

where goats have destroyed the understorey. The closed canopy reduces light (and hence the potential for weeds) and erosion from rainfall, while the widely spaced single boles allow visibility of the surface features. Figure 19 shows a good example of a naturally established beech gallery forest over the cemetery at Lyell. The canopy also suppresses much weedy growth, but not all—privet is a weed that will establish in poor light. Where there are large trees already on a site or reserve, a careful survey is needed as part of the conservation plan to decide whether they can be converted to a gallery forest, and the canopy maintained at a density which protects the site from erosion. The following questions need to be answered before determining a plan:

- Are the trees likely to be stable in the long term?
- Do they provide a spreading dense canopy?
- If thinned, will the site be seen amongst the boles of the trees?
- Can fallen trees be easily removed without damage to the site?
- Is the canopy too dense, causing dry erosion of banks and reducing potential growth of desirable ground covers?
- What saplings can be planted to eventually replace the canopy trees that are cut?
- Are there particular trees that are causing a problem—or will cause a problem—to particular archaeological features (e.g. trees at the head of a bank)?

If the site is to be kept open for public visiting and viewing, it will be possible to thin out the trees, while still maintaining a canopy to protect the ground surface from erosion and reduce weed growth. Puriri, mangleo, tawa, karaka (culturally appropriate), kanuka and most tree ferns are the main species that may lend themselves to management as gallery forests. On Te Kahu o Te Rangi, Kapiti Island, the shrublands and trees along a transect from high-water mark to tawa forest (Fig. 20) are maintained to protect stone-faced terraces and archaeological features

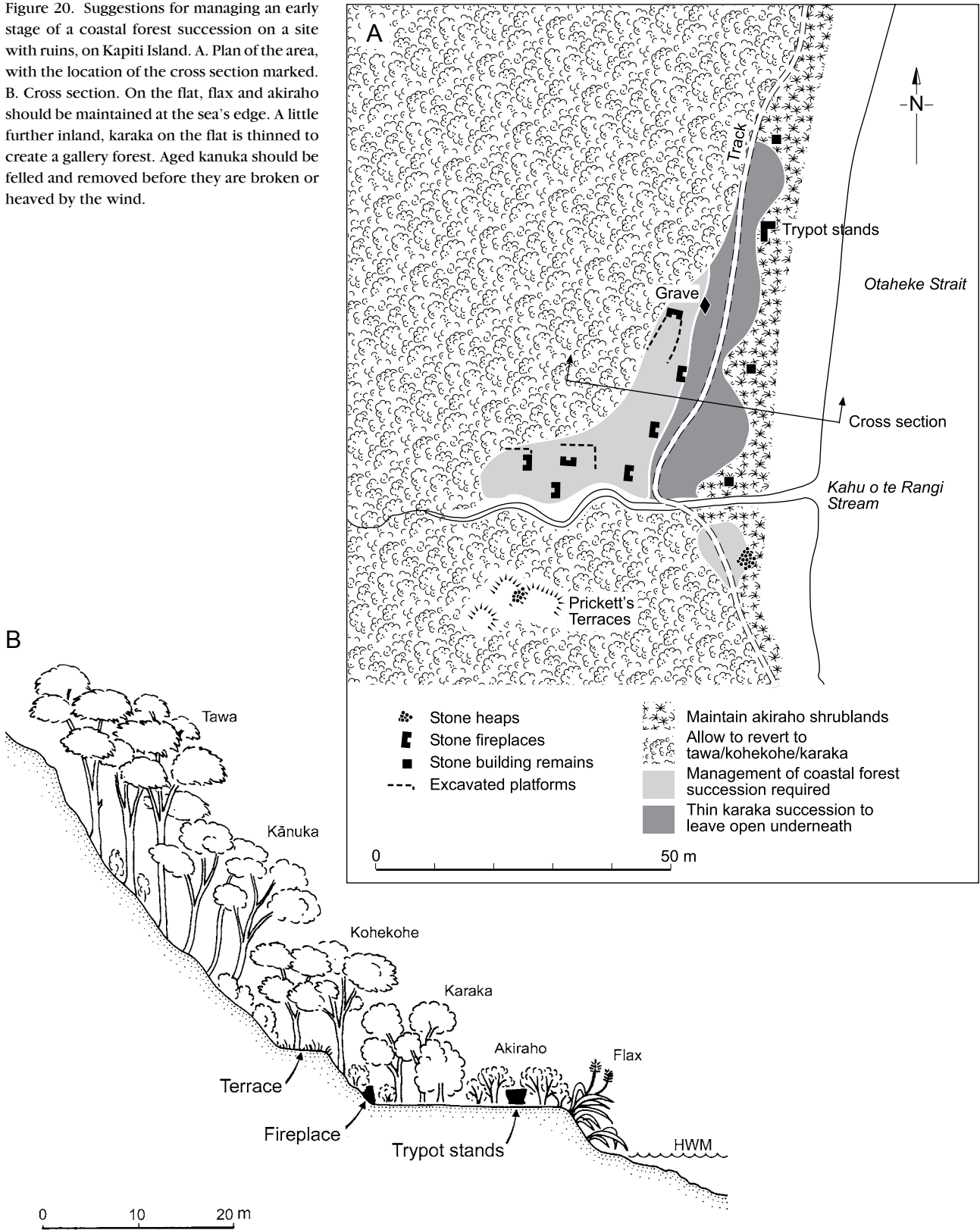
Figure 19. A gallery forest of beech and kamahi at the Lyell graveyard, West Coast. The ground slopes and is vulnerable to erosion because of the high number of visitors who are attracted to this notable commemorative setting.



