

Wollongbar Drainage Reserve

Restoration Plan

June 2001

Bob Moffatt



WOLLONGBAR DRAINAGE RESERVE

RESTORATION PLAN

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1. INTRODUCTION

This plan was prepared as part of the Bushland Regeneration Course conducted by TAFE by funds secured by NPWS from the National Heritage Trust Fund. The course ran from February to June 2001. This plan will be a useful guide for the Wollongbar Community Landcare Group which is a small band of local residents endeavouring to restore native rainforest vegetation adjacent to urban development in Wollongbar. A modified version of the plan may be presented to Ballina Shire Council (BSC) as a management plan for the subject site and so that the BSC may recognise the community effort and the values of the site.

2. SITE DESCRIPTION

The Wollongbar Drainage Reserve (referred hereafter as the project site) is located on the Alstonville Plateau at the urban interface within Wollongbar residential area in Ballina Shire (see site plan, map and aerial photograph). The reserve follows an (unnamed) intermittent watercourse and includes some significant individual trees amongst regrowth vegetation which exist as a very small rainforest remnant of the former Big Scrub on red kraznozem (basaltic) soils. The reserve is surrounded by and interspersed with exotic and native weeds of various species, including trees, shrubs, vines and ground covers.

The reserve acts as a green corridor and gives welcome relief to the urban landscape, it also provides habitat for native wildlife.

3. HISTORY AND BACKGROUND OF THE SITE

The general area known as the Alstonville Plateau, including the project site, would once have been part of the 'Big Scrub'. This formerly extensive area of subtropical rainforest was almost totally cleared since European settlement mostly by the late 19th/early 20th century for the purposes of timber extraction and agricultural pursuits, these included crops, cattle grazing, dairying and horticulture. Over the decades the Big Scrub was reduced to tiny fragments with remnants becoming isolated from other remnants by farming properties.

Declining agricultural returns and a demand for residential building blocks in this geographical area brought about closer settlement in the latter part of the 20th century. During the 1990's the area surrounding the project site was urbanised and the surrounding residential area continues to grow.

The project site was grazed by cattle for many years prior to being subdivided for residential development.

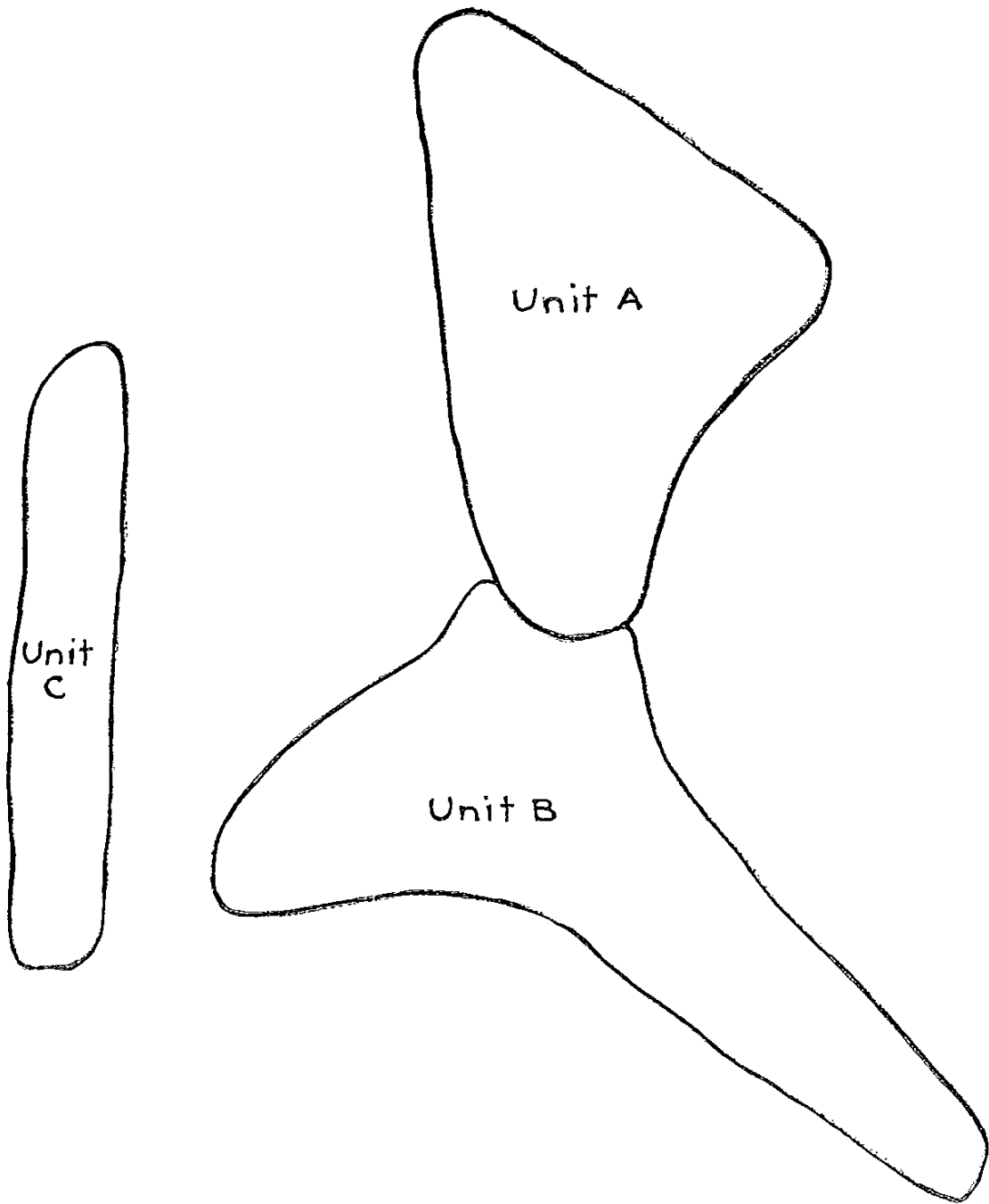
In the early 1990's residents and BSC planted numerous trees of mixed origin (both natives and exotics) along 'the reserve'. More recently (since 1998) several residents adjoining the site, with permission of BSC, embarked on a casual campaign of weed removal and planting of native rainforest tree seedlings with the view to 'improving' an area that was not otherwise being managed.

Initially large areas of Lantana were removed, Kikuyu grass sprayed and buffer plantings established at what might be termed the edge in order to expand and consolidate the site, these areas are hatched in the site plan. Importantly these buffer plantings allowed for the removal of Large-leaved Privet saplings from around the edge that were probably influencing the microclimate of the internal area. This approach continues where there is little chance of natural regeneration.

