CLAM BAY MANGROVE ASSESSMENT PROJECT 1999-2024

CONSERVANCY OF SOUTHWEST FLORIDA
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INTRODUCTION

Mangroves are at the frontlines in the field of battle against the impacts of climate change. They protect us from storms, hurricanes, cyclones, and storm surges. Southwest Florida's mangroves continue to prove their worth abating the devastating effects from Hurricanes such as Wilma, Irma and Ian. The damage to Collier County's population and associated real estate would have been so much worse without the mangrove systems that absorbed a lot of the storm surge and wind velocity from these storms. If these forests are kept healthy, their ability to protect shorelines from storms and to sequester carbon could mitigate future climatic impacts.

Mangroves are the foundation of estuaries, supporting a variety of life, from bacteria that break down their detritus through higher trophic levels via intricate food webs (Teas, 1979). An estimated 628 wildlife species in Florida, including numerous species of birds, fish, reptiles, amphibians, and mammals (USFWS, 1999) rely on mangrove systems. Their canopy is rich in epiphytes and provides roosting and bird nesting areas. Their extensive root systems, both above and below the water, provide safe havens for terrestrial and aquatic invertebrates such as mangrove crabs, shrimp, barnacles, sea squirts, insect larvae, oysters, and mussels. They help to maintain water quality by filtering water and trapping sediments, heavy metals and other pollutants. These forests receive inorganic matter from terrestrial systems and export organic matter containing needed nutrients to intertidal, estuarine, and nearshore marine ecosystems (Boer, 2000, Odum and Heald, 1975; Beck, et. al., 2001).

Mangroves are important to ecology and socioeconomics, in terms of flora and faunal productivity (IPCC, 2001). They are the main source of primary production in South Florida's coastal ecosystems (~80%), producing approximately 1 kg/m^2 of litter per year. This accumulation rate produces a density of bacteria in mangrove soil that is amongst the highest in the world (Robertson and Blaber, 1992). Mangrove soils are among the most carbon-dense ecosystems worldwide. They are sinks for carbon, nutrients and pollutants. Sadly, worldwide, there has been a considerable decrease in carbon sequestered by mangroves, primarily due to deforestation (Sanderman, et al., 2018).

Worldwide, there are 70 known mangrove species. Approximately, one in six of these species are on a path toward extinction. Over fifty percent of the world's mangrove forests have been destroyed primarily due to two factors: anthropogenic and natural. Anthropogenic impacts make up the bulk of the mortality and include coastal development, agriculture and aquaculture, tree harvesting, pollution and accelerated climate change due to human activities (IUNC, 2016 (Lewis, 1999; Parks and Bonifaz, 1994l and ELAW, 2021). While most countries have recently banned the conversion of mangroves to agriculture, loss rates are still considerable (~3.1% annually in some countries) (Sanderman, et al., 2018). The United States ranks in the top 20 countries where mangrove loss continues to occur (Sanderman, et al., 2018), with losses estimated at over 69% (Valiela, et al., 2001, Donato, et al., 2011). In Florida, mangrove losses are primarily caused by development along coastal areas and concomitant alterations to hydrology,

including of dredging, filling, diking and impounding wetlands (Turner and Lewis, 1997). While the rate of anthropogenically caused mangrove loss has lessened worldwide during this century, these types of mangrove losses still account for the majority of mangrove mortality (~62%) (Goldberg, et al. 2020). The second major factor, erosion, naturally contributes to mangrove decline worldwide and accounts for ~27% of mangrove mortality worldwide (Goldberg, et al. 2020). Other factors include the low genetic variability between mangroves, which decreases their ability to adapt to change (Feller, 2018). Likely, there will be considerable loss of mangrove forests in the coming decades, as natural, climatic and anthropogenic stressors combine with barriers that restrict the landward mangrove migration in response to sea level rise.

SITE DESCRIPTION

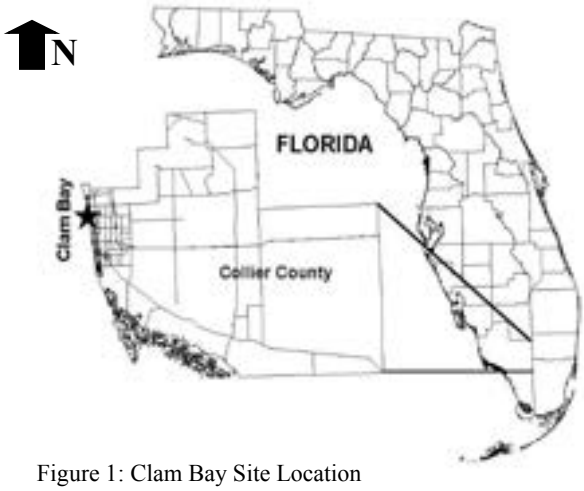


Figure 1: Clam Bay Site Location
Naples, Florida, USA
N –81 49 20 E 26 14 39

Historically, Clam Bay was tidally connected to the Gulf of Mexico via Wiggins Pass to the north, Doctor's Pass to the south, and Clam Pass, centrally located between the other two passes.

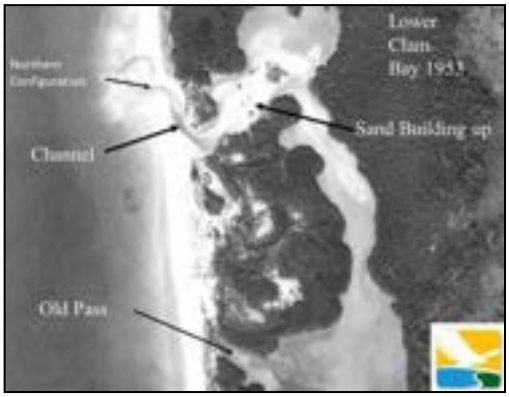
This estuary is one of the few remaining dynamic systems in the Cocohatchee-Gordon River Drainage System (Burch, 1990) (Figure 1), consisting of ~ 600 acres of shallow bays and mangrove swamps. Clam Bay is the only coastal designated National Resource Protection Area (NRPA) in Collier County.

Clam Bay became isolated in the 1950's when roads were constructed north and south of Upper and Lower Clam Bays, respectively. In 1952, Vanderbilt Beach Road cut off the connection between Upper Clam Bay and Wiggins Pass to the north. In 1958, Seagate Drive cut off the connection between Doctor's Pass and Lower Clam Bay to the south. Today, this estuarine system consists of a series of three of inter-connected, extremely shallow bay lagoons, Outer, Inner and Upper Clam Bays. These bays are still viable, although evidence of slow deterioration in the mangroves around Inner Clam Bay has been documented for over three decades (Benedict, 1984; Worley, 2017). Clam Pass remains the only viable tidal connection to the Gulf of Mexico, leading to several small lagoons and creeks that are aligned parallel to the shoreline. This pass naturally changes its orientation and its position has migrated north and south in concert with prevailing currents.

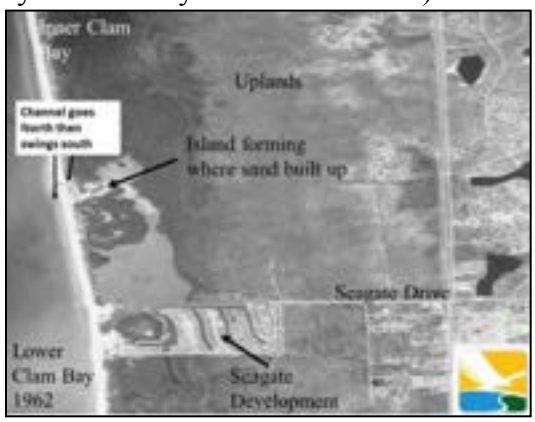
Clam Pass Over the Years

Clam Pass is a "semi-natural" pass, it does not have any hardened structures, but is dredged to keep it in the same place. Typically, Clam Pass would close up overtime and blow open in another area, part of a barrier island's natural processes of accretion and erosion. Sand and shorelines are dynamic and respond to changing currents, storms and wind strength and direction. Today the pass configuration is natural in that sand accretes and erodes in concert with the currents, winds and storms and Clam Pass is unnatural due to human interference as we dredge the pass trying to keep it straight and keep it in the same place, when nature wants to continually move and change.

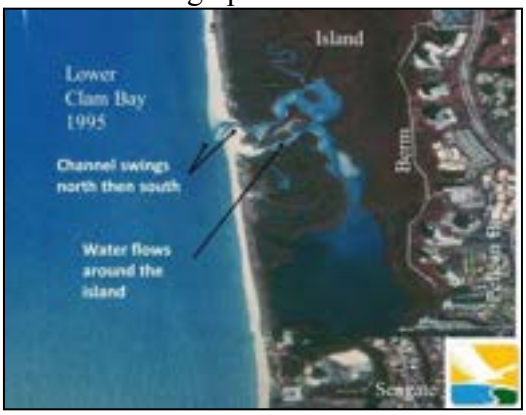
Historical photographs of the Pass illustrate how the Pass naturally functions.



1953 – Pre-development. Visible are the channel, a remnant of an old pass, and sand is observed building up. (Arrows pointing to the "channel" and the "sand building up" illustrate how dynamic the system is over time.)



1962 – Seagate Drive was constructed cutting off the estuary connection to the south. The Seagate canal system and residential areas are in the development phase. Note: Clam Pass channel in 1962 swung north then south and sand was building up.



1995 – Pelican Bay is visible adjacent to the estuary and the "sand buildup" has formed an island. Clam Pass still swings to the north and then to the south.

2003 – Two years after the extensive dredging project in 1999 and 1 year after the interior tributary dredging in 2002. Note: shoaling around island and the pass swings to the north.

2008 – The pass was dredged in 2007 resulting in a straighter pass channel.

2013 – Pre-emergency Dredge. Storms that occurred in 2012 resulted in the closure of Clam Pass. (If left to nature a new pass would develop in another part of the system with less sand build up).

2016 –Pre hydraulic dredge. Note the accretion and erosion, but the Pass is still viable moving a lot of water.

2022 – Post 2022 dredging. Post-Hurricane Ian, pass has silted in.

2013 – Post emergency Dredge (Note the straight channel).

2014 - Clam Pass has moved to the north again

2022 – Post 2016 and 2018 dredging. The pass is oriented northerly and sand has again accreted on the interior. This was prior to the dredging that occurred in March of 2022

2024 – Pass was dredged in the summer which opening up the Pass and orienting it to the north

Mangrove Deterioration

The first obvious signs of forest deterioration in Clam Bay occurred in 1991, when 5.67 hectares of black mangroves died in the northwest corner of the mangrove forest. This die-off occurred within six months of completion of a new hard-surfaced road. In 1995, a massive die-off of black mangroves, (approximately 202,350 m^2 (20 ha), occurred adjacent to the original 1991 dieback.

Unusually, heavy rainfall occurred during the wet seasons of 1992 and 1995, prior to the massive mangrove die-off. Black mangroves were inundated for two to six weeks and soils remained saturated for more than four months. Altered soil chemistry, lack of tidal exchange, and high surface water retention contributed to the decline in productivity, growth, and eventually death of these mangroves. The black mangroves were slowly dying for many years and the rainfall simply accelerated the process. The die-off extended southward along the Strand Road and the western shore of Upper Clam Bay. In the late 1990's, the die-off showed no signs of recovery and appeared to extend to the south and east (Figure 2).

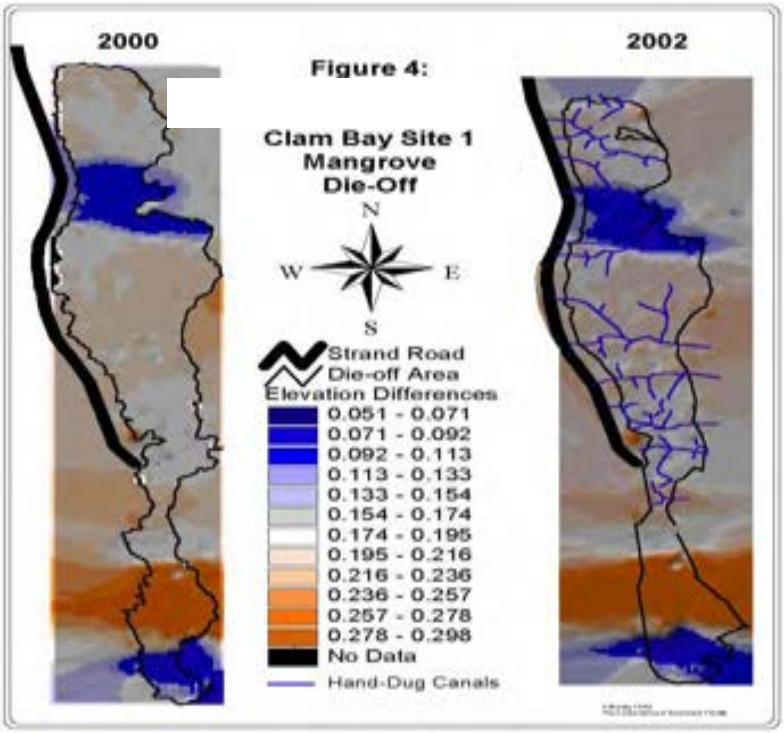
Today, the Clam Bay mangrove estuary is almost entirely enclosed by roads, retention walls and Pelican Bay, an extensive residential community (particularly at the northern terminus, surrounding Upper Clam Bay). The impaction of soil during building has likely prevented above ground sheetflow and below ground water flow to and from the Gulf. This contributed to higher than normal floodwaters and longer water retention times within the mangrove system in the mid to late 1990's. Large-scale die-offs of black mangroves suggest that impacts of intense development over the past five decades are influencing the health in portions, if not all, of the formerly healthy mangrove forests (Worley and Gore, 1995).

Figure 2: Clam Bay Pre-Development of the Strand Road (1990) and Post-Development (1996)

Source: Pelican Bay MSTBU Aerials 1990 and 1996

Residential development and associated infrastructure permanently altered the landscape surrounding this mangrove forest and thereby altering the natural hydrology. These alterations changed the volume and timing of freshwater flows into the estuary and affected the existing tidal regime. Freshwater runoff from developed areas surrounding the Clam Bay mangrove system is typically diverted through stormwater protection measures into the mangroves. (Worley and Gore, 1995). As a result, particularly during storm events, urban pollution and excessive nutrients are often shunted as a point source into Clam Bay. Stormwater enters the mangroves in large pulses, rather than slowly moving as sheetflow over the land or naturally percolating through groundwater tables. In the mid to late 1990's, excessive water runoff from Pelican Bay during the wet season became impounded within the mangrove forest resulting in stagnant pools. Conversely, during the dry season, tidal flow above and belowground became blocked creating a seasonal draught. Construction and subsequent development in close proximity to mangrove forests often alters the area's natural hydrologic regime, causing the trees to become stressed and die (Worley, 2005). The effect of placing development adjacent to mangrove forests does not often become visually apparent for many years or even decades. Pelican Bay began construction primarily in the 1970's and 1980's. The adjacent mangrove forest of Clam Bay was stressed for many years, which when coupled with additional stormwater impoundment accelerated tree mortality. Additionally, topographic and hydrologic data suggest that mangrove die-offs adjacent to development are lower in elevation and have higher water retention than mangroves located in areas that do not abut development (Figure 3). Therefore, water to pools in the lower elevations, impounds, and results in mangrove die-offs. This type of die-off can expand as a result of continual flooding and erosion (Worley, 2005).

Figure 3: Clam Bay Die-off Topography Pre and Post-Restoration Hand-dug Channel Installation within the Northwestern Die-off Area



Mangrove forest degradation and die-offs have been linked to new developments that were built adjacent to a mangrove forest. In a typical scenario, commercial and/or residential development moves in next to a black mangrove forest. This results in soil compaction during construction and reduced interstitial water flow. These alterations are often accompanied by a change in tidal flow and/or increased freshwater runoff into the mangroves, resulting in an altered hydroperiod. If surface water levels rise rapidly and do not drain or evaporate quickly, black mangrove pneumatophores become submerged, blocking gaseous exchange to the roots. Under normal tidal conditions, oxygen concentrations decline in the pneumatophores during high tide, but recover quickly during low tide (Allaway, et. al., 2001). If extended periods of inundation occur, oxygen storage and exchange become compromised, causing oxygen exchange in the submerged root systems to decline sharply. Thus, if pneumatophores are submerged for a prolonged period, black mangroves figuratively 'drown', and the result is mass mortality (Figure 4). Significant rainfall events can exacerbate and accelerate mangrove mortality, as demonstrated within the Clam Bay mangrove forest in 1995 and in 2016.

The mangrove die-off areas within the Clam Bay system were not recovering and were in fact expanding during the period of 1995 through 1999. In 1999, the local government initiated a ten-year restoration project in 1999. Tidal flow was improved by dredging the pass and main channel arteries within the estuary. Small tributaries near the main die-off were cleared with dynamite to drain the excess surface water and encourage tidal flushing (Figures 3, 5a & 5b & 5c). Five months into this study, Collier County began installing an extensive array of narrow hand dug channels throughout Clam Bay in an attempt to prevent extended surface water retention periods during the wet season and lower stagnant standing surface water levels. Dredging existing channels and extending the channel network had a visible effect on the local hydrology within the die-off by draining off floodwaters. However, this extensive array of channels has also led to erosion within the system. Each time an area within the forest shows deterioration that is not caused by storms or other natural stressors, the County tends to respond by digging another channel. Unfortunately, the original cause of the excess freshwater was not addressed at its source and continues to cause system issues during periods of heavy inundation.

Figure 4: Chronology of a Hypothetical Black Mangrove Die-off

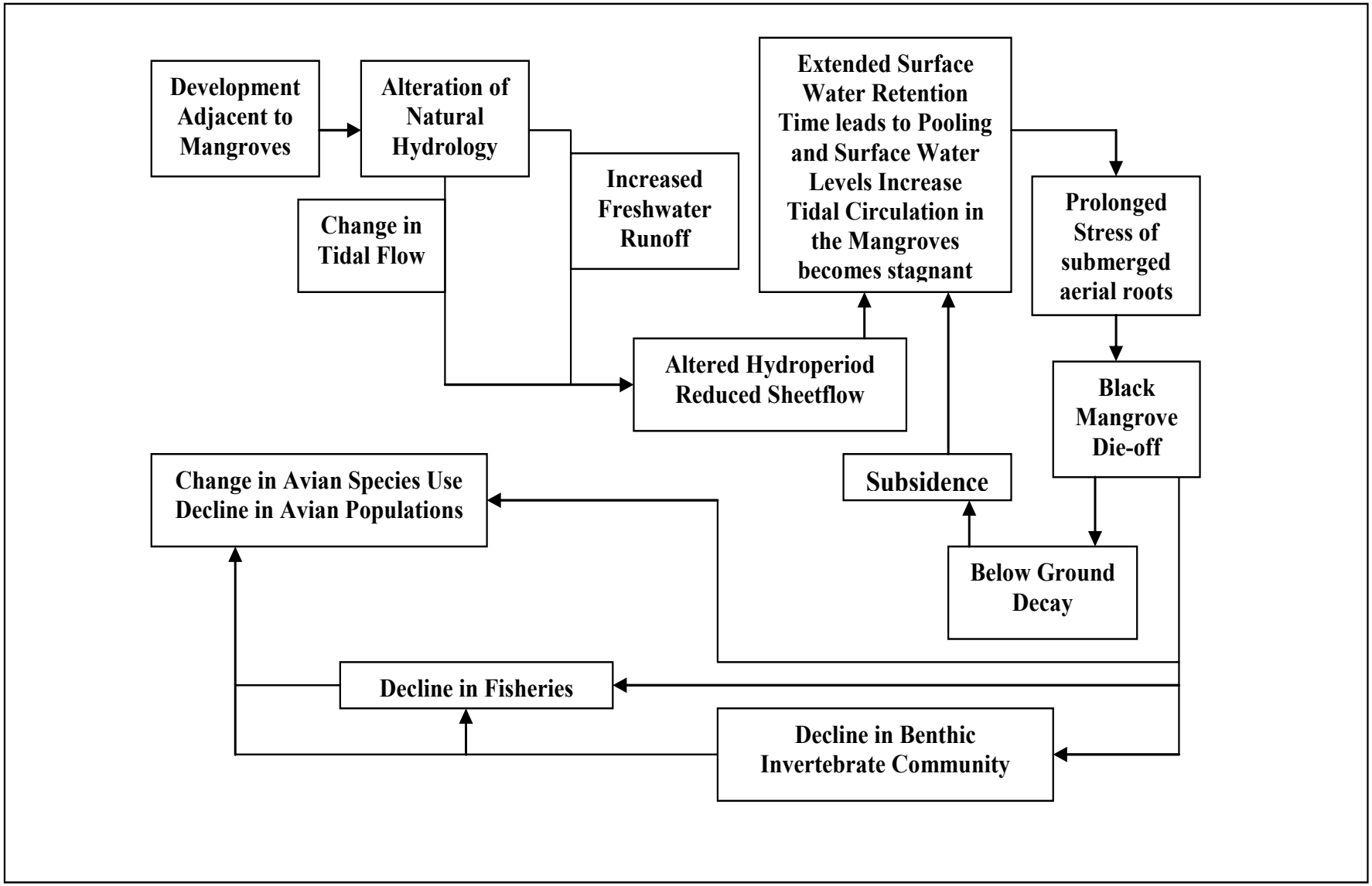
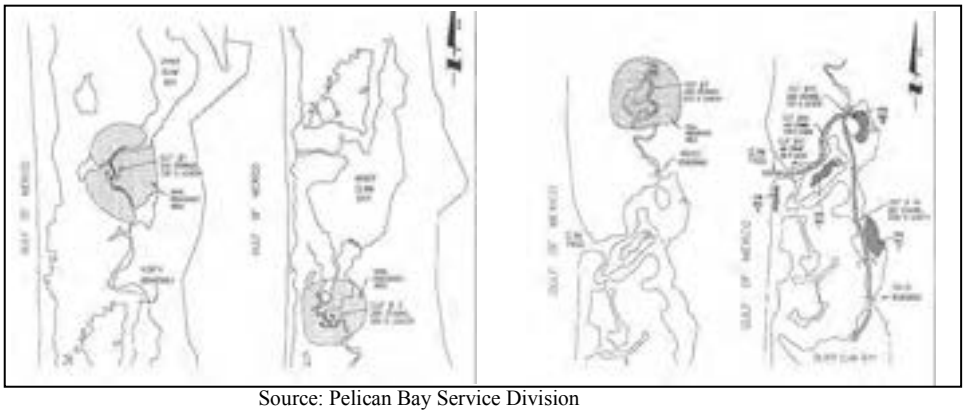


Figure 5a: Excerpts from Collier County's Clam Bay Restoration Plan



Source: Pelican Bay Service Division

Figure 5b: Hand-dug Channels 2006

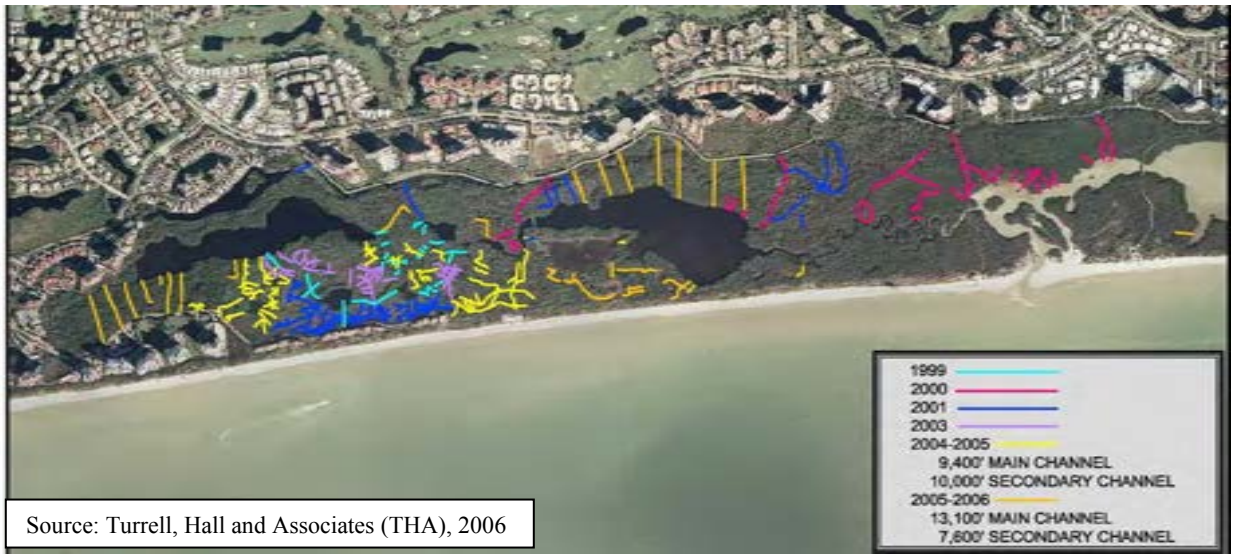
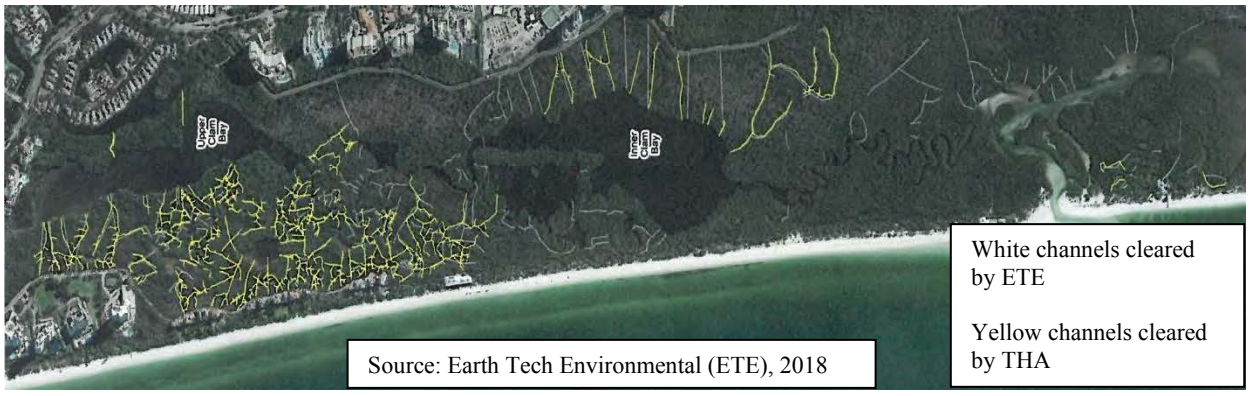


Figure 5c: Hand-dug Channels 2018



OBJECTIVES

Mangrove forests naturally change slowly; hence, annual monitoring is necessary to accurately assess the relative "stability" of the forest overtime. The objectives of this research project are to:

1) Evaluate the general health of the Clam Bay mangrove system overtime.
2) Gauge mangrove recovery in areas that have died out.
3) Compare pre and post restoration project recovery throughout the Clam Bay system.
4) Monitor the effects of hurricanes and other weather events on the system.

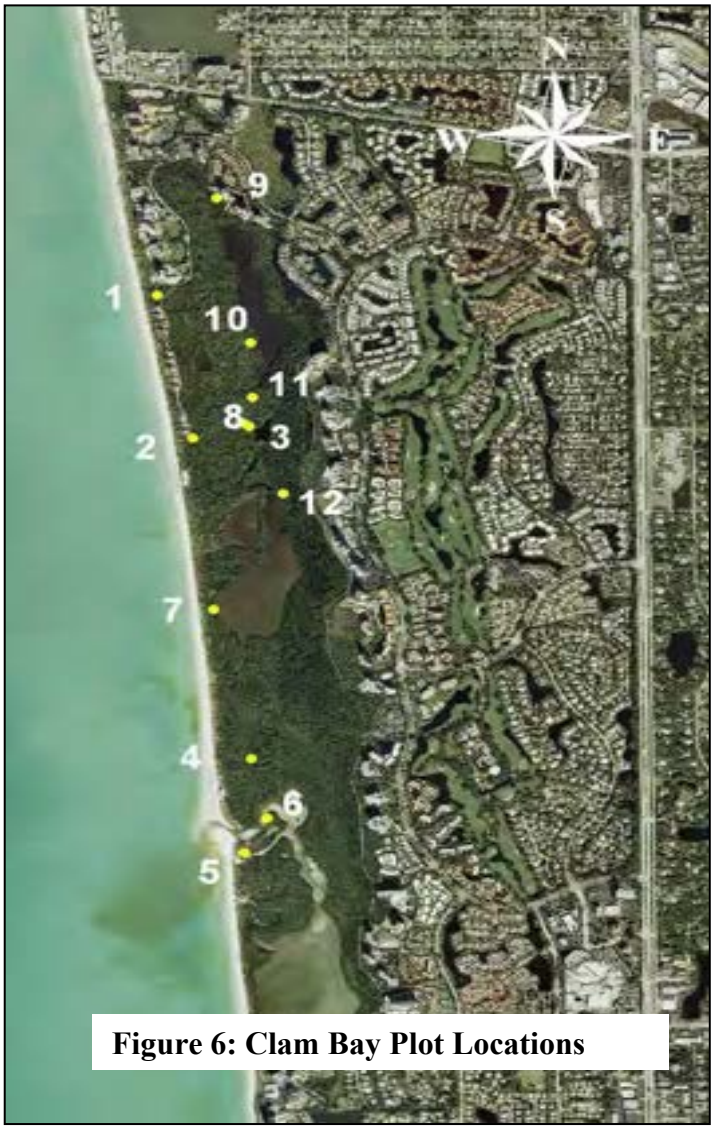


Figure 6: Clam Bay Plot Locations

METHODS

In 1999, twelve plots were established throughout the Clam Bay system, in areas that provided diversity in terms of substrate, hydrology, species, topography and tree condition (dead, stressed or relatively healthy) and are being monitored annually (Figure 6).

A "gradsect" sampling regime, a variant of a stratified random sampling system (Gillison and Brewer, 1985), was used to stratify plots within the Clam Bay system according to condition, species, topography, substrate and hydrology. Plots were classified in 1999 (pre-restoration) as either Relatively Healthy, Stressed or in a Die-off area and their status is being evaluated annually. Plot condition is determined using standardized mangrove data collection protocols developed for previous tree assessments over time and substantiated by work described by Duke, et al., 2010; Saintilan, 2010; and FRC Environmental, 2008/2010.

Each plot is circular in shape with a radius of 6 meters (Smith, 2000). The center of each plot was mapped using GPS coordinates. To determine the location of each tree and propagule (seedling) within a plot the distance and bearing of each mangrove is measured in relation to a known reference point located in the center of each plot. This information is used to assist in locating trees and seedlings on subsequent sampling visits and provides details of vegetative spatial arrangements within the plot. All trees within each plot greater

than 150 centimeters in height are identified to species (Red Mangrove, *Rhizophora mangle L.* (R), Black Mangrove, *Avicennia germinans L.* (B) or White Mangrove, *Laguncularia racemosa L.* (W)), tagged, measured (Diameter at Breast Height (DBH)) and visually classified for condition (relatively healthy, stressed, very stressed or dead) annually. Tree height was not included in tree morphometric measurements since DBH is a better indicator of dry weight than stem height (Smith and Whelan, 2006). For purposes of this study, a mangrove propagule is considered a seedling when it is at least 32 cm tall. Seedlings were identified to species, tagged, and measured (height). Cover estimates were generated based on an evaluation of cover data collected at 49 sample points within each 6-meter plot using a GRS densiometer. Sample points were placed at 1 m intervals, along 8 equidistant radii emanating from the center sample point of each plot. This method of cover sampling has been shown to be accurate, objective and repeatable. An estimate based on 49 samples yields a 95 percent confidence interval width between +/- 8.6% and +/-14.3% cover (Stumpf, 1993).

In 2018, Leaf Area Index (LAI) measurements were added to the suite of standard morphometric measurements currently being assessed. LAI as defined by Watson (1947), is the total one-sided area of leaf tissue per unit ground surface area. Measurement of LAI using gap fraction analysis was employed to estimate forest productivity through calculations. This method relies on a coefficient not specific to the area (instead of measuring canopy photosynthesis directly) and results in a calculated estimate of net primary productivity.

A CID Bio-Science Plant Canopy Imager, model CI-110, was used to measure size, shape, and the intensity of Photosynthetically Active Radiation (PAR). Two measurements were made in the center of each plot during the regular annual assessment and presented as an average. Images and PAR readings were captured at each plot facing north. The plant canopy analysis system analyzes and calculates PAR, LAI and leaf angle, which will be used for comparisons in 5-year intervals.

DATA ANALYSIS

Estimates of floristic composition are being used to assess temporal changes to vegetation compared to established pre-restoration plot conditions. Documented measurements and observations established during annual monitoring surveys were used to calculate the following parameters: number of individual trees and seedlings, tree relative and absolute density of species, mean DBH, total basal area, mean basal area, absolute and relative dominance, coverage and beginning in 2018, LAI and PAR.

Calculating Productivity Using Photosynthetic Formulas

Productivity was estimated from the amount of carbon fixed by net photosynthesis production in the canopy during daylight hours using the formula: $P_n = 0.0432*d*L* A_c$. Where P_n = average net daytime rate of photosynthesis (daytime net carbon fixation); 0.0432 is a numerical coefficient that converts μm C m^{-2} leaf s^{-1} (A_c units) to g C m^{-2} leaf h^{-1}; d = day length (in (min/60)); LAI = ((Avg ln(Ic/Io)/-k) * Cos(θ)); and A_c = 9 μm C m^{-2} leaf s^{-1}, the average rate of net photosynthesis for the canopy (Clough, et. al., 1997).

RESULTS

Floristic Characteristics

In 2024, 1274 trees were evaluated in the twelve study plots, consisting of 199 black mangroves (B), 729 red mangroves (R) and 346 white (W) mangroves (Tables 1 & 2). Of these trees:

- 224 trees were categorized as very stressed, (66 (B), 50 (R), and 108 (W) mangroves)
- 473 trees were categorized as stressed, (85 (B), 224 (R), and 164 (W) mangroves)
- 37 trees died during the period between the spring of 2023 and the spring of 2024, (9 (B), 10 (R), and 18 (W) trees)
- The remaining 540 trees, (39 (B), 445 (R), and 56 (W) mangroves), were categorized as being in relatively healthy condition this year (Table 2).
- 106 trees were recruited since 2023 consisting of 6 (B), 94 (R), and 6 (W) mangroves, of which 4 (W) mangroves achieved tree height without being recorded as a propagule.

In 2024, 5922 propagules were evaluated in the twelve study plots, (96 black (B), 5726 red (R) and 100 white (W) mangroves (Tables 3 and 4)). Of these propagules:

- Only 6 (B), 94 (R) and 2 (W) mangrove propagules were tall enough to be reclassified as trees
- Of the 5922 propagules:
    - 101 were categorized as very stressed, (10 (B), 82 (R), and 9 (W) propagules)
    - 702 propagules were categorized as stressed, (28 (B), 655 (R), and 19 (W) propagules)
    - 515 propagules died during the period between the spring of 2023 and the spring of 2024, (20 (B), 488 (R), and 515 (W) propagules)
    - The remaining 4604 propagules, (38 (B), 4501 (R), and 65 (W) mangroves) were categorized as in relatively good condition this year.

1999 Die-Off Areas

Prior to the County's restoration project in the summer of 1999, four plots were established in the die-off areas and labeled as plots 2, 3, 6 and 11.

Plot 2 is located in the northern die-off area (Figure 6). In the 1980's, pre-development, plot 2 was a healthy mature old growth black mangrove forest (Addison and Ritchie, 1990). In the late 1980's and early 1990's development and roadways surrounded this old growth forest cutting off tidal flow from the west and north and causing freshwater impoundment during periods of heavy rains. By 1995 this area had completely died out. The only remaining source or any tidal flow to this area originated from a narrow tributary to the east, which became partially blocked by debris prior to 1999. Dynamite was used to remove the blockage during the early days of restoration in 2000. Additionally, a hand-dug channel approximately five meters west of the plot was installed in 2001 in attempt to reduce

floodwater impoundment and shorten hydroperiods. In 2022, the original channel was extended to the south of this plot, just south of our SET station and another ditch was dug into this plot at ~270° from the center of the plot. While the intent of the contractors is to reduce flooding, these additional cuts result in plot fragmentation

Prior to any restoration activities, in 1999, plot 2 showed signs of recovery, following the 1995 die-off and vegetative collapse. However, only seven mangrove trees consisting of 1 (B) and 6 (W) mangroves, with a mean DBH of 4.36 cm and a total basal area of 0.032 m^2 were present. In the spring of 1999, pre-restoration, plot 2 actively recruited propagules. Plot 2 had 162 propagules, consisting of 23 (R) and 139 (W) mangroves. However, following the restoration initiative, between the fall of 1999 and the spring of 2000, the mangroves plot 2 started to die. Post-restoration, a heavy rainfall event occurred in 1999 during a November winter storm. As a result, plot 2 and the surrounding areas were submerged for approximately a month. This water impoundment drowned an estimated 99% of the propagules. Only one red mangrove propagule remained in 2000. Two hundred and thirty-nine of the 240 white and red mangrove propagules that tried to establish themselves died, along with six of the remaining nine trees between pre-restoration in the spring and post-restoration in the winter of 1999 (Tables 1 & 2 & 3). The plot hit rock bottom in 2002 when only one black mangrove tree remained. This was an old growth mature tree (DBH of 28.7 cm and a total basal area of 0.065 m^2). During this period tree mortality rates exceeded recruitment rates (Tables 1 & 4 and Figures 7 & 8). The County responded to this further deterioration by installing additional hand-dug channels in the area to drain off standing water. Following further channel installation, freshwater impoundment temporarily abated.

This plot recruited and established mangrove seedlings from 2002 to 2007. Propagule numbers peaked at 309 in 2007, consisting of 107 (B), 85 (R), and 117 (W) seedlings within plot 2 (Tables 3 & 4). In 2005, a few black mangrove propagules had become tall enough to be classified as trees. The total number of mangrove trees recruited into plot 2 almost doubled each subsequent year, from 2006 through 2008. In 2008, there were 109 mangrove trees, consisting of 58 (B), 7 (R) and 44 (W) mangroves, with a mean DBH of 1.72 cm and a total basal area of 0.157 m^2, indicative of young tall thin trees. A reciprocal relationship occurred between the number of recruited trees and the average DBH. As the number of new trees with very small DBH's increased, the plot average DBH decreased. Additionally, only one matured large girthed black mangrove remained that was present prior to the restoration. The increase in small stemmed trees, combined with the reduction in large old growth trees caused the average DBH to decline (Tables 1 & 4 and Figures 7 & 8).

While the highest number of new tree recruits occurred in 2009, tree numbers steadily rose. In 2015 tree numbers peaked at 291 trees, consisting of 84 (B), 47 (R), and 160 (W) (Table 1 and Figure 7). With the influx of so many seedlings attaining tree status, real estate within the plot was at a premium. As a result, beginning in 2011, competition for resources began taking a toll on some of the younger trees and many began to show stress and slowly died (Table 4).

Other factors also contributed to tree mortality. In the early winter months of 2016, 26 mangrove trees died following an extreme precipitation event that occurred during the dry season. Water impoundment from heavy rains remained in evidence throughout the

summer of 2016 causing high stagnant water levels within Plot 2. In 2017 water levels still remained near the surface during the dry season and water impoundment re-occurred periodically. Unfortunately, tree mortality rates surpassed recruitment rates in both the trees throughout the years through 2023. In 2016, propagule mortality was also high, surpassing recruitment rates (Table 4). In 2018, tree assessments not only reflected the damage wrought by Hurricane Irma in September of 2017, but compounded by continual waterlogging and increased stress over the years. In 2017, prior to Hurricane Irma, there were 256 mangrove trees consisting of 80 (B), 29 (R) and 147 (W) mangroves in Plot 2. New tree recruitment ceased between the 2017 and 2019 monitoring periods. By 2018, post Hurricane Irma, there were only 197 mangrove trees remaining, consisting of 67 (B), 12 (R) and 118 (W) mangroves. Fifty-nine trees died between the spring of 2017 and the spring of 2018 in plot 2 (Table 1 & 4 and Figures 7 & 8). The number of stressed and very stressed trees more than doubled between 2016 to 2017 and continued to rise through 2018, when ~92% were either stressed or very stressed (Table 2). In 2019, tree mortality continued as 33 more trees died. Tree mortality subsided as only 10 mangrove trees died during 2020 through 2022 (Table 4). In 2023, post Hurricane Ian mortality rates rose sharply outpacing tree recruitment. However, the majority of the trees that died were due to the hurricane, but rather due to anthropogenic causes. During the period between the 2023 and 2024 assessment, Plot 2 mortality rates decreased slightly and tree recruitment slightly outpaced tree mortality. One hundred and forty-eight mangrove trees remained in 2024, consisting of 53 (B), 7 (R) and 88 (W) mangrove trees, with a mean DBH of 3.41 cm and a total basal area of 0.458 m^2. In 2024, an estimated 86% of the trees are either stressed or very stressed. This plot is continually under stress from various factors including anthropogenic, inundation, and hurricanes (Tables 1 & 2 and Figures 7 & 8).

During the early years, post-restoration propagule recruitment vacillated primarily between red and black mangroves. White mangrove propagule recruitment rates, dominated between 2006 and 2008, and vacillated between all three propagule species through 2012. Species recruitment began to shift to primarily red mangrove seedlings throughout the remaining monitoring period (Table 4). Total propagule numbers began to recede from 2008 through 2012 as many saplings became trees, the tree canopy increased, and competition for resources weeded out those seedlings that were not as fit (Tables 3 & 4). Propagule recruitment remained relatively consistent between 2013 through 2023, albeit at a slower pace than in 2006 and 2007, vacillating between 12 and 48 recruits. In 2016, following a dry season of above average rainfall, propagule mortality briefly superseded propagule recruitment and again in 2018, following Hurricane Irma, when only 18 red propagules were recruited and 87 primarily red mangrove propagules died (Table 4). In 2019, only 74 propagules remained, which decreased to 70 in 2020. Propagule numbers rebounded slightly in 2021, 2022 and 2023. In 2024, propagule recruitment was on the rise and propagules totaled 188, consisting of 10 (B), 177 (R), and 1 (W) seedlings (Table 3 and Figure 9).

Figure 7. Plot 2 Trees Over Time by Species

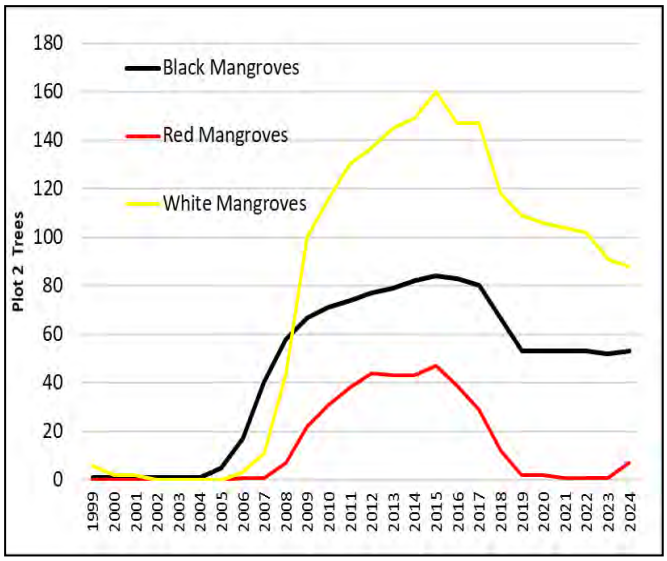


Figure 8. Plot 2 DBH (cm) Over Time by Species

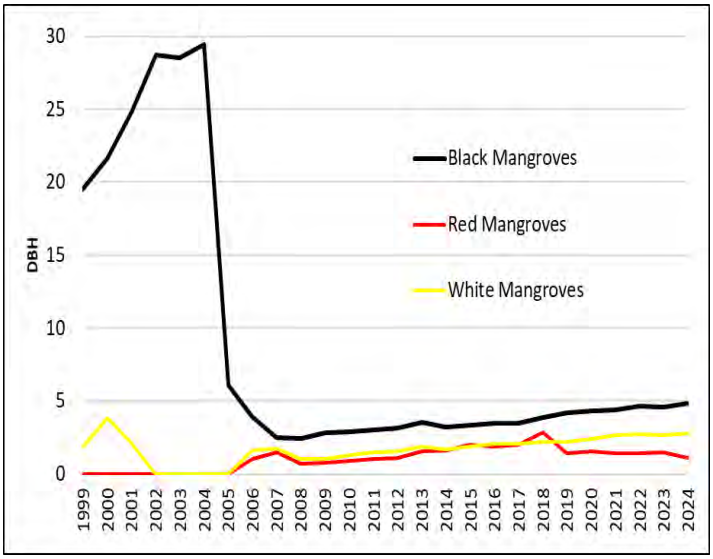
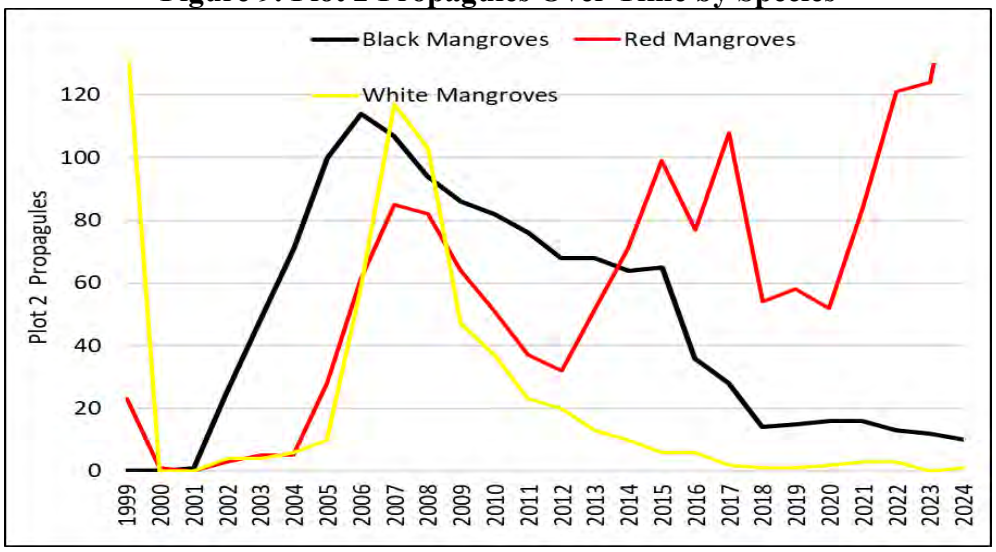


Figure 9. Plot 2 Propagules Over Time by Species



Canopy cover ranged from 0% in 2001 to 57% in 2016. Pre-Irma in 2017, canopy cover was 47%. Post Irma canopy vegetation in 2018 was 18%, reflecting the impact of Hurricane Irma as leaves were stripped from the trees from high winds. Canopy coverage increased slowly through 2022, due to subsequent greening of the remaining trees, only to decrease following Hurricane Ian to 29 % in 2023. In 2024, recovery from Hurricane Ian was reflected in the increase in canopy coverage to 43%, albeit inundation is still of primary concern in Plot 2 (Table 1 and Figure 10).

Figure 10: Plot 2 Over Time

Plot 3 is situated on the eastern side of the northernmost tributary between Inner and Upper Clam Bay. The main tributary was dredged in the summer of 1999 to allow for higher tidal flow (Figure 6). A hand-dug channel was cut directly through this plot to drain off the water that had impounded in the area and allow for tidal flushing during the initial restoration in 1999 to 2000.

Pre-restoration, plot 3 only consisted of three white mangrove and two red mangrove trees, with a mean DBH of 1.62 cm and a total basal area of 0.001 m^2 along with 13 propagules, 4 (B), 2 (R), and 7 (W) (Tables 1 & 2 and Figures 11 & 12). Post-restoration, there was an explosion in seedling recruitment from 2001-2003. Propagule numbers peaked in 2001, when plot 3 had 2534 living propagules of which 97.2% were white mangroves (Table 3 and Figure 13). Many propagules attained tree status and tree recruitment rose dramatically between 2001until 2003 (Table 4). In 2003, the total number of mangrove trees peaked at 610 trees. As tree numbers increased, white seedling mortality in particular increased over 20-fold in 2002, due to natural interspecies competition for resources. Tree recruitment and total numbers, declined thereafter through 2015, at variable rates, as competition weeded out the younger trees (Tables 1, 2 & 4). In 2016, heavy spring precipitation and subsequent plot inundation increased mangrove tree mortality. Only ~15% of the 110 total trees that remained in 2016 were still in relatively good condition. Tree mortality rates outpaced tree recruitment during the period between 2017 and 2019, following Hurricane Irma. Prior to Hurricane Irma, plot 3 was already exhibiting signs of stress and the storm only exacerbated its decline. Tree mortality rates slowly decreased through 2020, when 74 trees remained. (Tables 2 & 4 and Figure 11). Tree recruitment began to rebound in 2021 as tree mortality became negligible. Ninety trees were present in 2021 and by 2024 numbers increased to 207, consisting of 38 (B), 164 (R), and 5 (W) mangroves. Thirty percent of the trees remain stressed or very stressed. In the spring of 2024, mean DBH was 2.58 cm, along with total basal area of 0.213 m^2 in plot 3 (Tables 1 & 2 and Figures 11 & 12).

White mangrove trees were the dominant species from 2000 -2013, peaking in 2003, and then their numbers slowly declined through 2019 when the mortality rate of white mangrove trees lessened and stabilized. In 2014, the number of red mangrove trees surpassed the number of white mangrove trees in plot 3. This was in concert with a shift in propagule recruitment from primarily white mangroves to red mangroves, as these propagules gradually became trees by 2014. Black mangrove propagules took to attain tree status as propagule recruitment rates increased between 2007 and 2009. Black mangrove trees became equally dominant with red mangrove species from 2016 - 2021, when red mangrove trees became more dominant and remained dominant through 2024 (Tables 1, 2, & 4 and Figure 11).

White mangrove propagules dominated the early years of post-restoration monitoring in plot 3, rising dramatically and peaking in 2001. Mortality rates rose to 48% of the total propagules in 2002, when the white seedling population crashed. Mortality in white mangrove propagules was exceptionally high through 2006, averaging ~56%. Overall, red mangrove propagule recruitment dominated from 2003 through 2007 and black mangrove seedling recruitment briefly surpassed red seedling recruitment in 200 8-2009, before retaining their dominance through 2024 (Tables 3 & 4 and Figure 13).

Figure 11. Plot 3 Trees Over Time by Species

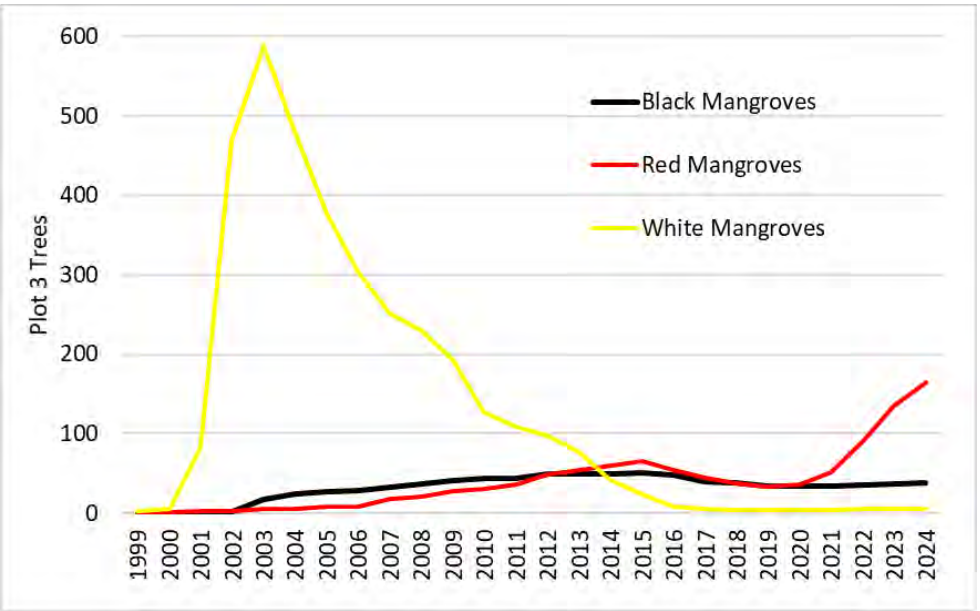
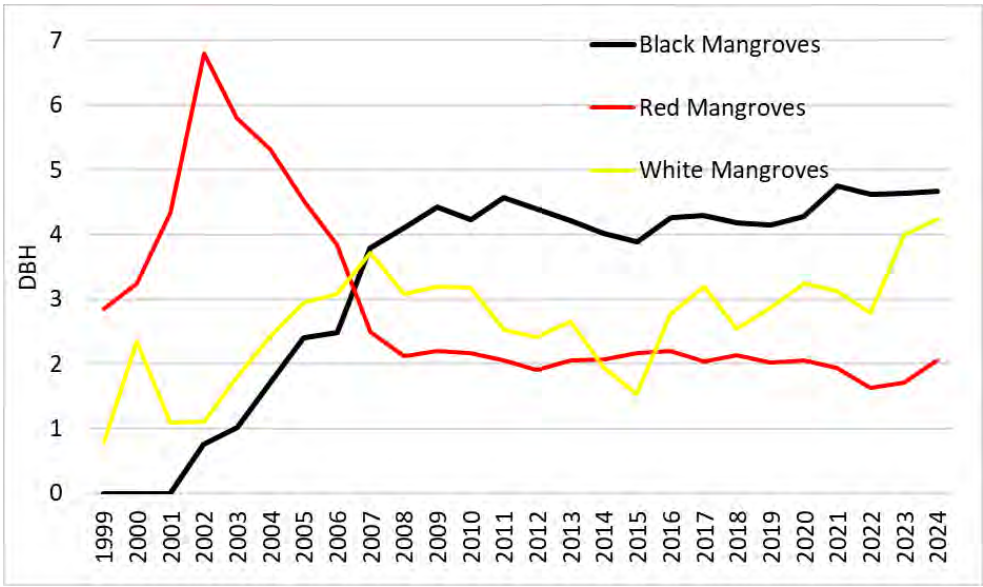


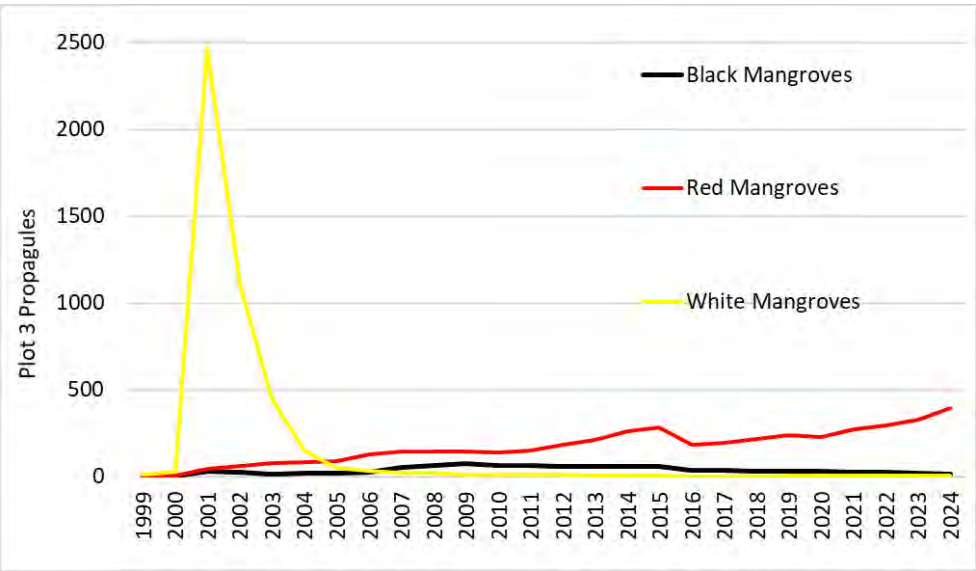
Figure 12. Plot 3 DBH (cm) Over Time by Species



Overall, the dramatic rise in propagule numbers that occurred in 2001 was a result of propagule re-establishment following water impoundment abatement. The subsequent dramatic propagule crash in 2002, resulted from the return of inundation and the return of extended water retention periods. Propagule numbers primarily decreased from 2002 through 2005 and rose slightly through 2007. Thereafter propagule numbers seemed relatively stable through 2011 and then increased in numbers through 2015. In 2016, propagule mortality dramatically increased to 41% of the assemblage. Unfortunately, this was not due to a concurrent increase in trees, or inter or intraspecific competition for resources, but rather, due to increased inundation. Half of the remaining propagules were

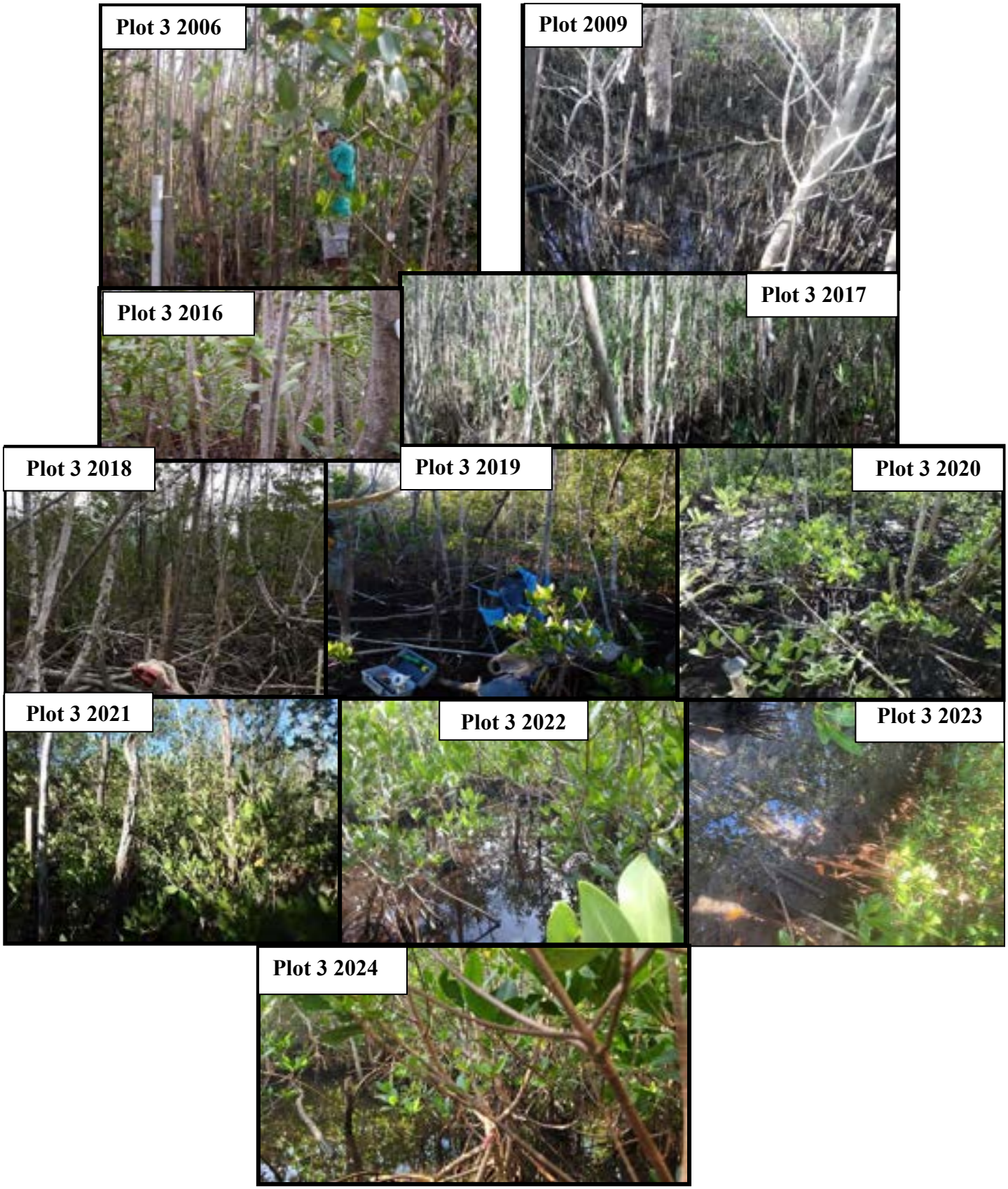
stressed or very stressed, and recruitment rates waned. By 2016, there were 213 propagules, of which 84% were red mangroves and 16% were black mangroves. (Tables 3 and 4, and Figure 13). In 2021 through 2024, propagule recruitment was higher than in 2016 through 2020. In 2024, 409 living propagules, consisting of 11 (B), 393 (R) and 5 (B) propagules were in Plot 3 (Table 3 and Figures 13 & 14).

Figure 13. Plot 3 Propagules Over Time by Species



Minimal tree recruitment occurred from 2017 through 2020, but rose to 47 and 32 primarily red mangrove trees in 2023 and 2024 respectively (Table 4). Canopy cover ranged from 0% in 1999-2001, and in 2018, peaking in 2024 at ~61%, and averaging ~32% over time (Table 1). Interestingly, coverage increased following Hurricane Ian, coincident with a storm surge event more than a wind event.

Figure 14: Plot 3 Over Time



Plot 6 is located in the southern part of the Clam Bay system, near the entrance of Clam Pass (Figure 6). The plot is frequently overwashed by storm and tidal surges from the Gulf of Mexico, which naturally kept tree and seedling recruitment to a minimum. A die-back of over 50% of the original trees occurred prior to 1995. The strength of tidal incursions has increased due to the County's dredging operations directly to the west of this area, which results in increased tidal flow and volume, leading to increased bank erosion (Figure 15: 15a-15j).

Figure 15 Plot 6 Overtime

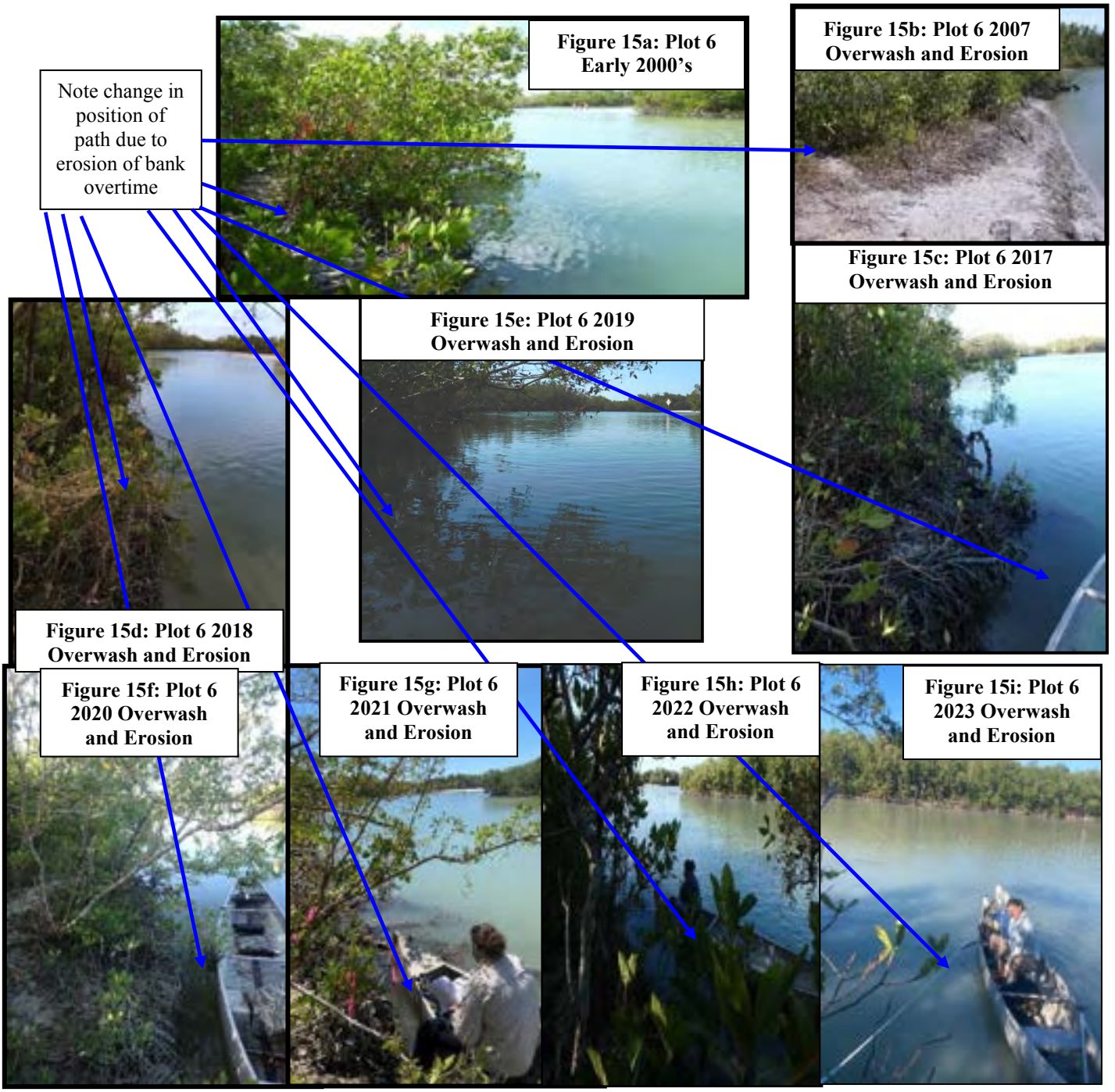
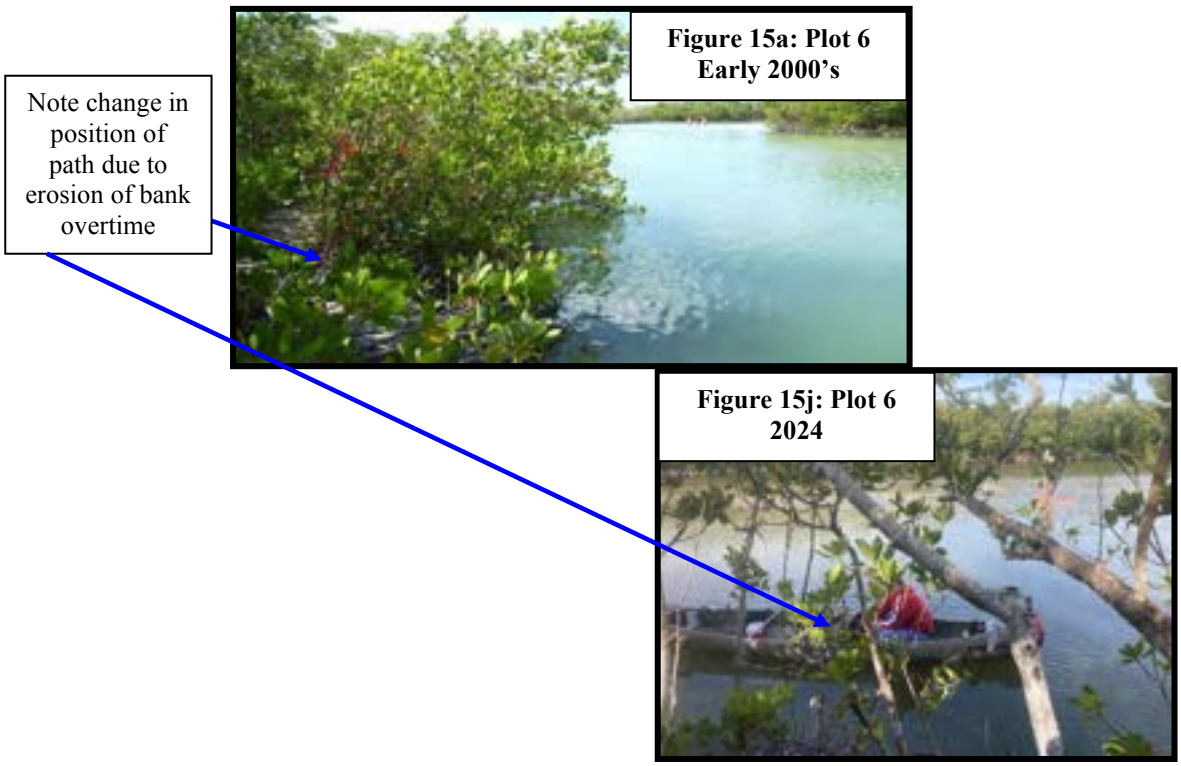


Figure 15 Plot 6 Overtime Continued



Prior to restoration, plot 6 had 13 mangrove trees consisting of 8 (B), 2 (R), and 3 (W) mangroves, with a mean DBH of 3.25 cm and a total basal area of 0.016 m^2 (Table 1 and Figures 16 & 17). In 1999, during the pre-restoration baseline assessment there were 258 propagules consisting of 19 (B), 201 (R), and 38 (W) present (Table 3 and Figure 18). Trees numbers rose slowly at a steady rate to 67 through 2009. Tree numbers remained relatively stable from 2010 through 2013; then rose steadily through 2016; prior to decreasing in 2017. A brief period of stabilization when 78 trees were present from 2018 to 2019; prior to steadily decreasing from 2020 through 2024 (Table 1 and Figure 16). In 2024, there were 37 mangrove trees consisting of 6 (B), 25 (R) and 6 (W) mangroves, with a mean DBH of 2.3 cm and a total basal area of 0.021 m^2 (Tables 1 & 2; Figures 16, 17 & 15i). Mean DBH has decreased periodically over the years, reflecting the death of older larger diameter trees and an increase in younger thinner trees. However, the mean DBH began to stabilize in the last four years (Table 1).

Propagule recruitment peaked in 2001. The total number of propagules peaked at 376 in 2002 and decreased slightly in 2003, prior to briefly stabilizing in 2004 through 2007. Propagule numbers continued to slowly decrease through 2011; rose briefly in 2012; then decreased over the years through 2018. Propagule numbers rose slightly in 2019; and then continued to decrease through 2023 when 57 seedlings remained. In 2024 propagules began to re-establish within Plot 6. In 2024, seventy propagules, consisting of 5 (B) and 65 (R) mangrove seedlings were present. Propagule mortality rates increased after dredging events primarily due to erosion along bank edges, which resulted in propagules and trees falling into the tributary. Bank washout was coincident with the initial dredging and the 2013 emergency dredge events. Additional dredging events took place in 2016, late spring

of 2018 and 2023 coincident with further erosion to the western edge of the plot (Figure 15d). Mortality rates also increased during storm events in 2020 and 2021 and Hurricane Ian in 2022. Red mangrove trees began dominating this plot beginning in 2015 and red mangrove propagules dominated over the entire study period (Tables 2, 3 & 4 and Figures 16 & 18).

