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PREDICTING MARINA SLIP RENTER TRIP SPENDING AT US ARMY CORPS OF ENGINEERS LAKES

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PREDICTING MARINA SLIP RENTER TRIP SPENDING AT US ARMY CORPS OF ENGINEERS LAKES

By

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ABSTRACT

PREDICTING MARINA SLIP RENTER TRIP SPENDING AT US ARMY CORPS OF ENGINEERS LAKES

By

Mary Kathleen Perales

This study summarizes party-day and party-trip spending profiles for boaters from Corps of Engineers marinas at three lakes: Harry S. Truman, Missouri; Lake Sidney Lanier, Georgia; and Raystown Lake, Pennsylvania. Visitor spending by marina slip renters across the lakes was measured and predictive models of spending were developed. Least squares regression models were developed for party-day and party-trip spending estimates within 30 miles of the lake.

Party trip spending across lakes was not significantly different ($p = 0.299$), although item spending differed significantly for gasoline/oil for auto and boat, groceries and camping fees. Data on trip spending were compared to characteristics of the boat and the boating trip. Overall, non-resident boaters traveling more than 30 miles had significantly higher expenditures locally. Boat length was classified into three size classes (20' and smaller, 21' to 30', and 31' and larger), and trip spending locally was significantly different ($p = 0.018$), with larger boats spending the most. Differences in spending were also seen in boat type classifications: boaters using sailboats recorded the lowest expenditures, cabin cruisers the most. Trip spending data were based on a mix of overnight and day trips. Spending on overnight trips was over 3.5 times greater than day trips.

The independent variables used in the regressions were based on the characteristics of the respondent (age), the household (distance traveled), the boat (boat length), and the trip (trip length and people on the boat). In addition, three dummy variables were created representing two of the three lakes (Lanier and Raystown) and a third, which substituted for one-way mileage (resident vs. non-resident).

Model 1 explained the least amount of variation in party-day spending (adjusted R square 0.090), while Model 2 for party-trip spending explained the most (adjusted R square 0.349). The seven variables in Model 2 explained 35 percent of the variability in the dependent variable. This means that 65 percent of the spending estimates were due to other factors or random variation. When a dummy variable (non-resident) was substituted for the one-way mileage traveled (Model 3), the amount of trip spending variance that was explained dropped from an adjusted R square value of 0.349 to 0.312. The non-resident variable (in Model 3) is less precise than using one-way mileage, but it allows for an easier estimation of spending for residents or non-residents.

This study describes mean spending for household, boat, trip and site characteristics. Improvements in describing geospatial, demographic and economic factors for each lake (and marina) would provide the Corps a means to evaluate future research priorities. Model variable additions, such as technologies used, more detailed item spending categories, regional characteristics, and spending opportunities may be areas for future research.

To My Parents: Anne Marie G. and Ernest S. Perales

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My thanks go out to you all for supporting me on this journey to the finish line. This race is done! What's next?

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ANOVA ..... ANalysis Of VAriance

BLS ..... Bureau of Labor Statistics

Corps ..... US Army Corps of Engineers

CPI ..... Consumer Price Index

EIA ..... Economic Impact Analysis

ERB ..... Ecological Resources Branch

ERDC ..... Engineer Research & Development Center

IBM ..... International Business Machines Corporation

I/O ..... Input-Output

IWR ..... Institute for Water Resources

Lanier ..... Lake Sidney Lanier

Large ..... Boat lengths 31' and larger

Medium ..... Boat lengths 21' to 30'

MGM ..... Money Generation Model

MI-REC ..... Micro-Implan RECreation Economic Impact Estimation System

NED ..... National Economic Development

NMMA ..... National Marine Manufacturers Association

NPS ..... National Park Service

NRM ..... Natural Resources Management

NRM Gateway ..... Natural Resources Management Gateway

NRMS ..... Natural Resources Management System

NVUM ..... National Visitor Use Monitoring

OMB..... Office of Management and Budget

PASW ..... Predictive Analytic Software

Raystown ..... Raystown Lake

REAS ..... Recreation Economic Assessment System

RED ..... Regional Economic Development

RMSP ..... Recreation Management Support Program

Small..... Boat lengths 20' and smaller

SPSS ..... Statistical Package for the Social Sciences, now an IBM Company

Std. ..... Standard or Standardized

Truman ..... Harry S Truman Lake

USACE ..... US Army Corps of Engineers

USFS ..... US Forest Service

CHAPTER 1

INTRODUCTION

Congress gave the US Army Corps of Engineers (USACE or Corps) a water resource management mission that historically focused on navigation, flood damage reduction, water supply, and hydropower. This mission resulted in the Corps becoming the largest federal provider of outdoor recreation opportunities in the nation. With over 450 water-resource projects made up of lakes and river segments and located in 43 states, the Corps has found itself to be a recreation resource and focal point for regional economic development across the nation.

As a federal agency, the Corps has a history of providing low- or no-cost recreation opportunities for the public. Local communities that surround these lands and water resources see the Corps as a provider of open space, park lands and water access that supports tourism and enhances regional economic development (RED). Often these places are referred to as "gateway" communities where there is interdependence between the local community and the public resource base (Archie, Terry, & Servian, 2010; Borrte, Christensen, Watson, Miller, & McCollum, 2002; Howe, McMahon, & Propst, 1997; Wilton & Nickerson, 2006).

The Corps must justify its programs to Congress, the Administration and the Office of Management and Budget (OMB). Current performance metrics for the Corps' national recreation program include National Economic Development

(NED) benefit estimation as one element in the development of future recreation budget justifications (USACE, 2010). Although not a performance metric, evaluating the regional economic significance of its recreation program is one way to gain recognition and local support for the program (Brown, 1987; Crompton, 2007; McGehee & Gustke, 1991; Propst & Gavrilis, 1987).

Economic Impact Analysis (EIA) is a tool to evaluate the level of economic development and can be used as a way to evaluate the regional economic consequences of management and policy alternatives (Connelly, Bibeault, Brown, & Brown, 2005; English, Bowker, Bergstrom, & Cordell, 1995). Corps lakes determine EIA estimates by tracking recreation use and visitor spending. Estimates of use and spending are then applied to models that estimate the economic activity of a region. The Corps lakes (or "projects") serve as a community attractor for economic development. EIA allows the agency to articulate one aspect of recreation benefits inside the agency, to partners, industries, and the public.

As precursors to EIA assessments, the Corps began describing its visitor market segments and their associated expenditures (Carlson, Propst, Stynes, & Jackson, 1995; Chang & Jackson, 2003; Jackson, Stynes, & Propst, 1994; Jackson, Stynes, Propst, & Carlson, 1996; Jackson, Stynes, Propst, & Siverts, 1992; Propst, Stynes, Chang, & Jackson, 1998; Propst, Stynes, & Jackson, 1992; Propst, Stynes, Lee et al. 1992). The Corps focused much of this research effort on developed recreation areas. Day users, overnight users (primarily camping), and visitors to other overnight accommodations (e.g., hotels, etc.)

were identified as key user groups, and within each group, those with and without watercraft (Propst, Stynes, & Jackson, 1992; Propst, Stynes, Lee et al. 1992). Spending profiles for recreation user groups at such areas have provided insight into the characteristics that best predict spending patterns. One of the market segments identified in these studies was visitors who boat. These boating groups (day users, campers, overnighters) consistently exhibited higher trip spending than their non-boating counterparts. Within the boating spectrum several distinct user groups can be identified, including: trailered boats at developed recreation areas, those that have dock permits (private or community docks) along the shorelines, and those who store their craft in marinas (both wet and dry dock storage).

The 1999 Natural Resources Management System (NRMS) database, estimated that over 175,000 boats were resident on Corps-operated rivers and lakes (Corps Lakes) through permitted docks and wet and dry storage facilities at marinas. The database identified nearly 190 lakes hosting 529 concessions providing wet slip boat storage and 213 of these facilities also provided dry storage (USACE, 2001a). Among the various types of boating populations at Corps Lakes, the focus of this research is on the boaters associated with marinas, and their boating use and spending patterns. Of the possible recreation boaters on Corps Lakes, this group is unique to the lake. By selecting to moor their boats at a marina, the boat owners have determined that their recreational boating will occur on a particular lake. Sampling frames for this group are

relatively easy to develop because they have rental agreements, are repeat visitors and can be identified and contacted through the marina concessionaire.

Unlike their day-use area boater counterpart, marina slip-renters are a market segment that is tied to a specific geographical location. The boats they maintain are typically larger than the ones that are trailered to a boat ramp, making some of their spending potentially different from other boaters. Estimates of their annual spending and trip spending are more likely to be tied to the study area (within 30 miles of the marina) than near their place of residence or other regions (outside 30 miles) (Carlson et al. 1995; Chang & Jackson, 2003).

Boaters at Corps lakes display a different and higher spending pattern than non-boaters (Carlson et al. 1995; Chang & Jackson, 2003; Propst, Stynes, Lee et al. 1992). In evaluating previous studies, it was determined that developed recreation area sampling frames did not provide adequate sample sizes of boaters renting marina slips to conduct a separate analysis of this important group. This limited the ability to measure the economic effects of visitors to marinas, who were thought to have spending patterns different than other developed recreation area boaters and visitors. Other developed area boaters (day use or overnight users) typically trailer a watercraft to the recreation area. Marina boats are typically larger, less suited for trailering, and stored for easy access. Additionally, higher boat costs and annual fees such as marina fees, insurance and maintenance, as well as increased operations per trip would be expected to be paid by marina slip-renters.

In this study, independent surveys of marina slip renters were employed at three Corps lakes to determine similarities and differences in spending patterns across the lakes. Finding no differences would imply that standard estimates of use and spending may be suitable for application to marinas across the nation. Where differences are noted, refinements to adjust averages for unique characteristics of individual marinas and lakes may be needed (e.g., rural/urban).

Focusing on the marina slip-renter population allows for the possibility of obtaining information on a segment of the boating population that is tied to the lake (Yoon & Uysal, 2005). Developing models to predict visitor spending of boaters using marinas would provide the agency a way to evaluate a marinas' economic contributions in places where no primary data are available. There are three primary types of marina-related spending: expenditures tied to an individual outing or recreation trip (trip spending), those related to the upkeep and maintenance of the watercraft (annual spending), and the cost of the watercraft and equipment itself (durable goods spending).

Study Purpose

The purpose of this study is to examine the spending behavior of a unique, water-based recreation market segment. The result will be a baseline spending profile and set of models that can be used to estimate marina slip renter expenditures for Corps lakes for which primary spending data are unavailable. There are over 200 marinas on lakes operated by the Corps (Corps Lakes), each maintaining less than 100 marina slips. Findings from this study

will provide generalized spending information for lakes unable to conduct independent surveys. A secondary purpose is to contribute to the literature on forecasting tourism expenditures for this user group.

Problem Statement

Marina slip renters are one of the boating market segments at Corps of Engineers water resource projects whose spending patterns have not been studied. Without evaluating the spending behavior of marina slip renters, it is not possible to evaluate the economic value of marinas on Corps of Engineers lakes across the nation. Budget allocation decisions are based on data regarding the returns on government investment and efficiencies (USACE, 2010). As such the economic contributions of various market segments come under review. Additionally, the determination of the market share of boaters using Corps facilities has not been assessed. The published literature on the modeling of recreation and tourism expenditures for boaters has not been focused on inland water resources. Much of the work has been coastal or oriented towards the boating population of the Great Lakes that typically has a shorter recreation boating season.

Study Objectives

This study will provide a baseline of spending profiles for marina slip renters at three locations and test for differences in spending across the lakes. The

three lakes that are being compared are: Harry S Truman, MO; Lake Sidney Lanier, GA; and Raystown Lake, PA.

- The first objective of this study is to compare trip spending patterns of marina slip renters at the three projects. Variables for comparison include the boat type and size, trip length of stay, and characteristics of the boater household.

Marina boats are considered to be larger than those trailered to recreation day use ramps. Spending differences based on the watercraft size will also be assessed.

- The second objective is to develop a predictive model to evaluate trip spending of marina boaters, based on the independent variables measuring characteristics of the following:
    - the boat
    - the trip, and
    - the household.

Survey Authorization

The studies described in this dissertation were initiated under the USACE Natural Resources Recreation Research Program, with funding for data collection and analysis provided under the Recreation Management and Support Program (RMSP). The RMSP work unit was entitled: Measuring the Economic Effects of Boat Dock Permit and Marina Slip Holders. The Ecological Resources Branch (ERB) of the US Army Engineer Research and Development Center (ERDC) at the Waterways Experiment Station (WES) was responsible for each of

the surveys described herein. The author of this dissertation was the principal investigator for the RMSP work unit, and a member of the ERB staff. The ERB was responsible for the survey designs, correspondence, survey instruments, sampling frame, and this analysis. The Institution for Public Policy and Social Research (IPPSR) Office for Survey Research (OSR) at Michigan State University (MSU) was responsible for final preparation and distribution of the pre-interview correspondence with respondents and conducted all telephone interviews under the direction and support of the Department of Park, Recreation and Tourism Resources (PRTR). PRTR provided technical assistance, analysis of the national marina study, analytic support, and all economic impact analysis (Amsden, Chang, Kasul, Lee, Perales, & Propst, 2008; Propst, Amsden, Chang, Kasul, Lee, & Perales, 2008; Propst, Chang, Kasul, Lee, Perales, & Amsden, 2008).

Instruments were developed using the guidelines provided by the Institute for Water Resources (IWR) and authorization was granted to the Corps of Engineers under OMB Clearance Number 0710-0001 (USACE IWR, 2010). IPPSR OSR obtained authorization through MSU Human Subjects Department, IRB Number 98-555/APP#I004674 and utilized their computer-assisted telephone interviews (CATI) system to conduct the work (Appendix A).

As products of these surveys, reports on the economic impact assessment of these three projects were developed (Amsden et al.2008; Propst, Amsden et al. 2008; Propst, Chang et al. 2008). This document builds on the work and findings of these previous studies and analyses.

CHAPTER 2

LITERATURE REVIEW

This chapter addresses the literature pertaining to regional economics, recreational boating, economic impact research conducted by the Corps of Engineers and visitor or tourist spending, with a primary focus on the latter. The sections of this chapter are designed to move from a discussion of the broad economic frameworks used by the Corps of Engineers, to a description of the Corps of Engineers recreation program, and then to a review of research associated with the focal point for this dissertation – marina visitor spending, which is critical to the development of the regional economic models and to understanding the economic impacts of boating.

Value is placed by the federal government on permitting the development of a water-based recreation opportunity (Soden, 1995). Communities and industries see the natural resource as an opportunity to co-locate. *High levels of shared perception suggest more joint management of economic-related activities. As a consequence, there are additional opportunities in the form of public-private partnerships between stakeholder and parks* (Soden, 1995, p.25.) Economic impact assessment allows for the value added by marinas to be quantified. In order to determine economic impacts, visitor spending and levels of recreation use need to be measured.

Economic Impacts

As described by Henderson and Cousins (1975) and Loomis and Walsh (1997), it is not the spending by tourists that is the measure of a community's prosperity but how this money is used by the businesses that receive it.

> *The economic impact of visitor spending is typically estimated by some variation of the following simple equation:*
> *Economic Impact of Tourist Spending = Number of Tourists*[/Visitors] * *Average Spending per Visitor * Multiplier* (Stynes, 1999a, pg.1).

Regional economic multipliers are applied to estimates of the number of visitors and their spending to quantify ensuing changes in income, employment, and sales. The economic effects of spending by non-residents locally, or new dollars coming into the region, are the basis for economic impact studies (Crompton, 2006; Loomis & Walsh, 1997; Stynes, 1999b; Stynes & White, 2006a). To fully understand the economic impacts of recreation, it is necessary to investigate the component parts of use estimation, visitor spending, economic impact models, and multipliers used in the analysis (Chang, 2001; Pedersen, 1990). Multiplying visits by spending yields the household spending vector required for I/O analysis (Alward, 1986; Cai, Leung, & Mak, 2006; Lipton & Miller, 1995). Variations in the region under study, the population of visitors, the definition of the trip, the unit of measure, the sectors of the economy in the survey instrument, and the recall period all need to be addressed in economic impact analysis (Alward, 1986; Archer, 1996; English & Thill, 1996; Frechtling, 1994, 2006; Getz, 1994; Loomis & Walsh, 1997; Stynes, 1999b; Tyrrell & Johnston, 2006; US Travel Data Center, 1976).

Where benefits (consumer surplus) studies provide value estimates above and beyond actual price, economic impacts are developed by estimating visitor use and spending and determining how the money flows through the economy (Chang, 2001; Loomis & Walsh, 1997). The information from visitor spending can be imported into I/O models, which describe the economy by sector, and translate visitor spending dollars into sales, jobs, and income estimates (Chang, 2001; Lipton & Miller, 1995; Loomis & Walsh, 1997; Murray, Kirkley, & Lipton, 2009).

Limitations

There are inherent limitations in the application of economic impact analysis in recreation and tourism applications (Crompton, 2006; Fleming & Toepper, 1990; Getz, 1994; Stynes, 1999c; Stynes & White, 2006a). Each of the components - visitor use estimates, visitor spending and regional multipliers, provides unique challenges in ensuring accurate estimates. In estimating use and spending, potential errors or bias can occur in sampling (e.g., non-response), measurement (e.g., recall), and analysis (e.g., processing) (Champ & Bishop, 1996; Zhou, 2000).

A limitation of this method is that linear relationships are assumed. If tourism spending rises by 20 percent, the number of new jobs and the amount of income in affected sectors also increase by 20 percent and this pattern continues indefinitely in an I/O model. In reality, however, such relationships are not viable (Kanters, Carter, & Pearson, 2001). At some point, continued inputs into the

system in the form of more tourists spending more dollars may have negative effects on social and environmental systems, thereby diminishing the ability of the region to sustain tourism spending growth at a given level (White, Virden, & van Riper, 2008). All systems have limits. Crompton (2006) warns that community costs, opportunity costs, and displacement costs are seldom evaluated in impact analysis.

Use Estimation

To avoid over-counting economic impacts, visitation estimates should be segmented into local and non-local visitors, as it is only expenditures by non-local visitors that are counted as new economic stimulus to a region (US Forest Service, 2007). Kanters et al. (2001) found that the concept of "new money or spending" is only non-local visitor spending locally and not local resident spending. They also note that economists debate if sport and recreation services create an economic impact. In the case of sports centers, *it has been argued that if a preferred service or product is not available in a resident's community, she will travel to an adjacent community to purchase that service creating a "negative" economic impact (p.57).* Estimating visitors over time and those from outside the region become critical to the modeling process.

Market segmentation is also important because spending patterns of various user groups are different. Campers typically spend more than day users, and that subset of visitors (either campers or day users) who participate in

boating activities spend even more (Jackson, Stynes, Propst, & Siverts, 1992; Loomis, 2007; Stynes & White, 2006b; US Forest Service, 2007). The development of use estimates by market segment provides researchers an added complexity in survey design. Furthermore, all use estimates are subject to sampling and measurement error (Pedersen, 1990; Stynes & White, 2006a, 2006b).

For marina slip renters, use estimates involve two parts, the estimate of the number of users (total slips) and the number of boating trips taken. Issues related to the percent occupancy by season, transient slip rental, and non-recreation slips (e.g. charter fishing, marina rentals) need to be addressed (Stynes, Wu, & Mahoney, 1998). Rental agreements (non-transient recreation boats) can provide information on the percentage of in-county residents as part of the registration process. Boat type and size data are observable traits at marina locations, which when tied to other registration information, improve the ability to classify boats in ways that are useful for EIA.

Visitor Spending

Fisk (1959) outlined the following four theories in leisure spending behavior: Marshall's Law of Demand (Marshall, 1949), Veblen's Conspicuous leisure (Bagwell & Bernheim, 1996; Basmann, Molina, & Slottje, 1988; Veblen, 1934), Riesman, Glazer and Denny's marginal differentiation in spending (Riesman, Glazer, & Denny, 1953), and Life-cycle consumption (Monroe, 1942; Morgan, 1954). The law of demand deals with optimizing utility functions, and

balancing supply and demand as a function of price. Conspicuous leisure is consumption for leisure's sake; luxury items like boats would be a conspicuous leisure purchase. Marginal differentiation is the way to "out-pace the Jones" (rather than keeping up with them). Being a part of the "scene" or a member of the club would be important to the consumer. Life-cycle consumption follows the consumption behavior of a dynamic family through life stages of aging with and without children. Beyond these four theories, characteristics of the household, such as income, predict spending, as they typically move together in the positive direction; the higher the personal income, the greater the spending (Davies & Mangan, 1992; Taylor, Fletcher, & Clabaugh, 1993).

However, in most research since the 1960s, models used to describe recreation tourism consumption have been based on the framework developed by Clawson and Knetsch (Clawson & Knetsch, 1966). In this framework the recreation experience is compartmentalized into five stages: planning, travel to the site, the recreation experience, the return trip, and the final phase of recollection and sharing. Woodside and Dubelaar (2002) set out to develop a conceptual framework based on the Clawson and Knetsch framework. Elements of the model included distance to the destination, traveler behaviors (length of stay, accommodations used, activities, areas visited, expenditures and gift buying behavior), prior visits, trip motivations, and visitor evaluations. For tourism strategies, this working model helps explain the complexity of the trip to aid in communication strategies and improve survey data collection.

Studies in the area of tourist expenditures deal with identifying subtle differences in characterization of the respondent, the trip and the recreation experience so that the results can be properly interpreted and applied (Lipton & Miller, 1995). Archer (1996) notes that I-O modeling *requires very detailed data about the transactions between the various sectors of the economy and about each sector's purchases of imports, their payments to factors of production, their level of employment, their sales to each of the other sectors and to exports, the public sector, and domestic consumption. In addition, in the case of tourism studies, breakdowns of the amount of money spent by the tourist in each sector of the economy are needed, preferably in the form of separate patterns of this expenditure for different categories of tourists (e.g., by their country of residence, type of accommodation used, and the like)* (p.704). Without detailed information, post-hoc analysis on spending by group type or segment would be difficult to accomplish.

For boaters, visitor spending can be defined in three parts: a) expenses of the trip, b) craft-related annual spending, and c) durable goods spending (Lee, 1999; Stynes, Brothers, Holecek, & Verbyla, 1983). Expenses of the trip are best related to sectors of the economy (e.g., food and beverage purchases at restaurants separated from food and beverage at grocery stores). Craft-related expenditures include the cost of renting the slip space, insurance and other costs of operations. Durable goods expenditures include the items that can be used on multiple trips including the boat, tackle, and other related equipment. Factors that influence visitor spending can include the trip type, characteristics of the

household, the trip length, transportation used, party size, and a number of other externalities. A few factors are discussed below.

