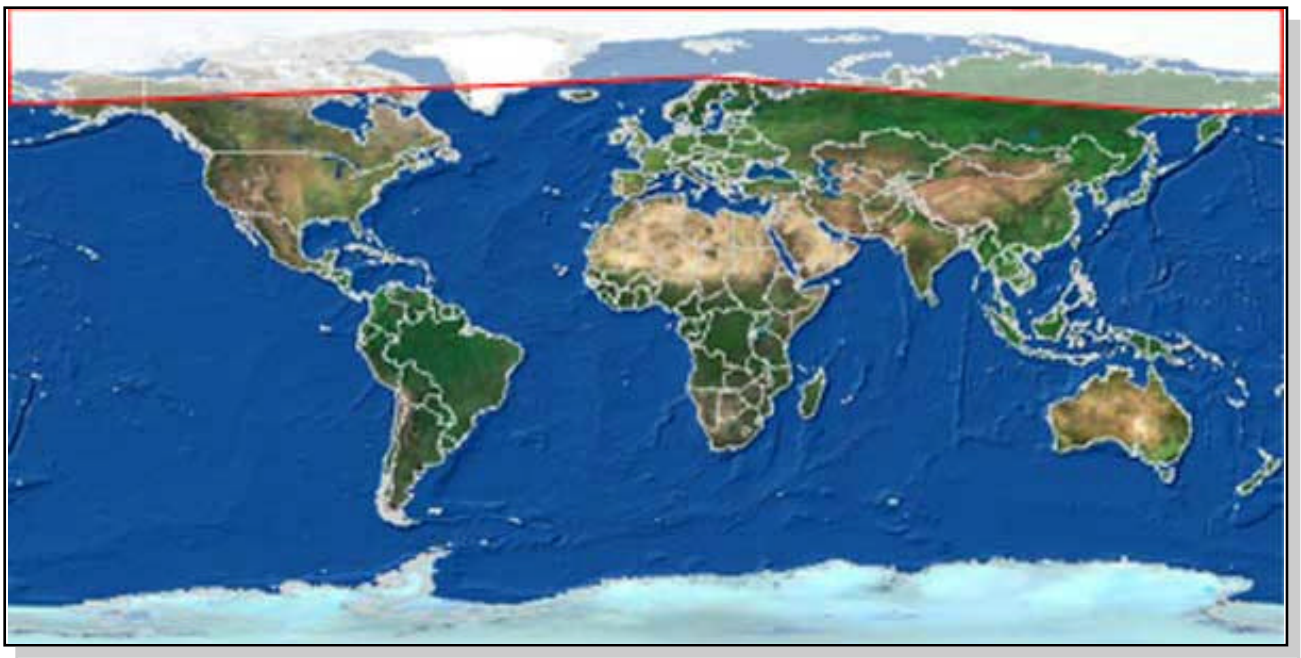
EARTHDIVE

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

PRE-DIVE BRIEFING PACK

Eco-Region 11a

Polar - Arctic



The **earthdive** Global Dive Log is sponsored by P&O

Contents

1.0 General Information

This booklet is a **pre-dive briefing pack** for the **Polar - Arctic** 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 complete an EARTHDIVE Science Log.

1.1 Introduction

The **EARTHDIVE Science Log** is a pioneering methodology that has been developed in partnership with **Coral Cay Conservation** and other marine scientists from around the world. Scientists established 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.

EARTHDIVE members can observe and record sightings of these marine animals during their dive(s) and enter observations in their own **Science Log**. EARTHDIVE members can also log 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 EARTHDIVE members in the **Global Dive Log**.

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 Science Log to record sightings of these exciting animals.

Collecting this valuable information for EARTHDIVE helps create the **Global Snapshot** - a valuable research tool.

This briefing pack lists the indicator species and anthropogenic pressures for the **Polar - Arctic** eco-region - where you have chosen to dive!

Thank you for recording scientific information for EARTHDIVE.

1.2 How to record a Science 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 king crabs, which you count for 10 or 15 minutes. On the other hand you may look for rare species such as ringed seals 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 Science 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 Science 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 - Arctic Eco-Region

This eco-region includes the Canadian Arctic territories of Nunavut, Yukon and the Northwest Territory; Russia's Northern Coast; Greenland; the Norwegian provinces (fylke) of Finmark and Troms; Norway's dependencies of Svalbard and Jan Mayen Islands.

