CHNEP Conservation Grant FY2021 – Final Report

Project Title: *A Bird's Eye View of Caloosahatchee Conditions: A Weekly Collection of the Effects of Lake Okeechobee Regulatory Releases*

In order to visually document the effects of regulatory releases and watershed flows 360° aerial photographs were taken weekly at Lighthouse Beach Park on Sanibel Island since April 2021 under a variety of conditions ranging from optimal to damaging flows at S-79 on the Caloosahatchee. During this time period, regulatory releases from Lake Okeechobee were minimal with the exception of a short period of time in May. However, watershed runoff did result in visual changes in water clarity, highlighting water storage needs within the watershed. The aerial photography is displayed as an interactive, virtual tour online and is regularly provided to policy makers and the public via the "Caloosahatchee & Estuary Conditions Report" and our new "Weekly Water Conditions Update". The drone was also able to document other events such runoff from the Sanibel River after Tropical Storm Elsa, macroalgae blooms at Bunche Beach, cyanobacteria blooms at S-79 on the Caloosahatchee, and other small localized bloom events. In addition to documenting events, our drone images have been used by the news media to show current conditions during high flows and has given SCCF and CHNEP media coverage of the products we have produced with the drone.

Project Results

- Weekly "little planet" images in the "Caloosahatchee & Estuary Conditions Report" which is a collaboration between SCCF, the City of Sanibel, J.N. "Ding" National Wildlife Refuge, the City of Cape Coral, and Lee County to provide current water quality assessments of the estuary and management recommendations to the US Army Corps of Engineers (USACE) and other state and federal agencies. (Fig. 1). http://sccf.org/water-quality/caloosahatchee-condition-reports (Drone images included in reports starting April 27, 2021.)
- 360° virtual tour website that allows policy makers and the public to interact with images from Lighthouse Beach park. The website displays metadata including the date, time, tide, and 14-day average flow at S-79. http://sccf.org/water-quality/aerialwq
- Included in the new "Weekly Water Conditions Update" which is used to provide conditions to the general public, residents, visitors, and the news media. This update distils the scientific "Caloosahatchee & Estuary Conditions Reports" in a simple and easy to understand way. This report reaches an audience of over 6,600 people who are signed up for SCCF newsletters and generates approximately 1,000 views to the 360° virtual tour website per month. (Fig. 2). http://sccf.org/water-quality/weekly-water-conditions-tracker
- Documentation of cyanobacterial blooms at S-79 on the Caloosahatchee in May 2021 after high volume release from Lake Okeechobee that resulted in stressful 14-day average flows (2100-2600 cfs) for 5 days from May 10 – 14, 2021. (Fig. 3).
- Documentation of drift algae accumulation at Blind Pass in May 2021. (Fig 4).
- Documentation of macroalgal blooms on Bunche Beach in Fort Myers in June 2021. (Fig. 5).
- Documentation of the Sanibel River Plume after Tropical Storm Elsa in July 2021 (Fig. 6).
- Collaboration with the City of Sanibel to monitor progress on the Jordan Marsh plant removal. Jordan Marsh is a filter marsh used to remove nutrients from the Sanibel River. The mature plants are less effective at filtering nutrients and need to be removed periodically to restore the benefits of the marsh to the Sanibel River. (Fig. 7).
- Featured on Wink News in September 2021. https://www.winknews.com/2021/09/20/aerial-images-give-researchers-closer-look-at-swfl-water-quality/

MEMORANDUM

To: USACE Colonel Andrew D. Kelly, LTC Todd F. Polk, Richard McMillen, Kim Taplin, SFWMD Governing Board, Executive Director Drew Bartlett, Jennifer Reynolds, Lawrence Glenn, DEP Interim Secretary Shawn Hamilton

From: Periodic Scientists Conference Call Participants
Kevin Godsea & Avery Renshaw - J.N. "Ding" Darling National Wildlife Refuge (NWR) Complex
Holly Milbrandt & Dana Dettmar - City of Sanibel
Lesli Haynes & Lisa Kreiger - Lee County
Harry Phillips & Maya Robert - City of Cape Coral
James Evans, Leah Reidenbach, & Rick Bartleson PhD - SCCF (Sanibel-Captiva Conservation Foundation)

Subject: Caloosahatchee & Estuary Conditions Report

Reporting Period: **September 14 – 20, 2021**

This report provides a scientific assessment of Caloosahatchee River and Estuary conditions and how these conditions affect the health, productivity, and function of the system.

