

# METHODS FOR EVALUATING THE REELFOOT LAKE FISHERY

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Reelfoot Lake, located in the extreme northwest corner of Tennessee, was formed as a result of the New Madrid Earthquake during the latter part of 1811 and the early days of 1812. At that time a series of severe shocks caused a large area of land, close to the Mississippi River to sink. The waters from the Mississippi River rushed into this depression and created Reelfoot Lake.

The Lake now embraces approximately twenty thousand surface acres. Since the adjacent land is flat, slight fluctuations in the water level change this acreage considerably. Few areas in the lake exceed a depth of 20 feet, and the average depth probably does not exceed 5 feet.

Reelfoot Lake offers natural beauty unusual for its latitude. Large cypress trees border the lake and thick, grotesque stumps protrude from the surface during times of low water. Numerous species of mammals, waterfowl and fish inhabit the area.

The Lake is considered extremely productive as its watershed is principally composed of rich alluvial and loess soil. The surrounding land is highly productive as to agricultural crops and the Lake produces large quantities of fish.

To understand the present fisheries problems on Reelfoot Lake, it is necessary to review the history of the lake. Long before restrictions were imposed upon the taking of wildlife resources and before the importance of fisheries management was recognized, the native people of Reelfoot Lake took fish at their pleasure and by any means possible. Thus a commercial fishery began which has continued for over 60 years. In the early days of this fishery all practical methods for capturing and harvesting the valuable species of fish, including the largemouth bass, were used. This commercial fishery developed and was a thriving business prior to the more recent expansion of the sport fishery on Reelfoot Lake. In later years, the sportsmen began to utilize the lake and it soon became a mecca for both fishermen and hunters. As conflict began to arise between sportsmen and commercial fishermen, laws were passed which outlawed certain types of commercial gear and prohibited the sale of black bass. Commercial fishermen, however, were permitted to continue their harvest of the game species such as white and black crappie, yellow bass and various species of sunfish.

As the sporting interest in Reelfoot Lake increased, the commercial fishermen became aware of their position and of the growing pressure to close this commercial fishery for game species. As a result, they obtained special legislation applicable to the lake and commercial fishing for game fish continues to this date.

These conflicts between sport and commercial fishing have created problems new to the Tennessee Game and Fish Commission. As a result, an investigational study of the Reelfoot Lake fishery was established to evaluate it and develop management plans for this valuable resource. This investigation is a full-time Dingell-Johnson project.

In order to manage the Reelfoot Lake Fishery on a sound basis and in the best interest of sport fishing, the relationship between sport and commercial fishing must be known. The following methods for evaluating the Reelfoot Lake Fishery are being used and will be discussed in this paper.

## METHODS

### Boat Census

A boat census was initiated to determine the total sport fishing pressure and compute the total harvest by sport fishermen. Twenty-two boat dock operators cooperated in this census. This plan provided an accurate method of obtaining a record of the actual number of boats used by sport fishermen. This procedure is possible on Reelfoot Lake because the docks are relatively close together and all may be reached by the census taker in less than one day's time.

Each dock operator receives a form at the beginning of each month. This form provides spaces for making daily records of all rented, private and guide boats. Guide boats are not classed as rented boats since most of them are privately owned; accurate information of their usage is also recorded. Private boats include those brought in by trailer and those locally owned. These boat census forms are collected at the end of each month. On these forms each dock operator estimates the boat usage by bass fishermen, bluegill fishermen or crappie fishermen. Past census records have shown that at least 95 percent of the fishermen specifically fish for one of these three species on each trip. Realizing that these boat usage figures are estimates, these percentages on boat usage are then compared with boat usage percentages as determined from creel census records and very close agreements of these percentages have been shown.

There are few areas suitable for bank fishing because of the physical nature of Reelfoot Lake and the surrounding shoreline. Therefore, it is believed that this boat census is completely adequate for determining the total fishing pressure on the lake.

### Creel Census

A creel census program was instituted to determine the sport fishing success. In order to increase the effectiveness of this census, the Lake was divided into three major areas according to the type of fishermen using these areas. The upper end of the lake contains four docks offering some guide service. The east side contains nine boat docks and is principally a largemouth and bluegill area; the largest percent of fishermen who employ guides are found in this area. The lower lake contains nine boat docks and is the principal crappie area. Few fishermen employ guides here.

Two full-time creel census clerks, working eight hours a day, six days a week (Monday omitted), sample the sportsmen's catch from March 1 to December 1 of each year. This eight-hour working period is varied according to the season in order to contact the most fishermen. These clerks are rotated from dock to dock within each month so that adequate data may be obtained from at least one-half of the docks in each of the three major areas. One census form is used for each fishing boat. The following data are recorded: (1) number of fishermen in the party; (2) state

of residence; (3) number of hours fished; (4) method of fishing; (5) success of each individual; (6) time of day fished; (7) number and weight of each species; (8) species fished for; and (9) use of a guide.

Creel data were analyzed according to individual species. Factors contributing to the increase or decrease of one species might have adverse effects on other species. Creel data also were analyzed relative to the boat census to determine the percentage of the total boats checked by the creel census clerks.

#### Total Harvest to Sport Fishermen

In order to determine the total harvest to sport fishermen the following procedure is used: The creels obtained from bass fishermen in each of the three areas are examined separately to determine the average weight per boat of each species harvested by bass fishermen. The averages determined for each respective area are then multiplied by the number of bass boats for this area which are obtained from boat census records. The total harvest to bass fishermen is then determined by simply adding the results from the three areas. The same procedure is used for crappie and bluegill fishermen.

Since the fishing pressure for each of the three species varies seasonally, and the three lake areas are somewhat specialized according to the species sought by the fishermen, it is thought that this procedure will eliminate gross averages and will give an accurate figure as to the total harvest. The influence of guides is also considered in the above method of compilation.

#### Commercial Fish Harvest and Inventory of Commercial Gear

Since game fish are taken on a commercial basis, it is also necessary to collect data concerning this harvest. A full-time census clerk is employed to record the total commercial harvest and to inventory the commercial gear. This clerk works six days each week on a year-round basis. Five commercial docks handle 90 percent of the commercial harvest. These docks are visited by this clerk at least once and sometimes twice each week. The following data are collected: (1) pounds of each species harvested, (2) amount of each type of gear used, (3) length of time gear was fished, (4) names of fishermen and (5) sufficient individual weights of each species to determine average weights. All docks are presently cooperating and the census clerk is able to record the total harvest since these docks keep individual catch records throughout the year. Complete catch records are brought up to date by the clerk each time a dock is sampled. It is extremely important in a census based on dock cooperation that the clerk contacts each dock operator as often as possible to insure accurate records and to gain detailed knowledge of the fishery. In addition to collecting the above catch data, all crappie harvested for sale must be tagged by an officer of the State Game and Fish Commission as prescribed by law. Records from this tagging program are combined with those recorded by the creel census clerk to gain the commercial harvest. It is felt that these data include at least 90 percent of the total commercial harvest.

Commercial fishery data have been analyzed to determine the following information: (1) total harvest and pounds contributed by individual species, (2) percent of the total harvest made up of game fish, (3) value of the harvest to the fishermen as well as the dressed retail value, (4) average weight of each species,

- (5) analysis of the catch of various commercial gear by individual species, and
- (6) seasonal usage of commercial gear.

#### Rate of Exploitation and Movement of the White Crappie

Five thousand white crappie will be tagged and released to determine the rate of exploitation to both sport and commercial fishermen and to determine the movements of these fish. Publicity will be given this program in an effort to recover as many of these tags as possible. If the program proves successful with the white crappie, largemouth and bluegill will be tagged at a later date.

#### Age Class Analysis

The age class composition will be determined for both the sport and commercial harvest of the following species: largemouth bass, bluegill, and white crappie. The creel census clerks will collect five hundred scale samples from each species taken by sport fishermen; the commercial census clerk also will collect five hundred samples from the two game species harvested commercially. These samples will be collected at a specific time each year. The length-frequency method will be used experimentally to determine ages. Results obtained by the length-frequency method will be compared with results obtained by the scale method for the same fish samples. Since previous age and growth studies have indicated that these species grow at a rapid rate in Reelfoot Lake and since it is possible to collect large numbers of these lengths in a relatively short time, the length-frequency method may prove sufficient for future studies.

Data from this phase of the project will be used to determine if any species has been over-harvested and to compare the age class composition of the sport and commercial fisheries harvest.

#### Age and Growth Analysis

The age and rate of growth for the largemouth bass, bluegill and white crappie will be ascertained to detect any major changes which might occur in the future due to changes in regulations or natural conditions.