

Experiencing Marine Reserves Manual – Section 4

Activity List and Information for EMR Unit Plan

See the appendix at the end of this manual for information on marine biodiversity, marine reserves and conservation.

Activity 1

Title: Classification

Teacher Information

Scientists classify all biological life according to their characteristics and evolutionary relationship, major groups within each **kingdom** are called **phyla**. For example the Mollusc **phylum** is subdivided into seven **classes** and divisions within each class are called **orders** and further subdivisions are called **families**.

Let's have a look at the classification of the common octopus or Wheke, *Pinnoctopus cordiformis*. It belongs to the **kingdom** of Animalia (it's not a plant!). The **phylum** is Mollusca, the **class** is Cephalopoda, the **family** is Octopodidae, the **genus** is *Pinnoctopus* and the **species** is *cordiformis*.

Of the 35,112 known NZ species of Animalia, 33,582 species or 95.6 % are invertebrates. Of these, 60% are terrestrial, 33% are marine and 7% are freshwater. These figures may change as we discover more species in the sea.

Molluscs – Soft Body

The group with the largest number of species in the sea is the Mollusca. The word mollusc means 'soft body' and many have a shell to protect it. Mollusca are commonly known as shell fish, but not all have shells such as the **class** gastropod and **order** Nudibranchia (sea slugs). 'Nudibranch' means naked gill (the gill is feathery rosette at the end of the animal). 4 Main classes of mollusc are:

- Gastropod (snails & slugs)
- Bivalve
- Chiton
- Cephalopod

There are lots of different shapes and sizes of gastropods. Some gastropods are herbivorous and others are carnivorous. Bi' means two and bivalves are shellfish that have two shells hinged together. The two shells are normally the same shape. Unlike some of the sea slugs and sea snails bivalves have no head, tentacles or eyes. Members of the chiton class have 8 armoured plates to protect the muscular foot which holds the chiton to its substrate. Cephalopods are shellfish too, although the shell is usually absent or is a small internal shell. These vary in size from the size of your hand to the giant squid found around Kaikoura. Cephalopod means head-foot. These animals have muscular bodies and can move quickly. They have a strong siphon which gives them jet propulsion. Most can squirt out a cloud of ink to mislead their attackers. This group of animals includes octopus, cuttlefish and squid.

Fish

Fish are found within the **phylum** Vertebrata (all have a backbone/vertebrae). They have gills for breathing underwater and fins for swimming. Some of the largest animals found in the ocean belong to this group, such as the whale shark. The two main types are bony fishes, and cartilaginous fishes (sharks & rays) which have bones made of rubbery cartilage.

Echinoderms – Spiny skin

About 7000 living members – all of which are marine!! Adults have a five part radial symmetry. They possess a water vascular system and exoskeleton made of calcium carbonate spines and plates. They have tube feet or suckers and can move in any direction This group includes starfish, brittle stars, sea cucumbers and sea urchin like kina.

Sponges/Porifera – Pore bearer

These are the simplest of animals. Sponges are porous creatures that act like living water filters. Always attached to a firm substrate, they lack muscles or any nervous system. Water is pumped through the sponge by tiny flagellated cells and any bacteria, tiny algae or plankton that is trapped is digested.

Coelentrates – Hollow bodied

Built on a circular pattern around a single opening or mouth, leading into a internal cavity. They often have tentacles and stinging cells. Coelentrates can be free living like jellyfish, or sessile like sea anemones. They have stinging cells which shoot out a stinging hook when predator or prey brush against the tentacles (New Zealand sea anemones are harmless to humans).

Crustacea

These animals wear a jointed suit of armour! They belong to a group called arthropods which also includes insects and spiders. Usually have legs, gills for breathing underwater and two pairs of antennae. Crustacea usually lay eggs and undergo metamorphosis (change in form) during development eg, swimming larva which grow into a sessile adult in the case of a barnacle. This group includes crabs, shrimps, crayfish, barnacles, sea lice and sand hoppers. They have appendages specially designed for:

- swimming
- crawling
- attaching to other animals or rocks
- feeding

They have antennae which help them to sense their surroundings.

Marine mammals

Marine mammals come in a range of shapes and sizes and include whales, dolphins and seals. Marine mammals breathe air and have to come to the surface to breathe. They are warm blooded and kept warm by a layer of fat or blubber. Some have developed amazing capacity for breath-holding – sperm whales are believed to be able to dive to 3000 m for 75 minutes! This amazing ability is due to a range of physiological adaptations including – slowing the heart rate, reduced circulation and efficient use of oxygen. Blue whales can be 37m in length and porpoises just 1.4m! Common dolphins are 1.4 – 2.6m in length and can hold their breath for around 8 minutes diving to 300m. Sperm whales are among the deepest diving marine mammals, diving to 3 km depths for up to 90 minutes. Marine mammals breast feed and give birth to live young.

Teacher instructions: Colour copy and cut the visual cards below, make enough copies for the amount of groups you will have (team exercise). Ask the students to group the animals by looking for common features and adaptations. Ask the students to make groups and sub groups by only reading out the group name and meaning, see how they go, then read them more information on each of the groups, give them a chance to re-arrange their groups if need be, then help them identify the correct answers below:

Answers:

Molluscs – Soft Body Clown nudibrach, Tiger shell, Scollop, Gem nudibranch, octopus, paua, can be further divided into snails and slugs: (gastropods) paua, tiger shell, clown nudibranch & gem nudibranch. Bivalve: scallop and Cephalopod: octopus & squid. Three sub groups within one group.

Fish Seahorse, eagle ray, pigfish, sand daggers wrasse, moray eel. Four sub-groups.

Echinoderms – Spiny skin Brittle star, starfish, diadema urchin, kina. Two sub-groups.

Sponges/Porifera – Pore bearer Sponges, finger sponge

Coelentrates – Hollow bodied Anemone

Crustacea Barnicle, red rock crab, crayfish, hermit crab. Three sub-groups

Marine mammals Common dolphin



Anemone – Kotare moana
Corynactis haddoni



Snake Star - Weki
Pectinura maculata



Common dolphin – Aihe
Dsiphinus deiphis



Red rock crab – Papaka ura
Plagusia chabrus



Crayfish – Koura
Jasus edwardsii



Clown nudibranch
Ceratosoma amoena



EMR - Samara Nicholas

Eagle ray – Whai keo
Myliobatis tenuicaudatus



Photo - Photo by Samara Nicholas

Gem nudibranch
Dendrodoris denisoni



EMR - Samara Nicholas

Diadema Urchin
Diadema palmeri



EMR - Samara Nicholas

Pigfish
Bodianus unimaculatus



EMR - Samara Nicholas

Sanddiggers wrasse
Coris sandageri



Photo by Jamie Ouirk

Kina
Evechinus chloroticus



Moray Eel
Gymnothorax spp.



Octopus – Wheke
Pinnoctopus cordiformis



Paua
Haliotis iris



Hermit crab – Kawekawe
Pagurus novaezelandiae



Golf ball sponge - Porotaka moana
Tethya aurantium



Barnacle – Tio Piripiri
Eiminius modestus



Seahorse – Manaia
Hippocampus abdominalis



Finger sponge – Kopuputai
Callyspongia ramosa



Squid – Ngu Wheke
Teptoteuthis australis



Tiger Shell – Maurea
Calliostoma tigris



Comb star – Pekapeka
Astropecten polyacanthus



Scallop – Tipa
Pecten novaezelandiae