A Recreational Boating Characterization of Collier County, Florida

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Aerial photos courtesy of Collier County Sheriff's Office Aviation Bureau

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Abstract

Collier County faces the difficult yet critical management challenge of how to sustain economic viability while maintaining the integrity of its coastal environmental resources. Waterway access improvements and recreational boating needs figure prominently within this multi-faceted challenge. The County recognizes that effective coastal community planning requires pertinent and accurate information concerning on-water activities that is obtained using the best technology and scientific methods. To meet this end, a recreational boating use study was recommended to document and map current marine facility and waterway usage. The recreational boating study described by this report resulted from a collaborative partnership between the Florida Fish and Wildlife Conservation Commission (FWC), the Collier County Coastal Zone Management Department, the University of Florida (UF) Collier County Cooperative Extension Program, and the UF Florida Sea Grant College Program.

This report documents the methods, procedures, and findings of a map-based mail survey that was distributed in three waves (September 2008, February 2009, and June 2009) to 7,700 boaters using Collier County waters (with some participating boaters receiving up to three questionnaires over the year-long study period) to obtain seasonal information about their boating preferences, use profiles, and travel patterns. For purposes of survey distribution and information analysis, boaters were categorized by waterway access type into marina (wet slip or dry storage), ramp (includes shoreline launch sites), or home dock user groups.

Questionnaire recipients were asked to mark on maps the origins of their two most recent recreational boating trips in Collier County, draw the associated travel routes, and identify boating destinations and activities along these routes. They also were asked to mark all areas of perceived congestion and where they would like additional access to waterways within the study area. Spatial data collected from 1,847 returned surveys (89.0% of all returns from the three survey waves) were digitized into the ESRI ArcGIS geographic information system (GIS). This translated to a sample of 3,770 travel routes, 3,770 trip departure sites (origins), 6,162 boating destinations, 1,047 congestion locations, and 296 locations where additional waterway access is desired.

This spatial approach is a significant way this study differs from previous efforts to characterize (i.e., profile and describe) boating patterns. An immediate output is maps that reveal boating “hotspots”—year–round and seasonal—and patterns of patronage for each boat ramp, which draw users from widely varying parts of the state. For instance, the maps suggest that the Outdoor Resorts of America ramp in Chokoloskee has significant patronage from Miami–Dade and Broward counties, and the Cocohatchee River Park ramp serves a much more local group of boaters. In addition, descriptive data about the mapped trips, such as timing and vessel type, and independent data about the respondent’s typical boating trips, including preferences determining departure sites and travel routes, frequency, and usual activities, can be linked with the GIS geodatabase for further analysis.

Quantitative analysis of answers to the mail survey questions (a) characterized boaters and their vessels by user groups: ramp, home dock, and marina wet slip and dry storage and (b) enabled temporal understanding of boater behaviors, both by month and by boating season. Boating is a busy year–round activity in Collier County; there are two distinct boating seasons, broadly defined as “peak” (January through May, centered on March and April) and “off–peak”

(June through December). The descriptive analysis presented in Part 2 is based on information provided by N=2,057 survey respondents who returned completed mail surveys.

This report summarizes key results of this analysis, and the accompanying CD-ROM provides the data for further investigations.

Two survey questions asked respondents to describe, in their own words, what detracts most from their Collier County boating experience and what is needed most to improve that experience. The leading detraction is *lack of courtesy and/or seamanship* in other boaters, and the most desired improvement is *greater access* to the water. Many other detractions and needs were offered, and this report discusses them in detail. Again, the underlying data are on the CD-ROM.

Information products generated from this study include:

1. Characteristics of boaters who use Collier County waterways for recreation
2. A profile of the types of recreational vessels operated on Collier County waterways
3. A description of the types of recreational activities that take place on Collier County waterways
4. A description of boater preferences as to waterway access facility amenities
5. A summary of principal Collier County waterway problems and needs perceived by boaters
6. Spatial data formatted within a GIS that can be used to map:
    a. service areas for Collier County boating facilities
    b. departure or launch sites
    c. water-based boating destinations and associated activities
    d. trip routes that define where Collier County boaters travel on the water
    e. areas of perceived waterway congestion
    f. areas where additional waterway access is desired

Part 1-Study Design

1.1 Introduction

Background

Boating is a key element in Florida's coastal lifestyle and growth phenomena. Florida ranks first in the nation in recreational boat registrations, with 973,836 registered in 2008, according to the Florida Fish and Wildlife Conservation Commission (myfwc.com). On average, this represents approximately one boat for every 18 residents. Of equal note, Florida is the number one U.S. destination for marine recreation—including saltwater boating—with an estimated 4.3 million participants (Leeworthy & Wiley, 2001). Coastal development, the ever-increasing number of boaters, and the diversity of recreational boating activities that now take place within Florida's coastal bays, estuaries, and waterways have had positive economic impacts, but have also profoundly altered the coastal estuarine environment (Letson, 2002; Antonini, Fann & Roat, 1999). As demand for the use of Florida's waterways increases, so does the need for enhanced public access, maintenance of waterway infrastructure, public safety, and environmental protection. There is, however, little information available to resource managers and planners that describes the actual use patterns and preferences of the boating community.

Collier County faces the difficult yet critical management challenge of sustaining economic viability while maintaining the integrity of coastal environmental resources. Recreational boating and waterway access figure prominently in this multi-faceted challenge. In 2008, Collier County had 23,234 registered recreational boats,[1] about one boat for every 13 permanent residents.[2] A projected population growth of 21.2% by 2020 foretells more demands for coastal access and marine resources, and its location makes Collier County a likely destination for boats trailered from neighboring counties. Given that recreational boating is a major contributor to Florida's economy (an estimated $18 billion annually[3]), a decline in access becomes a particularly pressing issue in the management challenge.

As demand for access to and use of Collier County waterways increases, so then does the need for a better understanding and detailing of present usage and its impacts. Collier County realizes that effective coastal and recreation planning requires pertinent and accurate information concerning on-water activities that is obtained using the best technology and scientific methods.

For optimum utility, science-based data pertaining to recreational boating patterns should include spatially referenced detail. For example, an analysis of boat trip origins that includes the type of access facility, facility location, and number of users is necessary for informed policy decisions as to siting infrastructure (e.g., public ramps). The knowledge of boater activities and destinations facilitates planning with respect to both impact considerations and shared waterway use. Finally, spatial analyses of boat traffic—from origin through destination locales—figure in

[1] http://myfwc.com/docs/Safety/2008_Boating_Statbook.pdf.
[2] The Collier County Comprehensive Planning Department reported 292,932 permanent residents in 2008 (http://www.colliergov.net/Index.aspx?page=262); the peak season population is approximately 100,000 greater. The county population is projected to be 355,118 by the year 2020.
[3] Murray, T.J. Virginia Institute of Marine Science, Gloucester Point, Virginia. Personal communication on behalf of the Marine Industries of Florida (www.boatflorida.org).

such determinations as waterway service levels (e.g., dredging, waterway signage) and appropriate regulatory input. A scientific approach provides information for rational and objective planning to assure that future economic viability and environmental protection needs are balanced.

Study Goals and Objectives

The goals of the study were (1) to quantify and map public access facility use through an inventory of marina patrons and repeated identification of boat ramp users over the course of a year, and (2) to obtain information from boaters who use Collier County access facilities (including residential docks) and waterways regarding their preferences, activities, and water–use patterns. Specific objectives included (1) the development of spatial data sets within a geographic information system (GIS) to map boating patterns, and (2) the analysis of trip information provided by boaters to describe the preferences and behaviors of boaters who use Collier County waterways. Examples of the information products derived from the study are as follows:

1. A profile of boaters who use Collier County waterways for recreation, and characteristics of their trips (e.g. timing, frequency, and duration);
2. A profile of the types of recreational vessels operated on Collier County waterways;
3. A description of the types of recreational activities that take place on Collier County waterways;
4. A ranking of specific features and amenities which determine access facility and travel route selection by Collier County waterway boaters;
5. An analysis of the principal waterway detractions and needs perceived by boaters;
6. A compilation of spatial boating trip data within a GIS that can be used to map:
    a. departure or launch sites (trip origins)
    b. water and land-side service areas for Collier County boating facilities
    c. water-based boating destinations and associated activities
    d. trip routes on Collier County waters as reported by boaters
    e. areas of perceived waterway congestion
    f. areas where additional waterway access is desired;
7. An evaluation of seasonal aspects for many of the information products listed above.

Information obtained from this analysis of recreational boating patterns can serve to advance objectives pertaining to a variety of waterway management issues. Examples of ways that boating pattern information can be used to improve public waterway access and aquatic resource management and to address boaters' concerns include the following:

1. Categorization and spatial representation of boater departure sites, routes, and destinations to address community concerns regarding waterway access, maintenance, signage, and facility siting;
2. Comparison of boating information with other spatial (GIS) data layers (e.g., environmental features, development patterns) to help guide resource and public safety management;

3. Identification of temporal and activity–derived spatial profiles to map boating pressure "hot-spots" on county waterways;
4. Identification of problems and needs in the Collier County boater's experience, as input to management strategies, education programs, and communications products, targeting available resources to issues of greatest concern;
5. Determination of service areas for public launching facilities and the demand placed on those facilities from county residents and visitors.

The study process involved (1) the development of a survey instrument and accompanying correspondence; (2) the identification of boater groups by waterway access facility type; (3) the implementation of seasonal mail surveys to the targeted boater groups; (4) the construction of spatial databases from returned mail surveys identifying trip departure sites, destinations, travel routes, congested areas, and access needs; and (5) the determination of seasonal boating profiles. The process was consistent with previous boating pattern studies conducted by Florida Sea Grant and the Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute for Tampa and Sarasota Bays (Sidman & Flamm, 2001; Sidman, Fik & Sargent, 2004); the Greater Charlotte Harbor (Sidman, Swett, Fik, S. Fann, D. Fann & Sargent, 2005); Sarasota County (Sidman, Swett, Fik, Fann & Sargent, 2006), Brevard County (Sidman, Fik, Swett, Sargent, Fletcher, D. Fann, S. Fann, Coffin, 2007), and Bay County (Sidman, Fik, Swett, Sargent, D. Fann, S. Fann, Coffin, 2008).

Study Region

The Collier County study region includes coastal waters approximately from the Lee County line southeast to the Monroe County line, and offshore to include many popular Gulf fishing reefs (Figure 1). The Ten Thousand Islands are in the study area. (Notice that the map is rotated 35 degrees clockwise so that north is no longer up; this is to better fit the study area on the rectangular survey instrument.) In addition to the 23,504 boats registered in the county in 2007[4], many boaters travel to the area from other Florida counties and from neighboring states. Recreational boaters are attracted to this region's protected waters, which provide excellent opportunities for small-craft boating, fishing and nature viewing, and picnicking/socializing along barrier island beaches and exposed sand spits. Access to the Gulf of Mexico offers further boating, fishing, and diving opportunities.

[4] Florida Fish and Wildlife Conservation Commission (myfwc.com/law/boating/).

Figure 1. Collier County Study Area

1.2 Mail Survey

Survey Instrument

The survey questionnaire developed for this study was patterned after similar, previous studies (Falk, Graefe, Drogin, Confer & Chandler, 1992; Sidman & Flamm, 2001; Sidman, et al. 2004; West, 1982; Sidman, et al. 2007; Sidman, et al. 2008) and was designed to (1) capture spatial information regarding trip departure sites, boating destinations, intervening travel routes, congested areas, and access needs; (2) characterize boaters with respect to the types of vessels owned and used, activity preferences, and the timing, frequency and duration of their recreational outings; and (3) identify problems and needs from the perspective of the boating community (see Appendix A for the survey instrument and associated correspondence).

The primary survey instrument was a two-sided 22 X 34 inch questionnaire that folded to 8.5 X 11 inches for mailing. Sequence numbers were appended that identified the user access group to which the recipient was linked. The questionnaire contained two maps (one at 1:63,360 scale of the coast from the Naples to the Marco Island areas, and one at 1:105,500 that included the entire study area) and 22 questions divided into the following topical areas:

1. Description of last two pleasure boating trips
2. Description of typical boating trips
3. Description of survey respondent

The following additional items were included with each mailed questionnaire:

1. A cover letter that explained the study
2. A postage paid return envelope
3. Questionnaire packets distributed by marinas (804) and a kayak outfitter (50) that also included a postcard to return name and address information for further participation.

In addition, a 4 x 6 card was mailed approximately two weeks after each mailing as a reminder to survey recipients to complete and return the questionnaire.

The questionnaire asked survey recipients to mark on the maps the location of departure sites, travel routes, and destination/activity sites associated with their last two pleasure boating trips. In addition, survey recipients were to mark locations at which they had experienced the most congestion, defined as “more boaters than they preferred,” and locations of desired additional waterway access. Complementary questions on the text side of the survey allowed recipients to characterize their last two trips according to vessel type; the departure day, month, and time; and the time spent on the water. In addition, recipients were asked to characterize and name the departure sites for their last two trips and to rank reasons for departure site selection, where this differed from a home dock. With respect to typical trips, respondents were asked to give the number of days per month that they had operated their boats during the past year and the typical activities they had pursued. They were also asked to identify and rank reasons for selecting travel routes. Finally, a series of questions sought to characterize the respondent in terms of age and boating experience. This section also included two open-ended questions giving the Collier County boater the opportunity to discuss detractions and needs in their boating experience.

A shortened survey was sent in the second and third mail waves to those boaters who had returned the full–length survey. Survey size and maps were unchanged in the short version. However, the questions addressing typical boating trips and the respondent descriptors were omitted, as these responses were already known from the long survey. Only the questions pertinent to the last two pleasure boating trips were included.

Sample Design

The sample design included a diverse representation of recreational boaters by targeting access facilities of three types: (1) marina wet slips and dry storage facilities, (2) residential docks, and (3) public boat ramps (including small numbers of shoreline/causeway users). The design was also intended to provide group-specific information that could be used to compare and contrast use patterns among these three Collier boater groups.

Mailed questionnaires were distributed to area boaters in three waves (Table 3). The first (September 2008) was made up entirely of the long surveys.

The second wave (February 2009) consisted of two survey types, both the long and the short versions. The latter went to those boaters from each of the three user groups who had completed and returned the first survey. The original long survey was sent to ramp users newly observed during the second seasonal ramp observation period. It was also sent to 161 home dock users not included in the first mailing and to 616 newly identified marina wet slip occupants.

The third wave of surveys (June 2009) also consisted of two survey types. Short surveys were sent to all marina and all dock users who had previously returned a long survey. They were also sent to the second wave ramp users who had returned the long version and to those first wave ramp users who had returned surveys and had again been identified in the third observation period. Long surveys went to those ramp users identified for the first time during the winter/spring months (third observation period).

Identifying Marina Patrons

Florida Sea Grant personnel visited 27 marinas to record vessel registration numbers or names and hailing ports for vessel owner identification (Table 1 and Figure 2). The wet slip and dry storage capacity for each marina was ascertained. Five of the marinas mailed surveys to their own patrons, primarily for client privacy; marina staff addressed and mailed 804 stamped survey packets prepared by FSG. These packets included a return postcard requesting the name and address of those respondents willing to participate in the two remaining seasonal mail outs. FSG personnel revisited wet slips at some marinas in December 2008 to identify new seasonal users (Table 1: "Winter (wet only)" column).

Table 1. Collier County Surveyed Marinas

	Occupancy Counts				Capacity Counts	
MARINA NAME	**Summer totals**	**Wet**	**Dry**	**Winter (wet only)**	**Wet**	**Dry**
Barefoot Boat Club	91	9	82	18	24	90
Pelican Isle Yacht Club	105	105	n/a	5 new	190	n/a
**Island Marina					54	n/a
*South Bay Marina	10	7	3		18	n/a
Bayfront Marina	17	17	n/a	13	42	n/a
**Naples Harbour Yacht Club			100		n/a	600
The Docks on Fifth	10	10	n/a	3 new	57	~93 planned
***Naples Bay Yacht Stowage					n/a	150
***Naples Boat Club					47	167
***Naples Sailing and Yacht Club					78	n/a
Naples City Dock at Crayton Cove	35	35	n/a	42	83	n/a
***Naples Yacht Club (winter mailing)					74	n/a
**Hamilton Harbor					35	325
Pelican Bend Marina	5	5	n/a	7	20	n/a
Isles Of Capri Marina	8	8	n/a	13	37	n/a
The Marina at Factory Bay	15	15	n/a	29	72	n/a
Marco River Marina	224	100	124	32	115	124
Marco Island Yacht Club	61	61	n/a	73	121	n/a
Cedar Bay Marina & Yacht Club	73	n/a	73	n/a	n/a	318
Esplanade	16	16	n/a	41	77	n/a
***Calusa Island Yacht Club & Marina					84	452
**Walker's Coon Key Marina					45	180
Port of the Islands Resort & Marina	50	15	35	37	170	70
Glades Haven Marina (winter mailing)	0			5	21	n/a
Chokoloskee Is. Resort & Marina (winter)	0			3	37	n/a
Tarpon Club Marina (under construction)	n/a			16	32	140
Everglades Isles Motorcoach Resort (under construction)	n/a			n/a	~122	
TOTAL	**820**	403	417		**~1,665**	**~2,709**

*Charter/rental vessels; not included in survey distribution

**Participation declined or unable to contact

***Survey addressing & mailing done by marina personnel (five marinas)

Figure 2. Collier County Marinas Surveyed

Identifying Ramp Patrons

FSG extension faculty and local individuals hired by FSG visited 13 area ramps (Table 2 and Figure 3) to collect license plate numbers associated with boat trailers and corresponding tow vehicles that were observed in ramp parking areas. All ramps were sampled on three weekend days per month. Three field workers were each assigned specific ramps to visit on the designated days so that all ramps could be sampled within a high use period, approximately 9:30 AM to 1 PM. Random weekday visits were also included for some of the busier ramps. The collection period ran for one year (June 2008–June 2009). Data collectors recorded 7,803 new and repeat users (Table 2). (The accompanying data CD–ROM includes an Excel spreadsheet that details ramp visits and tag counts.)

Vessel trailer and tow vehicle information was compared to trailer and vehicle registration databases to yield corresponding names and mailing addresses for ramp patrons. A total of 1,339 unique (non-repeat) ramp patrons, of 1,927 total tag entries (trailer/tow alone or in combination) recorded at ramps, were identified for the first mailing conducted in September 2008. Another 896 unique (with respect to all users identified to that point) ramp patrons received a first–time survey in February 2009, out of 2,224 total tag entries made from visits during mid-September through mid-January. Finally, 1,431 unique users received a first–time survey in June 2009, identified from 3,652 total tag entries made from late January 2009 through June 2009. A total of 3,666 ramp users (from 7,803 tag entries) received a first–time questionnaire.

Table 2. Surveyed Collier County Ramps: Visit Numbers and Recorded Tag Counts

Ramp Name	Total Number of Visits	Total Number of Weekend Visits	Total Tag Count*	Total Weekend Tag Count	Avg. Tag Count per Weekend Visit
Bayview Park	49	38	1,324	1,184	31
Caxambas Park	47	38	1,095	998	26
Outdoor Resorts of America	47	37	919	793	21
Collier Boulevard (951)**	48	38	904	789	21
Calusa Island YC and Marina	47	38	819	719	19
Cocohatchee River Park	45	38	797	759	20
Naples Landing	39	37	619	612	17
Port of the Islands	36	36	420	420	12
Glades Haven	36	36	278	278	8
Rookery Bay	36	36	261	261	7
Chokoloskee Island Park	36	36	189	189	5
Delnor-Wiggins State Park	36	36	138	138	4
Collier Seminole State Park	34	34	40	40	1
TOTALS	**536**	**478**	**7,803**	**7,180**	**15**

*Total number of trailer/tow vehicle observations at ramps over the entire survey period. If both trailer and tow tags were available for a given patron, this counted as a single "tag entry."

**Visits and/or tag counts were compromised by construction during significant portion of study period.

Figure 3. Collier County Public Boat Ramps Surveyed

Identifying Home Dock Users

A sample of residential dock users was selected by matching owner names and mailing addresses in Florida's Vessel Title Registration System (VTRS) to waterfront parcel owner and address information from Collier County property tax records—identifying waterfront parcel owners who also owned boats. A GIS "select by location" analysis used a detailed shoreline theme to identify waterfront properties in the Collier County tax assessor's parcel database. A GIS database operation that evaluated owner last name, street name, and the mailing street number yielded 2,161 matches between the VTRS records and waterfront parcels (Figure 4), from which home dock users were selected.

Figure 4. Spatial Distribution of the Collier County Dock Sample

Survey Return Breakdown

Questionnaires were mailed in three waves, over a one-year period, to capture seasonal use patterns. Smart Mail Services Inc. validated boater addresses and conducted each mailing (apart from the mailing conducted by five marinas to their own patrons). Table 3 is a breakdown, by waterway access group, of the number of surveys mailed and returned for each seasonal mailing. A total of 2,077 surveys were returned by August 19, 2009, a 22.2% overall return rate.

Table 3. Survey Return Breakdown

September 2008 Survey Wave			
Access Type	**Total Mailed**	**Surveys Returned**	**Return Rate (%)**
Marina	1,207*	216	17.9
Home Dock	2,000	326	16.3
Ramp	1,339	246	18.4
Kayak (outfitter handouts)	50	10	20.0
All Access Types	**4,596**	**798**	**17.4**

February 2009 Survey Wave			
Access Type	**Surveys Mailed**	**Surveys Returned**	**Return Rate (%)**
Marina (Long Survey)	616**	84	13.6
Marina (Short Survey)	168	90	53.6
Home Dock (Long Survey)	161	39	24.2
Home Dock (Short Survey)	318	161	50.6
Ramp (Long Survey)	896	174	19.4
Ramp (Short Survey)	248	122	49.2
All Access Types	**2,407**	**670**	**27.8**

June 2009 Survey Wave			
Access Type	**Surveys Mailed**	**Surveys Returned**	**Return Rate (%)**
Marina (Short Survey)	237	84	35.4
Home Dock (Short Survey)	355	143	40.3
Ramp (Short Survey)	333	145	43.5
Ramp (Long Survey)	1,431	237	16.6
All Access Types	**2,356**	**609**	**25.8**

*704 of which were mailed independently by four marinas to their patrons
**100 of which were mailed independently by one marina to its patrons

1.3. GIS Database Development

Spatial Database Design: Trip Origins, Travel Routes, and Destinations

Questionnaire recipients were asked to (1) mark on a map the starting points of their last two pleasure boating trips, (2) draw their entire travel routes, (3) identify activity locations along those routes, and (4) annotate the map with abbreviations for those activities. Not all returned surveys included spatial information or were of sufficient quality to be digitized. Data from 1,847 surveys (89.0% of total returns, or 691 summer returns, 613 fall/winter returns, and 543 spring returns) were digitized into the ESRI ArcGIS geographic information system (GIS). This yielded a sample of 3,770 trip departure sites and travel routes (some respondents reported only one trip) and 6,162 boating destinations (Table 4). Respondents were also asked to indicate by the letter C any places on the map they considered congested and by the letter A where they desired greater or improved waterway access. "C" and "A" mapped points totaled 1,047 and 296, respectively.

Table 4. Trip Features Digitized from Returned Surveys

Trip Features	Summer Returns	Fall/Winter Returns	Spring Returns	All Returns
Origins	1,376	1,330	1,064	3,770
Activity Locations	2,029	2,195	1,938	6,162
Travel Routes	1,376	1,330	1,064	3,770

Spatial information was digitized "on-screen" using a 1:24,000 scale shoreline, natural color Digital Orthophotograph Quarter Quadrangle (DOQQ) imagery, and the positions of marinas, ramps, navigation aids, and artificial reefs as background themes to enhance the accuracy. Trip departure sites, congestion spots, and locations of desired additional access were digitized as point features, with each record coded with the survey control number and, where appropriate, the trip number (i.e., first or second trip). A marina or ramp origin was also coded with the map legend number for the respective facility name. Destination/activity sites were digitized as point features and were coded with the survey control number, the trip number, and the type of activity. Travel routes were digitized as line features with the following attribute information coded: survey control number, trip number, and trip features such as one-way vs. round trip, and whether or not the trip was confined to the study region. Off-map trip attributes included ultimate destinations and associated activities.

The database structure allows information from survey questions to be linked to digitized spatial information via the survey control number (ID), which uniquely identifies spatial and attribute information provided by each survey respondent. Figure 5 illustrates the selection and display of destination point data within the GIS. A close-up of the southern Keewaydin Island boating area is displayed in the GIS view. Yellow symbols represent all destination sites, regardless of activity, in the area identified by survey respondents for summer mailings. Blue dots represent a subset of destination sites with a beach picnic (BP) activity attribute. The Select by Attributes window—upper right corner of Figure 5—illustrates a GIS database query that selects and highlights in blue on the GIS view those destination points with a "beach picnic" attribute.

The Selected Attributes of Destinations window—bottom of Figure 5—displays a portion of the 114 selected database records in blue. These records share the query criterion of beach picnic (BP field, the yellow highlighted column in the table).

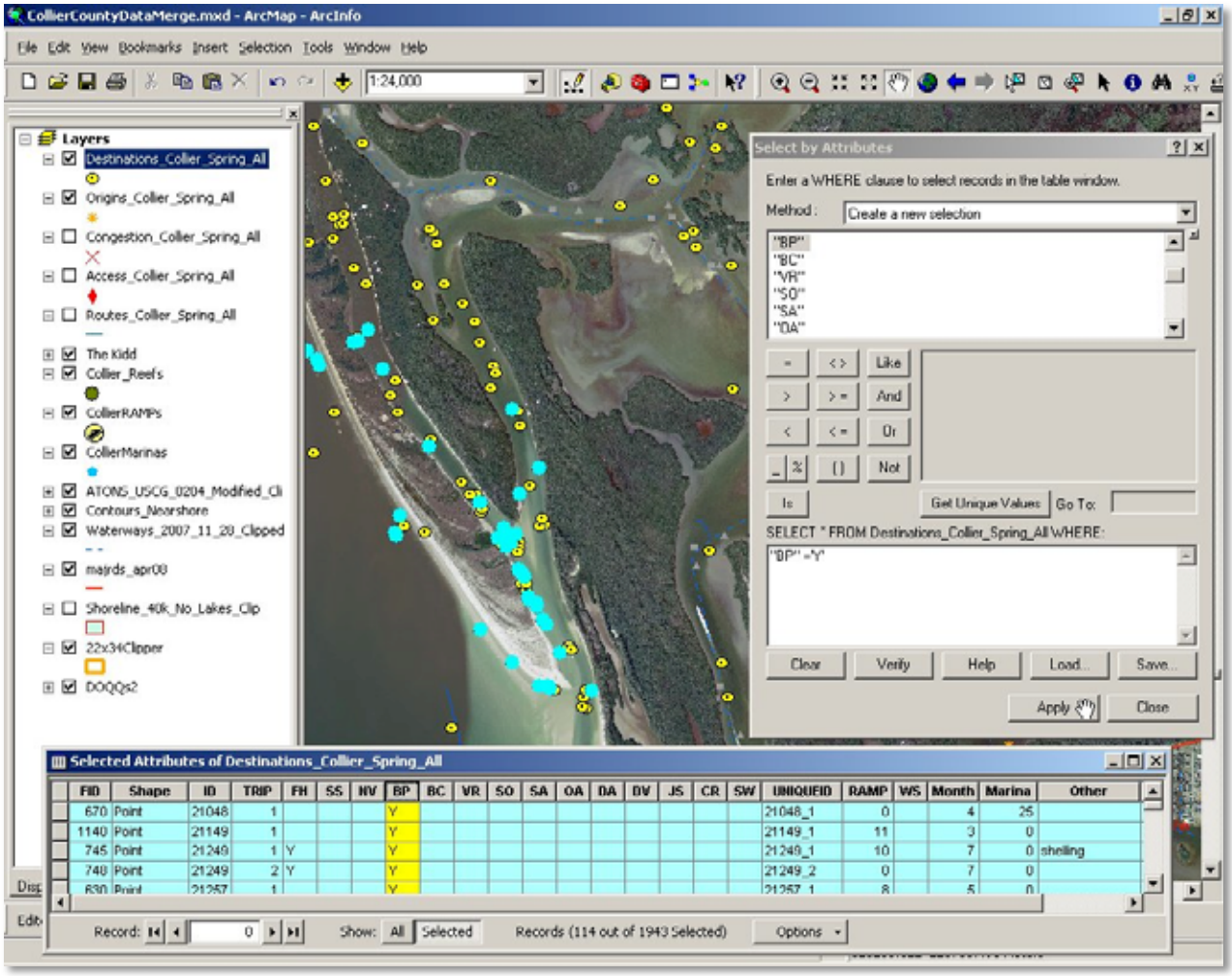

Figure 5. Example of GIS Attribute Query and Display: User–Selected Destination Activity (Beach Picnic)

Figure 6 displays reported summer travel routes in the vicinity of Naples and Gordon Pass. Pink lines represent travel routes digitized from returned surveys; orange symbols represent digitized departure sites. The blue lines depicted in the GIS view represent part of a round–trip travel route that was selected for display. The corresponding database record that is linked to the travel route via the survey control number ID is highlighted in blue in the feature attributes database window—lower center of Figure 6.

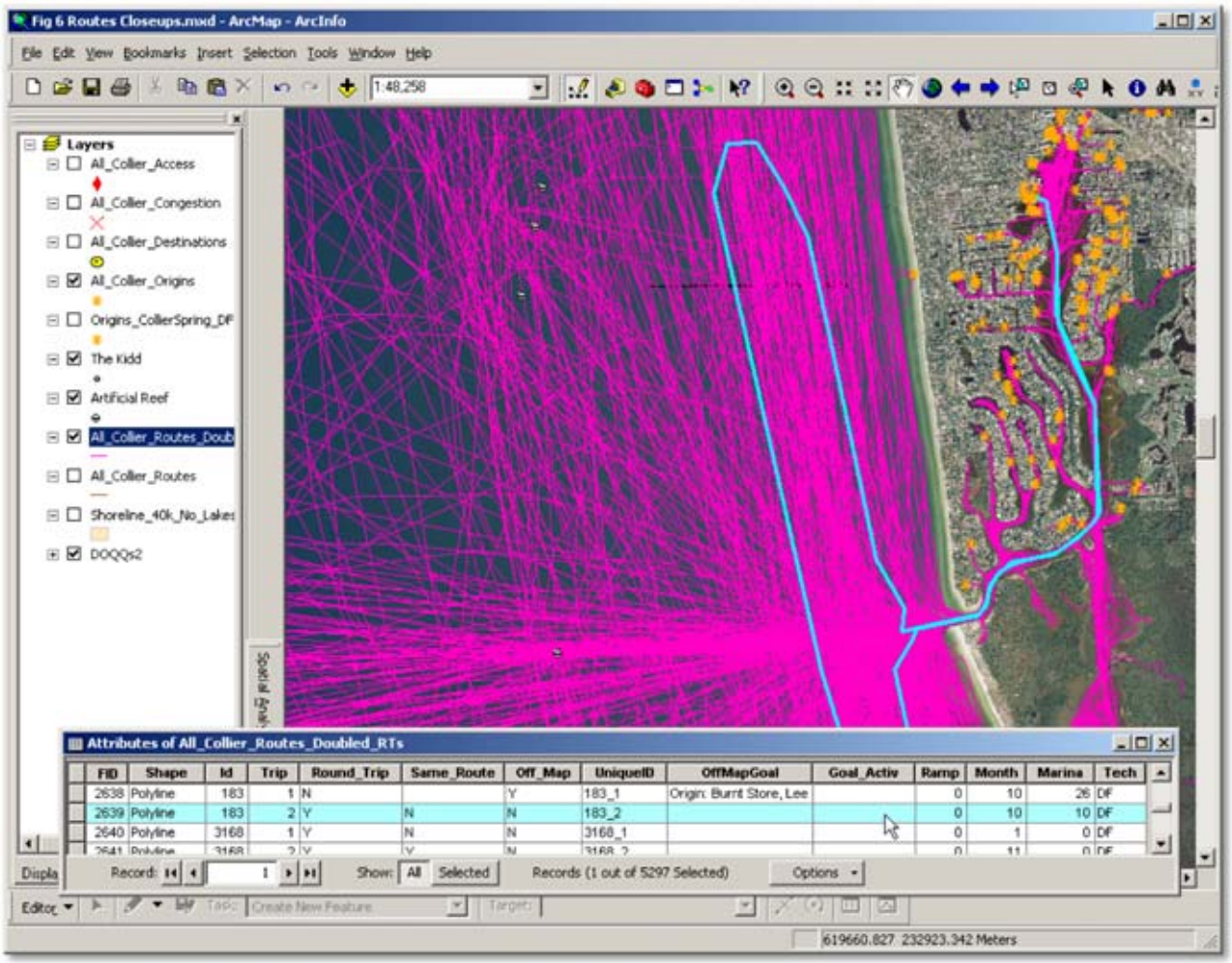

Figure 6. Example of GIS Attribute Query and Display: Reported Travel Routes

Part 2–Study Analysis

2.1. Boater/User–Group Characteristics

Overview

This chapter presents an evaluation and summary of the responses of boaters who participated in a mail survey about their boating activities within the Collier County study region. Data were collected from three waves of mail surveys sent out during the summer of 2008, the fall/winter of 2008-09, and spring of 2009. The three survey waves were employed to obtain coverage and information as to recreational boating activities, trips, and boater characteristics as they occur and/or vary over the course of the year.

The sections of this chapter on Boater/User-Group characteristics are divided up according to themes that describe (1) recreational boater profiles and vessel types; (2) choice rationale for selecting departure sites and travel routes within the study area; (3) boating trip departure times (AM and PM); (4) boating trip durations (daytrips and overnight trips); (5) types of boating activities in which survey participants engage; (6) drive time from home to departure sites by various user groups (ramp, home/condo dock, and marina wet slip and dry storage users); and (7) reasons for avoiding specific departure sites.

Note that while the survey instrument and questions were arranged to follow a logical progression, the following results and corresponding summary sections are arranged thematically and, therefore, the specific questions addressed do not necessarily follow the order in which they appeared on the survey instrument.

The descriptive analysis presented in this chapter is based on information provided by the N=2,057 survey respondents who returned completed mail surveys (obtained from a database comprising all surveys processed on or before the cut-off date of July 24th, 2009). There were 670 surveys (or 32.6% of the total) returned from the first wave of mailings that took place in the summer of 2008, 589 surveys returned from the fall/winter 2008-09 mailing (representing 28.6% of the total), and 798 (or 38.8% of the total) from the spring mailing of 2009. In general, the overall sample size, as well as those obtained from the various waves, were more than adequate from a statistical standpoint and allowed for a margin of error of less than 5% at the 95% confidence level (easily exceeding the estimated target of *N=380*).

Note, however, that the number of survey responses to the various survey questions or combinations of questions varies somewhat, as does the sample size associated with the various user groups or water access categories and/or seasons, based on participant response rate to specific questions. In the vast majority of cases and scenarios considered, the sample sizes remained adequate for the purposes of this study (and well within the targeted 5% margin of error). For convenience, the sample sizes are listed within each summary table and information is provided on the question(s) for which the summary statistics were obtained based on survey responses to the question(s). A copy of the survey instrument is provided in Appendix A.

Vessel and Boater Profiles: Waterway Access Categories, Vessel Type, and Boater Experience

Survey Participation by User Group

Table 5 shows frequency counts and a percentage breakdown of survey respondents by waterway access category (WAC). Five specific WACs are used in this analysis, defining boaters who depart from public Boat Ramps, Home/Condo Docks, Marina Wet Slips, Marina Dry Storage facilities, or a Shoreline/Causeway.

Of the n=1,925 survey respondents who answered Question 7 of the survey (pertaining to departure site type for last two trips)—approximately 44% accessed the waterways from a Boat Ramp for Trip 1. (Note: Since each survey respondent had to be represented with only a single access type for the purpose of this analysis, a single trip departure site was required. Trip 1 was used, since not all respondents reported two trips.) Those launching boats from Home/Condo Docks for Trip 1 accounted for approximately 33% of survey respondents. Together, these two groups accounted for about 77% of the survey respondents who answered Question 7 for Trip 1.

Respondents accessing the waterways from Marina Wet Slips accounted for fewer than 12% of the boaters participating in the survey, while those using Marina Dry Storage facilities accounted for fewer than 10% of the survey participants. Note that survey respondents associated with the Shoreline/Causeway waterway access category accounted for only 1% of the sample. (Table 5; Question 7, Trip 1)

Table 5. Survey Responses by Waterway Access Category (WAC)

Access Category	Frequency count	Percentage of total	Rank
Boat Ramp	850	44.2%	1
Home/Condo Dock	644	33.4%	2
Marina Wet Slip	225	11.7%	3
Marina Dry Storage	186	9.7%	4
Shoreline/Causeway	20	1.0%	5

n = 1,925 respondents to Question 7, Trip 1

Vessel Type

A summary breakdown of the vessels used by Collier County survey respondents is given in Table 6. The table is arranged so that the most frequently used vessel types are listed first and the least frequently used last. Of the n=1,912 survey responses to Question 5 for Trip 1 (pertaining to vessel type), approximately 53% of those respondents used boats in the Open Fisherman category—the most common vessel category found amongst survey participants—followed by Power Cruisers at 11%. These two vessel types account for almost two-thirds (64%) of all vessels used by Collier County survey respondents who reported Trip 1 in Question 5 of the survey.