Figure 16. Plot 6 Trees Over Time by Species

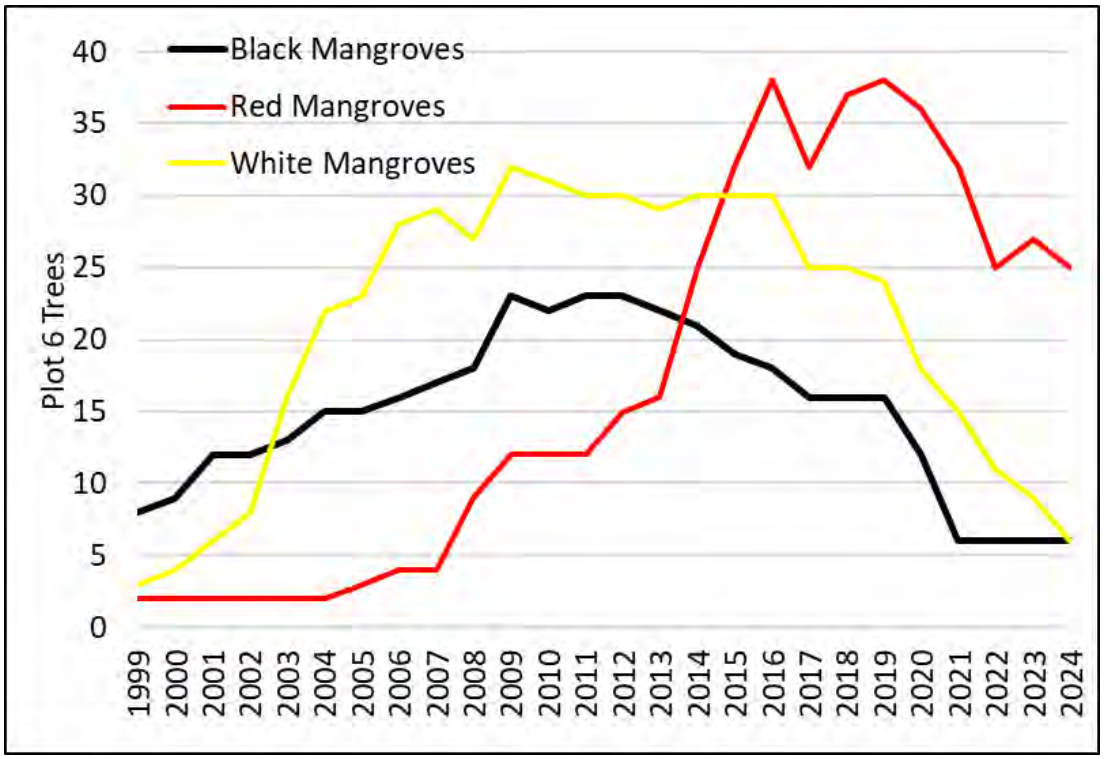
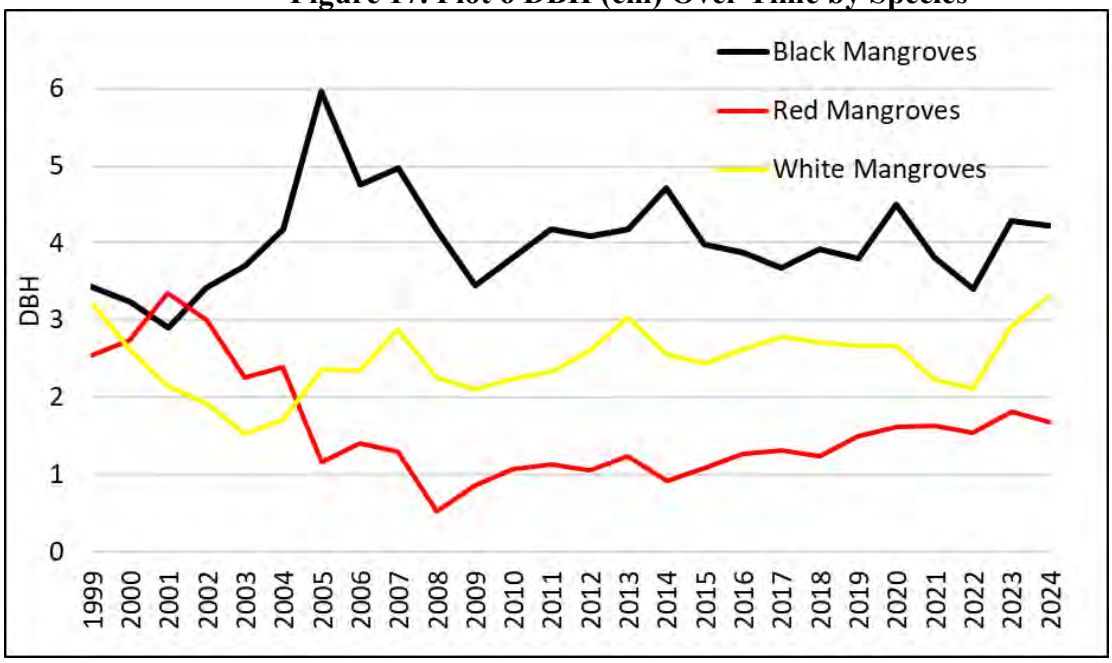
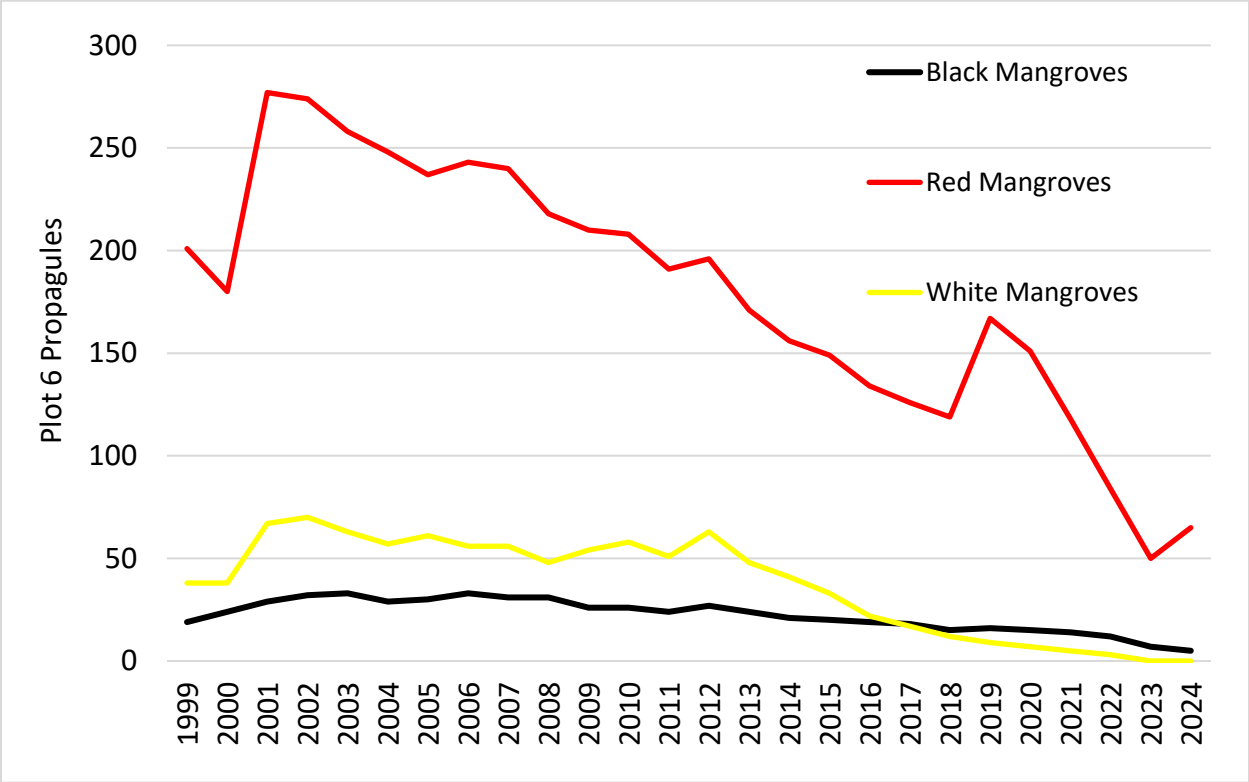


Figure 17. Plot 6 DBH (cm) Over Time by Species



Canopy cover was nonexistent in 2006 and 2023 following Hurricanes Wilma and Ian. The canopy rose to a meager 8.2% in 2024 and coverage was at its highest in 2015 at 39% (Table 1). Hurricanes Irma and Ian exacerbated stress within this plot, which was already exhibiting signs of stress prior to these storms. Following Hurricane Irma, in 2018 and 2019, 53% and 60% of the trees were stressed or very stressed in plot 6. Stress percentages reduced slightly in 2020 and 2021 to 39% and 43% respectively. Stress rose in 2022 prior to Hurricane Ian to 52% of the plot, then in 2023 post Hurricane Ian stress within the plot rose substantially to 75% and 81% in 2024 (Table 2). Seedling recruitment and mortality appears cyclic, coincident with dredging events, storm surges, extreme tides, and other weather events. (Table 3). Over the years plot 6 has not matured, but continues to remain in a state of arrested development and slow decline due to periodic washouts and continued bank erosion.

Figure 18. Plot 6 Propagules Over Time by Species



Plot 11 is located in the northern part of the estuary, inland in relation to plot 3, and on the upper eastern side of the main tributary between Inner and Upper Clam Bay. Plot 11 has less tidal influence than plot 3. (Figure 6). A few hand-dug channels are located to the south of plot 1, which allows some of the stormwater influx from the surrounding eastern and northern developments to drain into tributaries, instead of pooling in the mangroves at Plot 11.

In 1999, pre-restoration, this plot had suffered a mangrove die-off due to water impoundment and subsequent lack of gaseous exchange. At this time plot 11 had one mature red mangrove tree (DBH = 17 cm; total basal area 0.023 m^2), along with one red

mangrove and nine white mangrove seedlings (Tables 1 & 3 and Figures 19, 20, & 21). In 2001 post-restoration, seedling recruitment exploded to 675 living propagules, of which 93.5% were white mangrove seedlings. (Tables 3 & 4). During the years 2000-2001, many propagules attained sufficient height to reclassify them as trees. Similar to events that occurred in plot 3, as white mangrove propagule recruitment receded after 2001, white mangrove tree recruitment increased, peaking in 2002, when 106 white mangroves attained tree height. Recruitment rates of white mangrove trees primarily receded thereafter (Tables 1, 2 & 4 and Figures 19 & 20).

Figure 19. Plot 11 Trees Over Time by Species

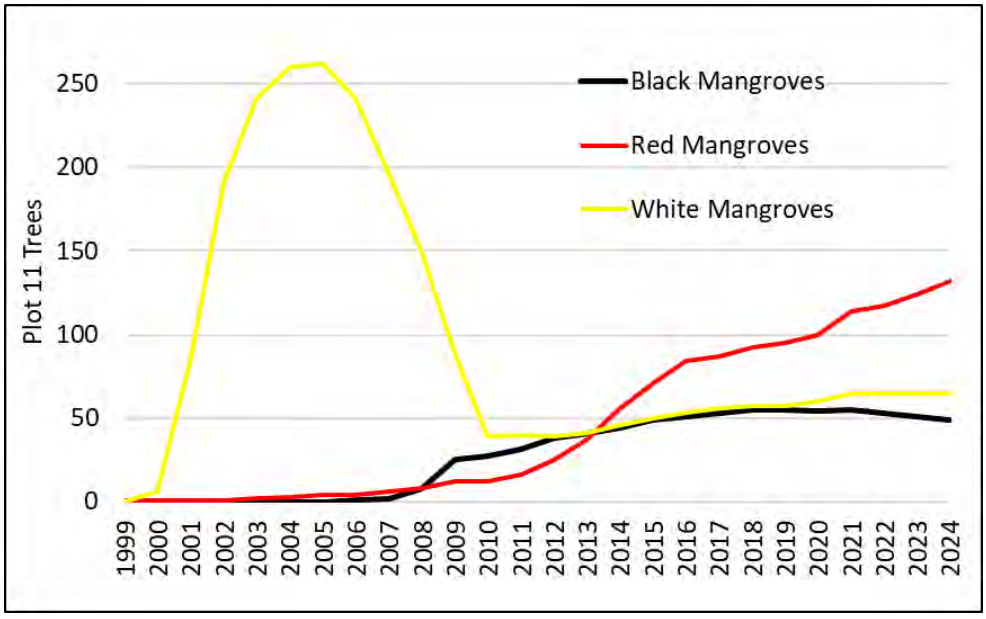
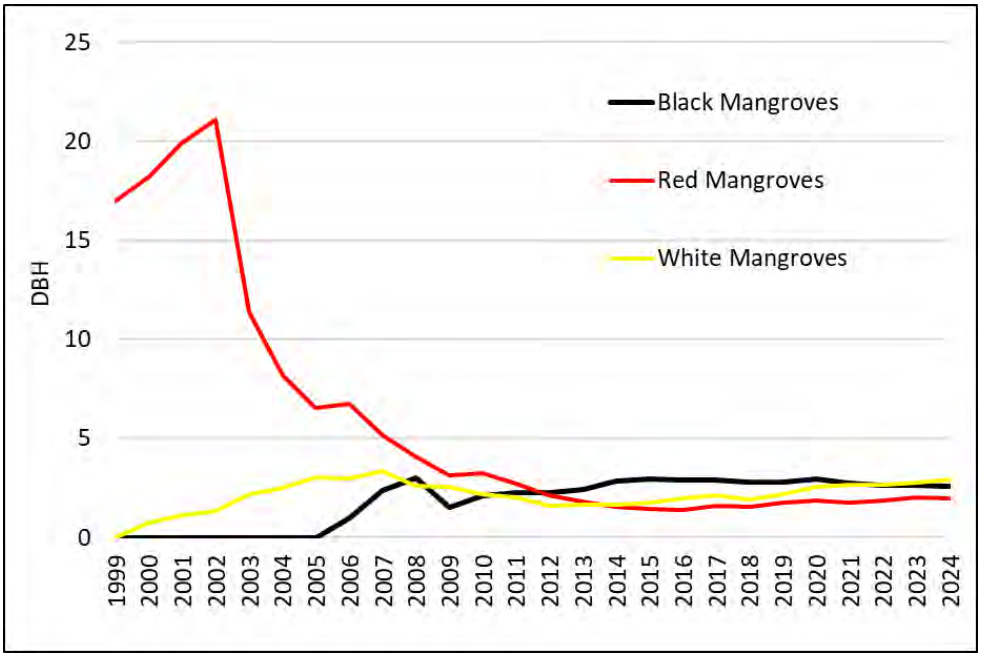


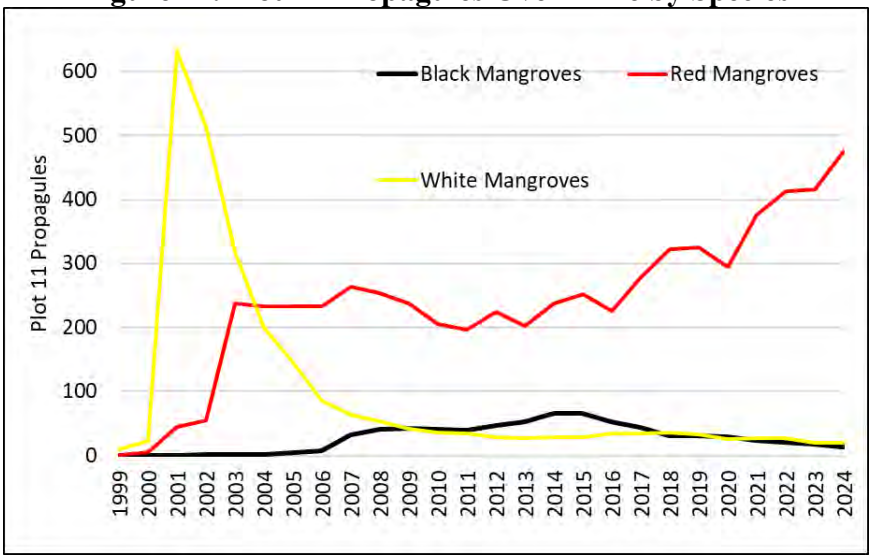
Figure 20. Plot 11 DBH (cm) Over Time by Species



In 2005, the number of mangrove trees in plot 11 peaked at 266 trees, with a mean DBH of 3.06 cm and a total basal area of 0.579 m^2 (Table 1 and Figures 19 & 20). The total number of trees slowly decreased at a variable rate from 2006-2010 and increased during the remaining years. This slow steady increase in tree numbers coincided with a slow shift in mangrove tree species dominance from white mangrove to red mangrove. In 2000, red mangrove propagules began recruitment into plot 11. Red mangrove propagules attain tree status more slowly than white mangrove seedlings. This was illustrated by the single digit recruitment rate of red mangrove trees through 2012 (Tables 2 & 4). White mangrove trees dominated plot 11 until 2014, when red mangroves became the dominant tree species. Black mangrove propagule recruitment rose from 2007-2009 and from 2012-2014. Black mangrove tree recruitment began in 2006, but this species was not as successful as the red mangroves, since black mangrove propagule and tree recruitment rates waned in the later part of the assessment period (Tables 2 & 4 and Figure 19). Plot 11 withstood Hurricanes Irma and Ian better than other plots, as loss was primarily limited to branch and vegetative loss, along with a few trees. In 2024, plot 11 reflected a mixed species mangrove forest, containing 246 trees consisting of 49 (B), 132 (R), and 65 (W) mangroves, with a mean DBH of 2.36 cm and a total basal area of 0.169 m^2 (Table 1 and Figures 19, 20 & 22).

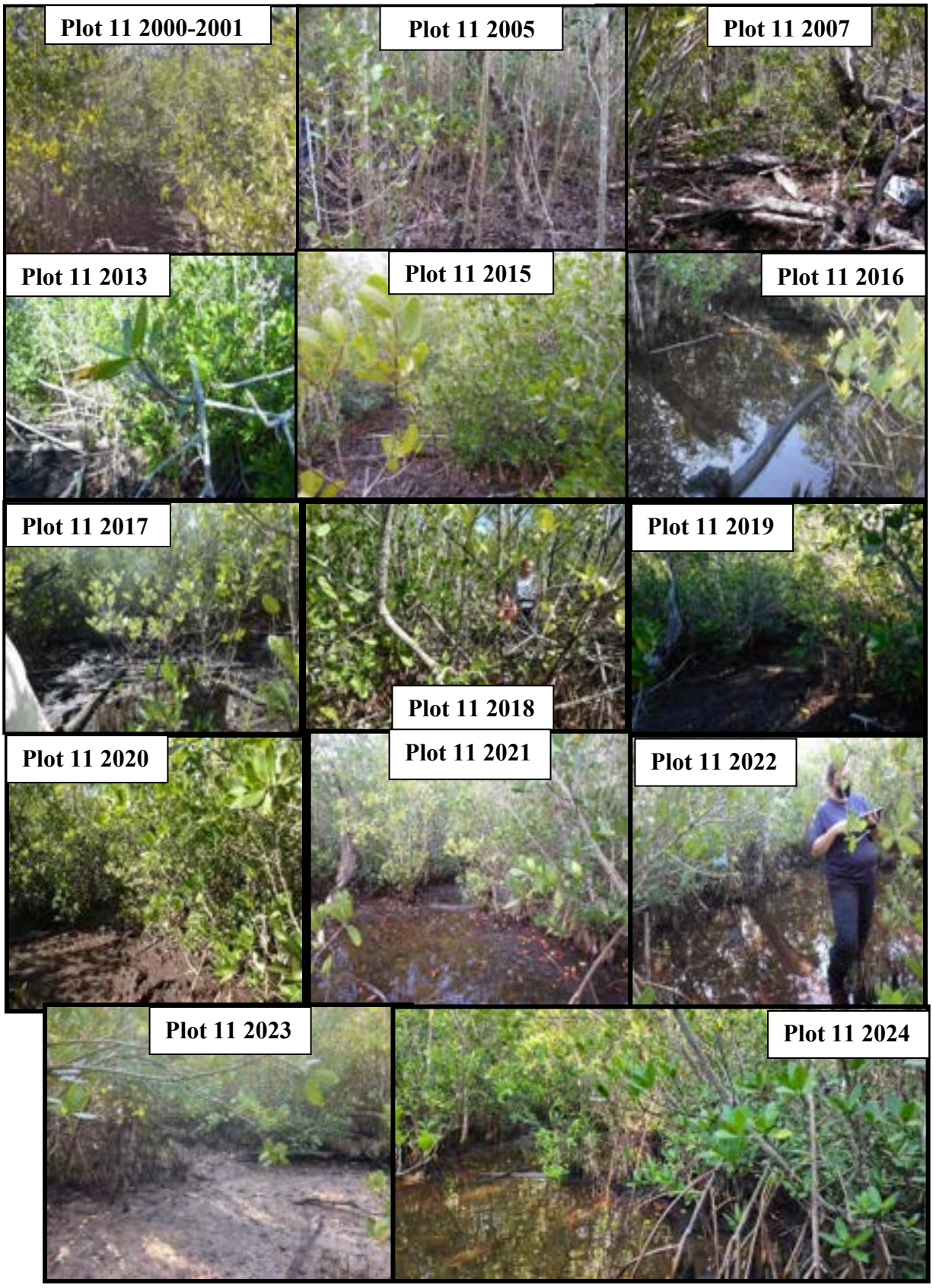
Elevated propagule recruitment occurred in 2001, 2003, 2004, 2021, and 2024, the later years likely in response to a more open canopy due to recent storms. Recruitment peaked in 2001, and rates were extremely variable in the remaining years (Table 4). Overall, total propagule numbers peaked in 2001, fluctuating thereafter, and decreasing through 2011. Propagules fluctuated through 2020, trending upward overall through 2024. In 2024, there were 509 living propagules (13 (B), 476 (R) and 20 (W)) and red mangrove propagules encompassed ~94% of the total assemblage (Tables 3 & 4 and Figure 21).

Figure 21. Plot 11 Propagules Over Time by Species



Canopy cover ranged from 0% at the onset of the study to 59%, in 2005. A significant decline in canopy coverage was observed in 2020, but showed significant improvement the following year. Hurricane Ian did not appear to have any effect on canopy cover. Over the years, canopy coverage averaged 28% in plot 11 (Table 1).

Figure 22: Plot 11 Over Time



Stressed Areas

In 1999, Plots 5, 8, 9 and 12 were located in areas classified as stressed at the start of this project.

Plot 5 is located close to Clam Pass in the southern part of the Clam Bay system (Figure 6). Plot 5 is similar to plot 6 in some respects. However, it is semi-protected from storm surge by a dune, and tidal access is restricted via a natural narrow channel. These characteristics negate overwash impact to all but the most extreme storm surges from the Gulf of Mexico. This plot occasionally suffers die-back from extreme tidal action or high winds from storms, but less frequently than plot 6. Throughout the monitoring period, this plot remained relatively stable as recruitment and mortality rates were lower than in other plots. Canopy cover vacillated over the study period going through times when the canopy opened up and then began to close over. Cover ranged from 16% in 2011 to 55% in 2022, averaging ~32% overall (Table 1).

White mangrove trees and red mangrove propagules dominated this plot in the spring of 1999. Pre-restoration, in 1999, plot 5 had 59 trees consisting of 15 (B) 6 (R) and 38 (W); mean DBH of 5.42 cm; and a basal area 0.261 m^2 (Tables 1 & 3 and Figures 23 & 24). Tree numbers steadily increased thereafter through 2010 when trees totaled 91. Trees were relatively stable from2011 through 2019 and decreased slightly thereafter. In 2024, 83 trees were present in plot 5 consisting of 19 (B) 47 (R) and 17 (W); a mean DBH of 3.52 cm; and a basal area of 0.184 m^2 (Table 1 and Figures 23 & 24). Species dominance switched from white mangrove trees to red mangrove trees in 2013, perhaps indicative of increased water levels.

Figure 23. Plot 5 Trees Over Time by Species

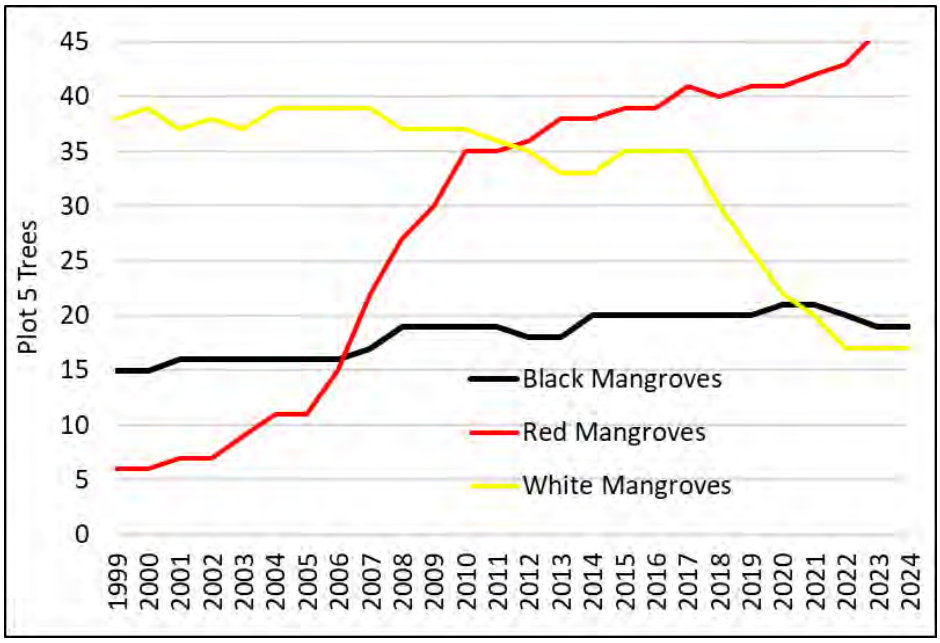
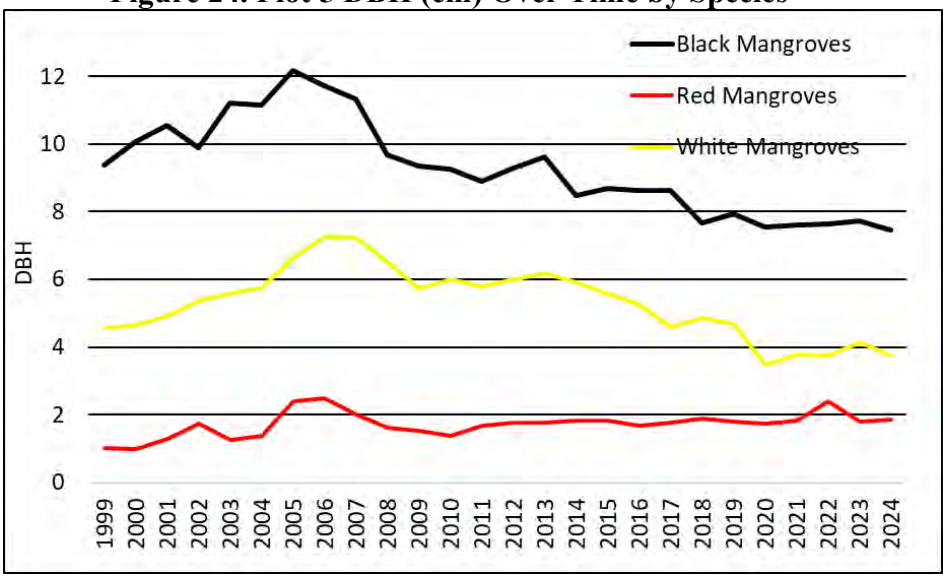


Figure 24. Plot 5 DBH (cm) Over Time by Species



In 1999, 33 propagules consisting of 7 (B), 19 (R) and 7 (W) mangroves were present (Table 3). Seedling recruitment increased when the plot was not subjected to tidal overwash and higher mortality appeared coincident with storms and extreme tides and/or storm surges (Tables 1 & 4 and Figure 25). Seedling recruitment doubled or tripled between the years 2000 - 2001, 2009 - 2010, 2013 - 2015; 2016 - 2017; and 2020 - 2021 remained relatively stable or decreased throughout the remaining years. Seedling mortality was relatively low, ranging from 1 propagule dying in 2010 to 14 and 16 propagules dying in 2018 and 2023 following Hurricanes Irma and Ian respectively (Table 4). Propagule numbers increased from 1999 – 2002; decreased or remained relatively constant from 2003 – 2009; primarily increased or remained relatively constant through 2019; and then began to decrease slowly or remain consistent through the remaining years. In 2024 there were 156 propagules consisting of 7 (B), 146 (R) and 3 (W) mangroves (Table 3 and Figure 25). Red mangrove seedlings dominated this plot and overall red mangrove propagules had higher establishment rates than the other species. Higher rates of red propagule establishment accounted for the rise in red mangrove tree species during the latter half of the study period, as some red mangrove propagules attained tree height (Tables 3 & 4 and Figure 26).

Figure 25. Plot 5 Propagules Over Time by Species

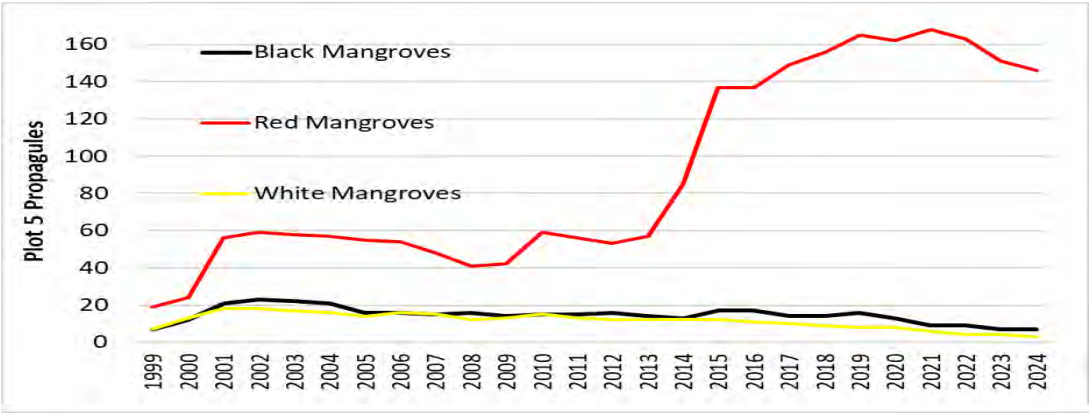
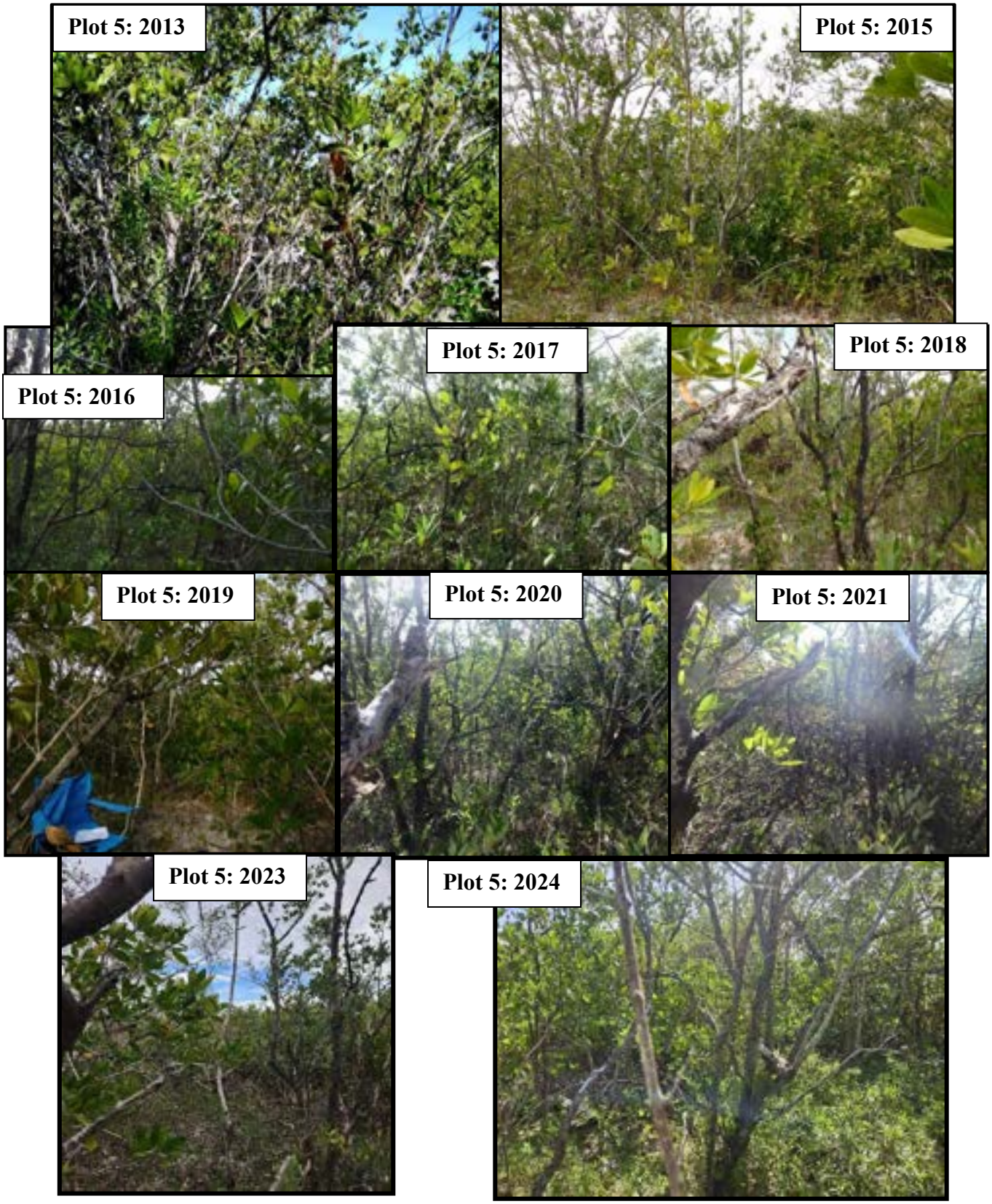


Figure 26: Plot 5 Over Time



Plot 8 is situated in the northern section of Clam Bay, on the western side of the main tributary between Inner and Upper Clam Bay. This plot is mostly surrounded by one of the main original die-off areas to the north, west, and south (Figure 6).

In 1999, ten red mangrove propagules were established during the pre-restoration baseline assessment within plot 8. There were 35 mangrove trees consisting of 4 (B) and 31 (R) mangroves, with a mean DBH of 9.9 cm, and a total basal area of 0.921 m^2 (Tables 1 & 2 & 3 and Figures 27 & 28 & 29). Canopy cover peaked at, 98% at the start of the study and dropped to 39% in 2018 post Hurricane Irma, averaging 68% overtime (Table 1). The high percentage of canopy cover in 1999 was primarily due to two very mature black mangroves with full crowns (DBH ≈ 60 cm and 93 cm). Hurricane Ian had minimal effect on canopy coverage in this plot as canopy coverage was at 67% and 76% in 2023 and 2024 respectively.

Figure 27. Plot 8 Trees Over Time by Species

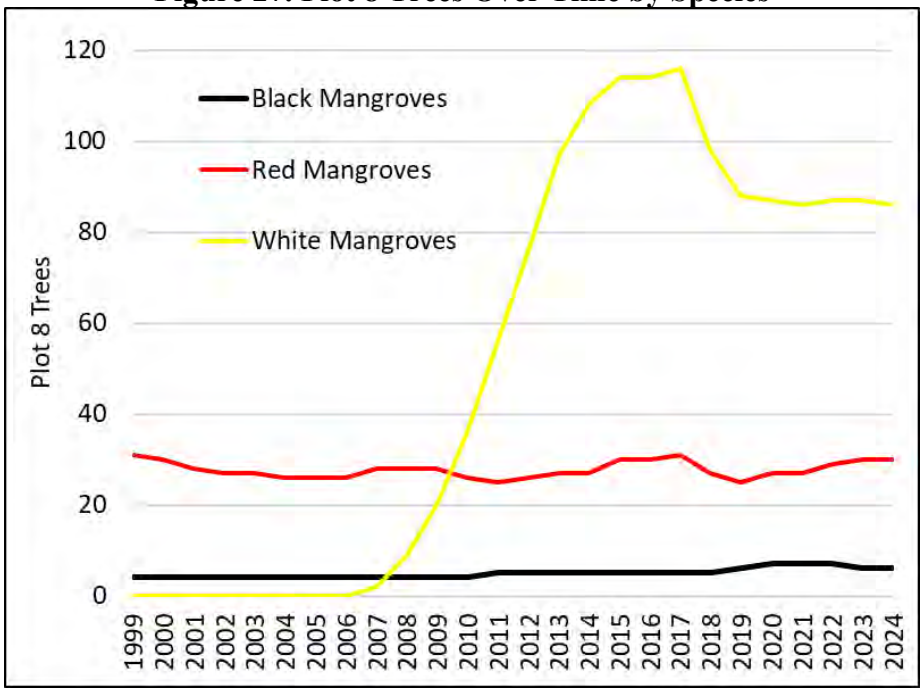


Figure 28. Plot 8 DBH (cm) Over Time by Species

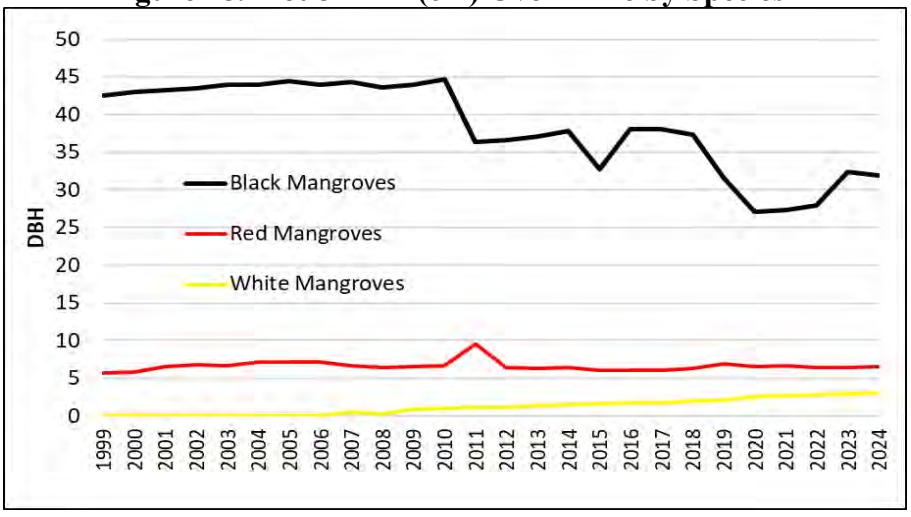
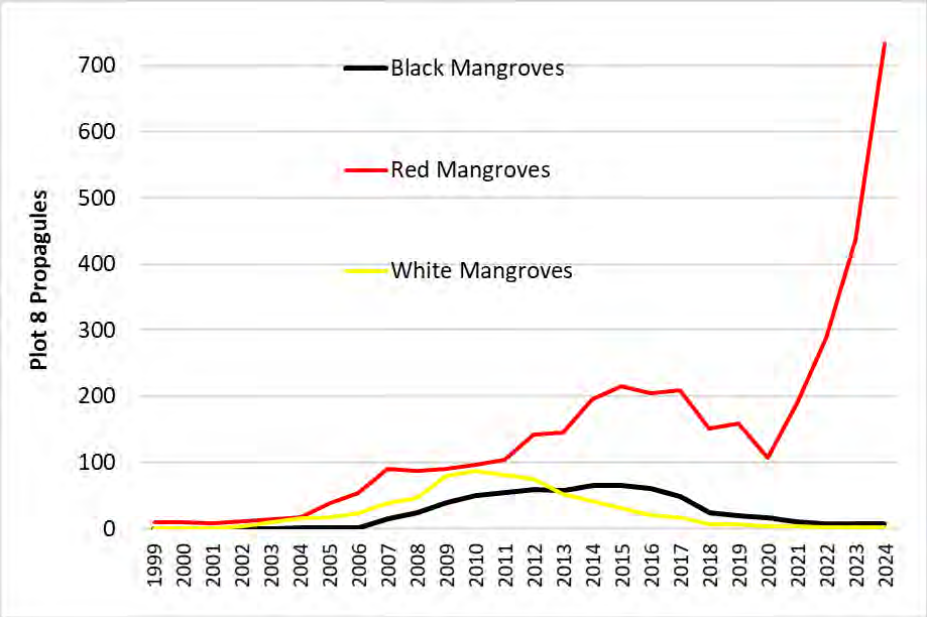


Figure 29. Plot 8 Propagules Over Time by Species



This plot was typical of a mature mixed red mangrove and black mangrove species forest, which showed little variation through 2006, as tree recruitment rates were nonexistent, and propagule recruitment and mortality rates were minimal. Following Hurricane Wilma in 2005, the canopy opened up and as a result propagule recruitment tripled between 2006 and 2007, followed by tree recruitment beginning in 2007 as propagules attained tree height. Tree recruitment, primarily white mangroves continued to rise steadily from 2007 through 2013. In 2014 tree recruitment began to slow down, tapered off to negligible recruitment in 2019. Three trees were recruited in 2022 and two trees each were recruited in 2023 and 2024. Tree mortality in 2018 increased after Hurricane Irma but remained minimal from 2020 through 2024 (Table 4).

As of 2024, plot 8 contained 122 trees consisting of 6 (B), 30 (R) and 86 (W), with a mean DBH of 5.34 cm and a total basal area of 1.20 m^2 (Tables 1 & 2 and Figures 27 & 28). In the early years of the study, red mangrove trees dominated plot 8 in numbers, but black mangrove trees comprised a larger area within the plot due to their much larger DBH. Beginning in 2010, the total number of white mangrove trees superseded the total number of red mangrove trees and remained dominant through 2024. However, due to tree maturity, black mangrove and red mangrove trees still dominate the spatial extent (Tables 1 & 2 and Figures 27 & 28). Over the years, until 2017, the percentage of stressed trees within plot 8 was less than 50%. Prior to Hurricane Irma, the trees that died were mostly older red mangroves. During the assessment that followed Hurricane Irma in 2018, twenty-three primarily white mangrove trees died and 95% of the remaining trees were stressed or very stressed. Post Hurricane Irma stress levels remained high, encompassing over 50% of the assemblage (Tables 2 & 4 and Figures 30 & 31). Delayed storm effects were still being felt in 2019 when 13 trees died. Three mangrove trees died between the 2023 and 2024 assessments, two due to delayed mortality from hurricanes (Tables 2 & 4).

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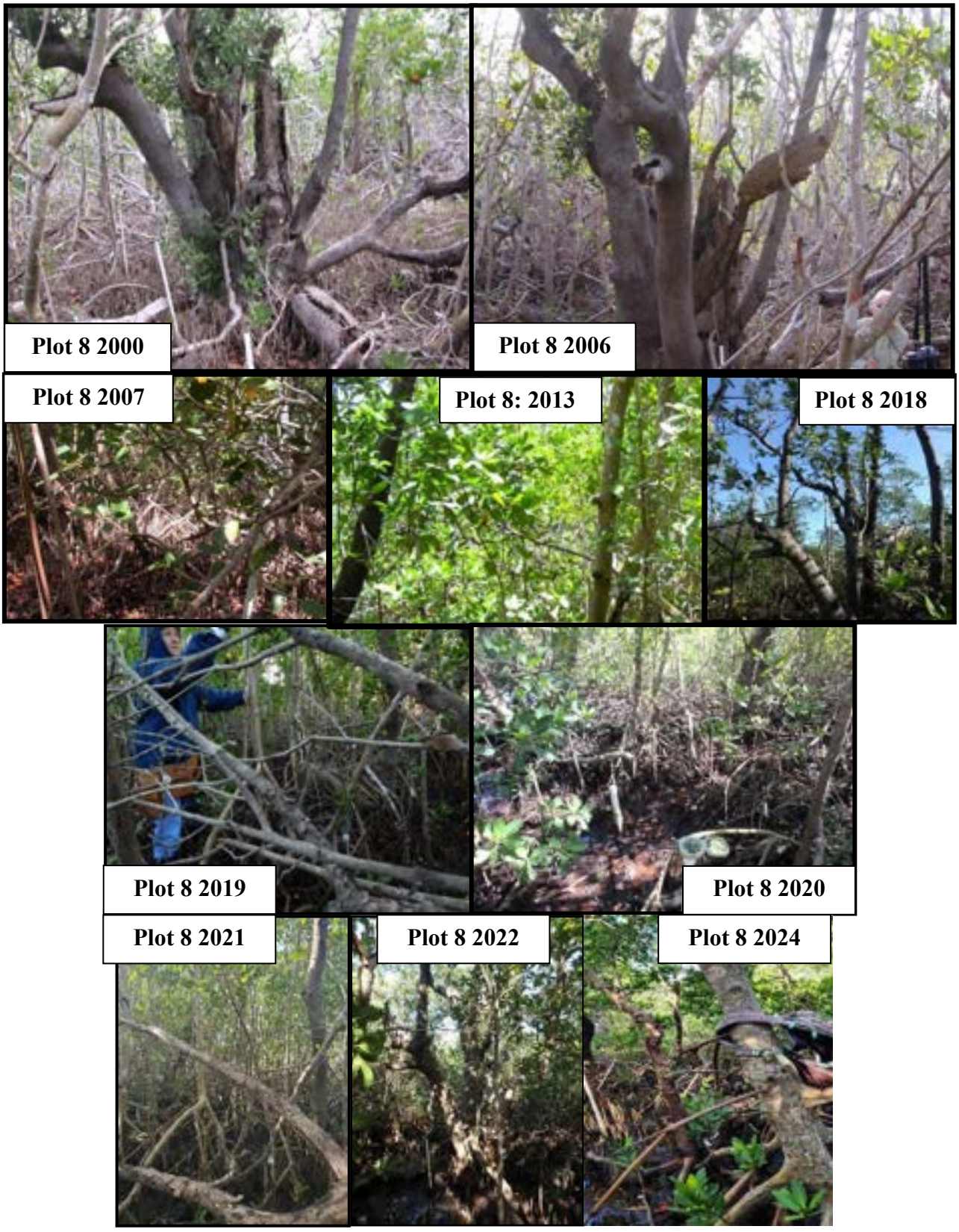
Figure 30: Plot 8 2018 Hurricane Irma Debris

The total numbers of propagules that were present within the plot rose steadily over the years, reaching 311 propagules in 2015 (except for a slight reduction in 2013). Seedling numbers primarily decreased from 2016 through 2020. Propagule mortality increased substantially following Hurricane Irma in 2018 and mortality continued through 2020. Propagule numbers rose substantially in plot 8 in 2021 through 2024 when there were 742 mangrove seedlings present consisting of 7 (B), 733 (R) and 2 (W) (Tables 3 & 4 and Figure 29).

Figure 31: Plot 8 Over Time



Plot 9 is located at the extreme northern end of the Clam Bay system, to the east of an extremely narrow tributary that extends north from Upper Clam Bay and directly to the west (within 50 m) of residential development (Figure 6). Tidal flow to this area from the south is very limited as the tributary has been slowly closing over time and tidal flow from the north was cut off in the 1950's by Vanderbilt Beach Road.

Figure 32: Plot 9 Mature Black Mangrove

Canopy cover was approximately ~90% pre-restoration The full canopy coverage was primarily due to one very mature black mangrove tree (DBH>90) (Table 1 and Figure 32). Coverage decreased in periods when this large tree had less foliage ranging from 41% in 2018, following Hurricane Irma to 92% in 2013. Hurricane Ian had minimal effect on the canopy as coverage remained the same in 2023 as in 2022 at 57%. Canopy coverage averaged 71% overtime.

In 1999, similar to plot 8, red mangrove trees dominated over the other mangrove species, but the black mangrove trees had greater girths and occupied a larger area. In 1999, plot 9 had 34 mangrove trees consisting of 2 (B), 24 (R) and 8 (W) mangroves, with a mean DBH of 8.27 cm and a total basal area of 0.802 m^2 (Tables 1 & 2 and Figures 33 & 34). Mature, primarily red mangrove trees, died between 1999 and 2000 when the total mortality rate reached 24%. In 2006, white mangrove trees became dominant and remained dominant through 2023. Red mangroves became the dominant species in 2024. During the period of 2001 through 2006 tree mortality rates were greater than tree recruitment rates. Tree numbers decreased and only 13 trees remained in 2006. Tree recruitment outstripped mortality from 2007 – 2012 causing tree numbers to increase to 176. This trend reversed from 2013 – 2019 when tree mortality again outstripped recruitment, resulting in only 24 trees remaining in 2019.

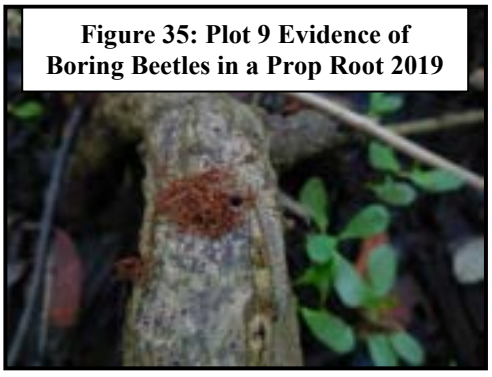


Figure 35: Plot 9 Evidence of Boring Beetles in a Prop Root 2019

Inter and intraspecific completion likely played a role in tree mortality, particularly from 2013 – 2015. Fifty-five trees died following heavy rainfall in 2016 and Hurricane Irma in 2017. In 2019, further signs of stress were apparent, as many of the trees and prop roots had evidence of boring beetle infestation (Figure 35). During the period of 2020 through 2022, a rate reversal occurred again where recruitment rates were higher than mortality rates and there were 69 trees present in plot 9 in 2022. Unfortunately following Hurricane Ian, mortality rates were higher than recruitment rates and tree numbers were further reduced to 33. Trees remained relatively stable during the period between the 2023 and 2024 assessment at 34 trees consisting of 3 (B), 17 (R), and 1 (W) with a mean DBH of 10.91 cm and a total basal area of 1.647 m^2 primarily due to one large mature black mangrove (Tables 1 & 2 & 4 and Figures 33 & 34).

Figure 33. Plot 9 Trees Over Time by Species

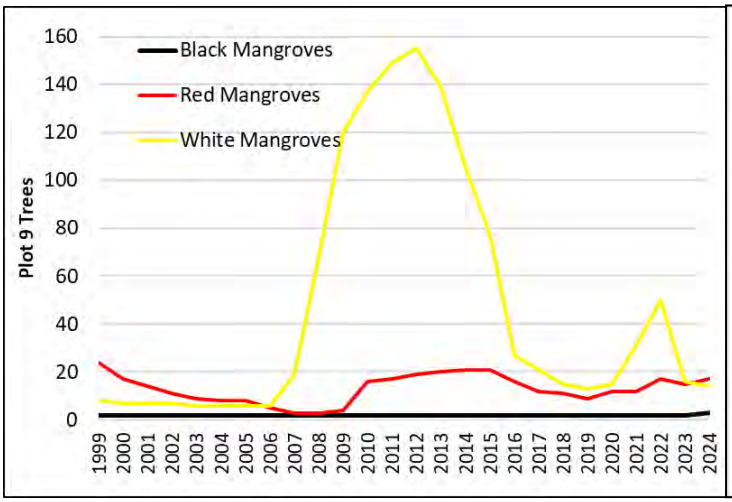
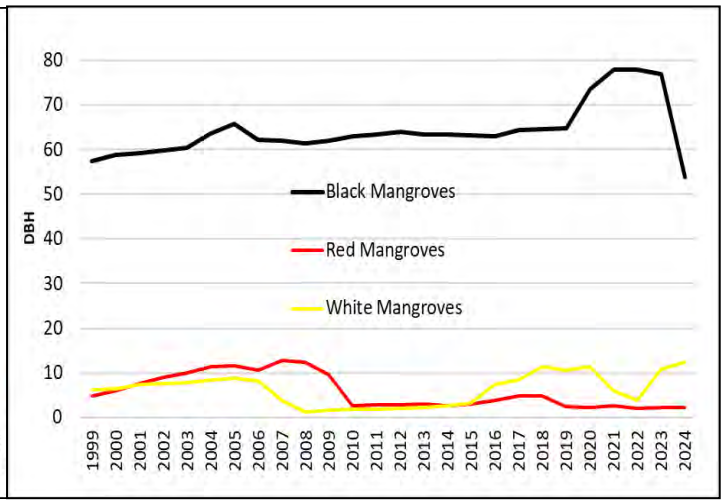


Figure 34. Plot 9 DBH (cm) Over Time by Species



Only one red mangrove propagule inhabited plot 9 during the pre-restoration baseline assessment that subsequently died in 2001 (Table 3 and Figure 36). Propagule recruitment began slowly in 2002; was minor through 2005; and increased exponentially from 2005 – 2007, when propagule numbers reached 319, during the initial recovery period from Hurricane Wilma in 2005. Propagule recruitment slowed down but outpaced mortality through 2010 when 300 propagules were established. This trend reversed from 2011 – 2016 when propagule mortality rates were greater than recruitment rates and propagules decreased to only 15 in 2016. During the period of 2017 – 2021 the trend reversed and by 2021, there were 350 propagules present. In 2022, propagule mortality rates exceeded recruitment, as propagules began to compete for resources and their numbers were reduced to 242. In 2023, following Hurricane Ian there were only 50 propagules remaining in plot 9. In2024 the plot began to recruit again, as 68 propagules were present, consisting of 8 (B), 46 (R) and 14 (W) (Tables 3 & 4 and Figure 36 & 37).

Figure 36. Plot 9 Propagules Over Time by Species

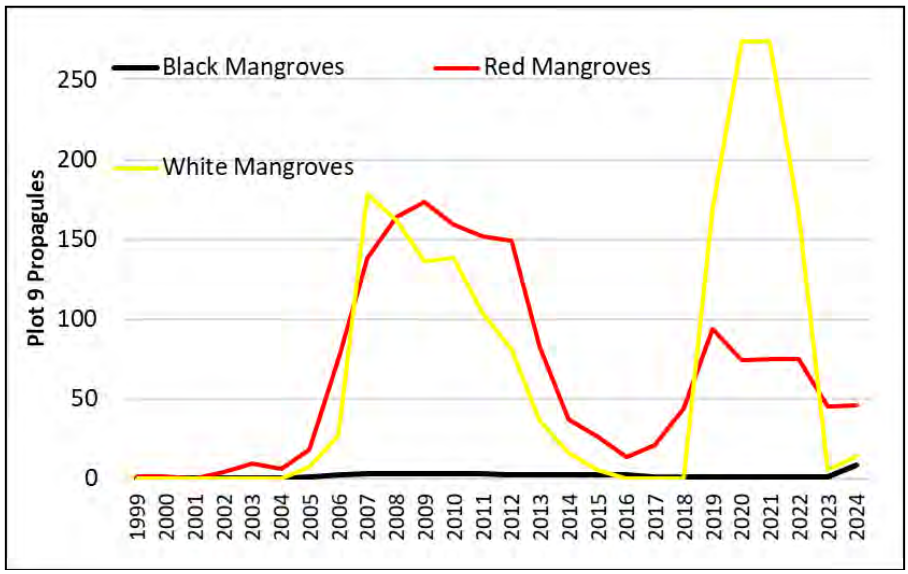
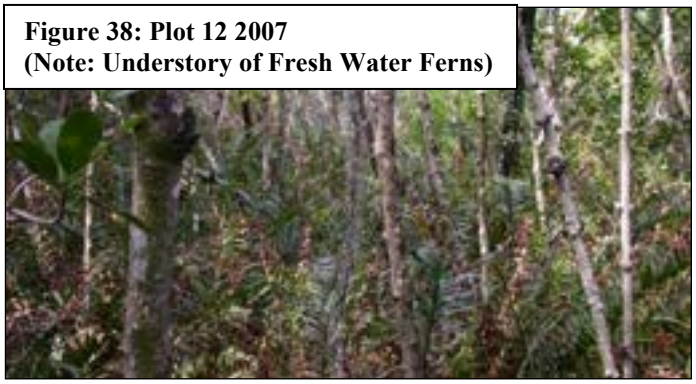


Figure 37: Plot 9 Over Time

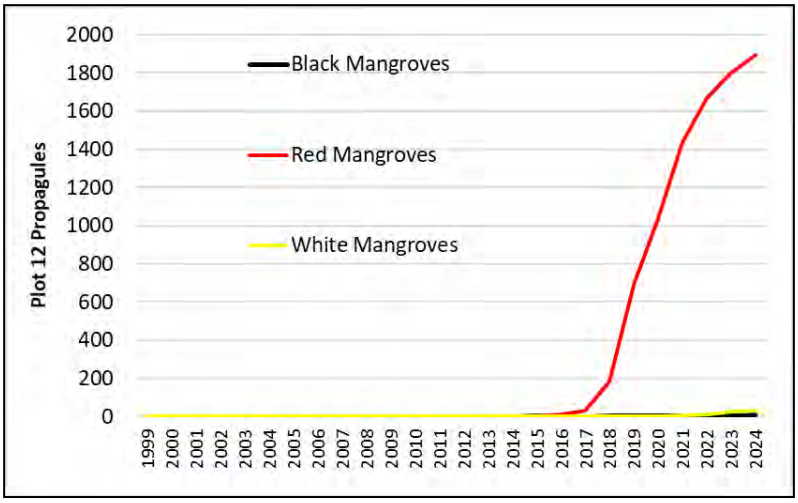
Figure 38: Plot 12 2007
(Note: Understory of Fresh Water Ferns)



Plot 12 is located towards the center of the Clam Bay system, just north of Inner Clam Bay, and to the east inland between the Inner Clam Bay and the berm in Pelican Bay (Figure 6). Historically, there is evidence that mangroves were the dominant vegetative species in this plot. The area was once a large black mangrove forest, but only one black mangrove remained in plot 12 in the spring of 1999, and it subsequently died in 2000. During the 1970's through the 1990's, freshwater outflows increased from the surrounding development. Freshwater plant species such as saw palmetto and various fern species became the dominant groundcover outcompeting the mangroves (Figure 38). This condition persisted until 2018 when saltwater flows were re-established. In 1999, pre-restoration, the remaining mangrove consisted primarily of stressed mature mangrove trees. Canopy cover was variable and ranged from 12% in 2020 to >95% in 2013 and 2017 (prior to Hurricane Irma), averaging 64% over the years (Table 1).

In 1999, plot 12 had 61 mangrove trees consisting of 1 (B), 44 (R) and 16 (W) mangroves, with a mean DBH of 8.26 cm and a total basal area of 0.455 m^2 (Table 1) and no propagules were present (Tables 1 & 3). Throughout the study period, red mangrove trees were more dominant, but white mangroves and the 1 remaining black mangrove tree were larger and had greater girths. Propagule recruitment and establishment were negligible until 2018. In the early years of this study, a few mangrove seedlings periodically attempted to become established, but none were successful until recently, due to the thick underbrush of palmetto and ferns (Tables 3 & 4 and Figure 38). In 2018, propagule recruitment began in earnest and remained very high throughout the years. In 2024, there were 1930 propagules present consisting of 6 (B), 1894 (R), and 30 (W), the most that have been established over the entire study period to date (Table 3 and Figure 39). Following the installation of ditches to the south, freshwater runoff into this area was somewhat abated as tidal flow increased into the area. Salinity curtailed freshwater plant establishment, allowing mangrove propagules to be more successful (Figure 39).

Figure 39. Plot 12 Propagules Over Time by Species



Tree numbers held steady at 59 in 2000 through 2003. Thereafter, mangrove trees slowly died through 2021 when only 22 trees remained. Tree recruitment was practically nonexistent until 2022 through 2024 when tree numbers rose as propagules attained tree status. In 2024 there were 84 mangrove trees consisting of 75 (R) and 9 (W). These mangroves had a mean DBH of 3.81 cm and a total basal area of 0.344 m^2 (Tables 1, 2 & 4 and Figures 40 & 41 & 42).

Figure 40. Plot 12 Trees Over Time by Species

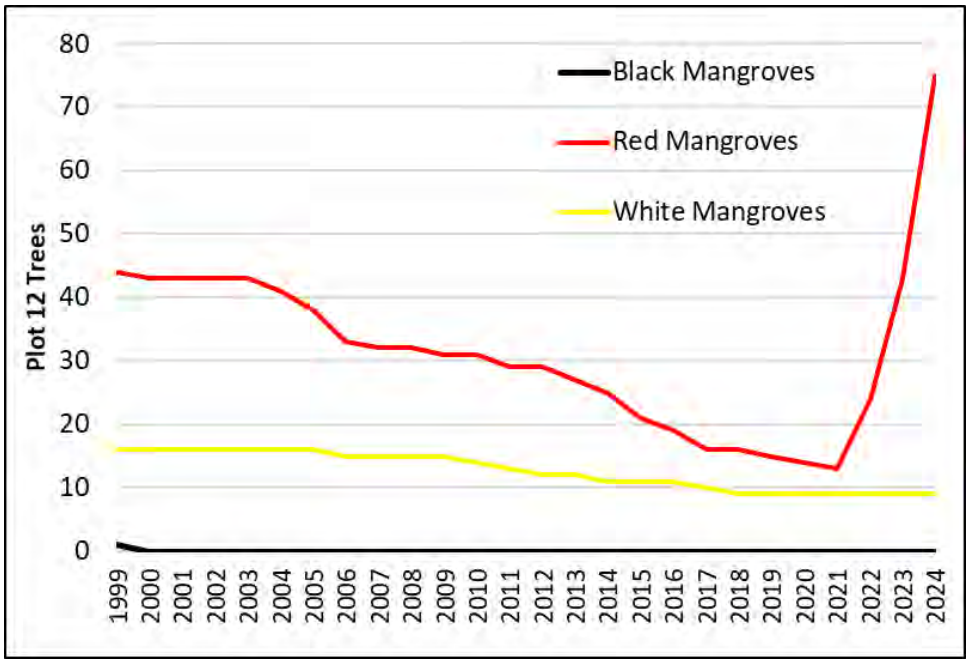


Figure 41. Plot 12 DBH (cm) Over Time by Species

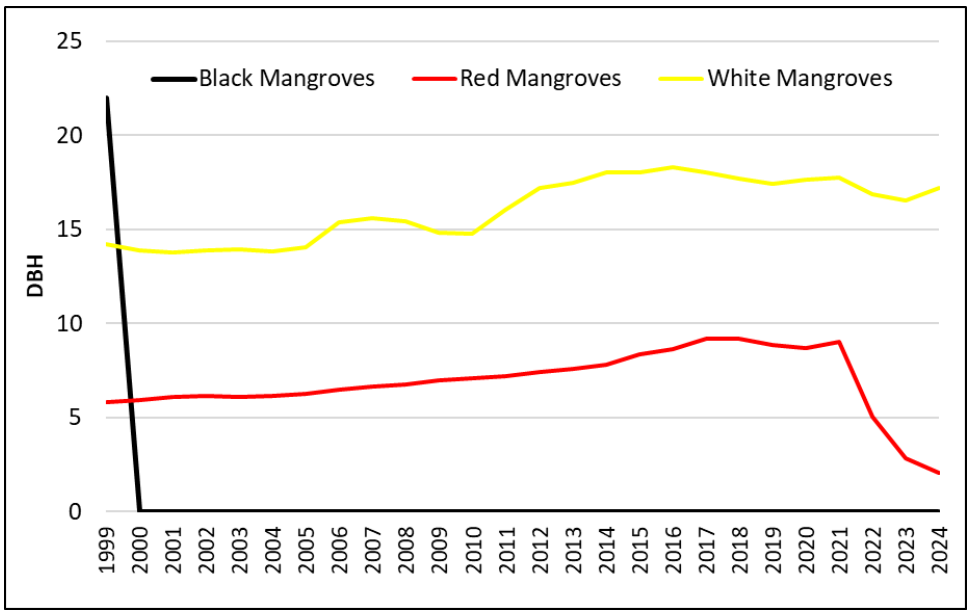


Figure 42: Plot 12 Over Time

Figure 42: Plot 12 Over Time Continued

Relatively Healthy Areas

Plots 1, 4, 7 and 10 were located in areas classified as relatively healthy at the start of this project. In the spring of 1999, larger and more mature trees dominated these plots compared to the stressed or die-off areas.

Plot 1 is located in the northwest sector of the Clam Bay estuary. This plot is situated between a high-rise condominium and an elite residential area, on the west side of the Strand Road in Bay Colony across from the major 1995 die-off. Plot 1 is influenced by tidal flows from the Gulf of Mexico through a dune system to the west and freshwater inflows from stormwater drainage to the east via a box culvert (Figure 6). In 1999, this plot was part of one of the last remaining stands of healthy mature black mangroves that still existed in the northern part of the Clam Bay system.

In the early years, tree and propagule recruitment and mortality rates were very low, indicative of the plot's maturity and stability at that time (Table 4). In a healthy mature black mangrove stand, the understory is limited and annual recruitment is often low or non-existent. In 1999, plot 1 had a total of 21 mature mangrove trees consisting of 13 (B) and 8 (W) mangroves, with a mean DBH of 10.58 cm and a total basal area of 0.316 m^2 during the pre-restoration baseline assessment (Tables 1 & 2). Red mangrove seedlings dominated the understory in the early years through 2007.

Figure 43: Plot 1 2006 Mature Mangroves Killed by Hurricane Wilma

This area consisted of a mature healthy grove in 1999, with an extensive canopy cover and minimal ground cover. Canopy cover was the highest in 1999 (87%) Table 1). The full canopy shaded the ground preventing propagule establishment that was consistent with a healthy mature forest. At this time only 11 propagules were present, consisting of 8 (R) and 3 (W) mangroves (Table 3). Following Hurricane Wilma in 2005, the composition of this plot changed dramatically. Almost half of

the mature mangrove trees were killed, likely by a tornado given the orientation of the debris field. The plot deteriorated and the canopy coverage decreased to 14% in 2006 following Hurricane Wilma (Figure 43) and was non-existent in 2018 following Hurricane Irma, following Hurricane Ian in 2023, and in 2024 respectively. (Table 1).

Tree mortality continued over the years and in 2007, only 15 trees remained. A similar scenario occurred during the same timeframe regarding propagules, as the total number of seedlings rose slightly in 2003, but reduced to 20 in 2007. As the canopy opened up and more resources became available, propagule recruitment increased in 2008, followed by increased tree recruitment in 2009. White mangrove propagules briefly dominated the assemblage in 2008 and 2009. Dominance shifted to black mangrove propagules in 2010 and the total number of propagules was relatively stable through 2014 and rose briefly in 2015. Propagules crashed in 2016 to only 20 living propagules, likely due to elevated inundation and increased hydroperiod in a plot, which was very stressed prior to the deluge. Plot 1 shows no signs of recovery to date. In 2024, there were only had 3 propagules, consisting of 2 red and 1 white mangroves (Tables 2 & 3 & 4 and Figures 44 & 45 & 46 & 47).

Black mangroves dominated the early years, but tree species dominance began fluctuating between black and white mangroves during the period of 2003 through 2008. White mangrove trees dominated in 2009 and remained dominant throughout the remainder of the study period. Mangrove trees were devastated by Hurricane Wilma. Only 19 trees remained and most of the mature black mangrove trees were killed. Trees began to recover in 2008, their numbers increased to 107 trees in 2012, and remained relatively constant until 2015. In 2016, mortality rates rose sharply, primarily due to inundations from heavy spring rains and tree numbers were reduced to 54. Tree numbers continued to decline throughout the remainder of the study period. Only eight trees remained in 2024 consisting of 1 (B), 1 (R), and 6 (W) mangroves. Floristic measurements were significantly reduced in comparison to baseline conditions in 1999 as the mean DBH was only 7.00 cm with a total basal area of only 0.046 m^2 in 2024 (Tables 1 & 1 & 4 and Figures 44 & 45 & 47).

