

## Coral Disease Decontamination Protocol

### **Reduce the spread of disease by cleaning and decontaminating dive gear**

Neoprene gear, such as wetsuits, booties, and gloves, and the internal bladder of buoyancy compensation devices (BCDs) can harbor and proliferate pathogenic bacteria and other microorganisms by remaining damp and trapping water. These pathogens can also adhere to other dive and snorkel gear, especially when the diver directly contacts the bottom and touches corals and other benthic organisms. Pathogens on dive gear may survive for extended periods and can be transferred among reefs on subsequent dives, and, potentially, transmitted to reefs internationally, unless your gear is disinfected.

Dive and snorkel gear can contribute to the overall transmission of pathogenic bacteria among reefs. Just like handwashing is a common practice to prevent the spread of disease among humans, disinfecting gear and following other best practices is recommended to prevent the accidental transmission of coral disease between reefs. Divers and snorkelers can reduce their likelihood of encountering and transferring pathogenic bacteria through proper buoyancy and by avoiding touching marine organisms. As a precautionary approach, they can further minimize transmission of pathogens by sanitizing dive equipment between dives and before and after each dive excursion, especially when travelling between countries or between infected and uninfected locations.

Ammonium-based disinfectants and chlorine bleach are effective antiseptics that minimize the spread of disease-causing pathogens from infected reefs and corals to uninfected sites. However, proper use and technique are necessary to properly sanitize gear and avoid harming equipment. Freshwater washing alone will not eliminate pathogens.

#### ***General Guidelines for Disinfection***

- All divers should decontaminate dive gear at the end of the day.
- Divers should inspect all dive gear and equipment carefully and remove any debris, such as seagrass, algae and sediment, following each dive.
- Divers should sanitize all gear between dives at sites with a high prevalence of disease, especially if subsequently moving to an uninfected site, and if coming into close contact with diseased corals or the bottom. The preferred option is to dive the “cleanest” site first and move to the “dirtiest” site last.
- Gear should be decontaminated between dive sites separated by large distances (>10 km), and in sensitive areas.
- Gear should be decontaminated when travelling between countries.
- To minimize spillage on dive platforms and ocean contamination, quaternary ammonium solutions should only be used to decontaminate dive gear when returning to shore. Sanitization between dives should involve a bleach solution kept in a sealed container to disinfect equipment that makes contact with corals (transect tapes, gloves, tools), and other gear should be washed in freshwater containing an antibacterial soap.
- Properly dispose of disinfectant solutions and rinse water in a sink, tub or shower. Never pour into the ocean or a storm drain. Quaternary ammonium wastewaters should not be drained through septic systems because of the potential for system upset and subsequent leakage into groundwater.

#### ***Gear-Specific Guidelines for Disinfection***

Tools, collection bags, sampling gear, transect tapes, clipboards, underwater slates, weight belts and other equipment that comes in contact with the bottom should be decontaminated using diluted chlorine bleach. Bleach is extremely corrosive to metals and should not be used to decontaminate regulators or neoprene wet suits as it can compromise the integrity of polymers such as neoprene and silicone rubber components in regulators. Bleach should never be mixed with ammonia-based solutions. Bleach rapidly degrades and must be used immediately after mixing; it should be changed daily.

- After each dive, soak non-sensitive equipment and tools for 10 minutes in a 10% bleach solution (1 qt. bleach/2 gal. water prepared in a 5-gallon bucket with a lid).

- Rinse with fresh water, air dry.

Wetsuits, Buoyancy Compensation Devices (BCDs), masks and fins should be decontaminated using quaternary ammonium disinfectants such as Virkon S<sup>1</sup>, RelyOn<sup>1</sup> and Lysol<sup>1</sup> All Purpose Cleaner. These are broad spectrum disinfectants and are effective for treating bacteria, viruses, fungi, larval mollusks and other microorganisms.

- After each dive, soak dive gear for 10 minutes in one of the following: 0.5% RelyOn (four 5 g. tablets/1 gal. water), 1% Virkon S (1.3 oz./2 gal. water), 6.6% Lysol (1 qt./1 gal. water), or an equal concentration of another quaternary ammonium disinfectant.
- Remove from disinfecting solution, soak in fresh water for 10 minutes, and allow to air dry.
- Particular attention needs to focus on decontaminating wetsuits and the internal bladders of BCs because of their ability to trap water that can house transmissible pathogens. Pour approximately ½ liter solution into the mouthpiece of the BC's exhaust hose while depressing the exhaust button, inflate the BC, and gently rotate the BCD in all directions to ensure the solution has reached all of the internal parts. Allow the BCD to sit for 10 minutes, and then immediately dump the solution into a container for proper disposal on land. Flush the BCD two times with fresh water.

Regulators, computers, gauges, underwater cameras and other sensitive scientific equipment should be decontaminated using fresh water with antibacterial dish soap or an isopropyl alcohol wipe and let dry.

- Prepare a solution of warm water and antibacterial dish soap or OdoBan<sup>1</sup> (5 oz./gal.). After each dive, soak regulators and other sensitive equipment for 20 minutes, rinse in fresh water and allow to dry.
- Additionally/alternatively, equipment can be wiped down with isopropyl alcohol. Be sure to wipe any small areas where water might accumulate.

<sup>1</sup> *This protocol does not endorse, recommend, or favor any specific commercial product, process, or service, or the use of any trade, firm or corporation name and is provided only to inform the public. Safety data sheets (SDS) for chemicals and user's manuals for equipment developed by product manufacturers provide critical information on the physical properties, reactivity, potential health hazards, storage, disposal, and appropriate first aid procedures for handling, application, and disposing of each product in a safe manner. Familiarization with the SDS for chemical products, and manufacturer's product care and use standards, will help to ensure appropriate use of these materials and safeguard human health.*

Adapted from:

**AMLC Disease Workshop 2017: Disinfection Recommendations for Sampling & Dive Gear**

**US Geological Survey (USGS) dive gear disinfection protocols 2017**

**Jonas et al. 2017. Dive equipment as a vector of bacteria associated with coral disease**

**Disease and introduced species prevention protocol for permitted activities in the marine environment  
Papahāumokuākea Marine National Monument**

**Biosecurity in aquaculture, Part 1: An overview** SRAC Publication No. 4707 2012

**National White-Nose Syndrome Decontamination Protocol - Version 09.13.2018**