

# Flora and vegetation of Rākino Island group, inner Hauraki Gulf

## Part 1b: West islet group of five islets/stacks

Ewen K. Cameron and Shelley Heiss-Dunlop

### Introduction

Further to our recent account of the main eleven islets and reef stacks of Rākino Island group (Cameron & Heiss-Dunlop 2023) we have now surveyed all five of the islets/rock stacks of the “West islet” group that support vascular plants. Previously, as Part 1 (op. cit.) we only surveyed the largest islet of this group, which we referred to then, and now, as “West islet”. The West islet group is situated at the end of the Department of Conservation (DoC) Recreation Reserve, the 500 m-long narrow peninsula (referred to here as the DoC peninsula) between Woody and West Bays (Figs. 1, 2), separated by a shallow, sandy channel (3–8 m across) (Fig. 3) except for 1–2 hours either side of low tide. For a wider location map and relevant images see Cameron & Heiss-Dunlop (2023: figs. 1, 2, 12–17). The rock type of the group of islets/stacks is eroding greywacke of Triassic-Jurassic age.

We have given the five islets/rock stacks of the West islet group informal names: West islet, Central islet, N-stack, NW-stack and S-stack based on their locations (see Figs. 1, 2). At low tide most of these islets/stacks are separated from each other by narrow channels (Fig. 4) except for Central islet and S-stack, where the channel is dry at low tide. Near

low tide a sandy-shelly beach is exposed, joining the south side of West and Central islets across to S-stack. There was no evidence of any plantings or frequent human visitation. The lack of high tide beaches, and the presence of rock oysters and barnacles on the sharp, intertidal rocks deter most people.

### Method

#### Objective 1

Our objective was to visit the islets/stacks of the West islet group that contained vascular plants, record the vascular flora and describe the vegetation. Additionally, we recorded other obvious flora and fauna, primarily the birds, and the more obvious bryophytes, seaweeds and lichens were also recorded. Many of these were photographed. Photographs of the islets/stacks and their biota were taken during all visits and several voucher specimens were collected and lodged in the Auckland Museum collections.

The results below are based on an observation of breeding birds from the boat on 27 Nov 2021 and five visits: (1) The original visit on 15 Nov 2020 for about 2 hours, when we walked out from northern West Bay during a low spring tide to West islet and



**Fig. 1.** Location of the five rock stacks/islets of the West islet group, near low tide, off the end of the DoC peninsula between Woody and West Bays, Rākino Island. Auckland Council GeoMaps (aerial base map 2017), modified by Joshua Salter. Scale bar = 50m.



climbed up from the steep south side as reported previously (op. cit.). The next four visits were all by inflatable: (2) SHD on 8 Oct 2023 for about 4 hours, climbed West islet from the north side to the summit, and briefly surveyed the southern slope of Central islet and S-stack; (3) we both landed on 9 Dec 2023 for about 5 hours and surveyed N-stack, NW-stack, S-stack, Central islet and briefly the lower northern side of West islet; (4) SHD on West islet for 1.5 hours on 16 Dec 2023 and climbed up from the north side; and (5) on 27 Dec 2023 we both landed and resurveyed West islet for c. two hours, ascending from the north side.

## Objective 2

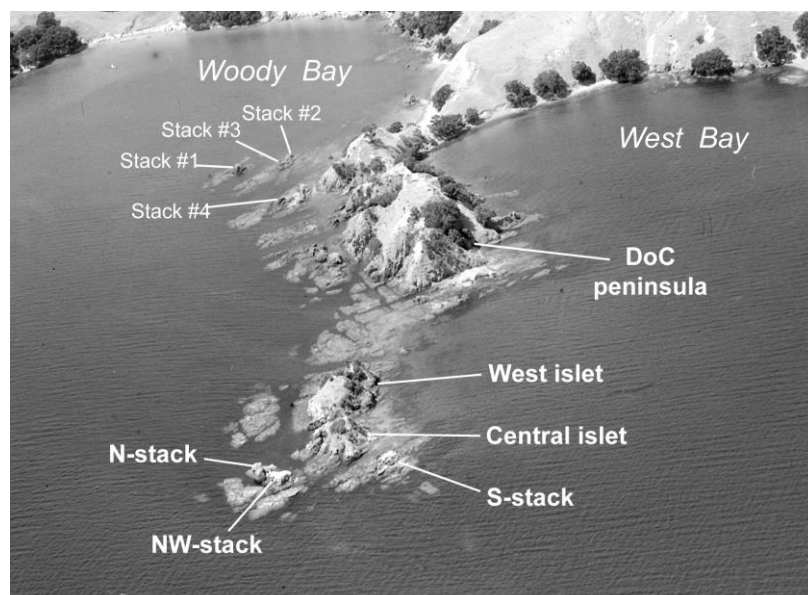
Our second objective was to land on a small stack, on the north side of the DoC peninsula, southern Woody Bay, referred to as Stack #1 by Cameron & Heiss-Dunlop (2023: 129) (see Fig. 2). We previously (22 Feb 2021) had only looked across a narrow, permanent channel with binoculars to record its flora. It was a possible location of a 1984 collection by Rhys Gardner of *Scleranthus biflorus* (AK 222080). On 9 Dec 2023 we landed by inflatable on the small stack (Stack #1), and while there we also rechecked Stack #2. See Appendix 1 for what was observed.

## Results for West islet group

See Table 1 for a summary of the vascular flora recorded for each islet/rock stack of the West islet group, along with their height (m asl), area (ha) and their combined totals. See Appendix 2 for the full list

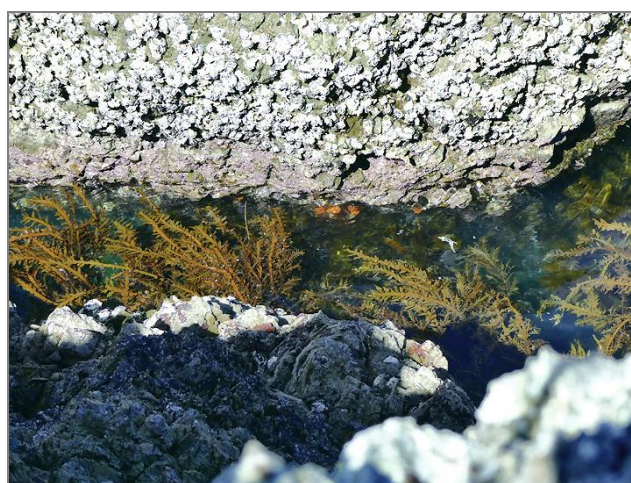


**Fig. 3.** The DoC peninsula from West islet looking east into West Bay; foreground the shallow channel separating the peninsula from the West islet group close to low tide. Photo: SHD, 16 Dec 2023.