Caloosahatchee Conditions Summary: Flows to the Caloosahatchee estuary had a 7-day average of **4,345 cfs** at S-79 with a 7-day average of **0 cfs** coming from the lake at **S-77**. **The 14-day moving average flow at S-79 is 3,290 cfs and has been in the damaging flow envelope (2,100 – 2,600 cfs; RECOVER 2020) for 4 days.**

Recommendation: We request that the Corps maintain releases from S-79 within the optimum flow envelope of 750 – 2,100 cfs based on the RECOVER 2020 performance measure for salinity while taking into consideration watershed flows from the Caloosahatchee basin.

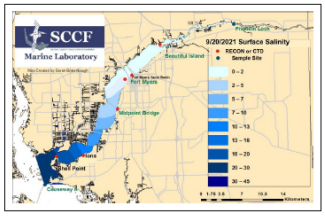
USACE Action: On Saturday, 5/29/21 the USACE decreased targeted flows to a 7-day average of 1,000 cfs (pulse) to the Caloosahatchee Estuary as measured at the WP Franklin Lock & Dam (S-79) and continued no releases to the St. Lucie Lock and Dam (S-80).

Lake Flows: In the past 7 days the total outflow from Lake Okeechobee was 0 AF with 0 AF to the Caloosahatchee through S-77, and 0 AF to the EAA through S-351, S-352, and S-354. The total net inflow to the Lake was 48,381 AF (45,495 AF from Fisheating Creek, S-71, S-72, S-84s, S-65EX, and S-65EX1) with a total backflow volume of 2,886 AF from S310 and C10A. Water conservation areas received flows of 9,108 AF, 27,435 AF, and 20,975 AF at WCA1, WCA2, and WCA3, respectively. Everglades National Park received 7,333 AF.

Lake Okeechobee Level: 15.06 ft (Low sub-band) — **Last Week:** 14.80 ft

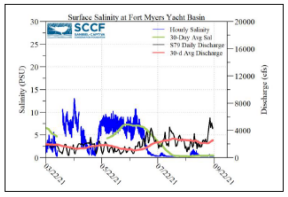
Lake Okeechobee Inflow: 4,540 cfs — **Lake Okeechobee Outflow:** 2 cfs

Weekly Rainfall Total: WP Franklin 2.41" Ortona 3.18" Moore Haven 0.90"



ACOE Daily Reports

Date	S79 Flow (cfs)	S78 Flow (cfs)	S77 Flow (cfs)
9/14/21	2443	1123	0
9/15/21	3662	1128	0
9/16/21	4605	2312	0
9/17/21	5845	2852	0
9/18/21	4460	2343	0
9/19/21	5132	2452	0
9/20/21	4270	2233	0
7-day avg	4345	2063	0



Light Penetration

Site	25% Iz	Target Values	Turbidity	Target Values
	meters		NTU	
Fort Myers	0.85*	> 1	2.4	< 18
Shell Point	1.11*	>2.2	1.4	< 18
Causeway	1.39m	> 2.2	1.9	< 5

25% Iz is the depth (z) where irradiance (I) is 25% of surface irradiance. Target values indicate the depth of light penetration needed for healthy seagrass.
m measured, * calculated

Cyanobacteria Status: On 9/21/21 sampling for cyanobacteria by the Lee County Environmental Lab reported no visible cyanobacteria in the Caloosahatchee.

Upper Estuary Conditions: The 30-day average surface salinity at the Fort Myers Yacht Basin was **0.5 psu**, within the suitable range for tape grass. Intervals of hypoxia were recorded at the Beautiful Island RECON site between 9/15/21 and 9/19/21.

Lower Estuary Conditions: The average salinity at Shell Point RECON was **20 psu**, within the optimal range for oysters, but **below optimal for seagrass**.

