United States Virgin Islands Bleaching Response Plan

Updated August 2020

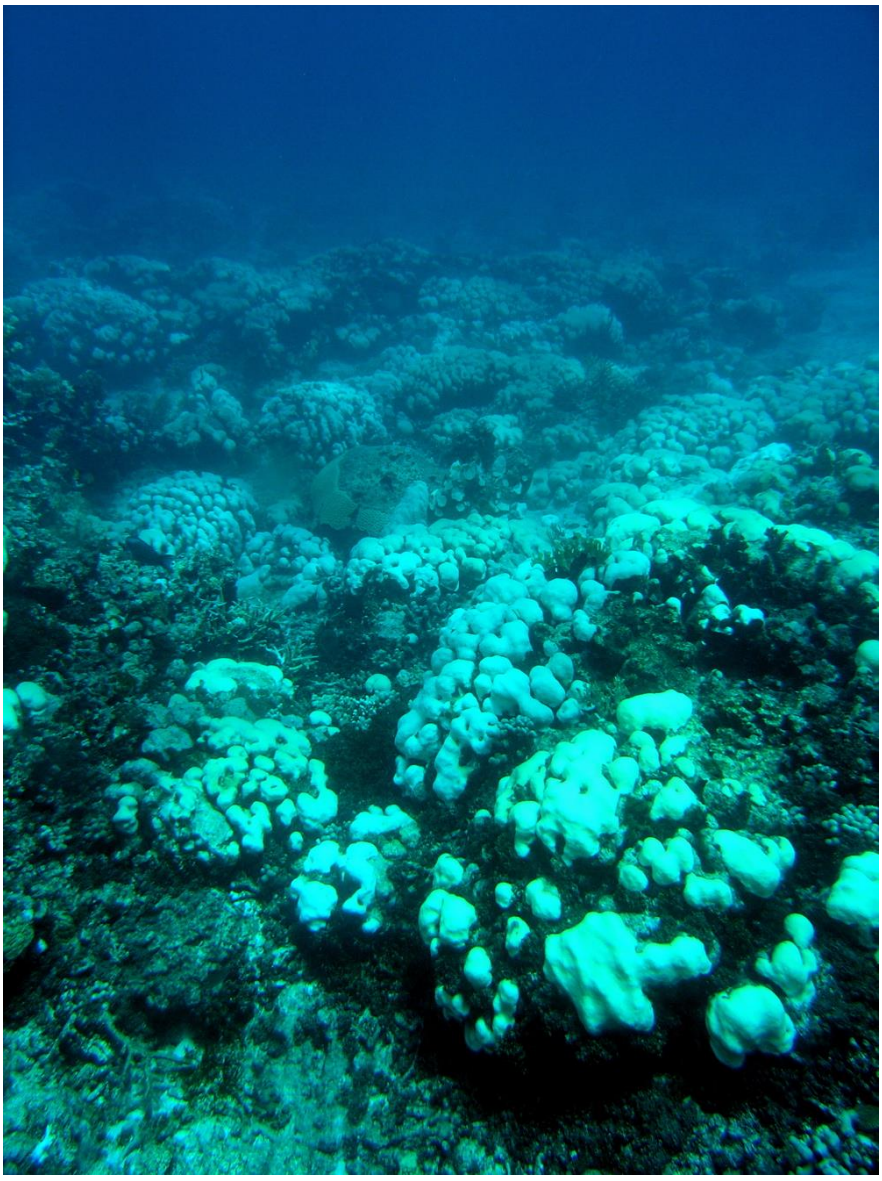

Photo Credit: Tyler Smith

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Introduction

The purpose of the US Virgin Islands Bleaching Response Plan is to assess and monitor coral bleaching primarily from warm water events; documenting the distribution and severity of bleaching as well as impacts to reefs and reef communities post bleaching events. This program will incorporate volunteer and scientist surveys and observations.

Early Warning System

The Coral Reef Watch products developed by the National Oceanic and Atmospheric Administration will be used to prepare and respond to mass bleaching events. Response activity will be directly based on the advisory received from NOAA along with local temperature data.

Advisory	*Response*
Bleaching Warning	USVI Bleaching Response Subcommittee meets to plan response, equipment available for monitoring is prepared/gathered, and press releases and individual calls are used to spread awareness and to mobilize community volunteers. Some pre-bleaching data are collected.
Alert Level 1	Monitoring activities continue. Emphasis placed on how much reef area and which species are more affected. Begin to look for signs of impacts to reefs.
Alert Level 2	Monitoring activities continue. More emphasis is placed on post bleaching impacts (direct mortality, increased prevalence of diseases, and any other changes).

