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**Subject:** Martin Revised Draft Study Plans

**Attachments:** 1 Migratory Fish Study Plan \_FINAL to Stakeholders 3-27-08\_.pdf; 2 Shoreline Habitat Assessment Study Plan \_FINAL to Stakeholders 3-27-08\_.pdf; 3 Tailrace Minimum Flow Study Plan \_FINAL to Stakeholders 3-27-08\_.pdf; 4 Fish Entrainment Study Plan \_FINAL to Stakeholders 3-27-08\_.pdf; 5 RTE Surveys Study Plan \_FINAL to Stakeholders 3-27-08\_.pdf; 6 Striped Bass Study Plan \_FINAL to Stakeholders 3-27-08\_.pdf; 7 Wildlife Management Plan Study Plan \_FINAL to Stakeholders 3-27-08\_.pdf; 8 NPDES Permits Study Plan \_FINAL to Stakeholders 3-27-08\_.pdf; 9 Erosion and Sedimentation Study Plan \_FINAL to Stakeholders 3-27-08\_.pdf; 10 Water Quantity Study Plan \_FINAL to Stakeholders 3-27-08\_.pdf; 11 Water Quality - Baseline Study Plan \_FINAL to Stakeholders 3-27-08\_.pdf; 12 Rule Curve Change Analysis Study Plan \_FINAL to Stakeholders 3-27-08\_.pdf; 13 Shoreline Management Plan Study Plan \_FINAL to Stakeholders 3-27-08\_.pdf; 14 Recreation Plan Study Plan \_FINAL to Stakeholders 3-27-08\_.pdf; 15 Socioeconomic Impacts of Rule Curve Change Study Plan \_FINAL to Stakeholders 3-27-08\_.pdf

As indicated in my March 10, 2008 email announcing our upcoming April 1st and 2nd meetings, attached are the Martin Draft Study Plans distributed to you in November 2007 that have been revised to incorporate, as appropriate, the comments we've received from Martin stakeholders. The substantive revisions made are highlighted to facilitate your review of these documents. These plans will be the subject of our discussions at the MIG meetings next week in Alex City.

We appreciate your continued participation in the Martin relicensing effort.



1 Migratory Fish Study Plan \_...



2 Shoreline Habitat Assessment...



3 Tailrace Minimum Flow Study...



4 Fish Entrainment Study Plan...



5 RTE Surveys Study Plan \_FIN...



6 Striped Bass Study Plan \_FI...



7 Wildlife Management Plan St.



8 NPDES Permits  
Study Plan \_F...



9 Erosion and  
Sedimentation S...



10 Water Quantity  
Study Plan \_...



11 Water Quality -  
Baseline S...



12 Rule Curve  
Change Analysis ...



13 Shoreline  
Management Plan S...



14 Recreation Plan  
Study Plan...



15 Socioeconomic  
Impacts of R...

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**Study Plan 1 - Migratory Fish – Tallapoosa Basin Literature Review**

**1.0 GOALS AND OBJECTIVES OF STUDY**

The U.S. Fish and Wildlife Service (USFWS) is interested in understanding and documenting the migratory species that currently or historically utilized the Tallapoosa River through a literature-based review. American eel is of main concern as this catadromous species has been collected in the Tallapoosa River downstream of the Thurlow Project, and passage of this species through the multiple dams on the Tallapoosa and Alabama Rivers is a concern for completion of its lifecycle.

USFWS is also interested in what other southeast hydroelectric power projects are doing in regard to managing American eels and would like to see a review and summary of other American eel management plans and any recovery plans for diadromous fish species in the Tallapoosa Basin.

**2.0 RELEVANT RESOURCE MANAGEMENT GOALS**

Impacts to migratory rare, threatened, endangered or commercial fish species (including the American eel) are of concern to the NOAA National Marine Fisheries Service and the USFWS as part of their Section 18 authority provided in the Federal Power Act. The USFWS has expressed a particular interest in southeast management goals for the American eel, and how the operation and relicensing of the Martin Project fits into those goals.

**3.0 BACKGROUND AND EXISTING INFORMATION**

There is extensive information available on migratory fish species including American eel. Many of these species are rare, threatened, endangered or of commercial value and have been studied on the Atlantic and Gulf coasts. A review of some of the information available is provided at the following internet sites:

- <http://www.fws.gov/southeast/gulfcoast/>
- <http://www.fws.gov/daphne/sturgeon/sturgeon.html>
- <http://www.nefsc.noaa.gov/sos/spsyn/op/eel/>
- [http://www.nefsc.noaa.gov/sos/spsyn/op/eel/archives/28\\_AmericanEel\\_2006.pdf](http://www.nefsc.noaa.gov/sos/spsyn/op/eel/archives/28_AmericanEel_2006.pdf)
- [http://www.fws.gov/northeast/ameel/American\\_Eel\\_Questions\\_and\\_Answers.PDF](http://www.fws.gov/northeast/ameel/American_Eel_Questions_and_Answers.PDF)
- <http://www.fws.gov/southeast/fisheries/SEFishPassage/SE%20FISH%20AND%20AQUATIC%20SPECIES%20BARRIER%20ASSESSMENT%20WORKSHOP%20DAY%202%20Questions.pdf>
- [http://nia.ecsu.edu/noaa/0506/noaa\\_coastal\\_conference/coastal\\_agenda\\_draft.pdf](http://nia.ecsu.edu/noaa/0506/noaa_coastal_conference/coastal_agenda_draft.pdf)

Additional citations that are available are:

- ASMFC. 2006a. Terms of Reference and Advisory Report to the American Eel stock assessment peer review. ASMFC Stock Assessment Report 06-01. 23 p.
- ASMFC. 2006b. 2006 review of the Atlantic States Marine Fisheries Commission Fishery Management Plan for American Eel (*Anguilla rostrata*). <http://www.asmfc.org/>.
- Collette, B.B. and G. Klein-MacPhee (ed.). 2002. Bigelow and Schroeder's Fishes of the Gulf of Maine. 3rd edition. Smithsonian Inst. Press. Washington, D.C. 748 p.
- Mettee, M. F., P. E. O'Neil, and J. M. Pierson. 1996. Fishes of Alabama and the Mobile basin. Oxmoor House, Birmingham, AL.

- U. S. Fish and Wildlife Service (USFWS) and Gulf States Marine Fisheries Commission (GSMFC). 1995. Gulf sturgeon recovery plan. U. S. Fish and Wildlife Service, Atlanta, GA.
- U. S. Fish and Wildlife Service (USFWS). 2000. Conservation agreement and strategy for the Alabama sturgeon. U. S. Fish and Wildlife Service, Atlanta, GA

As seen in this sampling of information available, information for the Atlantic and Gulf coasts are readily available. Therefore, there should be adequate information available for a literature-review based study for migratory species including American eel.

#### **4.0 PROJECT NEXUS**

Because migratory species use rivers as migratory routes between spawning areas in freshwater and saltwater, hydroelectric dams can serve as obstacles to migration. The Martin Project serves as a potential barrier for fish passage on the Tallapoosa River. However the Yates and Thurlow dams are located downstream of the Martin dam and serve as the first fish barriers on the Tallapoosa River. There are also additional Army Corps of Engineer dams downstream on the Alabama River – R.F. Henry Lock & Dam/Woodruff Lake, Millers Ferry Lock & Dam/Dannelly Lake, Claiborne Lock & Dam/Claiborne Lake.

#### **5.0 STUDY AREA AND STUDY SITES**

This study would focus on the Tallapoosa River with emphasis on the Martin Project and will include the Tallapoosa River downstream of the Yates and Thurlow Projects. It will also include, to some extent, the Alabama River.

#### **6.0 PROPOSED METHODOLOGY**

The proposed method for implementing this study would be a literature search and review and summary of the information gathered.

- 1) APC will solicit comments from the USFWS and National Marine Fisheries Service (NMFS) regarding the proposed study plan and request any documents they would like included in this literature search.
- 2) APC will review and summarize the historic range of migratory (anadromous, catadromous, and diadromous) fish species with emphasis on those species that are listed as rare, threatened or endangered on the USFWS and/or NOAA list of commercial species. The intent is to perform a thorough review of relevant literature (peer reviewed and “gray” literature).
- 3) APC will develop a bibliography of all documents (PDF copies of papers/reports/relevant documents and documentation of personal communications conducted) to be transmitted with the Draft Study Report. In addition, APC will develop a written summary for each relevant document reviewed as well as all relevant information gained through correspondence with researchers and others. Summaries for each relevant document should highlight the species, its life cycle and its historic range in the study area.
- 4) APC will use the “fish passage concept document” developed as part of the Coosa Project E9 IAG as a template for developing a similar process for Martin. The draft concept paper for the Martin fish passage document is included as Attachment A.
- 5) For the American eel, APC will review other existing recovery plans for information on how other hydroelectric power projects are addressing passage of American eels.

**7.0 CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE**

This study employs generally accepted practices for conducting literature searches. As noted above, the USFWS and NMFS will have opportunity to comment and edit this plan to include documents that should be reviewed and summarized as part of this study report.

**8.0 PRODUCTS**

A draft report summarizing the applicable literature of species associated with the Tallapoosa River Basin, specifically the Martin Project, will be distributed to MIG 1 for review and comment within 4 months of the completion of the literature gathering and review. A final report will be provided as part of the draft license application that will include PDF copies of the literature used for the report.

**9.0 SCHEDULE**

APC files Final Study Plan with FERC	November 2008
Anticipated FERC approval	April 2009
Begin Literature Review	July 2009
Draft Report	November 2009
Final Report	April 2010

**10.0 LEVEL OF EFFORT AND COST**

APC estimates the cost of consulting on study plan development, conducting a thorough literature review, developing a study report, and discussing the results with all stakeholders is approximately \$50,000.

**11.0 REFERENCES**

Many references are provided in the previous document sections.

ATTACHMENT A

ALABAMA POWER COMPANY  
*BIRMINGHAM, ALABAMA*

MARTIN RELICENSING PROJECT  
FERC NO. 364

Tallapoosa River Fish Passage Concept Document

*March 2008*

*Prepared by:*

Alabama Power Company  
United States Fish & Wildlife Service

**MARTIN RELICENSING PROJECT**

**TALLAPOOSA RIVER FISH PASSAGE CONCEPT DOCUMENT**

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## **ALABAMA POWER COMPANY BIRMINGHAM, ALABAMA**

### **MARTIN RELICENSING PROJECT**

#### **TALLAPOOSA RIVER FISH PASSAGE CONCEPT DOCUMENT**

##### ***1.0 INTRODUCTION***

The Alabama Power Company (APC) is currently relicensing the Martin hydroelectric projects on the Tallapoosa River. The relicensing process includes a multi-year cooperative effort between APC and interested stakeholders to address operational, recreational, and ecological concerns associated with hydroelectric project operations. During the initial (scoping) phase of the relicensing process, APC consulted a wide variety of stakeholders, including state and federal resource agencies, non-governmental organizations, and concerned citizens seeking their input on important relicensing issues. Stakeholders identified several issues to be addressed during this relicensing process, including fish passage related to the Tallapoosa and Alabama River basins.

As part of the cooperative process, APC held several meetings with the U.S. Fish and Wildlife Service (USFWS) and other stakeholders to further refine the fish passage issue. As part of these discussions, the USFWS identified preparation of a Fish Passage Concept Document to describe the fish passage issue and identify opportunities to enhance anadromous, catadromous, and diadromous species limited fish passage on the Tallapoosa River. The primary purpose of this document is to present the framework for addressing fish passage in the relicensing process. Specifically, it is the Tallapoosa River Fish Passage Concept Document that outlines the information needed to address the fish passage issue:

- What are the identified biological objectives?
- What information do we currently have?
- What information do we need?
- What is a reasonable initial approach for fish passage?

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## 2.0 BIOLOGICAL OBJECTIVES IDENTIFIED

The biological objectives should address three main areas:

- Which species are targets for fish passage?
- What are the fish passage goals for the selected species?
- What are the long-term restoration goals for the selected species?