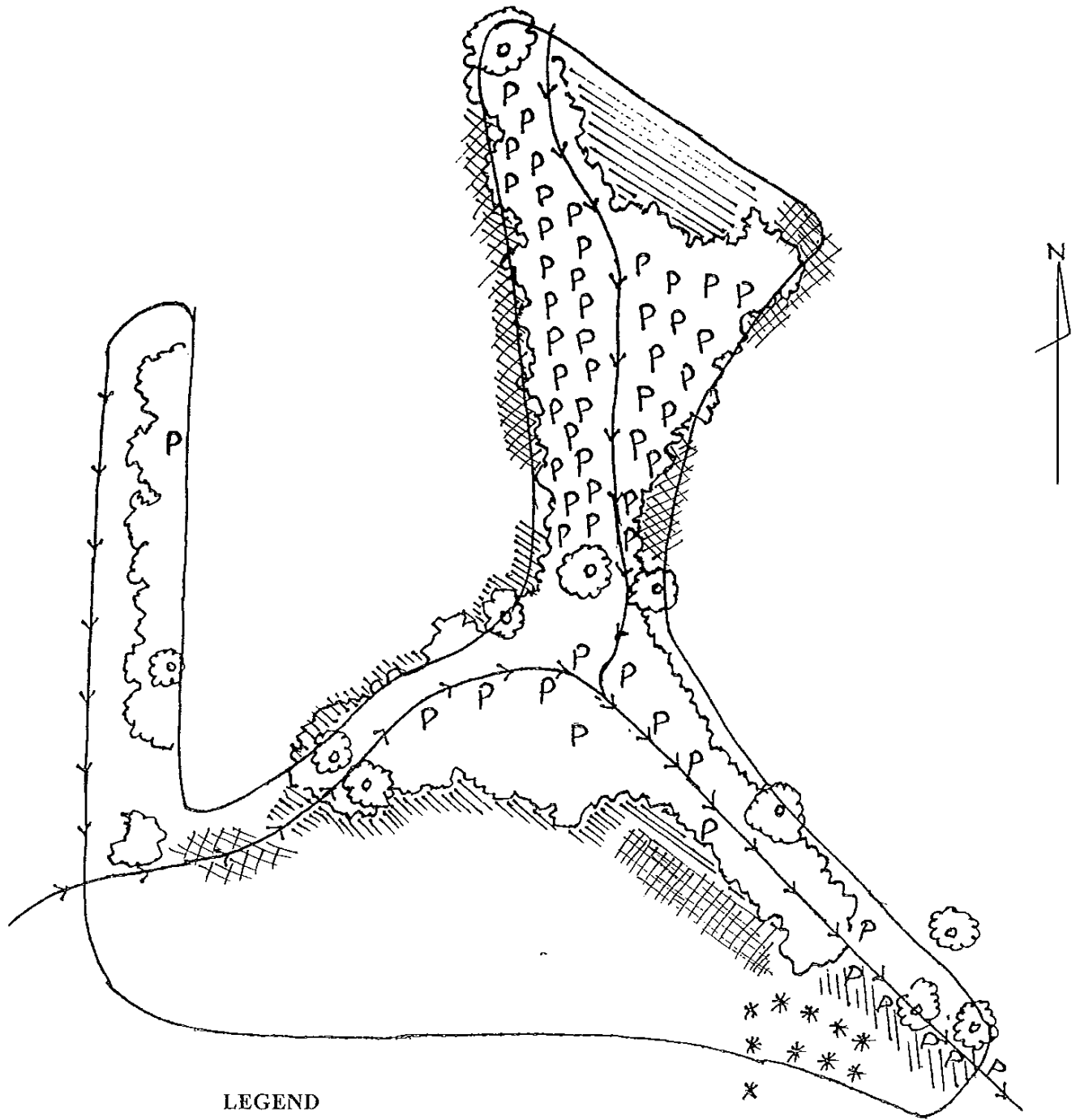
More recently a process of gradual removal of strategically identified weed trees has been implemented. Follow up control of seedling Large-leaved Privet and Wandering Jew has been required to reduce the competition for planted and naturally regenerating trees.

Map 1: Location of the Project Site



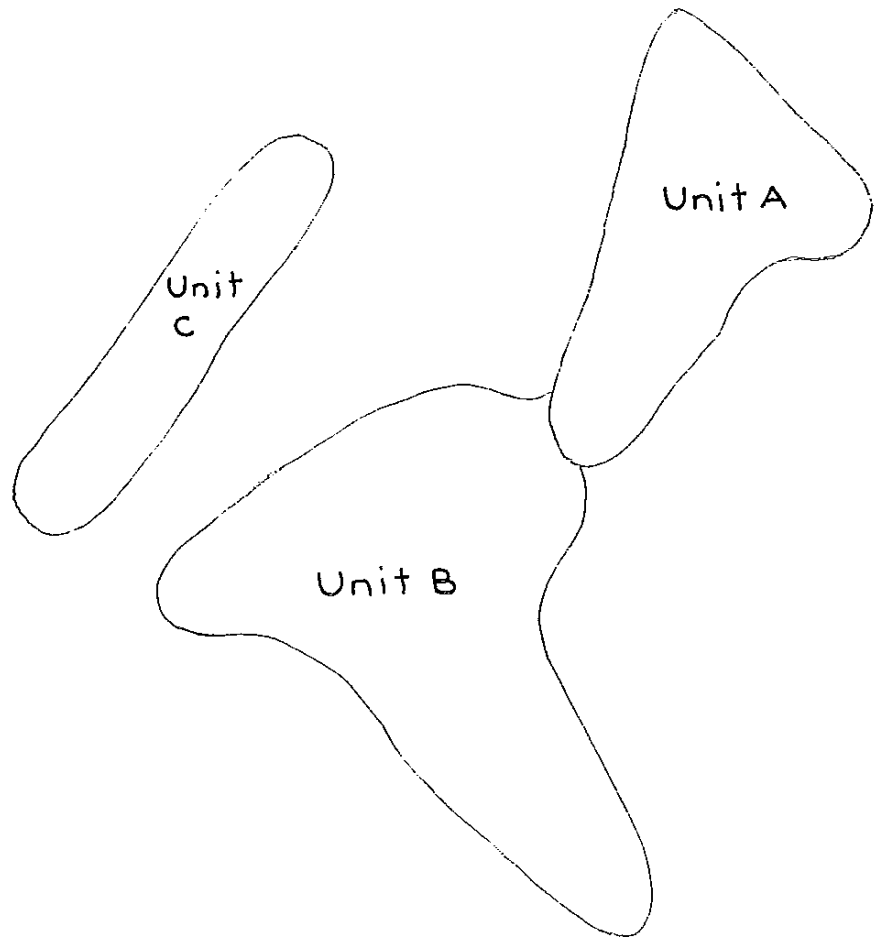


Map 2: The Project Site with major weed infestations



- LEGEND**
- Intermittent stream
 - ☼ Camphor Laurel
 - P Large-leaved Privet
 - * Pine
 - /// Planted areas
 - #### Proposed planting areas

Scale: approx 1:1000
Bob Moffatt May 2001



Aerial Photograph of the Project Site



4. PROJECT AIMS

The principal aim of the project is to re-establish, to the extent possible, the structure, the function, the integrity and the dynamics of the pre-existing indigenous ecosystem and the sustaining habitats that it provides.

Other aims:

1. to maintain and expand a 'green corridor' within our urban setting;
2. ensure survival and enhance the habitat of threatened and significant plant species;
3. to provide habitat for native wildlife; and
4. to maximise the habitat for native butterflies, in particular significant species such as the Richmond Birdwing (*Ornithoptera richmondia*) and the Regent Skipper (*Euschemon rafflesia*).

Longer Term Aims:

To link the site with the Wollongbar remnant some 100 metres downstream (beyond the scope of this plan at this stage).

