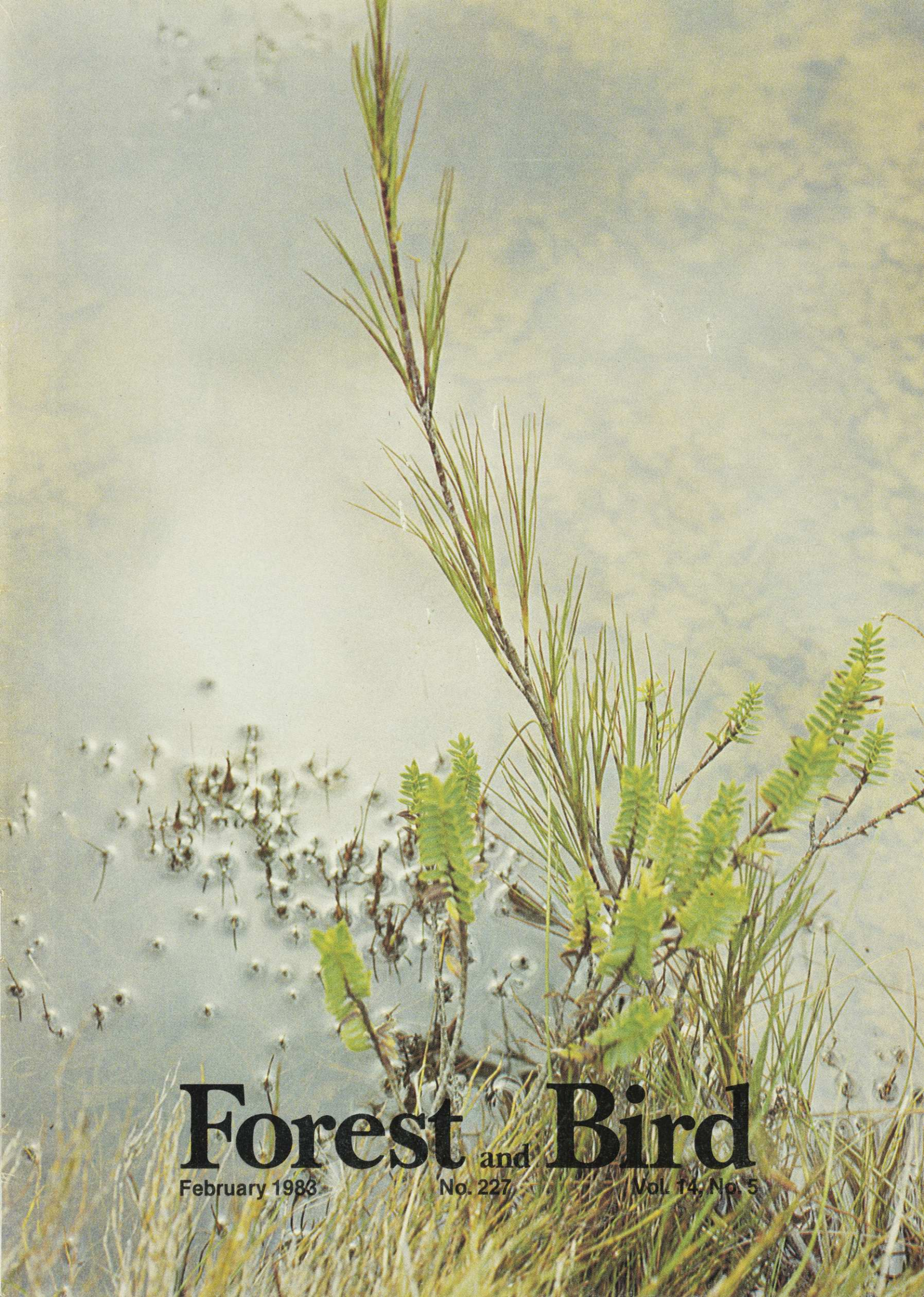

Forest and Bird

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David Gregorie photo

An umbrella moss growing in bog in Urewera National Park.

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IN THIS ISSUE

COVER: Reflections and refractions. A spray of *Dracophyllum* over swamp water in the "tundra" region in Urewera National Park. Photo by David Gregorie.

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Protecting wetlands

MY FAMILY AND I recently returned from a canoe trip down the Wanganui River from Retaruke to Pipiriki. The beautiful scenery over 87 km of river gorge, excellent weather, and 5 days of comparative peace made it difficult for me to write a waspish editorial.

However, this delightful experience has also served to highlight the significance of our November symposium and council meeting focusing on the urgent need for a comprehensive policy on the conservation and protection of wetlands in all their variety.

As with forests and mountains, natural waters have multiple uses. It is fair to say in the most general way that our Society will oppose uses which either destroy the integrity of the land or water or will significantly detract from that integrity.

The Wanganui River is an excellent example of a waterway where such uses compete. It is a highway, an energy source, and a port; it drains vast lands; it is a recreational delight; it has an intensely interesting history and folklore. It is also the main sewer for Taumarunui. Every use but the last can be accommodated with proper restraints and understanding. Indeed the contamination of the river received some timely publicity at the very time we were boiling and chlorinating the water to make it potable.

The abuse of the river of which I complain will, I am sure, soon be rectified by the borough council, and fortunately responsible government is now increasingly sensitive to public opinion on questions of pollution, especially when the health of humans, animals, and indeed plants is at risk.

I would like to conclude, however, by drawing close attention to more subtle interference with natural waters, where the serious consequences are not nearly so obvious. I refer in particular to the reclamation and abuse of harbours, estuaries, and swamps. In these places life, as we know it on earth, began. The creatures and plants are often minute, and large "waste" areas of marsh and mud flat still stir in us fear and distaste. Especially if a cold, wet southerly is blowing. These areas blur the boundaries between land and water. We must ensure that limited understanding and appreciation of them will not result in their destruction through indifference.

— *A. A. T. Ellis,*
President

Bush and mountain walks on Mount Ruapehu

BECAUSE OF its diverse character and features Tongariro National Park has a variety of bush and mountain walks for those who appreciate nature and scenery. In the February 1978 issue of *Forest and Bird* George H. Braithwaite described a 3½-day walk across Mount Tongariro and around Mount Ngauruhoe. In this article he deals with several shorter walks that start from or near the Tongariro National Park headquarters.

PARK HEADQUARTERS and the Chateau are in Whakapapa Village, on the lower north-west slopes of Mount Ruapehu. State Highway 48 and the principal streams of the area lie generally along this north-west direction.

Two of these streams indicate the limits of the area and the main walks covered: the Wairere-Whakapapanui and the Whakapapaiti.

The Wairere Stream plunges over the Taranaki Falls 2 km east of park headquarters, then converges with the road to feed into the Whakapapanui above the Tawhai Falls. The Whakapapanui, crossing under State Highway 48 above park headquarters, follows the road for 3 km before recrossing to the park headquarters side and tumbling over the Tawhai Falls. The Whakapapaiti Stream flows roughly parallel, 5 km to the south-west. (See the map on page 4.)

Outside the park the Whakapapanui and the Whakapapaiti soon join as the Whakapapa River, which flows into the Wanganui River.

The settled appearance of the area belies its violent ancestry. Over thousands of years eruptions have formed the steeper slopes and sent mud flows of volcanic debris called lahars surging down the slopes to form the surrounding "ring-plain", which extends beyond the park boundary. In 1975 a

Summary of vegetation, altitudes, and tracks

Vegetation zones between the Whakapapanui and Whakapapaiti Streams

Lower shrub land: Up to 950 (Tawhai Falls) and 980 m (State Highway 48).

Beech forest: From park boundary (870 to 880 m) and 950 to 980 m up to 1200 to 1280 m (broken by bog clearings).

Tussock: From 1200 to 1280 m up to 1350 to 1400 m.

Gravel field: Above 1350 to 1400 m

Significant altitudes

Entry to park: 870 m.
Park headquarters: 1125 m.

Tracks*

Near park entry

Track 1 — Lahar Mounds: 5 km below headquarters; 15 minutes return; 930 m.

Track 2 — Tawhai Falls: 4 km below headquarters; 40 minutes return; 950 m.

Around park headquarters

Track 3 — Ridge Track: 150 m above headquarters; 40 minutes return; 1140 to 1189 m.

Track 4 — Taranaki Falls: Turn-off 150 m below headquarters; 2½ hours round trip; 1130 m (start and finish), with maximum of 1220 m.

To Whakapapaiti (from Whakapapanui bridge, turn-off 250 m above headquarters)

Track 5 — Whakapapanui: 1½ hours one way, plus 2.5 km of road; 1130 to 1000 m.

Track 6 — Silica Rapids: 2½ hours return to road, plus 2.5 km of road; 1130 to 1260 m, maximum 1320 m.

Track 7 — Whakapapaiti: 5 hours return to road, plus 4.5 km of road; 1460 to 1130 m.

Upper track—Bruce Road to hut: 2 hours; 1460 to 1260 m, maximum 1510 m.

Lower track—Lower stream crossing to bridge: 2½ hours; 1120 to 1130 m, maximum 1225 m.

*Distances are from park headquarters, and altitudes are those at start and finish.

Mount Ruapehu from above the Silica Rapids. The tussock is somewhat scattered as it starts to merge into the gravel field above. The upper Whakapapaiti Track traverses the section below the steeper slopes.

lahar from the Crater Lake carried away the bridges crossing the Whakapapaiti Stream.

Mountain beech forest now covers much of the area. On the park headquarters (east) side of State Highway 48 the forest is mostly limited to stretches around the streams; beyond the Wairere Stream rolling tussock shrub land prevails. From the Whakapapanui to the Whakapapaiti Streams, however, the forest is continuous.

Around the Whakapapaiti the beech extends outside the park; along State Highway 48 it takes over from the lower heather and shrub land at the Tawhai Falls and continues beyond park headquarters. Above park headquarters it soon gives way to tussock with semi-alpine plants; this in turn thins out to the gravel field, which continues on to the steeper slopes at the Top of the Bruce.

Near park entry

State Highway 48 to park headquarters and beyond (the Bruce Road) turns off the National Park-Taupo Highway (State Highway 47) 9 km from National Park, on the gentle slope of the volcanic ring-plain broken by low mounds.

Above the turn-off are two short, signposted walks which can conveniently be taken before reaching park headquarters.

Track 1 — Lahar Mounds

This short track passes through tussock shrub land with alien heather (introduced by a misguided Scotsman who tried to establish grouse). It sidles round two mounds, then gently ascends a third to give a surprisingly extensive view of surrounding mounds and the ring-plain which the lahars have formed.

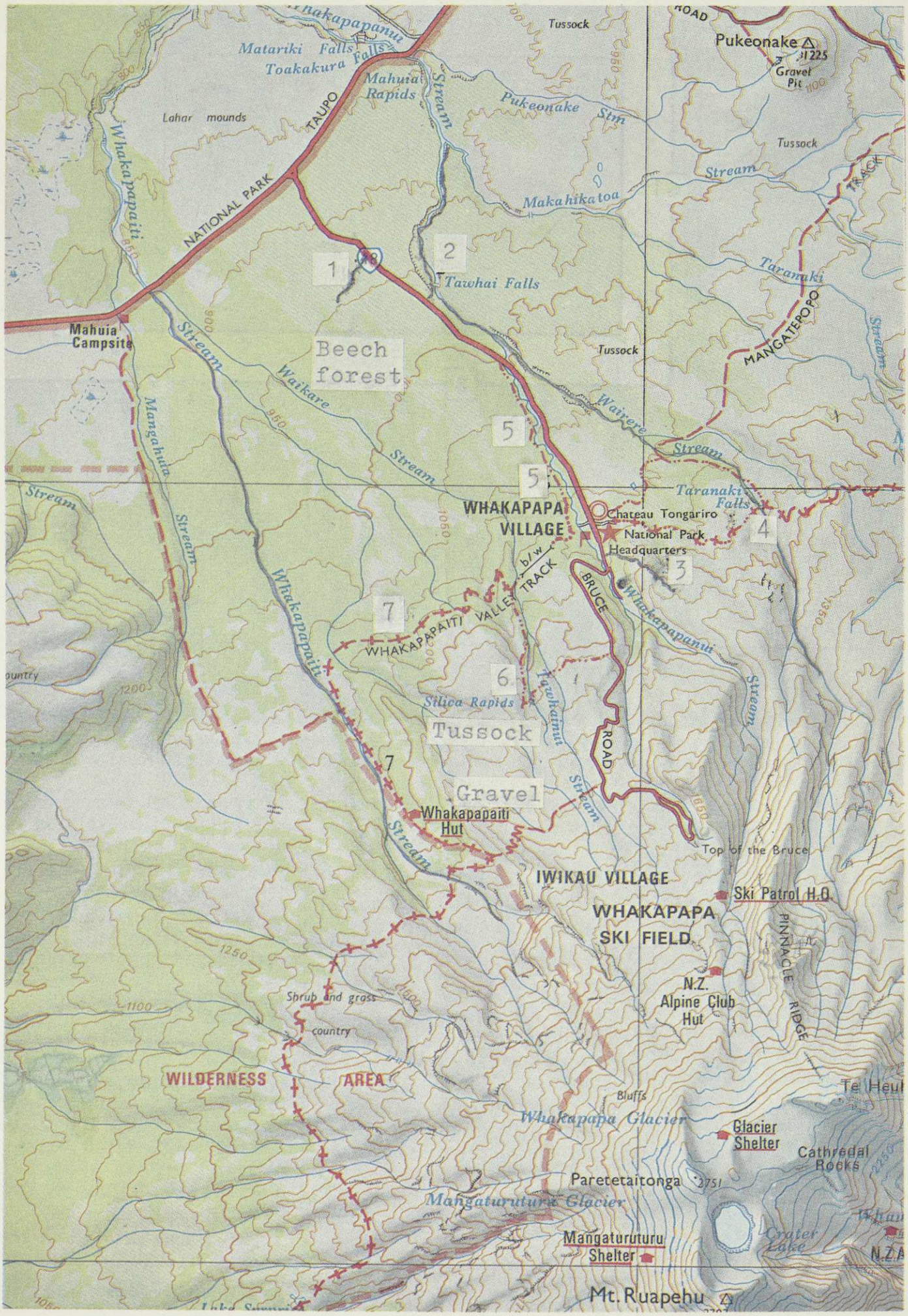
(The track starts 1.5 km from the turn-off, on the right or west side; 15 minutes return*.)

Track 2 — Tawhai Falls

This formed track marks the transition from the shrub land to the beech forest. At first it passes through more heather and tussock, but as it edges to the left bank of the Whakapapanui Stream mountain beech and tree shrubs are first seen.

Two tracks descend to the stream; one below the attractive

*Distances, walking times, and heights are approximate. Times are based on a moderate walking pace, with allowance for stops to view scenery and vegetation.



Part of Tongariro National Park, showing the tracks in relation to park headquarters. The tracks are 1: Lahar Mounds. 2: Tawhai Falls. 3: Ridge. 4: Taranaki Falls. 5: Whakapapanui. 6: Silica Rapids. 7: Whakapapaiti.

13-m falls and the other to the top of the falls. The lush undergrowth along the banks includes the graceful umbrella fern and delicate filmy fern and gives a foretaste of the attractions of the beech forest along the Whakapapanui Stream and elsewhere.

In summer you may find along the tussock track sun orchids (*Thelymitra*), with blue (possibly white) flowers, and a few hooded orchids (*Pterostylis*).

(The track starts 2.5 km from the turn-off, on the left or park headquarters side; 40 minutes return.)

Around park headquarters

Park headquarters are 6.5 km from the turn-off on the left above the Chateau.

Track 3 — Ridge Track

Another short walk starts from the picnic area 150 m above park headquarters.

