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STRUCTURE AND DYNAMICS OF ALLUVIAL FOREST

IN THE POCHANGINA VALLEY

A thesis presented in partial
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of Master of Science
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ABSTRACT

Species' population structures and replacement patterns are quantitatively described from intensive sampling of forest on alluvial surfaces of three ages. Observations and evidence from a range of other sites are incorporated to assist in tracing the development of forest on alluvial surfaces of the study area , and in examining factors influencing this development .

Cockayne's postulate that :

" ... the most important principle underlying succession in New Zealand forests is the relation of the different species to light ."

is investigated with respect to the study area .

\ Relatively even-aged totara-dominant dense podocarp stands have developed on floodplain surfaces made available by progressive channel down-cutting and lateral migrations. On older surfaces these first generation stands are replaced by forests dominated principally by the angiosperms tawa , titoki and mahoe.

On a terrace surface c.2,000 - 3,000 years old , forest variation appears attributable to dynamic processes as well as differences in site drainage . On mesic sites tall tawa-dominant forest prevails , although recent windthrows have produced low groves of mahoe and other small angiosperms , and also apparently stimulated some podocarp regeneration . On xeric terrace sites , titoki and rewarewa dominate the canopy .

Low densities of podocarps on the mesic terrace sites attest to very sparse regeneration after the demise of the dense first generation stands . The discontinuous size class distributions of podocarp species on these sites appear at least partially attributable to sporadic regeneration following major windthrows .

Podocarp densities are higher on the terrace xeric sites , regeneration of matai and totara apparently being favoured by the lower vegetation density and higher under-

storey light levels . On these sites matai shows an all - sized stable population structure , and a cyclic discontinuous replacement of totara seems possible.

[Seedling growth experiments showed both totara and kahikatea to be less shade-tolerant than two large angiosperm species (titoki and pukatea , respectively) typically seen to be replacing them in old growth forests on their respective sites. Except on the terrace xeric sites , light levels measured in forest understoreys were mainly below the compensation point experimentally estimated for totara seedlings . These findings confirm that ~~X~~ regeneration of kahikatea and especially totara is likely to be very infrequent in old growth forest on these sites. Cockayne's postulate does not completely explain species establishment patterns within these forests . However , the findings of this study lend support to his interpretation of " light relations " as the primary influence on successional trends , and suggest that regeneration of kahikatea and especially totara is likely to be largely disturbance-dependant .]

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