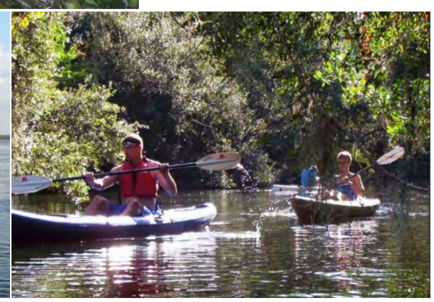
# FINAL REPORT

## Northeast Florida Aquatic Preserves Visitor Use Estimation Study

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## Introduction

Florida’s aquatic preserves (APs) come in a variety of shapes and sizes and offer enormous benefit to Florida citizens and visitors. They contain many features that are unique and others common to several APs. These features, such as containing islands, having Gulf or Atlantic Ocean frontage, incorporating rivers or significant stream segments, and containing seagrass beds help provide diverse and valuable recreation opportunities, but measuring this recreation value is difficult. A basic measure of recreation value is estimating how many people visit aquatic preserves, but the complexity of Florida’s APs also affects the research methods and procedures for estimating recreational use. Further complicating recreational use estimates are additional factors such as adjacent population and development, 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 is to improve public access management by developing a visitor use monitoring protocol for Florida’s coastal and aquatic managed areas. The developed protocol will be incorporated into existing management plans. The project will provide statistically valid and 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 NERR Stewardship Coordinators 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 and valid number of recreation uses to contribute to the statewide Land Management Uniform Accounting Council report (LMUAC 2016), and their 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.

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 2020-2021 fiscal year for the 14 aquatic preserves and the Guana Tolomato Matanzas National Estuarine Research Reserve (GTM NERR) 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 14 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).

DJI Mavic 2 drones were used at sample locations throughout an AP to photograph 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 edge of the shoreline and sweeping around to the southern 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 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 14 APs and GTM NERR studied in 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 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.
**All-Vehicle Count** – the sum of trailered vehicles and 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 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 nearly half of the water surface with drone photographs. 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 14 to 31 across all APs. Drones were used for watercraft counts at 12 of the 14 AP locations. Use of a drone at Ocklawaha River AP was not feasible as the viewing distance was very narrow and covered only a few hundred yards up- and down-river from the sampling locations. We used visual observation with binoculars for watercraft at Fort Clinch in addition to drone photography because FFA restrictions would only allow us to fly the drone intermittently due to the proximity of a military facility. At North Fork St. Lucie River AP, we were unable to identify and/or receive permission for suitable drone launch locations as private lands surround the entire AP. As a result, we used satellite imagery provided by Planet®, as a courtesy, to evaluate the efficacy of using this technology. We were able to secure suitable satellite imagery for 14 study days for analysis.

We conducted watercraft trailer counts and car counts at all sample locations. We also used time-lapse cameras to count watercraft on the Wekiva River at Blue Spring State Park and boat trailers at Jim King Boat Ramp for Nassau River. Few problems were encountered when counting boat trailers and cars at access locations. We counted boat trailers and cars separately as each provides a different perspective on 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 tied to beach visitors, kayak and canoe visitors, or visitors accompanying boaters.

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

| | Days | Watercraft Count | | | Vehicle Counts | | Time-Lapse |
|---|---|---|---|---|---|---|---|
| Location | Sampled | Drone | Observation | Satellite | Trailer | Car | Camera |
| Fort Clinch | 16 | X | X | | X | X | |
| Nassau River | 31 | X | | | X | X | X |
| Guana River AP/GTM North | 27 | X | | | X | X | |
| Pellicer Creek | 29 | X | | | X | X | |
| GTM NERR South | 29 | X | | | X | X | |
| Tamoka Marsh | 27 | X | | | X | X | |
| Mosquito Lagoon | 20 | X | | | X | X | |
| Banana River | 19 | X | | | X | X | |
| IR - Malabar to Vero Beach | 20 | X | | | X | X | |
| IR - Vero Beach to Ft. Pierce | 20 | X | | | X | X | |
| Jensen Beach to Jupiter | 20 | X | | | X | X | |
| Loxahatchee River – Lake Worth | 19 | X | | | X | X | |
| North Fork St. Lucie River | 14 | | | X | | | |
| Wekiva River | 15 | X | | | X | X | X |
| Oklawaha River | 15 | | X | | X | X | |

The number of watercraft survey sites varied among APs (Table 2). These survey sites ranged from zero at North Fork (no boat ramps or parking facilities available) to eight at Jensen Beach to Jupiter. As mentioned earlier, the number of sites we could use 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 were summed across all locations and the mean count presented for all 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, as expected. In seven of the 14 APs, weekend counts were statistically greater than weekday counts ($p \leq .05$). Many of the remaining differences were relatively large, but the small number of observations and wide variability in counts resulted in non-significance. The difference between weekday and weekend counts is important and is discussed later in this report.

The small number of observations and variability in the watercraft count data is reflected in the 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 Loxahatchee River-Lake Worth to 18.7% for GTM-NERR and averaged 12.0% overall. Weekday MSE percentages ranged from 10.1% for Jensen Beach-Jupiter to 27.3% for

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

| | | Total Count | | Weekday Count | | Weekend Count | | Statistics | |
|---|---|---|---|---|---|---|---|---|---|
| Aquatic Preserve | Number of Sites | Mean | Std. Error | Mean | Std. Error | Mean | Std. Error | t | P |
| Fort Clinch | 3 | 14.69 | 2.49 | 11.50 | 3.14 | 22.50 | 7.40 | 1.37 | .193 |
| Nassau River | 4 | 20.16 | 2.45 | 17.22 | 3.22 | 30.08 | 7.95 | 1.50 | .106 |
| Guana River AP/GTM North | 4 | 29.41 | 5.50 | 20.23 | 5.05 | 51.00 | 17.25 | 1.71 | .107 |
| Pellicer Creek | 2 | 6.97 | 0.87 | 4.64 | 0.63 | 12.27 | 2.54 | 2.92 | .010 |
| GTM South | 3 | 22.10 | 3.08 | 13.43 | 2.14 | 41.87 | 8.73 | 3.17 | .006 |
| Tamoka Marsh | 3 | 13.14 | 1.82 | 7.91 | 2.12 | 21.94 | 4.47 | 2.83 | .010 |
| Mosquito Lagoon | 3 | 28.64 | 2.35 | 23.25 | 3.06 | 37.42 | 5.80 | 2.16 | .046 |
| Banana River | 2 | 19.82 | 1.73 | 14.75 | 2.59 | 28.82 | 3.33 | 3.12 | .006 |
| IR - Malabar to Vero Beach | 4 | 44.12 | 5.24 | 32.22 | 5.42 | 67.91 | 13.95 | 2.20 | .041 |
| IR - Vero Beach to Ft. Pierce | 3 | 19.31 | 1.83 | 14.13 | 3.19 | 27.75 | 3.49 | 2.71 | .014 |
| North Fork St. Lucie River | 1 | 10.19 | 1.85 | 8.57 | 1.48 | 14.14 | 3.64 | 1.42 | .182 |
| Jensen Beach to Jupiter | 7 | 73.78 | 4.89 | 62.50 | 6.29 | 92.17 | 12.08 | 1.88 | .076 |
| Loxahatchee River – Lake Worth | 2 | 61.09 | 2.14 | 56.71 | 4.95 | 67.33 | 4.15 | 1.62 | .123 |
| Wekiva River | 2 | 16.78 | 2.52 | 8.00 | 1.25 | 27.50 | 5.19 | 3.65 | .004 |
| Oklawaha River | 2 | 41.89 | 3.65 | 35.00 | 5.01 | 50.30 | 8.89 | 1.15 | .269 |

Fort Clinch with an overall average of 18.1%. Weekend MSE percentages were somewhat larger than weekday MSEs as they ranged from 10.6% for Loxahatchee River-Lake Worth to 33.8% for Guana River/GTM and averaged 20.0% overall.

Trailer count locations ranged from one at Pellicer Creek to 11 at Jensen Beach-Jupiter. Car count locations ranged from one at North Fork to 13 at Jensen Beach-Jupiter. At some of the APs, additional data collection sites were initially considered. However, many 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 tie to watercraft count data. Our objective was to include as many access points as possible in order to identify those that were strongly correlated with watercraft counts.

**Weighting Weekend Vs. Weekday Counts**

The importance of differences between weekday and weekend watercraft counts is depicted in Table 3. Data from Banana River were used as an example to demonstrate the impact of calculating visitor use using three different methods affecting the calculation of visitor use totals. These methods include calculating visitor use for weekend and weekday observations separately then adding the results, calculating visitor use from weekend and weekday observations combined, and weighting weekend and weekday observations by their proportion during the year. This comparison of methods is important as it informed how we proceeded in building visitor use estimation models for each aquatic preserve. The example does not include the procedures for extrapolating the daily drone count to the entire year as these factors are constants across all methods.

The first estimate multiplies weekday and weekend mean watercraft counts by the number of weekdays and weekend days, respectively, in the research year (July 1, 2020 through June 30, 2021) and summing them. This yields a total of 6,875 visitors. While using these individual means would be optimal for calculating visitor use, for many APs we were unable to produce separate regression equations with significant predictors for watercraft use. Thus, we needed to evaluate alternative strategies that would yield significant predictive variables. The alternatives in the two remaining examples combined weekend and weekday counts.

Second, if we use the mean of all weekday and weekend counts combined (unweighted), the result is 8,351 visitors. This estimate is 21.6% greater than calculating weekday and weekend visitors separately and then summing them.

The final example shows the effect of weighting daily watercraft counts on calculating visitor use. Since we did not sample weekday and weekend days proportional to their occurrence throughout the year, weighting them to control for this effect is advisable. During the study year, we sampled weekend and weekdays relatively evenly. However, 71% of the days in the study year were weekdays and 29% weekend days. Weighting counts for each sample day eliminates the “weekend bias” of greater counts on weekends noted in Table 2. If we weight each weekday and weekend count based upon their respective number of days in the year, the unweighted mean count of 22.88 is reduced to 19.82. The result is visitor use of 7,223 or 5.2% greater than visitor use calculated from separate weekday and weekend estimates (Table 3). Weighting was also necessary because we were unable to produce separate regression equations for both weekend and weekday strata in many cases.

In the Banana River AP, using the weighted mean count over the unweighted mean count would reduce the visitor use estimation by 300,000 or more when extrapolated to the entire year and would be much closer to the separate weekday and weekend calculations in the first example.

Table 3: Effects of weighting weekday and weekend daily watercraft counts on annual visitor use estimates for Banana River AP.

| | Mean Watercraft Count | Days | Visitor Use | Difference from Sum |
|---|---|---|---|---|
| Weekday Count | 14.75 | 259 | 3,820 | |
| Weekend Count | 28.82 | 106 | 3,055 | |
| Sum Weekday and Weekend | | | 6,875 | |
| Unweighted Combined Count | 22.88 | 365 | 8,351 | 21.6% |
| Weighted Combined Count | 19.82 | 365 | 7,233 | 5.2% |

We conducted this same analysis for all 14 aquatic preserves and the GTM NERR and found consistent results (Table 4). Combined weekday and weekend count data (unweighted) overestimated separate weekday and weekend estimates from 5.4% at Wekiva River to 35.4% at Tomoka Marsh, with an average of 18.1 percent. However, by weighting weekday and weekend counts, visitor use estimates ranged from -3.8% at Nassau River to 9.7% at Tomoka Marsh compared to the individual summed estimates. The average was a 3.0% overestimate across all 14 APs and GTM NERR. Understanding the effect of these calculation methods is important as the choice of which is used in visitor use modeling could have dramatic effects on total visitation estimates.

Table 4: Summary of differences in unweighted and weighted daily visitor use estimates by aquatic preserve

| | Difference from Summed Weekday and Weekend Counts | |
|---|---|---|
| Location | Unweighted | Weighted |
| Fort Clinch | 15.7% | 0.0% |
| Nassau River | 7.9% | -3.8% |
| Guana River AP/GTM North | 24.1% | 0.8% |
| Pellicer Creek | 25.2% | 1.6% |
| GTM South | 29.7% | 1.9% |
| Tamoka Marsh | 35.4% | 9.7% |
| Mosquito Lagoon | 16.0% | 4.7% |
| Banana River | 21.6% | 5.2% |
| IR - Malabar to Vero Beach | 21.8% | 3.6% |
| IR - Vero Beach to Ft. Pierce | 23.3% | 6.8% |
| North Fork St. Lucie River | 11.5% | -0.2% |
| Jensen Beach to Jupiter | 12.9% | 3.8% |
| Loxahatchee River – Lake Worth | 6.1% | 2.2% |
| Wekiva River | 5.4% | 2.3% |
| Oklawaha River | 14.6% | 5.8% |
| Average Difference | 18.1% | 3.0% |

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 combined unweighted estimates.

**Predicting Watercraft Visitor Use**

The next section of this report focuses on visitor use estimation model development. The model we used is based on estimating daily watercraft 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 Banana River AP to illustrate the steps used in building the model.

First, we needed to identify which boat trailer and/or car count location(s) best predicted watercraft counts. To accomplish this step, we used a stepwise, weighted least squares regression. In the regression for Banana River (Table 5), we used trailer counts from four locations, car counts from the same four locations, and created four new variables by summing trailer and car counts for additional independent variables (All-Vehicle Counts). The stepwise regression identified the car counts from Kiwanis Island Park in Merritt Island as the variable significantly predicting the summed watercraft counts from the two drone flight locations (Kelly Park and Kiwanis Island Park). The mean instantaneous car count for Kiwanis Island Park was 10.06 vehicles.

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

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

Substituting the Constant and Beta coefficients from the regression results and the mean car count into the formula in Table 5 results in a predicted watercraft count of 19.82. The prediction equation is highly significant ($p < .001$) and the car count data accounts for 60.7% of the variation in watercraft counts. This percentage is quite good when considering the variability in the data (see Table 2) and the relatively small sample size (19 observations) in the study. The equation in Table 5 will be used in the visitor use estimation model discussed below. The Constant and Beta coefficients will be used to calculate watercraft counts from Kiwanis Island Park car counts collected by AP staff in the future.

Table 5: Regression equation predicting watercraft counts for Banana River AP

| Constant | Beta | Mean Car Count | Predicted Watercraft Count | R-Square | F | P |
|---|---|---|---|---|---|---|
| 10.601 | 0.916 | 10.06 | 19.82 | 0.607 | 26.29 | <.001 |

The same stepwise, weighted least squares regression was run for each of the remaining 13 aquatic preserves and GTM NERR in the study. Table 6 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, and all-vehicle counts for each survey location. The regressions resulted in one or two independent variables predicting mean daily watercraft counts. The equations were all highly significant and the predictor

| Table 6: Summary of regression equations predicting watercraft counts | | | | |
|---|---|---|---|---|
| AP Location | Number of Predictors | F | P | R-Square |
| Fort Clinch | 1 | 48.10 | <.001 | .775 |
| Nassau River | 1 | 143.06 | <.001 | .831 |
| Guana River AP/GTM North | 1 | 92.32 | <.001 | .787 |
| Pellicer Creek | 2 | 291.31 | <.001 | .915 |
| GTM South | 2 | 39.79 | <.001 | .754 |
| Tamoka Marsh | 1 | 25.93 | <.001 | .684 |
| Mosquito Lagoon | 1 | 59.01 | <.001 | .766 |
| Banana River | 1 | 26.29 | <.001 | .607 |
| Malabar to Vero Beach | 1 | 75.58 | <.001 | .808 |
| Vero Beach to Ft. Pierce | 2 | 17.95 | <.001 | .679 |
| North Fork St. Lucie River | 1 | 11.62 | .005 | .492 |
| Jensen Beach to Jupiter | 2 | 23.48 | <.001 | .734 |
| Loxahatchee River – Lake Worth | 1 | 13.67 | <.001 | .631 |
| Wekiva River | 1 | 146.27 | <.001 | .918 |
| Oklawaha River | 2 | 458.21 | <.001 | .972 |

variables accounted for 49% to 97% of the variation in daily watercraft counts. Again, this is excellent prediction based on the number of sampling days and diversity in the data. Overall, shoreside trailer, car and all-vehicle 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.

**Model Development**

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

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 7 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 7. There are several variables in this table that needed

| Table 7: Calculations for estimating Banana River AP visitor use | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| H | C | D | T | W | Extrapolation | | | | | |
| Hours /sample | Mean Watercraft Count | Duration of Count (hrs.) | Time in AP | Daily Watercraft Estimate | % of Use | Total Daily Watercraft | User Days | Total Watercraft Visits | Individuals / Watercraft | Total Visits |
| 12 | 19.82 | 0.25 | 6.6 | 144.1 | 8.90% | 1,619 | 365 | 591,036 | 2.5 | 1,477,590 |

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.

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. For some APs we had the majority the AP covered with drone photographs, while others were only 10-20% covered. We used mapping technology 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 data in the Florida boating literature. This was consistent with several studies (Sidman et al. 2004, 2007, 2009; Ault 2008) that reported boat occupancy data.

The sample model in Table 7 is built upon data from the Banana River AP. The predicted watercraft count (19.82) was from the regression model in Table 5. Based upon this count and using the above formula, an estimated average of 144 watercraft (W) used the AP area covered by drone observations each day. We determined that the drone observations capture 8.9% of visitor use in the AP for a single day. Dividing the daily watercraft estimate (W) by the use percentage extrapolates daily visitor use to the entire AP. Multiplying total daily watercraft by 365 days in the year yields an estimated 591,036 total watercraft visits during a year. Multiplying total watercraft visits by individuals per watercraft results in the total number of visits (1,477,590) made to the Banana River AP annually.

**Predicting Shoreline Visits**

Three APs in this study had boundaries extending three miles into the Atlantic Ocean which presented additional challenges for visitor use estimation at Fort Clinch AP, and Nassau River-St. Johns River Marshes AP, and the Guana River Marsh/Northern GTM-NERR. Atlantic Ocean visitors that entered beach waters should also be counted as AP and NERR visitors, and as such, should be included in annual AP visitor use estimates.

Our drone flights and personal observation counts in these three APs estimated watercraft use only and did not count beach users. As a result, we devised a method similar to counting watercraft to estimate beach visits. Our dependent variable in this case was the number of vehicles parked at public beach access points. At Fort Clinch, this included three locations within the state park. For Nassau River-St. Johns Marshes we surveyed two parking locations within Little Talbot Island State Park. We surveyed three public parking areas on Highway A1A for Guana River Marsh AP/Northern GTM-NERR shoreline use. At each of these APs, vehicle counts were made during the same time period drone flights and personal observations occurred.