5. OBJECTIVES

The objective of the project is to restore the vegetated corridor in our urban setting by:

- controlling exotic plants utilising best management techniques in an ordered and systematic fashion;
- providing for regeneration of naturally occurring native rainforest plants by managing the competition of various weed species;
- where appropriate, planting native rainforest species of local provenance adjacent to the remnant to expand and consolidate the site and so connect areas that are currently discontinuous within the site; and
- vegetate the riparian zone to minimise erosion and manage sedimentation.

6. MANAGEMENT PROBLEMS

The site suffers from numerous impacts, apart from weed invasion and competition, the principal impacts include:

6.1 Stormwater run-off

The increasing urbanisation of the catchment of the watercourse has led to more intense run-off from rainfall events. This altered hydrological regime includes an increase in quantity of water and an increase in flow speed of water pulses following showers and during prolonged rainfall. The hardened landscape (bitumen/tile roofing compared to pasture or trees) has resulted in scoured drainage lines and increased sedimentation. These intermittent streams are indicated on the site plan.

The effects of this increased run-off include erosion of soil upstream with resultant sedimentation downstream. Erosion of topsoil has led to exposure of tree roots along the streams whilst the sedimentation downstream, with increased nutrients, has tended to favour some plants, including weeds such as mistweed (*Ageratina riparia*) and natives such as Pollia (*Pollia crispata*).

A further impact of stormwater run-off generally is that of transport of weed propagules. Both Wandering Jew (*Tradescantia fluminensis*) and Madeira Vine

propagules arrive from upstream following rainfall events and take root. Seeds of the Bangalow Palm (*Archontophoenix cunninghamiana*) also arrive by this mode as well as those dropped by Flying Foxes (*Pteropus* spp.) and birds such as Currawongs.

The problem associated with the Madeira Vine has necessitated the expansion of the Landcare Group's activities upstream and beyond the boundaries of the reserve to control this weed which would otherwise continue to infest the reserve downstream.

Whilst siltation traps have been installed in the recent urban subdivision, the group will need to inform BSC as/when these require desilting to minimise the sedimentation downstream.

In order to stabilise eroded stream banks seedlings of plants of certain species may be planted or encouraged, e.g. species which have root systems suitable for binding potentially erodable sites such as *Ficus coronata* and *Eleocharis grandis* are suggested. These species have flexible stems when young which helps saplings to survive flood events. Downstream where sediments accumulate are sites for encouraging the establishment of Cunjevoi (*Alocasia brisbanensis*) and Pollia (*Pollia crispata*) to bind and stabilise the accumulated material.

6.2 Dumping refuse

Some uninformed neighbours make a practice of depositing unwanted material into the reserve, items include garden prunings and lawn clippings. The reserve is seen by a minority of neighbours as a piece of scrub of little value and thus a convenient out-of-the way place to deposit unwanted refuse.

Apart from the prunings taking root, the main effect is that of increased nutrients from the lawn clippings, particularly if from recently fertilised lawns. Increased nutrients tend to favour some weed species at the expense of native plants. Potential regenerating seedlings can also be covered with such material. The presence of garden waste in such areas also diminishes the visual character of such areas and can encourage other gardeners to act likewise.

To discourage the practice the landcare group prepared an information sheet for a letterbox drop to neighbours (see appendix 3) Members have also had discussions with targeted neighbours on one-to-one basis regarding the effects of introducing such materials into natural areas. The results of these actions has been particularly encouraging, (one suspected offender was asked to keep a watch and report any dumping activity, consequently no further deposits were made!). As some of the residences are rental properties, communication with new tenants will be required as they change.

Provided the practice doesn't continue, the effects of the practice should not be long term.

6.3 Uncontrolled Use

Being what it is, the reserve is a piece of urban bush where children and adolescents (and some adults!) can escape the rigours of domestic life, in fact for some it may be the beginnings of a lifetime of enquiry and satisfaction of being in, and feeling part of the Australian bush. Unfortunately not all the use is of a considerate nature, with deliberate acts of vandalism like cutting down small trees and setting fire to bales of mulch being the most severe. Littering is also an artefact of such use. Such actions are not confined to individual sites, but throughout the site, usually more remote from view or supervision.

Indirect impacts include trampling and soil compaction from uncontrolled pedestrian access. Inappropriate access such as walking directly upslope instead of following the contours can have soil erosion consequences potentially with gullying and severe loss of top soil and native vegetation. The provision of sediment control fencing on steeper slopes assists with directing pedestrian use away from such areas (see plate 1).

As the opportunity arises, individuals will be informed of the values of the area and how they may assist in reducing impacts on the reserve, such action hopefully will result in some recruits to the Landcare effort.

Plate 1: Sediment control fencing in Unit A assists direct pedestrian access off the slope



6.4 Natural Hazards

It is difficult at times to get potential recruits into even a small urban bush remnant because of the often perceived natural hazards. Several neighbours have offered to assist only to find the ticks and mosquitos too troublesome. Fear of spiders and snakes also deters some would-be recruits (or maybe these pests are just a convenient excuse?!).

Instruction on the use of appropriate insect deterrents is useful as is the wearing of appropriate clothing. The timing of some activities can be planned to avoid the worst of the pests, eg some activities can be planned for the winter season when the cooler weather does not suit the identified pests. Some sites/aspects are worse than others for the insect pests and so this can dictate the best area/s in which to undertake particular activities.

7. ANALYSIS OF NATIVE VEGETATION

Prior to European settlement the original plant community would have been part of the Big Scrub Rainforest, a considerable expanse of subtropical rainforest. Today less than 1% of that rainforest community remains as small isolated and weed impacted remnants and regrowth. With the exception of several large trees the project site is considered regrowth and therefore by using nearby remnants as reference areas the structural formation of the site would be expected to be classified as a **closed forest** or **tall closed forest** (Specht 1970) with the average tallest stratum expected to be in the vicinity of ~30 metres in height. Typically, nearby remnants in reasonable condition have a Foliage Projective Cover (FPC) >70% with touching or overlapping crowns in the canopy.

Nearby reference communities such as Wollongbar (downstream), Wollongbar TAFE remnant and Wollongbar Agricultural Station have a similar structure and general appearance and are in a healthier condition than is the project site. However these nearby remnants are not considered to be 'intact' due to the previous disturbances and weed impacts. Despite this they are still useful determinants of former floristics for the project site. These sites are within two kilometres of the project site.

Alternative 'intact' reference communities are more remote (Victoria Park and Davis Scrub Nature Reserves) some eight kilometres to the south.

Given the floristics of the foregoing areas it is considered that the original subtropical rainforest community of the project site would be classified as belonging to the White Booyong (*Heritiera trifoliolata*) alliance with a Black Bean (*Castanospermum australe*) / Red Bean (*Dysoxylum muelleri*) sub-alliance - Suballiance No 5 (Floyd 1990).

Floyd (1990) identifies the Wollongbar Agricultural Station and Davis Scrub as belonging to Suballiance No. 5, whereas Victoria Park with more abundant *Heritiera trifoliolata* in association with *Flindersia xanthoxyla*, *F. schottiana* and several *Ficus* spp is an example of Suballiance No 1 (White Booyong Suballiance).

