Summary of Manatee Use Trends in the Banana River at Kennedy Space Center, Florida In Support of Restore Lagoon Inflow Project, Florida Tech May 7, 2021

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West Indian Manatee

The Florida manatee (*Trichechus manatus latirostris*) inhabits marine, brackish, and freshwater systems in coastal and riverine areas throughout their range. Preferred habitats include areas near the shore featuring underwater vegetation like seagrass. They feed along grass bed margins with access to deep water channels, where they flee when threatened. Florida manatees can be found throughout Florida for most of the year. However, they cannot tolerate temperatures below 68 degrees Fahrenheit for extended periods of time. During the winter months cold temperatures often keep the population concentrated in peninsular Florida. Many manatees rely on the warm water from natural springs and power plant outfalls. During the summer manatees expand their range, and on rare occasions are far north as Massachusetts on the Atlantic coast and as far west as Texas on the Gulf coast. Manatees may travel hundreds of miles during a year's time, preferring to travel along channels and shorelines (USFWS 2019).

Florida manatees were first protected through Florida State Law in 1893. Manatees are protected by the Florida Manatee Sanctuary Act (§379.2431(2), Florida Statutes) and were listed for protection by the USFWS in March 11, 1967 (USFWS 2001). Both the Florida and Antillean subspecies received federal protection with the passage of the Endangered Species Act (ESA) in 1973. The West Indian manatee, *Trichechus manatus*, was down listed by the USFWS from Endangered to Threatened in March of 2017. They are also protected by the Marine Mammal Protection Act (MMPA) of 1972, as amended (16 U.S.C. 1461 *et seq*.).

Critical habitat was designated in 1976 for the Florida manatee (50 CFR Part 17.95(a)). This includes multiple waterways and parts of coastal Florida, from Jacksonville south to Miami and west around the peninsula to Tampa Bay. The waters around KSC fall into this designation. The Upper Banana River is additionally protected from public boating and access by NASA-Kennedy Space Center (KSC) for safety and security measures since the 1960's. Since 1990, the KSC portion of the Banana River is a designated manatee sanctuary. This sanctuary extends from

KARS Park I to the northern terminus of the Banana River. The area is protected from entry by any unauthorized motorized watercraft.

According to the most recent USFWS Florida Manatee Recovery Plan, the most significant problem faced by manatees in Florida is death or injury from boat strikes (USFWS 2001). The long-term availability of warm-water refuges for manatees is uncertain if minimum flows and levels are not established for the natural springs on which many manatees depend and as deregulation of the power industry in Florida occurs. Their survival will depend on maintaining the integrity of ecosystems and habitat sufficient to support a viable manatee population (USFWS 2001).

During cold winter periods manatees often move to warmer waters either south or to the neighboring power plants that produce warm water effluent. The Florida Power and Light, Cape Canaveral Energy Center (CECC), located on the Indian River a few kilometers west of KSC, attracts very large numbers of manatees (over 1000) during these extreme cold periods. The CECC is required to purposely release warm water to provide a refugia for manatees when local water temperatures drop below 68°F.

The extensive seagrass beds in the Banana River provided good forage habitat and safe harbor for manatees (Provancha and Provancha 1988, Provancha and Hall 1991, Lefebvre et al. 2016). Annual KSC seagrass transect monitoring (1984 to present) and manatee aerial surveys (1977 to present) conducted by NASA-KSC track the trends in seagrass and the abundance of manatees on KSC. Manatees occur year-round in the area, except during extreme cold events, with highest numbers recorded in the spring and fall, due to stopovers when manatees travel north and south. In 2012 the spring peak count was more than 1,400 individuals on one survey in this small area (28 sq. mi.). This represented 20 to 25% of the entire estimated Florida population. Historically, counts of manatees (averages) from the summer season provided the most appropriate period to track trends. This was based on observations that during summer months, manatee emigration/immigration around KSC appeared the lowest, in other words was more stable, or less noise in the data (Miller 1998). As evident in Figure 1, over the last several decades the numbers of manatees within the northern Banana River increased nearly tenfold.

