Duck Creek
Vegetation Restoration Plan

2003 Jen Ford

Produced by on behalf of Ballina Shire Council,
Big Scrub Rainforest Landcare Group
and D & C Woodhead by
Environmental Training and Employment Inc.
EnviTE NSW

EXECUTIVE SUMMARY

This vegetation restoration plan covers an area of Big Scrub rainforest and the surrounding land, including a substantial strip of riparian vegetation, on Duck Creek, near Alstonville in Northern New South Wales.

Environmental Training and Employment Inc. (EnviTE NSW) was commissioned by Ballina Shire Council, the Big Scrub Rainforest Landcare Group and Duncan & Caroline Woodhead to prepare this plan.

The plan concentrates on the land owned by the Woodhead's and an adjacent parcel of land owned by Ballina Shire Council. The total area of the land included in this plan covers 18.5 hectares with 17.9 hectares of that area being on private land. Both properties are listed as 1(b) – Rural Secondary Agricultural Land under Ballina Council's Local Environment Plan. It should be noted that only a small part of the much larger rainforest remnant that runs along the Duck Creek Valley has been studied. In order that the regeneration be fully effective further studies above and below this area need to be examined.

The restoration plan aims to facilitate an increase in the resilience and regenerative capacity of the entire site providing a suitable habitat for the conservation and movement of flora and fauna. Over 220 native flora species were identified of which five are listed as Rare or Threatened Australian Plants (R.O.T.A.P) and of these, three are listed as 'Vunerable' under the N.S.W Threatened Species Conservation Act 1995.

A number of management problems were identified in this plan including weed infestation. This plan also identifies vegetation communities and the extent and type of weed infestation over this large site. This information was used to designate a number of regeneration work zones based upon the urgency to arrest certain types of degradation, access, provision of follow up maintenance, and the ability of areas to naturally regenerate after initial treatment. Specific activities and the sequence of undertaking recommended tasks have been outlined for each identified work area.

Although a specific workforce has not been identified to carry out the proposed works, it is envisaged that the project will be undertaken by a combination of Green Corps, the Duck Creek Landcare Group, private landholders and professional bush regenerators.

It is strongly recommended that the proposed works are conducted in the sequence outlined in this report and that workers with the recommended qualifications and experience be employed where suggested. Adherence to the recommendations made in this plan will ensure the integrity of the environmental outcomes suggested in this plan.

This site contains enough ecological diversity and structural health to make this project feasible. If degradation is halted and sensitive regeneration is maintained, a valuable scientific and educational resource will be re-established. There are many good reasons for carrying out this work, including the conservation of Big Scrub remnant/regrowth rainforest and other associated vegetation types such as Dry rainforest and Sclerophyll forest, the restoration of riparian rainforest along Duck Creek improving water quality and conditions downstream, improved habitat for wildlife, and general public amenity.

This will be a long-term process involving intensive weed control and will often be a delicate balance between primary and secondary works. The less intensive secondary weed control that follows will need to be incorporated with regular monitoring and follow up treatment on a permanent basis. Environmental restoration brings with it the opportunity for people to come together as a community encouraging a more sustainable future.

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Acknowledgements

All photographs in this plan have been taken by Jen Ford. Maps have been produced on aerial photographs produced by F. A. King of Ballina Shire Council (Land Information Centre 2003).

Darren Bailey complied all flora species lists included in this plan. The author wishes to thank him for his knowledge on threatened species and his support in preparation of this plan.

Editorial support was provided by Maree Thompson.

1. INTRODUCTION

This plan has been prepared to provide practical information to Ballina Council, the Duck Creek Landcare group and private land holders on how to restore, to the extent possible, the original vegetation of sub-tropical rainforest. The plan concentrates on the land owned by Duncan and Caroline Woodhead and an adjacent parcel of land owned by Ballina Shire Council. The total area of the land included in this plan covers 18.5 hectares, with 17.9 hectares being on private land.

The subject land is listed as1(b) Rural (Secondary Agricultural Land) under Ballina Shire Council's Local Environmental Plan.

The plan has been commissioned by Ballina Shire Council, the Big Scrub Rainforest Landcare Group, and D and C Woodhead.

2. AIMS AND OBJECTIVES OF THE PLAN

2.1 Duck Creek Rehabilitation Plan Aim

The aim of this plan is to provide practical guidelines to enable groups and individuals, engaged in the rehabilitation of this site, to carry out works that will:

- Strengthen the resilience and regenerative capacity of all areas of sub-tropical rainforest and associated vegetation types,
- Repair the forest structure and re-instate those natural processes that have been halted due to degrading factors,
- Provide an environment where threatened species may be conserved and enhanced within the rainforest communities; and
- Provide a suitable habitat for all resident and migratory fauna.

2.2 Duck Creek Plan Objectives

The specific objectives of the plan and its recommended works are:

- To assess the extent and location of native plant and weed species,
- To gradually and systematically remove weed species from all zones,
- To provide information on weed species, weed control and restoration techniques,
- To assess the resilience and regeneration potential in and around the area,
- To strengthen the resilience of remnant vegetation by including the area of rainforest on Ballina Council land,
- To make recommendations for appropriate strategies for the long-term restoration and regeneration of the native vegetation and natural processes,
- To ensure further degradation of the remnant rainforest does not occur by highlighting priorities such as the control of Madeira Vine,
- To monitor populations of threatened species as the plan is implemented to ensure works are assisting these species,
- Liase with neighbours and relevant authorities to limit negative impacts on the site such as the dumping of garden refuse and the planting of non-indigenous species above the remnant; and
- To improve the water quality of Duck Creek by ensuring gullies, tributaries and the riparian zone are rehabilitated to a state of health.

3. SITE DESCRIPTION

3.2 Location

The site is situated on the southern side of the Bruxner Highway, directly behind the Alstonville Cemetery and faces southeast. It is approximately 2 km from the town of Alstonville on the far North Coast of New South Wales (Lismore Mapsheet 9540-2-N. 544025 E, 6807050 N).

The total size of the area covered is 18.5 hectares with the Woodhead's property covering 17.9 hectares and the remaining 0.6 hectares occupying land owned by Ballina Shire Council.

Plate 1: The vista overlooking the lower half of the property. This photo was taken from the bottom of Zone 2 overlooking Zone 3.

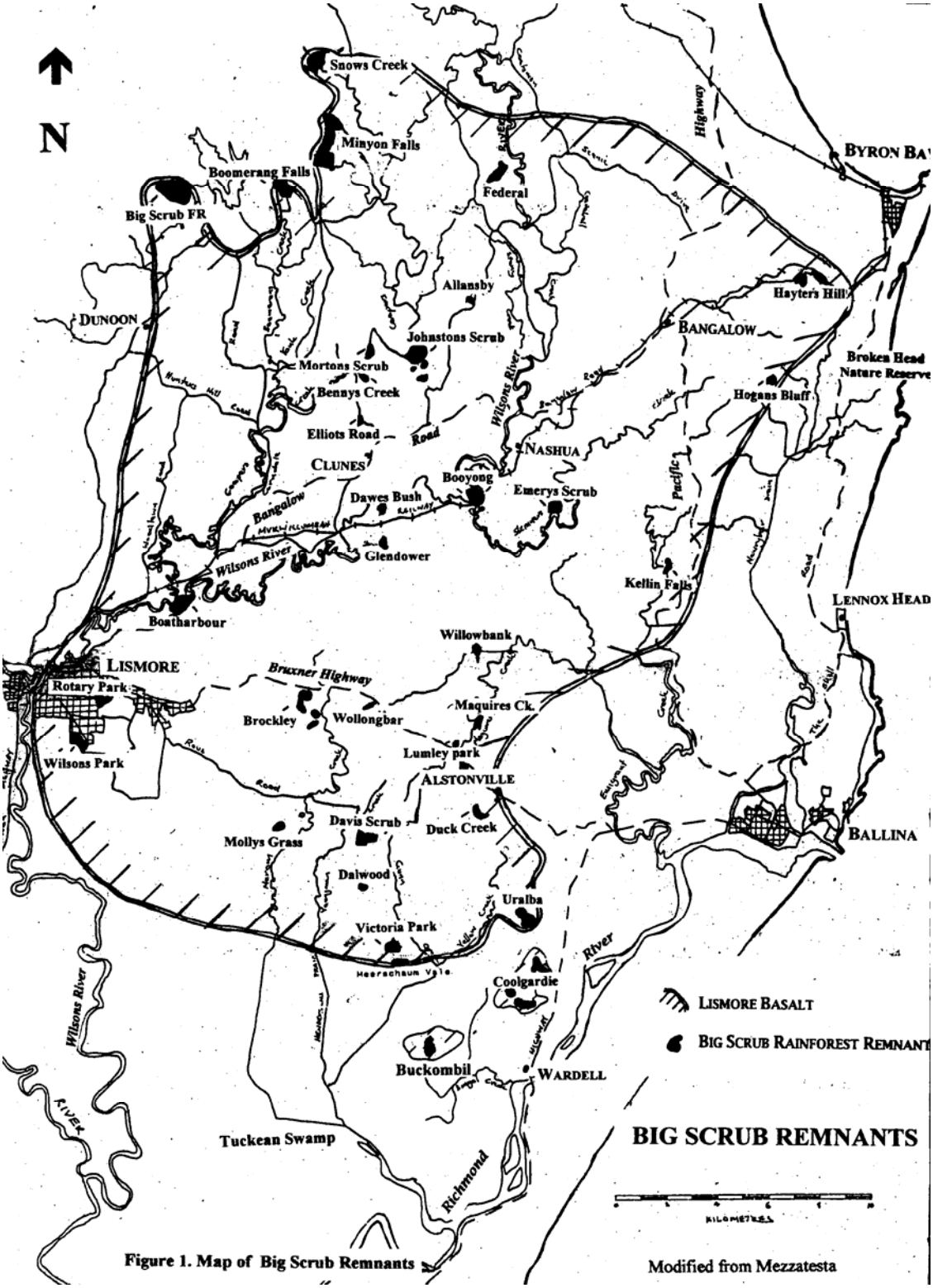

Figure 1: Big Scrub Remnants

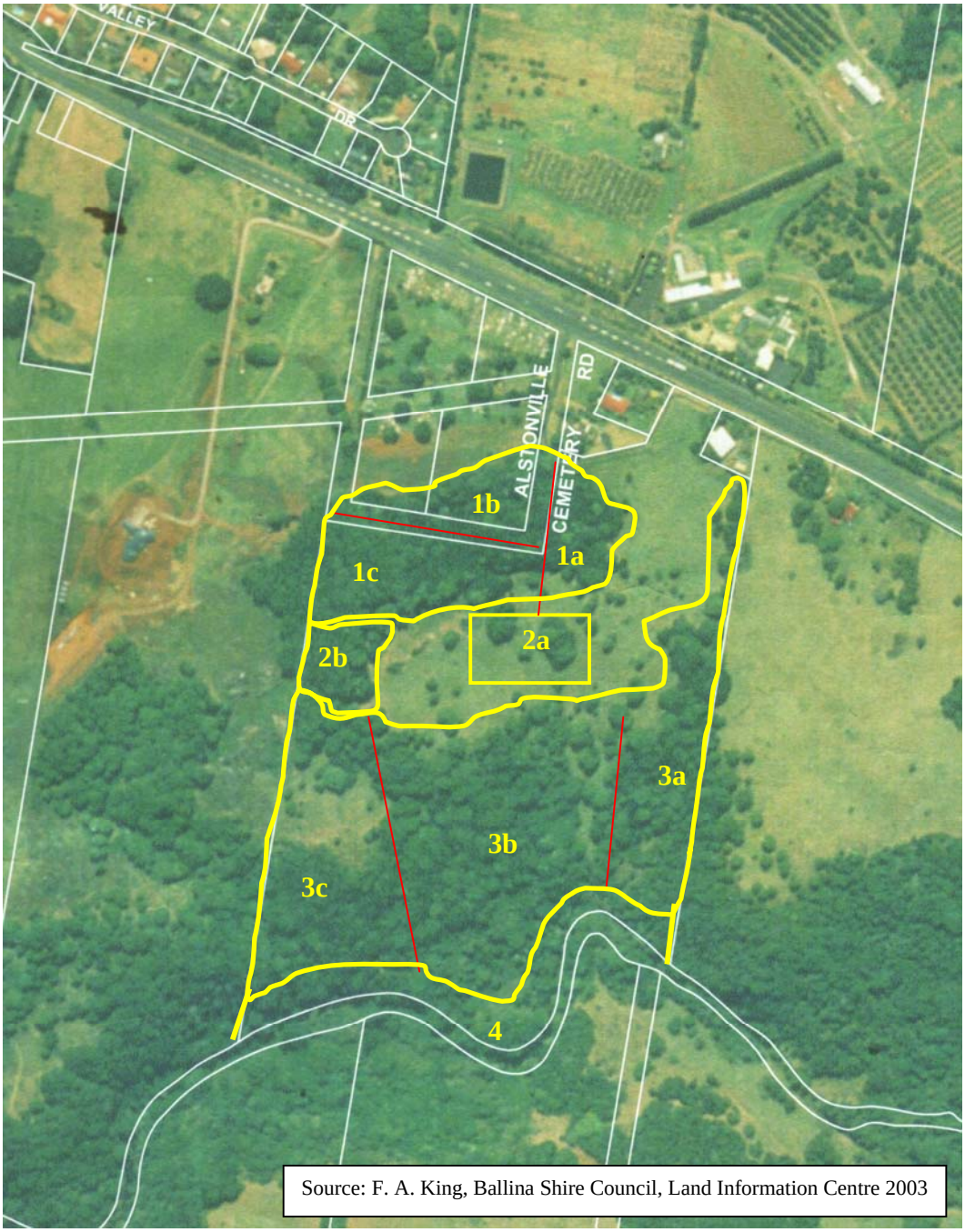

Figure 2: The Duck Creek study site illustrating work zones.

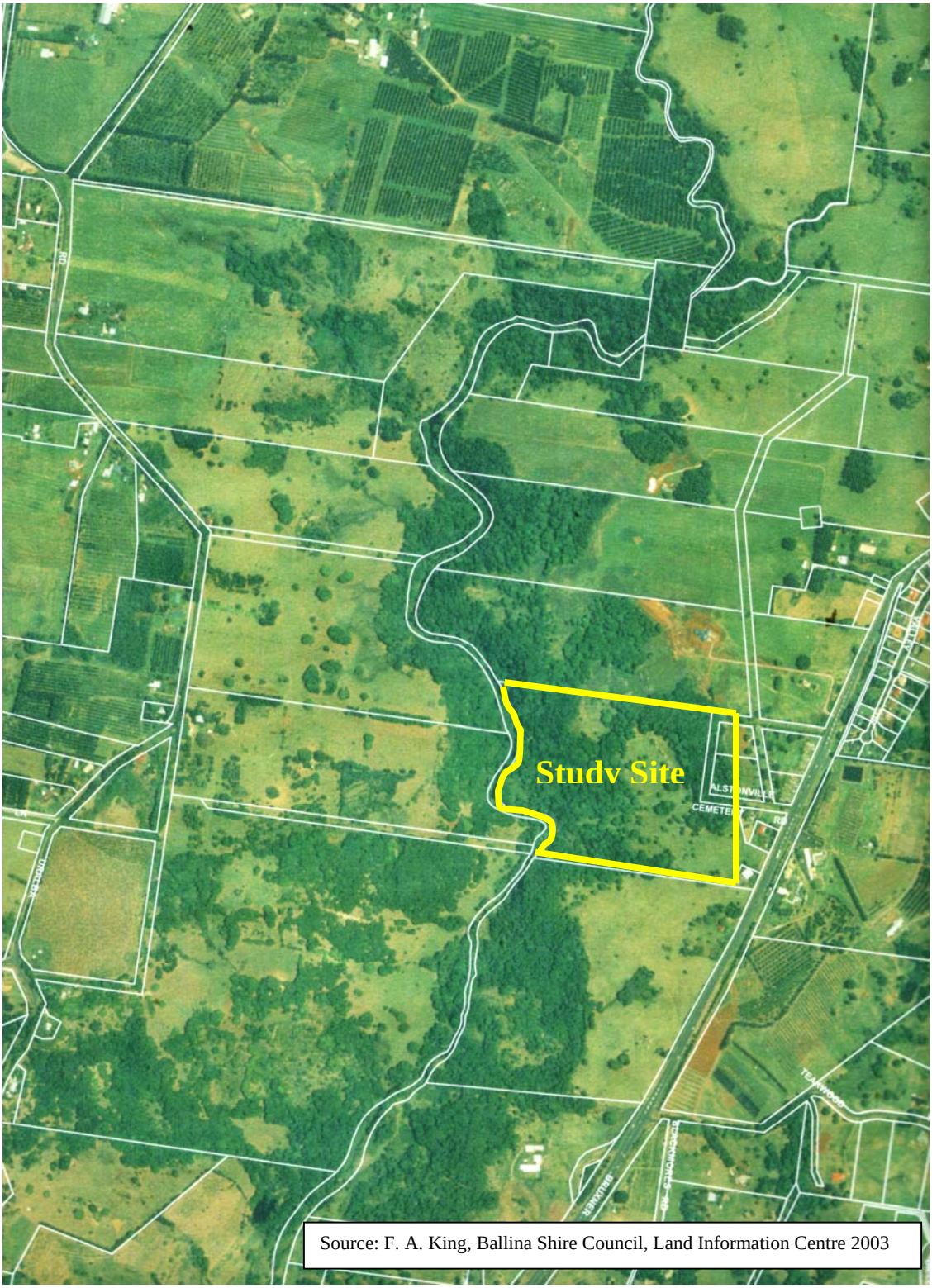

Figure 3: The Duck Creek study site (approximate boundaries) and surrounding areas.

Figure 4: Aerial Photograph of Duck Creek

Figure 5: Aerial Photo - Victoria Park, Lumley Park and Duck Creek

3.3 Geomorphology

Duck Creek remnant displays the characteristic free draining, deep and well structured kraznozem soils that cover much of the Big Scrub. The parent material is Tertiary Lismore basalt derived by the Mount Warning Volcanics and weathered to acidic, clay loams of variable depths with potentially high fertility in the organic layer. Kraznozems mainly occur in areas that have high rainfall (> 1300mm) and warm temperatures and grow lush subtropical rainforests in the Big Scrub region (Floyd 1990a, Lott & Duggin 1993). The upper slopes of the site consist of deep kraznozem soils that grade into shallower profiles in drainage depressions and areas with surface rock.

As the slope of the land continues down to Duck Creek, a section of land in zone 4, consists of an overlay of yellow podsolic soil and rocky outcrops. The soil profile changes along the riparian zone of Duck Creek as alluvial deposits in the form of silt gives the soil additional characteristics.

3.3 Climate

North eastern N.S.W experiences a warm temperate to subtropical climate regime that is generally characterized by a warm, moist summer and autumn (Dec – May) to a mild dry winter (Jun – Aug) and a warm dry spring (Sept. – Nov.). Annual rainfall in the Big Scrub area ranges from between 1300 – 2000 mm/yr (Holmes 1987, Lott & Duggin 1993, Morand 1994).

3.4 Land Tenure

The majority of the site included in this plan occurs on freehold land within Ballina Shire (Lot 5, DP 703647). An adjoining parcel of land that forms part of the main rainforest area, is owned by Ballina Shire Council (Lot 378, DP 729097 and Lot 2, DP 123 576). Both parcels of land are zoned 1(b) – Rural Secondary Agricultural Land, which is not indicative of its conservation value.

3.5 History of Disturbance

Duck Creek site was once part of the vast Big Scrub, which was approximately 75,000 hectares of subtropical rainforest associated with the Mount Warning volcanics. The Big Scrub is approximately between east Lismore, Alstonville, St Helena and Dunoon (Holmes 1987, Floyd 1990a, Mezzatesta 1992, Lott & Duggin 1993).

By the early 1900's much of the Big Scrub had been reduced to a series of isolated remnants that comprise less than 1% (or 300 ha.) of the original vegetation (Frith 1976, Floyd 1990a, Lott & Duggin 1993, Adam 1994). For the last 40 years much of the land included in this plan has been used for dairying with the rainforest at the top of the land displaying the only characteristics of original vegetation. Even then, this area termed as the remnant has undergone selective logging in the past.

4 SITE ASSESSMENT

4.1 Methods

The author conducted a number of site assessments from November 2002 to March 2003. Included in these site visits were walks and surveying, assessing the 7 or more properties that lie upstream from the Woodhead's.

Flora species were identified using a variety of guides, some of which are listed in Appendix 7, and with assistance of the Queensland herbarium. Darren Bailey compiled the native and weed species lists that are found in Appendices 1 and 2. Vegetation communities were zoned and classified using Floyd's structural-physiognomic-floristic classification method (Floyd, 1990).

