Evaluation of Catch Card Reporting at Mississippi State Lakes

Craig A. Walker,[1] *Department of Wildlife and Fisheries, Mississippi State, MS 39762*

Harold L. Schramm, Jr., *Mississippi Cooperative Fish and Wildlife Research Unit, Mississippi State, MS 39762*

Abstract: We evaluated voluntarily completed catch cards as an alternative to access point surveys at intensively managed state-owned fishing lakes in Mississippi. Catch cards, with signs encouraging participation and completion, were conspicuously available to anglers. Five percent of anglers voluntarily completed catch cards; response rate increased to 13% when agency personnel verbally requested participation in the catch card program from those anglers they encountered on-site. Anglers who voluntarily obtained and completed cards (respondents) were older, fished more often, and caught more fish on the day they completed the catch card than non-respondent anglers. Fish harvest reported on the catch cards did not differ from observed harvest. However, considering the response bias and low precision of estimates resulting from low response, voluntarily completed catch cards are not a viable substitute for creel surveys at Mississippi State lakes.

Key words: catch statistics, creel surveys, angler surveys, response bias

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Mississippi Department of Wildlife, Fisheries and Parks (MDWFP) provides fishing opportunities at 22 state fishing lakes and 23 state park lakes (hereafter referred to as state lakes) ranging in size from 31 to 2,964 ha. These intensively-managed lakes provide fishing for catfishes Ictaluridae, sunfishes *Lepomis* spp., crappies *Pomoxis* spp., and largemouth bass *Micropterus salmoides*. Boat, shore, and pier access is well developed at these lakes.

Maintaining successful fishing opportunities requires accurate and precise estimation of angler effort, catch, and harvest (Ney 1999). Additionally, providing a quality fishing experience requires unbiased estimation of preferences for and satisfaction with fishing and the fishing environment (Responsive Management 1999, Weithman 1999). Such information is readily obtained by well-designed access-point creel surveys; however, conducting creel surveys at these 45 lakes would exceed MDWFP's present personnel and fiscal capabilities. Catch-card reporting may provide a cost-effective alternative to traditional access point surveys when obtaining this information from state lake anglers in Mississippi. However, voluntary surveys can yield inaccu-

1. Present address: Utah Division of Wildlife Resources, 475 W. Price River Drive, Suite C, Price, UT 84501.

rate and imprecise estimates as a result of self-reporting error and small sample size (Pollock et al. 1994) as well as non-response bias due to a lack of participation among certain segments of the State lake angling population (Thompson and Hubert 1990, Pollock et al. 1994, Fisher 1996).

To assess the potential utility of catch cards to measure fishery parameters at MDWFP's state lakes we measured anglers' voluntary participation and the accuracy of the reported information. Further, we evaluated differences in participation among angler groups and different methods of soliciting angler cooperation.

Methods

Catch card programs were implemented and visitor interviews were conducted during 5 April–31 July 1999 at seven state lakes in northeastern Mississippi: Lake Lamar Bruce, Lake Lowndes State Park, Lake Monroe, Oktibbeha County Lake, Tippah County Lake, Tombigbee State Park, and Trace State Park (Trace Lake). Visitation and fishing use of these lakes is greatest during spring through early summer (W.D. Hubbard, Mississippi Department of Wildlife, Fisheries and Parks, pers. commun.). Excluding Trace Lake, where visitors are required to register and pay at a staffed gatehouse prior to entrance, access fees at State lakes are collected using an honor box system.

Catch cards used in this study allowed anglers to report fishing time, party size, ages and genders of party members, residence of respondent, ethnicity of respondent, species sought by respondent, number and species or species group of fish caught and harvested by party members, as well as a question regarding catch satisfaction. At Trace Lake, cards were distributed by agency personnel at the gatehouse, and anglers were asked to complete and return catch cards at the gatehouse when leaving the park. At the other lakes, anglers obtained cards from dispensers installed in conspicuous locations. Signs affixed to the dispensers asked anglers to obtain, complete, and return cards to the collection boxes upon trip completion; pencils were provided at dispensers for card completion.

Information about angler age, household income, and annual fishing frequency at all fishing locations were obtained from comprehensive interviews with State lake visitors conducted concomitantly with this study (Walker 2004). Following a stratified, random design, interviews were conducted at each facility on one weekday morning (0800–1300 hours), one weekend/ holiday morning, one weekday evening (1500–2000 hours), and one weekend/ holiday evening during every four-week interval. After identifying themselves as Mississippi State University employees and providing their names, interviewers asked drivers leaving each facility if they had previously participated in an interview. Visitors who had were thanked for their time and not interviewed. Those indicating they had not participated were asked if they would participate in an interview. Interviewers gave potential participants a brief overview of research importance, read them privacy guidelines, and told them the interview would last approximately five minutes. At the end of the interview, anglers were asked if they had obtained and completed a catch card during their visit. Based on

their reply, these anglers were assigned to one of three respondent classes: (1) those who obtained, completed, and returned cards (respondents), (2) those who obtained cards but failed to complete and return them (partial respondents), or (3) those who did not obtain a card (non-respondents). Partial respondents were asked to complete and return their catch card to the interviewer. Non-respondents were provided a card and asked to complete and return it to the interviewer.

