface area of 1,095 acres at full pool.

(i) Chlorophyll a (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, 1998): the mean of the photic-zone composite chlorophyll a samples collected monthly April through October shall not exceed 6 μg/l, as measured at the deepest point, main river channel, dam forebay.

Author: James E. McIndoe.
Statutory Authority: Code of Alabama 1975, §§ 22-22-9, 22-22A-5, 22-22A-6, 22-22A-8.
History: January 12, 2001. **Amended:** May 16, 2002; May 27, 2004; September 21, 2005; January 18, 2011.

335-6-10-.12 Implementation of the Antidegradation Policy.

(1) The antidegradation policy at rule 335-6-10-.04 addresses three categories of waters/uses:

(a) High quality waters that constitute an outstanding national resource (Tier 3);

(b) Waters where the quality exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water (Tier 2); and

(c) Existing instream water uses and the level of water quality necessary to protect the existing uses (Tier 1).

(2) Tier 3 waters are those waters designated pursuant to the Outstanding National Resource Water (ONRW) special designation at rule 335-6-10-.10, and are identified in rule 335-6-11-.02.

(3) Tier 1 waters are:

(a) Those waters (except waters assigned the use classification of Outstanding Alabama Water, which are Tier 2 waters) identified on the most recent EPA-approved Section 303(d) list;

(b) Those waters (except waters assigned the use classification of Outstanding Alabama Water, which are Tier 2 waters) for which attainment of applicable water quality standards has been, or is expected to be, achieved through implementation of effluent limitations more stringent than technology-based controls (BPT, BAT, and secondary treatment); and

(c) Those waters assigned the use classification of Limited Warmwater Fishery or Agricultural and Industrial Water Supply (as identified in rule 335-6-11-.02).

(4) Tier 2 waters are all other waters (those waters not identified as either Tier 3 waters or Tier 1 waters), including all waters assigned the use classification of Outstanding Alabama Water (as identified in rule 335-6-11-.02).

(5) All new or expanded discharges to Tier 2 waters (except discharges eligible for coverage under general permits) covered by the NPDES permitting program are potentially subject to the provisions of rule 335-6-10-.04(3). Applicants for such discharges are required to demonstrate that the proposed discharge is necessary for important economic or social development as a part of the permit application process.

(6) After receipt of a permit application for a potentially covered discharge, the Department will determine whether the proposed discharge is to a Tier 2 water, as defined in paragraph (4) above. Of necessity, this determination will be made on a case-by-case basis.

(7) The basic framework of the permitting process is unchanged for a covered discharge to a Tier 2 water. However, the process is enhanced to document the consideration of Tier 2 provisions. The additional documentation includes:

(a) The Department's determination that the application is for a new or expanded discharge;

(b) The Department's determination that the receiving stream is considered to be a Tier 2 water; and

(c) The Department's determination, based on the applicant's demonstration, that the proposed discharge is necessary for important economic or social development in the area in which the waters are located.

(8) All three items will be documented in the permit file and/or fact sheet, and will be used by the Department in its decision process. The public notice process will be used to announce a preliminary Department decision to deny or to allow a covered discharge to a Tier 2 water, while the final determination will be made concurrently with the final Department decision regarding the permit application for a covered discharge.

(9) Documentation by the applicant shall include:

(a) An evaluation of discharge alternatives completed by a Registered Professional Engineer licensed to practice in the State of Alabama.

1. The applicant shall document the discharge alternatives evaluation by completing and submitting the following forms[1], or by submitting the same information in another format acceptable to the Department:

(i) ADEM Form 311, Alternatives Analysis; and, as applicable,

(ii) ADEM Form 312, Calculation of Total Annualized Costs for Public-Sector Projects, or ADEM Form 313, Calculation of Total Annualized Costs for Private-Sector Projects. Alternatives with total annualized project costs that are less than 110% of the total annualized project costs for the Tier 2 discharge proposal are considered viable alternatives.

(b) A demonstration that the proposed discharge will support important economic or social development in the area in which the waters are located, documented by the applicant's response, in writing, to the following questions. The applicant shall provide supporting information for each response.

1. What environmental or public health problem will the discharger be correcting?

2. How much will the discharger be increasing employment (at its existing facility or as the result of locating a new facility)?

3. How much reduction in employment will the discharger be avoiding?

4. How much additional state or local taxes will the discharger be paying?

5. What public service to the community will the discharger be providing?

6. What economic or social benefit will the discharger be providing to the community?

Author: James E. McIndoe.
Statutory Authority: Code of Alabama 1975, §§ 22-22-9, 22-22A-5, 22-22A-6, 22-22A-8.
History: August 1, 2002. **Amended:** January 18, 2011.

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[1] Forms are listed in ADEM Admin. Code r. 335-1-1-.07 and are available for downloading on the ADEM web page under Forms.

TABLE 1
TOXIC POLLUTANT CRITERIA

Pollutant	Aquatic Life Criteria (in µg/l unless otherwise noted)				Human Health Criteria (in µg/l unless otherwise noted)	
	Freshwater Acute	Freshwater Chronic	Marine Acute	Marine Chronic	Consumption of Water and Fish	Consumption of Fish Only
Acenaphthene					Eq. 16	Eq. 17
Acrolein					Eq. 16	Eq. 17
Acrylonitrile [1]					Eq. 18	Eq. 19
Aldrin [1]	3.0		1.3		Eq. 18	Eq. 19
Anthracene					Eq. 16	Eq. 17
Antimony					Eq. 16	Eq. 17
Arsenic [1] (Risk level = 1×10^{-5})	340 (tri)	150 (tri)	69 (tri)	36 (tri)	Eq. 18	Eq. 19
Asbestos					7,000,000 fibers/l (MCL)	
Benzene [1]					Eq. 18	Eq. 19
Benzidine [1]					Eq. 18	Eq. 19
Benzo(a)anthracene [1]					Eq. 18	Eq. 19
Benzo(a)pyrene [1]					Eq. 18	Eq. 19
Benzo(b)fluoranthene [1]					Eq. 18	Eq. 19
Benzo(k)fluoranthene [1]					Eq. 18	Eq. 19
Bis(2-chloroethyl)ether [1]					Eq. 18	Eq. 19
Bis(2-chloroisopropyl)ether					Eq. 16	Eq. 17
Bis(2-ethylhexyl)phthalate [1]					Eq. 18	Eq. 19
Bromoform [1]					Eq. 18	Eq. 19

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Pollutant	Aquatic Life Criteria (in μg/l unless otherwise noted)				Human Health Criteria (in μg/l unless otherwise noted)	
	Freshwater Acute	Freshwater Chronic	Marine Acute	Marine Chronic	Consumption of Water and Fish	Consumption of Fish Only
Butylbenzyl phthalate					Eq. 16	Eq. 17
Cadmium	Eq. 1	Eq. 2	40	8.8		
Carbon tetrachloride [1]					Eq. 18	Eq. 19
Chlordane [1]	2.4	0.0043	0.09	0.004	Eq. 18	Eq. 19
Chlorobenzene					Eq. 16	Eq. 17
Chlorodibromomethane [1]					Eq. 18	Eq. 19
Chloroform [1]					Eq. 18	Eq. 19
2-Chloronaphthalene					Eq. 16	Eq. 17
2-Chlorophenol					Eq. 16	Eq. 17
Chromium (trivalent)	Eq. 3	Eq. 4				
Chromium (hexavalent)	16	11	1100	50		
Chrysene [1]					Eq. 18	Eq. 19
Copper	Eq. 5	Eq. 6	4.8	3.1	1300 (MCL)	
Cyanide (free)	22	5.2	1.0	1.0	Eq. 16	Eq. 17
4,4'-DDD [1]					Eq. 18	Eq. 19
4,4'-DDE [1]					Eq. 18	Eq. 19
4,4'-DDT [1]	1.1	0.001	0.13	0.001	Eq. 18	Eq. 19
Dibenzo(a,h)anthracene [1]					Eq. 18	Eq. 19
1,2-Dichlorobenzene					Eq. 16	Eq. 17

TABLE 1
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Pollutant	Aquatic Life Criteria (in µg/l unless otherwise noted)				Human Health Criteria (in µg/l unless otherwise noted)	
	Freshwater Acute	Freshwater Chronic	Marine Acute	Marine Chronic	Consumption of Water and Fish	Consumption of Fish Only
1,3-Dichlorobenzene					Eq. 16	Eq. 17
1,4-Dichlorobenzene					Eq. 16	Eq. 17
3,3'-Dichlorobenzidine [1]					Eq. 18	Eq. 19
Dichlorobromomethane [1]					Eq. 18	Eq. 19
1,2-Dichloroethane [1]					Eq. 18	Eq. 19
1,1-Dichloroethylene					Eq. 16	Eq. 17
2,4-Dichlorophenol					Eq. 16	Eq. 17
1,2 Dichloropropane [1]					Eq. 18	Eq. 19
1,3 Dichloropropylene [1]					Eq. 18	Eq. 19
Dieldrin [1]	0.24	0.056	0.71	0.0019	Eq. 18	Eq. 19
2,4-Dimethylphenol					Eq. 16	Eq. 17
Diethyl phthalate					Eq. 16	Eq. 17
Dimethyl phthalate					Eq. 16	Eq. 17
Di-n-butyl phthalate					Eq. 16	Eq. 17
4,6-Dinitro-2-methylphenol					Eq. 16	Eq. 17
2,4 Dinitrotoluene [1]					Eq. 18	Eq. 19
2,4-Dinitrophenol					Eq. 16	Eq. 17
Dioxin (2,3,7,8-TCDD) [1]					Eq. 18	Eq. 19

TABLE 1
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Pollutant	Aquatic Life Criteria (in µg/l unless otherwise noted)				Human Health Criteria (in µg/l unless otherwise noted)	
	Freshwater Acute	Freshwater Chronic	Marine Acute	Marine Chronic	Consumption of Water and Fish	Consumption of Fish Only
1,2-Diphenylhydrazine [1]					Eq. 18	Eq. 19
Endosulfan (alpha)	0.22	0.056	0.034	0.0087	Eq. 16	Eq. 17
Endosulfan (beta)	0.22	0.056	0.034	0.0087	Eq. 16	Eq. 17
Endosulfan sulfate					Eq. 16	Eq. 17
Endrin	0.086	0.036	0.037	0.0023	Eq. 16	Eq. 17
Endrin aldehyde					Eq. 16	Eq. 17
Ethylbenzene					Eq. 16	Eq. 17
Fluoranthene					Eq. 16	Eq. 17
Fluorene					Eq. 16	Eq. 17
Heptachlor [1]	0.52	0.0038	0.053	0.0036	Eq. 18	Eq. 19
Heptachlor epoxide [1]	0.52	0.0038	0.053	0.0036	Eq. 18	Eq. 19
Hexachlorobenzene [1]					Eq. 18	Eq. 19
Hexachlorobutadiene [1]					Eq. 18	Eq. 19
Hexachlorocyclohexane (alpha) [1]					Eq. 18	Eq. 19
Hexachlorocyclohexane (beta) [1]					Eq. 18	Eq. 19
Hexachlorocyclohexane (gamma)	0.95		0.16		Eq. 16	Eq. 17
Hexachlorocyclopentadiene					Eq. 16	Eq. 17
Hexachloroethane [1]					Eq. 18	Eq. 19
Indeno (1,2,3-cd) pyrene [1]					Eq. 18	Eq. 19

TABLE 1
TOXIC POLLUTANT CRITERIA

Pollutant	Aquatic Life Criteria (in µg/l unless otherwise noted)				Human Health Criteria (in µg/l unless otherwise noted)	
	Freshwater Acute	Freshwater Chronic	Marine Acute	Marine Chronic	Consumption of Water and Fish	Consumption of Fish Only
Isophorone [1]					Eq. 18	Eq. 19
Lead	Eq. 7	Eq. 8	210	8.1		
Mercury (total recoverable)	2.4	0.012	2.1	0.025	Eq. 16	Eq. 17
Methyl bromide					Eq. 16	Eq. 17
Methylene chloride [1]					Eq. 18	Eq. 19
Nickel	Eq. 9	Eq. 10	74	8.2	Eq. 16	Eq. 17
Nitrobenzene					Eq. 16	Eq. 17
N-Nitrosodimethylamine [1]					Eq. 18	Eq. 19
N-Nitrosodi-n-propylamine [1]					Eq. 18	Eq. 19
N-Nitrosodiphenylamine [1]					Eq. 18	Eq. 19
PCB-1016 [1,2]		0.014		0.03	Eq. 18	Eq. 19
PCB-1221 [1,2]		0.014		0.03	Eq. 18	Eq. 19
PCB-1232 [1,2]		0.014		0.03	Eq. 18	Eq. 19
PCB-1242 [1,2]		0.014		0.03	Eq. 18	Eq. 19
PCB-1248 [1,2]		0.014		0.03	Eq. 18	Eq. 19
PCB-1254 [1,2]		0.014		0.03	Eq. 18	Eq. 19
PCB-1260 [1,2]		0.014		0.03	Eq. 18	Eq. 19
Pentachlorophenol [1]	Eq. 11	Eq. 12	13	7.9	Eq. 18	Eq. 19

TABLE 1
TOXIC POLLUTANT CRITERIA

Pollutant	Aquatic Life Criteria (in µg/l unless otherwise noted)				Human Health Criteria (in µg/l unless otherwise noted)	
	Freshwater Acute	Freshwater Chronic	Marine Acute	Marine Chronic	Consumption of Water and Fish	Consumption of Fish Only
Phenol					Eq. 16	Eq. 17
Pyrene					Eq. 16	Eq. 17
Selenium [3]	20	5.0	290	71	Eq. 16	Eq. 17
Silver	Eq. 13		1.9			
1,1,2,2-Tetrachloroethane [1]					Eq. 18	Eq. 19
Tetrachloroethylene [1]					Eq. 18	Eq. 19
Thallium					Eq. 16	Eq. 17
Toluene					Eq. 16	Eq. 17
Toxaphene [1]	0.73	0.0002	0.21	0.0002	Eq. 18	Eq. 19
1,2-Trans-dichloroethylene					Eq. 16	Eq. 17
Tributyltin (TBT)	0.46	0.072	0.42	0.0074		
1,2,4-Trichlorobenzene					Eq. 16	Eq. 17
1,1,2-Trichloroethane [1]					Eq. 18	Eq. 19
Trichloroethylene [1]					Eq. 18	Eq. 19
2,4,6-Trichlorophenol [1]					Eq. 18	Eq. 19
Vinyl chloride [1]					Eq. 18	Eq. 19
Zinc	Eq. 14	Eq. 15	90	81	Eq. 16	Eq. 17

[1] Pollutants considered by EPA to be carcinogenic.

[2] The criteria for Polychlorinated Biphenyls (PCBs) apply to total PCBs, which is defined as the sum of the seven particular Aroclors (1016, 1221, 1232, 1242, 1248, 1254, and 1260) listed in this table.

[3] The freshwater aquatic life criteria for selenium are expressed in terms of total recoverable metal in the water column.

APPENDIX A

POLLUTANT	CAS Registry Number	REFERENCE DOSE mg/(kg-day)	CANCER POTENCY FACTOR (kg-day)/mg	BIO-CONCENTRATION FACTOR 1/kg	RELATIVE SOURCE CONTRIBUTION
Acenaphthene	83329	0.06		242	1.0
Acrolein	107028	0.0005		215	1.0
Acrylonitrile	107131		0.54	30	
Aldrin	309002		17	4670	
Anthracene	120127	0.3		30	1.0
Antimony	7440360	0.0004		1	0.4
Arsenic	7440382		1.75	44	
Benzene	71432		0.029	5.2	
Benzidine	92875		230	87.5	
Benzo(a)anthracene	56553		7.3	30	
Benzo(a)pyrene	50328		7.3	30	
Benzo(b)fluoranthene	205992		7.3	30	
Benzo(k)fluoranthene	207089		7.3	30	
Bis(2-chloroethyl)ether	111444		1.1	6.9	
Bis(2-chloroisopropyl)ether	108601	0.04		2.47	1.0
Bis(2-ethylhexyl)phthalate	117817		0.014	130	
Bromoform	75252		0.0079	3.75	
Butylbenzyl phthalate	85687	0.2		414	1.0
Carbon tetrachloride	56235		0.13	18.75	
Chlordane	57749		0.35	14100	
Chlorobenzene	108907	0.02		10.3	0.2
Chlorodibromomethane	124481		0.084	3.75	
Chloroform	67663		0.0061	3.75	

APPENDIX A

POLLUTANT	CAS Registry Number	REFERENCE DOSE mg/(kg-day)	CANCER POTENCY FACTOR (kg-day)/mg	BIO-CONCENTRATION FACTOR 1/kg	RELATIVE SOURCE CONTRIBUTION
2-Chloronaphthalene	91587	0.08		202	1.0
2-Chlorophenol	95578	0.005		134	1.0
Chrysene	218019		7.3	30	
Cyanide	57125	0.02		1	0.2
4,4'-DDD	72548		0.24	53600	
4,4'-DDE	72559		0.34	53600	
4,4'-DDT	50293		0.34	53600	
Dibenzo(a,h)anthracene	53703		7.3	30	
1,2-Dichlorobenzene	95501	0.09		55.6	0.2
1,3-Dichlorobenzene	541731	0.0134		55.6	1.0
1,4-Dichlorobenzene	106467	0.0134		55.6	0.2
3,3'-Dichlorobenzidine	91941		0.45	312	
Dichlorobromomethane	75274		0.062	3.75	
1,2-Dichloroethane	107062		0.091	1.2	
1,1-Dichloroethylene	75354	0.05		5.6	0.2
2,4-Dichlorophenol	120832	0.003		40.7	1.0
1,2-Dichloropropane	78875		0.067	4.1	
1,3-Dichloropropylene	542756		0.1	1.9	
Dieldrin	60571		16	4670	
Diethyl phthalate	84662	0.8		73	1.0
2,4 Dimethylphenol	105679	0.02		93.8	1.0
Dimethyl phthalate	131113	10		36	1.0
Di-n-butyl phthalate	84742	0.1		89	1.0

APPENDIX A

POLLUTANT	CAS Registry Number	REFERENCE DOSE mg/(kg-day)	CANCER POTENCY FACTOR (kg-day)/mg	BIO-CONCENTRATION FACTOR 1/kg	RELATIVE SOURCE CONTRIBUTION
4,6-Dinitro-2-methylphenol	534521	0.00039		5.5	1.0
2,4-Dinitrophenol	51285	0.002		1.5	1.0
2,4 Dinitrotoluene	121142		0.31	3.8	
Dioxin (2,3,7,8-TCDD)	1746016		17500	5000	
1,2-Diphenylhydrazine	122667		0.8	24.9	
Endosulfan (alpha)	959988	0.006		270	1.0
Endosulfan (beta)	33213659	0.006		270	1.0
Endosulfan sulfate	1031078	0.006		270	1.0
Endrin	72208	0.0003		3970	0.2
Endrin aldehyde	7421934	0.0003		3970	1.0
Ethylbenzene	100414	0.1		37.5	0.2
Fluoranthene	206440	0.04		1150	1.0
Fluorene	86737	0.04		30	1.0
Heptachlor	76448		4.5	11200	
Heptachlor epoxide	1024573		9.1	11200	
Hexachlorobenzene	118741		1.6	8690	
Hexachlorobutadiene	87683		0.078	2.78	
Hexachlorocyclohexane (alpha)	319846		6.3	130	
Hexachlorocyclohexane (beta)	319857		1.8	130	
Hexachlorocyclohexane (gamma)	58899	0.0003		130	0.2
Hexachlorocyclopentadiene	77474	0.006		4.34	0.2
Hexachloroethane	67721		0.014	86.9	
Indeno (1,2,3-cd) pyrene	193395		7.3	30	

APPENDIX A

POLLUTANT	CAS Registry Number	REFERENCE DOSE mg/(kg-day)	CANCER POTENCY FACTOR (kg-day)/mg	BIO-CONCENTRATION FACTOR l/kg	RELATIVE SOURCE CONTRIBUTION
Isophorone	78591		0.00095	4.38	
Mercury	7439976	0.0001		5500	1.0
Methyl bromide	74839	0.0014		3.75	1.0
Methylene chloride	75092		0.0075	0.9	
Nickel	7440020	0.02		47	1.0
Nitrobenzene	98953	0.0005		2.89	1.0
N-Nitrosodimethylamine	62759		51	0.026	
N-Nitrosodi-n-propylamine	621647		7	1.13	
N-Nitrosodiphenylamine	86306		0.0049	136	
PCB-1016 [1]	12674112		2.0	31200	
PCB-1221 [1]	11104282		2.0	31200	
PCB-1232 [1]	11141165		2.0	31200	
PCB-1242 [1]	53469219		2.0	31200	
PCB-1248 [1]	12672296		2.0	31200	
PCB-1254 [1]	11097691		2.0	31200	
PCB-1260 [1]	11096825		2.0	31200	
Pentachlorophenol	87865		0.12	11	
Phenol	108952	0.3		1.4	1.0
Pyrene	129000	0.03		30	1.0
Selenium	7782492	0.005		4.8	1.0
1,1,2,2-Tetrachloroethane	79345		0.2	5	
Tetrachloroethylene	127184		0.039776	30.6	
Thallium	7440280	0.000068		116	0.2

APPENDIX A

POLLUTANT	CAS Registry Number	REFERENCE DOSE mg/(kg-day)	CANCER POTENCY FACTOR (kg-day)/mg	BIO-CONCENTRATION FACTOR 1/kg	RELATIVE SOURCE CONTRIBUTION
Toluene	108883	0.2		10.7	0.2
Toxaphene	8001352		1.1	13100	
1,2-Trans-dichloroethylene	156605	0.02		1.58	0.2
1,2,4-Trichlorobenzene	120821	0.01		114	0.2
1,1,2-Trichloroethane	79005		0.057	4.5	
Trichloroethylene	79016		0.0126	10.6	
2,4,6-Trichlorophenol	88062		0.011	150	
Vinyl chloride	75014		1.4	1.17	
Zinc	7440666	0.3		47	1.0

[1] The criteria for Polychlorinated Biphenyls (PCBs) apply to total PCBs, which is defined as the sum of the seven particular Aroclors (1016, 1221, 1232, 1242, 1248, 1254, and 1260) listed in this table.

