Environmental Assessment of the Chassahowitzka River

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The Southwest Florida Water Management District (District) monitors environmental conditions in a number of water bodies in its 16-county area, including the Chassahowitzka River, to determine the health of our local waters. Various information is collected to understand these conditions, including water quality, hydrologic, and submerged aquatic vegetation (SAV) data. This report provides current information about the Chassahowitzka River in relation to the parameters collected by the District.

Figure 1: Aerial photograph of the Chassahowitzka River.

Sampling Locations

The maps below (Fig 2) indicate the sampling locations for some of the environmental conditions collected within the Chassahowitzka River. The surface water sampling location numbers indicate approximate distance from headspring.

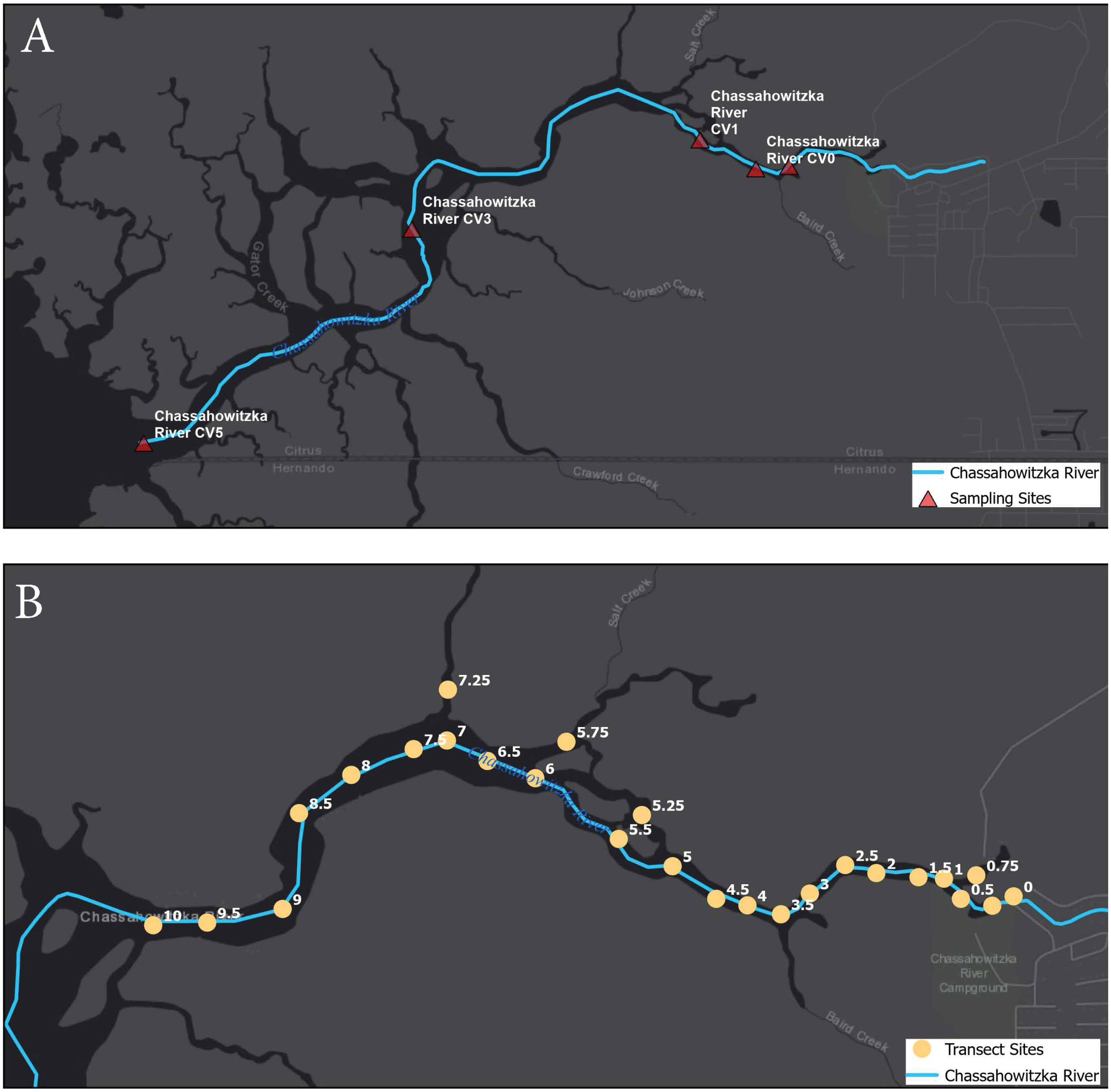


Figure 2: Sampling locations for (A) surface water sites and (B) submerged aquatic vegetation in the Chassahowitzka River.

