Economic Value of the Tournament Black Bass Fishery on Lake Guntersville, Alabama

by

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Abstract

Lake Guntersville is one of the most renown black bass fisheries in the United States and as such attracts many tournaments of various sizes and competition levels. This study attempted to quantify the economic impact of these tournaments on the local communities and state through expenditures, tax revenues, and estimated consumer surplus. The study was conducted via access points where anglers were distributed survey packets in postage paid envelopes and instructed to complete and return the survey via mail or online. Of 1672 total surveys distributed, 439 were returned, for a 26% response rate. A total of 272 tournaments were estimated to have occurred in 2013, fished by 10,035 anglers. Annual tournament angling effort on Lake Guntersville was estimated to be 89,000 angler hours; when accounting for time spent practicing this number increased to 266,000 hours. Overall annual tournament angling expenditures on Lake Guntersville in 2013 were $4.6 million dollars, generating $222,000 in tax revenue. The total economic impact of the tournament fishery was estimated to be $6.7 million after adjusting for a regional multiplier. Consumer surplus for tournament black bass anglers was $667 (SE, $102) per visit and $225 per day. Overall willingness-to-pay for tournament anglers was $1,122 per visit; consumer surplus represented 59% of the total willingness-to-pay. Large single tournaments, which attracted large proportions of out of state anglers and associated overnight trips, resulted in the greatest local economic impact, and should be the events local tourism bureaus and Chambers of Commerce focus on attracting to the area. These large events are usually highly publicized and can showcase the fishery directly leading to more tournaments and recreational angling at the fishery.

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List of Abbreviations

CPUE   Catch per unit effort

RPUE   Release while culling per unit effort

WPUE   Weighed in per unit effort

TCM   Travel cost model

WTP   Willingness to pay

Definitions of Note

Border State   Tennessee or Georgia

Consumer Surplus   willingness to pay above and beyond a person's actual expenditures and is the area below the recreational visit demand curve and above the equilibrium travel cost (price)

Culling   the act of removing a smaller fish from the live well during a tournament and replacing it with a larger fish that was just caught

Local   Madison, Marshall, or Jackson Counties, Alabama

Non-local   all of Alabama excluding Madison, Marshall, or Jackson Counties

Opportunity Cost   measure in terms of value of the next best alternative forgone; in this study, a fraction of the angler's wage rate applied to the round trip travel time to the study site and substitute sites

Substitute Site   similar site that could replace the study site; in this study the opportunity cost of travel to the substitute site was used in the travel cost model

Travel Cost Model   method to estimate travel costs (opportunity cost of travel plus actual expenditures) and visit frequency to establish angler visitation demand for tournament black bass fishing

Willingness-to-pay   maximum an angler is willing to pay to fish

I. INTRODUCTION

I. 1. Tournament Fishing

One of the largest and fastest growing aspects of inland fishery use is organized competitive sport fishing (Schramm et al. 1991a). Estimates of competitive fishing events (hereafter, "tournaments") on inland waters in the United States have increased, from 12,369 in 1978, to 18,303 in 2000, to the most recent estimate of 32,321 in 2005 (Schupp 1979; Kerr and Kamke 2003; Schramm and Hunt 2007). In 2005, number of tournaments per state ranged from 20 in the District of Columbia to 6,000 in Texas (Schramm and Hunt 2007). Duttweiler (1985) found that black bass *Micropterus* spp. represented the majority of freshwater tournament fishing in the United States, a ratio of 10 to 1 when compared to other species. Likewise, Schramm et al. (1991b) reported found that black bass were the target species in 78% of all competitive fishing events held on inland waters in North America.

Organized competitive fishing for black bass originated in Alabama in 1967 with the formation of the Bass Anglers Sportsman Society which has become the most recognized organization conducting bass fishing tournaments (Shupp 1979). Since 1967, many other bass tournament groups have been organized on the local, state, and national level, expanding from primarily southern and midwestern states to all regions of the continental United States. Advances in fishing technologies such as boats, motors, electronics, tackle, and accessories have come as a result of the popularity of tournament fishing and have led to greater specialization of black bass anglers. Wilde and Ditton (1994) found anglers that identifying themselves as specifically targeting largemouth bass *Micropterus salmoides* had characteristics different than anglers generally targeting just "bass", having more years of fishing experience, spending more

days fishing, having a higher percentage of boat ownership, and were more likely to participate in tournaments or belong to fishing clubs. Wilde et al. (1998) examined differences between tournament and non-tournament anglers and found that tournament fishermen were a more specialized group, spending more days fishing annually and were more invested in the resource. Tournament anglers undoubtedly have higher expenditures than many noncompetitive anglers due to larger tow-vehicles, boats and motors, and increased use of fuel, tackle, travel, and lodging (Schramm et al. 1991a).

Many tournament events last multiple days and attract participants from outside the region or state, (exceeding 50% of anglers in some tournaments), but can range in size from a few anglers in a Local Club to several thousand anglers (Schramm et al. 1991a). These events can result in substantial expenditures in the local communities where the event is held and can be an important component of the local economy which often spend thousands of dollars to attract these tournaments (Schramm et al. 1991a). The Southern Collegiate Bass Fishing Series in 2009 averaged more than eighty anglers in each of its four tournaments in North Alabama and attracted anglers from seven different states traveling an average distance of 850 km one way to reach the tournament (Myles and Swaim 2010). Competing anglers spent an average of $127.77 each day during the events, which resulted in a total direct economic impact of $111,141, including tournament organizer expenditures.

Recent boosts in tournament coverage through websites and other media emphasize that tournament fishing is more widespread now than it has been in the last twenty years (Schramm and Hunt 2007). The popularity of high-profile tournament series has turned fishing into a spectator sport where fans attend tournaments and follow the sport through various forms of printed and electronic media. The 2012 Bassmaster Classic, held over a three-day period in

Shreveport, Louisiana, attracted over 63,000 spectators who spent an average of $55.09 for local daytrippers, $120.75 for out-of-town daytrippers, and overnighters $273.73, for a total direct economic impact of $10.9 million to the Shreveport-Bossier metropolitan area (Destination Exploration 2012).

These tournaments often attract high levels of participation, of which a large proportion are not from the local area, and can be assumed to incur many travel and fishing related expenses in close proximity of Lake Guntersville (Schramm et al. 1991a). Chen et al. (2003) found on Lake Fork, Texas, that anglers from bordering states had average per trip expenditures that were six times more than those of local anglers, and non-bordering states spent over ten times per trip on average than local anglers. Ditton et al. (2002) predicted that areas with good fishing opportunities with large population concentrations on their borders are most likely to benefit from fishing as tourism; thus, Lake Guntersville is likely to attract many out of state tournaments due to its location within 300 km of four major metropolitan areas, three of which are outside Alabama.

Thus, black bass tournaments have a significant economic impact on the communities that hold these events, and numerous studies have recognized the importance of determining economic values of competitive fishing (Shupp 1979; Schramm et al. 1991a; Schramm and Hunt 2007). However, economic valuations of competitive fishing to date have determined the economic value of individual competitive events, but few have determined the overall economic impact of tournament angling on a specific resource (Driscoll et al. 2010). This study looks to address this concern by determining the overall economic impact of tournament bass angling on Lake Guntersville, Alabama, a main stem impoundment of the Tennessee River.

I. 2. Site Description

The birthplace of organized bass fishing tournaments and home to many large freshwater impoundments, the state of Alabama is well known for its black bass fisheries. In 2011 in Alabama 683,000 anglers spent $456 million statewide on recreational angling. Approximately 30% of these anglers were nonresidents

The 27,500-ha Lake Guntersville is the largest impoundment in the state of Alabama, located in the northeastern corner of the state adjacent to both Georgia and Tennessee. The reservoir was impounded in 1939 and provides flood control, navigation, hydroelectric power, water supply, and recreational opportunities. Lake Guntersville is predominantly known for its excellent fishing opportunities especially for black bass. In 2012 it was ranked by Bassmaster Magazine as the third best bass fishing lake in the country and boasts healthy populations of largemouth bass, spotted bass *Micropterus punctulatus,* and smallmouth bass *Micropterus dolomeiu* (Hall et al. 2012). Lake Guntersville also attracts several large tournament Trails including FLW series (Walmart FLW Tour, the FLW Everstart Series, the Walmart Bass Fishing League, and FLW College Fishing), Bassmaster series (the Bassmaster Elite Series, the Bassmaster Open Series, the Bassmaster Weekend Series), and American Bass Angler tournament series. Also, numerous Large Open events occur annually such as the Sealy Big Bass, Oakley Big Bass, the Rat-L-Trap Classic, the Snag Proof Open, the Spro Frog Open, and the Gambler Lures Tournament. Large tournaments and tournament series can produce significant economic impacts to the local Lake Guntersville area, specifically the surrounding towns of Guntersville and Scottsboro, and the surrounding counties of Jackson, Madison, and Marshall (Figure 1).

I. 3. Economic Valuation

One of the most common models for estimating the economic values of recreational fisheries is the travel cost method (TCM) (Palm and Malvestuto 1983; Sorg and Loomis 1986; Stynes and Donnelly 1987; Shrestha et al. 2002; Ojumu et al. 2009).   TCM is a revealed preference approach to estimating a demand curve for angling using travel costs (vehicle fuel, lodging, food and drink, etc.), angler expenditures (boat fuel, fishing equipment, license and tournament fees, etc.), substitute sites, opportunity costs, income distributions, and socioeconomic factors as it relates to distance traveled to reach the fishing site (Stynes and Donnelly 1987; Shrestha et al. 2002). Opportunity cost of income determines the value anglers place on a resource using the relationship between a percentage of their hourly salary, typically ranging from 25% to 50%, and the time spent travelling to and from a site (Sorg and Loomis 1986; Donnelly 1987; Pollock et al. 1994).

Opportunity cost of a substitute site examines how far an angler will travel to reach a target fishing site, as opposed to a substitute site (Sorg and Loomis 1986; Stynes and Donnelly 1987; Pollock et al. 1994). Possible bias can arise using the TCM to evaluate a fishery if multiple destination or multiple purpose trips are included in the estimate (Sorg and Loomis 1986). The recreational use value of a fishery is measured by anglers' willingness to pay, also known as consumer surplus, which is a non-market value placed on a resource representing the net benefit attributable to a fishery (Palm and Malvestuto 1983; Shrestha et al. 2002). Therefore, the consumer surplus of an individual can be considered the amount an angler is willing to pay for the use of a resource above and beyond their actual expenditures (Sorg and Loomis 1986). The contingent valuation method (CVM) is another model used to estimate consumer surplus by using a bid style approach to determine an individual's willingness to pay to use a resource

(Pollock et al. 1994). A potential bias in the CVM, however, is that individuals will often deflate or inflate estimates based on if they believe that higher charges will result from the survey, or that a resource with low economic value will be lost.

To measure the impact of the tournament black bass fishery on Lake Guntersville beyond direct expenditures a multiplier effect was used from Myles and Swaim (2010) which looked at the economic impact of college tournaments in North Alabama.

I. 4. Angler Surveys

The two main designs to conduct angler surveys on fishery resources are through access point and roving creel methods (Robson and Jones 1989). During access point surveys, a creel clerk waits at a boat ramp at a predetermined time and intercepts anglers as they complete their fishing trip. To be representative of an entire calendar year of tournament fishing this survey should be performed for 12 calendar months (Carlander et al. 1958).

I. 5. Rationale and Significance

Tournament fishing is and has been a growing use of our freshwater fishery resources since the late 1960's. Most recent estimates show over 30,000 inland competitive fishing events are being held annually in the United States of which approximately 80% are targeting black bass (Schramm and Hunt 2007). Wilde et al. (1998) found that black bass anglers fishing in tournaments exhibit greater angler specialization than other bass anglers. Fishing is a more central part of the lives of these anglers, they spend more days fishing, and invest more in fishing equipment. These anglers also typically have higher expenditures than noncompetitive anglers, often with great sums of money invested into tow-vehicles, performance boats and motors, tackle, fuel, and travel expenses to compete in events (Schramm et al. 1991a).

Quantifying the effort expended by tournament anglers in Lake Guntersville will provide insight into a component of the fishery that has not been directly studied previously. Valuating anglers' expenditures (tackle, equipment, licenses, food, travel, and lodging) by the location of these expenditures (towns, cities, and counties in the region) will provide estimates of the contribution of fishing tournaments to local economies and tax bases. Schramm et al. (1991a) found that in half of the tournaments studied, over 50% of the anglers were from out-of-state. With the proximity of Lake Guntersville to both Tennessee and Georgia it is likely that many anglers fishing in tournaments are non-residents. With the wide range of sizes and frequency of tournaments, the impact on the regional economies is likely highly variable among tournaments. Quantifying these differences will allow local chambers of commerce and tourism bureaus to better utilize resources to target specific angler markets to maximize their economic benefits from tournaments.

