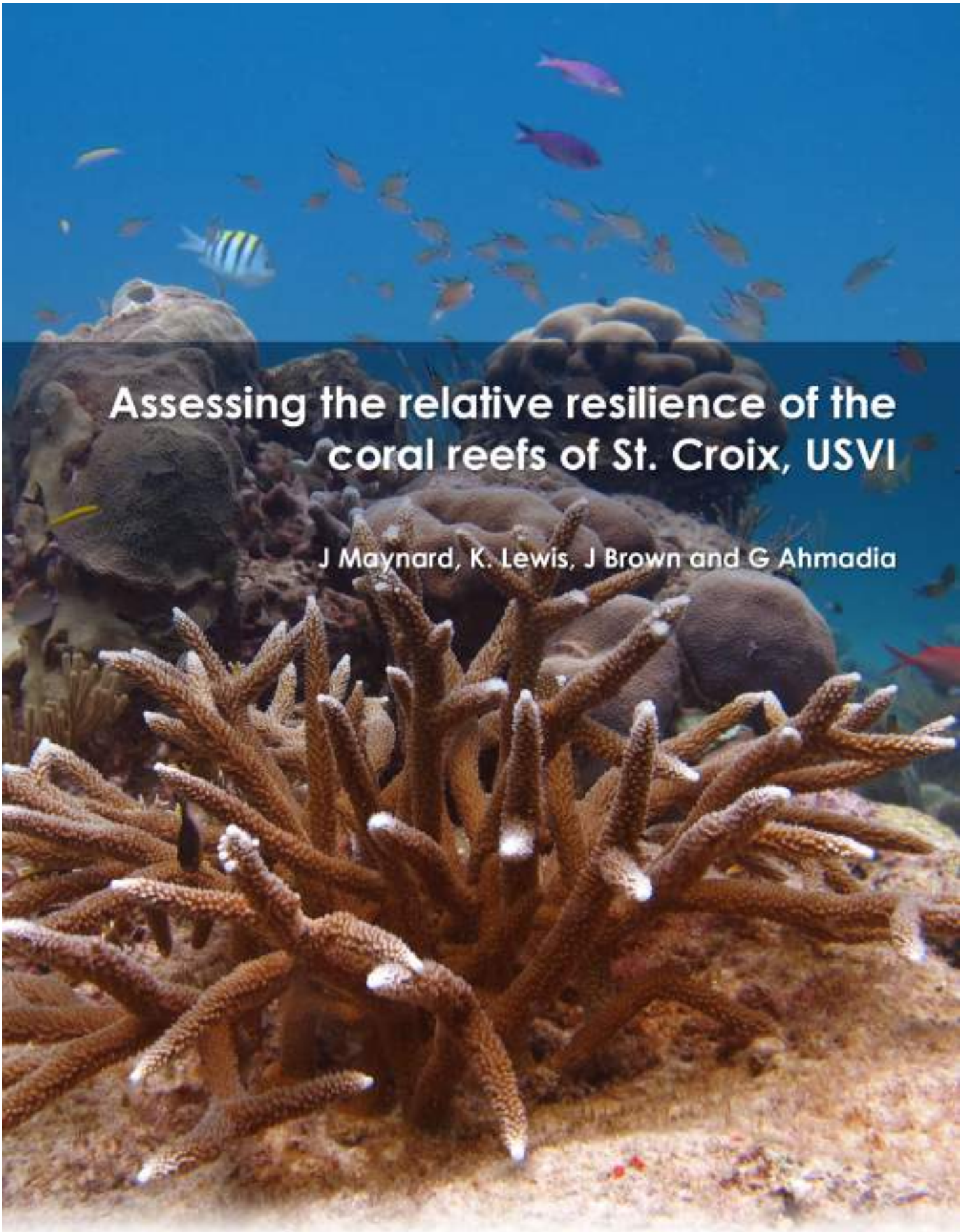

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Assessing the relative resilience of the coral reefs of St. Croix, USVI

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Contents

Summary

Coral reefs are dynamic systems that have evolved to be naturally resilient, recovering from disturbances if the processes that support recovery are intact. The natural resilience of reefs is now being challenged because reefs are under unprecedented pressure from increasing disturbance frequencies associated with climate change and from anthropogenic stress. Managers and conservationists seek to support reef resilience, which requires targeting actions to reduce stress and support recovery processes. This report describes an assessment of the relative resilience of reef sites near St. Croix, USVI based on key resilience indicators, such as herbivore biomass and coral diversity. The resultant rankings for sites and assessment of all sites as having high, medium or low relative resilience can aid with targeting management actions. Expected follow-on actions include: identifying potential sites for future MPAs and defending existing MPAs, prioritizing sites for coral transplantation to support recovery and communication and engagement with stakeholders and the public. Resilience has been hugely popular in the conservation community as a conceptual framework but there are very few examples of operationalizing resilience into decision-support for managers. This report is thus a critically important example others can learn from and is unique in two important ways. The analysis was conducted as desktop-only by compiling a range of existing data; there are many datasets on coral reef condition around the world that could be analysed using the approach described here. Secondly, the highly consultative and collaborative process used is a model for scientist-manager interactions that has strengthened inter-agency relationships and will maximize uptake of the analysis outputs.

Introduction and Objectives

Climate change is now widely regarded as the single greatest long-term threat to coral reefs. As the climate changes, the frequency and severity of many disturbances to reef health, like coral bleaching, will increase. Coral reefs have always been dynamic habitats in which episodic disturbances occur and set the reef growth clock back, followed by periods in which the system recovers. Under these conditions coral reefs have evolved to be resilient habitats – they can recover and maintain ecosystem function after disturbances - but this natural resilience of reefs is now being challenged. Reefs face unprecedented pressures so managers and conservationists have to support and build resilience when and where possible. As a conceptual framework, resilience has been hugely popular with conservationists but ‘operationalising’ resilience in a management setting has been difficult. Managers can limit stress, support recovery processes, and educate and raise awareness, but need information that helps to target these actions. Examples are just now emerging that demonstrate how to target and tailor actions by assessing the relative resilience of reef sites. This study is one such example.

The concept of undertaking a reef resilience assessment was first formally put forward in a technical guidance document published by the IUCN and partners in 2009 (Obura and Grimsditch, 2009). This document built on foundational work by Obura (2005) and Grimsditch and Salm (2006) on the identification of resilience indicators. The 2009 guidance from the IUCN and partners presented 61 variables that could serve as

'resilience indicators'; these are properties relating to the ability to resist stress (e.g., anomalously high seawater temperatures) and impacts and proxies of processes that underlie the ability of a coral reef to recover (e.g., herbivore biomass). In 2010, managers of the Great Barrier Reef Marine Park culled the list of proposed resilience indicators to 30 during an assessment used to inform placement of no-anchoring areas in Keppel Bay, Southern GBR (Maynard et al. 2010). Then, in 2011, leaders in this research area hosted a workshop at the International Marine Conservation Congress meeting in Vancouver, British Columbia. The workshop outcome was a survey filled out by 27 coral reef experts and managers that ranked 30 resilience indicators based on: 1) their perceived importance, 2) the strength of evidence the variable is linked to resistance or resilience, and 3) the feasibility of assessment/measurement. The resultant review paper (McClanahan et al. 2012) suggested that resilience assessment frameworks need only include 10-15 resilience indicators; all of which can be reliably assessed/measured, and have both strong evidence and high perceived importance.

This brief report shares the results of one of the first large-scale assessments of relative resilience using a short-list of indicators from McClanahan et al. (2012) and following guidance first presented in a TNC report by Maynard and Mcleod[1]. The output of the analysis is an assessment of spatial variation in relative resilience (high, medium or low) in combination with an assessment of relative levels of anthropogenic stress (also high, medium or low). Managers and conservationists can use the analysis outputs to support efforts to achieve conservation outcomes, like planning marine protected area networks, targeting actions to reduce stress, and educating and engaging with stakeholders and community members. In this project in USVI all of the following were specific objectives the project leaders hoped could be met either by undertaking the analysis or through interpretation of the analysis outputs:

1. Identify sites with high resilience that are not currently inside MPAs.
2. Assess threats at sites with high and low resilience to target conservation effort.
3. Develop materials to aid in educating and engaging about the importance of Buck Island and east end MPAs.
4. Prioritise sites for the transplantation of nursery-grown corals.

The process and methods used to undertake the analysis are presented, as well as the results and a description of the management/conservation applications and next steps.

Process and Methods

Project leaders and the TNC Resilience Committee for USVI decided which resilience indicators to include in the analysis through a consultative process. Project leaders developed a spreadsheet containing all 30 of the resilience indicators described in the McClanahan et al. (2012) review. The case was made to the Committee that indicators not in the top 20 for perceived importance and strength of evidence should be excluded.

[1] http://www.reefresilience.org/pdf/How-to_Guide_Final.pdf

This first suggestion was agreed upon; the rationale being that each additional indicator included dilutes the relative importance of each of the other indicators. In other words, a shorter list of indicators that are important to resistance properties and resilience processes is better than a longer list that includes weak indicators. The remaining indicators were then classified into three tiers in preparation for the second group consultation.

Tier 1 indicators are: (a) important to resistance properties and resilience processes in USVI, and (b) team members could acquire or calculate (from existing data) a continuous value for all sites. Tier 2 indicators met one but potentially not both of the criteria for Tier 1 so had to be discussed with project partners. Tier 3 indicators met neither of the Tier 1 criteria, are likely weak indicators, and/or would require too much effort to compile and standardize during the project timeframes. The final list combined Tier 1 and Tier 2 indicators and included 7 resilience indicators and 2 proxies for anthropogenic stress. The resilience indicators included are: resistant species, temperature variability, coral diversity, herbivore biomass, coral disease, macroalgae cover, and coral cover. The proxies for anthropogenic stress are a Landscape Development Index (LDI) for runoff (nutrients and sedimentation) (Oliver et al. 2011[3]) and 2010/2011 fisheries catch to represent the spatial distribution of fishing pressure.

The resilience indicators and stress proxies are described briefly below and a reference has been provided where applicable. The data were collected and compiled via a combination of fieldwork and desktop analysis undertaken under the Territorial and National Coral Reef Monitoring Programs (TCRMP and NCRMP) by staff from TNC, NOAA CRCP, DPRN-DFW, and NOAA's National Centers for Coastal Ocean Science' Biogeography Branch or by this report's authors. The focus here is on the assessment of relative resilience of reef sites, so we have not described here any of the field or desktop analyses undertaken as parts of other projects.