Whilst the freezing waters of the polar Arctic are not a natural destination for recreational divers, there are a number of important Large Marine Ecosystems (LME's) that are worthy of note.

The Kara Sea Large is located within the Arctic Circle on the huge Siberian shelf. This shallow sea is seasonally ice covered. The influx of warm ocean currents from the North Atlantic and high salt levels help provide mainly ice-free conditions from May to October, whilst a number of rivers (The Yenisei, Taz and Ob) discharge into the sea and are an important source of fresh water and nutrients. The rocky coasts harbour many small bays and inlets and are covered in shrubs and moss. There are many diverse habitats in this region. The Kara Sea LME is considered to be low in productivity, primarily because of the winter ice cover and the limited availability of both light and nutrients. Zooplankton biomass production is relatively low, and the distribution and species composition is influenced by the proximity of the Atlantic Ocean
A diversity of wildlife is found in the area, including bearded seals, walruses, and narwhals. The polar bear hunts for seals on the frozen edge of the sea and fish such as Arctic cod, flatfish, and smelt are abundant. The largest marine protected area on the northern hemisphere, the Franz-Josef-Land nature reserve, is located within the region.

The Barents Sea is another shallow sea, bounded by Atlantic water in the south and west, and by Arctic or mixed water in the north and east, with large seasonal and

annual changes in ocean climate. The distribution, growth and recruitment of the area's major fish species is greatly influenced by climatic conditions, with ice covering between one and two thirds of the sea. The ice cover varies considerably by season and by year. Deemed to be moderately productive, the Sea is affected by three major current systems, the Norwegian, the Atlantic and the Arctic current systems. The ecosystem is characterized by a food web with only a few dominant species such as diatom, krill, capelin and cod.

The Bering Strait and associated islands is a critical area for marine life migrating to and from summering grounds in the Chukchi Sea and elsewhere in the Arctic Ocean. The region supports huge seabird populations, including nearly 2 million murres and auklets, as well as one of the largest salmon runs in the world. There are also extensive kelp forests and eelgrass beds in coastal lagoons. The terrestrial portion of this area includes polar desert (the word "Svalbard" in fact means "cold desert"), as well as productive tundra areas. Arctic terns breed here, before traveling 36,000 km to winter in Antarctica. The strait is used by 14 species of marine mammals, such as the endangered bowhead (Balaena mysticetus) and gray whales (Eschrichtius robustus), several species of seals, and walruses (Odobenus rosmarus)

The West Bering Sea is considered moderately productive, and includes over 450 species of fish, crustaceans and mollusks. The reported 25 species of marine mammals include polar bears, whales, walruses, and sea lions. The Bering Sea provides important habitat for gray whales, endangered stellar sea lions and a large diversity of seabirds. The sea hosts the world's largest fish biomass for Pacific cod and cod-like fishes, with other fisheries including salmon, Alaskan pollock, walleye pollock, flatfish, rockfish, halibut, flounder and herring. The extent of the winter pack ice has markedly decreased, with the winter of 2001 heralding a relatively ice-free Bering Sea.

Is diving amongst icebergs, seals, seabirds, walruses and polar bears in sub zero waters the ultimate dive challenge? There are a small number of organisations geared to help you to do just that. 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.

3.0 Indicator Species

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

King Crab (*Paralithodes camtschatica*)
Low numbers are indicators of invasive alien - Barents Sea

Arctic Cod (*Boreogadus saida*)
Low numbers are indicators of overfishing

Ringed Seal (*Phoca hispida*)
Low numbers are indicators of endemic species / climate change

Mysid Shrimp (*Mysis littoralis*)
Low numbers are indicators of overfishing

Salmon - Pacific [*Oncorhynchus spp*. - 4 species] and Atlantic (*Salmo salar*)
Low numbers are Indicators of climate change in the Pacific and invasive alien in the Altantic

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 King Crab (*Paralithodes camtschatica*)

Originating from the Sea of Okhotsk in the Camchatca region of eastern Russia, and also native to the Bering Sea, the red king crab (*Paralithodes camtschatica*) was introduced to parts of the Russian waters of the Barents Sea in the 1960's. In the mid 1970's, individual specimens started to appear as bycatch on both sides of the shared Russian/Norwegian border. Since that time, bycatch numbers have increased significantly in that region.

