JOB PROGRESS REPORT

As required by

FEDERAL AID IN FISHERIES RESTORATION ACT

TEXAS

Federal Aid Project No. F-6-R-18

FISHERIES INVESTIGATIONS - REGION 5-B

Job No. II Stocking Recommendations

Project Leader: Roger L. McCabe

James U. Cross
Executive Director
Texas Parks and Wildlife Department
Austin, Texas

Fred G. Lowman
Branch Head, Inland Fisheries

Roy T. Huffman
Director, Current Operations

November 11, 1971

## SUMMARY

As in the previous two years, there were no newly constructed or renovated waters which warranted stocking surveys this segment. Surveys were conducted at the Frio, Nueces, and San Antonio Rivers and at Corpus Christi and Alice Lakes.

Species composition, numbers of young game fishes, and/or rough fish to game fish ratios were considered less than desirable in data from the Frio and Nueces Rivers. These factors were found to be satisfactory at Corpus Christi and Alice Lakes, although some game species have indicated declines in numbers.

No fingerling stockings are recommended at this time, but releases of advanced young channel catfish are planned for Alice Lake at a later date. Releases of young flathead catfish are recommended at Alice Lake and Lake Corpus Christi when they become available from Region V hatcheries.

JOB PROGRESS REPORT

State Texas

Project No. F-6-R-18 Project Title: Fisheries Investigations - Region 5-B

Job No. II Job Title: Stocking Recommendations

Period Covered: January 1, 1970 to December 31, 1970

Objectives:

To determine the waters in Region 5-B which would benefit from stocking.

1. To recommend stocking ratios for newly constructed or renovated waters.

2. To determine the species composition and abundance of young fishes in specified waters having established fish populations.

3. To recommend stocking of specified waters having established fish populations which exhibit deficits of young game fishes.

Procedures:

As in the previous two years, there were no newly constructed or renovated public waters which warranted stocking surveys this segment. Surveys were conducted at the Frio, Nueces, and San Antonio Rivers and at Corpus Christi and Alice Lakes. Locations and descriptions of the areas sampled are provided in the job progress report prepared last year (segment 17). Two surveys were conducted at each of the sites. Additional data were obtained from Lake Corpus Christi in conjunction with a fish aging study (Job IV) being conducted there during this period.

Sampling methods consisted of overnight gill netting and marginal seining. Various numbers of nylon straight mesh and experimental gill nets were employed. Straight mesh nets consisted of 1-, 1½-, or 2-inch mesh and were 100 feet long. Experimental gill nets were constructed of graduated mesh sizes from 1-3½ inches square and were 150 feet long. A 20-foot straight seine having one-fourth of an inch mesh and a 32-foot bag seine also having one-fourth of an inch mesh were used to capture young-of-the-year and other small specimens.

Numbers and bulk weights were determined by species and game fish-rough fish percentages were calculated. Individual weight and length data were recorded for all game fishes and for representative rough fish individuals from various size groups.

Procedures: (Con.)

Water analyses were conducted during each survey. Surface samples were tested for temperature, dissolved oxygen, carbon dioxide, alkalinity, turbidity, pH, chlorides, and total hardness.

Since common names are used in this report, a checklist of all species encountered is provided in Table 1. This checklist gives the common and scientific names recognized by the American Fisheries Society as featured in their Special Publication No. 6, A List of Common and Scientific Names of Fishes From the United States and Canada (Third Edition).

Findings:

Frio River
(Live Oak County)

Six experimental gill nets were set in a one-mile stretch of the river near and adjacent to Tips County Park along State Highway 72. Water levels fluctuate greatly at this site and frequent flooding results in redistribution of fish populations. Table 2 shows the combined netting results from the Frio River during June and October. Gars and smallmouth buffalo were the most numerous species captured and comprised the largest percentages by weight. Two unusually large alligator gar, one weighing 100 pounds and the other 60 pounds, greatly influenced the per cent by weight of rough fishes. Game fishes accounted for 33.75 per cent of the 80 individuals caught, while rough fish species comprised 66.25 per cent of the total. The 1970 game fish-rough fish ratio was much more favorable than in 1969, when game fishes comprised only 4.49 per cent of the total yield.

Seining efforts were also more productive than in 1969. Young-of-the-year channel catfish, largemouth bass, white bass, and white crappie were taken in relatively good numbers during both of the 1970 surveys. In addition, red shiners of all age classes were very abundant. Bullhead minnows, threadfin shad, Mexican tetra, and tidewater silverside were other forage species recorded in moderate numbers.