Water quality and hydrologic data

The District's Data Collection Bureau is responsible for the collection and management of water resource data. Water quality and hydrologic data is available through the District's Environmental Data Portal.

At each of these locations (Fig 2A), surface water samples and measurements are collected and include parameters such as total nitrogen, dissolved oxygen, water clarity, salinity, specific conductance, and temperature. Water clarity is recorded from horizontal secchi measurements.

In addition to the surface water sites, nitrate data is collected from the spring vent and reported to the Springs Coast Committees. This location is referenced in the Environmental Data Portal as station number 21022.

Rainfall data is derived from the monthly rainfall total throughout the Chassahowitzka Springshed.

Figure 3: Water quality data collection at one of the sampling stations in the Chassahowitzka River.

Submerged aquatic vegetation (SAV) data

Twenty-five sampling locations (Fig 2B), which are referred to as transects, are used to evaluate SAV in the river and are currently mapped during the winter and summer of each year. SAV data may be requested by emailing the Springs Team at SpringsTeam@WaterMatters.org.

Figure 4: *Vallisneria americana*, also known as eelgrass, is one of the SAV species found in the Chassahowitzka River.

Water Quality and Hydrologic Data

Rainfall and spring flow

The amount of rainfall a region receives directly affects the amount of water that flows from a spring. As rain falls to the ground, it is absorbed and percolates downward into the limestone bedrock. The limestone holds the water like a sponge, and the water becomes part of the Floridan Aquifer. This natural replenishment of the aquifer through rainfall is referred to as recharge, and is demonstrated in Figure 5.

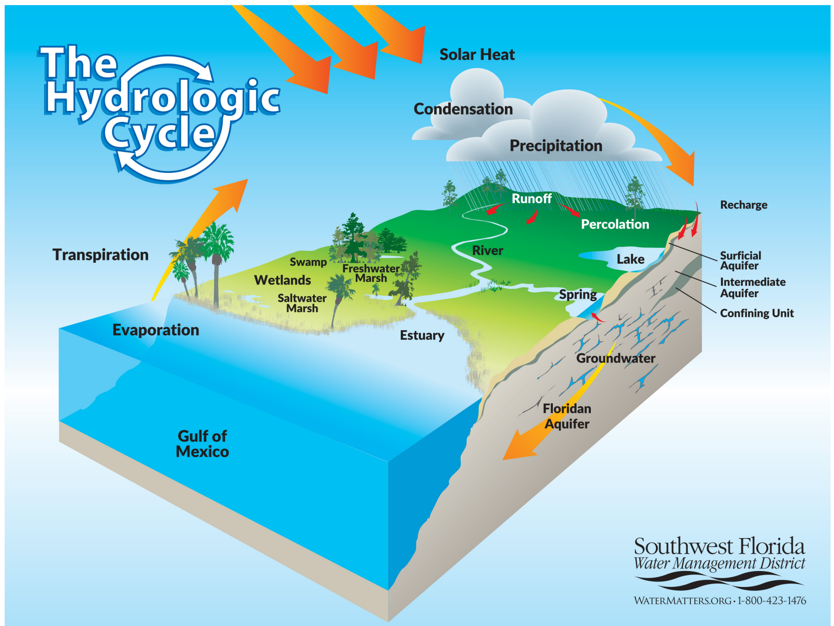


Figure 5: Hydrologic cycle showing how recharge occurs.

Due to the complexity of the aquifer system, travel time can take days to years before the water reaches the spring vent. However, patterns between rainfall and spring flow (Figure 6) can still be seen.