**Fig. 2.** Part of a 1954 oblique aerial view of the West islet group near high tide at the end of the DoC peninsula separating Woody and West Bays, on the western side of Rākino Island, looking NE. The five rock stacks/islets of the West islet group (foreground) and the four stacks (#1–#4) off the north side of the DoC peninsula are all labelled. Note – West islet has extensive grassland with a small shrubby area along the southern flanks; Central islet has a shrubby area around the summit (E face hidden). Whites Aviation Ltd. Photographs. Ref: 23526041. Alexander Turnbull Library, Wellington. 29 Jan 1954. Reproduced with permission.

of vascular plants and nesting bird species for each islet/stack. The combined total vascular flora for the group was 69 species, 49% of which were indigenous species. Three species were additional to the recent flora of the combined eleven islets and main reef stacks of Rākino Island and 14 of these were additional to the original West islet list (see Cameron & Heiss-Dunlop 2023: appendix). The three additions to all the islets/main reef stacks were: tarweed (*Bellardia viscosa*), black medick (*Medicago lupulina*) and onion orchid (*Microtis unifolia*) (see



**Fig. 4.** The tidal runnel separating N-stack and NW-stack at low tide supporting large brown algae, flapjack (*Carpophyllum maschalocarpum*), *Ecklonia radiata*, and orange sponges all submerged. Above the water is a 'pink paint' layer (a non-geniculate coralline alga) and then rock oysters. Photo: SHD, 9 Dec 2023.



Appendix 2). Other observations included 11 lichens, 5 bryophytes, 13 seaweeds, 10 birds, one mammal and two invertebrates. The vegetation of five islets/stacks and their biota are briefly described below.

### West islet

This is a revised account of the one by Cameron & Heiss-Dunlop (2023: p. 121, figs. 14–17), based on several more visits. The easiest access was from the northern side (Fig. 5), although going up the steeper, central southern side (Fig. 6) was also possible. Islet size is c. 48 × 29 m (0.09 ha), 14 m asl. There are two very steep, actively eroding guts, one on the NE corner and another on the south coast that almost bisects the islet. The NE corner is near vertical and lacks vegetation. Exotic grasslands dominated the west and southern slopes; and rather youthful woody vegetation covered about two thirds of the upper part of the islet (Fig. 7).

The woody vegetation was dominated by pōhutukawa (*Metrosideros excelsa*), mainly youthful-looking trees to 2–3 m tall, much wider than tall. Associated with them was karo (*Pittosporum crassifolium*, <2 m tall); rhamnus (*Rhamnus alaternus*, <1.5 m); boxthorn (*Lycium ferrosissimum*, <1m); houpapa (*Pseudopanax lessonii*, to c. 1.5 m); coastal māhoe (*Melicactus novae-zelandiae*, <1 m); coastal karamū (*Coprosma macrocarpa*, a couple of seedlings); and spreading bushes of taupata (*Coprosma repens*) mainly at the lower fringe, often associated with clumps of healthy *Astelia banksii* tussocks.

The main grassland of the western side was locally on good soil, and even a suspected midden shell (a whelk) was present. In other places the soil was rocky and shallow. The grassland was dominated by ratstail (*Sporobolus africanus*), hare's-tail (*Lagurus ovatus*, Fig. 7) and narrow-leaved plantain (*Plantago lanceolatum*); commonly associated with catchfly (*Silene gallica*), bur medick (*Medicago nigra*), slender birdsfoot trefoil (*Lotus angustissimus*), *Aira caryophyllaea*; and less commonly *Lolium rigidum*, prairie grass (*Bromus catharticus*), slender oat (*Avena barbata*), scarlet pimpernel (*Lysimachia arvensis*), fleabane (*Erigeron sumatrensis*), shivery grass (*Briza minor*), danthonia (*Rytidosperma racemosum*), centaury (*Centaurium erythraea*), broomrape (*Orobancha minor*), hairy birdsfoot trefoil (*Lotus subbiflorus*), subclover (*Trifolium subterraneum*) and tarweed (*Bellardia viscosa*) on the summit ridge. There is an occasional *Muehlenbeckia complexa* tangle, and rhamnus is starting to invade the grassland (Fig. 8). In the



**Fig. 5.** L to R, West islet (looks like two islets) and Central islet, looking south from boat. Photo: SHD, 6 Feb 2024.



**Fig. 6.** L to R, S-stack, Central islet and West islet, looking north from boat in West Bay. Photo: SHD, 8 Oct 2023.



**Fig. 7.** Exotic grassland dominated by ratstail, hare's-tail (obvious white heads) and narrow-leaved plantain; upper western flank of West islet looking south with the Three Sisters in the distance. The youthful shrubs are mainly karo, with pōhutukawa (near top) low houpapa (on Shelley's left), rhamnus and *Astelia banksii*. Photo: EKC, 27 Dec 2023.





**Fig. 8.** *Rhamnus* starting to invade the exotic grassland with abundant hare's-tail and narrow-leaved plantain, west side of West islet. Photo: EKC, 27 Dec 2023.



**Fig. 9.** Mats of the moss *Triquetrella papillata* (open state) locally gave the grasslands of West islet a golden hue. Photo: near top of West islet, SHD, 8 Oct 2023.



**Fig. 10.** The Nationally Threatened *Geranium retrorsum*, upper grassy slope, south-facing West islet. Photo: SHD, 08 Oct 2023.

areas of shallow soils, the larger grass species were mainly absent and mats of mosses were common (*Hypnum cupressiforme*, *Leptodontium interruptum*, *Thuidiopsis furfurosa*, *Triquetrella papillata*), often containing threads of the hardy liverwort *Chiloscyphus semiteres*. In places the abundance of *Triquetrella papillata* gave the grasslands a golden hue (Fig. 9), even more than *Hypnum cupressiforme* as stated previously by Cameron & Heiss-Dunlop (2023: fig. 16). Locally, *Geranium retrorsum* (Fig. 10), onion orchids and sun orchids (*Thelymitra longifolia*), clustered clover (*Trifolium glomeratum*), and some eight annual grass species were present.

