

JOB COMPLETION REPORT

FILE

As required by

FEDERAL AID IN FISHERIES RESTORATION ACT

TEXAS

Federal Aid Project No. F-2-R-19

FISHERIES INVESTIGATIONS REGION 2-B

Job No. E-9, Evaluation of a Catchable Trout Fishery

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## ABSTRACT

Catchable rainbow trout, Salmo gairdneri, were stocked in the Guadalupe River below Canyon Reservoir during March, 1966 by the Texas Parks and Wildlife Department in cooperation with the Lone Star Brewing Company when it was established that the deep discharge from Canyon Reservoir might provide suitable conditions for a cold water species of fish. Creel census indicated a return of 59 per cent of the 6,000 rainbow trout stocked during the seven month period following the stocking. Studies during the period of experimental stockings indicated that the tailrace waters would provide suitable conditions for trout during most years unless severe drought conditions existed.

Catchable trout were provided by the Lone Star Brewing Company until 1969 at which time trout were provided by the U. S. Bureau of Sports Fisheries and Wildlife. Catchable rainbow trout have been stocked in the fishery every spring and fall at a rate of approximately 9,000 per year. Over 60,000 have been stocked since the program began. The program has proven to be a great boost to the economy of the area and increased the fishermen utilization of the river over 2000 per cent in the first years of the fishery. Creel census has indicated a slight decrease in utilization since the beginning of the program and it appears that publicity of the stockings has a great influence upon fishermen harvest and utilization.

JOB COMPLETION REPORT

State of Texas

Name: Region 2-B Fisheries Studies

Project No. F-2-R-19

Title: Evaluation of a Catchable  
Trout Fishery

Job No. E-9

P. S. OBJECTIVE:

To determine the desirability of maintaining a "put-and-take" fishery of catchable rainbow trout, Salmo gairdneri, in the tailrace waters of the Guadalupe River below Canyon Dam, Comal County, Texas.

SEGMENT OBJECTIVES:

1. To determine the per cent return of stocked fish.
2. To determine the length of time a plant of trout contributes to the fishery.
3. To determine the average catch per man hour of fishing.
4. To determine the average catch per fishing trip.
5. To determine the average length of time per fishing trip.
6. To determine the economic factors involved, namely, the value of the returns.
7. To determine, through water quality studies, the continuance of Canyon Dam tailwaters to provide suitable trout habitat.
8. To determine, through bottom sample studies, the available food supply for a trout population.
9. To determine the utilization of available food by the trout.

PROCEDURES:

1. Studies were conducted on the 11 miles of Canyon tailrace waters concerning gradient, average width, average depth, riffle areas, pool areas, aquatic vegetation, species of rough fish and game fish, etc.
2. Water quality studies were run weekly to determine continuing suitability of the water for trout. Dissolved oxygen, carbon dioxide, alkalinity, and temperature were recorded.
3. Bottom samples were collected at various stations monthly.
4. Creel census was conducted after each stocking and the trout fishery was creeled approximately every two hours from dawn until dusk. A creel card (Figure 1) was filled out on each fisherman and a post

card (Figure 2) given to him to fill out and mail at the end of that creel day. The creel census was conducted for at least five consecutive days and two consecutive weekends following each drop, with creel check coming every other weekend thereafter. An economic evaluation sheet (Figure 3) was filled out on every tenth fisherman.

#### FINDINGS:

##### Physical Characteristics of the Tailwater

The Guadalupe River has its origin on the Edwards Plateau in south central Texas and flows southeastward through steep hills and limestone bluffs that characterize the region. This study was accomplished on a section of the Guadalupe River 12 miles northwest of New Braunfels, Comal County, Texas. The study area begins at the stilling basin of Canyon Reservoir and continues for 10.93 miles downstream. The stream has a gradient of 2.5 feet per mile, an average width of about 100 feet, and average depth of approximately 4 feet. The last figures will vary with the releases from Canyon Reservoir. The stream is clear to slightly murky and is composed of approximately 50 per cent riffles and 50 per cent pools. The stream bed is predominately gravel and limestone. Some silt deposits are found in the upper reach of the study area and in natural pools and in the five pools created by low water dams located at various points on the streams section.

##### Water Quality Characteristics

Eight temperature and water sample stations were established along an 11 mile stretch of the tailwaters. These stations are at intervals of approximately 1.2 miles (Figure 4). Weekly temperature and water samples were taken at each station from 1966 to 1968. Periodic readings were taken before and after these dates. Water quality of primary concern, other than temperature, was dissolved oxygen, alkalinity, carbon dioxide, and pH. Turbidity and hydrogen sulfide concentrations were determined as the need arose.

The average temperature by season and flow is illustrated in Figures 5 through 8. These graphs portray the seasonal fluctuations of temperatures at low flows as well as the almost stable temperature reading at high flows regardless of atmospheric temperature. An over-all average temperature at each station regardless of season or flow is illustrated in Figure 9.

Dissolved oxygen concentrations fluctuated very little throughout the entire stream. A high of 13.0 ppm was recorded at stations 4, 5 and 6 in mid-April, 1967. This occurred when the water release was the highest recorded since impoundment. A low of 7.0 ppm was recorded in mid-May, 1967. This occurred just shortly after the release gates had been closed for repair. Normally, dissolved oxygen concentrations ranged from 8.0 to 10.0 ppm.

Total alkalinity ranged from 171.0 ppm to 222.0 ppm. Rate of water flow or season had little affect.

Carbon dioxide concentrations ranged from 5.0 ppm to 0.00 ppm. The high readings usually occurred at low flows in the long deeper pools. Lower concentrations were recorded as the flow increased.

Average pH of the fishery was 7.6.