Resistant species – the percent of the coral community made up of species known or thought to have greater relative thermal tolerance than other local species. The resistant species included are: *D. strigosa, M. cavernosa, P. asteroids, S. siderea* (from Smith et al. 2008[2]).

Temperature variability – the standard deviation of temperatures during the 3 warmest months using NOAA Pathfinder v5.2.

Coral diversity – Simpson's Index of Diversity (1-D), which assesses the likelihood that two species taken randomly from a community will be the same species (D), the greater the likelihood the closer the value approaches 1 (because 1-D is used).

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[2] Smith, T. B., et al. "Assessing coral reef health across onshore to offshore stress gradients in the US Virgin Islands." *Marine Pollution Bulletin* 56.12 (2008): 1983-1991.
[3] Oliver, L. M., J. C. Lehrter, and W. S. Fisher. "Relating landscape development intensity to coral reef condition in the watersheds of St. Croix, US Virgin Islands." *Mar Ecol Prog Ser* 427 (2011): 293-302.

Herbivore biomass – biomass of Acanthurids and Scarids in grams/100m^2.

Coral disease – prevalence of coral diseases among the coral community.

Macroalgae cover and Coral cover – percentage cover of macroalgae and corals on the substrate.

A Landscape Development Index (LDI) created by assigning higher values to the most heavily modified watersheds and lowest values to least urbanized watershed using a map of landuse (adapted from Pittman et al. 2013[4])– ArcGIS was used to determine which watershed was closest to each of the reef sites and the LDI value for the watershed was assigned to the site as a proxy for the level of sediments and nutrients that might reach the site.

Fishing pressure – 2010/2011 fish catch in pounds for the 6 fishery zones. ArcGIS was used to determine which zone the site is within and fishing pressure was assumed to be directly related to catch so relative pressure was calculated by dividing the 2010/2011 catch for the zone by the max catch across all six zones.

The LDI and fishing pressure are fair proxies of levels of anthropogenic stress, but are both based on assumptions which the project team recognized would not be true for all sites. For many sites, more than one watershed will influence the level of sedimentation and nutrients reaching the site and exposure to sediments and nutrients will decrease rapidly with distance from shore. The approach used here does not account for either of these known realities of sediment and nutrient transport around St. Croix. Secondly, fishing pressure will vary greatly within the fishing zones and the percentage of the catch made up by the functional group with strong links to resilience processes (herbivores) is unknown. Including the stress proxies helps demonstrate the utility of this kind of analysis in targeting conservation effort since differences in stress levels at high and low resilience sites can be readily seen. The analysis can be revised when better or more stress proxies become available so in this sense including proxies currently available forms a launching pad for future work.

A relative resilience score is calculated as follows. For all 7 resilience indicators the scores for all sites (n=267) are ‘anchored’ to the maximum score by dividing the value for each site for the indicator by the maximum value among all sites. Anchoring values produces a score for each site on a standardized 0-1 scale, which expresses the value for each site relative (as a percentage) to the maximum value. Before anchored scores for all indicators can be averaged, the anchored scores for macroalgae and coral disease are subtracted from 1, which ensures the standardized 0-1 scale is uni-directional in that a high score is always a good score. The scores are then averaged to produce the resilience score and then these scores are also anchored to the maximum score to produce a final resilience score that expresses the ‘assessed resilience’ as relative to the maximum resilience score. The same approach is used for the proxies of anthropogenic stress, which are kept separate to the resilience scores. The values are anchored for all sites for

each proxy to the maximum value and then the values are averaged and re-anchored to produce the final stress score. For stress, high scores mean high stress. For both resilience and anthropogenic stress a high, medium and low scale is used based on the following data ranges: 0.8-1.0 for high, 0.6-0.79 for medium and <0.6 for low.

Sites are ranked from highest to lowest resilience (from 1 through to 268). Resilience scores are presented spatially on two maps; one that uses a 3-bin stoplight colour system of green, yellow and red for high, medium and low, respectively, and another that sets resilience scores into 10 equal (0.10) bins. Principle Components Analysis (PCA) is used to identify commonalities among the scores for the various indicators for high, medium, and low resilience sites; i.e., whether some resilience indicators more greatly influenced the final rankings and in what way. Variability in the anchored scores for the resilience indicators and stress proxies is also depicted using a box-and-whisker plot. The anchored scores for all resilience indicators and stress proxies as well as the resilience and stress scores and final resilience and stress scores are all within a multi-page table that forms Appendix 1. The report is complemented by an annotated Excel file available from the project leaders that shows how the analysis was completed and contains the raw data values for indicators and proxies (prior to anchoring).

Results

The final resilience scores ranged from 0.37 to 1 resulting in 91 sites being assessed as having high relative resilience, 162 medium and 14 with low relative resilience. There are high resilience sites on all sides of St. Croix but high resilience sites are concentrated in the Buck Island area and eastern end of the island (Figure 1, 2). Low resilience sites are concentrated in the southwestern end of the island and on the southern side (Figure 1, 2). For the high resilience sites there are 40 with high relative stress, 18 with medium and 33 with low stress (Table A1). For the medium resilience sites there are 53 with high relative stress, 40 with medium and 69 with low stress. For the low resilience sites, there are 4 with high stress, 6 with medium and 4 with low stress.

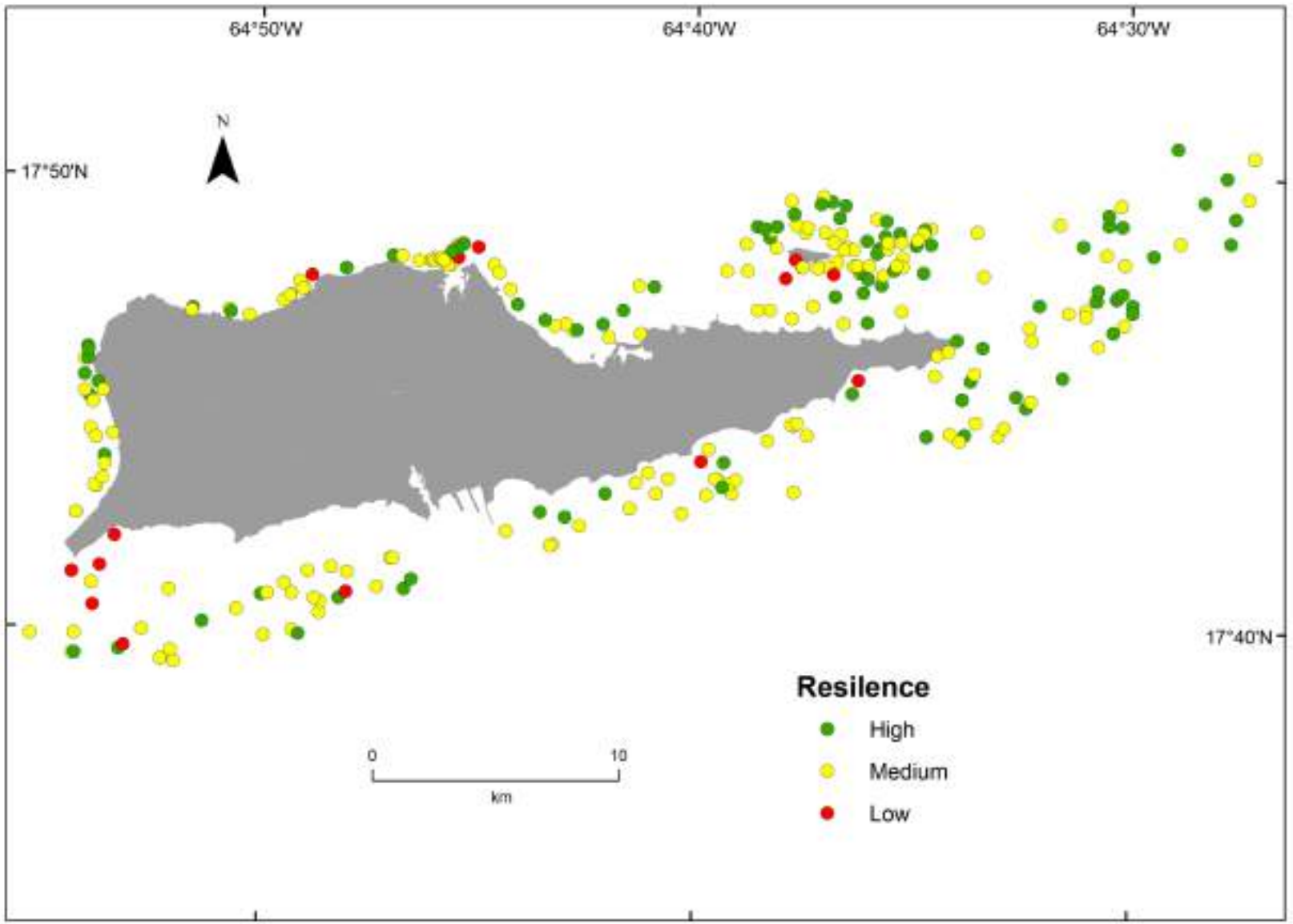

Figure 1. Map of relative resilience from the analysis results showing sites with high, medium and low relative resilience. The high, medium and low classifications refer to final resilience scores of 0.8-1, 0.6-0.79 and <0.6, respectively.

