EARTHDIVE

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

PRE-DIVE BRIEFING PACK

Eco-Region 11b

Polar - Antarctic

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1.0 General Information

This booklet is a **pre-dive briefing pack** for the **Polar - Antarctic** 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.

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

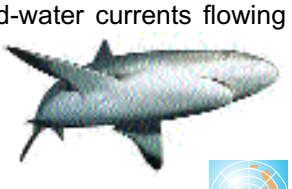
2.0 The Polar - Antartic Eco-Region

This ecoregion comprises the continent of Antarctica, plus Bouvet Island, the French Southern Territories and Heard and McDonald Islands.

Antarctica is the fifth largest and most isolated of our planet's continents, and an extreme environment for all life forms, particularly human! It is asymmetrically centred on the South Pole and almost entirely within the Antarctic Circle. Diving in these remote polar waters is possible, and those who are fortunate enough to do so will find that the rich marine life of Antarctica is incredibly diverse: sea slugs, sea cucumbers, fish and marine mammals are abundant. In addition to the sights of the region, such as the wonderful ice formations of icebergs, there are also the underwater sounds of this frozen continent. Important with all diving activities, even more important here, you must always be certain that you are in skilled, professional hands when you venture into the unknown and that you are suitably technically qualified.

Marine biologists have long had a fascination for Antarctic biota – the combined flora and fauna of the region. Despite the extreme cold - and despite being considered to be a low-productivity marine ecosystem due to limited light penetration and the cold - the Antarctic benthos is surprisingly diverse and extraordinarily beautiful. Whilst there is much that is familiar, the isolation and hostile environment means that several groups of flora and fauna are restricted to this southernmost part of the planet.

Many areas enjoy a very productive water column, which provides a rich source of sedimenting organic matter for both bottom feeding and suspension-feeding animals. The upwellings and cold-water currents flowing around Antarctica release large quantities of nutrients that cause plankton blooms. This gives rise to diverse community of bottom feeders and their predators, phytoplankton, zooplankton, fish, squid, seals, whales, and birds.



The marine ecosystem in areas of the ocean covered by seasonal ice is dominated by Antarctic krill, a small shrimp-like crustacean. The krill swarms are seasonal and

much of the food chain depends on them. The species found at this latitude have developed sophisticated mechanisms for survival under very cold conditions.

The Ross Sea is an arm of the Southern Ocean, between Victoria Land and Marie Byrd Land and where the sea extends further south than at any other point. It was discovered by the British explorer, Sir James Clark Ross, in 1841. Ross Island with Mt. Erebus, an active volcano, is in the western part of the sea; Roosevelt Island is in the east. The Ross Sea's southern extension is the Ross Ice Shelf, a great frozen area whose 400-mile seaward side is the source of huge icebergs. **McMurdo Sound**, on the western side of Ross Sea, is usually free of pack ice in late summer and has been the most important staging point for exploration and scientific investigation.

The Weddell Sea supports an enormously rich marine ecosystem, where huge quantities of krill provide food for a diverse population of fish and marine mammals. The sea also supports thriving colonies of penguins, which lay their eggs and raise their young on the Antarctic Peninsula. Important species include king penguins (Aptenodytes patagonicus), the Weddell seal (Leptonychotes weddelli), crabeater seals (Lobodon carcinophagus), humpback whales (Megaptera novaeangliae), and the minke whale (Balaenoptera edeni).

The Norwegian dependant territory of Bouvetøya – or **Bouvet Island** – is an inhospitable volcanic island that lies some 1,600 km south west of the Cape of Good Hope, on the southern extremity of the Mid-Atlantic Ridge. Uninhabited, it is now rarely visited since sealing and whaling ceased in the Southern Ocean. The island is permanently covered in ice several hundred feet thick. It was made a nature reserve in 1971.

The French Southern Territories - more correctly called 'Territory of the French Southern and Antarctic Lands' - consist of two archipelagos: Iles Crozet and Iles Kerguelen, and two volcanic islands: Ile Amsterdam and Ile Saint-Paul. There are no permanent inhabitants, but they host a number of researchers studying the native fauna. The Antarctic portion consists of "Adelie Land," a thin slice of the Antarctic continent discovered and claimed by the French in 1840. The 20 small mountainous islands of Crozet are a home to seals, king penguins and other birds, as well as some research scientists. France has designated the islands a national conservation area. The mostly barren islands are subject to low temperatures and long winters although the climate is mitigated somewhat by maritime influences

The Australian Territory of **Heard Island** and **McDonald Islands** lies about 1500 km north of Antarctica and over 4000 km south-west of Australia, near the meeting-point of Antarctic and more temperate ocean waters. The islands are an undisturbed habitat for sub-Antarctic plants and animals, and were declared a Marine Reserve in 2002.

