Coral Cay Conservation Diver

DISTINCTIVE SPECIALTY

INSTRUCTOR OUTLINE

Introduction

This section includes suggestions on how to use this guide, an overview of course philosophy and goals.

How to Use this Guide

This guide speaks to you, the Coral Cay Conservation Diver PADI Specialty Instructor. The guide contains four sections – the first contains standards specific to this course, the second contains knowledge development presentations, the third considers confined water training, and the fourth details the open water dives.

All required standards, learning objectives, activities, and performance requirements specific to the Coral Cay Conservation Diver course appear in **boldface** print. **The boldface assists you in easily identifying those requirements that you *must* adhere to when you conduct the course.** Items not in boldface print are recommendations for your information and consideration. General course standards applicable to all PADI courses are located in the General Standards and Procedures section of your PADI *Instructor Manual.*

Course Overview and Goals

The purpose of the PADI Coral Cay Conservation Diver Course is to enable divers to complete basic ecological surveys on tropical coral reefs and to build their awareness and appreciation for the environment they are diving in.

The goals of the Coral Cay Conservation Diver training are:

A. To develop the individual's knowledge of the coral reef environment
B. To teach the individual the basics of coral anatomy
C. To give the individual the skills needed to conduct a marine survey

Course Flow Options

This course contains knowledge development, a practical land-based session and 2 open water training dives. When possible, you should conduct the knowledge development session before any practical land-based sessions.

There are 2 open water dives to complete. You may rearrange skill sequences within each dive; however, the sequence of dives must stay intact. You may add more dives as necessary to meet student divers' needs. Organize your course to incorporate environment friendly techniques throughout each dive, to accommodate student diver learning style, logistical needs, and your sequencing preferences.

Section One:
Course Standards

This section includes the course standards, recommendations, and suggestions for conducting the PADI **Coral Cay Conservation Diver** course.

Standards at a Glance

Course Standards

Minimum Instructor Rating:	**PADI Coral Cay Conservation Diver Distinctive Specialty Instructor**
Prerequisites:	**PADI Open Water Diver, or qualifying prerequisite**
Minimum Age:	**12 years**
Ratios Open Water:	**Max 8:1** but preferably 3:1
Depth	**Maximum Depth 18 metres / 60 feet**: 6-12 metres/20-40 feet recommended
Hours:	Recommended: 10
Minimum Open Water Dives:	**2**

Materials and Equipment - Instructor and Student:

- ***Coral Cay Conservation Diver Course Instructor Outline (***Instructor only)
- **Student and Instructor equipment as outlined in the PADI Instructor Manual, General Standards and Procedures**
- **Tape measure**
- **Plum line**
- **Slate and Pencil**
- Specialty equipment and supplies:

  a. Spare parts kit
  b. Extra weights in small increments - for student trim
  c. Spare pencil

Instructor Prerequisites

To qualify to teach the **Coral Cay Conservation Diver** course, an individual must be a Teaching status PADI Master Scuba Diver Trainer or higher. **PADI Instructors may apply for the Coral Cay Conservation Diver Distinctive Specialty Instructor rating after completing a Specialty Instructor Training course with a PADI Course Director, or by providing proof of experience and applying directly to PADI.** For further detail, reference Membership Standards in the General Standards and Procedures section of your PADI *Instructor Manual.*

Student Diver Prerequisites

By the start of the course, a diver must be:

1. Certified as a PADI Open Water Diver or have a qualifying certification from another training organization. In this case, a qualifying certification is defined as proof of entry-level scuba certification with a minimum of four open water training dives. Verify student diver prerequisite skills and provide remediation as necessary.

2. Be at least 12 years.

Supervision and Ratios

Open Water Dives

A Teaching status PADI Coral Cay Conservation Diver Specialty Instructor must be present and in direct control of all activities and must ensure that all performance requirements are met. After all student divers have successfully demonstrated the required skills, the Instructor may exercise indirect control over the balance of the dive.

The maximum ratio for the open water dives is 8 student divers per instructor (8:1) but preferentially it would be 3:1

Site, Depths, and Hours

Site

Choose sites with conditions and environments suitable for completing requirements. Shallow dives will provide divers with more time to complete tasks. Use different open water dive sites, if possible, to give students divers experience in dealing with a variety of environmental conditions (incorporate environment friendly techniques throughout each dive) and logistical challenges.

