Good day! We’re here today to talk about coral reefs, an ecosystem at the heart of the US Virgin Islands culturally, economically and environmentally.

What’s even more exciting is that we’re going to talk about how you can help serve as a protector of local reefs through individual action and citizen science coral reef health reporting. ***\*click\****

**SLIDE 2:** We’ll start with an overview of the importance and benefits of coral reefs, some threats to coral reefs, and some basic coral biology. Then we’ll dive into two major threats that corals face locally and globally: bleaching and disease. We’ll end the presentation detailing how you can help scientists and managers assess local reef health. ***\*click\****

**SLIDE 3:** Let’s get started with talking about just what coral reefs do for us humans. ***\*click\****

**SLIDE**  **4:** Coral reefs are a cultural icon at the heart of the US Virgin Islands. As an ecosystem they support the USVI economy and community. Without them, Virgin Islanders wouldn’t be who they are at their core: self-sustainers and protectors. ***\*click\****

**SLIDE 5:** Besides being important culturally as an icon of the beautiful US Virgin Islands, coral reefs provide functional services and protection to our island home. ***\*click\****

**Upper left:** The hard skeletal structure that corals build provides us with shoreline protection and beach stabilization especially when it comes to high wave energy storm events like hurricanes. Without coral reefs, waves would simply crash on our shorelines, eroding away our beautiful beaches and putting houses and important infrastructure (like hospitals and businesses) at risk. ***\*click\****

**Upper right:** Economically, the USVI and other islands throughout the Caribbean depend on coral reefs to provide livelihoods and revenue through tourism and recreational diving. If there were no beautiful reefs to look at or provide homes for seafood, tourists wouldn’t be as attracted to come dive our reefs, stay in our hotels and eat at our restaurants. ***\*click\****

**Bottom left:** Coral reefs are hotspots of biodiversity, supporting hundreds of thousands of species (including corals, fish, and invertebrates like lobster and conch!). Many species depend on coral reefs for important parts of their life cycle like reproduction, feeding and sheltering. They are truly the rainforests of the sea. ***\*click\****

**Bottom right:** Coral reefs provide humans all over the world with a reliable source of protein (in the form of seafood). Both commercial and recreational fisheries provide income to island communities. If you enjoy eating seafood, you must also love coral reefs.

Additionally, many researchers have investigated several medicinal uses for coral reefs, like compounds used in blood pressure and heart disease medications. There could be a cure out there that we don’t even know of! Yet another reason to preserve coral reef ecosystems. ***\*click\****

**SLIDE 6:** Unfortunately, coral reefs are disappearing every day throughout the Caribbean and around the world. They face a myriad of different threats. ***\*click\****

**SLIDE 7:** Here are some of the main threats to coral reefs today (left to right):

1. **Recreational Pressures**: Corals can be drastically impacted by recreational pressures like boat groundings (see photos), dropping anchors on coral reefs, and SCUBA divers/snorkelers touching or standing on corals. Coastal development also threatens nearshore coral reefs through coastal erosion, local runoff, and increased visitors and use pressure on adjacent reefs.
2. **Hurricanes:** Powerful storms like hurricanes cause big waves and swells, breaking and toppling huge coral colonies. They also cause sand to shift underwater, sometimes smothering entire reefs. If broken off colonies land in sand or seagrass they will likely die. Warming oceans lead to stronger and more frequent storms.
3. **Overfishing:** Certain herbivore species play keystone roles on coral reefs, grazing on algae and keeping reefs in a healthy, balanced state.  In the 70s, the spread of disease caused the wide-spread die-off of long-spined sea urchins causing a spike in the growth of macroalgae on coral reefs.  Additionally, the overfishing of herbivorous fish like parrotfish causes algae growth to be left unchecked and algae will eventually overgrow new and existing corals.
4. **Land-based Pollution:** Rainfall on land carries oil and gas leaks from cars, fertilizers from farms, and even the soap you used to wash your car all the way to the ocean.  Actions on land have indirect impacts on local reefs.  Excessive sediments or nutrients can smother live corals or cause an overgrowth of algae that overtakes reefs.
5. **Climate Change:** Last but not least, the biggest threat to coral reefs hands down is global climate change.  Climate change is an impending doom for coral reef ecosystems causing increased ocean temperatures that lead to more frequent bleaching events, ocean acidification that weakens reef structures, and overall weakens the ability of coral reefs to recover from stress. ***\*click\****

