Evaluating Hunting and Fishing Licenses for the Mississippi Department of Wildlife, Fisheries, and Parks

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Abstract: License revenues are a substantial component of budgets for state natural resource agencies. Therefore it is important to retain license-paying residents and attract non-residents to maintain a revenue base. We addressed the problem of adjusting hunting and fishing licenses administered by the Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP). MDWFP provided data revealing total agency revenues generated approximately 40% of its annual budget. In 2004, license revenues alone generated U.S. $14.7 million, 22% of the $68 million annual budget. MDWFP intends to maintain or improve upon this despite stagnating funding from federal and state sources. We recommended increasing certain resident licenses by amounts of $2 to $20 to achieve this goal. If our recommendations are followed and average sales continue, hunting and fishing license revenues are projected to be approximately $16.3 million in fiscal year 2006, accounting for 26% of the projected $64 million budget. If sales approach the maximum, hunting and fishing license revenues are projected to be approximately $17.7 million, or 28% of the budget.

Key words: funding, hunting licenses, fishing licenses, license assessment, Mississippi, revenue

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The Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP) is responsible for management of hunting, fishing, recreational, and other related opportunities for both residents and non-residents in Mississippi. This agency promotes these activities, in part, by using revenues from license, access, user, and other fees and directs them toward enhancing natural areas, wildlife, wildlife habitat, wildlife education, law enforcement activities, and recreational opportunities. The remaining funding is provided by federal and state sources. Due to recent and anticipated budget cuts, MDWFP wanted to assess and potentially adjust license fees. The fiscal

situation was compounded by varying sportsperson participation rates and complicated legislative issues.

Historical data provided by MDWFP revealed total revenues generated approximately 40% of its budget. In 2004, hunting and fishing licenses generated $14.7 million, or 22% of the total budget. It was MDWFP's intent to maintain or improve upon this coverage in a climate of stagnating funding from federal and state sources. Regardless of the budget situation, all fees set by state agencies should be periodically reevaluated. Similar fees in surrounding states are public knowledge and should also be examined and compared, given that sportspersons will travel to pursue hunting and fishing activities (Grado et al. 2001).

Other studies have examined hunting and fishing license sales in other states (Duda 1998, Sutton et al. 2001, Floyd and Lee 2002, Mehmood et al. 2003) and decreasing angler participation due to demographic change (Loomis and Ditton 1988, Murdock et al. 1990, Murdock et al. 1996). A loss of license and other sales and in-state activity days would affect revenues collected by MDWFP. A loss of hunting, fishing, and other related activity expenditures associated with reduced activity days would also affect the state economy by reducing revenues for businesses that depend on resource-related activities. Conversely, attractive non-resident licenses would promote travel to the state, enhance overall revenues, and increase participant expenditures within the economy. In 2001, there were 586,000 fishermen in Mississippi whose total expenditures were $211 million and 357,000 hunters who spent $360 million on their activity (U.S. Department of the Interior [USDI] and U.S. Department of Commerce [USDC] 2002). Of these sportspersons, 23% (136,000) of the fisherman and 31% (111,000) of the hunters were non-residents (USDI and USDC 2002).

According to Johnson (1991), entrance and user fees are a means of restoring recreation funding lost by budget deficits. The problem then becomes one of adjusting license fees to retain residents in the state, increasing their activity rates, and attracting non-residents to hunting and fishing activities. An analysis of this problem needs to consider external events and historical trends such as the recent downward trend of certain license type purchases. Driver and Knopf (1976) and Fedler and Ditton (1994) indicated if fishing license fees reflected the full extent of benefits associated with the resource, fees would be much higher. Nicholson (1985) and Johnson (1991) stated sportspersons would purchase licenses if they believe the activity's value was equal to or greater than license cost. Mehmood et al. (2003) determined active Alabama hunters were in favor of modest fee increases.

Several factors have been determined to cause the downward trend in license sales. For example, Mehmood et al. (2003) determined a decline in Alabama hunting license sales could be attributed to competing interests, aging of former hunters, and a decline in societal support. In a national study, Fedler and Sweezy (1990) determined each dollar increase in the real price of a resident annual fishing license would result in a 4.7% decrease in sales. Teisl et al. (1999) determined the best strategy for increasing revenues was to raise or lower prices based on sportspersons'

price responsiveness. More specifically, Teisl et al. (1999) predicted raising resident license prices was the best strategy for increasing revenues.

The first objective of our study was to examine trends in resident and non-resident hunting and fishing licenses implemented by MDWFP. The second objective was to determine potential effects of license changes on revenues to MDWFP in the near-term future. Our third objective was to provide evidence of potential economic impacts associated with hunting and fishing activities on the state economy.