In Table 2-1, a list of species from the Section 1135 Preliminary Restoration Plan for the Alabama River that the U.S. Army Corp of Engineers (USACE) conducted in response to a request from the World Wildlife Fund (WWF). The plan states that there are 144 species of fish in the Alabama River (Mettee et al. 1996), but the species in the table represent the migratory species that would benefit from fish passage at Claiborne Lock & Dam. Species of special concern are the Gulf sturgeon, Alabama sturgeon, paddlefish, and the Alabama shad.

Table 2.1 Anadromous, Catadromous, and Diadromous fish species collected in the Alabama River.

Species	Species of Special Concern	Movement Characteristics
Gulf sturgeon ( <i>Acipenser oxyrinchus desotoi</i> )	x	Anadromous
Alabama sturgeon ( <i>Scaphirhynchus suttkusi</i> )	x	Diadromous
mooneye ( <i>Hiodon tergisus</i> )		Diadromous
paddlefish ( <i>Polyodon spathula</i> )	x	Diadromous
alligator gar ( <i>Lepisosteus spatula</i> )		Diadromous
American eel ( <i>Anguilla rostrata</i> )		Catadromous
Alabama shad ( <i>Alosa alabamae</i> )	x	Anadromous
skipjack herring ( <i>Alosa chrysochloris</i> )		Diadromous
gizzard shad ( <i>Dorosoma cepedianum</i> )		Diadromous
threadfin shad ( <i>Dorosoma petenense</i> )		Diadromous
blue sucker ( <i>Cycleptus elongatus</i> )		Diadromous
Alabama hog sucker ( <i>Hypentelium etowanum</i> )		Diadromous
smallmouth buffalo ( <i>Ictiobus bubalus</i> )		Diadromous
quillback ( <i>Carpionodes cyprinus</i> )		Diadromous
highfin carpsucker ( <i>Carpionodes velifer</i> )		Diadromous
spotted sucker ( <i>Minytrema melanops</i> )		Diadromous
river redhorse ( <i>Moxostoma carinatum</i> )		Diadromous
black redhorse ( <i>Moxostoma duquesnei</i> )		Diadromous
golden redhorse ( <i>Moxostoma erythrurum</i> )		Diadromous
blacktail redhorse ( <i>Moxostoma poecilurum</i> )		Diadromous
channel catfish ( <i>Ictalurus punctatus</i> )		Diadromous
blue catfish ( <i>Ictalurus furcatus</i> )		Diadromous
flathead catfish ( <i>Pylodictis olivaris</i> )		Diadromous
Atlantic needlefish ( <i>Strongylura marina</i> )		Diadromous
white bass ( <i>Morone chrysops</i> )		Diadromous
striped bass ( <i>Morone saxatilis</i> )		Anadromous

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Species	Species of Special Concern	Movement Characteristics
spotted bass ( <i>Micropterus punctulatus</i> )		Diadromous
largemouth bass ( <i>Micropterus salmoides</i> )		Diadromous
southern walleye ( <i>Stizostedion vitreum vitreum</i> )		Diadromous
freshwater drum ( <i>Aplodinotus grunniens</i> )		Diadromous
hogchoker ( <i>Trinectes maculatus</i> )		Diadromous
striped mullet ( <i>Mugil cephalus</i> )		Diadromous

Additional efforts have been made to collect fishes on the Tallapoosa river downstream of the Thurlow Project as part of a minimum flow evaluation plan for that project. These fish are presented in Table 2.2.

Table 2.2 Anadromous, Catadromous, and Diadromous fish species collected downstream of Thurlow Dam in the Tallapoosa River.

Species	Species of Special Concern	Movement Characteristics

Other federally listed species in the Tallapoosa and lower Alabama River include:

Alabama red-bellied turtle (*Pseudemys alabamensis*), southern clubshell (*Pleurobema decisum*), heavy pigtoe (*Pleurobema taitianum*), inflated heelsplitter (*Potamilus inflatus*), and fine-lined pocketbook (*Lampsilis altilis*).

Restoration goals should follow approved fishery management plans if they are in place (FERC 2003). A plan is available for the Gulf sturgeon (USFWS and GSMFC 1995), and other documents indicated a reference to a conservation agreement for the Alabama sturgeon (USFWS 2000) and future plans for the Alabama shad.

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## 3.0 *SCIENTIFIC BACKGROUND*

The purpose of this section is to investigate resources and define the existing information on the fisheries community and their need for migration.

The USACE prepared a Preliminary Restoration Plan (PRP) in 2000 at the request of the WWF, but the WWF withdrew from the project after this plan was completed. It is unclear as to whether the Ecosystem Restoration Report (ERR), a second step of the PRP, was ever completed, and which would have included an environmental impact statement (EIS) as well.

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## 4.0 SCIENTIFIC UNKNOWNNS

There are several scientific unknowns that will need to be addressed as part of fish passage.

- What information do we need to know about fish biology and fish passage needs (lifts, locks, or ladders) in addition to our current base knowledge?
- Which developments need fish passage facilities?
- What type of effectiveness studies would be needed?

Most of the current effort for fish passage has focused on Claiborne Lock & Dam, but fish passage should also be considered at the Miller's Ferry Development.

The USACE's PRP specifically proposed three types of fish passage for the Claiborne Lock & Dam: 1) modification of the existing lock gates (installation of sluice gates in the upper and lower gates), 2) construction of a fish lift at the west end of the fixed-crest spillway, and 3) construction of a fish bypass channel around the east end of the dam. The fish lift provides the best opportunity to pass the most species of fish, including sturgeon, but is the most expensive to construct. While the PRP does not mention downstream fish passage, it is assumed that this will be accomplished via periodic flood flows at Claiborne, which has been reported as the most effective at passing downstream migrants (FERC 2003).

During a sampling effort for passage via the lock mechanism, where a small attraction flow was provided for eight hours (starting at midnight), the PRP reports that "large numbers of fish" were collected. Species included: threadfin and gizzard shad, hogchoker, freshwater drum, channel catfish, blue catfish, bluegill, common carp, striped mullet, white and black crappie, skipjack herring, flathead catfish, American eel, paddlefish, smallmouth buffalo, silver chub, silverside shiner, and blacktail shiner.

The PRP notes that additional gill netting below Claiborne was scheduled for FY2000, with plans to provide fish attraction flows, but it is unknown if this effort was completed.

The PRP states that the discussion of the proposed fish passage techniques caused debate among technical experts because of the lack of site-specific information on the species of concern. Specific questions were raised about fish migratory movement timing, swimming performance capabilities, and attraction flow needs.

According to the FERC, the most frequently utilized method for assessing the effectiveness of a fish passage facility is the number of fish utilizing it. This method, while necessary, does not take into account the actual population of fish that are available to utilize the facility. Therefore, FERC recommends measuring effectiveness based on the proportion of the target population that is passed through the facility.

This recommended method will be more problematic for the Claiborne Lock & Dam. Estimates of the population below the dam may need to be determined before the fish passage facilities are in place to adequately measure the effectiveness of these facilities. The effectiveness of the potential facilities at Miller's Ferry will be easier to quantify, as they can be

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expressed as the percentage of fish that pass through these facilities as a function of the number of fish that pass through the facility immediately downstream (*e.g.*, the effectiveness of a facility at Miller's Ferry will be equal to the number of fish passing at Miller's Ferry divided by the number of fish passing at Claiborne). Effectiveness of downstream fish passage will be measured by mark and recapture techniques.

Additionally, the FERC (2003) recommends the following in the effectiveness plan: 1) including an effectiveness plan in all license articles requiring upstream or downstream fish passage as part of the requirement, and 2) defining the duration of monitoring the effectiveness (typically 2-4 years depending on flow conditions).

# DRAFT

## 5.0 *INITIAL APPROACH*

As part of setting an initial approach for examining fish passage needs, we need to consider what the sequence of events should be for fish passage, culture of stocks, restocking specific species of concern.

Construction of a fish passage facility on the Alabama River is under consideration at the Claiborne Lock & Dam, but is dependent on Federal appropriations. Once the paperwork for appropriations is completed and construction can actually begin, the USFWS plans to examine construction of facilities at the Miller's Ferry Lock & Dam.

As for culture and restocking, these would have to be developed with the assistance of the ADCNR. Restocking could take place once a successful propagation program is in place for this species. It is unlikely that other species would have to be restocked as there are viable populations below Claiborne which should increase as more spawning grounds are made available due to the passage facilities.

# DRAFT

## 6.0 *INFORMATION SOURCES/LITERATURE CITED*

Federal Energy Regulatory Commission (FERC). 2003. Evaluation of mitigation effectiveness at hydropower projects: Fish passage, draft report. Federal Energy Regulatory Commission, Washington, D. C.

Mettee, M. F., P. E. O'Neil, and J. M. Pierson. 1996. Fishes of Alabama and the Mobile basin. Oxmoor House, Birmingham, AL.

U. S. Fish and Wildlife Service (USFWS) and Gulf States Marine Fisheries Commission (GSMFC). 1995. Gulf sturgeon recovery plan. U. S. Fish and Wildlife Service, Atlanta, GA.

U. S. Fish and Wildlife Service (USFWS). 2000. Conservation agreement and strategy for the Alabama sturgeon. U. S. Fish and Wildlife Service, Atlanta, GA.

**Study Plan 2 – Lake Martin Assessment of Fish Density and Species Composition**  
**Associated with Various Shoreline Types**

**1.0 GOALS AND OBJECTIVES OF STUDY**

The Alabama Department of Natural Resources (ADCNR) has historically recommended that, for protection of aquatic resources, shoreline habitat not be altered as a property is developed. When a property owner has requested to alter the natural habitat by building a sea wall, the ADCNR has promoted the use of rip rap by itself or in addition to the sea wall to provide a “better” habitat for aquatic species. The ADCNR wishes to investigate the value of this historic recommendation to determine its effectiveness in meeting their goals for aquatic habitat. The ADCNR is especially interested in learning what type structure/material currently used on the lake is the most effective in providing shoreline refuge, habitat, etc., for aquatic species.

**2.0 RELEVANT RESOURCE MANAGEMENT GOALS**

ADCNR manages the recreational fishery of Lake Martin. Part of that management includes an effort to preserve and protect aquatic habitats of the lake. ADCNR recommendations to homeowners and developers of shoreline habitats on the lake should be accurate, cost-effective, and help the agency meet their overall goals.

**3.0 BACKGROUND AND EXISTING INFORMATION**

During fishery collections in the southeast, many biologists have observed a marked increase in the number of fish (abundance and diversity) associated with rip-rap areas of lakes when compared with sea wall areas. This has typically been accounted for by the diversity of habitats (interstitial spaces, irregular surface, gradual drop-off, etc.) associated with rip-rap areas vs. the straight, flat wall of a sea wall. However, no site specific studies of this issue in the southeast are currently known.

**4.0 PROJECT NEXUS**

APC implements shoreline management plans and permitting regulations that allow modification of the natural shoreline and include and/or promote the use of rip rap in front of traditional sea walls. APC and the ADCNR want to make sure that they are recommending a shoreline structure that protects the shoreline and also protects or enhances fishery habitat.

**5.0 STUDY AREA AND STUDY SITES**

The study area for this issue would include selected shoreline areas of Lake Martin. Multiple study sites will be selected around Lake Martin that will include four general habitat types – natural undeveloped, traditional sea wall, sea wall with rip rap, and modified stone or rock reinforced shorelines.

## 6.0 ***PROPOSED METHODOLOGY***

The proposed method for implementing this study would include a review of literature available on various shoreline structures (*i.e.*, seawall, seawall/rip rap, large stone or rock reinforced shoreline – including construction costs) followed by a field study at selected sites that represent the four types of shoreline habitats on Lake Martin. APC will work with ADCNR to identify sampling sites and analysis techniques.

### 6.1 Data Collection Techniques

Initially, multiple study areas on Lake Martin will be selected by APC and ADCNR that include the four habitat types for this study – natural undeveloped, traditional sea wall, sea wall/rip rap, and large stone or rock reinforced shorelines. Sites will be selected while the lake is at the winter pool level. At least four sites for each type of habitat will be geo-referenced and photographed upon selection.

Boat electrofishing will be performed at each site during the spring (May). Boat electrofishing will be performed along each shoreline in 3 to 5 feet water depth. Sampling effort will be determined prior to sampling through initial investigations at each site. Effort will be based on the amount of habitat available at each site, and every effort will be taken to standardize sampling effort and/or document catch per unit effort or catch per unit area.

