Phase 5 Final Report

Northwest Aquatic Preserves
Visitor Use Estimation Study

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Introduction

This is the third of three reports focusing on estimating visitor use in the Florida Aquatic Preserve system. During the first study year (FY 2020-2021), we collected data at 14 aquatic preserves (APs) in Northeast Florida and developed models estimating the annual number of visitors for each AP. Visitor use in the Northeast APs during 2020-2021 was estimated to be 22.7 million visitors.

This second study year (FY 2021-2022) estimated use at 12 APs in South Florida ranging through Biscayne Bay, the Florida Keys, and Southwest Florida. Visitor use in these APs exceeded 58 million visitors during the 12-month study period.

The final phase of the project (FY 2022-2023) focused on 18 APs in Northwest Florida from Tampa to Pensacola. It also included Biscayne Bay – Cape Florida to Monroe County Line and Lignumvitae Key aquatic preserves as carry-overs from year 2 which were incomplete due to construction and access issues.

Florida's aquatic preserves (APs) come in a variety of shapes and sizes and offer enormous economic, social, and environmental benefits to Florida citizens and visitors. They contain many features that are unique to an individual aquatic preserve. These feature in islands and bird nesting sites, Gulf or Atlantic Ocean frontage, rivers or significant stream segments, seagrass beds and other physical features, and diverse and valuable outdoor recreation opportunities. Measuring recreation value is difficult. One basic measure of recreation value is estimating how many people visit aquatic preserves. However, the diversity and complexity among Florida's APs affects the research methods and procedures used for estimating recreational use. Further complicating recreational use estimates are additional factors such as adjacent population and development levels, shoreline access, and restrictions on using airborne vehicles to collect data. The inherent complexity of many APs further exacerbates the problems associated with estimating recreational use in large areas.

The goal of this project was to improve public access management by developing a visitor use monitoring protocol for Florida's aquatic preserves. The developed protocol will be incorporated into existing management plans. The project will provide statistically reliable state-wide data that can be used to estimate public use of Florida's coastal resources, and assess future management needs to improve visitor experiences and protect coastal and aquatic ecosystems. Specifically, the assessment method developed under this project will provide reliable cost-efficient protocols for AP managers and to assess recreation uses of the coastal and river resources they manage. The identified standard method of visitor assessment will be useful for them to report a reliable number of recreation uses to contribute to the statewide Land Management Uniform Accounting Council report (LMUAC 2016), and other statewide annual and bi-annual reports.

With annual recreational use estimates and economic impacts mandated by the Land Management Uniform Accounting Council for all state managed lands, it can become burdensome for the small staff at each aquatic preserve to conduct comprehensive recreational use studies each year. The open access nature of aquatic preserves and lack of any formal entrance or user fee structure, such as those used by

state parks, severely hampers counting visitors over time. Further, the expense of implementing these studies annually would likely consume most AP budgets. Thus, the purpose of this project is to develop methods and procedures to establish baseline recreational use levels and develop models that will allow efficient and reliable year to year use estimates to be calculated from a few highly correlated indicators.

Developing accurate estimates of visitors to outdoor recreation areas like aquatic preserves is difficult. There are a few methods to obtain visitor use information, but many, such as mail or on-site visitor surveys are expensive and time-consuming. They also rely on respondent memory and are subject to declining response rates (Connelly and Brown 2011). Additionally, the incidence of encountering AP visitors in the general population is very low making survey costs extensive.

A useful alternative to visitor surveys is to count visitors at the recreation areas themselves. This has been done for decades primarily at parks and other areas with defined access points. However, for areas with open access or numerous entrances, such as waterways and beaches, counts at these complex sites have been little more than informal guesses (King and McGregor 2012).

The purpose of this report is to provide a guide to understanding the procedures we used in estimating visitor use at Florida's aquatic preserves. It details how data for initial use estimates were collected and analyzed, and the basis for selecting and using analytical techniques to aid in the estimation process. Knowing how these factors were used to build the Visitor Use Estimation Model is important for AP managers when using or explaining visitor use estimates to others. It is also important to recognize the need to make data collection and use estimation in future years as practical and efficient as possible to ease the workload burden. Within the context of this report, use estimates for the 2022-2023 fiscal year for the 17 aquatic are presented.

Use Estimation Procedures

Outdoor recreation researchers have typically been estimating visitor use at these complex sites using one of two types of methods. First are access point counts. These methods used personnel or mechanical counters to detect the number of visitors passing through the entry/exit point during the day. These methods are relatively labor intensive as personnel time must be allocated to the counting duties or to servicing mechanical counters regularly. Also, they are most effective when most visitors use a single entry/exit area. For areas, like aquatic preserves, that have many access points, access point counts are not feasible.

The second method involves counting recreation visitors at a specific location at specific times, referred to in the literature as "instantaneous counts" or "periodic counts" primarily developed for fisheries management (Hoenig et al. 1993). Instantaneous count methodologies have been widely used by researchers to estimate changes in recreational use in natural resource damage assessments associated with wildfires and oil spills. Instantaneous counts are often conducted using aerial overflights, drone flights, and direct observation.

In our study of AP visitor use, it was more practical to use the instantaneous count method because of the resources available and the need to cover 17 aquatic preserves during the study year. By implementing instantaneous counts at a sample of times, the number of visitor hours can then be estimated and then converted into a trip estimate by dividing by the average duration of a trip (Hoenig et al. 1993).

To collect instant count data, drones and personal observation techniques were used at sample locations throughout an AP to count boats in surrounding AP waters. Depending upon FAA restrictions, drones were flown to altitudes ranging from 100 to 400 feet above the launch point and positioned to take overlapping photographs in a panoramic fashion starting at the northern or western edge of the shoreline and sweeping around to the southern or eastern edge. All watercraft (power boats, sailboats, kayaks, canoes, and jet-skis) within the view field were counted.

The number of drone flight sampling locations varied by AP due to differences in AP configuration, shoreline access, and FAA and local authority regulations governing drone flights. These limitations are discussed fully in each appendix summarizing the research for individual APs. We encountered no restrictions at sample locations where trailer and car counts were made as these were all on publicly accessible locations like boat ramps, parks, and roadway waysides.

To determine the AP sampling area that was observed by drone or personal observation, the furthest distinguishing landmark (e.g., shoreline building or feature, island) nearest to where watercraft at their furthest visible point was identified. This landmark was then identified on Google Earth Pro and measured from the launch point. This provided a radius for calculating the area, in acres, of the view field. Summing the areas of all the view fields and dividing by the total surface water area of the AP provided the percentage of an AP sampled. This percentage was used in the use estimation model to extrapolate watercraft counts from the sampled areas to the entire AP.

We obtained the average trip duration by using time-lapse cameras at boat ramps to determine amount of time vehicles with trailers were parked between unloading and reloading the boat. Vehicles with boat trailers were identified and monitored by time-lapse cameras set at a rate of one frame per minute. Vehicles with trailers were identified throughout the day and parking times calculated to ensure boats launching later in the afternoon, with potentially shorter time on the water, would be included in the analysis.

To calculate the point-estimate of the number of watercraft visiting the sample area daily, we used the following formula explicated by Lockwood and Rakozy (2005). This procedure estimates daily watercraft (W) by multiplying the hours boats will be on the water during the sampling day (H) by the quotient of the number of watercraft counted (C) divided by the duration of the count (D) in hours or fraction of an hour. In our study, the duration of our drone flights while photographing averaged between 10 and 15 minutes. We opted for the more conservative time and used .25 hours as our duration measure. As suggested by Leggett (2017), we then divide the daily watercraft count for the sampling areas by the average time (T) watercraft remain in the water. This data came from the time-lapse camera trailer tracking data. This procedure was necessary to account for the multiple counting of a watercraft traveling through the sampling area during the visit. This is an essential concern when extrapolating the counts from sample areas to the entire AP.

Use Estimation Formula:

$$W = (H * (C/D))/T$$

Where:

W = Total daily number of watercraft estimated

H = Number of hours in sample period (day)

C = Number of watercraft counted during sampling period
D = Duration of the count in hours (or fraction of hour)
T = Time boats remain in the AP

This use estimation formula was then used to develop a visitor use estimation model extrapolating daily watercraft counts from sampled areas to the entire AP. This was achieved by dividing the sample area counts by the percentage of total AP surface water area to estimate daily watercraft use in the entire AP. Total daily watercraft use was then multiplied by 365 days in the study year to produce annual watercraft use. Multiplying annual watercraft use by the average number of individuals per vessel produces an estimate of total AP visitor use. We averaged occupancy data from several boating studies (Sidman et al. 2004, 2007, 2009; Ault 2008) over a variety of locations for our occupancy rate of 2.5 visitors per watercraft.

These procedures were used in calculating visitor use for each AP. Specific details of sampling locations, sampling days, and visitor use calculation procedures are provided in the appendix for each for the 18 APs studied during this phase of the Florida Aquatic Preserve Visitor Use Estimation Project.

Data Collection and Model Development

This section of the report summarizes the steps used to collect data and how that data were analyzed to develop visitor use prediction models. Specifically, it will discuss:

- Collecting watercraft data,
- Determining the weighting process of weekend and weekday, and scallop season sampling days,
- Predicting daily watercraft from shoreside facilities, and
- Developing the model to estimate total use.

Throughout this report we use several terms to describe the data we collected. Defining these terms will clarify their meaning and use in estimating aquatic preserve visits.

Watercraft Count – the number of watercraft identified from drone photographs or personal observation within the view field.
Trailer Count – the number of watercraft trailers attached to vehicles in a parking area.
Car Count – the number of non-trailered vehicles in a parking area.

Data Collection Summary

Each aquatic preserve is unique in its size, configuration, shoreline, access, and potential data collection sites. Locations from which we could legally launch drones and make personal observations to count watercraft were constrained by several factors, such as FAA flight restrictions, local community restrictions, proximity and access to an AP, and line of sight flight limitations on flight distance. Further, drone launch sites were not evenly spaced within an AP. As a result, we had to collect watercraft counts from locations falling within these limitations and infer visitor use levels to areas of the AP where we did not have the capability to collect data. In some of the APs, we were able to cover over half of the water

surface with drone photographs and personal observations. In others it was 20% or less. These coverage issues are presented and discussed for each AP in their respective appendix of this report.

The number of days sampled at each aquatic preserve varied due to several factors. Weather conditions were chief among these factors as drones were unable to fly during rain or high wind events. Additional days were substituted for sample days cancelled by weather. Another factor that impacted sample days was the usefulness of a sampling location. As we began data collection, it became apparent that some sample locations had little to no activity related to the AP. Other locations were then substituted, and additional sampling days used to ensure adequate sample numbers would be achieved for analysis and model building.

Sampling days and type of data collected at each AP is shown in Table 1. Sampling days varied from 12 to 21 across all APs. Further, additional sampling days were assigned to the six APs where scallop seasons occurred to account for the large increases in visitor use during the seasons.

Table 1: Sampling days and type of data collected by aquatic preserve

	Days	Watercraft Count		Vehicle Counts		
Aquatic Preserve	Sampled	Drone	Observation	Trailer	Car	Park Visitors
Fort Pickens	13		X	X	X	X
Yellow River Marsh	12	X	X	X		
Rocky Bayou	12		X	X		X
St. Andrews	13	X	X	X	X	X
St. Joseph Bay	17	X	X	X	X	
Apalachicola Bay	16	X	X	X	X	
Alligator Harbor	15	X	X	X	X	
Lake Jackson	13	X	X	X	X	
Big Bend Seagrasses	21	X	X	X		
St. Martins Marsh	19	X	X	X	X	
Nature Coast	18	X	X	X	X	
Pinellas County	12	X	X	X	X	X
Boca Ciega Bay	13	X	X	X	X	
Cockroach Bay	13	X	X	X	X	
Terra Ceia	13	X	X	X	X	
Rainbow Springs	12		X		X	X
Cape Florida	14	X	X	X		
Lignumvitae Key	12	X	X	X	X	

We conducted watercraft trailer counts and car counts at all sample locations where available. We counted boat trailers and cars separately as each provides a different measure for predicting AP use at that location. Some locations were used nearly exclusively by boaters as only vehicles with trailers were present while other locations had a mix of trailers and cars. Depending upon the location, cars were generally tied to beach visitors, kayak and canoe visitors, or visitors accompanying boaters.

The number of watercraft survey sites varied among APs (Table 2). These survey sites ranged from one at Rocky Bayou to 21 at Big Bend Seagrasses. As mentioned earlier, the number of sites we could use at each AP was limited by local agency regulations, proximity to AP waters, private riparian land ownership, and FAA flight restrictions.

In Table 2, instantaneous counts of watercraft for each AP were summed across all boat observation locations and the mean count presented for all sample days and separately for weekday and weekend days. These means represent the number of watercraft observed at the time of the count. Weekend watercraft counts were greater than weekday counts in all APs where boats were counted. However, two of these counts were not significantly different – Alligator Harbor and Lignumvitae Key. In fact, weekend counts were 72% greater than weekday counts across all APs. The differences between weekday and weekend counts are important and is discussed later in this report.

Table 2: Number of watercraft survey sites and mean daily watercraft counts by aquatic preserve

		Daily Count		Weekday Count		Weekend Count		Statistics	
Aquatic Preserve	Number of Sites	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	t	P
Fort Pickens	3	23.9	2.48	19.1	2.11	31.6	3.40	3.31	.003
Yellow River Marsh	2	5.8	0.71	4.3	0.41	8.8	0.48	6.64	<.001
Rocky Bayou	1	8.0	1.47	5.4	1.08	13.3	2.14	3.70	.002
St. Andrews	3	33.2	3.39	28.6	2.59	43.5	7.59	2.41	.017
St. Joseph Bay[1]	5	30.6	4.91	21.7	2.42	50.8	9.14	4.26	<.001
Apalachicola Bay[1]	6	26.3	3.71	19.6	3.09	39.5	4.33	3.73	.002
Alligator Harbor[1]	3	10.5	0.55	10.1	0.67	11.7	0.67	1.30	.113
Lake Jackson	4	6.1	0.70	5.0	0.57	7.8	1.32	2.24	.023
Big Bend Seagrasses[1]	7	27.4	2.11	24.6	2.29	34.5	2.55	2.52	.027
St. Martins Marsh[1]	5	21.1	2.59	17.1	1.97	33.0	2.52	4.23	.002
Nature Coast[1]	6	45.0	4.59	37.1	4.13	60.8	5.31	3.40	<.001
Pinellas County	16	72.2	6.35	61.7	7.25	86.8	8.02	2.29	.022
Boca Ciega Bay	8	72.3	8.86	51.8	6.68	105.2	6.96	6.13	<.001
Cockroach Bay	4	14.8	2.05	11.5	1.92	20.2	3.29	2.46	.016
Terra Ceia	4	25.0	2.94	20.8	1.44	31.8	6.55	2.06	.032
Rainbow Springs	3	44.0	4.58	36.1	2.61	66.7	2.40	6.54	<.001
Cape Florida	3	16.6	2.53	10.6	1.22	28.4	1.25	9.45	<.001
Lignumvitae Key	2	23.5	2.15	21.7	2.32	25.3	3.68	0.84	.210

[1]Does not include Scallop Season data

The small number of observations and variability in watercraft count data is reflected in the relatively large mean standard errors (MSE) associated with total, weekend, and weekday counts (Table 2). Dividing MSE by the count mean results in the percent MSE. This provides a better understanding of the variability in the count data. Total count mean standard errors ranged from 5.2% for Alligator Harbor to 18.4% for Rocky Bayou and averaged 13.1% overall. Weekday MSE percentages ranged from 6.6% for

Alligator Harbor to 20.2% for Rocky Bayou and averaged 12.8% overall. Weekend MSE percentages were somewhat larger than weekday MSEs for some APs as they ranged from 3.6% for Terra Ceia to 21.6% also for Terra Ceia and averaged 12.5% overall.

An additional factor we were concerned with was the effect of the Bay Scallop Season on visitor estimates. Six of the of the APs from Nature Coast to St. Joseph Bay have scallop seasons, generally running from July 1 through September 24. We anticipated a very significant increase in visitation during this period. With the exception of Alligator Harbor, five of the APs did have significant increases in watercraft counts when closed-season and open-season weekday and weekend counts were compared (Table 3). The weekday section in the table below shows a substantial increase in watercraft counts between open and closed scallop seasons. In the six APs, the average increase was 113% with a high of 186% for St. Martins Marsh and a low of 38% for Alligator Harbor, although the latter difference was not statistically significant.

Table 3: Mean daily watercraft counts by weekend, weekday, and scallop season

	Weekday			Weekend				
Aquatic Preserve	Scallop Season Closed	Scallop Season Open	Percentage Difference	Scallop Season Closed	Scallop Season Open	Percentage Difference	F	P
St. Joseph Bay	21.7[a]	55.5[b]	155.8%	50.75[b]	76.5[c]	50.7%	19.07	<.001
Apalachicola Bay	19.6[a]	54.0[b]	175.5%	39.5[b]	72.0[c]	82.3%	28.24	<.001
Alligator Harbor	10.1	14.0	38.2%	11.7	15.5	32.5%	1.75	.214
Big Bend Seagrasses	24.6[a]	41.0[bc]	66.7%	34.5[ab]	49.0[c]	42.0%	11.96	<.001
St. Martins Marsh	17.1[a]	49.0[b]	186.5%	33.0[c]	61.3[d]	85.8%	81.57	<.001
Nature Coast	37.1[a]	57.3[b]	54.4%	60.8[b]	83.0[c]	36.5%	16.72	<.001

Differences in weekend open and closed season watercraft counts were generally smaller than weekday counts (Table 3). Weekend watercraft counts during scallop season averaged 49% greater than non-season estimates. Watercraft counts during scallop season at Apalachicola Bay AP and were 80% greater than non-season watercraft counts. The small increase in scallop season watercraft counts at Alligator Harbor AP, while greater numerically than closed season counts, were not significantly greater. Further, open season weekday watercraft counts at St. Joseph Bay, Apalachicola Bay, Big Bend Seagrasses, and Nature Coast APs were essentially the same as weekend closed season watercraft counts.

Trailer and car counts were conducted at boat ramps adjacent to APs where watercraft counts occurred and at other ramps where we were prohibited from flying by local or FAA restrictions. For some APs, trailer counts at boat ramps where watercraft counts did not occur were the best predictors of total watercraft counts in an AP. Where this occurred, it will be pointed out in the individual AP summaries in the appendices.

Our sampling location strategy initially included several potential sites at each AP. However, after several sample days were completed, some of these sites had very low use levels, did not have adequate surface water area to attract boaters, or lacked vessel launching and/or vehicle parking facilities to

correlate with watercraft count data. Our objective was to optimize the number of access points for counting watercraft, in order to cover as much of the AP's surface waters as possible, and to identify boat ramp trailer and car counts that may be strongly correlated with watercraft counts.

Weighting Sample Counts

Because of the significant differences in mean weekday, weekend, and scallop season watercraft counts at most APs (Tables 2 and 3), it was necessary to weight counts based upon the number of weekdays and weekend days both in and out of scallop season throughout the study year. The study year had 262 weekdays and 103 weekend days. For the six APs with scallop seasons, there were varying number of weekdays and weekend days during the scalloping season as there are different season lengths within the Pasco to Gulf County scalloping region (Figure 1).

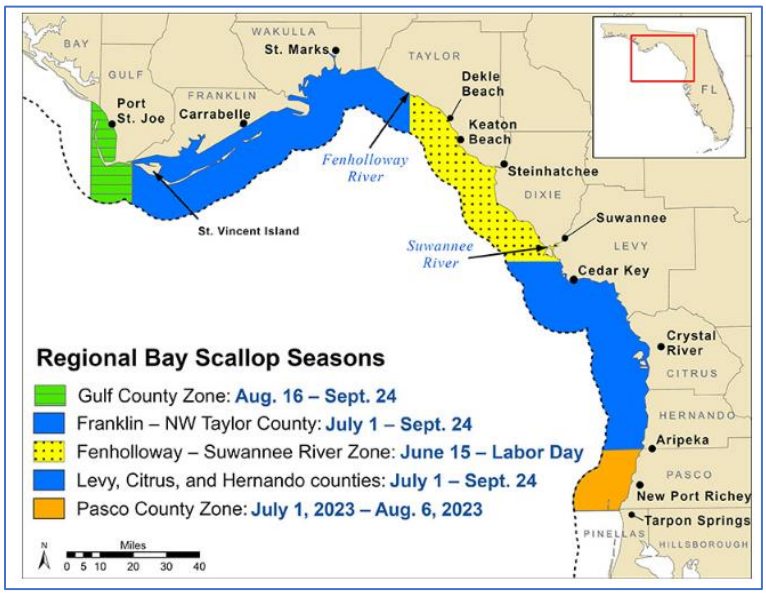

Figure 1: 2023 Florida Bay Scallop Seasons (Source: FL Fish & Wildlife Conservation Commission)

Since the number of days Bay Scallop Season varies across the six APs, we will use the Nature Coast AP as an example of how weighting was conducted and examine the results of weighting and not weighting sample days. The Nature Coast AP has a scallop season running from July 1 to September 24. Scallop season weights were derived by dividing the number of in-season weekdays (61), non-season weekdays (201), in-season weekend days (26), and non-season weekend days (77) in the study year by 365 days to yield the weighting percentages.

