Economic Sectors at Risk from Invasive Aquatic Weeds for the Kissimmee Chain of Lakes in Osceola County, Florida, 2004-2005

By:
Dr. Frederick W. Bell
Department of Economics
Florida State University

For:
Florida Department of Environmental Protection
Bureau of Invasive Plant Management
Tallahassee, Florida

Funding Provided By:
Florida Department of Environmental Protection
Florida Fish and Wildlife Conservation Commission
Aquatic Ecosystem Restoration Foundation

April 2006

TABLE OF CONTENTS

Page

Executive Summary ……3

Acknowledgement ……15

Chapter 1: Introduction to Hydrilla Control; Recreational Use and the Scope of the Study for the Kissimmee Chain of Lakes ……..16

Chapter 2: Economic Profile for Osceola County, Florida ……...31

Chapter 3: Recreational Economic Impact and Value of the Kissimmee Chain of Lakes Users on Osceola County, Florida ……..37

Chapter 4: Economic Value of the Water Withdrawn from the Kissimmee Chain of Lakes …...83

Chapter 5: Other Economic Values of the Kissimmee Chain of Lakes to Osceola County, Florida……..92

Technical Appendix A……... 95

Bibliography…….120

EXECUTIVE SUMMARY

Purpose

To identify and quantify those components of the economy at risk from invasive aquatic weeds including primarily the recreational sector of the Kissimmee Chain of Lakes (KCOL) consisting of Lake Tohopekaliga (Toho); Lake Hatchineha (Hatch); Lake Cypress and Lake Kissimmee in Osceola County, Florida. Secondary economic sectors investigated include agriculture (water supply only) and other economic sectors that should be examined in greater detail.

Invasive Aquatic Weeds in the KCOL

For the average acreage surveyed or SA for hydrilla in the KCOL, the trend showed a slight increase over the last 10 years increasing from an average of 22,239 acres from 1995-1999 to an average of 24,207 acres over the 2000-2004 period, a small increase of about 8.9%. But, Lake Toho exhibited a decidedly upward trend in hydrilla as measured by the SA statistic, while Lakes Hatch; Cypress and Kissimmee seemed to improve in terms of hydrilla concentration when the 1995-1999 period is compared to the 2000-2004 period. Acres treated for hydrilla by the Florida Department of Environmental Protection nearly doubled over the 1995-2004 period for the KCOL. One conclusion is inescapable. Despite more treatment for hydrilla accompanied by a rising price of the treatment herbicide, it is taking more real expenditures (i.e., expenditures measured in constant dollars) to control this invasive weed so it remains even at a relatively constant level of infestation. This thesis was confirmed by a recent study made by Bell (2004) of Lake Istokpoga just to the south of the KCOL in Highlands County, Florida. This means that

legislative appropriations must consider not only current dollars spent on hydrilla control but also the inflation in the price of the herbicide used to control this invasive weed.

Recreational Users of the KCOL

Using data from the Florida Fish and Wildlife Conservation Commission (FWC), it was estimated that in 2004 there were 298,841 person visits to the four lakes composing the KCOL of which about 68% of these visitations were made during the October through March period or "winter months". Tourism or visitors from outside Osceola County account for about 43% of person visits while the balance or 57% are residents of Osceola County. Recreational users are primarily boat fisher persons, but around 25% of all users engage in non-boat recreation including shore fishing; picnicking; camping and other forms of outdoor recreation. The KCOL adds recreation and other benefits to the Osceola County economy, which we shall sketch next.

The Economy: Osceola County, Florida:

Osceola County, which contains most of the KCOL, is located in Central Florida just south of Disney World. This county has grown from a population of over 110,000 in 1990 to over 194,000 in 2002, a 76.1% increase which is about three times as fast as the State of Florida over the same period. In the northern part of Osceola County, we have Lake Toho where many bass tournaments are held. This lake feeds into two smaller lakes called Hatchineha and Cypress in the central part of the county. Finally, Lake Kissimmee is a sizeable lake attracting many recreationalists in the southern part of Osceola County completing what is called the Kissimmee Chain of Lakes. From an economic perspective, Osceola County is viewed as a southern support for Disney World just to the north in Orange County, Florida. Based upon population, Osceola

County was ranked 31st in size out of 67 counties in the State of Florida in 2002. However, as pointed out above, Osceola County has grown three times the rate shown by the State of Florida over the 1990-2002 period. The economic base of Osceola County is largely in the service and retailing sectors, which support Disney World and other theme parks just to the north. Osceola County is the 2nd largest supplier of hotel rooms in the State of Florida (i.e., Orange County containing Disney World and other theme complexes is the 1st). Unfortunately, average earnings per job in Osceola County when compared to the State of Florida was about 83% reflecting employment in relatively low skilled occupations in the tourism sector. Earnings of labor (i.e., employment) and capital (i.e., stocks, bonds, etc) per capita in Osceola County were about 68% of the State of Florida average reflecting the low wage industries combined with an influx of migrants or retirees who bring with them rather modest savings from states to the north of Florida.

Economic Impact of the KCOL on Osceola County

To obtain more information on the economic role of the KCOL on Osceola County, we launched a yearlong random sample survey of users of the lakes in each quarter starting from the 4th quarter of 2004 through the 3rd quarter of 2005. Over the year, a total of 1,200 interviews were made at random among the four lakes to obtain a variety of economic information such as party spending per day while visiting each of the lakes in the KCOL. The survey instrument is contained in Appendix A.1. To address the recreational use issue, respondents were asked to check one of 11 mutually exclusive categories of recreational activities while engaging in their most recent visit to each of the lakes in the KCOL. Other important questions were asked such as the impact and reaction of lake users to the invasive aquatic weeds, which will be addressed below. We designed the recreational categories to include multiple use activities during the most

recent visit to the lake. Boat fishing only was a prime category since it gave us an idea of how prevalent this "singular activity" was among the lakes. The amount of other kinds of outdoor recreational activities such as picnicking and camping were also explored. Let us briefly describe the sample survey.

In consultation with the FWC, we established sampling sites in each of the lakes in the KCOL. The target number of interviews per quarter was established at 400 completes done at random among the four lakes composing the KCOL. Sites in each lake were selected in conjunction with advice from the FWC as to their approach in surveying boating anglers among the four lakes in the KCOL. Thus, we would have a random sample from well-established sites of approximately 400 interviews per quarter distributed at random among the four lakes. On a per lake basis, the statistical significance of the sample would vary depending on the number of users per lake. That is, smaller lakes such as Lake Cypress may have a lower level of statistical significance than larger lakes such as Lake Toho. In most cases, this would give us a sampling accuracy of between 5% and 10% on annual data. Quarterly data would vary in accuracy based upon both the size of the lake and seasonality. Statistical summaries of each question on the survey instrument were tabulated and edited by the survey unit and e-mailed to the principal investigator after the end of each quarter.

This critical survey was used to "blow-up" the boat angler participants arrived at above through "projection" (i.e., if we had 1,000 "boat anglers only" from the FWC and knew they were ½ of all participants based upon the recreational use obtained from the sample survey, then we would have 2,000 total participants). Total outdoor "recreational participant visits" were divided between Osceola County residents and those coming from outside the county or tourists

on a quarterly basis through the use of the sample survey (2004 4th quarter percentages used for 2005) and the person visits by boat anglers provided by the FWC and are shown as follows:

KCOL (2005)	Tourists	Residents	Total
Quarter 1 (Jan-Mar)	55,003	57,960	112,963
Quarter 2 (Apr-June)	22,168	41,048	63,216
Quarter 3 (July-Sept)	15,302	16,324	31,626
Quarter 4 (Oct-Dec)	35,260	55,776	91,036
Annual Total	127,733	171,108	298,841

For the KCOL in Osceola County, all person visits were nearly 300,000 embracing all recreational activities including boat fishing. Note the significant seasonality of person visits to the KCOL peaking in the winter months (January-March) for especially the tourist segment of the market. The lakes in the KCOL system are significantly underutilized in the hot summer of Florida as indicated by the above person visit figures.

From the survey, we were able to determine the spending per party and person visit by 11 prominent categories of spending while recreating on the KCOL. See Appendix A.1. When multiplied by person spending per day (i.e., spending per party divided by the number in the party—See survey instrument in Appendix A.1) by the number of participants discussed above, we obtain the total estimated sales to both residents and tourists. Tourists were, as they should be, treated separately from residents since the former injects money into the local economy, which has as multiplier effect on the rest of the economy. The spending multiplier usually runs between 1.25 and 1.50 for a small county such as Osceola. The local economy is moved upward

by exporting goods and services and when tourists come into the area they spend money primarily upon retailing and services, which creates wages and jobs for the local residents. The total economic impact of the KCOL on Osceola County is as follows (2005):

Osceola County: Economic Impact of the Kissimmee Chain of Lakes

Economic Impact Indicator	Measure	Period
Sales (2005)	$ 7.288 Million	Annual
Wages (2005)	$ 1.189 Million	Annual
Employment (2005)	70 Jobs	Annual
Percent Sales of Retail in Osceola	.42%	Annual
Percent Wages of Retail in Osceola	.54%	Annual
Percent Employees of Total Retail Employment in Osceola	.67%	Annual

Measured by retail sales; wages or employment, the KCOL accounts for less than 1% of Osceola County retail activity including multiplier effects. We must stress that this economic impact reflects only the utilization of the natural resources of the KCOL for outdoor recreation and does not include the numerous fishing tournaments, which go on during the year. That is, many of these "fishing" tournaments use the resources of the KCOL to attract those interested in seeing competitive anglers catch large bass, for example. This does inject dollars into the local community and creates additional jobs. However, one must question how this kind of activity addresses "the level of affluence issue" discussed earlier in this executive summary. Residents of Osceola County will still depend on industries attracting tourists even if tournament activity is

expanded. Therefore, other economic impacts reviewed in this study may be more important. But, at least, we have some quantification of the importance of the recreational use of the KCOL to the market economy in Osceola County. As far as the individual lakes are concerned, Lakes Toho and Kissimmee had almost the identical economic impact on Osceola County in terms of sales; wages and employment. Each of these lakes generated a little over $2.6 million per year in sales; over $400,000 in wages and supported around 25 full and part-time employees. Despite a considerably higher number of person visits to Lake Kissimmee (150,142) compared to Lake Toho (82,442), these two lakes were of about equal economic importance to Osceola County. The reason for the economic equality of the two lakes was found in the about double the spending per person visit for those visiting Lake Toho than those visiting Lake Kissimmee. We attribute this differential in spending to the proximity of Lake Toho to the City of Kissimmee plus the greater number of businesses and infrastructure around Lake Toho when compared to Lake Kissimmee. This is confirmed by the much higher spending by those visiting Lake Toho on hotels/motels than was estimated for Lake Kissimmee where camping out is a more prevalent choice. The thesis of "build them and they will come" may be applicable in explaining the economic difference between Lakes Toho and Kissimmee. Lake Hatch was a distant third in terms of its economic impact (i.e., sales; wages and employment) on Osceola County being about one-half of each of the two large lakes in the KCOL discussed above. Lake Hatch is like an extension of Lake Toho with about one-half the person visits as one moves south and down the chain of lakes. Finally, Lake Cypress has about one-quarter of the economic impact when compared to Lakes Toho and Kissimmee. This is primarily due to the lower attendance or person visits associated with Lake Cypress where visitor access to the lake is poor (i.e., few roads to the lake, etc). Finally, as pointed out in the main text, what has been summarized above as the

"market economic impact" is not the sole economic impact since we have not considered "use value" as yet.

Beyond market economic impacts of outdoor recreation discussed above is a concept called "use value" which users of KCOL receive since so many of the resources do not enter the market system and are simply not counted. Bird watching; picnicking and swimming, for example, are free. In fact, most things for which a visitor to the KCOL "consumes" are relatively free. Even fishing licenses are nominal and do not reflect what could be charged if lakes were private property. Although not counted in the market, these things are used free. Users of the KCOL would be willing to pay an additional $12.64 per year to use the lake if a proper program to control invasive aquatic weeds such as hydrilla were maintained. Obviously, other pollution control programs would raise the willingness to pay even more, but we restricted our question to the recreational value for the one program under study in this report. The willingness to pay for invasive aquatic weed control including hydrilla works out to about $5.06 per user visit noting that all visitors make about 2.5 trips to the KCOL per year. There are 498,841 visitors to the KCOL per year meaning that willingness to pay for invasive weed control per year is slightly over $1.5 million. The flow of recreational use value from a resource (e.g., waterways) relatively free of hydrilla into perpetuity or over a long period of time is substantial. The asset value of the State of Florida's investment in the hydrilla control program is about $50.4 million (i.e., the annual flow of use value into perpetuity discounted by a real interest rate of 3%). Put differently, if the government program to control hydrilla is discontinued, then, the asset value of recreation on the KCOL will decline by over $50 million. The conclusion is that the hydrilla control program provides a large positive recreational economic benefit on the KCOL. Any pollution threatening the decline in use value would be severely penalized under existing law providing

one can find the polluter. In the case of invasive aquatic weeds, the polluter is unknown so the government must spend taxpayer dollars to eliminate this negative "externality" and the economic loss of use value that is well document by not only this study, but volumes of other studies in the literature. The case where hydrilla becomes a potentially positive externality in fish tournaments is presently under separate study by the author and, if documented, might reduce the willingness to pay for eliminating hydrilla completely, for example. More will be said in this Executive Summary below with respect to preference of recreational users for invasive aquatic weed control below.

Perceptions of User of the KCOL of Invasive Weed Control

Hydrilla and other invasive aquatic weeds now cover about 5% of the KCOL. Respondents (both tourists and residents) indicated that as the percentages of the KCOL covered by such weeds increased that they would reduce their annual visits to all lakes in the system. At 100% coverage, days recreating on the KCOL would be reduced by over 58%. The general response to a build-up in such invasive weeds would be the same for residents of Osceola County as tourists visiting the KCOL. About 83% of all users of Lake Toho felt that invasive aquatic weeds posed a serious problem for recreation on this lake. This percentage declined as one went from Lakes Hatch; Cypress and finally Kissimmee. In the Lake Kissimmee case, only about 46% felt invasive weeds were a problem with respect to recreation. The highest percentage (30.2%) of recreational users felt that Lake Kissimmee was covered less by aquatic weeds over the last 3-4 years. As a generalization, we founds that a majority of recreational users in all four lakes comprising the KCOL felt that invasive aquatic weeds were presently reducing their recreational

value. A recent study of the KCOL stakeholders (Duckworth, 2006) found that 65% of respondents reported aquatic weeds negatively impacted enjoyment of lake-oriented activities.

Nature of Recreational Participation

To provide an idea of kinds of recreation that might be negatively impacted by invasive aquatic weeds, it is important to know something of the recreational activities at the KCOL. For example, if the lake were used primarily for picnicking, then hydrilla might offend the amenities of being near a lake and not the actual process of engaging in the activity such as boat fishing. In the case of Lake Toho, tourists visiting the lake primarily make the trip to engage in boat fishing only or in conjunction with other recreational activities (i.e., 88% engage in this kind of recreation). Thus, hydrilla may directly negate the recreational benefits of catching fish at the lake for most of the tourists. In addition, residents of Osceola County using Lake Toho come for a more balanced array of recreational activities. Even so, 77% of the residents come to this lake for boat fishing only or in conjunction with other recreational activities. Thus, hydrilla would negatively impact a greater diversity of recreational activities for residents when compared to tourists to the lake. The other three lakes generally follow this pattern and the reader can examine Appendix A of this report on the details of activities for the other three lakes.

Demographics of Lake Users

Demographic (e.g., age; income; home residents, etc) are important in dealing with the KCOL since tourists and residents will demand different things from their recreational experience depending on their background. For example, low-income residents may heavily depend on the lake to supply some of their food. This is usually referred to as a “subsistence

fishery". For tourists visiting Lake Toho in Osceola County, they are about 47 years of age; overwhelmingly white (86%) with respect to ethnicity; have a household income of over $42,000 and primarily come to this lake from other counties in Florida (60%). Such data are important in planning tourist facilities such as establishing businesses (e.g., hotels and restaurants) and providing governmental infrastructure (e.g., picnic benches; docks; boat ramps, campgrounds, etc.). Residents of Osceola County using Lake Toho have similar demographic characteristics when compared to tourists, but were found to be somewhat older and more affluent having a higher household income. Demographic data for the other three lakes are contained in Appendix A of this report.

The Value of Agricultural Use of Water from the KCOL

The economic impact of the KCOL ranges well beyond just the recreational opportunities at the lakes. In many Florida counties, the lakes are used as a source of water for agricultural irrigation. The agricultural sector in Osceola County is not very large relative to its large economic base in tourism. That is, agricultural accounts for less than one-half of one percent of total employment in this county. However, Osceola County withdraws about 25.49 million gallons per day from freshwater surface sources for agricultural use according to the USGS (2003), ranking this county 7th in the State of Florida in terms of water withdrawal from this source. The water is used to support the citrus and beef and cattle industries in Osceola County. It is estimated that the surface water from the KCOL helps support about $12.44 million in agricultural sales at the farm gate in Osceola County or about 10% of all farm sales. With the rapid economic growth in Osceola County, we might expect that there will be increasing competition for groundwater which now supports large segments of agricultural and that the county will look more to the KCOL in the future to supply the agricultural sector.

Other Economic Benefits from the KCOL

Invasive aquatic weeds in the KCOL have a negative impact on housing surrounding the lakes. That is, it is well documented in other areas that rising levels of hydrilla, for example, decrease property values. Since most users of the KCOL view invasive aquatic weeds as a serious problem to enjoying recreational opportunities, it is highly probable that property values surrounding the lake will decline with rising levels of hydrilla. A study of this nature was well beyond the scope of this inquiry.

Because invasive aquatic weeds block the normal flow of water, this also contributes to flood problems in and around the lake system. This was demonstrated by Bell (2004) for Lake Istokpoga just to the south of the KCOL in Highlands County, Florida. An economic study of flooding induced by invasive aquatic plants was also well beyond the scope of this inquiry, but may actually be one of the most important aspects of the problem with invasive weeds. Such weeds might promote flooding that would negatively impact the entire economy in Osceola County, Florida, which, is so important to Disney World and other theme parks just to the north.

ACKNOWLEDGEMENTS

We are especially appreciative of the excellent work Ms. Rhonda Wiggins and her staff did in collecting the sample data at the Kissimmee Chain of Lakes from October 2004 to September 2005. Ms. Karen Wells contributed as format and copy editor. These ladies were highly professional and contributed to having our research presented in a readable and orderly manner. Two professionals contributed their time from other agencies interested in the results of this study. Ms. Adriene Landrum of the Florida Fish and Wildlife Conservation Commission contributed data on boat fishing person visits to the Kissimmee Chain of Lakes, which was useful in developing estimates of total recreational users of this lake system. Also, Ms. Donna Richabus of the South Florida Water Management District was very helpful in supplying water permitting data to the author.

Funding for this project came from two different sources. First, the Florida Department of Environmental Protection contributed funding for this project. Second, funding also came from the Aquatic Ecosystem Restoration Foundation. We appreciate the role these organizations contributed in funding this research.

CHAPTER 1

INTRODUCTION TO HYDRILLA CONTROL; RECREATIONAL USE AND SCOPE OF STUDY OF THE FLORIDA KISSIMMEE CHAIN OF LAKES

Invasive aquatic weeds cause serious environmental and economic problems in many regions of the United States and throughout the world. The most severe problems in Florida's public waterways are caused by water lettuce and water hyacinth, two floating plants, and hydrilla, a submerged plant. Such species can grow to densities that severely impair or prohibit navigation and recreational use of water bodies. Such invasive weeds place the recreational and commercial assets of a lake or lake system at risk. However, the literature on invasive aquatic weeds in Florida is very sparse when asking about quantifying the economic damage to such foreign invaders. Milon et al (1986) investigated Orange and Lochloosa Lakes in Central Florida. They found that the current level of aquatic weed infestation placed fishery resources at risk to the point where anglers were willing to pay about $25 per year for a "weed stamp" affixed to each fishing license. Bell et al (1998) also evaluated the fishery at risk from invasive aquatic weeds in Lake Tarpon near the Gulf of Mexico in Central Florida. On average, anglers would be willing to pay nearly $26 per person yearly to reduce the incidence of aquatic weeds in Lake Tarpon. More recent results by Bell and Bonn (2004) showed that users of all recreational resources provided by Lake Istokpoga in South Central Florida would be willing to pay about $14 per year per person to control invasive aquatic weeds. This somewhat lower value is probably due to the inclusion of all recreational activity such as picnicking where the recreational users do not come into direct conflict with aquatic weeds, but still reflects an aesthetic loss. The evidence is mounting that invasive aquatic weeds increasingly place the natural resources of lake

systems at risk. Not only do users lose recreational value, but Bell and Bonn (2004) provided evidence that there is a significant economic impact on local communities, which depend on lake resources to attract tourists to their area. That is, a build-up in aquatic weed infestation over time will drive both residents around the lake and tourists to the lake to other lakes having less infestation. Jobs and wages are lost from the community having the increasingly infested lake or lakes.

The Kissimmee Chain of Lakes

The central purpose of this study is to focus on the economic impact of yet another lake from the growth of invasive aquatic weeds. In fact, we shall deal with a multiplicity of lakes just south of the Disney World Theme Park in Central Florida. This system is called the Kissimmee Chain of Lakes or KCOL for short. The Kissimmee River watershed consists of an upper and lower basin. The Upper Basin is approximately 1,600 square miles in area and is comprised of numerous lakes and slough systems. The lower basin consists of approximately 750 square miles and extends south from Lake Kissimmee to Lake Okeechobee. Figure 1.1 shows the KCOL. Since Lake Istokpoga has already been studied by Bell and Bonn (2004) discussed above and a report by Bell (2006) on two counties (Okeechobee and Glades Counties) surrounding Lake Okeechobee has been completed (2006), the decision was made to restrict our scope of analyses to four lakes on the northern boundary of the KCOL. Our KCOL is restricted to the following four lakes: (1) Lake Tohopekaliga (Toho for short); (2) Lake Cypress; (3) Lake Hatchineha (Hatch for short) and (4) Lake Kissimmee in Figure 1.1. Thus, our coverage in this study is confined to mainly the Upper Basin of the Kissimmee Chain of Lakes. Also, our somewhat modified definition of the KCOL is restricted to just Osceola County. That is, resident users will

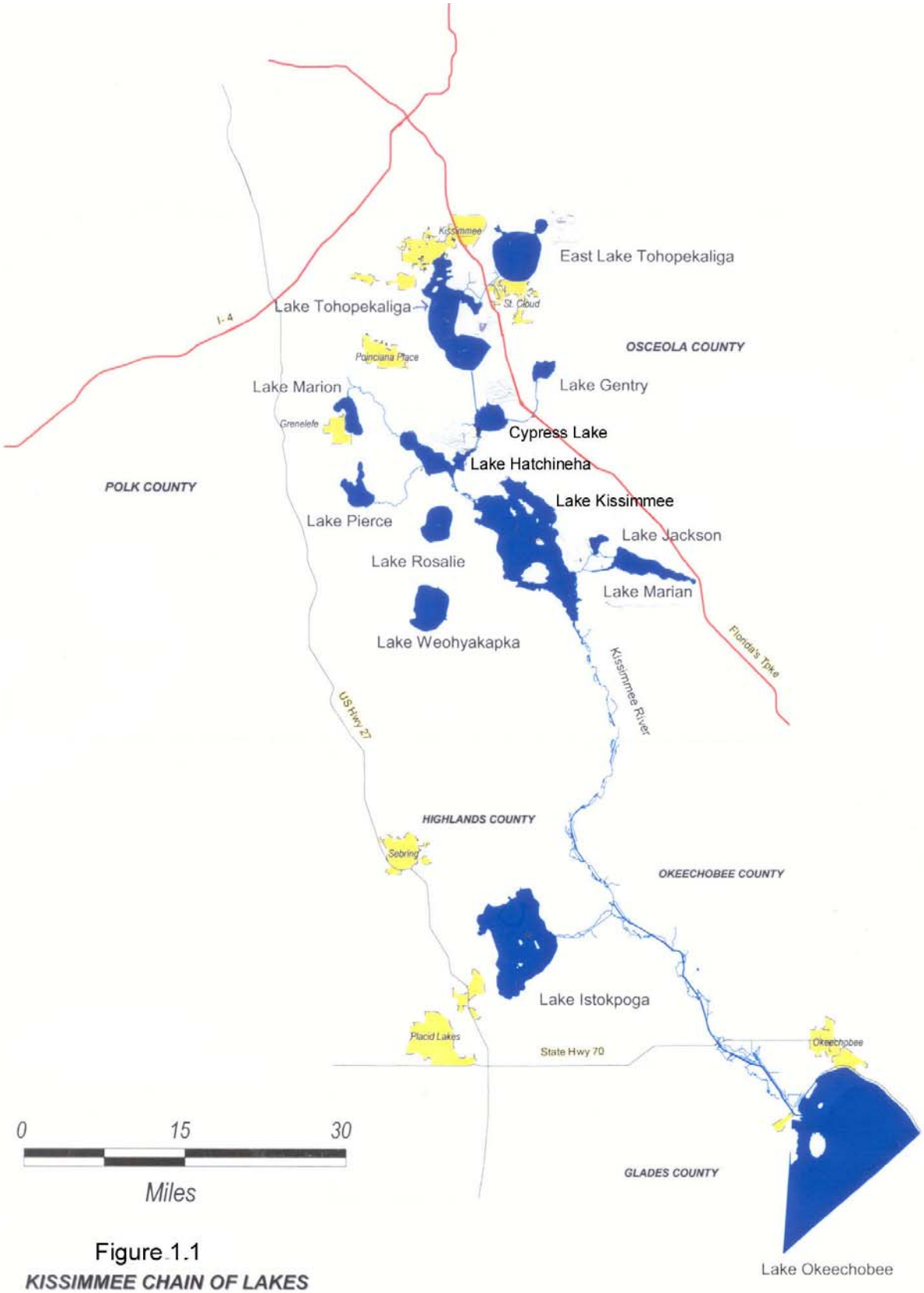


Figure 1.1
KISSIMMEE CHAIN OF LAKES

be a resident of Osceola County while those from outside Osceola County will be designated as tourists. “Tourists will be from any county in Florida; states outside Florida and even other countries. This is an important distinction since tourist dollars injected into Osceola County will have a multiplier effect on the local economy. More will be said about this in Chapter 2 dealing with an economic profile of Osceola County.

