

Standard Operating Procedure (SOP) #3

Safety Protocol

Version 3.00 (August 22, 2019)

Change History

New Version #	Revision Date	Author	Changes Made	Reasons for Change	Previous Version #
2.00	6/30/2007	Eric Brown	See Track Changes	Response to reviewer's comments	1.00
2.01	7/20/07	Larry Basch	See Track Changes	Additions, corrections	2.00
3.00	8/22/2019	Kelly Kozar	Updated hyperlinks	Hyperlinks out of date and no longer functioning.	2.01

Only changes in this specific SOP will be logged here. Version numbers increase incrementally by hundredths (e.g., version 1.01, version 1.02) for minor changes. Major revisions should be designated with the next whole number (e.g., version 2.0, 3.0, 4.0). Record the previous version number, date of revision, author of the revision, changes made, and reason for the change along with the new version number.

Purpose

This SOP explains the safety protocol for the Benthic Marine Community Vital Sign Monitoring Protocol and associated Standard Operating Procedures (SOPs) for the Pacific Island Network. This document outlines safety considerations for conducting various aspects of the protocol. All personnel should be familiar with this SOP in order to identify and use the most current procedures and ensure optimum safety.

A master equipment list for the entire Benthic Marine Community Vital Sign Monitoring Protocol can be found in Appendix SOP 1.a of SOP #1 Before the Field Season. The master equipment list should be updated simultaneously if any SOP requiring an equipment list is revised.

General Preparation and Review

Prior to the field season each year, usually beginning in early spring, all observers should review this entire protocol, including SOPs, and recommended references. In particular, all participants should be thoroughly familiar with the NPS Occupational Safety and Health Policies, scuba and watercraft manuals, various environmental and chemical safety guidelines, procedures outlined in SOP #2 Training Observers, as well as the various equipment lists and local biota guides listed in SOP #6 Pre-Dive Equipment Preparation. The USGS National Field Manual (<http://water.usgs.gov/owq/FieldManual/Chap9/content.html> [last accessed 22 August 2019]) is another recommended reference for safety procedures. Table SOP 3.1 provides a partial list of reference materials and websites with information on specific safety topics.

Table SOP 3.1. List of documents and websites for safety requirements and guidelines related to conducting the benthic marine monitoring protocol.

Safety Topic	Guidance	Website (if applicable)
Safety policies, regulations and requirements; training and guidelines	NPS Reference Manual #50B Occupational Safety and Health Program	https://www.nps.gov/policy/RM50Bdoclist.htm (last accessed 22 August 2019)
	DOI NPS SafetyNet	https://www.smis.doi.gov/safetynet/ (last accessed 22 August 2019)
	USGS National Field Manual Section 9.1	https://water.usgs.gov/owq/FieldManual/Chap9/chap9.pdf (last accessed 22 August 2019)
	29 CFR, Part 1960, "Elements for Federal Employee Occupational Safety and Health Programs," Subpart C	https://www.safety.af.mil/Portals/71/documents/Occupational/ (last accessed 22 August 2019)
	Departmental Manual (DM), Part 485, "Safety and Health Handbook," Chapter 4	
Safety training guidelines	DOI NPS SafetyNet	https://www.smis.doi.gov/safetynet/training/index.html (last accessed 22 August 2019)
	DOI Office of Occupational Health and Safety	https://www.doi.gov/pmb/osh (last accessed 22 August 2019)
	29 CFR, Part 1960, "Elements for Federal Employee Occupational Safety and Health Programs," Subpart H	https://www.safety.af.mil/Portals/71/documents/Occupational/ (last accessed 22 August 2019)
	Departmental Manual (DM), Part 485, "Safety and Health Handbook," Chapter 13	
Scuba safety	NPS Reference Manual 4 Diving Management	https://www.nps.gov/policy/DOrders/RM-4_6-2014.pdf (last accessed 22 August 2019)
	Scuba certification materials (PADI, NAUI, SSI, YMCA)	
Boating safety	NPS Reference Manual 50B, Section 9.0 Watercraft Safety	https://www.nps.gov/policy/RM50Bsection9.pdf (last accessed 22 August 2019)
	DOI Motorboat Operator Certification Course (MOCC) manual	
Transportation	NPS Reference Manual 50B, Section 6.0 Motor Vehicles	https://www.nps.gov/policy/RM50Bsection6.pdf (last accessed 22 August 2019)
	USGS National Field Manual Section 9.3	https://water.usgs.gov/owq/FieldManual/Chap9/chap9.pdf (last accessed 22 August 2019)