The importance of differences between weekday and weekend watercraft counts, and the effects of scallop season is depicted in Table 4 using the Nature Coast AP as an example. These comparisons include using no weighting of sample days, weighting weekday and weekend samples separately then adding the results, and weighting weekend and weekday observations both during and out of scallop season. These comparisons of weighting methods is important as it informed how we proceeded in building visitor use estimation models for each aquatic preserve. The example in Table 4 isolates the

effect of these calculation methods and does not include the procedures for extrapolating the daily watercraft counts to the entire year as these factors are constants across all methods.

Table 4: Differences in weighting watercraft counts by weekday, weekend, and scallop season

Type of Weight	Mean Daily Watercraft Count	Days	Weight	Annual Watercraft Count
Annual Unweighted Sum	53.4	365	1.00	19,487
Weighted Weekday	42.6	259	.710	11,043
Weighted Weekend	70.3	106	.290	7,450
Annual Weighted Sum				18,493
Non-Season Weekday	37.1	201	.551	7,462
Non-Season Weekend	60.8	77	.211	4,678
In-Season Weekday	57.3	61	.167	3,497
In-Season Weekend	83.0	26	.071	2,158
Annual Weighted Sum				17,795

The first weighting method uses the mean daily watercraft count for all sample days regardless of weekday or weekend day. The weight for this method is 1.00 as all days are treated equally. Multiplying the mean daily watercraft count by 365 days in the study year yields an annual watercraft count of 19,487.

The second method weights watercraft counts by weekday and weekend days. In this example, 71% of the days in the study year were weekdays and 29% weekend days. Making the calculations for weekday and weekend days separately and then adding them produces an annual watercraft count of 18,493. This is a reduction of 5.1% over the unweighted annual count.

The final method considers both weekdays and weekend days both in and out of scallop season for weighting. Table 4 shows the four weighting percentages used to calculate the annual watercraft count. Making the watercraft count calculations for each group of days and summing the results yields an annual watercraft count of 17,795. This is a reduction of 8.7% from the unweighted count and 3.8% below the weekday/weekend weighted count. Thus, weighting appropriately by weekday/weekend and scallop season can have a significant impact on annual watercraft estimates for the Nature Coast AP. Without weighting by either method, we would be overestimating annual watercraft counts from 5% to nearly 9%. We will explore this further for all APs studied this year below.

We conducted this same comparative analysis for all 16 aquatic preserves and found consistent results (Table 5). Unweighted daily watercraft count data overestimated weighting for weekday and weekend days by nearly 13% across all APs. The greatest overestimate ranged from 35.2% for Yellow River Marsh to 3.3% for Lignumvitae Key. Weighting by weekday and weekend days reduced mean daily watercraft counts by over 10% in six of the APs and 9% in another five.

When adding scallop season to the weighting mix with weekday and weekend days, the average reduction from unweighted mean daily watercraft count was 17.1% for the six APs with scallop seasons. This is significantly lower than weighting by weekday/weekend days alone. Four of the six APs had over 20% reductions from unweighted mean daily watercraft counts. Further, scallop season weighting resulted in additional watercraft count reductions of over 10% for four APs. These results further emphasize the need to weight watercraft counts when small samples are used.

Table 5: Summary of differences in unweighted and weighted daily watercraft count estimates by aquatic preserve

	Mean Daily Watercraft Counts				
Location	Unweighted	Weekday/Weekend Weighted	Difference from Unweighted	WD & WE & Scallop Weighted	Difference from Unweighted
Fort Pickens	23.9	21.7	-9.4%	n/a	n/a
Yellow River Marsh	5.8	5.0	-12.9%	n/a	n/a
Rocky Bayou	8.0	6.7	-16.1%	n/a	n/a
St. Andrews	33.2	30.9	-6.9%	n/a	n/a
Lake Jackson	6.1	5.6	-8.3%	n/a	n/a
St. Joseph Bay	38.9	33.6	-13.8%	27.3	-30.0%
Apalachicola Bay	35.4	31.2	-12.0%	26.0	-26.6%
Alligator Harbor	11.7	11.3	-3.2%	10.7	-8.4%
Big Bend Seagrasses	33.1	31.2	-5.7%	28.3	-14.5%
St. Martins Marsh	33.3	30.1	-9.6%	23.5	-29.4%
Nature Coast	53.4	48.3	-9.5%	44.0	-17.6%
Pinellas County	72.2	67.4	-6.6%	n/a	n/a
Boca Ciega Bay	72.3	62.2	-14.0%	n/a	n/a
Cockroach Bay	14.8	13.3	-10.6%	n/a	n/a
Terra Ceia	25.0	23.0	-8.0%	n/a	n/a
Rainbow Springs	44.0	39.9	-9.3%	n/a	n/a
Cape Florida	16.9	13.9	-18.1%	n/a	n/a
Lignumvitae Key	23.5	22.7	-3.3%	n/a	n/a
Average Difference			-9.9%		-21.1%

Limitations on the resources available for this study for sampling frequency and the future data collection burden on AP staff both guided our decision to use weighted watercraft counts as the basis for our models. The one or two weekday and weekend sampling days we could allocate to each AP per month precluded us from developing separate visitor use models for weekday and weekend days as discussed below. Clearly, weighting weekend and weekday counts provides the most useful approach for estimating visitor use. Additionally, it will require AP staff to collect data on a minimum of one weekday and one weekend day per month. This is an important consideration as AP staff may not work near data collection sites during any given month, which would require sending someone on a special

trip. Further, by weighting and combining weekday and weekend data, the measurement error is reduced considerably over separate weekday and weekend estimates and unweighted estimates.

Predicting Watercraft Visitor Use

This section of the report focuses on visitor use estimation model development. The model we used is based on estimating daily watercraft use and extrapolating that to total visitor use. Predicting daily watercraft from shoreside facilities is the first step in building the model. We use data from Nature Coast AP to illustrate the steps used in building the model.

First, we needed to identify which daily boat trailer and/or car count location(s) best predicted daily watercraft counts. To accomplish this step, we used a stepwise, weighted least squares regression. In the regression for Nature Coast AP (Table 6), we used trailer counts from six locations, trailer counts from four locations, and car counts from one location. The stepwise regression identified the boat trailer count from Anclote boat ramp as the variable significantly predicting the summed watercraft counts from the six watercraft count locations. The mean instantaneous trailer count from Anclote boat ramp was 40.8 trailers.

Next, we needed to predict the watercraft count from the trailer count variable. To do this, we use the regression results in the following formula:

Predicted Watercraft Count = Constant + (Beta x Mean Trailer Count)

Substituting the Constant and Beta coefficients from the regression results and the mean trailer count into the formula in Table 6 results in a predicted watercraft count of 43.99. The prediction equation is highly significant ($p < .001$) and trailer count data accounts for 92.0% of the variation in watercraft counts. This percentage is excellent when considering the variability in the data (see Table 2) and the relatively small sample size (18 observations) in the study. The equation in Table 6 will be used in the visitor use estimation model discussed below. The Constant and Beta coefficients will be used to calculate watercraft counts from trailer counts collected by AP staff at the Anclote boat ramp in the future.

Table 6: Regression equation predicting watercraft counts for Nature Coast AP

Constant	Anclote Boat Ramp		Predicted Watercraft Count	R-Square	F	P
	Beta	Mean Daily Trailer Count				
10.161	.829	40.81	43.99	.920	183.01	<.001

The same stepwise, weighted least squares regression was run for each of the remaining 17 aquatic preserves. Table 7 shows the number of predictor variables, F value and significance level, and R-Square for each of the resultant equations. In each of the regressions we use separate trailer and car counts for each survey location. The regressions resulted in only one independent variable predicting mean daily watercraft counts for each AP. For all APs, only boat trailer counts were significant predictors of watercraft counts. The equations were all highly significant and the predictor variables accounted for

72.7% to 93.5% of the variation in daily watercraft counts. Again, these are an excellent predictions based on the number of sampling days and diversity in the data. Overall, boat ramp trailer counts were found to be excellent predictors of watercraft using AP waters. Details of each regression and estimation formula for individual APs can be found in the appendices at the end of this summary report.

Table 7: Summary of regression equations predicting watercraft counts for all APs

AP Location	Number of Predictors	R-Square	F	P
Fort Pickens	1	0.852	65.99	<.001
Yellow River Marsh	1	0.825	45.26	<.001
Rocky Bayou	1	0.925	123.07	<.001
St. Andrews	1	0.864	70.15	<.001
St. Joseph Bay	1	0.859	91.11	<.001
Apalachicola Bay[1]	1	0.814	61.16	<.001
Alligator Harbor[1]	1	0.727	34.58	<.001
Lake Jackson	1	0.881	81.62	<.001
Big Bend Seagrasses[1]	1	0.845	103.87	<.001
St. Martins Marsh[1]	1	0.935	242.83	<.001
Nature Coast[1]	1	0.920	183.01	<.001
Pinellas County	1	0.835	50.79	<.001
Boca Ciega Bay	1	0.848	61.51	<.001
Cockroach Bay	1	0.891	90.10	<.001
Terra Ceia	1	0.822	50.94	<.001
Rainbow Springs	1	0.864	63.35	<.001
Cape Florida	1	0.849	67.64	<.001
Lignumvitae Key	1	0.790	37.71	<.001

[1] Includes Scallop Season

Model Development

Model development extrapolates the mean watercraft count, estimated by the regression equation, to the entire year. As mentioned above, we employed an adaptation of the following commonly used instantaneous count formula (Lockwood and Rokoczy 2005) to estimate the total number of watercraft using the entire AP.

Use Estimation Formula:

$W = [H * (C/D)] / T$

Where:

W = Total daily number of watercraft estimated

H = Number of hours in sample period (day)

C = Number of watercraft counted during sampling period (estimated from regression equation)

D = Duration of the count in hours (or fraction of hour)

T = Time boats remain in the AP

Table 8 shows the components of the model plus further steps to expand the watercraft use estimate to total AP visits. Formula components are shown at the top of Table 8. There are several variables in this table that needed verification during the project. First was the duration of sample day (H). We were able to sample during the period of sunrise to sunset. The number of hours between sunrise and sunset in Florida varies from 10 to 14 hours daily throughout the year. We averaged the number of hours of daylight occurring on the first day of each month (12 hours) to represent this variable.

Table 8: Calculations for estimating Nature Coast AP visitor use

H	C	D	T	W	Extrapolation					
Hours /sample	Mean Daily Watercraft Count	Duration of Count (hrs.)	Time in AP	Daily Watercraft Estimate	% of Use	Total Daily Watercraft	User Days	Total Watercraft Visits	Individuals per Watercraft	Total Visitors
12	44.0	0.25	6.6	319.93	6.1%	5,245	365	1,914,342	2.5	4,785,854

Second, we determined that watercraft remain in in AP waters (T) for an average of 6.6 hours after launching. Time-lapse camera data from boat ramp parking areas were used to estimate this variable. We tracked individual trailers over time on weekends and weekdays to calculate this average which was the same for both types of days.

Third, we needed to estimate the percentage of AP use that the watercraft counts included (Table 9). For Nature Coast AP, surface water area covered from the seven watercraft count locations was 27,540 acres or 6.1% of the 455,000 acre AP. As described above, percentage of AP visible from drone or observations varied for each AP. For example, Rocky Bayou had 100% of the AP covered, while others, such as Big Bend Seagrasses AP were only 4.2% covered. The wide differences in percentage of AP coverage centered on lack of shoreline access and large expanses of water where watercraft counts could not occur. We used mapping technology to quantify watercraft count coverage areas and management plan data to make these estimates.

Finally, we counted the number of occupants of watercraft to derive an average number of individuals occupying each watercraft. We used data from time-lapse cameras, drone photographs, and personal observations at boat ramps to assist with this task. In addition, we compared our estimate of 2.5 individuals to Florida boating research. This was consistent with several studies (Sidman et al. 2004, 2007, 2009; Ault 2008) that reported boat occupancy data. Where car counts were made, we counted the number of individuals entering or departing a vehicle in the parking area.

The sample model in Table 8 is built upon data from the Nature Coast AP. The predicted watercraft count (44.0) was from the regression model in Table 6. Based upon this count and using the above formula, an estimated average of 5,245 watercraft (W) used the AP area covered each day. We determined that our watercraft count area captured 6.06% of visitor use in the Nature Coast AP for a single day. Dividing the daily watercraft estimate (W) by the coverage percentage extrapolates daily watercraft use to the entire AP. Multiplying total daily watercraft by 365 days in the year yields an

estimated 1,14,342 total watercraft visits during a year. Multiplying total watercraft visits by individuals per watercraft results in the total number of visits (4,785,854) made to the Nature Coast AP annually.

Table 9: Proportion of aquatic preserve waters covered by drone flights (in acres)

AP Location	Observation Coverage (Acres)	AP Size (Acres)	Percentage Covered
Fort Pickens	6,161	30,000	20.5%
Yellow River Marsh	2,150	11,000	19.5%
Rocky Bayou	367	367	100.0%
St. Andrews	2,498	24,000	10.4%
St. Joseph Bay	8,646	55,674	15.5%
Apalachicola Bay	19,579	80,876	24.2%
Alligator Harbor	5,621	14,184	39.6%
Lake Jackson	4,322	5,133	84.2%
Big Bend Seagrasses	44,800	984,325	5.2%
St. Martins Marsh	6,600	28,461	23.2%
Nature Coast	27,540	455,000	6.1%
Pinellas County	39,888	350,000	11.4%
Boca Ciega Bay	14,194	58,000	24.5%
Cockroach Bay	4,130	4,900	84.3%
Terra Ceia	6,745	24,900	27.1%
Rainbow Springs	42	150	28.3%
Cape Florida	5,197	18,349	28.3%
Lignumvitae Key	2,908	6,700	43.4%

Total Visitor Use Estimates

Total visits do not represent unique individuals. Boaters and other users in each AP often spend several days on the water each year, many of these in their local AP. The focus of this study was on the number of visits made to aquatic preserves and not the number of individual visitors. To estimate the number of individuals, total visits would need to be divided by the average number of trips made by individuals to the AP annually.

Table 10: Total visitor use estimate by aquatic preserve	
Aquatic Preserve	Total Visits
Fort Pickens	701,126
Yellow River Marsh	170,564
Rocky Bayou	44,541
St. Andrews	1,066,359
St. Joseph Bay	503,827
Apalachicola Bay	713,236
Alligator Harbor	179,052
Lake Jackson	115,909
Big Bend Seagrasses	3,609,859
St. Martins Marsh	672,747
Nature Coast	4,785,854
Pinellas County	3,923,056
Boca Ciega Bay	1,696,183
Cockroach Bay	104,524
Terra Ceia	563,203
Rainbow Springs	705,119
Cape Florida	324,761
Lignumvitae Key	347,583

Discussion

The goal of this project was to develop an efficient and reliable method for managers to estimate visitor use in their respective aquatic preserves. We had excellent cooperation from state park and local park managers this year which improved data collection in several APs.

One problematic AP was again Lignumvitae Key. Our boat counts went smoothly, but once again, the Indian Key boat ramp was still under construction. However, anglers and others used the area around the bridge which allowed us to count those vehicles for analysis purposes. Surprisingly, these vehicle counts were strongly related to watercraft counts. Once the Indian Key boat ramp reopens this dynamic is very likely to change as boat trailers will be added to the mix and individuals fishing from the bank may change. Thus, it is recommended that a new study of Lignumvitae Key visitor use be conducted once the Indian Key boat ramp reopens.

Establishing baseline watercraft use levels and predicting that use with shoreside boat trailer counts at boat ramps resulted in equations that reliably estimated visitor use over the course of the study year. All equations were highly significant ($p \leq .001$) and all R-Square value equaled or exceeded .727, which were excellent considering the relatively small number of observations for each AP. These results reflect similar findings by Aldt et al. (2008) who found R-Square values of .800 or greater for the relationship of boat trailer counts to a single aerial boat census in Biscayne National Park.

AP staff will need to collect trailer count data monthly from only one location and enter the data into a spreadsheet database contained in their respective spreadsheet models. The spreadsheet will

automatically weight the counts and place the weighted count into a regression model (similar to Table 6) that estimates the watercraft count. This watercraft count will then be automatically transferred to the Visitor Use Estimation Model (Table 7) to produce total annual visits at the end of the fiscal year. Optimally, data collection should occur on at least one randomly selected weekday and one randomly selected weekend day per month and at randomly selected times between 10:00 and 16:00 hours. Additional sample days each month are highly recommended to reduce sampling errors.

This year's project had to deal with a new element affecting visitor use. Bay scallop seasons at several APs required us change the two weights for weekdays and weekend days to four weights for weekend and weekdays during non-scallop season and in-scallop season. The effect of scallop season was very significant at five of the six APs with seasons. Only Alligator Harbor AP showed little increase in boat counts during this time. This is likely due to the lack of access (boat ramps and marinas) along the AP coastline.

The Visitor Use Estimation Model should be viable for several years unless changes in the recreational infrastructure system in the region occurs. Boat ramps and parking areas may be closed for construction or from storms and rising water levels, for example. In these cases, we should be able to identify an alternate sampling location as trailer count locations we used in the study were highly inter-correlated which should allow for substitutions. In these cases, we would only need to re-run the regression without the closed site in the independent variable pool and update the Constant and Beta coefficients in the regression model. All other coefficients and calculations in the visitor use estimation model would remain unchanged.

Visitor use estimates should be considered conservative. Weighting weekend and weekday counts produced results significantly lower than unweighted calculations. Weighting was necessary because we were unable to produce separate regression equations for both weekend and weekday strata in most cases. Further, not weighting for scallop seasons would result in inflated overestimates.

Inability to identify small watercraft, such as kayaks and paddleboarders at the edge of the view field or watercraft in amongst vegetation adds to our conservative estimate. More importantly, our visitor use estimates were made for watercraft visitors only. This vastly underestimates total visits in APs with significant beach visitors, such as Pinellas, Nature Coast, and St. Andrews. Estimating beach visitors was beyond the capability of this study. Separate beach visitor estimates from state and local parks adjacent to an AP could be added to the total from this study to reflect use by all types of visitors more accurately.

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APPENDIX – A

Fort Pickens Aquatic Preserve
Visitor Use Estimation

Fort Pickens Aquatic Preserve
Visitor Use Estimation

Purpose

The purpose of this appendix is to provide details on the development of the Fort Pickens Aquatic Preserve (AP) Visitor Use Estimation Model. This background will inform Fort Pickens managers and staff about how the visitor use estimation model was derived and what procedures will be needed to continue use of the model in future years. This initial research was conducted during 2022-2023.

The following tables comprise the three components for estimating annual visits at Fort Pickens Aquatic Preserve: 1) a data entry spreadsheet for recording and weighting boat trailer counts; 2) a regression equation for estimating daily trailer counts; and 3) the Visitor Use Model for estimating total visitor use. These three tables will appear on the working spreadsheet managers will use to record data and report visitor use. Data in this report were from the 2022-2023 study.

Collecting, Entering and Weighting Data

For Fort Pickens AP, we counted watercraft and cars in the Fort Pickens area of Gulf Islands National Seashore, and boat trailers at Shoreline Park Boat Ramp which is outside the national seashore (Table A-1). Watercraft counts were made once between 10:00 and 16:00 hours on sampling days. For analysis purposes, we summed watercraft counts from both locations for our dependent variable.

Table A-1: Location and types of data collected at Fort Pickens AP

			Dependent Variable	Independent Variables		
Sample Location	GIS Coordinates		Watercraft	Trailers	Cars	All-Vehicles
Shoreline Park Boat Ramp	30.351313	-87.175642		X	X	X
Fort Pickens Fishing Pier	30.330463	-87.293102	X		X	
Big Lagoon Jet Ski Rentals	30.32747	-87.365582	X			

We counted boat trailers at Shoreline Park outside the AP as most boats exiting this location traveled toward and through AP waters. It was also the only relevant boat ramp in the area to include in our study. Counts were made between 10:00 and 16:00 hours in conjunction with watercraft counts. For independent variables, we used trailer and car counts independently, and then summed trailer and car counts at Shoreline Park as a separate All-Vehicle independent variable.

An Excel spreadsheet with columns for data entry will be provided to Fort Pickens managers, separate from this report, to begin building their visitor use estimation model during future years. An example of the data entry spreadsheet is shown in Table A-2. Based on the regression in Table A-3, Fort Pickens AP staff should collect trailer counts from Shoreline Park Boat Ramp a minimum of one weekday and one weekend day each month. Multiple counts each month would be preferable if it can be worked into staff work schedules.

