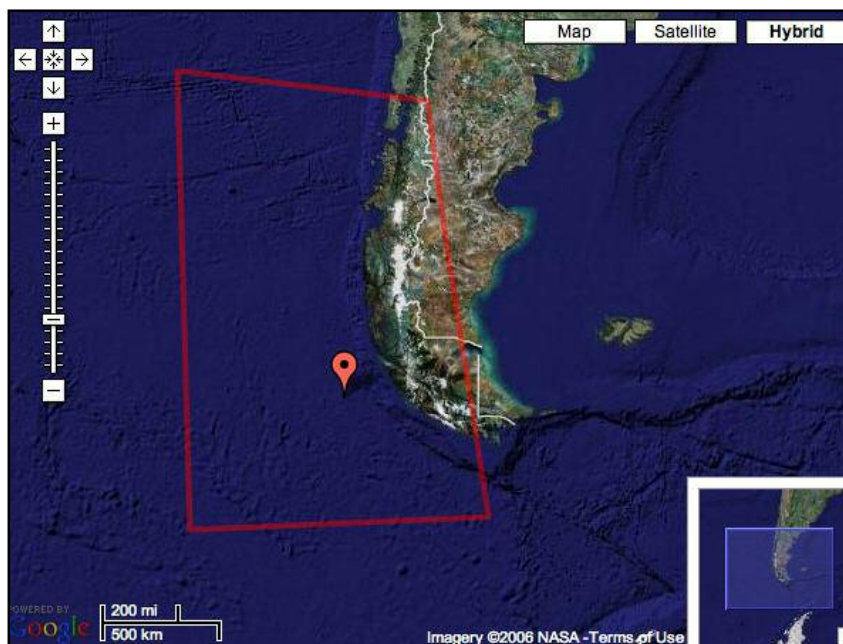


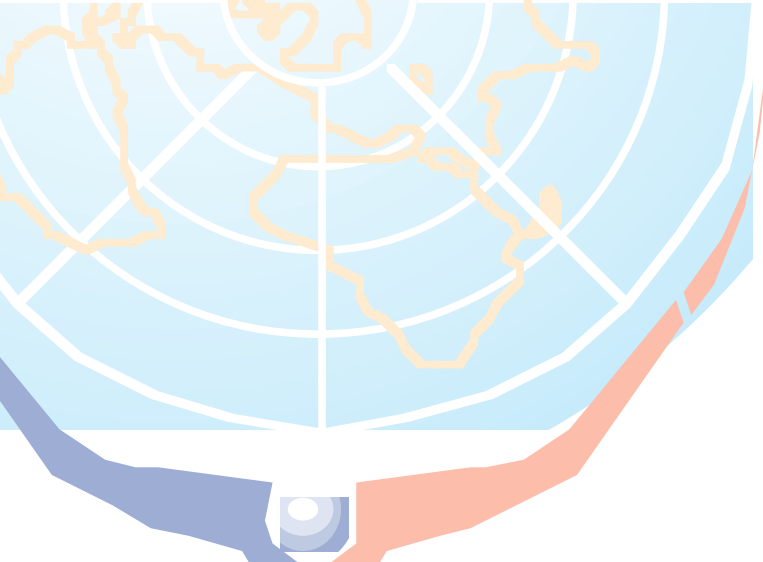


EARTHDIVE

“The health of our oceans is intrinsically linked to the future of life on this planet”

PRE-DIVE BRIEFING PACK **Eco-Region 2a** **South America - Pacific Coast - Temperate**





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1.0 General Information

This booklet is a **pre-dive briefing pack** for the **South America - Pacific Coast - Temperate** eco-region. Please feel free to print it and take it with you as an 'aide memoir' for your dive. It contains all the information you need to contribute to the **EARTHDIVE** Global Dive Log.

1.1 Introduction

The **EARTHDIVE Global Dive Log** is a pioneering methodology that has been developed in partnership with **UNEP-WCMC** and marine scientists from around the world. These marine scientists helped establish thirty **EARTHDIVE** eco-regions - areas of water that share a relatively similar climate and contain a common assembly of natural habitats and species. They then identified key indicator species for each region - an important set of marine animals whose numbers and changing population can tell us a lot about the changing state of our oceans.

You can help observe and record sightings of these marine animals during a dive or snorkel trip and enter observations into the **Global Dive Log**. You can also record evidence of key anthropogenic pressures - changes in the marine environment brought about by human activity such as pollution and overfishing. Any data you enter onto the **EARTHDIVE** website can be viewed by you and other visitors.

