Marine Conservation Philippines

Invertebrate Survey Manual

INVERTS

INVERTEBRATES SURVEY MANUAL

MCP'S MONITORING

Through a volunteer-based scientific diving program, Marine Conservation Philippines is focused on collecting and analysing biophysical data on locally-managed MPAs to assess effectiveness and resilience, and offer support to local and regional management units.

MPA effectiveness is defined using the legal scope of their establishment, and the goal is to enhance food security for local communities. MCP therefore uses commercial productivity of the ecosystem as a primary indicator of effectiveness, followed by substrate composition and resilience, which are considered indirect indicators as they are essential for maintaining food security in the long-term.

Commercial fish & invertebrate diversity, abundance and fluctuations as well as **substrate composition & resilience** within the MPAs are monitored on a **seasonal basis**. The monitoring method used employs the use of 30m transects in a **stratified random sampling** strategy that recognises **three depth ranges** (3-7m, 9-13m, 15-19m). By **observing each depth range and treating the results as an ecologically-representative set**, it is possible to generate an accurate model of the entire reef structure and community, determine its relative health, and track changes in the ecosystem over time.

HOW DOES IT WORK? Your survey training

To be able to carry out underwater surveys correctly, it is important that you learn to find and identify the different indicator species that we monitor. You will also need to learn and practice the survey methodology. To do so, you will go through a phase of in-water and out-of-water training with an experienced teacher.

To facilitate training and data collection, MCP separates monitoring by speciality (i.e., substrate, fish, invertebrates), allowing volunteers to focus on the relevant knowledge and skills to survey one group of indicators.

Introduction Week: (1 week, 6 dives)
The first week is designed to slowly refresh your diving skills, your awareness of basic marine ecology, and introduce you to our work here at MCP. It includes:

Refresh Dives (2 dives) to refresh dive skills and focus on buoyancy and trim needed to survey.

Introduction to Substrate (1 presentation, 2 dives) to introduce a variety of coral growth forms, algae, and stressors that coral reefs face.

Introduction to Fish (1 presentation, 2 dives) to introduce some of the key fish species we monitor.

Introduction to Coral Reef Monitoring (1 presentation, 2 dives) to provide a basic understanding of marine ecology as well as an introduction to MCP's monitoring program and the scientific skills you will need underwater.

INVERTS

Specialty training: After the first week, volunteers will take part in specialised training for one of our monitoring specialities. For Invertebrate monitoring, this training takes an average of 3 weeks. It includes:

Identification training: (3 presentations, 6 dives minimum, average 1 week, 1 dry test) The aim is to get comfortable with our list of monitored invertebrate groups with presentations in the afternoon, followed by 2 identification dives the next morning, and a quiz in the afternoon. During an identification dive, your teacher will bring a slate with the names of the invertebrates you were presented with the day before. To start with, the teacher will point at an invertebrate and show you which one it is on the slate or use hand signals to communicate. You will soon become more knowledgeable and be challenged to identify them yourself.

To assist your training, it is highly encouraged that you use part of your afternoons for studying. Your teacher will introduce you to different training tools to help you study independently (e.g., online presentations, flashcards): **study them!** The quicker you learn the different invertebrate groups, the more fun your dives will become and the sooner you will begin surveys!

At the end of this first phase of training, you will be asked to go through a final Identification Test (i.e., dry), for which the pass rate is 90%. When you are ready, you will also begin to do transect practices.

Invertebrate Transect Practice: (2 dives per day, average 2 weeks, 2 underwater tests) You will learn to do surveys through transect practice, which involves finding, identifying and sizing invertebrates. For Invertebrate surveys, divers conduct a belt survey by surveying 2.5m either side of a 30m reel (i.e., belt transect), with one diver on each side. During training, your teacher will count the invertebrates in the same area as you. You and your teacher will then compare what you have found, and your teacher will then show you or explain to you what you might have missed, giving you a better understanding of where to spot certain invertebrates. You will also learn how and where to set your transect line to follow the methodology correctly.

Once you and your teacher feel that you are prepared, you will be tested. You must complete and pass two ‘mock’ survey tests with a designated staff member. You will be assessed on your ability to find, identify, count and size the different invertebrate groups, as well as following the correct methodology (including dive safety) within a set amount of time (i.e., 30 minutes).

Training your eyes to be able to spot cryptic invertebrates takes a bit of time - don’t feel discouraged, you will get it!

**It is very important in scientific research that the data collection process is conducted systematically, showing little differences between each volunteer. This is something that MCP takes seriously. Therefore, please don’t feel offended if you are asked to practice a bit longer. As a volunteer, presumably learning fish for the first time, it can take a few dives to learn how to identify them correctly, get the eye to size them accurately, or count them when they are in high numbers. Everyone learns at a different pace and you will be given as much time and support as needed to reach the level required to collect reliable data!

In addition to this, your dive skills will also need to be sufficient to ensure both the safety of the reef and yourself. If it turns out that you have a lot of trouble with swimming in trim, frog kicking and/or keeping your feet up at all times, we'll ask you to do some extra buoyancy practice or join another Refresh Day. We want to prevent harming the coral while doing research as much as possible.

If someone were to accidentally kick a piece of coral and it breaks off, it could take 2-10 years to regrow, depending on the species of coral. This is another aspect that MCP takes very seriously, so again, please don’t be offended if we ask you to take a little more time to work on your dive skills; we are committed to working with you to make you a better diver. At the end of the day, it will make diving easier for you and more enjoyable!

INVERTS

Available survey materials:

- 30m reel
- A personal Invertebrates slate
- Pencils and erasers
- Reef Creature ID books

Survey methodology:

Surveys are conducted **as a buddy pair** along a **30m transect line** over **continuous reef** within a depth range (3-7m, 9-13m or 15-19m deep) that will be allocated to you on the day of your survey, at a chosen site.

After you are given a site briefing, you will be asked to lay out your reel in a designated zone of the reef within the depth range you were allocated. You will need to use your dive computer to control your depth, and use a compass for directional guidance (i.e., to stay parallel to shore) while laying out the transect. It is very important that you perform your survey over continuous reef within the depth range.

To perform a belt transect Invertebrate survey, you and your buddy will each choose one side of the 30m transect line to survey (2.5m wide), swimming in an **extended 'S'-shaped pattern** from the transect line to the imaginary 2.5m line and back, checking distance regularly using your body length. Invertebrate surveys must be completed within 30 minutes. You will record all invertebrates from our indicator list that you see on your side, sizing them and counting their abundance in a tally system. Your data will later be combined with your buddy's, as both of you are doing one survey together (i.e., each completing half).

Remember to look under ledges, coral heads, and in crevasses whilst preventing your feet from hitting the reef. Some invertebrates are easy to overlook if you don't search properly. They are well hidden and don't like to show themselves, like Coral Banded Shrimp and Octopus.

INVERTS

A few things to keep in mind

It is important that you're accurate in estimating how far 2.5m is. If you accidentally survey 3m width instead of 2.5m, you will see higher numbers of invertebrates and the data is not comparable anymore. If you are not sure, use your body length to measure the 2.5m width.

Just like any other dive, stay close to your buddy so you can respond quickly should an emergency occur. It is also convenient if you need help identifying anything or want to share something amazing you just spotted with your buddy!

Depending on your air consumption and the depth you are surveying at, you may be able to perform more than one survey in a single dive. To save time, you can also preemptively lay a survey line for you to complete on the second dive.

Depending on the depth of the transect and the dive location, the number of invertebrates you encounter can be different, and your total survey time can therefore differ as well. Shallow transects usually have more invertebrates compared to deeper transects, and some dive sites can have a very high number of invertebrates. A survey should take **20-30 minutes.**

Make sure to check your air regularly. Let your buddy know after each 30m transect how much air you have left. You might have the feeling that you are overdoing it a bit in terms of checking your air, but we notice that a lot of volunteers forget to check their air while they are doing research.

When assigned to deeper transects, make sure you do a safety stop. If you are down to 80 bar and you have not finished, abort the rest of the survey. **Don't start rushing to finish it;** you could endanger yourself by getting too low on air. Do a safety stop and surface calmly.

If a person has an emergency/is not feeling well, abort the survey. Surface together as a buddy team and ask for help from another team if necessary. If it turns out to be a minor problem and you both have enough air, you can choose to continue the survey or to return to shore.

SAFETY ALWAYS COMES FIRST!

Data entry

Once you have finished your dives, you will enter your data into our online database. Your teacher or an experienced volunteer will explain to you how this works. Make sure you enter your data accurately. After you have entered your data, go over it again and compare the data from the datasheet with your slate. If you make any mistakes, inform a staff member straight away so that it can be corrected.

Please enter the data the same afternoon and don't wait until the next day, as it is easy to forget and this can result in lost data or repeated survey replicates.

What do we do with the data?

MCP is interested in the effectiveness of Marine Protected Areas in preserving healthy ecosystems and commercial organisms in the region. Changes on the reef occur slowly and often take several years. Since our monitoring is long term, we will be able to monitor the health of the reef over several years and notice any increase or decline in reef health. The long term monitoring program is especially useful in the case of anthropogenic (human) threats or natural disasters disturbing the reefs. In our region, this can most commonly be the impacts of overfishing, pollution, climate change, and storms or typhoons.

Our data from the monitoring of commercial fish, invertebrates and substrate is analysed every season. We share it regularly with local governments units (LGUs) to support their coastal resource management strategies and actions.

Other organisations such as BFAR (Bureau of Fisheries Management and Agricultural Resources), DENR (Department of Environmental and Natural Resources), and other NGOs are also interested in our data. This is also sometimes the case for independent researchers who contact us or join us for a period of time with a specific purpose.