Figure 44. Plot 1 Trees Over Time by Species

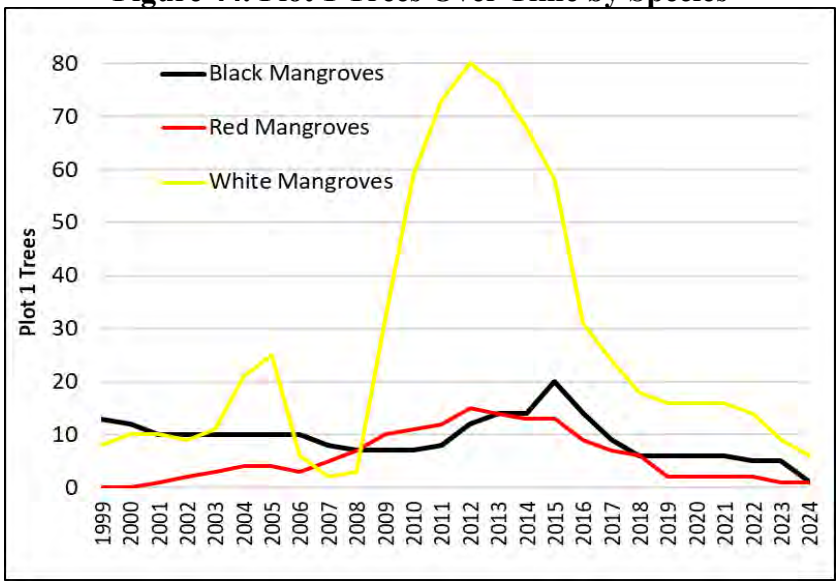


Figure 45. Plot 1 DBH (cm) Over Time by Species

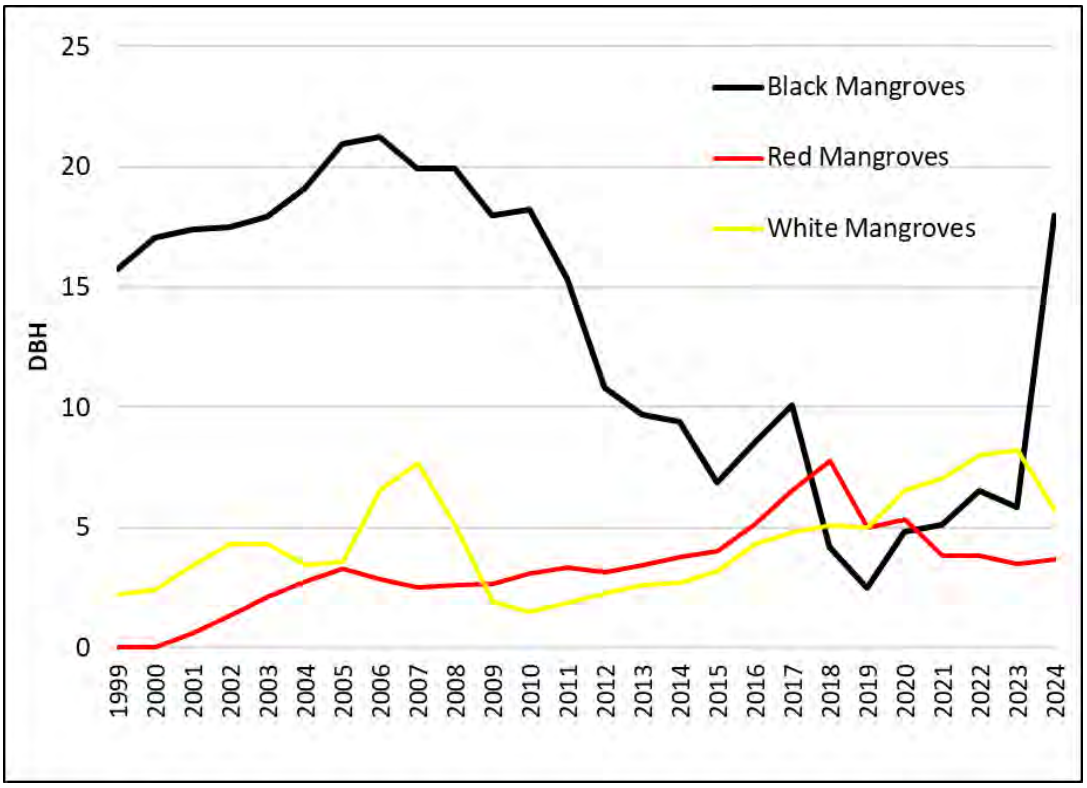


Figure 46. Plot 1 Propagules Over Time by Species

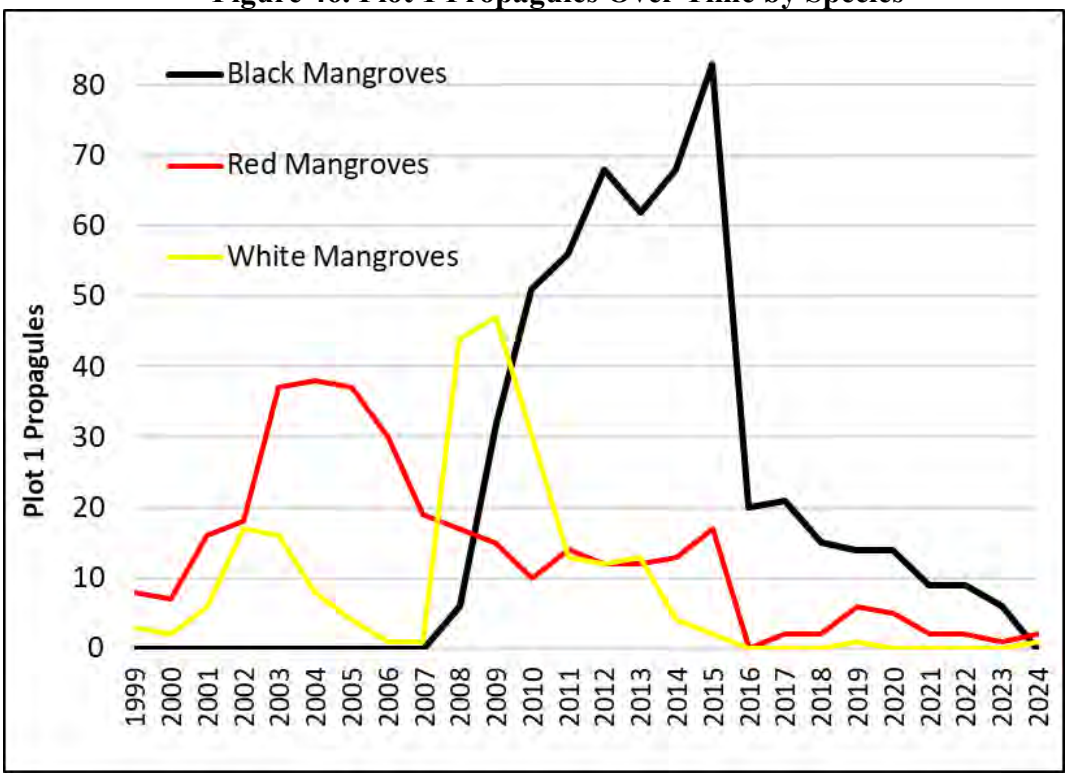


Figure 47: Plot 1 Over Time

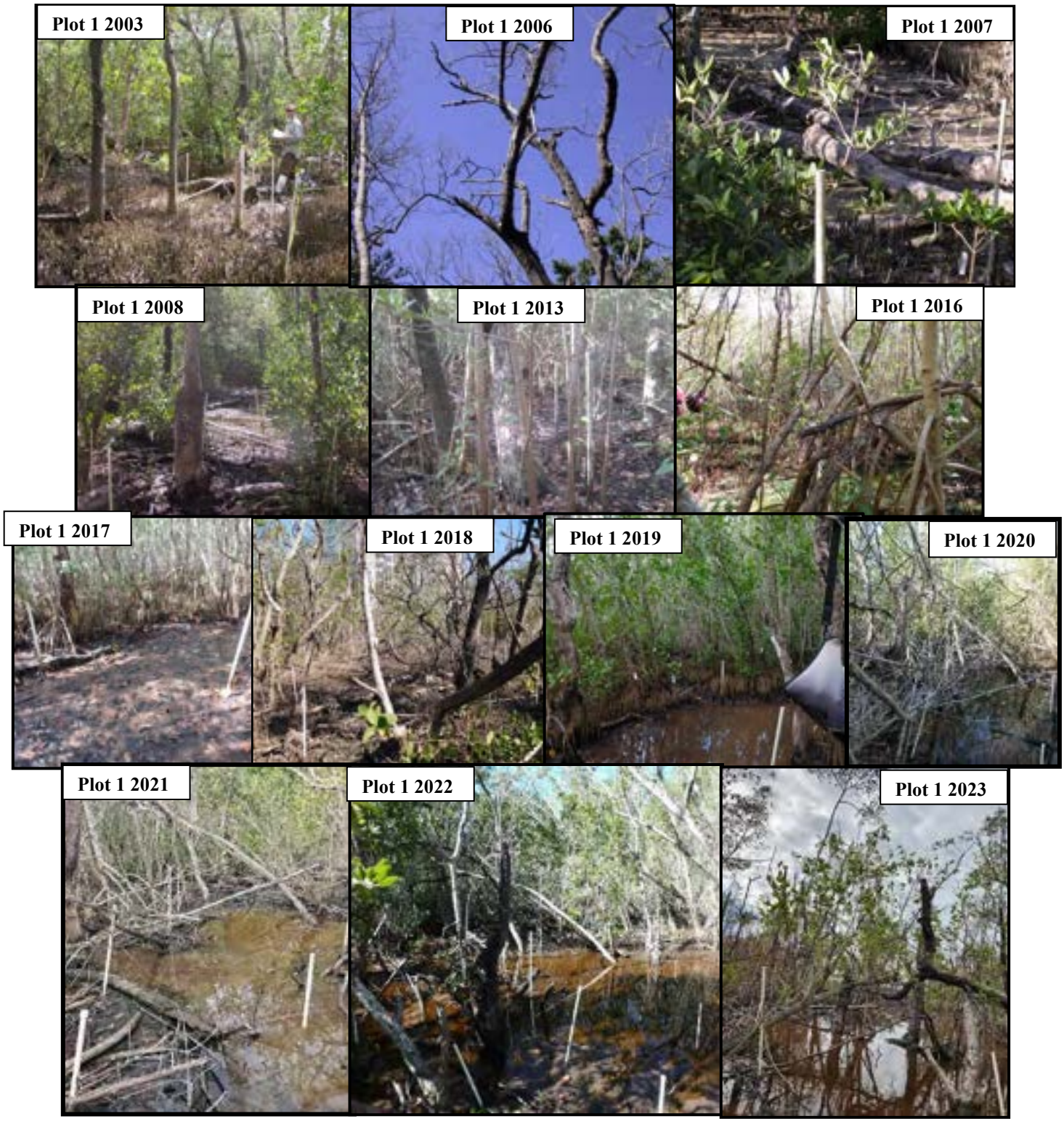


Figure 47: Plot 1 Over Time Continued

Plot 4 is located in the southern part of the estuary, to the west of the major tributary between Lower and Inner Clam Bays, where the County did significant dredging in 2000 (Figure 6). This area is tidally flushed by water from Clam Pass and has no point source freshwater inputs other than rainfall. This area has significant bank erosion along the tributary at this location. Erosion tends to increase following dredging events, which increases the tidal velocity along the banks of the tributary. In 1999, the east side of plot 4 was situated within approximately 3 m of the bank of the tidal tributary. As a result, this plot is frequently inundated, often daily, during high tides. Additionally, the proximity of plot 4 to the tidal channel creates a fringe mangrove effect dominated by red trees and seedlings. In 1999, 113 mature mangrove trees were present, consisting of 1 (B) and 112 (R) mangroves, mean DBH was 5.33 cm and total basal area was 0.279 m^2. Canopy cover ranged from 88% in 1999 to 43% in 2005, averaging 66% over the monitoring period (~80% in 2024). Hurricane Ian did not affect the canopy coverage in plot 4 (Tables 1 & 2 and Figures 48 & 49).

Figure 50: Plot 4 Example of an Infestation of *Cytospora rhizophorae*

Between the spring of 2000 and the fall of 2001, red mangrove trees were stressed to the degree that the trees developed a severe infestation of *Cytospora rhizophorae.* In the fall of 2001 (post-2001 assessment), this infestation resulted in heavy tree mortality tree mortality and ~40% of the trees died by the 2002 assessment. The infestation continued to negatively affect the trees though 2006 (Figure 50). Even today, a few of the remaining mature red mangrove trees that were present in plot 4 during this infestation are stressed. Tree numbers receded through the 2006 assessment until only 49 trees remained (Table 2 and Figure 48). Propagules, primarily red mangroves, began to be slowly recruited in 2006 at the same time when some of the larger mature trees died. Overall tree numbers began to rise within plot 4 from 2008 through 2015 when tree recruitment outpaced mortality. Thereafter, through 2019, tree numbers declined very slightly and stabilized. The smaller younger trees weathered the increased rainfall in 2016, and hurricane winds from Irma in

2018 and with the canopy opened up more new trees were recruited from 2020 through 2024. In 2024, there were 221 trees consisting of 4 (B), 203 (R) and 14 (W), with a mean DBH of 2.97 cm, and a total basal area of 0.287 m^2 (Tables 1, 2 & 4; Figures 48 & 49).

Figure 48. Plot 4 Trees Over Time by Species

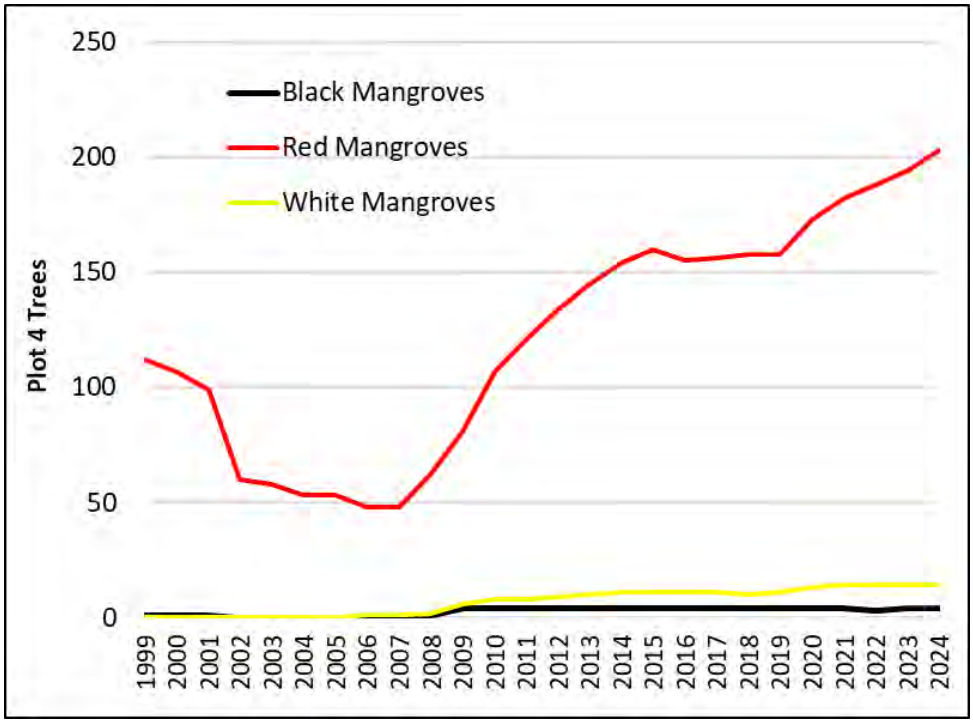
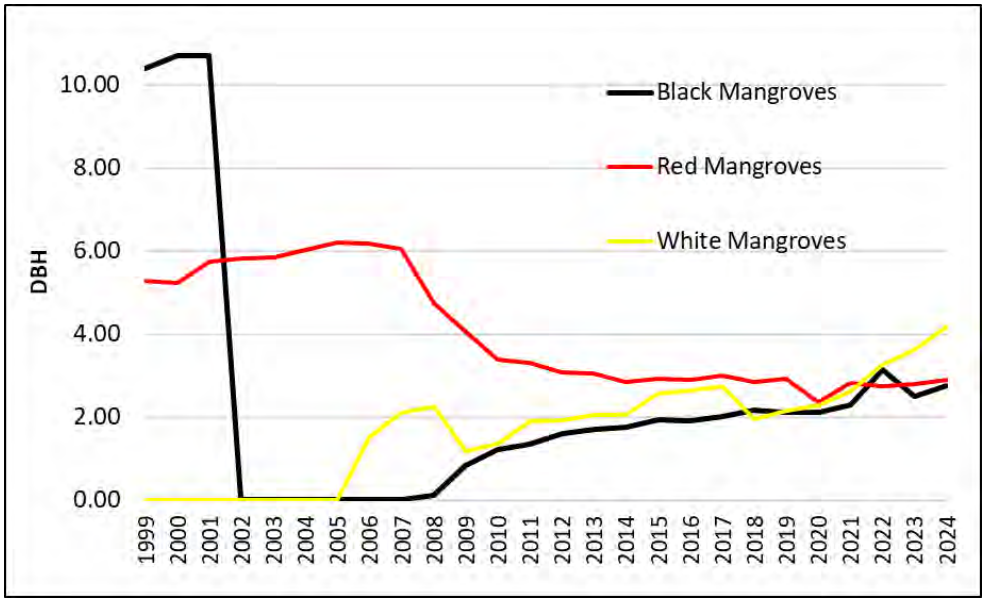
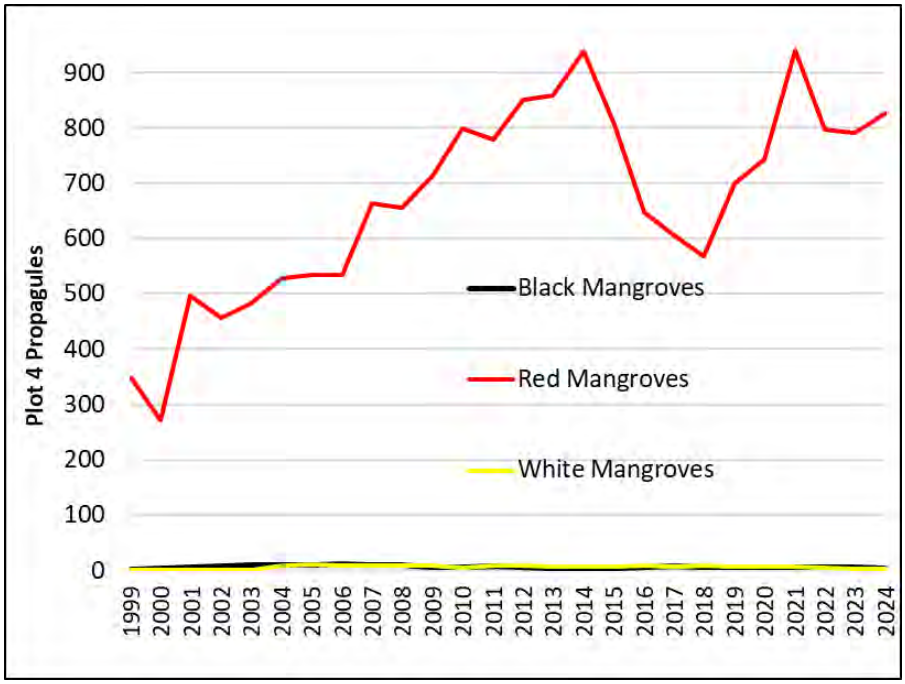


Figure 49. Plot 4 DBH (cm) Over Time by Species



Propagule recruitment and mortality is typically high in plot 4 and consists of primarily red mangrove seedlings. Propagules are washed in by the tides, attempt establishment, and then die due to waterlogging and competition. In 1999, there were 350 established propagules consisting of 2 (B) and 348 (R) (Tables 3 & 4 and Figure 51). Following the 1999 dredging of the tributary adjacent to the plot, propagule mortality increased in 2000 when 35% of the seedlings died, outpacing propagule recruitment. During this time, tidal currents within this plot went from being very mild to very strong, resulting in accelerating propagule mortality. Propagule mortality remained high through 2002, followed by periods of high recruitment. Throughout the years recruitment and mortality rates vacillated (Table 4). Propagule numbers rose steadily throughout most of the years, vacillating in an upward trajectory, and peaked briefly in 2014 at 950 propagules. Propagule numbers declined through 2018, and then rose again to peak briefly in 2021 to 952 total propagules. In 2022 propagules numbers slightly receded and in 2024 there were 831 (3 (B), 826 (R) and 2 (W)), 223 propagules were recruited and 179 died (Table 3 and Figures 51 & 52). Compared to the other plots, both the number of propagules recruited and the number of propagules that died is high (annually usually in the double or triple digits for either statistic) (Table 4). The close proximity of plot 4 to the tributary assists in red mangrove distribution and propagationl; however, without an open canopy and limited resources propagule mortality is also high.

Figure 51. Plot 4 Propagules Over Time by Species



Over the years, the bank near plot 4 continues to erode. As a result, the gap between the eastern edge of the plot and the bank of the tributary has steadily narrowed and in 2024 resulted in one tree falling into the tributary. Erosion will likely continue. Since dredging has become a more frequent occurrence, the volume and velocity of the tidal flow that can cause more bank erosion has increased. It is expected that the east side of plot 4 will continually erode.

Figure 52: Plot 4 Over Time

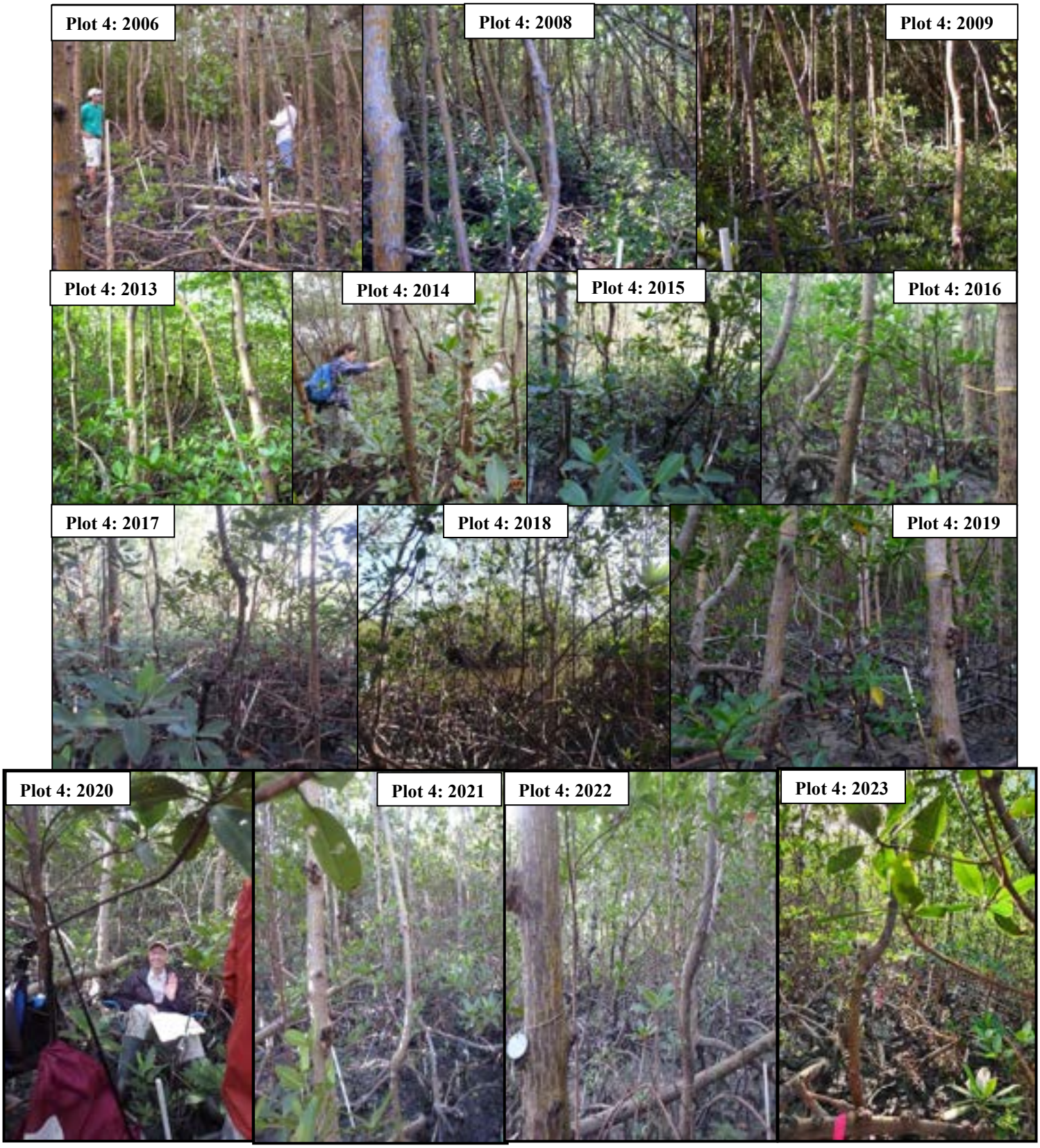


Figure 52: Plot 4 Over Time Continued

Plot 7 is centrally located within the Clam Bay, estuary, directly to the west of Inner Clam Bay. This plot is subject to tidal influence from eastern tributaries (Figure 6). Hurricane Ian destroyed this plot. Storm surge pushed sand from the dunes into plot 7. Any mangroves remaining were stripped of leaves and propagules were buried under dune sand.


Figure 53: Plot 7 Mature Black Mangroves

Throughout most of the monitoring period, except recently, canopy cover was primarily due to one mature black mangrove (DBH ≈ 45) (Figure 53). Canopy cover ranged from 86% in 2002 to 10% in 2018, (post Hurricane Irma). In 2023, post Hurricane Ian, canopy cover was only (12%) as the vegetation was destroyed. Some of the canopy began to reform in 2024 to 20%, and averaged 56% over the years. (Table 1).

Until recently, plot 7 was similar to plots 8 and 9 in that red mangrove trees dominated as far as total number of trees, while the mature black mangrove trees that were present pre-restoration, were taller and had bigger girths. In 1999, there were 20 mangrove trees present, consisting of 8 (B), 10 (R) and 2 (W) mangroves, with a mean DBH of 11.57 cm and a total basal area of 0.442 m^2 (Tables 1 & 2). Over the years tree mortality was very low, as only four trees died during the first 16 years of monitoring. However, between the 2015 and 2016 assessments the mortality rate more than doubled compared to the past 15 years. Twenty percent of the trees died and 83% of the remaining living trees were stressed or very stressed following unusually heavy rainfall and subsequent plot inundation and increased water retention periods. Mortality subsided briefly between the 2016 and 2017 assessment, prior to Hurricane Irma, which resulted in a 60% loss in mangrove trees and only 14 very stressed trees remained alive in 2018. From 2019 through 2023, tree mortality continued. In 2024, only six mangrove trees remained, consisting of 5 (B) and 1 (W) with a mean DBH of 22.78 cm and a total basal area of 0.340 m^2 (Tables 1 & 4 and Figures 54

& 55). The higher DBH and total basal area is due to the few remaining mature black mangrove trees that have been present throughout the 24 years of monitoring.

Figure 54. Plot 7 Trees Over Time by Species

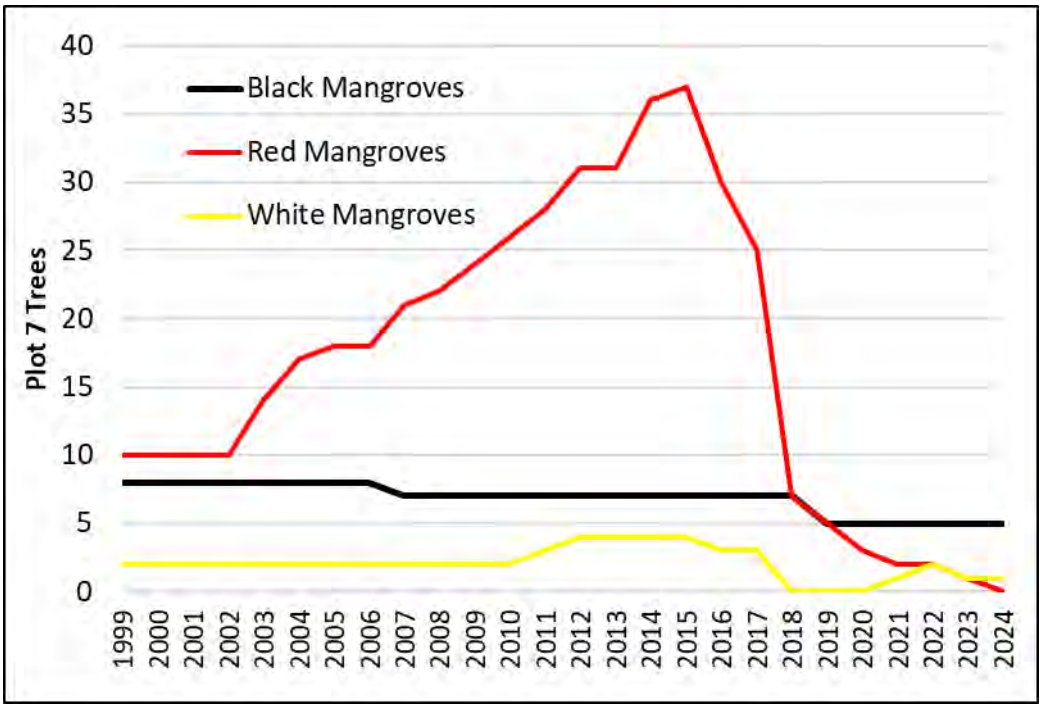
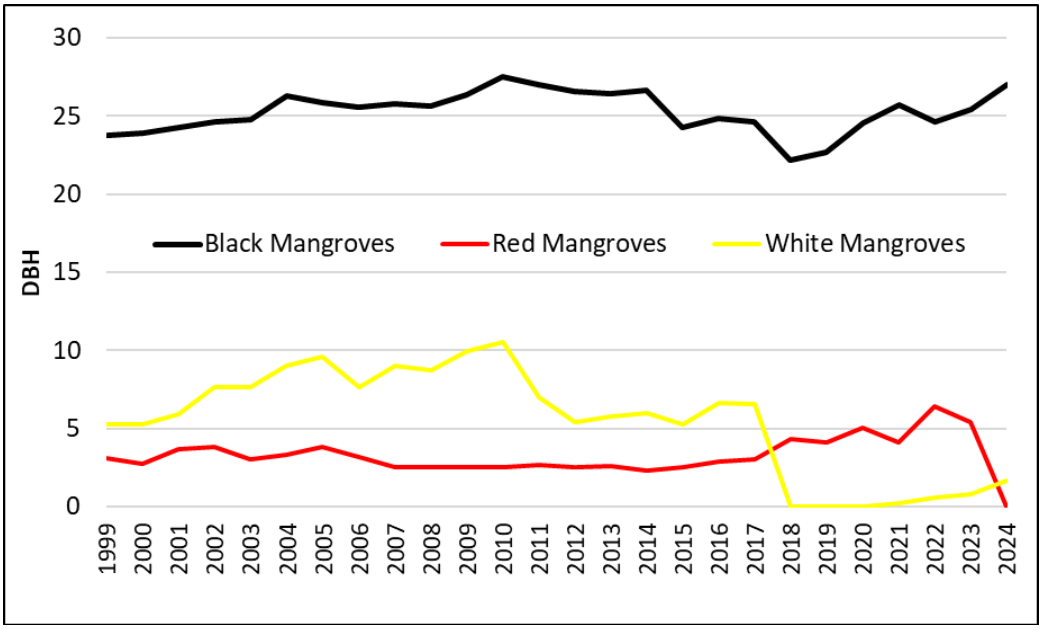


Figure 55. Plot 7 DBH (cm) Over Time by Species



In 1999, there were 83 propagules consisting of 3 (B), 67 (R), and 13 (W) (Table 3). Seedling recruitment and mortality showed minimal fluctuations during the early years. Seedling recruitment increased in the years following Hurricane Wilma. The number of new recruits peaked in 2007 and the total number of established seedlings peaked in 2008 with 398 seedlings (Table 4). Propagule numbers decreased in 2015, as inter and intraspecific competition for resources thinned out the crop to 258. Propagule mortality increased significantly in 2016 following heavy rains and prolonged inundation and numbers were reduced to 87. Propagule numbers rebounded in 2017, when the canopy opened up slightly, only to plummet once again to 62 in 2018, as Hurricane Irma hit this plot particularly hard. In 2019, propagule recruitment rebounded and increased over 5-fold, only to decrease in 2020 when propagule mortality outpaced recruitment. In 2021 and 2022, the propagule numbers rose to 177 in 2022. However, Hurricane Ian reduced the propagule assemblage to 52 propagules in 2023 and began the process of recovery again in 2024. During the 2024 assessment there were 64 propagules consisting of 3 (B), 46 (R), and 15 (W). Red mangrove propagules remained the dominant propagule species in plot 7 throughout the study period (Tables 3 & 4 and Figures 56 & 57).

Figure 56. Plot 7 Propagules Over Time by Species

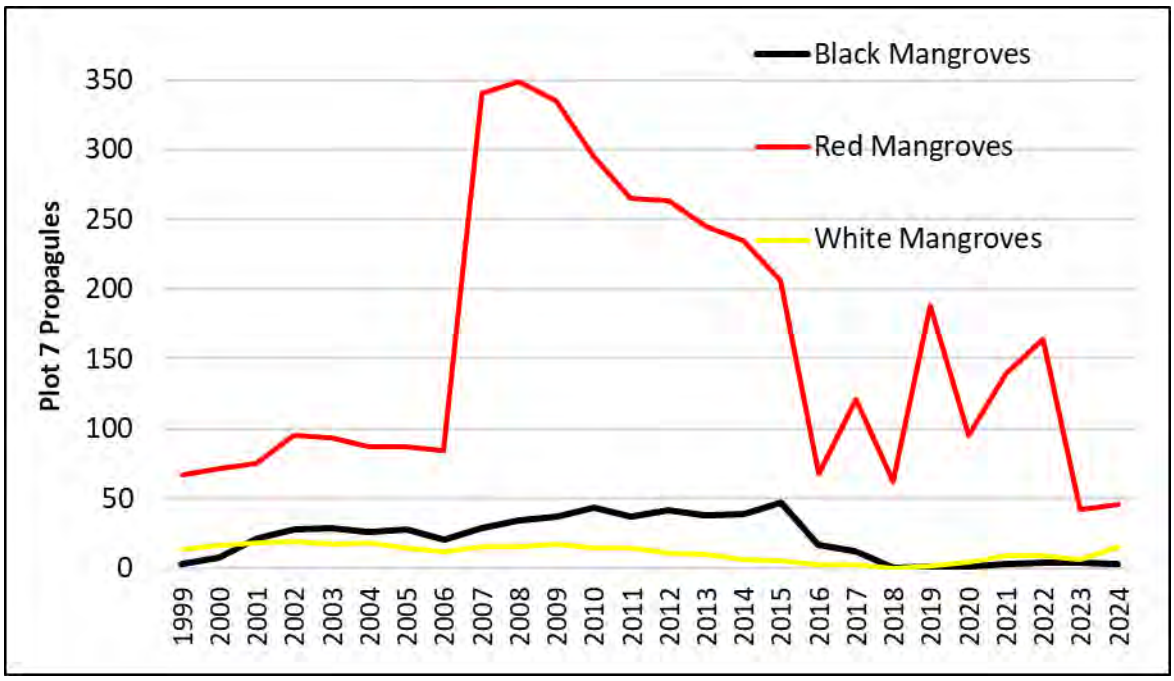


Figure 57: Plot 7 Over Time

Plot 10 is situated on the northwest side of Upper Clam Bay in close proximity to the original die-off to the east. This plot is subject to tidal influence from the east from Upper Clam Bay (Figure 6).

Figure 58: Channel cut through Plot 10 in 2004. (Note cut prop roots)

In 1999, plot 10 had 30 mangrove trees, consisting of 9 (B), 19 (R) and 2 (W) mangroves, with a mean DBH of 8.76 cm and a total basal area of 0.230 m^2 (Table 1). Forty-two propagules were present, consisting of 1 (B), 35 (R), and 6 (W) mangroves, during the pre-restoration baseline assessment (Tables 1 & 3). In 1999, red mangroves were the dominant species. At this time, plot 10 was more mature and thus its understory was limited. In 2004, the County cut a channel directly through this plot. This action caused mangrove disturbance, damage, and some tree mortality from severing prop roots and direct tree removal (Figure 58). Propagule recruitment was steady during the early period of this study and increased when the canopy opened up in 2006 and 2007 due to Hurricane Wilma. Propagule numbers rose steadily throughout the early years of the study, which peaked in 2008. Established propagules fluctuated on a very slight downward trend from 2009 through 2015, as some of the propagules achieved tree status. In 2016, following heavy rainfall, the propagule mortality rate accelerated, leaving only 69 living propagules remaining within plot 10. New propagule recruitment increased thereafter, from 2017 to 2019, subsided briefly in 2020, followed by an increase in propagule recruitment during the following four years. Propagule numbers, thus far, peaked in 2024 when a total of 437 living propagules were present, consisting of 3 (B) and 434 (R) mangrove propagules (Tables 3 & 4 and Figure 59). Canopy cover was estimated at 71% in 2024 and ranged from 45% in 2006 (post-Hurricane Wilma), to 90% in 2003 (Table 1). Overall, the canopy has opened up over the years.

Figure 59. Plot 10 Propagules Over Time by Species

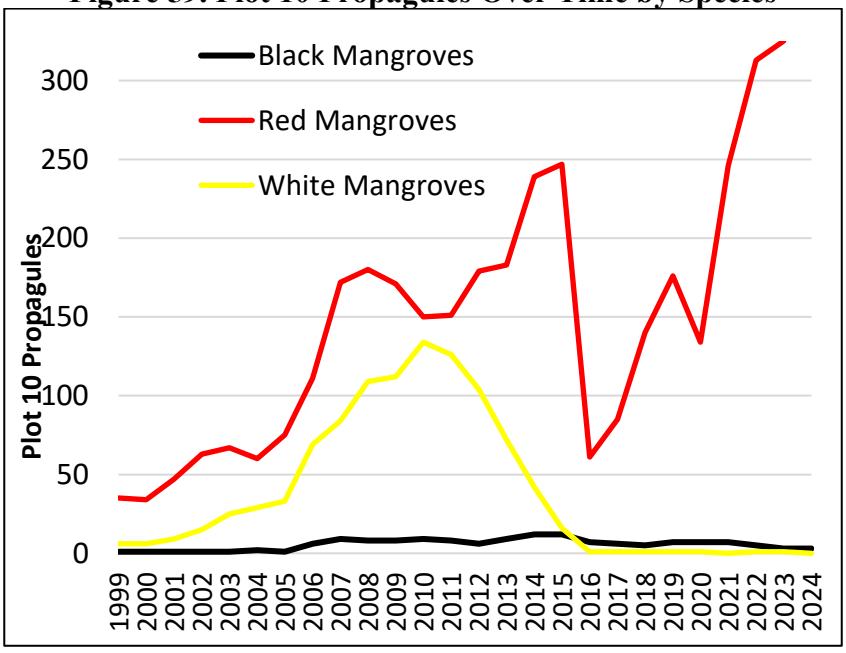


Figure 60: Plot 10 2005 Post Hurricane Wilma.
(Many trees roots were cut in 2004 when a channel was dug through the plot, destabilizing the trees adjacent to the channel).

Tree recruitment was minimal during the early years with only a few red mangrove propagules attaining tree status. (Table 4). Tree numbers were relatively stable until the plot was impacted by Hurricane Wilma in 2005. A mature large black mangrove next to the County's new hand-dug channel was uprooted and fell over bisecting the plot during Hurricane Wilma (Figure 60). Miraculously this tree is still living today, albeit slowly dying and is very very stressed and only a small offshoot remains viable. Tree recruitment increased in 2007, as seedlings (primarily white) attained tree height. Trees numbers rose steadily through 2013, when the number of established trees peaked at 133. The total number of trees decreased beginning in 2014 and continued to decline through 2020, when tree numbers seem to stabilize. In 2024, there were 41 trees present, consisting of 6 (B), 18 (R) and 17 (W), with a mean DBH of 8.76 cm, and a total basal area of 0.230 m^2 (Tables 1, 2 & 4 and Figures 61 & 62). In 2008, the dominant tree species switched from red to white mangroves, which remained the dominant tree species until 2023 when red and white mangroves were codominant. In 2024, red tree numbers edged out the white mangrove trees.

Tree mortality was low throughout the initial study period, as only eight trees died from 1999 through 2013. These losses were primarily due to storms, channel installation or inter and intraspecies competition between the trees for resources. In 2016, the tree mortality rate increased substantially (more than doubled) and was likely in part due waterlogging along with continued competition. In 2024, 71% of the remaining trees are stressed or very stressed (Tables 1, 2, 4 and Figure 63).

Figure 61. Plot 10 Trees Over Time by Species

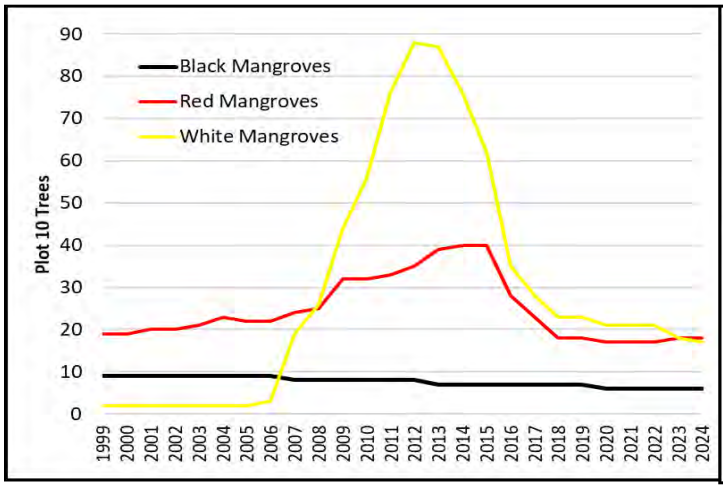


Figure 62. Plot 10 DBH (cm) Over Time by Species

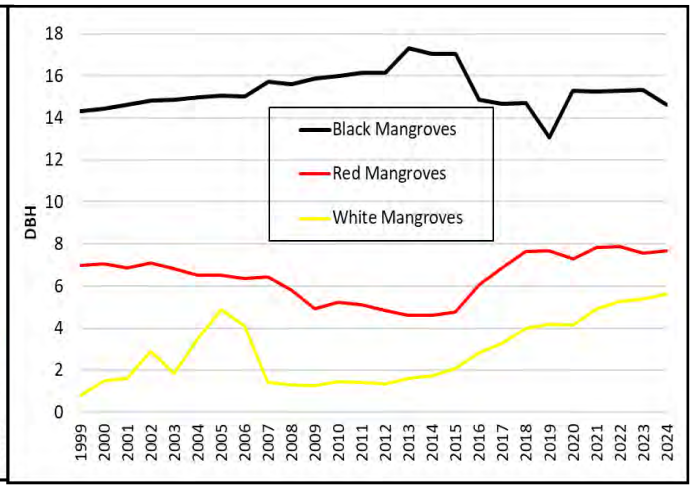
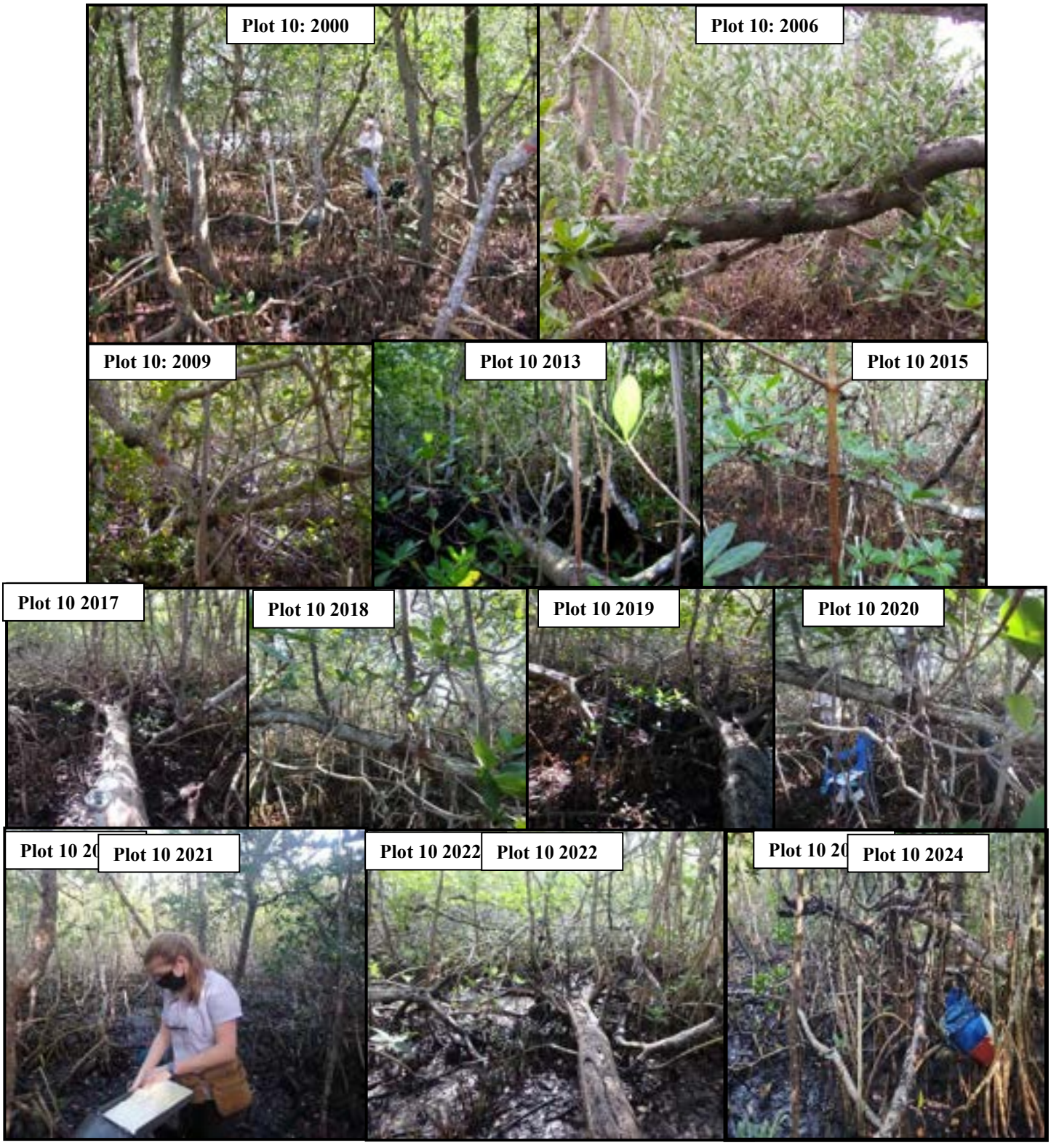


Figure 63: Plot 10 Over Time



Current Status

Plots 2, 3, 6, and 11, the original four die-off plots established in 1999, remain classified as a die-off or stressed.

Plots 2, 3, and 11 were originally classified as die-off areas. These plots showed signs of recovery within 5 years of the restoration project, and continued to recover through 2015, with periodic disruptions in progress due to natural disturbances such as Hurricane Wilma and frosts. Unfortunately, in 2016, recovery halted and was in some cases significantly setback due to impoundment of heavy dry season rains and subsequent mangrove waterlogging. Natural stressors from weather abated during 2017 and two of the three plots (plots 3 and 11) revealed signs of once again beginning to recover. Plot 2, however, continues to exhibit signs of deterioration as the trees and propagules that remained in this plot had increased stress levels. The effects of Hurricane Irma on these 3 plots set back progress significantly. However, Hurricane Ian itself had less negative impact. As of 2024, plot 2 is classified as very stressed, whereas plots 3 and 11 show signs of recovery and are classified as stressed. Plot 6 continues to erode and remains in a very very stressed 25 years later, suffering bouts of recovery followed by erosion and dieback.

Plot 2 is classified as very stressed. This plot has experienced periods of recovery followed by catastrophic losses in mangroves from anthropogenic and natural causes. Although plot 2 initially responded favorably to restoration activities, the long-term viability and ability to recover from both extreme natural and anthropogenic stressors is still uncertain. Tree mortality has outpaced recruitment from 2017 through 2023. No trees were recruited during the period of 2017 through 2019 or during the 2022 assessments. Only one white mangrove tree was recruited in 2020 and one black mangrove tree was recruited in both 2021 and 2023. In 2024, this plot showed some signs of recovery as tree recruitment was slightly higher than tree mortality.

In 2016, tree mortality rose above rates not indicative of natural plot maturation. Prior to the 2016 mangrove survey, the area was subjected to above average rainfall during a very wet dry season, which resulted in mangrove mortality. The County responded by installing hand-dug channels directly west and abutting plot 2. However, since the topography slopes downward to the east into this plot, there is still a tendency for standing water to accumulate during heavy rains. In 2017, Hurricane Irma exacerbated plot conditions and it continued to deteriorate through 2020. While propagule recruitment has increased slightly ever since, only time will tell if these seedlings will mature into trees given the saturated and often waterlogged soil conditions. Plot recovery or further deterioration will ultimately be determined by how saturated the soil becomes, how heavy the rainfall and runoff are, and how long it takes to recede. Recovery will also depend, in part, on weather patterns and whether or not sustained rainfall or if any additional severe weather events hit this area in the near future. Standing water was present in this plot during the 2020 dry season (~1 ½ ft.), and soils were very saturated in the 2021 and 2022 dry seasons, which is not a good sign. The storm surge from Hurricane Ian (~8 ft.) exacerbated inundation and water retention times. Six inches of water remained in the plot three months following the hurricane in 2023 (Figures 64a & 64b & 64c). During the 2024 mangrove assessment, another new ditch was dug into plot 2 at ~270°. The ditch also had sulfur scum on the surface of the standing water , indicative of very reduced soils. This year the plot was wet

but had no water standing water. However, evidence of recent inundation was found since grass ceriths were present (Figure 64d).

Figure 64d: Plot 2 2024 Sulfur scum in new channel

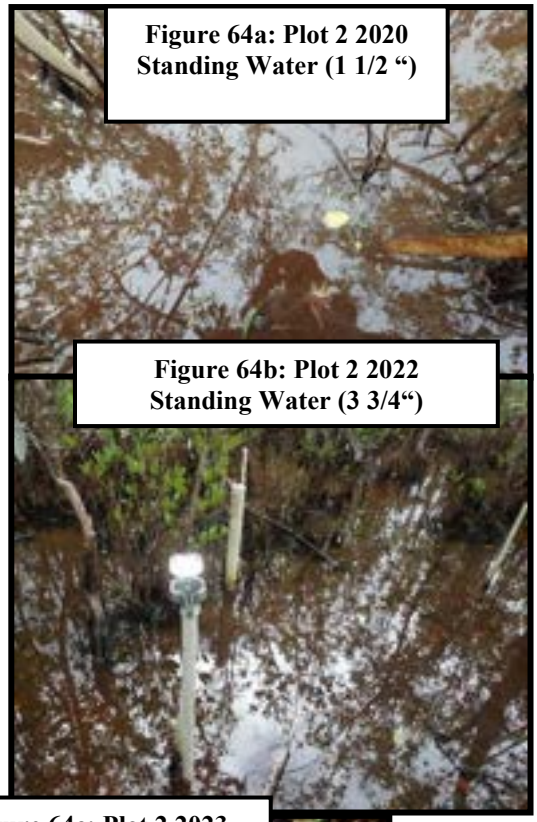


Figure 64a: Plot 2 2020 Standing Water (1 1/2 “)

Figure 64b: Plot 2 2022 Standing Water (3 3/4“)

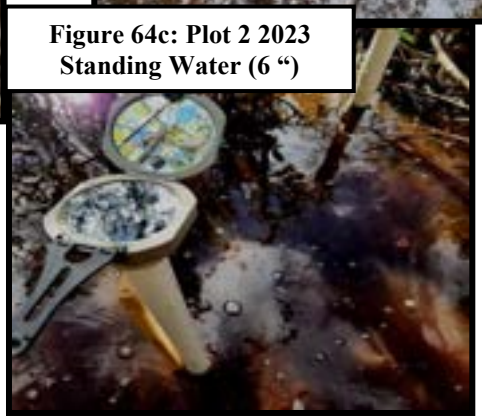
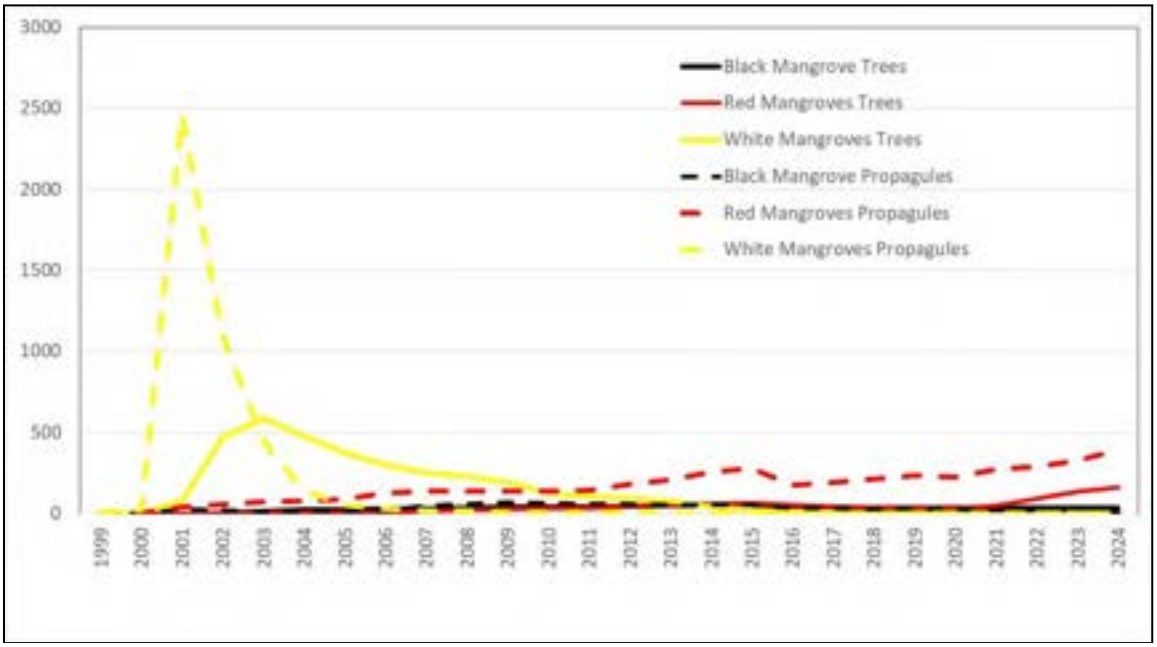


Figure 64c: Plot 2 2023 Standing Water (6 “)

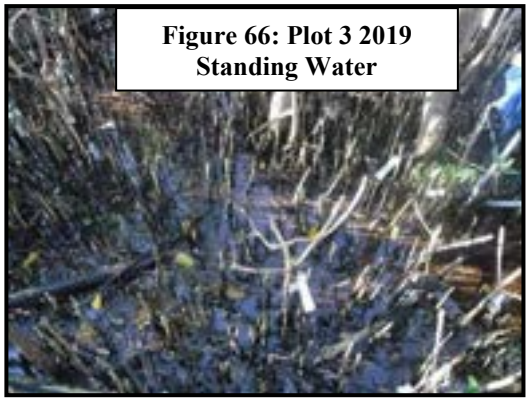
Initially, **<u>Plot 3</u>** showed significant improvement post-restoration and had the most promise of fully recovering. For the first 14 years following restoration (through 2015), this plot served as an excellent example of how a die-off caused by encroaching development and altered hydrology could be revegetated, by restoring tidal flow and abating flood water levels and retention periods. Within two years of the restoration, this plot was flooded with white mangrove seedlings, some of which attained tree height as early as 2002. Natural inter and intraspecies competition ensued and overtime, species dominance shifted as white mangroves were slowly replaced with red and black mangroves. As the red mangrove seedlings grew and became trees, they slowly outcompeted white mangrove trees. Much like plot 2, through 2015, plot 3 exemplified the process of mangrove forest regeneration and the beginnings of forest maturation (Figure 65).

Figure 65: Plot 3 Propagule and Tree Time Series



The inundation events of 2016, negatively impacted plot 3, water retention periods were significant and conditions declined through 2020. Thereafter, conditions reversed as tree and propagule recruitment surpassed mortality rates. It is too soon to discern whether this trend will hold in the future. Whether this plot will recover or decline, is likely dependent on its ability to recruit the next generation of trees, and on the intensity of the outside stressors both natural and anthropogenic that occur in the near future. This plot fared well through Hurricane Ian and retained minimal standing water, much less than in 2013 (Figure 66). Today, plot 3 is classified as a stressed area due to intermittent flooding and sulfur aroma, indicative of low soil redox levels. As the trees mature and if they regain a healthy status inter and intra-specific competition will likely ensue as the more robust mangroves outcompete their siblings.

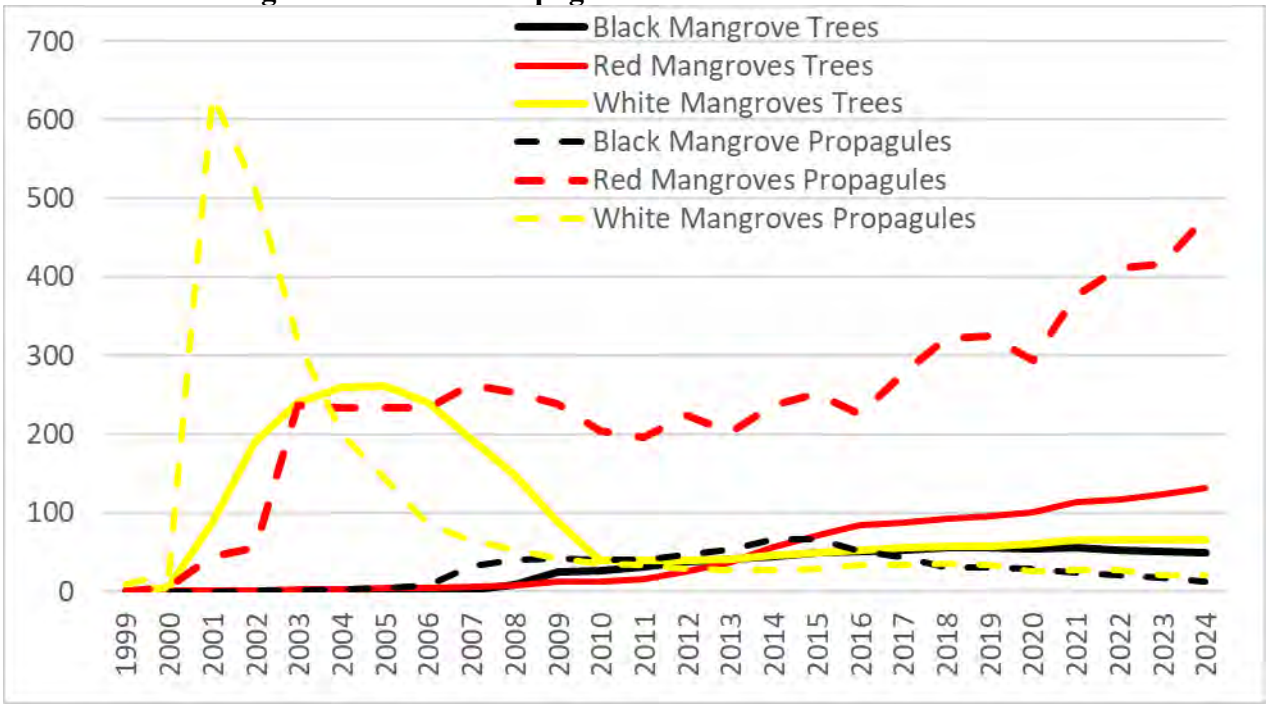
Figure 66: Plot 3 2019 Standing Water



Plot 11 in the spring of 1999 had only one living red mangrove tree and 10 propagules. Similar to plot 3, plot 11 exhibited early signs of restoration success through 2015. Actual seedling numbers in plot 11 were not as impressive as in plot 3, as the forest in this area initially recovered at a slower pace. White mangrove tree recruitment dominated the early years of this study as white mangrove seedlings rapidly attained tree status. Similar to plots 2 and 3, competition for resources ensued, which elevated mortality rates in the young trees, particularly during the period of 2006 - 2010, albeit some of the tree mortality that did occur was also due to impacts from Hurricane Wilma. In 2007, white mangrove tree recruitment was superseded by black mangrove and red mangrove tree recruitment. Red

mangrove trees were dominant by 2015, edging out black mangrove recruitment in the later years (Figure 67).

Figure 67: Plot 11 Propagule and Tree Time Series



Setbacks occurred in 2016, following heavy rains and inundation during the dry season, and propagule and tree mortality increased. Though affected by Hurricane Irma, this plot fared better than some of the other plots, since only 2% of its trees died. Today, primarily red propagules are being recruited and recruitment rates are higher than mortality rates. This plot also weathered Hurricane Ian well, as the storm had minimal impact on the trees. However, an estimated 62% of the remaining trees are stressed or very stressed. Similar to other die-off plots, if the periodic persistence of deep standing water and reduced soil conditions continue, this will be detrimental to future recovery. Recruitment remains low in a large section of this plot that has lower topography and has a tendency to impound water, which causes difficulty in long-term mangrove recruitment and establishment (Figures 68a & 68b & 68c & 68d). However, the more elevated sections of the plot have become crowded with new propagules and trees over the last eight years as the plot attempts to recover. It is expected that intra and interspecific competition will ensue as the new trees mature and the canopy re-forms. It is too soon to discern if recovery will continue, plot 11 remains classified as stressed.

Figure 68a: 2016 Low Topographical Area in Plot 11 Exhibiting Water Impoundment

Figure 68b: 2022 Low Topographical Area in Plot 11 Exhibiting Water Impoundment (5 ½")

Figure 68c: 2023 Low Topographical Area in Plot 11 Exhibiting Water Impoundment ½")

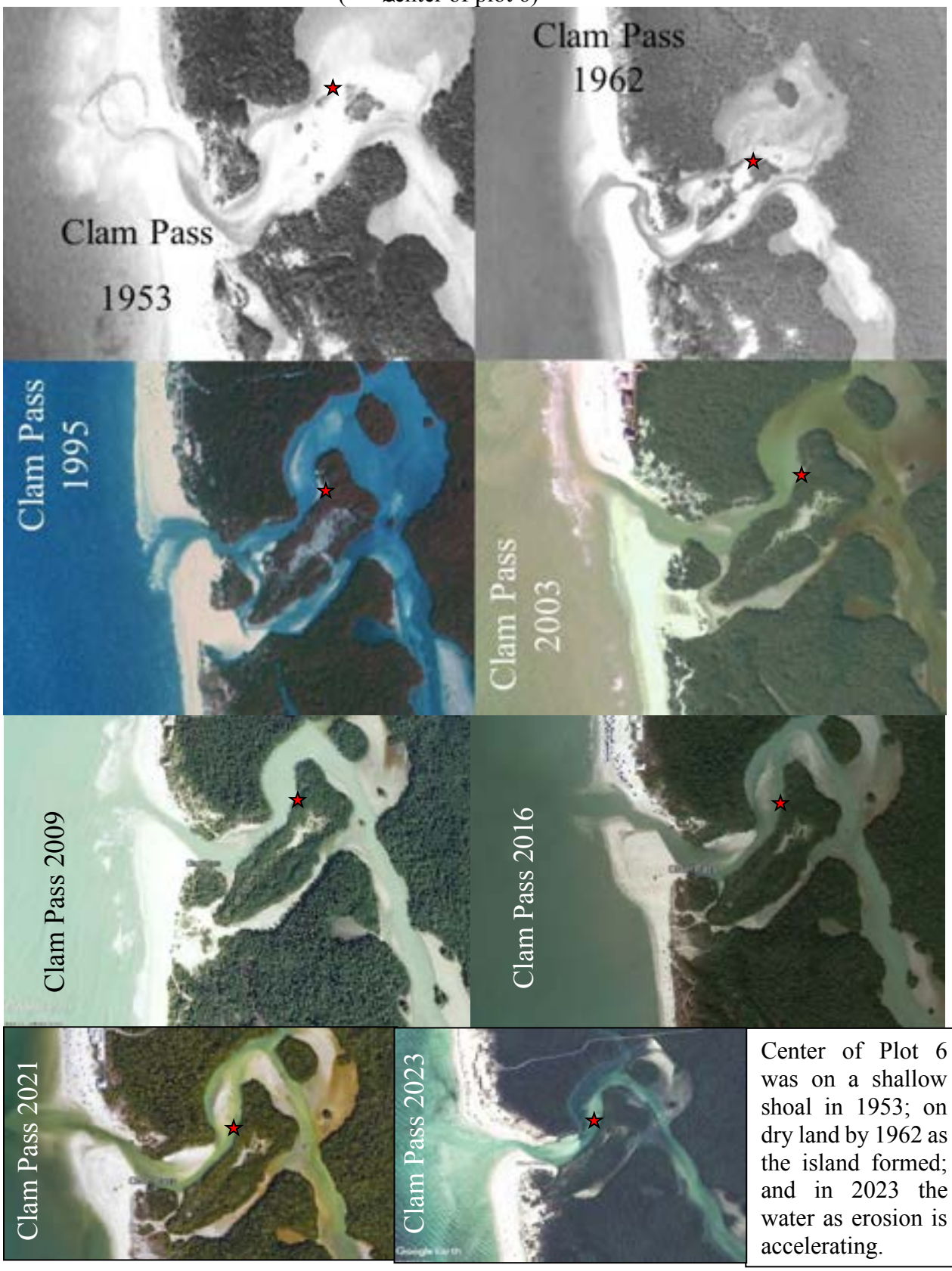
Figure 68d: 2024 Low Topographical Area in Plot 11 Exhibiting Water Impoundment 6")

Figure 70: Plot 6 Overwash from Hurricane Irma Storm Surge

Historically, **Plot 6** demonstrated how shifting sands naturally cause barrier islands to be in a constant state of change. Depending upon the orientation of the Pass and the frequency and intensity of storms, sand can build up overtime to form an island or it can erode away (Figure 69). Today the Pass is dredged periodically to keep it from naturally closing and breaking open somewhere else. Since plot 6 is located close to Clam Pass (within ~300 ft.), for many years it remained in a state of arrested development, kept in check by periodic episodes of shoreline erosion and accretion. However, more recently the western bank has continued to erode, preventing long-term stability and establishment of propagules and trees. Storm surge from periodic storms and even occasionally king tides, deposits sand and debris that buries propagules, while hurricane winds strip the tree of vegetation and branches (Figure 70). Dredging events have exacerbated bank erosion and subsequent mangrove washout, since tidal surge velocity often increases dramatically following dredging. The storm surge from Hurricane Ian overwashed plot 6, depositing sand and debris into the interior of the plot. Furthermore, the velocity of the surge increased the bank erosion (Figure 15) and ~85% of the propagules that died were washed away when the bank collapsed.

Plot 6 is representative of a mixed mangrove species forest. Species dominance fluctuated primarily between black mangrove and white mangrove trees during the early years of this study, with red mangrove trees dominating after 2015. Red mangrove seedlings, to date, have dominated over the other species, likely due to the plot's geographic location adjacent to the tidal flow, which washes in red propagules. In 2016, plot 6, unlike plots 2, 3 and 11, did not experience an increase in mortality rate for trees or seedlings. Its geographic location, sandy well drained soils, and topography do not favor water impoundment, which caused most of the mortality within the other plots. Plot 6 is now classified as a very, very stressed area, considering half of theplot is underwater, erosion continues to outpace accretion, and tree and propagule mortality is outpacing recruitment. Only one original tree present in plot 6 in 1999 has survived to the present day. This plot remains very stressed as 30% and 8% of the remaining propagules and trees respectively, were classified as stressed or very stressed in 2024.

Figure 69. Episodic Accretion and Erosion in Plot 6
(= center of plot 6)



Center of Plot 6 was on a shallow shoal in 1953; on dry land by 1962 as the island formed; and in 2023 the water as erosion is accelerating.

Plots 5, 8, 9, and 12 were initially classified as stressed areas prior to restoration. Storms, such as Hurricane Wilma, Hurricane Irma, Hurricane Ian, and other tropical disturbances, along with freshwater incursion have had varying degrees of effect on these plots. In some cases, causing actual mortality and in other cases opening up the canopy to allow sunlight to reach the forest floor. Responses ranged from increased propagule recruitment in subsequent years following the disturbances to increased mortality. Trees within plots 5 and 8 are showing less stress than plot 9. Hurricane Ian walloped plot 9 and mortality rates were very high. In 2016, two of the plots (8 and 9) were subjected to waterlogging. Additionally, fungal disease and insect infestations have gained a foothold in some of the older trees at times in plots 8, 9, and 12 over the years. All of the four plots were initially classified as stressed areas prior to restoration. In 2024, plots 5 and 8 were still classified as stressed, while plot 9 continues to be classified as very very stressed. Plot 12, is currently relatively healthy as conditions have dramatically improved over the last six years.

Plot 5 is a scrubby mangrove area that is similar to nearby plot 6. In 2024, 58% of the trees remain stressed or very stressed, slightly less than in 2023. However, the plot remains in a state of arrested development. Tree mortality was negligible over most of the years, although increased slightly following Hurricane Irma. The plot had signs of overwash from Hurricane Ian, which caused some propagule mortality, but overall, the trees were only slightly impacted, as stress levels pre and post hurricane were similar. This plot has all three species of mangroves. Species assemblages slowly changed over the years from a forest dominated by white mangrove trees in the early years to a forest that is now dominated by red mangrove trees and propagules (Figure 71). The elevated precipitation and subsequent runoff in the spring of 2016 did not affect this plot, likely due to a sandy, more permeable substrate that facilitates better drainage. This plot suffered less severe impact from Hurricanes Irma and Ian, since it was in a sheltered location and remains in a stressed condition.

Figure 71: Plot 5

In 1999, **Plot 8** consisted of primarily mature red mangroves and a few mature black mangrove trees, with a high degree of canopy cover, greater individual tree DBH, and a limited understory. After Hurricane Wilma occurred, the canopy opened up and this part of the forest was thrown back into a younger stage of development with an influx of new propagules. Red mangrove seedlings dominated this plot throughout the study period. However, white mangrove seedlings have a tendency to place their energy into stem growth, and as such, gained enough height to reclassify them as trees ahead of the red mangrove seedlings, which grow at a slower rate. As a result, white trees began to dominate the tree

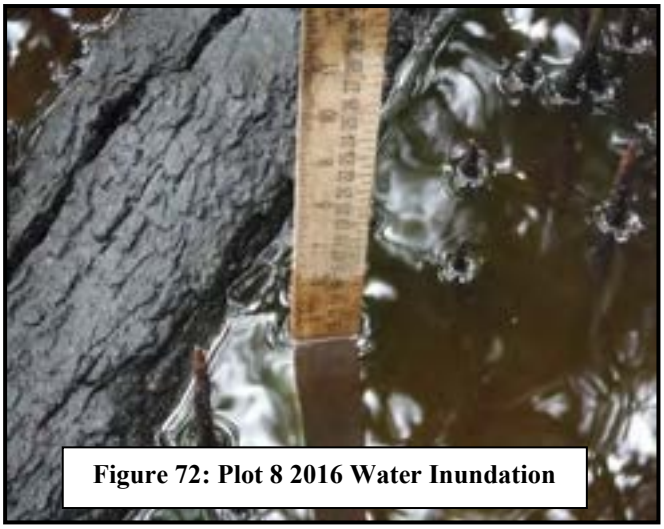
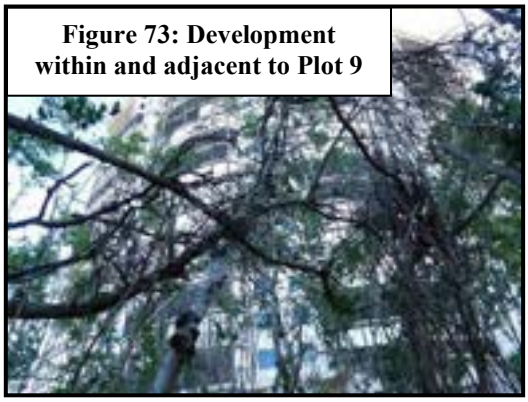


Figure 72: Plot 8 2016 Water Inundation

assemblage in 2011 and dominated throughout the remaining years. In 2016, high levels of standing water during the dry season caused some mangrove waterlogging (Figure 72). In 2017, waterlogging continued to negatively impact this plot and conditions deteriorated. Hurricane Irma caused further impact as tree mortality rates outpaced tree recruitment rates between the 2017 and 2019 assessments and mortality lessened from 2020 through 2023. This plot remains stressed, since many of the trees have visible signs of waterlogging, water is still impounded, and sulfur odor present indicates soil reduction.

Figure 73: Development within and adjacent to Plot 9



Plot 9 primarily consisted of a few mature black mangrove trees with little fluctuation in basal area extent during the early years of monitoring. There was very little understory typical of a mature mangrove forest. Developmental pressure from the surrounding residential neighborhood stressed the forest and contributed to the decline of the mature mangroves in this area. This construction was directly or indirectly responsible for the death of 18 trees during the first five post-restoration years (Figure 73). Furthermore, freshwater runoff from the surrounding development on into the mangroves allowed freshwater ferns to become established, some of which are still present (Figure 74). In 1999 through 2005 red mangrove trees were the dominant tree species, albeit the old growth black mangrove trees covered more of the area, due to their larger girths and canopies. In 2005, white mangrove recruitment was facilitated by Hurricane Wilma, which caused more stress to the older trees and opened up the canopy. Beginning in 2006, species dominance began to shift to white mangrove trees, as plot 9 regressed to a younger stage of development. This was evidenced by overall lower average DBH and the plethora of young white mangrove trees that became established. Tree recruitment peaked in 2009, followed by a period of inter and intra species competition, reflected in the decrease in overall tree numbers that began in 2013. Prior to 2016, this plot appeared to be on the road to recovery. Unfortunately this status abruptly changed. A high percentage of mangrove tree mortality occurred in 2016 (55%), in response to heavy spring precipitation. Hurricane Irma in 2017 further decimated the plot, downgrading its overall condition to very stressed. In 2019, 96% of the trees were stressed or very stressed, and boring beetles took advantage of the trees' infirmity to infiltrate the bark. *Cytospora rhizophorae* also appeared and infected some of the red mangroves (Figure 75). In spite of all these challenges, plot 9 attempted to recover when Hurricane Ian set this plot back again. Storm surge was strong in this area contributing to a sharp decline in propagules. Trees that were already stressed or very stressed trees could not take the additional stress and perished. Debris was scattered throughout the plot and a

Figure 74: Ferns within Plot 9 2021

Figure 75: 2019 *Cytospora rhizophorae* Infection Plot 9.

scale *Paratachardina lobata*, became prevalent infecting trees, and contributing to their mortality (Figure 77). In 2024 plot 9, while still extremely stressed, was once again attempting to recover as propagule recruitment rose slightly. Mangrove forest regeneration and population crashes occurred over the study period in plot 9 (Figure 76). The ultimate fate of this plot is uncertain. Continual stressors, natural and anthropogenic affect the trees in this area.