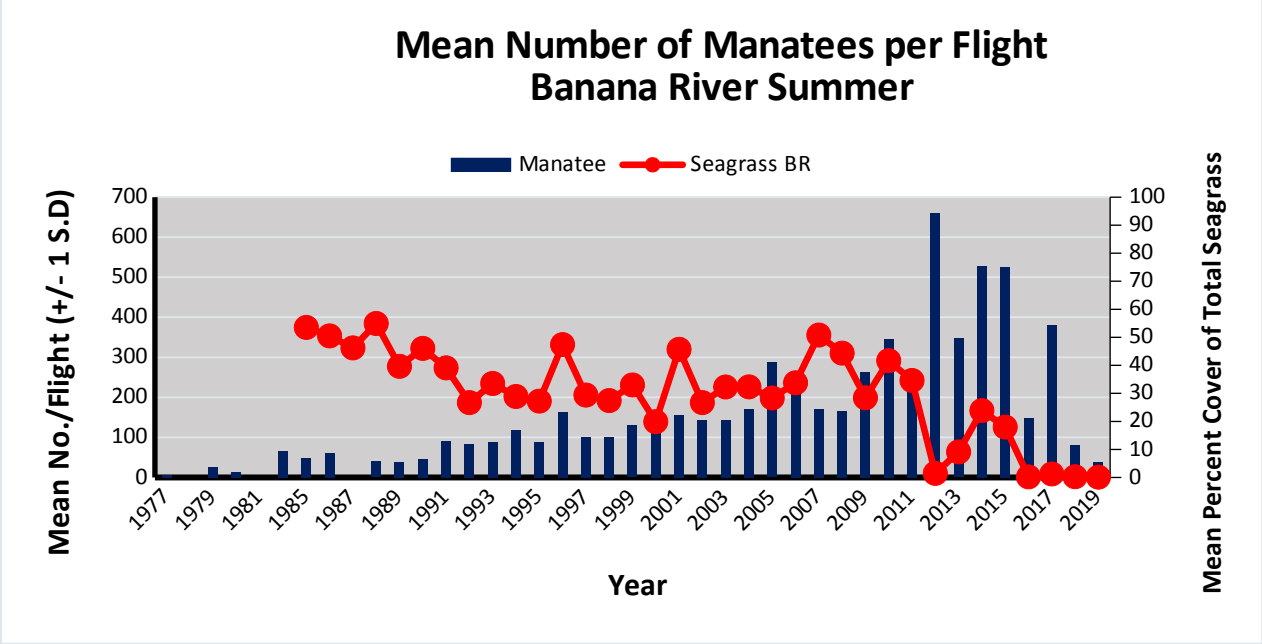

Figure 1. Mean number of manatees per flight from summer aerial surveys over the Banana River on KSC from 1989-2019 (Blue bars). Annual mean total seagrass percent cover for Banana River seagrass transects (Red line).

However, the number of manatees using the Banana River has decreased in the last five years to historic low numbers, for example, in 2019 there were less than 33 manatees/per flight observed (Figure 1). During the last decade intense algal blooms reduced approximately 97% of the once stable seagrass coverages. Improvements in seagrass cover were observed briefly from 2012 to 2015, as shown in Figure 1, but from 2016 to 2019 a Brown Tide returned and concomitant catastrophic losses in seagrasses followed (D. Scheidt/Herndon Solutions Group, 2021).

The patterns in spatial distribution of manatees observed during aerial surveys indicate utilization of all areas of the Banana River, from the Port Canaveral Locks, north into the Merritt Island National Wildlife Refuge (MINWR)/KSC manatee sanctuary. One pattern observed in all individual surveys and combined seasonal surveys is consistent presence within the Port Canaveral locks, the area directly adjacent and nearby waters (Figures 2-4). The nearby open water bounded by SR 528 on the south and east to the Barge Canal, is the only access or travel corridor to the MINWR/KSC manatee sanctuary. In fact, all aquatic organisms must either travel through the Barge Canal or from the south Banana River and then travel through this corridor area to ingress or egress the sanctuary.