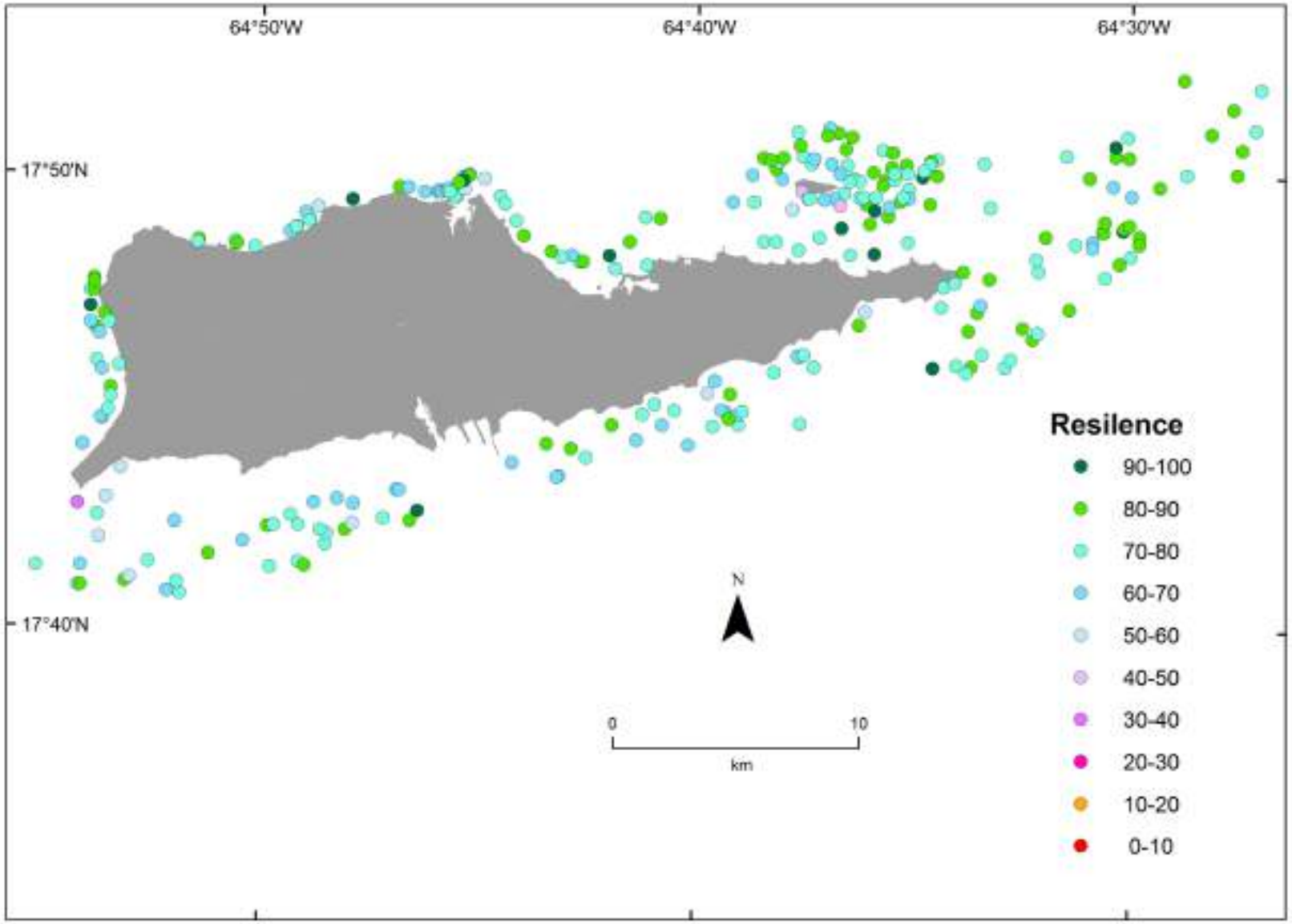

Figure 2. Map of relative resilience from the analysis results showing final resilience scores expressed as a percentage of the site with the highest scores (final resilience scores in Table A1) multipled by 100.

For the PCA, the horizontal axis, PC1, was responsible for 32.8% of the variation, with PCA eigenvector values indicating that Resistant Species (-0.902) is a major driver of the differences among sites in the final resilience scores (Figure 3). This indicator ranges across medium and highly resilient sites but nearly all of the sites assessed as having low relative resilience scores have a low value for resistant species. The vertical axis, PC2, was responsible for 23.8% of the variation, with PCA eigenvector values indicating that Coral Diversity (-0.845) and Herbivore Biomass (-0.414) are also major drivers of the differences among sites in final resilience scores. There is a very strong gradient of resilience scores across the y axis indicating that increasingly higher coral diversity and herbivore biomass are always associated with higher resilience scores.

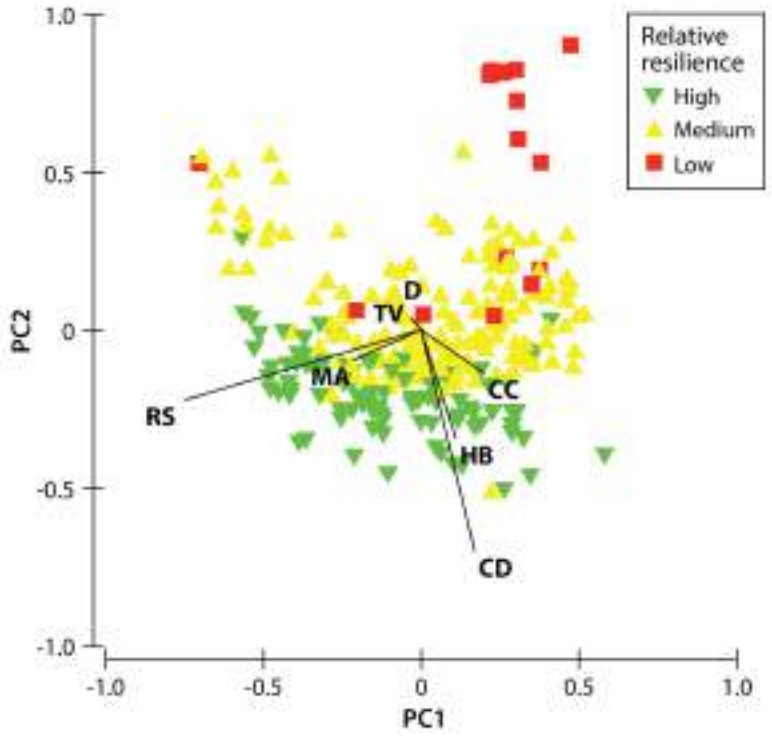

Figure 3: Principal component analysis (PCA) of the resilience indicators with vectors overlaid displaying the magnitude of each resilience indicator responsible for driving differences among the resilience scores of the sites. Indicator codes are as follows: RS – Resistant Species, CD – Coral Diversity, HB – Herbivore Biomass, MA – Macroalgae Cover, CC – Coral Cover, TV – Temperature Variability, D – Coral Disease.

The box and whisker plot (Figure 4) shows that variability is greatest (note box height) among the indicators for Resistant Species and lowest for Temperature Variability and Coral Disease. The variables with the lowest variability influence the final resilience scores and rankings least. Variability in scores for Temperature Variability and Coral Disease is so low among the reef sites surveyed near St. Croix that these two indicators could have been excluded with minimal impact on the final rankings. The plot also shows that half of the resilience scores are within the 0.7-0.81 range demonstrating that half the sites included are very similar in terms of assessed resilience. There is a near normal

distribution across the score range, which emphasizes that sites with high (~the top 25%) and low (~the bottom 25%) assessed resilience are different in important ways from most of the surveyed sites and hence targeting actions to support resilience at these sites may be appropriate (i.e., not all sites are equal).

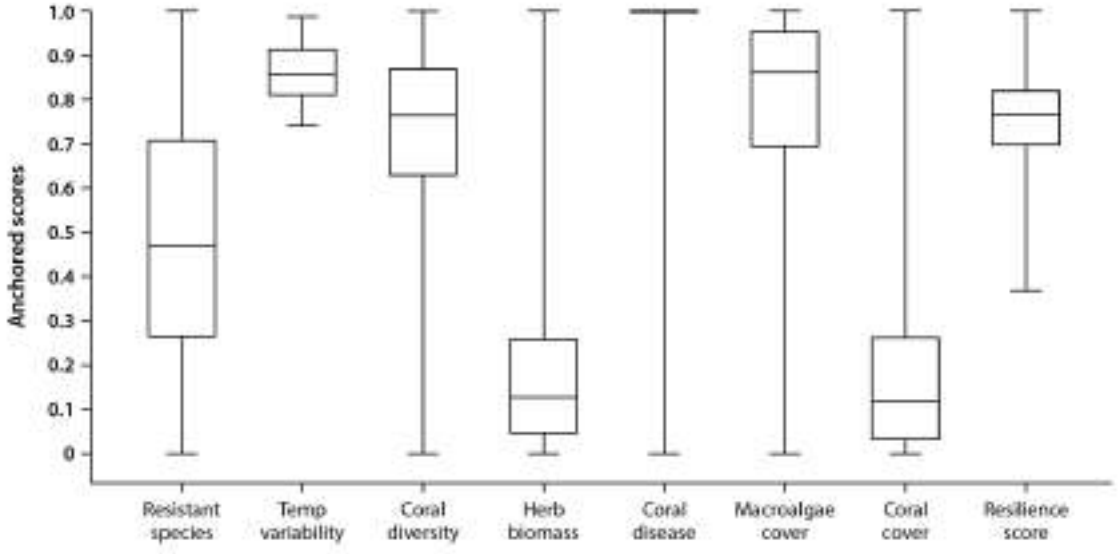

Figure 4. Box and whisker plot of anchored scores for resilience indicators and for the final resilience score.

Management Applications and Next Steps

All of the set objectives were met by the analysis or will be met over the coming months by using analysis outputs to engage with stakeholders and community members. It is not anticipated that this analysis will be used to create additional Marine Protected Areas right now. However, the results may be used to review MPA placement in the future and will inform a range of other management actions over the coming years that will support the resilience of St. Croix reefs. As an example, preliminary data suggests there is a positive and significant correlation between the resilience score from this analysis and known spatial variation in the survivorship of transplanted corals. The analysis results will now be used to determine where nursery-grown corals are most needed and have the greatest potential for restoration success. The project leaders now aim to extend the analysis to include reefs near St. Thomas and St. John to better target conservation effort across all 3 islands. The proxies for anthropogenic stress used in the analysis presented here will be refined in the coming years using current and dilution models for water quality and through producing more intensive assessments of spatial variation in resource use. Lastly, the project leaders aim to share this analysis with others leading similar work or interested in undertaking a similar assessment. Through these exchanges the approach presented will be further refined for use in the Caribbean and in other reef regions.

References (*Related to resilience assessments*)

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Maynard, J. A., et al. "Building resilience into practical conservation: identifying local management responses to global climate change in the southern Great Barrier Reef." *Coral Reefs* 29.2 (2010): 381-391.

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Obura, David, and Gabriel Grimsditch. *Resilience Assessment of coral reefs: Assessment protocol for coral reefs, focusing on coral bleaching and thermal stress*. IUCN, 2009.