I. 6. Study Objectives

This study estimates the economic value of tournament black bass fishing, to the towns, cities, and counties (Jackson, Marshall, and Madison) surrounding Lake Guntersville, Alabama and their tax contributions to these locales. Specifically, the project objectives are:

1. Quantify black bass tournament angling effort;

2. Quantify total travel costs for all tournament types angling for black bass;

3. Partition total tournament trip travel costs into the local cities and counties in which they occurred;

4. Quantify the consumer surplus associated with the demand on tournament black bass angling; and

5. Investigate the impact of socio-demographic variables on tournament fishing expenditures and associated taxes on local cities and counties.

II. METHODS

II. 1. Survey Design

The nature of bass tournaments where anglers depart from a single ramp together and return at a scheduled time to "weigh-in", made it necessary to use an access point survey in this study as opposed to a roving creel survey. I contacted local merchants, tournament organizers, and fishing clubs to determine where tournaments were being held and when the weigh-in would take place. Due to the chaotic nature of the weigh-in period with anglers weighing in fish, loading and securing their boats and gear, a conventional full creel interview was impractical. Therefore, prepaid postage mail surveys were distributed to anglers at the weigh in.

Survey questions included socio-demographic characteristics of anglers, substitute site information, and specific trip catch and expenditures (Appendix I). Due to the Alabama Department of Conservation and Natural Resources (ADCNR) interest in the use of castable umbrella rigs (A wire harness to which multiple baits can be attached to be used simultaneously) we asked if anglers used them while fishing tournaments on Lake Guntersville.

Tournaments were separated into different tournament types based on distinctive characteristics including number of events annually, number of participants, whether a tournament organizer was present, cost of entry fee, whether there was angler registration, organization membership, and if a set schedule existed. Prior to sampling black bass tournaments were separated into eight different types using the above characteristics which resulted in Professional, Semiprofessional, Large Open, Small Open, Trail, Non-Local Club, Local Club, and Wildcat tournaments. Professional events were the most organized and affiliated with a national fishing organization, had more than 300 participants, entry fees over $400, and a

large proportion of non-local anglers. Semiprofessional tournaments were affiliated with a national fishing organization as well, had over 100 participants, entry fees over $100, and attracted regional anglers. Large Open tournaments were one time large events on the reservoir that attracted many nonlocal anglers, were well organized, and ranged from 100 to 1200 participants. Small Open tournaments were single events that were normally held for charity or fund raising. These tournaments had a tournament organizer, typically 20 or more boats, and entry fees starting at $30. Trail tournaments were characterized as being part of a larger series where anglers competed against each other over the course of a season and had an official tournament director and were often sponsored. These tournaments typically had more than 20 boats, were mostly made up of regional anglers, and entry fees over $50. Non-Local Club and Local Club tournaments had similar characteristics including some form of tournament director, typically less than 20 boats, and entry fees less than $40. The difference between these two was the NonLocal Clubs were generally from out of state and would make Lake Guntersville their biggest trip of the year often fishing multiple day events. Lastly Wildcat tournaments were the least organized and were either spontaneous events or had a regular weekly schedule in which anyone could participate, for example from early spring to late fall there were weekly Tuesday and Thursday night Wildcat events. These tournaments had the lowest participation typically fewer than 15 boats, entry fees less than $40, and consisted of local anglers.

II. 2. Sampling Schedule and Tournament Selection

Tournament sampling began in February, 2013, and was completed at the end of January 2014. Sampling was primarily conducted on weekends (Saturday and Sunday) due to data found by McKee (2013) on Guntersville that approximately 90% of tournaments occurred between the days of Saturday and Sunday. During the peak tournament seasons of February-June and

September-November three weekend sampling trips were conducted each month when there were known tournaments occurring on Lake Guntersville. During the summer season, July-August, when many tournaments were fished into the evening, I conducted weekday trips to assess those nighttime events with a supplemental weekend trip if a known tournaments were occurring. During the winter season December-January, when there were fewer occurrences of tournaments two weekends were randomly sampled at major boat ramps.

Tournaments during which surveys were distributed were selected using a random non-uniform probability sampling where tournaments were chosen based on frequency of tournament type observed by McKee (Auburn University, unpublished data) on Lake Guntersville in 2012 (Table 1, Figure 2). Initial classification had both Local and Non-Local Club tournaments combined. Large single events received priority when occurring concurrently with smaller events to be certain their value was not overlooked and undocumented. Tournaments sampled were scheduled to maximize effective effort in distributing surveys on sampling trips.

II. 3. Survey Distribution

All surveys distributed were marked with a unique identification number to assign an angler contact to each individual survey. Surveys were distributed at the conclusion of tournaments, prior to or directly after, "weigh-in" (Exceptions were made if there was another method of obtaining a representative sample of competing anglers. e.g. pretournament meeting). Anglers were contacted once they removed their boat from the water while prepping their boat for Trailering or upon weighing and releasing their fish. Upon approaching the angler(s) the creel clerk identified themselves and stated their purpose. With the angler's permission a survey was distributed to them. Each survey packet directed anglers to complete the survey and return it

in the postage prepaid envelope or take the survey online instead if they preferred. The creel

clerk then asked for tournament affiliation, and if possible, recorded contact information from

that angler on the 'Tournament Angler Data Sheet' (Appendix II) next to the corresponding

survey number. If an angler declined to take the survey, a tic mark was placed into a category

labeled NS (Not Surveyed) on the 'Tournament Angler Data Sheet'. If the angler had already

been surveyed and refused to complete another survey a tic mark was placed in the category AS

(Already Surveyed) on the 'Tournament Data Sheet' (Appendix III).

Once the tournament is completed the creel clerk interviewed the tournament organizer to

collect data about the tournament on the 'Tournament Information Sheet' (Appendix IV).

Data collected on 'Tournament Information Sheet'

- Tournament (Club/Series name):
- Weigh-in location:
- Tournament Date(s):
- Launch time:
- Weigh-in time:
- Team or Individual:
- Entry Fee:
- Number of boats:
- Number of tournaments on Guntersville in 2013:

II. 4. Effort and Catch

Black bass tournament angling effort is a principle component to determine the overall

expenditures of tournament anglers on Lake Guntersville and provides useful information for

local governments and the ADCNR. This value was obtained using observed tournament

frequency on Lake Guntersville and expanded to estimate the total number of tournaments on the

reservoir for the calendar year by tournament type. Tournament angling effort and catch for an individual tournament was determined using the following equation

$$E(C)_j = \sum_{j=1}^{n} E(C)_h \times w_j \qquad (1)$$

where h represents an individual in a tournament, w_j represents the weighting factor for tournament j, $E(C)_j$ is total tournament angling effort in hours (or catch) for all anglers in an individual tournament in angler hours, and $E(C)_h$ represents the angling effort in hours (or catch) of each individual in a tournament. w_j is a weighting factor used to extrapolate known values to the entire tournament j population.

For each tournament surveyed, the total number of participants was determined by talking to a tournament organizer or participant in the event. This value along with the number of returned surveys was used to calculate the weighting factor w_j in the following equation

$$w_j = \frac{P_T}{S_R} \qquad (2)$$

where S_R represents the number of surveys returned and P_T is the total number of participants in the tournament. The total number of participants in each tournament was determined by talking to the tournament organizer.

Angler effort (or catch) for each tournament type was calculated using the following equation

$$E(C)_i = \sum E(C)_j \times w_i \qquad (3)$$

where i represents each tournament type, $E(C)_i$ represents the angling effort (or catch) of all individual tournaments within a single tournament type, $E(C)_j$ is as defined in equation 1, and w_i is the weighting factor to expand the cost estimate to all tournaments within type i where 1 = Wildcat, 2 = Local Club, 3 = Non-Local Club, 4 = Trail or Series, 5 = Small Open, 6 = Large Open, 7 = Semiprofessional, and 8 = Professional.

The weighting factor w_i is based on the uncertainty of knowing if a tournament within a tournament type occurred and was calculated using the following equation

$$w_i = \frac{(N_i + S_i + U_i) \times (U_i + S_{ALL})}{(S_i + U_i) \times (S_{ALL})} \tag{4}$$

where N_i is the number of tournaments of tournament type i that were known but not sampled due to sampling limitations, S_i is the number of known tournaments that were sampled of type i, U_i is the number of tournaments that were unknown of tournament type i but discovered while sampling another tournament, and S_{ALL} is the total number of known tournaments that were sampled of all tournament types.

Known tournaments that were sampled were tournaments that I knew were occurring on Lake Guntersville and were thus present to sample. Known but not sampled tournaments were tournaments I knew were occurring but were not sampled because of lack of manpower to cover all tournaments occurring on the lake. Unknown tournaments that were sampled were tournaments that I did not have knowledge of prior to sampling and were discovered while sampling known tournaments.

The overall effort (or catch) for anglers across all tournament types was calculated using the following equation

$$E(C) = \sum_{A=1}^{8} E(C)_i \qquad (5)$$

where $E(C)$ is the sum of aggregated effort (or catch) for each tournament type i and $E(C)_i$ is as

defined in equation 4.

Catch per unit effort (CPUE) is an estimate of angler success rate and was calculated

using the equation

$$CPUE = \frac{C}{E} \qquad (6)$$

where C is the total number of black bass caught across all tournament types and E is angler

effort in hours across all tournament types.

Catch per unit effort for each tournament type i ($CPUE_i$) was calculated using the

equation

$$CPUE_i = \frac{C_i}{E_i} \qquad (7)$$

where C_i is total number of black bass caught in tournament type i and E_i is total angler effort for

tournament type i.

II. 5. Expenditures

The tournament survey was used to collect angler expenditure and demographic data to

calculate total expenditures of tournament anglers. The estimated total number of tournaments

by tournament type occurring on Lake Guntersville and the average angler participation in these

events was used to estimate total number of angler trips to Lake Guntersville. The formal mail

survey was used to estimate average expenditures per trip. Tournament anglers provided data for several key independent travel cost variables (vehicle fuel, boat gas, lodging expense, groceries, meals, fishing tackle, guide fees, boat launch fees, repair/maintenance fees, and tournament entry fees).

The following equation calculates actual travel cost for a participant in a tournament

$$TC_h = \sum_{h=1}^{n} (x_1 + x_2 + x_3 + \cdots x_n) \tag{8}$$

where h represents an individual in a tournament, TC_h represents the travel cost of each individual in a tournament and x_n represents the independent cost variables n where 1=vehicle fuel, 2=boat gas, 3=lodging expense, 4=groceries, 5=meals, 6=fishing tackle, 7=guide fees, 8=boat launch fees, 9=repair/maintenance fees, 10=tournament entry fees, and 11=license fees.

To calculate the travel cost of each tournament the following equation was used

$$TC_j = \sum_{j=1}^{n} TC_h \times w_j \tag{9}$$

where w_j represents the weighting factor for tournament j as defined in equation 2, TC_j represents the total travel cost for all participants in tournament j, and TC_h is as defined in the above equation 8.

Travel cost for each tournament type will be calculated using the following equation

$$TC_i = \sum TC_j \times w_i \tag{10}$$

where i represents each tournament type, TC_i represents the travel cost of all individual tournaments within a single tournament type, TC_j is as defined in equation 4, and w_i is the weighting factor to expand the cost estimate to all tournaments within type i as defined in equation 4.

The overall travel cost for anglers across all tournament types was calculated using the following equation

$$TC = \sum_{A=1}^{8} TC_i \tag{11}$$

where TC is the sum of aggregated travel cost for each tournament type i and TC_i is as defined in equation 6.

II. 6. Tax Revenue

Local tournament trip expenditures occurring in the cities of Scottsboro and Guntersville, and the three counties of Jackson, Madison, and Marshall will be identified and the impact of tournament angling on these local tax bases and how they were spent will be quantified. Non-local expenditures are those that occurred outside the local area.

Total expenditures calculated in equation 11 were sorted by their location, city, county, and state. The tax rates used by the Alabama Department of Revenue were then applied to these expenditures to determine fuel, lodging, and general sales tax revenues for the local cities, counties, and State of Alabama (Table 2). Tax revenues were not calculated for out of state expenditures.

To calculate fuel tax revenues the tax rate of $3.34 per gallon of gas was divided by the average price of a gallon of regular unleaded gasoline for the state of Alabama in 2013 (C. Ingram, AAA Alabama, personal communication). This percentage tax rate was then multiplied by the total fuel expenditures in each location to estimate fuel tax revenues. The distribution rates of tax revenue within Alabama, local counties, and cities were obtained from McKee (2013).

