

# Evaluation of a Winter Put-and-Take Rainbow Trout Fishery in Lake Watonga, Oklahoma\*

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The Lake Watonga put-and-take winter rainbow trout (*Oncorhynchus mykiss*) stocking program was successful in terms of angler utilization (22,775 total angler-hours) and harvest (14,348 trout or 87% of the trout stocked). Economic benefits included a 24% increase in trout license sales for the five-month (November -March) trout season in Fiscal Year (FY) 1987 compared to the same time period in FY86, an estimated 17% increase in income for Roman Nose State Park and Resort, estimated angler expenditures of \$139,610, and a market value of harvested trout of \$25,289. Expenditures of \$11,013 for the trout were offset by returns of \$203,096 providing a cost-to-benefit ratio of 1:18.

## INTRODUCTION

The Oklahoma Department of Wildlife Conservation (ODWC) began a put-and-take rainbow trout (*Oncorhynchus mykiss*) stocking program in 1965 on the lower Illinois River below Lake Tenkiller (1), followed in 1968 by trout stockings on the Blue River Public Fishing area in southern Oklahoma (2). All anglers fishing in designated trout areas are required to purchase a special license during the trout season. These license sales provide all of the funding for Oklahoma trout programs. The success of a winter trout stocking program in a Texas state park lake (3) prompted the ODWC to study this format for the expansion of its trout program in 1986.

The objectives of this study were to: 1) evaluate the angling opportunity provided by a winter trout fishery in another region of Oklahoma; and 2) determine if such a program could provide economic benefits to the ODWC (license revenues) and the Oklahoma Department of Tourism and Recreation (revenues for a state park and resort in their off-season).

## METHODS

Lake Watonga, a 22-ha impoundment adjacent to Roman Nose State Park and Resort, 120 km northwest of Oklahoma City in Blaine County, was chosen as the study site. This ODWC-owned lake was designated as a trout fishing area in September, 1986, and beginning on October 30, 1986 and continuing through March 31, 1987, received biweekly stockings of 1250 to 2000 catchable-sized (>200 mm) rainbow trout (a total of 16,500 trout were stocked). Trout were purchased from, hauled by and stocked by a Missouri commercial producer.

A roving creel survey (4) was conducted during the five-month trout stocking period and continued through April to measure post-season trout fishing activity. Five-hour surveys were made on four weekend days and three weekdays randomly chosen each month, with starting times randomly chosen so each survey could be completed during daylight hours. Pressure counts (counts of all anglers, made in less than one hour) were done at the beginning, middle, and end of each creel period. Anglers were interviewed, with data on number in party, trip length, species sought, and the number of trout caught and harvested being recorded.

Voluntary angler survey cards, available at locations around the lake, were also provided to obtain additional information not gathered in creel survey interviews including distance travelled, expenses, etc. Anglers were encouraged by creel clerks and in program publicity to complete and deposit the survey cards in lake-side drop boxes.

Data analyses consisted of computer

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estimation of total angling pressure and trout harvest by expanding creel data by the total available daylight hours during the survey period (4). Monthly estimates, although tending to overestimate angling pressure and harvest due to the computational procedures used, were also calculated to determine if trends in the data existed.

A publicity campaign to inform anglers about the Lake Watonga trout program was initiated. Newspaper articles, radio and television programs, and slide shows were used to publicize the stockings.

## RESULTS AND DISCUSSION

### Creel Survey

An estimated 6073 trout anglers expended 22,775 angler-hours of effort or 93% of the total fishing pressure during the period (Table 1). The average trip length was 3.8 hr. Pressure per unit area for Lake Watonga (1023 angler-hours/ha) was higher than that reported for most trout fisheries, which ranged from 31 to 647 hr/ha (3, 5, 6).

Lake Watonga anglers harvested an estimated 14,348 trout (Table 1). This represents a return of 87% of the trout stocked and compares well with estimates of 10% in Kentucky (6), 51% and 69% in Texas (9, 3), and 95% in Arkansas (10). Returns from Oklahoma trout fisheries were 63% and 62% for the Illinois River in 1966 (7) and 1977 (8), respectively; and 64% for the Blue River's six-year average (2).

