Flora of Steeple Rock and The Pinnacles, Wellington Harbour

P. J. de Lange[1]; J. R. Rolfe[2]; H. Tomoana[3]

INTRODUCTION

It would seem that the vegetation of both Steeple Rock (Te Aroaro a Kupe) and The Pinnacles (Fig. 1) has not previously been described by botanists. These are rock stacks that form the local high points of a series of north–south-trending, presumably fault-bounded, coarsely arenaceous, greywacke reefs leading north from the notorious (with respect to the *Wahine* disaster) Barrett Reef to the Pinnacles and then Steeple Rock.

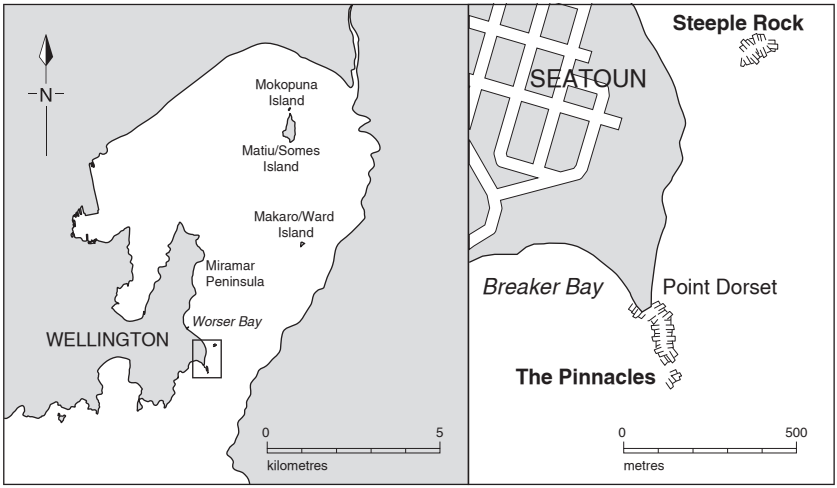

Figure 1. Location of Steeple Rock, The Pinnacles, Point Dorset, at Seatoun, Wellington Harbour. The coastline from Worser Bay to Breaker Bay, but most especially that area from Seatoun to Point Dorset comprises the former range of *Lepidium obtusatum*, an extinct scurvy grass that was known otherwise only from a small part of the west Auckland coastline along the northern side of the Manukau Heads.

1 Ecosystems and Species Unit, Department of Conservation, Private Bag 68908, Newton 1145, Auckland, pdelange@doc.govt.nz

2 Conservation Support Unit, Wellington Conservancy, Department of Conservation, P.O. Box 5086, Wellington 6145

3 Poneke Area, Wellington Conservancy, Department of Conservation, P.O. Box 5086, Wellington 6145

Both the rock stacks and their associated reefs are located along the eastern margin of Miramar Peninsula from Breaker Bay in the south to Seatoun in the north (Fig. 1). Steeple Rock is c.270 m from the Seatoun shoreline and The Pinnacles are c.100 m south of Point Dorset, although The Pinnacles are almost connected to the shore at low tide. Steeple Rock and The Pinnacles are frequently wave swept and so, with the exception of the higher parts of the rock stacks, are devoid of vascular plant vegetation. While there is a distinct lack of vegetation, we observed that all of the main stacks provide nesting grounds for spotted shags (*Stictocarbo punctatus*) and black-backed gulls (*Larus dominicanus*), and are a well known and important high-tide roost for red-billed gulls (*Larus novaehollandiae*) and white-fronted terns (*Sterna striata*) (G.A. Taylor pers. comm.). Common geckos (*Hoplodactylus maculatus*) and a common skink (*Oligosoma polychroma*) were seen on The Pinnacles.

During the morning of 18 August 2009 we investigated the vegetation of these rocks in an optimistic but altogether futile search for *Lepidium obtusatum*, a scurvy grass that was once known from the nearby shoreline and also the north Manukau Heads, west Auckland, and which is believed to have gone extinct about 1951 (de Lange 2005).