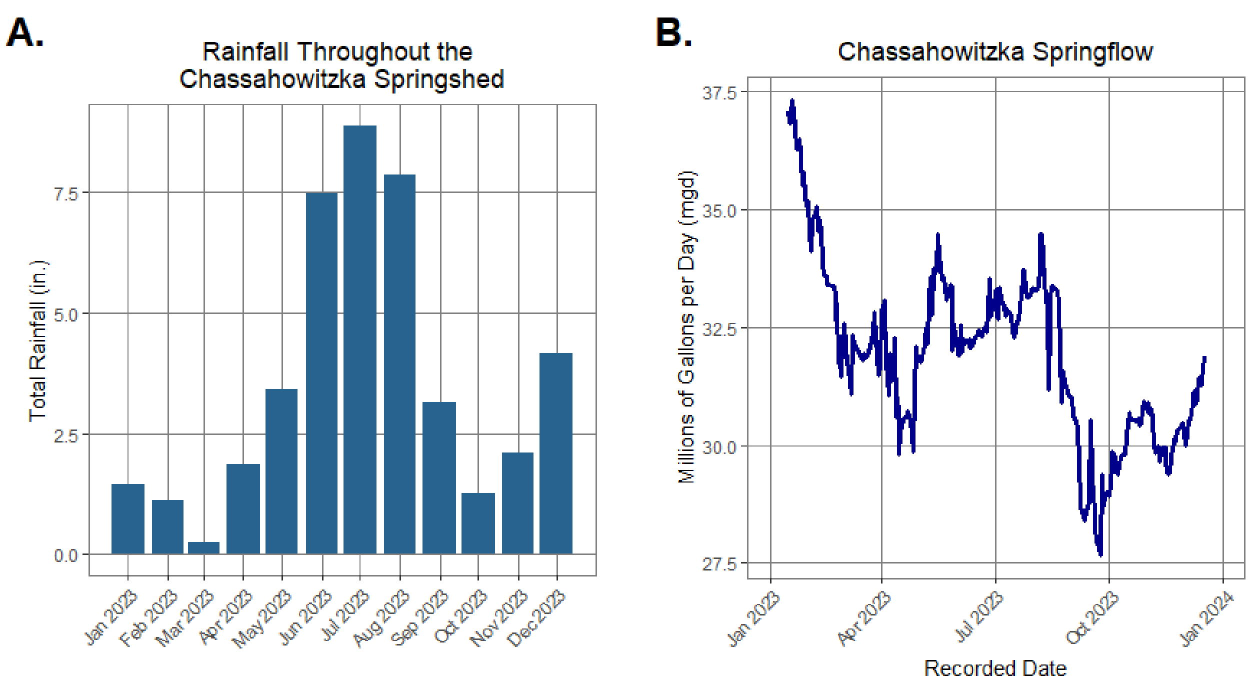
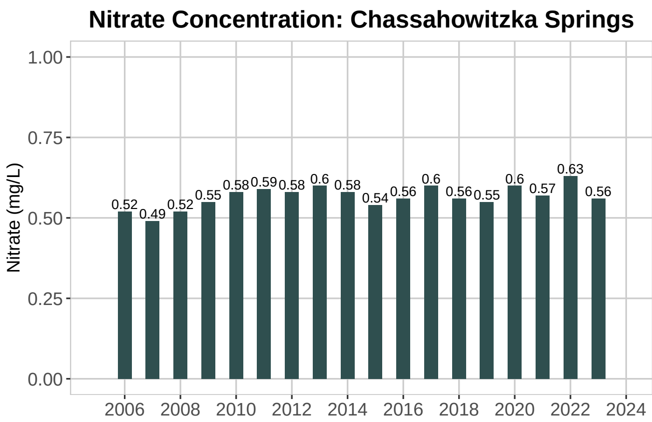
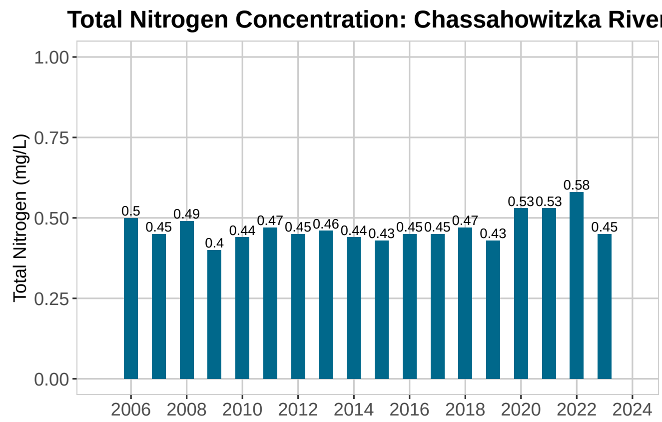


