



Judy A. Takats
World Wildlife Fund
Southeast Rivers and Streams
2021 21st Avenue S, Ste 200
Nashville, TN 37212

Direct Phone: 615-279-1814
Fax: 615-297-1429
judy.takats@wwfus.org

worldwildlife.org

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Russell A. Kelly
Chief, Permits and Services Division
Alabama Department of Environmental Management
PO Box 301463
Montgomery, Alabama 36130-1463

RE: Comments on Alabama Power Company's Water Quality Certification Application for Martin Hydroelectric Development (FERC Project Number 349)

Dear Mr. Kelly,

The World Wildlife Fund (WWF) has reviewed Alabama Power Company's (APC) Water Quality Certification Application (Application) for the Martin Hydroelectric Developments (Project), submitted to Alabama Department of Environmental Management (ADEM). We appreciate the opportunity to comment on this application and for your extending to the comment period.

WWF is an international 501 (c) (3) nonprofit conservation organization dedicated to protecting the world's wildlife and wildlands. WWF maintains its primary office in Washington, DC, and has a regional office in Nashville, Tennessee. The mission of the Nashville office is to ensure the protection, preservation and enhancement of aquatic life in the rivers and streams of the southeastern United States, specifically the Cumberland, Mobile, and Tennessee River Basins. WWF has over 1.2 million members in the United States and over 8,000 members in Alabama. We are interested in determining and quantifying the Martin Hydroelectric Project's impacts on fish, wildlife, and plants, and their habitats (including water quality). Our goal is to develop and implement measures to protect, enhance, and mitigate the impacts of the Martin Hydroelectric Project on these natural resources. As such, WWF has been an active stakeholder in the Martin Hydroelectric Relicensing process since its inception and will continue to do so moving forward.

Background

APC owns and operates Martin Hydroelectric Project located on the Tallapoosa River. APC also owns and operates two other hydroelectric projects on the Tallapoosa River – Yates and

Thurlow –located downstream of Martin Hydroelectric Project and one project – Harris – upstream of Martin. All four developments are licensed by the Federal Energy Regulatory Commission (FERC). The current operating license for the Martin Hydroelectric Project will expire in 2013.

Section 401 of the Clean Water Act (CWA) requires that APC obtain a water quality certification (401 Certification) from the State of Alabama and that the discharge complies with Alabama’s water quality standards as adopted under the CWA. The United States Environmental Protection Agency (EPA) regulations implementing Section 401 require that the 401 Certification issued by ADEM contain a statement that there is “reasonable assurance that the activity will be conducted in a manner which will not violate applicable water quality standards.” 40 C.F.R. § 121.2(a)(3).