Figure 76: Plot 9 Propagule and Tree Time Series

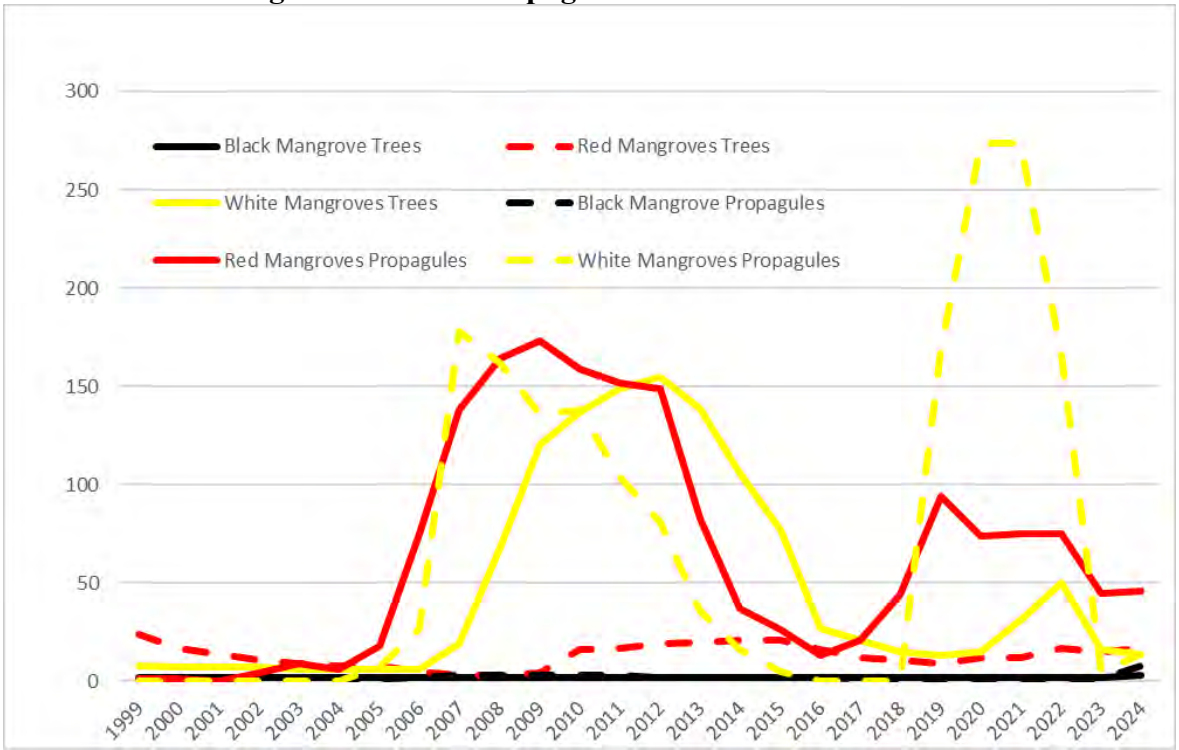


Figure 77: *Paratachardina lobata*

Plot 12 was in a steady state of decline from 1999-2015. Intermittently a few attempts were made to recruit propagules, but these seedlings would subsequently die thereafter. Throughout most of the study, a plethora of freshwater vegetation, primarily ferns and saw palmetto were thriving in this area. In the early years, the County attempted some restoration, but these efforts yielded no significant positive results. The mangroves in this area were headed toward total system collapse, especially when *Cytospora rhizophorae* infected some of the trees. Unless freshwater inflows and other anthropogenic stressors

were alleviated to reverse the immigration of freshwater flora, this area was slowly shifting into a freshwater swamp as the number of mature mangroves continued to die slowly.

However, in 2018, following diversion of some of the freshwater inflow away from this plot and only a glancing blow from Hurricane Irma, this plot began to recover and continued through 2024, despite Hurricane Ian. This recovery is a testament to mangrove resiliency. Recently, there has been an influx of primarily red mangrove propagules (Figure 78). As a result, this plot has been re-classified as relatively healthy. This plot is now slowly phasing out of the initial propagule recruitment phase and entering the tree recruitment phase, as some of the propagules attain the height necessary to reclassify them as trees.

Figure 78: Plot 12 Propagule Recruitment 2022

In 2022, a scale, *Paratachardina lobata*, infested many of the young red mangrove tree stems. This scale is an invasive insect that damages trees; however thus far its effects have been minimal (Figure 74).

Plots 1, 4, 7, and 10, initially classified as relatively healthy, have been downgraded to stressed or even die-off conditions. Weather disturbances over the years had varying degrees of effect on these plots. Plot 1 has deteriorated to the extent that it is classified as a die-off. Plot 4 is slightly stressed. Plot 7 has degraded to the extent that it is classified as a die-off following Hurricane Ian. Plot 10 is classified as stressed due primarily to waterlogging and past hurricane damage. If conditions affecting these plots persist, it is likely that two out of the four of these plots will likely continue deteriorating.

Plot 1 was located within a historic, very old mature black mangrove forest, along with a few white mangrove trees. There has been little change in this area since the 1980's (Addison and Ritchie, 1990). The mature black mangrove trees dominated during the early years of monitoring, outlasting other competitors. Propagule recruitment favored red mangroves in the early years post-restoration, but recruitment was very low, consistent with the maturity of the forest and dense canopy coverage.

Unfortunately, in 2005, Hurricane Wilma devastated Plot 1. A tornado touched down right in the center of the plot causing extensive damage (Figure 79a). Since then, plot 1 faced a myriad of anthropogenic stressors and minimal sustainable mangrove recovery. Stressors include increasing periods of freshwater discharge, which results in water impoundment and longer water retention periods, preventing recovery and causing further die-offs. Once Hurricane Wilma opened up the canopy, there was shift in forest composition. Most of the old growth black mangrove trees died. White and black mangrove seedlings and young white mangrove trees became more dominant. This assemblage persisted over the years until 2016 when all species of trees and seedlings suffered extensive mortality from extensive freshwater impoundment. This plot continues to decline and Hurricanes Irma and Ian added considerable stress to plot 1 (Figures 79b & 79c).

Figure 79: Plot 1

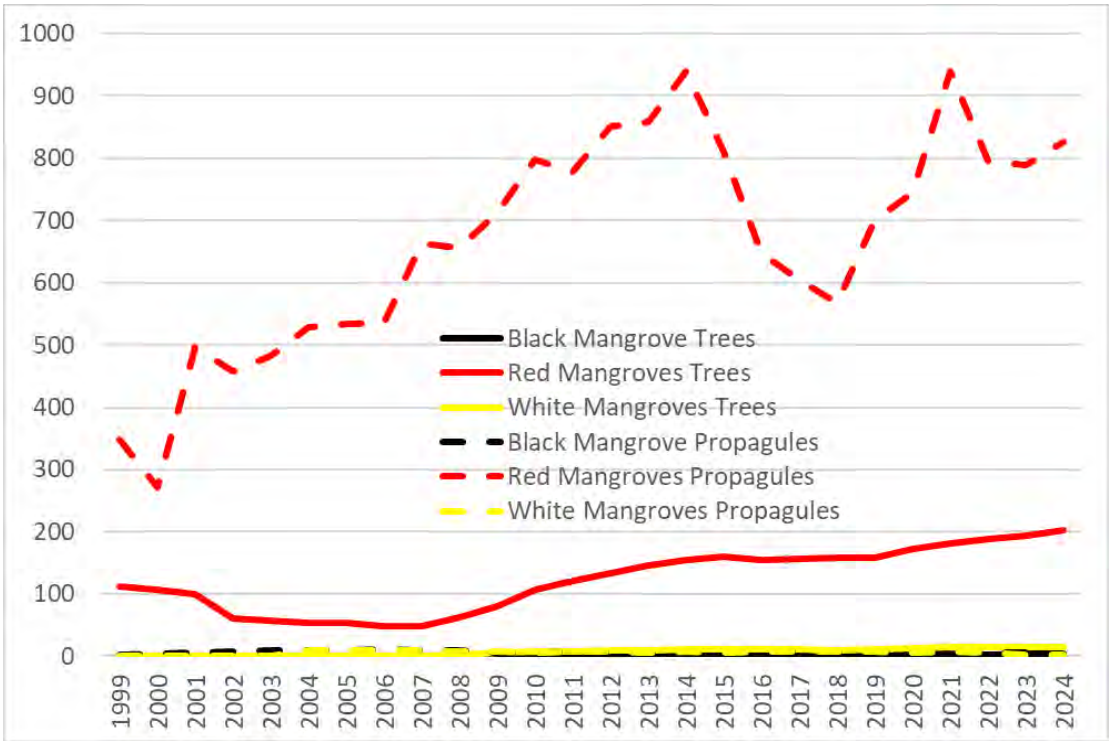
Figure 79a: Post-Hurricane Wilma	Figure 79b: Post-Hurricane Irma	Figure 79cPost-Hurricane Ian
		

Over the study period, plot 1 shifted from a mature black mangrove dominated forest, which showed little variation in overall tree numbers; to a devastated plot in 2006 and 2007. Plot 1 slowly tried to recover through 2015, but was severely hampered by excessive freshwater impoundment in 2016 and Hurricane Irma in 2017, further devastated this area. At this time, plot 1 became very stressed. Hurricane Ian further exacerbated conditions. Plot 1 is in a state of extreme stress (100% of the trees) and its overall health continues to deteriorate. Only one of the original mature black mangrove trees present in 1999 is still alive, albeit slowly dying. The County attempted, without success, to abate inundation by installing a hand-dug channel in this area following Hurricanes Wilma and Irma (Figure 80). Adding to the concerns, *Cytospora rhizophorae* gained a foothold in the area, exacerbating tree health and causing additional mortality. Over the years, tree mortality rates have outstripped recruitment and plot 1 has been re-classified as a die-off area. Unless water levels recede and retention periods decrease, this area is likely headed toward a peat collapse and becoming an extensive mudflat. Recovery is not likely possible without significant rerouting of storm water and investment of significant resources.

Figure 80: Plot 1 Hand-dug Channel

<u>Plot 4</u> is typical of a mangrove forest that fringes a tributary where red mangrove trees and seedlings dominate. Pre-restoration, older relatively healthy red mangrove trees existed with an understory of primarily red mangrove seedlings. Following the initial dredging of the tributary adjacent to this plot, tidal water levels remained within the area for a longer period of time and at deeper depths. This stressed the mangroves and the trees became waterlogged. During the interval between 2001 and 2002, forty out of a hundred red mangrove trees died from a severe infestation of *Cytospora rhizophorae*. This plot began to slowly recover from this fungal infestation and the plot regressed to an earlier stage of maturity. Over time primarily red mangrove propagules became established and slowly became trees (Figure 81).

Figure 81: Plot 4 Propagule and Tree Time Series



Propagule recruitment and mortality rates remain high, due to the high availability of propagules from the adjacent tributary. This plot seems to have difficulty maturing, likely due to increased tidal flow and continual overwash into the area. More frequent and increased tidal flow and water levels seem to undermine some of the mangrove's root systems causing plant instability and sometimes mortality. In 2016, similar to other plots, plot 4 was further stressed by an increase in precipitation and water impoundment, exacerbated by the more frequent and increased tidal flow. However, unlike some of the other areas within the Clam Bay system, this plot rode out Hurricanes Irma and Ian fairly well with minimal tree death.

Figure 82:
Plot 4 Proximity to Tributary 2023 (15") & 2024 (0")

Fringe mangroves along the tributary adjacent to plot 4 continue to fall into the tributary as the bank erodes. After each time the pass and interior tributaries are dredged the tributary flow velocity increases along the bank, causing increased erosion. The width of the tributary adjacent to plot 4 has continued to widen with increasing erosion causing further land subsidence (Figure 82). This cyclic pattern of slow continual erosion, slowly eats away at the bank toward the northeast side of plot 4, resulting in changes in water levels within the plot, and subsequent mangrove response. The accumulated stress from erosion and subsequent increased inundation and

mangrove waterlogging within plot 4 is a problem. The overall condition of plot 4 has vacillated between healthy and relatively stressed overtime. Today, 55% of the trees are stressed or very stressed and the overall status of plot 4 is slightly stressed.

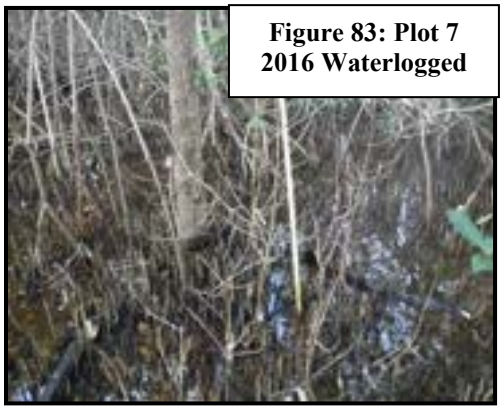
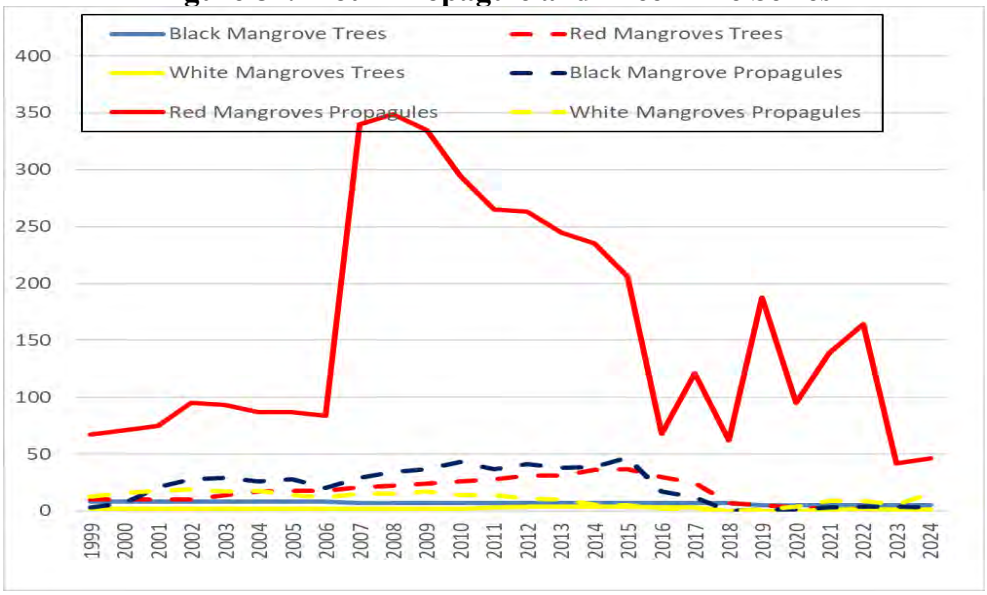


Figure 83: Plot 7 2016 Waterlogged

Pre-restoration **Plot 7** was relatively healthy and consisted of a closed canopy of primarily older black mangroves and red mangrove trees. This mature old growth status remained until Hurricane Wilma opened up the canopy, allowing an influx of young primarily red mangrove seedlings, which slowly grew into trees. In 2016, plot 7, like so many other plots, became waterlogged during the dry season, substantially increasing tree and propagule stress and mortality (Figure 83). In 2017, tree mortality rates temporarily abated, until Hurricane Irma when 60% of the trees died and the remainder were very stressed. Delayed mangrove tree mortality following Hurricane Irma continued to be a factor through 2022.The storm surge from Hurricane Ian exacerbated conditions, as the dune sand was deposited on top of the substrate wiping out most of the propagules and further damaging the few remaining trees. Figure 84 illustrates mangrove forest regeneration and population crashes over the study period.

A mudflat, located just north of plot 7, developed following the initial dieback in 1995. This mudflat is of concern, since it could continue to expand south into this plot (Figure 85). This plot was temporarily reclassified as a die-off area in 2023. Further tree mortality and minimal propagule recruitment occurred in 2024. Until mangrove recovery becomes evident and water inundation abates, this plot will remain categorized as a die-off area (Figure 86).

Figure 84: Plot 7 Propagule and Tree Time Series



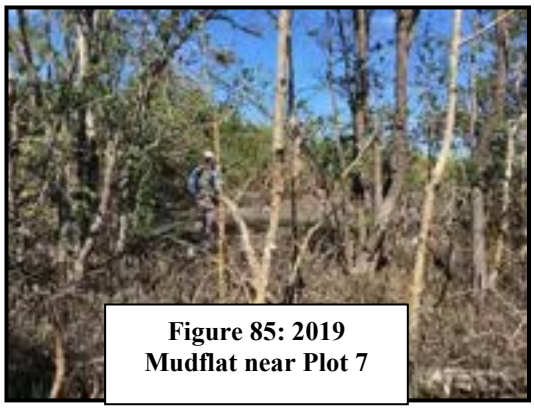


Figure 85: 2019 Mudflat near Plot 7

Figure 86: Plot 7 2022

Pre-restoration **Plot 10** was a relatively healthy mature mangrove forest consisting primarily of red and black mangroves. Throughout the early years of this study, there were more red mangrove trees, but the black mangrove trees covered more basal area. Since that time, several factors have caused this plot to decline. Prior to Hurricane Wilma channels were installed through this plot to drain water out of a die-off area to the west of this plot. During channel installation, mangrove root systems were cut or damaged causing these healthy mangrove trees to become unstable and subsequently fall over and die during Hurricane Wilma. Mangroves of comparable species and age that were located in the same vicinity, but not directly adjacent to the channels and did not have severed roots, easily weathered this storm. Tree mangrove dominance shifted in between the 2008 and 2009 assessments as white mangrove tree recruits outpaced red mangrove tree recruits. This shift is indicative of regression to an earlier stage of development, as younger trees began to take over the area and older trees died out.

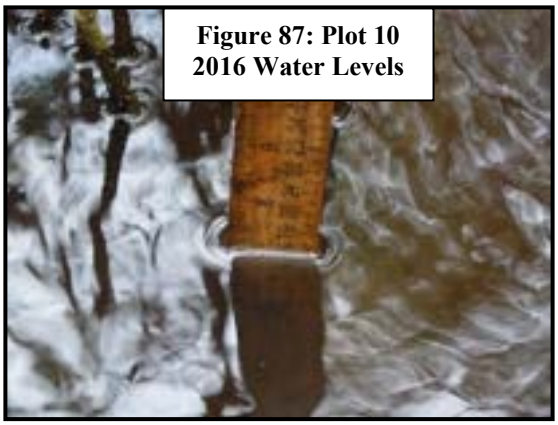


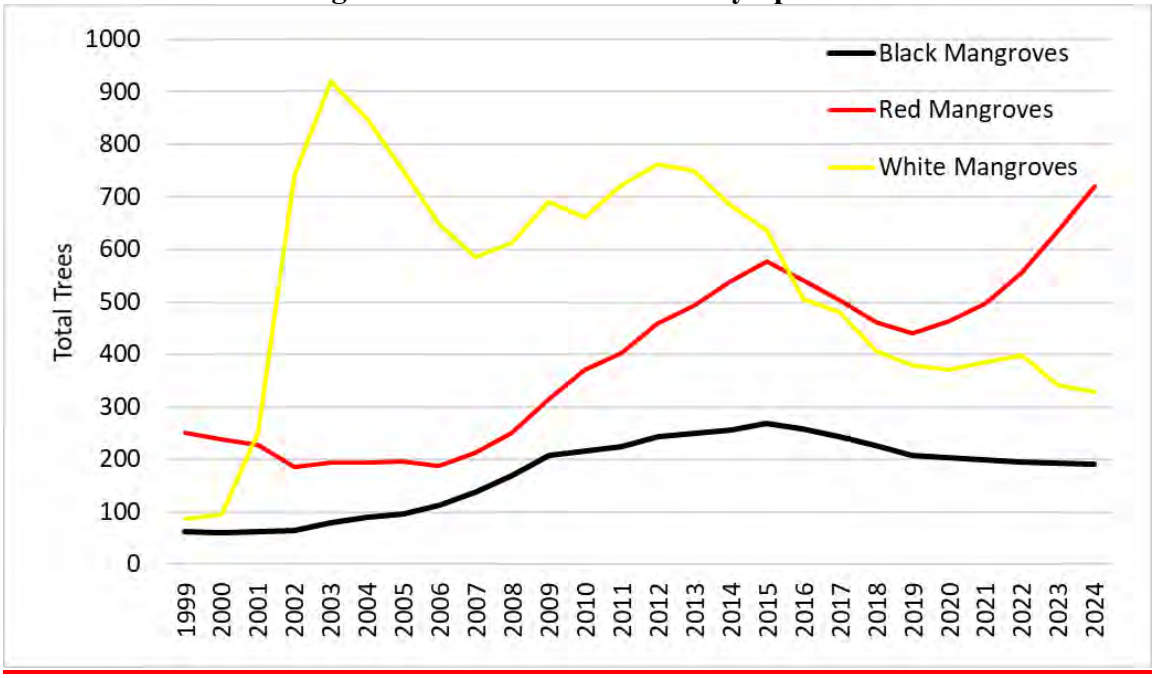
Figure 87: Plot 10 2016 Water Levels

Tree mortality rates were minimal until 2016 when water impoundment caused tree and propagule mortality to almost triple (Figure 87). Following Hurricane Irma, conditions further declined as tree mortality continued to outpace tree recruitment rates and ~19% of the trees died between the 2017 and 2018 assessments. Tree numbers declined through 2020, but remained relatively stable thereafter. Today approximately 71% of the trees remain either stressed or very stressed. Water stress continues to be evident. Black mangrove trees are trying to cope with flooded conditions by altering their pneumatophore architecture, sometimes radically, to attempt to maintain gaseous exchange (Figure 88). This plot is currently classified as stressed.

Figure 88: Extreme Stress Reflected in the Pneumatophores of Plot 10 2019-2024

Overall, the mangrove forest within the Clam Bay system is currently ~56% stressed or very stressed. White trees are trending downward, while red and black trees are trending upward with red trees dominating overall (Figure 89).

Figure 89: All Plots Overtime by Species



Mangroves were not the only species impacted by altered hydrology. Prior to restoration, there was a concurrent reduction in the epifauna. Fiddler crabs, once abundant in the area, fled as the soil became unsuitable due to very low soil redox levels. The die-off caused a cascading effect within the ecosystem as wildlife usage shifted from terrestrial to aquatic. Fish and wading birds immigrated and terrestrial invertebrates, reptiles, mammals and

arboreal birds exited the area. Seventeen years post-restoration, when the original die-offs exhibited signs of recovery and when surface water impoundment was absent, some of the terrestrial epifauna such as fiddler crabs and other wildlife responded to the estuarine improvements and returned.

Leaf Area Index (LAI)

LAI (Leaf Area Index) measurements are frequently used to compare mangrove study sites over time (Pool, 1973). LAI assesses the photosynthetic leaf area, which converts solar energy to chemical energy, and is often inversely related to the age of the mangrove stand. Latitude also influences LAI, with tropical mangrove forests typically having higher values than temperate forests. LAI generally peaks when a mangrove forest is undisturbed for approximately 20 years (Pool, D. J., 1973). However, achieving maximum LAI is rare due to the prevalence of natural events such as hurricanes and human disturbances.

This year, the average LAI measurements were slightly higher compared to the previous years as the forest continued to recover from the impacts of Hurricane Irma and Hurricane Ian. During the dry season, the mean LAI for the study area was 1.21, with values ranging from 0.11 at plot 6 to 2.68 at plot 4 (Table 5).

Photosynthetically Active Radiation (PAR)

PAR is influenced by the arrangement of vegetation in the forest canopy and the sun's position in the sky (Clough, et al. 1997). Consequently, PAR is more challenging to compare over time. Individual instantaneous rates of net canopy photosynthetic production (PAR) in the entire study area varied from 19.79 g C m^-2 leaf h^-1 at plot 8 to 748.11 g C m^-2 leaf h^-1 at plot 1, with a mean of 59.69 g C m^-2 leaf h^-1 (Table 5). Variations in mean LAI and PAR within the Clam Bay system are likely due to differing degrees of hurricane impact and the health of individual plots before and after the storm (Appendix A)

DISCUSSION

Mangrove die-offs are often the result of rapid environmental alterations (Jimenez and Lugo, 1985). The primary cause of black mangrove die-offs adjacent to development is usually altered hydrology. Normal hydrologic flow is altered when development and roads are built next to or bisect mangrove forests. Stormwater is diverted and runoff is shunted directly or indirectly into the mangroves. Construction of roads or buildings adjacent to estuarine areas can act like a dam interrupting the natural tidal cycle by preventing or impeding tidal waters from entering and exiting the adjacent mangrove area (Menon, et. al., 2000). Roadways directly affect the landscape by changing the adjacent slope resulting in an alteration of the timing and volume of surface water flow (Trombulak and Frissell, 2000). Furthermore, soil compaction during building can prevent aboveground and belowground tidal sheetflow of water into and out of mangrove estuaries. Since roads and buildings are typically built at higher elevations than the surrounding mangroves, precipitation and stormwater runoff tends to drain into the mangroves. This stormwater

becomes impounded, contributing to higher floodwaters and longer water retention times (i.e., extended hydroperiods) within the mangroves. Extended hydroperiod in combination with high levels of surface water often leads to ponding. If surface waters are deep enough to cause pneumatophore submersion for an extended period of time, black mangrove die-offs result.

Ideally, forest development has four stages: colonization, early development, maturation and senescence. For the last two decades, Clam Bay has experienced multiple stressors, both anthropogenic and natural, which have interrupted or setback forest development and maturity. Typically, an inverse relationship develops between percent cover and the number of established trees and propagules overtime. As the canopy fills in, cover increases and the number of propagules that successfully establish themselves decreases. The larger and older trees tend to outcompete younger trees as the forest matures and the increased canopy cover keeps the number of propagules to a minimum due to shading. Senescence and subsequent forest succession are rarely reached in mangrove forests due to external forces such as hurricanes, which regulate the forest into an earlier stage of development (Jimenez and Lugo, 1985).

Initially plots 2, 3 and 11 positively responded to hydrologic restoration initiatives that occurred in 2000. Plot 3 serves as an example. Restoration activities re-established tidal flushing, alleviating water impoundment within the plot. As the plot dried out, the die-off became naturally seeded with primarily white mangrove propagules. White mangroves often serve as a pioneer species. As such, white mangroves have a tendency to be the first mangrove species recruited, since they have an affinity for disturbed open areas, like the drained tidally flushed landscape that was present post-restoration. White mangroves typically grow rapidly, investing the majority of their energy in gaining height quickly. Therefore, within a short expanse of time, a multitude of white mangrove seedlings attained tree height in plot 3. The presence of so many thin white mangroves within a small area naturally caused competition for space and resources. The taller and healthier white mangroves quickly outcompeted their siblings, triggering a decrease in recruitment rates and an increase in mortality rates. Healthier and more robust trees gradually dominated the plot as they edged out the competition. As early as 2003, plot 3 began to show early signs of “succession” as red mangrove seedlings became the dominant propagule species recruited. In contrast to white mangroves, red mangroves have a different development strategy. They grow much slower, initially investing their energy into developing root systems. Once established red mangroves, develop thicker stems and eventually achieve a bush-like appearance as saplings, before slowly maturing into trees. In 2014, red mangrove trees outcompeted the white mangrove trees becoming the dominant tree species within plot 3. At the same time, some black mangrove seedlings had matured to the extent that they also outcompeted the white trees. Similar to red mangroves, black mangroves also develop slowly. These mangroves first concentrate their energy on developing a rather extensive underground and aboveground root system. In 2014, this plot seemed to be on the path of transforming into a mature mangrove forest, similar to the forest structure that was present prior to the 1995 die-off. Up until 2016, plot 3 served as an excellent example of how a mangrove foresee can become established in die-off areas, if the conditions are right.

In 2016, following a higher than normal rainfall in the dry season, water became impounded again, negatively impacting the mangrove forest Higher water levels and longer water retention periods caused mangrove mortality and Hurricane Irma in 2017 further slowed subsequent recovery. Today the plot, and many of the other plots, are slowly attempting to recover. Plot 3 is an example of what occurred throughout parts of the forest that suffered from the 1995 mangrove die-offs in Clam Bay, the 2016 precipitation event, and several storms. Only time will tell how the forest will respond. The increased freshwater discharge from development, repeated storm impacts, and sea level rise present difficult challenges to overcome in mangrove systems.

Many factors influence the health of the mangrove system. Factors such as storms, natural mortality, biotic factors, inundation and waterlogging can affect the state of the mangrove forests.

Storms

The 2023 storm season, was much quieter in comparison to the 2022 storm season in southwest Florida. However, there were a few events, which did cause sporadic localized flooding in the mangroves, including Tropical Storm Idalia in August of 2023. The storm later developed into Hurricane Idalia, a Category 3 hurricane, which made landfall in the Big Bend region of Florida with significant winds and storm surge. Tropical Storm Idalia was not very intense in Clam Bay. However, it did slow down forest recovery from Hurricane Ian in some mangrove areas closest to the Gulf of Mexico. This report also covers the period sixteen months post Hurricane Ian, a Category 4 hurricane that made landfall at Cayo Costa, on the southwest coast of Florida on September 28, 2022. Cayo Costa is approximately 40 miles away as the crow flies from Clam Bay. Hurricane Ian had a significant storm surge, ranging from 6-10 ft., that over washed the entire Clam Bay mangrove system and flooded the Pelican Bay development. The mangroves slowed down the surge significantly and dropped the water level an estimated 2 feet saving much of the residential area adjacent to the mangrove forest from more extensive damage. The mangroves were still standing for the most part, but there was significant coastal damage to the dune systems and the mangrove forested areas situated in closer to the Gulf.

Over the years, from February 1999 through February 2024, several severe weather events have impacted the Clam Bay estuary including:

- Hurricane Wilma (fall 2005)
- Tropical Storm Fay (summer 2008)
- An extended cold snap (winter 2008 & 2010)
- Tropical Storm Debbie (summer 2012)
- A heavier than average rainfall during the dry season (winter 2016)
- Hurricane Irma (summer 2017)
- A Meteotsunami, a wind storm, in December of 2018
- Tropical Storm Eta (fall 2020)
- Hurricane Ian (September 2022)
- Tropical Storm Idalia (August 2023)

Meteorological and physical conditions within the site can influence the extent of hurricane damage within a forest and its subsequent recovery response. These conditions include factors such as:

- Storm intensity
- Topography
- Soil characteristics
- Wind direction
- Storm surge

The extent and types of damage were variable throughout the Clam Bay estuary, even from the same storm, since storm dynamics and in situ conditions vary, even in areas of close proximity. For example, Hurricanes Wilma, Irma, and Ian all impacted Clam Bay to some degree. The mangrove trees in plot 1 were decimated during Hurricane Wilma, continued to decline thereafter, and suffered additional decline following Hurricanes Irma and Ian. Whereas plots 5 and 6 survived relatively unscathed from all three storms.

Mangrove susceptibility to hurricane-induced mortality can be species-specific (Sherman and Fahey, 2001). Alternatively, stand level structural complexity, relating to site-specific factors can influence a forests susceptibility to hurricane damage. Factors such as:

- Forest age
- Height
- Health
- Soil conditions

In Florida, younger, suppler, and shorter trees are often better able to withstand sustained hurricane winds and thus suffer less mortality than older more mature mangrove stands (Baldwin, et. al., 2001, Smith and Robblee, 1994). Hurricane Wilma was a wind storm, with very minimal storm surge. Larger more mature trees in plots 1, 7, 8, 9, 10 and 12 were more impacted by Hurricane Wilma than the younger trees in plots 2, 3, 4, 5, 6, and 11. Following Hurricane Irma, more widespread effects were felt throughout the Clam Bay system, even though this storm was not as strong in this area of Collier County in comparison to Hurricane Wilma. The effects were worse since the mangrove forest was in a more stressed condition prior to Hurricane Irma, than forest conditions prior to Hurricane Wilma. Plots 7, 9, 10 and 8, which still had older trees standing prior to Hurricane Irma, were heavily impacted. In many cases, Hurricane Irma delivered the coup de grâce to many areas within the forest. Alternatively, when storms produce heavy storm surge and wave action, mangroves situated closest to the surge are usually more impacted than the inland forested areas. These types of storms tend to deposit extensive quantities of sand from the beach and dune systems into the adjacent mangroves. This happened in plot 7 during Hurricane Ian and resulted in many mangrove seedlings smothered by sand. Only 4 years had passed since Hurricane Irma when Hurricane Ian hit this area, which is not enough time for forest recovery.

Differences in mangrove mortality patterns likely indicate that both initial and delayed tree mortality from hurricanes is complex. Mortality patterns are based on a variety of factors including:

- Local stand characteristics
- Physical site parameters
- Individual storm characteristics
- Degree of natural and anthropogenic stressors present that influence forest health.

Tree mortality is not always instantaneous. Often the bulk of tree mortality following severe storms is delayed. In 1996, Everham and Brokaw estimated that it could take five years for mortality rates to return to base-line conditions following a severe storm. However, we have documented storm related effects from Hurricane Wilma causing "delayed" mortality well beyond their 5-year estimate. As of 2024, there is still one mangrove living that was severely damaged by Hurricane Wilma in 2005 and is still slowly dying. It is likely that delayed mortality following Hurricane Irma and Ian will cause further loss of trees in the future within the Clam Bay mangrove forest. This year, eight trees died as a direct result of delayed mortality from hurricanes consisting of one tree from plots 7 and 11; two trees from plot 8 and four trees from plot 6. Delayed mortality from hurricanes also contributed to the death of 12 additional trees along with another factor(s), one tree from plots 2, 4, 5, 10, 11; three trees from plot 1; and four trees from plot 9 (Table 6). It is expected that the combination of Hurricanes Irma, Ian, and others will likely be responsible either solely or in combination with another factor for more tree mortality in the future. Given the poor condition of some of the plots, recovery will likely be delayed or even difficult without intervention.

Mangrove forest recovery following a storm often depends on:

- The severity of the storm
- The health of the trees
- The frequency between storm events
- Localized resource availability

Recovery could favor regrowth (resprouting), recruitment (new seedlings), release (rapid growth of the subcanopy), repression (secondary succession) or a combination of these mechanisms. Less severe hurricanes, such as a Category 1 storm, result in defoliation, whereas severe hurricanes, like Category 4 and 5 storms tend to produce gaps in forest structure. Recovery from a severe hurricane can take several decades and begins with recruited seedlings, becoming trees and reforming the canopy overtime.

Propagule recruitment will generally increase when storms or other circumstances cause a reduction in the canopy cover. Gaps in the canopy were created in areas where trees were knocked down or leaves were stripped from the mangrove branches during storms. In many

cases, storms can cause the forest to revert to an earlier stage of development. Hurricanes can also influence biotic factors (Everham and Brokaw, 1996) such as:

- Stem size (unimodal relationship)
- Species composition (different species are more susceptible to severe storms and have varying degrees of resprouting responses)
- Canopy structure (related to crown shape and tree geometry)
- Maturity (younger age classes generally fair better)
- Presence or absence of pathogens (disease increases the trees susceptibility to damage and insect infestations).

Following each storm there was usually a subsequent rise in mangrove seedling recruitment. Five years post-hurricane Irma, during the 2023 assessment, those areas stressed prior to the storm were still very stressed. Hurricane Ian was not as impactful to the forest overall since this hurricane produced a strong storm surge, but less of a wind field in the Clam Bay area than Hurricanes Wilma and Irma. How Clam Bay responds in the long-term is very uncertain due to the variety of anthropogenic and natural stressors that continue to impact this forest. It will be interesting to see how the 2024 summer storm season affects the forest in the upcoming 2025 Clam Bay assessment

Natural Mortality

Natural mortality is a process associated with normal interactions between individual trees independent of changes within the physical environment. Natural mortality is primarily density dependent, dictated by stand maturation and usually occurs in the smaller diameter class sizes. This type of mortality is primarily a result of inter or intraspecific competition, herbivory, endemic diseases or senescence (Jimenez and Lugo, 1985). Mortality within younger age class trees is primarily due to intra and interspecific competition, a natural occurrence as the forest matures. This occurs as the taller and heartier trees outcompete the smaller trees as the canopy forms overtime. Following initial colonization, mangroves exhibit species-specific growth responses to site conditions. They compete for light, nutrients and space. In dense stands, density-dependent mortality will occur, as larger diameter healthy trees will generally outcompete smaller diameter trees. This type of intra and interspecies competition was evident in many of the plots within Clam Bay throughout the course of this study, primarily within the original die-off plots as they attempted to recover overtime. In 2024, competition was not solely responsible for the deaths of any trees. However, competition played a role in the mortality of five trees, one tree in each of plots 2, 3. 4, 5, and 11 (Table 6).

Biotic Factors

Mangrove die-offs are not normally the result of disease or other biotic factors. Instead, these factors preferentially attack forests weakened by changes in the physical environment. Disease and infestations tend to occur in mangrove areas that are stressed, allowing the disease or infecting agent to gain a foothold (Jimenez and Lugo, 1985).

Cytospora rhizophorae is a classic example of a biotic factor that can stress or even cause death to red mangroves in particular, with a mortality rate of ~32% within an infected area

of mangrove forest (Weir, et. al., 2000). *Cytospora rhizophorae* spores enter trees through damaged roots or branches and are often associated with cankers that weaken trees (Tattar, et. al., 1994). Plot 4 was particularly susceptible to *Cytospora rhizophorae*, as these red mangrove trees were stressed from continual inundation prior to the infestation. *Cytospora rhizophorae* caused 40 of the 100 trees in this plot to die between the 2001 and 2002 assessments, a higher percentage (40%) than described in the literature. This particular outbreak lasted ~5 years and forest recovery of those trees that survived has been slow. Plot 4 is currently still recruiting mangrove trees to replace the ones that succumbed to this disease. Unfortunately, there was a re-emergence of this fungus in 2020 that contributed to the death of another red mangrove in plot 4, which thankfully did not spread to other trees in the plot. Over the years, this fungal disease was found in other areas within the Clam Bay system including plots 1, 2, 7, 8, 9, 10, 11, and 12. The plots that are currently showing symptoms, are stressed. *Cytospora rhizophorae* did not contribute to the death of any mangroves in 2024, but was observed in plot 9 and outside of plot 12.

In 2022, a scale, *Paratachardina lobata*, had infested many of the young red mangrove tree stems in plot 12, although it was not directly responsible for any tree deaths it does weaken the trees immune system. This insect is an invasive species native to India and Sri Lanka. *Paratachardina lobata* tends to cluster on woody stems, forming bumps or blackened areas when their numbers soar. The scales suction sap from the host plant and secrete the excess fluid that can cover woody stems and foliage. The scale causes stunted growth and die-back of the stems stressing the plant, sometimes causing death. A severe infestation of *Paratachardina lobata* occurred in plot 9. The infestation was so severe in small young trees with minimal girths that the insects girdled the trunks, killing 20 trees in 2023. *Paratachardina lobata* spreads during their nymph stage much like plant pollination, via the wind or hitching a ride on animals. As an adult they remain on the host they land on. Unfortunately, these pests have no natural enemies to check their populations in Florida (Howard, et al., 2002). In 2024, one tree in plot 11 died directly from this infestation and in plot 9 three tree died as a result of *Paratachardina lobate* and other factor (Table 6).

Cold snaps often weaken mangrove trees. Diseases and insects take advantage of the tree's infirmity and lower resistance to infection and infestation. Sections of the Clam Bay system were very stressed from cold snaps that occurred in the winters of 2008 and 2010. These areas subsequently became infested with wood boring beetles (xylovores). Under healthy conditions, wood borers that feed on living wood tend to attack living twigs or branches and the loss of these branches is usually and was recoverable. These beetle infestations become problematic if infected rates rise substantially and can contribute to an increase in tree mortality. Severe infestations are more likely to develop in trees that are stressed, sometimes to the extent that the trees become girdled and die. Chronic and acute infestations could have major negative consequences on the mangrove trees growth and reproduction (Feller, 2002).

Inundation and Waterlogging

Mortality caused by inundation is of primary concern in the Clam Bay mangrove system, given its history of die-backs caused from water impoundment and lack of tidal flushing. Anthropogenic hydrologic changes, exacerbated by periods of heavier than normal rainfall in 1992 and 1995, triggered the forest to collapse in some areas of the Clam Bay system after being stressed for decades (Figure 4). In the fall of 2015, system wide signs of stress

to the forest from waterlogging were once again apparent. External stressors, exacerbated by higher than normal precipitation in the winter of 2016, led to multiple regions within the mangrove forest being impounded with standing water, resulting in renewed diebacks. Longer water retention periods and deeper water levels places additional stress on the ecosystem. Inundation continued in 2017 and 2018 and to a lesser extent from 2019 to 2024. As a result, the forest declined, particularly in areas of lower topography. In 2024, twelve trees died as a result of waterlogging (four trees in each of plots 1 and 2 and one tree in each of plots 3, 8, 10, and plot 11). Eight trees died due to complications arising from waterlogging and other factors (three trees in plot 1, two trees in plot 2, and one tree in plots 3, 9, and 11) (Table 6).

Other Concerns

Accretion and erosion are natural processes within mangrove forests. However, erosion appears to be accelerating faster than natural in some of the fringe mangrove areas bordering the tributaries. The accelerated erosion rates appear to correspond to the increased tidal flow velocity from anthropogenic dredging activities and the installation of numerous channels throughout the system. Natural accretion rates cannot keep up with the added anthropogenically caused erosion rates in addition to the natural erosion. In 2024, bank erosion resulted in the death of two trees one in each of plots 4 and plot 6 (Table 6). It is anticipated, given the current rate of bank erosion adjacent to plot 4, will cause the death of more mangroves in the future in part due to increased tidal flushing from dredging events.

Forest Longevity

Mangroves are vital to Florida's future. These forests have proven there worth ecologically and economically. They are hotspots of biodiversity. Mangroves support local food webs, provide nurseries for commercial and recreational fisheries, provide habitat and shelter for a variety of organisms, and serve as an indicator of overall estuarine health (Johansson and Greening, 2000). These amazing forests are the economic foundation in coastal regions in the tropics and are necessary to maintain the quality of life for man and nature (Ashraf and Habjoka, 2013), yet their future is uncertain both here in Collier County, Florida and worldwide.

The myriad of factors and processes that shape mangrove forests is very complex. Our understanding of these amazing trees has risen over the last 25 years, but it is largely incomplete. Monitoring the system is essential to adaptively managing mangrove forests. It is to our benefit to continue to learn the science of how mangrove systems operate to be able to more accurately predict their long-term viability and their ability to buffer us in the future from severe climate related events. The future status of mangrove systems is very precarious and will largely depend on the health of these forests prior to a storm and their ability to rebound prior to another severe weather event. Outcomes will also depend on their ability locally to keep pace with sea level rise through sediment accretion. Northern and inland migration of mangroves into adjacent wetland communities has occurred in Florida since the 1950's in response to sea-level rise over those decades (IPCC, 2014). However, the mangroves adjacent to Pelican Bay do not have that option.

Mangrove trees often live for hundreds of years, yet it is evident that in this short period of annual monitoring, many changes, (both favorable and unfavorable), have occurred within the Clam Bay estuary. Favorable changes included initial revegetation of the die-off areas, reduction of impounded water, and return of tidal flushing in the northern terminus of the system. Unfavorable changes included:

- Increased tidal surge from dredging
- Tree stress and mortality
- Erosion of tributary banks
- Constructed channel expansion and subsequent increased bank erosion
- Increased water retention in 2016 and subsequent water impoundment
- Forest waterlogging
- Disease
- Invasion of freshwater and exotic plants
- Influx of new exotic species such as *Perna viridis*, (green mussels) and *Paratachardina lobate,* (scales).

Mangroves are inherently resilient. These trees are adapted to deal with adverse natural conditions. They are able to survive in saline and low oxygen environments, and they often take the brunt of storm effects. During the course of this project, from 1999 - 2024, the Clam Bay mangrove system has weathered natural events such as drought, frosts, extended periods of extreme heat and cold, tropical storms, above average rainfall, Hurricanes Wilma, Irma, Ian and even a meteotsunami. In Florida, mangrove loss due to extreme climatic events is becoming more common. The ability of these mangroves to recover after a storm in the future is questionable. If there is no longer enough time for these forests to recover in between storm events, the outcome becomes bleaker (Feller, et al., 2015). Recovery takes time. Mangrove forests are also facing the likelihood of reduced resiliency due to sea level rise (IPCC, 2001), in concert with increased storminess, their overall ability to rebound from stressors is lessened.

Over twenty-five years ago, anthropogenic factors triggered a sequence of events that caused the die-off and required anthropogenic intervention to mitigate these past mistakes. Prior to intervention, the die-off area was slowly expanding. The mature mangroves in plots 2, 3 and 11 could not tolerate the altered inundation patterns caused by development adjacent to the forest that resulted in extended hydroperiods and flood levels (Worley, 2006). The restoration that took place from 1999 to 2000, alleviated the altered hydrology and re-established tidal flushing, enabling forest recovery. Unfortunately, in 2016, higher than normal rainfall caused a reoccurrence of extended periods of inundation, in areas of lower topography, causing multiple die-backs and stress within the system. Regrettably, the setbacks that occurred in 2016 were followed by coup d'état by Hurricane Irma in the fall of 2017 and to a lesser extent Hurricane Ian in 2022. As such, the long-term prognosis for this area is uncertain. Whether or not deteriorating conditions are due to anthropogenic incursions, natural occurrences, the restoration project, or a combination thereof is debatable. The original anthropogenic stressors to the system were never thoroughly addressed. Some of the water impoundment issues within the original mangrove die-off areas were mitigated by "draining the swamp" or moving the problem downstream. The primary source of the hydrologic problems from the adjacent development and nearby communities were never fully addressed. There is still too much water being impounded

in the lower elevations within the forest. If solutions are initiated that alleviate both current stressors and the original source(s) of that stress, there could be improved results. The ability of mangroves to bounce back from the brink of annihilation is phenomenal. Given the chance and the right set of conditions, this system could rebound.

To reverse a mangrove die-off, it is necessary to diagnose the original causes(s) and remove and/or alleviate those stressors. There needs to be reciprocal sediment accretion and rebirth within the mangrove system; water impoundment must be attenuated; tidal flushing must be present; and erosion must be minimized. To return deteriorating mangrove systems to healthy forests, the system has to be able to withstand various stressors, and the Clam Bay system is no exception.

CONCLUDING REMARKS

Mangrove ecosystems are one of the most threatened ecosystems worldwide, yet these magnificent forests are also among the most valuable ecosystems, worth an estimated 1.6 billion dollars/year in revenue (Polidoro, et al., 2010). In Florida, mangrove estuaries play a major role in attracting tourists, the backbone of our economy, and provide food stock by suppling safe havens for ~75% of gamefish and 90% of south Florida's commercially caught fish and prawns to utilize at some stage in their lives (Law and Pyrell, 2012; Myers, 2003; Mesbahi and Pain, 2005).

The Clam Bay system is a remnant of what once was a large mangrove system, cut off by development. Additional stress levied upon the Clam Bay system, primarily due to concurrent hydrologic, topographic and other anthropogenic alterations, specifically isolation from surrounding development and roadways, have caused mangrove die-offs to expand and appear periodically within the forest. The lower topography and coastal positioning of the Clam Bay forest also make it particularly vulnerable to sea level rise. Impacts could be significant, since a majority of this forest is a basin mangrove system, naturally lower in elevation. Whether a mangrove forest can survive sea level rise primarily hinges upon the forest's ability to gain and maintain soil elevation, at least equal to, but preferably at a higher rate than the rising seas. Historically, soil accretion rates have for the most part kept pace with sea level rise (Parkinson et al., 2017). However, since sea-level rise is very likely to continue accelerating, the fate of mangrove systems, including the Clam Bay mangrove forest, is uncertain. In 2016, we saw an indication of how the Clam Bay mangrove system handles higher levels of water and the results were not encouraging.

There are contrary opinions on whether or not mangrove forests can survive this onslaught. Some scientists are convinced that mangroves will not keep pace with future sea level rise (DeLaune et al., 1994; Kirwan and Temmerman, 2009; Jarvis, 2010; Kearney and Turner, 2016; Meeder and Parkinson, 2018), while others believe these opinions are overblown (Kirwan and Megonigal, 2013; and Kirwan et al., 2016). Other scientists hedge their bets by suggesting that mangroves should be able to maintain pace with sea level rise until 2055 in fringe forests and until 2070 in basin forests, provided their landward migration is not impeded by areas of steep topography or hardened structures such as sea walls, levees, dams, houses and businesses (Oppenheimer, 2019). Regardless, in terms of the Clam Bay mangroves, unless soil accretion rates keep pace with rising sea levels and outpace erosion;

freshwater runoff is decreased; water impoundment alleviated; and unless the trees and the ecosystem are healthy, eventually this mangrove system will not survive long-term. Unfortunately, there is no room for Clam Bay's mangroves to move inland as the seas rise. They are boxed in by development (coastal squeeze). Therefore, unless the forests can keep pace with sea level rise, their mortality is certain.

Climate change has the potential to alter the structure, condition and even location of mangroves worldwide. Sea level rise and the predicted increase in intensity and frequency of storms could be very problematic for mangrove forests, since they form the front line and meet these challenges head on. Worldwide the future survival will vary depending on factors unique to forest location (Oppenheimer, 2019). Investigations are necessary to determine probable responses to sea level rise, along with devising solutions that will hopefully enable the Clam Bay system to survive long-term. In 2019, the Conservancy established two sediment elevation tables (SET's) adjacent to plots 2 and 4. These instruments can assess changes in land elevation overtime, thereby allowing sea level rise to be measured in conjunction with mangrove response. However, this method requires many years to evaluate and unless we know what the probable outcomes are, it will be difficult to devise methods to abate what potentially could be disastrous effects to our coastline. Nature-based solutions in response to sea level rise will likely prove an important tool in mitigating the inland extent of sea level rise at the local level.

Unfortunately, human activities and development in particular, have fragmented and stressed mangrove forests. The forests are fragments of their former glory, isolated and restricted in their ability to migrate and respond to changing local conditions brought about by changes in hydrology. These challenges result in a cascading effect where mangrove systems, not only lose their ability to adapt to climate-induced changes, but lessen their ability to be effective at forming protective barriers to inland communities from storm surge, along with decreasing their ability to provide ecosystem services. If mangrove systems are healthy, they have generally been able to accrete enough sediment to keep up with sea level rise, at least up to the present day. The effect of increased intensity and frequency of storms is another unknown factor in a mangrove forests ability to adapt to shortened recovery periods in between storm events. Regardless, the importance of restoring these trees to a healthy state cannot be understated to protect coastal assets.

The summer of 2024, a few months after this year's mangrove assessment, was very challenging for coastal systems and the Clam Bay system was no exception. Multiple washovers occurred from storm surge that flooded parts of Clam Bay during Tropical Storm Debbie in August, high high tide effects from Hurricane Francine and Hurricane Helene in September, and lastly Hurricane Milton in October 2024. The storm surge from Hurricane Milton was particularly intense as dune systems, which were recently rebuilt, were pushed into the mangroves behind the dunes. The impacts from these events are suspected to have set back recovery from past storms and caused additional damage along the coast. The next years monitoring assessment in February of 2025 will be very telling to the forest's recovery following these events. The frequency between storm events in the last 4 years, while not statistically relevant enough to state that storms have increased in frequency in the long term, in the short term these events while devastating also provide valuable data on mangrove recovery if storms were to increase in the long-term from climate change.

POSTSCRIPT

In 2022, the International Union for Conservation of Nature (IUCN) stated, "*Mangrove forests have been increasingly recognized as critical coastal ecosystems and are proven nature-based solutions to a changing climate"*. Unfortunately, the future of mangrove forests, including the Clam Bay mangrove system is uncertain. Worldwide and locally, anthropogenic and natural factors combined continue to add stress or even erase these forests or parts of the forests from existence.

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ADDENDUM

In 2022, the Conservancy's science team teamed up with Dr. Joseph Smoak and his graduate team from the University of South Florida to investigate the long-term sustainability of the Clam Bay mangrove ecosystem in the face of rising sea levels and the capacity of the soil to accumulate carbon and nutrients. Soil cores were collected, on July 28, 2022, in proximity to our two existing Sediment Elevation Tables (SETs) near mangrove plots 2 and 4. The cores were transported to the University of South Florida to discern nitrogen and inorganic carbon content, along with carbon dating, mass and depths for each age interval, which will be used to calculate mass accumulation and accretion rates. To date cores have been sectioned and the carbon dating and nutrient laboratory analysis has been recently completed. Data analysis was unfortunately delayed and is now expected to be completed in summer of 2025. Once the results are in, they will hopefully provide answers to some of the questions regarding the future of the Clam Bay mangrove system.

Table 1: Mangrove Floristic Characteristics

1999

Plot	% Canopy	Tree Numbers				Average DBH (cm)				Total Basal Area (m^2)				Average Basal Area (m^2)			
		B	R	W	Total	B	R	W	Total	B	R	W	Total	B	R	W	Total
1	87.30	13	0	8	21	15.73	0.00	2.23	10.58	0.313	0.000	0.003	0.316	2.40E-02	0.00E+00	4.36E-04	1.50E-02
2	14.30	1	0	6	7	19.50	0.00	1.83	4.36	0.032	0.000	0.000	0.032	2.99E-02	0.00E+00	2.97E-04	4.52E-03
3	0.00	0	2	3	5	0.00	2.85	0.80	1.62	0.000	0.001	0.000	0.001	0.00E+00	6.40E-04	6.02E-05	2.92E-04
4	87.80	1	112	0	113	10.40	5.29	0.00	5.33	0.276	0.271	0.000	0.279	8.50E-03	2.42E-03	0.00E+00	2.47E-03
5	46.90	15	6	38	59	9.38	1.02	4.55	5.42	0.146	0.001	0.104	0.261	1.06E-02	8.76E-05	2.68E-03	4.43E-03
6	4.00	8	2	3	13	3.44	2.55	3.23	3.25	0.014	0.002	0.000	0.016	1.20E-03	8.41E-04	1.54E-03	1.22E-03
7	77.60	8	10	2	20	23.76	3.08	5.25	11.57	0.423	0.011	0.008	0.442	5.31E-02	1.12E-03	2.94E-03	2.21E-02
8	98.00	4	31	0	35	42.55	5.68	0.00	9.90	0.821	0.100	0.000	0.921	2.05E-01	3.22E-03	0.00E+00	2.63E-02
9	89.80	2	24	8	34	57.35	4.88	6.18	8.27	0.660	0.110	0.032	0.802	3.30E-01	4.58E-03	4.02E-03	2.36E-02
10	83.70	9	19	2	30	14.33	6.97	0.80	8.76	0.151	0.076	0.003	0.230	1.71E-02	4.00E-03	6.99E-05	7.68E-03
11	0.00	0	1	0	1	0.00	17.00	0.00	17.00	0.000	0.023	0.000	0.023	0.00E+00	2.27E-02	0.00E+00	2.27E-02
12	91.80	1	44	16	61	22.00	5.79	14.20	8.26	0.026	0.125	0.294	0.455	3.80E-02	2.85E-03	1.82E-02	7.46E-03
Total		62	251	86	399	18.24	4.59	3.26	7.86	2.606	0.719	0.453	3.778	4.22E-02	2.87E-03	5.14E-03	9.47E-03

1999

Plot	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
	B	R	W	Total	B	R	W	Total	B	R	W	Total	B	R	W	Total
1	61.90	0.00	38.10	5.26	0.11	0.00	0.07	0.18	98.90	0.00	1.10	8.36	2.76E-03	0.00E+00	3.09E-05	2.79E-03

	14.2		85.7		0.00	0.00	0.05	0.06	94.3							
2	9	0.00	1	1.75	9	0	3	2	7	0.00	5.63	0.84	2.64E-04	0.00E+00	1.58E-05	2.80E-04
			60.0		0.00	0.01	0.02	0.04			12.3					
3	0.00	40.00	0	1.25	0	8	7	4	0.00	87.63	7	0.04	0.00E+00	1.13E-05	1.60E-06	1.29E-05
				28.3	0.00	0.99	0.00	0.99								
4	0.88	99.12	0.00	2	9	0	0	9	3.04	96.96	0.00	7.39	7.51E-05	2.39E-03	0.00E+00	2.47E-03
	25.4		64.4	14.7	0.13	0.05	0.33	0.52	60.8		38.9					
5	2	10.17	1	9	3	3	6	2	3	0.20	7	6.92	1.41E-03	4.65E-06	9.01E-04	2.31E-03
	61.5		23.0		0.07	0.01	0.02	0.11	60.2		29.1					
6	4	15.38	8	3.26	1	8	7	5	9	10.61	0	0.42	8.45E-05	1.49E-05	4.08E-05	1.40E-04
	40.0		10.0		0.07	0.08	0.01	0.17	96.1							
7	0	50.00	0	5.01	1	8	8	7	2	2.54	1.33	11.70	3.76E-03	9.94E-05	5.21E-05	3.91E-03
	11.4				0.03	0.27	0.00	0.30	89.1							
8	3	88.57	0.00	8.77	5	4	0	9	7	10.83	0.00	24.36	7.26E-03	8.82E-04	0.00E+00	8.14E-03
			23.5		0.01	0.21	0.07	0.30	82.2							
9	5.88	70.59	3	8.52	8	2	1	1	7	13.72	4.01	21.22	5.83E-03	9.72E-04	2.85E-04	7.09E-03
	30.0				0.08	0.16	0.01	0.26	66.9							
10	0	63.33	6.67	7.52	0	8	8	5	0	33.04	0.06	6.09	1.36E-03	6.73E-04	1.24E-06	2.04E-03
		100.0			0.00	0.00	0.00	0.00		100.0						
11	0.00	0	0.00	0.25	0	9	0	9	0.00	0	0.00	0.60	0.00E+00	2.01E-04	0.00E+00	2.01E-04
			26.2	15.2	0.00	0.38	0.14	0.53			64.1					
12	1.64	72.13	3	9	9	9	1	9	8.35	27.54	1	12.05	3.36E-04	1.11E-03	2.58E-03	4.03E-03
Tota	15.5		21.5		0.04	0.18	0.06	0.29	69.2		11.7	100.0				
l	4	62.91	5	100	6	5	3	4	6	19.04	0	0	1.93E-03	5.30E-04	3.26E-04	2.78E-03

Table 1: Mangrove Floristic Characteristics

2000

	% Canopy	**Tree Numbers**				**Average DBH (cm)**				**Total Basal Area (m^2)**				**Average Basal Area (m^2)**			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	67.30	12	0	10	22	17.03	0.00	2.43	10.39	0.310	0.000	0.006	0.316	2.59E-02	0.00E+00	6.10E-04	1.44E-02
2	12.20	1	0	2	3	21.60	0.00	3.80	9.73	0.037	0.000	0.002	0.039	3.66E-02	0.00E+00	1.15E-03	1.30E-02
3	0.00	0	2	6	8	0.00	3.25	2.35	2.58	0.000	0.002	0.003	0.005	0.00E+00	8.30E-04	5.00E-04	5.82E-04
4	83.70	1	107	0	108	10.70	5.23	0.00	5.28	0.009	0.256	0.000	0.265	8.99E-03	2.39E-03	0.00E+00	2.45E-03
5	30.60	15	6	39	60	10.06	0.98	4.66	5.64	0.177	0.000	0.114	0.292	1.18E-02	8.03E-05	2.93E-03	4.86E-03
6	4.10	9	2	4	15	3.23	2.75	2.63	3.01	0.011	0.002	0.005	0.018	1.19E-03	8.93E-04	1.28E-03	1.17E-03
7	71.40	8	10	2	20	23.93	2.73	5.30	11.47	0.429	0.009	0.006	0.444	5.36E-02	8.90E-04	3.01E-03	2.22E-02
8	79.60	4	30	0	34	43.03	5.84	0.00	10.22	0.835	0.102	0.000	0.937	2.09E-01	3.42E-03	0.00E+00	2.76E-02

9	85.70	2	17	7	26	58.75	5.99	6.44	10.17	0.692	0.105	0.033	0.830	3.46E-01	6.16E-03	4.72E-03	3.19E-02
10	79.60	9	19	2	30	14.44	7.07	1.50	8.91	0.156	0.078	0.000	0.235	1.74E-02	4.12E-03	2.05E-04	7.84E-03
11	0.00	0	1	6	7	0.00	18.20	0.77	3.26	0.000	0.026	0.000	0.026	0.00E+00	2.60E-02	5.05E-05	3.76E-03
12	89.80	0	43	16	59	0.00	5.94	13.87	8.09	0.000	0.129	0.277	0.406	0.00E+00	3.01E-03	1.73E-02	6.89E-03
Total		61	237	94	392	16.90	4.83	3.64	7.39	2.656	0.709	0.447	3.812	4.35E-02	2.99E-03	4.76E-03	9.73E-03

2000

	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	54.55	0.00	45.45	5.61	0.11	0.00	0.09	0.19	98.07	0.00	1.93	8.30	2.74E-03	0.00E+00	5.39E-05	2.80E-03
2	33.33	0.00	66.67	0.77	0.01	0.00	0.02	0.03	94.08	0.00	5.92	1.02	3.24E-04	0.00E+00	2.04E-05	3.44E-04
3	0.00	25.00	75.00	2.04	0.00	0.02	0.05	0.07	0.00	35.62	64.38	0.12	0.00E+00	1.47E-05	2.65E-05	4.12E-05
4	0.93	99.07	0.00	27.55	0.01	0.95	0.00	0.95	3.40	96.60	0.00	6.94	7.95E-05	2.26E-03	0.00E+00	2.34E-03
5	25.00	10.00	65.00	15.31	0.13	0.05	0.34	0.53	60.69	0.17	39.15	7.65	1.56E-03	4.26E-06	1.01E-03	2.58E-03
6	60.00	13.33	26.67	3.83	0.08	0.02	0.04	0.13	60.86	10.13	29.01	0.46	9.48E-05	1.58E-05	4.52E-05	1.56E-04
7	40.00	50.00	10.00	5.10	0.07	0.09	0.02	0.18	96.64	2.00	1.36	11.65	3.79E-03	7.87E-05	5.32E-05	3.93E-03
8	11.76	88.24	0.00	8.67	0.04	0.27	0.00	0.30	89.07	10.93	0.00	24.58	7.38E-03	9.06E-04	0.00E+00	8.29E-03
9	7.69	65.38	26.92	6.63	0.02	0.15	0.06	0.23	83.39	12.63	3.99	21.76	6.12E-03	9.26E-04	2.92E-04	7.33E-03
10	30.00	63.33	6.67	7.65	0.08	0.17	0.02	0.27	66.54	33.29	0.17	6.17	1.38E-03	6.92E-04	3.63E-06	2.08E-03
11	0.00	14.29	85.71	1.79	0.00	0.01	0.05	0.06	0.00	98.85	1.15	0.69	0.00E+00	2.30E-04	2.68E-06	2.33E-04
12	0.00	72.88	27.12	15.05	0.00	0.38	0.14	0.52	0.00	31.85	68.15	10.66	0.00E+00	1.14E-03	2.45E-03	3.59E-03
Total	15.56	60.46	23.98	100	0.04	0.17	0.07	0.29	69.66	18.60	11.73	100.00	1.96E-03	5.23E-04	3.30E-04	2.81E-03

Table 1: Mangrove Floristic Characteristics

2001

	% Canopy	Tree Numbers				Average DBH (cm)				Total Basal Area (m^2)				Average Basal Area (m^2)			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	59.00	10	1	10	21	17.38	0.60	3.42	9.93	0.273	0.000	0.013	0.286	2.73E-02	2.83E-05	1.27E-03	1.36E-02
2	0.00	1	0	2	3	24.80	0.00	2.10	9.67	0.048	0.000	0.001	0.049	4.83E-02	0.00E+00	5.23E-04	1.65E-02
3	0.00	0	3	82	85	0.00	4.33	1.10	1.21	0.000	0.006	0.035	0.041	0.00E+00	2.11E-03	4.21E-04	4.81E-04
4	84.00	1	99	0	100	10.70	5.75	0.00	5.80	0.009	0.274	0.000	0.283	8.99E-03	2.77E-03	0.00E+00	2.83E-03
5	24.00	16	7	37	60	10.55	1.29	4.92	6.00	0.219	0.001	0.094	0.314	1.37E-02	1.60E-04	2.54E-03	5.23E-03
6	4.00	12	2	6	20	2.90	3.35	2.15	2.72	0.014	0.002	0.006	0.023	1.16E-03	1.24E-03	1.06E-03	1.14E-03
7	76.00	8	10	2	20	24.27	3.66	5.95	12.13	0.443	0.013	0.007	0.463	5.54E-02	1.26E-03	3.37E-03	2.31E-02
8	67.00	4	28	0	32	43.21	6.51	0.00	11.10	0.845	0.110	0.000	0.955	2.11E-01	3.94E-03	0.00E+00	2.99E-02

9	76.00	2	14	7	23	59.25	7.50	7.46	11.98	0.700	0.111	0.039	0.850	3.50E-01	7.90E-03	5.64E-03	3.70E-02
10	82.00	9	20	2	31	14.63	6.88	1.63	8.79	0.160	0.081	0.000	0.242	1.78E-02	4.04E-03	2.38E-04	7.80E-03
11	6.00	0	1	86	87	0.00	19.90	1.14	1.36	0.000	0.031	0.030	0.061	0.00E+00	3.11E-02	3.46E-04	7.00E-04
12	82.00	0	43	16	59	0.00	6.09	13.79	8.18	0.000	0.133	0.275	0.408	0.00E+00	3.09E-03	1.72E-02	6.92E-03
Total		63	228	250	541	17.31	5.49	3.64	7.41	2.712	0.763	0.500	3.975	4.30E-02	3.35E-03	2.00E-03	7.35E-03

2001

	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	47.62	4.76	47.62	3.88	0.09	0.01	0.09	0.19	95.55	0.01	4.44	7.19	2.41E-03	2.50E-07	1.12E-04	2.53E-03
2	33.33	0.00	66.67	0.55	0.01	0.00	0.02	0.03	97.88	0.00	2.12	1.24	4.27E-04	0.00E+00	9.25E-06	4.36E-04
3	0.00	3.53	96.47	15.71	0.00	0.03	0.73	0.75	0.00	15.45	84.55	1.03	0.00E+00	5.59E-05	3.06E-04	3.61E-04
4	1.00	99.00	0.00	18.48	0.01	0.88	0.00	0.88	3.17	96.83	0.00	7.13	7.95E-05	2.43E-03	0.00E+00	2.51E-03
5	26.67	11.67	61.67	11.09	0.14	0.06	0.33	0.53	69.72	0.36	29.92	7.90	1.94E-03	9.90E-06	8.31E-04	2.78E-03
6	60.00	10.00	30.00	3.70	0.11	0.02	0.05	0.18	61.09	10.94	27.97	0.57	1.23E-04	2.20E-05	5.63E-05	2.01E-04
7	40.00	50.00	10.00	3.70	0.07	0.09	0.02	0.18	95.81	2.73	1.46	11.64	3.92E-03	1.12E-04	5.97E-05	4.09E-03
8	12.50	87.50	0.00	5.91	0.04	0.25	0.00	0.28	88.45	11.55	0.00	24.04	7.47E-03	9.76E-04	0.00E+00	8.45E-03
9	8.70	60.87	30.43	4.25	0.02	0.12	0.06	0.20	82.35	13.01	4.64	21.39	6.19E-03	9.78E-04	3.49E-04	7.52E-03
10	29.03	64.52	6.45	5.73	0.08	0.18	0.02	0.27	66.39	33.42	0.20	6.08	1.42E-03	7.14E-04	4.21E-06	2.14E-03
11	0.00	1.15	98.85	16.08	0.00	0.01	0.76	0.77	0.00	51.11	48.89	1.53	0.00E+00	2.75E-04	2.63E-04	5.38E-04
12	0.00	72.88	27.12	10.91	0.00	0.38	0.14	0.52	0.00	32.58	67.42	10.27	0.00E+00	1.18E-03	2.43E-03	3.61E-03
Total	11.65	42.14	46.21	100	0.05	0.17	0.18	0.40	68.22	19.19	12.58	100.00	2.00E-03	5.62E-04	3.69E-04	2.93E-03

Table 1: Mangrove Floristic Characteristics

2002

	% Canopy	Tree Numbers				Average DBH (cm)				Total Basal Area (m^2)				Average Basal Area (m^2)			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	61.00	10	2	9	21	17.50	1.35	4.29	10.30	0.275	0.000	0.015	0.291	2.75E-02	1.76E-04	1.72E-03	1.38E-02
2	6.00	1	0	0	1	28.70	0.00	0.00	28.70	0.065	0.000	0.000	0.065	6.47E-02	0.00E+00	0.00E+00	6.47E-02
3	14.00	2	3	469	474	0.75	6.80	1.10	1.14	0.000	0.012	0.283	0.295	5.38E-05	3.92E-03	6.04E-04	6.22E-04
4	55.00	0	60	0	60	0.00	5.82	0.00	5.82	0.000	0.170	0.000	0.170	0.00E+00	2.83E-03	0.00E+00	2.83E-03
5	24.00	16	7	38	61	9.89	1.73	5.37	6.14	0.187	0.002	0.126	0.315	1.17E-02	2.79E-04	3.31E-03	5.16E-03
6	2.00	12	2	8	22	3.43	3.00	1.93	2.84	0.018	0.002	0.007	0.027	1.50E-03	9.61E-04	8.85E-04	1.23E-03
7	86.00	8	10	2	20	24.64	3.84	7.65	12.54	0.457	0.014	0.009	0.480	5.71E-02	1.39E-03	4.72E-03	2.40E-02
8	82.00	4	27	0	31	43.44	6.80	0.00	11.53	0.849	0.116	0.000	0.965	2.12E-01	4.28E-03	0.00E+00	3.11E-02
9	63.00	2	11	7	20	59.80	8.96	7.51	13.54	0.713	0.113	0.041	0.866	3.56E-01	1.02E-02	5.86E-03	4.33E-02
10	69.00	9	20	2	31	14.81	7.09	2.90	9.06	0.165	0.084	0.001	0.250	1.83E-02	4.20E-03	7.24E-04	8.08E-03
11	27.00	0	1	191	192	0.00	21.10	1.35	1.46	0.000	0.035	0.092	0.127	0.00E+00	3.50E-02	4.83E-04	6.63E-04
12	78.00	0	43	16	59	0.00	6.15	13.86	8.24	0.000	0.135	0.280	0.415	0.00E+00	3.14E-03	1.75E-02	7.03E-03
Total		64	186	742	992	16.91	6.05	3.83	9.28	2.729	0.682	0.855	4.266	4.26E-02	3.67E-03	1.15E-03	4.30E-03

2002

	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	47.62	9.52	42.86	2.12	0.09	0.02	0.08	0.19	94.57	0.12	5.31	6.81	2.43E-03	3.12E-06	1.37E-04	2.57E-03
2	100.00	0.00	0.00	0.10	0.01	0.00	0.00	0.01	100.00	0.00	0.00	1.52	5.72E-04	0.00E+00	0.00E+00	5.72E-04
3	0.42	0.63	98.95	47.78	0.02	0.03	4.15	4.19	0.04	3.99	95.97	6.91	9.52E-07	1.04E-04	2.50E-03	2.61E-03
4	0.00	100.00	0.00	6.05	0.00	0.53	0.00	0.53	0.00	100.00	0.00	3.99	0.00E+00	1.50E-03	0.00E+00	1.50E-03
5	26.23	11.48	62.30	6.15	0.14	0.06	0.34	0.54	59.43	0.62	39.95	7.38	1.65E-03	1.72E-05	1.11E-03	2.78E-03
6	54.55	9.09	36.36	2.22	0.11	0.02	0.07	0.19	66.62	7.13	26.25	0.63	1.59E-04	1.70E-05	6.26E-05	2.38E-04
7	40.00	50.00	10.00	2.02	0.07	0.09	0.02	0.18	95.14	2.89	1.96	11.26	4.04E-03	1.23E-04	8.35E-05	4.25E-03
8	12.90	87.10	0.00	3.13	0.04	0.24	0.00	0.27	88.02	11.98	0.00	22.62	7.51E-03	1.02E-03	0.00E+00	8.53E-03
9	10.00	55.00	35.00	2.02	0.02	0.10	0.06	0.18	82.26	13.00	4.74	20.31	6.30E-03	9.96E-04	3.63E-04	7.66E-03
10	29.03	64.52	6.45	3.13	0.08	0.18	0.02	0.27	65.85	33.57	0.58	5.87	1.46E-03	7.43E-04	1.28E-05	2.21E-03
11	0.00	0.52	99.48	19.35	0.00	0.01	1.69	1.70	0.00	27.49	72.51	2.98	0.00E+00	3.09E-04	8.16E-04	1.12E-03
12	0.00	72.88	27.12	5.95	0.00	0.38	0.14	0.52	0.00	32.59	67.41	9.72	0.00E+00	1.20E-03	2.47E-03	3.67E-03
Total	6.45	18.75	74.80	100	0.05	0.14	0.55	0.73	63.96	16.00	20.04	100.00	2.01E-03	5.03E-04	6.30E-04	3.14E-03

