



3a What is special about our local west coast marine biodiversity?

Teacher notes

Time: suggested 30 mins

Resources: presentation, projector, screen

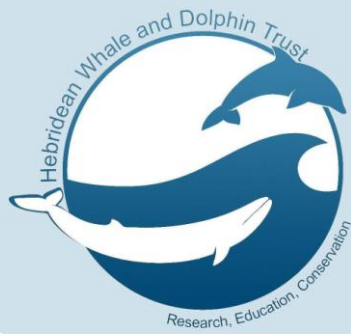
Aims: To raise awareness of the term biodiversity; communicate the benefits and values associated with biodiversity; encourage your school to make choices that improve the value of local biodiversity and encourage the sustainable use of natural resources.

Suggested method:

Work through each slide using background information to encourage discussions on the slide content. Each slide has suggestions for discussion topics.

Background Information:

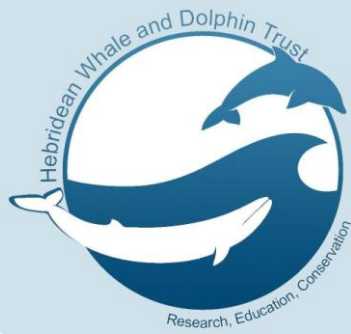
SLIDE 1 & 2 Introduction - The Hebridean Whale and Dolphin Trust, based in Tobermory on the Isle of Mull, is dedicated to the conservation of Scotland's whales, dolphins, and porpoises and the Hebridean marine environment through education, research and working with Hebridean communities. HWDT concentrates its efforts on the study of these marine mammals because they are usually predators at the top of their food chains, and thus provide an excellent indication of the health of the entire ecosystem on which they, and ultimately we, depend. The waters west of Scotland are extremely productive. The long and complex coastline, interaction of currents and wide variety of habitats provide a rich environment for marine life.



SLIDE 3 Coastline - the coastline of western Scotland is highly varied due to geology and soils, human alteration and usage, weathering and shaping by the sea, and other factors. The photos show human impact (lighthouse and a coastal town), natural rock formation (basalt formations of Staffa), and skerries around the Small Isles. The varied coastline provides many different habitats for a diverse range of flora and fauna. Discuss: What does the coast look like where you live? What do you like to do at the coast? Does the coast in western Scotland look different?

SLIDE 4 Marine habitats - the diversity of coastal features and formations leads to a huge diversity of marine habitats: coastal cliffs and banks that provide nesting sites for seabirds including gulls, gannets and puffins; the rocky shoreline where some animals are only covered by the sea at high tide; coastal waters that are home to a rich diversity of life; offshore waters where large groups of oceanic dolphins can be seen; and the deepest reaches of the ocean where sperm whales search for giant squid in the darkness. Discuss: Which habitat do you think has the highest biodiversity? All answers are valid with an explanation: the coastal cliffs and banks support many species of bird, plant and insect; rocky shores can be very high in biodiversity, with shelled animals, crabs, fish, anemones, urchins, seaweeds, barnacles, lichens and many more; coastal waters can be high in biodiversity, particularly in summer months when plankton blooms provide food for seasonal visitors including basking sharks and minke whales; offshore waters may be the least diverse, but may support larger numbers of species such as schools of fish and groups of dolphins; deep waters are home to giant squid, strange species of fish adapted to life without light, and deep-diving cetaceans.

SLIDE 5 Sea States - This is to illustrate that the marine environment is dynamic and marine life must be adapted to a particular niche or migrate. Most waves are caused by the wind, so the sea state (how rough it is) will change with wind strength and weather fronts. Under the waves, the sea moves according to the tides



(controlled by the gravitational pull of moon) and ocean currents. Sea temperature and light levels are not uniform and vary with depth, season and weather conditions.

Discuss: What effect do you think a heavy storm could have on coastal plants and animals? Can you think of some animals that stay in the same place all year and some that move around?