Appendix 1 – Table of Results for All Sites

Table A1. Anchored scores for all resilience indicators (normal font) and proxies for anthropogenic stress (bold italics). Sites are ranked from highest to lowest resilience score. For resilience indicators and stress proxies, the anchored scores are averaged to produce the resilience and stress scores and then those scores are anchored to the maximum score to produce the FINAL score. Final scores are assessed on a relative scale of high, medium, low as follows; 0.8-1.0 (high; green), 0.6-0.79 (medium; yellow), <0.6 (low, red). **Denotes medium and low resilience sites that might appear to be mis-classified; this is due to rounding in Excel when using two decimal places (all sites are correctly classified). Resilience indicators are as follows: RS – Resistant Species, TV – Temperature Variability, CD – Coral Diversity, HB – Herbivore Biomass, D – Coral Disease, MA – Macroalgae Cover, CC – Coral Cover. Stress proxies are as follows: LDI – Land Development Index, F – Fish Catch. See methods for more detail on the analysis.

Site	Lat	Long	Rankings	R Score FINAL	Resilience Score	RS	TV	CD	HB	D	MA	CC	*LDI*	*F*	*Stress Score*	*S Score FINAL*
6689	17.77	-64.50	1	1.00	0.79	0.74	0.86	0.87	0.60	1.00	0.97	0.48	***0.73***	***1.00***	***0.73***	***1.00***
6733	17.79	-64.75	2	0.97	0.77	0.82	0.74	0.81	0.16	1.00	0.97	0.86	***0.66***	***0.09***	***0.66***	***0.44***
6699	17.80	-64.51	3	0.97	0.76	0.36	0.86	0.92	0.93	1.00	0.94	0.34	***0.73***	***1.00***	***0.73***	***1.00***
6869	17.74	-64.90	4	0.96	0.76	0.77	0.99	0.81	0.18	1.00	0.93	0.66	***0.77***	***0.13***	***0.77***	***0.52***
6780	17.67	-64.77	5	0.94	0.74	0.88	0.99	0.87	0.44	0.99	0.98	0.04	***0.77***	***0.54***	***0.77***	***0.76***
6799	17.77	-64.61	6	0.94	0.74	0.54	0.86	0.91	0.49	1.00	0.99	0.42	***0.73***	***1.00***	***0.73***	***1.00***
6639	17.79	-64.58	7	0.94	0.74	0.91	0.76	0.67	0.84	1.00	1.00	0.01	***0.55***	***0.24***	***0.55***	***0.46***
6721	17.78	-64.80	8	0.94	0.74	0.47	0.84	0.93	0.65	1.00	1.00	0.29	***0.85***	***0.24***	***0.85***	***0.63***
6635	17.78	-64.60	9	0.93	0.74	0.77	0.82	0.78	0.79	0.94	0.95	0.10	***0.55***	***1.00***	***0.55***	***0.90***
6885	17.79	-64.75	10	0.92	0.73	0.81	0.94	0.91	0.11	1.00	0.97	0.37	***0.45***	***0.09***	***0.45***	***0.32***
6816	17.72	-64.57	11	0.92	0.73	0.96	0.91	0.71	0.29	1.00	0.94	0.30	***0.73***	***1.00***	***0.73***	***1.00***
Castle	17.76	-64.60	12	0.92	0.72	0.15	0.76	0.79	1.00	1.00	0.69	0.66	***0.68***	***1.00***	***0.68***	***0.98***
Eagle Ray	17.76	-64.70	13	0.91	0.72	0.54	0.88	0.91	0.78	1.00	0.66	0.25	***0.67***	***0.24***	***0.67***	***0.53***
6623	17.80	-64.64	14	0.90	0.71	0.46	0.87	0.98	0.57	1.00	1.00	0.10	***0.55***	***0.24***	***0.55***	***0.46***
6701	17.81	-64.47	15	0.90	0.71	0.80	0.86	0.88	0.12	1.00	0.96	0.33	***0.68***	***1.00***	***0.68***	***0.98***
6809	17.72	-64.56	16	0.89	0.71	1.00	0.86	0.73	0.03	0.99	0.99	0.34	***0.73***	***1.00***	***0.73***	***1.00***
6617	17.78	-64.59	17	0.89	0.70	0.30	0.76	0.91	0.48	1.00	0.97	0.49	***0.68***	***1.00***	***0.68***	***0.98***
6725	17.77	-64.69	18	0.89	0.70	0.86	0.94	0.72	0.06	1.00	1.00	0.32	***0.43***	***0.09***	***0.43***	***0.30***
6666	17.80	-64.63	19	0.89	0.70	0.90	0.87	0.22	0.94	1.00	0.93	0.04	***0.55***	***0.24***	***0.55***	***0.46***
6665	17.80	-64.64	20	0.88	0.70	0.63	0.87	0.96	0.35	1.00	0.99	0.10	***0.55***	***0.24***	***0.55***	***0.46***
6613	17.78	-64.60	21	0.88	0.70	0.28	0.76	0.89	0.63	0.99	0.91	0.44	***0.55***	***1.00***	***0.55***	***0.90***
6694	17.79	-64.46	22	0.88	0.70	0.70	0.90	0.90	0.08	1.00	0.96	0.34	***0.73***	***1.00***	***0.73***	***1.00***
6709	17.77	-64.50	23	0.88	0.69	0.42	0.90	0.95	0.37	1.00	0.85	0.36	***0.73***	***1.00***	***0.73***	***1.00***
6706	17.76	-64.50	24	0.88	0.69	0.39	0.88	0.91	0.44	1.00	0.88	0.34	***0.73***	***1.00***	***0.73***	***1.00***
6683	17.77	-64.51	25	0.87	0.69	0.19	0.90	0.55	0.24	0.98	0.93	1.00	***0.73***	***1.00***	***0.73***	***1.00***
6858	17.78	-64.58	26	0.87	0.68	0.88	0.97	0.71	0.18	1.00	0.98	0.08	***0.58***	***0.57***	***0.58***	***0.67***
6854	17.70	-64.65	27	0.87	0.68	0.94	0.81	0.70	0.36	1.00	0.87	0.12	***0.73***	***0.24***	***0.73***	***0.56***
6703	17.82	-64.46	28	0.87	0.68	0.84	0.86	0.87	0.06	1.00	0.94	0.23	***0.73***	***1.00***	***0.73***	***1.00***
6803	17.73	-64.54	29	0.86	0.68	0.48	0.91	0.93	0.36	1.00	0.78	0.31	***0.73***	***1.00***	***0.73***	***1.00***
6686	17.79	-64.49	30	0.86	0.68	0.50	0.86	0.70	0.21	1.00	0.88	0.64	***0.73***	***1.00***	***0.73***	***1.00***