Spending can vary by party type (e.g., business, pleasure, international, etc.) and trips can be influenced by preferences. Trip motivations may vary (i.e., physical, cultural, social or escapism), but all influence spending (Mok & Iverson, 2000; Suh & McAvoy, 2005). Beyond motivation, perception, and image surveys, characteristics of the respondent demographics, socioeconomic traits, party size, length of stay, trip purpose, activity of interest, mode of transportation, and accommodations influence direct spending (Archer, 1996; Davies & Mangan, 1992; Mok & Iverson, 2000; Suh & McAvoy, 2005; Uriely, 2010). Additional variables of interest or those used in predictive modeling for spending include income (Pyo, Uysal, & McLellan, 1991; Taylor et al. 1993), length of stay (Barros & Machado, 2010), race and gender (Agarwal & Yochum, 1999; Pullis, 2000), distance traveled (Hanagriff, Murova, & Lyford, 2010), and age and trip typology (Oh, Chen, Lehto, & O'Leary, 2004).

In addition, location characteristics influence spending. Stynes and White (2005) found that visitor spending "segment mix varies much more across forests and applications than the spending of visitors within a given segment." (p. 25). They determined that spending averages from pooled cases across forests would be more reliable than spending averages from individual forest estimates. Given a sufficient number of lakes surveyed, the same may be found when pooling marina slip renter spending averages across Corps lakes.

Four studies are highlighted to demonstrate the wide range of variables that are found to influence spending. First, Pyo et al. (1991) evaluated a linear expenditure model for tourism demand. The relationship assumed that under budget constraints, tourists or visitors will maximize their utility in purchasing goods and services. Five item spending categories were studied; i.e., transportation, accommodation, food services, entertainment, and other. Compared to other items, food purchases were considered necessary and could not be reduced. Lodging and transportation were found to be interrelated. With increased travel or transportation costs, lodging increased, as did food purchases. Food was considered necessary and lodging and transportation was identified as a category where expenditure reductions were possible. Optimizing the basics allows for additional spending in other areas. Entertainment and other recreation spending were not similarly related. Second, Oh et al. (2004) investigated shopping behavior supporting the association between expenditures and age, gender and trip typology. For trip typology, trips to more urban destinations create greater opportunities to shop, while trips to rural or more nature-based destinations have fewer shopping opportunities. Family life-cycle also influences expenditures. Third, Keown (1989) found high per-capita spending in three groups: young singles, young couples, and solitary survivors (widows), with the latter being identified as a significant consumer (shopping comprised over 40 percent of their expenditures). Fourth, Hanagriff, Murova and Lyford (2010), in rural Texas, found that trips associated with folk festivals, heritage festivals, historical, musical, agricultural, nature tourism, food/wine

festivals, art festivals, and other events brought a range of visitors with varying expenditures. Those tourists traveling over 60 miles were more likely to spend three times as much as others. Art events, historical events, and nature tourism events saw the greatest distances traveled and higher direct spending, but future work was recommended to collect additional information on group size, age, and gender.

Item spending categories used in many onsite and mail-back surveys include accommodations (hotel, motels, camping), transportation (air, rail, car), gasoline (car, recreation vehicle, boat), food services (restaurant and groceries), souvenirs, admission fees and miscellaneous expenses. Refinements to these item categories include distinguishing high and lower cost variables that are a part of the same category. For example, in overnight accommodations, camping and hotel expenditures can vary dramatically (Stynes & White, 2005; US Forest Service, 2010) and separating them at the time of surveying allows for greater interpretation clarity. For visitor surveys, a greater number of categories or item descriptions can improve respondent recall; however, too much detail can become a survey burden (Stynes, 1999c). For example, cues for alcoholic beverages in the item categories of "groceries, food and drink," or "restaurants and bars" helps to define what the spending item includes. The US Forest Service National Visitor Use Monitoring (NUVM) study found that changes made to the instrument in the lodging category (separating camping from hotel stays) increased the lodging expense reported (Stynes & White, 2005).

Trip spending can be estimated on a per-trip, per-night, per-season or annual basis. Issues related to survey and measurement error need to be addressed as the estimates of spending are subject to recall, telescoping and instrument errors. Spending can also be estimated by party, or by person. The latter is more difficult to obtain as most surveys are conducted with proxy respondents rather than all party members. Issues related to responses for children become a factor (Stynes, 1999c).

Recreation Boating

The 2010 Leisure Market Research Handbook (Miller & Washington, 2010) identified recreation boating as one of 65 segments of the leisure market, accounting for $15 billion of the $2.4 trillion market. The 65 leisure segments are not mutually exclusive; therefore spending estimates across categories can be duplicative. For example, the recreation boating segment and the fishing and hunting leisure segment likely share user groups and expenditures. The National Marine Manufacturers Association (NMMA) estimates that 72 million people boat, with 17.4 million boats in use; of these, 12.8 million are registered (Miller & Washington, 2010).

Sea Grant recognized and funded research related to the marina and boating sectors beginning in the early 1970s. Early studies in New York State surveyed boaters and identified boating industries - commercial marina and boatyards and estimated revenues. Studies after the 1974 gasoline energy crisis found no reduction in participants but did find a reduced consumption of fuel.

Studies in the 80s and 90s continued to identify the inventory of marinas and the demand in the Great Lakes area (Brown, 1976; Connelly, Brown, & Kay, 2004)

Stynes, et al. (1983) identified elements key to understanding the boating population, including collecting information on: 1) boat characteristics (including type, propulsion, and length), 2) annual craft-related spending, and 3) estimates of per day-trip related spending. Stynes et al. found that "Boat types and size are strongly related to spending patterns" (p.21). They also recommended the use of regression models to predict craft and trip spending using the type of craft and type of trip as a basis for segmentation, noting that craft spending errors were typically less than trip spending errors due to the nature of defining the trip.

Similarly, studies in the west (Neeley, Johnson, & DeYoung, 1998) began to determine the scope and expenditures associated with recreation boating types including registered recreation boats, commercial excursion, commercial charter, commercial nature-based tourism, and non-registered boating groups like windsurfers and river rafters. Due to limitations in data sources, estimates of commercial trips were based on one-day excursions, resulting in an underreporting of overnight stays. Data extrapolation techniques were used from secondary data sources to estimate total use and thereby total expenditures.

Carlson et al. (1995), in an evaluation of recreation economic impacts of the Upper Mississippi Region, found that while trips to developed park areas were the most common, they accounted for the lowest average spending per trip. Recreation trips from marinas had the highest trip spending averages, followed by permitted docks and sightseeing/visitor center areas.

The Ottawa River study (Hushak & Bielen, 1999) involved three surveys, two with area boaters, and the third with recreation-oriented businesses. For the contact survey (CS), the average household had 1.6 watercraft and trip expenditures per household were $197.39, with an average of 32.8 trips annually. A second survey sent to registered boat owners found an average of 1.7 boats per household with average trip spending of $135.41 per trip and 26.4 trips per year. Estimates of durable goods and annual maintenance costs were obtained. In addition, willingness to pay values were obtained to estimate economic value for environmental and navigation dredging. These data were designed to support the need for dredging to allow access to Lake Erie from the Ottawa River.

Connelly, Brown and Kay (2004) also conducted boater surveys (Great Lakes - New York) and tied expenditure estimates to water bodies and region, determining both en-route and on-site spending. Annual trip spending by location was measured for 10 categories of locations or activities, including marinas and yacht clubs, gas stations, restaurants and bars, grocery and convenience stores, bait and tackle shops, lodging, launching, mooring and tournament fees, entertainment, and other. Post hoc analysis of expenditures by watercraft size was conducted for boaters recording owning only one boat. The study team found that respondents with smaller boats spent less money (16'- $532 average), medium sized craft owners spent more (16'-25' - $1,204 average) and boaters of the largest crafts in the sample spent the most (26' or greater - $2,832 average). These averages varied by region and upstate New York's

medium and large watercraft boaters expenditures were very similar ($1,099 and $1,104, respectively). Statistical parameters of these estimates were not reported.

Marinas

The National Marine Manufacturers Association (2006) estimated that in 2005, there were 18 million boats in operation, 13 million that were registered. More boats were added to the fleet in 2005 than were retired, with a net gain of over 660,000 boats in one year. Of these watercraft less than one million (874,132) were housed in marinas. In 2005, 12,073 active marinas were identified in all 50 states. There are 476 marinas on Corps of Engineers managed lakes and rivers representing over 100,000 slips.

Carlson et al. (1995) compared study findings for visitors (from developed areas, marina slips, sightseeing areas, and permitted docks) in the Upper Mississippi River system and determined that the majority of annual visitation was from developed areas (73.3 percent) and marinas (17.3 percent). Average party sizes differed for developed areas and sightseeing areas (2.2 and 2.5 visitors, respectively), whereas marina and dock visitors averaged 3.8 and 4.1 visitors per party. *Trips to marinas had the highest spending average ($132), followed by trips to permitted docks ($86) and trips documented at sightseeing/visitor center areas ($83)* (p.29). Spending differences were attributed to party size, trip length, bundle of goods purchased and visitor segments represented (e.g., day/overnight user, boater, and residence in region).

On average, three-fourths of trip spending occurred within 30 miles of the recreation site. Although visitors to marinas accounted for 17 percent of the visits, they contributed 28 percent of the total trip spending in the region.

Similar findings were determined by Stynes, Wu, & Mahoney (1998), revealing that Michigan boaters at Great Lakes marinas accounted for 11 percent of the boats and 40 percent of the economic impacts of all Michigan boaters (estimate includes equipment, repair, slip rental, retrieval fees, off season storage, fuel, and insurance) . Great Lakes boaters that housed their boats in marinas averaged 27.4 to 31.1 boating days per year (size class under 28' and 29'+, respectively). Average boater spending for annual opertation and maintenace increased with boat size from $205 a year for 16' watercraft to $4,500 for boats over 29'.

In 2004, the Recreational Boating Research Symposium was convened to begin to identify research needs and goals relating to the boating community (Recreational Marine Research Center, 2004). Conducting a national survey of marinas to include *facilities, services, slip occupancy, revenues, employment and taxes* was one of their four work areas (pg. 12). Other important elements of the work included the development of standard terminology and definitions. Products of the Recreational Marine Research Center (RMRC) and its partners (Association of Marina Industries, Great Lakes Commission des Grands Lacs, US Coast Guard, and NMMA) were the database and website "On-line Boating Economic Impact Model" (Recreational Marine Research Center, 2007). The model allows for the development of economic impact assessments based on

two national boater surveys conducted in 2005 and 2006. Over 12,500 boaters were surveyed. Annual spending and trip spending estimates were obtained from boaters and price adjusted to 2007 dollars. The system allows the user to enter the number of boats by size class and motor type, select the characteristics of the spending region (e.g., rural) and utilizes average spending patterns from studies to develop impact estimates. The selection of a spending area (low, medium or high spending) determines the average spending profiles applied. Spending means provided below reflect a subset of options, focused on inland marinas, low and high spending areas for power boats and sailboats. Low spending areas (limited areas for spending and below average pricing) estimates for inland marinas were reported to range from $126 (under 40'), to $182 (over 40'+) for power boats and from $55 (under 40') to $ 97 (over 40'+) for sailboats. High spending areas (with opportunities for spending and above average pricing) were reported (in 2007 dollars) to range from $157 (under 40') to $229 (over 40'+) for power boats and from $77 (under 40') to $136 (40'+) for sailboats.

In response to Public Law 106-53, Water Resources Development Act of 1999, an assessment of recreation boating in the Great Lakes was conducted (Great Lakes Commission des Grands Lacs, 2007; USACE , 2008). The findings are provided *for informational purposes only, and* [do] *not contain any conclusions or recommendations for Federal action* (abstract). The report acknowledges *the significant regional economic benefits derived in Great Lakes states from such activities as Great Lakes boating spending, marina operation, charter fishing and boat sales and manufacturing (p.4)* (USACE, 2008). Studies

conducted by Michigan State University's Recreational Marine Research Center determined that Great Lakes boaters annually spent $ 2,200 on trip-related expenses (e.g., gas and oil, refreshments and food, lodging, and entertainment) and an additional $1,400 on craft-related expenses (e.g., slip fees, repairs, equipment, and insurance). Recreation use by Great Lakes boaters averaged 23 boating days per season. Findings of spending by craft size again supported differential spending (boats smaller than 16' spent $76 per boating day and watercraft over 40' spent $275 per day) (Great Lakes Commission des Grands Lacs, 2007).

The Great Lakes Recreational Boating study (USACE, 2008) found that in 2003, over a quarter million boats were stored at marinas in the Great Lakes states, with over 112,237 registered boats kept at Great Lakes marinas. The states in the study included Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin. The majority of the boats were in Michigan (42,583), New York (16,364), and Ohio (33,550). Adjacent to the Great Lakes, a total of 825 marinas, 144 yacht clubs, 64 boat yards, 72 campgrounds, and 107 condominiums operated over 119,000 slips. Boats in the marina were classified into six different size classes, less than 12' (representing 1 percent), 12'-15' (representing 2.5 percent), 16'-20' (representing 10.3 percent), 21'-27' (representing 57.1 percent), 28'-40' (representing 25.1 percent), and more than 40'(representing 4.2 percent). Trip spending was reported in four size classes for marinas on a total per boat day basis. Boating days and trip spending were reported by boat size for the categories of less than 21' (28 days boated per

year, $101 per boat day), 21'-28' (34.7 days boated per year, $163 per boat day), 28'-40' (40.7 days boated per year, $180 per boat day), and more than 40'(44.3 days boated per year, $285 per boat day). Average annual craft spending per boat was reported by boat size for the categories of less than 21' ($2,573 per boat), 21'-28' ($3, 784 per boat), 28'-40' ($7,109 per boat), and more than 40' ($11,214). Party size and length of trip information was not readily available.

Economic impact assessments for marinas to date have been summaries of non-resident spending locally or total visitor spending. There has been limited analysis or discussion on the independent variables that influence visitor spending. Characteristics of the boat (size, boat type, motor type), the trip (number of trips, party size), and the site (regional spending opportunities) all influence the spending behavior of the visitor.

Agency Focus

The Corps of Engineers received the authority to manage lands and waters for the purpose of recreation under the Flood Control Act of 1944 (USACE, Walla Walla District, 2010) and the Land and Water Conservation Fund Act of 1965 (Title 16 of the US Code) (Cornell Law School, 2006). The Corps began to organize recreation economic studies in the 1970s with the development of the Plan Formulation and Evaluation Studies (Hansen, 1974; Hansen & Hydra, 1974) and the National Economic Development Procedures Manuals (Freeman, Hankamer, Hansen, Mills, & Stoll, 1990; Hansen, Moser, & Vincent, 1986; Hansen & Badger, 1991; USACE, Institute for Water Resources

[IWR], 1974). These documents laid the foundation for recreation economic evaluations in the Corps of Engineers water resource projects.

The economic value of the recreation opportunity is a function of benefits and impacts. Benefits (i.e., consumer surplus) can be assessed in a variety of ways: Unit Day Values, Contingent Valuation Modeling, and Travel Cost Methods. These benefits can be evaluated against costs to develop efficiency ratings. It is this benefit-cost analysis that drives the national economic development evaluations required by federal agencies (including the Corps of Engineers) to evaluate programs at the national level. It is the tool used by the Corps of Engineers in reporting program efficiency to the Office of Management and Budget (Office of Management and Budget, 2009).

The Corps began work with the US Forest Service in the 1980's to develop the procedures for regional economic impact assessment (Bergstrom, Cordell, Ashley, & Watson, 1990; Propst & Gavrilis, 1987). Propst (1985) and others provided white papers dealing with items identified by the Corps and the US Forest Service as "unresolved issues... in assessing economic impacts of recreation and tourism" (p. i). Problem areas within the economic impact process were identified and examined. Problem areas included the development of multipliers, the use of I/O, analysis, evaluation and application of secondary effects, and data considerations.

From the initial interagency work, the Corps began a series of recreation economic impact assessments across the country and began to assess the spending patterns of various market segments of their visitors. This in turn was

used in conjunction with use estimates to develop economic impacts of Corps water resource lakes (Carlson et al. 1995; Jackson et al. 1992; Jackson et al. 1994; Lee & Propst, 1994; Propst et al. 1992; Propst et al. 1998)

Of the many segments of recreation users at a Corps water resource project, boaters are a key constituency. Boating segments that can be represented on a lake include transient boaters (day users, campers and boat lockages on rivers) and other boaters more vested in the local community (boat dock permit holders, yacht clubs and marina slip renters). Economic impact studies have found that boaters have higher spending rates than non-boaters (Jackson et al. 1992, Lee & Propst, 1994, Propst et al. 1992).

Marina slip renters are unique boaters in that they are tied to a single location for a season or a year, they have access to and receive services delivered by the marina, and they are repeat customers with knowledge of the resource and surrounding area. Furthermore, they have invested in a leisure activity of their choosing by selecting a type of boat suited to their preferences. For the Corps of Engineers, the marina slip renter represents a stakeholder who provides economic returns to the local community. Understanding ways to develop spending estimates for this important group will serve project managers by increasing their understanding of the economic consequences of resource allocation decisions.

Conceptual Model

There continues to be a need to quantify the spending of recreational boaters for the development of regional economic model outputs in terms of sales, jobs, and income. Some of the literature included in this chapter focuses on final economic impacts and less on visitor spending, the recreationist, and the recreation trip. Distance traveled, party size, boat size, household income, and length of stay have been identified as influencing visitor spending. As the distance to the lake increases, the potential for a longer trip and an overnight stay also increases and this in turn, increases the need for food services or groceries. Party size also increases the quantity of goods and services required. For motorized boating, the size of the boat influences the amount of fuel needed as does the activity (e.g., pleasure cruising or waterskiing over fishing). Regional site characteristics can vary and influence spending behavior. The availability of retail centers (e.g. rural or urban centers) changes spending opportunities and potentially trip spending. A conceptual model based on the literature can be described as:

$$
\begin{aligned}
&\textit{Visitor Trip Spending} \\
&\quad = f\{\text{Household Characteristics (income, residence distance to site)} \\
&\quad + \text{Trip Characteristics (party size, length of stay, lodging type, activity)} \\
&\quad + \text{Boat Characteristics (length, boat type)} \\
&\quad + \text{Site Characteristic (spending opportunities, price differences)}\}
\end{aligned}
$$

CHAPTER 3

METHODS

Study Population

Previous work conducted within Corps day-use and camping areas determined that some of the largest per-visit expenditures at Corps projects were attributable to the recreation boater (Jackson et al. 1994; Propst, Stynes, Chang, & Jackson, 1998; Propst, Stynes, & Jackson, 1992). Marinas are a discrete population segment that provides access to boaters on lakes and rivers operated by the Corps of Engineers. The distribution of marina slip renters is extensive throughout the Corps, occurring in 33 states, representing nearly 91,000 watercraft (USACE, 2001a) or approximately 10 percent of the estimated US marina market (NMMA, 2006). This study integrates and uses data from a series of studies conducted by the Corps to determine the spending patterns of a discrete group of boaters.

The first marina study, national in scope, was conducted in the fall of 1998 (Chang, Propst, Stynes, Perales, Kasul, & Jackson, 1999). A two-stage random sample design was used to select marinas proportional to the number of slips and then randomly select a fixed number of slip renters within each marina. The following year, six projects from across the country were randomly drawn to provide project and regional estimates from their marina renters. The projects were selected to represent organizational and geographical diversity. Due to marina reluctance in providing the sampling population lists, only three projects

attained full participation (Appendix C). The three lakes that remained in the sample represented the southeast (South Atlantic Division, Mobile District), the northeast (North Atlantic Division, Baltimore District) and the central United States (Northwestern Division, Kansas City District). These three studies are the focus of this work.

Table 1 summarizes parameters for the three lakes included in the marina study. Separate sampling frames and procedures were developed for each of the water resource projects. The Corps national database of record at the time of the study was the National Resources Management System (NRMS). The NRMS provided a priori estimates of the number of marina concessions and slips maintained on Corps projects (USACE, 2001a). All references to marina slip renters are limited to renters at concessions with "wet mooring" facilities or wet slips. Dry stacks facilities were not included.

Table 1. Number of Slips in Sample and Study Population by Lake.

Project	Total Marina Slips	Number of Slips in Frame	Number of Eligible Marinas	Actual Sample Size
Lake Sidney Lanier, GA[1]	5877	5319	6	211
Harry S. Truman, MO	1075	1075	5	202
Raystown Lake, PA	1163	1163	2	217

[1] Lake Lanier had five yacht clubs that were eliminated from the sampling frame. These clubs accounted for 9 percent of the total lake wet storage.

Delimitations

Boats kept in dry storage were eliminated from the study for a variety of reasons. From personal visits to Corps projects and conversations with Corps

managers, the inventory in dry storage was a mix of boats, empty trailers, and recreation vehicles in short- and long-term storage. Some dry-dock facilities were limited to boats, but these could not be determined a priori from the national NRMS data sets.

In addition to restricting the populations to be studied to concessions with wet moorings, use and spending were restricted to boating trips. Routine trips to the boat for maintenance were not included in the count of total boating use. Actual excursion was required. In addition, transient slips were not included in the study and cannot be assessed from the existing data sources. Transient slips are assumed to be in the portion of the slips left out of the frame, as well as those slips that were unoccupied. However, transient slips are assessed as part of the marina occupancy rate.

Yacht clubs were excluded as a third population of moored boaters. Yacht clubs provide "marina" type services but hold a "quasi-public" lease status. They were considered to be different than concession marinas. Questions concerning boat ownership, use and spending differences were additional factors in the decision to remove them from the study population.

Lake Sample Characteristics

Appendix B contains characterizations of the three lakes used in this report, including a snapshot of their 2009 recreation program and a comparison of the boating characteristics from the time of the study to 2009. The three lakes retained in the study provided for geographic and seasonal variations. Table 2 outlines findings from the studies conducted in 1999 (Amsden et al. 2008; Propst, Amsden et al. 2008; Propst, Chang et al. 2008).

Truman Lake in Missouri is the most rural of the three lakes in the study and the largest with over 55,600 surface acres, approaching 1000 miles of shoreline. The 30-mile distance range included a total of four counties in the study, covering just over 2,480 square miles, with an average population estimate of 23 persons per square mile (Appendix B). It is estimated that annual visitation approaches 2.5 million visits with annual revenues over $667K. Truman Lake marinas currently serve just over 1,300 slips, maintaining the lowest occupancy rate of the three lakes (78 percent). In addition, the respondents from Truman Lake contributed the fewest boating trips (24,659) and least overall spending ($ 3.82 million annual trip spending and $1.15 million annual goods and services spending) (Propst, Amsden et al.2008).

