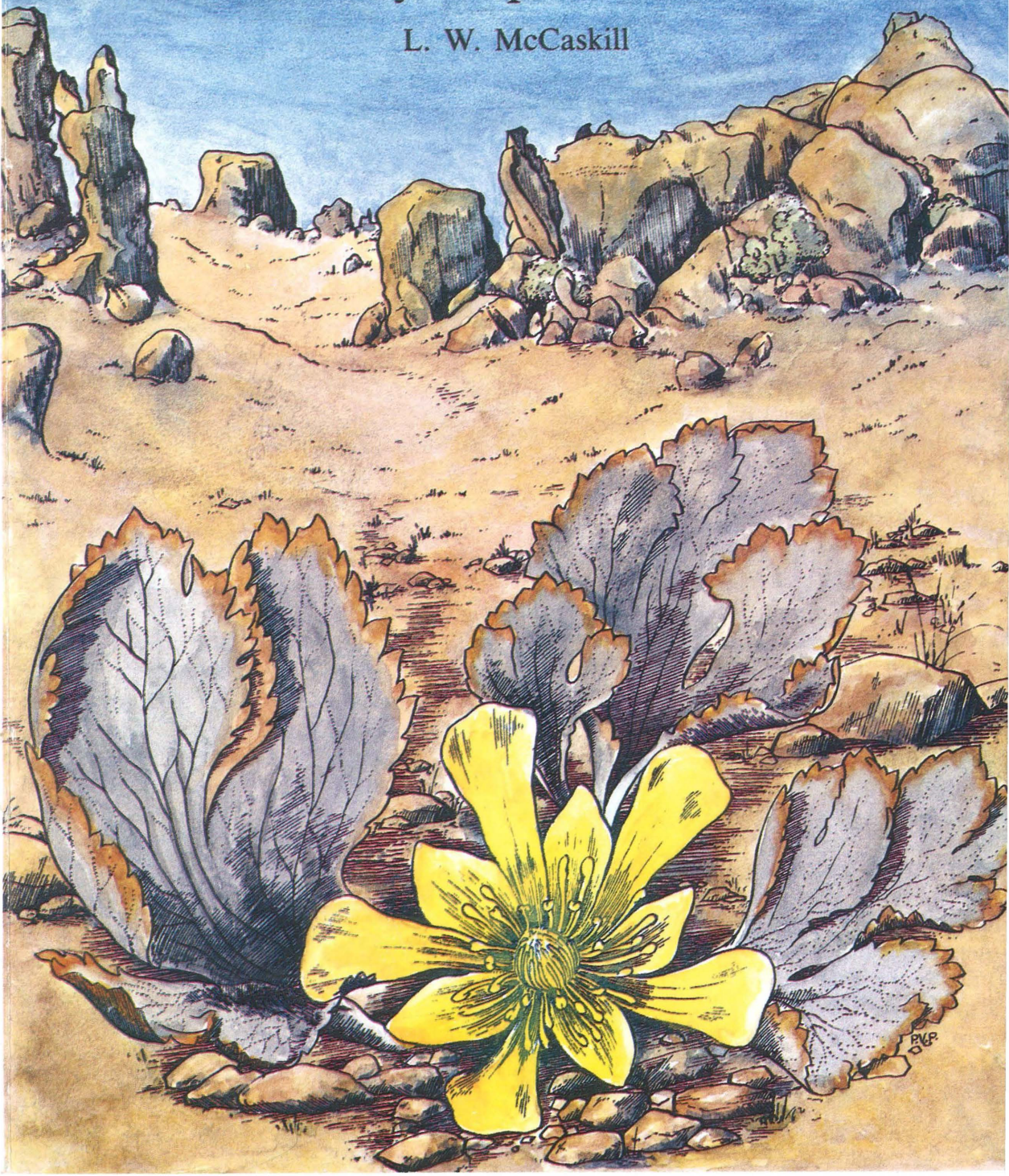


The Castle Hill buttercup

(*Ranunculus paucifolius*)

A story of preservation

L. W. McCaskill



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CASTLE HILL (920m) is a tor-studded limestone hill in the south-west corner of the intermontane basin variously known as the Broken River, Castle Hill or Trelis-sick basin. It gave its name to the Castle Hill Station on the Christchurch Arthur's Pass highway, a sheep run which begins near Lake Lyndon and was taken up by Porter Bros. in June 1858. Originally of 25,000 acres, 5,000 acres were added in February 1859 and another 5,000 in March 1861. In October 1864 the Porters sold Castle Hill to John and Charles Enys who had come to Canterbury from Cornwall in 1861. John was a keen amateur scientist, a keen collector of stamps and autographs and a generous giver of all kinds of natural history specimens to the Canterbury Museum. He was specially interested in butterflies and, as a keen angler, did much to introduce trout to the Waimakariri basin. He discovered marine fossils in the local limestones and bought the freehold so that they could be preserved. He had to sell Castle Hill in 1890 when he returned to England to look after the old home where he died in 1912.

