CORAL REEF HEALTH STATUS REPORT FOR JAMAICA: 2020

KPI No. 6 - Target: To undertake trend analysis of twelve (12) coral reef sites

National Environment and Planning Agency

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This document has been produced in fulfilment of the National Environment and Planning Agency Key Performance Indicator (KPI) No. 5: Coral Reef Health Index – Implement coral reef health tracking programme as a part of management measures at 12 sites within the Ocho Rios Marine Park Protected Area, Palisadoes-Port Royal Protected Area, Portland Bight Protected Area and Montego Bay Marine Park.

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TABLE OF CONTENTS

OVERVIEW

This report is an overview of the overall status for 22 sites monitored in 2020 based on the reef health index. The reef health index has become the main method of effectively tracking reef status as it allows for easy dissemination and understanding of technical information on reef health and resilience. The reef index is determined by the integration of four key indicators: coral cover, macro-algal cover, herbivorous fish abundance and commercially important fish abundance. This facilitates a more accurate comparison across all sites as these parameters (indicators) were collected at all sites.

The Reef Check methodology and photographic surveys were used to assess the substrate composition and a modified version of the Atlantic and Gulf Rapid Reef Assessment (AGRRA) methodology was used to collect data on fish biomass. The coral reef health index (CRHI) has become a method of effectively tracking reef status and in 2020 the tracking of the health status was conducted on reef systems within various marine protected areas that have been repeatedly monitored.

Regionally, Jamaica's 'poor' ranking is lower than that of the Caribbean which has a calculated ranking of 'fair'. However, this is comparable to the 'poor' ranking of the Bahamas (Dahlgren et al., 2020), Antigua & Barbuda (Camacho et al., 2020) and the Dominican Republic (Lang et al., 2020). Jamaica's CRHI has generally been consistent in its ranking as 'poor' for the last ten years. Since, 2011, with the exception of 2014, the CRHI has ranged from 2.1 to 2.4. In 2020, Jamaica's CHRI reached an unprecedented low with a CRHI of 2.0. This indicates that the health of the reef system has been in a steady decline over the past decade.

None of the 22 sites assessed in 2020 have achieved a 'good' ranking. The five highest ranking sites, which ranked as 'fair' were Boscobel Flats and Boscobel West (Sandals Boscobel Special Fishery Conservation Area), Sewage End (Ocho Rios Marine Park Protected Area), Sergeant Major and Airport Reef West both within the Montego Bay Marine Park, all with a CRHI of 2.8. The site calculated to have the lowest score was Choicy Reef (White River Special Fishery Conservation Area) that scored a 'critical' CRHI of 1.3.

Climate change has also been a large factor in the deteriorating health of the reefs. While there have been no major hurricanes, there has been an increase in uncommon weather activities. Other drivers of change such as coral bleaching from increased sea temperatures, human population growth, overfishing, coastal pollution and extensive coastal modification projects across the island with large scale disturbances which have the potential to result in further declines in coral cover.

Recently, another driver of change that has proven to be impacting Jamaica's reef systems is the recently identified Stony Coral Tissue Loss Disease (SCTLD). This rapidly degenerative bacterial disease causes the live coral tissue to sloth off the skeletal structures killing the coral colonies in a matter of weeks. This has contributed to the loss of coral cover island-wide. Coastal and marine management and conservation efforts need to be radically improved in order to save the reef system.

HEALTH STATUS ASSESSMENTS

SUBSTRATE COMPOSITION AND HERBIVORE INTERACTIONS

The Reef Check methodology and photographic surveys were used to assess substrate composition at target sites. Reef Check produces data in the field via a point intercept method which assesses every 0.5 m and provides mean percentage cover for the categories assessed along four discrete 20 m transects in depths ranging from 4 – 9 m. Photographic surveys were conducted at the Caribbean Planning for Adaptation to Climate Change (CPACC) long term monitoring sites: Gorgo City (Discovery Bay), Monkey Island (Portland) and Southeast Cay (Palisadoes-Port Royal Protected Area). The photographic surveys involved the analysis of five 20 m transects at 0.5 m intervals with the camera placed at a fixed distance of 0.5 m above the substrate. The images were later analyzed using a visual basic programme, Coral Point Count with Excel extensions (CPCe) version 4.1. Data generated using this protocol is also represented as percentage cover for substrate categories per site.

