# A visit to the Leigh Marine Laboratory and adjoining intertidal reefs

**Mike Wilcox**

A special seaweed trip was held on 29 September 2007 to the University of Auckland's Leigh Marine Laboratory to take advantage of a very low spring tide in the afternoon. Our group was: Colleen Brewer, David Brewer, Warren Brewer, Jim Budd, Louise Cotterall, Colleen Crampton, Brian Cumber, Colleen Foster, Leslie Haines, Peter Hutton, Alistair MacArthur, Morag MacDonald, Barrie McLeay, Gretta McLeay, Elaine Marshall, John Millett, Sharon Osman, Helen Preston Jones, Pat Seyb, Shirley Tomlinson, Mike Wilcox (leader), Maureen Young.

The objectives were to hear about some of the marine botanical research going on at the Laboratory, and the Cape Rodney - Okakiri Point Marine Reserve (Gordon & Ballantine 1976), to view the subtidal algal forests and fish species by glass-bottom boat, and to learn something of the algae inhabiting the intertidal reefs of Goat Island Bay.

Some research findings at the Marine Laboratory

Senior Lecturer Dr Alwyn Rees gave a comprehensive account of the interrelationships between algal growth, feeding habits of the common sea-urchin or kina (*Evechinus chloroticus*) and its main predators, snapper and crayfish. The common kelp (*Ecklonia radiata*) grows down to a depth of 20 m here, and can form extensive "forests" at 10-20 m depth, with individuals 1.5 m in length (Morton 1993). Another brown seaweed, *Carpophyllum flexuosum*, can go down to a depth of 15 m. Marauding urchins can eat through the base of the stipes of *Ecklonia*, felling whole stands of them (Schiel 2003). They also eat other seaweeds, especially agar weed (*Pterocladia lucida*), but do not favour *Carpophyllum* or the green seaweed, *Codium convolutum*. Where snapper and crayfish are plentiful, as they are in the Marine Reserve, they keep the urchin population down, which in turn allows the palatable algae to flourish (Shears & Babcock 2002, Andrew 2003, Ayling & Babcock 2003). Outside the reserve where there is heavy fishing, urchin populations can build up in spectacular fashion, resulting in extensive barren intertidal and subtidal shores with a low diversity of seaweed species. Much of this work was done by Russ Babcock, Nick Shears and Russell Cole.

Periodically, *Ecklonia radiata* goes pale, gets invaded by amphipod crustaceans, dies and rots away. There was a spectacular dieback epidemic in 1992-1993, with death of 40-100% of plants at depths > 10 m (Cole & Babcock 1996). Lois Easton (Easton 1995, Easton et al. 1997) studied this when she had a Bot Soc Lucy Cranwell Field Grant in 1994, and detected virus-like particles associated with dieback symptoms. The disease that kills *Ecklonia* follows phytoplankton blooms.

The association of amphipods with seaweeds has been studied by Richard Taylor, who showed that *Carpophyllum plumosum*, which has finely-divided foliage, harbours a high density of these crustaceans. Alwyn Rees also mentioned the studies done at the Mokohinau Islands where *Ulva pertusa* grows unusually abundantly in deep water. A probable reason for this is that the herbivorous fish, parore (*Girella cuspidata*), which very much favours *Ulva* as food in inshore waters, is rare there. As well as parore, the other main herbivorous fish at Leigh are silver drummer (*Kyphosus sydneyanus*), marblefish (*Aplodactylus arctidens*) and butterfish (*Odax pullus*), the latter browsing almost exclusively on *Carpophyllum maschalocarpum* and *Ecklonia radiata*.

Glass-bottom boat trip

There was a considerable swell on the outside of Goat Island so our trip was confined to the more sheltered waters on the inner side of the island. We saw large beds of *Ecklonia radiata* and *Carpophyllum flexuosum*, and considerable numbers of the bottom-dwelling goat fish (*Upeneichthys lineatus*), eagle rays, and snapper. Apart from a few clumps of *Pterocladia lucida*, red algae were not evident.