The Deck Boat and Speedboat (Runabout) categories each accounted for around 9% of the vessels used by survey respondents, placing them at a distant third and fourth place, respectively. At fifth place was the Off-Shore Sport Fisherman, which accounted for about 7% of the vessels associated with survey participants. Note that Sailboats (with Cabin) and Speed Boats of the

Scarab/Cigarette variety each accounted for approximately 3% of the identified vessels used by survey respondents. The remaining vessel types, which include Pontoon Boat, Kayak/Row/Canoe, and Jet Ski/Personal Watercraft, each accounted for 2% or less of the vessel types associated with trips reported by survey respondents. The Sailboat (no Cabin) category was the least represented, accounting for markedly less than 1% of the vessels identified by survey respondents. (Table 6; Question 5, Trip 1)

Table 6. Vessels Used by Survey Respondents for Reported Trips

Vessel type	Frequency count	% of total	Rank
Open Fisherman	1,017	53.2	1
Power Cruiser (with Cabin)	206	10.8	2
Deck Boat	167	8.7	3
Speed Boat (Runabout)	164	8.6	4
Off-Shore Sport Fisherman	128	6.7	5
Sailboat (with Cabin)	57	3.0	6
Speed Boat (Scarab/Cigarette w/ Cabin)	49	2.6	7
Pontoon Boat	38	2.0	8
Kayak/Row/Canoe	33	1.7	9
Jet Ski/Personal Watercraft	32	1.7	10
Other	17	0.9	11
Sailboat (no Cabin)	4	0.2	12

n = 1,912 respondents to Question 5, Trip 1

Vessel Length and Draft

Average length and draft statistics for vessels used in reported trips by survey respondents (Question 6, Trip 1) are shown in Table 7. The survey results reveal that the average (mean) vessel length was greatest for Marina Wet Slip users at 33.2 feet, followed by Dock users at 25.2 feet. Vessel lengths associated with Marina Dry Storage users averaged slightly less than 24 feet. Not surprisingly, the shortest vessel lengths were associated with survey respondents launching from Boat Ramps (18.8 feet) and Shoreline/Causeway (14.1 feet). For all Waterway Access Categories, the category–specific median vessel length was very similar to the average (mean) vessel length. This indicates a fairly symmetrical distribution of values about their respective centers. The 95% confidence band for the mean vessel length, as shown in Table 7, was 22.6 to 23.4 feet (or within approximately 0.5 feet of the estimated mean vessel length). This interval is likely to contain the actual (though unobserved) average length in the statistical population.

Similarly, the average (mean) and median vessel drafts were deepest for respondents departing from Marina Wet Slips (with a mean and median draft of approximately 3 feet); followed by users of Marina Dry Storage facilities and boaters departing from Docks (with mean and median drafts of approximately 2 feet). As expected, the shallowest vessel drafts were associated with respondents departing from Boat Ramps and the Shoreline/Causeway, with a mean vessel draft of approximately 1.2 and 0.5 feet, respectively. The median draft (in feet) for

Boat Ramp users was 1.0 foot, and the median draft for respondents departing from the Shoreline/Causeway was 0.5.

Based on the n=1,882 respondents to the survey question on Vessel Length by Water Access Category, it was shown that the overall mean vessel length was approximately 23 feet, with a median vessel length of 21 feet. Of the n=1,832 respondents to the survey question on vessel draft and Waterway Access Category, the mean vessel draft was 1.8 feet, and the median vessel draft was 1.5 feet. As noted earlier, the largest vessel length and draft values were associated with respondents departing from Marina Wet Slips, with a median vessel length (vessel draft) of approximately 33 feet (3 feet). (Table 7; Question 6, Trip 1)

Table 7. Vessel Length and Draft Statistics by Water Access Category

	Length (ft.)			Draft (ft.)		
Access Category	**Count**	**Mean**	**Median**	**Count**	**Mean**	**Median**
Boat Ramp	829	18.8	18	820	1.2	1.0
Dock	625	25.2	23	600	2.0	1.9
Marina Wet Slip	222	33.2	32	218	3.0	3.0
Marina Dry Storage	186	23.6	23	177	2.0	2.0
Shore/Causeway	20	14.1	14	17	0.5	0.5
All Categories	**1,882**	**23.0**	**21**	**1,832**	**1.8**	**1.5**
95% Conf. Interval:	**(22.6 – 23.4 ft.)**			**(1.70 – 1.81 ft.)**		

Years of Boating Experience

Summary statistics for years of reported boating experience of Collier County survey participants are shown in Table 8. A graph of the distribution of values is shown in Figure 7. Survey respondents had, on average, 15.4 years of recreational boating experience, with a median of 12 years boating experience. The most common answer among the n=1,269 survey respondents to Question 17 was 20 years boating experience (the mode).

It was estimated that the mean number of years of boating experience among survey respondents was somewhere between 14.8 and 16.0 years overall, based on the estimated 95% confidence interval for the mean. The maximum reported number of years boating experience was 75 years, and the minimum number was 0.02 years (or roughly 1 week). (Table 8; Question 18)

Table 8. Years Boating Experience in Florida for All Respondents (n=1,269)

Statistic*	Boating Experience in Florida
Average (overall)	**15.4 years**
Standard Deviation	11.4 years
Minimum	1 week
Maximum	65 years
Median (overall)	12 years
Mode	20 years
95% Confidence Interval	14.8 years –16.0 years

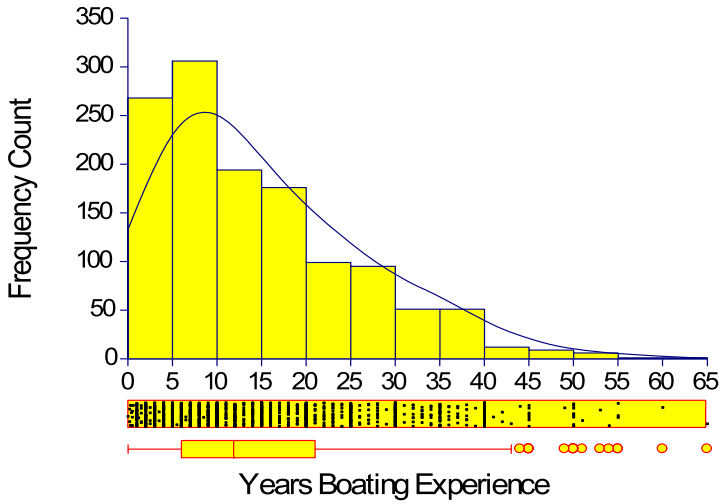

Figure 7. Histogram and Box Plot of Years Boating Experience for All Respondents (n=1,269)

Years Boating Experience by Waterway Access Category

Survey respondents who accessed the water from Home and Condominium Docks tended to have the greatest amount of boating experience, with approximately 17 years of on-water vessel operating experience on average (and a median of 15 years). All other respondents, from the remaining waterway access categories, had an average number of years of boating experience that was either not significantly different from the overall average or an average that fell below the overall average for all survey respondents (when compared to the overall mean of 15.4 years and a median of 12 years).

Boaters departing from Marina Dry Storage facilities or a Shoreline/Causeway tended to have the least boating experience—with an average of 10.9 years, and a median of 12 years boating experience, or an average of 7.6 years, and a median of 3.5 years, respectively. (Table 9; for Questions 7 and 17)

Table 9. Years of Boating Experience by Waterway Access Category

		Years of Experience				
Access Category	**n**	**Mean**	**Standard Deviation**	**Median**	**Min**	**Max**
Boat Ramp	605	15.8	11.9	14	.02	65
Home/Condo Dock	387	17.1**	11.4	15**	1.0	60
Marina Wet Slip	146	13.4	9.8	10	1.0	40
Marina Dry Storage	116	10.9*	8.6	8*	0.5	45
Shoreline/Causeway	14	7.6*	8.8	3.5*	0.2	28
All Categories	**1,268**	**15.4**	**--**	**12**	**0.02**	**65**

* Denotes less-than-average experience—values that are significantly less than the overall mean of 15.4 years at the 95% confidence level, with median values < 12 years. Also, significantly less boating experience than all other waterway access groups.

** Denotes greater-than-average experience—values that are significantly greater than the overall average of 15.4 years at the 95% confidence level, with median > 12 years.

Boating Safety Course Completion

Summary statistics on the percentage of Collier County survey respondents that reported completing a boater safety or seamanship course (based on responses to Question 18 of the survey instrument) are given in Table 10. Roughly 68% or 860 of the n=1,265 survey respondents indicated that they have had a boating safety or seamanship course.

Respondents launching their boats from Boat Ramps or a Shoreline/Causeway tended to be the least likely to have had a boating safety or seamanship course. Note that the percent of respondents departing from Boat Ramps having completed a seamanship course is approximately 57%, a value that is significantly less than the overall average of 67.9%. Only 6 out of 14 (42.8%) of the respondents who reported launching their boat from the Shoreline/Causeway indicated that they had complete a boater safety course.

Survey respondents accessing the water from Marina Wet Slips were the most likely to have had a boating safety or seamanship course (with approximately 87% of respondents indicating that they had complete a boating safety course); followed by boaters departing from Marina Dry Storage facilities (77%) and Home/Condo Docks (75%). The percentage of boaters who had completed a seamanship course from each of these three categories is found to be significantly greater than average when compared to all survey respondents and all Waterway Access Categories. (Table 10; Question 18)

Table 10. Numbers of Boaters Having Completed a Boat Safety/Seamanship Course

Access Category	n	Yes	Percentage	Above Average*
Boat Ramp	606	349	57.6%**	No
Home/Condo Dock	385	289	75.1%*	Yes
Marina Wet Slip	145	126	86.9%*	Yes
Marina Dry-Storage	115	89	77.4%*	Yes
Shoreline/Causeway	14	6	42.8%**	No
All Categories	**1,265**	**860**	**67.9%**	**-**

* Indicates a significantly above-average percentage at the 95% confidence level.
** Indicates a significantly less-than-average percentage at the 95% confidence level.

Age of Survey Respondents

A breakdown of the age of Collier County survey participants by Waterway Access Category is given in Table 11. The distribution of age for the n=1,265 respondents to Question 19 (where age = 2009-year born) is illustrated in Figure 8. The results indicate that survey respondents were approximately 57 years of age on average, with a standard deviation of approximately 12 years. Note that 58 years was the median age of all respondents.

Survey respondents who accessed the waterways from Marina Dry Storage facilities tended to be the oldest recreational boaters in the sample, with an average age of 64 years and a median age of 65 years. Respondents in this waterway access category were found to be significantly older than the average survey respondent, by an average of about seven years.

Respondents launching their vessels from Home/Condo Docks and Marina Wet Slips were found to be roughly five years older than the average survey respondent (or approximately 62

years of age); and significantly older than the overall average age for all respondents at the 95% confidence level (which was estimated at approximately 57 years). The median age of those launching from either Home/Condo Docks or Marina Wet Slips was 63 years, significantly older than the overall median of 58 years of age for all survey respondents.

Survey respondents launching from Boat Ramps tended to be about 5.5 years younger than the average survey respondent, and about 11-12 years younger than respondents departing from Marinas or Docks. The average (median) age of survey respondents departing from Boat Ramps was 51.7 (51) years. The average and median ages for respondents in this category were both significantly younger than for all survey respondents.(Table 11; Questions 7 (Trip 1) and 19)

Table 11. Age of Boaters by Waterway Access Category

		Age (in years)				
Access Category	**n**	**Average**	**Std. Dev.**	**Median**	**Min**	**Max**
Boat Ramp	605	51.7**	11.4	51**	16	87
Home/Condo Dock	384	62.1*	11.0	63*	27	88
Marina Wet-Slip	145	62.8*	10.5	63*	29	83
Marina Dry Storage	116	64.0*	11.2	65*	33	89
Shoreline/Causeway	14	58.7	13.3	60	24	79
All Categories	**1,265**	**57.3**	**12.4**	**58**	**16**	**89**

Note: 95% confidence interval for the mean: 56.6 to 58.0 years of age
* Denotes significantly above-average value or significantly larger median value (95% confidence)
** Denotes significantly below-average value or significantly smaller median value (95% confidence)

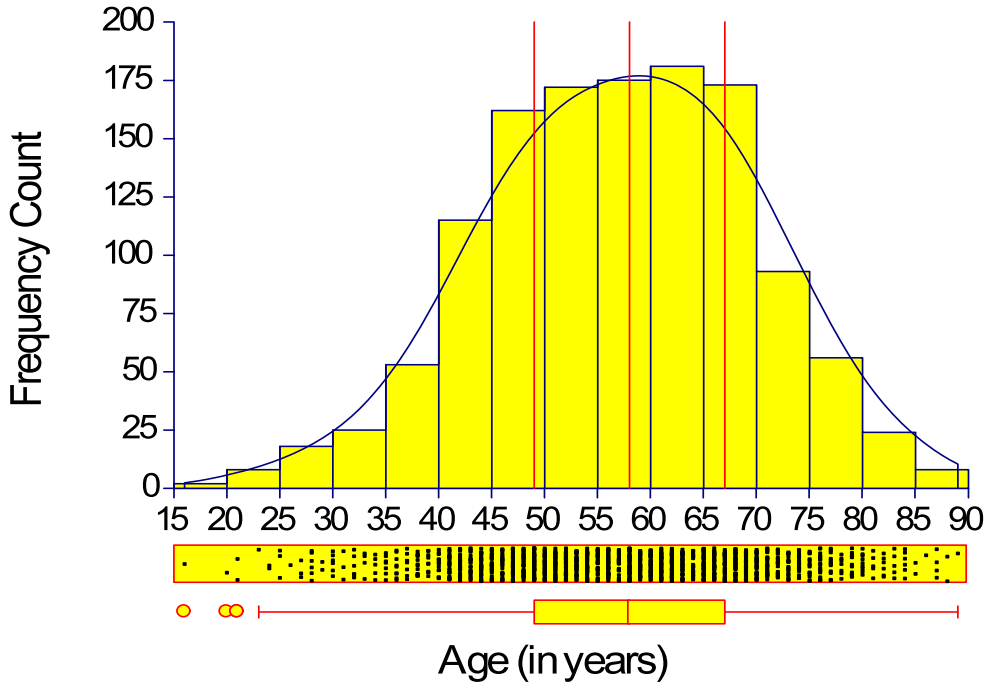

Figure 8. Histogram and Box Plot showing the Age of Survey Participants

Drive Time from Home to Departure Site

This section reports summary statistics on the reported Drive Times from home to departure sites for survey respondents who completed Questions 7 and 9, and who launched their vessel from a Boat Ramp, Marina Wet Slip, or Marina Dry Storage facility. Table 12, which contains drive time statistics for all Trip 1 responses, suggests the presence of outliers (i.e., large and extreme drive time values). Specifically, Table 12 reveals relatively large difference(s) between mean and median drive times. To control for the impact of the drive time outliers, Table 13 presents statistics for all Trip 1 and Trip 2 drive times that were equal to or less than three hours (i.e., excludes outliers). Also, Figure 9 illustrates the distribution of drive time values associated with drive times of three hours or less. To conclude this section, results are reported for trips where respondents reported extreme drive time values.

The overall mean drive time to a departure site based on all Trip 1 responses was approximately 31 minutes (Table 12). In contrast, when examining only trips with drive times equal to or less than three hours (excluding outliers), the mean drive time was roughly 24 minutes (Table 13). The larger sample size (n=3,630) achieved by analyzing Trips 1 and 2, and the absence of outliers, enabled a precise indication of the average drive time of boaters to their respective departure sites, as implied by the tight 95% confidence interval for the mean drive time (shown to be between 23.5-25.7 minutes). In short, the average drive time to a departure site, excluding outliers or extreme values, is roughly between 23 and 25 minutes for County boaters who launch from a Collier County Ramp or Marina.

On average, survey respondents launching from Marina Dry Storage and Marina Wet Slip facilities were shown to have drive times of between 30 and 34 minutes, values that were not significantly different from the average drive time of 31 minutes (Table 12). These two groups had average drive times that also were significantly less than the average drive time of respondents launching from Boat Ramps. Note, however, that the *maximum* reported drive time to a departure site for Marina Dry Storage facility users was the highest among all Waterway Access Categories at 900 minutes or 15 hours (an extreme value). Maximum reported drive time for a Marina Wet Slip user was 510 minutes or 8.5 hours (also an extreme value). Values such as these tend to inflate the mean drive times. Once the outliers were excluded, the mean drive times for Marina Wet Slip and Marina Dry Storage facility users were shown to be approximately 27 and 23 minutes, respectively (Table 13.)

Survey respondents departing from Boat Ramps tended to travel an average of approximately 53 minutes from home to a launch site. Note that the average drive time for Boat Ramp users is significantly longer than the average drive time of all respondents, and approximately 21-22 minutes longer than the average drive time associated with respondents from all Waterway Access Categories. Note that the maximum reported drive time for a Boat Ramp user was 360 minutes or 6 hours. Once outliers were eliminated, the average reported drive time from home to departure sites for Boat Ramp users was approximately 43 minutes (Table 13).

Table 12. Drive Times from Home to Departure Site for Reported Trips > 3 hours†

		Drive Time Statistics (in minutes)			
Access Category	**n**	**Mean**	**Median**	**Max**	**95% Confidence Interval**
Boat Ramp	846	52.5*	30*	360**	48.5–56.4
Marina Wet-Slip	199	33.8	15	510**	25.7–41.8
Marina Dry Storage	166	30.2	20	900	18.9–41.4
All Categories	**1,875**	**30.9**	**15**	**900**	**28.4–33.4**

† Results based on reported drive times for Trip 1 only.
* Significantly greater than the overall average or maximum at 95% confidence level
** Significantly less than the overall average or maximum at 95% confidence level

Table 13. Drive Times from Home to Departure Site for Trips with Drive Times ≤ 3 hours

		Drive-Time Statistics (in minutes)		
Access Category	**n**	**Mean**	**Median**	**95% Confidence Interval**
Boat Ramp	1,578	43.3	30	41.4 – 45.3
Marina Wet Slip	383	26.8	15	23.5 – 30.2
Marina Dry Storage	329	22.7	20	20.7 – 24.7
All Categories	**3,630**	**24.6**	**15**	**23.5 – 25.7**

† Results based on reported drive times for Trip 1 and Trip 2

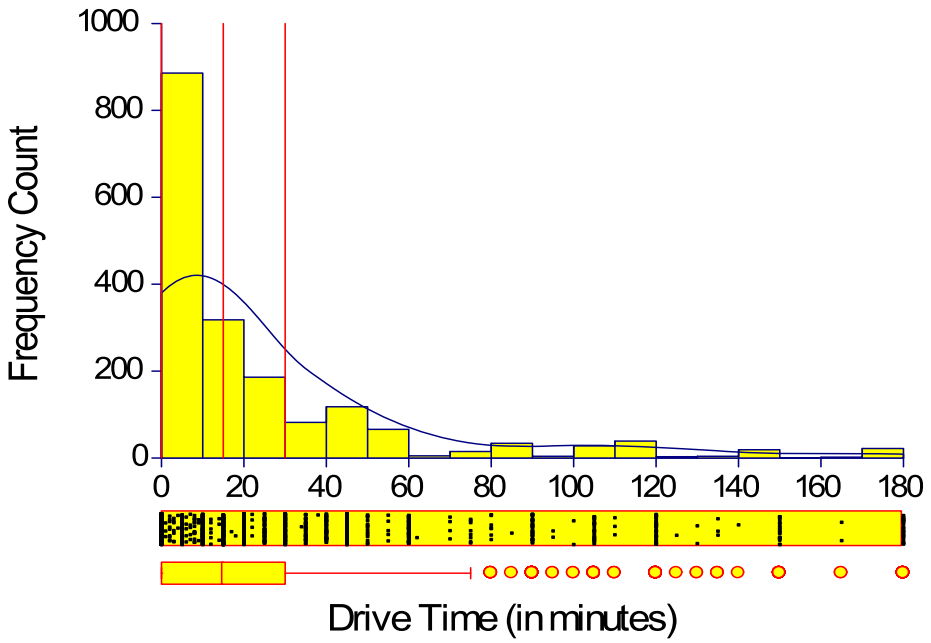

Figure 9. Histogram and Box Plot of Drive Times for Boaters/Respondents Traveling Three Hours or Less to their Departure Sites

Finally, 44 respondents reported drive times of longer than 3 hours. The mean drive time for this group was approximately 4.5 hours (standard deviation = 113.7 minutes) and the median was 4 hours. The 95% confidence interval for the mean drive time was 240 to 309 minutes. The mean (median) drive times in minutes by Water Access Category were (a) Boat Ramp: 255 (240), (b) Marina Wet Slip: 306 (270), and Marina Dry Storage: 600 (600).

Departure Times (AM and PM)

Statistics on departure times of Collier County survey participants are shown in Table 14. Note that the average AM and PM start times for reported trips by survey respondents (in response to Question 1) were highly variable amongst the various Waterway Access Categories (WACs). Also, note that of the 1,830 responses, 90% were for morning departure times and 10% for afternoon departure times.

The 765 respondents who departed from Boat Ramps in the morning launched earlier than did respondents from the other Waterway Access Categories (WACs), with an average departure time of 7:55AM. The 51 Boat Ramp users who reported afternoon departure times tended to depart later than other WACs, with an average departure time of 3:30PM. In general, Boat Ramp users who participated in the Collier County survey reported AM starting times that were significantly earlier than the average starting time of 8:35AM; they also reported PM departure times significantly later than the overall average PM starting time of 2:28PM for all WACs.

On average, survey respondents departing from Home/Condo Docks, Marina Wet Slips, Marina Dry Storage facilities, and a Shoreline/Causeway tended to begin their AM trips later than the average respondent, with departure times that were significantly later than the overall average start time of 8:35AM by roughly a half an hour. Survey respondents departing from Marina Wet Slips, Marina Dry Storage facilities, and a Shoreline/Causeway tended to have average PM

departure times that ranged from approximately 1:00PM to 1:45PM. Note that these PM departure times were significantly earlier than the overall average afternoon departure time of 2:28PM of boaters from all WACs. Survey respondents departing from Docks tended to have an average PM departure time that was not significantly different from the average PM departure time of 2:28PM. (Table 14; Question 1-AM, 1-PM and Question 7, Trip 1)

Table 14. Average Trip 1 Departure Times by Waterway Access Category

		Average Departure Times		
Access Category	**n**	**AM**	**n**	**PM**
Boat Ramp	765	7:55*	51	3:30**
Home/Condo Dock	492	9:07**	112	2:14
Marina Wet Slips	199	9:02**	16	1:45*
Marina Dry Storage	168	9:34**	7	12:55*
Shoreline/Causeway	18	9:14**	2	12:59*
All Categories (n)	**1,642**	**8:35**	**188**	**2:28**

* Denotes a trip departure time that is significantly earlier than the average start time for all waterway access groups (at the 95% confidence level).
** Denotes a trip departure time that is significantly later than the average start time for all waterway access groups (at the 95% confidence level).

Trip Duration: Day Trips (Trips less than or equal to 24 hours)

On-water trip duration statistics by Water Access Category are shown in Table 15 for all reported trips equal to or less than 24 hours (i.e., for trips characterized as “day trips”).

The summary statistics in this section are based on the n=3,237 total reported trips associated with Question 2 of the survey instrument (combining Trips 1 and 2). Note that the average overall day trip duration for survey participants was 5.7 hours (or 5 hours and 42 minutes).

Survey respondents launching from Boat Ramps tended to spend more time on the water than those accessing the water from other departure sites for reported trips of 24 hours or less in duration. Boaters/respondents from this group tended to spend about 1 hour more on the water than did the typical survey respondent. The average trip duration of respondents departing from Boat Ramps was approximately 6.7 hours (equivalent to 6 hours and 42 minutes).

Boaters departing from Home/Condo Docks were shown to have an average day trip duration of approximately 4.8 hours—a value that was markedly below the average day trip duration of survey respondents in all Waterway Access Categories; averaging about 55 minutes less time on the water than boaters from other user groups.

Survey respondents departing from Marinas or a Shoreline/Causeway had average trip durations that were not significantly different from the overall average for all respondents, with day trip durations ranging from approximately 5 to 5.5 hours.

All in all, reported trip durations for trips $\leq$ 24 hours (day trips) were longest for survey respondents departing from Boat Ramps and shortest for respondents departing from Home/Condo Docks and a Shoreline/Causeway, based on the calculated mean and median values obtained from responses to the survey. (Table 15; Question 2)

Table 15. On-Water Trip Duration by Waterway Access Category for Day Trips 1 and 2 (≤ 24 hours)

		Day Trip Duration (in hours)		
Access Category	**n**	**mean**	**95% C.I.**	**median**
Boat Ramp	1,380	6.7*	6.6-6.8	6
Marina Wet Slip	342	5.5	5.1-5.8	5
Shoreline/Causeway	42	5.5	4.3-6.6	4.5**
Marina Dry Storage	343	4.9	4.7-5.1	5
Home/Condo Dock	1,130	4.8**	4.7-5.0	4.5**
All Categories (n)	**3,237**	**5.7**	**5.6-5.8**	**5.5**

* Denotes above-average on-water trip duration (a value that is significantly greater than the average of 5.7 hours at the 95% confidence level) or a median value significantly greater than the overall median of 5.5.
**Denotes a below–average on–water trip duration (a value that is significantly less than the average of 5.7 hours at the 95% confidence level) or a median value significantly less than the overall median of 5.5.

Trip Duration: Overnight Trips (Trips exceeding 24 hours, and less than 7 days)

On-water trip duration statistics by Waterway Access Category are shown in Table 16 for trips that are greater than 24 hours in duration; i.e., trips characterized as "overnighters." Note that only reported trips that exceeded 24 hours in duration, but were less than or equal to 168 hours (or 7 days in length) were considered. The 168-hour cut-off was to lessen the impact of extreme or outlying values. The results are based on the responses to Question 2 of the survey instrument using all reported trips (that is, Trips 1 and 2).

The average reported overnight trip for all Waterway Access Categories (WACs) was approximately 53 hours in duration (or approximately 2.1 days), with a median overnight trip duration of 36 hours (or 1.5 days). Boaters/respondents departing from Marina Wet Slips tended to spend slightly more time on the water during overnight trips than did the average respondent. Survey respondents departing from Marina Wet Slips reported overnight trip durations that averaged approximately 69 hours (or roughly 2.8 days), with a median overnight trip duration of 52 hours (or 2.2 days). Survey respondents launching from Boat Ramps and Home/Condo Docks reported average overnight trip durations of 50.6 and 51.9 hours, respectively—values that were not significantly different from the overall average of all respondents from all WACs.

Overnight trips reported by boaters launching from Marina Dry Storage facilities averaged 34.3 hours (about 1.4 days) in duration, with a median value of 29 hours. The mean and median overnight trip durations for respondents departing from this WAC were significantly less than the overall average trip duration of 53.1 hours (2.2 days) and the overall median of 36 hours (1.5 days). (Table 16; Question 2)

Table 16. On-Water Trip Duration by Waterway Access Category for Overnight Trips (> 24 hours and ≤ 168 hours)

		Overnight Trip Duration (in hours)			
Access Category	**n**	**mean**	**95% C.I.**	**median**	**max**
Marina Wet Slip	71	68.8**	58.6 – 79.0	52**	168
Home/Condo Dock	123	51.9	46.5 – 57.3	34	168
Boat Ramp	240	50.6	47.1 – 54.1	36	168
Shoreline/Causeway	3†	35.6	NA	26	55
Marina Dry Storage	18	34.3*	27.6 – 41.0	29*	72
All Categories	**455**	**53.1**	**50.2 – 56.0**	**36**	**168**

† Small sample—not able to evaluate statistically.
* An on–water overnight trip duration significantly less than the average of 53.1 (or median of 36) hours at the 95% confidence interval.
** An on–water overnight trip duration significantly greater than the average of 53.1 (or median of 36) hours at the 95% confidence interval.

Weekday versus Weekend Trips

Table 17 shows statistics for the number and proportion of weekday versus weekend trips (as determined from responses to Question 3, for Trip 1). Of the n=1,855 trips reported by survey respondents, there was an approximately 50:50 split between weekdays (trips taking place from Monday through Friday) and weekend days (trips taking place on Saturday or Sunday) when the Water Access Categories (WACs) were considered in aggregate. However, distinct patterns emerged when each WAC was analyzed separately. For example, just over 60% of trips by Boat Ramp and Shoreline/Causeway users occurred on weekends. In contrast, weekends accounted for approximately 30% of trips by Marina Users.

Adjusting for the number of weekdays (5) versus weekend days (2), the typical weekend day (Saturday or Sunday) was associated with an impact of approximately 2.5 times more reported trips per day than on a typical weekday (Monday through Friday).[5] (Table 17; Question 3)

Table 17. Weekday versus Weekend Trips by Water Access Category

Access Category	Trip Counts and Percentages				
	Week	**Weekday**		**Weekend**	
	n	**n**	**%**	**n**	**%**
Boat Ramp	832	315	37.9*	517	62.1**
Home/Condo Dock	617	326	52.8**	291	47.2*
Marina Wet Slip	211	144	68.2**	67	31.8*
Marina Dry Storage	177	127	71.8**	50	28.2*
Shoreline/Causeway	18	7	38.9*	11	61.1**
All Categories	**1,855**	**919**	**49.5**	**936**	**50.5**

* Denotes a percentage value that is significantly less than the overall average % at 95% *c*onfidence *level*.

[5] Daily impact scores for weekday versus weekend trip were calculated by dividing the weekday trip percentage by 5 days and the weekend trip percentage by 2 days. For example, Table 17 shows that, overall, 49.5% of trips occurred on weekdays, which results in a daily impact score of 9.9 for weekdays (49.5/5). Weekend trips accounted for 50.5% of trips for all access categories, which results in a daily impact score of 25.25 for weekend days (50.5/2). Thus, on average, the daily impact of weekend trips is 2.5 times that of weekday trips (25.25/9.9).

** Denotes a percentage value significantly greater than the overall average % at 95% confidence level.

Rationale for Selecting Departure Sites

This section characterizes the choice rationale for selecting departure sites (e.g., marina or public ramp), based on the responses to Question 11 of the survey instrument. The results for selecting a favorite departure site are summarized in Table 18. Collier County survey respondents (Table 18; Question 11 criteria 1-15) preferred launch/departure sites

(a) Associated with well-marked access channels;
(b) Providing safe, secure, and adequate parking;
(c) Offering ease of launching and retrieving boats;
(d) In proximity to their favorite on-water boating spots/destinations;
(e) With short wait times to launch; and
(f) Near home.

Table 18. Reasons for Selecting a Favorite Departure/Launch Site

		Response	
Reason/Description	**n**	**Average***	**Rank****
Well-Marked Channels	889	1.02	1
Safe and Secure Parking	894	1.59	2
Adequate Parking	888	1.61	3
Ease of Launching/Retrieving Boat	884	1.75	4
Proximity to Favorite Boating Spots	877	1.84	5
Short Wait to Launch	874	1.99	6
Proximity to Home	889	2.35	7
No Parking/Launch Fees	865	2.44	8
Availability of Restrooms	875	2.46	9
Deep-Water Access	880	2.53	10
Availability of Fishing Supplies	865	2.74	11
Fuel Availability	886	3.11	12
Maintenance Service Access	854	3.36	13
Nearby Amenities (e.g. Restaurants)	869	3.45	14
Pump Out	863	3.76	15

Average response based on key: 1 – strongly agree (very important);* 2 – agree (important)*;* 3 – neutral*;* 4 – disagree (somewhat unimportant)*;* 5 – strongly disagree (very unimportant)
**Ranking from "most important" to "least important"

Rationale for Selecting Favorite Travel Route

Table 19 characterizes the choice rationale for selecting a favorite on-water travel route, based on the responses to Question 15 of the survey instrument. The top five responses suggest that survey respondents tended to select favorite travel routes to:

(a) Enjoy scenic beauty;
(b) Avoid congestion or congested areas;
(c) Obtain access to locations where fishing is good (i.e., fishing hot spots);
(d) Take advantage of well-marked channels; and
(e) Secure quick-and-easy access to favorite on-water boating spots or destinations.

Table 19. Reasons for Selecting a Favorite Travel Route

	Response		
Reason/Description/Criterion	**n**	**Average***	**Rank****
Enjoy scenic beauty	1209	1.60	1
Avoid congested areas	1218	1.73	2
Fishing is good	1198	2.03	3
Prefer well-marked channels	1220	2.07	4
Quick access to favorite boating spots	1163	2.16	5
Prefer calm protected waters	1212	2.25	6
Avoid shallow water	1228	2.38	7
Easy access to supplies or fuel	1176	2.98	8
None are important – just cruise around	1070	3.72	9

*Average response based on key: 1 – strongly agree (very important); 2 – agree (important); 3 – neutral; 4 – disagree (somewhat unimportant); 5 – strongly disagree (very unimportant)
**Ranking from "most important" to "least important"

Boater Activity Profile

Results for Respondents in all Waterway Access Categories

Table 20 presents a description, summary, and ranking of the recreational boating activities reported by n=1,274 survey respondents who answered Question 16 of the survey instrument. Respondents were asked to choose, from a list *of 15 activities* provided in the survey, ***all*** of the activities in which they engage on a "typical" boating trip. They also could select "Other" if their activity was not listed. The column labeled "Count" in Table 20 is the total number of times a given activity was chosen by survey respondents. Many survey respondents selected multiple activities from the list and, hence, the percentage values shown in the table do not sum to 100.

The top eight activities (ranks 1 through 8) each were identified by at least 29.5% (30% rounding to nearest %) of survey respondents. The remaining activities were all chosen by a percentage that was significantly less than 30% of survey respondents.

- Fishing ranked as the leading activity, with 78% of survey respondents indicating that they engaged in this activity during a typical boating trip.
- Nature Viewing was the second-most selected activity, with 53.5%, followed closely by Cruising at 45.4%, Beach Picnicking at 41.1%, and Sightseeing at 40.6%.
- Socializing, Restaurant Visitation, and Swimming rounded out the top-8 list with 39.3%, 34.9%, and 29.5%, respectively.

Note that Table 20 shows the results for all survey respondents. Tables 21 through 24 highlight the leading activities of boaters within each of the four Water Access Categories.

Table 20. Boater Activity Statistics: All Waterway Access Categories

Activity	Count	Percentage of Respondents*	Rank
Fishing	994	78.0%	1
Nature Viewing	682	53.5%	2
Cruising	579	45.4%	3
Beach Picnicking	523	41.1%	4
Sightseeing	517	40.6%	5
Socializing	501	39.3%	6
Visiting Restaurant	445	34.9%	7
Swimming	376	29.5%	8
Daytime Anchoring	304	23.8%	9
Beach Camping	182	14.2%	10
Diving	140	10.9%	11
Overnight Anchoring	129	10.1%	12
Water Skiing/Water Sports	123	9.6%	13
Other	91	7.1%	14
Sailing	47	3.7%	15
Jet Skiing	42	3.3%	16

*Percentage (%) values are based on n = 1,274 survey respondents

Results for Respondents Departing from Boat Ramps

The top-ranked activities of boaters departing from Boat Ramps are summarized in Table 21 (based on the responses to Question 16, where Question 7, Trip 1 = Boat Ramp).

Fishing ranked as the leading and predominant activity among the n=608 boat ramp users who responded to Question 16 of the survey instrument. Note that an overwhelming 91% (555 out of 608) of Collier County survey respondents departing from a Boat Ramp reported that they engaged in Fishing during a ”typical” boating trip. Nature Viewing, Beach Picnicking, Sightseeing, and Cruising rounded out the top-5 activities, each with over 30% of respondents acknowledging that they take part in these activities during a typical boating trip (for trips originating from Boat Ramps).

For this Waterway Access Category (i.e., Boat Ramp users), Fishing was chosen by a 3-to-1 margin over the next four-highest ranked activities. It should also be noted, however, that at least 1-out-of-3 survey respondents in this category reported engaging in activities ranked 2nd and 3rd (namely, Beach Picnicking and Sightseeing).

Other notable activities included Socializing and Visiting Restaurants. Only about 9% of the respondents in this WAC reported engaging in Overnight Anchoring, and only 1% in Sailing; suggesting that the vast majority of boaters who launch from Boat Ramps typically engage in daytrip activities using a motorized vessel.

Table 21. Boater Activity Statistics: Boat Ramp Access Category

Activity	Count	Percentage of Respondents*	Rank
Fishing	555	91.2%	1
Nature Viewing	311	51.2%	2
Beach Picnicking	225	37.0%	3
Sightseeing	202	33.2%	4
Cruising	192	31.5%	5
Swimming	186	30.5%	6
Socializing	179	29.4%	7
Beach Camping	142	23.4%	8
Visiting Restaurant	122	20.0%	9
Daytime Anchoring	114	18.7%	10
Diving	84	13.8%	11
Water Skiing/Water Sports	75	11.7%	12
Overnight Anchoring	55	9.0%	13
Jet Skiing	17	2.8%	14
Sailing	6	1.0%	15

**Percentage (%) values are based on n = 608 survey respondents*

Results for Respondents Departing from Home/Condo Docks

Fishing ranked as the top activity of the n=387 survey respondents departing from Home/Condo Docks, with 70.8% (roughly, 2 out of 3 respondents) reporting that they engage in this activity during a typical trip (Table 22). Nature Viewing (#2) and Cruising (#3) followed closely behind to round out the top-three ranked activities, each with over 50% of respondents from this WAC reporting that they engage in these activities during a "typical" boating trip.

Note that just slightly less than 1-out-of-2 respondents in this WAC (roughly 43% to 47%) reported engaging in Socializing, Visiting Restaurants, Sightseeing, and Beach Picnicking during a typical boating trip. The eighth-ranked activity was Swimming at 29%. (An honorable mention can be given to the roughly 27% that reported Daytime Anchoring as an activity.)

Survey respondents departing from a Home/Condo Dock are more than twice as likely to engage in Visiting Restaurants as compared to their counterparts departing from Boat Ramps (comparing percentage values in Tables 21 and 22 for that activity: 44% vs. 20%).

