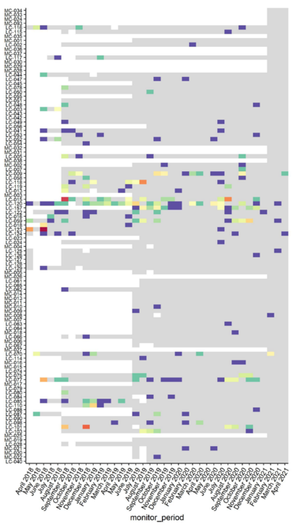
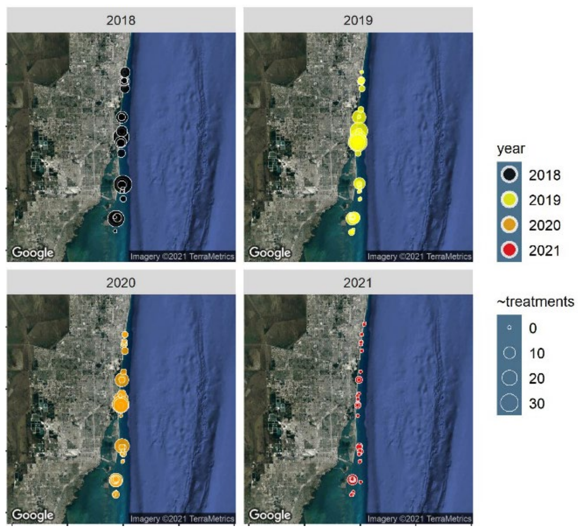
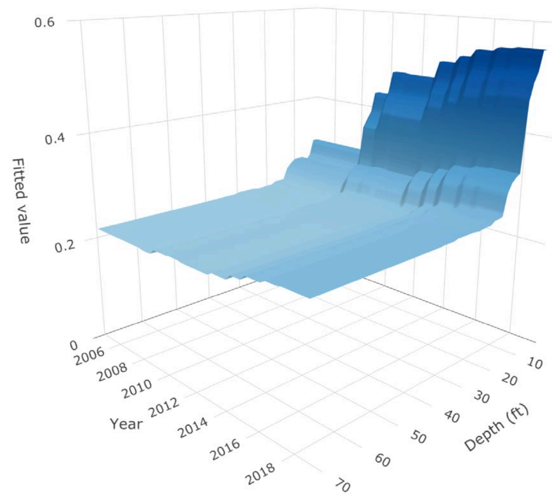
2020-2021
Southeast Florida Coral Reef Ecosystem Conservation Area (Coral ECA) Reef-building Coral Disease Intervention, Statistical Modelling, and Preparation for Restoration

Task 6 Final Report: Environmental drivers of stony coral tissue loss disease







Florida Department of Environmental Protection
Office of Resilience and Coastal Protection

2020-2021 Coral ECA Reef-building Coral Disease Intervention, Statistical Modelling, and Preparation for Restoration

Task 6 Final Report: Environmental drivers of stony coral tissue loss disease

Final Report

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Acknowledgements

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List of Acronyms

AIC	Akaike Information Criterion
AUC	Area under the curve
BRT	Boosted Regression Tree
C-CAP	NOAA Coastal Change Analysis Program
DRM	Disturbance Response Monitoring program
DSD	Dark spot disease
FCR	Florida's Coral Reef
DEP	Florida Department of Environmental Protection
FRRP	Florida Reef Resilience Program
FWC	Florida Fish and Wildlife Conservation Commission
ICA	Inlet Contributing Area
NOAA	National Oceanic and Atmospheric Administration
NSU	Nova Southeastern University
ORCP	Office of Resilience and Coastal Protection
SCTLD	Stony Coral Tissue Loss Disease
SD	Standard deviation
Coral ECA	Southeast Florida Coral Reef Ecosystem Conservation Area
TLD	Tissue loss disease
TNC	The Nature Conservancy

EXECUTIVE SUMMARY

Stony Coral Tissue Loss Disease (SCTLD) was first discovered in the Southeast Florida Coral Reef Ecosystem Conservation Area (Coral ECA) in 2014 and has had a devastating impact on the coral communities throughout the region. Successful disease interventions north of Biscayne National Park have kept corals alive providing a unique opportunity to examine the patterns of novel infection (disease incidence) over time and space. New infections varied over time, with total infections higher during June – October; the warmest, wettest time of year. New infections were not consistent between corals of the same species. Some were highly infected and unresponsive to treatments. Some exhibited high numbers of infections every month. Some exhibited low infections intermittently. Some only needed one treatment and some were never infected. There was some evidence that corals in closer proximity to each other showed more similar patterns of infection over time, suggesting possible links to drivers of disease that may be spatially clustered. This report describes an effort to test whether there are predictable patterns of SCTLD incidence within a population of *Orbicella* spp. that relate to gradients in abiotic environmental and human drivers within the Coral ECA (Part I). We also test whether there are similar correlates of Dark Spot Disease (DSD) and Tissue Loss Disease (TLD) at much broader spatial scales over several hundred km. Data sources for tests included disease monitoring data collected yearly from 2005 to 2019 as part of the Florida Reef Resilience Program's (FRRP) Disturbance Response Monitoring program (DRM, Part II).

Within the ECA (Part I), we synthesized a number of predictor variables that we hypothesized could be linked to SCTLD incidence. These included several biological characteristics of the corals (e.g., width of colony, height of colony, proportion of live tissue), abiotic environmental drivers (e.g., depth, seawater temperature, seawater nutrient concentrations) and human drivers (e.g., density of septic tanks as a proxy for human coastal development), outflow from the Inlet Contributing Areas (ICA), and distance to offshore outfall locations). We calculated colony-specific (n=51) estimates of these predictor variables and built two statistical models to test their ability to explain spatial and temporal patterns in SCTLD infections. Overall, our models showed that spatial variations in SCTLD infection are best explained by a positive relationship with the number of septic tanks within a 21km radius, with a noticeable increase in infections occurring beyond ~7000 tanks. This suggests some link between SCTLD infection levels and potential pollutants or pathogens associated with the presence of septic tanks and other waste-water infrastructure. Over time, our models showed that SCTLD infection levels were best explained by the flow rate from the nearest Inlet Contributing Area (ICA) to the reef over the previous 7 days, suggesting that the amount of water flowing out of the inlets effects the amount of disease on the reef. These results indicate that a spatial link exists between southeast Florida coastal urbanized waterways and the condition of corals on the reef. The nature and extent of these links warrant urgent and immediate further investigation.

Throughout Florida's Coral Reef (Part II), we synthesized several human predictor variables hypothesized to be linked to spatial variations in dark spot disease (DSD) and tissue loss disease (TLD) prevalence. These predictors were identified through discussions across the project research team and partly informed by our findings from Project Part I and were: 1) The Nature Conservancy (TNC) – Ocean Wealth (as a proxy of reef "use" by people), 2) Wastewater, 3) Septic Tanks, 4) Land Use, 5) Water Quality, and 6) Human Population Density. These data were quantified using a range of metrics and across a range of scales and combined with depth, coral host abundance, survey year (to account for the temporal nature of the disease data), and a range of metrics to capture habitat types, resulting in 109 predictor variables in total. We built statistical models using a boosted regression tree (BRT) framework to test the ability of

our predictors to explain variation in disease ‘hotspots’ (areas of unusually high disease occurrence) and the number of diseased coral hosts at 2,508 sites for DSD and 2643 sites for TLD.

Along Florida’s Coral Reef, our models explained ~64% of the underlying variation in the number of **DSD cases**. The number of DSD **cases** increased as both surface water silica concentration and coral host abundance increased, and became maximized where silica exceeded 1.15 uM/L and where there were >100 coral hosts. Silica in coastal waters is often used as a proxy for land-based run-off and this correlation with DSD warrants further investigation. DSD prevalence was higher in areas with >$13x10^6$ m^2 septic area within 8km regardless of coral host abundance, but cases were highest where this coincided with >100 coral hosts. The models explained ~40% of the underlying variation in **DSD hotspot** occurrence using 13 predictors. DSD hotspot occurrence was notably higher in areas of aggregate reef, where there was mud with infrequent (<10%) live coral cover, pavement, and shallow sandy areas (i.e., areas of overall poor habitat quality). DSD hotspot occurrence was also higher in shallower waters, especially less than 20 ft depth, regardless of habitat type. In contrast, our ability to predict spatial variations in **TLD cases** was less than half that as for DSD. Variations in TLD cases were driven by variations in habitat type, were higher in survey years beyond 2015, and where there were higher numbers of susceptible coral hosts. There were no meaningful predictors of spatial variations in **TLD hotspots.** It is possible that the annual movement of SCTLD across the reef confounded the TLD relationships and more investigation is needed to tease this out.

These investigations showed that coastal urbanization and water management influence the number of coral disease lesions on Florida’s Coral Reef at both large (100s km, across years) and small (within the ECA, across months) spatiotemporal scales. The strength of these relationships is concerning and intriguing and highlights the need for further research. In particular, predicting SCTLD patterns within the ECA (Part 1) could be greatly enhanced by: extending the timeline of the monitoring data (data presently exist); expanding the number of spatial scales over which we quantify the predictors; and, including additional predictor variables that capture a greater range of coastal human impacts to reefs (e.g., major sewage outbreaks, rainfall and coastal runoff). There is also a need to consider more detailed host-specific factors within the coral holobiont that might influence a particular colony’s ability to resist SCTLD. Identifying these biological factors and investigating how they interact in our models with abiotic environmental drivers may increase our ability to explain patterns of SCTLD within the ECA. These outcomes could identify the causative factors of increased coral disease and lead to effective management actions that reduce coral disease incidence and generally benefit coral health.

BACKGROUND

In 2019-20, DEP funded NSU (PO# B558F2) to continue previous coral disease interventions with the expectation of adapting to new methodologies to improve intervention success in the Southeast Florida Coral Reef Ecosystem Conservation Area (Coral ECA). These actions included increasing the monitoring and continued treatment of the priority large corals to 90 corals, conducting broadscale strike team reconnaissance and disease interventions, further testing of permitted intervention techniques and materials, and the identification of unique coral disease survivor sites. This information provided data on treatment effectiveness (i.e. which treatment saved the largest large colonies from extreme tissue loss); initiated probiotics testing; provided data on tissue loss rates, survivor sites, new infection rates through time, and classifying large corals into categories based on infection rates for future hypothesis testing.

In August 2020, DEP funded NSU (PO# B7B6F3) to continue the previous tasks and include additional components using advanced statistical modeling approaches to analyze data and identify possible environmental correlates to the previously observed new infection patterns and hot spot coral disease clustering throughout Florida's Coral Reef (Task 6). NSU contracted SymbioSeas and collaborated with Gareth J. Williams, Dr. Greta Aeby and Dave Whitall to help with the statistical modeling.

This project used state-of-art statistical analyses to model the abiotic environmental and human drivers of stony coral tissue loss disease (SCTLD) in the Coral ECA and Dark Spot Syndrome (DSD) and Tissue Loss Disease (TLD) in the Coral ECA and Florida Keys. Project Part I modeled the spatial and temporal drivers of SCTLD incidence (the occurrence of novel infections over time) on 51 monitored corals in the Coral ECA. Project Part II modeled the spatial variation in DSD and TLD disease 'hotspots' (areas of unusually high disease occurrence) and the number of diseased colonies across over 2000 sites along SE FL and the FL Keys. First, we report the methods and results of Part I by task objectives. Objective 1 reports on the data spatial processing of monitored corals and environmental predictors. Objective 2 reports on modeling the environmental and human drivers of DSD and TLD disease hotspots and number of disease cases. Then, we report the methods and results of Part II by task objectives: Objective 3 – Predictor variable synthesis and Objective 4 – Modeling drivers of regional disease hotspots.

1. PART I – MODEL TEMPORAL AND SPATIAL DRIVERS OF LARGE CORAL LESIONS

1.1. **Objective 1: Data processing of monitored corals and environmental/human predictors.**

To understand coral disease dynamics on reefs requires detailed information on the occurrence of novel disease cases in the population (disease incidence) (Work et al. 2008; Williams et al. 2010b). Here we used an unprecedented *in situ* monitoring data set of 51 of the 90 priority corals (*Orbicella* spp.) in the Coral ECA that were consistently visited monthly from September 2018 to April 2020 to record the occurrence of new SCTLD lesions. These monitoring efforts give us a measure of disease incidence through time that we could relate to colony-specific attributes (e.g., colony size, colony estimated live tissue) and concurrent spatial gradients in suspected environmental drivers of disease occurrence. Coral disease dynamics are often intricately linked to surrounding environmental conditions that can increase host susceptibility and pathogen virulence and in doing so drive patterns of disease prevalence and incidence across the seascape (Williams et al. 2010, Maynard et al. 2015, Aeby et al. 2020). Here we synthesized a number of data layers of suspected environmental drivers (both abiotic and human) of SCTLD dynamics over different spatial and temporal scales from a number of different sources, including *in situ* oceanographic data (e.g., seawater temperature and nutrient concentrations) and online data repositories, including flow data from the South Florida Water Management District (DBHYDRO), and estimates of human stressors associated with coastal development from Southeast Florida Coral Reef Initiative's (SEFCRI) Our Florida Reefs (OFR) marine planner. We also looked into the possibility of using satellite-derived data for estimates of water quality (chlorophyll-a from MODIS) and sea-surface temperature (from Pathfinder).

1.1.1. *Objective 1.1*

1.1.1.1. Results

There appeared to be a temporal signal in the number of novel SCTLD lesions developing on the monitored large corals (n=51) over time, with three distinct periods of higher disease levels in September 2018, December to January 2019, and June 2019 to August 2019 (Figure 1). Several colonies (n=18) experienced no SCTLD lesion development over the timeseries, leading to a highly zero-inflated data set. When examined as a total number of novel lesions across all corals, this temporal pattern was clearer (Figure 2).

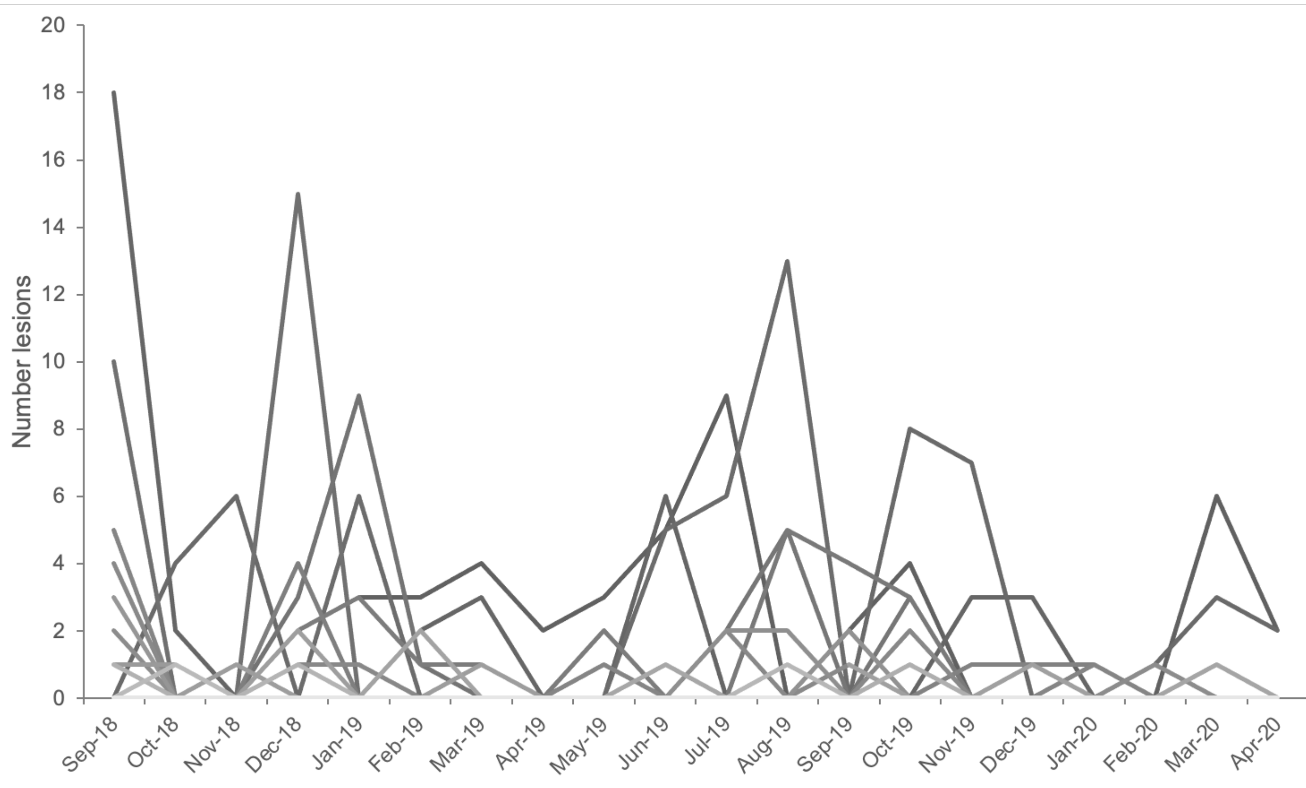

Figure 1. SCTLD disease incidence (number of novel SCTLD lesions over time) on 51 large corals monitored monthly from September 2018 to April 2020 (each line represents a different coral). Some corals (n=18) did not experience any lesion development over the timeseries.

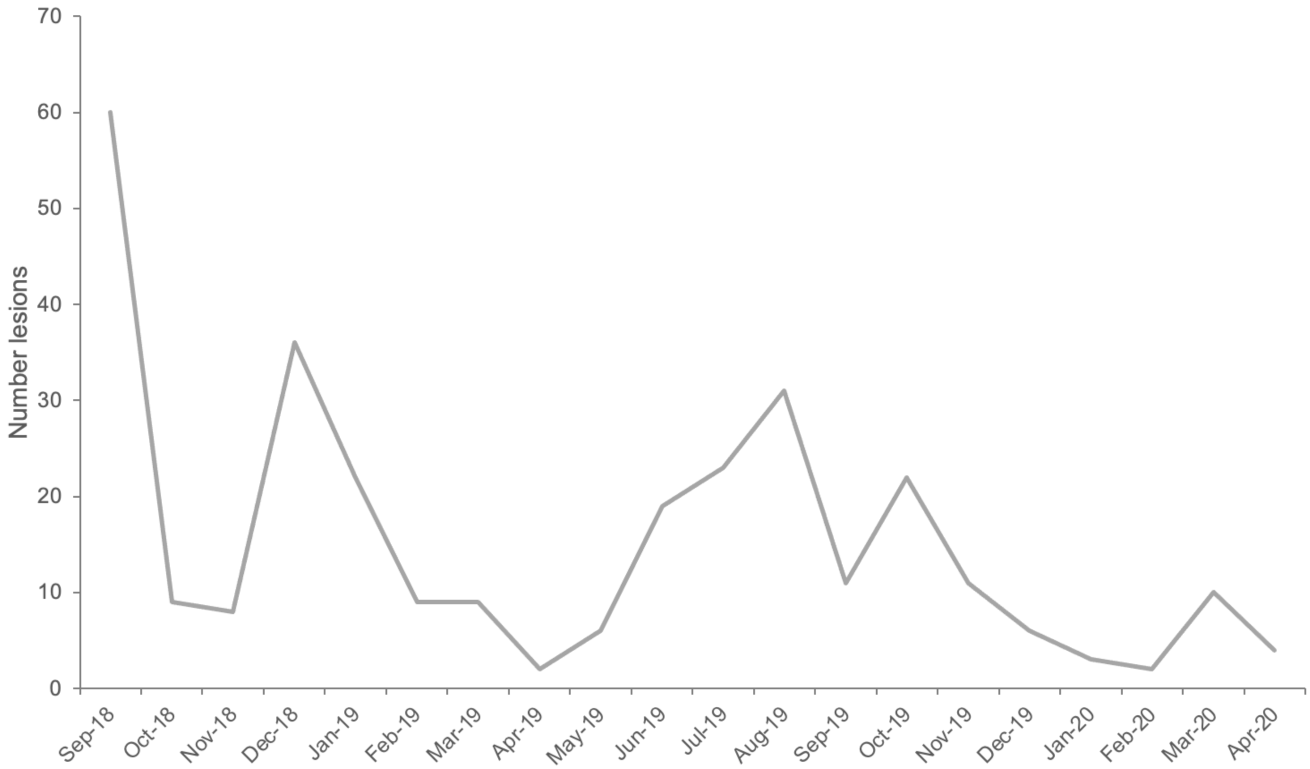

Figure 2. SCTLD disease incidence (number of novel SCTLD lesions over time) across 51 large corals monitored monthly from September 2018 to April 2020 (shown as a total of all lesions across all corals). Some corals (n=18) did not experience any lesion development over the timeseries.

1.1.2. Objective 1.2 – SECREMP in situ seawater temperature

1.1.2.1. Methodology

Subtle *in situ* variations in seawater temperature can have profound effects on the ecology of coral reef communities (Sheppard 2003; Williams et al. 2010a) including coral disease dynamics (Ben-Haim et al. 2003; Ward et al. 2007; Heron et al. 2012). In particular, periods of extreme high temperatures have been linked to increased prevalence and incidence of coral diseases on reefs (Bruno et al. 2007; McClanahan et al. 2009; Williams et al. 2011). Here we quantified background variations in *in situ* variations in seawater temperature within the vicinity of our 51 monitored large corals using four HOBO© Pro temperature loggers deployed for the Southeast Florida Coral Reef Evaluation and Monitoring Project (SECREMP) with 2-hr temporal sampling resolution. The HOBO loggers covered a total period of August 2017 to September 2020, but there were discrepancies in temporal coverage between loggers (DC1 covered August 2017 – July 2018, DC6 covered August 2017 – August 2018, DC8 covered August 2019 to July 2020, and BC1 covered March 2019 – September 2020). Because of this, and the consistency in temperature temporal patterns between loggers, we treated the set of four loggers as one sampling unit.

First, each HOBO logger was spatially joined to the nearest large coral location. We then extracted the seasonal mean and standard deviation (SD) for summer (July 1st – September 31st) from each HOBO timeseries and from this calculated the number of anomalously high temperature events using the "Hot Snap" metric, defined as any temperature event that exceeded 1SD of the long-term seasonal mean (Heron et al. 2010). We used a "period of accumulation" (*sensu* Heron et al. 2010) of 3, 7, 30, and 90 days, meaning that for each monthly coral survey across our disease survey timeline (September 2018 to April 2020), we calculated the number of Hot Snaps over the previous 3, 7, 30, and 90 days. We then multiplied this summed number of Hot Snap events by two to estimate the number of exposure hours (due to the 2-hr sampling resolution of the loggers, i.e., one event equaled two hours, two events equaled 4 hours and so on) (Table 1).

1.1.2.2. Results

There was clear temporal variation in the number of *in situ* Hot Snap exposure hours across our disease survey period from September 2018 to April 2020, with the number of hours generally higher from July to October in both 2018 and 2019. Across the entire disease survey period, the number of *in situ* Hot Snap exposure hours for any individual three-month period prior to the monthly disease surveys ranged from 0 to 522, while mean temperatures ranged from 23.87 to 30.42 °C, with a standard deviation of 0.41 to 1.91 °C and a maximum temperature ranging from 25.87 to 32.25 °C (Appendix 1).

Table 1. Example summed number of Hot Snap events (expressed as total exposure hours) for one of our 51 monitored large corals (LC-120) across the three months prior to each disease survey date from September 2018 to April 2020. Also given is the mean, standard deviation (1SD) and maximum temperature (°C) experienced over the three-month period prior to each disease survey date. Hot Snap values for each monitored large coral (n=51) can be found in Appendix 1. Survey date is day/month/year.

Coral	Survey date	HOBO	Hot Snap	mean_temp	sd_temp	max_temp
LC-120	09/08/2018	DC6	85	28.518	1.774	31.306
LC-120	13/09/2018	DC6	94	29.750	0.597	31.306
LC-120	08/11/2018	DC6	50	29.083	1.139	30.950
LC-120	18/12/2018	DC6	31	27.335	1.791	30.950
LC-120	15/01/2019	DC6	0	25.713	1.566	29.190
LC-120	19/02/2019	DC6	0	24.122	1.135	26.842
LC-120	21/03/2019	DC6	0	24.147	1.096	26.353
LC-120	11/04/2019	DC6	0	24.361	1.153	26.353
LC-120	21/05/2019	DC6	0	25.814	0.945	28.048
LC-120	14/06/2019	DC6	0	26.567	1.347	29.941
LC-120	16/07/2019	DC6	2	27.925	1.266	30.545
LC-120	16/08/2019	DC6	105	29.120	1.058	31.052
LC-120	24/09/2019	DC6	167	29.806	0.648	31.128
LC-120	21/10/2019	DC6	160	29.468	0.859	31.128
LC-120	12/11/2019	DC6	91	29.109	0.884	31.128
LC-120	04/12/2019	DC6	0	28.094	1.349	30.343
LC-120	07/01/2020	DC6	0	26.575	1.779	29.540
LC-120	20/02/2020	DC6	0	24.506	0.991	26.744
LC-120	06/03/2020	DC6	0	24.158	0.853	26.182
LC-120	16/04/2020	DC6	0	24.550	1.060	27.235

1.1.3. Objective 1.3 – Satellite-derived ocean color using MODIS

1.1.3.1. Methodology

Satellite-derived data can provide useful proxies for *in situ* environmental parameters in the ocean. For example, chlorophyll-a can serve as a useful proxy of phytoplankton biomass in ocean surface waters (Gove et al. 2013) and down through the photic zone (Gove et al. 2016) that are reflective of increased nutrient concentrations. Chlorophyll-a can be estimated using ocean surface color using NASA's Moderate Resolution Imaging Spectroradiometer (MODIS), however these data are confounded by nearshore shallow-water phenomena like sand reflectance and albedo effects (Gove et al. 2013). Furthermore, MODIS imagery estimates near-surface ocean color and can therefore miss the impact of suspended sediment settling out, or it can overestimate poor water quality due to continued suspension of fine sediments that never actually settle out on to the reef.

1.1.3.2. Results

Having assessed the MODIS imagery for the Coral ECA, we decided the data were not of sufficient quality to estimate water quality experienced by our individual monitored corals due primarily to the spatial mismatch between the satellite images (4 km spatial resolution) and the spatial autocorrelation present within our coral disease data set (~250 m, see Objective 1.7). In short, multiple corals that showed different disease incidence patterns would fall within the same 4 km pixel and thus be attributed the same chlorophyll-a value making any discernible pattern between SCTLD incidence and chlorophyll-a within a statistical model obsolete. This, on top of the nearshore issues of pixel contamination, meant we did not pursue this further and concluded MODIS data were not appropriate in this case.

1.1.4. Objective 1.4 – In situ seawater nutrient concentrations and water quality

1.1.4.1. Methodology

Increased nutrient concentrations in seawater can increase coral disease prevalence and severity within coral populations (Bruno et al. 2003; Voss and Richardson 2006). Here we quantified spatial variations in various *in situ* nutrient parameters from multi-year NOAA/FDEP water sampling stations in the Coral ECA and linked these measurements to our 51 monitored large corals (each large coral was spatially joined to the nearest five water sampling stations) (Figure 3). We quantified several analytes hypothesized to be linked to SCTLD dynamics (phosphate, nitrate, total nitrogen, total suspended solids) over four temporal windows: 3, 7, 30 and 90 days prior to each disease survey to match the periods of accumulation for our estimates of *in situ* seawater temperature stress (Table 2). After discussions across the research team, we decided to focus on measures of total nitrogen and total suspended solids due to their known links to coral disease dynamics on reefs (Bruno et al. 2003, Pollock et al. 2014). Upon examination of the data outputs, the 3- and 7-day temporal windows yielded too many missing data points and so only the 30 and 90 data temporal windows were included in subsequent analyses.

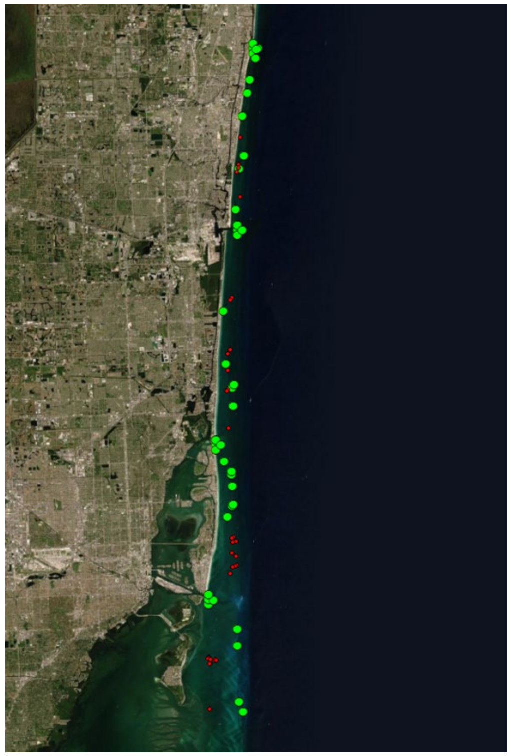

Figure 3. Location of our 51 monitored large corals (red dots) and NOAA/DEP water sampling stations (green dots) across our survey area. Each large coral was spatially joined to the nearest five water sampling stations.

Table 2. Example *in situ* total nitrogen (TotalN, mg/L) and total suspended solids (TSS, mg/L) for one of our 51 monitored large corals (LC-120) for the 90 days prior to each disease survey date. SD, standard deviation. Count, number of replicates. Survey date is day/month/year.

Coral	AssessDate	TotalN_Mean	TotalN_SD	TotalN_Count	TSS_Mean	TSS_SD	TSS_Count
LC-120	16/04/2020	0.013400	0.007369	5	1.842917	1.315886	12
LC-120	06/03/2020	0.011571	0.006803	7	1.547308	1.077386	13
LC-120	26/04/2018	0.035500	0.026823	6	5.144000	6.514281	10
LC-120	20/02/2020	0.019545	0.017201	11	1.682308	1.144184	13
LC-120	21/06/2018	0.024286	0.013768	7	2.812143	2.308936	14
LC-120	08/05/2018	0.036286	0.024574	7	4.767273	6.305032	11
LC-120	24/05/2018	0.033500	0.024077	8	4.255769	5.919514	13
LC-120	11/06/2018	0.023500	0.014910	6	2.159091	1.940145	11
LC-120	18/12/2018	0.027364	0.025252	11	3.531765	3.239434	17
LC-120	15/01/2019	0.020091	0.019751	11	3.289118	3.284299	17
LC-120	19/02/2019	0.019556	0.020026	9	2.599615	3.379516	13
LC-120	21/03/2019	0.022286	0.014986	7	2.354167	1.754762	12
LC-120	11/04/2019	0.023111	0.019199	9	1.885000	1.689527	12
LC-120	21/05/2019	0.025000	0.019140	13	1.616429	1.726205	14
LC-120	14/06/2019	0.024813	0.016249	16	1.125000	1.105527	17
LC-120	16/07/2019	0.025333	0.019218	12	1.354167	0.965653	12
LC-120	16/08/2019	0.025300	0.020050	10	1.462000	1.028819	10
LC-120	24/09/2019	0.021200	0.028235	5	2.110556	1.491435	9
LC-120	21/10/2019	0.028000	0.017588	7	1.834167	1.679862	12
LC-120	12/11/2019	0.028000	0.017588	7	1.834167	1.679862	12
LC-120	04/12/2019	0.026500	0.017138	12	1.625357	1.465404	14
LC-120	07/01/2020	0.028273	0.020090	11	1.624583	1.182496	12
LC-120	16/07/2018	0.026500	0.013693	6	2.536071	2.021102	14
LC-120	27/07/2018	0.026500	0.013693	6	2.536071	2.021102	14
LC-120	09/08/2018	0.021833	0.012481	6	2.625333	2.021559	15
LC-120	09/07/2018	0.024286	0.013768	7	3.125000	2.165498	13
LC-120	08/11/2018	0.034455	0.031614	11	3.657667	2.187122	15
LC-120	13/09/2018	0.029375	0.034801	8	2.394231	1.779958	13

1.1.5. Objective 1.5 – Satellite-derived sea-surface temperature (SST) using Pathfinder

After examining the spatial spread of our 51 monitored large corals and the extent of spatial clustering between them, we decided that 5-km resolution Pathfinder data would not be suitable for this Part I analysis due to the fact that: 1) multiple corals would receive the same Pathfinder pixel (and thus same SST values) and 2) that the *in situ* HOBO temperature data (Objective 1.2) was of superior quality for our disease incidence modeling.

1.1.6. Objective 1.6 – additional host-specific, environmental, and human impact variables

1.1.6.1. Methodology

We synthesized a number of predictors identified as suspected drivers of SCTLD disease incidence on the 51 monitored large corals over time. These included depth, colony-specific morphometrics (planar length, planar width, planar height, linear length, linear width, colony surface area, estimated live tissue surface area), and human drivers associated with water nutrient pollution (DBHYDRO flow data, distance to septic tanks, distance to each outfall location).

DBHYDRO flow data:

We quantified a proxy for nutrient exposure to the 51 monitored large corals using the South Florida Water Management District's DBHYDRO database (https://www.sfwmd.gov/science-data/dbhydro). This environmental database stores hydrologic, meteorologic, hydrogeologic and water quality data and is the source of historical and up-to-date environmental data for the 16-county region covered by the District. Using this database, we generated estimates of water flow from individual Inlet Contributing Areas (ICA) to the corals as a proxy for exposure to land-based sources of nutrients and pollutants. Previous analyses by NOAA show there to be a correlation between *in situ* water nutrient concentrations and flow data from the DBHYDRO database (Whitall et al. 2019). To generate colony-specific estimates of flow, we followed the following workflow:

1. Initial station search using the following search parameters:
   v_procedure|show_dbkey_info.web_qry_form|
   v_category|SW|
   v_js_flag|Y|
   v_paramStr|data_type/frequency/statistic_type/agency/active_dbkeys|
   v_data_type|FLOW|
   v_frequency|DA|
   v_statistic_type|MEAN|
   v_agency||
   v_active_dbkeys|Y|

   This gave a total returned rows of 1360.

2. Spatial join to ICAs, using a nearest neighbor approach (Figure 4, polygons are the ICAs that were joined to the green coral locations. The red dots are the DBHYDRO monitoring stations that were joined to each ICA).

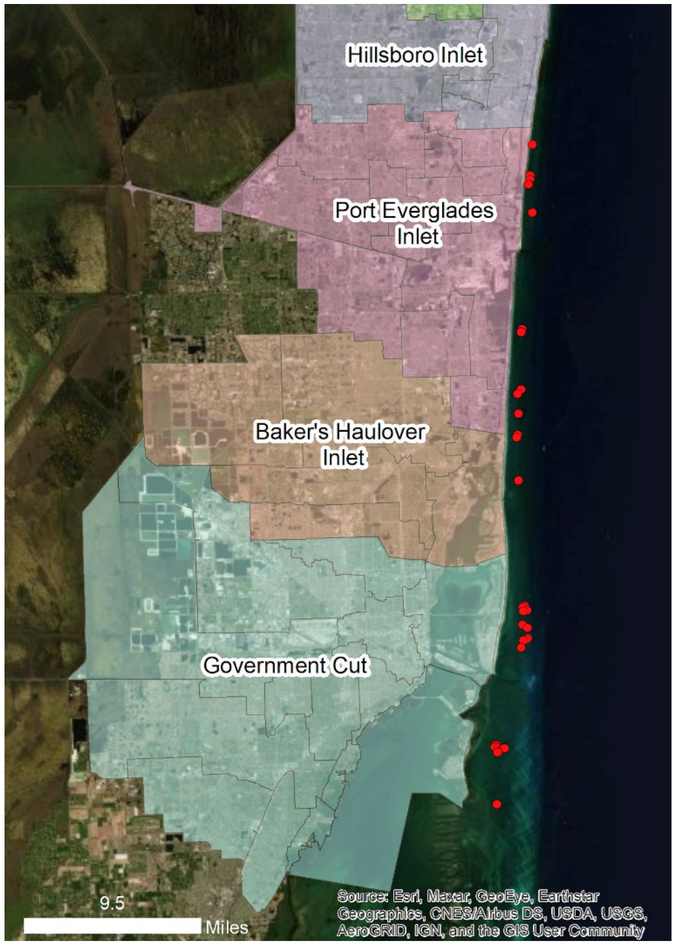

Figure 4. Inlet Contributing Area (ICA) polygons, DBHYDRO monitoring stations (red dots) and the 51 monitored large corals (green dots).

3. Remove points >79m (260 ft) from the ICAs due to the fact that some points are directly on the polygons and not picked up by our initial spatial join. This resulted in 160 remaining stations.

4. Removed points that ended before 2020, leaving a total of 105 remaining stations.

5. For each station we downloaded the flow data and used a custom-written R script to extract and sum each station for each date and ICA (Appendix 2). We did this for 4 temporal windows prior to the iterative survey dates for each individual coral (3, 7, 30 and 90 days). For an example, see Table 4.

Distance to each outfall location and septic tank densities:

We measured the linear distance (km) from each monitored large coral (n=51) to each outfall pipe (BAK030, PEV050, HIL060, BOC080, GOC014) location using a simple spatial join. The number of septic tanks were enumerated within a series of expanding radial buffers from each coral that followed a Fibonacci sequence: 1, 2, 3, 5, 8, 13, and 21 km (Figure 5).

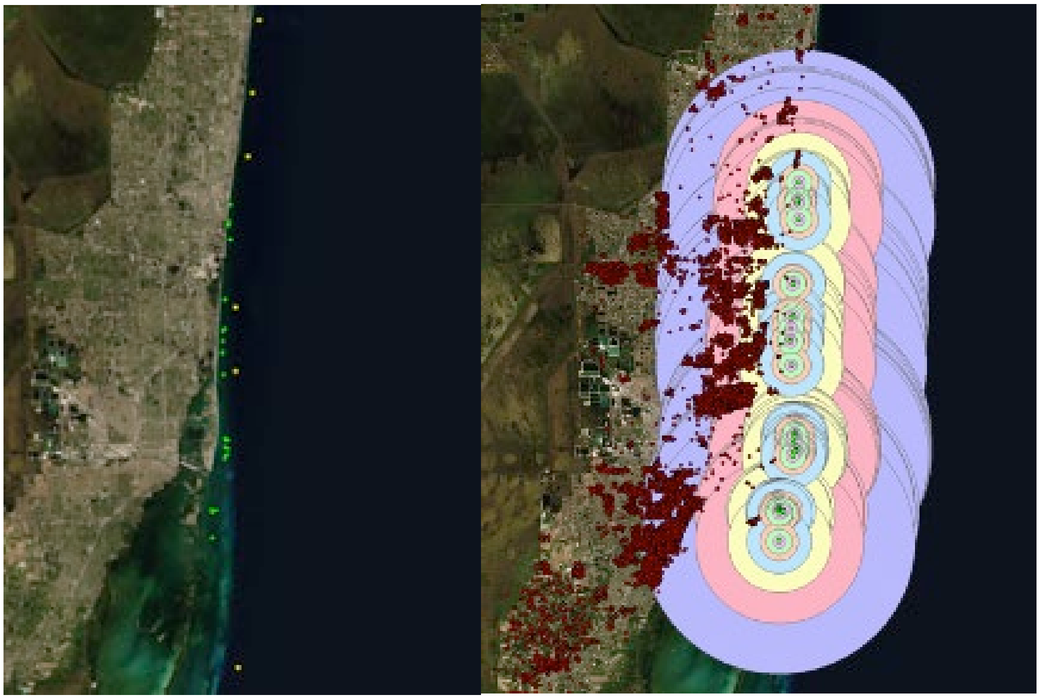

Figure 5. Left: Location of outfalls (yellow dots) and the 51 monitored large corals (green dots). Right: Radial buffer method to link each of the 51 monitored large corals (green dots) to the number of septic tanks (red dots) in the vicinity.

1.1.6.2. Results

Depth and colony morphometrics:

Depth of the colonies ranged from 5.2 m to 9.1 m. Planar length of the colonies ranged from 180 cm to 460 cm, planar width from 120 cm to 445 cm, planar height from 50 cm to 255 cm, linear length from 175 cm to 660 cm, and linear width from 140 cm to 575 cm. The surface area of the colonies ranged 28,701 cm^2 to 249,555 cm^2, the proportion of live coral ranged from 0.1 to 1.0, and the estimated live tissue coverage of the colonies ranged from 14,268 cm^2 to 201,244 cm^2 (Table 3).

DBHYDRO flow, distance to outfall locations, and septic tank densities

Flow data were highly variable through time. For example, the estimated flow of the ICA linked to LC-002 (in cubic feet per second) ranged from 0 to 4498 (3 days prior to survey date), 0 to 8926 (7 days), 366 to 34501 (30 days) and 4463 to 96280 (90 days) from September 2018 to April 2020. Similarly, the estimated flow of the ICA linked to LC-003 (in cubic feet per second) ranged from 0 to 4498 (3 days prior to survey date), 0 to 8478 (7 days), 366 to 33789 (30 days) and 4463 to 96774 (90 days) from September 2018 to April 2020 (Table 4). For flow data for each individual large coral over the timeseries please see Appendix 3. Across the 51 colonies, the distance to each outfall pipe varied by 10s km (Table 5), and the number of septic tanks ranged from 5632 to 10247 (21 km radius), 108 to 5732 (13 km radius), 7 to 1439 (8 km radius), 0 to 244 (5 km radius), 0 to 62 (3 km radius), 0 to 3 (2 km radius), and no tanks were observed within 1 km radius of any colony (Table 6).

Table 3. Summary of colony-specific morphometrics measured in April 2020 for 51 monitored large corals (*Orbicella* spp.) in the Coral ECA.