3.0 Indicator Species

What to look for and record in the **Polar - Antarctic eco-region**:

Brachiopods (Lampshells)
Low numbers are indicators of healthy, diverse environment

Erect Bryozoans
Low numbers are indicators of healthy, diverse environment

Well established, diverse sponge assemblages (*Porifera*)
Low numbers are indicators of healthy, diverse environment

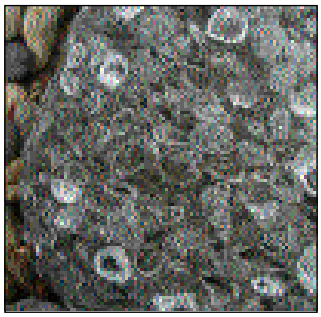
Krill (*Euphausia superba*)
Low numbers are indicators of overfishing

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 Brachiopods

Brachiopods mimic clams in appearance, but are anatomically quite different and are not related to the bivalve mollusc. They are filter feeding marine animals belonging to their own phylum (*Brachiopoda*) of the animal kingdom. Modern brachiopods occupy a variety of seabed habitats ranging from the Tropics to cold Polar waters, especially Antarctic waters. They are ***lophophorates***, one of the major groups within the animal kingdom and so are related to the Bryozoa and Phoronida. In turn, the Lophotrochozoa belong to a larger group within the Kingdom Animalia called the Bilateria, so named because they are bilaterally symmetrical with a left and a right side to their bodies.



They look like clams, at least in the sense that they have two shells. One shell - or valve – is the pedical (*foot or ventral)* valve and is used by the brachiopod to attach itself to a substrate. The other shell is the brachial or dorsal valve, which generally has a rounded elevated section through the midline. They are small animals with the largest living species having a shell length of about 10 cm and most species being much smaller than this.

Brachiopods are also commonly known as lampshells because the shape of the ventral valve of some Mediterranean species is thought to resemble ancient Greek and Roman oil lamps.

Although they seem rare in today's seas, there are about 300 living species of brachiopods and are actually fairly common, occurring in all oceans. However, because of their preference for very cold-water habitats, either in Polar regions or at great depths in the ocean, they are not commonly encountered. Although no longer numerous, they were once one of the most abundant forms of life.

Today Brachiopods are excellent indicators of a healthy, diverse environment.

3.2 Erect Bryozoans

Cheilostomatida bryozoan

In spite of there being a large number of living species – around 5000 – bryozoa remain relatively unknown. The name literally means ‘moss animals’, after the bushy, moss-like appearance of some species. The two main types are encrusting bryozoans and erect bryozoans.

These aquatic – principally marine – animals exist for the most part as colonies of interconnected individuals called zooids. Colonies may consist of just a few zooids, or many millions. Some species encrust rocky surfaces, shells and algae. Other species form lacy or fan-like colonies. Individual zooids are rarely larger than a millimetre, but colonies can range in size from just a few millimetres to several metres. Because of the colony forming nature of bryozoans, and because they are highly varied in both form and shape, they are sometimes confused with corals, hydrozoans and even seaweeds and sponges. Bryozoan colony structures and forms range from creeping colonies consisting of series of zooids arising from encrusting stolons (a stem like structure of colonial organisms from which new individuals arise by budding) to elaborate erect branching forms, and from encrusting patches and sheets to mounds and erect lobed and plate forms. Sea slugs and sea spiders, sea

urchins and various molluscs prey on them.

The sessile (attached) bryozoans form colonies of zooids by asexual 'budding', the process by which a smaller individual develops on, and then separates from, the larger parent body. This is a fast way to increase the bryozoan colony's size. They can also reproduce sexually, by producing sperm and egg cells.

The external skeletal walls of are calcareous (comprised of calcium carbonate) and the individual zooids sit in the equivalent of a calcified box with a gated opening from which a protruding feeding structure captures small plankton. Bryozoans have a a series of ten retractable tentacles with beating cilia (microscopic hairs) which gather the food from the water column and pass it down into the body cavity, where it is sucked into the stomach for digestion. This feeding structure is called the lophophore.