Methods

MDWFP provided current and historical data including license types, quantities sold per year, and associated revenues for each license type. Data were provided for most items for fiscal years 1983 to 2004. Initially, we arranged data by license type and then sorted by quantity sold and total revenue generated. We focused on the top quantity and revenue producers. We made license fee recommendations by considering past changes and sale trends.

We then conducted an information search to identify characteristics and prices of all relevant licenses in surrounding states (i.e., Alabama, Arkansas, Louisiana, and Tennessee) similar in nature to Mississippi's (Table 1). We compared similar state-to-state license fees to see if there was a margin for adjustment of the fee charged for a specific license type. In general, we made comparisons between Mississippi's fees and adjacent state fees to determine if prices should be increased, decreased, or remain the same. We made recommendations to make Mississippi's licenses competitive based on our professional judgment.

We then performed a sensitivity analysis to approximate future revenue generation based on past sales trends from 1997 to 2004 and recommended price changes. We based projected increases or decreases in license sales on trends developed from actual quantities sold during fiscal years 1997 to 2004. We used this time period because, prior to 1997, several license types were eliminated or combined to form current license types. We also recommended resident license fee adjustments based on quantities sold and price differentials between purchased items. We examined four scenarios that looked at the sensitivity on revenue projections where quantities sold would remain unchanged from fiscal year 2004 or achieve the minimum, maximum, or average quantities sold during fiscal years 1997 to 2004. We made revenue estimates from proposed changes in the collective resident fee structure. Nonresident license fees remained the same, since they were recently changed in 2002.

Finally, we analyzed economic impact of license purchases generated from Impact Analysis for Planning (IMPLAN) software (Olson and Lindall 2000). We determined the economic impact with license prices unchanged from 2004 and with our recommended price changes and conducted the analysis for the four scenarios where quantities sold would remain unchanged from fiscal year 2004 or achieve the minimum, maximum, or average quantities sold during fiscal years 1997 to 2004. We acquired the most current IMPLAN economic database from 2002 to perform this analysis. IMPLAN software uses economic data from an area of interest, in this

Table 1. Price comparisons of Mississippi's 2004 licenses to those of Alabama, Arkansas, Louisiana, and Tennessee.

License type	MS	AL	AR	LA	TN
Resident					
Sportsman[a]	32.00	58.50	35.50	100.00	101.00
All game hunting/freshwater fishing	17.00	23.50	—[b]	—	—
Archery/primitive weapon	14.00	—	21.00	—	36.00
Small game hunting/freshwater fishing	13.00	—	—	—	21.00
Freshwater fishing	8.00	9.50	10.50	9.50	—
3-day freshwater fishing	3.00	6.00	6.50	—	2.50
Commercial fishing	30.00	101.00	25.00	55.00	125.00
State trapper	25.00	7.40	—	25.00	18.00
Fur dealer	50.00	50.00	50.00	150.00	101.00
Non-resident					
Freshwater fishing	30.00	31.00	32.00	60.00	26.00
3-day freshwater fishing	15.00	11.00	11.00	15.00	10.50
All game hunting	300.00	—	—	—	—
Youth all game hunting	110.00	—	—	—	—
7-day all game hunting	125.00	75.00	125.00	—	105.50
Youth 7-day all game hunting	60.00	—	—	—	—
Small game hunting	75.00	75.00	80.00	150.00	56.00
7-day small game hunting	30.00	30.00	55.00	100.00	30.50
Archery/primitive weapon	75.00	—	—	52.00	—
Shooting preserve	13.00	7.00	—	15.00	75.00
Commercial fishing	200.00	200.00	—	460.00	500.00
State trapper	205.00	500.90	100.00	200.00	251.00
Fur dealer	205.00	300.00	200.00	300.00	101.00

a. Includes all game, freshwater fishing, and archery/primitive weapon license.
b. Similar license type not offered.

case Mississippi, to construct a model of its economy. There is a 509-sector input-output (I-O) transactions table based on the Bureau of Economic Analysis' National I-O table, which describes the intermediate use and production of commodities and services by U.S. manufacturers and businesses. State level models define relationships between its industries and account for monetary purchases from industries outside the state. These data sets were used to analyze the state's input-output structure. License expenditures made in the state on behalf of sporting activities were then organized into final demands on state industries and businesses. An IMPLAN model of the state generated direct and secondary impacts resulting from in-state participant expenditures for licenses. While non-resident expenditures are dedicated economic impacts, for this study we determined that resident expenditures be treated similarly.

Results

Top revenue producing resident licenses in 2004 included the Sportsman license ($3,438,016), All Game/Freshwater Fishing ($1,342,048), and Freshwater

Table 2. Average, maximum, and minimum annual changes in Mississippi's resident license sales from fiscal years 1997 to 2004.