	Depth (m)	Planar Length (cm)	Planar Width (cm)	Planar Height (cm)	Linear Length (cm)	Linear Width (cm)	Surface Area of Coral (cm2)	Proportion Live Coral	Estimated Live Tissue (cm2)
LC-120	6.1	405	360	160	380	290	205082.4	0.14	28711.5
LC-015	6.7	300	270	140	480	475	126048.9	0.15	18907.3
LC-009	7.0	430	335	210	605	575	244637.7	0.30	73391.3
LC-118	8.2	273	265	75	175	150	82174.9	0.45	36978.7
LC-101	6.1	295	240	130	400	320	110135.7	0.55	60574.6
LC-110	6.1	220	170	90	300	260	56533.4	0.40	22613.4
LC-059	7.0	330	230	100	420	330	99559.0	0.45	44801.5
LC-103	6.1	300	210	140	400	330	108579.5	0.35	38002.8
LC-085	6.1	350	250	180	490	440	160329.0	0.30	48098.7
LC-119	8.2	350	235	70	175	150	89502.8	0.19	17005.5
LC-077	6.1	215	210	160	420	400	95773.3	0.39	37351.6
LC-013	7.3	360	300	180	540	530	181376.1	0.66	119708.2
LC-122	6.1	320	270	115	210	190	116917.3	0.60	70150.4
LC-005	6.7	280	265	130	445	420	113077.9	0.55	62192.8
LC-047	5.8	220	180	85	310	265	56533.4	0.93	52576.1
LC-075	6.1	340	200	140	455	290	116482.9	0.20	23296.6
LC-054	5.8	210	195	105	300	275	65998.0	0.70	46198.6
LC-078	5.8	215	180	80	275	250	53583.1	0.90	48224.8
LC-080	6.1	360	310	140	460	440	157148.6	0.80	125718.9
LC-016	7.6	340	300	200	660	550	188210.6	0.82	154332.7
LC-041	5.5	250	230	130	370	335	95528.1	0.77	73556.6
LC-053	5.8	220	220	70	280	265	58460.6	0.87	50860.7
LC-058	7.9	230	230	90	320	290	71354.9	0.90	64219.4
LC-084	6.4	460	280	170	530	430	201509.9	0.25	50377.5
LC-117	7.0	250	300	120	340	390	108673.8	0.71	77158.4
LC-002	5.8	365	260	100	420	365	117107.9	0.25	29277.0
LC-018	6.7	400	330	190	490	450	214800.2	0.80	171840.1
LC-049	5.8	340	215	100	395	285	97746.0	0.90	87971.4
LC-052	5.8	350	275	255	440	390	221147.2	0.91	201244.0
LC-062	6.1	310	300	160	380	361	150932.5	0.35	52826.4
LC-066	7.6	280	230	90	330	288	82591.0	0.90	74331.9
LC-114	5.8	195	180	100	260	188	57683.8	0.69	39801.8
LC-124	7.0	412	445	170	230	290	249554.9	0.50	124777.5
LC-003	5.5	310	220	150	415	380	119879.7	0.80	95903.8
LC-007	7.6	320	305	150	490	450	149311.0	0.55	82121.1
LC-024	7.3	300	210	160	420	370	119758.1	0.45	53891.1
LC-028	6.1	345	305	145	445	423	154031.6	0.50	77015.8
LC-042	5.5	190	145	75	250	225	40899.3	0.95	38854.3
LC-043	5.5	290	210	85	355	265	77422.7	0.98	75874.2
LC-044	5.8	180	155	60	220	185	35965.8	0.95	34167.5
LC-048	5.8	240	205	75	270	245	61435.8	0.95	58364.0
LC-050	5.8	210	180	70	245	220	48796.4	0.90	43916.8
LC-051	5.8	190	120	50	195	140	28700.9	0.98	28126.9
LC-079	6.1	320	310	130	400	390	138066.9	0.50	69033.4
LC-115	5.2	200	235	140	265	325	88876.4	0.60	53325.8
LC-123	7.3	335	310	130	235	190	142679.0	0.10	14267.9
LC-125	7.6	440	421	130	360	340	218241.4	0.35	76384.5
LC-126	8.8	410	405	150	220	240	216411.0	0.70	151487.7
LC-127	8.8	450	360	180	295	230	238238.1	0.50	119119.0
LC-128	7.6	410	405	150	220	240	216411.0	0.35	75743.9
LC-129	9.1	362	329	100	330	250	137731.5	0.35	48206.0

Table 4. DBHYDRO flow data (summed flow in cubic feet per second) for two of the 51 monitored large corals (LC-002 and LC-003) over 4 temporal windows prior to each successive survey visit. UID, unique ID for internal accounting. ICA, Inlet Contributing Area. These data were generated for all 51 colonies. For flow data for each of the 51 corals please see Appendix 3. Survey date is day/month/year.

	ID	Date	ICA	3 days	7 days	30 days	90 days
LC-002	6	12/09/2018	Port Everglades Inlet	4232	8926	34501	96280
LC-002	7	26/10/2018	Port Everglades Inlet	256	465	9775	75468
LC-002	8	15/11/2018	Port Everglades Inlet	420	537	1618	53939
LC-002	9	03/12/2018	Port Everglades Inlet	166	346	1518	35779
LC-002	10	17/01/2019	Port Everglades Inlet	127	247	1448	4463
LC-002	11	15/02/2019	Port Everglades Inlet	2726	3912	11393	14265
LC-002	12	18/03/2019	Port Everglades Inlet	1014	1284	7944	20702
LC-002	13	12/04/2019	Port Everglades Inlet	888	1094	4407	22661
LC-002	14	22/05/2019	Port Everglades Inlet	228	818	3255	13538
LC-002	15	12/06/2019	Port Everglades Inlet	1244	2069	3998	11223
LC-002	16	15/07/2019	Port Everglades Inlet	462	1930	8306	15348
LC-002	17	15/08/2019	Port Everglades Inlet	4498	6200	13320	25142
LC-002	18	09/09/2019	Port Everglades Inlet	2826	5485	21592	38963
LC-002	19	16/10/2019	Port Everglades Inlet	972	2507	7179	40150
LC-002	20	13/11/2019	Port Everglades Inlet	254	423	2729	30261
LC-002	21	03/12/2019	Port Everglades Inlet	212	587	4947	21076
LC-002	22	08/01/2020	Port Everglades Inlet	284	737	9504	18226
LC-002	23	05/02/2020	Port Everglades Inlet	266	1299	2581	16741
LC-002	24	08/03/2020	Port Everglades Inlet	69	189	2336	14267
LC-002	25	08/04/2020	Port Everglades Inlet	0	0	366	5129
LC-003	30	18/09/2018	Port Everglades Inlet	4158	8478	33789	96774
LC-003	31	26/10/2018	Port Everglades Inlet	256	465	9775	75468
LC-003	32	15/11/2018	Port Everglades Inlet	420	537	1618	53939
LC-003	33	03/12/2018	Port Everglades Inlet	166	346	1518	35779
LC-003	34	17/01/2019	Port Everglades Inlet	127	247	1448	4463
LC-003	35	15/02/2019	Port Everglades Inlet	2726	3912	11393	14265
LC-003	36	18/03/2019	Port Everglades Inlet	1014	1284	7944	20702
LC-003	37	12/04/2019	Port Everglades Inlet	888	1094	4407	22661
LC-003	38	22/05/2019	Port Everglades Inlet	228	818	3255	13538
LC-003	39	12/06/2019	Port Everglades Inlet	1244	2069	3998	11223
LC-003	40	15/07/2019	Port Everglades Inlet	462	1930	8306	15348
LC-003	41	15/08/2019	Port Everglades Inlet	4498	6200	13320	25142
LC-003	42	09/09/2019	Port Everglades Inlet	2826	5485	21592	38963
LC-003	43	16/10/2019	Port Everglades Inlet	972	2507	7179	40150
LC-003	44	13/11/2019	Port Everglades Inlet	254	423	2729	30261
LC-003	45	03/12/2019	Port Everglades Inlet	212	587	4947	21076
LC-003	46	08/01/2020	Port Everglades Inlet	284	737	9504	18226
LC-003	47	05/02/2020	Port Everglades Inlet	266	1299	2581	16741
LC-003	48	08/03/2020	Port Everglades Inlet	69	189	2336	14267
LC-003	49	08/04/2020	Port Everglades Inlet	0	0	366	5129

Table 5. Pairwise distances (km) to each outfall pipe location from each of the 51 monitored large corals (LC).

Coral	BAK030	PEV050	HIL060	BOC080	GOC014
LC-002	25.65	15.07	11.80	22.32	45.45
LC-003	24.90	14.33	12.55	23.09	44.70
LC-005	22.43	11.85	14.86	25.46	42.23
LC-007	12.51	2.46	24.89	35.52	32.24
LC-009	12.28	2.36	25.16	35.78	32.00
LC-013	7.10	4.39	30.53	41.16	26.65
LC-015	5.51	5.90	32.18	42.82	24.97
LC-016	2.29	11.48	37.90	48.56	19.23
LC-018	11.78	22.29	48.74	59.41	8.39
LC-024	13.29	23.80	50.26	60.92	6.93
LC-028	28.98	39.47	65.92	76.58	9.82
LC-041	24.90	14.32	12.56	23.09	44.70
LC-042	24.90	14.33	12.55	23.09	44.70
LC-043	24.90	14.33	12.55	23.09	44.70
LC-044	24.91	14.33	12.55	23.08	44.70
LC-047	24.90	14.33	12.55	23.08	44.70
LC-048	24.90	14.33	12.56	23.09	44.70
LC-049	24.90	14.33	12.56	23.09	44.70
LC-050	24.90	14.33	12.55	23.09	44.70
LC-051	24.90	14.33	12.55	23.09	44.70
LC-052	24.90	14.32	12.56	23.09	44.69
LC-053	24.90	14.32	12.56	23.09	44.70
LC-054	24.89	14.32	12.57	23.10	44.69
LC-058	12.27	2.36	25.17	35.79	31.99
LC-059	11.68	22.20	48.65	59.32	8.43
LC-062	23.91	34.36	60.81	71.47	5.68
LC-066	23.92	34.37	60.82	71.48	5.67
LC-075	24.09	34.56	61.01	71.67	5.67
LC-077	24.09	34.56	61.01	71.67	5.67
LC-078	24.90	14.33	12.56	23.09	44.70
LC-079	24.04	34.54	60.99	71.65	5.36
LC-080	24.08	34.57	61.02	71.68	5.43
LC-084	24.10	34.59	61.05	71.71	5.46
LC-085	24.08	34.58	61.03	71.69	5.36
LC-101	24.49	34.96	61.41	72.07	5.96
LC-103	24.52	34.99	61.44	72.10	6.03
LC-110	24.08	34.58	61.03	71.69	5.36
LC-114	24.09	34.54	60.99	71.65	5.87
LC-115	28.31	17.72	9.19	19.66	48.11
LC-117	25.30	14.72	12.13	22.66	45.10
LC-118	7.42	3.86	30.05	40.70	27.05
LC-119	7.41	3.87	30.07	40.71	27.04
LC-120	3.93	7.66	34.00	44.65	23.15
LC-122	3.79	7.90	34.24	44.89	22.93
LC-123	12.03	22.57	49.02	59.68	8.02
LC-124	12.16	22.67	49.12	59.78	8.01
LC-125	13.52	24.07	50.51	61.18	6.54
LC-126	14.40	24.95	51.39	62.06	5.67
LC-127	14.53	25.07	51.52	62.18	5.59
LC-128	14.62	25.15	51.60	62.27	5.61
LC-129	15.28	25.80	52.26	62.92	5.10

Table 6. Number of septic tanks within a series of radial buffers from each of the 51 monitored large coral (LC) colonies.

	Septic_21km	Septic_13km	Septic_8km	Septic_5km	Septic_3km	Septic_2km	Septic_1km
LC-115	5798	1859	505	176	62	0	0
LC-002	6580	2227	744	6	1	1	0
LC-117	6677	2279	782	6	1	1	0
LC-003	6903	2351	898	19	1	1	0
LC-041	6910	2351	901	19	1	1	0
LC-042	6910	2351	901	19	1	1	0
LC-043	6912	2351	901	19	1	1	0
LC-044	6907	2351	899	19	1	1	0
LC-051	6912	2351	901	19	1	1	0
LC-052	6914	2351	905	19	1	1	0
LC-047	6914	2351	902	19	1	1	0
LC-048	6913	2351	902	19	1	1	0
LC-050	6920	2351	904	19	1	1	0
LC-078	6920	2351	906	19	1	1	0
LC-049	6920	2351	907	19	1	1	0
LC-053	6916	2351	906	19	1	1	0
LC-054	6920	2351	911	19	1	1	0
LC-005	7150	2754	758	7	4	0	0
LC-007	9828	5600	1355	182	2	2	0
LC-009	9982	5732	1366	244	2	2	0
LC-058	9987	5732	1362	244	2	2	0
LC-118	10210	5012	1322	68	3	1	0
LC-119	10209	4997	1321	67	3	1	0
LC-013	10247	5190	1439	108	5	1	0
LC-015	10095	5061	1398	101	4	2	0
LC-120	9900	5233	1197	123	3	3	0
LC-122	9897	5274	1197	144	6	3	0
LC-016	8643	4207	1096	27	6	1	0
LC-059	6435	1688	30	0	0	0	0
LC-018	6528	1723	30	1	0	0	0
LC-123	6339	1552	23	1	0	0	0
LC-124	6556	1635	28	1	0	0	0
LC-024	6832	1484	7	3	0	0	0
LC-125	6611	1349	7	3	0	0	0
LC-126	6682	1104	7	3	0	0	0
LC-127	6756	1130	7	3	0	0	0
LC-128	6898	1229	7	3	0	0	0
LC-129	6945	1066	8	4	1	0	0
LC-062	7520	354	105	94	0	0	0
LC-066	7512	345	105	94	0	0	0
LC-114	7554	388	104	96	0	0	0
LC-075	7361	298	104	92	0	0	0
LC-077	7359	298	104	92	0	0	0
LC-080	7073	204	104	54	0	0	0
LC-084	7085	204	104	55	0	0	0
LC-079	7019	186	104	48	0	0	0
LC-085	6966	171	104	46	0	0	0
LC-110	6964	170	104	46	0	0	0
LC-101	7250	283	102	94	0	0	0
LC-103	7289	307	102	95	0	0	0
LC-028	5632	108	96	34	0	0	0

1.1.7. Objective 1.7

To test for spatial autocorrelation in the development of novel SCTLD lesions over time, we used normalized mark variograms using the *markvario* function in the R package *spatstat* (Baddeley et al. 2015). The mark variogram *gamma(r)* of a marked point process *X* is a measure of the dependence between the marks of two points of the process a distance *r* apart, defined as:

*gamma(r) = E[(1/2) * (M1 - M2)^2]*

where *E[ ]* denotes expectation and *M1,M2* are the marks attached to two points of the process a distance *r* apart. This allowed us to determine if corals closer in space had more similar SCTLD lesion incidence dynamics than those further apart. We found that the occurrence of novel SCTLD lesions occurring within any given month across the time series was spatially clustered, with corals within 250 m of each other showing more similar disease incidence patterns than those further apart (Figure 6).

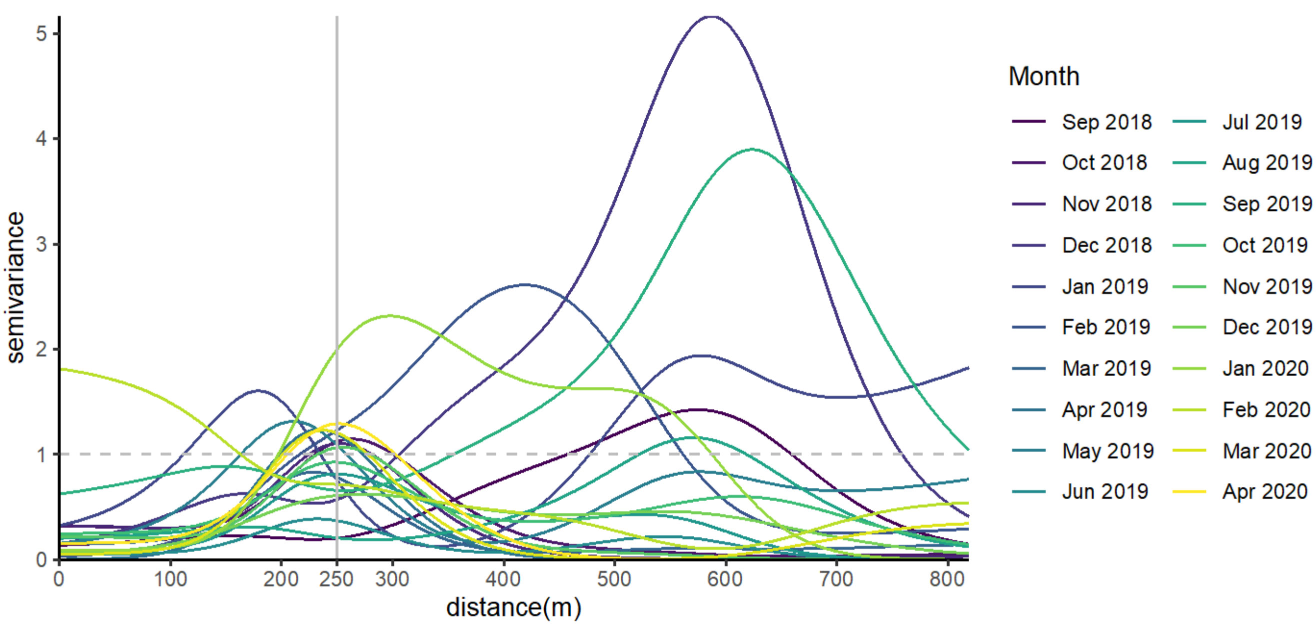

Figure 6. Spatial autocorrelation of novel SCTLD lesions on 51 monitored large corals by month (September 2018 to April 2020) measured as semivariance using normalized mark variograms. Most months reach their first peak and estimated total variance (1, horizontal dashed line) at a distance of ~250 m (vertical grey line), indicating that at smaller distances the points are autocorrelated.

To ensure the spatial autocorrelation signal was not being dominated by a single group of closely situated corals in the Fort Lauderdale area, we randomly subsampled the data points with a minimum spacing of 50 m, removing all but one point from the Fort Lauderdale cluster, as well as removing other very closely situated points elsewhere (n = 31). The spatial autocorrelation patterns remained similar (Figure 7), with the exception of a few months now showing an inverse pattern with increasing autocorrelation (decreasing variance) from 0 to 250 m. These months did include the two months with the most non-zero entries (September 2018 and December 2018) and the three months with the highest total number of novel lesions (September 2018, December 2018 and August 2019). This information on spatial autocorrelation in the SCTLD incidence patterns will inform our modeling efforts in Objective 2.

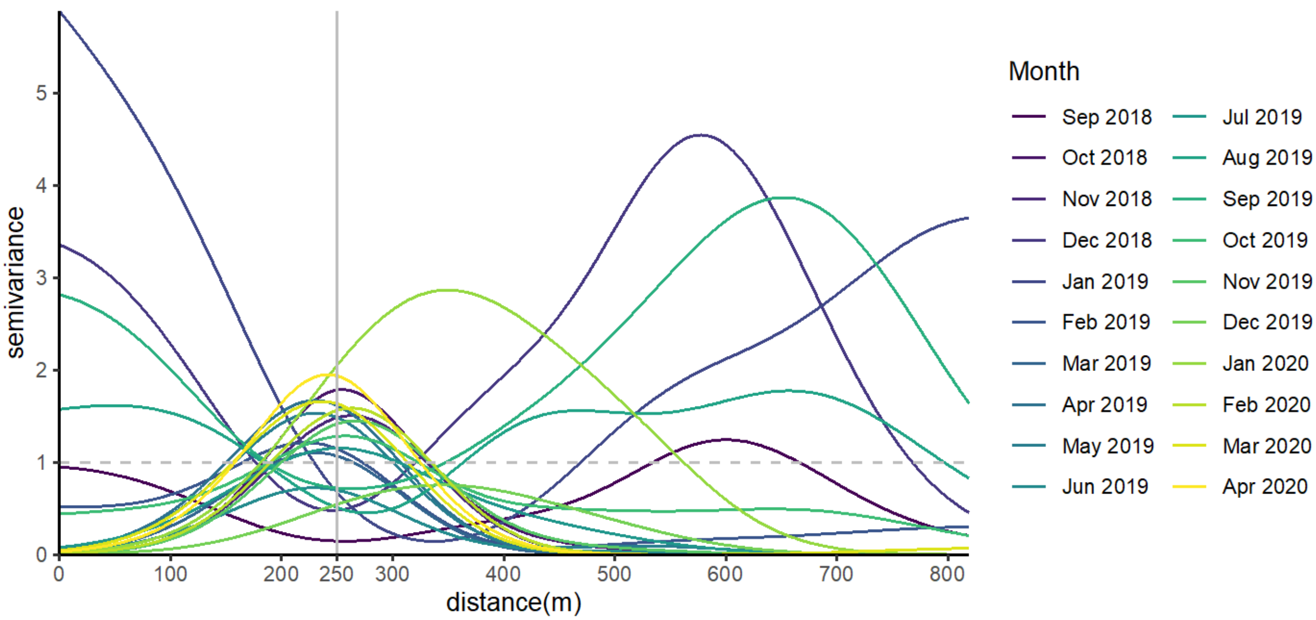

Figure 7. Spatial autocorrelation of novel SCTLD lesions on 31 monitored large corals by month (September 2018 to April 2020) measured as semivariance using normalized mark variograms on resampled data (minimum spacing of 50 m, n = 31). Most months reach their first peak and estimated total variance (1, horizontal dashed line) at a distance of ~250 m (vertical grey line), indicating that at smaller distances the points are autocorrelated.

1.1.8. Objective 1.8 Data synthesis for statistical modelling

Each of the 51 monitored large corals was spatially joined to our array of human/environmental predictors using the methods outlined above and summary tables were created for subsequent statistical modelling.

1.2. **Objective 2: Model environmental drivers of SCTLD incidence over time.**

Coral disease data are challenging to model due to the often zero-inflated nature of the data as a result of low overall disease prevalence and incidence within coral populations (Williams et al. 2010b; Aeby et al. 2011a; Aeby et al. 2011b). This means many traditional statistical modeling techniques are inappropriate. Distance-based permutation tests, however, have the flexibility to deal with such zero-inflated data as they make no prior assumptions about the data distribution and therefore prerequisites such as normality do not have to be satisfied (McArdle and Anderson 2001). Here we modeled the disease incidence patterns observed across our 51 monitored large corals from September 2018 to April 2020 (Figure 1) against a series of colony morphometrics, human and abiotic predictors hypothesized to be linked to SCCTLD incidence (summarized in Objective 1). The power of this monitoring data set is to be able to say with confidence whether corals experienced repeat infections over space and time.

1.2.1. Methodology

We quantified the number of novel SCTLD infections over time from monthly visits to our 51 large corals from September 2018 to April 2020. Based on their total number of infections over this time period, we classified them into 1 of 5 levels of infection: high, moderate, low, once, never (Table 7).

Spatial and temporal model: We first modeled the total number of novel SCTLD infections across the entire disease timeseries (September 2018 to April 2020, Table 7) against our suite of colony morphometric, human and abiotic predictors (*spatial model*) using distance-based permutational multiple regression (McArdle and Anderson 2001). The approach carries out a partitioning of variation in a data set described by a resemblance matrix according to a multiple regression model. Predictor variables can be categorical or continuous and the technique makes no prior assumptions about the nature of the response variable distribution, meaning that normality does not have to be satisfied.

We first investigated the predictor variables (n=26) for collineation using pairwise Pearson's correlations (*r*) and removed one of the two predictors for any that equaled $r > 0.8$ (Table 8). This resulted in a total of 12 predictor variables: depth (m), linear width of the colony (cm), surface area of the colony (cm^2), the proportion of live coral on the colony, the area of live tissue on the colony (cm^2), DBHYDRO 30 and 90 days prior to each survey date (mean value of these across all survey dates for each large coral), number of septic tanks within 5 km and 21 km, mean total suspended solids 30 days prior to each survey date (mean value of these across all survey dates for each large coral), and linear distance to nearest outflow (km) (note that we also examined the effect of adding the distance to each outfall as separate predictors in the model but this did not change the results presented here). The 12 predictors were normalized to account for variations in their data range and units. We calculated all possible candidate models (unique combinations of the predictors) and ranked them based on Akaike Information Criterion (Akaike 1973) with a second-order bias correction applied (AICc) (Hurvich and Tsai 1989; Burnham and Anderson 2004) to account for the relatively large number of predictor variables relative to independent response variables. We then repeated this entire process above to model the relationship between the predictors and the total number of SCTLD infections by month over time from September 2018 to April 2020 (*temporal model*).

Table 7. Our 51 monitored large corals, their total number of SCTLD infections from September 2018 to April 2020, and our designated categorical level of infection (5 levels). Note the "level of infection" is for display purposes only; it was not used as a variable in the statistical modelling.

Coral	Total infections	Level of infection
LC-120	49	HIGH
LC-015	46	HIGH
LC-009	31	HIGH
LC-118	31	HIGH
LC-101	25	HIGH
LC-110	13	MODERATE
LC-059	12	MODERATE
LC-103	12	MODERATE
LC-085	10	MODERATE
LC-119	9	MODERATE
LC-077	8	MODERATE
LC-013	7	MODERATE
LC-122	7	MODERATE
LC-005	6	MODERATE
LC-047	4	LOW
LC-075	4	LOW
LC-054	3	LOW
LC-078	3	LOW
LC-080	3	LOW
LC-016	2	LOW
LC-041	2	LOW
LC-053	2	LOW
LC-058	2	LOW
LC-084	2	LOW
LC-117	2	LOW
LC-002	1	ONCE
LC-018	1	ONCE
LC-049	1	ONCE
LC-052	1	ONCE
LC-062	1	ONCE
LC-066	1	ONCE
LC-114	1	ONCE
LC-124	1	ONCE
LC-003	0	NEVER
LC-007	0	NEVER
LC-024	0	NEVER
LC-028	0	NEVER
LC-042	0	NEVER
LC-043	0	NEVER
LC-044	0	NEVER
LC-048	0	NEVER
LC-050	0	NEVER
LC-051	0	NEVER
LC-079	0	NEVER
LC-115	0	NEVER
LC-123	0	NEVER
LC-125	0	NEVER
LC-126	0	NEVER
LC-127	0	NEVER
LC-128	0	NEVER
LC-129	0	NEVER

Table 8. Pairwise Pearson's correlation (r) values for our suite of colony morphometric, human and abiotic predictor variables. We removed one of the two predictors for any pairwise comparisons that equaled $r > 0.8$. Note that distance to outflow was chosen above number of Hot Snap exposure hours due to our hypothesis that variations in temperature are more likely to be linked to changes in disease dynamics over time rather than across space over such small distances.

	Depth	Planar Length	Planar Width	Planar Height	Linear Length	Linear Width	Surface Area	Prop. Live Coral	Live Tissue	dbHydro_3	dbHydro_7	dbHydro_30	dbHydro_90	OutFlow_KM	Septic_21km	Septic_13km	Septic_8km	Septic_5km	HotSnap_3	HotSnap_7	HotSnap_30	HotSnap_90	TSS_mean_30	TSS_mean_90	TN_mean_30
Planar Length (cm)	0.496																								
Planar Width (cm)	0.573	0.818																							
Planar Height (cm)	0.157	0.636	0.583																						
Linear Length (cm)	-0.041	0.395	0.179	0.657																					
Linear Width (cm)	-0.018	0.369	0.311	0.704	0.929																				
Surface Area Coral (cm)	0.442	0.907	0.889	0.840	0.439	0.501																			
Proportion Live Coral	-0.312	-0.519	-0.424	-0.323	-0.192	-0.170	-0.425																		
Live Tissue (cm2)	0.208	0.432	0.490	0.620	0.326	0.405	0.606	0.384																	
dbHydro_3	0.315	0.413	0.393	0.270	0.036	0.005	0.389	-0.411	0.090																
dbHydro_7	0.319	0.418	0.397	0.281	0.044	0.008	0.397	-0.422	0.086	0.998															
dbHydro_30	0.280	0.394	0.365	0.276	0.068	0.031	0.371	-0.423	0.067	0.995	0.996														
dbHydro_90	0.264	0.388	0.348	0.276	0.077	0.037	0.363	-0.423	0.059	0.991	0.993	0.999													
OutFlow_KM	-0.238	-0.076	-0.159	-0.033	-0.003	-0.069	-0.120	-0.155	-0.204	0.617	0.618	0.662	0.681												
Septic_21km	0.322	0.107	0.085	0.066	0.152	0.141	0.083	-0.218	-0.095	-0.418	-0.394	-0.391	-0.391	-0.501											
Septic_13km	0.207	-0.006	0.047	-0.030	0.042	0.085	0.009	0.051	0.013	-0.728	-0.720	-0.740	-0.750	-0.882	0.807										
Septic_8km	-0.114	-0.277	-0.262	-0.196	0.016	0.042	-0.264	0.284	-0.063	-0.934	-0.928	-0.930	-0.930	-0.721	0.674	0.895									
Septic_5km	0.021	-0.043	-0.017	0.154	0.219	0.246	0.024	-0.182	-0.152	-0.229	-0.206	-0.182	-0.176	-0.206	0.665	0.459	0.368								
HotSnap_total_3	-0.437	-0.422	-0.371	-0.131	0.121	0.151	-0.362	0.116	-0.191	-0.328	-0.323	-0.282	-0.277	0.135	0.219	0.118	0.345	0.360							
HotSnap_total_7	-0.238	-0.205	-0.177	0.019	0.177	0.161	-0.166	-0.142	-0.169	0.254	0.271	0.321	0.329	0.559	0.112	-0.295	-0.187	0.355	0.746						
HotSnap_total_30	-0.230	-0.140	-0.169	0.004	0.104	0.051	-0.140	-0.142	-0.159	0.535	0.546	0.594	0.603	0.822	-0.216	-0.651	-0.537	0.101	0.453	0.885					
HotSnap_total_90	-0.163	0.014	-0.078	0.139	0.237	0.168	-0.002	-0.295	-0.159	0.585	0.600	0.655	0.672	0.829	-0.099	-0.617	-0.555	0.222	0.349	0.822	0.926				
TSS_mean_30	0.701	0.516	0.573	0.215	-0.181	-0.151	0.487	-0.405	0.134	0.679	0.676	0.634	0.621	0.092	-0.122	-0.248	-0.561	-0.204	-0.632	-0.257	-0.066	-0.024			
TSS_mean_90	0.505	0.418	0.412	0.168	-0.152	-0.162	0.365	-0.391	0.047	0.840	0.839	0.821	0.818	0.477	-0.302	-0.578	-0.781	-0.265	-0.517	0.001	0.280	0.313	0.904		
TN_mean_30	0.198	0.317	0.432	0.308	0.000	0.003	0.397	-0.210	0.227	0.584	0.603	0.586	0.575	0.353	-0.344	-0.497	-0.618	-0.231	-0.225	0.156	0.288	0.303	0.418	0.504	
TN_mean_90	0.442	0.416	0.464	0.289	-0.011	-0.030	0.433	-0.318	0.202	0.903	0.903	0.877	0.865	0.399	-0.451	-0.625	-0.875	-0.352	-0.528	-0.002	0.276	0.296	0.787	0.851	0.727

1.2.2. Results

1.2.2.1. Spatial model

The total number of SCTLD infections ranged from 0 to 49 on any individual large coral colony from September 2018 to April 2020 (Table 7) and this spatial variation was best explained by three predictors (Table 9), namely the number of septic tanks within a 21 km radius (35.1% variation explained), the proportion of live coral on the colony (11.2% variation explained), and to a lesser extent depth (6.4% variation explained).

Overall, this model explained 52.7% of the spatial variation in the total number of SCTLD infections over the entire time period (Table 10). SCTLD infections showed a positive correlation with the number of septic tanks within a 21 km radius, with a noticeable increase in infections occurring beyond ~7000 tanks (Figure 8). SCTLD infections showed a negative correlation with the proportion of live coral on a colony, with colonies having more than 60% live tissue having fewer infections (Figure 9). There were deviations from the mean trend in both cases, and some of these outliers should be investigated further to determine why some of these corals are more susceptible or more resistant to infection. These model results can provide guidance for such targeted future investigation. Patterns with depth were less clear, although suggestive of corals at mid-depths (6-7 m) having more infections than those shallower or deeper. However, depth contributed relatively little to overall performance of the optimal model and this relationship should be interpreted with caution. These results remained largely unchanged when the Ft Lauderdale coral cluster was removed, the only difference was that depth no longer formed part of the optimal model and overall model performance dropped by 7.1% to 45.6% overall variation explained.

1.2.2.2. Temporal model

The total number of novel SCTLD infections (disease incidence) varied over time and ranged from 2 to 60 in any given month from September 2018 to April 2020 (Figure 2). There were 11 predictors for which we had temporal estimates: DBHYDRO flow over 3/7/30/90 days prior to the disease survey date, total number of Hot Snap exposure hours 3/7/30/90 days prior, mean total suspended solids and mean total nitrogen over the previous 90 days (mean total nitrogen over the previous 30 days had one time point missing data and so was excluded). Of these, seven were included in our model fitting process following pairwise calculations for colinearity, namely DBHYDRO 7 and 90 days prior, total number of Hot Snaps over the previous 7 and 90 days and mean total suspended solids over the previous 3 months (Table 11). The temporal variation was best explained by a model containing a single predictor (Table 12), namely the mean summed total DBHYDRO flow over the previous 7 days, that explained 49.7% of the variation in the number of SCTLD infections over time (Table 13). The number of SCTLD infections over time was positively correlated with mean flow and appeared extremely linear (Figure 10). Two months in particular deviated from this mean trend, namely December 2018 and January 2019, which had higher than expected disease levels. This warrants further investigation.

Table 9. Spatial model output. Predictor variables included in the model fitting process (trial) and those excluded due to high colinearity, the optimal model solution for each unique number of predictor variables, and the overall optimal model solutions ranked by their Akaike Information Criterion (AIC)c scores and the top model that balances model performance and parsimony shown in **bold**.

Predictor variables for model fitting

1	Depth (m)	Trial
2	Planar Length (cm)	Exclude
3	Planar Width (cm)	Exclude
4	Planar Height (cm)	Exclude
5	Linear Length (cm)	Exclude
6	Linear Width (cm)	Trial
7	Surface Area Coral (cm)	Trial
8	Proportion Live Coral	Trial
9	Live Tissue (cm2)	Trial
10	dbHydro_3	Exclude
11	dbHydro_7	Exclude
12	dbHydro_30	Trial
13	dbHydro_90	Trial
14	OutFlow_KM	Trial
15	Septic_21km	Trial
16	Septic_13km	Exclude
17	Septic_8km	Exclude
18	Septic_5km	Trial
19	HotSnap_total_3	Exclude
20	HotSnap_total_7	Exclude
21	HotSnap_total_30	Exclude
22	HotSnap_total_90	Exclude
23	TSS_mean_30	Trial
24	TSS_mean_90	Exclude
25	TN_mean_30	Trial
26	TN_mean_90	Exclude

Optimal solution for each number of variables

AICc	R^2	RSS	No.Vars	Selections
226.92	0.35137	4015.6	1	15
219.48	0.4637	3320.2	2	8,15
215.4	0.5273	2926.4	3	1,8,15
216.34	0.54128	2839.9	4	1,8,15,25
216.63	0.56137	2715.5	5	1,8,12,13,15
215.73	0.5912	2530.8	6	1,8,12,13,15,25
216.15	0.61004	2414.2	7	1,8,12-15,25
216.28	0.6311	2283.8	8	1,7,9,12-15,25
218.31	0.63885	2235.8	9	1,7,9,12-15,18,25
221.15	0.64187	2217.1	10	1,7-9,12-15,18,25
224.41	0.64315	2209.2	11	1,6-9,12-15,18,25
227.99	0.64345	2207.4	12	1,6-9,12-15,18,23,25

Overall optimal solutions

AICc	R^2	RSS	No.Vars	Selections
215.4	**0.5273**	**2926.4**	**3**	**1,8,15**
215.73	0.5912	2530.8	6	1,8,12,13,15,25
216.15	0.61004	2414.2	7	1,8,12-15,25
216.28	0.6311	2283.8	8	1,7,9,12-15,25

216.34	0.54128	2839.9	4	1,8,15,25
216.63	0.56137	2715.5	5	1,8,12,13,15
216.94	0.6263	2313.5	8	1,7,8,12-15,25
217.07	0.53463	2881	4	1,8,15,18
217.45	0.57717	2617.7	6	1,8,12-15
217.75	0.52839	2919.7	4	1,7,9,15

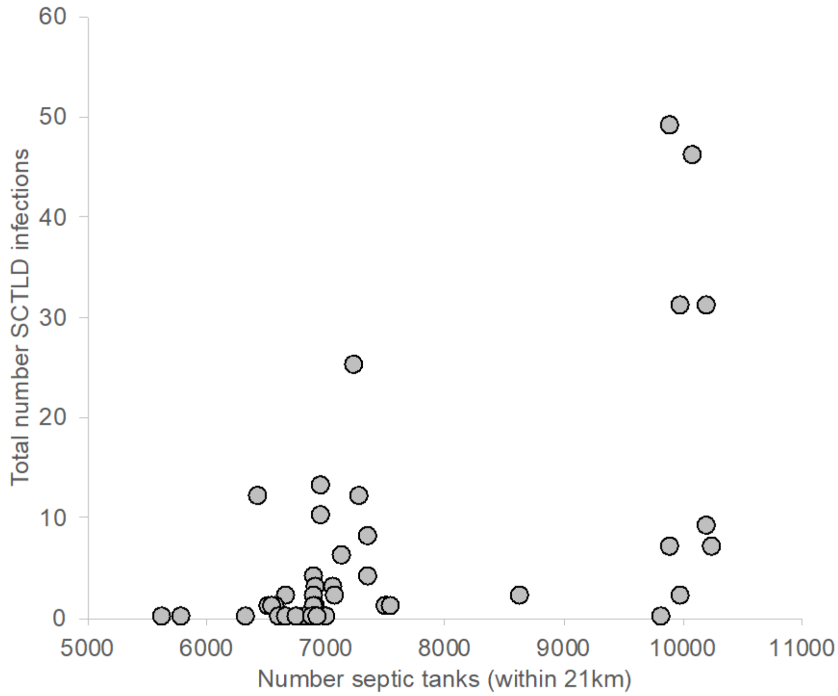

Figure 8. Correlation between total number of SCTLD infections from September 2018 and April 2020 and the number of septic tanks within 21km radius (n=51).

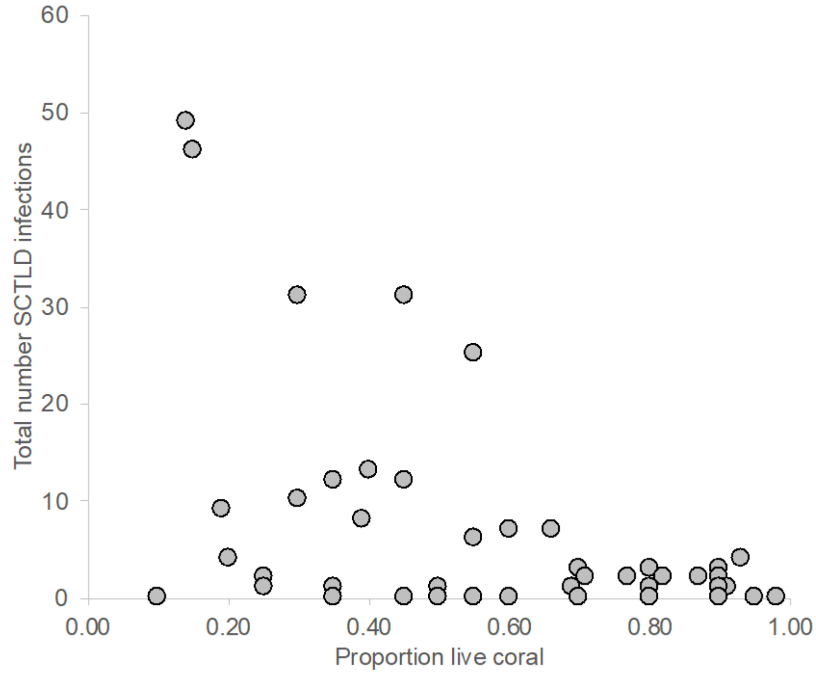

Figure 9. Correlation between total number of SCTLD infections from September 2018 and April 2020 and the proportion of live coral on a colony (n=51).

Table 10. Optimal spatial model summary, showing statistics for each of the three predictors included in the optimal spatial model, the proportion of variation in the response variable matrix they explain (Prop.) and the cumulative proportion of variation in the response variable matrix they explain (Cumul.). Overall, these three predictors explain 52.7% of the spatial variation seen in total SCTLD infections from September 2018 to April 2020.

Predictor	**AICc**	**SS(trace)**	**Pseudo-F**	**P**	**Prop.**	**Cumul.**	**res.df**
Septic_21km	226.92	2175.3	26.544	0.0001	0.35137	0.3514	49
Proportion Live Coral	219.48	695.4	10.053	0.003	0.11233	0.4637	48
Depth (m)	215.4	393.8	6.324	0.0176	0.06361	0.5273	47

Table 11. Pairwise Pearson's correlation values for our human and abiotic predictor variables for which we had temporal data and that were considered for our temporal model. We removed one of the two predictors for any pairwise comparisons that equaled $r > 0.8$.

	dbHydro 3	dbHydro 7	dbHydro 30	dbHydro 90	HotSnap total 3	HotSnap total 7	HotSnap total 30	HotSnap total 90	TSS mean 30	TN mean 30	TSS mean 90
dbHydro_7	0.973										
dbHydro_30	0.799	0.871									
dbHydro_90	0.531	0.594	0.775								
HotSnap_total_3	0.547	0.464	0.492	0.213							
HotSnap_total_7	0.519	0.440	0.478	0.191	0.996						
HotSnap_total_30	0.588	0.550	0.675	0.373	0.918	0.924					
HotSnap_total_90	0.589	0.614	0.758	0.818	0.393	0.376	0.599				
TSS_mean_30	-0.179	-0.135	0.019	0.078	-0.211	-0.217	-0.229	-0.164			
TN_mean_30	0.482	0.514	0.508	0.257	0.272	0.290	0.374	0.333	-0.278		
TSS_mean_90	-0.375	-0.399	-0.361	-0.053	-0.318	-0.314	-0.371	-0.349	0.360	-0.217	
TN_mean_90	0.508	0.534	0.519	0.325	0.518	0.545	0.605	0.413	-0.187	0.383	-0.333

Table 12. Temporal model output. Predictor variables included in the model fitting process (trial) and those excluded due to high colinearity, the optimal model solution for each unique number of predictor variables, and the overall optimal model solutions ranked by their AICc scores and the top model that balances model performance and parsimony shown in **bold**.

Predictor variables for model fitting

1	dbHydro_3	Exclude
2	dbHydro_7	Trial
3	dbHydro_30	Exclude
4	dbHydro_90	Trial
5	HotSnap_total_3	Exclude
6	HotSnap_total_7	Trial
7	HotSnap_total_30	Exclude
8	HotSnap_total_90	Trial
9	TSS_mean_30	Trial
10	TSS_mean_90	Trial
11	TN_mean_90	Trial

Optimal solution for each number of variables

AICc	R^2	RSS	No.Vars	Selections
96.315	0.49693	1951.2	1	2
97.319	0.54	1784.1	2	2,10
98.67	0.57993	1629.3	3	2,9,10
101.66	0.59293	1578.8	4	2,4,9,10
105.78	0.59409	1574.3	5	2,4,6,9,10
110.53	0.59657	1564.7	6	2,4,6,9-11
116.26	0.59703	1563	7	2,4,6,8-11

Overall optimal solutions

AICc	R^2	RSS	No.Vars	Selections
96.315	**0.49693**	**1951.2**	**1**	**2**
97.319	0.54	1784.1	2	2,10
98.347	0.51573	1878.3	2	2,4
98.545	0.51092	1896.9	2	2,9
98.67	0.57993	1629.3	3	2,9,10
98.786	0.505	1919.9	2	2,8
99.049	0.49844	1945.3	2	2,11
99.095	0.49729	1949.8	2	2,6
100.15	0.54776	1754	3	2,4,10

Table 13. Optimal temporal model summary, showing statistics for the single predictor included in the optimal temporal model, the proportion of variation in the response variable matrix it explains (Prop.). Overall, this single predictor explained 49.7% of the temporal variation seen in total SCTLD infections monthly from September 2018 to April 2020.