Site	Lat	Long	Rankings	R Score FINAL	Resilience Score	RS	TV	CD	HB	D	MA	CC	*LDI*	*F*	*Stress Score*	*S Score FINAL*
6871	17.71	-64.89	31	0.86	0.68	0.64	0.99	0.75	0.15	1.00	0.98	0.26	***0.77***	***0.13***	***0.77***	***0.52***
6622	17.81	-64.61	32	0.86	0.68	0.31	0.82	0.86	0.48	0.98	0.99	0.34	***0.55***	***0.24***	***0.55***	***0.46***
6718	17.76	-64.71	33	0.86	0.68	0.72	0.84	0.92	0.16	1.00	0.98	0.15	***0.85***	***0.24***	***0.85***	***0.63***
6669	17.81	-64.62	34	0.86	0.68	0.39	0.87	0.92	0.41	0.99	0.99	0.19	***0.55***	***0.24***	***0.55***	***0.46***
6822	17.75	-64.55	35	0.86	0.68	0.74	0.91	0.82	0.14	1.00	0.95	0.19	***0.73***	***1.00***	***0.73***	***1.00***
6748	17.64	-64.90	36	0.86	0.68	0.38	0.97	0.80	0.69	0.99	0.82	0.08	***0.77***	***0.54***	***0.77***	***0.76***
6671	17.78	-64.59	37	0.86	0.68	0.62	0.81	0.88	0.44	1.00	0.95	0.04	***0.73***	***0.24***	***0.73***	***0.56***
6848	17.76	-64.56	38	0.86	0.68	1.00	0.91	0.73	0.37	1.00	0.72	0.00	***0.65***	***0.57***	***0.65***	***0.71***
6698	17.80	-64.46	39	0.85	0.68	0.89	0.86	0.71	0.09	0.98	0.96	0.23	***0.68***	***1.00***	***0.68***	***0.98***
6896	17.77	-64.82	40	0.85	0.67	0.38	0.94	0.94	0.46	0.98	0.61	0.41	***0.45***	***0.09***	***0.45***	***0.32***
6881	17.75	-64.90	41	0.85	0.67	0.67	0.85	0.82	0.42	1.00	0.94	0.01	***0.52***	***0.13***	***0.52***	***0.38***
6691	17.77	-64.50	42	0.85	0.67	0.67	0.86	0.93	0.16	1.00	0.90	0.18	***0.73***	***1.00***	***0.73***	***1.00***
6865	17.74	-64.89	43	0.85	0.67	0.84	0.91	0.66	0.00	1.00	0.99	0.30	***0.77***	***0.13***	***0.77***	***0.52***
6812	17.74	-64.54	44	0.85	0.67	0.88	0.91	0.83	0.09	1.00	0.97	0.02	***0.65***	***0.57***	***0.65***	***0.71***
6890	17.76	-64.72	45	0.85	0.67	0.58	0.84	0.96	0.18	0.87	0.82	0.43	***0.85***	***0.24***	***0.85***	***0.63***
6630	17.81	-64.61	46	0.85	0.67	0.54	0.82	0.92	0.21	1.00	0.97	0.24	***0.55***	***1.00***	***0.55***	***0.90***
6707	17.77	-64.50	47	0.85	0.67	0.45	0.86	0.92	0.19	1.00	0.86	0.41	***0.73***	***1.00***	***0.73***	***1.00***
6806	17.77	-64.53	48	0.85	0.67	0.51	0.88	0.92	0.16	1.00	0.92	0.30	***0.73***	***1.00***	***0.73***	***1.00***
6690	17.77	-64.50	49	0.85	0.67	0.52	0.86	1.00	0.26	1.00	0.92	0.12	***0.73***	***1.00***	***0.73***	***1.00***
6894	17.77	-64.84	50	0.85	0.67	0.37	0.94	0.89	0.19	0.99	0.81	0.49	***0.43***	***0.09***	***0.43***	***0.30***
6668	17.80	-64.63	51	0.84	0.67	0.84	0.82	0.59	0.34	1.00	1.00	0.08	***0.55***	***0.24***	***0.55***	***0.46***
6727	17.78	-64.68	52	0.84	0.66	0.97	0.94	0.54	0.10	1.00	0.98	0.12	***0.43***	***0.09***	***0.43***	***0.30***
6652	17.79	-64.59	53	0.84	0.66	0.93	0.76	0.56	0.33	1.00	0.80	0.26	***0.55***	***1.00***	***0.55***	***0.90***
6766	17.65	-64.81	54	0.84	0.66	0.83	0.94	0.78	0.08	1.00	0.89	0.12	***0.73***	***0.54***	***0.73***	***0.74***
6642	17.80	-64.59	55	0.84	0.66	0.95	0.75	0.80	0.13	1.00	0.97	0.03	***0.68***	***1.00***	***0.68***	***0.98***
6772	17.70	-64.70	56	0.84	0.66	0.67	0.94	0.86	0.26	1.00	0.76	0.15	***0.86***	***0.54***	***0.86***	***0.81***
6804	17.74	-64.52	57	0.84	0.66	0.27	0.88	0.85	0.62	0.98	0.80	0.24	***0.73***	***1.00***	***0.73***	***1.00***
6696	17.80	-64.51	58	0.84	0.66	0.71	0.81	0.83	0.13	1.00	0.96	0.18	***0.73***	***1.00***	***0.73***	***1.00***
6695	17.80	-64.50	59	0.83	0.66	0.55	0.84	0.89	0.25	1.00	0.89	0.18	***0.73***	***1.00***	***0.73***	***1.00***
6739	17.79	-64.75	60	0.83	0.66	0.64	0.84	0.85	0.26	1.00	0.95	0.06	***0.66***	***0.09***	***0.66***	***0.44***
6882	17.75	-64.90	61	0.83	0.66	0.40	0.85	0.87	0.55	1.00	0.78	0.15	***0.49***	***0.13***	***0.49***	***0.36***
6793	17.66	-64.83	62	0.83	0.66	0.96	0.97	0.59	0.20	1.00	0.89	0.00	***0.77***	***0.54***	***0.77***	***0.76***
6819	17.74	-64.60	63	0.83	0.66	0.74	0.91	0.85	0.48	1.00	0.56	0.05	***0.73***	***1.00***	***0.73***	***1.00***
6820	17.74	-64.56	64	0.83	0.65	0.60	0.97	0.87	0.05	1.00	0.87	0.22	***0.73***	***0.57***	***0.73***	***0.75***
6883	17.75	-64.90	65	0.83	0.65	0.61	0.85	0.83	0.16	1.00	0.80	0.32	***0.49***	***0.13***	***0.49***	***0.36***
Sprat Hole	17.73	-64.90	66	0.83	0.65	0.41	0.85	0.70	0.44	0.98	0.74	0.46	***0.49***	***0.13***	***0.49***	***0.36***
6729	17.79	-64.78	67	0.82	0.65	0.30	0.84	0.87	0.58	1.00	0.74	0.23	***0.66***	***0.24***	***0.66***	***0.52***
6724	17.77	-64.86	68	0.82	0.65	0.32	0.84	0.93	0.42	1.00	0.71	0.33	***0.82***	***0.24***	***0.82***	***0.61***
6704	17.83	-64.48	69	0.82	0.65	0.57	0.81	0.79	0.05	1.00	0.93	0.38	***0.73***	***1.00***	***0.73***	***1.00***
Kings	17.69	-64.90	70	0.82	0.65	0.35	0.99	0.90	0.73	0.14	0.86	0.57	***0.77***	***0.13***	***0.77***	***0.52***

Site	Lat	Long	Rankings	R Score FINAL	Resilience Score	RS	TV	CD	HB	D	MA	CC	*LDI*	*F*	*Stress Score*	*S Score FINAL*
Corner																
6818	17.73	-64.56	71	0.82	0.65	0.68	0.97	0.83	0.11	1.00	0.93	0.00	***0.58***	***0.57***	***0.58***	***0.67***
6763	17.64	-64.88	72	0.82	0.65	0.71	0.94	0.82	0.18	1.00	0.83	0.05	***0.70***	***0.57***	***0.70***	***0.73***
6661	17.79	-64.60	73	0.82	0.65	0.79	0.76	0.72	0.15	1.00	0.94	0.17	***0.55***	***1.00***	***0.55***	***0.90***
Great Pond	17.71	-64.65	74	0.82	0.65	0.70	0.91	0.64	0.37	0.82	0.85	0.24	***0.66***	***0.57***	***0.66***	***0.71***
6769	17.65	-64.85	75	0.82	0.64	0.97	0.94	0.56	0.07	1.00	0.96	0.01	***0.77***	***0.54***	***0.77***	***0.76***
6743	17.66	-64.80	76	0.82	0.64	0.47	0.84	0.96	0.01	1.00	0.95	0.28	***0.66***	***0.09***	***0.66***	***0.44***
6624	17.77	-64.60	77	0.82	0.64	0.45	0.76	1.00	0.07	1.00	1.00	0.24	***0.68***	***1.00***	***0.68***	***0.98***
6749	17.66	-64.77	78	0.81	0.64	0.74	0.97	0.89	0.06	0.68	0.91	0.25	***0.77***	***0.54***	***0.77***	***0.76***
6628	17.80	-64.58	79	0.81	0.64	0.97	0.81	0.74	0.15	1.00	0.82	0.00	***0.72***	***0.24***	***0.72***	***0.56***
6634	17.80	-64.59	80	0.81	0.64	0.64	0.76	0.93	0.25	0.99	0.88	0.03	***0.55***	***1.00***	***0.55***	***0.90***
6632	17.79	-64.57	81	0.81	0.64	0.45	0.82	0.90	0.00	1.00	0.85	0.46	***0.55***	***0.24***	***0.55***	***0.46***
6723	17.77	-64.73	82	0.81	0.64	0.25	0.84	0.94	0.11	1.00	0.95	0.39	***0.54***	***0.09***	***0.54***	***0.37***
6684	17.77	-64.51	83	0.81	0.64	0.15	0.86	0.76	0.29	1.00	0.96	0.45	***0.73***	***1.00***	***0.73***	***1.00***
6774	17.69	-64.72	84	0.81	0.64	0.83	0.89	0.76	0.08	1.00	0.88	0.01	***1.00***	***0.54***	***1.00***	***0.89***
6662	17.79	-64.64	85	0.81	0.64	0.74	0.76	0.65	0.07	1.00	0.99	0.26	***0.55***	***1.00***	***0.55***	***0.90***
6692	17.79	-64.51	86	0.81	0.64	0.43	0.90	0.86	0.29	0.99	0.84	0.14	***0.73***	***1.00***	***0.73***	***1.00***
6886	17.79	-64.76	87	0.81	0.64	0.59	0.74	0.85	0.37	1.00	0.72	0.19	***0.66***	***0.09***	***0.66***	***0.44***
6677	17.79	-64.59	88	0.80	0.64	0.97	0.76	0.69	0.06	1.00	0.95	0.01	***0.68***	***1.00***	***0.68***	***0.98***
6663	17.79	-64.59	89	0.80	0.64	0.81	0.81	0.79	0.08	1.00	0.86	0.09	***0.55***	***0.24***	***0.55***	***0.46***
6784	17.69	-64.71	90	0.80	0.63	0.77	0.99	0.60	0.24	1.00	0.84	0.00	***0.77***	***0.54***	***0.77***	***0.76***
6667	17.80	-64.61	91	0.80	0.63	0.97	0.87	0.12	0.27	1.00	0.96	0.24	***0.55***	***0.24***	***0.55***	***0.46***
**6664	17.80	-64.63	92	0.80	0.63	0.58	0.76	0.66	0.19	0.99	0.98	0.25	***0.55***	***1.00***	***0.55***	***0.90***
**6612	17.78	-64.60	93	0.80	0.63	0.33	0.76	0.91	0.18	0.99	0.96	0.27	***0.55***	***1.00***	***0.55***	***0.90***
**6794	17.66	-64.83	94	0.80	0.63	0.86	0.94	0.67	0.28	1.00	0.64	0.03	***0.73***	***0.54***	***0.73***	***0.74***
**6851	17.73	-64.62	95	0.80	0.63	0.54	0.91	0.69	0.28	1.00	0.97	0.01	***0.66***	***0.57***	***0.66***	***0.71***
**6802	17.72	-64.54	96	0.80	0.63	0.41	0.76	0.82	0.33	1.00	0.86	0.22	***0.73***	***0.24***	***0.73***	***0.56***
6796	17.67	-64.82	97	0.79	0.63	0.69	0.94	0.75	0.13	1.00	0.80	0.09	***0.68***	***0.54***	***0.68***	***0.70***
6660	17.79	-64.58	98	0.79	0.63	0.82	0.76	0.90	0.15	0.99	0.75	0.02	***0.55***	***0.24***	***0.55***	***0.46***
6765	17.65	-64.83	99	0.79	0.63	0.72	0.97	0.69	0.03	0.93	0.94	0.11	***0.77***	***0.54***	***0.77***	***0.76***
6673	17.78	-64.64	100	0.79	0.63	0.49	0.87	0.77	0.06	1.00	1.00	0.18	***0.55***	***0.24***	***0.55***	***0.46***
6740	17.78	-64.76	101	0.79	0.62	0.60	0.74	0.65	0.37	1.00	0.94	0.07	***0.66***	***0.24***	***0.66***	***0.52***
6646	17.79	-64.61	102	0.79	0.62	0.50	0.76	0.87	0.13	0.99	0.91	0.22	***0.55***	***0.24***	***0.55***	***0.46***
6678	17.79	-64.59	103	0.79	0.62	0.87	0.76	0.66	0.05	1.00	0.90	0.13	***0.55***	***1.00***	***0.55***	***0.90***
6852	17.75	-64.57	104	0.79	0.62	0.99	0.97	0.40	0.03	0.95	0.97	0.04	***0.58***	***0.57***	***0.58***	***0.67***
6697	17.80	-64.52	105	0.79	0.62	0.21	0.86	0.62	0.30	0.99	0.93	0.45	***0.73***	***1.00***	***0.73***	***1.00***
6705	17.75	-64.51	106	0.79	0.62	0.41	0.81	0.98	0.16	1.00	0.93	0.07	***0.68***	***1.00***	***0.68***	***0.98***
6708	17.76	-64.50	107	0.79	0.62	0.30	0.90	0.80	0.22	1.00	0.86	0.28	***0.73***	***1.00***	***0.73***	***1.00***
6814	17.70	-64.63	108	0.79	0.62	0.56	0.91	0.86	0.18	1.00	0.83	0.03	***0.66***	***0.57***	***0.66***	***0.71***
6815	17.72	-64.56	109	0.79	0.62	0.47	0.91	0.84	0.42	0.99	0.62	0.10	***0.66***	***0.57***	***0.66***	***0.71***