FIGURE 3

ECONOMIC INFORMATION FORM FILLED OUT BY CREEL CLERK  
ON EVERY TENTH FISHERMAN

Economic Information

State \_\_\_\_\_ City \_\_\_\_\_

Main reason for trip \_\_\_\_\_

Boat: Type \_\_\_\_\_ Length \_\_\_\_\_ Motor (hp) \_\_\_\_\_

Rental fees: Boat \$ \_\_\_\_\_ Motor \$ \_\_\_\_\_ Launching \$ \_\_\_\_\_

License: Yes \_\_\_\_\_ No \_\_\_\_\_

Gas and oil purchased for boat: Gallons \_\_\_\_\_ Cost \$ \_\_\_\_\_

Meals purchased today: Number \_\_\_\_\_ Cost \$ \_\_\_\_\_

Light refreshments purchased for today: Cost \$ \_\_\_\_\_

Ice for today's trip: Pounds \_\_\_\_\_ Cost \$ \_\_\_\_\_

Lodgingplace last night \_\_\_\_\_ Cost \$ \_\_\_\_\_

Bait and tackle purchased for today's trip:

Natural bait \$ \_\_\_\_\_ Artificial lures \$ \_\_\_\_\_ Hooks \$ \_\_\_\_\_

Sinkers \$ \_\_\_\_\_ Line \$ \_\_\_\_\_ Floats \$ \_\_\_\_\_

Swivels \$ \_\_\_\_\_ Dip net \$ \_\_\_\_\_ Stringer \$ \_\_\_\_\_

Other \$ \_\_\_\_\_

Miles traveled today \_\_\_\_\_

Mileage cost (calculated) \_\_\_\_\_

License cost \$ \_\_\_\_\_

Total trip expenditure \$ \_\_\_\_\_

Remarks: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Excessive turbidity was encountered only when heavy rainfall was experienced on the trout area. The gradient of the stream plus the amount of release eased this situation in a short period of time.

Hydrogen sulfide, in trace amounts, was encountered at Station # 1 during July and August in 1967 and at other periods the following years when the lake was stratified.

The water quality studies indicate that the tailrace area will provide suitable trout habitat during most years. There is the possibility of severe droughts occurring periodically which might affect the lower reaches of the present trout fishery, but these conditions can be overcome by alteration of stocking procedures. Temperature of the water would be affected most by a cutback in the releases from Canyon Dam, while dissolved oxygen seems to vary with different releases.

#### Bottom Fauna Characteristics

The results of the bottom sample collections are given in Table 1 of this report. As can be seen, Ephemeroptera and Diptera are readily available in the stream and these two, along with Tricoptera, are most significant in the demands of rainbow trout. Limited stomach sampling indicated that the preferred diet of the fish seemed to be Tricoptera where available, but the fluctuation of the water level due to releases, many forms of terrestrial insects were also consumed by the trout. From all indications the food supply, in the form of invertebrates, in the Canyon tailrace area is more than adequate for the trout fishery.

#### Aquatic Vegetation

A list of the aquatic vegetation found in the study area can be found in Table 2.

#### Native Fish Population

The bulk of the fish population in this section of the river consists of rough fish; namely, longnose gar, gizzard shad, river carpsucker, and gray redhorse suckers. Game fish in the reach are channel catfish, flathead catfish, largemouth black bass, Guadalupe spotted bass, and numerous species of sunfish. Other species found in the river include stonerollers, mosquitofish, logperch, dusky darter, darters, and various minnows and shiners.

Large populations of rough fish existed in the trout fishery until the past few years. It appears that cold water released from the reservoir has resulted in decreased numbers of all species of native fish. Although various species are still collected, their numbers do not compare with those collected during the first years of the trout fishery.

A list of the native fish found in the trout fishery can be found in Table 2a.

#### Creel Census Results

Extensive creel census was conducted from segments 15 through 18 to determine angler harvest and per cent return of the stocked fish. After this time only spot creel checks were made to determine continued use of the fishery.

Table 1

CANYON TAILWATER BOTTOM SAMPLES

Total number of animals per month

<u>Common Name</u>	<u>Scientific Group</u>	<u>May '67</u>	<u>June '67</u>	<u>July '67</u>	<u>Aug '67</u>	<u>Sept '67</u>	<u>Dec '67</u>	<u>Jan '68</u>	<u>Feb '68</u>	<u>Total</u>
Mayflies	Ephemeroptera	758	142	9	155	249	97	20	96	1526
Segmented roundworms	Oligochaeta	16	17	4	7	17	17	18	23	120
Flies	Diptera	299	92	3	61	201	540	240	62	1498
Caddisflies	Tricoptera	34	17	175	28	41	57	14	33	399
Beetles and larvae	Coleoptera	108	221	9	306	96	32	23	19	19
Flatworms	Turbellaria	95	95	24	31	250	7	5	8	515
Freshwater mussels	Pelecypoda	6	62	119	0	29	35	31	32	314
Snails	Gastropoda	76	62	173	71	83	35	34	47	581
Dragonflies & Damselflies	Odonata	12	7	6	16	11	1	2	9	64
Stoneflies	Plecoptera	51	4	9	6	27	9	0	5	111
Water mites	Hydrachnidae	1	0	0	0	0	0	0	0	1
Unsegmented roundworms	Nematoda	3	0	0	0	4	1	0	0	8
Scuds	Amphipoda	7	0	0	0	0	0	1	3	11
Roundworms	Annelida	1	0	0	0	0	0	0	0	1
Crayfish	Decapoda	5	0	0	0	1	0	0	0	6
Freshwater sponge	Spongillidae	1	0	0	0	0	0	0	0	1
Leaches	Hirudinea	1	2	0	1	2	1	0	1	8
Dobsonflies	Megaloptera	2	0	0	22	2	0	0	0	26
Water striders	Hemiptera	0	5	1	0	19	10	0	0	35
Darters	Etheostoma sp.	0	0	0	0	0	1	0	0	1
Mollusca eggs		0	2	1	0	1	1	0	0	5
Fish eggs		0	0	0	0	0	14	0	1	15

TOTAL DISPLACEMENT IN CUBIC CM.