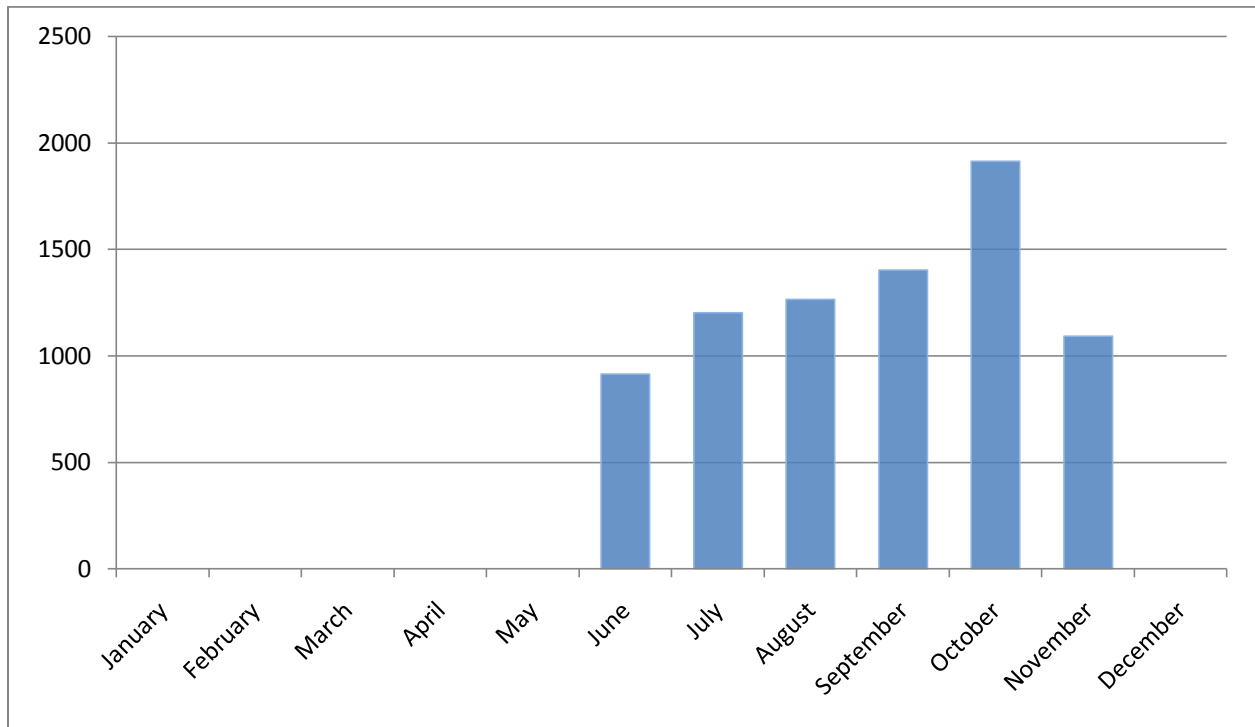
Data

We appreciate the data APC provided with the application. However, the temporal thoroughness of these data are insufficient to paint a complete picture of water quality in the waters affected by the Martin Project. In particular, troubling data gaps during periods of non-generation (which are times when discharges from the dam are confined to leakage) and December through May for all monitoring years are important to convey the full context of water quality in the Martin tailwater and water quality standard conformance with ADEM standards. Based on the data provided in APC’s 401 Water Quality Certification Application, WWF is not convinced there is a “reasonable assurance” that Martin Hydroelectric Project will be operated in a way that will not violate federal or state water quality standards for several reasons.

First, the data APC provided in their 401 Certification application seem to represent only a small fraction of data available for analysis. By example, APC states in their 401 Application that from 2002-2005, they “collected 30-minute dissolved oxygen (DO) and temperature data in the tailrace.” This statement seems to indicate that these data were collected from January 2002 – December 2005. However, that is not the case (See Figure 1). The “Description of Data” provided in Appendix D states these data were collected June through October for each year 2002-2005. But examination of the data show that in 2003 data provided begin on September 21. The data for 2002, 2003 and 2004 extend into November, past the October timeframe referenced in the “Description of Data”. Also, APC stated they collected data at 30-minute intervals, but the data provided suggest that they are collecting it on 15–minute intervals.¹

¹ These five dates and times are: 11/4/03 8:45 AM, 11/13/03 12:15 PM, 10/11/04 5:15 AM, 7/21/05 9:15 AM and 10/20/05 4:15 AM.

Figure 1: Number of Dissolved Oxygen Data Points Provided by Month, 2002 - 2006²



Additionally, APC did not provide continuous data for the tailrace between June – October 2002-2005. Using the first date and time of data provided per year (2002-2005) and the last date and time of data provided per year (2002-2005) at each 30-minute interval, we calculated the number of data points that should be available versus the number of data points that APC presented in Appendix D of their application. That figure varies from 23.8% to 40.7%. Of course, these percentages would be much smaller if calculated on a calendar year. Because data are provided for both temperature and DO, we use the number of DO data points to illustrate major gaps of data (see Table 1).

² For each DO data, APC provided the accompanying temperature reading. Thus, this graph also represents the number of data points for temperature.

