

THE REVEGETATION of GINNINDERRA CREEK

between

BARTON HIGHWAY AND MACGREGOR, A.C.T.

June 2000

"The integration of humans and wildlife within the same matrix needs to be further examined given the increased pressure on the landscape. If the idea of a conservation ethic is to succeed it will likely include the needs of humans to recreate in conjunction with the needs to encourage wildlife movement....."

(Fleury and Brown 1997)

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INTRODUCTORY COMMENT & ACKNOWLEDGEMENTS

When reading and reviewing various documents provided for this project, there were odd moments when I wondered why a general master plan for planting sites was required. Documents already available e.g. an environmental assessment of the corridor (Elvin 1998), an urban nature conservation report (Enviro Links et. al.1998), the Ginninderra Creek Catchment Strategy, the North Belconnen Landcare Group management plan and strategies plus many other major and minor sources are an excellent array of material providing sound advice, actions and future directions relevant to the preparation of a master plan for planting sites in the creek corridor.

However, when undertaking the field assessment and during discussions with others, it did become obvious that there are particular points and issues that needed to be addressed, and that their implementation could make a positive contribution to what is, in effect, the preparation of a Revegetation Master Plan. Objective assistance and comment from an outside source can provide another perspective on issues, and this is what is attempted in this report.

The preparation of a rigid, mapped Revegetation Master Plan is somewhat outside the scope of this report. What this report has attempted to do is provide some design techniques based on a variety of environmental factors that need to be met in the corridor, and also reveal issues essential to (or a constraint for) appropriate revegetation planning at the local level. It also provides comment on these issues, and differs somewhat from a usual plan format in that it makes some recommendations. Recommendations are presented as I hope they may help to emphasise the importance placed on these matters by the author.

I hope the comment provided in this report can contribute towards what is already recognised as a “flagship” environmental rehabilitation project of some fame in the Landcare world. The potential for the creek corridor to be utilised by people *and* existing and potential new species of urban wildlife is unquestionable. The only thing we should now have to do is decide on how quickly we can realise this potential!

I would like to acknowledge the people listed below for their contributions:

Agency: Chris Nazer, Tony Bray, Jane Carder, Frank Ingwersen.

Community: Jo Daly, Sandra Harding, Maurice Griffin-Waricke, Murray Smith, Chris Watson, , Paul Hodgkinson, Robert Cuickshank.

1) SUMMARY & RECOMMENDATIONS

A long term aim of any urban based Catchment Strategy should be to have diverse, self sustaining ecosystems for both people and the native plants and animals that share our living space. Canberra Urban Parks & Places (CUPP) and the member groups of the Ginninderra Catchment Group (GCG), have embarked on rehabilitating Ginninderra Creek and its catchment, and have called for a revegetation master plan to be prepared for the riparian zone of the creek corridor between the Barton Highway and the urban edge at Macgregor.

The scope of works provided by CUPP for this master plan have, I believe, been met at the broad level that was intended. The main issues related to revegetation planning for the corridor are provided in this report and are subjects of the recommendations below. *The nature and means of providing for revegetation planning in multi-use corridors in urban areas is complex and needs more refined master planning processes at the local level*, and these are discussed in this report.

The work already done in the Catchment in regard to overall planning is as good as has been done anywhere. The broad survey of the creek corridor for this project revealed that it has enormous potential for human recreation and wildlife if appropriately designed and maintained. This report will probably only serve to re-emphasise directions already charted for CUPP and the GCG and its member groups through the Catchment Strategy and other management documents already available.

The following recommendations are provided as they are seen as the most significant areas for further consideration or actions. It is recommended that:

Recommendation 1

that the information on urban wildlife corridors in the unpublished report (Enviro Links et.al.1998) to CUPP be compiled in different format to provide guidance material for planning for wildlife corridors in urban areas

Recommendation 2:

that willow removal from Ginninderra Creek continue, until all problem species (and individuals) have been removed.

Recommendation 3:

that the Weeping Willows that are not being removed from the creek be sexed during the flowering season to ensure they are all of one gender.

Recommendation 4:

that woody weed removal programs include all invasive species affecting the creekline, and that invasive species forming an understorey to willows be targeted for early removal even if the willows are not to be removed in the short term.

Recommendation 5:

that consideration be given to the removal of any plantings of invasive species that are affecting the creek channel, and that these species are no longer used or replaced (in accord with current guidelines) in locations where they are proven as troublesome or have a detrimental environmental impact.

Recommendation 6:

that any exotic invasive species currently offering protective and breeding habitat for wildlife be removed only after the provision of new habitat using regional native species are established.

Recommendation 7:

that in order to make the creek more accessible and improve its image and recreational use by the community, that

- i) *maintenance through mowing/slashing be increased, with these regimes being decided at the local level in conjunction with CUPP,*
- ii) *member groups of the GCG undertake field surveys to prepare proposals for discussion with CUPP for sites where increased mowing/slashing maintenance would be beneficial*
- iii) *GCG member groups facilitate access to these areas by mowing/slashing machinery*
- iv) *Areas designated for mowing/slashing be clearly designated on the locally produced revegetation plan.*

Recommendation 8:

that any plant debris resulting from weed removal programs be disposed of in a way that reduces negative public reaction to the visual impact and ensures they do not contribute to fuel loads in the corridor.

Recommendation 9:

that selected people from GCG member groups be provided with training in the use of herbicides, and that a trial weed management program(s) be established in conjunction with CUPP, and with CUPP having the role of determining the continuation of the program at the end of the trial period.

Recommendation 10:

that the GMC member groups:

- i) *prepare revegetation plans for their own sites, taking into account wildlife and human needs within the corridor.*
- ii) *ensure revegetation plans clearly delineate where plantings are to be undertaken.*

Recommendation 11:

that the preparation of the revegetation plans take into account fuel management issues as part of the planning process.

Recommendation 12:

that the member groups of the GCG be responsible for the maintenance of their plantings, until well enough established to hand over to CUPP.

Recommendation 13:

that member groups of the GCG place a priority on:

- i) *the conservation and management of existing stands of indigenous native vegetation*
- ii) *resolving their own priorities for revegetation within their own sites, but in conjunction with existing indigenous and planted native vegetation and what the adjoining member groups are doing in regard to revegetation.*

Recommendation 14:

that the member groups of the GCG examine the feasibility of growing plants for their revegetation projects with the assistance of others, as this is a more effective way of obtaining the desired species of the required provenance, and will assist in wider local community involvement in the revegetation project.

2) THE BRIEF

The brief for this project was to develop a revegetation plan for the riparian zone of Ginninderra Creek to ensure the environment is restored and environmental values sustained.

The scope of works included:

- environmentally assess a riparian zone of 100 metres width along Ginninderra Creek from the Barton Highway to the suburb of Macgregor (it was subsequently decided to exclude the Lake Ginninderra pondage)
- develop a planting template(s) for a 100m wide section of the riparian zone that can be used to guide revegetation works at certain types of sites.
- develop from the existing draft plant list a final list of endemic plant species suitable for use in the zone (it was subsequently agreed by all parties that this list should not exclude regional species suitable for use in the study area).
- provide a list of possible nursery suppliers of plants on the list
- provide a general masterplan for planting sites and their protection using the survey data.
- report the results in text and on maps as specified by Canberra Urban Parks and Places.
- report briefly on any other relevant factors that should be drawn to the attention of CUPP.

3) BACKGROUND

Ginninderra Creek and environs has a rich and diverse history. A “potted history” is provided below for background purposes only, as the history of the area has been well treated in other publications (Gillespie 1992; Elvin 1998). Gillespie 1992 was used extensively to compile the following.

3.1) Aboriginal History

Evidence of Indigenous peoples occupation within the ACT region has been carbon dated to more than 21,000 years before present. Other research centred on Lake George provides an indication through charcoal levels that indigenous people may have been present up to 120,000 years ago.

There is ample evidence of indigenous occupation of the district through artifact sites, various types of quarrying, rock carving and painting, bora rings, scarred trees, burial grounds and axe grinding groove sites. Two significant artifact sites have been discovered near the creek, one situated on the Murrumbidgee River close to where Ginninderra Creek joins the river, and another just outside the catchment at “Reidsdale” property.. While there is presently some controversy on the axe groove sites located in Umbagog District Park, it is certain that indigenous people utilised the creekline and surrounding district.

After the European invasion and settlement, Aboriginal people tragically and rapidly declined in number, primarily through introduced diseases to which they had minimal to no resistance, and the effect of these diseases was made worse by their way of life. The last full blooded Aboriginal person died in 1897 at Queanbeyan. Fortunately people descended from the Ngunnawal people are still present in our region, and there has been a concerted effort by these people to keep alive their culture.

It is of extreme importance that the surviving remnants of indigenous cultural heritage and important sites of the Ngunnawal people be conserved as part of any works associated with the Ginninderra Creek corridor. We are fortunate that the Ngunnawal's name for the creek is used today, even if corrupted from its original form.

3.2) European History

Ginninderra Creek holds a significant place in the early European settlement of the Canberra region. The general vicinity was first visited by Europeans in 1820 while in search of the Murrumbidgee River. The drive for pastoral extension saw the first stock depastured on the fertile plains of the Ginninderra Creek in 1825 by James Ainslie while he located suitable land to take up a grant for Robert Campbell. The son of Campbell's brother in law, George Thomas Palmer, established his station on Ginninderra Creek (then known as Ginninginninderry) by 1826 on the site now containing Palmerville Heritage Park. By 1828 nearly 2000 cattle, over 6000 sheep and nearly 50 horses were recorded as stocked by Palmer.

Much of the area was grassland to grassy woodland, with more heavily timbered country on the hills and ridges. At this stage the creek was a chain of ponds, but as clearing and grazing activity continued, and with the rise in the rabbit population in the 1890s, it was not long before stormwater runoff increased and sections of the creek began to incise. Much of the Yellow Box (*Eucalyptus melliodora*), Apple Box (*E. bridgesiana*), Red Stringybark (*E. macrorhyncha*) and Blakely's Red Gum (*E. blakelyi*) that occurred in the district was cleared for fencing and building materials. Wattle was also extensively used for building construction. Local timber clearing was extensive because of the difficulty of transporting timber and due to the fact that mainly wooden buildings were constructed and fences were of the post and rail type. Early pictures show the woodland that occurred in the district, and must have been very similar to that which is today found in the surrounds of Hall village and other nearby grassy woodland and grassland remnants. The first plantings of willows and other woody weed species commenced early after European settlement.

Wildlife was also prolific judging by early hunting and exploitation records. What were once common species e.g. Bustard (*Ardeotis australis*), Emu (*Dromaius novaehollandiae*), Brolga (*Grus rubicunda*),

Koala (*Phascolarctus cinerea*), Swamp Wallaby (*Wallabia bicolor*), Red-necked Wallaby (*Macropus rufogriseus*) were soon reduced in number or eliminated.. There are also records of Bandicoots, Dingoes, Kangaroo-rats, Platypus, Wedge-tailed Eagle, Carpet and Diamond Pythons in the area. Many species of lizards were also much commoner than today (e.g. Bearded Dragon, Cunningham's Skink, Blotched and Common Bluetongue and Shingleback).

Grazing continued unabated until the urban development of Belconnen commenced. At this time the creek and the surrounding country was very open. Occasional Willows (*Salix* spp) and other adventitious exotic species were present, but were kept very much under control by intensive grazing regimes. As the grazing was removed, Willows in particular spread very rapidly, smothering the creek. New and potentially serious weeds have continued to establish in recent years.

This was basically the situation prior to community efforts to try and restore some of the natural values of the creek, based on an early proposal by Mr. Maurice Griffin-Warwicke to the Legislative Assembly. CUPP's and the GCG are now working in partnership to rehabilitate this very important urban corridor.