A fauna survey has not been conducted, nor has the management of fauna been addressed in this plan.

4.2 Vegetation

The native vegetation of this site at Duck Creek varies considerably. It includes a closed canopy of regrowth rainforest containing remnant trees, areas of regrowth forest containing a good diversity of native species mixed with dense infestations of weed species, clumps of isolated trees including stands dominated by Camphor Laurel, open grassed areas, and a significant riparian zone bordering Duck Creek. As the vegetation changes and historically has undergone many modifications, the vegetation alliances and sub-alliances have also changed throughout the area.

4.2.1 Zone 1

The vegetation of the main area of rainforest is at varying degrees of health and development. The formal classification of this area is *Heritiera trifoliatum* (White Booyong) alliance and sub-alliance No.5, *Castanospermum – Dysoxylum mollissimum* (Black Bean – Red Bean).

Vegetation on the northern boundary on the Woodhead's property is open and lacking in structure. Although the forest edge on Council property displays better characteristics for maintaining a more constant micro-climate, the Madeira Vine infestation (approximately 250 square metres in size) is causing major damage to that immediate area. This exotic vine has the potential to destroy all layers of the rainforest. It has already reached the canopy and is present as a carpet of tublings on the forest floor.

The eastern forest margin is relatively closed, though it is predominately made up of Lantana and other weed species providing a good buffer zone to the forest. The western edge borders an old quarry and though the walls of the quarry help buffer some drying winds, the area is open and dominated by Camphor Laurel. The southern forest edge of Zone 1 displays good structure and resilience with many native plants germinating. Mist Flower dominates the expanding edge in a number of areas.

Plate 2: Madeira Vine climbing to the canopy on the northern edge of Zone 1(b).

The canopy of Zone 1 is generally in good health with no major gaps however Camphor Laurel makes up about 50 percent of the canopy species and up to 90 percent in the far western part of the zone.

Some areas of Zone 1 display good structure in the mid-storey. A long history of disturbance is evident in other areas, which are devoid of a healthy mid-layer. This has been exasperated by the dominance of a native vine, *Ripogonan alba* (White Supplejack), in the lower layers. This species is an integral part of the rainforest ecosystem-providing habitat for butterflies and their larvae, and necessary habitat and shelter for smaller bird species. The vine's strong, twining and woody stems have allowed this plant to out-compete other native species. It has created impenetrable thickets that are damaging the understorey of the rainforest and in some cases have caused death of native trees.

The ground layer of Zone 1 displays a mix of weeds and natives. In some areas the weeds, including *Tradescantia* and Mist Flower, are dense causing native seedlings to be out-competed for light, nutrients and water. In other areas native ferns and herbs such as Basket Grass, Naked Shield Fern and Creeping Shield Fern, dominate.

Overall, Zone 1 shows excellent resilience in the form of forest structure, regenerating native species and areas for natural expansion.

4.2.2 Zone 2

The areas of vegetation that makes up Zone 2, displays excellent resilience in the form of forest structure, diversity of native species, the germination of native seedlings, and its proximity to other covered areas. Zone 2 is also formally classified under the White Booyong alliance and sub-alliance no. 5, Red Bean – Black Bean.

Plate 3: The boundary between Zone 1 and Zone 2, with the latter Zone being on the right. There is great potiential for revegetaiton between these two Zones.

The islands of vegetation marked as Zone 2a are in close proximity to the southern edge of Zone 1. Despite containing large Camphor Laurel's and a heavy ground layer of Mist Flower, there is a great deal of potential for regeneration.

The area zoned as 2b forms part of the continuous canopy that extends from Zone 1. Zone 2b contains a good diversity of native species (Plate 6). Despite heavy weed infestation, the area displays good resilience. The structure of the canopy is sound, though it is dominated by Camphor Laurel. The mid-storey is sparse and the western edge of Zone 2b is open.

Plate 4: Zone 2(b) is in close proximity to the southern edge of Zone 1 (which is on the left). This edge represents the main rainforest section, displaying an excellent mix of native species.

4.2.3 Zone 3

Zone 3 has quite obviously undergone a great deal of disturbance in the past due to clearing and dairy farming, and the high level of weed infestation is indicative of this type of disturbance.

Zone 3 stretches across the landscape from the eastern to the western boundary on the intermediate slopes of the land and down to Duck Creek. This zone is steep and rocky and has been divided into three sub-zones using two of the main gullies as boundaries.

The lack of forest structure in many parts of Zone 3, coupled with the mix of native species that have naturally regenerated makes the process of formally classifying this area difficult. There is a distinct overlap of rainforest types on the more rocky parts of the slope with patches dominated by dry rainforest species such as *Drypetes delplanchei.* (Yellow Tulip). Native Elm, Red Kamala, Deciduos Fig, Python Tree, Flintwood and Red Fruited Olive Plum. In other areas amongst Camphor Laurel, the main canopy species consist of Sally Wattle, Red Ash, Cudgerie, Guioa and Crows Ash with an understorey of rainforest.

This may be due to there once being a mosaic of rainforest types due to exposure, drainage or a slight change in soil type. The fact that this zone is all re-growth may mean the Hoop Pine (*Araucaria cunninghamiana*) that is associated with this vegetation type was removed. Alternatively it may be due to the area having undergone micro-climate

changes including drying out the land due to the clearing of vegetation, increased exposure and increased run-off, changes in nutrients and the change in species dominating the cleared land.

The eastern portion (Zone 3a) runs down the boundary and across the slope to the gully and ends approximately 20 metres before the creek. The vegetation is a mix of subtropical and dry rainforest species and weeds. Resilience is strong under the large Fig and in the areas of dry rainforest. A good diversity of rainforest plants are present in the understorey, however the presence of Climbing Aspargus Fern (*Protasparagus plumosus*) under the Fig, is of particular concern. This plant has the potential to negatively affect all strata's of the forest.

Plate 5: Edge of Zone 3(a). Vegetation is made up of subtropical and dry rainforest species and weeds.

Zone 3b contains a diversity of plant species (weed and native) in a range of situations. The zone extends from the first main gully across the slope until the second major gully. Much of Zone 3b contains Camphor Laurel in the canopy with an understorey mix of native and exotic species. Other areas have been colonised by Lantana, while Crofton Weed and Mist Flower dominates the steep slopes.

The lower mid slopes of Zones 3b and 3c contain patches of excellent bush where native vegetation dominates. This is despite Camphor Laurel and Mist Flower being present in varying amounts.

Plate 6: Dense infestation of Mist flower on the forest floor. This is a typical shot of the level of weed infestation that occupies the lower strata of Zone 3.

Zone 3c is similar in floristic composition and level of weed infestation, to Zone 3b, though a number of smaller gullies are present in this zone. These gullies show good rehabilitation potential with many natives occupying these areas. Camphor Laurel makes up at least 50 percent of the canopy while Lantana and Mist Flower occupy large amounts of the understorey. There are, however, some excellent stands of rainforest with sound structural formation and diversity.

4.2.4 Zone 4

Zone 4 is the riparian zone that forms a 20 metre wide strip bordering Duck Creek. This heavily disturbed environment is characterised by the occasional large specimen of Blue Quandong, rocky outcrops and a high density of weed species typical of much of Duck Creek.

Plate 7: The Duck Creek Riparian Zone (Zone 4) shows a high degree of weed in the understorey (mainly Lantana, Mist Flower an Croften Weed), but has great potential for regeneration.

This area is best classified under Floyds Suballiance No. 4 *Elaeocarpus angustifolius* (previously *E. grandis*), Blue Quandong. The germination of many native seedlings in areas not completely dominated by weeds (such as Mist Flower, Crofton Weed and Lantana) shows good *in-situ* resilience. The continued recruitment of seed will be high in Zone 4. Seed and propagules enter the area from up stream, via the guts of flying fox and

birds using the existing cover of rainforest in the surrounding properties, and from further up the hill with the assistance of gravity.

Just above the creek lies an area of tall open forest growing on exposed metasediments. Brush Box and Sally Wattle dominate the canopy and a mix of Blue Lily Pilly (*Syzygium oleosum)* and Rose Myrtle (*Archirhodomyrtus beckleri*) make up the low, rainforest like understorey.

4.3 Threatened Species

A number of species that are protected under law in New South Wales occur on this site and are listed in the table below. The Threatened Species Conservation Act (1995) gives specific legal protection to plants listed under this act. The plants are allocated with a particular schedule according to its rarity.

More detailed information is contained in their ROTAP (Rare or Threatened Australian Plant) codes, which were developed by Briggs and Leigh in 1988. Species are assigned codes according to distribution, abundance, range and adequacy of conservation. See Appendix 7 for the definition of these Conservation codes.

The following protected species occur on this site and below is a brief description of habitat and distribution. Appendix 7 contains a list of the threatened species found in the wider Duck Creek area.

Species	**TSC Act**	**ROTAP**
Arthraxon hispidus	V	3VC-+
Macadamia tetraphylla	V	2VC-
Quassia sp. 'Mt Nardi'	N/a	3RC-
Rhodamnia maideniana	N/a	2RC
Tinospora tinosporoides	V	3RC-

Arthraxon hispidus is a poorly known species occurring in open swampy areas and wet areas near the creek at the edge of the rainforest. There are as few as five records for Arthraxon in NSW. It occurs at a single location on this site in a wet, open area above the creek. It also occurs occasionally in discrete open swampy patches and moist areas near the creek, downstream from this site. Specific management options should be employed in these areas, e.g. strategic hand weeding of Mistflower, Crofton and exotic grasses around patches of Arthraxon. Note that this grass has been known to 'burn off' a little following removal of 'protective' weeds in summer.

Macadamia tetraphylla (Queensland Nut) is widespread and common over the area of Duck Ck. It occurs regularly on the mid-upper slopes of Camphor Laurel dominated forest and on the edges of subtropical rainforest. The Macadamias are mostly mature trees- seedlings are not common.

Quassia sp. Mt Nardi occurs as very occasional individuals on both the Landcare site and Duck Creek in general. The hardy trees are commonly 1-2m in height and occur in disturbed areas of Lantana and Camphor.

Rhodamnia maideniana (Smooth Scrub Turpentine) was recorded as very occasional over the entire Duck Creek site. One individual was located on the Woodhead's property with another 5-6 individuals located above and below Marshall Falls. It prefers moist sheltered areas and generally occurs in disturbed forest.

Tinospora tinosporoides (Arrow-head Vine) occurs regularly throughout Duck Ck in areas where there is sufficient canopy cover. It occurs in both weed dominated areas and well developed rainforest. Bush regeneration activities are likely to stimulate the regeneration of *T. tinosporoides* and enhance its habitat.

4.4 Management Problems

The major problem facing the rehabilitation of this Duck Creek site is the degree of weed infestation over a large area. Weed infestation is heavy throughout much of the site limiting the germination of native seedlings, their growth and reproductive capacity. In many of the zones the weed species present also affect the structure of the regenerating native vegetation and its ability to form the necessary habit for maintaining a constant micro-climate. This level of infestation also increases the 'edge effect' that will further limit the area of native vegetation by altering micro-climate conditions such as light, soil nutrients, available water and the movement of wind. Major weeds identified are listed in Appendix 2 and profiles of each weed are included as Appendix 3.

In addition to the more obvious movement of exotic species and their impact on native vegetation, this site is also affected by garden escapees. Many years of dumping garden refuse on the upper slopes of Zone 1, has caused additional weed problems, as has the planting of exotic species above the remnant. These are moving into the remnant via wind dispersal and many Slash Pines are germinating as the cones roll down the hill from neighbouring land.

5. RECOMMENDATIONS

5.1 Regeneration Works

Four separate work zones have been identified (Figure 2) to assist with the rehabilitation of this site. The sequence of proposed works is based upon the need to arrest certain degradation factors while maximising natural regeneration capacities in each zone. Seasonal weather conditions and the need for follow up works have also been considered. It is strongly recommended that this sequence be adhered to, to prevent reinfestation of treated areas with weeds that maybe more detrimental to the rehabilitation of the site.

Explanation of the weed treatment methods recommended in this plan is included as Appendix 4. Specific treatment methods recommended for the major weed species encountered at this site are outlined in Appendix 5. A suggested list of tools and equipment to carry out recommended works is listed in Appendix 8.

A specific labour force has not been identified to carry out works proposed in this plan however it is envisaged that a combination of Green Corps, the Duck Creek Landcare group, private landholders and professional bush regenerators could all contribute to the rehabilitation of this site. It is recommended that each group or individual carrying out works on this site be led and trained by qualified bush regenerators and that this plan be followed to ensure success.

Work should begin in Zone 1 and once primary works have been completed and follow-up maintenance has stabilised, work can continue into the next zone. As most of the zones have been sub-divided due to the scale and scope of the project, this means that works must also follow the sub-zone order. The labelling of the sub-zones alphabetically, assists with the direction for work to be carried out ensuring that all works are consolidated and the maximum results are achieved.

Primary works involve the treatment of all weeds in the lower strata (i.e. below 3 metres in height), before controlling canopy weeds using methods such as tree injection. The one exception to this rule is for the treatment of Madeira Vine in Zone 2 which is a high priority. Follow up spraying should be done by qualified bush regenerators to minimise the regrowth of weeds, maximise natural regeneration, and prevent impacts on native flora and fauna.

As works by the landcare group have already commenced in the upper areas of zones 1(a) and 1(b), these areas should continue to receive follow up maintenance and be consolidated before more areas receive primary works.

5.1.1 Zone 1

From the main entrance opposite the cemetery, the division between Zone 1(a) and 1(b) is marked by the presence of the fence that is the boundary between private and Council land. The Woodhead's property lies to the east of this fence (Zone 1a), while the northern boundary of the forest on Council land (Zone 1b), stretches out to the west. Evidence of an old fence running parallel to the northern boundary of Zone 1(b) delineates the division once again between the ownership of land, and zones. Zone 1(c) is situated below this fence.

Plate 8: Looking into the rainforest in Zone 1

Zone 1a

Many parts of this zone have already had some primary works, though many weeds remain on all stratas of the forest.

- Follow up work in the form of spot spraying is required in the areas where primary works have already been carried out.
- Primary work should continue by working from the main entrance across the slope (adjacent to the northern boundary) in 10 metre strips to the eastern boundary. Each new 10 m strip across the slope should follow the edge of previously worked strips ensuring all weeds are controlled. Cut, scrape and paint (C-S-P) woody weeds (species that are common are Lantana, Camphor Laurel, Winter Senna, Cestrum, Tobacco Bush and both Privet species). Cut up treated species into 30-50cm pieces and leave on the ground to compost. Cut lantana at head height and to 1m past the drip line of any overhanging species on the edge. Ensure a 2m strip of Lantana is left as a buffer. Larger branches of Lantana can be suspended off the ground to avoid re-shooting.
- At the same time, control any exotic climbers encountered. Corky Passionfruit will best be treated using the C-S-P method while the Climbing Asparagus will need to be cut at head height and the rhizomes crowned out (See Appendix 4 for weed treatment methods). Those too hard to crown should be cut low to the ground and the regrowth sprayed in follow up maintenance. White Passionflower can be easily hand-pulled and the fruits should be collected and disposed of to limit reinfestation of this quick growing species.
- Control of the succulent garden escapees, that occupy the northern parts of the zone, is best done by manually removing them and composting them off-site.
- Hand weed the Mist Flower amongst native ground covers and suspend in a tree to dry out.
- Follow up spraying will need to be carried out at regular intervals to minimise the impacts of weed competition, with the first two years requiring more intensive assistance. Spray regimes will also need to include the treatment of *Tradescantia* on the forest floor and the over-spraying of Lantana on the edges in 1m increments to allow the forest to naturally expand over time. This ensures necessary habitat for birds is maintained as well as a buffer to drying winds. See Appendix 5 for rates of control.
- Once maintenance has stabilised, the systematic control of canopy weeds such as Camphor Laurel can commence. The 3-5 year program in this area should start with the injection of those that are beside larger native trees as well as the large specimen of Small-leaved Privet in the driveway. No more than 25% should be controlled in the first year and the injection of the Camphor Laurel's should be avoided while they are in fruit.

Plate 9: Fig Tree on the lower boundary of Zone 1b.

Plate 10: The north-western boundary of Zone 1b. Note the tangled mess of Madiera Vine and Tecoma.

Zone 1b

- Primary works have already commenced in this zone and regular follow-up is required to ensure these areas hold. Much Lantana has re-shot and secondary weeds include White Passionflower and Corky Passionfruit.
- Before work can begin on scraping the Madeira Vines, the carpet of tublings must first be sprayed to avoid them being trodden into the soil and to limit its dispersal. It is recommended that qualified bush regenerators carry out the initial sprays to maximise the result.
- Once *Anredera cordifolia* (Madeira Vine) has been controlled on the forest floor, workers such as Green Corps and the Landcare group can commence with the scraping of vines. Scrape and paint Madeira Vine with straight Glyphosate®. Scrape for up to 1 metre, on one side of the stem, then leaving a 5-10 cm gap before alternating and scraping and painting the other side of the stem. Collect tubers and remove from the site for disposal. Tublings can be crowned out with the use of a knife and be disposed of, or sprayed with Glyphosate® (see Appendix 5 for rates of control).
- Cut the dead Lantana canes under the Corkwood (*Duboisi myoporoides*) at the entrance, to above head height being careful to avoid the regenerating natives. As the Lantana is hanging low to the ground, exotic vines are taking advantage of this ladder climbing quickly back to the canopy. Hand pull or C-S-P all White Passionflowers and Corky Passionfruit.

Plate 11: Madeira Vine (Zone 1b) reaching the canopy on the north eastern edge of Ballina Shire Council land.

Plate 12: Zone 1, entrance to site. Note the Lantana skeleton hanging in a Corkwood (*Duboisia myoporoides*). This work has been carried out by the Duck Creek Landcare Group. Follow up work is still required in this area.

- Cut further into the Lantana on the north-western boundary of this zone. At least 2m of Lantana should be left as a buffer but it should be cut to 1m past the drip line of existing trees.Over-spraying of sections of Lantana from the inside of the forest will increase the area for natural regeneration while reducing the Lantana infestation over time. Increased forest area can also be gained by spraying the grass on the outside of the Lantana, encouraging the living 2m to roll outwards.
- Ensure exotic vines are not taking advantage of the Lantana structure.
- Continue working in strips across the slope and adjacent to boundaries. More common weeds dominating the understorey and in need of control are Climbing Asparagus, Camphor Laurel, Large and Small Leaved Privets, and Senna. The orange flowered Tecoma on the northern boundary also requires primary work in the form of C-S-P and spraying where it is inter-twined with Madeira Vine.
- Hand weed the Mist Flower amongst native groundcovers and hang in a tree to dry.
- The control of ground weeds such as Tradescantia, Mist Flower, Crofton Weed, Madeira and Camphor Laurel should be incorporated into a spray regime, carried out by professional bush regenerators.
- As both Corky Passionfruit and White Passionflower have varied responses to the application of sprays, it is suggested that hand removal or the C-S-P method, be applied.
- In the steep area adjacent to the fence dividing zones 1(a) and 1(b), place available logs across the slope as a form of erosion control. This is already an area of considerable traffic due to access, and will require monitoring.
- Cut wires off trees to assist with the health of these species. Remove the wire from the site and dispose of.
- Ensure fences are maintained to exclude livestock that are agisted in the neighbouring paddock.
- Ensure the Madeira Vine patch is regularly monitored and follow up works continue.

Note: Workers should be familiar with the identification of the Giant Stinging Tree (*Dendrochnide excelsa*). There are a number of regenerating species scattered throughout the zone. As this species is present as remnant trees it is likely that more will naturally regenerate as weeds are removed, increasing the risk of being stung.

Plate 13: Northern edge of Zone 1b. Foreground weeds include Madeira Vine, Smooth Senna and Lantana.

Plate 14: The northern edge of Zone 1b.

Zone 1c

- Continue primary work across the slope, working from the junction of Zones 1a and 1b heading in a westerly direction. C-S-P Camphor Laurel, Mickey Mouse Bush (*Ochna serrulata*), Small and Large Leaved Privets, Corky Passionfruit and other weeds in the understorey.
- Crown out Climbing Asparagus rhizomes and suspend in a tree to dry out. Leaves and stems should be cut up and left on the floor to compost. Manually remove or C-S-P other exotic vines during primary works.
- Those above head height should be left *in-situ*.
- The native vine (White Supplejack) that is currently forming very dense thickets requires pruning to allow native plants in the lower and mid stories to develop. As it is an important part of the rainforest it is suggested that where possible thickets be retained, but where regenerating species occur, it should be pruned. Ensure one branch is retained so that it may re-shoot (cutting *Ripogonan sp.* low to the ground increases the likelihood of death).
- In preparation for spraying of exotic groundcovers such as *Tradescantia* and Mist Flower, it is suggested that some hand weeding around native seedlings be undertaken. Spray regimes should also include the control of Mist Flower to 1m past the drip lines of existing vegetation.
- Maintain all works with regular follow-up and document the results.