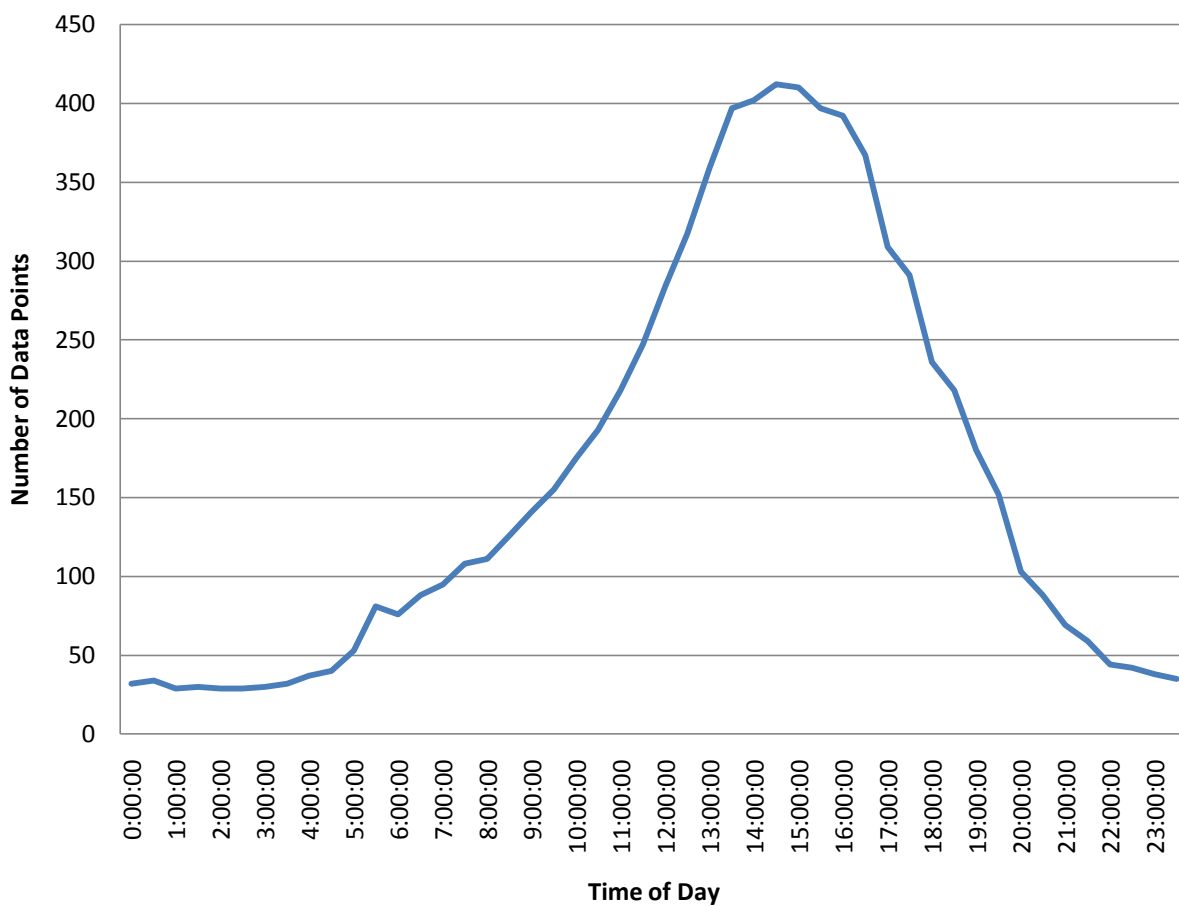
Table 1: APC Provided Data, 2002-2006

Year	Date and Time of First Datum	Date and Time of Last Datum	Number of DO Data Points Presented in Application	Number of DO Data Points at 30-minute Intervals	Percentage of Available Data Presented in Application
2002	6/2/02 3:00 PM	11/22/02 11:00 PM	2315	8321	27.8%
2003	9/21/03 6:30 PM	11/13/03 9:00 PM	608	2550	23.8%
2004	6/1/04 12:30 PM	11/3/04 11:30 PM	1878	7463	25.5%
2005	6/1/05 1:00 AM	10/31/05 9:00 PM	2986	7337	40.7%

