

## 4.2 Kermadec Islands & Marine Reserve (and White Island and Seamounts along the Kermadec Ridge)

### SITE LOCATION

The Kermadec archipelago contains the northernmost land and territorial seas in New Zealand. Raoul Island (Rangitahua) is by far the largest (2900 ha) of the 15 islands, which are spread as four clusters in a line over 250 km of the Pacific Ocean (Latitude 29° - 32° S and Longitude 177° - 179° W), about 1100 km north-east of the Northland coast (see Map 4.2).

The Kermadec Ridge is a chain of volcanic islands and submarine volcanoes (seamounts) lying in a line extending for 1100 km from Raoul Island to White Island, parallel to and about 140 km to the west of the deep Kermadec Trench (see map). White Island (Whakaari) lies 48 km off the Bay of Plenty coastline, at the southern end of the Kermadec Ridge.

### SITE DESCRIPTION

The site for immediate consideration consists of the land and marine environment of the Kermadec Islands. Raoul, Macauley, Curtis, Cheeseman, the Meyer Islands, and the other smaller islands are all strictly protected as the Kermadec Islands Nature Reserve

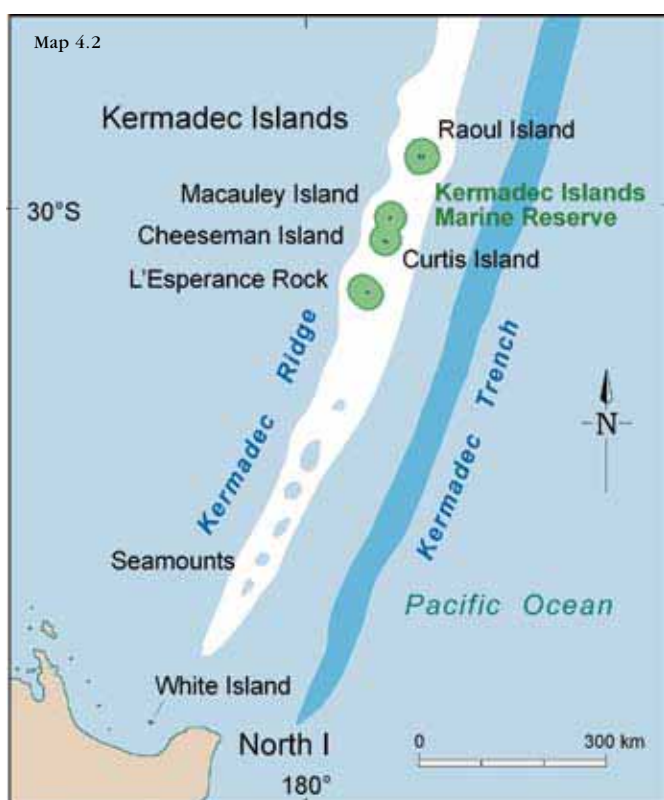
(total area 3280 ha); the much larger Kermadec Islands Marine Reserve (748,000 ha) surrounds the islands. Both the nature reserve and marine reserve are administered by the Department of Conservation (DOC).

In the longer term, the Advisory Group believes that there is a good case for extending the site SSW along the Kermadec Ridge (see map) to include a representative group of seamounts and the active marine volcano, White Island.

The Kermadec Islands are the northernmost of a chain of enormous deep-sea volcanoes making up the Kermadec Ridge, rising to a height of 8000 to 10,000 metres from the depths of the Kermadec Trench and extending up to 516 m above sea level on Raoul Island. The Kermadec Ridge has been formed by the intense tectonic activity associated with the subduction of the Pacific Plate under the Indo-Australian Plate. The Kermadec Ridge includes the volcanically-active White, Raoul and Curtis Islands, and is part of the great 'Pacific Ring of Fire'. Raoul Island erupted in 1964 and more

recently in the tragic eruption of March 2006. Earthquakes are a regular occurrence on Raoul Island and along the entire Kermadec Ridge.

The climate of the Kermadec Islands is mild and subtropical and they are occasionally battered by cyclones. Like many of the volcanic islands of the Pacific, the warm temperate forest of Raoul Island is dominated by species of the genus *Metrosideros*, in this case the Kermadec pohutukawa (*M. kermadecensis*). Nikau palms are widespread, conferring a distinctly subtropical look to the landscape, with ngaio, karaka, mahoe, mapou, and wharangi also common trees.