The formed path at first winds up through mountain beech with shiny broadleaf and coprosma among the understorey, but soon a few mountain toatoa and bog pine appear, then inaka and other smaller shrubs.

At the open tussock ridge there is a more alpine aspect with the sight of mountain inaka, then of mountain daisy. A good view is obtained over the village to Ngauruhoe; to the left the ridge slopes steeply down to a stream.

(Forty minutes return.)

Track 4 — Taranaki Falls

From Ngauruhoe Place (between park headquarters and the Chateau) the two major tracks to the Tongariro-Ngauruhoe region are linked by a track along the Wairere Stream to complete the Taranaki Falls loop track.

The apparently uniform red tussock behind the Chateau, where the lower track starts, is soon seen to support many small plants, including bog fern, inaka, and manuka, even some mountain inaka and mountain daisies (celmisias) and the inevitable heather. Beech-covered streams alternate with tussock, offering views to Ngauruhoe and Pukekaikiore, until the descent to the Wairere Stream and the Mangatepopo turn-off (about 30 minutes) leads into the beech forest proper.

Sensible gear needed

Though these walks are short, straightforward, and well marked, sensible gear and footwear (sandshoes, light boots, for example) should be taken.

Altitude is over 1000 m, and conditions can change rapidly. Even a straightforward track can soon get deceptively slippery patches in heavy rain or in snow or ice conditions.

Take a parka or waterproof coat. For at least the full-day trips carry warm clothing, and notify park headquarters of your plans by filling out an intentions sheet.

The track follows up the stream in attractive forest; short side tracks lead to the Lower Cascades and a view through trees over the Upper Cascades. Abruptly the track leaves the forest, crossing the stream on a high bridge to emerge on open lava ground. Plants clinging to the sheer lava wall under the bridge include *Ourisia vulcanica*, and the open ground supports snow totara, snowberry, and other alpines. The impressive 20-m falls are reached in a few minutes. You can stand under the falls (waterproof gear recommended!) and ponder on the forces that formed them.

You have now reached half way. Climb the track alongside the falls and turn back right (the Waihohonu Track heads left to the Tama Lakes) to cross the stream above the falls on the lava flow. Continue on the lava flow for some minutes with good outlooks.

Next cross a series of gullies, briefly re-enter the beech, then a final stretch of tussock completes the return to the road and park headquarters. The walk can of course be done in the opposite direction.

(The round trip takes 2½ hours; a pamphlet is available.)

(The Tongariro Park summer nature programme, from late December to late January, includes the Taranaki Falls walk, and nearly all the following walks, and provides an excellent way to do the walks in a well-led party.)

To the Whakapapaiti

The well-forested area between the Whakapapanui and the Whakapapaiti is watered by several streams. The Waikare Stream, 1 km from park headquarters, moves away to join the Whakapapaiti at the park boundary.

The almost continuous forest is broken by patches of tussock, bog fern, and wire rush where drainage is poor and by the fans of streams. Mountain beech is accompanied by some kaikawaka (mountain cedar), some with spiralled trunks; mountain toatoa and shiny leaf broadleaf are fairly common in gaps. The occasional mountain cabbage trees (*Cordyline indivisa*) are conspicuous with their round heads and broad, sword-shape leaves.

Trunks of beech and broadleaf in particular may be

smothered with lichens, mosses, and filmy and other ferns, which also vie with young shrubs on the forest floor. Pockets of native orchids can be found.

Tracks for this area radiate from across the footbridge which spans the Whakapapanui above park headquarters and the motor camp.

The Whakapapanui Track follows down the stream for 3 km before rejoining the road. The other tracks head across the forest, then turn upward before looping back to rejoin the Bruce Road further up.

The Silica Rapids Track crosses to the Waikare Stream, follows it up beyond the beech to tussock and the rapids, then heads back to the Bruce Road.

The Whakapapaiti Valley Track leaves the Silica Rapids Track at the Waikare to cross to the Whakapapaiti, continues up stream to the Whakapapaiti Hut, then up through the tussock to the scoria gravel field, climbing high out of the valley before returning to the Bruce Road near the ski-fields.

To reach the footbridge turn right 250 m up from park headquarters at the botanical garden on to a short road, and the second turn right is the track (the first turn goes to the camp site). Ruapehu may be seen as you cross the footbridge.

Track 5 — Whakapapanui

Cross the footbridge; after 8 minutes' walking turn right at the junction with the Silica Rapids-Whakapapaiti Track. This walk follows the stream down for 3 km, giving a good sample of the beech forest of the area. In fine weather the spreading branches of the beech admit dappled sunlight to play on the dense undergrowth; in misty rain gnarled branches of dying beeches can loom grotesquely. Umbrella fern and filmy fern contribute to the abundant undergrowth.

Cross the Golden Rapids on a side stream and continue along the main stream, with a side track here and there down to the stream bed. About half way toitois mark a boggy clearing. The canopy opens out, with the beech being largely replaced by native pines and kaikawaka, followed by mountain cabbage trees fringing the track. A sheltered seat may give a fine view of Ngauruhoe framed in beech; hooded orchids grow alongside.

On another boggy clearing crossed by a board-walk the tussock, bog fern, and wire rush are associated with silver pine and the bushy bog pine. A brief return to tall beech leads to the footbridge to cross back to the road. The reverse walk is a worthwhile option.

(One and a half hours one way; 2.5 km by road to park headquarters; a pamphlet is available.)

Track 6 — Silica Rapids

Perhaps the most enjoyable half-day walk in the park, this track offers much variety, with the colourful Silica Rapids as the highlight. The rapids and stream are seen at their best in sunlight.

Turn left 8 minutes from the footbridge to leave the Whakapapanui Track, then ascend a stream with golden rocks which give a foretaste of the rapids area. A large boggy clearing crossed on a board-walk gives good views of both Ruapehu and Ngauruhoe behind mature beech trees.

The track re-enters dense forest with streams, soon to cross the Waikare Stream and reach the second track junction (40 minutes). Turn left (the Whakapapaiti Valley Track bears right) to follow the Waikare Stream up to the rapids. In this section pink pines (*Dacrydium biforme*) display on single branchlets the striking contrast between their adult and juvenile foliage. Felled and tangled trees give evidence of severe storm damage.

Soon the Punaruku Waterfall is seen through surrounding shrubs, its ribbed walls formed of old lava and other deposits. The forest tapers off as the rise continues, and some mountain toatoa and bog pine lead into the tussock zone. The stream is recrossed, and shortly the Silica Rapids are reached (1 hour from the junction). The creamy alumino-silica deposit on the rocks is overlaid with rust-colour iron compounds in places, producing strangely beautiful contrasts.

Above the rapids a stream bed leads up to a tussock plateau with small pools containing sundews (*Drosera*). The return track, however, turns back, dropping steeply to the Tawhainui Stream, then climbing out on to an old lava flow, soon to sidle down a steep hummock with grotesque lava shapes seen on the skyline.

The many small plants in the tussock include the crawling pigmy pine, snowberry, celmisias, and both inaka and the mountain inaka at different heights. The road is reached, and then there is a 2.5-km walk to park headquarters.

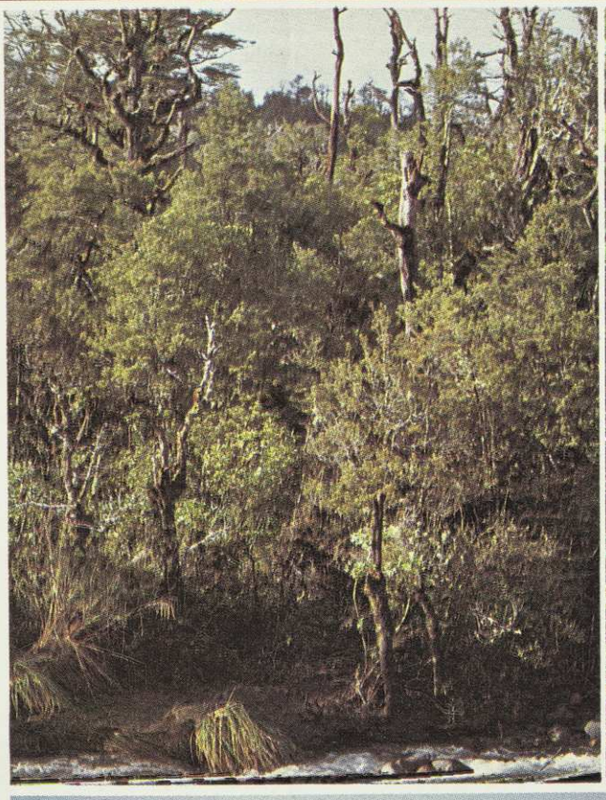
(Two and a half hours to the Bruce Road; 2.5 km by road back to park headquarters; a pamphlet is available.)

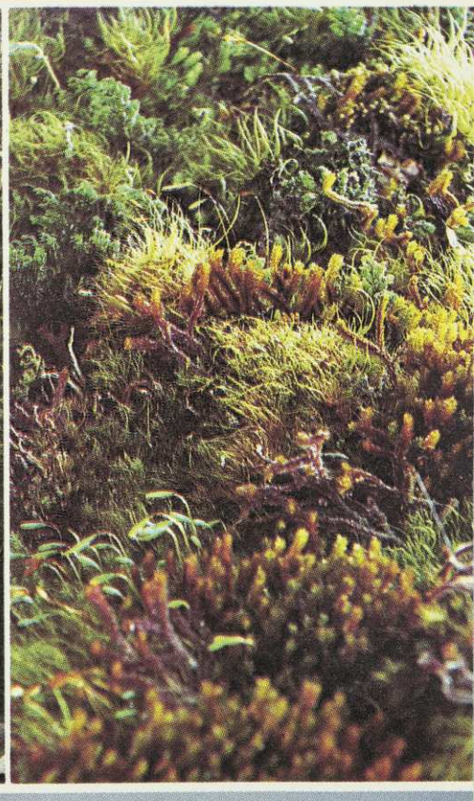
Track 7—Whakapapaiti Valley

From the Whakapapaiti Stream the track climbs right out of the beech forest and tussock into the higher altitude gravel field, briefly topping 1500 m. It is rougher going in parts than the local nature track walks, with unbridged stream crossings. If transport can be arranged, the track is easier walked from up the Bruce Road and therefore it is described in that direction, but if the Whakapapaiti Stream

Top left: Umbrella fern (*Gleichenia cunninghamii*) on the bank of the Whakapapanui Stream. This graceful fern (Maori name is waewaekotuku, suggesting feet of the white heron) occurs on most tracks where there is good tree cover.

Top right: Taranaki Falls. The cliff was formed by a massive lava flow which halted at this point thousands of years ago. The abrasive power of the Wairere Stream is slowly cutting a channel through the lip. A little down stream the water is cutting down deeply into the narrow gorge under the bridge which takes the track suddenly from the beech forest to the open lava across the stream.



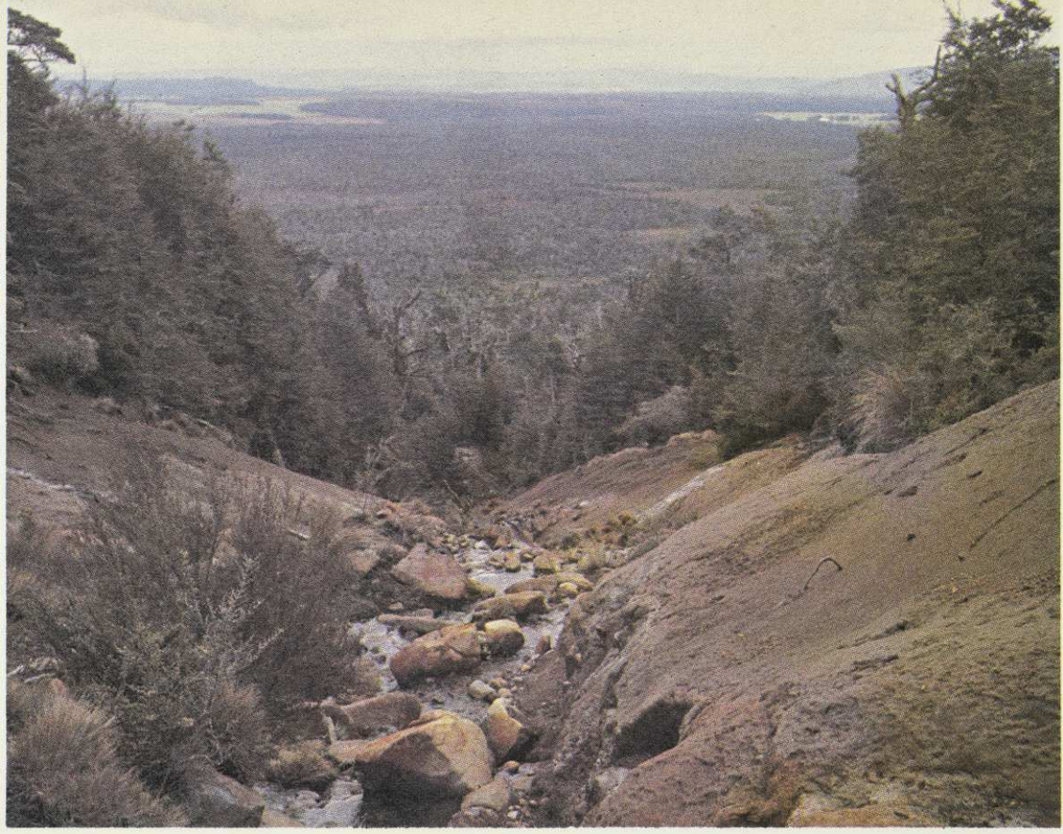


Middle left: Mountain beech (*Nothofagus solandri* var. *cliffortioides*) by the Whakapapanui Stream. Mature and dying beech are vulnerable to heavy snow and storms; the April 1982 cyclone brought down many of these trees. Young beech, with mountain toatoa and understorey trees soon spring up in the gaps.

Middle right: On all the beech forest walks trunks of mature beech and broadleaf, in particular, may be covered in lichens, mosses, and filmy and other ferns. The photo shows such a beech trunk on the lower Whakapapaiti Track.

Bottom: Mount Ngauruhoe capped in cloud behind mature mountain beech from the board-walk over the bog clearing on the Silica Rapids Track.

The Whakapapaiti Stream, from the lookout point on the short side track.



The broad fan of The Chute on the lower Whakapapaiti Track. Three of these stream fans break the forest along the track: the Slippery Gully twin fans, separated by a belt of beech, The Chute, and Tirohanga Pai.

Below: Large boulders give shelter to support an alpine garden below the zigzag on the upper Whakapapaiti Track. *Brachyglottis bidwillii* mingles with *Celmisia incana* and *Olearia*.

Left: The distinctive silvery-leaved mountain daisy (*Celmisia incana*) with other celmisias alongside the pinkish boulders of the Whakapapaiti Stream. Patches of *C. incana* are numerous in this area and on the upper Whakapapaiti Track.

Below: The large-leaved ourisia (*Ourisia macrophylla*) flowers by a stream crossing on the lower Whakapapaiti Track in November–December. The smaller *O. vulcanica* also flowers freely at this time at higher levels, around the Taranaki Falls (including the lava cliffs) and the upper Whakapapaiti Track.

On the Crater Lake climb panoramic views are obtained as Glacier Shelter draws near. Behind the Pinnacles are Ngauruhoe and Tongariro, with Tama Lakes on the right.

cannot be crossed, there is a climb back to the road.

The track leads straight down from the road to a desolate gravel field. The initial impression of a barren landscape is quickly dispelled by the sight of low-growing alpines in pockets of gravel and rock crevices. Mountain inaka, then sprawling snow totara and crawling pigmy pine, soon joined by low-growing shrub daisies and whipcord hebe, are only a few of the plants and herbs that establish on the inhospitable slopes.