Fish collected at each sample site will be identified to species and categorized by inch groups. If large numbers of minnows, clupeid, or centrarchids are collected, a sub-sampling routine will be used. Additional data collected at each site will include temperature, dissolved oxygen, and secchi disk reading. All data will be recorded on project specific data sheets that will clearly document collections.

### 6.2 Data Analysis

Collected data will be analyzed to evaluate abundance and species diversity at each habitat type. Based on the findings, recommendations will be made regarding future development of shoreline sites on Lake Martin.

## 7.0 ***CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE***

This study employs generally accepted practices for evaluating fish abundance and diversity along shoreline areas of reservoirs. The study methodology is consistent with generally accepted sampling principles and practices.

## 8.0 ***PRODUCTS***

Once this study is completed, a draft report of the findings will be available to the MIG 1. Upon review and discussion, a Final report will be filed with the Martin License Application.

**9.0 SCHEDULE**

Site Selection	March 2008
APC files Final Study Plan	November 2008
Anticipated FERC Approval	April 2009
Field Study (Spring)	May 2009
	May 2010 if needed
Draft Report	November 2010
Final Report	February 2011

**10.0 LEVEL OF EFFORT AND COST**

APC estimates the cost of consulting on study plan development, conducting the study, and developing a study report is approximately \$100,000.

**Study Plan 3 – Evaluation of Minimum Flows Downstream of Martin Dam**

**1.0 GOALS AND OBJECTIVES OF STUDY**

Operation of hydroelectric projects in a peaking mode could result in impacts downstream of the project in the tailrace area. The Alabama Department of Conservation and Natural Resources (ADCNR) and U.S. Fish and Wildlife Service (USFWS) would like to understand the relationship of project operation and the potential impacts of hydro peaking on the aquatic fauna and aquatic habitat in the tailrace area downstream of the Martin Project [and downstream in the Tallapoosa River below the Thurlow Dam](#). In particular, the ADCNR [would like to explore possibilities for flexibility in the Martin Dam operations that could enhance downstream areas – Martin tailrace, Yates reservoir, Thurlow reservoir, and the Tallapoosa River downstream of Thurlow Dam](#).

**2.0 RELEVANT RESOURCE MANAGEMENT GOALS**

The ADCNR manages recreational fisheries [downstream of the Martin Project](#). [Understanding any flexibility in project operations that still allows peaking would allow ADCNR and USFWS to work with APC to develop strategies to offset impacts associated with peaking where practical](#).

**3.0 BACKGROUND AND EXISTING INFORMATION**

There is limited data available for the Martin tailrace in terms of water quality, fisheries, rare, threatened, or endangered (RTE) species, and habitat parameters. Tailrace information for fish populations may be available through the ADCNR Reservoir Management Reports. Other recent information is presented in the Preliminary Application Document for the Martin Hydroelectric Project (APC, 2008). [Water quality, fisheries, and RTE information for the Tallapoosa River downstream of Thurlow Dam is available from a series of studies that APC has performed over the past 16 years](#).

**4.0 PROJECT NEXUS**

Operation of the Martin project affects the tailrace aquatic habitat downstream of the Martin Dam [and to some level, areas downstream of Thurlow Dam](#). This study will help to determine the magnitude of impacts (related to hydro peaking) on the Martin Project tailrace area [and downstream areas](#) and [identify project flexibility for enhancing downstream](#) aquatic habitat conditions and lessening project related impacts.

**5.0 STUDY AREA AND STUDY SITES**

The study area for this issue would include the immediate tailrace area downstream of the Martin Dam [and to some extent the Tallapoosa River downstream of Thurlow Dam](#).

## **6.0 PROPOSED METHODOLOGY**

The methodology for this study will encompass two parts: 1) an initial review of project operations and identification of project flexibility and 2) field surveys downstream as needed to evaluate project impacts.

### **Review of Project Operations**

APC, ADCNR, and USFWS will review seasonality of historic flows and peaking operations. This analysis will also include review of potential drought operation scenarios and the existing environmental data collected downstream of Thurlow Dam as part of the license compliance requirements. After review of this data, any field survey information needed (data type and location) will be identified and collected.

### **Field Sampling**

The level of field sampling needed will be determined based on the results of the review of project operations. Surveys may include:

- Reconnaissance surveys to establish sampling areas downstream of the Martin Dam
- Fish Sampling to gather fish community data at designated sampling sites. Fish sampling would be qualitative in nature and used to characterize the species present in each sampling reach. Because habitat types are quite deep (*i.e.*, lack of wadeable areas), sampling would primarily consist of boat electrofishing.
- Mussel, Snail, and Crayfish Sampling to gather occurrence and distribution data may need to be collected.
- Water Quality data may be reviewed - both historical (as reported in the Martin Water Quality Data Report) and present day data - including temperature and dissolved oxygen.

### ***Data Analysis and Assessment Criteria***

The collected data will be assimilated into a report for review by the agencies. This report will be used for discussing the need for any recommended changes in project operation to be considered in APC's license application.

## **7.0 CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE**

This study employs generally accepted practices for evaluating fisheries habitat at hydroelectric projects. The study methodology is consistent with generally accepted fishery sampling principles and practices.

## **8.0 PRODUCTS**

Data and analyses from this study will be shared periodically with the agencies and the MIG 1 during the study phase. A draft report will be distributed to the MIG 1 for review and comment within 6 months of completion of the analysis. A final report will be provided as part of the draft license application that will include raw data in tabular form, analysis performed, and results and discussion.

**9.0 SCHEDULE**

Project Operation Review	April - June 2008
APC files Final Study Plan	November 2008
Anticipated FERC Approval	April 2009
Field Surveys (as needed)	
Fisheries samples	Mid-March to early April 2009
Water Quality (Real Time)	May to October 2009
Mussel, snail, and crayfish samples	June to October 2009
Draft Report	December 2009
Discussion of Data	February 2010
Final Report	April 2010

**10.0 LEVEL OF EFFORT AND COST**

APC estimates the cost of consulting on study plan development, conducting the study and associated generation losses, developing a study report, and discussing the results with all stakeholders is approximately \$90,000.

**11.0 REFERENCES**

Alabama Power Company. 2008. Preliminary Application Document for the Martin Hydroelectric Project FERC No. 349-134.

## **Study Plan 4 - Fish Entrainment and Turbine Mortality**

### **1.0 GOALS AND OBJECTIVES OF STUDY**

Operation of hydroelectric projects can result in the sporadic entrainment of fish into the project turbines. Passage through the turbines can result in some degree of mortality as well as removal of fish from the project reservoir. The Alabama Department of Conservation and Natural Resources (ADCNR) and U.S. Fish and Wildlife Service (USFWS) would like to understand the relationship of project operation and the potential impacts of entrainment and turbine mortality on fish in Lake Martin.

In particular, the ADCNR is concerned about the impacts of fish entrainment on the populations of striped bass (*Morone saxatilis*) and largemouth bass (*Micropterus salmoides*) in Lake Martin, in part, because the stocking rates of these two species can be adjusted to offset entrainment impacts.

### **2.0 RELEVANT RESOURCE MANAGEMENT GOALS**

The ADCNR maintains a population of Gulf-strain striped bass in Lake Martin through an active stocking program. They also regulate the recreational fishing of game species such as largemouth bass. Knowledge of impacts to the Lake Martin fishery due to entrainment can allow them to adjust their management strategies for managing these two fisheries and potentially other recreational fisheries.

### **3.0 BACKGROUND AND EXISTING INFORMATION**

Over fifty site-specific studies of resident fish entrainment and mortality at hydroelectric sites in the United States have been performed and reported on to date. These studies provide order-of-magnitude estimates of annual fish entrainment (FERC, 1995). Descriptive information has been gathered from each entrainment study and includes:

- Location: geographical proximity, river basin;
- Project size: discharge capacity and power production;
- Project operation: e.g., peaking run-of-river, etc.;
- Biological factors: fish species composition;
- Impoundment characteristics: general water quality, impoundment size, flow regime; and
- Physical project characteristics: trash rack spacing, intake velocity, etc.

Extensive turbine mortality study data exists for a range of turbine types and physical characteristics, which can be compared to the Martin project turbines. These characteristics are commonly attributed to turbine passage mortality (Cramer and Oligher, 1963; Bell, 1991; Eicher, 1987; EPRI, 1992). Descriptive data includes:

- turbine design type;
- operating head;
- runner speed;
- diameter; and
- peripheral runner velocity.

Current information for Lake Martin's fish populations is available through the ADCNR Reservoir Management Reports. Similar study information performed on the recent Coosa and Warrior relicense is also available for use (APC, 2003).

#### **4.0 PROJECT NEXUS**

The study will determine the magnitude of impacts related to fish entrainment and turbine mortality related to operation of the Lake Martin project.

#### **5.0 STUDY AREA AND STUDY SITES**

The study area for this issue would include the forebay and intake area of the Martin Project.

#### **6.0 PROPOSED METHODOLOGY**

The methods for this study will follow those used to determine potential entrainment impacts for hydroelectric projects on the Coosa River as part of the Coosa relicensing process (APC, 2003).

##### ***Define the Entrainment Database***

For this study, fish entrainment information from other hydroelectric projects will be assembled into a database for analyzing the magnitude of potential entrainment. After review of the database, the most similar projects will be selected and used to develop a Martin entrainment estimate.

##### ***Calculate An Estimated Fish Entrainment Rate***

The entrainment rate information from the selected entrainment studies will be consolidated to develop fish entrainment rates for the Martin Project. The entrainment rates will be presented both in fish entrained per hour and fish entrained by volume of water passed through the project turbines (fish/million cubic feet). The data will be grouped by season where appropriate to determine an entrainment rate for each season of the year. The seasonal data will be used to develop an estimated seasonal mean entrainment rate for the Martin Project.

##### ***Estimate Species Composition and Length Frequency Distribution***

The species composition data from the Coosa Entrainment Study (2003), in conjunction with ADCNR data for Lake Martin, will be used to develop species composition for entrainment. Length frequency of fish entrained will be based on information from the entrainment database.

##### ***Estimate of Turbine Mortality***

As fish move through hydroelectric turbines, a percentage are killed due to turbine mortality (i.e., blade strikes, shear forces, and pressure changes, etc.). Turbine passage survival studies have been performed at numerous hydroelectric projects throughout the country. Characteristics of these projects will be compared to the characteristics of the Martin Project and suitable studies will be selected for the transfer of turbine mortality data for each development. Selected turbine survival rate data will be obtained from the literature and used to estimate the

number of fish killed due to turbine mortality. The following turbine characteristics will be used as criteria for use in this analysis:

- design type;
- operating head;
- runner speed;
- diameter; and
- peripheral runner velocity.

To the extent possible, turbine mortality rate data available from source studies will be related to the species-family group and size class of fish estimated to be entrained at the Martin Project. Where multiple tests are available for a given species-family group/size class, a mean survival rate will be computed. For species-family groups/size classes where no applicable data can be found or accepted, the survival rate reported for a similar group/size class will be substituted.

Once turbine mortality rates are developed from the study database, the rates will be applied to the entrainment estimates for the Martin Project. This will be accomplished by multiplying fish entrainment estimates by the composite mortality rates for each family/genus group and size class (where applicable).

### ***Filters***

Due to certain site-specific characteristics of the Martin Project, it may be necessary to adjust entrainment estimates. Factors affecting entrainment rates that may warrant investigation for adjustment of estimates include:

- stratification at the intakes (dissolved oxygen);
- intake velocities;
- fish habitat available at the intakes; and/or
- other factors.

### ***Field Verification***

ADCNR and USFWS have expressed a desire to verify the entrainment estimates at some level through field verification. APC proposes to use hydroacoustics to provide this verification. Hydroacoustics (either split beam or DIDSON) will be used to sample the penstock area, trash rack area, or forebay area to gather information on fish targets moving into the turbine intakes. Specific location of collections will be based on additional investigation of the penstock configuration and the ability to sample that area.