4) ENVIRONMENTAL SETTING

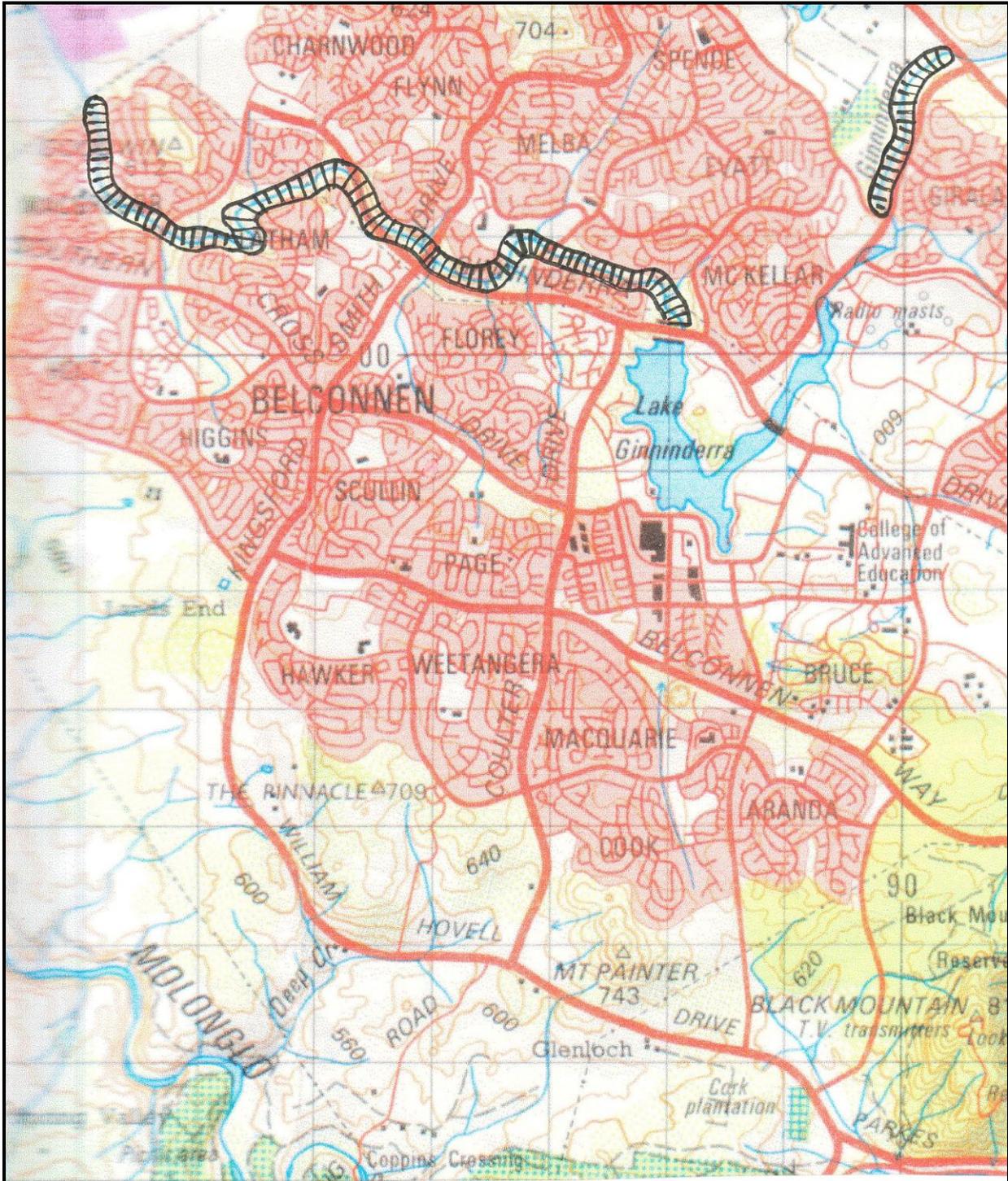
The catchment of Ginninderra Creek and its tributaries rise in the undulating hills in the north eastern part of the ACT and Yarrowlunla Shire between 800 and 900m and runs through large basins at about the 600m contour and into Murrumbidgee River. The catchment area is 32,000 hectares and is one of most heavily urbanised catchments in the Murray-Darling Basin. Ginninderra Creek carries c. a quarter of the urban runoff emanating from urban areas of Canberra to the Murrumbidgee River.. Further urban development is proposed for the catchment in the Gungahlin area.. The catchment also accommodates rural enterprises, open space and units of Canberra Nature Park. Rural residential development occurs within Yarrowlunla Shire, and there is currently a proposal to establish rural residential development in the ACT in an area currently zoned for the urban development of Kinlyside.

A major feature of the Creek occurs at its western end in the Ginninderra Creek gorge, where a privately owned tourist venue is being marketed as “Canberra’s Kakadu”.

Further information regarding the environmental setting of the creek has been documented by Elvin (1998), Gillespie (1992) and the State of the Environment Report (1997).

The Aboriginal name of “Ginninderry” is said to have meant “sparkling water throwing off little rays of light” (Gillespie 1989). Since the advent of urban development in the catchment, and probably during the years of use for agricultural purposes, the original quality of the creek and its environs as reflected by the Aboriginal name has been compromised forever. However it is quite feasible to re-instate many of the environmental qualities and values of the creek for both people and wildlife thus meeting many of the ACT’s stated objectives in nature conservation and biodiversity protection, provided the community and political will to do so remains as strong as it is today. The Ginninderra Creek Catchment Strategy 2000, officially launched as this report was being in final printing stages, is a welcome sign that the necessary commitment is there.

LOCATION MAP



Area surveyed is shaded.

5) METHODOLOGY

The methodology used for the preparation of this report was as follows:

- two meetings were held prior to commencement of the report to ascertain what was required. Representatives from CUPP and leaders of the member groups associated with the GCG were represented at the meetings.
- CUPP's issued a brief for the project.
- the sections of Ginninderra Creek to be surveyed (from the Barton Highway to the Ginninderra Pondage and then from the dam wall to where the Creek leaves the urban area at Macgregor) was divided up into 96 100m X 100m squares. The reason for this was to enable easier identification of each section of the creek.
- basic survey sheets were prepared and one sheet was prepared for each 100m x 100m grid square (the survey sheets are attached as Appendix 1 to this report).
- the full length of the Creek was walked, noting any factors on the survey sheet for each grid square. The extreme landscape modifications through large sections of the corridor resulted in some aspects of the survey sheets being fairly much the same throughout.
- contact was made with the Wildlife Research and Monitoring Unit of Environment ACT for any issues of concern to them within the surveyed sections of the Creek.
- contact was made by leaders of the member groups and with CUPP at various times during report preparation, including site meetings.
- reports already prepared for the Creek were used as reference documents during preparation of the report.

Reference Reports

A number of significant reports have been produced for, or are relevant to, Ginninderra Creek. These are:

- *Assessment of the Environmental Status of the Urbanised Section of Ginninderra Creek Corridor* (Enviropulse Consultancies 1998)
- *Ginninderra Creek Catchment Strategy* (Ginninderra Catchment Group 2000)
- *Ginninderra Creek Willow Management Survey* (Lang 1999)
- *Upper Murrumbidgee Catchment Riparian Survey* (Greening Australia 1996)
- *Unnamed document* (Griffin-Warwicke 1993) prepared for submission to the ACT Legislative Assembly regarding the rejuvenation of Ginninderra Creek.
- *North Belconnen Landcare Group Management Plan, Strategies and Actions*; Oram & Nazer 1994.
- *Murrumbidgee Catchment Action Plan* (Murrumbidgee Catchment Management Committee 1998)

Another report of relevance to this assessment was the unpublished report to CUPP's entitled *Wildlife Restoration Principles and Strategies for Urban Nature Conservation* (Enviro Links et.al. 1998). Ginninderra Creek is a good example of the types of areas referred to in the Enviro Links report that are well suited to greatly boosting the recreational value of public open space and increasing the habitat availability for many species of wildlife diversity within urban areas. A revegetation strategy for Ginninderra Creek will contribute to improving urban ecology and fits well into the recommendations made by Enviro Links et al. report.

6) BROAD OVERVIEW OF CURRENT STATUS

Barton Highway – William Slim Drive (grid squares 1-16)

The riparian zones of the creek in this area are flat and wide on the Palmerville side, rising more rapidly on the Giralang side. This section of the creek has been cleared of willows, and the creekline remains very stable. Some remnants of the original pools are able to be made out.

While the willows have been removed, some regeneration was noted. Cumbungi and Common Reed beds have re-established very rapidly since the willow removal and provide useful habitat. There are scattered exotic plantings, and copses of exotic trees that would have some heritage associations with Palmerville. The understorey is primarily introduced species. The water was discoloured after recent rain.

Some maintenance in the form of slashing occurs, but there are further areas that would benefit from similar maintenance. Revegetation plantings have been undertaken, but are not of a size that they are noticeable within the overall landscape. Some problems have been experienced in this area through new plantings being slashed.

This is a very important area to concentrate on with regard to revegetation due to its visibility from a main interstate road and an urban arterial route, and the almost total absence of any well established regional native species in this section. The Landcare “forest” (pending no further mishaps) will provide beneficial habitat for fauna in this section of corridor. Heritage aspects are important on the Palmerville side of the corridor, but should not exclude the establishment of native vegetation on the creek.

Ginninderra Dam Wall – Copland Drive (grid squares 17-32)

The floodplain for the most part is wide and flat, varying in extent from one side of the creek to the other. The creek appears quite stable in both willow infested and open areas of creekline where willows have been removed. Willow clearance varies on this section of creek. Close to the dam wall some clearance has been undertaken, a further middle section trees were being poisoned and towards Copland Drive all willows have been removed, and beds of Common Reed, Cumbungi and River Club Rush have colonised the creek. Reasonable sized pools occur at occasional intervals.

The understorey has been lost.

Some native grasses persist on the higher slopes near the dam wall, where some rock outcrops also occur. African Lovegrass (short *Chloremela*) and Chilean Needle Grass commence the heavy infestations readily seen in the next sections of corridor towards Macgregor.

Maintenance activity varies. In the revegetated grid squares 28 to 32, mowing maintenance is getting close to the standard required in many other parts of the corridor. Closer to the dam, there are extensive areas that offer great potential for appropriate landscaping and recreational opportunities, which will require an increase in maintenance.

The results of the willow clearance, re-colonisation and revegetation undertaken within Grid Squares 28 to 32 provide an excellent example of the techniques that should be adopted on a larger scale for the whole creek corridor.

Copland Drive – Kingsford Smith Drive (grid squares 33-46)

Wide and flat floodplains vary in width from one side of the creek to the other. Rock outcrops start to occur on rising ground in close proximity. The creek banks appear quite stable.

Some willow clearance has been undertaken at the eastern end of this sector. The remainder is heavily willow infested, and plants of Goat Willow (*Salix caprea*), another invasive species of willow, start to

appear in this section. Weeds such as Box Elder (*Acer negundo*) and other well recognised weed species also occur in greater numbers.

Well established native tree plantations occasionally occur and provide a useful base for both removal of willows and revegetation planning. The grove of Manna Gum (*Eucalyptus viminalis*) located about midway through this sector provide an excellent example of how the corridor could look in years to come.

The understorey has been lost, with only scattered native grasses remaining.

This section of creek offers a good opportunity for very focussed rehabilitation effort due to its proximity to Ginninderra Drive., and because there are stands of planted native vegetation in good locations on which to build further desirable habitat.

Kingsford Smith Drive – Ginninderra Drive (grid squares 47-59)

Wide flood plains exist on both sides of the creek in the first few grid squares, but then becomes tighter as the creek winds its way across and between Ginninderra Drive. This section is infested with willows and appears to receive some slashing maintenance. However, grass fuel loads appeared high in this sector.

The understorey has been lost, with introduced weeds mainly of pasture origin dominating.

This area, because of topography and infrastructure, is more difficult to maintain. However, the presence of Ginninderra Drive and the amount of established native plantings (especially *Casuarina cunninghamiana*) makes this section of creek corridor a priority for revegetation where a visual showpiece is required.

Ginninderra Drive – Macrossan Crescent (grid squares 60- 68)

Wide floodplains continue, though start to become more restricted at the western end of the sector.

Willow removal is well advanced in this sector, and there are plans to continue removals downstream.. Willow removals were being undertaken at the time of preparation of this report.

Maintenance in this sector could be greatly improved by a more refined examination of what should be slashed, and what parts mown to create a more user friendly groundcover for ease of public access.

The topography starts to become more interesting in relation to landscaping possibilities in this sector. More rock outcropping and patches of native grasses occur in this section, and should be used to advantage. This sector contains the controversial axe grinding grooves, a feature that could be emphasised by well considered plantings and landscape design.

Macrossan Crescent – Florey Drive (grid squares 69-81)

This section runs through steep Umbagog Gorge., though the creekline is willow infested. Stony slopes are a key landscape feature of this sector, as well as providing suitable habitat for a wide range of reptile, amphibian and invertebrate species. Unfortunately there appears to have been some moving and rolling of these rocks without replacement. Even if replaced, constant disturbance of rock habitat may well lead to a decline in any species using the area.

Patches of native grasses occur toward the western end on both sides of the creek, but the greater part of the understorey is lost. As these remnant patches are in the corridor, there may be opportunities to manage them in such a way that they better link with the “Blue Devil Grassland” feature of Umbagog Park.