Attachment 2

Final TMDL for Nutrient Impairment
Weiss Lake

Prepared by US EPA Region 4
October 2008

Attachment 2

Final TMDL for Nutrient Impairment
Weiss Lake

Prepared by US EPA Region 4
October 2008

FINAL

Total Maximum Daily Load (TMDL)

For

Nutrient Impairment

Weiss Lake	AL03150105-1003-102
Weiss Lake	AL03150105-1001-102

Cherokee County, Alabama

Prepared by:
US EPA Region 4
61 Forsyth Street SW
Atlanta, Georgia 30303

October, 2008

In compliance with the provisions of the Federal Clean Water Act, 33 U.S.C §1251 et. seq., as amended by the Water Quality Act of 1987, P.L. 400-4, the U.S. Environmental Protection Agency is hereby establishing Total Maximum Daily Loads (TMDLs) for Nutrients for Weiss Lake (AL03150105-1003-102 and AL03150105-1001-102) Subsequent actions must be consistent with these TMDLs.

James D. Giattina
Director
Water Management Division

Date

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TMDL INFORMATION PAGE

Table i. Listing Information

Waterbody ID	Name	Impairment	Boundaries	Uses*
AL03150105-1003-102	Weiss Lake	Nutrients	Weiss Dam Powerhouse to Spring Creek	PWS, S, F&W
AL03150105-1001-102	Weiss Lake	Nutrients	Spring Creek to AL/GA state-line	S, F&W

*PWS-Public Water Supply S-Swimming F&W-Fish and Wildlife

Table ii. Applicable Alabama Water Quality Standards

Parameter	Water Quality Criteria
Chlorophyll a	Alabama's Water Quality Criteria Applicable to Specific Lakes (335-6-10-.11(2)(c)(1)) for Weiss Lake in the Coosa River Basin. Weiss Lake: those waters impounded by Weiss Dam on the Coosa River. The lake has a surface area of 30,200 acres at full pool. (i) Chlorophyll a (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998*): the mean of photic-zone composite chlorophyll a samples collected monthly April through October shall not exceed 20 µg/L, as measured at the deepest point, main river channel, power dam forebay; or 20 µg/L, as measured at the deepest point, main river channel, immediately upstream of the causeway (Alabama Highway 9) at Cedar Bluff. If the mean of photic-zone composite chlorophyll a samples collected monthly April through October is significantly less than 20 µg/L for a given year, the Department will re-evaluate the chlorophyll a criteria, associated nutrient management strategies, and available data and information, and recommend changes, if appropriate, to maintain and protect existing uses.

Table iii. Nutrient (Total Phosphorus) TMDL Necessary to Meet WQS in Weiss Lake

ALABAMA			GEORGIA		TMDL
LA [1]	WLA		Aggregate allocation to GA at the State Border for loads from the Coosa River [4]	Aggregate allocation to GA at the state border for loads from the Chattooga River [5]	
	Major Point Sources (≥ 1 MGD) [2]	Minor Point Sources (< 1 MGD) [3]			
30% reduction (Q_1 * 0.37) #/day	1.0 mg/l	8.34 #/day maximum	30% reduction (Q_4 * 0.323) #/day	30% reduction (Q_5 * 0.862) #/day	30% reduction

1 The load allocation for Alabama is expressed as a function of flow (Q_1), where Q_1 represents the sum of flows (in terms of cubic feet per second as an annual average) of waters within Alabama that drain to Weiss Lake. The value of 0.37 represents an allowable growing season median concentration of 69 µg/L of total phosphorus multiplied by a units conversion factor.

2 The wasteload allocation requires that all Alabama major point sources (i.e., with a design flow equal or greater than 1 MGD) must each meet an end of pipe monthly average concentration of 1.0 mg/l (April through October only). Expressed as a daily load, the wasteload allocation for an individual major point source is Q_3 * 5.39 pounds per day, where Q_3 represents the effluent flow rate of the point source in terms of cubic feet per second. Future point sources may be allowed as long as such point sources comply with the wasteload allocation and water quality modeling analysis confirms that such dischargers will ensure protection of the applicable water quality standards.

3 The wasteload allocation requires that each Alabama minor point source (i.e., with a design flow less than 1 MGD) must not exceed 8.34 lbs/day, as a monthly average (April through October only). Future point sources may be allowed as long as such point sources comply with the wasteload allocation and water quality modeling analysis confirms that such dischargers will ensure protection of the applicable water quality standards.

4 The aggregate allocation for the Coosa River loads from Georgia at the state border is expressed as a function of flow (Q_4), where Q_4 represents the Coosa River flow (in terms of cubic feet per second as an annual average). The value of 0.323 represents an allowable growing season median concentration of 60 µg/L of total phosphorus multiplied by a units conversion factor.

5 The aggregate allocation for the Chattooga River loads from Georgia at the state border is expressed as a function of flow (Q_5), where Q_5 represents the Chattooga River flow (in terms of cubic feet per second as an annual average). The value of 0.862 represents an allowable growing season median concentration of 160 µg/L of total phosphorus multiplied by a units conversion factor.

EXECUTIVE SUMMARY

The State of Alabama originally placed Weiss Lake on the Alabama 1996 Section 303(d) List of Impaired Waterbodies due to priority organics, nutrients, pH and organic enrichment/dissolved oxygen (OE/DO). EPA approved delistings for OE/DO and pH with the 2000 and 2004 §303(d) lists, respectively, based on recent monitoring data that showed that the water quality standards for DO and pH were being attained in Weiss Lake. Total Maximum Daily Loads (TMDLs) were finalized for priority organics and nutrients in 2004. This TMDL is based on new and updated information and addresses impairment due to nutrients in Weiss Lake by providing an estimate of the total phosphorus concentrations allowable in the lake from the point sources and non-point sources in the watershed. This TMDL replaces the previous version established in 2004, and provided the most current information for input into the Coosa Lakes TMDLs.

Alabama has established a numeric chlorophyll a criterion of 20 μg/L for Weiss Lake. The criterion has been established at two specific locations in Weiss Lake and is applied as a growing season average defined as the period from April 1st through October 31st. The TMDL is represented by the growing season median total phosphorus loads, shown in Table 1, that are allowable so that Weiss Lake achieves an average growing season (April-October) chlorophyll a concentration of 20 μg/L at those specific compliance points (See Table ii). This target will allow for sufficient productivity in the reservoir to maintain the fisheries, while also reducing the risk of nuisance blooms of algae and reduce the hypolimnetic oxygen deficit, thereby improving fish habitat.

Table 1: Nutrient (Total Phosphorus) TMDL Necessary to Meet WQS in Weiss Lake

ALABAMA			**GEORGIA**		**TMDL**
LA [1]	**WLA**		**Aggregate allocation to GA at the State Border for loads from the Coosa River** [4]	**Aggregate allocation to GA at the state border for loads from the Chattooga River** [5]	
	Major Point Sources ($\geq$ 1 MGD) [2]	**Minor Point Sources (< 1 MGD)** [3]			
30% reduction (Q_1 * 0.37) #/day	1.0 mg/l	8.34 #/day maximum	30% reduction (Q_4 * 0.323) #/day	30% reduction (Q_5 * 0.862) #/day	30% reduction

1 The load allocation for Alabama is expressed as a function of flow (Q_1), where Q_1 represents the sum of flows (in terms of cubic feet per second as an annual average) of waters within Alabama that drain to Weiss Lake. The value of 0.37 represents an allowable growing season median concentration of 69 μg/L of total phosphorus multiplied by a units conversion factor.

2 The wasteload allocation requires that all Alabama major point sources (i.e., with a design flow equal or greater than 1 MGD) must each meet an end of pipe monthly average concentration of 1.0 mg/l (April through October only). Expressed as a daily load, the wasteload allocation for an individual major point source is Q_3 * 5.39 pounds per day, where Q_3 represents the effluent flow rate of the point source in terms of cubic feet per second. Future point sources may be allowed as long as such point sources comply with the wasteload allocation and water quality modeling analysis confirms that such dischargers will ensure protection of the applicable water quality standards.

3 The wasteload allocation requires that each Alabama minor point source (i.e., with a design flow less than 1 MGD) must not exceed 8.34 lbs/day, as a monthly average (April through October only). Future point sources may be allowed as long as such point sources comply with the wasteload allocation and water quality modeling analysis confirms that such dischargers will ensure protection of the applicable water quality standards.

4 The aggregate allocation for the Coosa River loads from Georgia at the state border is expressed as a function of flow (Q_4), where Q_4 represents the Coosa River flow (in terms of cubic feet per second as an annual average). The value of 0.323 represents an allowable growing season median concentration of 60 μg/L of total phosphorus multiplied by a units conversion factor.

5 The aggregate allocation for the Chattooga River loads from Georgia at the state border is expressed as a function of flow (Q_5), where Q_5 represents the Chattooga River flow (in terms of cubic feet per second as an annual average). The value of 0.862 represents an allowable growing season median concentration of 160 μg/L of total phosphorus multiplied by a units conversion factor.

1.0 INTRODUCTION

1.1 Background

The identification of waterbodies not meeting their designated use and the development of Total Maximum Daily Loads (TMDLs) for those waterbodies are required by Section 303(d) of the Clean Water Act and the Environmental Protection Agency's (EPA) Water Quality Planning and Management Regulations (40 CFR part 130). The TMDL process is designed to restore and maintain the quality of those impaired waterbodies through the establishment of pollutant specific allowable loads.

Weiss Lake, comprising 30,200 acres, was originally identified by the State of Alabama as being impaired due to nutrients in the 1996 §303(d) list of impaired waters and remained on the 1998 through 2004 lists. In 2004, EPA established a nutrient TMDL for Weiss Lake. In 2006, the waterbody was removed from the 303(d) list and placed in category 4a due to the nutrients TMDL being established. As of October 2008, the waterbody remains in category 4a. This TMDL is being revised as part of an effort by EPA, ADEM and Georgia Environmental Protection Division (GAEPD) to ensure all portions of the Coosa River will achieve water quality standards. Necessary load allocations are determined by linking compatible water quality models of multiple segments of the Coosa River system.

1.2 Applicable Waterbody Segment Use and Standard

The designated beneficial uses of Weiss Lake are Public Water Supply (Weiss Dam Powerhouse to Spring Creek only), Swimming, and Fish and Wildlife. The water use classifications are established by the State of Alabama in the Code of Alabama rule and regulations Chapter 335-6-11 Water Use Classifications for Interstate and Intrastate Waters.

The chlorophyll-a criteria, based on Alabama's Water Quality Criteria Applicable to Specific Lakes (335-6-10-.11(2)(c)(1)) for Weiss Lake in the Coosa River Basin, are as follows:

> Weiss Lake: those waters impounded by Weiss Dam on the Coosa River. The lake has a surface area of 30,200 acres at full pool.
>
> (i)Chlorophyll a (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998*): the mean of photic-zone composite chlorophyll a samples collected monthly April through October shall not exceed 20 µg/L, as measured at the deepest point, main river channel, power dam forebay; or 20 µg/L, as measured at the deepest point, main river channel, immediately upstream of the causeway (Alabama Highway 9) at Cedar Bluff. If the mean of photic-zone composite chlorophyll a samples collected monthly April through October is significantly less than 20 µg/L for a given year, the Department will re-evaluate the chlorophyll a criteria, associated nutrient management strategies, and available data and information, and recommend changes, if appropriate, to maintain and protect existing uses.

1.3 Nutrient Target Development

Phosphorus has commonly been considered the primary limiting nutrient governing algal growth in most freshwater stream systems in North America, particularly in freshwater lakes, in contrast with nitrogen-limited estuarine ecosystems (e.g., Correll, 1998). Case studies cited in EPA guidance demonstrated that control of nutrient concentrations can limit the growth of filamentous algae (USEPA, 2000; Sosiak, 2002). Recent evidence suggests that nutrient limitation by nitrogen or phosphorus may be seasonal and that nitrogen limitation has been observed in some streams (Dodds et al., 2000). Based on analysis of the readily available data and information, EPA has determined that reductions in phosphorus, without concurrent reductions in nitrogen, are expected to result in the attainment of the Weiss Lake chlorophyll a criteria. Although total nitrogen loads were considered in the modeling analysis, reductions to the existing nitrogen loads are not necessary to address the nutrient impairment within Weiss Lake.

Potential impacts of nitrogen downstream from Weiss Lake were also considered as part of the TMDL analysis. Four reservoirs in the Coosa River basin downstream from Weiss Lake (i.e., Lake Neely Henry, Lake Logan Martin, Lay Lake, and Lake Mitchell) are identified as impaired by nutrients on Alabama's CWA section 303(d) list. TMDLs to address the nutrient impairment for these reservoirs are contained in a separate report for public review and comment. The nutrient TMDLs for these reservoirs are based on a system of hydrodynamic and water quality models which are linked to the Weiss Lake model that represents the hydrodynamic and water quality conditions of Weiss Lake. Based on the modeling analysis, reductions in total phosphorus alone (i.e., without concurrent reductions in nitrogen) are appropriate to address the nutrient impairment in those downstream reservoirs.

Alabama has established numeric chlorophyll *a* criteria of 20 µg/L for Weiss Lake. More specifically, the established criteria shall not exceed 20 µg/L as measured for compliance at two specific locations within Weiss Lake, namely at the Weiss power dam forebay and immediately upstream of AL Hwy 9 causeway, as indicated in Table 2. The chlorophyll *a* criteria are applicable as a growing season average of monthly samples collected during the period of April through October. The TMDL is represented by the median total phosphorus loads that are allowable so that Weiss Lake achieves an average growing season chlorophyll *a* concentration of 20 µg/L at those specific compliance points. This target will allow for sufficient productivity in the reservoir to maintain the fisheries, while also reducing the risk of nuisance blooms of algae and reduce the hypolimnetic oxygen deficit, thereby improving fish habitat.

Table 2: Alabama's Water Quality Criteria Applicable to Weiss Lake

Parameter	Water Quality Criteria
Chlorophyll *a*	Alabama's Water Quality Criteria Applicable to Specific Lakes (335-6-10-.11(2)(c)(1)) for Weiss Lake in the Coosa River Basin. Weiss Lake: those waters impounded by Weiss Dam on the Coosa River. The lake has a surface area of 30,200 acres at full pool. (i) Chlorophyll *a* (corrected, as described in *Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998*): the mean of photic-zone composite chlorophyll *a* samples collected monthly April through October shall not exceed 20 µg/L, as measured at the deepest point, main river channel, power dam forebay; or 20 µg/L, as measured at the deepest point, main river channel, immediately upstream of the causeway (Alabama Highway 9) at Cedar Bluff. If the mean of photic-zone composite chlorophyll *a* samples collected monthly April through October is significantly less than 20 µg/L for a given year, the Department will re-evaluate the chlorophyll *a* criteria, associated nutrient management strategies, and available data and information, and recommend changes, if appropriate, to maintain and protect existing uses.

As outlined in Alabama's Nutrient Criteria Plan, ADEM is currently working on the development of numeric nutrient criteria, which may include parameters other than chlorophyll *a* and, as they are developed, they will be adopted in State water quality standards. The targets derived for this TMDL may not necessarily represent the final determination of the necessary parameters and protective values that may be applied to these waters, with respect to nutrient criteria. As the knowledge supporting the development of nutrient targets and/or adopted criteria continues to improve, EPA encourages the State to consider subsequent nutrient information in development of any future new or revised water quality standards for nutrients, following completion of this TMDL, and any subsequent modeling efforts that result from the Coosa River Lakes TMDLs.

2.0 WATERBODY ASSESSMENT

2.1 Watershed Description

Weiss Lake lies in the Upper Coosa Watershed in northeastern Alabama (**Figure 1**). The watershed, which has a drainage area of approximately 5,273 square miles, extends into Georgia and southern Tennessee. Weiss Lake is the upper most in a chain of lakes located on the Coosa River. The Coosa River flows through Weiss Lake, discharging through the Weiss Dam. The Dam is located approximately 226 miles upstream from the confluence of the Coosa and Tallapoosa Rivers. These two rivers merge together to form the Alabama River.

Weiss Lake extends approximately 52 miles upstream from the Weiss Dam. Weiss Dam was built in 1961 by Alabama Power Company for hydroelectric power generation and is a gravity concrete and earth-fill structure that is approximately 86 feet tall. The lake has a surface area of 30,200 acres at the normal water surface elevation of 564 feet MSL. The lake has 447 miles of shoreline and a maximum depth of 62 feet at the dam and an average depth of 10.2 feet. The storage capacity of Weiss Lake at the normal pool elevation is 306,331 acre-feet. Operation of the project is licensed by the Federal Energy Regulatory Commission (FERC).

The lake is used primarily for hydroelectric generation; however, its other uses include: flood control, public water supply, maintenance of downstream water quality, irrigation, swimming and other recreation. The lake also serves as an excellent habitat for fish and wildlife. Although Weiss Lake is used for flood control, there is a limited amount of storage that is available in the lake; therefore, the operation of the lake is coordinated with the other lakes in the Coosa River chain to minimize flooding.

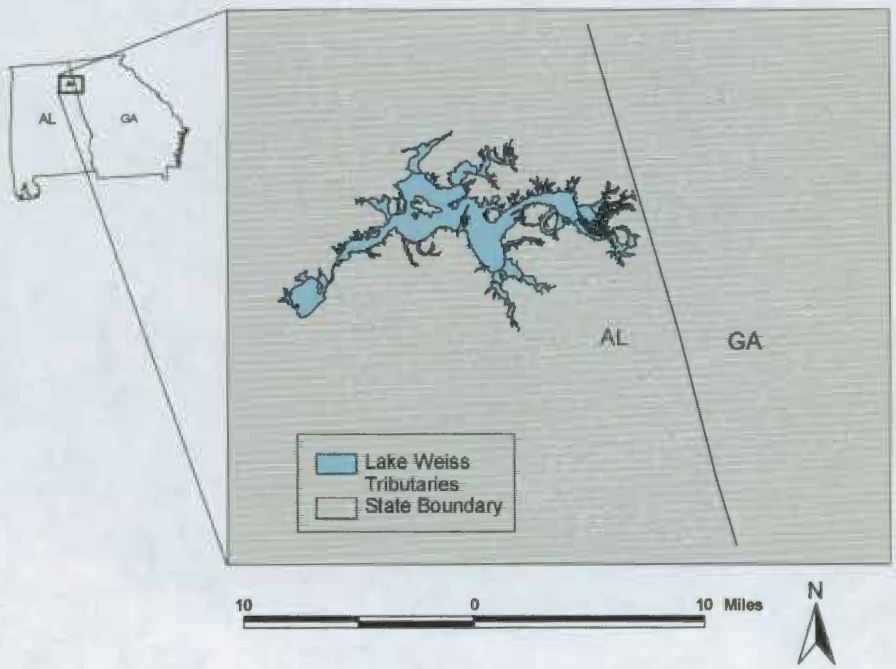

Figure 1: Location of Weiss Lake

2.2 Assessment of Point Sources

An important step in assessing pollutant sources in the Coosa River Watershed and Weiss Lake is locating the NPDES permitted sources. There are eighteen significant facilities permitted to discharge into the Upper Coosa River and Weiss Lake watersheds, all of these dischargers are included in the water quality model for Weiss Lake. Details on these facilities are included in the lake Weiss Water Quality and Watershed modeling reports. (Tetra Tech, Inc., 2007)

2.3 Landuse in Weiss Lake Watershed

Weiss Lake receives flow from four upstream watersheds that lie across the Alabama state line into northwestern Georgia. These watersheds, shown in **Figure 2**, include the Conasauga (HUC# 03150101), Coosawattee (HUC# 03150102), Oostanaula (HUC# 03150103), and Etowah (HUC# 03150104). The drainage area of the Coosa River Watershed and Weiss Lake is approximately 240,514 acres. The watersheds contain many different landuse types including: urban, forest, cropland, pasture, water, and wetlands. The land use information for the watershed is based on the 1999 National Land Cover Dataset (NLCD) and is summarized in **Table 3**. The landuse categories were grouped into the land uses of urban, forest, cropland, pasture, disturbed, wetlands, and water.