Resident license type	Average change (%)	Maximum change (%)	Minimum change (%)
Sportsman[a]	4.80	7.17	1.81
All game hunting/freshwater fishing	–6.23	–3.65	–9.81
Archery/primitive weapon	–14.10	18.81	–29.73
Small game hunting/freshwater fishing	–5.44	–0.35	–9.45
Freshwater fishing	0.05	5.43	–4.19
3-day freshwater fishing	3.34	25.44	–16.12
Commercial fishing	0.28	30.35	–19.76
State trapper	–1.31	15.87	–19.95
Fur dealer	4.21	58.33	–39.13
Overall weighted average change	–0.48	1.52	–3.87

a. Includes all game, freshwater fishing, and archery/primitive weapon license.

Fishing ($757,000) and accounted for 38% of all resident license revenue. Top non-resident license revenue producers in 2004 were the All Game ($4,188,000), 7-Day All Game ($1,167,750), and Archery/Primitive Weapon ($603,900) accounting for 75% of non-resident license revenues.

Weighted average resident hunting and fishing license average sales during 1997–2004 declined 0.48% per year (range: –3.87% to 1.52%) (Table 2). These averages were calculated by weighting each change per license type by the quantities sold versus taking a straight average. Individually, the largest average annual decrease was for Archery/Primitive Weapon (–14.10%). The greatest annual average increase was for the Sportsman license (4.80%), the most important resident revenue generator. Non-resident hunting and fishing license sales during this time period had a weighted average of 0.73% (range: –2.65% to 1.97%) (Table 3). Individually, the largest annual average decrease was for Three-Day Freshwater Fishing (–14.45%). The greatest annual average increase since 1997 was for State Trapper (51.71%). In total, all license sales averaged a 0.07% increase (range: –5.25% to 4.35%). Resident revenues increased 3.4% since 1999 and 6.5% from fiscal years 1997 to 2004, even though annual sales decreased. Non-resident revenue increased 27.3% since 1999 and by 43.9% from 1997 to 2004 with marginal increases in sales.

Recommendations in price changes ranged from $2 to $20 and were made for several resident licenses in Mississippi (Table 4). We recommended increasing the Sportsman license and All Game Hunting/Freshwater Fishing license types by $8 and increasing the Commercial Fishing license by $20. We did not recommend changes to the State Trapper and Fur Dealer licenses because changes in cost would result in minimal changes in revenues.

For resident licenses, recommended price changes and scenarios of zero, average, minimum, and maximum changes in license sales would lead to revenues of $7.48 million, $7.56 million, $7.28 million, and $7.81 million, respectively (Table

Table 3. Average, maximum, and minimum annual changes in Mississippi's non-resident license sales from fiscal years 1997 to 2004.

Non-resident license type	Average change (%)	Maximum change (%)	Minimum change (%)
Freshwater fishing	1.82	15.33	–7.84
1-day freshwater fishing[a]	43.88	43.88	43.88
3-day freshwater fishing	–14.45	6.23	–49.86
All game hunting	–0.48	6.62	–19.82
Youth all game hunting	3.69	15.86	–5.41
7-day all game hunting	5.90	20.41	–9.43
Youth 7-day all game hunting	10.70	43.11	–8.79
Small game hunting	4.91	12.53	–1.12
7-day small game hunting	2.91	12.96	–5.84
Archery/primitive weapon	0.79	11.22	–23.80
3-day archery/primitive weapon[a]	204.44	204.44	204.44
Shooting preserve	–1.15	32.78	–47.20
Commercial fishing	6.96	37.50	–19.23
State trapper	51.71	171.43	–12.31
Fur dealer	0.48	100.00	–55.56
Overall weighted average change	0.73	1.97	–2.65

a.Based on data from fiscal years 2003 and 2004.

Table 4. Recommended prices for Mississippi's resident license fees for fiscal year 2006.

License type	Fee ($) 2004	Recommended fee ($) changes	% Change	New license fees ($)
Sportsman[a]	32	+8	25	40
All game hunting/freshwater fishing	17	+8	47	25
Archery/primitive weapon	14	+6	43	20
Small game hunting/freshwater fishing	13	+3	23	16
Freshwater fishing	8	+2	25	10
3-day freshwater fishing	3	+3	100	6
Commercial fishing	30	+20	67	50
State trapper	25	0	0	25
Fur dealer	50	0	0	50

a. Includes all game, freshwater fishing, and archery/primitive weapon license.

5). For non-resident licenses, recommended scenarios of zero, average, minimum, and maximum changes in license sales would lead to revenues of $7.66 million, $8.04 million, $6.70 million, and $8.78 million, respectively (Table 5). For miscellaneous licenses, recommended scenarios of zero, average, minimum, and maximum changes in license sales would lead to revenues of $0.73 million, $0.74 million, $0.44 million, and $1.09 million, respectively (Table 5).

