

The Crater Plants of Raoul Island

Raoul or Sunday Island, located about 178°W by 29°S (approximately midway between Tauranga and Nukualofa, Tonga), is the largest of the Kermadec Islands and is presently under the jurisdiction of the New Zealand Department of Lands and Survey. The only inhabitants are the personnel of the Department of Civil Aviation Meteorological Station.

A large portion of the island is occupied by a crater with two main lakes forming two large inner craters. Raoul has had several historic eruptions (1814 and 1872) originating from the inner crater that forms Green Lake. In addition, the island has experienced numerous earthquakes. The last eruption (from Green Lake inner crater) occurred on the 21st of November, 1964. (N.Z. Weekly News, 24 February, 1965).

Through the kindness of the New Zealand Ornithological Society and the Royal New Zealand Navy I was able to visit Raoul last November and spend a day ashore (13 November). Most of my time was spent in the vicinity of Green Lake.

The 1964 eruption was mainly of ash and mud. The damage to the vegetation on the floor, walls and rim of the crater was quite extensive. Herbs and small shrubs growing on the crater floor must have been completely obliterated by the blast or covered by ash and mud. On the walls and rim of the inner crater the damage was not as severe. Pohutukawa (Metrosideros kermadecensis) could be seen in various stages of damage and recovery. Some were blown over and completely stripped of twigs, bark and leaves. Others were merely stripped of leaves and small twigs and were sprouting new leafy branches. Many trees had sprouted profusely since the blast, giving the appearance of a green bottle brush when viewed from a distance. Outside of the inner crater floor itself, the inner crater wall and rim north-east of the lake showed the severest damage of all. The blast was in this direction and knocked down and stripped off twigs as far as Blue Lake more than half a mile away from what could have been the centre of the blast.

The floor of the inner crater consisted of deeply cracked mud more or less near the lake edge and an ash-sand mixture towards the crater walls. In some areas near the lake edge and even farther away from the lake the mud was covered by a thin layer of pumice pebbles. The new plant growth on the inner crater floor was in rather scattered open patches. Damage caused by browsing goats was noted everywhere. Most of the plants were found growing on the ash-sand substratum and those that were found on the mud were restricted to where there was at least a light covering of pumice pebbles.

Pohutukawa, Ngaio (Myoporum lactum) and tutu (Coriaria sarmentosa) have been reported, growing on this inner crater floor prior to the eruption. The only traces of pohutukawa trees, other than seedlings, were dead trunks and branches sticking out of the mud and ash, completely stripped of their bark. There were a few isolated young ngaio trees, none more than two feet tall, and numerous tutu seedlings not exceeding five inches in height. Ten areas were chosen on the crater floor for a detailed study. The table over summarizes the results for the more prominent species. Actually, nineteen different species were found growing on the crater floor.

NAME	Abundance in plots	Occurrence on crater floor (% of plots)	Maximum height
<u>Metrosideros kermadecensis</u> (pohutukawa)	Rather numerous	80	4 x
<u>Coriaria sarmentosa</u> (tutu)	Very sparse to very numerous	40	5 x
<u>Myoporum laetum</u> (ngaio)	Infrequent	30	24"
HERBS: <u>Eriogon</u> sp. (Composite) +	Very sparse to very numerous	70	8"
<u>Ageratum houstonianum</u> + (Composite)	Infrequent to numerous	30	11"
<u>Solanum nigrum</u> (nightshade)	Very sparse	60	14"
<u>Scirpus nodosus</u> (sedge)	Very sparse to infrequent	50	12"
<u>Kyllinga brevifolia</u> (sedge)	Sparse to numerous	70	7"

x Seedlings + Alien or introduced plants

Ferns were not found in the first five areas or plots studied. Hypolepis tenuifolia, Histiopteris incisa and Lindsaea trichomanoides were however found in several of the remaining plots. H. incisa was rather numerous in the areas where it was found; the other two ferns were quite sparse. Nephrolepis exaltata was found growing in an area that had a number of exhausted fumaroles and several active ones. Mosses were only noted in the north-west section of the crater on the south faces of the gully walls. These gullies probably resulted from the eroding away of the soft ash and mud in this particular locality. The same type of moss was also found in the old as well as active fumaroles.

Providing there are no further eruptions, it would be of interest for a botanist to visit the crater on Raoul at two year intervals to study the vegetation in various stages of recolonization and recovery. There is, at present, a government botanist on Raoul who intends to set up permanent quadrats (small plots with definite boundaries) on the Green Lake inner crater floor with the idea that other botanists or himself may be able to return at various intervals in the near future.

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References

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