The least-likely activities for respondents departing from private Docks included Water Skiing/Water Sports, Diving, Sailing, Beach Camping, and Jet Skiing; each of which accounted for less than 10% of activities identified as occurring during a typical trip. (Table 22; Question 16)

Table 22. Boater Activity Statistics: Home/Condo Dock Access Category

Activity	Count	Percentage of Respondents*	Rank
Fishing	274	70.8%	1
Nature Viewing	210	54.2%	2
Cruising	203	52.4%	3
Socializing	181	46.7%	4
Visiting Restaurant	172	44.4%	5
Sightseeing	170	43.9%	6
Beach Picnicking	167	43.1%	7
Swimming	113	29.1%	8
Daytime Anchoring	105	27.1%	9
Overnight Anchoring	40	10.3%	10
Water Skiing/Water Sports	34	8.7%	11
Diving	33	8.5%	12
Sailing	26	6.7%	13
Beach Camping	21	5.4%	14
Jet Skiing	21	5.4%	15

*Percentage (%) values are based on n = 387 survey respondents

Results for Respondents departing from Marina Wet Slips

Cruising was the number-one activity for the n=148 Collier County survey respondents departing from Marina Wet Slips, with nearly 72% of respondents indicating that they engage in this activity during a typical trip (Table 23). Fishing was a close second with approximately 56% of survey respondents reporting that they engage in this activity during a typical outing. Rounding out the top-5 responses were Socializing and Visiting Restaurants (tied for third place with 53.3%), Nature Viewing and Sightseeing (tied for fourth place with 48.6%), and Daytime Anchoring (at fifth place with 31%). Swimming, Beach Picnicking, and Overnight Anchoring were also common, with well over 20% of respondents indicating that they partake in these activities during a typical boating trip. The three lowest ranked activities – Beach Camping, Beach Camping, Water Skiing/Water-Sports, and Jet Skiing – were each selected by less than 10% of respondents.

Table 23. Boater Activity Statistics: Marina Wet Slip Access Category

Activity	Count	Percentage of Respondents*	Rank
Cruising	106	71.6%	1
Fishing	83	56.0%	2
Socializing	79	53.3%	3†
Visiting Restaurant	79	53.3%	3†
Nature Viewing	72	48.6%	4‡
Sightseeing	72	48.6%	4‡
Daytime Anchoring	46	31.0%	5
Swimming	42	28.3%	6
Beach Picnicking	38	25.6%	7
Overnight Anchoring	32	21.6%	8
Diving	19	12.8%	9
Sailing	15	10.1%	10
Beach Camping	10	6.7%	11
Water Skiing/Water Sports	8	5.4%	12
Jet Skiing	1	0.6%	13

*Percentage (%) values are based on n = 148 survey respondents
† tied for 3rd place; ‡ tied for 4th place

Results for Respondents departing from Marina Dry Storage facilities

Fishing and Nature Viewing were tied for the top-ranked activity among the n=116 survey respondents to Question 16 who accessed waterways from Marina Dry Storage facilities, with approximately two-thirds (66%) of the survey respondents indicating that they engage in these activities during a "typical" boating trip (Table 24). Daytime Anchoring and Cruising were the second and third most-common activities reported by respondents departing from Marina Dry Storage facilities: both activities occurred on approximately 63% of typical trips taken by this Waterway Access group.

Visiting Restaurants was a frequent activity, with slightly over 60% of survey respondents indicating that they engage in this activity during a typical outing. Sightseeing, Socializing, Beach Picnicking, and Overnight Anchoring also were activities in which a fairly large percentage (over 30%) of respondents from this WAC engage in during a typical boating trip. Swimming deserves honorable mention as 1-in-4 respondents identified this as an activity that occurs during a typical trip. Less than 10% of survey respondents departing from Marina Dry Storage facilities identified Water Skiing/Water Sports, Diving, Jet Skiing, and Sailing as activities that occur on a typical trip.

Table 24. Boater Activity Statistics: Marina Dry Storage Access Category

Activity	Count	Percentage of Respondents*	Rank
Fishing	76	65.5%	1†
Nature Viewing	76	65.5%	1†
Daytime Anchoring	74	63.7%	2
Cruising	73	62.9%	3
Visiting Restaurant	70	60.3%	4
Sightseeing	64	55.2%	5
Socializing	55	47.4%	6
Beach Picnicking	54	46.5%	7
Overnight Anchoring	37	31.8%	8
Swimming	29	25.0%	9
Beach Camping	6	5.1%	10
Water Skiing/Water Sports	5	4.3%	11
Diving	3	2.5%	12
Jet Skiing	2	0.2%	13
Sailing	0	0.0%	14

*Percentage (%) values are based on n = 116 survey respondents
† tied for 1st place

Avoidance of Departure Sites/Boat Ramps

Question 10 asked participants if there was a boat ramp they would like to use but avoided. Out of n=832 survey respondents, 321 (or 38.6%) indicated that they desired to use a given ramp but avoided it for one reason or another. These 321 respondents were asked to name/identify the boat ramp/launch location they avoided, and to select reason(s) for avoiding it (from a list of avoidance factors that included concerns regarding congestion, infrastructure, safety, and parking).

Table 25 is a list of the 13 Collier County ramps that respondents mentioned avoiding and the number of times (counts and rankings) each ramp was reported. The ramp at Collier Blvd. Park was avoided by the most respondents (101), followed by Bayview Park (87) and then Naples Landing (36). Together, these three locations were identified by nearly 70% of the respondents as ramps that were avoided.

Table 25. Collier County Ramps Avoided by Survey Respondents

Ramp Name/Location	Number of Times Mentioned*	Percentage Overall	Avoidance Rank (high to low)
Collier Blvd. Boating Park (951)	101	31.5%	1
Bayview Park	87	27.1%	2
Naples Landing	36	11.2%	3
Caxambas Pass	19	5.9%	4
Calusa Island Marina	14	4.4%	6
Port of the Islands	12	3.7%	7
Chokoloskee Island Park	11	3.4%	5
Outdoor Resorts of America	10	3.1%	6
Glades Haven	8†	2.5%	7
Cocohatchee River Park	7†	2.2%	8‡
Rookery Bay	7†	2.2%	8‡
Delnor-Wiggins State Park	5†	1.6%	10
Collier Seminole State Park	3†	0.9%	11
All Ramps	**321***	**100.0%**	**N/A**

* Includes one response listed as "other".
† indicates a very small number of responses (m) in comparison to the top-8, where m < 10
‡ Tied for 8th

Table 26 summarizes, in descending order for all ramps, the frequency and ranks of thirteen reasons that respondents cited for avoiding ramps (avoidance factors). Inadequate Parking was the most frequently cited reason; it accounted for 30.5% of the 719 responses[6]. The second most cited avoidance factor was Too Crowded (Congestion), accounting for 25.0% of all responses. Inadequate Dock(s) was the third most cited reason, representing 13.3% of the responses. Together, these three avoidance factors accounted for nearly 70% of the 719 responses. No Restrooms ranked fourth, cited 64 times.

Fees/Excessive Fees was the fifth most cited reason for avoiding a ramp (Table 26). This reason is of particular significance, since it was not part of the original list of avoidance factors on the survey instrument but, rather, was a write-in survey response given by 36 boaters. The top three ramps noted for their excessive fees (Table 27) were Calusa Island Marina (11 responses), Outdoor Resorts of America (9), and Naples Landing (6).

[6] The number of responses (reasons for avoiding a ramp) totaled 719 and it exceeded the sample size of n=321 who answered question 10 because each respondent could select more than one reason (factor) for avoiding a ramp or launch location.

Table 26. Frequency Counts and Rankings of Selected Avoidance Factors (all ramps)

Avoidance Factor	Number of Times Cited	Percentage Overall	Rank
a. Inadequate Parking	220	30.5%	1
b. Too Crowded (Congestion)	180	25.0%	2
c. Inadequate Dock(s)	96	13.3%	3
d. No Restrooms	64	9.6%	4
e. Fees/Excessive Fees†	36	5.0%	5
f. Water Too Shallow	24	3.3%	6
g. Excessive Speed Zones in Area †	20	2.8%	7
h. Lane(s) Too Narrow	19	2.6%	8
i. Bad or No Pavement	16	2.2%	9
j. Slope Too Steep	15	2.1%	10
k. Ramp Access (Hours Open) †	15	2.1%	11
l. Strong Currents or Tides †	12	1.6%	12
m. Slope is Not Steep Enough	2	0.3%	13
All Avoidance Factors	**719**	**100.0%**	**N/A**

Eight ramps were identified as having been avoided by 10 or more survey respondents. Table 27 shows these eight ramps in ranked descending order, and it highlights the reasons why each was avoided.

Table 27. Primary Reasons for Ramp/Launch Site Avoidance, Top-8 Avoidance Locations

	Frequency Counts – Specific Avoidance Factors†												
Ramp / Location	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**m**
Collier Blvd. B. Pk.(951)	84	80	46	54	2	0	4	5	2	5	2	11	0
Bayview Park	83	56	33	4	0	9	0	10	3	1	0	0	0
Naples Landing	20	15	3	1	6	1	8	0	1	3	0	0	0
Caxambas Pass	5	9	3	0	2	0	0	1	0	3	9	0	0
Calusa Island Marina	2	2	1	1	11	1	0	0	0	0	0	0	0
Port of the Islands	0	0	0	0	1	0	8	0	0	1	0	0	0
Chokoloskee Island Park	6	3	3	0	2	4	0	2	2	0	0	1	0
Outdoor Resorts of Amer.	6	4	2	1	9	0	0	0	0	0	0	0	0
Subtotal for top-8	**206**	**169**	**91**	**61**	**33**	**15**	**20**	**18**	**8**	**13**	**11**	**12**	**0**

† See Table 26 for key to avoidance factors

Table 28 summarizes the chief avoidance factors for the top-8 avoidance ramps. The ramps/departure locations differ in terms of the actual number of specific avoidance factors identified by survey respondents. Some ramps have more infrastructure issues, some have crowding/congestion issues, and others have both. In short, the distribution of frequency counts for the selected avoidance factors is not necessarily similar across all ramps or launch locations.

In light of the differences in avoidance factors among the ramps, it is recommended that a more detailed and in-depth survey instrument be employed to gather information on the severity of the avoidance factors perceived by boaters who both use and/or avoid specific launch locations, as well as the ramps boaters use as substitutes (and the reasons why they prefer those substitutes). This information would serve a three-fold purpose, as it would (1) yield more in-depth insights into the shortcomings and/or problems associated with each of the avoided ramps/launch locations; (2) allow for the development of a prioritization scheme for maintenance and/or management of those ramps/launch locations (to potentially alleviate some of the concerns of boaters who frequent those sites; and (3) provide useful information and a geographic narrative of the locations of problem ramps/launch sites that would aid in the design and location of future public waterway access sites in Collier County.

Table 28. Primary Reasons for Ramp Avoidance, Top-8 Avoided Ramps

Ramp Name/Location (Total number of responses)	General Description of Avoidance Factors (Percentages represent how often the factor was mentioned.)
Collier Blvd. B. Park 951 (295)	Inadequate parking (28%), too crowded (27%), no restrooms (18%), inadequate docks (16%), strong currents/tides (4%)
Bayview Park (199)	Inadequate parking (42%), crowding/congestion (28%), inadequate docks (17%), narrow lanes (5%)
Naples Landing (58)	Inadequate parking (34%), too crowded (26%), excessive speed zones (14%), excessive fees (10%), slope too steep (5%), inadequate docks (5%)
Caxambas Pass (32)	Too crowded (28%), ramp access (limited hours open) (28%), inadequate parking (16%), inadequate docks (9%), slope too steep (9%)
Calusa Island Marina (18)	Fees/excessive fees (61%), inadequate parking (11%), too crowded (11%)
Port of the Islands (10)	Excessive speed zones (80%)
Chokoloskee Island Park (23)	Inadequate parking (26%), shallow water (17%), too crowded (13%), inadequate docks (13%)
Outdoor Resorts of America (22)	Excessive fees (41%), inadequate parking (27%), too crowded (18%)

Classifying Ramps/Departure Sites by Drive Times

Information was collected on the drive time (in minutes) from the survey respondents' places of residence to specific ramps and marinas from which they had departed to go boating. Table 29 presents, in alphabetical order by departure site name, summary results and drive-time statistics for 26 ramps and marinas for which there were at least 5 survey responses (sample sizes ranged from n=5 to n=153 respondents). The last column in Table 29 is the 95% confidence interval of the mean drive time to each departure site. The smaller the sample size, the wider the confidence interval and, thus, the interval was excessively wide for some of the departures sites—in particular, those with only 5 respondents.

Table 29. Drive-Time Statistics for Specific Ramps/Marinas/Departure Sites

Ramp/Launch Location	n	Mean	Median	Max	95% Confidence Interval (mean)
		(in minutes)			
Barefoot Boat Club	22	17.3	20	30	14.5 – 20.1
Bayview Park	153	21.4	20	75	19.3 – 23.5
Calusa Island Yacht Club	92	31.9	25	150	26.8 – 37.0
Calusa Marina	71	56.8	45	180	47.2 – 66.3
Caxambas Pass	98	44.2	45	150	38.3 – 50.1
Cedar Bay Yacht Club	18	17.3	17.5	35	13.7 – 20.9
Chokoloskee Island Park	23	89.3	90	180	69.1 – 109.5
Chokoloskee Island Resort/Marina	5	95.0	105	150	27.4 – 162.5
Cocohatchee River Park	99	21.3	15	120	17.4 – 25.3
Collier Blvd. Boating Park (951)	74	31.6	25	180	24.9 – 38.3
Collier Seminole State Park	5	72.0	45	135	15.5 – 128.5
Delnor-Wiggins State Park	20	16.4	10	60	10.0 – 22.7
Glades Haven	17	95.0	90	150	75.4 – 114.5
Marco Island Yacht Club	21	13.8	10	45	8.9 – 18.8
Marco River	25	16.8	15	45	12.8 – 20.9
Naples Bay Yacht Stowage	23	19.3	15	80	11.0 – 27.5
Naples Boat Club	30	30.3	20	180	14.5 – 46.2
Naples City Dock	13	19.6	20	40	15.4 – 23.7
Naples Landing	80	23.7	15	90	19.5 – 27.8
Naples Sailing & Yacht Club	20	19.5	17.5	45	15.6 – 23.3
Naples Yacht Club	11	15.7	15	30	9.2 – 22.2
Outdoor Resorts of America	71	103.2	105	180	92.5 – 114.0
Pelican Isle Yacht Club	32	14.0	15	30	11.6 – 16.5
Port of the Islands	81	65.9	60	180	55.5 – 76.3
Rod & Gun Club	5	74.0	50	140	16.1 – 131.8
Rookery Bay	22	32.5	30	80	25.7 – 39.2

The drive time information was used to categorize departure sites based on similarities. Three distinct groups, or clusters, were identified: (1) ramps/marinas with a “local draw”; (2) ramps/marinas with a “regional draw”; and (3) ramps/marinas with a “long draw” (Table 30, Figures 10 and 11). The results are based on an analysis of the summary statistics shown in Table 29, a comparison of means test, and a k-mean clusters routine (k=3) to help identify the groups of departures sites by drive times (and hence, their “draw”).

Four of the departure sites (Chokoloskee Island Park, Chokoloskee Resort & Marina, Glades Haven, and Outdoor Resorts of America) were “long–draw” sites with mean and median drive times that exceeded 60 minutes (Table 30); 14 departure sites were “local draws” with average drive times of less than 30 minutes; and eight sites were “regional draws” with drive times greater than 30 minutes, but less than or equal to 60 minutes.

Table 30. K-Means Cluster Analysis Summary Based on Drive-Time Statistics.

Variables	Cluster 1	Cluster 2	Cluster 3
Mean Drive Time (minutes)	19.2	50.8	95.6
Median Drive Time (minutes)	16.8	39.4	97.5
% of Variation Accounted for	43.0	32.2	12.4
Frequency Count	14	8	4
Cluster 1 – ***Local-Draw Launch Sites*** (14): Average Drive Time ≤ 30 minutes			
Barefoot Boat Club		Naples Bay Yacht Stowage	
Bayview Park		Naples City Dock	
Cedar Bay Yacht Club		Naples Landing	
Cocohatchee River Park		Naples Sailing & Yacht Club	
Delnor-Wiggins State Park		Naples Yacht Club	
Marco Island Yacht Club		Pelican Island Yacht Club	
Marco River		Rookery Bay	
Cluster 2 – ***Regional-Draw Sites*** (8): Average Drive Time > 30 and ≤ 60 min.			
Calusa Island Yacht Club		Collier Seminole State Park	
Calusa Marina		Naples Boat Club	
Caxambas Pass		Port of the Islands	
Collier Blvd. Boating Park (951)		Rod & Gun Club	
Cluster 3 – ***Long-Draw Sites*** (4): Drive Time > 60 minutes, Mean > 90 minutes			
Chokoloskee Island Park		Glades Haven	
Chokoloskee Resort & Marina		Outdoor Resorts of America	

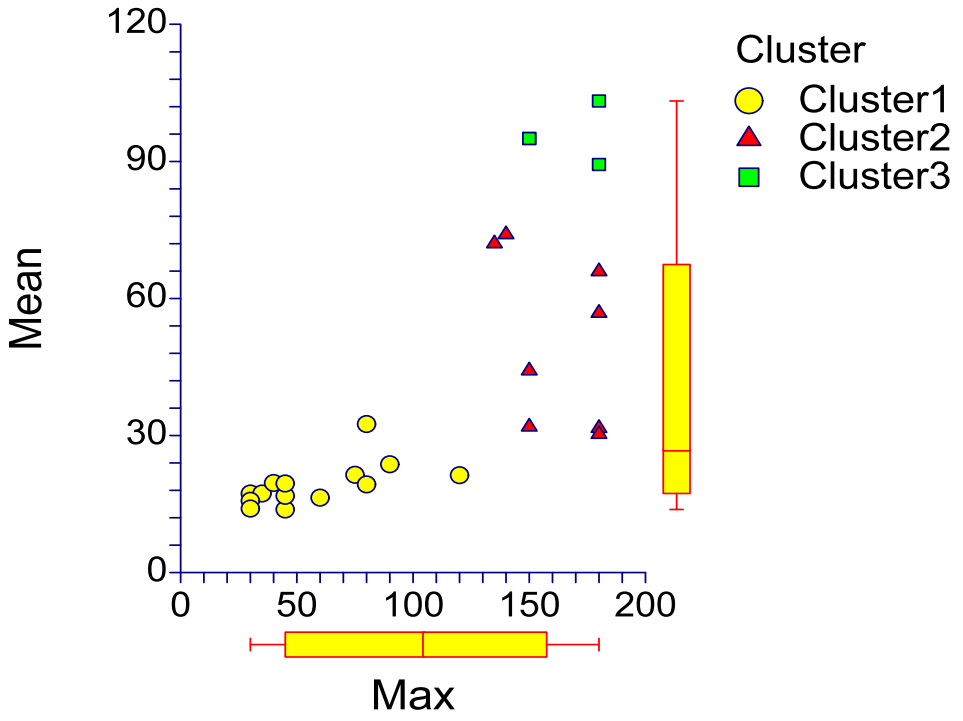

Figure 10. Cluster Plot of Ramp/Launch Site Locations by Mean and Maximum Reported Drive Times (k-means cluster analysis, k=3)

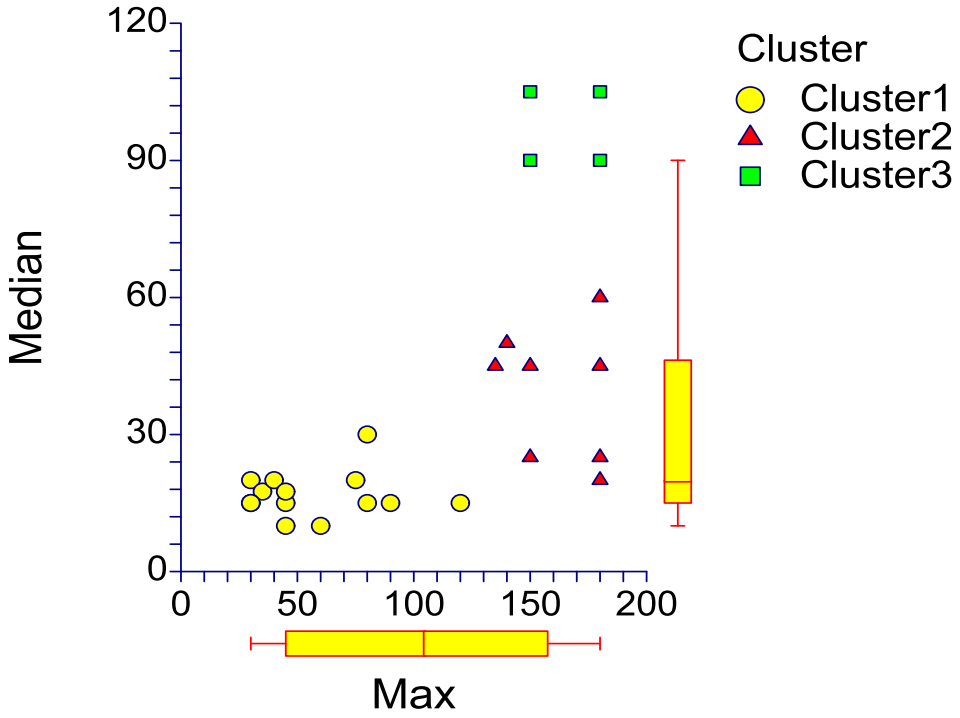

Figure 11. Cluster Plot of Ramp/Launch Site Locations by Median and Maximum Reported Drive Times (k-means cluster analysis, k=3)

Table 31 shows statistics by Waterway Access Category for drive times from boaters' homes to departure sites that were classified as regional or long draws. The results in Tables 29, 30, and 31 indicate much variability in the drive times of survey respondents by Departure Site and Waterway Access Category. In general, there are statistically significant distinctions between local, regional, and long draw ramps/departure sites in terms of their service areas and/or the extent of their "draw." Moreover, statistical evidence supports the contention that boaters launching their vessels from Collier County Boat Ramps and the Shoreline/Causeway ramps tend to travel greater distances and/or have longer drive times (by approximately 20-25 minutes) to their departure sites in comparison to boaters departing from Marina Wet Slips or Marina Dry Storage facilities.

When the analysis is re-run for only the "regional" or "long draw" ramps or launch locations, the average drive time from home to departure site increases markedly for respondents launching from Boat Ramps (compare results in the upper and lower portions of Table 30), with a statistically significant increase from 43 to 68 minutes (an increase of 25 minutes), and a median value that rises from 30 to 60 minutes (an increase of 30 minutes). The 95% confidence interval for the drive time from home to launch site is 63 to 73 minutes for Boat Ramp users, a Waterway Access category that travels substantially farther from home than boaters launching from Marina Wet Slips (34 to 65 minutes) or Marina Dry Storage facility users (22 to 31 minutes) to launch sites characterized as regional or long draw.

Table 31. Drive-Time Statistics for "Regional" and "Long Draw" Ramps/Departure Sites (k=12) (Trip 1)

	Drive-Time Statistics (in minutes)			
Access Category	**N**	**Mean**	**Median**	**95% Confidence Interval**
Boat Ramp	330	68.1*	60*	63.0 – 73.2
Marina Wet Slip	46	49.6*	30*	34.0 – 65.3
Marina Dry Storage	93	27.2**	20**	22.8 – 31.6

* Drive times significantly greater than overall mean or median at 95% confidence
** Drive times significantly less than the overall mean or median at 95% confidence

2.2. Seasonal Boating Characteristics

Monthly trip data were analyzed to identify the number and duration of boating seasons in the Collier County study region based on the average reported number of trips taken by boaters during each month and related trip statistics. Trip frequency counts per month – *the number of reported boating days for a given month* – were obtained from responses to Question 14 of the mail survey instrument.

For the purposes of this analysis, a *boating season* is defined as a grouping of "like" consecutive or non-consecutive months based on temporal trends in waterway use and monthly trip frequency counts. The averages of the number of reported trips per month are shown in Table 32 and highlighted in a bar graph shown in Figure 12. Summary statistics are presented based on the responses of all survey respondents and for each of the four Waterway Access Categories (WACs): Boat Ramps, Marina Wet Slips, Marina Dry Storage facilities, and Home/Condo Docks.

Visual inspection of the average number of trips for all waterway access groups (Figure 12) exposes a pattern that is consistent with defining two distinct boating seasons based on the reported monthly trips of Collier County boaters who participated in the survey. Identifiable clusters of "like months," based on similarities in trip frequencies (and monthly use of the regional waterways), suggest the presence of a primary "peak" season and an "off–peak" season.

The peak season is centered about the months of March and April, and runs from January through the end of May, with an average reported trip count per respondent/boater that ranges between approximately 4.0 and 4.8 trips per month—with peak month values that are, for the most part, shown to be significantly greater than the overall average of 3.85 trips per month at the 95% confidence level.

A lower use-intensity off–peak season spans from June through December (when trip counts for all Waterways Access Categories are reviewed and analyzed), with average reported trip counts that range from a low of approximately 3.0 to a high of 3.8 trips per month throughout this cycle. Note that the majority of monthly mean trip values for these off–peak months are shown to be significantly less than the overall average of 3.85 trips per month at the 95% confidence level.

January and November may appear to be borderline cases with means of 3.98 and 3.78, respectively. Yet the majority (roughly two-thirds) of January's 95% confidence interval falls

above the overall mean monthly trip value of 3.85, and the majority of November's 95% confidence interval (roughly two-thirds) falls below the overall mean monthly trip value of 3.85. Hence, January is more like the peak season months and November is more like the off–peak months, despite the fact that their respective mean trip values are not significantly different from 3.85 trips per month.

Several distinct trends emerge in the mean reported monthly trips associated with the various Waterway Access Categories (Table 32 and Figure 13). First, respondents departing from Marina Wet Slips and Marina Dry Storage facilities tend to be more active during the peak boating season in comparison to boaters from the other user groups, with peak usage occurring during March (with an average trip count of 6.08 and 5.80, respectively). Second, respondents who launch their vessels from Marina Wet Slips tend to be the most active during the off–peak boating season when compared to boaters from other user groups (e.g., note the secondary peak of 4.68 trips, on average, during the off–peak month of November). Third, Marina Wet Slip users tend to have an average number of trips per month that exceeds the average of each of the other user groups during each month of the year; with an overall average of 4.42 trips per month (a value that is significantly greater than the overall mean of 3.85 at the 95% confidence level).

Note how the average reported trip frequency drops off precipitously for all WACs during June, with the exception of Boat Ramp users (Table 32 and Figure 13). Respondents launching from Boat Ramps tend to report more consistent trip usage patterns throughout the year when compared to boaters in the other Waterway Access Categories, with monthly use trip counts that remain around the group average throughout the off–peak months. Note that April is the peak usage month for Boat Ramp and Dock users.

The greatest range in monthly usage can be found amongst Marina Wet Slip and Marina Dry Storage facility users, with sharp peaks that occur during the month of March and the least number of reported trips occurring during the month of October.

The two designated boating seasons in Collier County (as implied by the descriptive statistics and graphs in the previous section) were validated by the results of a cluster analysis using several hierarchical clustering routines. Appendix B explains the methods and results from this analysis.

Table 32. Average Number of Reported Trips by Month and User Category

Month	Average Number of Reported Trips					95% Confidence Interval (mean) All Users†
	All	Ramp	Dock	Marina Wet Slip	Marina Dry Storage	
January*	4.0	3.3	**4.5**	**4.6**	**5.0**	(3.7 – 4.2)
February*	**4.3**	3.4	**4.3**	**5.1**	**5.7**	(**4.0 – 4.5**)
March*	**4.8**	3.9	**5.2**	**6.1**	**5.8**	(**4.5 – 5.1**)
April* (peak month)	**4.8**	**4.1**	**5.4**	**5.9**	**5.3**	(**4.5 – 5.1**)
May*	**4.4**	**3.8**	**5.2**	**4.6**	3.9	(**4.1 – 4.6**)
June	3.7	**3.8**	4.1	3.4	2.3	(3.4 – 3.9)
July	3.3	3.5	3.6	3.1	1.9	(3.1 – 3.6)
August	3.1	3.4	3.2	2.6	1.8	(2.9 – 3.3)
September	3.1	3.4	3.4	2.4	1.8	(2.9 – 3.3)
October	3.6	3.6	3.9	3.7	2.4	(3.3 – 3.8)
November	3.8	3.5	4.0	**4.6**	**3.6**	(3.5 – 4.0)
December	3.5	3.2	4.1	3.9	3.1	(3.3 – 3.8)
Monthly Average	**3.9**	**3.3**	**4.3**	**4.4**	**3.4**	**(3.5 – 4.2)**
Monthly Median	**3.7**	**3.0**	**4.0**	**4.0**	**3.5**	
Total Annual Boating Days	**47.1**	**43.6**	***53.2***	***50.2***	**42.4**	**(44.6 – 50.0)**

* Indicates peak-season month (all boaters/all Waterway Access Categories).

Note: Values in **bold** indicate that the average number of trips for a given user group (in a given month) exceeds the overall mean for all months (i.e., the monthly average) for that user group, at 95% confidence. Totals in ***bold italics*** indicate the most-active group during the peak and/or off–peak season months.

† 95% Confidence Intervals are shown in parentheses, shown in bold if the lower limit of the confidence interval is greater than 3.85 trips—the overall average.

Peak-use month by Waterway Access Category is highlighted in blue.

Off–peak month by Waterway Access Category is highlighted in yellow.

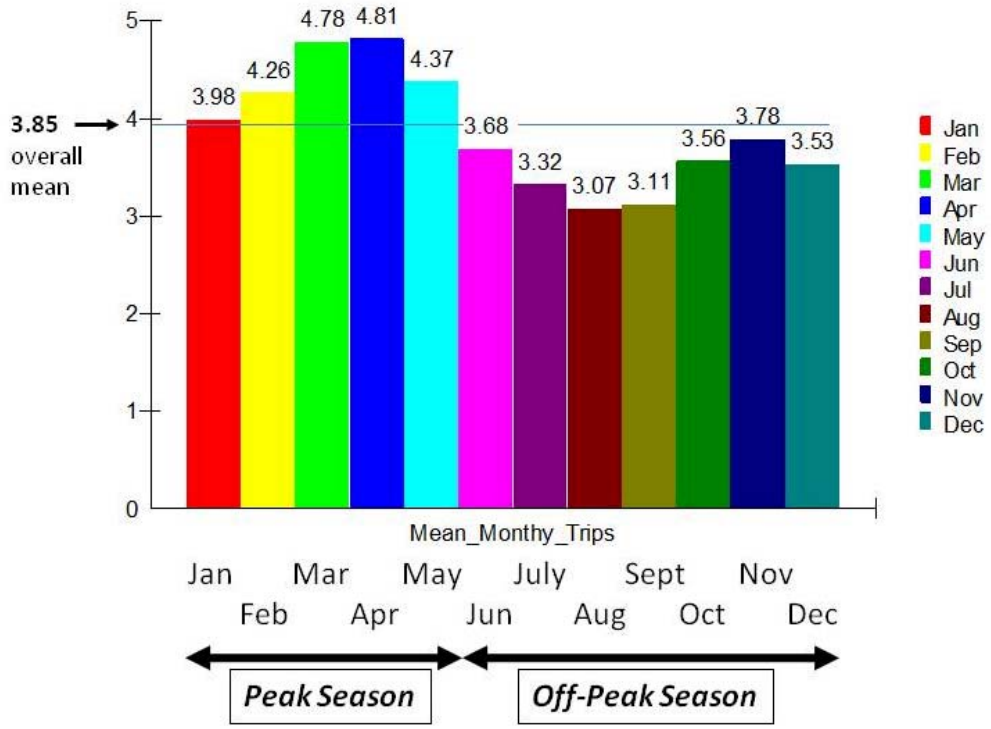

Figure 12. Mean Monthly Trip Counts (All Collier County Survey Respondents)

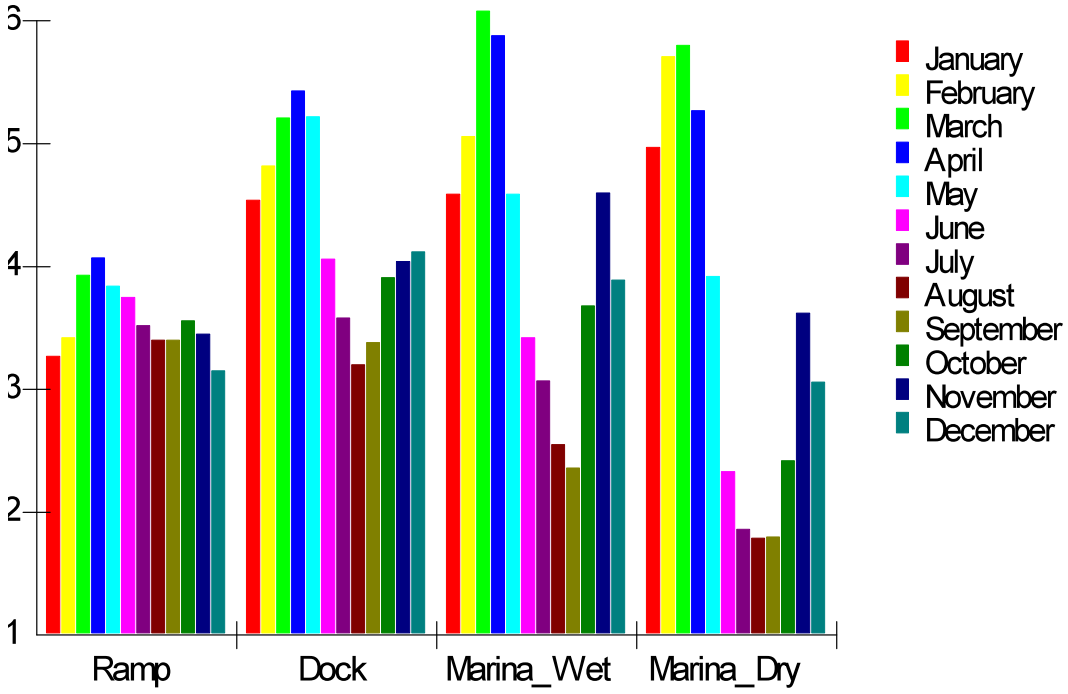

Figure 13. Mean Monthly Trip Counts by Waterway Access Category

A Note on Sample Size Consideration

Average monthly trip counts are based on use information obtained from Question 14 of the survey questionnaire, in which survey respondents were asked to report the number of boating trips taken during each month of the year. The maximum estimated standard deviation S_{max} for monthly trip counts of all respondents was approximately 4.95 trips per month. This value implies that a minimal required sample size (n*) of approximately 377 respondents to be within a margin of error of ±0.5 trip per month when estimating the mean monthly trip count at the 95% confidence level. For a more relaxed margin of error of ±0.75 trip per month, a minimum of approximately 240 respondents is necessary. As such, a sample of n=1,140 respondents – the minimum number who reported trips in any given month – easily exceeds the number required to meet the specified margin of error for generating estimates of the average number of monthly trips for all respondents.

In the validation of individual sample sizes associated with the various Waterway Access Categories, questions arise over the adequacy of the size of sub-samples. There is statistical evidence to suggest, however, that an adequate sub-sample size for each WAC was obtained based on the estimated standard deviations associated with reported monthly trip counts by category and an acceptable margin of error. For example, consider that for a j-th user category (j = 1,… 4 waterway access categories) for any given k-th month (k = 1,…12), the average estimated standard deviation of reported monthly trip counts for a j-th user category and k-th month (s^*_{jk}) is approximately 3.30 trips. Reported trip values and related statistics suggest that a minimum sample size of approximately 167 is required for each individual user group to be within the prescribed margin of error (±0.5 trip), or about 125 to be within a margin of error of ±0.75 trip. This sub-sample target is somewhat overstated, however, as it does not take into account the finite nature of the various boater populations associated with each of the four major waterway access groups within the Collier County study area. Consequently, the estimated require minimum sample size is estimated to range somewhere between 95 and 115 observations given the finite nature of the boating population(s) within the geographic region.

The estimated required sample size of between 95 and 115 trip observations is exceeded in the vast majority of cases examined. Thus, adjusting for the finite nature of the boating population within the various WACs examined (where n < N, and N is finite and relatively small, based on a rough estimate of Boat Ramp launch capacity or Marina Wet Slip and Marina Dry Storage availability within the region, and the standard deviation in monthly trip counts), the *minimum* required sample sizes fall within a range that has an “acceptable” maximum margin of error – (most of which is ±0.5 trip per month at 95% confidence).

Consequently, the sub-samples sizes associated with each Waterway Access Category obtained from the survey questionnaire may be deemed appropriate for the purposes and objectives of this study and the desired level of precision, with only a minor few exceptions (cases of sub-sample involving respondents departing from the Shoreline/Causeway, as well as a few instances involving Marina Dry Storage facility users). Note, however, that the sub-samples below the minimum required number are still considered to be “relatively large” in a statistical sense and therefore place no major limitations on the analysis. In short, “adequate” sample sizes were obtained from the various statistical populations to allow for the estimation of confidence intervals that are deemed as “acceptable” based on the stated statistical criteria.

Seasonal Trip Statistics by Waterway Access Category

This section examines the frequency of seasonal boating trips using the information from the reported trips taken by Collier County survey respondents. The analysis focuses on seasonal variations in the following trip-related attributes: AM and PM departure times, trip duration (daytrips versus overnight trips), weekend versus weekday trip proportions, and reported trip activities. Summary tables and graphics highlight various trip characteristics and patterns for all respondents by Waterway Access Category.

The number of total reported trips during the peak and off–peak boating seasons are shown in Table 33 (based on all trips reported by survey respondents: Trips 1 and 2). A total of n=3,682 boating trips were reported by survey respondents. The percentage of off–peak season trips (at 56%) is higher than the percentage of peak season trips (44%) due to the fact that the off-peak season included more months.

Adequate sample sizes were obtained for each season, as well as all of the major or predominant season/user-group combinations, except for the group labeled “other”—those respondents departing from a Shoreline/Causeway. Therefore, in forthcoming sections of this chapter, the Shoreline/Causeway group does not appear in all summary tables due to insufficient sample size.