Another example is the data provided for the tailrace from June 1 through October 31, 2006 – 2009, though APC stated they collected hourly data during times of generation. It is unclear why only the data collected during generation is provided. We believe non-generation water quality data are essential to describing water quality in the Project area and should be provided. We do appreciate the explanation of the failed water quality monitors as it does explain a small percentage of the missing data. For both rigor and transparency, APC should provide their full data set to ADEM and base all of their analyses on the full set of information. Providing the full data sets and analyses based on these complete sets of information would provide ADEM with a much clearer and complete understanding of water quality and water quality standard conformance at the Martin Hydroelectric Project. Any gaps in data should be explained (e.g., equipment failure; suspect data based on equipment quality assurance / quality control issues).

Second, time and date discrepancies plague the data APC provided. For example, APC gave ADEM 2 additional data points after 10/25/2002 at 18:00, but the next data (from 19:30 on 10/25/2002 to 7:30 on 10/26/2002) are missing. The next data point occurs on 10/26/02 at 8:00 (DO recorded at 4.5 mg/l), followed by another break until 14:30 (DO recorded at 4.59 mg/l). That single datum point is followed by another break in recorded DO data until 10/27/02 at 8:30 and 9:00 (DO recorded 4.65 mg/l and 4.60mg/l, respectively). Another, albeit smaller, data gap occurs with the next recorded DO is 4.52 mg/l at 14:00 on 10/27/02. In aggregate, the time of day variances in data from 2002 – 2005 can be best seen in Figure 2. Large gaps in the data provided over 2002 – 2005 are best seen in Figure 3. Each point represents a dissolved oxygen datum point.

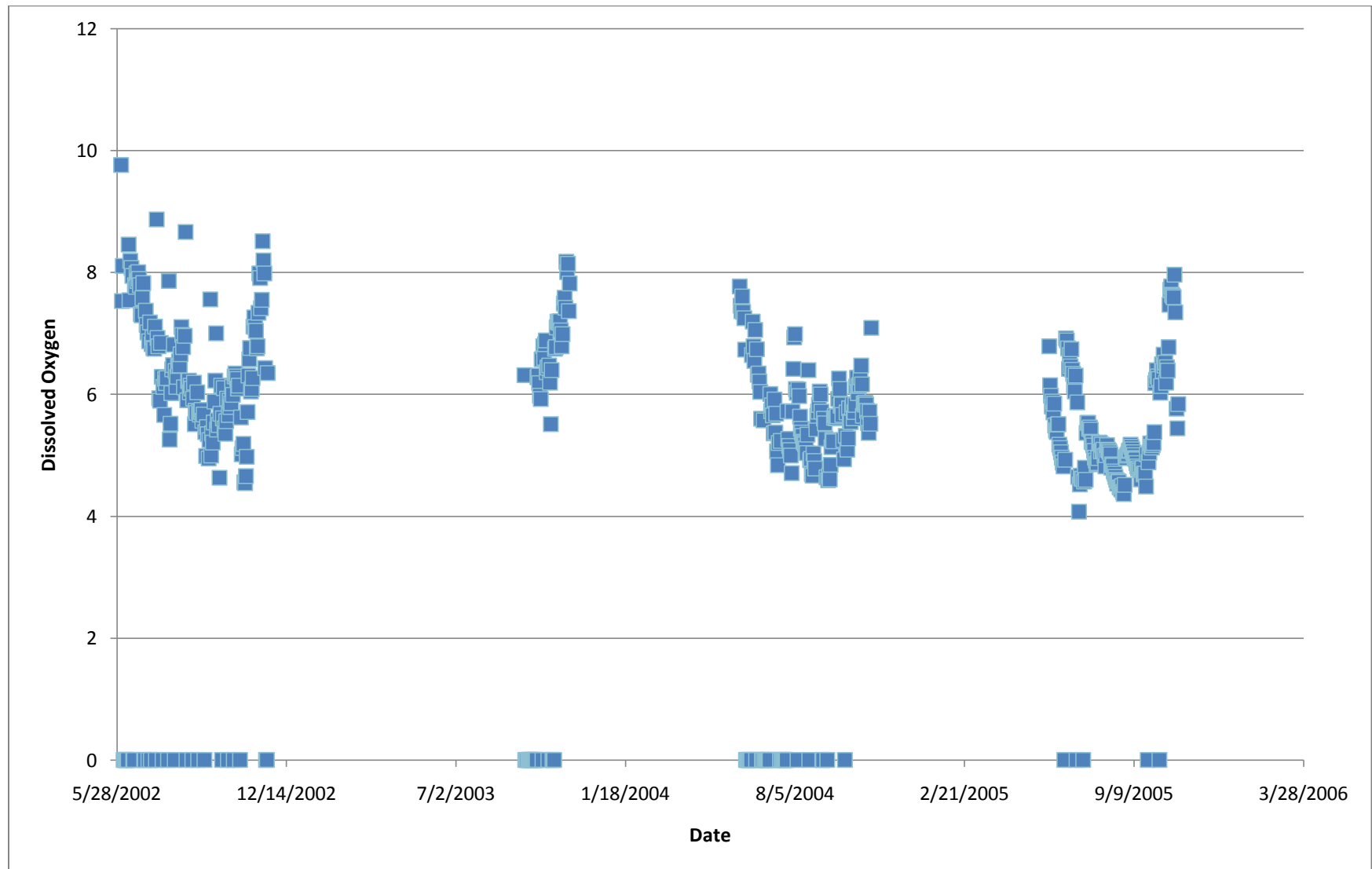
Figure 2: Total Number of Dissolved Oxygen Data Points Provided for Each 30-Minute Interval, 2002 - 2005^{3,4}