Despite the small size of the project site the three most common species identified by Floyd (1990) for Suballiance No 5 are present, these are *Castanospermum australe*, *Dysoxylum muelleri* and *Syzygium crebrinerve*. Of the trees identified by Floyd (1990) as common or very common in Suballiance No 5 at Davis Scrub all are present at the project site with only two exceptions, these being *Endiandra muelleri* and *E. pubens*. Likewise with shrubs, only two species are not represented at the project site which are common at Davis Scrub, these are *Triunia youngiana* and *Linospadix monostachys*.

A species obvious in the Wollongbar remnant (100m downstream from the project site) and present in the TAFE remnant is *Eleocarpus grandis*. Being a riparian zone species it is not listed for Davis Scrub (Floyd 1990) an area lacking definite watercourses and which may account for this apparent anomaly.

The project site comprises units of varying structure and vegetation types. Unit A is a dense regrowth area dominated by Large-leaved Privet (*Ligustrum lucidum*) having an FPC >70% with trees < 10m is classed as Low closed-forest. The remainder (Units B and C) have some mature trees but with some canopy weed trees recently treated have an FPC ~50% and height of trees being >10m could be classified as Open-forest (Specht 1970).

A list of native species of plants recorded for the project site is attached as Appendix 1. A modest 45 native trees and shrubs have been recorded in addition to herbs, vines, and ferns.

Plate 2: Red Cedar supporting Birds Nest Fern

Of significance are:

- a very large Red Cedar (*Toona ciliata*) supporting a splendid Birds Nest Fern (*Asplenium australasicum*) see plate 2.
- several *Acalypha* (*Acalypha eremorum*) listed as an Endangered Species under the Threatened Species Conservation Act 1995;
- the presence of Arrowhead Vine (*Tinospora tinosporoides*) listed as a Vulnerable Species under the Threatened Species Conservation Act 1995;
- naturally occurring *Pararistolochia praevenosa* vines which are the larval host plant for the Richmond Birdwing Butterfly (*Ornithoptera richmondia*); and



- the occurrence of *Wilkiea heuegeliana* and *Wilkiea austroqueenslandica* throughout units B and C. being larval host plants for the Regent Skipper (*Euschemon rafflesia*).

The overall health of the native vegetation varies between units and is a reflection of the previous disturbances and impacts.

Unit A

This area is dominated by Large-leaved Privet which is impeding the process of regeneration by suppressing native seedlings as they appear, or preventing germination by dominating the soil surface with their dense mat roots. As native plants are completely under-represented in this unit it would be considered as being close to the lower end of the fitness scale. Despite the foregoing, small seedlings of Guioa (*Guioa semiglauca*), Foambark (*Jagera pseudorhus*) Red Bean (*Dysoxylum mollissimum*) and Sweet Pittosporum (*Pittosporum undulatum*) occur amongst the privet seedlings and saplings.

Plate 3: Unit A understory dominated by Large-leaved Privet



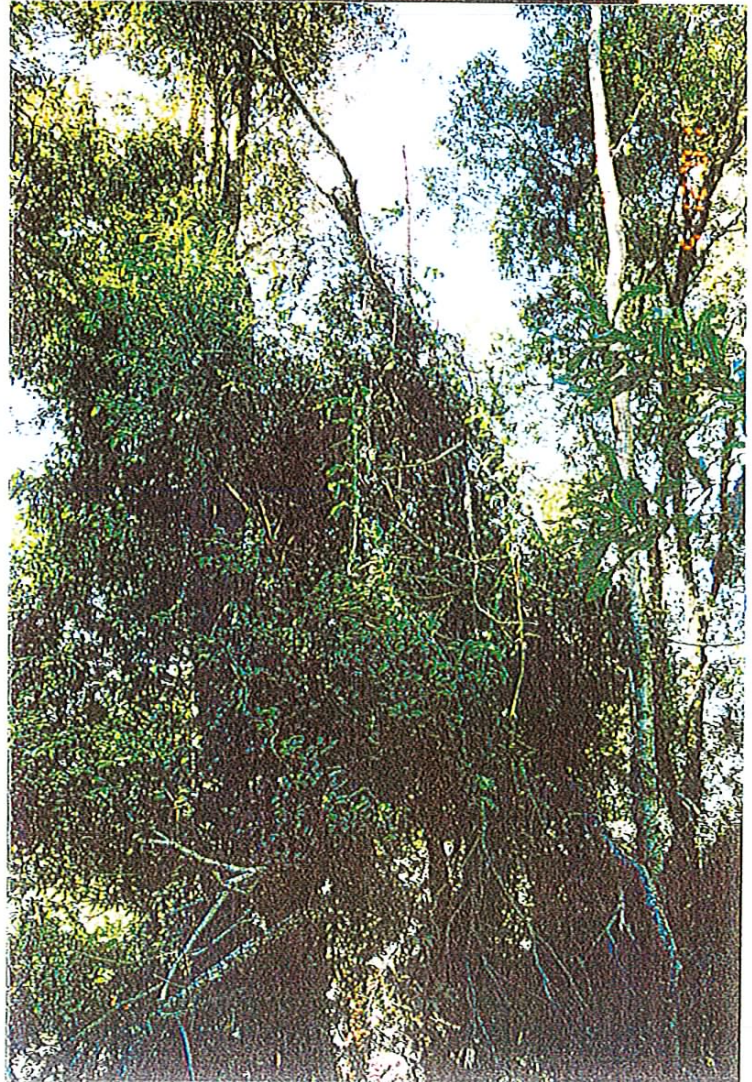
Units B & C

Both these units are dominated by native rainforest trees interspersed with occasional weed tree species, many of which have been treated (injected). The canopy is not intact but there is a lower strata of native seedlings and saplings available to fill the gaps over time. In Unit C the canopy and mid strata tend to be dominated by native vines, in particular *Cissus antarctica* and *Trophis* (=Malaisia) *scandens*. There appears to be a soil seed bank especially below larger perch trees, whilst many of the seedlings are weed species there is a healthy balance with a suite of native rainforest seedlings including Stage 3 & 4 species (Floyd,1990) e.g. White Booyong (*Heritiera trifoliolata*), Pepperberry (*Cryptocarya obovata*), Red Ash (*Alphitonia excelsa*) and Red Cedar (*Toona ciliata*).

Plate 4: Unit B understory of mixed rainforest species



Plate 5: Unit C mid storey dominated by native vines



About a dozen Silky Oak (*Grevillea robusta*) trees were planted during the early 1980's, this species does not belong in the alliance or sub-alliance identified for the area, these trees are now maturing and setting seed which will become a weed management problem in due course. It will be necessary to cull these trees over time.

The general lack of a mid storey in all units is probably a result of the former grazing by cattle which were removed in early 1980s and allowed for seedling establishment in Units B and C since that time. Competition from Large-leaved Privet prevented such re-establishment of Unit A, if indeed there is/was a soil seed bank.

8. ANALYSIS OF THE MAJOR WEED PROBLEMS

The species of weeds recorded occurring on the site are listed in appendix 2. The location of major weed infestations are indicated on the site plan.

Unit A

The Madeira Vine (*Anredera cordifolia*) infestation at the northern face of this unit appears to have arrived with a load of woodchip mulch sometime in the last 10 years, since that time tuberculins have appeared downstream. Along with Lantana (*Lantana camara*) the vine formed a curtain and was suppressing the growth of the few native rainforest trees and Large-leaved Privet (*Ligustrum lucidum*) trees in this area.