The **EARTHDIVE** eco-regions span all of the world's oceans - not just those areas with warm water and coral reefs. Whether you are diving in Scotland or Saint Lucia, Connecticut or Cocos, Denmark or Dominica, your data collection is equally valid and valuable. So you don't have to wait for the next exotic dive trip - home waters are just as important!

Each eco-region also has its own types of megafauna, from dolphins to whale sharks, from whales to polar bears (if you like really cold water) and provision is also made in the Global Dive Log to record sightings of these exciting animals.

Collecting this valuable information for **EARTHDIVE** helps create a **Global Dive Log** - a valuable research tool.

This briefing pack lists the indicator species and anthropogenic pressures for the **Mediterranean** eco-region.

Thank you for recording scientific information for **EARTHDIVE**.

1.2 How to record your observations into the Global Dive Log

When recording scientific information for **EARTHDIVE**, divers are recommended to follow our 7 Point Plan. You will find the use of a slate or some other method of taking notes underwater, such as a laminated fish identification card, invaluable. Always try to transfer your data to the **EARTHDIVE** website as soon as possible following your dive. Let dive buddies and dive leaders know what you are measuring, as they may be able to help with some post-dive questions on identification.

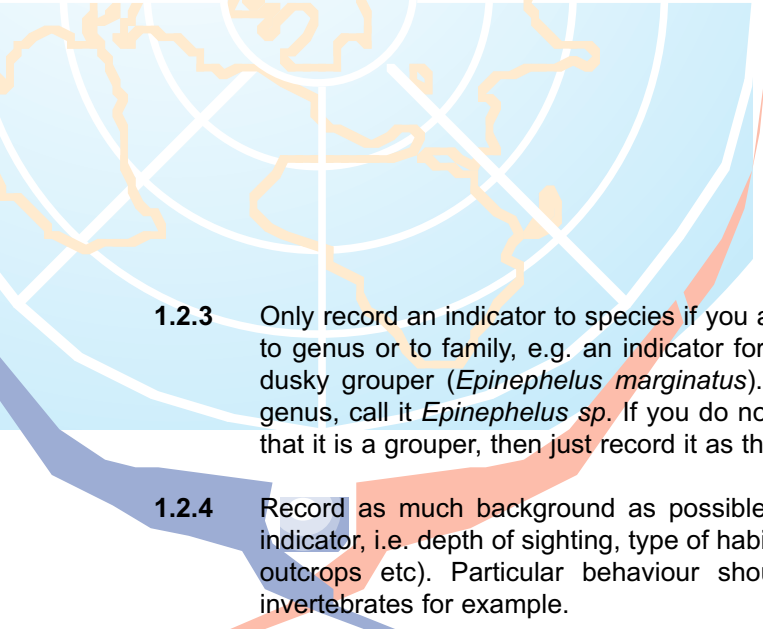
1.2.1 Try and ensure that the time of the underwater recording session is accurately noted. The length of the session can be all of the dive or just a period during the dive e.g. 10 minutes. You may even spend periods of time recording different indicators. For example there may be a dense aggregation of drums, which you count for 10 or 15 minutes. On the other hand you may look for other species such as groupers for most of the dive. Whatever your choice, the data is important so try to add the recording time in the notes for each indicator.

1.2.2 When possible always record **actual** counts of indicator species. If this is too difficult on the dive then enter your data into the abundance scale in the Global Dive Log as an estimate.



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- 
- 1.2.3 Only record an indicator to species if you are 100% certain that it is that species. Otherwise record to genus or to family, e.g. an indicator for the sub-tropical Atlantic Coast of South America is the dusky grouper (*Epinephelus marginatus*). If you are uncertain of the species but recognise the genus, call it *Epinephelus sp.* If you do not have time to recognise it, or do not know it apart from that it is a grouper, then just record it as that - it's just as important!
 - 1.2.4 Record as much background as possible in the notes section of the Global Dive Log for each indicator, i.e. depth of sighting, type of habitat (lower reef slope, kelp bed, sand with scattered rocky outcrops etc). Particular behaviour should also be noted - spawning behaviour in fish or invertebrates for example.
 - 1.2.5 When recording always fin slowly and evenly with minimal sudden movements. Moving rapidly will disturb resident fish causing them to hide from view more quickly. By moving slowly and evenly you have more chance of seeing indicator species and recording their presence/absence more accurately. Always look carefully for particular indicators such as lobsters, which are often under overhangs or in crevices.
 - 1.2.6 On your way to and from your dive site, record any observations you have made regarding the listed anthropogenic pressures for this eco-region.
 - 1.2.7 Following your dive, make notes from your slate or memory and keep them in a safe place. Add any further comments within 24 hours before you lose some of the detail from your memory.

Thank you

2.0 The South America - Pacific Coast - Temperate Eco-Region

This eco-region comprises the coastal waters of the southerly Chilean regions (regiones) VIII to XII (8 to 12).