Community Volunteers

Individuals from the public will be able to contribute to the assessment of coral bleaching by participating in the USVI BleachWatch program. In 2020, BleachWatch joined forces with the Coral Disease Advisory Committee to provide volunteers with one location to report bleaching or disease. A coral reef health curriculum was created and can be downloaded from www.vicoraldisease.org. This includes a presentation that contains information on the threats to coral reefs and the identification of coral bleaching and diseases. There are scripts to go along with the presentation so that educators can easily make use of the curriculum.

Bleaching Subcommittee

A small group made up of representatives from UVI (TCRMP, NCRMP), NPS, and DPNR will meet once there is a bleaching warning issued and their responsibilities are as follows:

- Subcommittee meets upon issuance of a bleaching warning to discuss next steps.
- Check in with local temperature loggers and consider time of year to better gauge bleaching risk.

- Prioritization of target "gap areas" in which to deploy rapid bleaching surveys (in addition to NCRMP, TCRMP and other ongoing monitoring programs). Dispatch surveyors to perform rapid bleaching surveys at selected sites.
- Creation of targeted time periods of assessment (during peak of bleaching event, post event to capture mortality, later to capture disease)
- Creation of data hand outs and underwater data sheets
- Agree on who will lead effort to compile data collected.

Bleaching Assessment and Monitoring

The University of the Virgin Islands Territorial Coral Reef Monitoring Program, NOAA's National Coral Reef Monitoring Program and surveys employed by the National Park Service long term monitoring programs all have the ability to recognize and record bleaching events[1]. However there are some gaps in coverage in geographic area, habitat types and timing that warrant additional coverage during large bleaching events. To address these gaps, a rapid bleaching survey methodology was created for easy and quick deployment in the event of a bleaching. A list of possible sites is included in Appendix III and can be finalized by the bleaching subcommittee for each bleaching event. Ideally surveys are performed at least three times in order to catch the peak of the bleaching event, mortality directly following the event, and months after the event to record later onset of disease.

USVI Bleaching Response Sampling Protocols

Outline

Tier I (Citizen scientists/community members)

- Concerned public with little background in marine science
- Brief online or workshop training; data submission via www.vicoraldisease.org
- www.vicoraldisease.org resources page contains instructions, information, survey material download, and page for submission of data
- GPS or map estimation of surveyed area
- Ability to report presence or absence of bleaching
- Coral coverage and species composition for each site report; ability to report other disturbances like disease, anchor/vessel damage, marine debris, etc.

Tier II (Marine professionals)

- Combination of ongoing long term monitoring programs (TCRMP, NCRMP, etc) and rapid bleaching surveys dispatched as necessary based on conditions.
- Marine professionals with recurring experience in coral reef environments; expertise or experience in ecological assessments or coral reef ecosystems

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[1] NPS Monitoring methods: https://irma.nps.gov/DataStore/DownloadFile/580460
TCRMP: https://sites.google.com/site/usvitcrmp/
NCRMP:
http://sero.nmfs.noaa.gov/sustainable_fisheries/caribbean/fish_indep_wkshp/surveys/ncrmp/index.html

- Reconnaissance of target reef habitats, geographic regions and physical regimes
- On spot assessment of presence or absence of bleaching/disease
- Directional swim or transect:
    - Coral species
    - Longest linear length (top view)
    - Estimates of bleaching/disease *presence*
    - Estimates of partial mortality

Methods

Tier I

Purpose: The Tier I Reef Assessment Sampling Protocol (BleachWatch) was developed for the recreational snorkeler/diver that is interested in submitting information on reef health. These short surveys are designed to provide a snapshot of local reefs to scientists and managers and may be used to guide where further surveys are conducted in an effort to determine the extent of bleaching and/or the resilience of those reefs. In 2020, BleachWatch joined forces with the Coral Disease Advisory Committee so that citizens reporting on disease sightings and those reporting on bleaching sightings could use one reporting form. The "VI Hunt for Coral Disease" form was adjusted to allow for bleaching observations and renamed the Coral Health Report. The BleachWatch training was converted into a combination presentation about both bleaching and disease and includes a script and data sheet so that anyone can access the training and the supporting materials. The materials can all be downloaded from the resources page of www.vicoraldisease.org.