Below the woody vegetation and grasslands were mainly lichen-clad rock, in or near the splash zone with scattered hardy plants of ice-plant (*Disphyma australe*), glasswort (*Salicornia quinqueflora*), shore groundsel (*Senecio lautus*), dichondra (*Dichondra repens*), knobby sedge (*Ficinia nodosa*), *Chenopodium triandrum*, small plants of taupata and even small pōhutukawa, along with exotic annuals such as sickle grass (*Parapholis incurva*), allseed (*Polycarpon tetraphyllum*), vulpia hair grass (*Festuca bromoides*) and suckling clover (*Trifolium dubium*).

In the steep southern gut, mostly below the grasslands were *Wahlenbergia vernicosa*, *Peperomia urvilleana* and *Asplenium haurakiense* in the open. Sadly, the single healthy plant of rauhuia (*Linum monogynum*) observed there on 15 Nov 2020 and unknown for the rest of the whole Rākino Island group, had gone, along with several other associated species on the steep south-facing slope.

As with other islets and taller stacks of the group, lichens were abundant on the exposed bare greywacke and are discussed further below. The shrubby fruticose lichen, *Ramalina celastri*, was present on pōhutukawa trunks (Fig. 11).

West islet is the largest, tallest islet of the group and supports the most species of vascular plants: 62 species with 52% being native (Table 1).

A reef heron was frequently observed from the boat around the coast of this group and on 8 Oct 2023 there was a deserted egg (with a hole in it) by the mouth of a small rock cavity; on 9 and 16 Dec 2023 there were three pale blue eggs present within the rock cavity (Fig. 12). Sadly, ten days later (on 27 Dec 2023) the nest was abandoned and only two eggs present. House sparrows were frequent on that date.

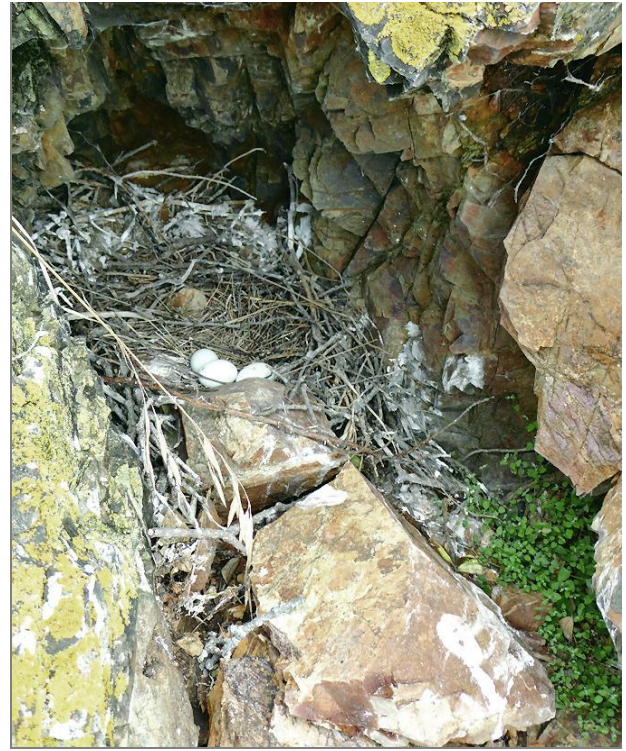
#### Central islet

Most of Central islet was steep and eroding; however, the western side (Fig. 6), being less steep,





**Fig. 11.** A common lichen of the Rākino islets, fertile *Ramalina celastri*, on low pōhutukawa branch near summit with fallen crimson filaments of pōhutukawa flowers, West islet. Photo: SHD, 27 Dec 2023.



**Fig. 12.** Reef heron nest in a small cave with three pale-blue eggs being incubated, later deserted. West islet. Photo: SHD 16 Dec 2023.

was straight-forward to ascend. The islet was conical in shape, and measured c. 36 × 25 m (0.061 ha), 13 m asl.

The woody vegetation comprised shrubs mainly to 2.5 m tall that were densest around the summit area, with only scattered individual bushes below this, mainly karo. The dense summit vegetation

consisted of shrubs of pōhutukawa, karo, and less commonly houpara (to 2 m tall), boxthorn (to 1.5m) and rhamnus (to 1 m, one already fruiting). Only three trees were over 2.5 m tall, which were pōhutukawa, 5–6 m tall, all rooted below the summit (Figs. 13, 14). The tallest was close to the NE steep face and didn't overtop the summit. About 4 m up from the base it had a partly broken head that



**Figs. 13 & 14:** **13 (L).** The suspected oldest tree of the West islet group, a pōhutukawa on the east side of Central islet (in the foreground) with a partially broken head – the twisted base is c. 0.5 m across. The upper tall pōhutukawa silhouetted is a separate tree on the west side. Seen from West islet. Photo: EKC, 27 Dec 2023. **14 (R).** Central islet (West islet behind) showing vigorous karo regeneration, 1–2 m tall, and the tall pōhutukawa of the west side of Central islet. Photo from S-stack looking NE: EKC, 9 Dec 2023.



had resprouted, and the tree base was twisted and c.0.5 m thick (Fig. 13). Its height and thick base indicated that it was most likely the oldest tree on the islet and of the West islet group. The tree that over-topped the summit the most (by c. 2.5 m) was rooted directly above the damaged tree. The single tall tree on the western side stood out when viewed from the south (Fig. 14), but scarcely overtopped the summit.

Taupata was present mainly as prostrate youthful-looking low shrubs on the lower fringe of the vegetation just above the splash zone. Karo was rapidly establishing on the open, less steep slopes (Fig. 14). Only small plants of *Muehlenbeckia complexa* were present.

Tussocks of *Astelia banksii* and clumps of knobby sedge were frequent on the steeper slopes. Half the vascular flora were annual species, and only three of the 24 annuals were native species. These annuals dominated the eroding open sites. Seven species, six annuals (*Bromus hordeaceus*, *Cotula australis*, *Gamochaeta coarctata*, *Lepidium didymum*, *Medicago lupulina*, *Sagina apetala*) and one perennial, the native sea spurrey (*Spergularia tasmanica*), (Fig. 15) were unrecorded on the larger West islet (see Appendix 2).

Central islet supported 45 species of vascular plants with 44% being native (Table 1).