Figure 6: (A) Rainfall in the Chassahowitzka River Springshed influences the (B) amount of springflow.

Nutrients and other water quality parameters

Development within the Chassahowitzka springshed has contributed to increased nutrients within the spring. These nutrients are from a variety of sources, including fertilizer use and septic tanks. Excess of nutrients can cause an ecological imbalance in the river. The Florida Department of Environmental Protection (FDEP) has adopted a Basin Management Action Plan (BMAP) to implement the total maximum daily load (TMDL) for the protection and restoration of this system. The below graphs show the nitrate concentration at the spring vent and the total nitrogen concentration within the river, which are reported to the Springs Coast Committees.





Excess nutrients in the water can cause reduced water clarity. However, water clarity is also impacted by many other natural factors such as tides, wind, and tannins. Tannins are compounds derived from plant organic matter that give water a brown pigment, which is how tea gets its color. Tannins from surrounding wetlands can enter spring-fed rivers and cause a change in the river's color.

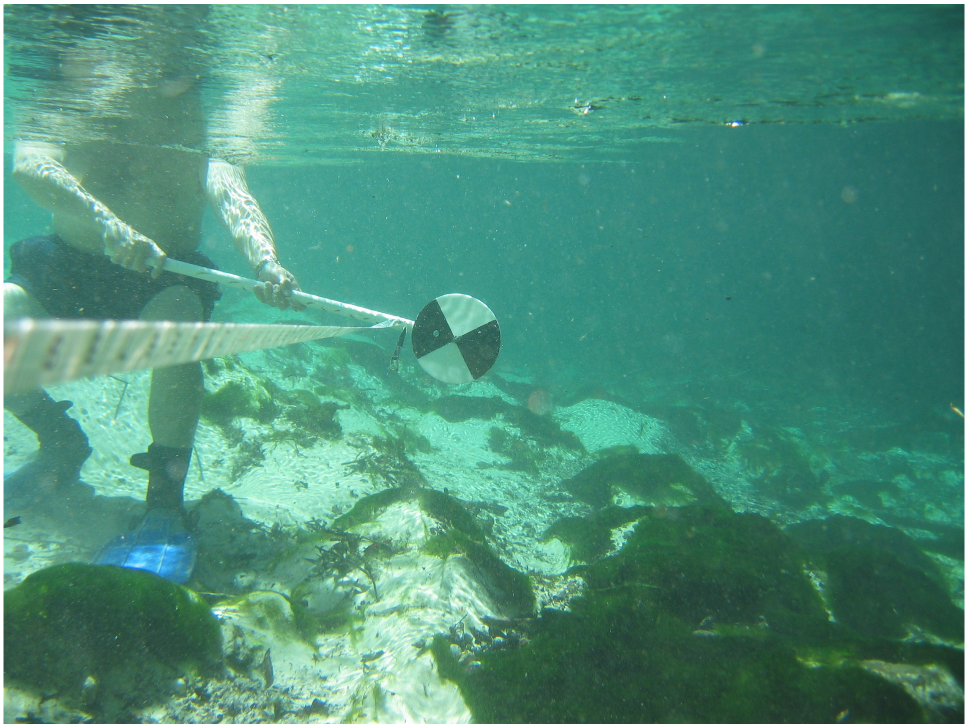
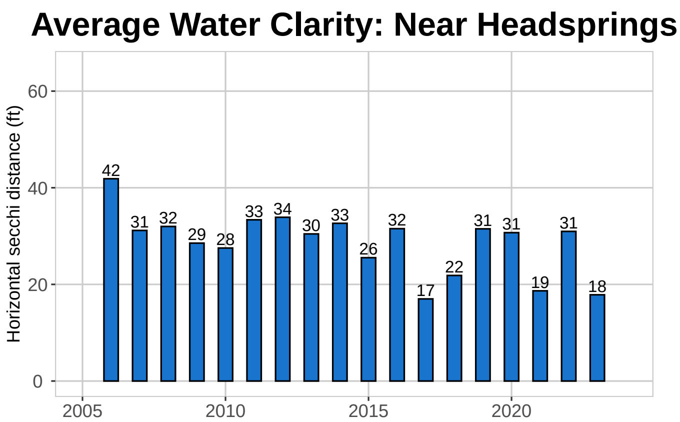
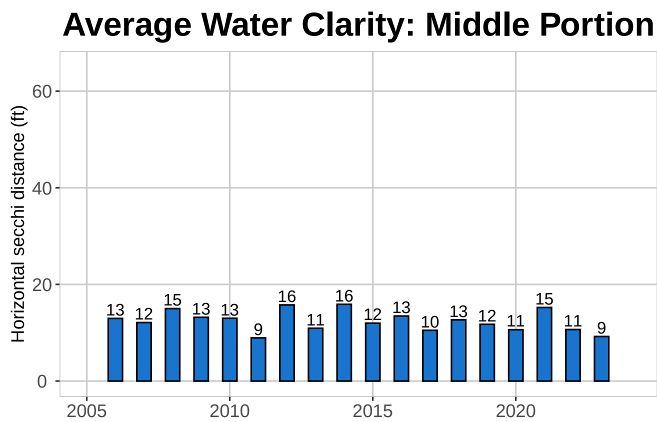