The summary statistics in Table 33 show that the greatest proportion of trips are associated with respondents departing from Boat Ramps, a boating group that accounts for 45% of all reported trips by survey respondents. Respondents departing from Docks were the next-largest user group with approximately 35% of all reported trips, followed by Marina Wet Slip users (at 12%) and Marina Dry Storage facility users (at 7%).

Boat Ramp and Dock users tended to report a larger percentage of off–peak season trips, whereas Marina Wet Slip and Marina Dry Storage users tended to report a larger percentage of peak season trips. In any event, the sheer number of reported trips in both peak and off–peak seasons for each of the four major WACs/user groups were more than adequate for the purposes of this study, with sample sizes that easily exceed the minimum required for extracting useful summary statistics and parameter estimates.

Table 33. Frequency Counts of All Reported Trips by Season and Waterway Access Category (Trips 1 and 2)

		Water Access Categories					
Season	**Statistic**	**All Users**	**Boat Ramp**	**Dock**	**Marina Wet Slip**	**Marina Dry Storage**	**Other***
Off-Peak	Season % [1]	100%	45%	37%	9%	9%	1%
	Year % [2]	56%	56%	59%	42%	66%	51%
	Trip Count	2,071	924	760	184	179	24
Peak	Season % [1]	100%	45%	32%	16%	6%	1%
	Year % [2]	44%	44%	41%	58%	34%	49%
	Trip Count	1,611	720	520	256	92	23
Year Round	Season % [1]	100%	45%	35%	12%	7%	1%
	Year % [2]	100%	100%	100%	100%	100%	100%
	Trip Count	3,682	1,644	1,280	440	271	47

* Survey respondents classified as "Other" include boaters launching from a Shoreline/Causeway.

[1] The seasonal percentage for a water access category (WAC) is based on its seasonal trip count as compared to the trip count for all users during the same season. For example, 924 off-peak boat ramp trips compared to 2,071 off-peak trips by all users means that 56% of all off-peak trips were by boat ramp users.

[2] The year percentage, by season, for a water access category (WAC) is based on its seasonal trip count as compared to the total number of year round trips for the same WAC. For example, 924 of the 1,644 total (year round) trips by boat ramp users occurred during the off-peak season and, thus, 56% of boat ramp trips were during the off-peak season (note, the off-peak season was determined based on all users).

Mean and Median Trips by Season and User Group

For the seasonal analysis of mean and median trips, only the four major waterway access groups were analyzed: Boat Ramps, Home/Condo Docks, Marina Wet Slips, and Marina Dry Storage facilities.

Table 34 highlights the mean and median number of reported trips taken during each of the two designated boating seasons (based on responses to Question 14 of the survey questionnaire). Table 35 shows the results of a KW-ANOVA equality of medians test and the Tukey-Kramer test.

Figures 14 and 15 highlight the mean number of trips per month by season (and Figure 14 shows the distribution of trips per month by season and the number of outliers).

Figures 16 and 17 highlight the mean and median monthly trips (respectively) by season and Waterway Access Category. [Note that trip data was "standardized" to reflect the mean and median number of reported trips that occurred during a "typical" month within each boating season. The summary statistics on trips in forthcoming sections of this chapter will be couched in season-specific terms.]

It is important to note that seasonal distributions of reported trips (as shown in Figure 14) are positively skewed and are significantly different from a "normal distribution" at the 95% confidence level (using Shapiro-Wilks and D'Aggostino's normality tests). The implication of

non-normality is that mean monthly trip counts by season may be somewhat overstated due to the presence of "outliers," as large outlying observations tend to inflate the mean.

Summary statistics in Table 34 reveal that the mean and median trips per month by season vary markedly across user groups and seasons, with the most dramatic differences observed between seasons and the least amount of variation in average monthly trips occurs across user groups.

Respondents from all user groups reported a median number of monthly trips in the off–peak season that was not statistically dissimilar from the overall median for the off–peak season. Survey respondents departing from Docks, Marina Wet Slips, and Marina Dry Storage facilities tended to have peak season means and medians that were significantly greater than the off–peak season means, whereas survey respondents who launched from Boat Ramps tended to have peak and off–peak seasonal means that were not significantly different from one another, nor were they significantly different from their overall user group mean. There were even greater differences observed in the seasonal means and medians of respondents departing from Home/Condo Dock and Marinas, once again suggesting the presence of large outlying values. By contrast there were no significant differences in the seasonal means of respondents departing from Boat Ramps. Dock and Marina users had median monthly trip counts that exceeded the overall median for all survey respondents during the peak season, with median trip counts that were significantly less than the overall median for all respondents during the off–peak season.

All in all, the test results shown in Table 35 point to significant differences in the median and mean values of reported trips across seasons and/or for the various Waterway Access Categories. These differences are highlighted in Figures 15, 16, and 17.

Table 34. Mean and Median Number of Trips per Season by Waterway Access Category

Season	Statistic	All Users	Boat Ramp	Dock	Marina Wet Slip	Marina Dry Storage
Off-Peak	Mean	3.5	3.5	3.9	3.4	2.4
	Median	2.6	2.5	2.8	2.3	1.7
	95% CI[1]	3.3 - 3.7	3.2 - 3.8	3.5 - 4.3	2.8 - 4.1	2.0 - 2.8
Peak	Mean	4.5	3.8	5.1	5.3	5.1
	Median	3.2	2.8	4.0	3.8	4.0
	95% CI[1]	4.2 - 4.7	3.4 - 4.1	4.6 - 5.5	4.5 - 6.1	4.4 - 5.9
Year Round	Mean	3.6	3.6	4.4	4.2	4.1
	Median	3.0	2.6	3.5	3.2	3.0

[1] 95% confidence interval

Table 35. KW-ANOVA Equality of Median Test Results and Tukey-Kramer Test: Median (Mean) Number of Trips per Month by Season

Kruskal-Wallis One-Way ANOVA (Rank Sum Test)

Hypotheses

Ho: Medians are equal

Ha: Medians are different

Method	Chi-Square DF	Probability (H)	Level	Decision (5%)
Not Corrected for Ties	1	37.531	0.000001	Reject Ho
Corrected for Ties	1	37.549	0.000001	Reject Ho
Number Sets of Ties	141			

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Off–peak	1140	1231755.00	1080.49	-6.126	2.57
Peak	1195	1495525.00	1251.49	+6.126	3.20

Kruskal-Wallis Multiple-Comparison Z-Value Test

Variable	Off–peak	Peak
Off–peak	0.0000	6.1278
Peak	6.1278	0.0000

Bonferroni Test: Medians significantly different if Z-value > 1.9600 (at 95% confidence level)

Tukey-Kramer Multiple-Comparison Test

Response(s): Off–peak, Peak

Alpha=0.05 DF=2333; MSE=15.71504; ***Critical Value=2.7733***

Group	Count	Mean	Different From Groups
Off–peak	1140	3.507769	Peak
Peak	1195	4.475481	Off–peak

Notes: This test provides a comparison of pair-wise differences between the means.
Reject Null Hypothesis of Equality of Means Peak versus Off–peak Seasons.

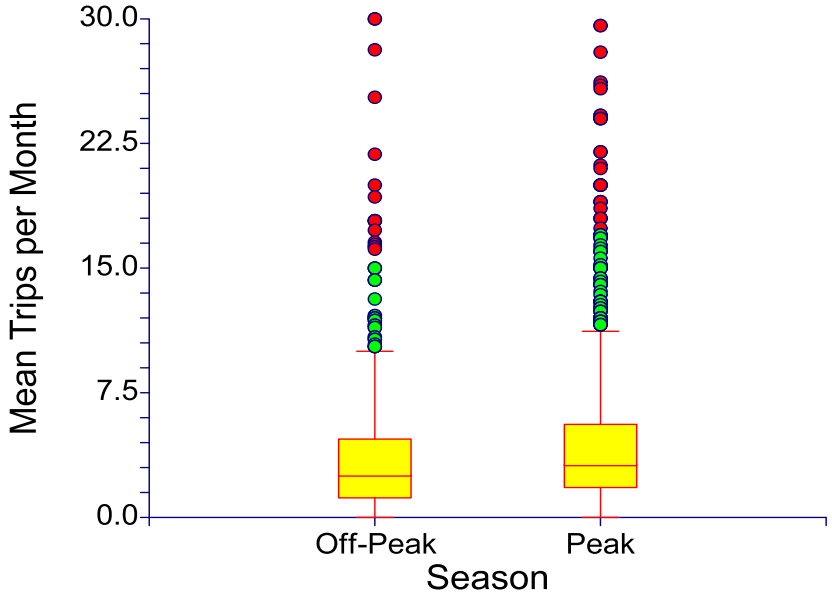

Figure 14. Box Plots of Reported Monthly Trips per Season (all survey respondents)

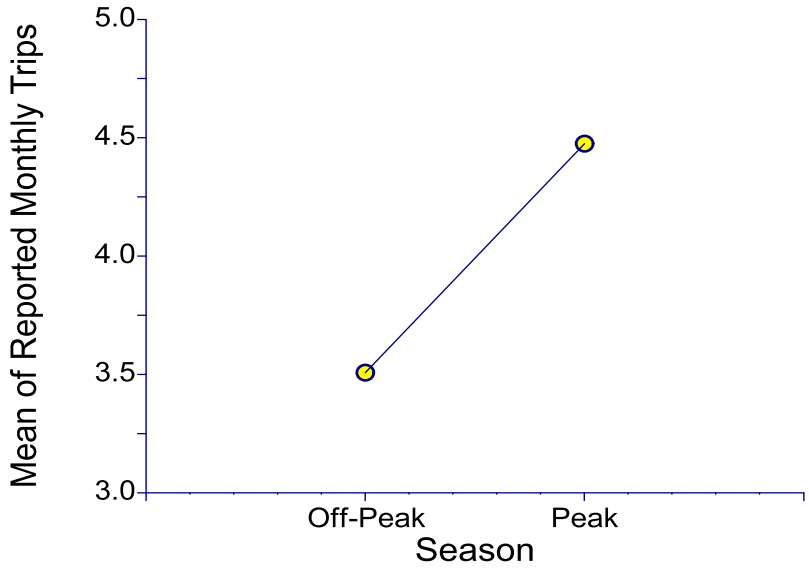

Figure 15. Mean Reported Monthly Trips by Season (all survey respondents)

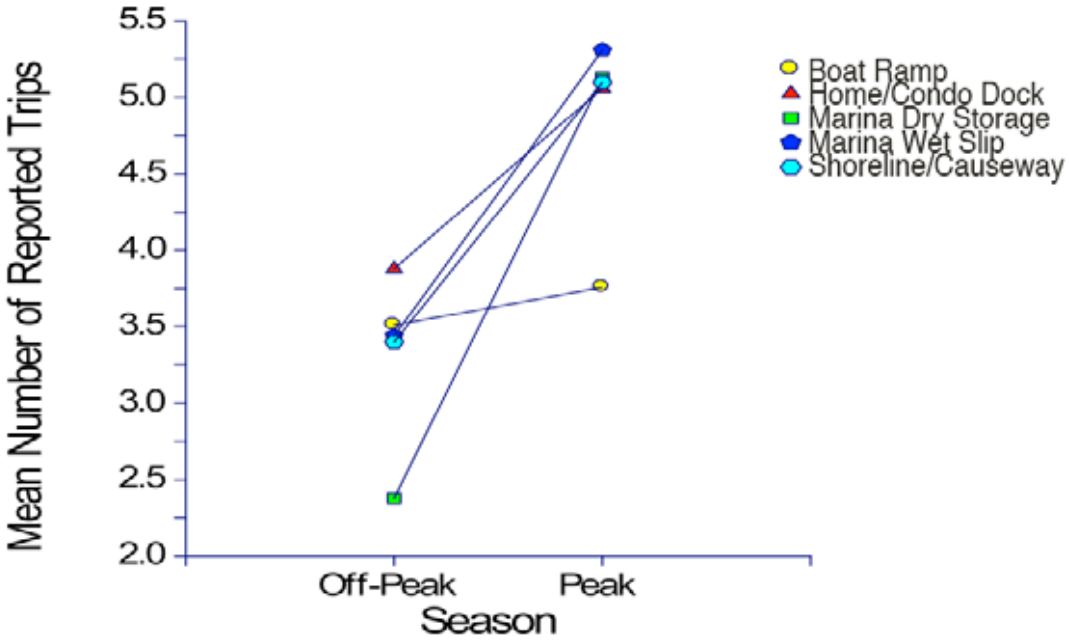

Figure 16. Mean (reported) Trips per Month by Season and User Group

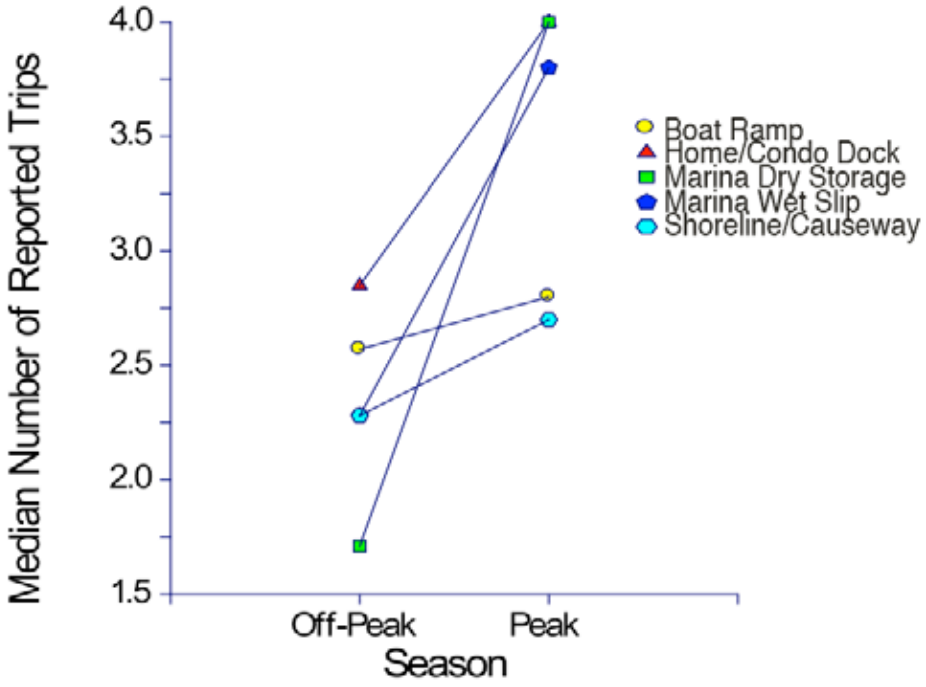

Figure 17. Median (reported) Trips per Month by Season and User Group

Seasonal and Temporal Analysis of Trip Departure Times by Waterway Access Category

AM Departure Time

Summary statistics for reported AM departure times by season and user group are presented in Table 36[7]. The results are based on information obtained from the n=3,220 total reported AM trips taken by survey respondents (Trips 1 and 2), or approximately 89% of the total trips reported.

The mean overall AM departure time of trips reported by all survey respondents was approximately 8:38AM. The average peak-season departure time of approximately 8:46 AM is 15 minutes later than the average AM departure time during off–peak season (8:31 AM).

Relative frequency histograms highlighting the distributions of reported AM departure times by season are shown in Figures 18 and 19. Class intervals are broken down by the half-hour to help differentiate the nuances that occur in the AM launch times by season.

The histograms (Figures 18 and 19) and summary statistics (Table 36) reveal several interesting features that are worthy of enumeration and discussion:

(1) The peak AM departure time tends to occur between 7:00 AM-7:30 AM, with a secondary peak departure time that occurs between 8:30 AM and 9:00 AM (a pattern that is consistent across seasons). Note that the departure times of 7:00 AM to 8:00 PM represent the first wave of early launch boaters, most likely linked to fishing as a predominant recreational boating activity (note that over 80% of respondents launching during these hours reported engaging in fishing as a reported activity that occurs during a typical trip).

(2) A "staggering" of departure times is evident in both histograms—with spikes followed by voids.

Note that there are consistent series of four sequential peaks that occur at various times, with a departure pattern that is fairly consistent across the two seasons, with a pattern that is similar to that which is observed over the entire year. The staggering of the latter three peaks represents successive waves of departures that occur approximately 45 minutes to 1 hour apart.

(3) Boaters launching from Boat Ramps begin their trips earlier than boaters from other user groups during the peak boating season (departing at approximately 7:57AM, on average; and 7:53 during the off–peak season).

(4) In general, respondents accessing the waterways from Docks and Marinas reported AM departure times that were significantly later than the average for all user groups and later

[7] Note that departure time difference between the peak boating season and the non-peak season may be somewhat understated due to complications that arise with the conversion to Daylight Savings Time (as pertaining to a sub-set of reported trips during specific times of the year).

than boaters departing from Boat Ramps during both the peak and off–peak boating seasons.

(5) Respondents departing from Marina Wet Slips, Docks, and Marina Dry Storage facilities all had average departure times that were after 9:00 AM (9:01 AM, 9:14, and 9:25 AM, respectively). Boaters launching from Docks or Marina Dry Storage facilities were shown to depart anywhere from about 30 and 100 minutes later than boaters departing from Boat Ramps during the various boating season.

(6) Marina Dry Storage facility users tend to have AM departure times that were later than all of the other Waterway Access Categories during the various seasons, and significantly later departure times than the typical boater from all user groups, as well as boaters departing from Boat Ramps or Marina Wet Slips.

(7) Early departing boaters (those that depart during the first wave of departures that take place at or around 7:00-7:30 AM, as illustrated by the primary peak in Figures 18, 19, and 24) are most likely to be Boat Ramp users and are most likely associated with the activity of Fishing; whereas boaters associated with later AM-hour departure times tend to launch their vessels from Marina Dry Storage facilities or Docks and are likely to engage in a variety of recreational activities that include Fishing, Nature Viewing/Sightseeing, Cruising, etc.

(8) The third and fourth waves of departures that occur just prior to 10:00 and 11:00 AM (associated with the third and fourth peaks in Figures 18, 19, and 20) are more likely to be associated with boaters departing from Home/Condo Docks and Marina Dry Storage Facilities.

AM Departure Times by Waterway Access Category and Season

AM departure times by season and user group are also highlighted in Figure 21. Substantial differences can be observed between the average AM departure times of Boat Ramp users versus those of other waterway access groups. Notwithstanding, the seasonal trends in departure times are quite similar; with the earliest AM departure times occurring during the peak boating season and the latest AM departure times occurring during the off–peak season.

In general, boaters departing from Ramps tend to launch anywhere from an hour to 75 minutes earlier than boaters launching from other user categories. As indicated earlier, Dock and Marina Wet Slip users tend to have AM departure times that are significant later than Ramp users during both the peak and off–peak seasons.

Table 36. Mean AM Departure Time by Season and Waterway Access Category (Trips 1 and 2)

			Waterway Access Categories			
Season	**Statistics**	**All Access Categories**	**Boat Ramp**	**Dock**	**Marina Wet Slip**	**Marina Dry Storage**
Off-Peak	Departure time (AM)	8:31	7:53†	9:08††	8:43*	9:10*††
	Sample size	1,746	820	581	167	156
Peak	Departure time (AM)	8:46	8:02†	9:21††	9:14††	9:40**††
	Sample size	1,474	659	404	215	719
Year Round	Departure time (AM)	8:38	7:57†	9:14††	9:01††	9:25††
	Sample size	3,220	1,483	993	382	335

Significant conclusions (at the 95% confidence level):

*Significantly *earlier* than values observed from the same user group or that group's overall mean *during other seasons*

** Significantly *later* than values observed for the same user group or that group's overall mean *during the other seasons*

† Significantly *earlier* than values observed for other user groups or the overall mean *during the same season*

†† Significantly *later* than values observed for other user groups or the overall mean *during the same season*

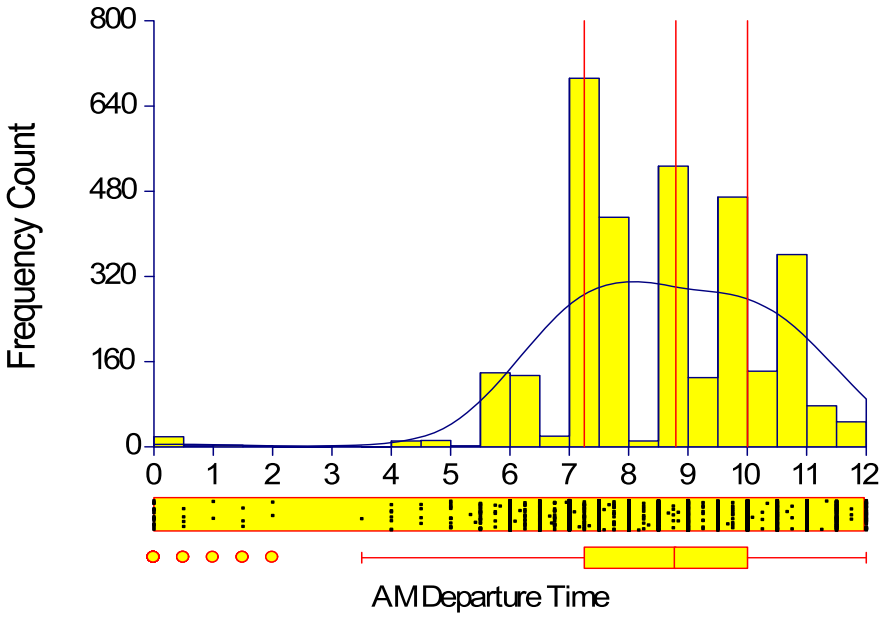

Figure 18. Histogram of AM Departure Times for Reported Trips (All Trips, All Seasons)

AM Departure Times (n = 3,220 reported trips)
Note: X-Axis (0.0 = midnight; 12.0 = noon)

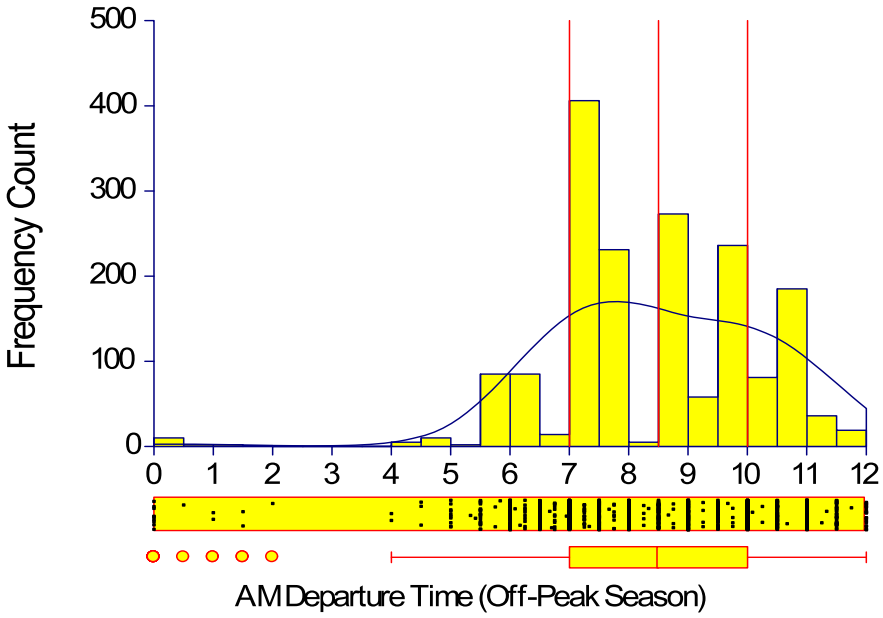

Figure 19. Histogram of AM Departure Time – Off–peak Season

AM Departure Times (n = 1,746 reported trips)
Note: X-Axis (0.0 = midnight; 12.0 = noon)

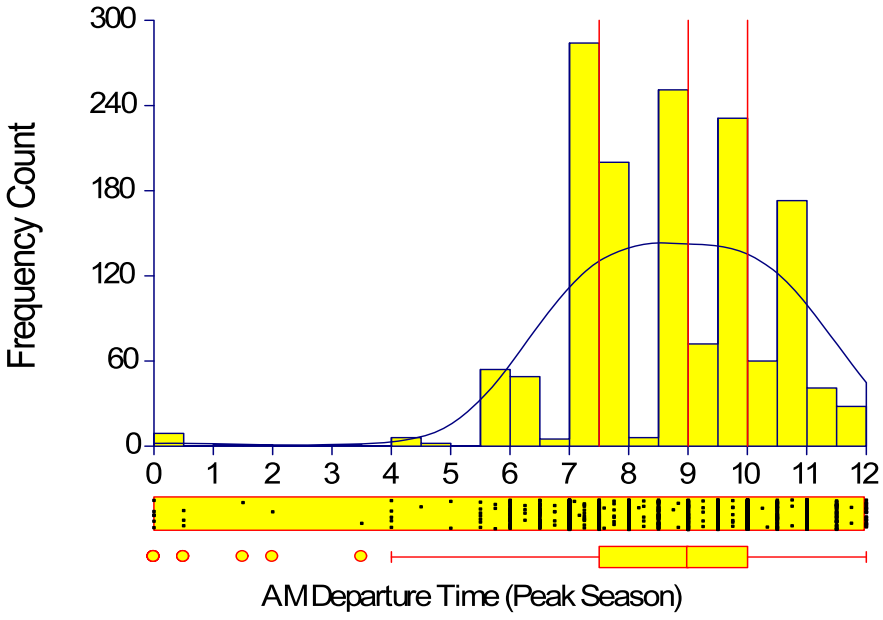

Figure 20. Histogram of AM Departure Time – Peak Season

AM Departure Times (n = 1,474 reported trips)
Note: X-Axis (0.0 = midnight; 12.0 = noon)

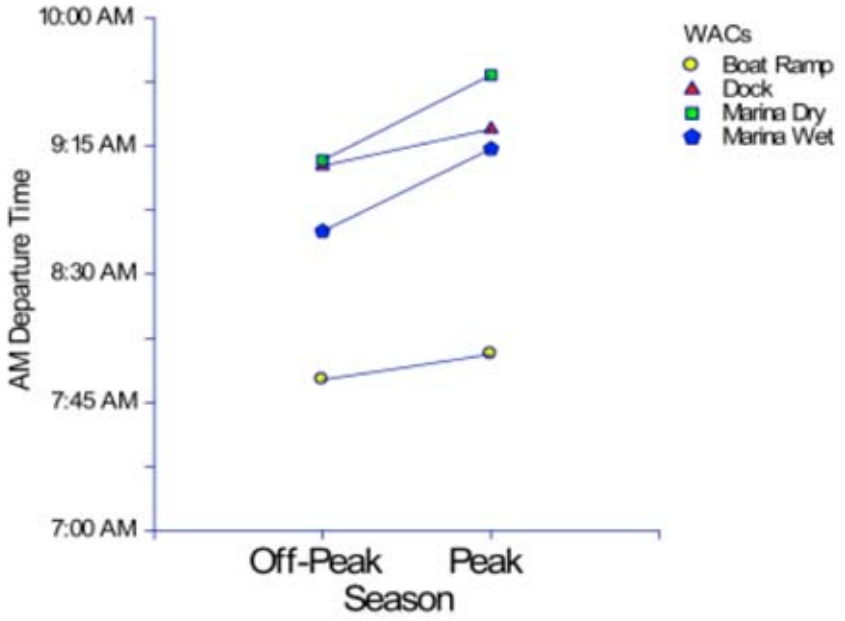

Figure 21. Mean AM Departure Time by User Group and Season (All Reported Trips)

PM Departure Time

A total of n=411 survey respondents reported trips with PM departure times. This sub-sample represents roughly 11% of the total reported trips obtained from the mail survey.

The distribution of PM departure times is shown in Figure 22, and Figure 23 breaks down PM departure times by Waterway Access Category and Season. The distribution of values is positively skewed and unimodal, with trip frequency counts that decline in a fairly consistent manner after the peak launch period, moving toward the evening hours. The peak PM departure time occurs between 12:30 and 1:00 PM, with departures declining steadily until the latest reported PM departure time of 11:00 PM.

A summary of the mean PM departure times by user groups and season is given in Table 37 and Figure 23. The reported mean PM launch time for reported trips that occurred during the off–peak boating season (2:48 PM) is not significantly different from the overall average PM launch time of 2:38 PM. Note, however, that the mean peak-season PM departure time for all reported trips (1:58 PM) tends to be significantly earlier than the overall average PM departure time of 2:38 PM. This is a likely byproduct of the relatively early reported mean PM launch times of Home/Condo Dock, Marina Wet Slip, and Marina Dry Storage facility users (with mean PM departure times that range from 12:48 to 1:55 PM during the peak season, and from 1:49 to 2:29 PM during the off–peak season). [In the table, “All Access Categories” include Shoreline/Causeway and Other. The results are for survey respondents who answered Questions 1 (PM), 4, and 7. These factors account for discrepancies in row/column totals (as not all respondents answered Questions 2, 4, and 7).]

The reported afternoon departure time of respondents using Boat Ramps was significantly later than other user groups during each of the designated boating seasons; with an overall average PM departure time of 3:23 PM. Boaters departing from Marina Dry Storage facilities tended to have mean PM departure times that were earlier than boaters from any of the other Waterway Access Categories in both the peak and off-peak seasons.

Table 37. Mean PM Departure Time by Season and Waterway Access Category (Trips 1 &2)

			Waterway Access Categories			
Season	**Statistics**	**All Access Categories**	**Boat Ramp**	**Dock**	**Marina Wet Slip**	**Marina Dry Storage**
Off-Peak	Departure time (PM)	2:48	3:56††	2:24	2:29**	1:45**†
	Sample size	231	62	148	9	10
Peak	Departure time (PM)	1:58*	2:32††	1:55*	1:40*	12:48*†
	Sample size	179	41	101	28	6
Year Round	Departure time (PM)	2:38	3:23††	2:12	1:52†	1:16†
	Sample size	411	104	249	37	16

Significant conclusions (at the 95% confidence level):

* Significantly *earlier* than values observed from the same user group or the overall mean *during other seasons*.
** Significantly *later* than values observed for the same user group or the overall mean *during the other season*.
† Significantly *earlier* than values observed for other user groups or the overall mean *during the same season*.
†† Significantly *later* than values observed for other user groups or the overall mean *during the same season*.

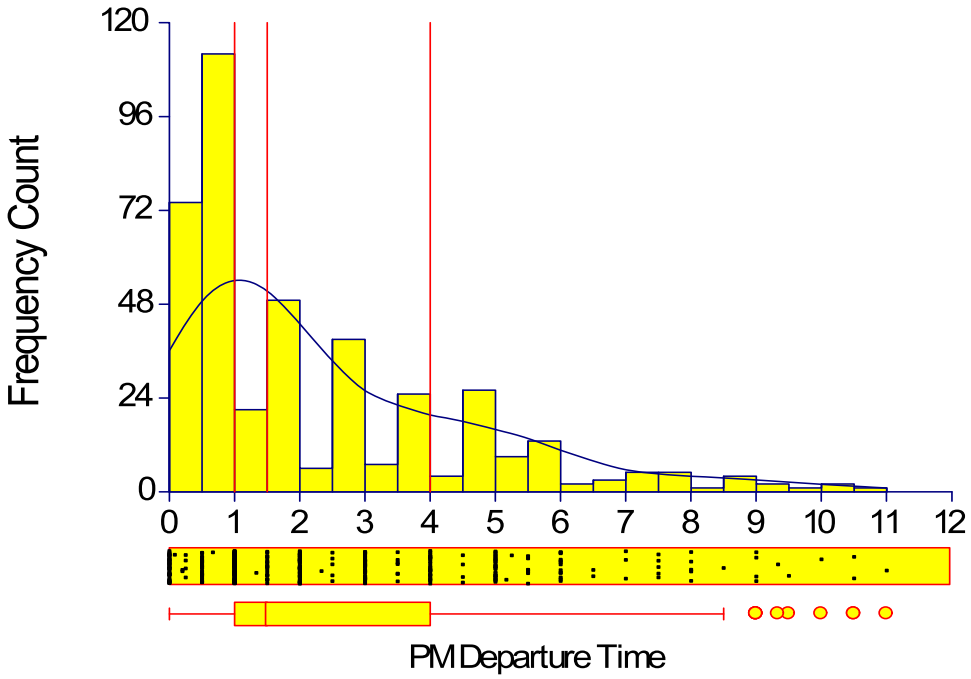

Figure 22. Frequency Distribution of PM Launch Times for Reported Trips

PM Departure Times (n = 411 reported trips)
Note: X-Axis (0.0 = noon; 11.0 = 11PM maximum)

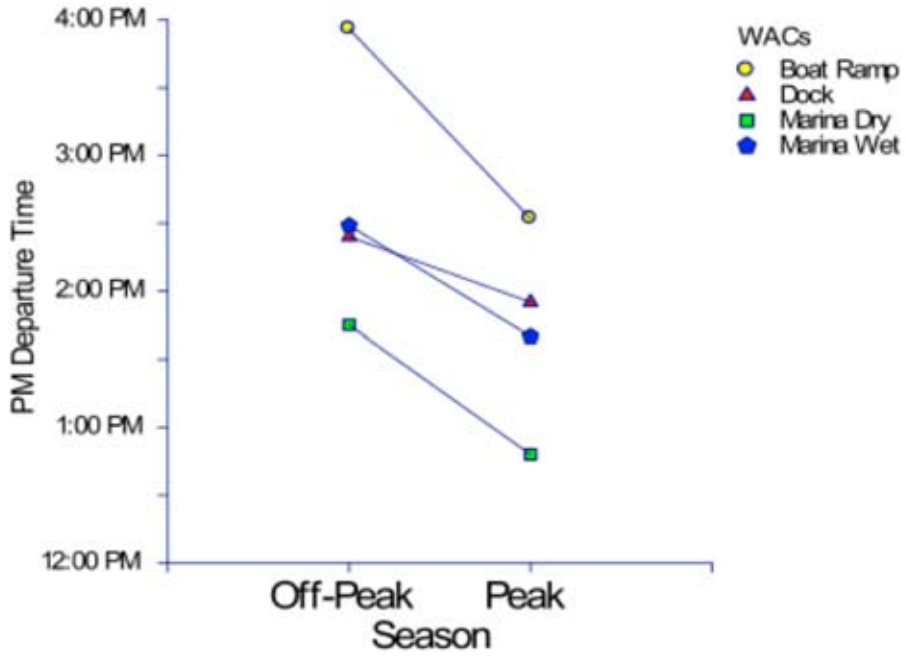

Figure 23. PM Launch Times for Reported Trips by Waterway Access Category and Season

Seasonal and User Group Analysis of Trip Duration

Day Trips: Reported Trips of 24 Hours or Less

Seasonal and user-group comparisons were made of trip durations of the n = 3,237 "daytrips" (trips of 24 hours or less) reported by Collier County survey participants. Note that daytrips represent roughly 87% of the total number of reported trips obtained from the mail survey. Summary statistics for day trip durations by season and user group are presented in Table 38, with supporting graphics shown in Figures 24 and 25.

The average trip duration (all reported trips, all seasons) was 5.7 hours. Note that the peak and off–peak trip durations (5.63 and 5.77 hours, respectively) were not significantly different from the overall average of 5.7 hours. The 95% confidence interval for the mean day trip duration was found to be between 5.60 hours and 5.80 hours for all user groups across all seasons. The limited range of this interval (approximately .20 hours or 12 minutes) indicates that reported trip durations are compactly distributed about the mean of 5.7 hours, a feature that is confirmed by the box plot of this distribution (Figure 24).

A more detailed analysis of day-trip duration revealed numerous statistical differences in the mean and median number of hours spent on the water during the peak and off–peak boating seasons and the four major user groups. Seasonal differences in the duration of day trips were least pronounced for respondents departing from Docks or Boat Ramps with a difference of only 5-7 minutes between the peak and off–peak boating season within the group.

Larger differences in seasonal trip durations were observed for Marina Wet Slip and Marina Dry Storage users, with off–peak season trip durations that were approximately one-half hour longer than the duration of trips taken during the peak season. Note, however, that there was very little variation in the seasonal trip duration found *within* the various Waterway Access Categories.

For example, reported day trips for respondents departing from Boat Ramps averaged about 6.6 to 6.7 hours, with no 'significant difference' observed between peak and off–peak season trip durations. Moreover, the median trip duration of 6 hours for respondents departing from public Boat Ramps was also consistent across seasons (as the value of 6.5 hours – the off–peak trip duration – is not significantly different from the overall user group median of 6 hours). In most cases, the peak and off–peak trip durations for a given user group were not significantly different from one another at the 95% confidence level.

By contrast, a substantial amount of variation in trip duration was observed *between* the Waterway Access Categories (this is illustrated in Figure 25).

Specifically, respondents departing from Boat Ramps reported trip durations that were approximately one to two hours longer than boaters from other Waterway Access Categories, on average. Median trip durations range from 4.5 to 6 hours, depending on the user category and season, whereas mean trip durations range from 4.8 to 6.7 hours.

Respondents departing from Docks reported the shortest trip durations, with an average of approximately 4.8 hours across all seasons and a median trip duration of 4.5 hours. Boaters departing from Docks and Marinas reported trip durations that were significantly less than those reported by respondents departing from Boat Ramps. All in all, the results presented in Table 38 reinforce the notion that boaters associated with the various user groups constitute distinct statistical populations with distinct use characteristics and trip durations that do not vary much across seasons.