Raystown Lake, PA currently has just over 1,300 slips in two marinas. The pool acreage of Raystown is the smallest of the three (8,300 acres and 118 miles of shoreline). However, the 100 percent occupancy and a greater number of annual trips resulted in nearly a doubling of the associated spending ($ 6.34 million annual trip spending and $ 3.9 million annual goods and services

Table 2. Comparison of the Three Lakes.

	Truman [1]	Lanier [1]	Raystown [1]
Number of Counties within 30 miles	4	16	5
Counties included	Benton, Henry, Hickory, and St. Clair	Banks, Barrow, Cherokee, Dawson, De Kalb, Forsyth, Franklin, Gwinnett, Habersham, Hall, Jackson, Lumpkin, Pickens, Stephens, Union, and White	Bedford, Blair, Fulton, Huntingdon, and Mifflin
Marinas in the frame	5	6	2
Occupancy rate	78%	96%	100%
Number of slips in frame	1,070	5,877	1,163
Estimated boats	835	5,642	1,163
Estimated number of annual party trips	24,659	198,417	31,456
Percent of new boats purchased (1997-1999 average)	4.13%	3.51%	7.41%
Estimated number of new boats purchased (1998)	34	198	86
Estimated total trip spending (inside 30 miles)	$3.82 Million	$32.86 Million	$6.34 Million
Estimated total annual goods and services spending	$1.15 Million	$31.04 Million	$3.90 Million

[1] Results from Propst, Chang et al. 2008, Propst, Amsden et al. 2008 and Amsden et al. 2008. All dollar amounts are in 1999 dollars.

spending). Raystown Lake is also a more densely populated area with over 87 persons per square mile in the five-county study area (Amsden et al. 2008).

The Lake Sidney Lanier study area included the greatest county coverage within the 30-mile distance zone (16), the heaviest population (426/sq mile), and the greatest number of marina slips in the frame 5,877 (which has increased to 6,120) on less than 40,000 water acres and less than 700 miles of shoreline. Due

to its extended seasonal use (southernmost of the lakes), trip spending was the highest at over $64 million ($33 million in trip spending and $31 million in annual goods and services spending) (Propst, Chang et al. 2008).

Three Lake Marina Study

Target sample sizes were based on the findings of the national marina study conducted for the Corps of Engineers (Chang et al. 1999). Rather than a straight random sample of all marinas throughout the Corps, a determination was made to sample projects and include all marinas at these projects, providing the capability to produce lake level estimates. Ranking projects by the total number of marina slips across the nation and retaining the top 90 percent eliminated over 50 projects. Cost consideration limited the study to include six projects. Selections were based on geographic, organizational, and density characteristics. Additional projects were also selected as alternate regional substitutes at the time of the draw.

The Corps Ecological Resources Branch (ERB) staff contacted each of the lake managers, providing information on the study design and a question-and-answer page, and requesting contact information for the marinas in operation on each project (Appendix C). A ranking of slips at each lake determined the number of marinas to be retained in the sample and the number of slips required within each. Each marina manager was contacted by phone, provided with a similar study and question-and-answer forms by mail, and asked to provide the slip renter information (Appendix C). Based on the variability in

spending behavior of the previous studies (Chang et al. 1999), a sample size of 200 was selected. In order to target 200 completed interviews per lake, and anticipating 50 percent response rate, each manager was asked to double the number of names originally determined in the sample. All marinas at each lake were included in the initial draw and based on random sampling proportional to size, a select number of slips were identified per marina. In other cases, the entire marina mailing list was provided and a random sample was drawn from its membership.

Survey Modifications

Data on key variables used in this analysis were collected through a computer assisted telephone interview (CATI) system administered by MSU IPPSR staff (Appendix C). .A total of 630 end-of-season interviews were completed.

Measurement

Respondents were mailed a pre-survey package outlining the study, a question-and-answer page, and a template outlining the spending questions that would be asked (Appendix C). CATI interviews were conducted with marina slip renters to determine characteristics of the following:

- Boating household and respondent
- Boat
- Recreation trip

Estimates of the number of boating trips taken during designated three-month segments of the year were collected. Respondents were asked to report trip-spending for their most recent trip. This was done to reduce recall bias and avoid telescoping effects, which could have visitors reporting their most expensive trips (Zhou, 2000). The total annual costs for durable goods (e.g. slip rental fees, insurance, maintenance, supplies) were also obtained, along with respondent and household demographic characteristics.

The elimination of outliers in this report followed the protocol identified in three related studies eliminating trips greater than 30 days (Amsden et al. 2008; Propst, Amsden et al. 2008; Propst, Chang et al. 2008) with one addition; per-day trip spending was limited to $500. Limiting per-day spending within 30 miles to $500 or less incorporated 97.9 percent of all records. A total of 13 records were eliminated using the length of stay under 30 days and the $500 limit (per-day spending ranging from $517.50 to $1462.00). Of these, only three records had per-day spending of more than $1,000.

Tests for statistical differences across the three lakes were conducted. The boating use and spending patterns associated with the marina slip renters on the three lakes were represented by three metrics:

- Average number of seasonal and annual recreation boating trips.
- Recreation spending on a party-trip and party-day basis (based on the last trip taken).
- Average per party day and trip spending for select boat size classes (based on the last trip taken).

Estimates of boating use and visitor spending were generated for each lake. Spending averages were estimated on a party-trip and party-day basis. Respondents were asked to provide spending estimates by categories (e.g. gasoline, groceries, lodging) for spending within 30 miles of the marina location (estimated distance for one county). Additionally, the respondents were asked to provide the total dollars spent outside of the 30-mile area. Appendix C contains a complete listing of item spending categories. Trip spending is that spending associated with the individual trip or recreation visit, including all participants on the trip. Party day spending is a calculated total (for all individuals) that divides total spending by the length of the trip to develop per-day estimates. Within each category (trip and per day) spending location is determined; location of spending was divided into local (within 30 miles of the Corps lake marina) or non-local (outside 30 miles).

Analysis

Sample estimates and statistical tests for this study were obtained using International Business Machines (IBM) Statistical Package for the Social Sciences (SPSS) Predictive Analytic Software (PASW) Statistics 18 (IBM SPSS, 2010).

For categorically measured attributes, the equality of response distributions between lake samples was tested using the chi-square test of homogeneity using the Pearson chi square statistic (Aczel & Sorinderpandian, 2004; Andrews, Klem, Davidson, O'Malley, & Rodgers, 1981). The chi-square

distribution test assumes that the parties selected for response were selected at random from all available parties. In this case, marina slip renters were randomly selected from within the population of available slip renters at each of the lakes. Responses from the three lakes are independent samples that were tested against each categorical demographic item.

The means of quantitatively measured attributes were evaluated between lakes or other user groups using parametric one way analysis of variance (ANOVA) F-test statistics (Aczel & Sorinderpandian, 2004). Analysis of variance tests were conducted for differences in mean spending across the three lakes on both a party trip, and party day basis. Additional testing for differences was made for resident-nonresident spending and spending by boat size classifications. The assumptions for ANOVA testing include that populations (lake, residency and boat size) were independent random samples and were normally distributed (Aczel & Sorinderpandian, 2004; Andrews et al. 1981).

Linear regression models were developed to explain and predict visitor spending as a function of lake, party, and trip characteristics. Separate regression models were developed for party trip and party day spending using seven attributes including respondent age, party size, distance from home, boat length, and trip duration. The regressions were obtained using least squares regressions procedures (Aczel & Sorinderpandian, 2004; McClendon, 2002). The ability of each model to explain variation in party spending was determined by the coefficient of multiple determination. Party and trip attributes that helped explain overall variation in trip spending were identified using F-tests. The

degree to which each attribute in the regression model helped to explain overall variation in trip or day spending was evaluated based on the adjusted R-squared statistic.

Total trip and per-day spending were price adjusted from 1999 to 2009 dollars using the Consumer Price Index (US Department of Labor, 2010). Although this procedure can be used to estimate trip spending in current dollars, it cannot be used to evaluate the relationship between variables. The relationships between independent and dependent variables are a function of the time when the study occurred. A current study of the spending patterns of marina slip renters using the categories of spending that were studied may likely exhibit a different relationship.

CHAPTER 4

RESULTS

To meet the first study objective (compare trip spending patterns at the three lakes), party trip spending was evaluated across the three sampling frames or lakes by characteristics of the marina respondent, the household, the boat, and the boating trip. The second objective (develop a predictive model to evaluate party trip spending) was met in a regression analysis to determine which combination of independent variables provided the best predictive model for recreation spending.

Objective 1. Three Lake Comparisons

In order to develop a predictive model of trip spending by marina slip renters from three different studies, testing for differences across the samples was completed. The three lakes were compared according to characteristics of the survey respondent and household, the boat, and the boating trip. Additionally, party trip and party day spending were evaluated by lake. Trip spending was compared for residents and non-residents, boat size and type, and trip characteristics. Dummy variables for the three lakes capture differences across lakes not explained by the other independent variables.

Household and Respondent Characteristics

Tables 3 and 4 provide an overview of respondent (Table 3) and household (Table 4) sample characteristics. Respondents at the three lakes

Table 3. Demographic Characteristics of Respondents by Lake.

Respondent Characteristics	Total	Truman	Lanier	Raystown	F or X^2	P Value
Registered Boat Owner	N=628	N=202	N=209	N=217		
Yes	93%	96%	92%	90%	5.25	0.072
Gender	N=628	N=202	N=210	N=216		
Male	83%	77%	89%	83%	11.14	0.004
Female	17%	23%	11%	17%		
	100%	100%	100%	100%		
Age Classification	N=621	N=200	N=208	N=213	54.97	0.000
35 & under	7%	3%	10%	8%		
36 - 45	19%	10%	27%	19%		
46 - 55	31%	27%	37%	30%		
56 & older	43%	61%	26%	43%		
	100%	101%	100%	100%		
Education	N=617	N=198	N=209	N=210	118.94	0.000
Some High School	4%	5%	1%	4%		
High School Graduate/GED	28%	36%	9%	39%		
Some College	22%	27%	13%	25%		
College Degree	28%	20%	48%	17%		
Some Graduate Work	2%	2%	3%	2%		
Graduate Degree	17%	10%	26%	13%		
	101%	100%	100%	100%		
Race	N=599	N=197	N=199	N=203	10.31	0.244
American Indian or Alaskan Native	2%	3%	2%	2%		
Asian	0%	0%	1%	0%		
Black or African American	1%	0%	2%	0%		
Native Hawaiian or Pacific Islander	0%	1%	0%	0%		
White	97%	97%	96%	98%		
	100%	101%	101%	100%		
Ethnicity	N=623	N=201	N=209	N=213		
Hispanic	1%	0%	2%	0%	5.20	0.074

Table 4. Demographic Characteristics of the Household by Lake.

Household Characteristics	Total	Truman	Lanier	Raystown	F or X^2	P Value
Permanent Home in 30 Miles	N=626	N=201	N=211	N=214	54.57	0.000
Yes	40%	44%	55%	21%		
Seasonal Residence	N=630	N=201	N=211	N=214	50.77	0.000
Yes	19%	28%	3%	25%		
One-Way Mileage	N=614	N=198	N=208	N=208	104.80	0.000
0-30	40%	43%	56%	21%		
31-50	24%	11%	30%	31%		
51-100	23%	29%	12%	30%		
101-200	10%	12%	1%	17%		
201+	2%	5%	1%	1%		
	99%	100%	100%	100%		
People in Household	N=624	N=202	N=209	N=213	38.20	0.000
One	8%	8%	6%	9%		
Two	53%	66%	46%	48%		
Three	18%	10%	19%	23%		
Four	14%	9%	20%	13%		
Five	5%	3%	7%	6%		
Six and more	2%	2%	2%	0%		
	100%	98%	100%	99%		
People Under 18	N=624	N=202	N=208	N=214	36.47	0.000
Zero	72%	85%	61%	72%		
One	14%	6%	20%	14%		
Two	10%	6%	13%	10%		
Three	3%	1%	5%	3%		
Four and more	1%	1%	1%	0%		
	100%	99%	100%	99%		
Income	N=550	N=180	N=182	N=188	153.25	0.000
UNDER $20,000	3%	4%	0%	4%		
$20,000 TO $39,999	14%	26%	1%	15%		
$40,000 TO $59,999	21%	26%	10%	28%		
$60,000 TO $79,999	17%	19%	9%	22%		
$80,000 TO $99,999	13%	11%	19%	9%		
OVER $100,000	33%	14%	62%	22%		
	101%	100%	101%	100%		

were mostly male (83 percent), registered boat owners (93 percent), white (97 percent), and non-Hispanic (99 percent). The samples for each lake differed in respondent education level and age ($p < 0.001$). Respondents from Lake Lanier were the youngest (74 percent were 55 years and under), while Truman Lake respondents were the oldest population (61 percent over 56 years of age).

Lake Lanier marina slip renters had the highest proportion of permanent resident households in the study area (55 percent) with Raystown having the least (21 percent). However, respondents from Truman Lake had the highest percentage of seasonal home owners in the study area (48 percent). Household composition also varied, with Truman Lake having more two-member households (66 percent) and fewest children under the age of 18 (14 percent). Lake Lanier respondents not only had the youngest population but the highest median income over $100,000 (62 percent) and were the most highly educated (48 percent with a college degree). With the exception of race and ethnicity, respondent and household characteristics differed significantly across the three lakes (p value < 0.01).

Boat Characteristics

Watercraft characteristics were divided into categories of boat length (size) and type (Table 5). Survey responses on the length of the boat kept at the marina were used to classify boats into the size classes of small (under 20'), medium (21-30'), and large (31' and over). This size class grouping was consistent with previous studies (Amsden et al. 2008; Propst, Amsden et al.

2008; Propst, Chang et al. 2008) but was also independently evaluated separating the largest group of boats (medium size group – 58 percent) into two subgroups. The resulting item spending ANOVA analysis findings were consistent across a single medium-size class and a two-part sub-group medium-size class.

Table 5. Distribution by Lake of Watercraft by Size and Type.

Category	Total	Truman	Lanier	Raystown	X^2	P Value
Boat Size	N=615	N=198	N=208	N=209	135.24	0.000
20' and smaller	25%	47%	7%	21%		
21' to 30'	58%	49%	57%	67%		
31' and larger	18%	4%	36%	12%		
	101%	100%	100%	100%		
Boat Type	N=614	N=210	N=210	N=216	303.54	0.000
Open Bow	21%	30%	10%	22%		
Cabin Cruiser	25%	5%	40%	30%		
Sailboat	11%	1%	33%	0%		
Pontoon	34%	61%	5%	38%		
Houseboat	8%	4%	12%	9%		
Other	1%	1%	1%	0%		
	100%	102%	101%	99%		

The majority of watercraft in the sample were between 21 and 30' in length. For the three lakes under study, the watercraft of choice differed significantly with the p value at <0.001 (Table 5). Truman Lake had the largest percentage of small boats (47 percent), Raystown had the largest percentage of midsized craft (67 percent), and Lake Lanier had the largest watercraft (36 percent). Boat types included open bow (open), cabin cruisers (cabin), sailboats, pontoons, houseboats, and miscellaneous (other). With the exception of Lake Lanier, pontoon boats comprised the most sampled vessel in the study and were the dominant boat type of the Truman Lake sample (61 percent). Lake Lanier

and Raystown Lake had more diversity in boat types, with Lake Lanier having the greatest representation of sailboats in the sample.

Trip Characteristics

Table 6 contains the estimated number of boating trips taken each season by marina slip renters at each lake. There were significant variations in use by season across the lakes ($p < 0.005$), with total annual usage being the most similar ($p = 0.045$). Across the year, total trips for each lake were highest during the summer, followed by spring, fall, and winter. Summer (defined as June, July, and August) at Raystown Lake received the greatest number of average boating trips (14) and summer represented over 55 percent of the total annual use. The southernmost lake (Lanier) received the greatest total use across all seasons with summer, spring, and fall usage being nearly equal.

In order to minimize recall bias, survey respondents were asked to provide information about their last trip taken (Champ & Bishop, 1996; Stynes, 1999c; Zhou, 2000). Table 7 describes the last boating trip. There were no discernable differences between lakes in nights away from home, days boated during the trip, or the boating party size. What varied was the percentage of day use to overnight trips. Truman Lake had the largest percentage of day use trips (53 percent) and Raystown Lake had the largest proportion of overnight trips (65 percent). The number of days of boat use on the trip was fairly homogenous around 2 days ($p = 0.419$). Differences in the number of people on the boating

Table 6. Number of Trips by Lake and Season.

Season	Total			Truman			Lanier			Raystown				
	N	Mean	% of Year	N	Mean	% of Year	N	Mean	% of Year	N	Mean	% of Year	F	Sig.
Fall	563	7.5	24%	179	7.3	23 %	196	9.5	26%	188	5.6	20%	7.40	0.001
		*0.43**			*0.81*			*0.87*			*0.44*			
Winter	566	2.9	9%	180	2.0	6 %	198	5.8	16%	188	0.8	3%	26.72	0.000
		0.31			*0.62*			*0.61*			*0.21*			
Spring	568	8.5	27%	182	9.3	30%	197	10.3	29%	189	5.9	22%	8.17	0.000
		0.48			*0.96*			*0.90*			*0.56*			
Summer	587	12.2	40%	188	11.9	40%	199	10.3	29%	200	14.3	56%	6.17	0.002
		0.48			*0.92*			*0.73*			*0.81*			
All Seasons	582	31.5		185	30.6		200	35.8		197	27.8		3.11	0.045
		1.35			*2.59*			*2.46*			*1.94*			

**Standard Error in Italics*

Table 7. Length of Stay Description of Last Trip and Party Size.

	Total		Truman		Lanier		Raystown		F	Sig.
Parameter	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error.		
	N=611		N=198		N=208		N=209			
Days of Boat Use	1.95	0.06	1.96	0.13	1.84	0.10	2.05	0.11	0.87	0.419
	N=609		N=197		N=208		N=206			
People on Boat	3.8	0.11	3.5	0.16	3.6	0.19	4.1	0.21	3.06	0.048
Percent of Parties Overnight	N=611		N=198		N=206		N=207			
	55%		47%		52%		65%			
	N=334		N=92		N=108		N=134			
Nights Away	2.6	0.13	3.2	0.50	2.3	0.29	2.4	0.15	3.78	0.024

trip across the three lakes was statistically significant ($p = 0.048$) with boating parties at Raystown averaging 4.1 people compared to 3.5 and 3.6 at the other two lakes. For those parties staying overnight, the total nights away was significantly different across the lakes ($p = 0.024$) and ranged from 2.3 to 3.2.

Per-Day and Trip Spending by Lake

Spending averages were estimated on both a party trip and party day basis. The per-person spending value is considered less desirable as spending by individuals in the party (e.g., children, adults, seniors) can be problematic in data collection and can lead to measurement errors (Stynes, 1999c; Stynes & White, 2006a). Table 8 illustrates the consistency in party trip spending across the three lakes, regardless of trip length or day or overnight trip characterization. Although Raystown Lake slip renters had the highest party trip expenditures of the three lakes, there was no significant difference in party trip spending within 30 miles of the marina between the three lakes. Gasoline (boat and auto) and food (restaurants and groceries) were the highest categories of item spending. Spending on groceries, camping fees, and gasoline (boat) were statistically different across the three lakes (p value < 0.05).

In order to convert spending from a per party trip to a per party day basis, trip spending is divided by the length of stay. Per day spending averages are shown in Table 9. Per-day spending includes both day users and overnight users, and this is where differences can be observed. The three lakes varied in

Table 8. Trip Spending Averages by Lake, ($ per party per trip) 1999 Dollars.

Spending category	Total		Truman		Lanier		Raystown		F	Sig.
	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error		
	N=615		N=198		N=208		N=209			
Gas/Oil Auto	$18.26	1.12	$17.66	1.96	$15.35	2.09	$21.73	1.72	2.85	0.059
Other Auto Expenses	$5.92	1.38	$6.96	2.34	$3.87	1.57	$6.98	3.04	0.56	0.570
Gas/Oil Boat	$34.71	2.21	$23.96	2.65	$39.57	4.66	$40.04	3.73	5.68	0.004
Other Boat Expenses	$11.88	2.94	$11.97	5.27	$8.73	3.44	$14.94	6.21	0.38	0.686
Restaurants	$26.73	2.49	$26.92	3.22	$27.90	4.04	$25.38	5.34	0.09	0.916
Groceries	$29.46	2.35	$18.64	2.80	$36.04	4.31	$33.16	4.68	5.22	0.006
Campground Fees	$2.84	0.74	$4.69	1.80	$0.12	0.12	$3.80	1.34	3.58	0.028
Lodging	$6.13	2.14	$11.19	5.25	$1.20	0.86	$6.22	3.74	1.81	0.165
Recreation Fees	$1.90	0.51	$0.93	0.55	$2.88	1.30	$1.82	0.58	1.20	0.302
Other Supplies	$13.88	1.92	$12.64	1.94	$11.85	3.73	$17.07	3.85	0.72	0.486
Total within 30 miles	$151.70	9.50	$135.58	16.93	$147.51	14.43	$171.15	17.80	1.21	0.299
Expenses 31+ Miles	$29.44	3.89	$34.24	9.47	$16.50	3.38	$37.78	6.22	2.91	0.055
Total trip spending	$181.14		$169.82		$164.01		$208.93			

Table 9. Trip Spending Averages by Lake, ($ per party per day)1999 Dollars.