There should be a priority placed on the management of the natural floral features of this section of the creek, and this section offers perhaps the best opportunity as a landscape feature in the creek corridor, with the simulation of a mini Ginninderra Gorge entirely possible.

Florey Drive – Osburn Drive (grid squares 82-91)

Wider floodplains reoccur after the creek emerges from Umbagog Gorge, though narrower than previous sectors.. The creek has some large pools.

The creek is willow infested and the understorey has been lost. More species of woody weeds start to appear in larger quantities e.g. Privet.. A priority should be placed on the understorey of woody weeds presently under the willow canopy, in part to lessen flood impacts and aesthetic impacts when the willows are removed.

The understorey is lost, and slashing is used to maintain grassed areas.

Osburn Drive - Macgregor Suburban Edge (grid squares 92-96)

On the eastern side of the creek, the riparian zone is relatively flat, rising more at the northern end of the site. The riparian zone on the western side is flat but very narrow, with ground rising more rapidly than the eastern side. The creek banks appear stable, and the creek has reasonable width and pools, though the water was black despite nearly an inch of rain.

The riparian zone contains extensive areas of Chilean Needle Grass. Phalaris, Paspalum and Tall Fescue, together with other common introduced pasture species. Some areas are slashed, but the un-maintained areas provide a seasonal high fuel load. Any natural understorey value has been eliminated.

Established infestations of some of the worst ACT environmental woody weeds are present on the creekline (Poplars, Willows, Privet, Box Elder, Rowan) with Poplar having been planted in the corridor. Residents on the eastern side appear to be planting or protecting adventitious seedlings and suckers such as Poplars and Privet. Other plantings that appear to have been planted by residents are a poor choice of species if considering biodiversity benefits. Little native vegetation other than patches of Common Reed and River Clubrush are present.

This section of corridor contains some well established native tree copses which provide a useful base planting for further revegetation planning.

7) RAPID FAUNA/HABITAT ASSESSMENT

7.1) Fauna

A rapid assessment (by bicycle) of the creek was undertaken on the 10th February 2000 to see what faunal species were present. This rapid assessment revealed that there are plenty of reasons for holding an optimistic outlook for the creek, with good potential for increasing faunal use of the corridor and increasing the number of species that use the corridor.

The assessment was conducted at a time when many summer migrant bird species were already moving out, and territorial calling had finished. Despite this, 33 species were recorded, and these are listed in the table below with other available records.

7.2) Habitat

The plantings undertaken in some sections of the corridor provide important habitat foci; with one based on Yellow Box (*Eucalyptus melliodora*) in Melba which is particularly valuable. Their weakness is the lack of a shrubby understorey; and where understorey does exist (e.g. between Kingsford Smith Drive and Copland Drive) it tends to be of Cootamundra Wattle (*Acacia baileyana*). Some fast-growing local wattles such as Silver Wattle (*Acacia dealbata*) and Red-stem Wattle (*Acacia rubida*) would be a valuable additions.

The areas of open grassland could be managed in some areas to maximise habitat values for birds e.g. Brown Quail (*Coturnix ypsilophora*) which are regularly reported from rank *Phalaris* around Lake Ginninderra. Four Brown Quail were observed at close quarters running through an exotic/native grass area close to the creek during a site visit. The Double-barred Finch (*Taeniopygia bichenovii*), a declining species locally, was also observed feeding on seeds in mown grass and flying to shelter in Cumbungi (*Typha sp*) on the creek.

There are areas where River She-oak (*Casuarina cunninghamiana*) and eucalypt plantings are now well established just above the creek where heavy willow-infestations still occur. These sections are a priority for willow removal. As the willows are removed, plantings down to the creek are needed at various points; and local Grevillea's would be a very useful habitat planting. There are areas of marshy land by the stream, probably good frog habitat; and more such areas could be easily developed. These areas can also be used for planting where they are unsuitable for other forms of habitat.

Superficially at least, the water appeared clear where it was flowing after 15mm of rain in the previous 48 hours. In bends in the creek, willow branches - flood debris, branches left from cutting, and living horizontal branches - are causing pooling and stagnation.

A large flowering *Banksia marginata* between Kingsford Smith Drive and Copeland Drive suggests that this species could be considered for more plantings, providing a valuable autumn nectar source.

Approaching Lake Ginninderra, there are some unfortunate plantings of Cotoneasters etc, which need to be removed.

The embedded granite outcrops at various places along the creekline are a feature to be emphasised and retained as habitat.

Following are fauna records for the creek that were obtained (excluding those species that are now locally extinct). It is provided to draw the currently available records into one listing.

Bird Records in the Creek Corridor

= sighted during this survey

+ = recorded by R. Summerell or R. Cruikshank 1998/1999

^ = previously recorded by others.

| COMMON NAME | SCIENTIFIC NAME |
|----------------------------|-------------------------------------|
| #Brown Quail | <i>Coturnix ypsilophora</i> |
| +Australasian Grebe | <i>Tachybaptus novaehollandiae</i> |
| +Hoary-headed Grebe | <i>Poliocephalus poliocephalus</i> |
| ##Pacific Black Duck | <i>Anas superciliosus</i> |
| ##Wood Duck | <i>Chenonetta jubata</i> |
| ##Little Pied Cormorant | <i>Phalacrocorax melanoleucos</i> |
| #Dusky Moorhen | <i>Gallinula tenebrosa</i> |
| #Purple Swamphen | <i>Porphyrio porphyrio</i> |
| +Eurasian Coot | <i>Fulica atra</i> |
| +White-necked Heron | <i>Ardea pacifica</i> |
| ##White-faced Heron | <i>Egretta novaehollandiae</i> |
| ##White Ibis | <i>Threskiornis molucca</i> |
| ^Latham's Snipe | <i>Gallinago hardwickii</i> |
| ##Masked Lapwing | <i>Vanellus miles</i> |
| +Black-shouldered Kite | <i>Elanus axillaris</i> |
| +Collared Sparrowhawk | <i>Accipiter cirrhocephalus</i> |
| #Brown Goshawk | <i>Accipiter fasciatus</i> |
| +Peregrine Falcon | <i>Falco peregrinus</i> |
| +Australian Hobby | <i>Falco longipennis</i> |
| +Brown Falcon | <i>Falco berigora</i> |
| +Nankeen Kestrel | <i>Falco cenchroides</i> |
| ##Feral Pigeon | <i>Columba livia</i> |
| ##Crested Pigeon | <i>Ocyphaps lophotes</i> |
| ##Galah | <i>Cacatua roseicapilla</i> |
| ##Sulphur-crested Cockatoo | <i>Cacatua galerita</i> |
| +Australian King Parrot | <i>Alisterus scapularis</i> |
| +Crimson Rosella | <i>Platycercus elegans</i> |
| +Eastern Rosella | <i>Platycercus eximius</i> |
| +Pallid Cuckoo | <i>Cuculus pallidus</i> |
| +Boobook Owl | <i>Ninox novaeseelandiae</i> |
| +Kookaburra | <i>Dacelo gigas</i> |
| +Sacred Kingfisher | <i>Todiramphus sanctus</i> |
| +Dollarbird | <i>Eurystomus orientalis</i> |
| ##Superb Fairy-wren | <i>Malurus cyaneus</i> |
| + White-browed Scrub Wren | <i>Sericornis frontalis</i> |
| ##Spotted Pardalote | <i>Pardalotus punctatus</i> |
| +Striated Pardalote | <i>Pardalotus striatus</i> |
| White-throated Gerygone | <i>Gerygone olivacea</i> |
| +Brown Thornbill | <i>Acanthiza pusilla</i> |
| +Buff-rumped Thornbill | <i>Acanthiza reguloides</i> |
| ##Yellow-rumped Thornbill | <i>Acanthiza chrysorrhoa</i> |
| +Striated Thornbill | <i>Acanthiza lineata</i> |
| ##Red Wattlebird | <i>Anthochaera carunculata</i> |
| ##Noisy Friarbird | <i>Philemon corniculatus</i> |
| +Yellow-faced Honeyeater | <i>Lichenostomus chrysops</i> |
| +White-eared Honeyeater | <i>Lichenostomus leucotis</i> |
| +White-plumed Honeyeater | <i>Lichenostomus penicillatus</i> |
| +New Holland Honeyeater | <i>Pholidonyris novaehollandiae</i> |
| +Eastern Spinebill | <i>Acanthorhynchus tenuirostris</i> |

| | |
|-----------------------------|---------------------------------|
| #+Scarlet Robin | <i>Petroica multicolor</i> |
| +Golden Whistler | <i>Pachycephala pectoralis</i> |
| #+Rufous Whistler | <i>Pachycephala rufiventris</i> |
| +Grey Shrike-thrush | <i>Colluricincla harmonica</i> |
| #+Australian Magpie-lark | <i>Grallina cyanoleuca</i> |
| +Grey Fantail | <i>Rhipidura fulliginosa</i> |
| #+Willie Wagtail | <i>Rhipidura leucophrys</i> |
| +Richard's Pipit | <i>Anthus novaeseelandiae</i> |
| +Skylark | <i>Alauda arvensis</i> |
| #+Black-faced Cuckoo-shrike | <i>Coracina novaehollandiae</i> |
| #+Australian Magpie | <i>Gymnorhina tibicen</i> |
| #+Pied Currawong | <i>Strepera graculina</i> |
| #+Australian Raven | <i>Corvus coronoides</i> |
| #+House Sparrow | <i>Passer domesticus</i> |
| +European Goldfinch | <i>Carduelis cardulis</i> |
| #+Double-barred Finch | <i>Taeniopygia guttata</i> |
| +Red-browed Finch | <i>Emblema temporalis</i> |
| #+Welcome Swallow | <i>Hirundo neoxena</i> |
| #Clamorous Reed-warbler | <i>Acrocephalus stentoreus</i> |
| #Little Grassbird | <i>Megalurus gramineus</i> |
| +Golden-headed Cisticola | <i>Cisticola exilis</i> |
| +Silvereye | <i>Zosterops lateralis</i> |
| #+Common Blackbird | <i>Turdus merula</i> |
| #+Common Starling | <i>Sturnus vulgaris</i> |
| +Common Mynah | <i>Acrodothis tristis</i> |

Reptile & Amphibian Records in the Creek Corridor

= A. Elvin 1998

+ = I. Fraser 2000

^ = R. Cruikshank

| | |
|-----------------------------------|---------------------------------|
| #Spotted-back Skink | <i>Ctenotus uber orientalis</i> |
| Cunningham's Skink | |
| Common Bluetongue | |
| Shingleback | |
| ^Long-necked Tortoise | <i>Chelodina longicollis</i> |
| ^Brown Snake | <i>Psuedonaja textilis</i> |
| +Common Eastern Froglet | <i>Crinia signifera</i> |
| #Spotted Burrowing Frog | <i>Neobatrachus sudelli</i> |
| #Whistling Tree Frog | <i>Litoria verreauxii</i> |
| +Eastern Banjo Frog or Pobblebonk | <i>Limnodynastes dumerilii</i> |

Mammal Records for the Creek Corridor

| | |
|-------------------|------------------------------|
| Eastern Water Rat | <i>Hydromys chrysogaster</i> |
|-------------------|------------------------------|

8) REVEGETATION STRATEGIES

The brief provided by CUPP's requested the development of a revegetation plan for the riparian zone (approx. 100m wide) of Ginninderra Creek for the urbanised section of the corridor between the Barton Highway and Macgregor, excluding the Pondage. The Pondage was not included as it is already under other forms of specific management.

The revegetation strategy requested is in accord with the very specific recommendations of *Wildlife Corridors and Landscape Restoration: Principles and Strategies for Urban Nature Conservation*, a report to CUPP's (Enviro Links et. al. 1998). In fact, many of the issues that arose as a result of the field assessment for this project were addressed in the Enviro Links Report. The information in this report would be valuable to individual groups in the Catchment Group, especially the sections referring to urban wildlife corridors functions and design. This report could be the basis for a "training and guideline" manual for member groups due to the information it contains and, as is indicated later in this report, a need for GCG member groups to be more involved with revegetation planning.

Recommendation 1

that the information on urban wildlife corridors in the unpublished report (Enviro Links et.al.1998) to CUPP be compiled in different format to provide guidance material for planning for wildlife corridors in urban areas.

Planting and revegetation are often used as indicators for environmental improvement. While it may be so, other factors (physical and social limitations, financial resources) have to influence any decisions made about revegetation in locations such as Ginninderra Creek , as it is important that any efforts contributed by the community through partnership arrangements are effective, and meets the groups needs as well as those of the broader community.

