

Catch/Release Bias in Reward Tag Exploitation Studies

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Abstract: A post card survey questionnaire was used to obtain information about the catch and release practices of anglers participating in largemouth bass (*Micropterus salmoides*) tag reward exploitation studies at 2 North Carolina reservoirs. The surveys demonstrated that at least 60% of all tagged bass captured were released. The post card survey resulted in substantial reductions in the estimated exploitation rates at both reservoirs.

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Tag reward exploitation studies have been conducted on several reservoirs to estimate annual fishing mortality in largemouth bass (*Micropterus salmoides*) populations (Reed and Davies 1980, Yeager and Van Den Avyle 1978, Rawstron and Hashagen 1972). Folmar et al. (1979) examined factors influencing tag reward exploitation estimates including tag loss, tagging mortality, tagged fish displacement, and tag non-reporting under different tag reward systems. However, little information is available concerning the effects of catch and release practices on tag reward exploitation studies.

Catch and release practices are common among largemouth bass fishermen. A survey of tournament largemouth bass fishermen in North Carolina during 1982 indicated that in more than 40,000 hours of fishing, 89% of the captured fish exceeding the minimum size limit (TL = 35.5 cm) were released (unpubl. data, N.C. Wildl. Resour. Comm.). Tournament release rates are high because organizers provide incentives to encourage the practice. However, many anglers also release fish in non-tournament situations.

Clark (1983) reviewed potential effects of catch and release practices

on recreational fisheries. As release rates increase, total catch and catch of trophy fish increase, total harvest declines, and total mortality may decrease. Consequently, the relative effectiveness of size and creel regulations designed to control fishing mortality and harvest can be influenced by voluntary catch and release practices.

Tag reward exploitation studies were conducted on largemouth bass populations in 2 North Carolina reservoirs, Badin Lake (Chapman and Harris 1981) and Lake Norman (unpubl. data, N.C. Wildl. Resour. Comm.). This paper presents a methodology for estimating the release rate of tagged fish and demonstrates the effects of catch and release practices on exploitation estimates.

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Methods

Sampling was conducted in the spring using 230 volt electrofishing units. Fish >200 mm were tagged with orange disc dangler tags labeled with an identification number, the word "reward," and the name and address of the North Carolina Wildlife Resources Commission. Tag values were randomly assigned and ranged from \$1.00 to \$100.00. Anglers were unaware of the tag value prior to receiving the reward. Exploitation rates for both studies were calculated as follows:

$$E = \frac{rc}{m}$$

where r = number of tagged largemouth bass harvested

m = total number of largemouth bass tagged

c = correction for tag non-reporting

The correction factor was based on the return rate of tags observed on creel fish and recorded by study personnel, wildlife enforcement officers, and creel clerks. It was calculated by dividing the number of tags observed by the number of those tags returned for rewards.

A post card survey was used to determine if tagged largemouth bass caught were harvested or released. Anglers returning a tag were mailed a stamped, self-addressed post card questionnaire. The questionnaire identified the returned tag number and asked if the fish had been kept or released. The rate of harvest was obtained by dividing the number of fish reportedly kept by the number of post card survey responses. The rate of harvest was then applied to the total number of tag returns to estimate the total number of tagged largemouth bass harvested (r). No effort was made to determine non-response bias in the post card survey.

Results and Discussion

A total of 4,906 largemouth bass were tagged at the 2 study lakes and 2,017 tags were voluntarily returned (Table 1). The tag return rates were 46% for Badin Lake and 40% for Lake Norman. The annual exploitation rates corrected for tag non-reporting, but not for catch and release practices, were 67% for Badin Lake and 56% for Lake Norman.

During the 2 investigations, 1,444 post card survey responses were received. Post card response rates were 62% for Badin Lake and 75% for Lake Norman. Anglers reported releasing 65% of the tag return largemouth bass from Badin Lake and 71% of the fish from Lake Norman. Adjusting the exploitation rate at each lake accordingly, the new rates are 24% for Badin Lake and 16% for Lake Norman.

The fisheries management implications of the 2 pairs of exploitation estimates are quite different. The unadjusted exploitation estimates are high and may justify a more restrictive harvest strategy. The corrected estimates are much lower and may support the use of less restrictive size and creel regulations.

The post card survey is subject to several potential sources of bias. Survey non-response should be evaluated, particularly if response is poor. The current popularity of the "release ethic" may pressure some anglers to claim they released fish which were actually kept. Also, anglers not returning tags immediately may have trouble recalling if a particular fish was kept or released. This may be particularly true if more than 1 tagged fish was caught.

A post card survey of anglers returning reward tags provided important information about the catch and release practices of anglers at Badin Lake and Lake Norman. This information resulted in substantial reductions of the annual exploitation rates estimated at both lakes using tag reward techniques. Managers might expect similar results from other fisheries where catch and release practices are common.

Table 1. Annual exploitation data for Badin Lake and Lake Norman.

| | Badin Lake | Lake Norman |
|------------------------------|------------|-------------|
| <i>N</i> fish tagged | 1,000 | 3,906 |
| <i>N</i> tags returned | 462 | 1,555 |
| <i>N</i> post cards returned | 284 | 1,160 |
| Fish reported harvested | 35% | 29% |
| Exploitation rate unadjusted | | |
| for catch and release | 67% | 56% |
| Exploitation rate adjusted | | |
| for catch and release | 24% | 16% |

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