Cross several stream beds. In this exposed zone snow and mist or rain may be your com-

Snow cover varies greatly. Glacier Shelter in January 1977 was covered in snow up to the roof, but in April 1978, when this photo was taken, it was quite uncovered and well above the snow. The "chimney" on the roof (left) gives access when the door is snowed in.

panions; then the sight of track poles looming ahead is very reassuring. Stone-studded surfaces and piled boulders bear mute testimony to the explosive power of the volcano. A climbing sidle to a long ridge includes a damp patch with tussock, and the silvery *Celmisia incana* joins other celmisias.

When the track reaches the top of the ridge and its highest point, a wide-ranging view, perhaps misty (or obscured) down into the upper Whakapapaiti Valley, reveals the result of massive glaciation, and the slope of rock debris down to it is the moraine of the ancient glacier.

As the track descends the steep moraine in broad zigzags of moderate grade, waterfalls at the head of the valley may be seen with the mountain behind. The park summer programme sometimes includes a walk to these falls from the ski-fields. At the bottom of the zigzag, 150 m lower, bear right to reach the junction with the track to the Mangaturuturu and Blyth Huts. (The track to Blyth Hut is part of the "round-the-mountain" track system. It is an open up-and-down trip across alpine vegetation, rock outcrops, and mountain streams. It is not recommended for the ordinary walker.)

Large boulders covered in alpine plants are seen as bare gravel field merges into tussock with alpine shrubs. The track descends more steeply through tussock and beech to a branch stream and the Whakapapaiti Hut. Either the hut or (if the weather is fine) further down stream is a good place to stop and eat.

Follow the stream, cross it, and come to the first crossing of the main stream. Bridges over the two main crossings were swept away in the 1975 lahar eruption. Pick good places to cross (probably up stream). Fording is usually reasonably safe, but the current is quite strong, and if the stream is high, a group crossing with aids may be required. The second crossing is the more difficult. If in doubt, the golden rule is turn back.

After the first main crossing follow down stream in fairly open beech forest on a track which can be muddy and slippery in places. Pass an old bivouac site, note the track on the left to the Hauhungatahi wilderness area, and come to the second main crossing.

(The Hauhungatahi Track leads to an interesting area, but makes the trip a long one, and care must be taken on routes which are not clearly marked. After 30 minutes a track turns right and follows the border of the wilderness area to the Mahuia camp site; the route straight ahead immediately enters the wilderness area. The route over Mount Hauhungatahi through podocarp forest to Erua is unmarked owing to the wilderness status.)

The second crossing will probably be made in two stages, so that you finish somewhat up stream from the track. You are now half way. Leave the main stream by ascending sharply on a side stream to a clearing above. A short side track on the left leads to a striking view down to the main stream from the cliff edge. The muddy clearing, which includes more *Celmisia incana* and whipcord hebe among the bog fern and other bog plants, soon leads into the dense beech forest of the lower valley track.

The forest is first broken by the twin fans of Slippery Gully (separated by a belt of beech, with outlooks to a plain below). The forest becomes more open, some mountain cabbage trees appear, and the slender, erect kaikawaka becomes more common. Two more broad stream fans (The Chute and Tirohanga Pai) are crossed as the track undulates to cross streams and wind round intervening spurs. Some lifeless trees are seen, bare trunks and branches pointing skywards, but the understorey is healthy and rapidly regenerates.

There is a final stream crossing, then the track bears right to ascend to the junction with the Silica Rapids Track at the Waikare Stream, and you head back to the Whakapapanui Stream and park headquarters.

(Five hours plus meal break from Bruce Road; 4.5 km by road to park headquarters.)

Off the beaten track

Whakapapanui Gorge

This is another full-day trip, for those who like to do it the hard way. It is rough and after a while involves "rock-hopping" and wet feet. **There is no track.**

Follow the Whakapapanui Stream up from the road control bridge above park headquarters. Beech trees extend well up the stream. If you go far enough, you come to Skippers Canyon, which ends in a cul-de-sac with sheer walls below the ski-fields at the Top of the Bruce. Return the same way.

A variation of this trip, sometimes included in the park summer programme, is to return by climbing out of the gorge on the right (east) and joining the Wairere Stream.

Up the mountain

Climbs to the Crater Lake of Ruapehu, though outside the scope of the ordinary walks described in this article, can be made in relative safety in suitable conditions with proper preparation and good leadership.

Crater Lake and The Dome from Top of the Bruce

For this very worthwhile 1-day trip be with some people

who know the area well, pick suitable conditions, and take the right gear.

Join one of the park summer programme trips if you can. In any event, get advice from park headquarters. Have dark glasses, sun-screen cream (do not forget under the chin), gloves, as well as warm clothing and a parka, good boots, food, and the like.

As conditions may change quickly and unpredictably, be prepared for sun on snow and wind, rain, and mist. Start out early. If you find icy conditions, turn back.

For the first two stages the chair-lift may be taken if it is available (you can take photos from it). From Hut Flat at the top of the first chair-lift, follow the poled route to Delta Corner, above the New Zealand Alpine Club Hut. Snow is likely most of the way from here. Steadily rise to the top of Knoll T-Bar (2–2½ hours).

From the top of the Knoll ridge walk up the glacier to Glacier Shelter, perched at 2600 m atop the Glacier Knob rock (though the rock, and possibly most of the shelter, may be snow covered). In good conditions, fine views are obtained over the Pinnacles and Ngauruhoe, with Tongariro behind. Veer left to climb the ridge which takes you to The Dome, and from there look down on to the Crater Lake (right) and into the Plateau (left).

Descend by the same route. The views downward will be more obvious, and on a clear day Mount Egmont may be seen in the distance before a right turn shows Ngauruhoe straight ahead and looming large. Continue back down the rocks on the poled track to the Top of the Bruce.

(Six and a half hours return to the Top of the Bruce; 1630 m altitude.)

Further information

The map "Tongariro National Park" (N.Z.M.S. 273, Department of Lands and Survey) is an indispensable reference. Particular reference should be made to the Ruapehu ski-fields map and the inset Whakapapa Village; brief track descriptions are included. Part of this map is reproduced on page 4.

"The Vegetation Map of Tongariro National Park" (I. A. E. Atkinson, DSIR) gives a very good picture of the vegetation of the area, with much information on canopy species and predominant growth, and valuable supporting text.

The handbook *The Restless Land* gives a wide-ranging description of the park and its features in 112 interest-packed pages with colour photos and diagrams and gives further references.

Pamphlets which describe specific tracks are available from park headquarters.

Crater Lake from Ohakune

This trip is included in the park summer programme, from the Ohakune ranger station. Get further information from one of the ranger stations.

This is a more consistently upward climb and approaches the Crater Lake from the west, by the Mangaturuturu Glacier, after first ascending to the Mangaturuturu Shelter, from where there are views to the south-west, including Lake Surprise.

North-east of park headquarters

Tracks to the north-east were dealt with in the previous article in the February 1978 issue. However, two variations are worth brief mention:

Tama Lakes

Start on the upper track to the Taranaki Falls and continue ahead on the Waihohonu Track. At Tama Saddle (2½ hours) turn left and after a few minutes come to the elevation overlooking the Lower Tama Lake. The Upper Lake, nestling below the slopes of Ngauruhoe, is reached by ascending an exposed scoria ridge. Good views back to Ruapehu over the Lower Tama Lake can be obtained.

(A full-day trip; 6 hours return.)

Mangatepopo to Ketetahi

This walk starts at the Mangatepopo Valley and finishes at the end of the Ketetahi Track, near Lake Rotoaira. If you join a park summer programme trip, the problem of return transport is taken care of.

The track climbs from the Mangatepopo Valley over the top of the Red Crater, across the Central Crater, and out to the north side of Tongariro. Ketetahi Hut is bypassed by taking the direct track to the springs, where a dip may be had. Then continue down to the road.

(A full-day trip; 7 hours one way.)

Conclusion

In winter the Top of the Bruce resounds to the steady tramp of skiers. In other seasons the park offers different attractions — to the walker, the student of nature, and the person who simply enjoys mountain air and scenery and alpine flowers.

Acknowledgment

The assistance of Department of Lands and Survey officers, both at head office and at Tongariro Park headquarters, in the preparation of this article is gratefully acknowledged. ■

The challenge of the "stoat invasion" on Maud Island

THE RECENT sighting of a stoat on Maud Island has raised doubts as to the value of this island as a habitat for rare birds. What should be done? It is a serious question, but surely not one that should cause immediate or total abandonment of the project. The event made it necessary for immediate action to be taken to protect one irreplaceable bird species present — the kakapo — but it is hoped this may be only a temporary setback.

By B. D. Bell, Wildlife Service

LET US look back over the history and development of the island since its purchase in 1975. Maud Island had been farmed and grazed intensively for many years, and only a few small patches of bush remained, but in these persisted both native frog (*Leiopelma hamiltoni*) and bush snail (*Powelliphanta obscura*). Both were faced with a deteriorating habitat and attack from wekas introduced to the island. The reservation of the island as a nature reserve and restriction of stock made their positions more secure. The elimination of wekas removed a significant predator.

Regeneration

Regeneration began to advance rapidly. This had been helped by the former owner, E. J. T. Shand, who had excluded stock from some areas before he sold it to the Crown. Some stock were retained to help manage a variety of habitats. In addition, several thousand trees, mainly taupata (but a few other food-producing trees as well), were planted. These are intended to reduce the danger of fire. This work was done mainly by various sections of the Society on a volunteer basis.

Remaining stock is now restricted to paddocks fenced by officers of the Wildlife Service, temporary workers, and volunteers. The stock is retained primarily to maintain a grassland habitat on parts of the island which can be used for species such as takahe. However, it also provides habitat for others and therefore adds to the number of species recorded and which can be brought in.

Though natural water is present in five streams even during drought conditions, a number of water points have been established so that any bird needing water can find it easily. This has been achieved by building catchment roofs which feed into holding tanks and then into shallow troughs. A dam holds back a small pond near the homestead, and consideration is being given to enlarging this and to providing a new pond at the opposite end of the island.

The resident fauna has already shown considerable improvement. The frog appears to have begun to expand its range, and the lizard fauna, formerly almost extinct because of regular burning off, is beginning to show a marked increase.

Wildlife Service photo

The native frog *Leiopelma hamiltoni*, which faced a deteriorating habitat before the island became a nature reserve.

Of the birds, the increase in fantails, riflemen, pigeons, and introduced finches has been spectacular. The tui, formerly only a visitor, has become an established breeding species.

Kakapo introduced

With the increase in regeneration it was considered the island was ready to receive its first rare species. Because of the pressures on the Fiordland kakapo population and its obvious decline three males were introduced to Maud Island in 1974-75. One male and one female were brought in from Stewart Island in 1980, and finally, in 1981, two more females from Stewart Island were released. Apart from two birds which died shortly after release (stress of transfer) and another killed accidentally, the others have all done well.

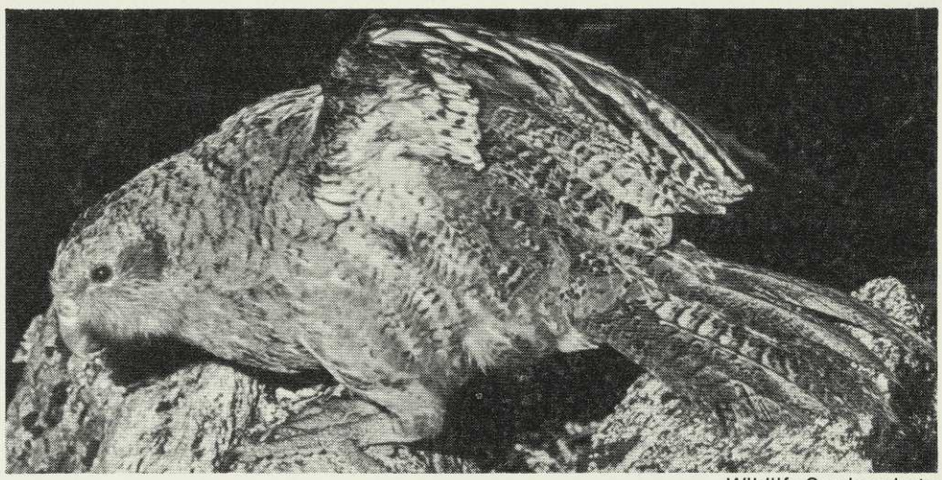
Most have increased in weight, four even surpassing their wild capture weights. Last summer "booming" occurred on the island for the first time. Booming is the male courtship behaviour, a prerequisite to mating. This, more than anything else, has shown that the island is suitable habitat.

In 1972 giant wetas (*Deinacrida rugosa*) were released on the "peninsula" section of the island. This was the first invertebrate translocation since Dr Powell attempted to establish flax snail (*Placostylus*) on some small islands off northern New Zealand. These wetas have apparently bred on the island and ample sign of them can now be found.

When it was found that the little spotted kiwi on D'Urville Island was down to perhaps only three individuals the question of captive breeding or translocation was considered. Captive breeding was considered, but the birds were old and would not adjust to captivity. A pair was released on Maud Island. Both were heard

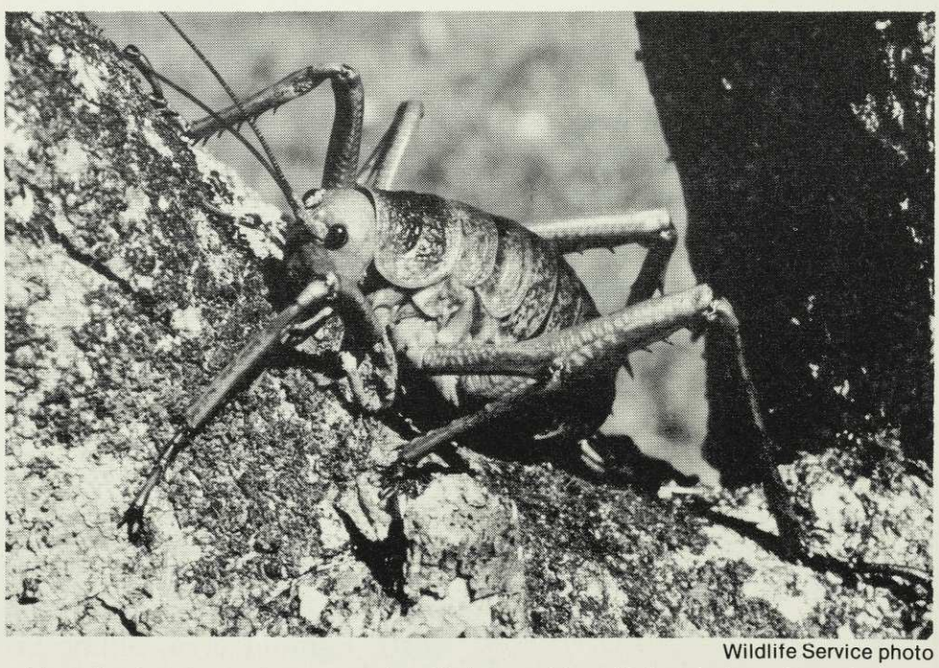
Wildlife Service photo by C. Veitch

The South Island saddleback. Liberations of the saddleback were made on Maud Island in 1980 and last year.



Wildlife Service photo

The kakapo transferred to Maud Island have been taken to Little Barrier Island since the sighting of the stoat.



Wildlife Service photo

The giant weta has appeared to thrive on Maud Island since its release there in 1972.

calling for some months, but now only the female is heard. Is the male busy looking after progeny, or has he failed to adapt to his new home?

Liberations of saddlebacks

Two liberations of saddlebacks have been made, in 1980 and 1982. Initially the birds spread over about half the island. They bred successfully and it looked as though another population had established.