After catch cards were collected, fish in possession (observed harvest) were identified to species and counted. The accuracy of card-reported harvest estimates was assessed by comparison with observed harvest. Significant differences between observed and card-reported harvest were tested with Wilcoxon signed-rank test (PROC NPAR1WAY, SAS 1999).

During the first month of this study, less than 5% of the anglers interviewed at all study lakes had obtained catch cards. At a meeting with agency personnel, verbal encouragement of card completion by agency personnel (i.e., solicitation) was identified as a feasible way to increase participation, and three lakes were randomly selected to use solicitation. Beginning 6 May, agency personnel at solicited lakes began verbally requesting participation in the catch card program from those anglers they encountered. Card use continued to rely on signage at the three "unsolicited" lakes. Due to the required registration, it was anticipated that all anglers would receive, complete, and return catch cards at Trace Lake. Personnel at this lake continued to attempt to issue catch cards to all anglers upon entry and collect them upon exit. Differences in participation before and after solicitation were tested by χ^2 analysis (SAS 1999).

Differences in angler age between catch card respondents and non-respondents were evaluated by two-sample *t*-test. Angler age distributions were normal by the Shapiro-Wilk test (Freund and Wilson 1997). Catch and annual fishing frequency were developed from count data, and differences between respondents and non-respondents were evaluated by a likelihood-ratio test (SAS 1999) based on the Poisson distribution (Freund and Wilson 1997). Comparisons of 1998 household income classes between respondents and non-respondents were made by χ^2 analysis. Statistical significance was set at $P < 0.05$ for all comparisons.

Results

Of the 288 anglers surveyed during the four months of this study, 34 (12%) were respondents, 10 (4%) were partial respondents, and 244 (84%) were non-respondents. Participation increased at the three solicited lakes from 2% before solicitation (before 5 May) to 13% with solicitation (after 5 May); participation rate did not change at the unsolicited lakes (Table 1). The participation rate also increased at Trace Lake from 5% before 5 May 1999 to 33% after 5 May 1999.

Anglers honored all requests for inspection of harvested fish, and observed harvest was not different ($P = 0.68$) from card-reported harvest. Of the 263 anglers checked, 84% correctly reported their harvest (i.e., card-reported harvest was the same as observed harvest), 7% overestimated harvest, and 9% underestimated har-

Table 1. Percentages of anglers who obtained and completed catch cards (participation rate) at Mississippi State lakes before (5 April–5 May) and after (6 May–31 July) verbal encouragement by agency personnel. See text for explanation of unsolicited lakes and solicited lakes. *N* is number of anglers interviewed; *P* is the probability of a significant difference from the χ^2 distribution.

	5 April–5 May		6 May–31 July		
Solicitation	Participation rate		Participation rate		
category		*N*		*N*	*P*
Solicited	2.4	41	13.1	61	0.02
Unsolicited	4.8	42	5.6	72	1.00
Trace Lake	5.0	18	33.3	54	0.01

Table 2. Angler characteristics of respondents and non-respondents to voluntary catch-card program at Mississippi State lakes.

	Respondents			Non-respondents			
Angler characteristic	Mean	*N*	SE	Mean	*N*	SE	*P*
Age (years)	46.3	34	2.10	40.6	243	0.86	0.02[a]
N fish caught on day of interview	8.1	12	3.12	5.0	239	0.49	<0.01[b]
Days fished in 1998	36.9	29	4.86	61.4	214	3.97	<0.01[b]

a. Probability of a difference between respondents and non-respondents by two-sample *t*-test.

b. Probability of a difference between respondents and non-respondents by likelihood-ratio test based on a Poisson distribution.

vest. Harvest by these anglers was overestimated by a total of 72 fish (average, 3.4 fish/angler) and underestimated by a total of 79 fish (average, 3.6 fish/angler). All anglers correctly identified harvested fish to species or species group on their catch card.

Of 288 anglers interviewed, 287 provided age data, 261 provided catch data, 253 provided annual fishing frequency data, and 262 provided annual household income data. Anglers ranged from 15 to 73 years old with a mean of 42 years; catch card respondents were significantly older than non-respondents (Table 2). The number of fish caught on the day of the interview ranged from 0 to 40 fish with a mean of 5 fish; catch-card respondents had significantly greater catch than non-respondents. The annual freshwater fishing frequency for anglers ranged from 1 to 275 days with a mean of 61 days; fishing frequency was significantly higher for catch-card non-respondents. Annual household income did not differ between catch card respondents and non-respondents (Fig. 1).