STEEPLE ROCK

Steeple Rock (NZTopo50 BQ31 541237; NZGD 2000 41° 19' 23.8" S, 174° 56' 29.7" E (NZMS260 R27 641854; NZGD1949 41° 19' 30" S, 174° 56' 29" E); Fig. 2) comprises a system of five main wave-washed rock stacks which have surfaces that are largely devoid of vegetation though, in places, splashes of black lichen (*Verrucaria* sp., probably *V. maura*) are common. Central to these outer rocks is the main Steeple itself, a narrow tor which rises to c.15 m a.s.l. and which is c.2 m wide at the summit, where it is topped by a large, rusting metal peg. Access to the Steeple is difficult because much of the surrounding shallow water is choked with dense drifts of bladder kelp (*Macrocystis pyrifera*). This proved to be a major impediment to our use of a

Figure 2. Steeple Rock, at low tide, viewed from the north-west, August 2009.

motor boat because the long, slender stems frequently entangled and fouled the propeller blades of the outboard motors.

Only one vascular plant, a taupata (*Coprosma repens*), was observed on Steeple Rock, growing on the southern side of the summit (Fig. 3). During our visit most of this plant was dead or dying, and most of the exposed branches were coated in copious amounts of guano derived from the spotted shag and black-backed gull nests and roosts along the summit, and also by thick wefts of the green alga *Prasiola stipitata*, a semi-marine species which requires only periodic inundation by saltwater or spray, and which positively revels in the type of habitat on Steeple Rock. *Prasiola* dominated the southern face, covering most of the weathered rock in a slimy, distinctly green, felted crust. Presumably it was thriving here because of the constant shower of guano which also, when moist, dribbles down the rock face, leaving a thick noisome, nutrient-rich substrate that is apparently favoured by this species (de Lange 1994), and because these slopes are less inclined to dry out. *Prasiola* was absent from the northern, western and eastern sides of Steeple Rock, and we assume this is because these faces dry out faster than the south side of the rock.

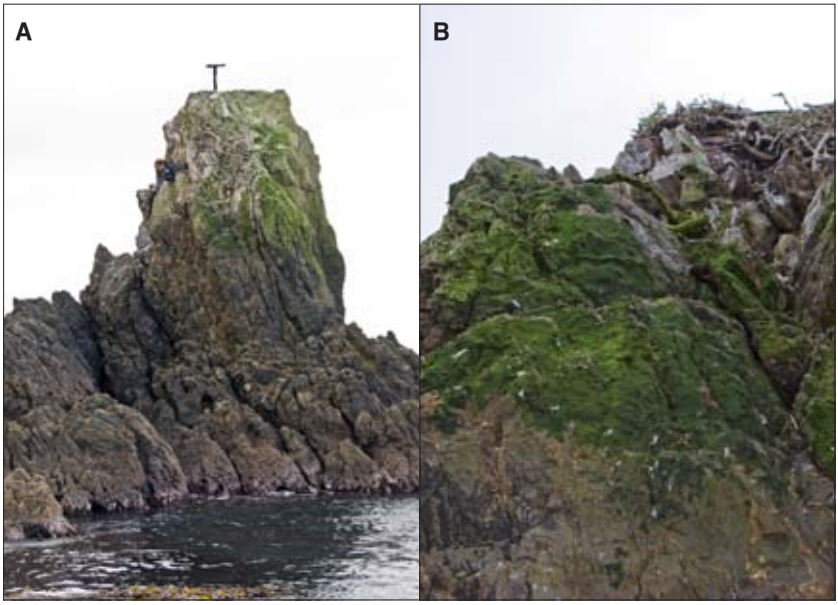

Figure. 3. (A) South side of Steeple Rock where a wind-shorn taupata (*Coprosma repens*) clinging to the rock face just below the summit was the only vascular plant recorded on the rock during our visit (August 2009). (B) *Prasiola stipitata*, a small, semi-marine green alga that thrives in nitrogen-rich conditions, was growing amongst the guano and taupata branches and trunk, and along the rocks leading down from the taupata.