Spending Category	Total		Truman		Lanier		Raystown		F	Sig
	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error		
	n=615		N=198		N=208		N=209			
Gas/Oil Auto	$10.41	0.51	$8.81	0.70	$9.08	1.01	$13.26	0.87	8.22	0.000
Other Auto Expenses	$2.78	0.58	$2.95	0.97	$2.26	0.90	$3.14	1.15	0.21	0.808
Gas/Oil Boat	$20.74	1.31	$13.89	1.32	$25.31	3.23	$22.67	1.61	7.01	0.001
Other Boat Expenses	$6.13	1.42	$5.75	2.52	$5.17	1.56	$7.45	3.06	0.23	0.791
Restaurants	$14.07	0.88	$13.00	1.39	$16.68	1.70	$12.47	1.45	2.29	0.102
Groceries	$15.41	0.96	$7.95	1.04	$20.47	1.74	$17.43	1.91	15.90	0.000
Campground Fees	$0.90	0.22	$1.14	0.36	$0.06	0.06	$1.50	0.55	3.89	0.021
Lodging	$1.95	0.61	$2.92	1.07	$0.74	0.72	$2.24	1.28	1.13	0.323
Recreation Fees	$0.95	0.24	$0.56	0.28	$1.32	0.57	$0.96	0.36	0.78	0.458
Other Supplies	$7.62	0.89	$7.81	1.57	$7.12	1.61	$7.93	1.43	0.08	0.922
Total within 30 miles	$80.96	3.29	$64.77	4.81	$88.22	6.21	$89.06	5.77	5.84	0.003
Expenses for 31+ Miles	$14.87	1.67	$13.35	3.09	$11.58	2.82	$19.57	2.77	2.14	0.119
Total trip spending	$95.82		$78.13		$99.80		$108.63			

total spending within 30 miles of the marina ($p < 0.05$). Raystown Lake visitors had the greatest proportion of overnight use (Table 7) and continued to have the largest per-day spending (Table 9). Truman Lake boaters had the lowest spending (Table 9) and the greatest proportion of day users (Table 7). Differences in item spending were identified in the categories of auto gas/oil, groceries, and campground fees across the three lakes ($p < 0.05$). The remaining items did not exhibit statistical differences across the lakes.

Differences from party trip to per-day costs revealed that Lake Lanier visitors spent more on their watercraft gasoline needs ($27.75). Similarly the per-day spending revealed that Lanier visitors spent more for food and drink in restaurants and groceries ($16.83 and $20.46, respectively). No other statistically significant differences in spending were revealed; however, the overall per day spending within the 30-mile region was statistically different across the three lakes ($F = 5.840$, $p = 0.003$, $df = 2$).

This study was conducted in 1999, and all the findings presented are in 1999 dollars. Procedures for converting the 1999 spending values to 2009 dollars are presented in Appendix D. Mean spending values (Per-day spending –Table 9; Per-trip spending –Table 8) were item price adjusted to provide the values in Tables 10 and 11. Spending in 2009 dollars is approximately 60 percent higher than the 1999 figures. While gas prices have doubled within the time period, sporting goods and clothing prices have slightly declined (Appendix D, Table D-2). The 2009 mean spending estimates assume visitors

did not alter purchases in response to price changes, but just paid the higher or lower prices in 2009.

Table 10. Trip Spending Averages by Lake, ($ per party per trip) 2009 Dollars.

Party Trip	Total	Truman	Lanier	Raystown
Spending category	Mean for 2009	Mean for 2009	Mean for 2009	Mean for 2009
Gas/Oil Auto	$36.77	$35.56	$30.91	$43.75
Other Auto Expenses	$8.38	$9.85	$5.48	$9.88
Gas/Oil Boat	$69.89	$48.24	$79.68	$80.62
Other Boat Expenses	$16.82	$16.94	$12.36	$21.15
Restaurants	$36.15	$36.41	$37.73	$34.32
Groceries	$38.60	$24.42	$47.22	$43.44
Campground Fees	$4.17	$6.88	$0.18	$5.58
Lodging	$7.10	$12.95	$1.39	$7.20
Recreation Fees	$2.79	$1.37	$4.23	$2.67
Other Supplies	$17.87	$16.28	$15.26	$21.98
Total within 30 miles	$238.53	$208.91	$234.42	$270.60
Aggregate Price Index (2009/1999)	1.572	1.541	1.589	1.581

Table 11. Trip Spending Averages by Lake, ($ per party per day) 2009 Dollars.

Party Day	Total	Truman	Lanier	Raystown
Spending category	Mean for 2009	Mean for 2009	Mean for 2009	Mean for 2009
Gas/Oil Auto	$20.96	$17.74	$18.28	$26.70
Other Auto Expenses	$3.94	$4.18	$3.20	$4.44
Gas/Oil Boat	$41.76	$27.97	$50.96	$45.65
Other Boat Expenses	$8.68	$8.14	$7.32	$10.55
Restaurants	$19.03	$17.58	$22.56	$16.86
Groceries	$20.19	$10.42	$26.82	$22.84
Campground Fees	$1.32	$1.67	$0.09	$2.20
Lodging	$2.26	$3.38	$0.86	$2.59
Recreation Fees	$1.39	$0.82	$1.94	$1.41
Other Supplies	$9.81	$10.06	$9.17	$10.21
Total within 30 miles	$129.34	$101.95	$141.19	$143.45
Aggregate Price Index (2009/1999)	1.598	1.574	1.6	1.611

Trip Spending by Residents and Non-Residents

One characteristic that influences spending is distance traveled. A primary component of every travel cost model (Loomis & Walsh, 1997), distance traveled influences visitor spending to the site for gasoline and restaurant and grocery items (English & Thill, 1996; Hanagriff et al. 2010). It is also the variable that separates spending that is attributable by visitors from outside the local region for use with economic impact models (Chang, 2001; Jackson et al. 1992)

The 30-mile distance zone is somewhat arbitrary in nature, but is used in these studies to approximate one county level distance. Other studies (Frechtling, 2006; Stynes & White, 2006a) set distances or zones to determine how much spending is originating from outside the region. Economic impact studies typically focus only on that spending inside the study region that originates with individuals from outside the study area (non-residents). This can be described as non-residents spending locally, or for this study, spending inside the 30-mile region by those parties traveling more than 30 miles.

As described in Table 4, Raystown Lake marina slip renters traveled the greatest distances to go boating (21 percent traveled 30 miles or less) and Lake Lanier boaters traveled the least (56 percent traveled 30 miles or less). This is reflected in Tables 8 and 9, where auto gasoline expenditures were greater for Raystown (Trip $26.69, Day $13.93) than for Lake Lanier boaters (Trip $15.51; Day $9.23) or Truman Lake boaters (Trip $17.64; Day $8.96). Those parties traveling farther distances spent more ($178.51) than visitors from within the region ($110.48) inside the 30-mile study area. ANOVA results for the analysis

of resident and non-resident spending are significantly different at p = 0.001 (Table 12). Auto gasoline expenses were significantly different (p = 0.000) making the distance traveled an important factor in trip spending. Average boating expenditures (gasoline and other) were not significantly different, across lakes. Total party spending per day was not significantly different between resident and non-resident boaters (p = 0.299, Table 12).

Table 12. Spending by Distance Traveled, All Lakes, ($ per party trip) 1999 Dollars

Spending categories	***Resident 30 miles or less***		***Non-Resident 31+ miles***		F	Sig.
	Mean N=246	Std. Error	Mean N=365	Std. Error		
Gas/Oil Auto	$9.39	1.15	$24.32	1.64	45.37	0.000
Other Auto Expenses	$3.48	1.38	$7.27	2.11	1.78	0.182
Gas/Oil Boat	$31.81	3.37	$36.29	2.92	.96	0.329
Other Boat Expenses	$10.38	4.26	$13.03	4.05	.18	0.672
Restaurants	$18.60	2.46	$31.63	3.76	6.60	0.010
Groceries	$22.32	2.69	$34.10	3.50	5.95	0.015
Campground Fees	$0.30	0.22	$4.59	1.23	7.95	0.005
Lodging	$0.16	0.16	$10.21	3.59	5.24	0.022
Recreation Fees	$1.34	0.57	$2.29	.77	.79	0.375
Other Supplies	$12.71	3.26	$14.79	2.38	.25	0.614
Total within 30 miles	$110.48	10.09	$178.51	14.22	12.31	0.000
Expenses 30+ Miles**	$6.89	2.25	$44.64	6.26	22.92	0.000
Total trip spending	$117.37		$223.15			
Per-day Total within 30 miles	$76.77	5.18	$83.88	4.30	1.08	0.299

Figure 1 illustrates the spending patterns of resident and non-resident boaters. With the exception of Lake Lanier visitors, total trip spending within 30 miles of the marina was greater for non-residents than residents. The author believes that within-region spending by local visitors at Lake Lanier is due in part

to the urbanization around Lake Lanier, providing a greater opportunity to spend money locally (see Appendix B).

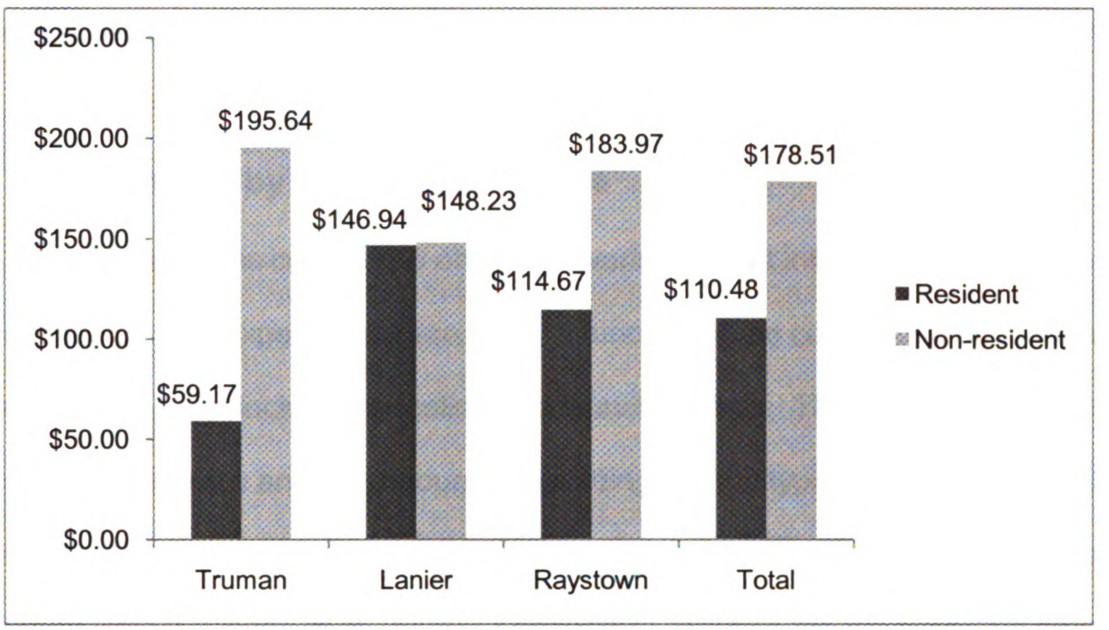

Figure 1. Average Party Trip Spending Within 30 Miles of Marina, by Residents and Non-Residents.

As indicated earlier, Raystown visitors traveled the greatest distance (Table 4) and spent the most per party trip (Table 8, $219.63). Lanier had the majority of local residents whose spending was reflected in higher amounts of per day spending for gasoline for their larger boats. More than half of Truman boaters traveled from outside the region but they were older and spent less. Across lakes, at the party trip spending level within 30 miles (Table 8), the differences between the lakes were not significant ($p = 0.299$). However, resident, non-resident party trip spending is significantly different at $p = 0.000$.

Pyo, Uysal and McLellan's (1991) research recognized the correlation between distances traveled, increased transportation costs, and food

expenditures (Pyo et al. 1991). Item spending for gas/oil auto (p = 0.000), restaurants (p = 0.010), groceries (p =0.015), camping fees (p = 0.005), and lodging (p =0.022) were significantly different for visitors traveling greater distances to go boating (Table 12).

Trip Spending by Boat Size and Type

Boat size is considered one of the variables that influences visitor spending. Trip expenditures are partly a function of the cost of operation for a day on the lake, including gasoline and launching fees. The costs of operation and maintenance and the amount of spending per trip typically increase with the size of the boat (Amsden et al. 2008; Carlson et al. 1995; Propst, Amsden et al. 2008; Propst, Chang et al. 2008). Appendix D contains the trip spending profiles by item for each boat size (small, medium, and large) classification.

Table 13 compares trip spending means to a merged data set across lakes within the three size classes: small (under 21'), medium (21- 30'), and large (31' and greater). The mean dollar values for total trip spending within 30 miles increased with boat size from small to large and were significantly different at p=0.018, where there was variability in spending by size class. Figure 2 illustrates the reason why boat length was a disappointing predictor of total spending for this study. In comparing resident to nonresident spending, there

Table 13. Spending by Boat Length Segments, ($ per party per trip) 1999 Dollars.

Spending Categories	20' and smaller		21' to 30'		31' and larger			
	N=151 Mean	Std. Error	N=356 Mean	Std Error	N=108 Mean	Std Error	F	Sig.
Gas/Oil Auto	$18.90	2.14	$17.27	1.28	$20.64	3.74	0.67	0.515
Other Auto Expenses	$8.21	2.99	$4.44	1.12	$7.61	5.58	0.80	0.451
Gas/Oil Boat	$19.51	1.81	$32.18	2.55	$64.28	8.42	23.44	0.000
Other Boat Expenses	$12.54	4.71	$14.51	4.66	$2.33	0.90	1.16	0.314
Restaurants	$25.32	3.06	$25.60	3.53	$32.42	6.96	0.55	0.575
Groceries	$15.74	2.55	$26.52	2.89	$58.32	8.17	18.87	0.000
Campground Fees	$3.57	1.63	$3.38	1.08	$0.05	0.05	1.52	0.220
Lodging	$2.19	1.17	$9.36	3.64	$0.97	0.93	1.59	0.204
Recreation Fees	$1.06	0.72	$1.65	0.48	$3.89	2.24	1.73	0.179
Other Supplies	$8.95	1.90	$17.23	3.13	$9.70	2.37	2.11	0.122
Total within 30 miles	$115.98	11.06	$152.14	13.95	$200.21	23.26	4.07	0.018
Expenses 31+ Miles	$25.92	7.36	$31.42	5.68	$27.84	6.03	0.19	0.828
Total trip spending	$141.90		$183.56		$228.06			
Pct. of local spending (within 30 miles)	82%		83%		88%			
Spending per party day inside 30 miles	$64.91	5.64	$81.03	4.20	$103.15	9.51	7.05	0.001

was not a clear pattern of increasing craft size and increasing spending values (variability in spending within a size class). A refinement in boat type market segmentation may improve boat size prediction of party trip spending.

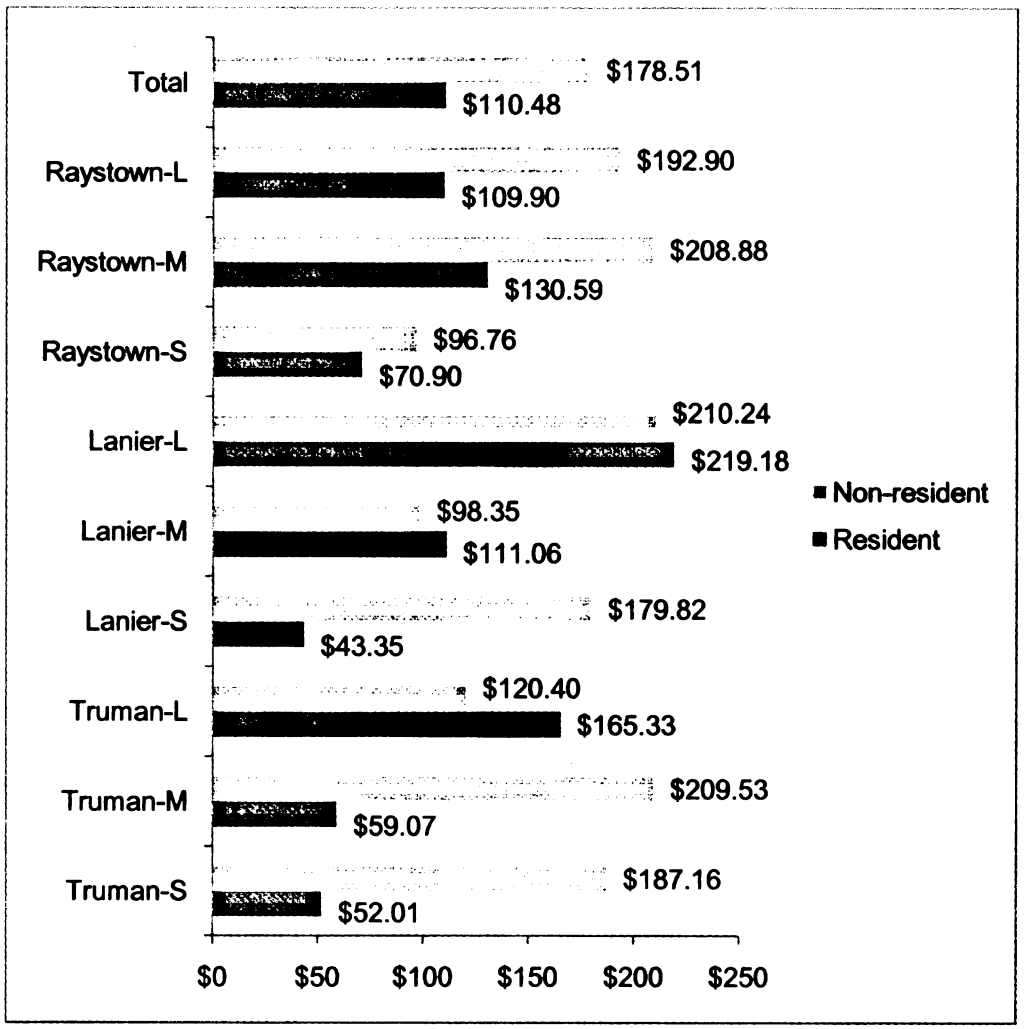

Figure 2. Party Trip Spending Within 30 Miles of Marina by Boat Size (Small, Medium, Large) for Residents and Non-Residents.

The type of watercraft used plays a role in the spending patterns of visitors at marinas. According to the NMMA, fuel costs accounted for roughly one third (34 percent) of annual boat costs for power boaters (for the categories of fuel, repairs and services, storage, insurance, taxes and interest payments) and less

than 4 percent for sailboats (National Marine Manufacturers Association, 2006). Per-party trip spending by boat type is developed in Table 14, but some cells have limited or no cases. Within a class of boat type (open, cabin, sailboat, etc.), across all lakes, trip spending was fairly similar with no boat type being significantly different. Marina slip renters using sailboats had the lowest per-trip spending (under $55.00); while mean trip spending for other boat types ranged from $127 - $210. Sailboat sample sizes were too small to allow additional analysis.

Table 14. Spending within 30 Miles, by Boat Type by Lake ($ per party per trip), 1999 Dollars.

Boat Type		Total	Truman	Lanier	Raystown	F	Sig.
Open Bow	N	127	59	21	47		
	Mean	$154.77	$148.71	$207.86	$138.66	0.42	0.661
	Std.Error	26.26	45.57	73.56	27.07		
Cabin Cruiser	N	154	9	82	63		
	Mean	$210.59	$192.22	$181.59	$250.98	1.18	0.309
	Std.Error	21.94	48.74	19.76	46.37		
Sailboat	N	69	1	68	0		
	Mean	$54.83	$7.00	$55.53	$0.00	0.49	0.486
	Std.Error	8.25	.	8.35	0		
Pontoon	N	209	120	10	79		
	Mean	$127.37	$126.63	$75.93	$135.01	0.47	0.626
	Std.Error	12.56	16.29	21.06	22.07		
Houseboat	N	51	8	24	19		
	Mean	$191.46	$135.75	$250.54	$140.29	1.36	0.267
	Std.Error	34.05	28.39	67.85	24.85		
Other	N	4	1	2	1		
	Mean	$130.25	$52.00	$179.50	$110.00	0.66	0.656
	Std.Error	40.79	.	65.50	.		

Age became an important independent variable with older boaters spending less money than younger boaters in the sample. Figure 3 illustrates the relationship between age and boat size for the party day spending. As the

trip length increased, the relationship became less distinctive. With this finding, age became an independent variable for the regression analysis.

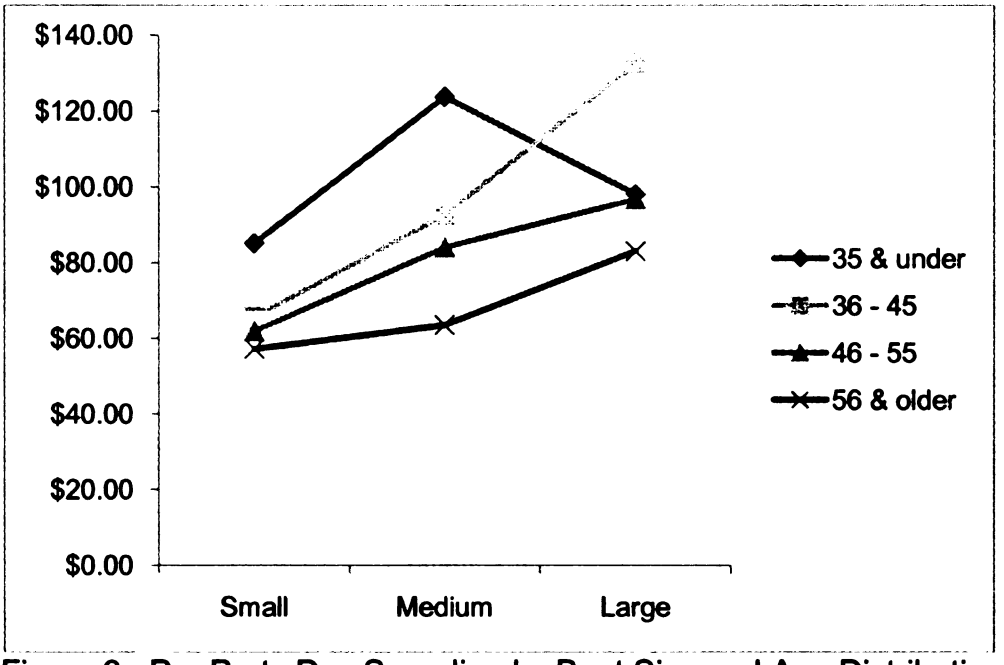

Figure 3. Per Party Day Spending by Boat Size and Age Distribution.

Trip Spending by Trip Length of Stay

Total trip spending is a blended total of day users and overnight visitors (Champ & Bishop, 1996; Hanagriff et al. 2010). Two trip characteristics: distance traveled and type of trip (overnight or day use), have been shown to influence total trip spending. The majority of marina visitors stayed overnight during their trip to their boat at the marina, while 45 percent were day users (Table 7). Similar to other studies (Hanagriff et al. 2010), spending differences between the two groups were significantly different ($p = <0.001$) with overnight visitors spending over 3.5 times more than day users on a trip (Table 15). Comparing the total per-party trip spending within 30 miles (Table 8, $p = 0.299$) to the component parts of trip spending by day users versus overnight parties, length of stay did influence spending (Table 15, $p = 0.000$). On a per-day basis, overnight users spent 44 percent more than day users ($93.26 to $64.55, respectively).