A current of cold Antarctic water known as the Humboldt (or Peru) Current flows from the southern tip of Chile, northwards as far as Peru, then turns west and leaves the coast. This causes an upwelling of deep, nutrient-rich water to rise up along the coast, creating perfect conditions for abundant plankton and an extraordinary variety of marine mammals, seabirds, and fish. The current is slow and shallow.



The waters of this eco-region teem with huge schools of small fish, mostly pelagic, such as anchovies, sardines and jack mackerel. These small creatures are the basis for the eco-region's food chain that other species rely on, including Chilean dolphins and Burmeister's porpoises. Both the endangered Humboldt and Magellanic (*Spheniscus magellanicus*), penguins benefit from the current and are often mistaken for each other. A number of species of turtles, including the leatherback and loggerhead, can be found throughout the region, as are southern sea lions (*Otaria flavescens*) and South American fur seals (*Arctocephalus australis*).

For scuba divers who are also interested in ornithology, the air is filled with the sharp calls of seabirds such as Wilson's petrels, flesh-footed and sooty shearwaters, and grey and red-necked phalaropes. Inca terns will dive to catch anchovies.

When the climatic phenomenon El Niño comes to the area every few years, the ocean grows warmer and the surface layer of water becomes more dense. It is then difficult for the Humboldt Current to maintain its typical upwellings, and the water becomes less nutrient-rich. Fish and wildlife populations can collapse when an El Niño changes wind and temperature patterns. This makes marine life vulnerable to



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intensive fishing practices, with overfishing leading to a loss of biodiversity.

These events have also led to sequential changes, where sardines and anchovies have replaced each other periodically as the dominant species in the ecosystem.

The shores of the remote Parque Nacional Chiloé, in the Xth Regione provides an important haven for cetaceans, seabirds, sea lions, and sea otters (*Lutra felina*). The national park is home to numerous areas of international importance as wintering areas for migratory shorebirds.

One of only four Fjord Marine ecosystems in the world, the eco-region hosts the only South temperate and Sub polar marine ecosystem near South America

3.0 Indicator Species

What to look for and record in the **South America - Pacific Coast - Temperate** eco-region:

All Sharks

Low numbers are indicators of overfishing



Tunicate (*Pyura chilensis*)

Low numbers are indicators of overfishing



Abalone (*Haliotis spp.*)

Invasive alien



Barnacle Rock Shell (*Concholepas concholepas*)

Low numbers are indicators of overfishing



Black Sea Urchin (*Tetrapygus niger*)

High numbers are indicators of overfishing



The International Union for Conservation of Nature and Natural Resources (IUCN) provides a listing of species that are at risk of global extinction. The 'IUCN Red List Categories and Criteria' are intended to be an easily and widely understood system and can be found at <http://www.redlist.org> The general aim of the system is to provide an explicit, objective framework for the classification of the broadest range of species according to their extinction risk. If any of the indicator species for this Eco-Region have been classified as Critically Endangered, Endangered or Vulnerable on the list, then we have included that information below.

3.1 Sharks

Identifying sharks in the wild is a great challenge! While scientists can spend weeks examining every detail of a species, divers may encounter a shark for only a few seconds or minutes. Many species look alike and one individual may not be identical to the next. There are, however, relatively few species in any one specific dive site and with some preparation and a little practice it is possible for all of us to recognise the more common and distinctive species.

The key to successful shark identification underwater is a process of elimination, based on a mental checklist of the main features to look for in every animal encountered. One feature alone is rarely enough for a positive identification, so gather as much information as you can before drawing firm conclusions.

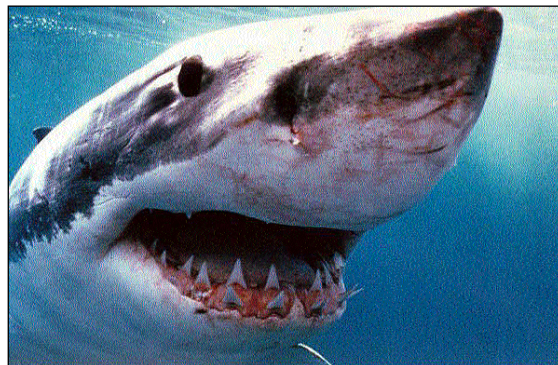
EARTHDIVE wants you to record sightings of sharks. That in itself is valuable. A total count of all species and the time duration of the count is important information in itself and you can record this data in the **Global Dive Log**.