Anglers harvested an average of 2.4 trout per trip to Lake Watonga, with a catch per hour (C/f) of 0.6 (Table 1). Mauck (2) reported a six-year mean catch from the Blue River of 2.8 trout per trip and a C/f of 0.7. Angler success at Lake Watonga was greater than that reported by Hicks (7) and Deppert (8) from the Illinois River (catch per trip was 1.6 in 1966 and 0.7 in 1977). Ott (3) reported 1.1 fish per trip (C/f of 0.4) in the Texas state park lake stocking experiment.

Monthly estimates of pressure and harvest, although they appear high (i.e., the sum of trout harvested in Table 1, 20,077, exceeds the total number stocked, 16,500), show trends that seem valid based on observations by the author and other creel personnel. Pressure and harvest in November was much lower than expected (Table 1). Water temperatures remained near 15 °C until November 24, after which they fell below 10 °C. In addition, the pH difference between the

TABLE 1. Lake Watonga creel survey estimates of trout angling pressure and harvest from November, 1986 through April, 1987.

| Pressure                            | Monthly Estimates |      |      |      |      |      | Annual Estimate <sup>a</sup> |
|-------------------------------------|-------------------|------|------|------|------|------|------------------------------|
|                                     | Nov.              | Dec. | Jan. | Feb. | Mar. | Apr. |                              |
| Trout anglers                       | 471               | 1002 | 2277 | 1433 | 1207 | 394  | 6073                         |
| Trout angler-hr                     | 1863              | 4308 | 5920 | 4587 | 4586 | 1497 | 22,775                       |
| Trout angler-hr/ha                  | 82                | 193  | 266  | 206  | 206  | 67   | 1023                         |
| Trout anglers/day                   | 17                | 38   | 52   | 43   | 41   | 14   | 33                           |
| Trip length (hr)                    | 3.9               | 4.3  | 2.6  | 3.2  | 3.8  | 3.8  | 3.8                          |
| Trout angler-hr as percent of total | 93                | 100  | 100  | 100  | 98   | 93   | 93                           |
| <b>Harvest</b>                      |                   |      |      |      |      |      |                              |
| Trout harvested                     | 1379              | 6322 | 3990 | 4399 | 3055 | 932  | 14,348                       |
| As percent of total trout stocked   | 15                | 54   | 85   | 88   | 84   | 87   | 87                           |
| Trout/trip                          | 2.9               | 6.3  | 1.8  | 3.1  | 2.5  | 2.4  | 2.4                          |
| Catch/angler-hr                     | 0.8               | 1.5  | 0.7  | 1.0  | 0.7  | 0.6  | 0.6                          |
| Trout harvest/ha                    | 62                | 284  | 179  | 198  | 137  | 42   | 644                          |

<sup>a</sup> Monthly values summed do not equal annual estimates due to computer estimating procedures; see Methods section and Gilliland (12).

supplier's hatchery water (7.2) and Lake Watonga (8.4) meant several days adjustment for newly stocked fish, thus decreasing their initial catchability (Marvin Emerson, Crystal Lake Fisheries, pers. comm.). Peak numbers of anglers (2277), pressure (5920 angler-hours), and the highest mean number of anglers/day (52) occurred in January. This increased pressure was seen as a response to the availability of the new year's trout license and the airing of several television and radio programs publicizing angler success. During December, January, and February trout angling accounted for 100% of the total pressure, and over 90% in the other three months, including 93% of the total pressure in April, after the trout season was over.

### Voluntary Angler Survey

Angler response to the voluntary card survey provided 682 cards from 1547 anglers (Table 2). Statistics compiled from the cards slightly overestimated catch and harvest rates when compared with those from the creel survey, indicating the more successful anglers responded to the survey. Anglers voluntarily reported harvesting 4256 trout for a catch of 3.2 trout/angler and a C/f of 0.8 (compared to 2.4 trout/angler and C/f of 0.6 from creel data). These data indicated that this new program was not competing with other trout fishing areas in the state since 76% of the anglers responding bought a trout license for the Lake Watonga program and the majority (91%) traveled less than 120 km.