THE PINNACLES

The Pinnacles (NZTopo50 BQ31 538227, 41°19'56.8"S, 174°50'17.7"E (NZMS 260 R27 638844, 41°20'3"S, 174°50'17"E); Fig. 4) extend south from the southern end of Point Dorset for about 170 m. Although separated from the shoreline by c.100 m of water, north–south-trending reefs which are exposed at low tide provide a series of interconnected hopping stones that make it nearly possible to reach The Pinnacles on foot. However, there is a last stretch of c. 10 m of open water reaching depths of 5–7 m that requires dedicated swimming, as the tidal current through here can be very strong. We found that boat access to The Pinnacles is much easier than to Steeple Rock because the water on the western side is deeper and, being subject to a strong tidal flush, is free of dense tangles of seaweed.

Figure 4. The Pinnacles viewed from the eastern side at low tide (August 2009).

The Pinnacles themselves comprise three main rock stacks aligned north to south and reaching up to c.25 m a.s.l. (Fig. 5). Of the three stacks, the northern two are of similar height, the middle being the tallest by about a metre. The southern and middle rock stacks are separated by a shallow channel choked with large, partially submerged boulders that provide relatively easy access between the stacks. The northern stack, however, is separated from the middle stack at low tide by c. 2 m of 1–2 m-deep water, though a series of large submerged boulders mean that, with careful judgement, one can easily wade between the stacks.

The western side of The Pinnacles is precipitous and much of the rock is rotten, so access across the stacks from this side, which is the easier to land on, can be difficult. Conversely, the eastern side of The Pinnacles, which is the more difficult to land on because of numerous near-surface, submerged rocks, has a series of small boulder chokes and narrow beaches, and so is relatively easy to traverse once one has landed from the west.

Figure 5. The Pinnacles at low tide in August 2009, showing the three main stacks aligned from south (left) to north (right). The southern stack was devoid of vascular plants, but the middle and northern stacks had sparse vegetation. The middle stack is the tallest; and a large twiggy, wind shorn taupata was growing on its summit. The northern stack supported the main area of vegetation observed on The Pinnacles—a low scrub of taupata through which sparse *Einadia* and *Disphyma* plants were growing when we visited. It was in this area that we saw common geckos (*Hoplodactylus maculatus*) and a common skink (*Oligosoma polychroma*).

During our visit we encountered numerous rock pigeons (*Columba livia*) which were roosting and nesting along the eastern side of the rock stacks. Spotted shags were common on the higher rock ledges, as was a resident population of black-backed gulls. As with Steeple Rock the roosting and nesting activities of these birds had left much of the upper slopes of the stacks coated in guano. Two common geckos and one common skink were also seen under taupata scrub and rocks near the summit of the northern stack.

We found that only the middle and northern Pinnacles supported a vascular flora. In contrast to the more exposed Steeple Rock, which supported only one taupata, these two rock stacks supported plants of six species. The most conspicuous of these was taupata, which formed dense, wind-shorn and twiggy sprawling masses across the summit and on the near-vertical slopes immediately below. These taupata masses were clearly visible from the shore and from the boat. It was mostly amongst the taupata that the spotted shags and black-backed gulls have been nesting, and many of the taupata appeared to have been "contained" by the activities of these nesting birds. Threaded through some of the taupata, and also in the clefts, crevices and boulder-choked shafts leading to the summit slopes were patches of *Disphyma australe*, *Sarcocornia quinqueflora* and, on the northern stack only, sparse greyish tangles of *Einadia triandra*. In a few places on the middle stack, occasional plants of *Senecio sterquilinus* were

seen. During our visit, many of the *Disphyma* and *Sarcocornia* were nearly dead, though seedlings of both were common.