6.13    4.13    4.29    6.19    5.06    3.69    2.22    2.59    5265

Table 2  
Checklist of Vegetation

<u>Scientific Name</u>	<u>Common Name</u>
Aquatic Plants	
<u>Chara vulgaris</u>	muskgrass
<u>Typha latifolia</u>	cattail
<u>Potamogeton natans</u>	boradleaf pondweed
<u>Potamogeton pectinatus</u>	sago pondweed
<u>Najas guadalupensis</u>	bushy pondweed
<u>Zizaniopsis milacea</u>	southern wild rice
<u>Nuphar sp.</u>	water lily
<u>Nasturtium sp.</u>	watercress
<u>Jussiaea sp.</u>	water primrose
<u>Myriophyllum heterophyllum</u>	parrot feather

Terrestrial Plants

<u>Taxodium distichum</u>	bald cypress
<u>Populus sp.</u>	cottonwood
<u>Carya illinoensis</u>	pecan
<u>Quercus sp.</u>	oak

Table 2a  
Checklist of Fishes

<u>Lepisosteus osseus</u>	longnose gar
<u>Dorosoma cepedianum</u>	gizzard shad
<u>Salmo gairdneri</u>	rainbow trout
<u>Carpionodes carpio</u>	river carpsucker
<u>Moxostoma congestum</u>	grey redhorse sucker
<u>Notropis spp.</u>	shiners
<u>Compostoma anomalum</u>	stoneroller
<u>Ictalurus punctatus</u>	channel catfish
<u>Pylodictus olivaris</u>	flathead catfish
<u>Gambusia affinis</u>	mosquitofish
<u>Micropterus punctulatus</u>	spotted bass
<u>Micropterus treculi</u>	Guadalupe River spotted bass
<u>Micropterus salmoides</u>	largemouth bass
<u>Lepomis spp.</u>	sunfish
<u>Hydropterus spp.</u>	darters
<u>Percina caprodes</u>	logperch
<u>Etheostoma spp.</u>	darters

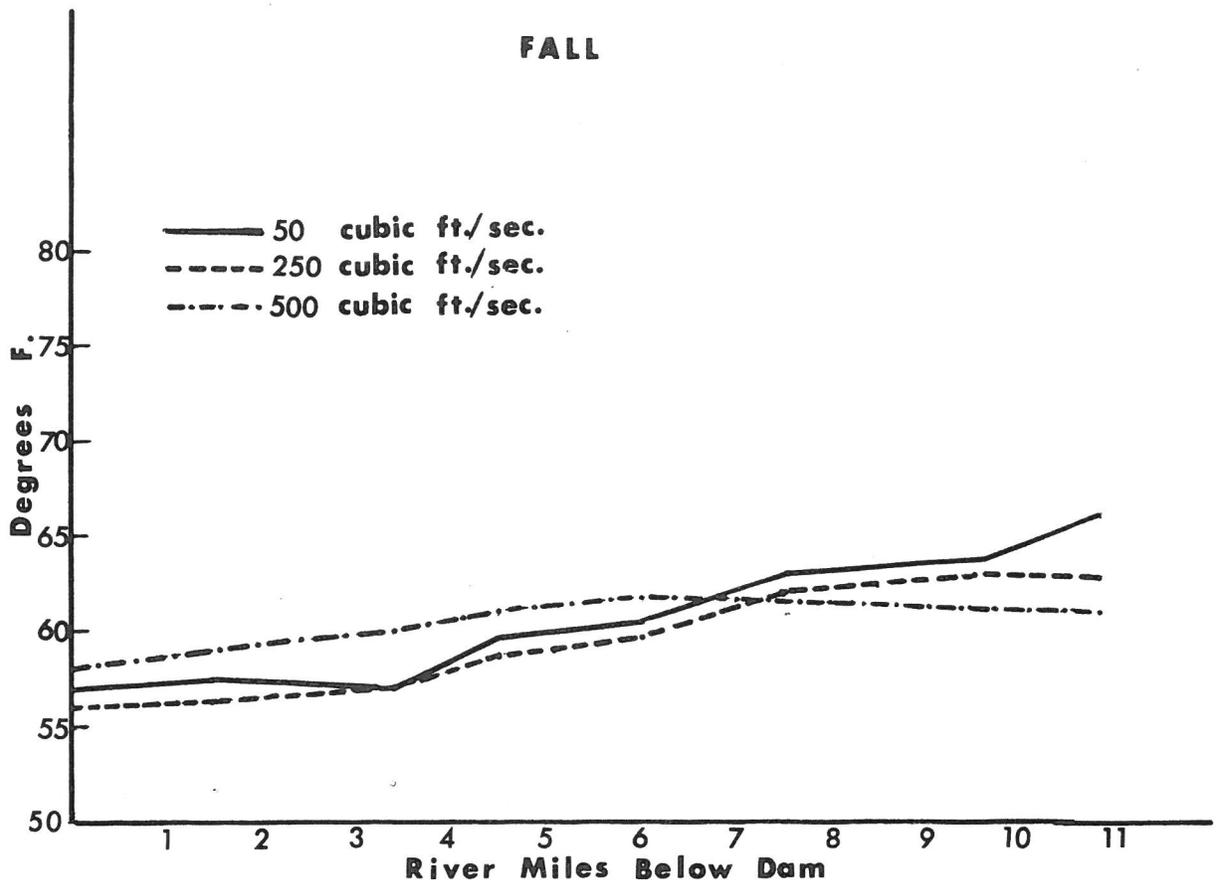


Figure 5 . -Water temperature vs miles of river downstream, at three different flow rates from September through December.