**SLIDE 8:** Because of climate change, bleaching events ***\*click\** *\*click\**** are occurring more frequentlyand at a wider scale.  Additionally ***\*click\*\*click\**,** the prevalence and spread of coral disease is on the rise. ***\*click\****

**SLIDE 9:** In order to understand how these stressors affect corals and coral reef ecosystems, we need to understand exactly how corals function. Let’s take a closer look at what exactly a coral is... ***\*click\****

**SLIDE 10:** So, let’s talk about coral. Corals are colonial animals, actually made up of lots ***\*click\**** of individual***\*click\**** animals***\*click\**** called ***\*click\**** polyps.Coral polyps have tentacles like a sea anemone but they all live connected to each other sharing energy and resources to form a… ***\*click\****

**SLIDE 11: *\*click\**** Colony! The coral head on the left has the polyp tentacles exposed and the colony on the right is what you’ll typically see during the daytime, the tentacles are tucked away, but those are still polyps! During the day most coral species keep their polyp tentacles tucked in for 2 reasons: (1) There’s not as much in the water column for the tiny tentacles to catch and eat and (2) coral polyps gather energy for the colony in another way: through photosynthesis (the process in which plants process sunlight for energy)! ***\*click\****

**SLIDE 12:** Let’s take a closer look at an individual coral polyp and just how these tiny animals can photosynthesize for the entire colony. ***\*click\****

**SLIDE 13:** A polyp is an animal that closely resembles an upside-down jellyfish. The live polyp has a mouth surrounded by tentacles. Those tentacles bring food into the polyp’s stomach and the living tissue that surrounds the polyp is shared amongst all polyps in a colony (or on a coral) which means they share nutrients and an immune system. The polyps all work together to build the skeleton which is what gives the coral it’s shape. Thousands and even millions of corals all growing and building skeletons over time is what gives us the structure that we call coral reefs. ***\*click\****

**SLIDE 14:** Coral reefs are the largest natural structure that can be seen from space. For a simple animal this is very important stuff! Let’s take a closer look at tissue of a polyp… ***\*click\****

**SLIDE 15:** Here you can see a few single coral polyps. These coral polyps are only a few weeks old! Each polyp’s tissue contains microscopic plants called Zooxanthellae (Zoo-zan-thell-ee; rhymes with frozen jelly)!This is how coral polyps photosynthesize during the day, with the help of their plant friends. It’s as if you had lettuce growing under your skin and that lettuce used sunlight to provide you energy. These zooxanthellae are what give the coral its color and during the day they provide up to 80% of the corals energy and nutrients! You can also see that where the zooxanthellae are absent, the coral is clear. Each coral can have a different mix of zooxanthellae types giving them unique colors. ***\*click\****

**SLIDE 16:** This is how the symbiotic relationship between zooxanthellae and coral polyps works. In this case during the day the sunlight provides the ***\*click\**** zooxanthellae with energy to feed the ***\*click\**** coral colony through photosynthesis and at night ***\*click\*,*** the polyps ***\*click\**** which is where the zooxanthellae safely live, they come out and use their tentacles to catch and feed on ***\*click\**** plankton, tiny animals that live in ocean water.