Using a modified version of the Atlantic and Gulf Rapid Reef Assessment (AGRRA) methodology, data on fish biomass was collected along four 5 m X 20 m belt transects. The size of each fish counted was estimated and assigned to a size category within the ranges of: <5, 5-10, 11-20, 21-30, 31-40 and >40 cm. The AGRRA protocol identifies the fish species from the list below as priority as these are ecologically relevant to the health of reefs and also important for commercial or recreational fisheries:

- **Acanthuridae** (Surgeonfish) ALL
- **Balistidae** (Triggerfish) ONLY *Melichthys niger* (Black Durgon)
- **Chaetodontidae** (Butterflyfish) ONLY
- **Haemulidae** (Grunt)
- **Lutjanidae** (Snapper) ALL
- **Pomacanthidae** (Angelfish)
- **Scaridae** (Parrotfish)
- **Serranidae** (Seabass)

Individuals observed from each of the following six species were also recorded:

- *Bodianus rufus* (Spanish hogfish)
- *Caranx rubber* (Bar jack)
- *Lachnolaimus maximus* (Hogfish)
- *Microspathodon chrysurus* (Yellowtail Damselfish)
- *Pterois volitans* (Lionfish)

Fish species biomass data recorded for Surgeonfish, Parrotfish, Snapper, Grunt and Groupers was used in the calculation of the index.

USING THE REEF HEALTH INDEX

This report is an overview of the overall status for 22 sites monitored in 2020 based on the reef health index. The reef health index has become the main method of effectively tracking reef status as it allows for easy dissemination and understanding of technical information on reef health and resilience. Since 2007, the Agency has institutionalized the monitoring of coral reef status by tracking the health status of reef systems in Jamaica using data collected at sites established and repeatedly monitored. In 2012 the use of key indicators to determine the reef health index (Box 1) was integrated in the reporting of data collected in 2011, which is in alignment with the methodology used to assess the Mesoamerican reef system since 2010[1].

BOX 1: Indicator description

Coral cover: proportion of reef surface covered by live stony corals which form the three-dimensional network of the reef **(recorded as % cover).**	**Macro-algal cover:** proportion of reef surface covered by fleshy algae **(recorded as % cover).**
Herbivorous fish abundance: biomass of surgeonfish and parrotfish; the most important grazers on plants that could overgrow the reef (**recorded as g/100m²**).	**Commercial fish abundance:** biomass of fish species (grunts, groupers, snappers) which are commercially significant in Jamaica (**recorded as g/100m²**).

Index Calculations

The grades are calculated by converting the mean data-value of each indicator into a condition ranked from one ('critical') to five ('very good'), based on pre-determined data ranges outlined in Table 1. The four grades are averaged to obtain the health index score for each site. For this report the 2008 data ranges were used to calculate the index.

Coral Reef Health Index (CRHI)

Very Good: >4.2 - 5 **Good:** >3.4 - 4.2

Fair: >2.6 - 3.4 **Poor:** >1.8 - 2.6

Critical: 1 - 1.8

Table 1: Threshold values by indicator used to determine overall ranking

2008 Index values	VERY GOOD (5)	GOOD (4)	FAIR (3)	POOR (2)	CRITICAL (1)
Coral Cover (%)	≥40	20.0-39.9	10.0-19.9	5.0-9.9	<5
Macro-algae Cover (%)	<10	10.0-19.9	20.0-39.9	40.0-59.9	≥60
Herbivorous Fish Abundance (g/100m²)	≥4800	3600-4799	2400-3599	1200-2399	<1200
Commercial Fish Abundance (g/100m²)	≥2800	2100-2799	1400-2099	700-1399	<700

[1] Healthy Reefs Initiative (2010). Report Card for Mesoamerican Reef. 22pp

TARGET SITES

Twenty-two sites across 10 locations were assessed from June 2020 to February 2021. The locations are the Montego Bay Marine Park (St. James), the Ocho Rios Marine Park Protected Area (St. Ann) which includes the White River Special Fishery Conservation Area (St. Ann), the Oracabessa Bay Special Fishery Conservation Area (St. Mary), Sandals Boscobel Special Fishery Conservation Area (St. Mary), Palisadoes-Port Royal Protected Area (Kingston), Portland Bight Protected Area (Clarendon/St. Catherine), Gorgo City, Discovery Bay (St. Ann), Hopewell (Hanover) and Monkey Island within the East Portland Special Fishery Conservation Area (Portland).

It should be noted that some sites such as and Dairy Bull (Discovery Bay), Pear Tree Bottom (Discovery Bay), Relocation 1 (Falmouth), Oyster Bay (Falmouth), Peter Tosh Reef (Belmont), Sandals Reef (Whitehouse), El Punto Negrilo (Negril Marine Park), Bloody Bay (Negril Marine Park) and Ireland Pen (Negril Marine Park) were assessed in 2019 but excluded for the 2020 monitoring period while RIU Nursery (St. Ann) and Sunset Beach Mooring (St. James) were not assessed in 2019, however were assessed for 2020.

HEALTH STATUS FINDINGS

REEF HEALTH SITES

Calculations showed that the majority (41%) of the sites (9 sites) ranked as 'poor', while 36% ranked as 'critical' (8 sites). Only 23% of reef sites assessed were ranked as 'fair' (5 sites). The overall average index of 2.0 calculated for all sites for 2020 continues to point to Jamaica's reef being in 'poor' condition, a consistent ranking with the previous year which indicates that there has been no improvement in the overall health of Jamaica's reef system. (Figure 1).