Then came an inexplicable decline. Birds declined in number, and their range shrank. What was wrong? During an effort to determine just how many birds were left a stoat was seen. Was this a solitary animal — a lone male or perhaps, worst of all, a pregnant female — or was it one of a small group?

Immediately efforts were made to trap the animal, but so far there have been no further sightings of either an animal or sign. Has it left the island again?

The trapping effort will go on, but in the meantime the kakapo, including the two females, were transferred to Little Barrier Island. The female kiwi has been transferred to another safe location in the Sounds.

Should the programme continue? Or should the island perhaps be used for other purposes, such as recreation? It still has high faunal value, being free of rodents, with a strong colony of *Leiopelma*. Can it be cleared of this current crisis, and can it be maintained clean?

In our work of translocation we have had difficulty in finding enough "clean" islands without invading the very important ecologically undisturbed ones like Poor Knights and Three Kings. We have been able to clean up and use some isolated ones such as Cuvier and Little Barrier. However, we could do with many more if we hope to translocate and establish additional populations.

Perhaps this is the time to take another step forward: can we remove predators from inshore islands and maintain them as clean habitat for various rare bird species? Maud Island and the "stoat invasion" have presented us with this challenge. Surely we owe this effort to those who contributed to the purchase of the island, to those who help in various ways by volunteering their labour, and to those who aid the work by their interest and moral support.

It can be done and must be done if we are to advance active conservation management. To do otherwise would be to fail. ■

Adventure Group trip to Mount Egmont in May

Following on the successful week-long trips to Maud Island (1981) and South Westland last year, the Wellington Adventure Group is holding this year's May trip at Mount Egmont.

Young people from branches of the Society throughout New Zealand are invited to participate in this trip, to be run over 8 days from Saturday 7 May to Sunday 15 May.

The trip will be based at the Camphouse, situated 945 m up Mount Egmont and overlooking the north Taranaki farmland. Activities will include forest walks and tramps in the north Egmont area, alpine instruction and a trip to the summit, and trips further afield to the Pukeiti Rhododendron Trust's area, Te Koru Pa, and New Plymouth.

Participation in the national park holiday programme will include talks, films, and slides by national park staff. It is also hoped to arrange at least one overnight tramp to the sphagnum moss swamp and Pouakai Range.

Food, accommodation, and transport (to and from Wellington) will cost $95. Other transport arrangements can be organised.

Those interested in joining the party or wanting further information should write to the trip leader, Brian Dobbie, 14B Worcester Street, Wellington, before the end of March.

Waitangi Forest, showing *Pinus elliotii* in compartment 7, with *P. radiata* in the foreground. This 84-ha compartment was estimated to contain eight kiwi territories in 1978.

Kiwis and pine forests

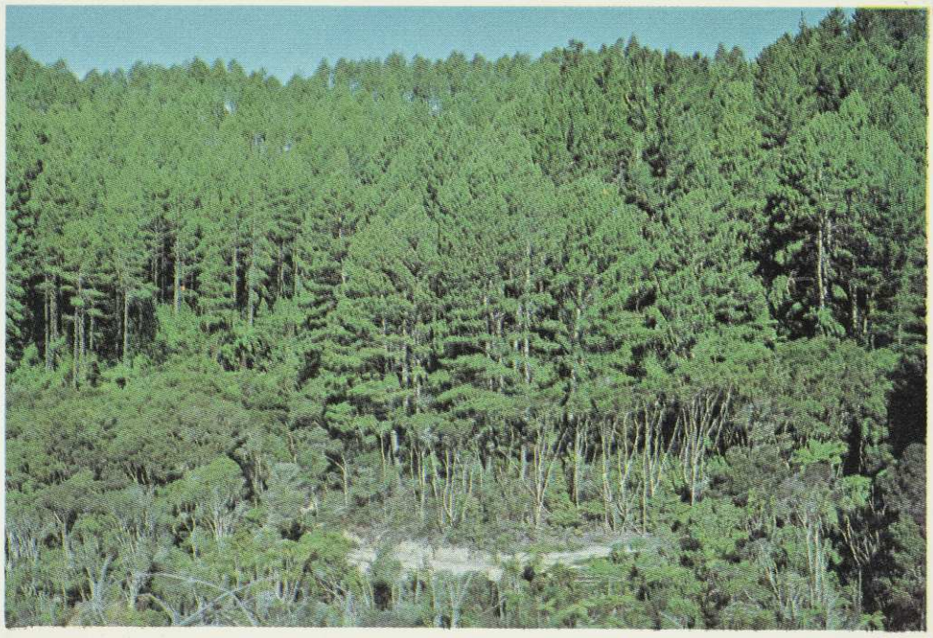
PRESS REPORTS in 1979 stating that Waitangi pine forest contained an estimated 400 kiwis and, furthermore, that kiwis were known to be present also in Glenbervie and other northern exotic forests triggered a series of inquiries to the Wildlife Service that are still continuing. Attitudes have ranged mostly from polite incredulity to hostile scepticism. How could these "barren monocultures", these "biological deserts", possibly cater for the requirements of such specialised birds that evolved with, and depend entirely on, the luxuriance of our native forests for their survival? To suggest that some plantations may have more birds per unit area than are believed to be present in many North Island indigenous forests was, to one irate correspondent, "misleading propaganda that should be discredited immediately".

By Brian Reid, Wildlife Service

SEVERAL WRITERS, though being pleased that our "national emblem" may have the versatility to adapt to pine plantations, expressed concern that if these provided suitable homes for kiwis, then another argument against the conversion of our dwindling indigenous vegetation to exotics was weakened. A senior forester saw the situation entirely differently. He remarked, somewhat drolly, that "it would be ironical if a moratorium is placed on log-

Part of compartment 8 of Waitangi Forest during clear-felling last year. Kiwis living in the felled area were still present 2 months later, when studies ceased. This 88-ha compartment contained an estimated 10 kiwi territories in 1978.

A kiwi nest entrance (centre of photo) in compartment 9, Waitangi Forest. This nest, which contained eggshell fragments, consisted of a tunnel formed by falling needles overlying slash of pine branches. This 150-ha compartment was estimated to contain 20 kiwi territories in 1978.



Compartment 8 of Waitangi Forest, showing pines on the slopes and typical swamp-native vegetation in the foreground. This riparian strip was partly damaged when the pines on the slope were felled last year.

A kiwi feeding or probe hole penetrating 8-cm-thick *Pinus elliotii* needle litter in compartment 6, Waitangi Forest. This compartment, estimated to contain two kiwi territories in 1978, was found to contain 12 territories in 1981–82.

A male kiwi living in *Pinus radiata* in compartment 2, Waitangi Forest, that was colour-banded and released last year. This 76-ha compartment contained an estimated five kiwi territories in 1978.

ging in some plantations while their suitability as kiwi sanctuaries is assessed''.

This article examines briefly the requirements of kiwis, discusses the advantages and limitations of indigenous and exotic forest as habitat, and presents some findings from the joint Forest Service-Wildlife Service kiwi study at Waitangi.

Needs for survival

For survival kiwis need a fairly stable habitat that provides suitable cover for shelter and nesting, adequate immunity from predators and hazards (possum traps, poisons, fire, and the like), water, and sufficient accessible food (mainly earthworms, insects, and other invertebrates, supplemented with berries and foliage) throughout the year.

Kiwi habitat

Native forests

We can only speculate about the probable great abundance of birdlife throughout the North Island in 1840, when predator-free and virtually unmodified forest (93 percent rich lowland forests and 7 percent montane forests) covered about 82 500 sq km (72 percent) of the land. About 75 percent of lowland forests and 10 percent of montane forests have now gone and today native forests (about 79 percent lowland and 21 percent montane) cover only 24 500 sq km (21.5 percent) of the island.

Much of the remaining lowland forest is fragmented or persists as small pockets and though, perhaps, 80 percent can still be classified as ''virgin'', the luxuriance of the vegetation often conceals the sad truth that none remains pristine. This is often apparent only from the low numbers of birds present in seemingly bountiful habitats.

While traversing predominantly virgin North Island forests from bush-edge to bush-edge with National Forest Survey parties between 1948 and 1954, I pitched camp at over 500 different sites and spent more than 600 nights under canvas in Coromandel, Taranaki, King Country, central plateau, and Urewera forests. Pigs were widespread and numerous over extensive tracts of bush, and hunting these with dogs was a national pastime. Goats, cattle, and deer locally were common, and evidence of possums, mustelids, rats, and, at times, cats was widespread.

Diary entries, on the other hand, show that though kiwis were heard during most fly-camping trips, the numbers that appeared to be present usually seemed only a small fraction of what the habitat should support. With few exceptions (some localities in Taranaki and the Ureweras), the frequency of calling indicated only sparse or moderate populations, and seldom did the rate of calling match that heard in the seemingly more austere habitats of the Waitangi plantation some 30 years later.

The number of birds heard per unit of listening time at Waitangi also far surpassed the numbers recorded during brief 2- to 4-night kiwi surveys in several King Country and central plateau indigenous forests during 1976 and 1977.

The reasons for generally low numbers of kiwis are not known. It is doubtful whether food and shelter were limiting factors, and of the environmental hazards present in the 1940s and 1950s pigs were probably the most devastating.

Their enjoyment of flesh, keen sense of smell, and prodigious excavating skills, presumably, accounted for many birds, and the dogs that were used to hunt pigs also killed kiwis.

Thus the introduced disadvantages in many native forests today outweigh their natural advantages and it is questionable whether they can still be regarded as ''natural habitat'', for they no longer provide ideal conditions for sustaining high kiwi populations. For example, in 1967 one King Country possum trapper was reported to have already trapped more than 90 kiwis, and, more recently, the casual use of cyanide baits has taken a heavy toll.

The highest kiwi density we have so far found, surprisingly, was in an isolated 130- to 140-ha remnant of cut-over/second-growth at Tangiteroria, where (from plotting calling patterns and locations in 1976 and 1978) the population was estimated at between 35 and 43 pairs. As the number of birds is excessive for the food resources of the bush and they feed extensively in surrounding pasture land, it seems that predation here is of little or no consequence.

Exotic forests

For every 100 ha of native bush remaining in the North Island there are now 27 ha of exotic forests. These latter (48 percent private and 52 percent State owned) cover 6705 sq km, but few are known to contain kiwi. Many, in addition to sharing the shortcomings now apparent in native forests, also have other limitations that generally make them a poor second to our lowland forest. These may be related to their locations, climate and soils, their less diverse vegetation, their newness, some management practices, and the quick rotation (from seedling to logs) of their timber.

Labelling them collectively as ''biological deserts'' is, however, more emotive than

factual, as native birds known to live in or utilise some pine forests include robins, tits, fantails, whiteheads, grey warblers, silvereyes, riflemen, cuckoos, moreporks, falcons, and even tuis, bellbirds, and pigeons.

Some pine forests which appear to cater for all their needs have contributed significantly to the preservation and spread of several insect-eating native birds, including a few species that are now relatively uncommon or, possibly, absent from some bush areas where once they were abundant. None of these forests, as far as we know, have the capacity to sustain entirely populations of native nectar-, leaf-, and fruit-eaters.

The survival of these birds may depend on a richer understorey of native and other broad-leaved plants than many plantations have, or on the presence of adequate patches of native bush nearby. In the latter case the exotic stands may provide a secondary — but important — supplementary feeding area.

Even the vast 125 000-ha Kaingaroa plantation has been shown to support greater densities of some species of native birds than are believed to be present in many native forests. Before afforestation the elevated, exposed, and bleak Kaingaroa plains boasted no finer covering than tough, stunted heath land shrubs and tussock grasses. The planting of pines thus converted an extensive tract of previously barren country into acceptable habitat for a considerable number of birds, both native and introduced species.

How widespread are kiwis in pine forests? Like Kaingaroa, many exotic forests are on waste land traditionally lacking kiwis and these can hardly be expected to have birds today unless liberations were made and afforestation created an "oasis" as far as the kiwis' needs are concerned. A bird identified as a kiwi was heard calling in Kaingaroa in 1965, but this was probably a mistaken identification, as no further supporting evidence has been reported.

It is more likely that Kaingaroa still lacks kiwis, as the low numbers inhabiting native forests to the east are under no pressure to abandon their traditional homes, and even if they were, any colonisation of this plantation would be hampered by farm land and water barriers of the intervening Rangitaiki River.

Unlike the extensive central plateau plantations, those at Glenbervie and Waitangi are on previously forested land that contained kiwis. Reports from Forest Service field staff that kiwis were still present and appeared to be utilising exotic as well as cut-over/second growth bush areas of these forests suggested some interesting ecological relationships that should be investigated, as it seemed that site preparation, planting, and subsequent management of maturing pine stands need not result in a total loss of birds from areas chosen for afforestation.

Joint Forest Service-Wildlife Service studies to assess the relative contributions of pine and indigenous components for sustaining a kiwi population were started at Waitangi in 1978.

The Forest Service, which funded this work, wished to confirm the "kiwi-pine relationship" and then "relate kiwi population trends with various developmental, management, and utilisation phases in the life of an exotic forest" to help "determine what changes may be required in management techniques" to safeguard kiwis.

The Wildlife Service defined the nature and sequence of the investigations necessary to meet these requirements, and the Entomology Division of DSIR contributed to the discussions on some methods and field techniques. The three men to whom all credit for intensive and thorough field work is due were Harold Corbett in 1978-79 and Rogan Colbourne and Ruud Kleinpaste in 1981-82.

Studies at Waitangi

Two features about Waitangi conveniently explained the presence of kiwis for the sceptics. They contended that this 2900-ha forest between Waitangi and Kerikeri provided an "island refuge" in an expanse of residential, orchard, and pasture land. It could be regarded as a geriatric refuge for birds displaced from the surrounding developed lands. Secondly, as only two-thirds is in exotics (1900 ha in pines and 100 ha in other species), it is the remaining 900 ha, consisting of scrub, bush, and swamp pockets, that alone sustains the kiwis.

The first contention is difficult to substantiate. Before European settlement Waitangi was clothed in kauri forest, but by 1840 the area was in scrub. Until exotic afforestation began in the 1930s successive attempts at farming were made, with numerous burnings and subsequent reversions to scrub land, and for about 100 years the kiwi population suffered a series of severe setbacks.

With such a history it seems that though some of the Waitangi kiwis may be immigrants, the present high population is composed largely of individuals bred within the forest. Data collected since 1978 mainly in exotic stands certainly indicate a healthy population with all age classes appropriately represented.

The first part of the study was made in 1978. Its aim was to estimate the population size and establish whether birds lived in all areas of the forest and then to relate relative kiwi densities with the different habitats (vegetation types, age of the stands, modifications resulting from various management practices, and the like).

One hundred and twelve listening stations were located at vantage points throughout the forest and these allowed the position of vocalising birds to be approximately determined. Then daytime follow-up searches for "sign" (mainly feeding probe holes) permitted a more precise plotting of territory sites. Each station was manned for about 13 minutes on six nights. Ground configuration and vegetation at times distorted acoustics and 37 substations were used to fix the positions of "problem" birds.

A preliminary analysis of the population survey data prepared mainly by Peter Thode, the district forester at Kaikohe, whose drive and curiosity launched the investigations, shows:

- Kiwis were generally found to be more numerous in native bush than in pine stands. The population density in the latter varied from less than 10 percent to about 45 percent of the density estimated for the compartment of bush at the west of the forest, which was proclaimed a kiwi sanctuary by the Forest Service in March 1978.
- The greatest densities of kiwis, however, occurred under previously thinned and/or pruned exotic stands that contained a dense ground cover of slash. These were estimated to contain between 10 and 35 percent more birds per unit area than were present in typical bush areas. Slash provides shelter and darkness without the need to burrow, and rotting logs, presumably, are rich in invertebrates for food.
- Though kiwis were found in pines of all ages (from 3 to 40 years), they were estimated to be up to six times more numerous per unit area in older stands, particularly in those that had a thicker (up to 10 cm) ground cover of pine needles.
- The relationship between kiwis and undergrowth was inconclusive, mainly because much of the shrub layer consisted of gorse, which is widespread in several compartments and holds little attraction for the birds.

