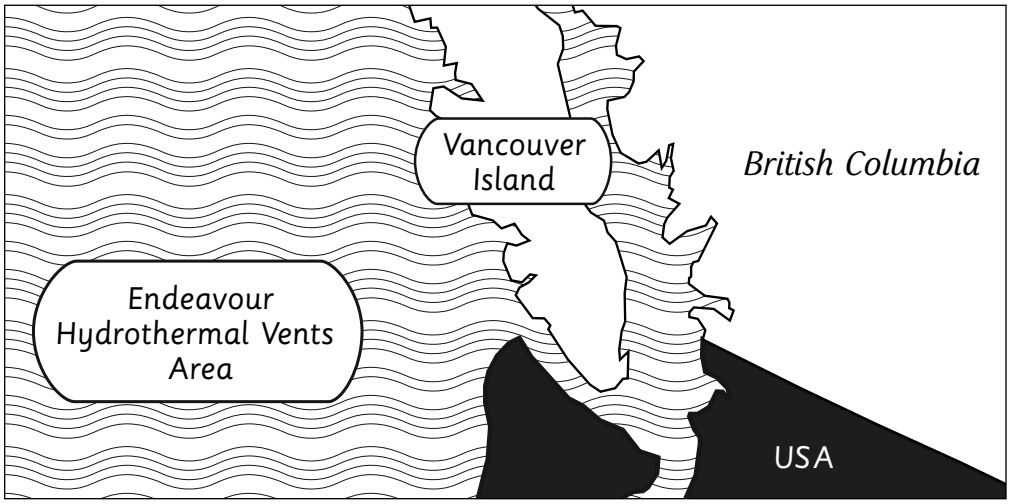
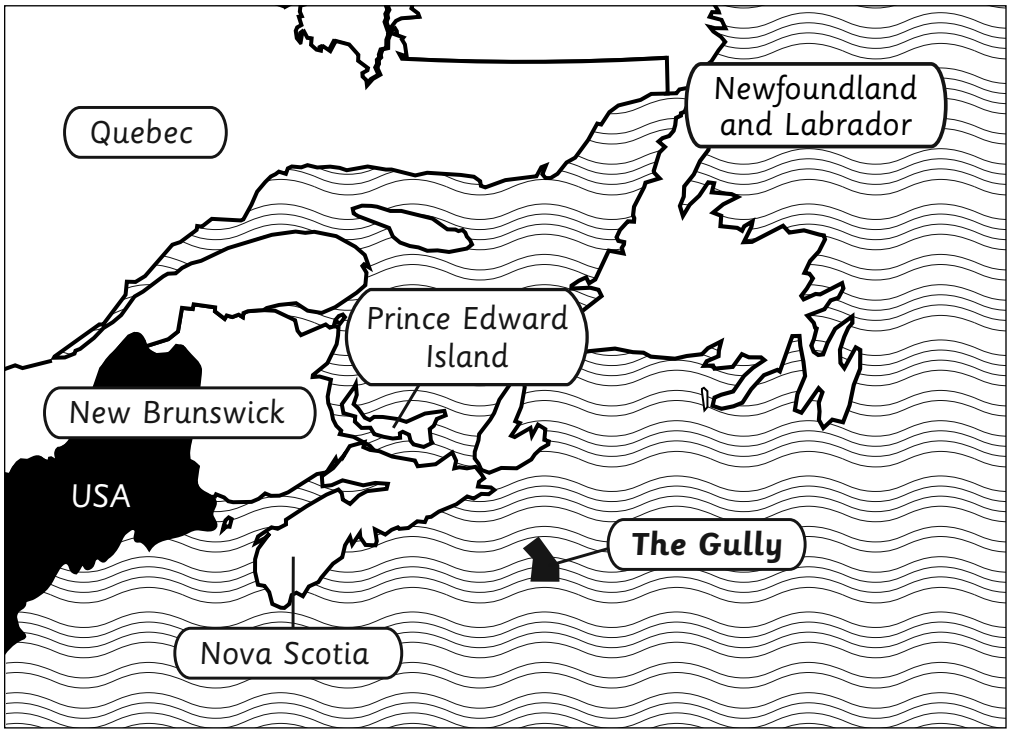
Marine Protected Areas

For as long as people have been building boats they have considered the ocean a resource that would never run out. Our planet's seas are so vast that it is hard to imagine that human beings could ever cause species of fish or other marine life to become extinct. Only recently have people begun to understand that ocean ***ecosystems*** *are vulnerable, and that some may disappear if we do not protect them.*