on the coastal strip. The karaka and kohekohe treeland is managed as a gallery forest so that the archaeological features can be seen.

It seems that puriri planted and maintained so that it retains a straight bole and spreading canopy at a height above about 6m is the most suitable species for planting on archaeological sites. Of course this is in

Figure 20. Suggestions for managing an early stage of a coastal forest succession on a site with ruins, on Kapiti Island. A. Plan of the area, with the location of the cross section marked. B. Cross section. On the flat, flax and akiraho should be maintained at the sea's edge. A little further inland, karaka on the flat is thinned to create a gallery forest. Aged kanuka should be felled and removed before they are broken or heaved by the wind.



warm temperate areas with little frost, or where puriri occurs naturally. Spacing of specimens is a matter for judgement, but one sapling per 20 m² may be suitable. Thinning could be carried out later. The most desirable trees with the right bole and canopy form will manifest themselves and unsatisfactory specimens can be removed.

In moist areas, kamahi and tree fern will grow easily. Kanuka is suitable on most harsh sites, such as dry ridgelines or exposed coastal headlands, where it may form a stable forest. Generally, these are seral species; experimental trials are needed to see whether they can be re-planted to renew cover in cycles of 30–60 years. Where tree growth with the potential to cause deterioration of a site has been removed, care should be taken to retain seedlings/saplings desirable for eventual canopy maintenance, or to plant saplings that will fill this role. On most sites where trees have been removed, the rapidly establishing natural adventives at ground level will provide a good degree of protection from surface erosion. For example, Fig. 21 shows fireweed and broad-leaved poa on a pa in the Bay of Plenty, where potentially unstable rewarewa trees have been removed. Figure 22 shows a satisfactory shrubland cover of five-finger and toetoe on an archaeological site on the Coromandel Peninsula.

(For tree removal/felling, see section 2.5.1, below.)

2.2.10 Weeds

Many weeds are present on archaeological sites. (The statutory expression is ‘plant pests’, but ‘weed’ is the commonly used word.) Weeds provide a reasonable stabilising cover on many sites (see discussion below on gorse and blackberry). Some can grow in deep shade (and hence prevent establishment of native seedlings) and can be useful in preventing dry erosion. Weeds may be retained, but only where the species are already present/common and widespread in the locality. The Biosecurity Act 1993 and consequent regulation require landowners to control certain plant pests. Local regulations will need to be checked with regional councils.

The main risk to the site from weeds is that they reduce visibility and lead to the site’s existence being forgotten, with subsequent use of heavy machinery to clear the weeds. Careful consideration is needed to balance weed control imperatives with the need to retain some form of cover. Historical relevance to the site must also be considered. In many instances they will have been plants brought in by the original inhabitants of the place. The vine *Eleagnus* sp., for example, was once commonly used as an ornamental hedging plant.

Any intervention in archaeological site management (including the removal of grazing animals) risks an increase in weeds. This work contains no particular guidance on weeds since this subject is increasingly well-covered by local government and DOC weeds specialists and procedures. Data on the distribution, identification, and control of weeds can be found in several sources including the Department of Conservation National Weeds Database, and publications and services from the Forest Research Institute and regional councils.