Raystown lake boaters had the highest day use spending across the three lakes (both within 30 miles of the lake and total dollars) (Table 16). For boaters that stayed overnight, all three lakes had similar spending rates ($219.18 to $228.51) within 30 miles of the lake. Truman boaters outspent the other lake boaters in their travel to the lake (Table 16).

Table 15. Spending by Length of Stay Segments: Day and Overnight Users, All Lakes, ($ per party per trip) 1999 Dollars.

	Day users			***Overnight users***				
Spending categories	N=277 Mean	Std. Error	Pct. Error*	N=334 Mean	Std. Error	Pct. Error*	F	Sig.
Gas/Oil Auto	$9.15	0.70	8%	$25.78	1.87	7%	59.75	0.000
Other Auto Expenses	$2.17	0.83	38%	$8.90	2.43	27%	5.87	0.016
Gas/Oil Boat	$16.36	1.14	7%	$50.04	3.76	8%	62.49	0.000
Other Boat Expenses	$7.37	2.51	34%	$15.77	5.00	32%	2.00	0.158
Restaurants	$11.65	1.12	10%	$38.90	4.37	11%	30.90	0.000
Groceries	$9.82	1.39	14%	$45.70	3.96	9%	62.72	0.000
Campground Fees	$0.00	0.00	0%	$5.23	1.35	26%	12.38	0.000
Lodging	$0.00	0.00	0%	$11.28	3.92	35%	6.88	0.009
Recreation Fees	$0.56	0.31	56%	$2.85	0.89	31%	5.08	0.025
Other Supplies	$7.48	1.45	19%	$19.08	3.29	17%	9.08	0.003
Total within 30 miles	$64.55	4.27	7%	$223.53	16.06	7%	77.44	0.000
Expenses 31+ Miles	$8.77	1.99	23%	$46.85	6.84	15%	24.286	0.000
Total trip spending	$73.32			$270.38				
Pct. of local spending (within 30 miles)	88%			83%				
Per Day Total within 30 miles	$64.55	4.27	7%	$93.26	4.64	5%	20.088	0.000

Table 16. Spending by Length of Stay Segments: Day and Overnight Users, By Lake, ($ per party per trip) 1999 Dollars.

	Day users				*Overnight users*			
Spending categories	Truman N=106	Lanier N=98	Raystown N=73	Sig	Truman N=92	Lanier N=108	Raystown N=134	Sig
Gas/Oil Auto	$7.32	$7.36	$14.23	**	$29.58	$22.24	$26.03	
Other Auto Expenses	$2.50	$2.34	$1.45		$12.10	$4.68	$10.10	
Gas/Oil Boat	$13.53	$13.44	$24.40	**	$35.99	$63.37	$48.94	*
Other Boat Expenses	$6.82	$5.78	$10.32		$17.91	$11.56	$17.69	
Restaurants	$9.85	$13.50	$11.77		$46.60	$40.83	$32.06	
Groceries	$5.03	$11.56	$14.44	*	$34.32	$58.28	$43.39	
Campground Fees	$0.00	$0.00	$0.00		$10.10	$0.23	$5.93	
Lodging	$0.00	$0.00	$0.00		$24.09	$2.31	$9.71	*
Recreation Fees	$0.66	$0.77	$0.14		$1.25	$4.86	$2.32	
Other Supplies	$9.21	$7.16	$5.38		$16.59	$16.32	$23.01	
Total within 30 miles	$54.92	$61.90	$82.12	*	$228.51	$224.69	$219.18	
Expenses 30+ Miles	$5.35	$6.99	$16.12		$67.53	$25.43	$49.92	
Total trip spending	$60.27	$68.89	$98.24		$296.04	$250.12	$269.09	
Pct. of local spending (within 30 miles)	91%	90%	84%		77%	90%	81%	

* Mean is significantly different across lakes (95 percent confidence)
**Mean is significantly different across lakes (99 percent confidence)

In evaluating the importance of overnight use as a factor in explaining trip spending variation, a dummy variable for overnight use (OVN) was created. Overnight use (OVN) was found to be significant (p = 0.000) and improved boat size and lake interaction, explaining 11 percent of party trip spending variation (Table 17).

Table 17. Analysis of Between-Subjects Effects for Lake, Boat Size, and Length of Stay Classifications.

Tests of Between-Subjects Effects[a]

Dependent Variable: total trip spending within 30 miles of the marina

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4685000.00	17	275571.67	5.59	0.000
Intercept	2846769.80	1	2846769.80	57.74	0.000
Lake (Truman, Lanier, Raystown)	4082.35	2	2041.18	0.04	0.959
Overnight (Ovn)	626490.12	1	626490.12	12.71	0.000
Boat Size (Boat)	56602.14	2	28301.07	0.57	0.564
Lake * Ovn	27647.98	2	13823.99	0.28	0.756
Lake * Boat	172956.71	4	43239.18	0.88	0.477
Ovn * Boat	106097.99	2	53048.99	1.08	0.342
Lake * Ovn * Boat	115838.94	4	28959.74	0.59	0.672
Error	29240000.00	593	49301.37		
Total	47940000.00	611			
Corrected Total	33920000.00	610			

a. R Squared = .138 (Adjusted R Squared = .113)

Objective 2. Regression Modeling

In order to predict trip spending inside 30 miles by marina slip renters, the boat, trip, and household variables were regressed against the dependent variable. From the literature and the study findings, boat size plays a role in spending as the larger boats require the greatest expenditures (Lee, 1999; Stynes et al. 1983). Trips identified in the study were a mix of overnight and day trips. Spending on overnight trips was over 3.5 times greater than on day trips. Reviewing the demographic and household characteristics of the sample, several variables proved to be significantly different across the three lakes (Tables 3 and 4). These variables included age of respondent, education, having a permanent home within 30 miles, having a seasonal home, the one-way distance traveled (resident/non-resident), the number of people in the household, the number of persons under 18 years of age and household income. Trip variables that were significant included percent overnight trips and party size.

IBM SPSS PASW Statistics 18 regression models were developed to look at each variable that was identified by the literature or significance testing to be of importance in visitor spending (Lee, 1999; Stynes et al. 1983). Least Squares Regression modeling assumes that all independent variables (party, lake, and trip attributes) are additive and non-interacting to estimate the dependent (spending) variable. The equation minimizes the sum of squared differences in the independent variables between their observed and predicted values. The coefficient estimates generated provide a description of the direction (positive or negative) and relationship (value change) between the dependent and

independent variable. Standardized coefficients are also produced in the analysis; these coefficients are based on a mean of zero and a variance of one (Andrews et al. 1981; McClendon, 2002). Once the initial regression model was completed, a stepwise model was used to determine which of the variables had the greatest contribution to the prediction in the relationship.

The following variables were tested against the dependent variables of party day spending and party trip spending:

Respondent variable – Age

Household variable – Income*, distance traveled

Boat variable – Boat length

Trip variable – Days (days = days + (nights + 1), people on the boat

Dummy Variable - Lanier and Raystown Lakes**

Model 1 illustrates the regression model with the dependent variable, per party day spending within 30 miles (Y [PerDay]). Model 2 regresses the model against the dependent variable, per party trip spending within 30 miles (Y[PerTrip]). Model 3 is a per-trip spending model, substituting the variable one-way mileage with the dummy variable non-resident (where nonresident =1) to estimate visitor trip spending within 30 miles (Y (TNonRes)).

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*The income variable was tested and dropped from consideration. The income variable reduced the number of study cases in the model by nearly 60 records due to missing data. In addition, income was able to explain less than one percent in variation (adjusted R square = 0.007) in the trip spending dependent variable. It was significantly correlated ($p < 0.01$) with five variables (Truman, Raystown, Lanier, boat length, and age) with the highest being Lanier at $r = 0.497$.

**No dummy variable was required for Truman Lake as it was considered part of the base equation.

Model 1: Least Squares Regression for Party Day Spending Within 30 Miles

The regression model was developed using independent variables based on the characteristics of the respondent (age), the household (distance traveled), the boat (boat length), and the trip (days and people on the boat). In addition, dummy variables representing the lake were included in the model equation.

Equation 1:

$$Y(PerDay) = \beta_0 + \beta_1 Lanier + \beta_2 Raystown + \beta_3 Length + \beta_4 Days + \beta_5 Age + \beta_7 Mileage + \beta_8 People + \varepsilon.$$

where:

Y (PerDay) = Average party day spending within 30 miles of marina
β_n = Coefficients to be estimated
Lanier = Lake reference (1 if Lake Lanier characteristics)
Raystown = Lake reference (1 if Raystown Lake characteristics)
Length = Boat length
Days = Length of stay in days (days = days + (nights + 1)
Age = Respondent age
Mileage = Actual one-way distance traveled to the marina
People = Number of people on the boating trip

Using the composite data set across the three lakes, the model provided an explanation of 9 percent (adjusted R square = 0.090) of the variation in the party's per-day spending. At the $\alpha = 0.05$ level, the independent variables of the household (age p= 0.001; mileage p=0.000) and the trip (people 0.000) were significant (Table 18).

Table 18. Least Squares Regression Results for Model 1 Estimating Per Party Day Spending Within 30 Miles of Marina.

Dependent Variable: Party Day Spending within 30 miles	
Data Set: 3 Lake Composite	
R	0.322
R Square	0.103
Adjusted R Square	0.093
Standard Error	73.801

Variable	Coefficient Estimate	Std. Error	Std. Beta	t	Sig.
(Constant)	76.28	19.59	0.00	3.89	0.000
Lanier is 1	16.96	8.78	0.10	1.93	0.054
Raystown is 1	11.66	7.76	0.07	1.50	0.134
Length of Boat	0.47	0.37	0.06	1.29	0.196
Number of Days	-2.81	1.80	-0.07	-1.56	0.120
Age	-0.95	0.28	-0.14	-3.41	0.001
Mileage One Way	0.27	0.07	0.17	3.69	0.000
People on Boat	5.62	1.15	0.20	4.91	0.000

	Sum of Squares	df	Mean Square	F	Sig.
Regression	369,412.66	7	52773.24	9.69	0.000
Residual	3,202,614.20	588	5446.62		
Total	3,572,026.85	595			

A stepwise regression was performed to evaluate the ability of the independent variables to explain the variation in the dependent variable (Table 19). The variables representing the number of people on the boating trip (4 percent), the respondent age (3 percent) and the one-way mileage (1 percent) were the variables contributing most to this model's explanation.

Table 19. Stepwise Regression Results Evaluating Model 1 Independent Variables (Per Day Estimates).

Model 1 Summary[d]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.204[a]	0.042	0.04	75.91
2	.272[b]	0.074	0.071	74.69
3	.297[c]	0.088	0.083	74.18

a. Predictors: (Constant), People on boat
b. Predictors: (Constant), People on boat, age
c. Predictors: (Constant), People on boat, age, mileage 1-way
d. Dependent Variable: per-day spending total inside 30 miles

The resulting unstandardized equation from the sample was:

Equation 2:

$$Y(PerDay) = 76.28 + 16.96\ Lanier + 11.66\ Raystown + 0.47\ Length - 2.81\ Days - 0.95\ Age + 0.27\ Mileage + 5.62\ People + \varepsilon.$$

The unstandardized equation would be used to predict the estimates of party trip spending within 30 miles of the marina if the values of the independent variables in the equation were known. In Equation 2, the intercept or base prediction of per-day spending for Truman Lake was $76.28, with the assumption that due to the additive nature of the equation, each value would be added to the intercept. The coefficient for the number of people on the boat variable is 5.62, for every person added to the boat, the predicted spending increases by $5.62. Days on the trip (days) is the variable for the trip length, however, Model 1 is estimating per-day spending. So, as the days value goes up, spending per day goes down by $2.81. The respondent's age is also negatively associated in the equation (i.e., as the age of the respondent goes up by a year, the estimated per-

day spending goes down by $-0.97). All other variables had positive coefficients and would add to the total per-day spending estimate.

Using the values from the study, the actual average per-day spending was estimated in Table 9 as $80.96 for the composite, $64.77 for Truman; $88.22 for Lanier and $89.06 for Raystown. Applying the regression model coefficients to the values of the independent variables from Table 20; the predicted value for per party-day spending is estimated at $78.31 for the composite, $62.00 for Truman, $86.90 for Lanier, and $85.46 for Raystown. Thus, the model underestimates per day spending between 1 and 4 percent.

Table 20. Descriptive Statistics for the Independent Variables Used in the Regression Models.

Variable	Mean N=596	Total Std Error	Truman Mean N=194	Truman Std Error	Lanier Mean N=203	Lanier Std Error	Raystown Mean N=199	Raystown Std Error	F	Sig.
Boat Length	26.20	0.39	22.02	0.32	31.34	0.90	25.05	0.44	60.04	0.000
Days	1.87	0.08	2.03	0.15	1.71	0.16	1.88	0.11	1.27	0.283
Age	53.06	0.48	58.44	0.80	48.90	0.71	52.05	0.83	38.57	0.000
Mileage*	52.35	1.94	60.13	4.30	34.60	2.31	62.87	2.89	23.35	0.000
People	3.77	0.11	3.54	0.16	3.65	0.20	4.11	0.21	2.45	0.087
Nonresident*	0.59	0.02	0.56	0.04	0.44	0.03	0.79	0.03	28.85	0.000

* Actual mileage or dummy variable non-resident used in model.

Model 2: Least Squares Regression for Party Trip Spending Within 30 Miles

The same independent variables are applied to the value of per party-trip spending in Model 2 and Equation 3.

Equation 3:

$$Y(PerTrip) = \beta_0 + \beta_1 Lanier + \beta_2 Raystown + \beta_3 Length + \beta_4 Days + \beta_5 Age + \beta_7 Mileage + \beta_8 People + \varepsilon.$$

where:

Y (PerTrip) = Average party trip spending within 30 miles of marina
All other variables follow Model 1.

Party-trip spending within 30 miles of the marina (Y [PerTrip]) was the dependent variable in the analysis. As with Model 1, dummy variables were created for lake segments (Lanier and Raystown); Truman was part of the base equation. Boat length, one-way mileage, and age were the actual values of boat length, mileage estimates, and respondent age.

The results of the regression model (Table 21) showed a marked improvement over Model 1's per party-day findings. The model's ability to explain the variation in mean spending increased to 35 percent (adjusted R square = 0.349). Similar to the per-day findings the independent variables of days (p = 0.000), age (p = 0.002), mileage (p = 0.000) and people (p = 0.000) were significant. The regression coefficient of the age variable was again negatively related to per-party trip spending; however, days were not. Each additional day added to the trip resulted in an estimated addition of $49.75 to total trip spending. Similarly, each additional person on the trip added $15.21.

Table 21. Least Squares Regression Results for Model 2 Estimating Party Trip Spending Within 30 Miles of Marina.

Dependent Variable: Party Trip Spending within 30 miles	
Data Set: 3 Lake Composite	
R	0.597
R Square	0.357
Adjusted R Square	0.349
Standard Error	190.239

Variable	Coefficient Estimate	Std. Error	Std. Beta	t	Sig.
(Constant)	25.85	50.49	0.00	0.51	0.609
Lanier is 1	30.56	22.63	0.06	1.35	0.177
Raystown is 1	11.36	20.00	0.02	0.57	0.570
Length of Boat	0.68	0.94	0.03	0.72	0.473
Number of Days	49.75	4.64	0.41	10.71	0.000
Age	-2.26	0.72	-0.11	-3.16	0.002
Mileage One Way	1.15	0.19	0.23	6.01	0.000
People on Boat	15.21	2.95	0.17	5.15	0.000

	Sum of Squares	df	Mean Square	F	Sig.
Regression	11808132.53	7.00	1686876.08	46.61	0.000
Residual	21280295.22	588.00	36190.98		
Total	33088427.75	595.00			

Evaluating the same equation using a stepwise analysis (Table 22) illustrates that the number of days on the boating trip provided the largest contribution to explaining the variation in party trip spending (adjusted R square = 0.269). The second highest contributor was the relationship between days and the one-way mileage to the marina (adjusted R square = 0.299). Adding the number of people on the boat during the last trip again improved the estimate,

until finally the age of the respondent provided an interaction with the others to result in the adjusted R square of 0.348 or an explanation of 35 percent in the variation.

Table 22. Stepwise Regression Results Evaluating Model 2 Independent Variables (Per Trip Estimates).

Model 2 Summary[e]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.520[a]	0.27	0.269	201.62
2	.549[b]	0.302	0.299	197.38
3	.579[c]	0.336	0.332	192.72
4	.594[d]	0.353	0.348	190.36

a. Predictors: (Constant), Number of Days
b. Predictors: (Constant), Number of Days, Mileage One Way
c. Predictors: (Constant), Number of Days, Mileage One Way, People on Boat
d. Predictors: (Constant), Number of Days, Mileage One Way, People on Boat, Age
e. Dependent Variable: total within 30 miles

The regression model for predicting party trip spending was developed as follows:

Equation 4:

$$Y(PerTrip) = 25.85 + 30.56\,Lanier + 11.36\,Raystown + 0.68\,Length + 49.75\,Days - 2.26\,Age + 1.15\,Mileage + 15.21\,People + \varepsilon.$$

Using the values from the study, the actual average per-trip spending was estimated in Table 8 at $151.70 for the composite, $135.58 for Truman, $137.51 for Lanier, and $171.15 for Raystown boaters. Using the regression model to predict per-party trip spending, the values of the independent variables (Table 20) are applied to Equation 4. Applying the regression model, the predicted value for per-party trip spending was estimated at $148.49 for the composite, $132.45 for Truman, $147.65 for Lanier, and $165.00 for Raystown.

With the exception of the Lake Lanier estimates the predictions were approximately 2 percent less than the actual spending. Lake Lanier's party trip spending was estimated at slightly over 100 percent.

Model 3: Least Squares Regression for Party Trip Spending Within 30 Miles, Non-Residents.

A further refinement of the spending profile is the local spending by non-local visitors – non-resident spending. In the previous two models, the one-way mileage estimated distance and increased with spending. Model 3 (Table 23) removes mileage as a variable and replaces it with a dummy variable for the non-resident category. The non-resident variable is less precise than one-way mileage, but allows for easier estimation of spending for residents or non-residents. The dependent variable in this model was party trip spending.

Equation 5:

$$Y(NonRes) = \beta_0 + \beta_1 Lanier + \beta_2 Raystown + \beta_3 Length + \beta_4 Days + \beta_5 Age + \beta_7 NonRes31 + \beta_8 People + \varepsilon.$$

where:

Y (TNonRes) = Average party trip spending within 30 miles of marina for non-residents traveling 31+ miles
NonRes31 – Dummy variable replacing mileage, for miles > 30
All other variables follow Model 1.

The explained variation decreased to 31.2 percent when replacing the actual mileage with the yes/no non-resident variable (adjusted R square = 0.312). Although the nonresident variable was not significant, the other independent variables that were significant for Model 2 remained significant for this model.

Table 23. Least Squares Regression Results for Model 3 Estimating Per Party Trip Spending Within 30 Miles of Marina Substituting Non-Resident Variable.

Dependent Variable: Party Trip Spending within 30 miles -					
R	0.565				
R Square	0.320				
Adjusted R Square	0.312				
Standard Error	195.669				
Variable	Coefficient Estimate	Std. Error	Std. Beta	t	Sig.
(Constant)	87.96	51.18	0.00	1.72	0.086
Lanier is 1	7.14	22.91	0.01	0.31	0.755
Raystown is 1	9.86	21.07	0.02	0.47	0.640
Length of Boat	0.40	0.97	0.02	0.41	0.679
Number of Days	60.92	4.38	0.51	13.93	0.000
Age	-2.58	0.73	-0.13	-3.52	0.000
Non-Resident	24.35	17.58	0.05	1.38	0.167
People on Boat	14.05	3.04	0.16	4.62	0.000
	Sum of Squares	df	Mean Square	F	Sig.
Regression	10576143.00	7	1510877.57	39.46	0.000
Residual	22512284.75	588	38286.20		
Total	33088427.75	595			

The stepwise evaluation (Table 24) of model 3 varied slightly from the per-party trip stepwise analysis (Table 22). In this analysis, length of the trip (days), people on the boat, and respondent age progressively increased explanation of the variation in trip spending with an adjusted R square of 0.313.

Table 24. Stepwise Regression Results Evaluating Model 3 Independent Variables (Per Trip Estimates).

Model 3 Summary[d]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.520[a]	.270	.269	201.62
2	.547[b]	.299	.297	197.78
3	.563[c]	.316	.313	195.46

a. Predictors: (Constant), Number of Days
b. Predictors: (Constant), Number of Days, People on Boat
c. Predictors: (Constant), Number of Days, People on Boat, Age
d. Dependent Variable: total within 30 miles

The resulting equation from Table 23 is:

Equation 6

$$Y(NonRes) = 87.96 + 7.14\,Lanier + 9.86\,Raystown + 0.40\,Length + 60.92\,Days - 2.58\,Age + 24.35\,NonRes31 + 14.05\,People + \varepsilon.$$

Using the regression coefficients from Table 23, this regression equation (Equation 6) differs from Equation 4 (party trip spending) in that the intercept value (from 25.85 to 87.96) and days on the trip value (49.75 to 60.92) are substantially higher. However, when values from Table 20 were applied to Equation 6, the results were identical to Model 2 per-party trip predicted values. This finding indicates that the nonresident variable (Yes/No) is as valuable as the actual mileage values for predicting trip spending and provides a tool for managers to use in estimating spending of either resident or nonresident marina boaters.

Model Summary

Table 25 summarizes the study findings (actual) and the results of model estimation (predicted). Using Equation 2 and the values for the independent

variables from Table 20, the predicted values for party-day spending are estimated (predicted). Similarly, party-trip spending results are presented (actual) and using Equation 4, the spending estimates are predicted. In all but one situation, the models underestimate (by 2-4 percent) the values of visitor spending when compared to study findings. The only exception was that the model prediction for Lake Sidney Lanier exceeded the actual value by 0.09 percent.

Table 25. Summary of Regression Models 1-2 with Actual and Predicted Values, 1999 Dollars.

Dependent		Total	Truman	Lanier	Raystown
Party Day*	Actual	$80.96	$64.77	$88.22	$89.06
	Predicted	$78.31	$62.00	$86.90	$85.46
	% Change	96.73%	95.73%	98.50%	95.96%
Party Trip **	Actual	$151.70	$135.58	$147.51	$171.15
	Predicted	$148.49	$132.45	$147.65	$165.00
	% Change	97.89%	97.69%	100.09%	96.41%

* Party Day - Actual value from Table 9 total party day spending within 30 miles. Predicted value from Model 1, (Equation 2)(Table 20) values for independent variables. Dummy variables in the total estimate were their proportions in the sample.