**Fig. 1. A couloir in the Channel Reefs (Mike Wilcox, 29 Sep 2007).**

Seaweeds of Echinoderm Reef, Channel Reefs and Pumphouse Reef

During our excursion over the reefs we were able to see a good range of algae across the shore, down to the lowest intertidal level. The seaweeds here have been mentioned by Morton & Chapman (1968), and by Starling (1968) who made a particular study of the deep intertidal canyons or couloirs (Fig. 1) that dissect the rock platforms of the Channel Reefs. The wide, flat sandstone Echinoderm Reef had many large shallow

pools and channels, the dominant species we saw there being three large brown alga, *Sargassum sinclairii*, *Cystophora torulosa* and *Carpophyllum plumosum*.

**Fig. 2. Channel Reefs, with Goat Island in background. (Mike Wilcox, 29 Sep 2007).**

The Channel Reefs (Fig. 2) and Pumphouse Reef are more elevated, and formed largely of hard grits and conglomerate (like coarse concrete), and were richer in species. The shaded high-tide ledges had abundant cushions of the densely-tangled red alga, *Capreolia implexa*, and below it on open surfaces was a short greenish sward of an unidentified cartilaginous red alga, and juvenile bubbles of *Splachnidium rugosum*. *Corallina officinalis* was very common. Shallow rock pools of the reef platforms supported extensive patches of *Hormosira banksii*, with much infestation by *Notheia anomala*. The sides of deep rock pools and couloirs had *Melanthalia abscissa*, *Pterocladiella capillacea*, *Zonaria turneriana, Halopteris paniculata*, *Dictyota dichotoma*, and *Champia laingii*, the latter two species having a distinct blue iridescence under water. At the lowest tide was a dense covering of *Carpophyllum maschalocarpum*, with strapweed (*Xiphophora chondrophylla*) above it, *Pterocladia lucida*, and *Ecklonia* forest below. Peter Hutton did some diving and found numbers of the green sea grape (*Caulerpa geminata*). *Carpophyllum plumosum* growing in channels had on it an epiphytic red alga with iridescent tips, *Acrosorium ciliolatum*.

We spotted a person intently studying Echinoderm Reef, and it turned out to be Dr Bill Ballantine, the founding director of the laboratory, who still maintains an interest in the long-term changes taking place on the reefs, and who gave us an impromptu outdoor lecture on his research. Here we saw the fleshy, encrusting brown algae *Ralfsia expansa* growing in close association with the honeycomb barnacle *Chamaesipho columna* (Williamson 1992, Buchanan 2005). Research at the Marine Laboratory at Leigh has found that the barnacle is an important source of nitrogen for the growth of this alga , which was referred to by Williamson as *Pseudolithoderma* sp. (Williamson & Rees 1994, Williamson & Creese 1996).

**Acknowledgements**
We are grateful to Alwyn Rees for hosting us at the Marine Laboratory and for his informative introduction.

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## Algae of Goat Island and adjoining Marine Reserve

Compiled from herbarium records dating back to 1974, and personal observations 2006-2008.