Note: The south-west part of Zone 1c is more degraded and dominated by Camphor Laurel. Its repair will take considerably more time and it is suggested that works in Zone 2 commence before the areas with 90 percent Camphor are thoroughly worked on.

5.1.2 Zone 2

This smaller zone is situated down slope from Zone 1 and occupies the flatter areas of the property. Zone 2(a) is a series of clumps of forest close to the southern boundary of Zone 1(a), and Zone 2(a) is part of the continuous strip of vegetation from Zone 1(c).

Zone 2a

- Control all woody weeds in the understorey by using the Cut, Scrape and Paint (C-S-P) method. Common weeds include Lantana, Camphor Laurel and Privet species.
- At the same time control any exotic vines encountered. The *Passiflora spp*. is best controlled by cutting them from native species in the understorey (if they are in the midstorey, cut the vine at head height and deal with only what is below this level) and then dealing with the root systems. Climbing Asparagus can be crowned out and hung in a tree to avoid them re-shooting (Appendix 4).
- Follow up spraying should include the control of Mist Flower to at least 1m past the drip lines. In areas of good native groundcover the Mist Flower should be carefully hand removed and suspended in a tree.
- A number of the mature Camphor Laurel's have already had some injection carried out on them but a percentage of these remain alive and are currently starting to sucker. These specimens need to be re-injected to avoid major infestation of Camphor's in the lower storey. Those remaining Camphor's in the canopy should be retained until all primary and secondary weeding in the understorey has been completed and stabilised.

- Ensure the expansion of these patches is maximised by continuing to spray out exotic groundcovers past the drip lines of existing trees. This will free up the floor of the forest allowing native plants in the seedbank to germinate.

Plate 15: A small road has been excavated through the clumps of vegetation that make up Zone 2a.

Zone 2b

- The edge of the forest closest to the open area where there are plans for an orchard and house, is very dynamic with a good number and diversity of native species regenerating. It is therefore recommended that primary works in this zone commence at the eastern junction of zone 1c and follow the edge of the forest to the southern edge of the zone. Work should continue in 5-10 metre strips following previously worked areas until the western side of the property is reached (indicated by a fence).
- Initial weed management should include the control of all weeds in the lower levels of the forest. Common weeds in this zone include Camphor Laurel, Large and Small-leaved Privet, Mickey Mouse Bush, White Passionflower, Corky Passionfruit and Climbing Asparagus. The scattered seedlings of Asparagus Fern need to be crowned out and hung in a tree.
- The White Supplejack will also need to be pruned from the lower strata's of the forest as they are strangling regenerating native species and significantly slowing down the successional process. This will further aid access and follow up sprays. It is however essential that this species be sensitively pruned so that it remains part of the forest structure and that all larger vines climbing canopy trees be left.

- The spraying of weed seedlings, exotic groundcovers such as Mist Flower and Climbing Asparagus should be carried out by professionals to ensure the maximum results.
- Once works on the ground have stabilised the systematic stem injection of canopy weeds, mainly Camphor Laurel, can commence. No more than a quarter of these should be taken out in the first year.
- Maintain all works and document the results.

5.1.3 Zone 3

This large zone on the intermediate slopes of the property is divided into three parts with the southern boundaries of this zone occurring 20 metres from Duck Creek. The zone marked as 3a stretches from the eastern fence line across and down the slope to the first main gully. The division between zones 3b and 3c are also delineated by major gullies in the forested areas, though a series of gullies occupy the steeper slopes of Zone 3c (see Figure 2 for zone boundaries).

Plate 16: The edge of Zone 3a. This zone extends from the eastern fence line across, and down the slope to the first main gully.

Zone 3a

- A small stand of trees on the higher points of this zone adjacent to the eastern boundary fence consist mainly of Coral Trees, Camphor Laurels and Slash Pines. The cattle are currently using these areas as shelter, therefore regeneration works should commence down slope where more native vegetation dominates. Along the eastern boundary and under the large Fig tree is where works in this zone should commence.
- Control the large numbers and diversity of weed species occurring in the lower layers of the forest using the C-S-P method. Common species in this area include Camphor Laurel, Mickey Mouse Bush, Small and Large-leaved Privet, Orange Jessamine, Smooth Senna and Lantana.

Note: All workers are to familiarise themselves with the identification of the White and Green Bolly Gums (*Neolitsea spp*.) as many are present in this zone and can be easily confused with Camphor Laurel.

- During primary works exotic vines such as Edible Passionfruit, White Passionflower and in particular, Climbing Asparagus should all be controlled using the appropriate methodology for each species (see Appendix 5 for weed treatment methods).
- Buffers of Lantana should be retained on the edges facing west but should be cut away from over-hanging species so that control over time is made easier.
- Spray regimes will need to include the control of Coral Berry (*Rivina humilis*), Climbing Asparagus and vast numbers of Small-leaved Privet seedlings, as well as Mistflower, Croften Weed and grasses.
- Pruning of native vines in parts of this zone is also required as in some cases they are completely smothering native species. In the vicinity of the eastern boundary Large Prickle Vine (*Caeasalpinia scorctechinii*) requires cutting back.
- Once ground works have been consolidated in the vicinity of the Fig tree and the eastern boundary, the systematic injection of canopy weeds including the Large leaved Privet, can commence. Work can then continue working form the eastern boundary across the slope to the first gully.
- Carrying out primary works in the gully prior to working in strips across the zone will help with the definition of sub-zones and the direction of works. If the gully is clean, the end of a primary strip will be more clearly defined. This order of primary works is a good way to maximise the natural recovery of this resilient area. C-S-P the woody weeds and hand weed exotic groundcovers such as Mist Flower.
- Work can then continue working form the eastern boundary across the slope in a westerly direction to the first gully. This area ranges dramatically from open areas dominated by exotic groundcovers and grasses, to Lantana thickets, to forested areas with a mix of native and weed species.

As Lantana grows in a range of habits and situations, the methods of control will need to vary to maximise regeneration potential, efficiency and habitat value. Below is a list of suggested methods:

- Where Lantana is climbing up trees (including isolated patches of Camphor Laurel), apply the C-S-P method to 1m past the drip lines, ensuring canes are cut at head height and left in the tree to breakdown. Cut pieces should be in 30-50cm lengths to assist with decomposition and follow up spraying.
- Where Lantana thickets dominate open areas, over-spraying with a weak solution of glyphosate® is effective for control and maintaining habitat. Ensure the Lantana is not in use with birds nesting or as wallaby camps. Leave the structure in place and follow up where required.
- Where Lantana occupies vast areas, cut tracks through with a brush-hook or loppers and over-spray using the above technique (see Appendix 5 for more detail). Ensure all primary works such as cutting the Lantana away from regenerating species has been done prior to carrying out this activity.
- Hand weed smaller plants where practical and amongst natives. Suspend the cane/s in a nearby tree to dry out.
- When treating Lantana in the gullies with the C-S-P method, remove thicker canes out of the damper situation to avoid reinfestation.
- Work from the more forested areas to the open areas treating weeds in the lower statra's before controlling canopy weeds.
- Included in initial works should be the pruning of some native vines such as Water Vine and Large Prickle Vine where they are completely smothering native trees.
- Due to the complex nature of this site, it is recommended that professionals be contracted wherever possible to carry out spraying.
- Camphor Laurel dominates the canopy over a large area and the systematic injection of this species could take 10 years. This more long-term approach of maintaining canopy cover will assist in the management of follow-up maintenance and the recruitment of seed.
- Monitor results and document works.

Zone 3b

- It is suggested that the gully marking the boundary between zones 3b and 3c first be regenerated to once again assist with the demarcation of zones and the direction of work. C-S-P woody weeds below 3m and hand weed exotic groundcovers. Hang Mist Flower and Croften Weed in a tree to avoid reinfestation.
- Vast areas of predominantly Mist Flower are to be sprayed out but where it is intermingled with native groundcovers or native seedlings, it is best controlled using the manual approach.
- Carry out systematic stem injection of canopy weeds as per the recommendation, Zone 3(a). In the areas of good bush on the lower slopes of this zone, competing canopy weeds can be treated at an earlier date.
- Monitor all works and record the results.

Zone 3c

- This zone contains a series of gullies and displays excellent resilience. Carry out primary regeneration in all of the gullies using the approach described in the above two zones.
- Once follow-up works in the gullies has stabilised, continue to carry out primary weed control working in 10m strips across the slope in an east to west direction.
- Spray regimes should follow the guidelines set out in the above two zones.
- The injection of canopy weed trees should commence with those that are next to native trees.
- Monitor all works and continue to conduct follow-up maintenance on all zones.

5.1.4 Zone 4

The strip of vegetation 20 metres wide bordering Duck Creek makes up the area marked as zone 4. This riparian zone ranges greatly in its level of disturbance and the weed and native species that occupy these areas.

Plate 17: This illustrates part of the riparian area (Zone 4). A high level and diversity of weed infestation is present together with a high diversity of native species. Restoration potential of this zone is high.

- Commence primary works from the western edge of the property and work down stream in an easterly direction to coincide with the flow of water. Common weeds to be controlled in initial works using the C-S-P method include Lantana, Smooth Senna and Small Leaved Privet.
- Cut Large Prickle Vine from native trees.
- No major infestations of MadeiraVine have been noted on the Woodhead's property but as works continue it is likely smaller vines and tublings will be uncovered. There are major infestations of this fast growing climber upstream and it is likely more of this plant will be distributed onto this site into the future. If vines are encountered during weeding, mark them with flagging tape so that the appropriate treatment can be applied in the near future. See Appendix 5 for more detail on the treatment of this weed.
- All spraying should be carried out by professional bush regenerators due to the sensitivity of the work close to the creek. It is however recommended that when controlling exotic groundcovers in the area close to the creek, that a 1-2m buffer area of vegetation closest to the water be retained, and hand weeded at a later date.
- Hand remove or dig up Elephant Ears along the creek. The large tuberous root system will need to be bagged up and removed from the site for composting. In areas where they are the dominant species, removal will need to be staggered over time so as not to expose large areas of the creek bank to erosion.
- Other weeds requiring hand removal are Mist Flower, Croften Weed and Blue Billy Goat Weed (*Ageratum houstonianum*). This method of weed control is especially important along the watermark and amongst areas of native groundcovers.
- The threatened species *Arthraxon hispidus* occurs in this zone in open swampy areas and wet areas near the creek at the edge of the rainforest. Specific management options should be employed in these areas, such as the strategic hand weeding of Mistflower, Crofton and exotic grasses around patches of Arthraxon. Note that this grass has been known to 'burn off' a little following removal of 'protective' weeds in summer.
- Once primary works on the lower levels has stabilised, commence the systematic injection of taller woody weeds.
- Continue with follow up maintenance in all zones and monitor the results.

5.2 General Management Recommendations

- Conduct further training with the landcare group and private landholders so that 'best practice' regeneration techniques can be employed to carry out restoration works. Training would include plant identification (weed, native and threatened species), appropriate control methods for the variety of weed situations, orientation of zones and sub-zones, and general management issues.

- Ensure a copy of this plan is on hand as works are being carried out. All contributing parties (Ballina council, Duck Creek Landcare Group and the Woodhead's) must all have a copy of this plan for easy reference.

- In Zone 3 where some earthworks have already been carried out in the form of bulldozing a track, it is imperative that some stabilisation techniques be immediately carried out to minimise the loss of topsoil in this area. Rocks and logs in the immediate area can be moved to below the track and on the edges of gullies, to help with the stabilisation.

- As plans are being currently made for an eco-tourism centre on the Woodhead's land, the potential of higher foot traffic and disturbance in the future is much greater. It is therefore suggested that further plans for track design and placement be made to provide the most safe and sensitive routes. Simple, manually constructed paths, particularly on the steeper slopes is recommended.

- Remove non-indigenous species from above Zones 1a and 1b. These include the Golden Rain Tree (*Keolreuteria paniculata*), Golden Trumpet Tree (*Tababuia chrysantha*), Poinsettia *(Poinsettia pulcherima)* and Slash Pines. The control of these species will prevent reinfestation into the main rainforest area.

- Ensure any native species that are planted are from the local area so as to maintain genetic integrity over this site.

- Previously dumped, non-organic material that is scattered throughout the rainforest and in particular in Zone 1b, should be removed and placed in landfill.

- Fruit species such as Dragon Fruit (*Hylocereus undatus*) have been planted in an orchard situation in close proximity to the main rainforest section. Some of these species are known to be dispersed by birds and flying foxes and so will need to be closely monitored to avoid these species entering natural areas.

- The contracting of qualified bush regenerators to carry out spraying and other follow-up activities, wherever possible, will maximise regeneration capacities and ensure the necessary sensitivity is applied to all works.

- Develop management plans for the seven properties upstream so as to improve water quality, the management of species continually entering this site and to best conserve this important area of the Big Scrub.

5.3 The Ideal Sequence of Recovery

Adherence to the previous recommendations will result in the following sequence of recovery. If this sequence of events is not noted, regeneration activities have not been successful and techniques may need to be modified or improved.

1. Green trash that has been evenly chopped up and left on the ground will break down and form a moisture retentive mulch. Aerial vines that have been severed and left in trees will deteriorate, so that light is slowly increased allowing plants beneath to acclimatise to increased levels of light and wind. Do not pull vines or material, such as Lantana or Climbing Asparagus, from trees, cut it at head height to allow maintenance to progress and allow it to drop over time *insitu.*
2. Sprayed groundcovers and exotic grasses will yellow and die. A germination of a mixture of species (weed and native) including annual weeds on the edges will occur. Hand remove or carefully spray out weeds amongst native seedlings and ground covers. Follow up on any C-S-P work that may have been missed and crown out any Climbing Asparagus rhizomes.
3. As existing ferns and ground covers advance, germination of pioneer species such as Brown Kurrajong, Sandpaper Figs, Foambark, Red Kamala, Bleeding Heart, and Cheese Trees, should occur and, as they grow, begin to stabilise the site. The germination of native species will vary greatly throughout the site and in the drier areas, different vegetation will expand their density and distribution. Woody weeds such as Lantana, Senna and Camphor Laurel and, herbaceous weeds such as Croften and Mist weed, will also be seen. Control as per Appendix 5.
4. Germination of dormant seed of secondary species, as well as those that enter the site from surrounding areas will also begin as weeds are removed.
5. As the pioneers form a canopy, the slower growing secondary species will establish and slowly grow. Weeding must continue through this phase. In the forested areas, gaps in the canopy will close over or be filled up with those natives in the mid-storey. Forest edges will also thicken up with a variety of species assisting in the development of a microclimate conducive with the germination of more sensitive native species
6. Where <u>only</u> exotic grasses and ground covers were present, the germination of native species maybe slower due to changed conditions. If germination of natives is not forthcoming after a period of 2 years, then the planting of suitable species may be required.
7. The canopy will develop and eventually secondary species will emerge and consolidate the canopy. The variety of trees reaching fruiting age should encourage birds and bats that will introduce seed of other species. At this point (i.e. 7+ years, depending on seedbank, vigour and climatic conditions), the system is getting close to self-sustaining and maintenance will be significantly reduced.

5.4 Plant Selection Guidelines

Areas with a very low potential to naturally regenerate may be encountered during the restoration process. In most cases these will be the areas long covered in exotic grasses or where soil has undergone structural changes. When the area requires supplement planting, care should be taken to use appropriate material that has been grown from seed collected in the local Alstonville area or nearby (refer to plant propagation publications in section 7). Many species have a very broad geographic range but genetic differences are found across the range. Trees found on this site have adapted to the specific conditions that occur at the top of the Alstonville plateau and along Duck Creek.

The introduction of species that would not naturally occur on this site is not recommended. This can be detrimental to ecological functions within the vegetation community. If the aims of the restoration project are to facilitate the recovery of rainforest communities, then planting trees that do not belong will detract from achieving this aim.

5.5 Other Issues

Fauna
Snakes, ticks, ants, mosquitos and chiggers (the larval mites that cause ‘scrub itch’) can potentially cause discomfort, disease and serious illness. The best way to avoid complications is to minimise the risk of bites. Always wear protective clothing i.e. long sleeves and trousers, sturdy boots and socks, and a hat. Apply repellant to skin and clothing, and always take repellant and a comprehensive first aid kit into the field. Ticks should be killed before removal (by directly applying repellant), as the shock of physical removal can stimulate them to release more toxin into their host.

Community Relations
As a diversity of people visit the cemetery close to the main entrance of the site, signage informing the public on the rehabilitation of the area, aims of the project, the conservation value of Duck Creek, and other relevant information, should be erected. This may assist with inciting support, extra help for the landcare group, ownership and the protection for local flora and fauna. It may also assist with the issue of dumping garden refuse in the upper slopes of the forest.

5.6 Monitoring

It is important to monitor the project through “before and after” photography. This provides a record of progress that will be useful to attract funding and identify successful techniques, as well as providing reassurance to workers and managers alike that their work has been useful. The slow success of rehabilitation works is best seen when specific photo points are established during the initial stages of the project and continually used. Records of work carried out including personnel, activities undertaken, weather conditions, successes and failures etc., are also invaluable monitoring tools.

Another important aspect of monitoring is maintaining species lists. The flora lists in this plan (Appendices 1 and 2) should be continually updated as new species are encountered. This not only provides useful data on the presence or absence of flora and fauna species that can be shared with various land managers, such as Ballina Shire Council, the Department of Land and Water Conservation (DLWC), and the National Parks and Wildlife Service, but will improve identification skills. The formation of a fauna species list can be compiled over time using the Daily Record Sheets (see Appendix 9)

It is recommended that permanent transect belts (approximately 4 per zone) be set up throughout the area with a number of them crossing through eco-tones and different vegetation types. Ongoing monitoring of these transects can provide valuable information on the natural repair of these ecosystems. Suggested data for collection could include species present (weed and native) at 3 different strata's (below 1m; 1-3m; above 3m), percentage of groundcovers – weed vs natives, and canopy cover according to the Specht classification system (1970). It is suggested that data be collected prior to regeneration works and then on a six monthly basis, and records kept for analysis. These can be collated and information set out in such a way so that it can be used for education.

6. CONCLUSION

This Duck Creek site contains good diversity and sufficient structure to make this restoration project feasible. If degradation is halted and sensitive regeneration is implemented and maintained, a valuable scientific and educational resource will be re-established. The positive outcomes for rehabilitating this area are many including:

- the conservation of Big Scrub rainforest in a landscape dominated by agricultural land,
- improved habitat for migratory and resident fauna species especially those already listed as threatened and,
- improving the general amenity of the area for recreational, aesthetic and educational purposes.

This will be a long-term process involving intensive weed control and will often be a delicate balance between primary and secondary works. The less intensive secondary weed control that follows will need to be incorporated with regular monitoring and follow up treatment on a permanent basis. Environmental restoration brings with it the opportunity for people to come together as a community while increasing our chance of a sustainable future.

7. REFERENCES

Floyd, A., 1990a. *Australian Rainforests in New South Wales*. Volume 1. Surrey Beatty and Sons, Sydney.

Floyd, A., 1990b. *Australian Rainforests in New South Wales*. Volume 2. Surrey Beatty and Sons, Sydney.

Morand, D. T., 1996. *Soil Landscapes of the Ballina 1:100 000 Sheet.* Soil Conservation Service, New South Wales.

8. RECOMMENDED READING

Management

Greening Australia, 1995. *Local Greening Plans: A Guide for Vegetation and Biodiversity Management*. Greening Australia, Canberra.

Bush Regeneration and Weed Control

Buchanen, R., 1989. *Bush Regeneration: Recovering Australian Landscapes*. TAFE Student Learning Publications, Sydney.

Wright, P. (ed.), 1991. *Bush Regenerators Handbook*. National Trust of Australia, Sydney.

Stanley, R., Dodkin, M., Love, A. and Dyason, R. (eds.), 1989. *Bitou Bush Control Handbook*. NSW Agriculture and Fisheries, Soil Conservation Service of NSW, and NSW National Parks and Wildife Service, Sydney.

NSW National Parks Wildlife Service (NPWS), 2001. *Bitou Bush Strategy*. NPWS, Sydney.

Scanlon, T., 2001. *NSW North Coast Camphor Laurel Kit*. North Coast Weeds Advisory Committee, Casino.

Plant Identification

Auld, B. and Medd, R., 1992. *Weeds: An Illustrated Guide to the Weeds of Australia*. Inkata Press, Sydney.

Big Scrub Rainforest Landcare Group, 1998. *Common Weeds of Northern NSW Rainforests: A Practical Manual on their Identification and Control*. Big Scrub Rainforest Landcare Group, Lismore.