Predictor	AICc	SS(trace)	Pseudo-F	P	Prop.	Cumul.	res.df
dbHydro_7	96.315	1927.4	17.78	0.0032	0.49693	0.49693	18

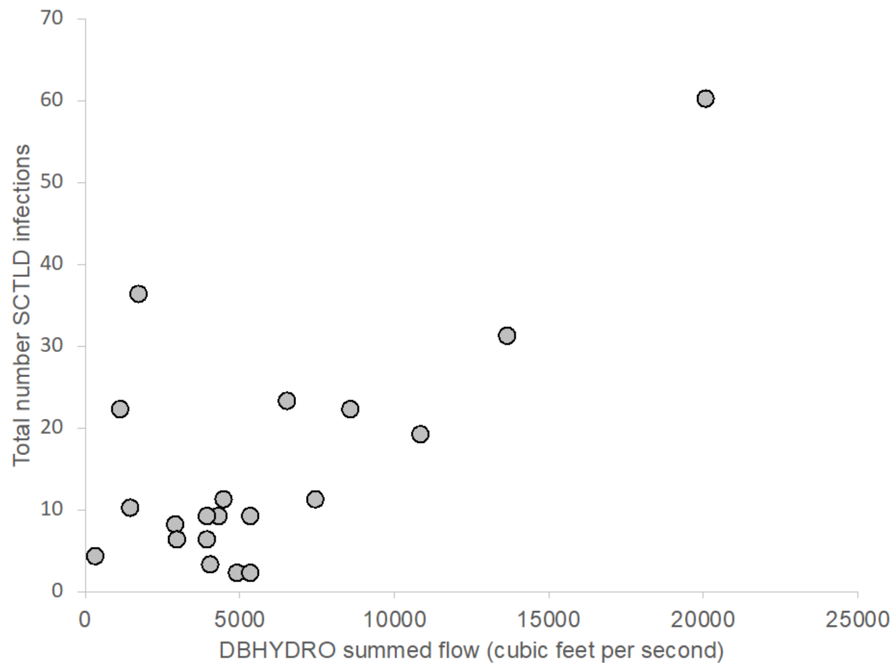

Figure 10. Correlation between temporal variation in SCTLD infections from September 2018 and April 2020 and mean DBHYDRO flow (summed flow in cubic feet per second) over the previous seven days. This relationship was robust to the removal of the Ft Lauderdale coral cluster.

1.1. Part I Summary

Overall, our models show that spatial variations in SCTLD infection levels at any single point in time in the Coral ECA are best explained by a positive relationship with septic tank density within the vicinity, suggesting some link between disease levels and potential pollutants or pathogens associated with the presence of septic tanks. This idea is supported by our temporal model which shows that over time, SCTLD infection levels are best explained by the flow rate from the Inlet Contributing Areas (ICA) to the reef, providing a spatial link between terrestrial septic tanks and the reef itself. These hypotheses warrant further investigation, particularly whether wastewater from septic tanks contain harmful pathogens that are reaching corals via ICA flushing and the broader impacts this might be having to reef habitats and reef communities in the study area. As new large coral monitoring data become available, these models can be updated, in particular the temporal model for which additional survey months will capture another full seasonal cycle and therefore increase the rigor of the model.

2. PART II - MODEL TEMPORAL AND SPATIAL DRIVERS OF DISEASE HOT SPOTS

Coral disease can peak in occurrence due to a number of environmental and human drivers that may be intricately correlated to one another, resulting in complex non-linear patterns of disease-environment relationships that can be challenging to quantify (Williams et al. 2010b). Furthermore, biotic variables like host density and cover also play key roles in dictating the occurrence of coral disease prevalence on reefs (Bruno et al. 2007; Williams et al. 2010b; Aeby et al. 2011b). Here we modeled the occurrence of Dark Spot Syndrome (DSD) and Tissue Loss Disease (TLD) along the entirety of Florida's Coral Reef using disease monitoring data collected as part of the Florida Reef Resilience Program's (FRRP) Disturbance Response Monitoring program (DRM). Disease surveys were conducted yearly from 2005 to 2019. We identified 'hotspots' of disease occurrence – areas of unusually high disease occurrence surrounded by other areas with high disease occurrence. This was done using the 'hotspot' analysis tool *Getis-Ord Gi** (Ord and Getis 1995; Getis and Ord 2010) in ArcGIS. The Moran's I index (Moran 1950) was used to determine the distance threshold to be used in the hotspot analysis and 'inverse distance' was used as the 'Conceptualization of Spatial Relationships' parameter. Below we provide a summary of the methods used to model the occurrence of these disease hotspots against a suite of suspected drivers, our results and a summary interpretation of our findings. We also report on modeling the occurrence of DSD and TLD as the number of diseased coral colonies at each location to examine what effect this had on the predictive performance of our models.

2.1. **Objective 3 – Predictor variable synthesis**

2.1.1. METHODOLOGY

We synthesized several human predictor variables hypothesized to be linked to spatial variations in DSD and TLD occurrence along Florida's Coral Reef. These were identified through discussions across the project research team and partly informed by our findings from Project Part I. In summary, we identified the following six predictors of interest: 1) The Nature Conservancy (TNC) – Ocean Wealth, 2) DEP Wastewater, 3) Septic Tanks, 4) Land Use, 5) Water Quality, and 6) Human Population Density. Below we describe the variables we synthesized under each of these groups and how we quantified them.

2.1.1.1. TNC Ocean Wealth Data

Here we used the concept of coral reef "use" to estimate the interactions between reefs along Florida's Coral Reef and people. We used the TNC Ocean Wealth Data database (https://oceanwealth.org) to quantify tourism in two ways: 1) total visits, and 2) total spend – both within 30 km of reefs, excluding urban areas (Spalding et al. 2017). Raw data were provided directly to our team from TNC and were then subjected to a series of spatial processing steps. First, we undertook a simple value extraction of total visits (FL_Visit) and total spend (FL_Spend) at the point location for each disease survey by year (n = 2,508 for DSD, n = 2,643 for TLD) using the *Extract Multi Values to Points* tool in ArcGIS Pro 2.7.1. The problem with this approach was that some disease survey locations were outside of the bounds of the Ocean Wealth data layer, and there was a tiny difference in the location of the FL_Visit and FL_Spend data layers provided by TNC (Figure 11). Our second approach was to use a simple Fibonacci sequence (1, 2, 3, 5, 8, 13, 21) to generate buffer distances (in km) from each disease survey location using the *Buffer* tool in ArcGIS Pro 2.7.1 (Figure **12**). We then used the *Zonal Statistics as Table* tool in ArcGIS Pro 2.7.1 to generate the mean, SD and count of Ocean Wealth data cells that fell within each buffer distance. The smaller buffer sizes did not capture all observations and resulted in some missing data on all extractions. To normalize the observations, we used R (www.r-project.org) to do some basic matching and to add NAs for missing locations on all files.

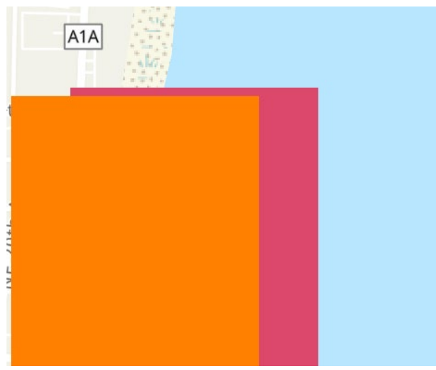

Figure 11. Spatial offset between FL_Visit (orange) and FL_Spend (pink) caused by tiny differences in the data layers, but that are enough to cause some disease locations to only land within one layer.

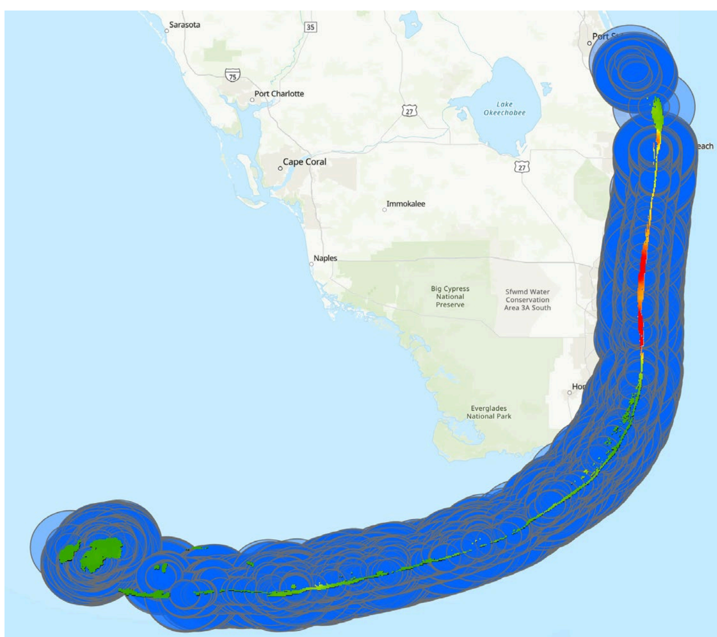

Figure 12**.** Example 21 km buffer (in blue) generated for each disease survey location along Florida's Coral Reef overlaid on the TNC Ocean Wealth data layers (color ramp).

All data were summarized in a series of output files containing the following meta-data:

Output File(s)

- Extract_Values.csv
    - 4 columns
        - Site - Site ID column
        - Year - Sampled year column
        - fl_visit - Extracted value from the FL_Visit layer
        - fl_spend - Extracted value from the FL_Spend layer

Output File(s)

- Buffer_*Spend/Visit_1/2/3/5/8/13/21*.csv
    - 4 columns
        - Site - Site ID column
        - Latitude – Latitude (WGS84)
        - Longitude – Longitude (WGS84)
        - Year - Sampled year column
        - ZONE_CODE – Unique ID for the cells that fall inside the buffer
        - COUNT – Count of cells that fall inside the buffer
        - AREA – Area of cells found inside the buffer (sq m)
        - MEAN – Mean of value
        - STD – standard deviation of value

2.1.1.2. Wastewater

Here we used the locations of wastewater treatment facilities within Florida provided by DEP as a proxy of human presence/influence and thus impacts to coastal areas. Specifically, we quantified the number of wastewater treatment facilities and their capacity to treat water and how much they are permitted to process across our spatial buffers. We used our Fibonacci buffers (1, 2, 3, 5, 8, 13, 21 km) around each disease survey location to undertake a spatial join with these data (Figure 13). Only the 13 and 21 km scales contained sufficient data for further analysis. The output summary file contained the following meta-data:

Output File(s)

- Step_2_DEP_*1/2/3/5/8/13/21*km.csv
    - 4 columns
        - Site - Site ID column
        - Latitude – Latitude (WGS84)
        - Longitude – Longitude (WGS84)
        - Year - Sampled year
        - count_wwtf – Count of all facilities falling inside the buffer
        - mean_design_cap – Mean of the design capacity of the facility
        - sd_design_cap – SD of the design capacity of the facility
        - mean_permitted – Mean allowed discharge from the facility
        - sd_permitted – SD allowed discharge from the facility

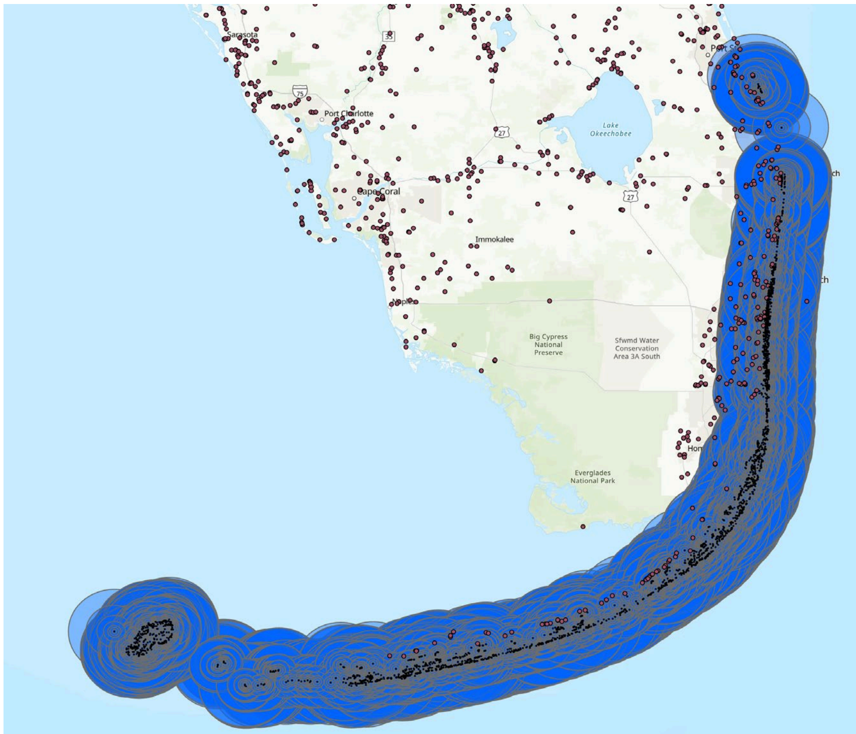

Figure 13. Location of wastewater treatment facilities in Florida (red circles), disease survey locations (black circles), and our radial buffers of varying spatial extents (blue circles).

2.1.1.3. Septic Tanks

We used two web-based resources to obtain 67 counties worth of data (from 2018) pertaining to the distribution of wastewater origins, namely:

- http://www.floridahealth.gov/environmental-health/onsite-sewage/research/flwmi/index.html
- http://ww10.doh.state.fl.us/pub/bos/Inventory/FloridaWaterManagementInventory/

From this, we extracted 8 categories of wastewater origin: 1) Known sewer, 2) Likely sewer, 3) Known septic, 4) Likely septic, 5) SWL sewer, 6) SWL septic, 7) Conflicting data, and 8) Unknown. We again used the Fibonacci buffers (1, 2, 3, 5, 8, 13, 21 km) around each disease survey location to undertake a spatial join with the Septic layer (Figure **14**). This proved extremely computationally challenging as every single building in the data set is a separate polygon. In a single thread, some of the buffers around disease survey locations had > 200,000 joins. This, multiplied by the number of buffers and between 2-20 min per join meant it would take several weeks to run even on a high-performance desktop computer. We overcame this by programming the spatial joins and data extractions at a supercomputing facility. This generated >300 GB of output files which were then processed to create summary statistics and saved in a manageable summary file size format (~3 MB).

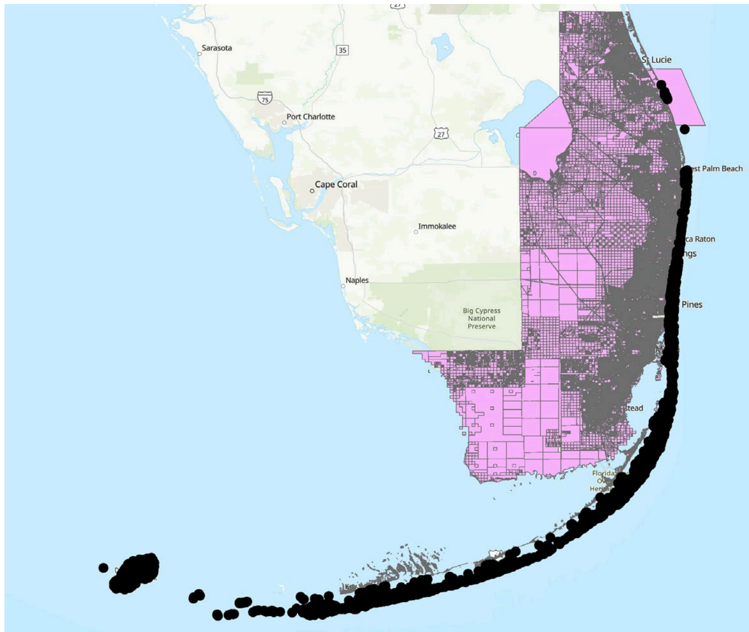

Figure 14. Total septic contributing area shown in pink/grey and disease survey locations along Florida's Coral Reef shown in black.

The output summary file contained the following meta-data:
Output File(s)

- Step_3_Septic_*area/count*_*1/2/3/5/8/13/21*km.csv
    - 11 columns

Units for area are square meters of areas that intersect with the buffer, count are the number of "areas" that intersect the buffer (

- Figure 15).
    - Site - Site ID column
    - Latitude – Latitude (WGS84)
    - Longitude – Longitude (WGS84)
    - Year - Sampled year
    - KnownSeptic - Areas known to drain to septic
    - KnownSewer - Areas known to drain to sewer
    - LikelySeptic - Areas likely to drain to septic
    - LikelySewer - Areas likely to drain to sewer
    - SWLSeptic - Specific designation for one county - septic
    - SWLSewer - Specific designation for one county - sewer
    - UNDT - Undetermined
    - UNK - Unknown
    - NULL - Null value
    - Septic - Calculated sum of KnownSeptic, LikelySeptic and SWLSeptic
    - Sewer - Calculated sum of KnownSewer, LikelySewer and SWLSewer

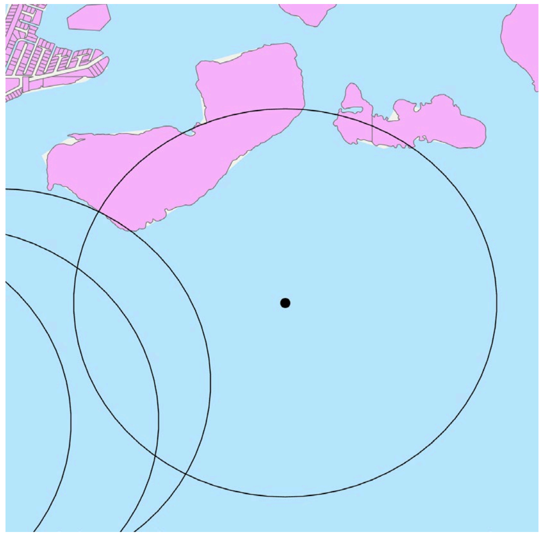

Figure 15. Example spatial buffer (1 km) around coral disease survey location O2206 (solid black point). The units for area are square meters of area that intersect with the buffer and the 'count' are the number of "areas" that intersect the buffer. In this example, the large island and the two small areas on the island to the right are all counted (3 count, 660,300 sq m area).

2.1.1.4. Land Use

Here we used the NOAA Coastal Change Analysis Program (C-CAP) regional Land Cover and Change Dataset, a 30 x 30 m resolution satellite-based product that contains information on a variety of land uses across the Florida region (last updated in 2016) (Figure 16). The dataset contains multiple land cover classes, however our focus was on estimating some degree of human development (urbanization) that could contribute to coastal runoff and pollution that might in turn trigger and exacerbate coral disease (Kaczmarsky 2006; Haapkylä et al. 2011). As such, we focused on two of the classes pertaining to 'Developed Land', namely '*Developed High Intensity*' and '*Developed Medium Intensity*'.

'Developed High Intensity' contains significant land area and is covered by concrete, asphalt, and other constructed materials. Vegetation, if present, occupies less than 20 % of the landscape. Constructed materials account for 80 – 100 % of the total cover. This class includes heavily built-up urban centers and large constructed surfaces in suburban and rural areas with a variety of land uses. 'Developed Medium Intensity' contains areas with a mixture of constructed materials and vegetation or other cover. Constructed materials account for 50 – 79 % of total area. This class commonly includes multi- and single-family housing areas, especially in suburban neighborhoods, but may include all types of land use (https://coast.noaa.gov/digitalcoast/data/ccapregional.html).

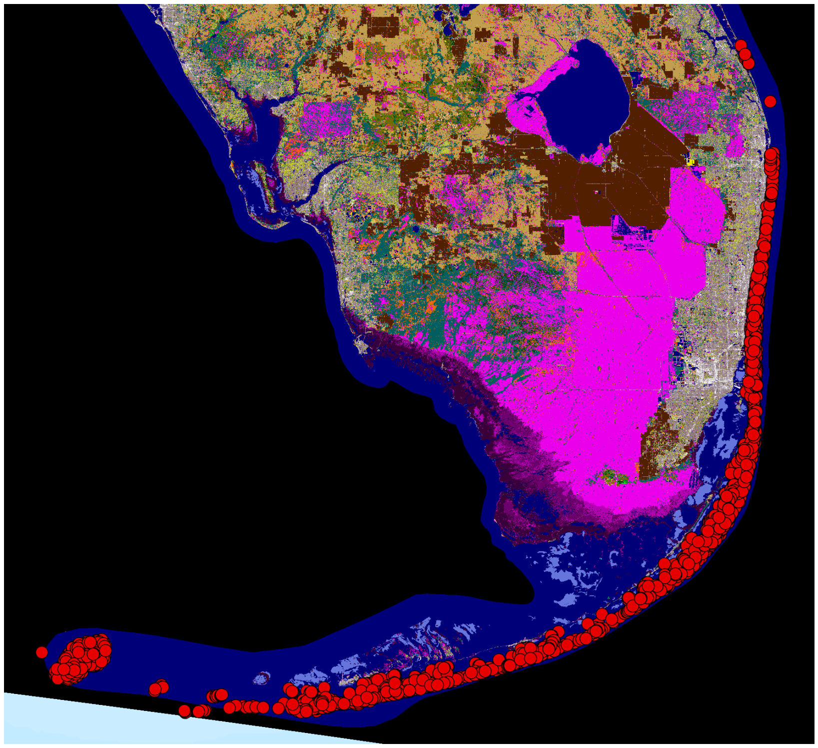

Figure 16. Spatial gradients in land use categorized by NOAA's Coastal Change Analysis Program (C-CAP) regional Land Cover and Change Dataset, with the location of our coral disease surveys shown as red circles.

We then calculated the total area of these two classes (in m^2) within our Fibonacci buffers (1, 2, 3, 5, 8, 13, 21 km) around each disease survey location using the *Tabulate Area* tool in ArcGIS Pro 2.7.1 and generated output summary files containing the following meta-data:

Output File(s)

- Step_4_Land_cover_*1/2/3/5/8/13/21*km.csv
    - 1 data column
    - Units for area are square meters of land cover area that intersect with the buffer, essentially it is the count of the number of 30 x 30 m grid cells.
        - Site - Site ID column
        - Latitude – Latitude (WGS84)
        - Longitude – Longitude (WGS84)
        - Year - Sampled year
        - Urban_m2 - Sum of area for CONUS categories 2 and 3 (high and medium density, respectively)

2.1.1.5. Water Quality

To quantify water quality, we used Florida International University's (FIU) Southeast Environmental Research Center's Water Quality Monitoring Network database (http://serc.fiu.edu/wqmnetwork/) as it provided data across SE FL and the Keys in a single source. Two limitations immediately emerged with these data: 1) limited temporal range (1994 – 2014), and 2) limited spatial extent (Figure **17**). In this case, we only utilized the more recent records for 2013, which were WQMP surveys 71 to 74. We extracted both bottom (B) and surface (S) values from the database and identified the following key water quality variables, of which five were retained for further analysis (shown in **bold**):

Abbreviation	*Variable*
N+N	Nitrate+Nitrite-Nitrogen
NO2-N	Nitrite-Nitrogen, Dissolved
NH4-N	Ammonium-Nitrogen
SRP	Soluble Reactive Phosphorus
TP*	**Phosphorus, Total**
TP- soil	Phosphorus, Total - Soil
Si	**Silica**
TOC	**Total Organic Carbon**
TN - ANTEK 9000	**Nitrogen, Total**
CHL-a	**Chlorophyll-a**

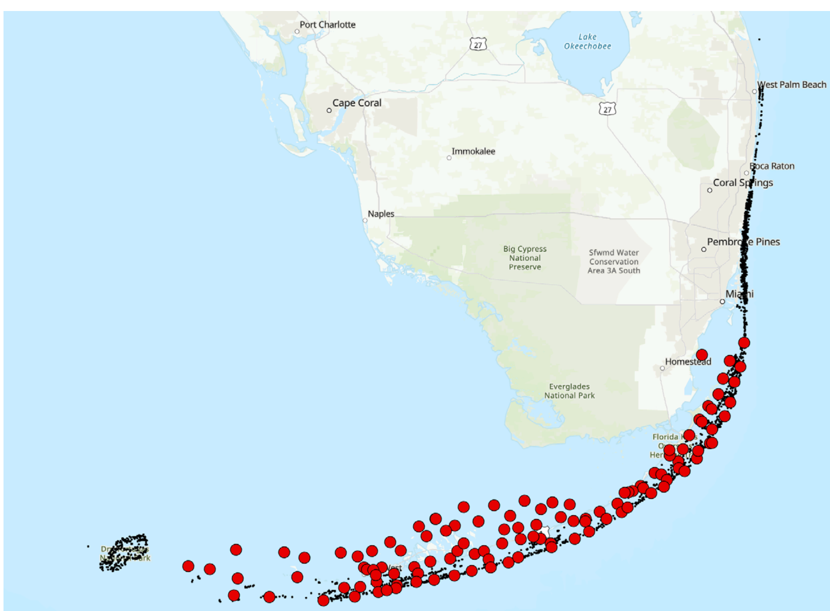

Figure 17**.** Distribution of water quality monitoring stations (red) and locations of coral disease surveys (black), showing the lack of spatial coverage in FIU's database for water quality data for the more northerly disease surveys. The red dots in this case represent WQMP surveys 73 and 74.
We again used our Fibonacci buffers (1, 2, 3, 5, 8, 13, 21 km) around each disease survey location to undertake a spatial join analysis, exported the data to a table and created a summary data file using R with the following meta-data:

Output File(s)

- Step_5_WQ_*1/2/3/5/8/13/21*km.csv
    - 29 data columns
    - Units are in uM per liter, except for CHLA which is in ug per liter.
        - Site - Site ID column
        - Latitude – Latitude (WGS84)
        - Longitude – Longitude (WGS84)
        - Year - Sampled year
        - TP_S/*B_mean/sd/count* - Total Phosphorus (S = surface, B = bottom)
        - TN_S/*B_mean/sd/count* - Total Nitrogen (S = surface, B = bottom)
        - Si_S/*B_mean/sd/count* - Silica (S = surface, B = bottom)
        - TOC_S/*B_mean/sd/count* - Total Organic Carbon (S = surface, B = bottom)
        - CHLA_*mean/sd/count* – Chlorophyll-a

2.1.1.6. Human Population

To quantify human populations within the vicinity of our coral disease survey locations we used the 2010 U.S. Census Population and Housing Unit Counts dataset for Florida (Figure **18**) (https://www.census.gov/geographies/mapping-files/2010/geo/tiger-data.html). We extracted total population and the sum of all housing units within our Fibonacci buffers (1, 2, 3, 5, 8, 13, 21 km) around each disease survey location, generating an output file with the following meta-data:

Output File(s)

- Step_6_Population_*1/2/3/5/8/13/21*km.csv
    - 2 data columns
        - Site - Site ID column
        - Latitude – Latitude (WGS84)
        - Longitude – Longitude (WGS84)
        - Year - Sampled year
        - pop_sum - Sum population of all census locations that fall inside the buffer
        - house_sum - Sum of all housing units that fall inside the buffer

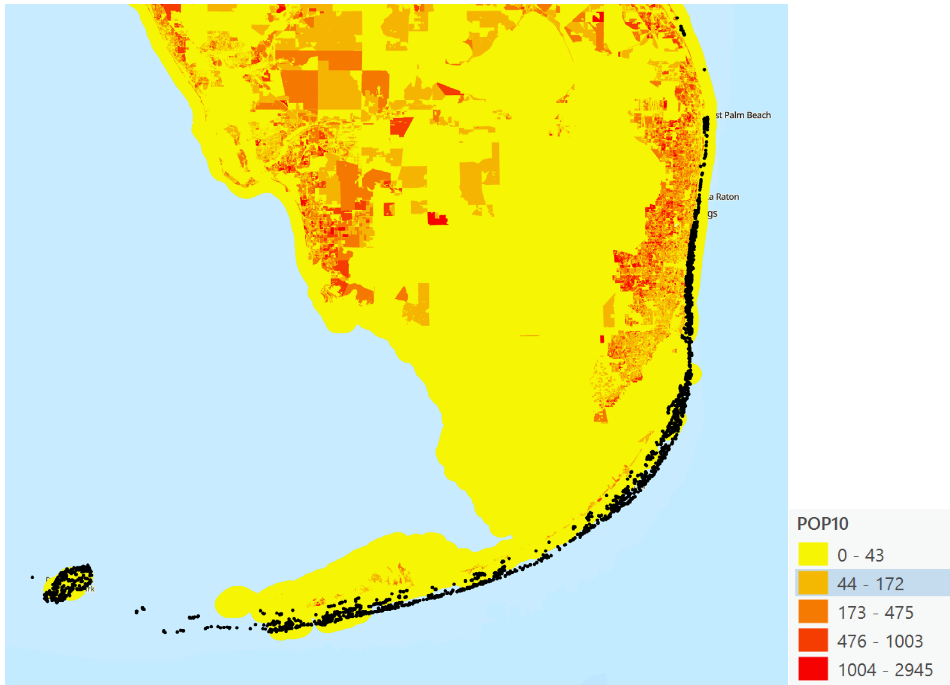

Figure 18. U.S. Census Population and Housing Unit Counts dataset for Florida for 2010, with the location of our coral disease survey locations shown in black.

2.2. **Objective 4 – Modeling drivers of regional disease hotspots**

2.2.1. METHODOLOGY

Our use of multiple buffers of different spatial scales for each predictor, in combination with the fact that all predictors had various versions of the defined variable, resulted in a total of 98 predictor variables across our categories 1 – 6 for possible inclusion in the DSD and TLD models. In addition to these, we included a suite of predictor variables to capture aspects of the habitat in each survey location for both DSD and TLD. Depth can have a profound effect on coral disease dynamics as numerous biophysical variables change predictably with depth, including temperature, light and wave energy (Williams et al. 2013). The surveys varied in depth from 3.6 to 70.9 ft (average = 27.4 ft) for DSD and 3.6 to 70.9 ft (average = 27.2 ft) for TLD, and so depth was included as a continuous predictor. Host abundance/density can also drive patterns of coral disease, including disease outbreaks (Bruno et al. 2007; Myers and Raymundo 2009; Aeby et al. 2011b). We therefore included the number of colonies vulnerable to each disease condition in each survey location. To capture aspects of the habitat, we included: *Reef Zone* (13 levels), *URM GeoForm* (11 levels), *URM GeoFormDet* (34 levels), and *URM ClassLv0-4* (various levels) (see Appendix 4 for descriptions of each of these). Finally, we included a 'Year' term to account for the temporal spread of the data. **This resulted in 109 predictor variables in total.** Despite our knowledge that some of the predictor variables likely collineated, given the large replication in the response variable, in addition to the fact that boosted regression trees are robust to the inclusion of spurious predictors, we included all predictors in the model fitting process.

2.2.1.1. Boosted Regression Tree Modeling

We modeled the power of our chosen predictors to explain spatial variations in TLD and DSD along Florida's Coral Reef using a Boosted Regression Tree (BRT) modeling framework. Unlike many modeling techniques that aim to fit a single parsimonious model, BRT incorporates machine learning decision tree methods (Breiman et al. 1984) and boosting, a method to reduce predictive error (Elith et al. 2008), to build an additive regression model in which individual terms are regression trees, fitted in a forward stage-wise manner (i.e., sequentially fitting each new tree to the residuals from the previous ones) (Williams et al. 2010b). In summary, BRT gives two crucial pieces of information, namely the underlying relationship between the response and each predictor, and the strongest statistical predictor (among the simultaneously tested predictors) of the response variable in question. Due to their flexible use and improved predictive power, the use of BRT has increased over the past few years to model non-linear ecological relationships at a range of spatial scales as computing power has increased, including modeling coral reef-environment associations (Williams et al. 2010b; Gove et al. 2015; Aston et al. 2019). Our team recently updated a number of the BRT routines within the R package *ggBRT* to include more rigorous estimates of model uncertainty and to link to updated graphics packages available in R, such as *ggplot* (Jouffray et al. 2019). These updated routines were used throughout our analyses.

Due to problems with assigning real probabilities in BRTs (there are no p-values) a key approach is to use validation processes that require a proportion of the data set to be held back (Elith et al. 2008). However, instead of splitting the data into training and test data sets, we used a cross-validation approach that allowed all the data to be used to train the algorithm and ultimately test model performance (Williams et al. 2010b; Aston et al. 2019). We used a 10-fold cross-validation approach to test the model against withheld portions of the data (1000s of times) and used the cross-validated percentage deviance explained, calculated as (1 – (cross-validated deviance/mean total deviance)), as our measure of model performance (Jouffray et al. 2019).

We calculated the relative importance of each predictor based on the number of times a variable was selected for splitting, weighted by the squared improvement to the model as a result of each split and averaged over all trees (Friedman and Meulman 2003; Elith et al. 2008). To assess the relative contribution of each predictor, we only considered predictors with a relative influence above that expected by chance (100/number of variables) (Müller et al. 2013) and then rescaled their influence to 100%. Partial dependency plots were used to visualize the relationships between the most influential predictors and the response variable, while keeping all other predictors at their mean (i.e., to visualize the conditional effect of each predictor). We calculated the 95% confidence intervals obtained from 100 bootstrap replicates around the functional fit as a measure of model uncertainty (Buston and Elith 2011, Jouffray et al. 2019); we limited the number of unique bootstraps to 100 due to the high computational power required to run these routines. Finally, we quantified the relative interaction strength between the predictors by measuring residual variation between pairwise model predictions with and without interactions (Pinsky and Byler 2015) and used bootstrap resampling to test the significance of the strongest interactions. Again, we limited the number of unique bootstraps to 50 due to the high computational demand required to run these routines. For each bootstrap, we randomly resampled the response variable before re-fitting the BRT model and then recorded the size of the interactions to generate a distribution under the null hypothesis of no interaction among predictors (Pinsky and Byler 2015; Jouffray et al. 2019). If significant, the interaction value can also be thought of as the relative contribution of the interaction between the two predictors towards the overall predictive performance of the model.

We classified DSD and TLD disease survey sites along Florida's Coral Reef as either being a disease 'hotspot' (1) or not (0) and modelled their occurrence using a Bernoulli distribution. We also investigated using the number of diseased colonies as the response variable and modelled this using a Poisson distribution for both DSD and TLD.

2.2.1.2. Model optimization

To optimize model predictive performance, we varied three core parameters of the BRT algorithm: the *bag-fraction* (bf, proportion of data to be selected at each step), the *learning rate* (lr, used to shrink the contribution of each tree as it is added to the model), and the *tree complexity* (tc, the number of terminal nodes in a tree). Using a customized loop routine (Richards et al. 2012), we identified the combination of these three parameters that resulted in the lowest cross-validation deviance (CVD) over bf-values 0.5, 0.7, and 0.8, lr-values 0.001, 0.0001, and 0.00001, and tc-values 1–5, while maintaining a minimum of ≥ 1000 fitted trees (and a maximum of 50000 trees). This resulted in the following optimal settings for DSD and TLD:

DSD hotspots: bag fraction = 0.7, learning rate = 0.001, tree complexity = 4 (Figure 19),

DSD #cases: bag fraction = 0.8, learning rate = 0.001, tree complexity = 2 (Figure 20),

TLD hotspots: bag fraction = 0.8, learning rate = 0.001, tree complexity = 2 (Figure 21),

TLD #cases: bag fraction = 0.8, learning rate = 0.001, tree complexity = 5 (Figure 22).

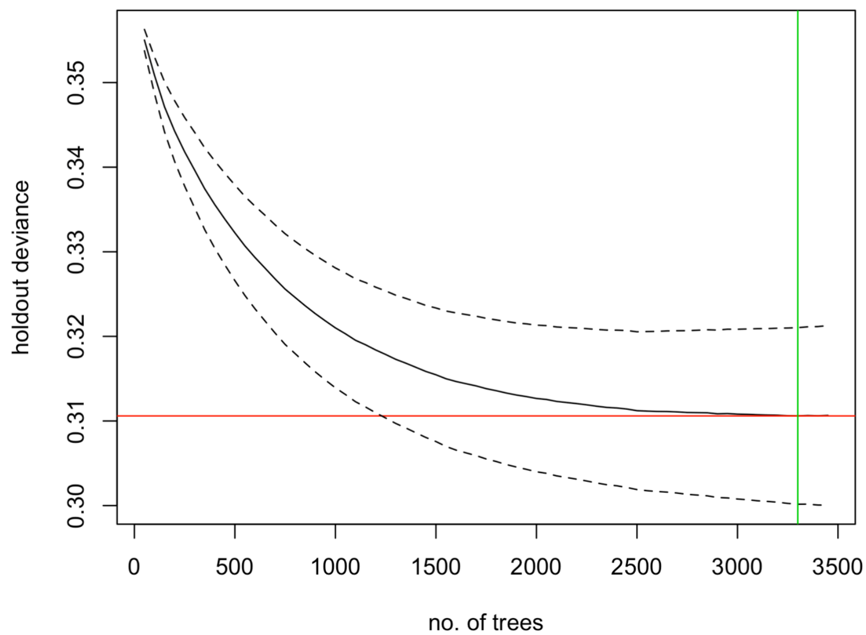

Figure 19. Relationship between the number of trees and predictive deviance for the optimal BRT parameter settings for DSD hotspots, showing the decreasing cross-validation deviance remaining in the response variable following the addition of individual trees (solid black line), and the error around the cross-validation deviance (dashed black lines). This optimal model included 3300 trees (vertical green line) and resulted in a cross-validation deviance of 0.311 (horizontal red line).

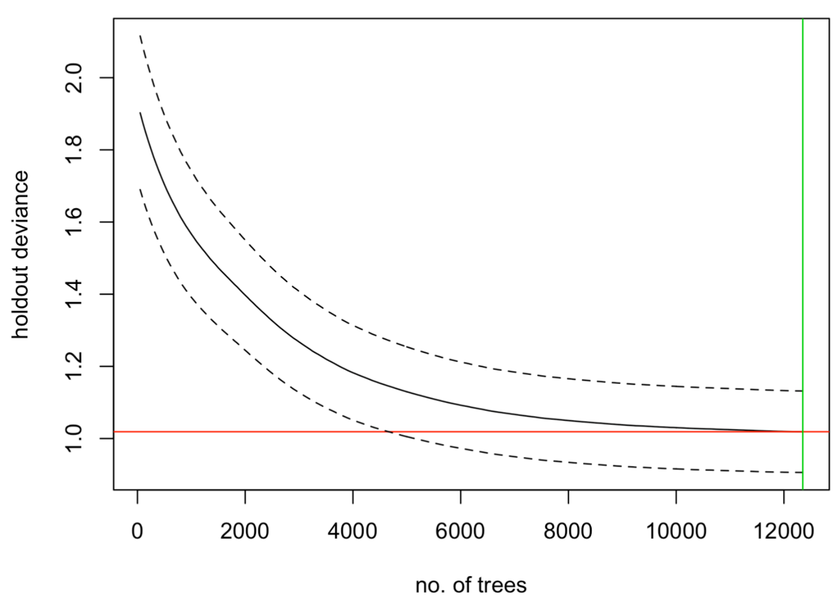

Figure 20. Relationship between the number of trees and predictive deviance for the optimal BRT parameter settings for DSD (#cases), showing the decreasing cross-validation deviance remaining in the response variable following the addition of individual trees (solid black line), and the error around the cross-validation deviance (dashed black lines). This optimal model included 12,350 trees (vertical green line) and resulted in a cross-validation deviance of 1.019 (horizontal red line).

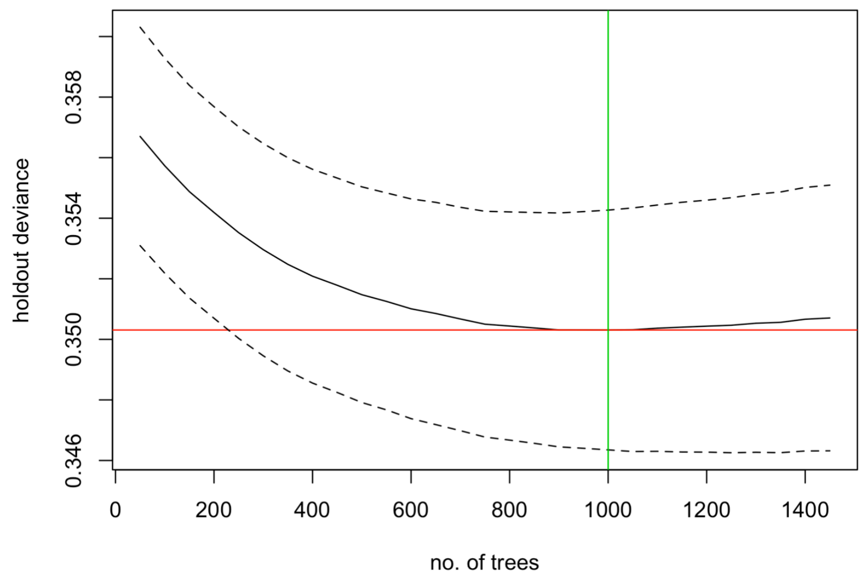

Figure 21. Relationship between the number of trees and predictive deviance for the optimal BRT parameter settings for TLD hotspots, showing the decreasing cross-validation deviance remaining in the response variable following the addition of individual trees (solid black line), and the error around the cross-validation deviance (dashed black lines). This optimal model included 1000 trees (vertical green line) and resulted in a cross-validation deviance of 0.35 (horizontal red line).

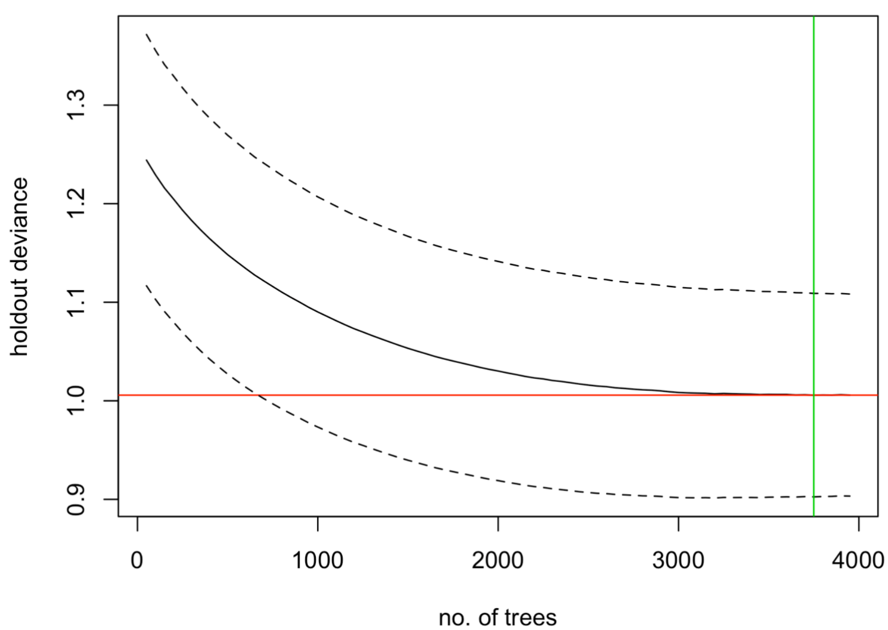

Figure 22. Relationship between the number of trees and predictive deviance for the optimal BRT parameter settings for TLD (#cases), showing the decreasing cross-validation deviance remaining in the response variable following the addition of individual trees (solid black line), and the error around the cross-validation deviance (dashed black lines). This optimal model included 3750 trees (vertical green line) and resulted in a cross-validation deviance of 1.006 (horizontal red line).

2.3. **RESULTS**

2.3.1. DSD - Hotspots

The optimal DSD hotspot model included 24 predictor variables (Table 14) and explained 40.7% of the underlying deviance in DSD hotspot presence/absence across the entire dataset. The training data AUC (area under the curve) value equaled 0.95 (values exceeding 0.9 are considered "outstanding"). When predicting to new data from the training data, however, the cross-validated percentage deviance explained dropped to 13.7% and the cross-validated AUC to 0.73 (considered "acceptable"). For context, an AUC value of 0.5 suggests no ability for the model to discriminate between a binomial response variable like we have here.

Three predictors heavily dominated the relative influence in the full DSD hotspot model, namely year (relative influence = 19.1%), habitat type (*URM ClassLv4*, relative influence = 17.4 %), and depth (relative influence = 12.2%). The probability of DSD hotspot occurrence increased through time (Figure 23). Four habitats in particular showed an increased probability of DSD hotspot occurrence, namely aggregate reef, mud with infrequent live coral (<10% live coral), pavement, and shallow sand (Figure 24). The probability of DSD hotspot occurrence was also higher in shallower waters, in particular in less than 20 feet of water (Figure 25). Depth and year interacted (interaction strength = 13.8) and this was statistically significant. The probability of DSD hotspot occurrence was highest in later years in shallower depths, but this was emphasized particularly after 2010 in the timeseries (Figure **26**). The plotting of this interaction emphasized the importance of depth relative to year, despite year having the slightly higher relative influence within the full model.

In summary, while there was an ability to explain ~41% of the DSD hotspot presence/absence across the full dataset using 24 predictors, our ability to predict to new data was just over the threshold for 'acceptable', and resulted in a drop of ~27% predictive performance. Overall, our results suggest that DSD hotspot occurrence has been increasing over time, particularly in shallow areas within particular habitats.

Table 14. Relative influence (%) of the 24 significant predictor variables for DSD hotspots that together explained 40.7% of the underlying deviance in the response variable (cross-validated percentage deviance explained = 13.7%).

Predictor	Influence (%)
Year	19.1
URM ClassLv4	17.4
Depth	12.2
urban_m2_21km	6.5
Si_bottom_8km	4.6
Septic_count_8km_Septic	3.7
Septic_area_8km_Septic	3.6
TOC_S_mean_13km	3.5
Total.Sids	3.3
Permitted_13km	2.7
Septic_area_13km_Septic	2.4
visit_extract	2.4
design_cap_21km	1.9
TOC_bottom_21km	1.9
TP_bottom_21km	1.7
visit_8km	1.7
Si_bottom_13km	1.7
Chl-a_21km	1.5
TN_surface_8km	1.5
urban_m2_8km	1.5
Si_bottom_21km	1.4
TOC_surface_8km	1.3
Septic_count_13km_Septic	1.2
TP_bottom_13km	1.2

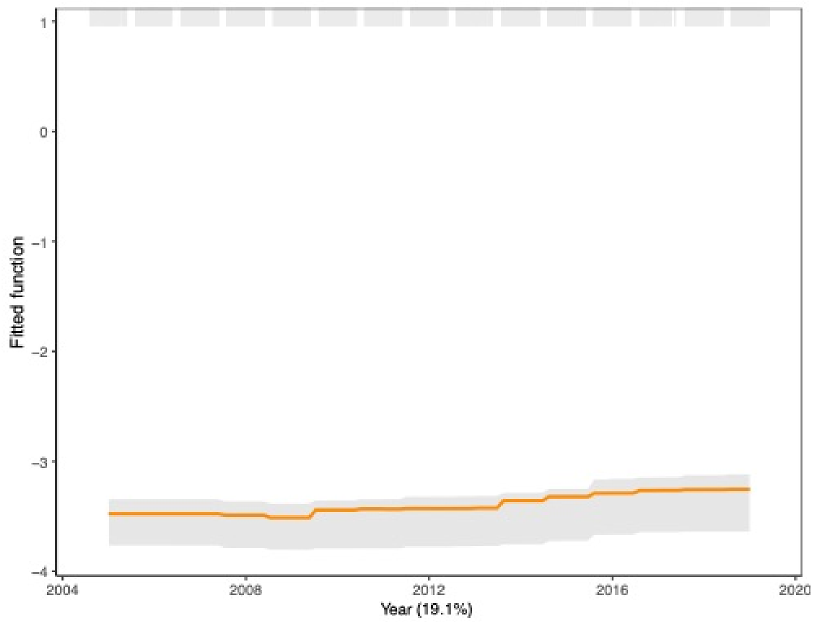

Figure 23. Effect of Year (survey year) on the probability of DSD hotspot occurrence. Values higher on the y-axis indicate an increased probability of a DSD hotspot. Mean effect (orange line) and 95% bootstrapped (n=100) confidence intervals (grey) shown. Response variable replication along x-axis shown by the light grey deciles along the top of the plot. Y-axis plotted on common scale to Fig. 4.7.

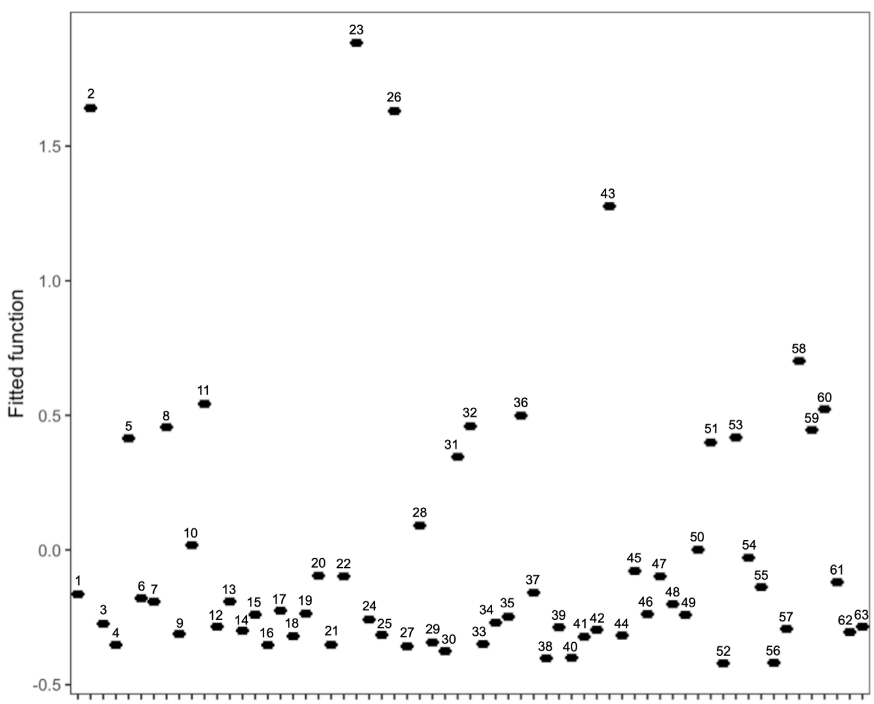

Figure 24. Effect of habitat type (*URM ClassLv4*) on the probability of DSD hotspot occurrence. Values higher on the y-axis indicate an increased probability of a DSD hotspot. Four habitats stand out as having a higher chance of DSD hotspot occurrence, namely: 2. Aggregate Reef, 23. Mud, Live coral (infrequent, <10%), 26. Pavement, and 43. Sand (shallow). See Appendix 4 for full habitat list.

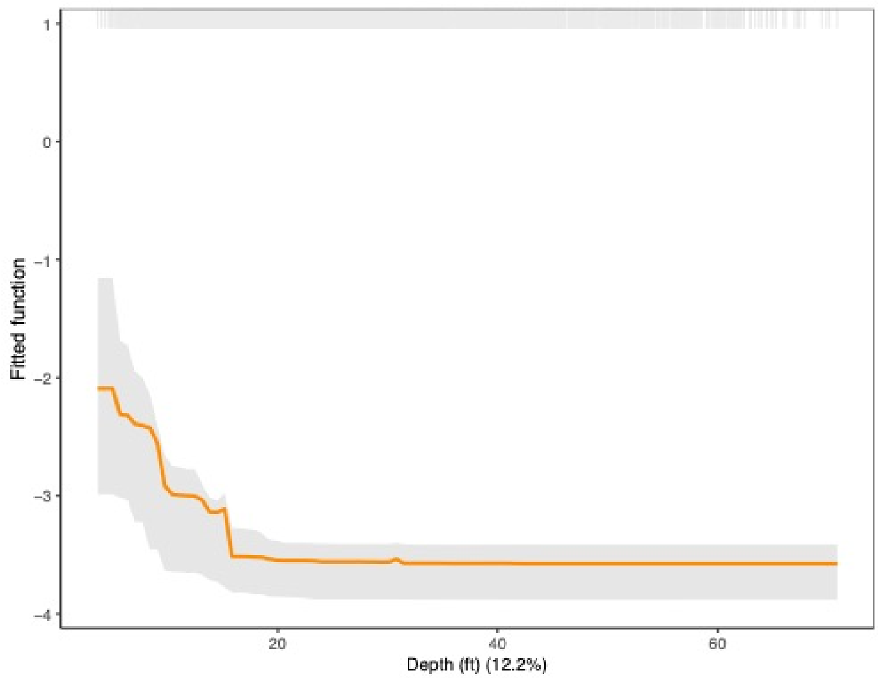

Figure 25. Effect of depth (feet) on the probability of DSD hotspot occurrence. Values higher on the y-axis indicate an increased probability of a DSD hotspot. Mean effect (orange line) and 95% bootstrapped (n=100) confidence intervals (grey) shown. Response variable replication along x-axis shown by the light grey deciles along the top of the plot.

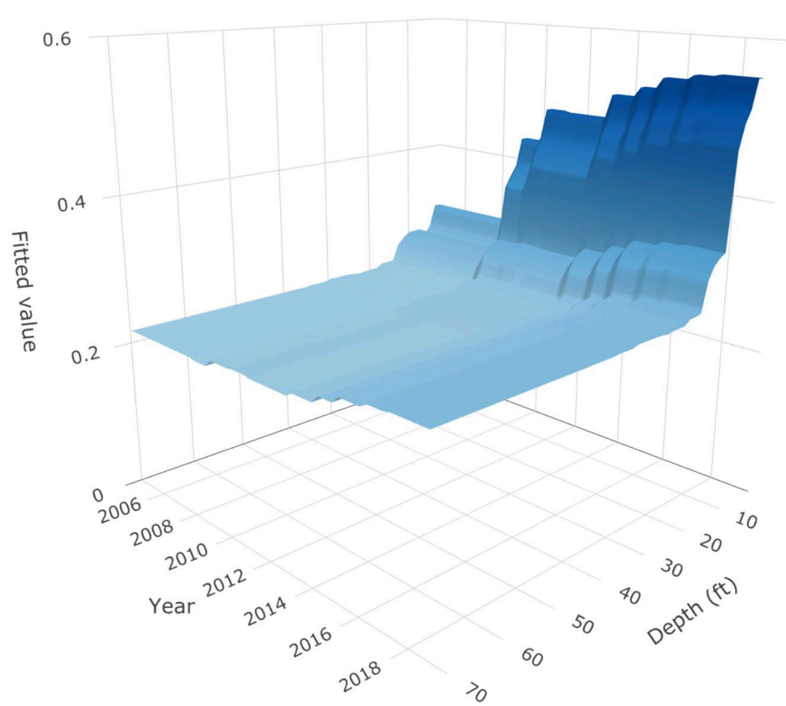

Figure 26. Interaction between year and depth on the probability of a DSD hotspot. The probability of DSD hotspot occurrence was highest in later years in shallower depths, but this was emphasized in particular after 2010 in the time series and in particular in 2016 and 2018.

2.3.1. DSD – Number of diseased colonies

The optimal model included 18 predictor variables (Table 15) and explained 64.4% of the underlying deviance in the number of DSD cases across the entire dataset. When predicting to new data from the training data, the cross-validated percentage deviance explained dropped to 47.1%, suggesting a reasonable ability to predict to new data. The relative influence of the predictors was more evenly distributed, but three predictors accounted for 45.5% of the relative influence in the model, namely the concentration of silica in the surface waters within a 13km radius, the total number of susceptible coral hosts, and the septic area within an 8km radius (Table 15). The number of DSD cases was higher where there was a greater number of susceptible coral hosts, with disease levels peaking in areas that had >50 coral hosts (Figure 27). The effect of silica in the surface waters and septic area was less apparent, and required that we examined the predictor variable interactions – all three of the top predictors interacted with each other and these were all statistically significant. The probability of DSD occurrence increased as both surface water silica concentration within a 13km radius and coral host abundances increased, and became maximized where silica exceeded 1.15 and where there were >100 coral hosts (Figure 28). DSD occurrence was also higher in areas with >13M m^2 septic area within 8km regardless of coral host abundance, but was highest where there were also >100 coral hosts (Figure 29).

Table 15. Relative influence (%) of the 18 significant predictor variables for DSD cases that together explained 64.4% of the underlying deviance in the response variable (cross-validated percentage deviance explained = 47.1%).

Predictor	Influence (%)
Si_surface_13km	18.4
Total.Sids	16.9
Septic_area_8km_Septic	10.2
URM ClassLv4	9.4
Depth	8.6
Year	7.1
Reef Zone	5.2
TOC_surface_13km	4.0
Chl-a_21km	3.9
TOC_surface_8km	3.8
TP_bottom_21km	2.7
spend_1km	2.4
Septic_area_21km_Sewer	1.5
TOC_bottom_21km	1.3
urban_m2_8km	1.3
spend_5km	1.2
Septic_count_8km_Septic	1.1
TP_surface_8km	1.1

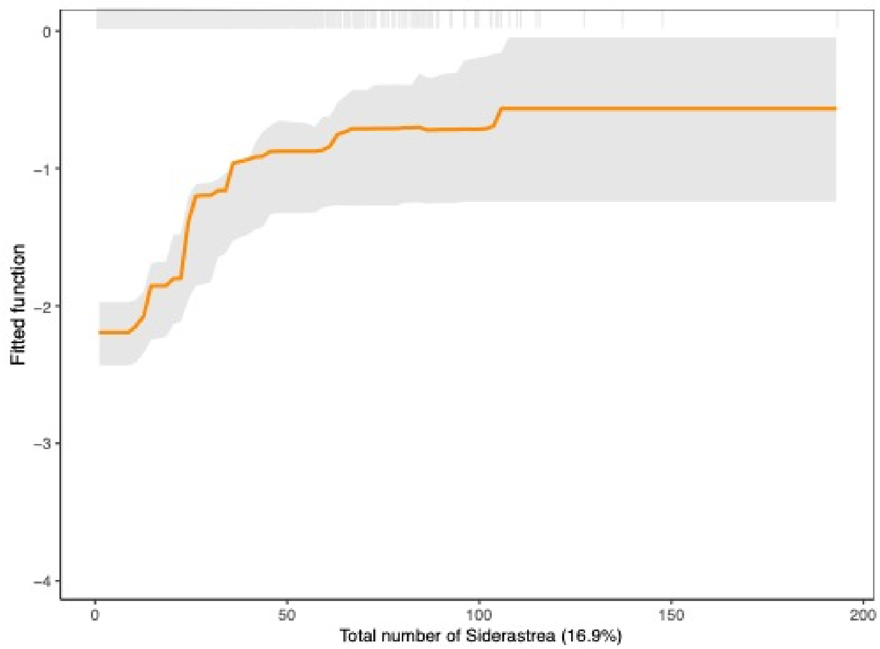

Figure 27. Effect of *Siderastrea* abundance on the number of DSD cases. Values higher on the y-axis indicate an increased probability of higher DSD levels. Mean effect (orange line) and 95% bootstrapped (n=100) confidence intervals (grey) shown. Response variable replication along x-axis shown by the light grey deciles along the top of the plot.

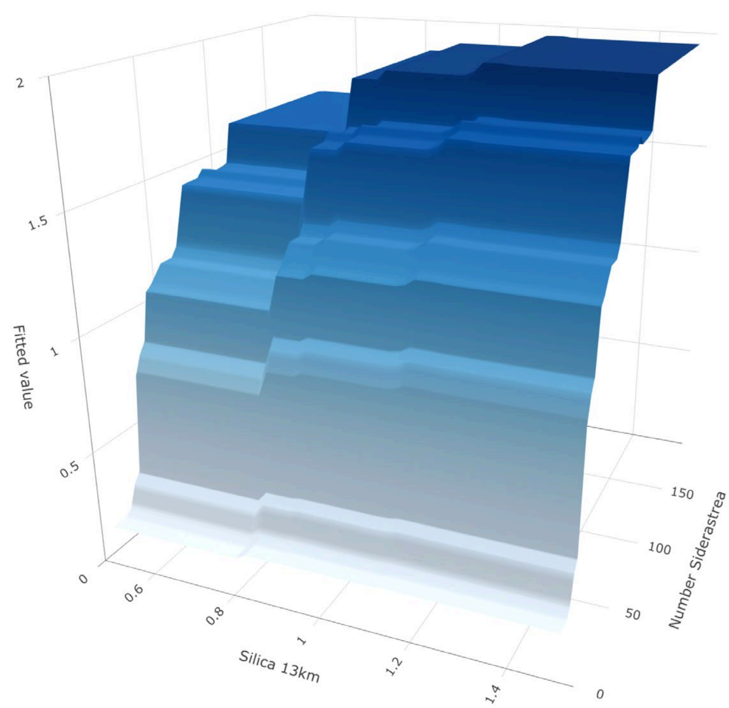

Figure 28. Interaction between surface silica concentration within a 13km radius and *Siderastrea* abundance on the probability of a DSD occurrence. The probability of DSD occurrence increases as both silica concentration and coral host abundance increase.

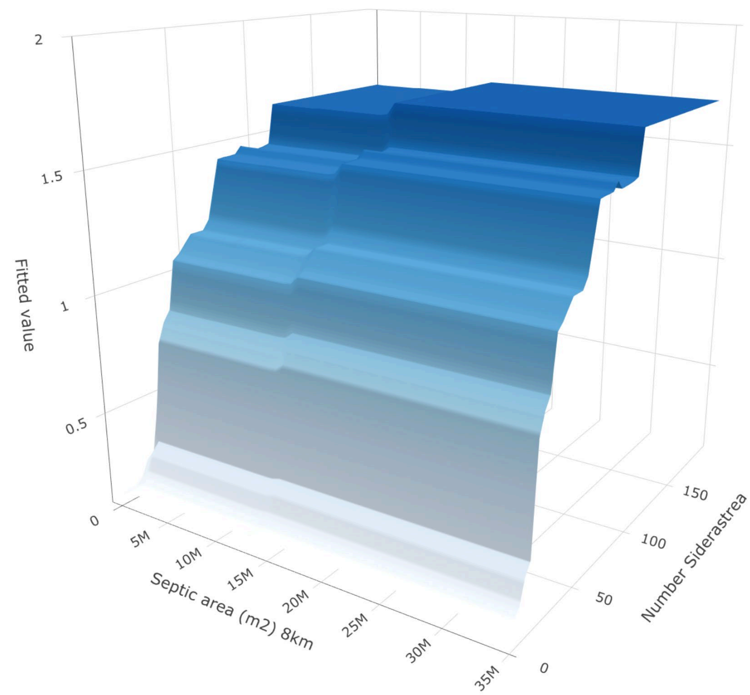

Figure 29. Interaction between septic area within 8km and *Siderastrea* abundance on the number of DSD cases. The probability of DSD occurrence was highest in areas with >13M m^2 septic area within 8km regardless of coral host abundance, but was highest where there were also >100 coral hosts.

2.3.2. TLD - Hotspots

The optimal TLD hotspot model included 16 predictor variables (Table 16), but only explained 9.7% of the underlying deviance in TLD hotspot occurrence across the entire dataset. The training data AUC (area under the curve) value equalled 0.79 (values exceeding 0.7 are considered "acceptable"). When predicting to new data from the training data, model performance was even worse and the cross-validated percentage deviance dropped to 2.1% and the cross-validated AUC to 0.62 (considered "poor"). For context, an AUC value of 0.5 suggests no ability for the model to discriminate between a binomial response variable like we have here.

A single predictor heavily dominated the relative influence in the full TLD hotspot model, namely habitat type (*URM ClassLv4*, relative influence = 51.9%) (Figure 30). Five habitats in particular showed an increased probability of TLD hotspot occurrence, namely Aggregate Reef, Algae (Continuous); Aggregate Reef, Live Coral (Sparse); Reef Rubble, Algae (Continuous); Sand, Algae (Discontinuous); and Scattered Coral/Rock in Unconsolidated Sediment. In summary, we could only explain 9.7% of the variation in TLD hotspot presence/absence across the full dataset using 16 predictors, and our ability to predict to new data was extremely poor.

Table 16. Relative influence (%) of the 16 significant predictor variables for TLD hotspots that together explained 9.7% of the underlying deviance in the response variable (cross-validated percentage deviance explained = 2.1%).

Predictor	Influence (%)
URM ClassLv4	51.9
Septic_area_8km_Septic	6.8
Septic_area_2km_Sewer	6.1
Chl-a_8km	4.5
Septic_count_2km_Sewer	4.1
Septic_count_21km_Septic	3.9
Septic_count_21km_Sewer	3.7
Septic_area_13km_Septic	3.5
Permitted_13km	3.2
Permitted_21km	3.1
Population_sum_13km	2.5
Septic_count_13km_Septic	1.8
visit_13km	1.4
urban_m2_5km	1.2
Si_bottom_8km	1.2
Total_SusceptibleColonies	1.1

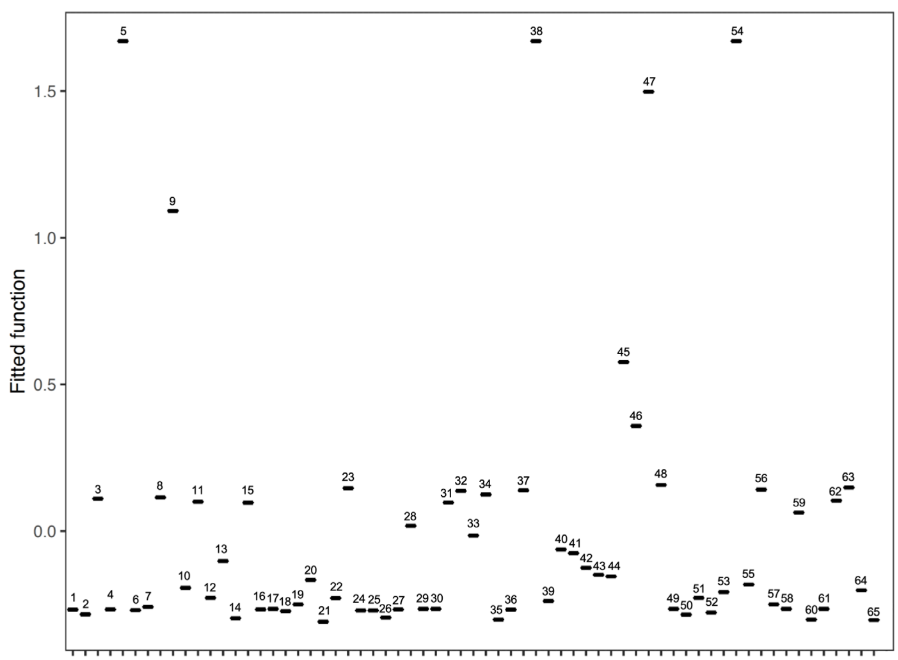

Figure 30. Effect of habitat type (*URM ClassLv4*) on the probability of TLD hotspot occurrence. Values higher on the y-axis indicate an increased probability of a TLD hotspot. Five habitats stand out as having a higher chance of TLD hotspot occurrence, namely: 5. Aggregate Reef, Algae (Continuous), 9. Aggregate Reef, Live Coral (Sparse), 38. Reef Rubble, Algae (Continuous), 47. Sand, Algae (Discontinuous), 54. Scattered Coral/Rock in Unconsolidated Sediment. See Appendix 5 for full habitat list.

2.3.3. TLD – Number of diseased colonies

The optimal model included 19 predictor variables (Table 17) and explained 52.1% of the underlying deviance in the number of TLD cases across the entire dataset. When predicting to new data from the training data, the cross-validated percentage deviance explained dropped to 20.6%, suggesting a low/reasonable ability to predict to new data. Two predictors in particular dominated the full model, namely habitat type (*URM* ClassLv4) and year, and together contributed 46.9% of the relative influence; the total number of susceptible colonies also contributed a further 9.4% of the relative influence (Table 17). Seven habitats in particular were associated with higher TLD occurrence, namely areas of Aggregate Reef, Algae (Continuous), Aggregate Reef, Live Coral (Sparse), Pavement with Seagrass (Continuous), Reef Rubble, Algae (Continuous), Sand (Shallow), Scattered Coral/Rock in Unconsolidated Sediment, and Scattered Coral/Rock in Unconsolidated Sediment, Live Coral (Discontinuous) (
Figure **31**). TLD cases were also higher in survey years after 2015 (Figure 32) and where there were higher numbers of susceptible hosts (although the association was weak compared to that of DSD cases and host abundance) (Figure 33).

Table 17. Relative influence (%) of the 19 significant predictor variables for TLD cases that together explained 52.1% of the underlying deviance in the response variable (cross-validated percentage deviance explained = 20.6%).

Predictor	Influence (%)
URM ClassLv4	24.8
Year	22.1
Total_SusceptibleColonies	9.4
Chl-a_8km	7.3
Depth	5.2
Septic_area_8km_Sewer	5.0
urban_m2_21km	4.2
TP_bottom_13km	3.3
Septic_area_21km_Septic	2.4
TN_bottom_21km	2.1
TN_surface_21km	2.0
Septic_area_5km_Septic	1.9
visit_3km	1.8
TOC_surface_21km	1.8
spend_1km	1.7
Septic_area_13km_Septic	1.4
TN_surface_8km	1.2
TP_bottom_8km	1.1
visit_13km	1.1

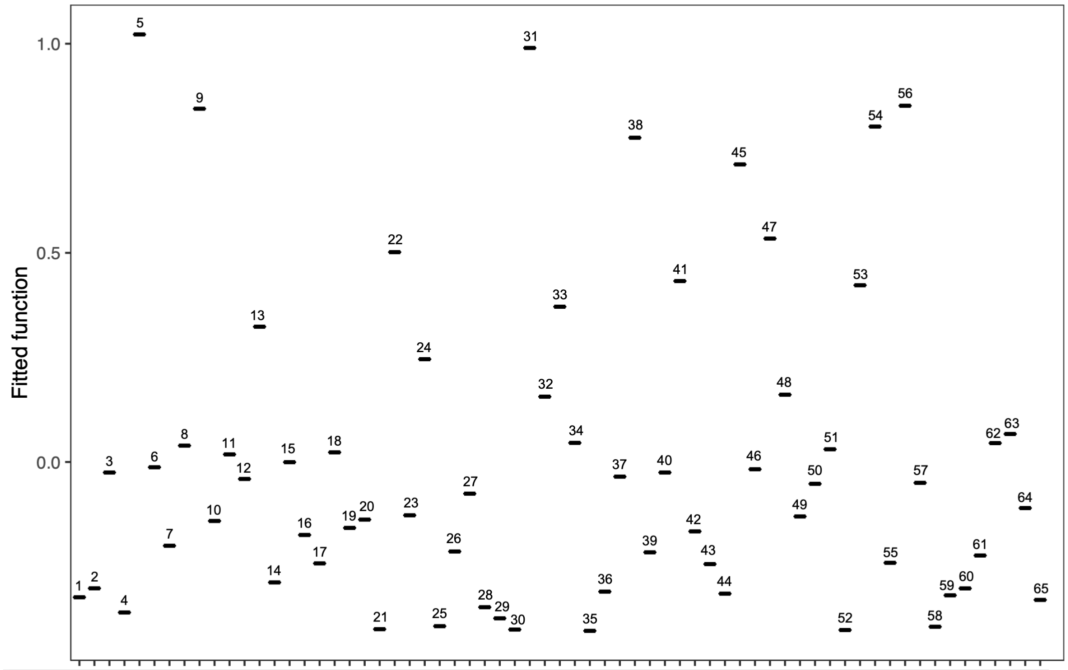

Figure 31. Effect of habitat type (*URM ClassLv4*) on the probability of TLD cases. Values higher on the y-axis indicate an increased probability of a TLD hotspot. Seven habitats stand out as having a higher chance of TLD occurrence, namely: 5. Aggregate Reef, Algae (Continuous), 9. Aggregate Reef, Live Coral (Sparse), 31. Pavement with Seagrass (Continuous), 38. Reef Rubble, Algae (Continuous), 45. Sand (Shallow), 54. Scattered Coral/Rock in Unconsolidated Sediment, and 56. Scattered Coral/Rock in Unconsolidated Sediment, Live Coral (Discontinuous). See Appendix 5 for full habitat list.

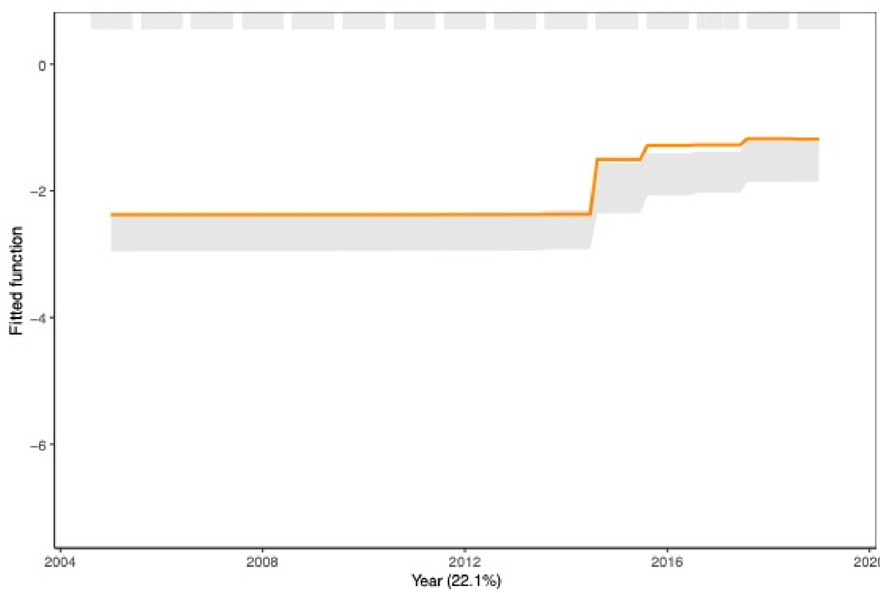

Figure 32. Effect of year on the number of TLD cases. Values higher on the y-axis indicate an increased probability of higher TLD cases. Mean effect (orange line) and 95% bootstrapped (n=100) confidence intervals (grey) shown. Response variable replication along x-axis shown by the light grey deciles along the top of the plot.

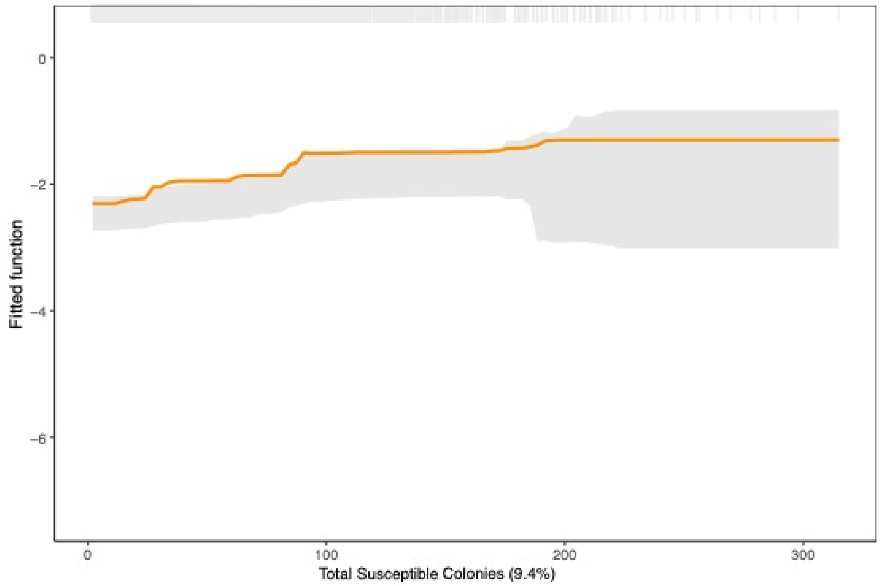

Figure 33. Effect of coral host abundance on the number of TLD cases. Values higher on the y-axis indicate an increased probability of higher TLD cases. Mean effect (orange line) and 95% bootstrapped (n=100) confidence intervals (grey) shown. Response variable replication along x-axis shown by the light grey deciles along the top of the plot.

2.4. **Part II Summary**

We modeled the occurrence of Dark Spot Syndrome (DSD) and Tissue Loss Disease (TLD) 'hotspots' and the number of diseased colonies along Florida's Coral Reef using yearly disease monitoring data (2005 to 2019) collected as part of the Florida Reef Resilience Program's (FRRP) Disturbance Response Monitoring program (DRM). To achieve this, we synthesized a total of 109 human impact and habitat related predictor variables across varying spatial scales (1 – 21km) for 2,508 and 2,643 DSD and TLD survey locations, respectively. We used a machine-learning modeling framework (Boosted Regression Trees) to identify spatial links between the predictors and DSD and TLD hotspot occurrence and number of disease cases. Our goal was to identify the conditions that increase the probability of either DSD or TLD in order to guide future survey designs and management actions aiming to understand and manage the occurrence of DSD and TLD along Florida's Coral Reef.

Overall, the spatial variation in disease hotspots was more challenging to explain than variations in the number of diseased coral hosts, and was harder still for TLD than for DSD. We explained ~40% of the underlying variation in DSD hotspot occurrence across the full dataset using 13 predictors, and over half of this variation was explained by variations in habitat type and depth. DSD hotspot occurrence was notably higher in areas of aggregate reef, where there was mud with infrequent (<10%) live coral cover, pavement, and shallow sandy areas. These habitat types appear to be more vulnerable to DSD hotspots and we recommend targeted surveys/surveillance in these habitat types along Florida's Coral Reef to monitor for future DSD outbreaks. DSD hotspot occurrence was also higher in shallower waters, in particular in less than 20 ft of water, regardless of habitat type. There could be various reasons for this linked to depth-related gradients in biophysical drivers (e.g., light intensity). Importantly, our ability to predict the occurrence of DSD hotspots across novel data when the model was constructed on portions of the full data set (i.e., training data) was poor to acceptable and resulted in a drop of ~30% predictive performance. In contrast, modeling the number of DSD cases resulted in improved predictive performance (64.4% of the underlying deviance in the number of DSD cases explained across the entire dataset) that remained fairly robust even when predicting to new data (47.1% cross-validated percentage deviance explained). The number of DSD cases increased as both surface water silica concentration and coral host abundance increased, and became maximized where silica exceeded 1.15 and where there were >100 coral hosts. DSD occurrence was also higher in areas with >13M m^2 septic area within 8km regardless of coral host abundance, but cases were highest where this coincided with >100 coral hosts. In contrast, we found no meaningful predictors of spatial variations in TLD hotspots and our ability to predict spatial variations in TLD cases was less than half that as for DSD. The full model explained 52.1% of the underlying deviance in the number of TLD cases across the entire dataset, but our ability to predict to new data was low/reasonable (20.6% cross-validated percentage deviance explained). Variations in TLD cases were driven by variations in habitat type, were higher in survey years beyond 2015, and where there were higher numbers of susceptible coral hosts.

Our results raise a number of points for future investigation and consideration. First, there appear to be some consistent conditions under which the probability of DSD and TLD occurring increase and this could help identify other areas along Florida's Coral Reef at risk of future disease occurrence and outbreaks. Second, the poor performance of the 'hotspot' models as compared to modeling the number of diseased colonies require we re-visit how disease hotspots are defined/computed and to critically ask whether they are ecologically meaningful. The improvement in model performance was particularly noticeable for DSD when using the number of diseased colonies as the model response variable. Finally, while our models were able to explain some of the underlying variation in disease cases, there remained substantial variation left unexplained, in particular for TLD. Given the number and varying types of predictors included in our models, in addition to our detailed exploration of variations in scale, our suggestion is to consider exploring possible host-specific biological drivers of DSD and TLD occurrence. It might be that these biological factors interact with some of the abiotic environmental drivers identified here to drive DSD and TLD patterns along Florida's Coral Reef. The methods developed and data layers produced as part of this project should be relevant to a number of future projects examining patterns of coral disease occurrence along Florida's Coral Reef and we have therefore provided DEP with all data summaries for possible future use.

3. FUTURE RESEARCH

These investigations showed that coastal urbanization and water management influence the number of coral disease lesions on Florida's Coral Reef across a number of spatial and temporal scales. The strength of those relationships is concerning and intriguing and highlights the need for further research to guide management actions to ameliorate coral disease in the region. Our larger-scale modeling efforts of DSD and TLD occurrence are considered complete and we intend to move forward with publishing our results for DSD in particular. Our models examining spatial and temporal patterns of SCTLD incidence (Part 1), however, could be greatly improved by: 1) extending the timeline of the monitoring data (data presently exist); 2) expanding the number of spatial scales over which we quantify the predictors; and, 3) including additional predictor variables that capture a greater range of coastal human impacts to reefs.

Fourteen additional months of monitoring data exist for the 51 large *O. faveolata* corals in the ECA collected from May 2020 to June 2021. Adding these additional data will increase the replication of the temporal model from n=20 to n=34, therefore improving its strength/rigor and importantly capturing another full seasonal cycle of SCTLD incidence (SCTLD incidence appears to peak in the summer months). Our confidence in the model results shown here will increase if we find a robust quantitative correlation between SCTLD incidence and ICA flow rates after including these additional data.

The relationship of the predictor variables to the SCTLD incidence within the Coral ECA varied spatially and temporally. For example, the ability of the number of septic tanks to explain spatial variations in SCTLD incidence was strongest when the number of tanks was quantified within a radius of 21km. The ability of flow rates from the ICAs to explain temporal variations in SCTLD incidence was strongest when flow rates were quantified over a 7-day period prior to the disease surveys. However, the scales over which we quantified these predictors was not exhaustive and we recommend expanding the number of scales over which these predictors are quantified and including these additional scales in our models. This might increase the amount of variation in SCTLD incidence the models can explain and also highlight in more detail the scales over which these human impacts are affecting SCTLD patterns on the reefs.

It is highly likely that other factors not quantified here could also play a role in predicting SCTLD incidence across scales within the Coral ECA. Our use of septic tanks as a proxy of coastal development could be expanded to include other metrics of coastal urbanization that also facilitate land-based runoff to coastal reefs, for example rainfall and the degree of impervious surfaces. Also, while we included some metrics to capture variations in coral host size and shape in our SCTLD models that we thought might influence disease susceptibility, we recommend quantifying more detailed host-specific factors that might affect patterns of SCTLD susceptibility. These could include underlying genetic differences and differences in endosymbiont communities between coral hosts. Identifying and quantifying these biological factors and investigating how they interact with abiotic environmental and human drivers may increase our ability to explain variations in SCTLD incidence and develop more meaningful management actions to benefit coral health. Some of these investigations have begun with the recently formed and funded SCTLD Resistance Research Consortium (RRC).

The SCTLD RRC is a DEP-funded collaborative coral sampling effort including data collected on host genotypes, microbiomes, metabolomics, proteomics, and transcriptomics, as well as cellular histopathology and endosymbionts. The goal is to understand the genetic, biochemical, and physiological underpinnings in the holobiont of individuals between infection categories to characterize risk factors that are driving differences in SCTLD infection rates. These findings are needed to understand the resistance and susceptibility factors of corals to SCTLD. The work will provide a fundamental understanding of *O. faveolata* holobiont at gross morphologic, genetic, biochemical and molecular scales at three time points across SE FL, Looe Key, and Sand Key. We have a unique opportunity to leverage these data for inclusion in our spatial and temporal models of SCTLD incidence. Combining abiotic environmental, human, and host-specific drivers of SCTLD susceptibility in a single statistical modeling framework should enhance our ability to predict disease patterns and advise on appropriate management actions for mitigation.

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APPENDIX 1. Summed number of Hot Snap (Heron et al. 2010) exposure hours for our 51 monitored large corals (LC) across the three months prior to each disease survey from September 2018 to April 2020. Also given is the mean, standard deviation (1SD) and maximum temperature (°C) over the three-month period prior to each disease survey date. Note dates are in "day, month, year" format.

