

**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.
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