Hydroacoustic sampling will be performed on a seasonal basis (quarterly basis) and will collect data over a multiple day period encompassing both day and night periods. Estimates of entrainment will be determined through analysis of the collected data and compared to the results of the desktop analysis. APC will develop a report that includes a recommendation regarding the level of impact that entrainment and turbine mortality potentially has on the lake fishery, with specific emphasis on striped bass and largemouth bass. APC will then review their results with stakeholders to develop potential protection and enhancement measures commensurate with the level of impact.

**7.0 CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE**

This study employs generally accepted practices for evaluating fish entrainment and turbine mortality at hydroelectric projects. The study methodology is consistent with generally accepted fishery sampling principles and practices.

**8.0 PRODUCTS**

Data and analyses from this study will be included in periodic reports to the ADCNR, USFWS, Alabama Department of Environmental Management (ADEM), and the MIG 1. A draft report will be distributed to the MIG 1 for review and comment within 6 to 8 months of completion of the analysis. A final report will be provided as part of the draft license application that will include raw data in tabular form, analysis performed, and results and discussion.

**9.0 SCHEDULE**

APC files Final Study Plan	November 2008
Anticipated FERC Approval	April 2009
Develop Entrainment and Turbine Mortality databases	May 2009
Draft Report	December 2009
Final Report	April 201

**10.0 LEVEL OF EFFORT AND COST**

APC estimates the cost of collecting the existing fisheries data, analyses and reporting is approximately \$115,000. This is based on development and analysis of a database of existing data and does not include additional field studies.

**11.0 REFERENCES**

Alabama Power Company. 2003. Coosa and Warrior River Projects- E11 - Impingement, Entrainment, and Turbine Mortality Study. Alabama Power Company, Birmingham, AL.

Bell, M. C. 1991. Fisheries Handbook of Engineering Requirements and Biological Criteria. United States Army Corps of Engineers, Fish Passage Development and Evaluation Program, Portland, OR.

Cramer, F. K., and R. C. Oligher. 1963. Passing fish through hydraulic turbines. Transactions of the American Fisheries Society 93:243-259.

Eicher Associates, Inc. 1987. Turbine-related fish mortality: Review and evaluation of studies. Research Project 2694-4. Prepared for Electric Power Research Institute, Palo Alto, CA.

Electric Power Research Institute (EPRI). September 1992. Fish Entrainment and Turbine Mortality Review and Guidelines. TR-101231 Research Project 2694-01. Prepared by Stone & Webster Environmental Services.

Federal Energy Regulatory Commission (FERC). 1995. Preliminary assessment of fish entrainment at hydropower projects – volume 1 (Paper No. DPR-10). Office of Hydropower Licensing, FERC, Washington, DC.

**Study Plan 5 - Rare, Threatened, and Endangered Species Surveys**

**1.0 GOALS AND OBJECTIVES OF STUDY**

The U.S. Fish and Wildlife Service (USFWS) and the Alabama Department of Conservation and Natural Resources (ADCNR) (agencies) are concerned about the presence of any Federal and/or State Rare, Threatened, and Endangered (RTE) species that currently reside within the Martin project boundary.

The goal of this study is to identify the location and abundance of any RTE species within the project boundary and determine if project operation potentially impacts any species present. If there are project related impacts, the agencies would like to determine ways to limit those impacts. The agencies would also like to determine if there are opportunities to enhance or reintroduce species to specific areas within or near the project.

**2.0 RELEVANT RESOURCE MANAGEMENT GOALS**

The USFWS has mandatory federal authority under Section 7 of the Federal Power Act to identify and limit the impacts of hydropower projects on any Federally protected Threatened or Endangered species within the project boundary. [A potential impact is fragmentation of species populations by the project and reduction of connectivity of populations.](#) The ADCNR has developed a policy to enhance RTE species through protection of habitat, supplemental stocking, and/or reintroduction of species to historic habitats. Protection and or enhancement of any populations of RTE species within the project boundary would be a positive action for sustaining any RTE species identified.

**3.0 BACKGROUND AND EXISTING INFORMATION**

Several preliminary surveys have been performed for RTE species within the project boundary and include:

- unionid survey in various main channel and tributary areas of the project,
- red cockaded woodpecker surveys on project properties, and
- annual bald eagle surveys on the lake.

**4.0 PROJECT NEXUS**

The study would determine if there are existing populations of RTE species within the project boundary and if project operation impacts those populations. [Fragmentation of the populations by the project is one area of impact to consider.](#)

**5.0 STUDY AREA AND STUDY SITES**

The study area for this issue would include all of the lands and waters located within the project boundary of the Lake Martin project. Additional tributary sites adjacent to the project may also be included if they are significantly influenced by project operations.

## **6.0 PROPOSED METHODOLOGY**

The overall purpose of this study would be to gather additional data for determination of the presence and location of RTE species within the project boundary, to determine if project operations affect these populations, and to identify potential aquatic restoration areas adjacent to the project. To accomplish this, the study will involve three components:

- 1) A literature search of the USFWS, Natural Heritage Trust, and Alabama Lands Division RTE species databases will be performed to see if any documented populations of RTE species occur within or adjacent to the project boundary.
- 2) Field surveys will be performed by qualified investigators in specific areas of the project identified by these databases or by ADCNR or USFWS personnel. These surveys will determine the presence or absence of RTE species within the project boundary. Initial conversations with the USFWS and ADCNR has led to RTE surveys in Manoy Creek, Blue Creek, Sandy Creek, the Tallapoosa River at Irwin Shoals, and the Tallapoosa River in the Martin Tailrace. These conversations have also revealed that an unidentified species of mussel has been observed in Martin Lake near Chimney Rock and there is possibly a non-native species of mussel near Wind Creek State Park (collected by Jeff Garner).
- 3) A review of low head dams located on tributaries to Lake Martin will be performed through review of existing studies (Gangloff). This will provide the agencies with potential restoration areas adjacent to the project boundary.

### **6.1 Data Collection Techniques**

To be developed in cooperation with USFWS based on RTE species distributions data.

### **6.2 Data Analysis**

To be developed in cooperation with USFWS with development of a Biological Assessment as the ultimate goal.

## **7.0 CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE**

This study employs generally accepted practices for evaluating RTE distributions at hydroelectric projects. The study methodology is consistent with generally accepted sampling principles and practices.

## **8.0 PRODUCTS**

This study will have three products:

- an RTE database for the Lake Martin area;
- a report of RTE locations within and/or adjacent to the Lake Martin Project; and
- a report that identifies potential restoration areas within or adjacent to the project boundary of the Lake Martin Project.

Data and analyses from this study will be included in periodic reports to ADCNR, USFWS, and the MIG 1. Draft reports will be distributed to the MIG 1 for review and comment

upon completion of the product. Final reports will be provided for each product as part of the draft license application and will contain all necessary data in tabular and graphic form to depict RTE abundance and/or distribution within the Lake Martin Project.

**9.0 SCHEDULE**

APC files Final Study Plan	November 2008
Anticipated FERC Approval	April 2009
Conduct Field Surveys	April – June 2009
Develop Database	May 2009
Finalize Database	August 2009
Finalize Report of Surveys	November 2009
Review Restoration Areas	January – April 2010
Draft Report	June 2010
Final Report	September 2010

**10.0 LEVEL OF EFFORT AND COST**

APC estimates the cost of consulting on the study plan, developing the RTE database, performing field surveys, reviewing and identifying restoration areas, and preparing a report is approximately \$100,000.

**11.0 REFERENCES**

Alabama Power Company. 2008. Preliminary Application Document for the Martin Hydroelectric Project (FERC No. 349). Alabama Power Company, Birmingham, AL.

**Study Plan 6 - Striped Bass Tagging – Hydroacoustic Collections**

**1.0 GOALS AND OBJECTIVES OF STUDY**

The Alabama Department of Conservation and Natural Resources (ADCNR) currently stocks Gulf-strain striped bass (*Morone saxatilis*) in Lake Martin. The ADCNR would like to understand the relationship of project operation and potential impact to striped bass habitat in Lake Martin. If such a relationship is present, the ADCNR would like to determine ways to predict periods of impact and limit their overall effects on the stocks of adult Gulf-strain striped bass in the lake.

**2.0 RELEVANT RESOURCE MANAGEMENT GOALS**

The ADCNR maintains a population of Gulf-strain striped bass in Lake Martin to create a unique inland recreational fishery and as a source of brood stock for striped bass stocking in the Gulf Coast drainages.

**3.0 BACKGROUND AND EXISTING INFORMATION**

Indiscriminant stocking of striped bass in the United States over the past 40 years have made it difficult to maintain a “pure strain” in the wild. The ADCNR maintains the Gulf-strain of striped bass in Lake Martin and is concerned with the “die-off” events of striped bass that are sporadically observed on Lake Martin during the summer and early fall. They are concerned that there is limited thermal refuge (cool temperatures/high dissolved oxygen) for striped bass in the lake and that there may be a relationship between project operation/generation and striped bass “die off” events. The ADCNR believes the turbine withdrawals may pull directly from the metalimnion and deplete the cool water/high dissolved oxygen layers of the lake which serve as a thermal refuge, especially for large adult fish.

According to studies in the southeast, adult striped bass prefer dissolved oxygen (DO) levels greater than 2 mg/l and temperatures less than 25°C (Isley, 2002; Moss, 2007; Hill, 1989; Francis-Floyd, 2002). Current information for Lake Martin (ADEM, 2005; APC, 2006), demonstrates the lake stratifies during the hot summer months, which restricts striped bass to the cooler water deeper in the lake. With the onset of stratification during the early summer, DO levels in the hypolimnion and metalimnion decrease due to anaerobic activity and reduced circulation and contact with the atmosphere. The layer of preferred habitat for striped bass naturally grows smaller as stratification intensifies until lake turnover in the fall destratifies the lake. It is believed that as the layers of water with ideal temperature and DO decreases, striped bass become overcrowded or at times have to sacrifice or choose between temperatures below 25°C and/or DO greater than 2mg/l. In marginal habitats with lower DO levels or higher temperatures, striped bass can become sluggish, feed less, or develop bacterial infections that can lead to increased mortality rates.

In addition to the studies cited above, the ADCNR cited a report by Dr. Steve Miranda (University of Mississippi) which reported that larger adult striped bass have a tendency to sink (not float) to the bottom of lakes upon death. This observation could potentially distort the number of die-offs and the number of fish involved with each die off reported in the past. They

also cited a new study from Smith Lake that deals with the interaction (overlap of diets – competition) of largemouth, stripers, and spotted bass, which may provide beneficial information.

#### **4.0 PROJECT NEXUS**

The study would determine if project operation actually impacts striped bass thermal refuge areas during the summer and fall periods of the year.

#### **5.0 STUDY AREA AND STUDY SITES**

The study area for this issue would include the main body and two major arms (Kowaliga and Tallapoosa) of Lake Martin.

#### **6.0 PROPOSED METHODOLOGY**

The proposed study for this issue will involve two components:

1) Striped Bass Expert Panel Review: Develop a “striped bass” Expert Panel composed of striped bass anglers, lake guides, and academic experts to discuss the existing Lake Martin striped bass fishery. This component will assist APC and the agencies in developing the scope and purpose of subsequent field studies. This review will also include further review of historic project operations, hydrologic patterns, and their affect on striped bass mortalities. Members of this panel will be identified by APC, ADCNR, and USFWS.

2) Based on the findings of the Expert Panel, a striped bass tracking study of the larger fish may be implemented using methods similar to the study performed on Smith Lake in the 1990’s. This study would consist of using sonic tags and hydroacoustics to track striped bass movements during the June – October time frame. The addition of hydroacoustics will allow enumeration of additional fish in the same area as the tagged striped bass, will collect information on size ranges of those fish, depict depth of the fish in relationship to water quality stratification, and will allow an understanding of the forage fish distributions and densities.

The overall purpose of these two studies would be to gather additional data for better understanding the operations/hydrology that trigger the sporadic summer die off event and to gather additional data on the size structure of the existing striped bass population.

##### 6.1 Data Collection Techniques

##### ***Striped Bass Expert Panel***

APC and the agencies will develop a list of experts and will request their help in reviewing this issue. The experts that participate will be provided with existing information on the striped bass fishery, water quality, and hydrology data. A date will be selected to review the information in a question and answer roundtable format. This session will be used to identify areas of the striped bass fishery that need to be investigated through field surveys.

### **Potential Field Surveys Techniques**

Each of these is to be developed based on the findings of the Expert Panel Review.