SLIDE 6 Marine animals - here is just a small selection of marine animals found off the west coast of Scotland. There are at least 7,000 animal species in British seas, as well as an abundance of plants and seabirds. Animal species are grouped in phyla: molluscs (shelled creatures, sea slugs, octopus, squid, cuttlefish), annelids (worms), cnidarians (anemones, jellyfish and coral), echinoderms (starfish & urchins), crustaceans (prawns, shrimp, barnacles, crabs & lobsters) and chordates (fish, amphibians, reptiles, birds and mammals). Many sea animals provide food for humans, and the fishing industry is very important in Scotland. The smallest yet most important component of marine ecosystems is the phytoplankton and zooplankton.

Discuss: Why do you think there are so many different animals in the sea? What food do you eat that comes from the sea?

SLIDE 7 Marine animals - These are the larger sea creatures that can be seen in the waters off the west coast of Scotland. There are two species of seal: the grey seal (adult: bottom middle; pup: top right) and the common seal (top left), which can both be seen year round. The grey seal comes ashore to give birth from October to December; the common seal hauls does so in late Spring. Seals can cause problems at economically important fish farms because they break the nets to get at the fish. The basking shark (lower right) is the second largest species of shark in the world (second to the whale shark) and the largest seen in the UK, growing to 9m in length. They can be seen in the Hebrides from May to September, arriving to exploit high concentrations of zooplankton which occur because of warmer sea temperatures and ocean mixing. Both were historically hunted in the area for meat, skins and oil but are



now protected by law. Along the shoreline otters can be seen cracking open shellfish or chewing on a fish. Discuss: why are large, charismatic species such as these so important in the Hebrides? Ideas: ecotourism, ecosystem, previously hunted. NOTE: Whales, dolphins and porpoises are dealt with in a separate slide.

SLIDE 8 Seabirds - again, a selection of the seabirds that can be found off the west coast of Scotland. These birds are reliant on land, where they build their nests, and on the sea to provide them with food. Birds are predators of smaller animals in the sea, such as fish and squid, and are preyed upon by larger birds and marine animals, such as sharks and killer whales. Historically, Scottish sea birds provided an important food source for islanders (both meat and eggs). The pictures show (clockwise from top left): gannet, Manx shearwater, guillemots, herring gull, shag, razorbill, puffin. Discuss: What do you think would happen to the biodiversity of sea birds if there were fewer fish in the sea?

SLIDE 9 Cetaceans - there are currently 83 species of whale, dolphin and porpoise recognised in the world and 24 of them have been recorded in the Hebrides. Some are resident year-round, like the bottlenose dolphin (bottom right), the harbour porpoise (bottom middle) and the killer whale (top left); others visit in the warm summer months to take advantage of abundant food supplies, including the common dolphin (top right) and the minke whale (bottom left). Historically whales were hunted for meat, oil and other by-products, but they are now protected from this by law in the UK. The diversity of species found here is due in part to the abundance of food; the region is home to cetacean species typical of both warm and cold oceans. Discuss: How and why are cetaceans important to people? (e.g. Historically hunted for food, tourism, pleasure, ecosystem benefits etc).



SLIDE 10 Threats - The major threats to the marine environment are introduced and discussion is encouraged.

Marine litter: basically any rubbish that makes its way into the sea. The most common material is plastic, and plastic bags in particular pose a threat to marine animals that eat jellyfish as these plastic can be mistakenly ingested and cause serious health problems and death.

Pollution: chemicals that enter the ocean accumulate in the bodies of marine animals (the higher up the food chain, the higher the toxin level). Marine mammals are therefore greatly affected and pollutants cause health problems including cancer.

Disturbance: for marine mammals, which use sound to navigate, communicate and find food, noise disturbance can greatly affect their behaviour. Boat collisions occur and injuries sustained are seen on the bodies of cetaceans and basking sharks.

Overfishing: taking too many fish too quickly has resulted in dramatically depleted fish stocks in certain target species. This affects the ecosystem by removing predators of smaller animals and prey for larger animals. Certain fishing techniques are particularly damaging, and indiscriminate techniques such as dredging damages the seabed.

The future: is up to you. Please encourage ideas on how to protect the marine environment and biodiversity for future generations. Stimulate discussions with ideas such as beach cleans, recycling, eco-friendly cleaning products, protected areas, community action, education.

SLIDE 11 The future - Encouraging ownership of the environment, and the importance of protecting biodiversity now for future generations.