

STUDY GUIDE



MARINE VERTEBRATES

SHORT COURSE



HOW TO WORK THROUGH THIS COURSE

Over the following pages, you will move through a logical, self-paced learning experience that can enlighten and educate you in Marine Vertebrates.

It is important from the outset to understand that learning about something is not the same as just reading about it. Learning implies a permanent change in what you know and can do.

Anyone can read a book and understand it; but for most people the detail of what you read is largely forgotten.

Reading something once only puts information into short-term memory. It is soon lost if you don't 'work' on it. Studying the same information takes longer, but by thinking about it and processing it you can transfer that information to long-term memory. This way, you will enhance your ability to recall and apply that information for years to come. If you take your time to work through the 5 lessons that follow, you will learn.

Read, Reflect, Research, Revise

Throughout the following pages, you will find not only things to read about, but also things to do:

1. Throughout each lesson, there are suggestions of things to do under the headings "Learn More". These are all sorts of ideas about things you can do in order to explore the subject further.
2. At the end of each lesson, there is an interactive selfassessment test (assignment), for you to undertake. When you click on this, your computer needs to be online. You will be taken to our cloud-based online school. The answers you choose will be evaluated immediately, and your results can be seen on completion of each test. You can return and repeat tests if you wish.

Undertaking these tasks will involve reflection, research and revision of the topics you read about. By repeatedly encountering each topic in different ways, your perspective on each subject will broaden, and the commitment of information to longer term memory will strengthen.

You don't need to undertake all of the suggested tasks if you don't want to; but we strongly recommend that you do some in each lesson, and that you take all of the self-assessment tests.

The more time you spend doing these things, the stronger your learning will be.

Completing the Course

After completing all 5 lessons you will be presented with a final assessment which can also be undertaken online.

Do not attempt to do this until you have worked through all 5 lessons, and feel like you have learnt the subject well.

Upon finishing this final assessment you will immediately see your final results, and you can save a pdf copy of those results as a "Certificate of Completion".

Welcome Audio

Click the button below to listen to the welcome audio for this course. This feature is supported by most computers and some mobile devices.



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PREFACE

This course is designed to provide a guide for some of the more common animals found in marine ecosystems around the world. The animals are presented in groups according to similar morphological features.

Lesson 1 of this course introduces the concept of taxonomic classification. It provides a general overview of how marine animals are classified into various phyla, orders, families etc. The larger groups are covered in further detail in following lessons. These are broken up into marine fish, birds, reptiles and mammals.

This course is aimed for anyone who has an interest in marine animals. .

LESSON 1 CLASSIFICATION OF ORGANISMS

INTRODUCTION

Ocean environments cover more than 70% of the earth's surface; therefore it is no wonder that they also contain almost 50% of all species on earth. The exact number of marine species in existence is not known as there are many areas of the ocean that remain unexplored. Scientists believe there are over 2.2

million species in our oceans. Over one million of these are marine animals. Marine animals can range significantly in size from microscopic krill through to the Blue Whale which is the largest animal to ever live on earth. The ocean environments they occupy can also vary from the intertidal zones along our coastlines through to the deepest depths of the oceans.



Epinephelus lanceolatus Queensland Groper

Marine species are extremely sensitive to changes in their environment. There are many human activities that have led to the endangerment of marine animals. These include overfishing, bottom trawling, whaling, pollution, habitat degradation and climate change.

Climate change associated with human activities over the past one hundred years has impacted greatly on marine ecosystems. The temperature of sea water in many tropical areas has been rising over time which has led to the increased occurrence of coral bleaching worldwide. This is a stress reaction in coral in which corals expel microscopic algae which provides their food resource.



Foxface *Siganus vulpinus*

Suggested Tasks: ▼

Throughout this course you will be provided with suggested tasks and reading to aid with your understanding. These will appear in the right hand column. Remember: these tasks are optional. The more you complete, the more you will learn, but in order to complete the course in 20 hours you will need to manage your time well. We suggest you spend about 10 minutes on each task you attempt, and no more than 20 minutes.



Pyramid Butterfly Fish *Hemitaurichthys polylepis*

The bleached coral can recover, but only if cooler water temperatures return and the algae are able to grow again. This is an incredibly slow process however, and the rate of destruction of the reefs is far quicker than the recovery rate.