An old variable oystercatcher's nest with a partial eggshell (from previous season?) was located low down on the western side of the islet on 9 Dec 2023. A small group of combined nesting red-billed gulls and white-fronted terns on the western side was observed from the boat on 27 Nov 2021.



**Fig. 15.** Native sea spurrey with white flowers, rooting in cracks of the rock in upper splash zone, west side of Central islet. Photo: SHD 9 Dec 2023.

### N-stack

The stack measured c. 8 × 10 m (0.009 ha), angling sharply to a narrow summit, 5 m asl (Fig. 16). Two channels, <1 m across, separate the stack from the rest of the reef, including NW-stack (Fig. 17) and Central islet, even at low tide. The upper part of N-stack was clothed with ice-plant and glasswort; shore groundsel was present, along with a single taupata bush c. 50 cm tall. All these are capable of withstanding salt spray (halophytes). Exposed lichen-covered rock was common.

N-stack supported only four species of vascular plants; all were indigenous (Table 1).

Egg shell of a white-fronted tern was present on 9 Dec 2023 – evidence of breeding?

### NW-stack

The stack measured c. 11 × 13 m (0.015 ha), rising to a smaller flat summit area (c.8 × 10 m), 5 m asl (Fig. 17). As mentioned above, narrow channels at low tide separate this stack on the reef. As with all the small stacks above wave-height, mats of ice-plants dominated the vegetation with scattered clumps of glasswort, shore groundsel and sickle grass. Some six low-lying shrubs of taupata were present along with a single erect karo c.1.5 m tall on the summit ridge. At the south end of the summit ridge among a low taupata and next to the karo (Fig. 18) were the only plants seen on this stack that were not halophytes: bur medick, broomrape and prairie grass. Twin cress (*Lepidium didymum*) and berry saltbush, were scarce and in the open, and an old black-backed gull nest contained a fruiting stem of riggut brome (*Bromus diandrus*) that may or may not have been sourced from this rock stack.



**Fig. 16.** The narrow N-stack only supported four vascular species, ice-plant and glasswort the main ones. Photo: EKC, 9 Dec 2023.

**Table 1.** Vascular plant species totals in different plant groups, native and naturalised for the five islets/stacks off the western end of the peninsula between Woody and West Bays, and their combined totals, along with areas and altitude for each islet/stack and their combined totals.

Plant group	West islet	Central islet	NW-stack	N-stack	S-stack	TOTALS
<u>Natives</u>						
Ferns	2	1	-	-	-	<b>2</b>
Dicots	20	14	6	4	6	<b>22</b>
Monocots	10	5	-	-	-	<b>10</b>
<u>Exotics</u>						
Dicots	18	17	3	-	2	<b>22</b>
Monocots	12	8	3	-	2	<b>13</b>
<b>Totals</b>	<b>62</b>	<b>45</b>	<b>12</b>	<b>4</b>	<b>10</b>	<b>69</b>
<b>% native</b>	52%	44%	50%	100%	60%	<b>49%</b>
<b>m asl</b>	14	13	5	5	4	
<b>Area (ha)</b>	0.09	0.061	0.015	0.009	0.009	<b>0.184</b>

NW-stack supported 12 species of vascular plants and although only 50% were native, the vegetation was dominated by native species (Table 1).

A pair of black-backed gulls had two chicks (Fig. 18) and an old nest on the summit ridge on 9 Dec 2023; the black-back family were still present on the 27 Dec 2023 (viewed from West islet); spur-winged plover were present near the summit, on 6 Feb 2024.

### S-stack

The rectangular S-stack measured c. 13 × 9 m (0.009 ha), rising to a low flat summit area, 4 m asl (Fig. 19). It is connected to the reef of Central islet

and there are no inter-tidal channels between them at low tide. The summit area and upper flanks are dominated by low spreading shrubs of taupata (to 0.5 m tall) and mats of ice-plant. Clumps of glasswort were frequent in cracks and hollows of the bare rock along the lower margin of the vegetation. The NZ spinach (*Tetragonia trigyna*) and broomrape were scarce, whereas shore groundsel and sickle grass were occasional. Broomrape (Fig. 20) was present on four of the five islets/stacks of this group, but this was the only one where we saw this root-parasite not associated with a member of the pea family (Fabaceae). On 8 Oct 2023 several uprooted plants of ripgut brome and a flowering head of narrow-leaved plantain (source unknown)



**Fig. 17.** L to R, NW-stack and N-stack from top of Central islet. Note the intertidal channels separating the two stacks from each other and from Central islet, near low tide. Photo: EKC, 9 Dec 2023.



**Fig. 18.** NW-stack with a single karo, low taupata, mats of ice-plant, a family of black-backed gulls and the abundant orange-crust lichen of coastal rocks, *Xanthoria parietina*; Motutapu I. in the background. Photo: SHD, 9 Dec 2023.

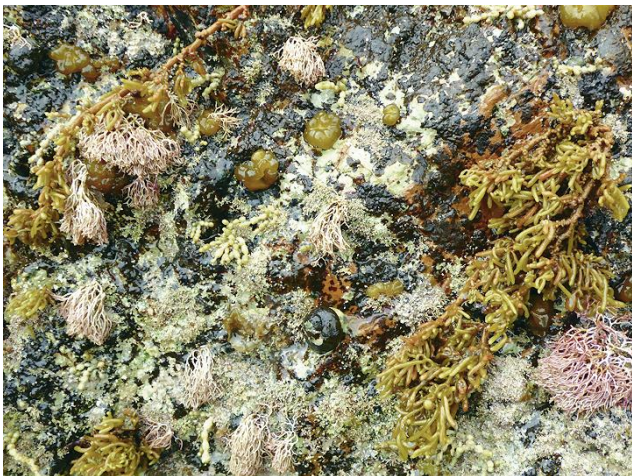




**Fig. 19.** S-stack at low tide, showing the low taupata, green mats of ice-plant and the orange rock-crust, *Xanthoria parietina*. Background: inner Three Sisters I. (left), Motutapu I. (right). Photo: EKC, 9 Dec 2023.



**Fig. 20.** A group of broomrape plants on S-stack in a mat of ice-plant, next to NZ spinach, with taupata above, but, unusually, no members of the pea family (Fabaceae) present. Three Sisters Islands in the distance. Photo: SHD, 8 Oct 2023.