Site	Lat	Long	Rankings	R Score FINAL	Resilience Score	RS	TV	CD	HB	D	MA	CC	*LDI*	*F*	*Stress Score*	*S Score FINAL*
6738	17.78	-64.76	110	0.79	0.62	0.44	0.84	0.86	0.18	1.00	0.97	0.05	***0.66***	***0.09***	***0.66***	***0.44***
6629	17.80	-64.59	111	0.78	0.62	0.67	0.76	0.92	0.11	1.00	0.83	0.05	***0.55***	***1.00***	***0.55***	***0.90***
6880	17.72	-64.89	112	0.78	0.62	1.00	0.99	0.25	0.00	1.00	1.00	0.11	***0.77***	***0.13***	***0.77***	***0.52***
6700	17.81	-64.50	113	0.78	0.62	0.18	0.86	0.82	0.31	1.00	0.95	0.22	***0.73***	***1.00***	***0.73***	***1.00***
6801	17.77	-64.62	114	0.78	0.62	0.56	0.76	0.93	0.09	1.00	0.90	0.10	***0.68***	***0.24***	***0.68***	***0.54***
6832	17.75	-64.57	115	0.78	0.62	0.76	0.91	0.54	0.14	1.00	0.91	0.07	***0.73***	***1.00***	***0.73***	***1.00***
6826	17.80	-64.56	116	0.78	0.62	0.62	0.75	0.93	0.01	1.00	0.96	0.07	***0.68***	***1.00***	***0.68***	***0.98***
6674	17.78	-64.59	117	0.78	0.62	0.73	0.81	0.84	0.04	1.00	0.86	0.05	***0.55***	***0.24***	***0.55***	***0.46***
6827	17.73	-64.56	118	0.78	0.62	0.71	0.76	0.69	0.10	0.99	0.98	0.10	***0.68***	***1.00***	***0.68***	***0.98***
6742	17.78	-64.76	119	0.78	0.62	0.57	0.74	0.94	0.14	1.00	0.94	0.00	***0.66***	***0.09***	***0.66***	***0.44***
6650	17.78	-64.60	120	0.78	0.61	0.96	0.76	0.08	0.41	1.00	0.95	0.14	***0.68***	***1.00***	***0.68***	***0.98***
6716	17.76	-64.70	121	0.78	0.61	0.38	0.88	0.83	0.27	1.00	0.91	0.03	***0.67***	***0.24***	***0.67***	***0.53***
6823	17.76	-64.53	122	0.78	0.61	0.73	0.91	0.88	0.04	1.00	0.73	0.01	***0.73***	***1.00***	***0.73***	***1.00***
6795	17.66	-64.82	123	0.78	0.61	0.37	0.94	0.91	0.17	1.00	0.77	0.14	***0.73***	***0.54***	***0.73***	***0.74***
Salt River West	17.79	-64.76	124	0.78	0.61	0.48	0.74	0.91	0.92	0.28	0.71	0.25	***0.66***	***0.09***	***0.66***	***0.44***
Jacks Bay	17.74	-64.57	125	0.78	0.61	0.59	0.91	0.78	0.16	0.86	0.83	0.16	***0.73***	***1.00***	***0.73***	***1.00***
6645	17.78	-64.60	126	0.77	0.61	0.49	0.81	0.83	0.22	1.00	0.92	0.00	***0.55***	***0.24***	***0.55***	***0.46***
6702	17.81	-64.45	127	0.77	0.61	0.58	0.81	0.74	0.13	0.95	0.98	0.07	***0.73***	***1.00***	***0.73***	***1.00***
Lang Bank EEMP	17.72	-64.55	128	0.77	0.61	0.14	0.91	0.45	0.45	0.92	0.79	0.61	***0.73***	***1.00***	***0.73***	***1.00***
6895	17.76	-64.83	129	0.77	0.61	0.29	0.94	0.90	0.15	0.95	0.55	0.48	***0.43***	***0.09***	***0.43***	***0.30***
6842	17.72	-64.63	130	0.77	0.61	0.63	0.91	0.53	0.21	1.00	0.98	0.02	***0.65***	***0.57***	***0.65***	***0.71***
6618	17.79	-64.60	131	0.77	0.61	0.08	0.76	0.73	0.17	1.00	0.90	0.62	***0.55***	***0.24***	***0.55***	***0.46***
6779	17.67	-64.89	132	0.77	0.61	0.45	0.94	0.73	0.01	1.00	0.89	0.23	***0.65***	***0.57***	***0.65***	***0.71***
6717	17.76	-64.71	133	0.77	0.61	0.56	0.88	0.90	0.23	1.00	0.65	0.03	***0.67***	***0.24***	***0.67***	***0.53***
6693	17.79	-64.48	134	0.77	0.61	0.24	0.86	0.71	0.20	1.00	0.89	0.36	***0.73***	***1.00***	***0.73***	***1.00***
6672	17.81	-64.63	135	0.77	0.61	0.34	0.76	0.77	0.18	1.00	0.97	0.21	***0.68***	***1.00***	***0.68***	***0.98***
6726	17.77	-64.86	136	0.77	0.60	0.51	0.88	0.68	0.00	1.00	1.00	0.16	***0.67***	***0.24***	***0.67***	***0.53***
6681	17.77	-64.51	137	0.76	0.60	0.06	0.86	0.63	0.40	1.00	0.76	0.52	***0.73***	***1.00***	***0.73***	***1.00***
6872	17.71	-64.89	138	0.76	0.60	0.43	0.85	0.85	0.04	1.00	0.95	0.11	***0.59***	***0.13***	***0.59***	***0.42***
6755	17.66	-64.81	139	0.76	0.60	0.67	0.94	0.72	0.00	1.00	0.86	0.02	***0.86***	***0.54***	***0.86***	***0.81***
6853	17.77	-64.63	140	0.76	0.60	0.19	0.91	0.64	0.34	1.00	0.92	0.21	***0.73***	***1.00***	***0.73***	***1.00***
Cane Bay	17.77	-64.81	141	0.76	0.60	0.44	0.84	0.84	0.14	0.80	0.69	0.44	***0.45***	***0.09***	***0.45***	***0.32***
6798	17.77	-64.52	142	0.76	0.60	0.36	0.86	0.63	0.06	1.00	0.82	0.48	***0.73***	***1.00***	***0.73***	***1.00***
6855	17.72	-64.64	143	0.76	0.60	0.75	0.91	0.75	0.06	0.99	0.68	0.05	***0.65***	***0.57***	***0.65***	***0.71***
L Bank R Hind	17.82	-64.45	144	0.76	0.60	0.22	0.86	0.70	0.37	0.74	0.80	0.49	***0.73***	***1.00***	***0.73***	***1.00***
6805	17.73	-64.53	145	0.75	0.60	0.17	0.88	0.53	0.11	1.00	0.98	0.51	***0.73***	***1.00***	***0.73***	***1.00***
6751	17.65	-64.81	146	0.75	0.59	0.66	0.94	0.58	0.00	0.99	0.99	0.00	***0.73***	***0.54***	***0.73***	***0.74***