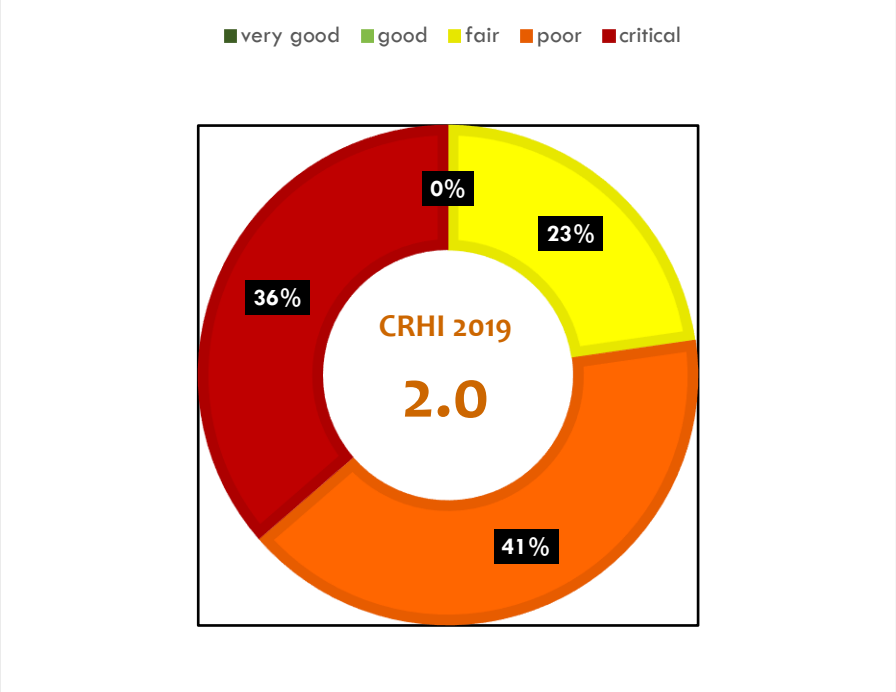

Figure 1: Overall average CRHI for 2020 assessment sites

None of the 22 sites assessed in 2020 have achieved a 'good' ranking.

The five highest ranked sites, which ranked as 'fair' were Boscobel Flats and Boscobel West (Sandals Boscobel Special Fishery Conservation Area), Sewage End (Ocho Rios Marine Park Protected Area), Sergeant Major and Airport Reef West both within the Montego Bay Marine Park, all with a CRHI of 2.8.

The site calculated to have the lowest score was Choicy Reef (White River Special Fishery Conservation Area) that scored a 'critical' CRHI of 1.3 (Table 1).

Table 1: CRHI for 2020 by reef assessment sites and locations

Parish	LOCATION	Site Name	CRHI per site	CRHI per location
Portland	East Portland Special Fishery Conservation Area	Monkey Island	2.3	2.3
Kingston	Palisadoes-Port Royal Protected Area	Drunkenman's Cay	2.3	1.9
		Lime Cay	1.8	
		South East Cay	1.5	
St. Catherine	Portland Bight Protected Area	Wreck Reef	1.5	1.7
		Pigeon Island West	1.8	
St. Mary	Sandals Boscobel Special Fishery Conservation Area	Boscobel Flats	2.8	2.8
		Boscobel West	2.8	
	Oracabessa Bay Special Fishery Conservation Area	Commander Reef	1.8	1.9
		Golden Eye Coral Garden	2.3	
		Coral Nursery	1.5	
St. Ann	Discovery Bay	Gorgo City	2	2.0
	Ocho Rios Marine Park Protected Area	Riu Nursery	1.5	2.2
		Sewage End	2.8	
	White River Special Fishery[2] Conservation Area	Dickies Reef	2.5	1.8
		Choicy Reef	1.3	
		Hermosa Cove	1.5	
St. James	Montego Bay Marine Park	Sunset Beach Mooring	1.5	2.2
		Classroom Reef	1.5	
		Sergeant Major	2.8	
		Airport Reef West	2.8	
Hanover	Hopewell	Round Hill	1.8	1.8
			2.0	

[2] The White River Special Fishery Conservation falls within the Ocho Rios Marine Protected Area.

Trends for Key Indicators

The average hard coral cover was determined to be 13.45%/100m² which is within the limits of the 'fair' ranking for that indicator. Four of the 22 sites assessed showed hard coral cover of 20% or greater, while thirteen sites showed hard coral cover of less than 10%. Average macro-algal coverage for 2020 was recorded as 31.97%, also within the "fair" ranking for that indicator; at eleven sites, macro-algal cover exceeded 40%. (Figure 2).

