

Standard Operating Procedure (SOP) #2

Training Observers

Version 3.01 (July 9, 2021)

Change History

New Version #	Revision Date	Author	Changes Made	Reasons for Change	Previous Version #
2.0	6/30/2007	Eric Brown	See track changes	Response to reviewer's comments	1.0
2.01	7/20/2007	Larry Basch	See track changes	Additions, corrections	2.0
3.0	8/22/2019	Kelly Kozar	Updated requirements and external links.	To more accurately reflect the training needed by personnel.	2.01
3.01	7/9/2021	Sheila McKenna, Kelly Kozar	Updated section on training new individuals.	To more accurately reflect current training practices.	3.0

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 outlines the requirements and training procedures that field staff and office analysts should follow. All field personnel should: (1) have National Park Service (NPS) Blue Card diving certification; (2) DOI Motorboat operator certification; (3) know how to operate survey gear such as underwater cameras, transect lines, Global Positioning System (GPS) units, and rugosity chains, and (4) know basic computer software such as MS-Word®, MS-Excel®, and Photogrid®. Office personnel need to know: (1) data management principles, infrastructure, and practices associated with this Vital Sign; (2) typical coral settlement species identification and general principles of identification for unanticipated/unknown species; (3) SOPs associated with field data collection practices; (4) Photogrid® and sound statistical background for analyses; (5) know how to identify substrate types, and; (6) analysis and reporting principles outlined in the SOPs associated with this protocol. The use of products identified in this protocol does not imply endorsement, effectiveness, or warranty by NPS.

A master equipment list for the entire Pacific Island Network (PACN) 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.

Field Personnel Requirements

NPS Operational Leadership Course

All NPS personnel should take the operational leadership course. This is typically a one-day course that can be conducted within each park or at a central location. Contact your supervisor for the next available class.

NPS Blue Card Certification

An essential component for conducting the underwater Marine Fish surveys is that divers maintain current NPS Blue Card certification or have approved diving reciprocity. Divers from some outside organizations (e.g., AAUS, NOAA) may take part in diving operations provided they have obtained a letter of reciprocity (LOR) from their Dive Safety Officer (DSO) and this LOR has been approved by the Park Dive Officer (PDO) prior to diving within that specific park.

All SCUBA divers must adhere to the requirements outlined in NPS Reference Manual #4 Dive Management (RM-4) and the Dive Safety Manual specific to their park of origin. All SCUBA divers must be familiar with reference materials required for NPS Blue Card certification (Table SOP 2.1).

Table SOP 2.1. References required for dive certification, including location where permanent copies can be located.

Reference	Location
Open Water Certification Manual for nationally recognized dive training organization (e.g., PADI, NAUI)	https://www.padi.com/courses/open-water-diver (accessed 9 July 2021), https://www.naui.org/certifications/ (accessed 9 July 2021)
NPS RM-4 (complete manual)	I&M Library, https://www.nps.gov/policy/DOrders/RM-4_6-2014.pdf (accessed 9 July 2021)
NPS Field Manual 4 Diving Management	https://www.nps.gov/subjects/policy/upload/FM-4_10-01-2019.pdf (accessed 9 July 2021)
Dive Safety Manual specific to each park	Available at each park

All field SCUBA diving personnel must spend time diving prior to the field season to obtain/maintain proficiency in buoyancy control. Someone skilled in maintaining buoyancy control underwater will have less trouble transporting gear, deploying and retrieving equipment, photographing the benthos, and conducting measurements on the substrate. In addition, divers with good buoyancy control will be less apt to damage the substrate during surveys.

NPS Motorboat Operator Certification

All employees who will operate motorboats must pass the DOI motorboat operator course prior to conducting field operations. Exceptions may be granted for personnel operating a boat under the supervision of a DOI motorboat operator instructor. All motorboat operators must be familiar with reference materials required of a DOI motorboat operator (Table SOP 2.2).

Table SOP 2.2. Reference materials required for DOI motorboat operator.

Reference	Location
DOI Motorboat Operator Certification Course (MOCC) Manual, DOI DM 485, Chapter 22	https://www.doi.gov/sites/doi.gov/files/elips/documents/485-dm-22.pdf (accessed 9 July 2021)
Maloney, E.S., and C.F. Chapman. 1996. Chapman Piloting: Seamanship & Small Boat Handling, 62 nd ed. William Morrow and Company.	I&M Library

Substrate Identification Procedure

All personnel must be familiar with the general benthic cover or substrate categories (coralline algae, corals, macroalgae, sand, and turf algae) and the coral species specific to each PACN park (see Appendix SOP 1.c in SOP #1 Before the Field Season). Staff new to the substrate identification procedure must be mentored by the marine ecologist or a senior biotechnician on substrate identification. New staff should ask questions as they start processing images and as they proceed along transects encountering new substrate types if the new staff is unsure of the correct substrate identification. The first two transects are submitted to the mentor for a preliminary check that the identifications are correct. For the learning check transects, correctly identifying at least 80% of the labeled substrates in digital still images from the park where analysis will occur (or network if the staff member will be identifying substrates for multiple parks) is required before continuing with the image analysis for the park. Observers should be familiar with all pertinent reference materials for substrate identification (Table SOP 2.3).

Table SOP 2.3. Reference materials for substrate identification.

Reference	Location
Abbott, I.A. 1999. Marine Red Algae of the Hawaiian Islands. Bishop Museum Press, Honolulu, Hawaii, USA.	I&M Library – hard copy
Abbott, I.A., and J.M. Huisman. 2004. Marine Green and Brown Algae of the Hawaiian Islands. Bishop Museum Press, Honolulu, Hawaii, USA.	I&M Library – hard copy
Fenner, D. 2005. Corals of Hawaii: A Field Guide to the Hard, Black and Soft Corals of Hawaii and the Northwest Hawaiian Islands, Including Midway. Mutual Publishing, Honolulu, Hawaii, USA.	I&M Library – hard copy
Hoover, J. P. 1999. Hawaii's Sea Creatures, a Guide to Hawaii's Marine Invertebrates. Mutual Publishing.	I&M Library – hard copy
Huisman, J.M., I.A. Abbott, and C.M. Smith. 2007. Hawaiian Reef Plants. University of Hawai'i Sea Grant College Program, Honolulu, Hawai'i.	I&M Library – hard copy
Littler, D.S., and M.M. Littler. 2003. South Pacific reef plants. Offshore Graphics, Inc., Washington, D.C., USA.	I&M Library – hard copy
Maragos, J. 1977. Reef and shore fauna of Hawaii. Section 1: Protozoa through Ctenophora. in D.M. Devaney and L.E. Eldredge, editors. Bishop Museum Press, Honolulu, Hawaii, USA.	I&M Library – hard copy
Payri, C, A. de R. N'Yeurt, and J. Orempuller 2000. Algues de Polyne'sia francaise Algae of French Polynesia. Au Vent des Isles, Editions Tahiti.	I&M Library – hard copy
Veron, J.E.N. 2000. Corals of the World. Australian Institute of Marine Science, Townsville, Australia.	I&M Library – hard copy

Operating Survey Gear

Underwater Camera Gear

Field personnel must be familiar with the operation of the underwater camera. See SOP #6 Pre-Dive Equipment Preparation for information on how to set up the camera for surveys.

Transect Line Deployment

Field personnel need to be familiar with the deployment of transect lines underwater by first deploying and spooling the lines on land. Once accomplished, they will proceed to practice deployment skills underwater while maintaining good buoyancy control. Keep in mind that some transect lines are weighted so buoyancy will change substantially while laying and spooling the line.

GPS Operation

Field personnel need to know how to operate the GPS to navigate to various waypoints. See SOP #4 Using Garmin® GPS Units and practice using the unit before heading out into the field.

Rugosity Chain

Field personnel will need to know how to deploy the rugosity chain on land prior to deployment underwater. See SOP #8 Conducting Marine Benthic Cover and Rugosity Surveys on how to measure rugosity. Once skilled on land, practice this skill underwater while maintaining good buoyancy control. Keep in mind that the rugosity chain is weighted so buoyancy will change substantially as you lay out the chain or spool it up.

Reference materials related to operating survey gear can be found in Table SOP 2.4.

Table SOP 2.4. Survey gear reference materials.

Reference	Location
Coyer, J., and J.D. Witman. 1990. The underwater catalog: A guide to methods in underwater research. Shoals Marine Laboratory, Cornell University and New York Sea Grant, Ithaca, New York, USA.	I&M Library – hard copy
English, S., C. Wilkinson, and V. Baker. 1994. Survey manual for tropical marine resources. Australian Institute of Marine Science, Townsville, Australia.	I&M Library – hard copy
Hill J. and C. Wilkinson 2004. Methods for Ecological Monitoring of Coral Reefs. Australian Institute of Marine Science, Townsville, Australia.	https://portals.iucn.org/library/efiles/documents/2004-023.pdf (accessed 9 July 2021)
Rogers, C.S., G. Garrison, R. Grober, Z-M Hillis, and M.A. Franke. 1994. Coral reef monitoring manual for the Caribbean and Western Atlantic. National Park Service, US Virgin Islands, USA.	https://permanent.access.gpo.gov/lps124781/MonitoringManual.pdf (accessed 9 July 2021)
Operator manual for cameras and underwater housings	See Table SOP 6.1 in SOP #6 Pre-Dive Equipment Preparation for camera models used in each park and links.
Operator manual for GPS to be used in the field (e.g., Garmin 76).	See SOP #4 Using Garmin® GPS Units for links to various Garmin model user guides.

PACN Benthic Marine Community Monitoring Protocol

All personnel involved in the benthic marine community monitoring program will need to be familiar with all chapters and SOPs of the Marine Benthic Community Monitoring Protocol¹.

All personnel will need to participate in at least one (1) on-site field visit during actual monitoring; even if they are only boat-based while divers conduct field data collection activities.

Data Management Principles, Infrastructure, and Practices

All personnel will be familiar with the PACN I&M Program, infrastructure and practices. All office personnel will be required to read and be familiar with the PACN data management principles and infrastructure, which can be found in Chapter 6, Data Management of the PACN Vital Sign Monitoring Plan².

The Benthic Marine Community Monitoring Protocol chapters and SOPs associated with data management include: Chapter 4 Data Handling, Analysis and Reporting, SOP #12 Workspace Setup and Project Records Management, SOP #13 Datasheet Handling Procedures, SOP #14 Data Entry, Verification, and Certification, SOP #15 Managing Photographic Images, SOP #16 Benthic Image Analysis, SOP #17 Settlement Analysis, SOP #18 Metadata Development, SOP #19 Sensitive Information Procedures, SOP #20 Product Delivery Specifications, and SOP #21 Product Posting and Distribution.

Field Data Collection Practices

All personnel will need to be familiar with all Benthic Marine Community Monitoring Protocol chapters and SOPs associated with field data collection and methods. Chapters and SOPs related to these practices and procedures include Chapter 3 Field Methods, SOP #7 Selecting and Marking Subtidal Sampling Transect Location, SOP #8 Conducting Marine Benthic Cover and Rugosity Surveys, SOP #9 Conducting Coral Settlement Sampling, and SOP #10 Measuring Coral Growth.

Computer Software

All personnel should be familiar with Microsoft Office[®], and in particular, MS-Word[®], MS-Excel[®] and preferably MS-Access[®]. Other software that personnel will need to know includes Photogrid[®]. Prior to using field images, personnel will need to practice with test images using Photogrid[®] as directed by the PI or designee. Personnel must be familiar with the general substrate categories (e.g., coralline algae, coral, macroalgae, sand, turf algae) and the settling coral taxa specific to each PACN park (see Appendix SOP 1.c in SOP #1 Before the Field Season). For information on managing field photos and obtaining and using Photogrid[®], please refer to in SOP #15 Managing Photographic Images and SOP #16 Benthic Image Analysis. Reference materials for operating computer software are listed in Table SOP 2.5.

¹ Pacific Island Network Benthic Marine Community Monitoring Protocol, <https://irma.nps.gov/DataStore/DownloadFile/427176> (accessed 9 July 2021).

² Pacific Island Network Vital Signs Monitoring Plan, <https://irma.nps.gov/DataStore/Reference/Profile/633437> (accessed 9 July 2021).

The use of products identified in this protocol does not imply endorsement, effectiveness, or warranty by NPS.

Table SOP 2.5. Computer software references.

Reference	Location
Microsoft Word® Support	https://support.office.com/en-us/word (accessed 9 July 2021)
Microsoft Excel® Support	https://support.office.com/en-us/excel (accessed 9 July 2021)
Photogrid® 1.0 software help section	HTML help section contained within program, no online sources, no pdf.

Statistical Background for Analyses

All personnel involved in this protocol will need to review the information for the *R*® Project for Statistical Computing, the Statistical Software used for data analysis with the Marine Fish Protocol. More information on data analysis can be found in SOP #19 Data Analysis and Reporting.

Table SOP 2.6. Reference material for statistical software.

Reference	Location
R core team 2021, The R Project for Statistical Computing	https://www.r-project.org (accessed 9 July 2021)

Analysis and Reporting Principles

All personnel involved in this protocol will be required to read and understand all chapters and SOPs associated with analysis and reporting in the Benthic Marine Community Protocol. In particular, personnel will need to be familiar with Chapter 4 Data Handling, Analysis, and Reporting, and SOP #22 Statistical Data Analysis and Reporting. Furthermore, personnel will need to be familiar with PACN and this Vital Sign's reporting needs and audiences both for the network and each park.