Briggs, J.D. and Leigh, J.H., 1988. *Rare or Threatened Australian Plants*. Australian National Parks and Wildlife Service, Canberra.

Carolin, R. & Clarke, P. 1991. *Beach Plants of South Eastern Australia*. Sainty and Associates, Sydney.

Coastcare, 1998. *Attack of the Killer Weeds*. Department of Land and Water Conservation, Sydney.

Land Protection, Department of Natural Resources, 2000. *Weed Pocket Guide: South East Queensland*. Department of Natural Resources, Brisbane.

Floyd, A., 1989. *Rainforest Trees*. Inkata Press, Sydney.

Harden, G.J. (ed.), 1990-1993. *Flora of New South Wales*. Vols. 1 to 4. University Press, Sydney.

Johns, L. and Stevenson, V., 1979. *The Complete Book of Fruit*. Angus and Robertson, Sydney.
Jones, D., 1986. *Ornamental Rainforest Plants of Australia*. Reed, Sydney.

Robinson, L., 1991. *Field Guide to the Native Plants of Sydney*. Kangaroo Press, Sydney.

Williams, J.B. and Harden G.J., 1993. *Rainforest Climbing Plants: A Field Guide to the Rainforest Climbing Plants of New South Wales using Vegetative Characters*. University of New England, Armidale.

Williams, J.B., Harden G.J. and McDonald, W.J.F., 1984. *Trees and Shrubs in Rainforests of New South Wales and Southern Queensland*. University of New England, Armidale.

Plant Propagation

Environmental Training and Employment (EnviTE), 1998. *Coastal Plant Propagation Manual*. EnviTE, Lismore.

Ralph, M., 1997. *Growing Australian Native Plants from Seed for Revegetation, Tree Planting and Direct Seeding*. Murray Ralph/Bushland Horticulture, Melbourne.

Appendix 1: Native Plant Species List for the Study Site (Woodhead and Council property)

Trees and Shrubs

FAMILY	Botanical name	Common Name
AKANIACEAE	*Akania bidwillii*	Turnipwood
ALANGIACEAE	*Alangium villosum subsp. polyosmoides*	Muskwood
ANACARDIACEAE	*Euroschinus falcata var. falcata*	Ribbonwood
APOCYNACEAE	*Alyxia ruscifolia*	Prickly Alyxia
APOCYNACEAE	*Tabernaemontana pandacaqui*	Banana Bush
ARALIACEAE	*Polyscias elegans*	Celery Wood
ARECACEAE	*Archontophoenix cunninghamiana*	Bangalow Palm
ASTELIACEAE	*Cordyline rubra*	Red-fruited Palm Lily
BORAGINACEAE	*Ehretia acuminata*	Koda
CAPPARACEAE	*Capparis arborea*	Brush Caper Berry
CELASTRACEAE	*Cassine australis var. australis*	Red-fruited Olive Plum
EBENACEAE	*Diospyros pentamera*	Myrtle Ebony
ELAEOCARPACEAE	*Elaeocarpus angustifolius*	Blue Quandong
ELAEOCARPACEAE	*Sloanea australis*	Maiden's Blush
ELAEOCARPACEAE	*Sloanea woollsii*	Yellow Carabeen
EUPHORBIACEAE	*Briedelia exaltata*	Scrub Ironbark
EUPHORBIACEAE	*Claoxylon australe*	Brittlewood
EUPHORBIACEAE	*Drypetes deplanchei*	Yellow Tulip
EUPHORBIACEAE	*Glochidion ferdinandi*	Cheese Tree
EUPHORBIACEAE	*Mallotus discolor*	Yellow Kamala
EUPHORBIACEAE	*Mallotus philippensis*	Red Kamala
EUPOMATIACEAE	*Eupomatia bennettii*	Small Bolwarra
FABACEAE	*Castanospermum australe*	Black Bean
FLACOURTIACEAE	*Scolopia braunii*	Flintwood
ICACINACEAE	*Citronella moorei*	Churnwood
LAURACEAE	*Beilschmedia elliptica*	Grey Walnut
LAURACEAE	*Cinnamomum oliveri*	Oliver's Sassafras
LAURACEAE	*Cinnamomum virens*	Red-barked Sassafras
LAURACEAE	*Cryptocarya glaucescens*	Jackwood
LAURACEAE	*Cryptocarya micronuera*	Murrogun
LAURACEAE	*Cryptocarya obovata*	Pepperberry
LAURACEAE	*Endiandra muelleri subsp. muelleri*	Green-leaved Rose Walnut
LAURACEAE	*Endiandra pubens*	Hairy Walnut
LAURACEAE	*Litsea australis*	Brown Bolly Gum
LAURACEAE	*Neolitsea australiensis*	Green Bolly Gum
LAURACEAE	*Neolitsea dealbata*	White Bolly Gum
LORANTHACEAE	*Amyema congener subsp. congener*	A Mistletoe
MELIACEAE	*Anthocarapa nitidula*	Incense Cedar
MELIACEAE	*Dysoxylum fraserianum*	Rosewood
MELIACEAE	*Dysoxylum mollisimum*	Red Bean
MELIACEAE	*Dysoxylum rufum*	Hairy Rosewood
MELIACEAE	*Melia azedarach var. australasica*	White Cedar
MELIACEAE	*Toona ciliata*	Red Cedar
MIMOSACEAE	*Acacia melanoxylon*	Sally Wattle
MIMOSACEAE	*Archidendron muelleriannum*	Veiny Laceflower
MIMOSACEAE	*Pararchidendron pruinosum var.*	Snow-wood

	pruinosum	
MONIMIACEAE	*Daphnandra sp. A*	Socketwood
MONIMIACEAE	*Doryphora sassafras*	Sassafras
MONIMIACEAE	*Wilkiea huegeliana*	Veiny Wilkiea
MONIMIACEAE	*Wilkiea macrophylla*	Large-leaved Wilkiea
MORACEAE	*Ficus coronata*	Creek Sandpaper Fig
MORACEAE	*Ficus fraseri*	White Sandpaper Fig
MORACEAE	*Ficus obliqua*	Small-leaved Fig
MORACEAE	*Ficus superba var. henneana*	Deciduous Fig
MORACEAE	*Ficus watkinsiana*	Strangler Fig
MORACEAE	*Steblus brunonianus*	Whalebone Tree
MYRTACEAE	*Acmena hemilampra*	Broad-leaved Lilly Pilly
MYRTACEAE	*Archirhodomyrtus beckleri*	Rose Myrtle
MYRTACEAE	*Austromyrtus bidwillii*	Python Tree
MYRTACEAE	*Lophostemon confertus*	Brush Box
MYRTACEAE	*Pilidiostigma glabrum*	Plum Myrtle
MYRTACEAE	*Rhodamnia rubescens*	Scrub Turpentine
MYRTACEAE	*Rhodomyrtus psidioides*	Native Guava
MYRTACEAE	*Syzygium australe*	Scrub Cherry
MYRTACEAE	*Syzygium francisii*	Giant Water Gum
OLEACEAE	*Notelaea johnsonii*	Veinless Mock Olive
OLEACEAE	*Notelaea longifolia*	Large Mock Olive
PITTOSPORACEAE	*Hymenospermum flavum*	Native Frangipani
PITTOSPORACEAE	*Pittosporum multiflorum*	Orange Thorn
PITTOSPORACEAE	*Pittosporum undulatum*	Sweet Pittosporum
PROTEACEAE	*Grevillea robusta*	Silky Oak
PROTEACEAE	*Macadamia tetraphylla*	Macadamia Nut
PROTEACEAE	*Triunia youngiana*	Honeysuckle Bush
RHAMNANCEAE	*Alphitonia excelsa*	Red Ash
RUBIACEAE	*Canthium coprosmides*	Coast Canthium
RUTACEAE	*Flindersia australis*	Teak
RUTACEAE	*Flindersia schottiana*	Cudgerie
RUTACEAE	*Flindersia xanthoxyla*	Yellowwood
RUTACEAE	*Melicope micrococca*	Hairy-leaved Doughwood
RUTACEAE	*Pentacerus australis*	Crows Ash
RUTACEAE	*Sarcomelicope simplicifolia subsp. simplicifolia*	Bauerella
SAMBUCACEAE	*Sambucus australasica*	Native Elderberry
SAPINDACEAE	*Arytera distylis*	Twin-leaved Coogara
SAPINDACEAE	*Diploglottis australis*	Native Tamarind
SAPINDACEAE	*Ellatostachys nervosa*	Green Tamarind
SAPINDACEAE	*Guioa semiglauca*	Guioa
SAPINDACEAE	*Jagera pseudorhus var. pseudorhus*	Foambark Tree
SAPINDACEAE	*Mischocarpus pyriformis*	Yellow Pear-fruit
SAPINDACEAE	*Sarcopterix stipata*	Steelwood
SAPINDACEAE	*Toechime dasyrrhache*	Blunt-leaved Steelwood
SAPOTACEAE	*Pouteria australis*	Black Apple
SIMAROUBACEAE	*Quassia sp. 'Mt Nardi'*	Quassia
SOLANACEAE	*Duboisia myoporoides*	Soft Corkwood
STERCULIACEAE	*Brachychiton acerifolius*	Flame Tree
STERCULIACEAE	*Commersonia batramia*	Brown Kurrajong
STERCULIACEAE	*Heritiera trifoliolata*	White Booyong

STERCULIACEAE	*Sterculia quadrifida*	Peanut Tree
ULMACEAE	*Aphananthe philippinensis*	Native Elm
ULMACEAE	*Trema tomentosa*	Native Peach
URTICACEAE	*Dendrocnide excelsa*	Giant Stinging Tree
URTICACEAE	*Dendrocnide photinophylla*	Shining-leaved Stinging Tree

Vines and Climbers

FAMILY	**Botanical name**	**Common Name**
AMARANTHACEAE	*Deeringia arborescens*	Climbing Deeringia
ANNONACEAE	*Rauwenhoffia leichhardtii*	Zig-Zag Vine
APOCYNACEAE	*Melodinus australis*	Southern Melodinus
APOCYNACEAE	*Parsonsia longipetiolata*	Green-leaved Silkpod
APOCYNACEAE	*Parsonsia straminea*	Common Silkpod
ARACEAE	*Pothos longipes*	Pothos
ARECACEAE	*Calamus muelleri*	Lawyer Vine
ARISTOLOCHIACEAE	*Pararistolochia praevenosa*	Aristolochia
ASCLEPIADACEAE	*Marsdenia rostrata*	Common Milk Vine
BIGNONIACEAE	*Pandorea jasminoides*	Bower Vine
BIGNONIACEAE	*Pandorea pandorana*	Wonga Vine
CAESALPINIACEAE	*Caesalpinia scortechinii*	Large Prickle Vine
CAESALPINIACEAE	*Caesalpinia subtropica*	Corky Prickle Vine
CELASTRACEAE	*Hippocraetia barbata*	Knot Vine
CUCURBITACEAE	*Diplocyclos palmatus*	Native Bryony
DILLENIACEAE	*Hibbertia scandens*	Twining Guinea Flower
DIOSCOREACEAE	*Dioscorea transversa*	Native Yam
FABACEAE	*Austrosteenisia glabristyla*	Giant Blood Vine
FABACEAE	*Derris involuta*	Native Derris
FABACEAE	*Milletia megasperma*	Native Wistaria
FLAGELLARIACEAE	*Flagellaria indica*	Whip Vine
LAZURIAGACEAE	*Geitonoplesium cymosum*	Scrambling Lily
MENISPERMACEAE	*Carronia multisepalea*	Carronia
MENISPERMACEAE	*Legnephora moorei*	Round-leaf Vine
MENISPERMACEAE	*Stephania japonica var. discolor*	Snake Vine
MENISPERMACEAE	*Tinospora tinosporoides*	Arrow-head Vine
MORACEAE	*Maclura cochinchinensis*	Cockspur Thorn
MORACEAE	*Trophis scandens*	Burny Vine
MYRSINACEAE	*Embelia australiana*	Embelia
OLEACEAE	*Jasminum dallachii*	Soft Jasmine
PIPERACEAE	*Piper nova-hollandiae*	Giant Pepper Vine
RIPOGONACEAE	*Ripogonum album*	White Supplejack
RIPOGONACEAE	*Ripogonum discolor*	Prickly Supplejack
ROSACEAE	*Rubus moluccanus*	Molucca bramble
ROSACEAE	*Rubus rosifolius*	Rose-leaf Bramble
SMILACACEAE	*Smilax australis*	Austral Sarsaparilla
VITACEAE	*Cayratia eurynema*	Soft Water Vine
VITACEAE	*Cissus antartica*	Water Vine

Ferns, Grasses and Groundcovers

FAMILY	Botanical name	Common Name
ACANTHACEAE	*Pseuderantherum variabile*	Pastel Flower
ADIANTACEAE	*Adiantum aethiopicum*	Common Maidenhair
ADIANTACEAE	*Adiantum diaphanum*	Filmy Maidenhair
ADIANTACEAE	*Adiantum hispidulum*	Rough Maidenhair
APIACEAE	*Centella asiatica*	A Pennywort
APIACEAE	*Hydrocotyle acutiloba*	A Pennywort
ARACEAE	*Alocasia brisbanensis*	Cunjevoi
ASPLENIACEAE	*Asplenium australasicum*	Bird's Nest Fern
ASTERACEAE	*Sigesbeckia orientalis subsp. orientalis*	Indian Weed
BLECHNACEAE	*Doodia aspera*	Rasp Fern
BLECHNACEAE	*Doodia caudata*	Small Rasp Fern
CAMPANULACEAE	*Wahlenbergia stricta subsp. stricta*	Tall Bluebell
CARYOPHYLLACEAE	*Drymaria cordata*	Tropical Chickweed
COMMELINACEAE	*Commelina cyanea*	Commelina
COMMELINACEAE	*Pollia crispata*	Pollia
CONVOLVULACEAE	*Dichondra repens*	Kidney Weed
CYATHEACEAE	*Cyathea australis*	Rough Tree Fern
CYATHEACEAE	*Cyathea cooperi*	Straw Tree Fern
CYATHEACEAE	*Cyathea leichhardtiana*	Prickly Tree Fern
CYPERACEAE	*Carex inversa*	Knob Sedge
CYPERACEAE	*Cyperus tetraphyllus*	A Sedge
DAVALLIACEAE	*Arthropteris tenella*	Climbing Fishbone Fern
DAVALLIACEAE	*Davallia solida var. pyxidata*	Hare's Foot Fern
DAVALLIACEAE	*Nephrolepis cordifolia*	Fishbone Fern
DENNSTAEDTIACEAE	*Dennstaedtia davallioides*	Lacy Ground Fern
DENNSTAEDTIACEAE	*Hypolepis glandulifera*	Downy Ground Fern
DENNSTAEDTIACEAE	*Hypolepis muelleri*	Harsh Ground Fern
DENNSTAEDTIACEAE	*Pteridium esculentum*	Bracken
DICKSONIACEAE	*Calochlaena dubia*	Common Ground Fern
DRYOPTERIDACEAE	*Lastreopsis marginans*	Bordered Shield Fern
DRYOPTERIDACEAE	*Lastreopsis microsora*	Creeping Shield Fern
DRYOPTERIDACEAE	*Lastreopsis munita*	Naked Shield Fern
GENTIANACEAE	*Centaurium spicatum*	Spike Centaury
GERANIACEAE	*Geranium solanderi*	Native Geranium
LAMIACEAE	*Plectranthus parviflorus*	Few-flowered Plectranthus
LOMANDRACEAE	*Lomandra spicata*	Rainforest Mat-rush
PHORMIACEAE	*Dianella caerulea*	Blue Flax Lily
POACEAE	*Cenchrus caliculatus*	Hillside Burrgrass
POACEAE	*Digitaria didactyla*	Queensland Blue Couch
POACEAE	*Oplismenus aemulus*	Basket Grass
POACEAE	*Oplismenus imbecillis*	Basket Grass
POACEAE	*Panicum pygmaeum*	Pygmy Panic
POLYPODIACEAE	*Microsorum scandens*	Fragrant Fern
POLYPODIACEAE	*Platycerium bifurcatum subsp. bifurcatum*	Elkhorn
POLYPODIACEAE	*Platycerium superbum*	Staghorn
POLYPODIACEAE	*Pyrrosia rupestris*	Rock Felt Fern
PORTULACACEAE	*Portulaca oleracea*	Pigweed
PSILOTACEAE	*Psilotum nudum*	Skeleton Fork Fern

PTERIDACEAE	*Pteris tremula*	Tender Brake
PTERIDACEAE	*Pteris umbrosa*	Jungle Brake
SINOPTERIDACEAE	*Cheilanthes distans*	Bristly Cloak Fern
SINOPTERIDACEAE	*Pellaea falcata*	Sickle Fern
THELYPTERIDACEAE	*Christella dentata*	Binung
URTICACEAE	*Elatostema reticulatum var. reticulatum*	Elatostema
ZINGIBERACEAE	*Alpinia caerulea*	Native Ginger

Aquatic and Wetland Plants

AMARANTHACEAE	*Alternanthera denticulata*	Lesser Joyweed
APIACEAE	*Hydrocotyle tripartita*	Pennywort
ASTERACEAE	*Eclipta prostrata*	Eclipta
CYPERACEAE	*Carex appressa*	Tall Sedge
CYPERACEAE	*Carex lobolepis*	A Sedge
CYPERACEAE	*Cyperus polystachyos*	Bunchy Flat-sedge
CYPERACEAE	*Cyperus sanguinolentus*	Cyperus
CYPERACEAE	*Cyperus sphaeroideus*	Cyperus
CYPERACEAE	*Isolepis inundata*	A Club-rush
CYPERACEAE	*Schoenoplectus mucronatus*	Schoenoplectus
HALORAGACEAE	*Myriophyllum latifolium*	A Water-milfoil
JUNCACEAE	*Juncus prismatocarpus*	A Rush
JUNCACEAE	*Juncus usitatus*	Common Rush
LEMNANCEAE	*Spirodela punctata*	Thin Duckweed
ONAGRACEAE	*Ludwigia octovalvis*	Willow Primrose
ONAGRACEAE	*Ludwigia peploides subsp. montevidensis*	Water Primrose
POACEAE	*Arthraxon hispidus*	Arthraxon
POACEAE	*Leersia hexandra*	Swamp Rice Grass
POACEAE	*Sacciolepis indica*	Indian Cupscale Grass
POLYGONACEAE	*Persicaria hydropiper*	Water Pepper
POLYGONACEAE	*Persicaria strigosa*	Prickly Smartweed
POLYGONACEAE	*Rumex brownii*	Swamp Dock
POTAMOGETONACEAE	*Potamogeton javanicus*	A Pondweed
RANUNCULACEAE	*Ranunculus inundatus*	Swamp Buttercup

Appendix 2: Weed Species List for Study Site (Woodhead and Council property)

Trees and Shrubs

FAMILY	Botanical name	Common Name
AMYGDALACEAE	**Prunus persica*	Peach
ARALIACEAE	**Schefflera actinophylla*	Umbrella Tree
ASTERACEAE	**Baccharis halimifolia*	Groundsel Bush
BIGNONIACEAE	**Tababuia chrysantha*	Golden Trumpet Tree
CAESALPINIACEAE	**Senna septemtrionalis*	Smooth Senna
LAURACEAE	**Cinnamomum camphora*	Camphor Laurel
MALACEAE	**Eriobotrya japonica*	Loquat
MYRSINACEAE	**Ardisia crenata*	Coral Berry
MYRTACEAE	**Eugenia uniflora*	Brazilian Cherry
MYRTACEAE	**Psidium guajava*	Guava
OCHNACEAE	**Ochna serrulata*	Ochna
OLEACEAE	**Ligustrum lucidum*	Large-leaved Privet
OLEACEAE	**Ligustrum sinense*	Small-leaved Privet
PINACEAE	**Pinus elliottii*	Slash Pine
RUBIACEAE	**Coffea arabica*	Coffee
RUTACEAE	**Citrus X taitensis*	Bush Lemon
RUTACEAE	**Murraya paniculata*	Orange Jessamine
SOLANACEAE	**Cestrum aurantiacum*	Orange Cestrum
SOLANACEAE	**Cestrum parqui*	Green Cestrum
SOLANACEAE	**Solanum mauritianum*	Tobacco Bush
ULMACEAE	**Celtis australis*	Nettle Tree
VERBENACEAE	**Lantana camara*	Lantana