The king crab is a valuable food source and as the world's largest edible crab, it is the most commercially important of all crabs. Whilst a number of studies have examined the optimum harvesting strategies for the species, very little has been done to understand the potential ecological impact that the species is likely to have in non-native waters.

The crab's diet appears to include a wide range of organisms, especially polychaetes worms, small bivalves such as clams and echinoderms like sea urchins and starfish. It consumes large quantities of food relative to its body size; creating concern that serious depletion of some benthic (bottom dwelling) species may occur where there are high concentrations of crabs in a limited area. The crab may well be a significant food competitor of bottom-feeding fishes. Whilst they do not compete directly with any other species, as they are generalist predators and voracious feeders, they can alter the balance of the ecosystem.

The red king crab population is dramatically rising in numbers and spreading in distribution. The Barents Sea population has increased six-fold since 1995, with an estimated 12 million members of the species now resident.

The crabs can be found at depths ranging from the shoreline down to 400 metres, depending on size, age and season.

One of the largest crabs, they can live for up to 25 years in the Arctic and can grow up to 1.5m, weighing up to 8-10 kg. King crabs are unique in that they have only 6 legs while most crabs have 8. When alive, it is actually dark burgundy in colour.

There are two other species of king crab that can be found in the region. The blue king crab (*Paralithodes platypus*) is actually brown when alive, with royal blue highlights. It has more spines on the shell.

The shell of the smaller brown or golden king crab (*Lithodes aequispina*) is a uniform light brown to golden colour. These last two species should not be recorded in the Science Log, but please feel free to note any that you see in your dive log, so that other earthdivers can share in your experience.

3.2 Arctic Cod (*Boreogadus saida*)

The Arctic or polar cod (*Boreogadus saida*) is distributed throughout the ecoregion and occurs in coastal habitats during both summer and winter months. It is able to tolerate a wide range of temperatures, saline levels and turbidities. It is found further north than any other fish species.

Arctic cod spawns only once during its life cycle. When newly hatched the larvae feed on copepods larvae (very small crustacea) and eggs. As they grow, they graduate to krill and other crustaceans, then to small fish. Adult cod feed mainly on fish such as capelin and herring and can grow to 40cm in length, though will typically be around 25cm. Although this species has a similar appearance to other southerly cod species, its slender body, deeply forked tail, projecting mouth and small barbel on its chin easily differentiate it.

The colouring is brown along the back, with fine dark points. The sides and stomach

are silvery; the fins almost black, with a pale streak at the base. The jaws are of almost equal length, with the lower jaw perhaps slightly longer. There are three dorsal (back) and two anal fins, each distinctly separate from each other. The one Pectoral fin reaches beyond end of first dorsal fin; and a pelvic fin has a slightly elongated ray. The body tapers toward the tail.

In the arctic, fish are generally less colourful than their southern counterparts, with the reduced sunlight making visual cues less important.

These fish are a key component of the arctic community's food chain as they are the primary food source for narwhals, belugas, ringed seals and a number of sea birds. Other predators such as Atlantic cod, Arctic char, Greenland halibut and Atlantic salmon also prey on Arctic cod. They are the principle consumers of plankton in the upper water column, unlike their cousins the Atlantic cod, which feed on the bottom.

3.3 Ringed Seal (*Phoca hispida*)

The ringed seal is the most common of the Arctic seals. It is not generally found on the open sea, but instead prefer areas where the ice is firm. It is distributed throughout the northern parts of the Baltic Sea, Canada, Alaska, Siberia and along Pacific Japanese coasts.

Adult ringed seals grow to 140-150 cm in length, with females slightly smaller than males. It is similar in shape and color to common seals, although generally darker. The belly is silver gray color and the dorsal side is pale gray with dark spots that are surrounded with pale colored rings.

The ringed seal is an opportunistic feeder, spending most of the time from late summer to early spring on this activity. It feeds mainly on benthic (bottom dwelling), nektonic (swimming) and planktonic organisms. In winter a large portion of the diet consists of Arctic cod

The female ringed seal matures reproductively at about 6 years of age and may bear one pup per year. Most mating occurs in late April and early May, which is within one month of birth. Pups can be taken from the birth lair on the ice by bears, foxes, and humans. As a result of this strong predation, the pups spend a large proportion of time in the water and learn to dive at a very young age.

Adult seals are solitary except for loose feeding aggregations in the water in summer. Starting in mid-May, they drag themselves onto the ice and bask in the sun. They moult at this time and feed infrequently. Groups of seals at haul out sites are large and seals lying on the ice are vigilant and aggressive.

Ringed seals preferred is areas that freeze to stable ice in winter. They live in darkness under ice for several months during the year. Ringed seals make lairs in the snow and ice for protection from predators and thermal shelter. They can occupy ice covered areas by maintaining breathing holes and breathing through cracks in the ice.

3.4 Mysid Shrimp (*Mysis littoralis*)

There are several crustacean forms that are commonly called shrimp although they do not belong to the same order as the true shrimp, order Decapoda, which also includes the lobsters and crabs.
Mysid shrimp are not true shrimps, although they look very similar. Mysid shrimp (*Mysis littoralis*) are members of the order Mysidacea.

Often called opossum shrimps because they carry their young in an under-belly pouch, they are smaller in size than the true shrimp. With their distinct set of antennae, mysids can be easily confused with krill, another shrimp-like creature. Mysids, however, inhabit a different space in the water column.

At most times of the year, they are found in shallow, intertidal waters with mud bottoms or granular sediments and seaweeds. Krill are found in deeper waters, from the surface down to depths of about 275 meters

Mysid shrimps can often be found behind clumps of seaweed, hiding from the current. They can be difficult to spot (look for the eyes), and monitoring them is hard – but rewarding - work!

3.5 Pacific Salmon (*Oncorhynchus spp*.) and Atlantic Salmon (*Salmo salar*)

The global demand for salmon – that most excellent of table fish - has led to a considerably- sized salmon farming industry in both the northern and southern hemispheres, with large numbers of fish being reared in net-pens. Although the Pacific waters have five endemic salmon species, many salmon farmers prefer the Atlantic salmon, as it is easier to culture.

Inevitably, farmed Atlantic salmon escape from the pens, often in large numbers. This has the effect of having an alien species competing with native species for spawning and rearing habitat. Atlantic and Pacific salmon are genetically different, so interbreeding is unlikely, but when farmed Pacific salmon escape, they can interbreed, and may dilute genetically based survival traits of the wild stocks.

The graceful **Atlantic salmon** (*Salmo salar*) is a native of the North Atlantic Ocean basin and is widely distributed from the Arctic Circle to Portugal in the eastern Atlantic, from Iceland and southern Greenland, and from northern Quebec south to the Connecticut River.

The Atlantic salmon is anadromous, that is they spend most of their adult lives in salt water, and migrate to freshwater rivers and lakes to reproduce. Other anadromous fish include the alewife, (Alosa pseudoharengus), American shad (*Alosa sapidissima*), striped bass, (*Morone saxatili*) and sturgeon (*Acipenser spp*.).

Salmo salar lives in fresh water for the first 2 or 3 years of life before migrating to sea. Their movements at sea are not well understood. Tagging has shown that while some salmon wander, the great majority return to the river in which they were spawned. Marine scientists do not fully understand how salmon are able to carry out this remarkable feat. Most believe that, given the salmon's extraordinarily acute sense of smell (1000 times greater than a dog's) they somehow retain the characteristic odour and taste of their parent stream via imprinting during migration.

Sea-run salmon grow up to 9kg, with the average commercially caught fish averaging around 5 kg. In salt water the fish are blue-green overlaid with a silvery coating. In freshwater the silvery coat is lost and becomes greenish or reddish brown mottled with red or orange. Atlantic salmon also have numerous cross-shaped black spots, scattered around the body. Colour shape and body markings on salmon can vary with age, sexual maturity and habitat.