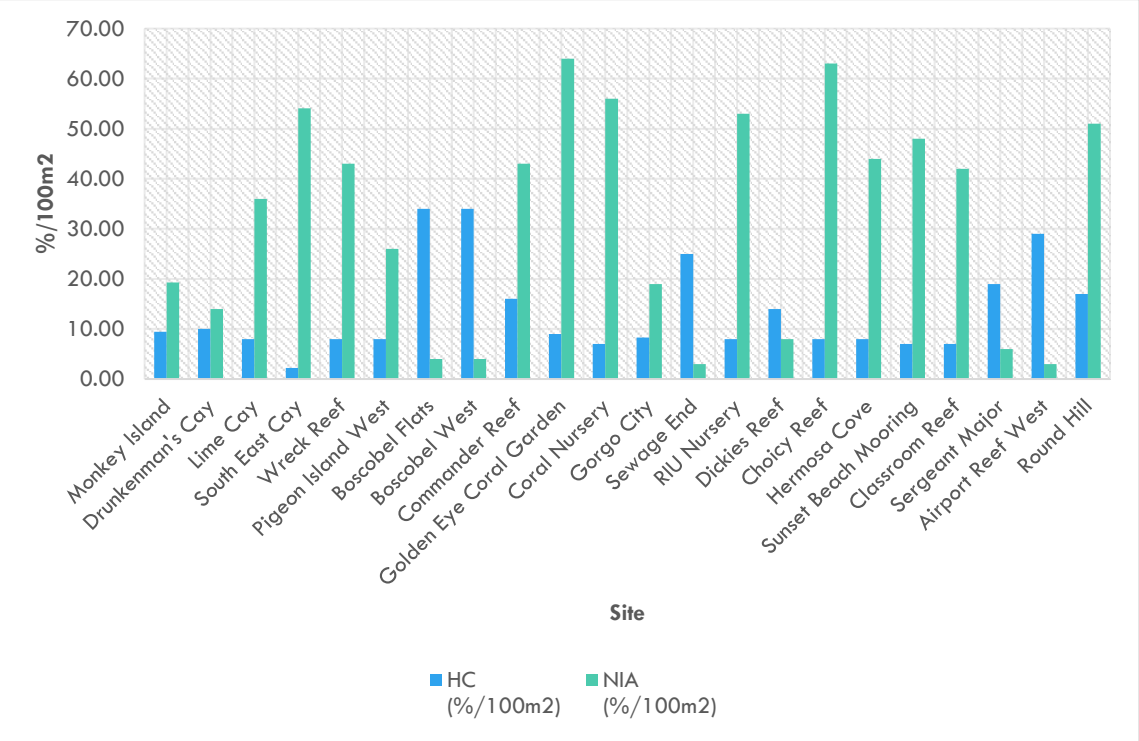

Figure 2: Comparison of percentage coral cover to algal cover across the sites

The average herbivorous fish biomass across the sites was 542.43 g/100m², representing a decrease of 11.08%, maintaining the 'critical' ranking from the previous year for that indicator. Twenty of the sites presented herbivorous fish biomass of less than 1200 g/100m² accounting for 90.9% of the 2020 sites. For commercial fish, the average biomass was calculated to be 32.99 g/100m² ranking as 'critical' for that indicator, consistent with the 2019 report and representing a reduction of 48.97% since the previous year. All sites assessed scored a 'critical' ranking for the commercial fish indicator. This suggests that more work is required in fisheries management across the island as the results show that the country continues to be severely overfished. (Figure 3 and Table 2).