To estimate shoreline visits, we replicated the regression and use estimation model procedures for watercraft visits described above. As noted above, the summated vehicle counts from the parking areas in each AP was the dependent variable and counts from individual parking areas were the independent variables used in the weighted least squares regression. The stepwise procedure of the regression for each AP identified the one parking area that best explained visitor use for that AP. The mean vehicle count was used in conjunction with the Constant and Beta coefficients to produce a mean vehicle count. The mean vehicle count was then substituted into the Shoreline Visitor Use Model to calculate total shoreline visits.

The Shoreline Visitor Use Model was designed exactly like the watercraft model with two notable changes. First, the "Time in AP" (T) parameter was reduced to 4.5 hours as our observation and the literature (Holdnak et al., 2009) both pointed to beach visits lasting for this amount of time. Second, the number of visitors per vehicle was specified at 2.7, again following our observation and the literature data. Additionally, we used drone photographs and personal observation to identify the proportion of the AP shoreline parking area visitors used. The specific details for estimating shoreline visitors in each AP is provided in their respective appendix.

Summing watercraft and shoreline visits results in total visits for each of the three APs and is reflected in the visit totals for Fort Clinch, Nassau River-St. Johns River Marshes, and Guana River Marsh/Northern GTM-NERR shown in Table 8.

**Total Visitor Use Estimates**

This total visitor use estimation procedure was used for all 14 APs and the GTM NERR in the study and are detailed in the individual AP reports found in the appendices. A summary of visitor use for the APs in this study is shown in Table 8. Loxahatchee River – Lake Worth AP had the largest amount of use with 3.8 million visits. Differences in the  number of visits is directly influenced by the surrounding population level (e.g., Jensen to Jupiter and Loxahatchee River – Lake Worth) and in some cases adjacent state and local parks (e.g., Fort Clinch and Nassau River). Access is also another factor limiting use. Some reaches of APs are several miles from the nearest boat ramp and receive relatively little use. Overall, we estimated over 22 million visits were made to the 14 APs and GTM NERR during the 2020-2021 fiscal year.

Total visits do not represent unique individuals. Boaters and beach 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 8: Total visitor use estimate by aquatic preserve | |
|---|---|
| Aquatic Preserve | Total Visits |
| Fort Clinch | 438,334 |
| Nassau River | 1,328,287 |
| Guana River AP/GTM North | 5,389,945 |
| Pellicer Creek | 102,515 |
| GTM South[1] | 940,041 |
| Tamoka Marsh | 289,039 |
| Mosquito Lagoon | 965,562 |
| Banana River | 1,477,590 |
| Malabar to Vero Beach | 2,502,601 |
| Vero Beach to Ft. Pierce | 810,968 |
| North Fork St. Lucie River | 67,605 |
| Jensen Beach to Jupiter | 3,261,578 |
| Loxahatchee River – Lake Worth | 3,825,232 |
| Wekiva River | 651,551 |
| Oklawaha River | 745,422 |
| Total[2] | 22,693,755 |

[1]Includes Pellicer Creek AP
[2]Does not double count Pellicer Creek

**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. Establishing baseline watercraft use levels and predicting that use with shoreside boat trailer and car counts at boat ramps, beach parking areas, and parks resulted in equations that reliably estimate visitor use over the course of the study year. All equations were highly significant ($p \le .005$) and all but one R-Square value exceeded .600, which were very good 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 be able to collect trailer and car count data monthly from one or two locations and feed the data into a spreadsheet database. The spreadsheet will automatically weight the counts and place the weighted count into a regression model (similar to Table 5) 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.

Boat trailer and car counts had both independent and combined effects on watercraft estimates depending on the AP. In some APs, trailer counts strongly predicted watercraft counts. In other APs, car counts were the most indicative. In a few APs, all-vehicle counts resulted in the best predictive model. The handling of the count data will be discussed specifically for each AP in their respective appendix.

The Visitor Use Estimation Model should be viable for several years unless changes in the recreational infrastructure system occur. 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 many trailer and car count locations we used in the study were highly inter-correlated and should allow for substitution. In this case, 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 close to separate efforts that were summed. Weighting was necessary because we were unable to produce separate regression equations for both weekend and weekday strata in many cases. The small overestimates from weighted equations were offset by the inability to identify small watercraft, such as kayaks, at the edge of the view field or watercraft in amongst vegetation. Further, our sampling only included daylight hours. Watercraft often are seen on AP waters at night as anglers fish, boaters return from trips outside the AP, or paddlers enjoy moonlight trips on the water.

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# APPENDIX – A

# Fort Clinch Aquatic Preserve
# Visitor Use Estimation

# Fort Clinch Aquatic Preserve
# Visitor Use Estimation

### Purpose

The purpose of this Appendix is to provide details of the procedures and development for the Fort Clinch Aquatic Preserve Visitor Use Estimation Model. This background will inform AP managers and staff about how visitor use estimation was derived and what procedures will be needed to continue use of the model in future years.

### Sampling Locations

Fort Clinch AP is somewhat unique in that it incurs two types of visits: watercraft and shoreline. Beaches along the Fort Clinch State Park's shoreline allow visitors to wade, swim, and fish in AP waters. Thus, in this AP we needed to count both watercraft and shoreline visits. To accomplish this task, we collected data from three locations in the state park shown in Table A-1.

Table A-1: Location and types of data collected at Fort Clinch aquatic preserve

| | | | Dependent Variable | Independent Variables | | |
|---|---|---|---|---|---|---|
| Sample Location | GIS Coordinates | | Watercraft | Trailers | Cars | All-Vehicles |
| East Beach Parking Lot | 30.698777 | -81.429734 | X | | X | |
| Fishing Area | 30.701112 | -81.460550 | X | X | X | X |
| Dee Dee Bartles Boat Ramp | 30.695912 | -81.459494 | | X | X | X |

We counted watercraft on AP waters from East Beach Parking Area and the Fishing Area through drone photography, when FFA restrictions were lifted, and by personal observation with binoculars, when necessary. The count was made once between 10:00 and 16:00 hours. For analysis purposes, we combined watercraft counts from the East Beach Parking Area and the Fishing Area for our dependent variable.

We counted boat trailers at the Fishing Area and Dee Dee Bartles Boat Ramp and separately counted cars (non-trailered vehicles) at all three sampling locations. Counts were made between 10:00 and 16:00 hours in conjunction with watercraft counts. We used these five independent counts plus all-vehicle counts, combining trailer and car counts, from the Fishing Area and Dee Dee Bartles, respectively, as independent variables.

### Predicting Watercraft Counts

The seven independent variables were entered into a stepwise least squares regression program with the summated watercraft counts as the dependent variable. Results of the regression are shown in Table A-2. Dee Dee Bartles Boat Ramp trailer count was the only independent variable identified that predicted watercraft counts. No other independent variables could significantly add to the prediction of watercraft counts. This equation was highly significant ($p > .001$), and the trailer counts accounted for 77.5% of the variation in watercraft counts.

Placing the Dee Dee Bartles (DDB) mean weighted trailer count (8.87), from the regression analysis, into the regression equation in Table A-2 results in a Predicted Daily Watercraft Count of 14.697. The Predicted Daily Watercraft Count is calculated by adding the product of the Mean Weighted Boat Ramp Trailer Count and Beta coefficient to the Constant coefficient. This predicted watercraft count will become part of the Visitor Use Model in Table A-3.

Table A-2: Regression equation predicting daily watercraft counts for Fort Clinch Aquatic Preserve

| Constant | Beta | Mean Weighted DDB Boat Ramp Trailer Count | Predicted Daily Watercraft Count | R-Square | F | P |
|---|---|---|---|---|---|---|
| 7.499 | .811 | 8.87 | 14.697 | .775 | 48.10 | <.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 A-3 is to show how the Predicted Daily Watercraft Count in Table A-2 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 water area covered by drone and observation watercraft counts was 52.1 percent. The area we were unable to cover was centered on the eastern offshore area of the AP.

As shown in Table A-3, nearly 75,000 watercraft visited Fort Clinch AP during the study year and resulted in an estimated 187,212 total visits during the year. This was only part of Fort Clinch AP visitation. Shoreline users also can be counted towards AP visitation. Calculating the number of shoreline users will be discussed in the next section.

Table A-3: Calculations for estimating Fort Clinch AP watercraft visitor use

| H | C | D | T | W | Extrapolation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hours /sample | Predicted Daily Watercraft Count | Duration of Count (hrs.) | Time in AP | Daily Watercraft Estimate | % of Area | Total Daily Watercraft | User Days | Total Water-craft Visits | Indivi-duals per Water-craft | Total Annual Visits |
| 12 | 14.697 | 0.25 | 6.6 | 106.9 | 52.1% | 205 | 365 | 74,885 | 2.5 | 187,212 |

**Predicting Shoreline Visits**

Fort Clinch visitors have access to an extensive shoreline along the St. Mary’s River and Atlantic Ocean. Visitors can wade, swim, or fish in these AP waters. We used the same approach to estimate shoreline visits as we used for estimating watercraft visits. As noted in Table A-1, we collected car counts from Dee Dee Bartles Boat Ramp, the Fishing Area, and the East Beach Parking Area during the same days watercraft counts were conducted. We attributed 100% of shoreline visits to these three locations as park visitors parking in other areas, such as the fort area, very infrequently approached or entered nearby shoreline areas.

To identify which location would best predict shoreline use we again used stepwise weighted least squares regression. We summed car counts from the three parking areas for the dependent variable and used the individual parking area car counts as independent variables. We used the same weekend (0.29) and weekday (0.71) weights to account for the different number of days each sample day represented in the total year.

The Daily Car Count regression is shown in Table A-4. Car counts from the East Beach Parking Area was the best predictor of daily car counts. The weighted East Beach instantaneous car count was 12.17 vehicles. The regression equation was highly significant ($p > .001$) and East Beach Parking Area car counts accounted for 84.8% of the variation in the summated car count dependent variable.

Using the Constant and Beta coefficients in the regression equation, as noted above, resulted in an estimated average of 23.89 cars at the time of the count. This visitor estimate was then substituted into the Shoreline Visitor Use Estimation Model (Table A-5) to extrapolate to total shoreline visits.

Table A-4: Regression equation predicting daily shoreline visitor counts for Fort Clinch Aquatic Preserve

| Constant | Beta | Mean Weighted East Beach Daily Car Count | Predicted Daily Car Count | R-Square | F | P |
|---|---|---|---|---|---|---|
| 5.238 | 1.532 | 12.17 | 23.89 | .848 | 77.98 | <.001 |

**Shoreline Visitor Use Estimation Model**

Three parameters in the Shoreline Visitor Use Estimation Model differ from the watercraft model. First, the amount of time visitors remained along the shoreline (4.5 hours) was less than watercraft visitors by about two hours. This estimate was derived from data in a Florida State Parks visitor study by Holdnak et al. (2009). Second, using drone photographs and observation, we determined that nearly all shoreline visitor use could be traced to the three parking areas. Thus, we assigned the percent of area parameter at 100 percent. Finally, data from the Holdnak, et al. (2009) study was used to calculate 2.7 individuals per vehicle during visits to coastal state parks. A total of 251,121 shoreline visits were estimated for the 2020-2021 study year. Adding shoreline and watercraft visits yields a total of 438,334 visits made annually to Fort Clinch Aquatic Preserve.

Table A-5: Calculations for estimating Fort Clinch AP shoreline visits

| H | C | D | T | W | Extrapolation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hours /sample | Predicted Daily Car Count | Duration of Count (hrs.) | Time in AP | Daily Car Estimate | % of Area | Total Daily Car Visits | User Days | Total Car Visits | Indivi-duals per Car | Total Shoreline Visits |
| 12 | 23.89 | 0.25 | 4.5 | 254.8 | 100% | 255 | 365 | 93,008 | 2.7 | 251,121 |

**Collecting, Entering and Weighting Data**

An Excel spreadsheet with columns for data entry will be provided to AP managers separately 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 A-6. For Fort Clinch, AP staff should collect trailer counts from Dee Dee Bartles Boat Ramp and car counts from East Beach 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. Data collection for both watercraft and shoreline visits should occur on the same day since they are near each other. Having both counts entered into the same spreadsheet table at the same time will reduce input errors.

Staff will enter the sample date (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.

Staff will also enter the trailer count from Dee Dee Bartles in Column D. The weighted use count will automatically be displayed in Column E.

Car count data from East Beach Parking Area will be entered into the data entry columns on the spreadsheet (Table A-6) in Column F to start the shoreline visit estimation process. Weighted car counts from the East Beach Parking Area will automatically populate Column G for shoreline visits.

The bottom of Table A-6 automatically displays the number of Sample Days, Sum of Weights, and Weighted Count Total. The last row in Table A-6 automatically displays the weighted mean daily count for watercraft and car visits. These weighted means are derived by dividing Weighted Count Total by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the weighted mean daily watercraft and car count from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count and Predicted Daily Car Count in Tables A-2 and A-4, respectively.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Fort Clinch, the data entry table for both watercraft and shoreline visits, the two regression equations, and the two use estimation tables 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 summation of annual watercraft and shoreline visits.

| Table A-6: Fort Clinch data entry table for calculating watercraft and shoreline visits | | | | | | | |
|---|---|---|---|---|---|---|---|
| Sample Date | Weekday or Weekend | Weight Weekday=.71 Weekend=.29 | Dee Dee Bartles Trailer Count | Weighted Use Total | | East Beach Car Count | Weighted Use Total |
| A | B | C | D | E | | D | E |
| 11/23/2020 | Weekday | 0.71 | 6 | 4.26 | | 17 | 12.07 |
| 12/10/2020 | Weekday | 0.71 | 1 | 0.71 | | 9 | 6.39 |
| 3/27/2021 | Weekend | 0.29 | 28 | 8.12 | | 10 | 2.9 |
| 4/3/2021 | Weekend | 0.29 | 9 | 2.61 | | 23 | 6.67 |
| 4/18/2021 | Weekend | 0.29 | 2 | 0.58 | | 4 | 1.16 |
| 4/20/2021 | Weekday | 0.71 | 3 | 2.13 | | 10 | 7.1 |
| 4/27/2021 | Weekday | 0.71 | 9 | 6.39 | | 5 | 3.55 |
| 4/30/2021 | Weekday | 0.71 | 15 | 10.65 | | 16 | 11.36 |
| 5/8/2021 | Weekend | 0.29 | 79 | 22.91 | | 44 | 12.76 |
| 5/15/2021 | Weekend | 0.29 | 8 | 2.32 | | 22 | 6.38 |
| 5/20/2021 | Weekday | 0.71 | 1 | 0.71 | | 5 | 3.55 |
| 5/24/2021 | Weekday | 0.71 | 4 | 2.84 | | 3 | 2.13 |
| 5/29/2021 | Weekend | 0.29 | 6 | 1.74 | | 18 | 5.22 |
| 6/6/2021 | Weekend | 0.29 | 3 | 0.87 | | 11 | 3.19 |
| 6/10/2021 | Weekday | 0.71 | 5 | 3.55 | | 8 | 5.68 |
| 6/20/2021 | Weekend | 0.29 | 2 | 0.58 | | 25 | 7.25 |
| Sample Days | | Weight Sum | | Weighted Total | | | Weighted Total |
| 16 | | 8.00 | | 70.97 | | | 97.36 |
| Weighted Mean (Weighted Total / Weight Sum) | | | | 8.87 | | | 12.17 |

# APPENDIX – B

## Nassau River-St. Johns Marshes Aquatic Preserve
## Visitor Use Estimation

# Nassau River-St. Johns River Marshes Aquatic Preserve Visitor Use Estimation

## Purpose

The purpose of this Appendix is to provide details of the procedures and development for the Nassau River-St. Johns River Marshes Aquatic Preserve Visitor Use Estimation Model. This background will inform AP managers and staff about how visitor use estimation was derived and what procedures will be needed to continue use of the model in future years.

## Sampling Locations

Nassau River-St. Johns River Marshes AP is somewhat unique in that it incurs two types of visitor use: watercraft and shoreline. Beaches along the AP Eastern shoreline allow visitors to wade, swim, and fish in AP waters. Thus, in this AP we needed to count both watercraft and shoreline visits. To accomplish this task, we collected data from seven locations in the AP shown in Table B-1.

Table B-1: Location and types of data collected at Nassau River-St. Johns River Marshes aquatic preserve

| | | | Dependent Variable | Independent Variables | | |
|---|---|---|---|---|---|---|
| Sample Location | GIS Coordinates | | Watercraft | Trailers | Cars | All-Vehicles |
| Jim King Boat Ramp | 30.395519 | -81.459219 | | X | X | X |
| Joe Carlucci Boat Ramp | 30.391696 | -81.464441 | | X | X | X |
| Little Talbot Is. South Loop | 30.458276 | -81.413432 | X | X | X | X |
| Big Talbot Is. Sawpit Creek | 30.510442 | -81.460588 | X | X | X | X |
| Goffinsville Boat Ramp | 30.565815 | -81.522022 | X | X | X | X |
| Holly Point | 30.549660 | -81.536378 | | X | X | X |
| Wilson Neck | 30.578680 | -81.587710 | | X | X | X |

We counted watercraft on AP waters from three areas through drone photography. We were able to use the drone at only three locations due to FAA and local flight restrictions in other locations. These counts were made once between 10:00 and 16:00 hours. For analysis purposes, we combined watercraft counts from all three areas for our dependent variable.

We counted boat trailers at all seven locations and separately counted cars (non-trailered vehicles) at the same seven sampling locations. Counts were made between 10:00 and 16:00 hours in conjunction with watercraft counts. We used these 14 independent counts plus seven all-vehicle counts, combining trailers and cars, from each of the seven locations as independent variables.

## Predicting Watercraft Counts

The 21 independent variables were entered into a stepwise least squares regression program with the summated watercraft counts as the dependent variable. Results of the regression are shown in Table B-2. The

Jim King Boat Ramp all-vehicle count was the only independent variable identified that predicted watercraft counts. No other independent variables could significantly add to the prediction of watercraft counts. This equation was highly significant (p > .001), and the all-vehicle counts accounted for 83.1% of the variation in watercraft counts.

Placing the Jim King Boat Ramp mean weighted all-vehicle count (36.18), from the regression analysis, into the regression equation in Table B-2 results in a Predicted Daily Watercraft Count of 20.153. The Predicted Daily Watercraft Count is calculated by adding the product of the Mean Weighted All-Vehicle Count and Beta coefficient to the Constant coefficient. This predicted watercraft count will become part of the Visitor Use Model in Table B-3.

Table B-2: Regression equation predicting daily watercraft counts for Nassau River-St. Johns River Marshes Aquatic Preserve

| Constant | Beta | Mean Weighted Jim King All-Vehicle Count | Predicted Daily Watercraft Count | R-Square | F | P |
|---|---|---|---|---|---|---|
| 2.824 | .479 | 36.18 | 20.153 | .831 | 143.06 | <.001 |

**Watercraft Visitor Use Estimation Model**

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 estimation model in Table B-3 is to show how the Predicted Daily Watercraft Count in Table B-2 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 water area covered by drone and observation watercraft counts was 15.9 percent. The area we were unable to cover included much of the Northern and Western sections of the AP as well some of the Eastern offshore area.

As shown in Table B-3, nearly 335,830 watercraft visited Nassau River-St. Johns River Marshes AP during the study year and resulted in an estimated 839,575 watercraft total visits during the year. This was only part of Nassau River-St. Johns River Marshes AP visits. Shoreline users also can be counted towards AP visits. Calculating the number of shoreline visits will be discussed in the next section.

Table B-3: Calculations for estimating Nassau River-St. Johns River Marshes AP watercraft visitor use

| H | C | D | T | W | Extrapolation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hours /sample | Predicted Daily Watercraft Count | Duration of Count (hrs.) | Time in AP | Daily Watercraft Estimate | % of Area | Total Daily Watercraft | User Days | Water-craft Visits | Indivi-duals per Water-craft | Total Watercraft Visits |
| 12 | 20.153 | 0.25 | 6.6 | 146.6 | 15.93% | 920 | 365 | 335,830 | 2.5 | 839,575 |

## Predicting Shoreline Visits

Nassau River-St. Johns River Marshes visitors primarily have access to shoreline along the Nassau River and Atlantic Ocean. Visitors can wade, swim, or fish in these AP waters. We used the same approach to estimate shoreline visits as we used for estimating watercraft visits. As noted in Table B-1, we collected car counts from Little Talbot Island South Loop Parking and Sawpit Creek Boat Ramp during the same days watercraft counts were conducted. We attributed 66.7% of shoreline visits to these two locations as shoreline visitors parking in other areas, such as Huguenot Memorial Park, contributed most of the remaining shoreline visits.

To identify which location would best predict shoreline use, we again used stepwise weighted least squares regression. We summed car counts from the two parking areas for the dependent variable and used the individual parking area counts as independent variables. We used the same weekend (0.29) and weekday (0.71) weights to account for the different number of days each sample day represented in the total year.

The Predicted Daily Car Count regression is shown in Table B-4. Car counts from the Little Talbot Island (LTI) South Loop Parking Area was the best predictor of daily car counts. The weighted LTI instantaneous car count was 24.01 vehicles. The regression equation was highly significant ($p < .001$) and LTI South Loop Parking Area car counts accounted for 93.5% of the variation in the summated car count dependent variable.

Using the Constant and Beta coefficients in the regression equation, as noted above, resulted in an estimated average of 33.49 cars at the time of the count. This estimate was then substituted into the Shoreline Visitor Use Estimation Model (Table B-5) to extrapolate to total shoreline visits.

Table B-4: Regression equation predicting daily car counts for Nassau River-St. Johns River Marshes Aquatic Preserve

| Constant | Beta | Mean Weighted LTI South Loop Car Count | Predicted Daily Car Count | R-Square | F | P |
|---|---|---|---|---|---|---|
| 4.361 | 1.213 | 24.01 | 33.49 | .935 | 416.60 | <.001 |

## Shoreline Visitor Use Estimation Model

Three parameters in the Shoreline Visitor Use Estimation Model (B-5) differ from the watercraft model. First, the amount of time visitors remained along the shoreline (4.5 hours) was less than watercraft visitors by about two hours. This estimate was derived from data in a Florida State Parks visitor study by Holdnak et al. (2009). Second, using drone photographs and observation, we determined that most shoreline visitor use could be traced to the two parking areas. Thus, we assigned the percent of area parameter at 66.7 percent. Finally, data from the Holdnak, et al. (2009) study was used to calculate 2.7 individuals per vehicle during visits to coastal state parks. A total of 488,711 shoreline visits were estimated for the 2020-2021 study year. Adding shoreline and watercraft visits yields a total of 1,328,286 visits made annually to Nassau River-St. Johns River Marshes Aquatic Preserve.

| Table B-5: Calculations for estimating Nassau River-St. Johns River Marshes shoreline visitor use | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| H | C | D | T | W | Extrapolation | | | | | |
| Hours /sample | Predicted Daily Car Count | Duration of Count (hrs.) | Time in AP | Daily Car Estimate | % of Area | Total Daily Car Visits | User Days | Total Car Visits | Indivi-duals per Car | Total Shoreline Visits |
| 12 | 33.49 | 0.25 | 4.5 | 357.2 | 66.7% | 536 | 365 | 195,484 | 2.7 | 488,711 |

**Collecting, Entering and Weighting Data**

An Excel spreadsheet with columns for data entry will be provided to AP managers separately 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-6. For Nassau River-St. Johns River Marshes, AP staff should collect all-vehicle counts from Jim King Boat Ramp and car counts from Little Talbot Island South Loop 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. Data for both watercraft and shoreline visits should occur on the same day. Having both counts entered into the same spreadsheet table will reduce the chances of input errors.

Staff will enter the sample date (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.

Staff will also enter the all-vehicle count from Jim King Boat Ramp in Column D to start the watercraft visit estimation process. The weighted all-vehicle count for each sample date will be automatically displayed in Column E.

Car counts from Little Talbot Island South Loop Parking Area will be entered in the data entry spreadsheet in Column F to start the shoreline visit estimation process. The weighted car count for each sample date will be automatically displayed in Column G for shoreline visits.

The bottom of Table B-6 automatically tracks the number of Sample Days, Sum of Weights, and Weighted Count Total for daily watercraft and shoreline visits. The last row in Table B-6 automatically displays the Weighted Mean Daily Count for watercraft and shoreline visits. These weighted means are derived by dividing Weighted Count Total by Sum of Weights. In the working Visitor Use Estimate spreadsheet, the Weighted Mean Daily Watercraft Count from the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count and Daily Car Count in Tables B-2 and B-4, respectively.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Nassau River-St. Johns River Marshes Aquatic Preserve, the data entry table for both watercraft and shoreline visits, the two regression equations, and the two use estimation tables 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 summation of annual watercraft and shoreline visits.

| Table B-6: Nassau River-St. Johns River Marshes Aquatic Preserve data entry table for calculating watercraft and shoreline visits | | | | | | | |
|---|---|---|---|---|---|---|---|
| Sample Date | Weekday or Weekend | Weight Weekday=.71 Weekend=.29 | Jim King All-Vehicle Count | Weighted Use Total | | LTI South Loop Car Count | Weighted Use Total |
| A | B | C | D | E | | F | G |
| 1/17/2021 | Weekend | 0.29 | 41 | 11.89 | | 32 | 9.28 |
| 1/21/2021 | Weekday | 0.71 | 13 | 9.23 | | 8 | 5.68 |
| 1/26/2021 | Weekday | 0.71 | 36 | 25.56 | | 16 | 11.36 |
| 1/31/2021 | Weekend | 0.29 | 20 | 5.8 | | 35 | 10.15 |
| 1/9/2021 | Weekend | 0.29 | 22 | 6.38 | | 12 | 3.48 |
| 11/23/2020 | Weekday | 0.71 | 31 | 22.01 | | 12 | 8.52 |
| 12/19/2020 | Weekend | 0.29 | 29 | 8.41 | | 20 | 5.8 |
| 12/30/2020 | Weekday | 0.71 | 24 | 17.04 | | 38 | 26.98 |
| 12/7/2020 | Weekday | 0.71 | 18 | 12.78 | | 7 | 4.97 |
| 2/17/2021 | Weekday | 0.71 | 3 | 2.13 | | 5 | 3.55 |
| 2/20/2021 | Weekend | 0.29 | 18 | 5.22 | | 17 | 4.93 |
| 2/28/2021 | Weekend | 0.29 | 138 | 40.02 | | 31 | 8.99 |
| 2/3/2021 | Weekday | 0.71 | 4 | 2.84 | | 5 | 3.55 |
| 2/6/2021 | Weekend | 0.29 | 6 | 1.74 | | 5 | 1.45 |
| 3/12/2021 | Weekday | 0.71 | 95 | 67.45 | | 81 | 57.51 |
| 3/14/2021 | Weekend | 0.29 | 82 | 23.78 | | 2 | 0.58 |
| 3/27/2021 | Weekend | 0.29 | 153 | 44.37 | | 69 | 20.01 |
| 3/4/2021 | Weekday | 0.71 | 25 | 17.75 | | 25 | 17.75 |
| 4/18/2021 | Weekend | 0.29 | 12 | 3.48 | | 11 | 3.19 |
| 4/20/2021 | Weekday | 0.71 | 14 | 9.94 | | 16 | 11.36 |
| 4/27/2021 | Weekday | 0.71 | 32 | 22.72 | | 24 | 17.04 |
| 4/3/2021 | Weekend | 0.29 | 85 | 24.65 | | 32 | 9.28 |
| 4/30/2021 | Weekday | 0.71 | 55 | 39.05 | | 31 | 22.01 |
| 5/15/2021 | Weekend | 0.29 | 56 | 16.24 | | 37 | 10.73 |
| 5/20/2021 | Weekday | 0.71 | 8 | 5.68 | | 8 | 5.68 |
| 5/24/2021 | Weekday | 0.71 | 22 | 15.62 | | 21 | 14.91 |
| 5/29/2021 | Weekday | 0.71 | 65 | 46.15 | | 50 | 35.5 |
| 5/8/2021 | Weekend | 0.29 | 146 | 42.34 | | 66 | 19.14 |
| 6/10/2021 | Weekday | 0.71 | 9 | 6.39 | | 9 | 6.39 |
| 6/20/2021 | Weekday | 0.71 | 13 | 9.23 | | 25 | 17.75 |
| 6/6/2021 | Weekday | 0.71 | 46 | 32.66 | | 28 | 19.88 |
| Sample Days | | Weight Sum | | Weighted Total | | | Weighted Total |
| 31 | | 16.55 | | 598.55 | | | 397.40 |
| Weighted Mean (Weighted Total / Weight Sum) | | | | 36.18 | | | 24.01 |

# APPENDIX – C

## Guana River Marsh Aquatic Preserve and GTM NERR North Visitor Use Estimation

# Guana River Marsh Aquatic Preserve and GTM NERR North Visitor Use Estimation

### Purpose

The purpose of this Appendix is to provide details of the procedures and development for the Guana River Marsh Aquatic Preserve and Guana Tolomato Matanzas NERR North (Guana River/GTM) Visitor Use Estimation Model. Since the boundaries for the AP and GTM Northern Area generally coincide, the use estimation in this report will apply to both entities. This background will inform AP managers the NERR Stewardship Coordinator about how visitor use estimation was derived and what procedures will be needed to continue use of the model in future years.

### Sampling Locations

Guana River/GTM is somewhat unique in that it incurs two types of visitor use: watercraft and shoreline. Beaches along the eastern shoreline allow visitors to wade, swim, and fish in AP waters. Thus, in this AP we needed to count both watercraft and shoreline visitors. To accomplish this task, we collected data from six locations in Guana River/GTM shown in Table C-1.

Table C-1: Location and types of data collected at Guana River/GTM

| | | | Dependent Variable | Independent Variables | | |
|---|---|---|---|---|---|---|
| Sample Location | GIS Coordinates | | Watercraft | Trailers | Cars | Trailers + Cars |
| Palm Valley Boat Ramp | 30.132687 | -81.385022 | | X | X | X |
| North Parking Area | 30.116482 | -81.345948 | X | | X | |
| Middle Parking Area | 30.083933 | -81.338199 | X | | X | |
| South Parking Area | 30.073979 | -81.335562 | X | | X | |
| Guana River Recreation Area | 30.021910 | -81.327377 | X | X | X | X |
| Vilano Boat Ramp | 29.911814 | -81.308634 | | X | X | X |

We counted watercraft on AP waters from four areas through drone photography. We were able to use the drone at only these locations due to FAA and local government drone flight restrictions. These counts were made once between 10:00 and 16:00 hours. For analysis purposes, we combined watercraft counts from all four areas for our dependent variable.

We counted boat trailers at four locations and separately counted cars (non-trailered vehicles) at all six sampling locations. Counts were made between 10:00 and 16:00 hours in conjunction with watercraft counts. We used these nine independent counts plus three all-vehicle counts, combining trailers and cars, from each of four locations as independent variables.

### Predicting Watercraft Counts

The 12 independent variables were entered into a stepwise least squares regression program with the summated watercraft counts as the dependent variable. Results of the regression are shown in Table C-2. The

Southern Parking Area car count was the only independent variable identified that predicted watercraft counts. No other independent variables could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$), and the car counts accounted for 78.7% of the variation in watercraft counts.

Placing the South Parking Area mean weighted car count (9.65) from the regression analysis, into the regression equation in Table C-2 results in a Predicted Watercraft Count of 29.41. The Predicted Watercraft Count is calculated by adding the product of the Mean Weighted Car Count and Beta coefficient to the Constant coefficient. This predicted watercraft count will become part of the Visitor Use Model in Table C-3.

Table C-2: Regression equation predicting daily watercraft counts for GTM NERR

| Constant | Beta | Mean Weighted South Parking Area Car Count | Predicted Watercraft Count | R-Square | F | P |
|---|---|---|---|---|---|---|
| 10.19 | 1.99 | 9.65 | 29.41 | .787 | 92.32 | <.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-3 is to show how the Predicted Watercraft Count in Table C-2 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 water area covered by watercraft counts was 8.9 percent. The area we were unable to cover included much of the water West of Highway A1A due to insufficient access and the inability of our drone photography to extend to the eastern limit of the AP/NERR.

As shown in Table C-3, nearly 877,187 watercraft visited Guana River/GTM during the study year and resulted in an estimated 2,192,968 total watercraft visits during the year. This was only part of Guana River/GTM visitation. Shoreline users also can be counted towards visitation. Calculating the number of shoreline visits will be discussed in the next section.

Table C-3: Calculations for estimating Guana River/GTM watercraft visitor use

| H | C | D | T | W | Extrapolation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hours /sample | Predicted Watercraft Count | Duration of Count (hrs.) | Time in AP | Daily Watercraft Estimate | % of Area | Total Daily Watercraft Visits | User Days | Total Water-craft Visits | Indivi-duals per Water-craft | Total Annual Visits |
| 12 | 29.41 | 0.25 | 6.6 | 213.9 | 8.9% | 2,403 | 365 | 877,187 | 2.5 | 2,192,968 |

**Predicting Shoreline Visitor Use**

Guana River/GTM visitors have access to shoreline along the Atlantic Ocean. Visitors can wade, swim, or fish in these waters. We used the same approach to estimate shoreline visits as we used for estimating watercraft visits. As noted in Table C-1, we collected car counts from three locations (North, Middle, and South Parking

Areas) for shoreline visit estimates during the same days watercraft counts were conducted. We attributed 50% of shoreline visits to these three locations as shoreline visitors parking in other areas and residential visitors contributed most of the remaining shoreline visits.

To identify which location would best predict shoreline use, we again used stepwise, weighted least squares regression. We summed car counts from the three parking areas for the dependent variable and used the three individual parking area counts as independent variables. We used the same weekend (0.29) and weekday (0.71) weights to account for the different number of days each sample day represented in the total year.

The Predicted Car Count regression is shown in Table C-4. Car counts from the Middle Parking Area was the best predictor of daily car counts. The weighted Middle Parking Area instantaneous car count was 13.83 vehicles. The regression equation was highly significant ($p < .001$) and Middle Parking Area car counts accounted for 92.5% of the variation in the summated car count dependent variable.

Using the Constant and Beta coefficients in the regression equation, as noted above, resulted in an estimated average of 44.61 cars at the time of the count. This estimate was then substituted into the Shoreline Visitor Use Estimation Model (Table C-5) to extrapolate to total shoreline visits.

Table C-4: Regression equation predicting daily car counts for Guana River/GTM

| Constant | Beta | Mean Weighted Middle Parking Area Car Count | Predicted Car Count | R-Square | F | P |
|---|---|---|---|---|---|---|
| 5.503 | 2.827 | 13.83 | 44.61 | .925 | 308.91 | <.001 |

**Shoreline Visitor Use Estimation Model**

Three parameters in the Shoreline Visitor Use Estimation Model (C-5) differ from the watercraft model. First, the amount of time visitors remained along the shoreline (4.5 hours) was less than watercraft visitors by about two hours. This estimate was derived from data in a Florida State Parks visitor study by Holdnak et al. (2009). Second, using drone photographs and observation, we determined that most shoreline visitor use could be traced to the three parking areas. Thus, we assigned the percent of area parameter at 50.0 percent. Finally, data from the Holdnak, et al. (2009) study was used to calculate 2.7 individuals per vehicle during visits to coastal state parks. A total of 639,395 shoreline visits were estimated for the 2020-2021 study year. Adding shoreline and watercraft visits yields a total of 2,832,363 visits made annually to Guana River/GTM.

Table C-5: Calculations for estimating Guana River/GTM shoreline visits

| H | C | D | T | W | Extrapolation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hours /sample | Predicted Car Count | Duration of Count (hrs.) | Time in AP | Daily Car Estimate | % of Area | Total Daily Car Visits | User Days | Total Car Visits | Indivi-duals per Car | Total Annual Visits |
| 12 | 44.61 | 0.25 | 4.5 | 324.4 | 50.0% | 649 | 365 | 236,813 | 2.7 | 639,395 |

**Collecting, Entering and Weighting Data**

An Excel spreadsheet with columns for data entry will be provided to AP managers separately 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-6. For Guana River/GTM, staff should collect car counts from Middle and South Parking Areas 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. Data for both watercraft and shoreline visits should occur on the same day since they are near each other. Having both counts entered into the same spreadsheet table will reduce chances of input errors.

Staff will enter the sample date (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.

Staff will also enter the car count from South Parking Area in Column D to start the watercraft visit estimation process. The weighted car count for each sample date will be automatically displayed in Column E.

Car count data from the Middle Parking Area will be entered into the data entry spreadsheet (Table C-6) in Column F to start the shoreline visit estimation process. Weighted car counts from the Middle Parking Area will automatically populate Column G for shoreline visits.

The bottom of Table C-6 automatically displays the number of Sample Days, Sum of Weights, and Weighted Count Total for watercraft and shoreline visits. The last row in Table C-6 automatically displays the weighted mean count for watercraft and shoreline visits. These weighted means are derived by dividing Weighted Count Total by Sum of Weights. In the working Visitor Use Estimation spreadsheet, the weighted mean daily watercraft and shoreline counts from the bottom of the data entry table will be automatically entered into the regression equations estimating the Predicted Daily Watercraft Count and Predicted Daily Car Count in Tables C-2 and C-4, respectively.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Guana River/GTM, the data entry table for both watercraft and shoreline visits, the two regression equations, and the two use estimation tables all will appear on the same spreadsheet. At the bottom of the spreadsheet will be a cell displaying Total Aquatic Preserve/NERR Visits, which reflects the summation of annual watercraft and shoreline visits.

| Table C-6: Guana River/GTM data entry table for calculating watercraft and shoreline visits | | | | | | |
|---|---|---|---|---|---|---|
| Sample Date | Weekday or Weekend | Weight Weekday=.71 Weekend=.29 | South Parking Area Car Count | Weighted Use Total | Middle Parking Area Car Count | Weighted Use Total |
| A | B | C | D | E | F | G |
| 1/10/2021 | Weekend | 0.29 | 5 | 1.45 | 3 | 0.87 |
| 1/16/2021 | Weekend | 0.29 | 2 | 0.58 | 13 | 3.77 |
| 1/20/2021 | Weekday | 0.71 | 4 | 2.84 | 10 | 7.1 |
| 1/30/2021 | Weekend | 0.29 | 4 | 1.16 | 14 | 4.06 |
| 11/25/2020 | Weekday | 0.71 | 11 | 7.81 | 16 | 11.36 |
| 12/20/2020 | Weekend | 0.29 | 3 | 0.87 | 3 | 0.87 |
| 12/30/2020 | Weekday | 0.71 | 5 | 3.55 | 6 | 4.26 |
| 12/9/2020 | Weekday | 0.71 | 0 | 0 | 2 | 1.42 |
| 2/21/2021 | Weekend | 0.29 | 14 | 4.06 | 10 | 2.9 |
| 2/25/2021 | Weekday | 0.71 | 15 | 10.65 | 25 | 17.75 |
| 2/27/2021 | Weekend | 0.29 | 8 | 2.32 | 15 | 4.35 |
| 2/7/2021 | Weekend | 0.29 | 8 | 2.32 | 11 | 3.19 |
| 3/13/2021 | Weekday | 0.71 | 0 | 0 | 2 | 1.42 |
| 3/14/2021 | Weekend | 0.29 | 97 | 28.13 | 91 | 26.39 |
| 3/25/2021 | Weekday | 0.71 | 14 | 9.94 | 20 | 14.2 |
| 3/28/2021 | Weekend | 0.29 | 80 | 23.2 | 68 | 19.72 |
| 3/29/2021 | Weekday | 0.71 | 4 | 2.84 | 8 | 5.68 |
| 4/15/2021 | Weekday | 0.71 | 1 | 0.71 | 2 | 1.42 |
| 4/22/2021 | Weekday | 0.71 | 2 | 1.42 | 2 | 1.42 |
| 4/28/2021 | Weekday | 0.71 | 2 | 1.42 | 2 | 1.42 |
| 5/15/2021 | Weekend | 0.29 | 21 | 6.09 | 21 | 6.09 |
| 5/20/2021 | Weekday | 0.71 | 4 | 2.84 | 16 | 11.36 |
| 5/24/2021 | Weekday | 0.71 | 7 | 4.97 | 21 | 14.91 |
| 5/29/2021 | Weekend | 0.29 | 23 | 6.67 | 24 | 6.96 |
| 5/9/2021 | Weekend | 0.29 | 8 | 2.32 | 8 | 2.32 |
| 6/10/2021 | Weekday | 0.71 | 3 | 2.13 | 10 | 7.1 |
| 6/6/2021 | Weekend | 0.29 | 7 | 2.03 | 25 | 7.25 |
| Sample Days | | Sum of Weights | | Weighted Total | | Weighted Total |
| 27 | | 13.71 | | 132.32 | | 189.56 |
| Weighted Mean (Weighted Total / Weight Sum) | | | | 9.65 | | 13.83 |

## APPENDIX – D

## Pellicer Creek Aquatic Preserve
## Visitor Use Estimation

# Pellicer Creek Aquatic Preserve
# Visitor Use Estimation

## Purpose

The purpose of this Appendix is to provide details of the procedures and development for the Pellicer Creek Aquatic Preserve Visitor Use Estimation Model. This background will inform AP managers and staff about how visitor use estimation was derived and what procedures will be needed to continue use of the model in future years.

## Sampling Locations

Access to Pellicer Creek is very limited and resulted in three data collection locations for the AP shown in Table D-1. Annual visits for the GTM-NERR Southern Region, which includes visits for Pellicer Creek, are provided in a separate Appendix.

| Table D-1: Location and types of data collected at Pellicer Creek AP | | | | | | |
|---|---|---|---|---|---|---|
| | | | Dependent Variable | Independent Variables | | |
| Sample Location | GIS Coordinates | | Watercraft | Trailers | Cars | All-Vehicles |
| Helen Mellon Schmidt Park | 29.694660 | -81.225170 | | X | X | X |
| North Bridge Parking Area | 29.711696 | -81.230335 | | | X | |
| River to Sea Preserve Park | 29.662110 | -81.212420 | X | | X | |

We counted watercraft on AP waters from one area through drone photography. We were able to use the drone at only this location due to very limited access due to development and government drone use regulations. These counts were made once between 10:00 and 16:00 hours. For analysis purposes, we use watercraft counts from River to Sea Preserve for our dependent variable.

We counted boat trailers at Helen Mellon Schmidt Park and separately counted cars (non-trailered vehicles) at all three sampling locations. Counts were made between 10:00 and 16:00 hours in conjunction with watercraft counts. We used these four independent car and trailer counts plus one all-vehicle count, combining trailers and cars, from Helen Mellon Schmidt Park as independent variables.

## Predicting Watercraft Counts

The five independent variables were entered into a stepwise, least squares regression program with the summated watercraft counts as the dependent variable. Results of the regression are shown in Table D-2. Helen Mellon Schmidt Park trailer counts was the only independent variable identified that predicted watercraft counts. No other independent variable could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$) and the car counts accounted for 91.5% of the variation in watercraft counts.

Placing the mean weighted trailer count from the Helen Mellon Schmidt Park (2.92), from the regression analysis, into the regression equation in Table D-2 results in a Predicted Watercraft Count of 6.97. The Predicted Watercraft Count is calculated by adding the Constant to the product of the Mean Weighted Trailer Count and associated Beta coefficient. The Predicted Watercraft Count will become part of the Visitor Use Model in Table D-3.

Table D-2: Regression equation predicting daily watercraft counts for Pellicer Creek AP

| | North Bridge | | | | | |
|---|---|---|---|---|---|---|
| Constant | Beta | Mean Weighted Trailer Count | Predicted Watercraft Count | $R^2$ | F | P |
| 2.139 | 1.65 | 2.92 | 6.96 | .915 | 291.31 | <.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-3 is to show how the Predicted Watercraft Count in Table D-2 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 water area covered by drone watercraft counts was 45.1 percent. The area we were unable to cover was due to insufficient access.

As shown in Table D-3, an estimated 41,006 watercraft visited Pellicer Creek AP during the study year and resulted in an estimated 102,515 total watercraft visits during the year.

Table D-3: Calculations for estimating Pellicer Creek AP watercraft visits

| H | C | D | T | W | Extrapolation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hours /sample | Predicted Watercraft Count | Duration of Count (hrs.) | Time in AP | Daily Watercraft Estimate | % of Area | Total Daily Watercraft Visits | User Days | Total Water-craft Visits | Indivi-duals per Water-craft | Total Annual Visits |
| 12 | 6.96 | 0.25 | 6.6 | 50.7 | 45.1% | 112 | 365 | 41,006 | 2.5 | 102,515 |

**Collecting, Entering and Weighting Data**

An Excel spreadsheet with columns for data entry will be provided to AP managers separately 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-4. For Pellicer Creek AP, staff should collect trailer counts from Helen Mellon Schmidt Park 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 (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.

Staff will also enter the trailer count from Helen Mellon Schmidt Park in Column D to start the watercraft visit estimation process. The weighted trailer counts for each sample date will be automatically displayed in Column E.

The bottom of Table D-4 automatically displays the number of Sample Days, Sum of Weights, and Weighted Count Total for car visits. The last row in Table D-4 automatically displays the weighted mean trailer count. The weighted mean is derived by dividing Weighted Count Total by Sum of Weights. In the working Visitor Use Estimation spreadsheet, the weighted mean trailer count from the bottom of the data entry table will be automatically entered into the regression equation estimating the Predicted Watercraft Count in Tables D-2.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Pellicer Creek AP, 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.

| Table D-4: Pellicer Creek AP data entry table for calculating watercraft visits | | | | |
|---|---|---|---|---|
| Sample Date | Weekday or Weekend | Weight Weekday=.71 Weekend=.29 | Helen Mellon Schmidt Park Trailer Count | Weighted Use Total |
| A | B | C | D | E |
| 1/10/2021 | Weekend | 0.29 | 1 | 5.51 |
| 1/16/2021 | Weekend | 0.29 | 1 | 2.9 |
| 1/20/2021 | Weekday | 0.71 | 2 | 9.94 |
| 1/30/2021 | Weekend | 0.29 | 5 | 7.54 |
| 11/25/2020 | Weekday | 0.71 | 0 | 15.62 |
| 12/9/2020 | Weekday | 0.71 | 0 | 6.39 |
| 12/20/2020 | Weekend | 0.29 | 0 | 0.58 |
| 12/28/2020 | Weekday | 0.71 | 1 | 14.2 |
| 2/7/2021 | Weekend | 0.29 | 0 | 6.38 |
| 2/21/2021 | Weekend | 0.29 | 1 | 6.38 |
| 2/25/2021 | Weekday | 0.71 | 4 | 12.78 |
| 2/27/2021 | Weekend | 0.29 | 17 | 8.41 |
| 3/7/2021 | Weekend | 0.29 | 0 | 4.06 |
| 3/13/2021 | Weekend | 0.29 | 10 | 10.15 |
| 3/25/2021 | Weekday | 0.71 | 0 | 18.46 |
| 3/28/2021 | Weekend | 0.29 | 4 | 8.41 |
| 3/29/2021 | Weekday | 0.71 | 0 | 8.52 |
| 4/15/2021 | Weekday | 0.71 | 2 | 4.97 |
| 4/22/2021 | Weekday | 0.71 | 1 | 8.52 |
| 4/28/2021 | Weekday | 0.71 | 3 | 10.65 |
| 5/9/2021 | Weekend | 0.29 | 7 | 8.12 |
| 5/15/2021 | Weekend | 0.29 | 10 | 11.6 |
| 5/20/2021 | Weekday | 0.71 | 2 | 18.46 |
| 5/24/2021 | Weekday | 0.71 | 2 | 19.17 |
| 5/29/2021 | Weekend | 0.29 | 15 | 11.02 |
| 6/6/2021 | Weekend | 0.29 | 10 | 13.92 |
| 6/10/2021 | Weekday | 0.71 | 1 | 22.01 |
| Sample Days | | Sum of Weights | | Weighted Total |
| 29 | | 14.29 | | 41.72 |
| Weighted Mean (Weighted Total / Weight Sum) | | | | 2.92 |

# APPENDIX – E

## Guana Tolomato Matanzas National Estuarine Research Reserve Southern Region Visitor Use Estimation

# Guana Tolomato Matanzas National Estuarine Research Reserve Southern Region Visitor Use Estimation

**Purpose**

The purpose of this Appendix is to provide details of the procedures and development for the Guana Tolomato Matanzas National Estuarine Research Reserve (GTM South) Southern Region Visitor Use Estimation Model. This background will inform AP managers and staff about how visitor use estimation was derived and what procedures will be needed to continue use of the model in future years.

**Sampling Locations**

Access to GTM South is very limited and resulted in three data collection locations shown in Table E-1. Annual visits for the GTM South includes visits for Pellicer Creek Aquatic Preserve. Pellicer Creek AP visitor use is discussed separately in Appendix D.

Table E-1: Location and types of data collected at GTM South

| | | | Dependent Variable | Independent Variables | | |
|---|---|---|---|---|---|---|
| Sample Location | GIS Coordinates | | Watercraft | Trailers | Cars | All-Vehicles |
| Helen Mellon Schmidt Park | 29.694660 | -81.225170 | X | X | X | X |
| North Bridge Parking Area | 29.711696 | -81.230335 | | | X | |
| River to Sea Preserve Park | 29.662110 | -81.212420 | X | | X | |

We counted watercraft on GTM South waters from two areas through drone photography. We were able to use the drone at only these locations because of very limited access and government drone use regulations. These counts were made once between 10:00 and 16:00 hours. For analysis purposes, we uses combined watercraft counts from both locations for our dependent variable.

We counted boat trailers at Helen Mellon Schmidt Park and separately counted cars (non-trailered vehicles) at all three sampling locations. Counts were made between 10:00 and 16:00 hours in conjunction with watercraft counts. We used these four independent car and trailer counts plus one all-vehicle count, combining trailers and cars, from Helen Mellon Schmidt Park as independent variables.

**Predicting Watercraft Counts**

The five independent variables were entered into a stepwise, least squares regression program with the summated watercraft counts as the dependent variable. Results of the regression are shown in Table E-2. Helen Mellon Schmidt Park trailer counts was the only independent variable identified that predicted watercraft counts. No other independent variable could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$) and the car counts accounted for 91.5% of the variation in watercraft counts.

Placing the mean weighted trailer count from the Helen Mellon Schmidt Park (2.92), from the regression analysis, into the regression equation in Table D-2 results in a Predicted Watercraft Count of 22.10. The Predicted Watercraft Count is calculated by adding the Constant to the product of the Mean Weighted Trailer Count and associated Beta coefficient. The Predicted Watercraft Count will become part of the Visitor Use Model in Table E-3.

Table E-2: Regression equation predicting daily watercraft counts for GTM South

| | North Bridge | | Helen Mellon Schmidt Park | | | | | |
|---|---|---|---|---|---|---|---|---|
| Constant | Beta | Mean Weighted Car Count | Beta | Mean Weighted All-Vehicle Count | Predicted Watercraft Count | $R^2$ | F | P |
| -22.73 | 1.52 | 21.41 | .700 | 16.18 | 22.10 | .754 | 39.79 | <.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 E-3 is to show how the Predicted Watercraft Count in Table E-2 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 water area covered by drone watercraft counts was 15.6 percent. The area we were unable to cover was due to insufficient access and drone flight restrictions.

As shown in Table E-3, an estimated 376,016 watercraft visited GTM South during the study year and resulted in an estimated 940,041 total watercraft visits during the year.

Table E-3: Calculations for estimating GTM South watercraft visits

| H | C | D | T | W | Extrapolation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hours /sample | Predicted Watercraft Count | Duration of Count (hrs.) | Time in AP | Daily Watercraft Estimate | % of Area | Total Daily Watercraft Visits | User Days | Total Water-craft Visits | Indivi-duals per Water-craft | Total Annual Visits |
| 12 | 22.10 | 0.25 | 6.6 | 160.7 | 15.6% | 1,030 | 365 | 376,016 | 2.5 | 940,041 |

## Collecting, Entering and Weighting Data

An Excel spreadsheet with columns for data entry will be provided to AP managers separately 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-4. For GTM South, staff should collect all-vehicle counts from Helen Mellon Schmidt Park and North Bridge 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 (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.

Staff will also enter the all-vehicle counts from Helen Mellon Schmidt Park in Column D to start the watercraft visit estimation process. The weighted all-vehicle counts for each sample date will be automatically displayed in Column E.

Car count data from the North Bridge Parking Area will be entered into the data entry spreadsheet (Table E-4) in Column F to start the shoreline visit estimation process. Weighted car counts from the North Bridge Parking Area will automatically populate Column G for car visits.

The bottom of Table E-4 automatically displays the number of Sample Days, Sum of Weights, and Weighted Count Total for all-vehicle visits and car visits. The last row in Table E-4 automatically displays the weighted means for all-vehicle and car count variables. The weighted mean is derived by dividing Weighted Count Total by Sum of Weights. In the working Visitor Use Estimation spreadsheet, the weighted mean all-vehicle and weighted mean car counts from the bottom of the data entry table will be automatically entered into the regression equation estimating the Predicted Watercraft Count in Tables E-2.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For GTM South, the data entry table for all-vehicle and 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.

| Table D-4: Pellicer Creek AP data entry table for calculating watercraft visits | | | | |
|---|---|---|---|---|
| Sample Date | Weekday or Weekend | Weight Weekday=.71 Weekend=.29 | Helen Mellon Schmidt Park Trailer Count | Weighted Use Total |
| A | B | C | D | E |
| 1/10/2021 | Weekend | 0.29 | 1 | 5.51 |
| 1/16/2021 | Weekend | 0.29 | 1 | 2.9 |
| 1/20/2021 | Weekday | 0.71 | 2 | 9.94 |
| 1/30/2021 | Weekend | 0.29 | 5 | 7.54 |
| 11/25/2020 | Weekday | 0.71 | 0 | 15.62 |
| 12/9/2020 | Weekday | 0.71 | 0 | 6.39 |
| 12/20/2020 | Weekend | 0.29 | 0 | 0.58 |
| 12/28/2020 | Weekday | 0.71 | 1 | 14.2 |
| 2/7/2021 | Weekend | 0.29 | 0 | 6.38 |
| 2/21/2021 | Weekend | 0.29 | 1 | 6.38 |
| 2/25/2021 | Weekday | 0.71 | 4 | 12.78 |
| 2/27/2021 | Weekend | 0.29 | 17 | 8.41 |
| 3/7/2021 | Weekend | 0.29 | 0 | 4.06 |
| 3/13/2021 | Weekend | 0.29 | 10 | 10.15 |
| 3/25/2021 | Weekday | 0.71 | 0 | 18.46 |
| 3/28/2021 | Weekend | 0.29 | 4 | 8.41 |
| 3/29/2021 | Weekday | 0.71 | 0 | 8.52 |
| 4/15/2021 | Weekday | 0.71 | 2 | 4.97 |
| 4/22/2021 | Weekday | 0.71 | 1 | 8.52 |
| 4/28/2021 | Weekday | 0.71 | 3 | 10.65 |
| 5/9/2021 | Weekend | 0.29 | 7 | 8.12 |
| 5/15/2021 | Weekend | 0.29 | 10 | 11.6 |
| 5/20/2021 | Weekday | 0.71 | 2 | 18.46 |
| 5/24/2021 | Weekday | 0.71 | 2 | 19.17 |
| 5/29/2021 | Weekend | 0.29 | 15 | 11.02 |
| 6/6/2021 | Weekend | 0.29 | 10 | 13.92 |
| 6/10/2021 | Weekday | 0.71 | 1 | 22.01 |
| Sample Days | | Sum of Weights | | Weighted Total |
| 29 | | 14.29 | | 41.72 |
| Weighted Mean (Weighted Total / Weight Sum) | | | | 2.92 |

# APPENDIX – F

## Tomoka Marsh Aquatic Preserve
## Visitor Use Estimation

# Tomoka Marsh Aquatic Preserve
# Visitor Use Estimation

### Purpose

The purpose of this Appendix is to provide details of the procedures and development for the Tomoka Marsh Aquatic Preserve Visitor Use Estimation Model. This background will inform AP managers and staff about how visitor use estimation was derived and what procedures will be needed to continue use of the model in future years.

### Sampling Locations

Access to Tomoka Marsh is somewhat limited and resulted in four data collection locations in the AP shown in Table F-1.

Table F-1: Location and types of data collected at Tomoka Marsh AP

| | | | Dependent Variable | Independent Variables | | |
|---|---|---|---|---|---|---|
| Sample Location | GIS Coordinates | | Watercraft | Trailers | Cars | Trailers + Cars |
| Gamble Rogers State Park | 29.437885 | -81.111939 | X | X | X | X |
| North Peninsula State Park | 29.409855 | -81.099610 | X | | X | |
| High Bridge Boat Ramp | 29.408685 | -81.100337 | | X | X | X |
| Tomoka State Park | 29.348640 | -81.088704 | X | X | X | X |

We counted watercraft on AP waters from three areas through drone photography. We were able to use the drone at only these locations due to local government drone flight restrictions. These counts were made once between 10:00 and 16:00 hours. For analysis purposes, we combined watercraft counts from the three areas for our dependent variable.

We counted boat trailers at three locations and separately counted cars (non-trailered vehicles) at all four sampling locations. Counts were made between 10:00 and 16:00 hours in conjunction with watercraft counts. We used these seven independent car and trailer counts plus three all-vehicle counts, combining trailers and cars, as independent variables.

### Predicting Watercraft Counts

The ten independent variables were entered into a stepwise, least squares regression program with the summated watercraft counts as the dependent variable. Results of the regression are shown in Table F-2. Tomoka State Park (TSP) all-vehicle counts and High Bridge Boat Ramp trailer counts were the two independent variables identified that predicted watercraft counts. No other independent variables could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$) and the trailer and all-vehicle counts accounted for 68.4% of the variation in watercraft counts.

Placing the mean weighted all-vehicle counts from Tomoka State Park (9.28) and trailer counts from High Bridge Boat Ramp (3.57), from the regression analysis, into the regression equation in Table F-2 results in a Predicted Watercraft Count of 13.14. The Predicted Watercraft Count is calculated by adding the Constant, the product of the Mean Weighted TSP All-Vehicle Count and Beta coefficient for TSP, and the product of Beta and Mean Weighted Trailer Count for High Bridge Boat Ramp together. The Predicted Watercraft Count will become part of the Visitor Use Model in Table F-3.

Table F-2: Regression equation predicting daily watercraft counts for Tomoka Marsh AP

| | Tomoka State Park | | High Bridge Boat Ramp | | | | | |
|---|---|---|---|---|---|---|---|---|
| Constant | Beta | Mean Weighted All-Vehicle Count | Beta | Mean Weighted Trailer Count | Predicted Watercraft Count | $R^2$ | F | P |
| -5.461 | 1.24 | 9.28 | 1.97 | 3.57 | 13.14 | .684 | 25.93 | <.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-3 is to show how the Predicted Watercraft Count in Table F-2 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 water area covered by drone watercraft counts was 30.18 percent. The area we were unable to cover was due to insufficient access.

As shown in Table F-3, an estimated 115,615 watercraft visited Tomoka Marsh AP during the study year and resulted in an estimated 289,039 total watercraft visits during the year.

Table F-3: Calculations for estimating Tomoka Marsh AP watercraft visits

| H | C | D | T | W | Extrapolation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hours /sample | Predicted Watercraft Count | Duration of Count (hrs.) | Time in AP | Daily Watercraft Estimate | % of Area | Total Daily Watercraft Visits | User Days | Total Water-craft Visits | Indivi-duals per Water-craft | Total Annual Visits |
| 12 | 13.14 | 0.25 | 6.6 | 95.6 | 30.18 | 317 | 365 | 115,615 | 2.5 | 289,039 |

**Collecting, Entering and Weighting Data**

An Excel spreadsheet with columns for data entry will be provided to AP managers separately 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-4. For Tomoka Marsh AP, staff should collect trailer and car (all-vehicle) counts from Tomoka State Park and trailer counts from High Bridge 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. Data collection for trailer and car counts should occur on the same day. Having both counts entered into the same spreadsheet table will reduce chances of input errors.

Staff will enter the sample date (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.

Staff will also enter the all-vehicle count from Tomoka State Park in Column D to start the watercraft visit estimation process. The weighted all-vehicle count for each sample date will be automatically displayed in Column E.

Trailer count data from the High Bridge Boat Ramp will be entered into the data entry spreadsheet (Table F-4) in Column F for the second sampling area. Weighted trailer counts from the High Bridge Boat Ramp will automatically populate Column G for watercraft visits.

The bottom of Table F-4 automatically displays the number of Sample Days, Sum of Weights, and Weighted Count Total for all-vehicle and trailer visits. The last row in Table F-4 automatically displays the weighted mean daily count for all-vehicle and trailer visits. These weighted means are derived by dividing Weighted Count Total by Sum of Weights. In the working Visitor Use Estimation spreadsheet, the weighted mean counts from the bottom of the data entry table will be automatically entered into the regression equation estimating the Predicted Watercraft Count in Tables F-2.

The working spreadsheet AP staff will use includes all components for estimating total visits. For Tomoka Marsh AP, the data entry table for TSP all-vehicle and High Bridge Boat Ramp 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.

| Table F-4: Tomoka Marsh AP data entry table for calculating watercraft visits | | | | | | | |
|---|---|---|---|---|---|---|---|
| Sample Date | Weekday or Weekend | Weight Weekday=.71 Weekend=.29 | TSP All-Vehicle Count | Weighted Use Total | | High Bridge Trailer Count | Weighted Use Total |
| A | B | C | D | E | | F | G |
| 1/10/2021 | Weekend | 0.29 | 6 | 1.74 | | 2 | 0.58 |
| 1/16/2021 | Weekend | 0.29 | 1 | 0.29 | | 3 | 0.87 |
| 1/20/2021 | Weekday | 0.71 | 6 | 4.26 | | 3 | 2.13 |
| 1/30/2021 | Weekend | 0.29 | 11 | 3.19 | | 10 | 2.9 |
| 11/25/2020 | Weekday | 0.71 | 6 | 4.26 | | 4 | 2.84 |
| 12/9/2020 | Weekday | 0.71 | 8 | 5.68 | | 3 | 2.13 |
| 12/20/2020 | Weekend | 0.29 | 6 | 1.74 | | 2 | 0.58 |
| 12/28/2020 | Weekend | 0.29 | 16 | 4.64 | | 5 | 1.45 |
| 2/7/2021 | Weekend | 0.29 | 3 | 0.87 | | 2 | 0.58 |
| 2/21/2021 | Weekend | 0.29 | 12 | 3.48 | | 1 | 0.29 |
| 2/27/2021 | Weekend | 0.29 | 35 | 10.15 | | 8 | 2.32 |
| 3/7/2021 | Weekend | 0.29 | 9 | 2.61 | | 1 | 0.29 |
| 3/13/2021 | Weekend | 0.29 | 18 | 5.22 | | 9 | 2.61 |
| 3/25/2021 | Weekday | 0.71 | 4 | 2.84 | | 1 | 0.71 |
| 3/28/2021 | Weekend | 0.29 | 6 | 1.74 | | 1 | 0.29 |
| 4/15/2021 | Weekday | 0.71 | 3 | 2.13 | | 2 | 1.42 |
| 4/22/2021 | Weekday | 0.71 | 10 | 7.1 | | 2 | 1.42 |
| 4/28/2021 | Weekday | 0.71 | 4 | 2.84 | | 6 | 4.26 |
| 5/9/2021 | Weekend | 0.29 | 14 | 4.06 | | 5 | 1.45 |
| 5/15/2021 | Weekend | 0.29 | 17 | 4.93 | | 3 | 0.87 |
| 5/20/2021 | Weekday | 0.71 | 12 | 8.52 | | 1 | 0.71 |
| 5/24/2021 | Weekday | 0.71 | 10 | 7.1 | | 5 | 3.55 |
| 5/29/2021 | Weekend | 0.29 | 19 | 5.51 | | 10 | 2.9 |
| 6/6/2021 | Weekend | 0.29 | 12 | 3.48 | | 11 | 3.19 |
| 6/10/2021 | Weekday | 0.71 | 12 | 8.52 | | 1 | 0.71 |
| Sample Days | | Sum of Weights | | Weighted Total | | | Weighted Total |
| 27 | | 12.45 | | 115.54 | | | 44.5 |
| Weighted Mean (Weighted Total / Weight Sum) | | | | 9.28 | | | 3.57 |

# APPENDIX – G

# Mosquito Lagoon Aquatic Preserve
# Visitor Use Estimation

# Mosquito Lagoon Aquatic Preserve
# Visitor Use Estimation

## Purpose

The purpose of this Appendix is to provide details of the procedures and development for the Mosquito Lagoon Aquatic Preserve Visitor Use Estimation Model. This background will inform AP managers and staff about how visitor use estimation was derived and what procedures will be needed to continue use of the model in future years.

## Sampling Locations

Access to Mosquito Lagoon is somewhat limited and resulted in four data collection locations in the AP shown in Table G-1.

Table G-1: Location and types of data collected at Mosquito Lagoon AP

| | | | Dependent Variable | Independent Variables | | |
|---|---|---|---|---|---|---|
| Sample Location | GIS Coordinates | | Watercraft | Trailers | Cars | Trailers + Cars |
| George R. Kennedy | 28.993536 | -80.903486 | | X | X | X |
| Maynard May Park | 28.989155 | -80.901060 | X | X | X | X |
| Veterans Memorial Park | 28.973033 | -80.892052 | X | X | X | X |
| JB'S Fish Camp | 28.946229 | -80.838383 | X | | | |

We counted watercraft on AP waters from three areas through drone photography. We were able to use the drone at only these locations due to local government drone flight restrictions. These counts were made once between 10:00 and 16:00 hours. For analysis purposes, we combined watercraft counts from the three areas for our dependent variable.

We counted boat trailers and cars at three sampling locations. Counts were made between 10:00 and 16:00 hours in conjunction with watercraft counts. We used these six independent car and trailer counts plus three all-vehicle counts, combining trailers and cars, as independent variables.

## Predicting Watercraft Counts

The nine independent variables were entered into a stepwise, least squares regression program with the summated watercraft counts as the dependent variable. Results of the regression are shown in Table G-2. The Maynard May Park boat trailer count was the only independent variable identified that predicted watercraft counts. No other independent variables could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$), and the car counts accounted for 76.6% of the variation in watercraft counts.

Placing the mean weighted trailer counts from Maynard May Park (8.19), from the regression analysis, into the regression equation in Table G-2 results in a Predicted Watercraft Count of 28.64. The Predicted Watercraft Count is calculated by adding the Constant to the product of the Mean Weighted Maynard May Park Trailer Count and Beta coefficient for Maynard May Park. The Predicted Watercraft Count will become part of the Visitor Use Model in Table G-3.

| Table G-2: Regression equation predicting daily watercraft counts for Mosquito Lagoon AP | | | | | | |
|---|---|---|---|---|---|---|
| | Maynard May Park | | | | | |
| Constant | Beta | Mean Weighted Trailer Count | Predicted Watercraft Count | $R^2$ | F | P |
| 17.75 | 1.33 | 8.19 | 28.64 | .766 | 59.01 | <.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 G-3 is to show how the Predicted Watercraft Count in Table G-2 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 water area covered by drone watercraft counts was 19.68% percent. The area we were unable to cover was primarily due to insufficient access.

As shown in Table G-3, an estimated 386,225 watercraft visited Mosquito Lagoon AP during the study year and resulted in an estimated 965,562 total watercraft visits during the year.

| Table F-3: Calculations for estimating Mosquito Lagoon AP watercraft visits | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| H | C | D | T | W | Extrapolation | | | | | |
| Hours /sample | Predicted Watercraft Count | Duration of Count (hrs.) | Time in AP | Daily Watercraft Estimate | % of Area | Total Daily Watercraft Visits | User Days | Total Water-craft Visits | Indivi-duals per Water-craft | Total Annual Visits |
| 12 | 28.64 | 0.25 | 6.6 | 208.3 | 19.68 | 1058 | 365 | 386,225 | 2.5 | 965,562 |

**Collecting, Entering and Weighting Data**

An Excel spreadsheet with columns for data entry will be provided to AP managers separately 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-4. For Mosquito Lagoon AP, staff should collect trailer counts from Maynard May Park 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 (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.

Staff will also enter the trailer count from Maynard May Park in Column D to start the watercraft visit estimation process. The weighted trailer count for each sample date will be automatically displayed in Column E.

The bottom of Table G-4 automatically displays the number of Sample Days, Sum of Weights, and Weighted Count Total for trailer visits. The last row in Table G-4 automatically displays the weighted mean trailer count. The weighted mean is derived by dividing Weighted Count Total by Sum of Weights. In the working Visitor Use Estimation spreadsheet, the weighted mean count from the bottom of the data entry table will be automatically entered into the regression equation estimating the Predicted Watercraft Count in Tables G-2.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Mosquito Lagoon AP, 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.

Table G-4: Mosquito Lagoon AP data entry table for calculating watercraft visits

| Sample Date | Weekday or Weekend | Weight Weekday=.71 Weekend=.29 | Maynard May Trailer Count | Weighted Use Total |
|---|---|---|---|---|
| A | B | C | D | E |
| 11/5/2020 | Weekday | 0.71 | 16 | 11.36 |
| 12/17/2020 | Weekday | 0.71 | 0 | 0 |
| 12/20/2020 | Weekend | 0.29 | 4 | 1.16 |
| 1/10/2021 | Weekday | 0.71 | 2 | 1.42 |
| 1/11/2021 | Weekend | 0.29 | 2 | 0.58 |
| 1/23/2021 | Weekend | 0.29 | 7 | 2.03 |
| 2/21/2021 | Weekend | 0.29 | 4 | 1.16 |
| 2/22/2021 | Weekday | 0.71 | 5 | 3.55 |
| 3/11/2021 | Weekday | 0.71 | 5 | 3.55 |
| 3/14/2021 | Weekend | 0.29 | 32 | 9.28 |
| 3/20/2021 | Weekend | 0.29 | 1 | 0.29 |
| 4/15/2021 | Weekday | 0.71 | 7 | 4.97 |
| 4/18/2021 | Weekend | 0.29 | 14 | 4.06 |
| 4/24/2021 | Weekend | 0.29 | 8 | 2.32 |
| 5/13/2021 | Weekday | 0.71 | 0 | 0 |
| 5/16/2021 | Weekend | 0.29 | 38 | 11.02 |
| 5/22/2021 | Weekend | 0.29 | 19 | 5.51 |
| 6/12/2021 | Weekend | 0.29 | 34 | 9.86 |
| 6/13/2021 | Weekend | 0.29 | 5 | 1.45 |
| Sample Days | | Sum of Weights | | Weighted Total |
| 20 | | 9.16 | | 74.99 |
| Weighted Mean (Weighted Total / Weight Sum) | | | | 8.19 |

# APPENDIX – H

# Banana River Aquatic Preserve Visitor Use Estimation

# Banana River Aquatic Preserve
# Visitor Use Estimation

### Purpose

The purpose of this Appendix is to provide details of the procedures and development for Banana River Aquatic Preserve Visitor Use Estimation Model. This background will inform AP managers and staff about how visitor use estimation was derived and what procedures will be needed to continue use of the model in future years.

### Sampling Locations

Access to Banana River is somewhat limited and resulted in four data collection locations in the AP shown in Table H-1.

Table H-1: Location and types of data collected at Banana River AP

| | | | Dependent Variable | Independent Variables | | |
|---|---|---|---|---|---|---|
| Sample Location | GIS Coordinates | | Watercraft | Trailers | Cars | All Vehicles |
| Kelly Park | 28.401877 | -80.662103 | X | X | X | X |
| Kiwanis Island Park | 28.36149 | -80.676597 | X | X | X | X |
| Ramp Road | 28.309092 | -80.614193 | | X | X | X |
| Constitutional Bicentennial Park | 28.357342 | -80.628504 | | X | X | X |

We counted watercraft on AP waters from two areas through drone photography. We were able to use the drone at only these locations due to local government drone flight restrictions. These counts were made once between 10:00 and 16:00 hours. For analysis purposes, we combined watercraft counts from the two areas for our dependent variable.

We counted boat trailers and cars at four sampling locations. Counts were made between 10:00 and 16:00 hours in conjunction with watercraft counts. We used these eight independent car and trailer counts plus four all-vehicle counts, combining trailers and cars, as independent variables.

### Predicting Watercraft Counts

The 12 independent variables were entered into a stepwise, least squares regression program with the summated watercraft counts as the dependent variable. Results of the regression are shown in Table H-2. The Kiwanis Island Park all-vehicle count was the only independent variable identified that predicted watercraft counts. No other independent variables could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$), and the all-vehicle counts accounted for 60.7% of the variation in watercraft counts.

Placing the mean weighted all-vehicle counts from Kiwanis Island Park (10.06), from the regression analysis, into the regression equation in Table H-2 results in a Predicted Watercraft Count of 19.82. The Predicted Watercraft Count is calculated by adding the Constant to the product of the Mean Weighted All-Vehicle Count and Beta coefficient for Kiwanis Island Park. The Predicted Watercraft Count will become part of the Visitor Use Model in Table H-3.

Table G-2: Regression equation predicting daily watercraft counts for Banana River AP

| | Kiwanis Island Park | | | | | |
|---|---|---|---|---|---|---|
| Constant | Beta | Mean Weighted All-Vehicle Count | Predicted Watercraft Count | $R^2$ | F | P |
| 10.60 | .916 | 10.06 | 19.82 | .607 | 26.29 | <.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-3 is to show how the Predicted Watercraft Count in Table H-2 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 water area covered by drone watercraft counts was 8.9% percent. The area we were unable to cover was primarily due to insufficient access and local government restrictions on drone flights.

As shown in Table H-3, an estimated 591,036 watercraft visited Banana River AP during the study year and resulted in an estimated 1,477,590 total watercraft visits during the year.

Table G-3: Calculations for estimating Banana River AP watercraft visits

| Estimation | | | | | Extrapolation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hours /sample | Predicted Watercraft Count | Duration of Count (hrs.) | Time in AP | Daily Watercraft Estimate | % of Area | Total Daily Watercraft Visits | User Days | Total Water-craft Visits | Indivi-duals per Water-craft | Total Annual Visits |
| 12 | 19.82 | 0.25 | 6.6 | 144.1 | 8.9% | 1,619 | 365 | 591,036 | 2.5 | 1,477,590 |

**Collecting, Entering and Weighting Data**

An Excel spreadsheet with columns for data entry will be provided to AP managers separately 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-4. For Banana River AP, staff should collect all-vehicle counts from Kiwanis Island Park 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 (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 weekday weight is .71.

Staff will also enter the all-vehicle count from Kiwanis Island Park in Column D to start the watercraft visit estimation process. The weighted all-vehicle count for each sample date will be automatically displayed in Column E.

The bottom of Table H-4 automatically displays the number of Sample Days, Sum of Weights, and Weighted Count Total for all-vehicle visits. The last row in Table H-4 automatically displays the weighted mean count for all-vehicle visits. The weighted mean is derived by dividing Weighted Count Total by Sum of Weights. In the working Visitor Use Estimation spreadsheet, the weighted mean count from the bottom of the data entry table will be automatically entered into the regression equation estimating the Predicted Watercraft Count in Tables H-2.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Banana River AP, the data entry table for all-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.

| Table H-4: Banana River AP data entry table for calculating watercraft visits | | | | |
|---|---|---|---|---|
| Sample Date | Weekday or Weekend | Weight Weekday=.71 Weekend=.29 | Kiwanis Island All- Vehicle Counts | Weighted Use Total |
| A | B | C | D | E |
| 1/10/2021 | Weekend | 0.29 | 5 | 1.45 |
| 1/11/2021 | Weekday | 0.71 | 13 | 9.23 |
| 1/23/2021 | Weekend | 0.29 | 2 | 0.58 |
| 11/10/2020 | Weekday | 0.71 | 3 | 2.13 |
| 12/17/2020 | Weekday | 0.71 | 3 | 2.13 |
| 12/20/2020 | Weekend | 0.29 | 15 | 4.35 |
| 2/21/2021 | Weekend | 0.29 | 7 | 2.03 |
| 2/22/2021 | Weekday | 0.71 | 5 | 3.55 |
| 3/11/2021 | Weekday | 0.71 | 4 | 2.84 |
| 3/14/2021 | Weekend | 0.29 | 30 | 8.7 |
| 3/20/2021 | Weekend | 0.29 | 9 | 2.61 |
| 4/15/2021 | Weekday | 0.71 | 4 | 2.84 |
| 4/18/2021 | Weekend | 0.29 | 27 | 7.83 |
| 5/13/2021 | Weekday | 0.71 | 4 | 2.84 |
| 5/16/2021 | Weekend | 0.29 | 18 | 5.22 |
| 5/22/2021 | Weekend | 0.29 | 14 | 4.06 |
| 6/12/2021 | Weekend | 0.29 | 40 | 11.6 |
| 6/13/2021 | Weekend | 0.29 | 23 | 6.67 |
| Sample Days | | Sum of Weights | | Weighted Total |
| 19 | | 8.87 | | 89.18 |
| Weighted Mean (Weighted Total / Weight Sum) | | | | 10.06 |

# APPENDIX – I

## Indian River-Malabar to Vero Beach Aquatic Preserve
## Visitor Use Estimation

# Indian River – Malabar to Vero Beach Aquatic Preserve Visitor Use Estimation

**Purpose**

The purpose of this Appendix is to provide details of the procedures and development for the Indian River – Malabar to Vero Beach Aquatic Preserve (Malabar to Vero Beach) Visitor Use Estimation Model. This background will inform AP managers and staff about how visitor use estimation was derived and what procedures will be needed to continue use of the model in future years.

**Sampling Locations**

Access to Malabar to Vero Beach is somewhat limited and resulted in four data collection locations in the AP shown in Table I-1.

Table I-1: Location and types of data collected at Indian River-Malabar to Vero Beach AP

| | | | Dependent Variable | Independent Variables | | |
|---|---|---|---|---|---|---|
| Sample Location | GIS Coordinates | | Watercraft | Trailers | Cars | All Vehicles |
| Pollack Park | 28.032496 | -80.582882 | X | X | X | X |
| Christianson Boat Landing | 27.931447 | -80.526801 | X | X | X | X |
| Wabasso Causeway | 27.756598 | -80.422529 | X | X | X | X |
| Sebastian Inlet State Park | 27.848857 | -80.455772 | X | X | X | X |
| MacWilliams Boat Ramp | 27.654341 | -80.369469 | | X | X | X |
| Main Street Boat Ramp | 27.817659 | -80.468649 | | X | X | X |

We counted watercraft on AP waters from four areas through drone photography. We were able to use the drone at only these locations due to local government drone flight restrictions. These counts were made once between 10:00 and 16:00 hours. For analysis purposes, we combined watercraft counts from the four areas for our dependent variable.

We counted boat trailers and cars at six sampling locations. Counts were made between 10:00 and 16:00 hours in conjunction with watercraft counts. We used these 12 independent car and trailer counts plus six all-vehicle counts, combining trailers and cars, as independent variables.

**Predicting Watercraft Counts**

The 18 independent variables were entered into a stepwise, least squares regression program with the summated watercraft counts as the dependent variable. Results of the regression are shown in Table I-2. The Christianson Boat Landing trailer count was the only independent variable identified that predicted watercraft counts. No other independent variables could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$), and the all-vehicle counts accounted for 80.8% of the variation in watercraft counts.

Placing the mean weighted trailer counts from Christianson Boat Landing (33.10), from the regression analysis, into the regression equation in Table I-2 results in a Predicted Watercraft Count of 44.11. The Predicted Watercraft Count is calculated by adding the Constant to the product of the Mean Weighted Trailer Count and Beta coefficient for Christianson Boat Landing. The Predicted Watercraft Count will become part of the Visitor Use Model in Table I-3.

Table I-2: Regression equation predicting daily watercraft counts for Malabar to Vero AP

| | Christianson Boat Landing | | | | | |
|---|---|---|---|---|---|---|
| Constant | Beta | Mean Weighted Trailer Count | Predicted Watercraft Count | $R^2$ | F | P |
| 14.49 | .895 | 33.10 | 44.11 | .808 | 75.58 | <.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 I-3 is to show how the Predicted Watercraft Count in Table I-2 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 water area covered by drone watercraft counts was 11.7% percent. The area we were unable to cover was primarily due to insufficient access and local government restrictions on drone flights.

As shown in Table I-3, an estimated 1,001,040 watercraft visited Malabar to Vero Beach AP during the study year and resulted in an estimated 2,502,601 total watercraft visits during the year.

Table I-3: Calculations for estimating Malabar to Vero AP watercraft visits

| Estimation | | | | | Extrapolation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hours /sample | Predicted Watercraft Count | Duration of Count (hrs.) | Time in AP | Daily Watercraft Estimate | % of Area | Total Daily Watercraft Visits | User Days | Total Water-craft Visits | Indivi-duals per Water-craft | Total Annual Visits |
| 12 | 44.11 | 0.25 | 6.6 | 320.9 | 11.7% | 2,743 | 365 | 1,001,040 | 2.5 | 2,502,601 |

**Collecting, Entering and Weighting Data**

An Excel spreadsheet with columns for data entry will be provided to AP managers separately 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-4. For Malabar to Vero AP, staff should collect trailer counts from Christianson Boat 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.

Staff will enter the sample date (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 weekday weight is .71.

Staff will also enter the trailer count from Christianson Boat Landing in Column D to start the watercraft visit estimation process. The weighted trailer count for each sample date will be automatically displayed in Column E.

The bottom of Table I-4 automatically displays the number of Sample Days, Sum of Weights, and Weighted Count Total for trailer visits. The last row in Table I-4 automatically displays the weighted mean count for trailer visits. The weighted mean is derived by dividing Weighted Count Total by Sum of Weights. In the working Visitor Use Estimation spreadsheet, the weighted mean trailer count from the bottom of the data entry table will be automatically entered into the regression equation estimating the Predicted Watercraft Count in Tables I-2.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Christianson Boat Landing AP, 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.

| Table I-4: Malabar to Vero AP data entry table for calculating watercraft visits | | | | |
|---|---|---|---|---|
| Sample Date | Weekday or Weekend | Weight Weekday=.71 Weekend=.29 | Kiwanis Island All Vehicles Count | Weighted Use Total |
| A | B | C | D | E |
| 1/10/2021 | Weekend | 0.29 | 14 | 4.06 |
| 1/11/2021 | Weekday | 0.71 | 17 | 12.07 |
| 1/21/2021 | Weekday | 0.71 | 72 | 51.12 |
| 11/17/2020 | Weekday | 0.71 | 9 | 6.39 |
| 12/17/2020 | Weekday | 0.71 | 11 | 7.81 |
| 12/20/2020 | Weekend | 0.29 | 34 | 9.86 |
| 2/21/2021 | Weekend | 0.29 | 6 | 1.74 |
| 2/22/2021 | Weekday | 0.71 | 16 | 11.36 |
| 3/11/2021 | Weekday | 0.71 | 20 | 14.2 |
| 3/14/2021 | Weekend | 0.29 | 93 | 26.97 |
| 3/20/2021 | Weekend | 0.29 | 53 | 15.37 |
| 4/15/2021 | Weekday | 0.71 | 34 | 24.14 |
| 4/18/2021 | Weekend | 0.29 | 59 | 17.11 |
| 4/24/2021 | Weekend | 0.29 | 6 | 1.74 |
| 5/13/2021 | Weekday | 0.71 | 6 | 4.26 |
| 5/16/2021 | Weekend | 0.29 | 42 | 12.18 |
| 5/22/2021 | Weekend | 0.29 | 35 | 10.15 |
| 6/12/2021 | Weekend | 0.29 | 115 | 33.35 |
| 6/13/2021 | Weekend | 0.29 | 144 | 41.76 |
| Sample Days | | Sum of Weights | | Weighted Total |
| 20 | | 9.58 | | 317.0 |
| Weighted Mean (Weighted Total / Weight Sum) | | | | 33.10 |

# APPENDIX – J

## Indian River-Vero Beach to Ft. Pierce Aquatic Preserve Visitor Use Estimation

# Indian River-Vero Beach to Ft. Pierce Aquatic Preserve
# Visitor Use Estimation

## Purpose

The purpose of this Appendix is to provide details of the procedures and development for the Indian River – Vero Beach to Ft. Pierce Aquatic Preserve (Vero Beach to Ft. Pierce) Visitor Use Estimation Model. This background will inform AP managers and staff about how visitor use estimation was derived and what procedures will be needed to continue use of the model in future years.

## Sampling Locations

Access to Vero Beach to Ft. Pierce AP is somewhat limited and resulted in four data collection locations in the AP shown in Table J-1.

Table J-1: Location and types of data collected at Indian River-Vero Beach to Ft. Pierce AP

| | | | Dependent Variable | Independent Variables | | |
|---|---|---|---|---|---|---|
| Sample Location | GIS Coordinates | | Watercraft | Trailers | Cars | All Vehicles |
| Round Island | 27.561021 | -80.328416 | X | X | X | X |
| North Causeway | 27.473548 | -80.322432 | X | x | x | x |
| Oslo Road Boat Ramp | 27.586681 | -80.365398 | | X | X | X |
| Stan Blum Park | 27.479907 | -80.311565 | | X | X | X |

We counted watercraft on AP waters from two areas through drone photography. We were able to use the drone at only these locations due to local government drone flight restrictions. These counts were made once between 10:00 and 16:00 hours. For analysis purposes, we combined watercraft counts from the two areas for our dependent variable.

We counted boat trailers and cars at four sampling locations. Counts were made between 10:00 and 16:00 hours in conjunction with watercraft counts. We used these eight independent car and trailer counts plus four all-vehicle counts, combining trailers and cars, as independent variables.

## Predicting Watercraft Counts

The 12 independent variables were entered into a stepwise, least squares regression program with the summated watercraft counts as the dependent variable. Results of the regression are shown in Table J-2. North Causeway trailer count and car count variables both entered the regression equation separately as independent predictors of watercraft counts. No other independent variables could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$) and the trailer and car counts accounted for 67.9% of the variation in watercraft counts.

Placing the mean weighted North Causeway trailer (24.05) and car (13.89) counts, from the regression analysis, into the regression equation in Table J-2 results in a Predicted Watercraft Count of 19.30. The Predicted Watercraft Count is calculated by adding the Constant to the product of the Mean Weighted Trailer Count and Beta coefficient plus the product of the Mean Weighted Car Count and Beta coefficient for Christianson Boat Landing. The Predicted Watercraft Count will become part of the Visitor Use Model in Table J-3.

Table J-2: Regression equation predicting daily watercraft counts for Vero Beach to Ft. Pierce AP

| | North Causeway | | North Causeway | | | | | |
|---|---|---|---|---|---|---|---|---|
| Constant | Beta | Mean Weighted Trailer Count | Beta | Mean Weighted Car Count | Predicted Watercraft Count | $R^2$ | F | P |
| 6.70 | .434 | 24.05 | .156 | 13.89 | 19.30 | .679 | 17.95 | <.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-3 is to show how the Predicted Watercraft Count in Table J-2 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 water area covered by drone watercraft counts was 15.8% percent. The area we were unable to cover was primarily due to insufficient access and local government restrictions on drone flights.

As shown in Table J-3, an estimated 324,387 watercraft visited Vero Beach to Ft. Pierce AP during the study year and resulted in an estimated 810,968 total watercraft visits during the year.

Table J-3: Calculations for estimating Vero Beach to Ft. Pierce AP watercraft visits

| Estimation | | | | | Extrapolation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hours /sample | Predicted Watercraft Count | Duration of Count (hrs.) | Time in AP | Daily Watercraft Estimate | % of Area | Total Daily Watercraft Visits | User Days | Total Water-craft Visits | Indivi-duals per Water-craft | Total Annual Visits |
| 12 | 19.30 | 0.25 | 6.6 | 140.4 | 15.8% | 889 | 365 | 324,387 | 2.5 | 810,968 |

### Collecting, Entering and Weighting Data

An Excel spreadsheet with columns for data entry will be provided to AP managers separately 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-4. For Vero Beach to Ft. Pierce AP, staff should collect separate trailer and car counts from North Causeway Park 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 (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 weekday weight is .71.

Staff will also enter the trailer counts from North Causeway in Column D to start the watercraft visit estimation process. The weighted trailer count for each sample date will be automatically displayed in Column E. The car counts from North Causeway will be entered in Column F with the weighted count displayed in Column G.

The bottom of Table J-4 automatically displays the number of Sample Days, Sum of Weights, and Weighted Count Total for trailer and car visits. The last row in Table J-4 automatically displays the weighted mean counts for trailer and car visits. The weighted mean is derived by dividing Weighted Count Total by Sum of Weights. In the working Visitor Use Estimation spreadsheet, the weighted mean trailer and car counts from the bottom of the data entry table will be automatically entered into the regression equation estimating the Predicted Watercraft Count in Tables J-2.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Indian River-Vero Beach to Ft. Pierce AP, the data entry table for trailer and 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.

| Table J-4: Indian River-Vero Beach to Ft. Pierce AP data entry table for calculating watercraft visits | | | | | | | |
|---|---|---|---|---|---|---|---|
| Sample Date | Weekday or Weekend | Weight Weekday=.71 Weekend=.29 | North Causeway Trailer Count | Weighted Use Total | | North Causeway Car Count | Weighted Use Total |
| A | B | C | D | E | | G | H |
| 1/8/2021 | Weekday | 0.71 | 26 | 18.46 | | 10 | 7.1 |
| 1/9/2021 | Weekend | 0.29 | 16 | 4.64 | | 3 | 0.87 |
| 1/24/2021 | Weekend | 0.29 | 34 | 9.86 | | 9 | 2.61 |
| 11/17/2020 | Weekday | 0.71 | 9 | 6.39 | | 4 | 2.84 |
| 12/18/2020 | Weekday | 0.71 | 4 | 2.84 | | 0 | 0 |
| 12/19/2020 | Weekend | 0.29 | 18 | 5.22 | | 2 | 0.58 |
| 2/19/2021 | Weekday | 0.71 | 37 | 26.27 | | 8 | 5.68 |
| 2/20/2021 | Weekend | 0.29 | 7 | 2.03 | | 0 | 0 |
| 3/12/2021 | Weekday | 0.71 | 15 | 10.65 | | 2 | 1.42 |
| 3/13/2021 | Weekend | 0.29 | 89 | 25.81 | | 4 | 1.16 |
| 3/21/2021 | Weekend | 0.29 | 24 | 6.96 | | 12 | 3.48 |
| 4/16/2021 | Weekday | 0.71 | 19 | 13.49 | | 15 | 10.65 |
| 4/17/2021 | Weekend | 0.29 | 10 | 2.9 | | 210 | 60.9 |
| 4/24/2021 | Weekend | 0.29 | 40 | 11.6 | | 36 | 10.44 |
| 5/14/2021 | Weekday | 0.71 | 10 | 7.1 | | 0 | 0 |
| 5/15/2021 | Weekend | 0.29 | 32 | 9.28 | | 10 | 2.9 |
| 5/23/2021 | Weekend | 0.29 | 34 | 9.86 | | 12 | 3.48 |
| 6/12/2021 | Weekend | 0.29 | 50 | 14.5 | | 15 | 4.35 |
| 6/13/2021 | Weekend | 0.29 | 70 | 20.3 | | 20 | 5.8 |
| 6/14/2021 | Weekday | 0.71 | 17 | 12.07 | | 4 | 2.84 |
| Sample Days | | Sum of Weights | | Weighted Total | | | Weighted Total |
| 20 | | 9.16 | | 220.23 | | | 127.10 |
| Weighted Mean (Weighted Total / Weight Sum) | | | | 24.05 | | | 13.89 |

# APPENDIX – K

# Jensen Beach to Jupiter Inlet Aquatic Preserve Visitor Use Estimation

# Jensen Beach to Jupiter Inlet Aquatic Preserve
# Visitor Use Estimation

### Purpose

The purpose of this Appendix is to provide details of the procedures and development for the Jensen Beach to Jupiter Inlet Aquatic Preserve Visitor Use Estimation Model. This background will inform AP managers and staff about how visitor use estimation was derived and what procedures will be needed to continue use of the model in future years.

### Sampling Locations

Access to Jensen Beach to Jupiter is somewhat limited and resulted in four data collection locations in the AP shown in Table K-1.

Table K-1: Location and types of data collected at Jensen Beach to Jupiter Inlet AP

| | | | Dependent Variable | Independent Variables | | |
|---|---|---|---|---|---|---|
| Sample Location | GIS Coordinates | | Watercraft | Trailers | Cars | All Vehicles |
| Jimmy Graham Park | 27.101513 | -80.141759 | X | X | X | X |
| Sandspirit Park | 27.162637 | -80.193960 | | X | X | X |
| Burt Reynolds Park | 26.941826 | -80.083738 | X | X | X | X |
| Cove Road | 26.956884 | -80.079948 | X | X | X | X |
| Owen K. Murphy Park | 27.144237 | -80.194611 | | X | X | X |
| Jensen Beach Causeway Boat Ramp | 27.251818 | -80.223622 | X | X | X | X |
| Ocean Boulevard Causeway | 27.208039 | -80.188730 | | X | X | X |
| Little Mud Creek | 27.378134 | -80.255732 | | X | X | X |

We counted watercraft on AP waters from four areas through drone photography. We were able to use the drone at only these locations due to local government drone flight restrictions. These counts were made once between 10:00 and 16:00 hours. For analysis purposes, we combined watercraft counts from the four areas for our dependent variable.

We counted boat trailers and cars at eight sampling locations. Counts were made between 10:00 and 16:00 hours in conjunction with watercraft counts. We used these 16 independent car and trailer counts plus eight all-vehicle counts, combining trailers and cars, as independent variables.

### Predicting Watercraft Counts

The 24 independent variables were entered into a stepwise, least squares regression program with the summated watercraft counts as the dependent variable. Results of the regression are shown in Table K-2. The all-vehicle Count from Jimmy Graham Park and Cove Road car count variables both entered the regression equation as independent predictors of watercraft counts. No other independent variables could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$), and the all-vehicle count and cars accounted for 73.4% of the variation in watercraft counts.

Placing the mean weighted Jimmy Graham Park all-vehicle (19.30) and Cove Road car (4.97) counts, from the regression analysis, into the regression equation in Table K-2 results in a Predicted Watercraft Count of 73.78. The Predicted Watercraft Count is calculated by adding the Constant to the product of the Mean Weighted All-Vehicle Count and Beta coefficient for Jimmy Graham Park plus the product of the Cove Road Weighted Mean Car Count and its Beta. The Predicted Watercraft Count will become part of the Visitor Use Model in Table K-3.

Table K-2: Regression equation predicting watercraft counts for Jensen Beach to Jupiter Inlet AP

| | Jimmy Graham Park | | Cove Road | | | | | |
|---|---|---|---|---|---|---|---|---|
| Constant | Beta | Mean Weighted Trailer Count | Beta | Mean Weighted Car Count | Predicted Watercraft Count | $R^2$ | F | P |
| 23.30 | 1.77 | 19.30 | 3.27 | 4.97 | 73.78 | .734 | 23.479 | <.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-3 is to show how the Predicted Watercraft Count in Table K-2 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 water area covered by drone watercraft counts was 15.01 percent. The area we were unable to cover was primarily due to insufficient access and local government restrictions on drone flights.

As shown in Table K-3, an estimated 1,304,631 watercraft visited Jensen Beach to Jupiter Inlet AP during the study year and resulted in an estimated 3,261,578 total watercraft visits during the year.

Table J-3: Calculations for estimating Jensen Beach to Jupiter Inlet AP watercraft visits

| Estimation | | | | | Extrapolation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hours /sample | Predicted Watercraft Count | Duration of Count (hrs.) | Time in AP | Daily Watercraft Estimate | % of Area | Total Daily Watercraft Visits | User Days | Total Water-craft Visits | Indivi-duals per Water-craft | Total Annual Visits |
| 12 | 73.78 | 0.25 | 6.6 | 536.6 | 15.01% | 3,574 | 365 | 1,304,631 | 2.5 | 3,261,578 |

### Collecting, Entering and Weighting Data

An Excel spreadsheet with columns for data entry will be provided to AP managers separately 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-4. For Jensen Beach to Jupiter AP, staff should collect all all-vehicle counts from

Jimmy Graham Park and car counts from Cove Road 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 (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 weekday weight is .71.

Staff will also enter the all-vehicle counts from Jimmy Graham Park in Column D to start the watercraft visit estimation process. The weighted all-vehicle count for each sample date will be automatically displayed in Column E. The car counts from Cove Road will be entered in Column F with the weighted count displayed in Column G.

The bottom of Table K-4 automatically displays the number of Sample Days, Sum of Weights, and Weighted Count Total for daily all-vehicle and car visits. The last row in Table K-4 automatically displays the weighted mean count for all-vehicle and car visits. The weighted mean is derived by dividing Weighted Count Total by Sum of Weights. In the working Visitor Use Estimation spreadsheet, the weighted mean all-vehicle and car counts from the bottom of the data entry table will be automatically entered into the regression equation estimating the Predicted Watercraft Count in Tables K-2.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Jensen Beach to Jupiter AP, the data entry table for all-vehicle and 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.

| Table K-4: Jensen Beach to Jupiter Inlet AP data entry table for calculating watercraft visits | | | | | | | |
|---|---|---|---|---|---|---|---|
| Sample Date | Weekday or Weekend | Weight Weekday=.71 Weekend=.29 | Jimmy Graham All-Vehicle Count | Weighted Use Total | | Cove Road Car Count | Weighted Use Total |
| A | B | C | D | E | | G | H |
| 11/20/2020 | Weekday | 0.71 | 10 | 7.1 | | 3 | 2.13 |
| 12/18/2020 | Weekday | 0.71 | 10 | 7.1 | | 3 | 2.13 |
| 12/19/2020 | Weekend | 0.29 | 13 | 3.77 | | 7 | 2.03 |
| 1/8/2021 | Weekday | 0.71 | 17 | 12.07 | | 3 | 2.13 |
| 1/9/2021 | Weekend | 0.29 | 8 | 2.32 | | 2 | 0.58 |
| 1/24/2021 | Weekend | 0.29 | 39 | 11.31 | | 22 | 6.38 |
| 2/19/2021 | Weekday | 0.71 | 14 | 9.94 | | 10 | 7.1 |
| 2/20/2021 | Weekend | 0.29 | 9 | 2.61 | | 4 | 1.16 |
| 3/12/2021 | Weekday | 0.71 | 18 | 12.78 | | 4 | 2.84 |
| 3/13/2021 | Weekend | 0.29 | 26 | 7.54 | | 1 | 0.29 |
| 3/21/2021 | Weekend | 0.29 | 38 | 11.02 | | 8 | 2.32 |
| 4/16/2021 | Weekday | 0.71 | 23 | 16.33 | | 5 | 3.55 |
| 4/17/2021 | Weekend | 0.29 | 33 | 9.57 | | 6 | 1.74 |
| 4/24/2021 | Weekend | 0.29 | 45 | 13.05 | | 7 | 2.03 |
| 5/14/2021 | Weekday | 0.71 | 15 | 10.65 | | 4 | 2.84 |
| 5/15/2021 | Weekend | 0.29 | 16 | 4.64 | | 6 | 1.74 |
| 5/23/2021 | Weekend | 0.29 | 38 | 11.02 | | 1 | 0.29 |
| 6/12/2021 | Weekend | 0.29 | 27 | 7.83 | | 5 | 1.45 |
| 6/13/2021 | Weekend | 0.29 | 36 | 10.44 | | 7 | 2.03 |
| 6/14/2021 | Weekday | 0.71 | 8 | 5.68 | | 1 | 0.71 |
| Sample Days | | Sum of Weights | | Weighted Total | | | Weighted Total |
| 20 | | 9.16 | | 176.77 | | | 45.47 |
| Weighted Mean (Weighted Total / Weight Sum) | | | | 19.30 | | | 4.97 |

# APPENDIX – L

## Loxahatchee River-Lake Worth Creek Aquatic Preserve
## Visitor Use Estimation

# Loxahatchee River – Lake Worth Creek Aquatic Preserve
# Visitor Use Estimation

## Purpose

The purpose of this Appendix is to provide details of the procedures and development for the Loxahatchee River – Lake Worth Creek Aquatic Preserve (Loxahatchee) Visitor Use Estimation Model. This background will inform AP managers and staff about how visitor use estimation was derived and what procedures will be needed to continue use of the model in future years.

## Sampling Locations

Access to Loxahatchee River – Lake Worth Creek AP is limited by surrounding development and accessibility issues. We were  able to identify a two locations for drone flights and that provided opportunities to count visitor trailers and cars. These data collection locations are listed in Table L-1.

Table L-1: Location and types of data collected at Jensen Loxahatchee River – Lake Worth Creek AP

| | | | Dependent Variable | Independent Variables | | |
|---|---|---|---|---|---|---|
| Sample Location | GIS Coordinates | | Watercraft | Trailers | Cars | All Vehicles |
| Palm Beach County Waterway Park | 26.941826 | -80.083738 | X | X | X | X |
| Burt Reynolds Park | 26.932893 | -80.085145 | X | X | X | X |

We counted watercraft on AP waters from drone photography at Palm Beach Waterway Park (PBCW Park) and Burt Reynolds (BR) Park.

We also counted boat trailers and cars at the same two locations for potential predictors of watercraft counts. Counts were made between 10:00 and 16:00 hours in. We used these four independent car and trailer counts plus two all-vehicle counts, combining trailers and cars, as independent variables.

## Predicting Watercraft Counts

The six independent variables were entered into a stepwise, least squares regression program with the watercraft counts as the dependent variable. Results of the regression are shown in Table L-2. The trailer count from Palm Beach County Waterway Park and the all-vehicle count from Burt Reynolds Park both entered the regression equation as significant predictors of watercraft counts. No other independent variables could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$), and they accounted for 63.1% of the variation in watercraft counts.

Placing the mean weighted PBCW Park trailer count (13.09) and the BR Park all-vehicle count (51.63), from the regression analysis, into the regression equation in Table L-2 results in a Predicted Watercraft Count of 61.08. The Predicted Watercraft Count is calculated by adding the Constant, the product of the Mean Weighted

PBCW Park Trailer Count and Beta coefficient, and the product of the Mean Weighted BR Park All-Vehicle Count and Beta coefficient. The Predicted Watercraft Count will become part of the Visitor Use Model in Table L-3.

| Table L-2: Regression equation predicting watercraft counts for Loxahatchee River – Lake Worth Creek AP | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PBCW Park | | BR Park | | | | | |
| Constant | Beta | Mean Weighted Count | Beta | Mean Weighted All-Vehicle Count | Predicted Watercraft Count | $R^2$ | F | P |
| 35.67 | 1.306 | 13.09 | .161 | 51.63 | 61.08 | .631 | 13.67 | <.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-3 is to show how the Predicted Watercraft Count in Table L-2 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 water area covered by watercraft counts was 10.6 percent.

As shown in Table L-3, an estimated 1,530,093 watercraft visited Loxahatchee River – Lake Worth Creek AP during the study year and resulted in an estimated 3,825,232 total visits during the year.

| Table L-3: Calculations for estimating Loxahatchee River – Lake Worth Creek AP watercraft visits | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Estimation | | | | | Extrapolation | | | | | |
| Hours /sample | Predicted Watercraft Count | Duration of Count (hrs.) | Time in AP | Daily Watercraft Estimate | % of Area | Total Daily Watercraft Visits | User Days | Total Water-craft Visits | Indivi-duals per Water-craft | Total Annual Visits |
| 12 | 61.08 | 0.25 | 6.6 | 444.3 | 10.6% | 4,192 | 365 | 1,560,093 | 2.5 | 3,825,232 |

**Collecting, Entering and Weighting Data**

An Excel spreadsheet with columns for data entry will be provided to AP managers separately 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-4. For Loxahatchee River – Lake Worth Creek AP, staff should collect trailer counts from Palm Beach County Waterway Park and all-vehicle counts from Burt Reynolds Park 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 (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 weekday weight is .71.

Staff will also enter trailer counts from PBCW Park in Column D and All-Vehicle counts from BR Park in Column F to start the watercraft visit estimation process. The weighted counts for each sample date will be automatically displayed in Columns E and G, respectively.

The bottom of Table L-4 automatically displays the number of Sample Days, Sum of Weights, and Weighted Count Total for trailer and all-vehicle visits. The last row in Table L-4 automatically displays the weighted mean count for trailer and all-vehicle visits. The weighted mean is derived by dividing Weighted Count Total by Sum of Weights. In the working Visitor Use Estimation spreadsheet, the weighted mean trailer and all-vehicle counts from the bottom of the data entry table will be automatically entered into the regression equation estimating the Predicted Watercraft Count in Tables L-2.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Loxahatchee River – Lake Worth Creek AP, the data entry table for trailer and all-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.

Table L-4: Loxahatchee River – Lake Worth Creek AP data entry table for calculating watercraft visits

| Sample Date | Weekday or Weekend | Weight Weekday=.71 Weekend=.29 | PBCW Trailer Count | Weighted Use Total | | BR Park All-Vehicle Count | Weighted Use Total |
|---|---|---|---|---|---|---|---|
| A | B | C | D | E | | G | H |
| 1/8/2021 | Weekday | 0.71 | 10 | 7.10 | | 32 | 22.72 |
| 1/9/2021 | Weekend | 0.29 | 9 | 2.61 | | 65 | 18.85 |
| 1/24/2021 | Weekend | 0.29 | 22 | 6.38 | | 86 | 24.94 |
| 12/18/2020 | Weekday | 0.71 | 15 | 10.65 | | 24 | 17.04 |
| 12/19/2020 | Weekend | 0.29 | 12 | 3.48 | | 42 | 12.18 |
| 2/19/2021 | Weekday | 0.71 | 9 | 6.39 | | 22 | 15.62 |
| 2/20/2021 | Weekend | 0.29 | 8 | 2.32 | | 85 | 24.65 |
| 3/12/2021 | Weekday | 0.71 | 14 | 9.94 | | 24 | 17.04 |
| 3/13/2021 | Weekend | 0.29 | 13 | 3.77 | | 120 | 34.8 |
| 3/21/2021 | Weekend | 0.29 | 23 | 6.67 | | 152 | 44.08 |
| 4/16/2021 | Weekday | 0.71 | 16 | 11.36 | | 93 | 66.03 |
| 4/17/2021 | Weekend | 0.29 | 20 | 5.80 | | 28 | 8.12 |
| 4/24/2021 | Weekend | 0.29 | 22 | 6.38 | | 30 | 8.7 |
| 5/14/2021 | Weekday | 0.71 | 10 | 7.10 | | 21 | 14.91 |
| 5/15/2021 | Weekend | 0.29 | 11 | 3.19 | | 73 | 21.17 |
| 5/23/2021 | Weekend | 0.29 | 22 | 6.38 | | 79 | 22.91 |
| 6/12/2021 | Weekend | 0.29 | 16 | 4.64 | | 131 | 37.99 |
| 6/13/2021 | Weekend | 0.29 | 10 | 2.90 | | 18 | 5.22 |
| 6/14/2021 | Weekday | 0.71 | 5 | 3.55 | | 27 | 19.17 |
| Sample Days | | Sum of Weights | | Weighted Total | | | Weighted Total |
| 19 | | 8.45 | | 110.61 | | | 436.14 |
| Weighted Mean (Weighted Total / Weight Sum) | | | | 13.09 | | | 51.63 |

# APPENDIX – M

# North Fork St. Lucie Aquatic Preserve
# Visitor Use Estimation

# North Fork St. Lucie Aquatic Preserve
# Visitor Use Estimation

## Purpose

The purpose of this Appendix is to provide details of the procedures and development for the North Fork St. Lucie Aquatic Preserve (North Fork) Visitor Use Estimation Model. This background will inform AP managers and staff about how visitor use estimation was derived and what procedures will be needed to continue use of the model in future years.

## Sampling Locations

Access to the North Fork St. Lucie AP is severely limited by surrounding development and accessibility issues. We were not able to identify a single location for drone flights or that provided opportunities to count visitor trailers or cars. To overcome these problems, we collaborated with Planet® to identify satellite images for 14 of our sampling days to substitute for drone flights. We also substituted three trailer and car count locations from Jensen Beach to Jupiter Inlet AP as independent variables to predict watercraft counts. These data collection locations are listed in Table M-1.

Table M-1: Location and types of data collected at Jensen North Fork St. Lucie AP

| | | | Dependent Variable | Independent Variables | | |
|---|---|---|---|---|---|---|
| Sample Location | GIS Coordinates | | Watercraft | Trailers | Cars | All Vehicles |
| Satellite Photographs | | | X | | | |
| Jimmy Graham Park | 27.101513 | -80.141759 | | X | X | X |
| Jensen Beach Causeway | 27.251818 | -80.223622 | | X | X | X |
| Ocean Boulevard Causeway | 27.208039 | -80.188730 | | X | X | X |

We counted watercraft on AP waters from satellite photography. We were unable to suitable locations to conduct drone flights.

Because of the lack of shoreside facilities to count boat trailers or cars, we substituted trailer and car count data from three nearby locations for potential predictors of watercraft counts. Counts were made between 10:00 and 16:00 hours in. We used these six independent car and trailer counts plus three all-vehicle counts, combining trailers and cars, as independent variables.

## Predicting Watercraft Counts

The nine independent variables were entered into a stepwise, least squares regression program with the satellite watercraft counts as the dependent variable. Results of the regression are shown in Table M-2. The trailer count from Jimmy Graham Park entered the regression equation as the only predictor of watercraft counts. No other independent variables could significantly add to the prediction of watercraft counts. This equation was highly significant (p = .005), and the trailer counts accounted for 49.2% of the variation in watercraft counts.

Placing the mean weighted Jimmy Graham Park trailer count (12.65), from the regression analysis, into the regression equation in Table M-2 results in a Predicted Watercraft Count of 10.18. The Predicted Watercraft Count is calculated by adding the Constant to the product of the Mean Weighted Trailer Count and Beta coefficient. The Predicted Watercraft Count will become part of the Visitor Use Model in Table M-3.

TableML-2: Regression equation predicting daily watercraft counts for North Fork St. Lucie AP

| | Jimmy Graham Park | | | | | |
|---|---|---|---|---|---|---|
| Constant | Beta | Mean Weighted Trailer Count | Predicted Watercraft Count | $R^2$ | F | P |
| 3.11 | .559 | 12.65 | 10.18 | .492 | 11.62 | .005 |

## 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-3 is to show how the Predicted Watercraft Count in Table M-2 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 water area covered by satellite watercraft counts was 100 percent.

As shown in Table M-3, an estimated 20,042 watercraft visited North Fork St. Lucie AP during the study year and resulted in an estimated 67,605 total watercraft visits during the year.

Table L-3: Calculations for estimating North Fork St. Lucie AP watercraft visits

| Estimation | | | | | Extrapolation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hours /sample | Predicted Watercraft Count | Duration of Count (hrs.) | Time in AP | Daily Watercraft Estimate | % of Area | Total Daily Watercraft Visits | User Days | Total Water-craft Visits | Indivi-duals per Water-craft | Total Annual Visits |
| 12 | 10.18 | 0.25 | 6.6 | 74.1 | 100% | 74.1 | 365 | 27,042 | 2.5 | 67,605 |

## Collecting, Entering and Weighting Data

An Excel spreadsheet with columns for data entry will be provided to AP managers separately 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-4. For North Fork St. Lucie AP, staff should collect all trailer counts from Jimmy Graham Park 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 (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 weekday weight is .71.

Staff will also enter the trailer counts from Jimmy Graham Park in Column D to start the watercraft visit estimation process. The weighted trailer count for each sample date will be automatically displayed in Column E.

The bottom of Table M-4 automatically displays the number of Sample Days, Sum of Weights, and Weighted Count Total for trailer visits. The last row in Table M-4 automatically displays the weighted mean count for trailer visits. The weighted mean is derived by dividing Weighted Count Total by Sum of Weights. In the working Visitor Use Estimation spreadsheet, the weighted mean trailer count from the bottom of the data entry table will be automatically entered into the regression equation estimating the Predicted Watercraft Count in Tables M-2.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For North Fork St. Lucie AP, 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.

Table M-4: North Fork St. Lucie AP data entry table for calculating watercraft visits

| Sample Date | Weekday or Weekend | Weight Weekday=.71 Weekend=.29 | Jimmy Graham Trailer Count | Weighted Use Total |
|---|---|---|---|---|
| A | B | C | D | E |
| 11/20/2021 | Weekday | 0.71 | 6 | 4.26 |
| 12/18/2020 | Weekday | 0.71 | 3 | 2.13 |
| 12/19/2020 | Weekend | 0.29 | 8 | 2.32 |
| 1/8/2021 | Weekday | 0.71 | 11 | 7.81 |
| 1/9/2021 | Weekend | 0.29 | 4 | 1.16 |
| 1/24/2021 | Weekend | 0.29 | 27 | 7.83 |
| 2/19/2021 | Weekday | 0.71 | 11 | 7.81 |
| 2/20/2021 | Weekend | 0.29 | 4 | 1.16 |
| 3/12/2021 | Weekday | 0.71 | 10 | 7.1 |
| 3/13/2021 | Weekend | 0.29 | 19 | 5.51 |
| 3/21/2021 | Weekday | 0.71 | 25 | 17.75 |
| 4/16/2021 | Weekday | 0.71 | 13 | 9.23 |
| 4/17/2021 | Weekend | 0.29 | 23 | 6.67 |
| 4/24/2021 | Weekend | 0.29 | 27 | 7.83 |
| Sample Days | | Sum of Weights | | Weighted Total |
| 14 | | 7.00 | | 88.6 |
| Weighted Mean (Weighted Total / Weight Sum) | | | | 12.65 |

# APPENDIX – N

# Wekiva River Aquatic Preserve
# Visitor Use Estimation

# Wekiva River Aquatic Preserve
# Visitor Use Estimation

## Purpose

The purpose of this Appendix is to provide details of the procedures and development for Wekiva River Visitor Use Estimation Model. This background will inform AP managers and staff about how visitor use estimation was derived and what procedures will be needed to continue use of the model in future years.

## Sampling Locations

Access to Wekiva River is somewhat limited and resulted in four data collection locations in the AP shown in Table N-1.

| Table N-1: Location and types of data collected at Wekiva River AP | | | | | | |
|---|---|---|---|---|---|---|
| | | | Dependent Variable | Independent Variables | | |
| Sample Location | GIS Coordinates | | Watercraft | Trailers | Cars | All Vehicles |
| Sam Stone Park and Boat Ramp | 29.009579 | -81.382610 | | X | X | X |
| Lake Monroe Wayside Park | 28.836680 | -81.323935 | X | X | X | X |
| Lake Monroe Park | 28.840306 | -81.321788 | | X | X | X |
| Blue Spring State Park | 28.942568 | -81.341688 | X | | | |

We counted watercraft on AP waters from two areas. We used drone photography at Lake Monroe Wayside Park and time-lapse photography at Blue Spring State Park. We were able to use the drone at only one location due to local government drone flight restrictions. These counts were made once between 10:00 and 16:00 hours. For analysis purposes, we combined watercraft counts from the two areas for our dependent variable.

We counted boat trailers and cars at three sampling locations. Counts were made between 10:00 and 16:00 hours in conjunction with watercraft counts. We used these six independent car and trailer counts plus three all-vehicle counts, combining trailers and cars, as independent variables.

## Predicting Watercraft Counts

The nine independent variables were entered into a stepwise, least squares regression program with the watercraft counts as the dependent variable. Results of the regression are shown in Table N-2. The Lake Monroe Park all-vehicle count was the only independent variable identified that predicted watercraft counts. No other independent variables could significantly add to the prediction of watercraft counts. This equation was highly significant ($p < .001$), and the all-vehicle counts accounted for 91.8% of the variation in watercraft counts.

Placing the mean weighted all-vehicle counts from Lake Monroe Park (25.46), from the regression analysis, into the regression equation in Table N-2 results in a Predicted Watercraft Count of 16.79. The Predicted Watercraft Count is calculated by adding the Constant to the product of the Mean Weighted All-Vehicle Count and Beta coefficient for Lake Monroe Park. The Predicted Watercraft Count will become part of the Visitor Use Model in Table N-3.

| Table N-2: Regression equation predicting watercraft counts for Wekiva River AP | | | | | | |
|---|---|---|---|---|---|---|
| | Lake Monroe Park | | | | | |
| Constant | Beta | Mean Weighted All-Vehicle Count | Predicted Watercraft Count | $R^2$ | F | P |
| 1.386 | .605 | 25.46 | 16.78 | .918 | 146.27 | <.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-3 is to show how the Predicted Watercraft Count in Table N-2 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 water area covered by drone watercraft counts was 17.09 percent. The area we were unable to cover was primarily due to insufficient access and local government restrictions on drone flights.

As shown in Table N-3, an estimated 260,620 watercraft visited Wekiva River AP during the study year and resulted in an estimated 651,551 total visits during the year.

| Table N-3: Calculations for estimating Wekiva River AP watercraft visits | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Estimation | | | | | Extrapolation | | | | | |
| Hours /sample | Predicted Watercraft Count | Duration of Count (hrs.) | Time in AP | Daily Watercraft Estimate | % of Area | Total Daily Watercraft Visits | User Days | Total Water-craft Visits | Indivi-duals per Water-craft | Total Annual Visits |
| 12 | 16.78 | 0.25 | 6.6 | 122.0 | 17.09% | 714 | 365 | 260,620 | 2.5 | 651,551 |

**Collecting, Entering and Weighting Data**

An Excel spreadsheet with columns for data entry will be provided to AP managers separately 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-4. For Wekiva River AP, staff should collect all-vehicle counts from Lake Monroe Park 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 (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 weekday weight is .71.

Staff will also enter the all-vehicle count from Lake Monroe Park in Column D to start the watercraft visit estimation process. The weighted all-vehicle count for each sample date will be automatically displayed in Column E.

The bottom of Table N-4 automatically displays the number of Sample Days, Sum of Weights, and Weighted Count Total for all-vehicle visits. The last row in Table N-4 automatically displays the weighted mean count for all-vehicle visits. The weighted mean is derived by dividing Weighted Count Total by Sum of Weights. In the working Visitor Use Estimation spreadsheet, the weighted mean all-vehicle count from the bottom of the data entry table will be automatically entered into the regression equation estimating the Predicted Watercraft Count in Tables N-2.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Lake Monroe Park AP, the data entry table for all-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.

Table N-4: Wekiva River AP data entry table for calculating watercraft visits

| Sample Date | Weekday or Weekend | Weight Weekday=.71 Weekend=.29 | Lake Monroe Park All Vehicles Count | Lake Monroe Park Weighted Use Total |
|---|---|---|---|---|
| A | B | C | D | E |
| 1/28/2021 | Weekday | 0.71 | 13 | 9.23 |
| 1/30/2021 | Weekend | 0.29 | 65 | 18.85 |
| 1/31/2021 | Weekend | 0.29 | 87 | 25.23 |
| 2/12/2021 | Weekday | 0.71 | 9 | 6.39 |
| 2/13/2021 | Weekend | 0.29 | 17 | 4.93 |
| 2/14/2021 | Weekend | 0.29 | 33 | 9.57 |
| 3/5/2021 | Weekday | 0.71 | 8 | 5.68 |
| 3/6/2021 | Weekend | 0.29 | 13 | 3.77 |
| 3/7/2021 | Weekend | 0.29 | 42 | 12.18 |
| 4/2/2021 | Weekday | 0.71 | 8 | 5.68 |
| 4/3/2021 | Weekend | 0.29 | 25 | 7.25 |
| 4/4/2021 | Weekend | 0.29 | 60 | 17.4 |
| 5/7/2021 | Weekday | 0.71 | 13 | 9.23 |
| 5/8/2021 | Weekend | 0.29 | 36 | 10.44 |
| 5/9/2021 | Weekend | 0.29 | 63 | 18.27 |
| Sample Days | | Sum of Weights | | Weighted Total |
| 15 | | 6.45 | | 164.1 |
| Weighted Mean (Weighted Total / Weight Sum) | | | | 25.46 |

# APPENDIX – O

# Oklawaha River Aquatic Preserve
# Visitor Use Estimation

# Oklawaha River Aquatic Preserve
# Visitor Use Estimation

## Purpose

The purpose of this Appendix is to provide details of the procedures and development for Oklawaha River Aquatic Preserve Visitor Use Estimation Model. This background will inform AP managers and staff about how visitor use estimation was derived and what procedures will be needed to continue use of the model in future years.

## Sampling Locations

Access to Oklawaha River is very limited and resulted in two data collection locations in the AP shown in Table O-1.

Table O-1: Location and types of data collected at Oklawaha River AP

| | | | Dependent Variable | Independent Variables | | |
|---|---|---|---|---|---|---|
| Sample Location | GIS Coordinates | | Watercraft | Trailers | Cars | All Vehicles |
| Ray Wayside Park | 29.214598 | -81.992273 | | X | X | X |
| Eureka East & West Boat Ramps | 29.374496 | -81.903070 | | X | X | X |

We did not count watercraft on Oklawaha AP waters due to the narrow, meandering corridor of the river which would limit observation to the immediate area. As a result, our approach was to estimate visitor use based on boat trailer and car counts. From our observations, it was apparent that nearly all individuals were engaged with the AP through boating, kayaking, canoeing, or fishing activities.

We counted boat trailers and cars at the two sampling locations. For Eureka East and West boat ramp parking areas, trailer counts were made at both locations and combined for one count. Likewise, car counts from both areas were considered as one variable.

All counts were made between 10:00 and 16:00 hours. We used these four independent car and trailer counts plus two all-vehicle counts, combining trailers and cars, as independent variables. The total of all four car and trailer counts was used as the dependent variable in the prediction equation.

## Predicting visitor Counts

The six independent variables were entered into a stepwise, least squares regression program with the summated trailer/car counts as the dependent variable. Results of the regression are shown in Table O-2. The Ray Wayside Park all-vehicle count was the only independent variable identified that predicted visitor counts. No other independent variables could significantly add to the prediction of visitor counts. This equation was highly significant ($p < .001$) and the all-vehicle counts accounted for 97.0% of the variation in visitor counts.

Placing the mean weighted all-vehicle counts from Ray Wayside Park (32.61), from the regression analysis, into the regression equation in Table O-2 results in a Predicted Vehicle Count of 41.87. The Predicted Vehicle Count is calculated by adding the Constant to the product of the Mean Weighted All-Vehicle Count and Beta coefficient for Ray Wayside Park. The Predicted Vehicle Count will become part of the Visitor Use Model in Table O-3.

Table O-2: Regression equation predicting vehicle counts for Oklawaha River AP

| | Ray Wayside Park | | | | | |
|---|---|---|---|---|---|---|
| Constant | Beta | Mean Weighted All-Vehicle Count | Predicted Vehicle Count | $R^2$ | F | P |
| 4.669 | 1.141 | 32.61 | 41.87 | .972 | 458.21 | <.001 |

**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-3 is to show how the Predicted Vehicle Count in Table O-2 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 water use covered by vehicle counts was 58.6 percent.

This percentage was determined after examining all access points along the Oklawaha River. The two access points we sampled covered most of the AP with the exception of Silver Springs. Access to Silver Springs is primarily through Silver Springs State Park. Analyzing state park visitation and breaking it down to visitors per day allowed us to compare it to use at the two sampling locations. The analysis resulted in Silver Springs State Park visitors accounting for 41.4% of all use.

As shown in Table O-3, an estimated 298,169 vehicles visited Oklawaha River AP during the study year and resulted in an estimated 745,422 total visits during the year.

Table N-3: Calculations for estimating Oklawaha River AP visits

| Estimation | | | | | Extrapolation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hours /sample | Predicted Daily Vehicle Count | Duration of Count (hrs.) | Time in AP | Daily Vehicle Estimate | % of Use | Total Daily Vehicles | User Days | Total Vehicles | Indivi-duals per Vehicle | Total Annual Visits |
| 12 | 41.89 | 0.25 | 6.6 | 478.7 | 58.6 | 817 | 365 | 298,169 | 2.5 | 745,422 |

**Collecting, Entering and Weighting Data**

An Excel spreadsheet with columns for data entry will be provided to AP managers separately 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-4. For Oklawaha River AP, staff should collect all all-vehicle counts from Ray Wayside Park 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 (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 weekday weight is .71.

Staff will also enter the all-vehicle count from Ray Wayside Park in Column D to start the watercraft visit estimation process. The weighted all-vehicle count for each sample date will be automatically displayed in Column E.

The bottom of Table O-4 automatically displays the number of Sample Days, Sum of Weights, and Weighted Count Total for all-vehicle visits. The last row in Table O-4 automatically displays the weighted mean count for all-vehicle visits. The weighted mean is derived by dividing Weighted Count Total by Sum of Weights. In the working Visitor Use Estimation spreadsheet, the weighted mean all-vehicle count from the bottom of the data entry table will be automatically entered into the regression equation estimating the Predicted Watercraft Count in Tables O-2.

The working spreadsheet AP staff will use includes all components for estimating total visitor use. For Oklawaha River AP, the data entry table for all-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.

| Table O-4: Oklawaha River AP data entry table for calculating vehicle visits | | | | |
|---|---|---|---|---|
| | | Weight | Ray Wayside Park | |
| Sample Date | Weekday or Weekend | Weekday=.71 Weekend=.29 | All Vehicles Count | Weighted Use Total |
| A | B | C | D | E |
| 1/28/2021 | Weekday | 0.71 | 15 | 10.65 |
| 1/30/2021 | Weekend | 0.29 | 39 | 11.31 |
| 1/31/2021 | Weekend | 0.29 | 65 | 18.85 |
| 2/12/2021 | Weekday | 0.71 | 25 | 17.75 |
| 2/13/2021 | Weekend | 0.29 | 3 | 0.87 |
| 2/14/2021 | Weekend | 0.29 | 20 | 5.8 |
| 3/5/2021 | Weekday | 0.71 | 37 | 26.27 |
| 3/6/2021 | Weekend | 0.29 | 13 | 3.77 |
| 3/7/2021 | Weekend | 0.29 | 69 | 20.01 |
| 4/2/2021 | Weekday | 0.71 | 19 | 13.49 |
| 4/3/2021 | Weekend | 0.29 | 75 | 21.75 |
| 4/4/2021 | Weekend | 0.29 | 35 | 10.15 |
| 5/7/2021 | Weekday | 0.71 | 38 | 26.98 |
| 5/8/2021 | Weekend | 0.29 | 38 | 11.02 |
| 5/9/2021 | Weekend | 0.29 | 40 | 11.6 |
| Sample Days | | Sum of Weights | | Weighted Total |
| 15 | | 6.45 | | 210.3 |
| Weighted Mean (Weighted Total / Weight Sum) | | | | 32.61 |