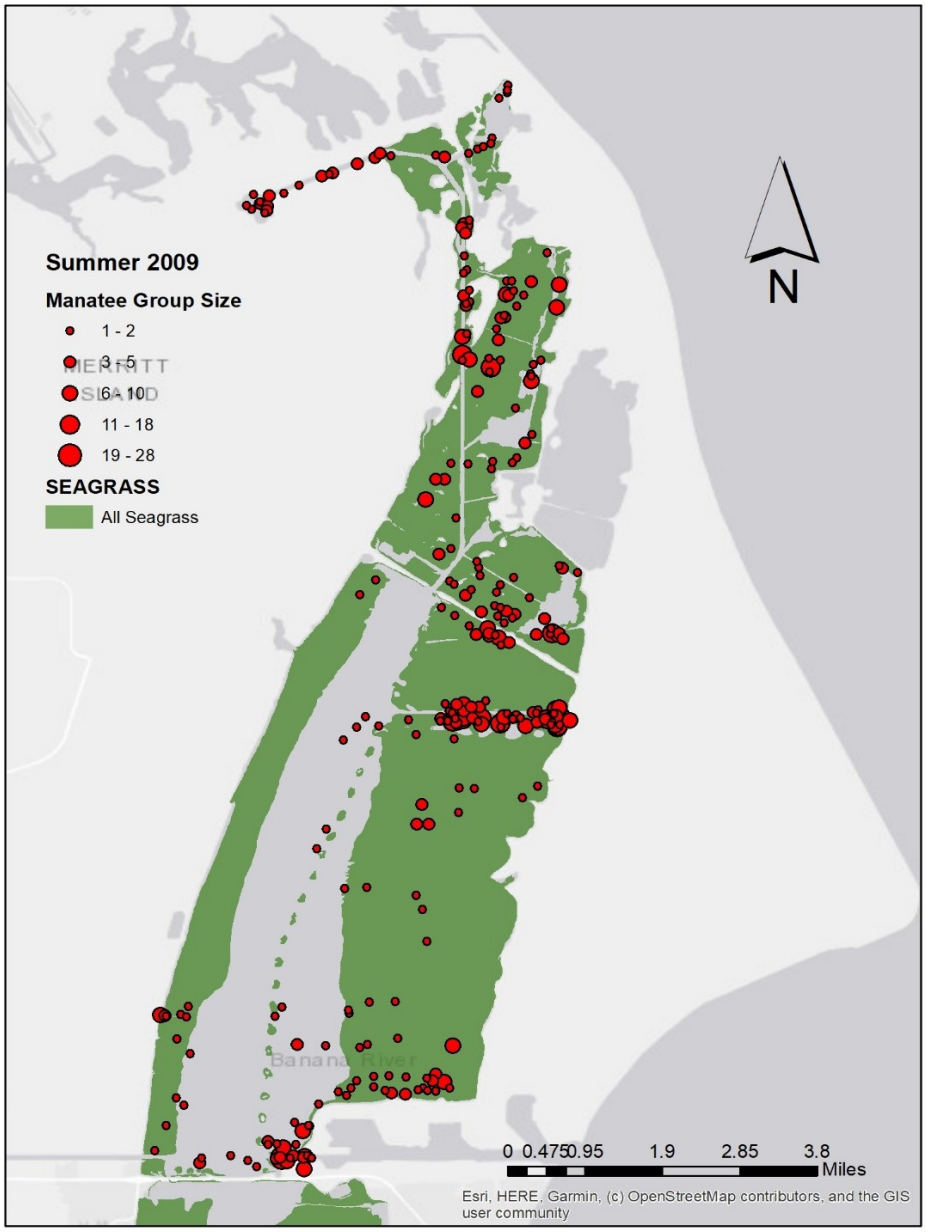

Figure 2. The combined results of individual surveys conducted during the summer months (June – August). Each red dot represents a location of a sighting and the size indicates the size of the group observed. Green area indicates presence of seagrass from Saint Johns River Water Management District (SJRWMD) seagrass mapping date for 2009.