³ The five data points which occurred at 15 minutes after or before the hour are not graphed. These data are: 11/4/03 8:45 AM, 11/13/03 12:15 PM, 10/11/04 5:15 AM, 7/21/05 9:15 AM and 10/20/05 4:15 AM.

⁴ For each DO data, APC provided the accompanying temperature reading. Thus, this graph also represents the number of data points for temperature.

Figure 3: Dissolved Oxygen Data 2002 - 2006.⁵

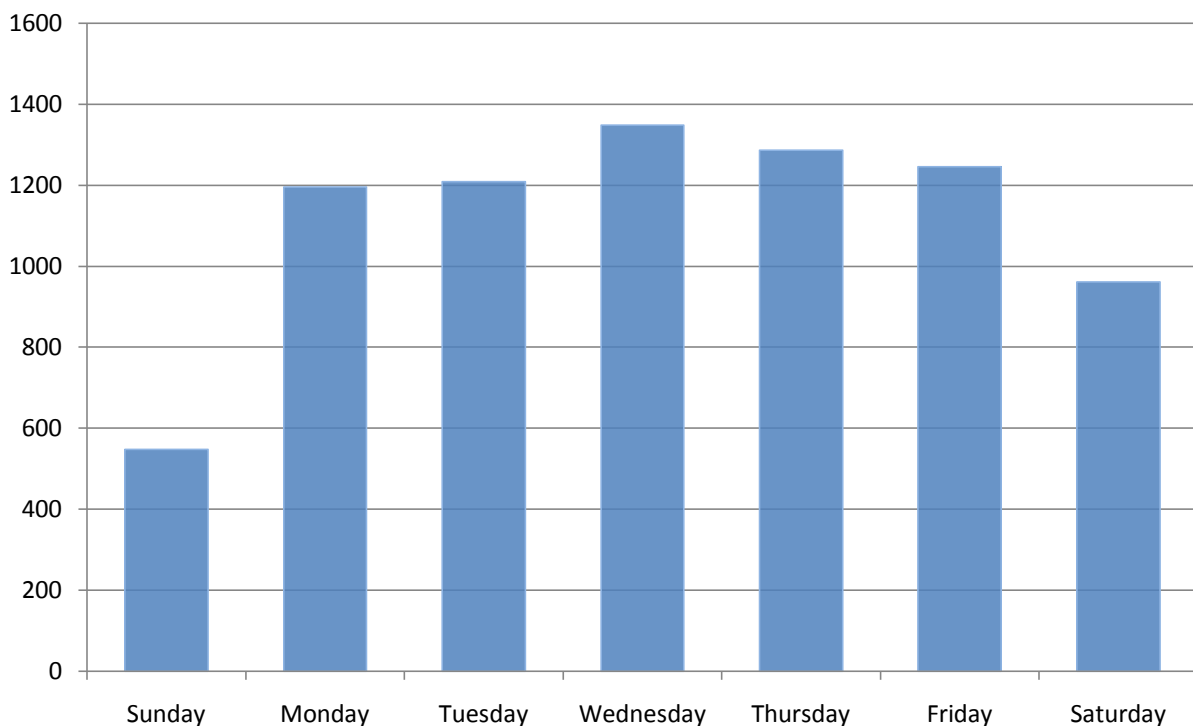


⁵ For each DO data, APC provided the accompanying temperature reading. Thus, this graph also represents the number of data points for temperature.

With fewer data existing at the times of day when DO is likely low (around dawn, typically in the 2:00 to 6:00 range, during warm seasons with lots of primary productivity), the application does not provide a complete understanding of the water quality conditions. The results of a data analysis would be far more robust (and necessary to understand the affects of the project on water quality) if the analyses included more early dawn readings during late spring, summer, and early fall when DO tends to be at their lowest levels.

Another pattern in the data provided for the period 2002-2005 is highlighted when data are charted by the day of the week (see Figure 4). Data for weekdays are approximately 2.5 times more abundant than data on Sunday. Again, to convey a complete picture of water quality in the Martin Project area, water quality conditions at all times on all days of the week should be provided.

Figure 4: Total Number of Dissolved Oxygen Data Points by Day of Week⁶



The compounded effect of missing data from day of week and time of day is easily seen in Figure 5.

⁶ For each DO data, APC provided the accompanying temperature reading. Thus, this graph also represents the number of data points for temperature.