Safety Topic	Guidance	Website (if applicable)
	State, Territory, and Commonwealth traffic laws	
Inclement weather and water activities	USGS National Field Manual Section 9.8	https://water.usgs.gov/owq/FieldManual/Chap9/chap9.pdf (last accessed 22 August 2019)
	National Weather Service	https://www.weather.gov/wrh/ (last accessed 22 August 2019)
Environmental conditions	USGS National Field Manual Section 9.8	https://water.usgs.gov/owq/FieldManual/Chap9/chap9.pdf (last accessed 22 August 2019)
	2011. OSHA. CDC. NIOSH. Protecting Workers from Heat Illness	https://www.cdc.gov/niosh/docs/2011-174/pdfs/2011-174.pdf?id=10.26616/NIOSH PUB2011174 (last accessed 22 August 2019)
Chemical handling and storage	USGS National Field Manual Section 9.6	https://water.usgs.gov/owq/FieldManual/Chap9/chap9.pdf (last accessed 22 August 2019)
	MSDS file, right to know, for specific chemicals	
Contaminated water	NPS Reference Manual 83A4 Bathing Beaches	https://www.nps.gov/policy/DOrders/RM-83A_2-16-2018.pdf (last accessed 22 August 2019)
	NPS Reference Manual 83A4 Recreational Waters	https://www.nps.gov/policy/DOrders/RM-83A_2-16-2018.pdf (last accessed 22 August 2019)
	USGS National Field Manual Section 9.7	https://water.usgs.gov/owq/FieldManual/Chap9/chap9.pdf (last accessed 22 August 2019)
	EPA	https://www.epa.gov/beaches (last accessed 22 August 2019)
Animals and disease vectors	NPS Reference Manual 83A6 Vectorborne and Zoonotic Diseases	https://www.nps.gov/policy/DOrders/RM-83A_2-16-2018.pdf (last accessed 22 August 2019)
	USGS National Field Manual Section 9.9	https://water.usgs.gov/owq/FieldManual/Chap9/chap9.pdf (last accessed 22 August 2019)
	Local biota lists located in SOP #6 Pre-Dive Equipment Preparation	

Safety is “the condition of averting or not causing injury, danger, or loss” (Lane and Fay 1997). As a Federal employee, partner, or cooperator, you are required to know and follow safety policies and requirements documented in Reference Manual 50 B Occupational Safety and Health Program (<https://www.nps.gov/policy/RM50Bdoclist.htm> [last accessed 22 August 2019]). For divers and boat operators, Reference Manual 4 Diving Management (RM-4 located at https://www.nps.gov/policy/DOrders/RM-4_6-2014.pdf [last accessed 22 August 2019]) and Reference Manual 9 Watercraft Safety (<https://www.nps.gov/policy/RM50Bsection9.pdf> [last accessed 22 August 2019]) should be followed accordingly. In addition, individual parks also have park-specific safety procedures, dive manuals, and operational protocols. This SOP recommends that all these available reference materials be used to address the topics below.

Safety Policies, Regulations and Requirements

All individuals participating in activities related to this Vital Sign must adhere to applicable safety policies, regulations, and requirements outlined in RM 50 B Occupational Safety and Health Program. This includes both field and office activities and applies equally to NPS staff, cooperators, partners, volunteers, and others. The applicable policies, regulations, and requirements of each participating agency should be compiled and reviewed before the field season as part of this SOP. Ensure that all field personnel obtain First Aid, CPR, and Oxygen administration training. This is also highly recommended for office personnel. Supervisors should ensure that all field staff are well trained in the safety guidelines and policies outlined below.