The main issues to address with revegetation on Ginninderra Creek are:

8.1) Willow removal

During the field survey for this report it was decided one of the best actions that could be taken to improve the health of Ginninderra Creek was to immediately remove all the willows and other exotic woody weeds along the creekline. When conducting the field survey, it was noted that further willow removal was already underway. This is a very positive action for the long term benefit of the Creek, and one which should continue for the full length of the creek at the earliest opportunity.

Ginninderra Creek was a very open creekline in both pre European and European times. Willows only really commenced as a problem for the creek when grazing was withdrawn for the commencement of urban construction. Prior to this stock grazing would have eliminated any seedlings or plants from vegetative regrowth. Aerial views of the catchment prior to urban development show how open the creek was (Elvin 1998).

The detrimental effects of willows are more clearly understood today, hence the momentum to free this and other streams of this significant genus of woody weeds. Willow removal is the major and most significant step that can be taken to assist creek health and also return the creek to the community. Another significant advantage is that the creek will no longer be out of sight, and therefore out of mind.

Willow removal will continue to cause consternation with some nearby residents, no matter how well the message is communicated. However, the benefits to the creek, wildlife and the local community over time far outweigh any immediate and short term aesthetic disruption(s), and it is strongly recommended that removals be continued.

Recommendation 2:

that willow removal from Ginninderra Creek continue, until all problem species (and individuals) have been removed.

Caution is always rightly stressed with willow removal programs, to ensure that further problems such as erosion do not commence. However, after having walked the study area, I do not believe the rapid and complete removal of willows from the creek will have any detrimental environmental effects, as much of the length of the creek has wide flood plains which will allow the pressure of floodwater to disperse quickly. This was also confirmed by the willow control officer for Greening Australia (S. Lang pers.comm). There are some narrower sections of the creek (e.g. within the Umbagog Gorge at Umbagog District Park) which will concentrate flows, but the geology here will not allow for easy erosion. These sections of the creek should be more heavily planted with flexible-stemmed species as part of a revegetation program. Wherever revegetation is required or desired, it should be undertaken as soon as possible after willow removal and mulching.

There are considerable areas of the creek where revegetation is not warranted (or at least of no urgency) and where leaving the creek open and visible (and access possible) appears to be a desirable outcome. This indicates the need for an overall planting plan to be developed, and this is discussed in 9.4) *Group activities* below.

On some stretches of the creek and within the 50m distance either side of the channel some planted native vegetation is already well established, and this will soften the impact of the removal program. In some cases, willows need to be removed to permit the maximum potential development of the planted native trees. Whatever willows are left on the creek (*Salix babylonica* or hybrids thereof are not being removed) must be of one gender, and checks should be done on these trees in the next flowering season. This would be easily undertaken by the member groups of the GCG.

Recommendation 3:

that the Weeping Willows that are not being removed from the creek be sexed during the flowering season to ensure they are all of one gender.

8.2) Other woody weeds

Other highly invasive woody weed species were present amongst and under the willows, and were also noted in gardens bordering the creek. Weedy species have been planted on public land by residents and by the original public planting programs. These woody weeds need both immediate and longer term attention.

Those requiring the most urgent attention are Privet (*Ligustrum* spp), Hawthorn (*Crataegus* spp), Box Elder (*Acer negundo*), Rowan (*Sorbus aucuparia*), Cotoneaster (*Cotoneaster* spp.), Firethorn (*Pyracantha* spp.), Flowering Plums (*Prunus* spp) and various species of Poplar (*Populus* spp).

Wherever these species are found on the immediate creekline, they should be a priority for removal. They interfere in the same way as willows with regard to water flow; provide an intensity of shading as high as that of willows and make access to the creek more difficult than willows when in heavy infestations. They are also a significant seed source for downstream areas. One of the most dense infestations is in grid squares 92-96 on the urban edge at Macgregor which is almost certainly allowing seeds to move toward Ginninderra Gorge.

Recommendation 4:

that woody weed removal programs include all invasive species affecting the creekline, and that invasive species forming an understorey to willows be targeted for early removal even if the willows are not to be removed in the short term.

Further away from the creek more adventitious species are present. Of particular note are the extensive plantings of various poplars, with the ubiquitous White Poplar (*Populus alba*) probably being the worst of these species. In fairness it should be said that the use of *Populus* spp on watercourses was almost par for the course in the ACT (see similar plantings in Weston/Curtin area) at the time these urban areas were developed. However, the sheer lack of imagination in the potential use of these watercourses for

wildlife as well as recreation never ceases to amaze! . Many of these plantations are close to the creek and seedlings/suckers have found their way into the creek channel.

There are limits to what the public will accept with tree removals. Current knowledge of the weediness of poplars prompts the author to recommend their early though staged removal. It is probably more realistic to suggest no replacement as they decline and need replacement. However, the possibility of some removals should not be ruled out, and trees that are located in close proximity to the creek such that suckers are hard to manage should be considered for removal over the short term. Providing enough room for slashing maintenance between these exotic plantations and the creek will assist with weed management. Poplars should not, in line with CUPPs' current tree replacement policy, again be used in such close proximity to the watercourse, nor on floodplains where managing suckers is almost impossible.

Recommendation 5:

that consideration be given to the removal of any plantings of invasive species that are affecting the creek channel, and that these species are no longer used or replaced (in accord with current guidelines) in locations where they are proven as troublesome or have a detrimental environmental impact.

Other woody weeds such as Hawthorn vary in density of infestation. They are also used as nesting and protective habitat for some native species. Their removal should be more measured, ensuring adequate alternative habitat has been provided before they are totally cleared. To ensure problems with this species are not exacerbated over time, removal of Hawthorn should be focussed on new seedlings and small trees until the alternative habitat is well established and then commence removal of mature Hawthorn trees.

Recommendation 6:

that any exotic invasive species currently offering protective and breeding habitat for wildlife be removed only after the provision of new habitat using regional native species are established.

There are some heritage issues associated with exotic species at Palmerville, and these are dealt with in 9.3) *Conservation of heritage* below.

8.3) Herbaceous weeds

Past and current landuses associated with the creek since the earliest European settlement has led to massive and irreversible changes to ground storey vegetation. The establishment of introduced pastures (and the usual contaminant species that came with them), and more recent invasions of herbaceous annual and perennial weeds has alienated most of the study area of its original vegetation community. The management of this group of weeds (including grasses) is fraught with frustration and has serious limitations. At risk of some disappointment and perhaps even disagreement, I believe the possibility of eliminating any of these species is not technically nor environmentally feasible at this point in time, and they need to be managed in a more effective way.

By way of example, examine African Love Grass (*Eragrostis curvula*) and Chilean Needle Grass (*Nassella neesiana*). Both these species when in flower and seed are distinct to a practiced eye, but recognition can be difficult for a lesser practiced one. This is probably the reason they have been able to establish so well and so widely, and when finally "discovered" they are usually present in significant infestations. The only realistic way to manage these species is to place them under management regimes that reduce their seeding capacity. There are a number of ways to achieve this, the two most practical within urban areas to "seedtop" the infestations by the use of herbicide, or manipulation of the mowing regime. This technique applies to the management of many herbaceous ground storey species. African Love Grass has a trait of shooting new flowering scapes very shortly after mowing, and this is a useful method of finding plants to remove them by other means.

The broadscale use of herbicide in proximity to the creek can be limited by the chemical registration (how and where it is permitted to be used) and by environmental considerations. For the latter reason, the

broadscale use of herbicides is not recommended. This leaves mowing/slashing as the main management method.

Slashing should be used for those areas where urban development is not in close proximity to the creek e.g. near Melba and below the dam wall. The finer finish usually provided by mowing should be utilised on any section of the creek where better access is required, but especially where the close proximity of urban development means a higher potential recreational user rate. The location of examples of these two types of sites are marked on the attached plans. It would seem highly desirable to increase the number of slashings/mowings per year, to keep the creek corridor more accessible. Some members of the groups have expressed a desire to retain "wild areas" on the creek. This is also very important, as protective habitat is provided by exotic grasses for some faunal species (e.g. the Brown Quail mentioned earlier). The detail on where and where not to mow/slash need refining for each revegetation plan prepared by the groups.

Mowing should also include opening up certain areas right to creek level. While filtration strips are important and likely to be retained for much of the creeks length, there are areas located near urban development that provide opportunities for better access to the creek e.g. some of the larger pools.

To enable access by mowing and slashing equipment there is a need to reinstate ground levels on some sections of the creek. This involves filling holes and removing any mounded soils or stumps and rocks. Any areas disturbed when restoring ground level should be grassed down for stabilisation. In terms of overall herbaceous weed management, it may be more effective for member groups of the GCG to examine the possibility of re-instating ground levels and removing obstructions to provide good mowing vehicle access at the earliest opportunity, and undertaking discussions with the CUPP's to increase mowing management. This one action alone, I forecast, will better endear the creek to nearby residents and the broader community, and will contribute a great deal to public relations for the Catchment Group/CUPP's partnership. Marshy areas where it is undesirable to permit access by machinery may be able to be utilised as special habitats (e.g. wetlands) or as areas for planting marsh or wet tolerant species.

Recommendation 7:

that in order to make the creek more accessible and improve its image and recreational use by the community, that

- v) maintenance through mowing/slashing be increased, with these regimes being decided at the local level in conjunction with CUPP,***
- vi) member groups of the GCG undertake field surveys to prepare proposals for discussion with CUPP for sites where increased mowing/slashing maintenance would be beneficial***
- vii) GCG member groups facilitate access to these areas by mowing/slashing machinery***
- viii) Areas designated for mowing/slashing be clearly designated on the locally produced revegetation plan.***

Increased slashing/mowing also has advantages in reducing fire ignition potential, especially as increased grass and weed growth can be expected as a result of willow and other woody weed removals. This is addressed further under 8.6) *Fuel management* below.

8.4) .Other weed matters

Weed mapping survey

A detailed weed mapping exercise was not undertaken as part of this strategy. I am also not sure what effective value it would be to have such a survey undertaken along Ginninderra Creek, as most weeds are found in most grid squares. Any money spent on a mapping survey may be better directed to on-ground weed management programs.

Rehabilitation of the corridor to a native vegetative cover is not technically feasible at present, and will remain irreversible for the foreseeable future. Original ground storey vegetation is absent or scattered except in a few isolated patches e.g. Umbagog District Park. It may be more effective to map these remnant areas and their component species accurately as part of a local revegetation plan and apply appropriate management techniques to maintain and (hopefully) extend these areas over time than map the weeds. It is difficult to identify high priority areas for weed management as they are so widespread, however mowing/slashing as described in 8.3) above will contribute significantly to overall weed management along the corridor.

Individual member groups will know their own “patches” with regard to weed occurrences. If not, then it is important that the member groups’ weeds knowledge base is built on by training provided through the Govt./community partnership process. Assistance in this regard can also be provided through the Weed Officer of the Conservation Council of the SE Region & Canberra. This is the best way to manage weeds along the creek (i.e. in smaller segments using local knowledge) combined with the broader scale mowing approach suggested in this report.

Weeds in/on creekline

As willows are removed there will be a rapid colonisation of the broader riparian zone, banks and shallow waters of the Creek. This pattern has been evident on the Creek (e.g. from the Barton Highway to the Pondage and between the dam wall and Copland Drive) where recolonisation of areas after willow removal is complete or at least well advanced.

Some native species e.g. River Club Rush (*Schoenoplectus validus*), Common Reed (*Phragmites communis*) and Cumbungi (*Typha* spp) are amongst some of the rapid colonisers of the creekline. It is highly probable that these native species occurred along the full length of the pre European creekline, in similar patterns that exist on some parts of the newly opened-up creek (i.e. dense stands of reeds in a drainage swale, linking deep and wide pools along the creek). Some exotic species are also efficient colonisers, in particular Umbrella Sedge (*Cyperis eragrostis*).

It is important that this “natural” stabilisation be permitted to take place. After a “balance” has been reached, it may become more obvious whether there is any need to focus on weed management. It should be remembered that to free the creek of all exotic aquatic and semi-aquatic species is not realistic. These species will always be there, and it will be more about sensible management than elimination. Once again, creekline weed management programs are best developed at a local level, using local knowledge of the site and their own human resources, and especially on creek behavior when in flood.

At all times the stability of the creek banks should be maintained.

Weed debris

The removal of woody weeds within the creek corridor is a important aspect of overall rehabilitation of the corridor. However, it must be remembered that many residents bordering on the creek, or regular users of the open space and bike path, do not necessarily understand the woody weed issue, and indeed actually class the woody weed species as positive landscape attributes. Many they grow in their own gardens! It is therefore important that community group weed removal programs do not provide a further burden through the groups and/or CUPP having to respond to community complaints about the aesthetics of plant debris and potential fire fuels. The local fire authorities would frown very severely on fuel buildup in the creek corridor (see 8.6) *Fuel management* below).