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However, identifying the actual species is even more important. If you do not recognise a species, ask your buddy, dive leader or other divers in the group, who may have seen it also. Or, record unusual features like, needle sharp teeth, incredibly long tail, diamond-shaped open mouth or a flattened hammer-shaped head. All these observations are sufficiently distinctive to help us and others make an identification. Record these details in the notes section for each indicator in the Global Dive Log.



Colour is also helpful – note the main background colours of both the upperside and underside as well as distinctive markings. The dorsal (back) fins can also tell us a lot. Do they have a broad or narrow base? Are they curved or upright? Are they falcate (sickle shaped)? Are the tips rounded or pointed? What is the background colour of the fins?



Blue Shark

Some species have very distinctive dorsal fins - the first dorsal of the oceanic whitetip, for instance, is huge, rounded and conspicuously marked with a mottled white tip.

One thing we are pretty sure of (unless the **Global Dive Log** proves us wrong!), is that all sharks are restricted in their range in one way or another. Whitetip reef sharks are only found in the Pacific and Indian Oceans (including the Red Sea), for example, while bull sharks are found virtually worldwide but only in tropical and sub-tropical waters. Caribbean reef sharks occur mainly around island reefs, whereas oceanic whitetip sharks are more common farther offshore in oceanic waters.

In this way we can tell you which sharks you might encounter in the **South America – Pacific Coast - Temperate** eco-region and some of these are listed below, but given the enormous diversity of species within the region, this list is not all-inclusive:

- | | |
|--|-------------------------------|
| ● Basking Shark | <i>Cetorhinus maximus</i> |
| ● Blue Shark | <i>Prionace glauca</i> |
| ● Bluntnose Sixgill Shark | <i>Hexanchus griseus</i> |
| ● Great White Shark (Vulnerable – IUCN) | <i>Carcharodon carcharias</i> |
| ● Porbeagle Shark | <i>Lamna nasus</i> |
| ● School or Tope Shark (Vulnerable – IUCN) | <i>Galeorhinus galeus</i> |

3.2 Tunicate (*Pyura chilensis*)

Tunicates, commonly called sea squirts, are a group of marine animals that spend most of their lives attached to docks, rocks or the undersides of boats. To most people they look like small, colored blobs. It often comes as a surprise to learn that they are actually more closely related to vertebrates like ourselves than to most other invertebrate animals.

Tunicates are part of the phylum *Urochordata*, closely related to the phylum *Chordata* that includes all vertebrates. Because of these close ties, many scientists are working hard to learn about their biochemistry, their developmental biology, and their genetic relationship to other invertebrate and vertebrate animals.

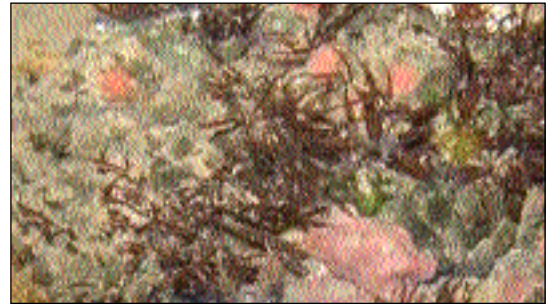
A tunicate is built like a barrel. The name, "tunicate" comes from the firm, but flexible body covering, called a tunic. Most tunicates live with the posterior, or lower end of the barrel attached firmly to a fixed object, and have two openings, or siphons,



projecting from the other. Tunicates are plankton feeders. They live by drawing seawater through their bodies. Water enters the oral siphon, passes through a sieve-like structure, the branchial basket that traps food particles and oxygen, and is expelled through the atrial siphon.

3.3 Abalone (*Haliotis* spp.)

Abalones are slow-growing, herbivorous marine snails. They belong to a large class of molluscs (*Gastropoda*) with single-structured shells. There are over 100 species worldwide in the single genus *Haliotis*, which means 'sea ear', a reflection of the flattened shape of the shell. It is no surprise then that it is called 'Oreille de Mer' in France.



Pyura chilensis



Haliotis

Abalone shells can be oval or rounded, with a row of respiratory pores and large dome towards one end. The strong, muscular foot generates enough suction to allow the abalone to fix itself firmly to rocky surfaces. They are found from the inter-tidal to the depth limit of marine plants, some 80 -100m, from tropical to cold waters.

The related endemic Chilean Abalone or 'Loco' (*Concholepas concholepas*) is from a different gastropod family (*Thaidinae*) and feeds exclusively on green algae. Highly prized as food, the Chilean Abalone has seen significant decline in numbers and is now scarce as a result of overfishing.