LC-120

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-120	09/08/2018	DC6	85	28.518	1.774	31.306	1092
LC-120	13/09/2018	DC6	94	29.750	0.597	31.306	1092
LC-120	08/11/2018	DC6	50	29.083	1.139	30.950	1092
LC-120	18/12/2018	DC6	31	27.335	1.791	30.950	1092
LC-120	15/01/2019	DC6	0	25.713	1.566	29.190	1092
LC-120	19/02/2019	DC6	0	24.122	1.135	26.842	1092
LC-120	21/03/2019	DC6	0	24.147	1.096	26.353	1092
LC-120	11/04/2019	DC6	0	24.361	1.153	26.353	1092
LC-120	21/05/2019	DC6	0	25.814	0.945	28.048	1092
LC-120	14/06/2019	DC6	0	26.567	1.347	29.941	1092
LC-120	16/07/2019	DC6	2	27.925	1.266	30.545	1092
LC-120	16/08/2019	DC6	105	29.120	1.058	31.052	1092
LC-120	24/09/2019	DC6	167	29.806	0.648	31.128	1092
LC-120	21/10/2019	DC6	160	29.468	0.859	31.128	1092
LC-120	12/11/2019	DC6	91	29.109	0.884	31.128	1092
LC-120	04/12/2019	DC6	0	28.094	1.349	30.343	1092
LC-120	07/01/2020	DC6	0	26.575	1.779	29.540	1092
LC-120	20/02/2020	DC6	0	24.506	0.991	26.744	1092
LC-120	06/03/2020	DC6	0	24.158	0.853	26.182	1092
LC-120	16/04/2020	DC6	0	24.550	1.060	27.235	1092

LC-015

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-015	13/09/2018	DC6	94	29.750	0.597	31.306	1092
LC-015	25/10/2018	DC6	50	29.502	0.737	30.950	1092
LC-015	08/11/2018	DC6	50	29.083	1.139	30.950	1092
LC-015	18/12/2018	DC6	31	27.335	1.791	30.950	1092
LC-015	15/01/2019	DC6	0	25.713	1.566	29.190	1092
LC-015	19/02/2019	DC6	0	24.122	1.135	26.842	1092
LC-015	21/03/2019	DC6	0	24.147	1.096	26.353	1092
LC-015	11/04/2019	DC6	0	24.361	1.153	26.353	1092
LC-015	21/05/2019	DC6	0	25.814	0.945	28.048	1092
LC-015	14/06/2019	DC6	0	26.567	1.347	29.941	1092
LC-015	16/07/2019	DC6	2	27.925	1.266	30.545	1092
LC-015	16/08/2019	DC6	105	29.120	1.058	31.052	1092
LC-015	24/09/2019	DC6	167	29.806	0.648	31.128	1092
LC-015	21/10/2019	DC6	160	29.468	0.859	31.128	1092
LC-015	12/11/2019	DC6	91	29.109	0.884	31.128	1092
LC-015	03/12/2019	DC6	0	28.153	1.291	30.343	1092
LC-015	08/01/2020	DC6	0	26.515	1.808	29.540	1092
LC-015	20/02/2020	DC6	0	24.506	0.991	26.744	1092
LC-015	05/03/2020	DC6	0	24.154	0.850	26.182	1092
LC-015	16/04/2020	DC6	0	24.550	1.060	27.235	1092

LC-009

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-009	11/09/2018	DC6	94	29.718	0.631	31.306	1092
LC-009	25/10/2018	DC6	50	29.502	0.737	30.950	1092
LC-009	15/11/2018	DC6	47	28.884	1.180	30.950	1092
LC-009	03/12/2018	DC6	41	28.111	1.549	30.950	1092
LC-009	15/01/2019	DC6	0	25.713	1.566	29.190	1092
LC-009	19/02/2019	DC6	0	24.122	1.135	26.842	1092
LC-009	21/03/2019	DC6	0	24.147	1.096	26.353	1092
LC-009	11/04/2019	DC6	0	24.361	1.153	26.353	1092
LC-009	21/05/2019	DC6	0	25.814	0.945	28.048	1092
LC-009	12/06/2019	DC6	0	26.487	1.328	29.941	1092
LC-009	16/07/2019	DC6	2	27.925	1.266	30.545	1092
LC-009	16/08/2019	DC6	105	29.120	1.058	31.052	1092
LC-009	24/09/2019	DC6	167	29.806	0.648	31.128	1092
LC-009	16/10/2019	DC6	165	29.532	0.859	31.128	1092
LC-009	12/11/2019	DC6	91	29.109	0.884	31.128	1092
LC-009	03/12/2019	DC6	0	28.153	1.291	30.343	1092
LC-009	08/01/2020	DC6	0	26.515	1.808	29.540	1092
LC-009	05/02/2020	DC6	0	24.927	1.288	28.468	1092
LC-009	06/03/2020	DC6	0	24.158	0.853	26.182	1092
LC-009	08/04/2020	DC6	0	24.355	1.038	27.161	1092

LC-118

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-118	13/09/2018	DC6	94	29.750	0.597	31.306	1092
LC-118	25/10/2018	DC6	50	29.502	0.737	30.950	1092
LC-118	08/11/2018	DC6	50	29.083	1.139	30.950	1092
LC-118	03/12/2018	DC6	41	28.111	1.549	30.950	1092
LC-118	15/01/2019	DC6	0	25.713	1.566	29.190	1092
LC-118	19/02/2019	DC6	0	24.122	1.135	26.842	1092
LC-118	21/03/2019	DC6	0	24.147	1.096	26.353	1092
LC-118	11/04/2019	DC6	0	24.361	1.153	26.353	1092
LC-118	21/05/2019	DC6	0	25.814	0.945	28.048	1092
LC-118	14/06/2019	DC6	0	26.567	1.347	29.941	1092
LC-118	16/07/2019	DC6	2	27.925	1.266	30.545	1092
LC-118	16/08/2019	DC6	105	29.120	1.058	31.052	1092
LC-118	24/09/2019	DC6	167	29.806	0.648	31.128	1092
LC-118	21/10/2019	DC6	160	29.468	0.859	31.128	1092
LC-118	12/11/2019	DC6	91	29.109	0.884	31.128	1092
LC-118	03/12/2019	DC6	0	28.153	1.291	30.343	1092
LC-118	08/01/2020	DC6	0	26.515	1.808	29.540	1092
LC-118	05/02/2020	DC6	0	24.927	1.288	28.468	1092
LC-118	06/03/2020	DC6	0	24.158	0.853	26.182	1092
LC-118	08/04/2020	DC6	0	24.355	1.038	27.161	1092

LC-101

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-101	18/09/2018	DC8	522	30.280	0.713	32.253	1092
LC-101	24/10/2018	DC8	365	29.781	0.949	31.306	1092
LC-101	06/11/2018	DC8	250	29.273	1.275	31.306	1092
LC-101	03/12/2018	DC8	115	28.112	1.666	31.204	1092
LC-101	14/01/2019	DC8	0	25.579	1.815	29.215	1092
LC-101	28/02/2019	DC8	0	23.873	1.123	26.598	1092
LC-101	25/03/2019	DC8	0	24.219	1.257	26.916	1092
LC-101	15/04/2019	DC8	0	24.605	1.413	27.677	1092
LC-101	20/05/2019	DC8	0	26.228	1.203	29.290	1092
LC-101	13/06/2019	DC8	1	27.016	1.556	30.495	1092
LC-101	13/06/2019	DC8	1	27.016	1.556	30.495	1092
LC-101	27/08/2019	DC8	511	30.252	0.878	31.944	1092
LC-101	16/09/2019	DC8	514	30.424	0.652	31.944	1092
LC-101	09/10/2019	DC8	364	29.952	1.028	31.944	1092
LC-101	05/11/2019	DC8	193	29.416	1.014	31.944	1092
LC-101	05/12/2019	DC8	0	27.984	1.493	30.419	1092
LC-101	16/01/2020	DC8	0	25.939	1.911	29.665	1092
LC-101	14/02/2020	DC8	0	24.416	1.025	27.407	1092
LC-101	16/03/2020	DC8	0	24.023	0.829	25.866	1092
LC-101	09/04/2020	DC8	0	24.475	1.200	27.727	1092

LC-110

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-110	10/09/2018	DC8	497	30.182	0.810	32.253	1092
LC-110	24/10/2018	DC8	365	29.781	0.949	31.306	1092
LC-110	06/11/2018	DC8	250	29.273	1.275	31.306	1092
LC-110	04/12/2018	DC8	115	28.082	1.688	31.204	1092
LC-110	14/01/2019	DC8	0	25.579	1.815	29.215	1092
LC-110	28/02/2019	DC8	0	23.873	1.123	26.598	1092
LC-110	25/03/2019	DC8	0	24.219	1.257	26.916	1092
LC-110	15/04/2019	DC8	0	24.605	1.413	27.677	1092
LC-110	20/05/2019	DC8	0	26.228	1.203	29.290	1092
LC-110	13/06/2019	DC8	1	27.016	1.556	30.495	1092
LC-110	17/07/2019	DC8	194	28.777	1.526	31.765	1092
LC-110	16/08/2019	DC8	420	29.923	1.126	31.842	1092
LC-110	16/09/2019	DC8	514	30.424	0.652	31.944	1092
LC-110	09/10/2019	DC8	364	29.952	1.028	31.944	1092
LC-110	05/11/2019	DC8	193	29.416	1.014	31.944	1092
LC-110	05/12/2019	DC8	0	27.984	1.493	30.419	1092
LC-110	16/01/2020	DC8	0	25.939	1.911	29.665	1092
LC-110	14/02/2020	DC8	0	24.416	1.025	27.407	1092
LC-110	13/03/2020	DC8	0	24.024	0.830	25.866	1092
LC-110	09/04/2020	DC8	0	24.475	1.200	27.727	1092

LC-059

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-059	18/09/2018	DC1	103	29.844	0.495	31.331	1091
LC-059	25/10/2018	DC1	30	29.493	0.700	31.331	1092
LC-059	08/11/2018	DC1	30	29.090	1.087	31.331	1092
LC-059	18/12/2018	DC1	15	27.360	1.741	31.077	1092
LC-059	15/01/2019	DC1	0	25.790	1.532	29.040	1092
LC-059	28/02/2019	DC1	0	24.178	1.017	26.500	1092
LC-059	21/03/2019	DC1	0	24.270	1.094	26.500	1092
LC-059	11/04/2019	DC1	0	24.494	1.151	26.500	1092
LC-059	26/04/2019	DC1	0	24.946	1.137	26.940	1092
LC-059	21/05/2019	DC1	0	25.962	0.917	28.543	1092
LC-059	13/06/2019	DC1	1	26.678	1.321	30.646	1092
LC-059	17/07/2019	DC1	8	28.119	1.336	30.748	1092
LC-059	28/08/2019	DC1	180	29.549	0.991	31.331	1092
LC-059	25/09/2019	DC1	179	29.865	0.652	31.331	1092
LC-059	18/10/2019	DC1	164	29.495	0.879	31.331	1092
LC-059	20/11/2019	DC1	8	28.734	0.989	30.722	1092
LC-059	04/12/2019	DC1	0	28.162	1.226	30.268	1092
LC-059	07/01/2020	DC1	0	26.653	1.729	29.565	1092
LC-059	04/02/2020	DC1	0	25.153	1.331	28.742	1092
LC-059	07/03/2020	DC1	0	24.211	0.834	25.914	1092
LC-059	16/04/2020	DC1	0	24.586	1.085	27.530	1092

LC-103

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-103	10/09/2018	DC8	497	30.182	0.810	32.253	1092
LC-103	24/10/2018	DC8	365	29.781	0.949	31.306	1092
LC-103	06/11/2018	DC8	250	29.273	1.275	31.306	1092
LC-103	04/12/2018	DC8	115	28.082	1.688	31.204	1092
LC-103	28/02/2019	DC8	0	23.873	1.123	26.598	1092
LC-103	25/03/2019	DC8	0	24.219	1.257	26.916	1092
LC-103	15/04/2019	DC8	0	24.605	1.413	27.677	1092
LC-103	20/05/2019	DC8	0	26.228	1.203	29.290	1092
LC-103	13/06/2019	DC8	1	27.016	1.556	30.495	1092
LC-103	19/07/2019	DC8	216	28.859	1.534	31.765	1092
LC-103	28/08/2019	DC8	511	30.278	0.841	31.944	1092
LC-103	16/09/2019	DC8	514	30.424	0.652	31.944	1092
LC-103	09/10/2019	DC8	364	29.952	1.028	31.944	1092
LC-103	05/11/2019	DC8	193	29.416	1.014	31.944	1092
LC-103	05/12/2019	DC8	0	27.984	1.493	30.419	1092
LC-103	16/01/2020	DC8	0	25.939	1.911	29.665	1092
LC-103	14/02/2020	DC8	0	24.416	1.025	27.407	1092
LC-103	16/03/2020	DC8	0	24.023	0.829	25.866	1092
LC-103	09/04/2020	DC8	0	24.475	1.200	27.727	1092

LC-085

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-085	13/09/2018	DC8	497	30.214	0.762	32.253	1092
LC-085	24/10/2018	DC8	365	29.781	0.949	31.306	1092
LC-085	06/11/2018	DC8	250	29.273	1.275	31.306	1092
LC-085	04/12/2018	DC8	115	28.082	1.688	31.204	1092
LC-085	14/01/2019	DC8	0	25.579	1.815	29.215	1092
LC-085	28/02/2019	DC8	0	23.873	1.123	26.598	1092
LC-085	25/03/2019	DC8	0	24.219	1.257	26.916	1092
LC-085	15/04/2019	DC8	0	24.605	1.413	27.677	1092
LC-085	20/05/2019	DC8	0	26.228	1.203	29.290	1092
LC-085	13/06/2019	DC8	1	27.016	1.556	30.495	1092
LC-085	17/07/2019	DC8	194	28.777	1.526	31.765	1092
LC-085	27/09/2019	DC8	466	30.271	0.819	31.944	1092
LC-085	09/10/2019	DC8	364	29.952	1.028	31.944	1092
LC-085	05/11/2019	DC8	193	29.416	1.014	31.944	1092
LC-085	05/12/2019	DC8	0	27.984	1.493	30.419	1092
LC-085	16/01/2020	DC8	0	25.939	1.911	29.665	1092
LC-085	14/02/2020	DC8	0	24.416	1.025	27.407	1092
LC-085	13/03/2020	DC8	0	24.024	0.830	25.866	1092
LC-085	09/04/2020	DC8	0	24.475	1.200	27.727	1092

LC-119

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-119	11/09/2018	DC6	94	29.718	0.631	31.306	1092
LC-119	25/10/2018	DC6	50	29.502	0.737	30.950	1092
LC-119	08/11/2018	DC6	50	29.083	1.139	30.950	1092
LC-119	03/12/2018	DC6	41	28.111	1.549	30.950	1092
LC-119	15/01/2019	DC6	0	25.713	1.566	29.190	1092
LC-119	19/02/2019	DC6	0	24.122	1.135	26.842	1092
LC-119	21/03/2019	DC6	0	24.147	1.096	26.353	1092
LC-119	11/04/2019	DC6	0	24.361	1.153	26.353	1092
LC-119	21/05/2019	DC6	0	25.814	0.945	28.048	1092
LC-119	14/06/2019	DC6	0	26.567	1.347	29.941	1092
LC-119	14/06/2019	DC6	0	26.567	1.347	29.941	1092
LC-119	16/08/2019	DC6	105	29.120	1.058	31.052	1092
LC-119	18/09/2019	DC6	167	29.760	0.743	31.128	1092
LC-119	21/10/2019	DC6	160	29.468	0.859	31.128	1092
LC-119	12/11/2019	DC6	91	29.109	0.884	31.128	1092
LC-119	03/12/2019	DC6	0	28.153	1.291	30.343	1092
LC-119	08/01/2020	DC6	0	26.515	1.808	29.540	1092
LC-119	05/02/2020	DC6	0	24.927	1.288	28.468	1092
LC-119	06/03/2020	DC6	0	24.158	0.853	26.182	1092
LC-119	08/04/2020	DC6	0	24.355	1.038	27.161	1092

LC-077

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-077	18/09/2018	DC8	522	30.280	0.713	32.253	1092
LC-077	24/10/2018	DC8	365	29.781	0.949	31.306	1092
LC-077	06/11/2018	DC8	250	29.273	1.275	31.306	1092
LC-077	04/12/2018	DC8	115	28.082	1.688	31.204	1092
LC-077	14/01/2019	DC8	0	25.579	1.815	29.215	1092
LC-077	28/02/2019	DC8	0	23.873	1.123	26.598	1092
LC-077	25/03/2019	DC8	0	24.219	1.257	26.916	1092
LC-077	15/04/2019	DC8	0	24.605	1.413	27.677	1092
LC-077	20/05/2019	DC8	0	26.228	1.203	29.290	1092
LC-077	13/06/2019	DC8	1	27.016	1.556	30.495	1092
LC-077	22/07/2019	DC8	220	28.989	1.475	31.765	1092
LC-077	27/08/2019	DC8	511	30.252	0.878	31.944	1092
LC-077	27/09/2019	DC8	466	30.271	0.819	31.944	1092
LC-077	17/10/2019	DC8	309	29.760	1.102	31.944	1092
LC-077	21/11/2019	DC8	27	28.712	1.147	30.798	1092
LC-077	06/12/2019	DC8	0	27.933	1.521	30.419	1092
LC-077	27/01/2020	DC8	0	25.337	1.620	29.240	1092
LC-077	14/02/2020	DC8	0	24.416	1.025	27.407	1092
LC-077	13/03/2020	DC8	0	24.024	0.830	25.866	1092
LC-077	10/04/2020	DC8	0	24.511	1.225	27.727	1092

LC-013

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-013	11/09/2018	DC6	94	29.718	0.631	31.306	1092
LC-013	25/10/2018	DC6	50	29.502	0.737	30.950	1092
LC-013	08/11/2018	DC6	50	29.083	1.139	30.950	1092
LC-013	18/12/2018	DC6	31	27.335	1.791	30.950	1092
LC-013	18/12/2018	DC6	31	27.335	1.791	30.950	1092
LC-013	19/02/2019	DC6	0	24.122	1.135	26.842	1092
LC-013	21/03/2019	DC6	0	24.147	1.096	26.353	1092
LC-013	11/04/2019	DC6	0	24.361	1.153	26.353	1092
LC-013	21/05/2019	DC6	0	25.814	0.945	28.048	1092
LC-013	14/06/2019	DC6	0	26.567	1.347	29.941	1092
LC-013	16/07/2019	DC6	2	27.925	1.266	30.545	1092
LC-013	16/08/2019	DC6	105	29.120	1.058	31.052	1092
LC-013	24/09/2019	DC6	167	29.806	0.648	31.128	1092
LC-013	21/10/2019	DC6	160	29.468	0.859	31.128	1092
LC-013	12/11/2019	DC6	91	29.109	0.884	31.128	1092
LC-013	03/12/2019	DC6	0	28.153	1.291	30.343	1092
LC-013	08/01/2020	DC6	0	26.515	1.808	29.540	1092
LC-013	05/02/2020	DC6	0	24.927	1.288	28.468	1092
LC-013	06/03/2020	DC6	0	24.158	0.853	26.182	1092
LC-013	08/04/2020	DC6	0	24.355	1.038	27.161	1092

LC-122

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-122	13/09/2018	DC6	94	29.750	0.597	31.306	1092
LC-122	25/10/2018	DC6	50	29.502	0.737	30.950	1092
LC-122	08/11/2018	DC6	50	29.083	1.139	30.950	1092
LC-122	18/12/2018	DC6	31	27.335	1.791	30.950	1092
LC-122	15/01/2019	DC6	0	25.713	1.566	29.190	1092
LC-122	19/02/2019	DC6	0	24.122	1.135	26.842	1092
LC-122	21/03/2019	DC6	0	24.147	1.096	26.353	1092
LC-122	12/04/2019	DC6	0	24.386	1.162	26.353	1092
LC-122	21/05/2019	DC6	0	25.814	0.945	28.048	1092
LC-122	14/06/2019	DC6	0	26.567	1.347	29.941	1092
LC-122	16/07/2019	DC6	2	27.925	1.266	30.545	1092
LC-122	16/08/2019	DC6	105	29.120	1.058	31.052	1092
LC-122	24/09/2019	DC6	167	29.806	0.648	31.128	1092
LC-122	18/10/2019	DC6	165	29.510	0.862	31.128	1092
LC-122	12/11/2019	DC6	91	29.109	0.884	31.128	1092
LC-122	04/12/2019	DC6	0	28.094	1.349	30.343	1092
LC-122	07/01/2020	DC6	0	26.575	1.779	29.540	1092
LC-122	20/02/2020	DC6	0	24.506	0.991	26.744	1092
LC-122	06/03/2020	DC6	0	24.158	0.853	26.182	1092
LC-122	16/04/2020	DC6	0	24.550	1.060	27.235	1092

LC-005

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-005	13/09/2018	BC1	40	29.628	0.512	30.773	1092
LC-005	26/10/2018	BC1	13	29.405	0.681	30.621	1092
LC-005	15/11/2018	BC1	13	28.835	1.096	30.621	1092
LC-005	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-005	17/01/2019	BC1	0	25.685	1.494	28.916	1092
LC-005	15/02/2019	BC1	0	24.315	1.232	27.161	1092
LC-005	18/03/2019	BC1	0	24.197	1.065	26.158	1092
LC-005	12/04/2019	BC1	0	24.483	1.133	26.451	1092
LC-005	22/05/2019	BC1	0	25.854	0.929	28.270	1092
LC-005	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-005	15/07/2019	BC1	0	27.776	1.252	30.369	1092
LC-005	15/08/2019	BC1	77	29.000	1.055	31.026	1092
LC-005	09/09/2019	BC1	149	29.569	0.875	31.128	1092
LC-005	16/10/2019	BC1	146	29.471	0.879	31.128	1092
LC-005	13/11/2019	BC1	84	29.004	0.929	31.128	1092
LC-005	03/12/2019	BC1	0	28.046	1.332	30.167	1092
LC-005	08/01/2020	BC1	0	26.508	1.730	29.439	1092
LC-005	05/02/2020	BC1	0	25.045	1.167	28.766	1092
LC-005	08/03/2020	BC1	0	24.353	0.776	26.134	1092
LC-005	08/04/2020	BC1	0	24.526	0.904	26.231	1092

LC-047

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-047	13/09/2018	BC1	40	29.628	0.512	30.773	1092
LC-047	26/10/2018	BC1	13	29.405	0.681	30.621	1092
LC-047	15/11/2018	BC1	13	28.835	1.096	30.621	1092
LC-047	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-047	17/01/2019	BC1	0	25.685	1.494	28.916	1092
LC-047	15/02/2019	BC1	0	24.315	1.232	27.161	1092
LC-047	18/03/2019	BC1	0	24.197	1.065	26.158	1092
LC-047	12/04/2019	BC1	0	24.483	1.133	26.451	1092
LC-047	22/05/2019	BC1	0	25.854	0.929	28.270	1092
LC-047	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-047	15/07/2019	BC1	0	27.776	1.252	30.369	1092
LC-047	15/08/2019	BC1	77	29.000	1.055	31.026	1092
LC-047	15/09/2019	BC1	149	29.638	0.822	31.128	1092
LC-047	16/10/2019	BC1	146	29.471	0.879	31.128	1092
LC-047	13/11/2019	BC1	84	29.004	0.929	31.128	1092
LC-047	03/12/2019	BC1	0	28.046	1.332	30.167	1092
LC-047	08/01/2020	BC1	0	26.508	1.730	29.439	1092
LC-047	05/02/2020	BC1	0	25.045	1.167	28.766	1092
LC-047	08/03/2020	BC1	0	24.353	0.776	26.134	1092
LC-047	08/04/2020	BC1	0	24.526	0.904	26.231	1092

LC-075

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-075	10/09/2018	DC8	497	30.182	0.810	32.253	1092
LC-075	24/10/2018	DC8	365	29.781	0.949	31.306	1092
LC-075	06/11/2018	DC8	250	29.273	1.275	31.306	1092
LC-075	04/12/2018	DC8	115	28.082	1.688	31.204	1092
LC-075	14/01/2019	DC8	0	25.579	1.815	29.215	1092
LC-075	28/02/2019	DC8	0	23.873	1.123	26.598	1092
LC-075	25/03/2019	DC8	0	24.219	1.257	26.916	1092
LC-075	15/04/2019	DC8	0	24.605	1.413	27.677	1092
LC-075	20/05/2019	DC8	0	26.228	1.203	29.290	1092
LC-075	13/06/2019	DC8	1	27.016	1.556	30.495	1092
LC-075	22/07/2019	DC8	220	28.989	1.475	31.765	1092
LC-075	27/08/2019	DC8	511	30.252	0.878	31.944	1092
LC-075	27/09/2019	DC8	466	30.271	0.819	31.944	1092
LC-075	17/10/2019	DC8	309	29.760	1.102	31.944	1092
LC-075	21/11/2019	DC8	27	28.712	1.147	30.798	1092
LC-075	06/12/2019	DC8	0	27.933	1.521	30.419	1092
LC-075	27/01/2020	DC8	0	25.337	1.620	29.240	1092
LC-075	14/02/2020	DC8	0	24.416	1.025	27.407	1092
LC-075	13/03/2020	DC8	0	24.024	0.830	25.866	1092
LC-075	10/04/2020	DC8	0	24.511	1.225	27.727	1092

LC-054

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-054	12/09/2018	BC1	40	29.611	0.532	30.773	1092
LC-054	26/10/2018	BC1	13	29.405	0.681	30.621	1092
LC-054	15/11/2018	BC1	13	28.835	1.096	30.621	1092
LC-054	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-054	15/02/2019	BC1	0	24.315	1.232	27.161	1092
LC-054	18/03/2019	BC1	0	24.197	1.065	26.158	1092
LC-054	12/04/2019	BC1	0	24.483	1.133	26.451	1092
LC-054	22/05/2019	BC1	0	25.854	0.929	28.270	1092
LC-054	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-054	15/07/2019	BC1	0	27.776	1.252	30.369	1092
LC-054	15/08/2019	BC1	77	29.000	1.055	31.026	1092
LC-054	09/09/2019	BC1	149	29.569	0.875	31.128	1092
LC-054	16/10/2019	BC1	146	29.471	0.879	31.128	1092
LC-054	13/11/2019	BC1	84	29.004	0.929	31.128	1092
LC-054	03/12/2019	BC1	0	28.046	1.332	30.167	1092
LC-054	08/01/2020	BC1	0	26.508	1.730	29.439	1092
LC-054	05/02/2020	BC1	0	25.045	1.167	28.766	1092
LC-054	08/03/2020	BC1	0	24.353	0.776	26.134	1092
LC-054	08/04/2020	BC1	0	24.526	0.904	26.231	1092

LC-078

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-078	13/09/2018	BC1	40	29.628	0.512	30.773	1092
LC-078	26/10/2018	BC1	13	29.405	0.681	30.621	1092
LC-078	15/11/2018	BC1	13	28.835	1.096	30.621	1092
LC-078	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-078	17/01/2019	BC1	0	25.685	1.494	28.916	1092
LC-078	15/02/2019	BC1	0	24.315	1.232	27.161	1092
LC-078	18/03/2019	BC1	0	24.197	1.065	26.158	1092
LC-078	12/04/2019	BC1	0	24.483	1.133	26.451	1092
LC-078	22/05/2019	BC1	0	25.854	0.929	28.270	1092
LC-078	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-078	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-078	14/07/2019	BC1	0	27.734	1.251	30.369	1092
LC-078	15/08/2019	BC1	77	29.000	1.055	31.026	1092
LC-078	09/09/2019	BC1	149	29.569	0.875	31.128	1092
LC-078	16/10/2019	BC1	146	29.471	0.879	31.128	1092
LC-078	05/11/2019	BC1	108	29.215	0.839	31.128	1092
LC-078	03/12/2019	BC1	0	28.046	1.332	30.167	1092
LC-078	08/01/2020	BC1	0	26.508	1.730	29.439	1092
LC-078	05/02/2020	BC1	0	25.045	1.167	28.766	1092
LC-078	08/03/2020	BC1	0	24.353	0.776	26.134	1092
LC-078	08/04/2020	BC1	0	24.526	0.904	26.231	1092

LC-080

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-080	18/09/2018	DC8	522	30.280	0.713	32.253	1092
LC-080	24/10/2018	DC8	365	29.781	0.949	31.306	1092
LC-080	06/11/2018	DC8	250	29.273	1.275	31.306	1092
LC-080	04/12/2018	DC8	115	28.082	1.688	31.204	1092
LC-080	14/01/2019	DC8	0	25.579	1.815	29.215	1092
LC-080	28/02/2019	DC8	0	23.873	1.123	26.598	1092
LC-080	25/03/2019	DC8	0	24.219	1.257	26.916	1092
LC-080	15/04/2019	DC8	0	24.605	1.413	27.677	1092
LC-080	20/05/2019	DC8	0	26.228	1.203	29.290	1092
LC-080	13/06/2019	DC8	1	27.016	1.556	30.495	1092
LC-080	22/07/2019	DC8	220	28.989	1.475	31.765	1092
LC-080	27/08/2019	DC8	511	30.252	0.878	31.944	1092
LC-080	27/09/2019	DC8	466	30.271	0.819	31.944	1092
LC-080	09/10/2019	DC8	364	29.952	1.028	31.944	1092
LC-080	21/11/2019	DC8	27	28.712	1.147	30.798	1092
LC-080	05/12/2019	DC8	0	27.984	1.493	30.419	1092
LC-080	16/01/2020	DC8	0	25.939	1.911	29.665	1092
LC-080	14/02/2020	DC8	0	24.416	1.025	27.407	1092
LC-080	13/03/2020	DC8	0	24.024	0.830	25.866	1092
LC-080	09/04/2020	DC8	0	24.475	1.200	27.727	1092

LC-016

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-016	11/09/2018	DC6	94	29.718	0.631	31.306	1092
LC-016	25/10/2018	DC6	50	29.502	0.737	30.950	1092
LC-016	08/11/2018	DC6	50	29.083	1.139	30.950	1092
LC-016	18/12/2018	DC6	31	27.335	1.791	30.950	1092
LC-016	15/01/2019	DC6	0	25.713	1.566	29.190	1092
LC-016	19/02/2019	DC6	0	24.122	1.135	26.842	1092
LC-016	21/03/2019	DC6	0	24.147	1.096	26.353	1092
LC-016	11/04/2019	DC6	0	24.361	1.153	26.353	1092
LC-016	21/05/2019	DC6	0	25.814	0.945	28.048	1092
LC-016	14/06/2019	DC6	0	26.567	1.347	29.941	1092
LC-016	16/07/2019	DC6	2	27.925	1.266	30.545	1092
LC-016	16/08/2019	DC6	105	29.120	1.058	31.052	1092
LC-016	24/09/2019	DC6	167	29.806	0.648	31.128	1092
LC-016	18/10/2019	DC6	165	29.510	0.862	31.128	1092
LC-016	12/11/2019	DC6	91	29.109	0.884	31.128	1092
LC-016	04/12/2019	DC6	0	28.094	1.349	30.343	1092
LC-016	07/01/2020	DC6	0	26.575	1.779	29.540	1092
LC-016	20/02/2020	DC6	0	24.506	0.991	26.744	1092
LC-016	06/03/2020	DC6	0	24.158	0.853	26.182	1092
LC-016	16/04/2020	DC6	0	24.550	1.060	27.235	1092

LC-041

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-041	18/09/2018	BC1	40	29.723	0.411	30.773	1092
LC-041	26/10/2018	BC1	13	29.405	0.681	30.621	1092
LC-041	15/11/2018	BC1	13	28.835	1.096	30.621	1092
LC-041	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-041	17/01/2019	BC1	0	25.685	1.494	28.916	1092
LC-041	15/02/2019	BC1	0	24.315	1.232	27.161	1092
LC-041	18/03/2019	BC1	0	24.197	1.065	26.158	1092
LC-041	12/04/2019	BC1	0	24.483	1.133	26.451	1092
LC-041	22/05/2019	BC1	0	25.854	0.929	28.270	1092
LC-041	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-041	15/07/2019	BC1	0	27.776	1.252	30.369	1092
LC-041	15/08/2019	BC1	77	29.000	1.055	31.026	1092
LC-041	09/09/2019	BC1	149	29.569	0.875	31.128	1092
LC-041	16/10/2019	BC1	146	29.471	0.879	31.128	1092
LC-041	13/11/2019	BC1	84	29.004	0.929	31.128	1092
LC-041	03/12/2019	BC1	0	28.046	1.332	30.167	1092
LC-041	08/01/2020	BC1	0	26.508	1.730	29.439	1092
LC-041	05/02/2020	BC1	0	25.045	1.167	28.766	1092
LC-041	06/03/2020	BC1	0	24.372	0.782	26.134	1092
LC-041	08/04/2020	BC1	0	24.526	0.904	26.231	1092

LC-053

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-053	12/09/2018	BC1	40	29.611	0.532	30.773	1092
LC-053	26/10/2018	BC1	13	29.405	0.681	30.621	1092
LC-053	15/11/2018	BC1	13	28.835	1.096	30.621	1092
LC-053	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-053	17/01/2019	BC1	0	25.685	1.494	28.916	1092
LC-053	15/02/2019	BC1	0	24.315	1.232	27.161	1092
LC-053	18/03/2019	BC1	0	24.197	1.065	26.158	1092
LC-053	12/04/2019	BC1	0	24.483	1.133	26.451	1092
LC-053	22/05/2019	BC1	0	25.854	0.929	28.270	1092
LC-053	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-053	15/07/2019	BC1	0	27.776	1.252	30.369	1092
LC-053	15/08/2019	BC1	77	29.000	1.055	31.026	1092
LC-053	09/09/2019	BC1	149	29.569	0.875	31.128	1092
LC-053	16/10/2019	BC1	146	29.471	0.879	31.128	1092
LC-053	13/11/2019	BC1	84	29.004	0.929	31.128	1092
LC-053	03/12/2019	BC1	0	28.046	1.332	30.167	1092
LC-053	08/01/2020	BC1	0	26.508	1.730	29.439	1092
LC-053	05/02/2020	BC1	0	25.045	1.167	28.766	1092
LC-053	08/03/2020	BC1	0	24.353	0.776	26.134	1092
LC-053	08/04/2020	BC1	0	24.526	0.904	26.231	1092

LC-058

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-058	11/09/2018	DC6	94	29.718	0.631	31.306	1092
LC-058	25/10/2018	DC6	50	29.502	0.737	30.950	1092
LC-058	15/11/2018	DC6	47	28.884	1.180	30.950	1092
LC-058	03/12/2018	DC6	41	28.111	1.549	30.950	1092
LC-058	15/01/2019	DC6	0	25.713	1.566	29.190	1092
LC-058	19/02/2019	DC6	0	24.122	1.135	26.842	1092
LC-058	21/03/2019	DC6	0	24.147	1.096	26.353	1092
LC-058	11/04/2019	DC6	0	24.361	1.153	26.353	1092
LC-058	11/05/2019	DC6	0	25.423	0.940	27.924	1092
LC-058	13/06/2019	DC6	0	26.527	1.337	29.941	1092
LC-058	15/07/2019	DC6	2	27.879	1.271	30.545	1092
LC-058	15/08/2019	DC6	99	29.084	1.068	31.052	1092
LC-058	24/09/2019	DC6	167	29.806	0.648	31.128	1092
LC-058	16/10/2019	DC6	165	29.532	0.859	31.128	1092
LC-058	12/11/2019	DC6	91	29.109	0.884	31.128	1092
LC-058	03/12/2019	DC6	0	28.153	1.291	30.343	1092
LC-058	08/01/2020	DC6	0	26.515	1.808	29.540	1092
LC-058	05/02/2020	DC6	0	24.927	1.288	28.468	1092
LC-058	06/03/2020	DC6	0	24.158	0.853	26.182	1092
LC-058	08/04/2020	DC6	0	24.355	1.038	27.161	1092

LC-084

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-084	10/09/2018	DC8	497	30.182	0.810	32.253	1092
LC-084	24/10/2018	DC8	365	29.781	0.949	31.306	1092
LC-084	06/11/2018	DC8	250	29.273	1.275	31.306	1092
LC-084	04/12/2018	DC8	115	28.082	1.688	31.204	1092
LC-084	15/01/2019	DC8	0	25.521	1.796	28.766	1092
LC-084	28/02/2019	DC8	0	23.873	1.123	26.598	1092
LC-084	25/03/2019	DC8	0	24.219	1.257	26.916	1092
LC-084	15/04/2019	DC8	0	24.605	1.413	27.677	1092
LC-084	21/05/2019	DC8	0	26.270	1.228	29.290	1092
LC-084	13/06/2019	DC8	1	27.016	1.556	30.495	1092
LC-084	27/09/2019	DC8	466	30.271	0.819	31.944	1092
LC-084	09/10/2019	DC8	364	29.952	1.028	31.944	1092
LC-084	21/11/2019	DC8	27	28.712	1.147	30.798	1092
LC-084	05/12/2019	DC8	0	27.984	1.493	30.419	1092
LC-084	16/01/2020	DC8	0	25.939	1.911	29.665	1092
LC-084	14/02/2020	DC8	0	24.416	1.025	27.407	1092
LC-084	13/03/2020	DC8	0	24.024	0.830	25.866	1092
LC-084	09/04/2020	DC8	0	24.475	1.200	27.727	1092

LC-117

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-117	11/11/2018	BC1	13	28.935	1.073	30.621	1092
LC-117	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-117	17/01/2019	BC1	0	25.685	1.494	28.916	1092
LC-117	15/02/2019	BC1	0	24.315	1.232	27.161	1092
LC-117	18/03/2019	BC1	0	24.197	1.065	26.158	1092
LC-117	12/04/2019	BC1	0	24.483	1.133	26.451	1092
LC-117	22/05/2019	BC1	0	25.854	0.929	28.270	1092
LC-117	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-117	15/07/2019	BC1	0	27.776	1.252	30.369	1092
LC-117	16/07/2019	BC1	1	27.824	1.251	30.444	1092
LC-117	15/08/2019	BC1	77	29.000	1.055	31.026	1092
LC-117	09/09/2019	BC1	149	29.569	0.875	31.128	1092
LC-117	16/10/2019	BC1	146	29.471	0.879	31.128	1092
LC-117	13/11/2019	BC1	84	29.004	0.929	31.128	1092
LC-117	03/12/2019	BC1	0	28.046	1.332	30.167	1092
LC-117	08/01/2020	BC1	0	26.508	1.730	29.439	1092
LC-117	05/02/2020	BC1	0	25.045	1.167	28.766	1092
LC-117	06/03/2020	BC1	0	24.372	0.782	26.134	1092
LC-117	08/04/2020	BC1	0	24.526	0.904	26.231	1092

LC-002

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-002	12/09/2018	BC1	40	29.611	0.532	30.773	1092
LC-002	26/10/2018	BC1	13	29.405	0.681	30.621	1092
LC-002	15/11/2018	BC1	13	28.835	1.096	30.621	1092
LC-002	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-002	17/01/2019	BC1	0	25.685	1.494	28.916	1092
LC-002	15/02/2019	BC1	0	24.315	1.232	27.161	1092
LC-002	18/03/2019	BC1	0	24.197	1.065	26.158	1092
LC-002	12/04/2019	BC1	0	24.483	1.133	26.451	1092
LC-002	22/05/2019	BC1	0	25.854	0.929	28.270	1092
LC-002	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-002	15/07/2019	BC1	0	27.776	1.252	30.369	1092
LC-002	15/08/2019	BC1	77	29.000	1.055	31.026	1092
LC-002	09/09/2019	BC1	149	29.569	0.875	31.128	1092
LC-002	16/10/2019	BC1	146	29.471	0.879	31.128	1092
LC-002	13/11/2019	BC1	84	29.004	0.929	31.128	1092
LC-002	03/12/2019	BC1	0	28.046	1.332	30.167	1092
LC-002	08/01/2020	BC1	0	26.508	1.730	29.439	1092
LC-002	05/02/2020	BC1	0	25.045	1.167	28.766	1092
LC-002	08/03/2020	BC1	0	24.353	0.776	26.134	1092
LC-002	08/04/2020	BC1	0	24.526	0.904	26.231	1092

LC-018

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-018	12/09/2018	DC1	98	29.726	0.633	31.331	1091
LC-018	25/10/2018	DC1	30	29.493	0.700	31.331	1092
LC-018	08/11/2018	DC1	30	29.090	1.087	31.331	1092
LC-018	18/12/2018	DC1	15	27.360	1.741	31.077	1092
LC-018	15/01/2019	DC1	0	25.790	1.532	29.040	1092
LC-018	28/02/2019	DC1	0	24.178	1.017	26.500	1092
LC-018	21/03/2019	DC1	0	24.270	1.094	26.500	1092
LC-018	11/04/2019	DC1	0	24.494	1.151	26.500	1092
LC-018	21/05/2019	DC1	0	25.962	0.917	28.543	1092
LC-018	13/06/2019	DC1	1	26.678	1.321	30.646	1092
LC-018	17/07/2019	DC1	8	28.119	1.336	30.748	1092
LC-018	28/08/2019	DC1	180	29.549	0.991	31.331	1092
LC-018	25/09/2019	DC1	179	29.865	0.652	31.331	1092
LC-018	18/10/2019	DC1	164	29.495	0.879	31.331	1092
LC-018	20/11/2019	DC1	8	28.734	0.989	30.722	1092
LC-018	04/12/2019	DC1	0	28.162	1.226	30.268	1092
LC-018	07/01/2020	DC1	0	26.653	1.729	29.565	1092
LC-018	04/02/2020	DC1	0	25.153	1.331	28.742	1092
LC-018	07/03/2020	DC1	0	24.211	0.834	25.914	1092
LC-018	16/04/2020	DC1	0	24.586	1.085	27.530	1092

LC-049

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-049	13/09/2018	BC1	40	29.628	0.512	30.773	1092
LC-049	26/10/2018	BC1	13	29.405	0.681	30.621	1092
LC-049	15/11/2018	BC1	13	28.835	1.096	30.621	1092
LC-049	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-049	17/01/2019	BC1	0	25.685	1.494	28.916	1092
LC-049	15/02/2019	BC1	0	24.315	1.232	27.161	1092
LC-049	18/03/2019	BC1	0	24.197	1.065	26.158	1092
LC-049	12/04/2019	BC1	0	24.483	1.133	26.451	1092
LC-049	21/05/2019	BC1	0	25.827	0.906	28.072	1092
LC-049	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-049	15/07/2019	BC1	0	27.776	1.252	30.369	1092
LC-049	15/08/2019	BC1	77	29.000	1.055	31.026	1092
LC-049	15/09/2019	BC1	149	29.638	0.822	31.128	1092
LC-049	16/10/2019	BC1	146	29.471	0.879	31.128	1092
LC-049	13/11/2019	BC1	84	29.004	0.929	31.128	1092
LC-049	03/12/2019	BC1	0	28.046	1.332	30.167	1092
LC-049	08/01/2020	BC1	0	26.508	1.730	29.439	1092
LC-049	05/02/2020	BC1	0	25.045	1.167	28.766	1092
LC-049	08/03/2020	BC1	0	24.353	0.776	26.134	1092
LC-049	08/04/2020	BC1	0	24.526	0.904	26.231	1092

LC-052

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-052	12/09/2018	BC1	40	29.611	0.532	30.773	1092
LC-052	26/10/2018	BC1	13	29.405	0.681	30.621	1092
LC-052	15/11/2018	BC1	13	28.835	1.096	30.621	1092
LC-052	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-052	17/01/2019	BC1	0	25.685	1.494	28.916	1092
LC-052	15/02/2019	BC1	0	24.315	1.232	27.161	1092
LC-052	18/03/2019	BC1	0	24.197	1.065	26.158	1092
LC-052	12/04/2019	BC1	0	24.483	1.133	26.451	1092
LC-052	22/05/2019	BC1	0	25.854	0.929	28.270	1092
LC-052	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-052	15/07/2019	BC1	0	27.776	1.252	30.369	1092
LC-052	15/08/2019	BC1	77	29.000	1.055	31.026	1092
LC-052	09/09/2019	BC1	149	29.569	0.875	31.128	1092
LC-052	16/10/2019	BC1	146	29.471	0.879	31.128	1092
LC-052	13/11/2019	BC1	84	29.004	0.929	31.128	1092
LC-052	03/12/2019	BC1	0	28.046	1.332	30.167	1092
LC-052	08/01/2020	BC1	0	26.508	1.730	29.439	1092
LC-052	05/02/2020	BC1	0	25.045	1.167	28.766	1092
LC-052	08/03/2020	BC1	0	24.353	0.776	26.134	1092
LC-052	08/04/2020	BC1	0	24.526	0.904	26.231	1092