II. 7. Travel Cost Model

The Travel Cost Model (TCM) as described by Parsons (2003) was used to describe the relationship between annual tournament visits to Lake Guntersville and a number of independent variables including travel cost, opportunity cost of a substitute site, tournament type, and socio-demographic characteristics. To determine the demand for tournament angling trips, opportunity costs must first be calculated for round trip travel time and for the option of tournament fishing at a substitute site. The following equation is used to calculate the opportunity cost for roundtrip travel time (OC_a):

$$OC_a = \frac{D_a}{55mph} \times (\frac{H_a}{2000})/3 \tag{12}$$

where H_a is annual household income for an angler, a; and D_a is roundtrip distance travelled in miles to Lake Guntersville for that angler. This equation values travel time as one-third of an angler's hourly pay rate which is calculated by taking annual household income and dividing it by the standard 2,000 hour work year (40 hours per week multiplied by 50 weeks per year). To quantify time spent travelling from home to Lake Guntersville and back home roundtrip travel distance was divided by an average speed of 55 mph (Prado 2006; Ojumo 2009).

Opportunity cost of travel for a substitute site is calculated similarly to equation 12, but using the roundtrip distance to the substitute site instead of roundtrip distance to Lake Guntersville.

I estimated travel cost for an individual angler (T_a) by:

$$T_a = OC_a + X_a \qquad (13)$$

where X is the summation of an angler's expenditures incurred on a tournament trip, including vehicle operation, lodging, restaurant meals, and groceries; and OC is as defined in equation 12.

Cost of vehicle operation was calculated by multiplying the angler's roundtrip distance travelled in miles by \$ 0.565, which was the Federal mileage reimbursement rate for vehicle operation for business purposes in 2013 (Internal Revenue Service 2012). This is within the American Automobile Association's composite average range of \$0.52 to \$0.78 per mile in 2013 (American Automobile Association 2013).

The quantity demanded (Q) for all tournament fishing trips on Lake Guntersville will be calculated using the following equation:

$$Q = \beta_0 + \beta_1 T + \beta_2 S + \beta_3 H + \beta_4 V + \varepsilon_i \qquad (14)$$

where β_n are parameter estimates for the regression, T is travel cost, S is opportunity cost of travelling to an substitute site, H is angler income, V is a matrix of socio-demographic variables that can effect fishing demand, and ε_i is random model error (Ojumu et al. 2009). It is expected that the demand curve would have a negative relationship between travel cost and number of trips demanded as visit cost increases as travel distance to the reservoir increases, therefore the number of tournaments an angler would fish on Guntersville should decrease as well.

I obtained individual angler household income through asking them to identify which income bracket range they belonged. The midpoint of each income range was then calculated and used in the TCM. To correct for the top income range being infinite (>$200,000), I added half of the preceding bracket income range ($200,000 - $100,000 / 2 = $50,000) to the initial value of the highest income bracket ($200,000 + $50,000 = $250,000).

I calculated Cook's distance for variables in the dataset and removed influential entries where Cook's distance was greater than four over the sample size (Bollen and Jackman 1990, SAS 2009). To account for overdispersion, truncation, and endogenous stratification I used a count model with a negative binomial distribution to estimate the quantity of tournament trips demanded by anglers on Lake Guntersville because the dependent variable, tournament trips, is a non-negative integer (Parsons 2003; Martínez-Espiñeira and Amoako-Tuffour 2008). This model weights the dependent variable, visits, by the number of days an angler spent at Lake Guntersville to correct for endogenous stratification and truncation. An additional parameter (α) is present in this model to account for missing heterogeneity and prevent the overdispersion present when the variance is larger than the mean for the data, which is common when looking at number of visits taken. Number of tournament trips taken were calculated using the negative binomial count model:

$$\lambda = \exp(\beta_0 + \beta_1 T + \beta_2 S + \beta_3 H + \beta_4 V + \alpha) \tag{15}$$

where λ is the expected number of tournament trips an angler will take, β are coefficient estimates, T is aggregated travel cost, S is opportunity cost of an substitute site, H is an angler's household income, V is a matrix of socio-demographic variables, and α is a parameter that determines the degree of dispersion in the predictions (Parsons 2003; Martínez-Espiñeira and

Amoako-Tuffour 2008). To accurately estimate consumer surplus using the TCM the variables travel cost, income, and substitute site opportunity cost must be included in the model (Kling 1989; Parsons 2003). Other variables selected to be used in the model were found to be statistically significant at $P \leq 0.05$ and collinear variables were removed (Ward and Beal 2000).

II. 8. Consumer Surplus

Consumer surplus gives the value above and beyond the actual cost of a tournament angling trip to Lake Guntersville that anglers are willing to pay to use the resource (Figure 3). Consumer surplus per tournament trip on Lake Guntersville was estimated using:

$$CS = \frac{(\hat{\lambda}/-\hat{\beta}_1)}{\hat{\lambda}} = \frac{1}{-\hat{\beta}_1} \tag{16}$$

where CS is the consumer surplus for a single tournament trip, $\hat{\lambda}$ is the estimated number of tournament trips, and $\hat{\beta}_1$ is the estimated travel cost coefficient from the TCM (from equation 15) (Parsons 2003). To estimate aggregate consumer surplus for the entire fishery the consumer surplus was multiplied by the estimated total number of tournament trips on Lake Guntersville. The second-order Taylor series approximation was used to calculate the standard error for the consumer surplus per tournament trip and was estimated using:

$$Var\left(\frac{1}{-\hat{\beta}_1}\right) = \left(\frac{\Upsilon^2}{-\hat{\beta}_1^{\,4}}\right) + 2\left(\frac{\Upsilon^4}{-\hat{\beta}_1^{\,6}}\right) \tag{17}$$

where Υ is the standard error of $\hat{\beta}_1$ (Englin and Shonkwiler 1995).

II. 9. Local Impact of Tournament Angling

Results of this analysis will be useful to local cities and counties as it can indicate the demographic groups they should target to increase tournament angling expenditures and taxes. This will be conducted by sorting total expenditures and taxes by location, tournament type, and other significant socio-demographic variables that might influence angler expenditures. From this analysis local government agencies and businesses can make more well-informed decisions on how to efficiently target angler groups to fish tournaments on Lake Guntersville.

III. Results

III. 1. Descriptive Survey Statistics

On site sampling of Lake Guntersville resulted in 77 different tournaments sampled and 1672 total surveys distributed to tournament black bass anglers from February 2013 to January 2014 (Figure 4). The most frequent tournament type sampled was Non-Local Club (23%) followed by Trail or Series (21%), Local Club (17%), Small Open (16%), Wildcat (9%), Large Open (6%), Semiprofessional (6%), and Professional (1%) (Table 3). Anglers returned 439 surveys which resulted in a response rate of 26%. On average 21.7 anglers were contacted and 5.7 surveys were returned by anglers from each tournament. Of those surveys returned 84% of the surveys were returned by mail and 16% of them were completed online. Of the 439 returned surveys only 28 anglers (6%) had been sampled at a previous tournament.

On average 58.7 (SE, 16.9) anglers fished in tournaments on Lake Guntersville from February 2013 to January 2014. This ranged from an average of 7 (SE, 2.3) anglers in Wildcat tournaments to 466.8 (SE, 206.7) in Large Open events (Table 3). The typical tournament angler on Lake Guntersville was a Caucasian male, 49 years old with 18 years of tournament fishing experience, and a mean annual household income of $106 thousand. On average, tournament anglers travelled 262 km one way, practiced 2 days for each tournament, and fished 6.7 tournaments annually on Lake Guntersville. Tournament anglers were generally satisfied with their angling experience averaging 3.2 out of 5 and catching an average of 8.5 bass during a tournament day. Thirty-seven per cent of tournament anglers stayed overnight while at the lake and 48% were from out of state. Forty per cent of anglers used a castable umbrella rig (Alabama

Rig) in the tournament about which they were interviewed, and 45% of tournament anglers belonged to a bass club.

Professional anglers travelled the farthest to fish tournaments on Lake Guntersville (621km one way) and constituted the greatest proportion of out of state anglers 80%. Semiprofessional, Large Open, and NonLocal Club tournaments all consisted of over 43% out of state anglers. Professional, Semiprofessional, Large Open, and Small Open tournament anglers stayed over 2.45 at Guntersville per trip and practiced on average more than 1.5 days per tournament (Table 4).

III. 2. Effort and Catch

Total overall tournament angling effort on Lake Guntersville was estimated to be 89,684 angler hours. Assuming one practice day is equivalent to the number of hours in a tournament day, overall effort for both practicing and tournament fishing was over 266 thousand angler hours. I estimated 10,035 anglers fished in 272 tournaments held on Lake Guntersville from February 2013 to January 2014. The most angling effort was observed at Large Open (36%) or Semiprofessional events (24%) followed by Trail or Series (9%), Small Open (8%), Wildcat (7%), Professional (6%), Non-Local Club (5%), and Local Club (4%) tournaments (Table 5).

Overall catch for tournament anglers were 69,415 black bass resulting in an average Catch per unit effort (CPUE) of 0.77 across all tournament types. A total of 18,872 black bass were caught and then held in the live well before being released when culling. This resulted in an average of 0.21 released by culling per unit effort (RPUE). Tournament anglers weighed in 22,931 black bass on Guntersville for an overall weighed in per unit effort (WPUE) of 0.26 (Table 5).

Wildcat tournament anglers fished a total of 6,206 hours and had a mean trip length of 5.84 hours per angler per event and mean one way travel distance of 24 km. Wildcat tournament anglers caught a total of 12,326 black bass for an average CPUE of 1.99, the highest of all tournament types. Average RPUE and WPUE were calculated to be 0.49 and 0.42 respectively (Table 5).

Local Club tournament anglers fished a total of 3,849 hours and had a mean trip length of 9.5 hours per angler per event and mean one way travel distance of 93 km. These anglers caught a total of 4,366 black bass for a CPUE of 1.13, a RPUE of 0.31, and WPUE of 0.36 (Table 5).

Non-Local Club tournament anglers fished a total of 4,463 hours and had a mean trip length of 11.05 hours per angler per event and mean one way travel distance of 321 km. Non-Local Club tournament anglers caught a total of 3,707 black bass and had a CPUE of 0.83, RPUE of 0.18, and WPUE of 0.32 (Table 5).

Trail and Series tournament anglers fished a total of 7,922 hours and had an average trip length of 8.2 hours per angler per event and mean one way travel distance of 133 km. These anglers caught a total of 8,200 black bass and had a CPUE of 1.04, RPUE of 0.38, and WPUE of 0.42 (Table 5).

Small Open tournament anglers fished a total of 7,434 hours and had an average trip length of 8.1 hours per angler per event and mean one way travel distance of 204 km. Small Open anglers caught a total of 11,054 black bass and had a CPUE of 1.49, RPUE of 0.41, and the highest WPUE of all tournament types at 0.48 (Table 5).

Large Open tournament anglers fished a total of 32,258 hours and had an average trip length of 13.4 hours per angler per event and mean one way travel distance of 286 km. These

anglers caught a total of 14,034 black bass and had a CPUE of 1.49 and RPUE of 0.12. Large Open tournament anglers had the lowest WPUE of all anglers at 0.10 (Table 5).

Semiprofessional anglers fished a total of 21,920 hours from February 2013 to January 2014 and had an average trip length of 10.5 hours per angler per event and mean one way travel distance of 160 km. Semiprofessional anglers caught a total of 13,810 black bass for a CPUE of 0.63, RPUE of 0.15, and WPUE of 0.28 (Table 5).

The only Professional tournament on Guntersville from February 2013 to January 2014 had a total effort of 5,632 hours and the event length was 16 hours and anglers had a mean one way travel distance of 621 km. Professional anglers caught a total of 1,918 fish in the event, releasing 518 bass when culling and weighing in a total of 1,138 bass. CPUE was calculated to be the lowest of all tournament types at 0.34, with the lowest RPUE of 0.09 of all tournament anglers, and WPUE of 0.20 (Table 5).

III. 3. Expenditures

Overall more than 10 thousand anglers competed in Black Bass tournaments on Lake Guntersville and generated $4,570,000 in direct expenditures during February 2013 to January 2014. The greatest expense for anglers fishing tournaments at Lake Guntersville was vehicle fuel and boat gas (33%), followed by tournament entry fees (27%), lodging (16%), tackle (7%), meals (6%), and grocery expenditures (6%). Repair and maintenance expenditures, license fees, launch fees, and guide fees comprised the remaining 6% of expenditures (Figure 5, Table 6). Total economic impact was estimated to be $6.7 million after adding a multiplier of 1.47 to direct expenditures (Myles and Swaim, 2010).

Tournament anglers fishing in Large Open events were responsible for $1.7 million (38%) of total tournament expenditures more than any other tournament type. Semi-Professional tournaments and the single Professional tournament had the second and third highest expenditures of $1.1 million (24%) and $550 thousand (12%) respectively. Trails and series (9%), Small Opens (7%), Non-Local Clubs (5%), Wildcats (3%), and Local Clubs (2%) made up the remaining $1.1 million in expenditures (Table 6). Professional anglers incurred the highest per trip expenditures of $1,568, followed by Non-Local Club ($502), Semi-professional ($486), Large Open ($463), Trail ($421), Small Open ($420), Local Club ($304), and Wildcat ($103) anglers.