**Fig. 21.** The rich seaweed diversity on the exposed intertidal rocks included: *Cystophora torulosa* (branching brown), *Liagora harveyana* (hanging pink), *Leathesia marina* (brown bubbles), *Hormosira banksii* (a few), pink paint (a non-geniculate coralline alga) and a cat's eye mollusc (lower centre). Photo: south side West islet, SHD, 16 Dec 2023.

were lying in one place on top of the ice-plant mat – the beginning of a gull's nest?

S-stack supported ten species of vascular plants with 60% being native (Table 1).

Some 13 white-fronted terns were prospecting on the stack on 8 Oct 2023; there was no evidence of their presence on 9 Dec 2023.

## Non-vascular plants

### Bryophytes

Small islets that are subject to desiccation and exposure to salt spray is usually not conducive to bryophytes. However, we recorded five bryophytes on West islet, all locally common in the open exotic grasslands: a liverwort, *Chiloscyphus semiteres*, and four moss species, *Hypnum cupressiforme*, *Leptodontium interruptum*, *Thuidiopsis furfurata* and *Triquetrella papillata* (Fig. 9). They were mainly on the shallower soils where the smaller grass species were present or on the steep south-facing grassy slopes. All were vouchered. Bryophytes appeared to be absent on the three stacks and were uncommon on Central islet.

### Seaweeds and other intertidal marine life

Only the more obvious species were recorded in the intertidal rocky areas around the five rocky islets/stacks. They were all attached to intertidal rock, from exposed to partially sheltered sites, in tidal surge channels and intertidal rock pools. The seaweeds around this group of islets and stacks were common and quite diverse, especially on the south side (Fig. 21), and included eight brown algae (flapjack/ *Carpophyllum maschalocarpum* Fig. 4, *Colpomenia peregrina*, *Cystophora torulosa*, *Ecklonia radiata*, Neptune's necklace/ *Hormosira banksii*, *Leathesia difformis*, *Scytothamnus australis*, *Splachnidium rugosum*), two green algae (*Codium convolutum*, *Codium fragile* subsp. *fragile*) and four red algae (*Apophloeosinclairii*, *Caulacanthus ustulatus*, *Liagora harveyana*, a non-geniculate coralline alga). The most ubiquitous species was Neptune's necklace. Most were vouchered. Purple rock crabs (*Leptograpsus variegatus*) were visible near low water by the outer channels or larger rock pools, and colourful encrusting sponges were locally visible by the spring low water mark in the outer channels.

### Lichens

Lichens were abundant on most exposed bare rock above the tidal zone. The yellow-orange crust, *Xanthoria parietina* (Fig. 18), stood out because of its bright colour, occupying quite large areas on all the islets and taller stacks. The lichens listed below were photographed on three of the islets/stacks and tentatively identified later by Dan Blanchon as: *Heteroderma* sp., *Lichina intermedia*, *Parmotrema*



sp., ?*Pertusaria*, *Ramalina celastri* (Fig. 11), *Stereocaulon ramulosum*, *Xanthoria parietina* on West islet; *Cladia ?blanchonii*, *Lepraria* sp., ?*Porpidia*, *Xanthoria parietina* on N-stack; and ?*Calopaca*, ?*Phyiscia* and *Xanthoria parietina* on S-stack. Many of them appeared to be present on most of the group.

## Fauna

**Invertebrates** – stink bug (from its smell) on Central and West islets; Suchier's meat ant (*Iridomyrmex suchieri*) with dark bodies and red heads were locally abundant in the exotic grassland on West islet.

**Lizards** – none seen.

**Birds** – West islet had the best potential for burrowing seabirds because it locally had good soil cover. However, no seabird burrows were detected on any of the islets/stacks. The five species we observed nesting, or saw evidence of nesting, are included in Appendix 2. There are four Nationally threatened/At-Risk bird species breeding on the islets and reef stacks: a reef heron (Nationally Endangered) attempted to breed on West islet (Fig. 12); white-fronted tern (Declining) were breeding on Central islet (27 Nov 2021), and possibly on N-stack (Oct-Dec 2023) and S-stack (Oct-Dec 2023); red-billed gull nested on west side Central islet (27 Nov 2021); and variable oystercatcher (Recovering), which were commonly seen feeding or resting on the reef, nested on Central islet (spring-summer 2022 or 2023). Other birds seen on the reef, stacks or islets of the West islet group included: pied shag, spur-winged plover, black-backed gull (nesting), welcome swallow, tūi and house sparrow. Reef heron was the only addition to those listed by Cameron & Heiss-Dunlop (2023: appendix) for all the other stacks and islets of Rākino Island.

**Mammals** – an adult New Zealand fur seal/kekeno was observed for c. 20 minutes quietly resting in the shallow channel between S-stack and Central islet, eventually moving around to the northern side of NW-stack (open to the north side) on 8 Oct 2023. No other fur seals were seen during our many boat visits to the Rākino Island group.

## Threatened and At-Risk vascular plants of the West islet group

There are five Threatened and At-Risk vascular plant species on the West islet group. They are: *Geranium retrorsum* (Fig. 10) and pōhutukawa (both Nationally Vulnerable, the latter because of the threat from Myrtle rust); *Linum monogynum* (Nationally At-Risk/Declining); coastal māhoe (Regionally At-Risk/Declining); and berry saltbush (Regionally Naturally Uncommon). With the exception of pōhutukawa, the threatened plant species of all the Rākino islets and reef stacks are listed in table 2 of Cameron & Heiss-Dunlop (2023: p. 131). There are no additional threatened species from the further surveys of the West islet group; all five were recorded for West islet, and only pōhutukawa and berry saltbush were also found on other islets/stacks of this group (see Appendix 2).

### Rauhuia (*Linum monogynum*)

On the 15 Nov 2020 there was a single, healthy adult plant of rauhuia on West islet. However, when returning to the same location on 9 Dec 2023 it was no longer present, and the area appeared to have suffered from erosion (compare Figs. 22 and 23). It was possibly washed into the sea during the record-breaking rainfall for NE New Zealand during the first half of 2023 (NIWA 2023) which included the Auckland Anniversary floods (27 Jan 2023) and Cyclone Gabrielle (11–17 Feb 2023).



**Fig. 22.** Southern gut of West islet where a healthy rauhuia (*Linum monogynum*) plant grew three years ago, at the spot marked with an arrow. Area appears to have been washed out since that previous visit (see Fig. 23). Photo: EKC, 27 Dec 2023.