Materials Needed:

- Diving or snorkeling equipment
- Underwater clipboard or slate and underwater datasheet, pencils
- Submersible digital camera or video camera

In field protocol:

Complete the observer and site information portions of the Coral Reef Health Report Data Sheet.

Perform a roving swim around your site and look around for healthy or unhealthy corals. If you are using the datasheet, tally the healthy and/or unhealthy corals in the boxes provided. Record any other impacts to corals and take photos of your site (representative photos, or specific photos of impacts). Give the site an overall ranking and describe the reef type where indicated. Explain any additional details in the notes section. Direct photos of the seafloor from above are useful. *Note: It is also important to record if **no** bleaching or disease is observed.*

This simple survey can be completed without the datasheet by just observing healthy and unhealthy corals as you swim around a site and then filling out a report on www.vicoraldisease.org upon completion of the dive.

Submit your observations on the online form using the "Report Sightings" link on www.vicoraldisease.org. The datasheet (if used) can then be erased and used again.

Tier II

Purpose: Tier II sampling is designed for those with considerable experience in marine monitoring and is considered a supplement to monitoring activities that may be activated under territorial and federal monitoring programs. The aims are to provide greater spatial and temporal characterization of coral bleaching, disease, and mortality. The more intensive methods to be employed by experienced observers will generate a deeper level of information content on the co-factors that ultimately impinge on coral reproduction, growth, and survival. This level of information in combination with other ongoing monitoring programs can provide greater insight on physical regimes and habitats that provide resistance and resilience to bleaching events, with implications for management of coral reef systems under the threat of increasing frequency and severity of extreme high seawater temperature events. Sampling will involve swimming along a random compass heading (Appendix I) while recording key information about coral health of each colony in a 1m swatch. Coral health information will include presence/absence of bleaching, disease and mortality. Photographs will also be taken at each site.

Coral Health Surveys

Materials Needed:

- Magnetic underwater compass
- Diving equipment
- Underwater clipboard or slate and underwater paper, pencils
  Submersible digital camera or video camera

In field Protocol:

Diver pairs will survey random sampling points generated by the coordinators following established protocols (Kramer et al. 2005; Smith et al. 2010) or select sites from the "gap areas" site list found in Appendix III. Sampling points will be located with GPS and divers will descend with a surface buoy and reel attached. Sampling will commence if the area is determined to be suitable; i.e., the presence of hard corals along proposed compass direction (Appendix I). If area is unsuitable then check area along next random compass heading. If the entire potential sampling area is unsuitable (e.g., very few corals), then end dive. If the sampling area is suitable divers will conduct a side-by-side swim until at least 100 colonies have been sampled in total. GPS point can be confirmed if needed using the dive buoy and boat or handheld GPS unit.

Coral Health Sampling. Each diver will swim in a line along the compass heading adjacent to one another. Each colony in a 1 m swath in front of the diver will be assessed, including fire corals (*Millepora* spp.). The object is to sample at least 100 colonies. Coral health sampling

will follow modified Territorial Coral Reef Monitoring Program (TCRMP) sampling protocols. Each colony (greater than 0.5cm) is assessed in situ for species identity, size, disease presence, bleaching presence, old and recent partial mortality (See Appendix 1 for expanded description of categories). Where colony margins are not distinct, for example thickets of staghorn coral (*Acropora cervicornis*) and boulder star corals (*Orbicella annularis*), then the observer should use their best judgment to make a reasonable "colony" for assessment. For example, changes in colony elevation and other borders can be used to delineate a separate sampling unit, even if it is suspected that adjacent coral tissue might be part of the same clone. Data should be entered into data entry sheets and given to data processing coordinator.

Site photographs. The site name and date should be recorded as a picture or video clip immediately before the filming. Representative still pictures or short video should be recorded in the area of the survey for permanent records. This can be taken above the bottom with a wide-field lens to get as many colonies in frame as possible with the potential to be assessed for bleaching. Pictures should be submitted to data coordinator along with entered digital site data. Video transects should follow methodology outlined in the TCRMP survey protocol.