History of Hydrilla Control in the Kissimmee Chain of Lakes

To give the reader some idea of how hydrilla control has faired in the KCOL, we obtained data from the Florida Department of Environmental Protection over the 1995-2004 period. Two key series were analyzed. They are shown in Table 1.1 for each of the four lakes and the combined KCOL. The first is acreage surveyed for hydrilla or SA. This is a rough indicator of the standing crop of hydrilla experienced in the various lakes composing the KCOL. Looking at the aggregate KCOL in terms of “SA”, it would appear that such acreage was rather stable for the period. For example, the Florida DEP reported acreage survey for hydrilla at 38,000 in 1995 and such acreage had actually turned down somewhat by 2004 as indicated in Table 1.1. However, the average “SA” from 1995-1999 has increased from 22,239 acres to 24,207 from 2000-2004 period, a small increase of about 8.9 percent shown at the bottom of Table 1.1 for the entire KCOL. There was not a highly consistent trend in “SA” among the various lakes composing the KCOL. For example, Lake Toho exhibited a decidedly upward trend in hydrilla as measured by the “SA” while Hatch; Cypress and Kissimmee seemed to improve in terms of reduced hydrilla standing crop when the average for the 1995-1999 period is compared to the average for the 2000-2004 period.

Table 1.1
Survey Acres (SA) and Total Acres Treated (AT) of Hydrilla for the Kissimmee Chain of Lakes (KCOL), Osceola County, Florida, 1995-2004

Year	Lake Toho		Lake Hatch		Lake Cypress	
	SA	AT	SA	AT	SA	AT
1995	11,250	668	6,000	20	2,500	25
1996	4,815	1,332	5,000	87	3,100	0
1997	1,500	2,761	1,150	980	600	125
1998	4,100	2,718	1,800	1,200	1,850	600
1999	9,800	2,973	6,000	1,897	3,700	1,000
2000	12,250	4,199	6,000	1,891	2,000	617
2001	14,100	4,625	4,100	1,270	3,200	1,145
2002	15,580	7,513	4,300	1,520	3,100	1,302
2003	11,850	9,261	3,250	1,993	2,450	1,601
2004	10,500	7,764	600	2,000	2,600	1,439

	Lake Kissimmee		KCOL	
	SA	AT	SA	AT
1995	18,250	868	38,000	1,581
1996	11,380	2,969	24,295	4,388
1997	5,700	3,442	8,950	7,308
1998	6,500	3,292	14,250	6,887
1999	6,200	2,513	25,700	8,383
2000	3,900	2,740	24,150	9,447
2001	2,956	2,070	24,356	9,110
2002	7,900	2,126	30,880	12,461
2003	6,500	2,185	24,050	13,439
2004	1,606	2,456	17,600	13,659

KCOL: 1995-1999 Versus 2000-20004

SA (1995-1999) Average:	22,239
SA (2000-2004) Average	24,207
Percent Change	8.9
AT (1996-2004) Average	5,709
AT (2000-2004) Average	11,623
Percent Change	104

SA: Acreage Surveyed for Hydrilla; AT: Acreage Treated for Hydrilla

Source: Florida Department of Environmental Protection

The trend in the rough incidence of hydrilla as measured by "SA" was slightly upward indicating that hydrilla control is certainly not complete and that authorities facing this invasive foreign weed are up against a formidable advisory. This is demonstrated by looking at the second series labeled "AT" or Acreage Treated for hydrilla shown in Table 1.1. At the bottom of this table, one can see that the acreage treated for hydrilla from the 1996-1999 period to the 2000-2004 period doubled for the overall KCOL going from 5,709 average acres per year in the earlier period to 11,626 average acres over the most recent past of 2000-2004 period. One conclusion is possible. Despite more treatment for hydrilla and the rising cost of the herbicide used for control, it is taking more real expenditures by the Florida DEP to control this invasive weed so that it remains at a relatively constant level. In this study, we shall see whether the current level of control is adequate in our survey of anglers and recreationalists using the LCOL. This thesis was shown to be valid by the recent study of Lake Istokpoga by environmental economists from Florida State University (2004). There is every reason to believe that this problem is widespread throughout Florida in that hydrilla is becoming an increasing liability coupled with increasing real cost of control.

Estimated Number of Recreational Users of the Kissimmee Chain of Lakes

The first step in estimating the economic impact of recreational users of a particular natural resource is to estimate the number of users of that resource. In this case, the resource includes not only the lake areas, but the shore that surround the lake which is used for a multitude of recreational pursuits including shore fishing; camping; picnicking and other forms of recreation. However, such a resource is not like a state park where there is an entrance and exit point and fees are charged to attendees. Thus, the number of users is more easily obtained. In

the case of a lake in Florida, the Florida Fish and Wildlife Conservation Commission (FWC) does collect person visit data for boat fishing as part of their assessment of the condition of the fishery resource in the lake. Such data are used to manage biological programs such as lake "drawdowns" and catch and release regulations. Shore fishing is not included in such data nor are other kinds of recreational pursuits such as picnicking and camping. As a first step in estimating the number of all persons' recreational visits connected with the Kissimmee Chain of Lakes (KCOL), we obtained the estimated annual number of boat angler visits from the Kissimmee Regional Office of the Florida FWC. Such data are shown in Table 1.2 for an annual basis in the last column of this table. Such data are "estimates" since the numbers, in many cases, pertain to years near the 2004-2005 period and not those years precisely. That is, the Florida FWC does not compile data for every year for each lake and did not have recent estimates for either 2004 or 2005, which are the years for which we would be sampling recreational users of the KCOL. In the judgment of the Florida FWC staff, they felt that such estimates would be very close to the annual numbers shown in Table 1.2 as approximations for the years 2004-2005. No quarterly data were available from the Florida FWC for the 2004-2005 period. In a study by Bell (2004), the seasonality of boat fishing was studied for Lake Istokpoga just south of the KCOL. Boat fishermen concentrated their fishing effort during the year in the first quarter (i.e., nearly one half of all fishing) or when the "snowbirds" from the northern parts of Florida and the rest of the United States is undergoing winter. This seasonality would hold from the KCOL to Lake Okeechobee on the southern portion of Florida in a similar pattern from lake to lake. Thus, we were able to estimate the quarterly number of boat angler visits using the seasonality percentages at the bottom of Table 1.2. For example, the Florida FWC estimated that Lake Toho had about 55,211 person visits per year as shown in the last column of this table. About 43% of these

Table 1.2
Estimated Quarterly Boat-Angler Visits to the Kissimmee Chain of Lakes During the 2004 Period
Osceola County, Florida

Quarter Months Year	One Jan-Mar 2005	Two Apr-June 2005	Three July-Sept 2005	Four Oct-Dec 2004	Annual Jan-Dec 2004-05
Lake					
Toho	23,741	12,698	5,521	13,251	55,211
Kissimmee	36,697	19,628	8,534	20,482	85,341
Cypress	7,742	4,142	1,801	4,322	18,007
Hatch	9,678	5,177	2,251	5,402	22,508
Total	77,858	41,645	18,107	43,457	181,067
Seasonal Pattern or % of Angler Yearly Visits Per Quarter	43%	23%	10%	24%	100%

Source: Kissimmee Regional Office of the Florida FWC (2005)
Bell, F. and Bonn, M., Economic Sectors at Risk from Invasive Aquatic Weeds at Lake Istokpoga, Florida (December 2004), Seasonal Pattern for Istokpoga Estimated as a Good Approximation for Kissimmee Chain of Lakes.

annual boat angler visits would be made in the first quarter of the year (i.e., snowbird effect) or 23,741 person visits. Thus, this procedure was repeated for all other lakes in the KCOL.

On an annual basis, Lake Kissimmee has the most boat angler use at an estimate 85,341 person visits or 47% of all KCOL visits followed by Lake Toho which comprises about 30% of all boat angler use of the KCOL. In terms of boat angler use, this is followed by Lake Hatch (12%) and Lake Cypress (11%) as one might expect given the area of the lake and access points to the lake during the four quarters of the year. The reader must be cautioned that the person visits shown in Table 1.2 is a subset of a larger set of numbers since the former only refers to boat anglers and their use of the KCOL for boat recreational fishing only. In other studies of lakes, Bell (2004) and others have found that picnicking alone may comprise more person visits than boat angling as an outdoor recreational pursuit. This means that a lake provides a wide variety of outdoor recreation pursuits, which are not directly associated with fishing. Thus, when one is assessing the recreational value of a lake, it should include all forms of outdoor recreation as an economic good provided to the public. This was discussed in the beginning of the chapter under the concept of "use value" which is a very real economic good provided to the public from recreational resources. Thus, such a resource should be protected from hydrilla and other forms of pollution so that its economic value will be sustained.

How do we go from Table 1.2 to a wider estimate of the recreational use of the KCOL? To accomplish this task, we engaged in a quarterly survey of a sample of all recreational users of the KCOL. On a quarterly basis starting in the last quarter of 2004, we interviewed 300 individuals across the four lakes on a random basis. The target population for each lake was all outdoor recreational users of the lake for which the survey was being conducted. The purpose of the survey for each lake was to get a sample size large enough so the survey had a plus or minus

10% survey error. Interviewing was spaced evenly within the quarter so the sample would be representative of recreational users of each lake within the quarter. One of the principal purposes of the survey was to ascertain the percentage distribution of recreational activities of outdoor recreational users of each lake. In this way, we could obtain the percent of recreational users engaged in boat fishing so we could calculate the number of all person visits for recreational pursuits on the lake. The survey instrument is shown in Appendix A.1 of this report. The choices on recreational pursuits are contained in questions Q21-Q31. For example, if 50% of the sample indicates they are engaged in only boat fishing or boat fishing plus other activities, then we would infer that all outdoor recreational users would be twice the number of the subset of boat angler visits. As an example, Table A.2 shows that first quarter of 2005, boat fishing or boat fishing in conjunction with other recreational pursuits comprised 77.5% of all recreational activities in Lake Toho of the KCOL. According to Table 1.2 in this chapter, boat fishermen visits for the first quarter of 2005 were 23,741. Thus, the total of all recreational person visits would be estimated at 30,634 (23,741/.775) which is shown in Table 1.3 of this chapter. Further, the reader should note that we have also given the percent of the sample that are residents of Osceola County, which contains the KCOL. Thus, one can see from Table A.1 in Appendix A, for example, that 61.1% of the recreational users of Lake Toho were from the county in question while 38.9% were tourists to the County. Such percentages from the survey discussed above will be useful in estimating the economic impact of the users of the KCOL calculated in Chapter 3 of this report. As we shall see, tourist dollars injected into a county create a multiplier effect on sales; wages and employment not true of resident dollars. This will be discussed in Chapter 3 in some detail.

Table 1.3

Estimated Quarterly and Annual Recreation Person Visits to the Kissimmee Chain of Lakes During the 2004-05 Period
Osceola County, Florida

Quarter Months Year	One Jan-Mar 2005	Two Apr-June 2005	Three July-Sept 2005	Four Oct-Dec 2004	Annual Jan-Dec 2004-05
Lake					
Toho	30,634	26,128	6,668	19,012	82,442
Kissimmee	47,845	23,792	19,986	58,520	150,143
Cypress	10,935	5,523	2,686	5,513	24,657
Hatch	23,548	7,774	2,251	7,991	41,564
Total	112,962	63,217	31,591	91,036	298,806
Seasonal Pattern or % of All Users Yearly Visits Per Quarter	38%	21%	11%	30%	100%

Source: Kissimmee Regional Office of the Florida FSW (2005)
Bell, F. and Bonn, M., Economic Sectors at Risk from Invasive Aquatic Weeds at Lake Istokpoga, Florida (December 2004), Seasonal Pattern for Istokpoga Estimated as a Good Approximation for Kissimmee Chain of Lakes.

Table 1.3 shows the overall results of adjusting person visits of boat anglers upward to account for other recreational activities. The annual number of person visits for all outdoor recreational activities was estimated at 298,806 person visits in the last column of Table 1.3 or 65% higher when adjusted upward for "other recreational activities" over boat-fishing alone or with other recreational pursuits as discussed above. The usual impression of a lake being available for primarily fishing needs to be altered to reflect other forms of outdoor recreation. The nature of these "other recreational activities" is shown in Appendix A.1 in Questions 21-31 and will be discussed in Chapter 3 of this report. After our adjustments discussed above, Lake Kissimmee still remained the most used lake by outdoor recreational users followed by Lake Toho. The ranking of lakes within the KCOL by all recreational use did not change appreciably over the ranking based on boat-angler visits only. From an economic standpoint, this is still important since a dollar value in spending is attached to each person day later in this report and a "use value" is assigned to these days as the recreational value of both the flow and asset value of all the outdoor recreational assets of the lake.

Finally, did the adjustment from boat-angler visits to all recreational visits change the seasonality of demand discussed above. After the adjustment to the larger figure for all recreational visits, the seasonality of demand became even more pronounced. That is, nearly 66% of boat-angler demand took place in the first two quarters of the year in the KCOL while 59% of all recreational activities took place during the same period after adding in "other recreational activities". So, the impact of adjusting from boat-fishermen to all outdoor recreational activities made the demand for all recreational activities less pronounced in the winter months or "tourist season". This means that other outdoor recreational activities tend to "iron-out" the pronounced seasonality associated with boat fishing. For example, picnicking and

camping as recreational activities are less tied to a biological resource such as fish. Except for the weather, land around the lake remains the same or is less invariant to seasons of the year. A less pronounced seasonality connected with all outdoor recreational activities shifts the demand for labor from part-time to full-time since relatively more demand for labor connected with the KCOL is prevalent during the last six months of the year than existing for just boat-fishing only (34% for boat fishing compared to 41% for all outdoor recreational activities).

The reader may want to look at Table A.2 at the percentages obtained from the sample survey discussed above. This survey will be used in conjunction with other data in Chapter 3 when dealing with the economic impact of the KCOL on Osceola County. As a generalization, boat-fishermen person visits probably account for about 61% of all outdoor recreational activities meaning that although it is the predominant outdoor recreational activity, other valuable recreational activities are available by using the KCOL. Tourism to the KCOL accounts for nearly 43% of all person visits while the balance or 57% is account for by residents of Osceola County. This is not shown in Table 1.3, but is extensively discussed in Chapter 3 dealing with the economic impact and recreational value of person visits to the KCOL. This may increase in the future as more fishing tournaments draw individuals to the county to witness professional fishing for bass. Finally, Table 1.3 will be used to estimate spending by residents and tourists connected with the KCOL. It should be pointed out that person visits to the lakes for outdoor recreation is the same concept used by My Florida in developing tourist estimates for the State of Florida. Now, let us turn to a general survey of the issues we shall consider in the rest of this report.

What Question Does This Report Seek to Answer?

Basically, the fundamental question we shall be asking in this report is as follows: Given the present economy in Osceola County, to what degree is the economy at risk from an expansion; deterioration and/or alteration in the incidence of invasive aquatic weeds? For example, how will be tourists to Osceola County react to an increase in the incidence of hydrilla on the KCOL? This will give policy makers some idea of how steps to restore the KCOL will improve the local economy presently at risk. Also, to what degree do invasive aquatic weeds lower the recreational value of the lake resources such as fish; camping areas; picnic areas and even bird watching? As the introduction to this chapter stated, repeated studies found that recreational users would be willing to pay more money using various vehicles (e.g., weed tax stamp on fishing license) to reduce the incidence of invasive aquatic weeds and thereby enhance the "use value" of outdoor recreational resources. Chapter 3 will concentrate on both the economic spending by users of the KCOL and the "use value" of the natural resources provided by the lakes.

Chapter 4 will deal with support the KCOL gives to the agricultural sectors in Osceola County. We shall attempt to establish the value produced by agriculture dependent on irrigation in Osceola County. Most of these agricultural products are exported outside the county. These "export dollars" support local employment and wages so this is another way in which the KCOL contributes to the economy.

There are many other economic benefits that are at risk to invasive aquatic weeds such as hydrilla. For example, a relatively pollution free lake will raise the property values around the lake system. Also, optimal management of water flow to and from the KCOL will prevent flooding, thereby reducing the cost of rebuilding, repair, and cleanup. This will be discussed in

Chapter 5. The reader is referred to Bell and Bonn (2004) for a theoretical and empirical exposition of a complete range of economic sectors at risk from invasive aquatic weeds. Now let us turn to Chapter 2 to discuss the economic profile of Osceola County under study in this report to see how natural resources support the economic base.

CHAPTER 2

ECONOMIC PROFILE OF OSCEOLA COUNTY, FLORIDA

Osceola County is located in Central Florida just south of Disney World. It is an inland county with four lakes called the Kissimmee Chain of Lakes. In the northern part of Osceola County, we have Lake Tohopekaliga (18,800 acres) where many bass tournaments are held. This lake feeds into two smaller lakes called Cypress (4,100 acres) and Hatchineha (6,700 acres) in the central part of the county. Finally, Lake Kissimmee is a sizeable lake (35,000 acres) attracting many recreationalists in the southern part of Osceola County completing what we call the Kissimmee Chain of Lakes. Hydrilla and other invasive aquatic weeds put the economic values of this chain of lakes at risk. To get some background on this county, Table 2.1 shows the growth in major economic indicators over the 1990-2002 period for which the latest data are available from the U.S. Department of Commerce (2003). The county's economic indicators are compared to the State of Florida as a whole. For example, over the 1990-2002 period, the population of Osceola County grew by over 76%, which is a much faster rate than the State of Florida as a whole (i.e., 28.1%). Much of this growth is a reflection of growth along the East-West I-4 corridor running through Disney World and Orlando. Of particular significance, about 83% of this increase in the Osceola County population during the 1990-2002 period came through in-migration from other parts of Florida and from out of state. Of special note, *aggregate* personal income in Osceola County grew at a much faster rate than the State of Florida over the 1990-2002 period shown in Table 2.1 due, in part, to the very rapid growth in population discussed above. The interaction of trends in aggregate income and population growth in Osceola County produced the change in per capita income, which is a critical measure of the increase in the level of affluence in this area. Per capita income in Osceola County

Table 2.1
Population, Income, Per Capita Income, Jobs and Earnings Per Job in Osceola County Containing the Kissimmee Chain of Lakes 1990-2002

	1990	2002	Percentage Change (1990-2002)	2002 Rank Among 67 Florida Counties
Population Growth				
Osceola County	110,319	194,242	76.1	31
Florida	13,033,307	16,691,701	28.1	
Aggregate Personal Income in $1000				
Osceola County (Thous $)	1,637,646	3,883,353	137.1	30
Florida (Thous $)	254,983,641	496,706,399	94.8	
Per Capita Income Growth				
Osceola County ($)	14,845	19,992	34.7	45
Florida ($)	19,564	29,758	52.1	
Full and Part-time Employment				
Osceola County	43,738	68,307	56.2	26
Florida	6,800,161	9,185,622	35.1	
Average Earnings Per Job				
Osceola County ($)	20,685	29,548	42.8	35
Florida ($)	23,886	35,756	49.7	

Source: Regional Economic Information System, U.S. Bureau of Economic Analysis, CD Rom-2003.

grew at about 67% of the rate of that for the State of Florida over the 1990-2002 period (i.e., 34.7% for Osceola versus 52.1% for Florida). In part, this is a reflection of the industrial base of the county, which is concentrated relatively low wage jobs (e.g., service and lodging industries). This is demonstrated in the bottom part of Table 2.1 which shows lower average earnings per job ($29,548) in Osceola County than the state average of $35,756. The principal county destinations for tourists to the State of Florida are Orange County containing Disney World and other attractions just to the north of Osceola County. See 2003 Florida Visitor Study. Osceola County provides lodging and eating and drinking establishments for these visitors to the state. Osceola County has the second largest number of licensed motel units in the State of Florida. Tourist development taxes collected from visitors to Osceola County were over $22 million in 2002-2003 ranking this county second in such revenue to only Orange County in the State of Florida.

Recently, there has been a shift in the economic base of Osceola County from just servicing Disney World and other tourist-related facilities in Orange County to eco-tourism using the abundant natural resources in this county. For example, the Bass Angler Sportsman Society (BASS) is moving its headquarters from Montgomery, Alabama, to Kissimmee in Osceola County this year. Governor Bush has agreed to provide $480,000 in state money for the move. In addition, BASS will get $120,000 in incentives from the county. This move means that about 120 jobs will be created according to Florida Trend (December, 2004). This is an effort to diversify the economy, but also use the natural resources such as the Kissimmee Chain of Lakes to attract visitors. The protection of these natural resources from hydrilla and other invasive aquatic weeds will reduce the risk of endangering these valuable resources so important to the economic base of Osceola County.