**Fig. 23.** The same area as in Fig. 22, photographed three years previously, with rauhuia (arrow) and a rich covering of small plants, including *Peperomia urvilleana* and *Asplenium haurakiense*. Photo: EKC, 15 Nov 2020.

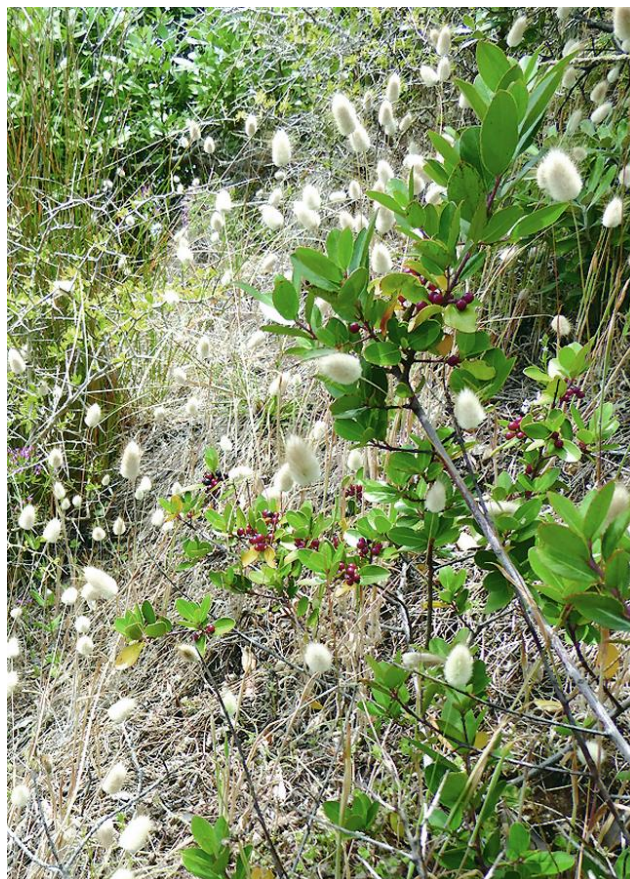


The latter caused coastal wave damage on Rākino's south coast in Home Bay (Craig Anderson, pers. comm.). Erosion from wave surge might also have been the cause of the demise of rauhuia and other species in the lower gut on the south coast of West islet.

Thomas Cheeseman collected rauhuia in Waitematā Harbour in 1883 – there appear to be no other records from that area. Populations of rauhuia have been declining in the Hauraki Gulf for many years. One of us (EKC) remembers an ABS trip to Motuhoropapa, Noises Islands, on 20 Mar 1993, where rauhuia was locally common on the NW peninsula - more recently (pers. obs.), it appears to have disappeared from there. Also, since 1990 it has been found on over eleven inner Hauraki Gulf islands (based on specimens in AK and EKC pers. obs.). However, most of these populations have not been checked in over a decade, and where they have been checked, rauhuia has not been found. For example, on Rotoroa I. there were "5 plants" of rauhuia in Nov 2006 (AK 297769) and on Ruthe islet it was "local" in Nov 1990 (AK 200581). It appears to have gone from both sites based on Ben Goodwin (pers. comm.) who specifically checked the southern coastline of Rotoroa I. a couple of times between 2013 and 2016, where there had been serious erosion and much of the cliff vegetation was gone; and SHD (pers. obs.) circumnavigated Ruthe islet on 14 Oct 2023. There is a rust pathogen that has been in New Zealand for a long time that attacks the leaves of this species (de Lange 2019) – perhaps this, combined with storm damage is the cause of its wider decline in the inner Hauraki Gulf.

## Discussion

The vegetation of these exposed islets has to cope with storm events (wind, rain, waves), erosion, desiccation and, in the past, most likely fire. As with the other islets of Rākino, the woody vegetation was youthful (Cameron & Heiss-Dunlop 2023) and also contained threatened plants and birds. The oldest tree appeared to be the pōhutukawa with broken upper branches on the very steep east side of Central islet, that was c.0.5 m across near the base (Fig. 13). The low stature of all coastal māhoe <1 m tall, even when sheltered by pōhutukawa, supports the youthfulness of this species. The fast-growing shrub karo was of small stature, and expanding its population on Central (Fig. 14) and West islets. This is most likely a response to the eradication of Norway rats from the Rākino Island group in 2000, because karo is extremely vulnerable to seed predation by rats (Campbell & Atkinson 1999). Moors (1985, in Campbell & Atkinson 1999) recorded karo as one of the foods most commonly eaten by Norway rats on the close-by Noises Islands.



**Fig. 24.** Small rhamnus bush with ripe red fruit, boxthorn behind and abundant hare's-tail; NW slope, upper Central islet. Photo: SHD, 9 Dec 2023.

The two ubiquitous woody weeds of the Rākino Island group, rhamnus and boxthorn (Fig. 24), are young plants on the two islets of this group, but both are spreading and need immediate control because they are already fruiting.

The DoC peninsula (see Fig. 3), east of the West islet group, is predominantly clad in native bush and has some of the best indigenous plant diversity on Rākino Island (authors pers. obs.). The peninsula is also the only known mainland location of breeding grey-faced petrel/ōi (based on feathers located by burrows with fresh white guano, SHD pers. obs., 11 Jan 2024). On a superficial look, the intertidal seaweed diversity also appeared to be high along this chain. Combining the maritime and terrestrial habitats with high species diversity of this whole peninsula complex indicates a biodiversity hot spot for Rākino Island group. The whole area deserves better weed control, especially of rhamnus and boxthorn.

The vascular plant species totals for all the main Rākino islets are repeated here as Table 2, updated from Cameron & Heiss-Dunlop (2023: table 1). This article completes our study of the islets and main reef stacks of the Rākino Island group. Our next account (Part 2) will cover Rākino Island itself.



**Table 2.** Vascular plant species totals in different plant groups, native and naturalised for the main 12 islets of Rākino Island and their combined totals, along with areas and altitudes for each islet. From Cameron & Heiss-Dunlop (2023: table 1, p. 115) with Central islet (M) added; West islet (C) and Totals updated; and the totals of Woody islet (B) and Sandy Island (L) corrected.