Literature Cited and Other Pertinent Sources

Carleton JH, Done TJ (1995) Quantitative video sampling of coral reef benthos: Large-scale application. Coral Reefs 14:35-46

Kohler K, Gill SM (2006) Coral Point Count with Excel extensions (CPCe): A Visual Basic program for the determination of coral and substrate coverage using random point count methodology. Computers and Geosciences 32:1259-1269. http://www.nova.edu/ocean/cpce/

Kramer P, Lang J, Marks K, Garza-Perez R, Ginsburg R (2005) AGRRA Methodology, version 4.0, June 2005. University of Miami, Miami

Miller J, Muller E, Rogers C, Waara R, Atkinson A, Whelan K, Patterson M, Witcher B (2010) Coral disease following massive bleaching in 2005 causes 60% decline in coral cover on reefs in the US Virgin Islands. Coral Reefs 28:925-937

Rogers CS, Garrison G, Grober R, Hillis Z, Franke M (2001) Coral Reef Monitoring Manual for the Caribbean and Western Atlantic. US National Park Service, St. John

Smith TB, Nemeth RS, Blondeau J, Calnan JM, Kadison E, Herzlieb S (2008) Assessing coral reef health across onshore to offshore stress gradients in the US Virgin Islands. Marine Pollution Bulletin 56:1983-1991

Smith TB, Blondeau J, Nemeth RS, Pittman SJ, Calnan JM, Kadison E, Gass J (2010) Benthic structure and cryptic mortality in a Caribbean mesophotic coral reef bank system, the Hind Bank Marine Conservation District, U.S. Virgin Islands. Coral Reefs 29:289-308

Appendix I

Example Sampling Codes and Random Compass Headings

Refer to "Coral Health Protocol" TCRMP document for more extensive list of codes.

Disease Codes

Dark Spots Disease (DSD)

Black Band Disease (BBD)

White Plague Disease (PLA)

Yellow Blotch/Band Disease (YBD)

Unknown Disease or Recent Lesions, Dead Coral (DCOR)

Coral Health Categories

Size. Maximum width is the maximum planar diameter.

Disease/Bleaching. Listed as 0, partial bleaching (PB, Stark white bleaching less than 100%), bleaching (BL, 100% stark white)

Recent partial mortality. Skeleton not eroded (fine corallite structure still intact) and bare or with a thin veneer of sheeting or filamentous algae. Typically visible for up to three months following tissue loss.

Old partial mortality. Skeleton eroded and covered with turf or macroalgae. Old mortality is a transition from recent mortality and typically lasts up to 1–4 years (see http://www.agrra.org/method/methodcor.html and Smith TB, Nemeth RS, Blondeau J, Calnan JM, Kadison E, Herzlieb S (2008) Assessing coral reef health across onshore to offshore stress gradients in the US Virgin Islands. Marine Pollution Bulletin 56:1983-1991).

Species Codes

Acropora cervicornis (AC) - coral
Acropora palmata (AP) - coral
Acropora prolifera (APR) - coral
Agaricia agaricites (AA) - coral
Agaricia fragilis (AF) - coral
Agaricia grahamae (AG) - coral
Agaricia humilis (AH) - coral
Agaricia lamarcki (AL) – coral
Agaricia undata (AU) - coral
Agaricia species (AGSP) - coral
Colpophyllia natans (CN) - coral
Dendrogyra cylindrus (DCY) - coral
Diploria labyrinthiformis (DL) - coral
Dichocoenia stokesii (DSO) - coral

Eusmilia fastigiata (EF) - coral
Favia fragum (FF) - coral
Helioseris cucullata (HC) - coral
Isophyllia sinuosa (IS) - coral
Isopyhyllastrea rigida (IR) - coral
Manicina areolata (MAR) - coral
Madracis decactis (MD) - coral
Madracis formosa (MAFO) - coral
Madracis mirabilis (MM) - coral
Meandrina meandrites (MME) - coral
Millepora alcicornis (MILA)
Millepora complanate (MILC)
Millepora squarrosa (MILS)
Montastrea cavernosa (MC) - coral
Mussa angulosa (MAN) - coral
Mycetophyllia aliciae (MAL) - coral
Mycetophyllia danaana (MDA) - coral
Mycetophyllia lamarckiana (ML) - coral
Mycetophyllia ferox (MF) - coral
Mycetophyllia species (MYSP) - coral
Oculina diffusa (OD) - coral
Orbicella annularis (OA) - coral
Orbicella faveolata (OFAV) - coral
Orbicella franksi (OFRA) - coral
Orbicella spp. (OX) - coral
Porites astreoides (PA) - coral
Porites branneri (PB) - coral
Porites divaricata (PD) - coral
Porites furcata (PF) - coral
Porites porites (PP) - coral
Porites branching species (PBSP) - coral
Pseudodiploria clivosa (PC) - coral
Pseudodiploria strigosa (PS) - coral
Scolymia cubensis (SC) - coral
Scolymia lacera (SL) - coral
Scolymia species (SCSP) - coral
Siderastrea radians (SR) - coral
Siderastrea siderea (SS) - coral
Siderastrea species (SSPP) - coral
Solenastrea bournoni (SB) - coral
Solenastrea hyades (SH) - coral
Stephanocoenia intercepta (SI) - coral
Tubastraea coccinea (TC) - coral