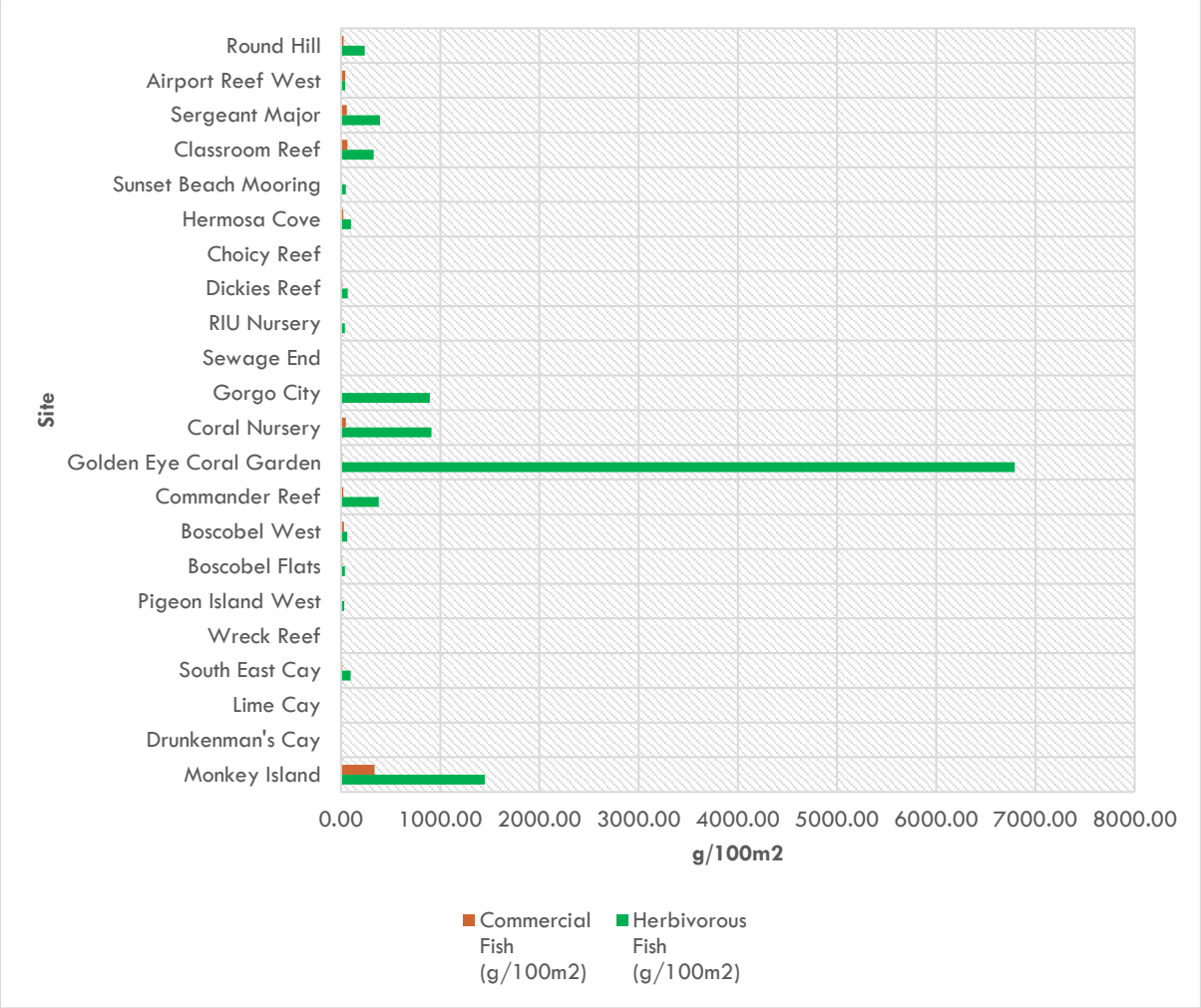

Figure 3: Comparison of indicator fish categories across the sites

ANNUAL TRENDS

Globally coral reef health has been on the decline for the past few years. The National Oceanic and Atmospheric Administration (NOAA), 2020 reported that data sets collected from 2012 – 2018 for the Pacific and Atlantic, indicated that U.S. coral reefs are in fair condition as they did not meet the historical references. They noted that the decline was attributed to climate change, unsustainable fishing practices and coral disease. McField et.al, 2020 also saw a decrease in the Reef Health Index (RHI) for the first time in 12 years, from 2.8 in 2016 to 2.5 in 2018 on the Mesoamerican Reefs.

Regionally, Jamaica's 'poor' ranking is lower than that of the Caribbean which has a calculated ranking of 'fair'. However, this is comparable to the 'poor' ranking of the Bahamas (Dahlgren et al., 2020), Antigua & Barbuda (Camacho et al., 2020) and the Dominican Republic (Lang et al., 2020). Jamaica's CRHI has generally been consistent in its ranking as 'poor' for the last ten years. Since, 2011, with the exception of 2014, the CRHI has ranged from 2.1 to 2.4. In 2020, Jamaica's CHRI reached an unprecedented low with a CHRI of 2.0 (Table 2). This indicates that the health of the reef system has been in a steady decline over the past decade.

Since Jamaica's 'good' ranking for the annual coral cover in 2018, it has decreased by 9.11%/100m^2 (40.38%) however, it is still above the 2011 low by 12.26%. Additionally, the herbivorous and

commercial fish counts have also decreased by 77.83 g/100m^2 and 97.09 g/100m^2 respectively, since 2011 to the lowest it has been in the last ten years (Figure 4). The macro-algal coverage for 2020 however, saw an increase by 4.33%/100m^2 (13.54%) since 2019 when it was at its lowest. It is however still 37.43% lower than the highest recorded figure in 2011. These dismal trends are a prediction of the future of Jamaica's marine and coastal ecosystems if drastic intervention does not occur soon.

Climate change has been a large factor in the deteriorating health of the reefs. While there have been no major hurricanes, there has been an increase in uncommon weather activities. Other drivers of change such as coral bleaching from increased sea temperatures, human population growth, overfishing and coastal pollution. Additionally, with increasing coastal development and infrastructure projects across the island, comes extensive coastal modification with large scale disturbances that have the potential to result in further declines in coral cover.

Recently, another driver of change that has proven to impact Jamaica's reef systems is the recently identified Stony Coral Tissue Loss Disease (SCTLD). This rapidly degenerative bacterial disease causes the live coral tissue to sloth off the skeletal structures killing the coral colonies in a matter of weeks. This has contributed to the loss of coral cover island wide. Coastal and marine management and conservation efforts need to be radically improved in order to save the reef system.

