COMPARISION OF TWO METHODS FOR ESTIMATING ANGLER-USE OF OKLAHOMA RESERVOIRS*

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The U.S. Fish and Wildlife Service as a part of their National Reservoir Research Program (NRRP) and the Oklahoma Department of Wildlife Conservation (ODWC) independently estimated angler-use on 25 Oklahoma reservoirs for 1975. The Fish and Wildlife Service utilized a multiple regression equation that relates fishing pressure to various physical parameters of 103 U.S. reservoirs in order to predict angler use. The ODWC utilized aerial observations. There was a positive relationship between NRRP predictions and ODWC estimates. However, compared to ODWC estimates the NRRP predictions of angler-use on these reservoirs were consistently higher. It is suggested that another factor, perhaps the ratio of fishing license sales to water surface area of a state or region, should be considered in the NRRP prediction.

INTRODUCTION

The creel survey became a tool for evaluating management practices and predicting management needs as early as 1920 (1). Even today, however, one of the main problems facing fishery biologists is that of obtaining accurate creel survey estimates. Generally, the amount of time and effort available for a creel survey limits its accuracy. A total count and interview of all sport fishermen is often not economically feasible, and some form of abbreviated survey becomes necessary. Because few comparisons of actual data generated by these different methods have been made, it is difficult to select the best one. If several methods yield reasonably comparable results, there is a rational basis for choosing the least cumbersome. For this reason, the following comparison was made.

METHODS AND MATERIALS

During 1974-1975 the Oklahoma Department of Wildlife Conservation (ODWC) initiated a creel survey on 47 Oklahoma impoundments greater than 200 hectares and on 17 small impoundments owned by the ODWC. After one year, estimates of harvest and angler use were obtained. Angler-use estimates for 25 of these reservoirs are shown in Table 1. Angler-use estimates were made by taking periodic counts from an aircraft. Although the periods between flights varied, counts were made on weekdays, weekends and major holidays during the year. The mean value for these counts was then multiplied by the annual number of daylight hours available for fishing. No estimate of nocturnal angler-use was attempted.

Prior to this census, the U.S. Fish and Wildlife Service under the National Reservoir Research Program (NRRP) compiled data for predicting fish production

TABLE 1. *Two estimates of angler-use on 25 Oklahoma reservoirs for 1975.*

Reservoir	ODWC-Estimated angler-days (thousands)	NRRP-Predicted angler-days (thousands)
Eufaula	160	440
Texoma	350	415
R. S. Kerr	69	410
Oologah	148	370
Grand	251	330
Keystone	152	200
Broken Bow	47	190
Fort Gibson	166	190
Hugo	65	190
Tenkiller	122	150
Thunderbird	76	130
Hudson	65	125
Ellsworth	105	105
Foss	25	100
Webbers Falls	25	95
Draper	54	85
Canton	32	80
Arbuckle	38	80
Fort Cobb	48	80
Murray	37	75
Atoka	9	65
Altus-Lugert	47	65
Pine Creek	30	60
Hefner	53	60
Hulah	16	50

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in Oklahoma (2). This program also predicted angler-use on 50 Oklahoma reservoirs using a multiple regression prediction equation. Regression coefficients for this equation were obtained by relating data on diurnal angler-use of 103 United States reservoirs to various environmental variables of these reservoirs. Angler-use figures for the 103 reservoirs had been previously obtained by creel census techniques. Environmental variables used in the equation were reservoir age, total dissolved solids, length of growing season, surface area, and storage ratio. Both ODWC and NRRP estimates of angler-use are based on 4-hour angler-days.

In the present comparison, simple linear regression and correlation were used to relate the estimates of angler-use obtained by the two methods.