This preliminary analysis provisionally placed the total adult population at 450 to 520 kiwis. A reassessment of the data indicates that this is a very conservative estimate. My calculations suggest that the adult population at Waitangi numbers at least 760 and may exceed 1000 kiwis. A similar estimate (between 800 and 1000 birds) was also made by Messrs Colbourne and Kleinpaste from data obtained during their assignments in 1981–82.

Conclusions

Native forests, besides providing berries and foliage of value for food, also probably contain considerably greater varieties and quantities of soil and litter invertebrates than occur beneath pine stands. The value of some pine forests over some bush land for kiwi habitat is therefore believed to be due to the disadvantages that the former lack. At Waitangi, where the hazards likely to be encountered in bush and pine blocks are similar, kiwis are generally more plentiful in bush areas and reach similar, or greater, numbers in pine stands only after pruning or thinning. This suggests that the time span when a compartment (management area) of pines can match lowland forest in providing high density kiwi habitat is linked to the duration of rotting slash and, therefore, is relatively short.

The fact that kiwis are up to 10 times more numerous in native bush than in pines at Waitangi probably exaggerates the relative differences in habitat quality of these two environments. Whereas the indigenous pockets occur mostly in damp gullies with more penetrable soils, the pines are planted mainly on drier, less favourable hill sites more susceptible to droughts. Mature pine stands in better low-lying areas are believed to contain sufficient food to sustain large numbers of kiwis. One 90-ha area of 23- to 28-year-old pines contained an estimated 16 or 17 pairs.

The main disadvantages of pine forests for kiwis (particularly those forests planted for wood-pulp) are the short lives of their stands — often shorter than the life span of a kiwi — and the destructive and highly disruptive operations associated with the beginning and end of each production cycle. Depending on the age of the stands, kiwis in one part of the forest may be at increased risk while, simultaneously, those in another part are benefiting from a different management procedure. Though management may cause fluctuations in the number of kiwis and the safety of individual birds cannot be guaranteed, the population within an exotic forest can be adequately maintained and safeguarded.

Rogan Colbourne has reported similarly high numbers of kiwis in Puhipuhi exotic forest (now in its second production cycle) and Waipoua kauri forest, and the density of birds at both forests is believed to equal, or exceed, the density in Waitangi.

Birdlife in exotic forests could be increased by planting suitable broad-leaved species along compartment margins, but this action would not provide a valid argument for those wishing to clear-fell and replace native bush with pines.

Native forests have their own intrinsic values and notwithstanding any reduced worth as habitat for indigenous fauna, their floristic character alone justifies their preservation. Furthermore, there is no guarantee that exotic forests at present supporting high populations of kiwis and other birds will remain immune from the large numbers of vermin that have contributed to the decline in birdlife in many bush lands.

Photos by Rogan Colbourne. ■

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UN adopts World Charter for Nature

By resolution of 28 October 1982 the United Nations General Assembly adopted the World Charter for Nature by a vote of 111 to 1, with 18 abstentions.

This decision marks the culmination of a 7-year effort by IUCN (the International Union for Conservation of Nature and Natural Resources, based in Gland, Switzerland) to gain world acceptance of a code of conduct for managing nature and natural resources. In 1975, on the occasion of the 12th General Assembly of IUCN, held in Kinshasa, President Mobutu Sese Seko, of Zaire, had issued the call for a global charter to draw attention to man's stewardship of nature.

The World Charter for Nature lays down universal principles of conservation by which all human conduct affecting nature is to be guided and judged. It thus provides an important complement to the 1980 World Conservation Strategy, also developed by IUCN with the advice, cooperation, and financial assistance of the United Nations Environment Programme and the World Wildlife Fund (WWF).

The director-general of IUCN, Dr Lee M. Talbot, welcomed the official adoption of the charter, which, he said, "finally raises the international recognition of environmental principles to the same level as the Universal Declaration of Human Rights. It reflects a global consensus on the responsibility of man to maintain, for his own survival, the essential ecological processes and life support system of our planet."

OBITUARY

W. N. W. Leech

William Norman Wood Leech, a distinguished life member of the Society, died in Palmerston North on 6 January at the age of 86 years.

Norman Leech's earliest years were spent in Taranaki, where he attended New Plymouth Boys' High School, and he was able last year, (though under physical disability) to attend that school's jubilee as one of its earliest pupils.

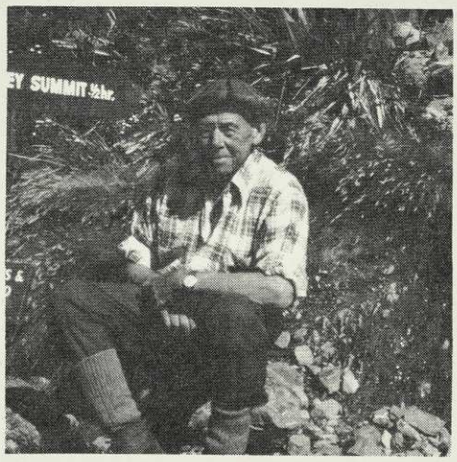
Having passed the university entrance examination at the age of 16, he attended Duntroon Military College in Australia, where he graduated as a junior officer. He later served in two campaigns in India between 1919 and 1921.

After his military service he was drawn to the land, but found that farming was not really his vocation and so he studied engineering. He joined the staff of the New Zealand Electricity Department, where he became transmission line engineer. In this position he was engaged in the surveying, planning, and construction of the transmission lines for the Wellington electricity district, work which harmonised with his love of outdoor life. When aerial surveying came into vogue he was one of the first to use the method.

As a Freemason he attained high office and was a respected member of several Masonic lodges.

After his retirement, over 20 years ago, he was able to follow more freely his interests and hobbies of conservation, photography, tramping and fishing.

His membership in the Society had extended over about



Norman Leech on the Routeburn Track in 1977.

40 years, and he was a committee member of the Manawatu Branch for 20 of those years. In June 1980 he was awarded the title of distinguished life member by the Society at the request of the Manawatu Branch.

"Norm", as he was known to our members, took a keen interest in the affairs of the Society, and it was good to walk beside him on a field trip, as he would bring the world alive by identifying the trees and shrubs.

Over the years he travelled to many parts of New Zealand by car and caravan, photographing all aspects of native flora and fauna. Because of this interest he submitted entries to several Society photographic competitions and he won at least two awards.

His activities during his ageing years were a source of admiration to us all. At the age of 81 he walked the Routeburn Track with his cousin, Mrs Norman Dalmer (wife of the former deputy national president). Right to the end of his life he was always planning another trip.

He attended many summer camps, though his walking was limited in latter years.

Beyond all this Norm was noted for his reliability. If he was asked to do a job, one could rest assured that it would be completed with meticulous detail and a sense of pride. Even in his failing years he still looked after the monthly newspaper advertisement for the branch, because, as he said, "I can't do much now, but this one job makes me feel useful."

One of Norm's secret hopes was that his "antique" car would outlive him and this hope is now realised. Though he was an experienced driver, some of our members and his family also will remember Norm and his car with a kindly chuckle after having experienced a "mildly perilous adventure" or two in that vehicle.

We all appreciate Norm for what he has given to us, and he will not be forgotten.

He is survived by his two brothers, living in Huntly and America respectively.

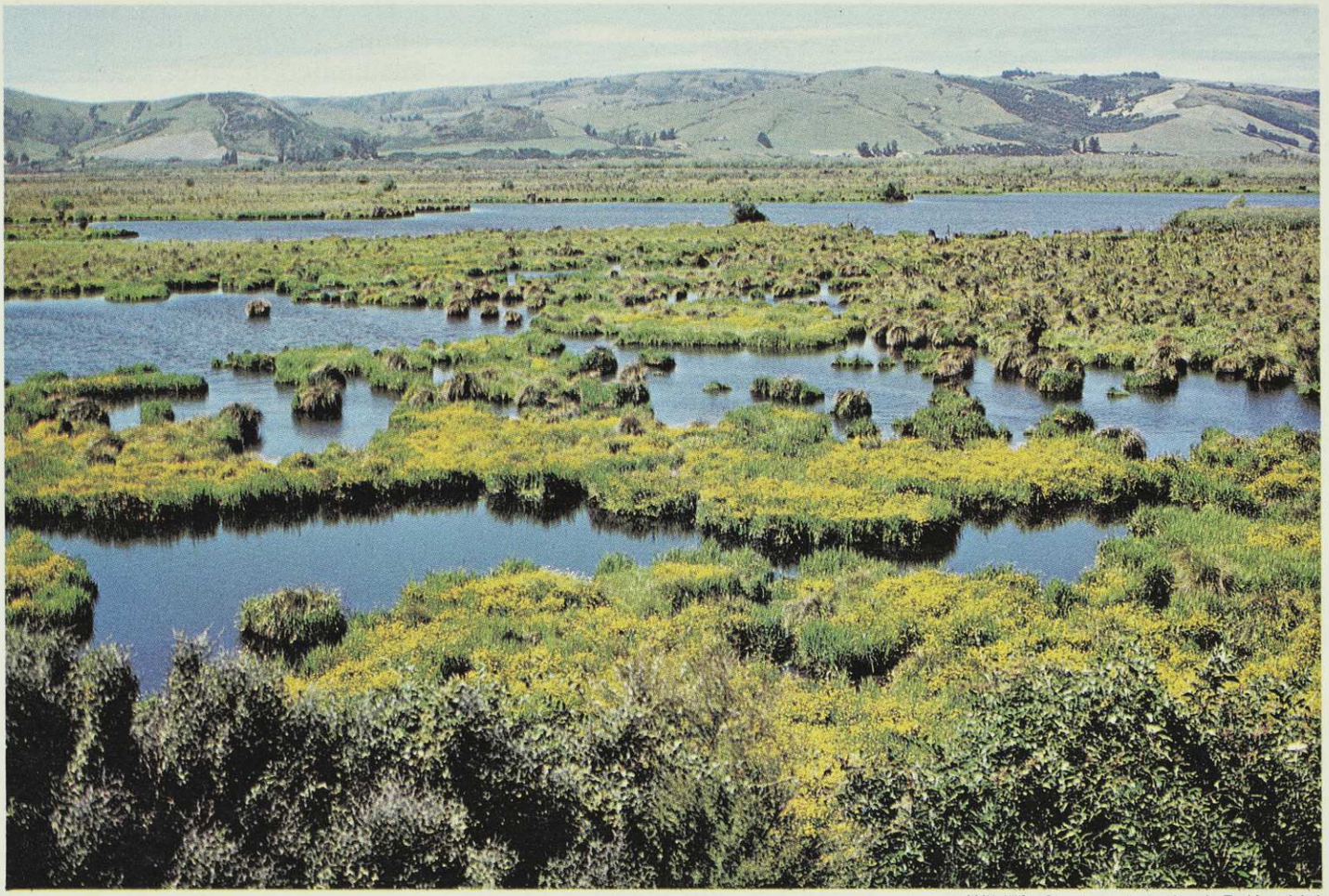
—N. E. D. and N. H., Manawatu Branch

Jubilee dinner

The South Canterbury Branch is holding a jubilee dinner on Thursday, 21 April, at 6.30 p.m. at the Caroline Bay tearooms, Timaru.

The guest speaker will be Dr Peter Harper, who will speak on "Birds of the Antarctic". Another speaker will be Mr Geoff Cloake, who will talk on the South Island high country.

Cost is $8.50. Bookings, with payment, may be made with Mrs E. L. Gillespie, 25 Maple Crescent, Timaru.



Wildlife Service photo by J. R. Kendrick

The Waipori wetlands on the Taieri Plains, Otago. These are important wetlands for a wide variety of water birds. Some portions are now wildlife management reserve, and most of the remaining wetland is designated for further wildlife management reserve purposes.

Wildlife Service photo by C. R. Veitch

Oystercatchers and godwits on Karaka Shell Beach, Manukau Harbour. The loss of unmodified estuaries suitable for wading and migratory birds has been caused by flood-protection works and reclamation. This has reduced available habitats and consequently the number of these birds.

Towards a wetland policy

THE OPENING ADDRESS at the Society's wetlands conference attended by councillors on Sunday 14 November was given by Dr Murray Williams. Because this address is considered so important to the wetland cause, it is published here for the information of all Society members.

BEING SUNDAY, I think it not inappropriate that I begin my address with some selected readings from the good book:

> And it came to pass after seven days, that the waters of the flood were upon the earth. (Genesis 7,10).
>
> And the flood was forty days upon the earth; and the waters increased, and bare up the ark; and it was lift up above the earth. (Genesis 7,17).
>
> And the waters prevailed exceedingly upon the earth; and all the high hills, that were under the whole heaven, were covered. (Genesis 7,19).

Clearly we used to have a lot of wetland! We have come a long way down hill. Indeed, we can almost lay the blame at His door:

> And it came to pass in the six hundredth and first year, in the first month, the first day of the month, the waters were dried up from off the earth; and Noah removed the covering of the ark, and looked, and, behold, the face of the ground was dry. (Genesis 8,13).

The story of a wetland created — and a wetland destroyed! The full sequence of natural events that I will later describe had begun. But how frequently since those biblical times has the cycle taken place? More particularly, how frequently, in your lifetime, have you been witness to the destructive event?

Your presence here today for the purpose of discussing and formulating a wetland policy suggests you have witnessed the demise of our wetlands all too frequently and that you believe it time to call halt to the galloping consumption of our wetland resource.

Your concern is well justified: our wetland resource is very small. We have none of it to give away; none of it to lose without a damned good fight.

The resource

How large is our wetland resource? It depends on just what definition of wetland we adopt. The IUCN definition is becoming the accepted international standard and one which the Society should also adopt:

"Wetlands are areas of marsh, fen, peat land, or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish, or salt, including areas of marine water the depth of which at low tide does not exceed six metres."

Within that definition we can identify obvious wetland types.

Estuaries, those semi-enclosed coastal bodies of water with a free connection to the sea and within which sea water is mixed and diluted with fresh water from land drainage. They number only about 300 around the coasts of New Zealand (McLay 1976). Two-thirds of these are less than 500 ha in area, and 90 percent are less than 1700 ha; in total they cover little more than 100 000 ha, that is, 0.35 percent of the New Zealand land area. The saltmarsh communities associated with them total only 8800 ha (Blaschke *et al.* 1981), that is, 9 percent of the estuarine area and 0.04 percent of the New Zealand land area.

Peat lands, an especially vulnerable wetland type in which the water table is at or just below the soil surface, total about 166 000 ha (McCraw 1979), 0.6 percent of the New Zealand land area or roughly

equivalent in total to the area of Stewart Island. Their vulnerability to conversion to pastoral or horticultural use is illustrated by the example that in Northland and Waikato alone some 50 000 ha now lacks its original or natural vegetative cover (Thompson 1979).

Swamp lands, areas dominated by raupo, sedges, and rushes, on their own or in combination with scrub and forest. They now total 145 000 ha (Blaschke *et al.* 1981), 0.5 percent of New Zealand's land area (and this total includes the remaining area of unmodified peat land). Some swamp land associations seem near extinction; a mere 7800 ha is classified as swamp forest. The climax kahikatea swamp forest has almost disappeared from the North Island and is now mostly restricted to Westland in the south.