3.4 Barnacle Rock Shell (*Concholepas concholepas*)

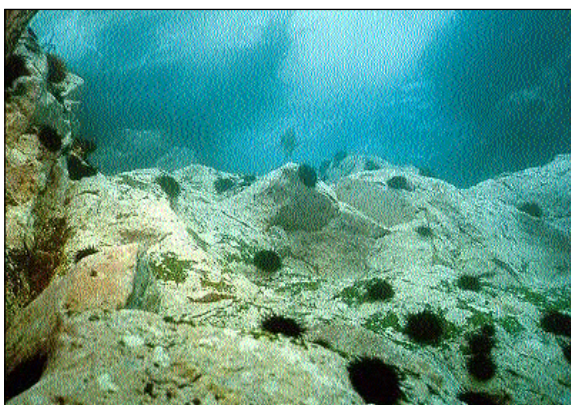
Gastropoda is the largest and most successful class of mollusks (*phylum Mollusca*), containing over 35,000 living species and 15,000 fossil forms. The shell of gastropods is of one piece (called univalve) and usually coiled or spiraled as in snails, periwinkles, conches, whelks, limpets, and abalones.

Concholepas concholepas is a gastropod and lives along the coasts of Peru and Chile in South America. The inhabitants call it 'loco' and collect it for eating.



Concholepas concholepas

3.5 Black Sea Urchin (*Tetrapyrgus niger*)

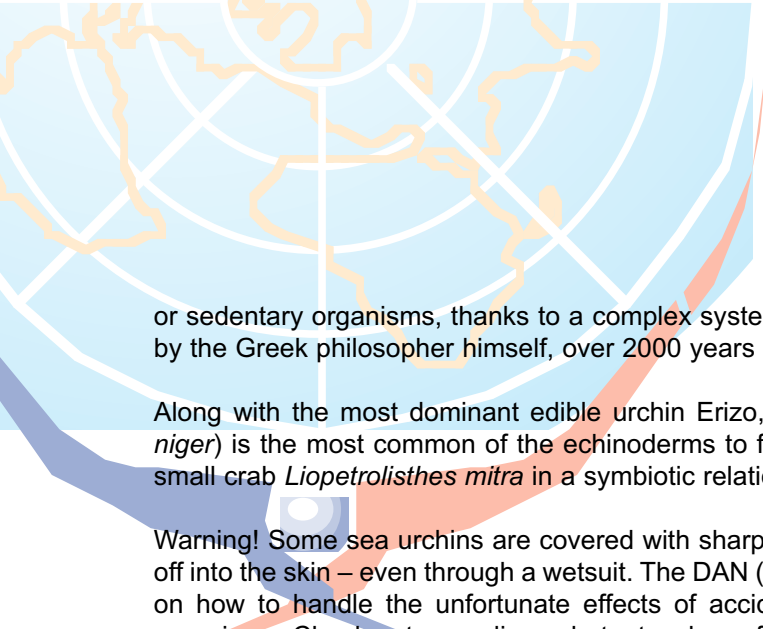


Tetrapyrgus niger

Sea urchins are extremely sensitive to water conditions and are first to show signs of stress, seen when their spines are laid down or are shed. Sea urchins (*echinoderms*) are a group of marine invertebrates that can be found in almost every major marine habitat from the poles to the equator and from the inter-tidal zone to depths of more than 5,000 metres. There are around 800 extant species and the group has a long and detailed fossil record stretching back many millions of years. All echinoderms have tube-feet and these play a very important role in feeding and respiration. Echinoids move by means of spines and climb and cling on to hard substrata by means of their tube-

feet. The spines also offer the primary means of defence. Sea urchins are herbivores and feed in a variety of ways. They have a powerful internal jaw and graze on algae





or sedentary organisms, thanks to a complex system of teeth called the "lantern of Aristotle", first described by the Greek philosopher himself, over 2000 years ago.

Along with the most dominant edible urchin Erizo, (*Loxechinus albus*), the Black Sea Urchin (*Tetrapygus niger*) is the most common of the echinoderms to found on the Chilean coast. It is known to play host to a small crab *Liopetrolisthes mitra* in a symbiotic relationship.

Warning! Some sea urchins are covered with sharp venom-filled spines that can easily penetrate and break off into the skin – even through a wetsuit. The DAN (Divers Alert Network) website contains useful information on how to handle the unfortunate effects of accidental brushes with these and other poisonous marine organisms. Check out www.diversalertnetwork.org for any information that you need.

Note: Many species of fish and plants are known by different names in different locations. Where appropriate, we provide the recognised scientific name, but in the case of common names, for the sake of consistency, we have used the common names as they appear in the fishbase.org database as our default name.

4.0 Anthropogenic pressures

EARTHDIVE is recording five different types of anthropogenic Pressures (effects resulting from the actions of humans). Collection of this data enables us to establish an ever-evolving **Global Snapshot** of our oceans.