Third, despite installing aerators in the 1970's and claims of 100% compliance, the data show a few occurrences of DO below 4.0 mg/l (October 2002 and July 2005). APC should describe the circumstances that led to each non-compliance event and propose improvements to their mitigation measures to decrease the potential for non-compliance in the future.

There appears to be an error with the data on May 19, 2004 at 12:10 PM. The forebay temperature at a depth of 100ft is noted as being 106.0 (°C).

Water Quality Monitoring Plan

APC proposes to monitor dissolved oxygen for a period of two years following the issuance of the license in their monitoring plan. Section 401 of the CWA Section requires that certification include "monitoring requirements necessary to assure that any applicant for a Federal license or permit will comply with any effluent limitations or other limitations." Based on the fact that the measures APC has in place to assure dissolved oxygen concentrations are above state water quality standards have not shown themselves to be 100 % effective in the past, it is clear that there is not "reasonable assurance" that Martin Hydroelectric Project will be operated in a way that conforms with federal or state water quality standards.

Moreover, there are long-term weather patterns that may affect water quality parameters in subtle ways and make attaining water quality standards more or less likely. If monitoring occurs only during those years where attaining state standards is relatively easier, then the results of the monitoring paint an unclear picture of the adequacy of mitigation measures. Monitoring dissolved oxygen, in particular, likely does not represent a significant cost and should be required immediately below Martin Hydroelectric Project (in line where APC suggests) and throughout the tailrace on the Tallapoosa River for the life of the license. This requirement is the ONLY way to demonstrate compliance with the state standards. Ideally, these readings would be taken on 15-minute intervals, which would allow for immediate corrective action in case of low or rapidly declining levels of DO.