Plant group	Woody I. A	Woody islet B	"West islet" C	"Central islet" M	3 Sisters inner D	3 Sisters mid E	3 Sisters outer F	South I. G	Little Sandy Point inner stack H	Little Sandy Point mid stack J	Little Sandy Point outer stack K	Sandy Bay I. L	Totals
<u>Natives:</u>													
Ferns	6	4	2	1	3	4	3	2	1	1	1	3	9
Dicots	29	23	20	14	10	17	13	12	13	11	13	17	36
Monocots	11	6	10	5	5	9	2	2	2	1	5	5	18
<u>Exotics:</u>													
Conifers	-	-	-	-	1	1	-	-	-	-	-	1	1
Dicots	23	17	18	17	8	13	13	12	9	6	17	9	34
Monocots	15	9	12	8	10	11	8	11	6	5	11	9	22
<b>Totals</b>	<b>84</b>	<b>59</b>	<b>62</b>	<b>45</b>	<b>37</b>	<b>55</b>	<b>39</b>	<b>39</b>	<b>31</b>	<b>24</b>	<b>47</b>	<b>44</b>	<b>120</b>
<b>% native</b>	55%	56%	52%	44%	49%	46%	46%	41%	52%	54%	40%	57%	<b>53%</b>
<b>m asl</b>	23	15	14	13	23	20	13	13	10	7	14	22	
<b>Area (ha)</b>	0.24	0.18	0.09	0.06	0.29	0.22	0.04	0.06	0.03	0.02	0.05	0.55	<b>1.83</b>

## Acknowledgements

We thank: Ngāi Tai ki Tāmaki for supporting our survey of the Rākino Island group; John MacKenzie for local information and encouragement; Jessica Beever for moss identifications; Dan Blanchon for lichen identifications from photographs; Mike Wilcox for assistance with seaweed identifications from photographs; Darren Ward for an ant identification;

Mike Ogle for feedback on fur seal behaviour (from video); Ben Goodwin for rauhuia information; Craig Anderson for storm damage information; Josie Galbraith for grey-faced petrel feather identification; Joshua Salter for improving and labelling several images; and Wolfgang Heiss-Dunlop for boat services.

## References

- Cameron, E.K.; Heiss-Dunlop, S. 2023: Flora and vegetation of Rākino Island group, inner Hauraki Gulf. Part 1: islets and main reef stacks. *Auckland Botanical Society Journal* 78: 113–139.
- Campbell, D.J.; Atkinson, I.A.E. 1999: Effects of kiore (*Rattus exulans* Peale) on recruitment of indigenous coastal trees on northern offshore islands of New Zealand. *Journal of the Royal Society of New Zealand* 29: 265–290.
- de Lange, P.J. 2019: The ongoing slide to extinction of the enigmatic Chatham Islands linen flax (*Linum monogynum* var. *chathamicum*). *Trilepidea* 190: 3–7.
- Moors, P.J. 1985: Norway rats (*Rattus norvegicus*) on the Noises and Motukawao Islands, Hauraki Gulf, New Zealand. *New Zealand Journal of Ecology* 8: 37–54.
- NIWA 2023: 2023 so far: NZ's record-breaking weather, 6 Jul 2023. <https://niwa.co.nz/news/2023-so-far-nzs-record-breaking-weather> accessed 6 Jan 2024.



## Appendix 1. Observations for two stacks, rechecked on 9 Dec 2023, south Woody Bay.

Additions and a correction for Stacks #1 and #2 (see Objective 2 under Method and Fig. 2)

Stack #1 (Fig. 25): the steep small rock stack measured c.7 × 10 m, 3.5 m asl and was crowned by a thick mat of flowering/fruitlet ice-plant along the narrow flat summit ridge, in places extending down the sides. Three additional species were all small and local: glasswort, shore groundsel and sickle grass. *Scleranthus biflorus* was absent. (It is most likely that *Scleranthus biflorus* used to grow on one of these stacks in 1984; AK 222080) Black-backed gulls had successfully nested on this stack, and three fluffy chicks were present during our visit. The parents and some additional gulls seriously dive-bombed us as we surveyed the stack, while we were being careful not to panic the chicks.



**Fig. 25.** L to R, Stacks #1, #2, #3, off southern Woody Bay near high tide; the base of the DoC peninsula background right. Looking SE from boat. SHD, 9 Dec 2023.

Stack #2: the stack was crowned by a shrubby pōhutukawa and a shrub of boxthorn. The boxthorn and three short-lived annuals, *Cotula australis*, shore groundsel and bur medick, were all added to the list of Stack #2 (op. cit.). There was also present a variable oystercatcher nest with one egg.

Correction: karo should previously have been recorded for Stacks #2 and #3 (not #1 and #3).

New stack totals for vascular plant species: four species (Stack #1) and 16 (Stack #2).

## Appendix 2. Vascular plants and bird nesting observations on the West islet group (five islets or stacks) off the western end of the DoC peninsula between Woody and West Bays, Rākino Island.

### Key:

A = additional to the list of Cameron & Heiss-Dunlop (2023, appendix)  
V = voucher in AK herbarium  
a = abundant  
c = common  
o = occasional

l = local  
lc = locally common  
s = scarce (<5 plants seen)  
×1 = only 1 plant seen  
(or ×2 plants seen, etc)  
\* = naturalised exotic species

+ = present  
++ = breeding on islet/stack (birds only)  
++? = thought to be breeding on the islet/stack

West islet group:	West islet	Central islet	NW-stack	N-stack	S-stack
<b>Ferns (2 + 0) (natives + naturalised)</b>					
<i>Asplenium haurakiense</i> / Hauraki Gulf spleenwort	o	l			
<i>Asplenium oblongifolium</i> / shining spleenwort	l				
<b>Dicots (22 + 22)</b>					
<i>Bellardia viscosa</i> / tarweed *	l, A, V				
<i>Centaureum erythraea</i> / centaury *	o	c			
<i>Chenopodium triandrum</i> / berry saltbush	lc	o	s		lc
<i>Coprosma macrocarpa</i> subsp. <i>minor</i> / coastal karamū	s				
<i>Coprosma repens</i> / taupata	o	o	o	×1	lc
<i>Cotula australis</i> / common cotula		l			
<i>Crassula sieberiana</i>	lc	o			
<i>Dichondra repens</i> / dichondra	o	lc			
<i>Disphyma australe</i> / ice-plant	o	c	a	a	a
<i>Erigeron sumatrensis</i> / fleabane *	o	o			
<i>Gamochaeta coarctata</i> / purple cudweed *		l			
<i>Geranium retrorsum</i> / turnip-rooted geranium	l, V				