### Economic Benefits to ODWC

To estimate the economic impact of the Lake Watonga trout program, total trout license sales for the five months of the trout season (FY87) were compared to those of the respective months from the previous year (FY86; Table 3). Sales for FY87 showed a 44% increase over FY86 with monthly

TABLE 2. Selected statistics collected from Lake Watonga voluntary angler survey cards (% of total where applicable), November, 1986 through March, 1987<sup>a</sup>

|  |               |
|--|---------------|
| Number of cards returned/number of anglers | 682/1547      |
| Numbers of anglers < 16 yrs. old           | 245 (16%)     |
| Trout harvested                            | 4256          |
| Trout harvested/angler                     | 3.2           |
| Mean trip length (hr)                      | 4.0           |
| Bought trout license for Lake Watonga      | 1176 (76%)    |
| Mean dollars spent/trip                    | \$23          |
| Trip rating: Excellent/Fair                | 421/311 (54%) |
| Good/Poor                                  | 296/345 (46%) |
| Distance traveled: 0–40 km                 | 211 (31%)     |
| 40–80 km                                   | 116 (17%)     |
| 80–120 km                                  | 293 (43%)     |
| 120–160 km                                 | 48 (7%)       |
| > 160 km                                   | 14 (2%)       |

<sup>a</sup> See Gilliland (12) for entire survey results.

TABLE 3. Trout stamp sales in numbers (and dollars) for November, 1985 through March, 1986 (FY86) versus same months 1986–87 (FY87), including total number and percentage attributable to Watonga area vendors<sup>a</sup>.

| Month           | FY86           | FY87           | % Change              |
|-----------------|----------------|----------------|-----------------------|
| November        | 710 (\$ 3,550) | 909 (\$ 6,135) | 28 (28 <sup>b</sup> ) |
| December        | 644 ( 4,191)   | 1280 ( 8,640)  | 99 (53 <sup>b</sup> ) |
| January         | 2124 (14,982)  | 3384 (22,845)  | 59 (52 <sup>b</sup> ) |
| February        | 1750 (12,267)  | 2345 (16,256)  | 34                    |
| March           | 2225 (15,148)  | 2723 (18,380)  | 22                    |
| Total           | 7784 (51,794)  | 11219 (76,159) | 44 (32 <sup>b</sup> ) |
| Watonga vendors | n/a            | 2675 (18,056)  | 24                    |

<sup>a</sup> Robert Taylor, ODWC, pers. comm.

<sup>b</sup> Adjusted for license fee increase in 1986.

increases ranging from 22% to 99%, and total income increasing 32% (adjusted for license fee increase in 1986). A total of 2675 trout licenses were sold during the five-month trout season by first-time trout license vendors in Watonga and at Roman Nose State Park and Resort (Table 3). This amounted to \$18,056, or 24% of the total statewide trout license revenue collected during that period.

### Benefits to Park and Resort

Park visitation, as estimated by park and resort personnel, increased by an average of 20% for the five months of the trout season (FY87) versus the same months from the previous winter (FY86) and park income, primarily day use, RV, and camping fees, rose by 82% (Table 4). Large increases occurred from December through January, when the park is normally empty (Leon Hightower, Roman Nose State Park, pers. comm.). Inclement weather (the lake was frozen over for two weeks) kept visitation low in February.

Roman Nose Resort saw an average increase of 8% in its FY87 income over FY866 (Table 4). Smaller than expected increases were attributed to trout anglers, being day visitors, not making use of lodge services, and annual variation in banquets and catering revenues (Pam Rickey, Manager, Roman Nose Resort, pers. comm.). A residual effect of the exposure given Roman Nose State Park and Resort during the trout season was seen in the following months, with spring and summer visitation being heavier than normal (Leon Hightower, Roman Nose State Park, and Pam Rickey, Roman Nose Resort, pers. comm.). This was attributed to people learning of the area because of the trout fishery and returning from vacations, picnics, camping, etc.