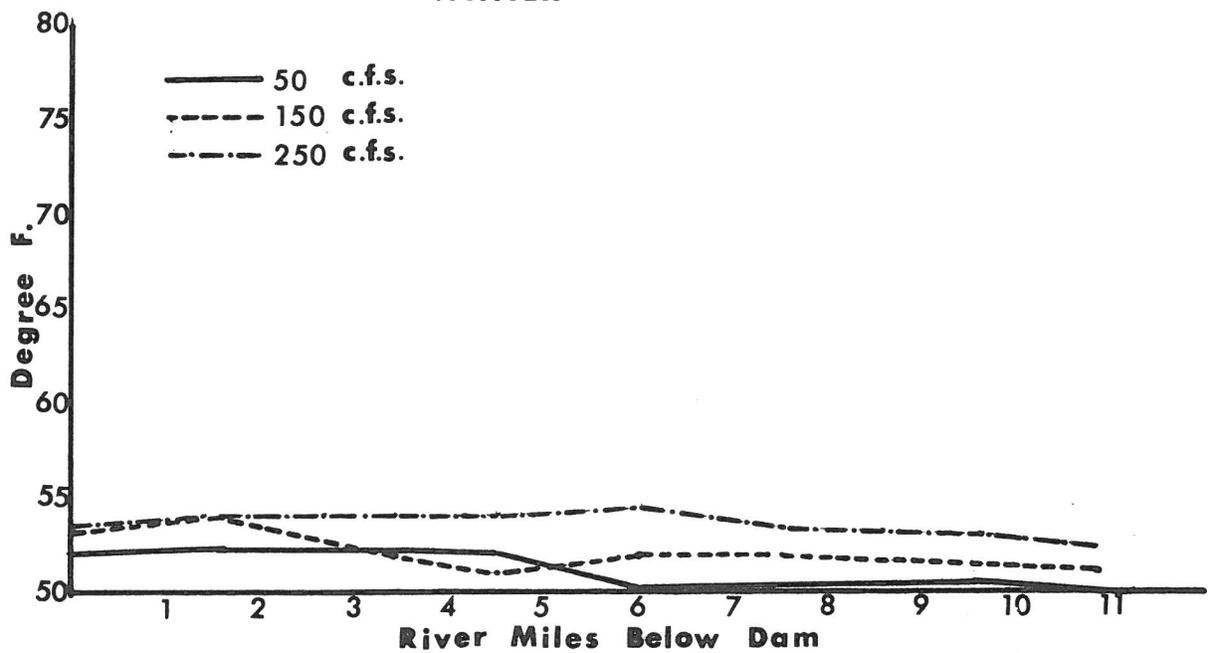


Figure 6 . -Water temperature vs miles of river downstream, at three different flow rates from January through March.

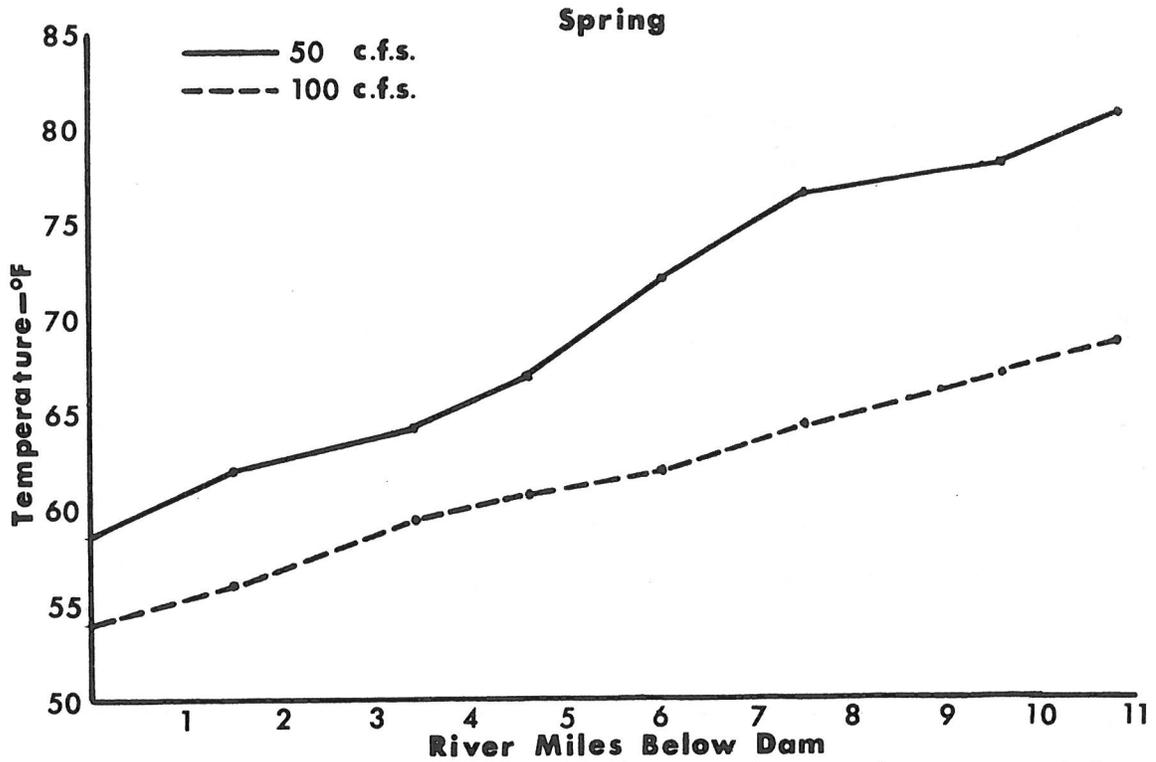


Figure 7. -Water temperature vs miles of river downstream at two flow rates from April through June.

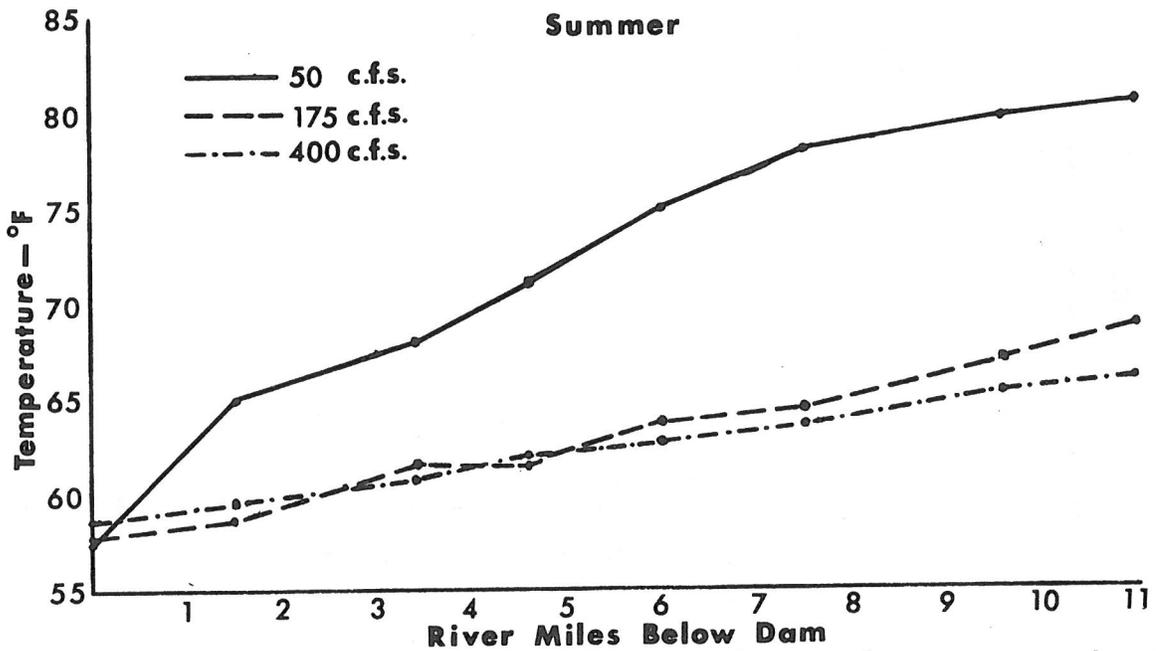


Figure 8. -Water temperature vs miles of river downstream at three flow rates from July through September.