West islet group:	West islet	Central islet	NW-stack	N-stack	S-stack
<i>Lepidium didymum</i> / twin cress *		l	×1		
<i>Linum monogynum</i> / rauhuia	[s]				
<i>Lotus angustissimus</i> / slender birdsfoot trefoil *	lc	l			
<i>Lotus subbiflorus</i> / hairy birdsfoot trefoil *	o	lc			
<i>Lycium ferrocissimum</i> / boxthorn *	c	l			
<i>Lysimachia arvensis</i> s.str. / scarlet pimpernel *	o-lc	o			
<i>Medicago lupulina</i> / black medick *		l, A, V			
<i>Medicago nigra</i> / bur medick *	o		l, V		
<i>Melicytus novae-zelandiae</i> / coastal māhoe	×5				
<i>Metrosideros excelsa</i> / pōhutakawa	c	lc			
<i>Muehlenbeckia complexa</i> / wire vine	o	l			
<i>Orobancha minor</i> / broomrape *	o	s	l		s
<i>Peperomia urvilleana</i> / peperomia	lc				
<i>Pittosporum crassifolium</i> / karo	lc	c	×1		
<i>Plantago lanceolata</i> / narrow-leaved plantain *	c	lc			for a nest?
<i>Polycarpon tetraphyllum</i> / allseed *	o	o			
<i>Pseudognaphalium luteoalbum</i> / Jersey cudweed	s				
<i>Pseudopanax lessonii</i> / houpapa	o	l			
<i>Rhamnus alaternus</i> / rhamnus *	lc	o			
<i>Sagina apetala</i> / pearlwort *		l			
<i>Salicornia quinqueflora</i> / glasswort	lc	o	o	c	lc
<i>Senecio hispidulus</i> / fireweed	o				
<i>Senecio lautus</i> / shore groundsel	o	o	l	l	o
<i>Silene gallica</i> / catchfly *	lc	lc			
<i>Sonchus oleraceus</i> / sow thistle *	o	o			
<i>Spergularia tasmanica</i> / native sea spurrey		o			
<i>Stellaria media</i> / chickweed *	l				
<i>Tetragonia trigyna</i> / NZ spinach	o	o			l
<i>Trifolium dubium</i> / suckling clover *	c				
<i>Trifolium glomeratum</i> / clustered clover *	lc				
<i>Trifolium subterraneum</i> / subclover *	o	l			
<i>Wahlenbergia vernicosa</i> / coastal harebell	l, V				
<b>Monocots (10 + 13)</b>					
<i>Aira caryophylla</i> / silvery hair grass *	la				
<i>Astelia banksia</i> / coastal astelia	lc	lc			
<i>Avena barbata</i> / slender oat *	o				
<i>Briza minor</i> / shivery grass *	o				
<i>Bromus catharticus</i> / prairie grass *	l		l		
<i>Bromus diandrus</i> / ripgut brome *	lc	lc	in nest		for a nest
<i>Bromus hordeaceus</i> / soft brome *		o			
<i>Carex testacea</i> / speckled sedge	l	l			
<i>Festuca bromoides</i> / vulpia hair grass *	c	c			
<i>Ficinia nodosa</i> / knobby sedge	o-lc	o-lc			
<i>Lachnagrostis billardiarei</i>	lc, V	s			
<i>Lachnagrostis littoralis</i> / coastal windgrass	l				



West islet group:	West islet	Central islet	NW-stack	N-stack	S-stack
<i>Lagurus ovatus</i> / hare's-tail *	a	la			
<i>Lolium perenne</i> / perennial ryegrass *	o				
<i>Lolium rigidum</i> / annual ryegrass *	lc	lc			
<i>Microlaena stipoides</i> / microlaena	l, V				
<i>Microtis unifolia</i> / onion orchid	o, A				
<i>Parapholis incurva</i> / sickle grass *	o-lc	lc	o		o
<i>Pentapogon crinitus</i> / long-hair plume grass	s				
<i>Poa anceps</i>	o	l			
<i>Rytidosperma racemosum</i> / danthonia *	o	l			
<i>Sporobolus africanus</i> / ratstail *	c	o			
<i>Thelymitra longifolia</i> / sun orchid	o				
<b>Nesting birds (5 + 0)</b>					
reef heron / matuku moana	++				
variable oystercatcher / tōrea pango		++	+		
black-backed gull / karoro			++		
red-billed gull / tarāpunga		++			
white-fronted tern / tara		++		++?	++?

## Orchid Ridge, Conical Peak Road, Dome Forest, Warkworth, and other orchid adventures

Maureen Young

### Orchid Ridge, Conical Peak Road

My advancing years have led me to promise myself that I will give up exploring untracked bush without a companion, but sometimes, like a woman who is expecting her ninth child, I just can't help myself. One such area of untracked bush that I frequently get the urge to visit, is an interesting ridge just off Conical Peak Road, on the north side of the Dome State Forest. There is a carpark area before the second bridge from SH1; this carpark was used by Auckland Botanical Society (ABS) on 21 March 2020 on a field trip further along Conical Peak Road (Young 2020).

In mid-November 2023 I crossed the bridge and walked a few metres along a short, weedy trail (lots of water figwort – *Scrophularia auriculata*) and came to the base of my special ridge. This ridge was once home to a number of large kauri trees (*Agathis australis*), but from the state of the stumps left behind, and with some knowledge of local logging practices, I estimate that the ridge would have been clear-felled in the late 19<sup>th</sup> century. The stumps are well into a state of decay, and both they and the ground around them have a good covering of mosses, the most common being the pipe-cleaner



**Fig. 1.** A decaying kauri stump with *Astelia trinervia*. Photo: VJ Paterson, 20 Nov 2023.

moss, *Ptychomnion aciculare*, an umbrella moss, *Mniodendron colensoi*, and *Dicranoloma billardiieri*. The kauri is regenerating with a number of young trees now present, as well as young rimu (*Dacrydium cupressinum*), kahikatea (*Dacrycarpus dacrydioides*), tanekaha (*Phyllocladus trichomanoides*), Hall's totara (*Podocarpus laetus*), totara (*P. totara*) and miro (*Prumnopitys ferruginea*). Northern rata