Site	Lat	Long	Rankings	R Score FINAL	Resilience Score	RS	TV	CD	HB	D	MA	CC	*LDI*	*F*	*Stress Score*	*S Score FINAL*
6866	17.74	-64.89	147	0.75	0.59	0.50	0.85	0.65	0.00	1.00	0.97	0.19	***0.49***	***0.13***	***0.49***	***0.36***
6761	17.64	-64.86	148	0.75	0.59	0.39	0.94	0.87	0.07	1.00	0.87	0.01	***0.65***	***0.57***	***0.65***	***0.71***
6619	17.80	-64.61	149	0.75	0.59	0.69	0.82	0.53	0.04	1.00	0.98	0.08	***0.55***	***0.24***	***0.55***	***0.46***
6659	17.78	-64.62	150	0.75	0.59	0.65	0.76	0.63	0.12	1.00	0.96	0.02	***0.55***	***0.24***	***0.55***	***0.46***
6615	17.79	-64.58	151	0.75	0.59	0.92	0.76	0.43	0.03	1.00	0.99	0.01	***0.55***	***1.00***	***0.55***	***0.90***
6641	17.79	-64.58	152	0.75	0.59	0.65	0.81	0.90	0.01	1.00	0.73	0.03	***0.55***	***0.24***	***0.55***	***0.46***
6813	17.70	-64.65	153	0.75	0.59	0.46	0.88	0.96	0.07	1.00	0.70	0.05	***0.73***	***1.00***	***0.73***	***1.00***
6750	17.65	-64.82	154	0.74	0.59	1.00	0.98	0.00	0.03	1.00	1.00	0.11	***0.59***	***0.54***	***0.59***	***0.65***
6786	17.71	-64.68	155	0.74	0.59	0.53	0.94	0.87	0.14	1.00	0.62	0.02	***0.65***	***0.57***	***0.65***	***0.71***
6861	17.65	-64.92	156	0.74	0.59	0.35	0.85	0.78	0.23	1.00	0.65	0.25	***0.52***	***0.13***	***0.52***	***0.38***
6849	17.70	-64.65	157	0.74	0.59	0.78	0.75	0.91	0.07	1.00	0.57	0.03	***0.68***	***1.00***	***0.68***	***0.98***
6734	17.79	-64.75	158	0.74	0.59	0.13	0.74	0.77	0.35	1.00	1.00	0.12	***0.66***	***0.09***	***0.66***	***0.44***
M Snapper	17.64	-64.86	159	0.74	0.59	0.34	0.94	0.74	0.33	0.95	0.69	0.12	***0.77***	***0.54***	***0.77***	***0.76***
6679	17.79	-64.59	160	0.74	0.59	0.28	0.76	0.64	0.26	1.00	0.92	0.26	***0.55***	***1.00***	***0.55***	***0.90***
6737	17.78	-64.76	161	0.74	0.59	0.63	0.74	0.84	0.15	1.00	0.74	0.01	***0.66***	***0.24***	***0.66***	***0.52***
6884	17.77	-64.81	162	0.74	0.59	0.32	0.85	0.73	0.38	1.00	0.44	0.38	***0.49***	***0.13***	***0.49***	***0.36***
6728	17.78	-64.74	163	0.74	0.59	0.75	0.88	0.85	0.24	1.00	0.32	0.07	***0.72***	***0.24***	***0.72***	***0.56***
6647	17.80	-64.62	164	0.74	0.59	0.37	0.76	0.86	0.13	0.99	0.88	0.11	***0.55***	***0.24***	***0.55***	***0.46***
6768	17.65	-64.87	165	0.74	0.59	0.88	0.97	0.34	0.07	1.00	0.83	0.01	***0.77***	***0.54***	***0.77***	***0.76***
6651	17.78	-64.60	166	0.74	0.59	0.51	0.76	0.78	0.18	1.00	0.81	0.06	***0.55***	***1.00***	***0.55***	***0.90***
6754	17.66	-64.81	167	0.74	0.58	0.83	0.98	0.33	0.00	1.00	0.93	0.02	***1.00***	***0.54***	***1.00***	***0.89***
6753	17.66	-64.78	168	0.74	0.58	0.49	0.94	0.68	0.01	1.00	0.93	0.04	***0.68***	***0.54***	***0.68***	***0.70***
6762	17.69	-64.71	169	0.74	0.58	0.56	0.94	0.84	0.13	1.00	0.56	0.06	***0.77***	***0.54***	***0.77***	***0.76***
6860	17.72	-64.89	170	0.74	0.58	0.39	0.85	0.80	0.10	1.00	0.50	0.44	***0.49***	***0.13***	***0.49***	***0.36***
6778	17.70	-64.67	171	0.73	0.58	0.70	0.94	0.66	0.11	1.00	0.63	0.02	***0.86***	***0.54***	***0.86***	***0.81***
6712	17.78	-64.76	172	0.73	0.58	0.23	0.84	0.82	0.20	1.00	0.52	0.45	***0.66***	***0.24***	***0.66***	***0.52***
6811	17.70	-64.66	173	0.73	0.58	0.37	0.91	0.79	0.04	1.00	0.80	0.15	***0.73***	***1.00***	***0.73***	***1.00***
6893	17.77	-64.84	174	0.73	0.58	0.43	0.88	0.89	0.13	1.00	0.18	0.54	***0.67***	***0.24***	***0.67***	***0.53***
6897	17.77	-64.82	175	0.73	0.58	0.79	0.94	0.55	0.15	1.00	0.32	0.30	***0.45***	***0.09***	***0.45***	***0.32***
6715	17.76	-64.68	176	0.73	0.58	0.11	0.74	0.78	0.19	1.00	0.83	0.38	***0.66***	***0.09***	***0.66***	***0.44***
6824	17.76	-64.54	177	0.73	0.57	0.98	0.86	0.18	0.03	1.00	0.94	0.03	***0.73***	***1.00***	***0.73***	***1.00***
6616	17.79	-64.61	178	0.73	0.57	0.18	0.76	0.91	0.17	1.00	0.86	0.14	***0.55***	***0.24***	***0.55***	***0.46***
6844	17.77	-64.58	179	0.73	0.57	0.93	0.97	0.26	0.00	1.00	0.84	0.01	***0.58***	***0.57***	***0.58***	***0.67***
6892	17.78	-64.69	180	0.73	0.57	0.39	0.84	0.85	0.03	0.95	0.86	0.08	***0.66***	***0.24***	***0.66***	***0.52***
6730	17.78	-64.76	181	0.72	0.57	0.30	0.74	0.87	0.37	1.00	0.56	0.17	***0.54***	***0.09***	***0.54***	***0.37***
6876	17.75	-64.90	182	0.72	0.57	0.44	0.85	0.80	0.10	0.99	0.45	0.37	***0.59***	***0.13***	***0.59***	***0.42***
6711	17.78	-64.74	183	0.72	0.57	0.27	0.84	0.90	0.16	1.00	0.54	0.28	***0.82***	***0.24***	***0.82***	***0.61***
6879	17.70	-64.89	184	0.72	0.57	0.00	0.85	0.55	0.42	0.75	1.00	0.42	***0.49***	***0.13***	***0.49***	***0.36***
6710	17.77	-64.73	185	0.72	0.57	0.28	0.90	0.94	0.13	1.00	0.31	0.42	***0.73***	***1.00***	***0.73***	***1.00***
6633	17.80	-64.58	186	0.72	0.57	0.46	0.75	0.98	0.00	1.00	0.76	0.05	***0.68***	***1.00***	***0.68***	***0.98***

Site	Lat	Long	Rankings	R Score FINAL	Resilience Score	RS	TV	CD	HB	D	MA	CC	*LDI*	*F*	*Stress Score*	*S Score FINAL*
6825	17.78	-64.55	187	0.72	0.57	0.55	0.86	0.74	0.06	1.00	0.68	0.09	***0.73***	***1.00***	***0.73***	***1.00***
6731	17.79	-64.76	188	0.72	0.57	0.46	0.84	0.76	0.11	1.00	0.55	0.25	***0.66***	***0.09***	***0.66***	***0.44***
Buck Island STX	17.79	-64.61	189	0.72	0.57	0.22	0.76	0.77	0.46	0.91	0.65	0.21	***0.55***	***0.24***	***0.55***	***0.46***
6790	17.70	-64.69	190	0.72	0.57	0.64	0.94	0.92	0.15	1.00	0.30	0.02	***0.73***	***0.54***	***0.73***	***0.74***
6840	17.76	-64.63	191	0.72	0.57	0.90	0.76	0.28	0.00	1.00	0.98	0.04	***0.68***	***0.24***	***0.68***	***0.54***
6735	17.79	-64.75	192	0.71	0.56	0.42	0.74	0.84	0.29	1.00	0.63	0.01	***0.66***	***0.09***	***0.66***	***0.44***
6621	17.80	-64.57	193	0.71	0.56	0.43	0.76	0.81	0.01	1.00	0.89	0.01	***0.68***	***1.00***	***0.68***	***0.98***
6658	17.78	-64.62	194	0.71	0.56	0.97	0.76	0.06	0.03	1.00	0.99	0.10	***0.68***	***1.00***	***0.68***	***0.98***
6810	17.72	-64.57	195	0.71	0.56	0.44	0.91	0.93	0.17	1.00	0.44	0.02	***0.73***	***1.00***	***0.73***	***1.00***
6833	17.77	-64.64	196	0.71	0.56	0.22	0.91	0.69	0.27	1.00	0.81	0.01	***0.73***	***1.00***	***0.73***	***1.00***
6648	17.80	-64.62	197	0.71	0.56	0.56	0.82	0.55	0.02	1.00	0.70	0.26	***0.55***	***0.24***	***0.55***	***0.46***
6817	17.72	-64.62	198	0.70	0.56	1.00	0.91	0.00	0.00	1.00	0.93	0.05	***0.73***	***1.00***	***0.73***	***1.00***
6889	17.76	-64.72	199	0.70	0.56	0.28	0.74	0.86	0.08	0.90	0.86	0.15	***0.54***	***0.09***	***0.54***	***0.37***
6839	17.76	-64.61	200	0.70	0.55	0.10	0.97	0.82	0.07	1.00	0.84	0.08	***0.73***	***0.57***	***0.73***	***0.75***
6654	17.79	-64.61	201	0.70	0.55	0.62	0.81	0.64	0.22	1.00	0.49	0.09	***0.55***	***0.24***	***0.55***	***0.46***
6682	17.78	-64.50	202	0.70	0.55	0.13	0.86	0.68	0.09	0.98	0.55	0.57	***0.73***	***1.00***	***0.73***	***1.00***
6745	17.68	-64.72	203	0.70	0.55	0.58	0.87	0.89	0.07	1.00	0.44	0.01	***0.70***	***0.57***	***0.70***	***0.73***
6746	17.64	-64.87	204	0.69	0.55	0.36	0.87	0.71	0.07	0.99	0.81	0.01	***0.70***	***0.57***	***0.70***	***0.73***
6859	17.74	-64.90	205	0.69	0.54	0.36	0.75	0.89	0.09	1.00	0.67	0.05	***0.68***	***1.00***	***0.68***	***0.98***
6732	17.79	-64.76	206	0.69	0.54	0.15	0.74	0.61	0.30	1.00	0.70	0.30	***0.66***	***0.09***	***0.66***	***0.44***
6653	17.79	-64.63	207	0.69	0.54	0.15	0.76	0.47	0.29	1.00	0.98	0.14	***0.55***	***1.00***	***0.55***	***0.90***
6744	17.68	-64.72	208	0.68	0.54	0.20	0.94	0.58	0.11	1.00	0.92	0.01	***0.86***	***0.54***	***0.86***	***0.81***
6887	17.78	-64.77	209	0.68	0.54	0.15	0.74	0.82	0.43	1.00	0.38	0.23	***0.66***	***0.09***	***0.66***	***0.44***
6680	17.77	-64.51	210	0.68	0.54	0.25	0.76	0.69	0.11	0.99	0.67	0.30	***0.55***	***1.00***	***0.55***	***0.90***
6767	17.65	-64.90	211	0.68	0.54	0.27	0.94	0.44	0.04	1.00	0.99	0.08	***0.73***	***0.54***	***0.73***	***0.74***
6640	17.79	-64.64	212	0.68	0.54	0.87	0.75	0.30	0.12	1.00	0.67	0.04	***0.68***	***1.00***	***0.68***	***0.98***
6785	17.70	-64.68	213	0.68	0.54	0.97	0.87	0.07	0.03	1.00	0.75	0.06	***0.70***	***0.57***	***0.70***	***0.73***
6670	17.78	-64.65	214	0.68	0.54	0.11	0.82	0.78	0.04	1.00	0.93	0.08	***0.55***	***0.24***	***0.55***	***0.46***
6719	17.77	-64.82	215	0.68	0.53	0.17	0.84	0.73	0.08	1.00	0.61	0.31	***0.85***	***0.24***	***0.85***	***0.63***
6614	17.78	-64.61	216	0.68	0.53	0.38	0.76	0.60	0.00	1.00	1.00	0.01	***0.55***	***0.24***	***0.55***	***0.46***
6747	17.64	-64.90	217	0.68	0.53	0.58	0.94	0.92	0.07	1.00	0.15	0.07	***0.77***	***0.54***	***0.77***	***0.76***
6867	17.69	-64.90	218	0.67	0.53	0.08	0.85	0.65	0.08	1.00	1.00	0.07	***0.49***	***0.13***	***0.49***	***0.36***
6760	17.69	-64.67	219	0.67	0.53	0.26	0.87	0.88	0.04	1.00	0.65	0.02	***1.00***	***0.57***	***1.00***	***0.91***
6979	17.66	-64.86	220	0.67	0.53	0.23	0.84	0.52	0.00	1.00	0.74	0.40	***0.45***	***0.09***	***0.45***	***0.32***
6720	17.76	-64.71	221	0.67	0.53	0.21	0.94	0.84	0.00	1.00	0.15	0.57	***0.45***	***0.09***	***0.45***	***0.32***
6843	17.73	-64.63	222	0.67	0.53	0.05	0.97	0.68	0.03	1.00	0.98	0.01	***0.58***	***0.57***	***0.58***	***0.67***
6782	17.67	-64.80	223	0.67	0.53	0.15	0.99	0.69	0.03	1.00	0.84	0.00	***0.77***	***0.54***	***0.77***	***0.76***
6759	17.69	-64.74	224	0.67	0.53	0.17	0.94	0.81	0.01	1.00	0.75	0.02	***0.86***	***0.54***	***0.86***	***0.81***
6714	17.78	-64.76	225	0.67	0.53	0.18	0.74	0.97	0.25	1.00	0.32	0.24	***0.66***	***0.09***	***0.66***	***0.44***