Scuba Diving

Unique safety hazards of using scuba are detailed in RM-4 (https://www.nps.gov/policy/DOrders/RM-4_6-2014.pdf [last accessed 22 August 2019]). Each diver must adhere to the guidelines required by the NPS Diving program and follow the safety requirements specific to each park. Park-specific Diving Safety Manuals are on file at each park and should also be made available and reviewed before field work. All scuba is conducted at the discretion of the Park Dive Officer (PDO), who has final approval of all scuba activity within his/her park. The PDO should be consulted prior to the start of field activities for assistance with park-specific requirements or safety issues. Recommended maintenance procedures for scuba equipment can also be found in RM-4 and SOP #6 Pre-Dive Equipment Preparation.

Transportation

Safety considerations for vehicles used to reach sampling sites should be reviewed for each park and field location. It is very important to inspect the vehicle before going into the field. Ensure that safety equipment required for the scheduled activity is stowed securely in the vehicle. During driving to and from sampling areas, it is particularly important to consider issues such as night-time driving, fatigue, storms, road flooding, driving in unfamiliar areas, and remote areas where large animals may be crossing the road. Additional details regarding transportation safety procedures and policies are listed in NPS Reference Manual 50B Section 6.0 Motor Vehicles (<https://www.nps.gov/policy/RM50Bsection6.pdf> [last accessed 22 August 2019]) and the USGS National Field Manual Section 9.3 (<https://water.usgs.gov/owq/FieldManual/Chap9/chap9.pdf> [last accessed 22 August 2019]).

In some cases, this protocol may require the transportation of a trailered vessel. Vehicles towing boat trailers should only be operated by individuals who have completed the DOI Motorboat Operator Certification Course (MOCC). All small boat operations must be conducted by DOI MOCC certified operators and must follow the operational and safety guidelines detailed in the NPS Reference Manual 9 “Watercraft Safety” (<https://www.nps.gov/policy/RM50Bsection9.pdf> [last accessed 22 August 2019]) in addition to any park-specific guidelines. In some cases, approval to operate motorboats may be granted to individuals holding comparable or greater certifications (e.g., U.S. Coast Guard Captain’s License), but this is at the discretion of the park safety officer and/or Park Diving Officer (PDO).

Weather and Sea Conditions

Sampling during inclement weather and sea conditions are of particular concern in the marine environment. Weather can change rapidly on the ocean, creating hazardous conditions in a relatively short time period. Prior to departure, it is the responsibility of all personnel to be aware of the local weather, tide, and current forecasts for the day and to decide whether or not it is safe for sampling to commence. Consult the USGS National Field Manual Section 9.8 (<https://water.usgs.gov/owq/FieldManual/Chap9/chap9.pdf> [last accessed 22 August 2019]) for more weather related safety considerations. Also review Reference Manual 9 “Watercraft Safety” (<https://www.nps.gov/policy/RM50Bsection9.pdf> [last accessed 22 August 2019]), Reference Manual 4 “Diving Management” (https://www.nps.gov/policy/DOrders/RM-4_6-2014.pdf [last accessed 22 August 2019]), and local sources for additional information regarding inclement weather or adverse sea conditions.

Sampling should be conducted during periods of calm winds and no or small ocean swell. If thunder is heard or lightning seen, sampling will be suspended and personnel should return to shore for at least 30 minutes. Do not stay in or on the water during a lightning storm. During intense rainfall events, visibility may drop and appropriate precautions should be taken to ensure that the boat does not ground. At any point during sampling, any personnel involved have the right and responsibility to abort a sampling trip if hazardous or potentially hazardous conditions are perceived.