Anglers from 20 different states fished tournaments on Lake Guntersville from February 2013 to January 2014. These out-of-state anglers contributed the most to total expenditures spending $2.6 million (56%). Outside of Alabama the states of Tennessee and Georgia contributed most to total expenditures of $1.0 million (22%) and $480 thousand (11%) respectively. Non-local Alabama anglers spent $1.5 million (33%) and Local anglers, those living within 30 miles of lake Guntersville, were responsible for $0.5 million (10%) of the total expenditures (Table 7).

III. 4. Tax Revenue

Tournament Black Bass angling on Lake Guntersville generated $222 thousand in revenue for the State of Alabama and local governments (Table 5). The State of Alabama received 64 per cent of this revenue a total of $141 thousand (Table 5). Fuel sales made up majority of this revenue (47%), followed by lodging (29%), and general sales (23%) (Table 5). State tax revenues were distributed as follows: 34% to roads and bridges; 24% to state health

services, education, and human welfare; 19% to the general fund; 6% to tourism; and 15% was returned to the counties for road maintenance, education, and tourism (Table 8).

For the local cities of Guntersville and Scottsboro, and counties of Jackson, Marshall, and Madison, tournament black bass angling generated $81 thousand in tax revenue. The city of Guntersville collected $33,809 in revenue of which 74% went to the general fund, which also provides road maintenance, 17% to tourism, and 9% to education (Tables 6 and 7). The city of Scottsboro generated $21,300 in tax revenue which distributed 87% to the general fund, 10% to education, and 3% to road maintenance (Tables 9 and 10).

Tournament angling expenditures generated $18,561 in tax revenue for Jackson County of which 52% went to tourism, 33% to education, and 25% went to maintenance of roads and bridges (Table 8 and 10). Marshall County received $6,556 in tax revenue from tournament anglers (Table 8). Sixty per cent of these funds went to tourism, road maintenance received 25%, and 14% of these funds went toward education (Table 9). Tournament angling revenues for Madison County were $622 of which 60% went to road maintenance, 37% went to education, and 4% went to tourism (Tables 9 and 10).

III. 5. Travel Cost Model and Consumer Surplus

Prior to estimating the TCM, outliers were removed using Cook's Distance procedure, resulting in the elimination of less than 5% of data set observations. The independent variables travel cost, log of household income, years of tournament experience, and number of practice days were significant in explaining the dependent variable number of tournament visitation to Lake Guntersville (Table 10). The independent variable opportunity cost of a substitute site was found to be non-significant, however, must be included in the model do to requirements of the

TCM to estimate consumer surplus (Kling 1989; Parsons 2003). The estimated negative binomial count model of demand for tournament visits for all tournament anglers on Lake Guntersville was:

$$\lambda = \exp(0.006 - 0.0015\,T + 0.0005\,S + 0.1584\,H + 0.0129\,E + 0.0628\,P + 1.0875) \quad (18)$$

where λ was the number of expected black bass tournament angling visits, T was the travel cost, S was the opportunity cost of a substitute site, H was the log of household income, E was years of tournament fishing experience, and P was number of days spent practicing before the tournament (Table 10).

Travel Cost was found to have a negative relationship with the dependent variable visits which indicates that an increase in travel cost will cause a decrease in the number of tournament visits an angler will make to Lake Guntersville. The independent variables log of household income, number of days spent practicing before the tournament, and years of tournament fishing experience had a positive relationship with the dependent variable visits, therefore, an increase in any of these variables will result in more tournament visits. The variable opportunity cost of substitute site was found non-significant in the model but was positively correlated with visits, which I would expect as distance to substitute sites and increasing travel costs should result in more visits to Lake Guntersville.

Consumer surplus for all tournament anglers of all tournament types was $667 per visit (SE, $62). Total willingness to pay (WTP) for a tournament angler on Lake Guntersville was $1,122 per visit which was found by summing the consumer surplus and the mean travel cost ($455). Thus, consumer surplus represented 59% of the total WTP for a tournament angler. Consumer surplus per visit was converted to consumer surplus per day by dividing by average

length of trip for an estimate of $225. Aggregate consumer surplus and willingness to pay for the tournament fishery on Lake Guntersville was estimated to be $6.7 million and $11.3 million, respectively.

Consumer surplus for out-of-state tournament anglers was $909 per visit (SE, $170) and $292 per day. Total WTP for out-of-state tournament anglers was $1,689 per visit (Table 11). Consumer surplus for in-state tournament anglers was $588 (SE, $107) and $207 per day. Total WTP for in-state tournament anglers on Lake Guntersville was $881 (Table 12).

IV. Discussion

IV. 1. Sampling Techniques

Typically black bass tournaments are held on weekends, have specific start and end times, require the use of watercraft, and each tournament is conducted at a single location. Due to these characteristics it was decided an access point survey was best suited for the highest response per sampling effort. Typically access point surveys are conducted using random nonuniform probabilities of sampling access points, however, Lake Guntersville is 121 km in length, has over thirty boat ramps that could hold tournaments, and prior information as to tournament use of individual ramps was unavailable (Malvestuto 1996). Therefore, I used prior roving creel data from a previous angler survey on Lake Guntersville to assign nonuniform probabilities to different tournament types and used all resources available (bait and tackle shops, information, flyers, internet websites, and direct communication) to identify tournaments occurring on Lake Guntersville from February 2013 to January 2014 (C. E. McKee, Auburn University, unpublished data).

Large single tournaments are known to have a substantial economic impact when compared to numerous small tournaments which I saw in this study as well (Schramm et al. 1991a; Destination Exploration 2012). The Professional Everstart tournament and Sealy Big Bass tournament were each responsible for 12% of the overall tournament angling expenditures on Lake Guntersville. This justifies our reasoning that large single events should have priority when sampling and that random nonuniform probability sampling should be used for all tournaments but these events.

I found that most tournaments originated from several of the larger ramps on Lake Guntersville (Goosepond, Waterfront grocery, Browns creek, and Lake Guntersville State Park). When sampling these ramps it was common to discover previously unknown tournaments and I documented up to five separate tournaments of four different tournament types going out of a single ramp in a single day. A permitting process for black bass tournaments in Alabama would help fisheries managers better manage and estimate the effect of tournaments occurring on the fishery.

Tournament type influenced how each tournament was sampled on Lake Guntersville. For Professional and Semiprofessional events they were highly publicized and there were multiple officials working for a for profit organization which helped inform anglers that a survey was taking place. At these events surveys were distributed after the angler weighed their fish and crossed the weigh-in stage or prior to the event at the pre-tournament meeting. Large Opens were conducted similarly to the Professional and Semiprofessional events, however, in the instance of big bass style tournaments (where anglers can launch from anywhere on the lake and but must weigh in at a specific location) I had to attend the tournament registration to distribute surveys. Small Open, Trail, NonLocal Club, Local Club, and Wildcat tournaments were surveyed

similarly by distributing the surveys as anglers were preparing their boats to Trailer. Therefore, to adequately sample all of the different types of tournaments on Lake Guntersville I had to adapt different strategies in order to maximize the number of anglers surveyed.

In our access point study I contacted on average 21.7 anglers per tournament and received 5.7 returned interviews, compared to McKee (2013) who averaged 4.8 interviews per roving creel. Of our returned surveys only 6% had been interviewed previously, however, I feel this low number is not indicative of the anglers that were contacted multiple times but rather those willing to complete the survey again.

IV. 2. Effort and Catch

I estimated that 272 tournaments occurred on Lake Guntersville from February 2013 to January 2014, which is 79% more than the 58 tournaments there was reported to the Alabama Bass Angler Information Team (BAIT) in 2013 (Abernathy 2013). Overall I found that 10,035 anglers participated in tournaments on Guntersville at this time which is 78% more than the 2,133 anglers which were reported to BAIT (Abernathy 2013). This discrepancy in both number of tournaments and number of anglers per tournament is most likely a result of lack of tournament officials participating in the program.

When compared to a tournament study on Sam Rayburn in 2008 I found that Lake Guntersville has more overall tournaments (272) than Sam Rayburn (101), but Sam Rayburn had many more total participants (19,784) than Guntersville (10,035) (Driscoll et al. 2010). This discrepancy can be explained by the different tournament types which are attracted to each reservoir. Sam Rayburn attracts many Large Open events which have over 1,000 participants in each, while Guntersville attracts many more small Wildcat tournaments which average less than

ten anglers per tournament (Driscoll et al. 2010). Overall tournament effort estimates on Lake Guntersville (89,000 angler hours; 3.2 angler hours per hectare) are comparable to those of Sam Rayburn, Texas (135,145 angler hours; 2.9 angler hours per hectare) in 2012-2013, but neither compare to the effort of Lake Fork (253,346 angler hours; 22.6 angler hours per hectare) (Driscoll and Ashe 2013; Storey and Bennett 2014). Number of black bass weighed and released on Lake Guntersville (22,931) was greater than Sam Rayburn (12,644) but less than Lake Fork (32,064) (Driscoll and Ashe 2013; Storey and Bennett 2014). These levels of effort and catch at Lake Guntersville demonstrate that it is comparable to other lakes which are known for high tournament effort.

Effort and catch varied greatly between different tournament types at Lake Guntersville. Large Open tournaments and Semiprofessional tournaments had the highest effort of all types. This is expected due to the number of anglers in each of these events. The single Professional event on Lake Guntersville had the lowest CPUE of all tournament types, however, the weather was poor that weekend which could have resulted in reduced catch rates. Tournament types that attracted mostly local anglers (Wildcats, Local Club, Small Open, and Trails) had the highest CPUE, all of which were over one fish per hour of effort. When managing a tournament fishery the number of fish caught and then released while culling should be considered because these fish experience more stress than typical catch and release. I estimated that 18,872 bass were caught and then released while culling by tournament anglers. The use of a castable umbrella rig (Alabama Rig) was common on tournaments at Lake Guntersville with 40% of anglers reporting throwing one during a tournament.

IV. 3. Expenditures

Total expenditures by tournament black bass anglers on Lake Guntersville were $4.6 million from February 2013 to January 2014. This estimate of tournament angling expenditures is 34% of the $13.4 million value of the recreational fishery on Lake Guntersville in 2012 and 30% greater than the estimated value of tournament fishery on Guntersville found by McKee (2013). I found that the average tournament trip on Lake Guntersville was $455 which is 56% greater than that for general black bass anglers on Lake Guntersville in 2012 (McKee 2013).

Forty-eight per cent of tournament anglers were from out of state which is consistent with findings of other studies (Schramm et al. 1991a). Overall out of state anglers made up 56% of tournament expenditures on Lake Guntersville which totaled $2.6 million. Local tournament anglers spent $708 thousand and nonlocal Alabama tournament anglers spent $1.3 million. From these findings it is evident that Lake Guntersville is a popular fishery for out of state tournament anglers, which also incur higher license fees and higher travel costs than local and many nonlocal anglers.

Driscoll et al. (2010) found that on Sam Rayburn Reservoir, Texas from November 2007 to October 2008 that tournament angler expenditures were $18.4 million which was 75% more than what I found on Lake Guntersville, however, tournament participation was also 60% greater on Sam Rayburn. In both studies cost of vehicle fuel, boat fuel, and tournament entry fees made up majority of the expenses incurred by tournament anglers (Driscoll et al. 2010).

Average tournament trip costs varied greatly by tournament type at Lake Guntersville ranging from $103 for Wildcat to $1,568 for Professional tournaments. The difference in trip costs between the tournament types can be attributed to the difference between these tournaments and the anglers that participate in them. Higher trip costs were seen in tournaments

that attracted more non local anglers or higher entry fees such as Professional, Semi Professional, Large Open, and Non-Local Club.

IV. 4. Tax Revenue

Overall tax revenue generated by tournament black bass angling at Lake Guntersville was $222,268, of which $141 thousand went to the state of Alabama (64%) and $80 thousand (36%) was dispersed to local city and county governments.

Lodging expenditures generated the greatest tax revenues overall ($88,142). Marshall and Jackson Counties are within the Alabama Mountain Lakes Region which imposes an additional 1% lodging tax which goes to promote tourism within the State of Alabama. Jackson County imposes an additional $1 per night lodging tax which goes to promote tourism within the county. The Cities of Guntersville and Scottsboro received majority of the lodging expenditures at Lake Guntersville and received $20,995 and $11,894 thousand in revenue respectively. The state of Alabama generated $41,502 in tax revenue from tournament lodging expenditures at Lake Guntersville.