The first reference to the Castle Hill buttercup is in the second part of the "Handbook of the New Zealand Flora" 1867 when in his circumscription of *Ranunculus chordorhizos* J. D. Hooker refers to a plant occurring — "Waimakariri district, on limestone — gravel."

Discovery and description

J. D. Enys is usually credited with the discovery of the plant. He was such a close observer and keen field botanist that he must surely have been introduced to it quite early in his occupation of Castle Hill. He did not refer to it in his diary, which is not surprising as the diary consists largely of one-word entries. T. Kirk was a regular visitor to Castle Hill, as were Cheeseman and Wall later, and it is probable that he saw the plant growing there. Enys sent him a herbarium specimen which was deposited in the Dominion Museum

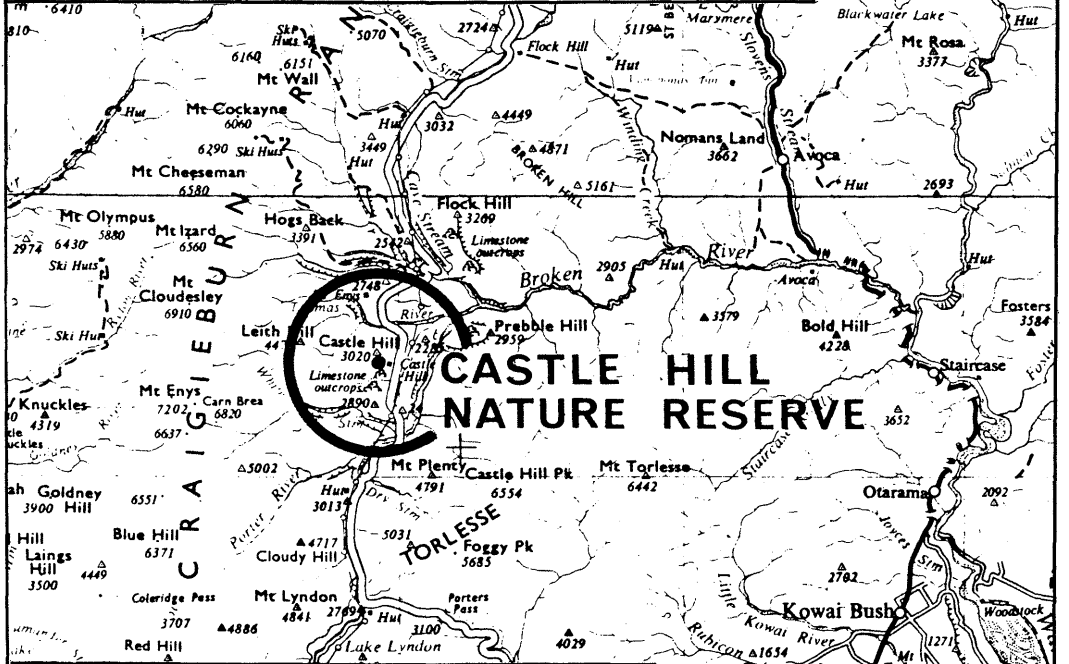
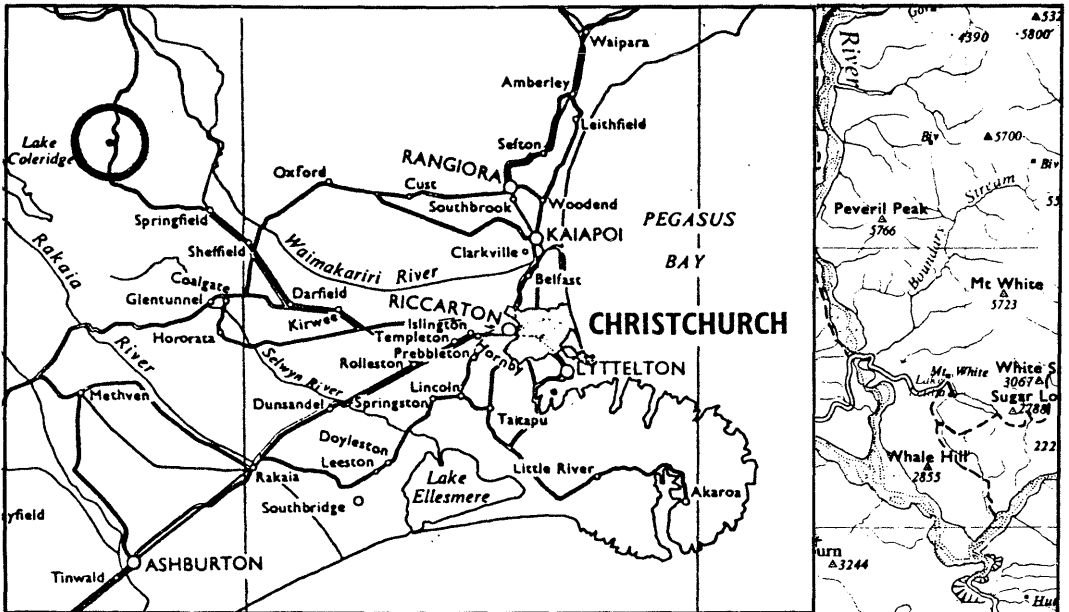
(now National Museum) on 23 December 1879. In his "Students Flora of New Zealand and the Outlying Islands", 1899 Kirk describes the plant as a new species. His complete description is as follows:

R. paucifolius, n.s. Rootstock short, stout, with thick vertical fibres 6in.—8in. long. Whole plant glabrous. Leaves 1 or 2, radical, 1 in.—2 in. long, spreading, petiolate, suborbicular, cuneate or almost reniform at base, nearly entire or 3–5 lobed or partite nearly to the middle; segments overlapping, minutely crenate or subserrate, not pitted above. Petiole with a broad sheath for half its length. Scape solitary, stout, naked, 1-flowered, equalling the petioles. Sepals 5, ovate-oblong, subacute, deflexed. Petals 5. Achenes few, turgid, with a straight subulate beak.

SOUTH Island: Amongst limestone gravel, Broken River, Waimakariri, J. D. Enys: Dec.

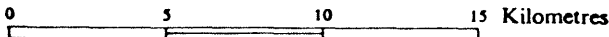
In his two editions of "The Manual of the New Zealand Flora" 1906 and 1925, Cheeseman followed Kirk as did Allan in his "Flora of New Zealand" 1961. But F. J. F. Fisher in "The Alpine Ranunculi of New Zealand" includes the plant as one of two sub-species making up the species *R. crithmifolius*. If this is accepted, the correct name is *Ranunculus crithmifolius*, sub-species *paucifolius*. However in "Scenic reserves of Canterbury" 1972, G. C. Kelly says: "For general purposes the full name is cumbersome; the plant can be adequately and accurately called the Castle Hill Buttercup, *Ranunculus paucifolius*" and that description is followed in this story.

The Castle Hill basin is notable from the point of view of rare plants. Situated between the Torlesse and Craigieburn Ranges and surrounded by greywacke it contains Tertiary limestone, mudstone and sandstone which provide a range of habitats very different from those surrounding them. The basin is notable for the rarity of some of the plants among which *Ranunculus paucifolius* is the best known. Others



LOCALITY MAP

Scale 1:250,000



are *Helichrysum dimorphum*, *Carmichaelia prona*, *Pilularia novae-zelandiae*, *Myosotis colensoi*, *Wahlenbergia brockiei*, *Carex opinata* and *Hebe cupressoides*.

The Castle Hill buttercup, rarely more than 10cm tall, is confined to an area of 6ha of limestone debris in a gently sloping basin surrounded by limestone cliffs, tors and boulders at an altitude of 760m west of the homestead of Castle Hill Station. It has a stout, sometimes branched, rhizomatous rootstock which normally grows down the slope. From the rootstock, fleshy roots up to 45cm long descend vertically to a depth which is usually quite moist. Plants seem to thrive best when the top of the rootstock is at least 4cm below the surface. To achieve this, plants smothered by debris shifted by the strong nor'west wind will grow upward through the covering in a few days. The deciduous leaves are radical, on stiff petioles, 3 to 7cm long and up to 6cm in diameter, three-lobed with the lobes overlapping, and the margins finely toothed or crenate. They are greyish-green to ashen-purple in colour, somewhat fleshy and with some brown epidermal pits. The seedlings often have tuber-like rootlets.

