

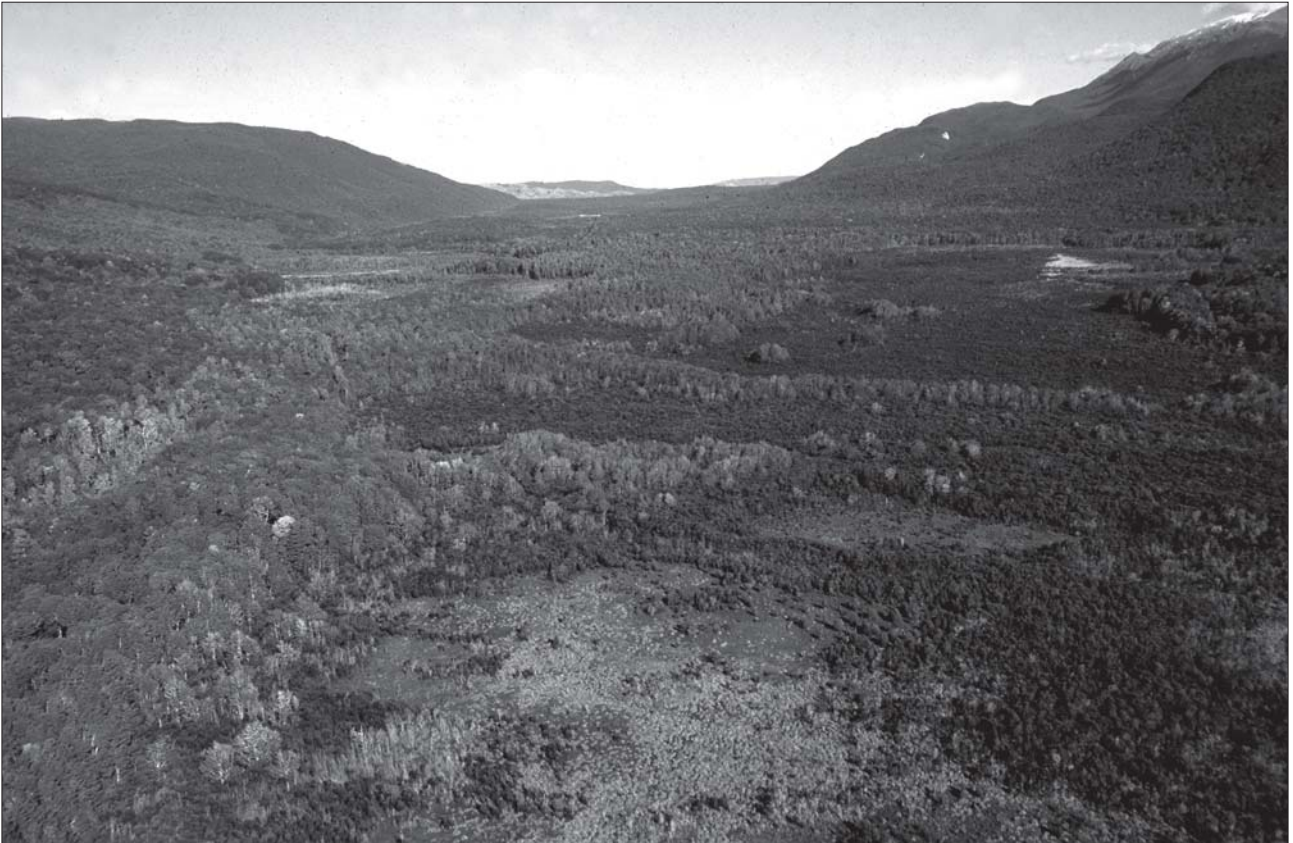
Appendix 1

LANDSCAPE AND VEGETATION OF THE SOUTHLAND PLAINS STUDY SITES



Waiau River. The higher-level terraces in the middle ground that flank the Takitimu Mountains are Pleistocene outwash gravels that abut valley remnants of Tertiary sediments on the right. A subtle sequence of Holocene-age, aggradational terraces that originally supported tall forests of silver beech, matai and totara flank the Waiau River in the foreground. A flood channel can be seen on the present terrace of the Waiau at centre foreground, while a cut-off meander occurs in the right foreground.

Photo: Geoff Rogers, RD&I, DOC.



Back Valley. The valley drains into both Lake Manapouri and the Waiau River, with the watershed saddle in the distance. Notable for its intact pattern of alluvial floodplain vegetation, the sequence shows the spatial and functional relationships between colluvial and alluvial sediments, hydrology driven by downslope wash from catchment hillslopes and the meandering course of the valley floor stream, and cold-air inversion on the valley floor. The resultant vegetation communities are higher-fertility toeslope and terrace forests of matai, kahikatea, and ribbonwood (left foreground), lower-fertility terraces of silver beech (throughout), levees with low forest of silver beech and peat-bog-filled, shallow depressions of mountain toatoa and inaka scrub, red tussockland, and wire rush (*Empodisma minus*) rushland. Rare shrubs and trees targeted in our study are concentrated in the higher-fertility podocarp-hardwood forests of toeslopes and flood channels. Scattered dieback of scrub results from fluctuating watertables on the margins and heavy frost within the hollows of shallow depressions. Quartzite Mount Titiroa, which forms part of the Hunter Mountains of Fiordland, is on the right.

Photo: Geoff Rogers, RD&I, DOC.