Further upstream and beyond the boundaries of the project site is another infestation of Madeira Vine which threatens to invade our area by stormwater movement.

As previously identified, Unit A is dominated by Large-leaved Privet which probably invaded the area following a major disturbance (clearing or intense grazing pressure) at least several decades ago. The Privet is suppressing native tree seedling growth by shading and almost totally occupying the soil surface with dense matting roots and root fibres. Ironically it is the Privet roots that are probably stabilising the stream bank in this Unit. Should the Privet be removed over a short period of time it is likely that a dense understory dominated by privet seedlings and an unstable creek bank will result. Lantana (*Lantana camara*) occurs along the western edge of this unit.

Plate 6: Unit A Lantana along western edge, canopy dominated by Large-leaved Privet



Unit B

The main weed problems in this area since the few mature Large-leaved Privet and Camphor Laurel (*Cinnamomum camphora*) trees have been treated is reinvasion by seedlings of both Camphor and Privet plus seedling Orange Jessamine (*Murraya paniculata*), the three Passion Vines (*Passiflora edulis*, *P. subpeltata* and *P. suberosa*), with occasional occurrences of Wandering Jew (*Tradescantia fluminensis*).

The weed seedling establishment and native seedling recruitment are both probably a result of treating the weed trees. The additional light through the canopy to the ground and the provision of exposed perch trees for frugivorous birds have both contributed to the present situation. The Camphor and Privet seedlings will compete with native tree seedlings for space whilst the passion vines will smother the seedlings and the Wandering Jew will prevent seedling germination. Given the opportunity the vines will ascend the larger trees and tend to smother the canopy.

Slash Pines (*Pinus elliottii*) planted at the eastern end of Unit B have been treated (injected) on the reserve, however several occurring on private property are maturing and will become a future source of weed propagules. The owner of this land has rejected an offer to remove these trees.

Unit C

Apart from several mature and coppicing Camphor Laurel and Large-leaved Privet Trees and small seedlings of these species, the main concern is vines in, or threatening to invade the canopy. The vines include both exotic (the three *Passiflora* spp identified above) and native vines, in particular *Trophis scandens* and *Cissus antarctica*. Climbing Asparagus (*Protasparagus plumosa*) is also in this area with potential to further establish itself in this site. Most of these weed species are bird-dispersed suggesting the few larger trees in this area are used as perches, with birds bringing in seed from the surrounding area. This unit also has Wandering Jew (*Tradescantia fluminenses*) at ground level with Tropical Chickweed (*Drymaria cordata*) threatening to invade from adjacent mowed grassed areas.

Downstream towards the Wollongbar remnant is a small occurrence of Groundsel (*Baccharis halimifolia*) which with wind dispersed seed threatens to invade the open areas of the project site.

9. ASSESSMENT OF THE REGENERATION CAPACITY AND SITE POTENTIAL

Unit A

This unit shows the characteristics of long term disturbance and degradation with: an overwhelming dominance of Large-leaved Privet, both in canopy, as seedlings on the forest floor and matted roots at the soil surface; very few native rainforest trees; a limited quantity of top soil and a minimal number of native seedlings.

This description suggests a very limited ability to recover without considerable assisted regeneration effort over an extended period of time. Therefore the site's native "in situ" resilience is estimated to be very poor.

With nearby sources of parent trees (in Units B and C and elsewhere in the area) and potential for establishing perch trees by injecting several Large-leaved Privet there should be a reasonable expectation that propagules will arrive from these local sources. With the removal of competition (Lantana and Privet) from the few adult rainforest trees present in this unit it is expected that the crowns of these individual trees may improve in health and therefore be more frequented by pollinators and seed dispersers and thus be able to be fertilised and produce viable propagules. Likewise seed dispersers will be more likely to visit these trees with propagules from elsewhere. Therefore the **long term** “migratory” resilience of this degraded unit should not be underestimated.

Units B & C

These units have the elements that demonstrate the ability to recover from previous disturbances with “*in situ*” components, such as:

- a dominance of larger native trees of seed bearing age;
- several cohorts of tree seedlings becoming established with a varied species mix;
- seedlings continue to germinate proving a soil seed bank is present; and
- damaged trees tend to recover and coppice.

The larger trees in these units produce abundant fruit and attract frugivorous birds and flying foxes. These trees include Sandpaper Figs (*Ficus coronata* and *F. fraseri*), Red Apple (*Acmena brachyandra*), Purple Cherry (*Syzygium crebrinerve*) and Red Ash (*Alphitonia excelsa*). Wild Tobacco (*Solanum mauritianum*) is present and also attracts fruit eating birds and flying foxes.

Being on or adjacent to a riparian corridor results in additional bird species moving along and through this landscape feature. The “migratory” resilience of these units, having the capacity of propagules to be brought in by dispersers and be dispersed elsewhere, is considered reasonably good. Despite these positive attributes, the small size and large edge of the site and persistent weed species present suggests on-going input of energy will be required to maintain the site.

9.1 Successional stages of the project site.

Unit A with a few Stage 3 species such as Foambark (*Jagera pseudorhus*) Guioa (*Guioa semiglauca*) and Sweet Pittosporum (*Pittosporum undulatum*) of modest size but dominated by Large-leaved Privet is most definitely all regrowth vegetation.

Units B and C have several large mature trees of Stage 4 of Floyd’s (1990) successional model including White Booyong (*Heritiera trifoliolata*) and Pepperberry (*Cryptocarya obovata*). In addition, there are several large individuals of Kooyman’s (1996) Mature Phase tree species such as Red Apple (*Acmena ingens*), Purple Cherry (*Syzygium crebrinerve*) and shrubs *Wilkiea huegeliana* and *W. austroqueenslandica*. These few mature elements are suggestive of mature phase forest, however considering the low density of the mature trees; the lack of an intact canopy; the general lack of medium sized trees and with cohorts of small saplings and seedlings, it is more indicative of regrowth vegetation around the few surviving elements of the pre existing vegetation.

10. RESTORATION STRATEGIES FOR THE SITE

The small size and large edge of the project site will have a significant bearing on its viability, in particular it is subject to climatic extremes such as drying winds and it will continue to be vulnerable to weed invasion. It is recognised therefore that it cannot be self-sustaining even in the long term and may never return to its pre-disturbance state, resources will be continuously required to maintain the area. It is envisaged however that over time energy requirements may be reduced and redirected downstream.

A range of restoration strategies will be utilised depending upon the site and characteristics of the particular unit.

The northern face of Unit A being in the public view and having a low resilience with little chance of recovery will rely on a reconstruction effort (McDonald 1994) where tree seedlings, fertiliser and mulch will be utilised. As a 'window-dressing area' the appearance of this section is important to maintain public support for the project.

As one objective is to maintain a green corridor throughout the drainage reserve, the western edge of this unit will be planted prior to privet treatment. Within the core of this unit appropriate tree seedlings may be planted under the privet canopy and once established a process of strategically selecting and treating occasional privet canopy trees will be implemented. Species lists for nearby remnants, particularly Wollongbar Agricultural Station and Davis Scrub (Suballiance No. 5) will be utilised for selecting trees for such plantings. The future of tree species already planted that do not belong to this suballiance will be considered for removal and replacement in due course.