Flowers are produced from early October to about mid-December. The five sepals are pale yellow and 5mm or so long. The flower is 2.5 to 5cm in diameter with 5 to 8 (sometimes more) round-tipped golden petals and has a dense cluster of yellow stamens. The fruiting heads are small, globose, with few achenes, the style subulate and curved. A special feature (which could be an adaptation to the preferred habitat of fine debris) is a reflexing of the pedicels of the ripening fruits downwards between the leaves. The attached fruits are pulled or pushed into the loose, usually moist, debris below the leaves.

The first detailed description of the site and its plants was given by Professor Arnold Wall in the Transactions of the New Zealand Institute, 1919/20. Wall described the mini-dune system moving with the wind. He found by digging where the plants grew close together that the lime

debris was up to 45cm deep, the material uniform, fine and incoherent. All plants (he counted 70 and thought there might be 100) were within an area of 250m by 50m but were mainly confined to two areas each about 50m by 35m. Most of the plants were found on ground sloping 6°–8°, few were on level spots, none were on very steep places. In only one place were they among tussocks; these were 12 plants among "very scanty tussocks". Wall summarised the conditions thus:

1. If the surface is kept bare and the debris is blown away, the buttercup has nowhere to live.
2. If the debris piles up, the plant is buried.
3. If the material becomes stabilised, then a closed association develops and the plant goes out."

With minor modifications Wall's description still applies. He listed the associations as follows: (Kelly's additions listed in Biological Survey of Reserves, Report 2 are included)

A. Barest Areas: lime debris deepest, loosest and driest. *Myosotis colensoi*, *Lepidium sisymbrioides*, *Oreomyrrhis rigida*, *Notothlaspi rosulatum* and the introduced *Arenaria serpyllifolia*.

B. Open formation. This has the plants listed in A. and also *Pimelea prostrata*, *Poa acicularifolia*, *Cardamine debilis*, *Carmichaelia monroi*, *C. corrugata*, *Wahlenbergia brockiei*, *W. gracilis*, *Anisotome enysii*, *A. aromatica*, *Ranunculus monroi*, *Senecio haastii*, *Raoulia hookeri*, *R. subsericea*, *Epilobium alsinoides*.

C. Nearly closed formation. (Some of the above may occur). *Plantago spathulata*, *Festuca novae-zelandiae*, *Poa colensoi*, *P. laevis*, *Hydrocotyle novae-zelandiae*, *Viola cunninghamii*, *Ranunculus insignis*, *Acaena inermis*, *Agropyron scabrum*, *Celmisia gracilentia*, *Geranium sessiliflorum*, *Crepis novae-zelandiae*.

The necessity since 1962 of hand-weeding many clumps of the buttercups because of competition by both native and exotic plants has resulted in the absence from parts of the reserve of some of the plants listed above.

The most common introduced plants today are *Arenaria serpyllifolia* (sandwort), *Cerastium glomeratum* (mouse-eared chickweed), *Chrysanthemum leucanthemum* (ox-eye daisy), three species of hawkweed occurring in the South Island tussock grassland — *Hieracium pilosella*, *H. praealtum* and *H. lachenalii* and *Acinos arvensis*.

Other plants found in the vicinity of the reserve (and of importance because of the proposed addition of 80 hectares of adjoining land with some kind of reserve status) are: *Aristotelia fruticosa*, *Asplenium anomalum*, *Carex brevifolia*, *Clematis australis*, *Coprosma petriei*, *C. propinqua*, *Corokia cotoneaster*, *Discaria toumatou*, *Hebe glaucophylla*, *Helichrysum bellidioides*, *Hymenanthera alpina*, *Kirkianella novae-zelandiae*, *Muehlenbeckia complexa*, *Myrsine divaricata*, *Olearia avicenniaefolia*, *Raoulia hookeri*, *Vittadinia australis*.

Wall, who had studied the whole area over many years and the reserve area closely in 1917–18, attempted an explanation of the history of *Ranunculus paucifolius*: “It is the product of drought or steppe climate which directly caused the development of its xerophytic characters . . . It is adapted only for life under very special and peculiar conditions, e.g. its confinement to gentle gradients and a limestone soil, which conditions have been provided and preserved for it by a series of fortunate chances, in one small locality only . . .

“Its life history may be summed up conjecturally. Originating in the very remote past during a period of drought (which was probably very long) somewhere or not far from an extensive area of Tertiary limestone, this plant acquired marked xerophytic characters and flourished, maintaining itself with ease; and as the area on which it grew was slowly and gradually eroded

(or in parts more rapidly by glaciation) it was restricted to areas continually diminishing in size and further and further separated from one another until it remained in only one very limited area peculiarly situated and adapted to its needs. Here, as in its original state, it had little or no severe competition to meet and overcome, and for countless ages it has continued to exist there, surviving at least one great period of glaciation, which its habitat escaped; at least one pluvial epoch, which could not be favourable to it; and finally the various dangers resultant upon human occupation — depredations of stock and of hares and rabbits, pests and blights, and agricultural necessities and accidents, such as the plough and wax match. Thus, within its own narrow nook, secure from the competition of rivals, this strange plant, relic of an earlier day and clime, is passing slowly, and it may be permitted to fancy, unreluctantly away before our eyes in an age-long euthanasia.”