LC-062

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-062	18/09/2018	DC8	522	30.280	0.713	32.253	1092
LC-062	24/10/2018	DC8	365	29.781	0.949	31.306	1092
LC-062	06/11/2018	DC8	250	29.273	1.275	31.306	1092
LC-062	04/12/2018	DC8	115	28.082	1.688	31.204	1092
LC-062	14/01/2019	DC8	0	25.579	1.815	29.215	1092
LC-062	28/02/2019	DC8	0	23.873	1.123	26.598	1092
LC-062	25/03/2019	DC8	0	24.219	1.257	26.916	1092
LC-062	15/04/2019	DC8	0	24.605	1.413	27.677	1092
LC-062	22/05/2019	DC8	0	26.305	1.253	29.290	1092
LC-062	13/06/2019	DC8	1	27.016	1.556	30.495	1092
LC-062	22/07/2019	DC8	220	28.989	1.475	31.765	1092
LC-062	15/08/2019	DC8	408	29.884	1.139	31.842	1092
LC-062	09/09/2019	DC8	514	30.376	0.718	31.944	1092
LC-062	17/10/2019	DC8	309	29.760	1.102	31.944	1092
LC-062	21/11/2019	DC8	27	28.712	1.147	30.798	1092
LC-062	06/12/2019	DC8	0	27.933	1.521	30.419	1092
LC-062	27/01/2020	DC8	0	25.337	1.620	29.240	1092
LC-062	14/02/2020	DC8	0	24.416	1.025	27.407	1092
LC-062	13/03/2020	DC8	0	24.024	0.830	25.866	1092
LC-062	10/04/2020	DC8	0	24.511	1.225	27.727	1092

LC-066

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-066	10/09/2018	DC8	497	30.182	0.810	32.253	1092
LC-066	06/11/2018	DC8	250	29.273	1.275	31.306	1092
LC-066	04/12/2018	DC8	115	28.082	1.688	31.204	1092
LC-066	14/01/2019	DC8	0	25.579	1.815	29.215	1092
LC-066	28/02/2019	DC8	0	23.873	1.123	26.598	1092
LC-066	25/03/2019	DC8	0	24.219	1.257	26.916	1092
LC-066	15/04/2019	DC8	0	24.605	1.413	27.677	1092
LC-066	20/05/2019	DC8	0	26.228	1.203	29.290	1092
LC-066	13/06/2019	DC8	1	27.016	1.556	30.495	1092
LC-066	22/07/2019	DC8	220	28.989	1.475	31.765	1092
LC-066	27/08/2019	DC8	511	30.252	0.878	31.944	1092
LC-066	15/09/2019	DC8	514	30.411	0.674	31.944	1092
LC-066	17/10/2019	DC8	309	29.760	1.102	31.944	1092
LC-066	21/11/2019	DC8	27	28.712	1.147	30.798	1092
LC-066	06/12/2019	DC8	0	27.933	1.521	30.419	1092
LC-066	27/01/2020	DC8	0	25.337	1.620	29.240	1092
LC-066	14/02/2020	DC8	0	24.416	1.025	27.407	1092
LC-066	13/03/2020	DC8	0	24.024	0.830	25.866	1092
LC-066	10/04/2020	DC8	0	24.511	1.225	27.727	1092

LC-114

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-114	10/09/2018	DC8	497	30.182	0.810	32.253	1092
LC-114	24/10/2018	DC8	365	29.781	0.949	31.306	1092
LC-114	06/11/2018	DC8	250	29.273	1.275	31.306	1092
LC-114	04/12/2018	DC8	115	28.082	1.688	31.204	1092
LC-114	28/02/2019	DC8	0	23.873	1.123	26.598	1092
LC-114	25/03/2019	DC8	0	24.219	1.257	26.916	1092
LC-114	15/04/2019	DC8	0	24.605	1.413	27.677	1092
LC-114	20/05/2019	DC8	0	26.228	1.203	29.290	1092
LC-114	13/06/2019	DC8	1	27.016	1.556	30.495	1092
LC-114	22/07/2019	DC8	220	28.989	1.475	31.765	1092
LC-114	27/08/2019	DC8	511	30.252	0.878	31.944	1092
LC-114	25/09/2019	DC8	476	30.317	0.765	31.944	1092
LC-114	17/10/2019	DC8	309	29.760	1.102	31.944	1092
LC-114	21/11/2019	DC8	27	28.712	1.147	30.798	1092
LC-114	06/12/2019	DC8	0	27.933	1.521	30.419	1092
LC-114	27/01/2020	DC8	0	25.337	1.620	29.240	1092
LC-114	14/02/2020	DC8	0	24.416	1.025	27.407	1092
LC-114	13/03/2020	DC8	0	24.024	0.830	25.866	1092
LC-114	10/04/2020	DC8	0	24.511	1.225	27.727	1092

LC-124

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-124	11/09/2018	DC1	98	29.710	0.659	31.331	1091
LC-124	25/10/2018	DC1	30	29.493	0.700	31.331	1092
LC-124	08/11/2018	DC1	30	29.090	1.087	31.331	1092
LC-124	18/12/2018	DC1	15	27.360	1.741	31.077	1092
LC-124	15/01/2019	DC1	0	25.790	1.532	29.040	1092
LC-124	14/02/2019	DC1	0	24.341	1.216	27.358	1092
LC-124	21/03/2019	DC1	0	24.270	1.094	26.500	1092
LC-124	12/04/2019	DC1	0	24.521	1.161	26.500	1092
LC-124	20/05/2019	DC1	0	25.931	0.901	28.543	1092
LC-124	14/06/2019	DC1	1	26.721	1.337	30.646	1092
LC-124	15/07/2019	DC1	8	28.040	1.322	30.748	1092
LC-124	28/08/2019	DC1	180	29.549	0.991	31.331	1092
LC-124	25/09/2019	DC1	179	29.865	0.652	31.331	1092
LC-124	18/10/2019	DC1	164	29.495	0.879	31.331	1092
LC-124	20/11/2019	DC1	8	28.734	0.989	30.722	1092
LC-124	04/12/2019	DC1	0	28.162	1.226	30.268	1092
LC-124	07/01/2020	DC1	0	26.653	1.729	29.565	1092
LC-124	04/02/2020	DC1	0	25.153	1.331	28.742	1092
LC-124	06/03/2020	DC1	0	24.224	0.845	25.914	1092
LC-124	16/04/2020	DC1	0	24.586	1.085	27.530	1092

LC-003

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-003	18/09/2018	BC1	40	29.723	0.411	30.773	1092
LC-003	26/10/2018	BC1	13	29.405	0.681	30.621	1092
LC-003	15/11/2018	BC1	13	28.835	1.096	30.621	1092
LC-003	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-003	17/01/2019	BC1	0	25.685	1.494	28.916	1092
LC-003	15/02/2019	BC1	0	24.315	1.232	27.161	1092
LC-003	18/03/2019	BC1	0	24.197	1.065	26.158	1092
LC-003	12/04/2019	BC1	0	24.483	1.133	26.451	1092
LC-003	22/05/2019	BC1	0	25.854	0.929	28.270	1092
LC-003	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-003	15/07/2019	BC1	0	27.776	1.252	30.369	1092
LC-003	15/08/2019	BC1	77	29.000	1.055	31.026	1092
LC-003	09/09/2019	BC1	149	29.569	0.875	31.128	1092
LC-003	16/10/2019	BC1	146	29.471	0.879	31.128	1092
LC-003	13/11/2019	BC1	84	29.004	0.929	31.128	1092
LC-003	03/12/2019	BC1	0	28.046	1.332	30.167	1092
LC-003	08/01/2020	BC1	0	26.508	1.730	29.439	1092
LC-003	05/02/2020	BC1	0	25.045	1.167	28.766	1092
LC-003	08/03/2020	BC1	0	24.353	0.776	26.134	1092
LC-003	08/04/2020	BC1	0	24.526	0.904	26.231	1092

LC-007

Summed number of Hot Snap (Heron et al. 2010) exposure hours for our 51 monitored large corals (LC) across the three months prior to each disease survey from September 2018 to April 2020. Also given is the mean, standard deviation (1SD) and maximum temperature (°C) over the three-month period prior to each disease survey date. Note dates are in "day, month, year" format.

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-007	11/09/2018	DC6	94	29.718	0.631	31.306	1092
LC-007	25/10/2018	DC6	50	29.502	0.737	30.950	1092
LC-007	15/11/2018	DC6	47	28.884	1.180	30.950	1092
LC-007	03/12/2018	DC6	41	28.111	1.549	30.950	1092
LC-007	15/01/2019	DC6	0	25.713	1.566	29.190	1092
LC-007	19/02/2019	DC6	0	24.122	1.135	26.842	1092
LC-007	21/03/2019	DC6	0	24.147	1.096	26.353	1092
LC-007	11/04/2019	DC6	0	24.361	1.153	26.353	1092
LC-007	21/05/2019	DC6	0	25.814	0.945	28.048	1092
LC-007	12/06/2019	DC6	0	26.487	1.328	29.941	1092
LC-007	16/07/2019	DC6	2	27.925	1.266	30.545	1092
LC-007	16/08/2019	DC6	105	29.120	1.058	31.052	1092
LC-007	24/09/2019	DC6	167	29.806	0.648	31.128	1092
LC-007	16/10/2019	DC6	165	29.532	0.859	31.128	1092
LC-007	12/11/2019	DC6	91	29.109	0.884	31.128	1092
LC-007	03/12/2019	DC6	0	28.153	1.291	30.343	1092
LC-007	08/01/2020	DC6	0	26.515	1.808	29.540	1092
LC-007	05/02/2020	DC6	0	24.927	1.288	28.468	1092
LC-007	06/03/2020	DC6	0	24.158	0.853	26.182	1092
LC-007	08/04/2020	DC6	0	24.355	1.038	27.161	1092

LC-024

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-024	11/09/2018	DC1	98	29.710	0.659	31.331	1091
LC-024	25/10/2018	DC1	30	29.493	0.700	31.331	1092
LC-024	08/11/2018	DC1	30	29.090	1.087	31.331	1092
LC-024	18/12/2018	DC1	15	27.360	1.741	31.077	1092
LC-024	15/01/2019	DC1	0	25.790	1.532	29.040	1092
LC-024	19/02/2019	DC1	0	24.230	1.117	26.818	1092
LC-024	21/03/2019	DC1	0	24.270	1.094	26.500	1092
LC-024	11/04/2019	DC1	0	24.494	1.151	26.500	1092
LC-024	20/05/2019	DC1	0	25.931	0.901	28.543	1092
LC-024	13/06/2019	DC1	1	26.678	1.321	30.646	1092
LC-024	15/07/2019	DC1	8	28.040	1.322	30.748	1092
LC-024	28/08/2019	DC1	180	29.549	0.991	31.331	1092
LC-024	25/09/2019	DC1	179	29.865	0.652	31.331	1092
LC-024	18/10/2019	DC1	164	29.495	0.879	31.331	1092
LC-024	20/11/2019	DC1	8	28.734	0.989	30.722	1092
LC-024	04/12/2019	DC1	0	28.162	1.226	30.268	1092
LC-024	07/01/2020	DC1	0	26.653	1.729	29.565	1092
LC-024	04/02/2020	DC1	0	25.153	1.331	28.742	1092
LC-024	06/03/2020	DC1	0	24.224	0.845	25.914	1092
LC-024	16/04/2020	DC1	0	24.586	1.085	27.530	1092

LC-028

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-028	10/09/2018	DC8	497	30.182	0.810	32.253	1092
LC-028	06/11/2018	DC8	250	29.273	1.275	31.306	1092
LC-028	04/12/2018	DC8	115	28.082	1.688	31.204	1092
LC-028	28/02/2019	DC8	0	23.873	1.123	26.598	1092
LC-028	25/03/2019	DC8	0	24.219	1.257	26.916	1092
LC-028	15/04/2019	DC8	0	24.605	1.413	27.677	1092
LC-028	20/05/2019	DC8	0	26.228	1.203	29.290	1092
LC-028	13/06/2019	DC8	1	27.016	1.556	30.495	1092
LC-028	19/07/2019	DC8	216	28.859	1.534	31.765	1092
LC-028	16/08/2019	DC8	420	29.923	1.126	31.842	1092
LC-028	16/09/2019	DC8	514	30.424	0.652	31.944	1092
LC-028	06/10/2019	DC8	397	30.036	0.974	31.944	1092
LC-028	05/11/2019	DC8	193	29.416	1.014	31.944	1092
LC-028	05/12/2019	DC8	0	27.984	1.493	30.419	1092
LC-028	16/01/2020	DC8	0	25.939	1.911	29.665	1092
LC-028	14/02/2020	DC8	0	24.416	1.025	27.407	1092
LC-028	13/03/2020	DC8	0	24.024	0.830	25.866	1092
LC-028	09/04/2020	DC8	0	24.475	1.200	27.727	1092

LC-042

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-042	12/09/2018	BC1	40	29.611	0.532	30.773	1092
LC-042	26/10/2018	BC1	13	29.405	0.681	30.621	1092
LC-042	15/11/2018	BC1	13	28.835	1.096	30.621	1092
LC-042	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-042	17/01/2019	BC1	0	25.685	1.494	28.916	1092
LC-042	15/02/2019	BC1	0	24.315	1.232	27.161	1092
LC-042	18/03/2019	BC1	0	24.197	1.065	26.158	1092
LC-042	12/04/2019	BC1	0	24.483	1.133	26.451	1092
LC-042	22/05/2019	BC1	0	25.854	0.929	28.270	1092
LC-042	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-042	15/07/2019	BC1	0	27.776	1.252	30.369	1092
LC-042	15/08/2019	BC1	77	29.000	1.055	31.026	1092
LC-042	09/09/2019	BC1	149	29.569	0.875	31.128	1092
LC-042	16/10/2019	BC1	146	29.471	0.879	31.128	1092
LC-042	13/11/2019	BC1	84	29.004	0.929	31.128	1092
LC-042	03/12/2019	BC1	0	28.046	1.332	30.167	1092
LC-042	08/01/2020	BC1	0	26.508	1.730	29.439	1092
LC-042	05/02/2020	BC1	0	25.045	1.167	28.766	1092
LC-042	06/03/2020	BC1	0	24.372	0.782	26.134	1092
LC-042	08/04/2020	BC1	0	24.526	0.904	26.231	1092

LC-043

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-043	12/09/2018	BC1	40	29.611	0.532	30.773	1092
LC-043	26/10/2018	BC1	13	29.405	0.681	30.621	1092
LC-043	15/11/2018	BC1	13	28.835	1.096	30.621	1092
LC-043	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-043	17/01/2019	BC1	0	25.685	1.494	28.916	1092
LC-043	15/02/2019	BC1	0	24.315	1.232	27.161	1092
LC-043	18/03/2019	BC1	0	24.197	1.065	26.158	1092
LC-043	11/04/2019	BC1	0	24.453	1.130	26.304	1092
LC-043	22/05/2019	BC1	0	25.854	0.929	28.270	1092
LC-043	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-043	15/07/2019	BC1	0	27.776	1.252	30.369	1092
LC-043	15/08/2019	BC1	77	29.000	1.055	31.026	1092
LC-043	09/09/2019	BC1	149	29.569	0.875	31.128	1092
LC-043	16/10/2019	BC1	146	29.471	0.879	31.128	1092
LC-043	13/11/2019	BC1	84	29.004	0.929	31.128	1092
LC-043	03/12/2019	BC1	0	28.046	1.332	30.167	1092
LC-043	08/01/2020	BC1	0	26.508	1.730	29.439	1092
LC-043	05/02/2020	BC1	0	25.045	1.167	28.766	1092
LC-043	06/03/2020	BC1	0	24.372	0.782	26.134	1092
LC-043	08/04/2020	BC1	0	24.526	0.904	26.231	1092

LC-044

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-044	12/09/2018	BC1	40	29.611	0.532	30.773	1092
LC-044	26/10/2018	BC1	13	29.405	0.681	30.621	1092
LC-044	15/11/2018	BC1	13	28.835	1.096	30.621	1092
LC-044	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-044	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-044	15/02/2019	BC1	0	24.315	1.232	27.161	1092
LC-044	18/03/2019	BC1	0	24.197	1.065	26.158	1092
LC-044	12/04/2019	BC1	0	24.483	1.133	26.451	1092
LC-044	22/05/2019	BC1	0	25.854	0.929	28.270	1092
LC-044	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-044	15/07/2019	BC1	0	27.776	1.252	30.369	1092
LC-044	15/08/2019	BC1	77	29.000	1.055	31.026	1092
LC-044	09/09/2019	BC1	149	29.569	0.875	31.128	1092
LC-044	16/10/2019	BC1	146	29.471	0.879	31.128	1092
LC-044	13/11/2019	BC1	84	29.004	0.929	31.128	1092
LC-044	03/12/2019	BC1	0	28.046	1.332	30.167	1092
LC-044	08/01/2020	BC1	0	26.508	1.730	29.439	1092
LC-044	05/02/2020	BC1	0	25.045	1.167	28.766	1092
LC-044	06/03/2020	BC1	0	24.372	0.782	26.134	1092
LC-044	08/04/2020	BC1	0	24.526	0.904	26.231	1092

LC-048

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-048	12/09/2018	BC1	40	29.611	0.532	30.773	1092
LC-048	26/10/2018	BC1	13	29.405	0.681	30.621	1092
LC-048	15/11/2018	BC1	13	28.835	1.096	30.621	1092
LC-048	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-048	17/01/2019	BC1	0	25.685	1.494	28.916	1092
LC-048	15/02/2019	BC1	0	24.315	1.232	27.161	1092
LC-048	18/03/2019	BC1	0	24.197	1.065	26.158	1092
LC-048	11/04/2019	BC1	0	24.453	1.130	26.304	1092
LC-048	22/05/2019	BC1	0	25.854	0.929	28.270	1092
LC-048	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-048	12/07/2019	BC1	0	27.665	1.244	30.369	1092
LC-048	15/08/2019	BC1	77	29.000	1.055	31.026	1092
LC-048	09/09/2019	BC1	149	29.569	0.875	31.128	1092
LC-048	16/10/2019	BC1	146	29.471	0.879	31.128	1092
LC-048	13/11/2019	BC1	84	29.004	0.929	31.128	1092
LC-048	03/12/2019	BC1	0	28.046	1.332	30.167	1092
LC-048	08/01/2020	BC1	0	26.508	1.730	29.439	1092
LC-048	05/02/2020	BC1	0	25.045	1.167	28.766	1092
LC-048	06/03/2020	BC1	0	24.372	0.782	26.134	1092
LC-048	08/04/2020	BC1	0	24.526	0.904	26.231	1092

LC-050

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-050	12/09/2018	BC1	40	29.611	0.532	30.773	1092
LC-050	26/10/2018	BC1	13	29.405	0.681	30.621	1092
LC-050	15/11/2018	BC1	13	28.835	1.096	30.621	1092
LC-050	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-050	17/01/2019	BC1	0	25.685	1.494	28.916	1092
LC-050	15/02/2019	BC1	0	24.315	1.232	27.161	1092
LC-050	18/03/2019	BC1	0	24.197	1.065	26.158	1092
LC-050	11/04/2019	BC1	0	24.453	1.130	26.304	1092
LC-050	22/05/2019	BC1	0	25.854	0.929	28.270	1092
LC-050	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-050	15/07/2019	BC1	0	27.776	1.252	30.369	1092
LC-050	15/08/2019	BC1	77	29.000	1.055	31.026	1092
LC-050	09/09/2019	BC1	149	29.569	0.875	31.128	1092
LC-050	16/10/2019	BC1	146	29.471	0.879	31.128	1092
LC-050	13/11/2019	BC1	84	29.004	0.929	31.128	1092
LC-050	03/12/2019	BC1	0	28.046	1.332	30.167	1092
LC-050	08/01/2020	BC1	0	26.508	1.730	29.439	1092
LC-050	05/02/2020	BC1	0	25.045	1.167	28.766	1092
LC-050	08/03/2020	BC1	0	24.353	0.776	26.134	1092
LC-050	08/04/2020	BC1	0	24.526	0.904	26.231	1092

LC-051

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-051	12/09/2018	BC1	40	29.611	0.532	30.773	1092
LC-051	26/10/2018	BC1	13	29.405	0.681	30.621	1092
LC-051	15/11/2018	BC1	13	28.835	1.096	30.621	1092
LC-051	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-051	17/01/2019	BC1	0	25.685	1.494	28.916	1092
LC-051	15/02/2019	BC1	0	24.315	1.232	27.161	1092
LC-051	18/03/2019	BC1	0	24.197	1.065	26.158	1092
LC-051	12/04/2019	BC1	0	24.483	1.133	26.451	1092
LC-051	22/05/2019	BC1	0	25.854	0.929	28.270	1092
LC-051	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-051	15/07/2019	BC1	0	27.776	1.252	30.369	1092
LC-051	15/08/2019	BC1	77	29.000	1.055	31.026	1092
LC-051	09/09/2019	BC1	149	29.569	0.875	31.128	1092
LC-051	16/10/2019	BC1	146	29.471	0.879	31.128	1092
LC-051	13/11/2019	BC1	84	29.004	0.929	31.128	1092
LC-051	03/12/2019	BC1	0	28.046	1.332	30.167	1092
LC-051	08/01/2020	BC1	0	26.508	1.730	29.439	1092
LC-051	05/02/2020	BC1	0	25.045	1.167	28.766	1092
LC-051	08/03/2020	BC1	0	24.353	0.776	26.134	1092
LC-051	08/04/2020	BC1	0	24.526	0.904	26.231	1092

LC-079

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-079	10/09/2018	DC8	497	30.182	0.810	32.253	1092
LC-079	24/10/2018	DC8	365	29.781	0.949	31.306	1092
LC-079	06/11/2018	DC8	250	29.273	1.275	31.306	1092
LC-079	04/12/2018	DC8	115	28.082	1.688	31.204	1092
LC-079	14/01/2019	DC8	0	25.579	1.815	29.215	1092
LC-079	28/02/2019	DC8	0	23.873	1.123	26.598	1092
LC-079	25/03/2019	DC8	0	24.219	1.257	26.916	1092
LC-079	15/04/2019	DC8	0	24.605	1.413	27.677	1092
LC-079	21/05/2019	DC8	0	26.270	1.228	29.290	1092
LC-079	13/06/2019	DC8	1	27.016	1.556	30.495	1092
LC-079	22/07/2019	DC8	220	28.989	1.475	31.765	1092
LC-079	27/08/2019	DC8	511	30.252	0.878	31.944	1092
LC-079	27/09/2019	DC8	466	30.271	0.819	31.944	1092
LC-079	09/10/2019	DC8	364	29.952	1.028	31.944	1092
LC-079	05/11/2019	DC8	193	29.416	1.014	31.944	1092
LC-079	05/12/2019	DC8	0	27.984	1.493	30.419	1092
LC-079	16/01/2020	DC8	0	25.939	1.911	29.665	1092
LC-079	14/02/2020	DC8	0	24.416	1.025	27.407	1092
LC-079	13/03/2020	DC8	0	24.024	0.830	25.866	1092
LC-079	09/04/2020	DC8	0	24.475	1.200	27.727	1092

LC-115

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-115	12/09/2018	BC1	40	29.611	0.532	30.773	1092
LC-115	15/11/2018	BC1	13	28.835	1.096	30.621	1092
LC-115	03/12/2018	BC1	13	28.102	1.472	30.621	1092
LC-115	17/01/2019	BC1	0	25.685	1.494	28.916	1092
LC-115	15/02/2019	BC1	0	24.315	1.232	27.161	1092
LC-115	18/03/2019	BC1	0	24.197	1.065	26.158	1092
LC-115	12/04/2019	BC1	0	24.483	1.133	26.451	1092
LC-115	20/05/2019	BC1	0	25.797	0.884	28.072	1092
LC-115	12/06/2019	BC1	0	26.486	1.200	29.414	1092
LC-115	15/07/2019	BC1	0	27.776	1.252	30.369	1092
LC-115	15/08/2019	BC1	77	29.000	1.055	31.026	1092
LC-115	25/09/2019	BC1	149	29.730	0.694	31.128	1092
LC-115	16/10/2019	BC1	146	29.471	0.879	31.128	1092
LC-115	13/11/2019	BC1	84	29.004	0.929	31.128	1092
LC-115	03/12/2019	BC1	0	28.046	1.332	30.167	1092
LC-115	08/01/2020	BC1	0	26.508	1.730	29.439	1092
LC-115	05/02/2020	BC1	0	25.045	1.167	28.766	1092
LC-115	08/03/2020	BC1	0	24.353	0.776	26.134	1092
LC-115	08/04/2020	BC1	0	24.526	0.904	26.231	1092

LC-123

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-123	11/09/2018	DC1	98	29.710	0.659	31.331	1091
LC-123	25/10/2018	DC1	30	29.493	0.700	31.331	1092
LC-123	08/11/2018	DC1	30	29.090	1.087	31.331	1092
LC-123	18/12/2018	DC1	15	27.360	1.741	31.077	1092
LC-123	15/01/2019	DC1	0	25.790	1.532	29.040	1092
LC-123	28/02/2019	DC1	0	24.178	1.017	26.500	1092
LC-123	21/03/2019	DC1	0	24.270	1.094	26.500	1092
LC-123	12/04/2019	DC1	0	24.521	1.161	26.500	1092
LC-123	21/05/2019	DC1	0	25.962	0.917	28.543	1092
LC-123	13/06/2019	DC1	1	26.678	1.321	30.646	1092
LC-123	17/07/2019	DC1	8	28.119	1.336	30.748	1092
LC-123	28/08/2019	DC1	180	29.549	0.991	31.331	1092
LC-123	25/09/2019	DC1	179	29.865	0.652	31.331	1092
LC-123	18/10/2019	DC1	164	29.495	0.879	31.331	1092
LC-123	20/11/2019	DC1	8	28.734	0.989	30.722	1092
LC-123	04/12/2019	DC1	0	28.162	1.226	30.268	1092
LC-123	07/01/2020	DC1	0	26.653	1.729	29.565	1092
LC-123	04/02/2020	DC1	0	25.153	1.331	28.742	1092
LC-123	06/03/2020	DC1	0	24.224	0.845	25.914	1092
LC-123	16/04/2020	DC1	0	24.586	1.085	27.530	1092

LC-125

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-125	11/09/2018	DC1	98	29.710	0.659	31.331	1091
LC-125	25/10/2018	DC1	30	29.493	0.700	31.331	1092
LC-125	08/11/2018	DC1	30	29.090	1.087	31.331	1092
LC-125	15/01/2019	DC1	0	25.790	1.532	29.040	1092
LC-125	28/02/2019	DC1	0	24.178	1.017	26.500	1092
LC-125	21/03/2019	DC1	0	24.270	1.094	26.500	1092
LC-125	11/04/2019	DC1	0	24.494	1.151	26.500	1092
LC-125	20/05/2019	DC1	0	25.931	0.901	28.543	1092
LC-125	13/06/2019	DC1	1	26.678	1.321	30.646	1092
LC-125	17/07/2019	DC1	8	28.119	1.336	30.748	1092
LC-125	28/08/2019	DC1	180	29.549	0.991	31.331	1092
LC-125	25/09/2019	DC1	179	29.865	0.652	31.331	1092
LC-125	18/10/2019	DC1	164	29.495	0.879	31.331	1092
LC-125	20/11/2019	DC1	8	28.734	0.989	30.722	1092
LC-125	03/12/2019	DC1	0	28.216	1.181	30.268	1092
LC-125	07/01/2020	DC1	0	26.653	1.729	29.565	1092
LC-125	04/02/2020	DC1	0	25.153	1.331	28.742	1092
LC-125	06/03/2020	DC1	0	24.224	0.845	25.914	1092
LC-125	16/04/2020	DC1	0	24.586	1.085	27.530	1092

LC-126

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-126	11/09/2018	DC1	98	29.710	0.659	31.331	1091
LC-126	25/10/2018	DC1	30	29.493	0.700	31.331	1092
LC-126	08/11/2018	DC1	30	29.090	1.087	31.331	1092
LC-126	18/12/2018	DC1	15	27.360	1.741	31.077	1092
LC-126	15/01/2019	DC1	0	25.790	1.532	29.040	1092
LC-126	28/02/2019	DC1	0	24.178	1.017	26.500	1092
LC-126	21/03/2019	DC1	0	24.270	1.094	26.500	1092
LC-126	11/04/2019	DC1	0	24.494	1.151	26.500	1092
LC-126	20/05/2019	DC1	0	25.931	0.901	28.543	1092
LC-126	13/06/2019	DC1	1	26.678	1.321	30.646	1092
LC-126	17/07/2019	DC1	8	28.119	1.336	30.748	1092
LC-126	28/08/2019	DC1	180	29.549	0.991	31.331	1092
LC-126	25/09/2019	DC1	179	29.865	0.652	31.331	1092
LC-126	18/10/2019	DC1	164	29.495	0.879	31.331	1092
LC-126	20/11/2019	DC1	8	28.734	0.989	30.722	1092
LC-126	04/12/2019	DC1	0	28.162	1.226	30.268	1092
LC-126	07/01/2020	DC1	0	26.653	1.729	29.565	1092
LC-126	04/02/2020	DC1	0	25.153	1.331	28.742	1092
LC-126	06/03/2020	DC1	0	24.224	0.845	25.914	1092
LC-126	16/04/2020	DC1	0	24.586	1.085	27.530	1092

LC-127

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-127	11/09/2018	DC1	98	29.710	0.659	31.331	1091
LC-127	25/10/2018	DC1	30	29.493	0.700	31.331	1092
LC-127	08/11/2018	DC1	30	29.090	1.087	31.331	1092
LC-127	18/12/2018	DC1	15	27.360	1.741	31.077	1092
LC-127	28/02/2019	DC1	0	24.178	1.017	26.500	1092
LC-127	21/03/2019	DC1	0	24.270	1.094	26.500	1092
LC-127	11/04/2019	DC1	0	24.494	1.151	26.500	1092
LC-127	20/05/2019	DC1	0	25.931	0.901	28.543	1092
LC-127	14/06/2019	DC1	1	26.721	1.337	30.646	1092
LC-127	17/07/2019	DC1	8	28.119	1.336	30.748	1092
LC-127	28/08/2019	DC1	180	29.549	0.991	31.331	1092
LC-127	27/09/2019	DC1	179	29.838	0.672	31.331	1092
LC-127	18/10/2019	DC1	164	29.495	0.879	31.331	1092
LC-127	20/11/2019	DC1	8	28.734	0.989	30.722	1092
LC-127	04/12/2019	DC1	0	28.162	1.226	30.268	1092
LC-127	07/01/2020	DC1	0	26.653	1.729	29.565	1092
LC-127	04/02/2020	DC1	0	25.153	1.331	28.742	1092
LC-127	06/03/2020	DC1	0	24.224	0.845	25.914	1092
LC-127	10/04/2020	DC1	0	24.436	1.009	26.744	1092

LC-128

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-128	11/09/2018	DC1	98	29.710	0.659	31.331	1091
LC-128	24/10/2018	DC1	31	29.516	0.685	31.331	1092
LC-128	08/11/2018	DC1	30	29.090	1.087	31.331	1092
LC-128	18/12/2018	DC1	15	27.360	1.741	31.077	1092
LC-128	15/01/2019	DC1	0	25.790	1.532	29.040	1092
LC-128	28/02/2019	DC1	0	24.178	1.017	26.500	1092
LC-128	21/03/2019	DC1	0	24.270	1.094	26.500	1092
LC-128	11/04/2019	DC1	0	24.494	1.151	26.500	1092
LC-128	20/05/2019	DC1	0	25.931	0.901	28.543	1092
LC-128	14/06/2019	DC1	1	26.721	1.337	30.646	1092
LC-128	17/07/2019	DC1	8	28.119	1.336	30.748	1092
LC-128	28/08/2019	DC1	180	29.549	0.991	31.331	1092
LC-128	27/09/2019	DC1	179	29.838	0.672	31.331	1092
LC-128	17/10/2019	DC1	172	29.514	0.887	31.331	1092
LC-128	20/11/2019	DC1	8	28.734	0.989	30.722	1092
LC-128	04/12/2019	DC1	0	28.162	1.226	30.268	1092
LC-128	07/01/2020	DC1	0	26.653	1.729	29.565	1092
LC-128	04/02/2020	DC1	0	25.153	1.331	28.742	1092
LC-128	06/03/2020	DC1	0	24.224	0.845	25.914	1092
LC-128	10/04/2020	DC1	0	24.436	1.009	26.744	1092

LC-129

Coral	Survey Date	HOBO	Total Hot Snap	mean_temp	sd_temp	max_temp	count_temp
LC-129	11/09/2018	DC1	98	29.710	0.659	31.331	1091
LC-129	24/10/2018	DC1	31	29.516	0.685	31.331	1092
LC-129	04/12/2018	DC1	20	28.089	1.522	31.077	1092
LC-129	14/01/2019	DC1	0	25.843	1.562	29.340	1092
LC-129	28/02/2019	DC1	0	24.178	1.017	26.500	1092
LC-129	28/03/2019	DC1	0	24.377	1.092	26.500	1092
LC-129	12/04/2019	DC1	0	24.521	1.161	26.500	1092
LC-129	20/05/2019	DC1	0	25.931	0.901	28.543	1092
LC-129	13/06/2019	DC1	1	26.678	1.321	30.646	1092
LC-129	17/07/2019	DC1	8	28.119	1.336	30.748	1092
LC-129	28/08/2019	DC1	180	29.549	0.991	31.331	1092
LC-129	27/09/2019	DC1	179	29.838	0.672	31.331	1092
LC-129	17/10/2019	DC1	172	29.514	0.887	31.331	1092
LC-129	20/11/2019	DC1	8	28.734	0.989	30.722	1092
LC-129	04/12/2019	DC1	0	28.162	1.226	30.268	1092
LC-129	07/01/2020	DC1	0	26.653	1.729	29.565	1092
LC-129	04/02/2020	DC1	0	25.153	1.331	28.742	1092
LC-129	06/03/2020	DC1	0	24.224	0.845	25.914	1092
LC-129	10/04/2020	DC1	0	24.436	1.009	26.744	1092

APPENDIX 2. Custom R script to extract and sum each DBHYDRO station flow data for any defined date and Inlet Contributing Area (ICA) from the South Florida Water Management District's DBHYDRO database (https://www.sfwmd.gov/science-data/dbhydro).

```
library(dplyr)
library(lubridate)

setwd("/Volumes/Current_Projects/Spatial_Coral_Landscape/Florida/Predictors_Geo
Database/Predictors_ICA_Flow/")
ica_flow_stations <-
read.csv("Full_Station_List_Mean_Daily_inc_USGS_Joined_ICA_Only_Inside_ICA_Max_
Year_2020.csv")
flow_data <- read.csv("Consolidated_All_ICA_Contributing_Stations.csv")
coral_locations <- read.csv("Priority_Monitoring_2019_with_nearest_ICA.csv")
coral_locations_date <- read.csv("Coral_Disease_Monitoring_Data_ID_Date.csv")

date_ica <- merge(x = coral_locations_date, y = coral_locations)
length(unique(date_ica$Name)) #Should be 51
length(unique(date_ica$Name_1)) #Should be 51
date_ica$Date <- lubridate::mdy(date_ica$AssessDate)

date_ica <- date_ica[, c("Name", "Date", "ICA_NAME", "UUID")]

flow_data_ica <- na.omit(merge(x = flow_data, y = unique(ica_flow_stations[ ,
c("Station", "ICA_NAME")]), all.x=TRUE))

flow_data_ica$Date <- lubridate::dmy(flow_data_ica$Daily_Date)


for(i in 1:nrow(date_ica)) {

  target <- lubridate::ymd(date_ica[i, "Date"])

  ica <- as.character(date_ica[i, "ICA_NAME"])

  flow_data_ica_subset <- filter(flow_data_ica, ICA_NAME==ica)

  date_ica$ica_flow_data_3_days[i] <- as.character(flow_data_ica_subset %>%
filter(between(Date, target - 3, target)) %>%
    summarise(sum_flow_3 = sum(Data_Value)))
  date_ica$ica_flow_data_7_days[i] <- as.character(flow_data_ica_subset %>%
filter(between(Date, target - 7, target)) %>%
    summarise(sum_flow_7 = sum(Data_Value)))
  date_ica$ica_flow_data_30_days[i] <- as.character(flow_data_ica_subset %>%
filter(between(Date, target - 30, target)) %>%
    summarise(sum_flow_30 = sum(Data_Value)))
  date_ica$ica_flow_data_90_days[i] <- as.character(flow_data_ica_subset %>%
filter(between(Date, target - 90, target)) %>%
    summarise(sum_flow_90 = sum(Data_Value)))
}

date_ica_merge <- merge(x = coral_locations_date, y = date_ica, all.x = TRUE)
write.csv(date_ica_merge, "Coral_Flow_Data.csv", row.names = FALSE)
```

APPENDIX 3. DBHYDRO flow data (in cubic feet per second) across 4 temporal windows prior to each individual coral survey date for our 51 monitored large corals from September 2018 to April 2020. Corals are ordered from high to low SCTLD incidence from top to bottom. UID, unique ID for internal accounting. ICA, Inlet Contributing Area. These data were generated for all 51 colonies. Note dates are in "day, month, year" format.

