TOTTY'S BUSH REVISITED

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INTRODUCTION

On Mr A.B. (Alan) Totty's farm, "Beechwood", Winterslow Road, near Taylor's Stream, Bushside (G.R. N.Z.M.S. 260, K36/854317 approx.) is a 0.28 ha remnant of the once-extensive beech/broadleaf forest with scattered podocarps, which clothed the upper plains of Mid-Canterbury, until it was cleared for timber, firewood and farming, in the late 19th and early 20th centuries.

The forest patch (Totty's Bush No 1 on Fig. 1) is one of several, scattered within an 81 hectare park-like area of pasture, in which there are also dotted many individual beech trees. The whole area has been dedicated as a Queen Elizabeth II National Trust covenant. In 1982 a group from the Society surveyed this forest patch, from which stock had been fenced out eight months earlier. Then, the forest stand had been easily accessible. Those present on that February day had moved easily through the open bush, measuring and recording (O'Brien, 1984).

The Staveley Camp, in January 1995, provided another opportunity to visit the bush, 13 years on. What a daunting sight greeted the 1995 party! (Daphne & Miles Banks, Gillian and Miles Giller, Betty Harvey, Warren Jowett, Roger Keey, Valerie Lovis, Neroli & Neil O'Brien, David Robinson and Colin Burrows). A very dense thicket of young trees, shrubs and vines now occupies the spaces between the tall adult beeches. In places this is almost impenetrable. Young beech trees are the main part of the thicket, but *Coprosma* spp and, near the margins, gorse, broom and hawthorn are important. Trees and shrubs are overgrown by vines, especially *Muehlenbeckia australis* and thorny *Rubus* spp. No-one who went into the bush emerged unscathed! Under the weight of fallen trees and rampant vegetation (and as a result of heavy snow in years past) the fence had collapsed in places; some posts had rotted. Our plans to establish quadrats in which the positions of plants could be mapped had to be hastily revised.

DATA RECORDED

We recorded:

1. All plant species seen within the fenced area.
2. An estimate of plant abundance for each species (see Table 1, the species list).
3. The diameter, at 1.5 m height (D.B.H.) of all trees (i.e. plants 6 m or more in height - see Tables 2, 3 and Fig. 2).

From Table 1 it appears that changes in species composition mostly apply to ferns and angiosperm herbs. Seen in 1982, but not in 1995, were five fern species, 13 herbs, one vine and one shrub. Note that most herbs occur just inside the fenced perimeter of the bush. Seen in 1995, but not in 1982, were two fern species, 10 herbs, three vines, three shrubs and one tree (*Sophora microphylla*, represented only by saplings).

In studies like this there must always be some doubt about the completeness of the respective listings, especially in relation to small individuals which might have been missed. The density of the cover during the 1995 visit could have compounded this problem. Also, there could have been some misidentifications. However, we have been careful on both these counts, so we hope that errors arising from such causes are minimal. One uncertainty is the actual identity of individuals in the population of beech trees. In O'Brien (1984) they were all recorded as *Nothofagus solandri* var. *cliffortioides* but this year those carrying out the measurements recorded them as *N. s.* var. *solandri*. Possibly, as in Sawmill Road Bush, both varieties are present. Here they are simply referred to as *N. solandri*.