Table 1: Mangrove Floristic Characteristics

2003

	% Canopy	Tree Numbers				Average DBH (cm)				Total Basal Area (m^2)				Average Basal Area (m^2)			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	63.30	10	3	11	24	17.95	2.10	4.30	9.71	0.285	0.002	0.022	0.308	2.85E-02	5.73E-04	1.97E-03	1.28E-02
2	6.00	1	0	0	1	28.50	0.00	0.00	28.50	0.064	0.000	0.000	0.064	6.38E-02	0.00E+00	0.00E+00	6.38E-02
3	39.00	17	5	588	610	1.02	5.80	1.79	1.80	0.002	0.021	0.632	0.656	1.24E-04	4.27E-03	1.08E-03	1.07E-03
4	63.00	0	58	0	58	0.00	5.86	0.00	5.86	0.000	0.167	0.000	0.167	0.00E+00	2.88E-03	0.00E+00	2.88E-03
5	35.00	16	9	37	62	11.22	1.24	5.56	6.40	0.240	0.002	0.122	0.364	1.50E-02	1.69E-04	3.30E-03	5.87E-03
6	10.00	13	2	16	31	3.72	2.25	1.52	2.49	0.021	0.001	0.008	0.030	1.65E-03	5.20E-04	4.96E-04	9.80E-04
7	63.00	8	14	2	24	24.74	3.01	7.65	10.64	0.462	0.015	0.009	0.486	5.77E-02	1.10E-03	4.74E-03	2.03E-02
8	84.00	4	27	0	31	44.01	6.63	0.00	11.45	0.872	0.112	0.000	0.984	2.18E-01	4.14E-03	0.00E+00	3.17E-02
9	82.00	2	9	6	17	50.30	9.93	7.70	15.07	0.715	0.113	0.040	0.868	3.58E-01	1.26E-02	6.62E-03	5.11E-02
10	89.79	9	21	2	32	14.85	6.84	1.85	8.78	0.166	0.087	0.001	0.253	1.84E-02	4.13E-03	2.78E-04	7.91E-03
11	45.00	0	2	241	243	0.00	11.35	2.18	2.25	0.000	0.038	0.234	0.272	0.00E+00	1.90E-02	9.72E-04	1.12E-03
12	78.00	0	43	16	59	0.00	6.09	13.92	8.21	0.000	0.134	0.282	0.416	0.00E+00	3.11E-03	1.76E-02	7.04E-03
Total		80	193	919	1192	17.19	5.09	3.87	9.26	2.827	0.692	1.349	4.868	3.53E-02	3.58E-03	1.47E-03	4.08E-03

2003

	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	41.67	12.50	45.83	2.01	0.09	0.03	0.10	0.21	92.42	0.56	7.03	6.33	2.52E-03	1.52E-05	1.91E-04	2.72E-03
2	100.00	0.00	0.00	0.08	0.01	0.00	0.00	0.01	100.00	0.00	0.00	1.31	5.64E-04	0.00E+00	0.00E+00	5.64E-04
3	2.79	0.82	96.39	51.17	0.15	0.04	5.20	5.39	0.32	3.26	96.42	13.47	1.86E-05	1.89E-04	5.59E-03	5.80E-03
4	0.00	100.00	0.00	4.87	0.00	0.51	0.00	0.51	0.00	100.00	0.00	3.44	0.00E+00	1.48E-03	0.00E+00	1.48E-03
5	25.81	14.52	59.68	5.20	0.14	0.08	0.33	0.55	66.01	0.42	33.58	7.47	2.12E-03	1.35E-05	1.08E-03	3.22E-03
6	41.94	6.45	51.61	2.60	0.11	0.02	0.14	0.27	70.47	3.43	26.10	0.62	1.89E-04	9.20E-06	7.01E-05	2.69E-04
7	33.33	58.33	8.33	2.01	0.07	0.12	0.02	0.21	94.90	3.15	1.95	9.99	4.08E-03	1.36E-04	8.38E-05	4.30E-03
8	12.90	87.10	0.00	2.60	0.04	0.24	0.00	0.27	88.63	11.37	0.00	20.21	7.71E-03	9.89E-04	0.00E+00	8.70E-03
9	11.76	52.94	35.29	1.43	0.02	0.08	0.05	0.15	82.41	13.01	4.58	17.83	6.33E-03	9.99E-04	3.51E-04	7.68E-03
10	28.13	65.63	6.25	2.68	0.08	0.19	0.02	0.28	65.50	34.28	0.22	5.20	1.47E-03	7.68E-04	4.92E-06	2.24E-03
11	0.00	0.82	99.18	20.39	0.00	0.02	2.13	2.15	0.00	13.98	86.02	5.59	0.00E+00	3.36E-04	2.07E-03	2.41E-03
12	0.00	72.88	27.12	4.95	0.00	0.38	0.14	0.52	0.00	32.19	67.81	8.54	0.00E+00	1.18E-03	2.49E-03	3.67E-03
Total	6.71	16.19	77.10	100	0.06	0.14	0.68	0.88	58.07	14.21	27.72	100.00	2.08E-03	5.10E-04	9.94E-04	3.59E-03

Table 1: Mangrove Floristic Characteristics

2004

	% Canopy	Tree Numbers				Average DBH (cm)				Total Basal Area (m^2)				Average Basal Area (m^2)			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	61.20	10	4	21	35	19.12	2.75	3.41	7.82	0.309	0.004	0.033	0.346	3.09E-02	8.94E-04	1.58E-03	9.88E-03
2	12.20	1	0	0	1	29.40	0.00	0.00	29.40	0.068	0.000	0.000	0.068	6.79E-02	0.00E+00	0.00E+00	6.79E-02
3	59.00	25	6	480	511	1.70	5.32	2.44	2.43	0.008	0.024	0.659	0.691	3.21E-04	3.96E-03	1.37E-03	1.35E-03
4	61.00	0	53	0	53	0.00	6.04	0.00	6.04	0.000	0.162	0.000	0.162	0.00E+00	3.05E-03	0.00E+00	3.05E-03
5	35.00	16	11	39	66	11.15	1.36	5.75	6.33	0.231	0.002	0.148	0.381	1.44E-02	1.89E-04	3.80E-03	5.77E-03
6	14.00	15	2	22	39	4.18	2.40	1.71	2.70	0.031	0.001	0.015	0.047	2.10E-03	6.54E-04	6.65E-04	1.22E-03
7	75.50	8	17	2	27	26.26	3.34	9.00	10.55	0.510	0.023	0.013	0.546	6.38E-02	1.34E-03	6.38E-03	2.02E-02
8	75.50	4	26	0	30	43.95	7.11	0.00	12.02	0.870	0.121	0.000	0.991	2.18E-01	4.66E-03	0.00E+00	3.30E-02
9	87.70	2	8	6	16	63.50	11.40	8.30	16.75	0.780	0.116	0.044	0.940	3.90E-01	1.45E-02	7.32E-03	5.87E-02
10	79.50	9	23	2	34	14.98	6.52	3.50	8.58	0.169	0.090	0.002	0.261	1.87E-02	3.91E-03	9.82E-04	7.66E-03
11	39.00	0	3	260	263	0.00	8.20	2.50	2.57	0.000	0.040	0.387	0.427	0.00E+00	1.34E-02	1.49E-03	1.63E-03
12	51.00	0	41	16	57	0.00	6.14	13.82	8.29	0.000	0.131	0.278	0.408	0.00E+00	3.18E-03	1.74E-02	7.16E-03
Total		90	194	848	1132	17.85	5.05	4.20	9.46	2.975	0.713	1.579	5.268	3.31E-02	3.68E-03	1.86E-03	4.65E-03

2004

	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	28.57	11.43	60.00	3.09	0.09	0.04	0.19	0.31	89.37	1.03	9.60	6.56	2.73E-03	3.16E-05	2.93E-04	3.06E-03
2	100.00	0.00	0.00	0.09	0.01	0.00	0.00	0.01	100.00	0.00	0.00	1.29	6.00E-04	0.00E+00	0.00E+00	6.00E-04
3	4.89	1.17	93.93	45.14	0.22	0.05	4.24	4.52	1.16	3.44	95.40	13.12	7.09E-05	2.10E-04	5.83E-03	6.11E-03
4	0.00	100.00	0.00	4.68	0.00	0.47	0.00	0.47	0.00	100.00	0.00	3.07	0.00E+00	1.43E-03	0.00E+00	1.43E-03
5	24.24	16.67	59.09	5.83	0.14	0.10	0.34	0.58	60.55	0.55	38.91	7.23	2.04E-03	1.84E-05	1.31E-03	3.37E-03
6	38.46	5.13	56.41	3.45	0.13	0.02	0.19	0.34	66.39	2.76	30.85	0.90	2.78E-04	1.16E-05	1.29E-04	4.19E-04
7	29.63	62.96	7.41	2.39	0.07	0.15	0.02	0.24	93.49	4.17	2.34	10.36	4.51E-03	2.01E-04	1.13E-04	4.82E-03
8	13.33	86.67	0.00	2.65	0.04	0.23	0.00	0.27	87.77	12.23	0.00	18.82	7.69E-03	1.07E-03	0.00E+00	8.77E-03
9	12.50	50.00	37.50	1.41	0.02	0.07	0.05	0.14	82.95	12.38	4.68	17.84	6.89E-03	1.03E-03	3.89E-04	8.31E-03
10	26.47	67.65	5.88	3.00	0.08	0.20	0.02	0.30	64.72	34.53	0.75	4.95	1.49E-03	7.96E-04	1.74E-05	2.30E-03
11	0.00	1.14	98.86	23.23	0.00	0.03	2.30	2.33	0.00	9.43	90.57	8.11	0.00E+00	3.56E-04	3.42E-03	3.78E-03
12	0.00	71.93	28.07	5.04	0.00	0.36	0.14	0.50	0.00	31.98	68.02	7.75	0.00E+00	1.15E-03	2.46E-03	3.61E-03
Total	7.95	17.14	74.91	100	0.07	0.14	0.62	0.83	56.48	13.54	29.97	100.00	2.19E-03	5.26E-04	1.16E-03	3.88E-03

Table 1: Mangrove Floristic Characteristics

2005

	% Canopy	Tree Numbers				Average DBH (cm)				Total Basal Area (m^2)				Average Basal Area (m^2)			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	73.50	10	4	25	39	20.94	3.30	3.59	8.01	0.403	0.006	0.043	0.452	4.03E-02	1.57E-03	1.71E-03	1.16E-02
2	10.20	5	0	0	5	6.10	0.00	0.00	6.10	0.067	0.000	0.000	0.067	1.33E-02	0.00E+00	0.00E+00	1.33E-02
3	53.10	27	8	377	412	2.40	4.51	2.96	2.95	0.015	0.026	0.783	0.825	5.54E-04	3.27E-03	2.08E-03	2.00E-03
4	42.90	0	53	0	53	0.00	6.21	0.00	6.21	0.000	0.170	0.000	0.170	0.00E+00	3.21E-03	0.00E+00	3.21E-03
5	24.50	16	11	39	66	12.18	2.41	6.63	7.27	0.261	0.007	0.206	0.474	1.63E-02	6.45E-04	5.28E-03	7.18E-03
6	8.20	15	3	23	41	5.97	1.17	2.36	3.59	0.073	0.000	0.027	0.100	4.84E-03	1.11E-04	1.18E-03	2.44E-03
7	73.50	8	18	2	28	25.83	3.85	9.60	10.54	0.481	0.027	0.014	0.522	6.01E-02	1.51E-03	7.24E-03	1.87E-02
8	71.40	4	26	0	30	44.40	7.16	0.00	12.13	0.882	0.122	0.000	1.003	2.20E-01	4.69E-03	0.00E+00	3.34E-02
9	75.50	2	8	6	16	65.80	11.59	8.68	17.28	0.810	0.120	0.048	0.978	4.05E-01	1.49E-02	7.93E-03	6.11E-02
10	53.10	9	22	2	33	15.07	6.51	4.90	8.75	0.170	0.088	0.004	0.262	1.89E-02	3.99E-03	1.95E-03	7.95E-03
11	59.20	0	4	262	266	0.00	6.55	3.01	3.06	0.000	0.039	0.539	0.579	0.00E+00	9.83E-03	2.06E-03	2.18E-03
12	67.30	0	38	16	54	0.00	6.28	14.04	8.58	0.000	0.126	0.286	0.412	0.00E+00	3.30E-03	1.79E-02	7.62E-03
Total		96	195	752	1043	16.56	4.96	4.65	7.87	3.161	0.731	1.951	5.843	3.29E-02	3.75E-03	2.59E-03	5.60E-03

2005

	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	25.64	10.26	64.10	3.74	0.09	0.04	0.22	0.34	89.15	1.39	9.46	7.73	3.56E-03	5.55E-05	3.78E-04	4.00E-03
2	100	0.00	0.00	0.48	0.04	0.00	0.00	0.04	100.00	0.00	0.00	1.14	5.89E-04	0.00E+00	0.00E+00	5.89E-04
3	6.55	1.94	91.50	39.50	0.24	0.07	3.33	3.64	1.82	3.17	95.01	14.11	1.32E-04	2.31E-04	6.93E-03	7.29E-03
4	0.00	100	0.00	5.08	0.00	0.47	0.00	0.47	0.00	100.00	0.00	2.91	0.00E+00	1.50E-03	0.00E+00	1.50E-03
5	24.24	16.67	59.09	6.33	0.14	0.10	0.34	0.58	55.03	1.50	43.47	8.11	2.31E-03	6.27E-05	1.82E-03	4.19E-03
6	36.59	7.32	56.10	3.93	0.13	0.03	0.20	0.36	72.58	0.33	27.08	1.71	6.41E-04	2.95E-06	2.39E-04	8.84E-04
7	28.57	64.29	7.14	2.68	0.07	0.16	0.02	0.25	92.01	5.21	2.77	8.94	4.25E-03	2.41E-04	1.28E-04	4.62E-03
8	13.33	86.67	0.00	2.88	0.04	0.23	0.00	0.27	87.85	12.15	0.00	17.17	7.79E-03	1.08E-03	0.00E+00	8.87E-03
9	12.50	50.00	37.50	1.53	0.02	0.07	0.05	0.14	82.90	12.23	4.87	16.73	7.17E-03	1.06E-03	4.21E-04	8.64E-03
10	27.27	66.67	6.06	3.16	0.08	0.19	0.02	0.29	65.01	33.50	1.49	4.49	1.51E-03	7.77E-04	3.45E-05	2.32E-03
11	0.00	1.50	98.50	25.50	0.00	0.04	2.32	2.35	0.00	6.79	93.21	9.90	0.00E+00	3.48E-04	4.77E-03	5.12E-03
12	0.00	70.37	29.63	5.18	0.00	0.34	0.14	0.48	0.00	30.51	69.49	7.04	0.00E+00	1.11E-03	2.53E-03	3.64E-03
Total	9.20	18.70	72.10	100	0.07	0.14	0.55	0.77	54.10	12.52	33.39	100.00	2.33E-03	5.39E-04	1.44E-03	4.31E-03

Table 1: Mangrove Floristic Characteristics

2006

	% Canopy	Tree Numbers				Average DBH (cm)				Total Basal Area (m^2)				Average Basal Area (m^2)			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	14.29	10	3	6	19	21.26	2.83	6.57	13.71	0.414	0.003	0.024	0.441	4.14E-02	9.23E-04	4.06E-03	2.32E-02
2	10.20	17	1	3	21	3.89	1.00	1.60	3.42	0.122	0.000	0.001	0.123	7.18E-03	7.86E-05	2.34E-04	5.85E-03
3	42.86	29	9	304	342	2.48	3.84	3.08	3.05	0.019	0.022	0.648	0.688	6.49E-04	2.40E-03	2.13E-03	2.01E-03
4	51.02	0	48	1	49	0.00	6.17	1.50	6.08	0.000	0.156	0.000	0.156	0.00E+00	3.24E-03	1.77E-04	3.18E-03
5	44.90	16	15	39	70	11.73	2.48	7.27	7.27	0.233	0.010	0.243	0.486	1.45E-02	6.64E-04	6.24E-03	6.94E-03
6	0.00	16	4	28	48	4.76	1.40	2.35	3.07	0.049	0.001	0.038	0.088	3.07E-03	2.04E-04	1.37E-03	1.84E-03
7	67.35	8	18	2	28	25.59	3.17	7.68	9.90	0.472	0.019	0.010	0.502	5.91E-02	1.07E-03	5.02E-03	1.79E-02
8	59.18	4	26	0	30	44.03	7.15	0.00	12.07	0.873	0.122	0.000	0.995	2.18E-01	4.70E-03	0.00E+00	3.32E-02
9	63.27	2	5	6	13	62.25	10.48	8.20	17.39	0.765	0.073	0.047	0.885	3.83E-01	1.47E-02	7.81E-03	6.81E-02
10	44.90	9	22	3	34	15.00	6.37	4.10	8.45	0.170	0.085	0.006	0.261	1.88E-02	3.88E-03	2.02E-03	7.68E-03
11	38.78	1	4	241	246	1.00	6.78	2.96	3.01	0.000	0.043	0.410	0.453	7.86E-05	1.06E-02	1.70E-03	1.84E-03
12	38.78	0	33	15	48	0.00	6.47	15.40	9.26	0.000	0.116	0.313	0.429	0.00E+00	3.52E-03	2.09E-02	8.94E-03
Total		112	188	648	948	16.00	4.85	5.06	8.06	3.117	0.649	1.741	5.507	2.78E-02	3.45E-03	2.69E-03	5.81E-03

2006

	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	52.63	15.79	31.58	2.00	0.09	0.03	0.05	0.17	93.85	0.63	5.52	8.02	3.66E-03	2.45E-05	2.15E-04	3.90E-03
2	80.95	4.76	14.29	2.22	0.15	0.01	0.03	0.19	99.36	0.06	0.57	2.23	1.08E-03	6.95E-07	6.21E-06	1.09E-03
3	8.48	2.63	88.89	36.08	0.26	0.08	2.69	3.02	2.74	3.14	94.12	12.50	1.66E-04	1.91E-04	5.73E-03	6.09E-03
4	0.00	97.96	2.04	5.17	0.00	0.42	0.01	0.43	0.00	99.89	0.11	2.83	0.00E+00	1.38E-03	1.56E-06	1.38E-03
5	22.86	21.43	55.71	7.38	0.14	0.13	0.34	0.62	47.89	2.05	50.06	8.82	2.06E-03	8.81E-05	2.15E-03	4.30E-03
6	33.33	8.33	58.33	5.06	0.14	0.04	0.25	0.42	55.67	0.92	43.41	1.60	4.35E-04	7.21E-06	3.39E-04	7.81E-04
7	28.57	64.29	7.14	2.95	0.07	0.16	0.02	0.25	94.18	3.82	2.00	9.11	4.18E-03	1.70E-04	8.87E-05	4.44E-03
8	13.33	86.67	0.00	3.16	0.04	0.23	0.00	0.27	87.73	12.27	0.00	18.07	7.72E-03	1.08E-03	0.00E+00	8.80E-03
9	15.38	38.46	46.15	1.37	0.02	0.04	0.05	0.11	86.42	8.28	5.29	16.08	6.77E-03	6.48E-04	4.14E-04	7.83E-03
10	26.47	64.71	8.82	3.59	0.08	0.19	0.03	0.30	64.97	32.72	2.32	4.74	1.50E-03	7.55E-04	5.35E-05	2.31E-03
11	0.41	1.63	97.97	25.95	0.01	0.04	2.13	2.18	0.02	9.39	90.60	8.22	6.95E-07	3.76E-04	3.63E-03	4.00E-03
12	0.00	68.75	31.25	5.06	0.00	0.29	0.13	0.42	0.00	27.05	72.95	7.79	0.00E+00	1.03E-03	2.77E-03	3.79E-03
Total	11.81	19.83	68.35	100	0.08	0.14	0.48	0.70	56.60	11.79	31.61	100	2.30E-03	4.78E-04	1.28E-03	4.06E-03

Table 1: Mangrove Floristic Characteristics

2007

Plot	% Canopy	Tree Numbers				Average DBH (cm)				Total Basal Area (m^2)				Average Basal Area (m^2)			
		B	R	W	Total	B	R	W	Total	B	R	W	Total	B	R	W	Total
1	32.60	8	5	2	15	19.95	2.50	7.65	12.49	0.303	0.005	0.014	0.324	3.79E-02	1.04E-03	7.57E-03	2.16E-02
2	20.40	40	1	11	52	2.47	1.50	1.76	2.30	0.140	0.000	0.008	0.148	3.51E-03	1.77E-04	7.10E-04	2.85E-03
3	55.10	33	18	251	302	3.79	2.50	3.71	3.65	0.048	0.023	0.764	0.835	1.47E-03	1.26E-03	3.04E-03	2.77E-03
4	67.30	0	48	1	49	0.00	6.06	2.10	5.98	0.000	0.158	0.003	0.161	0.00E+00	3.29E-03	3.46E-04	3.23E-03
5	32.60	17	22	39	78	11.34	2.01	7.22	6.65	0.247	0.017	0.246	0.510	1.45E-02	5.39E-04	6.32E-03	6.48E-03
6	6.10	17	4	29	50	4.98	1.30	2.88	3.47	0.056	0.001	0.017	0.074	3.28E-03	1.39E-04	1.76E-03	2.14E-03
7	65.30	7	21	2	30	25.71	2.50	9.05	8.37	0.423	0.006	0.013	0.442	6.04E-02	7.76E-04	6.67E-03	1.51E-02
8	73.50	4	28	2	34	44.38	6.66	0.50	10.74	0.882	0.124	0.000	1.006	2.22E-01	4.37E-03	2.04E-05	2.97E-02
9	71.40	2	3	19	24	61.95	12.67	3.80	9.77	0.753	0.057	0.074	0.884	3.78E-01	2.21E-02	4.01E-03	3.74E-02
10	67.30	8	24	19	51	15.71	6.45	1.42	6.03	0.158	0.092	0.014	0.264	2.05E-02	4.00E-03	7.30E-04	5.37E-03
11	42.80	2	6	195	203	2.35	5.15	3.35	3.39	0.004	0.035	0.394	0.433	6.74E-04	7.24E-03	2.00E-03	2.14E-03
12	65.30	0	32	15	47	0.00	6.67	15.59	9.52	0.000	0.123	0.321	0.444	0.00E+00	3.75E-03	2.14E-02	9.37E-03
Total		138	212	585	935	16.06	4.67	4.92	6.86	3.025	0.663	1.893	5.581	2.19E-02	3.13E-03	3.25E-03	5.97E-03

2007

Plot	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
	B	R	W	Total	B	R	W	Total	B	R	W	Total	B	R	W	Total
1	53.33	33.33	13.33	1.60	0.07	0.04	0.02	0.13	93.73	1.60	4.68	5.79	2.68E-03	4.58E-05	1.34E-04	2.86E-03

2		76.92	1.92	21.15	5.56	0.35	0.01	0.10	0.46	94.62	0.12	5.26	2.66	1.24E-03	1.56E-06	6.91E-05	1.31E-03
3		10.93	5.96	83.11	32.30	0.29	0.16	2.22	2.67	5.79	2.72	91.49	14.95	4.28E-04	2.01E-04	6.76E-03	7.38E-03
4		0.00	97.96	2.04	5.24	0.00	0.42	0.01	0.43	0.00	99.78	0.22	2.83	0.00E+00	1.40E-03	3.06E-06	1.40E-03
5		21.79	28.21	50.00	8.34	0.15	0.19	0.34	0.69	48.91	2.35	48.74	9.05	2.19E-03	1.05E-04	2.18E-03	4.47E-03
6		34.00	8.00	58.00	5.35	0.15	0.04	0.26	0.44	51.96	0.52	47.52	1.92	4.93E-04	4.93E-06	4.51E-04	9.48E-04
7		23.33	70.00	6.67	3.21	0.06	0.19	0.02	0.27	93.45	3.60	2.95	8.10	3.74E-03	1.44E-04	1.18E-04	4.00E-03
8		11.76	82.35	5.88	3.64	0.04	0.25	0.02	0.30	87.86	12.13	0.00	18.06	7.84E-03	1.08E-03	3.61E-07	8.92E-03
9		8.33	12.50	79.17	2.57	0.02	0.03	0.17	0.21	84.14	7.37	8.49	16.07	6.68E-03	5.85E-04	6.74E-04	7.94E-03
10		15.69	47.06	37.25	5.45	0.07	0.21	0.17	0.45	59.91	35.03	5.06	4.91	1.45E-03	8.49E-04	1.23E-04	2.42E-03
11		0.99	2.96	96.06	21.71	0.02	0.05	1.72	1.79	0.31	10.00	89.69	7.77	1.19E-05	3.84E-04	3.44E-03	3.84E-03
12		0.00	68.09	31.91	5.03	0.00	0.28	0.13	0.42	0.00	27.24	72.76	7.89	0.00E+00	1.06E-03	2.83E-03	3.89E-03
Total		14.76	22.67	62.57	100	0.10	0.16	0.43	0.69	54.16	11.86	33.98	100	2.23E-03	4.88E-04	1.40E-03	4.12E-03

Table 1: Mangrove Floristic Characteristics

2008

	% Canopy	**Tree Numbers**				**Average DBH (cm)**				**Total Basal Area (m^2)**				**Average Basal Area (m^2)**			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	26.50	7	7	3	17	19.94	2.60	5.07	10.18	0.27	0.00	0.01	0.30	3.97E-02	1.11E-03	4.69E-03	1.76E-02
2	24.50	58	7	44	109	2.39	0.70	0.99	1.72	0.143	0.000	0.013	0.157	2.47E-03	6.99E-05	3.00E-04	1.44E-03
3	51.00	37	21	231	289	4.10	2.11	3.08	3.14	0.062	0.020	0.599	0.681	1.68E-03	9.63E-04	2.59E-03	2.36E-03
4	67.40	1	62	2	65	0.10	4.74	2.25	4.59	0.000	0.158	0.002	0.159	7.86E-07	2.55E-03	7.61E-04	2.45E-03
5	20.40	19	27	37	83	9.68	1.60	6.50	5.64	0.231	0.010	0.191	0.432	1.21E-02	3.89E-04	5.15E-03	5.20E-03

										0.04	0.00	0.02	0.06				
6	14.30	18	9	27	54	4.18	0.52	2.25	2.61	7	0	0	7	2.61E-03	3.22E-05	7.44E-04	1.25E-03
						25.6				0.41	0.01	0.01	0.43				
7	63.30	7	22	2	31	1	2.51	8.70	8.13	0	6	3	9	5.86E-02	7.37E-04	6.52E-03	1.42E-02
						43.5				0.85	0.11	0.00	0.97				
8	61.20	4	28	9	41	5	6.39	0.27	8.67	6	4	0	0	2.14E-01	4.07E-03	1.43E-05	2.37E-02
						61.3	12.2			0.73	0.06	0.04	0.85				
9	73.50	2	3	68	73	0	7	1.29	3.38	8	5	9	2	3.69E-01	2.16E-02	7.23E-04	1.17E-02
						15.6				0.16	0.09	0.00	0.25				
10	65.30	8	25	26	59	1	5.83	1.28	5.15	1	0	8	9	2.01E-02	3.59E-03	3.20E-04	4.39E-03
										0.01	0.04	0.13	0.20				
11	22.50	8	8	149	165	3.00	4.10	2.59	2.69	9	5	8	2	2.32E-03	5.60E-03	9.27E-04	1.22E-03
								15.4		0.00	0.12	0.31	0.44				
12	57.10	0	32	15	47	0.00	6.76	5	9.53	0	4	8	2	0.00E+00	3.89E-03	2.12E-02	9.40E-03
Tota						15.7				2.94	0.65	1.36	4.96				
l		169	251	613	1033	9	4.18	4.14	5.45	6	1	5	1	1.74E-02	2.59E-03	2.23E-03	4.80E-03

2008

	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
Plot	**B**	**R**	**W**	**Tota l**	**B**	**R**	**W**	**Tota l**	**B**	**R**	**W**	**Tota l**	**B**	**R**	**W**	**Total**
	41.1								92.7							
1	8	41.18	17.65	1.65	0.06	0.06	0.03	0.15	1	2.60	4.69	6.05	2.46E-03	6.90E-05	1.24E-04	2.65E-03
	53.2			10.5					91.2							
2	1	6.42	40.37	5	0.51	0.06	0.39	0.96	8	0.31	8.41	3.17	1.27E-03	4.33E-06	1.17E-04	1.39E-03
	12.8			27.9							87.9	13.7				
3	0	7.27	79.93	8	0.33	0.19	2.04	2.56	9.10	2.97	3	3	5.48E-04	1.79E-04	5.30E-03	6.02E-03
										99.0						
4	1.54	95.38	3.08	6.29	0.01	0.55	0.02	0.57	0.00	4	0.95	3.21	6.95E-09	1.40E-03	1.35E-05	1.41E-03
	22.8								53.4		44.1					
5	9	32.53	44.58	8.03	0.17	0.24	0.33	0.73	5	2.43	2	8.71	2.04E-03	9.28E-05	1.68E-03	3.82E-03
	33.3								69.7		29.7					
6	3	16.67	50.00	5.23	0.16	0.08	0.24	0.48	9	0.43	8	1.36	4.16E-04	2.56E-06	1.78E-04	5.96E-04
	22.5								93.3							
7	8	70.97	6.45	3.00	0.06	0.19	0.02	0.27	4	3.69	2.97	8.85	3.62E-03	1.43E-04	1.15E-04	3.88E-03
									88.2	11.7		19.5				
8	9.76	68.29	21.95	3.97	0.04	0.25	0.08	0.36	4	5	0.01	5	7.57E-03	1.01E-03	1.14E-06	8.58E-03
									86.6			17.1				
9	2.74	4.11	93.15	7.07	0.02	0.03	0.60	0.65	3	7.60	5.76	8	6.53E-03	5.73E-04	4.34E-04	7.54E-03

10		13.56	42.37	44.07	5.71	0.07	0.22	0.23	0.52	62.17	34.61	3.22	5.22	1.42E-03	7.93E-04	7.37E-05	2.29E-03
11		4.85	4.85	90.30	15.97	0.07	0.07	1.32	1.46	9.22	22.23	68.56	4.06	1.64E-04	3.96E-04	1.22E-03	1.78E-03
12		0.00	68.09	31.91	4.55	0.00	0.28	0.13	0.42	0.00	28.14	71.86	8.91	0.00E+00	1.10E-03	2.81E-03	3.91E-03
Total		16.36	24.29	59.34	100	0.12	0.18	0.45	0.76	59.37	13.12	27.51	100	2.17E-03	4.80E-04	1.01E-03	3.66E-03

Table 1: Mangrove Floristic Characteristics

2009

	% Canopy	Tree Numbers				Average DBH (cm)				Total Basal Area (m^2)				Average Basal Area (m^2)			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	24.50	7	10	32	49	18.00	2.63	1.91	4.36	0.260	0.011	0.025	0.296	3.72E-02	1.05E-03	7.72E-04	6.03E-03
2	32.70	67	22	100	189	2.79	0.76	1.03	1.62	0.193	0.002	0.021	0.216	2.88E-03	7.68E-05	2.12E-04	1.14E-03
3	38.80	41	28	193	262	4.43	2.19	3.19	3.28	0.086	0.035	0.523	0.644	2.10E-03	1.27E-03	2.71E-03	2.46E-03
4	59.10	4	81	6	91	0.83	4.04	1.18	3.71	0.000	0.169	0.001	0.170	5.64E-05	2.08E-03	2.37E-04	1.87E-03
5	32.70	19	30	37	86	9.36	1.52	5.74	5.07	0.214	0.008	0.182	0.405	1.13E-02	2.72E-04	4.93E-03	4.70E-03
6	8.16	23	12	32	67	3.44	0.85	2.11	2.34	0.050	0.001	0.023	0.074	2.19E-03	6.22E-05	7.13E-04	1.10E-03
7	71.40	7	24	2	33	26.33	2.50	9.95	8.01	0.428	0.018	0.016	0.462	6.11E-02	7.45E-04	8.02E-03	1.40E-02
8	65.30	4	28	20	52	43.93	6.57	0.83	7.23	0.868	0.119	0.001	0.989	2.17E-01	4.26E-03	7.25E-05	1.90E-02
9	81.60	2	4	120	126	62.00	9.50	1.60	2.81	0.747	0.065	0.202	1.014	3.74E-01	1.63E-02	1.68E-03	8.05E-03
10	57.10	8	32	44	84	15.88	4.93	1.26	4.05	0.166	0.097	0.012	0.275	2.08E-02	3.02E-03	2.79E-04	3.28E-03
11	20.40	25	12	89	126	1.52	3.12	2.57	2.41	0.017	0.047	0.094	0.158	6.67E-04	3.95E-03	1.05E-03	1.25E-03
12	69.40	0	31	15	46	0.00	6.99	14.83	9.55	0.000	0.129	0.298	0.427	0.00E+00	4.15E-03	1.99E-02	9.27E-03
Total		207	314	690	1211	15.71	3.80	3.85	4.54	3.030	0.700	1.398	5.129	1.46E-02	2.23E-03	2.03E-03	4.23E-03

2009

	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	14.29	20.41	65.31	4.05	0.06	0.09	0.28	0.43	88.09	3.55	8.36	5.76	2.30E-03	9.29E-05	2.18E-04	2.61E-03
2	35.45	11.64	52.91	15.61	0.59	0.19	0.88	1.67	89.38	0.78	9.83	4.21	1.70E-03	1.49E-05	1.87E-04	1.91E-03
3	15.65	10.69	73.66	21.64	0.36	0.25	1.71	2.32	13.34	5.50	81.16	12.56	7.60E-04	3.13E-04	4.62E-03	5.69E-03
4	4.40	89.01	6.59	7.51	0.04	0.72	0.05	0.80	0.13	99.03	0.83	3.32	1.99E-06	1.49E-03	1.26E-05	1.51E-03
5	22.09	34.88	43.02	7.10	0.17	0.27	0.33	0.76	52.92	2.02	45.06	7.89	1.89E-03	7.23E-05	1.61E-03	3.58E-03

6		34.33	17.91	47.76	5.53	0.20	0.11	0.28	0.59	68.15	1.01	30.84	1.44	4.46E-04	6.60E-06	2.02E-04	6.54E-04
7		21.21	72.73	6.06	2.73	0.06	0.21	0.02	0.29	92.66	3.87	3.47	9.01	3.78E-03	1.58E-04	1.42E-04	4.08E-03
8		7.69	53.85	38.46	4.29	0.04	0.25	0.18	0.46	87.80	12.05	0.15	19.29	7.68E-03	1.05E-03	1.28E-05	8.75E-03
9		1.59	3.17	95.24	10.40	0.02	0.04	1.06	1.11	73.68	6.42	19.90	19.77	6.61E-03	5.76E-04	1.78E-03	8.97E-03
10		9.52	38.10	52.38	6.94	0.07	0.28	0.39	0.74	60.43	35.10	4.47	5.36	1.47E-03	8.54E-04	1.09E-04	2.43E-03
11		19.84	9.52	70.63	10.40	0.22	0.11	0.79	1.11	10.57	30.03	59.39	3.08	1.47E-04	4.19E-04	8.28E-04	1.39E-03
12		0.00	67.39	32.61	3.80	0.00	0.27	0.13	0.41	0.00	30.13	69.87	8.32	0.00E+00	1.14E-03	2.64E-03	3.77E-03
Total		17.09	25.93	56.98	100	0.15	0.23	0.51	0.89	59.09	13.65	27.27	100	2.23E-03	5.16E-04	1.03E-03	3.78E-03

Table 1: Mangrove Floristic Characteristics

2010

	% Canopy	**Tree Numbers**				**Average DBH (cm)**				**Total Basal Area (m^2)**				**Average Basal Area (m^2)**			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	42.90	7	11	59	77	18.20	3.09	1.48	3.23	0.262	0.017	0.030	0.310	3.75E-02	1.58E-03	5.08E-04	4.02E-03
2	32.70	71	31	116	218	2.88	0.88	1.28	1.76	0.201	0.003	0.031	0.235	2.83E-03	8.94E-05	2.69E-04	1.08E-03
3	28.60	44	31	127	202	4.23	2.17	3.17	3.25	0.090	0.043	0.357	0.490	2.05E-03	1.39E-03	2.81E-03	2.43E-03
4	61.20	4	107	8	119	1.23	3.39	1.35	3.18	0.000	0.191	0.003	0.194	1.22E-04	1.79E-03	3.18E-04	1.63E-03
5	28.60	19	35	37	91	9.25	1.38	5.99	4.90	0.212	0.009	0.196	0.416	1.12E-02	2.45E-04	5.28E-03	4.58E-03
6	10.20	22	12	31	65	3.82	1.07	2.25	2.56	0.057	0.001	0.025	0.083	2.57E-03	9.20E-05	8.14E-04	1.28E-03
7	65.30	7	26	2	35	27.51	2.56	10.55	8.01	0.464	0.020	0.018	0.502	6.63E-02	7.77E-04	8.93E-03	1.43E-02
8	55.10	4	26	36	66	44.75	6.67	0.94	5.85	0.907	0.114	0.004	1.025	2.27E-01	4.40E-03	1.08E-04	1.55E-02
9	63.30	2	16	137	155	62.95	2.59	1.84	2.71	0.764	0.066	0.228	1.058	3.82E-01	4.12E-03	1.66E-03	6.83E-03
10	63.30	8	32	56	96	15.99	5.23	1.44	3.92	0.169	0.105	0.024	0.297	2.11E-02	3.27E-03	4.21E-04	3.10E-03
11	24.50	27	12	39	78	2.11	3.23	2.21	2.33	0.022	0.046	0.035	0.103	8.15E-04	3.85E-03	8.97E-04	1.32E-03
12	63.30	0	31	14	45	0.00	7.10	14.76	9.48	0.000	0.132	0.288	0.421	0.00E+00	4.27E-03	2.06E-02	9.35E-03
Total		215	370	662	1247	16.08	3.28	3.94	4.26	3.149	0.748	1.238	5.135	1.46E-02	2.02E-03	1.87E-03	4.12E-03

2010

	% Relative Density				**Absolute Density (m^2)**				**% Relative Dominance**				**Absolute Dominance**			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	9.09	14.29	76.62	6.17	0.06	0.10	0.52	0.68	84.72	5.60	9.68	6.03	2.32E-03	1.53E-04	2.65E-04	2.74E-03
2	32.57	14.22	53.21	17.48	0.63	0.27	1.03	1.93	85.52	1.18	13.30	4.58	1.78E-03	2.45E-05	2.76E-04	2.08E-03
3	21.78	15.35	62.87	16.20	0.39	0.27	1.12	1.79	18.41	8.79	72.81	9.55	7.98E-04	3.81E-04	3.16E-03	4.34E-03
4	3.36	89.92	6.72	9.54	0.04	0.95	0.07	1.05	0.25	98.44	1.31	3.78	4.31E-06	1.69E-03	2.25E-05	1.72E-03
5	20.88	38.46	40.66	7.30	0.17	0.31	0.33	0.80	50.99	2.06	46.95	8.11	1.88E-03	7.58E-05	1.73E-03	3.68E-03
6	33.85	18.46	47.69	5.21	0.19	0.11	0.27	0.57	68.21	1.33	30.46	1.61	5.00E-04	9.77E-06	2.23E-04	7.33E-04

7	20.00	74.29	5.71	2.81	0.06	0.23	0.02	0.31	92.42	4.02	3.56	9.78	4.10E-03	1.79E-04	1.58E-04	4.44E-03
8	6.06	39.39	54.55	5.29	0.04	0.23	0.32	0.58	88.45	11.17	0.38	19.96	8.02E-03	1.01E-03	3.44E-05	9.06E-03
9	1.29	10.32	88.39	12.43	0.02	0.14	1.21	1.37	72.25	6.23	21.52	20.61	6.76E-03	5.82E-04	2.01E-03	9.35E-03
10	8.33	33.33	58.33	7.70	0.07	0.28	0.50	0.85	56.85	35.22	7.93	5.79	1.49E-03	9.25E-04	2.08E-04	2.63E-03
11	34.62	15.38	50.00	6.26	0.24	0.11	0.34	0.69	21.31	44.79	33.90	2.01	1.95E-04	4.09E-04	3.09E-04	9.13E-04
12	0.00	68.89	31.11	3.61	0.00	0.27	0.12	0.40	0.00	31.44	68.56	8.19	0.00E+00	1.17E-03	2.55E-03	3.72E-03
Total	17.24	29.67	53.09	100.00	0.16	0.27	0.49	0.92	61.33	14.56	24.11	100.00	2.32E-03	5.51E-04	9.12E-04	3.78E-03

Table 1: Mangrove Floristic Characteristics

2011

	% Canopy	Tree Numbers				Average DBH (cm)				Total Basal Area (m^2)				Average Basal Area (m^2)			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	34.69	8	12	73	93	15.34	3.36	1.89	3.23	0.221	0.021	0.045	0.288	2.77E-02	1.79E-03	6.15E-04	3.09E-03
2	26.53	74	38	130	242	3.03	1.04	1.47	1.88	0.227	0.004	0.046	0.277	3.07E-03	1.12E-04	3.52E-04	1.15E-03
3	42.85	44	36	109	189	4.57	2.05	2.53	2.91	0.094	0.043	0.126	0.264	2.14E-03	1.20E-03	1.16E-03	1.40E-03
4	51.02	4	121	8	133	1.35	3.30	1.88	3.15	0.001	0.209	0.004	0.214	1.46E-04	1.73E-03	4.70E-04	1.61E-03
5	16.33	19	35	36	90	8.88	1.66	5.79	4.85	0.203	0.011	0.144	0.358	1.07E-02	3.11E-04	4.01E-03	3.98E-03
6	12.44	23	12	30	65	4.19	1.13	2.34	2.77	0.074	0.004	0.027	0.099	3.07E-03	1.05E-04	8.99E-04	1.52E-03
7	69.39	7	28	3	38	26.97	2.67	6.97	7.47	0.451	0.026	0.017	0.494	6.49E-02	8.02E-04	5.70E-03	1.30E-02
8	59.18	5	25	56	86	36.32	9.52	1.13	5.62	0.931	0.657	0.008	1.596	1.86E-01	2.63E-02	1.43E-04	1.86E-02
9	77.55	2	17	149	168	63.45	2.94	1.87	2.71	0.770	0.062	0.273	1.119	3.90E-01	3.96E-03	1.83E-03	6.66E-03
10	51.02	8	33	76	117	16.14	5.13	1.42	3.47	0.170	0.107	0.024	0.301	2.15E-02	3.17E-03	3.15E-04	2.57E-03
11	28.57	31	16	40	87	2.26	2.71	2.05	2.25	0.021	0.044	0.034	0.109	8.78E-04	3.00E-03	8.42E-04	1.25E-03
12	63.27	0	29	13	42	0.00	7.24	16.06	9.95	0.000	0.123	0.307	0.434	0.00E+00	4.39E-03	2.36E-02	1.03E-02
Total		225	402	723	1350	15.21	3.56	3.78	4.19	3.180	1.317	1.054	5.551	1.41E-02	3.28E-03	1.46E-03	4.11E-03

2011

	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	8.60	12.90	78.49	6.89	0.07	0.11	0.65	0.82	7.46	15.60	5.18	5.18	1.96E-03	1.90E-04	3.97E-04	2.54E-03

		30.5	15.7	53.7			0.3				16.4					
2		8	0	2	17.93	0.65	4	1.15	2.14	1.54	9	4.99	4.99	2.01E-03	3.77E-05	4.04E-04	2.45E-03
		23.2	19.0	57.6			0.3			16.4	47.9					
3		8	5	7	14.00	0.39	2	0.96	1.67	3	3	4.75	4.75	8.31E-04	3.83E-04	1.12E-03	2.33E-03
			90.9				1.0			97.9							
4		3.01	8	6.02	9.85	0.04	7	0.07	1.18	7	1.76	3.85	3.85	5.18E-06	1.85E-03	3.33E-05	1.89E-03
		21.1	38.8	40.0			0.3				40.2						
5		1	9	0	6.67	0.17	1	0.32	0.80	3.03	6	6.45	6.45	1.80E-03	9.61E-05	1.28E-03	3.17E-03
		35.3	18.4	46.1			0.1				27.3						
6		8	6	5	4.81	0.20	1	0.27	0.57	1.28	1	1.78	1.78	6.24E-04	1.11E-05	2.38E-04	8.73E-04
		18.4	73.6				0.2										
7		2	8	7.89	2.81	0.06	5	0.03	0.34	4.55	3.46	8.89	8.89	4.01E-03	1.99E-04	1.51E-04	4.36E-03
			29.0	65.1			0.2			41.1							
8		5.81	7	2	6.37	0.04	2	0.50	0.76	4	0.50	28.74	28.74	8.23E-03	5.80E-03	7.08E-05	1.41E-02
			10.1	88.6			0.1				24.3						
9		1.19	2	9	12.44	0.02	5	1.32	1.49	6.01	7	20.16	20.16	6.89E-03	5.95E-04	2.41E-03	9.89E-03
			28.2	64.9			0.2			34.7							
10		6.84	1	6	8.67	0.07	9	0.67	1.03	8	7.97	5.41	5.41	1.52E-03	9.24E-04	2.12E-04	2.66E-03
		35.6	18.3	45.9			0.1			44.0	30.9						
11		3	9	8	6.44	0.27	4	0.35	0.77	7	3	1.96	1.96	2.41E-04	4.24E-04	2.98E-04	9.63E-04
			69.0	30.9			0.2			29.3	70.6						
12		0.00	5	5	3.11	0.00	6	0.11	0.37	7	3	7.82	7.82	0.00E+00	1.13E-03	2.71E-03	3.84E-03
		16.6	29.7	53.5	100.0		0.3			23.7	18.9	100.0	100.0				
Total		7	8	6	0	0.17	0	0.53	0.99	2	9	0	0	2.34E-03	9.70E-04	7.77E-04	4.09E-03

Table 1: Mangrove Floristic Characteristics

2012

	% Canopy	**Tree Numbers**				**Average DBH (cm)**				**Total Basal Area (m^2)**				**Average Basal Area (m^2)**			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
						10.8	3.1			0.23	0.02						
1	44.9	12	15	80	107	1	5	2.26	3.35	3	6	0.062	0.321	1.94E-02	1.72E-03	7.80E-04	3.00E-03
							1.0			0.25	0.00						
2	42.9	78	42	138	258	3.11	8	1.56	1.95	6	5	0.049	0.310	3.29E-03	1.27E-04	3.52E-04	1.20E-03
							1.9			0.10	0.04						
3	38.8	49	49	98	196	4.39	0	2.42	2.78	4	7	0.114	0.265	2.12E-03	9.64E-04	1.16E-03	1.35E-03
							3.0			0.00	0.21						
4	49.0	4	134	9	147	1.60	8	1.93	2.97	1	1	0.004	0.216	2.04E-04	1.58E-03	4.86E-04	1.47E-03
							1.7			0.19	0.01						
5	36.7	18	36	35	89	9.29	5	6.01	4.95	2	2	0.151	0.355	1.07E-02	3.39E-04	4.30E-03	3.98E-03

							1.0			0.06	0.00						
6	12.0	23	15	30	68	4.10	6	2.61	2.77	3	2	0.029	0.094	2.74E-03	1.09E-04	9.81E-04	1.38E-03
						26.5	2.5			0.44	0.02						
7	63.3	7	31	4	42	6	0	5.43	6.79	0	3	0.017	0.480	6.28E-02	7.41E-04	4.35E-03	1.14E-02
						36.5	6.3			0.92	0.10						
8	57.1	5	26	76	107	6	6	1.10	4.03	8	8	0.011	1.046	1.86E-01	4.14E-03	1.41E-04	9.78E-03
						63.9	2.8			0.79	0.06						
9	69.4	2	19	155	176	0	3	1.97	2.76	1	9	0.294	1.154	3.96E-01	3.64E-03	1.89E-03	6.56E-03
						16.1	4.8			0.17	0.10						
10	61.2	8	35	88	131	5	4	1.36	3.19	4	2	0.024	0.300	2.18E-02	2.90E-03	2.75E-04	2.29E-03
							2.1			0.03	0.04						
11	18.4	38	25	39	102	2.28	2	1.58	1.97	3	7	0.012	0.091	8.62E-04	1.88E-03	2.97E-04	8.96E-04
							7.3	17.1	10.2	0.00	0.13						
12	77.6	0	29	12	41	0.00	9	8	6	0	6	0.308	0.444	0.00E+00	4.68E-03	2.57E-02	1.08E-02
						14.8	3.1			3.21	0.78						
Total		244	456	764	1464	9	7	3.78	3.98	5	7	1.075	5.077	1.32E-02	1.73E-03	1.41E-03	3.47E-03

2012

	% Relative Density				**Absolute Density (m^2)**				**% Relative Dominance**				**Absolute Dominance**			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Tota l**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
	11.2	14.0	74.7			0.1			72.5							
1	1	2	7	7.31	0.11	3	0.71	0.95	2	8.03	19.45	6.32	2.06E-03	2.28E-04	5.52E-04	2.84E-03
	30.2	16.2	53.4			0.3			82.6							
2	3	8	9	17.62	0.69	7	1.22	2.28	4	1.72	15.63	6.11	2.27E-03	4.73E-05	4.29E-04	2.74E-03
	25.0	25.0	50.0			0.4			39.1	17.8						
3	0	0	0	13.39	0.43	3	0.87	1.73	9	2	42.98	5.22	9.18E-04	4.18E-04	1.01E-03	2.34E-03
		91.1				1.1				97.6						
4	2.72	6	6.12	10.04	0.04	8	0.08	1.30	0.38	0	2.02	4.26	7.21E-06	1.87E-03	3.87E-05	1.91E-03
	20.2	40.4	39.3			0.3			54.0							
5	2	5	3	6.08	0.16	2	0.31	0.79	9	3.44	42.48	6.98	1.70E-03	1.08E-04	1.33E-03	3.14E-03
	33.8	22.0	44.1			0.1			66.9							
6	2	6	2	4.64	0.20	3	0.27	0.60	7	1.74	31.29	1.85	5.57E-04	1.45E-05	2.60E-04	8.32E-04
	16.6	73.8				0.2			91.5							
7	7	1	9.52	2.87	0.06	7	0.04	0.37	9	4.78	3.62	9.46	3.89E-03	2.03E-04	1.54E-04	4.25E-03
		24.3	71.0			0.2			88.7	10.2						
8	4.67	0	3	7.31	0.04	3	0.67	0.95	0	8	1.02	20.60	8.20E-03	9.51E-04	9.46E-05	9.25E-03
		10.8	88.0			0.1			68.5							
9	1.14	0	7	12.02	0.02	7	1.37	1.56	7	6.00	25.43	22.74	7.00E-03	6.12E-04	2.60E-03	1.02E-02

10	6.11	26.72	67.18	8.95	0.07	0.31	0.78	1.16	58.08	33.86	8.06	5.91	1.54E-03	8.98E-04	2.14E-04	2.65E-03
11	37.25	24.51	38.24	6.97	0.34	0.22	0.34	0.90	35.83	51.48	12.68	1.80	2.90E-04	4.16E-04	1.03E-04	8.08E-04
12	0.00	70.73	29.27	2.80	0.00	0.26	0.11	0.36	0.00	30.56	69.44	8.74	0.00E+00	1.20E-03	2.72E-03	3.92E-03
Total	16.67	31.15	52.19	100.00	0.18	0.34	0.56	1.08	63.32	15.51	21.17	100.00	2.37E-03	5.80E-04	7.92E-04	3.74E-03

Table 1: Mangrove Floristic Characteristics

2013

Plot	% Canopy	Tree Numbers				Average DBH (cm)				Total Basal Area (m^2)				Average Basal Area (m^2)			
		B	R	W	Total	B	R	W	Total	B	R	W	Total	B	R	W	Total
1	77.55	14	14	76	104	9.69	3.44	2.60	3.67	0.226	0.030	0.075	0.331	1.62E-02	2.12E-03	9.87E-04	3.18E-03
2	42.85	79	43	145	267	3.52	1.56	1.87	2.31	0.335	0.011	0.070	0.415	4.24E-03	2.29E-04	4.88E-04	1.56E-03
3	38.77	50	55	77	182	4.21	2.05	2.65	2.90	0.097	0.054	0.091	0.242	1.94E-03	9.78E-04	1.19E-03	1.33E-03
4	61.22	4	145	10	159	1.70	3.06	2.05	2.96	0.001	0.216	0.005	0.222	2.36E-04	1.49E-03	4.99E-04	1.40E-03
5	38.80	18	38	33	89	9.61	1.77	6.19	4.99	0.199	0.013	0.149	0.361	1.11E-02	3.42E-04	4.50E-03	4.05E-03
6	16.32	22	16	29	67	4.17	1.24	3.04	2.98	0.047	0.002	0.037	0.086	2.13E-03	1.33E-04	1.29E-03	1.29E-03
7	81.63	7	31	4	42	0	26.42	2.63	6.89	0.438	0.023	0.018	0.480	6.26E-02	7.51E-04	4.54E-03	1.14E-02
8	67.35	5	27	97	129	6	37.06	1.35	3.76	0.945	0.113	0.017	1.075	1.89E-01	4.13E-03	1.95E-04	8.34E-03
9	91.83	2	20	139	161	0	63.42	2.27	3.11	0.770	0.072	0.329	1.171	3.87E-01	3.48E-03	2.36E-03	7.28E-03
10	69.39	7	39	87	133	1	17.34	1.61	3.32	0.170	0.096	0.045	0.311	2.45E-02	2.79E-03	3.60E-04	2.34E-03
11	30.61	41	37	41	119	2.44	1.83	1.63	1.97	0.026	0.054	0.022	0.102	9.51E-04	1.36E-03	3.01E-04	8.53E-04
12	100.00	0	27	12	39	0.00	7.50	17.50	10.62	0.000	0.134	0.315	0.449	#DIV/0!	5.03E-03	2.61E-02	1.15E-02
Total		249	492	750	1491	14.96	3.25	4.05	4.12	3.273	0.823	1.150	5.246	1.31E-02	1.67E-03	1.53E-03	3.52E-03

2013

Plot	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
	B	R	W	Total	B	R	W	Total	B	R	W	Total	B	R	W	Total
1	13.46	13.46	73.08	6.98	0.12	0.12	0.67	0.92	68.38	8.956	22.66	6.31	2.00E-03	2.62E-04	6.63E-04	2.93E-03

		29.5	16.1	54.3			0.3			80.6		17.0					
2		9	0	1	17.91	0.70	8	1.28	2.36	0	2.37	3	7.92	2.96E-03	8.70E-05	6.26E-04	3.67E-03
		27.4	30.2	42.3			0.4			40.0	22.2	37.7					
3		7	2	1	12.21	0.44	9	0.68	1.61	4	3	3	4.61	8.56E-04	4.75E-04	8.07E-04	2.14E-03
			91.1				1.2				97.3						
4		2.52	9	6.29	10.66	0.04	8	0.09	1.41	0.43	3	2.25	4.23	8.35E-06	1.91E-03	4.41E-05	1.96E-03
		20.2	42.7	37.0			0.3			55.2		41.1					
5		2	0	8	5.97	0.16	4	0.29	0.79	3	3.60	7	6.88	1.76E-03	1.15E-04	1.31E-03	3.19E-03
		32.8	23.8	43.2			0.1			54.2		43.2					
6		4	8	8	4.49	0.19	4	0.26	0.59	8	2.46	6	1.65	4.15E-04	1.88E-05	3.30E-04	7.64E-04
		16.6	73.8				0.2			91.3							
7		7	1	9.52	2.82	0.06	7	0.04	0.37	7	4.85	3.78	9.15	3.88E-03	2.06E-04	1.61E-04	4.24E-03
			20.9	75.1			0.2			87.8	10.3						
8		3.88	3	9	8.65	0.04	4	0.86	1.14	6	8	1.76	20.50	8.35E-03	9.87E-04	1.68E-04	9.51E-03
			12.4	86.3			0.1			66.0		27.9					
9		1.24	2	4	10.80	0.02	8	1.23	1.42	6	5.95	9	22.33	6.84E-03	6.16E-04	2.90E-03	1.04E-02
			29.3	65.4			0.3			55.0	34.9	10.0					
10		5.26	2	1	8.92	0.06	4	0.77	1.18	3	1	6	5.94	1.52E-03	9.61E-04	2.77E-04	2.75E-03
		34.4	31.0	34.4			0.3			38.4	49.4	12.1					
11		5	9	5	7.98	0.36	3	0.36	1.05	1	3	7	1.94	3.45E-04	4.44E-04	1.09E-04	8.98E-04
			69.2	30.7			0.2				30.2	69.7					
12		0.00	3	7	2.62	0.00	4	0.11	0.34	0.00	1	9	8.57	#DIV/0!	1.20E-03	2.77E-03	3.97E-03
Tota		16.7	33.0	50.3	100.0		0.3			62.3	15.7	21.9	100.0				
l		0	0	0	0	0.18	6	0.55	1.10	8	0	2	0	2.41E-03	6.07E-04	8.48E-04	3.87E-03

Table 1: Mangrove Floristic Characteristics

2014

	% Canopy	**Tree Numbers**				**Average DBH (cm)**				**Total Basal Area (m^2)**				**Average Basal Area (m^2)**			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Tota l**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
							3.7										
1	59.18	14	13	68	95	9.41	5	2.73	3.85	0.22	0.03	0.07	0.32	1.56E-02	2.62E-03	9.77E-04	3.36E-03
							1.5										
2	46.94	82	43	149	274	3.21	9	1.67	2.12	0.27	0.02	0.06	0.34	3.27E-03	3.63E-04	4.03E-04	1.25E-03
							2.0										
3	42.86	50	60	42	152	4.01	7	1.94	2.67	0.08	0.06	0.02	0.16	1.68E-03	1.00E-03	4.29E-04	1.07E-03
							2.8										
4	69.39	4	154	11	169	1.75	4	2.05	2.77	0.00	0.21	0.01	0.22	2.49E-04	1.35E-03	6.89E-04	1.28E-03
							1.8										
5	30.61	20	38	33	91	8.48	2	5.90	4.76	0.19	0.01	0.13	0.34	9.72E-03	3.61E-04	4.01E-03	3.74E-03

							0.9									
6	22.45	21	25	30	76	4.71	2	2.55	2.61	0.06	0.00	0.02	0.08	2.78E-03	9.35E-05	7.81E-04	1.11E-03
						26.6	2.3										
7	61.22	7	36	4	47	7	4	5.98	6.27	0.45	0.02	0.02	0.49	6.43E-02	6.67E-04	5.24E-03	1.05E-02
						37.8	6.4										
8	59.18	5	27	108	140	2	0	1.45	3.70	0.99	0.11	0.02	1.13	1.98E-01	4.23E-03	2.16E-04	8.05E-03
						63.4	2.6										
9	75.51	2	21	106	129	5	4	2.57	3.53	0.78	0.07	0.31	1.16	3.90E-01	3.18E-03	2.97E-03	9.00E-03
						17.0	4.6										
10	65.31	7	40	76	123	3	1	1.73	3.54	0.16	0.11	0.03	0.30	2.35E-02	2.71E-03	4.18E-04	2.48E-03
							1.5										
11	32.65	44	56	46	146	2.87	7	1.65	1.99	0.05	0.05	0.01	0.12	1.12E-03	9.54E-04	3.26E-04	8.06E-04
							7.7	18.0									
12	85.71	0	25	11	36	0.00	8	4	10.92	0.00	0.13	0.30	0.44	0.00E+00	5.30E-03	2.77E-02	1.21E-02
Tota						14.9	3.1										
l		256	538	684	1478	5	9	4.02	4.06	3.26	0.83	1.02	5.11	1.27E-02	1.55E-03	1.49E-03	3.46E-03

2014

	% Relative Density				**Absolute Density (m^2)**				**% Relative Dominance**				**Absolute Dominance**			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Tota l**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
	14.7	13.6	71.5			0.1			68.5	10.6	20.8					
1	4	8	8	6.43	0.12	1	0.60	0.84	3	6	1	6.25	1.93E-03	3.01E-04	5.87E-04	2.82E-03
	29.9	15.6	54.3			0.3			77.9		17.4					
2	3	9	8	18.54	0.73	8	1.32	2.42	9	4.54	7	6.72	2.37E-03	1.38E-04	5.30E-04	3.04E-03
	32.8	39.4	27.6			0.5			51.7	37.1	11.1					
3	9	7	3	10.28	0.44	3	0.37	1.34	6	4	0	3.18	7.42E-04	5.33E-04	1.59E-04	1.43E-03
		91.1				1.3				96.0						
4	2.37	2	6.51	11.43	0.04	6	0.10	1.49	0.46	4	3.50	4.24	8.79E-06	1.84E-03	6.70E-05	1.91E-03
	21.9	41.7	36.2			0.3			57.1		38.8					
5	8	6	6	6.16	0.18	4	0.29	0.80	0	4.03	6	6.66	1.72E-03	1.21E-04	1.17E-03	3.01E-03
	27.6	32.8	39.4			0.2			69.3		27.8					
6	3	9	7	5.14	0.19	2	0.27	0.67	8	2.78	4	1.65	5.16E-04	2.07E-05	2.07E-04	7.44E-04
	14.8	76.6				0.3			90.9							
7	9	0	8.51	3.18	0.06	2	0.04	0.42	1	4.85	4.24	9.69	3.98E-03	2.12E-04	1.85E-04	4.38E-03
		19.2	77.1			0.2			87.7	10.1						
8	3.57	9	4	9.47	0.04	4	0.95	1.24	8	5	2.07	22.06	8.75E-03	1.01E-03	2.06E-04	9.96E-03
		16.2	82.1			0.1			67.1		27.0					
9	1.55	8	7	8.73	0.02	9	0.94	1.14	7	5.75	8	22.74	6.90E-03	5.91E-04	2.78E-03	1.03E-02

		32.5	61.7			0.3			53.9	35.5	10.4					
10	5.69	2	9	8.32	0.06	5	0.67	1.09	9	8	3	5.96	1.45E-03	9.58E-04	2.81E-04	2.69E-03
	30.1	38.3	31.5			0.5			41.8	45.4	12.7					
11	4	6	1	9.88	0.39	0	0.41	1.29	5	3	3	2.30	4.35E-04	4.73E-04	1.32E-04	1.04E-03
		69.4	30.5			0.2				30.3	69.6					
12	0.00	4	6	2.44	0.00	2	0.10	0.32	0.00	2	8	8.55	0.00E+00	1.17E-03	2.69E-03	3.86E-03
Tota	17.3	36.4	46.2	100.0		0.4			63.7	16.3	19.9	100.0				
l	2	0	8	0	0.19	0	0.50	1.09	6	1	2	0	2.40E-03	6.14E-04	7.50E-04	3.76E-03

Table 1: Mangrove Floristic Characteristics

2015

	% Canopy	**Tree Numbers**				**Average DBH (cm)**				**Total Basal Area (m^2)**				**Average Basal Area (m^2)**			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Tota l**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
							4.0			0.22	0.03	0.07					
1	65.31	20	13	58	91	6.89	0	3.17	4.11	9	8	2	0.339	1.14E-02	2.93E-03	1.24E-03	3.72E-03
							2.0			0.23	0.01	0.07					
2	55.10	84	47	160	291	3.35	1	1.83	2.30	6	8	9	0.333	2.81E-03	3.85E-04	4.93E-04	1.14E-03
							2.1			0.08	0.06	0.00					
3	53.06	51	65	24	140	3.88	7	1.54	2.69	3	4	8	0.156	1.64E-03	9.84E-04	3.40E-04	1.11E-03
							2.9			0.00	0.22	0.01					
4	65.31	4	160	11	175	1.93	3	2.57	2.89	1	0	0	0.231	3.03E-04	1.37E-03	8.82E-04	1.32E-03
							1.8			0.19	0.01	0.13					
5	32.65	20	39	35	94	8.69	4	5.57	4.69	7	5	7	0.348	9.85E-03	3.76E-04	3.90E-03	3.71E-03
							1.0			0.04	0.00	0.02					
6	38.78	19	32	30	81	3.99	9	2.44	2.27	0	4	1	0.065	2.10E-03	1.23E-04	6.99E-04	8.01E-04
						24.2	2.5			0.38	0.02	0.01					
7	67.35	7	37	4	48	6	1	5.28	5.91	5	9	6	0.430	5.50E-02	7.83E-04	3.92E-03	8.96E-03
						32.7	6.0			0.66	0.12	0.02					
8	75.51	5	30	114	149	4	0	1.56	3.50	9	0	8	0.817	1.34E-01	4.01E-03	2.47E-04	5.49E-03
						63.1	3.0			0.76	0.07	0.33					
9	77.55	2	21	77	100	0	2	3.22	4.38	3	5	3	1.171	3.82E-01	3.56E-03	4.32E-03	1.17E-02
						17.0	4.7			0.16	0.11	0.03					
10	73.47	7	40	62	109	6	7	2.07	4.02	5	5	4	0.314	2.36E-02	2.86E-03	5.51E-04	2.88E-03
							1.4			0.05	0.05	0.01					
11	38.78	49	71	50	170	2.93	4	1.76	1.96	6	6	8	0.130	1.14E-03	7.82E-04	3.68E-04	7.62E-04
							8.3	18.0		0.00	0.13	0.30					
12	77.55	0	21	11	32	0.00	8	2	11.69	0	0	4	0.433	0.00E+00	6.18E-03	2.76E-02	1.35E-02

Tota					14.0	3.3			2.82	0.88	1.05				
l	268	576	636	1480	7	5	4.09	4.20	4	2	9	4.766	1.05E-02	1.53E-03	1.67E-03	3.22E-03

2015

	% Relative Density				**Absolute Density (m^2)**				**% Relative Dominance**				**Absolute Dominance**			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Tota l**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
	21.9	14.2	63.7			0.1			67.5	11.2	21.2					
1	8	9	4	6.15	0.18	1	0.51	0.80	1	5	4	7.11	2.02E-03	3.37E-04	6.36E-04	3.00E-03
	28.8	16.1	54.9			0.4			70.8		23.6					
2	7	5	8	19.66	0.74	2	1.41	2.57	7	5.44	9	6.98	2.08E-03	1.60E-04	6.97E-04	2.94E-03
	36.4	46.4	17.1			0.5			53.6	41.1						
3	3	3	4	9.46	0.45	7	0.21	1.24	3	3	5.24	3.26	7.38E-04	5.66E-04	7.21E-05	1.38E-03
		91.4				1.4				95.2						
4	2.29	3	6.29	11.82	0.04	1	0.10	1.55	0.53	7	4.21	4.84	1.07E-05	1.94E-03	8.58E-05	2.04E-03
	21.2	41.4	37.2			0.3			56.5		39.2					
5	8	9	3	6.35	0.18	4	0.31	0.83	5	4.22	4	7.31	1.74E-03	1.30E-04	1.21E-03	3.08E-03
	23.4	39.5	37.0			0.2			61.6		32.3					
6	6	1	4	5.47	0.17	8	0.27	0.72	0	6.07	3	1.36	3.53E-04	3.48E-05	1.85E-04	5.74E-04
	14.5	77.0				0.3			89.6							
7	8	8	8.33	3.24	0.06	3	0.04	0.42	1	6.74	3.65	9.02	3.41E-03	2.56E-04	1.39E-04	3.80E-03
		20.1	76.5			0.2			81.8	14.7						
8	3.36	3	1	10.07	0.04	7	1.01	1.32	4	1	3.45	17.15	5.91E-03	1.06E-03	2.49E-04	7.23E-03
		21.0	77.0			0.1			65.1		28.4					
9	2.00	0	0	6.76	0.02	9	0.68	0.88	9	6.38	2	24.56	6.75E-03	6.61E-04	2.94E-03	1.04E-02
		36.7	56.8			0.3			52.6	36.4	10.8					
10	6.42	0	8	7.36	0.06	5	0.55	0.96	3	9	9	6.59	1.46E-03	1.01E-03	3.02E-04	2.77E-03
	28.8	41.7	29.4			0.6			42.9	42.8	14.1					
11	2	6	1	11.49	0.43	3	0.44	1.50	8	4	8	2.72	4.93E-04	4.91E-04	1.62E-04	1.15E-03
		65.6	34.3			0.1				29.9	70.0					
12	0.00	3	8	2.16	0.00	9	0.10	0.28	0.00	5	5	9.09	0.00E+00	1.15E-03	2.68E-03	3.83E-03
Tota	18.1	38.9	42.9	100.0		0.4			59.2	18.5	22.2	100.0				
l	1	2	7	0	0.20	2	0.47	1.09	6	2	2	0	2.08E-03	6.50E-04	7.80E-04	3.51E-03

Table 1: Mangrove Floristic Characteristics

2016

Plot	% Canopy	Tree Numbers				Average DBH (cm)				Total Basal Area (m^2)				Average Basal Area (m^2)			
		B	R	W	Total	B	R	W	Total	B	R	W	Total	B	R	W	Total
1	57.14	14	9	31	54	8.51	5.12	4.29	5.52	0.218	0.035	0.050	0.303	1.56E-02	3.90E-03	1.62E-03	5.62E-03
2	57.14	83	39	147	269	3.48	1.89	2.04	2.46	0.282	0.019	0.067	0.368	3.40E-03	4.76E-04	4.55E-04	1.37E-03
3	36.73	48	54	8	110	4.26	2.19	2.78	3.14	0.092	0.047	0.006	0.145	1.92E-03	8.65E-04	7.07E-04	1.31E-03
4	73.47	4	155	11	170	1.90	2.91	2.64	2.87	0.001	0.205	0.011	0.217	3.10E-04	1.32E-03	9.89E-04	1.28E-03
5	20.41	20	39	35	94	8.62	1.68	5.26	4.49	0.191	0.018	0.120	0.330	9.56E-03	3.02E-04	3.64E-03	3.51E-03
6	34.69	18	38	30	86	3.88	1.27	2.62	2.29	0.034	0.006	0.026	0.066	1.91E-03	1.70E-04	8.52E-04	7.73E-04
7	65.31	7	30	3	40	24.86	2.92	6.67	7.04	0.396	0.024	0.029	0.449	5.80E-02	9.46E-04	4.96E-03	1.12E-02
8	69.39	5	30	114	149	38.04	6.11	1.69	3.80	1.011	0.123	0.032	1.166	2.02E-01	4.12E-03	2.85E-04	7.82E-03
9	79.59	2	16	27	45	63.00	3.81	7.29	8.53	0.757	0.066	0.424	1.257	3.80E-01	4.79E-03	1.56E-02	2.79E-02
10	55.10	7	28	35	70	14.86	6.06	2.83	5.32	0.134	0.107	0.032	0.273	1.86E-02	3.95E-03	9.26E-04	3.90E-03
11	32.65	51	84	53	188	2.92	1.41	1.96	1.97	0.054	0.054	0.028	0.136	1.12E-03	6.48E-04	4.52E-04	7.22E-04
12	65.31	0	19	11	30	0.00	8.62	18.33	12.18	0.000	0.123	0.319	0.442	0.00E+00	6.61E-03	2.88E-02	1.47E-02
Total		259	541	505	1305	14.53	3.67	4.87	4.97	3.183	0.843	1.127	5.153	1.23E-02	1.56E-03	2.23E-03	3.95E-03