LC-120

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-120	1170	13/09/2018	Baker's Haulover Inlet	2833.86	7149.69	24165.78	56917.58
LC-120	1171	08/11/2018	Baker's Haulover Inlet	0	33.47	1626.82	35537.89
LC-120	1172	18/12/2018	Baker's Haulover Inlet	182.92	182.92	1159.32	5546.86
LC-120	1173	15/01/2019	Baker's Haulover Inlet	0	0	562.85	2286.65
LC-120	1174	19/02/2019	Baker's Haulover Inlet	98.99	1732.71	8051.62	9536.69
LC-120	1175	21/03/2019	Baker's Haulover Inlet	2005.35	2005.35	4635.65	13053.55
LC-120	1176	11/04/2019	Baker's Haulover Inlet	1681.68	4331.56	6551.89	17205.2
LC-120	1177	21/05/2019	Baker's Haulover Inlet	155.8	2837.73	12483.28	23386.12
LC-120	1178	14/06/2019	Baker's Haulover Inlet	4802.79	9520.9	11314.38	30305.33
LC-120	1179	16/07/2019	Baker's Haulover Inlet	1025.25	5323.45	30775.76	55823.03
LC-120	1180	16/08/2019	Baker's Haulover Inlet	5894.53	11154.02	29483.92	71513.61
LC-120	1181	24/09/2019	Baker's Haulover Inlet	221.64	469.66	14015.07	66322.49
LC-120	1182	21/10/2019	Baker's Haulover Inlet	2090.18	5587.67	14530.86	65092.54
LC-120	1183	12/11/2019	Baker's Haulover Inlet	6.19	75.67	9817.54	43598.66
LC-120	1184	04/12/2019	Baker's Haulover Inlet	0	0	2955.17	24047.94
LC-120	1185	07/01/2020	Baker's Haulover Inlet	483.81	1922.08	14372.17	31987.15
LC-120	1186	20/02/2020	Baker's Haulover Inlet	1465.83	3226.84	7790.54	22698.75
LC-120	1187	06/03/2020	Baker's Haulover Inlet	53.91	53.91	4005.4	22582.76
LC-120	1188	16/04/2020	Baker's Haulover Inlet	0	0	80.26	8166.62

LC-015

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-015	140	13/09/2018	Port Everglades Inlet	4270.15	8714.24	34474.31	96423.54
LC-015	141	25/10/2018	Port Everglades Inlet	230.99	437.36	10694.28	75891.58
LC-015	142	08/11/2018	Port Everglades Inlet	107.89	245.12	3285.4	62198.17
LC-015	143	18/12/2018	Port Everglades Inlet	395.35	519.99	1509.76	19392.07
LC-015	144	15/01/2019	Port Everglades Inlet	53.94	225.38	1590.82	4491.18
LC-015	145	19/02/2019	Port Everglades Inlet	1446.9	4172.67	12742.65	15523.57
LC-015	146	21/03/2019	Port Everglades Inlet	2163.09	2465.83	8202.91	21798.96
LC-015	147	11/04/2019	Port Everglades Inlet	851.63	1091.4	4385.51	22594.13
LC-015	148	21/05/2019	Port Everglades Inlet	284.37	956.06	3253.49	13926.55
LC-015	149	14/06/2019	Port Everglades Inlet	986.35	2473.76	3962.16	11544.68
LC-015	150	16/07/2019	Port Everglades Inlet	337.02	1329.12	8142.05	15356.89
LC-015	151	16/08/2019	Port Everglades Inlet	4790.4	6666.7	14303.11	26126.3
LC-015	152	24/09/2019	Port Everglades Inlet	629.92	2317.31	17523.75	40405.45
LC-015	153	21/10/2019	Port Everglades Inlet	600.63	1369.81	5708.93	40547.86
LC-015	154	12/11/2019	Port Everglades Inlet	201.46	372.64	2948.12	31740.5
LC-015	155	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-015	156	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-015	157	20/02/2020	Port Everglades Inlet	200.02	422.72	3560.18	15059.43
LC-015	158	05/03/2020	Port Everglades Inlet	97.46	205.2	2468.57	14286.83
LC-015	159	16/04/2020	Port Everglades Inlet	0	0.03	236.68	4656.47

LC-009

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-009	100	11/09/2018	Port Everglades Inlet	4319.4	9813.42	34781.36	96235.82
LC-009	101	25/10/2018	Port Everglades Inlet	230.99	437.36	10694.28	75891.58
LC-009	102	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-009	103	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-009	104	15/01/2019	Port Everglades Inlet	53.94	225.38	1590.82	4491.18
LC-009	105	19/02/2019	Port Everglades Inlet	1446.9	4172.67	12742.65	15523.57
LC-009	106	21/03/2019	Port Everglades Inlet	2163.09	2465.83	8202.91	21798.96
LC-009	107	11/04/2019	Port Everglades Inlet	851.63	1091.4	4385.51	22594.13
LC-009	108	21/05/2019	Port Everglades Inlet	284.37	956.06	3253.49	13926.55
LC-009	109	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-009	110	16/07/2019	Port Everglades Inlet	337.02	1329.12	8142.05	15356.89
LC-009	111	16/08/2019	Port Everglades Inlet	4790.4	6666.7	14303.11	26126.3
LC-009	112	24/09/2019	Port Everglades Inlet	629.92	2317.31	17523.75	40405.45
LC-009	113	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-009	114	12/11/2019	Port Everglades Inlet	201.46	372.64	2948.12	31740.5
LC-009	115	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-009	116	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-009	117	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-009	118	06/03/2020	Port Everglades Inlet	102.46	185.76	2435.8	14306.98
LC-009	119	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-118

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-118	1121	13/09/2018	Port Everglades Inlet	4270.15	8714.24	34474.31	96423.54
LC-118	1122	25/10/2018	Port Everglades Inlet	230.99	437.36	10694.28	75891.58
LC-118	1123	08/11/2018	Port Everglades Inlet	107.89	245.12	3285.4	62198.17
LC-118	1124	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-118	1125	15/01/2019	Port Everglades Inlet	53.94	225.38	1590.82	4491.18
LC-118	1126	19/02/2019	Port Everglades Inlet	1446.9	4172.67	12742.65	15523.57
LC-118	1127	21/03/2019	Port Everglades Inlet	2163.09	2465.83	8202.91	21798.96
LC-118	1128	11/04/2019	Port Everglades Inlet	851.63	1091.4	4385.51	22594.13
LC-118	1129	21/05/2019	Port Everglades Inlet	284.37	956.06	3253.49	13926.55
LC-118	1130	14/06/2019	Port Everglades Inlet	986.35	2473.76	3962.16	11544.68
LC-118	1131	16/07/2019	Port Everglades Inlet	337.02	1329.12	8142.05	15356.89
LC-118	1132	16/08/2019	Port Everglades Inlet	4790.4	6666.7	14303.11	26126.3
LC-118	1133	24/09/2019	Port Everglades Inlet	629.92	2317.31	17523.75	40405.45
LC-118	1134	21/10/2019	Port Everglades Inlet	600.63	1369.81	5708.93	40547.86
LC-118	1135	12/11/2019	Port Everglades Inlet	201.46	372.64	2948.12	31740.5
LC-118	1136	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-118	1137	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-118	1138	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-118	1139	06/03/2020	Port Everglades Inlet	102.46	185.76	2435.8	14306.98
LC-118	1140	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-101

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-101	973	18/09/2018	Government Cut	13710.2	26229.27	110556.69	286826.38
LC-101	974	24/10/2018	Government Cut	4414.13	9184.33	54591.43	250206.18
LC-101	975	06/11/2018	Government Cut	3531.51	6234.68	37850.81	224531.45
LC-101	976	03/12/2018	Government Cut	1419.46	3719.75	21869.19	156319.44
LC-101	977	14/01/2019	Government Cut	1201.86	2510.45	15277.66	59911.96
LC-101	978	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-101	979	25/03/2019	Government Cut	2067.55	7134.08	18972.17	53066.6
LC-101	980	15/04/2019	Government Cut	2633.95	8000.27	26402.79	63301.84
LC-101	981	20/05/2019	Government Cut	1869.58	8027.86	35329.99	78360.75
LC-101	982	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-101	983	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-101	984	27/08/2019	Government Cut	10504.07	21229.1	98116.55	218836.57
LC-101	985	16/09/2019	Government Cut	7694.18	14647.35	80218.05	230252.48
LC-101	986	09/10/2019	Government Cut	8325.1	12450.93	45878.74	206026.12
LC-101	987	05/11/2019	Government Cut	4435.4	8841.78	51498.94	193067.09
LC-101	988	05/12/2019	Government Cut	2827.87	6020.63	29868.28	123422.24
LC-101	989	16/01/2020	Government Cut	3082.57	6014.74	46390.2	109083.97
LC-101	990	14/02/2020	Government Cut	3322.34	7778.77	31418.57	103528.57
LC-101	991	16/03/2020	Government Cut	1082.21	2346.61	21048.72	97411.28
LC-101	992	09/04/2020	Government Cut	428.09	873.35	5760.44	59962.23

LC-110

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-110	1013	10/09/2018	Government Cut	15890.6	37164.11	111343.9	284834.62
LC-110	1014	24/10/2018	Government Cut	4414.13	9184.33	54591.43	250206.18
LC-110	1015	06/11/2018	Government Cut	3531.51	6234.68	37850.81	224531.45
LC-110	1016	04/12/2018	Government Cut	1673.87	3608.97	21633.26	150645.54
LC-110	1017	14/01/2019	Government Cut	1201.86	2510.45	15277.66	59911.96
LC-110	1018	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-110	1019	25/03/2019	Government Cut	2067.55	7134.08	18972.17	53066.6
LC-110	1020	15/04/2019	Government Cut	2633.95	8000.27	26402.79	63301.84
LC-110	1021	20/05/2019	Government Cut	1869.58	8027.86	35329.99	78360.75
LC-110	1022	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-110	1023	17/07/2019	Government Cut	4671.25	13427.51	70333.57	141967.76
LC-110	1024	16/08/2019	Government Cut	18267.96	31998.97	84888.71	189424.47
LC-110	1025	16/09/2019	Government Cut	7694.18	14647.35	80218.05	230252.48
LC-110	1026	09/10/2019	Government Cut	8325.1	12450.93	45878.74	206026.12
LC-110	1027	05/11/2019	Government Cut	4435.4	8841.78	51498.94	193067.09
LC-110	1028	05/12/2019	Government Cut	2827.87	6020.63	29868.28	123422.24
LC-110	1029	16/01/2020	Government Cut	3082.57	6014.74	46390.2	109083.97
LC-110	1030	14/02/2020	Government Cut	3322.34	7778.77	31418.57	103528.57
LC-110	1031	13/03/2020	Government Cut	1242.92	2942.91	22807.8	99251.18
LC-110	1032	09/04/2020	Government Cut	428.09	873.35	5760.44	59962.23

LC-059

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-059	599	18/09/2018	Government Cut	13710.2	26229.27	110556.69	286826.38
LC-059	600	25/10/2018	Government Cut	4364.49	8996.2	53238.04	247788.3
LC-059	601	08/11/2018	Government Cut	2844.77	6207.34	35786.44	221765.79
LC-059	602	18/12/2018	Government Cut	2751.19	4129.01	16447.51	105674.9
LC-059	603	15/01/2019	Government Cut	1218.56	2503.87	14676.12	58748.41
LC-059	604	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-059	605	21/03/2019	Government Cut	5066.53	6817.68	19180.8	53952.58
LC-059	606	11/04/2019	Government Cut	5366.32	11515.87	25368.38	61869.75
LC-059	607	21/05/2019	Government Cut	1687.18	6295.52	34257.57	78046.94
LC-059	608	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-059	609	17/07/2019	Government Cut	4671.25	13427.51	70333.57	141967.76
LC-059	610	28/08/2019	Government Cut	11973.46	21690.28	98667.47	221720.43
LC-059	611	25/09/2019	Government Cut	4427.85	11134.36	66570.52	218174.4
LC-059	612	18/10/2019	Government Cut	7908.34	17417.17	49009.26	212699.67
LC-059	613	20/11/2019	Government Cut	4401.19	9805.74	37125	154014.24
LC-059	614	04/12/2019	Government Cut	3099.5	6283.2	30398.39	125546.25
LC-059	615	07/01/2020	Government Cut	4759.14	11488.2	47231.61	122808.25
LC-059	616	04/02/2020	Government Cut	8748.46	13282.04	30634.66	104152.05
LC-059	617	07/03/2020	Government Cut	1949.31	3416.23	27203.61	102617.29
LC-059	618	16/04/2020	Government Cut	544.95	1052.26	4633.94	55655.02

LC-103

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-103	994	10/09/2018	Government Cut	15890.6	37164.11	111343.9	284834.62
LC-103	995	24/10/2018	Government Cut	4414.13	9184.33	54591.43	250206.18
LC-103	996	06/11/2018	Government Cut	3531.51	6234.68	37850.81	224531.45
LC-103	997	04/12/2018	Government Cut	1673.87	3608.97	21633.26	150645.54
LC-103	998	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-103	999	25/03/2019	Government Cut	2067.55	7134.08	18972.17	53066.6
LC-103	1000	15/04/2019	Government Cut	2633.95	8000.27	26402.79	63301.84
LC-103	1001	20/05/2019	Government Cut	1869.58	8027.86	35329.99	78360.75
LC-103	1002	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-103	1003	19/07/2019	Government Cut	4583.87	11385.11	64288.28	141852.77
LC-103	1004	28/08/2019	Government Cut	11973.46	21690.28	98667.47	221720.43
LC-103	1005	16/09/2019	Government Cut	7694.18	14647.35	80218.05	230252.48
LC-103	1006	09/10/2019	Government Cut	8325.1	12450.93	45878.74	206026.12
LC-103	1007	05/11/2019	Government Cut	4435.4	8841.78	51498.94	193067.09
LC-103	1008	05/12/2019	Government Cut	2827.87	6020.63	29868.28	123422.24
LC-103	1009	16/01/2020	Government Cut	3082.57	6014.74	46390.2	109083.97
LC-103	1010	14/02/2020	Government Cut	3322.34	7778.77	31418.57	103528.57
LC-103	1011	16/03/2020	Government Cut	1082.21	2346.61	21048.72	97411.28
LC-103	1012	09/04/2020	Government Cut	428.09	873.35	5760.44	59962.23

LC-085

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-085	870	13/09/2018	Government Cut	12813.28	29691.3	107306.24	285151.26
LC-085	871	24/10/2018	Government Cut	4414.13	9184.33	54591.43	250206.18
LC-085	872	06/11/2018	Government Cut	3531.51	6234.68	37850.81	224531.45
LC-085	873	04/12/2018	Government Cut	1673.87	3608.97	21633.26	150645.54
LC-085	874	14/01/2019	Government Cut	1201.86	2510.45	15277.66	59911.96
LC-085	875	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-085	876	25/03/2019	Government Cut	2067.55	7134.08	18972.17	53066.6
LC-085	877	15/04/2019	Government Cut	2633.95	8000.27	26402.79	63301.84
LC-085	878	20/05/2019	Government Cut	1869.58	8027.86	35329.99	78360.75
LC-085	879	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-085	880	17/07/2019	Government Cut	4671.25	13427.51	70333.57	141967.76
LC-085	881	27/09/2019	Government Cut	4299.16	9954.47	62248.97	215384.58
LC-085	882	09/10/2019	Government Cut	8325.1	12450.93	45878.74	206026.12
LC-085	883	05/11/2019	Government Cut	4435.4	8841.78	51498.94	193067.09
LC-085	884	05/12/2019	Government Cut	2827.87	6020.63	29868.28	123422.24
LC-085	885	16/01/2020	Government Cut	3082.57	6014.74	46390.2	109083.97
LC-085	886	14/02/2020	Government Cut	3322.34	7778.77	31418.57	103528.57
LC-085	887	13/03/2020	Government Cut	1242.92	2942.91	22807.8	99251.18
LC-085	888	09/04/2020	Government Cut	428.09	873.35	5760.44	59962.23

LC-119

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-119	1141	11/09/2018	Port Everglades Inlet	4319.4	9813.42	34781.36	96235.82
LC-119	1142	25/10/2018	Port Everglades Inlet	230.99	437.36	10694.28	75891.58
LC-119	1143	08/11/2018	Port Everglades Inlet	107.89	245.12	3285.4	62198.17
LC-119	1144	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-119	1145	15/01/2019	Port Everglades Inlet	53.94	225.38	1590.82	4491.18
LC-119	1146	19/02/2019	Port Everglades Inlet	1446.9	4172.67	12742.65	15523.57
LC-119	1147	21/03/2019	Port Everglades Inlet	2163.09	2465.83	8202.91	21798.96
LC-119	1148	11/04/2019	Port Everglades Inlet	851.63	1091.4	4385.51	22594.13
LC-119	1149	21/05/2019	Port Everglades Inlet	284.37	956.06	3253.49	13926.55
LC-119	1150	14/06/2019	Port Everglades Inlet	986.35	2473.76	3962.16	11544.68
LC-119	1151	14/06/2019	Port Everglades Inlet	986.35	2473.76	3962.16	11544.68
LC-119	1152	16/08/2019	Port Everglades Inlet	4790.4	6666.7	14303.11	26126.3
LC-119	1153	18/09/2019	Port Everglades Inlet	1826.07	4122.98	18458.28	39992.54
LC-119	1154	21/10/2019	Port Everglades Inlet	600.63	1369.81	5708.93	40547.86
LC-119	1155	12/11/2019	Port Everglades Inlet	201.46	372.64	2948.12	31740.5
LC-119	1156	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-119	1157	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-119	1158	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-119	1159	06/03/2020	Port Everglades Inlet	102.46	185.76	2435.8	14306.98
LC-119	1160	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-077

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-077	766	18/09/2018	Government Cut	13710.2	26229.27	110556.69	286826.38
LC-077	767	24/10/2018	Government Cut	4414.13	9184.33	54591.43	250206.18
LC-077	768	06/11/2018	Government Cut	3531.51	6234.68	37850.81	224531.45
LC-077	769	04/12/2018	Government Cut	1673.87	3608.97	21633.26	150645.54
LC-077	770	14/01/2019	Government Cut	1201.86	2510.45	15277.66	59911.96
LC-077	771	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-077	772	25/03/2019	Government Cut	2067.55	7134.08	18972.17	53066.6
LC-077	773	15/04/2019	Government Cut	2633.95	8000.27	26402.79	63301.84
LC-077	774	20/05/2019	Government Cut	1869.58	8027.86	35329.99	78360.75
LC-077	775	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-077	776	22/07/2019	Government Cut	4420.8	9116.72	56117.46	142851
LC-077	777	27/08/2019	Government Cut	10504.07	21229.1	98116.55	218836.57
LC-077	778	27/09/2019	Government Cut	4299.16	9954.47	62248.97	215384.58
LC-077	779	17/10/2019	Government Cut	8926.1	18162.11	49393.5	212247.38
LC-077	780	21/11/2019	Government Cut	4035.53	9948.73	36646.05	151980.27
LC-077	781	06/12/2019	Government Cut	2341.9	5611	29254.84	121935.67
LC-077	782	27/01/2020	Government Cut	2309.5	4735.09	32254.09	99711.79
LC-077	783	14/02/2020	Government Cut	3322.34	7778.77	31418.57	103528.57
LC-077	784	13/03/2020	Government Cut	1242.92	2942.91	22807.8	99251.18
LC-077	785	10/04/2020	Government Cut	432.3	863.9	5593.42	59261.48

LC-013

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-013	120	11/09/2018	Port Everglades Inlet	4319.4	9813.42	34781.36	96235.82
LC-013	121	25/10/2018	Port Everglades Inlet	230.99	437.36	10694.28	75891.58
LC-013	122	08/11/2018	Port Everglades Inlet	107.89	245.12	3285.4	62198.17
LC-013	123	18/12/2018	Port Everglades Inlet	395.35	519.99	1509.76	19392.07
LC-013	124	18/12/2018	Port Everglades Inlet	395.35	519.99	1509.76	19392.07
LC-013	125	19/02/2019	Port Everglades Inlet	1446.9	4172.67	12742.65	15523.57
LC-013	126	21/03/2019	Port Everglades Inlet	2163.09	2465.83	8202.91	21798.96
LC-013	127	11/04/2019	Port Everglades Inlet	851.63	1091.4	4385.51	22594.13
LC-013	128	21/05/2019	Port Everglades Inlet	284.37	956.06	3253.49	13926.55
LC-013	129	14/06/2019	Port Everglades Inlet	986.35	2473.76	3962.16	11544.68
LC-013	130	16/07/2019	Port Everglades Inlet	337.02	1329.12	8142.05	15356.89
LC-013	131	16/08/2019	Port Everglades Inlet	4790.4	6666.7	14303.11	26126.3
LC-013	132	24/09/2019	Port Everglades Inlet	629.92	2317.31	17523.75	40405.45
LC-013	133	21/10/2019	Port Everglades Inlet	600.63	1369.81	5708.93	40547.86
LC-013	134	12/11/2019	Port Everglades Inlet	201.46	372.64	2948.12	31740.5
LC-013	135	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-013	136	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-013	137	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-013	138	06/03/2020	Port Everglades Inlet	102.46	185.76	2435.8	14306.98
LC-013	139	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-122

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-122	1233	13/09/2018	Baker's Haulover Inlet	2833.86	7149.69	24165.78	56917.58
LC-122	1234	25/10/2018	Baker's Haulover Inlet	21.12	54.56	2082.03	41434.73
LC-122	1235	08/11/2018	Baker's Haulover Inlet	0	33.47	1626.82	35537.89
LC-122	1236	18/12/2018	Baker's Haulover Inlet	182.92	182.92	1159.32	5546.86
LC-122	1237	15/01/2019	Baker's Haulover Inlet	0	0	562.85	2286.65
LC-122	1238	19/02/2019	Baker's Haulover Inlet	98.99	1732.71	8051.62	9536.69
LC-122	1239	21/03/2019	Baker's Haulover Inlet	2005.35	2005.35	4635.65	13053.55
LC-122	1240	12/04/2019	Baker's Haulover Inlet	1512.75	3630.56	6617.35	17270.66
LC-122	1241	21/05/2019	Baker's Haulover Inlet	155.8	2837.73	12483.28	23386.12
LC-122	1242	14/06/2019	Baker's Haulover Inlet	4802.79	9520.9	11314.38	30305.33
LC-122	1243	16/07/2019	Baker's Haulover Inlet	1025.25	5323.45	30775.76	55823.03
LC-122	1244	16/08/2019	Baker's Haulover Inlet	5894.53	11154.02	29483.92	71513.61
LC-122	1245	24/09/2019	Baker's Haulover Inlet	221.64	469.66	14015.07	66322.49
LC-122	1246	18/10/2019	Baker's Haulover Inlet	2908.56	7722.75	13207.36	63598.56
LC-122	1247	12/11/2019	Baker's Haulover Inlet	6.19	75.67	9817.54	43598.66
LC-122	1248	04/12/2019	Baker's Haulover Inlet	0	0	2955.17	24047.94
LC-122	1249	07/01/2020	Baker's Haulover Inlet	483.81	1922.08	14372.17	31987.15
LC-122	1250	20/02/2020	Baker's Haulover Inlet	1465.83	3226.84	7790.54	22698.75
LC-122	1251	06/03/2020	Baker's Haulover Inlet	53.91	53.91	4005.4	22582.76
LC-122	1252	16/04/2020	Baker's Haulover Inlet	0	0	80.26	8166.62

LC-005

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-005	60	13/09/2018	Port Everglades Inlet	4270.15	8714.24	34474.31	96423.54
LC-005	61	26/10/2018	Port Everglades Inlet	256.19	464.94	9775.32	75468.31
LC-005	62	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-005	63	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-005	64	17/01/2019	Port Everglades Inlet	126.67	246.76	1448.2	4462.53
LC-005	65	15/02/2019	Port Everglades Inlet	2725.77	3912.38	11393.43	14265.36
LC-005	66	18/03/2019	Port Everglades Inlet	1013.62	1284.2	7944.08	20701.71
LC-005	67	12/04/2019	Port Everglades Inlet	887.73	1094.48	4407.36	22661.36
LC-005	68	22/05/2019	Port Everglades Inlet	227.57	818.35	3254.62	13537.73
LC-005	69	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-005	70	15/07/2019	Port Everglades Inlet	461.61	1929.6	8305.7	15347.59
LC-005	71	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-005	72	09/09/2019	Port Everglades Inlet	2826.39	5485.31	21592.31	38962.56
LC-005	73	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-005	74	13/11/2019	Port Everglades Inlet	253.8	423.03	2729.29	30261.03
LC-005	75	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-005	76	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-005	77	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-005	78	08/03/2020	Port Everglades Inlet	69.28	189.48	2335.95	14267.12
LC-005	79	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-047

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-047	390	13/09/2018	Port Everglades Inlet	4270.15	8714.24	34474.31	96423.54
LC-047	391	26/10/2018	Port Everglades Inlet	256.19	464.94	9775.32	75468.31
LC-047	392	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-047	393	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-047	394	17/01/2019	Port Everglades Inlet	126.67	246.76	1448.2	4462.53
LC-047	395	15/02/2019	Port Everglades Inlet	2725.77	3912.38	11393.43	14265.36
LC-047	396	18/03/2019	Port Everglades Inlet	1013.62	1284.2	7944.08	20701.71
LC-047	397	12/04/2019	Port Everglades Inlet	887.73	1094.48	4407.36	22661.36
LC-047	398	22/05/2019	Port Everglades Inlet	227.57	818.35	3254.62	13537.73
LC-047	399	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-047	400	15/07/2019	Port Everglades Inlet	461.61	1929.6	8305.7	15347.59
LC-047	401	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-047	402	15/09/2019	Port Everglades Inlet	2096.17	4795.18	19794.03	40718.39
LC-047	403	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-047	404	13/11/2019	Port Everglades Inlet	253.8	423.03	2729.29	30261.03
LC-047	405	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-047	406	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-047	407	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-047	408	08/03/2020	Port Everglades Inlet	69.28	189.48	2335.95	14267.12
LC-047	409	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-075

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-075	741	10/09/2018	Government Cut	15890.6	37164.11	111343.9	284834.62
LC-075	742	24/10/2018	Government Cut	4414.13	9184.33	54591.43	250206.18
LC-075	743	06/11/2018	Government Cut	3531.51	6234.68	37850.81	224531.45
LC-075	744	04/12/2018	Government Cut	1673.87	3608.97	21633.26	150645.54
LC-075	745	14/01/2019	Government Cut	1201.86	2510.45	15277.66	59911.96
LC-075	746	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-075	747	25/03/2019	Government Cut	2067.55	7134.08	18972.17	53066.6
LC-075	748	15/04/2019	Government Cut	2633.95	8000.27	26402.79	63301.84
LC-075	749	20/05/2019	Government Cut	1869.58	8027.86	35329.99	78360.75
LC-075	750	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-075	751	22/07/2019	Government Cut	4420.8	9116.72	56117.46	142851
LC-075	752	27/08/2019	Government Cut	10504.07	21229.1	98116.55	218836.57
LC-075	753	27/09/2019	Government Cut	4299.16	9954.47	62248.97	215384.58
LC-075	754	17/10/2019	Government Cut	8926.1	18162.11	49393.5	212247.38
LC-075	755	21/11/2019	Government Cut	4035.53	9948.73	36646.05	151980.27
LC-075	756	06/12/2019	Government Cut	2341.9	5611	29254.84	121935.67
LC-075	757	27/01/2020	Government Cut	2309.5	4735.09	32254.09	99711.79
LC-075	758	14/02/2020	Government Cut	3322.34	7778.77	31418.57	103528.57
LC-075	759	13/03/2020	Government Cut	1242.92	2942.91	22807.8	99251.18
LC-075	760	10/04/2020	Government Cut	432.3	863.9	5593.42	59261.48

LC-054

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-054	534	12/09/2018	Port Everglades Inlet	4232.36	8925.7	34501.22	96280.38
LC-054	535	26/10/2018	Port Everglades Inlet	256.19	464.94	9775.32	75468.31
LC-054	536	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-054	537	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-054	538	17/01/2018	Port Everglades Inlet	3709.27	8414.72	33766.45	111989.39
LC-054	539	15/02/2019	Port Everglades Inlet	2725.77	3912.38	11393.43	14265.36
LC-054	540	18/03/2019	Port Everglades Inlet	1013.62	1284.2	7944.08	20701.71
LC-054	541	12/04/2019	Port Everglades Inlet	887.73	1094.48	4407.36	22661.36
LC-054	542	22/05/2019	Port Everglades Inlet	227.57	818.35	3254.62	13537.73
LC-054	543	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-054	544	15/07/2019	Port Everglades Inlet	461.61	1929.6	8305.7	15347.59
LC-054	545	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-054	546	09/09/2019	Port Everglades Inlet	2826.39	5485.31	21592.31	38962.56
LC-054	547	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-054	548	13/11/2019	Port Everglades Inlet	253.8	423.03	2729.29	30261.03
LC-054	549	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-054	550	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-054	551	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-054	552	08/03/2020	Port Everglades Inlet	69.28	189.48	2335.95	14267.12
LC-054	553	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-078

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-078	786	13/09/2018	Port Everglades Inlet	4270.15	8714.24	34474.31	96423.54
LC-078	787	26/10/2018	Port Everglades Inlet	256.19	464.94	9775.32	75468.31
LC-078	788	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-078	789	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-078	790	17/01/2019	Port Everglades Inlet	126.67	246.76	1448.2	4462.53
LC-078	791	15/02/2019	Port Everglades Inlet	2725.77	3912.38	11393.43	14265.36
LC-078	792	18/03/2019	Port Everglades Inlet	1013.62	1284.2	7944.08	20701.71
LC-078	793	12/04/2019	Port Everglades Inlet	887.73	1094.48	4407.36	22661.36
LC-078	794	22/05/2019	Port Everglades Inlet	227.57	818.35	3254.62	13537.73
LC-078	795	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-078	796	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-078	797	14/07/2019	Port Everglades Inlet	529.5	2059.55	8483.89	15352.37
LC-078	798	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-078	799	09/09/2019	Port Everglades Inlet	2826.39	5485.31	21592.31	38962.56
LC-078	800	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-078	801	05/11/2019	Port Everglades Inlet	194.14	388.3	5779.01	35381.51
LC-078	802	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-078	803	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-078	804	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-078	805	08/03/2020	Port Everglades Inlet	69.28	189.48	2335.95	14267.12
LC-078	806	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-080

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-080	827	18/09/2018	Government Cut	13710.2	26229.27	110556.69	286826.38
LC-080	828	24/10/2018	Government Cut	4414.13	9184.33	54591.43	250206.18
LC-080	829	06/11/2018	Government Cut	3531.51	6234.68	37850.81	224531.45
LC-080	830	04/12/2018	Government Cut	1673.87	3608.97	21633.26	150645.54
LC-080	831	14/01/2019	Government Cut	1201.86	2510.45	15277.66	59911.96
LC-080	832	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-080	833	25/03/2019	Government Cut	2067.55	7134.08	18972.17	53066.6
LC-080	834	15/04/2019	Government Cut	2633.95	8000.27	26402.79	63301.84
LC-080	835	20/05/2019	Government Cut	1869.58	8027.86	35329.99	78360.75
LC-080	836	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-080	837	22/07/2019	Government Cut	4420.8	9116.72	56117.46	142851
LC-080	838	27/08/2019	Government Cut	10504.07	21229.1	98116.55	218836.57
LC-080	839	27/09/2019	Government Cut	4299.16	9954.47	62248.97	215384.58
LC-080	840	09/10/2019	Government Cut	8325.1	12450.93	45878.74	206026.12
LC-080	841	21/11/2019	Government Cut	4035.53	9948.73	36646.05	151980.27
LC-080	842	05/12/2019	Government Cut	2827.87	6020.63	29868.28	123422.24
LC-080	843	16/01/2020	Government Cut	3082.57	6014.74	46390.2	109083.97
LC-080	844	14/02/2020	Government Cut	3322.34	7778.77	31418.57	103528.57
LC-080	845	13/03/2020	Government Cut	1242.92	2942.91	22807.8	99251.18
LC-080	846	09/04/2020	Government Cut	428.09	873.35	5760.44	59962.23

LC-016

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-016	162	11/09/2018	Baker's Haulover Inlet	4203.21	9360.96	26110.95	57290.8
LC-016	163	25/10/2018	Baker's Haulover Inlet	21.12	54.56	2082.03	41434.73
LC-016	164	08/11/2018	Baker's Haulover Inlet	0	33.47	1626.82	35537.89
LC-016	165	18/12/2018	Baker's Haulover Inlet	182.92	182.92	1159.32	5546.86
LC-016	166	15/01/2019	Baker's Haulover Inlet	0	0	562.85	2286.65
LC-016	167	19/02/2019	Baker's Haulover Inlet	98.99	1732.71	8051.62	9536.69
LC-016	168	21/03/2019	Baker's Haulover Inlet	2005.35	2005.35	4635.65	13053.55
LC-016	169	11/04/2019	Baker's Haulover Inlet	1681.68	4331.56	6551.89	17205.2
LC-016	170	21/05/2019	Baker's Haulover Inlet	155.8	2837.73	12483.28	23386.12
LC-016	171	14/06/2019	Baker's Haulover Inlet	4802.79	9520.9	11314.38	30305.33
LC-016	172	16/07/2019	Baker's Haulover Inlet	1025.25	5323.45	30775.76	55823.03
LC-016	173	16/08/2019	Baker's Haulover Inlet	5894.53	11154.02	29483.92	71513.61
LC-016	174	24/09/2019	Baker's Haulover Inlet	221.64	469.66	14015.07	66322.49
LC-016	175	18/10/2019	Baker's Haulover Inlet	2908.56	7722.75	13207.36	63598.56
LC-016	176	12/11/2019	Baker's Haulover Inlet	6.19	75.67	9817.54	43598.66
LC-016	177	04/12/2019	Baker's Haulover Inlet	0	0	2955.17	24047.94
LC-016	178	07/01/2020	Baker's Haulover Inlet	483.81	1922.08	14372.17	31987.15
LC-016	179	20/02/2020	Baker's Haulover Inlet	1465.83	3226.84	7790.54	22698.75
LC-016	180	06/03/2020	Baker's Haulover Inlet	53.91	53.91	4005.4	22582.76
LC-016	181	16/04/2020	Baker's Haulover Inlet	0	0	80.26	8166.62

LC-041

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-041	293	18/09/2018	Port Everglades Inlet	4157.7	8478.42	33789.03	96773.94
LC-041	294	26/10/2018	Port Everglades Inlet	256.19	464.94	9775.32	75468.31
LC-041	295	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-041	296	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-041	297	17/01/2019	Port Everglades Inlet	126.67	246.76	1448.2	4462.53
LC-041	298	15/02/2019	Port Everglades Inlet	2725.77	3912.38	11393.43	14265.36
LC-041	299	18/03/2019	Port Everglades Inlet	1013.62	1284.2	7944.08	20701.71
LC-041	300	12/04/2019	Port Everglades Inlet	887.73	1094.48	4407.36	22661.36
LC-041	301	22/05/2019	Port Everglades Inlet	227.57	818.35	3254.62	13537.73
LC-041	302	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-041	303	15/07/2019	Port Everglades Inlet	461.61	1929.6	8305.7	15347.59
LC-041	304	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-041	305	09/09/2019	Port Everglades Inlet	2826.39	5485.31	21592.31	38962.56
LC-041	306	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-041	307	13/11/2019	Port Everglades Inlet	253.8	423.03	2729.29	30261.03
LC-041	308	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-041	309	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-041	310	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-041	311	06/03/2020	Port Everglades Inlet	102.46	185.76	2435.8	14306.98
LC-041	312	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-053

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-053	514	12/09/2018	Port Everglades Inlet	4232.36	8925.7	34501.22	96280.38
LC-053	515	26/10/2018	Port Everglades Inlet	256.19	464.94	9775.32	75468.31
LC-053	516	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-053	517	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-053	518	17/01/2019	Port Everglades Inlet	126.67	246.76	1448.2	4462.53
LC-053	519	15/02/2019	Port Everglades Inlet	2725.77	3912.38	11393.43	14265.36
LC-053	520	18/03/2019	Port Everglades Inlet	1013.62	1284.2	7944.08	20701.71
LC-053	521	12/04/2019	Port Everglades Inlet	887.73	1094.48	4407.36	22661.36
LC-053	522	22/05/2019	Port Everglades Inlet	227.57	818.35	3254.62	13537.73
LC-053	523	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-053	524	15/07/2019	Port Everglades Inlet	461.61	1929.6	8305.7	15347.59
LC-053	525	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-053	526	09/09/2019	Port Everglades Inlet	2826.39	5485.31	21592.31	38962.56
LC-053	527	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-053	528	13/11/2019	Port Everglades Inlet	253.8	423.03	2729.29	30261.03
LC-053	529	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-053	530	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-053	531	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-053	532	08/03/2020	Port Everglades Inlet	69.28	189.48	2335.95	14267.12
LC-053	533	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-058

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-058	572	11/09/2018	Port Everglades Inlet	4319.4	9813.42	34781.36	96235.82
LC-058	573	25/10/2018	Port Everglades Inlet	230.99	437.36	10694.28	75891.58
LC-058	574	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-058	575	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-058	576	15/01/2019	Port Everglades Inlet	53.94	225.38	1590.82	4491.18
LC-058	577	19/02/2019	Port Everglades Inlet	1446.9	4172.67	12742.65	15523.57
LC-058	578	21/03/2019	Port Everglades Inlet	2163.09	2465.83	8202.91	21798.96
LC-058	579	11/04/2019	Port Everglades Inlet	851.63	1091.4	4385.51	22594.13
LC-058	580	11/05/2019	Port Everglades Inlet	397.49	1086.66	2898.79	17366.42
LC-058	581	13/06/2019	Port Everglades Inlet	1018.04	2268.72	3872.69	11359.62
LC-058	582	15/07/2019	Port Everglades Inlet	461.61	1929.6	8305.7	15347.59
LC-058	583	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-058	584	24/09/2019	Port Everglades Inlet	629.92	2317.31	17523.75	40405.45
LC-058	585	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-058	586	12/11/2019	Port Everglades Inlet	201.46	372.64	2948.12	31740.5
LC-058	587	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-058	588	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-058	589	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-058	590	06/03/2020	Port Everglades Inlet	102.46	185.76	2435.8	14306.98
LC-058	591	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-084

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-084	847	10/09/2018	Government Cut	15890.6	37164.11	111343.9	284834.62
LC-084	848	24/10/2018	Government Cut	4414.13	9184.33	54591.43	250206.18
LC-084	849	06/11/2018	Government Cut	3531.51	6234.68	37850.81	224531.45
LC-084	850	04/12/2018	Government Cut	1673.87	3608.97	21633.26	150645.54
LC-084	851	15/01/2019	Government Cut	1218.56	2503.87	14676.12	58748.41
LC-084	852	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-084	853	25/03/2019	Government Cut	2067.55	7134.08	18972.17	53066.6
LC-084	854	15/04/2019	Government Cut	2633.95	8000.27	26402.79	63301.84
LC-084	855	21/05/2019	Government Cut	1687.18	6295.52	34257.57	78046.94
LC-084	856	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-084	857	27/09/2019	Government Cut	4299.16	9954.47	62248.97	215384.58
LC-084	858	09/10/2019	Government Cut	8325.1	12450.93	45878.74	206026.12
LC-084	859	21/11/2019	Government Cut	4035.53	9948.73	36646.05	151980.27
LC-084	860	05/12/2019	Government Cut	2827.87	6020.63	29868.28	123422.24
LC-084	861	16/01/2020	Government Cut	3082.57	6014.74	46390.2	109083.97
LC-084	862	14/02/2020	Government Cut	3322.34	7778.77	31418.57	103528.57
LC-084	863	13/03/2020	Government Cut	1242.92	2942.91	22807.8	99251.18
LC-084	864	09/04/2020	Government Cut	428.09	873.35	5760.44	59962.23

LC-117

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-117	1103	11/11/2018	Port Everglades Inlet	117.08	231.8	2178.88	58140.42
LC-117	1104	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-117	1105	17/01/2019	Port Everglades Inlet	126.67	246.76	1448.2	4462.53
LC-117	1106	15/02/2019	Port Everglades Inlet	2725.77	3912.38	11393.43	14265.36
LC-117	1107	18/03/2019	Port Everglades Inlet	1013.62	1284.2	7944.08	20701.71
LC-117	1108	12/04/2019	Port Everglades Inlet	887.73	1094.48	4407.36	22661.36
LC-117	1109	22/05/2019	Port Everglades Inlet	227.57	818.35	3254.62	13537.73
LC-117	1110	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-117	1111	15/07/2019	Port Everglades Inlet	461.61	1929.6	8305.7	15347.59
LC-117	1112	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-117	1113	09/09/2019	Port Everglades Inlet	2826.39	5485.31	21592.31	38962.56
LC-117	1114	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-117	1115	13/11/2019	Port Everglades Inlet	253.8	423.03	2729.29	30261.03
LC-117	1116	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-117	1117	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-117	1118	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-117	1119	06/03/2020	Port Everglades Inlet	102.46	185.76	2435.8	14306.98
LC-117	1120	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-002

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-002	6	12/09/2018	Port Everglades Inlet	4232.36	8925.7	34501.22	96280.38
LC-002	7	26/10/2018	Port Everglades Inlet	256.19	464.94	9775.32	75468.31
LC-002	8	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-002	9	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-002	10	17/01/2019	Port Everglades Inlet	126.67	246.76	1448.2	4462.53
LC-002	11	15/02/2019	Port Everglades Inlet	2725.77	3912.38	11393.43	14265.36
LC-002	12	18/03/2019	Port Everglades Inlet	1013.62	1284.2	7944.08	20701.71
LC-002	13	12/04/2019	Port Everglades Inlet	887.73	1094.48	4407.36	22661.36
LC-002	14	22/05/2019	Port Everglades Inlet	227.57	818.35	3254.62	13537.73
LC-002	15	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-002	16	15/07/2019	Port Everglades Inlet	461.61	1929.6	8305.7	15347.59
LC-002	17	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-002	18	09/09/2019	Port Everglades Inlet	2826.39	5485.31	21592.31	38962.56
LC-002	19	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-002	20	13/11/2019	Port Everglades Inlet	253.8	423.03	2729.29	30261.03
LC-002	21	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-002	22	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-002	23	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-002	24	08/03/2020	Port Everglades Inlet	69.28	189.48	2335.95	14267.12
LC-002	25	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-018

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-018	187	12/09/2018	Government Cut	13535.51	31447.29	108560.74	285223.02
LC-018	188	25/10/2018	Government Cut	4364.49	8996.2	53238.04	247788.3
LC-018	189	08/11/2018	Government Cut	2844.77	6207.34	35786.44	221765.79
LC-018	190	18/12/2018	Government Cut	2751.19	4129.01	16447.51	105674.9
LC-018	191	15/01/2019	Government Cut	1218.56	2503.87	14676.12	58748.41
LC-018	192	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-018	193	21/03/2019	Government Cut	5066.53	6817.68	19180.8	53952.58
LC-018	194	11/04/2019	Government Cut	5366.32	11515.87	25368.38	61869.75
LC-018	195	21/05/2019	Government Cut	1687.18	6295.52	34257.57	78046.94
LC-018	196	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-018	197	17/07/2019	Government Cut	4671.25	13427.51	70333.57	141967.76
LC-018	198	28/08/2019	Government Cut	11973.46	21690.28	98667.47	221720.43
LC-018	199	25/09/2019	Government Cut	4427.85	11134.36	66570.52	218174.4
LC-018	200	18/10/2019	Government Cut	7908.34	17417.17	49009.26	212699.67
LC-018	201	20/11/2019	Government Cut	4401.19	9805.74	37125	154014.24
LC-018	202	04/12/2019	Government Cut	3099.5	6283.2	30398.39	125546.25
LC-018	203	07/01/2020	Government Cut	4759.14	11488.2	47231.61	122808.25
LC-018	204	04/02/2020	Government Cut	8748.46	13282.04	30634.66	104152.05
LC-018	205	07/03/2020	Government Cut	1949.31	3416.23	27203.61	102617.29
LC-018	206	16/04/2020	Government Cut	544.95	1052.26	4633.94	55655.02

LC-049

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-049	430	13/09/2018	Port Everglades Inlet	4270.15	8714.24	34474.31	96423.54
LC-049	431	26/10/2018	Port Everglades Inlet	256.19	464.94	9775.32	75468.31
LC-049	432	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-049	433	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-049	434	17/01/2019	Port Everglades Inlet	126.67	246.76	1448.2	4462.53
LC-049	435	15/02/2019	Port Everglades Inlet	2725.77	3912.38	11393.43	14265.36
LC-049	436	18/03/2019	Port Everglades Inlet	1013.62	1284.2	7944.08	20701.71
LC-049	437	12/04/2019	Port Everglades Inlet	887.73	1094.48	4407.36	22661.36
LC-049	438	21/05/2019	Port Everglades Inlet	284.37	956.06	3253.49	13926.55
LC-049	439	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-049	440	15/07/2019	Port Everglades Inlet	461.61	1929.6	8305.7	15347.59
LC-049	441	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-049	442	15/09/2019	Port Everglades Inlet	2096.17	4795.18	19794.03	40718.39
LC-049	443	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-049	444	13/11/2019	Port Everglades Inlet	253.8	423.03	2729.29	30261.03
LC-049	445	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-049	446	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-049	447	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-049	448	08/03/2020	Port Everglades Inlet	69.28	189.48	2335.95	14267.12
LC-049	449	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-052

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-052	494	12/09/2018	Port Everglades Inlet	4232.36	8925.7	34501.22	96280.38
LC-052	495	26/10/2018	Port Everglades Inlet	256.19	464.94	9775.32	75468.31
LC-052	496	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-052	497	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-052	498	17/01/2019	Port Everglades Inlet	126.67	246.76	1448.2	4462.53
LC-052	499	15/02/2019	Port Everglades Inlet	2725.77	3912.38	11393.43	14265.36
LC-052	500	18/03/2019	Port Everglades Inlet	1013.62	1284.2	7944.08	20701.71
LC-052	501	12/04/2019	Port Everglades Inlet	887.73	1094.48	4407.36	22661.36
LC-052	502	22/05/2019	Port Everglades Inlet	227.57	818.35	3254.62	13537.73
LC-052	503	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-052	504	15/07/2019	Port Everglades Inlet	461.61	1929.6	8305.7	15347.59
LC-052	505	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-052	506	09/09/2019	Port Everglades Inlet	2826.39	5485.31	21592.31	38962.56
LC-052	507	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-052	508	13/11/2019	Port Everglades Inlet	253.8	423.03	2729.29	30261.03
LC-052	509	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-052	510	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-052	511	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-052	512	08/03/2020	Port Everglades Inlet	69.28	189.48	2335.95	14267.12
LC-052	513	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-062

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-062	628	18/09/2018	Government Cut	13710.2	26229.27	110556.69	286826.38
LC-062	629	24/10/2018	Government Cut	4414.13	9184.33	54591.43	250206.18
LC-062	630	06/11/2018	Government Cut	3531.51	6234.68	37850.81	224531.45
LC-062	631	04/12/2018	Government Cut	1673.87	3608.97	21633.26	150645.54
LC-062	632	14/01/2019	Government Cut	1201.86	2510.45	15277.66	59911.96
LC-062	633	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-062	634	25/03/2019	Government Cut	2067.55	7134.08	18972.17	53066.6
LC-062	635	15/04/2019	Government Cut	2633.95	8000.27	26402.79	63301.84
LC-062	636	22/05/2019	Government Cut	1674.17	4953.07	34110.05	77845.08
LC-062	637	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-062	638	22/07/2019	Government Cut	4420.8	9116.72	56117.46	142851
LC-062	639	15/08/2019	Government Cut	16784.02	30046.26	81082.55	184891.04
LC-062	640	09/09/2019	Government Cut	7346.77	18738.12	96244.75	239017.66
LC-062	641	17/10/2019	Government Cut	8926.1	18162.11	49393.5	212247.38
LC-062	642	21/11/2019	Government Cut	4035.53	9948.73	36646.05	151980.27
LC-062	643	06/12/2019	Government Cut	2341.9	5611	29254.84	121935.67
LC-062	644	27/01/2020	Government Cut	2309.5	4735.09	32254.09	99711.79
LC-062	645	14/02/2020	Government Cut	3322.34	7778.77	31418.57	103528.57
LC-062	646	13/03/2020	Government Cut	1242.92	2942.91	22807.8	99251.18
LC-062	647	10/04/2020	Government Cut	432.3	863.9	5593.42	59261.48