Along the southern side of the northern-most stack, on a sheer, nearly inaccessible *Prasiola*-covered cliff face we also found several large patches of *Crassula moschata* (Fig. 6). This is a common species of the adjacent shoreline, as well as being abundant on Mokopuna and Matiu/Somes Islands (see Freegard & Weeber 1986; de Lange 1991; de Lange & Crowcroft 1992), although it is apparently absent from Makaro/Ward Island (de Lange & Sawyer 1996).

Figure 6. *Crassula moschata* growing on the southern side of the northern-most Pinnacle. The substrate is sheer guano- and *Prasiola*-covered arenaceous greywacke. This was the only place we saw this species on The Pinnacles.

Although no mosses or liverworts were observed on the rock stacks of The Pinnacles, the stacks do support numerous crustose lichens, of which the dark orange to golden-yellow *Xanthoria ligulata* was especially obvious. White and dark-orange splashes of *Caloplaca* were also common, as well as at least one species of *Xanthoparmelia*. A few tiny, battered tufts of *Ramalina celastri* were seen on dead taupata branches on the northern-most rock stack, and here we also found a few tufts of *Teloschistes flavicans* (AK 305901), which is apparently uncommon in the Wellington region.

DISCUSSION

The low diversity of the vascular flora of Steeple Rock and The Pinnacles is to be expected. These rock stacks are easily the most exposed, as well as the smallest, vegetated surfaces in the harbour, and they support little soil (the soil that was seen—only on the northern stack of The Pinnacles—barely qualifies for the term, consisting of fine organic matter and rock fragments, with no structure and certainly no profile).

Despite the undeniably harsh conditions, we had been hopeful of finding *Lepidium obtusatum* and/or nau/Cook's scurvy grass (*L. oleraceum*). Both species had been recorded from the nearby shoreline (*L. oleraceum* was last collected in 1937 and *L. obtusatum* in 1951), with the cliffs of Point Dorset corresponding to the type locality of *L. obtusatum* (Kirk 1891). The absence of both species probably relates to the harsh environment and lack of suitable micro-habitats for these species. While species of the *L. oleraceum* complex (Amey et al. 2007) are renowned for their ability to thrive in the nutrient-rich conditions generated in sea bird roosts and nesting sites (Norton et al. 1997), they also seem to need some soil and do not tolerate drought.

The condition of the vegetation on Steeple Rocks and The Pinnacles suggests that frequent summer droughts and winter storms are major determinants on the ability of plants to survive on these stacks. Even during our late-winter visit, with the exception of *Crassula moschata* and *Senecio sterquilinus*, none of the plants seen were in good condition, with more plants dead than alive.

Despite the paucity of the flora, we were pleased to find no naturalised species, perhaps further testimony to the difficult living conditions the rocks provide for plants. Further, with this brief account, our knowledge of the terrestrial vegetation of the islands, islets and rock stacks of the Wellington Harbour, a project one of us (PdL) started 20 years ago is now complete. Also, sadly, the ghost of *Lepidium obtusatum* can now finally be laid to rest.

ACKNOWLEDGEMENTS

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APPENDIX 1: FLORA[1] OF STEEPLE ROCK AND THE PINNACLES, WELLINGTON HARBOUR

	Steeple Rock	The Pinnacles
Coprosma repens A.Rich.	AK 305887	AK 305893
Crassula moschata G.Forst.		AK 305895
Disphyma australe (W.T.Aiton) N.E.Br. subsp. *australe*		AK 305889
Einadia triandra (G.Forst.) A.J.Scott		AK 305892
Prasiola stipitata Suhr	AK 305886	AK 305891
Sarcocornia quinqueflora (Bunge ex Ung.-Sternb.) A.J.Scott subsp. *quinqueflora*		AK 305894
Senecio sterquilinus Ornduff		AK 305890

1. Excluding lichens which, aside from *Teloschistes flavicans* (Sw.) Norman (AK 305901), were not collected.