Water Quality Conditions

Monitor Site	Salinity (psu)[a] [previous week]	Diss O_2 (mg/L)[b]	FDOM (qsde)[c]	Chlorophyll (µg/L)[d]
Beautiful Island	0.3 – 0.3 [0.3 – 0.3]	2.8– 4.5	360	8.1
Fort Myers Yacht Basin	0.3 – 0.9 [0.3 – 0.5]	4.3 – 6.8	358	9.0
Shell Point	7.2 – 30 [11 – 30]	3.5 – 6.1	167	5.3
McIntyre Creek	23.5 – 28.2	3.0 – 15.1	8.5 – 15.3	0.1 – 0.9
Tarpon Bay	24.0 – 31.6	3.8 – 9.4	6.6 – 17.1	-------
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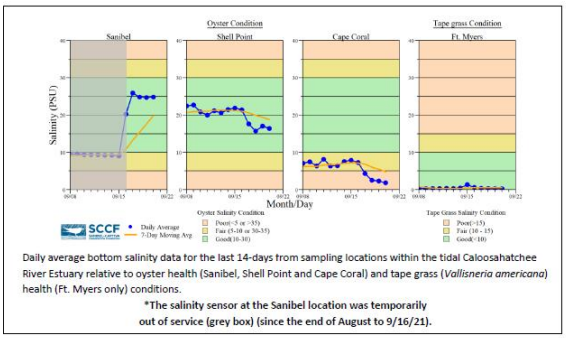
Red values are outside of the preferred range.
[a] Salinity target values: BI < 5, FM < 10, SP = 10 – 25
[b] Dissolved O_2 target values: all sites > 4
[c] FDOM target values: BI < 70, FM < 70, SP < 11
[d] Chlorophyll target values: BI < 11, FM < 11, SP < 11
[e] Single sonde lower and surface layer or surface grab lab measurement

Red Tide: On 9/10/21, the FWC reported that a patchy bloom of the red tide organism, *Karenia brevis*, persists along Florida's Gulf Coast. Over the past week, *K. brevis* was detected in 44 samples. Bloom concentrations (>100,000 cells/liter) were observed in 12 samples: three in and offshore of Pasco County and nine in and offshore of Pinellas County.

In Southwest Florida over the past week, *K. brevis* was observed at low to high concentrations in and offshore of Pinellas County, background to low concentrations in Manatee County, background to low concentrations in Sarasota County, background concentrations in Charlotte County, and **background and low concentrations in and offshore of Lee County**.

Wildlife Impacts: In the past week, the CROW wildlife hospital on Sanibel received 3 toxicosis patients: 1 brown pelican (died), 1 double crested cormorant (still at CROW), and 1 bridled tern (died).

Beach reports: On 9/13/21 – 9/20/21 the FWC fish kill hotline continued to receive reports of fish kills in Pinellas (8 reports), Sarasota (3 reports), Lee (2 reports), and Pasco counties (1 report) with red tide reported as the suspected cause. Affected species include dolphin, mullet, stingray, snook, trout, pinfish, red drum, grouper, puffer, crab and unidentified species.



Daily average bottom salinity data for the last 14-days from sampling locations within the tidal Caloosahatchee River Estuary relative to oyster health (Sanibel, Shell Point and Cape Coral) and tape grass (*Vallisneria americana*) health (Ft. Myers only) conditions.

***The salinity sensor at the Sanibel location was temporarily out of service (grey box) (since the end of August to 9/16/21).**

Water clarity at Lighthouse Beach Park on 9/17/21 at 1:55 PM on a falling tide (High tide: 3.23 ft @ 9:53 AM). Lighthouse Beach Park virtual tour.

Fig 1: The "Caloosahatchee & Estuary Conditions Report" featuring a little planet view of Lighthouse Beach Park.