Fuel expenditures generated the second largest tax revenues of $72,958 from $1.2 million in expenditures. Fuel tax is based on cents per gallon so the average price per gallon of gasoline in Alabama in 2013 of $3.34 per gallon was used to calculate tax rates for each municipality. Majority of the fuel tax revenue went directly to the State of Alabama ($141,436) of which approximately 6.6% is then redistributed to local county and city governments based on population (55%) and the remaining revenue is distributed equally among the state's 67 counties (McKee 2013). Fuel expenditures related to tournament angling at Lake Guntersville resulted in $658 being distributed to local governments. ADCNR receives $0.0015 per gallon of the $0.16

per gallon state fuel tax resulting in $626 of revenue from tournament bass angling on Lake Guntersville (McKee 2013).

General sales generated the least revenue from tournament fishing expenditures. These expenditures included groceries, restaurant meals, fishing tackle, launch fees, and repair or maintenance purchases. Overall $820,694 in expenditures resulted in $61,168 in tax revenue for the State and local governments. Most of these local general sales revenues went toward education and general funds.

Currently tournament entry fees are not taxed on a state or local level, therefore one of the largest expense categories for tournament anglers does not yield any tax revenue.

IV. 5. Consumer Surplus

To accurately estimate the value of a recreational fishery it is necessary to know how much an angler would be willing to pay exceeding their actual expenditures on a visit. I estimated this value using a TCM in which travel cost, opportunity cost of substitute site, and angler income are necessary variables to estimate consumer surplus (Kling 1989l; Pearson 2003). Other predicting variables were tested for significance and collinearity with the variables years of tournament experience and number of days spent practicing remaining in the final model (days spent practicing was removed from the TCM for in-state anglers because it was insignificant). Travel cost was negatively related to number of tournament visits and angler would make which I expected as number of visits should decrease as cost of travel increases. The variables log of household income, years of tournament experience, and number of days spent practicing were positively associated with visits in all models meaning an increase in these variables would result in an increase in tournament visits to Lake Guntersville. Opportunity cost

of substitute site was positively correlated with visits in the global and out-of-state angler TCM but was negatively correlated with visits in the in-state angler TCM, but was found insignificant in all models. This negative relationship for substitute site for in-state anglers could be a result of substitute sites being a greater distance away than Lake Guntersville (Tables 10-12).

Mean consumer surplus per tournament visit of $667 and $225 per day were considerably higher than most studies which used a negative binomial model to estimate consumer surplus. Lothrop (2012) found that mean consumer surplus for a striped bass fishery on Lewis Smith Lake, Alabama was $77 per visit. Prado (2006) found mean consumer surplus for trout anglers in the Lower Illinois River, Oklahoma to be $112 per angler day. Studies on The Snake River Idaho, and Yellowstone National Park had higher consumer surplus values of $159 and $172 respectively, but were still not representative of our findings (Nowell and Kerkvliet 2000; Kirkvliet et al. 2002).

Bilgic and Florkowski (2007) calculated the consumer surplus for the average bass angler in the southeastern United States to be $161 per trip from the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Lake Guntersville is one of the most prestigious black bass fisheries in the United States and I would expect anglers to be willing to pay more to utilize this fishery (Hall et al. 2012). Tournament anglers are also known to be considerably more invested in a fishery than general anglers and non-tournament black bass anglers which would further increase their consumer surplus (Schramm et al 1991a). Therefore, our estimate of $667 per visit and $225 per day are similar to another premium tournament bass fishery, Sam Rayburn Reservoir ($292 per trip), and bass anglers from Lake Guntersville ($240 per day) (Driscoll et al. 2010; McKee 2013).

Overall WTP for tournament black bass anglers was $1122 per visit in which consumer surplus represents 59% of the total WTP for a tournament angler. This value for percent of total WTP is similar with studies by Lothrop (2012) finding 57% and McKee (2013) finding consumer surplus to be 70% of total WTP.

Out-of-state anglers' consumer surplus was $909 per visit and (SE, $170) per day, which results in a WTP of $1689 (consumer surplus represents 53% of WTP). As I would expect this is higher than the average consumer surplus for a tournament angler on Lake Guntersville, because there higher travel costs as an angler's distance from the lake increases. In-state anglers have a lower consumer surplus of $588 per visit (SE, $107) and $207 per day, which results in a WTP of $881 (consumer surplus represents 67% of WTP). This is expected because of lower cost of travel and higher probability of making single day tournament trips to Lake Guntersville.

From these models it is evident that tournament anglers on Guntersville have a substantial investment in this fishery and are willing to pay much more than your average bass angler to participate in tournaments at the lake.

IV. 6. Local Impact of Tournament Angling

It is known that tournament anglers make substantial expenditures in local communities where tournament events are held (Schramm 1991a). For this reason I analyzed the different tournament types and their economic contribution to the two cities present on Lake Guntersville, Guntersville and Scottsboro. I found that in both cities that Large Open tournaments had the greatest economic impact ($270 thousand in Guntersville; $483 thousand in Scottsboro) and contribution to the local tax base ($9,809 in Guntersville; $13,919 in Scottsboro) despite only seven of these events occurring from February 2013 to January 2014. Large Open tournaments in

Scottsboro made up 65% of total expenditures and 67% of total tax revenues, while only accounting for 24% of expenditures and 22% of tax revenues in Guntersville. Semiprofessional tournaments were the second highest contributor to expenditures ($232 thousand in Guntersville; $120 thousand in Scottsboro) and tax revenues ($7,222 in Guntersville; $3,222 in Scottsboro) in both cities. Both Large Open and Semiprofessional tournaments attract a large proportion of out of state anglers (54% Large Open; 43% Semiprofessional) and have anglers that tend to stay more than two nights for each event.

The City of Guntersville received a large proportion of its expenditures (14%) and tax revenues (15%) from the single Professional tournament that was held on the lake from February 2013 to January 2014. This event was held at the Lake Guntersville State Park which is closer in proximity to the City of Guntersville than the City of Scottsboro. Therefore, it was not unexpected that this event would be a relatively low proportion of expenditures (2%) and tax revenues (2%) for Scottsboro.

Our observations indicate that the greatest economic impact to the local communities surrounding Lake Guntersville are from single large events with over one hundred participants. This includes Professional, Semiprofessional, and Large Open tournaments where anglers typically stay over two nights, and have a large proportion of out of state anglers. These large events also have an indirect effect by publicizing the lake and attracting other tournaments, as well as, recreational anglers to the fishery (McKee 2013).

IV. 7. Conclusions and Management Implications

Tournament black bass angling is an essential aspect of the recreational black bass fishery on the Lake Guntersville. Tournament anglers are known to be more specialized than

general bass angler and incur much higher expenditures which I have documented in this study (Schramm 1991a). These anglers not only fish tournaments on Lake Guntersville but also fish 18 days annually on the lake when not affiliated with a tournament. On average a tournament angler fished 6.7 tournaments on Lake Guntersville annually and were willing to invest 2 practice days of angling for each tournament fished.

From observing anglers at the many different tournaments it was evident that competition was only a small part of the reason for fishing tournaments. For many small bass clubs coming to Guntersville the tournaments was a social activity where anglers would stay multiple days and the event would resemble a group fishing trip with the tournament being friendly competition. Some of the clubs visiting the lake would have custom jerseys made for their club to distinguish themselves from others on the water. This was the opposite for large semi-professional and Professional tournaments where competition seemed to be the primary reason for attending the events.

Large Open tournaments drew high participation from anglers through the use of large prizes and encouraging amateur participation. As stated by McKee (2013) Large Open tournaments could be used to increase angler effort during non-peak seasons. I found that the Rat-L-Trap open tournament held in February 2013 drew 186 anglers to Lake Guntersville when lake and fishing conditions were less than preferred by most anglers. These single events draw a large economic impact and can be used to stimulate local businesses that rely on recreational fishing during times of low angler effort.

I found that the majority of tournaments originated from four major boat ramps, Goosepond, Waterfront grocery, Browns creek, and Lake Guntersville State Park. One sampling

day I encountered five tournaments using the same boat ramp. Most tournaments tend to start at the same time (safe fishing light) and end in early afternoon, which could cause angler conflicts if multiple tournaments are using the same area at the same time. To determine what tournament events were occurring on Lake Guntersville resulted in the use of bait and tackle shops, posted flyers, internet websites, and direct communication with anglers. Therefore, a permitting process for black bass tournaments could help reduce angler conflict and help lake managers better quantify and understand the effect of tournaments. Permitting for black bass tournaments are already in place in many states including North Carolina, California, Illinois, Wisconsin, and Iowa. Once identified that a tournament is occurring it could be posted to a public forum which could directly increase angler participation at Lake Guntersville.

The greatest local economic impact from tournament black bass angling on Lake Guntersville was seen in the Cities of Guntersville and Scottsboro. Both of these cities are located nearby many access points along the lake and offer anglers many lodging opportunities for multiple day trips. Lodging tax revenue was the greatest contributor to overall tax revenue and large single event tournaments (Large Open, Professional, Semiprofessional) in which anglers travelled from out of state and stayed multiple nights attributed most overall to expenditures in each of the two cities. Therefore, Chambers of Commerce and tourism bureaus in Guntersville and Scottsboro should focus on attracting large single event tournaments to the area. These events create the greatest local direct economic impact of all tournament types and offer a way to showcase the fishery which will indirectly lead to more angling effort and tournaments on Lake Guntersville.

V. Literature Cited

Abernathy, D. L. 2013. Bass angler information team Annual Report. Alabama Department of Conservation and Natural Resources, Federal Aid in Sport Fish Restoration, Project F-38, Annual Report, Montgomery.

American Automobile Association. 2013. Your Driving Costs. American Automobile Association. Available: https://newsroom.aaa.com/wp-content/uploads/2013/04/YourDrivingCosts2013.pdf (February 2015).

Bilgic, A., and W. J. Florkowski. 2007. Application of a hurdle negative binomial count data model to demand for bass fishing in the southeastern United States. Journal of Environmental Management 83(4):478-490.

Bollen, K. A., and R. W. Jackman. 1990. Regression diagnostics: An expository treatment of outliers and influential cases. Pages 257-291 *in* J. Fox and J. S. Long, editors. Modern Methods of Data Analysis. Sage, Newbury Park, California.

Carlander, K. D., C. J. Dicostanzo, and J. J. Jessen. 1958. Sampling problems in creel census. The Progressive Fish-Culturist 20(2):73-81.

Chen, R. J., K. M. Hunt, and R. B. Ditton. 2003. Estimating the economic impacts of a trophy largemouth bass fishery: issues and applications. North American Journal of Fisheries Management. 23(3):835-844.

Destination Exploration. 2012. 2012 Bassmaster Classic economic impact research.

Ditton, R. B., S. M. Holland, and D. K. Anderson. 2002. Recreational fishing as tourism. Fisheries 27(3):17-24.

Driscoll, T., J. Leitz, and R. Myers. 2010. Annual economic value of tournament and non-tournament angling at Sam Rayburn Reservoir. Texas Parks and Wildlife Department Inland Fisheries Division, Management Data Series No. 256 (2010), Austin, Texas.

Driscoll, T., and D. Ashe. 2013. Statewide freshwater fisheries and management program 2012 survey report Sam Rayburn Reservoir. Federal Aid in Sport Fish Restoration Act Texas Federal Aid Project F-221-M-3.

Duttweiler, M. W. 1985. Status of competitive fishing in the United States: trends and state fisheries policies. Fisheries 10(5):5-7.

Englin, J. and S. Shonkwiler. 1995. Estimating total welfare using count data models: an application to long-run recreation demand under conditions of endogenous stratification and truncation. The Review of Economics and Statistics 77(1):104-112.

Hall, J., D. H. Jones, and K. Bitz. 2012. Bassmaster 100 best bass lakes. Bassmaster (May):68

Internal Revenue Service. 2012. Standard Mileage Rates for 2013. Internal Revenue Service. Available: http://www.irs.gov/uac/Newsroom/2013-Standard-Mileage-Rates-Up-1-Cent-per-Mile-for-Business,-Medical-and-Moving (February 2015).

Kerkvliet, J., C. Nowell, and S. Lowe. 2002. The economic value of the greater Yellowstone blue-ribbon fishery. North American Journal of Fisheries Management 22:418-424

Kerr, S. J. and K. K. Kamke. 2003. Competitive Fishing in Freshwaters of North America. Fisheries 28(3): 26-31.

Kling, C. L. 1989. A note on the welfare effects of omitting substitute prices and quantities from travel cost models. Land Economics 65(3):290-296.

Lothrop R. L. 2012. Economic impact of striped bass angler visitation at Lewis Smith Lake, Alabama. Master's Thesis. Auburn University, Auburn, Alabama.

Malvestuto, S. P. 1996. Sampling the recreational creel. Pages 591-623 *in* B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Martínez-Espiñeira, R. and J. Amoako-Tuffour. 2008. Recreation demand analysis under truncation, overdispersion, and endogenous stratification: An application to Gros Morne National Park. Journal of Environmental Management 88(4): 1320-1332.

