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JOB PROGRESS REPORT

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FEDERAL AID IN FISHERIES RESTORATION ACT

TEXAS

Federal Aid Project No. F-6-R-16

FISHERIES INVESTIGATIONS - REGION 5-B

Job No. E-7 Experimental Aging Study

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## JOB PROGRESS REPORT

State Texas

Project No. F-6-R-16

Project Title: Fisheries Investigations -  
Region 5-B

Job No. E-7

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Period Covered: January 1, 1968 to December 31, 1968

### I. SUMMARY:

Aging fishes in areas having mild winters and consequent moderately fluctuating water temperatures, is generally considered difficult and inexact. The reasons for these assumptions are based on standard methods of age determination, but there is a lack of documentation based on valid experimentation.

It is the purpose of this job to determine whether or not a method or combination of methods can be used to accurately age fishes from South Texas waters and to document findings resulting from the study.

Literature research and acquisition were employed this segment. A bibliography has been prepared on pertinent publications and this reference will be augmented by further literature research.

Data and samples were obtained at Lake Corpus Christi throughout 1968. Morphological structures (scales, opercular bones, vertebrae and otoliths) and physical data were acquired from 1,092 fishes. Additional length-frequency data were also collected to supplement aging criteria.

Sampling resulted in rather unbalanced yields. Therefore, some degree of selectivity will be practiced during 1969 collecting procedures.

Age determination activities will commence when adequate samples have been processed and needed equipment items acquired.

### II. BACKGROUND:

Age determination is an important factor in fishery management and research. Unfortunately, accurate age estimates are, in many instances, difficult to attain. Due to geographical variation and anatomical difference, no set method for aging all fishes has been established.

Throughout most of the Temperate Zones, year marks on scales and bony parts are useful in aging. Annuli, or year marks, are formed due to a slowing down of temperature-dependent processes during winter months and resumption of rapid metabolism in the spring. Project F-6 encompasses an area in southern Texas lying near the transition area between the Temperate and Tropical Zones. This being the case, year marks are not always plainly evident in scales and bones due to mild winters of short duration, which result in only moderate fluctuations in fish growth rates. From these circumstances has arisen a common belief that fishes in this area cannot be accurately aged, but there seems to be little or no documentation on this presumption. It is the purpose of this job to determine whether or not a method or combination of methods can be used to age fishes from South Texas waters and to document the procedures and findings resulting from the study.

### III. OBJECTIVES:

1. To prepare a bibliography of aging studies with emphasis on fishes from mild climates.
2. To collect aging data of fishes from Lake Corpus Christi.
3. To determine if an efficient method or combination of methods can be established for aging South Texas fishes.

### IV. PROCEDURES:

Literature research and compilation of a bibliography on publications pertaining to age and growth determination have been done throughout the segment. New research developments and avenues of information occur frequently which necessitate further investigation and literature research. Therefore, this objective will be continued.

Monthly field trips to Lake Corpus Christi were made throughout 1968. Gill nets provided the primary means of procuring specimens for analysis. These varied from uniform mesh nets having 1- to 4-inch bar measurements, to standard and experimental gill nets having bar measurements of 1-3 $\frac{1}{2}$ -inch and 1-3-inch graduated mesh, respectively.

Four days per month were normally spent at the lake for netting and specimen dissection. Net sets, usually consisting of three nets each, were made two nights during the stay in most instances. Areas of collection were varied in regard to map location and habitat types.

Netting yields were supplemented by wire fish trap catches during the last quarter of the segment. Two traps, one of V-mouth design and the other a clover-leaf type, were used in conjunction with another job on the project. These traps were utilized to increase the number of sunfishes and Rio Grande perch captured.

Once obtained, fishes were placed on ice to retard spoilage, as considerable time is needed to process an entire catch. As each fish was worked, all data regarding that particular specimen was recorded on a collection envelope. Species, locality, date of capture, length (standard and total), weight, sex and gonadal condition, collector's name and pertinent remarks were noted for each fish worked.

After measuring and weighing, scale samples were removed from those specimens having scales by scraping free with a knife in an area below or above the lateral line (depending on species) directly beneath the dorsal fin. Approximately 25 scales were taken from each individual and placed in the collection envelope.

The specimen was then examined internally to determine sex and gonadal condition. The examiner noted whether the fish was mature or immature and sex distinguishable. Mature specimens were examined to determine stage of development - spent, approaching ripeness, or flowing.

The left opercular bone was removed from all specimens dissected. This was done by cutting with scissors through skin and bone above the opercle, across to the eye orbit, down to the mouth, and back along the branchiostegal rays below the opercle. Although additional bones and parts of bones were also removed in this way, it provided the fastest and surest means of obtaining the opercular bone without damage to it.

Three to five of the anterior trunk vertebrae were then removed by dissection and placed in a container for further processing.

Obtaining at least two otoliths, or inner ear stones, from every fish has been the most time consuming portion of the dissection procedures. Removal of the entire mandible allows unrestricted access to the pockets which house the inner ear. These pockets appear as a small bulbous enlargement on the midline of the neurocranium floor, slightly posterior to the brain area. To reach the otoliths one must cut into the region of the neurocranium the stones occupy. They are less conspicuous in some species than in others and can easily be misplaced or destroyed. There are three otoliths on each side of the head. Once removed these hard white stones were wrapped in Saran Wrap and placed in the collection envelope.

The left pectoral spine was removed from all catfishes for cross-sectioning and examination in the laboratory. To insure getting the basal portion of the spine, the ventral cleithrum portion of the pectoral girdle was severed and the left side of the girdle was removed.

Structures having excess flesh, bone, and connective tissue intact, i.e., opercular bones, pectoral elements, and vertebrae, were boiled and cleaned at the lake. They were then added to the respective collection envelopes, which were filed by species.

Length-frequency methods are included in this study to provide yet another criteria for determining ages. Length data obtained during regular

Figure 1  
Sample of Length-Frequency Data Sheet

LENGTH-FREQUENCY DISTRIBUTION

Location \_\_\_\_\_ Date \_\_\_\_\_ Gear \_\_\_\_\_  
Species \_\_\_\_\_

|     |  |  |  |  |  |  |  |
|-----|--|--|--|--|--|--|--|
| 0   |  |  |  |  |  |  |  |
| 10  |  |  |  |  |  |  |  |
| 20  |  |  |  |  |  |  |  |
| 30  |  |  |  |  |  |  |  |
| 40  |  |  |  |  |  |  |  |
| 50  |  |  |  |  |  |  |  |
| 60  |  |  |  |  |  |  |  |
| 70  |  |  |  |  |  |  |  |
| 80  |  |  |  |  |  |  |  |
| 90  |  |  |  |  |  |  |  |
| 100 |  |  |  |  |  |  |  |
| 110 |  |  |  |  |  |  |  |
| 120 |  |  |  |  |  |  |  |
| 130 |  |  |  |  |  |  |  |
| 140 |  |  |  |  |  |  |  |
| 150 |  |  |  |  |  |  |  |
| 160 |  |  |  |  |  |  |  |
| 170 |  |  |  |  |  |  |  |
| 180 |  |  |  |  |  |  |  |
| 190 |  |  |  |  |  |  |  |
| 200 |  |  |  |  |  |  |  |
| 210 |  |  |  |  |  |  |  |
| 220 |  |  |  |  |  |  |  |
| 230 |  |  |  |  |  |  |  |
| 240 |  |  |  |  |  |  |  |
| 250 |  |  |  |  |  |  |  |
| 260 |  |  |  |  |  |  |  |
| 270 |  |  |  |  |  |  |  |
| 280 |  |  |  |  |  |  |  |
| 290 |  |  |  |  |  |  |  |
| 300 |  |  |  |  |  |  |  |
| 310 |  |  |  |  |  |  |  |
| 320 |  |  |  |  |  |  |  |
| 330 |  |  |  |  |  |  |  |
| 340 |  |  |  |  |  |  |  |
| 350 |  |  |  |  |  |  |  |
| 360 |  |  |  |  |  |  |  |
| 370 |  |  |  |  |  |  |  |
| 380 |  |  |  |  |  |  |  |
| 390 |  |  |  |  |  |  |  |
| 400 |  |  |  |  |  |  |  |
| 410 |  |  |  |  |  |  |  |
| 420 |  |  |  |  |  |  |  |
| 430 |  |  |  |  |  |  |  |
| 440 |  |  |  |  |  |  |  |
| 450 |  |  |  |  |  |  |  |
| 460 |  |  |  |  |  |  |  |
| 470 |  |  |  |  |  |  |  |
| 480 |  |  |  |  |  |  |  |
| 490 |  |  |  |  |  |  |  |
| 500 |  |  |  |  |  |  |  |
| 510 |  |  |  |  |  |  |  |
| 520 |  |  |  |  |  |  |  |

Table 1  
Species and Number of Fishes Dissected, 1968\*

| Species                 | Number | Per Cent of Total |
|-------------------------|--------|-------------------|
| Threadfin shad          | 1      | 0.09              |
| Gizzard shad            | 167    | 15.29             |
| Smallmouth buffalo      | 100    | 9.16              |
| Carp                    | 54     | 4.95              |
| Golden shiner           | 1      | 0.09              |
| Channel catfish         | 88     | 8.06              |
| Blue catfish            | 112    | 10.26             |
| Yellow bullhead catfish | 1      | 0.09              |
| Flathead catfish        | 5      | 0.46              |
| White bass              | 118    | 10.80             |
| Largemouth bass         | 37     | 3.39              |
| Warmouth                | 9      | 0.82              |
| Redear sunfish          | 87     | 7.97              |
| Bluegill                | 54     | 4.95              |
| Redbreast sunfish       | 8      | 0.73              |
| Longear sunfish         | 14     | 1.28              |
| White crappie           | 113    | 10.35             |
| Black crappie           | 12     | 1.10              |
| Freshwater drum         | 104    | 9.52              |
| Rio Grande perch        | 7      | 0.64              |
| Total                   | 1092   | 100.00            |

\* Does not include gar species, as these were omitted from the study.

monthly field trips were supplemented by those recorded during eight additional trips designed solely for gathering length-frequency data. Collecting equipment on these days consisted of a variety of seines ranging from 20 to 375 feet in length with mesh sizes ranging from one-eighth to one-half inch. Fishes were measured to determine standard length; these data were recorded separately for each species on a length-frequency distribution form graduated in 10 millimeter intervals from 0 to 520 mm. (Figure 1). Modes will be determined for suspected year groups for each species and these will be incorporated in the laboratory aging process.

V. FINDINGS:

During the first year of this study a bibliography of approximately 125 related publications has been prepared. Annotations and procurement of literature were initiated on materials readily obtainable.

A total of 1,092 specimens were dissected during the year (Table 1). As can be seen in Table 1, an unbalanced sample has been obtained, with abundant species more prevalent. During the next segment, habitat and collecting gear will be used to selectively round out the sampling yield. Fish trapping will be continued, as selectivity for Rio Grande perch and sunfishes was exhibited during the short period this method was used.

Length-frequency sampling also resulted in a strongly unbalanced yield. Gizzard and threadfin shad greatly outnumbered all other species. Some species were represented by such a meager number that no definite year modes could be distinguished. Selectivity will also be employed to some degree in length-frequency sampling during the coming year in order to achieve some uniformity.

No aging methods were actually tested this segment. Necessary items of equipment such as scale projector, scale press, and sectioning equipment will be acquired during the next segment. Preliminary aging trials will be made to develop optimum techniques before actual age determinations are begun.

VI. RECOMMENDATIONS:

The first segment of this study has been devoted to gathering morphological samples and data. More of this type work will be needed during the 17th and possibly the 18th segments. This job is scheduled to run through 1971, at which time a manuscript will be prepared for publication. Findings could provide extremely useful tools for management and research.

VII. Prepared by: Roger L. McCabe  
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Date April 17, 1969

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