



ALABAMA POWER COMPANY

BIRMINGHAM, ALABAMA

MARTIN HYDROELECTRIC PROJECT

FERC NO. 349

STUDY PLAN 2 – ASSESSMENT OF FISH DENSITY AND SPECIES COMPOSITION ASSOCIATED WITH VARIOUS SHORELINE TYPES

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Prepared by:



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**STUDY PLAN 2 – ASSESSMENT OF FISH DENSITY AND SPECIES
COMPOSITION ASSOCIATED WITH VARIOUS SHORELINE TYPES ¹**

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 seawall or bulkhead, the ADCNR has promoted the use of rip rap by itself or in addition to the seawall 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 seawall 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 seawall. Although a number of studies have examined the influence of human shoreline development on fishes, there is no consensus on the impact of development and even less is known about comparing sites within a single lake.

¹ The majority of changes shown in this study plan are a result of input from Auburn University.

4.0 PROJECT NEXUS

Alabama Power Company (Alabama Power) 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 seawalls. Alabama Power 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.

The specific objectives of the study are to quantify fish abundances and species composition at four different shoreline types and in addition quantify other parameters important to the fish community within each of these four habitats/shoreline types, such as substrate composition, macroinvertebrates, and zooplankton density.

5.0 STUDY AREA AND STUDY SITES

The work will be conducted in the Blue Creek arm of Lake Martin. 4-5 replicate sites with similar characteristics (presence/absence of piers, slope, depth, etc.) will be selected for each of four treatments (undeveloped shoreline, shoreline with bulkhead, shoreline with significant amounts of rip rap, and shoreline with both bulkhead and rip rap).

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.

6.1 Data Collection Techniques

Initially, multiple study areas on Lake Martin will be selected by Alabama Power and ADCNR that include the four habitat types for this study – natural undeveloped, traditional seawall, seawall/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.

Sampling will be conducted while the lake is at or near full pool, generally between April through May, of both 2009 and 2010. Two types of electrofishing will be used, likely conducted once every 2 weeks at night (to ensure adequate catch rates), including traditional boat/boom electrofishing, and prod pole electrofishing (which allows effective sampling of shallow nearshore areas). All fish that are shocked will be identified, counted, and measured (total length in mm); fish that cannot be identified in the field will be returned to the laboratory. Larger sport fishes (e.g., largemouth bass, spotted bass, crappie) will have their diets removed via tubing in the field (Van Den Avyle and Roussel 1980); diets will be returned to the lab for analysis. Once each year a

sample of fishes will be retained from the primary sport fish species (likely largemouth bass, spotted bass, crappie); these fish will be returned to the lab where their otoliths will be removed and the fish aged and growth backcalculated using standard techniques (DeVries and Frie 1996). Zooplankton and benthic macroinvertebrates will be taken at each site to quantify potential food resources for fish populations. Zooplankton will be collected using vertical net hauls and benthic macroinvertebrates with artificial substrates and grab samples. Finally, other water quality parameters will be collected at each site (e.g., water temperature, dissolved oxygen).

Analysis includes comparison of species composition and species richness across shoreline treatments through time for both years. In addition, the biomass of food that key species (likely largemouth bass, spotted bass, crappie) consume will be measured and compared across shoreline treatments, as well as growth of these key species across shoreline treatments. The combined data will allow testing (using a replicated design) to determine if there are differences in the fishes associated with the four selected types of shorelines.

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.

Alabama Power will use this study in the development of Best Management Practices.

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*

Annual reports will be submitted on July 1st 2009 and 2010. Once this study is completed, a draft report of the findings including maps (electronic and hard copy) of the study area 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

This schedule corresponds to Alabama Power’s Process Plan and Schedule filed with FERC on February 16, 2009. Actual consultation meeting dates will be determined with MIG 1 members upon FERC approval of the study plan.

Site Selection	March 2008
Alabama Power files Final Study Plan	March 2009
FERC Approval	April 2009
Field Study (Spring).....	May 2009
.....	May 2010 if needed
MIG 1 Consultation	May 2009 – February 2011
Initial Study Report.....	November 2009
Initial Study Report Meeting	December 2009
Draft Report	November 2010
Final Report	February 2011
FERC Updated Study Report.....	September 2010
Updated Study Report Meeting	September 2010

10.0 LEVEL OF EFFORT AND COST

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

11.0 REFERENCES

DeVries, D. R. and R. V. Frie. 1996. Determination of age and growth. Pages 483-512 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Van Den Avyle, M.J. and J.E. Roussel. 1980. Evaluation of a simple method for removing food items from live black bass. Progressive Fish-Culturist 42: 222-223.