Implications for Fish and Wildlife

As stated on page 2 of this letter, Section 401 of the Clean Water Act (CWA) requires that APC obtain a water quality certification (401 Certification) from the State of Alabama and that the discharge complies with Alabama's water quality standards as adopted under the CWA. The United States Environmental Protection Agency (EPA) regulations implementing Section 401 require that the 401 Certification issued by ADEM contain a statement that there is "reasonable assurance that the activity will be conducted in a manner which will not violate applicable water quality standards." 40 C.F.R. § 121.2(a)(3).

EPA recommends a target dissolved oxygen concentration of 6.0 mg/l to have "no production impairment" to existing fisheries and 8.0 mg/l invertebrates.⁸ Alabama Department of Environmental Management's standard dissolved oxygen criterion "for a diversified warm water biota, including game fish ..." is 5.0 mg/l. In August 2010, EPA suggested that ADEM

“..consider eliminating of modifying the 4 mg/l standard variance for dissolved oxygen for existing hydroelectric generation impoundment discharges. A default provision in the standard allowing dissolved oxygen to be degraded to 4 mg/l during periods of hydroelectric impoundment discharge should not be allowed if a dissolved oxygen standard of 5 mg/l can be met or if a standard higher than 4 mg/l can be met. If the 5 mg/l dissolved oxygen cannot be met, then the State must make a demonstration documenting the lower water quality is adequate to protect existing uses fully, in accordance with CFR 131.12(a)(2).

WWF is concerned that the possible project impacts on these species have not been fully explored through the relicensing process to date nor are they examined in the 401 certification application. The lack of water quality data, especially during periods of non-generation is cause for concern to the aquatic animals residing or attempting to reside in these waters. Fish do not experience mean daily flow, rather, they experience flow on an instantaneous basis. Killgore and Hoover⁹ point out that

groups such as darters and species such as freshwater drum, which exhibit no behavioral or morphological adaptations to hypoxia ... were not abundant in the system. Regionally abundant and widespread species known to be intolerant of hypoxia...were conspicuously absent.

Many darter species, like the ones Killgore and Hoover¹⁰ describe that are behaviorally maladapted to respond to low DO are potentially present in the tailwaters of Martin. Moreover, many of these fish serve as hosts for the parasitic life stage of many mussel species.

Without the presence of these fish, mussel populations would suffer because a crucial developmental stage (transformation from glochidia to sub-adult) cannot be successfully completed, a situation that runs counter to efforts to protect and enhance (including recover) populations of these species. Dissolved oxygen concentrations lower than 3.0 mg/l for several hours are lethal for some species^{11,12}, cause metabolic stress and potentially mortality in

⁸ U.S. Environmental Protection Agency (EPA). 1986. Ambient Water Quality Criteria for Dissolved Oxygen. EPA 440/5-86-003. . Washington, D.C.

⁹ Killgore, K. J. and J. J. Hoover. 2001. Effects of Hypoxia on Fish Assemblages in a Vegetated Waterbody. J. Aquat. Plant Manage. 39: 40-44

¹⁰ ibid

¹¹ Spoor, W. A. 1977. Oxygen requirements of embryo and larvae of the largemouth bass, (*Micropterus salmoides*) (Lacepede). Journal of Fish Biology 11:77-86.

mussels^{13,14} and negatively impact reproduction¹⁵. While some adult freshwater mussels are capable of shutting down for a period of time, larval and juvenile stages do not have this luxury. It would only take one extended event of little to no DO to eliminate any recent recruitment that might have occurred prior to this event and kill many of the host fishes in the area. Kilgore and Hoover¹⁶ note that hypoxia is “usually defined as dissolved oxygen concentrations less than 5 mg/l” and that DO levels “can be used to predict fish species composition and quantify habitat quality...”. Johnson et. al¹⁷ noted that “dissolved oxygen was the habitat variable most strongly correlated to weekly unionid mortality ...” and that “as DO levels fell below 5 mg/L, the upper range of weekly unionid mortality increased steadily...”