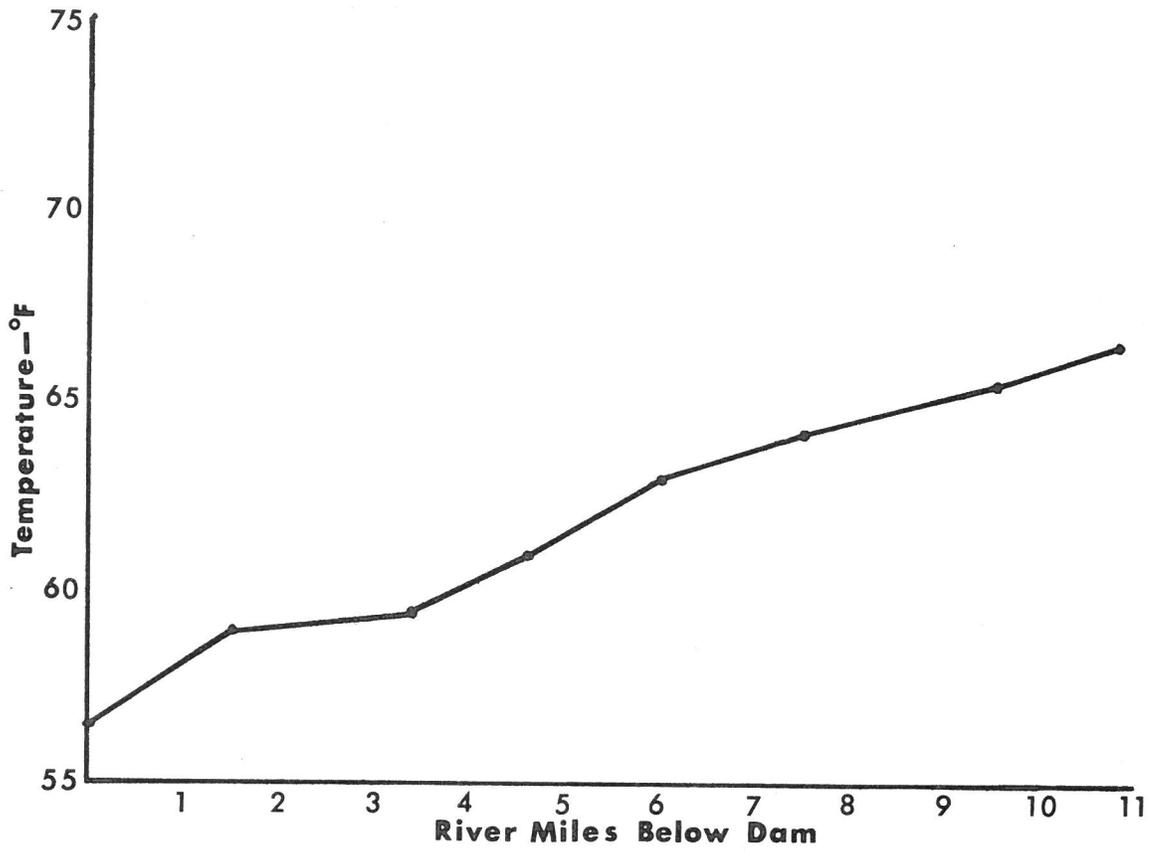


Figure 9. - Average temperature at all discharges vs miles downstream



During the segments mentioned above, the data from the creel census were divided into weekends and week days as it was apparant that there was considerable difference in fishing pressure and fish harvest.

The catch per man hour was tabulated from the fisherman for which the creel card and the returned post card where available. For the anglers who did not return the post card, an hour use count was derived. Since the creel was run every two hours, an extra hour was added to the final time entry made on these cards (i.e. if a John Doe was checked at 2:00 pm and was not fishing at 4:00 pm, it was assumed that he quit at 3:00 pm). The total daily catch figure was compiled as follows:

$$X = (Y) (Z+Q) \quad \text{Where: } X = \text{total daily catch}$$

Y= catch per man hour derived from returned post cards  
Z= hours use derived from fisherman returning post cards  
Q= hours use derived from fisherman not returning post cards

The total harvest estimate was obtained by the regression method described by Leslie and Davis (1939) which is based on the principle that population size can be estimated from the day to day decline in catch per unit of effort as the population size decreases. In the application of this method, daily catch per man hour (Y axis) has been plotted against cumulative catch (X axis) of marked fish. An example of the calculations is included with this report in Table 3, 4 and Graph 1.

### 1967 Creel Results

Using the regression method the projected catch of trout on weekends was calculated to be 2,330. The projected catch of trout on weekdays was calculated to be 1,219. The sum of these two projections, 3,549, reveals an angler harvest of 59 per cent of the 6,000 trout stocked March, 1967. This stocking contributed to the fishery approximately seven months, with some limited catches being recorded as late as September, 1967. The fishing pressure was directly proportional to the increase in days following the stocking. Fly fishermen had fairly uniform success throughout the seven month period.

The average catch per man hour for weekends and weekdays was 0.52 and 1.03 respectively. The catch per man hour also decreased steadily over the 5 months after stocking.

During the 1967 census period the fisherman spent an average of 4.00 hours per fishing trip and harvested 2.12 fish, while the weekday angler averaged 4.22 trout and 4.10 hours per trip. The weekday census covered the 2 weeks immediately following the drop while harvest was at its maximum. These figures were obtained from fishermen who returned the post cards for most reliable information.

During the period from March through September, 1967, approximately 1,600 fishermen were censused with an economic sheet filled out for every tenth fisherman. The fishermen spent an average of \$3.94 per fishing trip. This figure did not include the cost of gasoline, but represents only what the angler spent in the immediate area for bait, tackle, food, ice, etc. The projected figure for the economic impact represents an economic boost to the area of approximately \$10,000 by the trout program.