Figure 7: A secchi disk is used to measure water clarity.

Water clarity is measured using horizontal secchi measurements. A secchi disk is a black and white circular disk used by scientists to measure the distance until the disk is no longer visible. This method is often used by lowering the disk from a boat, but water clarity in springs often exceeds river depth. Horizontal secchi measurements are therefore conducted, where a diver swims until the disk is no longer visible. An example of this process is shown in Figure 7.

Water clarity decreases with downstream distance, which is a common phenomenon in many riverine systems. The below graphs show water clarity in the headsprings and middle portions of the Chassahowitzka River, which are reported to the Springs Coast Committees.





Submerged Aquatic Vegetation

Submerged aquatic vegetation (SAV) is mapped in the winter and summer of each year at specified locations called transects (see Fig 2B). Quadrats, which are square frames made of PVC pipe as seen in Figure 8, are used to measure coverage of species present. At each of these transects, one 0.25 m^2 quadrat is randomly tossed in the middle of the river and two are randomly tossed to each side approximately one-third and two-thirds the distance to the shoreline. The average of these five quadrats is used to capture the percent coverage at each transect to capture the variation between each riverbank.

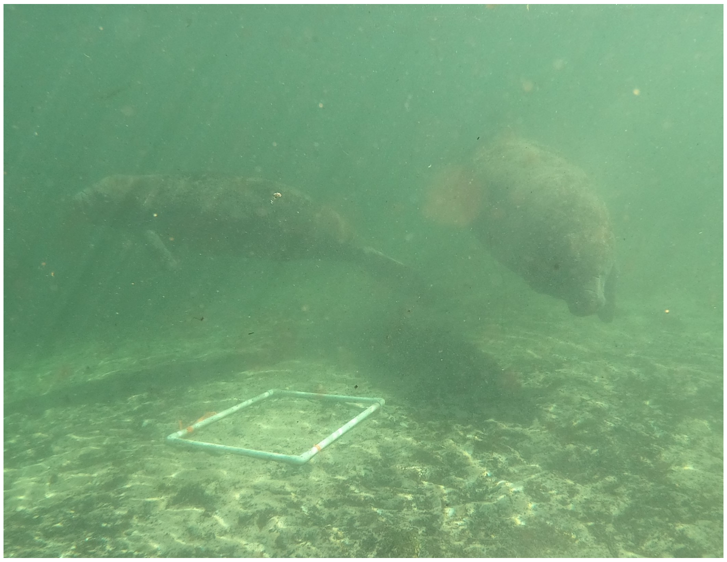


Figure 8: Manatees inspect quadrat during data collection in the Chassahowitzka River.