Random Compass Headings

100	230	360	50	10	30
330	170	150	90	150	90
160	240	210	360	90	350
100	110	310	310	50	220
340	210	330	350	10	190
230	320	170	50	350	140
200	80	340	210	60	150
150	170	210	300	170	180
40	90	180	140	60	120
360	80	100	200	50	220
80	180	240	360	80	150
50	320	50	170	200	130
20	260	160	350	170	10
60	140	340	320	40	340
220	60	270	280	70	30
150	260	220	80	360	320
230	160	50	240	10	170
150	310	110	170	140	250
90	130	120	320	170	350
150	160	230	270	240	110
360	150	190	340	10	200
120	40	180	280	110	140
250	200	190	160	70	300
320	270	340	190	120	170
350	50	120	340	140	60
350	270	270	310	190	170
100	210	40	220	300	160
240	30	230	330	120	200
30	120	160	150	160	330
260	250	240	190	340	260
80	150	320	140	160	50
180	350	140	230	360	200
350	140	160	30	130	140
130	150	350	100	140	310
170	10	170	110	160	250

Appendix II

Bleaching Subcommittee Sample Agenda

Once there is a "bleaching warning" level reached for the territory, the bleaching subcommittee should convene via conference call to discuss the following. The list below includes discussion topics and action items that could apply to a bleaching warning, alert levels I and II, a mass bleaching, or post bleaching. The committee can decide at each meeting which items apply to the present situation.

USVI Bleaching Subcommittee Members

Leslie Henderson, DPNR
Tyler Smith, UVI (TCRMP)
Marilyn Brandt, UVI (NCRMP)
Jeff Miller, NPS STJ
Nathaniel Hanna Holloway, NPS STX

Potential Agenda Items for Bleaching Subcommittee Meetings

- Discuss and assess the risk for bleaching in the territory based on in-situ water temperatures, time of year that bleaching warning is occurring, any community based observations, and any other pertinent factors. (checking various loggers when available)
- Assess whether extra surveys (in addition to already scheduled TCRMP, NCRMP, NPS, etc) are necessary
- Assess what equipment, budget and personnel are available to help with any extra surveys
- Decide on the appropriate monitoring schedule for any extra surveys (monthly, etc)
- Review agreed upon survey methodology (if applicable) and distribute data sheets, tools, etc
- Confirm selected sites for surveys
- Issue press releases and communication to public, managers and government officials (committee to decide at exactly what point this is most useful)
- Plan next subcommittee meeting based on current situation
- Select one person to coordinate reporting on the data collected during/after the bleaching event (compiling data, summarizing findings, distributing report)
- Discuss event post bleaching and possibly deploy surveyors to check on recovery

Appendix III

Gap areas site list

While the various long-term monitoring programs of the territory are able to accurately capture the presence/absence of bleaching and their effects over all, there are some areas not covered by those efforts that would benefit from additional surveys. These areas are considered "gap areas" or otherwise important, but not already tracked, areas that should be considered for the rapid bleaching survey methodology described in this plan. The bleaching subcommittee would examine this list to determine if and where to mobilize teams. This list might not be exhaustive and should be re-examined at each event to be sure that any new 'gap areas' are included. Ideally local teams of marine professionals contribute people and time to perform the surveys. Funding opportunities or contingency funds still need to be identified.