Environmental Conditions

Individual parks have occupant emergency plans which cover safety procedures for medical emergencies, earthquakes, floods, fires, Tsunamis, and bomb threats. Be familiar with the procedures and emergency contact numbers of your duty station park as well as other parks you may visit during field sampling activities. Overall, be aware of your environment, use common sense, do not exceed your limits (for example, operation of equipment; lifting heavy objects and equipment; physical tolerance to exertion, heat, and cold), and trust your instincts (Lane and Fay 1997). The USGS National Field Manual Section 9.8 (<https://water.usgs.gov/owq/FieldManual/Chap9/chap9.pdf> [last accessed 22 August 2019]) covers environmental hazards in more detail.

The marine environment presents additional unique environmental hazards. Strong currents and ocean swell can present physically challenging and dangerous conditions. Extended hours in the water breathing compressed gas can cause hypothermia and dehydration, which increase the likelihood of Decompression Sickness (DCS). Open boats expose crews to intense tropical sunlight, wind, and rain.

Chemical and Material Safety Considerations

All chemicals should be handled and stored according to the recommendations found in the specific Material Safety and Data Sheet (MSDS) provided by the chemical supplier. All persons using or exposed to hazardous substances must be fully informed of the properties and potential hazards of the material in use as well as proper handling and disposal procedures. Park staff should always be consulted about local considerations when handling any chemicals of concern. Other chemical handling procedures can be found in the USGS National Field Manual Section 9.6 (<https://water.usgs.gov/owq/FieldManual/Chap9/chap9.pdf> [last accessed 22 August 2019]).

Contaminated Water

Waterborne pathogens that may survive or be transmitted in seawater include Enterococci and Staphylococci bacteria. Never consume seawater. Marine areas being sampled may be contaminated with pathogens or harmful chemicals, although this situation is rare in the PACN. Water quality issues in the PACN are outlined in the PACN Monitoring Plan Appendix I: Water Quality Report. When working with water that is known to be contaminated, use extra precautions such as not eating or drinking while sampling. In particular, keep hands away from nose, ears and mouth and wash hands thoroughly before eating. If no soap and water are available, use of an antibacterial hand cleanser is highly recommended. Consult NPS Reference Manual 83A4 Bathing Beaches https://www.nps.gov/policy/DOrders/RM-83A_2-16-2018.pdf (last accessed 22 August 2019) and the USGS National Field Manual Section 9.7 (<https://water.usgs.gov/owq/FieldManual/Chap9/chap9.pdf> [last accessed 22 August 2019]) for complete recommended safety procedures concerning contaminated water.

Animal Hazards and Disease Vectors

Any open cut has a high likelihood of becoming infected and all cuts should be carefully and immediately tended and monitored. Corals can scrape or cut and care should be taken to avoid contact with the bottom. Hazardous marine life, including jellyfish, scorpion fish, cone snails, and large fish, can sting or bite, and some of these conditions can be life threatening (Thomas & Scott 1997). Appropriate first aid should be administered and professional medical attention sought if necessary. Contacts for local emergency medical facilities are listed in individual park dive plans. It is the responsibility of all personnel to be familiar with the local hazardous marine life and to understand the appropriate treatment methods. Recommended reference material covering the biota for each region can be found in SOP #6 Pre-Dive Equipment Preparation.

Field Trip Preparations and Emergency Contacts

Basic planning is required before each field sampling event. A large component of the planning effort involves gathering safety information and documenting all aspects of field sampling trip plans in advance. All field personnel should complete an Emergency Contact Form (Appendix SOP 3.a) and a Medical Information Form (Appendix SOP 3.b) prior to conducting field work. A trip plan (including a dive plan, as required by RM-4) must be completed. One copy should be left at the office, and additional copies should be given to the park safety officer and field personnel involved in the trip. Updated weather and marine forecasts should be obtained prior to departure. Upon completion of the field work it is imperative that personnel check in with the park safety officer, PDO, or other designated contact person(s) at the specified time noted on the dive plan. For details, please see SOP #2 Training Observers.