### Cost:Benefit Analysis

Costs to ODWC for the trout and delivery were \$11,013 (Table 5). Revenues generated by the program (Table 5) consisted of

TABLE 4. Estimated changes in income and visitation for Roman Nose State Park and Resort during five-month trout season 1986-87 versus respective months 1985-86<sup>a</sup>.

|                                      | November | December | January | February | March  | Total  |
|--------------------------------------|----------|----------|---------|----------|--------|--------|
| <b>State Park Visitation</b>         |          |          |         |          |        |        |
| 85-86                                | 8000     | 6700     | 10,000  | 6900     | 8600   | 40,200 |
| 86-87                                | 9200     | 8300     | 10,800  | 12,000   | 48,300 |        |
| % Change                             | 15       | 24       | 8       | 16       | 40     | 20     |
| <b>State Park Income<sup>b</sup></b> |          |          |         |          |        |        |
| % Change                             | 237      | 247      | 229     | 3        | 11     | 82     |
| <b>Resort Income<sup>b</sup></b>     |          |          |         |          |        |        |
| % Change                             | 3        | 28       | -57     | 120      | 5      | 8      |

<sup>a</sup> Based on unaudited data supplied by Leon Hightower, Roman Nose State Park, and Pam Rickey, Roman Nose Resort.

<sup>b</sup> Dollar values deleted at the request of Oklahoma Department of Tourism & Recreation.

TABLE 5. Cost:Benefit analysis of Lake Watonga trout stocking program November, 1986 through March, 1987.

|           |  |                  |
|-----------|--|------------------|
| Cost:     | Trout + delivery   | \$ 11,013        |
| Benefits: | 22,775 Angler-hours × \$6.13 <sup>a</sup> per hour expenditures                        | 139,610          |
|           | Estimated 2090 kg trout harvested @ local market price of \$12.10/kg on March 31, 1986 | 25,289           |
|           | Increased income for State Park and Resort   | 20,141           |
|           | Income to ODWC for trout stamp sales (Watonga vendors only)                            | 18,056           |
|           |  | <u>\$203,096</u> |

Cost = \$11,013 : Benefits = \$203,096 = 1:18

<sup>a</sup> Mean expenditure of \$32.69 per 5.33-hr mean trip length (11).

income to ODWC from trout license sales (by Watonga-area vendors only-\$18,056); estimated increases in income to Roman Nose State Park and Resort (\$20,250); estimated expenditures by anglers at \$6.13/hr (11) for 22,275 angler-hours (\$139,610); and estimated market value of trout harvested (in Norman area supermarkets) at an average market price on March 31, 1987 of \$12.10/kg (\$25,289). Costs of \$11,013 to benefits of \$203,096 provided a 1:18 ratio, which compared well with estimates from Ott (3) who reported a ratio of 1:15 for the four-month Texas state park program, and Forsage (9) who calculated a 1:28 ratio for a 12-month Texas tailwater program.

### **The Program's Future**

The Lake Watonga winter put-and-take trout stocking was a success by all measures and continuation of the program on an annual basis was recommended. License income exceeded trout costs, Roman Nose State Park and Resort experienced increased visitation and income, and the surrounding communities also saw enhanced economic benefits (Joyce Lucas, Watonga Chamber of Commerce, pers. comm.). The town of Watonga also held "Trout Derbys" during the 1988 and 1989 seasons, using trout fishing as an attraction to increase tourism.

As a result of the success of the Lake Watonga program, the ODWC trout stocking program was expanded in 1989 with similar winter trout stockings in the Altus-Lugert Reservoir tailwater (adjacent to Quartz Mountain State Park and Resort), and a 12-month program in the Mountain Fork River below Broken Bow Reservoir (adjacent to Beavers Bend State Park).

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