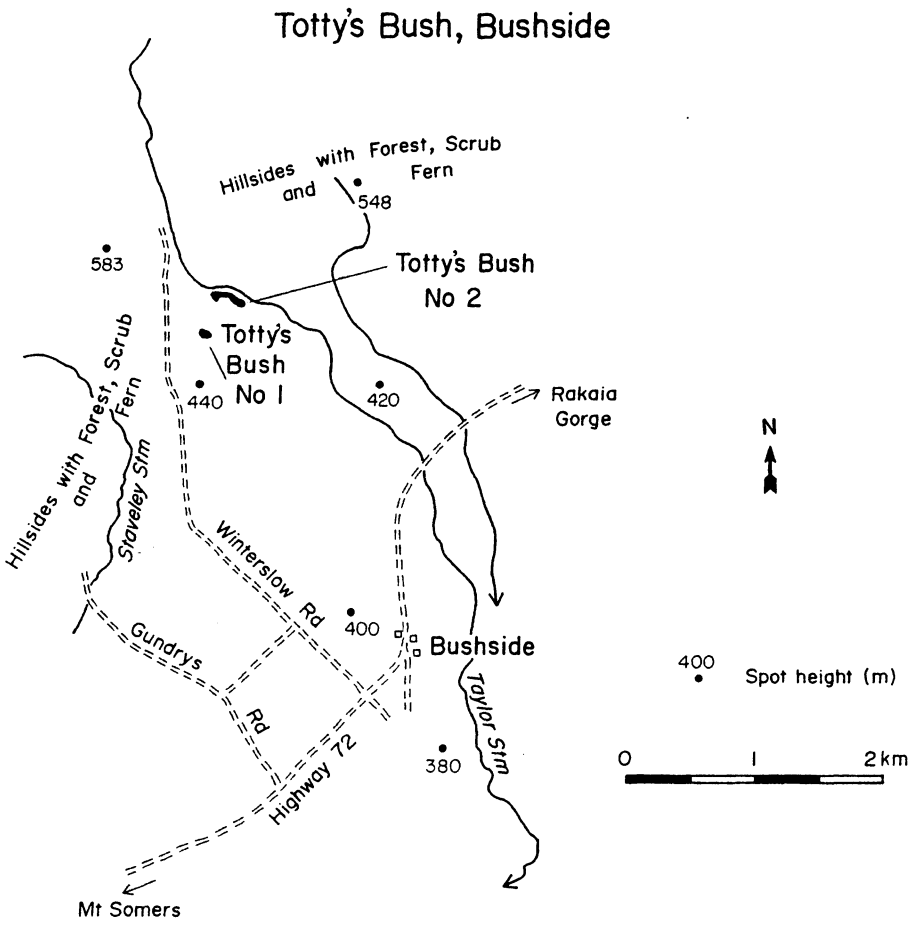

Fig. 1 Location of Totty's Bush areas

RESULTS AND COMMENT

Table 1 Species List

* adventive; + present 1982; - absent (or not seen)
abundance 1995: 1 only one or two plants seen; 2 moderate numbers; 3 very abundant - at least 50 seen

Ferns

	1982	1995
Asplenium sp. (sporelings)	+	-
Blechnum chambersii	+	-
B. discolor	+	-
B. fluviatile	+	-
B. minus	+	1
B. penna-marina	+	2
Botrychium australe	+	-
*Dryopteris filix-mas**	-	1
Histiopteris incisa	-	1
Hypolepis millefolium	+	3
Polystichum vestitum	+	1

Herbs

Acaena anserinifolia	+	3
*Achillea millefolium**	-	1
*Agrostis tenuis**	+	1
*Anthoxanthum odoratum**	+	2
Cardamine debilis	+	1
*Cerastium fontanum**	+	1
*C. holosteoides**	+	-
*Cirsium arvense**	+	1
*C. vulgare**	+	1
Corybas sp.	-	1
*Crepis capillaris**	+	1
*Cynosurus cristatus**	+	2
*Dactylis glomerata**	+	2
Epilobium sp.	+	-
*Festuca rubra**	+	-
*Fragaria vesca**	+	2
*Galium aparine**	-	1
Gnaphalium sp.	+	-
Helichrysum filicaule	+	-
*Hieracium lepidulum**	+	2
*H. pilosella**	-	1
*Holcus lanatus**	+	2
*Hordeum murinum**	+	-
Hydrocotyle moschata	+	1
Lagenifera petiolata	-	1
*Lolium perenne**	+	1
Luzula congesta	-	1
Microlaena avenacea	-	1
Nertera depressa	+	-
*Prunella vulgaris**	+	1
Ranunculus reflexus	+	1
*R. repens**	-	1
*Rumex acetosella**	+	-