One of the most interesting marine ecosystems in Canada is the Endeavour Hydrothermal Vents, which were discovered in 1982. They are located about 250 kilometres southwest of Vancouver Island, and are more than 2 kilometres below the surface. A hydrothermal vent occurs on the seafloor at places where the Earth's crust is spreading. Sometimes these openings extend several kilometres deep, all the way to the Earth's ***mantle****, which is extremely hot. Seawater is drawn into the earth near the vents, where it gets superheated by the mantle before being forced back out at temperatures of 300°C or more. Amazingly, some species thrive near these natural furnaces, making food off the chemicals that emerge from the vents. Animals such as crabs feed on these species. In fact, the Endeavour Hydrothermal Vents support some of the richest areas in the deep ocean, with up to half a million tiny animals per square metre. Some species are endemic to the vents, meaning they are found nowhere else in the world.*

In Atlantic Canada, more than 300 kilometres off the coast of Nova Scotia, is another important ocean ecosystem called the Gully. It's a deep undersea canyon where currents bring cold, nutrient-rich water to the surface. Tiny plants called phytoplankton combine these nutrients with energy from the sun to fuel their own growth and reproduction. Phytoplankton are at the bottom of most marine food chains. These are eaten by tiny animals called zooplankton, which in turn are eaten by fish, birds, and mammals. The Gully is also home to a dozen kinds of deep-sea corals, and about 15 species of whales and dolphins. One of these is the endangered northern bottlenose whale, which may be the deepest-diving mammal in the ocean. All of the organisms in the Gully, from plankton to whale, are linked in a unique web of life.



Humans are also part of the web of life in marine ecosystems. Sometimes, however, our role is a negative one. The Endeavour Vents, on the seafloor, are in a remote location that is not threatened by fishing or ship traffic, but researchers may accidentally harm the

area by removing mineral deposits and living **specimens**. Elsewhere in the world, tourism companies even take people to visit hydrothermal vents in **submersibles**, which can damage the sensitive habitat.

In the Gully, the threats are different. Areas near the canyon are heavily fished for tuna, swordfish, halibut and squid, which can disrupt the food web. The surrounding waters are also busy shipping lanes, and vessels may pollute the water or collide with whales as they breathe at the surface. The biggest concern, however, is that companies have expressed interest in exploring for oil and gas in the Gully. To search for undersea deposits of these resources, companies use airguns to send loud sound pulses into the ocean floor and listen for the echoes. These pulses may harm northern bottlenose whales and other mammals that use sound to locate their prey. In addition, an oil spill near the area could be a catastrophe for the Gully's many residents.

In other marine ecosystems, the main problem is irresponsible fishing. For example, if people catch too many young, immature fish before they have a chance to reproduce, fish stocks can decline or collapse completely. Another problem is that people fishing for one species may accidentally kill other marine animals. This is called bycatch, and it is another way that careless fishing can harm an ecosystem. Millions of families around the world make their living from fishing, and it is important to ensure that there are enough fish to sustain these people in the future.

To guard sensitive ecosystems from these threats, governments around the world have set up marine protected areas, or MPAs. Because each area faces a unique set of threats, there are many different types of MPAs. Some are called "no-take zones," where no fishing of any kind is allowed. Other MPAs only restrict certain activities.

In 2003, Canada made the Endeavour Hydrothermal Vents the country's first MPA. It is now against the law to remove any mineral structures or living things, or to carry out any activity that is likely to disturb the fragile ecosystem. Scientists are allowed to conduct research there, but only after obtaining a license and taking steps to make sure they are not causing harm.

The following year, the federal government also made the Gully an MPA. The Gully is divided into three zones, each with a different level of protection. The core – the deepest part of the canyon – is a no-take zone, and the outer zones allow some human activities while protecting the most vulnerable parts of the ecosystem. Most importantly, no oil or gas exploration is permitted in the Gully.

MPAs have many benefits for ocean life. Preserving areas such as the Endeavour Vents ensures that these unique habitats continue to thrive, allowing scientists to study the still mysterious creatures that dwell there. Limiting activity in places like the Gully helps protect endangered species such as the northern bottlenose whale, and protects overall biodiversity. But MPAs also help the people who rely on the ocean for their livelihood. By protecting **spawning** grounds and areas where juvenile fish grow up, we can ensure that more will survive to mature and reproduce. The eggs, larvae and mature fish will often spill over into areas where fishing is allowed, which means communities will benefit from bigger and more plentiful catches in the future.

In the short-term, however, it is sometimes hard to convince communities to obey the laws. If local people have been fishing in an area for many years, they may not agree that fish stocks are declining, or they may have no other way to support their families. That's why governments, scientists, conservationists and community leaders must sit down together and try to agree on the best way to protect marine ecosystems. These groups can help local people use the ocean in a sustainable way so they will be able to rely on its resources for many generations to come.

Glossary

ecosystem: *a community of plants and animals living together as a unit*

mantle: *a layer of dense rock that begins many kilometres below the Earth's surface*

specimen: *an individual plant or animal that is used for study*

submersible: *a small underwater vessel used for research or exploration*

spawn: *produce or deposit eggs*