Table 3

WEEKEND TROUT CREEL CENSUS SUMMARY

Date	Hours Fished	Total Trout	Catch per Angler Hour	Expanded from Use Counts			Total Daily Catch	Mean Daily Cumulative Catch
				Use Hours	Total Angler Hours	Total Daily Catch		
March 11	428	450	1.05	177	605	635	318	
" 12	342	237	0.69	176	518	357	813	
" 18	387	229	0.59	159	546	322	1,153	
" 19	343	195	0.57	148	491	280	1,454	
April 1	242	97	0.40	89	331	132	1,660	
" 2	260	61	0.23	92	352	89	1,770	
" 15	115	46	0.40	30	145	58	1,844	
" 16	108	15	0.14	23	131	18	1,882	
" 29	125	34	0.27	105	230	62	1,922	
" 30	109	17	0.16	75	184	29	1,967	
May 13	139	14	0.10	46	185	18	1,991	
" 14	38	3	0.08	37	75	6	2,003	
<b>TOTALS</b>	<b>2,636</b>			<b>3,793</b>		<b>2,006</b>		

Table 4

Mean Daily Cumulative Catch	X <sup>2</sup>	CATCH PER HOUR = Y	XY
318	101,124	1.05	333.90
813	660,969	0.69	560.97
1,153	1,329,409	0.59	680.27
1,454	2,114,116	0.57	828.78
1,660	2,755,600	0.40	664.00
1,770	3,132,900	0.23	407.10
1,844	3,400,336	0.40	737.60
1,882	3,541,924	0.14	263.48
1,922	3,694,084	0.27	518.94
1,967	3,869,089	0.16	314.72
1,991	3,964,081	0.10	199.10
2,003	4,012,009	0.08	160.24
$\Sigma X = 18,777$	$\Sigma X^2 = 32,575,641$	$\Sigma Y = 4.68$	$\Sigma XY = 5,669.10$

$$(\Sigma X)^2 = (18,777)^2 = 352,575,729 \quad N = 12$$

$$(\Sigma X)(\Sigma Y) = (18,777)(4.68) = 87,876.36$$

$$\text{Slope of line} = b = \frac{\Sigma XY - \frac{(\Sigma X)(\Sigma Y)}{N}}{\Sigma X^2 - \frac{(\Sigma X)^2}{N}}$$

$$= \frac{5,669.10 - \frac{87,876.36}{12}}{32,575,641 - \frac{352,575,729}{12}}$$

$$= \frac{-1,653.93}{3,194,331}$$

$$= -0.000517770$$

In the formula  $Y = a + bX$ , we now have  $b$  and can find  $a$  by substituting the average values for  $X$  and  $Y$  in the formula:

$$\bar{X} = \frac{\Sigma X}{N} = \frac{18,777}{12} = 1,576.65 \quad \bar{Y} = \frac{\Sigma Y}{N} = \frac{4.68}{12} = 0.39$$

$$\begin{aligned} \bar{Y} &= a + b\bar{X} & \text{or } 0.39 &= a + (-0.000517770)(1,576.65) \\ & & \text{or } 0.39 &= a + 0.8163420705 \\ & & \text{or } a &= 1.206342 \end{aligned}$$

The equation of the line is :  $Y = 1.3622167290 + (-0.000517770)(X)$

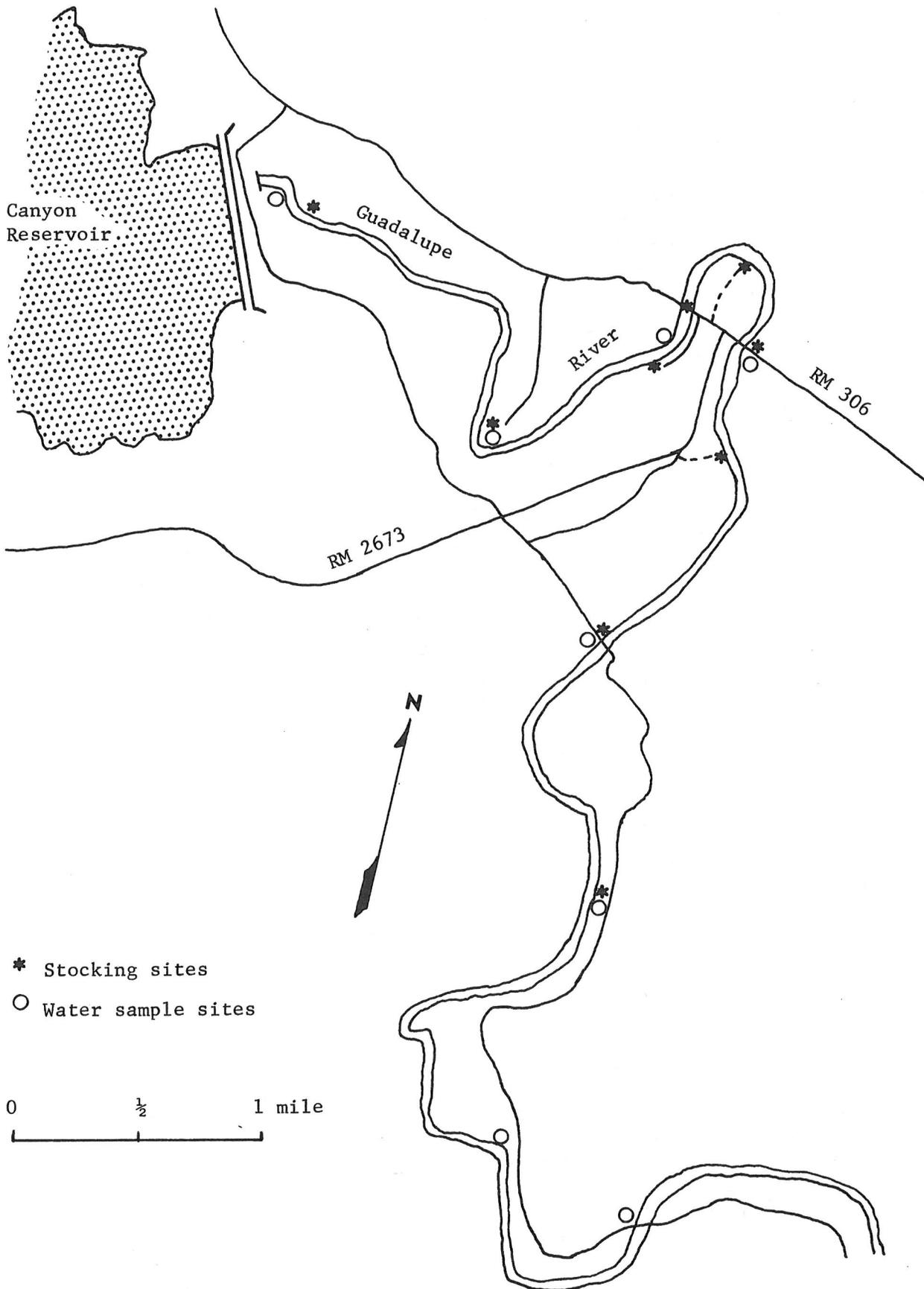
If we set  $Y$  (catch per hour) = 0 (which it theoretically will become only when no more fish are to be caught), then:

$$0 = 1.3622167290 + (-0.000517770)(X) \text{ then,}$$

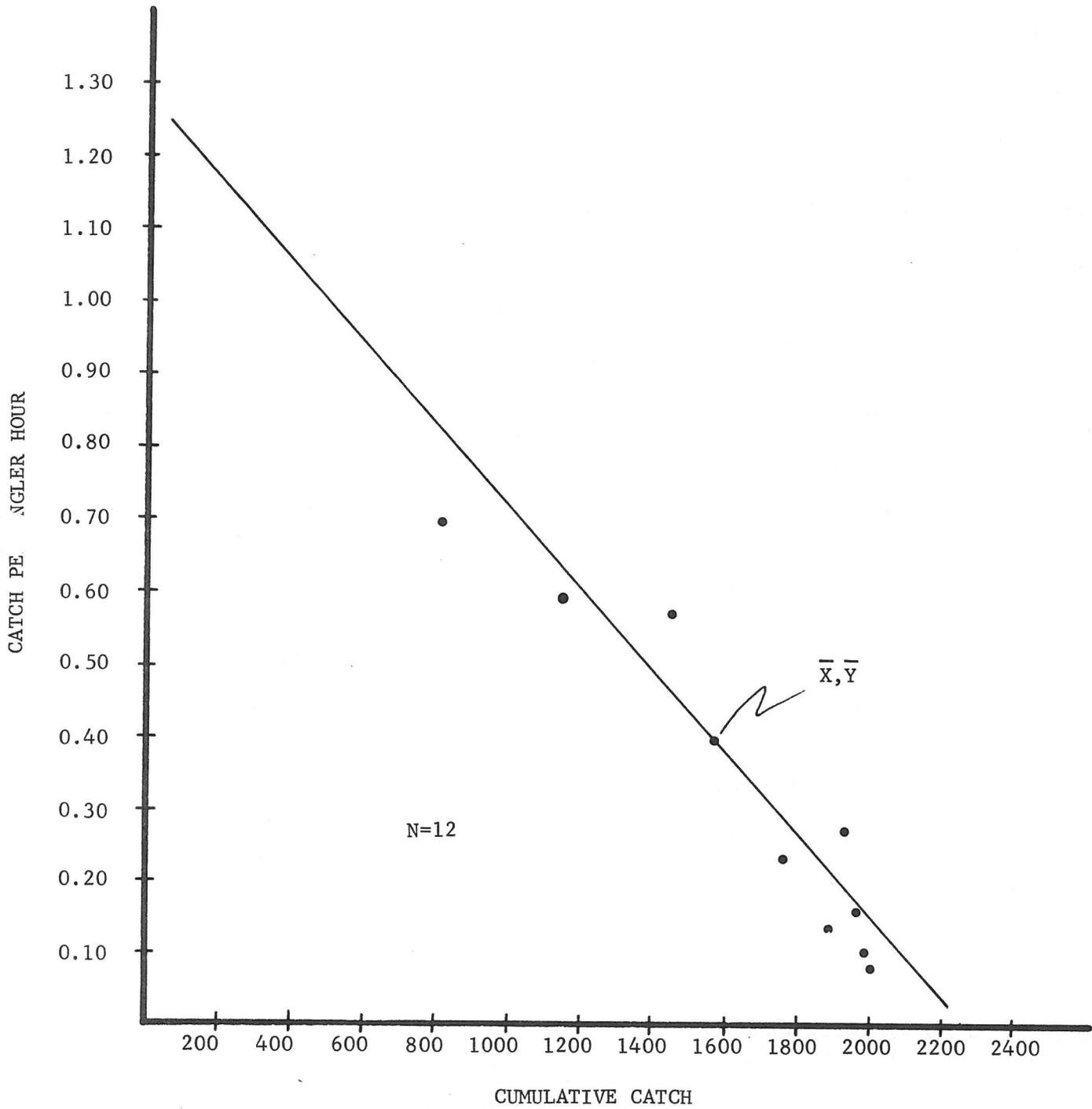
$$X = \frac{1.206342}{0.000517770} = 2,330$$

Or  $X = 2,330$  = estimated aventual return of marked fish on weekends

FIGURE 4. Water quality and trout stocking sites



Graph 1. Regression line of catch per hour plotted against cumulative catch.



With an average of 4 hours per fishing trip, the fishery provided 10,000 man hours of fishing during the 7 month period. This represents an increase of over 2000 per cent utilization of the area fishery over the use before the trout stocking.

A stocking of 3,000 additional rainbow trout in November of 1967 provided good fishing, but inclement weather inhibited creel census and the census was discontinued since it would not produce valid results.

#### 1968 Creel Results

Approximately 7,000 rainbow trout were stocked during the spring of 1968. The same calculations were made as in the previous creel census and the projected catch of trout on weekends was calculated to be 1,406 fish. The projected catch of trout on weekdays was calculated to be 1,017 fish. The sum of these projections, 2,423 fish, reveals an angler harvest of 35 per cent of the 7,000 stocked fish. These trout contributed to the fishery for approximately 5 months.

The average catch per man hour for the census period for weekends and weekdays was 0.47 and 0.56 respectively. As in the previous year the catch per man hour decreased steadily over the next few months.

During the census period, weekend fishermen spent an average of 3.84 hours per trip and harvested 1.79 fish, while the weekday angler averaged 2.16 fish and 3.70 hours per trip.

Economic data collected during this census period indicated the trout contributed an \$8,720 increase to economics of the area over the 4 month period.

The creel data indicated approximately 6,000 man hours of fishing during a period from May 30 to July 28, 1968.