The gap between Units B and C along the intermittent stream will rely on a reconstruction approach also. Appropriate species and locally sourced tree seedlings will be planted along this section to link the units. So as to minimise soil disturbance this planting will by necessity take place over an extended period of time.

Plate 7: The gap between Units B and C



The remainder (Units B and C) will rely on an assisted regeneration approach (McDonald 1994), where weeds will be removed and permitting regeneration of native plants to occur. Some common native vines may be pruned to allow trees and shrubs to consolidate and so resist weed invasion.

10.1 RECOMMENDATIONS:

Plate 8: Western edge of Unit C - where grass will be progressively sprayed out.

It is recommended the following occur in order of priority:

1. continue to suppress Madeira Vine using "cut, scrape and paint" method on stems of climbing plants with glyphosate at 1:0. Collect tubelings for composting and/or treat sprouting tubers by spraying when actively growing with glyphosate at 1:50 + LI700.
2. approach Ballina Shire Council to treat Groundsel outside the project site
3. continue to suppress Wandering Jew throughout the site as it is identified and spraying when actively growing with glyphosate at 1:50 + LI700.
4. spot weed seedlings (mostly privet and camphor laurel) around native seedlings, either hand pull or spray with glyphosate at 1:50 + LI700
5. treat sapling privet either cut, scrape and paint stems up to ~ 2.5cm with glyphosate at 1:1.5 or inject those >2.5cm with glyphosate 1:1.5
6. identify and treat 'selected' canopy tree weeds in unit A, mostly Large-leaved Privet adjacent to larger native trees by injecting with glyphosate at 1:1.5
7. clear lantana and plant appropriate trees on western edge of Unit A.
8. spray grasses on western edge of unit C (see plate 8) to allow natural regeneration, progress outwards from vegetated edge at about one metre per year.
9. treat coppicing privet and camphor laurel in unit C by injecting with glyphosate at 1:1.5
10. plant appropriately sourced seedlings and direct sow seeds of appropriate species beneath privet canopy in Unit A.
11. progressively plant up the gap between units B and C with appropriate species and locally sourced material.



12. As under-plantings become established in Unit A select and inject (as above) individual canopy privet trees to remove competition and permit limited entry of sun light.
13. Follow up with spraying seedling privet and camphor laurel on an annual basis with glyphosate at 1:50 + LI700
14. Cull the Silky Oaks over time, one or two per year by injecting with glyphosate at 1:1.5
15. On-going monitoring by fixed point photography and comprehensive records will be maintained to ensure that achievements are reached and/or allow for reconsideration of goals/objectives.

Weed removal will commence with the high priority weed Madeira Vine in unit A to prevent further establishment and with the intention of exhausting its regenerative capacity over several seasons.

With regeneration projects it is normal to work logically by commencing at/near the normal approach to the site and progressively working a minimal weed free edge throughout the site ensuring primary work is thorough and complete in one unit before progressing on to the next. The benefits of this approach include minimising the chances of transporting weed propagules from infested to non-infested areas and the moral-boosting sight of seeing maximum progress (as opposed to minor progress in several disjunct areas).

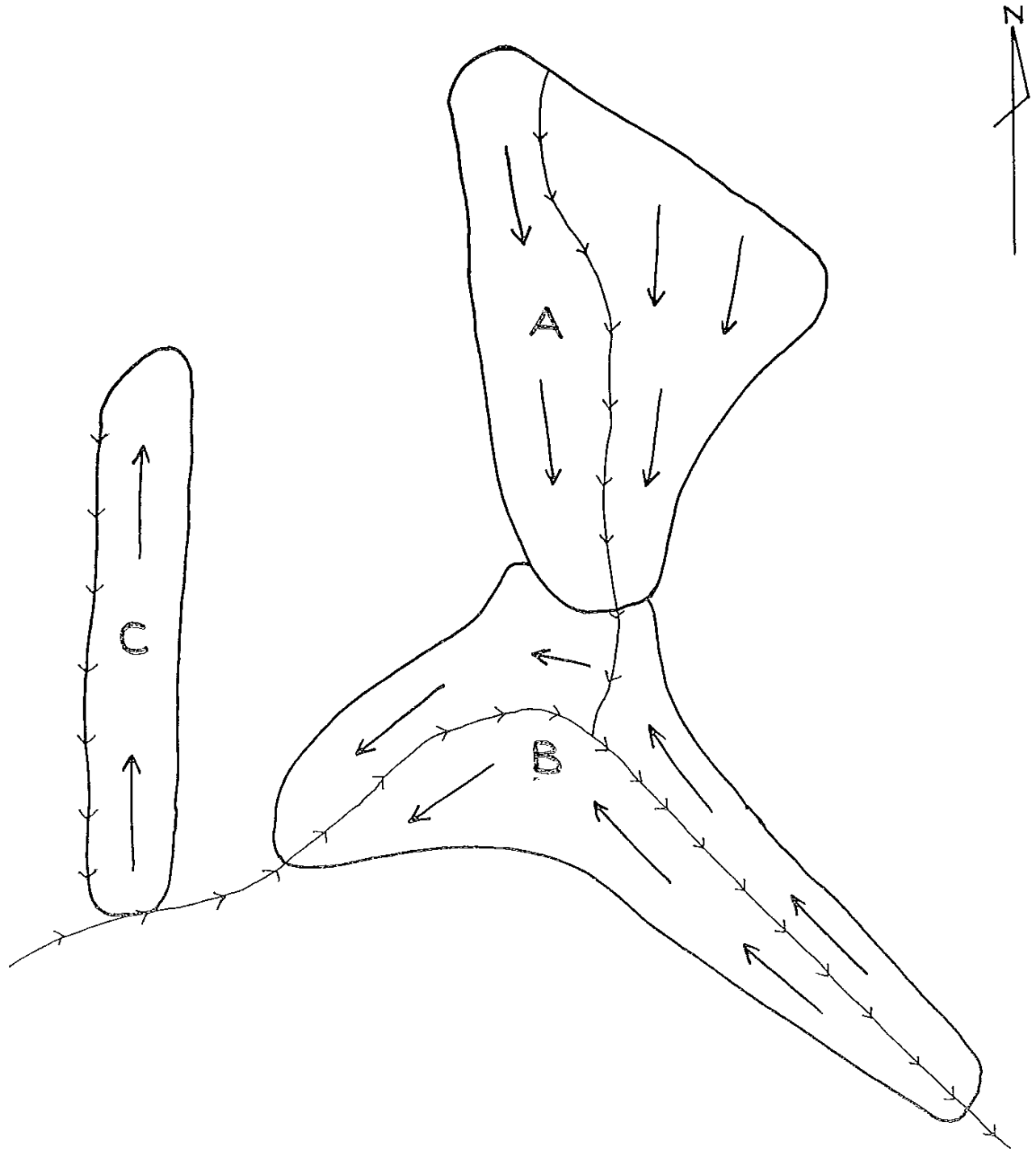
However given the small [✓] size, the odd shape of the drainage reserve and the discontinuous nature of the weed problems it is considered more advantageous at this site to approach the problems on several fronts and therefore undertake some of the tasks identified above, more or less concurrently and in disjunct areas. This is particularly important with Unit A where it will take a very long time to eventually replace the larger privet with native trees, it will allow several trees to be treated and monitored over several months or more whilst working on another weed problem in another unit. Care will need to be taken to ensure Madeira Vine tubers are not inadvertently transported from the infested site in unit A.