Vines

ARISTOLOCHIACEAE	**Aristolochia littoralis*	Dutchman's Pipe
ASCLEPIADACEAE	**Araujia sericifera*	Moth Vine
ASPARAGACEAE	**Protasparagus plumosus*	Climbing Asparagus
BASELLACEAE	**Anredera cordifolia*	Maidera Vine
CAESALPINIACEAE	**Caesalpinia decapetala*	Thorny Poinciana
PASSIFLORACEAE	**Passiflora edulis*	Edible Passionfruit
PASSIFLORACEAE	**Passiflora suberosa*	Corky Passionfruit
PASSIFLORACEAE	**Passiflora subpeltata*	White Passionflower
SOLANACEAE	**Solanum seaforthianum*	Climbing Nightshade

Herbs, Ferns and Groundcovers

FAMILY	*Botanical name*	Common Name
AMARANTHACEAE	**Amaranthus quitensis*	South American Amaranth
APIACEAE	**Ciclospermum leptophyllum*	Slender Celery
ASCLEPIADACEAE	**Gomphocarpus fruticosus*	Narrow-leaved Cotton Bush
ASTERACEAE	**Ageratina adenophora*	Crofton Weed
ASTERACEAE	**Ageratina riparia*	Mistflower
ASTERACEAE	**Ageratum houstonianum*	Blue Billygoat Weed
ASTERACEAE	**Ambrosia artemisiifolia*	Annual Ragweed
ASTERACEAE	**Bidens pilosa*	Cobbler's Pegs

ASTERACEAE	**Cirsium vulgare*	Scotch Thistle
ASTERACEAE	**Crassocephalum crepidioides*	Thickhead
ASTERACEAE	**Galinsoga parviflora*	Potato Weed
ASTERACEAE	**Gnaphalium coarctatum*	A Cudweed
ASTERACEAE	**Hypochaeris radicata*	Catsear
ASTERACEAE	**Senecio madagascariensis*	Fireweed
ASTERACEAE	**Sonchus oleraceus*	Common Sowthistle
CARYOPHYLLACEAE	**Stellaria media*	Chickweed
COMMELINACEAE	**Tradescantia fluminensis*	Wandering Creeper
CYPERACEAE	**Cyperus brevifolius*	Mullumbimby Couch
CYPERACEAE	**Cyperus rotundus*	Nutgrass
EUPHORBIACEAE	**Chamaesyce nutans*	A Caustic Weed
EUPHORBIACEAE	**Euphorbia peplus*	Petty Spurge
FABACEAE	**Trifolium fragiferum*	Strawberry Clover
FABACEAE	**Trifolium repens*	White Clover
LYTHRACEAE	**Cuphea carthagenensis*	Cuphea
MALVACEAE	**Sida rhombifolia*	Paddy's Lucerne
OXALIDACEAE	**Oxalis debilis var. corymbosa*	Oxalis
PHYTOLACCACEAE	**Phytolacca octandra*	Inkweed
PHYTOLACCACEAE	**Rivena humilis*	Red-fruited Coral Berry
POACEAE	**Andropogon virginicus*	Whiskey Grass
POACEAE	**Avena sativa*	Oats
POACEAE	**Briza minor*	Shivery Grass
POACEAE	**Bromus catharticus*	Prairie Grass
POACEAE	**Chloris gayana*	Rhodes Grass
POACEAE	**Eragrostis tenuifolia*	Elastic Grass
POACEAE	**Lolium multiflorum*	Italian Ryegrass
POACEAE	**Melinus repens*	Red Natal Grass
POACEAE	**Paspalum dilatatum*	Paspalum
POACEAE	**Paspalum urvillei*	Vasey Grass
POACEAE	**Paspalum wettsteinii*	Broad-leaved Paspalum
POACEAE	**Pennisetum clandestinum*	Kikuyu Grass
POACEAE	**Setaria sphacelata*	Setaria
POACEAE	**Sporobolis indicus var. capensis*	Parramatta Grass
POACEAE	**Stenotaphrum secundatum*	Buffalo Grass
PORTULACACEAE	**Talinum paniculatum*	Talinum
RUBIACEAE	**Richardia brasiliensis*	White Eye
SOLANACEAE	**Solanum capsicoides*	Devil's Apple
SOLANACEAE	**Solanum nigrum*	Black-berry Nightshade
SOLANACEAE	**Solanum pseudocapsicum*	Jerusalem Cherry
VERBENACEAE	**Verbena bonariensis*	Purpletop
VERBENACEAE	**Verbena rigida*	Veined Verbena

Aquatic and Wetland Plants

ARACEAE	**Xanthosoma violaceum*	Blue Taro
BRASSICACEAE	**Cardamine hirsuta*	Common Bittercress
HALORAGACEAE	**Myriophyllum aquaticum*	Parrots Feather
HYDROCHARITACEAE	**Egeria densa*	Dense Waterweed
POACEAE	**Urochloa mutica*	Para Grass

Appendix 3: Weed Profiles Duck Creek

This appendix provides profiles of significant weed occurring at the Duck Creek study site.

TREES & SHRUBS

Amygdalaceae
Prunus persica
Peach, Nectarine
Small to medium-sized deciduous tree. Varioius cultivars are grown for their edible fruits and as ornamentals, sometimes naturalised from discareded seeds. Native of East Asia (Harden, 1990, Vol.1)

Araliaceae
Schefflera actinophylla
Umbrella Tree
Native of North Queensland and naturalized in coastal districts of Far North Coast of N.S.W. A tree to 10 metres high, often multi-stemmed and sometimes epiphytic on rainforest trees (Harden, 1992, 87) making removal difficult. Its red fruit is dispersed by birds. Adventitious roots form readily from stem segments which remain in contact with the ground.

Asteraceae
Baccharis halimifolia
Groundsel Bush
Native of E. North America. Perennial shrub 1-6 metres high, grows in swampy areas near the sea, often behind mangroves (Harden, 1992, 200). It has the ability to form impenetrable thickets (Auld & Medd, 1992, 85). A declared W2 noxious weed for the Far North Coast of N.S.W. (W2 weeds must be continuously suppressed and destroyed).

Erythrina x sykseii
Coral Tree
Hybrid probably from New Zealand. A tree to 15 metres high which does not set fruit. It readily grows from old stumps and cuttings (Harden, 1991, 414). Its bulk displaces native vegetation. Often found on stream banks and spreads through floating fallen branches.

Senna septemtrionalis
Smooth Senna
Native of Mexico. A shrub 1-3 metres high. It does not produce root nodules and is frequently naturalized in moist sclerophyll forest and disturbed rainforest (Harden, 1991, 319). It produces a large number of seeds which appear to have a long viability, possibly for years.

Lauraceae
Cinnamomum camphora
Camphor Laurel
Native of China and Japan. A large tree of spreading habit that can grow to approximately 25-30 metres. It has abundant seed production, effective dispersal mechanism, mainly by birds, and some seed dormancy. It is a hardy, long-living competitive tree which can also reproduce rapidly by suckering to form single species stands. Camphor Laurel prefers deep, well-drained red soil but will grow well on alluvial soil; it cannot, however, tolerate prolonged flooding (Firth, 1992, p.69). It is extensively naturalized in coastal areas on the North Coast of NSW (Harden, 1990, p.144). It is a declared W4(d) noxious weed (i.e. must not be sold, propagated or knowingly distributed and must be fully and continuously suppressed and destroyed).

Malaceae
Eriobotrya japonica
Loquat
Small to medium tree, prefering sunny positions, found alongside roadsides, forest margins, fencelines, gaps in rainforest and in regrowth (The Big Scrub Rainforest Landcare Group, 2000). Flowers are white, flowering in autumn, with the fruit maturing in the following spring (Harden, 1990 Vol. 1). Fruits are dispersed by birds, rodents, bats, possums and people (The Big Scrub Rainforest Landcare Group, 2000). The plant germinates readity from seed, roots tap and lateral.

Myrtaceae
Eugenia uniflora
Brazilian Cherry
Native of Brazil. A broad, compact shrub with deep green, glossy foliage with rich wine-coloured new growth. Crushed leaves have a pungent, agreeable odour. Fruit is 2.5 cm. in diameter, deep crimson, fleshy and readily dispersed by birds (Popenoe, 1974, 286).

Psidium guajava
Guava
A shrub or small tree up to 6 metres high (Harden, 1991, 192). Its fleshy berries are attractive to birds which disperse the seed. It is resistant to glyphosate.

Ochnaceae
Ochna serrulata
Mickey Mouse Bush
Shrub two to three metres high. Leaves oblong to narrow elliptic, margins toothed. Ovoid drupes, five to eight millimetres long, black and embedded on a swollen red receptacle. Often cultivated. Native of South Africa (Harden, 1990, p. 490).

Oleaceae
Ligustrum lucidum
Large-leaved Privet
Native of China and Japan. A shrub to small tree up to 10 metres high which is an invasive weed, especially of coastal rainforests (Harden, 1992, 473). It is adapted to low light levels, coppices readily when damaged and has a mass of fibrous roots near the surface of the ground, these roots efficiently utilize the available moisture and nutrients in the soil to the detriment of any nearby plant. Each mature plant can produce from 10,000 to 100,000.00 seeds, which have a 1-2 year viability and are effectively spread by birds (Buchanan, 1989, 67-68).

Ligustrum. sinense
Small-leaved Privet
native of China a shrub to about 3 metres high. An invasive weed, especially on the margins of rainforest (Harden, 1992, 471). It is adapted to low light levels, coppices and suckers readily and has a mass of fibrous roots near the surface of the ground. These roots efficiently utilize the available moisture and nutrients in the soil to the detriment of any nearby plant. It can form thickets within the forest. Each plant can produce approximately 600 seedlings per square metre and seeds are effectively dispersed by birds (Buchanan, 1989, 67).

Pinaceae
Pinus elliottii
Slash Pine
A tall tree with ascending branches high on the trunk; the bark is reddish, shedding in thin scalesThe tree is native to SE USA to Central America and the West Indies. (Harden, 1990–1993). Needle like leaves create a thick sterile layer beneath the tree.

Solanum mauritianum
Wild Tobacco
A shrub or small tree up to 4 metres high, widely naturalized in rainforest regrowth (Harden, 1992, 359). Its fruit are dispersed by birds. In areas of higher light levels it can form thick stands displacing native species by competing for water, space and nutrients.

Rubiaceae
Coffea arabica
Coffee
Shrub to small tree. Prefers deep, free-draining soils; very shade tolerant; prefers dappled light. Flowers are white, fragrant star-shaped; autumn. Fruit is red when ripe; seed viable up to three years; late autumn - spring. Fruits are dispersed by birds, rodents and water (The Big Scrub Rainforest Landcare Group, 2000).

Rutaceae
Murraya paniculata
Orange Jessamine
Bushy shrub to small tree. Prefers well drained fertile soils, found in dry rainforests and in lowland subtropical rainforests on alluvial soils. Flowers are white, fragment, and flower in spring, with autumn flush. Fruit/seeds are bright red, shiny; seed: dull yellowish-grey; chiefly summer. Fruits/seeds are dispersed by birds, water, and human activities. Germinates easily from seed (The Big Scrub Rainforest Landcare Group, 2000).

Solanaceae
Cestrum parqui
Green Cestrum
A native to Chile and Peru, this long-lived perennial woody shrub grows to 3m and is partly decicuous in winter. It has invaded many bushland areas on disturbed sites and grows well on moist soils including creek banks. This garden escape is further dispursed by birds, water and from suckering. Flowers are greenish yellow and tubular born in clusters on the ends of branches and occur in autumn/summer. They are followed by a purplish-black shiny ovoid fruit. The fruits are thought to be toxic to stock, birds and bees.

Ulmaceae
Celtis australis
Neetle Tree
Medium-sized decidous tree. Often cultivated, rerely naturalised, chiefly in southern districts. Native of Africa (Harden, 1990).

Verbenaceae
Lantana camara
Lantana
Native of tropical South America. A scrambling shrub that often forms dense thickets (Harden, 1992, p.614) and can climb over 20 metres into trees. It grows best on well-drained, fertile soils including nutrient-enriched sands; roots also develop on branches that contact the ground, aiding its spread. It produces abundant seed, which is effectively dispersed by birds. According to Richard Lamb of Sydney University, when Lantana is present, particularly in sclerophyll communities, litter fall and nutrient turnover is altered, populations of native seeds are depleted, new seedlings are suppressed, soil structure is altered and micro-climate is changed, and some nutrients may be mobilized and lost to neighboring communities and others accumulated in unnatural amounts. These changed conditions seem to further favour Lantana and other weeds over native species (Buchanan, 1989, p.72) and in many forest areas can block secondary succession. It is a declared W3 noxious weed (i.e. must be prevented from spreading and its numbers reduced).

VINES & SCRAMBLERS

Aristolochiaceae
Aristolochia littoralis
Dutchmans Pipe
Strong perennial climber. Prefers protected positions in moist, well-drained soils; common garden plant. Flowers are flared, pipe-shape, cream colour with purple/brown mottles; November to March. Fruit/seed are parachute like brown capsules and are prolific seeders. Fruits/seeds are dispersed through expulsion, wind, water and insects. Seeds germinate readily. Roots are lateral underground, and are also surface runners.

Asclepidiaceae
Araujia sericiflora
Moth Vine
Native of Peru. A climber with twining stems to 5 metres high. It is widely naturalized and often grows in disturbed areas (Harden, 1992, 527). Each fruit contains many wind-dispersed seeds, making this plant difficult to contain.

Asparagaceae
Protasparagus plumosus
Climbing Asparagus
Perennial vine with wiry stem. It is a serious bushland weed once established. Difficult to eradicate; occurs on rainforest margins and tolerates low light conditions; tolerates various soils. Flowers are greenish white; solitary or paired; which flower in spring and summer. Fruit/seeds are black berries which fruit in June, and are dispersed by birds, ants, water, and rubbish dumping. Seeds are germinated readily. Broken rhizomes regrow, and are found underground, roots are fiburous (The Big Scrub Rainforest Landcare Group, 2000)

Basellaceae
Anredera cordifolia
Madeira Vine
Native of S. America. A climber with stems up to 20 metres long, producing tubers on roots and at nodes on aerial stems. It is widely naturalized in coastal districts, and is an invasive weed on the margins of rainforest (Harden, 1990, 177). This vine is extremely prolific, growing over 1 metre per week in warm, humid conditions. It produces countless vegetative aerial tubers which drop to the ground and remain dormant if conditions are not suitable for their growth. These tubers are spread by water, downhill movement and possibly rodents. The vine will rapidly smother plants of all sizes, destroying them through weight and inhibition of photosynthesis, and can block secondary succession (Hopkins). It is extremely difficult to control and is considered to be the most serious and destructive plant pest species affecting the North Coast rainforest remnants.

Caesalpiniaceae
Caesalpenia decapetala
Thorny Poinciana
Native of Southern and eastern Asia (Indonesia). A scrambling or climbing evergreen shrub up to 3m or as high as the host plant. Flowers are yellow with pink stamens and occur in winter followed by a legumenous, green pod. The very thorny stem coppices and the root system suckers. It is dispersed by birds and in particular finches, lorikeets and parrots and also water.

Passifloraceae
Passiflora edulis
Edible Passionfruit
Native of America. A climber which is often naturalized on the edge of rainforest and moist gullies (Harden, 1990, 434). This plant bears heavy fruit whose seeds are readily dispersed by birds and animals. Its foliage cover inhibits photosynthesis of supporting plants, which can also be damaged by its weight.

Passiflora. suberosa
Corky Passionfruit
Native of S. America. A slender vine with corky stems occasionally naturalized in disturbed rainforest in warmer areas (Harden, 1990, 435). Its foliage cover inhibits photosynthesis of supporting plants, which can also be damaged by its weight. Its seed is dispersed by birds and animals.

Passiflora subpeltata
White Passionflower
Native of Brazil. A climber which is a widespread weed along the coast on margins of rainforest and moist gullies (Harden, 1990, 435). Its foliage cover inhibits photosynthesis of supporting plants, which can also be damaged by its weight. Its seed is dispersed by birds and animals.

Solanum seaforthianum
Climbing Nightshade
Native of S. America. Sprawling perennial shrub or climber, naturalized in moister sites (Harden, 1992, 359). Like other vines, it causes stress on the support plant by its smothering action and weight. Its red berries are dispersed by birds

HERBS, FERNS AND GRASSES

Asteraceae
Ageratina adenophora
Crofton Weed
Native of Mexico. Erect, perennial, branched herb up to 1-2 metres high, growing in disturbed moist sites on fertile soils (Harden, 1992, 151). Its seeds are dispersed mainly by wind, it can form a dense cover inhibiting and sometimes preventing natural native regeneration. A declared Category 3 noxious weed in the Far North Coast of N.S.W. (W3 - weed must be prevented from spreading and its numbers and distribution reduced).

Ageratina riparia
Mistflower
Native of Mexico. Erect, perennial, sometimes decumbent herb, 0.3-1 metres high. Grows in disturbed damp sites, often in or near rainforests (Harden, 1992, 151). Its seeds are dispersed mainly by wind, and vegetative fragments can carry downstream. It can form a dense cover, inhibiting and sometimes preventing natural native regeneration. A declared Category 3 noxious weed in the Far North Coast of N.S.W. (see *a. adenophora*).

Ageratum houstonianum
Blue Billy Goat Weed
Native of Mexico. Common weed of wasteland north of Sydney. Erect or decumbent branched herb, 0.3-1 metre high, coarsely hairy or nearly glabrous. Leaves ovate to triangular, two to seven centimetres long. Margins are regularly toothed and both surfaces have scattered hairs. Florets are blue-mauve (Harden, 1992, p.150).

Ambrosia artemisiifolia
Ragweed
Native of N. America. An annual herb to 2 metres high, a weed of roadsides and wastelands (Harden, 1992, 268).

Bidens pilosa
Farmers Friends/Cobbler's Pegs
One of four similar species occurirng in NSW and native of the Americas. The plant is an erect annual herb that produces dark slender seeds with barbed spines. Farmers Friends, also know as Cobbler's Pegs, are weeds of disturbed areas, roadsides and wastelands. The seeds cling to clothing. (Auld and Medd 1999)

Senecio madagascariensis
Fire Weed
Annual or biennial herb, 20-60 centimetres high, mostly erect, sometimes much-branched, glabrous or sparsely hairy. Leaves variable. Flowers chiefly spring to autumn. Toxic to cattle and horses if eaten. Native of South Africa (Harden, 1992, p.308).

Commelinaceae
Tradescantia fluminensis (albiflora)
Wandering Jew
Native of S. America. A perennial succulent herb with fibrous roots and branching stems which readily take root at the nodes. It is naturalized on creek banks and in shaded places, especially rainforests (Harden, 1993, 257). Its resistance to herbicide and its growth habit make this plant difficult to eradicate. This dense groundcover suppresses the germination and growth of native species, thereby blocking secondary succession. It has been observed, however, that those species whose seed is large can penetrate and grow well e.g. Black Bean.

Phytolaccaceae
Phytolacca octandra
Inkweed
Herb one to two metres high, woody at the base. Stems and flowers green to pinkish. Flowers in spring and summer, fruit red turning to back when ripe. Usually found in moist areas. Native of tropical America (Harden, 1990, p.176).

Rivina humilis
Coral Berry
Native of S. America. A shrub or perennial herb up to 1 metre high, growing chiefly on the coast in or on the margins or rainforest, often common in lowland subtropical rainforest (Harden, 1990, 176). It is moderately shade-tolerant, forming a dense understorey and can thereby suppress secondary succession. It bears numerous red berries almost all year round, making it difficult to control.

Poaceae
Chloris gayana
Rhodes Grass
Native of Africa. An erect perennial grass up to 1.2 metres high (Harden, 1993, 461).
A course leaved, perennial, tufted grass up to 1.2m tall, with runners that root at the joints. Seeds are crowded along a series of up to 12 spikes radiating from the top of the seed stalk. Native to African.(Kleinschmidt et al, 1996)

Melinus repens
Red Natal Grass
A native of South America the gras is a perennial or annual with erect slender stems up to 1m high. Flowers are a panicle of silvery white to pink or purple silky, hairy spikelet. *M. ripens* is a widespread roadside and railway embankment weed, particularly in coastal NSW and Qld. (Auld & Medd, 1999)

Paspalum wettsteinii
Broad-leaved Paspalum
Native of America. A naturalized, tufted perennial grass (Harden, 1993, 467).

Pennisetum clandestinum
Kikuyu
A native of Africa. A creeping perennial grass with very long, robust stolons and rhizomes forming a mat. Kikuya is used widely as a lawn grass and is a common pasture grass in coastal subtropical Australia.

Setaria sp.
Setaria
An introduced summer-flowering grass. A densely to compactly tufted perennial to 2 metres high. It is naturalized in areas of the North Coast (Harden, 1993, 496).

Stenotaphrum secundatum
Buffalo Grass
Glabrous, stoloniferous perennial to 0.3 metres high. Flowers in Summer. Grows on the coast but cultivated elsewhere. Native of America and Africa (Harden, 1993, p.541).