Staff will enter the sample date (Table A-2, Column A) into the spreadsheet and select "weekend" or "weekday" from a dropdown in Column B to indicate the day type being sampled. Selecting the appropriate day type will automatically populate the weight (Column C) for the day type. The default is set to "weekend" with a value of 0.29, the percentage of weekend days in a year, and 0.71 for weekdays.

Staff will also enter the trailer counts from Shoreline Park Boat Ramp in Column D. The Weighted Trailer Counts will automatically be displayed in Column E.

The bottom of Table A-2 automatically displays the number of Sample Days, Sum of Weights, and Weighted Trailer Count Sum for daily trailer counts. The last row in Table A-2 automatically displays the Mean Weighted Trailer Count. The Mean Weighted Trailer Count is derived by dividing Weighted Trailer Count Sum by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Mean Weighted Trailer Count from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count in Table A-3.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Fort Pickens Aquatic Preserve, the data entry table for trailer counts, the regression equation, and the use estimation table all will appear on the same spreadsheet. At the bottom of the spreadsheet will be a cell displaying Total Aquatic Preserve Visits, which reflects the estimate of annual visits associated with watercraft use.

Table A-2: Fort Pickens AP data entry table for calculating weighted trailer counts

Sample Date	Weekday or Weekend	Weight[1]	Shoreline Park Boat Ramp Trailer Count	Weighted Use Total
A	B	C	D	E
10/19/2022	Weekday	0.71	19	13.49
10/27/2022	Weekday	0.71	17	12.07
11/19/2022	Weekend	0.29	20	5.8
12/14/2022	Weekday	0.71	9	6.39
2/16/2023	Weekday	0.71	11	7.81
3/18/2023	Weekend	0.29	22	6.38
3/23/2023	Weekday	0.71	15	10.65
4/5/2023	Weekday	0.71	18	12.78
4/16/2023	Weekend	0.29	23	6.67
5/13/2023	Weekend	0.29	14	4.06
5/24/2023	Weekday	0.71	12	8.52
6/15/2023	Weekday	0.71	15	10.65
6/16/2023	Weekend	0.29	29	8.41
Sample Days		Sum of Weights		Weighted Total
13		7.13		113.68
Weighted Mean (Weighted Total / Weight Sum)				15.94

[1]Weights: Weekday=.071; Weekend=.29

Predicting Watercraft Counts

The four independent variables were entered into a stepwise, weighted least squares regression program with the two summed watercraft counts as the dependent variable. Results of the regression are shown in Table A-3. The Shoreline Park Boat Ramp trailer count was the only variable with an independent effect in predicting watercraft counts. No other independent variable could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$). Shoreline Park Ramp trailer counts accounted for 85% of the variation in watercraft counts (Table A-3).

Placing the Shoreline Park Boat Ramp mean weighted trailer count (15.94) from data entry Table A-2 into the regression equation in Table A-3 results in a Predicted Daily Watercraft Count of 21.7. The Predicted Daily Watercraft Count is calculated by multiplying the Mean Weighted Shoreline Park Boat Ramp Trailer Count and its Beta coefficient and adding this product to the Constant coefficient. This Predicted Daily Watercraft Count will become part of the Visitor Use Model (Table A-4).

Table A-3: Regression equation predicting watercraft counts for Fort Pickens AP

Constant	Beta	Mean Daily Shoreline Park Boat Ramp Trailer Count	Predicted Watercraft Count	R-Square	F	P
-2.762	1.532	15.94	21.7	.857	65.99	<.001

Watercraft Visitor Use Estimation Model

The construction of the Visitor Use Estimation Model is discussed fully in the summary report and will not be reiterated here. The point in transitioning from the regression equation to the use model in Table A-4 is to show how the Predicted Daily Watercraft Count in Table A-3 is substituted into the use model. This will be done automatically in the Visitor Use Model spreadsheet. As noted in the summary report, all the remaining parameters in the Visitor Use Model are constants. The percentage of Fort Pickens AP water area covered by drone and observation watercraft counts was 20.5 percent.

As shown in Table A-4, nearly 280,451 watercraft visited Fort Pickens AP during the 2022-2023 study year and resulted in an estimated total of nearly 701,126 visits during the year.

Table A-4: Calculations for estimating Fort Pickens AP visitor use

H	C	D	T	W	Extrapolation					
Hours / Sample Day	Mean Watercraft Count	Duration of Count (hrs.)	Time in AP	Daily Watercraft Estimate	% Coverage	Total Daily Watercraft	User Days	Total Watercraft Visits	Individuals / Watercraft	Total Individual Visits
12	21.7	0.25	6.6	157.51	20.5%	768	365	280,451	2.5	701,126

APPENDIX – B

Yellow River Marsh Aquatic Preserve
Visitor Use Estimation

Yellow River Marsh Aquatic Preserve
Visitor Use Estimation

Purpose

The purpose of this appendix is to provide details on the development of the Yellow River Marsh Aquatic Preserve (AP) Visitor Use Estimation Model. This background will inform Yellow River Marsh managers and staff about how the visitor use estimation model was derived and what procedures will be needed to continue use of the model in future years. This initial research was conducted during 2022-2023.

The following tables comprise the three components for estimating annual visits at Yellow River Marsh Aquatic Preserve: 1) a data entry spreadsheet for recording and weighting boat trailer counts; 2) a regression equation for estimating daily trailer counts; and 3) the Visitor Use Model for estimating total visitor use. These three tables will appear on the working spreadsheet managers will use to record data and report visitor use. Data in this report were from the 2022-2023 study.

Collecting, Entering and Weighting Data

For Yellow River Marsh AP we counted watercraft, boat trailers, and cars at two locations adjacent to the AP and listed in Table B-1. We counted watercraft on AP waters from each location. The count was made once between 10:00 and 16:00 hours on sampling days. For analysis purposes, we summed watercraft counts from both locations for our dependent variable.

Table B-1: Location and types of data collected at Yellow River Marsh Aquatic Preserve

			Dependent Variable	Independent Variables	
Sample Location	GIS Coordinates		Watercraft	Trailers	Cars
Dickerson City Boat Ramp	30.480826	-87.058434	X	X	X
Milton Marina	30.563985	-87.010150	X	X	X

We counted boat trailers and cars (non-trailered vehicles) at two sampling locations. Counts were made between 10:00 and 16:00 hours in conjunction with watercraft counts. For independent variables, we used the trailer and car counts independently.

An Excel spreadsheet with columns for data entry will be provided to Yellow River Marsh managers, separate from this report, to begin building their visitor use estimation model for future years. An example of the data entry spreadsheet is shown in Table B-2. Based on the regression in Table B-3, Yellow River Marsh AP staff should collect trailer counts from Milton Marina a minimum of one weekday and one weekend day each month. Multiple counts each month would be preferable if it can be worked into staff work schedules.

Staff will enter the sample date (Table B-2, Column A) into the spreadsheet and select “weekend” or “weekday” from a dropdown in Column B to indicate the day type being sampled. Selecting the appropriate day type will automatically populate the weight (Column C) for the day type. The default is set to “weekend” with a value of 0.29, the percentage of weekend days in a year and .71 can be selected for weekdays.

Staff will also enter the trailer counts from Milton Marina in Column D. The Weighted Trailer Counts will automatically be displayed in Column E.

The bottom of Table B-2 automatically displays the number of Sample Days, Sum of Weights, and Weighted Trailer Count Sum for daily trailer counts. The last row in Table B-2 automatically displays the Mean Weighted Trailer Count. The Mean Weighted Trailer Count is derived by dividing Weighted Trailer Count Sum by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Mean Weighted Trailer Count from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count in Table B-3.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Yellow River Marsh Aquatic Preserve, the data entry table for trailer counts, the regression equation, and the use estimation table all will appear on the same spreadsheet. At the bottom of the spreadsheet will be a cell displaying Total Aquatic Preserve Visits, which reflects the estimate of annual visits associated with watercraft use.

Table B-2: Yellow River Marsh AP data entry table for calculating weighted trailer counts

Sample Date	Weekday or Weekend	Weight[1]	Milton Marine Boat Ramp Trailer Count	Weighted Trailer Count
A	B	C	D	E
10/19/2022	Weekday	0.71	3	2.13
10/27/2022	Weekday	0.71	2	1.42
11/19/2022	Weekend	0.29	5	1.45
12/14/2022	Weekday	0.71	2	1.42
3/18/2023	Weekend	0.29	6	1.74
3/23/2023	Weekday	0.71	2	1.42
4/5/2023	Weekday	0.71	1	0.71
4/24/2023	Weekday	0.71	4	2.84
5/13/2023	Weekend	0.29	7	2.03
5/24/2023	Weekday	0.71	2	1.42
6/15/2023	Weekday	0.71	3	2.13
6/16/2023	Weekend	0.29	5	1.45
Sample Days		Sum of Weights		Weighted Trailer Count Sum
12		6.84		20.16
Mean Weighted Daily Trailer Count (Weighted Total / Sum of Weights))				2.95

[1]Weights: Weekday= 0.71; Weekend= 0.29

Predicting Watercraft Counts

The four independent variables were entered into a stepwise, weighted least squares regression program with the summed watercraft counts as the dependent variable. Results of the regression are shown in Table B-3. The Milton Marina trailer count was the only variable with an independent effect in predicting watercraft counts. No other independent variable could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$). Milton Marina trailer counts accounted for 82% of the variation in watercraft counts (Table B-3).

Placing the Milton Marina mean weighted trailer count (2.95) from data entry Table B-2 into the regression equation in Table A-3 results in a Predicted Daily Watercraft Count of 5.0. The Predicted Daily Watercraft Count is calculated by multiplying the Mean Weighted Milton Marina Boat Ramp Trailer Count with its Beta coefficient and adding the product to the Constant coefficient. This Predicted Daily Watercraft Count will become part of the Visitor Use Model (Table B-4).

Table B-3: Regression equation predicting daily watercraft counts for Yellow River Marsh Aquatic Preserve

Constant	Beta	Mean Weighted Milton Marina Boat Ramp Trailer Count	Predicted Daily Watercraft Count	R-Square	F	P
1.525	1.183	2.95	5.0	.825	45.26	<.001

Watercraft Visitor Use Estimation Model

The construction of the Visitor Use Estimation Model is discussed fully in the summary report and will not be reiterated here. The point in transitioning from the regression equation to the use model in Table B-4 is to show how the Predicted Daily Watercraft Count in Table B-3 is substituted into the use model. This will be done automatically in the Visitor Use Model spreadsheet. As noted in the summary report, all the remaining parameters in the Visitor Use Model are constants. The percentage of Yellow River Marsh AP water area covered by watercraft counts was 19.5 percent.

As shown in Table B-4, 68,226 watercraft visited Yellow River Marsh AP during the 2021-2022 study year and resulted in an estimated 170,564 total visits during the year.

Table B-4: Calculations for estimating Yellow River Marsh AP visitor use

H	C	D	T	W	Extrapolation					
Hours /sample	Predicted Daily Watercraft Count	Duration of Count (hrs.)	Time in AP	Daily Watercraft Estimate	% Coverage	Total Daily Watercraft	User Days	Total Watercraft Visits	Individuals / Watercraft	Total Individual Visitors
12	5.0	0.25	6.6	36.45	19.5%	187	365	68,226	2.5	170,564

APPENDIX – C

Rocky Bayou Aquatic Preserve
Visitor Use Estimation

Rocky Bayou Aquatic Preserve
Visitor Use Estimation

Purpose

The purpose of this appendix is to provide details on the development of the Rocky Bayou Aquatic Preserve (AP) Visitor Use Estimation Model. This background will inform Rocky Bayou managers and staff about how the visitor use estimation model was derived and what procedures will be needed to continue use of the model in future years. This initial research was conducted during 2022-2023.

The following tables comprise the three components for estimating annual visits at Rocky Bayou Aquatic Preserve: 1) a data entry spreadsheet for recording and weighting boat trailer counts; 2) a regression equation for estimating daily trailer counts; and 3) the Visitor Use Model for estimating total visitor use. These three tables will appear on the working spreadsheet managers will use to record data and report visitor use. Data in this report were from the 2022-2023 study.

Collecting, Entering and Weighting Data

For Rocky Bayou AP we counted watercraft and boat trailers at Rocky Bayou State Park boat ramp (Table C-1). The counts were made once between 10:00 and 16:00 hours on sampling days.

Table C-1: Location and types of data collected at Rocky Bayou Aquatic Preserve

		Dependent Variable	Independent Variables	
Sample Location	GIS Coordinates	Watercraft	Trailers	Cars
Rocky Bayou SP Boat Ramp	30.50142 -86.4374	X	X	

An Excel spreadsheet with columns for data entry will be provided to Rocky Bayou managers, separate from this report, to begin building their visitor use estimation model for future years. An example of the data entry spreadsheet is shown in Table C-2. Based on the regression in Table C-3, Rocky Bayou AP staff should collect trailer counts from Rocky Bayou State Park boat ramp a minimum of one weekday and one weekend day each month. Multiple counts each month would be preferable if it can be worked into staff work schedules.

Staff will enter the sample date (Table C-2, Column A) into the spreadsheet and select “weekend” or “weekday” from a dropdown in Column B to indicate the day type being sampled. Selecting the appropriate day type will automatically populate the weight (Column C) for the day type. The default is set to “weekend” with a value of 0.29, the percentage of weekend days in a year. The weekday weight of 0.71 can also be selected.

Staff will also enter the trailer counts from the boat ramp in Column D. The Weighted Trailer Counts will automatically be displayed at in Columns E.

The bottom of Table C-2 automatically displays the number of Sample Days, Sum of Weights, and Weighted Trailer Count Sum for daily trailer counts. The last row in Table C-2 automatically displays the Mean Weighted Trailer Count. The Mean Weighted Trailer Count is derived by dividing Weighted Trailer Count Sum by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Mean Weighted Trailer Count from the bottom of the data entry table will be automatically entered into the regression equation estimating the Predicted Daily Watercraft Count in Table C-3.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Rocky Bayou Aquatic Preserve, the data entry table for trailer counts, the regression equation, and the use estimation table all will appear on the same spreadsheet. At the bottom of the spreadsheet will be a cell displaying Total Aquatic Preserve Visits, which reflects the estimate of annual visitors associated with watercraft use.

Table C-2: Rocky Bayou AP data entry table for calculating weighted trailer counts

Sample Date	Weekday or Weekend	Weight[1]	Rocky Bayou SP Boat Ramp Trailer Count	Weighted Trailer Count
A	B	C	D	E
10/27/2022	Weekday	0.71	7	4.97
12/14/2022	Weekday	0.71	8	5.68
12/14/2022	Weekday	0.71	8	5.68
3/18/2023	Weekend	0.29	11	3.19
3/23/2023	Weekday	0.71	6	4.26
4/5/2023	Weekday	0.71	2	1.42
4/16/2023	Weekend	0.29	14	4.06
5/13/2023	Weekend	0.29	22	6.38
5/24/2023	Weekday	0.71	9	6.39
6/15/2023	Weekend	0.71	11	7.81
6/16/2023	Weekend	0.29	18	5.22
6/27/2023	Weekday	0.71	13	9.23
Sample Days		Sum of Weights		Weighted Trailer Count Sum
12		6.84		64.29
Mean Weighted Daily Trailer Count (Weighted Trailer Count Sum / Sum of Weights)				9.40

[1]Weights: Weekday=.071; Weekend=.29

Predicting Watercraft Counts

The independent variable (trailer count) was entered into a weighted least squares regression program with the watercraft counts as the dependent variable. Results of the regression are shown in Table C-3. The boat ramp trailer counts were highly significant ($p < .001$). The boat ramp trailer counts accounted for 92% of the variation in watercraft counts (Table C-3).

Placing the boat ramp mean weighted trailer count (9.4) from data entry Table C-2 into the regression equation in Table C-3 results in a Predicted Daily Watercraft Count of 6.7. The Predicted Daily Watercraft Count is calculated by multiplying the Mean Weighted State Park Boat Ramp Trailer Count with its Beta coefficient and adding the product to the Constant coefficient. This Predicted Daily Watercraft Count will become part of the Visitor Use Model (Table C-4).

Table C-3: Regression equation predicting daily watercraft counts Rocky Bayou Aquatic Preserve

Constant	Beta	Mean Weighted Rocky Bayou SP Boat Ramp Trailer Count	Predicted Daily Watercraft Count	R-Square	F	P
-1.757	.901	9.40	6.7	.925	123.07	<.001

Watercraft Visitor Use Estimation Model

The construction of the Visitor Use Estimation Model is discussed fully in the summary report and will not be reiterated here. The point in transitioning from the regression equation to the use model in Table C-4 is to show how the Predicted Daily Watercraft Count in Table C-3 is substituted into the use model. This will be done automatically in the Visitor Use Model spreadsheet. As noted in the summary report, all the remaining parameters in the Visitor Use Model are constants. The percentage of Rocky Bayou AP water area covered by watercraft counts was 100 percent.

As shown in Table C-4, 17,816 watercraft visited Rocky Bayou AP during the 2021-2022 study year and resulted in 44,541 total visits by individuals.

Table C-4: Calculations for estimating Rocky Bayou AP visitor use

H	C	D	T	W	Extrapolation					
Hours /sample	Mean Watercraft Count	Duration of Count (hrs.)	Time in AP	Daily Watercraft Estimate	% Coverage	Total Daily Watercraft	User Days	Total Watercraft Visits	Individuals / Watercraft	Total Individual Visits
12	6.7	0.25	6.6	48.81	100.0%	49	365	17,816	2.5	44,541

APPENDIX – D

St. Andrews Aquatic Preserve
Visitor Use Estimation

St. Andrews Aquatic Preserve
Visitor Use Estimation

Purpose

The purpose of this Appendix is to provide details on the development of the St. Andrews Aquatic Preserve (AP) Visitor Use Estimation Model. This background will inform St. Andrews managers and staff about how the visitor use estimation model was derived and what procedures will be needed to continue use of the model in future years. This initial research was conducted during 2022-2023.

The following tables comprise the three components of for estimating annual visits at St. Andrews Aquatic Preserve: 1) a data entry spreadsheet for recording and weighting boat trailer counts; 2) a regression equation for estimating daily trailer counts; and 3) the Visitor Use Model for estimating total visitor use. These three tables will appear on the working spreadsheet managers will use to record data and report visitor use. Data in this report were from the 2022-2023 study.

Collecting, Entering and Weighting Data

For St. Andrews AP, we counted watercraft at three locations, boat trailers at one location, and cars at two locations throughout St. Andrews State Park and listed in Table D-1. Count was made once between 10:00 and 16:00 hours on sampling days. For analysis purposes, we summed watercraft counts from all three locations for our dependent variable. The trailer and car counts were used as independent variables.

Table D-1: Location and types of data collected at St. Andrews Aquatic Preserve

			Dependent Variable	Independent Variables	
Sample Location	GIS Coordinates		Watercraft	Trailers	Cars
St. Andrews Grand Lagoon Boat Ramp	30.13231	-85.7316	X	X	
St. Andrews SP Beach Access	30.12546	-85.7342	X		X
St. Andrews SP Pier	30.13179	-85.7422	X		X

An Excel spreadsheet with columns for data entry will be provided to St. Andrews managers, separate from this report, to begin building their visitor use estimation model for future years. An example of the data entry spreadsheet is shown in Table D-2. For St. Andrews AP staff should collect trailer counts from State Park Boat Ramp a minimum of one weekday and one weekend day each month. Multiple counts each month would be preferable if it can be worked into staff work schedules.

Staff will enter the sample date (Table D-2, Column A) into the spreadsheet and select “weekend” or “weekday” from a dropdown in Column B to indicate the day type being sampled. Selecting the appropriate day type will automatically populate the weight (Column C) for the day type. The default is set to “weekend” with a value of 0.29, the percentage of weekend days in a year, 0.71 can be selected for the weekday weigh. AP staff will also enter the trailer counts from St. Andrews State Park boat ramp in Columns D. The Weighted Trailer Counts will automatically be displayed in Column E.

The bottom of Table D-2 automatically displays the number of Sample Days, Sum of Weights, and Weighted Trailer Count Sum for daily trailer counts. The last row in Table D-2 automatically displays the Mean Weighted Trailer Count. The Mean Weighted Trailer Count is derived by dividing Weighted Trailer Count Sum by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Mean Weighted Trailer Count from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count in Table D-3.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For St. Andrews Aquatic Preserve, the data entry table for trailer counts, the regression equation, and the use estimation table all will appear on the same spreadsheet. At the bottom of the spreadsheet will be a cell displaying Total Aquatic Preserve Visits, which reflects the estimate of annual visitors associated with watercraft use.