Generally the approach will be to;

- weed through unit B from east to west
- weed south to north through unit C;
- strategically treating canopy weeds throughout unit A;
- weed removal and planting along western edge of unit A;
- regular follow up weed removal in all units;
- planting the gap between B and C; and
- eventually weeding and planting where necessary downstream toward the Wollongbar remnant.

The general work direction for weed management within each unit is depicted in map 3.

Map 3 Work Direction for Weed Management within each Unit



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- Specht 1970, Structural Formations in Australia - TAFE handout

Appendix 1

NATIVE SPECIES LIST - WOLLONGBAR DRAINAGE RESERVE

Trees/Shrubs:**Apocynaceae**

Tabernaemontana pandacaqui Banana Bush

Arecaceae

Archontophoenix cunninghamiana Bangalow Palm

Atherospermataceae

Doryphora sassafras Sassafras

Capparaceae

Capparis arborea Brush Caper Berry

Davidsoniaceae

Davidsonia pruriens var. *jerseyana* Davidson's Plum

Elaeocarpaceae

Elaeocarpus grandis Blue Quandong

Euphorbiaceae

Acalypha eremorum Acalypha

Actephila lindleyi Actephila

Breynia oblongifolia Breynia

Mallotus philippensis Red Kamala

Omalanthus populifolius Bleeding Heart

Eupomatiaceae

Eupomatia laurina Bolwarra

Fabaceae

Castanospermum australe Black Bean

Lauraceae

Cryptocarya obovata Pepperberry

Meliaceae

Dysoxylum mollissimum Red Bean

Toona ciliata Red Cedar

Mimosaceae

Pararchidendron pruinosum Snow Wood

Monimiaceae

Wilkiea huegeliana Veiny Wilkiea

Wilkiea austroqueenslandica Smooth Wilkiea

Moraceae

Ficus coronata Creek Sandpaper Fig

F. fraseri Sandpaper Fig

Myrtaceae

Acmena brachyandra Red Apple

Syzygium crebrinerve Purple Cherry

S. moorei Durobby

Pittosporaceae

Citriobatus pauciflorus Orange Thorn

Pittosporum undulatum Sweet Pittosporum

Proteaceae*Grevillea robusta*

Silky Oak

Macadamia tetraphylla

Queensland Nut

Rhamnaceae*Alphitonia excelsa*

Red Ash

Rutaceae*Flindersia australis*

Teak

Melicope elleryana

Pink Euodia

M. micrococca

White Euodia

Meliocope octandra

Doughwood

Sapindaceae*Diplogottis australis*

Native Tamarind

Guioa semiglauca

Guioa

Jagera pseudorhus

Foambark Tree

Sterculiaceae*Brachychiton acerifolius*

Flame Tree

Commersonia bartramia

Brown Kurrajong

Heritiera trifoliolata

White Booyong

Thymelaeaceae*Wikstroemia indica*

Wikstroemia

Ulmaceae*Trema aspera*

Poison Peach

Urticaceae*Dendrocnide photinophylla*

Shiny-leaved Stinging Tree

Verbenaceae*Clerodendrum floribundum*

Smooth Clerodendrum

Herbs:**Acanthaceae***Pseudoanthemum variabile*

Pastel Flower

Araceae*Alocasia brisbanensis*

Cunjevoi

Commelinaceae*Pollia crispata*

Pollia

Liliaceae*Dianella caerulea*

Blue Flax Lilly

Poaceae*Oplismenus imbecilus*

Basket Grass

Zingiberaceae*Alpinia caerulea*

Wild Ginger

Ferns/Fern allies:**Adiantaceae***Adiantum hispidulum*

Rough Maidenhair

Aspleniaceae*Asplenium australasicum*

Birds Nest Fern

Cyatheaceae*Cyathea australis*

Rough Treefern

Vines:**Annonaceae***Melodorum leichardtii*

Zig Zag Vine

Araceae*Pothos longipes*

Pothos

Arecaceae*Calamus muelleri*

Lawyer Vine

Aristolochiaceae*Pararistolochia praevenosa*

Aristolochia - Birdwing Vine

Bignoniaceae*Pandorea baileyana*

Large-leaved Wonga Vine

P. jasminoides

Bower-of-beauty

Commelinaceae*Commelina cyanea*

Native Wandering Jew or Commelina

Cucurbitaceae*Diplocyclos palmatus*

Native Bryony

Dioscoreaceae*Dioscorea transversa*

Native Yam

Fabaceae*Millettia megasperma*

Native Wisteria

Luzuriagaceae*Geitonoplesium cymosum*

Scrambling Lily

Menispermaceae*Carronia multiseptata*

Carronia

Tinospora tinosporoides

Arrow-head Vine

Moraceae*Machura cochinchinensis*

Cockspur

Trophis (=Malaisia) scandens

Burny Vine

Rosaceae*Rubus rosifolius*

Rose leaf Bramble

Smilacaceae*Ripogonum discolor*

Prickly Supplejack

Vitaceae*Cissus antarctica*

Water Vine

Appendix 2

WEED SPECIES LIST - WOLLONGBAR DRAINAGE RESERVE**Acanthaceae**

Hypoestes phyllostachya Freckle Plant

Areaceae

Syagrus romanzoffianum Cocos Palm

Asclepiadaceae

Araujia sericiflora Moth Vine

Asparagaceae

Protasparagus plumosa Climbing Asparagus

Asteraceae

Ageratina riparia Mist Weed
Ageratum houstonianum Blue Billy Goat Weed

Basellaceae

Anredera cordata Madeira Vine

Caryophyllaceae

Drymaria cordata Tropical Chickweed

Commelinaceae

Tradescantia fluminensis Wandering Jew

Fabaceae

Crotalaria incana Woolly Rattlepod
Desmodium uncatatum Silver-leaf Desmodium
Senna x floribunda Smooth Senna

Lauraceae

Cinnamomum camphora Camphor Laurel

Ochnaceae

Ochna serrulata Ochna

Oleaceae

Ligustrum lucidum Large-leaved Privet
L. sinense Small-leaved Privet

Passifloraceae

Passiflora edulis Common Passionfruit
P. suberosa Corky Passionfruit
P. subpeltata White Passionfruit

Phytolaccaceae

Phytolacca octandra Ink Weed

Pinaceae

Pinus elliottii Slash Pine

Poaceae

Paspalum wettsteinii Broad-leaved Paspalum

Rutaceae

Murraya paniculata Orange Jessamine

Sapindaceae

Koelreuteria paniculata Golden Rain Tree

Solanaceae*Solanum mauritianum**Cestrum nocturnum***Ulmaceae***Celtis occidentalis***Verbenaceae***Lantana camara*

Wild Tobacco

Lady-of-the-Night

Chinese Elm

Lantana



Newsletter to neighbours of Wollongbar Drainage Reserve

A small Landcare Group has recently formed with the view to managing the drainage reserve in the area highlighted on the attached map. Your residence adjoins this area – it is a common extension of our backyards.

Plans

The long term objective is to enhance naturally occurring rainforest plants by removing competing weeds. Where the weeds dominate (such as large privet and camphor laurel trees) it is proposed to replace these with rainforest tree seedlings over time to maintain as much as possible the existing green corridor. It is recognised that this process will necessarily take a long time, ten years or more! But if nothing is done to manage the area the weeds will certainly continue to dominate.

Buffer plantings of rainforest trees and shrubs are being established in selected areas to help protect and consolidate the core forest remnant.

Ballina Shire Council has approved the restoration of native rainforest vegetation along these watercourses.

Methods

Weed control will be undertaken generally using methods developed by rainforest regenerators. Control approach will be site specific bearing in mind the conditions (soil, aspect, degree of exposure etc) and potential for further weed invasion, natural rainforest regeneration or our ability to replace weeds with tree seedlings. Weed control will vary according to weed species and size of individual trees, for example with privet – large trees will be drilled and injected with herbicide, medium saplings treated by basal scraping and painting with herbicide, minor infestations of seedlings can be hand pulled whilst carpets of seedlings may be sprayed.

More information

If you would like more details or wish to discuss these proposals generally please contact Bob Moffatt (coordinator) on 66281536. It is not intended to become at all formal in the approach to managing the area but obviously it is best to work towards a common outcome and avoid any unnecessary disputes. I encourage you to 'phone and discuss if you need to clarify any issue.

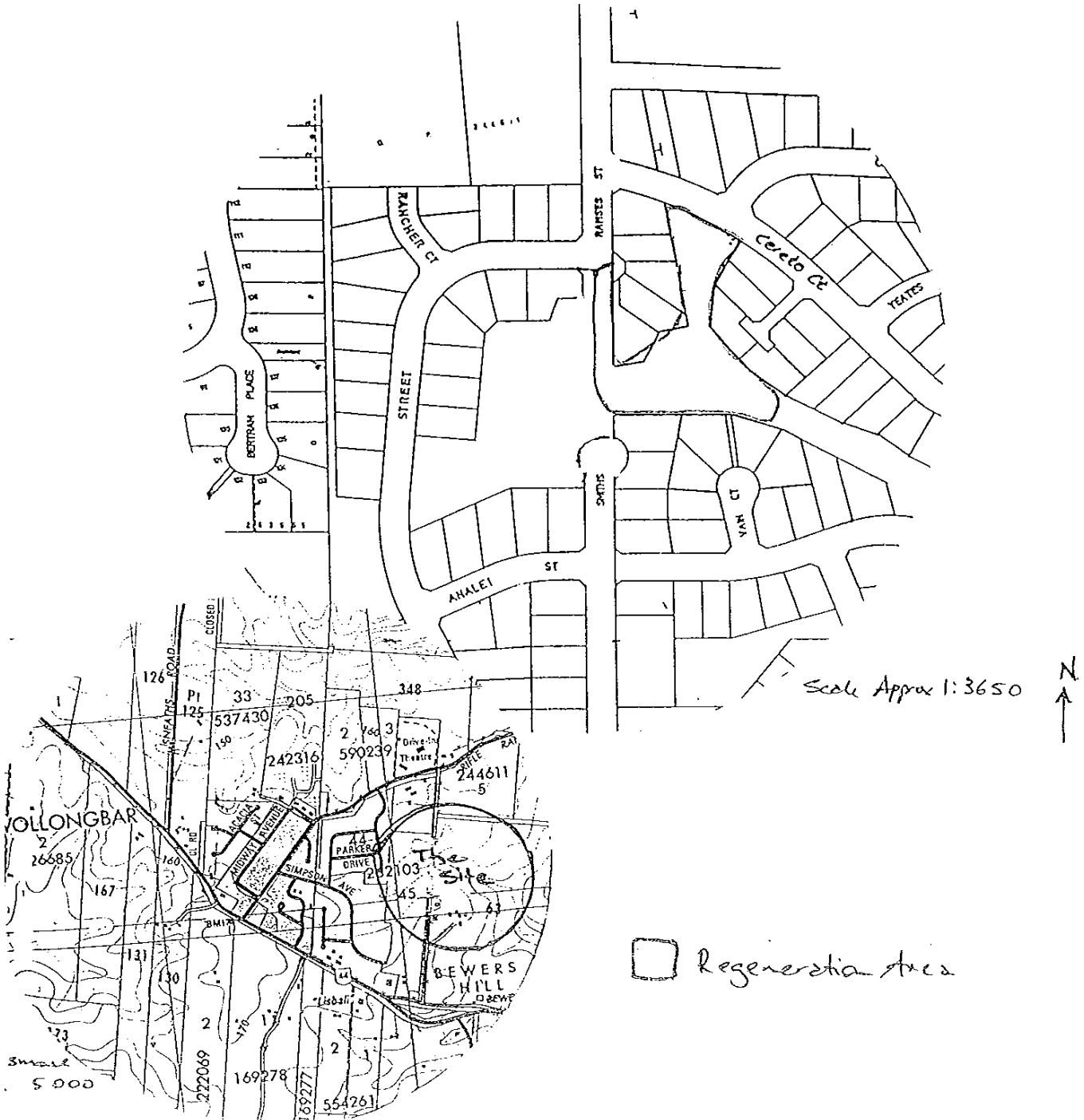
If you are interested in assisting generally, or simply improving the reserve area behind your residence do not hesitate to contact Bob.

Finally, all local folk are asked not to deposit lawn clippings or other garden refuse in the reserve area.



LANDCARE
NEW SOUTH WALES

Wollongbar Community Landcare Group



NAME: Bob Kroff 251

ASSIGNMENT Semester 1 - 2001 Bushland Management Issues / 300511

	Max. marks	Excellent	Very Good	Good	Fair
Presentation	15	15	12	9	6
Set out in logical manner	5	(5)	4	3	2
Neatness, 'readability', photos	5	(5)	4	3	2
Spelling, grammar etc.	5	(5)	4	3	2
Name & Brief Description History	5	5	4	3	2
Development of aims & objectives	15	15	12	9	6
Logical	7.5	(7.5)	6.0	4.5	3.0
Relevant	7.5	(7.5)	6.0	4.5	3.0
Site Plan	15	15	12	9	6
Included a map	5	(5)	4	3	2
Neatness, relevance, clarity etc.	10	10	(8)	6	4
Management problems	30	30	23	16	11
Description of each problem	10	10	8	6	4
Discussion of impacts, where & how	10	10	(8)	6	4
Suggestions for management	10	10	(8)	6	4
Analysis of native vegetation	35	25	16	11	6
Type of plant community, structure etc.	10	(10)	8	6	4
Native species list	10	(10)	8	6	4
Accuracy in spelling	10	10	(8)	6	4
Correct use of the Specht system	5	(5)	4	3	2
Discussion on health, age classes etc (successional stage)	10	(10)	8	6	4
Analysis of weed problem	50	50	40	30	20
Inclusion of weed species list	10	(10)	8	6	4
Accuracy in spelling	10	10	(8)	6	4
Major infestations located on map	10	(10)	8	6	4
Probable causes of infestations	10	(10)	8	6	4
Threat to native vegetation	10	10	(8)	6	4
Assessment of regeneration potential	20	20	15	12	9
In-situ resilience	10	10	(8)	6	4
Migratory resilience	10	10	(8)	6	4
Development of strategies	30	30	23	16	11
Restoration approach?	10	(10)	8	6	4
Priorities	10	10	(8)	6	4
Approp. weed control techniques	10	10	(8)	6	4
TOTAL	215	215	176	139	96
100%		(100)	80		