Most stretches of the creek were good in this regard, but it was disturbing to note where woody weed removals had taken place in Umbagog District Park, but the shrubs and trees had been left where they fell. This method may be acceptable in nature parks and rural areas, but the consequences of this in urban areas are a landscape littered with dry foliage which aesthetically is displeasing, and contributes to fire fuel loads in areas of higher ignition potential.. At the least, the plant material should be stacked at accessible points so they can be removed to recycling depots or disposed of by other agreed means.

This issue is raised as any broader public acceptance of removal programs will rely on an “improved landscape” and public support needs to be nurtured. A potential negative public reaction could arise if “tidying up” after weed removal programs is not undertaken. A similar negative reaction may come from the local fire authorities.

Recommendation 8

that any plant debris resulting from weed removal programs be disposed of in a way that reduces negative public reaction to the visual impact and ensures they do not contribute to fuel loads in the corridor.

Weed competition/management

Many of the species that will establish after willow removal will be severe competition for any new plantings. Weed management in this case may require the occasional use of herbicide, and the safe and effective use of herbicide requires a duty of care by the user(s).

CUPP's have weed spraying programs, and it is desirable that any weed management in the corridor be somehow integrated into this spraying program as the first option. However, community group activity could be more effective (through a better use of available human resources) by being permitted to use herbicide, especially in the maintenance of new or establishing plantings.

This does not mean that every GCG member group would have permission to use herbicide where they like within the corridor. Initially, they should be able to utilise herbicide to assist in the maintenance of new plantings, and for any other very specific programs approved in conjunction with CUPP. I would envisage perhaps one or two people from each member group being charged with approval to use herbicides. This approval would be under the same stringent requirements on personal health and safety, community protection and application requirements that of necessity apply to their use.

I suggest the above not only to assist the groups in their effectiveness, but with the realisation that the herbicide most likely to be used (and which approval could be restricted to), is Glyphosate. This chemical is freely available to anyone to use in domestic situations, and is widely used in many agency spraying programs. I cannot see how the use of herbicides, if approved, in any highly focussed spraying program by GCG member groups can have major implications. Indeed, if conducted properly, they could provide an example on the correct and safe use of this chemical to others in the community.

Any approval to trial the use of herbicide by the GCG member groups automatically implies a need for training. The level of professional knowledge within CUPP on herbicides and their use offers an opportunity to train selected people to trial a herbicide use scheme. Training would be a contribution by CUPP to the government/community partnership.

Recommendation 9:

that selected people from GCG member groups be provided with training in the use of herbicides, and that a trial weed management program(s) be established in conjunction with CUPP, and with CUPP having the role of determining the continuation of the program at the end of the trial period.

8.5) Replacement plantings

This aspect is the crucial part of the rehabilitation of the creek corridor. It is also important in building public goodwill. It needs to be examined in the light of what the community has indicated it wanted for the creek, but it is not recommended that any plantings be undertaken without a great deal of thought and pre-planning. It is of critical importance that almost every stem be planned for and accurately positioned at planting, and this requires the production of a scaled replanting plan for each groups patch. This plan needs to show exactly where individual plantings and group or island plantings are to be established, taking into account the equal priorities of aesthetics, future woody weed tree removals, desired vistas along the creek, wildlife needs and fuel and weed management through facilitating access for mowing/slashing and other maintenance equipment.

“Natural” recolonisation will occur along the creek banks and riparian zone after removal of the willows. Re-establishment of a vegetative cover, even if weedy in nature, is important for soil stabilisation. Immediately after willow removal is also an opportune time to plant desired species before too much competition establishes. It is highly desirable, and far more efficient, to plan for exactly where this revegetation is desired and/or useful before haphazardly replanting an area. As described earlier, it is not necessary to replant the whole creekline again, nor is it necessarily desirable. The original vegetation communities were grassland to grassy woodland, and a simulation of these communities would offer advantages to wildlife in their utilisation of the corridor, and permit more comprehensive horticultural maintenance if and where required.

Therefore, revegetation within the riparian zone would be best designed around:

- individual or small copses of indigenous and regional trees selected for particular soil conditions or zones,
- small to large plantations (islands) of trees and other shrubby regional species. A good example of this has already been employed in the section of creek near Copland Drive (grid squares 28 – 32). This form of planting suits human needs (access to the creek, plenty of usable open space, vistas, maintenance activity), wildlife needs (suitable plant selections for foraging and habitat), fuel and weed management and is aesthetically pleasing.
- utilising particular sites (e.g. boggy areas) to establish special habitat types where other uses are limited or undesirable.
- using regional species to “armour” banks of the creek where it is required.

I see the revegetation of the corridor as necessary semi-formal compromise to suit the location and potential future recreational uses of the creek corridor. Templates of examples of planting design are provided as Appendix 4.

In some places established plantings of native species adjoin willow infestations. These need more space to adequately develop, and provide a good base planting for underplanting or further planting where required. It is important to build on existing planted native vegetation features such as this. This also applies to remnant native vegetation, particularly ground storey communities of grasses and herbs such as the small remnants in Umbagog District Park. It is far better to focus efforts to protect and conserve remnant vegetation than trying to recreate it.

Recommendation 10:

that the GMC member groups:

- iii) prepare revegetation plans for their own sites, taking into account wildlife and human needs within the corridor.***
- iv) ensure revegetation plans clearly delineate where plantings are to be undertaken.***

8.6) Fuel management

Fire has been a dominant factor in the shaping and maintenance of many vegetation communities and overall landscapes in Australia. It would have been a frequent environmental influence in the creek corridor prior to European settlement. However, fire and its potential detrimental effects cannot be ignored as most fire events are unwelcome (e.g. accidental ignitions, prescribed burns escaping) but fire is also a necessary tool in ecological management. Uncontrolled fire is obviously not desirable, but the incidence of unplanned fires increase when higher densities of people choose to live in flammable landscapes. Uncontrolled fire is a very real issue with regard to safety of life, asset protection and protection of the natural environment.

The Southern Tablelands region is prone to bushfire. High intensity fires occur in this region once every twenty years or so, though there are unplanned fires of a less serious nature every 5 to 7 years. The intensity of fire years can be traced to the Southern Oscillation Index (the El Nino phenomenon) as it effects the weather conditions in Australia most dramatically. The fire patterns in the area are typically from the west and NW moving to the east. Parts of the creek corridor in an un-maintained condition appear to pose a considerable threat through unplanned fire events. It must be remembered that the

1994 fires in Sydney moved along natural corridors within the urban areas, therefore fuel management is important.

Ginninderra Creek warranted its own section within the ACT Bushfire Fuel Management Plan (ACT Government 1998) which indicated that the creek corridor, classed as semi-natural open space, has "greater than usual hazards". The fire hazard has been assessed as very high due to the potential for fire to escape the open spaces into urban areas. Fuel control actions in the plan includes seasonal manipulation of mowing, hand removal of woody weeds and other vegetation and some fuel reduction by use of fire (including ecological burns). The actions described within the plan are all valid.

The creek is classed in the Fuel Plan as "Semi-natural Open Space, and this translates to a generally lower level of maintenance than other public land categories (e.g. Neighborhood Pedestrian Parkland or Neighborhood Parks), which are said to receive horticultural maintenance of a high standard. While not suggesting that a high standard of maintenance is warranted or desirable in every section of the Creek corridor, there are certainly many areas where a higher standard of maintenance is desirable and which would fulfill a number of desirable objectives including better fuel management. This has been described in 8.3) *Herbaceous weeds* above, especially in relation to an increase in mowing/slashing.

Recommendation 11

that the preparation of the revegetation plans take into account fuel management issues as part of the planning process.

8.7) Planting strategies

Planting strategies need to consider human uses and needs in the corridor as maximising the potential of corridor usage by wildlife. Human needs were described in 8.5) *Replacement plantings* above and are easily met by sensible design techniques. Planning for wildlife usage is more difficult.

A corridor for wildlife

The potential for increasing the creeks suitability for wildlife habitation and use as a migratory corridor is significant. The observed use of newly opened up sections of the creek by large numbers of waterbirds are good evidence of this. By further removal of woody weeds and good spatial size and arrangement and selection of new plantings of regional native species, the number of native fauna able to utilise the corridor can be expected to increase. Species selection is covered in 8.9) *Species to be used* below. As discussed earlier, it is neither necessary or desirable to revegetate the whole length of the creek. The pre-European corridor would have involved large open areas of grassland and grassy woodland as discussed earlier.

The island plantings of various sizes referred to earlier should be established along the length of the corridor. The islands should utilise a suitable selection of regional native species which will contribute to healthier habitat than what exists there now. These islands should all be carefully planned and sighted as part of a group-prepared planting plan. Large islands do not need to be established immediately, but could be gradually built on over time depending on individual groups human resources or ability to recruit interested people to planting sessions. It is important to produce varying degrees of density in these plantings, including areas of very dense vegetation that utilise regional species that will deter penetration by cats and foxes e.g. Silky Hakea (*H. sericea*) and Native Blackthorn (*Bursaria lasiophylla*). They may also assist in reducing access by predatory native species such as the Currawong and unwanted human access.

Planning for wildlife corridor development has many facets, and these are clearly outlined in the Enviro Links et.al. report.

Emphasis on Chains-of-ponds

Many small Australian creeks were what has been referred to as chains-of-ponds. John Lhotsky in early travel through the region (1834) described chains-of-ponds as

"....a phenomenon not to be found, to my knowledge, in any other part of the world. They are commonly round or oval basins, of from 20 to 200 feet in

diameter, or length, excavated or sunk in the superficies of an alluvial soil, which is commonly of a rich kind, fed by subterraneous springs". (Starr 1999)

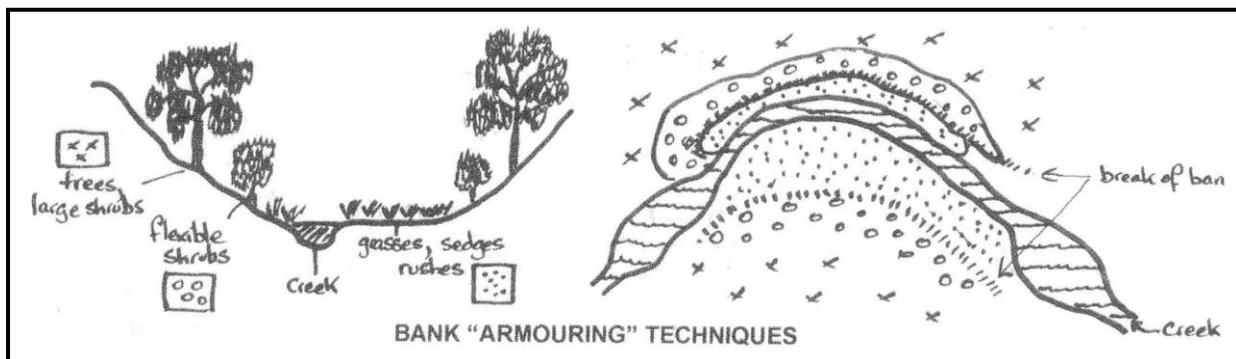
The area between the ponds are shallow channels that unite the ponds into running streams after heavy rain.

The original chains-of-ponds can still be made out on some sections of the creek. These features should be emphasised and not necessarily hidden by new plantings, as there is a tendency to establish plantings near water. Urban development in the catchment has resulted in the original flow patterns being changed, so the chains of ponds remain as interesting remnant features of the original creek. They have high educational value.

Control of stream erosion

The chances of increasing erosion through willow removal is not considered high. Erosion was not apparent on any section of the creek during the field assessment. This aspect does need continual monitoring however, and any evidence of channel incision or bank erosion will need to be addressed. The means of arresting erosion can vary from site to site, so it is not intended to be prescriptive in this strategy. Solutions would have to be developed at the local level if and when erosion is noted.

Planting can be very useful for "armoring" banks, especially where water flow during higher water flows are directed onto sections of bank. This is usually where the creek changes direction, forcing waterflow onto one bank. Precautionary plantings of indigenous or regional fibrous rooted but flexible herbs and shrubs can be a useful precautionary action to take, especially in newly opened up areas. It is a useful method to use in areas of narrow channel such as the small gorge in Umbagog District Park.



Feral and domestic animals

Predation by feral and domestic animals will be an ever present threat for wildlife within the corridor. Other measures to manage these animals under legislation will always be only partially effective. A cultural change by the whole community is required before predation by unmanaged animals will be minimised. Even if this is achieved, it does not reduce the threat by truly feral animals, and plantings can be used to reduce their impact.