2016

Plot	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
	B	R	W	Total	B	R	W	Total	B	R	W	Total	B	R	W	Total
1	25.93	16.67	57.41	4.14	0.12	0.08	0.27	0.48	71.91	11.53	16.57	5.89	1.93E-03	3.10E-04	4.43E-04	2.68E-03

		30.8	14.5	54.6						76.7		18.1				
2		6	0	5	20.61	0.73	0.34	1.30	2.38	6	5.05	9	7.13	2.50E-03	1.64E-04	5.91E-04	3.25E-03
		43.6	49.0							63.7	32.3						
3		4	9	7.27	8.43	0.42	0.48	0.07	0.97	8	1	3.91	2.80	8.15E-04	4.13E-04	5.00E-05	1.28E-03
			91.1								94.4						
4		2.35	8	6.47	13.03	0.04	1.37	0.10	1.50	0.57	2	5.01	4.22	1.10E-05	1.81E-03	9.62E-05	1.92E-03
		21.2	41.4	37.2						57.8		38.5					
5		8	9	3	7.20	0.18	0.34	0.31	0.83	6	3.57	7	6.41	1.69E-03	1.04E-04	1.13E-03	2.92E-03
		20.9	44.1	34.8						51.8		38.4					
6		3	9	8	6.59	0.16	0.34	0.27	0.76	6	9.70	4	1.29	3.05E-04	5.70E-05	2.26E-04	5.88E-04
		17.5	75.0							90.3							
7		0	0	7.50	3.07	0.06	0.27	0.03	0.35	8	6.32	3.31	8.72	3.59E-03	2.51E-04	1.32E-04	3.97E-03
			20.1	76.5						86.6	10.6						
8		3.36	3	1	11.42	0.04	0.27	1.01	1.32	1	0	2.78	22.62	8.93E-03	1.09E-03	2.87E-04	1.03E-02
			35.5	60.0						60.4		33.4					
9		4.44	6	0	3.45	0.02	0.14	0.24	0.40	6	6.09	5	24.40	6.72E-03	6.77E-04	3.72E-03	1.11E-02
		10.0	40.0	50.0						47.6	40.5	11.8					
10		0	0	0	5.36	0.06	0.25	0.31	0.62	0	3	7	5.30	1.15E-03	9.79E-04	2.87E-04	2.41E-03
		27.1	44.6	28.1						42.2	40.0	17.6					
11		3	8	9	14.41	0.45	0.74	0.47	1.66	7	8	5	2.63	5.07E-04	4.81E-04	2.12E-04	1.20E-03
			63.3	36.6							28.4	71.5					
12		0.00	3	7	2.30	0.00	0.17	0.10	0.27	0.00	1	9	8.57	0.00E+00	1.11E-03	2.80E-03	3.91E-03
Tota		19.8	41.4	38.7	100.0					61.7	16.3	21.8	100.0				
l		5	6	0	0	0.19	0.40	0.37	0.96	7	6	7	0	2.35E-03	6.21E-04	8.31E-04	3.80E-03

Table 1: Mangrove Floristic Characteristics

2017

	% Canopy	**Tree Numbers**				**Average DBH (cm)**				**Total Basal Area (m^2)**				**Average Basal Area (m^2)**			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	42.86	9	7	24	40	10.10	6.56	4.79	6.30	0.184	0.039	0.052	0.275	2.04E-02	5.62E-03	2.16E-03	6.87E-03
2	46.94	80	29	147	256	3.49	2.01	2.06	2.50	0.286	0.017	0.069	0.372	3.57E-03	5.78E-04	4.72E-04	1.45E-03
3	28.57	40	44	5	89	4.29	2.03	3.20	3.11	0.079	0.035	0.004	0.118	1.98E-03	7.90E-04	8.32E-04	1.33E-03
4	75.51	4	156	11	171	2.00	2.99	2.74	2.95	0.001	0.215	0.012	0.228	3.39E-04	1.38E-03	1.07E-03	1.33E-03
5	24.49	20	41	35	96	8.64	1.76	4.59	4.22	0.187	0.013	0.095	0.295	9.35E-03	3.20E-04	2.71E-03	3.07E-03

										0.02	0.00	0.02					
6	14.29	16	32	25	73	3.68	1.31	2.78	2.33	7	5	0	0.052	1.66E-03	1.52E-04	8.09E-04	7.07E-04
						24.5				0.40	0.02	0.01					
7	51.02	7	25	3	35	9	3.04	6.57	7.65	2	5	5	0.442	5.75E-02	9.93E-04	4.84E-03	1.26E-02
						38.1				1.01	0.12	0.03					
8	75.51	5	31	116	152	2	6.03	1.73	3.81	0	7	4	1.172	2.02E-01	4.11E-03	2.94E-04	7.71E-03
						64.4			10.4	0.80	0.07	0.40					
9	69.39	2	12	21	35	5	4.87	8.43	1	0	7	8	1.285	4.00E-01	6.40E-03	1.94E-02	3.67E-02
						14.6				0.12	0.10	0.03					
10	69.39	7	23	28	58	7	6.88	3.28	6.08	9	8	5	0.272	1.84E-02	4.71E-03	1.25E-03	4.69E-03
										0.05	0.05	0.03					
11	26.53	53	87	56	196	2.92	1.58	2.13	2.10	8	9	2	0.148	1.09E-03	6.74E-04	5.69E-04	7.58E-04
								18.0	12.5	0.00	0.12	0.27					
12	98.00	0	16	10	26	0.00	9.17	1	7	0	0	9	0.399	0.00E+00	7.50E-03	2.79E-02	1.54E-02
Tota						14.7				3.16	0.84	1.05					
l		243	503	481	1227	5	4.02	5.02	5.34	3	0	4	5.056	1.30E-02	1.67E-03	2.19E-03	4.12E-03

2017

	% Relative Density				**Absolute Density (m^2)**				**% Relative Dominance**				**Absolute Dominance**			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Tota l**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
	22.5	17.5	60.0						66.8	14.3	18.8					
1	0	0	0	3.26	0.08	0.06	0.21	0.35	3	2	6	5.43	1.62E-03	3.48E-04	4.58E-04	2.43E-03
	31.2	11.3	57.4						76.8		18.6					
2	5	3	2	20.86	0.71	0.26	1.30	2.26	5	4.51	4	7.36	2.53E-03	1.48E-04	6.13E-04	3.29E-03
	44.9	49.4							67.0	29.4						
3	4	4	5.62	7.25	0.35	0.39	0.04	0.79	0	7	3.53	2.33	6.99E-04	3.08E-04	3.68E-05	1.04E-03
		91.2								94.2						
4	2.34	3	6.43	13.94	0.04	1.38	0.10	1.51	0.60	6	5.15	4.50	1.20E-05	1.90E-03	1.04E-04	2.01E-03
	20.8	42.7	36.4						63.4		32.1					
5	3	1	6	7.82	0.18	0.36	0.31	0.85	1	4.45	4	5.83	1.65E-03	1.16E-04	8.38E-04	2.61E-03
	21.9	43.8	34.2						51.3		39.1					
6	2	4	5	5.95	0.14	0.28	0.22	0.65	7	9.44	9	1.02	2.35E-04	4.31E-05	1.79E-04	4.57E-04
	20.0	71.4							91.0							
7	0	3	8.57	2.85	0.06	0.22	0.03	0.31	9	5.62	3.29	8.73	3.56E-03	2.20E-04	1.28E-04	3.90E-03
		20.3	76.3						86.2	10.8						
8	3.29	9	2	12.39	0.04	0.27	1.03	1.34	2	7	2.91	23.17	8.93E-03	1.13E-03	3.02E-04	1.04E-02
		34.2	60.0						62.2		31.7					
9	5.71	9	0	2.85	0.02	0.11	0.19	0.31	8	5.97	4	25.41	7.07E-03	6.79E-04	3.61E-03	1.14E-02

		12.0	39.6	48.2						47.2	39.8	12.8					
10		7	6	8	4.73	0.06	0.20	0.25	0.51	9	2	9	5.38	1.14E-03	9.58E-04	3.10E-04	2.40E-03
		27.0	44.3	28.5						39.0	39.4	21.4					
11		4	9	7	15.97	0.47	0.77	0.50	1.73	4	8	8	2.94	5.13E-04	5.18E-04	2.82E-04	1.31E-03
			61.5	38.4							30.0	69.9					
12		0.00	4	6	2.12	0.00	0.14	0.09	0.23	0.00	7	3	7.89	0.00E+00	1.06E-03	2.47E-03	3.53E-03
Tota		19.8	40.9	39.2	100.0					62.5	16.6	20.8	100.0				
l		0	9	0	0	0.18	0.37	0.35	0.90	4	0	6	0	2.33E-03	6.18E-04	7.77E-04	3.73E-03

Table 1: Mangrove Floristic Characteristics

2018

	% Canopy	**Tree Numbers**				**Average DBH (cm)**				**Total Basal Area (m^2)**				**Average Basal Area (m^2)**			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	0.00	6	6	18	30	4.18	7.78	5.10	5.45	0.01 7	0.04 8	0.04 4	0.108	2.87E-03	7.94E-03	2.42E-03	3.62E-03
2	18.37	67	12	118	197	3.82	2.83	2.21	2.79	0.25 5	0.01 4	0.05 5	0.324	3.81E-03	1.16E-03	4.66E-04	1.64E-03
3	0.00	38	37	4	79	4.19	2.14	2.55	3.15	0.07 1	0.03 4	0.00 3	0.108	1.87E-03	9.07E-04	6.94E-04	1.36E-03
4	53.06	4	158	10	172	2.15	2.84	1.95	2.77	0.00 2	0.20 1	0.00 3	0.206	3.92E-04	1.27E-03	3.20E-04	1.20E-03
5	28.57	20	40	30	90	7.68	1.90	4.85	4.16	0.14 5	0.01 5	0.08 7	0.247	7.25E-03	3.75E-04	2.90E-03	2.74E-03
6	6.12	16	37	25	78	3.92	1.24	2.72	2.26	0.03 2	0.00 5	0.02 0	0.057	1.98E-03	1.45E-04	7.97E-04	7.31E-04
7	10.20	7	7	0	14	22.1 6	4.30	0.00	13.2 3	0.30 5	0.01 2	0.00 0	0.317	4.36E-02	1.71E-03	0.00E+00	2.26E-02
8	38.78	5	27	98	130	37.3 8	6.29	1.90	4.16	0.98 5	0.10 7	0.03 3	1.125	1.97E-01	3.95E-03	3.41E-04	8.65E-03
9	40.82	2	11	15	28	64.5 0	4.84	11.3 9	12.6 1	0.80 9	0.07 3	0.48 2	1.365	4.05E-01	6.68E-03	3.21E-02	4.87E-02
10	46.94	7	18	23	48	14.7 1	7.66	4.00	6.93	0.13 0	0.09 7	0.04 2	0.269	1.85E-02	5.37E-03	1.84E-03	5.60E-03
11	22.45	55	92	57	204	2.78	1.56	1.90	1.98	0.05 6	0.06 0	0.02 4	0.139	1.02E-03	6.47E-04	4.17E-04	6.84E-04
12	36.73	0	16	9	25	0.00	9.21	17.7 0	12.2 7	0.00 0	0.12 1	0.24 4	0.364	0.00E+00	7.55E-03	2.71E-02	1.46E-02

Tota					13.9				2.80	0.78	1.03					
l	227	461	407	1095	6	4.38	4.69	5.98	7	6	6	4.629	1.24E-02	1.71E-03	2.55E-03	4.23E-03

2018

	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Tota l**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
	20.0	20.0	60.0		0.05	0.05	0.15	0.26	15.8	43.9	40.2					
1	0	0	0	2.74	3	3	9	5	7	0	3	2.34	1.52E-04	4.21E-04	3.86E-04	9.59E-04
	34.0		59.9		0.59	0.10	1.04	1.74	78.7		16.9					
2	1	6.09	0	17.99	2	6	3	2	2	4.30	7	7.00	2.25E-03	1.23E-04	4.86E-04	2.86E-03
	48.1	46.8			0.33	0.32	0.03	0.69	66.2	31.2						
3	0	4	5.06	7.21	6	7	5	9	2	0	2.58	2.32	6.30E-04	2.97E-04	2.45E-05	9.51E-04
		91.8			0.03	1.39	0.08	1.52		97.6						
4	2.33	6	5.81	15.71	5	7	8	1	0.76	9	1.55	4.45	1.38E-05	1.78E-03	2.83E-05	1.82E-03
	22.2	44.4	33.3		0.17	0.35	0.26	0.79	58.7		35.1					
5	2	4	3	8.22	7	4	5	6	3	6.08	9	5.33	1.28E-03	1.33E-04	7.68E-04	2.18E-03
	20.5	47.4	32.0		0.14	0.32	0.22	0.69	55.6		34.9					
6	1	4	5	7.12	1	7	1	0	2	9.40	8	1.23	2.80E-04	4.74E-05	1.76E-04	5.04E-04
	50.0	50.0			0.06	0.06	0.00	0.12	96.2							
7	0	0	0.00	1.28	2	2	0	4	3	3.77	0.00	6.85	2.70E-03	1.06E-04	0.00E+00	2.80E-03
		20.7	75.3		0.04	0.23	0.86	1.14	87.5							
8	3.85	7	8	11.87	4	9	7	9	4	9.49	2.97	24.30	8.71E-03	9.44E-04	2.96E-04	9.95E-03
		39.2	53.5		0.01	0.09	0.13	0.24	59.3		35.3					
9	7.14	9	7	2.56	8	7	3	8	1	5.38	0	29.48	7.16E-03	6.50E-04	4.26E-03	1.21E-02
	14.5	37.5	47.9		0.06	0.15	0.20	0.42	48.2	36.0	15.7					
10	8	0	2	4.38	2	9	3	4	7	1	2	5.80	1.15E-03	8.55E-04	3.73E-04	2.37E-03
	26.9	45.1	27.9		0.48	0.81	0.50	1.80	40.3	42.6	17.0					
11	6	0	4	18.63	6	3	4	4	0	8	3	3.01	4.97E-04	5.26E-04	2.10E-04	1.23E-03
		64.0	36.0		0.00	0.14	0.08	0.22		33.1	66.8					
12	0.00	0	0	2.28	0	1	0	1	0.00	7	3	7.87	0.00E+00	1.07E-03	2.15E-03	3.22E-03
Tota	20.7	42.1	37.1	100.0	0.16	0.34	0.30	0.80	60.6	16.9	22.3	100.0				
l	3	0	7	0	7	0	0	7	3	8	8	0	2.07E-03	5.79E-04	7.63E-04	3.41E-03

Table 1: Mangrove Floristic Characteristics

2019

	% Canopy	Tree Numbers				Average DBH (cm)				Total Basal Area (m^2)				Average Basal Area (m^2)			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Tota l**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**

1	2.04	6	2	16	24	2.47	5.00	5.01	4.37	0.009	0.004	0.040	0.053	1.45E-03	2.19E-03	2.47E-03	2.19E-03
2	36.73	53	2	109	164	4.20	1.40	2.21	2.85	0.319	0.008	0.044	0.372	6.02E-03	4.13E-03	4.05E-04	2.27E-03
3	22.45	34	33	4	71	4.15	2.03	2.88	3.09	0.065	0.031	0.003	0.099	1.90E-03	9.54E-04	8.16E-04	1.40E-03
4	59.18	4	158	11	173	2.10	2.93	2.15	2.86	0.002	0.207	0.005	0.213	3.81E-04	1.31E-03	4.16E-04	1.23E-03
5	28.57	20	41	26	87	7.94	1.80	4.69	4.08	0.155	0.013	0.077	0.246	7.77E-03	3.11E-04	2.98E-03	2.82E-03
6	18.37	16	38	24	78	3.79	1.50	2.67	2.33	0.025	0.010	0.007	0.052	1.55E-03	2.71E-04	3.01E-04	6.70E-04
7	20.41	5	5	0	10	22.68	4.12	0.00	13.40	0.257	0.008	0.000	0.265	5.13E-02	1.64E-03	0.00E+00	2.65E-02
8	61.22	6	25	88	119	31.67	6.84	2.07	4.57	1.003	0.110	0.035	1.148	1.67E-01	4.39E-03	3.98E-04	9.65E-03
9	53.06	2	9	13	24	64.75	2.31	10.48	11.94	0.809	0.006	0.317	1.132	4.05E-01	7.17E-04	2.44E-02	4.72E-02
10	65.31	7	18	23	48	13.06	7.69	4.18	6.79	0.117	0.097	0.046	0.260	1.67E-02	5.36E-03	2.01E-03	5.42E-03
11	24.49	55	95	57	207	2.81	1.73	2.18	2.14	0.053	0.061	0.031	0.145	9.55E-04	6.42E-04	5.52E-04	7.01E-04
12	38.78	0	15	9	24	0.00	8.84	17.44	12.07	0.000	0.103	0.237	0.340	0.00E+00	6.86E-03	2.64E-02	1.42E-02
Total		208	441	380	1029	13.30	3.85	4.66	5.87	2.813	0.659	0.843	4.325	1.35E-02	1.50E-03	2.22E-03	4.20E-03

2019

	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	25.00	8.33	66.67	2.33	0.053	0.018	0.142	0.212	16.50	8.33	75.17	1.22	7.67E-05	3.87E-05	3.49E-04	4.65E-04
2	32.32	1.22	66.46	15.94	0.469	0.018	0.964	1.451	85.91	2.22	11.87	8.59	2.82E-03	7.31E-05	3.90E-04	3.29E-03
3	47.89	46.48	5.63	6.90	0.301	0.292	0.035	0.628	65.05	31.67	3.28	2.30	5.72E-04	2.78E-04	2.89E-05	8.79E-04
4	2.31	91.33	6.36	16.81	0.035	1.397	0.097	1.530	0.71	97.14	2.14	4.93	1.35E-05	1.83E-03	4.04E-05	1.89E-03

	22.9	47.1	29.8		0.17	0.36	0.23	0.76	63.2		31.5					
5	9	3	9	8.45	7	3	0	9	6	5.19	5	5.68	1.37E-03	1.13E-04	6.85E-04	2.17E-03
	20.5	48.7	30.7		0.14	0.33	0.21	0.69	47.5	19.7	13.8					
6	1	2	7	7.58	1	6	2	0	7	5	2	1.21	2.20E-04	9.12E-05	6.38E-05	4.62E-04
	50.0	50.0			0.04	0.04	0.00	0.08	96.9							
7	0	0	0.00	0.97	4	4	0	8	1	3.09	0.00	6.12	2.27E-03	7.25E-05	0.00E+00	2.34E-03
		21.0	73.9		0.05	0.22	0.77	1.05	87.3							
8	5.04	1	5	11.56	3	1	8	2	8	9.57	3.05	26.54	8.87E-03	9.71E-04	3.10E-04	1.01E-02
		37.5	54.1		0.01	0.08	0.11	0.21	71.4		27.9					
9	8.33	0	7	2.33	8	0	5	2	6	0.57	7	26.18	7.15E-03	5.70E-05	2.80E-03	1.00E-02
	14.5	37.5	47.9		0.06	0.15	0.20	0.42	45.0	37.1	17.8					
10	8	0	2	4.66	2	9	3	4	6	4	1	6.01	1.04E-03	8.54E-04	4.09E-04	2.30E-03
	26.5	45.8	27.5		0.48	0.84	0.50	1.83	36.2	42.0	21.7					
11	7	9	4	20.12	6	0	4	0	3	7	0	3.35	4.65E-04	5.39E-04	2.78E-04	1.28E-03
		62.5	37.5		0.00	0.13	0.08	0.21		30.2	69.7					
12	0.00	0	0	2.33	0	3	0	2	0.00	3	7	7.87	0.00E+00	9.10E-04	2.10E-03	3.01E-03
Tota	20.2	42.8	36.9	100.0	0.15	0.32	0.28	0.75	65.0	15.2	19.4	100.0				
l	1	6	3	0	3	5	0	8	3	4	9	0	2.07E-03	4.86E-04	6.21E-04	3.19E-03

Table 1: Mangrove Floristic Characteristics

2020

	% Canopy	**Tree Numbers**				**Average DBH (cm)**				**Total Basal Area (m^2)**				**Average Basal Area (m^2)**			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	10.20	6	2	16	24	4.82	5.35	6.58	6.03	0.03 7	0.00 5	0.08 7	0.130	6.23E-03	2.52E-03	5.45E-03	5.40E-03
2	24.49	53	2	106	161	4.29	1.55	2.41	3.03	0.30 7	0.00 0	0.06 0	0.368	5.79E-03	1.98E-04	5.69E-04	2.28E-03
3	12.24	34	36	4	74	4.27	2.05	3.25	3.14	0.06 7	0.03 3	0.00 4	0.104	1.97E-03	9.05E-04	1.06E-03	1.40E-03
4	65.31	4	173	13	190	2.10	2.87	2.35	2.82	0.00 2	0.21 4	0.00 7	0.223	4.30E-04	1.24E-03	5.43E-04	1.17E-03
5	24.49	21	41	22	84	7.55	1.72	3.47	3.64	0.15 5	0.01 2	0.04 5	0.212	7.38E-03	2.90E-04	2.04E-03	2.52E-03
6	20.41	12	36	18	66	4.50	1.62	2.67	2.43	0.02 7	0.00 8	0.01 3	0.049	2.28E-03	2.36E-04	7.11E-04	7.36E-04
7	26.53	5	3	0	8	24.5 2	5.07	0.00	17.2 3	0.29 6	0.00 7	0.00 0	0.302	5.91E-02	2.17E-03	0.00E+00	3.78E-02

8	40.82	7	27	87	121	27.11	6.49	2.50	4.81	0.980	0.115	0.050	1.144	1.40E-01	4.25E-03	5.75E-04	9.46E-03
9	53.06	2	12	15	29	73.50	2.13	11.29	11.79	1.026	0.007	0.517	1.551	5.13E-01	6.20E-04	3.45E-02	5.35E-02
10	61.22	6	17	21	44	15.28	7.29	4.14	6.77	0.119	0.093	0.046	0.258	1.99E-02	5.48E-03	2.18E-03	5.87E-03
11	6.12	54	100	60	214	2.98	1.86	2.54	2.33	0.056	0.068	0.045	0.169	1.03E-03	6.84E-04	7.47E-04	7.89E-04
12	12.24	0	14	9	23	0.00	8.68	17.64	12.19	0.000	0.094	0.250	0.344	0.00E+00	6.71E-03	2.78E-02	1.49E-02
Total		204	463	371	1038	14.24	3.89	4.90	6.35	3.071	0.657	1.124	4.852	1.51E-02	1.42E-03	3.03E-03	4.67E-03

2020

	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	25.00	8.33	66.67	2.31	0.053	0.018	0.141	0.212	28.82	3.88	67.30	2.67	3.30E-04	4.45E-05	7.71E-04	1.15E-03
2	32.92	1.24	65.84	15.51	0.469	0.018	0.937	1.424	83.49	0.11	16.41	7.57	2.71E-03	3.51E-06	5.33E-04	3.25E-03
3	45.95	48.65	5.41	7.13	0.301	0.318	0.035	0.654	64.47	31.43	4.11	2.14	5.91E-04	2.88E-04	3.76E-05	9.17E-04
4	2.11	91.05	6.84	18.30	0.035	1.530	0.115	1.680	0.77	96.06	3.16	4.60	1.52E-05	1.89E-03	6.24E-05	1.97E-03
5	25.00	48.81	26.19	8.09	0.186	0.363	0.195	0.743	73.19	5.61	21.20	4.36	1.37E-03	1.05E-04	3.97E-04	1.87E-03
6	18.18	54.55	27.27	6.36	0.106	0.318	0.159	0.584	56.21	17.46	26.33	1.00	2.42E-04	7.50E-05	1.13E-04	4.30E-04
7	62.50	37.50	0.00	0.77	0.044	0.027	0.000	0.071	97.84	2.16	0.00	6.22	2.61E-03	5.76E-05	0.00E+00	2.67E-03
8	5.79	22.31	71.90	11.66	0.062	0.239	0.769	1.070	85.61	10.02	4.37	23.58	8.66E-03	1.01E-03	4.42E-04	1.01E-02
9	6.90	41.38	51.72	2.79	0.018	0.106	0.133	0.256	66.17	0.48	33.35	31.96	9.07E-03	6.58E-05	4.57E-03	1.37E-02
10	13.64	38.64	47.73	4.24	0.053	0.150	0.186	0.389	46.20	36.05	17.74	5.32	1.06E-03	8.24E-04	4.05E-04	2.28E-03
11	25.23	46.73	28.04	20.62	0.477	0.884	0.531	1.892	32.96	40.48	26.56	3.48	4.92E-04	6.04E-04	3.96E-04	1.49E-03

12	0.00	60.87	39.13	2.22	0.00	0.12	0.08	0.20	0.00	27.32	72.68	7.09	0.00E+00	8.31E-04	2.21E-03	3.04E-03
Total	19.65	44.61	35.74	100.00	0.15	0.34	0.27	0.76	63.35	13.53	23.17	100.00	2.26E-03	4.84E-04	8.28E-04	3.58E-03

Table 1: Mangrove Floristic Characteristics

2021

	% Canopy	Tree Numbers				Average DBH (cm)				Total Basal Area (m^2)				Average Basal Area (m^2)			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	4.08	6	2	16	24	5.10	3.80	7.05	6.29	0.037	0.002	0.099	0.138	6.10E-03	1.14E-03	6.21E-03	5.76E-03
2	40.82	53	1	104	158	4.40	1.40	2.65	3.23	0.325	0.000	0.070	0.395	6.13E-03	1.54E-04	6.74E-04	2.50E-03
3	20.41	34	52	4	90	4.75	1.94	3.13	3.05	0.084	0.044	0.004	0.133	2.47E-03	8.55E-04	1.01E-03	1.47E-03
4	71.43	4	182	14	200	2.30	2.82	2.60	2.80	0.002	0.222	0.009	0.233	4.90E-04	1.22E-03	6.59E-04	1.16E-03
5	44.90	21	42	20	83	7.60	1.81	3.78	3.75	0.155	0.013	0.046	0.215	7.39E-03	3.21E-04	2.29E-03	2.59E-03
6	4.08	6	32	15	53	3.82	1.63	2.23	2.05	0.009	0.008	0.008	0.026	1.57E-03	2.41E-04	5.62E-04	4.81E-04
7	18.37	5	2	1	8	25.70	4.13	0.20	15.68	0.325	0.006	0.000	0.331	6.50E-02	3.11E-03	3.14E-06	4.14E-02
8	65.31	7	27	86	120	27.36	6.66	2.70	5.03	0.999	0.119	0.058	1.175	1.43E-01	4.40E-03	6.69E-04	9.80E-03
9	67.35	2	12	31	45	77.85	2.53	5.94	8.23	1.168	0.008	0.562	1.738	5.84E-01	6.96E-04	1.81E-02	3.86E-02
10	63.27	6	17	21	44	15.24	7.84	4.94	7.46	0.118	0.095	0.049	0.263	1.97E-02	5.61E-03	2.36E-03	5.98E-03
11	44.90	55	114	65	234	2.75	1.75	2.68	2.24	0.051	0.070	0.052	0.173	9.22E-04	6.16E-04	8.02E-04	7.40E-04
12	46.94	0	13	9	22	0.00	9.05	17.78	12.62	0.000	0.094	0.252	0.346	0.00E+00	7.26E-03	2.80E-02	1.57E-02
Total		199	496	386	1081	14.74	3.78	4.64	6.04	3.273	0.683	1.210	5.166	1.64E-02	1.38E-03	3.13E-03	4.78E-03

2021

	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	25.00	8.33	66.67	2.22	0.053	0.018	0.141	0.212	26.48	1.65	71.87	2.68	3.24E-04	2.02E-05	8.78E-04	1.22E-03
2	33.54	0.63	65.82	14.62	0.469	0.009	0.920	1.397	82.22	0.04	17.74	7.65	2.87E-03	1.36E-06	6.20E-04	3.49E-03
3	37.78	57.78	4.44	8.33	0.301	0.460	0.035	0.796	63.42	33.53	3.06	2.57	7.44E-04	3.93E-04	3.59E-05	1.17E-03
4	2.00	91.00	7.00	18.50	0.035	1.609	0.124	1.768	0.84	95.20	3.96	4.51	1.73E-05	1.96E-03	8.15E-05	2.06E-03
5	25.30	50.60	24.10	7.68	0.186	0.371	0.177	0.734	72.35	6.28	21.37	4.15	1.37E-03	1.19E-04	4.06E-04	1.90E-03
6	11.32	60.38	28.30	4.90	0.053	0.283	0.133	0.469	36.82	30.17	33.01	0.49	8.31E-05	6.81E-05	7.45E-05	2.26E-04
7	62.50	25.00	12.50	0.74	0.044	0.018	0.009	0.071	98.12	1.88	0.00	6.41	2.87E-03	5.51E-05	2.78E-08	2.93E-03
8	5.83	22.50	71.67	11.10	0.062	0.239	0.760	1.061	85.00	10.11	4.89	22.76	8.83E-03	1.05E-03	5.09E-04	1.04E-02
9	4.44	26.67	68.89	4.16	0.018	0.106	0.274	0.398	67.19	0.48	32.33	33.65	1.03E-02	7.38E-05	4.97E-03	1.54E-02
10	13.64	38.64	47.73	4.07	0.053	0.150	0.186	0.389	44.91	36.27	18.82	5.09	1.04E-03	8.43E-04	4.38E-04	2.33E-03
11	23.50	48.72	27.78	21.65	0.486	1.008	0.575	2.069	29.31	40.57	30.12	3.35	4.49E-04	6.21E-04	4.61E-04	1.53E-03
12	0.00	59.09	40.91	2.04	0.000	0.115	0.080	0.195	0.00	27.27	72.73	6.70	0.00E+00	8.34E-04	2.23E-03	3.06E-03
Total	18.41	45.88	35.71	100.00	0.147	0.365	0.284	0.797	63.36	13.22	23.42	100.00	2.41E-03	5.03E-04	8.91E-04	3.81E-03

Table 1: Mangrove Floristic Characteristics

2022

	% Canopy	Tree Numbers				Average DBH (cm)				Total Basal Area (m^2)				Average Basal Area (m^2)			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	8.16	5	2	14	21	6.52	3.80	8.01	7.26	0.039	0.002	0.103	0.144	7.85E-03	1.14E-03	7.35E-03	6.88E-03
2	34.69	53	1	102	156	4.61	1.40	2.68	3.33	0.398	0.000	0.071	0.469	7.50E-03	1.54E-04	6.97E-04	3.01E-03
3	22.45	35	91	5	131	4.61	1.62	2.78	2.47	0.084	0.057	0.005	0.145	2.40E-03	6.24E-04	9.25E-04	1.11E-03
4	79.59	3	188	14	205	3.13	2.75	3.24	2.79	0.003	0.219	0.014	0.237	9.34E-04	1.17E-03	1.03E-03	1.15E-03
5	55.10	20	43	17	80	7.65	2.39	3.74	3.71	0.149	0.014	0.032	0.195	7.44E-03	3.32E-04	1.87E-03	2.44E-03
6	10.20	6	25	11	42	3.41	1.54	2.11	1.75	0.008	0.006	0.009	0.022	1.25E-03	2.28E-04	8.07E-04	5.26E-04
7	20.41	5	2	2	9	24.60	6.40	0.55	17.09	0.275	0.007	0.000	0.282	5.50E-02	3.31E-03	3.18E-05	3.13E-02
8	73.47	7	29	87	123	27.90	6.36	2.74	5.13	1.019	0.124	0.062	1.205	1.46E-01	4.26E-03	7.16E-04	9.79E-03
9	57.14	2	17	50	69	77.80	1.97	3.87	7.43	1.245	0.008	0.279	1.532	6.23E-01	4.77E-04	5.58E-03	2.22E-02
10	67.35	6	17	21	44	15.30	7.86	5.28	7.64	0.119	0.095	0.057	0.271	1.98E-02	5.61E-03	2.72E-03	6.17E-03
11	32.65	53	117	65	235	2.62	1.87	2.66	2.29	0.046	0.079	0.055	0.180	8.62E-04	6.75E-04	8.52E-04	7.66E-04
12	44.90	0	24	9	33	0.00	5.05	16.88	5.48	0.000	0.095	0.000	0.096	0.00E+00	3.98E-03	7.07E-06	2.89E-03
Total		195	556	397	1148	14.85	3.59	4.55	5.53	3.384	0.707	0.688	4.778	1.74E-02	1.27E-03	1.73E-03	4.16E-03

2022

	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	23.81	9.52	66.67	1.83	0.044	0.018	0.124	0.186	27.17	1.58	71.25	3.02	3.47E-04	2.02E-05	9.10E-04	1.28E-03
2	33.97	0.64	65.38	13.59	0.469	0.009	0.902	1.379	84.80	0.03	15.16	9.82	3.52E-03	1.36E-06	6.29E-04	4.15E-03
3	26.72	69.47	3.82	11.41	0.309	0.805	0.044	1.158	57.80	39.02	3.18	3.04	7.43E-04	5.02E-04	4.09E-05	1.29E-03
4	1.46	91.71	6.83	17.86	0.027	1.662	0.124	1.813	1.18	92.71	6.11	4.95	2.48E-05	1.94E-03	1.28E-04	2.09E-03
5	25.00	53.75	21.25	6.97	0.177	0.380	0.150	0.707	76.35	7.32	16.33	4.08	1.32E-03	1.26E-04	2.82E-04	1.72E-03
6	14.29	59.52	26.19	3.66	0.053	0.221	0.097	0.371	34.03	25.80	40.17	0.46	6.65E-05	5.04E-05	7.85E-05	1.95E-04
7	55.56	22.22	22.22	0.78	0.044	0.018	0.018	0.080	97.63	2.35	0.02	5.90	2.43E-03	5.86E-05	5.63E-07	2.49E-03
8	5.69	23.58	70.73	10.71	0.062	0.256	0.769	1.088	84.58	10.26	5.17	25.21	9.01E-03	1.09E-03	5.50E-04	1.07E-02
9	2.90	24.64	72.46	6.01	0.018	0.150	0.442	0.610	81.28	0.53	18.19	32.07	1.10E-02	7.16E-05	2.47E-03	1.35E-02
10	13.64	38.64	47.73	3.83	0.053	0.150	0.186	0.389	43.76	35.17	21.08	5.68	1.05E-03	8.44E-04	5.06E-04	2.40E-03
11	22.55	49.79	27.66	20.47	0.469	1.035	0.575	2.078	25.37	43.86	30.77	3.77	4.04E-04	6.98E-04	4.90E-04	1.59E-03
12	0.00	72.73	27.27	2.87	0.000	0.212	0.080	0.292	0.00	99.93	0.07	2.00	0.00E+00	8.44E-04	5.63E-07	8.45E-04
Total	16.99	48.43	34.58	100.00	0.144	0.410	0.293	0.846	70.82	14.79	14.39	100.00	2.49E-03	5.21E-04	5.07E-04	3.52E-03

Table 1: Mangrove Floristic Characteristics

2023

	% Canopy	Tree Numbers				Average DBH (cm)				Total Basal Area (m^2)				Average Basal Area (m^2)			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	0.00	5	1	9	15	5.86	3.50	8.22	7.12	0.027	0.001	0.073	0.101	5.39E-03	9.62E-04	8.13E-03	6.74E-03
2	28.57	52	1	91	144	4.57	1.50	2.67	3.34	0.355	0.000	0.066	0.421	6.83E-03	1.77E-04	7.24E-04	2.93E-03
3	42.86	37	135	5	177	4.64	1.71	4.00	2.38	0.091	0.077	0.007	0.175	2.46E-03	5.70E-04	1.38E-03	9.88E-04
4	87.76	4	194	14	212	2.50	2.80	3.60	2.85	0.003	0.224	0.018	0.245	7.69E-04	1.15E-03	1.28E-03	1.15E-03
5	26.53	19	46	17	82	7.73	1.80	4.15	3.66	0.141	0.015	0.035	0.191	7.41E-03	3.19E-04	2.06E-03	2.32E-03
6	0.00	6	27	9	42	4.28	1.81	2.92	2.36	0.010	0.008	0.008	0.026	1.73E-03	2.85E-04	8.38E-04	6.10E-04
7	12.24	5	1	1	7	25.44	5.40	0.80	19.06	0.299	0.002	0.000	0.302	5.99E-02	2.29E-03	5.03E-05	4.31E-02
8	67.35	6	30	87	123	32.45	6.43	2.86	5.17	1.026	0.130	0.064	1.220	1.71E-01	4.33E-03	7.34E-04	9.92E-03
9	57.14	2	15	16	33	76.95	2.28	10.68	10.88	1.216	0.009	0.338	1.562	6.08E-01	5.90E-04	2.11E-02	4.73E-02
10	53.06	6	18	18	42	15.32	7.56	5.38	7.73	0.119	0.098	0.050	0.267	1.98E-02	5.43E-03	2.77E-03	6.35E-03
11	36.73	51	124	65	240	2.63	2.03	2.77	2.36	0.039	0.090	0.059	0.188	7.72E-04	7.24E-04	9.10E-04	7.85E-04
12	46.94	0	43	9	52	0.00	2.84	16.53	5.21	0.000	0.083	0.237	0.320	0.00E+00	1.94E-03	2.63E-02	6.16E-03
Total		193	635	341	1169	15.20	3.30	5.38	6.01	3.327	0.736	0.954	5.017	1.72E-02	1.16E-03	2.80E-03	4.29E-03

2023

	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	33.33	6.67	60.00	1.29	0.044	0.009	0.080	0.133	26.67	0.95	72.38	2.02	2.38E-04	8.51E-06	6.47E-04	8.94E-04
2	36.11	0.69	63.19	12.36	0.460	0.009	0.805	1.273	84.31	0.04	15.65	8.40	3.14E-03	1.56E-06	5.83E-04	3.72E-03
3	20.90	76.27	2.82	15.19	0.327	1.194	0.044	1.565	52.01	44.05	3.95	3.48	8.04E-04	6.81E-04	6.10E-05	1.55E-03
4	1.90	91.94	6.16	18.11	0.035	1.715	0.115	1.866	1.26	91.42	7.32	4.87	2.72E-05	1.98E-03	1.58E-04	2.16E-03
5	23.17	56.10	20.73	7.04	0.168	0.407	0.150	0.725	73.92	7.69	18.39	3.80	1.25E-03	1.30E-04	3.10E-04	1.69E-03
6	15.38	61.54	23.08	3.35	0.053	0.212	0.080	0.345	40.58	30.02	29.41	0.51	9.20E-05	6.80E-05	6.67E-05	2.27E-04
7	71.43	14.29	14.29	0.60	0.044	0.009	0.009	0.062	99.22	0.76	0.02	6.01	2.65E-03	2.03E-05	4.45E-07	2.67E-03
8	4.88	24.39	70.73	10.56	0.053	0.265	0.769	1.088	84.12	10.65	5.24	24.32	9.08E-03	1.15E-03	5.65E-04	1.08E-02
9	6.06	45.45	48.48	2.83	0.018	0.133	0.141	0.292	77.83	0.57	21.61	31.14	1.08E-02	7.83E-05	2.98E-03	1.38E-02
10	14.29	42.86	42.86	3.61	0.053	0.159	0.159	0.371	44.60	36.66	18.74	5.31	1.05E-03	8.64E-04	4.42E-04	2.36E-03
11	21.25	51.67	27.08	20.60	0.451	1.096	0.575	2.122	20.90	47.68	31.42	3.75	3.48E-04	7.94E-04	5.23E-04	1.67E-03
12	0.00	82.69	17.31	4.46	0.000	0.380	0.080	0.460	0.00	25.99	74.01	6.38	0.00E+00	7.36E-04	2.10E-03	2.83E-03
Total	16.57	54.25	29.18	100.00	0.142	0.466	0.251	0.858	66.32	14.67	19.02	100.00	2.45E-03	5.42E-04	7.03E-04	3.70E-03

Table 1: Mangrove Floristic Characteristics

2024

	% Canopy	Tree Numbers				Average DBH (cm)				Total Basal Area (m^2)				Average Basal Area (m^2)			
Plot		**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	0.00	1	1	6	8	18.00	3.70	5.72	7.00	0.025	0.001	0.020	0.046	2.55E-02	1.08E-03	3.27E-03	5.77E-03
2	42.86	53	7	88	148	4.80	1.09	2.78	3.41	0.390	0.001	0.067	0.458	7.35E-03	1.12E-04	7.67E-04	3.09E-03
3	61.22	38	164	5	207	4.67	2.05	4.24	2.58	0.096	0.110	0.007	0.213	2.51E-03	6.71E-04	1.50E-03	1.03E-03
4	79.59	4	203	14	221	2.75	2.89	4.18	2.97	0.004	0.258	0.025	0.287	8.81E-04	1.27E-03	1.77E-03	1.30E-03
5	34.69	19	47	17	83	7.46	1.85	3.75	3.52	0.134	0.018	0.032	0.184	7.05E-03	3.81E-04	1.89E-03	2.22E-03
6	8.16	6	25	6	37	4.22	1.68	3.32	2.28	0.010	0.006	0.004	0.021	1.67E-03	2.44E-04	7.34E-04	5.54E-04
7	20.41	5	0	1	6	27.00	0.00	1.70	22.78	0.339	0.000	0.000	0.340	6.79E-02	0.00E+00	2.27E-04	5.66E-02
8	75.51	6	30	86	122	31.93	6.50	3.08	5.34	0.990	0.135	0.075	1.200	1.65E-01	4.51E-03	8.69E-04	9.84E-03
9	67.35	3	17	14	34	53.73	2.22	12.28	10.91	1.295	0.010	0.342	1.647	4.32E-01	5.96E-04	2.44E-02	4.85E-02
10	71.43	6	18	17	41	14.62	7.69	5.62	7.85	0.115	0.100	0.052	0.268	1.92E-02	5.56E-03	3.07E-03	6.53E-03
11	46.94	49	132	65	246	2.56	1.99	2.93	2.36	0.041	0.061	0.068	0.169	8.31E-04	4.59E-04	1.04E-03	6.87E-04
12	36.73	0	75	9	84	0.00	2.06	17.21	3.81	0.000	0.086	0.258	0.344	0.00E+00	1.15E-03	2.86E-02	4.09E-03
Total		190	719	328	1237	14.31	2.81	5.57	6.23	3.439	0.787	0.950	5.176	1.81E-02	1.09E-03	2.90E-03	4.18E-03

2024

	% Relative Density				Absolute Density (m^2)				% Relative Dominance				Absolute Dominance			
Plot	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**	**B**	**R**	**W**	**Total**
1	12.50	12.50	75.00	0.65	0.009	0.009	0.053	0.071	55.12	2.33	42.55	0.89	2.25E-04	9.51E-06	1.74E-04	4.08E-04
2	35.81	4.73	59.46	11.96	0.469	0.062	0.778	1.309	85.09	0.17	14.74	8.84	3.44E-03	6.92E-06	5.97E-04	4.05E-03
3	18.36	79.23	2.42	16.73	0.336	1.450	0.044	1.830	44.82	51.66	3.52	4.12	8.45E-04	9.74E-04	6.63E-05	1.88E-03
4	1.81	91.86	6.33	17.87	0.035	1.795	0.124	1.954	1.23	90.13	8.65	5.54	3.11E-05	2.28E-03	2.19E-04	2.53E-03
5	22.89	56.63	20.48	6.71	0.168	0.416	0.150	0.734	72.82	9.73	17.45	3.55	1.18E-03	1.58E-04	2.84E-04	1.63E-03
6	16.22	67.57	16.22	2.99	0.053	0.221	0.053	0.327	48.76	29.76	21.47	0.40	8.84E-05	5.40E-05	3.89E-05	1.81E-04
7	83.33	0.00	16.67	0.49	0.044	0.000	0.009	0.053	99.93	0.00	0.07	6.56	3.00E-03	0.00E+00	2.01E-06	3.00E-03
8	4.92	24.59	70.49	9.86	0.053	0.265	0.760	1.079	82.49	11.28	6.22	23.19	8.75E-03	1.20E-03	6.61E-04	1.06E-02
9	8.82	50.00	41.18	2.75	0.027	0.150	0.124	0.301	78.62	0.62	20.76	31.83	1.15E-02	8.96E-05	3.02E-03	1.46E-02
10	14.63	43.90	41.46	3.31	0.053	0.159	0.150	0.363	43.10	37.40	19.50	5.17	1.02E-03	8.86E-04	4.62E-04	2.37E-03
11	19.92	53.66	26.42	19.89	0.433	1.167	0.575	2.175	24.11	35.88	40.01	3.26	3.60E-04	5.36E-04	5.98E-04	1.49E-03
12	0.00	89.29	10.71	6.79	0.000	0.663	0.080	0.743	0.00	25.03	74.97	6.64	0.00E+00	7.61E-04	2.28E-03	3.04E-03
Total	15.36	58.12	26.52	100.00	0.140	0.530	0.242	0.911	66.44	15.20	18.36	100.00	2.53E-03	5.80E-04	7.00E-04	3.81E-03

TABLE 2:TREES BY CONDITION

Plot 1 1999				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	11	0	8	19
Stressed	2	0	0	2
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	13	0	8	21

Plot 1 2000				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	9	0	8	17
Stressed	3	0	2	5
Very Stressed	0	0	0	0
Dead	1	0	0	1
Total	13	0	10	23

Plot 1 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	1	2	11
Stressed	2	0	8	10
Very Stressed	0	0	0	0
Dead	2	0	0	2
Total	12	1	10	23

Plot 1 2002				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	10	2	3	15
Stressed	0	0	6	6
Very Stressed	0	0	0	0
Dead	0	0	1	1
Total	10	2	10	22

Plot 1 2003				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	10	3	6	19
Stressed	0	0	5	5
Very Stressed	0	0	0	0
Dead	0	0	1	1
Total	10	3	12	25

Plot 1 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	10	3	15	28
Stressed	0	1	6	7
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	10	4	21	35

Plot 1 2005				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	10	3	14	27
Stressed	0	1	11	12
Very Stressed	0	0	0	0
Dead	0	1	1	2
Total	10	5	26	41

Plot 1 2006				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	3	0	3
Stressed	5	0	4	9
Very Stressed	5	0	2	7
Dead	0	1	19	20
Total	10	4	25	39

Plot 1 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	5	0	6
Stressed	5	0	1	6
Very Stressed	2	0	1	3
Dead	2	1	4	7
Total	10	6	6	22

Plot 1 2008				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	7	1	8
Stressed	4	0	1	5
Very Stressed	3	0	1	4
Dead	1	0	0	1
Total	8	7	3	18

Plot 1 2009				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	10	30	41
Stressed	6	0	2	8
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	7	10	32	49

Plot 1 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	9	38	47
Stressed	6	2	19	27
Very Stressed	1	0	2	3
Dead	0	0	0	0
Total	7	11	59	77

TABLE 2:TREES BY CONDITION

Plot 1 2011				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	7	46	54
Stressed	6	4	26	36
Very Stressed	1	1	1	3
Dead	0	0	2	2
Total	8	12	75	95

Plot 1 2012				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	6	10	49	65
Stressed	4	5	27	36
Very Stressed	2	0	4	6
Dead	0	0	1	1
Total	12	15	81	108

Plot 1 2013				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	6	10	44	60
Stressed	5	4	27	36
Very Stressed	3	0	5	8
Dead	0	2	5	7
Total	14	16	81	111

Plot 1 2014				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	5	8	42	55
Stressed	6	5	22	33
Very Stressed	3	0	4	7
Dead	1	1	9	11
Total	15	14	77	106

Plot 1 2015				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	10	5	4	19
Stressed	7	8	43	58
Very Stressed	3	0	11	14
Dead	0	0	11	11
Total	20	13	69	102

Plot 1 2016				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	5	2	2	9
Stressed	5	6	18	29
Very Stressed	4	1	11	16
Dead	7	4	27	38
Total	21	13	58	92

Plot 1 2017				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	5	2	1	8
Stressed	3	5	17	25
Very Stressed	1	0	6	7
Dead	5	2	7	14
Total	14	9	31	54

Plot 1 2018				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	1	1	3	5
Very Stressed	5	5	15	25
Dead	3	1	6	10
Total	9	7	24	40

Plot 1 2019				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	3	2	9	14
Very Stressed	3	0	7	10
Dead	0	4	2	6
Total	6	6	18	30

Plot 1 2020				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	2	1	8	11
Very Stressed	4	1	8	13
Dead	0	0	1	1
Total	6	2	17	25

Plot 1 2021				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	3	0	7	10
Very Stressed	3	2	9	14
Dead	0	0	0	0
Total	6	2	16	24

Plot 1 2022				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	3	0	3	6
Very Stressed	2	2	11	15
Dead	1	0	2	3
Total	6	2	16	24

TABLE 2:TREES BY CONDITION

Plot 1 2023					Plot 1 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0	**Alive**	0	0	0	0
Stressed	0	0	0	0	**Stressed**	0	0	1	1
Very Stressed	5	1	9	15	**Very Stressed**	1	1	5	7
Dead	0	1	5	6	**Dead**	4	0	3	7
Total	5	2	14	21	**Total**	5	1	9	15

TABLE 2:TREES BY CONDITION

Plot 2 1999

Number	BLACK	RED	WHITE	TOTAL
Alive	0	0	6	6
Stressed	1	0	0	1
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	1	0	6	7

Plot 2 2000

Number	BLACK	RED	WHITE	TOTAL
Alive	1	0	0	1
Stressed	0	0	2	2
Very Stressed	0	0	0	0
Dead	0	0	6	6
Total	1	0	8	9

Plot 2 2001

Number	BLACK	RED	WHITE	TOTAL
Alive	1	0	0	1
Stressed	0	0	2	2
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	1	0	2	3

Plot 2 2002

Number	BLACK	RED	WHITE	TOTAL
Alive	1	0	0	1
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	2	2
Total	1	0	2	3

Plot 2 2003

Number	BLACK	RED	WHITE	TOTAL
Alive	0	0	0	0
Stressed	1	0	0	1
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	1	0	0	1

Plot 2 2004

Number	BLACK	RED	WHITE	TOTAL
Alive	0	0	0	0
Stressed	1	0	0	1
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	1	0	0	1

Plot 2 2005

Number	BLACK	RED	WHITE	TOTAL
Alive	4	0	0	4
Stressed	1	0	0	1
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	5	0	0	5

Plot 2 2006

Number	BLACK	RED	WHITE	TOTAL
Alive	15	1	3	19
Stressed	2	0	0	2
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	17	1	3	21

Plot 2 2007

Number	BLACK	RED	WHITE	TOTAL
Alive	38	1	11	50
Stressed	2	0	0	2
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	40	1	11	52

Plot 2 2008

Number	BLACK	RED	WHITE	TOTAL
Alive	52	7	42	101
Stressed	5	0	2	7
Very Stressed	1	0	0	1
Dead	0	0	0	0
Total	58	7	44	109

Plot 2 2009

Number	BLACK	RED	WHITE	TOTAL
Alive	61	22	98	181
Stressed	6	0	2	8
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	67	22	100	189

Plot 2 2010

Number	BLACK	RED	WHITE	TOTAL
Alive	65	30	114	209
Stressed	6	0	2	8
Very Stressed	0	1	0	1
Dead	0	0	0	0
Total	71	31	116	218

TABLE 2:TREES BY CONDITION

Plot 2 2011

Number	BLACK	RED	WHITE	TOTAL
Alive	65	36	120	221
Stressed	9	2	10	21
Very Stressed	0	0	0	0
Dead	0	2	0	2
Total	74	40	130	244

Plot 2 2012

Number	BLACK	RED	WHITE	TOTAL
Alive	64	39	111	214
Stressed	12	4	23	39
Very Stressed	1	1	3	5
Dead	1	3	0	4
Total	78	47	137	262

Plot 2 2013

Number	BLACK	RED	WHITE	TOTAL
Alive	64	37	119	220
Stressed	14	5	23	42
Very Stressed	1	1	3	5
Dead	0	1	2	3
Total	79	44	147	270

Plot 2 2014

Number	BLACK	RED	WHITE	TOTAL
Alive	67	38	122	227
Stressed	13	5	23	41
Very Stressed	2	0	4	6
Dead	0	4	1	5
Total	82	47	150	279

Plot 2 2015

Number	BLACK	RED	WHITE	TOTAL
Alive	68	42	128	238
Stressed	13	5	21	39
Very Stressed	3	0	11	14
Dead	1	0	8	9
Total	85	47	168	300

Plot 2 2016

Number	BLACK	RED	WHITE	TOTAL
Alive	72	31	99	202
Stressed	10	6	43	59
Very Stressed	1	2	5	8
Dead	3	9	14	26
Total	86	48	161	295

Plot 2 2017

Number	BLACK	RED	WHITE	TOTAL
Alive	43	17	24	84
Stressed	29	9	93	131
Very Stressed	8	3	30	41
Dead	4	11	4	19
Total	84	40	151	275

Plot 2 2018

Number	BLACK	RED	WHITE	TOTAL
Alive	10	1	5	16
Stressed	21	2	26	49
Very Stressed	36	9	87	132
Dead	13	17	29	59
Total	80	29	147	256

Plot 2 2019

Number	BLACK	RED	WHITE	TOTAL
Alive	8	0	2	10
Stressed	32	2	73	107
Very Stressed	13	0	34	47
Dead	14	10	9	33
Total	67	12	118	197

Plot 2 2020

Number	BLACK	RED	WHITE	TOTAL
Alive	7	0	24	31
Stressed	33	1	64	98
Very Stressed	13	1	18	32
Dead	0	0	4	4
Total	53	2	110	165

Plot 2 2021

Number	BLACK	RED	WHITE	TOTAL
Alive	6	0	8	14
Stressed	36	1	57	94
Very Stressed	11	0	39	50
Dead	1	1	2	4
Total	54	2	106	162

Plot 2 2022

Number	BLACK	RED	WHITE	TOTAL
Alive	0	0	1	1
Stressed	38	1	54	93
Very Stressed	15	0	47	62
Dead	0	0	2	2
Total	53	1	104	158

TABLE 2:TREES BY CONDITION

Plot 2 2023					Plot 2 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	1	0	9	**Alive**	9	7	4	20
Stressed	24	0	26	50	**Stressed**	27	0	37	64
Very Stressed	20	0	65	85	**Very Stressed**	17	0	47	64
Dead	2	0	11	13	**Dead**	1	0	5	6
Total	54	1	102	157	**Total**	54	7	93	154

TABLE 2:TREES BY CONDITION

Plot 3 1999

Number	BLACK	RED	WHITE	TOTAL
Alive	0	2	3	5
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	2	3	5

Plot 3 2000

Number	BLACK	RED	WHITE	TOTAL
Alive	0	2	6	8
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	2	6	8

Plot 3 2001

Number	BLACK	RED	WHITE	TOTAL
Alive	0	3	82	85
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	3	82	85

Plot 3 2002

Number	BLACK	RED	WHITE	TOTAL
Alive	2	3	450	455
Stressed	0	0	19	19
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	2	3	469	474

Plot 3 2003

Number	BLACK	RED	WHITE	TOTAL
Alive	17	5	514	536
Stressed	0	0	74	74
Very Stressed	0	0	0	0
Dead	0	0	8	8
Total	17	5	596	618

Plot 3 2004

Number	BLACK	RED	WHITE	TOTAL
Alive	24	6	381	411
Stressed	1	0	99	100
Very Stressed	0	0	0	0
Dead	0	0	128	128
Total	25	6	608	639

Plot 3 2005

Number	BLACK	RED	WHITE	TOTAL
Alive	26	8	227	261
Stressed	1	0	126	127
Very Stressed	0	0	24	24
Dead	0	0	105	105
Total	27	8	482	517

Plot 3 2006

Number	BLACK	RED	WHITE	TOTAL
Alive	21	9	99	129
Stressed	7	0	154	161
Very Stressed	1	0	51	52
Dead	0	0	75	75
Total	29	9	379	417

Plot 3 2007

Number	BLACK	RED	WHITE	TOTAL
Alive	26	18	119	163
Stressed	5	0	90	95
Very Stressed	2	0	42	44
Dead	0	0	55	55
Total	33	18	306	357

Plot 3 2008

Number	BLACK	RED	WHITE	TOTAL
Alive	29	21	98	148
Stressed	6	0	77	83
Very Stressed	2	0	56	58
Dead	0	0	21	21
Total	37	21	252	310

Plot 3 2009

Number	BLACK	RED	WHITE	TOTAL
Alive	39	28	31	98
Stressed	0	0	103	103
Very Stressed	2	0	59	61
Dead	0	0	39	39
Total	41	28	232	301

Plot 3 2010

Number	BLACK	RED	WHITE	TOTAL
Alive	36	24	9	69
Stressed	6	5	27	38
Very Stressed	2	2	91	95
Dead	0	0	66	66
Total	44	31	193	268

TABLE 2:TREES BY CONDITION

Plot 3 2011				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	35	29	6	70
Stressed	6	5	30	41
Very Stressed	3	2	73	78
Dead	1	1	19	21
Total	45	37	128	210

Plot 3 2012				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	34	42	3	79
Stressed	13	5	27	45
Very Stressed	2	2	68	72
Dead	0	1	11	12
Total	49	50	109	208

Plot 3 2013				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	25	45	0	70
Stressed	22	6	23	51
Very Stressed	3	4	54	61
Dead	0	2	21	23
Total	50	57	98	205

Plot 3 2014				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	20	26	1	47
Stressed	24	29	0	53
Very Stressed	6	5	41	52
Dead	1	1	36	38
Total	51	61	78	190

Plot 3 2015				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	13	27	0	40
Stressed	33	29	1	63
Very Stressed	5	9	23	37
Dead	0	1	19	20
Total	51	66	43	160

Plot 3 2016				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	10	6	0	16
Stressed	27	27	1	55
Very Stressed	11	21	7	39
Dead	3	16	16	35
Total	51	70	24	145

Plot 3 2017				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	0	1	5
Stressed	29	12	0	41
Very Stressed	7	32	4	43
Dead	8	11	3	22
Total	48	55	8	111

Plot 3 2018				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	0	0	2
Stressed	17	9	0	26
Very Stressed	19	28	4	51
Dead	2	7	1	10
Total	40	44	5	89

Plot 3 2019				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	6	1	0	7
Stressed	21	15	2	38
Very Stressed	7	17	2	26
Dead	4	6	0	10
Total	38	39	4	81

Plot 3 2020				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	15	6	0	21
Stressed	14	17	1	32
Very Stressed	5	13	3	21
Dead	0	0	0	0
Total	34	36	4	74

Plot 3 2021				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	14	26	0	40
Stressed	16	19	3	38
Very Stressed	4	7	1	12
Dead	0	1	0	1
Total	34	53	4	91

Plot 3 2022				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	9	64	1	74
Stressed	23	22	2	47
Very Stressed	3	5	2	10
Dead	0	0	0	0
Total	35	91	5	131

TABLE 2:TREES BY CONDITION

Plot 3 2023					Plot 3 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	11	107	1	119	**Alive**	12	133	0	145
Stressed	21	22	2	45	**Stressed**	20	26	3	49
Very Stressed	5	6	2	13	**Very Stressed**	6	5	2	13
Dead	1	0	0	1	**Dead**	1	1	0	2
Total	38	135	5	178	**Total**	39	165	5	209

TABLE 2:TREES BY CONDITION

Plot 4 1999				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	111	0	112
Stressed	0	1	0	1
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	1	112	0	113

Plot 4 2000				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	71	0	72
Stressed	0	36	0	36
Very Stressed	0	0	0	0
Dead	0	5	0	5
Total	1	112	0	113

Plot 4 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	45	0	46
Stressed	0	54	0	54
Very Stressed	0	0	0	0
Dead	0	8	0	8
Total	1	107	0	108

Plot 4 2002				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	6	0	6
Stressed	0	54	0	54
Very Stressed	0	0	0	0
Dead	1	39	0	40
Total	1	99	0	100

Plot 4 2003				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	0	58	0	58
Very Stressed	0	0	0	0
Dead	0	2	0	2
Total	0	60	0	60

Plot 4 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	0	53	0	53
Very Stressed	0	0	0	0
Dead	0	5	0	5
Total	0	58	0	58

Plot 4 2005				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	0	51	0	51
Very Stressed	0	2	0	2
Dead	0	0	0	0
Total	0	53	0	53

Plot 4 2006				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	1	1
Stressed	0	35	0	35
Very Stressed	0	13	0	13
Dead	0	5	0	5
Total	0	53	1	54

Plot 4 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	3	1	4
Stressed	0	31	0	31
Very Stressed	0	14	0	14
Dead	0	3	0	3
Total	0	51	1	52

Plot 4 2008				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	17	2	20
Stressed	0	30	0	30
Very Stressed	0	15	0	15
Dead	0	0	0	0
Total	1	62	2	65

Plot 4 2009				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	36	6	46
Stressed	0	39	0	39
Very Stressed	0	6	0	6
Dead	0	0	0	0
Total	4	81	6	91

Plot 4 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	63	8	75
Stressed	0	37	0	37
Very Stressed	0	7	0	7
Dead	0	1	0	1
Total	4	108	8	120

TABLE 2:TREES BY CONDITION

Plot 4 2011				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	75	8	87
Stressed	0	38	0	38
Very Stressed	0	8	0	8
Dead	0	1	0	1
Total	4	122	8	134

Plot 4 2012				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	89	8	101
Stressed	0	38	1	39
Very Stressed	0	7	0	7
Dead	0	2	0	2
Total	4	136	9	149

Plot 4 2013				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	99	9	112
Stressed	0	39	1	40
Very Stressed	0	7	0	7
Dead	0	0	0	0
Total	4	145	10	159

Plot 4 2014				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	108	9	121
Stressed	0	39	1	40
Very Stressed	0	7	1	8
Dead	0	1	0	1
Total	4	155	11	170

Plot 4 2015				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	109	9	122
Stressed	0	42	1	43
Very Stressed	0	9	1	10
Dead	0	1	0	1
Total	4	161	11	176

Plot 4 2016				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	110	9	123
Stressed	0	39	1	40
Very Stressed	0	6	1	7
Dead	0	8	0	8
Total	4	163	11	178

Plot 4 2017				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	132	8	143
Stressed	1	23	2	26
Very Stressed	0	1	1	2
Dead	0	3	0	3
Total	4	159	11	174

Plot 4 2018				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	54	3	58
Stressed	1	67	4	72
Very Stressed	2	37	3	42
Dead	0	3	1	4
Total	4	161	11	176

Plot 4 2019				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	92	3	96
Stressed	1	45	7	53
Very Stressed	2	21	1	24
Dead	0	3	0	3
Total	4	161	11	176

Plot 4 2020				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	156	11	168
Stressed	2	11	2	15
Very Stressed	1	6	0	7
Dead	0	2	0	2
Total	4	175	13	192

Plot 4 2021				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	152	10	162
Stressed	3	25	3	31
Very Stressed	1	5	1	7
Dead	0	1	0	1
Total	4	183	14	201

Plot 4 2022				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	158	6	164
Stressed	3	26	7	36
Very Stressed	0	4	1	5
Dead	1	3	0	4
Total	4	191	14	209

TABLE 2:TREES BY CONDITION

Plot 4 2023					Plot 4 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	83	2	86	**Alive**	0	98	2	100
Stressed	3	76	8	86	**Stressed**	2	82	9	93
Very Stressed	0	35	4	39	**Very Stressed**	2	23	3	28
Dead	0	1	0	1	**Dead**	0	2	0	2
Total	4	195	14	213	**Total**	4	205	14	223

TABLE 2:TREES BY CONDITION

Plot 5 1999				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	14	6	20	40
Stressed	1	0	18	19
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	15	6	38	59

Plot 5 2000				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	12	6	20	38
Stressed	3	0	19	22
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	15	6	39	60

Plot 5 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	7	7	9	23
Stressed	9	0	28	37
Very Stressed	0	0	0	0
Dead	0	0	2	2
Total	16	7	39	62

Plot 5 2002				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	6	7	8	21
Stressed	10	0	30	40
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	16	7	38	61

Plot 5 2003				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	6	7	5	18
Stressed	10	2	32	44
Very Stressed	0	0	0	0
Dead	0	0	1	1
Total	16	9	38	63

Plot 5 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	6	9	4	19
Stressed	10	2	34	46
Very Stressed	0	0	1	1
Dead	0	0	0	0
Total	16	11	39	66

Plot 5 2005				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	5	9	4	18
Stressed	11	2	33	46
Very Stressed	0	0	2	2
Dead	0	0	0	0
Total	16	11	39	66

Plot 5 2006				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	9	11	7	27
Stressed	6	3	27	36
Very Stressed	1	1	5	7
Dead	1	0	1	2
Total	17	15	40	72

Plot 5 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	9	16	4	29
Stressed	7	6	25	38
Very Stressed	1	0	10	11
Dead	0	0	0	0
Total	17	22	39	78

Plot 5 2008				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	9	21	3	33
Stressed	9	6	16	31
Very Stressed	1	0	18	19
Dead	0	0	3	3
Total	19	27	40	86

Plot 5 2009				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	10	21	3	34
Stressed	9	9	19	37
Very Stressed	0	0	15	15
Dead	1	0	0	1
Total	20	30	37	87

Plot 5 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	12	30	2	44
Stressed	7	5	19	31
Very Stressed	0	0	16	16
Dead	0	0	1	1
Total	19	35	38	92

TABLE 2:TREES BY CONDITION

Plot 5 2011

Number	BLACK	RED	WHITE	TOTAL
Alive	8	28	1	37
Stressed	10	7	17	34
Very Stressed	1	0	18	19
Dead	1	0	1	2
Total	20	35	37	92

Plot 5 2012

Number	BLACK	RED	WHITE	TOTAL
Alive	8	28	1	37
Stressed	9	8	16	33
Very Stressed	1	0	18	19
Dead	1	0	1	2
Total	19	36	36	91

Plot 5 2013

Number	BLACK	RED	WHITE	TOTAL
Alive	7	30	0	37
Stressed	10	7	14	31
Very Stressed	1	1	19	21
Dead	0	0	2	2
Total	18	38	35	91

Plot 5 2014

Number	BLACK	RED	WHITE	TOTAL
Alive	7	25	1	33
Stressed	9	12	11	32
Very Stressed	4	1	21	26
Dead	0	0	0	0
Total	20	38	33	91

Plot 5 2015

Number	BLACK	RED	WHITE	TOTAL
Alive	7	26	2	35
Stressed	8	12	9	29
Very Stressed	5	1	24	30
Dead	0	0	0	0
Total	20	39	35	94

Plot 5 2016

Number	BLACK	RED	WHITE	TOTAL
Alive	9	36	2	47
Stressed	7	3	9	19
Very Stressed	4	0	24	28
Dead	0	0	0	0
Total	20	39	35	94

Plot 5 2017

Number	BLACK	RED	WHITE	TOTAL
Alive	8	36	2	46
Stressed	8	5	9	22
Very Stressed	4	0	24	28
Dead	0	0	0	0
Total	20	41	35	96

Plot 5 2018

Number	BLACK	RED	WHITE	TOTAL
Alive	7	20	0	27
Stressed	8	20	6	34
Very Stressed	5	0	24	29
Dead	0	1	6	7
Total	20	41	36	97

Plot 5 2019

Number	BLACK	RED	WHITE	TOTAL
Alive	5	9	0	14
Stressed	11	32	7	50
Very Stressed	4	0	19	23
Dead	0	0	4	4
Total	20	41	30	91

Plot 5 2020

Number	BLACK	RED	WHITE	TOTAL
Alive	5	17	1	23
Stressed	10	24	6	40
Very Stressed	6	0	15	21
Dead	0	0	4	4
Total	21	41	26	88

Plot 5 2021

Number	BLACK	RED	WHITE	TOTAL
Alive	6	17	1	24
Stressed	9	25	6	40
Very Stressed	6	0	13	19
Dead	0	0	2	2
Total	21	42	22	85

Plot 5 2022

Number	BLACK	RED	WHITE	TOTAL
Alive	7	19	1	27
Stressed	8	24	7	39
Very Stressed	5	0	9	14
Dead	1	0	3	4
Total	21	43	20	84

TABLE 2:TREES BY CONDITION

Plot 5 2023					Plot 5 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	7	23	0	30	**Alive**	8	27	0	35
Stressed	9	23	6	38	**Stressed**	9	20	7	36
Very Stressed	3	0	11	14	**Very Stressed**	2	0	10	12
Dead	1	0	0	1	**Dead**	0	1	0	1
Total	20	46	17	83	**Total**	19	48	17	84

TABLE 2:TREES BY CONDITION

Plot 6 1999				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	0	2	10
Stressed	0	2	1	3
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	8	2	3	13

Plot 6 2000				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	9	0	3	12
Stressed	0	2	1	3
Very Stressed	0	0	0	0
Dead	1	0	0	1
Total	10	2	4	16

Plot 6 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	10	0	3	13
Stressed	2	2	3	7
Very Stressed	0	0	0	0
Dead	1	0	0	1
Total	13	2	6	21

Plot 6 2002				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	10	0	2	12
Stressed	2	2	6	10
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	12	2	8	22

Plot 6 2003				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	1	10	19
Stressed	5	1	6	12
Very Stressed	0	0	0	0
Dead	0	1	0	1
Total	13	3	16	32

Plot 6 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	13	1	17	31
Stressed	2	1	5	8
Very Stressed	0	0	0	0
Dead	0	0	1	1
Total	15	2	23	40

Plot 6 2005				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	12	2	16	30
Stressed	3	1	7	11
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	15	3	23	41

Plot 6 2006				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	14	3	13	30
Stressed	2	1	15	18
Very Stressed	0	0	0	0
Dead	0	0	1	1
Total	16	4	29	49

Plot 6 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	14	4	18	36
Stressed	3	0	11	14
Very Stressed	0	0	0	0
Dead	0	1	4	5
Total	17	5	33	55

Plot 6 2008				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	15	9	13	37
Stressed	3	0	11	14
Very Stressed	0	0	3	3
Dead	0	0	3	3
Total	18	9	30	57

Plot 6 2009				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	20	11	15	46
Stressed	2	0	13	15
Very Stressed	1	1	4	6
Dead	0	0	3	3
Total	23	12	35	70

Plot 6 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	18	11	14	43
Stressed	2	0	13	15
Very Stressed	2	1	4	7
Dead	1	0	2	3
Total	23	12	33	68

TABLE 2:TREES BY CONDITION

Plot 6 2011

Number	BLACK	RED	WHITE	TOTAL
Alive	17	10	8	35
Stressed	4	2	14	20
Very Stressed	2	0	8	10
Dead	0	1	1	2
Total	23	13	31	67

Plot 6 2012

Number	BLACK	RED	WHITE	TOTAL
Alive	17	10	7	34
Stressed	5	4	15	24
Very Stressed	1	1	8	10
Dead	0	0	1	1
Total	23	15	31	69