Seasonal variation can be seen in the Chassahowitzka River between the summer and winter SAV data collection efforts. This variability is attributed to differing ecological conditions such as growth patterns of SAV species, seasonal changes in spring flow, and manatee grazing.

Salinity impacts the type and abundance of SAV species with freshwater species appearing closer to the headsprings. As a result, ecological zones are present within the river (see Figure 9), which are characterized by their salinities. The tidal freshwater habitat functions like a spring-fed river. The elevated salinities within the transition and estuarine zones cause fewer freshwater SAV species to grow.

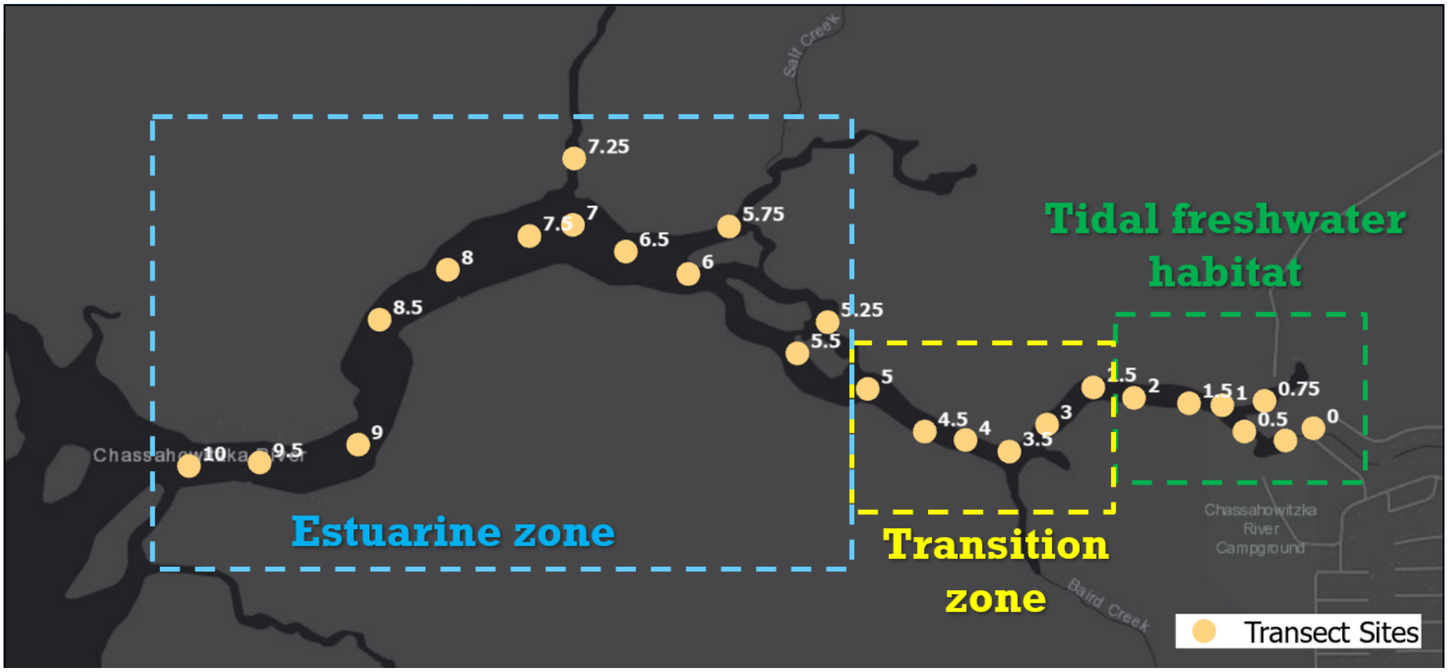
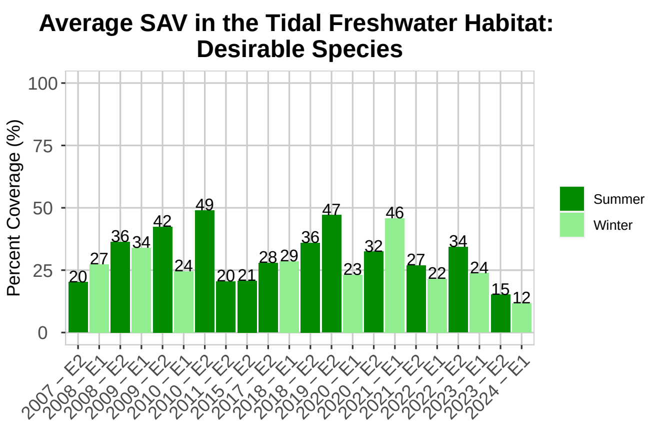
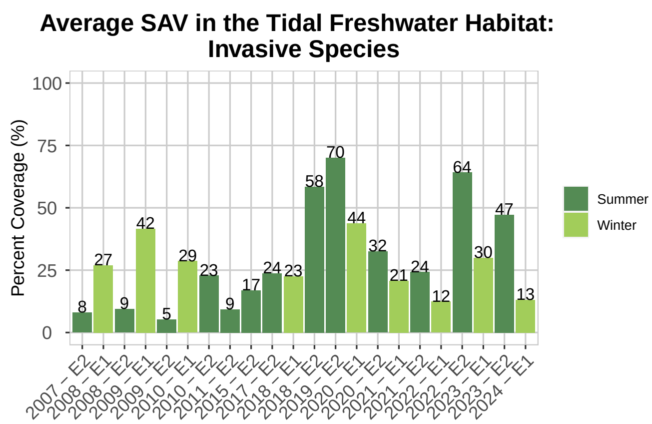
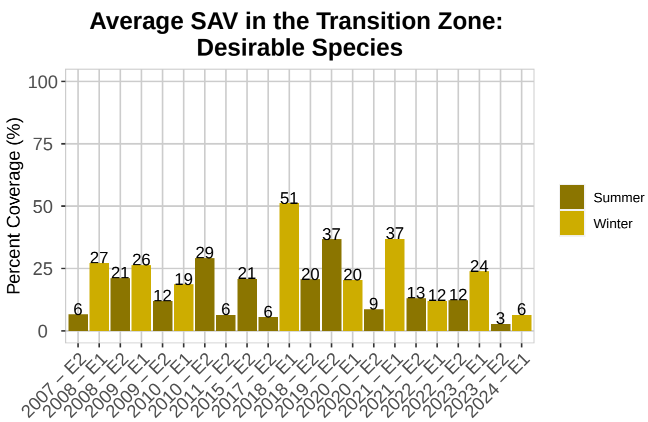