The types of anthropogenic pressures are the same for each region and are:

- Surface Pressures paper, wood, plastic and any other man-made debris
- Boat Activity pleasure, fishing, commercial
- Subsurface Pressures litter, sediment, physical damage
- Evidence of Fishing pots, traps, discarded nets, blast damage, cyanide damage, other etc.
- Coastal Development resorts, villages, towns, distance from the dive sites etc.

Please note any information you feel is relevant and record the data in the notes section for each impact in the Global Dive Log.

Thank you.

5.0 eCORD

EARTHDIVE asks all scuba divers to subscribe to the principles of **eCORD** - the **EARTHDIVE** Code of Responsible Diving - and to encourage others to practice them. **eCORD** is a straightforward 7 Point Plan which will help divers to limit the anthropogenic impact of recreational diving - while at the same time making their diving experiences more rewarding and enjoyable. Be sure to incorporate the 7 points in your dive planning!

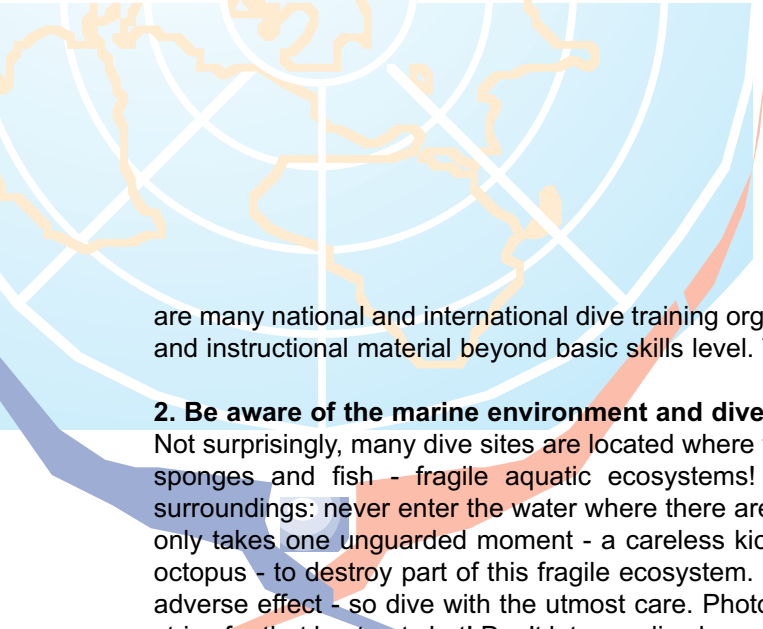
1. Know your limits.

Every dive is different and every diver is different. Always ensure that you dive within the limits of your training and experience, whilst taking due account of the prevailing conditions. Take the opportunity to advance and extend your skills whenever that opportunity arises. In particular, buoyancy skills can become a little rusty after any prolonged absence from the water. If you can't get pool or confined water practice before your trip, get your buoyancy control checked out by a qualified instructor on your first dive! There



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are many national and international dive training organisations which offer a comprehensive range of courses and instructional material beyond basic skills level. Take advantage of them!

2. Be aware of the marine environment and dive with care.

Not surprisingly, many dive sites are located where the reefs and walls play host to the most beautiful corals, sponges and fish - fragile aquatic ecosystems! Starting with your point of entry, be aware of your surroundings: never enter the water where there are living corals, water plants or reeds. Once underwater, it only takes one unguarded moment - a careless kick with a fin, an outstretched hand, a dragging gauge or octopus - to destroy part of this fragile ecosystem. Even fin kicks too close to the reef or sand can have an adverse effect - so dive with the utmost care. Photographers in particular need to take greater care as they strive for that best-yet-shot! Don't let your dive become an adverse anthropogenic impact! And remember that these rules apply just as much to 'hard' dive sites - such as wrecks, which have become the home of diverse marine life - as well as fresh-water and other sites.

3. Understand and respect marine flora and fauna.

A large part of the joy of diving is in learning more about the plants and animals who live in this unique underwater environment. In order to survive and thrive, many living creatures disguise themselves to look like plants and inanimate objects, or develop defence mechanisms such as stings. Some even do both! (Have you seen a stonefish lately?) The **EARTHDIVE** briefing packs (available by download only) provide information about indicator species for the region in which you are planning to dive. In addition, dive training organisations run marine naturalist and identification courses. The more that you learn, the more that you will see, the more that you will derive pleasure from your underwater experience - and the safer you will be for yourself, other divers and the marine environment!

4. Don't interfere.

First and foremost, be an observer in the underwater environment. As a general rule, look don't touch. Remember that polyps can be destroyed by even the gentlest contact. Never stand on coral even if it looks solid and robust.