The annual economic impact of hunting and fishing license purchases ranged from $21.3 to $26.6 million if no changes were made to the fee schedule. However, if our recommended fee changes were implemented, annual economic impacts

Table 5. Hunting and fishing license revenue projections for the Mississippi Department of Wildlife, Fisheries, and Parks for fiscal year 2006.

License recommendations	Sales same as 2004	Average expected sales[a]	Minimum expected sales[a]	Maximum expected sales[a]
No changes from 2004				
Resident	5,711,703	5,788,084	5,582,331	5,975,802
Non-resident	7,660,483	8,036,161	6,699,031	8,780,265
Miscellaneous	725,811	743,926	437,046	1,084,733
Total	$14,097,997	$14,568,170	$12,718,408	$15,840,800
Recommended fee changes				
Resident	7,481,913	7,559,700	7,282,901	7,813,667
Non-resident	7,660,483	8,036,161	6,699,031	8,780,265
Miscellaneous	725,811	743,926	437,046	1,084,733
Total	$15,868,207	$16,339,787	$14,418,978	$17,678,665

a. Based on changes in license fee sales from fiscal years 1997 to 2004.

would range from $24.2 to $29.6 million, an increase of approximately $3 million. These numbers are a reflection of only revenues generated by licenses purchased and do not account for impacts of all other sportspersons' expenditures in the state.

Discussion

Revenue and constituent support are both important to the MDWFP. Therefore, we analyzed data with both in mind. In most cases, our directives were based on historical data and trends revealed for the past eight years where license types were consistent. More sophisticated analyses were limited because most resident license prices only changed once since 1983 and most non-resident license prices only changed twice during this same time period.

Overall, total resident license sales have, on average, decreased over the 1997 to 2004 period while non-resident license sales have shown a slight increase. This trend, the fact that resident license fees were last changed in 1994, and recent price increases in 2002 for non-resident licenses led to a small number of price increase recommendations. These price recommendations need to be accepted in total because increases favored the key revenue generator license, the Sportsman license, thus discouraging individual purchases of specific hunting or fishing licenses only.

Based on actual and projected revenue requirements for MDWFP it appeared that, despite recent trends of increases for some licenses and decreases for others and price increases recently instituted for non-residents in 2002, license fee adjustments recommended by our study should be sufficient to cover a reasonable portion of the agency's expenses in the near-term future. At worst, if sales were to drop to the minimum expected and resident fee recommendations were not followed, expected revenues would be $12.7 million (Table 5). In this situation, hunting and fishing license revenues would still cover 20% of the $64 million 2006 budget. If our resi-

dent fee recommendations are followed and average expected sales materialize, 26% ($16.3 million) of expenditures are expected to be covered. If minimum and maximum expected sales materialize, then 23% and 28% of expenditures will be covered, respectively. In addition, our recommendations and projections would still sustain a sizeable economic impact to the state from license sales and all other expenditures associated with license activity. While it is known that licenses are a small portion of a sportsperson's expenditures (USDI and USDC 2002), economic impacts attributed to the total hunting and fishing experience is much larger. Therefore, licenses need to be reasonable and justified because sportsmen may focus on these identifiable expenses and be influenced to go elsewhere, resulting in lower overall economic impacts in the state.

We made a number of recommendations in this study. As previously noted, one was to increase certain resident licenses fees to match fees charged by surrounding states. Another recommendation was offered to generate additional revenue. Several states in the southern region are charging a fee or requiring a permit (generally ranging from $10–$26) for individuals who hunt on state wildlife management areas (WMAs). For example, both Alabama and Louisiana charge $15. Mississippi was the only state in the region that did not charge for using public WMAs. In fiscal year 2004, 167,853 activity-days were estimated by MDWFP for Mississippi's WMAs. Assuming the average sportsperson spends eight activity-days per year hunting on a WMA, approximately 20,980 individuals would need to purchase a WMA permit. At a permit cost of $15, an additional $314,700 in revenue would be generated for MDWFP. It is possible this figure could be higher. If the quantity of individuals using Mississippi's WMAs were known with greater certainty, along with their activity-days, expected increases in revenues could be estimated with greater accuracy.

There were several other areas requiring further research. For example, MDWFP needs to examine how changes in bag limits and season length may affect revenues. Another area in need of examination would be to survey the constituency to assess their propensity or willingness-to-pay for certain license fees or permits, based on value received. Ready et al. (2005) determined that projections based on stated behavior (e.g., in a survey) was better than projections from revealed behavior (e.g., historical license sales) at predicting resident fishing license sales in Pennsylvania.

Finally, any change in license fees or permits should be instituted with a marketing strategy to provide information to current and potential sportspersons on the benefits derived from individual licenses, fees, and permits and programs that gain support from these revenues. As in recreation studies we previously alluded to, sports-persons' objections are subdued, and support often garnered, when participants see benefits of fees they are being asked to pay.

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