*R. obtusifolius**	+	-
Rytidosperma sp.	+	-
*Sagina procumbens**	+	-
*Senecio jacobaea**	+	1
S. wairauensis	+	1
*Stellaria graminea**	-	1
*S. media**	+	1
*Taraxacum officinale**	+	1
*Trifolium pratense**	+	-
*T. repens**	+	1
*Verbascum thapsus**	-	1
*Veronica serpyllifolia**	+	-

Vines

Clematis paniculata	+	1
Muehlenbeckia australis	-	3
Parsonsia heterophylla	+	1
Rubus cissoides	+	3
*R. fruticosus**	-	3
R. schmidelioides	+	-
R. squarrosus	-	1

Shrubs

Aristotelia fruticosa x *serrata*	-	1
Coprosma propinqua	-	2
C. rhamnoides	+	3
C. rigida	+	3
C. sp. "t" (aff. *C. parviflora*)	+	2
*Cytisus scoparius**	+	2
*Leycesteria formosa**	-	1
Myrsine divaricata	+	1
Myrtus pedunculata	+	1
Olearia sp.	+	-
Pseudowintera colorata	+	1
Ribes sp.*	+	1
*Rosa rubiginosa**	+	1
*Ulex europaeus**	+	2

Trees

*Acer pseudoplatanus**	+	2
Aristotelia serrata	+	2
Carpodetus serratus	+	2
*Crataegus monogyna**	+	2
Elaeocarpus hookerianus	+	1
Fuchsia excorticata	+	2
Griselinia littoralis	+	3
Hoheria lyallii	+	2
Nothofagus solandri	+	3
Pseudopanax crassifolius	+	2
Sophora microphylla	-	1

Table 2 compares the well-grown trees present during the two measurements.

Table 2 Numbers of Trees with Trunk Diameter of 10 cm or More at 1.5 m Height

	1982	1995	
Nothofagus solandri	33	25	(+ 7 dead standing trees and several dead fallen trees)
Carpodetus serratus	5	6	
Griselinia littoralis	5	5	
Pseudopanax crasifolius	3	4	
Elaeocarpus hookerianus	2	1	
Fuchsia excorticata	2	1	
Crataegus monogyna	-	2	

For *Nothofagus solandri* the change in density of older trees is outstanding. Failure to survive snow break of the canopy is probably the cause of death of larger trees. At present, however, 98 *N. solandri* trees are 6 m or more high (35 of them are 10.0 to 19.9 m high and seven are 20 m or more high). In fact, judged by the numbers of dead standing and fallen trees, there must have been some recruitment to the group of individuals with stem diameter of 10 cm or more. Also, there are innumerable smaller saplings. There can be no doubt that recruitment of *N. solandri* is rapid, prolific, and easily able to replace the trees that have died. Fig. 2 depicts the population size structure for this species, as reflected by the individuals that are 6 m or more high. Diameter of the stem is a very rough proxy for age; it is evident that death of the old trees (the oldest possibly 150 - 200 years) will allow vigorous young saplings and poles to fill the gaps. The present gaps in the tall canopy will soon be filled by a dense pole stand and deep shading (present at ground level now because of the thicket of young beech saplings and shrubs) will be maintained. This may create problems for other slower-growing and shorter tree species, which could be suppressed by the dense, potentially taller *Nothofagus* stand.