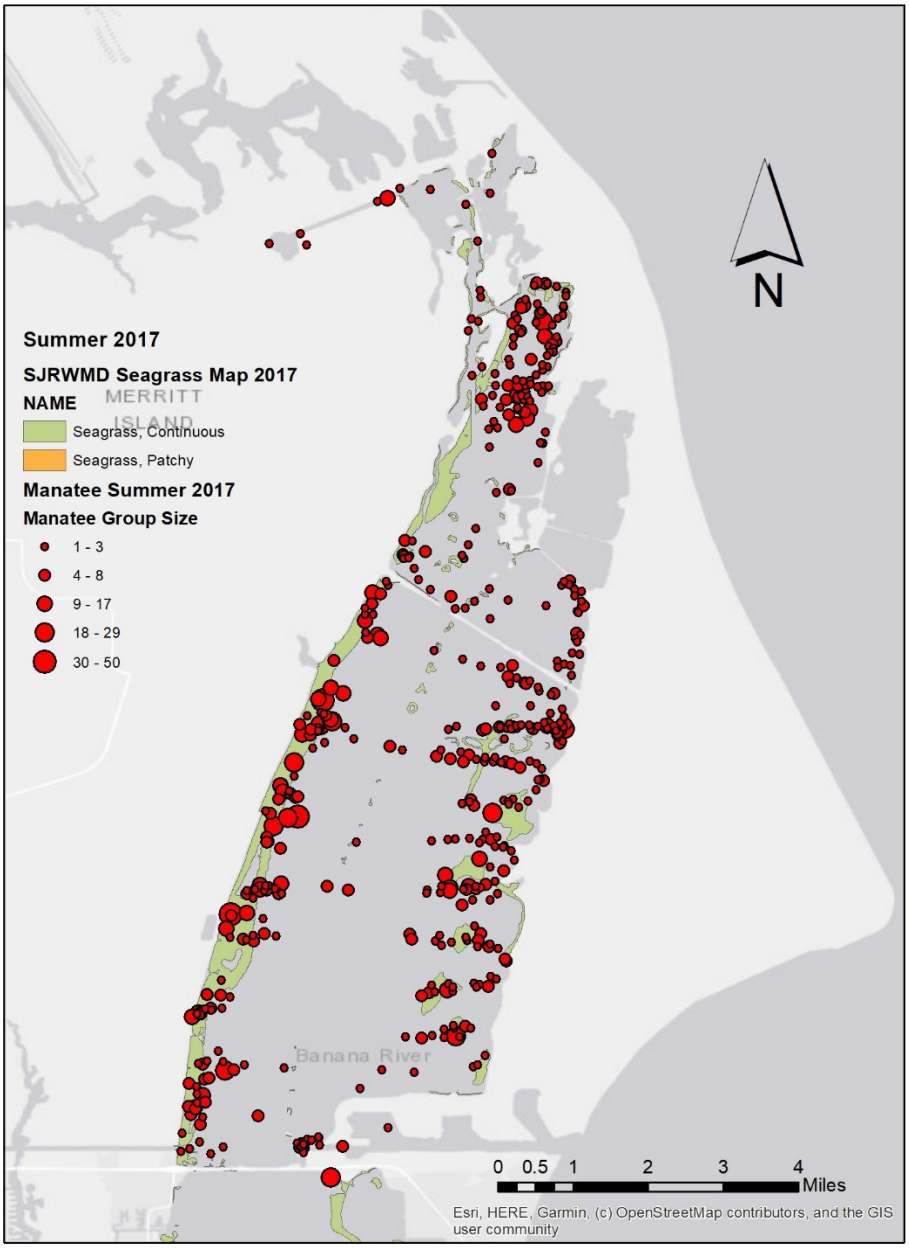

Figure 3. The combined results of individual surveys conducted during the summer months (June – August). Each red dot represents a location of a sighting and the size indicates the size of the group observed. Green area indicates presence of seagrass from Saint Johns River Water Management District (SJRWMD) seagrass mapping date for 2017.