** Party Trip - Actual value from Table 8 total party trip spending within 30 miles. Predicted from Model 2, (Equation 4)(Table 20) values for independent variables. Dummy variables in the total estimate were their proportions in the sample.

Seven independent variables were used in the prediction models. A variable for income was tested in the models but did not explain any variation in the dependent variable. The income variable reduced the number of records in the sample by nearly 60 records, significantly correlated with five variables, explained less than one percent of variation in trip spending, and was eliminated from the models.

The ability of the seven variables to explain the variation in spending changed between the models. Length of stay or days on the trip was the variable providing the greatest ability to explain variation in spending with the exception of Model 1, where the dependent variable was spending for a single day (Table 26). The number of people on the trip, the age of the respondent, and the distance traveled explained the most variance in the party day model. This is understandable as the per-day value is a mix of day use and overnight stays making the number of people and the distance traveled important.

Table 26. Review of the Independent Variables of the Regressions

Variation Explained	Model 1 Per Day	Model 2 Per Trip	Model 3 Per Trip – Non-Resident
More	People	Days	Days
	Age	Miles	People
	Miles	People	Age
Less		Age	

Model Application

The independent variables used in the model provide a guide to how the information could be applied in another setting. Some of the information is currently available to marinas (e.g., boat size), while some will have to be reviewed and collected or approximated (e.g., boater age). A hypothetical application of the data findings is presented.

Step 1. Determining which model to use.

Selecting per day (Model 1) or per trip (Model 2 or 3) spending estimates is the first question. Model 2 explains 35 percent of the variability in the dependent variables. However, for this example the marina does not have estimates of the distance traveled from each slip renter (Model 3 is selected). The number nonresident slip renters can be determined by the city of residence from the registration forms. In Equation 6, actual distance traveled (miles) is replaced with the dummy variable for resident/nonresident, where nonresident = 1.

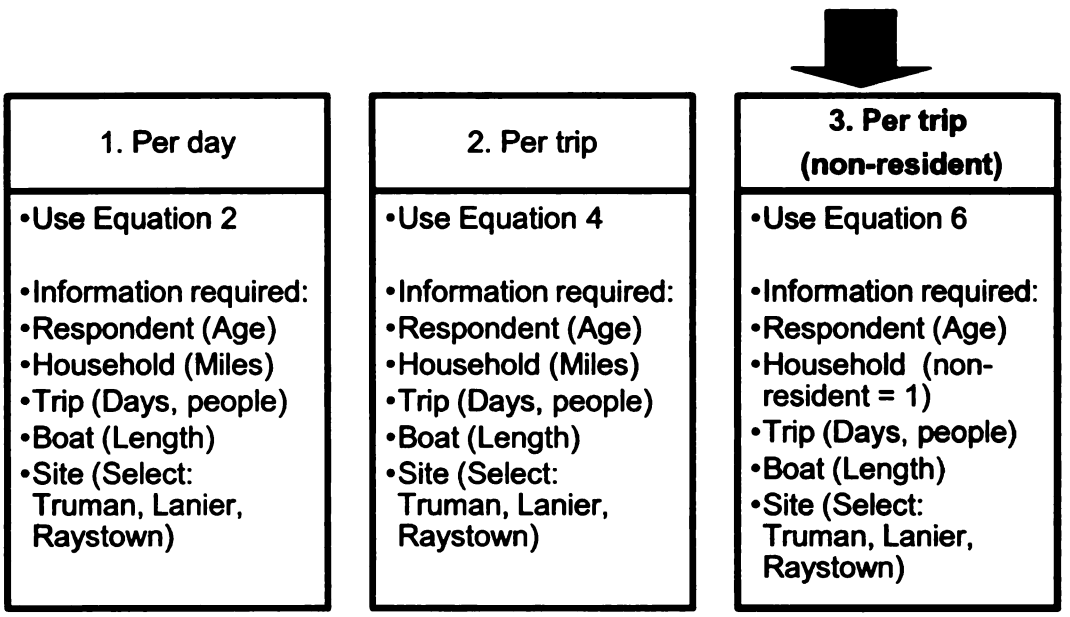

Figure 4. Select Model for Application.

Step 2. Determine site characteristic to use.

This study was conducted at three different sites. Characteristics of the location are provided in Tables 2, B-1, B-2, B-3, and B-4. In order to determine which of the three lakes to use, an evaluation of the lakes is required. A review

of the region surrounding each lake provides a glimpse of the ability of the visitor to spend money. Truman is in a rural area with limited spending opportunity in the region. Lanier is located in an urban setting and has a high level of spending opportunity inside the region. Raystown is more rural, but trip spending is high. For the example, the assumption is that the region is most like Lake Lanier's.

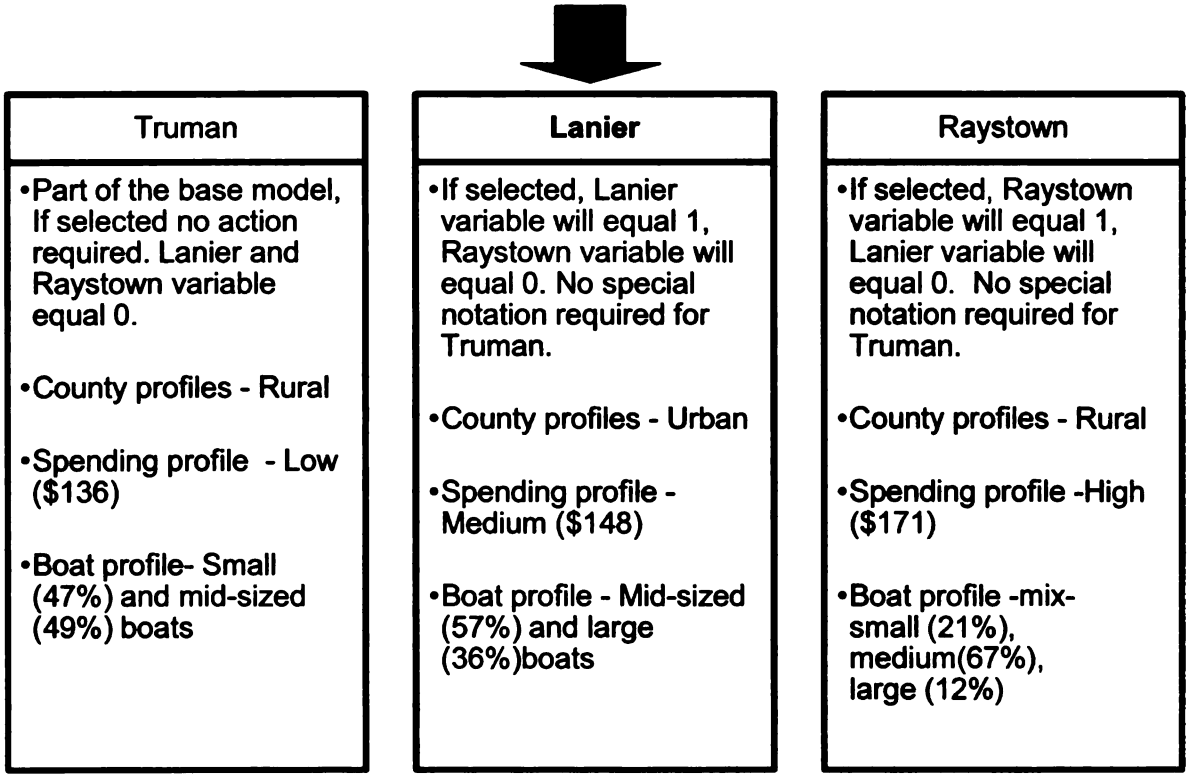

Figure 5. Selection of Lake Most Similar.

Step 3. Complete equation.

For the chosen equation, begin to populate the other variables in the equation. For the example, Model 3 (Equation 6) and Lake Lanier were selected in steps 1 and 2. The rest of the equation needs to be completed. The variables boat length, days, age and people have to be enumerated. Table 20 can be used to help understand the estimates and the range of data from the survey.

Assuming a marina operator can estimate the average size of all boats in the harbor, an overall average boat length can be determined. In keeping with step 1, estimate the total number and average boat size from the residents that have been identified as being from outside the local area (based on city of residence). Similarly the average days on the trip, average age of the boater and number of people on the trip need to be estimated. For the purpose of this example, the average estimates from the composite results (Table 20) will be used. The result would be Equation 7.

Equation 7.

$$Y(NonRes) = 87.96 + 7.14\,Lanier(1) + 9.86\,Raystown(0) + 0.40\,Length(26) + 60.92\,Days(1.9) - 2.58\,Age(53) + 24.35\,NonRes31(1) + 14.05\,People(3.8) + \varepsilon.$$

Note that in Equation 7 the value for nonresident is 1 rather than 0.59 (Table 20). Using the value of 1 signifies that the equation is being used to estimate nonresidents only. The resulting number will be the estimate of average party trip spending by nonresidents locally (within 30 miles of the lake). In this case, the estimated trip spending by non-residents for a "Lanier-type" setting would be $162 per boat. This number could then be multiplied by the total number of non-resident boats at the marina. This result ($162) is in 1999 dollars. To inflate the value to 2009 dollars use the average CPI adjustment of 1.589 from Table 10 (trip spending for Lanier). The 2009 value is $257.

CHAPTER 5

DISCUSSION AND CONCLUSIONS

This chapter is divided into four parts: study limitations, study findings, agency implications, and future research recommendations.

Study Limitations

There are a number of study limitations to be addressed, including: data age, scope, and application. These data have been used to study spending behavior by visitors to three marinas. The data are limited and they are dated. They provide a snapshot of a past relationship and serve as a guide for future work in the study of boaters that rent marina slips. For age reference, the data were collected in 1999 and represent 1999 dollars and, more importantly, 1999 spending behavior. The data were transformed from 1999 to 2009 dollar values. This linear transformation of dollar values is based on the Consumer Price Index and reflects changes in price over time by spending category (see Appendix E). The utility of the data is, in part, the baseline that it represents. It is a study of marina boater spending data on three inland water resources lakes and will serve as a starting point for future evaluations. The study helps to document a unique boater group that has chosen a resource base as their primary recreation center (quantified by the number of annual trips). The study confirms that variables such as respondent age, boat length, one-way mileage or residency, party size and trip duration play important roles in estimating and predicting visitor

spending, but these variables tell only part of the story. Depending on which model is chosen, 65-67 percent of the variation in spending remains unexplained.

In scope, there are only three lakes, two are rural (Truman and Raystown), one urban (Lanier). The lakes represent three geographic areas of the country, Missouri, Pennsylvania, and Georgia. This limitation prevents generalization to other regions of the country. Other related research (Becker, 1997) used to evaluate lake characteristics may provide insights into applications of this work. Research implications and data applications for the agency are addressed below.

Study Findings

This study involved a survey of marina boaters at Corps of Engineers marinas at three lakes: Harry S. Truman, Missouri; Lake Sidney Lanier, Georgia; and Raystown Lake, Pennsylvania. The objectives were to identify the spending profiles of marina slip renters, to test for sample differences, and to develop predictive models of their spending.

Objective 1

The first objective was to compare samples and trip spending patterns at the three projects. Reviewing the demographic and household characteristics of the sample, several variables proved to be significantly different across the three lakes (Tables 3 and 4). These variables included age of respondent, education, having a permanent home within 30 miles, having a seasonal home, the one-way

distance traveled (resident/non-resident), the number of people in the household, the number of persons under 18 years of age, and household income.

In a review of the boat types that were a part of the sample (N=615), pontoons (N=209), comprised the greatest number among marina slip renters surveyed. Sixty eight percent of the medium boat size (21' to 30') category was comprised of pontoon boats. Boating trips (Table 6) varied by season and lake, with the southernmost lake (Lanier, GA) having the most active boating and the most northern lake (Raystown, PA) having the least ($p = 0.05$). Boating party sizes were significantly different ($p = 0.05$) and ranged from 3.5 to 4.1.

Party trip spending across lakes was not significantly different ($p = 0.299$), although item spending differed significantly for gasoline/oil for auto and boat, groceries and camping fees (Table 8). Data on trip spending were compared to characteristics of the boat and the boating trip. Overall, non-resident boaters traveling more than 30 miles had significantly higher expenditures locally (Table 12, $p = 0.000$), with the exception of Lanier boaters (Figure 1).

Boat length was classified into three size classes (20' and smaller, 21' to 30', and 31' and larger), and trip spending locally was significantly different ($p = 0.018$, Table 13). Differences in spending were also seen in boat type classifications. Boaters using sailboats recorded the lowest expenditures (Table 14). Sailboat sample sizes were too small to allow further analysis. Trip spending data were a mix of overnight and day trips. Spending on overnight trips was over 3.5 times greater than day trips (Table 15).

The conceptual model was tested against the study findings and modified by removing household income, and adding respondent age and variables to represent the lakes in the study.

Visitor Trip Spending

$= f\{$ Household Characteristics (age, residence or distance traveled)

+ Trip Characteristics (party size, length of stay)

+ Boat Characteristics (length, boat type)

+ Site Characteristics (Truman, Lanier, Raystown)$\}$

Objective 2

The second objective was to develop a predictive model to evaluate party spending. The independent variables used in the regressions were based on the characteristics of the respondent (age), the household (distance traveled), the boat (boat length), and the trip (days and people on the boat). In addition, three dummy variables were created representing two of the three lakes (Lanier and Raystown) and a third serving as a substitute for one-way mileage (non-resident). No dummy variable was required for Truman Lake as it was considered part of the base equation. Three regression models were developed to estimate visitor spending within 30 miles of the marina on a party day and party trip basis (Models 1 and 2). One additional model of party-trip spending was evaluated; substituting the dummy variable non-resident, for the one-way trip mileage variable (Model 3).

The models reflect average slip-renter spending across the three lakes.

Model 1 explained the least variation in per-day spending (adjusted R square = 0.090), while Model 2 had the greatest explanatory power. The seven variables in the model explained 35 percent of the variability in the dependent variable. This means that 65 percent of the spending estimates were due to other factors or random variation. Estimating trip spending with a dummy variable (non-resident) substituting for the one-way mileage traveled (Model 3) dropped the amount of variance explained by the model from an adjusted R square of 0.349 to 0.312. Model 3 provides the manager with a variable that is less precise than one-way mileage, but in order to estimate spending the value of "1" for non-resident or "0" for residents is all that is required.

Agency Implications

The study results will allow the Corps to evaluate management actions as they relate to the marina spectrum of the boating public. Using best available data, NMMA indicated that there were 12,073 active marinas in operation in 2005 hosting 874,132 slips, with the average marina size being 72 slips (National Marine Manufacturers Association, 2006). For 2009, the Corps of Engineers identified 476 marinas hosting 100,183 slips in 32 states on their lands and waters. Assuming minimal changes in the 2005 estimates of marinas and slips, this would mean that the Corps of Engineers hosts approximately 4 percent of the marinas and 11 percent of the slips nationally (USACE, 2009). For the states of Missouri, Georgia, and Pennsylvania, there were 124 marinas with 12,736 slips, 118 marinas with 8,876 slips, and 75 marinas with 10,378 slips,

respectively (NMMA, 2005). In 2009, the Corps recorded a total of 42 marinas with 7,617 slips in MO, 35 marinas with 10,635 slips in GA, and 6 marinas with 2, 286 slips in PA. Discrepancies are the result of comparisons across different years, this information is provided as an indicator of the importance of Corps Lakes to the marina market. Many of these resources on Corps lands and waters are owned and operated by others. Understanding the importance of marinas in the national marketplace is essential to the agency and the regions it serves.

Economic impact assessments estimate how new money flowing into local areas and regions affects economic activity (jobs, sales, income). For existing water resources projects, regional economic modeling results help justify local partnerships and continued operations and maintenance funding for recreation. Local citizenry and governments can use economic impact information to support economic development. For example, the local chambers of commerce around Lake Sidney Lanier reviewed the economic impact summaries from the *Value to the Nation* website (USACE IWR, 2006) and realized their dependence on the economic activity associated with the lake. Local chambers organized other chambers around the state and developed the *Great Lakes of Georgia* website and brochures (Great Lakes of Georgia, 2004). In doing so, they created a marketing tool for the state and local communities. The Corps' nine water resources projects in Georgia became central to their marketing plan. Central to the website are the marina and boating opportunities provided by the lakes.

These findings can also be used to improve the Corps' economic impact information contained in reports and on web pages. Marinas can now be added as a key component of community and economic benefits in the *Value to the Nation* reports (USACE IWR, 2006) and in the *NRM Gateway Economic Impact Analysis* spending profiles segment of the website (USACE, 2001b). This study also justifies the need for improved reporting requirements inside the agency. Identifying that Corps' marina operators represent more than 10 percent of the national market of marina slips may help operators and the Corps identify data gaps and improve data collection to help tell the story. NMMA maintains statistics reflecting marina markets by state. Managers could use improved reporting summaries of boat types and sizes by marina and state to better integrate with national statistics of the NMMA. Data gathering from slip renters should include in-county residence or non-residence information during the time of the initial rental. Annual marina inspections could require improved reporting on boat characteristics and distributions of slip renter residency. USACE's monthly visitation estimation and reporting system (VERS, [USACE , 2006]) should be adapted to identify marinas, and slip/boat estimates in a more systematic way across the nation. The Corps database of record (Operations and Maintenance Business Information Links- OMBIL) should be modified to collect more than baseline information for marina concessions including, total slips, percent occupancy, numbers of boats by size class and type by residency (USACE, 2009).

In addition to the Corps' recreation mission, other missions of the agency impact marina operations outside the agency. For example, changing needs in the Pacific Northwest from the transport of timber products to recreation use of harbors spurred the interest to obtain recreation economic impact information. Chang and Jackson (2003) studied the economics of recreation use in coastal rivers and ports in Oregon. Similarly, the Great Lakes studies (Great Lakes Commission des Grands Lacs, 2007; USACE , 2008) show a support for recreation boating and concern for the Corps' continued involvement in support of dredging of recreational harbors. Regional economic development from marinas would be increased if the Corps had necessary funding to maintain navigation for recreation harbors. Private investment would increase in waterways were navigation could be assured and recreation boating maintained.

Within a multipurpose agency like the Corps, there is a need to continually evaluate all program areas that influence recreation boating. The high priority of keeping ports and harbors open for navigation transportation will continue to be pitted against the recreational use of harbors. Economic impact findings are neutral. They state current conditions or potential changes in conditions based on changes in use and spending due to management actions. Economic findings have been used by external advocacy groups to document economic importance in support of recreation harbors. Corps personnel need to have an understanding and appreciation of the extent of recreation economic impacts generated by recreational watercraft and the role the Corps plays in supporting regional economic development.

Future Research

This study serves as a baseline for research on Corps marina slip renters and brings to light the need for additional investigations. Marina boaters on Corps-managed waterways are only a part of the total boating market that utilizes Corps water resources. Spending patterns associated with other boating groups, including permitted boats (community and private docks), yacht clubs, and dry storage facilities also needs to be addressed.

This study identified five independent variables of the respondent, the household, the boat, and the trip that were significant. Specifically, it was confirmed that age, boat length, one-way mileage or residency, party size, and trip duration play an important role in estimating and predicting visitor spending but they only tell part of the story. These variables helped explain one-third of the variations in party trip spending. Research is needed to help determine what other variables of interest may be of importance to visitor spending. For example, English and Thill (1996), in modeling travel and enroute purchases, determined that information on the number and types of purchase opportunities could be incorporated to help estimate enroute spending.

This work has supported other research findings (Hanagriff et al. 2010; Pyo et al. 1991) showing that increased distance traveled resulted in increases in lodging, grocery, and gasoline expenditures. Although these items may be related, there may be significant changes to the nature and extent of their relationships over time. For example, changes in gasoline prices since the time

of the surveys may have shorten boating trips, or lengthened trip duration to maximize auto expenses, or the relationships may have remained unchanged. The impact of such price changes is uncertain. Vedenov, Duffield and Wetzstein (2006) describe the extreme asymmetry of gasoline prices with steep inclines and moderate declines, changes so extreme that gasoline prices were partially responsible for the 2001 recession. Changes in gasoline consumption as it relates to leisure consumption such as boating and distance driving for recreation should be studied further. Shifts in gas consumption, watercraft preferences, and automobile changes may result from the externality of a dynamic gasoline market and potentially impact trip spending. Advanced technologies and higher efficiency product development could alter the boating market in other ways including changes in durable goods spending. Advancement in online tools, like the American Automobile Association (AAA) Fuel Cost Calculator and the AAA Fuel Price Finder, allows travelers to estimate gasoline consumption and find low-cost gas options along the trip path. This allows travelers the opportunity to evaluate travel costs in relation to other anticipated spending (e.g. hotel costs) (AAA, 2010). Prior knowledge for elements of trip spending such as gasoline expenses provide visitors with tool advancements in setting price or spending constraints and refining the bundle of goods and services selected for their trip.

Similarly, other changes in preferences over time have occurred with the costs and changes in preferences in groceries and restaurant usage. A number of studies related to the costs of healthy eating are underway. Although there are some mixed results in determining if healthy food costs more and

determining regional cost differences, spending for groceries is changing (Carlson & Frazao, 2010; Zhang, You, Carlson, & Lin, 2010). Consumer preferences for healthy, or beneficial, or eco-friendly foods are changing the way consumers buy groceries and order food at restaurants (Johnston & Roheim, 2006; Marette, Roosen, Blanchemanche, & Verger, 2008; Smith & Huang, 2009; Zhang, Gallardo, McCluskey, & Kupferman, 2010). These externalities may never appear in recreation visitor spending surveys, but they may impact the amount and variation in spending that occurs. Wellness and health research in this area will lead the way to determine if spending studies need to be modified to assess these cultural and societal changes.

This group of boaters is unique; they have invested (or sunk costs) in a boat that remains in one location – the marina. They are tied to the marina and the lake. Many in this group are long-time visitors and are loyal to the lake. This group of boaters is suited and may be willing to participate in additional surveys to test for spending differences over time. Longitudinal studies have the potential for advancing the recreation literature in areas such as: life cycle spending, place affiliation, hedonic modeling, and quality of life studies. Recreation benefits to the individual, the community, the environment and the economy are all potential areas of research.