#### ***Tracking Techniques***

A number of adult striped bass will be collected and tagged with sonic tags prior to lake stratification (April – May). These fish will be tracked monthly through the summer until fall destratification (October – November). The distribution of these fish will be analyzed to better understand striped bass movements in the lake in relation to stratification.

#### ***Hydroacoustic Collections***

Hydroacoustics will be collected monthly as supplemental information in combination with fish tag tracking. Hydroacoustic surveys of the areas where tracked fish are observed will be performed during either daytime or night depending on discussions within MIG 1. Hydroacoustics data will be analyzed to determine the presence of other large targets (striped bass) in the vicinity of the tagged fish and to determine density and distribution of forage fish in relation to the thermocline.

#### ***Water Quality***

Water Quality profiles will be collected – DO and Temp in a representative area of the hydroacoustic collections. This data will be used to determine the exact level of stratification in the area where tagged striped bass are located.

#### ***Project Operation***

Information on turbine operations (machine hours) will be compared to the observed fish distributions and level of stratification. This analysis will also be prepared for historic water quality profile data to determine trends in project operation, stratification, and potential impacts to striped bass in the lake.

## **6.2 Data Analysis**

APC will prepare a report of findings from the “Expert Panel Review”. This will be presented to the MIG 1 members for review.

A report of all field studies will also be prepared and discussed with the MIG 1 to identify recommendations for addressing impacts (if any are discovered).

## **7.0 *CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE***

This study employs generally accepted practices for evaluating fish distributions and stock assessments at hydroelectric projects. The study methodology is consistent with generally accepted fishery sampling principles and practices.

## **8.0 PRODUCTS**

Data and analyses from this study will be included in periodic reports to the MIG 1 during the study phase. [A report of the findings of the “Expert Panel Review” will be distributed to the MIG for review within 3 months of the panel.](#) A draft report of the field study results will be distributed to the MIG 1 for review and comment within 6 to 8 months of completion of the field study. A final report will be provided as part of the draft license application that will include raw data in tabular form, maps of sample sites, conditions during sampling, and an analysis of striped bass distribution in relation to lake water quality parameters and project operation.

## **9.0 SCHEDULE**

APC files Final Study Plan	November 2008
Anticipated FERC Approval	April 2009
Expert Panel Review	January 2009
Collect Field Data	April – November 2009
Review data and finalize report on field studies	December 2009
Draft Report	June 2010
Final Report	September 2010

## **10.0 LEVEL OF EFFORT AND COST**

APC estimates the cost of consulting on the study plan, collecting the fisheries data, analyses, and developing a draft and final report is approximately \$200,000 based on the level of field studies to be performed.

## **11.0 REFERENCES**

- Alabama Department of Environmental Management (ADEM). 2005. Water Quality Data for Martin Reservoir. Alabama Department of Environmental Management, Montgomery, AL.
- Alabama Power Company, Environmental Compliance. 2006. Water Quality Depth Profiles at Martin Hydroelectric Project. Alabama Power Company, Birmingham, AL.
- Francis-Floyd, Ruth. 2002. Dissolved Oxygen for Fish Production. University of Florida, IFAS Extension. [Online] URL: <http://edis.ifas.ufl.edu/FA2002>. Accessed August 10, 2007.
- Hill, Jennifer, et al. 1989. Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates. Biological Report 82 (11.118). Completed for U.S. Fish and Wildlife Service and Army Corps of Engineers, Coastal Ecology Group.
- Isley, Jeffrey and Shawn Young. 2002. Striped bass annual site fidelity and habitat utilization in J. Strom Thurmond Reservoir, South Carolina-Georgia. Transactions of the American Fisheries Society. Vol. 131, no. 5, pp. 828-837.

Moss, Jerry L. Cool Striped Bass. Alabama Department of Conservation and Natural Resources. [Online] URL:  
<http://www.outdooralabama.com/fishing/freshwater/fish/bassstriped/striped/cool.cfm>.  
Accessed February 23, 2007.

**Study Plan 7 - Lake Martin – Wildlife Management Plan**

**1.0 GOALS AND OBJECTIVES OF STUDY**

The Alabama Dept. of Conservation and Natural Resources (ADCNR) would like to understand more about the lands that are included within the project boundary of the Martin Project (*i.e.*, quantity, location, timber stands, etc.). ADCNR is especially concerned about [providing habitat diversity among all APC lands within the project boundary to enhance native vegetation and wildlife species \(such as Priority 1 and 2 species and rare, threatened, and endangered species\). This would include the conservation, restoration, and management of longleaf pine systems on project lands.](#) ADCNR would like to work with the U.S. Fish and Wildlife Service, Alabama Power, and interested stakeholders to develop a viable wildlife management plan for the Martin Project.

**2.0 RELEVANT RESOURCE MANAGEMENT GOALS**

The ADCNR manages wildlife throughout the state. Knowledge of the lands included as part of the Martin Project would allow them to work with Alabama Power Company (APC) to develop strategies to enhance the public wildlife resources, protect or enhance rare, threatened, or endangered (RTE) species and offset potential impacts associated with development around the project. [A CD containing an electronic format of Alabama’s Wildlife Strategy will be provided to APC by ADCNR.](#)

**3.0 BACKGROUND AND EXISTING INFORMATION**

APC includes approximately 8800 acres of land within their project boundary. These lands are a mixture of both developed and undeveloped property. APC is going to develop a Shoreline Management Plan, which will contain GIS overlays of all lands within the project and includes its current use or designation. APC has land designated as “Natural Undeveloped” that would be of interest to ADCNR for management of wildlife resources. APC is also performing RTE Surveys on the Martin Project lands and some properties adjacent to the project.

ADCNR has management strategies and goals for wildlife resources of the state, including RTE species. A combination of APC data and ADCNR goals would be pooled to determine the best approach for development of a Wildlife Management Plan (WMP) for enhancing wildlife resources within the Martin Project.

**4.0 PROJECT NEXUS**

The study would result in a WMP that would enhance wildlife resources within the Martin Project. This Plan would also determine management strategies to reduce impacts to and/or enhance habitat quality of RTE wildlife species within the Martin Project.

**5.0 STUDY AREA AND STUDY SITES**

The primary study area for this issue would include all of the APC owned lands included within the Martin project boundary.

## **6.0 PROPOSED METHODOLOGY**

The methodology for this study will generally follow the methods used to develop the WMP for the Coosa Hydroelectric Projects as part of the Coosa relicensing process. First, APC will develop GIS overlays of:

- all lands within the project boundary;
- current land use classification;
- current timber type and timber management;
- locations of known populations of RTE species.

APC will then host a series of meetings with the ADCNR and other interested stakeholders to review and compare the GIS information and develop a consensus based WMP.

The plan will contain the following structure at a minimum:

- Introduction
- Purpose of the Plan
- Wildlife Management Objectives
- Waterfowl Management Actions (if applicable)
- RTE Management Actions (red-cockaded woodpecker, bald eagle, etc.)
- [Priority 1 and 2 species \(refer to Alabama's Comprehensive Wildlife Strategy\)](#)
- Timber Management including herbicides, thinning, etc.
- [Habitat Management and the use of proper silvicultural systems](#)
- Adjacent Lands – Management Agreements (if applicable)
- Wildlife Openings
- Handicapped Hunting Areas (if applicable)
- General Wildlife Enhancements [\(controlling non-native invasive plant species, etc.\)](#)
- [Plan will contain provisions to monitor and measure management productivity.](#)

## **7.0 CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE**

This study employs generally accepted practices for evaluating wildlife habitat at hydroelectric projects. The study methodology is consistent with accepted practices used during the Coosa and Warrior relicensing studies accepted by state and federal agencies.

## **8.0 PRODUCTS**

Data and analyses from this study will be shared periodically with the agencies and MIG 1 during the study phase. Meetings will be hosted by APC to develop a draft WMP that will be distributed for review and comment to the MIG 1 within 6 months of completion of the WMP. The Final WMP will be provided as part of the draft license application.

**9.0 SCHEDULE**

Develop GIS overlays (percentages of present forest types)	April – December 2008
APC files Final Study Plan	November 2008
Anticipated FERC Approval	April 2009
Periodic Meetings with agencies	March 2008 to December 2009
Draft WMP	June 2010
Final WMP	November 2010

**10.0 LEVEL OF EFFORT AND COST**

APC estimates the cost of consulting on the study plan, collecting the field data, analyses, and reporting is approximately \$70,000.

**11.0 REFERENCES**

Alabama Power Company. 2005. Wildlife Management Plan for the Coosa Hydroelectric Project.

Alabama Department of Conservation and Natural Resources. 2005. Alabama Comprehensive Wildlife Management Plan.

**Study Plan 2 - Location of NPDES Permits on Lake Martin**

**1.0 GOALS AND OBJECTIVES OF STUDY**

The consulting agencies identified the following issues: declining water quality of Lake Martin, Calpine Power Plant impacts to Hillabee Creek, NPDES permits from Alexander City and the impact to Wind Creek and Lake Martin water quality, and an assessment of all NPDES permits that discharge into Lake Martin.

The purpose of this study is to develop a list of all NPDES permits on Lake Martin and identify their location. Once the permit list is compiled, it will be added to a Geographic Information System (GIS) overlay for use during the Martin relicensing.

**2.0 RELEVANT RESOURCE MANAGEMENT GOALS**

The Alabama Department of Environmental Management (ADEM) is responsible for maintaining high water quality levels on Lake Martin. This is an integral aspect of Lake Martin's success as a recreation, drinking water, fish and wildlife, and economic resource.

**3.0 BACKGROUND AND EXISTING INFORMATION**

In order to maintain high water quality, Federal and State laws regulate pollution from both point and non-point sources. Point sources are distinct conveyances. Examples include pipes and man-made ditches as well as discharges from municipal, industrial, and other facilities. Point source pollution sites within the Lake Martin reservoir are regulated through the National Point Discharge Elimination System (NPDES) managed by the ADEM and the United States Environmental Protection Agency (USEPA). NPDES permits include provisions such as limits on types of discharge, monitoring, and reporting requirements. An NPDES permit will usually indicate an acceptable pollutant parameter and the permittee may choose the best method to achieve these levels. The permits are issued for a five year term and may be renewed or administratively extended. The application process for the NPDES permits require that the public be notified and allowed to comment on NPDES permit application. The ADEM NPDES application requires information such as the purpose of the application, previous permit numbers, business activity, and waste storage and disposal.

Non-point source pollution is caused by precipitation moving across the ground and carrying pollutants such as pesticides and fertilizers with it. Several agencies including the Clean Water Partnership (CWP), the Soil Water Conservation Committee (SWCC), the Natural Resource Conservation Service (NRCS), and the Alabama Department of Public Health (ADPH) are concerned about monitoring discharges into Lake Martin and they have been working together (along with the APC) to determine the origin of non-point source pollution in the basin.

**4.0 PROJECT NEXUS**

There are both point and non-point sources of pollution that have direct and indirect impacts to Lake Martin.

## **5.0 STUDY AREA AND STUDY SITES**

The study area will encompass Lake Martin, APC-owned lands within the Project Boundary, and significant point sources on specific tributaries as they pertain to point source discharges.

## **6.0 PROPOSED METHODOLOGY**

The identification of NPDES permits on Lake Martin will be accomplished through the use of secondary data sources.

### **6.1 Data Collection Techniques**

Existing information will be used to facilitate data collection for this study. First, a request for up to date NPDES data from the ADEM will be made.

Once a list of NPDES permit locations is complete and other existing literature has been compiled and reviewed, a draft report will be issued to Martin Issue Group (MIG) 2 for their review and comment. [The report will include a list of the NPDES locations, owners, and effluent limits.](#) Comments received from MIG2 will be incorporated into a final report.

### **6.2 Data Analysis**

Other than a literature review, there will be no data analysis associated with this study. The GIS overlays may be compared with areas of Lake Martin experiencing water quality problems to better understand the impacts of discharges.

## **7.0 CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE**

The planned study methods discussed above are consistent with the methods followed in the Coosa and Warrior relicensing projects and have been accepted by the federal and state agencies and other interested stakeholders in those projects.