Pacific salmon differ from Atlantic salmon in that they spawn only once and die soon after, whereas the Atlantic salmon may spawn more than once. The Pacific salmon belongs to the genus "Oncorhynchus", in which there are five species. Although there are slight variations within the species, the each follow the same basic life cycle. Up to 4,000 eggs are buried in gravel nests, the size of the nest depending on the size of the female parent. The embryos incubate and hatch within the nest, emerging as salmon 'fry' in the spring. Each of the species follows a slightly different life plan, with, for example, some migrating to the sea almost immediately upon leaving the gravel nest, whilst others remain in freshwater for a number of years before migrating. Of the 4,000 eggs, only 800 will hatch, only 200 will reach the sea and ten will reach maturity, with barely two adults returning to spawn.

Chinook Salmon (*Oncorhynchus tshawytscha*) are also known as spings or kings, They live up to eight years, weigh up 36 kg, and are the most sought after game salmon. They begin migration to the sea within a few months of emerging from the

gravel bed and can be identified by their small eyes, black gums at the base of their teeth and long black spots along their back and tail. While in salt water, the chinook has a dark back with a greenish-blue sheen. As it returns to its parent stream, the body colour darkens and it develops a reddish hue around the fins and belly. The teeth of adult spawning males become enlarged and the snout develops into a hook. In saltwater, chinook feed on large zooplankton, herring, sand lance and many other fish.

Chum Salmon (*Oncorhynchus keta*) are also known as keta or dog salmon. They live up to five years and weigh up to 11 kg. Chum migrate seaward almost immediately upon leaving the gravel nest and can be identified by their large pupils and mouth, a lack of spots on their back and tail and silver streaks on their tail. The base of the tail is also very narrow. Spawning chum show reddish bars across their sides, with some specimens also sporting blotches of grey or black.

Coho Salmon (*Oncorhynchus kisutch*) are also known as silvers or bluebacks and are highly prized both commercially and as a sports fish. It is the most widely dispersed of the Pacific salmon species. They live three years and weigh up to 10.5 kg. Coho can be identified by the whiteness at the base of their teeth with black at the edge of their gums. Adult cohos have silvery sides and a metallic-blue back with irregular black spots. Spawning males undergo colour changes and may exhibit bright red on their sides, bright green on their back and head, with darker colouration on their belly. They also develop a hooked jaw with sharp teeth. Most coho tend to remain close to the coast and prefer warm water – often moving south in the fall and winter months

Coho Salmon

Pink salmon (*Oncorhynchus gorbuscha*) are the smallest of the Pacific salmon and have the shortest lifespan – two years. Weighing up to 4.5 kg, pinks are also known as humpies as a result of the exaggerated humped back developed by males as they return to spawn. They are also the most abundant of the Pacific salmon species and can be identified by their small scales over silver bodies and large oval spots on their back and tail. As they mature, humpies develop blue backs with heavy oval blotches on the tail and upper body.

Sockeye Salmon

Sockeye Salmon (*Oncorhynchus nerka*) are the slimmest and most streamlined of the Pacific salmon; they are the most highly prized for their commercial value as a food product. Sockeye live four to five years and weigh up to 5.5 kg. Their slender bodies have small black speckles on their back with distinct large scales and a dark, spot free tail. Sockeye can begin life as far as 1600 km from the sea, often in rivers that feed into lakes, or in the outlets and spring-fed beaches of lakes.

After emerging from the gravel nest, the young sockeye spends up to three years in lakes usually downstream from their spawning area. Migrating juveniles, known as smolts, make the long run to the sea during May and June. They then range far out into the Pacific and the Gulf of Alaska, thousands of miles from their parent streams. As they return to spawn, they turn varying shades of red with pale green heads. The males develop large teeth and hooked jaws.

The best way to identify an Atlantic salmon is to look for the large black spots on the gill covers and back and absence of spots on the tail. Atlantic salmon have 8-11 rays in their anal fins while Pacific salmon have 11-13 rays.

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 your Science Log.

Thank you.

5.0 eCORD

EARTHDIVE asks all of its members 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 following 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 to members 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 Science 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.

King Crab (*Paralithodes camtschatica*)
How many King Crabs 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:

Arctic Cod

How many Arctic Cods 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:

Ringed seal (*Phoca hispida*)

How many Ringed Seals 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:

Mysid shrimp (*Mysis littoralis*)
How many Mysid Shrimps 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:

Salmon: Pacific and Atlantic
How many Salmon 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:

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 your Science 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

EARTHDIVE