Preservation

In 1948 the Lands and Survey Department fortunately decided to learn more about this delightful plant, to work for the deferment of its euthanasia and to use it to assist the public, particularly young people, in finding out what conservation really means.

The prime mover in action towards preservation of the buttercup was Walter Boa Brockie (1897–1972). Born at Selkirk, Scotland, he, at 14, became an apprentice gardener on the Haining Estate, a property of the Duke of Buccleuch. He served in the Great War from 1914 until April 1917 when he was taken prisoner by the Turks in the Sinai Desert. After the war he returned to Haining and completed his apprenticeship. In 1921 he emigrated to New Zealand and became gardener at Bushy Park, Palmerston until in 1928 he joined the staff of the Christchurch Botanic Gardens where he developed his interest in native plants, especially those from the mountain areas. He had 500 alpine species

in cultivation. In June 1947 he was appointed curator of the Otari Plant Museum at Wilton, Wellington, a post he held until he retired in 1962. From 1940 until he left Canterbury, Brockie encouraged by J. A. McPherson, Director of the Christchurch Botanic Gardens, made a special study of *Ranunculus paucifolius*. The story of this study was published by the Christchurch Domain Board in 1946. He was awarded the Loder Cup in 1945.

In January 1940 Brockie counted the plants, noting the number of leaves on each. The list showed why it was that Kirk in 1899 described the plant as having "Leaves 1 or 2".

1 leaf	1 plant
2 leaves	25 plants
3 leaves	20 plants
4 leaves	12 plants
5 leaves	6 plants
6 leaves	5 plants
7 leaves	6 plants
<hr/>	
Total plants	75

The average number of leaves was thus about $3\frac{1}{2}$.

About 1925 R. Blackley Snr had transplanted two buttercups to the homestead garden. Brockie noted that these plants in 1940 had 200 and 60 leaves respectively. He wondered how much the constant tramping by sheep had to do with the small number of leaves of the "wild" plants. (The homestead plants were manured with a covering of six inches of sheep dung by a well-meaning farm manager and killed in 1961.)

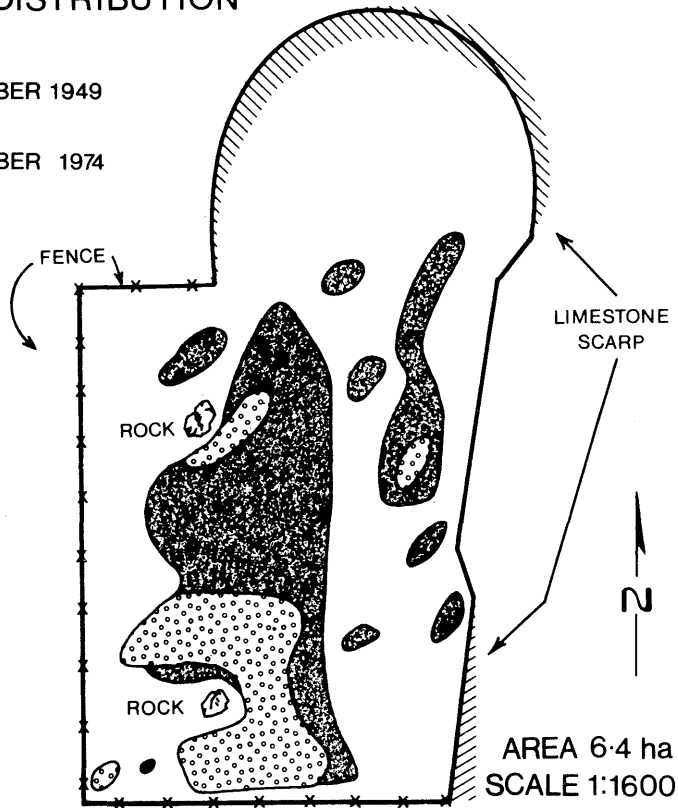
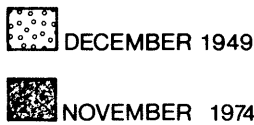
So in 1940 Brockie fenced in an area of nearly seven square metres containing two plants each with four leaves. Near these plants he dug a square metre hole 15cm deep and refilled with soil from the tussock grassland mixed with limestone debris. Into this he transplanted two two-leaved plants of *Ranunculus* from the adjoining tussocky ridge. The plants were examined annually and numbers of leaves and flowers recorded. In November 1945 the plants which originally had only four leaves each, now

had 17 and 16 respectively. (By 1946, they had 23 and 20 leaves). The specimens planted in improved soil with two leaves had 27 and 16 in 1945, and 36 and 24 in 1946. It was quite obvious that the future welfare of the *Ranunculus* depended on the exclusion of stock.