Site Name	Island	Lat, Long	Depth	Comments/Rationale
Hurricane Hole, specifically Princess, Otter and Water	STJ	18.355451, -64.691947 18.350726, -64.691529 18.348333, -64.690242	surface to 10 m priority	remarkable diversity, possible climate change refuge (but badly damaged by the storms), unique in the Caribbean; recommended by Caroline Rogers
Elkhorn sites in Haulover, Hawksnest, off Turtle Point	STJ	18.348231, -64.677174 18.350309, -64.781362 18.344087, -64.788872	surface to 5 m priority	long-term monitoring used to be conducted in these locations and information is available on bleaching and disease from these sites; Recommended by Caroline Rogers
Leinster Bay	STJ	18.366968, -64.726505		Recommended by Caroline Rogers
Limetree Cove	STJ	18.343627, -64.680461		Specifically the Orbicella areas; east side of haulover bay (south); recommended by Caroline Rogers
Waterlemon Cay	STJ	18.367394, -64.722769	1-15ft	Snorkelable- though sometimes strong currents are present; rationale—high visitation site and potential for outreach; Recommended by NPS/VIIS RM
Trunk Cay	STJ	18.354772, -64.768859	1-15ft	Snorkelable, though sometimes currents are present on the NW side of cay;

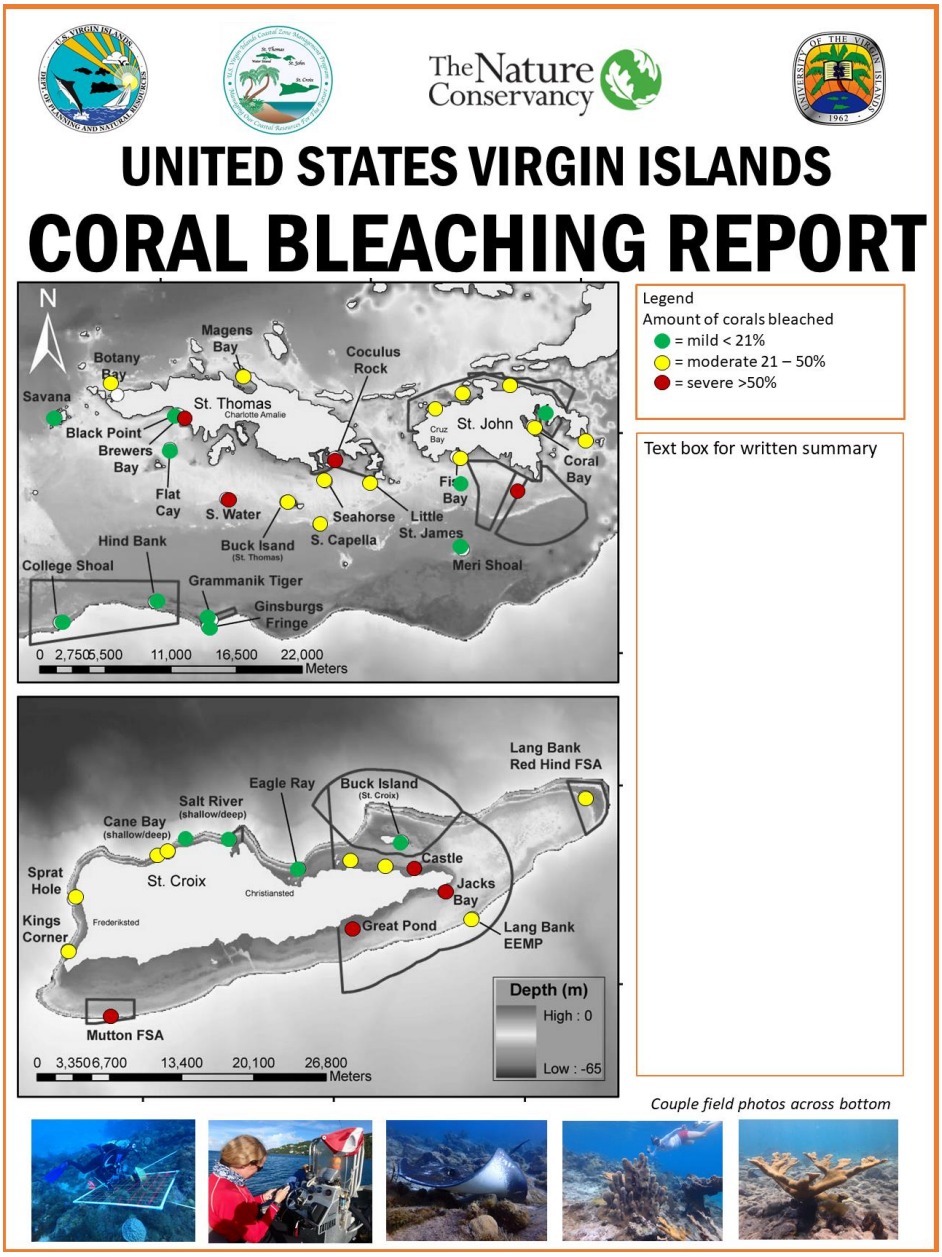
				Rationale: high visitation site and potential for outreach; recommended by NPS/VIIS RM
South Pilsbury	STJ	18.297, -64.793	100ft	Strong current flushing and dense high diversity coral community; recommended by UVI
St. John Mid-shelf Reef	STJ	18.273, -64713	80-100ft	Diverse community; recommended by UVI
Tampo	STJ	18.179, -64.749	100-140ft	Diverse hardbottom community; recommended by UVI
Tamarind Reef	STX	17.761789, -64.671316 17.761389, -64.669911 17.761225, -64.669010	3-20ft	Right offshore from the resort, enter west of breakwater; recommended by EEMP
Black Point	STX	17.762097, -64.648814 17.762600, -64.648645 17.762294, -64.648188 17.762346, -64.647400	0-17	Right off the point and into the western end of Prune Bay; lots of Orbicella; can be rough; recommended by EEMP
Smugglers Cove	STX	17.756409, -64.592205 17.757541, -64.590622 17.757951, -64.590002 17.758395, -64.588733	0-8ft	Eastern side of cove and heading towards Cramers Park; recommended by EEMP
Isaac Bay	STX	17.749716, -64.571530 Canyon at 17.750675, -64.568654	6-15ft	Access with walking trail from Pt. Udall; patch reefs and haystacks in sand matrix; recommended by EEMP
Buck Cut Acropora	STX	17.764826, -64.623697 17.764989, -64.623302	12-25ft	Look for buoy(s). At present only red is in the water. Palmata is on both sides of the cut; barrier reef