## **8.0 PRODUCTS**

A draft report will be distributed to the MIG 2 for review and comment within 6 to 8 months of completion of the point source data collection. Analysis of the point source data will be used to determine the necessity of non-point source pollution data. A final report will be provided as part of the draft license application that will include raw data, GIS overlays, and training guidelines for non-point source pollution detection.

## **9.0 SCHEDULE**

APC Files Final Study Plan	November 2008
Anticipated FERC Approval	April 2009
Draft Report	July 2009
MIG-2 Review	September 2009
Final Report	January 2010

***10.0 LEVEL OF EFFORT AND COST***

APC estimates the cost of consulting of developing the study plan, collecting and reviewing existing information, and reporting is approximately \$25,000.

***11.0 REFERENCES***

Alabama Department of Environmental Management – National Pollution Discharge Elimination System <http://www.adem.state.al.us/WaterDivision/WaterDivisionPP.htm> accessed on 11-07-07.

### **Study Plan 3 - Erosion and Sedimentation**

#### **1.0 GOALS AND OBJECTIVES OF STUDY**

The consulting stakeholders identified shoreline erosion and sedimentation in areas of Lake Martin as two issues that they are concerned about. They would like Alabama Power Company (APC) to collect additional information on erosion areas within the lake or tailrace that are related to project operation and to collect information on the amount of sedimentation that is occurring in the upper portion of the of the lake near Irwin Shoals and in the mouths of tributaries of Lake Martin. Additionally, the agencies would like to understand if nuisance aquatic vegetation is becoming a problem in these areas of sedimentation. Stakeholders have also identified “tributary headcutting” as an issue to investigate at some level.

#### **2.0 RELEVANT RESOURCE MANAGEMENT GOALS**

The consulting agencies regulate recreational fishing and water quality resources on Lake Martin. As part of that responsibility, they would like to limit project related shoreline erosion and its impacts on water quality; to identify areas of sedimentation; to identify areas that currently have or could potentially have nuisance aquatic vegetation; and to identify ways to reduce adverse impacts related to project operation on these issues.

#### **3.0 BACKGROUND AND EXISTING INFORMATION**

Project operations related to lake level fluctuations can result in areas of the shoreline that exhibit erosion within the lakebed. However, much of the erosion that occurs around the lake is a result of construction and development adjacent to the Martin project boundary. APC currently employs several contractors for Lake Martin. These contractors typically inspect new development sites and note any excessive amounts of shoreline erosion occurring as a result of land development. These contractors are also aware of “hotspot” erosion sites on the lake below the full pool elevation. APC also has an Aquatic Vegetation control group that periodically inspects Lake Martin for nuisance aquatic vegetation and treats infested areas accordingly. These sites often occur in areas where excessive sedimentation has accumulated. With regard to sediment accumulation amounts and rates, there are no known sources that can describe this aspect of the issue. However, LIDAR information and flyover photography are available for the project at winter pool. This information may be helpful in identifying areas of sedimentation around the project.

#### **4.0 PROJECT NEXUS**

Erosion “hotspot” sites can periodically occur along the lake shoreline related to project lake level fluctuation or the immediate tailrace below the project dam as a result of peaking flows. Erosion materials often deposit along the lake (upstream river channel and tributary mouths) and can create areas that are prone to the establishment of nuisance aquatic vegetation.

#### **5.0 STUDY AREA AND STUDY SITES**

Erosion “hotspot sites” are typically limited to the area between the full pool elevation to the lowest level of the winter drawdown on Lake Martin and the immediate Tailrace downstream

of Martin Dam. Sediment accumulation areas typically occur in the upstream areas of the lake and in the mouth of tributaries of the lake. The study area will be focused on these erosion “hotspot” areas and sediment accumulation areas. The presence or absence of nuisance aquatic vegetation will be documented in these areas. Tributary headcutting will be examined on selected streams that drain into the lake to determine the significance of this issue.

## **6.0 PROPOSED METHODOLOGY**

### **6.1 Erosion Hotspot Data Collection and Analysis**

The identification of erosion hotspot areas will follow methods used during the Coosa and Warrior Erosion Hotspot Surveys. Erosion “hotspot” sites will be identified on Martin Lake in the Martin Dam tailrace. Each identified site will be examined to determine the cause of erosion – project operation, land disturbance (development), and/or both causes combined. The Data sheet for this field evaluation is attached to this Study Plan. Tributary headcutting will be investigated on at least two of the larger tributaries of the lake to determine if headcutting is potentially a source of erosion impact. Once each erosion site has been evaluated, a draft report of the field surveys will be prepared and issued to Martin Issue Group (MIG) 2 for their review and comment. Comments received from MIG-2 will be incorporated or addressed in the final report.

### **6.2 Sedimentation Area Data Collection and Analysis**

The identification of sedimentation areas will be performed through examination of the LIDAR and lake photography available for the project. This will be accompanied by field observations to verify sedimentation areas. Each of these areas will be surveyed for nuisance aquatic vegetation and APC records for treatment of these areas will be reviewed. A summary of surveys and recommendations will be prepared and issued to the MIG-2 group for review and comment. Comments received from the MIG-2 will be incorporated or addressed, as applicable, in the final report.

## **7.0 CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE**

The planned study methods discussed above are consistent with the methods followed in the Coosa and Warrior relicensing projects and have been accepted by the federal and state agencies and other interested stakeholders in those projects.

## **8.0 PRODUCTS**

Once this study is complete, a draft report of erosion spots on Lake Martin and Martin Dam tailrace and a draft report of sedimentation areas will be distributed to the MIG 2 for review and comment. Upon review and discussion, Final reports will be filed with the Martin License Application.

**9.0 SCHEDULE**

APC files Final Study Plan	November 2008
Anticipated FERC Approval	April 2009
MIG 2 input on potential erosion and sedimentation spots	July 2009
Field Surveys	September 2009 - January 2010
Draft Reports to MIG-2	April 2010
Final Reports	December 2010

**10.0 LEVEL OF EFFORT AND COST**

APC estimates the cost of consulting on development of the study plan, collecting and reviewing existing information, and reporting is approximately \$150,000.

**11.0 REFERENCES**

Alabama Power Company (APC). 2005. Coosa/Warrior Projects: Erosion Repair and Monitoring Plan. Alabama Power Company, Birmingham, AL.

**MARTIN HYDROPOWER RELICENSING**  
EROSION & BANK STABILITY STUDY

Water Body: \_\_\_\_\_ Date: \_\_\_\_\_

Field Personnel: \_\_\_\_\_ Photo No.: \_\_\_\_\_

1. Erosion Area Location:  
ID: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Time: \_\_\_\_\_

2. Potential Cause:
- Project operations (water level fluctuations)
  - Natural factor independent of operations (e.g., seasonal flooding, riverine processes, etc.)
  - Land use (e.g., farming, ranching, mining, development, etc.)
  - Anthropogenic (Foot/bike paths, vehicle traffic, waves from boats, etc.)
  - Other: \_\_\_\_\_

3. Position in Landscape:
- |   |   |
|---|---|
| <input type="checkbox"/> Levee/Embankment   | <input type="checkbox"/> Main Channel/Main Body of Lake |
| <input type="checkbox"/> Steep bank         | <input type="checkbox"/> Cove                           |
| <input type="checkbox"/> Floodplain Terrace | <input type="checkbox"/> Other: _____                   |

4. Physical Properties:
- |               |   |
|---------------|---|
| Length: _____ | Slope: <input type="checkbox"/> Steep (> 20%) |
| Width: _____  | <input type="checkbox"/> Moderate (8% to 20%) |
| Shape: _____  | <input type="checkbox"/> Gentle (< 8%)        |

5. Erosion Processes:
- Direct scour from river or tributary flows
  - Piping
  - Slumping due to scoured toe of bank
  - Gully or rill erosion from overland flows towards lake
  - Other: \_\_\_\_\_

6. Adjacent Land Use / Vegetable Cover:
- |   |   |
|---|---|
| <input type="checkbox"/> Agricultural         | <input type="checkbox"/> Unvegetated                        |
| <input type="checkbox"/> Undeveloped, Grassy  | <input type="checkbox"/> Early successional vegetation      |
| <input type="checkbox"/> Undeveloped, Wooded  | <input type="checkbox"/> Exposed roots or root undercutting |
| <input type="checkbox"/> Road Crossing/Bridge | <input type="checkbox"/> Leaning or fallen trees            |
| <input type="checkbox"/> Roadway, Gravel      | <input type="checkbox"/> Other: _____                       |
| <input type="checkbox"/> Roadway, Paved       |   |
| <input type="checkbox"/> Park                 |   |
| <input type="checkbox"/> Other: _____         |   |

7. Hydrologic Impact Information (Erosion area affected during or by):
- Extreme Floods
  - Above normal high water level
  - Within range of normal water level fluctuations

8. Description of Exposed Soils:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

9. General Comments:  
\_\_\_\_\_

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(Provide additional comments on back of sheet)

**Study Plan 4 - Water Quantity, Water Use, and Water Withdrawals**

**1.0 GOALS AND OBJECTIVES OF STUDY**

In preliminary consultation with various agencies and stakeholders, the following issues were identified: the amount of water being withdrawn from Lake Martin and the correlation with population; limiting future water withdrawals, especially for municipalities; and accommodating/increasing permitted withdrawals for riparian use.

The goal of this study is to produce a white paper detailing Alabama Power Company's (APC) water withdrawal policy, current known water withdrawals from the Martin Project, ecological and navigational flow requirements in the Tallapoosa River basin, and drought contingency operations at the Martin Project.

**2.0 RELEVANT RESOURCE MANAGEMENT GOALS**

During the summer of 2007, Alabama experienced the worst drought in recorded history. During August 2007, nearly three-fourths of the state was classified as "exceptional," the highest drought level issued by the U.S. Drought Monitor. As a result of this drought, APC reservoirs experienced the lowest inflows in recorded history, which significantly curtailed hydroelectric generation at the Martin Project, except for the flows passed necessary to meet downstream requirements. Understanding how and why APC manages this water resource is imperative because of the impact that water scarcity may have on other resources at the Project.

**3.0 BACKGROUND AND EXISTING INFORMATION**

Over the last decade, there have been a growing number of new demands placed on APC's water resources. These additional demands have been for such uses as residential water supply, industrial growth, agriculture, recreational use, and environmental stewardship. Since large storage reservoirs provide a constant and reliable water supply, many water withdrawers have sought approval from APC to use its hydroelectric reservoirs as a source of water.

APC's existing policy was first developed in 1989 to manage water withdrawals and give consideration to the economic impacts of water withdrawals from its reservoirs. Consistent with Federal Energy Regulatory Commission (FERC) precedent on compensation for water withdrawals from federally-licensed hydroelectric projects, APC developed a water withdrawal policy designed to prevent APC's ratepayers from subsidizing the withdrawals from the reservoirs.

In 1993, the Alabama Legislature enacted the Alabama Water Resources Act, which created the Office of Water Resources (OWR). The OWR's primary purpose was to create a system for tracking the various uses of Alabama's waters. This system was intended to help the state develop plans and strategies for the management of its waters. The Alabama Water Resources Act also required that a declaration of beneficial use be submitted to the OWR by each public water system that regularly serves, individually or in combination with other such systems, more than 10,000 households and by each person who diverts, withdraws, or consumes more than 100,000 gallons of water a day from the waters of the state. Thus, this law requires

that a prospective withdrawer of water from an APC reservoir must file a declaration with the OWR.

In 2001, the OWR requested that APC implement measures to provide incentives to promote conservation of water resources. In response to this request, APC has implemented a process requiring applicants to demonstrate that they have initiated and obtained the necessary approvals from the OWR prior to granting permission to withdraw from APC's reservoirs.

[Water use and drought management have been studied in the Alabama-Coosa-Tallapoosa Comprehensive Study done in the 1990's. Data and models from that study are currently being updated to include the 2000 and 2007 droughts as part of the development of new U.S. Army Corps of Engineering basin manuals.](#)

#### **4.0 PROJECT NEXUS**

Availability of water is of utmost concern to the future operation of the Martin Project. Understanding how much water is available and the various competing interests will provide valuable information for deciding how this scarce resource is managed.

#### **5.0 STUDY AREA AND STUDY SITES**

The study area will encompass Lake Martin, APC-owned lands within the Project Boundary, and specific tributaries as they pertain to water withdrawals.