McKee, C. E. 2013. Economic impact of recreational angler visitation to Lake Guntersville, Alabama. Master's Thesis. Auburn University, Auburn, Alabama.

Myles A. E. and J. Swaim. 2010. Economic impact of collegiate bass tournaments: experiences from Auburn University. 2010 Annual Meeting, Southern Agricultural Economics Association.

Nowell, C., and J. Kerkvliet. 2000. The economic value of the Henry's Fork Fishery. Intermountain Journal of Science 6:285-292.

Ojumu, O., D. Hite, and D. Fields. 2009. Estimating demand for recreational fishing in Alabama using travel cost model. 2009 Annual Meeting, Southern Agricultural Economics Association.

Palm Jr., R. C., and S. P. Malvestuto. 1983. Relationships between economic benefit and sport-fishing effort on West Point Reservoir, Alabama- Georgia. Transactions of the American Fisheries Society 112(1):71-78.

Parsons, George R. 2003. The travel cost model. Pages 269-329 *in* P.A. Champ, K. J. Boyle, and T. C. Brown. A primer on nonmarket valuation. Kluwer Academic Publishers, Norwell, Massachusetts.

Pollock, K. H., C. M Jones, and T. L. Brown. 1994. Angler survey methods and their applications in fishery management. American Fisheries Society, Special Publication 25, Bethesda, Maryland.

Prado, B. E. 2006. Economic valuation of the lower Illinois River trout fishery in Oklahoma under current and hypothetical management plans. Doctoral dissertation. Oklahoma State University, Stillwater.

Robson, D., and C. M. Jones. 1989. The theoretical basis of an access site angler survey design. Biometrics 45(1):83-98.

SAS Institute Inc. 2009. SAS system for linear models. Release 9.2. Cary, North Carolina.

Schramm, H. L., M. L. Armstrong, A. J. Fedler, N. A. Funicelli, D. M. Green, J. L. Hahn, D. P. Lee, R. E. Manns Jr., S. P. Quinn, and S. J. Waters. 1991a. Sociological, economic, and biological aspects of competitive fishing. Fisheries 16(3):13-21.

Schramm, H. L., M. L. Armstrong, N. A. Funicelli, D. M. Green, D. P. Lee, R. E. Manns Jr.,B. D. Taubert, and S. J. Waters. 1991b. The Status of competitive sport fishing in North America. Fisheries 16(3): 4-12.

Schramm, H. L. and K. M. Hunt. 2007. Issues, benefits, and problems associated with fishing tournaments in inland waters of the United States: a survey of fishery agency administrators. Fisheries 32(5):234-243.

Shrestha, R. K., A. F. Seidl, and A. S. Moraes. 2002. Value of recreational fishing in the Brazilian Pantanal: a travel cost analysis using count data models. Ecological Economics 42(1-2):289-299.

Shupp, B., 1979. 1978 status of bass fishing tournaments in the United States. Fisheries 4(6):11-19.

Sorg, C. F., and J. B. Loomis. 1986. Economic value of Idaho sport fisheries with an update on valuation techniques. North American Journal of Fisheries Management 6(4):494-503.

Storey, K. W., and D. L. Bennett. 2014. Statewide freshwater fisheries and management program 2013 survey report Lake Fork. Federal Aid in Sport Fish Restoration Act Texas Federal Aid Project F-221-M-4.

Stynes, D. J. and D. M. Donnelly. 1987. Simplifying the travel cost method. Transactions of the American Fisheries Society 116(3):432-440.

U.S. Fish and Wildlife Service, and the U.S. Bureau of Census. 2011. 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. U.S. Government Printing Office, Washington, D.C.

Wilde, G. R. and R. B. Ditton. 1994. A management-oriented approach to understanding diversity among largemouth bass anglers. North American Journal of Fisheries Management 14(1):34-40.

Wilde, G. R., R. K. Riechers, and R. B. Ditton. 1998. Differences in attitudes, fishing motives, and demographic characteristics between tournament and nontournament black bass anglers in Texas. North American Journal of Fisheries Management 18(2):422-431.

VI. Tables

Table 1. Relative tournament frequency by tournament type on Lake Guntersville in 2012, n=166 (C. E. McKee, Auburn University, unpublished data).

Tournament Type	Number of Interviews	Relative Percentage
Wildcat	12	7%
Small Club	65	40%
Trail or Series	28	17%
Small Open	10	6%
Large Open	18	11%
Semi-Professional	29	18%

Table 2. Tax rates for the Cities of Guntersville and Scottsboro, Counties of Jackson, Marshall, and Madison, and the State of Alabama.

Location	Lodging	General Sales	Fuel
Guntersville	6%	4%	0.29940%
Scottsboro	5%	3%	0.59880%
Jackson	2% + $1	2%	0.89820%
Marshall	1%	1%	0.29940%
Madison	1%	2%	0.59880%
Alabama	4-5%	4%	5.68862%

Table 3: Number of tournaments sampled and average number of anglers per tournament (mean ± SE) by tournament type.

Tournament Type	Tournaments Sampled	Average Number of Anglers per Tournament
Wildcat	7	7 ± 2.3
Local Club	13	12.9 ± 1.59
Non-Local Club	18	15.6 ± 2.2
Trail/Series	16	24 ± 5.8
Small Open	12	13 ± 8.8
Large Open	5	466.8 ± 206.7
Semiprofessional	5	205.2 ± 22.1
Professional	1	352

Table 4: Descriptive variable averages for different tournament types. Trips are average number of tournaments an angler of that type will take on Guntersville.

Tournament Type	Number of Tournaments	Number of Nights	Trips	Practice Days	Distance Travelled (km one way)	% of Anglers from out-of-state
Professional	1	5.37	3.02	3.52	621	80%
Semiprofessional	10	2.45	8.19	2.39	161	43%
Large Open	7	2.76	5.73	1.86	283	43%
Small Open	24	3.87	7.27	1.51	251	30%
Trail	47	1.47	10.43	1.7	134	24%
NonLocal Club	33	2.6	1.74	1.43	322	79%
Local Club	33	2.1	4.7	1.33	93	8%
Wildcat	117	0	36	0.77	29	0%

Table 5: Total angling effort (angler hours); total number of bass caught, released while culling and weighed in; and catch per unit effort, released while culling per unit effort, and weighed in per unit effort by tournament type on Lake Guntersville.

Tournament Type	Effort	Catch	Released	Weighed	CPUE	RPUE	WPUE
Wildcat	6,206	12,326	3,055	2,576	1.99	0.49	0.42
Local Club	3,849	4,366	1,179	1,400	1.13	0.31	0.36
Non-Local Club	4,463	3,707	821	1,410	0.83	0.18	0.32
Trail/Series	7,922	8,200	2,991	3,350	1.04	0.38	0.42
Small Open	7,434	11,054	3,018	3,574	1.49	0.41	0.48
Large Open	32,258	14,034	4,023	3,360	0.44	0.12	0.10
Semiprofessional	21,920	13,810	3,267	6,123	0.63	0.15	0.28
Professional	5,632	1,918	518	1,138	0.34	0.09	0.20
Total	89,684	69,415	18,872	22,931	0.77	0.21	0.26

Table 6. Travel Cost, in thousands, for all tournament types occurring on Lake Guntersville

Tournament Type	N, expanded	Vehicle Fuel	Boat Fuel	Lodge	Grocery	Meals	Tackle	Guide	Launch	Repair	Licenses	Entry	Total Cost	Lower 95%	Upper 95%
Wildcat	1,127	32.2	35.8	.0	6.3	1.9	5.1	.0	.0	.0	2.9	32.2	116.5	82.31	150.63
Local Club	361	23.7	25.9	8.7	6.1	3.7	10.1	.0	1.6	3.2	1.7	25.3	109.9	90.93	128.79
Non-Local Club	486	53.3	41.9	60.0	14.6	16.5	17.1	.0	.8	.1	14.0	25.5	243.9	200.72	287.06
Trail	963	70.4	82.0	71.3	18.3	21.1	29.1	.0	11.5	10.8	9.9	80.6	405.0	341.67	468.28
Small Open	766	69.0	65.2	37.6	21.2	22.4	16.1	.0	.5	1.3	7.9	80.6	321.6	237.27	405.91
Large Open	3,722	324.5	225.2	330.5	124.3	99.5	122.2	.3	4.4	68.6	44.4	379.3	1,723.2	1,341.77	2,104.54
Semiprofessional	2,258	183.3	160.4	143.8	44.5	60.7	78.2	.0	2.2	27.7	37.5	359.4	1,097.6	952.62	1,242.59
Professional	352	59.3	51.5	79.2	29.4	29.4	35.5	.0	.1	8.3	12.8	246.4	552.0	485.05	619.02
Total	10,035	815.7	687.8	731.0	264.6	255.2	313.4	.4	21.3	119.9	131.2	1,229.3	4,569.6	3,732.33	5,406.81

Table 7. Travel cost in thousands by state of angler origin

State	Total	Percent
Alabama	$1,981	43%
Arkansas	$ 22	0%
Florida	$ 274	6%
Georgia	$ 483	10%
Illinois	$ 25	1%
Indiana	$ 162	4%
Kentucky	$ 103	2%
Louisiana	$ 82	2%
Maryland	$ 14	0%
Michigan	$ 74	2%
Minnesota	$ 8	0%
Mississippi	$ 66	1%
North Carolina	$ 44	1%
Oregon	$ 18	0%
Pennsylvania	$ 32	1%
South Carolina	$ 92	2%
Tennessee	$1,005	22%
Virginia	$ 21	0%
Wisconsin	$ 8	0%
West Virginia	$ 90	2%

Table 8. Tax revenue generated by tournament angler expenditures.

Location	Lodging Tax	Lodging Expenditures	Lodging Tax Revenue	General Sales Tax	General Sales Expenditures	General Sales Tax Revenue	Fuel Tax	Fuel Expenditures	Fuel Tax Revenue	Total Tax Revenue
Guntersville	6%	$349,244	$20,955	4%	$294,153	$11,766	0.29940%	$367,683	$1,101	$33,822
Scottsboro	5%	$237,882	$11,894	3%	$294,499	$8,835	0.59880%	$234,314	$555	$21,284
Jackson	2% + $1	$279,712	$9,822	2%	$313,549	$6,271	0.89820%	$274,708	$2,467	$18,561
Marshall	1%	$394,223	$3,942	1%	$91,267	$913	0.29940%	$568,158	$1,701	$6,556
Madison	1%	$2,644	$26	2%	$22,834	$228	0.59880%	$61,342	$367	$622
Alabama	4-5%	$694,735	$41,502	4%	$820,694	$33,155	5.68862%	$1,173,809	$66,779	$141,436
Total			$88,142			$61,168			$72,971	$222,281

Table 9. Distribution of tax revenue generated by tournament angling expenditures on Lake Guntersville.

Location	Roads and Bridges	Education	Tourism	General Fund	Health and Human Services	TOTAL
Guntersville	N/A	$2,942	$5,832	$25,035	N/A	$33,809
Scottsboro	$555	$2,209	N/A	$18,520	N/A	$21,284
Jackson	$2,467	$6,271	$9,822	$0	N/A	$18,561
Marshall	$1,701	$913	$3,942	$0	N/A	$6,556
Madison	$367	$228	$26	$0	N/A	$622
Alabama	$45,687	N/A	$8,300	$24,901	$33,155	$112,044

Table 10. Results from TCM regression to explain the demand for tournament trips taken by all anglers on Lake Guntersville.

Variable	Parameter Estimate	Standard Error	*Pr > ChiSq*	Mean	SD (Mean)
Intercept	0.006	0.7754	0.9939	N/A	N/A
Travel Cost	-0.0015	0.0001	<0.0001	$531	$507
Opportunity Cost Substitute Site	0.0005	0.0006	0.4019	$53	$111
Log Income	0.1584	0.0685	0.0208	11.4	0.67
Years Tournament Experience	0.0129	0.0036	0.0004	18.13	11.81
Days Spent Practicing	0.0628	0.0211	0.003	1.97	1.97
Dispersion	1.0875	0.1136			
Model Information					
DF (Error)	368				
Consumer Surplus	$667				
Consumer Surplus per Day	$225				
X^2	521				

Table 11. Results from TCM regression to explain the demand for tournament trips taken by out-of-state anglers on Lake Guntersville.