Raoul Island, taken in 1992,  
looking SW across Blue and  
Green Lakes to Denham Bay.  
*GeoSmart*

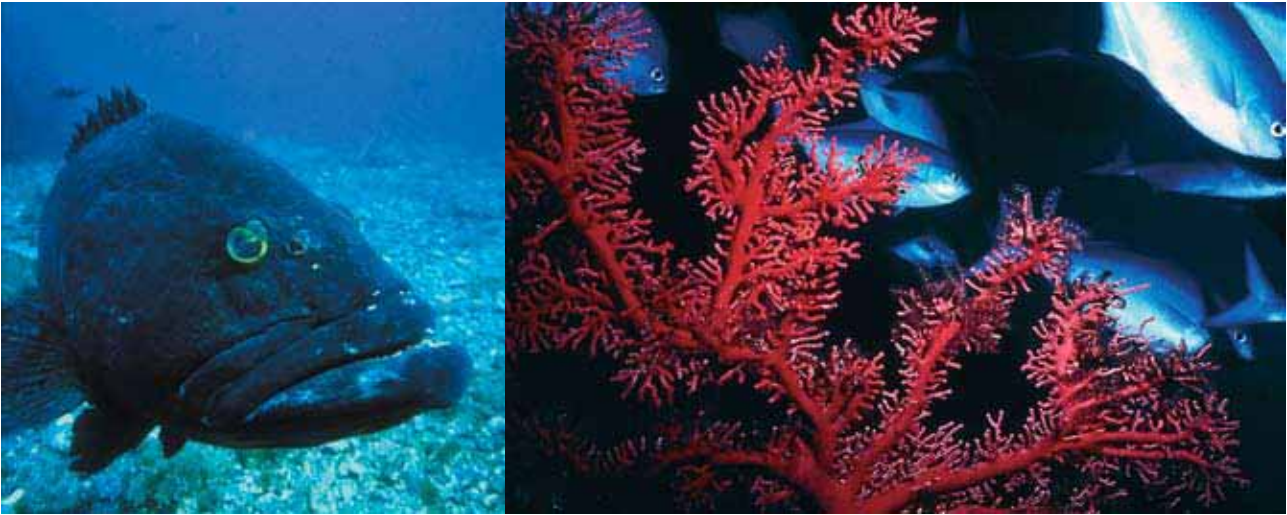
## VALUES THAT MAY JUSTIFY WORLD HERITAGE TENTATIVE LISTING

The Natural Heritage Advisory Group consider that the proposed site probably meets all four natural criteria (*vii* to *x*) and in particular contains features of outstanding universal value with respect to criteria (*viii*), (*ix*), and (*x*). They consider that the Kermadec Islands and the marine reserve could be immediately advanced for World Heritage site nomination. The outstanding universal values of this site relate very much to the biological values addressed by criteria (*ix*) and (*x*), especially for the marine assemblage.

In the longer term, the Advisory Group recommends a more diverse serial nomination, extending the site to include White Island and the best candidates among the seamounts of the Kermadec Ridge. Such an enlarged site would contain outstanding universal geological values addressed by criterion (*viii*), as well as strengthening the case based on marine biological values.

Macauley Island, looking WNW  
past Haszard Islet.  
*Mike Ambrose, DOC*





Left: A large spotted black grouper, a subtropical fish which can live to over 100 years.

The Kermadec Islands Marine Reserve now protects one of the largest remaining natural populations of subtropical grouper in the world.

Right: Red coral (*Errina* sp.) and blue maomao, Kermadec Islands Marine Reserve.

*Photos: Roger Grace*

### ***Criteria (ix) and (x)***

The marine environment of the Kermadecs is probably the most isolated and least modified in the country, matching that around New Zealand's Subantarctic Islands World Heritage Site. In terms of their marine ecology, the Kermadecs occupy a position intermediate between the tropical islands of the Pacific (*i.e.* they lack coral reefs although reef-forming coral species grow at the islands) and the temperate New Zealand mainland (*i.e.* they have a pan-tropical seaweed flora and most of the large brown algae of the NZ mainland are absent). The marine reserve protects marine habitats lying over a huge depth range, from mean low water mark to over 3000 metres deep.

The marine environment contains a number of outstanding marine fauna features, in particular:

- sea snakes and turtles;
- tropical herbivorous fish;
- giant limpets;
- the southern limit of a number of marine organisms, such as the Crown of Thorns starfish; and
- huge spotted black grouper, believed to be the largest remaining population in the world. This fish can grow up to a metre in length, possibly live for 100 years, and is strictly protected at the Kermadecs under fisheries, wildlife and marine reserve legislation.

South-east coast of Raoul Island from near D'Arcy Point.

*Mike Ambrose, DOC*





Interior of nikau forest,  
Raoul Island.  
Roger Grace

Right: Fruits of the Kermadec  
nikau palm.  
Don Merton, DOC

Key rare plant species are *Hebe breviracemosa*, *Pittosporum aff. crassifolium* and *Senecio kermadecensis*, with *Lepidium oleraceum* on Macauley Island.



Although the Kermadecs lie in similar latitudes to the marine communities at Lord Howe and Norfolk Islands, the marine ecosystems at the Kermadecs have a unique setting and unique features: their position straddling the ridge/trench of the plate boundary; their tectonic activity (especially the hydrothermal vents); their position in relation to the oceanic current systems in the South Pacific Ocean; and the wide depth-range of the marine reserve. Although Australia's Great Barrier Reef World Heritage site is much larger, the Kermadec Marine Reserve is possibly the largest strictly protected marine area in the world.