Rubiaceae
Ricardia brasiliensis
Brazil Weed/ White Eye/Mexican Clover
A pale green, softly hairy, usually prostrate, clump forming perrenial with opposite leaves. Flowers are very small, white and thickly clustered in the leaf forks. Native to South America.

Solanaceae
Solanum nigrum
Blackberry Nightshade
Native of Europe. A herb or short-lived perennial which flowers mainly in spring and produces numerous dull black or purple-black berries (Harden, 1992, 356) which are bird-dispersed.

*References***:**
Auld, B. and Medd, R., 1992. *Weeds: An Illustrated Botanical Guide to the Weeds of Australia*. Inkata Press, Sydney.
Buchanen, R., 1989. *Bush Regeneration: Recovering Australian Landscapes*. TAFE Student Learning Publications, Australia.
Eby, P. and Palmer, C., 1988. Flying Foxes in Remnants in Northern New South Wales. In Phillips, S. (ed.), 1991. *Rainforest Remnants*. NSW National Parks and Wildlife Service, Sydney.
Harden, G. (ed.), 1990–1993. *Flora of New South Wales*. Vols. 1-4. NSW University Press, Sydney.
Stanley, R., Dodkin, M, Love, A. and Dyason, R. (eds.), 1989. *Bitou Bush Control Handbook*. NSW Agriculture and Fisheries, Soil Conservation Service of NSW, and NSW National Parks and Wildlife Service, Sydney.

Source: adapted from Joseph, R. 1995. *Rainforest Remnants Restoration and Rehabilitation Project Incorporating Plant Pest Species Survey and Prior Works Documentation: Boatharbour Nature Reserve*. NSW National Parks and Wildlife Service, Alstonville.
Joseph, R., McDonald, T., Stewart, B. and Fitzgerald, M., 1998. *Tweed Coast Littoral Rainforests: Draft SEPP 26 Management Plan*. Tweed Shire Council, Tweed Heads.

Appendix 4: Weed Treatment Methods

1. "Cut-scrape-paint": this method applies to all woody shrubs, trees and some vines.

(a) Cut plant low to the ground at an angle.

(b) Apply Glyphosate immediately at the rate of 1 part Glyphosate: 1.5 parts water, with a paintbrush approximately 1.5 centimetres wide.

(c) Scrape sides lightly to reveal green tissue and apply the herbicide to the scraped area.

(d) Take care that the brush is not contaminated with soil.

Note: all seed that has high viability and longevity, e.g. *Senna* spp. and other members of the Fabaceae family, or plants with a high invasive potential, such as *Schefflera actinophylla*, must be removed from the parent and either composted on site or removed from the site.

2. "Gouge-paint": this method applies to those plant species that have a fleshy root system, such as rhizomes or large bulbs. It is particularly appropriate for the treatment of *Protasparagus* spp. (Asparagus).

(a) Gouge out sections of the fleshy base with a knife (if using on Asparagus, first cut the stems at shoulder height and also at the base).

(b) Apply 1 part Glyphosate: 1.5 parts water immediately, with a paint brush approximately 1.5 centimetres wide.

3. "Stem Injection": this method applies to all woody trees and shrubs with a diameter of about six to ten centimetres or greater.

(a) With a tomahawk, make a cut the width of the blade, at a slight angle, into the trunk. **Note:** it is important not to make cuts too deep.

(b) Apply herbicide immediately into the cut using a tree-injecting device (if using Glyphosate, apply at the rate of 1 part Glyphosate: 1.5 parts water).

(c) Repeat this procedure in a brickwork pattern around the circumference of the tree, as close to the ground as possible. Where the presence of a crotch angle makes this difficult, make a cut above it. **Note:** two rows of cuts will be sufficient for trees with trunks of six to ten centimetres; larger trunk diameters will need correspondingly more.

(d) Treat all visible lateral roots as per (a).

4. "Scrape-ditch-paint": this method is applicable to many species of vines where it is desirable to treat the vines intact, particularly those with aerial tubers such as *Anredera corifolia* (Madeira Vine) or those which will propagate from segments, e.g. *Delairia odorata* (Cape Ivy).

(a) Scrape the stem tissue on one side of the stem only for at least 20-30 centimetres if possible. **Note:** on Madeira Vine, it is necessary to scrape heavily. Scrape as many sections of the stem as possible.

(b) Apply undiluted Glyphosate with a paintbrush.

(c) On stems that are thicker or horizontal, make a ditch into the stem with a knife and apply herbicide. Tubers and side roots should be treated the same way. **Note:** care must be taken not to sever the stem.

5. "Spraying": this is carried out using a 15 litre backpack spray unit with a modified spray nozzle that gives a solid spray pattern. Glyphosate is the main herbicide used with the addition of a marker dye. For plants that show some resistance (e.g. Madeira Vine) or where growing conditions are not optimal, an acidifying agent, such as Protec® is added (in the past LI700® has been used. Protec® is an oil based alternative which is effective and more versatile in its applications), is added. Metsulfuron can also be used for resistant species and grasses. It should be used with a surfactant, such as Protec® (Previously Protec® has been used for this purpose).

Note: where both Glyphosate and Metsulfuron are recommended for a species, it may be possible to use a commercially available compound of these two herbicides. This approach is currently under trial and is not suitable for operators unskilled in precision spraying.

Note: dilution rates for Glyphosate and Metsulfuron are in accordance with the manufacturer's recommendations and any variation requires a permit from the National Registration Authority.

Dilution Rates (Glyphosate: water):

- Plants with more or less succulent leaves, *e.g. Tradescantia fluminensis, Anredera cordifolia* (autumn to winter is the suggested time for spraying these plants), *Chlorophytum* spp. etc.
  1 part Glyphosate: 50 parts water + Protec®
- *Lantana camara*
  1 part Glyphosate: 100 parts water
- Other soft-leaved plants, annuals and grasses
  1 part Glyphosate: 100 parts water
- *Chrysanthemoides monilifera* subsp. *rotundata*
  1 part Glyphosate: 150 – 400 parts water

Dilution Rates (Metsulfuron: water):

- 1.5g Metsulfuron: 10 litres water + Protec®:

6. "Overspray": this method is applicable to large, dense infestations of such plants as *Chrysanthemoides monilifera* subsp. *rotundata* (Bitou Bush) and *Lantana camara* (Lantana), where it is desirable to leave the dead plants intact to prevent erosion and over-exposure of large areas, protect native seedlings from predators such as wallabies, and avoid trampling by humans.

(a) Spray over the top of the infestation, using a weak solution of Glyphosate. Marker Dye (such as Herbi Dye) is used to indicate sprayed areas.
Note: any native plants that may be under the weed will be protected by the foliage cover of the weed.

(b) Leave the sprayed plants intact so that native seedlings can establish under the shelter provided.

Note*:* Lantana – 1 part Glyphosate: 100 parts water
Bitou Bush – 1 part Glyphosate: 150 parts to 400 parts water

Alternatively: weeds can be cut and flattened with bush-hooks or loppers and the subsequent regrowth sprayed with Glyphosate.
Note: in many cases it is preferable to overspray wherever practicable as this will cause less erosion and trampling of suppressed native plants, such as ferns and seedlings. However, handwork will be necessary to "cut-scrape-paint" any unsprayed Bitou Bush or Lantana that surrounds native plants.

7. "Crowning": this method is applicable to weeds which have their growing points below the surface of the ground (corms, bulbs, rhizomes, clumped or fibrous root systems, etc. e.g. *Protasparagus* spp., *Chlorophytum comosum* and grasses).

(a) Grasp the leaves or stems and hold them tightly so that the base of the plant is visible. Plants with sharp leaves or stems should be cut back first.

(b) Insert the knife close to the base of the plant at a slight angle, with the tip well under the root system.

(c) Cut through the roots close to the base. Depending on the size of the plant, two or more cuts may be needed to sever all the roots.

(d) Remove the plant. Make sure that the base of the plant where the roots begin is completely removed.

Source: adapted from Joseph, R., 2001. *Course Notes from Certificate II in Bushland Regeneration*. TAFE, Wollongbar.

Appendix 5: Treatment Methods for Weeds at Duck Creek

Note: Ratios for Application of Herbicide

Dilution ratios for application of a mix of herbicide (Glyphosate based such as Round Up®) and water are provided. For example, 1:50 means that one part by volume of herbicide is mixed with fifty parts by volume of water . All cut, scrap and paint at 1:1.5 refers to Glyphosate.

For some weeds a combination of Glyphosate and Metsulfuron is recommended, however a permit will be required for this off label usage.

Protec ® is added in some treatments to assist the transfer of the herbicide through the surface tissue – particularly plants with waxy leaves, such as Camphor Laurel, Madeira Vine and Wandering Jew.

For more detail on control method techniques refer to Appendix 5: Weed Removal and Control Techniques

WEED SPECIES CONTROL METHODS

Trees and Shrubs

Scientific Name	Common Name	Control Method
Baccharis halimfolia	Groundsel Bush	Cut, scrape & paint **1:1.5**, spray small seedlings/regrowth glyphosate **1:50 + Protec**® + dye
Cinnamonum camphora	Camphor Laurel	Stem inject **1:15** larger trees, cut scrape and paint **1:1.5** small plants. Cut, scrape and paint **1:1.5**
Eugenia uniflora	Brazilian Cherry	Cut, scrape and paint **1:1.5**; frill, spear or drill **1:1.5**; spray glyphosate **1:100 + Protec**®. Best time to spray – early autumn.
Lantana camara	Lantana	Lopper and cut, scrape and paint base **1:1.5.**. Spray regrowth glyphosate **1:100** + dye
Schefflera actinophylla	Umbrella Tree	Hand pull seedlings and bag. Cut, scrape and paint or stem inject **1:1.5**. Cut sections, can regrow if left on the ground
Psidium guajava	Guava	Cut and paint **1:1.5**
Solanum mauritianum	Tobacco Bush	Stem inject **1:1.5** larger trees. Cut, scrape and paint **1:1.5**. Spray seedlings glyphosate **1:100 + Protec**®
Ochna serrulata	Ochna	Scrape and paint (lightly) 2 sides with straight glyphosate. Spray seedlings glyphosate **1:50 + Protec**® Difficult to pull will regrow from broken root. Paint stem on larger specimens with neat glyphosate to a height of 50 cm
Ligustrum lucidium	Large-Leaved Privet	Stem inject **1:1.5** larger trees. Cut, scrape and paint **1:1.5** small plants. Spray seedlings glyphosate **1:50 + Protec**® + dye
Ligustrum sinsense	Small-Leaved Privet	Stem inject **1:1.5** larger trees. Cut, scrape and paint **1:1.5** small plants. Spray seedlings glyphosate **1:50 + LI700**. For multi-stemmed specimens chainsaw and

		cut, scrape and paint **1:15**
Prunus persica	Peach	Cut, scrape and paint **1:1.5;** spray small seedlings/regrowth glyphosate **1:50 + Protec**® + dye
Tababuia chrysantha	Golden Trumpet Tree	Cut, scrape and paint **1:1.5;** spray glyphosate **1:50 + Protec**® + dye
Senna septemtrionalis	Smooth Senna	Cut, scrape and paint **1:1.5;** spray glyphosate **1:50 + Protec**® + dye. Bag fruits and remove from site.
Eriobotrya japonica	Loquat	Cut, scrape and paint **1:1.5.** Collect fruits and compost.
Ardisia crenata	Coral Berry	Cut, scrape and paint **1:1.5**.
Psidium guajava	Guava	Cut, scrape and paint **1:1.5;** Inject **1:1**
Pinus ellrothi	Slash Pine	Ringbark or cut, scrape and paint
Coffea arabica	Coffee	Cut, scrape and paint **1:1.5** (resistant to spray, requires manual control)
Cestrum aurantiacum	Orange Cestrum	Cut, scrape and paint **1:1.5** or inject (may need more than one treatment)
Cestrum parqui	Green Cestrum	Cut, scrape and paint **1:1.5;** spray glyphosate **1:50 + Protec**® + dye
Celtis australis	Nettle Tree	Cut, scrape and paint **1:1.5** spray glyphosate **1:50 + Protec**® + dye
Murraya paniculata	Orange Jessamine	Cut, scrape and paint **1:1.5;** spray glyphosate **1:50 + Protec**® + dye

Vines and Scramblers

Scientific Name	**Common Name**	**Control Method**
Anredera cordifolia	Madeira Vine	Scrape as much stem as possible (on one side) and paint with 100% glyphosate, tubers: scrape/gouge and paint (100%); spray ground infestations 1:50 + Protec®). Bag tubers. Do not cut the stem.
Protasparagus plumosus	Climbing Asparagus Fern	Crowning, cut stems at chest height, then at ground level, spray regrowth glyphosate **1:50 + Protec**®
Passiflora edulis	Edible Passionfruit	Usually hand pull, but if necessary cut, scrape and paint **1:1.5**. Roll up vines, spray regrowth glyphosate **1:100 + Protec**®. Bag fruit
Passiflora suberosa	Corky Passionfruit	Smaller vines can be pulled and regrowh sprayed. Spray vines scrambling on the ground glyphosate **1:50 + Protec**®. Follow large vines carefully to all roots. Cut, scrape and paint **1:1.5**
Passiflora subpeltata	White Passionfruit	Hand pull smaller vines, cut, scrape and paint **1:1.5**. Spray regrowth glyphosate **1:50 + Protec**®
Solanum seaforthianum	Climbing Nightshade	Hand pull or scrape and paint **1:1.5.** Best to locate the flower. If in seed, bag the fruit
Aristolochia elegans	Dutchman's Pipe	Cut at head height and scrape and paint 60 cm of vine (ie lateral roots along ground and paint in neat

		glyphosate), spray seedlings **1:50 + Protec**®
Caesalpinia decapotata	Thorny Poinciana	Cut, scrape and paint **1:1.5;** spray glyphosate **1:50 + Protec**® + dye.
Aryia sericifolia	Moth Vine	Cut, scrape and paint **1:1.5;** spray glyphosate **1:50 + Protec**® + dye. Handpull seedlings, collect fruits and dispose.

Herbs, Ferns and Grasses

Scientific Name	Common Name	Control Method
Ageratina adenophora	Crofton Weed	Spray *glyphosate* **1:100.** Hand pull and hang up
Ageratina riparia	Mist Weed	Spray *glyphosate* **1:100**. Hand pull and hang up
Ageratum houstonianum	Billygoat Weed	Spray *glyphosate* **1:100.** Hand pull and hang up
Pennisetum clandestinum	Kikuyu Grass	Spray *glyphosate* **1:100**
Rivina humulis	Coral Berry	Bag fruit or whole plants including fruit. Spray **1:50 + Protec**®. Hand pull where possible
Senecio madagascariensis	Fireweed	Hand pull
Tradescantia fluminensis	Wandering Jew	Spray *glyphosate* **1:50 + Protec**®. In small areas carefully remove
Stenotaphrum secundatum	Buffalo Grass	Spray *glyphosate* **1:100 + Protec**®

A permit will be required for off label usage of these chemicals. Agral and LI700 should be used as per manufacturer's instructions.

Note: Unless otherwise stated the herbicide recommended for the techniques described above is Glyphosate e.g. Roundup®. Protec® should be used as per manufacturer's instructions. An off label permit is required from the National Registration Authority for any combination of herbicides or for rates not described on the product labels.

Appendix 6: Complete Flora of Duck Creek – Darren Bailey

Native Species

Trees and Shrubs

FAMILY	***Botanical name***	**Common Name**
AKANIACEAE	*Akania bidwillii*	Turnipwood
ALANGIACEAE	*Alangium villosum subsp. polyosmoides*	Muskwood
ANACARDIACEAE	*Euroschinus falcata var. falcata*	Ribbonwood
APOCYNACEAE	*Alyxia ruscifolia*	Prickly Alyxia
APOCYNACEAE	*Neisosperma poweri*	Milkbush
APOCYNACEAE	*Ochrosia moorei*	Southern Ochrosia
APOCYNACEAE	*Tabenaemontana pandacaqui*	Banana Bush
ARALIACEAE	*Polyscias elegans*	Celery Wood
ARALIACEAE	*Polyscias murrayi*	Pencil Cedar
ARECACEAE	*Archontophoenix cunninghamiana*	Bangalow Palm
ARECACEAE	*Linospadix monostachya*	Walking Stick Palm
ASTELIACEAE	*Cordyline rubra*	Red-fruited Palm Lily
ASTERACEAE	*Ozothamnus diosmifolius*	White Dogwood
BORAGINACEAE	*Ehretia acuminata*	Koda
BURSERACEAE	*Canarium australasicum*	Mango Bark
CAPPARACEAE	*Capparis arborea*	Brush Caper Berry
CELASTRACEAE	*Cassine australis var. australis*	Red-fruited Olive Plum
CELASTRACEAE	*Hedraianthera porphyropetala*	Hedraianthera
CELASTRACEAE	*Siphonodon australe*	Ivorywood
CUNONIACEAE	*Geissois benthamii*	Red Carabeen
EBENACEAE	*Diospyros pentamera*	Myrtle Ebony
ELAEOCARPACEAE	*Elaeocarpus angustifolius*	Blue Quandong
ELAEOCARPACEAE	*Elaeocarpus kirtonii*	Silver Quandong
ELAEOCARPACEAE	*Elaeocarpus obovatus*	Hard Quandong
ELAEOCARPACEAE	*Sloanea australis*	Maiden's Blush
ELAEOCARPACEAE	*Sloanea woollsii*	Yellow Carabeen
EPACRIDACEAE	*Trochocarpa laurina*	Tree Heath
ESCALLONIACEAE	*Abrophyllum ornans*	Native Hydrangea
ESCALLONIACEAE	*Polyosma cunninghamii*	Featherwood
EUPHORBIACEAE	*Acalypha sp. aff. eremorum*	Acalypha
EUPHORBIACEAE	*Actephila lindleyi*	Actephila
EUPHORBIACEAE	*Baloghia inophylla*	Scrub Bloodwood
EUPHORBIACEAE	*Briedelia exaltata*	Scrub Ironbark
EUPHORBIACEAE	*Claoxylon australe*	Brittlewood
EUPHORBIACEAE	*Cleistanthus cunninghamii*	Cleistanthus
EUPHORBIACEAE	*Croton verreauxii*	Native Cascarilla
EUPHORBIACEAE	*Drypetes deplanchei*	Yellow Tulip
EUPHORBIACEAE	*Glochidion ferdinandi*	Cheese Tree
EUPHORBIACEAE	*Glochidion sumatranum*	Umbrella Cheese Tree
EUPHORBIACEAE	*Mallotus discolor*	Yellow Kamala
EUPHORBIACEAE	*Mallotus philippensis*	Red Kamala
EUPHORBIACEAE	*Omalanthus populifolius*	Bleeding Heart
EUPOMATIACEAE	*Eupomatia bennettii*	Small Bolwarra