The paucity of swamp lands is, perhaps, more graphically illustrated by comparing their extent with that of open fresh water (340 000 ha) and flowing water (295 000 ha) (Blaschke *et al.* 1981). At the time of European settlement, swamp lands associated with Lake Ellesmere covered about four times the existing lake area, as shown by files and maps of the North Canterbury Catchment and Regional Water Board, and old maps of the lower Wairarapa suggest swamp lands extended similarly well beyond the confines of the present lake.

This reflects what we all know and observe: in this agriculturally oriented nation drainage of swamp land is encouraged, and pastoral development extends to the very edge of our waterways.

It is difficult to obtain a realistic assessment of just how extensive our wetland resource was at the time of European settlement. But some local examples hint at the possible extent of the loss.

In the lower Waikato basin, in the Franklin, Waikato, Waipa, and Raglan Counties, 20 000 ha of unmodified wetland remains, about 15 percent of the original resource (Ogle and Cheyne 1981). In the Piako and Hauraki Plains Counties 13 000 ha of an original 90 000 ha of wetland now remains. Wetland drainage in these areas presents special difficulties; small wonder that in less difficult areas, like Taranaki, **no** unmodified wetlands of consequence remain.

Diversity

It is seldom appreciated that wetlands are the homes of an astonishing diversity of plant and animal species; their numbers are out of all proportion to the size of the wetland resource. One example will suffice: of the birds which are regular visitors to New Zealand or are permanently resident and breeding, 22 percent have wetlands as their primary habitat, and a further 5 percent have wetlands as an important secondary habitat (Williams 1973). No other major habitat type supports as many bird species: the huge resources of the sea support 22 percent of the birds on the New Zealand faunal list.

This disproportionately large number of plants and animals associated with wetlands is because of the great diversity of niches available in the wetland environment. We are talking of an ecosystem which encompasses open water, dry land, and all gradations between. It offers the opportunity for existence for plants and animals to live under, in, on, or over the open water; for those that can live at the water's edge tolerating seasonal or tidal inundation and exposure; for those plants demanding of a wet soil as well as those requiring an almost dry substrate. And it also provides a haven for animals able to exploit resources beyond the wetland margin, but which still require a safe wetland retreat.

Productivity

It is this immense diversity of plant and animal life, and the fact that wetlands are nutrient traps, that confers on them their most outstanding feature — their productivity. Estuarine wetlands have a net primary productivity equal to that of a tropical rain forest and up to four times that of a ryegrass pasture (Knox 1980). Freshwater wetlands may even exceed this: a recent study in New Zealand has shown a raupo stand to produce more than 2.5 kg dry weight of plant material per square metre per year, equivalent to about 250 tonnes wet weight per hectare. That makes raupo the second most productive plant yet recorded in New Zealand — second only to *Pinus radiata* on the very best and most heavily fertilised sites near Rotorua (J. Ogden, personal communication).

We are dealing with the most productive and diverse ecosystems on earth!

Instability

That diversity and that productivity confer another feature on wetlands — and one that will prove an enormous headache in the formulation of a wetland policy — their inherent instability.

In an article in your journal (Williams 1981) I tried to summarise the features of that instability in freshwater wetlands. I commented that, no matter how large the impoundment — Lake Taupo or a small farm pond — and no matter the method of formation — volcanic activity, earth movement, changed drainage patterns, or as a consequence of man's machines — the impoundment is, from the moment of formation, subjected to processes which endeavour to convert it into solid ground.

Sediment comes down the inflowing water courses; it is

transported by wind; it comes from adjacent land run-off and from erosion of the shoreline. As a result the impoundment becomes progressively more shallow.

Plants and animals, by their decomposition, contribute to the infilling and provide the materials for further plant and animal growth.

Slowly — and the rate is, of course, highly variable — the open water area will become occluded, and a typical swamp develops. After further deposition of sediments and organic matter a soil develops and the swamp is transformed into increasingly solid and dry ground.

The consequence of this process is that animals and plants of the open water are replaced by those tolerant of wet swamp conditions. They in turn give way to species characteristic of drier ground. Eventually, a climax forest may stand where thousands of years before a lake had occurred.

In other words, lakes and swamps are only transitory. It follows that the animals and plants inhabiting them, likewise, are there only temporarily.

Estuaries as well

Lest you think this inherent instability is restricted to freshwater wetlands, may I refer you to an excellent overview article on estuaries (Knox 1980) in which Professor George Knox encapsulated the dynamism of estuarine systems.

He wrote: "The most significant characteristic of the true estuarine environment is the instability of the system, and it is this that determines the main biological features. The complex environment undergoes constant change with the concentration and dilution of chemicals; deposition and erosion of sediments; and the coming and going of plants and animals. This meeting place of land and sea is probably the most dynamic area on earth: the catchword is **change**."

Nightmare

That instability, that progression from one seral stage to the next, is a preservationist's nightmare. What do you do about rare and endangered plants and animals present in some wetland and which, by the natural order of things, will eventually be displaced from that system? What do you do about *Baumea complanata*, reputedly known from only one wetland in the far north? What if the rare and endangered brown teal, with its requirement for occluded swamp land, needs assistance in the same wetland as *Baumea*, or *Sporodanthus traversii*, or *Thelypteris confluens*, or indeed any other threatened or rare plant?

Given this dilemma prompts me to pose a few questions about your policy-making endeavours to come. Precisely what is it that you seek to achieve?

Choices

I think you have a choice of approaches.

You can take as your starting point the desire to prevent the demise of, or alteration to, **any** wetland, irrespective of size, seral stage, type, or location.

You could seek the imposition of a code of minimum impact for wetlands.

You could seek legislative protection for **all** wetlands, perhaps using the Italian "safety of wetlands" legislation as a model, under which all wetlands and their contributing systems are declared inviolate. You could seek to extend that protection beyond the immediate confines of that wetland, perhaps to include a buffer zone in the manner of riparian strips along waterways.

You could campaign against subsidies being made available from the public purse, by way of low-interest loans from the Rural Bank, for the drainage or reclamation of wetlands for agricultural use.

You could perhaps contribute to the funding of covenant schemes such as those available through the Queen Elizabeth II National Trust.

And you could seek a greater responsibility being shown towards our international obligations: New Zealand signed the IUCN Convention on Wetlands of International Importance in 1976, declaring Waituna Lagoon and Farewell Spit (both already reserves!) as reserves under the convention. Why, in the 6 years since then, have no further sites been designated? The claims of Lake Ellesmere, Kaipara Harbour, Manukau Harbour, Whangamarino Swamp, and the Kopuatai peat dome seem impeccable.

Indeed New Zealand's performance has been evident of a total lack of commitment. Denmark, a mere 16 percent of the size of New Zealand with twice our population, has 26 wetlands, totalling 594 000 ha in area, reserved under the convention. Italy, not much larger than New Zealand, but with 17 times our population, has reserved 34 sites covering 50 000 ha. Our two sites total 14 000 ha (Smart 1981).

A representative series

Your alternative approach is to seek the preservation of a representative series of wetlands in each of New Zealand's ecological districts — wetlands you have identified as being the best examples of their type in each district.

You could further seek the preservation of a wetland for the purposes of protecting a particular plant or animal present there if you feel it justified.

But in raising this alternative

I am bound to highlight some of its problems.

- It implies that there is a classification system that allows a representative series to be identified. That will be a challenge in itself, for such is the extreme diversity of wetlands that **nowhere** has a simple and satisfactory system of wetland classification yet been devised. But plenty of people have tried.
- It implies we know where all our wetlands are (that is, an inventory) and that we know the legal and ecological status of each.
- It implies active management, having the knowledge of how to arrest or modify the seral progression in wetlands, and having the resources of finance and equipment to do it.

Factor overlooked

Whatever the aims and approach you adopt, there is one other element to be considered, one factor seemingly overlooked, for no workshop has been organised for its discussion. Yet it is fundamental to the thrust of your policy. It is this: How do you sell your policy?

No matter how brilliantly constructed your final policy, it will have almost **no** value unless, as a result, you can bring not only your membership but also the wider public demonstrably into your camp. You must convince other than yourselves that there is a need to conserve, even preserve, our remaining wetlands.

They will be a difficult product to sell. Everyone can grow to appreciate the hydrological, recreational, and wildlife values of wetlands. But the public conception of, perhaps their prejudice against, wetlands is that they are wet, slushy, muddy, even stinking places into which wise adults never venture and from which dirty kids emerge!

This is a large but very important challenge. I do not believe you can conceive a realistic wetlands policy without an eye to your intended audience.

I have departed somewhat from providing you with an overview of wetlands and may have even sounded like a judge directing a jury. I will close by offering you a direction in the mould of that with which I started this address. I have always fondly imagined that God gave Adam and Eve a specific instruction. After the flood I feel sure it would also have been given to Noah's sons and their wives and also to each pair of animals as they left the ark. I will slightly adapt that advice and direct you to:

"Go forth and policify".

References

Blaschke, P. M., Hunter, G. C., Eyles, G. O., and van Berkel, P. R., 1981: Analysis of New Zealand's vegetation cover using land resource inventory data. *N.Z. Journal of Ecology 4*: 1–19.

Knox, G. A., 1980: The estuarine zone — an overview. *Soil and Water 16*: 13–17.

McCraw, J. D., 1979: Peat and peatlands — an overview. *Soil and Water 15*: 13–17.

McLay, C. L., 1976: An inventory of the status and origin of New Zealand estuarine systems. *Proceedings of the N.Z. Ecological Society 23*: 8–26.

Ogle, C. C., and Cheyne, J., 1981: The wildlife and wildlife values of the Whangamarino wetlands. *Wildlife Service Fauna Survey Unit Report No. 28*.

Smart, M., 1981: Ramsar Convention. *International Waterfowl Research Bureau Bulletin No. 47*: 6–7.

Thompson, K., 1979: Good grounds for reservation. *Soil and Water 15*: 20–21.

Williams, G. R., 1973: Birds. *In* "The Natural History of New Zealand," pp. 304-333. Reed, Wellington.

Williams, M., 1981: No wetland is forever. *Forest and Bird* 13 (11): 27-29. ■

Queen Elizabeth II Scholarships

Six post-graduate students were awarded Queen Elizabeth II Scholarships by the Society in December.

The scholarships will be used for research into the preservation and protection of indigenous flora and fauna.

Christine Reed, who is studying for an M.Sc. degree at Massey University, will research into the reproductive behaviour of captive black stilts reared in isolation. She will do most of this work at the Mount Bruce native bird reserve.

Yvonne Weeber, who is studying for an honours degree in science at Victoria University, will examine the dynamics of beech and podocarp boundaries in the west Akatarawa Valley. She will be looking to find whether beech is replacing podocarp forest or if the reverse is occurring.

Caitilin Duff, who has majored in botany and ecology at the University of Auckland, will be studying the regeneration of the pohutukawa in its natural habitat. The tree is an important natural aid to coastal erosion control and will survive extreme habitats where few other tree species could exist.

Shona Myers, who has gained a B.Sc. degree in botany at the University of Auckland, will be studying the germination and seedling establishment of taraire, a tree which forms an important component of the forests in the Northland and Auckland regions.

Rosemary Gales, who is studying for an M.Sc. degree in zoology at the University of Otago, will research into the effects of human disturbance on sea bird nesting. She will be monitoring sea bird colonies on the Otago Peninsula, many inaccessible by land, including colonies of gulls, terns, shags, and sooty shearwater.

Caroline Lintott, for her M.Sc. degree thesis in ecology at the University of Canterbury, will research the seed biology of subalpine plants.

The N.Z. plover—the forgotten one

THE NEW ZEALAND SHORE PLOVER (tuturuatu) seemed to suffer from a behavioural problem — to lack a vital component necessary to ensure the survival of the species. There it is, an active member of one of this country's largest and most diverse order of birds, the waders, and yet it has to be listed as an endangered species. Indeed, this energetic and friendly inhabitant of the shoreline moved towards the possibility of extinction so swiftly that even the record books had problems keeping pace.

By Philip Gray, Wildlife Service

WHEN BIRDS rather than people held dominion over New Zealand, the shore plover (*Thinornis novaeseelandiae*) was distributed widely over both main islands, the Chathams, and possibly many off-shore islands.

Sightings in the mid and late nineteenth century reported the birds foraging and inhabiting the mud flats of river estuaries; moving along the tide line in the Hauraki Gulf and Manukau Harbour; plying the sand spits of Tauranga Harbour, Queen Charlotte Sound, and several islets on the eastern and south-eastern coasts of the South Island; and rummaging on the rock platforms of the Chathams.

The shore plover liked to feed on the small crustaceans and other animal life of the intertidal zone and in the salt marsh areas in the bays.

Dwindling numbers

However, despite its one-time wide distribution, the bird apparently had never occurred anywhere in large numbers. With the arrival of people these numbers dwindled rapidly. Being a coastal inhabitant the plover met imported predators

***This series of articles is sponsored by the National Provident Fund in the cause of conservation.**

Wildlife Service photo

A male New Zealand shore plover.

immediately; the rats and cats killed the birds with such speed that even the ornithologists were surprised. So much so, that these observers failed to obtain a specimen from the mainland for any of the New Zealand collections, an oversight they would not repeat.

As cats and rats spread everywhere and the extinction of tuturuatu accelerated, the professional collectors focused on the bird's final refuge, South East Island, in the Chatham Islands. Between 1890 and 1910 these barbarians killed hundreds of these beautiful birds and sold them as mounted specimens to museums. Luckily regeneration outlasted the slaughter.

Striking colouring

The colouring of the shore plover is truly striking. The forehead, cheeks, and throat are black (brownish in females), and the crown and hind parts are greyish brown; these two colour hues are separated by a band of white. The bill is orange-red, and the legs are pinkish brown. Even when compared with other members of the talented wader family, the New Zealand shore plover is an outstanding bird. Perhaps its nearest rival would be its cousin, the turnstone, but only when this Arctic wader is in its summer colours.

The high-pitched peep call of the shore plover is chorused by adults when danger threatens their chicks. Unlike most endangered species, these plovers are magnificent flyers, and the pursuit flight of mated pairs is quite spectacular, one bird following the other's zigzag course with perfect co-ordination.

Sad to say, the shore plover has failed to attract a management research project to help with its struggle for survival. With so many endangered species in so small a country, the meagre funds available always seemed to be diverted elsewhere. Now some tentative measures are being tried out.

With a population of 50 pairs, resident only on South East Island, attempts were made to spread the species to other predator-free islands. Unfortunately the plover has a strong homing instinct, and 15 birds released on Mangere Island in 1970 quickly returned to South East Island.

Another attempt in 1972 with juveniles whose powers of flight had been reduced by the removal of several flight feathers from one wing also failed. As the feathers grew in again those birds, too, returned to their natal island.

Artificial hatching

An attempt to hatch 10 eggs artificially in 1981 resulted in only one chick, now a lone survivor at Mount Bruce native bird reserve. In December last year further eggs were placed in incubators on the spot to try to form the nucleus of a captive breeding population. Shore plovers, like many waders, adapt exceedingly well to captivity.

Meanwhile researchers have found the behavioural fault. The flaw was not a missing component, but rather one component too many. These endemic birds were too tame and friendly, virtues which gave them no inherent sense of danger. Though other plovers moved warily along the tide line, the shore plover mingled freely with people and predator alike. Unfortunately such virtues as trust and friendship have limited use in today's world and result in endangered species. ■

Bequests and donations

The Society has received a number of bequests recently and you may wish to consider helping in this way to keep New Zealand beautiful.

Is there any cause more worthy of bequests by public-spirited citizens than the objectives of the Royal Forest and Bird Protection Society, which is working wholly and solely for the welfare of New Zealand, present and future? Here is a suggested form of bequest:

"I give and bequeath a ..... proportion of my estate to the Royal Forest and Bird Protection Society of New Zealand (Incorporated) and I declare that the receipt of the secretary for the time being of the said Society shall be a complete discharge to my executors of the legacy hereby given to such Society."