Table 38. Mean and Median Reported Trip Durations (in hours) by Season and Waterway Access Category – Reported "Day Trips" (Trips ≤ 24 Hours)

			Waterway Access Categories			
Season	**Statistics**	**All Access Categories[1]**	**Boat Ramp**	**Dock**	**Marina Wet Slip**	**Marina Dry Storage**
Off-Peak	Mean trip duration (hrs)	5.8	6.8††	4.8†	5.9**	5.2**†
	Median trip duration (hrs)	6.0	6.5	4.5	5.0	5.0
	Sample size (trips 1 & 2)	1,808	799	673	147	167
Peak	Mean trip duration (hrs)	5.6	6.6††	4.9†	5.2*	4.7*†
	Median trip duration (hrs)	5.0	6.0	4.0	4.5	5.0
	Sample size (trips 1 & 2)	1,415	576	448	195	176
Year Round	Mean trip duration (hrs)	5.7	6.7††	4.8†	5.5	4.9†
	Median trip duration (hrs)	5.5	6.0	4.5	5.0	5.0
	Sample size (trips 1 & 2)	3,237	1,380	1,130	342	343

[1] "All Access Categories" include Shoreline/Causeway and Other. The results are for respondents who answered Questions 2 (Duration ≤ 24hrs), 4, and 7, and, thus, account for discrepancies in row/column totals. Significant conclusions (at the 95% confidence level):

* Significantly *less* than values observed from the same user group or the overall mean during the *other* seasons

** Significantly *greater* than values observed for the same user group or the overall mean during the *other* season

† Significantly *less* than values observed for other user groups or the overall mean during the *same* season

†† Significantly *greater* than values observed for other user groups or the overall mean during the *same* season

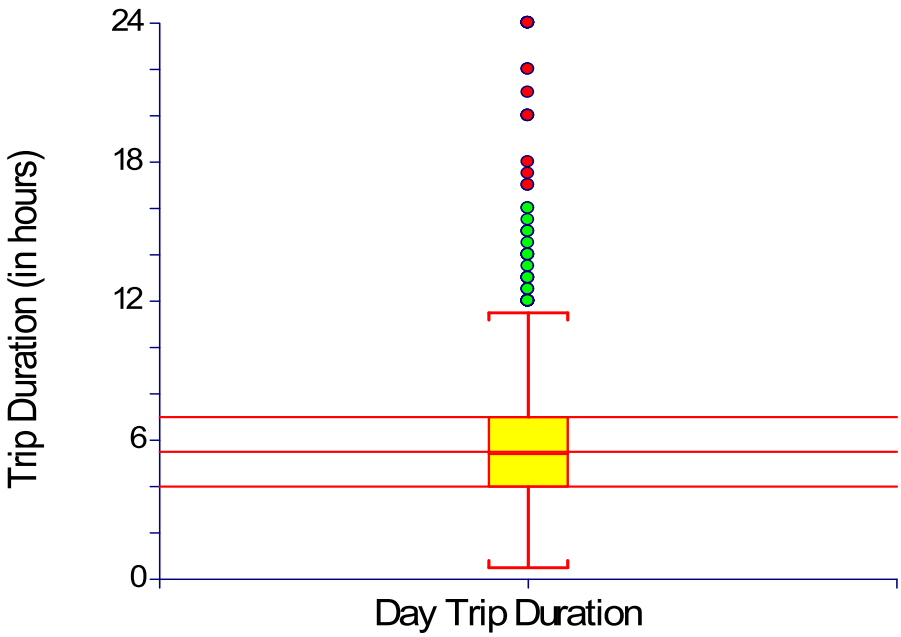

Figure 24. Box-Plot of the Trip Duration of "Day Trips" as Reported by Respondents from All User Groups/All Seasons

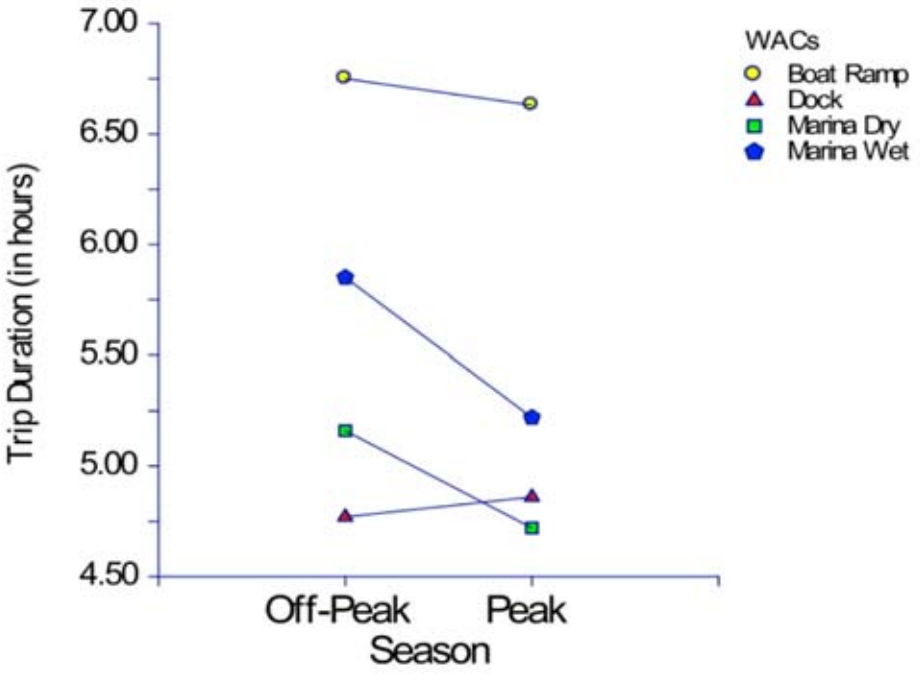

Figure 25. Average Reported Duration of Day Trips (in hours) by Season/User Group

Overnighters: Reported Trips Greater than 24 Hours in Duration

A total of n=455 reported trips (representing approximately 13% of the total trips reported by survey respondents) were categorized as "overnighters" (i.e., trips that were over 24 hours in duration). Note that only overnight trips that were greater than 24 hours in duration but less than or equal to 168 hours (7 days) were used in this analysis. A limit of 168 hours was employed to sidestep the influence of extreme outliers (values that >>168) that might skew the distribution of trip duration values and inflate the mean. Note that the distribution of values of overnight trip duration is one that has only three outliers that fall between 144 and 168 hours (see distribution of values in Figure 26).

Summary statistics for overnight trip duration are provided in Table 39, by season and by user group, and in Figure 27. Note that the overall mean overnight trip duration was 53.1 hours, with a median overnight trip duration of 36 hours (a value that was fairly consistent across groups, with the exception of Marina Wet Slip users – a group that demonstrated significantly larger median trip duration values (ranging from 51.5 to 54.0 hours). The gap between the mean and the median trip values, as exhibited in most season/user group combinations, imply that the distribution of overnight trip durations is indeed highly skewed; a feature that is confirmed by the box plot in Figure 26.

The results revealed that Marina Wet Slip users had the longest average overnight trip durations in both the peak and off–peak seasons, with trip durations of 70 and 67 hours, respectively. Note that this waterway user group had reported trip durations that were nearing the 3-day mark. Marina Wet Slip users had overnight trip durations that were significantly greater than boaters from all other Waterway Access Categories (and trip durations that exceeded the averages of all groups in the peak and off–peak seasons). In fact, survey respondents departing from Marina Wet Slips reported overnight trip durations that were between 14 and 37 hours longer, on average, than trip durations of other user groups.

By contrast, Marina Dry Storage users reported the shortest overnight trip durations with peak-season (off–peak-season) trip durations of approximately 32 (36) hours. Marina Dry Storage facility users had overnight trip durations that were significantly less than boaters from the other user groups (and approximately a day-and-a-half shorter than boaters departing from Marina Wet Slips).

Note that overnight trip durations reported by boaters departing from Docks and Boat Ramps were not significantly different from the average overnight trip duration of all survey respondents (and ranged between about 48 and 56 hours depending on the season).

Mostly, there were virtually no discernable differences between trip durations in the peak versus the off–peak seasons, with the exception of Dock users, who reported having slightly longer overnight trips during the peak boating season than their all-season group average.

Table 39. Mean and Median Overnight Trip Durations (hours) by Season and User Group—"Overnighters" (Trips > 24 Hours and ≤ 168 Hours)

Season	All Users‡	Ramp	Dock	Marina Wet Slip	Marina Dry Storage
Off–peak	***50.3 hrs***	**48.8**	**47.9***	**67.0††**	**36.8†**
	36 hrs	36	37	51.5††	30†
	(207)	(109)	(60)	(28)	(8)
Peak	***55.4 hrs***	**52.2**	**55.8****	**70.0††**	**32.3†**
	36 hrs	36	34	54††	28.5†
	(248)	(131)	(63)	(43)	(10)
All Seasons	**53.1 hrs**	**50.6**	**51.9**	**68.8††**	**34.3†**
	36 hrs	36	34.5	52††	29†
	(455)	(240)	(123)	(71)	(18)

Mean departure time shown in **boldface type**; sample sizes are shown in parentheses.

‡ Note that "All Users" include Shoreline/Causeway and Other. Also, these results are for survey respondents who answered Questions 2 (Duration >24hrs), 4, and 7. These factors account for discrepancies in row/column totals (as not all respondents answered Questions 2, 4, and 7).

Significant conclusions (at the 95% confidence level):

* Significantly *less* than values observed from the same user group or the overall mean during the *other* seasons

** Significantly *greater* than values observed for the same user group or the overall mean during the *other* season

† Significantly *less* than values observed for other user groups or the overall mean during the *same* season

†† Significantly *greater* than values observed for other user groups or the overall mean during the *same* season

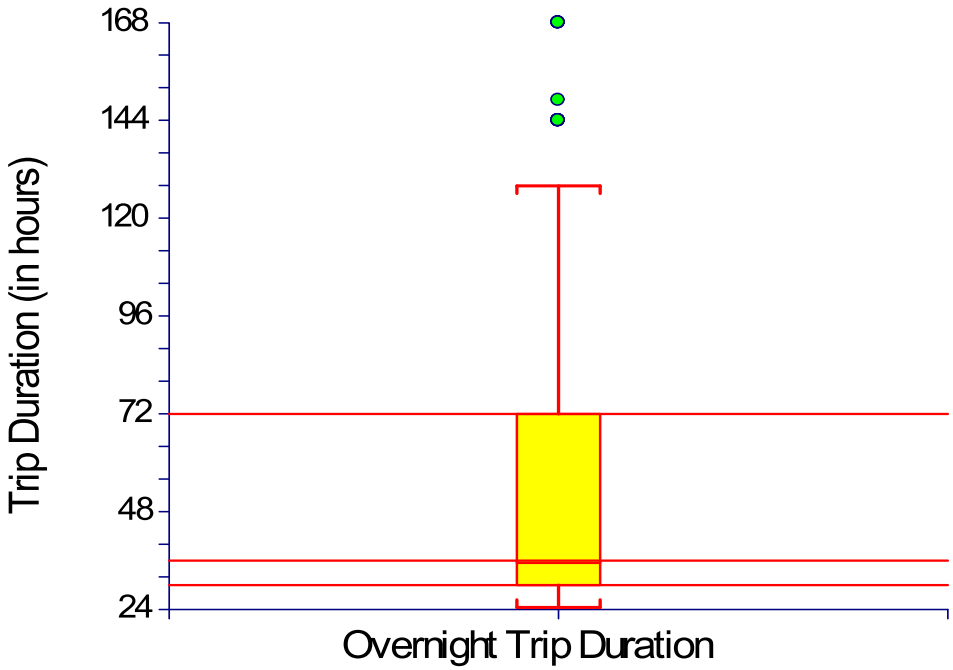

Figure 26. Box Plot Showing Duration of Reported Overnight Trips by Survey Respondents from All User Groups (Trips of Duration > 24 hours and < 168 hours)

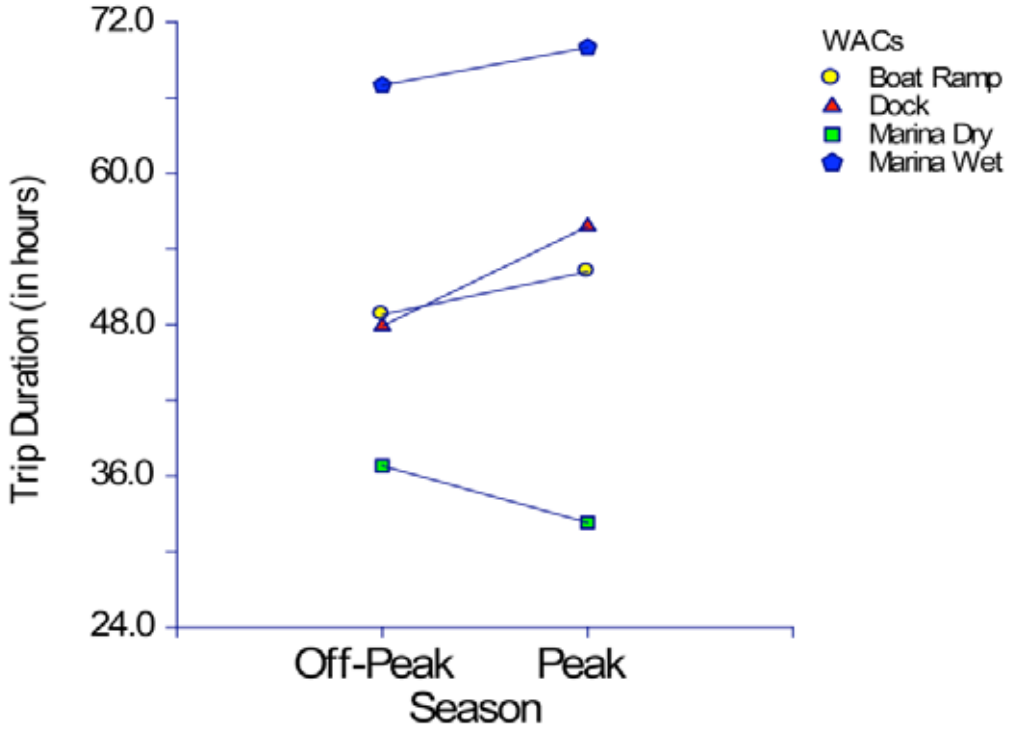

Figure 27. Average Reported Duration of Overnight Trips by Season and User Group (Trip duration > 24 hours and < 168 hours)

Seasonal Analysis of Weekend vs. Weekday Trips

Summary statistics highlighting the proportion of trips associated with weekend days (Saturday or Sunday) versus weekdays (Monday through Friday) are based on the responses to Question 3 of the survey. Of the n=3,611 reported trips, 1,867 fell on weekend days – yielding an overall proportion of 0.517. In other words, 51.7% of the reported trips by Collier County survey respondents were classified as "weekend trips", implying that 48.3% were weekday trips.

A breakdown of the proportion of weekend trips by waterway access group and season is presented in Table 40 and Figure 28. Boat Ramp users had the highest proportion of reported trips falling on weekend days (approximately 0.63 overall), with a peak (off–peak) season proportion of 0.67 (0.57). Note that proportion of weekday trips for this user group during the peak (off–peak) boating season was significantly less (greater) than the year-round average of .633. Moreover, Ramp users tend to have weekend trip proportions that were significantly larger than any of the other Water Access Categories; meaning that this group was the most likely of all groups to engage in recreational boating activities during weekend days.

Survey respondents departing from Marina Wet Slips and Marina Dry Storage facilities had a relatively lower proportion of weekend trips in both the peak and off–peak boating seasons, with overall averages of 0.35 and 0.31, respectively. Survey respondents departing from Marina Dry Storage facilities had the lowest overall proportion of trips occurring on weekends during the peak boating season (approximately 0.21 or 21%).

It should be noted that if all days of the week were "equally likely" in terms of observing a recreational boating trip (that is, trips were equally spread out over the course of the week), the "expected" proportion of weekend trips would be 2/7 = 0.285 (or 28.5%). This benchmark represents a value by which to compare the proportion of reported trips by user group and/or season to see gauge the relative contribution of the various user groups to boating traffic during weekend days. Note that in all cases, users groups posted proportions that significantly exceeded this benchmark in each and every boating seasons with the exception of Marina Dry Storage users during the peak season (with a 0.212).

Overall, the ratio of "reported" weekend trips to "expected" weekend trips -- (0**.517** / **0.285**) or **1.81** – indicates that weekend trips are, on average, about 1.8 times as likely to occur than weekday trips (across all seasons and all user groups). During the "off–peak" season, this weekend-use ratio increases to (0**.564 / 0.285**) or 1.97, indicating that, all other things being equal, a weekend trips are, on average, almost two times (2x) as likely to occur than weekday trips. During the "peak" season, this weekend-use ratio decline to (0**.459 / 0.285**) or **1.61**, indicating that weekend trips are, on average, about 1.6 times as likely to occur than weekday trips. These results suggest that the reported boating trips of the Collier County survey participants are more spread out over weekend and weekday days during the peak boating season, and more concentrated on weekends during the off–peak season. All in all, these indices highlight the weekend orientation of recreational boating trips in the Collier County study region. Furthermore, it should be noted that Ramp users having the largest weekend trip concentrations, with a weekend-use ratio of (0.678 / 0.285) = 2.37 during the off–peak season; suggesting that this user group is 2.3x more likely to take weekend boating trip than a weekday trip during the months of June through December.

Table 40. Proportion of "Weekend Trips" by User Group and Season

Season	All Users	Ramp	Dock	Marina Wet Slip	Marina Dry Storage
Off–peak	***0.564*** [1,122/1,988]	**0.678*†** (613/904)	**0.491** (363/738)	**0.419**†** (73/174)	**0.424**†** (73/172)
Peak	***0.459*** [745/1,623]	**0.575*††** (407/707)	**0.453** (226/499)	**0.311**††** (74/238)	**0.212**†††** (38/179)
Overall	**0.*517*** [1,867/3,611]	**0.633*** (1,020/1,611)	**0.476** (589/1,237)	**0.356**** (147/412)	**0.316**** (111/351)

Note: Sample sizes in brackets are the number of reported trips in each season for all users/respondents.
Proportions (P) by cells for WAC/season combinations are shown in parentheses
P = number of "weekend trips" divided by the number of trips for that user group and season.
"All Users" are for the four major WACs/user groups only.
Significant conclusions (at the 95% confidence level):

* Significantly *greater* than mean for the *same season*
** Significantly *less* than mean for the *same season*
† Significantly *greater* than mean for *same user group*
†† Significantly *less* than mean for *same user group*

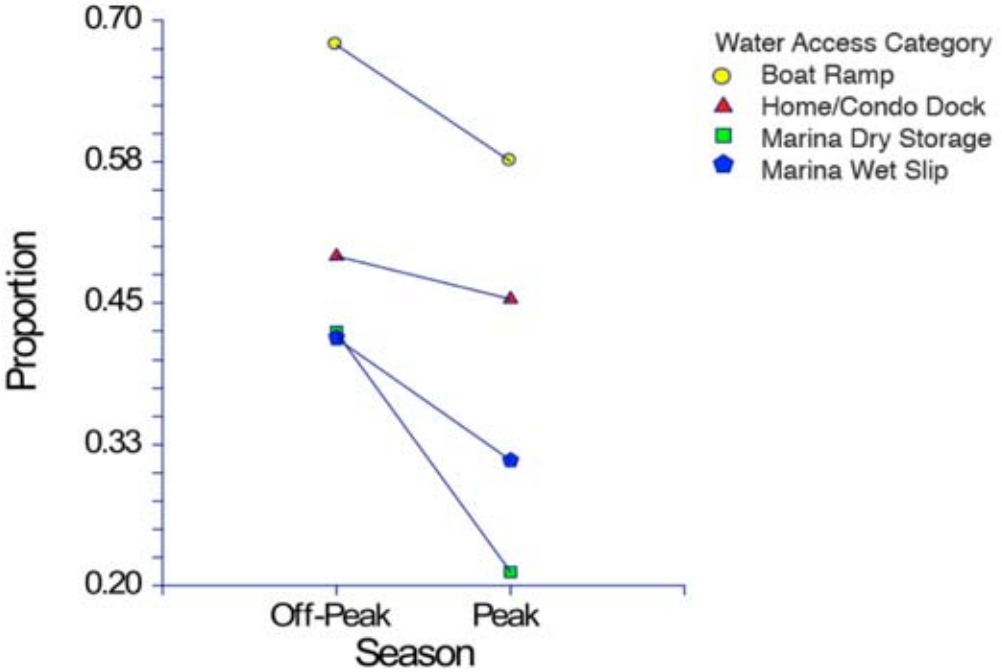

Figure 28. Proportion of Weekend Trips by Season and User Group

Boating Activities That Occur During Typical Trips—A Seasonal Analysis

Information on recreational boating activities that occur on a typical trip was also gathered from survey respondents, along with the number of typical trips taken per month. The objective was to identify the predominant boating activities by user group and season in the Collier County study region. A list of 15 boating activities was provided in Question 16 of the survey questionnaire. Survey respondents were asked to identify those boating activities that they engage in during a "typical trip," and "check all that apply." Survey participants were also asked to report the number of typical trips taken in each month of the year. Data on boating activities and trips per month were combined to estimate the number and the percentage of specific trip activities that occur during the two designated boating season during a typical boating trip.

Table 41 provides a breakdown of the estimated percentage of recreational boating activities for each of the 15 activity categories listed in the Survey Questionnaire. The percentage breakdown of boating activities tended to be fairly consistent from season to season, and no marked differences were observed in the reported activities that a respondent reported engaging in during a typical boating trip in the peak versus the off–peak season. Results are based on n = 1,274 total survey respondents, activities said to occur during a "typical trip," and for seasons associated with reported trips.

Fishing was the predominant activity of boaters who participated in the survey, regardless of season. As a seasonal recreational boating activity, 77% (79%) of Collier County survey respondents indicated that they engage in Fishing during the off–peak (peak) season.

The top-5 recreational boating activities during the ***off–peak*** season (in descending order of reported frequency) were Fishing (77%), Nature Viewing (53%), Cruising (45%), Beach Picnicking (43%), and Socializing (40%).

The top-5 recreational boating activities during the ***peak*** season (in descending order of reported frequency) were **Fishing** (79%), Nature Viewing (55%), Cruising (45%), Sightseeing (42%), and Socializing (37%).

Note that there were virtually no significant increase or decrease in the percentage of respondents who indicated that they engaged in certain activities in the peak season versus the off–peak season, and percentages were not significantly different from the year-round percentages in 26 out of a possible 30 (or 86.6%) of the cases.

Exceptions include a slight percentage increase in Sightseeing and a very modest decline in Beach Picnicking, Swimming, and Jet Skiing during the peak boating season. While weather and coastal waterway conditions, the amount of available daylight, and personal preferences play prominent roles in influencing the likelihood of the various boating activities—with more favorable physical conditions occurring during the peak boating season—surprisingly, the percentages of activities occurring during "typical" boating trips were found to be relatively stable across the various boating seasons.

Table 41. Percentage of Respondents Engaging in a Particular Activity by Season (as reported for a "Typical Trip")

Recreational Boating Activity*	*Year Round*	Overall Ranking (OR)	Off–Peak (OP) Season	OP Rank	Peak (P) Season	P Rank
Fishing	78.0	1	77.2	1	79.5	1
Nature Viewing	53.5	2	52.4	2	55.5	2
Cruising	45.4	3	45.6	3	45.2	3
Sight Seeing	40.5	4	39.0	6	42.8††	4
Beach Picnicking	41.1	5	43.5	4	37.0†	6
Socializing	39.3	6	40.6	5	37.2	5
Visiting Restaurants	34.9	7	35.0	7	35.0	7
Swimming	29.5	8	32.6	8	24.7†	8
Daytime Anchoring	23.8	9	24.5	9	22.7	9
Beach Camping	14.2		13.5		15.5	
Diving	10.9		11.8		9.8	
Overnight Anchoring	10.1		10.0		10.0	
Water Skiing/Water Sports	9.6		11.8		6.3	
Sailing	3.6		2.9		4.7	
Jet Skiing	3.2		4.3		1.6†	

Note: Column totals do not sum to 100% as many respondents indicated engaging in ***multiple*** recreational boating activities during a typical boating trip.

† Indicates that the percentage value for an activity in a given season was statistically *less* than the yearly percentage value at the 95% confidence level (top-ranked activities only).

†† Indicates that the percentage value for an activity in a given season was statistically *greater* than the yearly percentage value at the 95% confidence level (top-ranked activities only).

2.3. Collier Boating Detractions and Needs

Overview

This chapter analyzes the responses to the following survey questions:

-Question 21: *What detracts most from your Collier County boating experience?*

-Question 22: *What is needed most to improve your Collier County boating experience?*

Typologies of principal detractions and principal needs were developed through content analyses of the 2,831 responses to these questions in n=1,332 returned surveys[8] (i.e., the long version that contained Questions 21 and 22). Of these, 993 surveys had responses included in Question 21 analysis, and Question 22 analysis included 1,030 surveys. (Singular responses (e.g., "stop feeding dolphins") or tangential responses (e.g., "mosquitoes" or "a larger boat") were excluded.) Answers that shared a theme, such as "altered environment" for Question 21 or "more water access" for Question 22, were grouped as a *primary category*. In most cases, a primary category could be divided into one or more *subcategories,* identifying more specific concerns, such as "beach litter" or "more ramps." Every effort was made to capture the intended meaning of a given response and to maintain consistency in its assignment to a particular category and subcategory.

In addition to the total response analysis for each question, this chapter compares detraction and need perceptions among the waterway access groups (i.e., Marina (combined wet slip and dry storage), Home Dock, and Ramp (includes shoreline)) by analyzing each group's return independently. Independent analyses were necessary to ensure that issues pertinent to all boating groups were recognized, given the differing amount of survey input from each group. For example, about twice as many Ramp users received the long survey as did Marina users, and almost three times as many Ramp user responses were ultimately analyzed, as were Marina user responses. This disparity would potentially obscure or minimize concerns unique to the Marina group in an analysis based only on total response.

Detractions

Table 42 lists the eight primary categories of perceived boating detractions in descending rank, defined through the analysis of answers to Question 21. Each is followed by its composite subcategories, with the top ten overall identified in the last column. The top 10 detraction subcategories (of 39 subcategories total) together accounted for 924 responses, or 64.9% of the n=1,424 analyzed responses to this question. Only the *no detractions* category did not comprise subcategories and was ranked both as a category and a subcategory. The leading primary category addressed the *lack of courtesy and/or seamanship* in other boaters. It accounted for just over 28% (n=403) of all analyzed responses. Within this, the leading subcategory consisted of general comments as to *bad behaviors in other boaters* (n=169 or 11.9% of total). This was also the leading subcategory overall (Table 42). Two other subcategories within *lack of courtesy/seamanship* made the top ten overall, with 5.5% of all responses specifically referring to *PWC operator behaviors* (6th) and 4.6% citing *speeders* and *boats generating big wakes* (9th).

[8] Many survey respondents provided multiple answers to one or both questions; others chose not to answer. Therefore, the total response does not equal the returned survey count or the analyzed survey count.

Table 42. Boating Detraction Categories / Subcategories for All User Types

Categories / Sub-Categories	Totals* (all user groups)	% of Total (n=1,424)	Category Rank	Subcat. Rank (top–ten)
Lack of Courtesy and/or Seamanship	**403**	**28.3**	**1**	
Other Boater Behaviors	**169**	**11.9**		**1**
PWC Operators	**79**	**5.5**		**6**
Speeding and Big Wakes	**66**	**4.6**		**9**
Tourists and Rentals	35	2.5		
Ramp User Behaviors	21	1.5		
Boaters Under the Influence	13	0.9		
Power Boat / Air Boat Noise	13	0.9		
Access Difficulties	**299**	**21.0**	**2**	
Inadequate Ramp Parking	**110**	**7.7**		**2**
Too Few Public Ramps / Ramp Congestion	**105**	**7.4**		**3**
High Ramp Fees	34	2.4		
Restricted Launch Times	14	1.0		
Too Few Public Marina / Wet Slips	19	1.3		
Inadequate Dry Storage	12	0.8		
Excessive Regulation / Enforcement	**207**	**14.5**	**3**	
Speed Zones / No Wake Zones	**98**	**6.9**		**5**
Patrol Presence	46	3.2		
Manatee Zones	32	2.3		
Fishing Regulations	19	1.3		
Boating Regulations in General	9	0.6		
Infrastructure Shortcomings	**180**	**12.6**	**4**	
Lack of Dredging (Shoaling)	**77**	**5.4**		**7**
Lack of Channel Marks / Waterway Signs	38	2.7		
Inadequate Recreational Destination Infrastructure	30	2.1		
Inadequate Ramp Facilities	23	1.6		
Inadequate Marina Facilities	11	0.7		
Congestion	**132**	**9.3**	**5**	
Waterways	**99**	**7.0**		**4**
Weekends / Holidays	33	2.3		
Altered Natural Environment	**109**	**7.7**	**6**	
Water Pollution / Floating Trash	**49**	**3.4**		**10**
Lack of Fish	25	1.8		
Trash on Beaches	18	1.3		
Red Tide	10	0.7		
Loss of Natural Areas to Development	5	0.4		
No Detractions	**72**	**5.1**	**7**	**8**
Lack of Regulation or Enforcement	**22**	1.5	8	
Speed / No Wake Zones	10	0.7		
Fishing Regulations / Catch Limits	6	0.4		
Lack of Patrols / Enforcement	4	0.3		

***"Other" subcategories omitted from table, so counts and percents do not yield true totals for a given category.**

Access difficulties comprised the second highest primary category of responses (n=299 or 21.0% of total) as a result of its top two subcategories, *inadequate ramp parking* and *too few public ramps or ramp congestion,* which ranked 2nd and 3rd respectively among all detraction subcategories (Table 42). Perceptions of *excessive regulation or enforcement*, particularly as to *speed and no wake zones,* made up the third highest primary category (n=207 or 14.5% of total), followed by *infrastructure shortcomings* with 12.6% of all responses, led by *lack of dredging* concerns.

Congestion was the 5th ranked category with 9.3% of all analyzed answers to Question 21 (Table 42). Those reporting only *weekend or holiday congestion* were parsed from those citing *congested waterways* (n=99, or 4th ranked subcategory) in general or in particular sites. The *altered natural environment* category followed, with 7.7% of response input, the majority of which concerned *water pollution or floating trash,* making this the 10th leading subcategory overall.

The responders specifically stating that there were *no detractions* to their boating experience were just over 5% of the total (n=72), such that this group ranked 7th in the eight categories, but, as a subcategory, within the top ten (8th). Finally, a small group of boaters cited the *lack of regulations or their enforcement* as the major detraction to Collier boating.

The number of responses to detraction categories and subcategories coming from each of the waterway access groups is shown in Tables 43, 44, and 45. Relative importance within a given group is also tabulated, with internal percentages and rankings of both primary categories and subcategories.

All groups had significant response numbers making up the leading primary category, the *Lack of Courtesy and/or Seamanship* in other boaters, but especially the Home Dock users, for whom it was the top detraction category, with over a third of all group responses and with almost twice as many as their 2nd ranked category (Table 44). Approximately one fourth each of Marina and Ramp analyzed answers cited bad practices on the part of other boaters as the main detraction to their boating experience, making this the 2nd ranked category for these user groups (Tables 43 and 45). General references to boaters' lack of consideration for others, to their inexperience, and to their ignorance of or disregard for boating safety and regulations comprised *bad boater behaviors in general*, the leading subcategory overall (n=169 or 11.9% of total) and for Dock users, while 2nd and 3rd for Marina and Ramp users respectively.

Personal watercraft operators led among the more specifically targeted boat operators, with 5.5% of all responses (6th ranked subcategory overall, 2nd for Dock users, and 5th for Ramp users) (Tables 42, 44, 45). References were made to speed, lack of regard for fishers' space, lack of environmental stewardship, and intrusive numbers in backcountry tour groups. *Speeding powerboat operators and those generating big wakes* comprised the 9th ranked subcategory overall and encompassed a significant response percentage within each access group (5.3% of Marina, 4.9% of Dock, and 4.3% of Ramp responses). Disregard for the safety of smaller craft, particularly in congested passes or smaller channels, was stressed. *Inexperience or insufficient training on the part of tourists and rental boat operators*, *drinking and boating*, and inconsiderate *powerboat and airboat noise levels* were all cited by small numbers within each user group (Tables 43, 44, 44). Almost 3% of ramp user responses addressed *inconsiderate boater behaviors at launch sites*.

Limited Access was the second leading primary category overall (n=299 or 21% of all analyzed answers to Question 21). Over 88% of responses in this category came from Ramp users, making it their leading detraction primary category with 34% of all user group responses (n=264) and incorporating three of their top ten subcategories (Table 44). *Inadequate ramp parking* (n=110, with 109 from ramp group or 14.0% of ramp responses) ranked second overall among detraction subcategories and was the highest-ranking subcategory for Ramp users. Bayview Park (n=14) and Collier Blvd. Boating Park (n=7) were specifically identified with inadequate parking facilities. The *lack of overnight parking* provisions (n=19) at Collier ramps was included in this subcategory. Close behind and ranking 2nd in Ramp subcategory responses and 3rd overall were answers of *too few public ramps* or *congested ramps,* for a total of n=98 (12.6% of ramp total). Limited access imposed by *high ramp launch and/or parking fees* encompassed 34 responses from Ramp users [South Collier ramps most often specified (n=7)], and *restricted launch times* included 13 Ramp user responses. Five of the latter were directed at Caxambas Pass ramp, either for closing too early or not opening early enough.

Limited access was the 5th ranked category in the Marina response analysis, primarily as *too few public marinas and wet slips* (n=12) and *inadequate dry storage* (n=11), the 7th and 9th ranked subcategories overall in this user group (Table 43). Lack of affordability (n=4) and loss to privatization (n=2) were cited with respect to marinas. The *limited access* category ranked 7th for Dock users (Table 44), with *too few public ramps* the only access subcategory to represent greater than one percent of their total responses.

The 3rd ranking detraction category overall, that of *excessive regulation or enforcement* (n=207 or 14.5% of total) (Table 42), comprised similar percentages of the three user group totals, ranking 3rd in Marina and Ramp user categories and 2nd in Home Dock categories (Tables 43, 44, 45). Its leading subcategory of *Speed Zones and No Wake Zones* (5th ranked overall, Table 46), with descriptors of "too many," "too long," or "inappropriately located," also had significant response numbers from all three user groups and was the 3rd highest subcategory overall for both Marina and Dock users and 6th highest for Ramp users (Tables 43, 44, 45). Frequently named "over–regulated" sites included Naples Bay (n=15) and Faka Union Canal (n=7), and *weekend extension of limits* was cited as a detraction by n=7.

No other *excessive regulation/enforcement* subcategory made the overall top ten but *excessive patrol presence* (n=46 or 3.2% of total) ranked 7th in Dock user subcategories. The detraction was typically expressed as too many stops by too many different law enforcers without cause. *Unnecessary manatee zone* concerns were grouped separately as a speed regulation issue, comprising 2.3% of total responses, followed by *strict fishing regulations* with 1.3%.

The detraction category of *infrastructure shortcomings* comprised waterway infrastructure, ramp and marina quality, and recreational destination infrastructure. With 12.6% of all responses (n=180), this primary category ranked 4th overall (Table 42) and was the leading category for Marina users (Table 43), 3rd for Home Dock (Table 44), and 5th for Ramp users (Table 45). In the Marina user response analysis, *lack of dredging* was the leading detraction subcategory (n=39 or 14.8% of marina total. *Lack of dredging* was also the only infrastructure subcategory to make the top ten overall, at 7th (Table 42). The recurrent shoaling of Delnor-Wiggins Pass was a principal concern (n=21), cited as responsible for limited and tide–dependent usage. Inadequate or unclear *channel marks or speed zone signs* was the 2nd leading infrastructure subcategory, but made the top ten only for Marina users (4.6% of group total, ranking 7th).

R*ecreational destination infrastructure* shortcomings made up the 10th ranked subcategory for both Marina and Home Dock users (Tables 43, 44), with the four leading deficiencies in the detraction analysis being waterfront restaurants (n=7), public beaches (n=7), artificial reefs (n=5), and public docks (n=5).

Ramp facility infrastructure shortcomings (independent of parking, considered under *access*) were cited in 3% of all ramp user responses and included lack of dock space (n=5), lack of fish cleaning stations (n=5), and lack of lighting or security (n=4). Responses *of marina facility inadequacies* came from both Marina users (2.3%) and Home Dock users (1.3%), citing the lack of maintenance boatyards (n=4), haul-out capability (n=2), and fuel pump availability (n=4).

Waterway congestion was the 5th leading detraction category overall (n=132 or 9.3% of all responses) (Table 42) and ranked 4th among Marina and Ramp user categories (Tables 43, 45) and 5th in Home Dock categories (Table 44).

This was followed by the *altered natural environment* category with 109 responses, the highest input coming from Home Dock users (11.2% of group total vs. 6.7% of Ramp and 5.3% of Marina). The leading subcategory of *water pollution or floating trash* ranked 10th overall and included 7.3% of all Home Dock responses as its 6th highest subcategory. *Red tide* was a separate subcategory, with less than 1% of all responses. *Beach trash* and *lack of fish* embraces 1.3% and 1.8% of the total respectively.

The primary category with the fewest responses was that of *too little regulation or enforcement* (n=22 or 1.5% of total). This was also true within each user group analysis, for which the category ranked 8th.

No detractions to the Collier boating experience made up the 7th ranked primary category and included almost 10% of Marina responses (n=25, ranked 5th as category and as subcategory). Lesser but significant percentages within Home Dock (4.9%) and Ramp (3.6%) analyses had this answer to Question 21, such that it was a top–ten subcategory for each.