Table 2: Comparison of CRHI over the years

	HC %/100m2	NIA %/100m2	Herbivorous Fish g/100m2	Commercial Fish g/100m2	Overall CRHI
2011 (Baseline)	11.80	51.10	2447.00	1135.30	**2.4**
2013	20.30	28.30	1185.20	155.80	**2.1**
2015	23.30	29.40	790.60	82.50	**2.2**
2016	23.30	29.00	1145.70	337.30	**2.4**
2018	22.56	34.66	856.80	166.59	**2.2**
2019	18.70	27.64	610.07	64.66	**2.2**
2020 (Current)	13.45	31.97	542.43	32.99	**2**

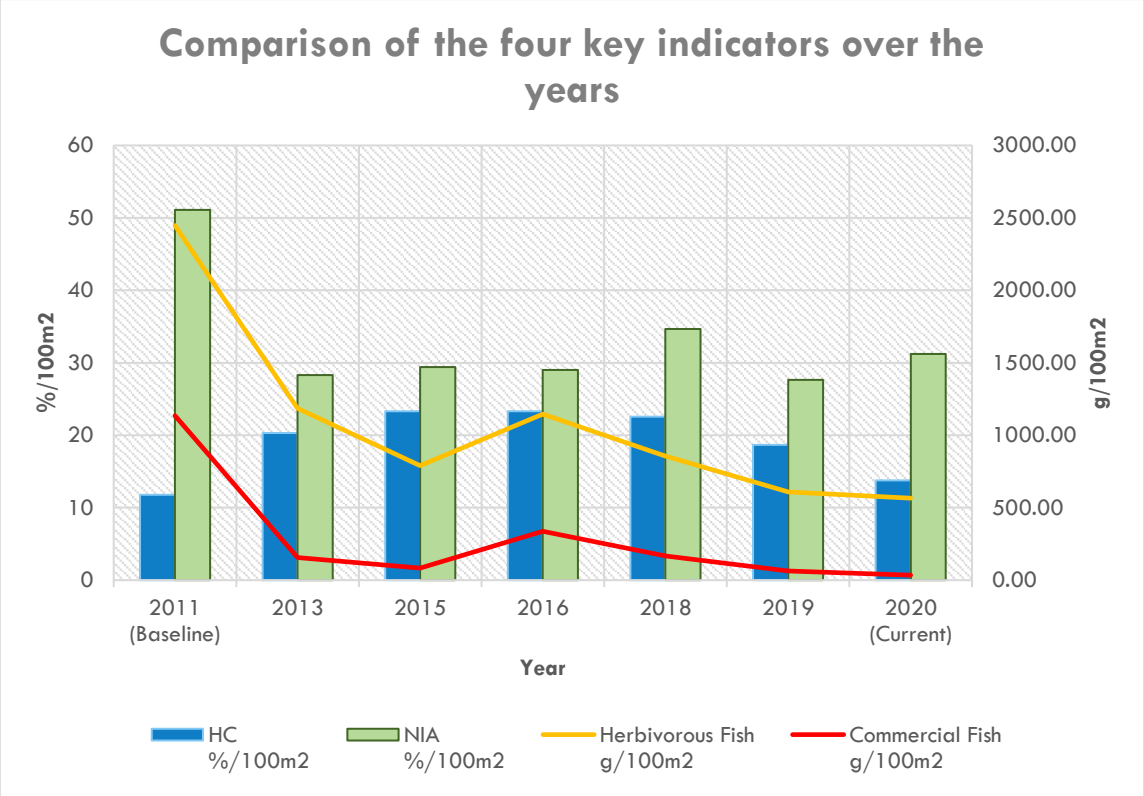

Figure 4: Comparison of the key indicators over the years

KEY ACTIONS FOR REEF CONSERVATION

ACTION PLAN FOR CORALS AND REEFS IN JAMAICA (APCAR) 2018-2023

The APCAR 2018-2023 (revised September 2019) builds on information presented in APCAR 2010 and provides clear and targeted actions to build resilience in coral reef ecosystems and in the people that rely on them over the five year period 2018-2023. The plan purports strategies and actions that are formulated based on guiding principles which integrate both biological and social resilience in line with the National Strategy and Action Plan on Biological Diversity in Jamaica (2016 - 2021) and the Aichi Targets 6, 7, 8, 9, 10, 11, 14 and 15 outlined in the Convention on Biological Diversity (CBD) Strategic Plan 2012.

If fully implemented, these actions will help to ensure that coral reefs continue to provide invaluable ecological, social and economic services to future generations and that their beauty, diversity and power to inspire will remain undiminished. The plan encourages citizens to foster an ethic of active participation and sharing of responsibility to care for our reefs. This challenge of safeguarding corals and reefs cannot be met by governmental action alone. Rather, it will require both concerted efforts and sustained collaboration by many public and private entities concerned with the fate of coral reefs locally and worldwide.

The Action Plan for Corals and Reefs in Jamaica (APCAR) was circulated to complementary government agencies, partner environmental non-governmental organizations and academia. It is expected that annual updates from the entities will enable tracking of progress for coral reef management. The APCAR has also been posted on the Agency website for accessibility of the Public.