A large number of the 5000 species are polymorphs – that is to say that the colony supports several types of zooid – each type carrying out a different colonial function. These differing functions can include feeding (the autozooid), defensive action (*avicularia*), reproductive activity (*gonozoids*) and general housekeeping (*vibracula*)!

The bryozoan phylum contains three major living groups:

The order **Cyclostomata** are bryozoans with calcified colonies and tubular zooids with terminal orifices for lophophore protrusion. Encrusting, mound and erect branching forms are found within this group.

The order **Cheilostomata** are calcified colonies often with rectangular box-like autozooids with sub-terminal orifices for lophophore protrusion. This is the largest group of bryozoans. A very wide range of encrusting, mound and erect colony morphologies are found in this order.

Non-calcified bryozoan colonies comprise the order **Ctenostomata**. The group includes delicate forms in which autozooids or clusters of autozooids arise from branching encrusting or erect stolons. Other species grow as fleshy encrusting sheets or erect lobes.

So little is known about the ecology and distribution of bryozoans that many opportunities exist for furthering our understanding of this fascinating group of animals. Only a minority of bryozoan species can be identified reliably using gross colony identification – and even then only by an expert. In most cases, microscopic examination of structures at the level of the zooid is necessary. For our purposes we only need to know that a colony, or colonies, have been monitored. However, if you can identify the species, all well and good! Some of the many individual species groups are noted below.

Colonies of erect **Bryozoan *Camptoplites spp***. are at their most diverse on the Antarctic Shelf but can also be found in the Indian, Atlantic, and Pacific Oceans. They have dichotomous branching (dividing by pairs) at regular intervals, and can grow to heights in excess of five centimetres. They can develop slender, open branched forms, dense feathery tuft forms, or highly branched fan-shaped forms.

Reteporella spp. bryozoans form erect netted colonies with their branches fusing at regular intervals leaving elongated spaces between. Reteporella spp. colonies can take the form of a tree, a netted cup, or sheet-like folds. They are abundant in the Ross Sea in both shallow and deeper water.

The cyclostomate bryozoa ***Hornera spp.*** are found throughout Antarctica, the Antarctic Peninsula, sub Antarctic islands and Tierra del Fuego.

Cellaria spp. form erect, tufted, dichotomous-branching colonies attached to the substrate by chitinous rhizoids (rudimentary rootlike organs). Abundant quantities of the species ***Cellaria moniliorata*** are found in the Ross Sea at depths below fifty metres.

Diverse assemblages of bryozoans are an indicator of healthy shores and coastal seabeds. Growth and diversity can be adversely affected by acute or chronic exposure to sewage effluent, oil or other chemical pollutants. Physical damage can be caused by towed fishing gear and by the careless diving activities.

3.3 Well established, diverse sponge assemblages (*Porifera*)

With more than 5000 species known across the world, sponges, (***Porifera***) come in an incredible variety of colors and an amazing array of shapes, ranging from a few millimetres to two metres across. They are predominantly marine and are found in virtually all aquatic habitats, although approximately 150 species are found in freshwater. The phylum name *Porifera* means pore-bearing, reflecting the perforated surfaces of the sponge's tissue.

Sponge shape and size is affected to some degree by the environmental conditions they inhabit - strong currents, differing substrata and so forth lead to a great diversity even amongst the same species.

Sponges are primitive multi cellular animals whose porous body is supported by a fibrous skeletal framework. They have a simple kind of cellular-level organization, meaning that that their cells are specialized so that different cells perform different functions. However, similar cells are not organized into tissues and the body is a sort of loose aggregation of different kinds of cells.

Despite being classified as this most primitive form of simplistic body structure that lacks organs and true tissues, sponges can demonstrate sophisticated cellular systems, complex developmental and reproductive processes, versatility in feeding behaviour, production of unique natural chemicals and intimate symbiotic relationships with other organisms

Dependent on how the body is organised, sponges fall into three main groups. The simplest form is the **asconoid** group of sponges. These are shaped like a simple tube perforated by pores. The open internal part of the tube is called the spongocoel; it contains the collar cells which carry beating flagellae, the tiny hairs which drive water movement. The single opening to the outside is called the osculum.

The **syconoid** group of sponges are the next most complicated group. These tend to be larger than asconoids and also have a tubular body with a single osculum, but their body wall is thicker and the pores that penetrate it are longer, forming a system of simple canals. These canals are lined by collar cells, the flagellae of which move water from the outside, into the spongocoel and out the osculum.

