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## Otago Coastal Description



### 3.1 Introduction

Otago's 480 kilometre coastline is diverse and beautiful. In the north, the cobble beaches of the Waitaki Fan reach as far south as Cape Wanbrow. The rest of the coastline is made up of alternating cliff headlands and sand beaches, interrupted by the ancient Dunedin Volcano, now Otago Harbour. Rivers ranging in size from the large Waitaki and Clutha/Mata-Au to the many small rivers of the Catlins coast drain the high inland plateau, carrying sediments and fresh water to the sea. Many of the river mouths form estuarine wetlands of significant importance to both marine and freshwater wildlife. There are two urban areas, Oamaru (12,000 people) and Dunedin (114,000 people), as well as many small fishing and holiday communities. Offshore, the sea floor shelves out for about 30 kilometres, and then abruptly steepens. This marks the ancient coastline of Otago, when sea level was lower.

Much of Otago's coastal land has been modified from its original bush clad state, with farmland dominating much of the coastal edge and urban areas being spread along its length. Otago's largest urban areas, Dunedin and Oamaru, have been developed around harbours and their citizens have almost direct access to the sea. There are still a few places where forests extend to the margin of the coastal marine area. Here the sequence of changing vegetation type with increasing oceanic influence can be observed in a nearly unmodified state. Most of these forested areas are found in the Catlins area but a few do exist to the north. On the seaward side, apart from some localised areas of development around commercial and fishing port areas, much of Otago's coast below the line of mean high water springs is undeveloped and unmodified.

Otago Harbour is home to Otago's only commercial port, with facilities being located at Port Chalmers and in the upper harbour basin area. The commercial port has had a long historical association with the harbour and is now the main export gateway for the region's produce. The existing nature of activities within and immediately adjacent to the commercial port area are of a commercial and ongoing nature.

The rocks that outcrop along Dunedin's coast represent the major stages of geological history, beginning with the schistose of Gondwana, followed by two sedimentary sequences interrupted by the eruption of the Dunedin Volcano, and finally modern glacial and interglacial deposits. There are many other significant cliffed and rocky coastal landforms along Otago's coast which are of geological interest and provide an important environment to significant communities of flora and fauna. Sediments offshore reflect the land rocks, as much of the material is weathered from land. The rest is shell material. Modern muds, sands, and gravels lie close to shore, with their distribution reflecting the locations of river mouths. Ancient gravels and sands from the last glacial period mantle the mid-to-outer shelf, and relict sandy muds line the submarine canyons and slope bottom.

Water masses with different salinities and temperatures have different densities, which tends to inhibit mixing. About 20-30 kilometres offshore of Otago, the warm and salty Southland Current intrudes on the "normal" cool and less saline subantarctic surface water. Near shore coastal water is extremely variable and strongly influenced by runoff and river levels. The boundary between warm subtropical water and cool subantarctic water (the Subtropical Convergence) is a large scale feature of the

Southern Ocean. The east coast of the South Island is one of the very few places in the world where this global front approaches land.

In general, longshore drift, tidal flow, large-scale currents, dominant wave pattern and winds all combine to move water north east along the Otago coast. Sediment transport in a north easterly direction is a direct result of these forces. There are a few local southerly eddies, but the net transfer of water and sediment in Otago is to the north east.

Although a few studies have considered nutrient levels and heavy metal concentrations in sea water, little is known regarding the chemistry of Otago's seas.

Most vertebrates are swimmers. Sharks and other fish, whales and dolphins are some of the well-known swimming marine vertebrates, which inhabit Otago's coastal marine area. Otago is home to some rare and significant sea birds, in particular Royal albatross and yellow-eyed penguin. The region also has significant communities of wading birds. New Zealand fur seals commonly haul out on Otago's rocky coasts.

Below mean high water springs there are a variety of habitats used by a wide range of marine species. Many habitats contain fish species, which are important for recreation, commerce and as a food source for the many protected marine mammals and seabirds. Adjacent to the land there are the intertidal areas which can be broadly classified into estuaries, wetlands, beaches and rocky shores. These are important feeding and breeding habitats for seabirds and marine mammals.

Directly below the influence of the tide are the rocky reef, kelp forest and soft shore communities. Rocky reefs contain a broad range of marine species and have the greatest diversity of life of all subtidal habitats. The large variety of fish is an important food source for seabirds and Hookers sea-lion.

Further offshore but still within 12 nautical miles of the coast other soft bottom communities important to the multi species trawl fishery are found. These marine communities include red cod, rig, gurnard and barracouta. Otago is also unusual in that there is a deep water scallop fishery within the inshore area.

Most of the Otago coast is in fairly constant, although minor, retreat. There are only very small areas that are actually growing. Where underlying rocks are hard enough, cliff retreat is minimal, but almost all soft sediment parts of the coast are either retreating or shifting. North Otago from the Waitaki River to Moeraki experiences the most coastal erosion in the region, and river mouths are subject to flood-related shifting.

There are numerous coastal structures on the Otago coastline. The vast majority are located in Otago Harbour, due to the extensive recreational and shipping needs of Otago's largest city. Other ports and small communities along Otago's coastline may have only a wharf or a rocky seawall.

Pollution at detectable levels (and therefore subject to study) in New Zealand tends to be concentrated in estuaries or near cities. Otago's coastal seas are most affected by human sewage (4 major and about 8 minor outfalls), stormwater, and agricultural

pollutants such as fertilisers, and animal wastes. Industrial wastes may have considerable impact on a small scale, but there are only a few sources. There is potential for hydrocarbon spills in port areas and on wharves with diesel pumps.

There are more than 80 protected areas along the landward edge of Otago's coastline, ranging from scenic, recreational, and historical reserves to wildlife and bird sanctuaries. Most of these fall under the jurisdiction of the Department of Conservation with the rest being primarily managed by territorial authorities. At the present time, there are no marine reserves.

The coastal environment is a very important place where the people of Otago can pursue various recreational activities. The coast is used for many active recreational pursuits such as yachting and rowing. The coast also has significant amenity value to the people actively using the coast and to those people who choose to live in locations from where they can observe the coast.