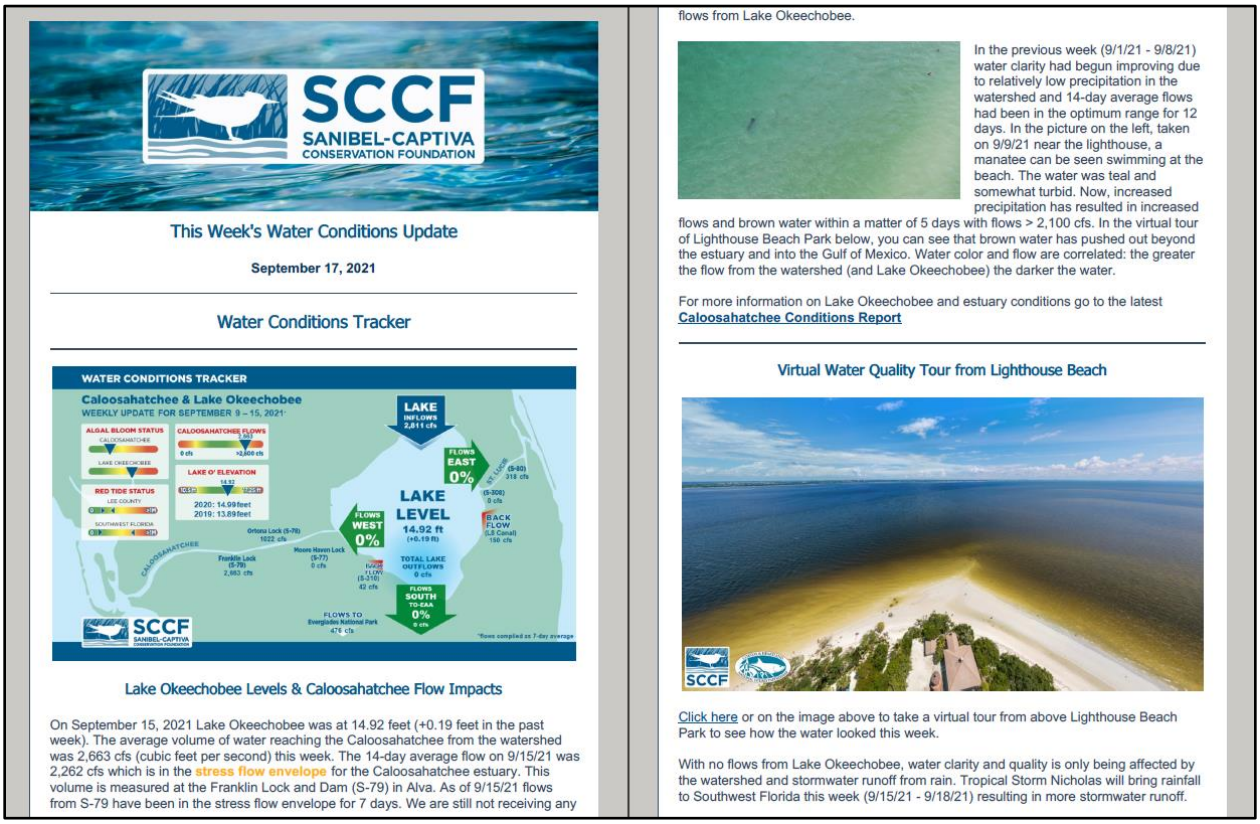


Figure 2: The "Weekly Water Conditions Update" featuring a view of Lighthouse Beach Park.

Figure 3: Cyanobacteria Blooms on the Caloosahatchee at S-79 on May 19, 2021.

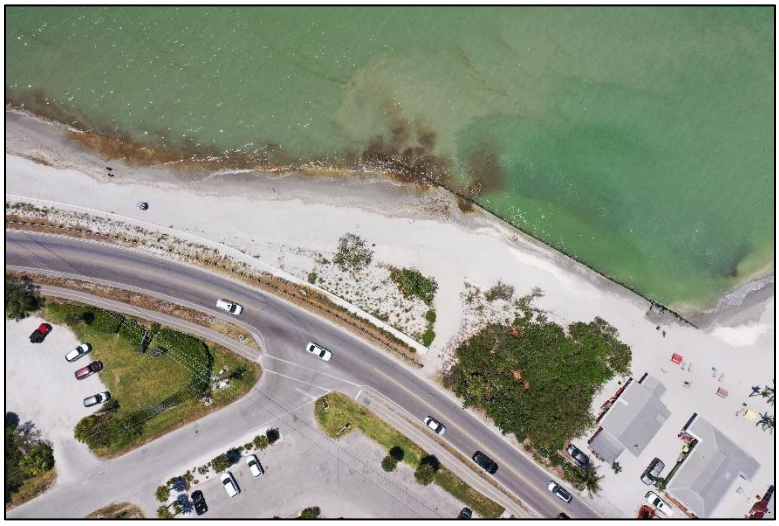


Figure 4: Drift macroalgae accumulation at Blind Pass on May 24, 2021

Figure 5: Macroalgae bloom at Bunche Beach on June 15, 2021

Figure 6: Brown water plume from the Sanibel River after the Beach Road weir was opened after Tropical Storm Elsa on July 8, 2021

Figure 7: Monitoring of the plant removal project at Jordan Marsh for the City of Sanibel.