It is the responsibility of all personnel to ensure that the appropriate safety equipment is present and in working condition. Examples of safety equipment checklists are provided below (Appendix SOP 3.c) and in SOP #6 Pre-Dive Equipment Preparation. These lists should be customized according to the specific field conditions, tasks, and the needs of personnel. Additional safety equipment may be required at some parks, and the park safety officer and PDO must be consulted prior to commencing field sampling activities. No sampling activities will be conducted without all necessary safety equipment present and in proper working condition.

Literature Cited

Lane, S.L., and R.G. Fay. 1997. Safety in field activities: U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chap. A9, <https://water.usgs.gov/owq/FieldManual/Chap9/chap9.pdf> (accessed 9 August 2019).

U.S. Geological Survey (variously dated) National field manual for the collection of water-quality data: U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chaps. A1-A9, available online at <https://water.usgs.gov/owq/FieldManual/Chap9/chap9.pdf> (accessed 9 August 2019).

Appendix SOP 3.a. Emergency contact form

(modified from USGS National Field Manual, Ch. A9)

Emergency Contact Form

Employee Name:

Personal Contacts

Name	Phone # (home) (work)

Personal Physician

Name	Phone # (home) (work)

PACN Contacts

WAPA

Name	Phone # (home) (work)

NPSA

Name	Phone # (home) (work)

KALA

Name	Phone # (home) (work)

KAHO

Name	Phone # (home) (work)

Local Emergency Contacts

Hospital	Phone #	Address

Walk-in Clinic	Phone #	Address

Police Station	Phone #	Address

Fire Station	Phone #	Address

Utility Station	Phone #	Address

Health Information Centers

Center Disease Control:

Information Hotline:

Disease Directory (Fax):

Other:

Appendix SOP 3.b. Medical information form for office personnel

(modified from USGS National Field Manual, CH. A9)

Medical Information for Office Personnel

Employee Name:

Home Phone:

Treatment Preference:

Medical:

Other:

Doctor

Name	Phone # (home) (work)

Other Emergency Contacts

Name	Phone # (home) (work)

Relevant Medical History

Allergies:

Medical Conditions:

Current Medications:

Medications to Avoid:

Special Instructions:

Additional Information:

Appendix SOB 3.c. Example of standard safety checklist

Standard Safety Checklist

Climate and UV Protection:

Item:	Check:
Boots	
Fluids (e.g., water, electrolyte drink)	
Hat, wide-brimmed	
Insect repellent (unscented)	
Rain gear	
Sunglasses	
Sunscreen	
Antibacterial soap or hand lotion	
Temperature-modifying clothing	

Items for Vehicles:

Item:	Check:
Vests and jackets w/reflective protection	
First aid kit (see below)	
Flares	
Fire extinguisher	
Flashlight	
Tool kit	
Reflector triangles	

Chemical Protection and Storage:

Item:	Check:
Chemical spill kit	
Personal Protective Equipment (eye wear, gloves, apron, close-toed shoes)	
Eye wash kit (replace old/expired solution)	
Material Safety Data Sheets (MSDS)	
Chemical reagents (stored appropriately)	
Flammable solvents (stored appropriately)	
Pressurized gases (stored appropriately)	

First Aid and Protective Equipment:

Item:	Check:
Complete change of clothes (stored dry)	
Fire extinguisher (safely secured)	
First aid kit and manual (ensure full/updated)	
Orange reflective vest	

Communications:

Item:	Check:
Cellular phone/communication equipment	
Field folder (see below)	

Field Folder:

Item:	Check:
Maps	
Medical facility numbers/location	
Emergency contact numbers	

Miscellaneous Equipment:

Item:	Check:
Bungee cords (to secure loose articles)	
District flood plan (most current)	
Flagging	
Flares	
Flashlight (include batteries)	
Safety cones	
Tool kit	
USGS TWRI Book 9 Chapter A9	