Approximately 2,000 channel catfish fingerlings were released in the Tips Park area of the river in August. Few of these individuals were in evidence during the October survey.

Results of the 1970 water analyses are shown in Table 3. A rather high carbon dioxide reading of 12.0 ppm was recorded during the June 24 survey. Although this reading is far from lethal when accompanied by a dissolved oxygen reading of 6.0 ppm, it is worthy to note the marked increase over the less than 5.0 ppm reading taken during the May 1969 survey. The June pH reading of 7.1 is somewhat lower than the 8.5 recorded in May 1969. The increase in carbon dioxide and decrease in pH during the June analysis could possibly be the result of a high carbonic acid content at the time of sampling. All other readings were considered normal.

Table 1
Species Checklist

| Common Name | Scientific Name |
|---|---|
| Spotted gar | Lepisosteus oculatus |
| Longnose gar | Lepisosteus osseus |
| Alligator gar | Lepisosteus spatula |
| Ladyfish | Elops saurus |
| Gizzard shad | Dorosoma cepedianum |
| Threadfin shad | Dorosoma petenense |
| Mexican tetra | Astyanax mexicanus |
| Carp | Cyprinus carpio |
| Speckled chub | Hybopsis aestivalis |
| Golden shiner | Notemigonus crysoleucas |
| Blackspot shiner | Notropis atrocaudalis |
| Ghost shiner | Notropis buchanani |
| Pugnose minnow | Notropis emiliae |
| Red shiner | Notropis lutrensis |
| Proserpine shiner | Notropis proserpinus |
| Blacktail shiner | Notropis venustus |
| Bullhead minnow | Pimephales vigilax |
| River carpsucker | Carpiodes carpio |
| Smallmouth buffalo | Ictiobus bubalus |
| Blue catfish | Ictalurus furcatus |
| Black bullhead | Ictalurus melas |
| Yellow bullhead | Ictalurus natalis |
| Channel catfish | Ictalurus punctatus |
| Flathead catfish | Pylodictis olivaris |
| Atlantic needlefish | Strongylura marina |
| Sheepshead minnow | Cyprinodon variegatus |
| Mosquitofish | Gambusia affinis |
| Sailfin molly | Poecilia latipinna |
| Tidewater silverside | Menidia beryllina |
| White bass | Morone chrysops |
| Green sunfish | Lepomis cyanellus |
| Warmouth | Lepomis gulosus |
| Bluegill | Lepomis macrochirus |
| Longear sunfish | Lepomis megalotis |
| Redear sunfish | Lepomis microlophus |
| Largemouth bass | Micropterus salmoides |
| White crappie | Pomoxis annularis |
| Black crappie | Pomoxis nigromaculatus |
| Freshwater drum | Aplodinotus grunniens |
| Atlantic croaker | Micropogon undulatus |
| Rio Grande perch | Cichlasoma cyanoguttatum |
| Striped mullet | Mugil cephalus |

Table 2
Frio River Netting Results, June and October 1970

| Species | No. | Per Cent No. | Wt. | Per Cent Wt. | Mean Wt. |
|---|---|---|---|---|---|
| Alligator gar | 2 | 2.50 | 160.0 | 38.58 | 80.0 |
| Spotted gar | 6 | 7.50 | 9.0 | 2.17 | 1.5 |
| Longnose gar | 20 | 25.00 | 71.0 | 17.12 | 3.6 |
| Smallmouth buffalo | 20 | 25.00 | 132.8 | 32.02 | 6.6 |
| Channel catfish* | 2 | 2.50 | 0.3 | 0.07 | 0.2 |
| Flathead catfish* | 4 | 5.00 | 31.6 | 7.62 | 7.9 |
| Redear sunfish* | 3 | 3.75 | 0.6 | 0.15 | 0.2 |
| Bluegill* | 5 | 6.25 | 0.6 | 0.15 | 0.1 |
| White crappie* | 7 | 8.75 | 2.0 | 0.48 | 0.3 |
| Black crappie* | 6 | 7.50 | 1.1 | 0.27 | 0.2 |
| Freshwater drum | 5 | 6.25 | 5.7 | 1.37 | 1.1 |
| Total | 80 | 100.00 | 414.7 | 100.00 | |
| Game fish | 27 | 33.75 | 36.2 | 8.74 | |
| Rough fish | 53 | 66.25 | 378.5 | 91.26 | |

* denotes game fish

Table 3
Frio River Water Analyses Results, 1970

| | | |
|---|---|---|
| Date: | June 24 | October 22 |
| Location: | Tips Park | Tips Park |
| Depth: | Surface | Surface |
| Water temperature: | 80°F | 70°F |
| Dissolved oxygen (ppm): | 6.0 | 8.0 |
| Carbon dioxide (ppm): | 12.0 | 8.0 |
| M. O. alkalinity (ppm): | 260.0 | 235.0 |
| Turbidity (secchi): | 260 mm | 260 mm |
| pH: | 7.1 | 8.3 |
| Chlorides (ppm $Cl^-$): | 145.0 | 175.0 |
| Total hardness (ppm $CaCO_3$): | 270.0 | 280.0 |

Findings: (Con.)

Nueces River
(Nueces County)

Three experimental gill nets each were set in the Bazemore Park and River Park vicinities. These areas are also subjected to frequent flooding and population fluctuation. Rough fish species normally constitute a very large percentage of the total netting yield, as can be seen in Table 4. Saltwater species such as croaker, striped mullet, and blue crab are frequently encountered during surveys in the area between Wesley Seale Dam and Nueces Bay. Rough fish species comprised 92.26 per cent of the total number caught and 95.84 per cent of the total weight as compared to 90.74 per cent by number and 97.85 per cent by weight in the 1969 sample. Longnose gar and gizzard shad jointly accounted for 73.80 per cent of the total number and 55.20 per cent of the total weight. There were no young-of-the-year game fishes taken in either of the two gill netting efforts.

Steep banks and swift, deep water characterize the Nueces River at the two sampling sites. These conditions limit seining activities to only a few areas, which are less than optimum. There were no young-of-the-year game species taken by seining and forage fish (pugnose minnow, red shiner, sheepshead minnow and sailfin molly) numbers were down considerably from the previous year. Freshwater shrimp (Palaemontes sp.) were very noticeable, as they have been for the past several years.

Approximately 4,000 channel catfish fingerlings were released on August 26, 1970, at sampling sites on the Nueces River. As in the Frio River, there were no individuals representative of this release in the sampling yields, which suggests very poor survival or relocation of these fish.

Table 5 shows results of the spring and fall water analyses. These results are very comparable to those of 1969, although the methyl orange alkalinity readings were down an average of 40 ppm. No detrimental readings were revealed.

San Antonio River
(Karnes County)

Two experimental and one 1½-inch straight mesh gill nets were set during each survey in a rather isolated area of the San Antonio River known as Conquista Park, near FM Road 791, Karnes County. The presence of 71 longnose gar (55.04 per cent of the total number of fishes caught) greatly overbalanced the netting yield of the June and October samples. This resulted in a decline in the overall game fish percentages as compared to the previous year's data. The combined 1970 netting results (Table 6) included data from 12 species, while only seven species were netted in 1969. Channel catfish comprised the largest percentage of game fishes captured during 1969 and 1970. The mean weights from this species for those two years were 1.0 and 1.1 pounds, respectively. Although several sexually immature channel catfish were noted, there were no 0-1 age group game fishes taken in gill nets.

Table 4
Nueces River Netting Results, May and October 1970

| Species | No. | Per Cent No. | Wt. | Per Cent Wt. | Mean Wt. |
|---|---|---|---|---|---|
| Alligator gar | 4 | 2.38 | 30.0 | 12.48 | 7.5 |
| Spotted gar | 4 | 2.38 | 4.8 | 2.00 | 1.2 |
| Longnose gar | 37 | 22.02 | 71.2 | 29.62 | 1.9 |
| Threadfin shad | 1 | 0.60 | 0.1 | 0.04 | 0.1 |
| Gizzard shad | 87 | 51.78 | 61.5 | 25.58 | 0.7 |
| Smallmouth buffalo | 11 | 6.54 | 58.7 | 24.42 | 5.3 |
| Channel catfish* | 3 | 1.78 | 2.4 | 1.00 | 0.8 |
| Blue catfish* | 6 | 3.57 | 6.0 | 2.50 | 1.0 |
| Striped mullet | 1 | 0.60 | 0.9 | 0.37 | 0.9 |
| White bass* | 2 | 1.19 | 1.3 | 0.54 | 0.7 |
| Bluegill* | 1 | 0.60 | 0.1 | 0.04 | 0.1 |
| Black crappie * | 1 | 0.60 | 0.2 | 0.08 | 0.2 |
| Freshwater drum | 5 | 2.98 | 2.7 | 1.12 | 0.5 |
| Croaker | 5 | 2.98 | 0.5 | 0.21 | 0.5 |
| Total | 168 | 100.00 | 240.4 | 100.00 | |
| Game fish | 13 | 7.74 | 10.0 | 4.16 | |
| Rough fish | 155 | 92.26 | 230.4 | 95.84 | |

*denotes game fish

Table 5
Nueces River Water Analyses Results, 1970

| | | |
|---|---|---|
| Date: | May 14 | October 26 |
| Location: | Nueces River Park | Bazemore Park |
| Depth: | Surface | Surface |
| Water temperature: | 77°F | 81°F |
| Dissolved oxygen (ppm): | 8.0 | 7.0 |
| Carbon dioxide (ppm): | 5.0 | 5.0 |
| M. O. alkalinity (ppm): | 200.0 | 180.0 |
| Turbidity (secchi): | 325 mm | 250 mm |
| pH: | 8.2 | 8.0 |
| Chlorides (ppm $Cl^-$): | 105.0 | 165.0 |
| Total hardness (ppm $CaCO_3$): | 180.0 | 220.0 |

Table 6
San Antonio River Netting Results,
June and October, 1970

| Species | No. | Per Cent No. | Wt. | Per Cent Wt. | Mean Wt. |
|---|---|---|---|---|---|
| Spotted gar | 7 | 5.43 | 4.9 | 2.71 | 0.7 |
| Longnose gar | 71 | 55.04 | 97.1 | 53.71 | 1.4 |
| Gizzard shad | 13 | 10.08 | 9.2 | 5.09 | 0.7 |
| Smallmouth buffalo | 13 | 10.08 | 34.9 | 19.30 | 2.7 |
| River carpsucker | 1 | 0.77 | 2.5 | 1.38 | 2.5 |
| Channel catfish* | 11 | 8.53 | 11.6 | 6.42 | 1.1 |
| Flathead catfish* | 3 | 2.33 | 17.5 | 9.68 | 5.8 |
| Largemouth bass* | 1 | 0.77 | 0.6 | 0.33 | 0.6 |
| Warmouth* | 1 | 0.77 | 0.1 | 0.05 | 0.1 |
| Longear sunfish* | 2 | 1.55 | 0.2 | 0.11 | 0.1 |
| White crappie* | 5 | 3.88 | 1.9 | 1.05 | 0.4 |
| Rio Grande perch | 1 | 0.77 | 0.3 | 0.17 | 0.3 |
| Total | 129 | 100.00 | 180.8 | 100.00 | |
| Game fish | 23 | 17.83 | 31.9 | 17.64 | |
| Rough fish | 106 | 82.17 | 148.9 | 82.36 | |

*denotes game fish

Table 7
San Antonio River Water Analyses Results, 1970

| | | |
|---|---|---|
| Date: | June 11 | October 19 |
| Location: | Conquista Park | Conquista Park |
| Depth: | Surface | Surface |
| Water temperature: | 78°F | 64°F |
| Dissolved oxygen (ppm): | 6.0 | 6.0 |
| Carbon dioxide (ppm): | 12.0 | - |
| M. O. alkalinity (ppm): | 280.0 | 240.0 |
| Turbidity (secchi): | 368 mm | 363 mm |
| pH: | 7.8 | 7.5 |
| Chlorides (ppm $Cl^-$): | 115.0 | 85.0 |
| Total hardness (ppm $CaCO_3$): | 300.0 | 290.0 |

Findings: (Con.)

Seining attempts were very successful in procuring young-of-the year specimens, particularly channel catfish. Nighttime sampling was very productive in a wide stretch of shallow rapids approximately 50 yards long and in an area directly below these rapids. The fast-moving water necessitated the use of a shorter straight seine rather than the 32-foot bag seine normally used. The June survey yielded 52 young-of-the-year channel catfish, and the October survey captured 20 of these juveniles with relative ease. In addition to the channel catfish, two juvenile largemouth bass comprised the remainder of the game fish seining yield. Numerous gizzard shad (616) of all age groups were also captured. Red shiner, bullhead minnow, and mosquitofish were forage species found in moderate numbers. A species not normally encountered in other areas of Region 5-B, the speckled chub, was also recorded during the October sample.

As shown in Table 7, the San Antonio River water analyses results were much like those from the Frio River. A relatively high carbon dioxide reading (12.0 ppm) was recorded during the June survey and was accompanied by a somewhat lower than normal pH reading (7.8). Normally, the carbon dioxide reading is around 5.0 ppm at midday and pH readings are in the vicinity of 8.5. As in previous analyses, alkalinity readings were higher than other waters tested due to the many large limestone outcroppings found in and along the river basin.

Lake Corpus Christi
(Live Oak, Jim Wells, and San Patricio Counties)

Two experimental and one 1½-inch straight mesh gill nets were set overnight during each of the spring and fall sampling trips to Lake Corpus Christi. Data from these surveys were supplemented with those from four additional netting ventures made in conjunction with an experimental aging study (Job IV) being conducted by F-6-R personnel. Results of the two regular surveys (May and December) are presented in Table 8. Freshwater drum and spotted gar exhibited marked increases in the overall netting yield while smallmouth buffalo and gizzard shad numbers have remained relatively stable. Although blue and channel catfishes have maintained satisfactory numbers, flathead catfish were not represented in spring and fall samples. Similarly, largemouth bass, white crappie, and black crappie have maintained adequate populations, but white bass, while not lacking, were not obtained in quantities experienced previously.

Marginal seining captured limited numbers of 0-1 age group largemouth bass and crappie. Channel and blue catfishes were not taken by this method, but reproduction of these species is believed adequate. Numerous juvenile bluegill and redear sunfishes were recorded. Forage species were strongly evident in all drags, with threadfin shad, Mexican tetra, Rio Grande perch, and pugnose minnows comprising the majority of the catch.

Water chemistry information is provided in Table 9. Other than lower alkalinity and pH readings, conditions were much as they were in 1969. No deleterious readings were disclosed.

Table 8
Lake Corpus Christi Netting Results,
May and December, 1970

| Species | No. | Per Cent No. | Wt. | Per Cent Wt. | Mean Wt. |
|---|---|---|---|---|---|
| Spotted gar | 22 | 10.79 | 41.9 | 15.97 | 1.9 |
| Gizzard shad | 43 | 21.08 | 16.6 | 6.33 | 0.4 |
| Smallmouth buffalo | 18 | 8.83 | 96.3 | 36.71 | 5.4 |
| Carp | 3 | 1.47 | 16.5 | 6.29 | 5.5 |
| Channel catfish* | 16 | 7.84 | 7.6 | 2.90 | 0.5 |
| Blue catfish* | 10 | 4.90 | 13.0 | 4.96 | 1.3 |
| Yellow bullhead | 2 | 0.98 | 1.6 | 0.61 | 0.8 |
| White bass* | 15 | 7.35 | 6.4 | 2.44 | 0.4 |
| Largemouth bass* | 9 | 4.41 | 7.6 | 2.90 | 0.8 |
| Bluegill* | 5 | 2.45 | 0.5 | 0.19 | 0.1 |
| White crappie * | 7 | 3.43 | 4.0 | 1.52 | 0.6 |
| Black crappie* | 16 | 7.84 | 4.9 | 1.87 | 0.3 |
| Freshwater drum | 38 | 18.63 | 45.4 | 17.31 | 1.2 |
| Total | 204 | 100.00 | 262.3 | 100.00 | |
| Game fish | 78 | 38.22 | 44.0 | 16.78 | |
| Rough fish | 126 | 61.78 | 218.3 | 83.22 | |

*denotes game fish

Table 9
Lake Corpus Christi Water Analyses Results, 1970

| | | |
|---|---|---|
| Date: | May 22 | December 10 |
| Location: | Camp Bell | Weber's Camp |
| Depth: | Surface | Surface |
| Water temperature: | 77°F | 65°F |
| Dissolved oxygen (ppm): | 7.0 | 8.0 |
| Carbon dioxide (ppm): | 6.0 | 8.0 |
| M. O. alkalinity (ppm): | 160.0 | 170.0 |
| Turbidity (secchi): | 300 mm | 370 mm |
| pH: | 7.3 | 7.8 |
| Chlorides (ppm $Cl^-$): | 67.5 | 47.5 |
| Total hardness (ppm $CaCO_3$): | 185.0 | 160.0 |

Findings: (Con.)

Alice Lake
(Jim Wells County)

Two experimental and one 1-inch straight mesh gill nets were set overnight in Alice Lake during the May survey, while one experimental and one 1½-inch straight mesh nets were used in the October survey. As in the 1969 netting results, game fish species once again exceeded rough fish species in numbers (182 to 145) and total weight (92.7 pounds to 69.9 pounds) (Table 10). The number and mean weight of gizzard shad each exhibited an increase over the previous year's figures, as this species continues to be the most abundant rough fish in the lake. Black bullheads have remained relatively abundant, but are not considered troublesome at this time. Channel catfish, black crappie, and white crappie have maintained good numbers, although the mean weights of the former two declined slightly. Largemouth bass and sunfish remained about the same as in 1969. Excluding sunfish species, no 0-1 age group game fishes were captured in gill nets.

Seining efforts failed to capture a single young-of-the-year channel catfish and produced only moderate numbers of largemouth bass, white crappie, and black crappie. Deficits in juvenile sunfishes and other forage species, combined with those of game species, indicates heavy mortality due to predation during an extended lake draw-down. Drought conditions and domestic consumption by the city of Alice contributed to the prolonged reduction in water volume.

Water conditions were much the same as previously recorded. Table 11 relates the close similarity between the May and October analyses results.

Recommendations:

Although sampling data indicate deficits of young game fishes in both the Frio and Nueces Rivers, no additional stocking is recommended at this time. Mortality rates of fingerlings stocked at these locations in past years is believed to have been very high and frequent flooding has resulted in relocation of these young individuals to areas far removed from the release sites.

As stated in the 1969 progress report, flathead catfish numbers in Lake Corpus Christi appear to be on the decline and should be bolstered by releases of hatchery-reared advanced fingerlings. Rearing of this species has not been undertaken on a large scale in Region V hatcheries in the past, but plans for installation of incubating apparatus during 1971 will hopefully aid in satisfying the need for these fish.

Alice Lake exhibited a need for supplemental channel catfish releases, due to heavy predation during a lake draw-down. Plans are in progress for stocking advanced young (up to 3/4 pounds) in selected waters in the upcoming

Table 10
Alice Lake Netting Results,
May and October, 1970

| Species | No. | Per Cent No. | Wt. | Per Cent Wt. | Mean Wt. |
|---|---|---|---|---|---|
| Gizzard shad | 109 | 33.33 | 55.3 | 34.01 | 0.5 |
| Golden shiner | 2 | 0.61 | 0.4 | 0.25 | 0.2 |
| Channel catfish* | 55 | 16.82 | 53.5 | 32.90 | 1.0 |
| Black bullhead | 34 | 10.40 | 14.2 | 8.73 | 0.4 |
| Largemouth bass* | 7 | 2.14 | 8.5 | 5.23 | 1.2 |
| Warmouth* | 4 | 1.22 | 0.6 | 0.37 | 0.2 |
| Redear sunfish* | 22 | 6.73 | 4.0 | 2.46 | 0.2 |
| Bluegill* | 16 | 4.90 | 3.1 | 1.91 | 0.2 |
| White crappie* | 44 | 13.45 | 13.6 | 8.36 | 0.3 |
| Black crappie* | 34 | 10.40 | 9.4 | 5.78 | 0.3 |
| Total | 327 | 100.00 | 162.6 | 100.00 | |
| Game fish | 182 | 55.66 | 92.7 | 57.01 | |
| Rough fish | 145 | 44.34 | 69.9 | 42.99 | |

*denotes game fish

Table 11
Alice Lake Water Analyses, 1970

| | | |
|---|---|---|
| Date: | May 12 | October 26 |
| Location: | At dam | At dam |
| Depth: | Surface | Surface |
| Water temperature: | 78°F | 80°F |
| Dissolved oxygen (ppm): | 8.0 | 8.0 |
| Carbon dioxide (ppm): | 4.0 | 4.0 |
| M. O. alkalinity (ppm): | 190.0 | 180.0 |
| Turbidity (secchi): | 284 mm | 321 mm |
| pH: | 8.3 | 8.4 |
| Chlorides (ppm $Cl^-$): | 61.0 | 25.0 |
| Total hardness (ppm $CaCO_3$): | 195.0 | 150.0 |

Recommendations: (Con.)

year and to evaluate the worth of such an endeavor. Alice Lake would lend itself well to such an undertaking which could result in a betterment of the fishery with lower mortality rates, and perhaps a reduction in overall rearing costs to the State. Therefore, stocking of fingerling channel catfish is not recommended at this time, while keeping in mind plans to stock larger individuals at a later date. Releases of young flathead catfish is also recommended when these fish become available from Region V hatcheries. This species provides an excellent sport fish and an equally good predator, which would assist in the control of the increasing numbers of bullheads found in Alice Lake.

Prepared by Roger L. McCabe
Project Leader

Approved by Fred D. Lowman

Date November 11, 1971

Elgin M. C. Dietz
Assistant for Inland Fisheries