Table D-2: St. Andrews AP data entry table for calculating weighted trailer counts

Sample Date	Weekday or Weekend	Weight[1]	Daily St. Andrews State Park Boat Ramp Trailer Count	Weighted Trailer Count
A	B	C	D	E
10/26/2022	Weekday	.71	5	3.55
11/20/2022	Weekend	.29	4	1.16
12/15/2022	Weekday	.71	3	2.13
3/18/2023	Weekend	.29	12	3.48
3/23/2023	Weekday	.71	7	4.97
4/5/2023	Weekday	.71	9	6.39
4/16/2023	Weekend	.29	13	3.77
4/19/2023	Weekday	.71	5	3.55
4/20/2023	Weekday	.71	6	4.26
5/4/2023	Weekday	.71	8	5.68
5/25/2023	Weekday	.71	7	4.97
6/16/2023	Weekend	.29	13	3.77
6/27/2023	Weekday	.71	9	6.39
Sample Days		Sum of Weights		Weighted Trailer Count Sum
13		7.55		54.07
Mean Weighted Daily Trailer Count (Weighted Trailer Count Sum / Sum of Weights)				7.16

[1]Weights: Weekday=.071; Weekend=.29

Predicting Watercraft Counts

The six independent variables were entered into a stepwise, weighted least squares regression program with the summed watercraft counts as the dependent variable. Results of the regression are shown in Table D-3. The St. Andrews State Park boat ramp trailer count was the only variable to have an independent effect in predicting watercraft counts. No other independent variable could significantly

add to the prediction of watercraft counts. This equation was highly significant ($p < .001$). State Park boat ramp trailer counts accounted for 86% of the variation in watercraft counts.

Placing the state park boat ramp mean weighted trailer count (7.16) from data entry Table D-2 into the regression equation in Table D-3 results in a Predicted Daily Watercraft Count of 30.9. The Predicted Daily Watercraft Count is calculated by multiplying the Mean Weighted St. Andrews State Park Boat Ramp trailer count and its Beta coefficient and adding the product to the Constant coefficient. This Predicted Daily Watercraft Count will become part of the Visitor Use Model (Table D-4).

Table D-3: Regression equation predicting watercraft counts for St. Andrews AP

Constant	Beta	Mean Daily St. Andrews SP Boat Ramp Trailer Count	Predicted Watercraft Count	R-Square	F	P
5.972	3.474	7.16	30.9	.864	70.15	<.001

Watercraft Visitor Use Estimation Model

The construction of the Visitor Use Estimation Model is discussed fully in the summary report and will not be reiterated here. The point in transitioning from the regression equation to the use model in Table D-4 is to show how the Predicted Daily Watercraft Count in Table D-3 is substituted into the use model. This will be done automatically in the Visitor Use Model spreadsheet. As noted in the summary report, all the remaining parameters in the Visitor Use Model are constants. The percentage of St. Andrews AP water area covered by watercraft counts was 19.2 percent.

As shown in Table D-4, 426,543 watercraft visited St. Andrews AP during the 2022-2023 study year and resulted in an estimated 1,066,359 total visits by individuals during the year.

Table D-4: Calculations for estimating St. Andrews AP visitor use

H	C	D	T	W	Extrapolation					
Hours /sample	Mean Watercraft Count	Duration of Count (hrs.)	Time in AP	Daily Watercraft Estimate	% Coverage	Total Daily Watercraft	User Days	Total Watercraft Visits	Individuals / Watercraft	Total Individual Visits
12	27.6	0.25	6.6	224.37	19.2%	1,169	365	426,543	2.5	1,066,359

APPENDIX – E

St. Joseph Bay Aquatic Preserve
Visitor Use Estimation

St. Joseph Bay Aquatic Preserve
Visitor Use Estimation

Purpose

The purpose of this appendix is to provide details on the development of the St. Joseph Bay Aquatic Preserve (AP) Visitor Use Estimation Model. This background will inform St. Joseph Bay managers and staff about how the visitor use estimation model was derived and what procedures will be needed to continue use of the model in future years. This initial research was conducted during 2022-2023.

The following tables comprise the three components for estimating annual visits at St. Joseph Bay Aquatic Preserve: 1) a data entry spreadsheet for recording and weighting boat trailer counts; 2) a regression equation for estimating daily trailer counts; and 3) the Visitor Use Model for estimating total visitor use. These three tables will appear on the working spreadsheet managers will use to record data and report visitor use. Data in this report were from the 2022-2023 study.

Collecting, Entering and Weighting Data

For St. Joseph Bay AP we counted watercraft at five locations, boat trailers at four locations, and cars at two locations throughout the AP and listed in Table E-1. Counts were made once between 10:00 and 16:00 hours on sampling days. For analysis purposes, we summed watercraft counts from the five locations for our dependent variable.

Table E-1: Location and types of data collected at St. Joseph Bay Aquatic Preserve

			Dependent Variable	Independent Variables	
Sample Location	GIS Coordinates		Watercraft	Trailers	Cars
T.H. Stone State Park Boat Ramp	29.76424	-85.4028	X	X	
State Park Beach Access #3	29.76555	-85.4041	X	X	X
Frank Pate Park	29.81110	-85.3053	X	X	X
Highland View Boat Ramp	29.83247	-85.3132	X	X	
Windmark Public Beach Access	29.88851	-85.3546	X		

An Excel spreadsheet with columns for data entry will be provided to St. Joseph Bay managers, separate from this report, to begin building their visitor use estimation model for future years. An example of the data entry spreadsheet is shown in Table E-2. Based on the regression in Table E-3, St. Joseph Bay AP staff should collect trailer counts from T.H. Stone Memorial State Park boat ramp a minimum of one weekday and one weekend day each month. Multiple counts each month would be preferable if it can be worked into staff work schedules.

Staff will enter the sample date (Table E-2, Column A) into the spreadsheet and select “weekend”, “weekday” from a dropdown in Column B to indicate the day type being sampled. Further, “Weekday(S) or “Weekend(S) may also be selected to represent sample days during Bay Scallop Season. Selecting the appropriate day type will automatically populate the weight (Column C) for the day type. The default is set to “weekend” with a value of 0.258, the percentage of non-scallop season weekend days in a year. Other weight values, appearing in the footnote at the bottom of Table E-2, will also be displayed for the appropriate day type. Staff will also enter the trailer counts from T.H. Stone Memorial State Park boat ramp in Column D. The Weighted Trailer Counts will automatically be displayed in Column E.

The bottom of Table E-2 automatically displays the number of Sample Days, Sum of Weights, and Weighted Trailer Count Sum for daily trailer counts. The last row in Table E-2 automatically displays the Mean Weighted Trailer Count. The Mean Weighted Trailer Count is derived by dividing Weighted Trailer Count Sum by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Mean Weighted Trailer Count from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count in Table E-3.

Table E-2: St. Joseph Bay AP data entry table for calculating weighted trailer counts

Sample Date	Weekday or Weekend	Weight by Weekend, Weekend, and Scallop Season[1]	T.H. Stone State Park Boat Ramp Trailer Count	Weighted Trailer Count
A	B	C	D	E
10/27/2022	Weekday	.633	6	3.798
11/19/2022	Weekend	.258	6	1.548
12/14/2022	Weekday	.633	4	2.532
3/18/2023	Weekend	.258	14	3.612
3/23/2023	Weekday	.633	5	3.165
4/5/2023	Weekday	.633	4	2.532
4/16/2023	Weekend	.258	16	4.128
4/19/2023	Weekday	.633	4	2.532
4/20/2023	Weekday	.633	4	2.532
5/4/2023	Weekday	.633	11	6.963
5/13/2023	Weekend	.258	24	6.192
5/25/2023	Weekday	.633	7	4.431
6/20/2023	Weekday	.633	9	5.697
7/3/2023	Weekday	.077	11	0.847
7/8/2023	Weekend	.033	19	0.627
7/15/2023	Weekend	.033	25	0.825
7/19/2023	Weekday	.077	13	1.001
Sample Days		Sum of Weights		Weighted Trailer Count Sum
17		6.949		52.962
Mean Weighted Daily Trailer Count (Weighted Trailer Count Sum / Sum of Weights)				7.62

[1]Weights: Non-scallop weekday=.633, Non-scallop weekend=.258; Scallop weekday=.077; Scallop weekend=.033

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For St. Joseph Bay Aquatic Preserve, the data entry table for trailer counts, the regression equation, and the use estimation table all will appear on the same spreadsheet. At the bottom of the spreadsheet will be a cell displaying Total Aquatic Preserve Visits, which reflects the estimate of annual visitors associated with watercraft use.

Predicting Watercraft Counts

The six independent variables were entered into a stepwise, weighted least squares regression program with the five summed watercraft counts as the dependent variable. Results of the regression are shown in Table E-3. The State Park boat ramp trailer count was the only variable with an independent effect in predicting watercraft counts. No other independent variable could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$). State Park boat ramp trailer counts accounted for 86% of the variation in watercraft.

Placing the T.H. Stone boat ramp Mean Weighted Trailer Count (7.62) from data entry Table E-2 into the regression equation in Table E-3 results in a Predicted Daily Watercraft Count of 27.3. The Predicted Daily Watercraft Count is calculated by multiplying the Mean Weighted State Park boat ramp trailer count with its Beta coefficient and adding the product to the Constant coefficient. This Predicted Daily Watercraft Count will become part of the Visitor Use Model (Table E-4).

Table E-3: Regression equation predicting watercraft counts for St. Joseph Bay AP

Constant	Beta	Mean Daily T.H. Stone State Park Boat Ramp Count	Predicted Watercraft Count	R-Square	F	P
5.465	2.859	7.62	27.3	.859	91.11	<.001

Watercraft Visitor Use Estimation Model

The construction of the Visitor Use Estimation Model is discussed fully in the summary report and will not be reiterated here. The point in transitioning from the regression equation to the use model in Table E-4 is to show how the Predicted Daily Watercraft Count in Table E-3 is substituted into the use model. This will be done automatically in the Visitor Use Model spreadsheet. As noted in the summary report, all the remaining parameters in the Visitor Use Model are constants. The percentage of St. Joseph Bay AP water area covered by drone and observation watercraft counts was 35.9 percent.

As shown in Table E-4, about 201,531 watercraft visited St. Joseph Bay AP during the 2022-2023 study year and resulted in an estimated 503,827 total visits during the year.

Table E-4: Calculations for estimating St. Joseph Bay AP visitor use										
H	C	D	T	W	Extrapolation					
Hours /sample	Mean Watercraft Count	Duration of Count (hrs.)	Time in AP	Daily Watercraft Estimate	% Coverage	Total Daily Watercraft	User Days	Total Watercraft Visits	Individuals / Watercraft	Total Individual Visits
12	27.3	0.25	6.6	198.22	35.9%	552	365	201,531	2.5	503,827

Appendix F

Apalachicola Bay Aquatic Preserve
Visitor Use Estimation

Apalachicola Bay Aquatic Preserve
Visitor Use Estimation

Purpose

The purpose of this appendix is to provide details on the development of the Apalachicola Bay Aquatic Preserve (AP) Visitor Use Estimation Model. This background will inform Apalachicola Bay managers and staff about how the visitor use estimation model was derived and what procedures will be needed to continue use of the model in future years. This initial research was conducted during 2022-2023.

The following tables comprise the three components for estimating annual visits at Apalachicola Bay Aquatic Preserve: 1) a data entry spreadsheet for recording and weighting boat trailer counts; 2) a regression equation for estimating daily trailer counts; and 3) the Visitor Use Model for estimating total visitor use. These three tables will appear on the working spreadsheet managers will use to record data and report visitor use. Data in this report were from the 2022-2023 study.

Collecting, Entering and Weighting Data

For Apalachicola Bay AP we counted watercraft at seven locations, boat trailers at six locations, and cars at two locations throughout the AP (Table F-1). The counts was made once between 10:00 and 16:00 hours on sampling days. For analysis purposes, we summed watercraft counts from the seven locations for our dependent variable. For independent variables, we used the six trailer, and two car counts independently.

Table F-1: Location and types of data collected at Apalachicola Bay Aquatic Preserve

			Dependent Variable	Independent Variables	
Sample Location	GIS Coordinates		Watercraft	Trailers	Cars
HWY 98 Pull-off	29.78572	-84.7680	X	X	
St. Georges Is. 300 South Boat Ramp	29.67261	-84.8682	X	X	X
300 Bridge North Fishing Pier	29.72278	-84.8878	X		X
Indian Creek Boat Ramp	29.73819	-84.9003	X	X	
Battery Park Boat Ramp	29.72362	-84.9818	X	X	
Seafood Landing Park Boat Ramp	29.71303	-85.0206	X	X	
Indian Pass Beach Boat Ramp	29.68317	-85.2222	X	X	

An Excel spreadsheet with columns for data entry will be provided to Apalachicola Bay AP managers, separate from this report, to begin building their visitor use estimation model for future years. An example of the data entry spreadsheet is shown in Table F-2. Based on the regression in Table F-3, Apalachicola Bay AP staff should collect trailer counts from Battery Park Boat Ramp a minimum of one weekday and one weekend day each month. Multiple counts each month would be preferable if it can be worked into staff work schedules.

Staff will enter the sample date (Table F-2, Column A) into the spreadsheet and select “weekend”, “weekday” from a dropdown in Column B to indicate the day type being sampled. Further, “Weekday(S) or “Weekend(S) may also be selected to represent sample days during Bay Scallop Season. Selecting the appropriate day type will automatically populate the weight (Column C) for the day type. The default is set to “weekend” with a value of 0.219, the percentage of non-scallop season weekend days in a year. Other weight values, appearing in the footnote at the bottom of Table F-2, will also be displayed for the appropriate day type. Staff will also enter the trailer counts from Battery Park Boat Ramp in Column D. The Weighted Trailer Counts will automatically be displayed in Column E.

The bottom of Table F-2 automatically displays the number of Sample Days, Sum of Weights, and Weighted Trailer Count Sum for daily trailer counts. The bottom of Table F-2 automatically displays the Mean Weighted Daily Trailer Count. The Mean Weighted Trailer Count is derived by dividing Weighted Trailer Count Sum by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Mean Weighted Trailer Count from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count in Table F-3.

Table F-2: Apalachicola Bay Aquatic Preserve data entry table for calculating weighted trailer counts

Sample Date	Weekday or Weekend	Weight[1]	Battery Park Boat Ramp Trailer Count	Weighted Trailer Count
A	B	C	D	E
10/27/2022	Weekday	.542	10	5.42
11/19/2022	Weekend	.219	20	4.38
12/14/2022	Weekday	.542	9	4.88
3/18/2023	Weekend	.219	26	5.69
3/23/2023	Weekday	.542	10	5.42
4/5/2023	Weekday	.542	17	9.21
4/16/2023	Weekend	.219	31	6.79
4/19/2023	Weekday	.542	8	4.34
4/20/2023	Weekday	.542	9	4.88
5/4/2023	Weekday	.542	20	10.84
5/13/2023	Weekend	.219	22	4.82
6/20/2023	Weekday	.542	20	10.84
7/3/2023	Weekday(S)	.167	26	4.34
7/8/2023	Weekend(S)	.071	28	1.99
7/15/2023	Weekend(S)	.071	31	2.20
7/19/2023	Weekday(S)	.167	24	4.01
Sample Days		Sum of Weights		Weighted Trailer Count Sum
16		5.688		90.046
Mean Weighted Daily Trailer Count (Weighted Trailer Count Sum / Sum of Weights)				15.83

[1]Weights: Non-scallop weekday=.542, Non-scallop weekend=.219; Scallop weekday=.167; Scallop weekend=.071

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Apalachicola Bay Aquatic Preserve, the data entry table for trailer counts, the regression equation, and the use estimation table all will appear on the same spreadsheet. At the bottom of the spreadsheet will be a cell displaying Total Aquatic Preserve Visits, which reflects the estimate of annual visitors associated with watercraft use.

Predicting Watercraft Counts

The eight independent variables were entered into a stepwise, weighted least squares regression program with the seven summed watercraft counts as the dependent variable. Results of the regression are shown in Table F-3. The Battery Park Boat Ramp trailer count was the only variable with an independent effect in predicting watercraft counts. No other independent variable could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$). Battery Park boat ramp trailer counts accounted for 81% of the variation in watercraft counts (Table F-3).

Placing the Battery Park Boat Ramp mean weighted trailer count (15.83) from data entry Table F-2 into the regression equation in Table F-3 results in a Predicted Daily Watercraft Count of 26.0. The Predicted Daily Watercraft Count is calculated by multiplying the Mean Weighted Battery Park Boat Ramp Trailer Count with its Beta coefficient and adding the product to the Constant coefficient. This Predicted Daily Watercraft Count will become part of the Visitor Use Model (Table F-4).

Table F-3: Regression equation predicting watercraft counts for Apalachicola Bay AP

Constant	Beta	Mean Battery Park Boat Ramp Trailer Count	Predicted Watercraft Count	R-Square	F	P
-3.975	1.894	15.83	26.0	.814	61.16	<.001

Watercraft Visitor Use Estimation Model

The construction of the Visitor Use Estimation Model is discussed fully in the summary report and will not be reiterated here. The point in transitioning from the regression equation to the use model in Table F-4 is to show how the Predicted Daily Watercraft Count in Table F-3 is substituted into the use model. This will be done automatically in the Visitor Use Model spreadsheet. As noted in the summary report, all the remaining parameters in the Visitor Use Model are constants. The percentage of Apalachicola Bay AP water area covered by drone and observation watercraft counts was 24.2 percent.

As shown in Table F-4, about 285,294 watercraft visited Apalachicola Bay AP during the 2022-2023 study year and resulted in 713,326 total visits during the year.

Table F-4: Calculations for estimating Apalachicola Bay AP visitor use										
H	C	D	T	W	Extrapolation					
Hours /sample	Mean Watercraft Count	Duration of Count (hrs.)	Time in AP	Daily Watercraft Estimate	% Coverage	Total Daily Watercraft	User Days	Total Watercraft Visits	Individuals / Watercraft	Total Individual Visits
12	26.0	0.25	6.6	189.15	24.2%	782	365	285,294	2.5	713,236

Appendix G

Alligator Harbor Aquatic Preserve
Visitor Use Estimation

Alligator Harbor Aquatic Preserve
Visitor Use Estimation

Purpose

The purpose of this appendix is to provide details on the development of the Alligator Harbor Aquatic Preserve (AP) Visitor Use Estimation Model. This background will inform Alligator Harbor managers and staff about how the visitor use estimation model was derived and what procedures will be needed to continue use of the model in future years. This initial research was conducted during 2022-2023.

The following tables comprise the three components for estimating annual visits at Alligator Harbor Aquatic Preserve: 1) a data entry spreadsheet for recording and weighting boat trailer counts; 2) a regression equation for estimating daily trailer counts; and 3) the Visitor Use Model for estimating total visitor use. These three tables will appear on the working spreadsheet managers will use to record data and report visitor use. Data in this report were from the 2022-2023 study.

Collecting, Entering and Weighting Data

For Alligator Harbor AP we counted watercraft from four locations, boat trailers at one location, and cars at three locations throughout the AP (Table G-1). Counts were made once between 10:00 and 16:00 hours on sampling days. For analysis purposes, we summed watercraft counts from the four locations for our dependent variable. Trailer counts from St. George's Island boat ramp were included in the analysis as no suitable public boat ramp exists close to Alligator Harbor AP.

Table G-1: Location and types of data collected at Alligator Harbor Aquatic Preserve

			Dependent Variable	Independent Variables	
Sample Location	GIS Coordinates		Watercraft	Trailers	Cars
Alligator Harbor Boat Launch	29.90049	-84.3976	X		X
End of Road Alligator Point	29.90479	-84.4237	X		X
Turkey Point	29.91202	-84.4903	X		
FSU Marine	29.91662	-84.5127	X		
St. Georges Island Boat Ramp	29.67261	-84.8682		X	X

An Excel spreadsheet with columns for data entry will be provided to Alligator Harbor managers, separate from this report, to begin building their visitor use estimation model for future years. An example of the data entry spreadsheet is shown in Table G-2. Based on the regression in Table G-3, Alligator Harbor AP staff should collect trailer counts from St. George's Island Boat Ramp a minimum of one weekday and one weekend day each month. Multiple counts each month would be preferable if it can be worked into staff work schedules.

Staff will enter the sample date (Table G-2, Column A) into the spreadsheet and select “weekend”, “weekday” from a dropdown in Column B to indicate the day type being sampled. Further, “Weekday(S)” or “Weekend(S)” may also be selected to represent sample days during Bay Scallop Season. Selecting the appropriate day type will automatically populate the weight (Column C) for the day type. The default is set to “weekend” with a value of 0.219, the percentage of non-scallop season weekend days in a year. Other weight values, appearing in the footnote at the bottom of Table G-2, will be displayed for the appropriate day type. Staff will also enter the trailer counts from St. George’s Island Boat Ramp in Column D. The Weighted Trailer Counts will automatically be displayed in Columns E.

The bottom of Table G-2 automatically displays the number of Sample Days, Sum of Weights, and Weighted Trailer Count Sum for daily trailer counts. The last row in Table G-2 automatically displays the Mean Weighted Trailer Count. The Mean Weighted Trailer Count is derived by dividing Weighted Trailer Count Sum by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Mean Weighted Trailer Count from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count in Table G-3.

Table G-2: Alligator Harbor Aquatic Preserve data entry table for calculating weighted trailer counts

Sample Date	Weekday or Weekend	Weight	St. Georges Island Boat Ramp Trailer Count	Weighted Trailer Count
A	B	C	D	E
10/27/2022	Weekday	0.542	3	1.63
11/19/2022	Weekend	0.219	6	1.31
12/14/2022	Weekday	0.542	6	3.25
3/23/2023	Weekday	0.542	5	2.71
4/5/2023	Weekday	0.542	4	2.17
4/15/2023	Weekday	0.542	9	4.88
4/20/2023	Weekend	0.219	7	1.53
4/26/2023	Weekday	0.542	6	3.25
5/1/2023	Weekday	0.542	4	2.17
5/13/2023	Weekend	0.219	6	1.31
6/20/2023	Weekday	0.542	5	2.71
7/3/2023	Weekday	0.167	4	0.67
7/8/2023	Weekend	0.071	7	0.50
7/15/2023	Weekend	0.071	9	0.64
7/19/2023	Weekday	0.167	11	1.84
Sample Days		Sum of Weights		Weighted Trailer Count Sum
15		5.469		30.566
Mean Weighted Daily Trailer Count (Weighted Trailer Count Sum / Sum of Weights)				5.59

[1]Weights: Non-scallop weekday=.542, Non-scallop weekend=.219; Scallop weekday=.167; Scallop weekend=.071

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Alligator Harbor Aquatic Preserve, the data entry table for trailer counts, the regression equation, and the use estimation table all will appear on the same spreadsheet. At the bottom of the spreadsheet will be a cell displaying Total Aquatic Preserve Visits, which reflects the estimate of annual visitors associated with watercraft use.

Predicting Watercraft Counts

The four independent variables were entered into a stepwise, weighted least squares regression program with the four summated watercraft counts as the dependent variable. Results of the regression are shown in Table G-3. The St. George's Island Boat Ramp trailer count was the only variable with an independent effect in predicting watercraft counts. No other independent variable could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$). St. George's Island Boat Ramp trailer counts accounted for 72% of the variation in watercraft counts (Table G-3).

Placing the St. George's Island Boat Ramp mean weighted trailer count (5.59) from data entry Table G-2 into the regression equation in Table G-3 results in a Predicted Daily Watercraft Count of 10.7. The Predicted Daily Watercraft Count is calculated by multiplying the Mean St. George's Island Boat Ramp Trailer Count by its Beta coefficient and adding the product to the Constant coefficient. This Predicted Daily Watercraft Count will become part of the Visitor Use Model (Table G-4).

Table G-3: Regression equation predicting watercraft counts for Lake Jackson AP

Constant	Beta	Mean Daily St. Georges Island Boat Ramp Trailer Count	Predicted Watercraft Count	R-Square	F	P
4.229	1.155	5.59	10.7	.727	34.58	<.001

Watercraft Visitor Use Estimation Model

The construction of the Visitor Use Estimation Model is discussed fully in the summary report and will not be reiterated here. The point in transitioning from the regression equation to the use model in Table G-4 is to show how the Predicted Daily Watercraft Count in Table G-3 is substituted into the use model. This will be done automatically in the Visitor Use Model spreadsheet. As noted in the summary report, all the remaining parameters in the Visitor Use Model are constants. The percentage of Lake Jackson AP water area covered by drone and observation watercraft counts was 39.6 percent.

As shown in Table G-4, about 71,621 watercraft visited Alligator Harbor AP during the 2022-2023 study year and resulted in an estimated 179,052 total visits by individuals during the year.

Table G-4: Calculations for estimating Alligator Harbor AP visitor use										
H	C	D	T	W	Extrapolation					
Hours /sample	Mean Watercraft Count	Duration of Count (hrs.)	Time in AP	Daily Watercraft Estimate	% Coverage	Total Daily Watercraft	User Days	Total Watercraft Visits	Individuals / Watercraft	Total Individual Visits
12	10.7	0.25	6.6	77.70	39.6%	196	365	71,621	2.5	179,052

Appendix H

Lake Jackson Aquatic Preserve
Visitor Use Estimation

Lake Jackson Aquatic Preserve
Visitor Use Estimation

Purpose

The purpose of this appendix is to provide details on the development of the Lake Jackson Aquatic Preserve (AP) Visitor Use Estimation Model. This background will inform Lake Jackson managers and staff about how the visitor use estimation model was derived and what procedures will be needed to continue use of the model in future years. This initial research was conducted during 2022-2023.

The following tables comprise the three components for estimating annual visits at Lake Jackson Aquatic Preserve: 1) a data entry spreadsheet for recording and weighting car counts; 2) a regression equation for estimating daily vehicle counts; and 3) the Visitor Use Model for estimating total visitor use. These three tables will appear on the working spreadsheet managers will use to record data and report visitor use. Data in this report were from the 2022-2023 study.

Collecting, Entering and Weighting Data

Lake Jackson AP is unique among other APs in that use can vary substantially based on water level. In times of drought, the current condition, water levels are low and boating use is limited to airboats, canoes, and kayaks. Thus, very little boating use occurs. On the other hand, low water levels improves and expands bird habitat which draws birdwatchers and other outdoor enthusiasts to the preserve. As a result, we modified our data collection to include boat trailers and cars at all locations, particularly since canoes and kayaks are often transported on top of vehicles and not trailered.

For Lake Jackson AP we counted watercraft, vehicles with trailers, and cars at all eight locations to ensure we had a diversity of data to analyze at this unusual AP. We counted watercraft at all locations, boat trailers at two locations, and cars at all locations throughout the AP (Table H-1). The counts were made once between 10:00 and 16:00 hours on sampling days. However, after five sample days at each of the eight locations, we eliminated Sunset View Landing, Cedar Hill Landing, Miller Landing, and Roden Cove Landing due to inactivity. Of the 20 days sampling at these locations, only one vehicle was present.

Because of the absence of watercraft on Lake Jackson throughout the study year, we changed our focus from counting watercraft to counting all vehicles. For analysis purposes, we summed all vehicles (vehicles with trailers and cars) from the four remaining locations for our dependent variable. For independent variables, we used the vehicle counts from the four sample location independently.

An Excel spreadsheet with columns for data entry will be provided to Lake Jackson managers, separate from this report, to begin building their visitor use estimation model for future years. An example of the data entry spreadsheet is shown in Table H-2. Based on the regression in Table H-3, Lake Jackson AP staff should collect vehicle counts from Jackson View Landing a minimum of one weekday and one weekend day each month. Multiple counts each month would be preferable if it can be worked into staff work schedules.

Table H-1: Location and types of data collected at Lake Jackson Aquatic Preserve						
			Dependent Variable	Independent Variables		
Sample Location	GIS Coordinates		Watercraft	Trailers	Cars	All Vehicles
Fuller Road Landing[1]	30.49368	-84.3075	X		X	
Crowder Landing[1]	30.50761	-84.3130	X		X	
Faulk Drive Landing[1]	30.52231	-84.322	X		X	
Jackson View Landing[1]	30.52375	-84.3528	X	X	X	X
Sunset View Landing	30.53359	-84.3557	X	X	X	X
Cedar Hill Landing	30.57982	-84.2879	X		X	
Miller Landing	30.53937	-84.3274	X		X	
Rhoden Cove Landing	30.51392	-84.2950	X		X	
[1] Final sample locations use for analysis						

Staff will enter the sample date (Table H-2, Column A) into the spreadsheet and select “weekend” or “weekday” from a dropdown in Column B to indicate the day type being sampled. Selecting the appropriate day type will automatically populate the weight (Column C) for the day type. The default is set to “weekend” with a value of 0.29, the percentage of weekend days in a year. The weekday weight of 0.71 is also offered as an alternative. Staff will also enter the vehicle counts from Jackson View Landing in Column D. The Weighted Trailer Counts will automatically be displayed in Columns E.

The bottom of Table H-2 automatically displays the number of Sample Days, Sum of Weights, and Weighted Vehicle Count Sum for daily vehicle counts. The last row in Table H-2 automatically displays the Mean Weighted Vehicle Count. The Mean Weighted Vehicle Count is derived by dividing Weighted Vehicle Count Sum by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Mean Weighted Vehicle Count from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Vehicle Count in Table H-3.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Lake Jackson Aquatic Preserve, the data entry table for vehicle counts, the regression equation, and the use estimation table all will appear on the same spreadsheet. At the bottom of the spreadsheet will be a cell displaying Total Aquatic Preserve Visits, which reflects the estimate of annual visitors associated with vehicle use.

Table H-2: Lake Jackson Aquatic Preserve data entry table for calculating weighted vehicle counts				
Sample Date	Weekday or Weekend	Weight[1]	Jackson View Landing Daily All Vehicle Count	Weighted Vehicle Count
A	B	C	D	E
10/19/2022	Weekday	0.71	3	2.13
10/27/2022	Weekday	0.71	2	1.42
11/19/2022	Weekend	0.29	4	1.16
12/14/2022	Weekday	0.71	2	1.42
2/16/2023	Weekday	0.71	1	0.71
3/18/2023	Weekend	0.29	3	0.87
3/23/2023	Weekday	0.71	2	1.42
4/5/2023	Weekday	0.71	3	2.13
4/16/2023	Weekend	0.29	4	1.16
5/13/2023	Weekend	0.29	2	0.58
5/24/2023	Weekday	0.71	1	0.71
6/15/2023	Weekday	0.71	2	1.42
6/16/2023	Weekend	0.29	3	0.87
Sample Days		Sum of Weights		Weighted Vehicle Count Sum
13		7.13		16
Mean Weighted Daily Vehicle Count (Weighted Vehicle Count Sum / Sum of Weights)				2.24
[1]Weights: Weekday=.071; Weekend=.29				

Predicting Vehicle Counts

The six independent variables were entered into a stepwise, weighted least squares regression program with the four summated daily vehicle counts as the dependent variable. Results of the regression are shown in Table H-3. The Jackson View Landing vehicle count was the only variable with an independent effect in predicting total vehicle counts. No other independent variable could significantly add to the prediction of vehicle counts. This equation was highly significant ($p < .001$). Jackson View Landing vehicle counts accounted for 88% of the variation in total vehicle counts (Table H-3).

Placing the Jackson View Landing Mean Weighted Daily Vehicle Count (2.24) from data entry Table H-2 into the regression equation in Table H-3 results in a Predicted Daily Vehicle Count of 5.6. The Predicted Daily Vehicle Count is calculated by multiplying the Mean Jackson View Landing Vehicle Count by its Beta coefficient and adding the product to the Constant coefficient. This Predicted Daily Vehicle Count will become part of the Visitor Use Model (Table H-4).

Table H-3: Regression equation predicting daily vehicle counts for Lake Jackson AP						
Constant	Beta	Mean Daily Jackson View All Vehicle Count	Predicted Daily Vehicle Count	R-Square	F	P
0.407	2.301	2.24	5.6	.881	81.62	<.001

Watercraft Visitor Use Estimation Model

The construction of the Visitor Use Estimation Model is discussed fully in the summary report and will not be reiterated here. The point in transitioning from the regression equation to the use model in Table H-4 is to show how the Predicted Daily Vehicle Count in Table H-3 is substituted into the use model. This will be done automatically in the Visitor Use Model spreadsheet. As noted in the summary report, all the remaining parameters in the Visitor Use Model are constants. The percentage of Lake Jackson AP water area covered by vehicle counts was 84.2 percent. As shown in Table H-4, about 46,364 watercraft visited Lake Jackson AP during the 2022-2023 study year and resulted in over 115,909 total visits during the year.

Table H-4: Calculations for estimating Lake Jackson AP visitor use										
H	C	D	T	W	Extrapolation					
Hours /sample	Mean Vehicle Count	Duration of Count (hrs.)	Time in AP	Daily Vehicles Estimate	% Coverage	Total Daily Vehicles	User Days	Total Vehicles Visits	Individuals / Watercraft	Total Individual Visits
12	5.6	0.25	2.5	106.95	84.2%	127	365	46,364	2.5	115,909

Appendix I

Big Bend Seagrasses Aquatic Preserve
Visitor Use Estimation

Big Bend Seagrasses Aquatic Preserve
Visitor Use Estimation

Purpose

The purpose of this appendix is to provide details on the development of the Big Bend Seagrasses Aquatic Preserve (AP) Visitor Use Estimation Model. This background will inform Big Bend Seagrasses managers and staff about how the visitor use estimation model was derived and what procedures will be needed to continue use of the model in future years. This initial research was conducted during 2022-2023.

The following tables comprise the three components for estimating annual visits at Big Bend Seagrasses Aquatic Preserve: 1) a data entry spreadsheet for recording and weighting boat trailer counts; 2) a regression equation for estimating daily trailer counts; and 3) the Visitor Use Model for estimating total visitor use. These three tables will appear on the working spreadsheet managers will use to record data and report visitor use. Data in this report were from the 2022-2023 study.

Collecting, Entering and Weighting Data

For Big Bend Seagrasses AP, we counted watercraft at six locations, boat trailers at six locations, and no cars throughout the AP (Table H-1). The counts were made once between 10:00 and 16:00 hours on sampling days. For analysis purposes, we used the summed watercraft counts from the six locations for our dependent variable.

Table I-1: Location and types of data collected at Big Bend Seagrasses Aquatic Preserve

			Dependent Variable	Independent Variables	
Sample Location	GIS Coordinates		Watercraft	Trailers	Cars
St. Marks Lighthouse Boat Ramp	30.07857	-84.178	X	X	
Aucilla Boat Ramp	30.11653	-83.9794	X	X	
Steinhatchee North Boat Ramp	29.67288	-83.3925	X	X	
Horseshoe Beach Park	29.43999	-83.2931	X	X	
Shired Island Boat Ramp	29.39873	-83.2048	X	X	
Cedar Key Boat Ramp	29.13609	-83.0298	X	X	

An Excel spreadsheet with columns for data entry will be provided to Big Bend Seagrasses managers, separate from this report, to begin building their visitor use estimation model for future years. An example of the data entry spreadsheet is shown in Table I-2. Based on the regression in Table I-3, Big Bend Seagrasses AP staff should collect trailer counts from Cedar Key Boat Ramp a minimum of one weekday and one weekend day each month. Multiple counts each month would be preferable if it can be worked into staff work schedules.

Staff will enter the sample date (Table I-2, Column A) into the spreadsheet and select “weekend”, “weekday” from a dropdown in Column B to indicate the day type being sampled. Further,

"Weekday(S)" or "Weekend(S)" may be selected to represent sample days during Bay Scallop Season. Selecting the appropriate day type will automatically populate the weight (Column C) for the day type. The default is set to "weekend" with a value of 0.219, the percentage of non-scallop season weekend days in a year. Other weight values, appearing in the footnote at the bottom of Table I-2, will also be displayed for selecting the appropriate day type. Staff will also enter the trailer counts from Cedar Key Boat Ramp in Column D. The Weighted Trailer Counts will automatically be displayed in Columns E.

The bottom of Table I-2 automatically displays the number of Sample Days, Sum of Weights, and Weighted Trailer Count Sum for daily trailer counts. The last row in Table I-2 automatically displays the Mean Weighted Trailer Count. The Mean Weighted Trailer Count is derived by dividing Weighted Trailer Count Sum by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Mean Weighted Trailer Count from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count in Table I-3.

Table I-2: Big Bend Seagrasses Aquatic Preserve data entry table for calculating weighted daily trailer counts

Sample Date	Weekday or Weekend	Weight	Cedar Key Boat Ramp Trailer Count	Weighted Trailer Count
A	B	C	D	E
8/2/2022	Weekday	.071	41	2.91
8/13/2022	Weekend	.186	39	7.25
11/18/2022	Weekday	.523	11	5.75
11/19/2022	Weekend	.219	28	6.13
12/19/2022	Weekday	.523	10	5.23
2/25/2023	Weekday	.523	12	6.28
2/26/2023	Weekend	.219	28	6.13
2/27/2023	Weekday	.523	16	8.37
3/14/2023	Weekday	.523	23	12.03
3/22/2023	Weekday	.523	19	9.94
3/29/2023	Weekday	.523	14	7.32
4/12/2023	Weekday	.523	15	7.85
4/22/2023	Weekend	.219	29	6.35
4/26/2023	Weekday	.523	30	15.69
5/1/2023	Weekday	.523	25	13.08
5/13/2023	Weekend	.219	27	5.91
6/20/2023	Weekday	.186	35	6.51
7/3/2023	Weekday	.186	22	4.09
7/8/2023	Weekend	.071	43	3.05
7/12/2023	Weekday	.186	26	4.84
7/19/2023	Weekend	.071	40	2.84
Sample Days		Sum of Weights		Weighted Trailer Count Sum
21		7.063		147.549
Mean Weighted Daily Trailer Count (Weighted Trailer Count Sum / Sum of Weights)				20.890

[1]Weights: Non-scallop weekday=.542, Non-scallop weekend=.219; Scallop weekday=.167; Scallop weekend=.071

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Big Bend Seagrasses Aquatic Preserve, the data entry table for trailer counts, the regression equation, and the use estimation table all will appear on the same spreadsheet. At the bottom of the spreadsheet will be a cell displaying Total Aquatic Preserve Visits, which reflects the estimate of annual visits associated with watercraft use.

Predicting Watercraft Counts

The six independent variables were entered into a stepwise, weighted least squares regression program with the six summated watercraft counts as the dependent variable. Results of the regression are shown in Table I-3. The Cedar Key Boat Ramp trailer count was the only variable with an independent effect in predicting watercraft counts. No other independent variable could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$). Cedar Key Boat Ramp trailer counts accounted for 84% of the variation in watercraft counts (Table I-3).

Placing the Big Bend Seagrasses Boat Ramp mean weighted trailer count (20.89) from data entry Table I-2 into the regression equation in Table I-3 results in a Predicted Daily Watercraft Count of 28.3. The Predicted Daily Watercraft Count is calculated by multiplying the Mean Cedar Key Boat Ramp Trailer Count by its Beta coefficient and adding the product to the Constant coefficient. This Predicted Daily Watercraft Count will become part of the Visitor Use Model (Table I-4).

Table I-3: Regression equation predicting watercraft counts for Big Bend Seagrasses AP

Constant	Beta	Mean Daily Cedar Key Trailer Count	Predicted Daily Watercraft Count	R-Square	F	P
6.915	1.023	20.89	28.3	0.845	103.87	<.001

Watercraft Visitor Use Estimation Model

The construction of the Visitor Use Estimation Model is discussed fully in the summary report and will not be reiterated here. The point in transitioning from the regression equation to the use model in Table I-4 is to show how the Predicted Daily Watercraft Count in Table I-3 is substituted into the use model. This will be done automatically in the Visitor Use Model spreadsheet. As noted in the summary report, all the remaining parameters in the Visitor Use Model are constants. The percentage of Big Bend Seagrasses AP water area covered by watercraft counts was 5.2 percent.

As shown in Table I-4, about 1,443,944 watercraft visited Big Bend Seagrasses AP during the 2022-2023 study year and resulted in over 3.6 million total visits during the year.

Table I-4: Calculations for estimating Big Bend Seagrasses AP visitor use

H	C	D	T	W	Extrapolation					
Hours /sample	Mean Watercraft Count	Duration of Count (hrs.)	Time in AP	Daily Watercraft Estimate	% Coverage	Total Daily Watercraft	User Days	Total Watercraft Visits	Individuals / Watercraft	Total Individual Visits
12	28.3	0.25	6.6	205.71	5.2%	3,956	365	1,443,944	2.5	3,609,859

Appendix J

St. Martins Marsh Aquatic Preserve
Visitor Use Estimation

St. Martins Marsh Aquatic Preserve
Visitor Use Estimation

Purpose

The purpose of this appendix is to provide details on the development of the St. Martins Marsh Aquatic Preserve (AP) Visitor Use Estimation Model. This background will inform St. Martins Marsh managers and staff about how the visitor use estimation model was derived and what procedures will be needed to continue use of the model in future years. This initial research was conducted during 2022-2023.

The following tables comprise the three components for estimating annual visits at St. Martins Marsh Aquatic Preserve: 1) a data entry spreadsheet for recording and weighting boat trailer counts; 2) a regression equation for estimating daily trailer counts; and 3) the Visitor Use Model for estimating total visitor use. These three tables will appear on the working spreadsheet managers will use to record data and report visitor use. Data in this report were from the 2022-2023 study.

Collecting, Entering and Weighting Data

For St. Martins Marsh AP we counted watercraft and boat trailers at five locations throughout the AP and listed in Table J-1. The counts were made once between 10:00 and 16:00 hours on sampling days. For analysis purposes, we summed watercraft counts from the five locations for our dependent variable.