The largest and most complex sponges are the **leuconoids**. These sponges are made up of masses of tissue penetrated by numerous canals which lead to numerous small chambers lined with collar cells. Water moves through the canals, into these chambers, and out via a central canal and osculum.

Sponges feed on detritus particles, plankton and bacteria that are brought close by water currents created by the collar cells. Food items are taken into individual cells where digestion occurs.

As with Bryozoa in the section above, sponges can reproduce by both sexual and asexual means. Asexual reproduction is via external budding, although some species can also form internal buds, or gemmules, which can survive conditions that would otherwise kill the parent sponge.

Sponges also provide a home for a number of small marine plants, which live in and around their pore systems. Symbiotic relationships with bacteria and algae have also been reported, in which the sponge provides its symbiotic partner with support and protection in return for a range of benefits including nutrition, transportation of chemicals throughout the sponge tissue, assistance in chemical defence and removal of waste products from the sponge. The microbial biomass can also contribute to the rigidity of the sponge structure.

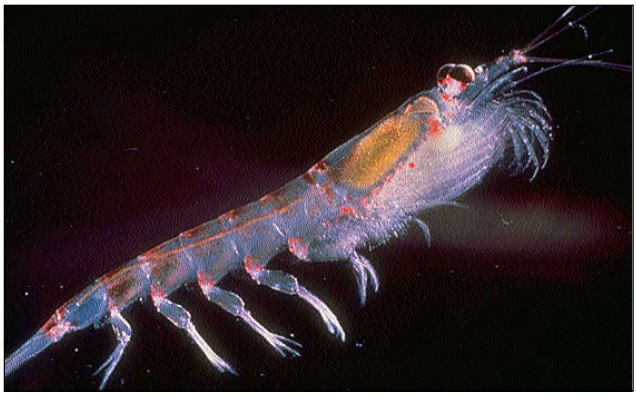
The world of medical science has a keen interest in sponges, as they are the source of more natural chemicals than any other marine invertebrate. Many of these compounds have potent bioactive properties (anti-tumour, anti-inflammatory, anti-

viral and anti-microbial.

The microbial community associated with Antarctic sponges is well adapted to extreme and pristine, environmental conditions. This makes them potentially susceptible to small-scale fluctuations in water quality and levels of environmental contamination. Antarctic sponges have been found to be long-lived and sensitive to disturbance. As such, they represent sensitive indicator species reflecting environmental health.

3.4 Krill (*Euphausia superba*)

There are around 85 krill species, ranging in size from 1cm to 14cm. The dominant species in the southern polar waters is the Antarctic krill (*Euphausia superba*), a small shrimp-like crustacean which plays a key role in the Antarctic food web. Krill is considered to be a keystone species, as it is the staple food of many fish, birds and mammals in the Southern Ocean. They are exclusively marine and have a life span of about 5 to 10 years. They are one of the most abundant and successful animal species on the planet. The total biomass of krill exceeds that of the human race. Put another way, the combined weight of the planet's krill population is greater than the combined weight of every man, woman and child on earth.



Euphausia superba

Antarctic krill occur in groups or large swarms and occupy a niche similar to that of the herring in the North Atlantic, since large schools of pelagic fish are absent in these waters. They grow to 6 cm and weigh around 1g, feeding primarily on phytoplankton (microscopic plant life) or sea ice algae. They have five pairs of swimming legs, large black eyes and congregate in huge swarms near the surface, which can colour the water from pink to orange to red. They are mostly transparent, although their shell is tinged a bright red by small pigment spots. Their digestive system often reflects the pigmentation from their phytoplankton diet, and can appear as a vivid green. The overall appearance of live specimens is quite beautiful.

The krill's feeding mechanism is a dense comb of hair along a further six pairs of forward legs, each of which is split into two branches and covered with a net-like array of feathery seta (stiff hair). This is designed to filter phytoplankton from the water column and to scrape algae from the ice.

There is a degree of uncertainty as to how krill survive the Antarctic winter. They do not appear to build up reserves of fat, so must either use some food available under the ice such as sea-ice algae, detritus on the sea floor, or perhaps become omnivorous and supplement their normal phytoplankton diet with other animals in the water. There is laboratory evidence to suggest that Antarctic krill can survive for 200 days without food, using up the very material of their body to meet their metabolic needs and shrinking in the process.

Apart from frequenting the sea ice to feed, krill, in particular juveniles, seek protection from predators in the many nooks and crannies formed by the deformed sea ice floes.