The coral gives the zooxanthellae a place to live and everything they need for photosynthesis. The zooxanthellae give the coral food and energy for the entire coral colony. This creates a symbiotic relationship between the two. Pretty cool stuff for such ”simple” animals. ***\*click\****

**SLIDE 17:** Now that we know all about coral biology and structure, let’s dive into exactly what coral bleaching is and why it’s such a problem. ***\*click\****

**SLIDE 18:** When corals experience stress (in the form of increased temperatures, excess nutrients, disease, etc), they lose their photosynthetic zooxanthellae. Without the zooxanthellae, corals are still alive and can still feed and survive, they are however, (because they are stressed) more vulnerable and will eventually starve to death if stress continues. ***\*click\****

**SLIDE 19:** Here is a close up of what coral bleaching looks like on a brain coral. In the healthy coral, the tissue retains it’s healthy color due to it’s zooxanthellae. At the start of stress, sometimes coral colonies will simply experience paling which is when some, but not all, of the zooxanthellae are expelled. This appears as patchiness or lightness of color. When a coral is bleached, all of the zooxanthellae are expelled and the coral appears bright white because the tissue is now clear and you can see all the way through to the skeleton below. The clear coral polyps are still visible and present (you might just have to look really closely!). Corals can remain bleached and alive for a short period of time, but eventually they will starve to death since they lose up to 80% of their food supply without their zooxanthellae. Once a coral dies, they no longer appear stark white because fuzzy algae quickly colonizes the exposed coral skeleton. A dead coral will have no live polyps or tissue visible. Since corals grow as colonies it is possible for only part of the colony to die and you may see healthy tissue, bleached tissue, and dead coral patches on a single colony. ***\*click\****

**SLIDE 20:** In some of these corals you can still see where the coral has retained the zooxanthellae (grooved brain coral bottom left and great star coral top left). Other corals lose essentially all of their symbiotic algae (lobed star coral, far right) and appear bright white. You can see in the bottom middle picture that the polyp tentacles are still present, meaning the tissue is still on the coral, but the tissue has no color. Also notice how bleaching tends to affect the entire colony at once, or in a bleaching to paling gradient rather than in spots, lesions or patterns (which is often how disease presents itself). In a diseased coral you won’t be able to find live coral polyps on the white, dead coral skeleton. This is an important difference. ***\*click\****

**SLIDE 21:** Bleaching merely removes the pigment from the coral polyps, but the tissue is still there, disease, predation and other causes of mortality kill/remove the actual tissue of the polyp. So if there are still polyps present– it’s bleaching, if there are no polyps, and the coral is bright white, it’s recent mortality. You may have to look verrrrry closely if you wan’t to differentiate the two. ***\*click\****

**SLIDE 22:** So why is coral bleaching a problem? Well, coral bleaching isn’t just happening to one species or on one reef at one location. More and more frequently, our reefs are experiencing mass bleaching events where almost every coral on a reef will bleach and possibly, eventually die, killing entire ecosystems in one fell swoop. Current trends indicate that global, mass bleaching events of entire reefs could be the new normal.

Localized or colony specific bleaching (like in the previous photos) has been recorded for over 100 years, but only in the last couple decades have we seen mass coral bleaching events (when a wide range of species bleach over a large area). The most common cause of mass coral bleaching is elevated water temperatures- even 1 or 2 degrees Celsius. It doesn’t sound like much of a change, but small temperature increases in the human body can cause negative health impacts too. An increase of just 2 degrees Fahrenheit would give you a serious fever of 100.7 degrees Fahrenheit! Recovery after bleaching events can be slow and hindered by other local stressors like pollution, sedimentation, overfishing and coral disease.