Table J-1: Location and types of data collected at St. Martins Marsh Aquatic Preserve

			Dependent Variable	Independent Variables	
Sample Location	GIS Coordinates		Watercraft	Trailers	Cars
Fort Island Boat Ramp	28.91095	-82.6922	X	X	
Marine Science Station	28.90018	-82.6464	X		
Fort Island Trail Boat Ramp	28.90339	-82.6346	X	X	
Crystal River City Marina (Pete's Marina)	28.89369	-82.597		X	
Ozello Community Park	28.86789	-82.6662	X		X
Ozello Park	28.83142	-82.6561	X	X	

We counted boat trailers at four locations, and cars (non-trailered vehicles) at one sampling location. Counts were made between 10:00 and 16:00 hours in conjunction with watercraft counts. For independent variables, we used the four trailer counts and one car count independently.

An Excel spreadsheet with columns for data entry will be provided to St. Martins Marsh managers, separate from this report, to begin building their visitor use estimation model for future years. An example of the data entry spreadsheet is shown in Table J-2. Based on the regression in Table J-3, St. Martins Marsh AP staff should collect trailer counts from Fort Island Boat Ramp a minimum of one weekday and one weekend day each month. Multiple counts each month would be preferable if it can be worked into staff work schedules.

Staff will enter the sample date (Table J-2, Column A) into the spreadsheet and select “weekend”, “weekday” from a dropdown in Column B to indicate the day type being sampled. Further, “Weekday(S)” or “Weekend(S)” may be selected to represent sample days during Bay Scallop Season. Selecting the appropriate day type will automatically populate the weight (Column C) for the day type. The default is set to “weekend” with a value of 0.219, the percentage of non-scallop season weekend days in a year. Other weight values, appearing in the footnote at the bottom of Table J-2, will also be displayed for selecting the appropriate day type. Staff will also enter the trailer counts from Fort Island Boat Ramp in Column D. The Weighted Trailer Counts will automatically be displayed in Columns E.

The bottom of Table J-2 automatically displays the number of Sample Days, Sum of Weights, and Weighted Trailer Count Sum for daily trailer counts. The last row in Table J-2 automatically displays the Mean Weighted Trailer Count. The Mean Weighted Trailer Count is derived by dividing Weighted Trailer Count Sum by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Mean Weighted Trailer Count from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count in Table J-3.

Table J-2: St. Martins Marsh Aquatic Preserve data entry table for calculating weighted trailer counts

Sample Date	Weekday or Weekend	Weight[1]	Fort Island Boat Ramp Trailer Count	Weighted Trailer Count
A	B	C	D	E
8/2/2022	Weekday	0.167	28	4.68
8/13/2022	Weekend	0.071	35	2.49
11/18/2022	Weekday	0.542	13	7.05
11/19/2022	Weekend	0.219	22	4.82
12/19/2022	Weekday	0.542	12	6.50
2/20/2023	Weekday	0.542	12	6.50
3/3/2023	Weekday	0.542	5	2.71
3/17/2023	Weekday	0.542	19	10.30
3/28/2023	Weekday	0.542	19	10.30
4/11/2023	Weekday	0.542	6	3.25
4/22/2023	Weekend	0.219	24	5.26
4/27/2023	Weekday	0.542	12	6.50
5/1/2023	Weekday	0.542	13	7.05
5/13/2023	Weekend	0.219	24	5.26
6/6/2023	Weekday	0.167	31	5.18
7/3/2023	Weekday	0.164	36	5.90
7/8/2023	Weekend	0.071	44	3.12
7/12/2023	Weekday	0.167	33	5.51
7/19/2023	Weekend	0.071	41	2.91
Sample Days		Sum of Weights		Weighted Trailer Count Sum
19		6.413		105.28
Mean Weighted Daily Trailer Count (Weighted Trailer Count Sum / Sum of Weights)				16.417

[1]Weights: Non-scallop weekday=.542, Non-scallop weekend=.219; Scallop weekday=.167; Scallop weekend=.071

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For St. Martins Marsh Aquatic Preserve, the data entry table for trailer counts, the regression equation, and the use estimation table all will appear on the same spreadsheet. At the bottom of the spreadsheet will be a cell displaying Total Aquatic Preserve Visits, which reflects the estimate of annual visitors associated with watercraft use.

Predicting Watercraft Counts

The five independent variables were entered into a stepwise, weighted least squares regression program with the five summated watercraft counts as the dependent variable. Results of the regression are shown in Table J-3. The Fort Island Boat Ramp trailer count was the only variable predicting watercraft counts. No other independent variable could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$). Fort Island Boat Ramp trailer counts accounted for 93% of the variation in watercraft counts (Table J-3).

Placing the Fort Island Boat Ramp mean weighted trailer count (16.42) from data entry Table J-2, into the regression equation in Table J-3 results in a Predicted Daily Watercraft Count of 23.5. The Predicted Daily Watercraft Count is calculated by multiplying the Mean Fort Island Mean Daily Trailer Count by its Beta coefficient and adding the product to the Constant coefficient. This Predicted Daily Watercraft Count will become part of the Visitor Use Model (Table J-4).

Table J-3: Regression equation predicting watercraft counts for Martins Marsh AP

Constant	Beta	Mean Daily Fort Island Trailer Count	Predicted Watercraft Daily Count	R-Square	F	P
-0.614	1.470	16.42	23.5	0.935	242.83	<.001

Watercraft Visitor Use Estimation Model

The construction of the Visitor Use Estimation Model is discussed fully in the summary report and will not be reiterated here. The point in transitioning from the regression equation to the use model in Table J-4 is to show how the Predicted Daily Watercraft Count in Table J-3 is substituted into the use model. This will be done automatically in the Visitor Use Model spreadsheet. As noted in the summary report, all the remaining parameters in the Visitor Use Model are constants. The percentage of St. Martins Marsh AP water area covered by watercraft counts was 23.2 percent.

As shown in Table J-4, about 269,099 watercraft visited St. Martins Marsh AP during the 2022-2023 study year and resulted in 672,747 total visits during the year.

Table I-4: Calculations for estimating Martins Marsh AP visitor use										
H	C	D	T	W	Extrapolation					
Hours /sample	Mean Watercraft Count	Duration of Count (hrs.)	Time in AP	Daily Watercraft Estimate	% Coverage	Total Daily Watercraft	User Days	Total Watercraft Visits	Individuals / Watercraft	Total Individual Visits
12	23.5	0.25	6.6	171.04	23.2%	737	365	269,099	2.5	672,747

Appendix K

Nature Coast Aquatic Preserve
Visitor Use Estimation

Nature Coast Aquatic Preserve
Visitor Use Estimation

Purpose

The purpose of this appendix is to provide details on the development of the Nature Coast Aquatic Preserve (AP) Visitor Use Estimation Model. This background will inform Nature Coast managers and staff about how the visitor use estimation model was derived and what procedures will be needed to continue use of the model in future years. This initial research was conducted during 2022-2023.

The following tables comprise the three components for estimating annual visits at Nature Coast Aquatic Preserve: 1) a data entry spreadsheet for recording and weighting boat trailer counts; 2) a regression equation for estimating daily trailer counts; and 3) the Visitor Use Model for estimating total visitor use. These three tables will appear on the working spreadsheet managers will use to record data and report visitor use. Data in this report were from the 2022-2023 study.

Collecting, Entering and Weighting Data

For Nature Coast AP we counted watercraft at six locations, boat trailers at three locations, and cars at three locations throughout the AP (Table K-1). The counts were made once between 10:00 and 16:00 hours on sampling days. For analysis purposes, we summed watercraft counts from the six locations for our dependent variable. Trailer counts and car counts from each relevant location served as independent variables.

Table K-1: Location and types of data collected at Nature Coast Aquatic Preserve

			Dependent Variable	Independent Variables	
Sample Location	GIS Coordinates		Watercraft	Trailers	Cars
Yankeetown Boat Ramp	29.00141	-82.7615	X	X	
Mason Creek Boat Ramp	28.76131	-82.6337	X		X
R.J. Strickland Memorial Park Boat Ramp	28.3616	-82.7085	X	X	
R.K. Rees Memorial Park Boat Ramp	28.25368	-82.7574	X		X
Anclote River Park Boat Ramp	28.17632	-82.7885	X	X	
Fred Howard Park	28.15419	-82.8054	X		X

An Excel spreadsheet with columns for data entry will be provided to Nature Coast managers, separate from this report, to begin building their visitor use estimation model for future years. An example of the data entry spreadsheet is shown in Table K-2. Based on the regression in Table K-3, Nature Coast AP staff should collect trailer counts from Anclote River Park Boat Ramp a minimum of one weekday and one weekend day each month. Multiple counts each month would be preferable if it can be worked into staff work schedules.

Staff will enter the sample date (Table K-2, Column A) into the spreadsheet and select “Weekend”, or “Weekday” from a dropdown in Column B to indicate the day type being sampled. Further, “Weekday(S)” or “Weekend(S)” may be selected to represent sample days during Bay Scallop Season.

Selecting the appropriate day type will automatically populate the weight (Column C) for the day type. The default is set to "weekend" with a value of 0.219, the percentage of non-scallop season weekend days in a year. Other weight values, appearing in the footnote at the bottom of Table J-2, will also be displayed for selecting the appropriate day type. Staff will also enter the trailer counts from Anclote River Park Boat Ramp in Column D. The Weighted Trailer Counts will automatically be displayed in Column E.

The bottom of Table K-2 automatically displays the number of Sample Days, Sum of Weights, and Weighted Trailer Count Sum for daily trailer counts. The last row in Table K-2 automatically displays the Mean Weighted Trailer Count. The Mean Weighted Trailer Count is derived by dividing Weighted Trailer Count Sum by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Mean Weighted Trailer Count from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count in Table K-3.

Table K2: Nature Coast Aquatic Preserve data entry table for calculating weighted trailer counts

Sample Date	Weekday or Weekend	Weight[1]	Anclote River Park Boat Ramp Trailer Count	Weighted Trailer Count
A	B	C	D	E
8/2/2022	Weekend	0.071	82	5.82
8/13/2022	Weekday	0.167	61	10.19
2/17/2023	Weekday	0.542	44	23.85
2/18/2023	Weekend	0.219	46	10.07
3/3/2023	Weekday	0.542	55	29.81
3/23/2023	Weekday	0.542	48	26.02
3/30/2023	Weekday	0.542	30	16.26
4/16/2023	Weekend	0.219	67	14.67
4/18/2023	Weekday	0.542	27	14.63
4/28/2023	Weekday	0.542	15	8.13
5/4/2023	Weekday	0.542	10	5.42
5/13/2023	Weekend	0.219	53	11.61
5/27/2023	Weekend	0.219	65	14.24
6/6/2023	Weekday	0.542	39	21.14
7/3/2023	Weekday	0.167	58	9.69
7/8/2023	Weekend	0.071	75	5.33
7/12/2023	Weekday	0.167	56	9.35
7/19/2023	Weekend	0.071	79	5.61
Sample Days		Sum of Weights		Weighted Trailer Count Sum
18		5.926		241.826
[1]Mean Weighted Daily Trailer Count (Weighted Trailer Count Sum / Sum of Weights)				40.808
[1]Weights: Non-scallop weekday=.542, Non-scallop weekend=.219; Scallop weekday=.167; Scallop weekend=.071				

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Nature Coast Aquatic Preserve, the data entry table for trailer counts, the regression equation, and the use estimation table all will appear on the same spreadsheet. At the bottom of the spreadsheet will be a cell displaying Total Aquatic Preserve Visits, which reflects the estimate of annual visitors associated with watercraft use.

Predicting Watercraft Counts

The six independent variables were entered into a stepwise, weighted least squares regression program with the six summated watercraft counts as the dependent variable. Results of the regression are shown in Table K-3. The Anclote River Park Boat Ramp trailer count was the only variable with an independent effect in predicting watercraft counts. No other independent variable could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$). Anclote River Park Boat Ramp trailer counts accounted for 92% of the variation in watercraft counts (Table K-3).

Placing the Anclote River Park Boat Ramp mean weighted trailer count (40.81) from data entry Table K-2, into the regression equation in Table K-3 results in a Predicted Daily Watercraft Count of 44.0. The Predicted Daily Watercraft Count is calculated by multiplying the Anclote River Park Mean Daily Trailer Count by its Beta coefficient and adding the product to the Constant coefficient. This Predicted Daily Watercraft Count will become part of the Visitor Use Model (Table K-4).

Table J-3: Regression equation predicting watercraft counts for Nature Coast AP

Constant	Beta	Mean Daily Anclote River Park Trailer Count	Predicted Watercraft Count	R-Square	F	P
10.161	0.829	40.81	44.0	.920	183.01	<.001

Watercraft Visitor Use Estimation Model

The construction of the Visitor Use Estimation Model is discussed fully in the summary report and will not be reiterated here. The point in transitioning from the regression equation to the use model in Table K-4 is to show how the Predicted Daily Watercraft Count in Table K-3 is substituted into the use model. This will be done automatically in the Visitor Use Model spreadsheet. As noted in the summary report, all the remaining parameters in the Visitor Use Model are constants. The percentage of Nature Coast AP water area covered by watercraft counts was 6.1 percent.

As shown in Table K-4, about 1.9 million watercraft visited Nature Coast AP during the 2022-2023 study year and resulted in over 4.7 million total visits during the year.

Table J-4: Calculations for estimating Nature Coast AP visitor use										
H	C	D	T	W	Extrapolation					
Hours /sample	Mean Watercraft Count	Duration of Count (hrs.)	Time in AP	Daily Watercraft Estimate	% Coverage	Total Daily Watercraft	User Days	Total Watercraft Visits	Individuals / Watercraft	Total Individual Visits
12	44.0	0.25	6.6	319.93	6.1%	5,245	365	1,914,342	2.5	4,785,854

Appendix L

Pinellas County Aquatic Preserve
Visitor Use Estimation

Pinellas County Aquatic Preserve
Visitor Use Estimation

Purpose

The purpose of this appendix is to provide details on the development of the Pinellas County Aquatic Preserve (AP) Visitor Use Estimation Model. This background will inform Pinellas County AP managers and staff about how the visitor use estimation model was derived and what procedures will be needed to continue use of the model in future years. This initial research was conducted during 2022-2023.

The following tables comprise the three components for estimating annual visits at Pinellas County Aquatic Preserve: 1) a data entry spreadsheet for recording and weighting boat trailer counts; 2) a regression equation for estimating daily trailer counts; and 3) the Visitor Use Model for estimating total visitor use. These three tables will appear on the working spreadsheet managers will use to record data and report visitor use. Data in this report were from the 2022-2023 study.

Collecting, Entering and Weighting Data

For Pinellas County AP we counted watercraft at 16 locations, boat trailers at 13 locations, and cars at one location throughout the AP (Table L-1). The counts were made once between 10:00 and 16:00 hours on sampling days. For analysis purposes, we summed watercraft counts from the 16 locations for our dependent variable. For independent variables, we used the 13 trailer counts and one car count.

Table L-1: Location and types of data collected at Pinellas County Aquatic Preserve

			Dependent Variable	Independent Variables	
Sample Location	GIS Coordinates		Watercraft	Trailers	Cars
Grandview Park Boat Ramp	27.73426	-82.6402	X	X	
Point Pinellas Boat Ramp (Bay Vista Park)	27.7039	-82.6399	X	X	
Gandy Bridge East Kayak Launch	27.87719	-82.5886	X	X	
Cooper's Bayou Park	27.97300	-82.6972	X	X	
Philippe Park Boat Ramp	28.01391	-82.6827	X	X	
John Chesnut Park Boat Ramp	28.08629	-82.7017	X	X	
AL Anderson Park	28.13327	-82.7385	X	X	
Indian Shores Beach Access	27.85402	-82.8455	X	X	
Belaire Causeway Boat Ramp	27.91750	-82.8273	X	X	
Belaire Shores Parking Lot	27.91435	-82.8458	X	X	
Sand Key Park	27.96271	-82.8295	X	X	
Seminole Street Boat Ramp	27.97435	-82.8025	X	X	
Clearwater Beach Boat Ramp	27.98484	-82.8238	X	X	
Josiah Cephas Weaver Park	28.02112	-82.7901	X		
Sunset Beach Park	28.14401	-82.7903	X		
Honeymoon Island State Park	28.06302	-82.8312	X		X

An Excel spreadsheet with columns for data entry will be provided to Pinellas County managers, separate from this report, to begin building their visitor use estimation model for future years. An example of the data entry spreadsheet is shown in Table L-2. Based on the regression in Table L-3, Pinellas County AP staff should collect trailer counts from Seminole Street Boat Ramp a minimum of one weekday and one weekend day each month. Multiple counts each month would be preferable if it can be worked into staff work schedules.

Staff will enter the sample date (Table L-2, Column A) into the spreadsheet and select "weekend" or "weekday" from a dropdown in Column B to indicate the day type being sampled. Selecting the appropriate day type will automatically populate the weight (Column C) for the day type. The default is set to "weekend" with a value of 0.29, the percentage of weekend days in a year. The weekday weight of 0.71 may also be selected. Staff will also enter the trailer counts from Seminole Street Boat Ramp in Column D. The Weighted Trailer Counts will automatically be displayed in Columns E.

Table L-2: Pinellas County Aquatic Preserve data entry table for calculating weighted trailer counts

Sample Date	Weekday or Weekend	Weight[1]	Seminole Street Boat Ramp Trailer Count	Weighted Trailer Count
A	B	C	D	E
2/25/2023	Weekend	0.29	29	8.41
2/26/2023	Weekday	0.71	35	24.85
3/9/2023	Weekday	0.71	9	6.39
3/15/2023	Weekday	0.71	27	19.17
3/25/2023	Weekend	0.29	31	8.99
4/6/2023	Weekday	0.71	28	19.88
4/20/2023	Weekday	0.71	31	22.01
4/23/2023	Weekend	0.29	38	11.02
5/4/2023	Weekday	0.71	21	14.91
5/13/2023	Weekend	0.29	36	10.44
5/21/2023	Weekend	0.29	34	9.86
6/5/2023	Weekday	0.71	33	23.43
Sample Days		Sum of Weights		Weighted Trailer Count Sum
12		6.42		179.36
Mean Weighted Daily Trailer Count (Weighted Trailer Count Sum / Sum of Weights)				27.938

[1]Weights: Weekday =.71; Weekend = .29

The bottom of Table L-2 automatically displays the number of Sample Days, Sum of Weights, and Weighted Trailer Count Sum for daily trailer counts. The last row in Table L-2 automatically displays the Mean Weighted Trailer Count. The Mean Weighted Trailer Count is derived by dividing Weighted Trailer Count Sum by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Mean Weighted Trailer Count from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count in Table L-3.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Pinellas County Aquatic Preserve, the data entry table for trailer counts, the regression equation, and the use estimation table all will appear on the same spreadsheet. At the bottom of the spreadsheet will be a cell displaying Total Aquatic Preserve Visits, which reflects the estimate of annual visitors associated with watercraft use.

Predicting Watercraft Counts

The 14 independent variables were entered into a stepwise, weighted least squares regression program with the summated watercraft count from the 16 locations as the dependent variable. Results of the regression are shown in Table L-3. The Seminole Street Boat Ramp trailer count was the only variable with an independent effect in predicting watercraft counts. No other independent variable could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$). Seminole Street Boat Ramp trailer counts accounted for 83% of the variation in watercraft counts (Table L-3).

Placing the Seminole Street Boat Ramp mean weighted trailer count (27.94) from data entry Table L-2, into the regression equation in Table L-3 results in a Predicted Daily Watercraft Count of 67.4. The Predicted Daily Watercraft Count is calculated by multiplying the Seminole Street Mean Daily Trailer Count by its Beta coefficient and adding the product to the Constant coefficient. This Predicted Daily Watercraft Count will become part of the Visitor Use Model (Table L-4).

Table L-3: Regression equation predicting watercraft counts for Pinellas County AP

Constant	Beta	Mean Daily Seminole Boat Ramp Trailer Count	Predicted Watercraft Count	R-Square	F	P
2.631	2.318	27.94	67.4	.835	50.79	<.001

Watercraft Visitor Use Estimation Model

The construction of the Visitor Use Estimation Model is discussed fully in the summary report and will not be reiterated here. The point in transitioning from the regression equation to the use model in Table L-4 is to show how the Predicted Daily Watercraft Count in Table L-3 is substituted into the use model. This will be done automatically in the Visitor Use Model spreadsheet. As noted in the summary report, all the remaining parameters in the Visitor Use Model are constants. The percentage of Pinellas County AP water area covered by watercraft counts was 11.4 percent.

As shown in Table L-4, about 1.5 million watercraft visited Pinellas County AP during the 2022-2023 study year and resulted in over 3.9 million total visits during the year.

Table L-4: Calculations for estimating Pinellas County AP visitor use

H	C	D	T	W	Extrapolation					
Hours /sample	Mean Watercraft Count	Duration of Count (hrs.)	Time in AP	Daily Watercraft Estimate	% Coverage	Total Daily Watercraft	User Days	Total Watercraft Visits	Individuals / Watercraft	Total Individual Visits
12	67.4	0.25	6.6	490.11	11.4%	4,299	365	1,569,222	2.5	3,923,056

Appendix M

Boca Ciega Bay Aquatic Preserve
Visitor Use Estimation

Boca Ciega Bay Aquatic Preserve
Visitor Use Estimation

Purpose

The purpose of this appendix is to provide details on the development of the Boca Ciega Aquatic Preserve (AP) Visitor Use Estimation Model. This background will inform Boca Ciega managers and staff about how the visitor use estimation model was derived and what procedures will be needed to continue use of the model in future years. This initial research was conducted during 2021-2022.

The following tables comprise the three components for estimating annual visits at Boca Ciega Aquatic Preserve: 1) a data entry spreadsheet for recording and weighting boat trailer counts; 2) a regression equation for estimating daily trailer counts; and 3) the Visitor Use Model for estimating total visitor use. These three tables will appear on the working spreadsheet managers will use to record data and report visitor use. Data in this report were from the 2022-2023 study.

Collecting, Entering and Weighting Data

For Boca Ciega AP we counted watercraft at eight locations, boat trailers at five locations, and cars at one location throughout the AP (Table M-1). The counts were made once between 10:00 and 16:00 hours on sampling days. For analysis purposes, we summed watercraft counts from the eight locations for our dependent variable. For independent variables, we used the five trailer counts and one car count.

Table M-1: Location and types of data collected at Boca Ciega Bay Aquatic Preserve

			Dependent Variable	Independent Variables	
Sample Location	GIS Coordinates		Watercraft	Trailers	Cars
Fort De Soto Boat Ramp	27.64510	-82.7179	X	X	
Gulf Fishing Pier (S & E)	27.61330	-82.7363	X	X	
1st Avenue Beach Access (S & E)	27.68317	-82.7383	X		X
Maximo Boat Ramp	27.71152	-82.6834	X	X	
Colonel Michael J. Horan Park	27.74489	-82.748	X		
Pinellas Co. Boat Ramp (Park Blvd)	27.84241	-82.8391	X	X	
Bay Pines Boat Ramp	27.81212	-82.7681	X	X	
Johns Pass Park	27.78330	-82.7840	X		

An Excel spreadsheet with columns for data entry will be provided to Boca Ciega managers, separate from this report, to begin building their visitor use estimation model for future years. An example of the data entry spreadsheet is shown in Table M-2. Based on the regression in Table M-3, Boca Ciega AP staff should collect trailer counts from Pinellas County Boat Ramp a minimum of one weekday and one weekend day each month. Multiple counts each month would be preferable if it can be worked into staff work schedules.

Staff will enter the sample date (Table M-2, Column A) into the spreadsheet and select "weekend" or "weekday" from a dropdown in Column B to indicate the day type being sampled. Selecting the appropriate day type will automatically populate the weight (Column C) for the day type. The default is set to "weekend" with a value of 0.29, the percentage of weekend days in a year. For weekday samples, a weight on 0.71 will appear. Staff will also enter the trailer counts from Pinellas County Boat Ramp in Column D. The Weighted Trailer Counts will automatically be displayed in Columns E.

Table M-2: Boca Ciega Bay Aquatic Preserve data entry table for calculating weighted trailer counts

Sample Date	Weekday or Weekend	Weight[1]	Pinellas County Boat Ramp Trailer Count	Weighted Trailer Count
A	B	C	D	E
1/26/2023	Weekday	0.71	5	3.55
2/25/2023	Weekend	0.29	29	8.41
3/8/2023	Weekday	0.71	2	1.42
3/15/2023	Weekday	0.71	8	5.68
3/24/2023	Weekday	0.71	10	7.10
4/5/2023	Weekday	0.71	2	1.42
4/19/2023	Weekday	0.71	3	2.13
4/23/2023	Weekend	0.29	18	5.22
5/4/2023	Weekday	0.71	5	3.55
5/13/2023	Weekend	0.29	22	6.38
5/21/2023	Weekend	0.29	24	6.96
6/5/2023	Weekday	0.71	17	12.07
6/17/2023	Weekend	0.29	24	6.96
Sample Days		Sum of Weights		Weighted Trailer Count Sum
13		7.13		70.85
Mean Weighted Daily Trailer Count (Weighted Trailer Count Sum / Sum of Weights)				9.937

[1]Weights: Weekday =.71; Weekend = .29

The bottom of Table M-2 automatically displays the number of Sample Days, Sum of Weights, and Weighted Trailer Count Sum for daily trailer counts. The last row in Table M-2 automatically displays the Mean Weighted Trailer Count. The Mean Weighted Trailer Count is derived by dividing Weighted Trailer Count Sum by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Mean Weighted Trailer Count from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count in Table M-3.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Boca Ciega Aquatic Preserve, the data entry table for trailer counts, the regression equation, and the use estimation table all will appear on the same spreadsheet. At the bottom of the spreadsheet will be a cell displaying Total Aquatic Preserve Visits, which reflects the estimate of annual visitors associated with watercraft use.

Predicting Watercraft Counts

The six independent variables were entered into a stepwise, weighted least squares regression program with the summated watercraft count from the eight locations as the dependent variable. Results of the regression are shown in Table M-3. The Pinellas County Boat Ramp trailer count was the only variable with an independent effect in predicting watercraft counts. No other independent variable could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$). Pinellas County Boat Ramp trailer counts accounted for 84% of the variation in watercraft counts (Table M-3).

Placing the Pinellas County Boat Ramp mean weighted trailer count (9.94) from data entry Table M-2, into the regression equation in Table M-3 results in a Predicted Daily Watercraft Count of 62.6. The Predicted Daily Watercraft Count is calculated by multiplying the Pinellas County Boat Ramp Mean Daily Trailer Count by its Beta coefficient and adding the product to the Constant coefficient. This Predicted Daily Watercraft Count will become part of the Visitor Use Model (Table M-4).

Table L-3: Regression equation predicting watercraft counts for Boca Ciega Bay AP

Constant	Beta	Mean Daily Pinellas County Boat Ramp Trailer Count	Predicted Watercraft Count	R-Square	F	P
31.974	3.084	9.94	62.6	0.848	61.51	<.001

Watercraft Visitor Use Estimation Model

The construction of the Visitor Use Estimation Model is discussed fully in the summary report and will not be reiterated here. The point in transitioning from the regression equation to the use model in Table M-4 is to show how the Predicted Daily Watercraft Count in Table M-3 is substituted into the use model. This will be done automatically in the Visitor Use Model spreadsheet. As noted in the summary report, all the remaining parameters in the Visitor Use Model are constants. The percentage of Boca Ciega AP water area covered by watercraft counts was 24.5 percent.

As shown in Table M-4, about 678,473 watercraft visited Boca Ciega AP during the 2022-2023 study year and resulted in nearly 1.7 million total visits during the year.

Table L-4: Calculations for estimating Boca Ciega Bay AP visitor use

H	C	D	T	W	Extrapolation					
Hours /sample	Mean Watercraft Count	Duration of Count (hrs.)	Time in AP	Daily Watercraft Estimate	% Coverage	Total Daily Watercraft	User Days	Total Watercraft Visits	Individuals / Watercraft	Total Individual Visits
12	62.6	0.25	6.6	455.41	24.5%	1,859	365	678,473	2.5	1,696,183

Appendix N

Cockroach Bay Aquatic Preserve
Visitor Use Estimation

Cockroach Bay Aquatic Preserve
Visitor Use Estimation

Purpose

The purpose of this appendix is to provide details on the development of the Cockroach Bay Aquatic Preserve (AP) Visitor Use Estimation Model. This background will inform Cockroach Bay managers and staff about how the visitor use estimation model was derived and what procedures will be needed to continue use of the model in future years. This initial research was conducted during 2022-2023.

The following tables comprise the three components for estimating annual visits at Cockroach Bay Aquatic Preserve: 1) a data entry spreadsheet for recording and weighting boat trailer counts; 2) a regression equation for estimating daily trailer counts; and 3) the Visitor Use Model for estimating total visitor use. These three tables will appear on the working spreadsheet managers will use to record data and report visitor use. Data in this report were from the 2022-2023 study.

Collecting, Entering and Weighting Data

For Cockroach Bay AP we counted watercraft at four locations, boat trailers at three locations, and cars at two locations throughout the AP and listed in Table N-1. The counts were made once between 10:00 and 16:00 hours on sampling days. For analysis purposes, we summed watercraft counts from the four locations for our dependent variable. We use the three trailer counts and two car counts as independent variables to predict the summated watercraft count in the analysis below.

Table N - 1: Location and types of data collected at Cockroach Bay Aquatic Preserve

			Dependent Variable	Independent Variables	
Sample Location	GIS Coordinates		Watercraft	Trailers	Cars
Cockroach Bay Boat Ramp	27.68697	-82.5205	X	X	
Domino Park Boat Ramp	27.69391	-82.4452	X	X	
Old Highway 41 Fishing Pier	27.70455	-82.4473	X		X
Wildcat Park Boat Ramp	27.67595	-82.4362	X	X	X

An Excel spreadsheet with columns for data entry will be provided to Cockroach Bay managers, separate from this report, to begin building their visitor use estimation model for future years. An example of the data entry spreadsheet is shown in Table N-2. Based on the regression analysis in Table N-3, Cockroach Bay AP staff should collect trailer counts from Cockroach Bay Boat Ramp a minimum of one weekday and one weekend day each month. Multiple counts each month would be preferable if it can be worked into staff work schedules.

Staff will enter the sample date (Table N-2, Column A) into the spreadsheet and select “weekend” or “weekday” from a dropdown in Column B to indicate the day type being sampled. Selecting the appropriate day type will automatically populate the weight (Column C) for the day type. The default is set to “weekend” with a value of 0.29, the percentage of weekend days in a year. A weight of 0.71 will

be displayed for weekday samples. Staff will also enter the trailer counts from Cockroach Bay Boat Ramp in Column D. The Weighted Trailer Counts will automatically be displayed in Columns E.

Table N - 2: Cockroach Bay Aquatic Preserve data entry table for calculating weighted trailer counts

Sample Date	Weekday or Weekend	Weight[1]	Cockroach Bay Boat Ramp Trailer Count	Weighted Trailer Count
A	B	C	D	E
1/26/2023	Weekday	0.71	29	20.59
2/25/2023	Weekend	0.29	31	8.99
3/8/2023	Weekday	0.71	11	7.81
3/15/2023	Weekday	0.71	29	20.59
3/24/2023	Weekday	0.71	26	18.46
4/5/2023	Weekday	0.71	21	14.91
4/19/2023	Weekday	0.71	15	10.65
4/23/2023	Weekend	0.29	33	9.57
5/4/2023	Weekday	0.71	13	9.23
5/13/2023	Weekend	0.29	35	10.15
5/21/2023	Weekend	0.29	38	11.02
6/5/2023	Weekday	0.71	31	22.01
6/17/2023	Weekend	0.29	44	12.76
Sample Days		Sum of Weights		Weighted Trailer Count Sum
13		7.13		176.74
Mean Weighted Daily Trailer Count (Weighted Trailer Count Sum / Sum of Weights)				24.788

[1]Weights: Weekday =.71; Weekend = .29

The bottom of Table N-2 automatically displays the number of Sample Days, Sum of Weights, and Weighted Trailer Count Sum for daily trailer counts. The last row in Table N-2 automatically displays the Mean Weighted Trailer Count. The Mean Weighted Trailer Count is derived by dividing Weighted Trailer Count Sum by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Mean Weighted Trailer Count from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count in Table N-3.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Cockroach Bay Aquatic Preserve, the data entry table for trailer counts, the regression equation, and the use estimation table all will appear on the same spreadsheet. At the bottom of the spreadsheet will be a cell displaying Total Aquatic Preserve Visits, which reflects the estimate of annual visitors associated with watercraft use.

Predicting Watercraft Counts

The five independent variables were entered into a stepwise, weighted least squares regression program with the summated watercraft count from the four locations as the dependent variable. Results of the regression are shown in Table N-3. The Cockroach Bay Boat Ramp trailer count was the only variable with an independent effect in predicting watercraft counts. No other independent variable could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$). Cockroach Bay Boat Ramp trailer counts accounted for 89% of the variation in watercraft counts (Table N-3).

Placing the Cockroach Bay Boat Ramp mean weighted trailer count (24.79) from data entry Table N-2, into the regression equation in Table N-3 results in a Predicted Daily Watercraft Count of 13.3. The Predicted Daily Watercraft Count is calculated by multiplying the Cockroach Bay Mean Daily Trailer Count by its Beta coefficient and adding the product to the Constant coefficient. This Predicted Daily Watercraft Count will become part of the Visitor Use Model (Table N-4).

Table N-3: Regression equation predicting watercraft counts for Cockroach Bay AP

Constant	Beta	Mean Daily Cockroach Bay Ramp Trailer Count	Predicted Watercraft Count	R-Square	F	P
-3.405	0.673	24.79	13.3	.891	90.10	<.001

Watercraft Visitor Use Estimation Model

The construction of the Visitor Use Estimation Model is discussed fully in the summary report and will not be reiterated here. The point in transitioning from the regression equation to the use model in Table N-4 is to show how the Predicted Daily Watercraft Count in Table N-3 is substituted into the use model. This will be done automatically in the Visitor Use Model spreadsheet. As noted in the summary report, all the remaining parameters in the Visitor Use Model are constants. The percentage of Cockroach Bay AP water area covered by watercraft counts was 84.3 percent.

As shown in Table N-4, about 41,810 watercraft visited Cockroach Bay AP during the 2022-2023 study year and resulted in 105,524 total visits during the year.

Table M - 4: Calculations for estimating Cockroach Bay AP visitor use

H	C	D	T	W	Extrapolation					
Hours /sample	Mean Watercraft Count	Duration of Count (hrs.)	Time in AP	Daily Watercraft Estimate	% Coverage	Total Daily Watercraft	User Days	Total Watercraft Visits	Individuals / Watercraft	Total Individual Visits
12	13.3	0.25	6.6	96.56	84.3%	115	365	41,810	2.5	104,524

Appendix O

Terra Ceia Aquatic Preserve
Visitor Use Estimation

Terra Ceia Aquatic Preserve
Visitor Use Estimation

Purpose

The purpose of this appendix is to provide details on the development of the Terra Ceia Aquatic Preserve (AP) Visitor Use Estimation Model. This background will inform Terra Ceia managers and staff about how the visitor use estimation model was derived and what procedures will be needed to continue use of the model in future years. This initial research was conducted during 2022-2023.

The following tables comprise the three components for estimating annual visits at Terra Ceia Aquatic Preserve: 1) a data entry spreadsheet for recording and weighting boat trailer counts; 2) a regression equation for estimating daily trailer counts; and 3) the Visitor Use Model for estimating total visitor use. These three tables will appear on the working spreadsheet managers will use to record data and report visitor use. Data in this report were from the 2022-2023 study.

Collecting, Entering and Weighting Data

For Terra Ceia AP we counted watercraft at three locations, boat trailers at two locations, and cars at one location (Table O-1). The counts were made once between 10:00 and 16:00 hours on sampling days. For analysis purposes, we summed watercraft counts from the three locations for our dependent variable. Because there were no public boat ramps or marinas within Terra Ceia AP available for our project, we included trailer count data from Cockroach Bay Boat Ramp and Domino Park Boat Ramp in our analysis as they were the closest boat ramps we could use as proxies for boater use. We used data from these two boat ramps and car counts at Manatee County Rest Area as independent variables in the analysis below. Counts at Cockroach Bay Boat Ramp and Domino Park Boat Ramp were conducted during the same days as those in Terra Ceia AP.

Table O-1: Location and types of data collected at Terra Ceia Aquatic Preserve

			Dependent Variable	Independent Variables	
Sample Location	GIS Coordinates		Watercraft	Trailers	Cars
Emerson Point	27.53231	-82.6465	X		
Manatee County Rest Area	27.58470	-82.6140	X		X
Seabreeze Point Bridge	27.56830	-82.5695	X		
Domino Park Boat Ramp	27.69391	-82.4452		X	
Cockroach Bay Boat Ramp	27.68697	-82.5204		X	

An Excel spreadsheet with columns for data entry will be provided to Terra Ceia AP managers, separate from this report, to begin building their visitor use estimation model for future years. An example of the data entry spreadsheet is shown in Table O-2. Based on the regression in Table O-3, Terra Ceia AP staff should collect trailer counts from Domino Park Boat Ramp a minimum of one

weekday and one weekend day each month. Multiple counts each month would be preferable if it can be worked into staff work schedules.

Staff will enter the sample date (Table O-2, Column A) into the spreadsheet and select "weekend" or "weekday" from a dropdown in Column B to indicate the day type being sampled. Selecting the appropriate day type will automatically populate the weight (Column C) for the day type. The default is set to "weekend" with a value of 0.29, the percentage of weekend days in a year. The weight for weekday samples is 0.71. Staff will also enter the trailer counts from Domino Park Boat Ramp in Column D. The Weighted Trailer Counts will automatically be displayed in Columns E.

Table O-2: Terra Ceia Aquatic Preserve data entry table for calculating weighted trailer counts

Sample Date	Weekday or Weekend	Weight[1]	Domino Park Boat Ramp Trailer Count	Weighted Trailer Count
A	B	C	D	E
2/25/2023	Weekend	0.29	3	0.87
3/8/2023	Weekday	0.71	7	4.97
3/24/2023	Weekday	0.71	7	4.97
4/5/2023	Weekday	0.71	6	4.26
4/19/2023	Weekday	0.71	5	3.55
4/19/2023	Weekday	0.71	6	4.26
4/23/2023	Weekend	0.29	10	2.90
5/4/2023	Weekday	0.71	5	3.55
5/4/2023	Weekday	0.71	5	3.55
5/13/2023	Weekend	0.29	13	3.77
5/21/2023	Weekend	0.29	15	4.35
6/5/2023	Weekday	0.71	8	5.68
6/17/2023	Weekend	0.29	17	4.93
Sample Days		Sum of Weights		Weighted Trailer Count Sum
13		7.13		51.61
Mean Weighted Daily Trailer Count (Weighted Trailer Count Sum / Sum of Weights)				7.238

[1]Weights: Weekday =.71; Weekend = .29

The bottom of Table O-2 automatically displays the number of Sample Days, Sum of Weights, and Weighted Trailer Count Sum for daily trailer counts. The last row in Table O-2 automatically displays the Mean Weighted Trailer Count. The Mean Weighted Trailer Count is derived by dividing Weighted Trailer Count Sum by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Mean Weighted Trailer Count from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count in Table O-3.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Terra Ceia Aquatic Preserve, the data entry table for trailer counts, the regression equation, and the

use estimation table all will appear on the same spreadsheet. At the bottom of the spreadsheet will be a cell displaying Total Aquatic Preserve Visits, which reflects the estimate of annual visitors associated with watercraft use.

Predicting Watercraft Counts

The three independent variables were entered into a stepwise, weighted least squares regression program with the three summated watercraft counts as the dependent variable. Results of the regression are shown in Table O-3. The Domino Park Boat Ramp trailer count was the only variable with an independent effect in predicting watercraft counts. No other independent variable could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$). Domino Park Boat Ramp trailer counts accounted for 82% of the variation in watercraft counts (Table O-3).

Placing the Domino Park Boat Ramp mean weighted trailer count (7.24) from data entry Table O-2, into the regression equation in Table O-3 results in a Predicted Daily Watercraft Count of 23.0. The Predicted Daily Watercraft Count is calculated by multiplying the Domino Park Mean Daily Trailer Count by its Beta coefficient and adding the product to the Constant coefficient. This Predicted Daily Watercraft Count will become part of the Visitor Use Model (Table O-4).

Table O-3: Regression equation predicting watercraft counts for Terra Ceia AP

Constant	Beta	Mean Daily Domino Park Boat Ramp Trailer Count	Predicted Watercraft Count	R-Square	F	P
6.582	2.268	7.24	23.0	.822	50.94	<.001

Watercraft Visitor Use Estimation Model

The construction of the Visitor Use Estimation Model is discussed fully in the summary report and will not be reiterated here. The point in transitioning from the regression equation to the use model in Table O-4 is to show how the Predicted Daily Watercraft Count in Table O-3 is substituted into the use model. This will be done automatically in the Visitor Use Model spreadsheet. As noted in the summary report, all the remaining parameters in the Visitor Use Model are constants. The percentage of Terra Ceia AP water area covered by drone and observation watercraft counts was 27.1 percent.

As shown in Table O-4, about 225,281 watercraft visited Terra Ceia AP during the 2022-2023 study year and resulted in 563,203 total visits during the year.