STONY CORAL TISSUE LOSS DISEASE PILOT PROJECT

Stony Coral Tissue Loss Disease (SCTLD) is contagious between individual corals and between coral species. SCTLD was first recorded near Miami in 2014 and since then it has spread south at a rate of approximately 2.5km per month reaching Key West by August 2019. It does not affect humans. It is water-borne and can also spread through contact. Work is ongoing to determine the pathogen(s) involved and although it has not yet been determined, antibiotics have arrested disease progression in both laboratory and field experiments, so a bacterial component is highly likely.

A regional peer-to-peer learning exchange on SCTLD was hosted in Key West on 1 - 2 August 2019 by the MPAConnect Network, a partnership between the Gulf and Caribbean Fisheries Institute (GCFI) and the US National Oceanic and Atmospheric Administration's Coral Reef Conservation Program (NOAA CRCP), with funding from NOAA CRCP and the National Fish and Wildlife Foundation (NFWF) Coral Reef Conservation Fund. The learning exchange provided capacity-building support to Caribbean countries and territories currently affected by SCTLD and susceptible to the disease. Already the network is playing a role in assisting members with coral disease identification, the interpretation of results of monitoring, sharing advice and contacts on treatment protocols and guiding outreach to decision makers.

SCTLD was confirmed in Jamaica in February 2018 within the White River area and since has progressed along the north coast. In order to prevent the further spread of SCTLD, the

recommendation from SCTLD experts in Florida is to treat the disease as quickly and as aggressively as possible once identified in new locations. Mechanical, chemical and biological treatment protocols have been tested in Florida and the lowest failure rates have been achieved by treating SCTLD-affected corals with antibiotics directly applied to lesions. Large-scale field trials indicate that best practice to date is application of amoxycillin trihydrate powder with CoreRx Base2B. A US based pharmaceutical company called Ocean Alchemists has offered to donate a jar (400g) of Base 2 to Jamaica through the GCFI to combat the outbreak of SCTLD in Florida and the wider Caribbean region.

In partnership with the University of the West Indies Discovery Bay Marine Lab (DBML) and the Veterinary Services Division (VSD), the Agency recommended that a pilot study be conducted at a site within the Discovery Bay area. The treatment site will be selected based on:

- Large coral colonies close to others of the same species that are of high susceptibility; and
- Colonies with a large amount of remaining tissue and a small number of active lesions.

Site selection criteria relate to the regulatory framework, for example, sites within a marine protected area (MPA) may respond more positively to treatment since they may not be affected by additional stressors such as fishing pressure.

The project has suffered several setbacks in the acquisition of the antibiotics pertinent to the implementation and success of the project. However, it is in the final stages of the procurement process and the treatment will begin in 2021.

REEF CHECK TRAINING

The Agency coordinated an internal reef check training to increase its technical staff capabilities and increase the man power available to adequately monitor the various reef sites island wide. The Ecosystems Management Branch was tasked with hosting a series of training for divers across the Agency to be certified as Reef Check's EcoDivers. The training consisted of three classroom sessions and one field activity geared at familiarizing the participants on methods used to conduct Reef Check assessments.

The course was designed for scientific and non-scientific divers to understand the goal of reef assessments and employ the standard Reef Check method in the collection of strong scientific data. Upon the completion of the course participants were certified as an EcoDiver and are now able to participate in Reef Check surveys throughout the Caribbean region. All nine participants were certified as EcoDivers with eight certified in Fish, Invert and Substrate data collection and one certified in Invert and Substrate.

Another training session was executed by the management of the White River Special Fishery Conservation Area with support of the Agency to train eleven individuals from the White River Special Fishery Conservation Area, Sandals Boscobel Special Fishery Conservation Area, Sandals Whitehouse Special Fishery Conservation Area and Discovery Bay Area. The participants ranged from Sanctuary Managers, Game Wardens, Fisher folks, consultants and hoteliers. These persons were trained as a part of a capacity building for the conduct of reef assessments.

GOING FORWARD

To improve the coral reef system in Jamaica, an integrated, coordinated and adaptive inter-agency approach to coastal and marine management and conservation is necessary to target the drivers and thus stem the decline in reef health. This begins with implementing the activities outlined in the Action Plan for Corals and Reefs in Jamaica (APCAR).

Full implementation will require the action of policy makers in finalizing and gazetting legislation by revision of fines/penalties for breaches and increased resources for enforcement of the legislation. Without strong legislation, the efforts of key agencies such as the National Environment and Planning Agency (NEPA), the National Fisheries Authority (NFA) and their agents will be ineffective.

In its decision 14/34 the Conference of the Parties (COP) [3]to the Convention on Biological Diversity (CBD) adopted a comprehensive and participatory process for the preparation of the post-2020 global biodiversity framework (GBF). The International Coral Reef Initiative (ICRI) members adopted a recommendation for the inclusion of coral reefs within the CBD Post-2020 GBF. The recommendation includes a set of clear indicators that measure the health, integrity and function of coral reefs including live coral cover, coral reef extent, fish abundance, and coral reefs that are under some form of area-based management.