				with many palmata; recommended by EEMP
East Side of Green Cay	STX	17.767861, -64.664226 17.765260 -64.665337	0-9ft	All along eastern slope of green cay; OANN, APAL and other spp, kayak or swim accessible; recommended by EEMP
Rod Bay	STX	17.734194, -64.613376 17.731919, -64.615833	0-9ft	East side of Rod Bay, has some prolifera; recommended by EEMP
East End Bay	STX	17.752989, -64.566979	0-5ft	Not totally aware of whats there, very hard access due to rough conditions, need very calm day to access; recommended by EEMP
Turner Hole	STX	17.737331, -64.608043	0-10ft	West side of bay, from resort walk all the way west to last houses; shallow patch reefs in seagrass and sand matrix; recommended by EEMP
BUIS South Fore Reef	STX			recommended by NPS
SARI East Wall	STX			recommended by NPS
SARI West Wall	STX			recommended by NPS
Thatch Cay	STT	18.355, -64.84	0-50ft	Populations of *Acropora* spp.; recommended by UVI
Cow and Calf	STT	18.304, -64.846	0-15ft	Populations of *Acropora* spp.; recommended by UVI
Han Lolick	STT	18.406, -64.903	1-15ft	Populations of *Acropora* spp.; recommended by UVI
Inner Brass Island	STT	18.379, -64.964	1-40ft	Populations of *Acropora* spp.; recommended by UVI
Outer Caret Bay	STT	18.377, -64.983	30-80ft	Strong current flushing and dense high diversity coral community; recommended by UVI
Hendricks Bay	STT	18.367, -64.997	40-60ft	Strong current flushing and dense high diversity coral community; recommended by UVI
Perseverance Bay	STT	18.347, -64.998		High diversity coral community on spur and

				groove reef; recommended by UVI
Stumpy Point	STT	18.368, -65.027	40-100ft	Strong current flushing and dense high diversity coral community; recommended by UVI
South Sail Rock	STT	18.266, -65.106	90-110ft	Dense upper mesophotic *Orbicella* reef; recommended by UVI
St. Thomas Mid-shelf Reef	STT	18.260, -64.972	90-130ft	Diverse community; recommended by UVI
French Cap	STT	18.235, -64.847	80-140ft	Dense upper mesophotic *Orbicella* reef; recommended by UVI
Fortuna Bay	STT	18.343524, -65.019223		Diverse reef community not otherwise monitored; recommended by UVI grad student
Coki Point	STT	18.349308, -64.862742		Diverse reef community not otherwise monitored, contains some *palmata*; recommended by UVI grad student

Appendix IV

Sample Bleaching Report Template



PowerPoint version available in supplemental documents for this plan. Should be edited and updated to add text and appropriate map/pictures.