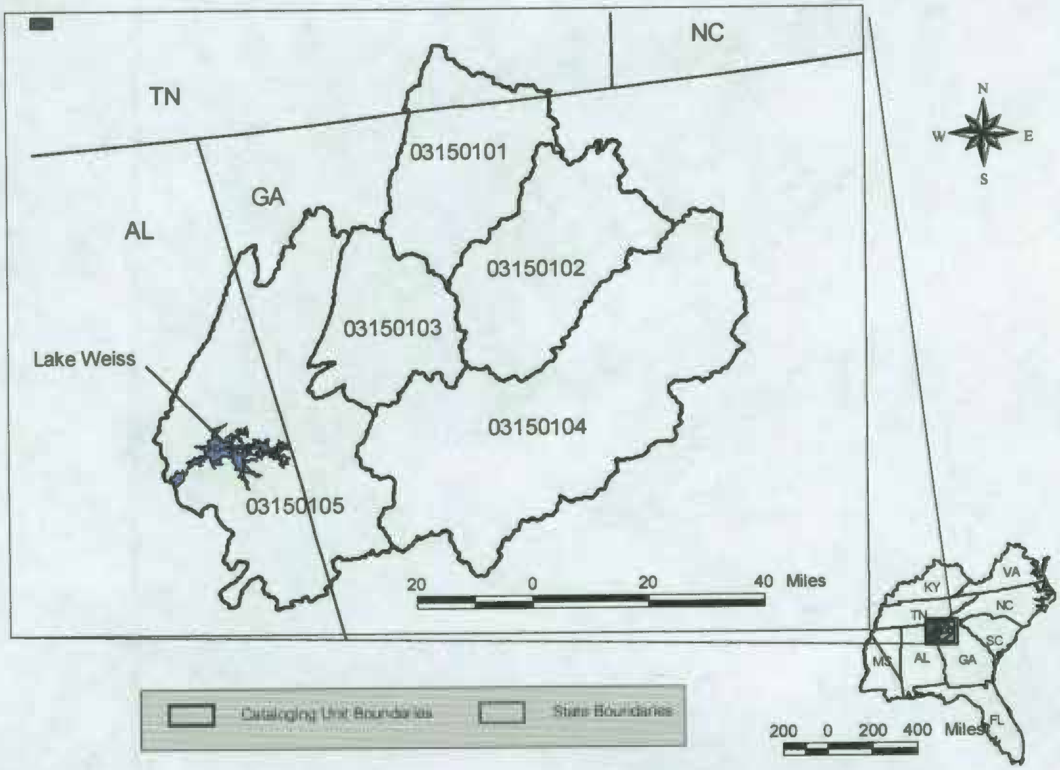

Figure 2: Watersheds Draining to Weiss Lake

Table 3: Landuse in Coosa River and Weiss Lake Watersheds

Landuse (acres)	Barren	Cropland	Forest	Pasture	Urban Impervious	Urban Pervious	Wetlands
Upper Coosa River Watersheds							
Coosawattee	656	82,94	424,965	74,370	8,951	26,741	1,761
Oostanuala	568	11,005	239,067	69,572	11,852	21,169	2,310
Conasauga	1,207	12,307	300,962	92,290	19,757	33,620	4,222
Etowah	7806	15757	777455	178274	68084	118214	7756
Headwater Total	*10,237*	*47,363*	*1,742,449*	*414,506*	*108,643*	*199,744*	*16,049*
Coosa River and Weiss Lake							
Beech, King and Cabin Creeks	7,806	1,189,103	777,455	178,274	68,084	118,214	714
Cedar Creek	310	3,067	88,626	30,437	4,390	9,227	1,040
Chattooga River	283	8,149	164,574	55,972	6,599	15,535	1,657
Little River	178	5,468	119,363	33,908	1,559	5,006	838
Cowan Creek	131	6,498	32,276	14,963	840	2,381	661
South of Lake Watershed 534	566	9,878	45,419	12,850	1,155	2,734	2,174
Middle Weiss Lake Watershed	0	8,073	62,096	13,025	2,509	4,482	1,938
Lower Weiss Lake Watershed	28	2,180	12,770	7,630	390	1,125	100
Weiss Lake Watershed Total	*9,302*	*1,232,416*	*1,302,579*	*347,059*	*85,526*	*158,704*	*9,122*
Grand Total	*19,539*	*1,279,779*	*3,045,028*	*761,565*	*194,170*	*358,448*	*25,171*
Percent	*0.34 %*	*22.52 %*	*53.57 %*	*13.40 %*	*3.42 %*	*6.31 %*	*0.44 %*

2.4 Assessment of Non-Point Sources

The two primary nutrients of concern are nitrogen and phosphorus. Total Nitrogen (TN) is a combination of many forms of nitrogen found in the environment. Inorganic nitrogen can be transported in particulate and dissolved phases in surface runoff. Dissolved inorganic nitrogen can be transported in groundwater and may enter a stream from groundwater infiltration.

Unlike nitrogen, phosphorus is primarily transported in surface runoff when it has been absorbed by eroding sediment. Phosphorus may also be associated with fine-grained particulate matter in the atmosphere and can enter streams as a result of dry fallout and rainfall (USEPA, 1999). However, phosphorus is typically not readily available from the atmosphere or the natural water supply (Davis and Cornwell, 1998). As a result, phosphorus may be a limiting nutrient in non-point source dominated rivers and streams.

For Weiss Lake, based on data and modeling analyses, phosphorus was determined to be the limiting nutrient and this TMDL will evaluate the reduction of total phosphorus to meet the Weiss Lake chlorophyll a criteria of 20 µg/L expressed as a growing season average.

3.0 ANALYTICAL APPROACH

3.1 Introduction

Weiss Lake was listed as impaired by nutrients, presumed at that time to be indicated by excess chlorophyll-a. For the purposes of this TMDL, the existing impaired condition of Weiss Lake was compared to the subsequently adopted Alabama chlorophyll a criteria of 20 µg/L growing season average, as measured at specific locations within the lake. TMDL allocations were determined by analyzing the effects of TP loads on in-lake response variables of algal biomass required to meet the applicable water quality standards. The EPA Water Quality Analysis Simulation Program, Version 7 (WASP7.2) was applied as the in-stream water quality model (Wool, et. al., 2001). WASP7.2 contains an eutrophication component that simulates complex nutrient transport and cycling in the streams, as well as models any dissolved oxygen sag resulting from point source discharges. The purpose of the modeling exercise was to determine the level of reductions in nutrient loads that would have to occur in order to protect the designated use and achieve water quality standards in Weiss Lake.

3.2 Estimating Non-point Source Loads

The Loading Simulation Program in C++ (LSPC) was also used to represent the watershed runoff to Weiss Lake downstream of USGS flow gage 02397000. The model was also used to represent the accumulation and washoff of nutrients within the entire Weiss Lake drainage area. The model was developed for total nitrogen and total phosphorus using observed 2005 concentration data from four tributary stations discharging to Weiss Lake: Cedar, Kings, Cabin and Beech Creeks; and three larger river water quality stations: Chattooga River at Mills Creek, Little River and Coosa River. The watershed model was run for the entire simulation period (January 1, 1991 – December 31, 2005) to generate a time series of water quality concentrations for the watersheds. LSPC provided concentrations of total nitrogen and total phosphorus for input to the WASP water quality model. The total nutrients were broken down into their respective components based on the sampling data. Total nitrogen was broken down into three components: organic nitrogen, nitrate-nitrite and ammonia nitrogen; total phosphorus was broken down into ortho-phosphorus and organic phosphorus.

Modifications to the original LSPC model (Tetra Tech, Inc., 2007) included: revising the kinetic decay rates, modeling just total nitrogen and phosphorus, and inclusion of point source contributions for all the modeled parameters, not just the parameters monitored by the point sources.

3.3 WASP Model

The WASP model helps users interpret and predict water quality responses to natural phenomena and man-made pollution for various pollution management decisions. WASP is a dynamic compartment-modeling program for aquatic systems, including both the water column and the underlying benthos. The time-varying processes of advection, dispersion, point and diffuse mass loading and boundary exchange are represented in the basic program. This analysis used the conventional pollutant (eutrophication) module. The conventional pollutant module represents the reaction kinetics for nutrients (nitrogen, phosphorus), carbon sources (detritus, algae, and three CBOD groups), algal growth and dissolved oxygen. The WASP model was used to provide an estimate for the existing growing season in-lake chlorophyll a concentrations based on least disturbed landuse conditions.

The EFDC hydrodynamic model provided the flow, velocity and temperature transport mechanism and was incorporated into the WASP water quality model through the hydrodynamic linkage file. The EFDC model provided the following information to WASP:

- Flows from the upstream boundary, point sources and watersheds
- Temperatures from the upstream boundary, point sources and watersheds
- Three dimensional model cell structure and volumes
- Cell volumes and transport

The WASP model for Weiss Lake was setup using the following state variables:

- Ammonia (NH_3)
- Nitrate+Nitrite (NO_2+NO_3)
- Organic Nitrogen
- Orthophosphate (PO_4)
- Organic Phosphorus
- Chlorophyll-a (Chl a)
- Dissolved Oxygen (DO)
- Carbonaceous Biochemical Oxygen Demand (CBOD)

Calibration details for both the EFDC and WASP models are provided in the "Hydrodynamic and Water Quality Modeling Report for Weiss Lake, Alabama" (Tetra Tech, Inc., 2007).

EPA updated the Weiss Lake EFDC and WASP models. EPA revised the EFDC Model for Weiss Lake by updating the Georgia Power Plant Hammond heat load and modified Upper Coosa River depths to represent the actual cross section, as measured by the Army Corps of Engineers by using the GAEPD RIV1 hydraulic cross section information. EPA revised the WASP Model for Weiss Lake to incorporate the updated watershed loads, include the city of Rome WTF in the main model and adjusted kinetic parameters to achieve a calibrated model to the Chlorophyll a growing season (April thru October) averages.

3.3.1 Weiss Lake Model Segmentation

The lake was segmented into curvilinear orthogonal computational grid cells representing horizontal dimensions for the hydrodynamic model. The hydrodynamic model utilizes the generalized vertical coordinate system that allows for a variable number of layers in the vertical direction. The waterbody was segmented into 207 horizontal grid cells (**Figure 3**).

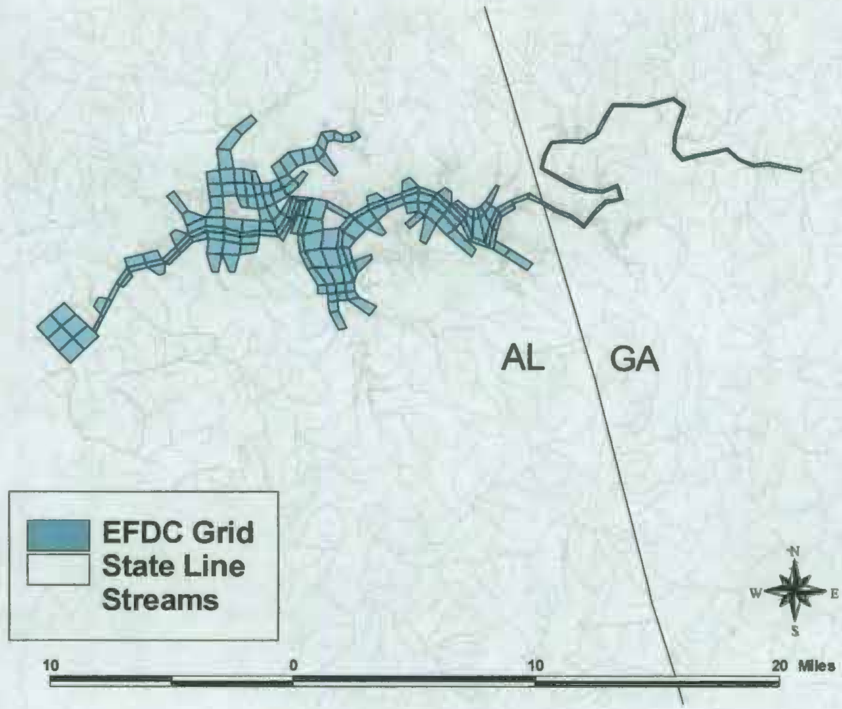

Figure 3: Grid Cells for Weiss Lake EFDC Model

The grid on the Coosa River effectively reaches the USGS station 02397000 near Rome, Georgia. In order to define the domain coverage, a GIS polygon coverage of the pool boundary of Weiss Lake, provided by Alabama Power, was used. Also, a GIS coverage of the Coosa River was used to define the channel in the lake. The grid was first developed to follow the original river channel, where the main flow occurs, and then was built to cover the rest of the reservoir area. The bottom elevation of each grid cell was defined based on the available data from Alabama Power and GAEPD, taking into account the total pool area and volume of the reservoir provided by Alabama Power.

3.3.2 Weiss Lake Model Simulation Period

The simulation period for the calibration of the water quality model was from January 1, 2001 through December 31, 2005, concentrating on 2005 when additional water quality data were available. The 2005 period was selected because, during that growing season, GAEPD and

ADEM performed extensive data collection efforts on Weiss Lake. ADEM also collected water quality data on Weiss Lake during the 2000 to 2004 growing seasons. Water quality data for the upstream boundary was collected at the USGS station 02397000. Chlorophyll _a_ data at the upstream boundary were collected daily from March 12 through December 23, 2005. All other parameters were collected approximately weekly from mid-April through mid-October.

3.4 Model Results for Existing Conditions

The watershed model was run from 1991 thru 2005. The growing season median TP load for this period is 3,210 kg/day, of which 2,280 kg/day are nonpoint source (NPS) loads and 930 kg/day are wastewater treatment (WTF) effluent discharges. The model was also run under natural landuse conditions (90 percent forest and 10 percent wetlands). **Table 4** provides the annual loads broken down by state for existing and natural conditions. These loads vary by year, dependent on the flow of the rivers and the pollutant washoff due to rainfall. **Table 5** illustrates how the annual TP loads vary by year for the years 2001 thru 2005 and shows the associated growing season average chlorophyll _a_ predicted for each year at the most critical Alabama Weiss Lake compliance site, Weiss Station 2, based on model runs.

Table 4: Growing Season Median TP Loads by State

Scenario	Georgia TP (kg/day) Growing Season Median Loads	Alabama TP (kg/day) Growing Season Median Loads
Existing Conditions	2,930	280
Existing with no WTF discharges	2,005	196
Natural Conditions	800	135

Table 5: Growing Season Median TP Loads and predicted Chl a 2001 – 2005

Year	Weiss Lake Growing Season Median TP Loads (kg/day)	Compliance Point – Station Weiss 2* Chl a (µg/L)
2001	2,740	33
2002	2,150	25
2003	4,290	24
2004	2,415	27
2005	2,110	28

* See Hydrodynamic and Water Quality Modeling Report for Weiss Lake, Alabama, Tetra Tech, Inc., 2007 for station location

Years 2001, 2004 and 2005 are the critical time periods for high chlorophyll _a_ concentrations. Since 2005 has a better data set and, therefore, better modeling inputs that reflect the actual conditions, this year was selected as the critical year and was used for TMDL development.

4.0 DEVELOPMENT OF THE TMDL

The TMDL process quantifies the amount of a pollutant that can be assimilated in a waterbody and still meet the water quality standard, identifies the sources of the pollutant, and recommends regulatory or other actions to be taken to achieve compliance with applicable water quality standards based on the relationship between pollution sources and in-stream water quality conditions. TMDLs are comprised of the sum of individual wasteload allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources, and natural background levels. In addition, the TMDL must include a margin of safety (MOS), either implicitly or explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. Conceptually, this definition is denoted by the equation:

$$\text{TMDL} = \sum \text{WLAs} + \sum \text{LAs} + \text{MOS}$$

The objective of a TMDL is to allocate loads among all of the known pollutant sources throughout a watershed so that appropriate control measures can be implemented and WQS achieved. 40 CFR 130.2 (i) states that TMDLs are expressed in terms of mass per time (e.g. pounds per day), toxicity, or other appropriate measures.

The TMDL for Weiss Lake is expressed as the allowable loadings of TP that are expected to achieve the chlorophyll a criteria. The sources of TP originate in two states, Alabama and Georgia. This TMDL is composed of three categories of allocations: 1) a wasteload allocation for the point sources in Alabama; 2) a load allocation for the nonpoint sources in Alabama; and 3) and aggregate allowable pollutant load, which includes both the point and nonpoint contributions from Georgia sources at the state border. The target chlorophyll a concentration is 20 µg/L, expressed as a growing season average (April through October). Consistent with the applicable water quality standards for the TMDL, the allocations are applicable from April through October. As previously stated, 2005 was selected as the critical year for TMDL development.

4.1 Wasteload Allocation (WLA)

Facilities regulated by the NPDES program in Alabama are assigned a WLA. The WLAs are expressed separately for major point sources (i.e., facilities with a discharge capacity greater than or equal to 1.0 million gallons per day (MGD)) and minor point sources (i.e., facilities with a discharge capacity less than 1.0 MGD).

For this TMDL, the WLA for the point sources in Alabama require reductions of TP to achieve the chlorophyll a criteria established for Weiss Lake. The WLA call for reductions of TP effluent concentrations from the major point sources to achieve TP = 1 mg/L as a monthly average. These reductions are consistent with the GaEPD nutrient reduction procedure for nutrient impaired waterbodies. For minor point sources in Alabama, the WLA requires that effluent loads shall not exceed 8.34 pound per day.

4.2 Load Allocation (LA)

The LA for this TMDL addresses nonpoint source TP loads originating in Alabama. The primary mode for transport of nutrients to streams is during a storm event. Modification of the land surface from a pervious land cover to an impervious surface results in higher peak flow rates that wash nutrient enriched water into the stream. The LA calls for a 30 percent overall reduction in growing season median TP loadings from non-point sources throughout the portion of the watershed within Alabama. Note, these reductions can be targeted at watersheds with higher nonpoint source TP concentration as long as the over all reduction of 30% is achieved.

4.3 Determination of TMDL

In addition to the WLA and LA for point sources and nonpoint sources in Alabama identified above, this TMDL provided an aggregate allocation to Georgia at the state border for the TP loads originating from the Coosa and Chattooga Rivers. The aggregate allocations require a 30% reduction of TP loads from Georgia. Based on the results of EPA's modeling analysis, the reductions required by the WLA, LA, and aggregate allocation to Georgia will result in the attainment of the applicable water quality standards.

These results, illustrated in **Figure 4** and **Table 6Table 6: Existing Conditions and TMDL Chl a Results**, show a predicted growing season chlorophyll a average concentration at the compliance point of 19 µg/L, which does not exceed the targeted water quality criteria for chlorophyll a of 20 ug/L at that point. The resultant annual and daily loads for 2005 are provided in **Table 7**. Note, these annual and daily maximum loads are specific to low flow critical years only, but the allocations provided in Table 7 below will provide protection for both wet and dry years.

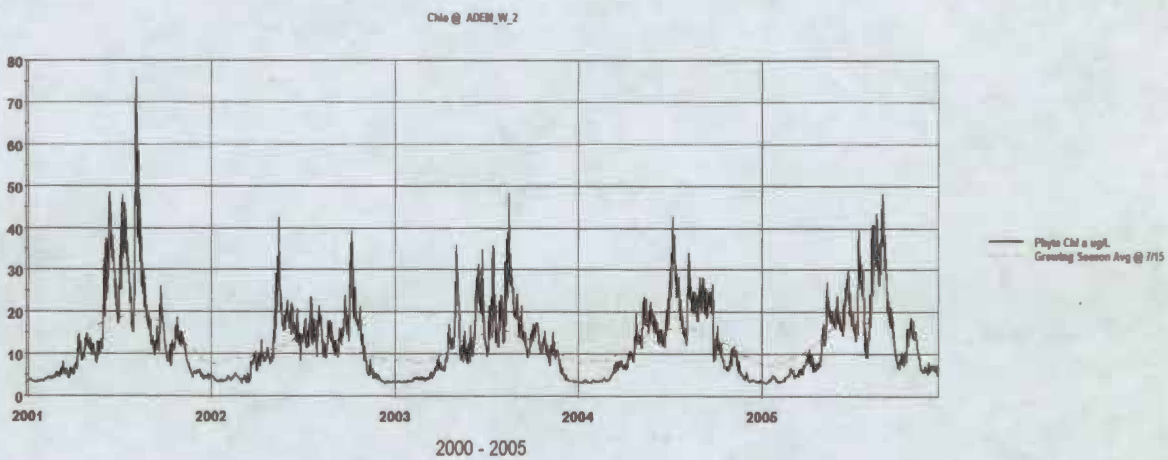

Figure 4: Predicted Chl a at Alabama Weiss Station 2 – Critical Segment Station

Table 6: Existing Conditions and TMDL Chl *a* Results

Year	Weiss 2		Weiss 1	
	Actual	TMDL	Actual	TMDL
2001	33	19	23	10
2002	25	15	17	7
2003	24	16	22	10
2004	27	17	20	5
2005	28	18	22	6

Table 7: Nutrient (Total Phosphorus) TMDL Necessary to Meet WQS in Weiss Lake

ALABAMA			GEORGIA		TMDL
LA [1]	WLA		Aggregate allocation to GA at the State Border for loads from the Coosa River [4]	Aggregate allocation to GA at the state border for loads from the Chattooga River [5]	
	Major Point Sources (≥ 1 MGD) [2]	Minor Point Sources (< 1 MGD) [3]			
30% reduction (Q_1 * 0.37) #/day)	1.0 mg/l	8.34 #/day maximum	30% reduction (Q_4 * 0.323) #/day	30% reduction (Q_5 * 0.862) #/day	30% reduction

1 The load allocation for Alabama is expressed as a function of flow (Q_1), where Q_1 represents the sum of flows (in terms of cubic feet per second as an annual average) of waters within Alabama that drain to Weiss Lake. The value of 0.37 represents an allowable growing season median concentration of 69 µg/L of total phosphorus multiplied by a units conversion factor.

2 The wasteload allocation requires that all Alabama major point sources (i.e., with a design flow equal or greater than 1 MGD) must each meet an end of pipe monthly average concentration of 1.0 mg/l (April through October only). Expressed as a daily load, the wasteload allocation for an individual major point source is Q_3 * 5.39 pounds per day, where Q_3 represents the effluent flow rate of the point source in terms of cubic feet per second. Future point sources may be allowed as long as such point sources comply with the wasteload allocation <u>and</u> water quality modeling analysis confirms that such dischargers will ensure protection of the applicable water quality standards.

3 The wasteload allocation requires that each Alabama minor point source (i.e., with a design flow less than 1 MGD) must not exceed 8.34 lbs/day, as a monthly average (April through October only). Future point sources may be allowed as long as such point sources comply with the wasteload allocation <u>and</u> water quality modeling analysis confirms that such dischargers will ensure protection of the applicable water quality standards.

4 The aggregate allocation for the Coosa River loads from Georgia at the state border is expressed as a function of flow (Q_4), where Q_4 represents the Coosa River flow (in terms of cubic feet per second as an annual average). The value of 0.323 represents an allowable growing season median concentration of 60 µg/L of total phosphorus multiplied by a units conversion factor.

5 The aggregate allocation for the Chattooga River loads from Georgia at the state border is expressed as a function of flow (Q_5), where Q_5 represents the Chattooga River flow (in terms of cubic feet per second as an annual average). The value of 0.862 represents an allowable growing season median concentration of 160 µg/L of total phosphorus multiplied by a units conversion factor.

The 30 percent overall reduction can be implemented in any number of ways, as long as the overall reduction equals 30 percent. Best management practices (BMPs) should be encouraged in the watershed to reduce potential TN and TP loads from non-point sources. The watershed with high monitored phosphorus concentrations should be considered a priority for riparian buffer zone restoration and other nutrient reduction BMPs.

4.4 Margin of Safety

TMDLs shall include a margin of safety (MOS) that takes into account any lack of knowledge about the pollutant loading and in-lake water quality. For this TMDL, the measured water quality was used directly to determine the reduction to meet the water quality standard. In this case, the lack of knowledge concerns the data and how well it represents the true water quality. There are two methods for incorporating a MOS in the analysis: 1) implicitly incorporate the MOS using conservative model assumptions to develop allocations; or 2) explicitly specify a portion of the TMDL as the MOS and use the remainder for allocations. An implicit MOS was incorporated in the analyses through the years of data collection and a multiyear modeling exercise. Based on modeling predictions, the TMDL allocations result in a growing season average chlorophyll a concentration of 19 µg/L, which is less than the TMDL target and water quality criteria of 20 µg/L and provides and explicit margin of safety.

4.5 Critical Conditions and Seasonal Variation

The model scenario used a multi-year time period and accounts for numerous seasons and various meteorological conditions. Years 2001 and 2005 are the critical low flow growing seasons which result in the highest chlorophyll a values. By achieving the reduction for these growing seasons critical conditions, water quality standards will be achieved during all other times. Seasonal variation must also be considered to ensure that water quality standards will be met during all seasons of the year. Seasonal variation was considered by targeting the critical low flow growing seasons as this is when the nutrient loadings entering the system produce the greatest response in phytoplankton within the lake resulting in the highest chlorophyll a concentrations.

5.0 CONCLUSION

EPA has determined that the allocations described in this TMDL report will ensure protection of the applicable water quality standards in Weiss Lake. EPA solicited public review and comment on a proposed draft of this TMDL and also requested comment with respect to the allocation of the TMDL between the point sources and nonpoint sources. No comments were received during the public notice period; therefore, there is not a responsiveness summary included in the Administrative Record.

The State is strongly encouraged to continue monitoring and studying nutrients and nutrient-related parameters in Weiss Lake and considering this information consistent with ADEM's nutrient criteria plan. As part of this process, EPA recommends that the State consider conducting effluent discharge studies, for both nitrogen and phosphorus, in order to verify the targets in the TMDL. This TMDL assigns wasteload allocations to the NPDES facilities in the watershed. It is recommended that the Weiss Lake watershed be considered a priority for riparian buffer zone restoration and other nutrient reduction BMPs. The implementation of these BMP activities should reduce the nutrient load entering the system. This will provide improved water quality for the support of aquatic life in the water bodies and will result in the attainment of the applicable water quality standards.

6.0 PUBLIC PARTICIPATION

This draft TMDL was proposed for public review and comment for a 30-day period beginning August 29, 2008. EPA distributed information regarding the public notice of the TMDL by e-mail to members of the public who have requested that ADEM and GAEPPD include them on a TMDL mailing list. The TMDL was also made available for review and comment on EPA Region 4's website. The public was given an opportunity to review the TMDL and submit comments to EPA in writing. No comments were received during the public notice period; therefore, there is not a responsiveness summary included in the Administrative Record.

REFERENCES

ADEM. 2007. "Nutrient Criteria Implementation Plan – State of Alabama."

Correll, D. L. 1998. The role of phosphorus in the eutrophication of receiving waters: A review. J. Environ. Qual. 27:261-266

Davis and Cornwell. 1998. Introduction to Environmental Engineering. McGraw-Hill.

Dodds, W. K. and E. B. Welch. 2000. Establishing nutrient criteria in streams. J. N. Am. Benthol. Soc. 19:186-196.

Tetra Tech, Inc. 2007. Hydrodynamic and Water Quality Modeling Report for Weiss Lake, Alabama.

U.S. EPA. 2001. BASINS PLOAD Version 3.0 Users Manual. Office of Water, Washington, D.C.

U.S. EPA. 2000. Nutrient Criteria Technical Guidance Manual: Rivers and Streams. EPA-822-B-00-002. Office of Water, Washington, D.C.

U.S. EPA. 2000. Stressor Identification Guidance Document. EPA/822/B-00/025. Office of Water, Washington, D.C.

U.S. EPA. 1999. Protocol for Developing Nutrient TMDLs. EPA 841 -B-99-007. Office of Water (4503F), Washington D.C. 135 pp.

U.S. Department of the Interior, U.S. Geological Survey. 1999. The Quality of Our Nation's Waters—Nutrients and Pesticides. Circular 1225, Reston, Virginia.

Washington State Department of Ecology. January 1994. A Citizen's Guide to Understanding & Monitoring Lakes and Streams. Water Quality Program.

Wool, Tim A., Robert B. Ambrose, James L. Martin, and Edward A. Comer, 2001. 2001, *Water Quality Analysis Simulation Program (WASP) Version 6.0 DRAFT: User's Manual*, U.S. Environmental Protection Agency – Region 4 Atlanta, GA.

Appendix A:

EPA Updated Lake Weiss Model Calibration Results

WASP Parameters and Constants

Constants are values (such as coefficients, ratios and rates) related to the water quality constituents being simulated. Examples of constants are the nitrification rate, BOD decay rate, and denitrification temperature coefficient. As their name suggests, constants are applied to the entire model for the duration of the simulation. A table of constant values input into the WASP Model is provided in Table 1.

Table 1: WASP Input for Global Constants

PARAMETER	ON/OFF	VALUE
AMMONIA		
Nitrification Rate Constant @20 °C (per day)	1	0.2
Nitrification Temperature Coefficient	1	1.08
Half Saturation Constant for Nitrification Oxygen Limit (mg O/L)	1	1.5
Minimum Temperature for Nitrification Reaction, deg C	0	0
Ammonia Partition Coefficient to Water Column Solids, L/kg	0	0
Ammonia Partition Coefficient to Bentic Solids, L/kg	0	0
NITRITE		
Denitrification Rate Constant @ 20 °C (per day)	1	0.2
Denitrification Temperature Coefficient	1	1.08
Half Saturation Constant for Denitrification Oxygen Limit (mg O/L)	1	0.01
ORGANIC NITROGEN		
Dissolved Organic Nitrogen Mineralization Rate Constant @ 20 °C (per day)	1	0.05
Dissolved Organic Nitrogen Mineralization Temperature Coefficient	1	1.08
Organic Nitrogen Decay Rate Constant in Sediments @ 20 °C (per day)	0	0.02
Organic Nitrogen Decay in Sediment Temperature Coefficient	0	1.08
Fraction of Phytoplankton Death Recycled to Organic Nitrogen	1	0.8
ORTHO-P		
Orthophosphate Partition Coefficient to Water Column Solids, L/kg	100	0.05
Orthophosphate Partition Coefficient to Benthic Solids, L/kg	0	1.08
ORGANIC-P		
Mineralization Rate Constant for Dissolved Organic P @ 20 °C (per day)	1	0.1
Dissolved Organic Phosphorus Mineralization Temperature Coefficient	1	1.08
Organic Phosphorus Decay Rate Constant in Sediments @ 20 °C (per day)	0	0.02
Organic Phosphorus Decay in Sediments Temperature Coefficient	0	1.08
Fraction of Phytoplankton Death Recycled to Organic Phosphorus	1	0.8
PHYTOPLANKTON		
Phytoplankton Maximum Growth Rate Constant @ 20 °C (per day)	1	2.5
Phytoplankton Growth Temperature Coefficient	1	1.06
Include Algal Self Shading Light Extinction in Steele (0=Yes, 1=No)	1	1
Exponent for Self Shading (Mult * TCHL A^Exp)	0	0
Multiplier for Self Shading (Mult * TCHL A^Exp)	0	0
Phytoplankton Self Shading Extinction (Dick Smith Formulation)	0	0
Phytoplankton Carbon to Chlorophyll Ratio	1	40
Phytoplankton Half-Saturation Constant for Nitrogen Uptake (mg N/L)	1	0.02
Phytoplankton Half-Saturation Constant for Phosphorus Uptake (mg P/L)	1	0.002
Phytoplankton Endogenous Respiration Rate Constant @ 20 °C (per day)	1	0.1
Phytoplankton Respiration Temperature Coefficient	1	1.06
Phytoplankton Death Rate Constant (Non-Zooplankton Predation) (per day)	1	0.02
Phytoplankton Zooplankton Grazing Rate Constant (per day)	0	0.1

Nutrient Limitation Option	0	0
Phytoplankton Decay Rate Constant in Sediments (per day)	0	0.02
Phytoplankton Temperature Coefficient for Sediment Decay	0	1.08
Phytoplankton Phosphorus to Carbon Ratio	1	0.024
Phytoplankton Nitrogen to Carbon Ratio	1	0.18
Phytoplankton Half-Sat. for Recycle of Nitrogen and Phosphorus (mg Phyt C/L)	1	0.1
LIGHT		
Light Option (1 uses input light; 2 uses calculated diel light)	1	2
Phytoplankton Maximum Quantum Yield Constant	1	360
Phytoplankton Optimal Light Saturation	1	350
Background Light Extinction Multiplier	1	0
Detritus & Solids Light Extinction Multiplier	1	0.017
DOC Light Extinction Multiplier	1	0.017
REAERATION		
Waterbody Type Used for Wind Driven Reaeration Rate	1	2
Calc Reaeration Option (0=Covar, 1=O'Connor, 2=Owens, 3=Churchill, 4=Tsivoglou)	1	1
Global Reaeration Rate Constant @ 20 °C (per day)	0	0
Elevation above Sea Level (meters) used for DO Saturation	0	0
Reaeration Option (Sums Wind and Hydraulic Ka)	1	1
Minimum Reaeration Rate, per day	0	0
Theta -- Reaeration Temperature Correction	1	1.024
Oxygen to Carbon Stoichiometric Ratio	1	2.667
DETRITUS		
Detritus Dissolution Rate (1/day)	1	0.1
Temperature Correction for detritus dissolution	1	1.08
CBOD1		
BOD (1) Decay Rate Constant @ 20 °C (per day)	1	0.15
BOD (1) Decay Rate Temperature Correction Coefficient	1	1.047
BOD (1) Decay Rate Constant in Sediments @ 20 °C (per day)	0	0.035
BOD (1) Decay Rate in Sediments Temperature Correction Coefficient	0	1.08
BOD (1) Half Saturation Oxygen Limit (mg O/L)	1	0.2
Fraction of Detritus Dissolution to BOD (1)	0	0
Fraction of BOD (1) Carbon Source for Denitrification	0	0
CBOD2		
BOD (2) Decay Rate @ 20 °C (per day)	1	0.015
BOD (2) Decay Rate Temperature Correction Coefficient	1	1.047
BOD (2) Decay Rate Constant in Sediments @ 20 °C (per day)	0	0.035
BOD (2) Decay Rate in Sediments Temperature Correction Coefficient	0	1.08
BOD (2) Half Saturation Oxygen Limit (mg O/L)	1	0.2
Fraction of Detritus Dissolution to BOD (2)	1	1
Fraction of BOD (2) Carbon Source for Denitrification	0	0
CBOD3		
BOD (3) Decay Rate Constant @ 20 °C (per day)	1	0.2
BOD (3) Decay Rate Temperature Correction Coefficient	1	1.047
BOD (3) Decay Rate Constant in Sediments (per day)	0	0.035
BOD (3) Decay Rate in Sediments Temperature Correction Coefficient	0	1.08
BOD (3) Half Saturation Oxygen Limit (mg O/L)	1	0.2
Fraction of Detritus Dissolution to BOD (3)	0	0
Fraction of BOD (3) Carbon Source for Denitrification	0	0

Calibration Graphs:

Growing Season 2005 was the main EPA updated WASP model calibration period. During this period GaEPD conducted extensive monitoring to establish accurate headwater and boundary model parameter input conditions. The model was run for the 2001 through 2005 period to provide an understanding of the system under various flow conditions. Also, ADEM conducted monthly Lake Weiss monitoring for 2001 through 2005.

The following figures provide a visual comparison of collected data and model output for years 2001 through 2005.

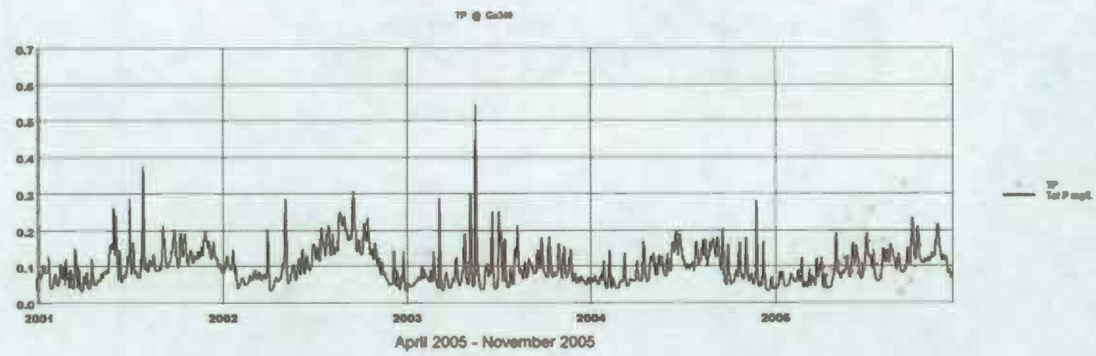

Figure 1: TP at GA340 Coosa River below Rome

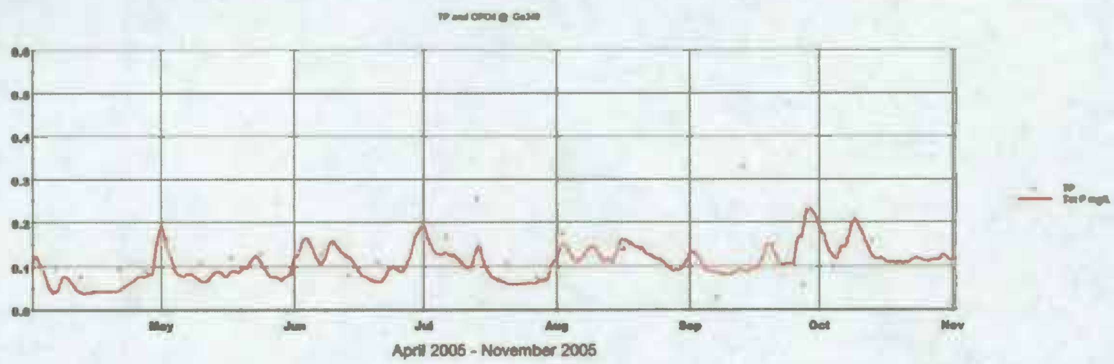

Figure 2: Growing Season 2005 TP at GA340 Coosa River below Rome

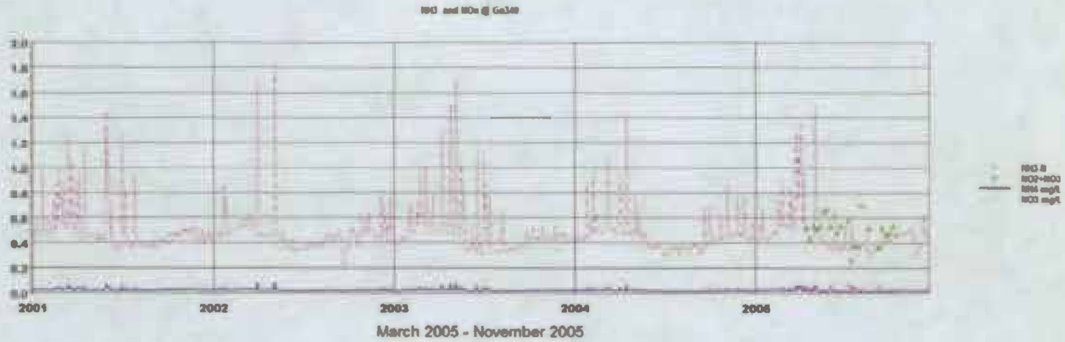

Figure 3: NOx and NH_3 at GA340 Coosa River below Rome

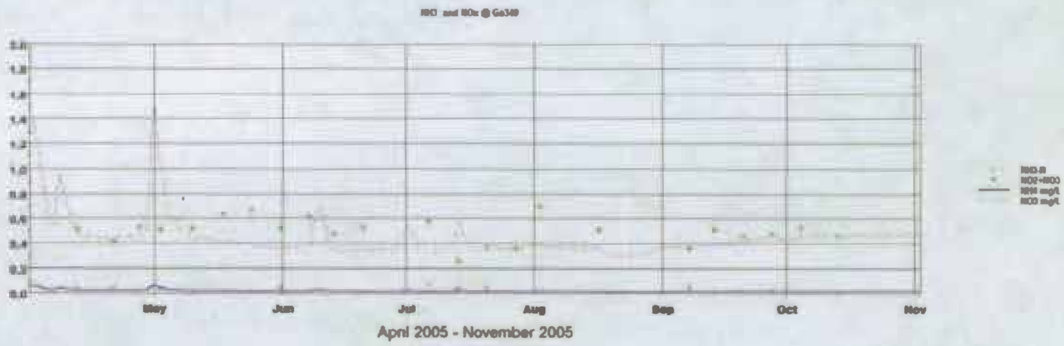

Figure 4: Growing Season 2005 NOx and NH_3 at GA340 Coosa River below Rome

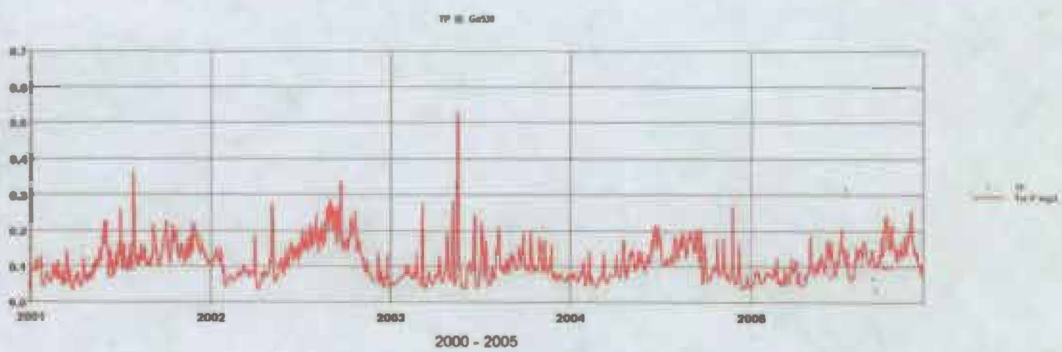

Figure 5: TP at Ga540 Coosa River near the State Line

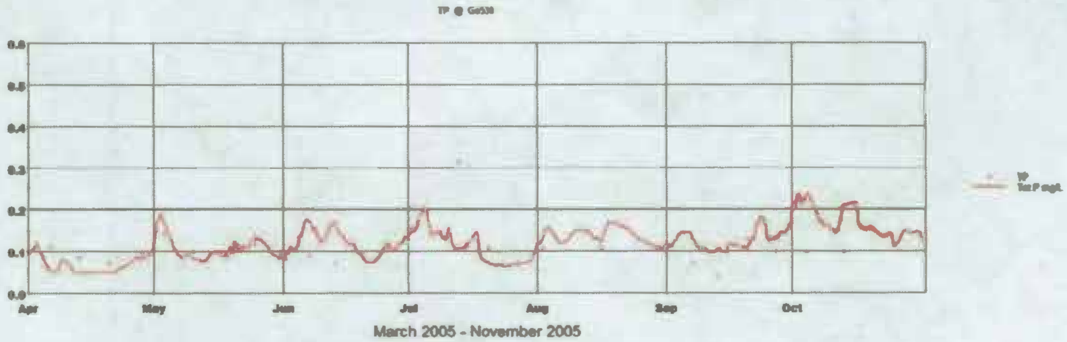

Figure 6: Growing Season TP at Ga540 Coosa River near the State Line

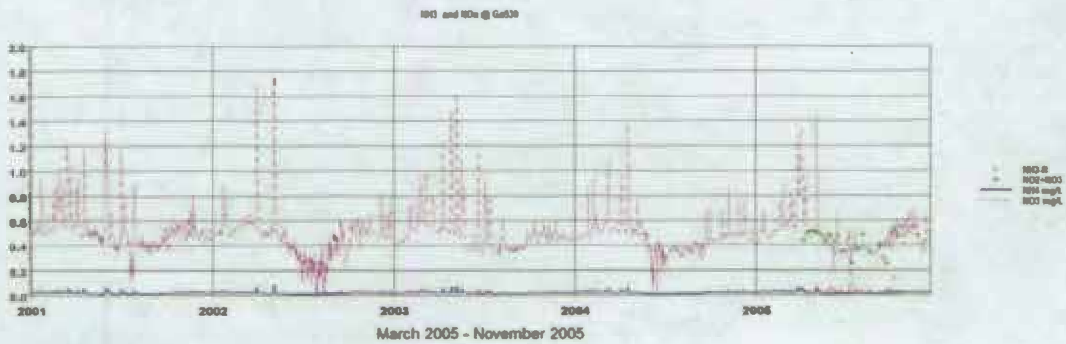

Figure 7: NOx and NH_3 at Ga540 Coosa River near the State Line

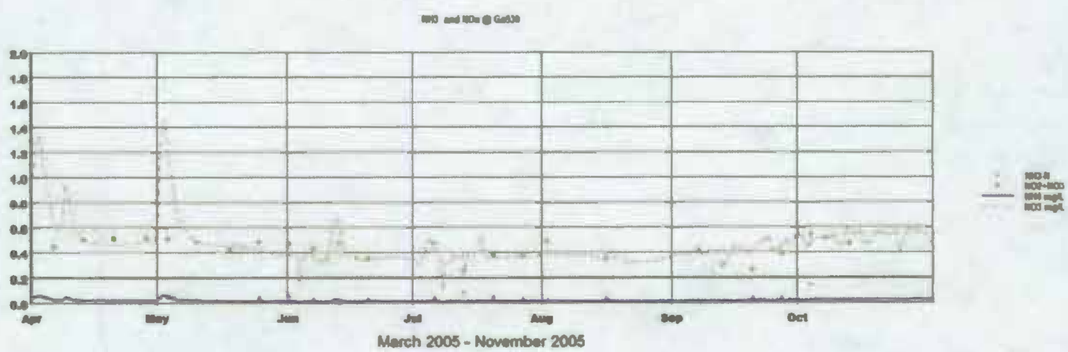

Figure 8: Growing Season NOx and NH_3 at Ga540 Coosa River near the State Line

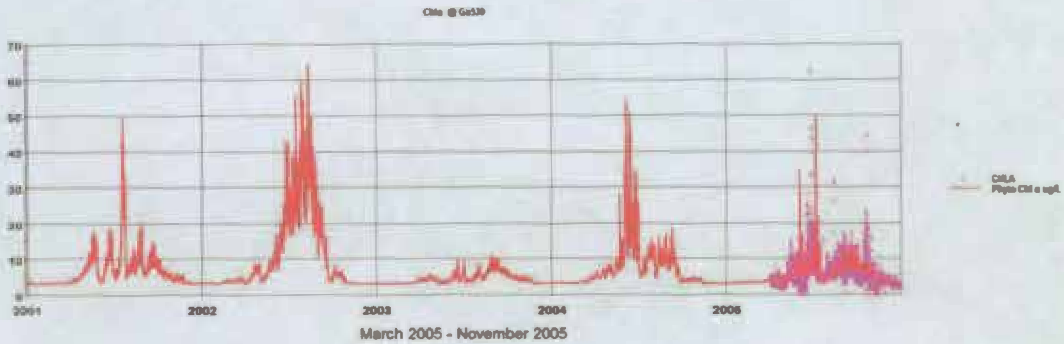

Figure 9: Chl *a* at Ga540 Coosa River near the State Line

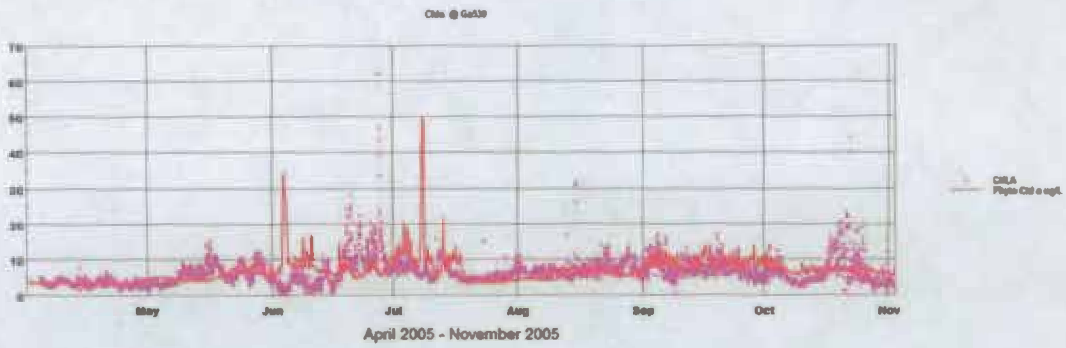

Figure 10: Growing Season 2005 Chl *a* at Ga540 Coosa River near the State Line

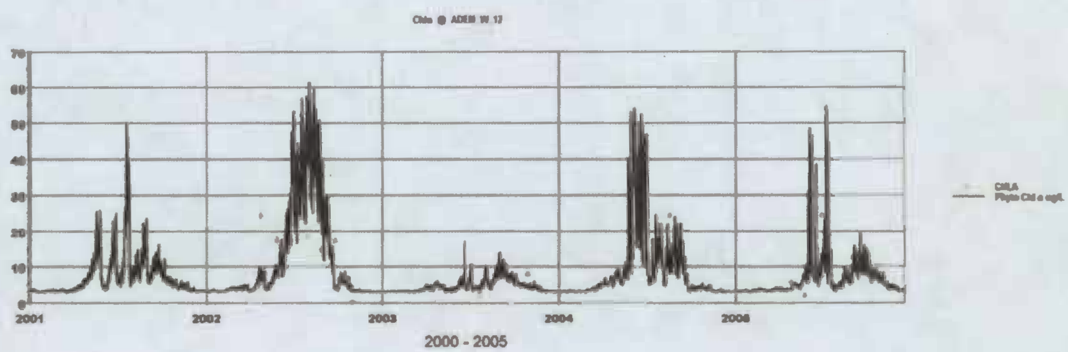

Figure 11: Chl *a* at Alabama Weiss 12 near State Line

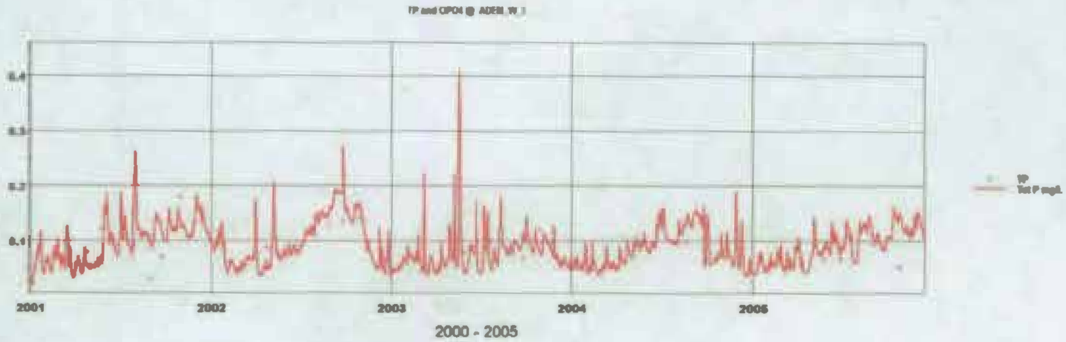

Figure 12: TP at Alabama Weiss 3 – Mid Lake Station

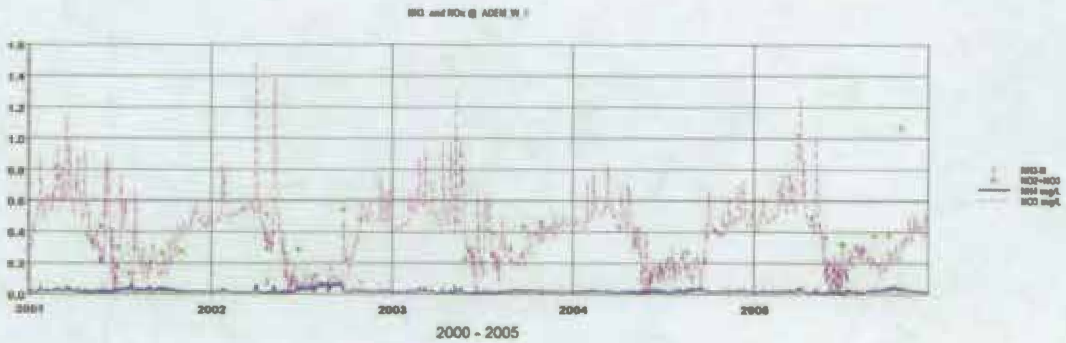

Figure 13: NOx and NH_3 at Alabama Weiss 3 – Mid Lake Station

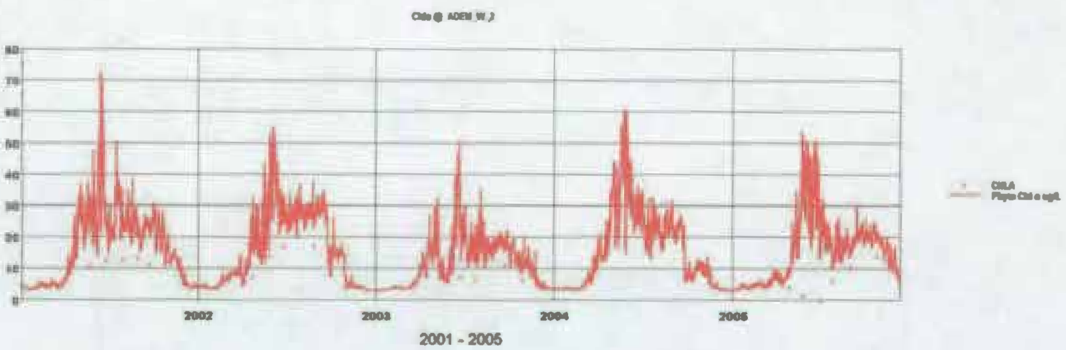

Figure 14: Chl *a* at Alabama Weiss 3 – Mid Lake Station

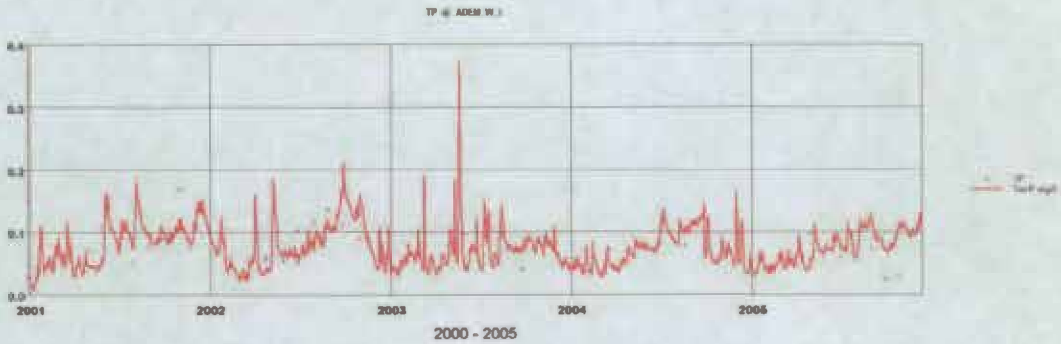

Figure 15: TP at Alabama Weiss 2 – Upper Lower Lake Monitoring Station (Critical Chl a Segment)

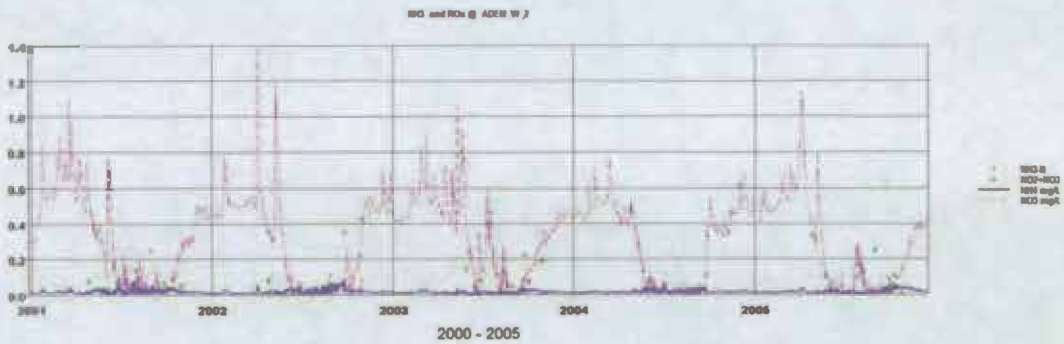

Figure 16: NOx and NH_3 at Alabama Weiss 2 – Upper Lower Lake Monitoring Station (Critical Chl a Segment)

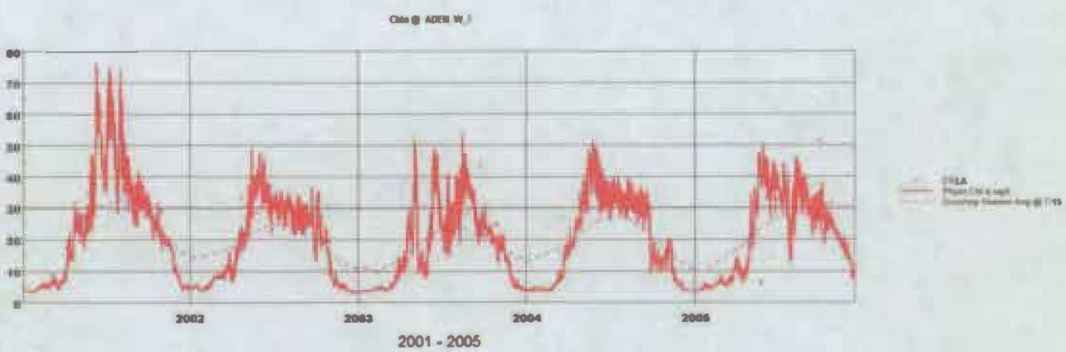

Figure 17: Chl a at Alabama Weiss 2 – Upper Lower Lake Monitoring Station (Critical Chl a Segment)

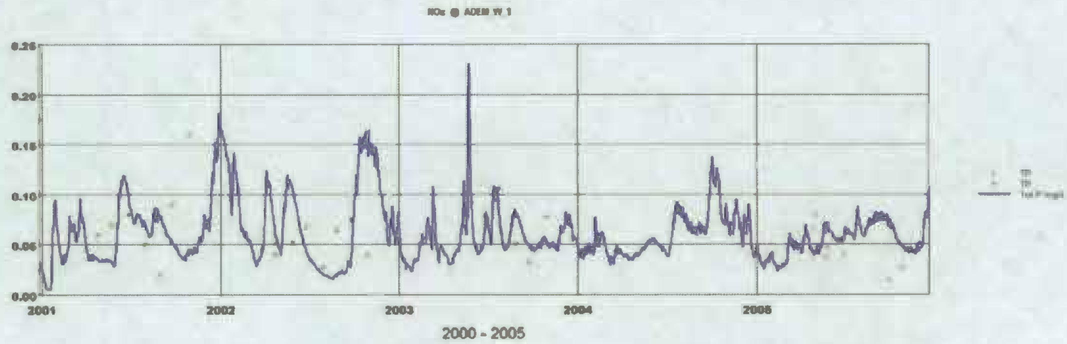

Figure 18: TP at Alabama Weiss 1 and 1a in Dam Pool Station

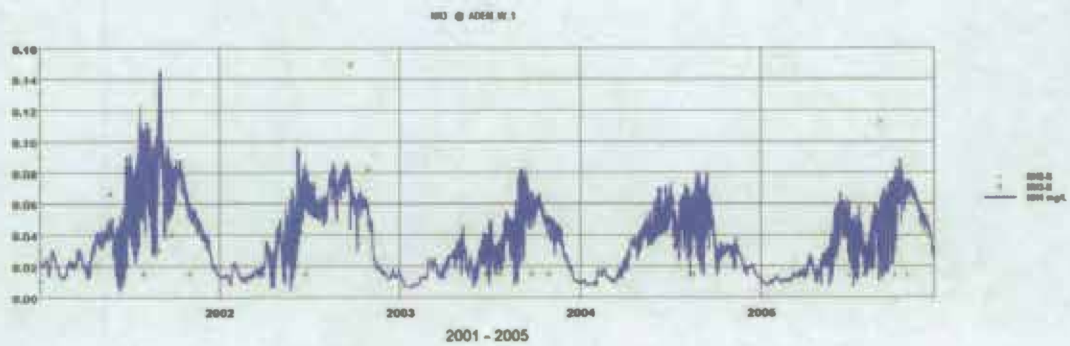

Figure 19: NH_3 at Alabama Weiss 1 and 1a in Dam Pool Station

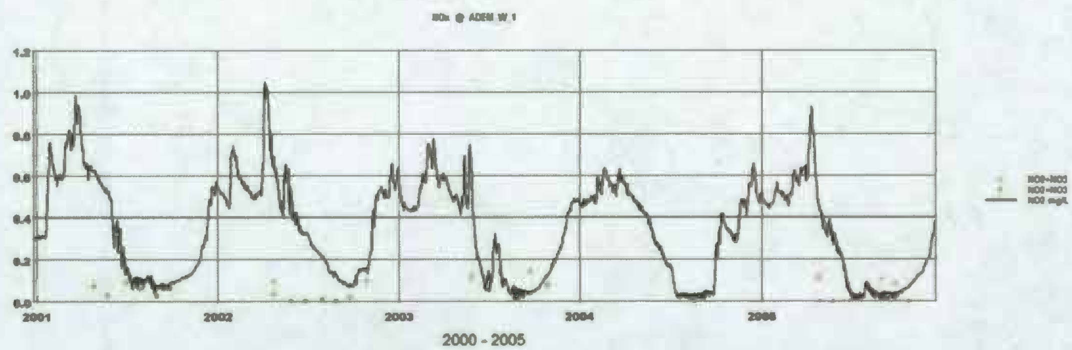

Figure 20: NOx at Alabama Weiss 1 and 1a in Dam Pool Station

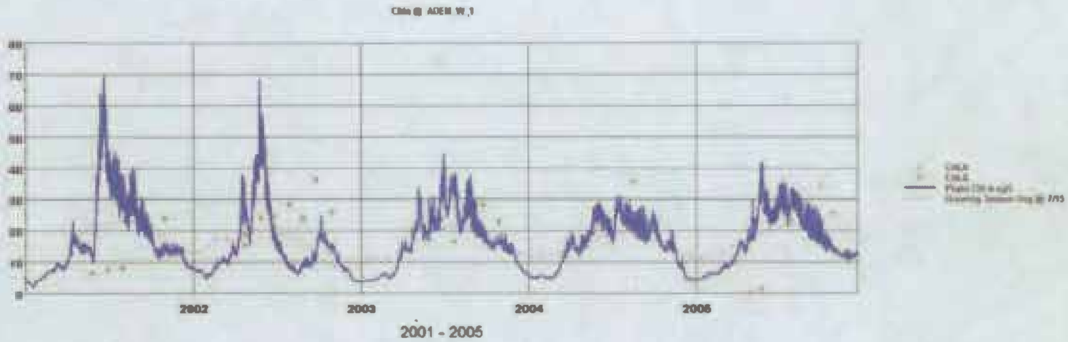

Figure 21: Chl *a* at Alabama Weiss 1 and 1a in Dam Pool Station

Lake Weiss Watershed Boundary Conditions

The Lake Weiss LSPC TMDL Watershed Model was used to determine the daily flows and nutrient concentrations for the major watersheds contributing to Lake Weiss. The upstream watersheds were included in the model to provide a tool that could estimate the inflow of water quality constituents to the headwater of the Weiss Lake hydrodynamic model. The watershed model was calibrated for hydrology using the daily flow record from a USGS gaging station located on Coosa River near Rome, Georgia (USGS 02397000). (Tt 2007)

The model was calibrated for BOD, nitrate-nitrite, ammonia, organic nitrogen, total phosphorus, and orthophosphate using observed 2005 concentration data from four tributary stations discharging to Weiss Lake (Cedar, Kings, Cabin and Beech Creeks). The model was validated using data from three additional water quality stations: Chattooga River at Mills Creek, Little River and Coosa River. The calibrated watershed model was run for the entire simulation period (January 1, 1991 – December 31, 2005) to generate a time series of water quality concentrations for the watersheds. LSPC provided concentrations for BOD, nitrate-nitrite, ammonia, organic nitrogen, orthophosphate, and total phosphorus. (Tt 2007).

Modifications to the Tt LSPC model included revising the output to just Total Nitrogen (TN) and Total Phosphorus (TP). The TN and TP were divided in to their components based on the available stream data (Table 2). These daily flows and concentrations were also inputted into an Excel spreadsheet for easy import to the WASP Model.

Table 2: TN and TP Components

Percent of TN			Percent of TP	
Org_N	NH_3	Nox	OrgP	OPO_4
0.27	0.03	0.7	0.2	0.8

In addition, the point source contributions included all the modeled parameters, not just the parameters monitored in the discharges NPDES permit. Table 3 provides the major wastewater dischargers' flows and nutrient concentrations for those located both in the Upper Coosa Headwater Watersheds and the Watersheds flowing directly to the Coosa River and Lake Weiss.

Table 3: Major Dischargers in the Watersheds flowing directly to the Coosa River and Lake Weiss

NPDES #	Facility	Flow (mgd)	BOD_5	$CBOD_u$	NH_3	OrthoP	NO_x	OrgN
GA0030333	CALHOUN WPCP	8.5	12	48	0.5	8	2.5	0.5
GA0024091	CARTERSVILLE WPCP	11	5	20	0.5	7	2.5	0.5
GA0025721	CAVE SPRING WPCP	0.22	30	120	20	10	0	2
AL0024678	CEDAR BLUFF UB TOWN OF WWTP	0.2	40	160	3	1	15	3
GA0024074	CEDARTOWN WPCP	2.5	7.5	30	0.5	5	2.5	0.5
GA0032492	CHATSWORTH WPCP	1.5	3	12	0.5	2	2.5	0.5
AL0062723	CENTRE TOWN OF WWSB LAGOON	0.6	12	48	7	3	35	7
AL0057592	CHEROKEE CO WWTP WATER AUTH	0.1	2	8	10	5	5	5
	City of Dallas combined North and West WTFs	1.4	20	80	4	5	20	4
GA0026115	EMERSON POND	0.17	20	80	10	5	5	5
GA0025712	LAFAYETTE WPCP	2	3	12	0.3	4	1.5	0.3
GA0026042	ROCKMART WPCP	1.5	2	8	0.3	12	1.5	0.3
GA0025704	SUMMERVILLE WPCP	2	10	40	2	2	10	2
GA0025607	TRION WPCP	5	6	24	1	3	5	1

For ease of use in TMDL Development, the City of Rome point source that enters Coosa River was inputted directly in the Lake Weiss model as a WASP load, as were the other direct dischargers. The LSPC model was run without this discharger and the LSPC concentrations were entered as WASP main stem or boundary conditions.

The following sections provide the individual watersheds flows and the nitrogen and phosphorous concentrations in figure and tabular forms.

Upper Coosa River below Rome:

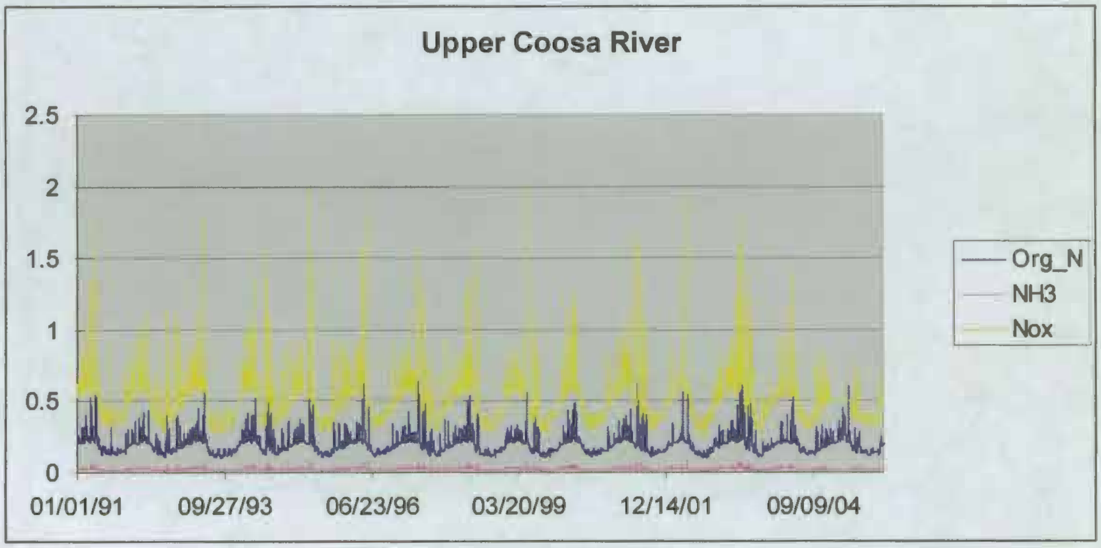

Figure 22: Nitrogen Concentrations for Upper Coosa River below Rome, Georgia

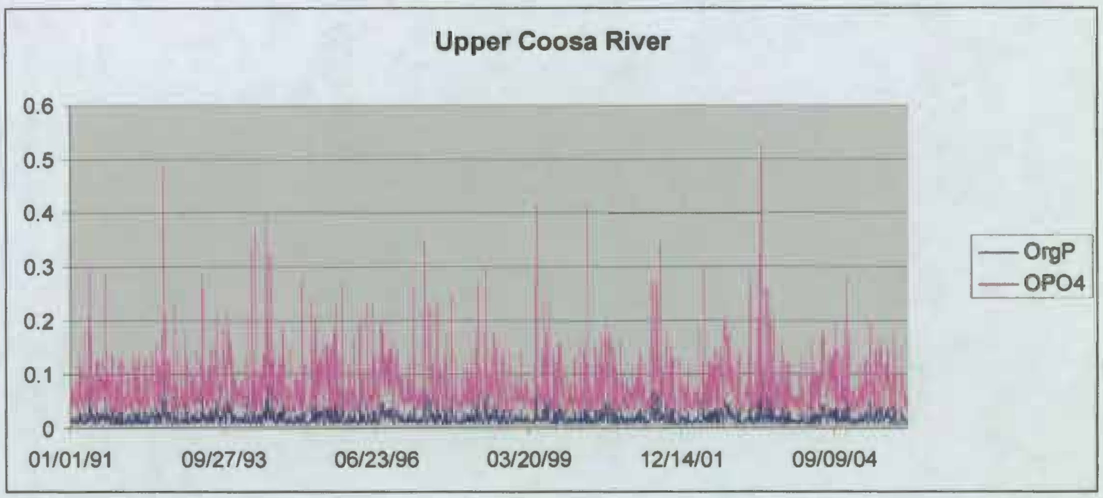

Figure 23: Phosphorous Concentrations for Upper Coosa River below Rome, Georgia

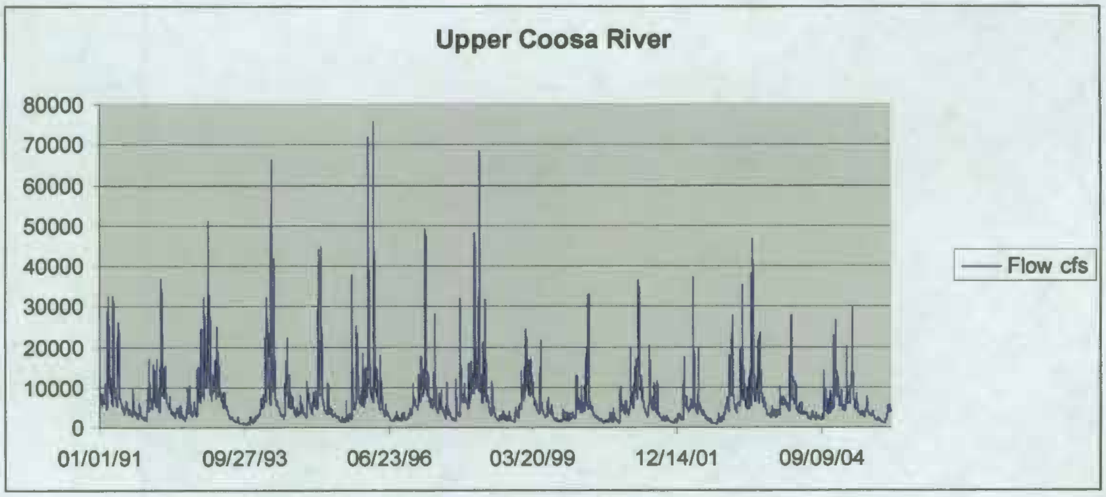

Figure 24: Flows for Upper Coosa River below Rome, Georgia

Table 4: Summary Flows and the Nitrogen and Phosphorus Concentrations for Upper Coosa River below Rome, Georgia

Year	Median Value				
	Flow (cfs)	TN (mg/L)	TP (mg/L)	TN (#/day)	TP (#/day)
1991 - 2005	6224	0.71	0.080	23451	2665
1997	5839	0.72	0.075	22372	2341
2000	2888	0.67	0.074	10331	1141
2001	3841	0.71	0.078	14491	1605
2002	3594	0.72	0.083	13810	1602
2003	6183	0.75	0.078	24798	2578
2004	4107	0.72	0.079	15698	1734
2005	4045	0.68	0.079	14766	1711

Beech, King and Cabin Creeks:

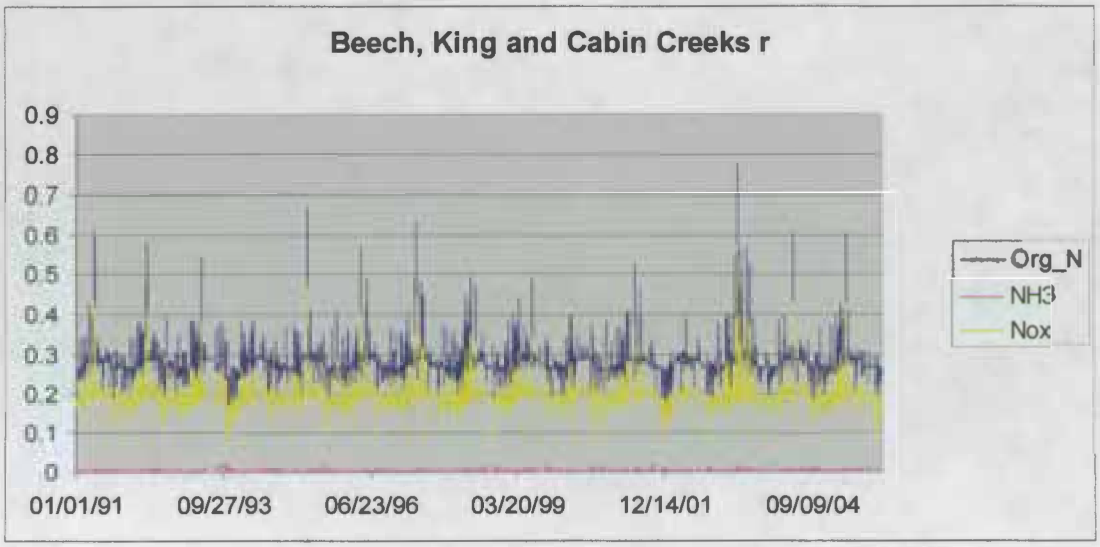

Figure 25: Nitrogen Concentrations for Beech, King and Cabin Creeks

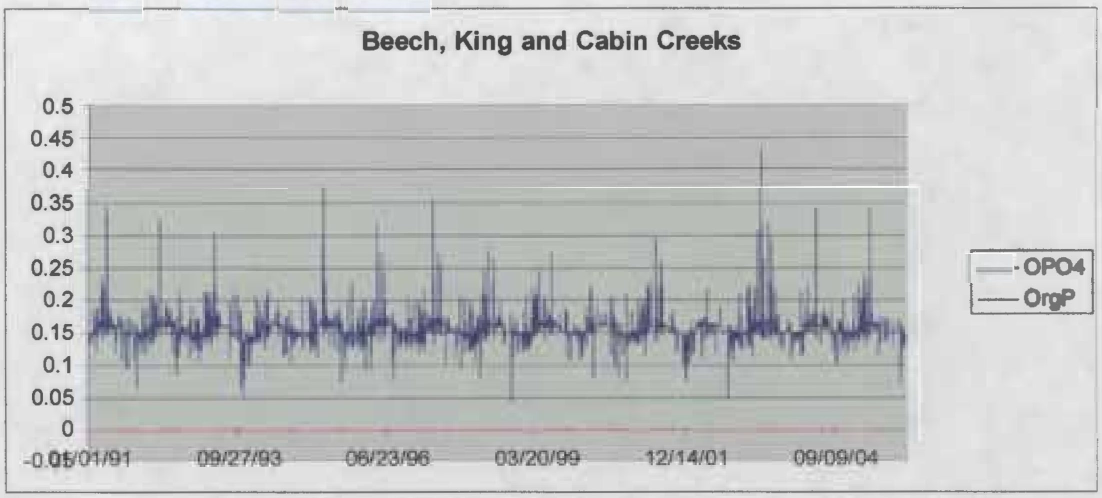

Figure 26: Phosphorus Concentrations for Beech, King and Cabin Creeks

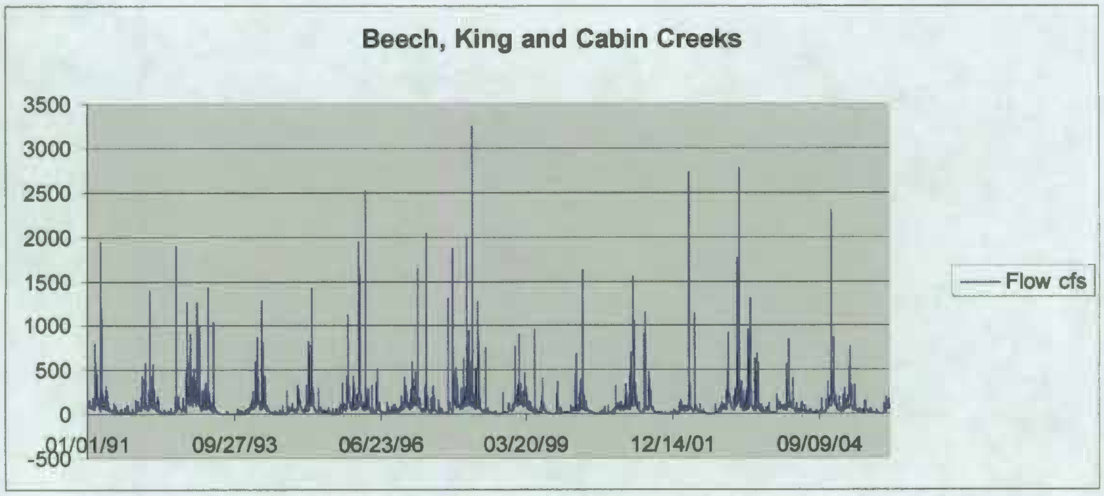

Figure 27: Flows for Beech, King and Cabin Creeks

Table 5: Summary Flows and the Nitrogen and Phosphorus Concentrations for Beech, King and Cabin Creeks

Year	Median Value				
	Flow (cfs)	TN (mg/L)	TP (mg/L)	TN (#/day)	TP (#/day)
1991 - 2005	84	0.46	0.152	207	68
1997	61	0.46	0.152	149	49
2000	25	0.46	0.153	62	21
2001	36	0.46	0.152	88	29
2002	36	0.47	0.154	90	29
2003	66	0.46	0.151	162	53
2004	40	0.48	0.156	102	34
2005	38	0.46	0.151	92	30

Cedar Creek:

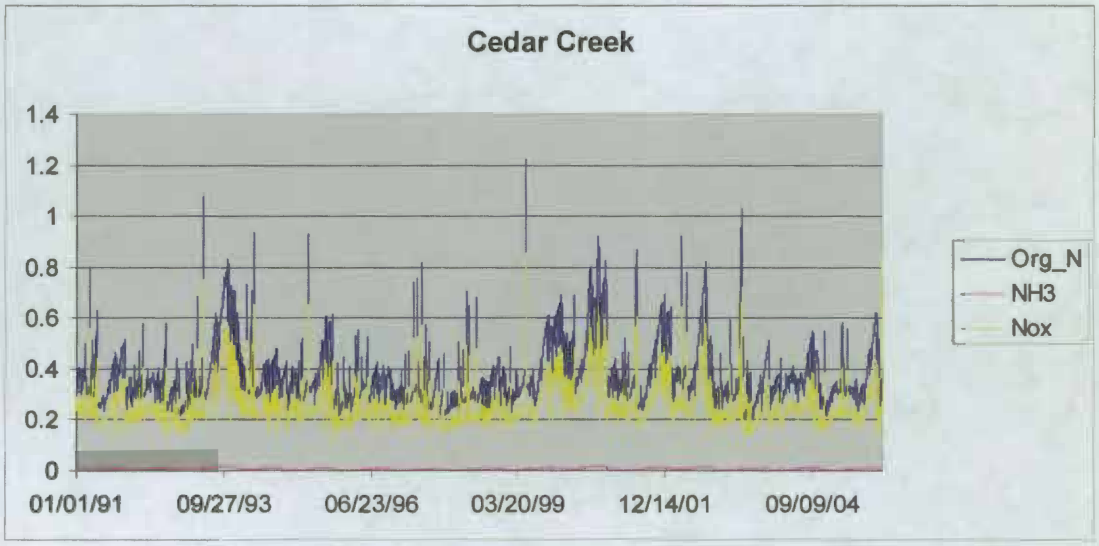

Figure 28: Nitrogen Concentrations for Cedar Creek

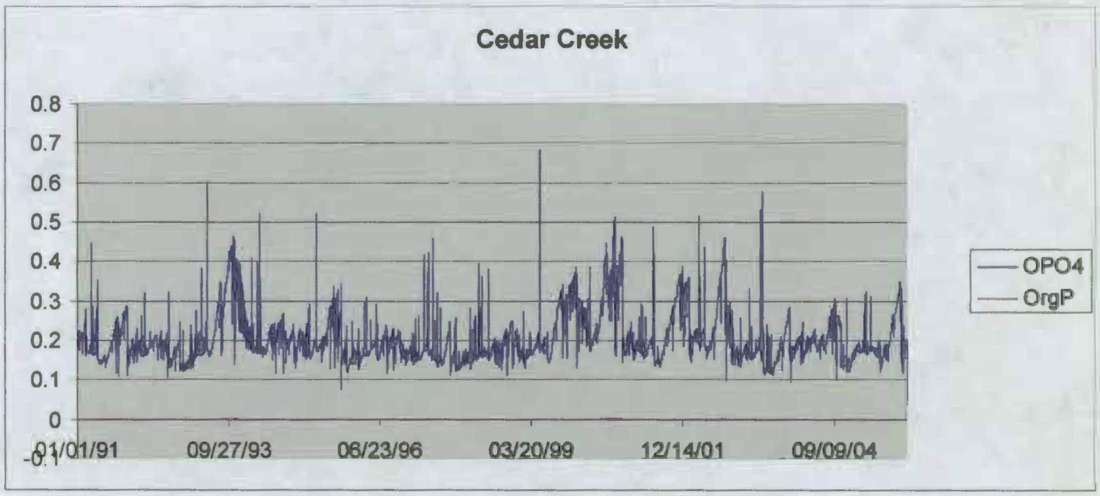

Figure 29: Phosphorus Concentrations for Cedar Creek

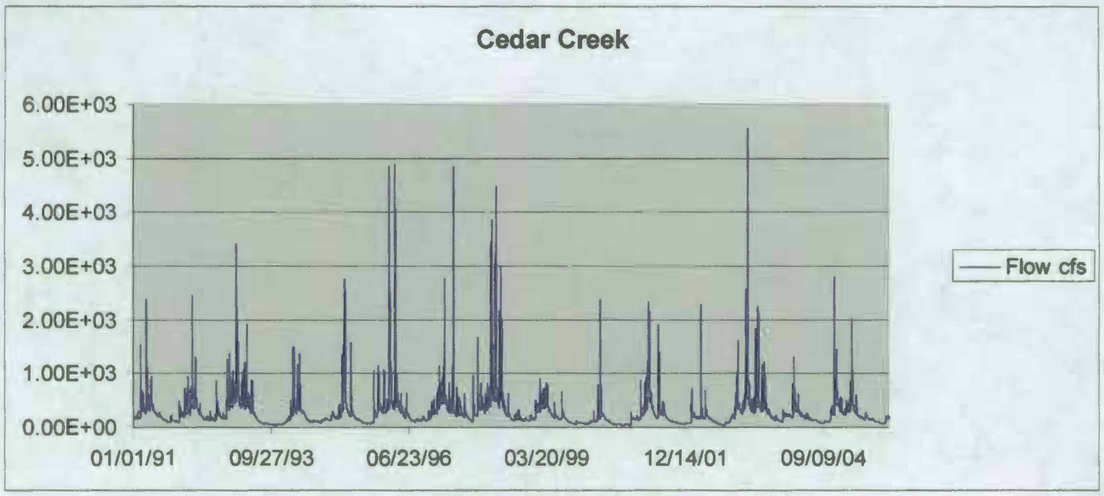

Figure 30: Flows for Cedar Creek

Table 6: Summary Flows and the Nitrogen and Phosphorus Concentrations for Cedar Creek

Year	Median Value				
	Flow (cfs)	TN (mg/L)	TP (mg/L)	TN (#/day)	TP (#/day)
1991 - 2005	291	0.57	0.187	884	290
1997	321	0.49	0.161	838	275
2000	101	0.83	0.271	446	146
2001	178	0.60	0.196	571	187
2002	158	0.66	0.217	557	183
2003	299	0.51	0.168	819	269
2004	187	0.60	0.196	597	196
2005	190	0.56	0.183	567	185

Chattooga River:

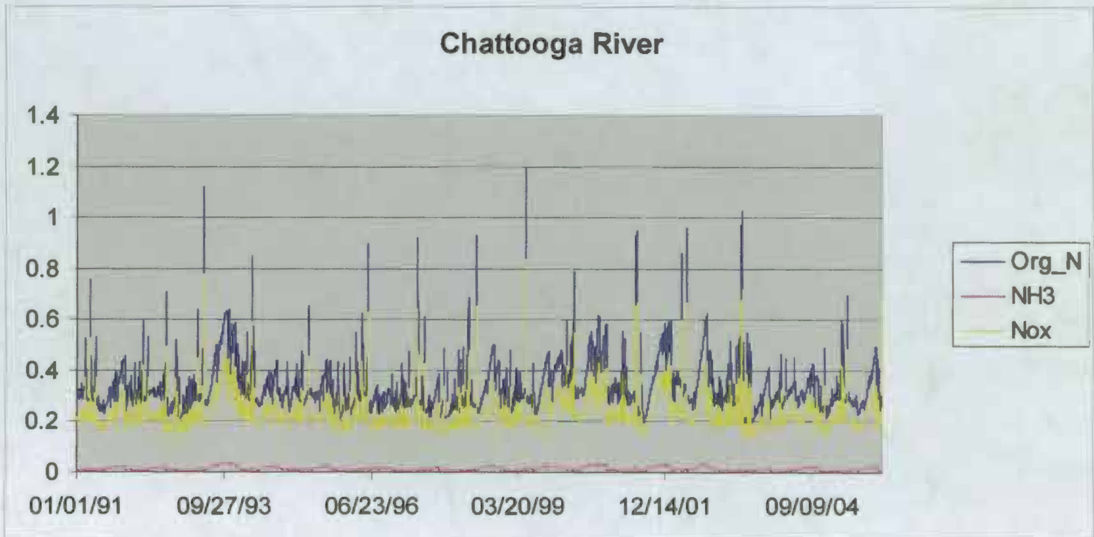

Figure 31: Nitrogen Concentrations for Chattooga River

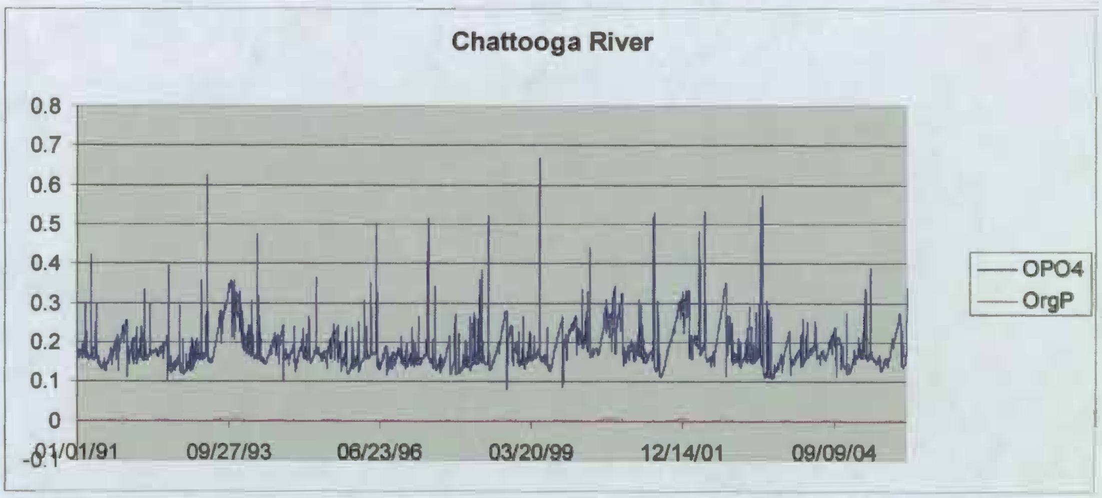

Figure 32: Phosphorus Concentrations for Chattooga River

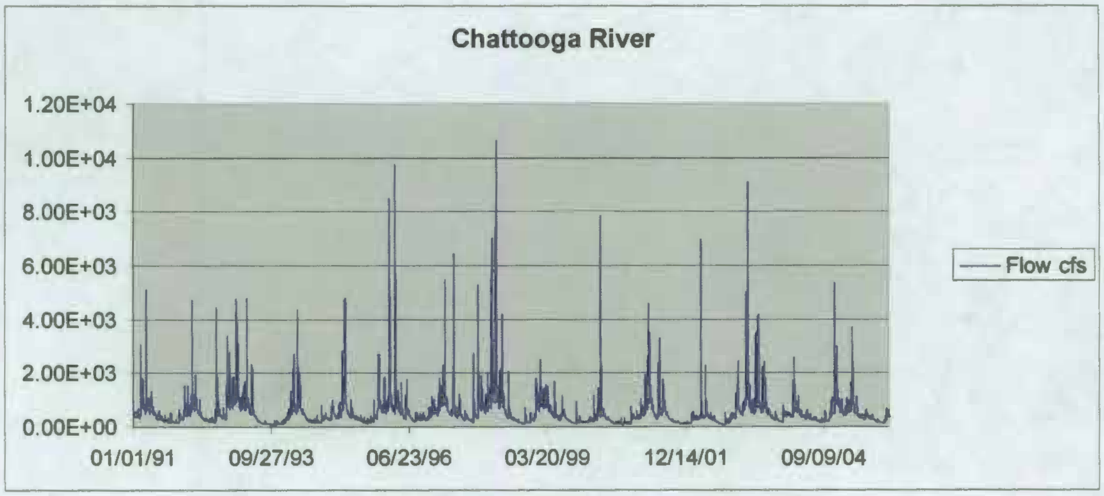

Figure 33: Flows for Chattooga River

Table 7: Summary Flows and the Nitrogen and Phosphorus Concentrations for Chattooga River

Year	Median Value				
	Flow (cfs)	TN (mg/L)	TP (mg/L)	TN (#/day)	TP (#/day)
1991 - 2005	575	0.52	0.171	1609	526
1997	545	0.47	0.154	1371	448
2000	238	0.66	0.216	841	274
2001	386	0.55	0.179	1128	369
2002	286	0.61	0.198	927	302
2003	562	0.48	0.158	1447	473
2004	370	0.53	0.173	1050	343
2005	394	0.51	0.165	1062	347

South of Lake Watershed:

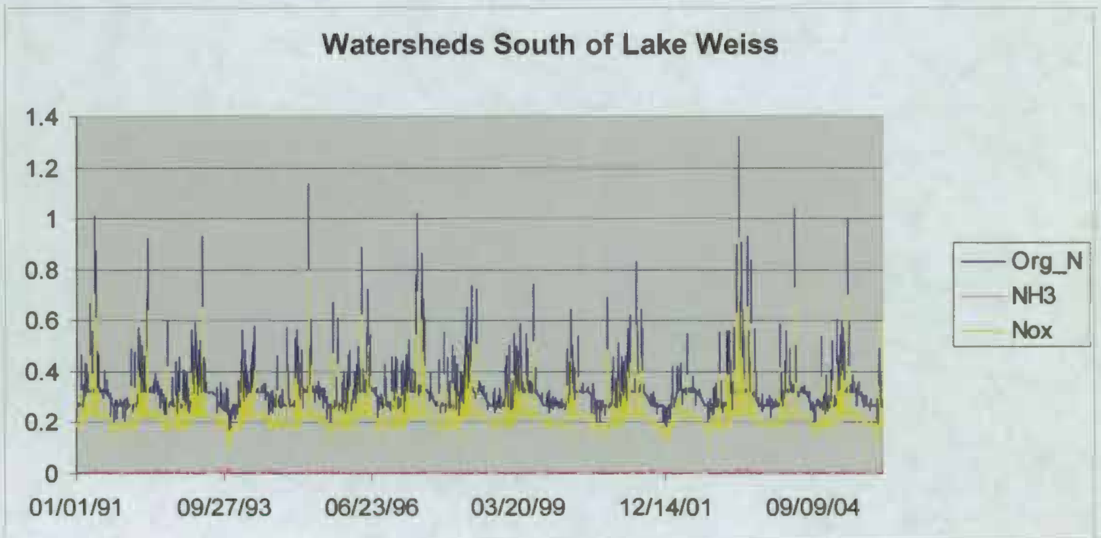

Figure 34: Nitrogen Concentrations for South of Lake Watersheds

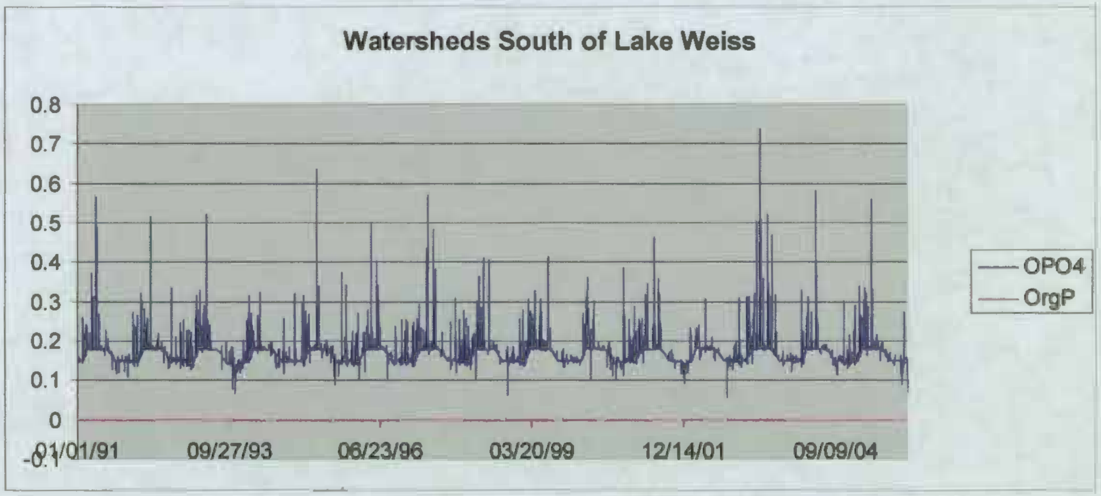

Figure 35: Phosphorus Concentrations for South of Lake Watersheds

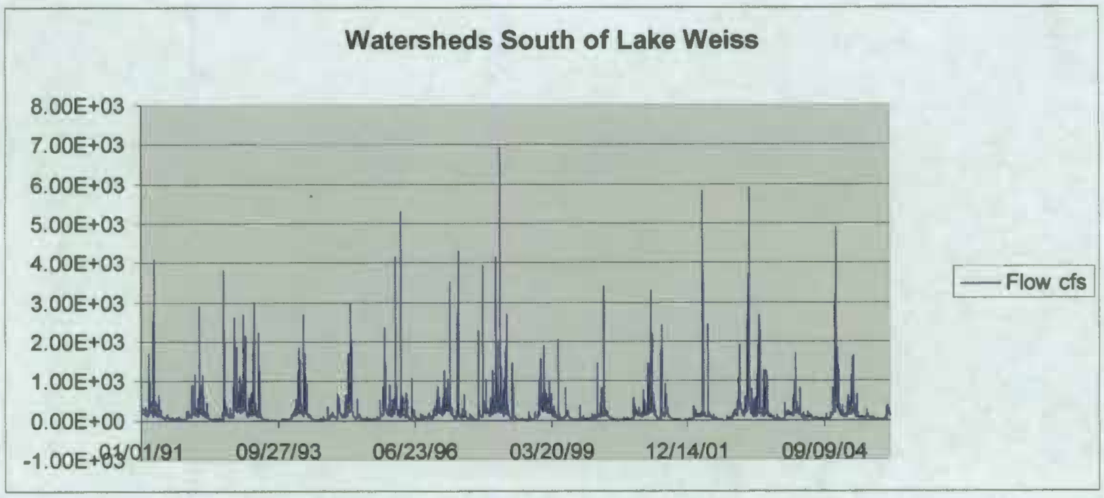

Figure 36: Flows for South of Lake Watersheds

Table 8: Summary Flows and the Nitrogen and Phosphorus Concentrations for South of Lake Watersheds

Year	Median Value				
	Flow (cfs)	TN (mg/L)	TP (mg/L)	TN (#/day)	TP (#/day)
1991 - 2005	178	0.51	0.166	481	158
1997	125	0.51	0.167	341	112
2000	50	0.49	0.161	132	43
2001	75	0.51	0.167	205	67
2002	75	0.50	0.166	201	66
2003	139	0.51	0.167	378	124
2004	84	0.51	0.168	229	75
2005	74	0.50	0.165	198	65

Spring Creek Watersheds:

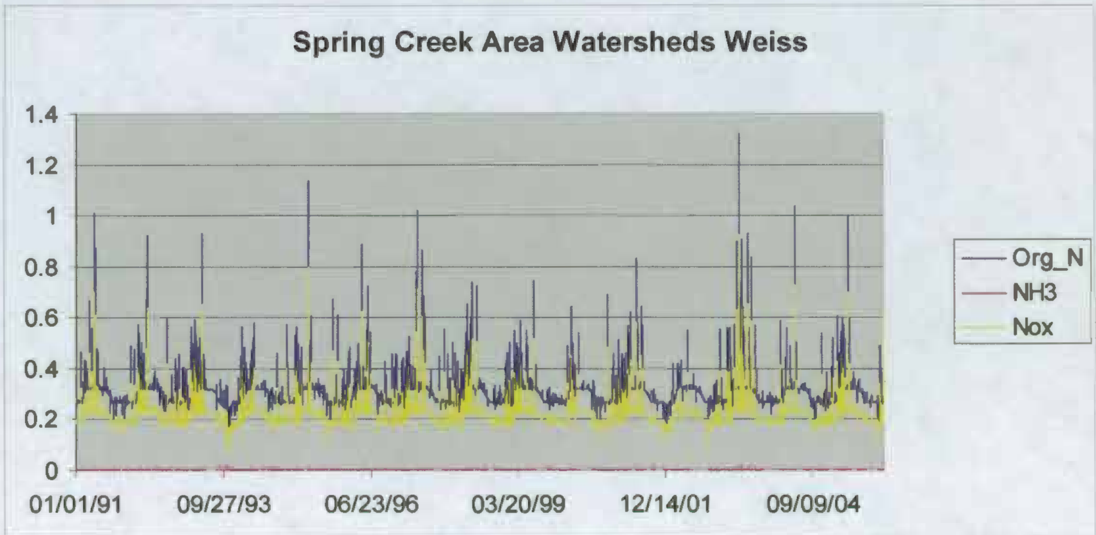

Figure 37: Nitrogen Concentrations for Spring Creek

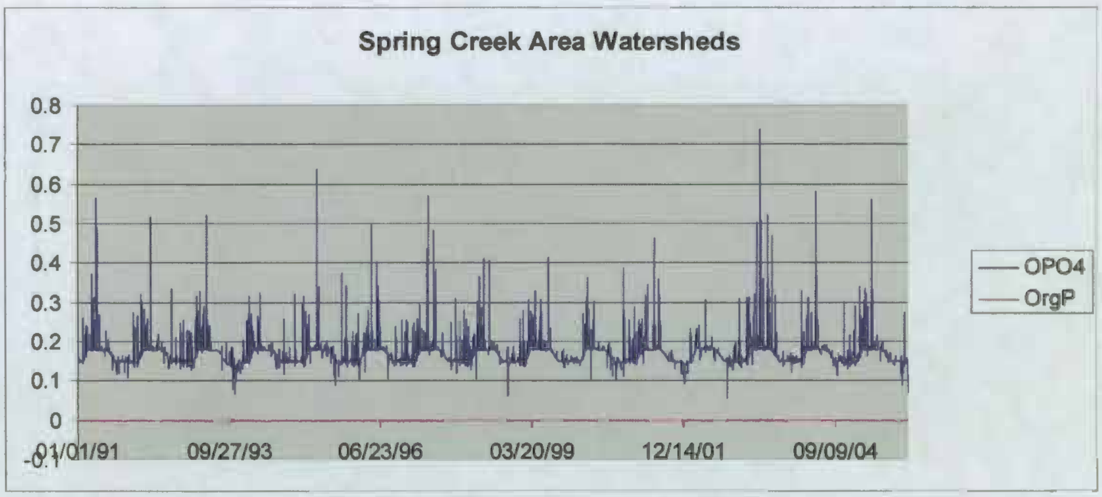

Figure 38: Phosphorus Concentrations for Spring Creek

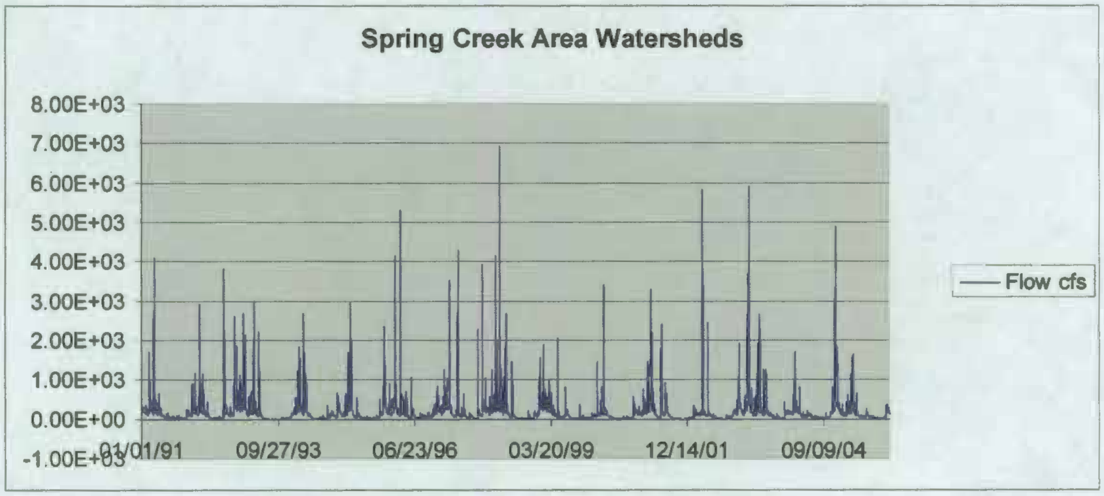

Figure 39: Flows for Spring Creek

Table 9: Summary Flows and the Nitrogen and Phosphorus Concentrations for Spring Creek

Year	Median Value				
	Flow (cfs)	TN (mg/L)	TP (mg/L)	TN (#/day)	TP (#/day)
1991 - 2005	178	0.51	0.166	481	158
1997	125	0.51	0.167	341	112
2000	50	0.49	0.161	132	43
2001	75	0.51	0.167	205	67
2002	75	0.50	0.166	201	66
2003	139	0.51	0.167	378	124
2004	84	0.51	0.168	229	75
2005	74	0.50	0.165	198	65

Little River and Mud Creek Watershed:

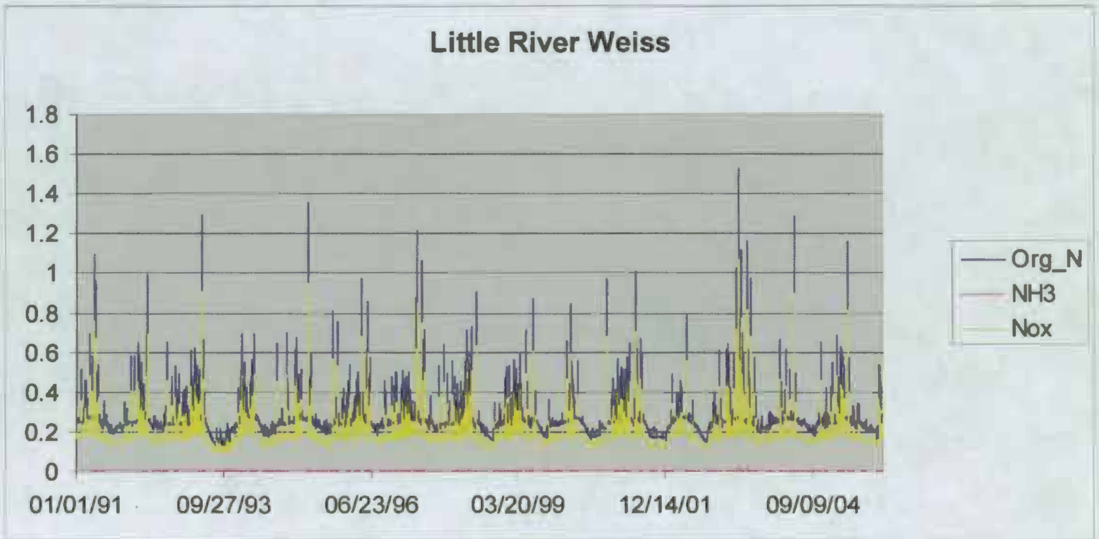

Figure 40: Nitrogen Concentrations for Little River and Mud Creek Watersheds

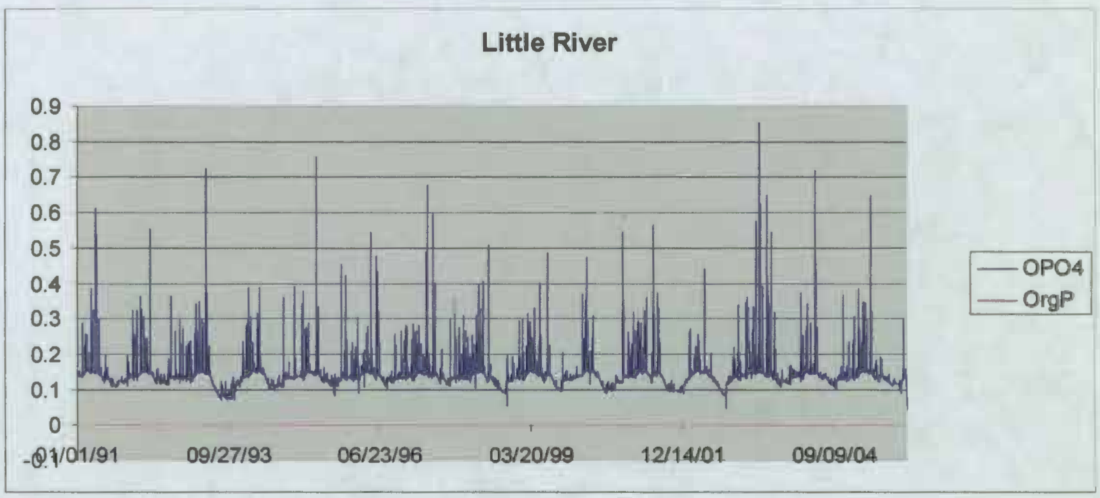

Figure 41: Phosphorus Concentrations for Little River and Mud Creek Watersheds

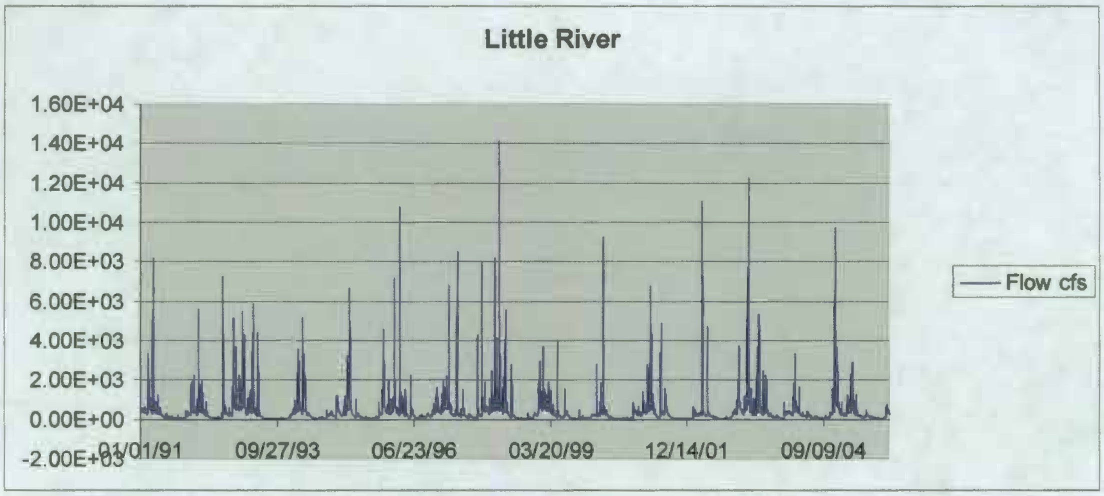

Figure 42: Flows for Little River and Mud Creek Watersheds

Table 10: Summary Flows and the Nitrogen and Phosphorus Concentrations for Little River and Mud Creek

Year	Median Value				
	Flow (cfs)	TN (mg/L)	TP (mg/L)	TN (#/day)	TP (#/day)
1991 – 2005	385	0.42	0.137	855	281
1997	290	0.42	0.139	654	215
2000	116	0.41	0.136	257	84
2001	181	0.42	0.139	408	134
2002	162	0.41	0.136	358	118
2003	316	0.43	0.140	719	236
2004	189	0.42	0.139	425	140
2005	174	0.42	0.137	386	127

Watersheds Lower North of Lake Weiss including Yellow River:

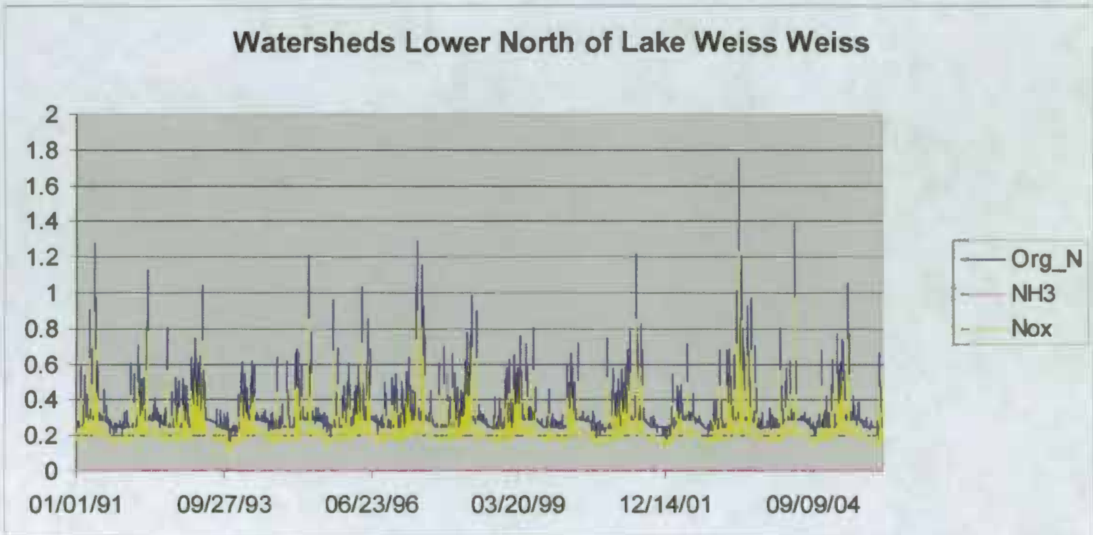

Figure 43: Nitrogen Concentrations for Lower Northern Watersheds

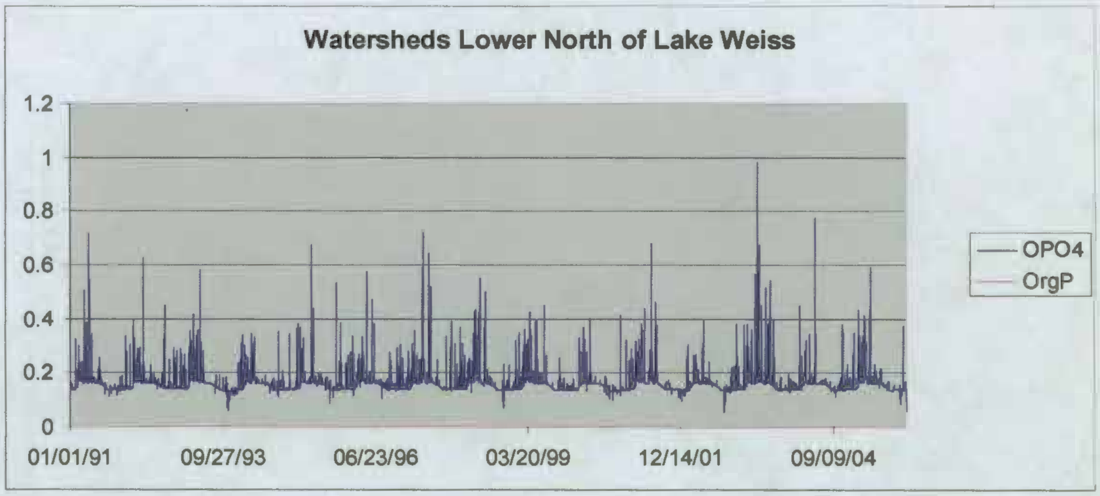

Figure 44: Phosphorus Concentrations for Lower Northern Watersheds

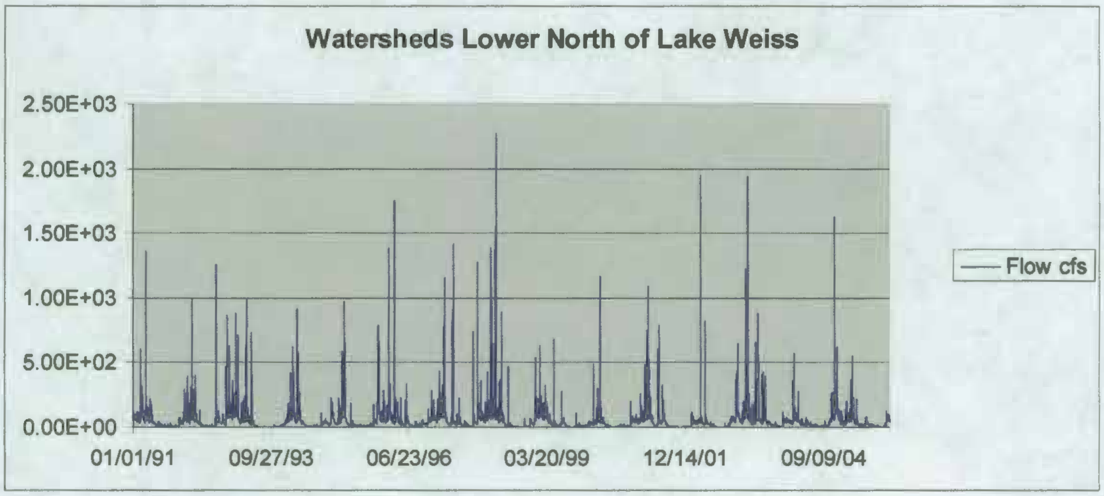

Figure 45: Flows for Lower Northern Watersheds

Table 11: Summary Flows and the Nitrogen and Phosphorus Concentrations for Lower Northern Watersheds

Year	Median Value				
	Flow (cfs)	TN (mg/L)	TP (mg/L)	TN (#/day)	TP (#/day)
1991 – 2005	58	0.47	0.155	146	48
1997	41	0.48	0.159	106	35
2000	16	0.47	0.153	41	13
2001	25	0.47	0.154	61	20
2002	24	0.47	0.153	60	20
2003	45	0.48	0.159	116	38
2004	27	0.48	0.157	69	23
2005	24	0.47	0.153	60	20

Lower South Watersheds:

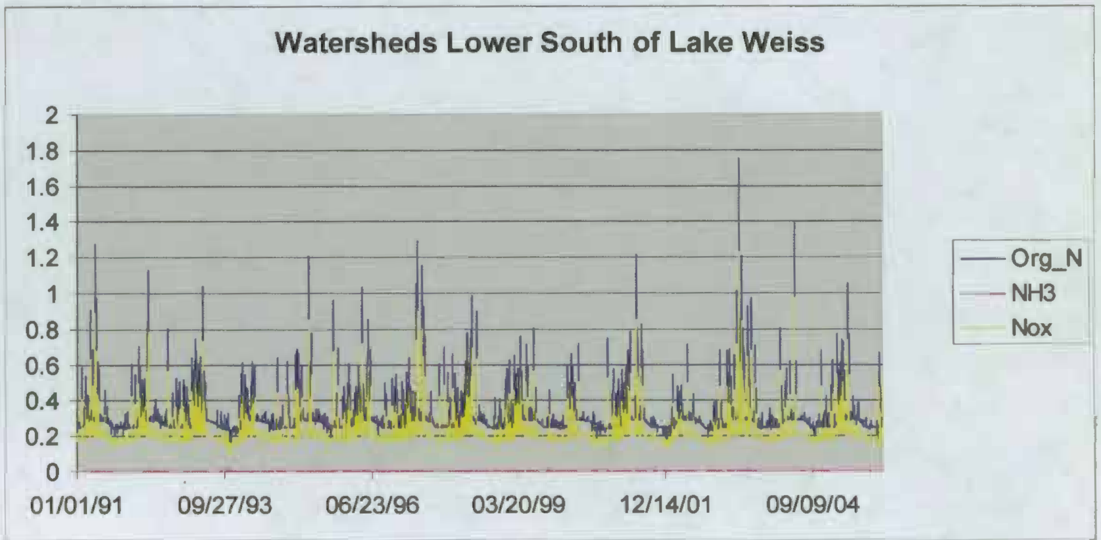

Figure 46: Nitrogen Concentrations for Lower Southern Watersheds

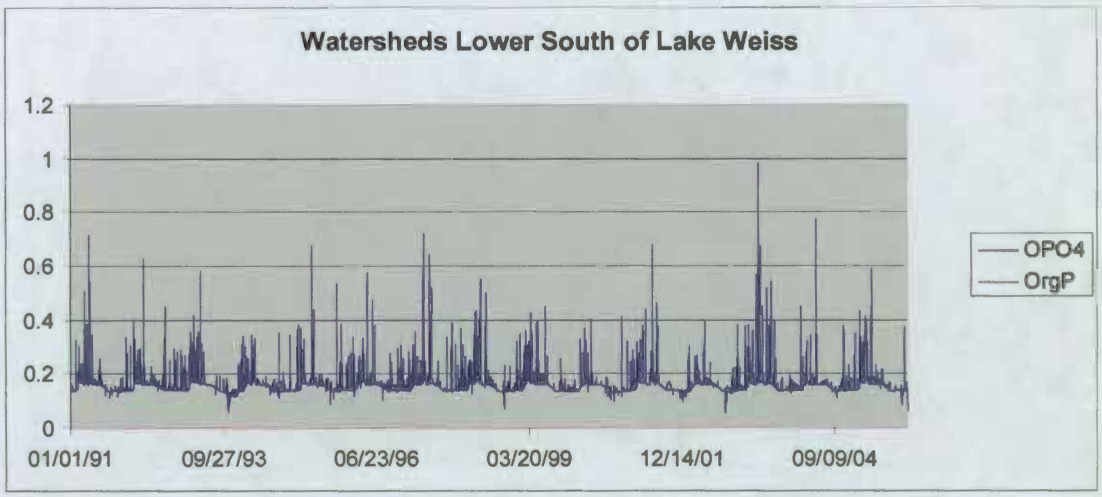

Figure 47: Phosphorus Concentrations for Lower Southern Watersheds

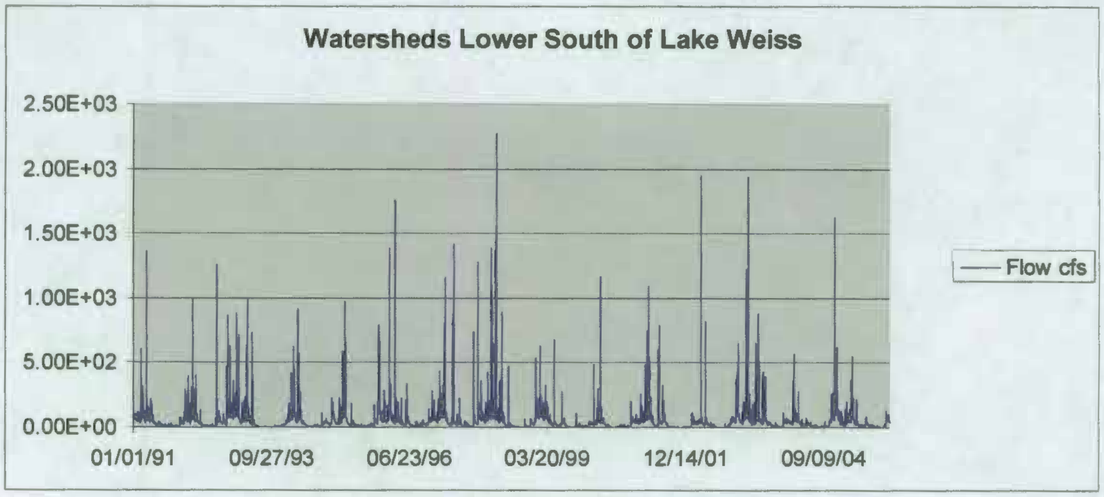

Figure 48: Flows for Lower Southern Watersheds

Table 12: Summary Flows and the Nitrogen and Phosphorus Concentrations for Lower Southern Watersheds

Year	Median Value				
	Flow (cfs)	TN (mg/L)	TP (mg/L)	TN (#/day)	TP (#/day)
1991 - 2005	58	0.47	0.155	146	48
1997	41	0.48	0.159	106	35
2000	16	0.47	0.153	41	13
2001	25	0.47	0.154	61	20
2002	24	0.47	0.153	60	20
2003	45	0.48	0.159	116	38
2004	27	0.48	0.157	69	23
2005	24	0.47	0.153	60	20

Appendix B:

Lake Weiss TMDL Model – July 2008

The 2001 – 2005 EPA updated Lake Weiss model was used for TMDL development and reduction scenarios. Note there are many ways to reduce phosphorus for this TMDL. The example methodology used for Point and Non Point Sources phosphorus reductions are as follows:

1. Major Point Sources set to 1 mg/L Total Phosphorus
2. Minor Point Sources (> 0.1 mgd) set to 8.34 lbs/day max
3. Minor Point Sources (< 0.1 mgd) set at existing values or estimations
4. Non Point Source reductions at 30% for all watersheds. Note: this could vary for implementation purposes as long as overall loads do not change.
5. Alabama Weiss 2 Monitoring Station is the critical segment in which to meet the Chl a Standard of 20 µg/L.

The following figures and tables visual show how the critical segment Chl a and the Total Phosphorous at the State Line responds to the above phosphorous reductions.

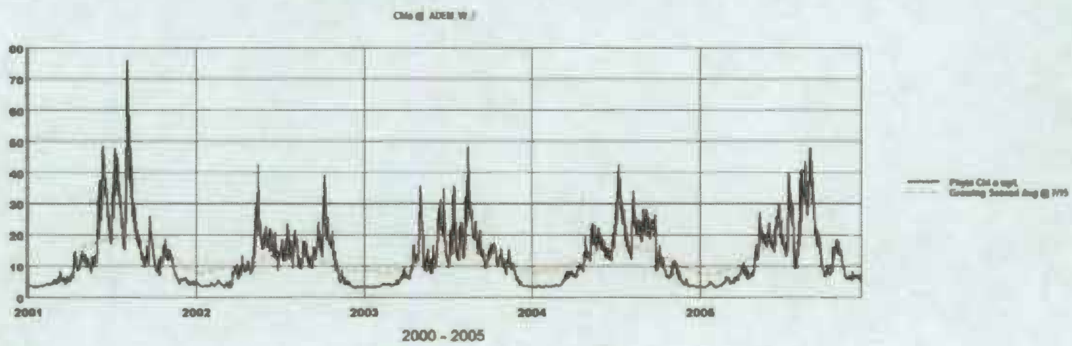

Figure 49: Example TMDL Chl a at Alabama Weiss 2 – Critical Segment Station

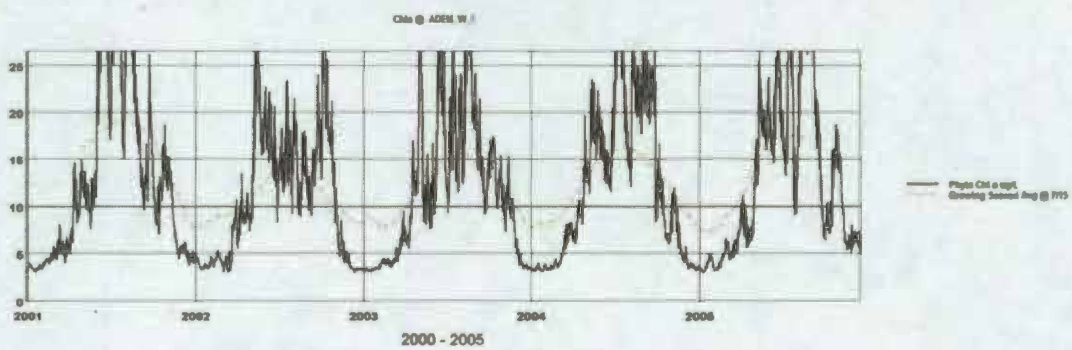

Figure 50: Example TMDL Chl a (zoomed in) at Alabama Weiss 2 – Critical Segment Station

Table 13: Lake Weiss Growing Season Average Chl a Data and Model Results 2001 - 2005

Year	Weiss 2		Weiss 1	
	Actual	TMDL	Actual	TMDL
2001	33	19	23	10
2002	25	15	17	7
2003	24	16	22	10
2004	27	17	20	5
2005	28	18	22	6

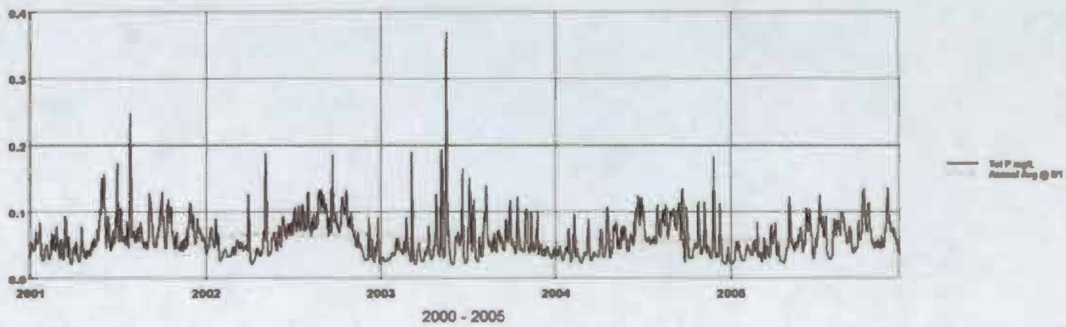

Figure 51: Coosa River Total Phosphorus at State Line

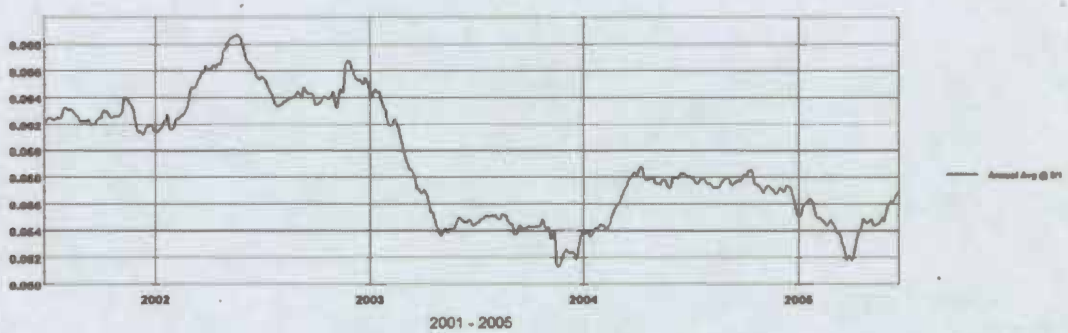

Figure 52: Growing Season Median (running 240 day average) of Total Phosphorus at State Line

Table 14: Growing Season Median TP at State Line

Year	TMDL
2001	0.062
2002	0.063
2003	0.055
2004	0.058
2005	0.057

Hydrodynamic and Water Quality Modeling Report
for
Weiss Lake, Alabama

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