Table O - 4: Calculations for estimating Terra Ceia AP visitor use

H	C	D	T	W	Extrapolation					
Hours /sample	Mean Watercraft Count	Duration of Count (hrs.)	Time in AP	Daily Watercraft Estimate	% Coverage	Total Daily Watercraft	User Days	Total Watercraft Visits	Individuals / Watercraft	Total Individual Visits
12	23.0	0.25	6.6	167.26	27.1%	617	365	225,281	2.5	563,203

Appendix P

Rainbow Springs Aquatic Preserve
Visitor Use Estimation

Rainbow Springs Aquatic Preserve
Visitor Use Estimation

Purpose

The purpose of this appendix is to provide details on the development of the Rainbow Springs Aquatic Preserve (AP) Visitor Use Estimation Model. This background will inform Rainbow Springs managers and staff about how the visitor use estimation model was derived and what procedures will be needed to continue use of the model in future years. This initial research was conducted during 2022-2023.

The following tables comprise the three components for estimating annual visits at Rainbow Springs Aquatic Preserve: 1) a data entry spreadsheet for recording and weighting vehicle counts; 2) a regression equation for estimating daily vehicle counts; and 3) the Visitor Use Model for estimating total visits. These three tables will appear on the working spreadsheet managers will use to record data and report visitor use. Data in this report were from the 2022-2023 study.

Collecting, Entering and Weighting Data

For Rainbow Springs AP we counted watercraft at three locations and vehicles at the same three locations (Table P-1). The counts were made once between 10:00 and 16:00 hours on sampling days. For analysis purposes, we summed watercraft counts from the three locations for our dependent variable. We used vehicle count data from the same three locations as independent variables in our analysis.

Table P-1: Location and types of data collected at Rainbow Springs Aquatic Preserve

			Dependent Variable	Independent Variables
Sample Location	GIS Coordinates		Watercraft	Vehicles
Rainbow Springs State Park	29.10245	-82.437606	X	X
PK Hole Park	29.08715	-82.428734	X	X
Blue Run of Dunnellon Park	29.04929	-82.446785	X	X

An Excel spreadsheet with columns for data entry will be provided to Rainbow Springs AP managers, separate from this report, to begin building their visitor use estimation model for future years. An example of the data entry spreadsheet is shown in Table P-2. Based on the regression in Table P-3, Rainbow Springs AP staff should collect vehicle counts from the Blue Run of Dunnellon parking area a minimum of one weekday and one weekend day each month. Multiple counts each month would be preferable if it can be worked into staff work schedules.

Staff will enter the sample date (Table P-2, Column A) into the spreadsheet and select “weekend” or “weekday” from a dropdown in Column B to indicate the day type being sampled. Selecting the appropriate day type will automatically populate the weight (Column C) for the day type. The default is set to “weekend” with a value of 0.29, the percentage of weekend days in a year. The weight for

weekdays (0.71) may also be selected from the dropdown. Staff will also enter the vehicle counts from Blue Run of Dunnellon parking area in Column D. The Weighted Vehicle Counts will automatically be displayed in Columns E.

Table P-2: Rainbow Springs Aquatic Preserve data entry table for calculating weighted vehicle counts

Sample Date	Weekday or Weekend	Weight[1]	Blue Run Vehicle Count	Weighted Vehicle Count
A	B	C	D	E
2/20/2023	Weekday	0.71	19	13.49
3/3/2023	Weekday	0.71	17	12.07
3/17/2023	Weekday	0.71	17	12.07
3/28/2023	Weekday	0.71	21	14.91
4/11/2023	Weekday	0.71	18	12.78
4/27/2023	Weekday	0.71	17	12.07
5/6/2023	Weekend	0.29	33	9.57
5/17/2023	Weekday	0.71	27	19.17
6/7/2023	Weekday	0.71	25	17.75
6/24/2023	Weekend	0.29	33	9.57
7/8/2023	Weekend	0.29	33	9.57
7/11/2023	Weekday	0.71	28	19.88
Sample Days		Sum of Weights		Weighted Car Count Sum
12		7.26		162.90
Mean Weighted Daily Vehicle Count (Weighted Vehicle Count Sum / Sum of Weights)				22.438

[1]Weights: Weekday =.71; Weekend = .29

The bottom of Table P-2 automatically displays the number of Sample Days, Sum of Weights, and Weighted Vehicle Count Sum for daily vehicle counts. The last row in Table P-2 automatically displays the Mean Weighted Vehicle Count. The Mean Weighted Vehicle Count is derived by dividing Weighted Vehicle Count Sum by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Mean Weighted Vehicle Count from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count in Table P-3.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Rainbow Springs Aquatic Preserve, the data entry table for vehicle counts, the regression equation, and the use estimation table all will appear on the same spreadsheet. At the bottom of the spreadsheet

will be a cell displaying Total Aquatic Preserve Visits, which reflects the estimate of annual visitors associated with watercraft use.

Predicting Watercraft Counts

The three independent variables were entered into a stepwise, weighted least squares regression program with the summated watercraft count from the three locations as the dependent variable. Results of the regression are shown in Table P-3. The Blue Run of Dunnellon vehicle count was the only variable with an independent effect in predicting watercraft counts. No other independent variable could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$). Blue Run of Dunnellon vehicle counts accounted for 86% of the variation in watercraft counts (Table P-3).

Placing the Blue Run of Dunnellon mean weighted vehicle count (22.44) from data entry Table P-2, into the regression equation in Table P-3 results in a Predicted Daily Watercraft Count of 39.9. The Predicted Daily Watercraft Count is calculated by multiplying the Blue Run of Dunnellon Mean Daily vehicle Count by its Beta coefficient and adding the product to the Constant coefficient. This Predicted Daily Watercraft Count will become part of the Visitor Use Model (Table P-4).

Table P-3: Regression equation predicting watercraft counts for Rainbow Springs AP

Constant	Beta	Mean Daily Blue Run Car Count	Predicted Watercraft Count	R-Square	F	P
-6.595	2.072	22.44	39.9	0.864	63.35	<.001

Watercraft Visitor Use Estimation Model

The construction of the Visitor Use Estimation Model is discussed fully in the summary report and will not be reiterated here. The point in transitioning from the regression equation to the use model in Table P-4 is to show how the Predicted Daily Watercraft Count in Table P-3 is substituted into the use model. This will be done automatically in the Visitor Use Model spreadsheet. As noted in the summary report, all the remaining parameters in the Visitor Use Model are constants. The percentage of Rainbow Springs AP water area covered by watercraft counts was 22.8 percent.

Additionally, we examined the number of individuals occupying each watercraft, which included canoes, kayaks, tubes and motorboats, over a 30-minute period. Because of the large number of tubes and kayaks, typically occupied by one individual, our mean individuals per watercraft of 1.15 was lower than individuals per watercraft in other APs.

As shown in Table P-4, about 613,147 watercraft visited Rainbow Springs AP during the 2022-2023 study year and resulted in 705,119 total visits during the year. It appears that about half of the visits occur at Rainbow Springs State Park. The park's visitor attendance for 2021-2022 was 333,771. An equal or greater number of visitors access the AP through P.K. Hole Park. However, we were unable to obtain their attendance numbers.

Table P- 4: Calculations for estimating Rainbow Springs AP visitor use

H	C	D	T	W	Extrapolation					
Hours /sample	Mean Watercraft Count	Duration of Count (hrs.)	Time in AP	Daily Watercraft Estimate	% Coverage	Total Daily Watercraft	User Days	Total Watercraft Visits	Individuals / Watercraft	Total Individual Visits
12	39.9	0.25	5	383.01	22.8%	1,680	365	613,147	1.15	705,119

Appendix Q

Biscayne Bay - Cape Florida to Monroe County Line Aquatic Preserve

Visitor Use Estimation

Biscayne Bay-Cape Florida to Monroe County Line Aquatic Preserve Visitor Use Estimation

Purpose

The purpose of this appendix is to provide details on the development of the Biscayne Bay - Cape Florida to Monroe County Line Aquatic Preserve (Cape Florida AP) Visitor Use Estimation Model. This aquatic preserve is comprised of two areas. The first is the aquatic area off the southern point of Cape Florida and the second includes waters of Card Sound east of the Card Sound Road toll bridge. This background will inform Cape Florida managers and staff about how the visitor use estimation model was derived and what procedures will be needed to continue use of the model in future years. This initial research was conducted during 2022-2023.

The following tables comprise the three components for estimating annual visits at Cape Florida Aquatic Preserve: 1) a data entry spreadsheet for recording and weighting boat trailer counts; 2) a regression equation for estimating daily trailer counts; and 3) the Visitor Use Model for estimating total visitor use. These three tables will appear on the working spreadsheet managers will use to record data and report visitor use. Data in this report were from the 2022-2023 study.

Collecting, Entering and Weighting Data

For Cape Florida AP we counted watercraft at three locations, and boat trailers at two locations (Table Q-1). The counts were made once between 10:00 and 16:00 hours on sampling days. For analysis purposes, we summed watercraft counts from the three locations for our dependent variable. Trailer counts from the two boat ramps, Matheson Hammock and Crandon Park were included as there were no public boat ramps at Card Sound nor within Bill Baggs Cape Florida State Park.

Table Q - 1: Location and types of data collected at Cape Florida Aquatic Preserve

			Dependent Variable	Independent Variables	
Sample Location	GIS Coordinates		Watercraft	Trailers	Cars
Cape Florida State Park	25.66713	-80.1579	X		
Card Sound Toll Bridge	25.28497	-80.3614	X		
Card Sound East	25.30497	-80.2975	X		
Matheson Hammock Boat Ramp	25.67989	-80.2563		X	
Crandon Park Boat Ramp	25.72375	-80.1550		X	

An Excel spreadsheet with columns for data entry will be provided to Cape Florida managers, separate from this report, to begin building their visitor use estimation model for future years. An example of the data entry spreadsheet is shown in Table Q-2. Based on the regression in Table Q-3, Cape Florida AP staff should collect trailer counts from Matheson Hammock Boat Ramp a minimum of one weekday and one weekend day each month. Multiple counts each month would be preferable if it can be worked into staff work schedules.

Staff will enter the sample date (Table Q-2, Column A) into the spreadsheet and select "weekend" or "weekday" from a dropdown in Column B to indicate the day type being sampled. Selecting the appropriate day type will automatically populate the weight (Column C) for the day type. The default is set to "weekend" with a value of 0.29, the percentage of weekend days in a year. The dropdown will also include a weight of 0.71 for weekdays. Staff will also enter the trailer counts from Matheson Hammock Boat Ramp in Column D. The Weighted Trailer Counts will automatically be displayed at the bottom of Columns E.

Table Q-2: Cape Florida Aquatic Preserve data entry table for calculating weighted trailer counts

Sample Date	Weekday or Weekend	Weight[1]	Matheson Hammock Boat Ramp Trailer Count	Weighted Trailer Count
A	B	C	D	E
10/21/2022	Weekday	0.71	7	4.97
10/23/2022	Weekend	0.29	70	20.30
12/15/2022	Weekday	0.71	34	24.14
1/4/2023	Weekday	0.71	29	20.59
2/19/2023	Weekend	0.29	82	23.78
2/16/2023	Weekday	0.71	8	5.68
3/22/2023	Weekday	0.71	10	7.10
3/25/2023	Weekend	0.29	67	19.43
4/13/2023	Weekday	0.71	40	28.40
4/18/2023	Weekday	0.71	26	18.46
4/22/2023	Weekend	0.29	85	24.65
5/11/2023	Weekday	0.71	11	7.81
6/18/2023	Weekend	0.29	79	22.91
6/19/2023	Weekday	0.71	13	9.23
Sample Days		Sum of Weights		Weighted Trailer Count Sum
14		7.84		237.45
Mean Weighted Daily Trailer Count (Weighted Trailer Count Sum / Sum of Weights)				30.287

[1]Weights: Weekday =.71; Weekend = .29

The bottom of Table Q-2 automatically displays the number of Sample Days, Sum of Weights, and Weighted Trailer Count Sum for daily trailer counts. The last row in Table Q-2 automatically displays the Mean Weighted Trailer Count. The Mean Weighted Trailer Count is derived by dividing Weighted Trailer Count Sum by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Mean Weighted Trailer Count from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count in Table Q-3.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Cape Florida Aquatic Preserve, the data entry table for trailer counts, the regression equation, and the use estimation table all will appear on the same spreadsheet. At the bottom of the spreadsheet will

be a cell displaying Total Aquatic Preserve Visits, which reflects the estimate of annual visitors associated with watercraft use.

Predicting Watercraft Counts

The two independent variables were entered into a stepwise, weighted least squares regression program with the summated watercraft count from the three locations as the dependent variable. Results of the regression are shown in Table Q-3. The Matheson Hammock Boat Ramp trailer count was the only variable with an independent effect in predicting watercraft counts. No other independent variable could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$). Matheson Hammock Boat Ramp trailer counts accounted for 85% of the variation in watercraft counts (Table Q-3).

Placing the Matheson Hammock Boat Ramp mean weighted trailer count (30.29) from data entry Table Q-2, into the regression equation in Table Q-3 results in a Predicted Daily Watercraft Count of 13.8. The Predicted Daily Watercraft Count is calculated by multiplying the Matheson Hammock Mean Daily Trailer Count by its Beta coefficient and adding the product to the Constant coefficient. This Predicted Daily Watercraft Count will become part of the Visitor Use Model (Table Q-4).

Table Q-3: Regression equation predicting watercraft counts for Cape Florida AP

Constant	Beta	Mean Daily Matheson Hammock Boat Ramp Trailer Count	Predicted Watercraft Count	R-Square	F	P
5.187	0.286	30.29	13.8	0.849	67.64	<.001

Watercraft Visitor Use Estimation Model

The construction of the Visitor Use Estimation Model is discussed fully in the summary report and will not be reiterated here. The point in transitioning from the regression equation to the use model in Table Q-4 is to show how the Predicted Daily Watercraft Count in Table Q-3 is substituted into the use model. This will be done automatically in the Visitor Use Model spreadsheet. As noted in the summary report, all the remaining parameters in the Visitor Use Model are constants. The percentage of Cape Florida AP water area covered by drone and observation watercraft counts was 28.3 percent.

As shown in Table Q-4, about 129,905 watercraft visited Cape Florida AP during the 2022-2023 study year and resulted in an estimated 324,762 total visits during the year.

Table Q - 4: Calculations for estimating Cape Florida AP visitor use

H	C	D	T	W	Extrapolation					
Hours /sample	Mean Watercraft Count	Duration of Count (hrs.)	Time in AP	Daily Watercraft Estimate	% Coverage	Total Daily Watercraft	User Days	Total Watercraft Visits	Individuals / Watercraft	Total Individual Visits
12	13.8	0.25	6.6	100.72	28.3%	356	365	129,905	2.5	324,762

Appendix R

Lignumvitae Key Aquatic Preserve
Visitor Use Estimation

Lignumvitae Key Aquatic Preserve
Visitor Use Estimation

Purpose

The purpose of this appendix is to provide details on the development of the Lignumvitae Key Aquatic Preserve (AP) Visitor Use Estimation Model. This background will inform Lignumvitae Key managers and staff about how the visitor use estimation model was derived and what procedures will be needed to continue use of the model in future years. This initial research was conducted during 2022-2023.

The following tables comprise the three components for estimating annual visits at Lignumvitae Key Aquatic Preserve: 1) a data entry spreadsheet for recording and weighting boat trailer counts; 2) a regression equation for estimating daily trailer counts; and 3) the Visitor Use Model for estimating total visitor use. These three tables will appear on the working spreadsheet managers will use to record data and report visitor use. Data in this report were from the 2022-2023 study.

Collecting, Entering and Weighting Data

For Lignumvitae Key AP we counted watercraft at two locations and cars at one location (Table R-1). The counts were made once between 10:00 and 16:00 hours on sampling days. For analysis purposes, we summed watercraft counts from the two locations for our dependent variable. Because there were no public boat ramps or marinas meeting our trailer count needs near Lignumvitae Key AP, we included counts from cars near the Indian Key Boat Ramp, which was closed for construction, in our analysis as it was the only viable alternative we had for modeling. We used car count data as the independent variable in our analysis.

Table R - 1: Location and types of data collected at Lignumvitae Key Aquatic Preserve

			Dependent Variable	Independent Variables	
Sample Location	GIS Coordinates		Watercraft	Trailers	Cars
Indian Key Boat Ramp	24.88851	-80.6788	X		X
Bud 'n Mary's	24.89833	-80.6593	X		

An Excel spreadsheet with columns for data entry will be provided to Lignumvitae Key AP managers, separate from this report, to begin building their visitor use estimation model for future years. An example of the data entry spreadsheet is shown in Table R-2. Based on the regression in Table R-3, Lignumvitae Key AP staff should collect car counts from the Indian Key Boat Ramp a minimum of one weekday and one weekend day each month. Multiple counts each month would be preferable if it can be worked into staff work schedules.

Staff will enter the sample date (Table R-2, Column A) into the spreadsheet and select “weekend” or “weekday” from a dropdown in Column B to indicate the day type being sampled. Selecting the appropriate day type will automatically populate the weight (Column C) for the day type. The default is set to “weekend” with a value of 0.29, the percentage of weekend days in a year. The weight for

weekdays (0.71) may also be selected from the dropdown. Staff will also enter the car counts from Indian Key Boat Ramp in Column D. The Weighted Trailer Counts will automatically be displayed in Columns E.

Table R-2: Lignumvitae Key Aquatic Preserve data entry table for calculating weighted car counts

Sample Date	Weekday or Weekend	Weight[1]	Indian Key Car Count	Weighted Trailer Count
A	B	C	D	E
10/23/2022	Weekend	0.29	10	2.90
12/18/2022	Weekend	0.29	6	1.74
1/24/2023	Weekday	0.71	9	6.39
2/19/2023	Weekend	0.29	12	3.48
3/18/2023	Weekday	0.71	10	7.10
3/20/2023	Weekday	0.71	8	5.68
4/16/2023	Weekday	0.71	6	4.26
4/18/2023	Weekend	0.29	8	2.32
5/6/2023	Weekend	0.29	9	2.61
5/7/2023	Weekday	0.71	10	7.10
6/17/2023	Weekend	0.29	16	4.64
6/16/2023	Weekday	0.71	13	9.23
Sample Days		Sum of Weights		Weighted Car Count Sum
12		6		57.45
Mean Weighted Daily Car Count (Weighted Car Count Sum / Sum of Weights)				9.575

[1]Weights: Weekday =.71; Weekend = .29

The bottom of Table R-2 automatically displays the number of Sample Days, Sum of Weights, and Weighted Car Count Sum for daily trailer counts. The last row in Table R-2 automatically displays the Mean Weighted Car Count. The Mean Weighted Car Count is derived by dividing Weighted Car Count Sum by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Mean Weighted Car Count from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count in Table R-3.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Lignumvitae Key Aquatic Preserve, the data entry table for car counts, the regression equation, and the use estimation table all will appear on the same spreadsheet. At the bottom of the spreadsheet will be a cell displaying Total Aquatic Preserve Visits, which reflects the estimate of annual visitors associated with watercraft use.

Predicting Watercraft Counts

The one independent variable was entered into a weighted least squares regression program with the summated watercraft counts from the two locations as the dependent variable. Results of the regression are shown in Table R-3. The Indian Key Boat Ramp car count was significant in predicting watercraft counts. This equation was highly significant ($p < .001$). Indian Key Boat Ramp car counts accounted for 79% of the variation in watercraft counts (Table R-3).

Placing the Indian Key Boat Ramp mean weighted car count (9.58) from data entry Table R-2, into the regression equation in Table R-3 results in a Predicted Daily Watercraft Count of 22.7. The Predicted Daily Watercraft Count is calculated by multiplying the Indian Key Mean Daily Car Count by its Beta coefficient and adding the product to the Constant coefficient. This Predicted Daily Watercraft Count will become part of the Visitor Use Model (Table R-4).

Table R-3: Regression equation predicting watercraft counts for Lignumvitae Key AP

Constant	Beta	Mean Daily Indian Key Car Count	Predicted Watercraft Count	R-Square	F	P
0.900	2.280	9.58	22.7	.790	37.71	<.001

Watercraft Visitor Use Estimation Model

The construction of the Visitor Use Estimation Model is discussed fully in the summary report and will not be reiterated here. The point in transitioning from the regression equation to the use model in Table R-4 is to show how the Predicted Daily Watercraft Count in Table R-3 is substituted into the use model. This will be done automatically in the Visitor Use Model spreadsheet. As noted in the summary report, all the remaining parameters in the Visitor Use Model are constants. The percentage of Lignumvitae Key AP water area covered by watercraft counts was 43.4 percent.

As shown in Table R-4, about 139,033 watercraft visited Lignumvitae Key AP during the 2022-2023 study year and resulted in 347,583 total visits during the year.

Table R- 4: Calculations for estimating Lignumvitae Key AP visitor use

H	C	D	T	W	Extrapolation					
Hours /sample	Mean Watercraft Count	Duration of Count (hrs.)	Time in AP	Daily Watercraft Estimate	% Coverage	Total Daily Watercraft	User Days	Total Watercraft Visits	Individuals / Watercraft	Total Individual Visits
12	22.7	0.25	6.6	165.32	43.4%	381	365	139,033	2.5	347,583