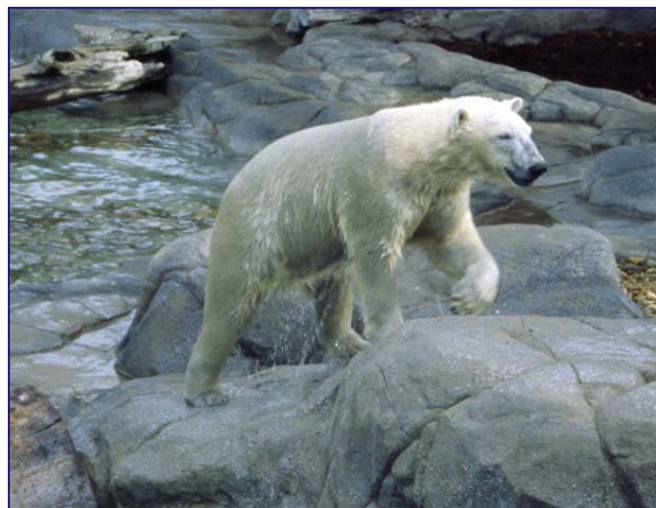
We need to ensure the human impact on marine animals is reduced to ensure that future generations can also enjoy these fascinating creatures.



Orbicular Batfish *Platax*



Pelican *Pelecanus conspicillatus*



Polar Bear *Ursus maritimus*

TAXONOMY: GROUPING BIOLOGICAL ORGANISMS

In the scientific system, living organisms are classified by dividing them into groups, which have similar characteristics. These groups are then divided into smaller groups with similar characteristics. These are divided again and so the division of group to sub group and sub group to further sub groups goes on, until you finally have only one type of organism in each group.



There are many different levels of division, although the main ones which we use are at the bottom end of the scale (i.e. family, genus, species and variety).

The main levels of division are as follows:

- all living organisms are divided into KINGDOMS
- all animals are divided into phyla (singular Phylum) or DIVISIONS
- divisions are divided into CLASSES
- classes are divided into ORDERS
- orders are divided into FAMILIES
- families are divided into GENERA (singular: Genus)
- genera are divided into SPECIES
- species are sometimes divided into SUBSPECIES



CLASSIFICATION

Living organisms are classified in Prokaryotes and Eukaryotes. Prokaryotes are further classified in 2 kingdoms: Archaea and Bacteria; Eukaryotes are classified in 4 kingdoms: Protista or Chromista, Animalia, Plantae and Fungi.

The 6 Kingdoms of organisms:

- **Kingdom Archaea** – include unicellular species that lack a nucleus and have cell membranes made of ether-linked phospholipids.
- **Kingdom Bacteria (Eubacteria)** – include bacteria, defined by their simple cell structure and lack of a nucleus.
- **Kingdom Chromista or Protista** – unicellular and colonial organisms with more complex eukaryotic cells. This Kingdom includes the diatoms, dinoflagellates, algae and protozoa.
- **Kingdom Animalia** – the animal kingdom. This includes over 1 million described species in 30 different phyla
- **Kingdom Plantae** – multicellular, photosynthesising eukaryotes. Underrepresented in ocean environments as many flowering plants cannot complete their lifecycle submerged in salt water.
- **Kingdom Fungi** – eukaryotes that do not photosynthesise. These organisms are unique because of they reproduce by spores.

In this course our focus will be on Kingdom Animalia. Kingdom Animalia contains 29 phyla. Some of the more common phyla are described below.

In addition to these levels of division new divisions have been introduced over time. For example, infraclass and superorder, among others, are now considered taxonomic divisions. Due to new species being discovered there are increasing numbers of new species belonging to the same number of divisions. The increase in the number of described species has led to the growth of the divisions of classification.



Corals are members of *Phylum Cnidaria*

Also, as the techniques for identification have advanced species which may have once belonged to one division may have been reclassified into another division. Genetic markers have brought taxonomic classification a long way to grouping species. There are always exceptions and the classifications shown in one text book or resource may differ slightly to another. It is important to check the classification from various reliable resources. Lastly, statistics given may also change over time. For example there may be more than 30,000 fish species but not all are described and it is not always easy to create an exact figure.