Appendix V

USVI Bleaching Response Communication Plan

The following chart offers suggestions of how and when to communicate with various groups should a bleaching event occur. The Bleaching Response Subcommittee should work with the CZM education and outreach representative as well as other partner organizations to decide what communication will be best given the current situation.

Group	Method of communication	What to communicate	Responsible Party
Reef Users • Recreational divers (dive shops, dive clubs) • Fishermen • Tourism (hotels, restaurants, airlines)	• Flyers at dive shops, hotels, etc • Email lists • Facebook group posts and shares • BleachWatch community program • Tourism meetings *(have rep on HTA Environmental Committee)* • Engaging fishermen *(engage Fish and Wildlife to help with this)*	• Before: educate about bleaching, ask for observations (short video shared at start of bleaching season) • During: continue to ask for bleaching reports; advise about any additional suggestions based on bleaching (ready to deliver posters to hang on dive boats, at hotels etc.); provide additional BleachWatch trainings sessions • After: encourage participation in any additional surveys; report on severity, extent etc. of the event	BleachWatch Team & Steering committee; CZM E&O representative
Management/Decision Makers • DPNR • Senators • Governor	• Set up or attend already scheduled meetings (Bleaching plan to be announced at first two VICRAG meetings) • Update with progress	• Before: Announce start of bleaching season (email, video short) • During: regular updates of severity and extent; recommend any additional measures/closures; have DPNR or a	Steering Committee; CZM E&O representative

	• Email list • Press release sent through DPNR Commissioner's office	senator stand behind recommendations (like areas to avoid) • <u>After</u>: report/update on mortality/recovery; recommend management/conservation actions based on that	

Colleagues/Partners
• DPNR
  ○ CZM
  ○ F&W
  ○ EEMP
  ○ STEER
• UVI
• TNC
• NPS
• NOAA
• USGS
	• Email list
	• VICRAG meetings (and ask reps to pass word to their groups)
	• Subcommittee meeting at bleaching warning
		• <u>Before</u>: reminder about bleaching season and coral reef watch updates; petition field teams for observations, temperature data etc.
		• <u>During</u>: send out Tier II surveyors; standardize what gets said to press/community
		• <u>After</u>: send out Tier II surveyors/collect data from NCRMP/TCRMP; report on bleaching event; standardize what gets said to community/press
			Steering Committee

Media • Radio • Newspaper (Avis, Daily News, VI Consortium, VI Source, others?) • St. Croix This Week • Facebook Pages (of each group/organization) and	• Canned/generic press releases or Facebook posts ready to go (to be updated at time of release) including 'what you can do', 'bleaching season has begun', 'mass bleaching is happening'…etc	• <u>Before</u>: advertise BleachWatch; article about bleaching in paper/magazines; announce the start of bleaching season (video?) • <u>During</u>: petition for observations; alert the community; announce suggestions on areas to avoid, "what can you do to help" list;	Steering Committee; CZM E&O Rep

other social media (Instagram, etc.) • VI Alert text messaging (if possible)	• Press conferences? • Key Journalists? • Press releases sent through DPNR Commissioners office	advertise additional BleachWatch trainings(s) • <u>After</u>: report on event, publish in papers, magazines, etc.	

Ready-to-go publications

Ideally the following resources are prepared (only needing minor updating) in advance, and ready to be deployed should a bleaching event occur. The Bleaching Response Subcommittee should work together with VICRAG, TNC, and the education and outreach coordinator for CZM to prepare some or all of the following.

- What you can do to help before, during and after a bleaching event (for community/press)
- Bleaching season has started, here's what you should do (for all groups; press release and poster, video?)
- Bleaching warning has been issued, here's what you should do (for all groups; press release and poster)
- Template for reporting on bleaching event (press release version, report for partners, report for community)
- Notice (suggestion) to avoid certain areas due to lots of bleaching
- Poster for dive/snorkel boats advising about bleaching (and what to do if you see it)