Mass bleaching events are not slowing down any time soon, leaving less time in between bleaching events for coral reefs to recover. This is not good news for coral reefs. ***\*click\****

**SLIDE 23:** Speaking of disease, let’s dive into another increasing threat to coral reefs: coral disease. ***\*click\****

**SLIDE 24:** Disease is a natural part of any ecosystem (humans included), so coral disease is not a new threat to coral reefs, but it is definitely a worsening threat that we simply don’t know much about. Coral diseases were first studied in the 19070s and, since then, diseases have wiped out large populations of coral species in the Caribbean. For example, the emergence of White Band Disease in the 1990s elimated more than 90% of branching corals like Elkhorn over a very short time period. The increase in coral diseases since they were initially studied is unprecedented over thousands of years. What we do know is that coral diseases have the ability to dramatically impact reefs and significantly contribute to reef decline.  We also still don’t know much about many diseases and if you notice, most diseases are simply named based on their outward presentation rather than the cause of the disease. ***\*click\****

**SLIDE 25:** Most diseases are characterized by distinct patterns and an obvious margin between live and dead tissue on a coral head.  Additionally, some diseases have a specific color associated with them or an associated microbial band or mat (like in the bottom left photo of Black Band Disease).  Other criteria used to separate disease, since they can often share characteristics, include the shape of lesion(s), any pattern of tissue loss, whether tissue is being lost slowly or rapidly, and what species are affected by the disease.  Sometimes diseases only target one or two species, while other diseases are less species-specific.  The common factor is that all diseases cause some sort of visual abnormality or impairment on a coral, typically resulting in a portion of the coral dying.  Let’s look a little closer at some of the most common diseases we’ve mentioned so far.***\*click\****

**SLIDE 26:** There are over 40 diseases that impact stony corals in the Caribbean. These are just a handful of the disease we have historically observed in the USVI. Here’s a little bit about each one. Let’s see if you can figure out how they got their names… ***\*click\****

* Black Band Disease, has a black band of algae associated with the disease front ***\*click\****
* Red Band Disease, has a… red band of algae/cyanobacteria associated with the disease legion front ***\*click\****
* White Band Disease, you guessed it, has a white band that moves along with the disease progression. White band specifically affects Acroporids. ***\*click\****
* White Plague consists of any form of rapid tissue loss on many different species of corals ***\*click\****
* Dark Spots Disease is common on Siderastraids and shows up as… dark spots. ***\*click\****
* Finally, Yellow Band Disease is a slow-moving disease that presents itself with a pale yellow band at the disease margin. ***\*click\****

**SLIDE 27:** So, what exactly causes outbreaks of these various coral diseases? Well, we know more about some diseases than others.  First, it is most important to note that coral disease is a natural occurrence in coral reef ecosystems.  Diseases can be caused by viral or bacterial pathogens, but the presence of disease can be exacerbated by several stressors. Here are just a few stressors that can cause outbreaks of coral disease. (left to right)

1. **Sedimentation:** Scientific studies have reported a strong correlation between disease and environmental factors, including high levels of disease and faster spread of disease in areas affected by nutrients, sediments and other pollutants. Pre-existing bacteria often reside in sediment layers on the seafloor. Large vessels and strong storms can disrupt sediment layers, introducing new or high levels of existing bacteria that cause coral disease.
2. **Human Activities:** Dredging, contamination by moving vessels exchange ballast water, and runoff from changes in land use can throw coral ecosystems out of balance and cause surges in disease.
3. **Overfishing:** Overfishing can disrupt coral reef ecosystems and cause unbalanced levels of algae, bacteria, coral and fish, putting corals at risk of contracting disease.
4. **Land-based Pollution:** Runoff of toxic chemicals and pollutants can have devastating impacts on coral reefs, threatening corals’ immune systems, making them more vulnerable to disease.
5. **Climate Change:** Increasing ocean temperatures cause corals to bleach, threatening their immune systems and making them more susceptible to disease. Generally speaking, disease prevalence and severity is greater during periods of warm water, and recent disease outbreaks have been associated with mass bleaching events.***\*click\****

**SLIDE 28:** There is one pressing coral disease epidemic that is ravaging Caribbean coral reefs, Stony Coral Tissue Loss Disease (SCTLD). Let’s talk more about this disease. ***\*click\****