Plot 6 2013

Number	BLACK	RED	WHITE	TOTAL
Alive	17	10	6	33
Stressed	5	5	15	25
Very Stressed	0	1	8	9
Dead	1	0	1	2
Total	23	16	30	69

Plot 6 2014

Number	BLACK	RED	WHITE	TOTAL
Alive	13	13	4	30
Stressed	5	10	10	25
Very Stressed	3	2	16	21
Dead	1	0	2	3
Total	22	25	32	79

Plot 6 2015

Number	BLACK	RED	WHITE	TOTAL
Alive	12	17	4	33
Stressed	6	13	14	33
Very Stressed	1	2	12	15
Dead	2	0	4	6
Total	21	32	34	87

Plot 6 2016

Number	BLACK	RED	WHITE	TOTAL
Alive	15	26	6	47
Stressed	2	10	17	29
Very Stressed	1	2	7	10
Dead	1	0	1	2
Total	19	38	31	88

Plot 6 2017

Number	BLACK	RED	WHITE	TOTAL
Alive	13	24	7	44
Stressed	2	8	13	23
Very Stressed	1	0	5	6
Dead	5	7	7	19
Total	21	39	32	92

Plot 6 2018

Number	BLACK	RED	WHITE	TOTAL
Alive	12	24	1	37
Stressed	4	13	13	30
Very Stressed	0	0	11	11
Dead	1	1	0	2
Total	17	38	25	80

Plot 6 2019

Number	BLACK	RED	WHITE	TOTAL
Alive	7	22	2	31
Stressed	6	15	7	28
Very Stressed	3	1	15	19
Dead	0	2	2	4
Total	16	40	26	82

Plot 6 2020

Number	BLACK	RED	WHITE	TOTAL
Alive	4	34	2	40
Stressed	7	2	9	18
Very Stressed	1	0	7	8
Dead	4	3	6	13
Total	16	39	24	79

Plot 6 2021

Number	BLACK	RED	WHITE	TOTAL
Alive	3	26	1	30
Stressed	2	6	5	13
Very Stressed	1	0	9	10
Dead	6	6	3	15
Total	12	38	18	68

Plot 6 2022

Number	BLACK	RED	WHITE	TOTAL
Alive	4	15	1	20
Stressed	1	10	2	13
Very Stressed	1	0	8	9
Dead	0	7	4	11
Total	6	32	15	53

TABLE 2:TREES BY CONDITION

Plot 6 2023					Plot 6 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	8	1	12	**Alive**	2	5	0	7
Stressed	1	13	0	14	**Stressed**	3	15	4	22
Very Stressed	2	6	8	16	**Very Stressed**	1	5	2	8
Dead	0	1	3	4	**Dead**	0	2	3	5
Total	6	28	12	46	**Total**	6	27	9	42

TABLE 2:TREES BY CONDITION

Plot 7 1999				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	8	2	18
Stressed	0	2	0	2
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	8	10	2	20

Plot 7 2000				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	10	2	20
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	1	0	1
Total	8	11	2	21

Plot 7 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	10	2	20
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	8	10	2	20

Plot 7 2002				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	10	2	20
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	8	10	2	20

Plot 7 2003				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	13	2	23
Stressed	0	1	0	1
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	8	14	2	24

Plot 7 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	16	2	26
Stressed	0	1	0	1
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	8	17	2	27

Plot 7 2005				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	17	2	27
Stressed	0	1	0	1
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	8	18	2	28

Plot 7 2006				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	17	2	27
Stressed	0	1	0	1
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	8	18	2	28

Plot 7 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	7	20	2	29
Stressed	0	0	0	0
Very Stressed	0	1	0	1
Dead	1	0	0	1
Total	8	21	2	31

Plot 7 2008				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	7	20	2	29
Stressed	0	1	0	1
Very Stressed	0	1	0	1
Dead	0	0	0	0
Total	7	22	2	31

Plot 7 2009				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	7	24	2	33
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	7	24	2	33

Plot 7 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	6	26	2	34
Stressed	1	0	0	1
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	7	26	2	35

TABLE 2:TREES BY CONDITION

Plot 7 2011

Number	BLACK	RED	WHITE	TOTAL
Alive	6	28	2	36
Stressed	1	0	1	2
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	7	28	3	38

Plot 7 2012

Number	BLACK	RED	WHITE	TOTAL
Alive	6	27	3	36
Stressed	1	4	1	6
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	7	31	4	42

Plot 7 2013

Number	BLACK	RED	WHITE	TOTAL
Alive	6	27	2	35
Stressed	1	3	2	6
Very Stressed	0	1	0	1
Dead	0	0	0	0
Total	7	31	4	42

Plot 7 2014

Number	BLACK	RED	WHITE	TOTAL
Alive	4	30	1	35
Stressed	3	5	1	9
Very Stressed	0	1	2	3
Dead	0	2	0	2
Total	7	38	4	49

Plot 7 2015

Number	BLACK	RED	WHITE	TOTAL
Alive	2	26	0	28
Stressed	4	9	2	15
Very Stressed	1	2	2	5
Dead	0	0	0	0
Total	7	37	4	48

Plot 7 2016

Number	BLACK	RED	WHITE	TOTAL
Alive	1	6	0	7
Stressed	4	20	3	27
Very Stressed	2	4	0	6
Dead	0	9	1	10
Total	7	39	4	50

Plot 7 2017

Number	BLACK	RED	WHITE	TOTAL
Alive	1	6	0	7
Stressed	4	17	3	24
Very Stressed	2	2	0	4
Dead	0	5	0	5
Total	7	30	3	40

Plot 7 2018

Number	BLACK	RED	WHITE	TOTAL
Alive	0	0	0	0
Stressed	0	0	0	0
Very Stressed	7	7	0	14
Dead	0	18	3	21
Total	7	25	3	35

Plot 7 2019

Number	BLACK	RED	WHITE	TOTAL
Alive	0	0	0	0
Stressed	0	0	0	0
Very Stressed	5	5	0	10
Dead	2	2	0	4
Total	7	7	0	14

Plot 7 2020

Number	BLACK	RED	WHITE	TOTAL
Alive	0	0	0	0
Stressed	2	0	0	2
Very Stressed	3	3	0	6
Dead	0	2	0	2
Total	5	5	0	10

Plot 7 2021

Number	BLACK	RED	WHITE	TOTAL
Alive	0	0	1	1
Stressed	2	0	0	2
Very Stressed	3	2	0	5
Dead	0	1	0	1
Total	5	3	1	9

Plot 7 2022

Number	BLACK	RED	WHITE	TOTAL
Alive	0	0	1	1
Stressed	1	0	0	1
Very Stressed	4	2	1	7
Dead	0	0	0	0
Total	5	2	2	9

TABLE 2:TREES BY CONDITION

Plot 7 2023					Plot 7 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	1	1	**Alive**	1	0	0	1
Stressed	1	0	0	1	**Stressed**	1	0	1	2
Very Stressed	4	1	0	5	**Very Stressed**	3	0	0	3
Dead	0	1	1	2	**Dead**	0	1	0	1
Total	5	2	2	9	**Total**	5	1	1	7

TABLE 2:TREES BY CONDITION

Plot 8 1999

Number	BLACK	RED	WHITE	TOTAL
Alive	4	5	0	9
Stressed	0	26	0	26
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	4	31	0	35

Plot 8 2000

Number	BLACK	RED	WHITE	TOTAL
Alive	4	15	0	19
Stressed	0	15	0	15
Very Stressed	0	0	0	0
Dead	0	1	0	1
Total	4	31	0	35

Plot 8 2001

Number	BLACK	RED	WHITE	TOTAL
Alive	4	9	0	13
Stressed	0	19	0	19
Very Stressed	0	0	0	0
Dead	0	2	0	2
Total	4	30	0	34

Plot 8 2002

Number	BLACK	RED	WHITE	TOTAL
Alive	4	11	0	15
Stressed	0	16	0	16
Very Stressed	0	0	0	0
Dead	0	1	0	1
Total	4	28	0	32

Plot 8 2003

Number	BLACK	RED	WHITE	TOTAL
Alive	4	5	0	9
Stressed	0	22	0	22
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	4	27	0	31

Plot 8 2004

Number	BLACK	RED	WHITE	TOTAL
Alive	4	5	0	9
Stressed	0	21	0	21
Very Stressed	0	0	0	0
Dead	0	1	0	1
Total	4	27	0	31

Plot 8 2005

Number	BLACK	RED	WHITE	TOTAL
Alive	4	5	0	9
Stressed	0	21	0	21
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	4	26	0	30

Plot 8 2006

Number	BLACK	RED	WHITE	TOTAL
Alive	3	10	0	13
Stressed	1	12	0	13
Very Stressed	0	4	0	4
Dead	0	0	0	0
Total	4	26	0	30

Plot 8 2007

Number	BLACK	RED	WHITE	TOTAL
Alive	3	18	2	23
Stressed	1	10	0	11
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	4	28	2	34

Plot 8 2008

Number	BLACK	RED	WHITE	TOTAL
Alive	3	18	9	30
Stressed	1	10	0	11
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	4	28	9	41

Plot 8 2009

Number	BLACK	RED	WHITE	TOTAL
Alive	4	19	20	43
Stressed	0	8	0	8
Very Stressed	0	1	0	1
Dead	0	0	0	0
Total	4	28	20	52

Plot 8 2010

Number	BLACK	RED	WHITE	TOTAL
Alive	4	20	36	60
Stressed	0	4	0	4
Very Stressed	0	2	0	2
Dead	0	2	0	2
Total	4	28	36	68

TABLE 2:TREES BY CONDITION

Plot 8 2011

Number	BLACK	RED	WHITE	TOTAL
Alive	5	17	55	77
Stressed	0	5	1	6
Very Stressed	0	3	0	3
Dead	0	1	0	1
Total	5	26	56	87

Plot 8 2012

Number	BLACK	RED	WHITE	TOTAL
Alive	5	18	74	97
Stressed	0	5	2	7
Very Stressed	0	3	0	3
Dead	0	0	0	0
Total	5	26	76	107

Plot 8 2013

Number	BLACK	RED	WHITE	TOTAL
Alive	5	19	91	115
Stressed	0	5	6	11
Very Stressed	0	3	0	3
Dead	0	0	0	0
Total	5	27	97	129

Plot 8 2014

Number	BLACK	RED	WHITE	TOTAL
Alive	5	20	101	126
Stressed	0	4	7	11
Very Stressed	0	3	0	3
Dead	0	0	0	0
Total	5	27	108	140

Plot 8 2015

Number	BLACK	RED	WHITE	TOTAL
Alive	5	25	79	109
Stressed	0	3	33	36
Very Stressed	0	2	2	4
Dead	0	0	0	0
Total	5	30	114	149

Plot 8 2016

Number	BLACK	RED	WHITE	TOTAL
Alive	5	24	80	109
Stressed	0	4	27	31
Very Stressed	0	2	7	9
Dead	0	0	3	3
Total	5	30	117	152

Plot 8 2017

Number	BLACK	RED	WHITE	TOTAL
Alive	5	24	39	68
Stressed	0	5	58	63
Very Stressed	0	2	19	21
Dead	0	0	0	0
Total	5	31	116	152

Plot 8 2018

Number	BLACK	RED	WHITE	TOTAL
Alive	0	5	1	6
Stressed	1	12	34	47
Very Stressed	4	10	63	77
Dead	0	5	18	23
Total	5	32	116	153

Plot 8 2019

Number	BLACK	RED	WHITE	TOTAL
Alive	0	13	30	43
Stressed	3	6	41	50
Very Stressed	3	6	17	26
Dead	0	2	11	13
Total	6	27	99	132

Plot 8 2020

Number	BLACK	RED	WHITE	TOTAL
Alive	1	20	38	59
Stressed	5	3	38	46
Very Stressed	1	4	11	16
Dead	0	0	3	3
Total	7	27	90	124

Plot 8 2021

Number	BLACK	RED	WHITE	TOTAL
Alive	1	19	36	56
Stressed	6	4	41	51
Very Stressed	0	4	9	13
Dead	0	0	1	1
Total	7	27	87	121

Plot 8 2022

Number	BLACK	RED	WHITE	TOTAL
Alive	1	20	34	55
Stressed	5	5	50	60
Very Stressed	1	4	3	8
Dead	0	0	0	0
Total	7	29	87	123

TABLE 2:TREES BY CONDITION

Plot 8 2023					Plot 8 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	21	24	47	**Alive**	1	23	34	58
Stressed	3	5	42	50	**Stressed**	3	5	39	47
Very Stressed	1	4	21	26	**Very Stressed**	2	2	13	17
Dead	1	0	1	2	**Dead**	0	2	1	3
Total	7	30	88	125	**Total**	6	32	87	125

TABLE 2:TREES BY CONDITION

Plot 9 1999				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	12	6	20
Stressed	0	12	2	14
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	2	24	8	34

Plot 9 2000				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	8	5	15
Stressed	0	9	2	11
Very Stressed	0	0	0	0
Dead	0	7	1	8
Total	2	24	8	34

Plot 9 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	6	2	10
Stressed	0	8	5	13
Very Stressed	0	0	0	0
Dead	0	3	0	3
Total	2	17	7	26

Plot 9 2002				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	6	2	10
Stressed	0	5	5	10
Very Stressed	0	0	0	0
Dead	0	3	0	3
Total	2	14	7	23

Plot 9 2003				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	6	2	10
Stressed	0	3	4	7
Very Stressed	0	0	0	0
Dead	0	2	1	3
Total	2	11	7	20

Plot 9 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	6	2	10
Stressed	0	2	4	6
Very Stressed	0	0	0	0
Dead	0	1	0	1
Total	2	9	6	17

Plot 9 2005				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	6	2	10
Stressed	0	2	4	6
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	2	8	6	16

Plot 9 2006				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	1	1	3
Stressed	1	4	3	8
Very Stressed	0	0	2	2
Dead	0	3	0	3
Total	2	8	6	16

Plot 9 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	1	14	16
Stressed	1	2	3	6
Very Stressed	0	0	2	2
Dead	0	2	0	2
Total	2	5	19	26

Plot 9 2008				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	1	59	60
Stressed	2	2	6	10
Very Stressed	0	0	3	3
Dead	0	0	0	0
Total	2	3	68	73

Plot 9 2009				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	2	114	117
Stressed	1	2	5	8
Very Stressed	0	0	1	1
Dead	0	0	0	0
Total	2	4	120	126

Plot 9 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	14	122	137
Stressed	1	2	13	16
Very Stressed	0	0	2	2
Dead	0	0	0	0
Total	2	16	137	155

TABLE 2:TREES BY CONDITION

Plot 9 2011

Number	BLACK	RED	WHITE	TOTAL
Alive	1	15	114	130
Stressed	1	2	33	36
Very Stressed	0	0	2	2
Dead	0	0	0	0
Total	2	17	149	168

Plot 9 2012

Number	BLACK	RED	WHITE	TOTAL
Alive	1	17	84	102
Stressed	1	2	63	66
Very Stressed	0	0	8	8
Dead	0	0	1	1
Total	2	19	156	177

Plot 9 2013

Number	BLACK	RED	WHITE	TOTAL
Alive	1	17	72	90
Stressed	1	3	59	63
Very Stressed	0	0	8	8
Dead	0	0	18	18
Total	2	20	157	179

Plot 9 2014

Number	BLACK	RED	WHITE	TOTAL
Alive	1	16	53	70
Stressed	1	5	49	55
Very Stressed	0	0	4	4
Dead	0	2	33	35
Total	2	23	139	164

Plot 9 2015

Number	BLACK	RED	WHITE	TOTAL
Alive	1	10	23	34
Stressed	1	9	40	50
Very Stressed	0	2	14	16
Dead	0	2	29	31
Total	2	23	106	131

Plot 9 2016

Number	BLACK	RED	WHITE	TOTAL
Alive	1	5	8	14
Stressed	1	10	13	24
Very Stressed	0	1	6	7
Dead	0	5	50	55
Total	2	21	77	100

Plot 9 2017

Number	BLACK	RED	WHITE	TOTAL
Alive	1	5	2	8
Stressed	1	6	11	18
Very Stressed	0	1	8	9
Dead	0	4	7	11
Total	2	16	28	46

Plot 9 2018

Number	BLACK	RED	WHITE	TOTAL
Alive	0	1	0	1
Stressed	1	5	2	8
Very Stressed	1	5	13	19
Dead	0	1	6	7
Total	2	12	21	35

Plot 9 2019

Number	BLACK	RED	WHITE	TOTAL
Alive	0	1	0	1
Stressed	2	5	6	13
Very Stressed	0	3	7	10
Dead	0	2	2	4
Total	2	11	15	28

Plot 9 2020

Number	BLACK	RED	WHITE	TOTAL
Alive	0	6	4	10
Stressed	2	3	8	13
Very Stressed	0	3	3	6
Dead	0	0	0	0
Total	2	12	15	29

Plot 9 2021

Number	BLACK	RED	WHITE	TOTAL
Alive	0	4	20	24
Stressed	2	5	10	17
Very Stressed	0	3	1	4
Dead	0	0	2	2
Total	2	12	33	47

Plot 9 2022

Number	BLACK	RED	WHITE	TOTAL
Alive	0	9	21	30
Stressed	2	6	25	33
Very Stressed	0	2	4	6
Dead	0	0	1	1
Total	2	17	51	70

TABLE 2:TREES BY CONDITION

Plot 9 2023					Plot 9 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	2	0	2	**Alive**	1	11	2	14
Stressed	2	10	6	18	**Stressed**	2	5	8	15
Very Stressed	0	3	10	13	**Very Stressed**	0	1	4	5
Dead	0	2	35	37	**Dead**	0	1	3	4
Total	2	17	51	70	**Total**	3	18	17	38

TABLE 2: TREES BY CONDITION

Plot 10 1999

Number	BLACK	RED	WHITE	TOTAL
Alive	9	15	2	26
Stressed	0	4	0	4
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	9	19	2	30

Plot 10 2000

Number	BLACK	RED	WHITE	TOTAL
Alive	8	16	2	26
Stressed	1	3	0	4
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	9	19	2	30

Plot 10 2001

Number	BLACK	RED	WHITE	TOTAL
Alive	8	17	0	25
Stressed	1	3	2	6
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	9	20	2	31

Plot 10 2002

Number	BLACK	RED	WHITE	TOTAL
Alive	8	15	0	23
Stressed	1	5	2	8
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	9	20	2	31

Plot 10 2003

Number	BLACK	RED	WHITE	TOTAL
Alive	9	6	0	15
Stressed	0	14	2	16
Very Stressed	0	1	0	1
Dead	0	0	0	0
Total	9	21	2	32

Plot 10 2004

Number	BLACK	RED	WHITE	TOTAL
Alive	8	8	0	16
Stressed	1	13	2	16
Very Stressed	0	2	0	2
Dead	0	0	0	0
Total	9	23	2	34

Plot 10 2005

Number	BLACK	RED	WHITE	TOTAL
Alive	8	9	0	17
Stressed	1	13	2	16
Very Stressed	0	0	0	0
Dead	0	2	0	2
Total	9	24	2	35

Plot 10 2006

Number	BLACK	RED	WHITE	TOTAL
Alive	4	10	1	15
Stressed	3	9	2	14
Very Stressed	2	3	0	5
Dead	0	1	0	1
Total	9	23	3	35

Plot 10 2007

Number	BLACK	RED	WHITE	TOTAL
Alive	5	15	17	37
Stressed	1	7	2	10
Very Stressed	2	2	0	4
Dead	1	0	0	1
Total	9	24	19	52

Plot 10 2008

Number	BLACK	RED	WHITE	TOTAL
Alive	5	16	23	44
Stressed	1	7	3	11
Very Stressed	2	2	0	4
Dead	0	0	0	0
Total	8	25	26	59

Plot 10 2009

Number	BLACK	RED	WHITE	TOTAL
Alive	7	24	44	75
Stressed	1	7	0	8
Very Stressed	0	1	0	1
Dead	0	0	0	0
Total	8	32	44	84

Plot 10 2010

Number	BLACK	RED	WHITE	TOTAL
Alive	7	22	54	83
Stressed	1	9	2	12
Very Stressed	0	1	0	1
Dead	0	0	0	0
Total	8	32	56	96

TABLE 2:TREES BY CONDITION

Plot 10 2011

Number	BLACK	RED	WHITE	TOTAL
Alive	6	23	68	97
Stressed	2	9	7	18
Very Stressed	0	1	1	2
Dead	0	0	0	0
Total	8	33	76	117

Plot 10 2012

Number	BLACK	RED	WHITE	TOTAL
Alive	6	23	70	99
Stressed	2	9	13	24
Very Stressed	0	3	5	8
Dead	0	0	0	0
Total	8	35	88	131

Plot 10 2013

Number	BLACK	RED	WHITE	TOTAL
Alive	5	26	69	100
Stressed	2	10	12	24
Very Stressed	0	3	6	9
Dead	1	0	3	4
Total	8	39	90	137

Plot 10 2014

Number	BLACK	RED	WHITE	TOTAL
Alive	5	27	40	72
Stressed	1	6	16	23
Very Stressed	1	7	20	28
Dead	0	0	13	13
Total	7	40	89	136

Plot 10 2015

Number	BLACK	RED	WHITE	TOTAL
Alive	4	26	9	39
Stressed	1	9	20	30
Very Stressed	2	5	33	40
Dead	0	0	14	14
Total	7	40	76	123

Plot 10 2016

Number	BLACK	RED	WHITE	TOTAL
Alive	1	9	1	11
Stressed	1	8	12	21
Very Stressed	5	11	22	38
Dead	0	13	27	40
Total	7	41	62	110

Plot 10 2017

Number	BLACK	RED	WHITE	TOTAL
Alive	1	8	2	11
Stressed	1	9	13	23
Very Stressed	5	6	13	24
Dead	0	5	7	12
Total	7	28	35	70

Plot 10 2018

Number	BLACK	RED	WHITE	TOTAL
Alive	0	1	0	1
Stressed	0	9	10	19
Very Stressed	7	8	13	28
Dead	0	5	6	11
Total	7	23	29	59

Plot 10 2019

Number	BLACK	RED	WHITE	TOTAL
Alive	0	2	0	2
Stressed	3	8	17	28
Very Stressed	4	8	6	18
Dead	0	0	0	0
Total	7	18	23	48

Plot 10 2020

Number	BLACK	RED	WHITE	TOTAL
Alive	0	5	7	12
Stressed	1	8	12	21
Very Stressed	5	4	2	11
Dead	1	1	2	4
Total	7	18	23	48

Plot 10 2021

Number	BLACK	RED	WHITE	TOTAL
Alive	0	6	10	16
Stressed	1	8	9	18
Very Stressed	5	3	2	10
Dead	0	0	0	0
Total	6	17	21	44

Plot 10 2022

Number	BLACK	RED	WHITE	TOTAL
Alive	0	7	4	11
Stressed	2	8	15	25
Very Stressed	4	2	2	8
Dead	0	0	0	0
Total	6	17	21	44

TABLE 2:TREES BY CONDITION

Plot 10 2023					Plot 10 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	12	2	14	**Alive**	0	9	3	12
Stressed	0	3	7	10	**Stressed**	0	6	12	18
Very Stressed	6	3	9	18	**Very Stressed**	6	3	2	11
Dead	0	0	3	3	**Dead**	0	0	2	2
Total	6	18	21	45	**Total**	6	18	19	43

TABLE 2:TREES BY CONDITION

Plot 11 1999

Number	BLACK	RED	WHITE	TOTAL
Alive	0	1	0	1
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	1	0	1

Plot 11 2000

Number	BLACK	RED	WHITE	TOTAL
Alive	0	1	6	7
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	1	6	7

Plot 11 2001

Number	BLACK	RED	WHITE	TOTAL
Alive	0	1	85	86
Stressed	0	0	1	1
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	1	86	87

Plot 11 2002

Number	BLACK	RED	WHITE	TOTAL
Alive	0	1	188	189
Stressed	0	0	3	3
Very Stressed	0	0	0	0
Dead	0	0	1	1
Total	0	1	192	193

Plot 11 2003

Number	BLACK	RED	WHITE	TOTAL
Alive	0	2	230	232
Stressed	0	0	10	10
Very Stressed	0	0	1	1
Dead	0	0	0	0
Total	0	2	241	243

Plot 11 2004

Number	BLACK	RED	WHITE	TOTAL
Alive	0	3	247	250
Stressed	0	0	13	13
Very Stressed	0	0	0	0
Dead	0	0	1	1
Total	0	3	261	264

Plot 11 2005

Number	BLACK	RED	WHITE	TOTAL
Alive	0	4	225	229
Stressed	0	0	35	35
Very Stressed	0	0	2	2
Dead	0	0	7	7
Total	0	4	269	273

Plot 11 2006

Number	BLACK	RED	WHITE	TOTAL
Alive	1	4	145	150
Stressed	0	0	83	83
Very Stressed	0	0	13	13
Dead	0	0	26	26
Total	1	4	267	272

Plot 11 2007

Number	BLACK	RED	WHITE	TOTAL
Alive	2	6	102	110
Stressed	0	0	63	63
Very Stressed	0	0	30	30
Dead	0	0	46	46
Total	2	6	241	249

Plot 11 2008

Number	BLACK	RED	WHITE	TOTAL
Alive	8	8	13	29
Stressed	0	0	90	90
Very Stressed	0	0	46	46
Dead	0	0	46	46
Total	8	8	195	211

Plot 11 2009

Number	BLACK	RED	WHITE	TOTAL
Alive	25	10	1	36
Stressed	0	2	21	23
Very Stressed	0	0	67	67
Dead	0	0	62	62
Total	25	12	151	188

Plot 11 2010

Number	BLACK	RED	WHITE	TOTAL
Alive	27	10	0	37
Stressed	0	2	12	14
Very Stressed	0	0	27	27
Dead	0	1	50	51
Total	27	13	89	129

TABLE 2:TREES BY CONDITION

Plot 11 2011

Number	BLACK	RED	WHITE	TOTAL
Alive	29	13	2	44
Stressed	2	2	15	19
Very Stressed	0	1	23	24
Dead	0	0	2	2
Total	31	16	42	89

Plot 11 2012

Number	BLACK	RED	WHITE	TOTAL
Alive	30	22	7	59
Stressed	7	2	13	22
Very Stressed	1	1	19	21
Dead	0	0	9	9
Total	38	25	48	111

Plot 11 2013

Number	BLACK	RED	WHITE	TOTAL
Alive	26	26	8	60
Stressed	14	10	13	37
Very Stressed	1	1	20	22
Dead	0	1	2	3
Total	41	38	43	122

Plot 11 2014

Number	BLACK	RED	WHITE	TOTAL
Alive	33	45	12	90
Stressed	10	10	13	33
Very Stressed	1	1	21	23
Dead	0	0	1	1
Total	44	56	47	147

Plot 11 2015

Number	BLACK	RED	WHITE	TOTAL
Alive	29	57	16	102
Stressed	17	14	15	46
Very Stressed	3	0	19	22
Dead	0	1	1	2
Total	49	72	51	172

Plot 11 2016

Number	BLACK	RED	WHITE	TOTAL
Alive	31	68	20	119
Stressed	17	14	22	53
Very Stressed	3	2	11	16
Dead	0	4	2	6
Total	51	88	55	194

Plot 11 2017

Number	BLACK	RED	WHITE	TOTAL
Alive	31	70	23	124
Stressed	19	15	20	54
Very Stressed	3	2	13	18
Dead	0	3	2	5
Total	53	90	58	201

Plot 11 2018

Number	BLACK	RED	WHITE	TOTAL
Alive	15	68	15	98
Stressed	21	21	25	67
Very Stressed	19	3	17	39
Dead	0	1	3	4
Total	55	93	60	208

Plot 11 2019

Number	BLACK	RED	WHITE	TOTAL
Alive	19	69	9	97
Stressed	23	22	39	84
Very Stressed	13	4	9	26
Dead	0	4	3	7
Total	55	99	60	214

Plot 11 2020

Number	BLACK	RED	WHITE	TOTAL
Alive	13	98	19	130
Stressed	25	1	34	60
Very Stressed	16	1	7	24
Dead	1	0	1	2
Total	55	100	61	216

Plot 11 2021

Number	BLACK	RED	WHITE	TOTAL
Alive	10	109	26	145
Stressed	30	4	35	69
Very Stressed	15	1	4	20
Dead	0	0	0	0
Total	55	114	65	234

Plot 11 2022

Number	BLACK	RED	WHITE	TOTAL
Alive	4	105	17	126
Stressed	31	10	40	81
Very Stressed	18	2	8	28
Dead	3	1	1	5
Total	56	118	66	240

TABLE 2:TREES BY CONDITION

Plot 11 2023					Plot 11 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	75	9	86	**Alive**	5	77	11	93
Stressed	15	27	28	70	**Stressed**	18	53	38	109
Very Stressed	34	22	28	84	**Very Stressed**	26	2	16	44
Dead	2	0	2	4	**Dead**	3	0	1	4
Total	53	124	67	244	**Total**	52	132	66	250

TABLE 2:TREES BY CONDITION

Plot 12 1999

Number	BLACK	RED	WHITE	TOTAL
Alive	0	27	15	42
Stressed	1	17	1	19
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	1	44	16	61

Plot 12 2000

Number	BLACK	RED	WHITE	TOTAL
Alive	0	19	15	34
Stressed	0	24	1	25
Very Stressed	0	0	0	0
Dead	1	1	0	2
Total	1	44	16	61

Plot 12 2001

Number	BLACK	RED	WHITE	TOTAL
Alive	0	8	14	22
Stressed	0	35	2	37
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	43	16	59

Plot 12 2002

Number	BLACK	RED	WHITE	TOTAL
Alive	0	4	12	16
Stressed	0	39	4	43
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	43	16	59

Plot 12 2003

Number	BLACK	RED	WHITE	TOTAL
Alive	0	1	7	8
Stressed	0	42	9	51
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	43	16	59

Plot 12 2004

Number	BLACK	RED	WHITE	TOTAL
Alive	0	2	9	11
Stressed	0	38	7	45
Very Stressed	0	1	0	1
Dead	0	2	0	2
Total	0	43	16	59

Plot 12 2005

Number	BLACK	RED	WHITE	TOTAL
Alive	0	2	9	11
Stressed	0	35	7	42
Very Stressed	0	1	0	1
Dead	0	3	0	3
Total	0	41	16	57

Plot 12 2006

Number	BLACK	RED	WHITE	TOTAL
Alive	0	2	3	5
Stressed	0	15	9	24
Very Stressed	0	16	3	19
Dead	0	5	1	6
Total	0	38	16	54

Plot 12 2007

Number	BLACK	RED	WHITE	TOTAL
Alive	0	1	6	7
Stressed	0	16	6	22
Very Stressed	0	15	3	18
Dead	0	1	0	1
Total	0	33	15	48

Plot 12 2008

Number	BLACK	RED	WHITE	TOTAL
Alive	0	1	6	7
Stressed	0	13	6	19
Very Stressed	0	18	3	21
Dead	0	0	0	0
Total	0	32	15	47

Plot 12 2009

Number	BLACK	RED	WHITE	TOTAL
Alive	0	2	4	6
Stressed	0	16	7	23
Very Stressed	0	13	4	17
Dead	0	2	0	2
Total	0	33	15	48

Plot 12 2010

Number	BLACK	RED	WHITE	TOTAL
Alive	0	5	4	9
Stressed	0	14	3	17
Very Stressed	0	12	7	19
Dead	0	0	1	1
Total	0	31	15	46

TABLE 2:TREES BY CONDITION

Plot 12 2011

Number	BLACK	RED	WHITE	TOTAL
Alive	0	3	4	7
Stressed	0	14	3	17
Very Stressed	0	12	6	18
Dead	0	2	1	3
Total	0	31	14	45

Plot 12 2012

Number	BLACK	RED	WHITE	TOTAL
Alive	0	2	1	3
Stressed	0	11	5	16
Very Stressed	0	16	6	22
Dead	0	0	1	1
Total	0	29	13	42

Plot 12 2013

Number	BLACK	RED	WHITE	TOTAL
Alive	0	2	1	3
Stressed	0	11	5	16
Very Stressed	0	14	6	20
Dead	0	2	0	2
Total	0	29	12	41

Plot 12 2014

Number	BLACK	RED	WHITE	TOTAL
Alive	0	1	1	2
Stressed	0	11	5	16
Very Stressed	0	13	5	18
Dead	0	2	1	3
Total	0	27	12	39

Plot 12 2015

Number	BLACK	RED	WHITE	TOTAL
Alive	0	0	1	1
Stressed	0	13	6	19
Very Stressed	0	8	4	12
Dead	0	4	0	4
Total	0	25	11	36

Plot 12 2016

Number	BLACK	RED	WHITE	TOTAL
Alive	0	0	1	1
Stressed	0	13	6	19
Very Stressed	0	6	4	10
Dead	0	2	0	2
Total	0	21	11	32

Plot 12 2017

Number	BLACK	RED	WHITE	TOTAL
Alive	0	4	0	4
Stressed	0	10	7	17
Very Stressed	0	2	3	5
Dead	0	3	1	4
Total	0	19	11	30

Plot 12 2018

Number	BLACK	RED	WHITE	TOTAL
Alive	0	0	0	0
Stressed	0	6	2	8
Very Stressed	0	10	7	17
Dead	0	0	1	1
Total	0	16	10	26

Plot 12 2019

Number	BLACK	RED	WHITE	TOTAL
Alive	0	1	0	1
Stressed	0	6	5	11
Very Stressed	0	8	4	12
Dead	0	1	0	1
Total	0	16	9	25

Plot 12 2020

Number	BLACK	RED	WHITE	TOTAL
Alive	0	4	1	5
Stressed	0	4	7	11
Very Stressed	0	6	1	7
Dead	0	1	0	1
Total	0	15	9	24

Plot 12 2021

Number	BLACK	RED	WHITE	TOTAL
Alive	0	2	0	2
Stressed	0	7	7	14
Very Stressed	0	4	2	6
Dead	0	1	0	1
Total	0	14	9	23

Plot 12 2022

Number	BLACK	RED	WHITE	TOTAL
Alive	0	14	0	14
Stressed	0	7	6	13
Very Stressed	0	3	3	6
Dead	0	0	1	1
Total	0	24	10	34

TABLE 2:TREES BY CONDITION

Plot 12 2023					Plot 12 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	27	0	27	**Alive**	0	55	0	55
Stressed	0	10	3	13	**Stressed**	0	12	5	17
Very Stressed	0	6	6	12	**Very Stressed**	0	8	4	12
Dead	0	1	0	1	**Dead**	0	0	0	0
Total	0	44	9	53	**Total**	0	75	9	84

TABLE 2:TREES BY CONDITION

All Plots 1999

Number	BLACK	RED	WHITE	TOTAL
Alive	57	187	64	308
Stressed	5	64	22	91
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	62	251	86	399

All Plots 2000

Number	BLACK	RED	WHITE	TOTAL
Alive	54	148	67	269
Stressed	7	89	27	123
Very Stressed	0	0	0	0
Dead	3	15	7	25
Total	64	252	101	417

All Plots 2001

Number	BLACK	RED	WHITE	TOTAL
Alive	49	107	199	355
Stressed	14	121	51	186
Very Stressed	0	0	0	0
Dead	3	13	2	18
Total	66	241	252	559

All Plots 2002

Number	BLACK	RED	WHITE	TOTAL
Alive	51	65	667	783
Stressed	13	121	75	209
Very Stressed	0	0	0	0
Dead	1	43	4	48
Total	65	229	746	1040

All Plots 2003

Number	BLACK	RED	WHITE	TOTAL
Alive	64	49	776	889
Stressed	16	143	142	301
Very Stressed	0	1	1	2
Dead	0	5	11	16
Total	80	198	930	1208

All Plots 2004

Number	BLACK	RED	WHITE	TOTAL
Alive	75	59	677	811
Stressed	15	132	170	317
Very Stressed	0	3	1	4
Dead	0	9	130	139
Total	90	203	978	1271

All Plots 2005

Number	BLACK	RED	WHITE	TOTAL
Alive	79	65	499	643
Stressed	17	127	225	369
Very Stressed	0	3	28	31
Dead	0	6	113	119
Total	96	201	865	1162

All Plots 2006

Number	BLACK	RED	WHITE	TOTAL
Alive	76	71	275	422
Stressed	27	80	297	404
Very Stressed	9	37	76	122
Dead	1	15	123	139
Total	113	203	771	1087

All Plots 2007

Number	BLACK	RED	WHITE	TOTAL
Alive	106	108	296	510
Stressed	25	72	201	298
Very Stressed	7	32	88	127
Dead	4	8	109	121
Total	142	220	694	1056

All Plots 2008

Number	BLACK	RED	WHITE	TOTAL
Alive	129	146	271	546
Stressed	31	69	212	312
Very Stressed	9	36	130	175
Dead	1	0	73	74
Total	170	251	686	1107

All Plots 2009

Number	BLACK	RED	WHITE	TOTAL
Alive	179	209	368	756
Stressed	25	83	172	280
Very Stressed	3	22	150	175
Dead	1	2	104	107
Total	208	316	794	1318

All Plots 2010

Number	BLACK	RED	WHITE	TOTAL
Alive	180	264	403	847
Stressed	30	80	110	220
Very Stressed	5	26	149	180
Dead	1	4	120	125
Total	216	374	782	1372

TABLE 2:TREES BY CONDITION

All Plots 2011

Number	BLACK	RED	WHITE	TOTAL
Alive	177	284	434	895
Stressed	41	90	157	288
Very Stressed	7	28	132	167
Dead	2	8	26	36
Total	227	410	749	1386

All Plots 2012

Number	BLACK	RED	WHITE	TOTAL
Alive	181	327	418	926
Stressed	54	97	206	357
Very Stressed	8	34	139	181
Dead	2	6	25	33
Total	245	464	788	1497

All Plots 2013

Number	BLACK	RED	WHITE	TOTAL
Alive	166	348	421	935
Stressed	74	108	200	382
Very Stressed	9	36	129	174
Dead	2	8	54	64
Total	251	500	804	1555

All Plots 2014

Number	BLACK	RED	WHITE	TOTAL
Alive	164	357	387	908
Stressed	72	141	158	371
Very Stressed	20	40	139	199
Dead	3	13	96	112
Total	259	551	780	1590

All Plots 2015

Number	BLACK	RED	WHITE	TOTAL
Alive	155	370	275	800
Stressed	90	166	205	461
Very Stressed	23	40	156	219
Dead	3	9	86	98
Total	271	585	722	1578

All Plots 2016

Number	BLACK	RED	WHITE	TOTAL
Alive	154	323	228	705
Stressed	74	160	172	406
Very Stressed	31	58	105	194
Dead	14	70	141	225
Total	273	611	646	1530

All Plots 2017

Number	BLACK	RED	WHITE	TOTAL
Alive	115	328	109	552
Stressed	97	124	246	467
Very Stressed	31	51	126	208
Dead	22	54	38	114
Total	265	557	519	1341

All Plots 2018

Number	BLACK	RED	WHITE	TOTAL
Alive	47	174	25	246
Stressed	75	165	125	365
Very Stressed	105	122	257	484
Dead	19	60	80	159
Total	246	521	487	1254

All Plots 2019

Number	BLACK	RED	WHITE	TOTAL
Alive	46	210	46	302
Stressed	105	158	213	476
Very Stressed	57	73	121	251
Dead	20	36	33	89
Total	228	477	413	1118

All Plots 2020

Number	BLACK	RED	WHITE	TOTAL
Alive	46	346	107	499
Stressed	103	75	189	367
Very Stressed	55	42	75	172
Dead	6	9	21	36
Total	210	472	392	1074

All Plots 2021

Number	BLACK	RED	WHITE	TOTAL
Alive	40	361	113	514
Stressed	110	104	183	397
Very Stressed	49	31	90	170
Dead	7	11	10	28
Total	206	507	396	1109

All Plots 2022

Number	BLACK	RED	WHITE	TOTAL
Alive	25	411	87	523
Stressed	117	119	211	447
Very Stressed	53	26	99	178
Dead	6	11	14	31
Total	201	567	411	1179

TABLE 2:TREES BY CONDITION

All Plots 2023					All Plots 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	34	359	40	433	**Alive**	39	445	56	540
Stressed	79	189	128	396	**Stressed**	85	224	164	473
Very Stressed	80	87	173	340	**Very Stressed**	66	50	108	224
Dead	7	7	61	75	**Dead**	9	10	18	37
Total	200	642	402	1244	**Total**	199	729	346	1274

TABLE 3: PROPAGULES BY CONDITION

Plot 1 1999				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	8	3	11
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	8	3	11

Plot 1 2000				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	4	1	5
Stressed	0	3	1	4
Very Stressed	0	0	0	0
Dead	0	1	0	1
Total	0	8	2	10

Plot 1 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	12	4	16
Stressed	0	4	2	6
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	16	6	22

Plot 1 2002				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	7	7	14
Stressed	0	11	10	21
Very Stressed	0	0	0	0
Dead	0	2	7	9
Total	0	20	24	44

Plot 1 2003				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	33	9	42
Stressed	0	4	7	11
Very Stressed	0	0	0	0
Dead	0	1	1	2
Total	0	38	17	55

Plot 1 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	31	2	33
Stressed	0	7	6	13
Very Stressed	0	0	0	0
Dead	0	3	0	3
Total	0	41	8	49

Plot 1 2005				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	28	0	28
Stressed	0	9	4	13
Very Stressed	0	0	0	0
Dead	0	6	1	7
Total	0	43	5	48

Plot 1 2006				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	28	0	28
Stressed	0	2	1	3
Very Stressed	0	0	0	0
Dead	0	12	3	15
Total	0	42	4	46

Plot 1 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	15	1	16
Stressed	0	2	0	2
Very Stressed	0	2	0	2
Dead	0	8	1	9
Total	0	27	2	29

Plot 1 2008				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	6	14	42	62
Stressed	0	1	2	3
Very Stressed	0	2	0	2
Dead	0	2	0	2
Total	6	19	44	69

Plot 1 2009				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	32	13	41	86
Stressed	0	1	5	6
Very Stressed	0	1	1	2
Dead	3	0	1	4
Total	35	15	48	98

Plot 1 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	46	7	22	75
Stressed	4	1	7	12
Very Stressed	1	2	1	4
Dead	8	4	2	14
Total	59	14	32	105

TABLE 3: PROPAGULES BY CONDITION

Plot 1 2011				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	49	12	9	70
Stressed	7	2	3	12
Very Stressed	0	0	1	1
Dead	2	1	3	6
Total	58	15	16	89

Plot 1 2012				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	57	10	7	74
Stressed	10	2	5	17
Very Stressed	1	0	0	1
Dead	9	0	2	11
Total	77	12	14	103

Plot 1 2013				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	50	11	9	70
Stressed	9	1	4	14
Very Stressed	3	0	0	3
Dead	13	1	3	17
Total	75	13	16	104

Plot 1 2014				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	42	7	1	50
Stressed	18	6	1	25
Very Stressed	8	0	2	10
Dead	2	0	8	10
Total	70	13	12	95

Plot 1 2015				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	47	11	1	59
Stressed	28	6	0	34
Very Stressed	8	0	1	9
Dead	5	3	2	10
Total	88	20	4	112

Plot 1 2016				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	5	0	0	5
Stressed	13	0	0	13
Very Stressed	2	0	0	2
Dead	62	17	2	81
Total	82	17	2	101

Plot 1 2017				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	2	0	6
Stressed	10	0	0	10
Very Stressed	7	0	0	7
Dead	2	0	0	2
Total	23	2	0	25

Plot 1 2018				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	1	0	4
Stressed	9	1	0	10
Very Stressed	3	0	0	3
Dead	7	1	0	8
Total	22	3	0	25

Plot 1 2019				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	6	0	8
Stressed	10	0	1	11
Very Stressed	2	0	0	2
Dead	1	1	0	2
Total	15	7	1	23

Plot 1 2020				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	4	0	5
Stressed	8	1	0	9
Very Stressed	5	0	0	5
Dead	0	2	0	2
Total	14	7	0	21

Plot 1 2021				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	1	0	3
Stressed	5	0	0	5
Very Stressed	2	1	0	3
Dead	5	3	0	8
Total	14	5	0	19

Plot 1 2022				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	1	0	2
Stressed	6	0	0	6
Very Stressed	2	1	0	3
Dead	0	0	0	0
Total	9	2	0	11

TABLE 3: PROPAGULES BY CONDITION

Plot 1 2023					Plot 1 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	1	0	1	**Alive**	0	1	1	2
Stressed	0	0	0	0	**Stressed**	0	1	0	1
Very Stressed	6	0	0	6	**Very Stressed**	0	0	0	0
Dead	3	1	0	4	**Dead**	6	0	0	6
Total	9	2	0	11	**Total**	6	2	1	9

TABLE 3: PROPAGULES BY CONDITION

Plot 2 1999

Number	BLACK	RED	WHITE	TOTAL
Alive	0	23	139	162
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	23	139	162

Plot 2 2000

Number	BLACK	RED	WHITE	TOTAL
Alive	0	1	0	1
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	94	145	239
Total	0	95	145	240

Plot 2 2001

Number	BLACK	RED	WHITE	TOTAL
Alive	0	0	0	0
Stressed	1	0	0	1
Very Stressed	0	0	0	0
Dead	0	1	0	1
Total	1	1	0	2

Plot 2 2002

Number	BLACK	RED	WHITE	TOTAL
Alive	21	3	3	27
Stressed	4	0	1	5
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	25	3	4	32

Plot 2 2003

Number	BLACK	RED	WHITE	TOTAL
Alive	37	5	3	45
Stressed	11	0	1	12
Very Stressed	0	0	0	0
Dead	22	0	2	24
Total	70	5	6	81

Plot 2 2004

Number	BLACK	RED	WHITE	TOTAL
Alive	47	5	4	56
Stressed	24	0	2	26
Very Stressed	0	0	0	0
Dead	6	1	1	8
Total	77	6	7	90

Plot 2 2005

Number	BLACK	RED	WHITE	TOTAL
Alive	75	28	7	110
Stressed	25	0	3	28
Very Stressed	0	0	0	0
Dead	3	0	0	3
Total	103	28	10	141

Plot 2 2006

Number	BLACK	RED	WHITE	TOTAL
Alive	113	61	57	231
Stressed	1	0	1	2
Very Stressed	0	0	0	0
Dead	4	1	0	5
Total	118	62	58	238

Plot 2 2007

Number	BLACK	RED	WHITE	TOTAL
Alive	106	85	114	305
Stressed	1	0	3	4
Very Stressed	0	0	0	0
Dead	0	2	1	3
Total	107	87	118	312

Plot 2 2008

Number	BLACK	RED	WHITE	TOTAL
Alive	84	78	96	258
Stressed	10	4	7	21
Very Stressed	0	0	0	0
Dead	7	5	1	13
Total	101	87	104	292

Plot 2 2009

Number	BLACK	RED	WHITE	TOTAL
Alive	67	61	44	172
Stressed	13	3	2	18
Very Stressed	6	0	1	7
Dead	7	6	5	18
Total	93	70	52	215

Plot 2 2010

Number	BLACK	RED	WHITE	TOTAL
Alive	63	48	32	143
Stressed	13	3	4	20
Very Stressed	6	0	1	7
Dead	7	10	1	18
Total	89	61	38	188

TABLE 3: PROPAGULES BY CONDITION

Plot 2 2011				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	41	32	15	88
Stressed	25	5	6	36
Very Stressed	10	0	2	12
Dead	8	9	1	18
Total	84	46	24	154

Plot 2 2012				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	29	27	10	66
Stressed	26	4	6	36
Very Stressed	13	1	4	18
Dead	9	6	4	19
Total	77	38	24	139

Plot 2 2013				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	36	44	9	89
Stressed	24	6	3	33
Very Stressed	8	2	1	11
Dead	8	4	4	16
Total	76	56	17	149

Plot 2 2014				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	13	62	2	77
Stressed	33	7	2	42
Very Stressed	18	2	6	26
Dead	8	5	1	14
Total	72	76	11	159

Plot 2 2015				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	11	81	1	93
Stressed	33	16	1	50
Very Stressed	21	2	4	27
Dead	5	9	4	18
Total	70	108	10	188

Plot 2 2016				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	6	63	1	70
Stressed	23	10	1	34
Very Stressed	7	4	4	15
Dead	29	46	1	76
Total	65	123	7	195

Plot 2 2017				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	5	96	0	101
Stressed	15	9	0	24
Very Stressed	8	3	2	13
Dead	8	24	4	36
Total	36	132	6	174

Plot 2 2018				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	39	0	41
Stressed	10	14	0	24
Very Stressed	2	1	1	4
Dead	14	72	1	87
Total	28	126	2	156

Plot 2 2019				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	5	49	0	54
Stressed	9	9	0	18
Very Stressed	1	0	1	2
Dead	2	20	0	22
Total	17	78	1	96

Plot 2 2020				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	42	1	47
Stressed	11	9	0	20
Very Stressed	1	1	1	3
Dead	0	16	0	16
Total	16	68	2	86

Plot 2 2021				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	5	81	2	88
Stressed	9	3	0	12
Very Stressed	2	0	1	3
Dead	0	7	0	7
Total	16	91	3	110

Plot 2 2022				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	5	113	2	120
Stressed	8	7	0	15
Very Stressed	0	1	1	2
Dead	4	5	0	9
Total	17	126	3	146

TABLE 3: PROPAGULES BY CONDITION

Plot 2 2023					Plot 2 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	6	98	0	104	**Alive**	8	173	1	182
Stressed	6	25	0	31	**Stressed**	2	4	0	6
Very Stressed	0	1	0	1	**Very Stressed**	0	0	0	0
Dead	1	36	3	40	**Dead**	0	11	0	11
Total	13	160	3	176	**Total**	10	188	1	199

TABLE 3: PROPAGULES BY CONDITION

Plot 3 1999				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	1	5	6
Stressed	4	1	2	7
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	4	2	7	13

Plot 3 2000				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	1	16	17
Stressed	0	1	10	11
Very Stressed	0	0	0	0
Dead	4	2	1	7
Total	4	4	27	35

Plot 3 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	29	38	2093	2160
Stressed	1	2	371	374
Very Stressed	0	0	0	0
Dead	0	1	49	50
Total	30	41	2513	2584

Plot 3 2002				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	19	54	396	469
Stressed	6	6	708	720
Very Stressed	0	0	0	0
Dead	7	2	1081	1090
Total	32	62	2185	2279

Plot 3 2003				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	69	81	154
Stressed	7	7	364	378
Very Stressed	0	0	0	0
Dead	1	6	535	542
Total	12	82	980	1074

Plot 3 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	12	69	26	107
Stressed	4	10	104	118
Very Stressed	0	0	16	16
Dead	1	18	291	310
Total	17	97	437	551

Plot 3 2005				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	12	74	6	92
Stressed	3	14	42	59
Very Stressed	0	0	2	2
Dead	2	8	95	105
Total	17	96	145	258

Plot 3 2006				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	16	114	5	135
Stressed	5	11	23	39
Very Stressed	0	1	1	2
Dead	0	9	21	30
Total	21	135	50	206

Plot 3 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	48	127	4	179
Stressed	4	11	9	24
Very Stressed	0	3	8	11
Dead	1	11	8	20
Total	53	152	29	234

Plot 3 2008				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	59	125	3	187
Stressed	4	10	8	22
Very Stressed	0	5	8	13
Dead	1	6	2	9
Total	64	146	21	231

Plot 3 2009				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	67	133	2	202
Stressed	3	6	7	16
Very Stressed	0	1	2	3
Dead	8	8	7	23
Total	78	148	18	244

Plot 3 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	48	121	1	170
Stressed	16	15	8	39
Very Stressed	0	1	1	2
Dead	9	9	2	20
Total	73	146	12	231

TABLE 3: PROPAGULES BY CONDITION

Plot 3 1999				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	1	5	6
Stressed	4	1	2	7
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	4	2	7	13

Plot 3 2000				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	1	16	17
Stressed	0	1	10	11
Very Stressed	0	0	0	0
Dead	4	2	1	7
Total	4	4	27	35

Plot 3 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	29	38	2093	2160
Stressed	1	2	371	374
Very Stressed	0	0	0	0
Dead	0	1	49	50
Total	30	41	2513	2584

Plot 3 2002				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	19	54	396	469
Stressed	6	6	708	720
Very Stressed	0	0	0	0
Dead	7	2	1081	1090
Total	32	62	2185	2279

Plot 3 2003				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	69	81	154
Stressed	7	7	364	378
Very Stressed	0	0	0	0
Dead	1	6	535	542
Total	12	82	980	1074

Plot 3 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	12	69	26	107
Stressed	4	10	104	118
Very Stressed	0	0	16	16
Dead	1	18	291	310
Total	17	97	437	551

Plot 3 2005				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	12	74	6	92
Stressed	3	14	42	59
Very Stressed	0	0	2	2
Dead	2	8	95	105
Total	17	96	145	258

Plot 3 2006				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	16	114	5	135
Stressed	5	11	23	39
Very Stressed	0	1	1	2
Dead	0	9	21	30
Total	21	135	50	206

Plot 3 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	48	127	4	179
Stressed	4	11	9	24
Very Stressed	0	3	8	11
Dead	1	11	8	20
Total	53	152	29	234

Plot 3 2008				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	59	125	3	187
Stressed	4	10	8	22
Very Stressed	0	5	8	13
Dead	1	6	2	9
Total	64	146	21	231

Plot 3 2009				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	67	133	2	202
Stressed	3	6	7	16
Very Stressed	0	1	2	3
Dead	8	8	7	23
Total	78	148	18	244

Plot 3 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	48	121	1	170
Stressed	16	15	8	39
Very Stressed	0	1	1	2
Dead	9	9	2	20
Total	73	146	12	231

TABLE 3: PROPAGULES BY CONDITION

Plot 3 2023					Plot 3 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	286	3	292	**Alive**	0	348	5	353
Stressed	5	41	0	46	**Stressed**	7	42	0	49
Very Stressed	8	0	1	9	**Very Stressed**	4	3	0	7
Dead	2	18	0	20	**Dead**	3	19	1	23
Total	18	345	4	367	**Total**	14	412	6	432

TABLE 3: PROPAGULES BY CONDITION

Plot 4 1999				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	348	0	350
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	2	348	0	350

Plot 4 2000				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	267	1	272
Stressed	0	5	0	5
Very Stressed	0	0	0	0
Dead	0	152	0	152
Total	4	424	1	429

Plot 4 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	5	389	0	394
Stressed	1	108	1	110
Very Stressed	0	0	0	0
Dead	1	166	0	167
Total	7	663	1	671

Plot 4 2002				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	7	349	0	356
Stressed	0	108	1	109
Very Stressed	0	0	0	0
Dead	1	110	0	111
Total	8	567	1	576

Plot 4 2003				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	5	334	1	340
Stressed	4	149	0	153
Very Stressed	0	0	0	0
Dead	0	99	0	99
Total	9	582	1	592

Plot 4 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	5	365	7	377
Stressed	4	163	2	169
Very Stressed	0	0	0	0
Dead	0	102	0	102
Total	9	630	9	648

Plot 4 2005				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	5	359	7	371
Stressed	5	175	3	183
Very Stressed	0	0	0	0
Dead	0	63	1	64
Total	10	597	11	618

Plot 4 2006				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	10	494	9	513
Stressed	1	41	0	42
Very Stressed	0	0	0	0
Dead	1	56	0	57
Total	12	591	9	612

Plot 4 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	9	625	9	643
Stressed	1	38	0	39
Very Stressed	0	0	0	0
Dead	1	8	0	9
Total	11	671	9	691

Plot 4 2008				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	609	8	625
Stressed	0	43	0	43
Very Stressed	1	4	0	5
Dead	1	22	0	23
Total	10	678	8	696

Plot 4 2009				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	5	670	8	683
Stressed	0	42	0	42
Very Stressed	1	1	0	2
Dead	0	59	1	60
Total	6	772	9	787

Plot 4 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	5	749	5	759
Stressed	0	43	0	43
Very Stressed	1	6	0	7
Dead	0	46	1	47
Total	6	844	6	856

TABLE 3: PROPAGULES BY CONDITION

Plot 4 2011				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	716	7	727
Stressed	1	61	1	63
Very Stressed	2	2	0	4
Dead	0	79	0	79
Total	7	858	8	873

Plot 4 2012				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	760	8	772
Stressed	0	74	0	74
Very Stressed	2	17	0	19
Dead	2	53	0	55
Total	8	904	8	920

Plot 4 2013				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	756	3	761
Stressed	1	89	2	92
Very Stressed	1	13	1	15
Dead	2	63	1	66
Total	6	921	7	934

Plot 4 2014				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	735	4	742
Stressed	0	164	2	166
Very Stressed	1	40	1	42
Dead	1	99	0	100
Total	5	1038	7	1050

Plot 4 2015				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	511	3	517
Stressed	0	247	3	250
Very Stressed	1	52	0	53
Dead	0	177	1	178
Total	4	987	7	998

Plot 4 2016				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	396	3	402
Stressed	3	212	4	219
Very Stressed	0	40	1	41
Dead	0	212	0	212
Total	6	860	8	874

Plot 4 2017				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	419	3	426
Stressed	3	153	2	158
Very Stressed	0	33	2	35
Dead	0	143	2	145
Total	7	748	9	764

Plot 4 2018				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	391	4	396
Stressed	1	144	2	147
Very Stressed	3	33	2	38
Dead	2	131	0	133
Total	7	699	8	714

Plot 4 2019				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	550	2	553
Stressed	2	130	4	136
Very Stressed	2	20	1	23
Dead	0	34	1	35
Total	5	734	8	747

Plot 4 2020				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	5	641	2	648
Stressed	0	93	3	96
Very Stressed	0	10	1	11
Dead	0	86	0	86
Total	5	830	6	841

Plot 4 2021				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	778	3	785
Stressed	1	134	3	138
Very Stressed	0	28	1	29
Dead	0	128	1	129
Total	5	1068	8	1081

Plot 4 2022				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	622	2	627
Stressed	2	154	2	158
Very Stressed	0	21	1	22
Dead	0	223	2	225
Total	5	1020	7	1032

TABLE 3: PROPAGULES BY CONDITION

Plot 4 2023					Plot 4 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	619	2	624	**Alive**	1	633	1	635
Stressed	1	154	0	155	**Stressed**	2	165	1	168
Very Stressed	1	17	1	19	**Very Stressed**	0	28	0	28
Dead	0	219	2	221	**Dead**	2	176	1	179
Total	5	1009	5	1019	**Total**	5	1002	3	1010

TABLE 3: PROPAGULES BY CONDITION

Plot 5 1999				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	7	19	7	33
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	7	19	7	33

Plot 5 2000				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	11	16	2	29
Stressed	1	8	11	20
Very Stressed	0	0	0	0
Dead	0	4	2	6
Total	12	28	15	55

Plot 5 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	12	36	4	52
Stressed	9	20	14	43
Very Stressed	0	0	0	0
Dead	0	2	2	4
Total	21	58	20	99

Plot 5 2002				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	11	29	6	46
Stressed	12	30	12	54
Very Stressed	0	0	0	0
Dead	2	2	2	6
Total	25	61	20	106

Plot 5 2003				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	9	25	6	40
Stressed	13	33	11	57
Very Stressed	0	0	0	0
Dead	1	1	2	4
Total	23	59	19	101

Plot 5 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	10	28	7	45
Stressed	11	29	9	49
Very Stressed	0	0	0	0
Dead	2	1	1	4
Total	23	58	17	98

Plot 5 2005				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	10	25	6	41
Stressed	6	30	8	44
Very Stressed	0	0	0	0
Dead	5	2	3	10
Total	21	57	17	95

Plot 5 2006				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	13	46	10	69
Stressed	3	8	5	16
Very Stressed	0	0	1	1
Dead	0	2	0	2
Total	16	56	16	88

Plot 5 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	9	39	6	54
Stressed	5	8	8	21
Very Stressed	1	1	1	3
Dead	1	2	2	5
Total	16	50	17	83

Plot 5 2008				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	10	33	3	46
Stressed	5	8	9	22
Very Stressed	1	0	0	1
Dead	0	3	2	5
Total	16	44	14	74

Plot 5 2009				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	11	38	3	52
Stressed	2	3	9	14
Very Stressed	1	1	1	3
Dead	3	1	0	4
Total	17	43	13	73

Plot 5 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	12	54	5	71
Stressed	2	3	8	13
Very Stressed	1	2	2	5
Dead	0	0	1	1
Total	15	59	16	90

TABLE 3: PROPAGULES BY CONDITION

Plot 5 2011				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	12	49	5	66
Stressed	2	5	6	13
Very Stressed	1	2	2	5
Dead	1	4	2	7
Total	16	60	15	91

Plot 5 2012				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	10	40	3	53
Stressed	4	12	8	24
Very Stressed	2	1	1	4
Dead	0	3	1	4
Total	16	56	13	85

Plot 5 2013				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	44	3	55
Stressed	4	13	8	25
Very Stressed	2	0	1	3
Dead	3	2	1	6
Total	17	59	13	89

Plot 5 2014				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	6	70	1	77
Stressed	6	14	6	26
Very Stressed	1	1	5	7
Dead	1	1	0	2
Total	14	86	12	112

Plot 5 2015				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	11	120	1	132
Stressed	5	15	4	24
Very Stressed	1	2	7	10
Dead	1	1	1	3
Total	18	138	13	169

Plot 5 2016				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	9	122	3	134
Stressed	5	13	3	21
Very Stressed	3	2	5	10
Dead	0	9	1	10
Total	17	146	12	175

Plot 5 2017				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	6	136	1	143
Stressed	6	12	1	19
Very Stressed	2	1	8	11
Dead	3	7	2	12
Total	17	156	12	185

Plot 5 2018				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	7	134	1	142
Stressed	6	20	3	29
Very Stressed	1	2	5	8
Dead	1	11	2	14
Total	15	167	11	193

Plot 5 2019				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	6	125	3	134
Stressed	7	36	1	44
Very Stressed	3	4	4	11
Dead	0	3	2	5
Total	16	168	10	194

Plot 5 2020				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	7	137	1	145
Stressed	4	24	2	30
Very Stressed	2	1	5	8
Dead	2	5	0	7
Total	15	167	8	190

Plot 5 2021				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	7	143	1	151
Stressed	1	25	2	28
Very Stressed	1	0	3	4
Dead	4	5	2	11
Total	13	173	8	194

Plot 5 2022				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	132	0	135
Stressed	3	29	2	34
Very Stressed	3	2	2	7
Dead	0	8	2	10
Total	9	171	6	186

TABLE 3: PROPAGULES BY CONDITION

Plot 5 2023					Plot 5 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	114	0	116	**Alive**	3	113	0	116
Stressed	4	35	2	41	**Stressed**	3	31	1	35
Very Stressed	1	2	2	5	**Very Stressed**	1	2	2	5
Dead	2	13	1	16	**Dead**	0	7	1	8
Total	9	164	5	178	**Total**	7	153	4	164

TABLE 3: PROPAGULES BY CONDITION

Plot 6 1999				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	19	201	38	258
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	19	201	38	258

Plot 6 2000				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	23	153	22	198
Stressed	1	27	16	44
Very Stressed	0	0	0	0
Dead	1	46	10	57
Total	25	226	48	299

Plot 6 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	20	140	17	177
Stressed	9	137	50	196
Very Stressed	0	0	0	0
Dead	1	14	0	15
Total	30	291	67	388

Plot 6 2002				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	20	135	20	175
Stressed	12	139	50	201
Very Stressed	0	0	0	0
Dead	1	19	4	24
Total	33	293	74	400

Plot 6 2003				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	20	115	23	158
Stressed	13	143	40	196
Very Stressed	0	0	0	0
Dead	1	16	6	23
Total	34	274	69	377

Plot 6 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	20	148	30	198
Stressed	9	100	27	136
Very Stressed	0	0	0	0
Dead	3	12	1	16
Total	32	260	58	350

Plot 6 2005				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	27	174	42	243
Stressed	3	63	18	84
Very Stressed	0	0	1	1
Dead	3	12	6	21
Total	33	249	67	349

Plot 6 2006				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	30	207	30	267
Stressed	3	36	25	64
Very Stressed	0	0	1	1
Dead	0	10	2	12
Total	33	253	58	344

Plot 6 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	28	205	38	271
Stressed	3	29	16	48
Very Stressed	0	6	2	8
Dead	2	12	5	19
Total	33	252	61	346

Plot 6 2008				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	24	170	26	220
Stressed	5	34	17	56
Very Stressed	2	14	5	21
Dead	0	20	8	28
Total	31	238	56	325

Plot 6 2009				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	21	103	22	146
Stressed	4	74	19	97
Very Stressed	1	33	13	47
Dead	4	19	6	29
Total	30	229	60	319

Plot 6 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	20	108	30	158
Stressed	5	71	15	91
Very Stressed	1	29	13	43
Dead	0	22	3	25
Total	26	230	61	317

TABLE 3: PROPAGULES BY CONDITION

Plot 6 2011				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	14	78	21	113
Stressed	8	91	17	116
Very Stressed	2	22	13	37
Dead	2	18	8	28
Total	26	209	59	294

Plot 6 2012				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	16	80	31	127
Stressed	8	91	20	119
Very Stressed	3	25	12	40
Dead	1	11	3	15
Total	28	207	66	301

Plot 6 2013				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	11	62	7	80
Stressed	10	85	13	108
Very Stressed	3	24	28	55
Dead	3	28	15	46
Total	27	199	63	289

Plot 6 2014				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	50	5	63
Stressed	10	82	14	106
Very Stressed	3	24	22	49
Dead	3	13	7	23
Total	24	169	48	241

Plot 6 2015				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	7	47	0	54
Stressed	7	78	11	96
Very Stressed	6	24	22	52
Dead	5	15	8	28
Total	25	164	41	230

Plot 6 2016				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	87	1	96
Stressed	5	31	10	46
Very Stressed	6	16	11	33
Dead	2	14	11	27
Total	21	148	33	202

Plot 6 2017				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	10	67	1	78
Stressed	8	43	6	57
Very Stressed	0	16	10	26
Dead	2	19	6	27
Total	20	145	23	188

Plot 6 2018				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	9	73	0	82
Stressed	6	35	7	48
Very Stressed	0	11	5	16
Dead	5	19	5	29
Total	20	138	17	175

Plot 6 2019				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	110	0	118
Stressed	5	45	4	54
Very Stressed	3	12	5	20
Dead	0	11	4	15
Total	16	178	13	207

Plot 6 2020				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	7	105	0	112
Stressed	6	39	4	49
Very Stressed	2	7	3	12
Dead	2	45	2	49
Total	17	196	9	222

Plot 6 2021				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	6	71	2	79
Stressed	6	30	0	36
Very Stressed	2	17	3	22
Dead	1	53	3	57
Total	15	171	8	194

Plot 6 2022				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	45	2	51
Stressed	7	30	0	37
Very Stressed	1	9	1	11
Dead	2	45	2	49
Total	14	129	5	148

TABLE 3: PROPAGULES BY CONDITION

Plot 6 2023					Plot 6 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	5	17	0	22	**Alive**	2	47	0	49
Stressed	2	23	0	25	**Stressed**	2	16	0	18
Very Stressed	0	10	0	10	**Very Stressed**	1	2	0	3
Dead	6	39	3	48	**Dead**	2	20	0	22
Total	13	89	3	105	**Total**	7	85	0	92

TABLE 3: PROPAGULES BY CONDITION

Plot 7 1999				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	67	13	83
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	3	67	13	83

Plot 7 2000				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	6	67	5	78
Stressed	1	4	11	16
Very Stressed	0	0	0	0
Dead	1	6	0	7
Total	8	77	16	101

Plot 7 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	20	71	6	97
Stressed	1	4	12	17
Very Stressed	0	0	0	0
Dead	1	7	3	11
Total	22	82	21	125

Plot 7 2002				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	26	87	7	120
Stressed	2	8	12	22
Very Stressed	0	0	0	0
Dead	1	4	2	7
Total	29	99	21	149

Plot 7 2003				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	21	80	2	103
Stressed	8	13	15	36
Very Stressed	0	0	0	0
Dead	4	8	2	14
Total	33	101	19	153

Plot 7 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	21	79	10	110
Stressed	5	8	8	21
Very Stressed	0	0	0	0
Dead	11	13	2	26
Total	37	100	20	157

Plot 7 2005				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	21	73	5	99
Stressed	7	14	9	30
Very Stressed	0	0	0	0
Dead	6	8	4	18
Total	34	95	18	147

Plot 7 2006				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	14	72	8	94
Stressed	6	11	4	21
Very Stressed	0	1	0	1
Dead	10	26	3	39
Total	30	110	15	155

Plot 7 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	23	319	9	351
Stressed	6	19	5	30
Very Stressed	0	2	1	3
Dead	3	6	0	9
Total	32	346	15	393

Plot 7 2008				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	27	320	8	355
Stressed	7	25	7	39
Very Stressed	0	4	0	4
Dead	2	18	1	21
Total	36	367	16	419

Plot 7 2009				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	29	264	10	303
Stressed	7	62	6	75
Very Stressed	1	9	1	11
Dead	6	38	0	44
Total	43	373	17	433

Plot 7 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	29	203	7	239
Stressed	10	81	6	97
Very Stressed	4	11	1	16
Dead	0	52	3	55
Total	43	347	17	407

TABLE 3: PROPAGULES BY CONDITION

Plot 7 2011				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	23	180	7	210
Stressed	10	80	6	96
Very Stressed	4	5	1	10
Dead	9	62	2	73
Total	46	327	16	389

Plot 7 2012				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	26	182	6	214
Stressed	12	76	5	93
Very Stressed	3	5	0	8
Dead	3	37	3	43
Total	44	300	14	358

Plot 7 2013				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	25	168	6	199
Stressed	12	70	2	84
Very Stressed	1	7	2	10
Dead	7	31	2	40
Total	45	276	12	333

Plot 7 2014				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	15	123	2	140
Stressed	22	91	1	114
Very Stressed	2	21	3	26
Dead	1	27	4	32
Total	40	262	10	312

Plot 7 2015				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	20	101	1	122
Stressed	24	83	2	109
Very Stressed	3	22	2	27
Dead	5	38	1	44
Total	52	244	6	302

Plot 7 2016				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	32	0	35
Stressed	9	21	2	32
Very Stressed	5	15	0	20
Dead	31	148	3	182
Total	48	216	5	269

Plot 7 2017				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	98	0	99
Stressed	10	16	2	28
Very Stressed	1	7	0	8
Dead	6	21	0	27
Total	18	142	2	162

Plot 7 2018				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	45	0	45
Stressed	0	11	0	11
Very Stressed	0	6	0	6
Dead	12	83	2	97
Total	12	145	2	159

Plot 7 2019				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	179	1	181
Stressed	0	8	0	8
Very Stressed	0	1	0	1
Dead	0	7	0	7
Total	1	195	1	197

Plot 7 2020				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	75	4	80
Stressed	0	18	0	18
Very Stressed	0	2	0	2
Dead	1	102	0	103
Total	2	197	4	203

Plot 7 2021				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	99	7	109
Stressed	0	32	1	33
Very Stressed	0	8	1	9
Dead	0	15	0	15
Total	3	154	9	166

Plot 7 2022				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	129	8	140
Stressed	1	29	0	30
Very Stressed	0	6	1	7
Dead	0	22	1	23
Total	4	186	10	200

TABLE 3: PROPAGULES BY CONDITION

Plot 7 2023					Plot 7 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	28	4	35	**Alive**	3	36	12	51
Stressed	0	7	1	8	**Stressed**	0	9	3	12
Very Stressed	1	7	1	9	**Very Stressed**	0	1	0	1
Dead	1	130	3	134	**Dead**	1	15	0	16
Total	5	172	9	186	**Total**	4	61	15	80