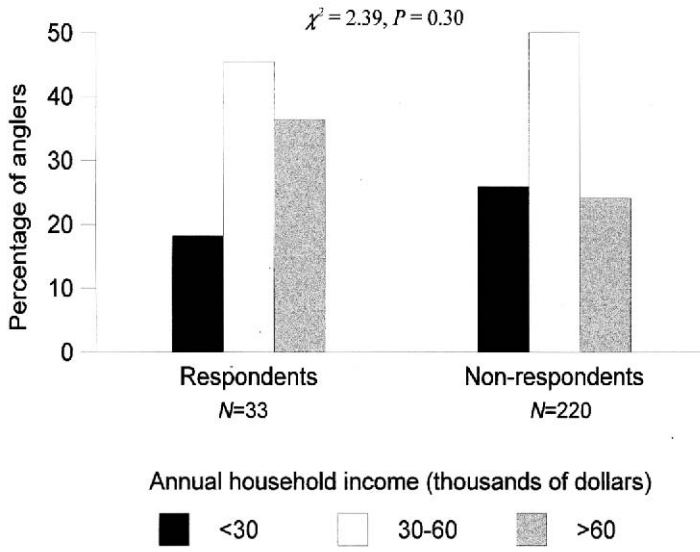

Figure 1. Annual household income of respondents and non-respondents in the state lake trip report card program.

Discussion

Although encouragement by agency personnel increased catch card participation, respondents still represented only 13% of anglers interviewed after 5 May 1999 at solicited lakes. Participation at Trace Lake provides insight into anglers' attitudes about the catch card program and identifies a possible cause of low participation. Because catch cards were distributed to and collected from all anglers at Trace Lake throughout the study, no change in angler participation was expected after 5 May. We later learned that low participation before 5 May at Trace Lake was a result of anglers declining to take catch cards from the gatehouse attendant upon entrance. After 5 May, attendants at Trace Lake were more insistent that the anglers obtained, completed, and returned a catch card. Although participation increased after the attendants became more assertive, 59% of anglers interviewed at Trace Lake between 6 May and 31 July still refused to take cards from the attendant.

The lack of participation at Trace Lake, and possibly the other lakes, may be the result of repeated survey exposure. Many of the non-respondents at Trace Lake stated that they refused to take catch cards because they had completed cards during earlier trips and thought that additional participation was unnecessary. Schleifer (1986) suggests that elevated refusal rates can result from repeated survey exposure. The greater fishing frequency of non-respondents in this study further supports the idea that repeated survey exposure may reduce catch card participation.

Similarity between card-reported and observed harvest suggest little bias from catch cards. Thus, voluntary trip report cards appear to be an economical method for obtaining an accurate estimate of angler harvest for those anglers who complete the cards. However, differences in participation, based on success (catch rate), resulted in biased catch rates. Similar to the findings of Fraidenburg and Bargmann (1982), more successful anglers (anglers catching more fish per trip) had greater participation rates. Expanding catch card estimates to the angler population at a state lake would result in overestimation of catch and harvest rates.

The percentage of anglers who were catch card respondents increased by 11% when agency personnel encouraged anglers to obtain and complete cards. These findings indicate that signs alone are not an effective method for conveying the importance of angler participation in voluntary reporting programs such as catch cards. Gaining angler cooperation at state lakes may require that agency personnel contact anglers on-site. However, considering the low response rate and, thus, low precision, even when substantial personnel time is invested to encourage participation, and the bias in voluntarily reported harvest, catch cards are not an effective method for obtaining reliable catch data at Mississippi State lakes.

Anglers are increasingly called upon to assume the role of co-manager (*sensu lat.,* Pinkerton 1992) of recreational fisheries. For example, restrictive harvest regulations are a common element of fisheries management plans, and most fisheries management agencies now attempt to incorporate angler survey results into the development of management objectives (Wilde et al. 1996). Angler catch statistics and inputs are useful only when obtained from a large and unbiased sample of anglers. Angler cooperation is essential to economically obtain large and unbiased samples. The level of participation attained in this study indicates that most Mississippi State lake anglers are not yet prepared to take on the role of co-manager. To gain sufficient and representative input, managers must help anglers recognize the value of taking an active role in the fisheries management process. The park-like environments and readily accessible resources of State lakes provide ideal venues to begin establishing this relationship. Increased cooperation with cost-effective voluntary participation programs like catch cards will allow both managers and anglers to reap the benefits of effectively obtained angler information.

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