An improved understanding of the lake in relation to its surrounding region in terms of economic development is also needed. Having similar data across a higher number of lakes would enable the development of models that are more sensitive to fluctuations in lake and regional characteristics than the current

models, which only include dummy variables for the three lakes. Additional research is needed to refine the models in this study. Due to the small number of lakes (three in this study), the models estimate average spending for individuals, not lakes. The ability to explain individual variation does not add much to the understanding of average spending for a given lake. The dummy variables in the modes helped capture some of the variation, but they do not sufficiently predict spending for other lakes. Therefore, future research needs to focus on measuring reliable spending averages at a larger sample of lakes. With a sufficient sample of lakes, average trip spending can be regressed against variables describing the lake and location setting to capture how spending opportunities in the area and lake characteristics determine the kinds of visitors attracted (e.g., boat size), their trip patterns (e.g., day vs. overnight), and spending (local prices and spending opportunities). Being able to develop a geospatial, demographic and economic reference for each lake (and marina) would provide the Corps a means to evaluate areas and lakes for future research. Currently much of this information is housed locally, at the project office or Corps District office. Overlaying a national database with NMMA statistics would help to develop research priorities. For example, identifying marinas located near retail centers and restaurants that influence spending behavior can be used to evaluate lakes for research. Integrating and validating research findings such as Becker's (1997) *Classification of Corps of Engineers Projects for Economic Impact Assessment* will strengthen managers' use of secondary data. Increased

geospatial analysis combined with demographic and economic indicators could serve as an indicator for market segmentation and improve future modeling work.

Research associated with age and gender should also be advanced. This study was conducted with an 83 percent male-boater sample (Table 3). The average boating party size was 3.7 (Table 7). There is no information on the makeup of the boating party regarding gender. From the findings, groceries were one of the item spending categories of significant difference across the lakes (Table 8). The literature does not indicate if the person surveyed was the primary shopper. As described by Stynes and White (2006b), improvements in defining the lodging spending category provided clarification in spending estimates for that sector. It should be possible to clarify spending estimates in the groceries sector by identifying the primary shopper (Keown, 1989; Oh et al., 2004). Evaluating other trip spending categories may provide similar recommendations for further study.

Pedersen (1990) suggested that there were two primary purposes for use of I/O models by public agencies. One purpose is to measure the total impacts associated with some activity. Another purpose of I/O is to identify areas for economic development or targeting efforts (Pedersen, 1990). This author offers a third reason for the need for regional modeling by federal agencies: advocacy by stakeholders and communities. For existing federal resources (lakes already in existence), it is the need to assess the use of recreation facilities (visitor use) and quantify the positive local economic effects (spending converted to jobs, sales and income) that drives these studies. These data provide information that

validates the lake as key to economic stability in the region. This study provides the agency and local community leaders with data for advocacy in support of park and recreation resources. Within a multipurpose agency like the Corps of Engineers, the operation and maintenance of recreation facilities has difficulty competing with other critical mission areas (e.g. navigation and flood damage reduction infrastructure needs) in the internal budgeting process. An informed constituency provides support for park and recreation programs and strengthens the Corps' role as a partner in regional economic development.

APPENDICES

APPENDIX A

Human Subjects Authorization

Instruments were developed using the guidelines provided by the Institute for Water Resources (IWR) and authorization was granted to the Corps of Engineers under OMB Clearance Number 0710-0001 (USACE IWR, 2010). IPPSR OSR obtained authorization through MSU Human Subjects Department, IRB Number 98-555/APP#I004674 and utilized their computer assisted telephone interviews (CATI) system to conduct the work. Field correspondence and survey instrument worksheets are in Appendix C.

IRB# 98-555

TITLE: Corps of Engineers Marina User/Dock Owner Expenditure Study

CATEGORY: I-C

APPROVAL DATE: 09/15/98

APPENDIX B

Lake Characteristics

The three lakes (Truman, Lanier and Raystown) surveyed have unique characteristics regarding their development, recreation program, boating facilities and regional impacts. The following tables provide an overview of these four characterizations for each of the lakes under study. Table B-1 contains general information on the project purpose, authorization, nearest metropolitan area, acreage and construction year.

Table B-1. Descriptive Information on Lakes in the Study.

	Truman	Lanier	Raystown
Corps Division	Northwestern	South Atlantic	North Atlantic
Corps District	Kansas City	Mobile	Baltimore
State	MO	GA	PA
Metropolitan Statistical Area Served and Distance to Lake (miles)	Kansas City, MO-KS: 52	Atlanta, GA: 45	Altoona, PA: 30; Johnstown, PA: 50; State College, PA: 46
Watershed	Grand-Osage	Apalachicola-Chattahoochee-Flint	Susquehanna
Authorization	1954 Flood Control Act for Missouri River Basin.	1946 River and Harbor Act	Flood Control Act of Oct 23, 1962 (Public Law 87-874), House Document No. 565, 87th Congress, 2nd Session
Construction Completed	1979	1957	Dam was completed in 1973. Recreation areas completed in 1978.
Primary Purpose	Flood Control	Flood Control	Flood Control
Total Area Acres (land, water, easement)	268,722	58,634	29,703
Total Pool Acres (fee and easement)	55,600	39,038	8,300
Miles of Shoreline	958	692	118
Miles of Boundary	625	700	80
Miles of Roadway	58	84	40
Eisenhower Project	No	Yes	
www.CorpsLakes.us	/HarryTruman	/Lanier	/Raystown

[1] Majority of information was obtained from OMBIL (USACE, 2009) and Websites (USACE, 2004). Data were verified and corrected by Project Staff.

Table B-2. 2009 Summary of Lake Recreation Program*.

	Truman	Lanier	Raystown
Full Time Equivalent Staff*	31	24	23
Ranger + NRM FTE Staff*	9	14	6
Ranger + NRM Part-time & temporary staff	10	4	12
Developed Public Parks	14	46	12
Annual Passes Sold	2,494	3,037	2,180
Golden Age/Access***	0	0	0
Citations and Warnings*	52	1,783	1,696
Interpretive Contacts*	43,514	10,029	3,479
Number of Volunteers*	85	947	187
Volunteer Hours Worked*	5716	21217	12151
Visits Estimated	2,485,239	6,863,752	979,666
Fees Collected Day Use ($)	62,585.12	373,321.13	97,921.89
Fees Collected Camping ($)	346,368.96	566,412.58	523,841.03
Fees Collected Other ($)	258,488.88	59,825.00	32,447.05

* Source: OMBIL (USACE, 2009) with refinements provided by Lake

** Staff- All staff numbers represent the number of employees during peak employment period. It does not represent Full Time Equivalent (FTE) as defined by the Government Accountability Office (GAO) as the number of total hours worked divided by the maximum number of compensable hours in a work year as defined by law.

*** "The U.S. Army Corps of Engineers and other federal agencies no longer issue Golden Age and Golden Access Passports as of January 1, 2007. These passports have been replaced with the America the Beautiful – the National Parks and Federal Recreational Lands Pass: an Interagency Senior Pass for age-related discounts and an Interagency Access Pass for disability-related discounts. The U.S. Army Corps of Engineers cannot sell or issue the America the Beautiful passes, because the Corps was not included in the legislation that set up the program. However, the Corps does accept and provide discounts for the Interagency Senior and Interagency Access Passes or previously issued Golden Age or Access Passports at Corps-managed areas. If a previously issued Golden Age or Access Passport is lost, stolen, or worn out, a new pass must be obtained." (USACE, 2004)

Table B-3. Boating Characteristics of Projects in 1998 and 2009*

	Truman		Lanier		Raystown	
Year	1998	2009	1998	2009	1998	2009
Number of Marinas	5	5	10	11	2	2
Est. Number of Boats in Wet-Storage	1,075	1,309	5,319	6,120	1,163	1,313
Dry Storage	365	75	3278	1890	287	283
Number of Yacht Clubs	0	0	6	5	0	0
Number of Private Docks	0	0	7,944	1,590**	0	0
Number Community Docks	0	0	48	3**	0	0
Est. Boats at Yacht Clubs	0	0	274	954	0	0
Est. Boats at Private Docks	0	0	15,984	18,988	0	0
Est. Boats at Community Docks	0	0	2,684	2,156	0	0

*1998 data NRMS (USACE, 2001a), 2009 data OMBIL (USACE, 2009)

** Lake Sidney Lanier no longer issues private dock permits. This number is a reflection of the consolidated permits and represents over 10,000 individual docks, reflected in the estimates of boats served.

Table B-4. Census County Data Comparison by Lake

	Truman [1]	Lanier [1]	Raystown [1]
Number of Counties in the study area	4	16	5
Counties included	Benton, Henry, Hickory, and St. Clair	Banks, Barrow, Cherokee, Dawson, De Kalb, Forsyth, Franklin, Gwinnett, Habersham, Hall, Jackson, Lumpkin, Pickens, Stephens, Union, and White	Bedford, Blair, Fulton, Huntingdon and Mifflin
Census[2]			
Population estimate for study area, 2000	57,769	1,914,908	285,461
Household estimate, 2000	24,504	688,426	112,118
Persons per household, 2000	2.32	2.74	2.46
Median household income	$29,192	$50,313	$34,468
Land area, 2000 (square miles)	2,484	4,495	3,265
Persons per square mile	23.28	426.02	87.49

1 Results from the three individual marina reports, unless otherwise noted.
2 US Census Bureau: generated by author; using State and County Quick Facts: http://quickfacts.census.gov/qfd/ (27 September 2006). (US Census Bureau)

APPENDIX C

Correspondence

Correspondence with managers, marina operators, and marina slip renters occurred prior to the survey's initiation. The first correspondence from ERDC was with the Corps Project Managers at the locations that were selected. Similarly, once the project managers provided the contact information for the Marina concessionaire owners, letters followed from ISSPR. Only three of the original six lakes remained in the study due to marina concession participation. Once the list of potential slip renters and randomly selected respondents was chosen, a letter and worksheet outlining the survey were prepared and delivered by ISSPR. These items follow.

It was noted that the original sampling design called for three strata, weekly, monthly and annual estimates. Due to problems in obtaining renter contact information at the start of the recreation season, ISSPR was unable to complete weekly and monthly sample quotas. A new survey design ensued and all survey participants were converted to an end-of-season survey and annual estimates of trips and last trip spending. Projects were notified of the change in design and this notification is provided. The study findings in this report are limited to the end-of-season data collection.

CEWES-EN-R (70-1r) 20 April 1999

MEMORANDUM FOR SEE DISTRIBUTION

Subject: Survey of Economic Impacts of Marina Slip-renters

1. The U.S. Army Engineer Research and Development Center, Waterways Experiment Station will initiate a regional survey to estimate the economic impacts associated with marina slip-renters at six water resource projects. The resulting information will be estimates of recreation use and spending by marina slip renters at your project. A second goal of the study is to evaluate various questionnaire designs to determine if the recall period has an effect on use and spending estimates. A final objective is to analyze use and spending by a variety of boat types to allow for utilization of the information outside of the projects included in the study. These projects include three "northern" and three "southern" sites. It is possible that all marinas on your project will be included in the list of randomly selected slips. A total of 360 names of slip-renters will be obtained in order to reach a goal of 190 completed interviews. The additional slip-renters have been pre-selected to replace any that choose not to participate in the study.

2. A member of my staff will contact your office to obtain the name, mailing address, and telephone and fax numbers of the point of contact for the concessions on your project. The Michigan State University staff will contact the concessionaires in order of the random selection draw. A listing of slips will be identified. Each marina concessionaire will be contacted and asked for information on specific slips. Should any of the concessionaires choose not to participate in the study, the remaining concessions on the project will be required to provide sufficient information to meet the target sample size. From within this group of names, 190 will be interviewed. The sample will be divided into three groups. Group 1 will receive only one telephone call, estimated to be 15 minutes in length. Groups 2 and 3 will receive two additional calls of approximately 8 minutes duration. The information will be associated with the marina slip renters' recreation use and average spending patterns. Seasonal reporting will be acquired from Group 1, while monthly and weekly information will be acquired from Groups 2 and 3, respectively. A series of questions and answers on the study has been provided in encl. 1

1. If you prefer, you may provide the necessary information by e-mail or fax to Ms. M. Kathleen Perales at peralek@wes.army.mil, fax 601-634-3726. Any questions you have may also be directed to Ms. Perales, 601-634-3779. Our Michigan State University contact is Ms. Karen Clark; she can be reached at 517-355-6672 ext. 134. Your assistance in this work is greatly appreciated.

Encl

H. ROGER HAMILTON, PhD
Chief, Resource Analysis
Branch

CEWES-EN-R (70-1r)
Subject: Survey of Economic Impacts of Marina Slip Renters

DISTRIBUTION:
USAE, Dale Hollow Lake, Franklin D. Massa, Attn: CELRN-CO-DAL-R
USAE, Harry S. Truman Lake, Diane Parks, Attn: CENWK-OF-HT
USAE, Lake Sidney Lanier, Erwin Topper, Attn: CESAM-OP-SL
USAE, Mississippi River Pools 11-20, Roger Bollman, Attn: CEMVR-OD-MN
USAE, Raystown Lake, Dwight Beall, Attn: CENAB-OP
USAE, Texoma Lake, Chris Lynch, Attn: CESWT-OD-TX

Enclosure

Questions and Answers for the Project Manager

The Corps of Engineers is in the process of determining the economic benefits from marina slip renters. Estimates of recreation use and trip spending are the focus of this study. We are providing these materials to answer the most frequently asked questions.

Why is the Corps interested in this?

The U.S. Army Corps of Engineers operates over 450 water resource projects across the country. On these projects there are over 500 licensed marina operators serving nearly 90,000 slip renters. The Corps is obtaining baseline information on use and spending from people who rent slips. The national study will determine the economic impacts provided by recreation at marinas nationally and help the Corps assess the economic implications of management decisions affecting marinas. The regional study will provide project-wide estimates and regional estimates that may be used by projects as alternatives to the national averages. In addition, an evaluation of how data are collected will provide insight and recommendations into how the Corps may collect data in the future.

Who authorized this?

The study is part of the research effort entitled "Measuring the economic effects of boat dock owners and marina slip renters" funded under the Recreation Research Program. Last year's efforts involved surveying marina slip renters to develop an national average of recreation use and spending that can be incorporated into an economic model to estimate benefits. This year's effort evaluates six specific projects and looks for answers to project-wide estimates, regional estimates, and recall bias.

What is my role?

We will call you and ask for the point of contact associated with a specific marina on the project. We will send a similar question-and-answer letter to the concessionaire. We will ask the marina operator for the names, addresses, and phone numbers for a number of clients. A subset of these names will be interviewed. Your role will be to provide support to the study and respond to concessionaire and slip renters questions that are directed to the project office. Each group will be provided both Waterways Experiment Station and Michigan State staff points of contact, but we realize that your office is the first order called.

How was your project selected?

We reviewed the Natural Resource Management System (NRMS) database and evaluated the distribution of all projects with over 1000 marina slips. With the help of a statistician, we set targets of the sample size based on information collected in last year's study. We limited the total number of projects that could be in the sample (six) and further restricted them by region (northern and southern). We wanted geographic diversity, and selected the top three within each geographic mix. A replacement project was selected, should any of the projects refuse participation in the sample. This process resulted in your project being selected.

What's next?

After we obtain the marina operator's name and number, we will contact the concessionaire. Knowing the total number of slips under license (based on your entries in the NRMS), we will ask for specific slips, determined by a random draw.

Who will be contacted?

We will send letters of introduction to all the people whose names we receive from the concessionaire. A subsample of the individuals will be called. There is a 190 in 360 chance a person will receive a call, with only a small number of slip renters being asked the complete list of interview questions.

Who will call whom?

Someone from my office will contact the project asking for the name, address and phone number of the specific concession. The MSU will send out a letter to the concession operator and describe the study and the requirements. Staff from Michigan State University will conduct the actual interviews with the individual slip-renter. Staff from the University will identify themselves as conducting this survey for the Corps. Slip renters may receive as few as one call and as many as three calls during the summer period.

How long will it take?

Each household will receive a call of approximately 15 minutes in duration. Two thirds will receive two more calls of approximately 8 minutes in length.

What type of questions will be asked?

A variety of questions will be asked. Information on how much a slip-renter used their boat during different seasons of the year, how much money they spent at various locations and in different spending categories, characteristics of the boat, and standard demographic information. Comments and opinions will also be welcome!

Who else will get the slip-renters name?

No one! We are not selling anything. This is a research effort! All the information provided by the slip-holder is confidential and will not be tied to them as an individual. The information will be rolled up with the other surveys to get a national number on recreation use and spending. All telephone lists will be destroyed at the end of the survey.

Will I get project-level information from the survey being done this year?

YES. This study differs from the national survey effort and sufficient sampling will occur to provide project level estimates.

If they call us, what can we say?

I am including the following message in the letters to the slip renters. You may use it as well.

"Your opinion is important to us. The President has ordered that we get a better understanding of our customer base; this includes you. As with all Federal programs, the Corps is being asked to do more with less. Data describing the economic benefits of recreation provides the Corps information supporting partnerships and recreation initiatives. Your response will represent all slip renters on this project. Please take the time to assist us in this effort. Your participation is appreciated!"

If I have a problem with the interviewers or the study, whom can I contact?

Ms. M. Kathleen Perales is the researcher at the US Army Engineer Research and Development Center, (ERDC) Waterways Experiment Station, responsible for this study. She can be reached at the ERDC, ATTN: Perales, EN-R, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, peralek@wes.army.mil, 601-634-3779.

ADDRESS

Dear

This summer, the U.S. Army Engineer Research and Development Center at the Waterways Experiment Station (WES) in cooperation with Michigan State University (MSU), will initiate a survey to determine the economic impacts associated with marina slip renters at your project. The marina you operate has been selected to be included in this survey. The Project Manager for your lake was notified and provided us with your name, address, phone and fax numbers to assist in this process. A series of questions and answers on the study has been provided in enclosure 1 to identify the scope of the study. A copy of these materials has also been provided to the project manager at your lake.

A member of my staff will be contacting your office to obtain the name, mailing address and telephone and fax number for individual slip-renters. Enclosure 2 contains the randomly preselected list of slip numbers for which we will inquire and a procedure for matching these numbers to the slips at your site. This listing was generated based on the project manager's reporting of the number of wet slips in your marina. From within the project, 360 slip-renters will be identified. Michigan State University Staff will conduct the interviews. An individual slip-renter may receive one to three phone calls. One call will take approximately 15 minutes, those receiving the second and third calls can expect these calls to last approximately 8 minutes.

During the call, the marina slip renters will be asked about boating trips during the past year and what purchases were made associated with these trips. The information will provide the Corps with information needed to estimate the economic returns of marina slip renters on this project.

A letter will go out to the slip renter prior to the phone call. Any questions you have may be directed to Ms. M. Kathleen Perales, at WES at 601-634-3779 or Ms. Karen Clark, at Michigan State University at 517-355-6672 ext. 134.

Sincerely,

Karen Clark

Enclosures

Copies Furnished:

USAE, Dale Hollow Lake, Franklin D. Massa, Attn: CELRN-CO-DAL-R
USAE, Harry S. Truman Lake, Diane Parks, Attn:
USAE, Lake Sidney Lanier, Erwin Topper, Attn: CESAM-OP-SL
USAE, Mississippi River Pools 11-20, Roger Bollman, Attn:
USAE, Raystown Lake, Dwight Beall, Attn:
USAE, Texoma Lake, Chris Lynch, Attn: CESWT-OD-TX

Attachment 1
Questions and Answers for the Concession Operator

The Corps of Engineers is in the process of determining the economic benefits from marina slip renters, who boat on Corps of Engineers managed lakes and rivers. Estimates of recreation use and trip spending are the focus of this work. We are providing these materials to answer the most frequently asked questions about the study.

Why is the Corps interested in this?

The US Army Corps of Engineers operates over 450 water resource projects across the country. On these projects there are over 500 licensed marina operators serving nearly 90,000 slip renters. The Corps is obtaining baseline information on use and spending from people who rent slips. This study will determine the economic impacts provided by recreation at marinas on this project, and allow the Corps to assess the economic implications of management decisions affecting marinas.

Who authorized this?

The study is part of the research effort entitled "Measuring the economic effects of boat dock owners and marina slip renters" funded under the Corps' Recreation Management Support Program. This year's efforts involve surveying marina slip renters to develop regional estimates of recreation use and spending that can be incorporated into an economic model to estimate benefits.

How was my business selected?

Your project was selected. Only six projects nationally will be surveyed this summer. Your chances of being selected were based on the number of wet-slips at your site. A random sample of slips was selected from within the project and some of them were yours.

What's next?

Knowing the total number of marina slips on this Corps of Engineers Project, we will ask for specific slip numbers, determined by a random draw. The list of slips and instructions for selection is enclosed. We limited the number of renters within the project to be contacted.

Who will be contacted?

We will send out letters of introduction to all the people whose names we receive from you. A subsample of the individuals will be called. If there are no refusals, there will be a 50 percent chance a person whose name was given to us will receive a call.

Who will be calling?

Someone from this office will contact you and explain the study. Staff from Michigan State University will conduct the actual interviews with the individual slip-renter. We will use the address you give us to contact the renter by mail and then contact them by phone. Staff from the university will identify themselves as conducting this survey for the Corps. Slip renters will receive between 1 and three phone calls.

Encl 1

How long will it take?

Those people only receiving one call can expect the call to take approximately 15 minutes. Each additional call will be require about half the time or 8 minutes.

What type of questions will be asked?

A variety of questions will be asked. Information on how much a slip-renter used their boat during different seasons of the year, how much money they spent at various locations and in different spending categories, characteristics of the boat and standard demographic information. Comments and opinions will also be welcome!

Who else will get the slip-renters name?

No one! We are not selling anything. This is a research effort! All the information provided by the slip-holder is confidential and will not be tied to them as an individual. The information will be rolled up with the other surveys to get a project-wide estimate of recreation use and spending. All phone lists will be destroyed at the end of the survey.

If they call here, what can we say?

The Corps needs their help. The President has ordered that we get a better understanding of our customer base. As with all federal programs, the Corps is being asked to do more with less. Data describing the economic benefits of recreation provides the Corps information supporting partnerships and recreation initiatives. Their response will serve to represent the slip renters across this project. Please take the time to assist us in this effort. Their participation is appreciated!

If I have a problem with the interviewers or the study, whom can I contact?

Ms. M. Kathleen Perales is the researcher at the US Army Engineer Research and Development Center at the Waterways Experiment Station, responsible for this study. She can be reached at USAERD at Waterways Experiment Station, ATTN: Perales, EN-R, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, peralek@wes.army.mil, 601-634-3779.

Attachment 2
Listing of wet slips identified for surveying.

Instructions for selecting marina slip renters to participate.