TABLE 3: PROPAGULES BY CONDITION

Plot 8 1999				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	10	0	10
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	10	0	10

Plot 8 2000				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	10	0	10
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	1	0	1
Total	0	11	0	11

Plot 8 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	8	0	8
Stressed	0	1	0	1
Very Stressed	0	0	0	0
Dead	0	2	0	2
Total	0	11	0	11

Plot 8 2002				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	10	4	14
Stressed	0	1	0	1
Very Stressed	0	0	0	0
Dead	0	1	0	1
Total	0	12	4	16

Plot 8 2003				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	14	5	19
Stressed	0	1	5	6
Very Stressed	0	0	0	0
Dead	0	2	0	2
Total	0	17	10	27

Plot 8 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	16	12	30
Stressed	0	1	4	5
Very Stressed	0	0	0	0
Dead	0	4	1	5
Total	2	21	17	40

Plot 8 2005				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	37	10	49
Stressed	0	2	8	10
Very Stressed	0	0	0	0
Dead	0	1	1	2
Total	2	40	19	61

Plot 8 2006				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	50	22	74
Stressed	0	4	1	5
Very Stressed	0	0	0	0
Dead	1	3	0	4
Total	3	57	23	83

Plot 8 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	14	88	35	137
Stressed	1	2	4	7
Very Stressed	0	0	0	0
Dead	0	3	1	4
Total	15	93	40	148

Plot 8 2008				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	25	82	43	150
Stressed	0	5	4	9
Very Stressed	0	0	0	0
Dead	1	7	0	8
Total	26	94	47	167

Plot 8 2009				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	40	84	78	202
Stressed	0	6	2	8
Very Stressed	0	0	0	0
Dead	1	7	1	9
Total	41	97	81	219

Plot 8 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	43	86	77	206
Stressed	5	7	9	21
Very Stressed	2	3	1	6
Dead	0	6	0	6
Total	50	102	87	239

TABLE 3: PROPAGULES BY CONDITION

Plot 8 2011				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	44	91	71	206
Stressed	9	10	8	27
Very Stressed	1	3	2	6
Dead	0	7	0	7
Total	54	111	81	246

Plot 8 2012				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	46	127	63	236
Stressed	9	13	9	31
Very Stressed	5	3	3	11
Dead	5	1	2	8
Total	65	144	77	286

Plot 8 2013				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	41	122	35	198
Stressed	12	19	10	41
Very Stressed	4	5	7	16
Dead	5	10	2	17
Total	62	156	54	272

Plot 8 2014				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	48	168	24	240
Stressed	9	23	9	41
Very Stressed	9	4	9	22
Dead	0	5	3	8
Total	66	200	45	311

Plot 8 2015				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	29	169	8	206
Stressed	24	41	15	80
Very Stressed	12	5	8	25
Dead	1	11	5	17
Total	66	226	36	328

Plot 8 2016				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	25	165	5	195
Stressed	30	34	8	72
Very Stressed	6	5	8	19
Dead	6	50	7	63
Total	67	254	28	349

Plot 8 2017				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	14	166	0	180
Stressed	22	39	3	64
Very Stressed	13	4	15	32
Dead	12	34	3	49
Total	61	243	21	325

Plot 8 2018				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	107	0	111
Stressed	13	40	4	57
Very Stressed	8	4	2	14
Dead	25	89	12	126
Total	50	240	18	308

Plot 8 2019				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	122	1	127
Stressed	12	36	3	51
Very Stressed	4	1	2	7
Dead	4	22	0	26
Total	24	181	6	211

Plot 8 2020				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	95	0	99
Stressed	12	10	3	25
Very Stressed	0	2	1	3
Dead	3	58	1	62
Total	19	165	5	189

Plot 8 2021				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	178	0	181
Stressed	5	10	3	18
Very Stressed	3	2	0	5
Dead	5	28	1	34
Total	16	218	4	238

Plot 8 2022				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	272	0	273
Stressed	6	15	2	23
Very Stressed	1	2	0	3
Dead	3	26	0	29
Total	11	315	2	328

TABLE 3: PROPAGULES BY CONDITION

Plot 8 2023					Plot 8 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	409	0	413	**Alive**	1	679	0	680
Stressed	3	22	1	26	**Stressed**	6	52	1	59
Very Stressed	1	5	1	7	**Very Stressed**	0	2	1	3
Dead	1	43	0	44	**Dead**	1	31	0	32
Total	9	479	2	490	**Total**	8	764	2	774

TABLE 3: PROPAGULES BY CONDITION

Plot 9 1999				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	1	0	1
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	1	0	1

Plot 9 2000				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	1	0	1
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	1	0	1

Plot 9 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	1	0	1
Total	0	1	0	1

Plot 9 2002				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	3	0	3
Stressed	0	1	0	1
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	4	0	4

Plot 9 2003				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	7	0	7
Stressed	0	2	0	2
Very Stressed	0	0	0	0
Dead	0	4	0	4
Total	0	13	0	13

Plot 9 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	6	0	6
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	9	0	9
Total	0	15	0	15

Plot 9 2005				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	18	7	26
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	1	0	1
Total	1	19	7	27

Plot 9 2006				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	74	27	103
Stressed	0	0	0	0
Very Stressed	0	1	0	1
Dead	0	0	1	1
Total	2	75	28	105

Plot 9 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	132	175	310
Stressed	0	5	3	8
Very Stressed	0	1	0	1
Dead	1	0	0	1
Total	4	138	178	320

Plot 9 2008				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	157	159	319
Stressed	0	5	3	8
Very Stressed	0	2	0	2
Dead	0	2	2	4
Total	3	166	164	333

Plot 9 2009				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	163	127	293
Stressed	0	7	7	14
Very Stressed	0	3	2	5
Dead	0	14	6	20
Total	3	187	142	332

Plot 9 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	136	82	221
Stressed	0	14	42	56
Very Stressed	0	9	14	23
Dead	1	17	11	29
Total	4	176	149	329

TABLE 3: PROPAGULES BY CONDITION

Plot 9 2011				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	127	48	177
Stressed	0	21	43	64
Very Stressed	1	4	13	18
Dead	0	27	28	55
Total	3	179	132	314

Plot 9 2012				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	120	19	141
Stressed	0	24	30	54
Very Stressed	0	5	32	37
Dead	1	12	22	35
Total	3	161	103	267

Plot 9 2013				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	49	2	53
Stressed	0	27	4	31
Very Stressed	0	7	30	37
Dead	0	69	48	117
Total	2	152	84	238

Plot 9 2014				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	22	0	24
Stressed	0	11	1	12
Very Stressed	0	4	15	19
Dead	0	45	21	66
Total	2	82	37	121

Plot 9 2015				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	3	0	3
Stressed	1	19	0	20
Very Stressed	1	4	5	10
Dead	0	13	11	24
Total	2	39	16	57

Plot 9 2016				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	1	0	1
Stressed	1	10	0	11
Very Stressed	1	2	0	3
Dead	0	13	5	18
Total	2	26	5	33

Plot 9 2017				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	12	0	12
Stressed	0	6	0	6
Very Stressed	1	3	0	4
Dead	1	2	0	3
Total	2	23	0	25

Plot 9 2018				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	42	0	43
Stressed	0	2	0	2
Very Stressed	0	0	0	0
Dead	0	9	0	9
Total	1	53	0	54

Plot 9 2019				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	89	169	259
Stressed	0	4	0	4
Very Stressed	0	1	0	1
Dead	0	2	0	2
Total	1	96	169	266

Plot 9 2020				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	68	246	314
Stressed	1	5	28	34
Very Stressed	0	1	0	1
Dead	0	23	14	37
Total	1	97	288	386

Plot 9 2021				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	72	213	285
Stressed	1	2	45	48
Very Stressed	0	1	16	17
Dead	0	7	26	33
Total	1	82	300	383

Plot 9 2022				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	69	89	158
Stressed	1	5	55	61
Very Stressed	0	1	22	23
Dead	0	3	128	131
Total	1	78	294	373

TABLE 3: PROPAGULES BY CONDITION

Plot 9 2023					Plot 9 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	23	2	25	**Alive**	8	29	10	47
Stressed	1	19	3	23	**Stressed**	0	16	4	20
Very Stressed	0	3	0	3	**Very Stressed**	0	1	0	1
Dead	0	32	161	193	**Dead**	0	6	0	6
Total	1	77	166	244	**Total**	8	52	14	74

TABLE 3: PROPAGULES BY CONDITION

Plot 10 1999				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	35	6	42
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	1	35	6	42

Plot 10 2000				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	30	2	33
Stressed	0	4	4	8
Very Stressed	0	0	0	0
Dead	0	6	1	7
Total	1	40	7	48

Plot 10 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	45	2	48
Stressed	0	2	7	9
Very Stressed	0	0	0	0
Dead	0	6	0	6
Total	1	53	9	63

Plot 10 2002				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	58	8	67
Stressed	0	5	7	12
Very Stressed	0	0	0	0
Dead	0	4	0	4
Total	1	67	15	83

Plot 10 2003				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	57	5	63
Stressed	0	10	20	30
Very Stressed	0	0	0	0
Dead	0	10	1	11
Total	1	77	26	104

Plot 10 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	56	21	79
Stressed	0	4	8	12
Very Stressed	0	0	0	0
Dead	0	16	1	17
Total	2	76	30	108

Plot 10 2005				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	69	26	96
Stressed	0	6	7	13
Very Stressed	0	0	0	0
Dead	1	8	4	13
Total	2	83	37	122

Plot 10 2006				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	5	98	59	162
Stressed	1	13	9	23
Very Stressed	0	0	1	1
Dead	0	4	0	4
Total	6	115	69	190

Plot 10 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	160	72	240
Stressed	1	12	11	24
Very Stressed	0	0	1	1
Dead	0	11	3	14
Total	9	183	87	279

Plot 10 2008				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	7	169	96	272
Stressed	1	10	11	22
Very Stressed	0	1	2	3
Dead	2	18	0	20
Total	10	198	109	317

Plot 10 2009				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	7	156	83	246
Stressed	1	14	23	38
Very Stressed	0	1	6	7
Dead	1	19	0	20
Total	9	190	112	311

Plot 10 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	7	127	103	237
Stressed	2	21	28	51
Very Stressed	0	2	3	5
Dead	0	27	5	32
Total	9	177	139	325

TABLE 3: PROPAGULES BY CONDITION

Plot 10 2011				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	130	84	216
Stressed	3	20	30	53
Very Stressed	3	1	12	16
Dead	1	28	3	32
Total	9	179	129	317

Plot 10 2012				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	160	63	224
Stressed	3	19	29	51
Very Stressed	2	0	12	14
Dead	3	20	19	42
Total	9	199	123	331

Plot 10 2013				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	162	39	205
Stressed	3	18	17	38
Very Stressed	2	3	16	21
Dead	0	20	30	50
Total	9	203	102	314

Plot 10 2014				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	7	217	22	246
Stressed	3	19	8	30
Very Stressed	2	3	12	17
Dead	0	23	29	52
Total	12	262	71	345

Plot 10 2015				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	6	223	3	232
Stressed	4	19	3	26
Very Stressed	2	5	10	17
Dead	0	39	26	65
Total	12	286	42	340

Plot 10 2016				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	48	1	53
Stressed	2	12	0	14
Very Stressed	1	1	0	2
Dead	6	202	15	223
Total	13	263	16	292

Plot 10 2017				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	78	1	83
Stressed	1	7	0	8
Very Stressed	1	0	0	1
Dead	2	15	0	17
Total	8	100	1	109

Plot 10 2018				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	123	1	126
Stressed	2	14	0	16
Very Stressed	1	3	0	4
Dead	1	20	0	21
Total	6	160	1	167

Plot 10 2019				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	160	1	165
Stressed	1	15	0	16
Very Stressed	2	1	0	3
Dead	0	20	0	20
Total	7	196	1	204

Plot 10 2020				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	125	0	129
Stressed	2	8	0	10
Very Stressed	1	1	1	3
Dead	0	63	0	63
Total	7	197	1	205

Plot 10 2021				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	234	0	237
Stressed	3	11	0	14
Very Stressed	1	1	0	2
Dead	0	32	1	33
Total	7	278	1	286

Plot 10 2022				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	258	1	261
Stressed	3	33	0	36
Very Stressed	0	22	0	22
Dead	2	33	0	35
Total	7	346	1	354

TABLE 3: PROPAGULES BY CONDITION

Plot 10 2023					Plot 10 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	257	1	259	**Alive**	1	370	0	371
Stressed	2	56	0	58	**Stressed**	1	56	0	57
Very Stressed	0	12	0	12	**Very Stressed**	1	8	0	9
Dead	2	87	0	89	**Dead**	0	54	0	54
Total	5	412	1	418	**Total**	3	488	0	491

TABLE 3: PROPAGULES BY CONDITION

Plot 11 1999				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	1	9	10
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	1	9	10

Plot 11 2000				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	5	21	26
Stressed	0	0	2	2
Very Stressed	0	0	0	0
Dead	0	0	1	1
Total	0	5	24	29

Plot 11 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	39	547	586
Stressed	0	5	84	89
Very Stressed	0	0	0	0
Dead	0	4	1	5
Total	0	48	632	680

Plot 11 2002				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	44	202	247
Stressed	0	11	311	322
Very Stressed	0	0	0	0
Dead	0	17	73	90
Total	1	72	586	659

Plot 11 2003				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	226	89	316
Stressed	0	11	229	240
Very Stressed	0	0	0	0
Dead	0	12	153	165
Total	1	249	471	721

Plot 11 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	219	80	301
Stressed	0	14	120	134
Very Stressed	0	0	0	0
Dead	0	103	112	215
Total	2	336	312	650

Plot 11 2005				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	217	52	273
Stressed	0	16	93	109
Very Stressed	0	0	0	0
Dead	0	54	46	100
Total	4	287	191	482

Plot 11 2006				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	8	228	35	271
Stressed	0	5	51	56
Very Stressed	0	0	0	0
Dead	0	51	57	108
Total	8	284	143	435

Plot 11 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	32	250	25	307
Stressed	0	11	24	35
Very Stressed	0	2	15	17
Dead	0	24	22	46
Total	32	287	86	405

Plot 11 2008				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	41	238	18	297
Stressed	0	10	17	27
Very Stressed	0	5	19	24
Dead	0	22	11	33
Total	41	275	65	381

Plot 11 2009				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	40	200	17	257
Stressed	2	34	15	51
Very Stressed	0	4	10	14
Dead	0	49	15	64
Total	42	287	57	386

Plot 11 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	34	170	13	217
Stressed	7	32	15	54
Very Stressed	0	3	8	11
Dead	5	40	9	54
Total	46	245	45	336

TABLE 3: PROPAGULES BY CONDITION

Plot 11 2011				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	28	162	13	203
Stressed	12	32	15	59
Very Stressed	0	2	6	8
Dead	0	12	1	13
Total	40	208	35	283

Plot 11 2012				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	38	193	11	242
Stressed	8	30	9	47
Very Stressed	1	1	9	11
Dead	2	10	2	14
Total	49	234	31	314

Plot 11 2013				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	34	174	12	220
Stressed	17	29	6	52
Very Stressed	2	0	9	11
Dead	1	31	2	34
Total	54	234	29	317

Plot 11 2014				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	47	212	15	274
Stressed	16	23	6	45
Very Stressed	3	2	7	12
Dead	1	5	1	7
Total	67	242	29	338

Plot 11 2015				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	47	232	17	296
Stressed	15	20	3	38
Very Stressed	4	0	9	13
Dead	0	6	0	6
Total	66	258	29	353

Plot 11 2016				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	37	213	22	272
Stressed	11	11	7	29
Very Stressed	4	1	5	10
Dead	20	44	2	66
Total	72	269	36	377

Plot 11 2017				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	35	272	16	323
Stressed	7	4	13	24
Very Stressed	2	2	5	9
Dead	9	15	2	26
Total	53	293	36	382

Plot 11 2018				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	17	301	17	335
Stressed	12	16	13	41
Very Stressed	2	5	6	13
Dead	16	34	4	54
Total	47	356	40	443

Plot 11 2019				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	19	299	11	329
Stressed	10	26	15	51
Very Stressed	2	0	7	9
Dead	1	33	1	35
Total	32	358	34	424

Plot 11 2020				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	16	290	6	312
Stressed	9	3	12	24
Very Stressed	4	1	8	13
Dead	2	39	3	44
Total	31	333	29	393

Plot 11 2021				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	15	359	10	384
Stressed	6	12	12	30
Very Stressed	3	5	5	13
Dead	7	17	2	26
Total	31	393	29	453

Plot 11 2022				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	10	386	7	403
Stressed	5	24	14	43
Very Stressed	6	2	6	14
Dead	3	15	2	20
Total	24	427	29	480

TABLE 3: PROPAGULES BY CONDITION

Plot 11 2023					Plot 11 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	7	361	6	374	**Alive**	7	422	8	437
Stressed	3	49	6	58	**Stressed**	5	48	7	60
Very Stressed	8	6	8	22	**Very Stressed**	1	6	5	12
Dead	3	39	7	49	**Dead**	5	42	3	50
Total	21	455	27	503	**Total**	18	518	23	559

TABLE 3: PROPAGULES BY CONDITION

Plot 12 1999				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	0	0	0

Plot 12 2000				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	0	1	0	1
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	1	0	1

Plot 12 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	0	1	0	1
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	1	0	1

Plot 12 2002				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	2	0	2
Stressed	0	1	0	1
Very Stressed	0	0	0	0
Dead	0	1	0	1
Total	0	4	0	4

Plot 12 2003				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	3	0	3
Total	0	3	0	3

Plot 12 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	0	0	0

Plot 12 2005				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	0	0	0

Plot 12 2006				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	0	0	0

Plot 12 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	0	0	0

Plot 12 2008				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	0	0	0

Plot 12 2009				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	1	0	1
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	1	0	1

Plot 12 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	2	0	2
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	1	0	1
Total	0	3	0	3

TABLE 3: PROPAGULES BY CONDITION

Plot 12 2011				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	2	0	2
Total	0	2	0	2

Plot 12 2012				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	1	0	1
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	1	0	1

Plot 12 2013				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	1	0	1
Total	0	1	0	1

Plot 12 2014				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	0	0	0
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	0	0	0	0

Plot 12 2015				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	0	0	1
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	0	0	0	0
Total	1	0	0	1

Plot 12 2016				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	11	0	11
Stressed	0	0	0	0
Very Stressed	0	0	0	0
Dead	1	0	0	1
Total	1	11	0	12

Plot 12 2017				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	29	0	29
Stressed	0	2	0	2
Very Stressed	0	1	0	1
Dead	0	8	0	8
Total	0	40	0	40

Plot 12 2018				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	1	177	0	178
Stressed	0	2	0	2
Very Stressed	0	2	0	2
Dead	0	7	0	7
Total	1	188	0	189

Plot 12 2019				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	0	679	0	679
Stressed	1	8	1	10
Very Stressed	0	3	0	3
Dead	0	7	0	7
Total	1	697	1	699

Plot 12 2020				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	1018	2	1023
Stressed	0	14	0	14
Very Stressed	0	5	0	5
Dead	0	28	0	28
Total	3	1065	2	1070

Plot 12 2021				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	4	1376	6	1386
Stressed	0	59	0	59
Very Stressed	1	3	0	4
Dead	0	39	0	39
Total	5	1477	6	1488

Plot 12 2022				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	2	1551	9	1562
Stressed	0	106	1	107
Very Stressed	3	12	0	15
Dead	0	61	0	61
Total	5	1730	10	1745

TABLE 3: PROPAGULES BY CONDITION

Plot 12 2023					Plot 12 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	3	1586	21	1610	**Alive**	4	1650	27	1681
Stressed	0	175	1	176	**Stressed**	0	215	2	217
Very Stressed	2	43	1	46	**Very Stressed**	2	29	1	32
Dead	1	106	1	108	**Dead**	0	107	1	108
Total	6	1910	24	1940	**Total**	6	2001	31	2038

TABLE 3: PROPAGULES BY CONDITION ALL PLOTS

All Plots 1999					All Plots 2000					All Plots 2001				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	32	714	220	966	**Alive**	45	555	70	670	**Alive**	87	778	2673	3538
Stressed	4	1	2	7	**Stressed**	3	53	55	111	**Stressed**	22	284	541	847
Very Stressed	0	0	0	0	**Very Stressed**	0	0	0	0	**Very Stressed**	0	0	0	0
Dead	0	0	0	0	**Dead**	6	312	160	478	**Dead**	3	204	55	262
Total	36	715	222	973	**Total**	54	920	285	1259	**Total**	112	1266	3269	4647

All Plots 2002					All Plots 2003					All Plots 2004				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	106	781	653	1540	**Alive**	98	965	224	1287	**Alive**	121	1022	199	1342
Stressed	36	321	1112	1469	**Stressed**	56	373	692	1121	**Stressed**	57	336	290	683
Very Stressed	0	0	0	0	**Very Stressed**	0	0	0	0	**Very Stressed**	0	0	16	16
Dead	12	162	1169	1343	**Dead**	29	162	702	893	**Dead**	23	282	410	715
Total	154	1264	2934	4352	**Total**	183	1500	1618	3301	**Total**	201	1640	915	2756

All Plots 2005					All Plots 2006					All Plots 2007				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	158	1102	168	1428	**Alive**	213	1472	262	1947	**Alive**	280	2045	488	2813
Stressed	49	329	195	573	**Stressed**	20	131	120	271	**Stressed**	22	137	83	242
Very Stressed	0	0	3	3	**Very Stressed**	0	3	4	7	**Very Stressed**	1	17	28	46
Dead	20	163	161	344	**Dead**	16	174	87	277	**Dead**	9	87	43	139
Total	227	1594	527	2348	**Total**	249	1780	473	2502	**Total**	312	2286	642	3240

All Plots 2008										All Plots 2010				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**		**All Plots 2009**				**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	294	1995	502	2791	**Alive**	322	1886	435	2643	**Alive**	310	1811	377	2498
Stressed	32	155	85	272	**Stressed**	32	252	95	379	**Stressed**	64	291	142	497
Very Stressed	4	37	34	75	**Very Stressed**	10	54	37	101	**Very Stressed**	16	68	45	129
Dead	14	125	27	166	**Dead**	33	220	42	295	**Dead**	30	234	38	302
Total	344	2312	648	3304	**Total**	397	2412	609	3418	**Total**	420	2404	602	3426

TABLE 3: PROPAGULES BY CONDITION

All Plots 2011				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	259	1716	281	2256
Stressed	94	333	140	567
Very Stressed	26	42	53	121
Dead	32	264	51	347
Total	411	2355	525	3291

All Plots 2012				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	268	1875	222	2365
Stressed	96	351	124	571
Very Stressed	35	60	77	172
Dead	38	158	58	254
Total	437	2444	481	3362

All Plots 2013				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	243	1771	125	2139
Stressed	114	382	69	565
Very Stressed	31	67	98	196
Dead	43	269	113	425
Total	431	2489	405	3325

All Plots 2014				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	214	1852	76	2142
Stressed	144	496	50	690
Very Stressed	53	115	84	252
Dead	21	235	75	331
Total	432	2698	285	3415

All Plots 2015				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	203	1677	35	1915
Stressed	165	616	42	823
Very Stressed	69	144	69	282
Dead	25	325	60	410
Total	462	2762	206	3430

All Plots 2016				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	112	1232	36	1380
Stressed	122	408	35	565
Very Stressed	37	117	34	188
Dead	180	880	48	1108
Total	451	2637	153	3241

All Plots 2017				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	96	1477	22	1595
Stressed	100	345	27	472
Very Stressed	37	106	42	185
Dead	47	312	19	378
Total	280	2240	110	2630

All Plots 2018				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	53	1556	23	1632
Stressed	73	371	29	473
Very Stressed	29	85	21	135
Dead	88	507	26	621
Total	243	2519	99	2861

All Plots 2019				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	55	2521	189	2765
Stressed	71	387	29	487
Very Stressed	28	54	20	102
Dead	10	170	8	188
Total	164	3132	246	3542

All Plots 2020				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	56	2797	263	3116
Stressed	67	252	52	371
Very Stressed	23	33	20	76
Dead	11	490	20	521
Total	157	3572	355	4084

All Plots 2021				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	55	3635	246	3936
Stressed	51	347	66	464
Very Stressed	21	66	30	117
Dead	25	348	36	409
Total	152	4396	378	4926

All Plots 2022				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	37	3841	122	4000
Stressed	50	460	76	586
Very Stressed	26	80	34	140
Dead	15	450	137	602
Total	128	4831	369	5328

TABLE 3: PROPAGULES BY CONDITION

All Plots 2023					All Plots 2024				
Number	**BLACK**	**RED**	**WHITE**	**TOTAL**	**Number**	**BLACK**	**RED**	**WHITE**	**TOTAL**
Alive	37	3799	39	3875	**Alive**	38	4501	65	4604
Stressed	27	606	14	647	**Stressed**	28	655	19	702
Very Stressed	28	106	15	149	**Very Stressed**	10	82	9	101
Dead	22	763	181	966	**Dead**	20	488	7	515
Total	114	5274	249	5637	**Total**	96	5726	100	5922

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 1 Tree Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	0	2	2	2000	1	0	0	1
2001	0	1	0	1	2001	2	0	0	2
2002	0	1	0	1	2002	0	0	1	1
2003	0	1	3	4	2003	0	0	1	1
2004	0	1	10	11	2004	0	0	0	0
2005	0	1	5	6	2005	0	1	1	2
2006	0	0	0	0	2006	0	1	19	20
2007	0	3	0	3	2007	2	1	4	7
2008	0	2	1	3	2008	1	0	0	1
2009	0	3	29	32	2009	0	0	0	0
2010	0	1	27	28	2010	0	0	0	0
2011	1	1	16	18	2011	0	0	2	2
2012	4	3	8	15	2012	0	0	1	1
2013	2	1	1	4	2013	0	2	5	7
2014	1	0	1	2	2014	1	1	9	11
2015	6	0	1	7	2015	0	0	11	11
2016	1	0	0	1	2016	7	4	27	38
2017	0	0	0	0	2017	5	2	7	14
2018	0	0	0	0	2018	3	1	6	10
2019	0	0	0	0	2019	0	4	2	6
2020	0	0	1	1	2020	0	0	1	1
2021	0	0	0	0	2021	0	0	0	0
2022	0	0	0	0	2022	1	0	2	3
2023	0	0	0	0	2023	0	1	5	6
2024	0	0	0	0	2024	4	0	3	7

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 1 Propagule Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	0	1	1	2000	0	1	0	1
2001	0	10	4	14	2001	0	0	0	0
2002	0	5	18	23	2002	0	2	7	9
2003	0	21	3	24	2003	0	1	1	2
2004	0	5	2	7	2004	0	3	0	3
2005	0	6	2	8	2005	0	6	1	7
2006	0	5	0	5	2006	0	12	3	15
2007	0	0	1	1	2007	0	8	1	9
2008	6	2	44	52	2008	0	2	0	2
2009	29	1	32	62	2009	3	0	1	4
2010	27	0	11	38	2010	8	4	2	14
2011	8	6	2	16	2011	2	1	3	6
2012	23	1	6	30	2012	9	0	2	11
2013	9	2	5	16	2013	13	1	3	17
2014	9	1	0	10	2014	2	0	8	10
2015	25	7	0	32	2015	5	3	2	10
2016	0	0	0	0	2016	62	17	2	81
2017	3	2	0	5	2017	2	0	0	2
2018	1	1	0	2	2018	7	1	0	8
2019	0	5	1	6	2019	1	1	0	2
2020	0	1	0	1	2020	0	2	0	2
2021	0	4	21	25	2021	5	3	0	8
2022	0	0	0	0	2022	0	0	0	0
2023	0	0	0	0	2023	3	1	0	4
2024	0	1	1	2	2024	6	0	0	6

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 2 Tree Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	0	2	2	2000	0	0	6	6
2001	0	0	0	0	2001	0	0	0	0
2002	0	0	0	0	2002	0	0	2	2
2003	0	0	0	0	2003	0	0	0	0
2004	0	0	0	0	2004	0	0	0	0
2005	4	0	0	4	2005	0	0	0	0
2006	12	1	3	16	2006	0	0	0	0
2007	23	0	8	31	2007	0	0	0	0
2008	18	6	33	57	2008	0	0	0	0
2009	9	15	56	80	2009	0	0	0	0
2010	4	9	16	29	2010	0	0	0	0
2011	3	9	14	26	2011	0	2	0	2
2012	5	7	8	20	2012	1	3	0	4
2013	1	2	9	12	2013	0	1	2	3
2014	3	4	5	12	2014	0	4	1	5
2015	3	4	19	26	2015	1	0	8	9
2016	2	1	1	4	2016	3	9	14	26
2017	1	1	4	6	2017	4	11	4	19
2018	0	0	0	0	2018	13	17	29	59
2019	0	0	0	0	2019	14	10	9	33
2020	0	0	1	1	2020	0	0	4	4
2021	1	0	0	1	2021	1	1	2	4
2022	0	0	0	0	2022	0	0	2	2
2023	1	0	0	1	2023	2	0	11	13
2024	2	6	2	10	2024	1	0	5	6

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 2 Propagule Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	72	8	80	2000	0	94	145	239
2001	1	0	0	1	2001	0	1	0	1
2002	24	3	4	31	2002	0	0	0	0
2003	45	2	2	49	2003	22	0	2	24
2004	29	1	3	33	2004	6	1	1	8
2005	35	23	4	62	2005	3	0	0	3
2006	29	35	51	115	2006	4	1	0	5
2007	16	26	68	110	2007	0	2	1	3
2008	10	8	16	34	2008	7	5	1	13
2009	8	3	5	16	2009	7	6	5	18
2010	7	6	7	20	2010	7	10	1	18
2011	5	4	1	10	2011	8	9	1	18
2012	5	7	5	17	2012	9	6	4	19
2013	9	26	3	38	2013	8	4	4	16
2014	7	26	0	33	2014	8	5	1	14
2015	7	40	1	48	2015	5	9	4	18
2016	2	25	1	28	2016	29	46	1	76
2017	0	55	0	55	2017	8	24	4	36
2018	0	18	0	18	2018	14	72	1	87
2019	3	24	0	27	2019	2	20	0	22
2020	1	10	1	12	2020	0	16	0	16
2021	0	39	1	40	2021	0	7	0	7
2022	1	42	0	43	2022	4	5	0	9
2023	0	39	0	39	2023	1	36	3	40
2024	0	70	1	71	2024	0	11	0	11

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 3 Tree Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	0	3	3	2000	0	0	0	0
2001	0	1	76	77	2001	0	0	0	0
2002	2	0	387	389	2002	0	0	0	0
2003	15	2	127	144	2003	0	0	8	8
2004	8	1	20	29	2004	0	0	128	128
2005	2	2	2	6	2005	0	0	105	105
2006	2	1	2	5	2006	0	0	75	75
2007	4	9	2	15	2007	0	0	55	55
2008	4	3	1	8	2008	0	0	21	21
2009	4	7	1	12	2009	0	0	39	39
2010	3	3	0	6	2010	0	0	66	66
2011	1	6	1	8	2011	1	1	19	21
2012	5	14	0	19	2012	0	1	11	12
2013	1	8	0	9	2013	0	2	21	23
2014	1	6	1	8	2014	1	1	36	38
2015	1	6	1	8	2015	0	1	19	20
2016	0	5	0	5	2016	3	16	16	35
2017	0	1	0	1	2017	8	11	3	22
2018	0	0	0	0	2018	2	7	1	10
2019	0	2	0	2	2019	4	6	0	10
2020	0	3	0	3	2020	0	0	0	0
2021	0	17	0	17	2021	0	1	0	1
2022	1	39	1	41	2022	0	0	0	0
2023	3	44	0	47	2023	1	0	0	1
2024	2	30	0	32	2024	1	1	0	2

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 3 Propagule Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	2	23	25	2000	4	2	1	7
2001	30	40	2506	2576	2001	0	1	49	50
2002	4	22	99	125	2002	7	2	1081	1090
2003	2	24	3	29	2003	1	6	535	542
2004	11	22	9	42	2004	1	18	291	310
2005	3	19	0	22	2005	2	8	95	105
2006	7	48	0	55	2006	0	9	21	30
2007	34	35	1	70	2007	1	11	8	20
2008	14	8	0	22	2008	1	6	2	9
2009	19	13	0	32	2009	8	8	7	23
2010	6	9	1	16	2010	9	9	2	20
2011	4	30	0	34	2011	9	15	3	27
2012	4	55	1	60	2012	3	5	0	8
2013	1	43	0	44	2013	1	9	5	15
2014	3	62	0	65	2014	4	12	1	17
2015	3	42	0	45	2015	3	13	1	17
2016	2	30	0	32	2016	23	125	1	149
2017	1	38	0	39	2017	2	24	0	26
2018	1	52	0	53	2018	5	31	0	36
2019	0	33	1	34	2019	2	10	0	12
2020	0	19	0	19	2020	1	23	0	24
2021	0	76	1	77	2021	3	14	0	17
2022	0	68	1	69	2022	1	9	0	10
2023	0	97	2	99	2023	2	18	0	20
2024	0	115	2	117	2024	3	19	1	23

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 4 Tree Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	0	0	0	2000	0	5	0	5
2001	0	0	0	0	2001	0	8	0	8
2002	0	0	0	0	2002	1	39	0	40
2003	0	0	0	0	2003	0	2	0	2
2004	0	0	0	0	2004	0	5	0	5
2005	0	0	0	0	2005	0	0	0	0
2006	0	0	1	1	2006	0	5	0	5
2007	0	3	0	3	2007	0	3	0	3
2008	1	14	1	16	2008	0	0	0	0
2009	3	19	4	26	2009	0	0	0	0
2010	0	27	2	29	2010	0	1	0	1
2011	0	15	0	15	2011	0	1	0	1
2012	0	15	1	16	2012	0	2	0	2
2013	0	11	1	12	2013	0	0	0	0
2014	0	10	1	11	2014	0	1	0	1
2015	0	7	0	7	2015	0	1	0	1
2016	0	3	0	3	2016	0	8	0	8
2017	0	4	0	4	2017	0	3	0	3
2018	0	5	0	5	2018	0	3	1	4
2019	0	3	1	4	2019	0	3	0	3
2020	0	17	2	19	2020	0	2	0	2
2021	0	10	1	11	2021	0	1	0	1
2022	0	9	0	9	2022	1	3	0	4
2023	1	7	0	8	2023	0	1	0	1
2024	0	11	0	11	2024	0	2	0	2

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 4 Propagule Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	2	76	1	79	2000	0	152	0	152
2001	3	391	0	394	2001	1	166	0	167
2002	2	70	0	72	2002	1	110	0	111
2003	2	125	0	127	2003	0	99	0	99
2004	0	147	8	155	2004	0	102	0	102
2005	1	69	2	72	2005	0	63	1	64
2006	2	57	0	59	2006	1	56	0	57
2007	0	139	0	139	2007	1	8	0	9
2008	0	28	0	28	2008	1	22	0	23
2009	0	134	5	139	2009	0	59	1	60
2010	0	158	0	158	2010	0	46	1	47
2011	1	74	3	78	2011	0	79	0	79
2012	1	140	1	142	2012	2	53	0	55
2013	0	81	0	81	2013	2	63	1	66
2014	1	189	1	191	2014	1	99	0	100
2015	0	54	0	54	2015	0	177	1	178
2016	2	52	2	56	2016	0	212	0	212
2017	1	104	1	106	2017	0	143	2	145
2018	0	99	1	100	2018	2	131	0	133
2019	0	169	1	170	2019	0	34	1	35
2020	0	147	1	148	2020	0	86	0	86
2021	0	334	2	336	2021	0	128	1	129
2022	0	89	0	89	2022	0	223	2	225
2023	0	219	0	219	2023	0	219	2	221
2024	0	223	0	223	2024	2	176	1	179

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 5 Tree Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	0	1	1	2000	0	0	0	0
2001	1	1	0	2	2001	0	0	2	2
2002	0	0	1	1	2002	0	0	0	0
2003	0	2	0	2	2003	0	0	1	1
2004	0	2	2	4	2004	0	0	0	0
2005	0	0	0	0	2005	0	0	0	0
2006	1	4	1	6	2006	1	0	1	2
2007	1	7	0	8	2007	0	0	0	0
2008	2	5	1	8	2008	0	0	3	3
2009	1	3	0	4	2009	1	0	0	1
2010	0	5	1	6	2010	0	0	1	1
2011	1	0	0	1	2011	1	0	1	2
2012	0	1	0	1	2012	1	0	1	2
2013	0	2	0	2	2013	0	0	2	2
2014	2	0	0	2	2014	0	0	0	0
2015	0	1	2	3	2015	0	0	0	0
2016	0	0	0	0	2016	0	0	0	0
2017	0	2	0	2	2017	0	0	0	0
2018	0	0	1	1	2018	0	1	6	7
2019	0	1	0	1	2019	0	0	4	4
2020	1	0	0	1	2020	0	0	4	4
2021	0	1	0	1	2021	0	0	2	2
2022	0	1	0	1	2022	1	0	3	4
2023	0	3	0	3	2023	1	0	0	1
2024	0	2	0	2	2024	0	1	0	1

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 5 Propagule Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	5	9	8	22	2000	0	4	2	6
2001	10	35	7	52	2001	0	2	2	4
2002	4	5	3	12	2002	2	2	2	6
2003	0	2	1	3	2003	1	1	2	4
2004	1	2	1	4	2004	2	1	1	4
2005	0	0	1	1	2005	5	2	3	10
2006	1	5	3	9	2006	0	2	0	2
2007	1	3	1	5	2007	1	2	2	5
2008	3	1	0	4	2008	0	3	2	5
2009	2	5	1	8	2009	3	1	0	4
2010	1	22	4	27	2010	0	0	1	1
2011	2	1	0	3	2011	1	4	2	7
2012	1	1	0	2	2012	0	3	1	4
2013	1	8	1	10	2013	3	2	1	6
2014	2	29	0	31	2014	1	1	0	2
2015	5	54	1	60	2015	1	1	1	3
2016	0	9	0	9	2016	0	9	1	10
2017	0	19	1	20	2017	3	7	2	12
2018	1	18	1	20	2018	1	11	2	14
2019	2	13	1	16	2019	0	3	2	5
2020	0	2	0	2	2020	2	5	0	7
2021	0	12	0	12	2021	4	5	2	11
2022	0	4	0	4	2022	0	8	2	10
2023	0	4	1	5	2023	2	13	1	16
2024	0	4	0	4	2024	0	7	1	8

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 6 Tree Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	2	0	1	3	2000	1	0	0	1
2001	4	0	2	6	2001	1	0	0	1
2002	0	0	2	2	2002	0	0	0	0
2003	1	1	8	10	2003	0	1	0	1
2004	2	0	7	9	2004	0	0	1	1
2005	0	1	1	2	2005	0	0	0	0
2006	1	1	6	8	2006	0	0	1	1
2007	1	1	5	7	2007	0	1	4	5
2008	1	5	1	7	2008	0	0	3	3
2009	5	3	8	16	2009	0	0	3	3
2010	0	0	1	1	2010	1	0	2	3
2011	1	1	0	2	2011	0	1	1	2
2012	0	3	1	4	2012	0	0	1	1
2013	0	1	0	1	2013	1	0	1	2
2014	0	9	3	12	2014	1	0	2	3
2015	0	7	4	11	2015	2	0	4	6
2016	0	6	1	7	2016	1	0	1	2
2017	3	1	2	6	2017	5	7	7	19
2018	1	6	0	7	2018	1	1	0	2
2019	0	3	1	4	2019	0	2	2	4
2020	0	1	0	1	2020	4	3	6	13
2021	0	2	0	2	2021	6	6	3	15
2022	0	0	0	0	2022	0	7	4	11
2023	0	1	3	4	2023	0	1	3	4
2024	0	0	1	1	2024	0	2	3	5

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 6 Propagule Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	7	25	11	43	2000	1	46	10	57
2001	10	111	31	152	2001	1	14	0	15
2002	4	16	9	29	2002	1	19	4	24
2003	3	1	7	11	2003	1	16	6	23
2004	1	2	2	5	2004	3	12	1	16
2005	4	2	11	17	2005	3	12	6	21
2006	4	17	1	22	2006	0	10	2	12
2007	1	10	8	19	2007	2	12	5	19
2008	1	3	1	5	2008	0	20	8	28
2009	3	14	15	32	2009	4	19	6	29
2010	0	20	8	28	2010	0	22	3	25
2011	1	2	1	4	2011	2	18	8	28
2012	4	19	15	38	2012	1	11	3	15
2013	0	4	0	4	2013	3	28	15	46
2014	0	7	3	10	2014	3	13	7	23
2015	4	14	1	19	2015	5	15	8	28
2016	1	5	1	7	2016	2	14	11	27
2017	2	11	1	14	2017	2	19	6	27
2018	2	17	0	19	2018	5	19	5	29
2019	1	62	1	64	2019	0	11	4	15
2020	1	30	0	31	2020	2	45	2	49
2021	0	22	1	23	2021	1	53	3	57
2022	0	11	0	11	2022	2	45	2	49
2023	1	6	0	7	2023	6	39	3	48
2024	0	35	0	35	2024	2	20	0	22

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 7 Tree Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	1	0	1	2000	0	1	0	1
2001	0	0	0	0	2001	0	0	0	0
2002	0	0	0	0	2002	0	0	0	0
2003	0	4	0	4	2003	0	0	0	0
2004	0	3	0	3	2004	0	0	0	0
2005	0	1	0	1	2005	0	0	0	0
2006	0	0	0	0	2006	0	0	0	0
2007	0	3	0	3	2007	1	0	0	1
2008	0	1	0	1	2008	0	0	0	0
2009	0	2	0	2	2009	0	0	0	0
2010	0	2	0	2	2010	0	0	0	0
2011	0	2	1	3	2011	0	0	0	0
2012	0	3	1	4	2012	0	0	0	0
2013	0	0	0	0	2013	0	0	0	0
2014	0	7	0	7	2014	0	2	0	2
2015	0	1	0	1	2015	0	0	0	0
2016	0	2	0	2	2016	0	9	1	10
2017	0	0	0	0	2017	0	5	0	5
2018	0	0	0	0	2018	0	18	3	21
2019	0	0	0	0	2019	2	2	0	4
2020	0	0	0	0	2020	0	2	0	2
2021	0	0	1	1	2021	0	1	0	1
2022	0	0	1	1	2022	0	0	0	0
2023	0	0	0	0	2023	0	1	1	2
2024	0	0	0	0	2024	0	1	0	1

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 7 Propagule Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	5	10	3	18	2000	1	6	0	7
2001	15	11	5	31	2001	1	7	3	11
2002	8	24	3	35	2002	1	4	2	7
2003	5	10	0	15	2003	4	8	2	14
2004	8	10	3	21	2004	11	13	2	26
2005	8	9	0	17	2005	6	8	4	18
2006	2	23	1	26	2006	10	26	3	39
2007	12	265	3	280	2007	3	6	0	9
2008	7	28	1	36	2008	2	18	1	21
2009	9	26	2	37	2009	6	38	0	44
2010	6	14	0	20	2010	0	52	3	55
2011	3	34	3	40	2011	9	62	2	73
2012	7	38	1	46	2012	3	37	3	43
2013	4	13	1	18	2013	7	31	2	40
2014	2	23	0	25	2014	1	27	4	32
2015	13	10	0	23	2015	5	38	1	44
2016	1	11	0	12	2016	31	148	3	182
2017	1	74	0	75	2017	6	21	0	27
2018	0	24	0	24	2018	12	83	2	97
2019	1	133	1	135	2019	0	7	0	7
2020	1	9	3	13	2020	1	102	0	103
2021	2	59	6	67	2021	0	15	0	15
2022	1	47	2	50	2022	0	22	1	23
2023	1	8	0	9	2023	1	130	3	134
2024	0	19	9	28	2024	1	15	0	16

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 8 Tree Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	0	0	0	2000	0	1	0	1
2001	0	0	0	0	2001	0	2	0	2
2002	0	0	0	0	2002	0	1	0	1
2003	0	0	0	0	2003	0	0	0	0
2004	0	0	0	0	2004	0	1	0	1
2005	0	0	0	0	2005	0	0	0	0
2006	0	0	0	0	2006	0	0	0	0
2007	0	2	2	4	2007	0	0	0	0
2008	0	0	7	7	2008	0	0	0	0
2009	0	0	11	11	2009	0	0	0	0
2010	0	0	16	16	2010	0	2	0	2
2011	1	0	20	21	2011	0	1	0	1
2012	0	1	20	21	2012	0	0	0	0
2013	0	1	21	22	2013	0	0	0	0
2014	0	0	11	11	2014	0	0	0	0
2015	0	3	6	9	2015	0	0	0	0
2016	0	0	3	3	2016	0	0	3	3
2017	0	1	2	3	2017	0	0	0	0
2018	0	1	0	1	2018	0	5	18	23
2019	1	0	1	2	2019	0	2	11	13
2020	1	2	2	5	2020	0	0	3	3
2021	0	0	0	0	2021	0	0	1	1
2022	0	2	1	3	2022	0	0	0	0
2023	0	1	1	2	2023	1	0	1	2
2024	0	2	0	2	2024	0	2	1	3

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 8 Propagule Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	1	0	1	2000	0	1	0	1
2001	0	1	0	1	2001	0	2	0	2
2002	0	3	4	7	2002	0	1	0	1
2003	0	6	6	12	2003	0	2	0	2
2004	2	6	7	15	2004	0	4	1	5
2005	0	23	3	26	2005	0	1	1	2
2006	1	18	5	24	2006	1	3	0	4
2007	13	41	19	73	2007	0	3	1	4
2008	11	4	15	30	2008	1	7	0	8
2009	16	10	43	69	2009	1	7	1	9
2010	10	12	23	45	2010	0	6	0	6
2011	5	15	14	34	2011	0	7	0	7
2012	11	41	14	66	2012	5	1	2	8
2013	2	14	0	16	2013	5	10	2	17
2014	9	54	3	66	2014	0	5	3	8
2015	0	34	0	34	2015	1	11	5	17
2016	2	39	0	41	2016	6	50	7	63
2017	0	40	0	40	2017	12	34	3	49
2018	1	32	0	33	2018	25	89	12	126
2019	0	30	1	31	2019	4	22	0	26
2020	0	8	1	9	2020	3	58	1	62
2021	0	111	0	111	2021	5	28	1	34
2022	0	127	0	127	2022	3	26	0	29
2023	1	191	0	192	2023	1	43	0	44
2024	0	330	0	330	2024	1	31	0	32

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years
Plot 9 Tree Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	0	0	0	2000	0	7	1	8
2001	0	0	0	0	2001	0	3	0	3
2002	0	0	0	0	2002	0	3	0	3
2003	0	0	0	0	2003	0	2	1	3
2004	0	0	0	0	2004	0	1	0	1
2005	0	0	0	0	2005	0	0	0	0
2006	0	0	0	0	2006	0	3	0	3
2007	0	0	13	13	2007	0	2	0	2
2008	0	0	49	49	2008	0	0	0	0
2009	0	1	52	53	2009	0	0	0	0
2010	0	12	17	29	2010	0	0	0	0
2011	0	1	12	13	2011	0	0	0	0
2012	0	2	7	9	2012	0	0	1	1
2013	0	1	2	3	2013	0	0	18	18
2014	0	3	0	3	2014	0	2	33	35
2015	0	2	0	2	2015	0	2	29	31
2016	0	0	0	0	2016	0	5	50	55
2017	0	0	1	1	2017	0	4	7	11
2018	0	0	0	0	2018	0	1	6	7
2019	0	0	0	0	2019	0	2	2	4
2020	0	3	2	5	2020	0	0	0	0
2021	0	0	18	18	2021	0	0	2	2
2022	0	5	20	25	2022	0	0	1	1
2023	0	0	1	1	2023	0	2	35	37
2024	1	3	1	5	2024	0	1	3	4

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years
Plot 9 Propagule Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	0	0	0	2000	0	0	0	0
2001	0	0	0	0	2001	0	1	0	1
2002	0	4	0	4	2002	0	0	0	0
2003	0	9	0	9	2003	0	4	0	4
2004	0	6	0	6	2004	0	9	0	9
2005	1	13	7	21	2005	0	1	0	1
2006	1	57	21	79	2006	0	0	1	1
2007	2	63	162	227	2007	1	0	0	1
2008	0	28	35	63	2008	0	2	2	4
2009	0	24	32	56	2009	0	14	6	20
2010	1	15	29	45	2010	1	17	11	29
2011	0	21	5	26	2011	0	27	28	55
2012	0	11	1	12	2012	1	12	22	35
2013	0	4	3	7	2013	0	69	48	117
2014	0	2	1	3	2014	0	45	21	66
2015	0	3	0	3	2015	0	13	11	24
2016	0	0	0	0	2016	0	13	5	18
2017	0	10	0	10	2017	1	2	0	3
2018	0	32	0	32	2018	0	9	0	9
2019	0	52	169	221	2019	0	2	0	2
2020	0	6	120	126	2020	0	23	14	37
2021	0	8	44	52	2021	0	7	26	33
2022	0	8	39	47	2022	0	3	128	131
2023	0	2	0	2	2023	0	32	161	193
2024	8	10	10	28	2024	0	6	0	6

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years
Plot 10 Tree Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	0	0	0	2000	0	0	0	0
2001	0	1	0	1	2001	0	0	0	0
2002	0	0	0	0	2002	0	0	0	0
2003	0	1	0	1	2003	0	0	0	0
2004	0	2	0	2	2004	0	0	0	0
2005	0	1	0	1	2005	0	2	0	2
2006	0	1	1	2	2006	0	1	0	1
2007	0	2	16	18	2007	1	0	0	1
2008	0	1	7	8	2008	0	0	0	0
2009	0	7	18	25	2009	0	0	0	0
2010	0	0	12	12	2010	0	0	0	0
2011	0	1	20	21	2011	0	0	0	0
2012	0	2	11	13	2012	0	0	0	0
2013	0	4	2	6	2013	1	0	3	4
2014	0	1	2	3	2014	0	0	13	13
2015	0	0	0	0	2015	0	0	14	14
2016	0	1	0	1	2016	0	13	27	40
2017	0	0	0	0	2017	0	5	7	12
2018	0	0	1	1	2018	0	5	6	11
2019	0	0	0	0	2019	0	0	0	0
2020	0	0	0	0	2020	1	1	2	4
2021	0	0	0	0	2021	0	0	0	0
2022	0	0	0	0	2022	0	0	0	0
2023	0	1	0	1	2023	0	0	3	3
2024	0	0	1	1	2024	0	0	2	2

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years
Plot 10 Propagule Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	5	1	6	2000	0	6	1	7
2001	0	20	3	23	2001	0	6	0	6
2002	0	20	6	26	2002	0	4	0	4
2003	0	15	11	26	2003	0	10	1	11
2004	1	11	5	17	2004	0	16	1	17
2005	0	24	8	32	2005	1	8	4	13
2006	5	41	37	83	2006	0	4	0	4
2007	3	74	34	111	2007	0	11	3	14
2008	1	27	31	59	2008	2	18	0	20
2009	1	17	21	39	2009	1	19	0	20
2010	1	6	38	45	2010	0	27	5	32
2011	0	30	15	45	2011	1	28	3	32
2012	1	50	9	60	2012	3	20	19	42
2013	3	27	0	30	2013	0	20	30	50
2014	3	80	1	84	2014	0	23	29	52
2015	0	47	0	47	2015	0	39	26	65
2016	1	17	0	18	2016	6	202	15	223
2017	1	39	0	40	2017	2	15	0	17
2018	0	75	0	75	2018	1	20	0	21
2019	2	56	0	58	2019	0	20	0	20
2020	0	21	0	21	2020	0	63	0	63
2021	0	144	0	144	2021	0	32	1	33
2022	0	100	1	101	2022	2	33	0	35
2023	0	100	0	100	2023	2	87	0	89
2024	0	163	0	163	2024	0	54	0	54

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 11 Tree Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	0	6	6	2000	0	0	0	0
2001	0	0	80	80	2001	0	0	0	0
2002	0	0	106	106	2002	0	0	1	1
2003	0	1	50	51	2003	0	0	0	0
2004	0	1	20	21	2004	0	0	1	1
2005	0	1	9	10	2005	0	0	7	7
2006	1	0	5	6	2006	0	0	26	26
2007	1	2	0	3	2007	0	0	46	46
2008	6	2	0	8	2008	0	0	46	46
2009	17	4	2	23	2009	0	0	62	62
2010	2	1	0	3	2010	0	1	50	51
2011	4	4	3	11	2011	0	0	2	2
2012	7	9	8	24	2012	0	0	9	9
2013	3	13	4	20	2013	0	1	2	3
2014	3	19	6	28	2014	0	0	1	1
2015	5	16	5	26	2015	0	1	1	2
2016	2	17	5	24	2016	0	4	2	6
2017	2	6	5	13	2017	0	3	2	5
2018	2	6	4	12	2018	0	1	3	4
2019	0	7	3	10	2019	0	4	3	7
2020	0	5	4	9	2020	1	0	1	2
2021	1	14	5	20	2021	0	0	0	0
2022	1	4	1	6	2022	3	1	1	5
2023	0	7	2	9	2023	2	0	2	4
2024	1	8	1	10	2024	3	0	1	4

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 11 Propagule Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	4	21	25	2000	0	0	1	1
2001	0	43	628	671	2001	0	4	1	5
2002	1	28	60	89	2002	0	17	73	90
2003	0	195	8	203	2003	0	12	153	165
2004	1	100	14	115	2004	0	103	112	215
2005	2	55	0	57	2005	0	54	46	100
2006	5	51	1	57	2006	0	51	57	108
2007	25	56	0	81	2007	0	24	22	46
2008	13	14	1	28	2008	0	22	11	33
2009	15	38	4	57	2009	0	49	15	64
2010	6	8	3	17	2010	5	40	9	54
2011	3	7	2	12	2011	0	12	1	13
2012	15	47	5	67	2012	2	10	2	14
2013	10	23	4	37	2013	1	31	2	34
2014	17	57	8	82	2014	1	5	1	7
2015	5	37	5	47	2015	0	6	0	6
2016	8	31	11	50	2016	20	44	2	66
2017	2	73	5	80	2017	9	15	2	26
2018	4	84	9	97	2018	16	34	4	54
2019	1	41	1	43	2019	1	33	1	35
2020	0	13	0	13	2020	2	39	3	44
2021	2	109	3	114	2021	7	17	2	26
2022	0	55	3	58	2022	3	15	2	20
2023	0	50	2	52	2023	3	39	7	49
2024	1	110	3	114	2024	5	42	3	50

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 12 Tree Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	0	0	0	2000	1	1	0	2
2001	0	0	0	0	2001	0	0	0	0
2002	0	0	0	0	2002	0	0	0	0
2003	0	0	0	0	2003	0	0	0	0
2004	0	0	0	0	2004	0	2	0	2
2005	0	0	0	0	2005	0	3	0	3
2006	0	0	0	0	2006	0	5	1	6
2007	0	0	0	0	2007	0	1	0	1
2008	0	0	0	0	2008	0	0	0	0
2009	0	1	0	1	2009	0	2	0	2
2010	0	0	0	0	2010	0	0	1	1
2011	0	0	0	0	2011	0	2	1	3
2012	0	0	0	0	2012	0	0	1	1
2013	0	0	0	0	2013	0	2	0	2
2014	0	0	0	0	2014	0	2	1	3
2015	0	0	0	0	2015	0	4	0	4
2016	0	0	0	0	2016	0	2	0	2
2017	0	0	0	0	2017	0	3	1	4
2018	0	0	0	0	2018	0	0	1	1
2019	0	0	0	0	2019	0	1	0	1
2020	0	0	0	0	2020	0	1	0	1
2021	0	0	0	0	2021	0	1	0	1
2022	0	11	1	12	2022	0	0	1	1
2023	0	20	0	20	2023	0	1	0	1
2024	0	32	0	32	2024	0	0	0	0

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years

Plot 12 Propagule Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	0	1	0	1	2000	0	0	0	0
2001	0	0	0	0	2001	0	0	0	0
2002	0	3	0	3	2002	0	1	0	1
2003	0	0	0	0	2003	0	3	0	3
2004	0	0	0	0	2004	0	0	0	0
2005	0	0	0	0	2005	0	0	0	0
2006	0	0	0	0	2006	0	0	0	0
2007	0	0	0	0	2007	0	0	0	0
2008	0	0	0	0	2008	0	0	0	0
2009	0	1	0	1	2009	0	0	0	0
2010	0	2	0	2	2010	0	1	0	1
2011	0	0	0	0	2011	0	2	0	2
2012	0	1	0	1	2012	0	0	0	0
2013	0	0	0	0	2013	0	1	0	1
2014	0	0	0	0	2014	0	0	0	0
2015	1	0	0	1	2015	0	0	0	0
2016	0	11	0	11	2016	1	0	0	1
2017	0	29	0	29	2017	0	8	0	8
2018	1	156	0	157	2018	0	7	0	7
2019	0	516	1	517	2019	0	7	0	7
2020	2	375	1	378	2020	0	28	0	28
2021	2	440	4	446	2021	0	39	0	39
2022	0	303	5	308	2022	0	61	0	61
2023	1	261	14	276	2023	1	106	1	108
2024	1	229	8	238	2024	0	107	1	108

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years
ALL PLOTS Tree Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	-	-	-	-	1999	-	-	-	-
2000	2	1	15	18	2000	3	15	7	25
2001	5	4	158	167	2001	3	13	2	18
2002	2	1	496	499	2002	1	43	4	48
2003	16	12	188	216	2003	0	5	11	16
2004	10	10	59	79	2004	0	9	130	139
2005	6	7	17	30	2005	0	6	113	119
2006	17	8	19	44	2006	1	15	123	139
2007	30	32	46	108	2007	4	8	109	121
2008	32	39	101	172	2008	1	0	73	74
2009	39	65	181	285	2009	1	2	104	107
2010	9	60	92	161	2010	1	4	120	125
2011	12	40	87	139	2011	2	8	26	36
2012	21	60	65	146	2012	2	6	25	33
2013	7	44	40	91	2013	2	8	54	64
2014	10	59	30	99	2014	3	13	96	112
2015	15	47	38	100	2015	3	9	86	98
2016	5	35	10	50	2016	14	70	141	225
2017	6	16	14	36	2017	22	54	38	114
2018	3	18	6	27	2018	19	60	80	159
2019	1	16	6	23	2019	20	36	33	89
2020	2	31	12	45	2020	6	9	21	36
2021	2	44	25	71	2021	7	11	10	28
2022	3	72	28	103	2022	6	11	14	31
2023	5	84	7	96	2023	7	7	61	75
2024	6	94	6	106	2024	9	10	18	37

Table 4: Mangrove Tree And Propagule Recruitment And Mortality Over The Years
ALL PLOTS Propagule Recruitment and Mortality over the Years

	Recruitment					Mortality			
YEAR	B	R	W	Total	YEAR	B	R	W	Total
1999	0	0	0	0	1999	0	0	0	0
2000	19	205	77	301	2000	6	312	160	478
2001	69	662	3184	3915	2001	3	204	55	262
2002	47	203	206	456	2002	12	162	1169	1343
2003	57	410	41	508	2003	29	162	702	893
2004	54	312	54	420	2004	23	282	410	715
2005	54	243	38	335	2005	20	163	161	344
2006	57	357	120	534	2006	16	174	87	277
2007	107	712	297	1116	2007	9	87	43	139
2008	66	151	144	361	2008	14	125	27	166
2009	102	286	160	548	2009	33	220	42	295
2010	65	272	124	461	2010	30	234	38	302
2011	32	224	46	302	2011	32	264	51	347
2012	72	411	58	541	2012	38	158	58	254
2013	39	245	17	301	2013	43	269	113	425
2014	53	530	17	600	2014	21	235	75	331
2015	63	342	8	413	2015	25	325	60	410
2016	19	230	15	264	2016	180	880	48	1108
2017	11	494	8	513	2017	47	312	19	378
2018	11	608	11	630	2018	88	507	26	621
2019	10	1134	178	1322	2019	10	170	8	188
2020	5	641	127	773	2020	11	490	20	521
2021	6	1358	83	1447	2021	25	348	36	409
2022	2	854	51	907	2022	15	450	137	602
2023	4	977	19	1000	2023	22	763	181	966
2024	10	1309	34	1353	2024	20	488	7	515

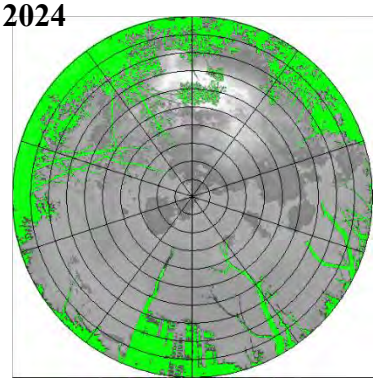
Table 5: Leaf Area Index (LAI) and Productivity (PAR) 2024

Plot	Longitude	Latitude	Altitude	Leaf Area Index	Mean Leaf Angle	Transmission Coefficient	Sunflecks	PAR
1	-8149.00	2614.01	-0.08	0.20	85.91	0.90	4.17	748.11
2	-8149.00	2614.00	0.14	1.31	85.64	0.42	0.00	61.92
3	-8147.98	2614.01	0.00	1.36	15.64	0.27	0.00	54.43
4	-8149.00	2613.01	0.00	2.68	9.55	0.10	0.00	57.46
5	-8149.00	2613.00	0.12	0.57	60.52	0.66	4.17	657.76
6	-8147.98	2613.00	0.02	0.11	80.69	0.92	8.33	381.82
7	-8149.00	2613.01	-0.02	1.20	31.03	0.34	0.00	189.25
8	-8149.00	2614.01	0.00	1.22	31.13	0.31	0.00	19.79
9	-8149.00	2614.02	0.00	1.75	16.84	0.20	0.00	20.70
10	-8149.00	2614.01	0.93	1.06	11.19	0.33	0.00	31.00
11	-8149.00	2614.01	0.00	1.78	17.45	0.18	0.00	22.18
12	-8147.98	2614.00	0.01	0.37	55.10	0.68	0.00	115.40
minimum				0.11	9.55	0.10	0.00	19.79
mean				1.21	31.08	0.34	0.00	59.69
max				2.68	85.91	0.92	8.33	748.11

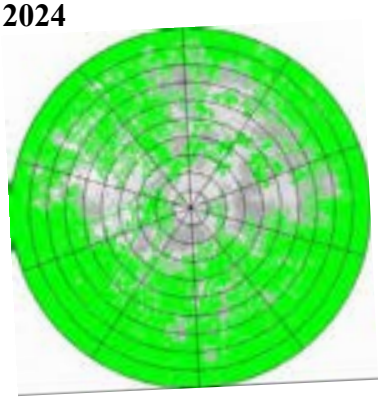
Table 6: Mortality 2024													
Tree Mortality Factor(s)	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**	**Plot 6**	**Plot 7**	**Plot 8**	**Plot 9**	**Plot 10**	**Plot 11**	**Plot 12**	**Total**
Hurricane(s) - Delayed Mortality & Infestation	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**3**
Hurricane(s) - Delayed Mortality	**0**	**0**	**0**	**0**	**0**	**4**	**1**	**2**	**0**	**0**	**1**	**0**	**8**
Hurricane & Competition	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
Hurricane & Inundation	**3**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**5**
Hurricane & Inundation & Competition	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**
Inundation	**4**	**4**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**1**	**0**	**12**
Inundation & Competition	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
Competition	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Anthropogenic Bank Erosion	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
Anthropogenic Contractors	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Infestation	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**
Natural exacebated by Hurricane(s)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**
Inundation & Competition & Anthropogenic	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
Total	**7**	**6**	**2**	**2**	**1**	**5**	**1**	**3**	**4**	**2**	**4**	**0**	**37**

Appendix A: Canopy Imagery

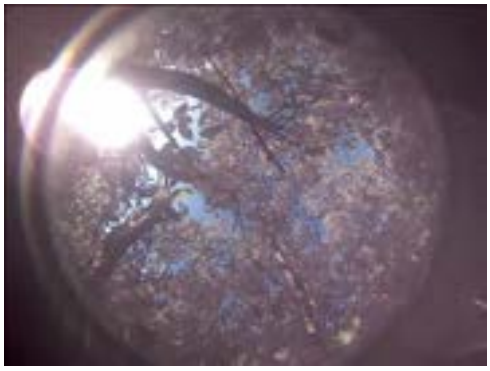
Plot 1 2024

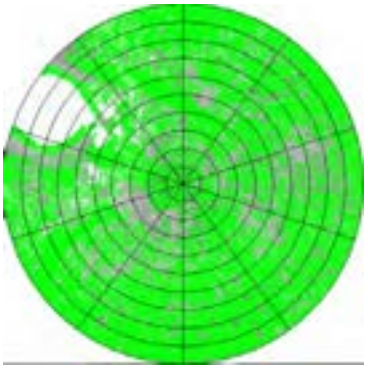


Plot 2 2024

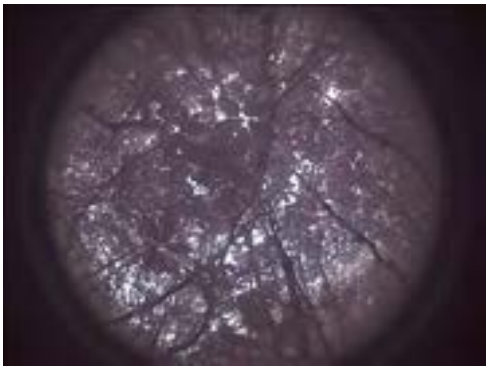


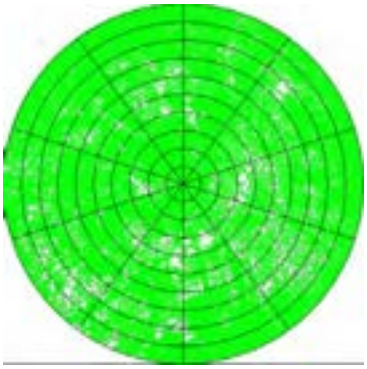
Plot 3 2024





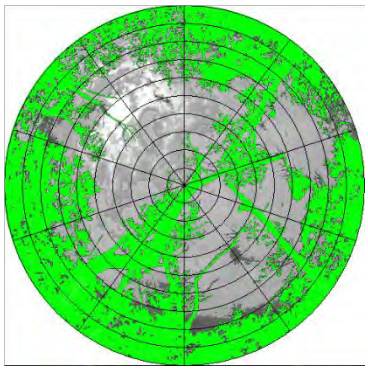
Plot 4 2024



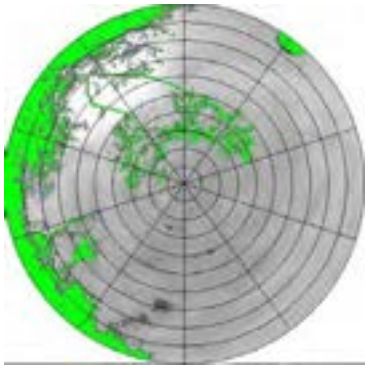


Appendix A: Canopy Imagery

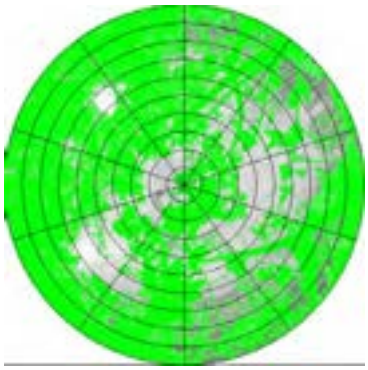
Plot 5 2024



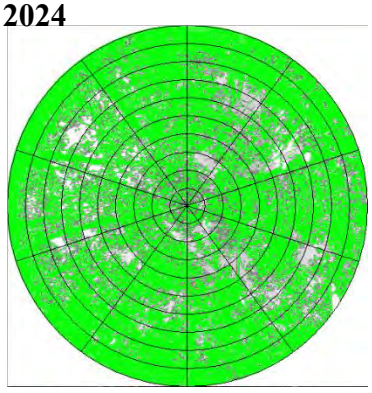
Plot 6 2024



Plot 7 2024

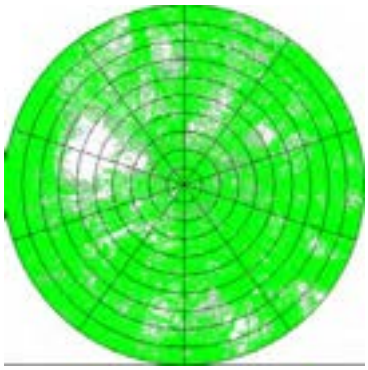


Plot 8 2024

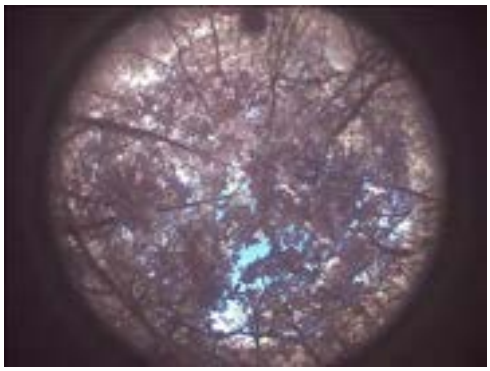


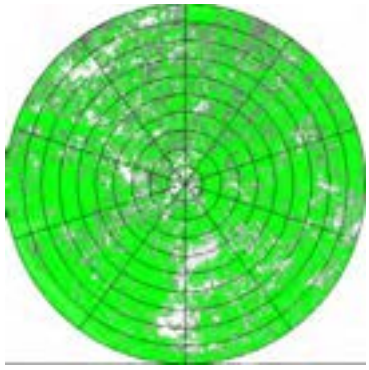
Appendix A: Canopy Imagery

Plot 9 2024

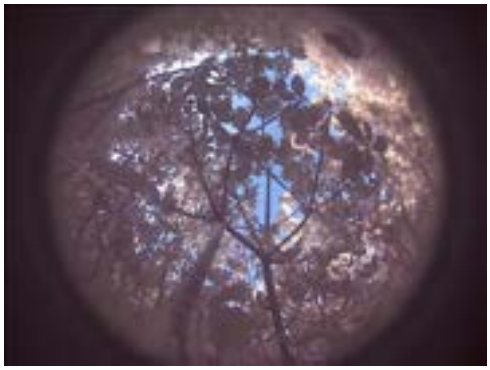


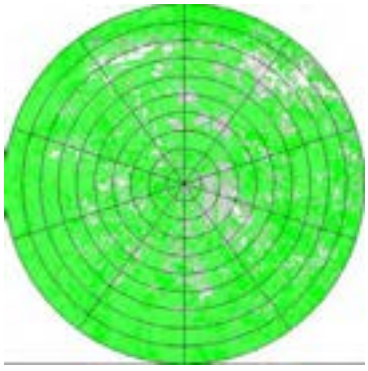
Plot 10 2024



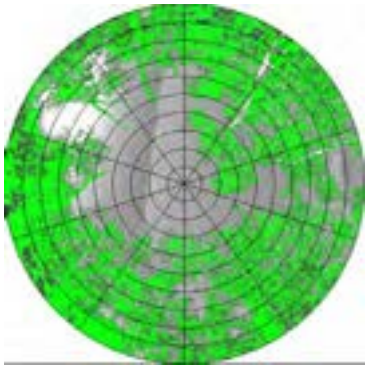


Plot 11 2024





Plot 12 2024



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