Based on the potential biological effects of sub-5.0 mg/l dissolved oxygen concentrations to fishes and aquatic invertebrates and EPA’s guidance and desire, it seems that a DO standard of 5.0 mg/l be applied at all times (generation and non-generation) to reduce impacts to fishes, mussels, snails, and other aquatic animals from using these habitats.

Before moving forward with any certification, we recommend ADEM:

- (1) Obtain continuous data during all times, generation as well as non-generation, January – December for the past 10 years to provide a more accurate representation of the Tallapoosa River system and, in fact, are essential for the 401 Certification.
- (2) In addition to annual statistics (which should include some measure of variance in addition to maxima, minima, and means), ADEM obtain monthly statistics for the years of record (again, showing maxima, minima, means, and variances for each month of the year).
- (3) In accordance with FERC’s recognition of Martin’s downstream impacts, obtain water quality data for areas farther downstream of Martin Hydroelectric Project. By broadening the scope of scope of the relicensing, the FERC acknowledged that the releases from Martin affect downstream to Montgomery Water Works gaging station (nearly 50 miles downstream of Martin Dam).
- (4) As part of any future Water Quality Monitoring Plan

¹² Cech, J. J., Jr., C. G. Campagna, and S. J. Mitchell. 1979. Respiratory responses of largemouth bass (*Micropterus salmoides*) to environmental changes in temperature and dissolved oxygen. Transactions of the American Fisheries Society 108:166-171.

¹³ Chen, L. 1998. The respiratory physiology and energy metabolism of freshwater mussels and their responses to lack of oxygen. Ph.D. dissertation. Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

¹⁴ Kaiser, B.E. and M.C. Barnhart. 2006. Effects of hypoxia on brood survival in the freshwater mussel, *Venustaconcha ellipsiformis*. Presented at the North American Benthological Society Meeting. Anchorage, Alaska. Abstract available at <http://www.benthos.org/database/allabstracts.cfm/db/Anchorage2006abstracts/id/736>.

¹⁵ *ibid*

¹⁶ Killgore, K. J. and J. J. Hoover. 2001. Effects of Hypoxia on Fish Assemblages in a Vegetated Waterbody. J. Aquat. Plant Manage. 39: 40-44

¹⁷ Johnson, P. M., A. E. Liner, S.W.Golladay and W.K. Michener. 2000. Effects of drought on freshwater mussels and instream habitat in Coastal Plain tributaries of the Flint River, southwest Georgia (July-October, 2000). Report Presented to The Nature Conservancy Apalachicola River and Bay Project.

- a. Require continuous monitoring, at 15-minute intervals, throughout the term of the license with a provision that every fifth year, the plan is revisited in consultation with resources agencies and other interested parties. Should the monitoring data demonstrate that the aeration is not positively affecting dissolved oxygen, for example, the license should be reopened and APC required to develop further or alternate measures to bring waters affected by the project and its operation in compliance with state standards. WWF views this monitoring plan as a measure of the effectiveness of the mitigation and as a means to document compliance over the entire term of the license. Without continuous monitoring, neither APC nor ADEM has any assurance that mitigation measures are working adequately to protect Tallapoosa River beneficial uses.
- b. For periods when water quality measures do not meet state standards over more than one sample (we suggest samples be taken at 15-minute intervals) the duration of that water quality excursion should be presented. Presenting the data in this manner would yield a better picture of compliance with this standard. It is important to note that aquatic fauna do not live on averages. Prolonged periods of slightly substandard dissolved oxygen could be fatal to aquatic fauna therefore, it is important to maintain a suitable level of DO.

Again, we appreciate the opportunity to comment on this project and for extending the comment period to 1 April 2011. We hope our comments will be helpful as you proceed with the water quality certification process and in your efforts to protect this global treasure for future generations. Should you have any questions, please contact me.

Sincerely,

Judy Takats
Senior Program Officer

cc: Jim Crew, Alabama Power Company
Stan Cook, Alabama Department of Conservation and Natural Resources
Jeff Powell, US Fish and Wildlife Service
Lynn Sisk, Alabama Department of Environmental Management
Federal Energy Regulatory Commission