EUPOMATIACEAE	*Eupomatia laurina*	Bolwarra
FABACEAE	*Castanospermum australe*	Black Bean
FLACOURTIACEAE	*Scolopia braunii*	Flintwood
ICACINACEAE	*Citronella moorei*	Churnwood
LAURACEAE	*Beilschmedia elliptica*	Grey Walnut
LAURACEAE	*Beilschmedia obtusifolia*	Blush walnut
LAURACEAE	*Cinnamomum oliveri*	Oliver's Sassafras
LAURACEAE	*Cinnamomum virens*	Red-barked Sassafras
LAURACEAE	*Cryptocarya glaucescens*	Jackwood
LAURACEAE	*Cryptocarya micronuera*	Murrogun
LAURACEAE	*Cryptocarya obovata*	Pepperberry
LAURACEAE	*Cryptocarya triplinervis var. pubens*	Three-veined Laurel
LAURACEAE	*Endiandra muelleri subsp. muelleri*	Green-leaved Rose Walnut
LAURACEAE	*Endiandra pubens*	Hairy Walnut
LAURACEAE	*Litsea australis*	Brown Bolly Gum
LAURACEAE	*Neolitsea australiensis*	Green Bolly Gum
LAURACEAE	*Neolitsea dealbata*	White Bolly Gum
LORANTHACEAE	*Amyema congener subsp. congener*	A Mistletoe
MELIACEAE	*Anthocarapa nitidula*	Incense Cedar
MELIACEAE	*Dysoxylum fraserianum*	Rosewood
MELIACEAE	*Dysoxylum mollisimum*	Red Bean
MELIACEAE	*Dysoxylum rufum*	Hairy Rosewood
MELIACEAE	*Melia azedarach var. australasica*	White Cedar
MELIACEAE	*Toona ciliata*	Red Cedar
MIMOSACEAE	*Acacia melanoxylon*	Sally Wattle
MIMOSACEAE	*Archidendron grandiflorum*	Pink Laceflower
MIMOSACEAE	*Archidendron muelleriannum*	Veiny Laceflower
MIMOSACEAE	*Pararchidendron pruinosum var. pruinosum*	Snow-wood
MONIMIACEAE	*Daphnandra sp. A*	Socketwood
MONIMIACEAE	*Doryphora sassafras*	Sassafras
MONIMIACEAE	*Wilkiea austroqueenslandica*	Smooth Wilkiea
MONIMIACEAE	*Wilkiea huegeliana*	Veiny Wilkiea
MONIMIACEAE	*Wilkiea macrophylla*	Large-leaved Wilkiea
MORACEAE	*Ficus coronata*	Creek Sandpaper Fig
MORACEAE	*Ficus fraseri*	White Sandpaper Fig
MORACEAE	*Ficus obliqua*	Small-leaved Fig
MORACEAE	*Ficus superba var. henneana*	Deciduous Fig
MORACEAE	*Ficus virens var. sublanceolata*	White Fig
MORACEAE	*Ficus watkinsiana*	Strangler Fig
MORACEAE	*Steblus brunonianus*	Whalebone Tree
MYRSINACEAE	*Rapanea subsessilis*	Red Muttonwood
MYRTACEAE	*Acmena hemilampra*	Broad-leaved Lilly Pilly
MYRTACEAE	*Acmena ingens*	Red Apple
MYRTACEAE	*Acmena smithii*	Common Lilly Pilly
MYRTACEAE	*Archirhodomyrtus beckleri*	Rose Myrtle
MYRTACEAE	*Austromyrtus bidwillii*	Python Tree
MYRTACEAE	*Decaspermum humile*	Silky Myrtle
MYRTACEAE	*Lophostemon confertus*	Brush Box
MYRTACEAE	*Pilidiostigma glabrum*	Plum Myrtle
MYRTACEAE	*Rhodamnia argentea*	Malletwood
MYRTACEAE	*Rhodamnia maideniana*	Smooth Scrub Turpentine

MYRTACEAE	*Rhodamnia rubescens*	Scrub Turpentine
MYRTACEAE	*Rhodomyrtus psidioides*	Native Guava
MYRTACEAE	*Syzygium australe*	Scrub Cherry
MYRTACEAE	*Syzygium corynanthum*	Sour Cherry
MYRTACEAE	*Syzygium crebrinerve*	Purple Cherry
MYRTACEAE	*Syzygium francisii*	Giant Water Gum
MYRTACEAE	*Syzygium hodgkinsoniae*	Red Lilly Pilly
MYRTACEAE	*Syzygium luehmannii*	Riberry
MYRTACEAE	*Syzygium oleosum*	Blue Lilly Pilly
OLEACEAE	*Notelaea johnsonii*	Veinless Mock Olive
OLEACEAE	*Notelaea longifolia*	Large Mock Olive
PITTOSPORACEAE	*Hymenospermum flavum*	Native Frangipani
PITTOSPORACEAE	*Pittosporum multiflorum*	Orange Thorn
PITTOSPORACEAE	*Pittosporum revolutum*	Hairy Pittosporum
PITTOSPORACEAE	*Pittosporum undulatum*	Sweet Pittosporum
PODOCARPACEAE	*Podocarpus elatus*	Plum Pine
PROTEACEAE	*Floydia praealta*	Ball Nut
PROTEACEAE	*Grevillea robusta*	Silky Oak
PROTEACEAE	*Helicia glabriflora*	Smooth Helicia
PROTEACEAE	*Macadamia tetraphylla*	Macadamia Nut
PROTEACEAE	*Stenocarpus sinuatus*	Fire Wheel Tree
PROTEACEAE	*Triunia youngiana*	Honeysuckle Bush
RHAMNANCEAE	*Alphitonia excelsa*	Red Ash
RHAMNANCEAE	*Emmenosperma alphitonioides*	Yellow Ash
RUBIACEAE	*Atractocarpus chartaceus*	Narrow-leaved Gardenia
RUBIACEAE	*Canthium coprosmoides*	Coast Canthium
RUBIACEAE	*Ixora beckleri*	Native Ixora
RUTACEAE	*Acronychia wilcoxiana*	Silver Aspen
RUTACEAE	*Bouchardatia nuerococca*	Union Nut
RUTACEAE	*Citrus australasica*	Finger lime
RUTACEAE	*Flindersia australis*	Teak
RUTACEAE	*Flindersia bennettiana*	Bennett's Ash
RUTACEAE	*Flindersia schottiana*	Cudgerie
RUTACEAE	*Flindersia xanthoxyla*	Yellowwood
RUTACEAE	*Melicope elleryana*	Pink-flowered Doughwood
RUTACEAE	*Melicope micrococca*	Hairy-leaved Doughwood
RUTACEAE	*Melicope octandra*	Doughwood
RUTACEAE	*Pentacerus australis*	Crows Ash
RUTACEAE	*Sarcomelicope simplicifolia subsp. simplicifolia*	Bauerella
SAMBUCACEAE	*Sambucus australasica*	Native Elderberry
SAPINDACEAE	*Arytera distylis*	Twin-leaved Coogera
SAPINDACEAE	*Atalaya salicifolia*	Brush Whitewood
SAPINDACEAE	*Cupaniopsis anacardioides*	Tuckeroo
SAPINDACEAE	*Cupaniopsis flagelliformis var. australis*	Brown Tuckeroo
SAPINDACEAE	*Diploglottis australis*	Native Tamarind
SAPINDACEAE	*Ellatostachys nervosa*	Green Tamarind
SAPINDACEAE	*Guioa semiglauca*	Guioa
SAPINDACEAE	*Harpullia alata*	Wing-leaved Tulip
SAPINDACEAE	*Harpullia hillii*	Blunt-leaved Tulip
SAPINDACEAE	*Jagera pseudorhus var. pseudorhus*	Foambark Tree
SAPINDACEAE	*Mischocarpus australis*	Red Pear-fruit

SAPINDACEAE	*Mischocarpus pyriformis*	Yellow Pear-fruit
SAPINDACEAE	*Rhysotoechia bifoliolata*	Twin-leaf Tuckeroo
SAPINDACEAE	*Sarcopterix stipata*	Steelwood
SAPINDACEAE	*Toechime dasyrrhache*	Blunt-leaved Steelwood
SAPOTACEAE	*Pouteria australis*	Black Apple
SAPOTACEAE	*Pouteria myrsinoides*	Blunt-leaved Coondoo
SIMAROUBACEAE	*Ailanthus triphysa*	White Bean
SIMAROUBACEAE	*Quassia sp.* 'Mt Nardi'	Quassia
SOLANACEAE	*Duboisia myoporoides*	Soft Corkwood
STERCULIACEAE	*Brachychiton aceriflolius*	Flame Tree
STERCULIACEAE	*Commersonia batramia*	Brown Kurrajong
STERCULIACEAE	*Heritiera trifoliolata*	White Booyong
STERCULIACEAE	*Sterculia quadrifida*	Peanut Tree
SYMPLOCACEAE	*Symplocus thwaitesii*	Buff Hazelwood
SURIANACEAE	*Guilfoylia monostylis*	Native Plum
ULMACEAE	*Aphananthe philippinensis*	Native Elm
THYMELIACEAE	*Wikstroemia indica*	Wikstroemia
ULMACEAE	*Trema tomentosa*	Native Peach
URTICACEAE	*Boehmeria platyphylla var. austroqueenslandica*	Native Ramie
URTICACEAE	*Dendrocnide excelsa*	Giant Stinging Tree
URTICACEAE	*Dendrocnide photinophylla*	Shining-leaved Stinging Tree
VERBEBACEAE	*Clerodendrum floribundum*	Smooth Clerodendrum
VERBEBACEAE	*Gmelina leichhardtii*	White Beech

Vines and Climbers

FAMILY	***Botanical name***	**Common Name**
AMARANTHACEAE	*Deeringia arborescens*	Climbing Deeringia
ANNONACEAE	*Rauwenhoffia leichhardtii*	Zig-Zag Vine
APOCYNACEAE	*Melodinus australis*	Southern Melodinus
APOCYNACEAE	*Parsonsia fulva*	Furry Silkpod
APOCYNACEAE	*Parsonsia longipetiolata*	Green-leaved Silkpod
APOCYNACEAE	*Parsonsia notata*	Veinless Silkpod
APOCYNACEAE	*Parsonsia straminea*	Common Silkpod
APOCYNACEAE	*Parsonsia velutina*	Hairy Silkpod
ARACEAE	*Pothos longipes*	Pothos
ARALIACEAE	*Cephalaralia cephalobotrys*	Climbing Panax
ARECACEAE	*Calamus muelleri*	Lawyer Vine
ARISTOLOCHIACEAE	*Pararistolochia praevenosa*	Aristolochia
ASCLEPIADACEAE	*Hoya australis*	Native Hoya
ASCLEPIADACEAE	*Marsdenia rostrata*	Common Milk Vine
BIGNONIACEAE	*Pandorea jasminoides*	Bower Vine
BIGNONIACEAE	*Pandorea pandorana*	Wonga Vine
CAESALPINIACEAE	*Caesalpinia scortechinii*	Large Prickle Vine
CAESALPINIACEAE	*Caesalpinia subtropica*	Corky Prickle Vine
CELASTRACEAE	*Celastrus subspicatus*	Large-leaf Staff Vine
CELASTRACEAE	*Hippocraetia barbata*	Knot Vine
CUCURBITACEAE	*Diplocyclos palmatus*	Native Bryony
CUCURBITACEAE	*Trichosanthes subvelutina*	Silky Cucumber
DILLENIACEAE	*Hibbertia scandens*	Twining Guinea Flower
DIOSCOREACEAE	*Dioscorea transversa*	Native Yam

FABACEAE	*Austrosteenisia glabristyla*	Giant Blood Vine
FABACEAE	*Derris involuta*	Native Derris
FABACEAE	*Milletia megasperma*	Native Wistaria
FLAGELLARIACEAE	*Flagellaria indica*	Whip Vine
LAZURIAGACEAE	*Geitonoplesium cymosum*	Scrambling Lily
MENISPERMACEAE	*Carronia multisepalea*	Carronia
MENISPERMACEAE	*Legnephora moorei*	Round-leaf Vine
MENISPERMACEAE	*Sarcopetalum harveyanum*	Pearl Vine
MENISPERMACEAE	*Stephania aculeata*	Prickly Snake Vine
MENISPERMACEAE	*Stephania japonica var. discolor*	Snake Vine
MENISPERMACEAE	*Tinospora tinosporoides*	Arrow-head Vine
MONIMIACEAE	*Palmeria scandens*	Anchor Vine
MORACEAE	*Maclura cochinchinensis*	Cockspur Thorn
MORACEAE	*Trophis scandens*	Burny Vine
MYRISINACEAE	*Embelia australiana*	Embelia
OLEACEAE	*Jasminum dallachii*	Soft Jasmine
PIPERACEAE	*Piper nova-hollandiae*	Giant Pepper Vine
RANUNCULACEAE	*Clematis glycinoides*	Forest Clematis
RIPOGONACEAE	*Ripogonum album*	White Supplejack
RIPOGONACEAE	*Ripogonum discolor*	Prickly Supplejack
ROSACEAE	*Rubus moluccanus*	Molucca Bramble
ROSACEAE	*Rubus rosifolius*	Rose-leaf Bramble
SMILACACEAE	*Smilax australis*	Austral Sarsaparilla
VITACEAE	*Cayratia clematidea*	Slender Grape
VITACEAE	*Cayratia eurynema*	Soft Water Vine
VITACEAE	*Cissus antartica*	Water Vine
VITACEAE	*Cissus hypogluaca*	Five-leaf Water Vine
VITACEAE	*Cissus sterculifolia*	Long-leaf Water Vine
VITACEAE	*Tetrastigma nitens*	Three-leaf Water Vine

Ferns, Grasses and Groundcovers

FAMILY	***Botanical name***	**Common Name**
ACANTHACEAE	*Pseuderantherum variabile*	Pastel Flower
ADIANTACEAE	*Adiantum aethiopicum*	Common Maidenhair
ADIANTACEAE	*Adiantum diaphanum*	Filmy Maidenhair
ADIANTACEAE	*Adiantum hispidulum*	Rough Maidenhair
APIACEAE	*Centella asiatica*	A Pennywort
APIACEAE	*Hydrocotyle acutiloba*	A Pennywort
APIACEAE	*Hyrdrocotyle pedicillosa*	A Pennywort
ARACEAE	*Alocasia brisbanensis*	Cunjevoi
ARACEAE	*Gymnostachys anceps*	Settler's Flax
ASPLENIACEAE	*Asplenium australasicum*	Bird's Nest Fern
ASPLENIACEAE	*Asplenium attenuatum*	Simple Spleenwort
ASTERACEAE	*Centratherum punctatum subsp. australianum*	Centratherum
ASTERACEAE	*Sigesbeckia orientalis subsp. orientalis*	Indian Weed
BLECHNACEAE	*Blechnum cartilagineum*	Gristle Fern
BLECHNACEAE	*Doodia aspera*	Rasp Fern
BLECHNACEAE	*Doodia caudata*	Small Rasp Fern
CAMPANULACEAE	*Wahlenbergia stricta subsp. stricta*	Tall Bluebell
CARYOPHYLLACEAE	*Drymaria cordata*	Tropical Chickweed

COMMELINACEAE	*Aneilema acuminatum*	Aneilema
COMMELINACEAE	*Aneilema biflorum*	Aneilema
COMMELINACEAE	*Commelina cyanea*	Commelina
COMMELINACEAE	*Pollia crispata*	Pollia
CONVOLVULACEAE	*Dichondra repens*	Kidney Weed
CYATHEACEAE	*Cyathea australis*	Rough Tree Fern
CYATHEACEAE	*Cyathea cooperi*	Straw Tree Fern
CYATHEACEAE	*Cyathea leichhardtiana*	Prickly Tree Fern
CYPERACEAE	*Carex inversa*	Knob Sedge
CYPERACEAE	*Cyperus enervis*	A Sedge
CYPERACEAE	*Cyperus imbecillis*	A Sedge
CYPERACEAE	*Cyperus tetraphyllus*	A Sedge
CYPERACEAE	*Cyperus trinervis*	A Sedge
CYPERACEAE	*Gahnia aspera*	Saw-sedge
DAVALLIACEAE	*Arthropteris beckleri*	Hairy Climbing Fishbone Fern
DAVALLIACEAE	*Arthropteris tenella*	Climbing Fishbone Fern
DAVALLIACEAE	*Davallia solida var. pyxidata*	Hare's Foot Fern
DAVALLIACEAE	*Nephrolepis cordifolia*	Fishbone Fern
DENNSTAEDTIACEAE	*Dennstaedtia davallioides*	Lacy Ground Fern
DENNSTAEDTIACEAE	*Histiopteris incisa*	Bat's Wing Fern
DENNSTAEDTIACEAE	*Hypolepis glandulifera*	Downy Ground Fern
DENNSTAEDTIACEAE	*Hypolepis muelleri*	Harsh Ground Fern
DENNSTAEDTIACEAE	*Pteridium esculentum*	Bracken
DICKSONIACEAE	*Calochlaena dubia*	Common Ground Fern
DRYOPTERIDACEAE	*Lastreopsis marginans*	Bordered Shield Fern
DRYOPTERIDACEAE	*Lastreopsis microsora*	Creeping Shield Fern
DRYOPTERIDACEAE	*Lastreopsis munita*	Naked Shield Fern
GENTIANACEAE	*Centaurium spicatum*	Spike Centaury
GERANIACEAE	*Geranium solanderi*	Native Geranium
GLEICHENIACEAE	*Gleichenia dicarpa*	Pouched Coral-fern
GLEICHENIACEAE	*Sticherus flabellatus*	Umbrella Fern
LAMIACEAE	*Plectranthus parviflorus*	Few-flowered Plectranthus
LOMANDRACEAE	*Lomandra spicata*	Rainforest Mat-rush
LYCOPODIACEAE	*Lycopodium cernuum*	Scrambling Club Moss
ORCHIDACEAE	*Cheirostylis ovata*	Jewel Orchid
ORCHIDACEAE	*Pseudovanilla foliata*	Giant Climbing Orchid
ORCHIDACEAE	*Spiranthes sinensis* subsp. *australis*	Ladies' Tresses
PEPEROMIACEAE	*Peperomia blanda var. floribunda*	Peperomia
PHORMIACEAE	*Dianella caerulea*	Blue-fruited Flax Lily
POACEAE	*Cenchrus caliculatus*	Hillside Burrgrass
POACEAE	*Digitaria didactyla*	Queensland Blue Couch
POACEAE	*Entolasia marginata*	Bordered Panic
POACEAE	*Oplismenus aemulus*	Basket Grass
POACEAE	*Oplismenus imbecillis*	Basket Grass
POACEAE	*Panicum lachnophyllum*	Don't Panic
POACEAE	*Panicum pygmaeum*	Pygmy Panic
POACEAE	*Paspalum orbiculare*	Ditch Millet
POLYPODIACEAE	*Microsorum scandens*	Fragrant Fern
POLYPODIACEAE	*Platycerium bifurcatum subsp. bifurcatum*	Elkhorn
POLYPODIACEAE	*Platycerium superbum*	Staghorn

POLYPODIACEAE	*Pyrrosia confluens*	Horseshoe Felt Fern
POLYPODIACEAE	*Pyrrosia rupestris*	Rock Felt Fern
PORTULACACEAE	*Portulaca oleracea*	Pigweed
PSILOTACEAE	*Psilotum nudum*	Skeleton Fork Fern
PTERIDACEAE	*Pteris tremula*	Tender Brake
PTERIDACEAE	*Pteris umbrosa*	Jungle Brake
SCROPHULARIACEAE	*Veronica plebeia*	Trailing Speedwell
SINOPTERIDACEAE	*Cheilanthes distans*	Bristly Cloak Fern
SINOPTERIDACEAE	*Cheilanthes sieberi subsp. sieberi*	Narrow Rock Fern
SINOPTERIDACEAE	*Pellaea falcata*	Sickle Fern
SINOPTERIDACEAE	*Pellaea paradoxa*	Large-leaved Sickle Fern
THELYPTERIDACEAE	*Christella dentata*	Binung
URTICACEAE	*Elatostema reticulatum var. reticulatum*	Elatostema
URTICACEAE	*Urtica incisa*	Stinging Nettle
ZINGIBERACEAE	*Alpinia caerulea*	Native Ginger

Aquatic and Wetland Plants

FAMILY	***Botanical name***	**Common Name**
AMARANTHACEAE	*Alternanthera denticulata*	Lesser Joyweed
APIACEAE	*Hydrocotyle tripartita*	Pennywort
ASTERACEAE	*Eclipta prostrata*	Eclipta
CYPERACEAE	*Carex appressa*	Tall Sedge
CYPERACEAE	*Carex fascicularis*	Tassel Sedge
CYPERACEAE	*Carex lobolepis*	Carex
CYPERACEAE	*Carex maculata*	Carex
CYPERACEAE	*Cyperus exaltatus*	Tall Flat-sedge
CYPERACEAE	*Cyperus polystachyos*	Bunchy Flat-sedge
CYPERACEAE	*Cyperus sanguinolentus*	Cyperus
CYPERACEAE	*Cyperus sphaeroideus*	Cyperus
CYPERACEAE	*Fimbristylis velata*	A Fringe -rush
CYPERACEAE	*Isolepis inundata*	Swamp Club-rush
CYPERACEAE	*Eleocharis equisetina*	A Spike-rush
CYPERACEAE	*Schoenoplectus mucronatus*	A Club-rush
HALORAGACEAE	*Myriophyllum latifolium*	A Water-milfoil
JUNCACEAE	*Juncus continuus*	A Rush
JUNCACEAE	*Juncus polyanthemos*	A Rush
JUNCACEAE	*Juncus prismatocarpus*	A Rush
JUNCACEAE	*Juncus usitatus*	Common Rush
LEMNANCEAE	*Spirodela punctata*	Thin Duckweed
MENYANTHACEAE	*Nymphoides indica*	Water Snowflake
ONAGRACEAE	*Ludwigia octovalvis*	Willow Primrose
ONAGRACEAE	*Ludwigia peploides subsp. montevidensis*	Water Primrose
PHYLIDRACEAE	*Philydrum lanuginosum*	Frogsmouth
POACEAE	*Agrostis avenacea var. avenacea*	Blown Grass
POACEAE	*Arthraxon hispidus*	Arthraxon
POACEAE	*Isachne globosa*	Swamp Millet
POACEAE	*Leersia hexandra*	Swamp Rice Grass
POACEAE	*Sacciolepis indica*	Indian Cupscale Grass
POLYGONACEAE	*Persicaria decipiens*	Slender Knotweed
POLYGONACEAE	*Persicaria hydropiper*	Water Pepper