Table 43. Boating Detractions Perceived by Marina Users

Categories (Count, % of Total) n=263	Categ. Rank	Subcategories	Count	% of Total	Top–10 Subcat.
Lack of Courtesy and/or Seamanship (n=64, %=24.3)	**2**	**Other Boater Behaviors**	**32**	**12.2**	**2**
		PWC Operators	4	1.5	
		Speeding and Big Wakes	**14**	**5.3**	**6**
		Tourists and Rentals	6	2.3	
		Ramp Users	0	0	
		Boaters Under the Influence	2	0.8	
		Power Boat / Air Boat Noise	4	1.5	
		Other	2	0.8	
Access Barriers (n=25, %=9.5)	**5**	Inadequate Ramp Parking	0	0	
		Too Few Public Ramps/Congestion	1	0.4	
		High Ramp Fees	0	0	
		Restricted Launch Times	1	0.4	
		Too Few Public Marinas / Wet Slips	**12**	**4.6**	**7**
		Inadequate Dry Storage	**11**	**4.2**	**9**
		Shoreline / Causeway Access	0	0	
Excessive Regulation / Enforcement (n=37, %=14.1)	**3**	**Speed Zones / No Wake Zones**	**28**	**10.6**	**3**
		Patrol Presence	3	1.1	
		Manatee Zones	3	1.1	
		Fishing Regulations	1	0.4	
		Boating Regulations in General	1	0.4	
		Anchoring Restrictions	1	0.4	
Infrastructure Shortcomings (n=66, %=25.1)	**1**	**Lack of Dredging (Shoaling)**	**39**	**14.8**	**1**
		Lack of Channel Marks / Signs	**12**	**4.6**	**7**
		Lack of Recreational Provisions	**8**	**3.0**	**10**
		Inadequate Ramp Facilities	0	0	
		Inadequate Marina Facilities	6	2.3	
		Other	1	0.4	
Congestion (n=29, %=11.0)	**4**	**Waterways**	**26**	**9.9**	**4**
		Weekends / Holidays	3	1.1	
Altered Natural Environment (n=14, %=5.3)	**7**	Water Pollution / Floating Trash	6	2.3	
		Lack of Fish	4	1.5	
		Beach Trash	2	0.8	
		Red Tide	2	0.8	
		Loss of Natural Areas to Development	0	0	
		Other	0	0	
No Detractions (n=25, %=9.5)	**5**	**No Detractions**	**25**	**9.5**	**5**
Lack of Regulation or Enforcement (n=3, %=1.1)	**8**	Speed Zones / No Wake Zones	2	0.8	
		Fishing Regulations	1	0.4	
		Lack of Patrols / Enforcement	0	0	
		Manatee Zones	0	0	

Table 44. Boating Detractions Perceived by Home Dock Users

Categories (Count, % of Total) n=385	Categ. Rank	Subcategories	Count	% of Total (n=385)	Top–10 Subcat.
Lack of Courtesy and/or Seamanship (n=132, %=34.3)	**1**	**Other Boater Behaviors**	**57**	**14.8**	**1**
		PWC Operators	**33**	**8.6**	**2**
		Speeding and Big Wakes	**19**	**4.9**	**8**
		Tourists and Rentals	13	3.4	
		Ramp Users	0		
		Boaters Under the Influence	2	0.5	
		Power Boat / Air Boat Noise	6	1.6	
		Other	2	0.5	
Access Barriers (n=10, %=2.6)	**7**	Inadequate Ramp Parking	1	0.3	
		Too Few Public Ramps/Congestion	6	1.6	
		High Ramp Fees	0	0	
		Restricted Launch Times	0	0	
		Too Few Public Marinas / Wet Slips	1	0.3	
		Inadequate Dry Storage	0	0	
		Shoreline / Causeway Access	2	0.5	
Excessive Regulation / Enforcement (n=76, %=19.7)	**2**	**Speed Zones / No Wake Zones**	**31**	**8.1**	**3**
		Patrol Presence	**23**	**6.0**	**7**
		Manatee Zones	9	2.3	
		Fishing Regulations	5	1.3	
		Boating Regulations in General	6	1.6	
		Anchoring Restrictions	2	0.5	
Infrastructure Shortcomings (n=61, %=15.8)	**3**	**Lack of Dredging (Shoaling)**	**30**	**7.8**	**4**
		Lack of Channel Marks / Signs	12	3.1	
		Lack of Recreational Provisions	**14**	**3.6**	**10**
		Inadequate Ramp Facilities	0	0	
		Inadequate Marina Facilities	5	1.3	
		Other	0	0	
Congestion (n=37, %=9.6)	**5**	**Waterways**	**29**	**7.5**	**5**
		Weekends / Holidays	8	2.1	
Altered Natural Environment (n=43, %=11.2)	**4**	**Water Pollution / Floating Trash**	**28**	**7.3**	**6**
		Lack of Fish	7	1.8	
		Beach Trash	3	0.8	
		Red Tide	3	0.8	
		Loss of Natural Areas to Development	1	0.3	
		Other	1	0.3	
No Detractions (n=19, %=4.9)	**6**	**No Detractions**	**19**	**4.9**	**8**
Lack of Regulation or Enforcement (n=7, %=1.8)	**8**	Speed Zones / No Wake Zones	5	1.3	
		Fishing Regulations	1	0.3	
		Lack of Patrols / Enforcement	0	0	
		Manatee Zones	1	0.3	

Table 45. Boating Detractions Perceived by Ramp Users

Categories (Count, % of Total) n=776	Categ. Rank	Subcategories	Count	% of Total (n=776)	Top–10 Subcat.
Lack of Courtesy and/or Seamanship (n=207, %=26.7)	**2**	**Other Boater Behaviors**	**80**	**10.3**	**3**
		PWC Operators	**42**	**5.4**	**5**
		Speeding and Big Wakes	**33**	**4.3**	**8**
		Tourists and Rentals	16	2.1	
		Ramp Users	21	2.7	
		Boaters Under the Influence	9	1.2	
		Power Boat / Air Boat Noise	3	0.4	
		Other	3	0.4	
Access Barriers (n=264, %=34.0)	**1**	**Inadequate Ramp Parking**	**109**	**14.0**	**1**
		Too Few Public Ramps/Congestion	**98**	**12.6**	**2**
		High Ramp Fees	**34**	**4.4**	**7**
		Restricted Launch Times	13	1.7	
		Too Few Public Marinas / Wet Slips	6	0.8	
		Inadequate Dry Storage	1	0.1	
		Shoreline / Causeway Access	3	0.4	
Excessive Regulation / Enforcement (n=94, %=12.1)	**3**	**Speed Zones / No Wake Zones**	**39**	**5.0**	**6**
		Patrol Presence	20	2.6	
		Manatee Zones	20	2.6	
		Fishing Regulations	13	1.7	
		Boating Regulations in General	2	0.3	
		Anchoring Restrictions	0	0	
Infrastructure Shortcomings (n=53, %=6.8)	**5**	Lack of Dredging (Shoaling)	8	1.0	
		Lack of Channel Marks / Signs	14	1.8	
		Lack of Recreational Provisions	8	1.0	
		Inadequate Ramp Facilities	**23**	**3.0**	**10**
		Inadequate Marina Facilities	0	0	
		Other	0	0	
Congestion (n=66, %=8.5)	**4**	**Waterways**	**44**	**5.7**	**4**
		Weekends / Holidays	22	2.8	
Altered Natural Environment (n=52, %=6.7)	**6**	Water Pollution / Floating Trash	15	1.9	
		Lack of Fish	14	1.8	
		Beach Trash	13	1.7	
		Red Tide	5	0.6	
		Loss of Natural Areas to Development	4	0.5	
		Other	1	0.1	
No Detractions (n=28, %=3.6)	**7**	**No Detractions**	**28**	**3.6**	**9**
Lack of Regulation or Enforcement (n=12, %=1.5)	**8**	Speed Zones / No Wake Zones	3	0.4	
		Fishing Regulations	4	0.5	
		Lack of Patrols / Enforcement	4	0.5	
		Manatee Zones	1	0.1	

Needs

The analysis of responses to Question 22 suggested eight primary categories, all having subcategories except *No Needs* and *Less Congestion*, as seen in Table 46. Suggested changes to improve the Collier boating experience (needs) could be grouped into categories and subcategories that mirrored those defined in the detraction analysis. However, the areas of emphasis shifted in hierarchy, and the different waterway access groups were more internally consistent as to respective principal need category. The *access* category subsumed almost 50% of all Ramp user responses, and *infrastructure improvements* made up 37% and 46% of all needs in Home Dock and Marina user responses, respectively. Put another way, the 2nd leading category for each user group contained less than one–fourth (in the case of Marina), less than one–third (in the case of Ramp), and less than one–half (in the case of Home Dock) of the group's leading category response number (Tables 47, 48, and 49).

The need to facilitate *water access* led among categories, with 433 responses or 30.8% of the total (n=1,407) analyzed responses to Question 22 (Table 46). This was driven by the large Ramp user group, whose input (n=382) accounted for 88% of all *access* category responses. *Infrastructure improvements* followed (n=383 or 27.3% of total), ranking first among categories for Marina and Home Dock users and in each case inclusive of their 1st and 2nd ranked subcategories overall The need for *more recreational boating regulation or enforcement* (n=158 or 11.2% of total) barely surpassed the need for *less regulation or enforcement* (n=144 or 10.2% of total), respectively ranking 3rd and 4th overall among categories.

Ranked 5th was the need for *boater education*, with 107 responses (7.6% of total). Even combining this category with that of *more regulation or enforcement* (for a total of 18.8%) did not attain the Needs emphasis that *lack of courtesy and seamanship* attained under Detractions (28.3% of total). Almost tied with *education* was the response category calling for *environmental protection* (n=104 or 7.4% of total). The need for *less congested waterways* made up only 1.1% of all responses to Question 22, trailing the 4.5% (n=63) indicating *no needs* with respect to their Collier County boating experience.

The *improved access* category included the leading two subcategories: the need for *more ramps* (n=179) and the need for *more ramp parking* (n=163). These two subcategories led among all 42 subcategories under Needs and contained 39.3% of all Ramp user responses. Public or County ramps were called for in 56 instances, and areas to the south (Chokoloskee, Everglades City, and Goodland) were most often cited as needing public ramps (n=43). Increased parking at ramps was not grouped with other ramp facility improvements (found under *infrastructure*), because of its direct impact on access. Parking need at Bayview ramp (n=25) and at Collier Blvd. Boating Park (n=11) were specifically cited, in addition to calls for more parking at all ramps. Overnight parking needs made up 16 responses in this subcategory. For Ramp users, two more access needs subcategories made their top ten: *lower ramp fees* (n=29) and *longer ramp hours* (n=22).

Access was the 2nd ranked category in the Marina response analysis, encompassing *more marinas and wet slips* (their 7th ranked subcategory overall) and *more dry storage* (their 9th ranked overall) (Table 47). For Home Dock users, the access category was 6th, with 13 of 20 total responses calling for more ramps or more ramp parking (Table 48).

Table 46. Boater Need Categories / Subcategories for All User Types

Categories/Sub-Categories	**Totals*** (all user groups)	**% of Total** (n=1,407)	**Category Rank**	**Subcategory Rank** (top–ten)
More Water Access	**433**	**30.8**	**1**	
More Ramps	**179**	**12.7**		**1**
More Ramp Parking	**163**	**11.6**		**2**
More Marinas / Slips	30	2.1		
Lower Ramp Fees	29	2.1		
More Dry Storage	15	1.1		
Longer Ramp Access Hours	6	0.4		
More Kayak Suitable Launch Sites	7	0.5		
Infrastructure Improvements	**383**	**27.3**	**2**	
Recreational Destination Provisions	**102**	**7.3**		**3**
[Shore Amenities with Accessibility - 44]				
[Artificial Reefs - 32]				
[Public Beaches, Islands, Parks- 13]				
[Public Anchorages, Moorings - 8]				
[Everglades Campsites - 3]				
[Designated Watersport Areas - 2]				
Channel / Zone Markers and Signs	**100**	**7.1**		**4**
Dredging of Passes, Channels	**83**	**5.9**		**5**
Improved Ramp Facilities	**69**	**4.9**		**7**
Full Service Marinas	29	2.1		
More Regulation / Enforcement	**158**	**11.2**	**3**	
Speed / No Wake Zones	42	3.0		
PWC Restrictions	30	2.1		
More Patrol Presence	29	2.1		
Enforcement of Existing Regulations	19	1.4		
Operator Licensure	13	0.9		
Fishing Regulation	11	0.8		
Rental Boats	6	0.4		
Ramp Supervision	5	0.4		
Drinking and Boating	3	0.2		
Less Regulation / Enforcement	**144**	**10.2**	**4**	
Speed / No Wake Zones	**64**	**4.6**		**8**
Manatee Zones	28	2.0		
Fishing Regulations	18	1.3		
Less Patrol Harassment	18	1.3		
Less Regulation in General	8	0.6		
Less Dog Restriction from Beaches	4	0.3		
Motorboat Access to E.N.P.	4	0.3		
Education	**107**	**7.6**	**5**	
Overall Safety, Etiquette, Regulations, Skills	**82**	**5.8**		**6**
Ramp Launch/Retrieval Skills & Etiquette	8	0.6		
Boat Renters	8	0.6		
Environment / Conservation	6	0.4		
Environmental Protection	**104**	**7.4**	**6**	
Water Quality Improvement	**43**	**3.1**		**10**
More Fish	31	2.2		
Reduce Beach Trash	10	0.7		
Less Development/More Natural Areas	10	0.7		
Grass Flats Protection	6	0.4		

No Needs	**63**	**4.5**	**7**	**9**
Less Congestion	**15**	**1.1**	**8**	

*"Other" subcategories omitted from table, so counts and percents do not yield true totals for a given category.

The need for *infrastructure improvements*, the second ranked category, included four of the top–ten subcategories overall (Table 46), led by *more recreational destination provisions* (n=102 or 7.3% of total need response). This subcategory was 2nd in rank for both Marina and Home Dock users, the former group emphasizing *shore amenities with adequate public docks* (n=23), including waterfront restaurants (Table 47). The Home Dock analysis included 17 responses for *shore amenities with access* and 17 for *artificial reefs*. Artificial reefs also made up the largest recreational infrastructure need for Ramp users (n=9). More close–in reefs were important in 12 responses overall, compared to three for offshore. The need for more *public beaches, islands, and parks* constituted the 3rd ranked recreational destination infrastructure division, with n=13 responses, and smaller numbers called for more *overnight public anchorages and moorings* (n=8).

Improved channel markers and waterway signs, the 2nd most populated infrastructure subcategory and 4th overall (Table 46), was the principal need for Home Dock users (n=51 or 13.9% of Dock total) (Table 48) and 3rd for Marina users (n=26) (Table 47). More, better-maintained, and updated channel markers were called for, including in the "back country," and clearer speed zone signage and shallow water markers. Following, with n=83 total responses, was the *dredging* subcategory, ranked 5th in the top–ten needs subcategories. *Dredging* was the foremost need subcategory in the Marina user group, with 15.6% of their responses (vs. 15.2% for recreational destination provisions), and was the 3rd ranked subcategory for Home Dock users with 7.9% of responses (Table 48). A preponderance of the Pass dredging responses targeted Delnor–Wiggins Pass (n=26), with a significant number calling for a jetty to permanently address recurrent shoaling.

Under *infrastructure*, 69 responses called for *improved ramp facilities*, 60 coming from the Ramp user group, making this their 3rd highest subcategory of needs. Fish cleaning stations (n=13), better security (n=10), more and better tie-up docks (n=8), and more lanes (n=7) led among needed improvements. The *full-service marinas* subcategory was 9th ranking among Marina users (3.8% of group), but also 10th in Home Dock subcategories (3.0% of group) (Tables 47 and 48). A maintenance yard with haul–out lift for boat repairs was the needed improvement in seven responses. Calls for bait and tackle shops (4), pump-out stations (3), and fuel docks (10) were included in this subcategory.

Boating improvements pertaining to *more regulation or enforcement* made up the 3rd ranked needs category overall and for Marina (n=30) and Ramp (n=69) users (Table 46), 2nd for Home Dock users (n=59). *Better enforcement of existing boating and fishing regulations* (n=19) and a *greater patrol presence* (n=29) together made up 3.5% of all expressed needs, fairly evenly spread across user groups.

The largest subcategory (n=42) encompassed the need for ***more*** *slow speed and no wake zones* or better enforcement, and primarily represented Home Dock (n=21) and Marina (n=13) users. The *PWC operator* was targeted in 30 responses, the highest internal percentage coming from the Home Dock analysis and chiefly stressing more restricted areas of operation and limits to backcountry group numbers. Tighter enforcement of *fish catch and size limits* drew small

response numbers (n=11), followed by more *rental boat supervision* from Home Dock users (n=5) and more *ramp supervision* from Ramp users (n=5).

A greater number (n=64) of responses called for ***less*** *speed or no wake zone regulation,* the leading subcategory under *less regulation or enforcement* and the 8th ranked overall. It included 3.2% of Ramp responses and more than 6% of all Dock and Marina responses. Shorter slow zones, removal of unnecessary no–wake zones, a faster speed limit in Faka Union Canal, and no further speed restrictions in Naples Bay were all offered as improvements. *Manatee zones* also elicited responses for less regulation (n=28), primarily from ramp users as their 10th ranked subcategory. Fewer and shorter zones, seasonal enforcement changes, and review for appropriateness were suggested. Eighteen responses called for *less patrol harassment,* specifically fewer marine officers and boat checks, and no stops without cause. This subcategory ranked 10th in the Home Dock analysis (Table 48).

Those answers to Question 22 in which *boater education* was emphasized (n=107 or 7.6% of the total) made up the 5th ranked category. It encompassed needs of *improved safety, etiquette, and skills on the part of other boaters in general*, the 6th ranked subcategory (n=82) overall, but 3rd, 4th, and 5th within Dock, Ramp, and Marina access groups respectively. Small response numbers also addressed the need for more *rental operator training* (n=8) and for ensuring ramp use etiquette (n=8). Finally, six called for *teaching more respect for nature and the environment*.

The latter theme also found expression under the *environmental protection* category, which followed *education* closely in total response number (n=104) and also had similar internal user group percentages. *Water quality improvement* was the principal boating need under this category (n=43 responses). Naples Bay clean-up comprised 7 responses, cessation of Lake Okeechobee discharges 4, and control of freshwater runoff 8. The need for *more fish* was the 2nd highest environmental protection subcategory (n=31), including calls for local fish hatcheries (n=7), particularly redfish. Attention to *beach trash* and *less development/more natural areas* each garnered 10 responses, with another 6 directed at *grass flats protection*. Ramp user responses predominated in each of the latter 3 subcategories (n=18 total).

No needs was the 7th ranked category overall and was well represented within each user group. Marina responses led in group percentage (7.6% of user group), followed by Home Dock (5.2%) and Ramp responses (3.1%). As a subcategory, it was within the top–ten for each user group, 5th for Marina users.

The final and smallest category comprised *less congestion* or *fewer boaters* as a need. This is in contrast to the 5th place finish of *congestion* as a detraction.

Table 47. Boating Needs Perceived by Marina Users

Categories (Count, % of Total) n=263	Categ. Rank	Subcategories	Count	% of Total (n=263)	Top-10 Subcat.
Boating Access (n=31, %=11.8)	**2**	More Ramps	6	2.3	
		More Ramp Parking	1	0.4	
		More Marinas / Wet Slips	**13**	**4.9**	**7**
		Lower Ramp Fees	0	0	
		Longer Ramp Access Hours	0	0	
		More Dry Storage	**10**	**3.8**	**9**
		More Kayak Launch Sites	0	0	
		Other	1	0.4	
Infrastructure Improvements (n=121, %=46.0)	**1**	**Recreational Destination Provisions**	**40**	**15.2**	**2**
		[Shore Amenities with Public Docks]	[23]		
		[Artificial Reefs]	[6]		
		[Public Beaches, Islands, Parks]	[7]		
		[Public Anchorages, Moorings]	[4]		
		[Everglades Campsites]	[0]		
		[Designated Watersport Areas]	[0]		
		Channel/Zone Markers and Signs	**26**	**9.9**	**3**
		Dredging of Passes, Channels	**41**	**15.6**	**1**
		Better Ramp Facilities	4	1.5	
		Full Service Marinas	**10**	**3.8**	**9**
More Regulation/ Enforcement (n=30, %=11.4)	**3**	**Speed Zones / No Wake Zones**	**13**	**4.9**	**7**
		PWC Restrictions	2	0.8	
		More Patrol Presence	5	1.9	
		Enforcement of Existing Regulations	6	2.3	
		Operator Licensure	2	0.8	
		Fishing Regulations	1	0.4	
		Rental Boats	0	0	
		Ramp Supervision	0	0	
		Drinking and Boating	1	0.4	
Less Regulation/ Enforcement (n=20, %=7.6)	**5**	**Speed / No Wake Zones**	**16**	**6.1**	**6**
		Manatee Zones	0	0	
		Fishing Regulations	1	0.4	
		Less Patrol Harassment	1	0.4	
		Less Regulation in General	0	0	
		Other	2	0.8	
Education (n=22, %=8.4)	**4**	**Overall Safety, Etiquette, Skills,**	**18**	**6.8**	**5**
		Ramp Skills, Etiquette	0	0	
		Boat Renters	3	1.1	
		Environment / Conservation	1	0.4	
		Other	0	0	
Environmental Protection (n=17, %=6.5)	**7**	Water Quality Improvement	7	2.7	
		More Fish	7	2.7	
		Beach Trash Removal	3	1.1	
		More Natural Areas, Less Development	0	0	
		Grass Flats Protection	0	0	
		Other	0	0	
No Needs (n=20, %=7.6)	**5**	**No Needs**	**20**	**7.6**	**4**

Less Congestion (n=2, %=0.8)	**8**	Less Congestion	2	0.8	

Table 48. Boating Needs Perceived by Home Dock Users

Categories (Count, % of Tot.)	Categ. Rank	Subcategories	Count (n=366)	% of Total	Top-10 Subcat.
Boating Access (n=20, %=5.5)	**6**	More Ramps	7	1.9	
		More Ramp Parking	6	1.6	
		More Marinas / Wet Slips	6	1.6	
		Lower Ramp Fees	0	0	
		Longer Ramp Access Hours	0	0	
		More Dry Storage	0	0	
		More Kayak Launch Sites	0	0	
		Other	1	0.3	
Infrastructure Improvements (n=136, %=37.2)	**1**	**Recreational Destination Provisions**	**40**	**10.9**	**2**
		[Shore Amenities with Public Docks]	[17]		
		[Artificial Reefs]	[17]		
		[Public Beaches, Islands, Parks]	[1]		
		[Public Anchorages, Moorings]	[4]		
		[Everglades Campsites]	[0]		
		[Designated Watersport Areas]	[1]		
		Channel/Zone Markers and Signs	**51**	**13.9**	**1**
		Dredging of Passes, Channels	**29**	**7.9**	**3**
		Better Ramp Facilities	5	1.4	
		Full Service Marinas	**11**	**3.0**	**10**
More Regulation/ Enforcement (n=59, %=16.1)	**2**	**Speed Zones / No Wake Zones**	**21**	**5.7**	**6**
		PWC Restrictions	**13**	**3.6**	**9**
		More Patrol Presence	6	1.6	
		Enforcement of Existing Regulations	6	1.6	
		Operator Licensure	5	1.4	
		Fishing Regulations	3	0.8	
		Rental Boats	5	1.4	
		Ramp Supervision	0	0	
		Drinking and Boating	0	0	
Less Regulation/ Enforcement (n=56, %=15.3)	**3**	**Speed / No Wake Zones**	**23**	**6.3**	**5**
		Manatee Zones	7	1.9	
		Fishing Regulations	5	1.4	
		Less Patrol Harassment	**11**	**3.0**	**10**
		Less Regulation in General	7	1.9	
		Other	3	0.8	
Education (n=34, %=9.3)	**5**	Overall Safety, Etiquette, Skills, Regs.	29	7.9	**3**
		Ramp Skills, Etiquette	0	0	
		Boat Renters	4	1.1	
		Environment / Conservation	1	0.3	
		Other	0	0	
Environmental Protection (n=38, %=10.4)	**4**	**Water Quality Improvement**	**20**	**5.5**	**7**
		More Fish	10	2.7	
		Beach Trash Removal	2	0.5	
		More Natural Areas, Less Development	1	0.3	
		Grass Flats Protection	2	0.5	
		Other	3	0.8	

No Needs (n=19, %=5.2)	**7**	**No Needs**	**19**	**5.2**	**8**
Less Congestion (n=4, %=1.1)	**8**	Less Congestion	4	1.1	

Table 49. Boating Needs Perceived by Ramp Users

Categories (Count, % of Total) n=778	Categ. Rank	Subcategories	Count	% of Total (n=778)	Top-10 Subcat.
Boating Access (n=382, %=49.1)	**1**	**More Ramps**	**166**	**21.3**	**1**
		More Ramp Parking	**156**	**20.1**	**2**
		More Marinas / Wet Slips	11	1.4	
		Lower Ramp Fees	**29**	**3.7**	**5**
		Longer Ramp Access Hours	6	0.8	
		More Dry Storage	5	0.6	
		More Kayak Launch Sites	7	0.9	
		Other	2	0.3	
Infrastructure Improvements (n=126, %=16.2)	**2**	**Recreational Destination Provisions**	**22**	**2.8**	**9**
		[Shore Amenities with Public Docks]	[4]		
		[Artificial Reefs]	[9]		
		[Public Beaches, Islands, Parks]	[5]		
		[Public Anchorages, Moorings]	[0]		
		[Everglades Campsites]	[3]		
		[Designated Watersport Areas]	[1]		
		Channel/Zone Markers and Signs	**23**	**3.0**	**8**
		Dredging of Passes, Channels	13	1.7	
		Better Ramp Facilities	**60**	**7.7**	**3**
		Full Service Marinas	8	1.0	
More Regulation/ Enforcement (n=69, %=8.9)	**3**	Speed Zones / No Wake Zones	8	1.0	
		PWC Restrictions	15	1.9	
		More Patrol Presence	18	2.3	
		Enforcement of Existing Regulations	7	0.9	
		Operator Licensure	6	0.8	
		Fishing Regulations	7	0.9	
		Rental Boats	1	0.1	
		Ramp Supervision	5	0.6	
		Drinking and Boating	2	0.3	
Less Regulation/ Enforcement (n=68, %=8.7)	**4**	**Speed / No Wake Zones**	**25**	**3.2**	**6**
		Manatee Zones	**21**	**2.7**	**10**
		Fishing Regulations	12	1.5	
		Less Patrol Harassment	6	0.8	
		1	1	0.1	
		Other	3	0.4	
Education (n=51, %=6.6)	**5**	**Overall Safety, Etiquette, Skills,**	**35**	**4.5**	**4**
		Ramp Skills, Etiquette	8	1.0	
		Boat Renters	1	0.1	
		Environment / Conservation	4	0.5	
		Other	3	0.4	
Environmental Protection (n=49, %=6.3)	**6**	Water Quality Improvement	16	2.1	
		More Fish	14	1.8	
		Beach Trash Removal	5	0.6	
		More Natural Areas, Less Development	9	1.2	
		Grass Flats Protection	4	0.5	
		Other	1	0.1	

No Needs (n=24, %=3.1)	**7**	No Needs	24	3.1	**7**
Less Congestion (n=9, %=1.2)	**8**	Less Congestion	9	1.2	

Part 3–Spatial Analysis of Boating Patterns

3.1. Mapping Ramp Patronage

An important element of the Collier County recreational boating characterization was to determine the general land–side service areas for the county's boat ramps. This analysis relied, first, upon identifying ramp patrons and, second, mapping where those patrons live relative to the facilities that they used. Florida Sea Grant personnel collected automobile and vessel trailer registration numbers at 13 boat ramps on weekend and weekday visits over a year (June 2008 through June 2009). Trailer and automobile tag numbers collected at the ramps were compared to registration data maintained by the Florida Department of Highway Safety and Motor Vehicles in order to obtain names and mailing addresses. Figure 29 shows locations in Florida of 3,610 patrons mapped using address locating or *geocoding* software[9]. Fifty-eight others geocoded to states other than Florida.

[9] Geocoding is the process of associating street addresses to geographic coordinates.

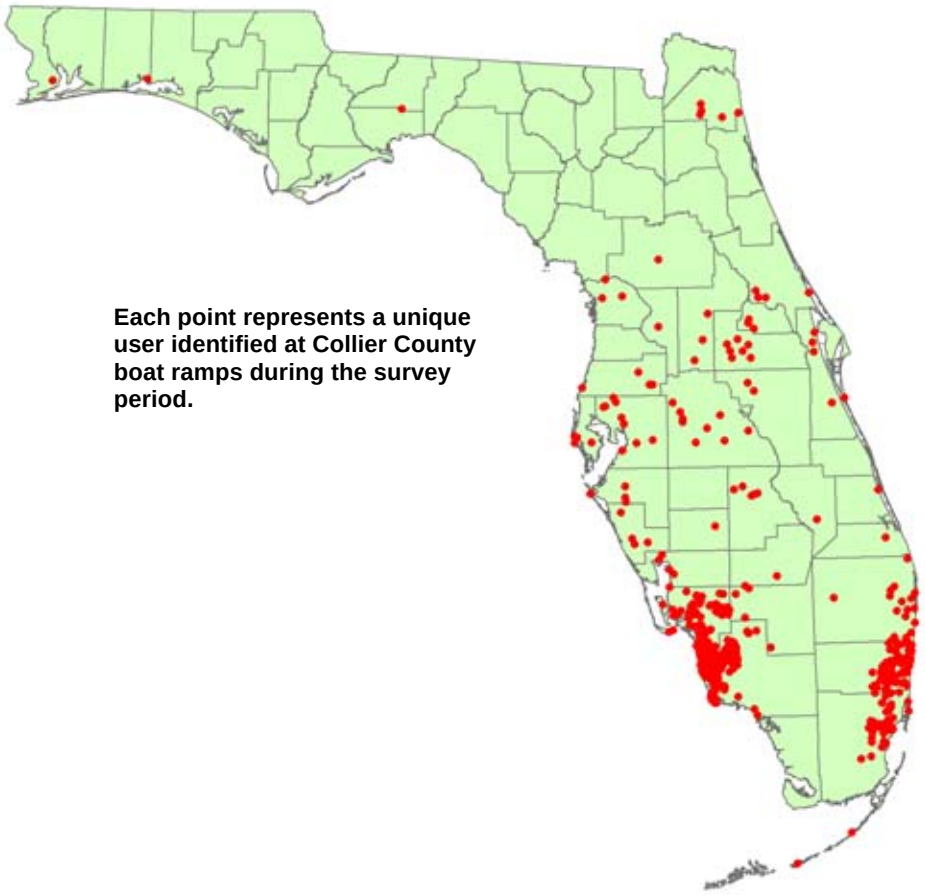

Figure 29. Florida Distribution of Collier County Ramp Patrons

Of the 3,610 Florida ramp patrons, 65.4% of the addresses were in Collier County (Figure 30). Of other Florida counties, Lee (9.7%), Broward (7.2%), Miami–Dade (3.5%), and Palm Beach (1.8%) contributed an additional 22.2% to Collier County ramp use. These top five counties accounted for 87.6% of Collier County in-state ramp patronage.

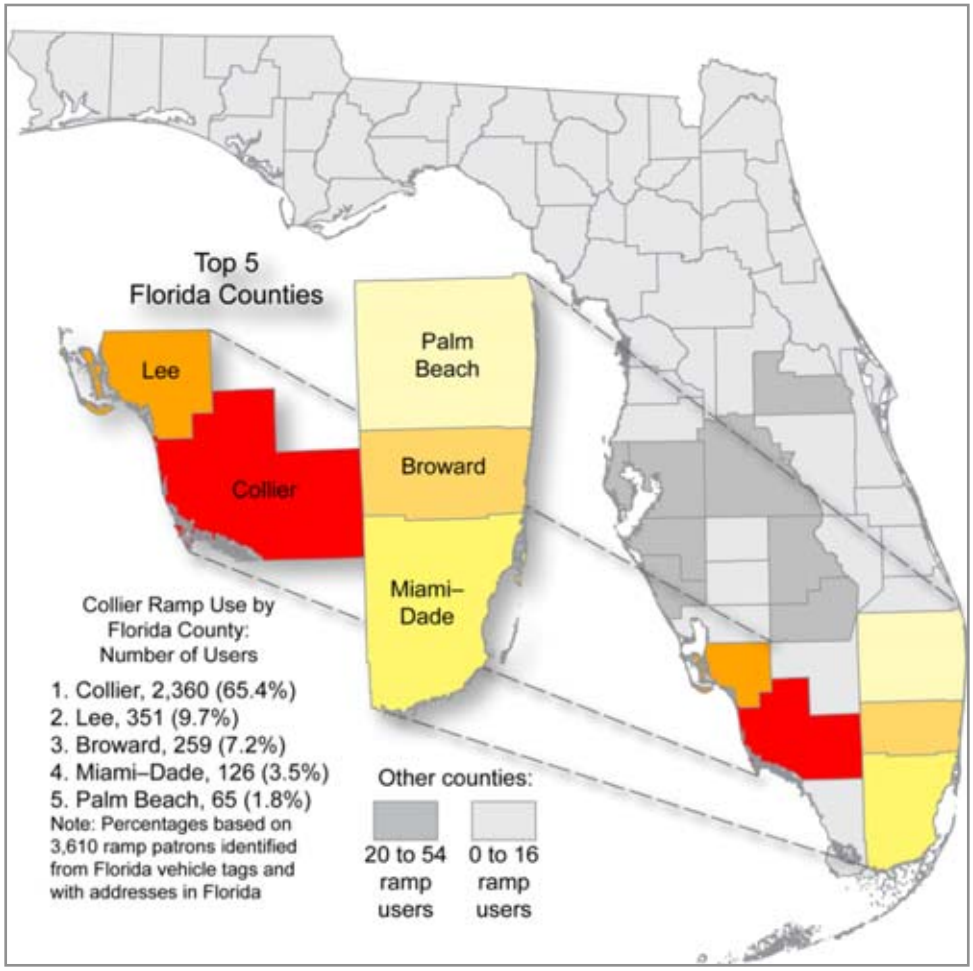

Figure 30. Principal Counties of Residence for Collier Ramp Patrons

Ramp Use Land–Side Profile

Geocoded ramp patron data can be used to map land–side service areas for individual ramps. Figure 31 shows such areas for six ramps: Bayview Park, Outdoor Resorts of America, Collier Blvd. Boating Park (SR 951), Caxambas Park, Cocohatchee River Park, and Calusa Island YC and Marina. The GIS method incorporated criteria established by Applebaum (1966) for determining a retail market share boundary based on consumer travel distances. Applebaum suggested that a primary service area encompass an area that accounts for 70 to 80 percent of the users or consumers within that market; these maps comprise 75 to 81 percent of users for each ramp. This data can be used to estimate demand for particular boat ramps, based on use profiles (obtained from this study) and the number of trailer boats within delineated service areas.

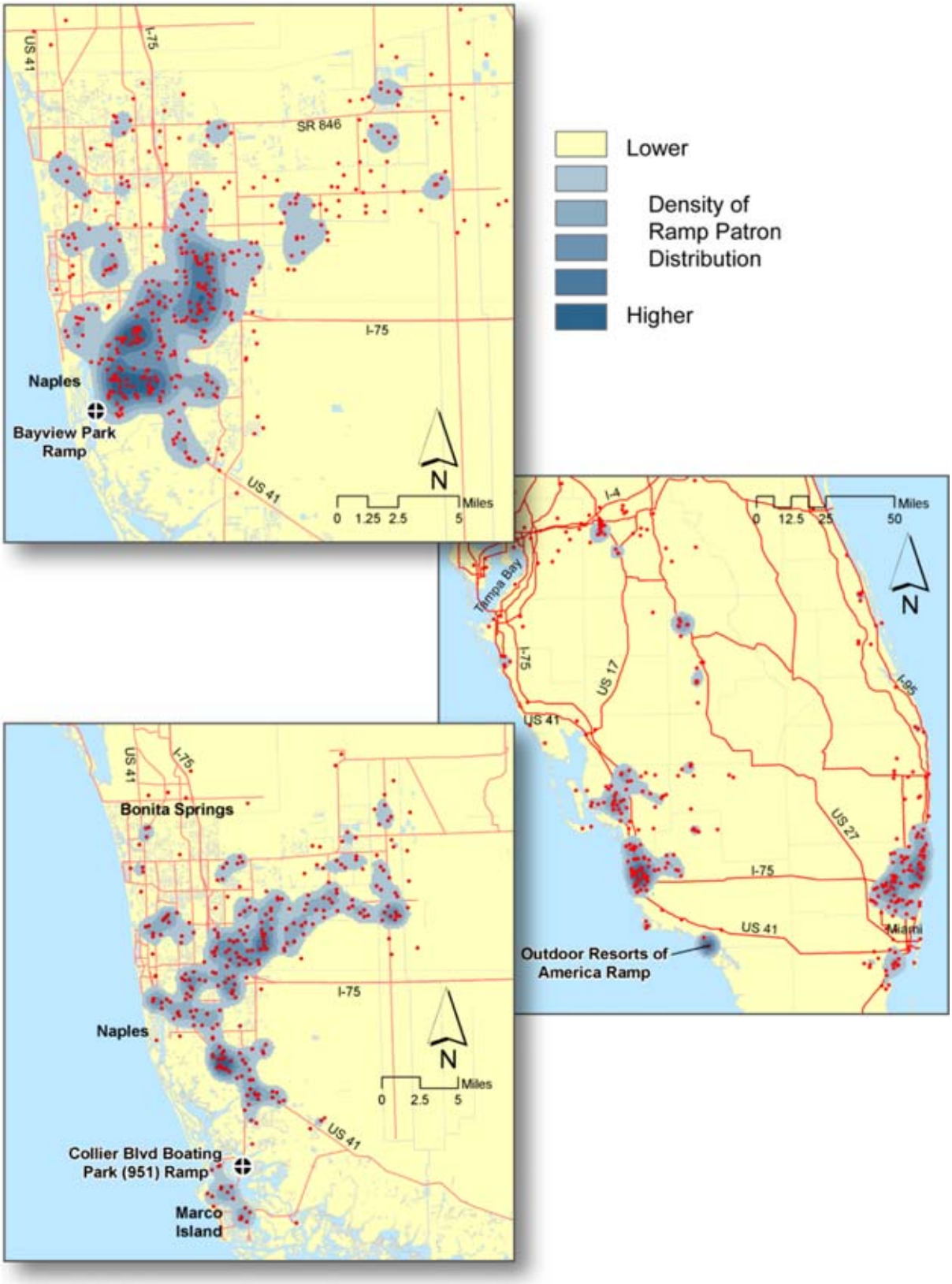

Figure 31. User Service Areas for Six Popular Collier County Ramps

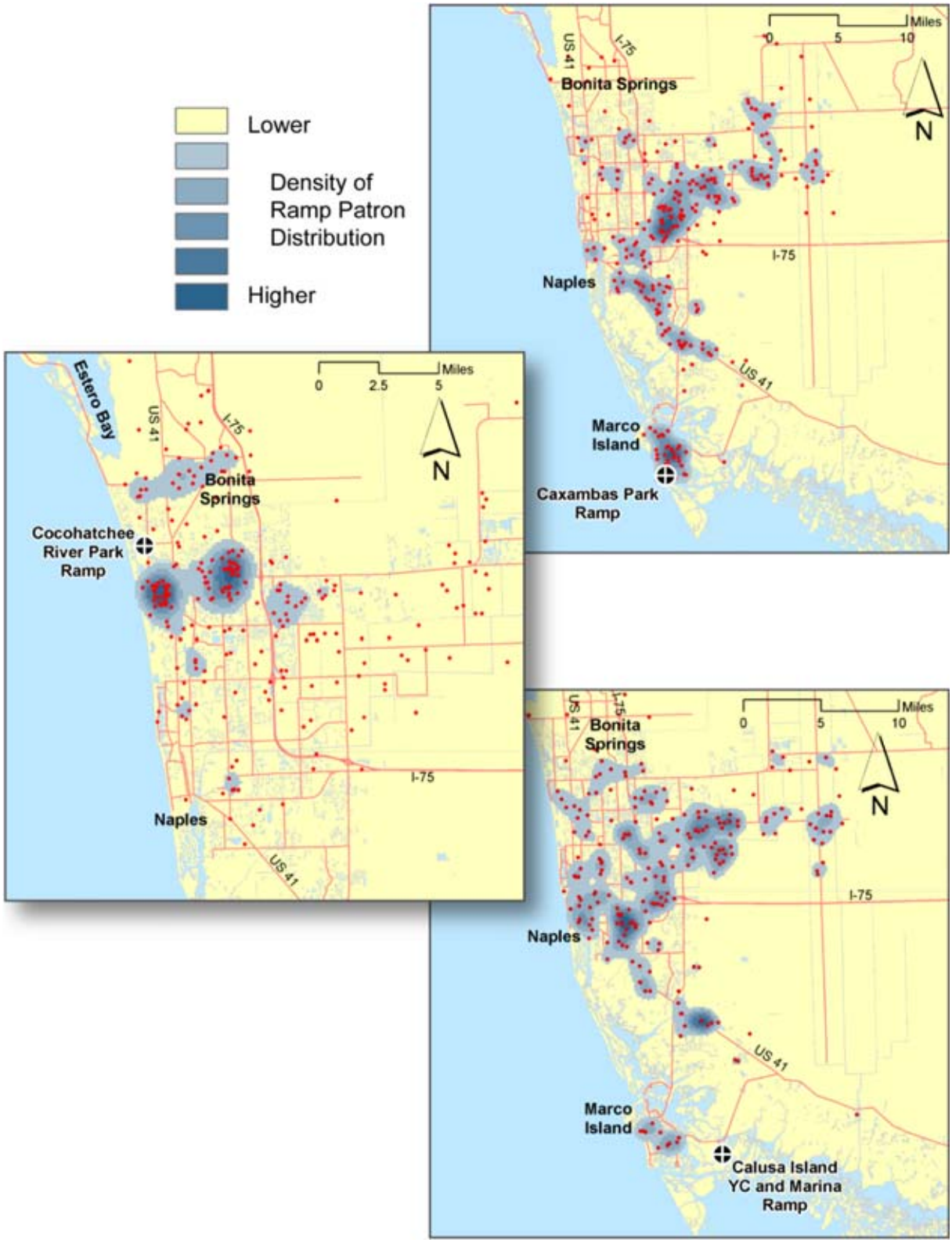

Figure 31. (Continued)

Ramp Use vs. Parking Capacity

The parking capacities of boat ramps were determined and compared with the average numbers of boat trailers observed during peak (January - May) use period (Table 50). The high and low trailer counts during the same period are included. The analysis was limited to the 15 weekend/holiday days (from Jan 24 to Jun 6) that ramp visits took place. Some boat ramps are operating close to or above estimated parking capacity during some use periods (highlighted in table). By contrast, some ramps may be underutilized relative to parking capacities.

Table 50. Ramp Parking Capacity and Usage Estimates in the Peak Usage Period

Ramp	Parking Places*	Number of Trailers Observed	
		High / Low	Average
Cocohatchee River Park	58	43 / 9	20
Delnor-Wiggins State Park	31	9 / 1	4
Naples Landing	39	42 / 7	17
Bayview Park	15+	60 / 16	35
Rookery Bay	8	26 / 1	10
Collier Blvd. Boating Park (951) †	19+	46 / 8	19
Caxambas Pass	41	43 / 15	31
Calusa Marina	39	34 / 10	22
Collier Seminole State Park	15	4 / 0	2
Port of the Islands	23	34 / 3	17
Glades Haven	15	16 / 6	11
Outdoor Resorts of America	16+	44 / 8	24
Chokoloskee Island Park	11	3 / 10	7

*Designated rig parking spaces; "+" means nearby overflow, shared, or street-side parking available.
† Use was compromised by construction activity during a significant portion of the study period.

3.2. Mapping Boating Patterns

General Density Patterns

This chapter presents the results of a GIS analysis that mapped the distribution or spread of the digitized trip information as “density of occurrence.” Continuous density surfaces generated by the GIS illustrate the degree of concentration or clustering of digitized trip information.

Route densities are depicted in Figures 32 and 33. The greatest density of vessel traffic occurs in the Gulf passes and the estuary channels approaching them. Many respondents drew routes along the beaches, often transiting between passes or traveling to destinations on the beach itself. Offshore, the flow of boat traffic is largely dispersed, with some greater density of routes leading to artificial reefs or other destinations in the Gulf of Mexico. The Ten Thousand Islands are heavily traveled, and many routes continue off the map southeast to destinations in the Everglades coastal waters.

Figure 34 displays favorite destinations, the locales where respondents most like to visit on a typical recreational boating outing. The density analysis revealed several prime inshore and destinations: the passes and beaches near them, Rookery Bay, Johnson Bay, Cape Romano, and the Ten Thousand Islands. Offshore, some artificial reefs are popular destinations, consistent with patterns suggested by the route density maps.

Figure 35 illustrates areas where boaters experience congestion, defined in Question 18 as “more boats than you prefer.” The analysis shows that respondents experience the most congestion at favorite boating destinations, especially the passes, Naples Bay and the Gordon River, southern Keewaydin Island, and Cape Romano.

Natural-color Digital Ortho Photo Quadrangle (DOQQ) imagery with one-meter resolution was the base map for digitization of trip information drawn on the 1:109,636-scale survey maps by respondents. As a result, information collected as part of the study can also be mapped at higher resolutions than shown in Figures 32 through 35. Figure 36 shows favorite destination spots mapped by survey respondents and a density analysis of those points for the south Keewaydin Island area.

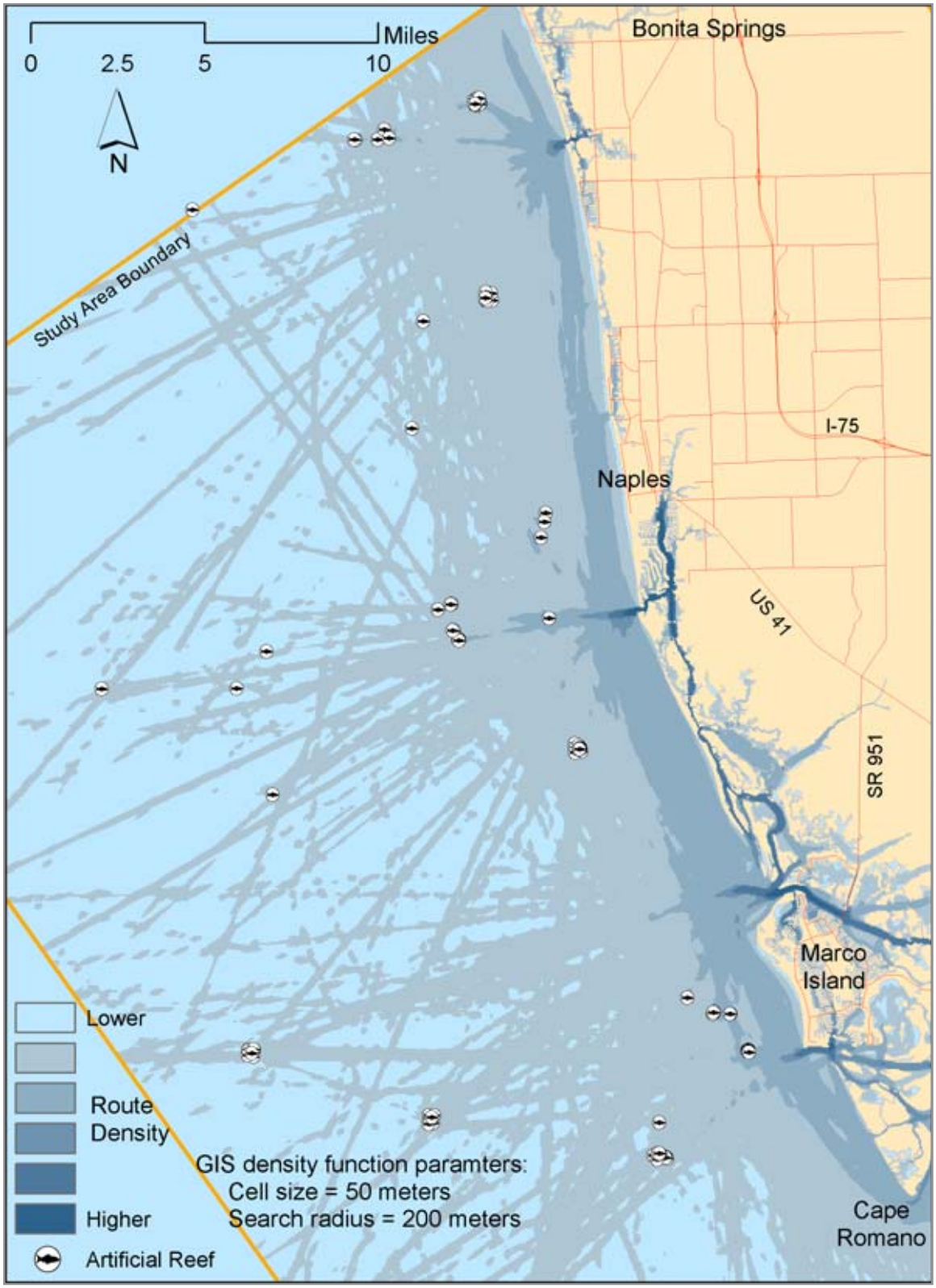

Figure 32. Route Density, Northern Portion of the Study Area

Figure 33. Route Densities, Southern Portion of the Study Area

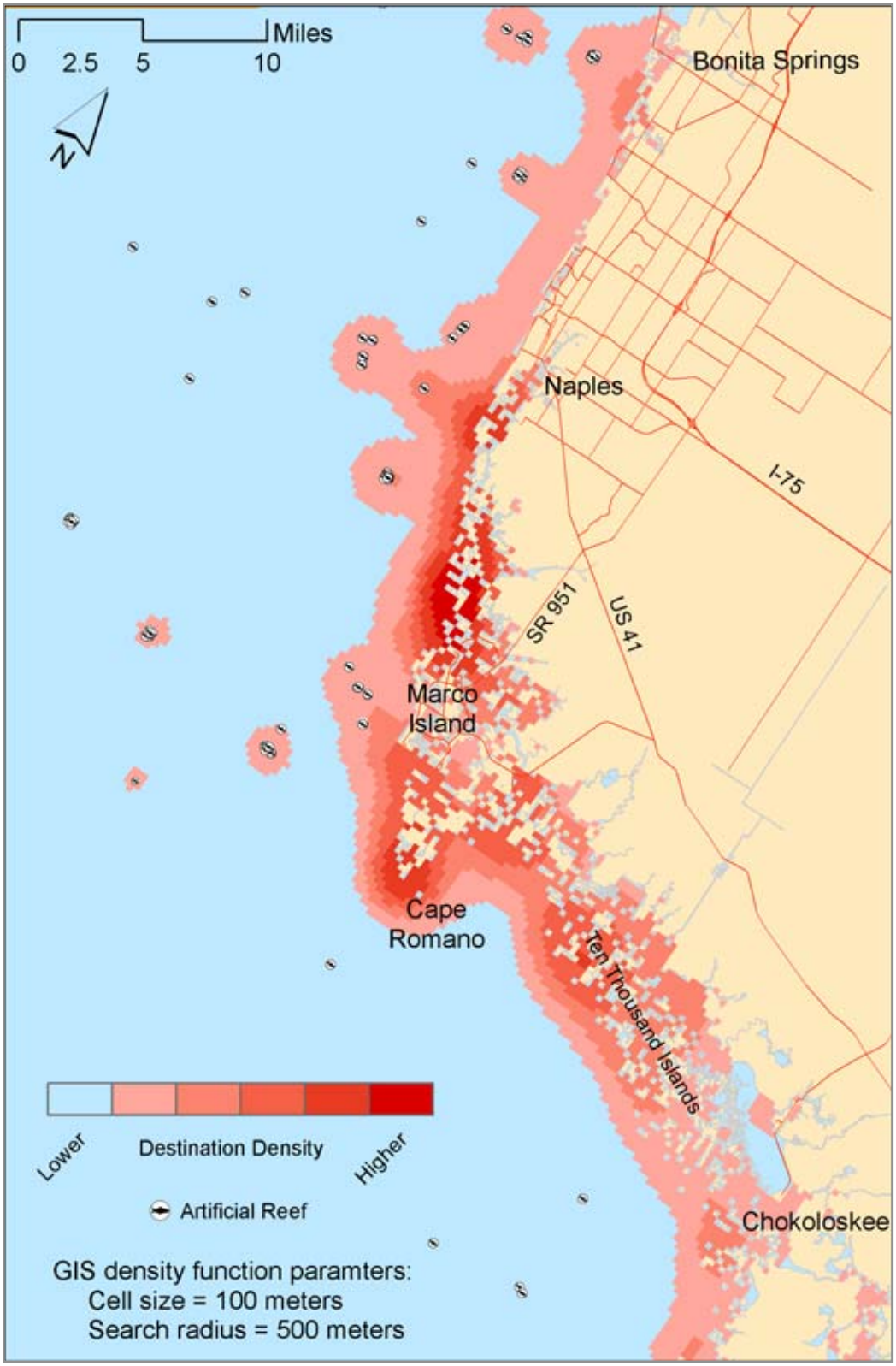

Figure 34. Favorite Destinations Density

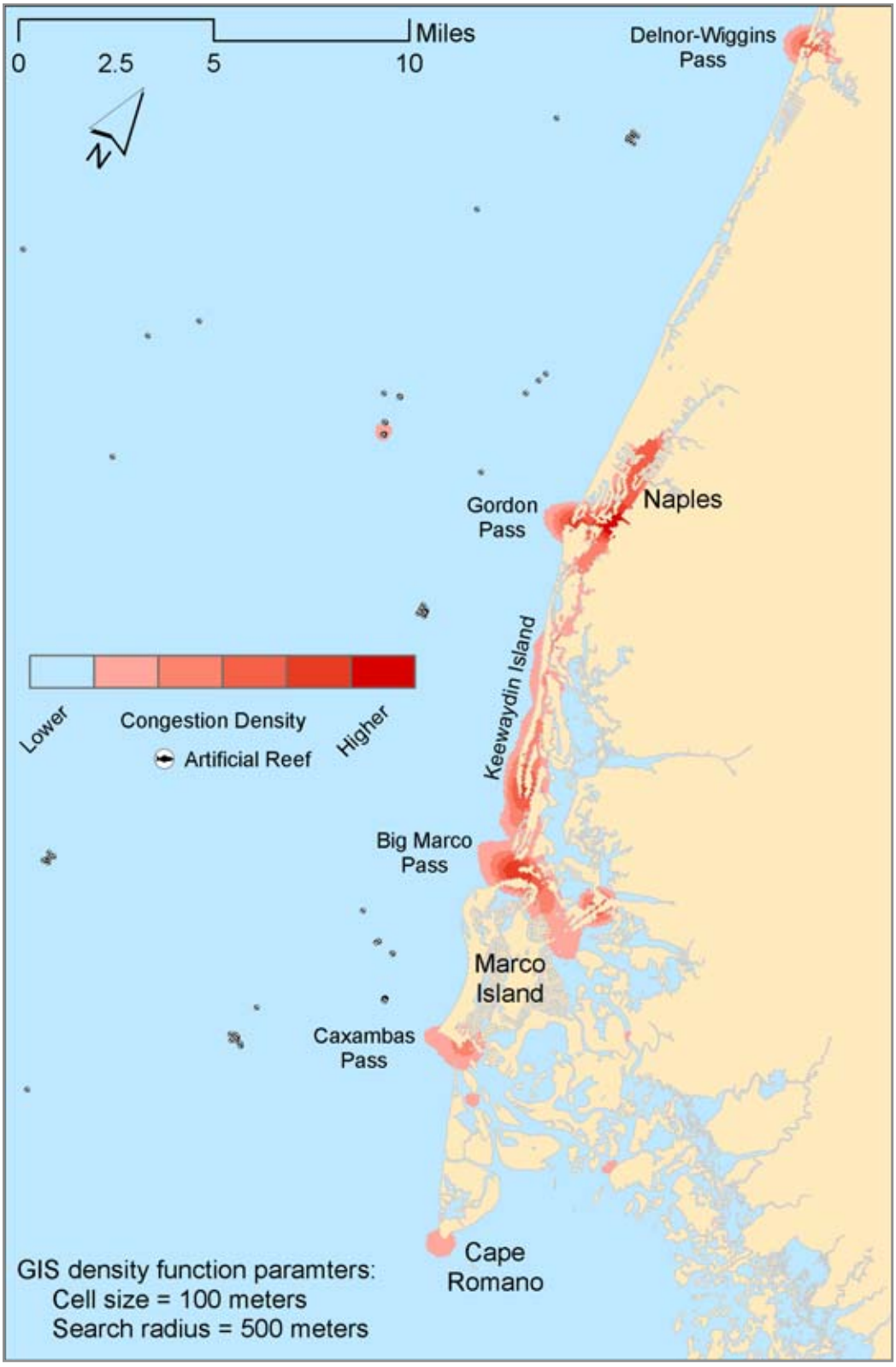

Figure 35. Congested Areas as Summarized with the GIS

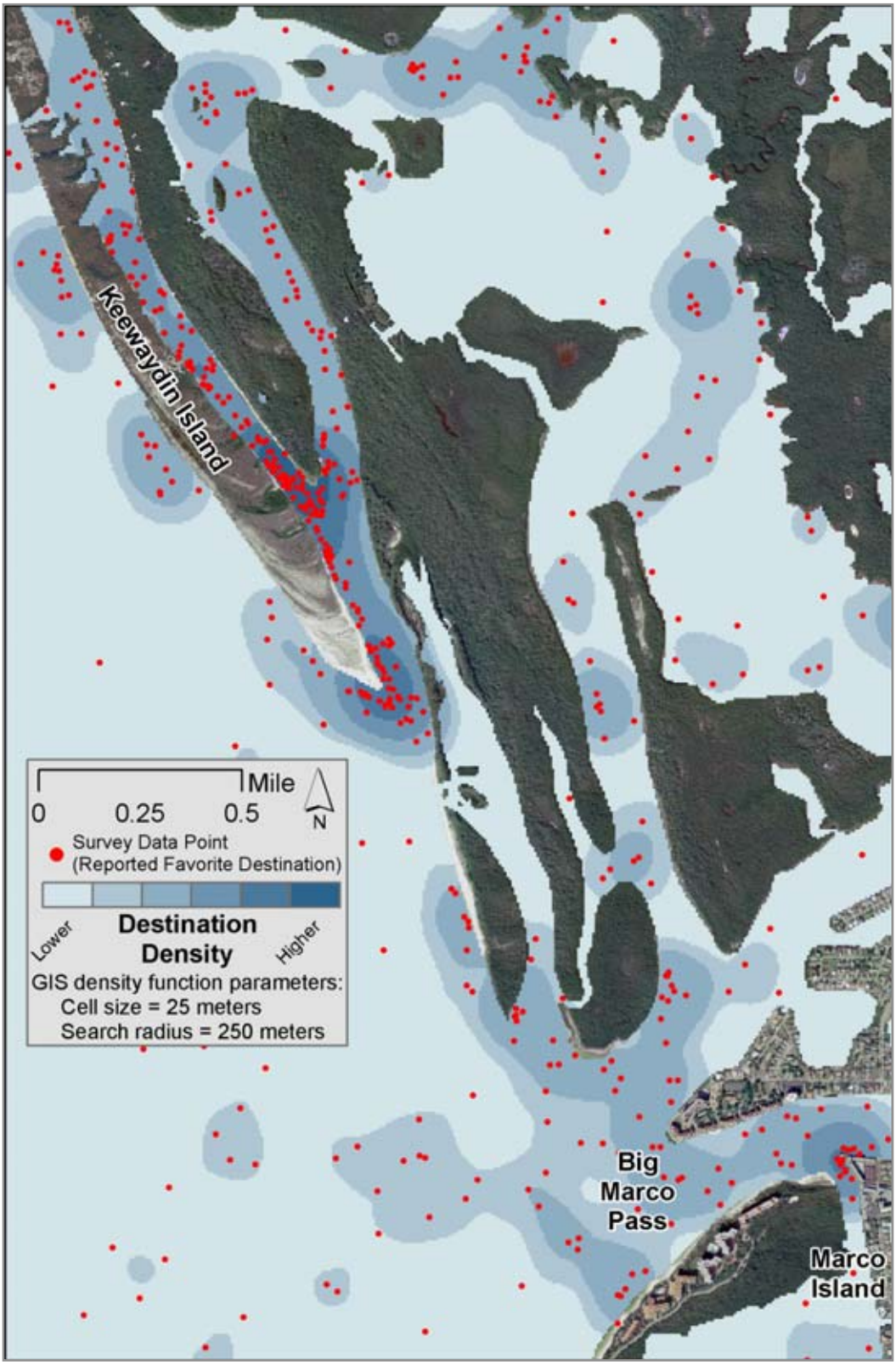

Figure 36. Close-up of some Favorite Destination Areas

Seasonal Boating Patterns

As discussed in Section 2.2, Collier County has two basic boating seasons: “Peak” (January through May) and “Off–Peak” (June–December). The GIS database for origins, routes, and destinations includes the month of the trip, allowing comparison of boating patterns between months, boating seasons, or time periods. For instance, Figures 37 and 38 show density of vessel routes in the Ten Thousand Island vicinity for the Peak and the Off–Peak seasons, respectively. On such maps the number of cases analyzed affects density and therefore the overall intensity of the colors, so in these figures the classification method Geometric Interval is chosen to emphasize spatial *changes* in density. In this area there appear to be few significant differences between the seasonal traffic patterns, though some changes are visible in the Ten Thousand Islands backcountry.

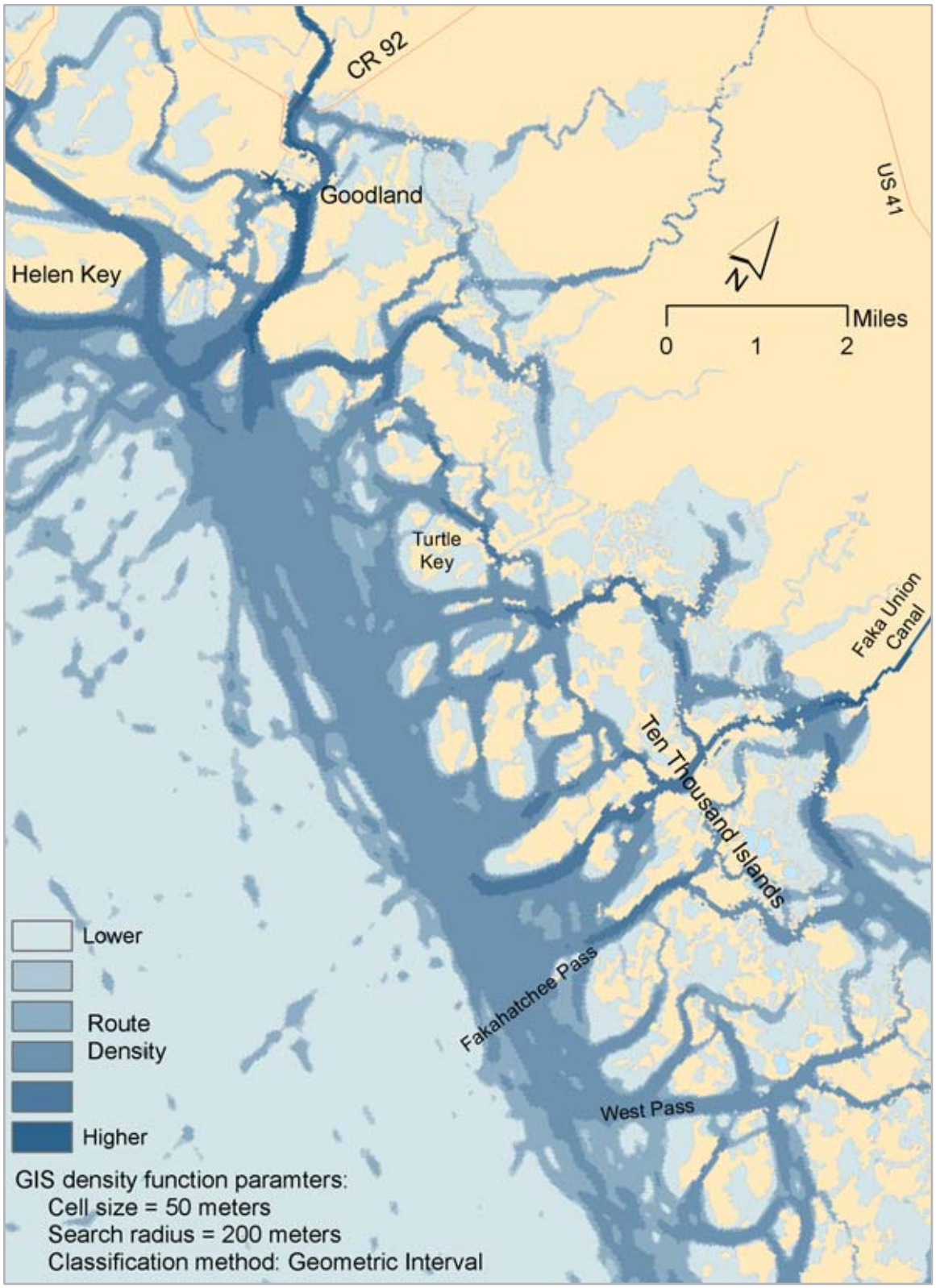

Figure 37. Peak Season Route Densities

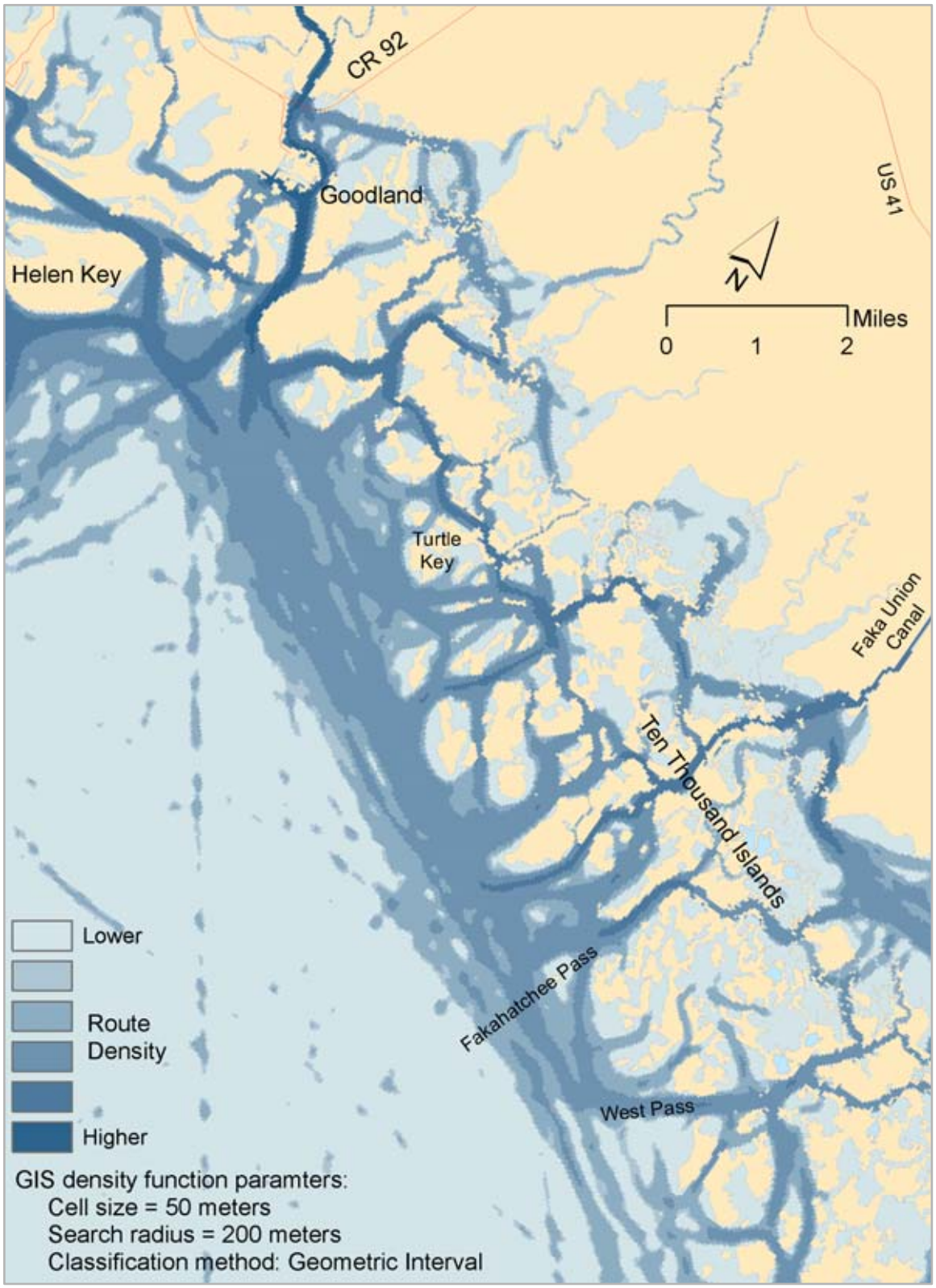

Figure 38. Off–Peak Season Route Densities

Part 4–Summary and Conclusions

The purpose of this study was (1) to quantify and map public access facility use through an inventory of marinas and boat ramps, and (2) to characterize the use patterns of boaters on waterways within and around Collier County by season and by waterway access type. The analysis presented in this report was based upon information collected during visits to marinas and boat ramps and through the distribution of three waves of mail surveys that targeted boaters who accessed the water from marina wet slips, marina dry-storage facilities, public ramps, and private docks. It is intended that this project's analyses and information products be of interest and use to citizens and policymakers deciding the future course of Collier County waterways.

The analysis first relied on the identification of primary boating periods by use of a cluster analysis based on the reported number of days per month that respondents spent boating. The cluster analysis revealed the presence of two distinct boating periods: a peak season (January through May) and an off–peak season (June through December). These boating periods differed from those recently determined for Brevard and Bay counties, highlighting regional differences in boating use in a state known for its "year-round boating season" (Sidman, et al. 2007, 2008).

The second analytical element involved the evaluation of seasonal trends among the four waterway access user groups. The analysis highlighted trends in (a) trip frequency, (b) trip departure times, (c) trip durations (d) weekend vs. weekday use patterns, and (e) boating activities by season. Although trip frequency for most respondents from all user groups for a given season did not differ from the seasonal mean, there were distinct user group characteristics as to trip departure times and trip durations.

The third analytical component of this study focused on (1) the spatial distribution of ramp patrons, and (2) spatial patterns of waterway use and period-specific boating patterns from reported trip data captured by the three mail survey waves. The resulting maps shows that the principal boating "hot-spots" are popular throughout the year (e.g., Keewaydin Island, artificial reefs in the Gulf of Mexico, and fishing holes in the Ten Thousand Islands), although they experience some small seasonal differences in use intensity patterns. Some ramps draw mostly local patrons and others attract users from elsewhere in the state, such as Miami–Dade and Broward counties.

The principal reported *detraction* from their Collier County boating experience is the *lack of courtesy and/or seamanship* in other boaters, followed by waterway *access difficulties*. Boaters reported their leading *need* to improve that experience would be *improved access* to the water, followed by the broad category of *infrastructure improvements*. It is important to consider these responses in the context of the various waterway user categories, as this report details.

The study showed that boaters in Collier County tend to avoid certain ramps, for various reasons. A new, dedicated survey should gather more detailed information on the factors that cause such avoidance, as well as identify the ramps that boaters use as substitutes and the motives for such preferences. This information would (1) yield deeper insights into the problems with some existing ramps; (2) help prioritize improvements to the avoided ramps; and (3) aid in the design and siting of future public waterway access sites.

The results underscore the importance of collecting boating data throughout the course of a year via multiple contacts (i.e., survey waves that allow for the collection of data during different boating seasons). The analyses verify the utility of targeting of the four waterway access groups–user groups that show statistically significant variability in trip behavior, trip characteristics, and use patterns over boating seasons.

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APPENDIX A: Mail Cover Letter and Survey Instrument

UF UNIVERSITY of FLORIDA

Florida Sea Grant College Program
Boating and Waterway Management Program

407 Nuclear Science Bldg.
PO Box 110400
Gainesville, FL 32611-0400
352-392-6233
352-392-5113 Fax

A Survey Conducted by the University of Florida Sea Grant College Program and Collier County

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Dear Boat Owner/Operator,

We are asking you to participate in a boating study being conducted by the University of Florida Sea Grant College Program and the Collier County Coastal Zone Management Department. The study seeks to characterize boating in Collier County waterways, including the Ten Thousand Islands area and the Gulf of Mexico. Your responses will be very important to help Collier County determine demand for public access facilities (marinas and boat ramps), expand existing or site new facilities, and to prioritize and improve waterway and facility maintenance.

The questionnaire should take about 20 minutes to complete. We would appreciate your returning it as soon as possible. We have provided a self-addressed, postage-paid return envelope. **Please be assured that the information you provide will be held in the strictest confidence. Answers will NOT be traced to individuals and your name or address will NOT be made available to anyone else**. Your participation is completely voluntary – you do not have to answer any question that you do not want to. The questionnaire control number is used only to track survey returns.

You are one of a targeted group of boaters using Collier County waterways to have received this survey, and your input is very important. Furthermore, as a selected user, you may receive a follow-up survey near the end of this year and in the spring of 2009. This will enable us to evaluate facility use and boating patterns for the entire year.

For questions about your rights as a research participant, you may contact the University of Florida Institutional Review Board at PO Box 112250, Gainesville, FL 32611 or 352-392-0433. If you have any questions about this survey, you may contact Robert Swett PhD at the University of Florida (352) 392-6233 or Pamela Keyes at the Collier County Coastal Zone Management Department (239) 252-2980, or by email at boatersurvey@ifas.ufl.edu.

We are most grateful for your assistance in this important project.

Robert Swett, PhD
Assistant Professor
University of Florida
Gainesville, FL 32611

Pamela Keyes
Environmental Specialist
Coastal Zone Management Department
Collier County Government
Naples, FL 34116

PART 1. PLEASE DRAW THE ROUTES OF YOUR LAST TWO BOATING TRIPS

This questionnaire has two maps. Map A (to the right of these questions) shows the Naples and Marco Island areas in detail. Map B (on the reverse side) shows greater offshore area. On the more appropriate map or maps, please provide information about your last two boating trips in the past 12 months. This will include marking your launch or departure sites, drawing your boating travel routes, and marking your boating activity spots or destinations along those routes. ***Please refer to the "Instructions for drawing routes and destinations" boxes on the maps.*** Thank you!

☞ **If you have not boated in the Collier County area in the past year, please check here** ☐ **and return the survey in the postage–paid envelope. Again, we thank you.**

PART 2. PLEASE DESCRIBE YOUR LAST TWO BOATING TRIPS

Question 1. About what time did you get on the water for each of the two trips that you drew on the map? (*for example, 7:30 AM*)

First trip (**solid line**)	AM	PM
Second trip (**dashed line**)	AM	PM

Question 2. About how long were you on the water on each of the two trips that you drew on the map? (*Please write in the number of hours* **or** *days.*)

First trip (**solid line**)	Hours	Days
Second trip (**dashed line**)	Hours	Days

Question 3. Please circle the day(s) of the week that you took each of the two trips that you drew on the map.

First trip (**solid line**)	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Second trip (**dashed line**)	Mon	Tue	Wed	Thu	Fri	Sat	Sun

Question 4. Please circle the month in which you took each of the two trips that you drew on the map.

First trip (**solid line**)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Second trip (**dashed line**)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec

Question 5. From the list below, please check the box beside the type of boat that you used on each of the two trips that you drew on the map.

Trip 1	Boat Type	Trip 2
☐	Personal Watercraft/Jet Ski	☐
☐	Kayak/Row/Canoe	☐
☐	Sailboat (no cabin)	☐
☐	Sailboat (with cabin)	☐
☐	Speed Boat (no cabin)	☐
☐	Speed Boat (with cabin)	☐
☐	Open Fisherman/Flats/Skiff	☐
☐	Offshore Sportfisherman (with cabin)	☐
☐	Power Cruiser (with cabin)	☐
☐	Deck Boat	☐
☐	Pontoon Boat	☐
☐	Other (specify) _____	☐

Question 6. Please enter the length and draft of the boat(s) that you identified above. (*Draft is how far below the water your prop, hull, or keel extends.*)

First trip (**solid line**)	**Length** (feet)	**Draft** (feet–inches)
Second trip (**dashed line**)	**Length** (feet)	**Draft** (feet–inches)

Question 7. Please indicate the departure site type of your first and second trips by checking the appropriate box.

Trip 1	Departure Site Type	Trip 2
☐	Boat ramp	☐
☐	Shoreline/Causeway	☐
☐	Marina wet slip	☐
☐	Home or condominium dock	☐
☐	Marina dry storage	☐

If you departed from a ramp, marina, or shoreline/causeway, please answer the following questions.
If you departed from a residential or condominium dock, please skip to Question 13.

Question 8. Please provide the name or location of the ramp, marina, or shoreline/causeway from which you departed on each of your last two trips that you drew on the map.

First trip: _____

Second trip: _____

Question 9. About how long does it take to drive from your home to the ramp, marina, or shoreline/causeway that you identified in Question 8?

First trip: Hours _____ Minutes _____

Second trip: Hours _____ Minutes _____

Question 10. Is there a boat ramp that you would like to use, but avoid? Yes ☐ No ☐

If yes, please name the ramp: _____

Please check all of the following that apply to the ramp you would like to use, but avoid.

☐ Water too shallow ☐ Lane(s) too narrow ☐ Bad or no pavement
☐ Slope too steep ☐ Slope not steep enough ☐ Inadequate parking
☐ No restrooms ☐ Too crowded ☐ Inadequate docks
☐ Other _____

Question 11. What is important to you in selecting a ramp, marina, or shoreline/causeway? (*In the table below, check the box that best describes how important each factor is to you.*)

Statement	Very Important	Important	Neutral	Unimportant	Very Unimportant
a) Deep-water access	☐	☐	☐	☐	☐
b) Restroom availability	☐	☐	☐	☐	☐
c) No parking or launch fee	☐	☐	☐	☐	☐
d) Well-marked access channels	☐	☐	☐	☐	☐
e) Proximity to my favorite boating spots	☐	☐	☐	☐	☐
f) Adequate parking	☐	☐	☐	☐	☐
g) Availability of fishing supplies, bait	☐	☐	☐	☐	☐
h) Short wait to launch	☐	☐	☐	☐	☐
i) Maintenance service	☐	☐	☐	☐	☐
j) Fuel availability	☐	☐	☐	☐	☐
k) Pump-out capability	☐	☐	☐	☐	☐
l) Nearby amenities (e.g., restaurant)	☐	☐	☐	☐	☐
k) Proximity to my home	☐	☐	☐	☐	☐
l) Ease of launching and retrieving boat	☐	☐	☐	☐	☐
m) Safe and secure parking area	☐	☐	☐	☐	☐
n) Other _____	☐	☐	☐	☐	☐

Question 12. At which sites, if any, have you felt the need for additional access to the water? Please mark these sites with an "**A**" on your trip map.

Question 13. In which areas, if any, have you experienced the greatest amount of boat congestion on the water? Please mark congested areas on the map with the letter "**C**." (*"Congestion" refers to the presence of more boats than you would prefer.*)

PART 3. PLEASE DESCRIBE YOUR TYPICAL BOATING TRIPS

Question 14. In the boxes below, please write the number of days per month that you operated your boat in the Collier County mapped area in the past year.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Question 15. Which of the following are important to you in selecting your typical boating routes? (*For a–i in the table below, check the box that best describes your opinion.*)

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
a) I try to avoid congested areas/crowds.	☐	☐	☐	☐	☐
b) I try to avoid shallow water.	☐	☐	☐	☐	☐
c) The fishing is good.	☐	☐	☐	☐	☐
d) I prefer well-marked channels.	☐	☐	☐	☐	☐
e) I prefer calm, protected waters.	☐	☐	☐	☐	☐
f) None are important. I just cruise around.	☐	☐	☐	☐	☐
g) Easy access to supplies or fuel	☐	☐	☐	☐	☐
h) Quick access to my favorite boating spots	☐	☐	☐	☐	☐
i) I enjoy the scenic beauty	☐	☐	☐	☐	☐
j) Other _____	☐	☐	☐	☐	☐

Question 16. What are your activities on your typical boating trips? (*Check all that apply.*)

☐ Beach Picnicking ☐ Nature Viewing ☐ Sightseeing
☐ Cruising ☐ Daytime Anchoring ☐ Socializing
☐ Diving ☐ Overnight Anchoring ☐ Visiting Restaurant
☐ Fishing ☐ Sailing ☐ Swimming
☐ Skiing/Water Sports ☐ Beach Camping ☐ Jet Skiing
☐ Other (*specify*) _____

PART 4. PLEASE DESCRIBE YOURSELF

Question 17. How long have you been operating a boat in the Collier County area? _____ years.

Question 18. Have you ever taken a boating safety or seamanship course? Yes ☐ No ☐

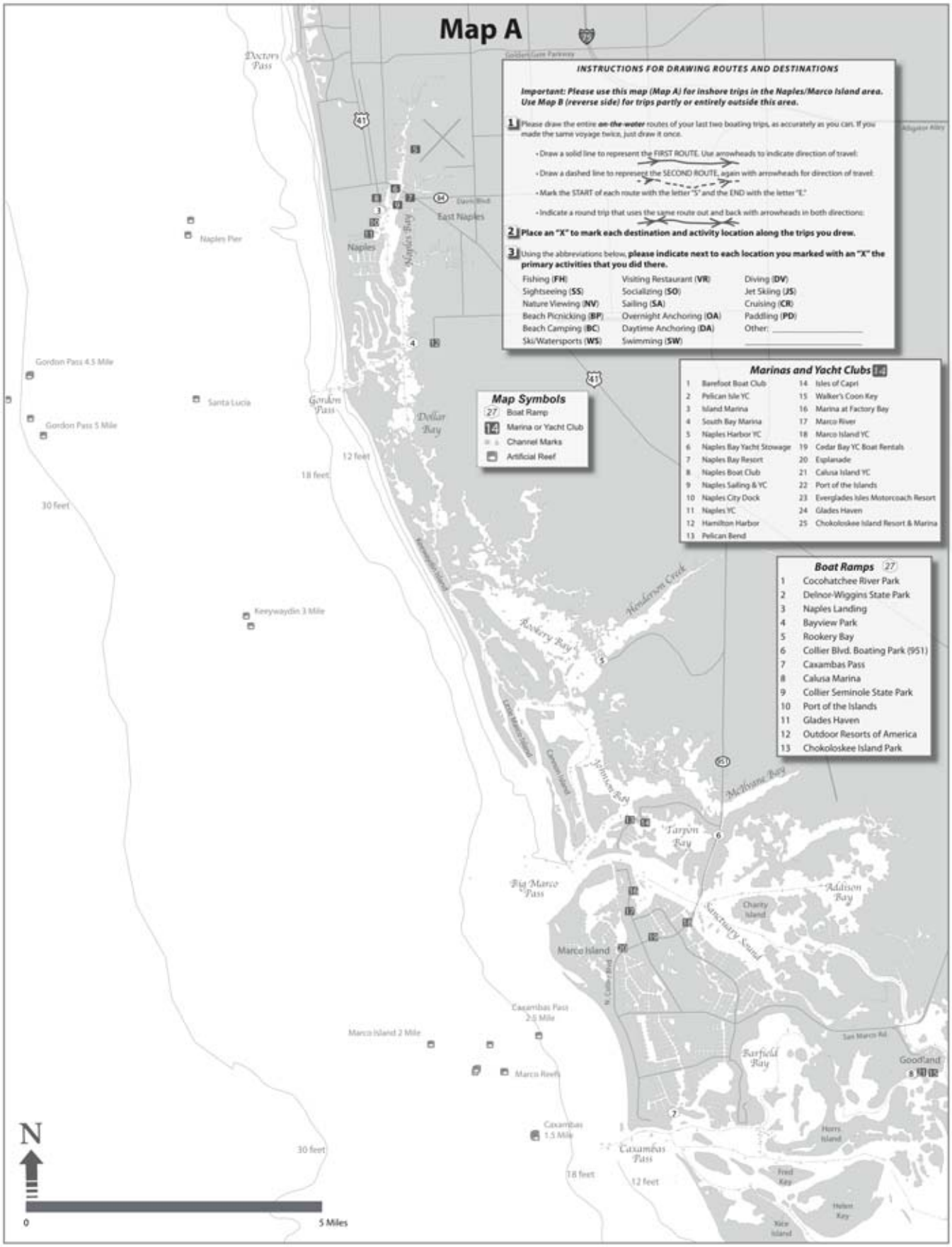
Question 19. In what year were you born? _____

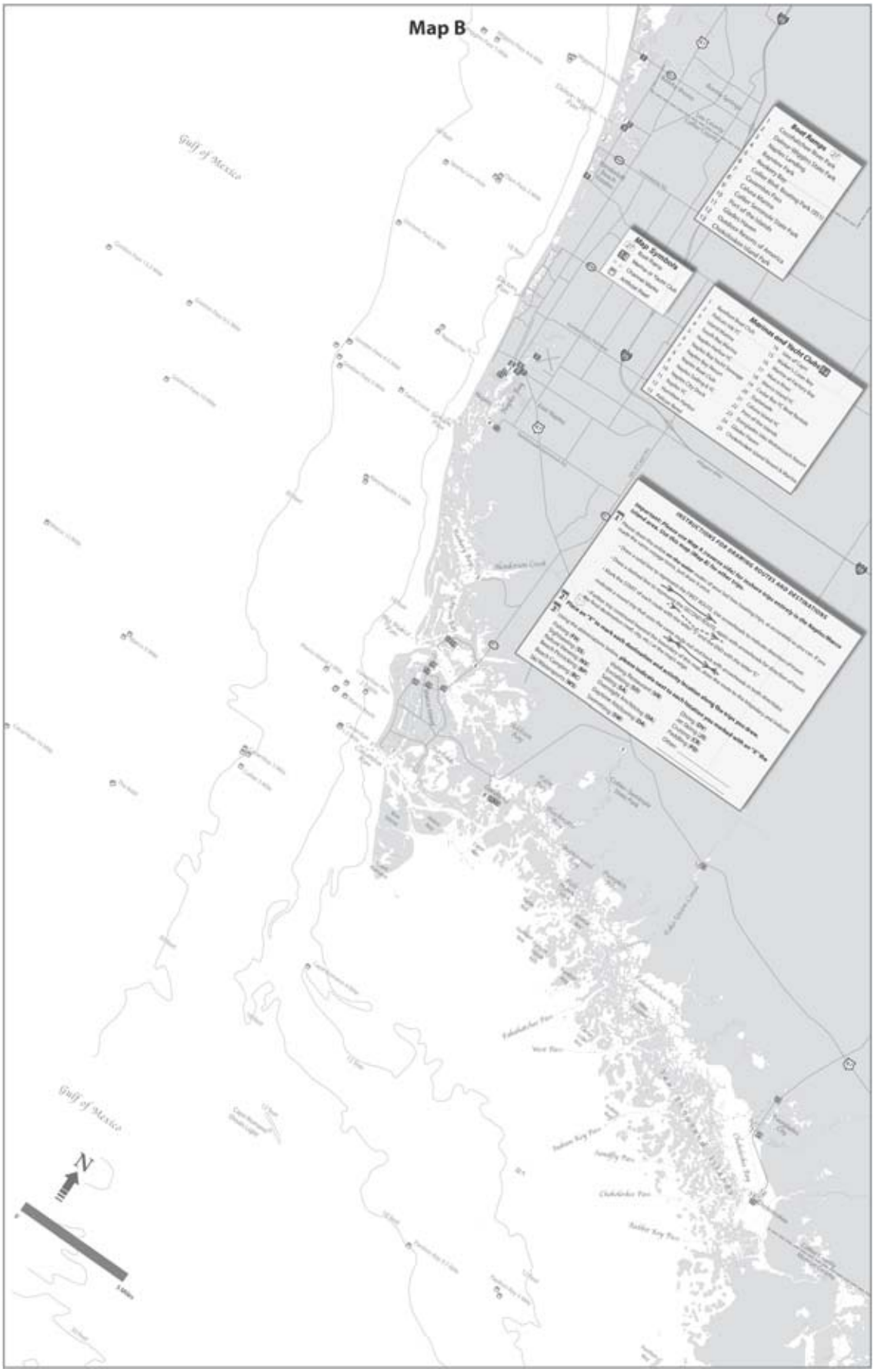
Question 20. What is the ZIP code of your primary residence? _____

Question 21. What detracts most from your Collier County boating experience?

Question 22. What is needed most to improve your Collier County boating experience?

PLEASE RETURN THIS QUESTIONNAIRE IN THE ENCLOSED POSTAGE–PAID ENVELOPE.
THANK YOU VERY MUCH FOR YOUR TIME AND PARTICIPATION.


Map A
INSTRUCTIONS FOR DRAWING ROUTES AND DESTINATIONS
Important: Please use this map (Map A) for inshore trips in the Naples/Marco Island area. Use Map B (reverse side) for trips partly or entirely outside this area.
1 Please draw the entire on the water routes of your last two boating trips, as accurately as you can. If you made the same voyage twice, just draw it once.
• Draw a solid line to represent the FIRST ROUTE. Use arrowheads to indicate direction of travel.
• Draw a dashed line to represent the SECOND ROUTE, again with arrowheads for direction of travel.
• Mark the START of each route with the letter "S" and the END with the letter "E."
• Indicate a round trip that uses the same route out and back with arrowheads in both directions.
2 Place an "X" to mark each destination and activity location along the trips you drew.
3 Using the abbreviations below, please indicate next to each location you marked with an "X" the primary activities that you did there.
Fishing (FH)
Sightseeing (SS)
Nature Viewing (NV)
Beach Picnicking (BP)
Beach Camping (BC)
Ski/Watersports (WS)
Visiting Restaurant (VR)
Socializing (SO)
Sailing (SA)
Overnight Anchoring (OA)
Daytime Anchoring (DA)
Swimming (SW)
Diving (DV)
Jet Skiing (JS)
Cruising (CR)
Paddling (PD)
Other: _____
Marinas and Yacht Clubs 14
1 Barefoot Boat Club
2 Pelican Isle YC
3 Island Marina
4 South Bay Marina
5 Naples Harbor YC
6 Naples Bay Yacht Stowage
7 Naples Bay Resort
8 Naples Boat Club
9 Naples Sailing & YC
10 Naples City Dock
11 Naples YC
12 Hamilton Harbor
13 Pelican Bend
14 Isles of Capri
15 Walker's Coon Key
16 Marina at Factory Bay
17 Marco River
18 Marco Island YC
19 Cedar Bay YC Boat Rentals
20 Esplanade
21 Calusa Island YC
22 Port of the Islands
23 Everglades Isles Motorcoach Resort
24 Glades Haven
25 Chokoloskee Island Resort & Marina
Map Symbols
27 Boat Ramp
14 Marina or Yacht Club
Channel Marks
Artificial Reef
Boat Ramps 27
1 Cocohatchee River Park
2 Delnor-Wiggins State Park
3 Naples Landing
4 Bayview Park
5 Rookery Bay
6 Collier Blvd. Boating Park (951)
7 Caxambas Pass
8 Calusa Marina
9 Collier Seminole State Park
10 Port of the Islands
11 Glades Haven
12 Outdoor Resorts of America
13 Chokoloskee Island Park
Doctors Pass
Naples Pier
Naples
East Naples
Naples Bay
Gordon Pass 4.5 Mile
Gordon Pass 5 Mile
Santa Lucia
Gordon Pass
Dollar Bay
12 feet
18 feet
30 feet
Keewaydin 3 Mile
Rookery Bay
Henderson Creek
Johnson Bay
Tarpon Bay
McIlvane Bay
Big Marco Pass
Addison Bay
Charity Island
Sanctuary Sound
Marco Island
Caxambas Pass 2.5 Mile
Marco Island 2 Mile
Marco Reefs
Barfield Bay
Goodland
Caxambas 1.5 Mile
Caxambas Pass
Horrs Island
Fred Key
Helen Key
Key Island
N
0
5 Miles


Map B
Gulf of Mexico
Gulf of Mexico
N

APPENDIX B: Validation of Designated Boating Seasons

Cluster Analysis

The two designated boating seasons in Collier County (as implied by the descriptive statistics and graphs shown in the previous section) were validated by the results of a cluster analysis. Several hierarchical clustering routines were run using monthly data for the variables listed in Table 51, each yielding consistent results and validating the presence of a peak and off–peak boating season as implied in Figure 12. The clustering routines were constrained to search for an optimal number of clusters c*, based on an assessment of the natural breaks and the trends found within the monthly trip data as reported by Collier County survey participants in response to Question 14. The cluster analysis was carried out under the imposed minimum (maximum) of two (five) clusters in the identification of 'like boating months' based on trip data. Hierarchical clustering routines were chosen given that the variables used to describe the trends in Figure 12 were measured at a variety of different "scales" (i.e., the analysis involved the use of nominal, ordinal, and interval- scale data).

Table 51. Variables Used in the Hierarchical Cluster Analysis

Cluster/Label Variable: ***MONTH*** (month of the year): January–December	
Variables used to cluster *MONTH**	
Variable	***Description***
ANRT	Average Number of Reported Trips (per month)
DISTP	Distance from Peak center-- absolute number of months
Rank	Rank of ANRT (in descending order → 1=high; 12=low)
MA3_Rank	Moving Average of Rank (3rd, centered)
INC_ANRT	Increase in ANRT (over previous month)
AATM	Above-Average Trip Month (1=yes; 0=no)

*Note that the variables listed above are measured at a variety of scales, including the nominal, ordinal, and interval scale; requiring clustering methods that allow for "mixed" data types.

Hierarchical clustering methods were used to identify clusters of months that exhibited 'similar' characteristics in terms of the trip information such as average reported trips, the relative position of months with respect to the peak-trip months, the monthly "moving average" and how that average compares to the overall average, and monthly trip rankings. Similarity, and hence the clustering of 'like months,' is determined by the shortest statistical "distance" (i.e., the least dissimilarity distance between clusters) in which months or clusters of months are linked together in relational or statistical space, measured in Euclidean terms.

In short, individual months and clusters of months were "linked" together in a manner that is efficient in terms of accounting for variation, similarities/dissimilarities, and/or differences in the values of monthly observations for the variables listed in Table 51.

Dendrograms

A cluster routine is typically accompanied by a "dendrogram"—a graphical device that displays the distance (or dissimilarity) between clusters, and the distance at which individual objects or clusters are joined. This device offers a way to visually map the distances at which various clusters join and/or various observational units link together. It also allows for the identification of logical break points that separate clusters, and gives an historical account of the clustering process as individual elements/clusters

are linked together (starting with clustering of the most similar and ending with the clustering of the least similar or most dissimilar). Dissimilarity distances and break points, appearing as large gaps between clusters, are the basis by which an optimal number of clusters can be found. In short, a dendrogram is a graph that includes information on the dissimilarity distances at which clusters form and link together.

Summary statistics for the cluster analysis on reported monthly trips and the designation of peak and off–peak boating seasons are provided in Table 52. Four distinct hierarchical clustering algorithms were employed. Each of the four routines produced identical groupings or clusters of months. In addition, the cluster routines produced *cophenetic* correlation coefficients that ranged between 0.69 and 0.79 – indicating that the identified cluster groupings are strong and efficient in terms of representing the similarities/dissimilarities that exist in the values of the variables associated with the different months of the year. Note: Cluster routines were run using *NCSS 2000 Hierarchical Clustering Algorithms.* Similar cluster designations were also produced using the Manhattan metric distance types.

Table 52. Results of Cluster Analysis in the Designation of Boating Seasons

	Distance Values for Clusters and Cluster Links			
Routine →	**Simple Avg. Weighted**	**Group Average Un-Weighted**	**Median Weighted**	**Centroid Un-Weighted**
Distance type →	**Euclidean**			
Cluster(s) identified: 1 and 2				
Off–Peak	{June, July, August, September, October, November, December}			
1	0.767	0.798	0.392	0.393
Peak	{January, February, March, April, May}			
2	0.860	0.810	0.634	0.543
Cluster links (final) 1-2	1.268	1.352	1.034	1.529
Cophenetic Correlation	0.766	0.798	0.691	0.713
Identified # of clusters	2	2	2	2

The results suggest that the months of January through May form a distinct cluster whose members are similar in terms of reported trip statistics, yet dissimilar and differentiable from months not contained within this cluster. As these months are associated with average trip values that exceed the overall average of 3.85, they are designated as “peak” boating months. Note also that these five months are statistically dissimilar to the other months of the year. Employing the same logic, it is demonstrated that the months of June through December form an “off–peak” boating season, a cluster of months with average trip counts below the overall average of 3.85. This off–peak cluster is markedly different from the cluster of months that comprise the “peak” season in terms of similarity (given that the peak and non-peak clusters do not join until very late in the clustering procedure in each of the dendrograms, below). In conclusion, each of the four hierarchical clustering routines suggested the existence of a five-month “peak season” (which runs from January through the end of May) and an “off–peak” season (June through December).

A more detailed account of the step-by-step clustering process for each of the hierarchical clustering routines is provided by the dendrograms shown in Figures 39 through 42. The vertical axis of the dendrogram represents the months (or clusters of months) as they link up using each of the four respective clustering algorithms. The horizontal axis yields a measure of "dissimilarity" or the statistical distance at which months or clusters of months "fuse together." The observed gaps between clusters reveal distinct break points based on dissimilarity distances. The horizontal axis provides a platform for viewing the positioning of each month as it clusters with other months, and shows how months and clusters of months are linked and arranged in relational space at any given dissimilarity distance value.

The dendrogram is useful in helping to visualize the distance at which any two months and/or clusters are fused together and the degree to which there is dissimilarity between months or clusters. The less the dissimilarity (or the more similarity), the faster months or clusters link together as one moves from right to left on the dendrogram.

For example, the dendrogram in Figure 42 suggests that the months of March and May are very similar (note that they cluster very rapidly at a distance of approximately 0.25). Yet these two months are very dissimilar to the months of October and November (a pair of months that are also similar to one another, yet are very different from the cluster which contains March and May). The difference is noticeable when one considers that the March-May pairing does not cluster with the October-November pairing until the very end of the clustering sequence (at a distance of approximately 1.53). Hence, the month of March is more similar to the month of May (joined at a distance of approximately 0.25) than March is to the month of say November (as May and November are not joined until a distance of 1.53, when the peak and off–peak cluster link up).

In all of the dendrograms associated with the various hierarchical clustering routines, a fairly large natural break or gap is observed between the final clustering of the "off–peak" months and the "peak" months. For instance, consider the gap between the final linkage of clusters in Figure 40 – a gap that spans the distances 0.81 to 1.36, moving right to left on the horizontal axis; thus, producing a gap of 1.35-0.81= 0.54. An even larger gap can be observed between the major clusters in Figure 42, with a visible gap of approximately (1.53 -0.54) or 0.99.

In general, dissimilarity between any two months or clusters increases as the distance between those months or clusters increases, as one moves left on the horizontal axis. In the case of monthly trip statistics, there is strong empirical evidence that the months associated with each of the two distinct clusters are very dissimilar in comparison to the months found within the same seasonal cluster (which tend to be similar).

Note also that the dendrograms shown in Figures 39 through 42 are similar in their linkage structure. This consistency suggests that designated boating seasons represent an efficient and consistent way to group months based on the reported monthly trip data provided by Collier County survey respondents. The results of the hierarchical cluster analysis also suggest that the optimal number of clusters is 2, with groupings of months that match those identified by visual inspection of Figure 12 and the summary statistics highlighted in Table 32. In sum, the cluster analysis provides tangible statistical evidence for the designated groupings of months that define the two distinct boating seasons—defined as peak and off–peak for the purposes of this study.

It is interesting to point out that the resulting clusters do not conform to conventional seasonal classifications of winter, spring, summer, and fall. This statistical finding suggests that trip propensity in any given month may be affected by numerous factors including physical conditions (e.g., regional and seasonal weather patterns), boater characteristics and preferences, and behavioral factors—boaters' perceptions and expectations regarding conditions associated with individual months or time periods and

the on-water recreational boating experience in a given season, as well as general use or activity patterns by waterway access category and season. Perceptions on congestion/crowding and accessibility to favorite on-water destinations also affect trip propensity and use patterns.

The results presented in this section form the foundation for the seasonal analyses in which trip patterns and activities by boating seasons and user groups are analyzed (Section 2.2).

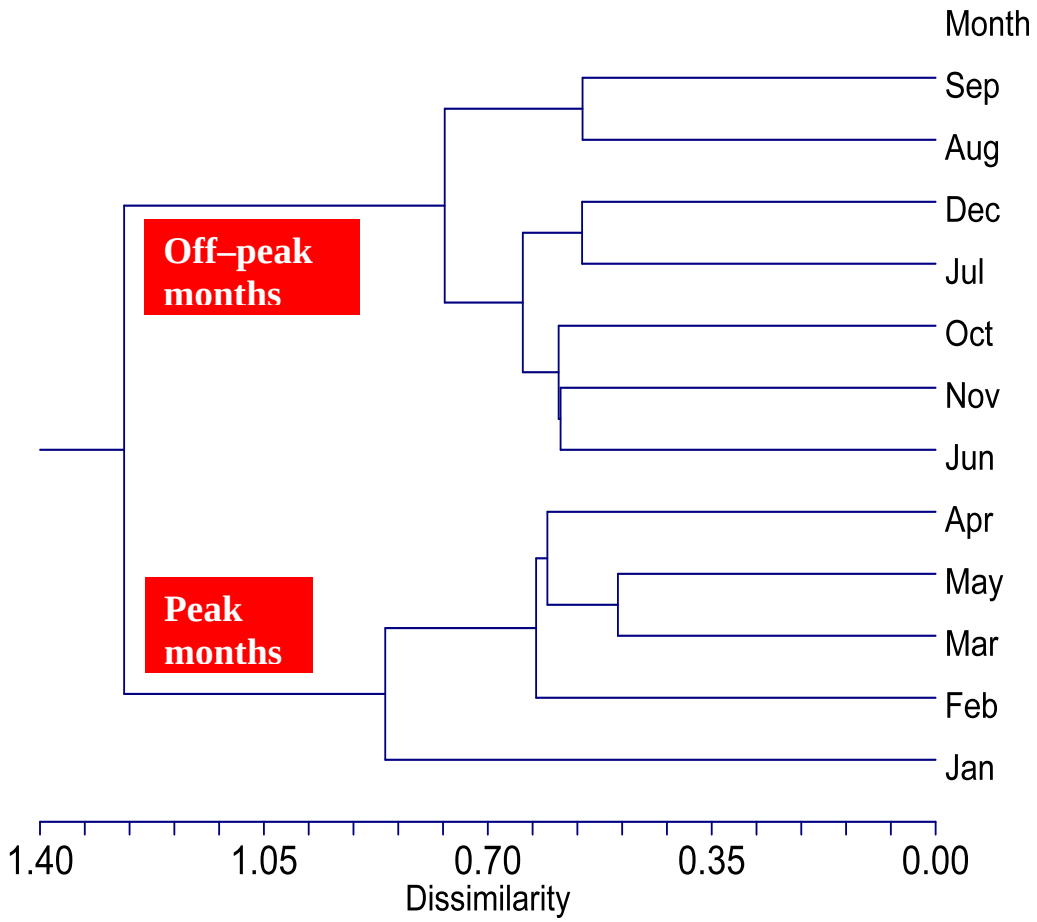


Figure 39. Dendrogram showing clusters of months based on the mean number of reported monthly trips and related variables; using a Multivariate Hierarchical Cluster Analysis (*Method: Simple Average, Weighted Pair-Group w/Euclidean Distance*)

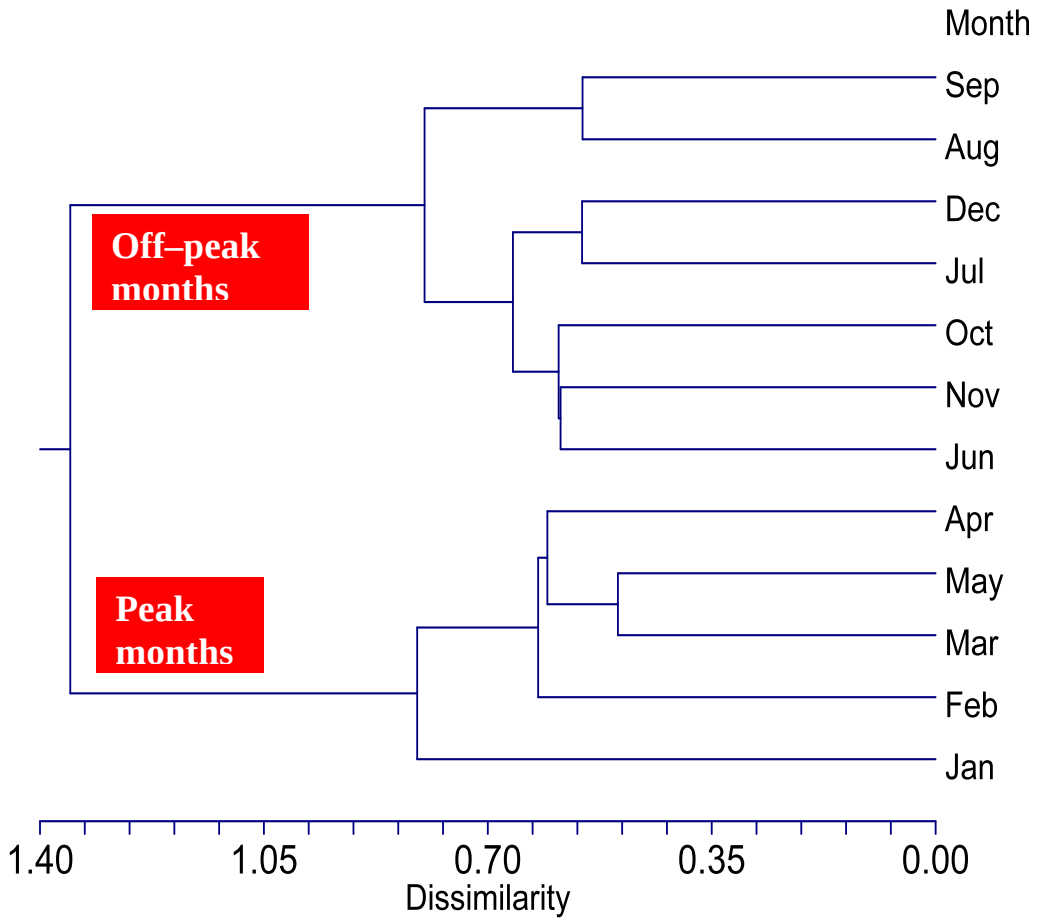


Figure 40. Dendrogram showing clusters of months based on the mean number of reported monthly trips and related variables; using a Multivariate Hierarchical Cluster Analysis (*Method: Group Average, Un-Weighted Pair-Group w/Euclidean Distance*)

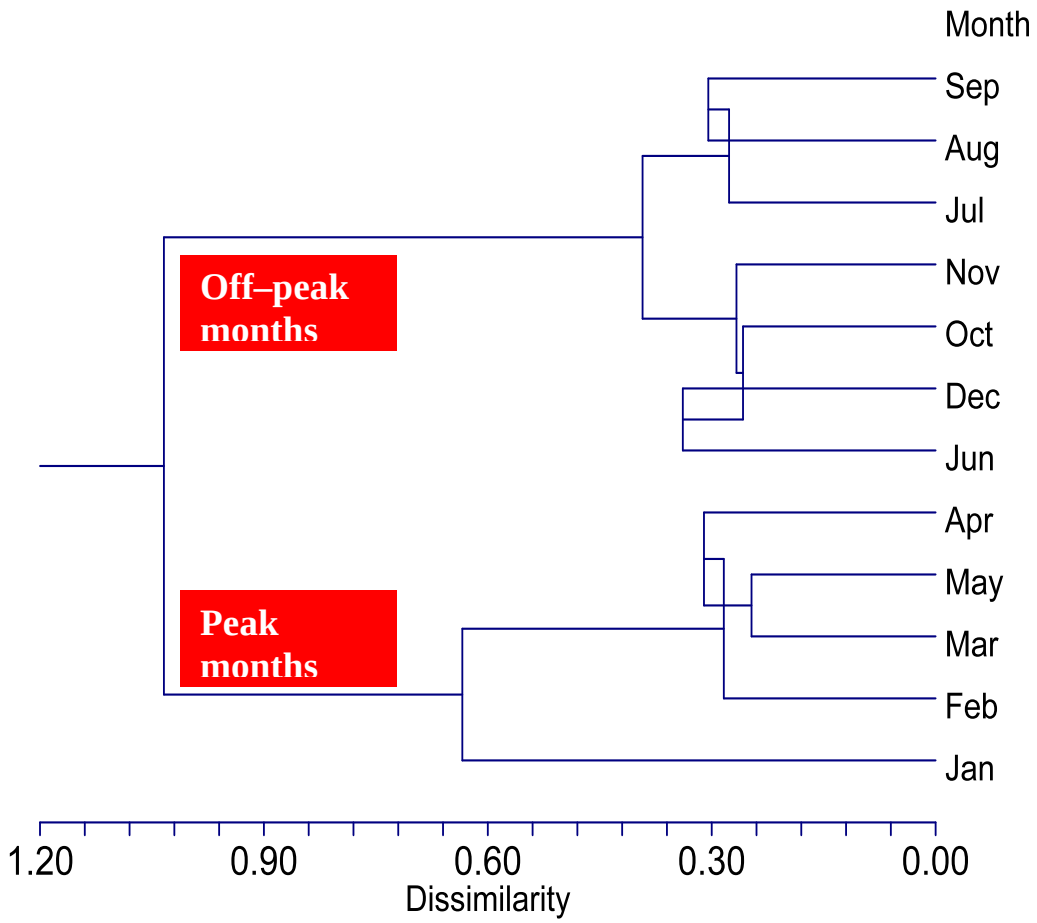


Figure 41. Dendrogram showing clusters of months based on the mean number of reported monthly trips and related variables; using a Multivariate Hierarchical Cluster Analysis (*Method: Median, Weighted Pair-Group Centroid w/Euclidean Distance*)

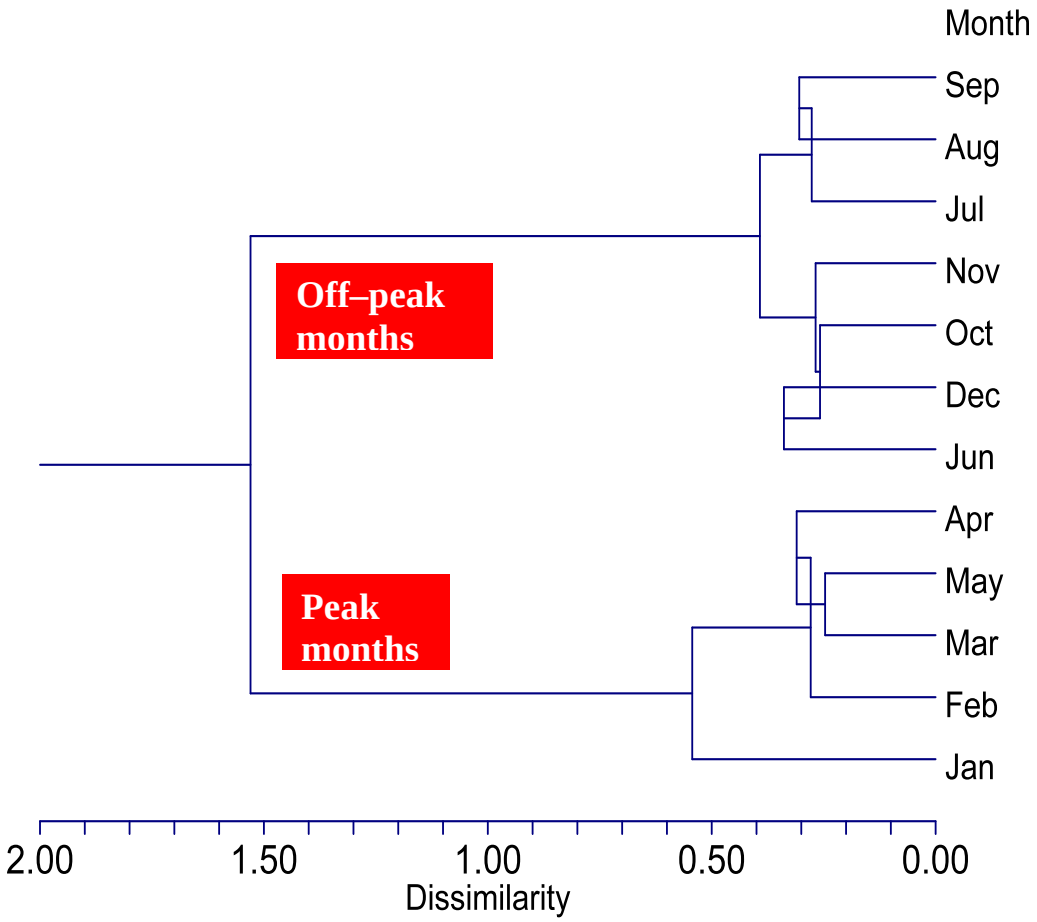


Figure 42. Dendrogram showing clusters of months based on the mean number of reported monthly trips and related variables; using a Multivariate Hierarchical Cluster Analysis (*Method: Centroid, Un-Weighted Pair-Group Centroid w/Euclidean Distance*)

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