On May 26, 1968, a 17 inch, 3 pound rainbow with an 11.5 inch girth was caught by Mr. A. M. Benke of San Antonio, Texas. On June 22, 1968, Mr. Ron Sharp of San Antonio, Texas caught a 21.5 inch, 4.8 pound rainbow which had a 13 inch girth. These fish were determined to be from the 1966 stockings since neither of the fish were fin-clipped in any manner. All of the fish except the 1966 stockings had been fin-clipped.

Approximately 3,000 trout from the U. S. Fish and Wildlife Services were stocked in the river on October 21, 1968. Limited creel census operations indicated an approximate harvest of 30 per cent of the fish over the winter months. Inclement weather inhibited the harvest of this particular stocking, but these trout did provide good fishing until early spring.

#### 1969 Creel Results

A total of 9,000 rainbow trout were stocked in the fishery in March of 1970. Distress was observed in many fish and an estimate of approximately 10 per cent (1,000) of the trout were lost. The cause was believed to be due to a large number of fish shipped in the truck for such a long distance.

The projected catch on weekends was calculated to be 2,471 fish and the catch of the weekday fishermen was estimated to be 1,000 fish based on the data for the past two years. The sum of these two projections indicates a harvest of 3,471 fish,

or approximately 43.4 per cent of the fish stocked. Creel census was conducted for only 2 months after stocking, but spot creel checks indicated catches as late as October.

During the census period in 1970 the weekend fishermen spent an average of 3 hours per trip and harvested 2.6 fish per trip.

#### 1970 Creel Results

By use of the same calculations as in the previous year, the weekend harvest was determined to be 1,045 fish. Weekday catches were again based on the figures for 1967 and 1968 since detailed weekday creel was impossible due to other project activities. The calculations reveal a harvest of 34 per cent of the 6,000 trout stocked.

An additional 3,000 trout were stocked during November, 1970. Limited creel census indicated a reduced fishermen utilization. Inclement weather, prevalent during this period, was responsible for the reduced fishermen utilization.

#### 1971 Creel Results

Detailed creel census on the trout fishery was not conducted during this year. The fishery was considered established and only spot checks were made to determine continued fishermen utilization. A total of 9,000 rainbow trout were stocked during this year.

#### DISCUSSION

During the course of this study, it has been determined that the tailrace waters of Canyon Reservoir will provide suitable habitat for rainbow trout as a put-and-take, catchable fishery. The water quality indicates that this will be true for most years if the area does not suffer extreme drought conditions. The bottom sample collections from 1967-68 reveal that the native species of aquatic invertebrates found in the Guadalupe River are in enough numbers and diversity to support the rainbow trout fishery, barring any drastic change.

Water temperatures during the study period remained at acceptable levels for at least 6 miles downstream at all times of the year. Low releases during the summer months raised the temperatures in the 80's in the lower reaches of the fishery and for this reason the stockings in the past few years were made in the first 5-6 miles of the fishery below the dam. Water quality and flow records indicate that the fishery is dependent upon the flow from the reservoir to maintain low water temperatures in the first few miles of river below the dam. As Figures 5,6,7,8, and 9 indicate, the critical time for the fishery each year will be at times of low flow in the warm summer months. This flow is regulated by the U. S. Corps of Engineers and Guadalupe River Authority and varies from time to time and season to season. Therefore, the trout must survive high and low releases at various times of the year for the fishery to produce larger fish as the years progress.

There are indications that the fishery has produced few fish of sufficient size to suggest carry-over from the previous year's stocking during the past few years. During the first years of the program, however, the record fish was caught and determined to have been in the fishery for two years. These larger fish were stocked from fish received from a private hatchery in Rockbridge, Missouri. Although low flows were experienced during the summer of these years, many carry-over fish have been reported. Collections with electrofishing gear have also failed to recover any larger trout. It is possible that the trout received from

the private hatchery were more adapted to survive in the river than those trout received from the federal sources.

Since the beginning of the program the fishermen utilization of the fishery has declined to some degree. Creel census results also indicate a change in harvest in the past few years. This can be attributed to a variety of factors.

The accuracy of the creel census is probably the most important factor.

This accuracy depends on the personnel conducting the creel and the cooperation of the fishermen in returning requested information on a post card. The confidence placed in the results is proportional to the return of the information. Although it is felt that the census results did give reliable information it is probably that the above variables did provide for some inconsistency in the calculated results.

High releases from the reservoir also have an effect upon fishermen harvest. A high release inhibits wade fishing in many of the prime fishing areas and also provides a larger ranging area for the fish. Inclement weather from year to year also played a part in decreased harvest of the trout in some instances.

Probably the most important factor in fishermen utilization in the few weeks following stocking is the publicity received prior to stocking. In the first years of the program the stocking received intensive publicity that resulted in heavy fishing pressure the first weeks after stocking with a large per cent of the trout caught during this period. In the past years of decreased publicity, the fishing pressure was relatively light as compared to the first two years of the program. It is believed that intensive publicity alone can produce high fishermen harvest percentages in a catchable fishery.

Although the popularity of the fishery has declined slightly it is felt that ample utilization still exists to warrant continuing the catchable program. Efforts have been made in current stocking to publicize the date well in advance in the news media.

A major problem in the fishery is the public access. Since the beginning of the trout program public access has decreased. Two fee fishing areas have been closed to the general public as a result of subdivision. The only public access points on the fishery are 1 mile of federal land immediately below the dam and three highway bridge crossings. There is additional land available to property owners in subdivisions, however. Float fishing is also becoming more popular since the public access is limited.

Creel census has indicated that a large per cent of the trout are caught in the few weeks immediately after stocking and very few fish are caught from May to November since no stocking is carried out during this time. This means that the catchable fishery is providing about six months of good fishing out of each year. This was discussed with members of Trout Unlimited, an organization formed in San Antonio as a result of the trout program, and they have plans to purchase brown trout fingerling in 1972 and stock in the existing catchable rainbow trout fishery. Project plans are to monitor this stocking to measure its affect on the fishery and the area. If this attempt at establishing a fingerling program is successful it could provide good trout fishing year round. If this proves to be correct it could be applied to the rainbow program as well.

It is recommended that the man days spent on this job be applied to the evaluation of the brown trout stockings and that the catchable rainbow trout program be continued as in the past.

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