Depths

6-12 metres/20-40 feet recommended
18 metres/60 feet limit

Hours

The PADI Coral Cay Conservation Diver course includes 2 open water dives. Conduct dives during daylight hours between sunrise and sunset. The minimum number of recommended hours is 10.

Assessment Standards

The student diver must demonstrate accurate and adequate knowledge during the open water dives and must perform all skills (procedures and motor skills) fluidly, with little difficulty, in a manner that demonstrates minimal or no stress.

Certification Requirements and Procedures

By the completion of the course, student divers must complete *all* performance requirements for Coral Cay Conservation Diver Open Water Dives One and Two. The instructor certifying the student diver must ensure that all certification requirements have been met. The certifying instructor obtains a Coral Cay Conservation Diver certification by submitting a completed, signed PIC to the appropriate PADI office.

Section Two:
Knowledge Development

Use the following teaching outline as a road map of the conduct, content, sequence and structure for the Coral Cay Conservation Diver course. The result should be student divers with theoretical knowledge and pragmatic experience who can adapt what they have learned to conduct basic ecological surveys on tropical coral reefs. **Student divers will be able to explain the following learning objectives.**

Knowledge Development

Learning Objectives

By the end of knowledge development, student divers will be able to explain:

- **Where coral reefs are found around the world**
- **Basic coral anatomy**
- **The current major threats to coral reefs**
- **Coral growth forms and basic identification**
- **The method for a simple substrate survey**

Knowledge Development Teaching Outline

A. Course Introduction

1. Staff and student diver introductions

Note:

Introduce yourself and assistants. Explain your background with Coral Cay Conservation – Reef Survey diving if your student divers aren't familiar with you.

Give times, dates and locations as appropriate for classroom presentations and open water dives.

1. Course goals:
   a. To develop the individual's knowledge of the coral reef environment
   b. To teach the individual the basics of coral anatomy
   c. To give the individual the skills needed to conduct a marine survey
2. Course overview
   a. Classroom presentations
   c. Open water dives. There will be two open water dives.
3. Certification
   a. Upon successfully completing the course, you will receive the Coral Cay Conservation Diver Specialty certification.
   b. Certification means that you will be qualified to plan, organize, and make dives in conditions generally comparable to or better than, those in which you are trained.

Note:

Use the PADI Student Record File. Explain all course costs and materials, and what the costs do and do not include, including equipment use, dive site fees, etc.

4. Class requirements

a. Complete paperwork.
b. Course costs.
c. Equipment needs.
d. Schedule and attendance.

B. Course Content

Background Information:

Coral reefs have been called the 'rainforests of the sea' and are perhaps the most diverse and ecologically complex of marine communities. They cover only 0.5% of the sea floor yet they hold around 25% of all known marine species. They are entirely formed by the biological activity of reef-building animals belonging to the phylum Cnidaria, which excrete calcium carbonate as their skeleton. Coral reefs are amongst the oldest of marine communities with a geological history of more than 500 million years.

The diversity of life on coral reefs is extraordinarily rich. It has been estimated that a single reef can have as many as 3000 animal species. Reefs in the Indo-Pacific region are the most diverse, with up to 700 hard coral species, with the most diverse region being the Indonesian and Philippine Archipelagos. Atlantic reefs on contrast are home to only about 60 hard coral species. The number of mollusc species is estimated at about 5000 in the Pacific versus 2000 in the Atlantic and fish are estimated at 3000 versus 750 species in the respective regions.

- **What is a coral reef?**

Reefs are structures made of limestone ($CaCO_3$). The carbonate reef structure is mainly contributed to by hard corals, but also other organisms such as coralline algae, clams, polychaete worms with $CaCO_3$ tubes, and fire corals have a considerable input. Coral is an animal, BUT it has a symbiotic relationship with algae that provide >80% of the food for the coral. Other organisms such as boring sponges and parrotfish are responsible for erosion of reef structures. Reefs grow when limestone accretion is greater than erosion.

- **Where are coral reefs found?**

Coral reefs occupy about 0.5-1% of the world's oceans. Coral reefs are confined to the tropics. Reef-building corals can tolerate temperatures between 18^{o} and 40^{o} C, optimal growth occurs between 23^{o} and 29^{o}C. They require a high salinity ranging from 32 to 42 % and high light levels. High light levels are needed for growth, as a result they are absent below the maximal light penetration depth (25 m to up to 80 m) and in turbid water. Coral reefs also require a hard substratum (rock) for initial settlement and growth. Growth rates vary between 1-15cm yr-1.

These conditions are required to keep the deposition rate of limestone greater than the erosion/dissolution rate. This is the reason why there are no hard coral reefs in the temperate British waters. Also, around the coast of Brazil where the Amazon and Orinoco rivers converge on the sea, coral development does not occur, due to the large amount of sediment loaded, fresh water significantly reducing the salinity and the clarity of the water. The availability of sunlight is of prime importance for the growth and development of a coral reef. Therefore, they are absent below the maximal light penetration depth (25 m to up to 80 m) and in turbid water.

Coral reefs occur between the tropics of Cancer and Capricorn. The most diverse reefs occur within a triangular region called Wallacea between Malaysia, Papua New Guinea and the Philippines.

- **The ecological importance of reefs**

Coral reefs bring high productivity to areas which otherwise would be relatively unproductive. High species diversity is an important characteristic of coral reefs. They provide an amazing array of habitats, food, shelter, living space and substratum for a huge number of species. Reefs are also considered as an ecologically stable environment, which means that there is little variability in the local environmental conditions. This fact has resulted in evolutionary specialisation

demonstrated by the numerous close relationships that exist between some of the reef species. These close relationships, or 'symbiosis' are exemplified by the occurrence of cleaning stations, where species of fish (mainly predators) actively solicit the activities of shrimps and small or juvenile fish in order to cleanse their bodies of parasites and mouths of pieces of food. Many species of goby have also evolved to co-exist with shrimp that dig the burrows whilst the gobies act as a look-out.

Reef communities and habitats can be differentiated according to species assemblage and abundance. Communities and habitats are both influenced and distinguished by physical factors such as exposure, degree of tidal change, waves, currents and depth. The main communities / habitats associated with reefs are; rocky coral reef, patchy coral reef, mud flats, sea grass beds and mangroves.

- **Types of reef**

Reef formation is initiated by the attachment of free-swimming coral larvae to submerged rock within the boundaries of coral growth.

1. Fringing Reef

As coral recruits take hold on to submerged rock they build up a layer of coral reef, as the coral continues to grow over hundreds to thousands of years a fringing reef is formed.

These reefs extend upwards to just below sea level and outwards into the open ocean.

2. Barrier Reef

A coral reef growing parallel to the coastline and separated from it by a lagoon is called a barrier reef. The lagoon may develop between the fringing reef and the land. As the reef continues to grow further and further offshore it eventually reaches the edge of the continental shelf.

When the Barrier reef reaches its peak growth and the reef crest nears the surface sediment and other particulates collect at the highest point causing land formation. If conditions are right the reef crest can then become colonized by mangroves, coconuts or other primary colonizing species which consolidate the lose sediments into a more permanent structure. Barrier reefs can also originate offshore if the depth of the seabed is shallow enough to allow corals to grow. E.g. Great barrier reef.

3. Atolls

Reef formation is initiated by the attachment of free-swimming coral larvae to submerged rock at the edges of volcanic islands. As the coral grows and expands, a fringing reef is formed. If the volcanic island is slowly sinking, coral continues growing upward and a barrier reef is formed e.g. the Australian GBR, which is hundreds of metres thick and millions of years old. Atolls are the final stage of this geological process, when the original island is submerged completely, and the reef is left as a ring around a central lagoon. e.g. Taka Bone Rate Atoll in southern Sulawesi.

- **What are the main threats to coral reefs?**

Natural impacts include typhoons, storm damage, disease, crown of thorns starfish, global warming and ocean acidification. Anthropogenic impacts include the curio trade, chemical pollution, nutrient loading, construction and sedimentation, mangrove destruction, overfishing, destructive and illegal fishing practices and tourism.

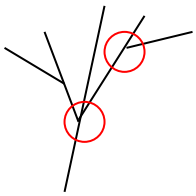
- **What is the structure of a coral?**

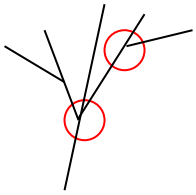
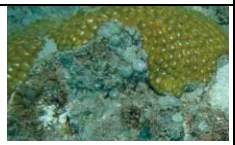
The individual coral animals are called polyps and are similar in structure to jelly fish. They comprise of a ring of tentacles around a central mouth and very simple body and digestive system. For protection the coral will grow a protective barrier of calcium carbonate around itself and this is known as the corallite.

Basic Identification and Growth Forms:

- **How do you tell the difference between Acropora and Non-Acropora corals?**
  Acropora corals have distinctive corallites that look like cups protruding from the surface of the colony. Non-Acropora corals do not have 'polyp cups'. There will also be a terminal polyp at the end of each protrusion.

- **Coral growth forms divided into Acropora and Non-Acropora**

CATEGORIES		Abr.		NOTES/REMARKS
ACROPORA	BRANCHING	ACB		At least 2^{o} branching 
	ENCRUSTING	ACE		Almost like a layer of paint on the rock. Usually base plate of immature Acropora forms
	SUBMASSIVE	ACS		Primary branching. Robust with knob, wedge or fist like form,
	DIGITATE (Acropora only)	ACD		No branching with finger like protrusions
	TABULATE (Acropora only)	ACT		Horizontal flattened plates
	BOTTLEBRUSH (Acropora only)	ACR		Short branchlets made of tubular axial corralites. Looks like a bottle brush

NON ACROPORA	BRANCHING	CB		At least 2^{o} branching 
	ENCRUSTING	CE		Major portion attached to substratum as a laminar plate
	SUBMASSIVE	CS		Tends to form small columns, knobs or wedges
	MASSIVE (Non-Acropora only)	CM		Solid boulder or mound
	FOLIOSE (Non-Acropora only)	CF		Coral attached at one or more points, leaf or plate like appearance
	MUSHROOM (Non-Acropora only)	CMR		Solitary, free living corals of the *Fungia* sp.

Survey Methodology:

- **Finding a suitable site:**

When looking for a suitable site the surveyor must think about the depth of the reef and the associated bottom time. It is important to understand your profile and given max depth so as to allow yourself enough time to lay the line, complete the survey and then still have time to collect the line back up before the end of the dive. A 20m survey should take approximately 30mins to complete

- **Laying the line:**

Finding a suitable anchor point is key. This must be done in a way that does not damage the reef and so the surveyor needs to find either a rock or piece of dead coral that the transect line can be tied to. Once the line is secured the surveyors buddy then needs to carefully lay the 20m of line over the coral trying to follow the contour of the reef so that

there is minimal change in depth across length of the transect. Once complete, signal to the surveyor that you are ready to begin.

- **Conducting a transect:**

The surveyor needs to record the coral life form (as per the options above) that is found under the line every 50cm. To do this they must swim slowly over the line looking straight down on it and then place the plum line to the right of each marker. They then need to record the information on their slate before moving onto the next point. If the substrate under the line is not a piece of coral the surveyor simply marks it down as "other" and moves on.

By the end of the transect 40 separate data points should have been recorded and the survey is complete.

- **Collecting the line:**

This is a job for the surveyor's buddy. As the surveyor starts the transect (as described above) the buddy can slowly roll up the line being careful not to get to close to the surveyor whilst maintaining good buddy contact.

As the surveyor finishes the transect the buddy should complete rolling up the line, signal to the surveyor that they are ready and check their bottom time.

Being aware of your surroundings:

It is very important that as a diver wanting to become a Reef Survey, the individual does everything that they can to minimise their impact on the reef itself. It would therefore be useful to follow Project AWARE's 'Ten Ways a Diver Can Protect the Underwater Environment':

1. Dive carefully to protect fragile aquatic ecosystems

Many aquatic organisms are delicate and can be harmed by the bump of a camera, the swipe of a fin or even the gentle touch of a hand. Some aquatic organisms like corals grow very slowly and breaking even a small piece can destroy decades of growth. By being careful you can prevent long term damage to magnificent dive sites.

2. Be aware of your body and equipment placement when diving

Keep your gauges and alternate air source secured so they don't drag over the reef or other vital habitat. Control your buoyancy, taking care not to touch fragile organisms with your body or equipment. You can do your part and prevent injury to aquatic life every time you dive.

3. Keep your dive skills sharp through continuing education

Before heading to open water seek bottom time with a certified professional in a pool or other environment that won't be damaged. You can also refresh your skills and knowledge with a PADI Scuba Review, PADI Advanced Open Water Diver course or Project AWARE Specialty course such as Peak Performance Buoyancy.

4. Consider how your interactions affect aquatic life

Avoid touching, handling, feeding or riding on aquatic life. These actions may stress the animal, interrupt feeding and mating behaviour or provoke aggressive behaviour in normally nonaggressive species.

5. Understand and respect underwater life

Playing with animals or using them as food for other species can leave a trail of destruction, disrupt local ecosystems and rob other divers of their experiences with these creatures. Consider enrolling in a PADI Underwater Naturalist, AWARE Fish Identification or Coral Reef Conservation Specialty course to better understand sustainable interactions.

6. Be an Eco tourist

Make informed decisions when selecting a destination and choose Project AWARE Environmental Operators or other facilities dedicated to sustainable business practices. Obey all local laws and regulations and understand your effect on the environment. Don't collect souvenirs like corals or shells. Instead, take underwater photos and follow Project AWARE's 10 Tips for Underwater Photographers.

7. Respect underwater cultural heritage

Divers are privileged to access dive sites that are part of our cultural heritage and maritime history. Wrecks can also serve as important habitats for fish and other aquatic life. Help preserve these sites for future generations by obeying local laws, diving responsibly and treating wrecks with respect.

8. Report environmental disturbances or destruction

As a diver, you're in a unique position to monitor the health of local waters. If you notice unusual depletion of aquatic life, injury to aquatic animals or strange substances in the water, report these observations to responsible authorities in your area.

9. Be a role model for other divers and non-divers when interacting with the environment

As a diver, you see the underwater results of carelessness and neglect. Set a good example in your own interactions so that others can learn from you.

10. Get involved in local environmental activities and issues

You can greatly affect your corner of the planet. There are plenty of opportunities to support healthy aquatic environments including Project AWARE conservation and data collection activities like local beach and underwater cleanups and CoralWatch monitoring, supporting environmental legislative issues, attending public hearings on local water resources, conserving water or making responsible seafood choices.

Section Three:

Open Water Dives

General Open Water Considerations

1. Involve student divers in dive-planning activities. Give special attention to student diver anxiety and stress levels, in addition to student diver equipment preparedness.
2. Conduct a thorough briefing. The better the briefing, the more smoothly the dive will proceed. Assign buddy teams according to ability (weak with strong) and establish a check-in/check-out procedure
3. Assign logistical duties to staff and review emergency protocols.
4. Remind divers to familiarize themselves with their buddy's equipment.
5. Evaluate diver's thermal protection for appropriateness for the dive site and expected conditions.
6. Make yourself available to answer questions during equipment assembly, safety checks and gear-up.

Performance Requirements

By the end of the open water dives, student divers will be able to:

- **Identify the main coral life forms found on the local reefs**
- **Choose a suitable site to perform a reef survey**
- **Lay a survey line**
- **Perform a basic reef survey**

Dive One

• **Species Identification**

A. Briefing
   1. Evaluation of conditions
   2. Facilities at dive site
   3. Entry technique to be used – location dependant
   4. Exit technique to be used – location dependent
   5. Bottom composition and topography around training site
   6. Depth range on bottom
   7. Ending tank pressure – when to terminate the dive
   8. Interesting and helpful facts about the dive site
   9. **Sequence of training dive – review Dive 1 skills**
      a. **Suiting up**

b. Predive Safety check
c. Buoyancy check at the surface
d. Species ID practice
e. Dive for fun and pleasure
f. Ascent

B. Predive procedures
C. Descent
D. Instructor to point out the different growth forms of coral. Student to write them down on their slate
E. Post-dive procedures
F. Debriefing specifically going through any mistakes on the identifications
G. Log dive (instructor signs logbook)

Dive Two

• Laying a line and practice survey

NB: Prior to Dive 2 being completed the instructor should walk the students through the methodology on land to ensure that the divers fully understand the process before entering the water.

A. Briefing
1. Evaluation of conditions
2. Facilities at dive site
3. Entry technique to be used – location dependent
4. Exit technique to be used – location dependent
5. Bottom composition and topography around training site
6. Depth range on bottom
7. Ending tank pressure – when to terminate the dive
8. Interesting and helpful facts about the dive site
9. **Sequence of training dive – review Dive 1 skills**
    - **a. Suiting up**
    - **b. Predive Safety check**
    - **c. Buoyancy check at the surface**
    - **d. Choose a suitable survey site**
    - **e. Lay a transect line without touching or damaging the reef**
    - **f. Conduct a 20m transect**
    - **g. Roll line back up**
    - **h. Dive for fun and pleasure**
    - **i. Ascent**

B. Predive procedures
C. Descent
D. Student to locate and select a suitable survey site then lay the transect line. The Student and Instructor then need to conduct the survey by recording what is lying under the line every 50cm and so should end up with 40 survey points. Once this has been completed the student then needs to roll up the survey line.
E. Post-dive procedures
F. Debriefing to include a comparison between the instructor's survey and the students.
G. Log dive (instructor signs logbook)