Variable	Parameter Estimate	Standard Error	*Pr > ChiSq*	Mean	SD (Mean)
Intercept	-1.4386	1.2675	0.2564	N/A	N/A
Travel Cost	-0.0011	0.0002	<0.0001	$780	$560
Opportunity Cost Substitute Site	0.0001	0.0006	0.8506	$76	$150
Log Income	0.2384	0.1123	0.0337	11.48	0.61
Years Tournament Experience	0.009	0.0054	0.0979	17.16	11.11
Days Spent Practicing	0.1618	0.0366	<0.0001	2.11	1.93
Dispersion	0.7649	0.1486			
Model Information					
DF (Error)	175				
Consumer Surplus	$909				
Consumer Surplus per Day	$292				
X^2	266				

Table 12. Results from TCM regression to explain the demand for tournament trips taken by in-state anglers on Lake Guntersville.

| Variable	Parameter Estimate	Standard Error	*Pr > ChiSq*	Mean	SD (Mean)
Intercept	0.3903	1.0376	0.7068	N/A	N/A
Travel Cost	-0.0017	0.0003	<0.0001	$293	$297
Opportunity Cost Substitute Site	-0.0001	0.0015	0.9377	$32	$42
Log Income	0.1522	0.0935	0.1036	11.31	0.72
Years Tournament Experience	0.0138	0.0048	0.0038	19.05	12.39
Dispersion	0.7649	0.1486			
Model Information					
DF (Error)	188				
Consumer Surplus	$588				
Consumer Surplus per Day	$207				
X^2	273				

VII. Figures
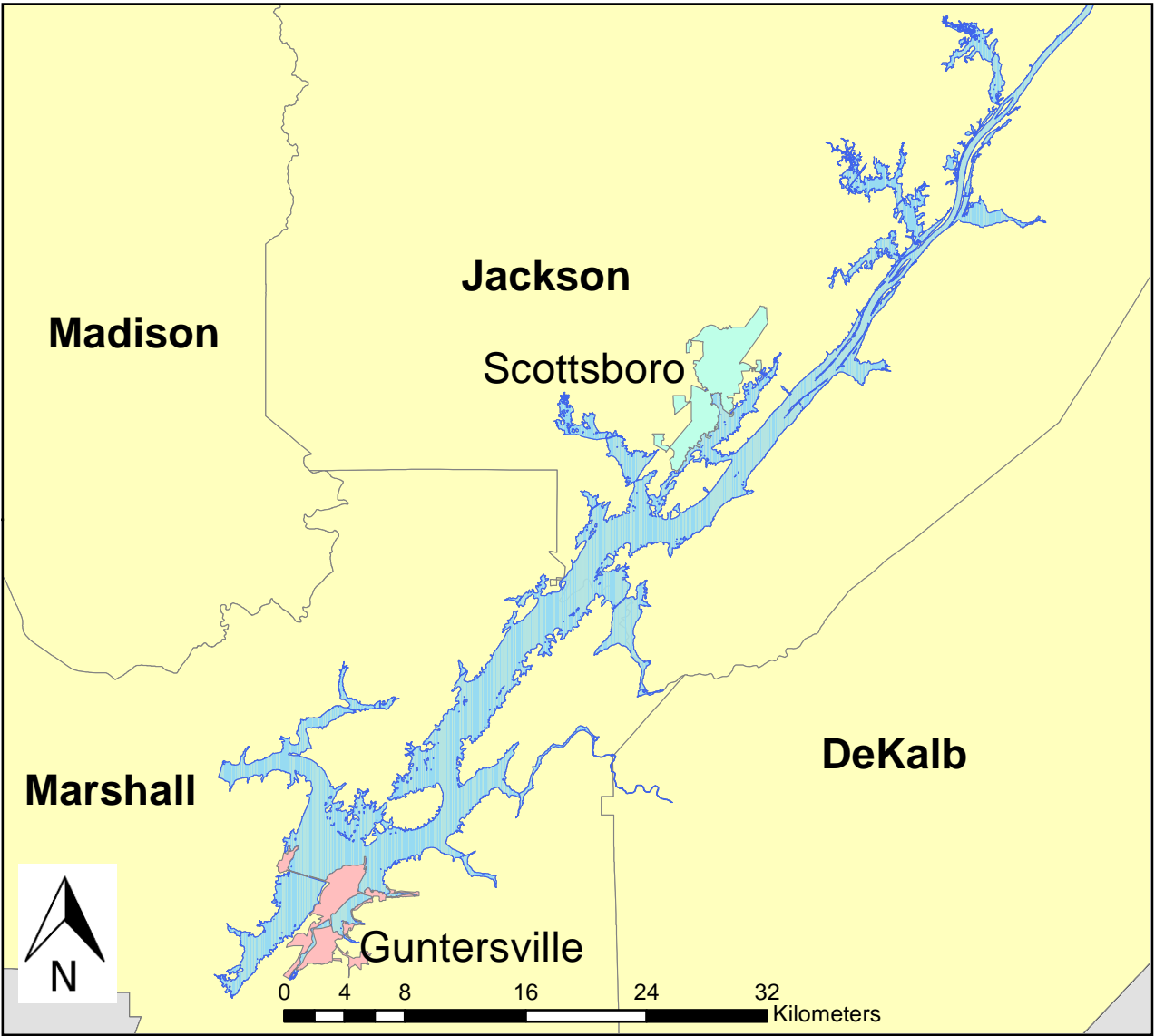
Figure 1. Map of Lake Guntersville the surrounding Counties of Marshall, Madison, and Jackson, and Cities of Guntersville, and Scottsboro.
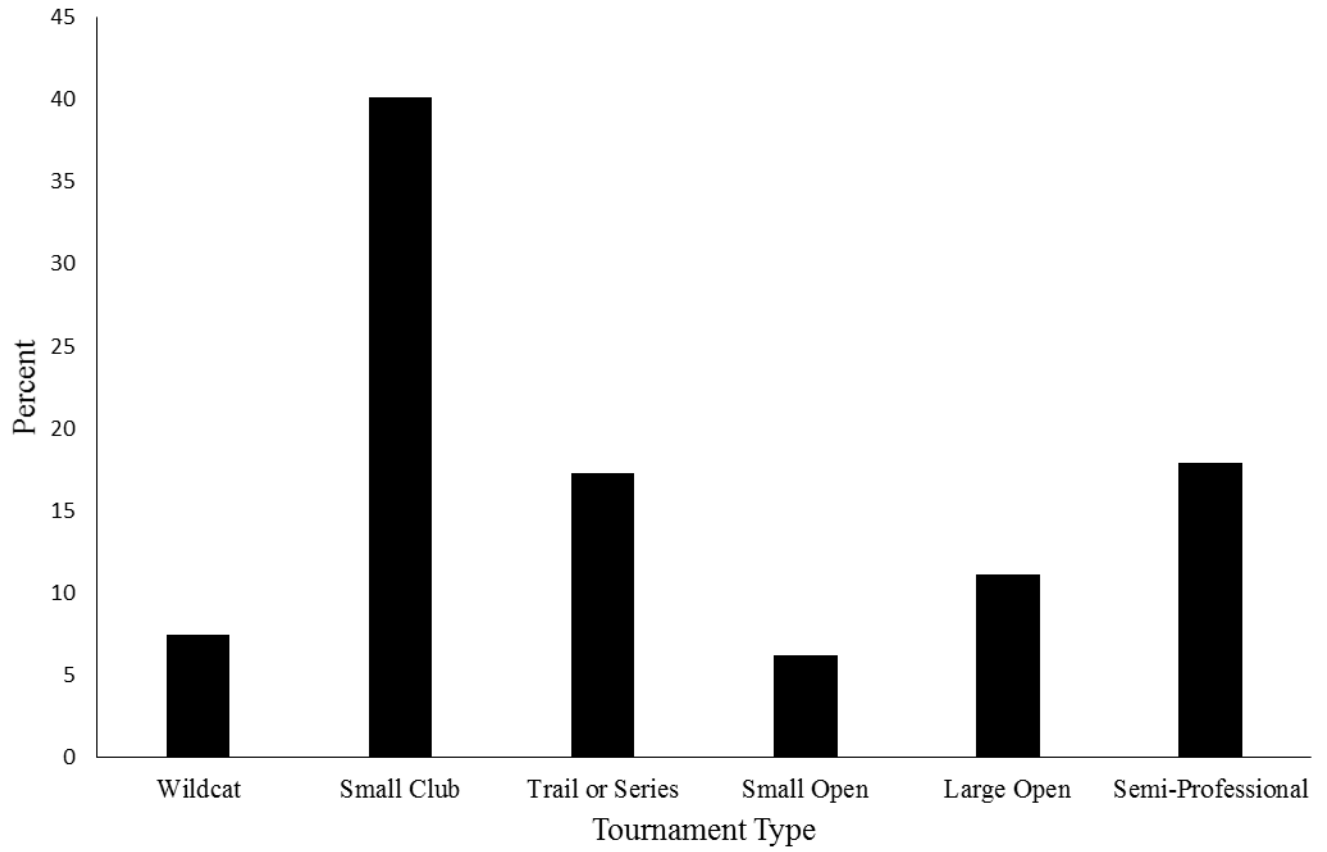
Figure 2: Relative tournament frequency by tournament type on Lake Guntersville in 2012
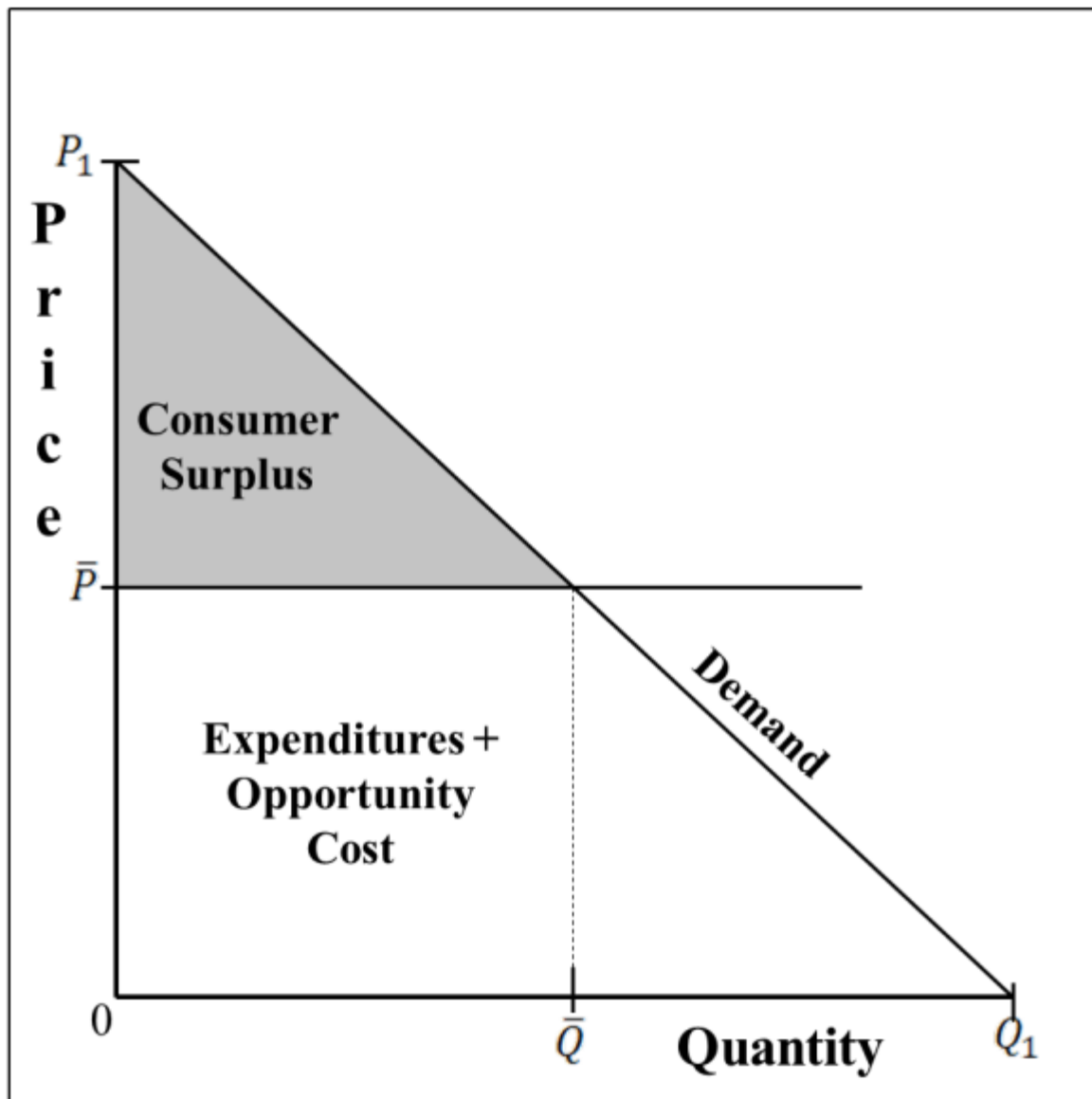n=166 (C. E. McKee, Auburn University, unpublished data).