Table 2.2 shows some more revealing statistics about the Osceola County economy for 2002, the most recent year available. First, the unemployment rate is comparable to that in the State of Florida. This means that Osceola County is similar to Florida in its ability to create jobs. In fact, Osceola is a mirror image of Florida in that it has the characteristic tourism as it supports Orange County mixed with an abundance of natural resources. A look at the unemployment rate over the last ten years in Osceola County reveals a significantly similar rate to the state average. In addition, the labor force participation rate (i.e., work force divided by population) is similar to the state average; meaning work force and population are a mirror image of the State of Florida. Also, the poverty rate or percent of people in the county designated as "poor" is practically the same as the state average. We see in Table 2.2 that Osceola County has a lower median age than the State of Florida and a substantially smaller percent of their residents over 65 years old than the state average. Thus, Osceola County has a relatively youthful population who are very active in the work force. What all this tells us is that Osceola County has a population composition that is looking for jobs, but unfortunately is finding an economic base that although growing (i.e., the jobs are there), is not offering the kinds of jobs which provide relatively high earnings. As per capita income in the U.S. and around the world rises, tourism will continue to grow at a rapid clip. The nature of the typical tourist attractions in Florida (e.g., theme parks) does not demand highly skilled professionals who would command higher wages. Recreational fishing does demand skilled guides as well as devices that propel boats (e.g., high power engines) and a case might be made, although not investigated in the literature to the author's knowledge, that recreational fishers would demand more highly skilled personnel than theme parks, for example. This is only a working hypothesis and, if true, might mean that eco-tourism might actually raise

Table 2.2
Socioeconomic Characteristics of Osceola County
Containing the Kissimmee Chain of Lakes in Florida
2002

Recorded Unemployment Rate	Percent
Osceola County	5.3
Florida	5.5
Labor Force Participation Rate	Percent
Osceola County	77.5
Florida	76.1
Poverty Rate (% of Population)	Percent
Osceola County	13.4
Florida	12.8
Median Age	Years
Osceola County	34.5
Florida	39.4
Percent White of the Population	
Osceola County	57.4
Florida	65.1
% 65 year or Over	
Osceola County	10.8
Florida	17.2

Comparison of Per Capita Income and Components: Osceola County Versus Florida

Economic Indicator:	Osceola County	Florida	Osceola vs. Florida Difference
Per Capita Income	$19,992	$29,758	-$9,766
Earnings from Labor	$13,700	$17,545	-$3,845
Earnings from Capital	$2,693	$7,377	-$4,684
Transfer Payments	$3,599	$4,836	-$1,237

Source: Regional Economic Information System, U.S. BEA, CD Rom-2003

earnings of the Osceola work force. Also, tournament fishers have higher "skill levels". The author must stress that this is an open question at this point and needs more documentation and study.

The bottom part of Table 2.2 shows the elements of per capita income, the basic level of affluence in Osceola County, compared to the state average. Per capita income probably tells us more about a county than any other economic statistic since it is the single measure of economic welfare. The first column illustrates the critical components of the per capita income of residents of Osceola County, which was $19,992 per year in 2002 or $9,766 lower than the State of Florida average. Why is there nearly a 49% differential (i.e., the state average is 49% higher than that revealed for Osceola County)? The fundamental reason is that the income from labor per person in Osceola County is $3,848 below that generated by the State of Florida reflecting primarily the one economic factor discussed above: relatively low paying industries (e.g., traditions tourism such as theme parks). Second, the people moving into Osceola County for jobs and especially retirement are not bringing much capital with them such as stocks and bonds as their income from these securities entitled "Earnings from Capital" in Table 2.2 are $2,693 per person when compared to the State of Florida where income from capital is $7,377 per person, a difference shown in the last column of $4,684. People with high earnings from capital are located in Naples, Fort Myers and West Palm Beach and do not tend to locate in interior counties of Florida. Lastly, Table 2.2 shows that "Transfer Payments" or largely retirement benefits per capita are $ 1,237 lower for Osceola County when compared to the State of Florida average. This is consistent with our observations that Osceola County is not primarily a retirement community, but more like the State of Florida with a very low paying industrial base for its relatively young and enterprising people.

What does this all mean from the standpoint of evaluating the Kissimmee Chain of Lakes and the environmental problems facing these lakes? The recreational sector of the lakes directly employs workers and produces a multiplier effect by the injection of tourist dollars into the local economy. Agricultural withdrawal of water from Lake Okeechobee helps maintain this sector and the employees working there. A threat to Kissimmee Chain of Lakes will have a potentially adverse impact on the unemployment rate as well as poverty rate discussed above. The expansion of eco-tourism through the use of Kissimmee Chain of Lakes will contribute to more opportunities in the local economy, even drawing retirees out of retirement if they are skilled fishing guides, for example. Excellent fishing may be associated with drawing in those migrants to become residents with a larger portfolio of capital assets such as stocks, bonds and other property. Of interest, our short review shows a definite tie between the Osceola County's economic growth and the health and maintenance of its natural resources. That is, the Kissimmee Chain of Lakes cannot be looked at in a vacuum, but must be evaluated in terms of successfully managing the natural environment to protect those economic assets at risk! It is the documentation of the Kissimmee Chain of Lakes assets at risk that is the subject matter of the rest of this report. At a minimum, the use of these resources will provide jobs to the local population, which is bound to move to Central Florida. Negative environmental effects on these lake resources may prevent or impede job creation creating higher unemployment.

CHAPTER 3

RECREATIONAL ECONOMIC IMPACT AND VALUE OF THE KCOL USERS ON OSCEOLA COUNTY, FLORIDA

Introduction

In Chapter 1, we discussed an estimate of the number of person visits associated with each lake in the Kissimmee Chain of Lakes concentrated largely in Osceola County, Florida. Person visits may be divided into those by residents of the county and tourists to the county. Tourists may come from neighboring counties or from outside of Florida. The person visits is a generic measure of the demand for outdoor recreational pursuits ranging from boat fishing to picnicking in and around the lakes constituting the KCOL. Such "person visits" constitute the major instrument by which there is an economic impact on Osceola County of outdoor recreation connected with the four lakes in the KCOL. The spending of money by residents and tourists connected with the lakes constitutes one form of economic impact as this spending on hotels to bait shops creates employment and wages within Osceola County. These lakes are assets, which not only attract tourist to the county, but help keep residents (and their dollars) home rather than in neighboring counties with lake resources of which there are many (e.g., Lake Istokpoga in Highlands County). Thus, this chapter is concerned with spending connected with the four lakes in the KCOL and the wages and employment with which they are directly and indirectly associated. It is important to note that this spending must actually enter the market place to create employment and wages. That is, a boating angler from outside Osceola County (i.e., tourist to Osceola County) must spend money, for example, on a hotel or motel for maids and desk clerks to be employed since wages are paid from these receipts. This may seem very obvious and even trivial to the casual observer, but is of paramount importance when considering natural

resources. The reason for this is that such resources as water bodies are common property where there is little or no charge is made for their use by recreationalists. There are no receipts collected to employ labor, for example, in the case of fishing for bass or using picnic tables in and around the lake. The problem of common property resources has become one of the most vexing ones in economics since the use of resources with no charge leads to an overuse of the resources producing a reduction of the resources for some biological resources and growing negative externalities for non-renewable resources. Good examples of these two kinds of resources are fish in the lake and picnic tables on the 4th of July. The term "externalities" means that recreationalists are impacted by having the air polluted by "others" or the fish resource diminished by the action of "others". These are called "negative externalities" since the recreational users lose sometime from the "quality of their recreational experience". In Chapter 1, we discussed the concept of "use value" which is a tangible economic value flowing from a natural resource that is common property such as discussed above. Thus, in addition to the economic impact of dollar spending there is "use value" flowing from common property resources. In this chapter, we shall first concern ourselves with the economic impact generated by the KCOL by the spending of dollars connected with using the natural resources in and around the lakes in the system.

Spending, Employment, and Wage: Recreational Users

The first step in estimating the spending by recreational users of the KCOL was discussed in Chapter 1 as we were able to measure the person visits by quarter and annually to each of the lakes (Toho, Hatch, Cypress and Kissimmee.) The use of the lakes expressed by person visits was discussed in Chapter 1 in which we divided the users into county residents and tourists to

Osceola County. We also discussed the survey instrument used in this study. 300 surveys distributed among the four lakes were made each quarter of the year running from the last quarter of 2004 to the third quarter of 2005. Over the year, a total of 1,200 interviews were made to obtain a variety of information including party spending per day while visiting the lake(s). Appendix A.1 contains this survey instrument. Spending ranged from lodging to gasoline bought while at the lake, for example. We placed spending on a per party basis since some expenditures are jointly made by two or more individuals such as a night at a motel. We also obtained the number in the party so party spending per day by category (e.g., lodging, bait, food, beverages, etc.) could be divided by party size to obtain the elements or categories of spending per person day. Since our measure of outdoor recreational demand is measured in person daily visits, we wished to get an estimate of the dollar spending per person day by the seven categories of party spending shown in Appendix A.1. Note that the spending per person day is again derived by dividing party spending per day by the number in the party. Thus, this is a sample average, which can be used to multiply by aggregate person visits discussed in Chapter 1 of this report. In our presentation of the results of the economic impact analyses, we shall deal with each of the four lakes separately in the KCOL. Thus, the reader may select out a lake for which he or she may need information. This will be followed by an aggregation of all lakes in the KCOL to get an overall impression of the entire chain's impact on Osceola County, Florida.

Economic Impact of Lake Tohopekaliga

The results of the statistical analyses discussed above are shown in Table 3.1 for the four quarters and annual periods of Osceola resident spending on Lake Toho. Another way of

Table 3.1
A Summary of the Economic Impact of Lake Toho in the Kissimmee Chain of Lakes by Quarter and Annually on Osceola County, Florida by Residents Only Over the 2004-2005 Period

Quarter (Q4-Q3) and Year	Q4 (Oct-Dec) 2004	Q1 (Jan-Mar) 2005	Q2 (Apr-June) 2005	Q3 (July-Sept) 2005	Annual (2004-05)
Direct Expenditures on Goods/ Service					
Lodgings/Camping Fees	$19,379	$16,958	$23,750	$3,720	$63,807
Food/Beverages	$38,495	$145,701	$183,834	$14,696	$382,726
Marina Fees, etc.	$11,846	$50,863	$105,765	$13,406	$181,880
Bait, etc.	$17,484	$61,483	$89,735	$16,671	$185,373
Gasoline	$46,933	$94,223	$144,105	$29,193	$314,454
General Shopping	$2,328	$12,052	$16,614	$6,523	$37,517
All Other Expenditures	$3,971	$11,493	$20,827	$1,994	$38,285
Total Direct Spending	$140,436	$392,773	$584,630	$86,203	$1,204,042
Spending Multiplier: 1					
Total Direct and Indirect Spending (Direct * Multiplier)	$140,436	$392,773	$584,630	$86,203	$1,204,042
Direct Expenditures Distributed by Accommodation Mode					
Hotels/Motels	$0	$0	$0	$0	$0
Friends and Family	$0	$0	$0	$0	$0
Camping	$44,223	$45,894	$81,342	$13,370	$184,829
Day Visitors	$96,212	$346,879	$503,288	$72,834	$1,019,213
Total Direct Expenditures	$140,435	$392,773	$584,630	$86,204	$1,204,042
Full-Time Employment (Jobs) Generated from Direct Spending	4.91	15.86	23.47	2.83	11.77
Employment Multiplier: 1					
Direct and Indirect Employment	4.91	15.86	23.47	2.83	11.77
Wages Generated from Direct Spending	$18,902	$59,719	$91,789	$11,575	$181,985
Wage Multiplier: 1					
Direct and Indirect Wages	$18,902	$59,719	$91,789	$11,575	$181,985
Person Visits	11,597	18,587	22,087	4,601	56,872
Direct Expenditures Per Visit	$12.11	$21.13	$26.47	$18.74	$21.17

Source: Survey by Florida State University

displaying spending by quarter and annually is to divide the spending into accommodation categories as follows: (1) Hotel/Motel; (2) Friends and Family; (3) Camping and (4) Day Visitors. This is especially important for tourists to see if spending is concentrated in hotels and motels which are high valued items compare to tourists taking day drips and thereby minimizing spending in another county.

Tables 3.1 and 3.2 also contain an important adjustment for the spending multiplier effect evident for tourists, but not for residents. Table 3.1 refers to the estimated spending by residents of Osceola County connected to Lake Toho, the second largest lake within the KCOL. Over the four quarters stretching from October 2004 to August, 2005, it is estimated that residents spent about $1.2 million with the highest quarter being the second quarter of 2005 (April-June) at $584,630 (49%). For the year, food/beverage and gasoline occupied the two largest components of direct spending by residents or about (58%). Below "Direct Spending" is a line for "Indirect Spending" which is always equal to one for residents. The reason is that residents in a regional economy have no indirect spending while tourists do. Thus, direct and indirect spending for residents are the same number (i.e., direct spending is what we estimate and indirect is zero). The reason is quite simple. Residents derive their income from the growth in the local economy and their income is a result of this growth. Residents either spend their money on goods and services or save their income. In contrast, tourist dollars and income from selling goods and services to people outside the local economy is what economist call "injection" of dollars into the economy. For example, if a resident of Georgia visited Lake Toho in Osceola County, he or she may initially book a motel and eat a dinner in Kissimmee. The money is injected by an external source. The motel and restaurant owner in Kissimmee will spend part of this injection on wages and supplies. Wage earners at the motel and restaurant will use their money spending on goods

Table 3.2
A Summary of the Economic Impact of Lake Toho in the Kissimmee Chain of Lakes by Quarter and Annually on Osceola County, Florida by Tourists Only Over the 2004-2005 Period

Quarter (Q-4-Q3) and Year	Q4 (Oct-Dec) 2004	Q1 (Jan-Mar) 2005	Q2 (Apr-June) 2005	Q3 (July-Sept) 2005	Annual (2004-05)
Direct Expenditures on Goods/ Service					
Lodgings/Camping Fees	$11,502	$293,149	$26,987	$16,494	$348,132
Food/Beverages	$27,673	$203,351	$37,850	$14,774	$283,648
Marina Fees, etc.	$8,358	$80,895	$10,455	$6,897	$106,605
Bait, etc.	$6,420	$59,432	$7,822	$8,235	$81,909
Gasoline	$34,629	$107,455	$22,718	$11,211	$176,013
General Shopping	$744	$3,584	$3,947	$1,449	$9,724
All Other Expenditures	$867	$9,378	$4,026	$1,224	$15,495
Total Direct Spending	$90,193	$757,244	$113,805	$60,284	$1,021,526
Spending Multiplier	1.4125	1.4339	1.4218	1.4293	1.430
Total Direct and Indirect Spending (Direct * Multiplier)	$127,398	$1,085,775	$161,804	$86,166	$1,461,143
Direct Expenditures Distributed by Accommodation Mode					
Hotels/Motels	$0	$550,724	$38,074	$27,713	$616,511
Friends and Family	$10,075	$22,373	$1,684	$2,613	$36,745
Camping	$31,984	$93,508	$36,502	$23,029	$185,023
Day Visitors	$48,134	$90,639	$37,545	$6,929	$183,247
Total Direct Expenditures	$90,193	$757,244	$113,805	$60,284	$1,021,526
Full-Time Employment (Jobs) Generated from Direct Spending	3.24	30.35	4.52	2.29	10.1
Employment Multiplier:	1.2901	1.3057	1.2888	1.2971	1.31
Direct and Indirect Employment	4.19	39.63	5.82	2.97	13.2
Wages Generated from Direct Spending	$12,260	$123,329	$17,452	$9,266	$162,307
Wages Multiplier:	1.3618	1.3755	1.3611	1.3697	1.37
Direct and Indirect Wages	$16,573	$169,644	$23,754	$12,691	$222,662
Person Visits	7,415	12,047	4,041	2,067	25,570
Direct Expenditures Per Visit	$12.16	$62.86	$28.16	$29.16	$39.95

Source: Survey by Florida State University

and services sold locally such as gasoline and groceries. Each time money changes hands, money will also "leak out of Osceola County" as there is a cost of importing blankets used by the motel and gasoline sold by the local dealer. Tourists are associated with the economic base of the community, which drives its growth. Autos in Detroit or tourists in Florida are a good example of the nature of the economic base, which drives all economic activity in a region.

Table 3.1 shows no multiplier effect by residents, but does indicate how much of local spending by residents is related to Lake Toho in Osceola County (i.e., a multiplier of unity means no multiplier effect). As one would expect, residents do not stay in motels or with friends and family, but do camp or are mainly day visitors as shown in Table 3.1. Spending by accommodation mode is very useful in evaluating the local economic effect of Lake Toho on the Osceola County economy. Of course, the bottom lines in terms of economic impact are the creation of jobs and wages. The spending of residents of about $1.2 million generates nearly 12 full and part-time jobs churning out nearly $182,000 dollars per year in wages. How were the number of jobs and wages estimated? The author consulted the 1997 U.S. Census of Business (1997) for Osceola County. This publication contains sales; wages and employment for the county by spending category and is the most accurate and detailed publication available. For example, this publication has detailed sales figures along with all wages and employees for the hotel and motel industry in the county. Using the CPI or consumer price index, we updated the sales figures to 2004. We could then estimate the sales to employment ratio and the percent of sales going to labor in the form of wages for 2004. These critical ratios allowed us to estimate how much labor would be used per dollar of sales. Thus, if $100,000 of sales in 2004 dollars demanded one full and or part time worker, then $1 million in sales would demand 10 workers. Studies indicate that the ratio of wages to sales is relatively constant over short periods such as 5-

10 years. This percentage was used to calculate the estimated wages associated with expenditures by categories shown in Table 3.1. For example, the Census of Business indicated that wages for all categories in Table 3.1 are about 15% of sales for resident spending at Lake Toho or $181,985. When this figure is divided by 11.77 or total estimated full and part time employment, annual wages per employee are about $15,462 per year. The low wage nature of the industries involved and the existence of part time employees make the estimated annual earnings relatively low. The bottom of Table 3.1 shows the person visits by residents for each quarter and annually for Lake Toho in Osceola County. Notice that the tables are set up so there are two for each lake; one for residents and one for tourists. Finally, note that direct expenditures average a little over $21 per person day using the annual average in the last column of Table 3.1.

Table 3.2 is the economic activity generated by tourists from outside Osceola County at Lake Toho as part of the KCOL. Tourist spending is much more complex than residents in that it includes a "multiplier effect" from the injection of dollars into the county as discussed above. Note that Table 3.2 shows that tourists pumped over $1 million directly into the local economy on an annual basis. In contrast to residents, the biggest expenditure by tourists was for lodging and camping fees since they had to provide for accommodations while in the local area. As discussed above, the initial injection of this spending created a multiplier effect throughout Osceola County. To get the multiplier effect, we used a model called IMPLAN (2004), which is available for each county in the United States. Using the multipliers specific to Osceola County, Florida for the expenditure categories shown in Table 3.2, we were able to calculate the "indirect effect" of spending injected by tourists to Lake Toho as part of the KCOL. The empirical spending multipliers are as follows:

Category	Multiplier
Lodging/Camping	1.46
Food/Beverages	1.41
Marina Use	1.46
Bait	1.38
Gasoline	1.38
Retail General Shopping	1.38
All Other	1.38

The spending multipliers tell us that for each dollar injected by tourist into the Osceola County economy nearly $1.50 is created. For a small regional economy, the multiplier is expected to run in the range shown above. In Table 3.2, we see that the aggregate spending multiplier is 1.43, which is an average of the above multipliers weighted by direct spending shown in Table 3.2. IMPLAN also has separate multipliers for employment and wages, which are available from the author. The weighted multipliers for employment and wages are 1.31 and 1.37 respectively which were used in the calculation of the direct and indirect effects of the initial spending injections of tourist spending on good and services related to Lake Toho in Osceola County. Tourists to Lake Toho over a year supported about 13 direct and indirect jobs creating over $222,000 in salaries as shown in Table 3.2. Lake Toho is followed by Table 3.3, which gives the total economic impact of residents and tourists. For Lake Toho, this is the "bottom line table" indicating that this lake generates almost $2.7 million in spending; nearly 25 jobs and almost $405,000 in wages. The three table format describe above is used for each of the four lakes composing the KCOL. Now, let us turn to a discussion of Lake Hatchineha.

Table 3.3
A Summary of the Total Economic Impact by Residents and Tourists Using Lake Toho in the Kissimmee Chain of Lakes Over 12 Months from 2004-2005 (October, 2004 - September, 2005)

	Amount
Expenditures on Goods and Services*	
Residents	$1,204,042
Tourists (Direct and Indirect)	$1,461,143
Total Sales Impact	$2,665,185
	Number
Employment Generated by Expenditures*	
Residents	11.77
Tourists (Direct and Indirect)	13
Total Employment Impact	24.77
	Amount
Wages Generated by Expenditures*	
Residents	$181,985
Tourists (Direct and Indirect)	$222,662
Total Wage Impact	$404,647

Source: Tables 3.1 and 3.2

Economic Impact of Lake Hatchineha

Table 3.4 shows the economic impact of resident spending connected with Lake Hatch. At 6,700 acres, this lake is much smaller lake than Lake Toho and has limited access. This lake attracts only about 30% of residents of Osceola County that are attracted by Lake Toho. Yet, the direct spending of Lake Hatch generated over $270,000 by county residents accounting for almost 3 jobs and connected wages of nearly $90,000. People that use Lake Hatch from Osceola County also spend much less per visitor day ($15.53) or about 73% of daily spending on Lake Toho. There are more sites on Lake Toho than Lake Hatch, which can attract residents' money.

Table 3.5 indicates that tourists to Lake Hatch in Osceola County spend a little over $1 million when multiplier effects are included. This spending supports nearly 10 jobs generating over $712, 000 in wages for these workers. More tourist person days are spent by tourists than local residents which accounts for the larger economic impact of tourism. Finally, Table 3.6 shows that residents and tourists combined account for nearly $1.29 million in spending supporting over 12 jobs and generating about a quarter of a million dollars in wages and salaries. Next, let's consider Lake Cypress, which is the smallest lake in the KCOL.

Economic Impact of Lake Cypress

By far, Lake Cypress is the smallest lake in the KCOL as measured by size; 4,100 acres, and recreational usage. Usage of Lake Cypress by residents was only about one-fifth of the usage of Lake Toho. Access to Lake Cypress is limited as evidenced by the few roads to this lake. Many anglers, for example, enter Lake Cypress by navigating through the chain of lakes in a boat. However, Lake Cypress does make a contribution. This lake generated about a quarter of a million dollars in Osceola County resident spending as shown in Table 3.7. From an economic

Table 3.4
A Summary of the Economic Impact of Lake Hatch in the Kissimmee Chain of Lakes by Quarter and Annually on Osceola County, Florida by Residents Only Over the 2004-2005 Period

Quarter (Q4-Q3) and Year	Q4 (Oct-Dec) 2004	Q1 (Jan-Mar) 2005	Q2 (Apr-June) 2005	Q3 (July-Sept) 2005	Annual (2004-05)
Direct Expenditures on Goods/ Service					
Lodgings/Camping Fees	$0	$0	$0	$0	$0
Food/Beverages	$19,850	$58,580	$7,255	$5,925	$91,610
Marina Fees, etc.	$6,316	$27,432	$12,266	$4,247	$50,261
Bait, etc.	$7,579	$32,320	$3,520	$3,973	$47,392
Gasoline	$20,752	$46,177	$0	$4,829	$71,758
General Shopping	$0	$4,323	$1,600	$1,028	$6,951
All Other Expenditures	$0	$1,737	$0	$343	$2,080
Total Direct Spending	$54,497	$170,569	$24,641	$20,345	$270,052
Spending Multiplier: 1					
Total Direct and Indirect Spending (Direct * Multiplier)	$54,497	$170,569	$24,641	$20,345	$270,052
Direct Expenditures Distributed by Accommodation Mode					
Hotels/Motels	$0	$0	$0	$0	$0
Friends and Family	$0	$0	$0	$0	$0
Camping	$0	$0	$0	$0	$0
Day Visitors	$54,497	$170,569	$24,641	$20,345	$270,052
Total Direct Expenditures	$54,497	$170,569	$24,641	$20,345	$270,052
Generated from Direct Spending	2.06	6.81	1.33	0.82	2.76
Employment Multiplier: 1					
Direct and Indirect Employment	2.06	6.81	1.33	0.82	2.76
Wages Generated from Direct Spending	$7,594	$26,000	$52,454	$3,236	$89,284
Wage Multiplier: 1					
Direct and Indirect Wages	$7,594	$26,000	$52,454	$3,236	$89,284
Person Visits	5,594	9,696	864	1,233	17,387
Direct Expenditures Per Visit	$9.74	$17.59	$28.52	$16.50	$15.53

Source: Survey by Florida State University

Table 3.5
A Summary of the Economic Impact of Lake Hatch in the Kissimmee Chain of Lakes by Quarter and Annually on Osceola County, Florida by Tourists Only Over the 2004-2005 Period

Quarter (Q4-Q3) and Year	Q4 (Oct-Dec) 2004	Q1 (Jan-Mar) 2005	Q2 (Apr-June) 2005	Q3 (July-Sept) 2005	Annual (2004-05)
Direct Expenditures on Goods/ Service					
Lodgings/Camping Fees	$0	$80,688	$49,329	$8,043	$138,060
Food/Beverages	$8,509	$140,410	$65,170	$11,391	$225,480
Marina Fees, etc.	$2,708	$66,282	$28,753	$7,149	$104,892
Bait, etc.	$3,249	$57,229	$35,922	$7,009	$103,409
Gasoline	$8,896	$61,998	$34,460	$8,082	$113,436
General Shopping	$0	$11,131	$2,591	$1,578	$15,300
All Other Expenditures	$619	$6,431	$5,258	$0	$12,308
Total Direct Spending	$23,981	$424,169	$221,483	$43,252	$712,885
Spending Multiplier:	1.411	1.428	1.43	1.429	1.428
Total Direct and Indirect Spending (Direct * Multiplier)	$33,824	$605,900	$316,721	$61,805	$1,018,250
Direct Expenditures Distributed by Accommodation Mode					
Hotels/Motels	$0	$0	$31,669	$5,702	$37,371
Friends and Family	$0	$10,389	$17,651	$1,764	$29,804
Camping	$0	$281,542	$140,204	$27,251	$448,997
Day Visitors	$23,981	$132,238	$31,959	$8,535	$196,713
Total Direct Expenditures	$23,981	$424,169	$221,483	$43,252	$712,885
Full-Time Employment (Jobs) Generated from Direct Spending	0.89	17.96	8.91	1.72	2.76
Employment Multiplier:	1.274	1.282	1.288	1.287	3.43
Direct and Indirect Employment	1.15	23.04	11.47	2.21	9.47
Wages Generated from Direct Spending	$3,313	$70,950	$35,479	$6,963	$116,705
Wage Multiplier:	1.343	1.363	1.366	1.367	1.363
Direct and Indirect Wages	$4,449	$96,718	$48,469	$9,517	$159,153
Person Visits	2,398	13,852	6,910	1,453	24,613
Direct Expenditures Per Visit	$10.00	$30.62	$32.05	$29.77	$28.96

Source: Survey by Florida State University

Table 3.6
A Summary of the Total Economic Impact by Residents and Tourists Using Lake Hatch in the Kissimmee Chain of Lakes Over 12 Months from 2004-2005 (October 2004 - September 2005)

	Amount
Expenditures on Goods and Services*	
Residents	$270,052
Tourists (Direct and Indirect)	$1,018,250
Total Sales Impact	$1,288,302
	Number
Employment Generated by Expenditures*	
Residents	2.76
Tourists (Direct and Indirect)	9.47
Total Employment Impact	12.23
	Amount
Wages Generated by Expenditures*	
Residents	$116,705
Tourists (Direct and Indirect)	$159,153
Total Wage Impact	$275,858

Source: Tables 3.4 and 3.5

Table 3.7
A Summary of the Economic Impact of Lake Cypress in the Kissimmee Chain of Lakes by Quarter and Annually on Osceola County, Florida by Residents Only Over the 2004-2005 Period

Quarter (Q4-Q3) and Year	Q4 (Oct-Dec) 2004	Q1 (Jan-Mar) 2005	Q2 (Apr-June) 2005	Q3 (July-Sept) 2005	Annual (2004-05)
Direct Expenditures on Goods/ Service					
Lodgings/Camping Fees	$0	$11,526	$6,388	$966	$18,880
Food/Beverages	$12,445	$48,024	$17,019	$4,504	$81,992
Marina Fees, etc.	$7,670	$21,124	$14,563	$3,226	$46,583
Bait, etc.	$3,763	$15,658	$5,999	$3,844	$29,264
Gasoline	$16,641	$28,815	$10,742	$3,463	$59,661
General Shopping	$145	$1,773	$506	$1,589	$4,013
All Other Expenditures	$289	$3,405	$3,608	$579	$7,881
Total Direct Spending	$40,953	$130,325	$58,825	$18,171	$248,274
Spending Multiplier: 1					
Total Direct and Indirect Spending (Direct * Multiplier)	$40,953	$130,325	$58,825	$18,171	$248,274
Direct Expenditures Distributed by Accommodation Mode					
Hotels/Motels	$0	$0	$0	$0	$0
Friends and Family	$0	$2,660	$0	$0	$2,660
Camping	$0	$53,933	$24,727	$2,967	$81,627
Day Visitors	$40,953	$73,732	$34,098	$15,204	$163,987
Total Direct Expenditures	$40,953	$130,325	$58,825	$18,171	$248,274
Full-Time Employment (Jobs) Generated from Direct Spending	1.56	5.5	2.53	0.69	2.57
Employment Multiplier: 1					
Direct and Indirect Employment	1.56	5.5	2.53	0.69	2.57
Wages Generated from Direct Spending	$6,014	$21,114	$10,307	$2,796	$40,231
Wage Multiplier: 1					
Direct and Indirect Wages	$6,014	$21,114	$10,307	$2,796	$40,231
Person Visits	3,473	4,729	2,071	897	11,170
Direct Expenditures Per Visit	$11.79	$27.56	$28.40	$20.26	$22.23

Source: Survey by Florida State University

perspective, Lake Cypress was comparable in terms of economic impact for residents as Lake Hatch due primarily to the high spending per day of those visiting Lake Cypress offsetting the higher attendance at Lake Hatch. There is no apparent reason why spending per day by county visitors to Lake Cypress was higher than that made at Lake Hatch. Sampling variability may account for such findings since random sampling at all the lakes may result in small quarterly and annual sample sizes for small lakes such as Hatch and Cypress. Finally, Tables 3.8 and 3.9 indicate that Lake Cypress had the smallest of all lakes in terms of the economic impact of tourists. This lake had the smallest visitation of tourists than any other lake in the KCOL. Less than one-half a million dollars a year was spent by tourists on Lake Cypress supporting less than 4 jobs. As is generally true of all four lakes, tourists do have a higher spending force per day than residents. Now, let us turn to the largest lake in the KCOL system: Lake Kissimmee.

Economic Impact of Lake Kissimmee

Lake Kissimmee is to the south of Lakes Toho, Hatch and Cypress and is often sought by tournament anglers for its fine bass fishing. About 50% more residents visit Lake Kissimmee than Lake Toho per year. Table 3.10 shows that despite the high usage of Lake Kissimmee, it generates less spending than Lake Toho. Lake Kissimmee generates about $1 million in resident direct spending, about 17% less than Lake Toho. The wages generated by Lake Kissimmee, as would be expected from the relative spending figures are less than Lake Toho. In terms of jobs, Lake Kissimmee generates from resident spending nearly 13 jobs (Lake Toho 12 jobs) and about $175,000 in wages (Lake Toho, $182,000). The main difference between the two lakes (Kissimmee versus Toho) is the resident spending per day. Resident spending per day at Lake Toho is almost 75% higher than what we have derived for Lake Kissimmee. We believe that this

Table 3.8
A Summary of the Economic Impact of Lake Cypress in the Kissimmee Chain of Lakes by Quarter and Annually on Osceola County, Florida by Tourists Only Over the 2004-2005 Period

Quarter (Q4-Q3) and Year	Q4 (Oct-Dec) 2004	Q1 (Jan-Mar) 2005	Q2 (Apr-June) 2005	Q3 (July-Sept) 2005	Annual (2004-05)
Direct Expenditures on Goods/ Service					
Lodgings/Camping Fees	$728	$61,482	$8,285	$5,767	$76,262
Food/Beverages	$12,695	$72,860	$28,468	$12,361	$126,384
Marina Fees, etc.	$0	$5,172	$33,555	$6,715	$45,442
Bait, etc.	$1,483	$9,456	$11,432	$5,335	$27,706
Gasoline	$886	$6,502	$15,537	$9,188	$32,113
General Shopping	$73	$2,512	$3,312	$538	$6,435
All Other Expenditures	$140	$1,921	$3,952	$269	$6,282
Total Direct Spending	$16,005	$159,905	$104,541	$40,173	$320,624
Spending Multiplier:	1.415	1.432	1.429	1.425	1.429
Total Direct and Indirect Spending (Direct * Multiplier)	$22,645	$228,944	$149,382	$57,233	$458,204
Direct Expenditures Distributed by Accommodation Mode					
Hotels/Motels	$0	$80,087	$0	$7,408	$87,495
Friends and Family	$3,497	$12,560	$1,036	$1,200	$18,293
Camping	$1,457	$32,239	$34,175	$10,380	$78,251
Day Visitors	$11,051	$35,019	$69,330	$21,185	$136,585
Total Direct Expenditures	$16,005	$159,905	$104,541	$40,173	$320,624
Full-Time Employment (Jobs) Generated from Direct Spending	0.85	7.22	4.74	1.63	3.61
Employment Multiplier:	1.255	1.292	1.272	1.284	1.283
Direct and Indirect Employment	1.07	9.32	6.03	2.09	4.63
Wages Generated from Direct Spending	$2,766	$27,043	$19,747	$6,454	$56,010
Wage Multiplier:	1.33	1.362	1.366	1.362	1.362
Direct and Indirect Wages	$3,673	$36,843	$26,979	$8,789	$76,284
Person Visits	2,040	6,206	3,452	1,389	13,087
Direct Expenditures Per Visit	$7.85	$25.77	$30.28	$28.92	$24.50

Source: Survey by Florida State University

Table 3.9
A Summary of the Total Economic Impact by Residents and Tourists Using Lake Cypress in the Kissimmee Chain of Lakes Over 12 Months from 2004-2005 (October, 2004 - September, 2005)

	Amount
Expenditures on Goods and Services*	
Residents	$248,274
Tourists (Direct and Indirect)	$458,204
Total Sales Impact	$706,478
	Number
Employment Generated by Expenditures*	
Residents	2.57
Tourists (Direct and Indirect)	4.63
Total Employment Impact	7.2
	Amount
Wages Generated by Expenditures*	
Residents	$40,231
Tourists (Direct and Indirect)	$8,789
Total Wage Impact	$49,020

Source: Tables 3.7 and 3.9

Table 3.10
A Summary of the Economic Impact of Lake Kissimmee in the Kissimmee Chain of Lakes by Quarter and Annually on Osceola County, Florida by Residents Only Over the 2004-2005 Period

Quarter (Q4-Q3) and Year	Q4 (Oct-Dec) 2004	Q1 (Jan-Mar) 2005	Q2 (Apr-June) 2005	Q3 (July-Sept) 2005	Annual (2004-05)
Direct Expenditures on Goods/ Service					
Lodgings/Camping Fees	$48,219	$11,346	$2,354	$5,206	$67,125
Food/Beverages	$179,486	$214,087	$108,716	$57,169	$559,458
Marina Fees, etc.	$16,227	$58,657	$18,728	$10,620	$104,232
Bait, etc.	$26,663	$46,666	$26,284	$17,348	$116,961
Gasoline	$15,048	$50,058	$35,710	$16,212	$117,028
General Shopping	$14,585	$16,660	$17,083	$9,196	$57,524
All Other Expenditures	$1,956	$7,169	$10,849	$1,723	$21,697
Total Direct Spending	$302,184	$404,643	$219,724	$117,474	$1,044,025
Spending Multiplier: 1					
Total Direct and Indirect Spending (Direct * Multiplier)	$302,184	$404,643	$219,724	$117,474	$1,044,025
Direct Expenditures Distributed by Accommodation Mode					
Hotels/Motels	$0	$0	$0	$0	$0
Friends and Family	$6,688	$20,356	$0	$0	$27,044
Camping	$101,544	$30,484	$8,922	$18,751	$159,701
Day Visitors	$193,952	$353,803	$210,802	$98,723	$857,280
Total Direct Expenditures	$302,184	$404,643	$219,724	$117,474	$1,044,025
Full-Time Employment (Jobs) Generated from Direct Spending	14.74	19.37	9.56	5.18	12.2125
Employment Multiplier: 1					
Direct and Indirect Employment	14.74	19.37	9.56	5.18	12.2125
Wages Generated from Direct Spending	$52,111	$70,484	$34,109	$18,714	$175,418
Wage Multiplier: 1					
Direct and Indirect Wages	$52,111	$70,484	$34,109	$18,714	$175,418
Person Visits	35,112	24,948	16,026	9,593	85,679
Direct Expenditures Per Visit	$8.61	$16.22	$13.71	$12.25	$12.19

Source: Survey by Florida State University

difference flows from the difference in the business and infrastructure build-up around Lake Toho compared to the barren development surrounding Lake Kissimmee. Finally, tourists to Lake Kissimmee are numerous, and are more than double those attracted by Lake Toho. But, tourists to Lake Toho spend almost $40 per day compared a little over $17 at Lake Kissimmee. Still, tourism attracted to Lake Kissimmee generates over $1.5 million in spending when multiplier effects are considered supporting nearly 14 jobs as shown in Table 3.11. Finally, as indicated in Table 3.12, Lake Kissimmee generates over $2.6 million in resident and tourist spending supporting nearly 26 jobs and about $420,000 in wages and salaries. Thus, as measured by economic impact, Lake Kissimmee is somewhat comparable to Lake Toho. Why do these two lakes have comparable economic impacts when residents and tourists are combined? The fundamental reason is that although Lake Kissimmee has nearly twice the attendance of Lake Toho (i.e., 150,143 compared to 82,442 person visits) spending by residents and tourists is only about one-half on a person day basis at the former lake (Kissimmee) when compared to the latter lake (Toho) in the KCOL chain. The lack of lake-related infrastructure and businesses around Lake Kissimmee seems to play a major role in consumer spending. Lake Toho has the City of Kissimmee at its northern end and is surrounded by all kinds of lake-related development (e.g., condos, etc.) whereas Lake Kissimmee is in the "rural south" of Osceola County. We believe our spending data reflects this phenomenon. Now, let us turn to the entire KCOL and their collective economic impact on Osceola County.

Total Economic Impact of the KCOL on Osceola County

Consider Table 3.13 as the summary of the collective economic impact of the entire KCOL system on Osceola County. Table 3.13 shows that collectively the four lakes in the

Table 3.11
A Summary of the Economic Impact of Lake Kissimmee in the Kissimmee Chain of Lakes by Quarter and Annually on Osceola County, Florida by Tourists Only Over the 2004-2005 Period

Quarter (Q4-Q3) and Year	Q4 (Oct-Dec) 2004	Q1 (Jan-Mar) 2005	Q2 (Apr-June) 2005	Q3 (July-Sept) 2005	Annual (2004-05)
Direct Expenditures on Goods/ Service					
Lodgings/Camping Fees	$49,833	$143,005	$47,523	$35,406	$275,767
Food/Beverages	$75,803	$152,192	$70,077	$58,868	$356,940
Marina Fees, etc.	$26,948	$54,249	$25,863	$32,494	$139,554
Bait, etc.	$22,104	$40,501	$20,885	$30,056	$113,546
Gasoline	$61,876	$70,016	$11,907	$23,554	$167,353
General Shopping	$6,784	$23,388	$4,037	$9,292	$43,501
All Other Expenditures	$3,897	$9,929	$2,422	$3,531	$19,779
Total Direct Spending	$247,245	$493,280	$182,714	$193,201	$1,116,440
Spending Multiplier:	1.421	1.428	1.433	1.42	1.419
Total Direct and Indirect Spending (Direct * Multiplier)	$351,382	$704,313	$261,789	$267,220	$1,584,704
Direct Expenditures Distributed by Accommodation Mode					
Hotels/Motels	$38,507	$120,466	$69,066	$24,450	$252,489
Friends and Family	$19,241	$16,859	$23,181	$6,196	$65,477
Camping	$57,475	$196,376	$63,227	$83,943	$401,021
Day Visitors	$132,022	$159,579	$27,240	$78,612	$397,453
Total Direct Expenditures	$247,245	$493,280	$182,714	$193,201	$1,116,440
Full-Time Employment (Jobs) Generated from Direct Spending	9.54	20.03	8.27	8.11	11.4875
Employment Multiplier:	1.29	1.292	1.284	1.28	1.16
Direct and Indirect Employment	12.31	20.03	10.61	10.34	13.32
Wages Generated from Direct Spending	$31,161	$79,442	$32,346	$32,483	$175,432
Wage Multiplier:	1.359	1.366	1.365	1.364	1.394
Direct and Indirect Wages	$50,532	$108,485	$41,145	$44,320	$244,482
Person Visits	23,408	22,897	7,765	10,393	64,463
Direct Expenditures Per Visit	$10.56	$21.54	$23.53	$18.59	$17.32

Source: Survey by Florida State University

Table 3.12
A Summary of the Total Economic Impact by Residents and Tourists Using Lake Kissimmee in the Kissimmee Chain of Lakes Over 12 Months from 2004-2005 (October, 2004 - August, 2005)

	Amount
Expenditures on Goods and Services*	
Residents	$1,044,025
Tourists (Direct and Indirect)	$1,584,704
Total Sales Impact	$2,628,729
	Number
Employment Generated by Expenditures*	
Residents	12.22
Tourists (Direct and Indirect)	13.32
Total Employment Impact	25.54
	Amount
Wages Generated by Expenditures*	
Residents	$175,418
Tourists (Direct and Indirect)	$244,482
Total Wage Impact	$419,900

Source: Tables 3.10 and 3.11

Table 3.13
Annual Economic Impact of Recreational Activity by Residents and Tourists Using the Kissimmee Chain of Lakes in Osceola County, Florida from October, 2004 to August, 2005

	Toho	Cypress	Hatch	Kissimmee	Total Economic Impact
Direct Expenditures					
Lodging/Camping	$411,939	$95,142	$138,060	$342,892	$988,033
Food/Beverages	$666,374	$208,376	$317,090	$916,398	$2,108,238
Marina Fees, etc.	$288,485	$92,025	$155,153	$243,786	$779,449
Bait, etc.	$267,282	$56,970	$150,801	$230,507	$705,560
Gasoline	$490,467	$91,774	$185,194	$284,381	$1,051,816
General Shopping	$47,241	$10,448	$22,251	$101,025	$180,965
All Other Spending	$53,780	$14,163	$14,388	$41,476	$123,807
Total Direct	$2,225,568	$568,898	$982,937	$2,160,465	$5,937,868
Indirect Expenditures	$439,617	$137,580	$305,365	$468,264	$1,350,826
Total:Direct+Indirect	$2,665,185	$706,478	$1,288,302	$2,628,729	$7,288,694
Direct Spending by Accommodation Mode					
Hotel/Motels	$616,511	$87,495	$37,371	$252,489	$993,866
Friends/Family	$36,745	$20,953	$29,804	$92,521	$180,023
Camping	$369,852	$159,878	$448,997	$560,722	$1,539,449
Day Visitors	$1,202,460	$300,572	$466,765	$1,254,733	$3,224,530
Total Direct	$2,225,568	$568,898	$982,937	$2,160,465	$5,937,868
Indirect Expenditures	$439,617	$137,580	$305,365	$468,264	$1,350,826
Total Direct+Indirect	$2,665,185	$706,478	$1,288,302	$2,628,729	$7,288,694
All Direct and Indirect Wages Generated	$404,647	$116,515	$248,437	$419,900	$1,189,499
All Direct and Indirect Employment Generated	24.97	7.2	12.23	25.5	69.9
All Visitors	82,442	24,258	41,999	150,142	298,841
All Direct Spending/ Visitor Day	$27.00	$23.45	$23.40	$14.39	$19.87

Comparison of Economic Impact of KCOL with Osceola County:	Osceola County	KCOL	
Retail Sales (Millions of Dollars -2002)	$1,752	$7.29	0.42%
Retail Payroll (Millions of Dollar - 2004)	$220	$1.19	0.54%
Retail Employees - 2004)	10,304	70	0.67%

Source: Florida Fish and Wildlife Conservation Com; FSU Survey; Florida Stat Abstract, 2005

KCOL generated resident and tourist spending of nearly $7.5 million in Osceola County with the ranking of lakes running from Toho, Kissimmee, Hatch and Cypress lakes in order of total dollar impact. For all the lakes, most of the spending was on food/beverages; gasoline and lodging/camping occupying about 56% of all spending. Day visitors and campers were most responsible for the spending in and around the four lakes in the KCOL. The spending at all four lakes was responsible for over $1.2 million in wages and salaries and slightly over 72 full and part time jobs. At the bottom of Table 3.13, we have a comparison of the estimated economic impact of the KCOL with retail sales, payroll and employment in Osceola County. The KCOL is responsible for slightly less than one-half percent of retail sales in the county (.42%). Outside recreation is fairly labor intensive so we would expect that the employment effect of the recreational fishing sector and other activities would occupy a larger percent of wages and employment. Indeed, this was true as the KCOL accounted for .54% of the entire retail payroll in Osceola County and .67% of retail employees. The reader should go back to Chapter 2 where we discussed the economic base of Osceola County, which is heavily linked to tourism in Orange County to the north (i.e., Disney World). Tourists are attracted to outdoor recreation in Osceola County as represented by the KCOL. Those looking for a bigger economic impact must consider that Osceola County has four lakes comprising the KCOL where recreational activity can be expanded especially in and around Lake Kissimmee. Tourist expansion will be a mixed blessing since the industry does provide jobs, but such jobs are relatively unskilled and low paying types of employment. The thrust of this report is to identify the threat to any jobs in the county by invasive aquatic weeds. So, we shall now turn to how the KCOL can deal with hydrilla and other invasive aquatic weeds to stabilize and expand employment in the outdoor recreational sectors in and around the lake.

Use Value of Hydrilla Control and Potential Economic Losses from the Lack of Hydrilla Control On the Kissimmee Chain of Lakes

In Chapter 1, we discussed an alternative method for the valuation of natural resources such as lakes and fish. In addition to the economic impact of these resources on the local community, which was discussed above, we noted that many of these resources such as recreational fish are not traded in an organized market. Such resources are common property and are notorious for exhibiting inefficient economic properties. Since there is no overt market price for a beach or fish, recreational users "overuse the resource". This is why fresh and saltwater fisheries, for example, are on the decline throughout the world. Outdoor recreation is such a good, which is common property in nature. Yet, outdoor recreational users flock to these resources on a daily basis, but are not charged an overt price for their use. The reader should not confuse the economic impact of visitors to the resources discussed in great detail earlier in this chapter. The spending discussed earlier only allows the recreational user to get to the resource and support themselves while using such common property resources. When a boater uses the water for recreation or fish in the water for outdoor recreation, this has a "use value" to the user, but there is no overt market price connected with the use of such resources. Therefore, economists have developed methodologies to estimate the "use value" of the resource. This is usually accomplished by asking those that recreate about their "willingness to pay" for the use of the resource. The reader is referred to Appendix A.1, which contains the survey instrument discussed above and administered to user of the KCOL. Please look at question 37 in this survey instrument. The use value was limited to what recreational users would be willing to pay to preserve the lake by significantly reducing or eliminating hydrilla, an invasive aquatic weed. Invasive aquatic weeds are similar to pollutants that produce negative externalities to the recreational users. Some have denied that hydrilla produces a negative externality and even

produces a positive externality especially for those engaging in fishing tournaments. In this case, recreational fishermen would not be willing to pay anything to stop the growth of hydrilla. In question 37, we asked those using the KCOL what they would be willing to pay per year for a hydrilla stamp, which would fund a program to ensure hydrilla was maintained at about the current level. The hydrilla stamp would be paid for by each adult member of the fishing or non-fishing. Note that question 37 asks the individual respondent: "Amount per year you would be willing to spend". Thus, those just using the lake for picnicking would pay for the stamp to protect the lake from invasive aquatic plants as well as fishermen who come in more direct connect with this invasive weed. This is our rather crude way of getting an idea of the "use value" of the lake when the lake is protected at its current level from hydrilla. This is not the total use value of the lake since other programs would also be a cost to the State of Florida, but are not included in this question. Again, this would be an annual hydrilla stamp covering each adult using the KCOL.

Table 3.14 shows the calculation of the use value of a stamp to control hydrilla in the Kissimmee Chain of Lakes. Taking the entire sample for the KCOL over the four quarters sampled, the mean willingness to pay for a stamp to control hydrilla was $12.64 per year/person. This varied considerably among lakes. The yearly average willingness to pay for the control of hydrilla was $16.38 for Lake Toho to a low of but $10.94 for Lake Hatch. Each of the respondents averaged about 2.5 trips to the KCOL per year so the willingness to pay per trip was $5.06 ($12.64/2.5). As we estimated in the section above on the economic impact of the KCOL, 298,841 person visits were made in a year to this lake system. Thus, the estimated yearly use value of preventing the KCOL from the invasive nature of hydrilla was a little over $1.5 million per year. What we are saying is that the users of the natural resources of the KCOL relatively

Table 3.14
A Comparison of Use Value for Controlling Hydrilla in The Kissimmee Chain of Lakes for All Users 2004-2005

Items	
WTP/Person/Year	$12.64
Visits to Lake/Year	2.5
WTP/Person/Visit	$5.06
Person Visits Per Year*	298,841
Annual Flow of Use Value	$1,512,121
Capitalized Value of Lake (One County)*	$50,404,009

*Table A.1
**Annual Flow of Use Value/Discount Rate of 3%

free of hydrilla derive slightly over $1.5 million per year. Put differently, the flow of income from a resource relatively free of hydrilla into perpetuity is substantial. The asset value of this investment is the flow of hydrilla control benefits of about $50.4 million. If we consider that the KCOL provides an overall use value, then not allowing the infestation of hydrilla adds over $50 million to its asset value to recreational users. Put another way, if the government program to fund hydrilla control is discontinued, then the asset value of the KCOL will decline by $50 million. It is obvious that the hydrilla control program at its current level provides a positive impact on the KCOL as demonstrated by this experiment.

More can be said about the influence of hydrilla on the recreational users by further questions used in our survey instrument in Appendix A.1. Consider question 36, which asked respondents to react in terms of days spent at lakes composing the KCOL to increasing levels of hydrilla. Remember, the sample survey discussed above covered 1,200 users of the KCOL. We said to respondents that hydrilla and other invasive aquatic weeds now cover about 5% of the KCOL in question 38 in Appendix A.1 (Survey Instrument). We further asked what percent of their present day spent at the lake would be reduced if hydrilla covered an ever increasing percentage of the KCOL. The results for all four lakes were as follows:

Potential Hydrilla/Other Weeds Surface Cover (Percent)	**Percent Annual Days Reduced**
25%	14.7%
50%	26.3%
75%	39.8%
100%	58.1%

As we can see from the results, as the incidence of hydrilla/other weeds increased in terms of coverage of the KCOL, recreational users would cutback their use of this lake system. No control of hydrilla would eventually lead in the absence of other factors (e.g., hurricanes, etc.) to 100

percent coverage of the KCOL with hydrilla/other weeds and a reduction of days spent in Osceola County by 58.1%. Returning to our economic impact analyses discussed in this chapter, this would mean that spending by residents and tourists would drop from about $7.5 million per year to $3.14 million per year supporting not 72 full and part time employees, but 30 employees with a loss in employment of about 42 jobs. This economic activity would be transferred out of Osceola County to another county where the economic impact of hydrilla/other weeds was less. If such invasive weeds covered all lakes, then respondents would seek other forms of outdoor recreation in possibly different counties. Thus, we can see that not only are recreational users willing to pay for hydrilla control, but they react negatively to a build-up in hydrilla/other weeds on the surface of a lake even among those not using the lake directly (picnicking versus boat fishing). Each of the lakes composing the KCOL was about as equally sensitive to a build-up in hydrilla/other weeds measured by recreational withdrawal from usage.

Perception of Users of the KCOL with Respect to Hydrilla's Presence In the Lake System

It would seem self-evident that the invasion of hydrilla into the native ecosystem of the KCOL would be widely regarded as a negative externality by the users of the lakes. In discussions with users and promoters of events involving the KCOL, this was not always clear. For example, participants in prestigious bass tournaments held on the KCOL sometimes viewed hydrilla as a positive externality, which made larger bass easier to catch. Such tournaments are the subject of a separate report being prepared for the Florida Department of Environmental Protection. As part of our study of the KCOL, we asked our random sample of users three questions pertaining to their perception of the role invasive aquatic weeds play in the recreational

experience connected with the four lakes. The reader is referred to Appendix A.1 containing the survey instrument, questions 33-35.

Table 3.15 shows the response of Lake Toho users (i.e., all; residents and visitors) to question 33 regarding whether hydrilla/water lettuce are a serious problem to enjoying the recreational opportunities provided by the lake. From our earlier discussion, such a negative externality would reduce "use value" of the lake and would deter people from using the lake. We have already seen above that a build-up of invasive aquatic weeds would, in general, cause users to cutback their use of the KCOL. In Table 3.15, we can see that the overwhelming percent of all users agree that invasive plants pose a serious problem for recreation on Lake Toho. Using the sample collected over the entire year, nearly 83% of all respondents felt either strongly or agreed with statement that invasive plants pose a serious problem for recreation on Lake Toho. Only 2% disagreed while a little over 15% did not know or did not answer the question. No one strongly disagreed with the thesis that invasive aquatic plants reduce recreational values. Residents of Osceola County regarded hydrilla as a detriment to recreation when compared to visitors (i.e., 88.3% vs. 70.2%). This difference may be due to visitors' unfamiliarity with the problem and the fact that tournament participants are, in many cases, visitors to the area. The recent CITGO Bass Tournament invitees were all from outside of Osceola County, for example.

With respect to Question 34 asking about the trend in hydrilla on Lake Toho, nearly 25.3% felt that invasive aquatic weeds were covering more of the lake over the last 3-4 years. 46.5% felt the coverage was about the same or getting smaller over the recent past as shown in Table 3.16. This finding is consistent with the material in Chapter 1, which showed the acreage surveyed for hydrilla on Lake Toho falling over the last 3-4 years. Acres treated for hydrilla also increased over the recent past as shown in Chapter 1. In terms of such trends in hydrilla

Table 3.15
Perception of Invasive Aquatic Weed Being a Problem to Enjoying Recreational Opportunities on Lake Toho by All Users, 2004-2005

QUESTION ASKED--- If we say that invasive aquatic weeds such as hydrilla/water lettuce are a serious problem to enjoying recreational opportunity around Lake Toho would you	Quarter 4 Oct-Dec 2004	Quarter 1 Jan-Mar 2005	Quarter 2 Apr-June 2005	Quarter 3 July-Sept 2005	Annual Average
	(Percent of Each Group Answering from Five Alternatives)				
1. Strongly Agree (All Users)	32.6%	29.2%	22.7%	31%	28.9%
Residents of Osceola County	33.3%	37.0%	26.8%	40%	34.3%
Visitors to Osceola County	31.4%	17.1%	0%	11.1%	14.9%
2. Agree (All Users)	36.0%	59.6%	67.0%	52.9%	53.9%
Residents of Osceola County	42.6%	57.4%	65.9%	50%	54.0%
Visitors to Osceola County	25.7%	62.9%	73.3%	59.3%	55.3%
3. Disagree (All Users)	4.5%	2.2%	0%	1.1%	2.0%
Residents of Osceola County	3.7%	1.9%	0%	1.7%	1.8%
Visitors to Osceola County	5.7%	2.9%	0%	0%	2.2%
4. Strongly Disagree (All Users)	0%	0%	0%	0%	0%
Residents of Osceola County	0%	0%	0%	0%	0%
Visitors to Osceola County	0%	0%	0%	0%	0%
5. Don't Know/No Answer (All Users)	27.0%	9%	10.3%	14.9%	15.3%
Residents of Osceola County	20.4%	3.7%	7.3%	8.3%	5.1%
Visitors to Osceola County	37.1%	17.10%	26.7%	29.6%	27.6%

Note: Sample size for all users was 200 interviews per quarter

Source: Department of Economics, Florida State University.

Table 3.16
Temporal Sensitivity of All Users of Lake Toho to Government Actions to Control Invasive Aquatic Weeds As of 2004-05

QUESTION ASKED -- Over the last few years (3-4), have you noticed that invasive aquatic weeds as they cover Lake Toho's surface are getting?	Quarter 4 Oct-Dec 2003	Quarter 1 Jan-Mar 2003	Quarter 2 Apr-June 2004	Quarter 3 July-Sept 2004	Annual Average
	(Percent from Each Group Answering from Four Alternatives)				
1.Larger (All Users)	47.2%	19.1%	15.5%	19.5%	25.3%
Residents of Osceola County	55.6%	11.1%	14.6%	20.0%	58.2%
Visitors to Osceola County	34.3%	31.4%	31.4%	18.8%	52.9%
2.About the Same (All Users)	18.00%	42.7%	44.3%	37.9%	35.7%
Residents of Osceola County	16.70%	44.4%	47.6%	43.3%	38.0%
Visitors to Osceola County	20.00%	40.0%	40.0%	25.9%	31.7%
3. Smaller (All Users)	6.7%	13.5%	11.3%	11.5%	10.8%
Residents of Osceola County	7.4%	11.1%	13.4%	11.7%	10.9%
Visitors to Osceola County	5.7%	17.1%	17.1%	11.1%	12.8%
4. Don't Know/No Answer (All Users)	28.1%	24.7%	28.9%	31.0%	23.2%
Residents of Osceola County	20.4%	33.3%	24.4%	25.0%	25.8%
Visitors to Osceola County	40.0%	11.4%	11.4%	44.4%	26.8%

Note: Sample size for all users is 200 interviews per quarter

Source: Department of Economics, Florida State University.

coverage, residents and visitors of Osceola County were about the same in their responses according to Table 3.16.

The reaction of recreational users to hydrilla in terms of what they would do and what would be the specific impact of a build-up of this invasive aquatic weeds are shown in Table 3.17 (i.e., answer to question 35 in Appendix A.1). Whether residents or visitors to Osceola County, a little less than a third would choose to go to another lake if hydrilla covered the entire lake. As we discussed earlier in this chapter, all users would cut their days at all lakes in the KCOL by about 58% if hydrilla covered the entire lake system. In any event, lake users would be deterred by a hydrilla build-up from using either Lake Toho or the entire KCOL by a substantial percentage. Nearly 40% of all users would contact their state representatives voicing their displeasure for the build-up of hydrilla. Since the State of Florida funds the hydrilla control program administered by the Florida Department of Environmental Protection, this certainly would be the proper place to take up such an issue of invasive weeds and the level of recreational value. About 20% of all users would contact local representatives if such a massive build-up in hydrilla took place. It is not clear whether users know exactly what governmental agency is responsible for hydrilla control.

Finally, Table 3.17 shows the perceived impact of such a massive build-up in hydrilla. Nearly 43% of all users of Lake Toho said that they would "lose a substantial recreational value" due to a coverage of Lake Toho by hydrilla adding reinforcement to the idea that such a negative externality would result in a loss in "use value" discussed at length above. About one-third of all users felt that they would lose the use of their recreational equipment such as boat motors and idle capacity of their docks, etc. A large number of Lake Toho users depend on fishing to augment their food supply. People on low household incomes may not even be

Table 3.17
Reaction and Impact on All Users of Lake Toho if No Funds Were Available for Aquatic Weed Control
2004-2005

QUESTION	Quarter 4 Oct-Dec	Quarter 1 Jan-Mar	Quarter 2 Apr-June	Quarter 3 July-Sept	Annual Average
The State of Florida spends a lot of money on controlling hydrilla and other invasive weeds. If no funds were available and hydrilla rapidly covered the entire lake and other lakes in Florida?, how would you first	(Percent of User Group Indicating How They Would React/ Be Impacted - Multiple Responses Accepted in Survey)				
REACT and then how would you be impacted?					
All Users					
Go to Another Lake	49.4%	20.20%	21.6%	24.1%	28.8%
Contact State Representative	4.5%	57.30%	53.6%	42.5%	39.5%
Contact Local Representative	23.6%	16.90%	21.6%	21.8%	21.0%
Talk to Others/Do Nothing/No Reaction	22.5%	5.60%	3.1%	11.5%	10.7%
Residents					
Go to Another Lake	46.3%	22.2%	22.0%	23.3%	28.5%
Contact State Representative	5.6%	66.7%	52.4%	46.7%	42.9%
Contact Local Representative	27.8%	9.3%	22.0%	20%	19.8%
Talk to Others/Do Nothing/No Reaction	20.4%	1.9%	3.7%	10%	9.0%
Tourists					
Go to Another Lake	54.3%	17.1%	20.00%	25.9%	29.3%
Contact State Representative	2.9%	42.9%	60.0%	33.3%	34.8%
Contact Local Representative	17.1%	28.6%	20.00%	25.9%	22.9%
Talk to Others/Do Nothing/No Reaction	25.7%	11.4%	0%	14.8%	13.0%
IMPACT					
All Users					
Lose A Substantial Recreational Value	60.7%	34.80%	33.00%	41.4%	42.5%
Lose Use of Recreational Equipment	10.1%	36.00%	54.6%	36.8%	34.4%
Lose An Importance Source of Food	3.4%	25.8%	10.3%	41.4%	20.2%
No Impact	25.8%	3.4%	2.1%	8.0%	2.9%
Residents					
Lose A Substantial Recreational Value	87.0%	18.5%	25.6%	36.7%	41.2%
Lose Use of Recreational Equipment	0%	48.1%	62.2%	45%	38.8%
Lose An Importance Source of Food	5.6%	27.8%	11.0%	15%	15.1%
No Impact	7.4%	5.6%	1.2%	3.3%	4.4%
Tourists					
Lose A Substantial Recreational Value	20.00%	60.0%	73.3%	51.9%	51.3%
Lose Use of Recreational Equipment	25.7%	17.1%	13.3%	18.5%	18.7%
Lose An Importance Source of Food	0%	22.9%	6.7%	11.1%	10.2%
No Impact	54.3%	0%	6.7%	18.5%	19.9%

Note: 200 Interviews of all groups made per quarter.

Source: Department of Economics, Florida State University

employed so they use their excess time to combine recreational fishing with their hunt for food. This is sometimes called a “subsistence fishery” which is very prevalent throughout the world and especially in lesser-developed countries. Among all users of Lake Toho, Table 3.17 shows that annual average of over 20% of users of Lake Toho would lose an importance source of food if hydrilla and other invasive aquatic weeds filled the lake! Only a small percent of all users felt there would be no economic impact upon them as a result of a lake-wide build-up in invasive aquatic weeds. Up until now, we have focused upon Lake Toho only since the reader may want to study how each lake is separately impacted by aquatic weeds. Detailed tables for Lakes Hatch; Cypress and Kissimmee were placed in the appendix of this report (i.e., Tables A.3-A.11). However, a summary of these tables for the other lakes in the KCOL will be instructive as follows:

ALL USERS:	LAKES:	HATCH	CYPRESS	KISSIMMEE
1.Strongly Agree/ Agree Aquatic Weeds Serious Problem for Recreation		72.9%	68.1%	46.3%
2. Feel Aquatic Weeds Are Are Covering More of Surface of Lake Over Last 3-4 Years		30.7%	13.9%	5.3%
3. Feel Aquatic Weeds Are Covering Less of Surface of Lake Over Last 3-4 Years		4.5%	11.8%	30.2%
4. How Would User React to Lake Coverage by Hydrilla?				
Go to Another Lake		23.9%	33.4%	47.7%
Contact State/Local Rep		56.7%	59.8%	42.2%
5. What Would be the Impact of Lake Coverage by Hydrilla?				
Loss of Recreational Value		61.2%	40.3%	52/6%

The above data are taken from the Appendix to this report. For all users of Lakes Hatch and Cypress, well over 50% agreed that invasive aquatic weeds were a serous problem to enjoying recreational opportunities around the lakes while nearly 50% felt the same for Lake Kissimmee. In Chapter 1, we discussed the data indicating that Lake Kissimmee is one of the least covered with hydrilla of the KCOL so we can understand these results. This idea is reinforced by item number 2 above indicating that Lake Kissimmee is viewed by a low percentage of users as getting worse with hydrilla over the last 3-5 years. In fact, nearly a third of the users felt Lake Kissimmee was getting less affected by invasive aquatic weeds compared to the other three lakes in the KCOL. Finally, about a quarter to one-third of the users of Lakes Hatch and Cypress would go to other lakes if hydrilla covered all of these lakes indicating a propensity to readily substitute lakes <u>if hydrilla became pervasive</u>. A reduction of the program to control hydrilla on a statewide basis would make substitution very difficult since there would be no place to go. This possibility was not addressed in the survey since users seem to always feel there was “some place else” free of hydrilla. Finally, for all of the remaining lakes in the KCOL summarized above, it would appear that they would loose recreational value if hydrilla covered most of the three lakes under review. This is consistent with our finding about Lake Toho indicating that “use value” would <u>decline</u> not only in terms of the number of recreational users, but most likely the value presently assigned by all users of the lake. That is, recreational use value would <u>fall</u> due to a decrease in the number of annual recreational days, but also the “use value per day”. The latter was beyond the scope of this study, but a day at a lake in the KCOL would certainly be worth less if accompanied by massive amounts of hydrilla when compared to a hydrilla-clean environment. Thus, hydrilla is a dangerous pollutant threatening the present level of economic impact established in the first part of this chapter.

The Nature of Recreational Participation

It is important to know the choices made by recreational participants in engaging in recreation on the KCOL. Such choices range from whether the choice to visit the lake is primary to the trip (e.g., principal reason for making the trip) to what kind of outdoor recreation is involved (e.g., fishing would require docks and ramps while picnicking would demand benches). Therefore, as part of our survey of users of the KCOL, we tried to get an idea of the nature of the recreational experience. Table 3.18 shows a profile of tourists or visitors to Lake Toho from outside Osceola County. This would be of special interest to tourist bureaus that actively promote tourism through the use of a tourist tax on motels and hotels. Nearly 79% of tourists visiting Lake Toho indicated that this trip was the primary reason for their journey. Lake Toho has a well-developed infrastructure for recreating and many businesses and homes surrounding this increasingly urbanized lake topped off by the City of Kissimmee, Florida. Over the year running from the fourth quarter of 2004 to the third quarter of 2005, 112 individuals were interviewed who used Lake Toho as shown in Table 2.18 (e.g., sample distribution by recreational activity). 60 individuals or 54% engaged in "boat fishing only" while a total of 98 or almost 88% where engaged in boat fishing plus other activities such as camping, picnicking, and other forms of recreation. Slightly fewer than 5% were involved in just shore fishing and something else in conjunction with shore fishing. Over 6% were engaged in picnicking only. This activity was, however, combined with boat fishing as shown in Table 3.18 to 13% of all recreational pursuits. What does this show us? It indicates that Lake Toho is a "fishing lake" but is also a place where other recreation takes place. It does appear to indicate that our sample reflects the basic nature of Lake Toho. Over 85% of the users of Lake Toho own their own boat.

Table 3.18
Recreational Participation by Tourists from Outside Osceola County to Lake Toho from 4th Quarter, 2004 to the 3rd Quarter, 2005

Time Period	2004 4th	2005 1st	2005 2nd	2005 3rd	Annual Average
Purpose of Trip to Lake (%)					
Primarily to Visit Lake	68.6	74.3	86.7	85.2	78.7
Lake Combined with Another Destination	31.4	25.7	13.3	14.8	21.3
Kinds of Recreational Activities Participated in at Lake	Sample	Sample	Sample	Sample	Annual
Boat Fishing					
(1) Boat Fishing Only	16	20	10	14	60
(2) Boat Fishing and Camping Only	8	10	1	6	25
(3) Boat Fishing and Picnicing Only	3	0	2	2	7
(4) Boat Fishing & All Other	0	5	0	1	6
Shore Fishing					
(1) Shore Fishing Only	1	0	0	0	1
(2) Shore Fishing & Any Other Activity	2	0	1	1	4
Camping Only	0	0	1	1	2
Picnicking Only	5	0	0	2	7
Sightseeing Only	0	0	0	0	0
Other Forms of Recreation	0	0	0	0	0
Total					
Total Sample	35	35	15	27	112
Percent Participating in Boat Fishing Only or In Conjunction with Any Other Activity	77.2	100	86.7	85.2	87.5
Own a Boat Used on Lake (%)					
Yes	74.3	91.4	86.7	88.9	85.3
No	25.7	8.6	13.3	11.1	14.7
How Many Meals Do You Expect to Come from Fish Caught on This Trip (Average for All Sample)	1	1.3	1.6	1.3	1.3
Size of Party	2.7	2.9	2.9	3.9	3.1
Length of Stay on Trip	2.9	5.1	5.0	4.8	4.5

Source: Department of Economics, Florida State University

Users of Lake Toho indicated that well over one meal would come from bass or other fish caught on this trip. This goes back to our discussion of the economic benefits from the lake to include "subsistence fishing". In the wake of million-dollar fishing tournaments, this aspect of a lake's economic benefits might be easily lost. Assigning a price of $5 per fishing meal to fish caught from Lake Toho and noting the number of person days by tourists and residents of 82,442 from Table 1.3 in Chapter 1, we could say that users receive over $417,000 per year from this incidental catch! For tourists to Lake Toho, the party size runs over 3 persons/trip and this party stays for, on average, 4.5 days.

The recreational participation of residents of Osceola County visiting Lake Toho is shown in Table 3.19. Over the period of sampling, nearly 250 residents were interviewed with over 77% engaged in boat fishing only and fishing in conjunction with other recreational activities. For residents, Lake Toho was somewhat less than a "fishing lake", but would still fall in that category. Nearly 15% of all resident users engaged in shore fishing, which is much higher than observed for tourists discussed above. This is as expected since tourists travel longer distances to Lake Toho and would probably not make this trip just to fish from the shore. By its very nature, shore fishing is probably a local activity. Local residents were less likely to own their own boat than tourists in our sample. Finally, "locals" obtained more meals from their trip than tourists, which is not surprising. That is, Lake Toho probably attracts more locals to snatch a meal since they are close to the resource and they indicate that the visit to Lake Toho is the primary reason (94.6%) for their trip. The size of party is slightly smaller for residents than tourists. Putting tourists and residents together, we get a picture of Lake Toho as being primarily

Table 3.19
Recreational Participation by Residents of Osceola County to Lake Toho from 4th Quarter, 2004 to 3rd Quarter, 2005

Time Period	2004 4th	2005 1st	2005 2nd	2005 3rd	Annual Average
Purpose of Trip to Lake (%)					
Primarily to Visit Lake	87.0	98.1	93.9	98.3	94.6
Lake Combined with Another Destination	13.0	1.9	6.1	1.7	5.4
Kinds of Recreational Activities Participated in at Lake	Sample	Sample	Sample	Sample	Annual
Boat Fishing					
(1) Boat Fishing Only	25	36	51	35	147
(2) Boat Fishing and Camping Only	9	2	2	7	20
(3) Boat Fishing and Picnicing Only	1	3	5	2	11
(4) Boat Fishing & All Other	0	1	9	5	15
Shore Fishing					
(1) Shore Fishing Only	3	0	0	1	4
(2) Shore Fishing & Any Other Activity	7	4	15	7	33
Camping Only	0	0	0	0	0
Picnicking Only	9	8	0	3	20
Other Forms of Recreation	0	0	0	0	0
Total					
Total Sample	54	54	82	60	250
Percent Participating in Boat Fishing Only or In Conjunction with Any Other Activity	64.8	77.8	90.2	81.7	77.2
Own a Boat Used on Lake (%)					
Yes	64.8	70.4	65.9	68.3	67.4
No	35.2	29.6	34.1	31.7	32.6
How Many Meals Do You Expect to Come from Fish Caught on This Trip (Average for All Sample)	.9	1.7	1.7	2.4	1.7
Size of Party	2.4	2.0	2.5	3.4	2.6

Source: Department of Economics, Florida State University

a “fishing lake” providing a draw for tourists and residents. What about the other three lakes in the KCOL? We have used the same format used for Lake Toho for the other three lakes and put the detailed data in Appendix A. We can summarize the results below and leave the details to the interested reader who might want to utilize the detailed data in the Appendix.

Lakes Cypress and Hatch are just south of Lake Toho in the KCOL. In the case of residents and tourists, these two lakes have somewhat more (higher percent) shore fisher persons than Lake Toho. However, it would appear that these two lakes merely take the spillover from Lake Toho and are really not too different in terms of the kinds of recreation for tourists than that occurring on Lake Toho. This general statement is also true of the residents of Osceola County using the two lakes. See Tables 3.18 and 3.19 in text and A.12-A.15 in the Appendix.

As we move to the south in the KCOL from Lake Cypress to Lakes Hatch and Kissimmee, we get more into open areas where there is less development of infrastructure and businesses. We have placed the detailed tables pertaining to these three lakes in Appendix A.12-A.17. Finally, we have Lake Kissimmee at the bottom end of the KCOL. With respect to the tourist sector using Lake Kissimmee, only about 55% engaged in “boat fishing only or boat fishing in conjunction with other recreational activities” compared to nearly 88% for Lake Toho. Shore fishing along the banks of Lake Kissimmee was much more prevalent than for Lake Toho for tourists. Nearly one third of all recreational activities for those designated as tourists on Lake Kissimmee consistent of “shore fishing only or shore fishing combined with other activities”. Development along the banks of Lake Kissimmee is not nearly as extensive as that for Lake Toho; therefore, anglers can more easily take advantage of the shoreline. With respect to residents, the same pattern emerged for Lake Kissimmee with respect to the kind of recreation as with tourists. That is, for residents of Osceola County only about 40% engaged in “only shore fishing or shore fishing and other activities only” while this was heavily de-emphasized along the

banks of Lake Toho. Thus, as we move from north to south, it would appear that fishermen increasingly take advantage of shore fishing, which is easier and cheaper. This is not to say that "fishing" is better (e.g., size and number of fish are larger) from Lake Toho as compared to Lake Kissimmee. A working hypothesis is that as development in the form of the number of businesses and residential buildings evolves over time that Lake Kissimmee may look more and more like Lake Toho. Our results show a present marked contrast between boat fishing and shore fishing when Lake Toho is compared to Lake Kissimmee in this survey.

Demographics of KCOL Users

In any study of the users of the KCOL, it is necessary to identify the demographics and other statistics that reflect this population. Again, tourists are treated separately from residents of Osceola County. Such statistics are used in the marketing of tourist destinations, for example, and to identify which segment of the local population demands county and city services necessary to support outdoor recreation such as docks and boat ramps. Table 3.20 shows a profile of the out-of-county (i.e., tourists) users of Lake Toho in the KCOL. The quarterly figures are given, but we shall discuss only the annual averages in the name of brevity. For tourist visitors to Lake Toho, the typical recreational user is almost 47 years of age with a household income of a little over $42,000. The tourist population is decidedly "white" in term of ethnicity, but there is a substantial percent that are African Americans (nearly 10%) and Hispanics (nearly 5%). Nearly 60% of the tourists are from Florida counties other than Osceola meaning, of course, that 40% come from other states. The western end of the KCOL is approximately at the boarder of Polk and Osceola counties. In fact, some would put parts of the KCOL in Polk County, but we shall obey the political boundaries since data to aid in this project are reported by county and the overwhelming percentage of the KCOL is in Osceola County. The KCOL draws

Table 3.20
Demographic and Descriptive Statistics of Recreational Tourists from Outside Osceola County of Lake Toho
4th Quarter, 2004 to 3rd Quarter, 2005

Time Period	2003 4th	2004 1st	2nd	3rd	Annual Quarterly Average
Characteristics					
Interviews	35	35	15	27	112
Average Age	50.5	46.8	40.7	48.2	46.6
Medium Household Income	$32,874	$42,222	$53,003	$40,000	$42,025
Ethnicity (%)					
White	82.9	91.4	80.0	88.9	85.8
African American	11.4	5.7	13.3	7.4	9.5
Hispanic	5.7	2.9	6.7	3.7	4.7
Asian & Other	0	0	0	0	0
Point of Origin (%)					
Florida	77.1	48.6	53.3	59.3	59.6
Georgia	5.7	20.0	13.3	7.4	11.6
South Carolina	0	0	26.7	11.1	9.5
New York	0	0	0	3.7	1.7
North Carolina	2.9	5.7	0	0	2.2
Alabama	0	0	0	0	0
Wisconsin	5.7	0	0	3.7	1.0
Illinois	0	0	0	0	0
All Other	2.8	20	6.7	14.8	14.4
County of Origin from Inside Florida(%)					
Polk	29.6	31.3	62.5	31.3	38.7
Lee	33.3	25.0	0	25.0	20.8
Hardee	3.7	0	12.5	0.0	4.1
Okeechobee	3.7	18.8	0	6.3	7.2
Lake	7.4	0	12.5	6.3	6.7
All Other	22.3	24.9	12.5	31.1	22.5
Mode of Travel to Lake (%)					
Auto	91.4	88.6	10.0	92.8	93.2
Other	8.6	11.4	0	7.2	6.8
Accommodations (%)					
Hotel/Motel	0	37.1	20.0	14.8	18.0
Campgrounds	25.7	28.6	20.0	37.0	27.9
Friends & Family	17.1	11.4	6.7	11.1	11.6
Day Trip Only	57.1	22.9	53.3	37.0	42.5

Source: Survey by Florida State University, 2003-2004

tourists from the southeastern United States and up the eastern corridor. Overwhelmingly, people visit the KCOL by automobile as indicated in Table 3.20. Of some interest is that nearly 43% of the tourists to Lake Toho are “day visitors”. This is in contrast to theme parks such as Disney World just to the north of Osceola County, which draws tourists for weekly stays. Only 18% of the visitors to Lake Toho stay at a hotel, yet Osceola County provides numerous hotel and motel rooms to the Disney complex just to the north of Osceola County. In general, lake recreation is not usually a great stimulus to the hotel and motel industry. In fact, camping in conjunction with lake visitation is greater than hotel and motel usage since camping is a complementary activity to fishing and other outdoor recreational activities. Finally, the demographics surrounding the resident population are shown in Table 3.21. Residents appear to be older and have a larger household income than tourists to Lake Toho. The age difference might be explained by the retirement factor where Lake Toho is in a county, which attracts retirees. Further, freshwater fishing is not considered to be a sport for the affluent, such as deep-sea fishing or “high-end golf”. This might explain the appeal of lake fishing to lower income tourists. Much of the purpose of this study was to collect demographic data, but not provide a highly detailed analysis of these data, which is well beyond the scope of this report. The demographics and other descriptive statistics for Lakes Hatch, Cypress, and Kissimmee are included in Appendix A for the reader’s inspection. See Tables A.18 through A.23. We will not provide a detailed analysis as attempted for Lake Toho.

Table 3.21
Demographic and Descriptive Statistics of Resident Recreational Users from Osceola County Who Used Lake Toho from 4th Quarter, 2004 to 3rd Quarter,2005

Time Period	2004 4th	2005 1st	2nd	2005 3rd	Annual Quarterly Average
Characteristics					
Interviews	54	54	82	60	63
Average Age	48.1	43.0	45.8	44.9	45.5
Median Household Income	$55,555	$59,259	$67,317	$65,000	$61,783
Ethnicity (%)					
White	81.5	83.3	79.3	85.0	82.3
African American	13.0	14.8	13.4	13.3	13.6
Hispanic	5.6	1.9	7.3	1.7	4.1
Asian & Other	0	0	0	0	0
Trips to Lake Per Year	2.7	4.9	2.7	3.3	3.4

Source: Survey by Florida State University, 2003-2004

CHAPTER 4

ECONOMIC VALUE OF WATER WITHDRAWN FROM THE KISSIMMEE CHAIN OF LAKES

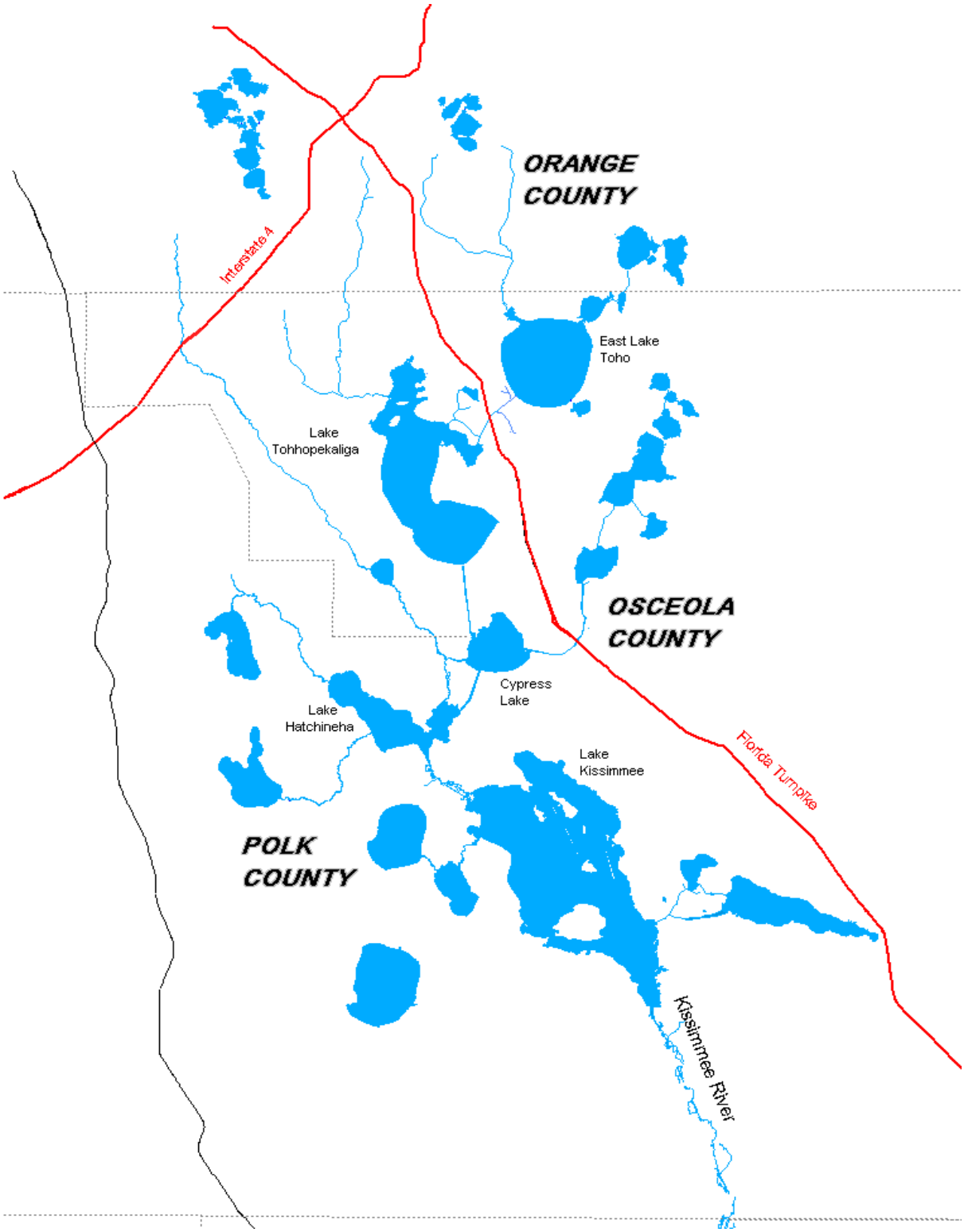
Introduction

Relative to other industries in Osceola County, its agricultural sector only employed 333 individuals in 2002 with a total employment of over 68,000 individuals in the same year or about one-half percent to total employment. Cash receipts and other income from farming were a little over $127 million in 2002. Even though relatively small, the agricultural sector has a demand for water that is, in part, supplied by the KCOL and the canals connecting these lakes which will be discussed below. Figure 4.1 shows the four lakes and the various canals connecting these lakes for the Kissimmee Chain of Lakes. Of the 652,673 acres in farmland in Osceola County, 359,041 acres or about 55% are in pasture while 76,148 acres or about 12% is in cropland for the year 2002. Two main crops produced in Osceola County are oranges and other citrus (croplands) and livestock (pasture). See Florida Statistical Abstract (2005). The latter sector contributes to Osceola County having the second largest farms in the State of Florida. In 2002, Osceola's farms averaged 1,258 acres per farm compared to a statewide average of only 236 acres. While Florida farms produced about $1,000 per acre annually in gross income, the farms in Osceola County produced $1,643 per acre annually. Thus, although relatively small, the agricultural sector in Osceola County relies on citrus and beef sales to support its production and employment. In 2004, citrus sales from Osceola County were about 6,623,000 boxes at $2.35/box or about $15.6 million. Livestock and poultry sales in the same year amounted to nearly $21 million. In addition to capital and labor, the agricultural sector in Osceola County also depends on water as an input or what is commonly called a "factor of production". The U.S. Geological Survey

Figure 4.1

Kissimmee Chain of Lakes

(Lakes Tohopekaliga, Cypress, Hatchineha, and Kissimmee) and Connecting Canals



(2003) reported that agricultural water withdrawn from freshwater surface water in Osceola County in 2003 was 25.49 million gallons per day. Such usage would, in part, depend on the Kissimmee Chain of Lakes and canals running through the central part of Osceola County. Using these data from the USGS (2003), we see that Osceola County is the 7th largest county in the State of Florida to be withdrawing freshwater surface water for agricultural purpose. Thus, even though relatively small compared to other industries in Osceola County, the agricultural sector is a relatively high demander of freshwater surface water primarily coming from the KCOL.

Even with the above discussion, agriculture in Osceola County under study in this report depends on the water supply for irrigation during the dry seasons and to keep the productivity of agricultural land high. Thus, the KCOL contributes greatly to maintaining agricultural productivity in Osceola County by furnishing surface water for irrigation. Thus, we see that the KCOL is an important input into the production from agriculture in Osceola County.

There is every indication that the agricultural sector will select surface water withdrawal over ground water. Bower (personal correspondence, 3/24/04) of the South Florida Water Management District indicates " In general, if a permittee has surface and ground water as sources, they will usually heavily favor the use of surface water because its more economical to obtain. Large-diameter, high capacity, low-head differential pumps are usually cheaper to run than wells". This is but another reason to think that the KCOL economic benefits are not just restricted to recreation, which was discussed in Chapter 3. Thus, a vital part of Osceola County's economy discussed in this report is water withdrawal from the KCOL for agricultural irrigation. We shall attempt to estimate the economic value generated in this county by its ability to withdrawn water as an input into the production process for agricultural output.

Permitted Water Allocations from the KCOL

To assess how dependent agriculture is upon the withdrawal of water from the KCOL, we first obtained detailed permittee data from the South Florida Water Management District (SFWMD) on allocation of water from both the KCOL and allied canals for agricultural purposes (2005, Richabus, SFWMD). On advice from Richabus (SFWMD, 2005), it was decided to use water allocated from both the KCOL and on and off-site canals so that all water conceivably related to the KCOL would be included in our analyses. *It is important to make a distinction between the allocation of water and usage. Permit information shows water allocated and not what is actually used. The reader should be aware of this distinction and we shall comment on this below.* Table 4.1 shows a summary of the raw water allocation data obtained from the SFWMD. The column headings show the kinds of agricultural crops using the water from the KCOL and surrounding canals. Based upon the data supplied by the SFWMD, it would appear that Osceola County's agricultural sector was allocated about 6.885 billion gallons of water per year (2005) for agricultural purposes (or nearly 18.9 million gallons per day). According to the U.S. Geological Survey, Osceola County actually uses about 25.49 million gallons of surface water per day for irrigation in agriculture. This gives us a "utilization factor" to apply to the data obtained from the SFWMD on what is allocated discussed in the last section. More importantly, about 135% of the allocated water is used for agricultural irrigation (i.e., 25.49/18.9). This would mean that the allocation data maintained by the SFWMD does not reflect actual utilization. With the scarcity of water becoming a growing problem in some areas, this is a problem well beyond the scope of this study. The allocation data does give us the relative allocation among crops as shown in Table 4.1, but is diminished somewhat in usage since the allocation falls short of usage

Table 4.1
Allocation of Water from the Kissimmee Chain of Lakes to Agricultural Permit Holders in Osceola County, Florida (Mil/Gal/Yr)

Crop:	Citrus	Pasture	Turf	Lake
Permit #				Withdrawal
1	71.29	0	0	Toho
2	548.76	0	0	Toho
3	255.43	0	0	Kissimmee
4	23	0	0	Toho
5	0	240.75	0	SFWMD:Canal C-38
6	0	0	4,254.62	Hatch
7	0	0	1,391.60	SFWMD:Canal C-38
Total	898.48	240.75	5646.22	

Summary by Crop	Millions/Gallons/Year Allocation
Citrus	898.48
Pasture	240.75
Turf	5646.22
Grand Total	6785.45
Millions/ Gallons/ Day	18.59027

Sources: Richabus (2005)
South Florida Water Management District

and the relative usage among crops could be impacted. The principal use of the water for agriculture was apparently by the "Turf Industry" (i.e., beef and other ranch projects) in Osceola County followed by those growing citrus and using pastures as shown in the middle of Table 4.1. Thus, the use of water from the KCOL and canals seems to be highly concentrated in Osceola County in but three agricultural sectors.

Dollar Value of Economic Support of Agricultural for Osceola County

The purpose of this chapter is to demonstrate the approximate degree of economic support the KCOL supplies to the agricultural sectors in Osceola County in the form of water used for irrigation. Table 4.2 shows the computations for Osceola County. The first column shows the crops produced in this county taken from Table 4.1. These are the agricultural categories used by the South Florida Water Management District. For example, the first column of numbers in Table 4.2 show that Citrus is "allocated" approximately 999 million of gallons of water per year or about 2.74 million gallons of water per day for irrigation. The big question is the water "used" per acre for irrigation by the citrus industry in Osceola County. Unfortunately, such data are not readily available, but an estimate can be obtained from the 2004 Florida Statistical Abstract (2005). This estimate is a statewide average, which shows that 2,236 gallons of water (per day) are used per acre for irrigation of citrus crops in the State of Florida. Since we have estimated the total water allocated for citrus irrigation in Osceola County, this would mean that there were a little over 1,224 acres devoted to citrus production, which is shown in the 4th column of numbers in Table 4.2 (i.e., about 2.74 million of gallons used per day divided by 2,236 acres). How much total citrus cash receipts would this generate? From the Florida Statistical Abstract (2005), cash receipts per acre for citrus on a Florida-wide basis generated $1,136 per year in 2003. Thus, the

Table 4.2
The Estimated Value of Agricultural Production in Osceola County, Florida Based Upon Allocation of Water from the Kissimmee Chain of Lakes 2004

Crop	2004 Allocation: Millions/ Gallons/ Year in Osceol a County County (SFWMD)	2004 Allocation: Millions/ Gallons/ Day in Osceol a County County* (SFWMD)	Water Used Per Acre for Irrigation Per Day** (Florida****	Estimated Acres Irrigated in Osceol a County (County)*** (Florida****	Estimated Receipts Generated Per Acre*****	Value of Crops Supported by Pumpage from the KCOL and Canals
Citrus	999	2.736986	2,236	1224.055	$1,136	$1,390,526.14
Pasture	241	0.660274	2,757	239.49	$271.60	$65,045.49
Turf/Sod	5,646	15.46849	3,422	4520.308	$1,716	$7,756,848.11
Total	6,886	18.86575				$9,212,419.74

Source: SFWMD = Withdrawal of water obtained from the South Florida Water Management District
*Annual withdrawal divided by 365;
** Florida Statistical Abstract, 2004; Data for year 2000 for all of Florida
**** All Florida water withdrawal divided by all acres irrigated;
*****Cash Value of Crops at the farm gate (tree) divided by number of acres in Florida.
******Estimated acres irrigated time value per acre.

citrus crop in Osceola County would generate about $1.39 million dollars in gross revenue per year if the total allocation were used. Repeating this procedure for all other crops, we estimated in Table 4.2 that the crops supported by the allocation of water would be worth about $9.2 million if the entire allocation were used. But, here is the rub! According to the USGS, the agricultural sector in Osceola County uses about 35% more than what the SFWMD has allocated to permitees according to the data, which we have been provided. Thus, we adjusted the "value figures" upward. Using the 135% usage or "utilization factor" of allocated water discussed above among all agricultural commodities, Osceola County produces crops worth about $12.4 million (1.35 X $9.212 million) which are supported by or uses water for irrigation from the KCOL.

In conclusion, it would appear that the water usage from the Kissimmee Chain of Lakes would generate $12.4 million in sales at the farm gate. One strong caveat is in order here. That is, water is but one factor used in producing agricultural products such as land, labor, fertilizer, etc. Thus, water in itself does not produce all of the value, but is associated with the total receipts mentioned above. It would be more correct to say that irrigation and hence the use of the KCOL's water contribute to cash crop estimated between $12 and $13 million. The incremental value of irrigation for all crops in Osceola County is beyond the scope of this study. We can summarize the results obtained in this Chapter as follows:

Agricultural Indicators	**Osceola County**
Cash Value at the Farm Gate (2002)	$127 Million
Cash Value at the Farm Gate for Crops Supported by 100% Water Allocation	$ 9.2 Million
Percent of Cash Value at Farm Gate Estimated Using Water	

Usage from USGS Compared To SFWMD Allocation	135%
Estimated Cash Value at Farm Gates Supported by Reported Actual Water Usage from KCOL	$12.44 Million

The above analyses show that Osceola County is supported by surface water for agricultural irrigation from the KCOL. But, the calculations reveal that only about 10% of the value produced at the farm gate is directly dependent on a supply of surface water from the KCOL. The most probable reason for this relatively small dependence of agriculture on surface water from the KCOL is that about 76% of the supply of water in Osceola County is supplied by ground water whereas ground water supplies 51% of water to the agricultural sector on a statewide basis. Despite the KCOL, Osceola County's agricultural sector finds it more economical to tap into the ground water reserves than pull water from the KCOL. This would mean that Bowers (personal correspondence, 2004) thesis that surface water is more economical to tap than groundwater is not true in Osceola County. Osceola County has the Floridan Aquifer very near the surface making it relatively cheap to tap into groundwater. This possible cost advantage may dictate that groundwater would be more economical to use in agriculture rather than tap into the surface water of the KCOL. Further inquiry into this situation is well beyond the scope of this project. Yet, the KCOL does contribute to agriculture and the therefore the economy of Osceola County. Given the relatively small agricultural sector in Osceola County relative to other industries in this county (e.g., hotels and motels supplying Disney) and the apparent ease of tapping into groundwater, the surface water of the KCOL for agriculture plays a relatively minor role in the overall county's economy. Thus, in light of these observations, the use of the KCOL in outdoor recreation and fishing tournament activities becomes relatively more prominent and economically more important.

CHAPTER 5

OTHER ECONOMIC VALUES OF THE KISSIMMEE CHAIN OF LAKES TO OSCEOLA COUNTY, FLORIDA

Property Values and Environmental Pollution

One of major sectors at risk from invasive aquatic weeds is the residential property sector. The segment of this sector most at risk is residential property located on water bodies. In Osceola County, Florida, there were 41,282 owner occupied housing units in the year 2000 according to the Florida Statistical Abstract (2005). It is not known how many of these residential units are directly or very close to water bodies such as the KCOL. Such households may be part of a subdivision, which may or may not be on the KCOL. In general, property values are elevated when such property is on a lake since the lake offers aesthetic values and close proximity to many recreational opportunities for which the user pays a small (e.g., fishing license) or no fee (e.g., bird watching). Water bodies may lower property values if they are infested with invasive aquatic weeds, polluted by agricultural run-off or have uncertain water levels. This is called a "negative externality" since what is happening is that the state, in these cases, may be allowing water pollution by not making polluters internalize the cost of their products. An agricultural producer would have higher cost, for example, if made to control run-off from fertilizer used in the production of crops. For Osceola County surrounding the KCOL, no study is available on the role of various forms of pollution influencing property values such as invasive aquatic weeds. Any quantification of the impact of the level of "invasive aquatic weed pollution" perceived by users of the KCOL is beyond the scope of this study. But, it is important that it be mentioned and that future study of this phenomenon be studied. However, we can briefly survey the kinds of economic values found from other studies.

For example, the impact of invasive aquatic weeds (i.e., considered a serious problem by nearly 63% of all those using the KCOL in Chapter 3) was investigated in Guntersville, Alabama as part of the Joint Agency Project between the US Army Corps of engineers and the Tennessee Valley Authority. Lake Guntersville is a highly popular recreational destination undergoing increasing development for permanent residents and tourists. A residential shoreline study modeled the relationship between residential property values and levels of aquatic plants over the 1981-1990 period. The report was published by Driscoll (1994). Complete control of invasive aquatic weeds increased property values by 17% for developed lots and 35% for undeveloped properties while plant levels had no effect on the sale price of back lots where environmental values from the lake are not directly realized. A review of other studies on invasive aquatic weeds would seem to indicate that a build-up in the weed biomass to what residents call "severe" would result in a decline in property values of at least 10%.

To get a complete idea of the magnitude of the "property value problem", it is highly recommended that research identify and quantifies the numbers and kinds of property units exposed to invasive aquatic weeds on the KCOL be identified and an economic study be launched to identify any economic losses created by this pollution problem to property owners. Given the willingness of users of the KCOL to pay for clean-up of the lake when only about two to three visits to the lakes, on average, are made per year, then it might be a reasonable conclusion that people actually living on the lake in a dwelling would be damaged much more than the "average user". In Chapter 3, we established that users of the KCOL would be willing to pay about $5 per person visit for some kind of invasive aquatic weed control.

Economic Losses from Flooding on the KCOL

Since invasive aquatic weeds are one of the most serious environmental problems on the KCOL, it might be wise to ask what other potential economic losses might be identified. Too much rainfall directly on the lake plus any run-off will raise the level of the lake where potential economic damage is very possible. Of course, there is always flooding over the banks of the lake creating damage to homes and businesses near the lake. This is where invasive aquatic weeds enter the problem. It has been established for Lake Istokpoga in Highlands County, Florida to the south of the KCOL that rooted, aquatic submerged plants increase friction losses thus increasing the degree of flooding. A reduction in the incidence of invasive aquatic weeds will reduce water levels providing positive economic events especially in heavy storm years. Invasive aquatic weed management is similar to a police force that must be maintained for random events (e.g., severe rainfall) produced by individuals and nature. Hydrilla was not present within the system when the structures and canals that connect the KCOL were designed and constructed. It is important to evaluate the densities and proximities of hydrilla populations within the KCOL in regards to those structures and canals that may impede water flow during emergency situations; for example during hurricanes or tropical storms. A more intensive study of the KCOL may show that even with the probability of storms factored into expenditures on invasive aquatic weed management, a program is very cost-effective given the way these weeds enhance flooding potential as demonstrated quite convincingly by Lake Istokpoga. For a further explanation, see Bell (2004). We mention this as a further area for study. It is, of course, well beyond the parameters of this economic impact of study of the KCOL.

APPENDIX A.1: KCOL SURVEY INSTRUMENT

Tourists to Osceola County: ___ **Site: _____**

Resident of Osceola County: ___

Lake :(1)Toho _____
(2)Cypress _____
(3) Hatch _____
(4) Kissimmee ____

Economic Survey of Hydrilla in the Kissimmee Chain of Lakes

Q1 In what state do you live? _____
Q2 In what county do you live? _____
Q3 Mode of travel to the lake? 1. Auto 2. Bus 3 Other
Q4 Size of party (including children and yourself) ____
Q5 How many in party 18 yr or older? _____
Q6 Length of stay on this trip: # days ___
Q7 Accommodations use if stayed overnight:

1. **Day Trip** **4. Campgrounds**
2. **Hotel/Motel** **5. Condominiums**
3. **Friends & Family**

Q8 How many trips do you make to this lake per year? #/yr ____
Q9 Do you own a boat used on this lake? Yes ___ No____
Q10 Was your purpose for trip primarily to visit the lake or Combined with another destination?
1. Primarily **2. Combined**
Q11 Ethnicity:

1. **White** **4. Asian**
2. **African American** **5. Other**
3. **Hispanic**

Q12 Age _____
Q13 Total Household Income (Circle One)

1. Under 20,000 **5. $50,000 - $59,000**
2. $20,000-$29,999 **6. $70,000 - $59,999**
3. $30,000-$39,999 **7. $80,000 - $89,999**
4. $40,000-$49,999 **8. $90,000 or more**

For all the member of your party, please estimate the average amount spent on the following per day while in and around the lake:
Q14 $ _____ Lodging
Q15 $ _____ Food/Beverages (Restaurants & Stores)
Q16 $ _____ Marina/ Recreational Fees/ guides/ boat rentals
Q17 $ _____ Bait and Tackle
Q18 $ _____ Gasoline Bought at and around the lake and to get to lake
Q19 $ _____ General Shopping

Q20 $ _____ All other spending while at lake

While at the lake while on this trip, what recreational activities did you participate in? (Check only one activity or activities)

Q21 _____ Boat Fishing Only
Q22 _____ Shore Fishing Only
Q23 _____ Boat Fishing and Camping Only
Q24 _____ Boat Fishing and Picnicking Only
Q25 _____ Boat Fishing and Other Recreation other than camping or picnicking
Q26 _____ Shore Fishing and Camping Only
Q27 _____ Shore Fishing Picnicking Only
Q28 _____ Shore Fishing and Other Recreation other than camping and picnicking
Q29 _____ Camping Only
Q30 _____ Picnicking Only
Q31 _____ Other than listed above (e.g., just bird watching; bird watching and hiking, etc).

32. How many meals do you expect to come from fish you and your party catch in the lake on this trip? # of Means _____

Q33 If we're to say that "invasive weeds" such as hydrilla and water hyacinth/water lettuce are a serious problem to you and others in your party enjoying recreational opportunities around Lake _____, would you: (Circle One)

1. Strongly Agree
2. Agree
3. Disagree
4. Strongly Disagree
5. Don't Know/ No Answer

Q34 Over the last few years (3-5), have you noticed that hydrilla as it covers the lake's surface is getting:

1. Larger
2. Smaller
3. About the same
4. Don't Know/No Answer

Q35 The State of Florida spends a lot of money on controlling hydrilla. If no funds were available and hydrilla rapidly covered the entire lake, how would you first react and then how would you react.

React

1. **Call/Write state representative**
2. **Call/write local officials**
3. **Just Go to Another Lake**
4. **Do Nothing/ No Reaction**
5. **Other _____**

Impacted

1. **Lose a substantial recreational value**
2. **Be unable to use my recreational equipment**

3. **Lose an important source of food**
4. **Not Impact**
5. **Other _____**

Q36 Presently, hydrilla covers about _____ percent of the lake. Consider the total number of days you spend recreating on the lake. What percent of your present annual days would you reduce if hydrilla covered the following percent of the lake's surface? (Zero % cutback in days to increasing hydrilla is ok)

Potential Hydrilla Surface Cover	Percent Annual Days Reduced
25%	_____
50%	_____
75%	_____
100%	_____

Q37 Everyone that uses the lake derives recreational value, but except for a fishing license, there is no fee for controlling hydrilla. What if the State of Florida were unable continue this program. That is, to fund this program, you would have to pay an annual users fee to fund the control of hydrilla. You could use the Lake for as many days you want per year. Not purchasing a weed stamp would mean there would be inadequate funds to control the growth of hydrilla. How much per year would you be willing to pay for a hydrilla stamp to sustain this program?
$ _____/year

Table A.2
Estimated Percentages Boat Fishing and Resident of Total Users of the Kissimmee Chains of Lakes During the 2004-05 Period Osceola County, Florida

Quarter		One	Two	Three	Four	Simple
Months		Jan-Mar	Apr-June	July-Sept	Oct-Dec	Annual
Year		2005	2005	2005	2004	Average
Lake	Adjustment			Sample Results		
	Percent					
Toho	Boat Fish	77.50%	48.60%	82.80%	69.70%	69.70%
	Residents	61.10%	84.50%	69.00%	61.10%	68.90%
Kiss	Boat Fish	76.70%	82.50%	42.70%	35.00%	59.20%
	Residents	52.10%	67.40%	48.00%	60.10%	56.90%
Cypress	Boat Fish	70.80%	75.00%	78.80%	78.40%	75.80%
	Residents	43.20%	37.50%	39.20%	63.10%	45.80%
Hatch	Boat Fish	41.10%	66.60%	83.80%	67.60%	64.80%
	Residents	41.10%	11.10%	45.90%	70.10%	42.00%
Seasonal Pattern or % of Angler Yearly Visits Per Quarter		43%	23%	10%	24%	100%

Source: Survey by the Department of Economics, Florida State University
Bell, F and Bonn, M., Economic Sectors at Risk from Invasive Aquatic Weeds at Lake Istokpoga, Florida (December, 2004),
Seasonal Pattern for Istokpoga Estimated as a Good Approximation for K-Chain of Lakes.

Table A.3
Perception of Invasive Aquatic Weed Being a Problem to Enjoying Recreational Opportunities on Lake Hatch by All Users, 2004-2005

QUESTION ASKED--- If we say that invasive aquatic weeds such as hydrilla/water lettuce are a serious problem to enjoying recreational opportunity around Lake Hatch would you	Quarter 4 Oct-Dec 2003	Quarter 1 Jan-Mar 2003	Quarter 2 Apr-June 2004	Quarter 3 July-Sept 2004	Annual Average
	(Percent of Each Group Answering from Five Alternatives)				
1. Strongly Agree (All Users)	47.1%	26.5%	3.7%	24.3%	25.4%
Residents of Osceola County	50.0%	28.6%	0%	41.2%	29.9%
Visitors to Osceola County	40.0%	25.0%	4.2%	10%	19.8%
2. Agree (All Users)	29.4%	67.6%	44.4%	48.6%	47.5%
Residents of Osceola County	33.3%	71.4%	66.7%	47.1%	54.6%
Visitors to Osceola County	20.0%	65.0%	41.7%	50%	44.2%
3. Disagree (All Users)	17.6%	2.9%	3.7%	8.1%	8.1%
Residents of Osceola County	12.5%	0%	0%	5.8%	4.6%
Visitors to Osceola County	30.0%	5.0%	4.2%	10%	12.3%
4. Strongly Disagree (All Users)	2.9%	0%	0%	2.7%	1.4%
Residents of Osceola County	0%	0%	0%	0%	.3%
Visitors to Osceola County	10%	0%	0%	5%	3.8%
5. Don't Know/No Answer (All Users)	2.9%	2.9%	48.1%	16.2%	17.5%
Residents of Osceola County	4.2%	0%	33.3%	5.9%	11.9%
Visitors to Osceola County	0%	5%	50.0%	25%	20.0%

Note: Sample size for all users was 300 interviews per quarter

Source: Department of Economics, Florida State University.

Table A.4
Temporal Sensitivity of All Users of Lake Hatch to Government Actions to Control Invasive Aquatic Weeds As of 2004-05

QUESTION ASKED -- Over the last few years (3-4), have you noticed that invasive aquatic weeds, as they cover Lake Hatch's surface, are getting?	Quarter 4 Oct-Dec 2004	Quarter 1 Jan-Mar 2005	Quarter 2 Apr-June 2005	Quarter 3 July-Sept 2005	Annual Average
	(Percent from Each Group Answering from Four Alternatives)				
1.Larger (All Users)	52.9%	23.5%	11.1%	35.1%	30.7%
Residents of Osceola County	62.5%	28.6%	0%	47.1%	34.6%
Visitors to Osceola County	30.0%	20.0%	20%	25%	23.3%
2.About the Same (All Users)	26.5%	55.9%	29.6%	32.4%	36.1%
Residents of Osceola County	20.8%	57.1%	33.3%	35.3%	36.6%
Visitors to Osceola County	40.0%	55%	55.0%	30%	45.0%
3. Smaller (All Users)	8.8%	0%	3.7%	5.4%	4.5%
Residents of Osceola County	4.2%	0%	0%	5.9%	2.5%
Visitors to Osceola County	20.0%	0%	0%	5%	6.3%
4. Don't Know/No Answer (All Users)	11.8%	20.6%	55.6%	27%	25.6%
Residents of Osceola County	12.5%	14.3%	66.7%	11.8%	33.0%
Visitors to Osceola County	10.0%	25%	25.0%	40%	19.4%

Source: Department of Economics, Florida State University.

Table A.5
Reaction and Impact on All Users of Lake Hatch if No Funds Were Available for Aquatic Weed Control
2004-2005

QUESTION	Quarter 4 Oct-Dec	Quarter 1 Jan-Mar	Quarter 2 Apr-June	Quarter 3 July-Sept	Annual Average
The State of Florida spends a lot of money on controlling hydrilla and other invasive weeds. If no funds were available and hydrilla rapidly covered the entire lake and other lakes in Florida, how would you first react and then how would you be impacted?	(Percent of User Group Indicating How They Would React/ Be Impacted - Multiple Responses Accepted in Survey)				
REACT					
All Users					
Go to Another Lake	47.1%	44.1%	18.5%	37.8%	36.9%
Contact State Representative	5.9%	2.9%	70.4%	16.2%	23.9%
Contact Local Representative	35.3%	44.1%	11.1%	40.5%	32.8%
Talk to Others/Do Nothing/No Reaction	11.8%	8.8%	0%	5.4%	7.9%
Residents					
Go to Another Lake	37.5%	21.4%	66.7%	29.4%	38.8%
Contact State Representative	8.3%	7.1%	0%	0%	3.9%
Contact Local Representative	37.5%	57.1%	33.3%	58.8%	46.7%
Talk to Others/Do Nothing/No Reaction	16.7%	14.3%	0%	11.8%	10.7%
Visitors					
Go to Another Lake	70.9%	80.0%	12.5%	45%	51.9%
Contact State Representative	0%	0%	79.2%	30%	27.3%
Contact Local Representative	30%	35.0%	8.3%	25%	24.6%
Talk to Others/Do Nothing/No Reaction	0%	5.0%	0%	0%	1.0%
IMPACT					
All Users					
Lose A Substantial Recreational Value	70.6%	50.0%	59.30%	64.9%	61.2%
Lose Use of Recreational Equipment	0%	26.5%	22.2%	8.1%	14.2%
Lose An Importance Source of Food	0%	11.8%	0%	5.4%	4.3%
No Impact	29.4%	11.8%	18.5%	21.6%	20.3%
Residents					
Lose A Substantial Recreational Value	87.5%	42.9%	0%	64.7%	48.8%
Lose Use of Recreational Equipment	0%	28.6%	100%	5.9%	33.6%
Lose An Importance Source of Food	0%	14.3%	0%	11.8%	6.5%
No Impact	12.5%	14.3%	0%	17.6%	11.1%
Visitors					
Lose A Substantial Recreational Value	30.0%	55%	66.7%	65%	54.2%
Lose Use of Recreational Equipment	0%	25%	12.5%	10%	11.9%
Lose An Importance Source of Food	0%	10%	0%	0%	2.5%
No Impact	70.0%	10%	20.8%	25%	31.5%

Source: Department of Economics, Florida State University

Table A.6
Perception of Invasive Aquatic Weeds Being a Problem to Enjoying Recreational Opportunities on Lake Cypress by All Users, 2004-2005

QUESTION ASKED--- If we say that invasive aquatic weeds such as hydrilla/water lettuce are a serious problem to enjoying recreational opportunity around Lake Cypress would you	Quarter 4 Oct-Dec 2004	Quarter 1 Jan-Mar 2005	Quarter 2 Apr-June 2005	Quarter 3 July-Sept 2005	Annual Average
	(Percent of Each Group Answering from Five Alternatives)				
1. Strongly Agree (All Users)	2.7%	2.7%	6.3%	3.0%	3.7%
Residents of Osceola County	4.3%	0%	0%	7.7%	3.0%
Visitors to Osceola County	0%	4.8%	10%	0%	3.9%
2. Agree (All Users)	51.4%	67.6%	71.9%	66.7%	64.4%
Residents of Osceola County	47.8%	50%	75.8%	53.8%	56.9%
Visitors to Osceola County	57.1%	81%	70%	75%	70.8%
3. Disagree (All Users)	18.9%	13.5%	6.3%	18.2%	14.3%
Residents of Osceola County	30.4%	25%	0%	23.1%	19.6%
Visitors to Osceola County	0%	0%	10%	15%	6.3%
4. Strongly Disagree (All Users)	5.4%	0%	0%	0%	1.4%
Residents of Osceola County	0%	0%	0%	0%	0%
Visitors to Osceola County	14.3%	4.8%	0%	0%	4.8%
5. Don't Know/No Answer (All Users)	21.6%	16.3%	15.6%	12.1%	16.4%
Residents of Osceola County	17.4%	25%	25%	15.4%	20.7%
Visitors to Osceola County	28.6%	0%	10%	10%	12.2%

Source: Department of Economics, Florida State University.

Table A.7
Temporal Sensitivity of All Users of Lake Cypress to Government Actions to Control Invasive Aquatic Weeds As of 2004-05

QUESTION ASKED -- Over the last few years(3-4), have you noticed that invasive aquatic weeds, as they cover Cypress Lake's surface, are getting?	Quarter 4 Oct-Dec 2004	Quarter 1 Jan-Mar 2005	Quarter 2 Apr-June 2005	Quarter 3 July-Sept 2005	Annual Average
	(Percent from Each Group Answering from Four Alternatives)				
1.Larger (All Users)	2.7%	18.9%	21.9%	12.1%	13.9%
Residents of Osceola County	4.3%	6.3%	16.7%	15.4%	20.4%
Visitors to Osceola County	0%	28.6%	28.6%	10.0%	11.8%
2.About the Same (All Users)	37.8%	70.3%	65.6%	63.6%	59.3%
Residents of Osceola County	43.5%	75%	75.0%	61.5%	63.8%
Visitors to Osceola County	28.6%	66.7%	66.7%	65.0%	56.8%
3. Smaller (All Users)	35.1%	0%	0%	12.1%	11.8%
Residents of Osceola County	34.8%	0%	0%	7.7%	10.6%
Visitors to Osceola County	35.7%	0%	0%	15.0%	12.7%
4. Don't Know/No Answer (All Users)	24.3%	10.8%	12.50%	12.1%	14.9%
Residents of Osceola County	17.4%	18.8%	8.3%	15.4%	15.0%
Visitors to Osceola County	35.7%	4.8%	4.8%	10.0%	13.8%

Source: Department of Economics, Florida State University.

Table A.8
Reaction and Impact on All Users of Cypress Lake if No Funds Were Available for Aquatic Weed Control
2004-2005

QUESTION	Quarter 4 Oct-Dec	Quarter 5 Jan-Mar	Quarter 5 Apr-June	Quarter 5 July-Sept	Annual Average
The State of Florida spends a lot of money on controlling hydrilla and other invasive weeds. If no funds were available and hydrilla rapidly covered the entire lake and other lakes in Florida, how would you first react and then how would you be impacted?	(Percent of User Group Indicating How They Would React/ Be Impacted - Multiple Responses Accepted in Survey)				
REACT					
All Users					
Go to Another Lake	54.1%	24.3%	21.9%	33.3%	33.4%
Contact State Representative	8.1%	13.5%	18.8%	15.2%	13.9%
Contact Local Representative	13.5%	62.2%	59.4%	48.5%	45.9%
Talk to Others/Do Nothing/No Reaction	24.3%	0%	0%	3.0%	6.8%
Residents					
Go to Another Lake	43.5%	0%	41.7%	38.5%	30.9%
Contact State Representative	8.7%	25%	0%	15.4%	12.3%
Contact Local Representative	17.4%	75%	58.3%	38.5%	47.3%
Talk to Others/Do Nothing/No Reaction	30.4%	0%	0%	7.7%	9.5%
Visitors					
Go to Another Lake	71.4%	42.9%	10%	30%	38.6%
Contact State Representative	7.1%	4.8%	30%	15%	14.2%
Contact Local Representative	7.1%	52.4%	60%	55%	43.6%
Talk to Others/Do Nothing/No Reaction	14.3%	0%	0%	0%	3.6%
IMPACT					
All Users					
Lose A Substantial Recreational Value	62.2%	37.8%	18.8%	42.4%	40.3%
Lose Use of Recreational Equipment	5.4%	45.9%	59.4%	33.3%	36.0%
Lose An Importance Source of Food	5.4%	16.2%	18.8%	12.1%	23.2%
No Impact	27.0%	0%	3.1%	12.1%	10.6%
Residents					
Lose A Substantial Recreational Value	91.3%	37.5%	25%	53.8%	51.9%
Lose Use of Recreational Equipment	8.7%	50.0%	66.7%	98.5%	40.9%
Lose An Importance Source of Food	0%	12.5%	8.3%	7.7%	7.1%
No Impact	0%	0%	0%	0%	0%
Visitors					
Lose A Substantial Recreational Value	14.3%	38.1%	15.0%	35%	25.6%
Lose Use of Recreational Equipment	14.3%	42.9%	55%	30%	35.6%
Lose An Importance Source of Food	0%	19.0%	25.0%	18%	15.5%
No Impact	71.4%	0%	5.0%	20%	12.7%

Source: Department of Economics, Florida State University

Table A.9
Perception of Invasive Aquatic Weeds Being a Problem to Enjoying Recreational Opportunities on Lake Kissimmee by All Users, 2004-2005

QUESTION ASKED--- If we say that invasive aquatic weeds such as hydrilla/water lettuce are a serious problem to enjoying recreational opportunity around Lake Kissimmee would you	Quarter 4 Oct-Dec 2004	Quarter 1 Jan-Mar 2005	Quarter 2 Apr-June 2005	Quarter 3 July-Sept 2005	Annual Average
	(Percent of Each Group Answering from Five Alternatives)				
1. Strongly Agree (All Users)	8.6%	.7%	4.2%	4.9%	4.6%
Residents of Osceola County	13.1%	0%	0%	6.6%	4.9%
Visitors to Osceola County	1.8%	1.5%	2.1%	1.9%	1.8%
2. Agree (All Users)	30.7%	40.0%	56.3%	39.9%	41.7%
Residents of Osceola County	26.2%	35.6%	35.6%	40.7%	34.6%
Visitors to Osceola County	37.5%	44.8%	27.7%	38.5%	37.0%
3. Disagree (All Users)	44.3%	35.7%	2.1%	26.6%	33.6%
Residents of Osceola County	46.4%	45.2%	45.2%	29.7%	41.6%
Visitors to Osceola County	41.1%	25.4%	6.4%	21.2%	23.5%
4. Strongly Disagree (All Users)	10.7%	4.3%	4.2%	8.4%	6.9%
Residents of Osceola County	10.7%	6.8%	6.8%	7.7%	8.0%
Visitors to Osceola County	10.7%	1.5%	0%	9.6%	5.5%
5. Don't Know/No Answer (All Users)	5.7%	19.3%	33.3%	20.3%	20.0%
Residents of Osceola County	3.6%	12.3%	12.3%	15.4%	10.9%
Visitors to Osceola County	8.9%	26.9%	63.8%	28.8%	32.1%

Source: Department of Economics, Florida State University.

Table A.10
Temporal Sensitivity of All Users of Lake Kissimmee to Government Actions to Control Invasive Aquatic Weeds As of 2004-05

QUESTION ASKED -- Over the last few years (3-4), have you noticed that invasive aquatic weeds, as they cover Lake Kissimmee's surface, are getting?	Quarter 4 Oct-Dec 2004	Quarter 1 Jan-Mar 2005	Quarter 2 Apr-June 2005	Quarter 3 July-Sept 2005	Annual Average
	(Percent from Each Group Answering from Four Alternatives)				
1.Larger (All Users)	3.6%	2.9%	8.3%	6.3%	5.3%
Residents of Osceola County	3.6%	2.7%	7.2%	7.7%	5.3%
Visitors to Osceola County	3.6%	3.0%	3.0%	3.8%	3.4%
2.About the Same (All Users)	55.0%	47.9%	36.1%	46.2%	46.3%
Residents of Osceola County	54.8%	52.1%	48.5%	53.8%	52.3%
Visitors to Osceola County	55.4%	43.%	43.3%	32.7%	43.7%
3. Smaller (All Users)	27.9%	37.9%	26.4%	28.7%	30.2%
Residents of Osceola County	32.1%	42.5%	33.0%	27.5%	33.8%
Visitors to Osceola County	21.4%	32.8%	32.8%	30.8%	29.5%
4. Don't Know/No Answer (All Users)	13.8%	11.4%	29.2%	18.9%	18.3%
Residents of Osceola County	9.5%	2.7%	11.3%	11.0%	8.6%
Visitors to Osceola County	19.6%	20.9%	20.9%	32.7%	23.5%

Source: Department of Economics, Florida State University.

Table A.11
Reaction and Impact on All Users of Lake Kissimmee if No Funds Were Available for Aquatic Weed Control
2004-2005

QUESTION The State of Florida spends a lot of money on controlling hydrilla and other invasive weeds. If no funds were available and hydrilla rapidly covered the entire lake and other lakes in Florida, how would you first react and then how would you be impacted?	Quarter 4 Oct-Dec	Quarter 1 Jan-Mar	Quarter 2 Apr-June	Quarter 3 July-Sept	Annual Average
	(Percent of User Group Indicating How They Would React/ Be Impacted - Multiple Responses Accepted in Survey)				
REACT					
All Users					
Go to Another Lake	60.0%	50.7%	34.7%	45.5%	47.7%
Contact State Representative	2.1%	3.6%	37.5%	16.1%	14.8%
Contact Local Representative	25.7%	34.3%	20.8%	28.7%	27.4%
Talk to Others/Do Nothing/No Reaction	12.1%	10.00%	6.3%	9.8%	10.0%
Residents					
Go to Another Lake	52.4%	45.2%	47.4%	47.3%	48.0%
Contact State Representative	2.4%	4.1%	16.5%	8.8%	8.0%
Contact Local Representative	28.6%	37.0%	26.8%	29.7%	30.7%
Talk to Others/Do Nothing/No Reaction	16.7%	11.0%	9.2%	14.3%	12.8%
Visitors					
Go to Another Lake	71.4%	56.7%	8.6%	42.3%	44.8%
Contact State Representative	1.8%	3.0%	80.9%	28.8%	28.4%
Contact Local Representative	21.4%	31.3%	8.5%	26.9%	22.0%
Talk to Others/Do Nothing/No Reaction	5.4%	9.0%	2.1%	1.9%	4.6%
IMPACT					
All Users					
Lose A Substantial Recreational Value	49.3%	58.6%	47.9%	54.5%	52.6%
Lose Use of Recreational Equipment	2.1%	8.6%	24.3%	11.9%	11.7%
Lose An Importance Source of Food	.7%	7.1%	6.3%	4.2%	4.6%
No Impact	47.9%	25.7%	21.5%	29.4%	31.1%
Residents					
Lose A Substantial Recreational Value	66.7%	61.6%	45.4%	56.0%	57.4%
Lose Use of Recreational Equipment	0%	11.0%	32.0%	16.5%	15.1%
Lose An Importance Source of Food	1.2%	6.8%	4.1%	3.3%	3.9%
No Impact	32.1%	20.5%	18.6%	24.2%	23.9%
Visitors					
Lose A Substantial Recreational Value	23.2%	55.2%	53.2%	51.9%	45.9%
Lose Use of Recreational Equipment	5.4%	6.0%	8.5%	3.8%	6.0%
Lose An Importance Source of Food	0%	7.5%	10.6%	5.8%	6.0%
No Impact	71.4%	31.3%	27.7%	38.5%	42.2%

Source: Department of Economics, Florida State University

Table A.12
Recreational Participation by Tourists from Outside Osceola County to Lake Hatch from 4th Quarter, 2004 to the 3rd Quarter, 2005

Time Period	2004 4th	2004 1st	2005 2nd	2005 3rd	Annual Average
Purpose of Trip to Lake (%)					
Primarily to Visit Lake	80	65	87.5	65	73.1%
Lake Combined with Another Destination	20	35	12.5	35	26.9%
Kinds of Recreational Activities Participated in at Lake	Sample	Sample	Sample	Sample	Annual
Boat Fishing					
(1) Boat Fishing Only	4	7	7	6	24
(2) Boat Fishing and Camping Only	0	10	7	11	28
(3) Boat Fishing and Picnicking Only	2	2	1	2	7
(4) Boat Fishing & All Other Shore Fishing					
(1) Shore Fishing Only	0	0	3	0	3
(2) Shore Fishing & Any Other Activity	2	1	4	1	8
Camping Only	0	0	2	0	2
Picnicking Only	2	0	0	0	2
Sightseeing Only	0	0	0	0	0
Forms of Recreation Other Than Above	0	0	0	0	0
Total Sample	10	20	24	20	74
Percent Participating in Boat Fishing Only or In Conjunction with Any Other Activity	60	95	62.5	95	79.7%
Own a Boat Used on Lake (%)					
Yes	60	90	70.8	95.0	79.0%
No	40	10	29.2	5.0	21.0%
How Many Meals Do You Expect to Come from Fish Caught on This Trip (Average for All Sample)	0	2.5	1.4	2.1	1.5
Size of Party	3.1	2.5	2.2	3.0	2.7
Length of Stay on Trip	0	2.5	1.8	4.2	2.1

Source: Department of Economics, Florida State University

Table A.13
Recreational Participation by Residents of Osceola County to Lake Hatch from 4th Quarter, 2004 to 3rd Quarter, 2005

Time Period	2004 4th	2005 1st	2005 2nd	2005 3rd	Annual Average
Purpose of Trip to Lake (%)					
Primarily to Visit Lake	87.5	85.7	100	88.2	90.4%
Lake Combined with Another Destination	12.5	14.3	0	11.8	9.6%
Kinds of Recreational Activities					
Participated in at Lake	Sample	Sample	Sample	Sample	Annual
Boat Fishing					
(1) Boat Fishing Only	9	0	0	2	11
(2) Boat Fishing and Camping Only	0	0	0	0	0
(3) Boat Fishing and Picnicking Only	8	8	3	9	28
(4) Boat Fishing & All Other	0	3	3	1	7
Shore Fishing					
(1) Shore Fishing Only	0	0	0	0	0
(2) Shore Fishing & Any Other Activity	3	3	3	4	13
Camping Only	0	0	3	0	3
Picnicking Only	4	0	0	1	5
Sightseeing Only	0	0	0	0	0
Other Forms of Recreation	0	0	0	0	0
Total Sample	24	14	12	17	67
Percent Participating in Boat Fishing Only or In Conjunction with Any Other Activity	70.8	78.6	50	70.6	68.7%
Own a Boat Used on Lake (%)					
Yes	70.8	78.6	100	70.6	80%
No	29.2	21.4	0	29.4	20%
How Many Meals Do You Expect to Come from Fish Caught on This Trip (Average for All Sample)	.1	2.2	.7	1.1	1.0
Size of Party	2.6	2.4	2.7	3.6	2.8

Source: Department of Economics, Florida State University

Table A.14
Recreational Participation by Tourists from Outside Osceola County to Cypress Lake from 4th Quarter, 2004 to 3rd Quarter, 2005

Time Period	2004 4th	2005 1st	2005 2nd	2005 3rd	Annual Average
Purpose of Trip to Lake (%)					
Primarily to Visit Lake	57.1	52.4	75	70	47.9%
Lake Combined with Another Destination	42.9	47.6	25	30	52.1%
Kinds of Recreational Activities Participated in at Lake	Sample	Sample	Sample	Sample	Annual
Boat Fishing					
(1) Boat Fishing Only	9	12	3	9	33
(2) Boat Fishing and Camping Only	0	6	3	4	13
(3) Boat Fishing and Picnicking Only	0	0	10	2	12
(4) Boat Fishing & All Other	0	3	0	1	4
Shore Fishing					
(1) Shore Fishing Only	0	0	1	0	1
(2) Shore Fishing & Any Other Activity	2	0	1	2	5
Camping Only	0	0	1	0	1
Picnicking Only	0	0	?	2	2
Sightseeing Only	3	0	1	0	4
Other Forms of Recreation	0	0	0	0	0
Total					
Total Sample	14	21	20	20	75
Percent Participating in Boat Fishing Only or In Conjunction with Any Other Activity	64.3	100	80	80	81.1%
Own a Boat Used on Lake (%)					
Yes	64.3	52.4	75	70	65.4%
No	35.7	47.6	25	30	34.6%
How Many Meals Do You Expect to Come from Fish Caught on This Trip (Average for All Sample)	.1	.3	1.3	2.3	1.0
Size of Party	3.1	2.9	2.3	3.4	2.9
Length of Stay on Trip	3.8	2.9	5.1	4.1	4.0

Source: Department of Economics, Florida State University

Table A.15
Recreational Participation by Residents of Osceola County to Cypress Lake from 4th Quarter, 2004 to 3rd Quarter, 2005

Time Period	2004 4th	2005 1st	2005 2nd	2005 3rd	Annual Average
Purpose of Trip to Lake (%)					
Primarily to Visit Lake	82.6	68.8	100	76.9	82.1%
Lake Combined with Another Destination	17.4	31.2	0	23.1	17.9%
Kinds of Recreational Activities					
Participated in at Lake	Sample	Sample	Sample	Sample	Annual
Boat Fishing					
(1) Boat Fishing Only	14	6	1	5	26
(2) Boat Fishing and Camping Only	0	3	10	1	14
(3) Boat Fishing and Picnicking Only	6	5	5	4	20
(4) Boat Fishing & All Other	0	0	0	0	0
Shore Fishing					
(1) Shore Fishing Only	1	0	0	0	1
(2) Shore Fishing & Any Other Activity	2	2	2	2	8
Camping Only	0	0	0	0	0
Picnicking Only	0	0	0	0	0
All Other Forms of Recreation	0	0	2	1	3
Total Sample	23	16	20	13	72
Percent Participating in Boat Fishing Only or In Conjunction with Any Other Activity	86.9	87.5	80.0	76.9	82.8%
Own a Boat Used on Lake (%)					
Yes	87.0	68.8	58.3	84.6	74.7%
No	13.0	31.2	41.7	15.4	25.3%
How Many Meals Do You Expect to Come from Fish Caught on This Trip (Average for All Sample)	.2	2.6	1.6	1.6	1.5
Size of Party	2.4	2.3	2.3	3.2	2.6

Source: Department of Economics, Florida State University

Table A.16
Recreational Participation by Tourists from Outside Osceola County to Lake Kissimmee from 4th Quarter, 2004 to 3rd Quarter, 2005

Time Period	2004 4th	2005 1st	2005 2nd	2005 3rd	Annual Average
Purpose of Trip to Lake (%)					
Primarily to Visit Lake	50.9	52.2	80.9	66.7	62.7%
Lake Combined with Another Destination	49.1	47.8	19.1	33.3	37.3%
Kinds of Recreational Activities Participated in at Lake	Sample	Sample	Sample	Sample	Annual
Boat Fishing					
(1) Boat Fishing Only	6	4	16	10	36
(2) Boat Fishing and Camping Only	7	15	14	11	47
(3) Boat Fishing and Picnicking Only	13	15	2	9	39
(4) Boat Fishing & All Other	0	0	1	0	1
Shore Fishing					
(1) Shore Fishing Only	1	5	5	3	14
(2) Shore Fishing & Any Other Activity	14	19	7	12	52
Camping Only	0	0	0	0	0
Picnicking Only	9	9	2	6	26
Sightseeing Only	0	0	0	0	0
Other Forms of Recreation	6	0	0	1	7
Total					
Total Sample	56	67	47	52	222
Percent Participating in Boat Fishing Only or In Conjunction with Any Other Activity	46.4	50.7	70.2	57.7	55.4%
Own a Boat Used on Lake (%)					
Yes	46.4	50.7	74.5	63.5	58.8%
No	53.6	49.3	25.5	36.5	41.2%
How Many Meals Do You Expect to Come from Fish Caught on This Trip (Average for All Sample)	.3	1.9	1.3	1.4	1.5
Size of Party	3.7	3.3	3.3	4.2	3.6
Length of Stay on Trip	3.1	3.3	4.9	4.7	4.0

Source: Department of Economics, Florida State University

Table A.17
Recreational Participation by Residents of Osceola County to Lake Kissimmee from 4th Quarter, 2004 to 3rd Quarter, 2005

Time Period	2004 4th	2005 1st	2005 2nd	2005 3rd	Annual Average
Purpose of Trip to Lake (%)					
Primarily to Visit Lake	88.1	79.5	100	92.3	89.9%
Lake Combined with Another Destination	11.9	20.5	0	7.7	10.1%
Kinds of Recreational Activities Participated in at Lake	Sample	Sample	Sample	Sample	Annual
Boat Fishing					
(1) Boat Fishing Only	17	13	9	15	54
(2) Boat Fishing and Camping Only	4	4	1	3	12
(3) Boat Fishing and Picnicking Only	2	7	27	13	49
(4) Boat Fishing & All Other	0	3	0	0	3
Shore Fishing					
(1) Shore Fishing Only	1	6	0	2	9
(2) Shore Fishing & Any Other Activity	46	25	21	36	128
Camping Only	0	15	0	0	15
Picnicking Only	14	0	32	22	68
Sightseeing Only	0	0	0	0	0
All Other Forms of Recreation	0	0	5	0	5
Total Sample	84	73	95	91	343
Percent Participating in Boat Fishing Only or In Conjunction with Any Other Activity	27.4	37	38.9	34.1	34.4%
Own a Boat Used on Lake (%)					
Yes	27.4	45.2	38.1	33.0	35.9%
No	72.6	54.8	61.9	67.0	64.1%
How Many Meals Do You Expect to Come from Fish Caught on This Trip (Average for All Sample)	.3	1.5	.8	1.2	1.0
Size of Party	3.1	2.2	3.4	4.1	3.2

Source: Department of Economics, Florida State University

Table A.18
Demographic and Descriptive Statistics of Recreational Tourists from Outside Osceola County of Lake Hatch
4th Quarter, 2004 to 3rd Quarter, 2005

Time Period	2004 4th	2005 1st	2nd	3rd	Annual Quarterly Average
Characteristics					
Interviews	10	20	24	20	74
Average Age	?	43.3	42.8	46.3	44.8
Medium Household Income	$46,000	$45,000	$52,500	$42,000	$46,375
Ethnicity (%)					
White	90	65	70.8	75	75.2
African American	10	30	20.8	15	19.0
Hispanic	0	5	8.3	10	5.8
Asian & Other	0	0	0	0	0
Point of Origin (%)					
Florida	90	80	25	50	62
Georgia	0	5	8.3	5	4.6
South Carolina	0	5	0	5	2.5
New York	10	0	0	0	2.5
Ohio	0	5	16.7	0	5.4
North Carolina	0	0	0	0	0
Alabama	0	0	0	0	0
Tennessee	0	5	4.2	10	4.8
Illinois	0	0	8.3	0	2.0
All Other	0	0	19	30	16.2
County of Origin from Inside Florida(%)					
Polk	11.1	40	0	10	15.3
Lake	11.1	0	0	20	7.8
Hardee	11.1	0	0	0	2.8
Okeechobee	0	0	0	20	5.0
Lee	22.2	10	0	20	13.0
All Other	44.5	50	100	30	56.1
Mode of Travel to Lake (%)					
Auto	90	100	75.0	90	88.8
Other	10	0	25.0	10	11.2
Accommodations (%)					
Hotel/Motel	0	0	8.3	10	4.6
Campgrounds	0	50	58.3	55	40.8
Friends & Family	0	5	16.7	10	8.0
Day Trip Only	100	45	18.7	25	46.6

Source: Survey by Florida State University, 2004-2005

Table A.19
Demographic and Descriptive Statistics of Recreational Resident Users from Osceola County Who Used Lake Hatch from 4th Quarter, 2004 to 3rd Quarter,2005

Time Period	2004 4th	2005 1st	2nd	3rd	Annual Quarterly Average
Characteristics					
Interviews	24	14	3	17	58
Average Age	50.0	44.8	45.7	46.3	46.7
Median Household Income	$38,576	$60,500	$60,000	$42,400	$50,369
Ethnicity (%)					
White	83.3	85.7	100	94.1	90.7
African American	12.5	7.1	0	0	4.9
Hispanic	4.2	7.1	0	5.9	4.4
Asian & Other	0	0	0	0	0
Trips to Lake Per Year	2.7	3.4	3.3	3.1	3.1

Source: Survey by Florida State University, 2003-2004

Table A.20
Demographic and Descriptive Statistics of Recreational Tourists from Outside Osceola County of Cypress Lake
4th Quarter, 2004 to 3rd Quarter, 2005

Time Period	2003 4th	2003 1st	2004 2nd	2004 3rd	Annual Quarterly Average
Characteristics					
Interviews	14	21	20	20	75
Average Age	53.4	43.4	43.1	47.3	47.7
Medium Household Income	$39,500	$45,000	$59,000	$50,000	$48,375
Ethnicity (%)					
White	90	90.4	85.0	90.0	88.9
African American	10	4.8	10.0	5.0	7.5
Hispanic	0	4.8	5.0	5.0	3.6
Asian & Other	0	0	0	0	0
Point of Origin (%)					
Florida	57.1	52.4	95	65	67.4
Georgia	21.4	9.5	0	15	11.5
South Carolina	0	9.5	0	5	3.6
New York	0	0	8	0	0
Ohio	0	4.8	0	0	1.2
North Carolina	0	4.8	0	5	2.5
Alabama	0	4.8	0	0	1.2
Wisconsin	0	0	0	0	0
Illinois	0	0	0	0	0
All Other	21.5	14.2	5	10	12.6
County of Origin from Inside Florida(%)					
Polk	57.1	20.0	0	18.2	23.8
Lake	0	13.3	29.4	9.1	13.0
Hardee	14.3	6.7	0	9.1	7.5
Okeechobee	0	6.7	11.8	9.1	6.9
Desoto	0	0	0	0	0
All Other	28.6	53.3	58.8	54.5	48.8
Mode of Travel to Lake (%)					
Auto	92.9	100	100	100	100
Other	7.1	0	0	0	0
Accommodations (%)					
Hotel/Motel	0	19.0	5.0	10	8.5
Campgrounds	7.1	28.6	25.0	20	20.2
Friends & Family	35.7	19.0	0	10	16.2
Day Trip Only	57.1	33.3	70.0	60	55.1

Source: Survey by Florida State University, 2004-2005.

Table A.21
Demographic and Descriptive Statistics of Resident Recreational Users from Osceola County Who Used Cypress Lake from 4th Quarter, 2004 to 3rd Quarter,2005

Time Period	2004 4th	2005 1st	2nd	3rd	Annual Quarterly Average
Characteristics					
Interviews	24	16	12	13	65
Average Age	50	44.3	45.5	47.2	46.8
Median Household Income	$45,000	$40,000	$55,000	$30,000	$42,500
Ethnicity (%)					
White	87.0	68.8	83.3	84.6	80.9
African American	8.7	25.0	18.6	7.7	15.0
Hispanic	4.3	6.3	0	7.7	4.6
Asian & Other	0	0	0	0	0
Trips to Lake Per Year	1.8	3.1	2.3	2.4	2.4

Source: Survey by Florida State University, 2003-2004

Table A.22
Demographic and Descriptive Statistics of Recreational Tourists from Outside Osceola County of Lake Kissimmee
4th Quarter, 2004 to 3rd Quarter, 2005

Time Period	2004 4th	2005 1st	2nd	3rd	Annual Quarterly Average
Characteristics					
Interviews	56	67	47	52	222
Average Age	51	43.6	44.9	48.0	46.9
Medium Household Income	$50,360	$61,000	$66,120	$65,000	$60,620
Ethnicity (%)					
White	82.1	80.6	85.1	76.8	81.1
African American	8.9	13.4	12.8	13.5	12.2
Hispanic	8.9	6.0	2.1	7.7	6.2
Asian & Other	0	0	0	0	0
Point of Origin (%)					
Florida	57.1	58.2	21.3	51.9	47
Georgia	1.8	10.4	17.0	11.5	10
South Carolina	5.4	6.0	10.6	3.8	7
New York	14.3	4.5	8.5	7.7	9
Tennessee	1.8	3.0	6.4	0	3
North Carolina	5.4	6.0	0	9.6	5
Alabama	3.6	3.0	8.5	5.8	5
Kentucky	3.6	0	0	0	1
All Other	3.4	5.9	27.7	9.9	11
County of Origin from Inside Florida(%)					
Polk	14.3	20.0	30	20	21
Lake	10.7	8.6	10	12	10
Hardee	7.1	5.7	10	4	7
Okeechobee	7.1	5.7	10	12	9
Lee	25.0	20.0	10	20	19
All Other	?	?	30	32	34
Mode of Travel to Lake (%)					
Auto	85.7	95.5	87.2	92.3	90.2
Other	14.3	4.5	12.8	7.7	9.8
Accommodations (%)					
Hotel/Motel	7.1	7.5	12.8	3.8	7.8
Campgrounds	19.6	32.8	36.2	34.6	30.8
Friends & Family	12.5	6.0	25.5	7.7	13.0
Day Trip Only	60.7	46.3	25.5	53.8	48.4

Source: Survey by Florida State University, 2004-2005

Table A.23
Demographic and Descriptive Statistics of Resident Recreational Users from Osceola County Who Used Lake Kissimmee from 4th Quarter, 2004 to 3rd Quarter,2005

Time Period	2004 4th	2005 1st	2nd	3rd	Annual Quarterly Average
Characteristics					
Interviews	84	73	97	91	345
Average Age	50.6	44.4	45.4	49.5	47.5
Median Household Income	$40,000	$38,000	$48,000	$45,000	$42,750
Ethnicity (%)					
White	85.7	84.9	78.4	79.1	82.0
African American	10.7	12.3	14.4	14.3	12.9
Hispanic	3.6	2.7	7.2	6.6	5.0
Asian & Other	0	0	0	0	0
Trips to Lake Per Year	2.3	3.1	2.8	2.7	2.7

Source: Survey by Florida State University, 2003-2004

BIBLIOGRAPHY

Bell, Frederick W., The Economic Value of Lake Tarpon, Florida and the Impact of Aquatic Weeds, A.L. Burruss Institute of Public Service, Kennesaw State University, February, 1998.

Bell, Frederick W., The Economic Value of Lake Jackson, Florida, A.L. Burruss Institute of Public Service, Kennesaw State University, 1994.

Bell, Frederick W. and Mark A. Bonn, Economic Sectors at Risk from Invasive Aquatic Weeds at Lake Istokpoga, Florida, The Bureau of Invasive Plant Management, Florida Department of Environment of Environmental Protection, Tallahassee, Florida, December, 2004.

Bower, Elements of Water Withdrawal, South Florida Water Management District, March 2004 (personal correspondence).

Drissoll, P & et al, The Effect of Aquatic Plants on Residential Shoreline Property Values at Gunterville Reservoir, Tennessee Valley Authority and U.S. Army Corps of Engineers 1994.

Duckworth, Briget, Kissimmee Chain of Lakes Long Term Management Plan (KCOL LTMP), SFWMD, unpublished Stakeholder Survey Evaluation, Kissimmee, Florida, 2006.

Florida Visitor Study, MyFlorida.com, 2003.

Milon, J.W., J. Yingling, and J.E. Reynolds, An Economic Analysis of the Benefits of Aquatic Weed Control in North-Central Florida With Special Reference to Orange and Lochloosa Lakes, Economics Report 113, UF, IFAS, 52pp., 1986.

Minnesota IMPLAN Group, Inc. Implan Pro, Version 2.0, Stillwater, Minn. 2004.

Richabus, Donna. Personal Correspondence of All Water Permit Allocation from Lakes Toho; Hatch; Cypress and Kissimmee, South Florida Water Management District, September, 2005.

University of Florida, 2005 Statistical Abstract, Gainesville, Florida, 2004.

University of Florida, Florida Statistical Abstract, Gainesville, Florida, 2005.

U.S. Department of Commerce, Regional Economic Information System, Bureau of Economic Analyses, Economics and Statistics Administration, RCN-0351, REIS CD-Rom, 1969-2002.

U.S. Department of Commerce, 1997 Economic Census of Business, 1998.

U.S. Geological Survey, Agricultural Water Withdrawal, unpublished data, Tallahassee, FL, 2003.