### Red algae

*Abroteia suborbiculare*
*Acrosorium ciliolatum*
*Acrosymphyton firmum*
*Amphiroa anceps*
*Antithamnion applicitum*
*Antothamnionella adnata*
*Aphanocladia delicatula*
*Apophlaea sinclairii*
*Arthrocardia corymbosa*
*Asparagopsis armata*
*Bangia atropurpurea*
*Callithamnion gracile*
*Caloglossa vieillardii*
*Capreolia implexa*
*Catenella fusiformis*
*Catenellopsis oligartha*
*Caulacanthus ustulatus*
*Centroceras clavulatum*
*Ceramium apiculatum*
*Ceramium uncinatum*
*Champia laingii*
*Cheilosporum elegans*
*Chondracanthus chapmanii*
*Chondria lanceolata*
*Cladhymenia longifolia*
*Colaconema caespitosum* (syn. *Audouinella botryocarpa*)
*Corallina officinalis*
*Curdiea codioides*
*Curdiea coriacea*
*Dasyclonium bipartitum*
*Dasyclonium incisum*
*Dasyclonium ovalifolium*
*Delisea compressa*
*Erythrotrichia bangioides*
*Gelidium caulacantheum*
*Gigartina alveata*
*Gigartina decipiens*
*Gigartina laingii*
*Grateloupia pinnata*
*Griffithsia teges*
*Haliptilon roseum*
*Helminthocladia australis*
*Hildenbrandia dawsonii*
*Hummbrella hydra*
*Hymenena variolosa*
*Jania micrarthrodia*
*Kallymenia berggrenii*
*Laurencia distichophylla*
*Laurencia gracilis*
*Laurencia thyrsifera*
*Liagora harveyana*
*Lithophyllum carpophylli*
*Lomentaria caespitosa*
*Lomentaria umbellata*
*Lophurella caespitosa*
*Melanthalia abscissa*
*Metamorphe colensoi*
*Nemalion helminthoides*
*Nothogenia fastigiata*
*Nothogenia pulvinata*
*Osmundaria colensoi*
*Peyssonelia rugosa*
*Plocamium angustum*
*Plocamium cartilagineum*
*Plocamium cirrhosum*
*Polysiphonia aterrima*
*Polysiphonia scopulorum*
*Polysiphonia strictissima*
*Porphyra coleana*
*Pterocladia lucida*
*Pterocladiella capillacea*
*Ptilonia mooreana*
*Rhodymenia leptophylla*
*Schmitzia evanescens*
*Scinaia berggrenii*
*Scinaia firma*
*Stictosiphonia gracilis*
*Stictosiphonia hookeri*
*Symphyocladia marchantioides*

### Brown algae

*Bachelotia antillarum*
*Carpomitra costata*
*Carpophyllum angustifolium*
*Carpophyllum flexuosum*
*Carpophyllum maschalocarpum*
*Carpophyllum plumosum* var. *capillifolium*
*Carpophyllum plumosum* var. *plumosum*
*Colpomenia bullosa*
*Colpomenia peregrina*
*Colpomenia sinuosa*
*Cystophora retroflexa*
*Cystophora torulosa*
*Dictyota dichotoma*
*Dictyota ocellata*
*Distromium skottsbergii*
*Ecklonia radiata*
*Glossophora kunthii*
*Halopteris paniculata*
*Hapalospongidion gelatinosum*
*Hormosira banksii*
*Landsburgia quercifolia*
*Leathesia difformis*
*Myriogloea intestinalis*
*Notheia anomala*
*Pseudolithoderma roscoffense*
*Ralfsia expansa*
*Sargassum sinclairii*
*Scytosiphon lomentaria*
*Scytothamnus australis*
*Sphacelaria rigidula*
*Splachnidium rugosum*
*Tinocladia novae-zelandiae*
*Xiphophora chondrophylla*
*Zonaria turneriana*

### Green algae

*Bryopsis plumosa*
*Caulerpa geminata*
*Chaetomorpha aerea*
*Chaetomorpha linum*
*Cladophora coelothrix*
*Cladophora crinalis*
*Cladophora herpestica*
*Codium convolutum*

*Codium cranwelliae*
*Codium fragile* subsp. *tomentosoides*
*Derbesia novae-zelandiae*
*Microdictyon mutabile* (syn. *Boodlea mutabile*)
*Microdictyon umbilicatum*
*Monostroma lindaueri*
*Pedobesia clavaeformis*
*Rhizoclonium africanum* (syn. *R. hookeri*)
*Rhizoclonium riparium*
*Ulva intestinalis*
*Ulva parva*
*Ulva procera*
*Ulva* sp. 1 (Heesch et al 2007)
*Uronema womersleyi*
*Wittrockiella salina*

# Vascular flora and birds of Horuhoru Rock (Gannet Rock), off northern Waiheke Island, Hauraki Gulf, Auckland

**Ewen K. Cameron & Graeme A. Taylor**

Horuhoru Rock (Gannet Rock) lies 1.5 km north of Thumb Point, the northeast corner of Waiheke Island in the Hauraki Gulf, Auckland: Lat. 36° 43' 28" South, Long. 175° 10' 15" East (map reference: NZMS S10 043953) (Figs. 1-3). It is a narrow, irregular, steep-sided rocky island with the long axis running N-S, 250 m long by 95 m across, covering 1.3 ha (Taylor 1989) and 22 m asl. The flattish summit ridge is cliffed right around except for the mid-western part, where a series of terraces offers easy access to the summit ridge. The island was invested by the Crown in Ngati Paoa in 1981 (Monin 1996).