Table 3 Heights and Stem Diameters of Tree Species Other than *Nothofagus*

Height in metres/Stem diameter in centimetres*						
Acer pseudoplatanus	6/3	6/3	6/6	6/6		
Carpodetus serratus	8/12	8/18	8/19	8/35	10/20	10/30
Crataegus monogyna	10/19	10/20				
Elaeocarpus hookerianus	10/34					
Fuchsia excorticata	8/12					
Griselinia littoralis	8/18	6/30	8/31	8/41	10/44	
Hoheria lyallii	8/5	8/5				
Pseudopanax crassifolius	6/3	10/17	10/20	10/24	10/25	dead 1/-

* heights to nearest m. diameters at 1/5 m height to nearest cm

POSSIBLE MANAGEMENT

Among the tree species other than *Nothofagus solandri*, one *Fuchsia excorticata* and one *Elaeocarpus hookerianus* appear to have been lost (? through snow break). On the other hand one *Carpodetus serratus*, one *Pseudopanax crassifolius* and two *Crataegus monogyna* have reached tree size (6 m or more high).

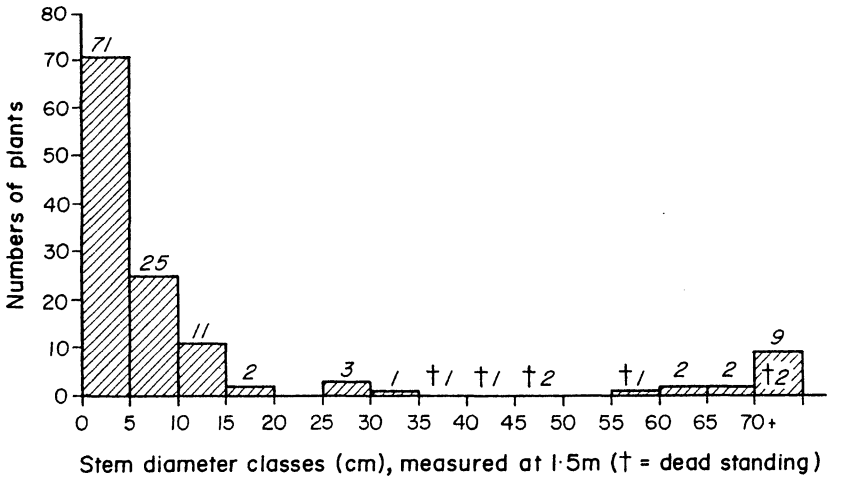

Fig. 2 Population distribution, by diameter classes for *Nothofagus solandri* trees 6 m or more high

It is hoped that native broadleaved angiosperm trees will continue to thrive in the bush. They may need some help to do so, by judicious thinning of adjacent young beeches. Also, *Acer pseudoplatanus* and *Crataegus monogyna* could be killed, to avoid competition between them and native species. Virtually all other adventive plants should be suppressed, naturally, by the natives.Some of the vine cover, particularly of *Muehlenbeckia australis*, and perhaps *Rubus cissoides*, appears to be harming "host" trees. Again, some of these vines could be killed to alleviate this.

The other main management tasks are: to make sure that the fence is well-maintained (the fence has recently been repaired by Mr Totty); to monitor the course of change in species composition of the stand at more frequent (say, 3 year) intervals; and to take action if any unforeseen problems arise. This must be done by liaison with Mr Totty and the Queen Elizabeth II National Trust Field Officer (at present David Webster).

It is possible that one other larger area of forest vegetation (on Fig. 1 Totty's Bush No 2, GR. K36/856320) on Mr Totty's property could be ring-fenced and our Society could perform very useful tasks in recording the composition and population dynamics of plant species in it. We made a start on a floristic list for it in January 1995, but need a further visit to verify some identifications.

Mr Totty has set a fine example for other land-owners by establishing his covenanted reserve. It is somewhat unusual in that the covenant extends "for the life of the trees". Mr Totty has been very supportive of all that we have done. He has also successfully established shelter belts of native trees and shrubs on the farm, propagated from local seed sources - a very interesting practical demonstration of the use of native plant resources.

REFERENCE

O'Brien, N. 1984. Totty's Bush - A Society Project. *Canterbury Botanical Society Journal 18*: 7-9