**SLIDE 29:** Stony Coral Tissue Loss Disease (SCTLD) was first observed in Southeast Florida in 2014 and has since spread throughout the Florida Reef Tract and has shown up on reefs throughout the northern Caribbean, including Jamaica, Mexico, Turks and Caicos and the Dominican Republic.  SCTLD was first confirmed in St. Thomas in the US Virgin Islands in January of 2019, and since then, has progressed around the entire island of St. Thomas and extended into Culebra, PR and parts of St. John and the British Virgin Islands. The disease most recently appeared on St. Croix in May of 2020.  The rapid spread and high mortality of SCLTD make it a particularly worrisome outbreak of coral disease. ***\*click\****

**SLIDE 30: *\*Click play on video\**** This is what SCTLD does to coral reefs. This video was taken shortly after the initial observation of Stony Coral Tissue Loss Disease in St. Thomas, USVI in January 2019. The appearance of this disease shocked local marine scientists because of the apparent rapid speed and widespread reef impact this disease showed. Everywhere you see white in this video is recent death. It had only been 1 month since divers had visited this site and in that 1 month, rapid mortality of a wide variety of coral species had occurred, as seen in this video. ***\*click\****

**SLIDE 31:** Stony Coral Tissue Loss Disease (SCTLD) is more dangerous than historical disease outbreaks because of the large number of species it impacts, the rapidness of tissue loss, the long presence and widespread range of the disease and the high mortality rate of corals after infection.  SCTLD affects 26 species of hard corals (remember we only have about 40 species total in the USVI).  SCTLD presents itself as fast moving, often multiple, lesions (areas where the coral tissue is literally rotting and falling off the skeleton).  This disease has been shown to be highly transmissible through water and experts have seen a greater than 90% mortality rate for infected corals meaning once corals get SCLTD they, more often than not, die completely. ***\*click\****

**SLIDE 32:** Unlike bleaching, SCTLD causes rapid tissue loss on coral colonies.  Bleaching and tissue loss can be difficult to tell apart even with the most expert eye.  Sometimes, bleaching may even come first and then be followed by tissue loss, which is why researchers often conduct repeat surveys if a reef looks at risk.  The main difference between bleaching and tissue loss, like we discussed before, is the presence versus absence of live tissue.  A bleached or paling coral will still have a layer of live tissue covering its skeleton, but the tissue will be clear or translucent.  A coral with disease or tissue loss often has a leading edge of tissue loss; prior to that leading edge there will be exposed coral skeleton with no live tissue.  Often algae will start to overgrow the exposed dead tissue, changing it from bright white to fuzzy green or brown in a matter of days.  If stressful conditions that cause the bleaching or disease subside a coral can recover from bleaching, but it does not recover from tissue loss. ***\*click\****

**SLIDE 33:** Because bleaching and disease are frequent threats to coral reefs, researchers and managers have come up with innovative ways to track and monitor these wide-ranging impacts. ***\*click\****

**SLIDE 34:** In today’s world of technology, we can start monitoring for coral bleaching without even getting in the water. Coral Reef Watch is a website that uses satellite imagery and temperature readings to create maps showing the potential for coral bleaching. Once the conditions become warm enough to trigger a bleaching warning, the territorial bleaching response plan starts putting the wheels in motion to be ready for a mass bleaching event. There is a committee of scientists and reef managers that meet to discuss the next steps. ***\*click\****

**SLIDE 35:** Coral reef watch also predicts what sort of conditions we will have over the next few months. This image from September 2018 shows the USVI is not predicted to go above a bleaching watch level, but we still need to be prepared. Droughts, storms and other weather patterns can affect our potential for bleaching events. In 2017, we reached a bleaching warning in September, but wind, rain and cloud coverage from an active hurricane season caused the water temperatures to drop enough to avoid bleaching alerts for the rest of the season. Unfortunately, the two category 5 hurricanes that hit the USVI that season and cooled water temperatures also caused significant physical damage to shallow coral reefs from huge waves, increased sediment runoff, marine debris, and sunken boats. ***\*click\****