Island plantings, their size and constituent species can contribute to wildlife protection as indicated in *A corridor for wildlife* above. Means of utilising plantings to provide secure habitat is essential if wildlife is to be encouraged to use the corridor.

Management of exotic aquatic pest species such as carp and weather loach pose a substantial challenge, but innovative means of trapping for removal or competitions organised around reducing populations have an educative value even if not an effect on overall populations.

Maintenance.

No revegetation strategy will ever reach its full potential without adequate and appropriate post planting maintenance. In fact, poorly managed plantings have the potential to detract from community contributions if they fall into disrepair, or do not achieve their potential. The actual planting of the plants is

often the easy part, as residents who do not usually contribute to community activities can often be enticed to a tree planting session. Then follows the need to ensure they survive, by watering and weed management in particular. Adequate maintenance regimes for these plantings are essential until they are established.

Follow-up maintenance appears to have been a point of contention in some parts of the corridor, and yet not in others. The plantings in grid squares 28 – 32 are well established and appear to be well maintained. They are rapidly becoming a landscape feature of the corridor. In other sites, plantings are struggling in areas of heavy weed infestation. There have also been some comments received about the mowing of newly planted areas. There is no doubt that the preparation of replanting plans detailing specific sites for planting will assist all parties in their management of the corridor. Focussing effort on island plantings will achieve greater wildlife benefits in a shorter time than placing efforts into widespread random plantings, and will certainly make post planting maintenance easier. Adequate maintenance is a chore that must be undertaken, and is a task that would appear to be best supplied by the community groups themselves.

Recommendation 12:

that the member groups of the GCG be responsible for the maintenance of their plantings, until well enough established to hand over to CUPP.

8.8) Priority areas for revegetation

The whole of the surveyed section of the corridor offers significant revegetation opportunities. For this reason, as well as it being equitable to ensure each group has access to funding for revegetation work, it is difficult to indicate any one area as being a higher priority than another.

Prior to any consideration of revegetation however, it is of importance to examine what remnant vegetation, established native plantings or other landscape features already exist, and use them as a framework upon which to build. This means the appropriate conservation and management of remnant native vegetation. The main area of remnant vegetation and landscape features (the gorge) are situated within Umbagog District Park. At present, this is where some significant weeds are located, and where debris from weeding activities are detracting from the site. There appears to have been no willow removal undertaken here, and the fragile nature of these trees was evidenced in one tree having fallen over and blocking the narrow channel. This area would have a high priority for remnant vegetation management, woody weed removal and revegetation projects.

The next priority is to examine links between existing areas of planted native vegetation, gradually completing corridor linkage. The groups themselves should prepare revegetation plans for their individual sites, and to some extent defining the areas of priority themselves, but by considering the whole corridor in context.

As indicated earlier, the priority of re-establishing vegetation wherever willows are removed is not seen as critical or desirable for many sections of the corridor.

Recommendation 13:

that member groups of the GCG place a priority on:

- iii) the conservation and management of existing stands of indigenous native vegetation***
- iv) resolving their own priorities for revegetation within their own sites, but in conjunction with existing indigenous and planted native vegetation and what the adjoining member groups are doing in regard to revegetation.***

8.9) Species to be used

It was noted at the commencement of this project that a consensus had been reached by member groups that regional, rather than just endemic, flora species would be used for revegetation purposes. The field assessment confirmed this as a very reasonable approach to a replanting program. The fact is that the greater area of the corridor has been alienated from its original vegetation communities. This loss is, with current technical limitations associated with rehabilitation, of a permanent nature. The objective

should be to increase urban sustainability by utilising areas of public land for a mixed recreational and wildlife corridor. The species formerly planted in the corridor, primarily willows and poplars, are very ineffective habitat for the greater proportion of native fauna. Rehabilitation means rebuilding with the use of local and regional species. Not a lot is known about plant selection for this purpose, but reasonable assumptions may be made.

A list of regional flora was compiled by Mr. Murray Smith of North Belconnen Landcare Group. This listing was assessed at the commencement of the project to provide a listing of the most useful “core” regional species for structural planting purposes along the corridor. Species selection was based on providing long term breeding habitat and short term foraging and protective habitat for a range of fauna species. Aesthetics were also considered. The revised list (attached as Appendix 2) does not preclude the use of other local and regional species.

8.10) Obtaining plants for revegetation

Plants grown from local or regional provenance seed or cutting material stand a far better chance of successful establishment. Seed-grown plants should be the preferred option, with cuttings utilised where propagation by seed is not available. A license is required in the ACT prior to collecting native plant material.

The collection of local seed could readily be undertaken by GCG member groups. It could be a useful social activity by the group(s), also improving recognition skills as well as obtaining species required for revegetation work, rather than ad hoc arrangements of only being able to purchase plants that are available through nurseries at any particular time. Any excess seed could be provided to the Greening Australia seed bank, enabling them to provide well provenanced seed to other Landcare groups or for use through their own propagation program.

There are recommended techniques for the collection of seed or cuttings from wild populations to maintain diversity in selected species. This is not so critical with seed but is when collecting cuttings. If GCG member groups decide to become involved with growing their own plants, or providing propagation material to selected growers, correct sampling procedures should be followed. Further information on sampling techniques is available from the Australian Network for Plant Conservation based at the Australian National Botanic Gardens, or the CCSERAC.

With community funding sources being spread ever wider, maintaining these funding levels is not guaranteed. Planting stock is a significant cost associated with revegetation projects, and this can be substantially reduced by propagating your own plants (this could be conducted as a group activity). The average 85 cent to \$1.20 forestry tube planting stock can be produced for around 20 cents when grown in reasonable quantity. There may be someone in the local area who are prepared to grow some plants for projects, but not necessarily become involved in other ways.

Rotary International have native plant growing schemes, but the selection of species is wide. For large numbers, they may be prepared to grow certain lines for use in local revegetation projects from provided seed. Secondary colleges with horticulture or agriculture in their curriculum also offer potential for growing plants e.g. Ginninderra College. Wider community involvement in projects, even if through no direct contact with the corridor, will lead to a greater community appreciation of the longer term vision for the corridor.

Recommendation 14:

that the member groups of the GCG examine the feasibility of growing plants for their revegetation projects with the assistance of others, as this is a more effective way of obtaining the desired species of the required provenance, and will assist in wider local community involvement in the revegetation project.

9) OTHER ISSUES

The brief indicated that the project was not necessarily confined to environmental issues, but “other factors” should be referred to if deemed relevant to the project. While the issues below may appear outside the scope of a revegetation strategy, they were obvious constraints to achieving the full potential of a strategy. Some are issues that only individuals can address within themselves, and some could mean further workloads for under-resourced voluntary groups and agencies.. For these reasons, no recommendations have been prepared in this part of the report. The issues are drawn to your attention, and comments made, so they can (hopefully) be addressed through further action in the near future.

Other issues noted were:

9.1) Government/community co-operative partnership arrangements

For reasons centred on current public management philosophies initiated through government, local communities are strongly encouraged to become involved in the management (through partnership) of public assets and addressing other social needs. Some community sectors have responded well with the environment being one area to benefit from community inputs. However, the operation of government/community partnerships continue as a source of trepidation (and some irritation) for both agency and group partners. This has resulted in some tensions both within GCG member groups and between groups and CUPP. I think this has, at least in part, been due to no clearly defined roles for either partner being established.

A suitable mechanism to resolve disputes can be found at the group/agency level, but is far more difficult at the individual level. The reasons for disputes are usually many-fold and complicated, and are not going to be discussed in detail here, other than to say the tensions that currently exist would almost certainly be resolved quickly if the future roles of the partners were specified.

There is no better way to ensure harmony and achievement of objectives than through good planning. The Catchment Group has itself clearly indicated the need for planning through the various issues raised and addressed in its catchment strategy. Elsewhere in this report the importance of individual groups preparing their own revegetation master plans is indicated. I believe that many of the issues that have contributed to the occasional tensions are resolvable through an appropriate revegetation planning process, involving both community and agency people. The obvious forum for planning is through the Catchment Group meetings, or by separate workshops. This will facilitate local inputs, but in the regional context of management of the full length of the corridor.

The proposals for corridor management proposed by this report will require more government resources (e.g. mowing and slashing). I question whether these resources are available to CUPP's in present budgetary arrangements. As landscape deterioration and better recreational use of the corridor is an issue, there may be opportunities for community groups (environmental and social) to make stronger representation to government on the importance of establishing permanent funding for maintenance of the corridor.

9.2) Future development works

There are a number of sites suitable for the construction of GPT's and SRP's. These should be located on revegetation plans so any revegetation does not interfere with their construction. Other areas zoned for construction should also be identified.

9.3) Conservation of heritage

There are a number of heritage locations within a 50m distance of the creekline, including the controversial axe grooves at Latham and heritage plantings and other objects at Palmerville District Park. The creek itself features prominently in the heritage in the local region.

Protection of heritage is an essential part of a revegetation plan. For example, there is some truth to the argument that willows are important components of European cultural landscapes in Australia and should therefore be retained. However, the environmental consequences of doing so are well known. The compromise on Ginninderra Creek has been to retain examples of Weeping Willow (*Salix babylonica*) as it was the original willow species planted, and to remove the more problematic species of more recent origin. Such compromises will be a regular part of the rehabilitation, especially near Palmerville.

It is unclear as to what individual trees and copses of trees are part of the heritage value of Palmerville. While some individual trees are recognised, some suckering species are moving into close proximity of the creek. Some may be recent plantings selected because of the nature of the site and to accentuate heritage values. Important trees must be conserved, but the retention of troublesome species such as White poplar is not recommended.

Some analysis and mapping of the heritage vegetation on the Palmerville site is needed, and this needs to be done in conjunction with the ACT Heritage Unit and local historians. Any management guidelines for heritage vegetation needs to be indicated on a vegetation management plan for this section of the creek.

9.4) Group activities

Only activities regarded as within the scope of community groups and relevant to revegetation have been selected for discussion.

Surveying/Monitoring

The desirability of collecting a wide range of information through various types of surveying and monitoring were discussed earlier, especially in relation to flora and fauna. The GCG should facilitate surveying and monitoring projects where they are required. Members of other community groups may be prepared to provide any information they already hold or make some arrangements to collect it.

Maintenance

Group involvement in maintenance was discussed above. Maintenance is a critical aspect for the success or failure of revegetation projects, and is an activity usually undertaken by community groups.

Growing plants

This has been discussed in more detail above.

Public education, awareness and communication

GCG member groups have done some excellent work through the production of brochures related to the creek and other parts of the catchment.. A further means of keeping the local community informed of progress in the creek corridor has been addressed in the Catchment Management Strategy through the production of a yearly report for distribution.

The Catchment Management Strategy recognises the importance of awareness raising and communication, and the need for public input through consultation. If these issues are undertaken at the level indicated in the Strategy, public expectations will be met.

Some of the tasks undertaken in rehabilitating the creek (despite high standards of communication and awareness being conducted) will raise community concern. The removal of willows and other woody weeds are a case in point. Public concern about weed removal needs to be addressed, but as the effects of woody weeds and proposals to remove them have already been subject to community education and consultation processes, they should not be permitted to obstruct removals proceeding. It is still important however to notify adjacent residents when the removal programs are to be commenced.

The objectives and actions outlined for education in the Catchment Management Strategy is comprehensive. The launch of the strategy was conducted during the preparation of this report. It is important that the launch of the strategy be widely advertised, and copies be made available to members of the community who request it.

Revegetation related projects (including weed removal) should continue to be advertised through appropriate signage in the corridor.

One area in which member groups can increase the educational effort in the catchment is in relation to environmental weeds. During the course of the assessment, it was noted that many of the environmental weed species affecting the creek are common in gardens that adjoin the corridor. Education projects targeting these species are potentially of longer term importance to the maintenance of the environmental values of the corridor.

The Catchment Management Strategy details an education program for schools in the catchment. The involvement of schools in monitoring activities e.g. Waterwatch is entirely feasible. Extending school involvement in revegetation activities may be more difficult, unless it can be related to curriculum. For example, colleges with horticultural or agricultural units may well be able to assist through propagation of seedlings, but may be limited to this. While understanding the reasoning for educational efforts directed at schools, calls for their participation from a wide variety of community based projects are somewhat unrealistic due to other curriculum commitments. Implementing education projects and encouraging participation from other community groups e.g. Rotary, Lions and scouts could yield equally positive benefits as could be achieved through schools.