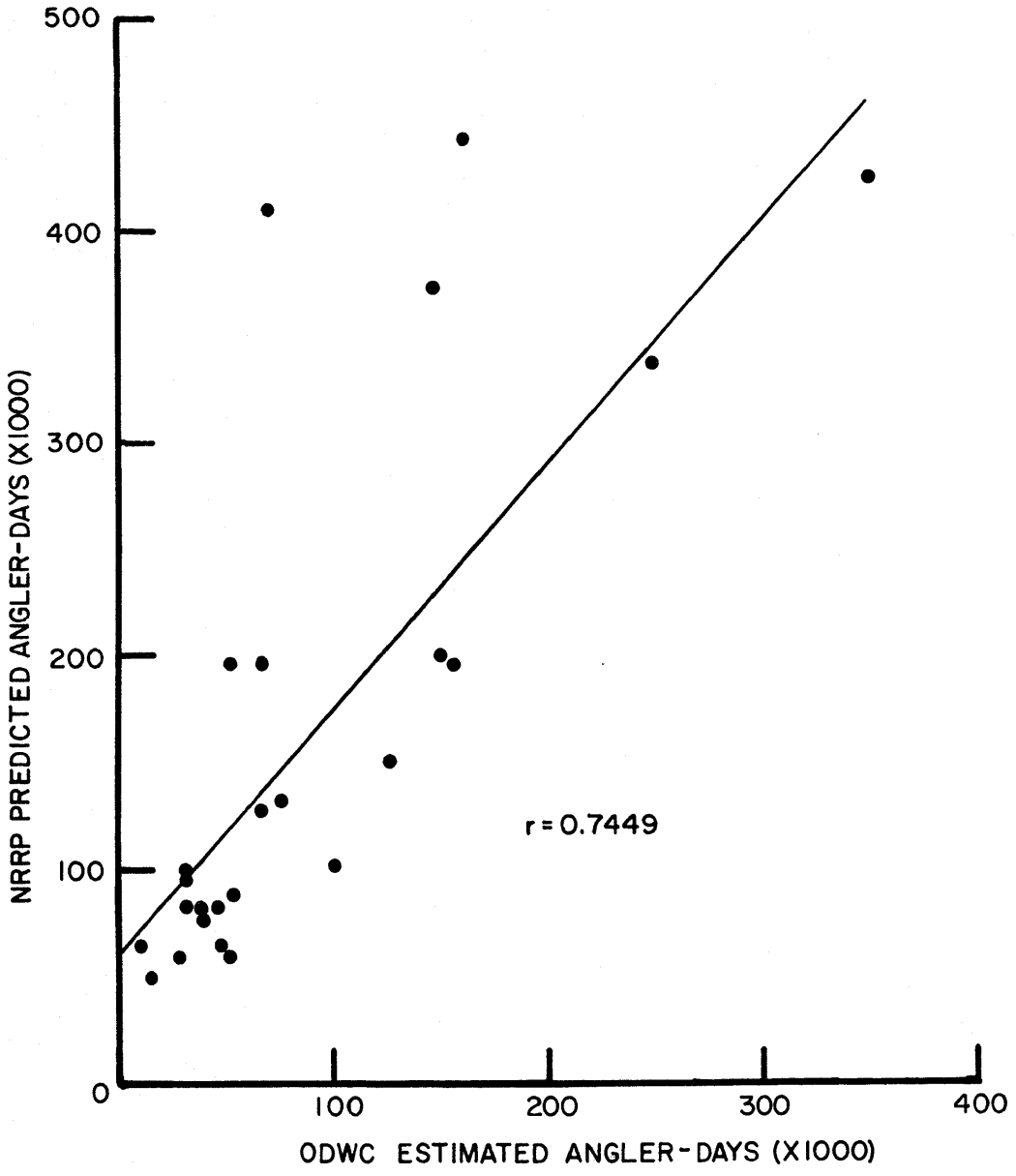

FIGURE 1. Regression of NRRP predictions of angler use (Y) on ODWC predictions of angler use (X).

RESULTS

The NRRP predictions exceeded the ODWC estimates of angler-days for each reservoir (Table 1) by an average of nearly 64,000 days (Figure 1). In every case but one, the NRRP predictions exceeded the ODWC estimate. The data were positively correlated and the r value (0.7449) was significantly different from zero using a Student's t-test ($P < 0.01$) (3). Although perfect correlation of angler-use for each reservoir was not obtained, there was a definite positive relationship between the two methods. The least squares equation for the regression of NRRP predictions (Y) on ODWC prediction (X) was:

$$Y = 63899.5 + 1.160\ X$$

Thus, an increase of 10,000 angler-days by the ODWC predictions was accompanied by an approximately equal increase of 11,600 angler-days by NRRP estimates. The increases shown by the two methods were, in fact, shown not to differ significantly: a Student's t-test (4) indicated the slope (b) of our equation did not significantly differ from 1.0 ($P > 0.4$).

DISCUSSION

In any large-scale creel survey the investigator must choose between a relatively expensive field census, such as was used to obtain the ODWC estimates, and a less expensive inferential model such as the NRRP equation.

In the present comparison, it appears that the NRRP equation was similar to the ODWC census in providing the order of angler-use for 25 Oklahoma reservoirs. For economic reasons, then, the NRRP equation would seem more practical for relative comparisons of angler-use between reservoirs. However, the NRRP equation produced consistently higher estimates of angler-use than the ODWC's aerial survey. Therefore, estimates based on reliable data obtained from the actual reservoirs in question are preferable to those obtained by use of the NRRP equation in cases where estimates of actual rather than relative values of angler-use are needed.

In examining the NRRP equation, one additional factor was found which may have merit for consideration if results from use of the equation are to become more comparable to ODWC estimates. While nonresident fishing may contribute a slight amount to the total angler effort, it is felt that the abundance of water area in relation to license sales is a factor presently limiting realization of the angler potential in Oklahoma as predicted by the NRRP equation. The average reservoir used to produce the NRRP equation was located in a state that had 2.01 times as many license holders per hectare of impounded water (reservoirs over 200 hectares) as Oklahoma. From data obtained from the U.S. Fish and Wildlife Service, it appears that Oklahoma sold only about 2 percent of the total annual fishing licenses in the United States in 1975 (636,494), although it ranked second in the total surface area of impounded water (238,760 hectares).

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