**SLIDE 36:**  The recent appearance of Stony Coral Tissue Loss Disease (SCTLD) in the USVI caused coral experts to jump into action through the creation of the Virgin Islands Coral Disease Advisory Committee.  This group includes local, regional, and national coral scientists and managers from government, academic, and non-profit organizations.  The VI CDAC has teams focused on Epidemiology and Research into the causes of SCTLD, Data Management, Communications and education with the public, Coral Restoration in the face of SCTLD, and in order to facilitate tracking and intervention of SCTLD, the Strike Teams. ***\*click\** *\*click\****

**SLIDE 37:** There are Strike Teams on all three main islands in the USVI.  Strike Teams are composed of professional and volunteer divers who conduct in-depth surveys of reefs to gather data on the disease spread and areas where treatment or intervention are appropriate. Current interventions for corals impacted by SCTLD include treatment with antibiotics, amputating diseased portions of corals or culling/removing entire diseased coral colonies if they are small enough. ***\*click\****

**SLIDE 38:** Data gathered by the SCTLD Strike Teams is incorporated into a Coral Health Tracking map showing where Strike Team surveys have been completed, what interventions have been completed and where and even when and where citizen science reports have been completed (we’ll go more into detail later about how you can have your observation put on the map!).***\*click\****

**SLIDE 39:** So with all of this negative news for coral reefs, what can you do to help the situation.  The answer ranges from small every day behavior changes, to contributing to science and coral health tracking, to supporting political changes that enhance environmental protections. ***\*click\****

**SLIDE 40:** The main threat to coral reefs, and something that impacts coral bleaching and disease, is climate change.  So firstly, in order to help you can take personal actions to fight climate change:  reduce your own carbon footprint, vote for leaders that will make climate-minded decisions, support local and organic agriculture and consume less carbon-emitting meat like beef.   You can also help coral reefs in your own backyard by reducing local stress on reefs.  This can be done by reducing runoff pollution, planting trees and mangroves, avoiding fertilizers and pesticides, ensuring your vehicle doesn’t have oil or gas leaks, and supporting the managed development of coastal areas with watersheds in mind.  Personally, you can also reduce point source pollution by refusing single use plastics that often end up on our shorelines and, reuse items like jars and bags as much as possible.  You should also choose locally-caught sustainable seafood (look for the Reef Responsible logo at participating restaurants!) and be sure you are a responsible boater and/or snorkeler/diver- never touch corals or drop anchor on the reef.

Finally, you can donate your time and volunteer to help!  Participate or host your own beach clean up to make a visible difference, find a local group doing mangrove or coral restoration and volunteer with them to actively build back our ecosystems, and also lend your eyes on the reef to send managers and researchers reports about the underwater world. ***\*click\****

**SLIDE 41:** We need your eyes on the reef!  Coral researchers can’t be everywhere at once and we’re lucky here in the USVI to have miles of coral ecosystems to explore.  Whenever you’re in the water pay close attention to the appearance of the surrounding corals and report what you see!  You can submit reports of weird or unhealthy corals, or pristine, breathtaking reefs to vicoraldisease.org!  After your report is submitted the VI CDAC team will review any details or pictures attached and if they agree that something is not right about the area, they’ll send a team out to double check.  You never know- your observation could be the first sighting of disease or bleaching in an area! ***\*click\****

**SLIDE 42:** Here, we’ll walk you through the website; it’s easy and user friendly. On your computer or smartphone, go to vicoraldisease.org and click on “Report Sightings” in the upper right corner. ***\*click\****

**SLIDE 43:**  This is what your coral health report will look like.  Be sure to enter the information completely and attach any pictures if you can- those often help a lot! Once you’ve filled in details about your dive or snorkel and answered two simple questions, you’ll click “Submit” at the bottom. Then your report is officially submitted and a member of the VI-CDAC will get back to you to follow up on your report if anything looks suspicious. Your report will also go to the Coral Reef Health Tracking Map- explore the vicoraldisease.org website for more information! ***\*click\****