But without waiting for the results of Brockie's experiments McPherson and McCaskill took the matter up with the Royal New Zealand Institute of Horticulture at the 1942 annual conference and the Minister in Charge of Scenery Preservation was urged to take steps for the preservation of the *Ranunculus*. The trustees of the Castle Hill estate offered no objection to the fencing of the small portion of land in which the plants grew. The Department of Lands and Survey co-operated and in 1943 McPherson persuaded the Under-Secretary to make a grant towards the cost of fencing. But action was not possible because of wartime exigencies. There was an acute shortage of labour and materials and all surveyors were engaged on military mapping.

Brockie left for Wellington in June 1947 and asked McCaskill to accept responsibility for further action. McCaskill approached T. W. Preston, Commissioner of Crown Lands, Christchurch. On behalf of his department Preston agreed to constitute a reserve by taking a piece of the freehold to be donated by the owners of Castle Hill and adding a piece of the Crown leasehold from the pastoral run. The department would pay for the work if McCaskill would obtain the materials and get the fence erected. Wire was unobtainable on the open market but the Superintendents of Reserves in the cities of Dunedin and Christchurch provided enough from their stocks at pre-war prices. McCaskill had a special order of silver pine posts cut at Ross. At the time he was on the staff of Lincoln College and he arranged for the Diploma students under C. P. Tebb, the farm manager, and S. C. Harris, the fencing instructor to erect the fence on a Sunday in March 1948. (Despite the dire

CASTLE HILL BUTTERCUP DISTRIBUTION



predictions of high country runholders the fence has stood the test of time).

It had been agreed that the fence would be erected in such a situation that it would enclose all existing plants and would be surveyed later. The survey was made in June 1953 when it was found that the area to be reserved consisted of 8903m² of the Crown leasehold and 5.5138 ha of the freehold (gifted by the owners) – a total of 6.4041 ha. The important point to notice is that from March 1948 all stock was excluded from the plants. The area was gazetted as a Reserve for the Protection of Flora and Fauna on 22 July 1954 (Gazette No. 44 page 1188). This was the highest form of protection that could be given at the time and access by the public was only

by the written permission of the Commissioner of Crown Lands, Christchurch.

The first Honorary Ranger was R. Blackley Jnr appointed in 1948, and all managers since then have been appointed Honorary Rangers. McCaskill has been an Honorary Ranger since January 1965.

During the protracted negotiations, Mr Blackley was most helpful. At the Pacific Science Congress in Christchurch in 1949 he was publicly thanked, “on behalf of the botanists of the world”, by Professor Carl Skottsberg, the great Swedish botanist.

Under the terms of the 1977 Reserves Act, the Castle Hill Reserve became a Nature Reserve which is land set aside “for the purpose of protecting and preserving

in perpetuity indigenous flora or fauna or natural features that are of such rarity, scientific interest or importance, or so unique that their protection and preservation are in the public interest." Admission is only by permit.

Immediately prior to fencing in March 1948 a careful count showed only 32 plants, probably an underestimate because there had recently been major stock movements. Seedlings are very frail and are easily disturbed by any minor movement of the lime; even young plants can be buried beyond recovery by the movement of a few stock. At times several thousand sheep were involved.

In December 1949 McCaskill, with Lincoln College students, marked all plants carefully with bamboo rods to prevent duplication. The dramatic increase in numbers to 135 consisted mainly of young plants and seedlings; for the first time for 100 years the buttercup had been undisturbed by stock for nearly a year. (The distribution of the resulting plants is shown on the map).

At intervals between 1949 and 1959 seed was collected both from "wild" plants and from the two plants in the homestead garden and sown in what were thought to be suitable sites adjoining the original areas. In October 1958, McCaskill again used students to make a careful count and located 145 plants. He considered this to be an under-estimate because a proportion of plants is always late in emerging and seedlings are usually later than October in appearing. At this time the depredations of hares were causing concern. Hares living on the tussock grassland on Castle Hill itself were using the reserve as a route between the hill slopes and the rich feeding areas on the improved pastures and turnip crops around the homestead. Plants adjacent to their tracks were sometimes almost defoliated. The Department of Lands and Survey added netting to the original fence and hare traffic was largely deflected but not entirely so.