Always resist the temptation to feed fish and discourage others from doing so. You may interfere with their normal feeding habits, damage their health and encourage aggressive behaviour. Leave only your bubbles!

5. Take only what you need.

The marine environment is a valuable source of food for mankind and it is important that it remains so into the future. If you are among those divers who enjoy taking food from the sea, observe some simple rules:

- Obtain any necessary permits or licenses.
- Comply with all relevant fish and game regulations. These are designed to protect and preserve fish stocks, the environment and other users.
- Only take what you can eat. If you catch it and can't eat it, put it back.
- Never kill for the sake of 'sport'.
- Avoid spear fishing in areas populated by other divers or visitors to the area, or where you might cause collateral damage.

Don't be tempted to collect shells, corals or other mementos of your dive. If you want a souvenir, take a photograph!

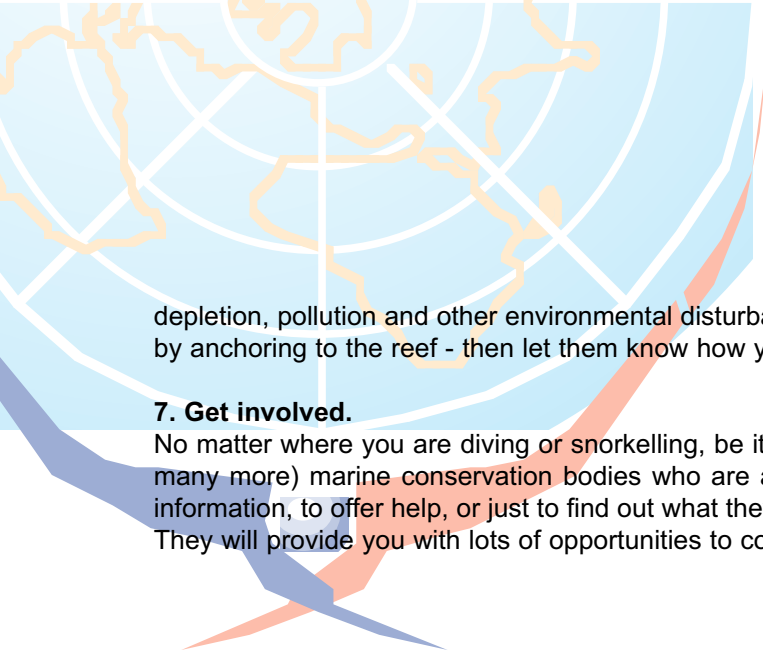
6. Observe and report.

As an **EARTHDIVE** member, you will be in a unique position to monitor and report on the health, biodiversity and any obvious damage to dive sites using the **EARTHDIVE** Global Dive Log. In addition, we would encourage you to report anything unusual to the appropriate local marine and environmental authorities, or if this is difficult, get your dive centre to do it for you. They have a vested interest in a healthy marine environment, and will normally be more than willing to help. Always be on the lookout for physical damage, fish stock



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depletion, pollution and other environmental disturbances. If the dive operation itself is causing damage -say by anchoring to the reef - then let them know how you feel in no uncertain terms!

7. Get involved.

No matter where you are diving or snorkelling, be it at home or abroad, there will be at least one (and often many more) marine conservation bodies who are active in the area. Don't be afraid to approach them for information, to offer help, or just to find out what they have to offer. You will receive an enthusiastic welcome! They will provide you with lots of opportunities to contribute to marine conservation.



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Tunicate (*Pyura chilensis*)

How many Tunicate did you see? (tick box and/or record actual number)

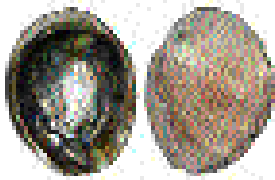
0 1 - 5 6 - 20 20 - 50 51 - 250 >250

Actual Number (write actual number)

How long were you looking for this indicator? (minutes)

Add your additional information here. In what type of habitat did you see this indicator? What was it doing? At what depth did you see it/them? It would be helpful if you note whether the tunicates you observed were in separate colonies, and over how large an area each colony was spread (m²).

Additional Information:



Abalone

How many Abalone did you see? (tick box and/or record actual number)

0 1 - 5 6 - 20 20 - 50 51 - 250 >250

Actual Number (write actual number)

How long were you looking for this indicator? (minutes)

Add your additional information here. In what type of habitat did you see this indicator? What was it doing? At what depth did you see it/them? It would be helpful if you note whether the abalones you observed were in separate colonies, and over how large an area each colony was spread (m²).