Donations to the Society's funds are also of great help in its work. Such donations of $5 or more are qualified as tax deductible. A receipt from the Society will be supplied for each donation.

Supplement to issue

Accompanying this issue are a supplement and a mail order catalogue.

South Auckland party visits Red Mercury Island

AT LABOUR DAY weekend last year six members of the South Auckland Branch, with a permit from the Hauraki Maritime Park Board and guided by Graham Falla, visited Red Mercury Island, in the Mercury Islands group.

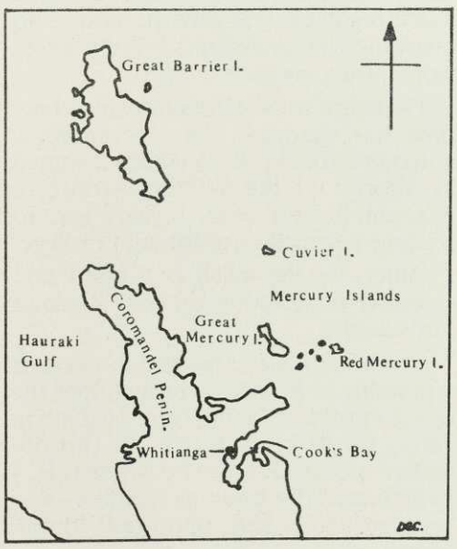
The group, of which six islands are part of the Hauraki Maritime Park, lies about 32 km east of Whitianga, Coromandel Peninsula.

Red Mercury Island is 206 hectares in area. It is undulating up to 112 m in height

By Josie Driessen

and is covered with an even growth of predominantly mapou and mahoe about 6 m high, with pohutukawas on the coast and dotted throughout. The whole island was burnt in 1934.

We were part of a group of 43 members spending the weekend exploring bush and shore in the Cook's Bay area. The 2-hour trip on a fast char-



Red Mercury Island is the easternmost of the Mercury Islands group, which lies about 32 km east of Whitianga.

Three of the party being ferried ashore at von Luckner's Cove on Red Mercury Island.

The visitors photographed above von Luckner's Cove, 30 m below. From left: Shane Kake, Graham Falla, Ellice Keys, Betty Harris, and Martin Fey.

Typical fern and mapou-mahoe growth on the island.

tered launch was choppy, and a squally westerly meant landing at von Luckner's Cove on the south-east corner.

Volcanic cliffs

The beautiful colours of the volcanic cliffs — purples, yellows, and all shades of red — showed how well named was the island.

Two dinghy trips to the boulder beach in a slight swell landed us for our specified 3 hours' study. The sun soon warmed both us and the numerous skinks darting about among the beach boulders. They were probably *Leiolopisma suteri*, common to the North Island east coast.

Ngaio near the beach was low growing and flowering profusely, attracting bellbirds and white-eyes. Grey warblers were common and four red-crowned parakeets were seen in the pohutukawas on the cliff.

We used precious time scrambling up the steep cliff, hanging on to pohutukawa roots and coprosma. When we reached the top walking was easy under the canopy of mapou and mahoe except for numerous grey-faced petrel burrows. These were unoccupied except for one near the beach.

Saddlebacks

We soon saw our first saddleback and, with help from a squeaker, encouraged it close and heard the intriguing typical "chatter" song. It was a beautiful bird and for all of us our first sight of one. Eight saddlebacks were seen and possibly more heard during our short walk of about 400 m inland. Two swallows, a chaffinch, and a fantail were also seen. In all we observed eight bird species on the island.

The beautiful maidenhair fern *Adiantum aethiopicum* flourished in damp places, and *Asplenium lucidum* was abundant.

Those landed on the island were Graham Falla, Betty Harris, Ellice Keys, Shane Kake, Martin Fey, and myself.

Waikaremoana Lodge Building Fund

The Wairoa Branch proposes to donate the amount held in the Waikaremoana Lodge Building Fund, about $6,000, to the Bushy Park Trust for the purposes of maintenance, renewal, and additions to Bushy Park.

Any member having objection to this proposal should contact the secretary, Wairoa Branch, by 31 March.

BOOKS

Birds at Risk: Text by Richard B. Sibson, illustrations by Bill Howard

In the previous issue of *Forest and Bird* the advertisement for this book did not give the price — a sort of hiding one's light under a bushel.

So here it is. The book costs $39.95.

Birds at Risk has been tastefully handled by the publishers, and the combination of full-colour reproductions of the bird paintings and a section with text and excellent line drawings with easy cross-reference is a boon to the reader. It is a beautiful book to handle, which heightens the interest and impels attention to the plight of these New Zealand birds at risk.

Some of the reproductions of the colour paintings of the birds have colour disparity, and one supposes that these fall within the artist's licence, though some are possibly to do with the separation balance in the processing. However, these faults do not detract from the general worthiness and clarity of the pictures. I refer in particular to the blue duck and the kakapo.

I am disappointed that in the treatment of three birds which have engaged the Society in research and rescue attempts over the past 5 years the Society gets no mention. Yet at a cost of well over $100,000 we have made possible the rebuilding of black robin habitat on Mangere Island by the provision of 120 000 *Olearia traversii* seedlings. Moreover we helped the Government to purchase the island as a sanctuary some years ago.

We have maintained a scientist, Rod Hay, in Pureora for a 3-year research on the needs of the kokako, which resulted in the Government's stopping logging and making a reserve of the kokako habitat.

We have supported Ray Pierce in protection of the black stilt in the Mackenzie Country and have built two successful exclosures encompassing over 20 acres each, wire-netted and electrified against wild cats and ferrets, to make safe breeding areas for the black stilt. These moves, with other nest protection outside the safe areas, have boosted the numbers of that bird in the wild by almost 100 percent over the last 3 years.

Admittedly, the Society's work on these projects has been in support of the Wildlife Service, who have allowed us to work under their statute, but it has always been where the work on these birds at risk could not be done alone by the hard-pressed Wildlife Service.

I think the author is mistaken to underrate the Society efforts when dealing with these three endangered birds. Perhaps he did not appreciate the importance of the Society's work to these birds.

Anyway, we get no mention throughout the book, and as I know Society members, who have been so much involved, will buy the book and question the omission, I hope these words will allay their concern.

There are some errors (mostly where time has outdated the information), and one is that G. R. Williams is shown as director of the Wildlife Service, a position he left over 3 years ago to become a professor at Lincoln College.

Otherwise the book is a good and extensive dissertation on New Zealand birds at risk.

The book is welcome and it succeeds admirably in its aim — to highlight the serious problem facing New Zealand in caring for its birds at risk. As this objective is central to the Society's role, I recommend the book to members as a very readable and important publication.

— David G. Collingwood

A.H. and A.W. Reed **$39.95**

Look after trees and their leaves

By David Gregorie

WHY DO trees have leaves? When I asked some children this question a few years ago I got some interesting answers.

"For possums to eat," one boy said. "To give us shade in the summer," said another. "To shelter birds and hide their nests from cats," said a girl. "Trees make leaves so they look pretty," said someone else.

They all thought trees made leaves to help birds or animals, or for use to look at. But trees aren't so kind hearted. Trees don't make leaves at all, really. It's the other way round. It's the leaves that make the trees.

If that sounds silly, I'll explain how and why.

Chemical factories

Leaves are not for decoration or shade. They are highly sophisticated, fully automated, super-miniaturised chemical factories. They can do something that scientists have not yet learnt to do.

Each leaf is a solar cell. It uses the energy in sunlight to extract a gas called carbon dioxide (CO_2) from the air and another gas, hydrogen (H_2), from the water it sucks up through its roots.

Next, the leaf links the carbon and the hydrogen together to make new substances called **carbohydrates**. This process is called photosynthesis and it depends on a green-coloured chemical called chlorophyll, which is made by the leaf. That is why leaves are mostly green.

There are several different kinds of carbohydrates, but the most important are sugar, cellulose, and starch. Sugar dissolves in water; so the plant can pump it around in its sap where it is needed. Some plants have so much sugar that their sap tastes sweet — sugar cane and sugar maple, for example.

The plant can change the sugar into cellulose, which is used to make wood. Or it can change the sugar into starch and store it in seeds or nuts, or underground in tubers like potatoes or kumara. This is to provide food for the growing baby plant before it has leaves and roots of its own.

Or the trees can put the sugar into its flowers as nectar so that bees will crawl in looking for it and, quite without meaning to, spread pollen from flower to flower and fertilise the seeds. The bees use the nectar to make honey.

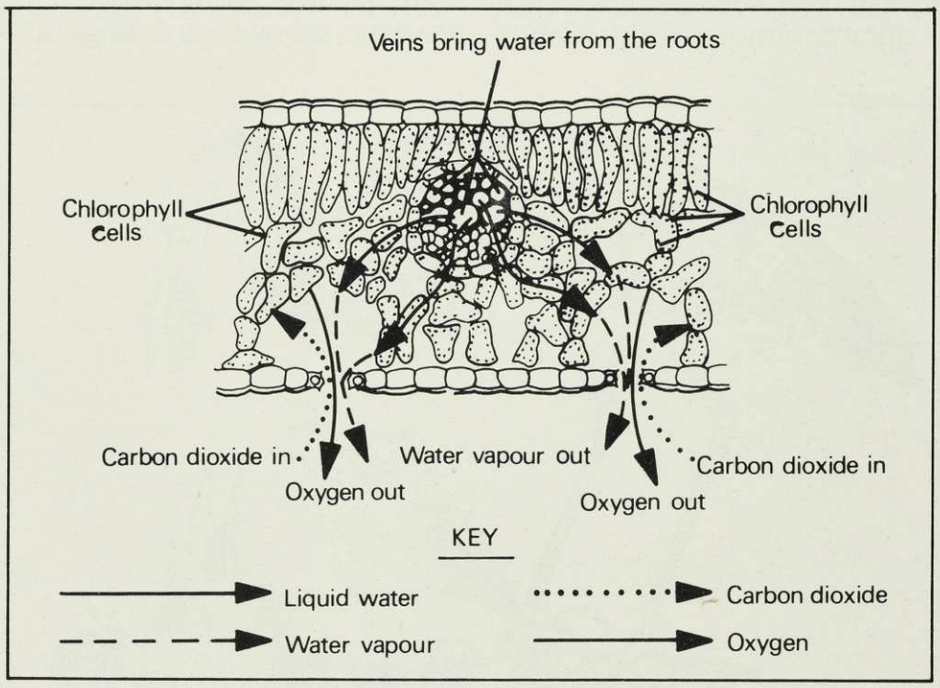
So the leaves are very important. The whole tree, no matter how big it is, is made by its leaves out of carbon from the air and hydrogen from water in the ground.

Release of oxygen

Photosynthesis has a curious side effect. When the leaf takes carbon from the air and hydrogen from the water, there is a lot of oxygen left over which the plant does not need. The oxygen is released into the air and we breathe it.

About 23 percent of the air is oxygen and all of it comes from trees and plants. Without oxygen all animals would die. So would we.

This is one reason why trees



This drawing shows what you would see if you cut a leaf in half across the middle and then looked at the edge under a microscope. Water flows up from the roots and along the veins in the leaf. Air comes in through holes in the under side of the leaf. The sugar made by the chlorophyll with the help of sun-power is taken back down the veins to where it is needed. The unwanted oxygen and spare water go out through the holes in the under side of the leaf.

*Sponsored by the J. R. McKenzie Trust.

are so important. They make the vital part of the air we breathe. They can do quite nicely without us, but we can't do without them.

Of course, leaves are important to us for other reasons too. Most animals eat them. Trees don't make leaves for animals to eat, but they eat them anyway. Some animals eat fruit, seeds, nuts, and underground tubers. And some animals eat the animals that eat the plants. Human beings eat almost anything.

So that's why trees have leaves. And that's why trees and their leaves are important to us. We'd better look after them.

BIRDS I HAVE MET

17. The white-faced heron

By Avis Acres

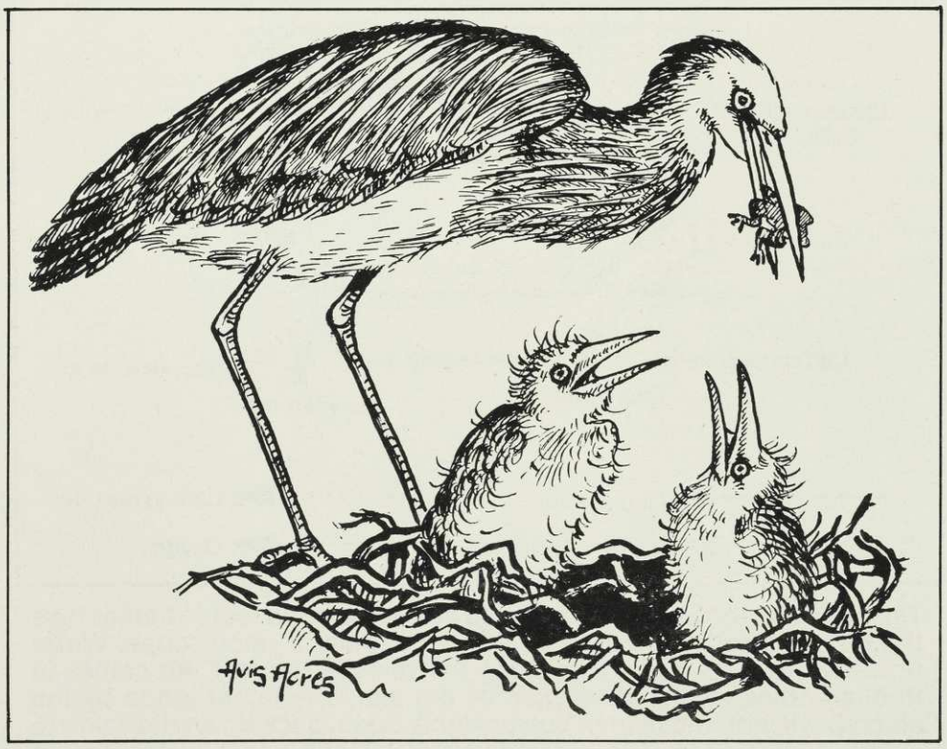
THE WHITE-FACED HERON is an elegant bird with bluish grey plumage, a white forehead and chin, with white around the eye, and bronze breast feathers. Its under surface is light grey. It has distinctive long grey plumes on its back, a black bill and wing quills, a dark-grey tail, and greenish yellow legs.

When it perches on a fence post this heron is often seen hunched up with the long neck tucked between the shoulders. Its flight is slow and graceful, with the neck outstretched.

Up until 40 years ago this Australian species was seldom seen in New Zealand, but now it is quite common in both islands in coastal districts. These birds are plentiful on farms in the Horowhenua district. I once counted 12 feeding together by a stream on a farm near Otaki.

White-faced herons build straggly, insecure nests of twigs high up in the tops of tall trees. I watched two of them nest building at the top of a huge pine tree and wondered how the poor chicks managed to stay safely in such a flimsy-looking home.

Both parents incubate the eggs, which are pale bluish green. Three to five are laid about June to December and take 25 days to incubate. The nestlings are awkward, ungainly-looking creatures, but are probably perfect specimens in their parents' eyes.



White-faced heron nestlings are awkward, ungainly-looking creatures.

I know a certain family in Levin who have no love for white-faced herons. Unfortunately they have very tall trees in their garden and a large goldfish pond. Some years ago a pair of herons flew over the garden, discovered the tall pine trees and the goldfish pond, and decided they had found the perfect nesting site, with fresh fish and frogs on their doorstep, so to speak.

Year after year they return to raise another family, but they do **not** receive a warm welcome. By the time the family is reared the goldfish pond is sadly depleted and has to be restocked each season.

White-faced herons are a common sight in Tauranga, feeding on the mud flats at low tide and on beaches. They also favour lakes and mangrove swamps. They feed on small fishes, including whitebait, shrimps, insects, crabs, and frogs.

When landing on its nest the heron makes a gutteral "graaw" ending in a repeated "gow-gow-gow". When it is frightened it gives a high-pitched call.

In autumn white-faced herons sometimes gather in large flocks. Over 80 have been seen together in mangrove swamps in a Kaipara creek and in marsh land at Manukau.

New Zealand plants

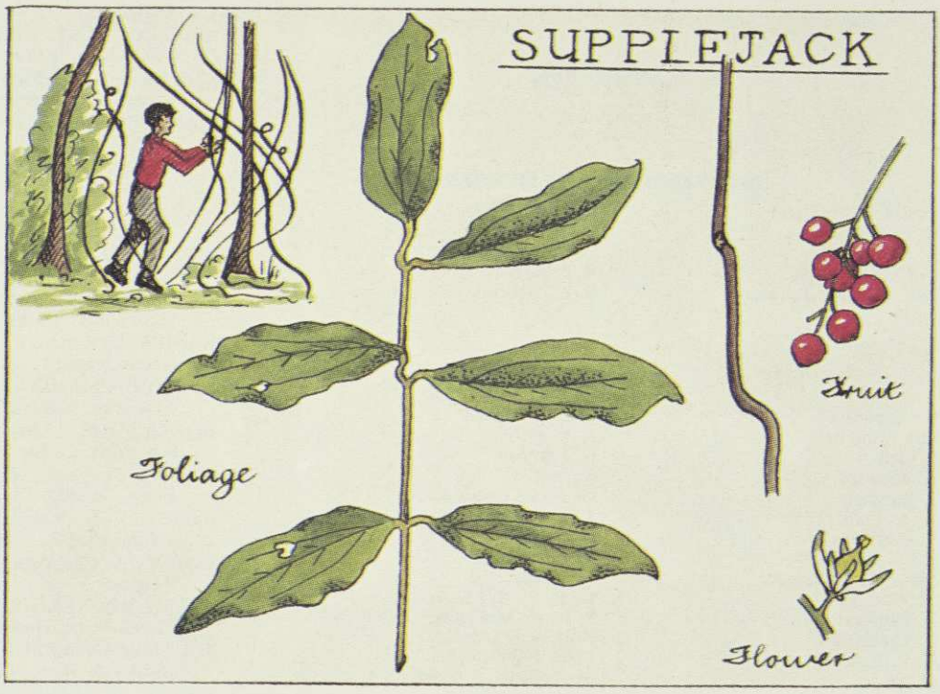
By
Sheila Cunningham

Supplejack

Supplejack, kareao (*Rhipogonum scandens*), belongs to the lily family and is a liane, that is, a plant which stretches up to the light in the forest canopy by supporting itself on another plant's stems.

The young black shoots have no tendrils, but bend over at the top when about 1½ m high. By motion in the moving air they seek and come in contact with nearby vines or stems and wind themselves round and up these.

The leaves are at only the ends of the shoots. It is a vigorous creeper which can obstruct a passage through the bush. So strong are the shoots that they are nearly impossible to break, and one can make safe rope ladders with them. They have also been used in the construction of Maori huts and baskets. The berries are a bright red.



The supplejack is a liane with shoots that are nearly impossible to break.

Fuchsia

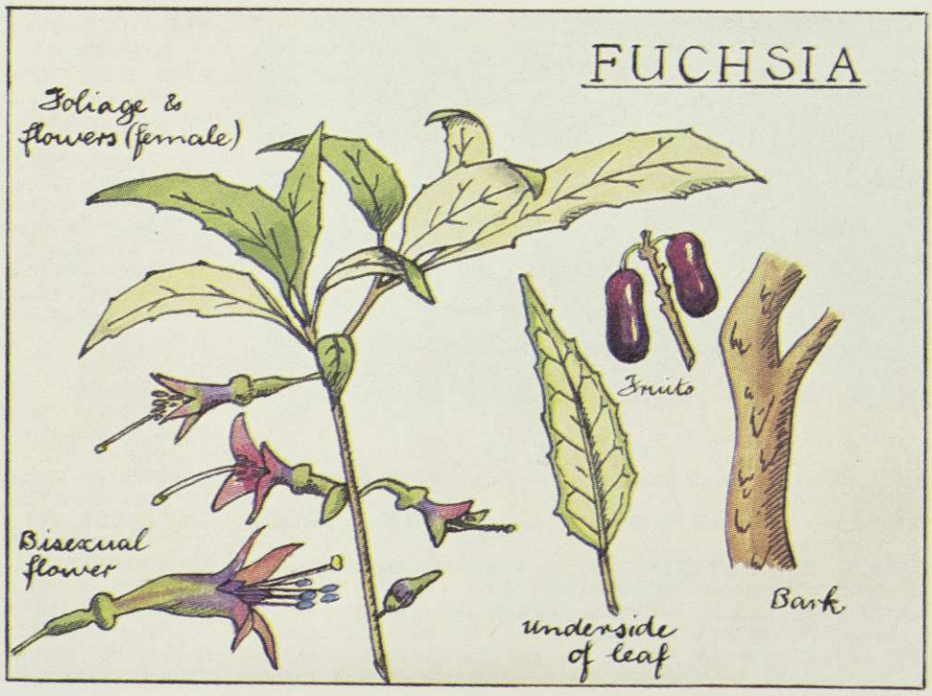
The fuchsia (kotukutuku) (*Fuchsia excorticata*) grows to 12 m. It has silvery under sides to its leaves, is deciduous, and grows in a spreading and twisting shape. As the wood has pretty markings, it is used for ornaments. The bark is a beautiful conspicuous tan and is papery and peels off.

There are two kinds of fuchsia trees with different flowers. One has normal bisexual flowers with unusual blue pollen. The other has smaller flowers; these are all female flowers with aborted stamens.

The fleshy fruit, which ripens to purple-black, is called konini by the Maoris and can be made into jam.

The fuchsia is one of the few deciduous trees in the New Zealand forest.

The fuchsia, which was named after the German botanist Fuchs, is one of the few deciduous trees in the New Zealand forest.



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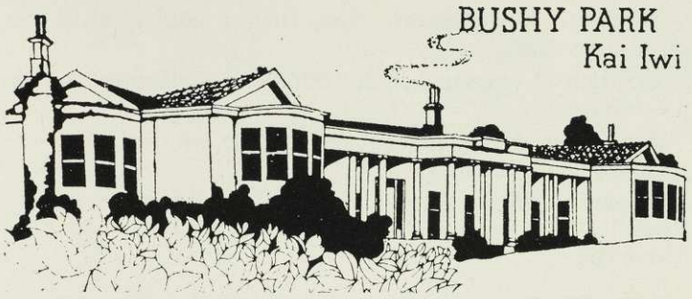
SOCIETY'S LODGES AND HOUSES



Bushy Park, Kai Iwi

24 km north of Wanganui

Fine old homestead, lovely grounds, 89 ha of native bush.

Make your own programme.

Electric stove, hot water, and other facilities available. Bring your own rations. Bedding supplied. Linen and towels $1.50 per bed*.

Fees: Members: single, $9 per night; double, $14 per night. Non-members: single, $14 per night; double, $18 per night. Children aged from 1 to 12 years, $6 per night. Day visitors, members and non-members, $1; children under 12 years, 50c; family group of two adults and children, $3.

Custodian: C/o Bushy Park Homestead, Kai Iwi, R.D.8, Wanganui. Telephone Kai Iwi 879.

The park is closed to daytime visitors on Mondays and Tuesdays.

Patoka Lodge

Hawke's Bay

The lodge is situated 48 km from Napier on the Puketitiri Road 8 km past Patoka, amid the 14-ha William Hartree Memorial Scenic Reserve. The lodge offers quiet retreat and bush walks of botanical interest. There are also many places of interest within a short distance.

The lodge has two bunkrooms, accommodating 10 people. Extra mattresses and pillows are available to sleep up to 20. The lodge has a fully equipped kitchen, including a refrigerator.

Visitors supply their own linen, pillow cases, blankets or sleeping bags, and cutlery. The nearest store is 8 km away. No animals are permitted.

An information leaflet is supplied with notice of booking. A key will be posted a week before the date booked and this is to be returned with payment after occupation.

Fees (per night): Adult members, $1.50; junior members, 75c; adult non-members, $2; junior non-members, $1.
A 50 percent deposit is required with each booking.

For information and bookings apply to: June Northe, 212 Kennedy Road, Napier. Telephone Napier 438-193.

Ruapehu Lodge

Whakapapa Village, Tongariro National Park

Ruapehu Lodge is now available for **members only**, and all bookings must be made with the Society's head office, P.O. Box 631, Wellington.

Fees: Winter season (1 June to 31 October)	$7 per night
Summer season (1 November to 1 May)	$5 per night
Children	$2.50 per night

Bookings may be made 9 months in advance and must be secured by a deposit of $1 per night per member. The full amount must be paid not later than 4 weeks before occupation.

If full payment is not received by the due date, the bunks may be relet.

All refunds are subject to a $12 surcharge.

No animals or pets are allowed in the lodge or the national park.

There is no key at the lodge, but one will be posted within 10 days of booking.

No member may occupy the lodge without first booking through head office, Wellington.

Tautuku Lodge

Coastal Otago

Situated 72 km from Balclutha on State Highway 92, Tautuku Lodge on the Society's 550-ha bush-clad Lenz Reserve in coastal south-east Otago is the place for that weekend or holiday in beautiful, peaceful, unspoilt surroundings.

The reserve has interesting bush walks, and native birds are numerous. The round track is a comfortable 4 hours' walk, and as this is in its formative state, visitors are requested to keep to the marked track route.

The lodge is fully equipped and accommodates eight or nine people. It has a lounge, kitchen, two bunkrooms with innerspring mattresses and foam rubber pillows, washroom with tub, basin, and shower, and an ablution block with toilets, basins, and showers. The cooking facilities in the modern kitchen are excellent.

There is also a self-contained A-frame cabin, for two adults, with loft accommodation for possibly two.

Bring with you all food supplies, bed linen, and pillow cases, blankets, towels, tea-towels, etc.

Bookings are accepted up to 9 months in advance. No refunds are made unless cancellation is advised at least 1 month before reserved occupancy.

Rates per night are: Senior members, $5 junior members, $2; senior non-members, $8; junior non-members (5-17 years of age), $3.

A deposit of 50 percent is to be made with each booking.

For free brochure and all bookings send a stamped, addressed envelope to Mrs F. C. Bennett, Papatowai, R.D. Owaka. Telephone 160M.

*All charges in these notices are subject to alteration from time to time.

(Continued on next page)

Waiheke Island Cottage

Onetangi, Waiheke Island

The cottage has comfortable bunk accommodation for eight people and has electric lighting, stove, refrigerator, and hot water. Adjacent to a 49-ha wildlife reserve, it is in easy walking distance from shops and beach. It is reached by ferry from Auckland City (two or three return trips daily) and by bus or taxi from the island ferry wharf. Everything is supplied except linen and food. **No animals are permitted.**

Summer (mid-October to Easter, inclusive)

Nightly (not weekends): $2 per person per night.

Weekends: $12 minimum. More than 2 adults, $2 per person per night.

Weekly: $30 minimum. More than 2 adults, $2 per person per night.

Winter (after Easter to mid-October)

Nightly (not weekends): $1.25 per person per night.

Weekends: $12 minimum. More than 3 adults, $1.25 per person per night.

Weekly: $20 minimum. More than 2 adults, $1.25 per person per night.

Children 15 years and under: First two, half rates; others, no charge.

A deposit of 50 percent is payable on booking, the remainder before entry.

Booking Officer: Mrs R. Foley, 23 Stoddard Street, Mt Roskill, Auckland. Telephone Auckland 696-769 (evenings).

Turner Cottage

Stewart Island

Turner Cottage, on Stewart Island, is available for renting. The cottage, a one-roomed dwelling furnished for three people, can be obtained at a rental of $6 a day for members and $8 a day for non-members.

For details write, enclosing a stamped, addressed envelope, to:

"Turner Cottage", c/o Mrs N. Fyfe, P.O. Box 67, Halfmoon Bay, Stewart Island.

Gallery of New Zealand flora

THE ILLUSTRATION of the whau opposite is reproduced from *The Art Album of New Zealand Flora*, volume 1, by Mr and Mrs E. H. Featon, published by Bock and Cousins in 1889.

The whau, *Entelea arborescens* (the arborescent *Entelea*), is a small shrub or canopy tree, large leaved, up to 6 m tall, and with a trunk up to 25 cm in diameter.

The branchlets and leaves are densely clad in soft whitish branched hairs, and the bark of the tree is grey. The leaves are alternate and large on stalks 10 to 20 cm long. The leaf blades are 10 to 22 cm long or more and are obliquely rounded — ovate heart shaped — tapering to a gradually diminishing point. They are notched and serrated, 5 to 7 nerved from the leaf base. (Cheeseman recorded a plant on Cuvier Island in 1925 which had stalks 60 cm long, with leaf blades 45 cm in diameter.)

These leaves are beautifully veined and soft and fade quickly when gathered.

The abundant flowers are produced in large drooping clusters and are a pure white with crumpled petals. Each single blossom is about 2.5 cm in diameter. The petals are pointed and number four or five. The fruit is dark brown and rough with long rigid bristles which can reach 2.5 cm in length.

The whau is one of New Zealand's three large-leaved trees which by their foliage seem to suggest a tropical origin. The other two are *Meryta sinclairii* and *Pisonia brunoniana*.

It is not common, but ranges from Three Kings Islands in the north to the Marlborough–Nelson area in the South Island.

The wood is extremely light, the specific gravity being much less than that of cork. The settlers sometimes called it the "cork tree", and the Maoris used the wood for floats for nets and for small rafts used in laying out crayfish pots.

This plant was first described by R. Brown in 1824. The genus is confined to New Zealand and this tree is its only species. The whau can therefore be regarded as peculiarly a New Zealand plant.

The cut blossoms are hard to preserve fresh, even for a few hours, as the thick sap exudes rapidly from the dismembered part, which really "bleeds to death". It was found that the only way to preserve the blossoms, even for a short time, was to insert the cut end into a potato perforated to receive it.

The tree is frost sensitive and needs protection. It is easily raised from seeds and will grow in any warm, sheltered situation.

The whau's beautiful begonia-looking leaf is a pleasure to the eye, and the shrub has made a splendid garden plant. It blossoms in November.

— *David G. Collingwood*

Gallery of New Zealand flora

A forest is more than trees

A forest, large or small, native or exotic, is home to countless varieties of plant and animal life, many of which cannot survive outside the forest environment. It protects the ground from the effects of heavy rains, which cause soil erosion, provides attractive scenic backdrops in the countryside, and gives wide scope for recreation pursuits.

Wildlife Service photo

Nurseryweb spider (Dolomedes minor)

Nurseryweb spiders are found throughout New Zealand, mostly in scrub and grasslands and often near water.

The nurseryweb spider is brown with pinkish grey and vertical black streaks on its head and thorax. The male and female are similar, but the male is more slender and lives only a short time after reaching maturity.

Nurseryweb spiders detect their prey by vibration and touch and scoop it up with their legs while their fangs inject venom.

The mother spider carries her young in an egg sac held in her mouth for about 4 weeks. When the young spiders are due to emerge she attaches the sac to some vegetation and weaves a nest of silk (a nursery) around it and the supporting twigs. She stays near the nursery for about 2 weeks until the young disperse.

New Zealand Forest Service

NZFS4