The land fauna and flora of the islands are also very interesting. Like the Hawaiian Islands, the Kermadecs are true 'oceanic islands'. Such islands have never been joined to continents by land-bridges and consequently they usually lack indigenous reptiles and mammals. Twenty-one indigenous bird species breed on Raoul Island, four of which are endemic. Curtis and Macauley Islands contain the world's largest populations of Kermadec shearwater and black-winged petrel.

The flora of the Kermadec Islands is quite restricted in extent, most plants having arrived because their seeds were carried on the wind, floated across the ocean, or attached to the feathers of migrating birds. Outstanding land vegetation features are:

- its youthfulness;
- the high level of endemism (23 out of a total of about 115 indigenous vascular plants); and
- the many examples of adaptive evolution of distinctive Kermadec species from mainland New Zealand genera which have made their way to the islands.



White Island (Whakaari).  
Lloyd Homer, GNS

### ***Criteria (vii) and (viii)***

A serial site containing White Island, key seamounts, and the Kermadec Islands would be the outstanding protected section of the 'Pacific Ring of Fire'. White Island and the seamounts are *superlative natural phenomena* and the former has a stark but *exceptional natural beauty* (criterion *vii*). White Island is New Zealand's most active and largest marine volcano and the seamounts (including those which are volcanically active or contain hydro-thermally active vents like some of the Rumble Seamounts) display *significant on-going geological processes in the development of .....geomorphic features* (criterion *viii*). The seamounts also display a variety of volcanic landforms; some are simple cone-shaped; others have calderas. The Kermadec Ridge/Trench is also considered to be of geo-historical importance as a key site where 'seafloor-spreading' (and the increasing age of the ocean floor with distance from the mid-ocean ridge) was first recognised, leading to a fuller understanding of the dynamics of plate tectonics.

The fluids released from the hydrothermal vents of the seamounts are of considerable scientific interest because of their unusual chemistry. Furthermore, new populations of organisms are being discovered around these vents, many uniquely related to the depth, geochemistry, and flow characteristics of the hydrothermal waters. Of considerable interest are the differences in organism assemblages on seamounts as little as 50 km apart, indicating that there is likely to be a high degree of *evolutionary diversity* in marine life along this chain of 'underwater mountains'. However, although the Kermadec Ridge's marine biodiversity is currently subject to increasing scientific study, the benthic biodiversity of most of the seamounts is as yet little known. This supports the wisdom of using a two-stage process, whereby a full site is advanced for nomination once a representative group of protected seamounts can be selected.

## INTEGRITY, MANAGEMENT, AND RISK ISSUES

There are no known integrity, management, or risk shortcomings for the Kermadec Nature Reserve and Marine Reserve components of the site. Both reserves are among the most strictly protected in New Zealand. The marine reserve encompasses a very wide range of underwater landforms and marine ecosystems.

Past human occupation has modified the indigenous flora and fauna of the islands. The introduction of a number of pest animals (such as kiore, goat, cat and Norway rat), weeds and unsuccessful attempts to farm sheep and cattle on Raoul Island, all had detrimental impacts on the islands' land ecosystems. However, in the last 15 years impressive rehabilitation progress has been made in the removal of weeds and pests from all the affected islands in the group. A major conservation landmark was achieved in 2004 with the eradication of Norway rats and cats from Raoul Island. Rats are currently being removed from Macauley Island. It is anticipated that the remaining weed species on Raoul Island will be under control or eradicated within a couple of years.

White Island is a private scenic reserve and the support of the owners would be necessary before any moves are made to add it to the site. Tourism (including diving in the extremely clear waters around the island) is the main commercial activity and could pose a risk if it escalates beyond its present level. There is no legal protection for the marine environment around White Island (regarded by DOC as a prime candidate for marine reserve status because of the scientific values of its unique biophysical environment). A 1,444 ha marine reserve has been proposed for the Volkner Rocks five kilometres northwest of White Island, but this proposal is considered inadequate for protecting the outstanding marine environment around the volcanically-active island.

The integrity, management and risk issues associated with the Kermadec Ridge seamounts are more complex. Only one (Rumble III) of the 19 seamounts along the Kermadec Ridge is currently protected. Although most of the Kermadec Ridge seamounts have not yet been subjected to fishing pressure, the risk of further damage from trawling is a serious threat to their integrity. Mining around the hydrothermal vents of the seamounts is another serious threat. The Advisory Group consider that ecosystems around the Kermadec Ridge seamounts are so vulnerable that there should be a moratorium on any fishing and mining until the provisions of the 2005 Marine Protected Areas policy have been applied to the entire chain and a system of protected areas and a sustainable fishing regime devised.

Blue and Green Lakes,  
Raoul Island, prior to the  
2006 eruption.  
*Mike Ambrose, DOC*