**SLIDE 44:** This is an extra section if your group would like to conduct a more detailed coral reef health survey in order to practice field data gathering skills. ***\*click\****

**SLIDE 45:** Gathering data in the field requires an ability to multitask and be very aware of your surroundings. You can conduct these surveys on SCUBA or snorkeling. If you’re new to the underwater data gathering practice it may be helpful to conduct a survey as a buddy pair with one person pointing out unhealthy corals and another person writing down information on the data sheet. ***\*click\****

**SLIDE 46:** Here’s what you’ll need if you want to conduct a Reef Health Report Field Survey. The methods are basic: make sure you complete the information at the top of your data sheet before you get in the water and be sure you can complete at least a 20 minute snorkel or dive. Let’s take a closer look at the data sheet you’ll be using. ***\*click\****

**SLIDE 47:** The Coral Reef Health Report data sheet contains all the information you’ll need to collect in order to submit a complete Coral Reef Health Report to the vicoraldisease.org website. In addition to filling out your name, the date of your survey and the location, you’ll also need to be able to identify some basic coral species. Pictures have been provided to make your survey even easier. As you swim along you will tally any healthy or unhealthy coral colonies of each species that you see. At the end of your survey answer two basic questions about the overall health and appearance of the site you surveyed. Afterwards, submit your report like normal on the vicoraldisease.org website! Simply include your species specific tallies in the “Note on Observations” section of the Report form. ***\*click\****

**SLIDE 48:** Let’s review just what you should be looking for as you gather more detailed data during your Coral Reef Health Report Field Survey. When you look for bleaching you should see that coral tissue is still present even if it lacks color and the polyps are clear/translucent. Also, bleaching usually occurs during or following the warm-weather months (think September to January). Remember, bleaching can be a response to warm water temperatures or a response to illness or injury so your observation of bleaching could be an indication of an even sicker coral. ***\*click\****

**SLIDE 49:** You may also see some corals with common indications of coral diseases or predation due to worms or snails.  Common coral diseases have a consistent (or smooth lined) disease margin.  Remember also that some coral diseases present themselves as an area of discoloration: think yellow bank and black band.  You also may notice that coral disease often moves from the base of the colony upwards rather than as an isolated spot in the middle of the coral colony, like in the bottom left picture of white plague (although there are of course exceptions to this rule).  When you’re observing predation, you may often see an irregular border of tissue loss where a snail has crawled along and eaten the live coral polyps like in the upper right picture.  Sometimes if you look even closer you may even find a snail nearby! ***\*click\* \*click\****The corallivorous snails have a yellow foot or body if you flip them over. ***\*click\**** In the bottom left hand picture you can see that fireworms typically consume staghorn coral from the tips down so a large portion of white on the tips of Staghorn or other corals could be an indication of fireworm predation. ***\*click\* \*click\****Another common predator that can cause a coral to deteriorate or bleach is the clinoid sponge.  These orange sponges, seen in the bottom middle picture, erode away at corals from the inside out.  You may see their orange siphons sticking out of a coral.   Don’t forget even parrotfish can much on corals!  When you see stark white bites out of a coral colony like the photo in the top middle here, this is often evidence of parrotfish predation.  ***\*click\****

**SLIDE 50:** Finally, when you’re looking for unhealthy corals be sure to stay aware of symptoms of SCTLD on a reef. Stony Coral Tissue Loss Disease typically affects maze, pillar or brain corals first. If you see lots of unhealthy individuals of these species you should absolutely be sure to include this in your report. Remember, SCTLD presents itself as rapid tissue loss in multiple spots on a colony. If you see a reef with multiple lesions, take photos and/or include this information in your Coral Health Report. ***\*click\****

**SLIDE 51:** Don’t forget we want your reports of healthy reefs too!  This helps researchers and managers determine where the frontline of the disease is and where areas of resilience or refuge are.  These reports could be essential to the preservation and restoration of coral reef ecosystems and all that they provide.