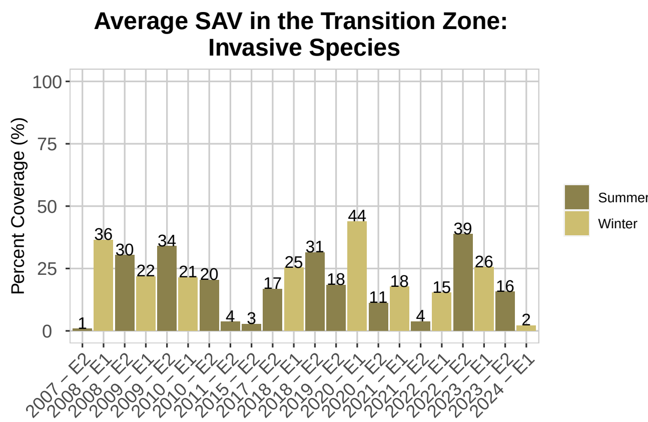
Figure 9: The submerged aquatic vegetation (SAV) in the Chassahowitzka River can be classified into the tidal freshwater habitat, transition zone, and estuarine zone.

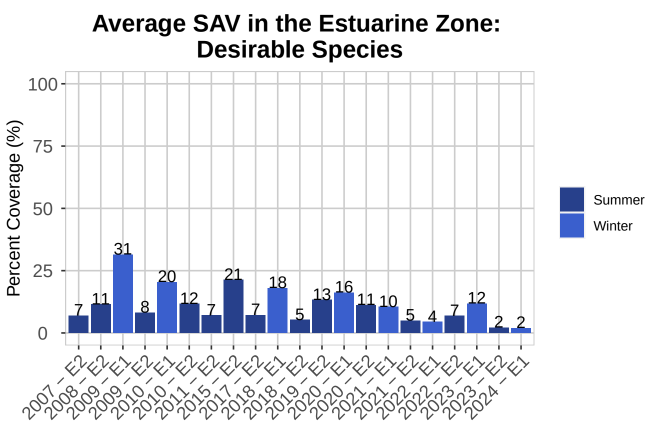
The below graphs show the average desirable and invasive SAV species in the different zones present in the Chassahowitzka River.

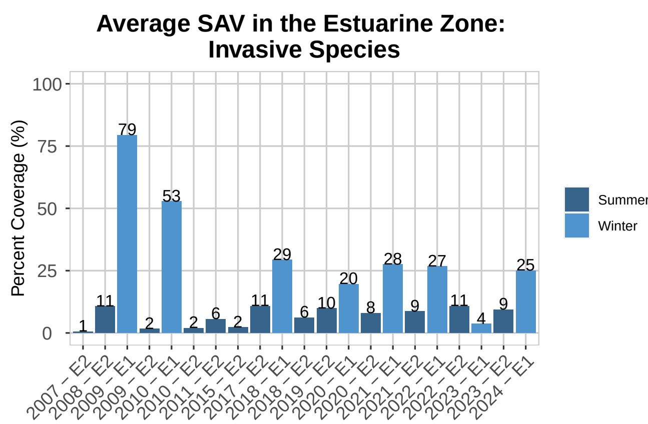





Average SAV in the Transition Zone:
Desirable Species
Percent Coverage (%)
0
25
50
75
100
6
27
21
26
12
19
29
6
21
6
51
20
37
20
9
37
13
12
12
24
3
6
2007 – E2
2008 – E1
2008 – E2
2009 – E1
2009 – E2
2010 – E1
2010 – E2
2011 – E2
2015 – E2
2017 – E2
2018 – E1
2018 – E2
2019 – E2
2020 – E1
2020 – E2
2021 – E1
2021 – E2
2022 – E1
2022 – E2
2023 – E1
2023 – E2
2024 – E1
Summer
Winter


Average SAV in the Transition Zone:
Invasive Species
Percent Coverage (%)
0
25
50
75
100
1
36
30
22
34
21
20
4
3
17
25
31
18
44
11
18
4
15
39
26
16
2
2007 – E2
2008 – E1
2008 – E2
2009 – E1
2009 – E2
2010 – E1
2010 – E2
2011 – E2
2015 – E2
2017 – E2
2018 – E1
2018 – E2
2019 – E2
2020 – E1
2020 – E2
2021 – E1
2021 – E2
2022 – E1
2022 – E2
2023 – E1
2023 – E2
2024 – E1
Summer
Winter


Average SAV in the Estuarine Zone:
Desirable Species
Percent Coverage (%)
0
25
50
75
100
7
11
31
8
20
12
7
21
7
18
5
13
16
11
10
5
4
7
12
2
2
2007 – E2
2008 – E2
2009 – E1
2009 – E2
2010 – E1
2010 – E2
2011 – E2
2015 – E2
2017 – E2
2018 – E1
2018 – E2
2019 – E2
2020 – E1
2020 – E2
2021 – E1
2021 – E2
2022 – E1
2022 – E2
2023 – E1
2023 – E2
2024 – E1
Summer
Winter


Average SAV in the Estuarine Zone:
Invasive Species
Percent Coverage (%)
0
25
50
75
100
1
11
79
2
53
2
6
2
11
29
6
10
20
8
28
9
27
11
4
9
25
2007 – E2
2008 – E2
2009 – E1
2009 – E2
2010 – E1
2010 – E2
2011 – E2
2015 – E2
2017 – E2
2018 – E1
2018 – E2
2019 – E2
2020 – E1
2020 – E2
2021 – E1
2021 – E2
2022 – E1
2022 – E2
2023 – E1
2023 – E2
2024 – E1
Summer
Winter