Ongoing evaluation

Any well planned project requires some form of evaluation at regular intervals. While this is an extra chore, it will assist in better project organisation, encourage better integration with neighbouring groups and government agencies work programs and maintenance requirements, and provide indications of whether objectives are being met. A annual reporting process from member groups to the Catchment Coordinator has already been addressed in the Catchment Management Strategy. These inputs could be used as the base for an annual newsletter to residents or for an annual article in one of the free local papers.

Ongoing evaluation should also be applied to other forms of monitoring, whether it be water quality, fauna or flora. These forms of monitoring can readily be undertaken by member groups or by approaches for the assistance of other community groups (see *Survey/monitoring* above).

Photographic monitoring of the progress of revegetation projects are also useful for monitoring changes and as an educational tool.

Funding

Funding is also well addressed in the Catchment Management Strategy. Currently most funding for projects in the corridor are obtained through public funding sources which are important, particularly during the establishment phases of any project. To maximise community interest and commitment for the rehabilitation of the corridor, it would be advantageous to obtain sponsorship support from business, community groups and individuals in the Ginninderra Creek catchment.

Private sponsorship (financial or in kind) is often promoted as a future direction, or something to be examined at some future stage. The reason for this is the lack of success in this area. Private sponsors are constantly being asked to support various community based projects, and the number of dollars often associated with environmental projects are significant. They are usually also required on an ongoing basis. Also, any success in obtaining sponsorship does not necessarily reflect the volunteer time allocated to obtaining it. The prospects for the GCG in obtaining financial or in kind support are probably higher than most.

The GCG is now well established, has committed people and on-ground results and an impressive plan for the future in the Management Strategy. These factors are pre-requisites for success in sponsorship. I feel by extending that process to the preparation of revegetation plans, sponsorship for particular items or aspects of the plan (e.g. tools, materials, planting stock, signage) could be obtained.

The above "other issues" may seem to be incidental to a revegetation strategy, but they are not. Whether it be energies (voluntary or otherwise) that need to be directed to dispute resolution and away from achieving the objectives of the rehabilitation project(s), or lack of poor data, communication and planning which obstruct efforts, they need to be addressed.

10) CONCLUSION

The undertaking of this survey and report preparation confirmed the high quality of the planning and physical work already being undertaken in the Ginninderra Creek corridor. It also confirmed the directions already being undertaken in some parts of the corridor as being very appropriate for the corridor.

If the recommendations and other advice contained in this report are implemented, a more timely, effective and efficient revegetation program will be the outcome. The assessment did reveal a current lack of focus in revegetation activity, except in one outstanding area in North Belconnen. This area should be used as the basic model for revegetation activity and corridor maintenance.

There is an urgent need to clearly define the roles and responsibilities of each participating group and CUPP, and this should be resolved as soon as possible. Clearly defining roles and responsibilities, and the preparation of local (site specific) revegetation plans will greatly assist in the more rapid transformation of the corridor as a useful movement and habitat corridor for wildlife, as well as better suiting human needs and aspirations for the creek corridor.

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COPIES OF FIELD SURVEY SHEETS

RECOMMENDED PLANT SPECIES for GINNINDERRA CREEK

Following is a list of species best suited for revegetation activities on Ginninderra Creek. Those species most suited for the structural element of revegetation are highlighted by grey shading. The unshaded species are included as they are well suited for special purposes such as erosion control, attraction to wildlife, screening or aesthetics.

NB: Native flora is protected in the ACT, and in many cases within the local region. Permission will be required before collecting seed from some locations in the Territory. Inquiries regarding seed or cutting collection can be made through the Wildlife Research & Monitoring Unit of Environment ACT.

Under "To Grow" S=seed; C=cuttings; D=division; ?????= the author has not tried to propagate before.

| BOTANICAL NAME | COMMON NAMES | FAMILY | TO GROW |
|--|-------------------------------------|------------------|---------|
| <i>Acacia dealbata</i> | Silver Wattle | Mimosaceae | S |
| <i>Acacia mearnsii</i> | Green Wattle or Black Wattle | Mimosaceae | S |
| <i>Acacia melanoxylon</i> | Blackwood | Mimosaceae | S |
| <i>Acacia rubida</i> | Red Leaf Wattle or Red Stem Wattle | Mimosaceae | S |
| <i>Acacia siculiformis</i> | Creek Wattle or Dagger Wattle | Mimosaceae | S |
| <i>Acaena novae-zelandiae</i> | Bidgee-widgee | Rosaceae | C |
| <i>Adriana glabrata</i> var. <i>acerifolia</i> | | Euphorbiaceae | C |
| <i>Ajuga australis</i> | Australian Bugle | Boraginaceae | C |
| <i>Alisma plantago-aquatica</i> | Water Plantain | Alismataceae | S,D |
| <i>Allocasuarina leuhmannii</i> | Bull She-oak | Casuarinaceae | S |
| <i>Baumea rubiginosa</i> | | Cyperaceae | S,D |
| <i>Bertya rosmarinifolia</i> | | Euphorbiaceae | C |
| <i>Bolboschoenus caldwellii</i> | Clubrush | Cyperaceae | S,D |
| <i>Bolboschoenus fluviatilis</i> | Marsh Clubrush | Cyperaceae | S,D |
| <i>Bossiaea riparia</i> | | Fabaceae | S |
| <i>Bracteantha viscosa</i> | Golden Everlasting | Asteraceae | S,C |
| <i>Bulbine bulbosa</i> | Bulbine Lily or Native Leek | Asphodelaceae | S |
| <i>Bursaria lasiophylla</i> | Australian Blackthorn | Pittosporaceae | S,C |
| <i>Callistemon sieberi</i> | River Bottlebrush | Myrtaceae | S,C |
| <i>Callitris endlicheri</i> | Black Cypress Pine | Cupressaceae | S |
| <i>Calotis anthemoides</i> | Burr Daisy | Asteraceae | D |
| <i>Calytrix tetragona</i> | Common Fringe Myrtle | Myrtaceae | C |
| <i>Carex appressa</i> | Tussock Sedge or Tall Sedge | Cyperaceae | C,D |
| <i>Casuarina cunninghamiana</i> | River She-oak | Casuarinaceae | S |
| <i>Centipeda cunninghamii</i> | Common Sneezeweed | Asteraceae | C |
| <i>Chrysocephalum apiculatum</i> | Yellow Buttons | Asteraceae | C |
| <i>Correa reflexa</i> var. <i>reflexa</i> | Native Fuchsia or Common Correa | Rutaceae | C |
| <i>Craspedia variabilis</i> | Billy Buttons | Asteraceae | S |
| <i>Derwentia perfoliata</i> | Blue Veronica or Digger's Speedwell | Scrophulariaceae | C |
| <i>Dianella revoluta</i> var. <i>revoluta</i> | Spreading Flax Lily | Phormiaceae | D |
| <i>Dianella tasmanica</i> | Blue Flax Lily | Phormiaceae | D |
| <i>Discaria pubescens</i> | Australian Anchor Plant | Rhamnaceae | C |
| <i>Dodonaea viscosa</i> subsp. <i>angustifolia</i> | Giant Hop Bush | Sapindaceae | S,C |
| <i>Eleocharis acuta</i> | Common Spike Rush or Hair Grass | Cyperaceae | D |
| <i>Eryngium rostratum</i> | Blue Devil | Apiaceae | S |
| <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | Myrtaceae | S |
| <i>Eucalyptus bridgesiana</i> | Apple Box | Myrtaceae | S |
| <i>Eucalyptus melliodora</i> | Yellow Box | Myrtaceae | S |
| <i>Eucalyptus pauciflora</i> | Snow Gum or White Sally | Myrtaceae | S |

| BOTANICAL NAME | COMMON NAMES | FAMILY | TO GROW |
|----------------------------------|--------------------------------------|------------------|---------|
| <i>Eucalyptus rubida</i> | Candle Bark | Myrtaceae | S |
| <i>Eucalyptus stellulata</i> | Black Sally | Myrtaceae | S |
| <i>Eucalyptus viminalis</i> | Ribbon Gum or Manna Gum | Myrtaceae | S |
| <i>Gynatrix pulchella</i> | Hempbush | Malvaceae | S, C |
| <i>Gonocarpus tetragynus</i> | Raspweed | Haloragaceae | C |
| <i>Goodenia pinnatifida</i> | Scrambled Eggs | Goodeniaceae | C |
| <i>Gratiola peruviana</i> | Brooklime | Scrophulariaceae | C |
| <i>Grevillea juniperina</i> | Juniper Grevillea | Proteaceae | C |
| <i>Grevillea lanigera</i> | Grevillea | Proteaceae | C |
| <i>Hakea microcarpa</i> | Hakea | Proteaceae | S,C |
| <i>Haloragis heterophylla</i> | Perennial Raspweed | Haloragaceae | C |
| <i>Helichrysum scorpioides</i> | Button everlasting | Asteraceae | S,C |
| <i>Hydrocotyle laxiflora</i> | Stinking Pennywort | Apiaceae | D |
| <i>Hydrocotyle peduncularis</i> | | Apiaceae | D |
| <i>Hypericum gramineum</i> | Small St John's Wort | Clusiaceae | C |
| <i>Hypericum japonicum</i> | Matted St John's Wort | Clusiaceae | C |
| <i>Hypoxis hygrometrica</i> | Golden Weather Grass | Hypoxidaceae | ???? |
| <i>Isotoma fluviatilis</i> | Swamp Isotome | Campanulaceae | D |
| <i>Juncus australis</i> | Rush | Juncaceae | S,D |
| <i>Juncus filicaulis</i> | Rush | Juncaceae | S,D |
| <i>Juncus fockei</i> | Rush | Juncaceae | S,D |
| <i>Juncus holoschoenus</i> | Rush | Juncaceae | S,D |
| <i>Juncus homalocaulis</i> | Rush | Juncaceae | S,D |
| <i>Juncus planifolius</i> | Rush | Juncaceae | S,D |
| <i>Juncus sarophorus</i> | Rush | Juncaceae | S,D |
| <i>Juncus subsecundus</i> | Rush | Juncaceae | S,D |
| <i>Juncus usitatus</i> | Common Rush | Juncaceae | S,D |
| <i>Juncus vaginatus</i> | Rush | Juncaceae | S,D |
| <i>Kunzea ericoides</i> | Burgan | Myrtaceae | C |
| <i>Kunzea parvifolia</i> | Purple Kunzea or Violet Kunzea | Myrtaceae | C |
| <i>Leptorhynchus squamatus</i> | Hairy Buttons | Asteraceae | C |
| <i>Leptospermum brevipes</i> | Slender Tea-tree | Myrtaceae | S |
| <i>Leptospermum juniperinum</i> | Prickly Tea-tree | Myrtaceae | S |
| <i>Leptospermum lanigerum</i> | Woolly Tea-tree | Myrtaceae | S |
| <i>Leptospermum myrtifolium</i> | Swamp Tea-tree | Myrtaceae | S |
| <i>Leptospermum obovatum</i> | River Tea-tree | Myrtaceae | S |
| <i>Lomandra longifolia</i> | Long-leaf Mat Rush | Lomandraceae | S,D |
| <i>Lomatia myricoides</i> | | Proteaceae | S,C |
| <i>Ludwigia peploides</i> | Water Primrose | Onagraceae | C |
| <i>Luzula densiflora</i> | | Juncaceae | S |
| <i>Luzula flaccida</i> | | Juncaceae | S |
| <i>Luzula meridionalis</i> | | Juncaceae | S |
| <i>Lythrum hyssopifolia</i> | Hyssop Loosestrife | Lythraceae | C |
| <i>Lythrum salicaria</i> | Purple Loosestrife | Lythraceae | C |
| <i>Mentha laxiflora</i> | Forest Mint | Lamiaceae | C |
| <i>Micranthemum hexandrum</i> | | Euphorbiaceae | C |
| <i>Microlaena stipoides</i> | Weeping Grass | Poaceae | D |
| <i>Microseris scapigera</i> | Murrong, Yam or Native Dandelion | Asteraceae | S |
| <i>Montia fontana</i> | Water Blinks | Portulacaceae | C |
| <i>Myriophyllum crispatum</i> | Water Milfoil | Haloragaceae | C |
| <i>Myriophyllum papillosum</i> | Water Milfoil | Haloragaceae | C |
| <i>Myriophyllum pedunculatum</i> | Water Milfoil | Haloragaceae | C |
| <i>Myriophyllum verrucosum</i> | Red Water Milfoil | Haloragaceae | C |
| <i>Neopaxia australasica</i> | Snow Purslane or White Purslane | Portulacaceae | C |
| <i>Nymphoides geminata</i> | Fringed Water-lily or Floating Heart | Menyanthaceae | D |
| <i>Olearia stellulata</i> | Daisy Bush | Asteraceae | C |
| <i>Ottelia ovalifolia</i> | Swamp Lily | Hydrocharitaceae | ???? |
| <i>Panicum effusum</i> | Hairy Panic Grass | Poaceae | S |
| <i>Parahebe perfoliata</i> | Blue Veronica, Speedwell | Scrophulariaceae | C |
| <i>Pelargonium inodorum</i> | Native Pelargonium | Geraniaceae | S |
| <i>Pellaea falcata</i> | Sickle Fern | Sinopteridaceae | D |
| <i>Phragmites australis</i> | Common Reed | Poaceae | D |
| <i>Pimelea curviflora</i> | Curved Rice Flower | Thymelaeaceae | C |