Attached is a table with a listing of randomly sampled numbers for your marina. It was based on the number of wet slips that we were told you had in this marina. We ask that you assemble a listing of your clients and help match the random sample to the listing of your clients.

We are only interested in wet slip renters, not dry storage. In whatever type of system you store the information, we ask that you take the time to use the numbers we identified and find the comparable slip for your marina.

For example, your list may be alphabetical, by location, or numerical

Alphabetical	Location	Numeric
Adams	11 East Dock	Pier 12-1
Ahner	12 East Dock	Pier 12-2
Allen	13 East Dock	Pier 12-3
Allison	14 East Dock	Pier 12-4
Ames	15 East Dock	Pier 12-5
Andrews	23 Sunset Bay	Pier 12-6
Brown	24 Sunset Bay	Pier 12-7
Campbell	25 Sunset Bay	Pier 12-8
Chaney	11 Harbor Lights	Pier 12-9
Cook	12 Harbor Lights	Pier 12-10

The sample we have drawn may require the third (3) and the seventh (7) slip. For the above example, this would result in the following selections:

Alphabetical	Location	Numeric
Allen	13 East Dock	Pier 12-3
Brown	24 Sunset Bay	Pier 12-7

For each of the slips identified, we require information in order to conduct the survey. A table has been provided to assist in collecting the following information:

- Information on your marina
- Name of the renter
- Mailing address
- Phone numbers (day and evening)
- Fax number where available
- Description of boat in this slip

THANK YOU!

Encl 2

Marina:
Total wet-slips in marina: _____ YES or ____ NO: Correct figure:
Total vacant/non-rented slips:
Total slips used by marina for rental or transients:
Concessionaire Comments:

(Date)

«Renter»
«Address»
«Adress_2»
«City», «STATE» «zip»

Dear «Renter»:

The US Army Engineer Research and Development Center (ERDC) at the Waterways Experiment Station (WES) in conjunction with Michigan State University (MSU) is conducting a regional survey to determine the economic impacts associated with marina slip renters at «Marina» where you keep your boat. Estimates of recreation use and trip spending are the focus of this study. The slip you rent has been randomly selected to be part of this research project. In the selection process, we contacted both the marina operator and the Corps of Engineers project manager to obtain approval to contact you.

A professional data collection specialist from the Survey Research Division of the Institute for Public Policy and Social Research at MSU will be contacting you by telephone. They will ask you a series of questions about boating trips taken during the past year and what purchases were made in association with these trips. This information will provide the Corps with data needed to estimate the economic returns of marina slip renters nationally. All information provided is voluntary, confidential, and will be combined to produce lake-wide results. A series of questions and answers is included to assist in explaining the study.

Also included is a worksheet that describes the type of questions to be asked and assist you in completing the interview. We expect the first call to take no more than 15 minutes. A few of you will receive two additional five-minute calls, asking about use within a shorter time period (i.e. last seven days or last 30 days). Michigan State University (MSU) will conduct all the phone calls. Due to the nature of the sampling, there is a slight chance you will not be called. Surveys are scheduled begin in July and continue through September. Your participation in this study will help us understand the economic importance of boating and support the consideration of boating in the management of lakes and rivers administered by the Corps of Engineers.

Any questions you may have can be directed to Ms. Kathleen Perales at 601-634-3779 or Ms. Karen Clark at (517) 355-6672. Thank you in advance for your valuable cooperation. Your assistance and support of this project is greatly appreciated.

Sincerely,

Karen Clark
Project Director

Attachment 1
Questions and Answers for Marina Slip Renters

The Corps of Engineers is in the process of determining the economic impacts from individuals like you, marina slip renters who boat on lakes and rivers administered by the Corps. Estimates of recreation use and trip spending are the focus of this study. We are providing these materials to answer the most frequently asked questions about the study and provide a format for the telephone interview that some of you will receive.

Why is the Corps interested in this?

The US Army Corps of Engineers operates over 450 water resource projects across the country.
On these projects there are over 500-licensed marina operators serving nearly 90,000 slip renters. The Corps is obtaining baseline information on use and spending from people who rent slips. This will be used to determine the economic impacts provided by recreation at marinas at this project and regionally, thereby helping the Corps assess the economic implications of management decisions affecting marinas.

How was my name selected?

We sat down with a statistician and determined how many people we needed to contact in order to get a valid national sample. We contacted the project office, got the marina operator's name and number. Knowing the total number of slips under license, we drew a sample from the list of slip-renters. There was a target number of slip renters to be interviewed at this project, and your name came up in the random draw.

Who will be contacted?

A subsample of the individuals being sent this letter will be interviewed. There is approximately a 50 percent chance that you will receive a call. With only a limited number of slip renters being asked the complete listing of questions, your participation is critical and your information appreciated!

Who will be calling me?

The Corps has a contract with Michigan State University for this data collection effort. Staff from the University will identify themselves as conducting this survey for the Corps. There are three groups of phone calls being made. One group will get one-15 minute call, the other two groups will get two additional five-minute calls.

How long will it take?

In order to get a regional estimate, each household will receive a call of 15 minutes in length. Two thirds of the group will receive two more calls lasting approximately 5 minutes.

What type of questions will be asked?

A variety of questions will be asked. Information on how much you used the boat during different seasons of the year, how much money you spent at various locations and in different spending categories, characterization of your boat, your boating experience and standard demographic information. Your comments and opinions will also be welcome!

Who else will get my name and number?

No one! We are not selling anything. This is a research effort! All the information you provide is confidential and will not be tied to you as an individual. The information will be rolled up with the other surveys to get a national number on recreation use and spending. All lists will be destroyed at the end of the survey.

Why should I do this?

Your opinion is important to us. The President has ordered that we get a better understanding of our customer base; this includes you. As with all federal programs, the Corps is being asked to do more with less. Data describing the economic benefits of recreation provides the Corps information supporting partnerships and recreation initiatives. Please take the time to read the enclosed materials, review the questions and then provide the answers to the interviewer once you are contacted.

If I have a problem with the interviewers or the study, whom can I contact?

Ms. M. Kathleen Perales is the researcher at the US Army Engineers Waterways Experiment Station, responsible for this study. She can be reached at USAE Waterways Experiment Station, ATTN: Perales, EN-R, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, 601-634-3779.

Economic Impact Study of Marine Slip Renters Worksheet

Conducted for the
US Army Corps of Engineer Water Resource Projects

by the
Institute for Public Policy and Social Research
Michigan State University
East Lansing, MI 48824
517/355-6672

Economic Impact Study of Marina Slip Owners
US Army Corps of Engineers Water Resource Projects

The interview is broken into five parts: trips, recreation, and expenses, boat expenditures, management and benefit, demographic information, and compliments and opinions. The interviewer who contacts use will be asking for detailed information within these areas. This worksheet is provided to assist you in answering those questions.

SECTION A: TRIPS, RECREATION, AND EXPENSES
When answering the following questions, please use the following definition of a trip: A visit to the marina starting from your permanent residence that was taken between September 1, 1998 and August 31, 1999.

TOTAL TRIPS	September 1, 1998 to August 31, 1999	
FALL	September 1, 1998 to November 31, 1998	
WINTER	December 1, 1998 to February 28, 1999	
SPRING	March 1, 1999 to May 31, 1999	
SUMMER	June 1, 1999 to August 31, 1999	

**Please make sure that the trips within each of the seasons are equal to the total number of trips.*

During how many of the trips that you took last year did you or members of your party participate in each of the following activities?

Activity	Number of Trips	Activity	Number of Trips
Fish		**Picnic**	
Water Ski		**Hunt**	
Scuba Dive		**Hike**	
Swim		**Other Activities:**	
Camp			

US Corps of Engineers Water Resource Projects, OMB Clearance Number: 0710-0001, Michigan State University, IRB Number 98-555

Economic Impact Study of Marina Slip Owners
US Army Corps of Engineers Water Resource Projects

For the next set of questions, the interviewer will ask you for detailed information for the last trip taken between September 1, 1998 and August 31, 1999.

Number of nights away from permanent home on this trip _____
Number of people on the boat _____

For this trip, about how many total dollars would you say that you and others spent, within 30 miles of your boat, during the last you took, for each of the following categories? (*Please round to the nearest dollar*)

Gas, oil, auto expenses for your auto/RV/Truck	$
All other expenses for your auto/RV/Truck including parking and repairs	$
Gas, oil, auto expenses for your boat	$
All other expenses for your boat, including launching fees (outside standard rental) and repairs	$
Food and drink at restaurants	$
Groceries	$
Public campground fees	$
Private and or commercial lodging. This includes private camping fees, hotels and motels, bed and breakfasts.	$
Other recreation and amusement fees, such as golf fees, entrance fees and equipment rental	$
Other merchandise and supplies. This includes clothing, souvenirs, tackle and bait but does not include durable goods like fishing rods or furniture	$

For the categories previously identified, please estimate the **total** amount of money spent in locations **more than 30** miles from your boat. This could include purchases made for at-home preparation for the trip, food, and lodging on the way TO and FROM the marina. (*Please round to the nearest dollar*).

$_____ total expenses more than 30 miles from boat.

US Corps Engineers Water Resource Projects, OMB Clearance Number: 0710-0001. Michigan State University, IRB Number 98-555

Economic Impact Study of Marina Slip Owners
US Army Corps of Engineers Water Resource Projects

SECTION B: BOAT EXPENDITURES

Cost of the boat.	$
Cost of in-board motor (if applicable or not included in purchase price).	$
Cost of out-board motor (if applicable or not included in purchase price).	$
Cost of other motor (if applicable or not included in purchase price).	$
Year Purchased.	19
Cost of annual rental and storage.	$
Cost of insurance.	$

SECTION C: MANAGEMENT AND BENEFIT

1). What changes or improvements would you like to see at the lake to make your boating trips more enjoyable?

2). What have been the biggest changes in boating conditions you have seen on the lake since you began boating there?

3). What personal benefits do you feel you receive from the boating experience?

4). What community or neighborhood benefits can you identify that are associated with having the marina on this lake/river?

SECTION D: DEMOGRAPHIC INFORMATION

SECTION E: COMMENTS AND OPINIOINS

US Corps of Engineers Water Resource Projects. OMB Clearance Number: 0710-0001, Michigan State University, IRB Number 98-555

August 20, 1999

To: Messrs. Massa, Topper, Bollman, Beal, Jordan and Ms. Parks,

Subject: Marina Survey being conducted at your project.

1) We were unsuccessful at obtaining the needed information from marina operators to conduct the experimental design study at any of the six projects. We are planning however still obtain project level estimates of use and spending at three of the six projects. Lake Sidney Lanier, Harry S. Truman and Raystown Lakes should have a sufficient pool of names to draw from, to conduct a project level data collection effort and analysis.

2) It is with great regret that I will be unable to deliver project level estimates for Mississippi River Pools and Texoma and Dale Hollow Lakes.

3) I have instructed Ms. Karen Clark at Michigan State University to terminate all requests for data at marinas on Mississippi River Pools, Texoma and Dale Hollow. I have recommended that she continue contacts with the other three projects with a deliverable by the end of the month. If these individual marinas are unable to meet that time frame they will be considered "refusals" and the appropriate sampling weights will be redistributed to the pool of names we have on hand.

4) We have had great success in the contacts that we have made. Respondents have been extremely cooperative and understand the value of the information they are providing in this research effort. We apologize for any inconvenience we may have caused individuals whose data will be eliminated from the final sample. Our target estimates of slip-renters to be contacted will now be approximately 600 rather than the original 1170. Only 37 of the calls made to date will not be brought forward in that effort. The remainder will be recontacted to accommodate the new data requirements. They will not be receiving the anticipated 3 contacts, but rather 2. The second one will permit the data to become comparable across all contacts. The following table outlines the number of interviews conducted to date as received from Michigan State University earlier this week.

Marina	Weekly	Monthly	Project
Aqualand	25	20	Lanier
Eisenhower*	6	7	Texoma
Holiday on Lanier	18	8	Lanier
Massy*	8	6	MS Pools
7 points	55	51	Raystown
Sterrett	33	37	Truman
Sunrise	18	9	Lanier
Sunset*	5	5	Dale Hollow
Interviews	168	143	
*Affected calls	19	18	

5.) We thank you for your continued support. We will be contacting a few of you concerning your participation in the private boat dock survey. We are currently in the process of obtaining necessary data sets from project offices.

M. Kathleen Perales
Principal Investigator

APPENDIX D

Consumer Price Index Adjustments

The Bureau of Labor Statistics (BLS) Consumer Price Index (CPI) adjustments were applied to the values of spending to translate 1999 dollar values to 2009 dollars. Table D-1 contains the CPI values for the years 1999 to 2009 and the BLS source sectors for recreation-related spending items (US Department of Labor, 2010). CPI tables are available from 1981 to 2010. Table D-2 contains the 1999 and 2009 ratio relationship and the item spending categories from this study as they were applied. The ratios developed in Table D-2 were applied to the specific item spending mean to develop the 2009 mean spending value. The estimated 2009 values for party trip and party day spending are presented in Tables 10 and 11.

Table D-1. Bureau of Labor Statistics, Consumer Price Index Values for 1999 to 2009 for Select Recreation Sectors*.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	BLS Source*
lodging out	241.2	252.4	254	251.4	252.2	265.3	274.2	285.6	299.9	301	279.2	sehb02
food & beverage												
at home	164.2	167.9	173.4	175.6	179.4	186.2	189.8	193.1	201.2	214.1	215.1	saf11
food out	165.1	169	173.9	178.3	182.1	187.5	193.4	199.4	206.7	215.8	223.3	sefv
gasoline	100.1	128.6	124	116	135.1	159.7	194.7	219.9	238	277.5	201.6	setb01
services	188.8	195.3	203.4	209.8	216.5	222.8	230.1	238.9	246.8	255.5	259.2	sas
sporting goods	120.3	119	118.5	116.4	115.3	115	115.5	117.1	116.4	118.4	119.9	serc
amusements	216.5	230.5	242.4	251.4	263.2	272.9	282.3	291.9	303.8	312.3	317.8	serf02
clothing/retail goods	131.3	129.6	127.3	124	120.9	120.4	119.5	119.5	119	118.9	120.1	saa
auto parts &repair	171.9	177.3	183.5	190.2	195.6	200.2	206.9	215.6	223	233.9	243.3	setd
other (general index)	166.6	172.2	177.1	179.9	184	188.9	195.3	201.6	207.3	215.3	214.5	sa0

* Spending sectors from BLS CPI website (http://www.bls.gov/cpi/#tables): Go to CPI Databases, All Urban Consumers, On Screen Data Search, US City Averages, All items or selected sector as reflected in column heading BLS source, Annual Value.

Table D-2. Consumer Price Index Computed Rates of Change for 1999 to 2009.

BLS Category	1999	2009	Ratio 2009/1999	Spending Item
lodging out	241.2	279.215	1.158	lodging
food & beverage at home	164.2	215.124	1.310	grocery
food out	165.1	223.272	1.352	restaurant
gasoline	100.1	201.555	2.014	gasoline
services	188.8	259.154	1.373	
sporting goods	120.3	119.856	0.996	
amusements	216.5	317.769	1.468	Fees/amusement/camping
clothing/retail goods	131.3	120.078	0.915	
auto parts & repair	171.9	243.337	1.416	auto/boat/repair
other (general index)	166.6	214.537	1.288	other
transportation	144.4	179.252	1.241	

APPENDIX E

Boat Characteristics

Additional analyses of boat size and type are provided in this appendix. Tables E-1,E-2, and E-3 are cross tabulations for sample results on the boat type and size, boat type and motor type, and boat size and motor type. Tables E4 to E-6 are the item spending analysis for each lake and the composite dataset by the three boat size classifications of small, medium, and large.

Table E-1. Boat Type by Boat Length, All Lakes, (N= 614).

	Boat Type						
Boat Length	open	cabin	sailboat	pontoon	house	other	total
20' and smaller	12.38%	1.79%	0.16%	9.93%	0.00%	0.33%	24.59%
21' to 30'	7.82%	16.94%	9.12%	23.45%	0.33%	0.33%	57.98%
31' and larger	0.49%	6.35%	1.95%	0.65%	7.98%	0.00%	17.43%
Total	20.68%	25.08%	11.24%	34.04%	8.31%	0.65%	100.00%

Table E-2. Boat Type by Motor Type, All Lakes, (N= 611).

	Boat Type						
In-Board Motor	open	cabin	sailboat	pontoon	house	other	total
With	10.47%	20.46%	4.91%	2.13%	5.07%	0.33%	43.37%
Without	10.31%	4.58%	6.38%	31.91%	3.11%	0.33%	56.63%
Total	20.79%	25.04%	11.29%	34.04%	8.18%	0.65%	100.00%

Table E-3. Boat Length by Motor Type, All Lakes (N= 612).

	Boat Length			
In-Board Motor	20' and smaller	21' to 30'	31' and larger	Total
With	7.52%	22.39%	13.40%	40.44%
Without	16.99%	35.62%	4.08%	59.56%
Total	24.51%	58.01%	17.48%	100.00%

Table E-4. Trip Spending Averages by Lake for Craft Size Under 21 feet (Small), 1999 Dollars.

Spending category	Total		Truman		Lanier		Raystown		F	Sig.
	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error		
	N=151		N=93		N=15		N=43			
Gas/Oil Auto	$18.90	2.14	$18.29	3.10	$15.89	3.81	$21.28	3.10	0.30	0.74
Other Auto Expenses	$8.21	2.99	$12.30	4.78	$1.33	1.33	$1.74	1.24	1.52	0.22
Gas/Oil Boat	$19.51	1.81	$18.22	2.25	$27.13	7.80	$19.65	3.03	1.05	0.35
Other Boat Expenses	$12.54	4.71	$11.75	5.51	$24.67	19.97	$10.00	9.31	0.38	0.69
Restaurants	$25.32	3.06	$28.35	4.49	$30.00	9.17	$17.14	3.15	1.44	0.24
Groceries	$15.74	2.55	$15.62	3.72	$26.67	9.56	$12.16	1.99	1.20	0.30
Campground Fees	$3.57	1.63	$5.53	2.62	$1.67	1.67	$0.00	0.00	1.19	0.31
Lodging	$2.19	1.17	$1.08	0.77	$0.00	0.00	$5.35	3.74	1.50	0.23
Recreation Fees	$1.06	0.72	$1.72	1.16	$0.00	0.00	$0.00	0.00	0.68	0.51
Other Supplies	$8.95	1.90	$10.37	2.17	$16.07	13.40	$3.42	0.85	2.11	0.13
Total within 30 miles	$115.98	11.06	$123.22	15.64	$143.43	38.77	$90.74	13.24	1.18	0.31
Expenses 31+ Miles	$25.92	7.36	$35.18	11.78	$11.00	4.79	$11.09	2.80	1.28	0.28
Total trip spending	$141.90		$158.40		$154.43		$101.84			

Table E-5. Trip Spending Averages by Lake for Craft Size 21-30 feet (Medium), 1999 Dollars.

Spending Category	Total		Truman		Lanier		Raystown		F	Sig.
	Mean N=356	Std. Error	Mean N=97	Std. Error	Mean N=119	Std. Error	Mean N=140	Std. Error		
Gas/Oil Auto	$17.27	1.28	$17.53	2.67	$11.54	1.75	$21.95	2.14	6.19	0.00
Other Auto Expenses	$4.44	1.12	$1.29	0.52	$5.60	2.65	$5.64	1.69	1.49	0.23
Gas/Oil Boat	$32.18	2.55	$28.38	4.64	$20.03	2.70	$45.14	4.96	9.59	0.00
Other Boat Expenses	$14.51	4.66	$12.66	9.39	$10.45	5.41	$19.24	8.80	0.35	0.71
Restaurants	$25.60	3.53	$26.02	4.96	$20.27	3.22	$29.84	7.82	0.67	0.51
Groceries	$26.52	2.89	$21.05	4.37	$21.57	2.86	$34.52	6.18	2.51	0.08
Campground Fees	$3.38	1.08	$4.28	2.70	$0.00	0.00	$5.64	1.99	2.62	0.07
Lodging	$9.36	3.64	$21.81	10.61	$1.26	1.26	$7.61	5.46	2.49	0.08
Recreation Fees	$1.65	0.48	$0.26	0.15	$2.02	1.12	$2.29	0.75	1.61	0.51
Other Supplies	$17.23	3.13	$14.00	3.30	$13.20	6.04	$22.89	5.63	1.07	0.35
Total within 30 miles	$152.14	13.95	$147.28	31.12	$105.94	15.37	$194.77	24.56	3.74	0.02
Expenses 31+ Miles	$31.42	5.68	$35.03	15.74	$11.91	3.88	$45.51	8.74	3.28	0.04
Total trip spending	$183.56		$182.32		$117.84		$240.28			

Table E-6. Trip Spending Averages by Lake for Craft Size Over 31 feet (Large), 1999 Dollars.

Spending Category	Total		Truman		Lanier		Raystown		F	Sig.
	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error		
	N=108		N=8		N=74		N=26			
Gas/Oil Auto	$20.64	3.74	$12.00	3.58	$21.36	5.06	$21.25	5.78	0.21	0.81
Other Auto Expenses	$7.61	5.58	$13.63	13.63	$1.59	1.06	$22.88	22.69	1.35	0.26
Gas/Oil Boat	$64.28	8.42	$37.25	20.08	$73.51	11.29	$46.31	11.60	1.35	0.26
Other Boat Expenses	$2.33	0.90	$6.25	6.25	$2.73	1.12	$0.00	0.00	1.61	0.20
Restaurants	$32.42	6.96	$21.25	5.15	$39.74	9.83	$15.00	6.01	1.24	0.29
Groceries	$58.32	8.17	$24.38	11.47	$61.22	10.47	$60.54	15.77	0.69	0.50
Campground Fees	$0.05	0.05	$0.00	0.00	$0.00	0.00	$0.19	0.19	1.59	0.21
Lodging	$0.97	0.93	$0.00	0.00	$1.35	1.35	$0.19	0.19	0.18	0.84
Recreation Fees	$3.89	2.24	$0.00	0.00	$4.86	3.17	$2.31	2.31	0.23	0.79
Other Supplies	$9.70	2.37	$22.50	7.61	$8.82	3.02	$8.27	4.10	1.17	0.31
Total within 30 miles	$200.21	23.26	$137.25	27.68	$215.20	29.77	$176.94	45.74	0.53	0.59
Expenses 31+ Miles	$27.84	6.03	$13.75	7.30	$24.99	7.03	$40.31	14.89	0.79	0.46
Total trip spending	$228.06		$151.00		$240.18		$217.25			

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