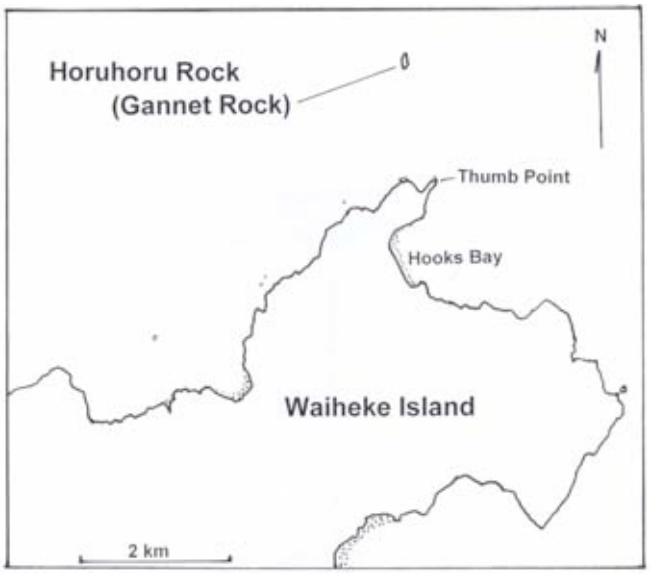


**Fig. 1. Location of Horuhoru Rock (Gannet Rock), 1.5 km north of Thumb Point, the northeast corner of Waiheke Island, Hauraki Gulf, Auckland. (Drawn by Ewen Cameron)**

This article is based on a visit by Graeme Taylor and Alan Tennyson on 29 October 1988, 805-940 hrs; and Steve Benham, Ewen Cameron, Peter Hutton and Mike Wilcox on 27 September 2007, 1225-1400 hrs. Mike Wilcox separately recorded the seaweeds during this visit (Wilcox 2008). The island is a major rookery for Australasian gannets (*Morus serrator*). The 1988 survey included the upper island area occupied by the gannets; the 2007 survey was during a 3.2 m low springtide and excluded the upper nesting area.

## Introduction

Horuhoru Rock consists of folded red cherts of the Waipapa Terrane and is listed in the New Zealand Geopreservation Inventory as one of best examples of red chert in the Auckland region (Bruce Hayward pers. comm.). The rock was solid (not crumbly) and except for the steepest parts, moving around was mostly straightforward, and the rock could be circumnavigated on foot at low tide.

The main published biological work carried out on the island has been related to the nesting gannets which also includes sketches, photos and notes of the vegetation (Fleming 1947, Fleming & Wodzicki 1952, Stein 1971, Wodzicki et al. 1984). There has been a single study of the terrestrial vegetation (Gillham 1960), and a separate algal study (Dellow 1955). Based on electronic searches of the most likely New Zealand herbaria to hold relevant records, eight previous vascular plant collections from Horuhoru Rock were located in the Auckland Museum (AK) and Te Papa Museum (WELT). The Landcare Research herbarium (CHR) held at least 50 specimens collected by Mary Gillham, but none from Horuhoru Rock.

## Vegetation

Summit ridge vegetation

Previous images of the island compared with present day clearly illustrate the detrimental effect the expanding gannet population has had on the taupata (*Coprosma repens*) bush on the island's summit ridge. Earlier photographs and sketches that have been taken: c. 1934 photo (Fleming & Wodzicki 1952: fig. 21); 2 October 1946 sketch (Fleming 1947: fig.); mid April 1963 photo (by Mike Wilcox); and ≤1971 sketch & photo (Stein 1971: figs. 2 & 3).

The c. 1934 photo (Fig. 4) shows the taupata scrub on the summit ridge. On 2 October 1946 three areas of taupata scrub on the summit ridge separated four main groups of nesting gannets (Fleming 1947: fig.). This is further commented on and mapped in more detail by Stein (1971: fig. 2), who added that the southern stand of taupata contained many old gnarled trees up to 2 m high, that the northern taupata stand