| BOTANICAL NAME | COMMON NAMES | FAMILY | TO GROW |
|--|------------------------------------|------------------|---------|
| <i>Plantago varia</i> | Native Plantain | Plantaginaceae | S |
| <i>Poa labillardieri</i> | River Tussock | Poaceae | S,D |
| <i>Poa sieberana</i> | Snow Grass | Poaceae | S,D |
| <i>Pomaderris angustifolia</i> | Pomaderris | Rhamnaceae | C |
| <i>Pomaderris intermedia</i> | Pomaderris | Rhamnaceae | C |
| <i>Pomaderris pallida</i> | Pomaderris | Rhamnaceae | C |
| <i>Potamogeton crispus</i> | Curly Pondweed | Potamogetonaceae | D |
| <i>Potamogeton ochreatus</i> | Blunt Pondweed or Slender Pondweed | Potamogetonaceae | D |
| <i>Potamogeton perfoliatus</i> | Clasped pondweed | Potamogetonaceae | D |
| <i>Potamogeton tricarinatus</i> | Floating Pondweed | Potamogetonaceae | D |
| <i>Pratia pedunculata</i> | Trailing Pratia or Swamp Pratia | Campanulaceae | D |
| <i>Ranunculus lappaceus</i> | Common Buttercup | Ranunculaceae | S |
| <i>Ranunculus papulentus</i> | | Ranunculaceae | D |
| <i>Rumex brownii</i> | Swamp Dock | Polygonaceae | S |
| <i>Samolus valerandi</i> | Common Brookweed | Primulaceae | C |
| <i>Schoenoplectus pungens</i> | Clubrush | Cyperaceae | D |
| <i>Schoenus apogon</i> | | Cyperaceae | S |
| <i>Scirpus cernua</i> | Nodding Club-rush | Cyperaceae | D |
| <i>Scirpus fluitans</i> | Floating Club-rush | Cyperaceae | D |
| <i>Scirpus hookeriana</i> | | Cyperaceae | D |
| <i>Scirpus inundata</i> | | Cyperaceae | D |
| <i>Scirpus platycarpa</i> | | Cyperaceae | D |
| <i>Scirpus subtilissima</i> | | Cyperaceae | D |
| <i>Scleranthus diander</i> | Knawel | Caryophyllaceae | S,D |
| <i>Scutellaria humilis</i> | Australian Skullcap | Lamiaceae | C |
| <i>Solenogyne dominii</i> | | Asteraceae | S |
| <i>Solenogyne gunnii</i> | | Asteraceae | S |
| <i>Stellaria pungens</i> | Prickly Starwort or Prickly Knawel | Caryophyllaceae | C |
| <i>Stipa bigeniculata</i> | Tall Spear-grass | Poaceae | S,D |
| <i>Stipa densiflora</i> | Hairy Spear Grass | Poaceae | S,D |
| <i>Stipa scabra subsp. falcata</i> | Slender Spear Grass | Poaceae | S,D |
| <i>Stylidium graminifolium</i> | Grass Leaf Trigger Plant | Stylidiaceae | S |
| <i>Themeda australis</i> | Kangaroo Grass | Poaceae | S,D |
| <i>Thysanotus tuberosus</i> | Common Fringed Lily | Anthericaceae | ???? |
| <i>Tricoryne elatior</i> | Yellow Rush Lily or Star Lily | Anthericaceae | ???? |
| <i>Typha domingensis</i> | Bulrush or Cumbungi | Typhaceae | D |
| <i>Typha orientalis</i> | Bulrush or Cumbungi | Typhaceae | D |
| <i>Vallisneria spiralis</i> | Eel Grass or Ribbon Weed | Hydrocharitaceae | D |
| <i>Velleia paradoxa</i> | | Goodeniaceae | ???? |
| <i>Viola bentonicifolia</i> | Showy Violet or Mountain Violet | Violaceae | S |
| <i>Vittadinia cuneata</i> | Fuzzy New Holland Daisy | Asteraceae | S,C |
| <i>Vittadinia muelleri</i> | Narrow-leaf New Holland Daisy | Asteraceae | S,C |
| <i>Wahlenbergia communis</i> | Common Bluebell | Campanulaceae | S |
| <i>Wahlenbergia multicaulis-tadgelii</i> | | Campanulaceae | S |
| <i>Wahlenbergia stricta</i> | Tall Bluebell | Campanulaceae | S |
| <i>Westringia eremicola</i> | | Lamiaceae | C |
| <i>Wurmbea dioica</i> | Early Nancy | Colchicaceae | ???? |
| <i>Zornia dyctiocarpa</i> | | Fabaceae | C |

LISTING OF LOCAL NURSERIES

BLACKBUTT BANKSIAS

Andy Rawlinson (6257 4682) (Lyneham). A range of locally grown plants including a selection of ACT and South Coast species. \$2.50/tumbler, \$3.50/T7 pot, \$4.50/6" pot.

KAMA PLANTS

Paul Carmen (6288 4208) Fisher A wide range of locally grown Australian plants, mostly in 70 mm tumblers. Plant list available. \$2.50/tumbler, \$3.50, \$4.50 for larger pots.

THE PLANT PEOPLE

John Carter (6231 7055) Wanniasa A large range of over 250 plants, from ground covers, daisies, and native grasses to trees. The range includes quite a number of species native to the ACT. All plants are locally grown. Most plants are in 6" pots with a few species being in 3" tubes. \$4.00 for 6" pots and \$2.50 for 3" tubes.

BINALONG NURSERY

Paul and Lorraine Walker (6227 4365) Binalong Growing species suitable to the Yass and Canberra region from the showy and unusual to the hardiest re-vegetation plants and farm trees. From 85 cents for contract orders.

DEALBATA NURSERY

Bill and Fran Peterie (6456 5043) Dalgety A specialist commercial nursery supplying many plants native to alpine and sub-alpine areas, such as Kosciuszko National Park. Grows some species native to the Brindabellas, plus many Monaro region. A good source for rural trees. Also grows to order. Prices start at \$1.20.

FARM TREES BRAIDWOOD

Ewan and Jocelyn Sussman (4847 5083) Braidwood. Quality native trees, shrubs and ground covers. Specialising in plants for farm forestry, windbreaks, erosion and salinity control, beautification, biodiversity and wildlife corridors. Prefers to grow to order or by contract. Prices from 80 cents for large orders.

I.D.P NURSERY

Iris Philp (6226 8132 mob 0417 662 995). Australian plants grown at Murrumbateman suitable for Canberra and surrounding district. \$2.50 tubes/tumbler, \$3.50 70 mm square tube/squat pots, \$4.50 125 mm pots. Contract inquires welcome.

STOCKS NATIVE NURSERY

Ben and Irene Stocks (phone 6386 2682, fax 6386 3995) Lot 3, Wyoming Estate, Simmonds Road, Harden; PO Box 69, Harden 2587. Locally propagated and grown plants. Over 250 species.. Will grow under contract for Landcare and farm planting. Prices from 80 cents for farm trees in bulk orders.

GURAWIN NATIVE PLANTS

Geoff & Gwyn Clark Ph 62511043 Cook. Range of species native to the ACT available. Will grow to contract.

WEEREEWA NATIVE PLANTS

Mr Joe Swartz, 35 Rutledge St, Bungendore, NSW 2621 Ph 62381704. A range of native species and will grow to contract.

BYWONG NURSERY

Mr Peter Ollerenshaw, RMB 265 Millyn Road, via Bungendore, NSW 2621 Ph 62369280. This is a wholesale nursery, but for special orders or contractual growing arrangements Mr Ollerenshaw would probably be pleased to hear from you.

KURRAJONG NURSERY

Kambah Pool Road Kambah ACT 2902. This nursery used to grow regional species, but seems to have become a more general nursery outlet.

LYNDFIELD PARK NURSERY

John Weatherstone, Oolong Road, Gunning NSW 2581 Ph (02) 48451282. Mr Weatherstone is a regional commercial seed collector as well as nurseryman.

SOCIETY FOR GROWING AUSTRALIAN PLANTS

Ms Cindy Royston (President), 41 Jamieson Cres, Kambah ACT 2902 Ph 62316067

DAN & DAN FORESTRY SERVICES

Yass Valley Way, Yass NSW 2582, Ph (02) 62262955

YARRALUMLA NURSERY

Banks St (Weston Park), Yarralumla ACT 2600 Ph 62072444.

Mr WARREN GANTER

3 Macarthur Ave, O'connor Ph 62576630. Mr Ganter does not supply plants, but does collect seed in the region.

Mr GEOFF BUTLER

38 Birchmans Grove, via Bungendore NSW 2621. Ph 62369158. Prepared to grow on a contractual basis for future seasons from supplied seed.

Suggested Planting Templates

Geoff Butler & Associates
 38 Birchmans grove
 via Bungendore NSW 2621
 ph/fax (02) 62369158
 Email
 gbutler@dynamite.com.au

SCALE: 1cm = 10m approx.

DRAWN: June 2000

LEGEND:

(x) Marshy areas with
 Reeds, Cumbungi

o Shrubbs bordering
 Marshy areas.

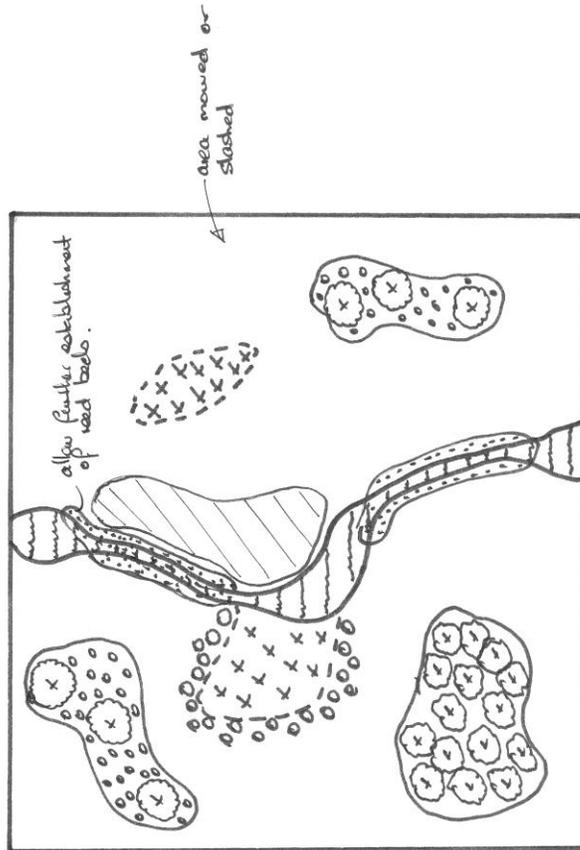
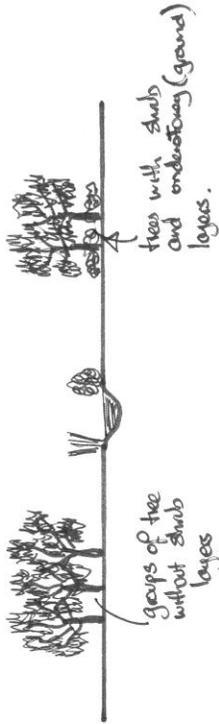
large euc's.

Cumbungi and reeds
 on creek.

Some areas may be
 left "wild" ie no
 mowing or slashing.

POTENTIAL PROFILE
 1) Alluvial Floodplains

Sheet 1 of 3



Geoff Butler & Associates
 38 Birchmans grove
 via Bungendore NSW 2621
 ph/fax (02) 62369158
 Email
 gbutler@dynamite.com.au

SCALE: 1cm = 10m approx.

DRAWN: June 2000

LEGEND:

- ⊗ large eucalypts.
- large shrubs / small trees
- x small shrubs.

POTENTIAL PROFILE

2) Slopes and Floodplains

Sheet 2 of 3