Krill spend their days at depths of around 100 m, generally safe from their major predators. They swim to the surface at night to feed, congregating in huge swarms, often thousands of metres across at densities of thousands per square metre, attracting large carnivorous animals such as baleen whales, seals, pelagic fish and sea birds.

The Antarctic krill is also caught commercially for human and livestock consumption, with an annual catch of around 120,000 tonnes.

When surveying krill during your dive, you may come across just a few of the indicator species, or indeed a large 'swarm'. If just a few, then record the numbers

as accurately as possible. If you encounter a large aggregation then it should be recorded as abundant, i.e. 5 on the DAFOR scale. You could also try to estimate the size of the krill 'swarm' (in cubic metres) if it is distinct enough to do so, and also record the number of 'swarms' seen during the dive if there is more than one.

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 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 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.

6.0 Appendices

Post Dive Recording Sheet - **General Data** (complete/add/delete/tick as applicable)

Dive No: ☐☐☐☐☐ **Dive Site Name:** ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

GPS: N/S: ☐☐•☐☐☐☐☐☐☐ E/W: ☐☐•☐☐☐☐☐☐☐ (Decimal Degrees up to 7 decimal points)

Date:☐☐/☐☐/☐☐☐☐ **Boat** ☐ **Shore** ☐ **Water Type:** Salt ☐/Brackish☐/Fresh☐

Dive Type: Recreational ☐ Technical ☐ Training ☐ Drift ☐ Search ☐ Wreck ☐ Drift ☐ Night ☐ Other ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Time In: ☐☐:☐☐ **Time Out:** ☐☐:☐☐ (24 hour clock) **Dive Time:** ☐:☐☐ (hr:mins)

Air/Nitrox Start: ☐☐☐ End: ☐☐☐ (psi or bar) **Max Depth** ☐☐☐ (ft/m)

Visibility: ☐☐☐ ft/m **Temperatures: water**: ☐☐°C/☐☐°F **air**: ☐☐°C/☐☐☐°F

Current: None ☐ Light ☐ Medium ☐ Strong ☐ (tick)

Surface Conditions: Cloudy ☐ Sunny ☐ Partly Cloudy ☐ Rain ☐ Variable ☐ other

IF DIVING WITH A CLUB/DIVE CENTRE/LIVEABOARD OR RESORT, WERE YOU GIVEN AN ENVIRONMENTAL BRIEFING: YES ☐ NO ☐

Please record any other information you normally record immediately following a dive. Add this data to the **earthdive** website via your control panel as soon as possible. **Thank you**

Post Dive Recording Sheet - **Indicator Species**
Important Note: If you allocated some time to looking for one of the indicator species, but didn't find any, please make sure that you record a **0 (zero)** count in the appropriate box, and record how much time you spent looking for the indicator.

Brachiopods
How many Brachiopods 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? Can you record its species? What was it doing? At what depth did you see it/them?

Additional Information:

Erect Bryozoans

How many erect Bryozoan colonies 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? Can you record its species? What was it doing? At what depth did you see it/them?

Additional Information:

Well established, diverse sponge assemblages

How many well established, diverse sponge assemblages did you see? (tick box and/or record actual number)

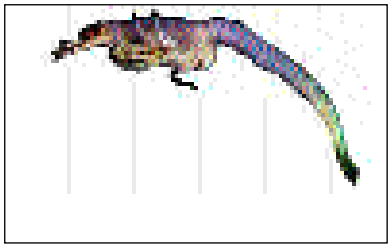
0 ☐ 1 - 5 ☐ 6 - 20 ☐ 20 - 50 ☐ 51 - 250 ☐ >250 ☐

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? Can you record any of the species in the assemblage? What was it doing? At what depth did you see it/them?

Additional Information:



Krill (*Euphausia superba*)

How many Krill did you see? See notes in section 3.4 (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? Can you record its species? What was it doing? At what depth did you see it/them?

Post Dive Recording Sheet - **Anthropogenic Pressures**

Surface Pressures

Did you see any Surface Litter? (tick box)

Yes ☐ No ☐ Dont Know ☐

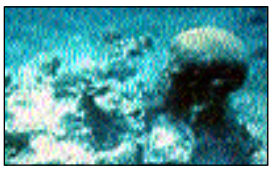
If yes please record any details (plastic, wood, paper, other etc.) Please record quantity and any other relevant information.

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, cynanide 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.

© **Elizabeth Fleming**
Turtle shell ornaments on display

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.

TRAFFIC