Site	Lat	Long	Rankings	R Score FINAL	Resilience Score	RS	TV	CD	HB	D	MA	CC	*LDI*	*F*	*Stress Score*	*S Score FINAL*
6649	17.78	-64.58	226	0.67	0.53	0.58	0.82	0.68	0.04	1.00	0.56	0.01	***0.55***	***0.24***	***0.55***	***0.46***
6888	17.79	-64.78	227	0.67	0.53	0.54	0.74	0.74	0.03	1.00	0.38	0.25	***0.66***	***0.09***	***0.66***	***0.44***
6868	17.70	-64.89	228	0.66	0.52	0.24	0.99	0.86	0.28	0.20	0.98	0.12	***0.77***	***0.13***	***0.77***	***0.52***
6631	17.81	-64.61	229	0.66	0.52	0.09	0.82	0.44	0.31	1.00	0.84	0.16	***0.55***	***0.24***	***0.55***	***0.46***
6655	17.80	-64.61	230	0.66	0.52	0.45	0.76	0.75	0.13	0.55	0.93	0.07	***0.55***	***0.24***	***0.55***	***0.46***
7055	17.73	-64.89	231	0.66	0.52	0.26	0.94	0.49	0.05	0.97	0.91	0.01	***0.77***	***0.54***	***0.77***	***0.76***
6687	17.79	-64.51	232	0.65	0.52	0.10	0.90	0.68	0.39	1.00	0.54	0.01	***0.73***	***1.00***	***0.73***	***1.00***
Cane Bay D	17.78	-64.82	233	0.65	0.52	0.01	0.84	0.46	0.22	1.00	0.70	0.37	***0.45***	***0.09***	***0.45***	***0.32***
6777	17.67	-64.80	234	0.65	0.51	1.00	0.89	0.00	0.01	0.70	0.98	0.01	***1.00***	***0.54***	***1.00***	***0.89***
Salt River D	17.79	-64.76	235	0.65	0.51	0.05	0.74	0.54	0.17	1.00	0.76	0.34	***0.66***	***0.09***	***0.66***	***0.44***
6656	17.80	-64.62	236	0.65	0.51	0.16	0.82	0.46	0.05	1.00	0.87	0.23	***0.55***	***0.24***	***0.55***	***0.46***
6797	17.77	-64.51	237	0.65	0.51	0.13	0.94	0.67	0.14	1.00	0.54	0.17	***0.68***	***0.54***	***0.68***	***0.70***
6775	17.68	-64.78	238	0.65	0.51	0.00	0.87	0.67	0.18	1.00	0.86	0.01	***0.70***	***0.57***	***0.70***	***0.73***
6620	17.78	-64.62	239	0.65	0.51	0.10	0.76	0.47	0.10	1.00	0.92	0.23	***0.55***	***0.24***	***0.55***	***0.46***
7056	17.72	-64.89	240	0.64	0.51	0.15	0.85	0.59	0.03	1.00	0.88	0.07	***0.52***	***0.13***	***0.52***	***0.38***
6837	17.72	-64.66	241	0.64	0.51	0.77	0.91	0.40	0.07	1.00	0.39	0.02	***0.65***	***0.57***	***0.65***	***0.71***
6713	17.78	-64.76	242	0.64	0.51	0.32	0.74	0.82	0.04	0.99	0.43	0.20	***0.66***	***0.09***	***0.66***	***0.44***
6789	17.66	-64.84	243	0.64	0.51	0.68	0.94	0.58	0.09	1.00	0.22	0.03	***0.70***	***0.57***	***0.70***	***0.73***
6850	17.71	-64.66	244	0.64	0.50	0.92	0.91	0.16	0.00	1.00	0.44	0.11	***0.66***	***0.57***	***0.66***	***0.71***
6736	17.79	-64.75	245	0.64	0.50	0.00	0.74	0.56	0.04	1.00	0.98	0.20	***0.66***	***0.09***	***0.66***	***0.44***
6773	17.68	-64.78	246	0.64	0.50	0.15	0.94	0.66	0.01	0.85	0.78	0.13	***0.70***	***0.57***	***0.70***	***0.73***
6847	17.70	-64.65	247	0.63	0.50	1.00	0.76	0.00	0.02	1.00	0.38	0.34	***0.68***	***1.00***	***0.68***	***0.98***
6836	17.70	-64.65	248	0.63	0.50	0.57	0.81	0.65	0.11	1.00	0.31	0.03	***0.73***	***0.24***	***0.73***	***0.56***
6870	17.70	-64.89	249	0.63	0.50	0.32	0.85	0.73	0.04	1.00	0.31	0.22	***0.49***	***0.13***	***0.49***	***0.36***
6657	17.78	-64.59	250	0.62	0.49	0.29	0.82	0.74	0.04	1.00	0.49	0.05	***0.55***	***0.24***	***0.55***	***0.46***
6788	17.69	-64.69	251	0.61	0.48	0.02	0.94	0.79	0.06	1.00	0.53	0.04	***0.65***	***0.57***	***0.65***	***0.71***
6821	17.74	-64.56	252	0.61	0.48	0.43	0.91	0.91	0.06	1.00	0.02	0.04	***0.73***	***1.00***	***0.73***	***1.00***
6771	17.67	-64.81	253	0.60	0.48	0.07	0.99	0.78	0.16	1.00	0.32	0.01	***0.77***	***0.54***	***0.77***	***0.76***
**6756	17.66	-64.80	254	0.60	0.47	0.13	0.94	0.25	0.01	1.00	0.95	0.03	***0.68***	***0.54***	***0.68***	***0.70***
**6891	17.79	-64.75	255	0.60	0.47	0.31	0.84	0.69	0.15	0.94	0.11	0.24	***0.82***	***0.24***	***0.82***	***0.61***
6636	17.78	-64.63	256	0.59	0.46	0.00	0.76	0.00	0.01	1.00	0.98	0.48	***0.55***	***1.00***	***0.55***	***0.90***
6764	17.64	-64.88	257	0.57	0.45	0.36	0.97	0.68	0.04	1.00	0.01	0.08	***0.77***	***0.54***	***0.77***	***0.76***
6898	17.78	-64.81	258	0.54	0.43	0.32	0.94	0.62	0.28	0.00	0.65	0.20	***0.45***	***0.09***	***0.45***	***0.32***
6838	17.74	-64.60	259	0.53	0.42	0.00	0.91	0.31	0.16	1.00	0.56	0.01	***0.66***	***0.57***	***0.66***	***0.71***
6841	17.71	-64.66	260	0.52	0.41	0.00	0.81	0.26	0.01	1.00	0.76	0.04	***0.73***	***0.24***	***0.73***	***0.56***
6792	17.66	-64.89	261	0.52	0.41	0.00	0.94	0.00	0.00	1.00	0.87	0.05	***0.65***	***0.57***	***0.65***	***0.71***
6741	17.79	-64.75	262	0.51	0.40	0.00	0.84	0.00	0.00	0.98	0.92	0.07	***0.66***	***0.09***	***0.66***	***0.44***
6783	17.67	-64.89	263	0.51	0.40	0.00	0.94	0.00	0.03	1.00	0.76	0.07	***0.86***	***0.54***	***0.86***	***0.81***
6770	17.68	-64.89	264	0.50	0.40	0.00	0.94	0.00	0.06	1.00	0.75	0.03	***0.73***	***0.54***	***0.73***	***0.74***
6638	17.78	-64.61	265	0.49	0.39	0.00	0.81	0.00	0.02	1.00	0.87	0.00	***0.55***	***0.24***	***0.55***	***0.46***

Site	Lat	Long	Rankings	R Score FINAL	Resilience Score	RS	TV	CD	HB	D	MA	CC	*LDI*	*F*	*Stress Score*	*S Score FINAL*
6644	17.79	-64.63	266	0.48	0.38	0.00	0.82	0.00	0.00	1.00	0.67	0.15	***0.55***	***1.00***	***0.55***	***0.90***
6781	17.67	-64.90	267	0.37	0.29	0.00	0.89	0.00	0.00	1.00	0.00	0.15	***1.00***	***0.54***	***1.00***	***0.89***