Figure 3. Graphical representation of a demand curve (quantity demanded) and consumer surplus P_1 is the maximum visit price that one is willing to pay and Q_1 is the maximum number of visits a consumer will demand at a price of $0. $\bar{P}$ is the equilibrium (mean) price paid and $\bar{Q}$ is the equilibrium (mean) number of visits demanded by a typical (average) consumer. Consumer surplus is the willingness-to-pay for a recreational visit above and beyond a person's actual visit expenditures and is the area below the recreational visit demand curve and above the equilibrium visit cost ($\bar{P}$). Expenditures are actual purchases incurred by the person on the visit plus the opportunity cost of time based on the respondent's wage rate and the calculated roundtrip travel time.
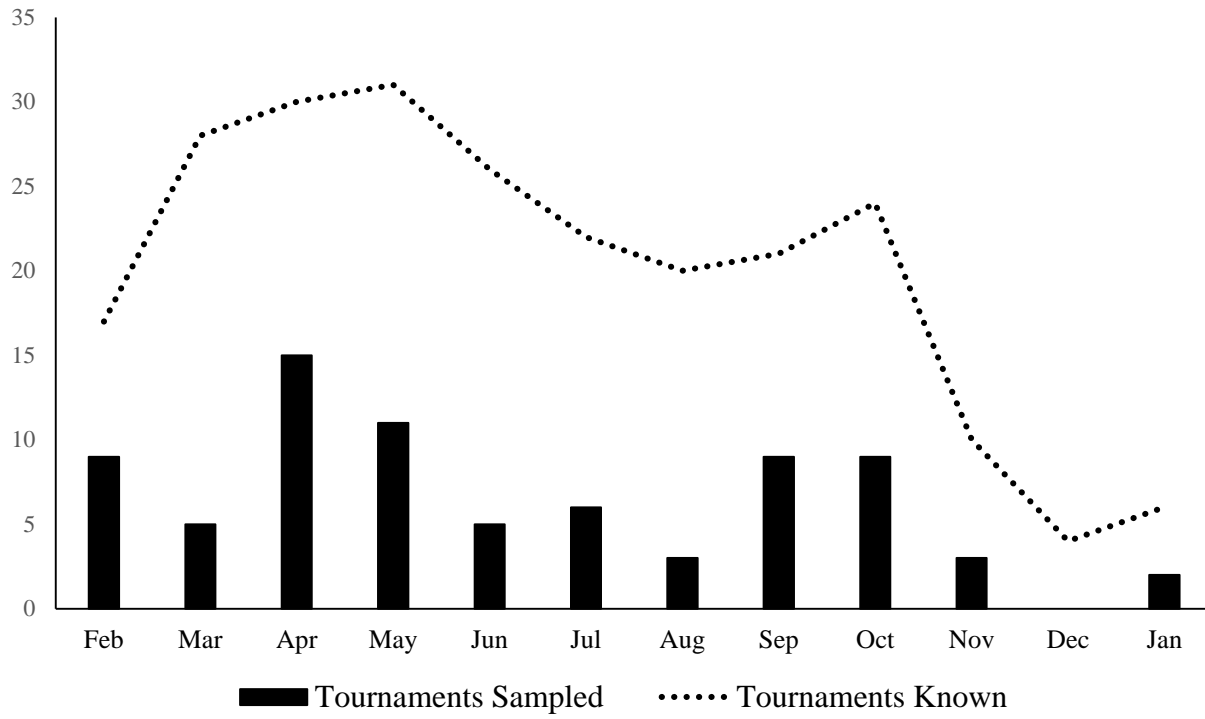
Figure 4. Tournaments known to occur and tournaments sampled on Lake Guntersville by month.
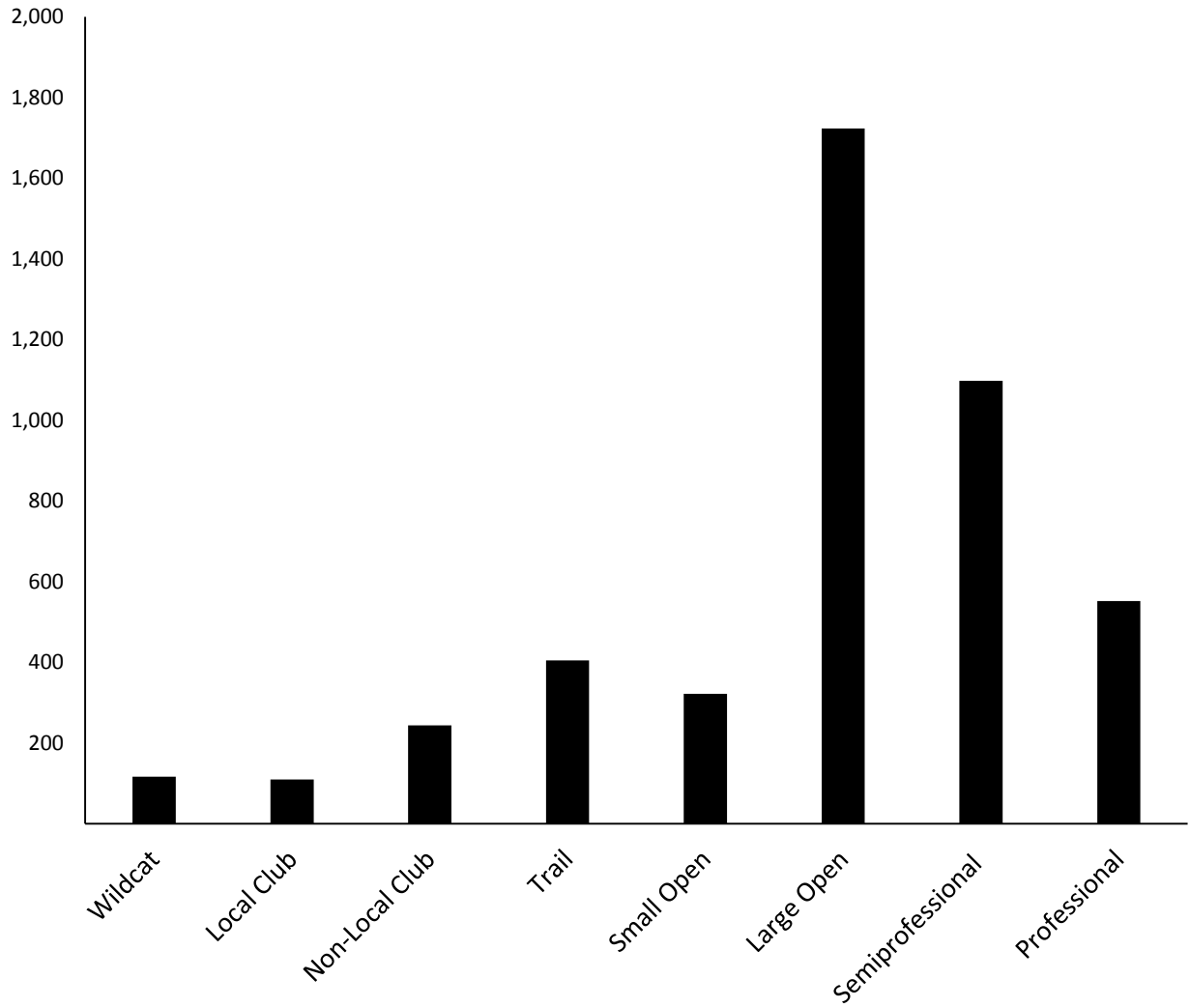
Figure 5. Total angler expenditures on Lake Guntersville by tournament type in thousands

VIII. Appendices

VIII. 1. Tournament Angler Data Sheet

GUNTERSVILLE TOURNAMENT SURVEY 2013		PAGE _____ OF _____	
DATE	**TOURNAMENT**	**RAMP**	

Survey ID#	Name	Phone Number	Tournament

AS_____   NS_____

VIII. 2. Tournament Information Sheet

Tournament Information Sheet

Tournament (Club/Series name):

Weigh-in location:

Tournament Date(s):

Launch time:

Weigh-in time:

Team or Individual:

Entry Fee:

Number of boats:

Number of tournaments on Guntersville in 2013:

2013 Lake Guntersville Tournament Angling Survey

To complete this survey ONLINE please visit the website listed below

www.guntersville2013.webs.com

then enter the password **bass2013**

When asked for your ID# it is

ID# __ __ __ __

Otherwise

Please complete the paper survey and mail it back to us in the postage paid envelope it came in.

XIII. 4. Mail-in Tournament Angler Creel Survey Form

Date: _____ Ramp: _____ Tournament/Club Name: _____ ID #: _____

Hello, we are working with Auburn University Fisheries Department to conduct a tournament fishing survey on Lake Guntersville. This survey should only take five minutes. All of the information you include on this survey will remain confidential, anonymous and no one will try to sell you anything. The information collected in this survey will be used to evaluate the economic impact of tournament angling on Lake Guntersville.

- -

1. What is the date that you are filling out this survey _____

2. Please circle the position that indicates your involvement in this tournament

        Boater   *Non-Boater*

3. Have we contacted you before about this survey?   *Yes*   *No*

4. How many miles did you travel from your home to attend this tournament (*one way*)? _____

5. What city and state do you live in?

    a. City: _____   b. State _____   c. Lake Resident?   *Yes*   *No*

6. How many days did you "practice" for this tournament if any? _____

7. How many tournaments did you fish at Lake Guntersville in 2012? _____

8. How many tournaments do you plan to fish at Lake Guntersville in 2013? _____

    a. What tournaments do you plan on fishing here? _____

    b. If you **DO NOT** plan on returning to Guntersville to fish any other tournaments in 2013 why not (*Circle Answer*)?

        Distance   *Quality of Fishing*   *Other* _____

9. How many days did you fish Lake Guntersville in 2012 that were **NOT** related to a tournament in any way? _____

10. On what water body would you most likely fish a tournament other than at Lake Guntersville? _____

11. How many Bass did you catch today? _____

    a. How many Bass did you bring to weigh-in today? _____

    b. How many total Bass did you place in the live well and then release when culling today? _____

12. Did you use a castable umbrella rig (Alabama Rig) today?   *Yes*   *No*

13. Are you a member of a bass fishing club?   *Yes*   *No*   Name of Club _____

14. How many years of tournament fishing experience do you have? _____

15. For this tournament you fished on Guntersville how would you rate your fishing experience (*Circle Response*)?

   Poor   *Fair*   *Average*   *Good*   *Excellent*

16. Did you purchase an Alabama fishing license for this tournament?   *Yes*   *No*

    a. If YES which kind of license did you purchase?   *Annual License*   *7-Day License*

    b. Where did you purchase your license?   *Online*   *City* _____

XIII. 4. Mail-in Tournament Angler Creel Survey Form

17. Did you stay overnight while at Lake Guntersville for this tournament?   Yes   No
      a.   If yes how many nights did you stay near or at the lake? _____

18. Please circle what type of lodging you used while visiting the lake for this tournament (*Circle Response*)

    Hotel/Motel   *Cabin/house*   *RV Park (private)*   *State Camping Site/Park*   *County Camping Site/Park*

    City Camping Site/Park   *Friend/Family home*   *Private Property*   *Other_____*

   IF YOU STAYED ON PRIVATE PROPERTY PLEASE ANSWER a, b, and c

      a.   Do you own, rent, or lease this property?   *Own*   *Rent*   *Lease*

      b.   Is the primary reason you use this property to fish at Lake Guntersville? *Yes*   *No*

      c.   What city/county is this in?   _____

19. **We would like to break down your individual expenses to compete in this tournament by what items you purchased and where you bought them. If you purchased these items in Alabama, please list the county or city where the purchase occurred, if known. A map of the Lake Guntersville area with the Counties and Cities labeled is on the last page for your convenience. If the items were purchased outside Alabama, please just list the state where they were purchased.**

Item	Location	Cost	Location	Cost	Location	Cost
Vehicle fuel purchased in Dollars for this trip						
Boat gas purchased in Dollars for this trip						
Lodging						
Groceries/drinks/ice						
Restaurant meals						
Fishing equipment/tackle						
Guide fees/tips						
Boat launch/Storage fees						
Repair/Maintenance						
Tournament entry fee						

To complete this survey we need to know a little more about you. This information will remain confidential and anonymous but is needed for the survey:

XIII. 4. Mail-in Tournament Angler Creel Survey Form

20. Sex: *Male*   *Female*

21. Age: _____

22. Occupation: _____

23. Household Income (*Circle Response*)

   Less than $10,000   *$10,000-$19,999*   *$20,000-$24,999*   *$25,000-$29,999*   *$30,000-$34,999*   *$35,000-$39,999*

   $40,000-$49,999   *$50,000-$74,999*   *$75,000-$99,999*   *$100,000-$199,999*   *Greater than $200,000*

24. Ethnicity (*Circle Response*)

        White   *African American*   *Hispanic*   *Asian*   *Other* _____

25. Do you have any comments about tournament fishing at Lake Guntersville you would like to share?

   COMMENTS: _____

   _____

   _____

This completes the survey we appreciate your time. If you have any additional questions about the survey or need clarification on anything please contact Pat Snellings by email at PLS0007@auburn.edu or by phone at (540) 907-5120.