In 1958 the Springfield Lime Company

was operating in the area immediately south of the reserve. McCaskill approached the staff and asked them to leave at least three metres from the fence untouched and to smooth over the surface of the pit when they ceased mining. They refused to cooperate with the result that lime was removed right up to the fence and the pit which is included in the additional reserve will need considerable work to prevent further erosion.

From 1961 young plants and rooted pieces of older plants were transplanted in numerous sites until the autumn of 1972. Plants were thus established on completely new sites within the reserve. Their distribution is shown on the map.

By 1960 it was obvious that with complete protection from stock, some native plants, especially the needle poa (*Poa acicularifolia*) and introduced plants including the three species of *Hieracium*, and ox-eye daisy, were stabilising much of the loose debris. The resulting competition was reducing the flowering and seed production of the *Ranunculus* and even causing death. Since 1961 an area round each plant has been kept free of weeds and to ensure that helpers and other visitors did not damage plants by tramping, all plants were surrounded by pieces of limestone rock.

An incident in the spring of 1962 showed the necessity of having management plans and adhering strictly to their requirements. By chance, McCaskill discovered that the Commissioner of Crown Lands, Christchurch, had given permission to the Director, Parks and Reserves, Christchurch City Council to remove nine *Ranunculus* plants to the Botanic Gardens. These were "to be propagated and released to the trade" so that keen gardeners would be less likely to steal plants from the reserve. McCaskill did his utmost to have the permission annulled, without success. Attempts at propagation failed; all the plants died. By what McCaskill angrily called "a piece of official vandalism", nearly six per cent of all plants existing in a wild state were needlessly destroyed.

In the summer of 1966 an infestation of rabbits on Castle Hill Station resulted in two warrens being established within the reserve with resulting severe defoliation of many plants. By arrangement with the Rabbit Destruction Council, McCaskill treated the warrens with cyanogas on two occasions and employees of the station conducted an intensive shooting campaign in the vicinity. Since then only an occasional rabbit has been seen in the reserve. One striking effect of the destruction of rabbits was the increase in penwiper; there were 50 flowering plants in December 1968.

In 1967 it was felt that mortality of the seedlings was so high, due to surface drought and movement of the limestone debris by wind and water, that it would be better to raise plants horticulturally and transplant from pots into suitable areas in the reserve. Accordingly half the seed collected in the autumns of 1967 and 1968 was supplied to the Christchurch Botanic Gardens but the scheme was unsuccessful, no seedlings being produced.

In the spring of 1971 several sheep found a track through the rocks and spent some time on the reserve before being detected. Some 50 buttercup plants were severely defoliated but most, if not all, recovered. Ranger Don Cowie closed all access points through the rocks. Deeply interested in the preservation of the plant Cowie had become an essential part of the team and was particularly helpful in his control of the damage due to the flooding in the spring of 1971.

On 10 December 1971 G. L. Kelly with his wife and McCaskill spent a long day in the reserve and removed competing vegetation from all buttercups. (For his report which supported what was being done and guided further decisions see Biological Survey of Reserves Report 2, May 1972, page 26). They estimated that there were at least 250 plants. It was agreed that it was difficult to be clear as to what constituted a separate plant and since then most references have been to "clumps".

On 9 February 1972, Cowie and McCaskill transplanted 44 plants at least one year old and 18 seedlings. In spite of intense drought subsequently, this action resulted in the clumps 114, 115, 116, and 140, 141, 143 on the survey map. Cowie had interested the Chief Surveyor, Christchurch who agreed to make an accurate map of the clumps if they were pegged. So in November 1972 Cowie and McCaskill pegged 117 clumps; their position is shown on the survey map M/T 72/1 at a scale of 50 links to one inch. In October and November 1974, further clumps were pegged (making a total of 155) and roughly located on the map. A careful count showed that there could be 300 individual plants. The approximate distribution is shown on the map and it was believed that all suitable sites had some plants. In March 1978 there were 177 pegged clumps with over 400 individual plants.

All of the evidence had shown that the most economical and satisfactory method of establishing new plantings was by using plants at least one year old. Margaret Bulfin of Botany Division, DSIR, Lincoln became interested and was supplied with seed in the autumn of 1975. She has described her successful method:

"In 1946 W. B. Brockie reported results of seed sowing in a nursery plot at Castle Hill when he found that overall germination was poor. He recorded a total of only about ten per cent but found that some seeds germinated after 4 years in the soil.