Dean Burn. The catchment is a tributary of the Waiau River and a major focus of our field sampling. Once-extensive floodplain forest and shrubland and sedgeland on winter-water-ponded shallow depressions have been cleared (left). Drainage and cultivation for pasture improvement is progressively obliterating geomorphic and hydrological evidence of levees, flood channels, knolls, cut-off meanders and winter-water-ponded depressions in previously unimproved paddocks. In intact native vegetation, scattered kahikatea and matai are emergent over silver beech on well-drained terraces that surround shrub- and sedge-covered, winter-water-ponded depressions bordering the hill country on the right. Low podocarp-hardwood forest extends up colluvial slopes of high-fertility Tertiary sediments on terraces to the right. Narrow levees, flood channels, and cut-off meanders bordering small streams within the intact floodplain forest are camouflaged by the overarching tall forests when viewed from the air but their functional significance is evident beneath the forest by the presence of the rare shrubs and trees. The northern Longwood Range is in the left distance.

Photo: Geoff Rogers, RD&I, DOC.

Appendix 2

CHARACTERISTICS OF SOUTHLAND'S FLOODPLAIN FOREST COMMUNITIES

Community	Ordination	Environment	Structural characteristics	Richness*	All rare plants	Fragmentation
A (<i>n</i> = 62) Widespread	High Axis 2, 3 and 4 scores	Many dry (high soil moisture and vapour pressure deficit, low r:pet ratio) frosty eastern sites, esp. in Oreti catchment. Often on levee habitat, close to stream	Seldom with emergents, sparse or non-existent emergent and canopy tiers, often without understorey or sparse understorey	Species poor understorey and canopy tiers, few epiphytes. Exotic rich, esp. in subcanopy, understorey and ground tiers	Few rare plants per plot, esp. in understorey and ground tiers. Mf and Cw most frequent target plants, but Co, Cp, Po, Oh also recorded	Most fragmented forest type: rel. high degree catchment deforestation, ecosystem loss, and spatial isolation. Many plots in pasture, many with pasture edges
B (<i>n</i> = 4) Mouat's 3 Dunsdale 1			Dense subcanopy and understorey	Species-rich, particularly in subcanopy and ground tiers	Average. Target plants Co, Cw, Mf	Exotic lianes
C (<i>n</i> = 7) Broadlands 2 Quinn's 1 Swale Road 2 Taylor's 2	Highest Axis 2 score, Low Axis 1 and 3 scores	Waiau catchment only. Relatively high soil moisture deficit, soils not gleyed. Dry terraces distant from stream (outside floodplain ecosystem proper)	Tall, dense canopy, tall subcanopy and understorey. High litter cover but sparse ground cover		Average. Target plants Co, Mf	Generally in small forest fragments rather than pasture
D (<i>n</i> = 13) Mouat's 3 Dunsdale 10	High Axis 1 score, Low Axis 3 and 4 scores	~Eastern (esp. Oreti catchment). Often the nearest forest edge is the stream, and silt soils predominate (seldom loam or gley), no annual soil moisture deficit	Rich, dense, tall emergent tier and rich, dense understorey. Low canopy height, subcanopy tier often absent or sparse	Species rich, particularly in the canopy, ground and understorey tiers	Rel. high total number of rare plants per plot, especially in canopy and understorey. Cw and Mf common, also Co, Cp, Oh	Typically high catchment deforestation (but not high degree of ecosystem loss or spatial isolation)
E (<i>n</i> = 6) Back V. 6	High Axis 1 score	Terrace habitat, distant from stream, soils show gleying and have deep organic layer. Climate rel. high rainfall with low moisture deficit	Presence of emergents, but short canopy, subcanopy and understorey	High canopy richness and canopy cover	Average. Target plants Both Mf and Po present in all plots, usually in ground, canopy and emergent tiers	Most intact ecosystem: not fragmented (low ecosystem loss and catchment deforestation)
F (<i>n</i> = 12) Back V. 5 Mouat's 4 Quinn's 2 Taylor's 1	Low Axis 1 and 4 scores	Western sites, esp. less deforested catchments (i.e. Waiau), some sites on peat. Climate—low moisture deficit	Seldom emergents, but tall canopy, subcanopy and dense understorey, many epiphytes	Rich in epiphytes, but species poor overall: few lianes	Few rare plants per plot (of the target plants Cp only), esp. few in canopy and subcanopy	Usually natural edges, little ecosystem loss or catchment deforestation
G (<i>n</i> = 24) Mouat's 8 Quinn's 2 Cowie Rd 1 Dunsdale 2 Turnbull's 4 Glendening 2 Gorge Rd 1 Titiroa 1 Waihopai 1 Cook Rd 2	High Axis 4 and esp. low Axis 2 scores (also low Axis 1)	Backswamps or swamps, with gleying, often distant from stream. Seldom on levees. Eastern catchments (Mataura, Toi, Waihopai). Climate relatively frost-free, low moisture deficit	Presence of emergents	Species rich, rich in epiphytes, exotic species poor	Of target plants Cp usually recorded, Co, Cw, and Mf occasionally	Often high catchment deforestation and ecosystem loss, but plots are seldom associated with pasture, and relatively few are in forest patches with artificial edges
H (<i>n</i> = 7) Back V. 1 Mouat's 1 Quinn's 5	Low Axis 1 and 2 scores	High rainfall, low deficit	Tall, dense emergent tier, tall, dense understorey	High richness in emergent, understorey and ground tiers, low exotic richness	Many rare plants per plot in ground tier. Co, Cp, Mf most common target plants	Relatively intact: high edge-area ratio, low catchment deforestation and ecosystem loss

Co = *Coprosma obconica*; Cp = *C. pedicellata*; Cw = *C. wallii*; Mf = *Melicytus flexuosus*; Oh = *Olearia hectorii*; Po = *Pittosporum obcordatum*

* Indigenous spp. unless indicated.