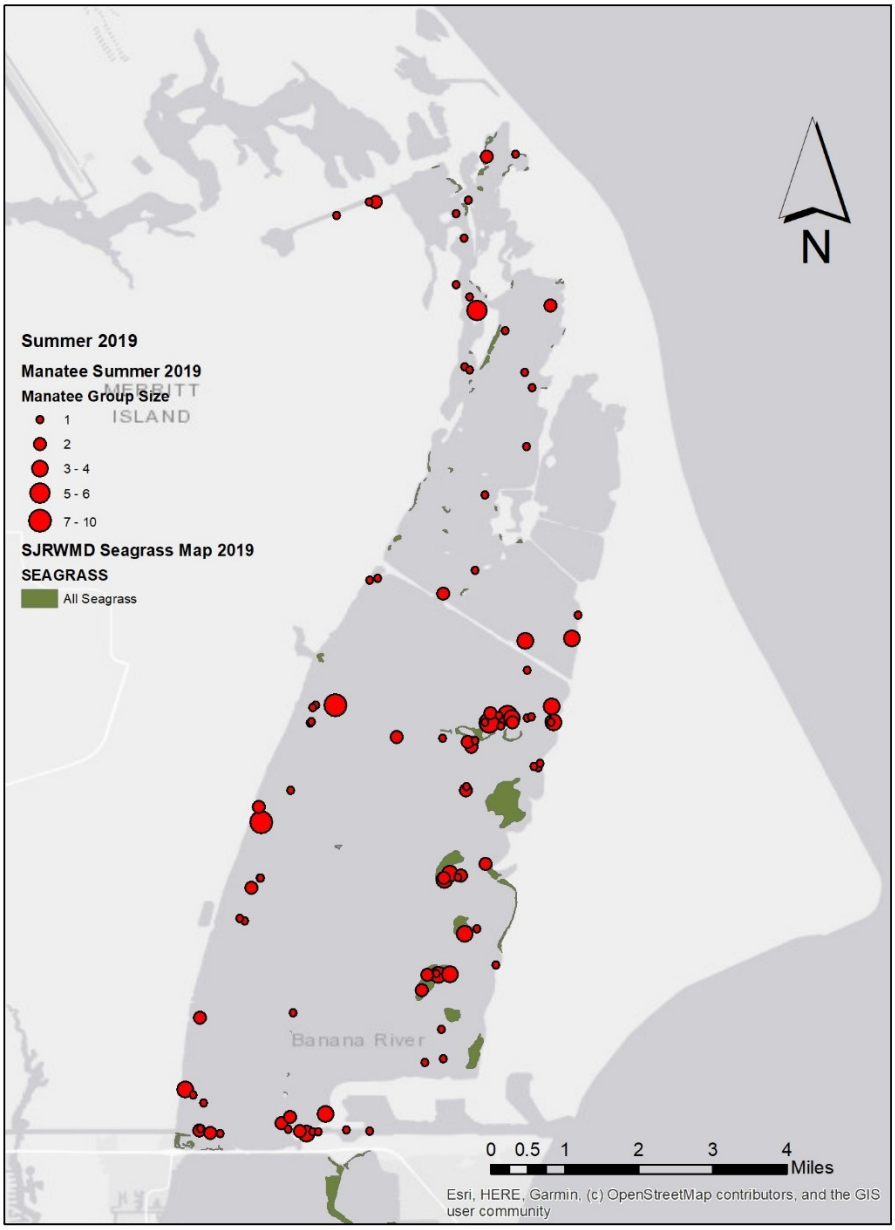

Figure 4. The combined results of individual surveys conducted during the summer months (June – August). Each red dot represents a location of a sighting and the size indicates the size of the group observed. Green area indicates presence of seagrass from Saint Johns River Water Management District (SJRWMD) seagrass mapping date for 2019.

Literature Cited

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Additional Information

Manatee Talking Points

Ecology

1. Annual year-round population.
2. Spring highest numbers.
3. Summer most stable.
4. Seagrass forage area.
5. Manatee sanctuary.
6. Percentage around locks.
7. Travel corridor – must travel past locks to access and leave sanctuary.

Some considerations regarding impact assessments related to proposed pumping

Pumping local sea water into the BR may directly impact/interfere/disrupt movement and behavior. Most likely related to temperature effects and in some cases by attraction to a flowing water source.

a. Positive improvement to water quality and SAV could result in improved forage for manatees
b. Negative or positive outcome might include missing seasonal environmental cues occurring in the normally shallow, wind driven river system and instead remain locally, to rely on warmer water produced by the project
    i. Manatees might remain at the site instead of moving south or to the CECC (sanctioned warm water site).
    ii. Would the site offer enough modulated water temperatures in the BR to enhance manatee refugia options?
    iii. Warm water attraction, however, could increase interactions with boat traffic and anglers in the manatee travel corridor areas,
    iv. Would there be an added attraction by anglers to the site (increased fish presence?) This could increase risk of boat strikes and general disturbance of other behaviors.

This is same as Figure 1 without seagrass data.

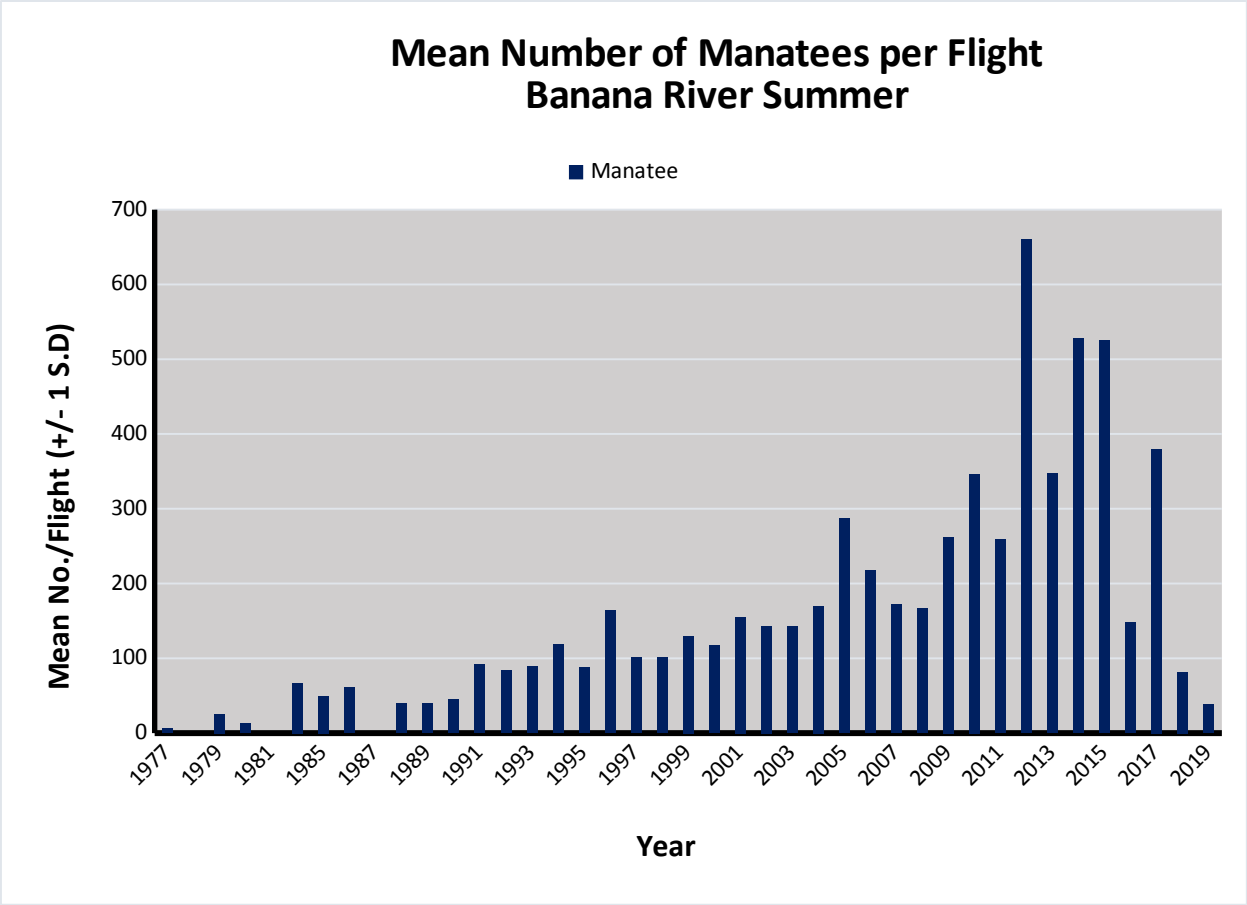

Figure 1extra. Mean number of manatees per flight from summer aerial surveys over the Banana River on KSC from 1989-2019 (Blue bars).