#### **6.0 PROPOSED METHODOLOGY**

The identification of water withdrawers on APC reservoirs will be accomplished through the use of secondary data sources.

##### **6.1 Data Collection Techniques**

Existing information will be used to facilitate data collection for this study. First, a request for up-to-date "Declaration of Beneficial Use" data from the OWR will be made. APC records on those withdrawals approved by the FERC will also be collected.

Other reports will be consulted during the collection of known withdrawal locations. There were a number of studies related to the Alabama-Coosa-Tallapoosa (ACT) Draft Environmental Impact Statement that will be found and reviewed (See Section 11.0). Information pertinent to APC's water withdrawal policy can also be found in the "E4-Water Quantity, Water Use and Water Withdrawals" report finalized during the Coosa/Warrior relicensing process. Other literature will be gathered and reviewed on an as needed basis.

Once a list of known withdrawal locations is complete and other existing literature has been reviewed, a draft report will be issued to Martin Issue Group (MIG) 2 for their input. Comments received from MIG-2 will be incorporated into a final report.

##### **6.2 Data Analysis**

Other than a literature review, there will be no data analysis associated with this study.

**7.0 CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE**

The planned study methods discussed above are consistent with the methods followed in the Coosa and Warrior relicensing projects and have been accepted by the federal and state agencies and other interested stakeholders in those projects.

**8.0 PRODUCTS**

Once this study is completed, a draft white paper detailing APC water withdrawal policy, current known water withdrawals from the Martin Project, ecological and navigational flow requirements in the Tallapoosa River basin, and drought contingency operations at the Martin Project will be available to the MIG 2 for review and comment. Upon review and discussion, a Final white paper will be filed with the Martin License Application.

**9.0 SCHEDULE**

APC files Final Study Plan	November 2008
Anticipated FERC Approval	April 2009
Consult with and Obtain OWR and other withdrawal data	May 2009
Report to MIG-2 for discussion	September 2009
Draft Report	February 2010
Final Report	December 2010

**10.0 LEVEL OF EFFORT AND COST**

APC estimates the cost of consulting on the study plan, collecting and reviewing existing information, and reporting is approximately \$25,000.

**11.0 REFERENCES**

Alabama Power Company (APC). 2003. Coosa/Warrior Relicensing Project: E4 – Water Quantity, Water Use and Water Withdrawals. Alabama Power Company, Birmingham, AL.

Davis, W. Y., M. T. Beezhold, E. M. Opitz, and B. Dziegielewski. June 1996. ACT-ACF Comprehensive Study Municipal and Industrial Water Use Forecasts. Planning and Management Consultants, Ltd.

Freeman, M. C., J. M. Nestler, and P. N. Johnson. 1997. Riverine Resources: Water Needs and Environmental Effects Analyses in the Alabama-Coosa-Tallapoosa and Apalachicola-Chattahoochee-Flint River Basins. Final Report to the Technical Coordinating Group of the ACT-ACF Comprehensive Study. U.S. Geological Survey, Biological Resources Division, Patuxent Wildlife Research Center, Athens, GA.

Natural Resources Conservation Service (NRCS). March 1996. ACT/ACF River Basins Comprehensive Study: Agricultural Water Demand, Appendix B: Basinwide Management Shared Vision Data. U.S. Department of Agriculture, Athens, GA.

Planning and Management Consultants Limited. 1996. ACT-ACF Comprehensive Study, Municipal and Industrial Water Use Forecasts Final Report. Summary Report, Technical Report; and two data diskettes. Prepared for the U.S. Army Corps of Engineers, Institute for Water Resources.

U.S. Environmental Protection Agency (EPA). May 1996. BASINS CDROM version 1, 1993-1994. Office of Water/Office of Science and Technology. EPA-823-C-96-004.

**Study Plan 1 - Lake Martin Adaptive Management Water Quality**

**1.0 GOALS AND OBJECTIVES OF STUDY**

The Alabama Department of Environmental Management (ADEM), Alabama Department of Conservation and Natural Resources (ADCNR), and the U.S. Fish and Wildlife Service (USFWS) have commented that the Martin Project should be managed as to meet State Water Quality Standards in the lake and in the tailrace. Information should be collected to evaluate any proposed changes to the rule curve and to address 303(d) list concerns. The goal for this study is to prepare an adequate baseline of water quality information for Lake Martin and the project tailrace [for use in developing an application for 401 water quality certification and to use in any analysis of potential changes in project operation that may occur as a result of relicensing.](#) [Additionally, a review of existing nutrient inputs to the lake may also be reviewed in relation to water body classifications of Lake Martin.](#)

**2.0 RELEVANT RESOURCE MANAGEMENT GOALS**

ADEM is vested with the authority to award a 401 water quality certificate to the project, which will be incorporated into the new Federal Energy Regulatory Commission (FERC) operating license for the Martin Project. ADEM's goal is for the Martin Project to meet all state water quality standards. The USFWS and ADCNR have similar goals in that they want to reduce or eliminate any project related water quality impacts to aquatic resources associated with the Martin Project. Both of these goals are relevant in protecting the public resources associated with the Martin Project.

**3.0 BACKGROUND AND EXISTING INFORMATION**

A fairly extensive amount of water quality data exists for the Martin Hydroelectric Project. These data have been collected primarily by the Alabama Power Company (APC) and ADEM over the past years. Much of these data are summarized in the APC Water Quality Report (2005), ADEM 305(b) Report (2004), and the APC Preliminary Information Document (2006).

**4.0 PROJECT NEXUS**

Although water quality is influenced greatly by point and non-point pollution, annual hydrology, and weather patterns, it is also related to the presence of the project and project operation. There are some variables that APC manages which may influence the water quality of the Martin Project. One of those variables is the operation rule curve and potential changes to that curve. [If review of the project operations and downstream flood analyses identifies a potential increase to the winter rule curve or change to the amount of time the summer rule curve is in effect at Lake Martin, the implementation of that change and any potential impacts to water quality of the project will need to be analyzed.](#)

## **5.0 STUDY AREA AND STUDY SITES**

The study area includes all of the waters located within the Martin Project boundary and the tailrace of the project. There are multiple historical sampling sites where water quality data has been collected. If future studies are deemed necessary, study sites will align closely with the historical data sites so that deviations in long-term trends can be discerned. As appropriate, additional sites will be added to be consistent with generally accepted water quality sampling principles and practices.

## **6.0 PROPOSED METHODOLOGY**

If review of the project operations and downstream flood analyses identifies a potential increase to the winter rule curve or change to the amount of time the summer rule curve is in effect at Lake Martin, the implementation of that change and any potential impacts to water quality of the project will need to be analyzed.

### **6.1 Continuation of Baseline Water Quality Sampling**

APC will continue their collection of water quality sampling on the lake and tailrace to be used in development of the 401 water quality certification application.

### **6.2 Analysis of Nutrient Levels in Lake Martin**

Nutrient levels in the lake may need to be addressed in relation to lake classifications. If so, APC will examine nutrient inputs into the lake in relation to observed lake productivity. This will be developed with ADEM and with the MIG 2 as deemed necessary.

## **7.0 CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE**

This study will employ generally accepted practices for evaluating water quality at hydroelectric projects. The study methodology will be consistent with generally accepted water quality sampling principles and practices.

## **8.0 PRODUCTS**

Data and analyses from this study will be included in periodic reports to the agencies and the MIG 2. A final Water Quality Report will be provided as part of the draft license application and will include raw data in tabular form, maps of sample sites, and proposed protection and enhancement measures. Any nutrient analysis deemed necessary will also be developed and reported to the agencies and the MIG 2 and included in the Water Quality Report.

## **9.0 SCHEDULE**

APC files Final Study Plan	November 2008
Anticipated FERC Approval	April 2009
Continue collection of baseline Data)	April 2009 – March 2010
Prepare 401 Water Quality Certification	April 2010
Final Report	October 2010

***10.0 LEVEL OF EFFORT AND COST***

The exact cost of this effort is unknown at this point and will be based on the cost to continue baseline sampling, but it could be approximately \$150,000.

***REFERENCES***

Alabama Department of Environmental Management. 2004. Alabama's Integrated Water Quality and Assessment Report 305(b) Report.

Alabama Power Company. 2006. Water Quality Data for the Martin Hydroelectric Project. Environmental Compliance.

Alabama Power Company. 2006. Preliminary Information Document – Water Quality Section.

CH2MHILL. 2005. Tallapoosa River Basin Management Plan. The Clean Watershed Partnership - March 2005.

**Study Plan - Lake Martin Rule Curve Change Analysis**

**1.0 GOALS AND OBJECTIVES OF STUDY**

Many stakeholder groups have requested that Alabama Power Company (APC) investigate the feasibility of raising the winter rule curve at Martin. APC's goal of this study would be to determine the feasibility of revising the Martin rule curve by modeling changes involving an increase in winter pool elevation up to 5 feet (485 MD). APC would need to determine potential flood impacts associated with higher winter rule curve levels and also address the duration of the summer pool (e.g., extending the summer pool into October or November).

**2.0 RELEVANT RESOURCE MANAGEMENT GOALS**

The rule curve analysis will assist APC in making a proposal for the Pre-Application Document (PAD) and Preliminary Licensing Proposal for FERC's analysis in determining new license conditions for the Martin Project. The goal of the analysis will be to determine an appropriate winter pool level that optimizes the many interests in the operation of the Martin project. APC will work with agencies and other stakeholders to ensure that resource management goals for individual resource areas are taken into account and any applicable environmental, cultural, or recreational relicensing studies take into account examining effects of any proposed rule curve change.

**3.0 BACKGROUND AND EXISTING INFORMATION**

APC has existing tools it is using to develop the appropriate flood control, routing and budget models for Martin to determine the feasibility of raising the winter rule curve. These tools include the Corps of Engineers HEC-RAS and Flood Frequency Analysis (FFA) models, the ACT unimpaired flow data set developed by the Corps and others, APC's Project Routing model, APC's spreadsheet model to determine flow duration and APC's HydroBudget model.

**4.0 PROJECT NEXUS**

The Project is licensed by FERC and all proposed operational changes must be disclosed and affects addressed in the license application to FERC.

**5.0 STUDY AREA AND STUDY SITES**

The study area includes all of the waters located within the Martin Project boundary and the tailrace of the Project. It also includes looking at effects on inflows to APC's downstream Yates and Thurlow Project, [and resulting flows downstream of the Thurlow Project in the Tallapoosa River](#). The upstream Harris Project will not be affected by changes in the Lake Martin rule curve.

**6.0 PROPOSED METHODOLOGY**

- 1) Develop the Flood Frequency Analysis (FFA) to determine the statistical frequency of historical flood event.

- 2) Develop a 100yr design flood based off the FFA considering peak timing and volume of the event.
- 3) Develop the HEC-RAS model for Martin and for downstream.
- 4) Develop the Project Routing model to route the flood thru the dam determining the appropriate outflow and elevation.
- 5) Route the 100 yr design flood for the current flood control and rule curve as well as for any proposed flood control and rule curve to be limited to a reasonable number of runs.
- 6) [Working with stakeholders, develop a “short list” of rule curve elevation changes and extensions of time at summer pool in the shoulder seasons for analysis by the models.](#)
- 7) Evaluate the results and identify any impacts to downstream resources.
- 8) Flow duration analysis for low flow scenarios.
- 9) HydroBudget analysis to determine the cost associated with increased winter pool elevations.
- 10) [Provide results to stakeholders for review.](#)

### **7.0 CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE**

- 1) This same type of analysis was performed in the 1999 Neely Henry study to raise the winter pool levels, and was accepted by the Corps of Engineers and FERC.
- 2) This same type of analysis was performed for the Coosa Relicensing evaluation of raising the winter pool levels at Weiss and Logan Martin, with the methodology being accepted by the Corps of Engineers and FERC.

### **8.0 PRODUCTS**

Data and documentation of the analyses from this study will be included in the PAD and Preliminary Licensing Proposal. Any draft reports generated as part of this study will be distributed to the MIG 3 for review and comment.

### **9.0 SCHEDULE**

Conduct Analysis	September – January 2008
Present Results	February – April 2008
Provide workshop on modeling	April 2008
Incorporate APC’s Proposal to further investigate changes in elevation and timing of rule curve into PAD	June 2008
Submit final study plan for FERC review and approval	November 2008
FERC anticipated approval	April 2009
Conduct evaluations	April 2009-December 2009
Present results of evaluations	February 2010
Discussions with stakeholders	March – August 2010

### **10.0 LEVEL OF EFFORT AND COST**

APC estimates that consultation with the MIG 3 and development of models and analysis on the potential rule curve change at Lake Martin will cost approximately \$250,000.

*11.0 REFERENCES*

**Study Plan - Shoreline Management**

**1.0 GOALS AND OBJECTIVES OF STUDY**

Alabama Power Company (APC) intends to develop and implement a Shoreline Management Plan (SMP) for the Martin Project that will identify land uses and land use categories, determine Lake Martin shoreline management policies, reiterate the permitting program regulations, and establish and promote best management practices around Lake Martin.

**2.0 RELEVANT RESOURCE MANAGEMENT GOALS**

The FERC is responsible for issuing licenses for the construction, operation, and maintenance of non-federal hydropower projects. APC, as Licensee, is responsible for operating and maintaining its FERC-licensed projects in accordance with the license requirements and project purposes (*i.e.*, power generation, public recreation, environmental protection, aesthetic values, etc.). Consistent with these license responsibilities, a Licensee may authorize specific uses and occupancies of the project reservoir shoreline that are not related to hydroelectric power production or other project purposes. These land and water uses are typically referred to as "non-project uses."

"Non-project uses" typically require a permit from APC before development and construction take place. Examples of "non-project uses" include boat docks, seawalls, rip-rap, excavation, etc. Depending on the extent of development and/or construction, there may be the possibility of affecting fish and/or wildlife habitat and water quality. The goals of the SMP for the Martin Project are to:

- 1) Provide for reasonable public access;
- 2) Protect fish and wildlife habitat;
- 3) Protect cultural resources;
- 4) Protect operational needs;
- 5) Facilitate compliance with appropriate license articles;
- 6) Protect water quality;
- 7) Reduce erosion;
- 8) Minimize scenic impacts;
- 9) Involve stakeholders in the development of the SMP.

It is expected that each of these goals will include measurable objectives to determine if the long-term goals are being met.

**3.0 BACKGROUND AND EXISTING INFORMATION**

- APC has developed two SMPs (Coosa and Warrior Rivers) that are pending FERC approval.
- APC also has an existing Recreation and Land Management Plan for the Martin Project.
- APC has new LIDAR data for use to assist with verifying the project boundary.
- Existing land use maps are also available.
- APC has an existing permitting program for all its hydroelectric projects.

- FERC’s “Guidance for Shoreline Management Planning at Hydropower Projects”

#### **4.0 PROJECT NEXUS**

The nexus to the Project is the FERC project boundary. FERC also requires most hydroelectric projects under its jurisdiction to develop and implement a Shoreline Management Plan.

#### **5.0 STUDY AREA AND STUDY SITES**

The study area for this issue would include APC-owned lands within the FERC project boundary for the Martin Project.

#### **6.0 PROPOSED METHODOLOGY**

The proposed method for implementing this study would be as follows:

- 1) Develop land use classifications for Lake Martin.
- 2) Revise land use maps with APC’s proposed changes in land use classifications.
- 3) Meet with stakeholders to discuss the proposed changes and review the steps in developing a SMP.
- 4) Develop BMPs
- 5) Review APC permitting regulations.
- 6) Develop APC policies for Martin (*i.e.*, dredging, etc.)
- 7) Develop a Draft plan for stakeholder review and comment.
- 8) Develop a Final plan for FERC approval.

#### **7.0 CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE**

Development of the SMP will follow general consultation guidelines in the Integrated Licensing Process and past practices associated with developing the SMP for the Coosa and Warrior Projects.

#### **8.0 PRODUCTS**

A draft and final SMP will be developed in consultation with and assistance from the MIG 4. The SMP will include the following:

- Glossary and Commonly Used Acronyms;
- Purpose and Goals of the SMP;
- Shoreline Management Policies;
- Shoreline Management;
  - Shoreline Classification;
  - Shoreline Management Policies;
  - APC’s Permitting Program;
  - Implementation and Review.

A final SMP will be provided to the MIG 4 for review and comment and a Final SMP will be filed as part of the draft license application that will include a PDF copy of the literature used for the report.

**9.0 SCHEDULE**

APC files Final Study Plan	November 2008
Anticipated FERC Approval	April 2009
Consultation with MIG 4	May 2009- July 2010
Draft SMP	September 2010
Final SMP	January 2011

**10.0 LEVEL OF EFFORT AND COST**

APC estimates the cost of consulting with the MIG 4 and developing a Draft and Final SMP, will be approximately \$200,000.

**11.0 REFERENCES**

Federal Energy Regulatory Commission. April 2001. Guidance for Shoreline Management Planning at Hydropower Projects.

**Study Plan 1 - Recreation Plan**

**1.0 GOALS AND OBJECTIVES OF STUDY**

Alabama Power Company (APC) intends to develop and implement a Recreation Plan for the Martin Project that will describe the Project and existing facilities, discuss current and future use estimates and facility inventories, and propose plans for recreational facilities in the future.

**2.0 RELEVANT RESOURCE MANAGEMENT GOALS**

FERC requires that each licensee prepare and implement a recreation plan. APC's Recreation Plan will include an assessment of the physical condition of the recreation facilities/sites, their current and projected future use, the proposed physical improvements for each facility/site, a compilation of ownership, operation and maintenance responsibilities, and a tentative schedule for the implementation of the improvements. Because development of the Recreation Plan involves extensive consultation with the agencies and other stakeholders, APC will review and include in their analysis of recreational use and demand the appropriate state and Federal resource plans.

**3.0 BACKGROUND AND EXISTING INFORMATION**

- Alabama Power Company. 2003. FERC FORM 80.
- E/PRO and Alabama Power Company. Coosa and Warrior River Recreation Plans.
- Kleinschmidt report of recreational use and facility inventory (this data will be ready in December 2007).
- ADECA data (i.e., SCORP).
- Alabama Census data.

**4.0 PROJECT NEXUS**

The nexus to the Project is the FERC project boundary and general project vicinity. While the Recreation Plan will focus on facilities and activities within the project boundary, a general description of the facilities and activities in the Project vicinity will also be included.

**5.0 STUDY AREA AND STUDY SITES**

The study area will include Lake Martin, its tributaries, and lands and water within the FERC project boundary for the Martin Project. As noted above, the study area will be expanded to include a general description of the sites and facilities in the project vicinity.

**6.0 PROPOSED METHODOLOGY**

The proposed method for implementing this study would be as follows:

- 1) Develop a report of existing information [to be included in the Preliminary Application Document \(PAD\)](#).
- 2) Meet with MIG 5 to discuss desired conditions on Lake Martin.
- 3) Determine existing and potential future use (based on data collected in 2007).

- 4) Determine what enhancement measures are needed and when and who is responsible.
- 5) Develop Draft Recreation Plan.
- 6) Develop Final Recreation Plan.

**7.0 CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE**

Development of the Recreation Plan will follow the consultation guidelines in the Integrated Licensing Process and past practices associated with developing the Recreation Plans for the Coosa and Warrior Projects.

**8.0 PRODUCTS**

A draft and final Recreation Plan will be developed in consultation with the MIG 5. The Recreation Plan will include the following:

- Glossary and Commonly Used Acronyms;
- Purpose and Goals of the Recreation Plan;
- Project Description;
- Data Collection Methods;
- Estimate of Use – Existing and Future;
- Concept Plans for Recreation Enhancements;
- Recreation Maps.

A draft Recreation Plan will be distributed to the MIG 5 for review and comment. A final Recreation Plan will be provided as part of the license application that will include a PDF copy of the literature/citations used in the report.

**9.0 SCHEDULE**

APC files Final Study Plan	November 2008
Anticipated FERC Approval	April 2009
Consultation with MIG 5 members	May 2009 – June 2010
Draft Recreation Plan	September 2010
Final Recreation Plan	December 2010

**10.0 LEVEL OF EFFORT AND COST**

APC estimates the cost of conducting a Draft and Final Recreation Plan, including consultation with the MIG 5, will be approximately \$125,000.

**11.0 REFERENCES**

**Study Plan 2 - Socioeconomic Impacts of Rule Curve Change**

**1.0 GOALS AND OBJECTIVES OF STUDY**

The purpose of this study is to estimate the social and economic impact of a rule curve change at the Martin Project.

**2.0 RELEVANT RESOURCE MANAGEMENT GOALS**

Fluctuating water levels at hydropower projects may affect resources associated with a hydroelectric project. Not only could fluctuating water levels affect the environmental resources (*i.e.*, fisheries, erosion, aquatic plants, etc.), they also affect social and economic resources (recreation use, property values, etc.). Many Lake Martin stakeholders have requested an examination of how a rule curve change at Lake Martin could potentially affect recreation visitation, property values, and reservoir related businesses.

**3.0 BACKGROUND AND EXISTING INFORMATION**

Fishery Information Management Systems, Inc. (FIMS) conducted a study in the 1990s that estimated recreation visitation, trip expenses, distribution of recreation use, property values, and reservoir related business activity. Much of the information provided in the report (FIMS, 1997) is relevant to possible rule curve changes associated with the relicensing of Lake Martin. The FIMS report will provide the basis for this study and will be used as a template for providing current effects of a possible rule curve change. Furthermore, APC conducted a recreational use study in 2007 that will provide current recreational use patterns as well as an up-to-date inventory of on-the-water businesses at Lake Martin.

**4.0 PROJECT NEXUS**

The nexus to the Project is the FERC project boundary and general project vicinity. The FIMS study also identified the market area for Lake Martin visitors, generally including the counties surrounding the Project, as well as major metropolitan areas in the vicinity (Birmingham and Montgomery).

**5.0 STUDY AREA AND STUDY SITES**

The study area will include Lake Martin, its tributaries, and lands and water within the FERC project boundary for the Martin Project. As noted above, the study area will be expanded to include a qualitative assessment of market areas associated with recreation visitation at the Project.

**6.0 PROPOSED METHODOLOGY**

The draft methodology for [inclusion in a Request for Proposals \(RFP\) to be sent out to a select group of experts will include:](#)

- 1) Use existing data (2007 study) to estimate current year recreation use.
- 2) Adjust trip expense information from FIMS study using the consumer price index (CPI).
- 3) Adjust trip expenses by market segment from FIMS study using current population data for market segments identified in FIMS study.

- 4) Update property value information from interviews with knowledgeable real estate personnel around Lake Martin.
- 5) Update number of businesses associated with Lake Martin using phone books, advertising in magazines, websites, etc.
- 6) Adjust business related income using CPI.
- 7) Conduct phone interviews with those businesses dependent on a winter draw down (e.g., seawall construction).
- 8) Use existing regression equations reported in FIMS study to estimate economic impact, recreational use, and property values of a three to five foot increase in winter pool as well as changes in number of months at full pool.

[Variations to the methodology may be acceptable depending on the reasons given in response to the RFP.](#)

### **7.0 CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE**

Updating existing studies is common practice in relicensing proceedings. The methodology used in the FIMS study is common to economic and recreation studies at other hydropower project in the Southeast.

### **8.0 PRODUCTS**

A draft report will be distributed to the MIG 5 for review and comment. A final report will be provided as part of the license application that will include a PDF copy of the literature/citations used in the report.

### **9.0 SCHEDULE**

APC files Final Study Plan	November 2008
Anticipated FERC Approval	April 2009
Consult with MIG 5	June 2009
Collect Updated Data from Identified Sources	October 2008 – January 2009
Draft Report	Fall 2009
Final Report	Spring 2010

### **10.0 LEVEL OF EFFORT AND COST**

APC estimates the cost of conducting the study, including consultation with the MIG 5, will be approximately \$125,000.

### **11.0 REFERENCES**

Fishery Information Management Systems. 1997. Potential Impacts of Water Diversion on Recreational Use and Economic Values Associated with Six Alabama Reservoir Systems, Volume 6: The Martin Reservoir System. ADECA-OWR-97-07. Alabama Department of Economic and Community Affairs, Montgomery, AL.