Additional Information:





Barnacle Rock Shell

How many Barnacle Rock Shells did you see? (tick box and/or record actual number)

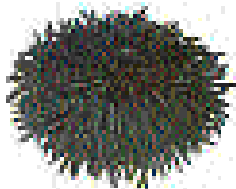
0 1 - 5 6 - 20 20 - 50 51 - 250 >250

Actual Number (write actual number)

How long were you looking for this indicator? (minutes)

Add your additional information here. In what type of habitat did you see this indicator? What was it doing? At what depth did you see it/them? It would be helpful if you note whether the barnacle rock shells you observed were in separate colonies, and over how large an area each colony was spread (m²).

Additional Information:



Black Sea Urchin (*Tetrapygus niger*)

How many Black Sea Urchins did you see? (tick box and/or record actual number)

0 1 - 5 6 - 20 20 - 50 51 - 250 >250

Actual Number (write actual number)

How long were you looking for this indicator? (minutes)

Add your additional information here. In what type of habitat did you see this indicator? What was it doing? At what depth did you see it/them? It would be helpful if you note whether the black sea urchins you observed were in separate colonies, and over how large an area each colony was spread (m²).

Additional Information:



Post Dive Recording Sheet - **Anthropogenic Pressures**



Surface Pressures

Did you see any Surface Litter? (tick box)

Yes No Dont Know

If yes please record any details (plastic, wood, paper, other etc.) Please record quantity and any other relevant information.



Boat Activity

Did you see any Boat Activity? (tick box)

Yes No Dont Know

If yes please record any details (i.e fishing boats, pleasure boats, commercial vessels any other etc)

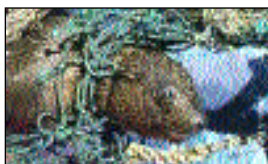


Subsurface Pressures

Did you see any Surface Litter? (tick box)

Yes No Dont Know

If yes please record any details (litter, sediment, physical damage, coral bleaching other etc).

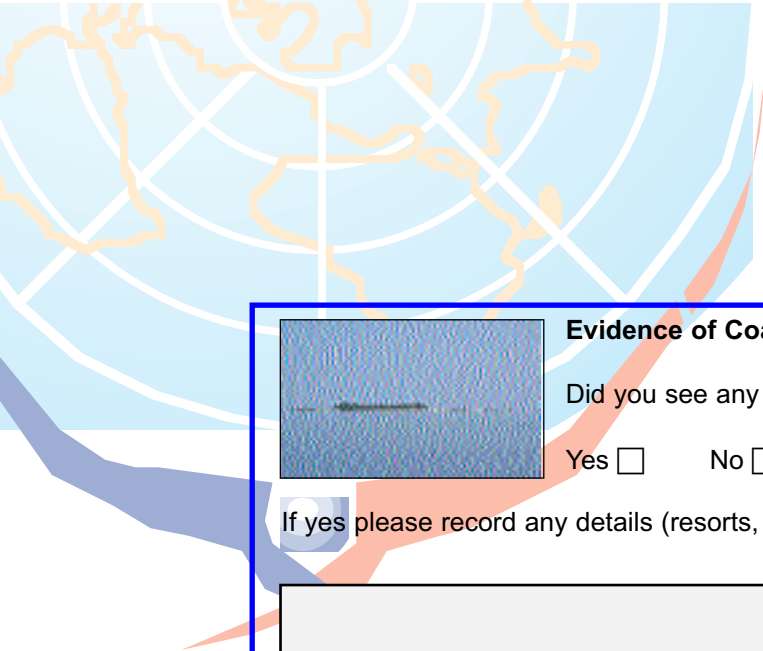


Evidence of Fishing

Did you see any Surface Litter? (tick box)

Yes No Dont Know

If yes please record any details (pots, traps, discarded nets, blast damage, cyanide damage, other etc).



Evidence of Coastal Development

Did you see any evidence of Coastal Development? (tick box)

Yes No Dont Know

If yes please record any details (resorts, villages, towns, distance form the dives site etc).

Evidence of the illegal trade in endangered species

Any observations you make below and record in the Global Dive Log will be passed onto **TRAFFIC**, the world's wildlife trade monitoring network.

TRAFFIC works to ensure that the trade in wild plants and animals is not a threat to the conservation of nature. It has offices covering most parts of the world and works in close co-operation with the Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). **TRAFFIC** is a joint programme of WWF and IUCN-The World Conservation Union.

Evidence of the illegal trade in endangered species

Did you find any evidence at any time during your holiday/dive trip of the illegal trade of endangered species. (tick box)

Yes No Dont Know

If yes please record any details (the species, sale location, and any other available information). Please refer to the **TRAFFIC** Guide for more information concerning species identification, local laws, and contact information of **TRAFFIC** to report offences.



© Elizabeth Fleming
Turtle shell ornaments on display

TRAFFIC