LC-066

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-066	677	10/09/2018	Government Cut	15890.6	37164.11	111343.9	284834.62
LC-066	678	06/11/2018	Government Cut	3531.51	6234.68	37850.81	224531.45
LC-066	679	04/12/2018	Government Cut	1673.87	3608.97	21633.26	150645.54
LC-066	680	14/01/2019	Government Cut	1201.86	2510.45	15277.66	59911.96
LC-066	681	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-066	682	25/03/2019	Government Cut	2067.55	7134.08	18972.17	53066.6
LC-066	683	15/04/2019	Government Cut	2633.95	8000.27	26402.79	63301.84
LC-066	684	20/05/2019	Government Cut	1869.58	8027.86	35329.99	78360.75
LC-066	685	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-066	686	22/07/2019	Government Cut	4420.8	9116.72	56117.46	142851
LC-066	687	27/08/2019	Government Cut	10504.07	21229.1	98116.55	218836.57
LC-066	688	15/09/2019	Government Cut	7425.03	14508.79	83288.36	232366.04
LC-066	689	17/10/2019	Government Cut	8926.1	18162.11	49393.5	212247.38
LC-066	690	21/11/2019	Government Cut	4035.53	9948.73	36646.05	151980.27
LC-066	691	06/12/2019	Government Cut	2341.9	5611	29254.84	121935.67
LC-066	692	27/01/2020	Government Cut	2309.5	4735.09	32254.09	99711.79
LC-066	693	14/02/2020	Government Cut	3322.34	7778.77	31418.57	103528.57
LC-066	694	13/03/2020	Government Cut	1242.92	2942.91	22807.8	99251.18
LC-066	695	10/04/2020	Government Cut	432.3	863.9	5593.42	59261.48

LC-114

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-114	1035	10/09/2018	Government Cut	15890.6	37164.11	111343.9	284834.62
LC-114	1036	24/10/2018	Government Cut	4414.13	9184.33	54591.43	250206.18
LC-114	1037	06/11/2018	Government Cut	3531.51	6234.68	37850.81	224531.45
LC-114	1038	04/12/2018	Government Cut	1673.87	3608.97	21633.26	150645.54
LC-114	1039	25/03/2019	Government Cut	2067.55	7134.08	18972.17	53066.6
LC-114	1040	15/04/2019	Government Cut	2633.95	8000.27	26402.79	63301.84
LC-114	1041	20/05/2019	Government Cut	1869.58	8027.86	35329.99	78360.75
LC-114	1042	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-114	1043	22/07/2019	Government Cut	4420.8	9116.72	56117.46	142851
LC-114	1044	27/08/2019	Government Cut	10504.07	21229.1	98116.55	218836.57
LC-114	1045	25/09/2019	Government Cut	4427.85	11134.36	66570.52	218174.4
LC-114	1046	17/10/2019	Government Cut	8926.1	18162.11	49393.5	212247.38
LC-114	1047	21/11/2019	Government Cut	4035.53	9948.73	36646.05	151980.27
LC-114	1048	06/12/2019	Government Cut	2341.9	5611	29254.84	121935.67
LC-114	1049	27/01/2020	Government Cut	2309.5	4735.09	32254.09	99711.79
LC-114	1050	14/02/2020	Government Cut	3322.34	7778.77	31418.57	103528.57
LC-114	1051	13/03/2020	Government Cut	1242.92	2942.91	22807.8	99251.18
LC-114	1052	10/04/2020	Government Cut	432.3	863.9	5593.42	59261.48

LC-124

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-124	1286	11/09/2018	Government Cut	14614.01	34598.72	110347.8	285019.65
LC-124	1287	25/10/2018	Government Cut	4364.49	8996.2	53238.04	247788.3
LC-124	1288	08/11/2018	Government Cut	2844.77	6207.34	35786.44	221765.79
LC-124	1289	18/12/2018	Government Cut	2751.19	4129.01	16447.51	105674.9
LC-124	1290	15/01/2019	Government Cut	1218.56	2503.87	14676.12	58748.41
LC-124	1291	14/02/2019	Government Cut	4574.63	6530.43	21063.58	51747.31
LC-124	1292	21/03/2019	Government Cut	5066.53	6817.68	19180.8	53952.58
LC-124	1293	12/04/2019	Government Cut	5126.46	10193.02	25724.97	62260.23
LC-124	1294	20/05/2019	Government Cut	1869.58	8027.86	35329.99	78360.75
LC-124	1295	14/06/2019	Government Cut	11294	23012	31941.5	92657.95
LC-124	1296	15/07/2019	Government Cut	6801.24	17656.78	74292.35	140547.51
LC-124	1297	28/08/2019	Government Cut	11973.46	21690.28	98667.47	221720.43
LC-124	1298	25/09/2019	Government Cut	4427.85	11134.36	66570.52	218174.4
LC-124	1299	18/10/2019	Government Cut	7908.34	17417.17	49009.26	212699.67
LC-124	1300	20/11/2019	Government Cut	4401.19	9805.74	37125	154014.24
LC-124	1301	04/12/2019	Government Cut	3099.5	6283.2	30398.39	125546.25
LC-124	1302	07/01/2020	Government Cut	4759.14	11488.2	47231.61	122808.25
LC-124	1303	04/02/2020	Government Cut	8748.46	13282.04	30634.66	104152.05
LC-124	1304	06/03/2020	Government Cut	1789.12	3610.91	27879.93	102777.14
LC-124	1305	16/04/2020	Government Cut	544.95	1052.26	4633.94	55655.02

LC-003

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-003	30	18/09/2018	Port Everglades Inlet	4157.7	8478.42	33789.03	96773.94
LC-003	31	26/10/2018	Port Everglades Inlet	256.19	464.94	9775.32	75468.31
LC-003	32	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-003	33	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-003	34	17/01/2019	Port Everglades Inlet	126.67	246.76	1448.2	4462.53
LC-003	35	15/02/2019	Port Everglades Inlet	2725.77	3912.38	11393.43	14265.36
LC-003	36	18/03/2019	Port Everglades Inlet	1013.62	1284.2	7944.08	20701.71
LC-003	37	12/04/2019	Port Everglades Inlet	887.73	1094.48	4407.36	22661.36
LC-003	38	22/05/2019	Port Everglades Inlet	227.57	818.35	3254.62	13537.73
LC-003	39	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-003	40	15/07/2019	Port Everglades Inlet	461.61	1929.6	8305.7	15347.59
LC-003	41	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-003	42	09/09/2019	Port Everglades Inlet	2826.39	5485.31	21592.31	38962.56
LC-003	43	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-003	44	13/11/2019	Port Everglades Inlet	253.8	423.03	2729.29	30261.03
LC-003	45	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-003	46	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-003	47	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-003	48	08/03/2020	Port Everglades Inlet	69.28	189.48	2335.95	14267.12
LC-003	49	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-007

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-007	80	11/09/2018	Port Everglades Inlet	4319.4	9813.42	34781.36	96235.82
LC-007	81	25/10/2018	Port Everglades Inlet	230.99	437.36	10694.28	75891.58
LC-007	82	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-007	83	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-007	84	15/01/2019	Port Everglades Inlet	53.94	225.38	1590.82	4491.18
LC-007	85	19/02/2019	Port Everglades Inlet	1446.9	4172.67	12742.65	15523.57
LC-007	86	21/03/2019	Port Everglades Inlet	2163.09	2465.83	8202.91	21798.96
LC-007	87	11/04/2019	Port Everglades Inlet	851.63	1091.4	4385.51	22594.13
LC-007	88	21/05/2019	Port Everglades Inlet	284.37	956.06	3253.49	13926.55
LC-007	89	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-007	90	16/07/2019	Port Everglades Inlet	337.02	1329.12	8142.05	15356.89
LC-007	91	16/08/2019	Port Everglades Inlet	4790.4	6666.7	14303.11	26126.3
LC-007	92	24/09/2019	Port Everglades Inlet	629.92	2317.31	17523.75	40405.45
LC-007	93	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-007	94	12/11/2019	Port Everglades Inlet	201.46	372.64	2948.12	31740.5
LC-007	95	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-007	96	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-007	97	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-007	98	06/03/2020	Port Everglades Inlet	102.46	185.76	2435.8	14306.98
LC-007	99	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-024

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-024	216	11/09/2018	Government Cut	14614.01	34598.72	110347.8	285019.65
LC-024	217	25/10/2018	Government Cut	4364.49	8996.2	53238.04	247788.3
LC-024	218	08/11/2018	Government Cut	2844.77	6207.34	35786.44	221765.79
LC-024	219	18/12/2018	Government Cut	2751.19	4129.01	16447.51	105674.9
LC-024	220	15/01/2019	Government Cut	1218.56	2503.87	14676.12	58748.41
LC-024	221	19/02/2019	Government Cut	2362.47	7163.29	22829.2	51073.46
LC-024	222	21/03/2019	Government Cut	5066.53	6817.68	19180.8	53952.58
LC-024	223	11/04/2019	Government Cut	5366.32	11515.87	25368.38	61869.75
LC-024	224	20/05/2019	Government Cut	1869.58	8027.86	35329.99	78360.75
LC-024	225	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-024	226	15/07/2019	Government Cut	6801.24	17656.78	74292.35	140547.51
LC-024	227	28/08/2019	Government Cut	11973.46	21690.28	98667.47	221720.43
LC-024	228	25/09/2019	Government Cut	4427.85	11134.36	66570.52	218174.4
LC-024	229	18/10/2019	Government Cut	7908.34	17417.17	49009.26	212699.67
LC-024	230	20/11/2019	Government Cut	4401.19	9805.74	37125	154014.24
LC-024	231	04/12/2019	Government Cut	3099.5	6283.2	30398.39	125546.25
LC-024	232	07/01/2020	Government Cut	4759.14	11488.2	47231.61	122808.25
LC-024	233	04/02/2020	Government Cut	8748.46	13282.04	30634.66	104152.05
LC-024	234	06/03/2020	Government Cut	1789.12	3610.91	27879.93	102777.14
LC-024	235	16/04/2020	Government Cut	544.95	1052.26	4633.94	55655.02

LC-028

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-028	236	10/09/2018	Government Cut	15890.6	37164.11	111343.9	284834.62
LC-028	237	06/11/2018	Government Cut	3531.51	6234.68	37850.81	224531.45
LC-028	238	04/12/2018	Government Cut	1673.87	3608.97	21633.26	150645.54
LC-028	239	14/01/2018	Government Cut	5684.58	14213.61	69020.68	283935.39
LC-028	240	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-028	241	25/03/2019	Government Cut	2067.55	7134.08	18972.17	53066.6
LC-028	242	15/04/2019	Government Cut	2633.95	8000.27	26402.79	63301.84
LC-028	243	20/05/2019	Government Cut	1869.58	8027.86	35329.99	78360.75
LC-028	244	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-028	245	19/07/2019	Government Cut	4583.87	11385.11	64288.28	141852.77
LC-028	246	16/08/2019	Government Cut	18267.96	31998.97	84888.71	189424.47
LC-028	247	16/09/2019	Government Cut	7694.18	14647.35	80218.05	230252.48
LC-028	248	06/10/2019	Government Cut	4196.48	7946.2	44217.62	207958.94
LC-028	249	05/11/2019	Government Cut	4435.4	8841.78	51498.94	193067.09
LC-028	250	05/12/2019	Government Cut	2827.87	6020.63	29868.28	123422.24
LC-028	251	16/01/2020	Government Cut	3082.57	6014.74	46390.2	109083.97
LC-028	252	14/02/2020	Government Cut	3322.34	7778.77	31418.57	103528.57
LC-028	253	13/03/2020	Government Cut	1242.92	2942.91	22807.8	99251.18
LC-028	254	09/04/2020	Government Cut	428.09	873.35	5760.44	59962.23

LC-042

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-042	313	12/09/2018	Port Everglades Inlet	4232.36	8925.7	34501.22	96280.38
LC-042	314	26/10/2018	Port Everglades Inlet	256.19	464.94	9775.32	75468.31
LC-042	315	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-042	316	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-042	317	17/01/2019	Port Everglades Inlet	126.67	246.76	1448.2	4462.53
LC-042	318	15/02/2019	Port Everglades Inlet	2725.77	3912.38	11393.43	14265.36
LC-042	319	18/03/2019	Port Everglades Inlet	1013.62	1284.2	7944.08	20701.71
LC-042	320	12/04/2019	Port Everglades Inlet	887.73	1094.48	4407.36	22661.36
LC-042	321	22/05/2019	Port Everglades Inlet	227.57	818.35	3254.62	13537.73
LC-042	322	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-042	323	15/07/2019	Port Everglades Inlet	461.61	1929.6	8305.7	15347.59
LC-042	324	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-042	325	09/09/2019	Port Everglades Inlet	2826.39	5485.31	21592.31	38962.56
LC-042	326	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-042	327	13/11/2019	Port Everglades Inlet	253.8	423.03	2729.29	30261.03
LC-042	328	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-042	329	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-042	330	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-042	331	06/03/2020	Port Everglades Inlet	102.46	185.76	2435.8	14306.98
LC-042	332	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-043

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-043	333	12/09/2018	Port Everglades Inlet	4232.36	8925.7	34501.22	96280.38
LC-043	334	26/10/2018	Port Everglades Inlet	256.19	464.94	9775.32	75468.31
LC-043	335	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-043	336	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-043	337	17/01/2019	Port Everglades Inlet	126.67	246.76	1448.2	4462.53
LC-043	338	15/02/2019	Port Everglades Inlet	2725.77	3912.38	11393.43	14265.36
LC-043	339	18/03/2019	Port Everglades Inlet	1013.62	1284.2	7944.08	20701.71
LC-043	340	11/04/2019	Port Everglades Inlet	851.63	1091.4	4385.51	22594.13
LC-043	341	22/05/2019	Port Everglades Inlet	227.57	818.35	3254.62	13537.73
LC-043	342	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-043	343	15/07/2019	Port Everglades Inlet	461.61	1929.6	8305.7	15347.59
LC-043	344	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-043	345	09/09/2019	Port Everglades Inlet	2826.39	5485.31	21592.31	38962.56
LC-043	346	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-043	347	13/11/2019	Port Everglades Inlet	253.8	423.03	2729.29	30261.03
LC-043	348	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-043	349	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-043	350	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-043	351	06/03/2020	Port Everglades Inlet	102.46	185.76	2435.8	14306.98
LC-043	352	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-044

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-044	357	12/09/2018	Port Everglades Inlet	4232.36	8925.7	34501.22	96280.38
LC-044	358	26/10/2018	Port Everglades Inlet	256.19	464.94	9775.32	75468.31
LC-044	359	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-044	360	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-044	361	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-044	362	15/02/2019	Port Everglades Inlet	2725.77	3912.38	11393.43	14265.36
LC-044	363	18/03/2019	Port Everglades Inlet	1013.62	1284.2	7944.08	20701.71
LC-044	364	12/04/2019	Port Everglades Inlet	887.73	1094.48	4407.36	22661.36
LC-044	365	22/05/2019	Port Everglades Inlet	227.57	818.35	3254.62	13537.73
LC-044	366	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-044	367	15/07/2019	Port Everglades Inlet	461.61	1929.6	8305.7	15347.59
LC-044	368	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-044	369	09/09/2019	Port Everglades Inlet	2826.39	5485.31	21592.31	38962.56
LC-044	370	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-044	371	13/11/2019	Port Everglades Inlet	253.8	423.03	2729.29	30261.03
LC-044	372	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-044	373	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-044	374	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-044	375	06/03/2020	Port Everglades Inlet	102.46	185.76	2435.8	14306.98
LC-044	376	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-048

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-048	410	12/09/2018	Port Everglades Inlet	4232.36	8925.7	34501.22	96280.38
LC-048	411	26/10/2018	Port Everglades Inlet	256.19	464.94	9775.32	75468.31
LC-048	412	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-048	413	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-048	414	17/01/2019	Port Everglades Inlet	126.67	246.76	1448.2	4462.53
LC-048	415	15/02/2019	Port Everglades Inlet	2725.77	3912.38	11393.43	14265.36
LC-048	416	18/03/2019	Port Everglades Inlet	1013.62	1284.2	7944.08	20701.71
LC-048	417	11/04/2019	Port Everglades Inlet	851.63	1091.4	4385.51	22594.13
LC-048	418	22/05/2019	Port Everglades Inlet	227.57	818.35	3254.62	13537.73
LC-048	419	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-048	420	12/07/2019	Port Everglades Inlet	992.1	2237.62	8677.16	15361.26
LC-048	421	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-048	422	09/09/2019	Port Everglades Inlet	2826.39	5485.31	21592.31	38962.56
LC-048	423	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-048	424	13/11/2019	Port Everglades Inlet	253.8	423.03	2729.29	30261.03
LC-048	425	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-048	426	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-048	427	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-048	428	06/03/2020	Port Everglades Inlet	102.46	185.76	2435.8	14306.98
LC-048	429	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-050

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-050	450	12/09/2018	Port Everglades Inlet	4232.36	8925.7	34501.22	96280.38
LC-050	451	26/10/2018	Port Everglades Inlet	256.19	464.94	9775.32	75468.31
LC-050	452	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-050	453	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-050	454	17/01/2019	Port Everglades Inlet	126.67	246.76	1448.2	4462.53
LC-050	455	15/02/2019	Port Everglades Inlet	2725.77	3912.38	11393.43	14265.36
LC-050	456	18/03/2019	Port Everglades Inlet	1013.62	1284.2	7944.08	20701.71
LC-050	457	11/04/2019	Port Everglades Inlet	851.63	1091.4	4385.51	22594.13
LC-050	458	22/05/2019	Port Everglades Inlet	227.57	818.35	3254.62	13537.73
LC-050	459	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-050	460	15/07/2019	Port Everglades Inlet	461.61	1929.6	8305.7	15347.59
LC-050	461	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-050	462	09/09/2019	Port Everglades Inlet	2826.39	5485.31	21592.31	38962.56
LC-050	463	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-050	464	13/11/2019	Port Everglades Inlet	253.8	423.03	2729.29	30261.03
LC-050	465	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-050	466	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-050	467	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-050	468	08/03/2020	Port Everglades Inlet	69.28	189.48	2335.95	14267.12
LC-050	469	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-051

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-051	470	12/09/2018	Port Everglades Inlet	4232.36	8925.7	34501.22	96280.38
LC-051	471	26/10/2018	Port Everglades Inlet	256.19	464.94	9775.32	75468.31
LC-051	472	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-051	473	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-051	474	17/01/2019	Port Everglades Inlet	126.67	246.76	1448.2	4462.53
LC-051	475	15/02/2019	Port Everglades Inlet	2725.77	3912.38	11393.43	14265.36
LC-051	476	18/03/2019	Port Everglades Inlet	1013.62	1284.2	7944.08	20701.71
LC-051	477	12/04/2019	Port Everglades Inlet	887.73	1094.48	4407.36	22661.36
LC-051	478	22/05/2019	Port Everglades Inlet	227.57	818.35	3254.62	13537.73
LC-051	479	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-051	480	15/07/2019	Port Everglades Inlet	461.61	1929.6	8305.7	15347.59
LC-051	481	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-051	482	09/09/2019	Port Everglades Inlet	2826.39	5485.31	21592.31	38962.56
LC-051	483	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-051	484	13/11/2019	Port Everglades Inlet	253.8	423.03	2729.29	30261.03
LC-051	485	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-051	486	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-051	487	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-051	488	08/03/2020	Port Everglades Inlet	69.28	189.48	2335.95	14267.12
LC-051	489	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-079

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-079	807	10/09/2018	Government Cut	15890.6	37164.11	111343.9	284834.62
LC-079	808	24/10/2018	Government Cut	4414.13	9184.33	54591.43	250206.18
LC-079	809	06/11/2018	Government Cut	3531.51	6234.68	37850.81	224531.45
LC-079	810	04/12/2018	Government Cut	1673.87	3608.97	21633.26	150645.54
LC-079	811	14/01/2019	Government Cut	1201.86	2510.45	15277.66	59911.96
LC-079	812	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-079	813	25/03/2019	Government Cut	2067.55	7134.08	18972.17	53066.6
LC-079	814	15/04/2019	Government Cut	2633.95	8000.27	26402.79	63301.84
LC-079	815	21/05/2019	Government Cut	1687.18	6295.52	34257.57	78046.94
LC-079	816	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-079	817	22/07/2019	Government Cut	4420.8	9116.72	56117.46	142851
LC-079	818	27/08/2019	Government Cut	10504.07	21229.1	98116.55	218836.57
LC-079	819	27/09/2019	Government Cut	4299.16	9954.47	62248.97	215384.58
LC-079	820	09/10/2019	Government Cut	8325.1	12450.93	45878.74	206026.12
LC-079	821	05/11/2019	Government Cut	4435.4	8841.78	51498.94	193067.09
LC-079	822	05/12/2019	Government Cut	2827.87	6020.63	29868.28	123422.24
LC-079	823	16/01/2020	Government Cut	3082.57	6014.74	46390.2	109083.97
LC-079	824	14/02/2020	Government Cut	3322.34	7778.77	31418.57	103528.57
LC-079	825	13/03/2020	Government Cut	1242.92	2942.91	22807.8	99251.18
LC-079	826	09/04/2020	Government Cut	428.09	873.35	5760.44	59962.23

LC-115

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-115	1053	12/09/2018	Port Everglades Inlet	4232.36	8925.7	34501.22	96280.38
LC-115	1054	15/11/2018	Port Everglades Inlet	419.77	536.85	1617.57	53939.15
LC-115	1055	03/12/2018	Port Everglades Inlet	165.57	345.74	1517.74	35779.4
LC-115	1056	17/01/2019	Port Everglades Inlet	126.67	246.76	1448.2	4462.53
LC-115	1057	15/02/2019	Port Everglades Inlet	2725.77	3912.38	11393.43	14265.36
LC-115	1058	18/03/2019	Port Everglades Inlet	1013.62	1284.2	7944.08	20701.71
LC-115	1059	12/04/2019	Port Everglades Inlet	887.73	1094.48	4407.36	22661.36
LC-115	1060	20/05/2019	Port Everglades Inlet	294.95	1228.71	3278.2	14190.75
LC-115	1061	12/06/2019	Port Everglades Inlet	1243.97	2069.41	3997.84	11222.8
LC-115	1062	15/07/2019	Port Everglades Inlet	461.61	1929.6	8305.7	15347.59
LC-115	1063	15/08/2019	Port Everglades Inlet	4497.75	6199.71	13319.9	25141.67
LC-115	1064	25/09/2019	Port Everglades Inlet	306.65	1916.53	17352.63	40348.12
LC-115	1065	16/10/2019	Port Everglades Inlet	972.32	2507.26	7179.16	40150.43
LC-115	1066	13/11/2019	Port Everglades Inlet	253.8	423.03	2729.29	30261.03
LC-115	1067	03/12/2019	Port Everglades Inlet	212.04	587.42	4947.33	21076.15
LC-115	1068	08/01/2020	Port Everglades Inlet	283.7	736.81	9504.02	18226.22
LC-115	1069	05/02/2020	Port Everglades Inlet	265.68	1298.75	2580.77	16740.71
LC-115	1070	08/03/2020	Port Everglades Inlet	69.28	189.48	2335.95	14267.12
LC-115	1071	08/04/2020	Port Everglades Inlet	0	0	365.88	5128.98

LC-123

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-123	1261	11/09/2018	Government Cut	14614.01	34598.72	110347.8	285019.65
LC-123	1262	25/10/2018	Government Cut	4364.49	8996.2	53238.04	247788.3
LC-123	1263	08/11/2018	Government Cut	2844.77	6207.34	35786.44	221765.79
LC-123	1264	18/12/2018	Government Cut	2751.19	4129.01	16447.51	105674.9
LC-123	1265	15/01/2019	Government Cut	1218.56	2503.87	14676.12	58748.41
LC-123	1266	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-123	1267	21/03/2019	Government Cut	5066.53	6817.68	19180.8	53952.58
LC-123	1268	12/04/2019	Government Cut	5126.46	10193.02	25724.97	62260.23
LC-123	1269	21/05/2019	Government Cut	1687.18	6295.52	34257.57	78046.94
LC-123	1270	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-123	1271	17/07/2019	Government Cut	4671.25	13427.51	70333.57	141967.76
LC-123	1272	28/08/2019	Government Cut	11973.46	21690.28	98667.47	221720.43
LC-123	1273	25/09/2019	Government Cut	4427.85	11134.36	66570.52	218174.4
LC-123	1274	18/10/2019	Government Cut	7908.34	17417.17	49009.26	212699.67
LC-123	1275	20/11/2019	Government Cut	4401.19	9805.74	37125	154014.24
LC-123	1276	04/12/2019	Government Cut	3099.5	6283.2	30398.39	125546.25
LC-123	1277	07/01/2020	Government Cut	4759.14	11488.2	47231.61	122808.25
LC-123	1278	04/02/2020	Government Cut	8748.46	13282.04	30634.66	104152.05
LC-123	1279	06/03/2020	Government Cut	1789.12	3610.91	27879.93	102777.14
LC-123	1280	16/04/2020	Government Cut	544.95	1052.26	4633.94	55655.02

LC-125

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-125	1306	11/09/2018	Government Cut	14614.01	34598.72	110347.8	285019.65
LC-125	1307	25/10/2018	Government Cut	4364.49	8996.2	53238.04	247788.3
LC-125	1308	08/11/2018	Government Cut	2844.77	6207.34	35786.44	221765.79
LC-125	1309	15/01/2019	Government Cut	1218.56	2503.87	14676.12	58748.41
LC-125	1310	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-125	1311	21/03/2019	Government Cut	5066.53	6817.68	19180.8	53952.58
LC-125	1312	11/04/2019	Government Cut	5366.32	11515.87	25368.38	61869.75
LC-125	1313	20/05/2019	Government Cut	1869.58	8027.86	35329.99	78360.75
LC-125	1314	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-125	1315	17/07/2019	Government Cut	4671.25	13427.51	70333.57	141967.76
LC-125	1316	28/08/2019	Government Cut	11973.46	21690.28	98667.47	221720.43
LC-125	1317	25/09/2019	Government Cut	4427.85	11134.36	66570.52	218174.4
LC-125	1318	18/10/2019	Government Cut	7908.34	17417.17	49009.26	212699.67
LC-125	1319	20/11/2019	Government Cut	4401.19	9805.74	37125	154014.24
LC-125	1320	03/12/2019	Government Cut	3175.14	6544.66	31028.79	127624.96
LC-125	1321	07/01/2020	Government Cut	4759.14	11488.2	47231.61	122808.25
LC-125	1322	04/02/2020	Government Cut	8748.46	13282.04	30634.66	104152.05
LC-125	1323	06/03/2020	Government Cut	1789.12	3610.91	27879.93	102777.14
LC-125	1324	16/04/2020	Government Cut	544.95	1052.26	4633.94	55655.02

LC-126

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-126	1325	11/09/2018	Government Cut	14614.01	34598.72	110347.8	285019.65
LC-126	1326	25/10/2018	Government Cut	4364.49	8996.2	53238.04	247788.3
LC-126	1327	08/11/2018	Government Cut	2844.77	6207.34	35786.44	221765.79
LC-126	1328	18/12/2018	Government Cut	2751.19	4129.01	16447.51	105674.9
LC-126	1329	15/01/2019	Government Cut	1218.56	2503.87	14676.12	58748.41
LC-126	1330	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-126	1331	21/03/2019	Government Cut	5066.53	6817.68	19180.8	53952.58
LC-126	1332	11/04/2019	Government Cut	5366.32	11515.87	25368.38	61869.75
LC-126	1333	20/05/2019	Government Cut	1869.58	8027.86	35329.99	78360.75
LC-126	1334	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-126	1335	17/07/2019	Government Cut	4671.25	13427.51	70333.57	141967.76
LC-126	1336	28/08/2019	Government Cut	11973.46	21690.28	98667.47	221720.43
LC-126	1337	25/09/2019	Government Cut	4427.85	11134.36	66570.52	218174.4
LC-126	1338	18/10/2019	Government Cut	7908.34	17417.17	49009.26	212699.67
LC-126	1339	20/11/2019	Government Cut	4401.19	9805.74	37125	154014.24
LC-126	1340	04/12/2019	Government Cut	3099.5	6283.2	30398.39	125546.25
LC-126	1341	07/01/2020	Government Cut	4759.14	11488.2	47231.61	122808.25
LC-126	1342	04/02/2020	Government Cut	8748.46	13282.04	30634.66	104152.05
LC-126	1343	06/03/2020	Government Cut	1789.12	3610.91	27879.93	102777.14
LC-126	1344	16/04/2020	Government Cut	544.95	1052.26	4633.94	55655.02

LC-127

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-127	1346	11/09/2018	Government Cut	14614.01	34598.72	110347.8	285019.65
LC-127	1347	25/10/2018	Government Cut	4364.49	8996.2	53238.04	247788.3
LC-127	1348	08/11/2018	Government Cut	2844.77	6207.34	35786.44	221765.79
LC-127	1349	18/12/2018	Government Cut	2751.19	4129.01	16447.51	105674.9
LC-127	1350	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-127	1351	21/03/2019	Government Cut	5066.53	6817.68	19180.8	53952.58
LC-127	1352	11/04/2019	Government Cut	5366.32	11515.87	25368.38	61869.75
LC-127	1353	20/05/2019	Government Cut	1869.58	8027.86	35329.99	78360.75
LC-127	1354	14/06/2019	Government Cut	11294	23012	31941.5	92657.95
LC-127	1355	17/07/2019	Government Cut	4671.25	13427.51	70333.57	141967.76
LC-127	1356	28/08/2019	Government Cut	11973.46	21690.28	98667.47	221720.43
LC-127	1357	27/09/2019	Government Cut	4299.16	9954.47	62248.97	215384.58
LC-127	1358	18/10/2019	Government Cut	7908.34	17417.17	49009.26	212699.67
LC-127	1359	20/11/2019	Government Cut	4401.19	9805.74	37125	154014.24
LC-127	1360	04/12/2019	Government Cut	3099.5	6283.2	30398.39	125546.25
LC-127	1361	07/01/2020	Government Cut	4759.14	11488.2	47231.61	122808.25
LC-127	1362	04/02/2020	Government Cut	8748.46	13282.04	30634.66	104152.05
LC-127	1363	06/03/2020	Government Cut	1789.12	3610.91	27879.93	102777.14
LC-127	1364	10/04/2020	Government Cut	432.3	863.9	5593.42	59261.48

LC-128

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-128	1365	11/09/2018	Government Cut	14614.01	34598.72	110347.8	285019.65
LC-128	1366	24/10/2018	Government Cut	4414.13	9184.33	54591.43	250206.18
LC-128	1367	08/11/2018	Government Cut	2844.77	6207.34	35786.44	221765.79
LC-128	1368	18/12/2018	Government Cut	2751.19	4129.01	16447.51	105674.9
LC-128	1369	15/01/2019	Government Cut	1218.56	2503.87	14676.12	58748.41
LC-128	1370	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-128	1371	21/03/2019	Government Cut	5066.53	6817.68	19180.8	53952.58
LC-128	1372	11/04/2019	Government Cut	5366.32	11515.87	25368.38	61869.75
LC-128	1373	20/05/2019	Government Cut	1869.58	8027.86	35329.99	78360.75
LC-128	1374	14/06/2019	Government Cut	11294	23012	31941.5	92657.95
LC-128	1375	17/07/2019	Government Cut	4671.25	13427.51	70333.57	141967.76
LC-128	1376	28/08/2019	Government Cut	11973.46	21690.28	98667.47	221720.43
LC-128	1377	27/09/2019	Government Cut	4299.16	9954.47	62248.97	215384.58
LC-128	1378	17/10/2019	Government Cut	8926.1	18162.11	49393.5	212247.38
LC-128	1379	20/11/2019	Government Cut	4401.19	9805.74	37125	154014.24
LC-128	1380	04/12/2019	Government Cut	3099.5	6283.2	30398.39	125546.25
LC-128	1381	07/01/2020	Government Cut	4759.14	11488.2	47231.61	122808.25
LC-128	1382	04/02/2020	Government Cut	8748.46	13282.04	30634.66	104152.05
LC-128	1383	06/03/2020	Government Cut	1789.12	3610.91	27879.93	102777.14
LC-128	1384	10/04/2020	Government Cut	432.3	863.9	5593.42	59261.48

LC-129

	UUID	Date	ICA_NAME	3 days	7 days	30 days	90 days
LC-129	1390	11/09/2018	Government Cut	14614.01	34598.72	110347.8	285019.65
LC-129	1391	24/10/2018	Government Cut	4414.13	9184.33	54591.43	250206.18
LC-129	1392	04/12/2018	Government Cut	1673.87	3608.97	21633.26	150645.54
LC-129	1393	14/01/2019	Government Cut	1201.86	2510.45	15277.66	59911.96
LC-129	1394	28/02/2019	Government Cut	5443.68	7531.79	23713.3	53268.02
LC-129	1395	28/03/2019	Government Cut	2190.25	4303.25	19115.19	53428.72
LC-129	1396	12/04/2019	Government Cut	5126.46	10193.02	25724.97	62260.23
LC-129	1397	20/05/2019	Government Cut	1869.58	8027.86	35329.99	78360.75
LC-129	1398	13/06/2019	Government Cut	11994.87	20679.52	30940.74	90252.46
LC-129	1399	17/07/2019	Government Cut	4671.25	13427.51	70333.57	141967.76
LC-129	1400	28/08/2019	Government Cut	11973.46	21690.28	98667.47	221720.43
LC-129	1401	27/09/2019	Government Cut	4299.16	9954.47	62248.97	215384.58
LC-129	1402	17/10/2019	Government Cut	8926.1	18162.11	49393.5	212247.38
LC-129	1403	20/11/2019	Government Cut	4401.19	9805.74	37125	154014.24
LC-129	1404	04/12/2019	Government Cut	3099.5	6283.2	30398.39	125546.25
LC-129	1405	07/01/2020	Government Cut	4759.14	11488.2	47231.61	122808.25
LC-129	1406	04/02/2020	Government Cut	8748.46	13282.04	30634.66	104152.05
LC-129	1407	06/03/2020	Government Cut	1789.12	3610.91	27879.93	102777.14
LC-129	1408	10/04/2020	Government Cut	432.3	863.9	5593.42	59261.48

APPENDIX 4. Habitat variables included in the boosted regression tree modelling for DSD.

	Reef Zone
1	Bank
2	Deepwater
3	Forereef
4	Inner Reef
5	Inshore
6	Intra Island
7	Lagoon
8	Mid Channel
9	Middle Reef
10	Offshore Patch Reef
11	Outer Reef
12	Reef Ridge
13	Undetermined

	URM GeoForm
1	Aggregate Reef
2	Artificial
3	Coral Reef and Colonized Hardbottom
4	Coral Reef and Hardbottom
5	Patch Reef
6	Patch Reefs
7	Platform Margin Reef
8	Reef Terrace (high profile)
9	Seagrass
10	Uncolonized Sediment
11	Unknown

	URM GeoFormDet
1	*Acropora cervicornis*
2	Aggregate Reef
3	Aggregated Patch Reef
4	Aggregated Patch Reefs
5	Artificial
6	Colonized Pavement
7	Continuous SRV
8	Coral Patch Reef: Individual Patch Reef
9	Coral Platform Margin Reef: Remnant - Low Profile
10	Deep Ridge Complex
11	Discontinuous Seagrass
12	Discontinuous SRV
13	High Relief Spur and Groove
14	Individual Patch Reef
15	Inner Reef
16	Linear Reef
17	Low Relief Spur and Groove
18	Mud
19	Outer Reef
20	Patch Reef
21	Patchy Coral and/or Rock in Unconsolidated Bottom
22	Pavement
23	Pavement with Sand Channels
24	Reef Rubble
25	Reef Terrace (high profile)
26	Remnant (low profile)
27	Ridge
28	Sand
29	Sand Borrow Area
30	Sand with Scattered Coral and Rock
31	Scattered Rock in Unconsolidated Sediment
32	Spur and Groove
33	Unconsolidated Sediment
34	Unknown

	URM ClassLv0
1	Artificial
2	Coral Reef and Hardbottom
3	Dredged/Excavated
4	Not Classified
5	Seagrass
6	Unconsolidated Sediment

	URM ClassLv1
1	Aggregate Reef
2	Artificial
3	Dredged/Excavated
4	Individual or Aggregated Patch Reef
5	Not Classified
6	Pavement
7	Reef Rubble
8	Ridge
9	Scattered Coral/Rock in Unconsolidated Sediment
10	Seagrass (Continuous)
11	Seagrass (Discontinuous)
12	Unconsolidated Sediment

	URM ClassLv2
1	Aggregate Reef
2	Artificial
3	Colonized Pavement
4	Dredged/Excavated
5	Individual or Aggregated Patch Reef
6	Not Classified
7	Pavement
8	Pavement with Sand Channels
9	Pavement with Seagrass
10	Reef Rubble
11	Ridge
12	Scattered Coral/Rock in Unconsolidated Sediment
13	Seagrass (Continuous)
14	Seagrass (Discontinuous)
15	Spur and Groove
16	Unconsolidated Sediment

	URM ClassLv3
1	Aggregate Reef
2	Aggregate Reef (Inner)
3	Aggregate Reef (Outer)
4	Aggregated Patch Reef
5	Artificial
6	Colonized Pavement
7	Dredged/Excavated
8	Individual Patch Reef
9	Not Classified
10	Pavement
11	Pavement with Sand Channels
12	Pavement with Seagrass
13	Reef Rubble
14	Reef Terrace (High Profile)
15	Reef Terrace (Low Profile)
16	Ridge
17	Scattered Coral/Rock in Unconsolidated Sediment
18	Seagrass (Continuous)
19	Seagrass (Discontinuous)
20	Spur and Groove
21	Spur and Groove (High Relief)
22	Unconsolidated Sediment
23	Unconsolidated Sediment, Mud
24	Unconsolidated Sediment, Sand

	URM ClassLv4
1	*Acropora cervicornis*
2	Aggregate Reef
3	Aggregate Reef (Inner)
4	Aggregate Reef (Outer)
5	Aggregate Reef, Algae (Continuous)
6	Aggregate Reef, Algae (Discontinuous)
7	Aggregate Reef, Live Coral (Discontinuous)
8	Aggregate Reef, Live Coral (Patchy)
9	Aggregate Reef, Live Coral (Sparse)
10	Aggregate Reef, Uncolonized
11	Aggregated Patch Reef
12	Aggregated Patch Reef, Algae (Discontinuous)
13	Artificial
14	Colonized Pavement
15	Colonized Pavement (Shallow)
16	Colonized Pavement, Live Coral (Discontinuous)
17	Colonized Pavement, Live Coral (Patchy)
18	Colonized Pavement, Live Coral (Sparse)
19	Deep Ridge Complex
20	Individual Patch Reef
21	Individual Patch Reef, Algae (Discontinuous)
22	Mud, Algae (Discontinuous)
23	Mud, Live Coral (Infrequent, <10%)
24	Mud, Seagrass (Continuous)
25	Mud, Seagrass (Discontinuous)
26	Pavement
27	Pavement with Sand Channels
28	Pavement with Sand Channels, Algae (Continuous)
29	Pavement with Sand Channels, Algae (Discontinuous)
30	Pavement with Seagrass
31	Pavement with Seagrass (Continuous)
32	Pavement with Seagrass (Discontinuous)
33	Pavement, Algae (Continuous)
34	Pavement, Algae (Discontinuous)
35	Reef Rubble
36	Reef Rubble, Algae (Continuous)
37	Reef Rubble, Algae (Discontinuous)
38	Reef Terrace (High Profile)
39	Remnant Reef (Low Profile)
40	Ridge
41	Sand
42	Sand (No Cover)
43	Sand (Shallow)
44	Sand Borrow Area
45	Sand, Algae (Sparse)
46	Sand, Live Coral (Infrequent, <10%)
47	Sand, Seagrass (Continuous)
48	Sand, Seagrass (Discontinuous)
49	Sand, Seagrass (Patchy)
50	Sand, Seagrass (Sparse)
51	Scattered Coral/Rock in Unconsolidated Sediment
52	Scattered Coral/Rock in Unconsolidated Sediment, Algae (Discontinuous)
53	Scattered Coral/Rock in Unconsolidated Sediment, Live Coral (Discontinuous)
54	Seagrass (Continuous)
55	Seagrass (Discontinuous)
56	Spur and Groove
57	Spur and Groove (High Relief)
58	Spur and Groove (Outer)
59	Spur and Groove, Algae (Continuous)
60	Spur and Groove, Algae (Discontinuous)
61	Unconsolidated Sediment
62	Unknown

APPENDIX 5. Habitat variables within URM ClassLv4 for TLD.

	URM ClassLv4
1	*Acropora cervicornis*
2	Aggregate Reef
3	Aggregate Reef (Inner)
4	Aggregate Reef (Outer)
5	Aggregate Reef, Algae (Continuous)
6	Aggregate Reef, Algae (Discontinuous)
7	Aggregate Reef, Live Coral (Discontinuous)
8	Aggregate Reef, Live Coral (Patchy)
9	Aggregate Reef, Live Coral (Sparse)
10	Aggregate Reef, Uncolonized
11	Aggregated Patch Reef
12	Aggregated Patch Reef, Algae (Discontinuous)
13	Artificial
14	Colonized Pavement
15	Colonized Pavement (Shallow)
16	Colonized Pavement, Live Coral (Discontinuous)
17	Colonized Pavement, Live Coral (Patchy)
18	Colonized Pavement, Live Coral (Sparse)
19	Deep Ridge Complex
20	Individual Patch Reef
21	Individual Patch Reef, Algae (Discontinuous)
22	Mud, Algae (Discontinuous)
23	Mud, Live Coral (Infrequent, <10%)
24	Mud, Seagrass (Continuous)
25	Mud, Seagrass (Discontinuous)
26	Pavement
27	Pavement with Sand Channels
28	Pavement with Sand Channels, Algae (Continuous)
29	Pavement with Sand Channels, Algae (Discontinuous)
30	Pavement with Seagrass
31	Pavement with Seagrass (Continuous)
32	Pavement with Seagrass (Discontinuous)
33	Pavement with Seagrass (Patchy)
34	Pavement, Algae (Continuous)
35	Pavement, Algae (Discontinuous)
36	Reef Rubble
37	Reef Rubble with Seagrass (Discontinuous)
38	Reef Rubble, Algae (Continuous)
39	Reef Rubble, Algae (Discontinuous)
40	Reef Terrace (High Profile)
41	Remnant Reef (Low Profile)
42	Ridge
43	Sand
44	Sand (No Cover)
45	Sand (Shallow)
46	Sand Borrow Area
47	Sand, Algae (Discontinuous)
48	Sand, Algae (Sparse)
49	Sand, Live Coral (Infrequent, <10%)
50	Sand, Seagrass (Continuous)
51	Sand, Seagrass (Discontinuous)
52	Sand, Seagrass (Patchy)
53	Sand, Seagrass (Sparse)
54	Scattered Coral/Rock in Unconsolidated Sediment
55	Scattered Coral/Rock in Unconsolidated Sediment, Algae (Discontinuous)
56	Scattered Coral/Rock in Unconsolidated Sediment, Live Coral (Discontinuous)
57	Seagrass (Continuous)
58	Seagrass (Discontinuous)
59	Spur and Groove
60	Spur and Groove (High Relief)
61	Spur and Groove (Outer)
62	Spur and Groove, Algae (Continuous)
63	Spur and Groove, Algae (Discontinuous)
64	Unconsolidated Sediment
65	Unknown