Seeds collected by L. W. McCaskill in 1976 were made available to me for seed germination tests and I have since had collections made in 1978, 1979, 1980 and 1982. Not all the achenes ("seeds") on a head are fertilised. The number of small, shrivelled and clearly unfertilised "seeds" can range from 12.5 per cent to 50 per cent.

With the apparently good seeds tests have been made for germination at temperatures of 0°, 5°, 10°, 12°, 15° and 25°C in dark and 25°, and 25/18°C in

light as well as in many combinations of these temperatures. Best results have been achieved in the laboratory by placing the seeds in blotting paper pads kept moist in petrie dishes and moved monthly between cabinets maintained at 5°C in the dark and an open germinating tank at 25°C in light. Even so overall germination is slow, with first seedlings appearing about 13 months after treatment begins and total germination is only about 10 per cent, a figure which agrees with W.B. Brockie's field experiments. Some seedlings appeared after 3 years in the germinator.

Seeds of this *Ranunculus* clearly need a period of after-ripening once the achenes have dried and this can be reduced by the treatment indicated but it is possible that only a percentage of the seeds are potentially viable. This year, 1982, a collection was made of green achenes and these are now being tested. *R. lyallii* and some other *Ranunculus* species germinate better when collected green.

The small seedlings transplant readily into planters and have been grown on at Lincoln for planting in the reserve."

On 13 October 1977 six seedlings were transplanted at 120A on the Map M/T 72/1. They were all thriving in 1981 and in November of that year the first of the six flowered. On 17 and 18 October 1981 15 further seedlings from Botany Division were planted during visits made by members of the IUCN 15th General Assembly in Christchurch.

Over the years a few plants of the buttercup have been grown from seed at Kew Gardens, London.

In March, 1976, seed sent to Kew was shared with Edinburgh and Cambridge Botanic Gardens. In all cases it germinated in 1978 and flowered freely in the spring of 1980.

In 1977 by arrangement with the owners of the freehold and in exchange for Crown land on the terrace of the Thomas River, an area of nearly 77.5 ha including much

of the two limestone ridges above the *Ranunculus* reserve became Crown property. It is most desirable that this area be gazetted as Scenic reserve. If so it could provide an interesting experiment combining a Nature reserve to which access is only by permit with a Scenic reserve to which the public have right of entry. The first requirement would be the fencing of the reserved land from the run and the provision of car access by the legal road to a car park on the flat by the stream. It is most important that there be no "improvements"; this is a case where the existing landscape must be preserved for all time. To reduce the desire of the public to enter the Nature reserve a small area inside the fence, but adjoining it, was planted in August 1977. The plants included some clumps of the *Ranunculus* and some of the other unusual plants. They were close enough to the fence to be studied and photographed from outside the Nature reserve.

On 6 October 1980 the Castle Hill Nature Reserve Management Plan was approved. It was prepared by the Chief Ranger for the Canterbury Land District and his staff assisted by local scientists. The Plan supports the classification as a Nature reserve but suggests that the added status of a National reserve could be applicable. An appendix provides a checklist of native and introduced plants in the Nature reserve, including bryophytes.

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Honorary membership of IUCN (International Union for the Conservation of Nature and Natural Resources) was conferred on Lance McCaskill at the General Assembly in Christchurch in October 1981. Not bestowed lightly, this was a fitting reward for the man who, at 81, had only a few days before, accompanied a group of distinguished Assembly delegates when they planted fourteen rare Castle Hill buttercup plants in the Castle Hill Reserve in the Waimakariri Basin, Canterbury. Lance McCaskill (centre, below), was instrumental in having this reserve established to ensure the preservation of this extremely rare plant – yet another in a long line of conservation accomplishments.

After gaining a master's degree in agricultural science at Canterbury University, Lance McCaskill lectured at Dunedin and Christchurch Teachers' Colleges. Then, from 1944-60 he taught at Lincoln College. Until his retirement in 1964, he was Director of the Tussock Grasslands and Mountain Lands Institute.

According to the September 1965 issue of the Institute's *Review* it was "a retirement in name only". This assertion has been borne out by the continuing contributions he has made since then to the conservation of New Zealand's natural resources. Until 1968, when he was awarded the C.B.E., he was a member of the National Parks Authority. In the centennial year of Lincoln College (1978), the University of Canterbury admitted him to the degree of D.Sc., *honoris causa*. He is still an honorary ranger, writer and influential environmental advocate.