POLYGONACEAE	*Persicaria strigosa*	Prickly Smartweed
POLYGONACEAE	*Rumex brownii*	Swamp Dock
POTAMOGETONACEAE	*Potamogeton javanicus*	A Pondweed
RANUNCULACEAE	*Ranunculus inundatus*	Swamp Buttercup
TYPHACEAE	*Typha orientalis*	Broad-leaved Cumbungi

Introduced Species

Trees and Shrubs

FAMILY	*Botanical name*	Common Name
AMYGDALACEAE	**Prunus persica*	Peach
ANACARDIACEAE	**Magnifera indica*	Mango
ARALIACEAE	**Schefflera actinophylla*	Umbrella Tree
ASTERACEAE	**Baccharis halimifolia*	Groundsel Bush
BIGNONIACEAE	**Jacaranda mimosifolia*	Jacaranda
BIGNONIACEAE	**Tababuia chrysantha*	Golden Trumpet Tree
BIGNONIACEAE	**Tecoma capensis*	Cape Honeysuckle
BUDDLEJACEAE	**Buddleja madagascariensis*	Butterfly Bush
CAESALPINIACEAE	**Senna pendula var. glabrata*	Winter Senna
CAESALPINIACEAE	**Senna septemtrionalis*	Smooth Senna
EBENACEAE	**Diospyros kaki*	Chinese Persimmon
EUPHORBIACEAE	**Ricinus communis*	Castor Oil Plant
FABACEAE	**Erythrina X sykesii*	Coral Tree
FABACEAE	**Koelreuteria paniculata*	Golden Rain Tree
LAURACEAE	**Cinnamomum camphora*	Camphor Laurel
MALACEAE	**Eriobotrya japonica*	Loquat
MUSACEAE	**Musa paradisica*	Banana
MYRSINACEAE	**Ardisia crenata*	Coral Berry
MYRTACEAE	**Eugenia uniflora*	Brazilian Cherry
MYRTACEAE	**Psidium cattleianum*	Cherry Guava
MYRTACEAE	**Psidium guajava*	Guava
OCHNACEAE	**Ochna serrulata*	Ochna
OLEACEAE	**Ligustrum lucidum*	Large-leaved Privet
OLEACEAE	**Ligustrum sinense*	Small-leaved Privet
PINACEAE	**Pinus elliottii*	Slash Pine
POACEAE	**Phyllostachys aurea*	Fishpole Bamboo
RUBIACEAE	**Coffea arabica*	Coffee
RUTACEAE	**Citrus X taitensis*	Bush Lemon
RUTACEAE	**Murraya paniculata*	Orange Jessamine
SOLANACEAE	**Cestrum aurantiacum*	Orange Cestrum
SOLANACEAE	**Cestrum parqui*	Green Cestrum
SOLANACEAE	**Solanum mauritianum*	Tobacco Bush
ULMACEAE	**Celtis australis*	Nettle Tree
VERBENACEAE	**Lantana camara*	Lantana

Vines and Climbers

FAMILY	*Botanical name*	Common Name
ARISTOLOCHIACEAE	**Aristolochia littoralis*	Dutchman's Pipe
ASCLEPIADACEAE	**Araujia sericifera*	Moth Vine
ASPARAGACEAE	**Protasparagus plumosus*	Climbing Asparagus
BASELLACEAE	**Anredera cordifolia*	Maidera Vine
BIGNONIACEAE	**Macfadyena anguis-cati*	Cat's Claw Creeper
CAESALPINIACEAE	**Caesalpinia decapetala*	Thorny Poinciana
CONVOLVULACEAE	**Ipomea indica*	Morning-Glory Vine
FABACEAE	**Macroptilium atropurpureum*	Siratro
PASSIFLORACEAE	**Passiflora edulis*	Edible Passionfruit

PASSIFLORACEAE	**Passiflora suberosa*	Corky Passionfruit
PASSIFLORACEAE	**Passiflora subpeltata*	White Passionflower
SOLANACEAE	**Solanum seaforthianum*	Climbing Nightshade

Ferns, Grasses and Groundcovers

FAMILY	***Botanical name***	**Common Name**
AMARANTHACEAE	**Amaranthus quitensis*	South American Amaranth
APIACEAE	**Ciclospermum leptophyllum*	Slender Celery
APIACEAE	**Hydrocotyle bonariensis*	Pennywort
ASCLEPIADACEAE	**Gomphocarpus fruticosus*	Narrow-leaved Cotton Bush
ASTERACEAE	**Ageratina adenophora*	Crofton Weed
ASTERACEAE	**Ageratina riparia*	Mistflower
ASTERACEAE	**Ageratum houstonianum*	Blue Billygoat Weed
ASTERACEAE	**Ambrosia artemisiifolia*	Annual Ragweed
ASTERACEAE	**Bidens pilosa*	Cobbler's Pegs
ASTERACEAE	**Cirsium vulgare*	Scotch Thistle
ASTERACEAE	**Crassocephalum crepidioides*	Thickhead
ASTERACEAE	**Galinsoga parviflora*	Potato Weed
ASTERACEAE	**Gnaphalium coarctatum*	A Cudweed
ASTERACEAE	**Hypochaeris radicata*	Catsear
ASTERACEAE	**Senecio madagascariensis*	Fireweed
ASTERACEAE	**Sonchus oleraceus*	Common Sowthistle
ASTERACEAE	**Xanthium occidentale*	Noogoora Burr
CANNACEAE	**Canna indica*	Canna Lily
CARYOPHYLLACEAE	**Stellaria media*	Chickweed
COMMELINACEAE	**Tradescantia fluminensis*	Wandering Creeper
CYPERACEAE	**Cyperus brevifolius*	Mullumbimby Couch
CYPERACEAE	**Cyperus rotundus*	Nutgrass
EUPHORBIACEAE	**Euphorbia peplus*	Petty Spurge
FABACEAE	**Trifolium fragiferum*	Strawberry Clover
FABACEAE	**Trifolium repens*	White Clover
LYTHRACEAE	**Cuphea carthagenensis*	Cuphea
MALVACEAE	**Sida rhombifolia*	Paddy's Lucerne
OXALIDACEAE	**Oxalis debilis var. corymbosa*	Oxalis
PHYTOLACCACEAE	**Phytolacca octandra*	Inkweed
PHYTOLACCACEAE	**Rivena humilis*	Coral Berry
POACEAE	**Andropogon virginicus*	Whiskey Grass
POACEAE	**Avena sativa*	Oats
POACEAE	**Briza minor*	Shivery Grass
POACEAE	**Bromus catharticus*	Prairie Grass
POACEAE	**Chloris gayana*	Rhodes Grass
POACEAE	**Eragrostis tenuifolia*	Elastic Grass
POACEAE	**Lolium multiflorum*	Italian Ryegrass
POACEAE	**Melinus repens*	Red Natal Grass
POACEAE	**Paspalum dilatatum*	Paspalum
POACEAE	**Paspalum urvillei*	Vasey Grass
POACEAE	**Paspalum wettsteinii*	Broad-leaved Paspalum
POACEAE	**Pennisetum clandestinum*	Kikuyu Grass
POACEAE	**Pennisetum purpureum*	Elephant Grass
POACEAE	**Setaria palmifolia*	Palm Grass
POACEAE	**Setaria sphacelata*	Setaria

POACEAE	**Sporobolis indicus var. capensis*	Parramatta Grass
POACEAE	**Stenotaphrum secundatum*	Buffalo Grass
POLYGONACEAE	**Acetosa sagittata*	Turkey Rhubarb
PORTULACACEAE	**Talinum paniculatum*	Talinum
RUBIACEAE	**Richardia brasiliensis*	Mexican Clover
SOLANACEAE	**Solanum capsicoides*	Devil's Apple
SOLANACEAE	**Solanum nigrum*	Black-berry Nightshade
SOLANACEAE	**Solanum pseudocapsicum*	Jerusalem Cherry
TAENITIDACEAE	**Pityrogramma austroamericana*	Gold Fern
VERBENACEAE	**Verbena bonariensis*	Purpletop
VERBENACEAE	**Verbena rigida*	Veined Verbena

Aquatic and Wetland Plants

ARACEAE	**Xanthosoma violaceum*	Blue Taro
BRASSICACEAE	**Cardamine hirsuta*	Common Bittercress
CALLITRICHACEAE	**Callitriche stagnalis*	Common Starwort
HALORAGACEAE	**Myriophyllum aquaticum*	Parrots Feather
HYDROCHARITACEAE	**Egeria densa*	Dense Waterweed
NYMPHAEACEAE	**Nymphaea caerulea subsp. zanzibarensis*	Cape Waterlily
POACEAE	**Urochloa mutica*	Para Grass
POLYGONACEAE	**Persicaria maculosa*	Redshank

*Introduced in NSW

REFERENCES

Auld,B.A. and Medd, R.W. (1987). **Weeds- An illustrated botanical Guide to the weeds of Australia**, NSW Agriculture, Inkata Press, Melbourne.

Beadle, N.C.W. (1984). **Students Flora of North Eastern New South Wales. Part 1. Pteridophytes**. Botany Department, University of New England, Armidale NSW.

Briggs,J.D. and Leigh,J.H.(1996). **Rare or Threatened Australian Plants**. CSIRO Publishing Australia.

Chaffey, C. (2002). **A Field Guide to Australian Ferns- Volume 1**. Natureview Publishing, Bangalow NSW.

Fairly,L. and Moore,P.(1989). **Native Plants of the Sydney District**. The Society for Growing Australian Plants, Kangaroo Press Pty Ltd.

Floyd,A.G.(1989). **Rainforest trees of Mainland South-eastern Australia.** Forestry Commission of New South Wales, Inkata Press, Sydney NSW.

Floyd,A.G.(1990). **Australian Rainforests in New South Wales- Volume 1 and 2**. NSW National Parks and Wildlife Service, Surrey Beatty and Sons Pty Ltd.

Harden,G.J.(1990-1993). **Flora of New South Wales, vols 1- 4**. Royal Botanic Gardens, Sydney.

Harden, G.J. and Williams, J.B. (2000). **Rainforest Climbing Plants- A Field Guide to the Rainforest Climbing Plants of New South Wales Using Vegetative Characters**. Department of Botany, University of New England, Armidale NSW.

Macaboy, S. (1991). **What Tree Is That**. Weldon Publishing, Sydney, Australia.

Richards,P.G; De Vries,R.J. and Flint,C.(1988). **Vascular Plants of Conservation Significance in North Eastern New South Wales: Inventory and Assesment.** Unpublished draft report, NSW National Parks and Wildlife Service, CRA Unit, Northern Zone.

Romanowski, N. (1988). **Aquatic and Wetland Plants: a field guide for non-tropical Australia**, University of New South Wales Press Ltd.

Stephens, K.M. and Dowling, R.M. (2002). **Wetland Plants of Queensland- A field guide**. CSIRO Publishing, Victoria.

Wheeler, D.J.B. and S.W.L. Jacobs and B.E. Norton. (1982). **Grasses of New South Wales**. Department of Botany, University of New England, Armidale NSW.

Williams,J.B., G.J.Harden and W.J.F.McDonald (1984**). Trees and Shrubs in Rainforests of New South Wales and Southern Queensland**. Department of Botany, University of New England, Armidale NSW.

ACKNOWLEDGEMENTS

I gratefully acknowledge the following contributors:

Alex Floyd (North Coast Regional Herbarium)
Garry Chapple and Karen Wilson (Royal Botanic Gardens)
Van Klaphake (Botanist)
Andrew Benwell (Environmental Consultant)
Sue Bower (Environmental Consultant)
Bill Faulkner (Threatened Species Unit, NPWS)

Appendix 7: Rare and Endangered Flora of Duck Creek at Alstonville

Landcare Site

Species	TSC Act	ROTAP
Arthraxon hispidus	V	3VC-+
Macadamia tetraphylla	V	2VC-
Quassia sp. 'Mt Nardi'	N/a	3RC-
Tinospora tinosporoides	V	3RC-

Duck Creek

Species	TSC Act	ROTAP
Arthraxon hispidus	V	3VC-+
Floydia praealta	V	3VC-
Macadamia tetraphylla	V	2VC-
Ochrosia moorei	E	2ECi
Quassia sp. 'Mt Nardi'	N/a	3RC-
Rhodamnia maideniana	N/a	2RC-
Syzygium hodgkinsoniae	V	3VC-
Tinospora tinosporoides	V	3RC-
Trichosanthes subvelutina	N/a	3RC-

Arthraxon hispidus is a poorly known species occurring in open swampy areas and wet areas near the creek at the edge of the rainforest. There are as few as five records for Arthraxon in NSW. It occurs at a single location at the Landcare site in a wet, open area above the creek. It also occurs occasionally in discrete open swampy patches and moist areas near the creek, downstream of the Landcare site only. Specific management options should be employed in these areas, e.g. strategic hand weeding of Mistflower, Crofton and exotic grasses around patches of Arthraxon. Note that this grass has been known to 'burn off' a little following removal of 'protective' weeds in summer.

Floydia praelta was recorded at a single location as an individual (1m in height) in subtropical rainforest of good condition. It is located near the creek on the north side approximately mid-way between Wardell Road and Marshall Falls. Further recording and monitoring of locations of Floydia should occur when working at Duck Ck. Bush regeneration activities are not likely to adversely affect this species.

Macadamia tetraphylla is widespread and common over the area of Duck Ck. It occurs regularly on the mid-upper slopes of Camphor Laurel dominated forest and on the edges of subtropical rainforest. The Macadamias are mostly mature trees- seedlings are not common.

Ochrosia moorei was recorded from a single locality, in a disturbed area near the creek. About 4 or 5 small trees were noted. Ochrosia is located closer to Wardell Rd than

Marshall falls. Care should be taken not to damage these trees during work and further records of the species should be noted and monitored. Note that Alex Floyd has early records of Ochrosia from Duck Ck.
Quassia sp. Mt Nardi occurs as very occasional individuals on both the Landcare site and Duck Ck in general. The hardy trees are commonly 1-2m in height and occur in disturbed areas of Lantana and Camphor.

Rhodamnia maideniana was recorded as very occasional(5 or 6) individuals from above and below Marshall Falls. It prefers moist sheltered areas and generally occurs in disturbed forest.

Syzygium hodkinsoniae occurs between subtropical rainforest and Small-leaved Privet dominated areas of the creekbank, about 100m upstream of Marshall Falls only. About 15 individuals were noted, ranging from seedlings to trees 5-6m in height. Care should be taken not to trample seedlings where a working track may develop following the creek. Strategic control of Privet and Lantana should occur around Syzygium to maintain suitable microclimate.

Tinospora tinosporoides occurs regularly throughout Duck Creek in areas where there is sufficient canopy cover. It occurs in both weed dominated areas and well developed rainforest. Bush regeneration activities are likely to stimulate the regeneration of Tinospora and enhance its habitat.

Trichosanthes subvelutina was recorded at a single location on the mid-slope between Marshall Falls and the Landcare site. It occurs above the rainforest regrowth, in an area of Lantana and Privet. Bush regeneration activities are likely to stimulate the regeneration of Trichosanthes and enhance its habitat.

Also note that the record of *Neisosperma poweri* (in good bush above falls only) may be the southern limit of the taxon in NSW. The current opinion in the Threatened Species Unit at Coffs is that it should be listed on TSC Act and so may well be in the future. *Neisosperma* is common in Queensland but very rare in the Big Scrub. I know it from Booyong and Hermans Scrub(possibly at Dalwood, Vic Park).
Also note that the record of *Acalypha* sp. aff. *eremorum* has conservation significance. It is a newly described taxon that has been recently separated from the spiny shrub *Acalypha eremorum* in Queensland and is therefore not currently listed on the TSC Act. The identification was confirmed by Alex Floyd of Coffs Botanic Garden and Qld Herbarium. No comment could be made by NPWS because no formal proposal for listing has been submitted to the Scientific Committee. The southern limit in NSW may well be at Duck Ck. It occurs in good bush above and below the falls as about 10 individuals. This species also occurs at Booyong, Hermans, Wiltons and Killen Falls(possibly Rotary Park). Locations of this species should be regarded as highly significant.

Conservation of Native Plants

In N.S.W. specific legal protection is assigned to native plants that are listed on the schedules of the Threatened Species Conservation Act (1995). Species are allocated to the schedules according to rarity:

Schedule 1.	Presumed Extinct **(X) -** Species that have not been recorded in NSW for at least 50 years
	Endangered **(E)** - Species that are likely to become extinct in NSW unless action is taken to stop their decline
Schedule 2.	Vulnerable **(V)** - Species that are likely to become endangered in NSW unless action is taken to stop their decline

More detailed information is contained in their ROTAP (Rare or Threatened Australian Plant) codes, which were developed by Briggs and Leigh in 1988. Species are assigned codes according to distribution, abundance, range and adequacy of conservation. Rare, threatened and poorly known plants are defined as:

-Rare plants are species that may be represented by a relatively large population in a very restricted area or by smaller populations spread over a wider range, or by some intermediate pattern.

-Threatened plants are species at risk of disappearing from the wild within one or two decades (endangered) or during the next 20-50 years (vulnerable), through depletion or habitat destruction.

-Poorly known plants are those suspected, but not definitely known, to belong to any of the above categories.

Details of the ROTAP classification codes are listed:

ROTAP Classification Codes

Distribution Category	Criteria
1.	Taxa known only from the type collection
2.	Taxa with a very restricted distribution in Australia with a maximum geographic range of less than 100 km.
3.	Taxa with a range greater than 100 km in Australia but occurring only in small populations than are mainly restricted to highly specific and localised habitats.
Conservation Status	
X – Presumed Extinct	Taxa that have either not been found in recent years despite thorough searching, or have not been collected for at least 50 years
E – Endangered	Taxa in serious risk of disappearing in the wild state within one or two decades if present land use and other causal factors continue to operate.
V – Vulnerable	Taxa not presently endangered but at risk from disappearing from the wild over a long period (20-50years) through continued

	depletion, or which largely occur on sites likely to experience changes in land use that would threaten the survival
R – Rare	Taxa which are rare in Australia but which overall are not currently considered Endangered or Vulnerable. Such species may be represented by a relatively large population in a very restricted area or by smaller populations spread over a wider range, or some intermediate combination of distribution pattern
K – Poorly Known	Taxa that are suspected but not definitely known, to belong to one of the above categories. At present field distribution information is inadequate.
Conservation Adequacy Code	
C	The taxon is known from a conservation reserve (National Park, Nature Reserve etc).
a	This indicates that the taxon is considered adequately conserved, with a population of 1000 plants or more known to occur within conservation reserves.
i	The taxon is considered inadequately reserved with a total population of less 1000 plants known to occur within a conservation reserve.
-	The species has been recorded from a conservation reserve but the population size within the reserve is unknown.
t	Total known population reserved
+	Overseas occurrence

Appendix 8: Tools and Equipment Required

Non-consumables

- Plastic or steel boxes for equipment storage
- Leather pouches with belts to secure secateurs and knives
- Felco® secateurs (no.5)
- Victorinox® boning knives with non-slip handles
- Sandvik® loppers (no.16)
- Large bow saw
- Small pruning saws
- Poison pots, stands, and paintbrushes
- Goggles for mixing and applying herbicide
- Tomahawk
- Tree injection unit
- Sharpening stone
- Wheel barrow
- Chemical measuring container
- Rubber gloves for measuring and applying herbicide
- Gardening gloves
- 15 litre backpack spray unit with Rega® nozzle
- Black builders' plastic for composting
- Native plant and weed identification manuals
- Hand lens
- Camera
- First aid kit

Consumables

- Aerosol oil for tool maintenance (WD40® or Inox®)
- Diary/ journal
- Work record sheets (see Appendix 7)
- Flagging tape
- Photographic film
- Glyphosate (Newfarm Duo)
- Protec®
- Metsulfuron (Brushoff® or Brush Killer®)
- Spray marker dye (Kiwi Lite, pink, organic dye or Herbi Dye)
- Stakes or star pickets for photo points

Appendix 9: Regeneration Record Sheet

REGENERATION RECORD SHEET

Remnant Name:	Date:
Personnel/Volunteers:	Hours Worked:
Weather Conditions (temperature, prevailing wind, cloud cover etc.):	
Work Completed (work zone – use map on reverse, methods trialed, comments on previous works, monitoring, followup or reminders etc.):	

Weeds Treated	Methods Used	Chemical & Application Rate

Chemical	Vol. Used (ml)	Chemical	Vol. Used (ml)

Payment/Funding	Cheque No.	Invoice No.

Observations (flora, fauna, fruiting, flowering etc.):
Accidents/Incidents/Near Misses: