FILE

Report of Fisheries Investigation

Fishery Problem Determination

by

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Dingle-Johnson Project F-5-R-8, Job D-1
April 1, 1960 - March 1, 1961

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ABSTRACT

Netting and seining data from 18 lakes and 5 river systems are examined to detect the existing fishery problems. Problematical species are defined and specified as to their numerical relative abundance in the concerned waters. Relative abundance by species for 18 lakes is averaged to provide a mathematical basis for determining regional abundance of problematic fish. A preliminary method of evaluation has been initiated to conform to field techniques, especially in regard to survey work on waters with little or no backlog of fisheries data. In any instance where any problematic species exceeded its regional average, it was regarded as being a fisheries problem. Using this method, 21 instances of overabundunce are indicated in 18 lakes. Four kinds of problems of overabundance are discussed, which are:

(1) Overpopulation and domination of a lake's production by a single non-predaceous type species;

(2) Domination of fish produced through collective overabundance by several non-predaceous forage type species;

(3) Domination of a water's production by stunted game fish or by other predaceous kinds of fish;

(4) Collection overpopulation by stunted game and predaceous fish and by non-predaceous forage type fish.

Specific fishery problems are combined to indicate the relative merit of each lake's production of usable fish for 18 lakes where investigations were done. Collective problems are included under 'rough fish' totals and these averages indicate that 63.21 per cent of all fish production numerically and 62.21 per cent of the total estimated weight of fish produced is undesirable production. Ten of eighteen lakes are found to be less productive in game fish than other fish. These are Imperial Reservoir, Lake Ascarate, Towle Park Lake, Lake Balmorhea, Mountain Creek Reservoir, Lake Kirby, Lake Nasworthy, San Angelo Reservoir, Devil's Lake and Lake Walk. Four of the lakes are eliminated from present consideration because they are already included in future management plans for watersheds. Experimental biological management is attempted in two of the other reservoirs. The remaining four reservoirs, Lake Ascarate, Towle Park Lake, Lake Balmorhea and Mountain Creek Reservoir, should be given priority in future management consideration.

JOB COMPLETION REPORT

State of Texas

Name Fishery Investigations and Surveys of the Waters of Region 3-B

Project No. F-5-R-8

Job No. D-1

Title Fishery Problems Determination

Period Covered April 1, 1960 - March 1, 1961

Objective:

Analysis of data to determine specific fisheries problems in the concerned waters.

Procedure:

The data collected during the work on the various jobs for F-5-R-8 were examined to determine the existence of problems that may require additional investigation or experimental methods of resolution.

Findings:

Discussion and Limitation of Report

In previous completion reports for this job, the existence of fishery problems that were not biological in their derivation was discussed. Some of these were problems of public access to waters. Others involved the utilization of the fish produced, the problem of public education, the unequal distribution of the human population in relation to the public waters of this region, and the many problems arising from meeting expanding responsibility with a fixed financial resource. Although additional information has been obtained on these problems, their basic structure is much the same as was previously outlined. For that reason, no space will be given to considering such problems in this report. All problems included are entirely biological in their source.

Problems of Manipulating Fish Populations or of Controlling Undesired Fish Production

The principal species of fish that are found in western Texas that may be problematical are gizzard shad (Dorosoma cepedianum), river carpsuckers (Carpiodes carpio), carp (Cyprinus carpio), bullhead catfishes (Ictalurus natalis and I. melas), sunfishes (Lepomis sp.), and white crappie (Pomoxis annularis). Other species that less frequently create problems are gray redhorse suckers (Moxostoma congestum), smallmouth buffalo (Ictiobus bubalus), golden shiners (Notemigonus crysoleucas), Rio Grande Chichlids (Cichalasoma cyanoguttatum), longnose gar (Lepisosteus osseus), and mosquitofish (Gambusia affinis). The complete data that established the existence of the region's fishery management problems are presented in detail in the various completion reports for the year's work. The statistics presented here are included because they serve to summarize a particular situation or because they are more pertinent on a regional basis. In nearly all waters where established fish populations were sampled, by netting or seining, a fishery problem was reflected in the results of that work. The most common problem was one of overabundance of undesired fish. The following statistics point to some of the more important problems of overabundance.

Figure 1

Fishery Problems of Overabundance as Reflected by Gill Net Collections Taken at Eighteen Reservoirs During the Past Year

Body of Water	Gizzard Shad % by Number	River Carpsuckers % by No.	River Carpsuckers % by Wt.	Carp % by No.	Sunfish % by No.	Crappie % by No.	Bullheads % by No.
Mountain Creek Res.	-	85.56*	98.87*	-	3.55	7.85	-
Towle Park Lake	-	29.34*	61.53*	.44	-	14.14	34.78*
Old City Lake	-	-	-	36.52*	5.44*	13.48	5.44
Lake Balmorhea	28.78*	49.09*	73.53*	10.91	.30	.61	-
New City Lake	15.02	8.81	31.12*	-	1.03	49.23*	7.26
Lake Kirby	59.50*	2.30	3.69	3.15	-	3.22	-
Lake Seely	3.03	-	-	-	15.15*	54.55*	6.06
Lake Nasworthy	24.45	47.48*	75.58*	8.18	.19	7.23	-
San Angelo Res.	11.11	45.55*	60.04*	8.89	6.66*	12.23	-
Oak Creek Res.	-	13.99	30.85*	6.63	32.05	28.55	2.21
Lake Daniel	34.02*	3.67	15.53	4.16	7.83	23.80*	-
Lake Colorado City	5.76	40.39*	43.56*	-	-	30.77*	-
Champion Creek Res.	-	-	-	10.15*	-	42.03*	-
Lake J.B. Thomas	18.87	6.77	12.58	1.74	2.31	13.98	-
Imperial Res.	33.19*	14.46	9.38	4.68	.43	-	-
Devil's Lake	30.19*	20.59	-	1.21	4.24	13.33	-
Lake Walk	23.12	35.84*	-	-	3.46	1.17	-
Lake Ascarate	78.24*	5.57	54.57	6.91	4.78	-	-
Average abundance of each species taken from lakes where it occurred in sampling	28.15	24.60	43.84	7.78	5.05	18.28	16.30

*Exceeds regional average and points to the existence of a fishery problem of overabundance.

Biologically speaking, a fishery problem of overabundance is much easier to detect than it is to evaluate. In fisheries management, many species that create problems through overabundance are also beneficial when they occur in a proper relationship to other fish produced. The fishery manager needs to know exactly where the concerned species ceases to be an asset and becomes a liability. Where to draw this line is, of course, the question that is unanswered in existing data. It is not the purpose of the writer to attempt to offer such a scientific 'rule of thumb', but some standard is needed for detecting specific problems. The method presented here, of assuming that a particular species should be considered a problem when it exceeds its regional average, is questionable and unproven. It is used only in the absence of a more complete and positive method. In the analysis of all biological data, some assumptions are made. In this instance, it is assumed that the sampling of 18 widely separated lakes with standard gill nets, during the past year, is an adequate basis for obtaining a numerical average for abundance of species and that this figure could be regarded as being a regional average. If that assumption is true, it would appear logical that in most instances where a problematical species exceeds its regional average, it should be regarded as being a fisheries problem of overabundance. The problem, thus implied, is one of degree and is of immediate consequence only if the species of fish causing the problem makes up a very high percentage of the total fish obtained in the

sampling of that particular lake. The datum is also of managerial consequence if the collective quantity of several species makes up a problem of overabundance. The method is erroneous through oversimplification, and other data, such as that obtained on condition and abundance as reflected in weight figures, may be more informative in specific instances. In Region 3-B, problems of overabundance are usually extremely complicated and variable in effect and are imperfectly understood. However, using the method described, 21 instances of overabundance are indicated in 18 lakes. For simplicity, four basic kinds of problems will be considered.

I. Domination of a Waters Production by a Single Forage Species

A. River carpsuckers are a management problem that needs immediate correction in eight of fourteen reservoirs where these fish were found. This species may be regarded as providing a dormant problem wherever they occur. The apparent lack of utility of these fish indicates that between 25 and 40 per cent of the basic means of subsistence produced by the region's waters is diverted from producing game fish into the production of these apparently useless fish.

B. Gizzard shad are a problem of overabundance in instances such as those indicated at Lake Ascarate and Lake Kirby. However, this species is also the most important forage species for the region, and is more often easily reduced through natural controls.

II. Domination of a Lakes Production Through Collective Overabundance of Several Forage Species

Ten of eighteen lakes were dominated by river carpsuckers and gizzard shad. In several localities, in streams, drum and smallmouth buffalo were contributive to the dominance of that particular area by forage species. In Brownwood Country Club Lake and in several other small impoundments, carp, golden shiners and mosquitofish were detrimental, through excess, to game fish production.

III. Domination of a Lakes Production by Unusable Game Fish or by Other Predaceous Species of Fish

A. Sunfish are often 'stunted' and excessive in small impoundments, and may constitute a basic problem in larger reservoirs, such as that indicated at Oak Creek Reservoir. This problem is entirely one of average size since the fish are desirable when large enough to provide food and sport.

B. White crappie are usually problematical and their sizable growth is controlled by conditions that are not clearly defined. Like other centrarchids, these fish tend to be 'stunted' much of the time, and through that condition, are a problem of overabundance.

C. Bullheads are usually a problem of varying degree where they are encountered and occasionally are the primary problem, such as in Champion Creek Reservoir. However, their detrimental effects are less severe than for many other species, and they often are the basis for developing a highly desirable flathead catfish population.

D. Longnose gars may be problematical in lakes such as Imperial Reservoir where they represented 34.04 per cent of the fish captured for the resurvey data. However, this species is usually beneficial in helping to control other species.

IV. Collective Overabundance of a Productive Water by Mixed Species, Both Game and Forage Fish

Occasionally, a reservoir is found to be unproductive in usable fish because there are simply too many fish for the quantity of water impounded. When this happens, virtually all of the centrarchids are stunted, and the forage species dominate the fish populations through larger size, and their ability to compete for plankton type food. This condition can be further complicated by the presence of additional problematic species, such as bullheads or gars. This final category may be considered to be a combination of all previously discussed kinds of fishing problems, and varies in degree and by species with the particular lake where it occurs.

All material presented thus far was intended to point out the kinds of problems and their specific existence. The basis for considering a particular species as a problem has also been described. Hereafter, this report will deal exclusively with management, and statistics are grouped to provide a basis for considering that phase of work. A problematical species is included under the rough fish total if it exceeds the regional average, and is included under the game fish if it was of a useable nature to sportsmen. For this reason, a particular species may be regarded as being an asset in one instance and as a liability in another. The lakes studied and their basic problems are as follows:

Old City Lake at Anson

Rough fish (carp, golden shiners and bullhead) made up 59.37 per cent of the fish captured in netting, and were 55.44 per cent of the total weight. Game fish (channel catfish, bluegills and western longear sunfish) were 40.63 per cent of the fish captured, and were 44.56 per cent of the total weight.

Towle Park Lake

Rough fish (river carpsuckers, carp and black bullheads) were 69.56 per cent by number, and 95.94 per cent by weight. Game fish (largemouth bass, bluegills and white crappie) were 30.44 per cent by number. Sunfish were the primary game species present. That questionable group is considered game species only because this lake occurs within the City of Snyder, and is fished by children. The percentage by weight, 4.06 per cent, may be more indicative.

Lake Balmorhea

Rough fish (gizzard shad, carpsuckers and carp) completely dominate this reservoir (88.87 per cent by number, and 91.56 per cent of the total estimated weight) and the control of these fish should be immediately effected if other circumstances will permit. Consideration might be given to attempting the salvage of game fish (channel catfish, largemouth bass, white bass and white crappie) if that work is justifiable, since these fish are in excellent condition.

Mountain Creek Reservoir

Rough fish (86.32 per cent and 98.25 per cent by weight) completely dominate this Coke County lake. The game species (channel catfish, largemouth bass, bluegill and white crappie) comprised 11.22 per cent of the total number, and 8.44 per cent of the total weight, and are regarded as being undesirable because of poor condition and parasites.

New City Lake at Anson

Rough fish (gizzard shad, carpsuckers and bullheads) made up 31.08 per cent of the number, and 37.04 per cent of the weight of fish netted. Game species (channel catfish, largemouth bass, bluegill and crappie) comprised 69.92 per cent of the number, and 62.96 per cent of the weight of fish captured.

Lake Kirby

Rough fish (gizzard shad, smallmouth buffalo and river carpsuckers) were 65.42 per cent of the total number, and 37.91 per cent of the total weight of all fish. Desirable populations of game fish (channel catfish and white crappie) made up 34.58 per cent of the total number of the sample, and 62.07 per cent of the total weight.

Lake Seely

Rough fish and game species of an unuseable nature combine to constitute a fisheries management problem. Stunted crappie were 54.55 per cent of all fish captured, bullheads were 30.32 per cent, and sunfishes made up 15.15 per cent of the netting sample. Seining revealed that golden shiners were abundant and could be regarded as an additional species that contributes to the problem of overabundance.

Lake Nasworthy

Lake Nasworthy was dominated by longnose gar, gizzard shad, carpsuckers, carp and drum. These species made up 80.78 per cent of the total fish netted, and were 84.34 per cent of the total weight. Game fish (channel catfish, flathead catfish, white bass, largemouth bass, bluegill and white crappie) were in excellent condition and were 19.22 per cent by number, and 15.66 per cent of the total weight.

San Angelo Reservoir

Rough fish (gizzard shad, river carpsuckers, carp and drum) made up 65.56 per cent of all fish captured, and were 81.25 per cent of the sample weight. The game fish (channel catfish, largemouth bass, bluegill and white crappie) were in excellent condition, and were 34.44 per cent of the total number, and 18.75 per cent of the total sample weight.

Oak Creek Reservoir

Although a collective rough fish and forage fish problem of overabundance exists, the condition of largemouth bass and channel catfish is excellent. Rough fish (gizzard shad, river carpsuckers, bullheads, carp, sunfish and crappie) made up 82.62 per cent of the total number of fish captured, and 96.68 per cent of the total weight.

Lake Daniel

Rough fish (gizzard shad, river carpsuckers, carp, drum and golden shiners) constitute a problem for the future since those species made up 42.82 per cent of the total numbers of fish captured, and 56.31 per cent of the weight of the sample. Game species (channel catfish, flathead catfish, largemouth bass and crappie) were 57.18 per cent of the total numbers, and 43.69 per cent of the total estimated weight.

Lake Colorado City

Rough fish (gizzard shad, river carpsuckers and gray redhorse suckers) made up 46.15 per cent by number, and 44.48 per cent of the total weight of all fish captured. Game species were in excellent condition, and were 53.85 per cent of the total number, and 55.51 per cent of the total weight.

Champion Creek Reservoir

Undesirable fish (bullheads and golden shiners) were 44.93 per cent of the total sample, and were 21.62 per cent of the total estimated weight. Bullheads are the primary problem, and were 42.03 per cent of all fish captured. Largemouth bass were especially numerous and in good condition. Channel catfish and other game species made up 55.07 per cent of the total number, and 75.91 per cent of the total weight.

Lake J. B. Thomas

Rough fish (gizzard shad, carpsuckers and carp) were 27.38 per cent of the total number of fish captured, and 24.09 per cent of the estimated total weight. In this particular instance, both crappie and sunfish were included as game species, but were not always utilized as such. Game fish totals were 72.62 per cent numerically, and 75.91 per cent by weight. Channel catfish, flathead catfish, white bass, crappie and sunfish were included in the latter group.

Imperial Reservoir

Rough fish (longnose gar, gizzard shad, river carpsuckers and carp) made up 86.81 per cent of the total number of fish captured, and 82.35 per cent of the total weight. Experimentally introduced redfish and atlantic croakers, and white bass were the most important game fish. These species made up 13.19 per cent of the total number, and 17.65 per cent of the total weight.

Lake Walk

Rough fish (longnose gar, alligator gar, gizzard shad, gray redhorse suckers, drum, golden shiners and river carpsuckers) made up 63.58 per cent of the total fish captured. Channel catfish, white bass, largemouth bass and white crappie made up 36.42 per cent of the fish captured. Game fish were in excellent condition.

Lake Ascarate

Rough fish (gizzard shad, carp, suckers and sunfishes) were 95.50 per cent of all fish captured, and were 93.05 per cent of the total sample weight. Game species (largemouth bass and channel catfish), that made up 4.50 per cent of the total number and 6.95 per cent of the total weight, were in poor condition and heavily parasitized.

Devil's Lake

Rough fish (longnose gar, gizzard shad, gray redhorse suckers and river carpsuckers) made up 63.58 per cent of the fish captured. Game species (channel catfish, white bass, largemouth bass and sunfishes) were in excellent condition.

An average abundance of rough fish in the eighteen reservoirs where investigations were conducted would indicate that an average of 63.21 per cent of all fish occurring in these waters are undesired production. The estimated unuseable fish in terms of weight would average 62.21 per cent. Game species would average about

44.93 per cent by number, and 37.41 per cent by total weight. If these figures are arbitrarily selected as the best means of determining which waters are in most vital need of management, then ten of eighteen lakes need corrective management immediately. These are Imperial Reservoir, Lake Ascarate, Towle Park Lake, Lake Balmorhea, Mountain Creek Reservoir, Lake Kirby, Lake Nasworthy, San Angelo Reservoir, Devil's Lake and Lake Walk. Four of these lakes may be eliminated from further consideration because they are to be included in watershed development plans when new reservoirs are constructed. Lake Nasworthy and San Angelo Reservoir will be included in a management program for the Concho River Watershed when Twin Buttes Reservoir is completed. Devil's Lake and Lake Walk will be incorporated into a management plan for the International Amistad Reservoir program near Del Rio. Lake Kirby and Imperial Reservoir are included in experimental management programs at the present time. The four remaining reservoirs, Lake Ascarate, Towle Park Lake, Lake Balmorhea and Mountain Creek Reservoir, should be given priority in management consideration. This has already been done as completion reports for Project F-14-D-3 will reveal. Only Lake Balmorhea has not been renovated.

Problems of Excessive Aquatic Vegetation

Excessive vegetation is usually a problem of less consequence in this region than is common for the state. This is because of the fluctuations in reservoirs, the intermittent nature of run-off, and the inconsistency of stream flow. The problem becomes more apparent during the 'wet' cycle as a result of an increase of stability of the various waters. The immediate need for control work is apparent only in Old Anson City Lake, Lake Nasworthy, in the permanent flow portions of the upper Concho Rivers, and in similar stream areas of the Pecos and Rio Grande Rivers. Dense mats of bulrushes and cattails are in upper areas of several reservoirs. However, the beneficial aspects of these plants is such that limited control in a few areas should be sufficient for that aspect of the vegetation problem. This emergent vegetation usually offers effective protection for the fisherman against rough weather, and from the harassment of speed boats and water skiers. In extreme cases, bulrushes and cattails have created a problem by blocking the shore areas to fishermen operating from the banks and others from boats. Where this happens, as it has in Lake Nasworthy, passageways should be maintained by chemical control so that boats will have access to these protected fishing waters, and so that shore fishermen can enjoy their sport uninhibited. The accepted means of controlling these plants by using 2-4-D is adequate for accomplishing the basic purpose, but more inexpensive and permanent controls are needed. Submerged vegetation, as a problem, is extensive in only a few clear water associations. The above named stream areas and the clear water lakes, such as Lake Ascarate at El Paso, Texas Brick Company Lake at Brownwood, Mountain Creek Reservoir at Robert Lee, and a few others over the region are the only affected waters. The control of many types and species that constitute submerged vegetation is a badly needed management technique. Unfortunately, no really effective, longlasting and inexpensive methods are available.

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