These metrics will also enable an improved consistency of information available at global and regional scales contributing to a more informative overview of changes in coral reef systems. These metrics will also aid the policy makers and investors in tracking the conservation outcomes for coral reefs.

It is recommended that a publication on best practices and lessons learned for local restoration projects completed be done, a database with a compilation of information on local restoration be created and the expansion of Stony Coral Tissue Loss Disease treatment project to other sites such as Negril and other high exposure sites.

[3] Website: https://www.icriforum.org/Post2020/

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APPENDICES

APPENDIX I – 2020 SUMMARY DATA FOR INDICES

Location	Site	HC (%/100 m2)	NIA (%/100 m2)	Herbivorous Fish (g/100m2)	Commercial Fish (g/100 m2)
East Portland Special Fish Conservation Area	Monkey Island	9.42	19.27	1449.17	338.94
Palisadoes-Port Royal Protected Area	Drunkenman's Cay	10.00	14.00	1.81	0.00
Palisadoes-Port Royal Protected Area	Lime Cay	8.00	36.00	8.98	0.00
Palisadoes-Port Royal Protected Area	South East Cay	2.21	54.10	97.70	12.16
Portland Bight Protected Area	Wreck Reef	8.00	43.00	9.54	0.00
Portland Bight Protected Area	Pigeon Island West	8.00	26.00	32.75	1.59
Sandals Boscobel Special Fishery Conservation Area	Boscobel Flats	34.00	4.00	37.86	13.08
Sandals Boscobel Special Fishery Conservation Area	Boscobel West	34.00	4.00	60.64	28.37
Oracabessa Bay Special Fishery Conservation Area	Commander Reef	16.00	43.00	378.71	24.14
Oracabessa Bay Special Fishery Conservation Area	Golden Eye Coral Garden	9.00	64.00	6792.01	14.34
Oracabessa Bay Special Fishery Conservation Area	Coral Nursery	7.00	56.00	912.28	49.23
Discovery Bay	Gorgo City	8.31	18.96	893.54	9.45
Ocho Rios Marine Park Protected Area	Sewage End	25.00	3.00	0.87	0.08
Ocho Rios Marine Park Protected Area	RIU Nursery	8.00	53.00	38.16	6.12
White River Special Fishery Conservation Area	Dickies Reef	14.00	8.00	66.36	13.66
White River Special Fishery Conservation Area	Choicy Reef	8.00	63.00	6.39	4.80
White River Special Fishery Conservation Area	Hermosa Cove	8.00	44.00	98.93	21.66
Montego Bay Marine Park	Sunset Beach Mooring	7.00	48.00	47.55	1.51
Montego Bay Marine Park	Classroom Reef	7.00	42.00	326.79	62.86
Montego Bay Marine Park	Sergeant Major	19.00	6.00	393.72	56.76
Montego Bay Marine Park	Airport Reef West	29.00	3.00	41.48	42.16
Hopewell	Round Hill	17.00	51.00	238.18	24.95
	Average	13.45	31.97	542.43	32.99

Appendix II– Excerpt from the Coral Reef Health Status Report for Jamaica: 2019 – Monitoring and trend analysis of coral reef health at 29 coral reef sites.

Parish	Location	Site Name	CRHI per Site	CRHI per Location
Portland	East Portland Special Fishery Conservation Area	Monkey Island	2.8	2.8
Kingston	Palisadoes-Port Royal Protected Area	Drunkenman's Cay	2.3	1.9
		Lime Cay	2	
		South East Cay	1.3	
St. Catherine	Portland Bight Protected Area	Wreck Reef	2.3	2.2
		Pigeon Island West	2	
St. Mary	Sandals Boscobel Special Fishery Conservation Area	Boscobel Flats	2	2.4
		Boscobel West	2.8	
	Oracabessa Bay Special Fishery Conservation Area	Commander Reef	1.5	1.7
		Golden Eye Coral Garden	1.8	
		Coral Nursery	1.8	
St. Ann	Discovery Bay	Dairy Bull	2.3	2.1
		Pear Tree Bottom	1.5	
		Gorgo City	2.5	
	Ocho Rios Marine Park Protected Area	Sewage End	2.8	2.8
	White River Special Fishery Conservation Area	Dickies Reef	1.8	1.8
		Choicy Reef	1.5	
		Hermosa Cove	2	
St. James	Montego Bay Marine Park	Classroom Reef	2.3	2.5
		Sergeant Major	2.3	
		Airport Reef West	2.8	
Trelawny	Falmouth	Relocation 1	2	2.3
		Oyster Bay	2.5	
Westmoreland	Belmont	Peter Tosh Reef	2.5	2.5
	Whitehouse	Sandals Reef	2.3	2.3
Hanover	Negril Marine Park	El Punto Negrilo	2.5	2.6
		Bloody Bay	2.5	
		Ireland Pen	2.8	
	Hopewell	Round Hill	2.8	2.8
			2.2	

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