

ACTION PLAN No. 10

In accordance with section 21 of the *Nature Conservation Act 1980*, **Yellow Box/Red Gum Grassy Woodland** was declared an **endangered ecological community** on 19 May 1997 (formerly Instrument No. 89 of 1997 and currently Instrument No. 192 of 1998). Section 23 of the Act requires the Conservator of Flora and Fauna to prepare an Action Plan in response to each declaration. This is the Action Plan for the:

Yellow Box/Red Gum Grassy Woodland An Endangered Ecological Community

Preamble

The *Nature Conservation Act 1980* establishes the ACT Flora and Fauna Committee with responsibilities for assessing the conservation status of the ACT's flora and fauna and the ecological significance of potentially threatening processes. Where the Committee believes that a species or ecological community is threatened with extinction or a process is an ecological threat, it is required to advise the responsible minister, and recommend that a declaration be made accordingly.

Flora and Fauna Committee assessments are made on nature conservation grounds only and are guided by specified criteria as set out in its publication "*Threatened Species and Communities in the ACT*, July 1995".

In making its assessment of Yellow Box/Red Gum Grassy Woodland, the Committee concluded that it satisfied the criteria indicated in the adjacent table.

An Action Plan is required in response to each declaration. It must include proposals for the identification, protection and survival of a threatened species or ecological community, or, in the case of a threatening process, proposals to minimise its effect.

This Action Plan was prepared by the Conservator of Flora and Fauna in accordance with the requirements of the Nature Conservation Act, in consultation with the Flora and Fauna Committee and after the statutory period for public comment.

While the legal authority of this Action Plan is confined to the Australian Capital Territory, management considerations are addressed in a regional context.

Criteria Satisfied

- 3.2 The Community is subject to current and continuing threats or other processes likely to lead to premature extinction as demonstrated by:
- 3.2.1 Severe decline in distribution.
 - 3.2.2 Marked alteration of composition or structure.
 - 3.2.3 Community is approaching non-sustainability.
 - 3.2.4 Loss or decline of species that play a major role in community function.
 - 3.2.5 Small distribution causing the community to be at risk of premature extinction.
 - 3.2.6 Community processes being altered to the extent that interaction between the community components will be impeded.

Links with other Action Plans

Measures proposed in this Action Plan complement those in the following Action Plans: Natural Temperate Grassland, Button Wrinklewort *Rutidosis leptorrynchoides*, Small Purple Pea *Swainsona recta*, Hooded Robin *Melanodryas cucullata*, Swift Parrot *Lathamus discolor*, Superb Parrot *Polytelis swainsonii*, Brown Treecreeper *Climacteris picumnus*, Regent Honeyeater *Xanthomyza phrygia*, Painted Honeyeater *Grantiella picta*, and the Perunga Grasshopper *Perunga ochracea*. Action Plans are listed at the end of this document.

Description

In the nomination for the Yellow Box/Red Gum Grassy Woodland as an endangered ecological community, the following definition was used and was accepted by the Flora and Fauna Committee:

“Yellow Box/Red Gum Grassy Woodland is an open woodland community in which either or both of Yellow Box *Eucalyptus melliodora* and Blakely's Red Gum *E. blakelyi* are usually present and commonly dominant or co-dominant. Apple Box *E. bridgesiana* is a frequent associate. The trees form an open canopy above a species-rich understorey of native tussock grasses, herbs and scattered shrubs. The combination results in a variegated mosaic of vegetation patches with features that are transitional between forest and grassland, and the community is frequently interspersed with these other vegetation types. Yellow Box/Red Gum Grassy Woodlands are utilised by a large number of animal species. The name of this ecological community (Yellow Box/Red Gum Grassy Woodland) is intended to encompass the dominant trees of the upper stratum, the characteristic plants of the understorey and the characteristic animals that interact with the vegetation complex”.

This Action Plan deals with the ecological community falling within the scope of this definition only. Trees in remnant woodland areas that do not fulfil the definition of the endangered ecological community are not the subject of this Action Plan. Management of these trees may be covered in other ways, for example, as components of other areas of vegetation which would effectively serve as wildlife corridor areas.

STRUCTURE

Woodland is characterised by a discontinuous stratum of medium height (10 - 30 m) in which the tree canopies are clearly separated (Costin 1954, McDonald *et al.* 1990) having a foliage cover of 10 - 30% (AUSLIG 1990). Compared with forest trees, the crowns of woodland trees are typically more rounded and of much greater depth, branching low from the main trunk. In Grassy Woodland, the next tallest vegetation stratum with a cover of more than 10% is dominated by grasses (AUSLIG 1990). Costin (1954) notes that similar vegetation in other countries has been termed woodland, parkland, woodland-climax, wood-meadow and savannah.

In Yellow Box/Red Gum Grassy Woodland, the understorey is usually dominated by a more or less continuous stratum in which mid-height tussock grasses are prominent. Structurally and floristically, this stratum closely resembles Natural Temperate Grassland which, prior to settlement, was often adjacent to it; examples of this in the ACT are now uncommon. Shrubs may also be present and may sometimes form a discontinuous middle stratum (Costin 1954; Landsberg *et al.* 1990).

FLORISTICS

Other tree species may be associated with *E. melliodora* and *E. blakelyi* in the Yellow Box/Red Gum Grassy Woodland community. These include Apple Box *E. bridgesiana*, Mealy Bundy *E. nortonii*, Candlebark *E. rubida*, Brittle Gum *E. mannifera*, Scribbly Gum *E. rossii*, Red Stringybark *E. macrorhyncha* and Hill She-Oak *Allocasuarina verticillata*. These species are found where conditions are intermediate between those most characteristic of Yellow Box/Red Gum Grassy Woodland and other tree communities. Because of selective clearing and unequal capacities to regenerate in the various species, the mixtures found today in patches of timber appear to be ecological communities but they may represent only the mixing of marginal occurrences of the previously adjoining and more integrated communities of these species.

Yellow Box/Red Gum Grassy Woodland understorey is usually grass and forb dominated but a shrub layer, when present, may contain some of the following: Silver Wattle *Acacia dealbata*, Lightwood *A. implexa*, Hill She-oak *Allocasuarina verticillata*, Burgan or Tea tree *Kunzea ericoides*, Blackthorn *Bursaria spinosa* ssp. *lasiophylla*, Peach Heath *Lissanthe strigosa*, Native Cherry *Exocarpos cupressiformis* and *Cassinia* spp.

The ground layer, the lowest stratum, frequently includes the native grass species Kangaroo Grass *Themeda triandra*, Red-leg Grass *Bothriochloa macra* and several species of Wallaby Grass *Austrodanthonia* species. It may also include a rich flora of forbs where grazing is not prevalent. These include Common Woodruff *Asperula conferta*, Bulbine Lily *Bulbine bulbosa*, Yellow Button *Chrysocephalum apiculatum*, Glycines *Glycine* spp., Scrambled Eggs *Goodenia pinnatifida*, Stinking Pennywort *Hydrocotyle laxiflora*, Bluebell *Wahlenbergia* species and Early Nancy *Wurmbea dioica*. Less commonly found are Billy Buttons *Craspedia variabilis* and Rice Flower *Pimelea linifolia*.

Following European settlement, four principal factors have modified the structure of woodland:

1. **Ring-barking and selective clearing**, combined with the destruction of tree seedlings by rabbits and livestock, have considerably reduced the density of the dominant trees in most areas. The relative abundance of species has been changed. Many of the remaining trees are large and old. For example, Banks (1997) reported the age of one urban Yellow Box tree at approximately 310 years.
2. **Grazing** has also reduced the height, cover and biomass of the grassy stratum, with the taller native grasses often being replaced by lower growing species of grasses and forbs (Costin 1954, Moore 1966, AUSLIG 1990). There is often a paucity of younger trees and saplings in grazed stands (Costin 1954; AUSLIG 1990; Landsberg *et al.* 1990, Frawley 1991) where stock may have caused compaction of soil under remaining trees leading to reduced seedling survival.
3. **Deliberate introduction of exotic pasture plants** such as the grasses *Phalaris aquatica* and Cocksfoot *Dactylis glomerata*, and many clovers has occurred widely. The degree of structural change depends on the species introduced and the extent of cultivation (Costin 1954; Moore 1966; AUSLIG 1990). It is most extreme when the mid-height native tussock grassy stratum is replaced by sown pasture dominated by exotic grasses and legumes. Under these conditions, the native tussock structure is generally lost, although a less intense form of modification, in which some native species generally persist and some of the tussock structure may be retained, can be found.
4. **Response to disturbance** - In some Monaro grassy woodlands of low pastoral value, particularly those in which Apple Box (*E. bridgesiana*) is prominent, partial clearing of overstorey trees has been followed by dense regrowth with eucalypt saplings and the development of a secondary shrub layer dominated by species of *Acacia*, *Cassinia* and *Kunzea* (Costin 1954). Such structural changes do not appear to have followed clearing of the usually topographically lower Yellow Box/Red Gum Grassy Woodland community but occur where grazing has been withdrawn for various periods and tree species have readily regenerated. Shrub understorey seems to persist on rocky ridges which may carry this community.

Of further interest is the situation of the original woodland where the hill slopes reached the plains. Prior to European settlement Yellow Box *E. melliodora* and Red Gum *E. blakelyi* occupied the lower slopes of many hills in the ACT on slightly richer and better textured soils but did not always extend into the lowest of the natural grassy plains below because of extremely low winter temperatures. At the margin, the scattered trees of the woodland included Snow Gum *E. pauciflora*, Candlebark *E. rubida*, and Apple Box *E. bridgesiana*. Today, examples of this transition in the ACT are very rare, although vestiges of it can be seen between William Hovell Drive and Aranda Bushland, and in the Jerrabomberra and Majura valleys.

FAUNA

Yellow Box/Red Gum Grassy Woodland provides habitat for many animals, including birds, bats, reptiles, ground dwelling and arboreal mammals, and invertebrates. The hollows developed in older tree trunks and branches, together with fallen wood, are vital habitat for many of these species. Trees do not develop hollows until they are at least seventy years old and some standing trees are now about 300 years old (Banks 1997). Termites, fire and wood rotting fungi promote hollow formation but the hollows may carry fire up into trees and eventually destroy them. Loose bark provides shelter for some of the invertebrates which provide food for birds. In the better quality stands, structural complexity is created by the presence of tree hollows, trees of different ages and a variable shrub and grassy understorey which provide nesting sites, shelter and food resources for fauna.

Some characteristic animal species are listed below but it is not possible to precisely associate assemblages of species with particular woodland areas or conditions. Animal habitat in relation to woodland type and condition is best considered in terms of assemblages and populations which may vary to a considerable degree, both seasonally and over a longer period of time.

In the ACT, about fifty bird species occur as residents or summer migrants in grassy woodland which is important breeding habitat for many species (Taylor 1992) including Crimson Rosella *Platycerus elegans* and Laughing Kookaburra *Dacelo novaguineae*. In woodland where the native grassy understorey has survived, species include the Jacky Winter *Microeca fascinans*, Diamond Firetail *Emblema guttata*, Rufous Songlark *Cincloramphus mathewsi* and Hooded Robin *Melanodryas cucullata*, all of which were once more

widespread. The Western Gerygone *Gerygone fusca* and Crested Shrike Tit *Falcunculus frontatus* are other woodland rarities. Among the birds of prey are Brown Falcon *Falco berigora*, Australian Kestrel *Falco cenchroides* and Wedge-tailed Eagle *Aquila audax*. Robinson and Traill (1996) consider that more than a quarter of the landbirds of woodlands are in decline or threatened.

Studies by Er (1995) show that the vertical complexity of the woodland is vital to supporting a diversity of native birds. Further, the survival of bird populations in the colder seasons is related to size of woodland patches.

The Eastern Grey Kangaroo *Macropus giganteus* is abundant in the ACT and occurs in all types of grassy woodland on both rural and reserve lands. In the marginal dry hill country of the lower Naas and Gudgenby catchments, the Wallaroo *Macropus robustus* is present in small numbers. Other mammals found in grassy woodland include the Swamp Wallaby *Wallabia bicolor* and Red-necked Wallaby *Macropus rufogriseus*, the arboreal Brush-tailed Possum *Trichosurus vulpecula* and Sugar Glider *Petaurus breviceps*. The Echidna *Tachyglossus aculeata* is a terrestrial inhabitant of woodland, and shelters in the soil and feeds on ants and termites.

Environment ACT records show that three species of bats *Vespadelus vulturnus*, *V. regulus* and *Nyctinomus australis* occur in lowland woodland. Yellow Box and Red Gum are potential habitat trees where hollows have formed in the branches and trunks.

Many species of reptiles have been recorded in woodland areas and abundance varies widely. Among the reptiles recorded are the Tree Dragon *Amphibolurus muricatus*, Shingleback *Trachydosaurus rugosus*, Three-toed Skink *Hemieris decresiensis*, Common Dwarf Skink *Menetia greyii*, Common Bearded Dragon *Pogona barbata*, Rosenberg's Monitor *Varanus rosenbergi*, Lace Monitor *V. varius* and the Olive Legless Lizard *Delma inornata*. Snakes found include the common Red-bellied Black Snake *Pseudechis porphyriaceus* and the Eastern Brown Snake *Pseudonaja textilis*.

Frogs occur in wetter areas within woodland and may use logs, rocks and thick grass for shelter. Species recorded in ACT woodland include Peron's Tree Frog *Litoria peronii* (dependent on logs, trees) and the Smooth Toadlet *Uperoleia laevigata*.

Woodland, dominated by many tree species, is the characteristic vegetation covering 25% of the Australian continent (Gillison 1994). Settled areas now contain only highly modified woodland, some of which may actually be modified low open forest. In south-eastern Australia, woodland trees are usually species of *Eucalyptus* but may include *Allocasuarina*, *Acacia*, *Callitris* and others.

Woodland generally develops in drier areas, or in higher rainfall areas where seasonal patterns include a definite dry season. Close to Canberra, which falls within the South Eastern Highlands region of the *Interim Biogeographic Regionalisation of Australia* (Thackway and Cresswell 1995), rainfall is 580 mm per annum and mean lowest and highest temperatures are 1.1°C in July and 28°C in January. Drought-prone soils and certain geological substrates may promote woodland development in areas that climatically could support forest.

The dominant trees of temperate woodlands are listed in Table 1 (after Beadle 1981). Of the three principal woodland alliances, only the *E. melliodora* - *E. blakelyi* alliance (series of groups of related woodland communities) is represented in the ACT. Yellow Box/Red Gum woodland is the most easterly of the temperate Box Woodlands which once occupied the land that has been cleared for sheep and wheat farming in NSW and Victoria.

The loss of trees on pastoral lands has been severe in many areas. Studies in NSW by Prober and Thiele (1993; 1995) of the floristically and structurally similar White Box woodland show that less than 0.01% still exists in good condition, although it previously covered several million hectares in NSW. In the NSW Regional Forest Assessment for Tumut Region, it is estimated that around 91% of woodland communities containing Yellow Box or Red Gum have been cleared (NSW NPWS 1996).

Through the establishment of the ACT and its legislation and management practices restricting timber clearance, remnant vegetation of the *E. melliodora* - *E. blakelyi* alliance has survived close to Canberra, albeit to a limited extent. However, these remnants are in many cases still subject to grazing and uneven suppression of regeneration. Attrition is occurring as a subtle process mediated by drought, fire, lack of regrowth and insect defoliation (Landsberg *et al.* 1990). This is often referred to as rural tree decline.

Distribution

Table 1. Associated trees of the major woodland communities in SE Australia (adapted from Beadle 1981).

Alliance	Main Association	Minor Association
<i>E. melliodora</i> - <i>E. blakelyi</i> (Yellow Box/Red Gum)	<i>E. melliodora</i> - <i>E. blakelyi</i>	<i>E. bridgesiana</i>
	<i>E. melliodora</i>	<i>E. dives</i>
	<i>E. blakelyi</i>	<i>E. polyanthemos</i>
<i>E. albens</i> (White Box)	<i>E. albens</i>	
	<i>E. albens</i> - <i>Callitris</i> <i>glaucophylla</i>	---
<i>E. microcarpa</i> (Grey Box)	<i>E. microcarpa</i>	<i>E. melliodora</i>

Shading indicates representation of the Associations found in the ACT.

OCCURRENCE OF REMNANT STANDS IN THE ACT

A preliminary survey of the extent and quality of remnant woodland vegetation in the ACT has been completed (Ingwersen *et al.* 1997). Woodland occurs widely in the northern ACT but many remnant patches, including Yellow Box/Red Gum Grassy Woodland, are separated by untimbered land or urban areas and there has clearly been much fragmentation of the original woodland ecosystem. Its extent and condition, particularly of its understorey, vary widely on both public and rural lands. Woodland remnants on rural lands contribute substantially to the woodland remaining in the ACT.

Mapping units

Woodland stands have been selected for inclusion in this Action Plan where:

1. the proportion of crown cover contributed by either *E. melliodora* or *E. blakelyi*, or both jointly, is equal to or greater than 40%; and
2. the understorey is not exotic pasture or degraded beyond recovery; and
3. remnants are not isolated trees or clumps.

The remnant stands of Yellow Box/Red Gum Grassy Woodland which meet these criteria are shown in red in Map 1. They comprise 7888 ha, or about 25% of the Yellow Box/Red Gum Grassy Woodland that was once distributed over the lowlands of the ACT (estimated to have been 32,000 ha (J. Landsberg pers. comm.).

The proportions of native species in the understorey of the grassy woodlands varies with previous land use and disturbances. The

condition recorded at the time of the preliminary survey (Ingwersen *et al.* 1997) was also greatly influenced by drought and, in places, grazing pressure. There is a need for more detailed ecological analyses to define better the botanical significance of the understorey and the conservation value of each woodland patch.

The pink areas, totalling about 4000 ha, are remnants that are likely in the past to have been typical Yellow Box/Red Gum Grassy Woodland but which have now been so modified that they no longer represent the community of inter-related native plants and animals. They have been reduced to Yellow Box and/or Red Gum trees over exotic pasture or understorey which is now so degraded that, although some native species may remain, the proportion of native species is too low to re-establish the understorey characteristic of the endangered ecological community. The presence of a diverse weed flora also makes re-establishment of the native understorey a difficult and costly task. Such remnants are called *depauperate* Yellow Box/Red Gum grassy woodland.

The green areas, totalling about 20 000 ha, are woodlands of other kinds which do not contain 40% of Yellow Box or Red Gum trees. Some of these areas retain high conservation values as a woodland community but they do not belong to the ecological community that is declared endangered. These woodlands are dominated by Apple Box *E. bridgesiana*, Red Box *E. polyanthemos*, Mealy Bundy *E. nortonii*, Bundy *E. goniocalyx* and rarely, Black Cypress Pine *Callitris endlicheri* or Kurrajong *Brachychiton populneum*.

Woodland quality rating

A preliminary rating of the quality of all Yellow Box/Red Gum Grassy Woodland in the ACT has been estimated from field observations of:

- the dominant species of trees,
- the proportion of exotic and native species in the ground cover; and
- the presence of native shrub understorey and regenerating trees (Table 2).

The size and shape of woodland patches and their connection to other patches were also considered. Specific woodland density classes (after Walker and Hopkins 1990) were used to categorise stands of trees as:

1. *Woodland* (tree crowns spaced from 0.25 to 1 diameters); or
2. *Open Woodland* (tree crowns spaced from 1 to 5 diameters).

Woodland was more highly rated than Open Woodland, as this is considered to provide greater opportunity for more species of flora and fauna. This denser class is taken as evidence of a higher degree of representation of the original woodland condition.

Woodland, because it is denser, is more likely to represent the less disturbed remnant community or stands which have regenerated more successfully. Open woodland stands may have been more cleared and less regenerated, and therefore imply greater disturbance and less natural condition. However, the original density of either type is not known and considerable variation probably existed as a continuum of

variation which is also seen today.

Points for each set of attributes were summed. Stands with dissimilar attributes could therefore be rated at the same level in some cases.

Woodland quality ratings need to be reviewed in the light of more detailed vegetation surveys, and where possible, fauna surveys. These were not part of the survey carried out by Ingwersen *et al.* (1997). These reviews will be carried out progressively, and programmed to assist in any planning reviews of future urban areas and to take advantage of improved seasonal conditions.

Table 2 Yellow Box/Red Gum Grassy Woodland quality rating

<p>Yellow Box/Red Gum Grassy Woodland endangered community remnants are those where: -</p> <ul style="list-style-type: none"> • the proportion of crown cover contributed by either <i>E. melliodora</i> or <i>E. blakelyi</i> or both jointly $\geq 40\%$; and • understorey is not exotic pasture; and • remnants are not isolated trees or clumps. 		
Attribute	Rating \longrightarrow	
	LOW	HIGH
Dominant tree species (species $\geq 15\%$ contribution)	minimum one species	three or more species
Eucalypt regeneration in mid-stratum	absent	dominant, abundant
Grassy understorey composition	mixed exotic and native species	predominantly native species
Patch configuration	elongated	globular/variable
Size of patches	small (< 1 ha)	large (> 5 ha)
Connectivity of remnant patches	isolated	connected
Extent of edge abutting	up to half contact with adjacent unit	more than half contact with adjacent unit
Woodland density	open woodland	woodland

Conservation Status

YELLOW BOX/RED GUM GRASSY WOODLAND

Yellow Box/Red Gum Grassy Woodland is recognised as a threatened ecological community in the following source:

Australian Capital Territory

Endangered Ecological Community. - Section 21 of the *Nature Conservation Act 1980*, Instrument No. 192 of 1998 (formerly Instrument No. 89 of 1997).

Threats

In addition to the factors that have modified the structure, floristics and distribution of the community already described, there are continuing threats to the existence of the remaining trees and to the long term functioning of the community as a system of ecologically related elements. These are:

- **clearing for agriculture and grazing;**
- **provision of urban services and infrastructure** in areas with good terrain for building; leading to fragmentation, separation and degradation of remaining viable habitat areas;
- **firewood collection;**
- **failure of tree regeneration;**
- **rural tree die-back;**
- **pasture improvement** resulting in modification of ground cover;
- **grazing by stock (and other grazing animals)** at levels which suppress regeneration of trees and alter the understorey;
- **invasion by weeds and feral animals;** and
- **changed fire regimes** - fire is a factor in maintaining woodland structure and species richness.

CLEARING FOR AGRICULTURAL AND PASTORAL USE

Although the current rate of tree removal in the ACT has not been quantified for the Yellow Box/Red Gum Grassy Woodland community, rates of tree clearance for agriculture in other box woodlands of the adjacent region continue to be high (Sivertsen 1993). The extent of total clearing of Yellow Box/Red Gum Grassy Woodland in the ACT region has been estimated to be around 90% (Landsberg in press).

In the ACT, legislative constraints and a high degree of compliance by landholders have reduced illegal clearing. Where urban planning and development occur, consultation and landscape assessment processes have ensured that many woodland remnants and individual trees have been retained as part of the landscape setting of Canberra. Through the requirements for new rural leases to have Property Management Agreements (PMAs), it will be possible to set farm management conditions that encourage the maintenance of the existing quality and extent of rural woodland, and improve the current condition of these areas.

URBAN/SUBURBAN DEVELOPMENT AND PROVISION OF INFRASTRUCTURE SERVICES

Most of the remaining Yellow Box/Red Gum Grassy Woodland in the ACT lies in the gently undulating open country in the northern third of the Territory. The land here is easy to access, suitable for urban development and close to existing towns and urban infrastructure. Thus, woodland areas that may be retained within the urban fabric face major threats from land clearing and degradation.

Both conventional urban expansion in the long term and the development of rural residential housing are seen as threats. The main areas where there is potential conflict between future urban use and the conservation value of Yellow Box/Red Gum Grassy Woodland are at Gungahlin and Jerrabomberra/Symonston. However, with sensitive planning paying regard to the ecological resources contained in a proposed development area, it may be possible to retain some remnant woodland as an integral part of new urban areas, although some existing patches of woodland will be cleared.

Although degradation of areas of woodland remaining within the urban fabric will occur, this Action Plan is intended to preserve the Yellow Box/Red Gum Grassy Woodland community as far as is practicable. There will be situations where the understorey is likely to be lost, although the mature trees may be retained in open space or streetscapes. Such remnants may be enriched by sparse plantings of trees and alteration of the grassy understorey. In these cases, the ecological community will not have been preserved within the urban development although the habitat value of the trees and some of the landscape amenity values will, in some measure, be retained.

FIREWOOD COLLECTION

Firewood production is Australia's second largest timber industry. In NSW and Victoria, more than 60% of the fuelwood collected comes from woodlands (Robinson and Traill 1996). Canberra is a heavy consumer of firewood with an estimated 45,000 t used annually, much of which is collected from remnants of woodland on private land on the Southern Tablelands and the Central Slopes of NSW.

Yellow Box is high quality firewood. Under the Nature Conservation Act, rural lessees may use timber on their properties for firewood but are not permitted to sell it. There is illegal collecting from public land and other areas managed as Canberra Nature Park but its extent is not known. During the construction of new suburbs, timber in the vicinity of building sites has been reported a target of collectors but with the establishment of a suburb, access is restricted and surveillance is improved.

The collection of fallen timber and the removal of dead trees can be a threatening process for some birds and small animals. Fallen timber provides sites for perching, nesting and shelter for smaller animals including reptiles, frogs and invertebrates, which are part of the rich wildlife still found on the margins of Canberra.

Collection of firewood for commercial purposes is not permitted in the ACT. While this promotes conservation locally, it does place pressure on the resource in NSW.

To address this issue, the ACT Firewood Strategy is promoting the use of mixed fuelwood loads sourced increasingly from plantations. This will involve the use of a more diverse range of hardwoods, and once a significant proportion of solid fuel heaters are certified for softwood use, plantation softwood. In keeping with this program, growing some plantation fuelwood and promotion of the use of local plantation softwood must be part of a management strategy for woodland remnants in the ACT and on a regional basis. The use of pine from local plantations should be promoted to reduce demand for non-plantation timber.

FAILURE OF TREE REGENERATION

The loss of trees through direct clearing has led to the present distribution of woodland trees in the rural and urban landscape but a lower than original tree density is maintained by reduced regeneration because of grazing by stock and other herbivores. This suppression of tree seedling regeneration, as well as possible

ringbarking of mature trees by horses, also pose direct threats to the persistence of the tree overstorey (Jacobs 1955, Costin 1954, Frawley 1991).

Seedlings of Red Stringybark, Yellow Box and Blakely's Red Gum are particularly attractive to sheep and cattle, and although mature trees may be present in many woodland areas, there is often little regeneration of seedlings or a range of age classes to effect tree replacement.

RURAL TREE DIEBACK

Dieback of native trees is widespread in many agricultural and pastoral regions of Australia, and is particularly severe in the Tablelands of NSW and the ACT where the Yellow Box/Red Gum Community has its major occurrence (Landsberg and Wylie 1988, Baracioli 1993).

Red Gum is one of the tree species most severely affected by dieback in the ACT and surrounding region. Dieback has many interacting causes but grazing by livestock is pivotal. Although death of tree canopies usually results from very high rates of defoliation by insects, the build up in insect populations follows changes initiated by vertebrate grazers. Nutrient enrichment of the tree canopies is a major contributing factor (Landsberg *et al.* 1990) and a decline in the abundance and diversity of insectivorous birds is also implicated (Ford 1985; Lyon 1985). The changes in bird communities are closely tied to the loss of shrubs and general habitat simplification caused by continual grazing.

DELIBERATE MODIFICATION OF GRASSY GROUND COVER

The pasture "improvement" of grassy ecosystems in the ACT region has traditionally involved the introduction of European grasses and clovers. These have been either mixed with the existing native grasses or sown into land prepared by cultivation. Such species require higher levels of the major nutrients phosphorus and nitrogen which are usually added from time to time as superphosphate.

Fertiliser application is a crucial factor in altering the understorey of grassy woodland. It is undertaken to enhance the grazing value of the land and hence promotes the effects of grazing already outlined, including tree dieback.

A related issue is the redistribution of nutrients, whether added or endogenous, by grazing animals. Sheep in particular congregate in "camps" where manure deposits raise nutrients

to locally high levels (Robinson *et al.* 1983, Landsberg *et al.* 1990). This promotes growth of nitrogen loving weeds. Improved pastures require maintenance applications of fertiliser, although clovers, if well established, contribute to the nitrogen requirements of the grasses. The increased fertility creates conditions favourable to weeds leading to the introduced grasses dominating the original native grass and forb understorey. Such nutrient enrichment has been implicated in the development of tree dieback (Landsberg and Wylie 1988).

GRAZING

Grazing by stock and rabbits removes seedlings of the dominant trees and diminishes understorey diversity by the selective removal of palatable forbs. The relative dominance of the grasses is altered and bare ground may be increased. New bare ground usually indicates adverse impact or the inability of damaged soils to support more complete cover. This ground is prone to erosion and forms a poor seed bed for regeneration.

Light grazing in Natural Temperate Grassland has been proposed to maintain a sufficiently open structure to sustain the forb component but the intensity, season and duration of grazing must be carefully controlled to avoid damage (ACT Government 1997a). There may be a need to modify some grazing regimes in selected grassy woodland areas to achieve conservation objectives in rural lands (under PMAs) and within reserves where grazing may be permitted. This is consistent with the view of Prober and Thiele (1995) that the characteristics of currently grazed communities be retained while grazing continues at historical levels. However, an improvement in conservation outcomes could be achieved by a reduction in grazing intensity and removal of exotic plant species. When developing PMAs the total grazing pressure by combinations of stock, kangaroos and rabbits should be considered.

Grazing by kangaroos may at times contribute to the deterioration of the grassy understorey but tree seedling regeneration is less likely to be affected. Kangaroos have previously contributed to grassland deterioration at the Tidbinbilla Nature Reserve and given this observation, alteration of the species composition of the grassy understorey may occur. Therefore management of kangaroo populations is important in managing the understorey of Yellow Box/Red Gum Grassy Woodland.

Further research and monitoring will be needed to determine the most desirable grazing regimes to achieve sustainable management practices and to assess impact.

INVASION BY WEEDS AND FERAL ANIMALS

Degradation of remnant woodlands of all kinds is frequently indicated by the presence of Briar *Rosa rubiginosa*, Hawthorn *Crataegus monogyna*, African Boxthorn *Lycium ferocissimum* and the many species of thistles which invade heavily grazed or disturbed ground. The presence of these woody weeds and introduced grasses has caused many otherwise significant woodland patches to be excluded from this Action Plan because their understorey no longer contains a sustainable level of native species.

In addition to exotic plants that have become naturalised in grassy woodlands (Berry and Mulvaney 1995), feral herbivores such as rabbits and hares contribute to the negative impacts of grazing (Costin 1954). Feral predators such as foxes and cats are also widespread (Frawley 1991). They have been implicated in the decline of many Australian native mammals throughout Australia (Strahan 1995) although their impact on native fauna within the Yellow Box/Red Gum Grassy Woodland community has not been quantified.

FIRE

Fire is no longer used as a means of promoting pasture growth in the ACT but natural, arsonist and accidental ignitions occur which may burn extensive areas in hot dry weather and strong winds. Some loss of mature trees occurs and young, even-aged stands (including seedlings) may be killed or temporarily set back in their development.

Burning may promote hollow development in mature trees but it may also threaten animals using such hollows at the time of the fire. Crown damage is unlikely in short pastures but ungrazed rank grass may promote severe canopy scorch which may affect tree vigour and habitat values. In the absence of grazing, occasional planned fires are desirable to maintain grass cover in an open condition favourable to the development of a richer and denser forb component.

A plan for bushfire fuel management in the ACT has been prepared (ACT Government 1997b) and when revised, aspects that may affect Yellow Box/Red Gum Grassy Woodland will be reviewed.

Major Conservation Objective

The major conservation objective of this Action Plan is to:

- **conserve Yellow Box/Red Gum Grassy Woodland as a viable and well represented ecological community in the ACT in perpetuity.**

Supporting objectives are to:

- **Conserve the most significant areas of Yellow Box/Red Gum Grassy Woodland** based on the assessment of vegetation characteristics including tree species richness, remnant patch size, tree cover, proportion of native species in the understorey, connectivity with adjacent woodland, potential for long term viability, and wildlife values.
- **Ensure that the ACT reserve system includes areas of Yellow Box/Red Gum Grassy Woodland with the aim of making the system -**
 1. **comprehensive** -it will include examples of the Yellow Box/Red Gum Grassy Woodland community across its geographic range in the ACT;
 2. **adequate** - it will replicate ecologically viable Yellow Box/Red Gum Grassy Woodland communities, species and populations; and
 3. **representative** - it will reasonably reflect the biological diversity of the remaining remnants of Yellow Box/Red Gum Grassy Woodland in the ACT.
- **Maintain viable woodland remnants in an off-reserve system** which protects and enhances woodland conservation values through the cooperation of rural lessees mediated by PMAs.
- **Where feasible, conserve other viable remnants of Yellow Box/Red Gum Grassy Woodland within the matrix of urban and other land uses in the ACT** through appropriate planning and by sensitive and compatible land-use management.
- **Promote awareness amongst relevant agencies, landholders and the community of the major conservation objectives of this Action Plan** and its role in meeting ACT, regional and national objectives for the conservation of biodiversity.

STRATEGY

The following conservation strategy will be applied to achieve the objectives of this Action Plan:

- In consultation with Planning and Land Management (Department of Urban Services), ensure information on woodlands is incorporated at an early stage into planning of future urban development areas.
- Include areas of Yellow Box/Red Gum Grassy Woodland in existing or new reserves.
- Apply conservation measures, including advice and assistance to landholders, to protect and manage off-reserve remnants through PMAs, farm planning and lease arrangements.
- Support and encourage appropriate conservation management of remnants including activities conducted by community groups such as Landcare.
- Apply adaptive management strategies to maintain and enhance woodland conservation and monitor their effectiveness.
- Facilitate education programs which promote protection, conservation management and understanding of woodland communities.
- Promote research into the conservation management of Yellow Box/Red Gum Grassy Woodland and its component species.
- Maintain links with the full range of public and private land managers and other stakeholders to ensure a coordinated woodland conservation effort.

The final boundaries for areas of Yellow Box/Red Gum Grassy Woodland that may be retained within urban development areas and institutional land uses cannot be defined without further detailed assessment of available ecological data and planning options. Important considerations will include:

- evaluation of remnants in relation to patch size and degree of similarity to other types of woodland;
- linkages between remnant patches and other elements in conservation/biodiversity corridors;
- progress towards full implementation of PMAs on rural lands;
- extent of remnants on Public Land in Hills, Ridges and Buffer areas; and
- the extent to which development proposals provide opportunities for compatible land uses.

As part of this strategic approach, the extent to which certain remnants form key linkages in relation to existing reserves and land outside present or future areas for development, will be assessed. The most important components will be a system of woodland and other habitat corridor elements: in particular, Mulligans Flat, Gooroo, Ainslie-Majura, the land east of the airport, and the Mugga Mugga - Callum Brae area. These elements contribute to an eastern conservation corridor. A second strategic corridor is represented by smaller and more isolated elements extending from the lower Naas Valley, along the Murrumbidgee River Corridor, including Castle Hill, and areas on rural land near Weston Creek, Stromlo and Uriarra.

The retention of woodland trees, generally without their native grassy understorey, will be undertaken as far as possible within the urban open space areas associated with residential developments and as part of the tree retention pattern for streets and residential blocks. However, some clearing of Yellow Box - Red Gum Grassy Woodland remnants will result from new urban development, particularly in Gungahlin and Symonston/Jerrabomberra. Although the integrity of the woodland community will inevitably be reduced, valuable habitat connectivity, particularly for birds, may be able to be maintained.

Conservation Issues and Intended Management Actions

REGIONAL CONSERVATION

A regional perspective is essential to achieving effective conservation of Yellow Box/Red Gum Grassy Woodland. Areas of the endangered community close to the northern and eastern ACT border will link to the wider region in NSW. These are important to provide alternative habitat after severe fires or other disturbances. The Draft ACT and sub-region planning strategy (ACT and Sub-Region Planning Committee 1995) provides a framework for such a regional approach.

⇒ Environment ACT will actively participate in developing, implementing and promoting collaborative or joint ACT and NSW measures for the protection and conservation management of Yellow Box/Red Gum Grassy Woodland and other woodland types in the region.

Areas of high quality Yellow Box/Red Gum Grassy Woodland, included in existing reserves or subject to off-reserve conservation management, will contribute to the regional effort for conservation of this community.

SURVEY AND MONITORING

Further broadscale surveys to discover remnant patches of woodland are not required in the ACT but more detailed surveys of some small areas and the floristics of remnant patches is necessary to provide a sound basis for land use planning, conservation management and monitoring change, and applying adaptive management strategies. Surveys of the fauna of these areas should be included. Indicator species or species groups may be selected for monitoring in key areas.

Secondary grasslands, from which the original woodland trees have been cleared, could be assessed for their potential for replanting trees with a view to improving habitat continuity and extension of existing remnants.

⇒ Environment ACT (Wildlife Research and Monitoring (WR&M)) will undertake more detailed floristic surveys of remnant woodland patches to improve the assessment of the botanical significance of the understorey and therefore the conservation significance of the woodland patch.

⇒ Environment ACT (WR&M) will evaluate secondary grassland areas when assessing sites for tree planting and rehabilitation programs.

⇒ Permanent reference areas will be established to obtain baseline data for subsequent monitoring and feedback to land managers.

⇒ Faunal elements will be selectively surveyed and monitored in association with vegetation characteristics, as there is currently insufficient data to show that all core sites for all woodland fauna species coincide with areas planned for protection. This will further document the nature of particular remnant patches and the range of types within the Yellow Box/Red Gum Grassy Woodland community in the ACT.

Environment ACT (WR&M) is, in conjunction with other specialists, developing suitable procedures to cope with a wide range of woodland site conditions, both on and off reserve.

NATIONAL LAND

Some significant areas of Yellow Box/Red Gum Grassy Woodland occur on land which is owned or occupied by the Commonwealth or is shown as a Designated Area in the National Capital Plan and is under the planning control of the National Capital Authority. Planning for and management of this land should be coordinated with this Action Plan through the respective planning and land management procedures of the ACT and Commonwealth Governments.

⇒ Environment ACT (WR&M) will liaise with the relevant managers of National Land and develop Memoranda of Understanding for the future conservation management of significant woodland remnants.

THREATENED SPECIES

Threatened species are those that are formally declared as *vulnerable* or *endangered* under the *Nature Conservation Act 1980*. Five species of birds associated with Yellow Box/Red Gum Grassy Woodland habitat are declared *vulnerable to extinction* in the ACT region:

- Hooded Robin *Melanodryas cucullata*;
- Swift Parrot *Lathamus discolor*, a rare winter visitor;
- Superb Parrot *Polytelis swainsonii*, a migrant;
- Brown Treecreeper *Climacteris picumnus*; and
- Painted Honeyeater *Grantiella picta*, a migrant.

One bird species has been declared *endangered*:

- Regent Honeyeater *Xanthomyza phrygia*, a migrant.

An *endangered* species of daisy, Button Wrinklewort *Rutidosia leptorrhynchooides* occurs in both Yellow Box/Red Gum Grassy Woodland and Natural Temperate Grassland. The Perunga Grasshopper *Perunga ochracea* which is listed as *vulnerable*, and the Small Purple Pea *Swainsona recta*, listed as *endangered*, are also found in grassy woodland communities.

⇒ Conservation management of Yellow Box/Red Gum Grassy Woodland will take into account the known conservation requirements of listed threatened species that are considered to be component species.

Conservation objectives and management requirements for those species are set out in their respective Action Plans.

FRAGMENTATION

Fragmentation of woodland has already occurred due to pastoral land use and urban development. Where there is a likelihood of this occurring with new urban development and infrastructure that serves urban areas, or on rural leases, involvement in the early stages of planning processes and the preparation of PMAs will enable the issue to be addressed. In particular, opportunities for minimising further fragmentation by linking reserved areas with non-reserve land, especially on rural leases and urban open space, will be sought. Supplementation of remnants with new plantings by community organisations will be sought to create linkages.

⇒ Environment ACT will liaise with other agencies and landholders to minimise any further fragmentation of Yellow Box/Red Gum Grassy Woodland. Where feasible, measures such as replanting or regenerating woodland trees to create links between remnant fragments will be promoted using local seed stock.

MANAGEMENT

Degradation and dieback processes are closely associated with rural land use although the immediate cause of tree decline or degradation of woodland attributes may be the result of land management practices that were imposed some years ago. Conservation management and rehabilitation of degraded woodlands are long term processes requiring the active support and participation by public land managers and landholders.

Managers of both Public Land and leases containing Yellow Box/Red Gum Grassy Woodland will require advice to guide, and direct where necessary, their management of this endangered community. Such advice may include protection of regeneration from damage by stock, excessive nutrient enrichment and fire, as well as the protection of the grassy understorey. On rural leases, the intensity of grazing of Yellow Box/Red Gum Grassy Woodland understorey will be recommended only on an ecologically sustainable basis (i.e. at current or lower rates). Consideration of total grazing pressure is an important factor in land management, whereby grazing by herbivores other than stock (e.g. kangaroos and rabbits) is taken into account in management practices. Where appropriate, the powers of the Conservator of Flora and Fauna under the *Nature Conservation Act 1980*, in particular, Section 47, "Conservation Directions" may be required to circumscribe some activities.

⇒ Environment ACT will provide advice to individual rural lessees on biodiversity issues

to assist in the preparation of PMAs.

- ⇒ Environment ACT will promote regeneration and maintenance of native grass and forb understorey to rural landholders. This will be supported through PMAs that seek to take account of total grazing pressure from all herbivores, prevent clearing of understorey, and control the use of fertiliser, herbicides, grazing and soil disturbance in significant Yellow Box/Red Gum Grassy Woodland remnants.
- ⇒ Environment ACT (WR&M) will develop conservation management guidelines consistent with the primary land use purpose, to assist rural lessees and other land managers to manage woodland remnants so that conservation objectives are met.
- ⇒ Relevant management actions and strategies proposed for the conservation of Natural Temperate Grassland (Action Plan No. 1) will be applied in respect of the grassy understorey of Yellow Box/Red Gum Grassy Woodland. These include:
 - the retention and/or enhancement of ecological community diversity and structure;
 - control of destructive disturbance;
 - control of fire consistent with the ACT Bushfire (fuel) Management Plan; and
 - control of weeds.
- ⇒ Research results and other relevant information from studies of woodland and grassland ecosystems will be used to develop and refine the management guidelines.

ENHANCEMENT OF LOWER QUALITY WOODLAND AREAS

It may be possible, with appropriate management and regeneration measures, to enhance the quality of some remnant Yellow Box/Red Gum Grassy Woodlands. Measures could include tree planting by community groups, removal of woody and other weeds, selective removal or killing of mistletoe and the management of natural regeneration processes. Control of feral animals such as rabbits and hares may need to be undertaken. Enhancement actions could occur in conjunction with appropriate tree-planting programs and Bushcare activities funded through the Commonwealth's Natural Heritage Trust.

- ⇒ Environment ACT will promote woodland regeneration measures designed to enhance the conservation values of Yellow Box/Red

Gum Grassy Woodland remnants. In areas for which it has direct management responsibility (Public Land - Nature Reserve), management priorities and programs will be reviewed to identify opportunities for enhancement of conservation values.

- ⇒ Regeneration will be assisted, where necessary, by the re-planting of trees of the characteristic dominant species. Understorey species will be replanted where feasible.
- ⇒ A range of trees, including significant dominant trees, some of which are up to 300 years old (Banks 1997) will be used to contribute to a seed bank for future replanting in the Canberra region. Consultation with relevant experts will be sought where appropriate.

ECOLOGICAL RESEARCH

Little research has been done locally on the ecology and conservation management of Yellow Box/Red Gum Grassy Woodland but the results of regional studies of Grassy White Box Woodland, studies of tree decline and research on Natural Temperate Grassland can be used, particularly in respect of the grassy understorey. New research is needed to address the management of regeneration, aspects of mid-storey species and key ecological processes in woodlands.

- ⇒ Environment ACT (WR&M) will promote interest amongst academic institutions and individuals in undertaking research into the ecology and management of woodland.
- ⇒ Environment ACT will monitor the condition of the Yellow Box/Red Gum Grassy Woodland community following major changes in grazing or fire regimes and urban development.

MANAGEMENT OF WOODLANDS WITH DEGRADED UNDERSTOREYS AND ALSO OF REMNANT TREES

Some areas of remnant woodland are now so degraded or modified that they are reduced to stands of mature Yellow Box or Red Gum trees. These are termed depauperate woodland. These areas may no longer be regarded as comprising a viable ecological community that meets the criteria for the Yellow Box/Red Gum Grassy Woodland endangered ecological community. However, individual trees or stands of trees may nevertheless retain significant ecological values, particularly as habitat for birds and other animals. Opportunities may exist for these trees to be retained as part of urban, broadacre or rural land uses. Small groups of

trees and trees distributed in thin, extended patches may contribute to wildlife corridors that link better quality or more extensive woodland and open forest habitats. In some cases, enhancement by revegetation with native understorey will be considered, using local seed stock.

- ⇒ When assessing development proposals and applications to clear timber, particular consideration will be given to whether trees of the characteristic dominant species are involved and their potential value as habitat for native fauna and corridors between reserved areas.
- ⇒ Where necessary, provisions of the *Nature Conservation Act 1980* including Section 43, "Preservation of native timber" will be considered to enforce protection of habitat trees.

EDUCATION AND LIAISON

All managers of woodland communities, whether on government or private land, require information and guidance on the most appropriate actions for woodland conservation. Information must be shared between woodland managers, researchers and the community to maintain a high level of community awareness of the conservation needs of Yellow Box/Red Gum Grassy Woodland. Part of this program should focus on the need for maintaining the understorey, especially the retention of fallen timber, as significant habitat for threatened species, such as the Hooded Robin and Brown Treecreeper. This will be complemented by the ACT Firewood Strategy, which deals with appropriate firewood sourcing, to avoid pressure on the Yellow Box/Red Gum Grassy Woodland community.

- ⇒ Environment ACT (WR&M) will maintain a database containing information on woodland distribution and conservation values to assist public land managers, rural landholders and community groups in projects for Landcare and similar activities.

Protection

GENERAL

Patches of the Yellow Box/Red Gum Grassy Woodland ecological community occur on land under a variety of land use categories shown on the National Capital Plan and Territory Plan. Broadly, areas of the ACT defined in the National Capital Plan as having the "special characteristics of the national capital" (*Designated Areas*) come under the planning

control of the National Capital Authority. All other areas come under the Territory Plan, prepared and administered by the ACT Government. For the policies of the Territory Plan to have effect, they must "not be inconsistent" with the National Capital Plan. From a management perspective, land may be either Territory Land (managed by the ACT Government) or National Land (managed by a Commonwealth agency).

Yellow Box/Red Gum Grassy Woodland exists within many of the land uses shown in the Territory Plan and National Capital Plan. They include *Public Land (Pc) - Nature Reserve, Public Land (Pd) - Special Purpose Reserve, Hills, Ridges and Buffer areas, Rural* (leasehold tenure), *Broadacre, and Urban (including Residential, Industrial and other similar land use categories)*. The areas of Yellow Box/Red Gum Woodland under each of these land use and planning categories are set out in Table 3.

Remnant patches range from a few hectares to around 200 ha. Around 82% of the patches are less than 30 ha and large areas (over 100 ha) are rare (less than 3% of the patches). Remnants contiguous with other woodland types create larger stands which may contribute significantly to the landscape of an area and its wildlife habitat value.

Remnants range in altitude from about 500 to 900 m. All remaining areas below 600 m are reserved, and other examples are included in reserves across the altitudinal range of this community in the ACT.

About 1633 ha of Yellow Box/Red Gum Grassy Woodland are already protected within the ACT's nature reserve system. These are in the Ainslie-Majura and Mulligans Flat Reserves (Map 2); Red Hill Reserve and Isaacs Ridge (Map 4); and in Rob Roy Reserve and the nature reserves of the Murrumbidgee River Corridor (Map 5). These areas represent almost 21% of the area of this ecological community remaining in the ACT.

In addition to land formally protected in reserves 2312 ha (29%) of Yellow Box/Red Gum Grassy Woodland is located within areas shown in the Territory Plan as Hills, Ridges and Buffers (HRB), Mountain and Bushland or Murrumbidgee River Corridor. These land use categories largely surround and separate Canberra's urban areas and permitted land uses preclude urban residential and industrial development. An additional 558 ha (7.0 %) is located in areas of Territory Land shown in the National Capital Plan as Designated Area (Inner Hills).

When the areas of Yellow Box/Red Gum Grassy Woodland located in nature reserves and the major open space categories of the Territory Plan and National Capital Plan are considered together, 57% of the remaining woodland is protected from the direct threat of clearing for urban land use. This proportion is increased when patches of woodland located on the Majura Field Firing Range (Broadacre land use) (Map 2) are included.

About 1504 ha (19%) of Yellow Box/Red Gum Grassy Woodland is found on rural land. Some patches are located adjacent to nature reserves and other non-urban land uses and present opportunities for off-reserve conservation management, particularly where linkage and continuity of habitat are important considerations. It is acknowledged that ACT rural lessees, over the past 80 years or more, have been good custodians of their land and that this provides a foundation for improved approaches to rural land use. While there is increasing potential for a wider range of pastoral, agricultural and horticultural practices land uses in the ACT, the maintenance and enhancement of remnant woodland is also viewed as an integral part of sustainable rural enterprises. However, a legacy of ecological problems remains to be addressed in some areas:

- overclearing in the last century lack of regeneration;
- loss of habitat complexity and patch size sufficient to support native birds and other fauna;
- susceptibility of trees to "die-back" condition;
- dryland salination potential; and
- catchment stability and water quality of the Upper Murrumbidgee catchment.

Some remnant patches of Yellow Box/Red Gum Grassy Woodland totalling 764 ha (9.7%) are located on land which has been allocated for urban land uses.

While the objective of this Action Plan is to conserve Yellow Box/Red Gum Grassy Woodland as a viable and well represented ecological community in the ACT, protective actions will be applied selectively in the context of the development needs of Canberra and protection measures taken across the ACT. It will not be feasible to preserve the endangered community in every place it occurs. Retention of remnants in urban areas may only occasionally be a realistic option when balancing the many planning considerations including urban development requirements and the size, ecological quality and connectivity of woodland remnants.

In this context, final decisions in some areas cannot be made until further planning options are examined in urban development areas; in particular, the Gooroo Ridge (c. 197 ha), Kinlyside (c. 125 ha) and Callum Brae (c. 313 ha) areas. Within the approximate areas indicated, long term urban and infrastructure plans are yet to be finalised but in the planning process, the objective of this Action Plan to conserve Yellow Box/Red Gum Grassy Woodland will be a major consideration.

The above summary of the protection status of Yellow Box/Red Gum Grassy Woodland in the ACT does not include other types of woodland in close proximity but of a different ecological type. These may contain dominant tree species other than Yellow Box and Red Gum but where the latter are present, either species or both together contribute less than 40% to the canopy cover. The grassy shrub understorey may range from predominantly native to highly degraded. While such woodland remnants are not a primary concern of this Action Plan, they often abut patches of the Yellow Box/Red Gum Grassy Woodland ecological community. Where the woodland quality rating has been estimated as *moderate*, *high* or *very high*, such woodland remnants can contribute to the overall size and shape of mixed woodland areas and wildlife corridors.

Remnants of the original Yellow Box/Red Gum Grassy Woodland community which have insufficient native species to maintain or re-establish the characteristic native understorey are categorised as depauperate Yellow Box/Red Gum grassy woodland. These may also be associated with higher quality remnants. These can contribute to wildlife values and may be included in conservation management areas where practical land use boundaries must be established. In urban areas, they may be treated under urban design and siting principles within the urban fabric thereby retaining the value of the trees in streetscapes and open space areas.

In formulating proposed protection measures outlined in this section, the following operational principles have been applied on a District basis:

- Patches of Yellow Box/Red Gum Grassy Woodland which are presently shown as *Public Land (Pc) - Nature Reserve Areas* in the Territory Plan, are to remain as the core protected area representing this endangered ecological community in the ACT Nature Reserve system.

- Patches of Yellow Box/Red Gum Grassy Woodland shown as *Hills, Ridges and Buffers (HRB)*, *Rural* or *Broadacre* in the Territory Plan will be considered within future planning reviews (such as the review of the urban structure of Gungahlin carried out by PALM in 1998). Where woodland remnants remain in rural land use, they will be covered by PMAs that ensure protection of conservation values when existing lease arrangements are reviewed.
- Areas of Yellow Box/Red Gum Grassy Woodland within land proposed for Residential or Broadacre land uses in the Territory Plan will be considered for incorporation, at least in part, into urban open space. For the higher quality remnants, an urban park where the understorey is not converted by sowing with grass and where fertiliser and irrigation will not be applied, would be appropriate. For lower quality and small remnants, retaining the dominant trees only may be more appropriate. The latter would achieve preservation of the trees and some associated wildlife values but would not preserve the area as representing the endangered ecological community.
- Patches of Yellow Box/Red Gum Grassy Woodland located within the Lanyon/Lambrigg Conservation Reserve will be the subject of consultation with rural lessees with the aim of securing PMAs which will ensure protection of the ecological community and the special landscape conservation values as part of continuing rural enterprises.
- Selection of areas and their boundaries for protection or special management arrangements will take into consideration patch size (viability), floristic and structural diversity, representativeness and naturalness.
- Small remnants of Yellow Box/Red Gum Grassy Woodland should be integrated where possible with larger patches of woodland of other types and or adjacent remnant native grasslands.
- Replication of conservation areas is necessary as a precaution against catastrophic events such as fire and/or unpredictable local elimination of key species and irrevocable loss of community structure.

MEASURES FOR PROTECTION

Two principal measures are available for protecting the conservation values of Yellow Box/Red Gum Grassy Woodland in the long term. These are to (i) declare Nature Reserves on Public Land under the Territory Plan and (ii) establish off-reserve conservation management arrangements with landholders whose land contains woodlands with significant conservation value. Two mechanisms for facilitating off-reserve conservation have been developed in the ACT:

(a) Memoranda of Understanding (MOUs) with landholders, particularly Commonwealth Government agencies; and

(b) the Property Management Agreement (PMA), which is applicable on rural leased land. Under changes proposed for the *Land (Planning and Environment) Act 1991* Property Management Agreements will be referred to as Land Management Agreements.

In urban areas measures may include planning and site management mechanisms.

(i) Reservation - Hills, Ridges and Buffer Areas with Public Land Overlay for Nature Reserve

Reservation is generally recognised as providing the primary mechanism for ensuring that sites of high conservation value are not eventually converted to a land use incompatible with their natural values (Caughley and Gunn 1996). Reservation is therefore an important mechanism for the protection of Yellow Box/Red Gum Grassy Woodland because it can contribute to achieving the goal of establishing a comprehensive, adequate and representative reserve system for the ACT.

Small additions to the ACT reserve system may be possible as a result of planning reviews being undertaken or foreshadowed for the Gungahlin and Jerrabomberra/Symonston Districts.

(ii) Memoranda of Understanding

Memoranda of Understanding (MOUs) between the ACT Government and landholders, particularly the Commonwealth Government, provide another means by which woodland areas with high conservation value can be managed so as to maintain their conservation value in perpetuity while enabling other compatible land uses, as identified in each MOU, to occur. An MOU with a Commonwealth agency does not preclude the possibility of the land being reserved in the future under Commonwealth legislation.

MOUs will be negotiated with relevant landholders, including the Commonwealth Government, to protect sites of high conservation value that are otherwise unavailable for reservation.

(iii) Off-reserve conservation through Property Management Agreement (PMA) for Rural Land

Rural land, particularly in the Stromlo, Paddys River, Lanyon, Rob Roy and Naas areas contains extensive areas of remnant woodland, including areas of Yellow Box/Red Gum Grassy Woodland with significant conservation value. Conservation management of the Yellow Box/Red Gum Grassy Woodland community on rural leases will be promoted to rural lessees in the context of ecologically sustainable land management, the requirements of the *Nature Conservation Act 1980* and this Action Plan.

PMAs are required under the *Land (Planning and Environment) Act 1991* only when a lease is sold or renewed and therefore provide only infrequent opportunities for advising the landholder about the management of the remnant natural vegetation of a property. PMAs are valuable in assisting landholders to assess and give priority to conservation measures on rural properties. The PMA is now envisaged as encompassing broader aspects of farm management (Rural Policy Taskforce 1997). The scope of and procedures for developing PMAs is currently being examined by Environment ACT in consultation with interested parties, including the Rural Lessees Association. It will be central to this process to maximise cooperation, working through issues with individual lessees. The Action Plan recognises that woodlands remaining on rural leases are, in part, a result of selective clearing and retention of timber by past and present landholders.

Opportunities to influence land management practices on leases arise under the PMA process only when leases are renewed or transferred. Many ACT leases will be renewed for up to 99 years in the first few years of the life of this Action Plan. As this process will be vital in achieving off-reserve conservation, strict conditions will be sought where appropriate. There will be emphasis on safeguarding adequate regeneration, retaining understorey and avoidance of tree clearance.

As the environmental conditions of a lease change or as pressures operating on the land develop, there is little potential to alter a PMA. The Rural Policy Taskforce Report has noted this and the effectiveness of this Action Plan on

rural lands will depend in part on the resolution of this issue. PMAs for leases containing significant Yellow Box/Red Gum Grassy Woodland will be required to show that the ecological community will be conserved, managed sustainably and improved where appropriate.

A PMA approach will be taken on rural land for remnant patches with very high to moderate conservation value. This is the appropriate protection measure pending resolution of longer term planning issues through a planning review process, or as an interim step in cases where inclusion in the ACT reserve system is a possible long term outcome.

A particular issue that PMAs must address is the level of grazing maintained in areas of Yellow Box/Red Gum Grassy Woodland within leases. The PMA, as an agreement between the ACT Government and a rural lessee, will enable delineation of certain areas with very high conservation values and the application of conditions to parts of a lease according to the quality of each area. Grazing has been identified as a threat to the floristic integrity of the understorey in particular in related woodland ecosystems (Prober and Thiele 1995). Opportunities to negotiate minimal or no grazing on rural land with the highest conservation values will be taken where the lessee wishes to make a contribution to off-reserve conservation.

Although minimal grazing is sometimes acceptable, PMA conditions should reflect the need to undertake local monitoring and experimental approaches to grazing management. Management will then be adaptively applied in the light of relevant new knowledge.

On some rural leases there may be agreement that the lessee will undertake works, such as fencing, to achieve conservation objectives as part of their rural enterprise management. To help with this, the Government is intending to establish a Rural Conservation Trust which will contribute to the financial costs of such works, providing these works will assist in achieving long term conservation goals on land not included in the Reserve system.

(iv) Off-reserve conservation on Public Land within the urban fabric

The PMA process applies only to rural leasehold land. A similar mechanism does not exist for Public Land that is not a conservation reserve or which is occupied by Government agencies. Where appropriate, the Conservator of Flora and

Fauna may give directions under Section 47 of the *Nature Conservation Act 1980* for the protection of flora and timber on the land.

In new urban areas some remnant Yellow Box/Red Gum Grassy Woodland may be able to be incorporated into the urban fabric, and be protected and managed as an integral part of the landscape, in roadside reserves, easements or urban parks. Guidelines will be provided to the responsible agency to assist conservation of the woodland values of the site.

ACTIONS PROPOSED IN VARIOUS DISTRICTS

For the purposes of this Action Plan, the principles for defining the land use suitable for conserving Yellow Box/Red Gum Grassy Woodland have been applied across the following districts:

- Gungahlin;
- Majura;
- Jerrabomberra, Woden and Central Canberra;
- Belconnen;
- Tuggeranong; and
- Paddys River.

Each District contains public and private land tenures of various kinds. Proposals for protection and conservation management of patches of Yellow Box/Red Gum Grassy Woodland are outlined below for each District.

(i) Gungahlin District (Maps 2 & 3 and Table 4)

About 334 ha of Yellow Box/Red Gum Grassy Woodland, together with other woodland types with significant conservation values, are currently protected within the boundaries of Mulligans Flat Reserve, and the Mulanggari and Gungaderra Reserves (which mostly contain Natural Temperate Grassland). However, there are other significant areas of Yellow Box/Red Gum Grassy Woodland in Gungahlin which remain outside any reserve, particularly in the south east corner.

The Territory Plan sets the broad planning framework for Gungahlin's future use and development. This framework requires some refinement with more detailed planning work, particularly in the light of recent changes such as the relocation of the Town Centre and the creation of Mulanggari and Gungaderra reserves containing Natural Temperate Grassland and the Striped Legless Lizard (*Delma impar*).

In view of this, planning studies are scheduled for completion in 1999 which will review the urban structure of the north-eastern part of Gungahlin. As part of this work, a 28 ha area of Yellow Box/Red Gum Grassy Woodland with very high conservation value adjacent to the south-western boundary of Mulligans Flat Reserve (Map 2 - 'E') will be incorporated into the Mulligans Flat Reserve.

In the central, northern and western parts of Gungahlin (Map 2 - 'G' & 'H'), remnant patches of Yellow Box/Red Gum Grassy Woodland which are located in proposed future urban areas are being assessed for their potential long term viability as part of the urban fabric. Some may be retained and included in urban parks or roadside reserves, or as part of the landscape setting for community purposes or other less intensive land uses. Lower maintenance costs, generally associated with native vegetation, may result in a net benefit to the community.

In the south-eastern part of Gungahlin, north of the Federal Highway (Gooroo Hill, Map 2 - 'F') several patches of Yellow Box/Red Gum Grassy Woodland with a high woodland quality remain. Some are located within the existing HRB areas while others are currently located in areas covered by Residential land use policies.

The area shown as Residential in the Territory Plan (1993) was defined prior to the survey of woodland from which this Action Plan is derived. Consequently, it did not take fully into account the conservation values of woodland in this area. It is recognised that this needs to be reviewed in the future by Planning and Land Management (PALM), in the light of the high quality woodland that is present in the area. A study similar to that undertaken in 1998-9 for the central and north-eastern part of Gungahlin is planned to be carried out by PALM. Until this is done (within the next 10-20 years), the land will be managed as rural lease.

Patches of Yellow Box/Red Gum Grassy Woodland currently within HRB areas will be reviewed in the light of Territory Plan policies, their intended function as visual amenity for residential land and their conservation significance as representative areas containing an endangered ecological community. This work will also take into account the conservation values of adjacent woodland patches of other types. One objective will be to achieve effective conservation throughout this area which links with Mulligans Flat Reserve and provides a wildlife corridor along the eastern edge of Gungahlin south to Majura.

(ii) Majura District (Map 2, Table 5)

The Ainslie/Majura unit of Canberra Nature Park contains areas of Yellow Box/Red Gum Grassy Woodland totalling 440 ha. Some have long been recognised as being of local importance to the conservation of some of the region's most threatened woodland birds (Taylor 1992).

Significant woodland exists where the projected Horse Park Drive intersects with the Federal Highway and Majura Lane (Map 2 - 'A'), and in areas south of the Federal Highway around Majura Reserve (Map 2 - 'B').

It is proposed to alter the Territory Plan in this area and incorporate 19 ha of woodland east of Antill Street, Watson (Map 2 - 'B1') into the adjacent Majura Reserve (part of Canberra Nature Park (CNP)).

Woodland with significant conservation values located between Ainslie-Majura and adjacent suburbs (Map 2 - 'B2') will continue to be managed in sympathy with Ainslie-Majura which is part of CNP.

A preliminary study and demonstration of a fast light rail link between the Canberra International Airport and Northcott Drive, Campbell, will traverse a patch of Yellow Box/Red Gum Grassy Woodland located in the quadrant of land between Northcott Drive and Fairbairn Avenue. As part of the works associated with this project, rehabilitation of temporarily disturbed areas will be undertaken using appropriate local native species.(Map 3 - 'B3').

Future transport corridors in the Majura Valley are being studied to identify the likely alignments for the very high speed train and the Majura Parkway. Consideration will be given to maintaining a wildlife habitat link between Ainslie-Majura and the hills and ridges along the ACT/NSW border, including Greenwood Hill (Map 3 - 'C' & 'D1').

Other areas of high quality Yellow Box/Red Gum Grassy Woodland in the Majura District (Map 3 - 'C' & 'D3') will be maintained through PMAs negotiated with rural lessees or, in the case of the Majura Field Firing Range (Map 3 - 'D2'), by means of a Memorandum of Understanding with the Department of Defence.

(iii) South Canberra, Jerrabomberra/Symonston Districts (Map 4, Table 6)

Patches of Yellow Box/Red Gum Grassy Woodland covering a total area of 243 ha are currently reserved within the Red Hill and Wanniasa Hills units of CNP. Another 57 ha on the northern part of Isaacs Ridge is shown on the Territory Plan as Public Land (Pc) - Nature Reserve. This area is not currently proposed for inclusion within Canberra Nature Park (Map 4 - 'L1'). About 46 ha of Yellow Box/Red Gum Grassy Woodland are located at Stirling Park Ridge which is a Designated Area under the National Capital Plan.

On the lower eastern slopes of the southern part of Isaacs Ridge (Map 4 - 'L'), shown as Public Land - Nature Reserve on the Territory Plan, half of the remnant woodland in the area (about 22 ha) (Map 4 - 'L2') is proposed to be managed as CNP (ACT Government 1996). The balance of the woodland in this part of Isaacs Ridge (25 ha) falls outside the proposed CNP boundary and is shown in the Territory Plan as Broadacre (Map 4 - 'M2').

Further review of land use in the context of the woodland quality ratings of these areas is proposed and may require strict PMA conditions if rural land uses continue. In such cases, monitoring of tree stand and grassy understorey condition would be required.

The Jerrabomberra Valley is shown as Broadacre Land Use in the Territory Plan. The existing land use policies aim to cater for the continuing demand for non-urban and special uses which require larger sites located outside urban areas and/or with clearance zones from conflicting development. The Jerrabomberra Valley is also identified in the National Capital Plan and Territory Plan as a possible major area for urban development subject to the outcomes of a range of environmental and planning investigations.

Several remnants of the Yellow Box/Red Gum Grassy Woodland community are located in this district (Map 4 - 'J'). They cannot be effectively conserved as individual fragments. However, there is scope for conserving a belt of woodland (sometimes referred to as the Callum Brae woodlands (Frawley 1991)) including these patches, or parts thereof, as a more or less continuous area of mixed woodland types. However, as with other land with high potential for future urban uses, not all the Yellow Box - Red Gum Grassy Woodland in this area will be protected. Resolution of future land uses in this area will follow the planning investigations

referred to above. It is likely that some areas will eventually be cleared for urban land use.

Importantly, there is an opportunity to conserve the interface between adjacent areas of woodland, some of which are depauperate Yellow Box/Red Gum Grassy Woodland (and lack a substantially native grassy understorey), and an area of Natural Temperate Grassland which is identified as having *very high* conservation value (Action Plan No. 1). Continuity of conservation management practices is desirable along the high ground between the northernmost patches adjacent to the Mugga quarry (Map 4 - 'J') and 'Woden' Property, in order to achieve two conservation aims:

1. to maintain ecologically viable wildlife corridor linkages; and
2. to conserve and demonstrate the original sequence of low hill and valley bottom woodland and grassland communities.

Fragmentation of this substantial area of woodland is a major threat to these concepts.

Rural land use, where ultimately retained under the Broadacre zoning of the Territory Plan, will be carried out under PMA conditions which will require monitoring of the integrity of the ecological community including the tree stand condition and grassy understorey composition. PMAs will also need to have the capacity to adjust management arrangements to ensure that conservation aims are met under such agreements.

At this stage, a review of land use policies in the light of the woodland quality ratings associated with the endangered ecological community is required to determine the best balance between future land use and conservation objectives. The extent to which PMAs can be used to achieve effective conservation on rural leases in this area will also be included in the review.

At East O'Malley (Map 4 - 'K') it is proposed to incorporate approximately 42 ha of Yellow Box/Red Gum Grassy Woodland, currently shown as Residential Land in the Territory Plan, into the Mt Mugga Reserve. In addition, approximately 20 ha will be the subject of a planning review to determine the most appropriate boundary for residential development adjacent to O'Malley. This woodland still retains a range of habitats for reptiles, birds and arboreal mammals characteristic of the ACT. This change will protect some of the woodland with the highest conservation values and help maintain habitat

continuity between Red Hill Nature Reserve, Isaacs Ridge and the Callum Brae woodlands.

Where residential development does occur, careful subdivision design and the development approval process can be used to provide opportunities for urban designs which retain substantially continuous tree cover and associated habitat. Larger blocks and clustered developments could facilitate such designs and avoid clearing the woodland and retaining only isolated trees.

(iv) Rural lands: Belconnen, Stromlo, Paddys River, Tuggeranong Districts (Map 5(i) & (ii))

Belconnen & Stromlo Districts (Map 5(i), Table 7)

In the Belconnen District (Map 5(i)), remnant patches of Yellow Box/Red Gum Grassy Woodland will be retained as part of the rural landscape. PMAs for affected rural properties will identify conservation values and ensure that land management practices maintain and, where possible, enhance them. Establishment of a conservation corridor within the timbered land on the rural lease, 'Kama', (Map 5(i) - 'N1') linking the Molonglo River to the Pinnacle and adjacent hills bordering Belconnen will be a priority. Where necessary, the Conservator's powers under Section 47 of the *Nature Conservation Act 1980* may be used as an interim measure to ensure effective conservation.

Small remnants of the community exist near Glenloch (Map 5(i) - 'O'), and these are associated with a larger area of woodland of *moderate* woodland quality rating near Caswell Drive. These remnants are close to the highly fragmented woodland margin containing Snow Gum *E. Pauciflora* on Black Mountain Creek. A PMA is appropriate for these small areas provided that the native grass of the understorey can be maintained.

Near 'Lands End' (Map 5(i) - 'N2') woodland with sufficient native grass understorey is present to warrant conditions to be included in a PMA that will achieve retention of native grasses and reduction of exotic species. The area is adjacent to a large remnant of open forest and woodland associated with the historical 'Lands End' cemetery where the grassy understorey and pasture are no longer native.

About 12 ha of Yellow Box/Red Gum Grassy Woodland is contained in the Dunlop Reserve which is managed by Canberra Nature Park (Map 5(i) - 'N3').

Several high quality woodland remnants located on rural land in the Weston Creek-Stromlo area (Map 5(i) - 'P') will be subject to PMAs. Several small patches isolated within Stromlo Forest pine plantations will be subject to an MOU with ACT Forests where appropriate.

Tuggeranong District (Map 5(ii), Table 8)

In the Tuggeranong District, a large area (518 ha) of Yellow Box/Red Gum Grassy Woodland near the Rob Roy Range is Public Land - Nature Reserve and shown as HRB in the Territory Plan (Map 5(ii) - 'U1'). A small portion (16 ha) of this is managed as part of the Rob Roy unit of CNP while the balance will remain as leasehold land managed under PMAs. This will require monitoring to ensure conservation objectives are achieved.

Relatively small areas of woodland on the edge of Conder totalling 23 ha are shown as Residential on the Territory Plan. It is proposed to alter the land use of approximately 12 ha of Yellow Box/Red Gum Grassy Woodland south of Eaglemont Retreat by incorporating it into the Tuggeranong Hill Reserve. On the SW slopes of Tuggeranong Hill 11 ha of land (Conder 4a) will be used for residential development while allowing access to the reserve (Map 5(ii) - 'U2').

South of the Tuggeranong District, the lower Naas area contains highly fragmented patches of woodland on hillslopes, some containing Yellow Box which are subject to ongoing assessment. Some are within Namadgi National Park while others fall within rural leases.

Paddys River District (Map 5(i) and (ii), Table 9)

In the vicinity of Castle Hill, west of the Murrumbidgee River (Map 5(ii) - 'Q1'), areas of Yellow Box/Red Gum Grassy Woodland with *very high* and *high* woodland quality ratings and contiguous with other types of woodland, will be managed as rural land under PMAs.

This area is particularly noted for the bird life that it supports. Considerable monitoring effort will be required to ensure that the PMAs are adequate to achieve effective long term conservation. The relationship of the Castle Hill area to the Public Land, Nature Reserve policies of the Territory Plan to the north, the Lanyon-Lambrigg Landscape Conservation Reserve to the east and proximity to Namadgi National Park to the south will need to be taken into account when assessing how critical these woodland remnants are to maintaining links with other important wildlife conservation areas. Strict conditions in the relevant PMAs will be required to address this issue.

Remnant patches within the Bullen Range Nature Reserve (Map 5(i) & (ii) - 'X') are at present under restricted grazing. Therefore it will be necessary to carefully monitor the condition of the Yellow Box/Red Gum Grassy Woodland contained there. A similar situation arises in other parts of the Murrumbidgee River Corridor where patches of Yellow Box/Red Gum Grassy Woodland are within the boundaries of the Stony Creek, Woodstock (Map 5(i) - 'X'), and Gigerline (Map 5(ii) - 'W') Nature Reserves, and the Pine Island Special Purpose Reserve (Map 5(ii) - 'R').

Large patches of the community, totalling 294 ha are present on rural leased land within the Lanyon Landscape Conservation Area (Map 5(ii) - 'Q2'). They have a woodland quality rating of *high* and management under PMA conditions is required.

Other areas of the woodland community (totalling 802 ha) are located on rural leases in the Freshford, Castle Hill and Paddys River area. It is proposed that this continue under suitable PMAs which safeguard the important conservation values of the area.

Table 3 Current status of land containing patches of Yellow Box/Red Gum woodland (showing total area (ha) of woodland in each land use category, by District.

	Nature Reserve	Other non-Urban Land		Rural	Broad-acre	Urban	Total (%)
		Territory Plan	National Capital Plan (Designated Area)				
Gungahlin	334	365 (HRB)	113		1	595	1408 (17.8)
Majura	440	62 (HRB) 39*	78	36	777	34	1466 (18.6)
Sth Canberra Symonston	243	7	178		339	107	874 (11.1)
Belconnen/Stromlo	18	137 (HRB) 7 (Plantation) (Rural)	97 (HRB) 92	293		5	649 (8.2)
Tuggeranong Rob Roy Range	281	518 (HRB) 543 (MtB)		373		23	1738 (22.0)
Paddys River/Murrumbidgee River Corridor	317	321**(MRC) 237 (HRB) 76 (MtB)		802			1753 (22.2)
Total (ha) (%)	1633 (20.7)	2312 (29.3)	558 (7.1)	1504 (19.1)	1117 (14.2)	764 (9.7)	7888

*Hackett Horse Paddocks **Includes Lanyon/Lambrigg Landscape Conservation reserve
 HRB - Hills, Ridges and Buffers MRC - Murrumbidgee River Corridor MtB - Mountain and Bushlands

Table 4 Gungahlin: area of land and proposed land use or other action. (Map 2)

Location and current Planning Policy or Land Use	Area (ha)	Proposed Planning Policy, Land Use or other Action
Mulligans Flat Reserve	310	Nature Reserve (existing)
Mulanggari & Gungaderra Reserves	24	Nature Reserve (existing)
Gungahlin Central (E&G)		
HRB	43	Planning Review, with some areas incorporated into urban fabric Nature Reserve (Mulligans Flat)
Urban - Residential	147	
	28	
Gungahlin Gooroo Hill/Throsby (F)		
HRB	197	Planning review, with some areas HRB HRB (Designated Area - National Capital Plan)
Urban - Residential	295	
HRB (Designated Area) (F)	113	
Gungahlin West (H)		
HRB	125	Planning review, with some areas to be HRB or incorporated into urban fabric Planning Review
Urban - Residential	125	
Broadacre	1	
Total	1408	

HRB - Hills, Ridges and Buffers in Territory Plan

PMA - Property Management Agreement

Table 5 Majura District: area of land and proposed land use or other action. (Map 3)

Location and current Planning Policy or Land Use	Area (ha)	Proposed Planning Policy, Land Use or other Actions
Ainslie/Majura Reserve	440	Nature Reserve (existing)
Hackett - Campbell(B) Urban (Entertainment, Accommodation & Leisure) HRB -between suburbs and Mt Majura Hackett Horse Paddocks Broadacre HRB - Designated Area	16 18 62 39 17 6	Urban (Entertainment, Accommodation & Leisure) Nature Reserve (Majura) HRB (Canberra Nature Park) Horse Paddocks Broadacre (Planning Review) HRB (Designated Area - National Capital Plan with PMAs)
Majura Valley (North) HRB - Designated Area (C) Broadacre (D1)	72 377	HRB (Designated Area - National Capital Plan with PMAs) Planning Review (road/train corridor)
Majura Valley (Central) (D2) Majura Field Firing Range	297	Broadacre (MOU - Department of Defence)
Majura Valley (South) (D3) Broadacre Rural	86 36	Broadacre (with PMAs) Rural (with PMAs)
Total	1466	

HRB - Hills, Ridges and Buffers in Territory Plan
MOU - Memorandum of Understanding.

PMA - Property Management Agreement

Table 6 South Canberra, Jerrabomberra/Symonston District: area of land and proposed land use or other action. (Map 4)

Location and current Planning Policy or Land Use	Area (ha)	Proposed Planning Policy, Land Use or other Action
Stirling Park Ridge (Designated Area)	46	HRB (Designated Area - National Capital Plan)
Red Hill (Canberra Nature Park)	178	Nature Reserve (existing)
Restricted Access (Federal Golf Club)	7	Federal Golf Club
East O'Malley (K) Urban (residential)	45 42 20	Urban Residential Nature Reserve (Mt Mugga) Planning Review
Isaacs Ridge HRB (Designated Area) (L1) HRB (Designated Area) (L2) Broadacre	73 22 1	HRB (Designated Area - National Capital Plan)
Mugga Lane (North) (N1) HRB (Designated Area)	37	HRB (Designated Area - National Capital Plan)
Mugga Lane (South) (N2) Broadacre	25	Planning Review
Wanniassa Hills (Canberra Nature Park)	65	HRB Canberra Nature Park
Symonston (J) Broadacre Urban (Industrial)	313 4	Planning Review (with PMAs in interim) Industrial
Total	874	

Table 7 Belconnen and Stromlo Districts: area of land and proposed land use or other action. (Map 5(i))

Location and current Planning Policy or land use	Area (ha)	Proposed Planning Policy, Land Use or other action
Smiths Paddock & Glenloch (O)		
HRB (Designated Area)	23	HRB (Designated Area-NCP with PMAs)
Mt Painter	6	Inner Hills (NCP (CNP))
Belconnen (N)		
HRB (N, N1 and N2)	137	HRB (with PMAs)
HRB (Designated Area) (N1)	16	HRB (Designated Area-NCP with PMAs)
Rural (N1 and N2)	161	Rural (with PMAs)
Dunlop Reserve (N3)	12	Nature Reserve (existing)
Dunlop urban residential (N3)	5	Urban residential
Stromlo (P)		
Rural (Designated Area)	92	Rural (Designated Area -NCP with PMAs)
HRB (Designated Area)	58	HRB (Designated Area - NCP with PMAs)
Rural	132	Rural (with PMAs)
Plantation	7	Plantation (MOU with ACT Forests)
Total	649	

HRB - Hills, Ridges and Buffers
CNP - Canberra Nature Park

PMA - Property Management Agreement
NCP - National Capital Plan

Table 8 Tuggeranong and Naas Districts: area of land and proposed land use or other action. (Map 5(ii))

Location and current Planning Policy or Land Use	Area (ha)	Proposed Planning Policy , Land Use or other Action
Tuggeranong		
Rob Roy Nature Reserve (U1)	16	Nature Reserve (existing) - CNP
Tuggeranong Hill Nature Reserve (U2)	33	
Residential (U2)	11	Residential
Residential (U2)	12	Nature Reserve (Tuggeranong Hill)
HRB (V)	518	HRB (with PMAs)
Rural (V)	373	Rural (with PMAs)
Naas (T)		
MtN	543	MtN (with PMAs)
Gigerline Nature Reserve (MRC) (W)	232	Nature Reserve (existing) (MRC)
Total	1738	

HRB - Hills, Ridges and Buffers in Territory Plan
MtN - Mountain and Bushlands in Territory Plan
CNP - Canberra Nature Park in Territory Plan

PMA - Property Management Agreement
MRC- Murrumbidgee River Corridor in Territory Plan

Table 9 Paddys River District (includes Murrumbidgee River Corridor): area of land and proposed land use or other action. (Map 5(i) & (ii))

Location and current Planning Policy or Land Use	Area (ha)	Proposed Planning Policy, Land Use or other Actions
Bullen Range Nature Reserve (MRC) (X) Stony Creek Nature Reserve (MRC) (X) Woodstock Nature Reserve (MRC) (X) Pine Island (Special Purpose Reserve) (R)	268 26 15 8	Nature Reserve (existing) Nature Reserve (existing) Nature Reserve (existing) Special Purpose Reserve (existing)
Lanyon Landscape Conservation Reserve (Q)	294	Landscape Reserve (existing) (with PMAs)
Castle Hill (Q) Rural HRB	319 237	Rural (with PMAs) HRB (with PMAs)
Freshford (R) Rural MRC	163 27	Rural (with PMAs) MRC (with PMAs)
Paddys River(S) Rural Mountains & B'lands	320 76	Rural (with PMAs) Mountains and Bushlands (with PMAs)
Total	1753	

HRB - Hills, Ridges and Buffers in Territory Plan; PMA - Property Management Agreement
MRC - Murrumbidgee River Corridor in Territory Plan.

TREE RETENTION IN RURAL AND BROADACRE LAND USE AREAS

Some areas of Yellow Box/Red Gum Grassy Woodland with lower overall conservation values due to the presence of a degraded or exotic understorey, will receive partial protection as part of the management approach to other types of woodland.

There is potential for institutional use and special facilities within a framework of woodland and grassland conservation, maintaining many of the trees, thereby preserving some habitat continuity. There is particular value in this approach for stands of remnant trees (Yellow Box, Red Gum and other woodland dominants) with little or no understorey, if they are close to patches of Yellow Box/Red Gum Grassy Woodland.

Stands of Yellow Box and Red Gum trees will be retained where this is compatible with a future rural, industrial or broadacre land use. The aim of this will be to maintain, where possible, patches of habitat trees and continuity of habitat. MOUs or PMAs will be negotiated as appropriate.

The main social benefit of conserving representative areas of Yellow Box/Red Gum Grassy Woodland is that it addresses community concerns that further loss or extinction of significant ecological communities, together with their component native species, be prevented.

On rural lands, there is value to the lessee in retaining remnant trees for shelter. On land where the low economic potential has precluded complete conversion to improved pasture, the remaining trees provide increased stability of the land surface. Plantings also provide landscape amenity for properties.

There are other identified benefits in conserving representative areas of the community, which include:

- regulation of the hydrological balance by maintenance of trees in the infiltration zone;
- agricultural pest control through maintenance of a diverse predator fauna;
- higher pasture productivity in treed areas;
- drought fodder protection associated with maintenance of native grass understorey; and
- provision of wind breaks and stock shade.

Socio-economic Issues

There are four main aspects of planning in Canberra that will be affected by the implementation of this Action Plan. These are:

1. Future Urban Areas and Urban Infrastructure

Proposals for future urban areas, as identified in either the National Capital Plan or the Territory Plan, and provided for in the Residential Land Release Program, may, for some areas, require review to take into account the conservation values of any Yellow Box/Red Gum woodland found there. There may be a need to redefine the urban edge, the location of urban parks and the extent, if any, of woodland that can be conserved under the HRB land use policies.

During these reviews, which will be on an area by area basis, opportunities will be investigated for:

- realignment of reserve boundaries;
- establishing links between environmentally significant areas;
- off-reserve conservation options; and
- using a woodland setting to add value to the urban development.

Reference will need to be made to the overall achievement of the conservation objectives of this and other relevant Action Plans.

The structural plan for the northern part of Gungahlin was reviewed during 1998 and information on woodland values was used as one of the many information inputs. Similar reviews will be carried out in other parts of Gungahlin, with that covering the south-eastern portion, including Gooroo, being particularly important for the Yellow Box/Red Gum Grassy Woodland found there.

As stated elsewhere in this Action Plan, it will not be feasible to preserve the endangered community in every place it occurs. Retention of remnants in urban areas may only occasionally be a realistic option when balancing the many planning considerations, including urban development and infrastructure requirements, and the size, ecological quality and connectivity of woodland remnants.

2. Transport Facilities

The provision and/or upgrading of the following transport facilities may be affected:

- Majura Parkway - southern section and connections (see above); and
- Very High Speed Train corridor (Majura and Jerrabomberra valleys).

3. Industrial Areas

The planning for future industrial areas, in particular, a possible extension to industrial areas near Hume and in Symonston.

4. Rural Leasing Aspects

Some of the sites of high conservation value, including those in the Jerrabomberra Valley, are within rural leases. Preliminary investigations indicate that some of these leases currently contain withdrawal clauses allowing for the use of land for public purposes. The Rural Policy Taskforce has recently reviewed all aspects of rural leases including the recommendation of appropriate lease terms. Two recommendations of the Taskforce that will affect the Action Plans are that:

- the lease term for rural areas of the ACT will be 99 years except for the Majura and Jerrabomberra valleys where the terms will be to the year 2020; and
- there be no withdrawal clauses over any part of a rural lease unless it has been clearly defined for an imminent public work, such as a road, stormwater or other infrastructure, or where a habitat has been identified as needing special conservation status.

This will mean that the Territory would have to withdraw any area of land having conservation significance at the time of an application for a new lease, or acquire it subsequently under the provisions of the *Land Acquisition Act 1994*.

It is expected that it will be sometime later in 1999 before rural lessees are able to take up a new lease under the proposed new arrangements. In the meantime, Environment ACT will need to identify areas requiring special conservation measures before applications for extended lease terms are received. In the event that large areas of a lease are to be withdrawn for conservation purposes, consideration will be given to the viability of the remainder of the lease.

This will mean that the Territory would have to withdraw any area of land having conservation significance at the time of an application for a new lease, or acquire it subsequently under the provisions of the *Land Acquisition Act 1994*.

It is expected that it will be sometime later in 1999 before rural lessees are able to take up a new lease under the proposed new arrangements. In the meantime, Environment ACT will need to identify areas requiring special conservation measures before applications for extended lease terms are received. In the event

that large areas of a lease are to be withdrawn for conservation purposes, consideration will be given to the viability of the remainder of the lease.

Legislative Provisions

The following ACT legislation applies to the conservation of flora and fauna in the ACT:

Nature Conservation Act 1980

The *Nature Conservation Act 1980* provides authority for the Conservator of Flora and Fauna to manage Public Land reserved for conservation of the natural environment. Activities that are inconsistent with management objectives for nature conservation are controlled. Special measures for conservation of a species or community of concern can be introduced in a reserved area, including restriction of access to important habitat.

Section 47 of the Act allows the Conservator of Flora and Fauna to give the occupier of land directions for protection or conservation of native plants and animals. This provision is relevant to the management of threats to the conservation requirements of a species or community of concern that occurs on leased land.

Part VIA of the Act allows the Conservator to enter into a Management Agreement with an agency where its activities have potential to conflict with nature conservation objectives. This provision is relevant to management of conservation threats on unleased land.

Section 43 provides for the protection of timber on rural leases. Controls are enforceable in respect to clearing of timber for rural production. This is allowed for the purposes of development of pasture or agriculture, and although timber may be used on the farm, it may not be used as a product to be sold from the farm unless it is from a farm plantation.

On unleased land, timber removal (except for small wood) is allowed only under licence.

Provisions of the *Nature Conservation Act 1980* are applicable to Commonwealth land.

Land (Planning and Environment) Act 1991

The *Land (Planning and Environment) Act 1991* is the primary authority for land planning and administration. It establishes the Territory Plan which identifies nature reserves, national parks and wilderness areas within the public land estate.

The Land (Planning and Environment) Act establishes the Heritage Places Register. Places of natural heritage significance may be identified and conservation requirements specified.

Environmental assessments and Inquiries may be initiated in relation to land use and development proposals.

Consultation and Community Participation

Community participation with activities assisting the conservation of native woodland will be encouraged through Park Care and Landcare groups operating in areas containing the Yellow Box/Red Gum Grassy Woodland community. Information on the conservation of this ecological community will be incorporated into education programs conducted by Environment ACT.

Direct consultation and advice will be available for rural landholders to assist in farm planning and land use issues.

⇒ Environment ACT will actively participate in consultations with rural lessees and community groups concerning conservation and management of the Yellow Box/Red Gum Grassy Woodland community.

Implementation and Review

RESPONSIBILITY FOR IMPLEMENTATION

Environment ACT (WR&M) will have responsibility for coordinating implementation of this Action Plan, subject to government priorities and resources. Primary responsibility for conservation of the woodland community on Territory Land will rest with the ACT Parks and Conservation Service whilst relevant Commonwealth agencies will have responsibility for National Land. However, provisions in the *Nature Conservation Act 1980* (ACT) are still applicable.

EVALUATION

Implementation of this Action Plan will be a collaborative exercise between Government agencies, landholders and the community generally. Commonwealth and NSW participation will be critical in some cases.

The Action Plan will be reviewed after three years. The review will comprise an assessment of progress using the following performance indicators:

- completion of commitments that can reasonably be expected to be finalised within the review timeframe (e.g. introduction of a statutory protection measure for a species; development of a management plan);
- completion of a stage in a process with a time line that exceeds the review period (e.g. design or commencement of a research program);
- commencement of a particular commitment that is of a continuing nature (e.g. design or commencement of a monitoring program for population abundance); and
- expert assessment of achievement of conservation objectives of the Action Plan.

The review will be reported to the ACT Flora and Fauna Committee. This will provide an opportunity for Environment ACT and the Flora and Fauna Committee to assess progress, take account of developments in nature conservation knowledge, policy and administration and review directions and priorities for future conservation action.

The following conservation actions will be given priority attention:

- ⇒ implementation of recommended protection measures including off-reserve conservation measures;
- ⇒ development of management plans, negotiation of MOUs and PMAs which contain measures to conserve this endangered ecological community;
- ⇒ implementation of management plans and appropriate conservation works (e.g. fencing);
- ⇒ completion of planning reviews, particularly with respect to identifying long term land use for land containing remnant woodlands, transport corridors and the urban edge; and
- ⇒ monitoring success of off-reserve conservation measures.

Acknowledgments

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References

- ACT Government, 1996. Canberra Nature Park, draft Management Plan. Conservation Series No. 8. Department of Urban Services, Canberra.
- ACT Government, 1997a. *Natural temperate grassland: An endangered ecological community*. Action Plan No. 1. Environment ACT, Canberra.
- ACT Government, 1997b. Bushfire (fuel) Management Plan - draft. Department of Urban Services, Canberra.
- ACT & Sub-Region Planning Committee, 1995. *Draft ACT and sub-region planning strategy*.
- AUSLIG (Australian Surveying and Land Information Group), 1990. *Atlas of Australian Resources*. Third Series Volume 6 Vegetation. AUSLIG, Canberra.
- Banks, J. C. G., 1997. Tree ages and ageing in yellow box. In Dargavel, J., (ed.) *The coming of age: forest age and heritage values*, pp. 17 - 28. Technical Series No 1. Australian Heritage Commission, Environment Australia, Canberra.
- Baracioli, L., 1993. *Rural dieback of eucalypts on the Southern Tablelands of New South Wales*. BSc (hons) thesis, Australian National University.
- Beadle, N. C. W., 1981. *The vegetation of Australia*. Cambridge University Press, Cambridge.
- Berry, S. & Mulvaney, M., 1995. *An environmental weeds survey of the Australian Capital Territory*. A report to the Conservation Council of the South-East Region and Canberra.
- Caughley, G. & Gunn, A., 1996. *Conservation biology in theory and practice*. Blackwell Science, Sydney.
- Costin, A. B., 1954. *A study of the ecosystems of the Monaro region of New South Wales*. Government Printer, Sydney.
- Er, K. B. H., 1995. *Maximisation of bird species diversity in Yellow Box - Blakely's Red Gum woodland remnants*. BSc (hons) thesis, Australian National University.
- Ford, H. A., 1985. The bird community in eucalypt woodland and eucalypt dieback in the Northern Tablelands of New South Wales. In Keast, A., Recher, H.F., Ford, H. & Saunders, D., (eds) *Birds of Eucalypt forests and woodlands: ecology, conservation and management*. Surrey Beatty & Sons, Chipping Norton.

- Frawley, K. J., 1991. *The conservation of remnant woodland and native grassland in the ACT*. National Parks Association of the ACT, Canberra.
- Ingwersen, F., Goodisson, T., Ormay, P., Woodward, S. & Morris, B., 1997. *Woodlands in the ACT sector of the South Eastern Highlands division of the IBRA: Report of a survey under the States Cooperative Program of Environment Australia*, Wildlife Research and Monitoring Unit, ACT Parks and Conservation Service.
- Jacobs, M. R., 1955. *Growth habits of the eucalypts*. Forestry and Timber Bureau, Canberra.
- Landsberg, J. & Wylie, F. R., 1988. Dieback of rural trees in Australia. *Geojournal* 7: 231-7.
- Landsberg, J., Morse, J & Khanna, P., 1990. Tree die-back and insect dynamics in remnants of native woodland on farms. *Proceedings of the Ecological Society of Australia* 16: 149-165.
- Landsberg, J. in press. Status of temperate woodlands in the ACT region. In Hobbs, R. J. and Yates, C. J., (eds) *Temperate Eucalypt Woodlands in Australia: biology, conservation management and restoration*. Surrey Beatty & Sons, Chipping Norton.
- Lyon, R. H., 1985. Birds in fragmented forests in Gippsland, Victoria. In Keast, A., Recher, H.F., Ford, H. & Saunders, D., (eds) *Birds of eucalypt forests and woodlands: ecology, conservation and management*. Surrey Beatty & Sons, Chipping Norton.
- McDonald, R. C., Isbell, R. F., Speight, J. G., Walker, J. & Hopkins, M. S., 1990. *Australian soil and land survey field handbook*. Second Edition. Inkata Press, Melbourne.
- Moore, R.M., 1966. Man as a factor in the dynamics of plant communities. *Proceedings of the Ecological Society of Australia* 1: 106-110.
- NSW NPWS, 1996. *Interim forest assessment process preparation of data and databases, Volume 2, Pre 1750 vegetation and forest disturbance mapping for the Tumut study area*. Unpublished report to the Resource and Conservation Assessment Council (RACAC). New South Wales National Parks & Wildlife Service, Queanbeyan.
- Prober, S. & Thiele, K., 1993. The ecology and genetics of remnant grassy white box woodlands in relation to their conservation. *Victorian Naturalist* 110: 30-36.
- Prober, S. M. & Thiele, K. R., 1995. Conservation of the grassy white box woodlands: relative contributions of size and disturbance to floristic composition and diversity of remnants. *Australian Journal of Botany* 43: 349-366.
- Robinson, G. G., Whalley R. D. B. & Taylor J. A., 1983. The effect of prior history of superphosphate application and stocking rate on faecal and nutrient distribution on grazed natural pastures. *Australian Rangelands Journal* 5: 79-82.
- Robinson, D. & Traill, B. J., 1996. Conserving woodland birds in the wheat and sheep belts of southern Australia. RAOU Conservation Statement No. 10, Supplement to *Wingspan* (6) 2.
- Rural Policy Taskforce, 1997. *Rural Policy Taskforce Report, toward a sustainable future*. Department of Urban Services, Canberra.
- Sivertsen, D., 1993. Conservation of remnant vegetation in the box and ironbark lands of New South Wales. *Victorian Naturalist* 110: 24-29.
- Strahan, R., (ed.) 1995. *The mammals of Australia*. Reed Books, Chatswood.
- Taylor, M., (ed.) (1992). *Birds of the ACT: an atlas*. Canberra Ornithologists Group Inc. & NCPA, Canberra.
- Thackway, R. & Cresswell, I. D., (eds) 1995. *An interim biogeographic regionalisation for Australia*. Australian Nature Conservation Agency, Canberra.
- Walker, J. & Hopkins, M. S., 1990. Vegetation. In McDonald R. C., Isbell R. F., Speight J. G., Walker J. & Hopkins M. S., (eds) *Australian soil and land survey field handbook - Second Edition*. Inkata Press, Melbourne.

List of Action Plans - October 1999

In accordance with Section 23 of the *Nature Conservation Act 1980*, the following Action Plans have been prepared by the Conservator of Flora and Fauna:

- No. 1: Natural Temperate Grassland - an endangered ecological community.
- No. 2: Striped Legless Lizard (*Delma impar*) - a vulnerable species.
- No. 3: Eastern Lined Earless Dragon (*Tympanocryptis lineata pinguicollis*) - an endangered species.
- No. 4: A leek orchid (*Prasophyllum petilum*) - an endangered species.
- No. 5: A subalpine herb (*Gentiana baeuerlenii*) - an endangered species.
- No. 6: Northern Corroboree Frog (*Pseudophryne pengilleyi*) - a vulnerable species.
- No. 7: Golden Sun Moth (*Synemon plana*) - an endangered species.
- No. 8: Button Wrinklewort (*Rutidosia leptorrhynchoidea*) - an endangered species.
- No. 9: Small Purple Pea (*Swainsona recta*) - an endangered species.
- No. 10: Yellow Box/Red Gum Grassy Woodland - an endangered ecological community.
- No. 11: Two-spined Blackfish (*Gadopsis bispinosus*) - a vulnerable species.
- No. 12: Trout Cod (*Maccullochella macquariensis*) - an endangered species.
- No. 13: Macquarie Perch (*Macquaria australasica*) - an endangered species.
- No. 14: Murray River Crayfish (*Euastacus armatus*) - a vulnerable species.
- No. 15: Hooded Robin (*Melanodryas cucullata*) - a vulnerable species.
- No. 16: Swift Parrot (*Lathamus discolor*) - a vulnerable species.
- No. 17: Superb Parrot (*Polytelis swainsonii*) - a vulnerable species.
- No. 18: Brown Treecreeper (*Climacteris picumnus*) - a vulnerable species.
- No. 19: Painted Honeyeater (*Grantiella picta*) - a vulnerable species.
- No. 20: Regent Honeyeater (*Xanthomyza phrygia*) - an endangered species.
- No. 21: Perunga Grasshopper (*Perunga ochracea*) - a vulnerable species.
- No. 22: Brush-tailed Rock-wallaby (*Petrogale penicillata*) - an endangered species.

No. 23: Smoky Mouse (*Pseudomys fumeus*) - an endangered species.

No. 24: Tuggeranong Lignum (*Muehlenbeckia tuggeranong*) - an endangered species.

FURTHER INFORMATION

Further information on this Action Plan or other threatened species and ecological communities can be obtained from:

Environment ACT
(Wildlife Research and Monitoring)

Phone: (02) 6207 2126

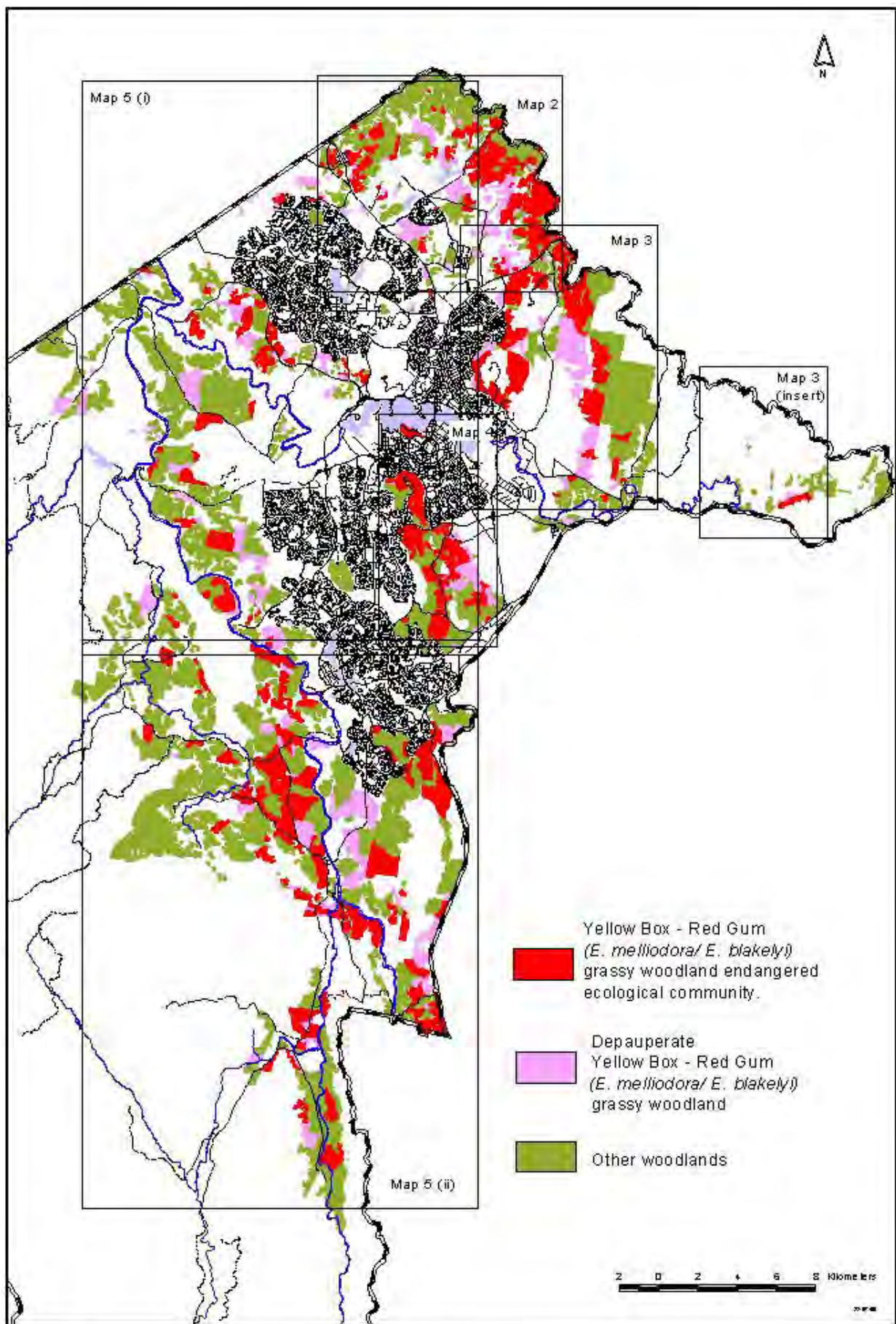
Fax: (02) 6207 2122

Environment ACT Homepage:

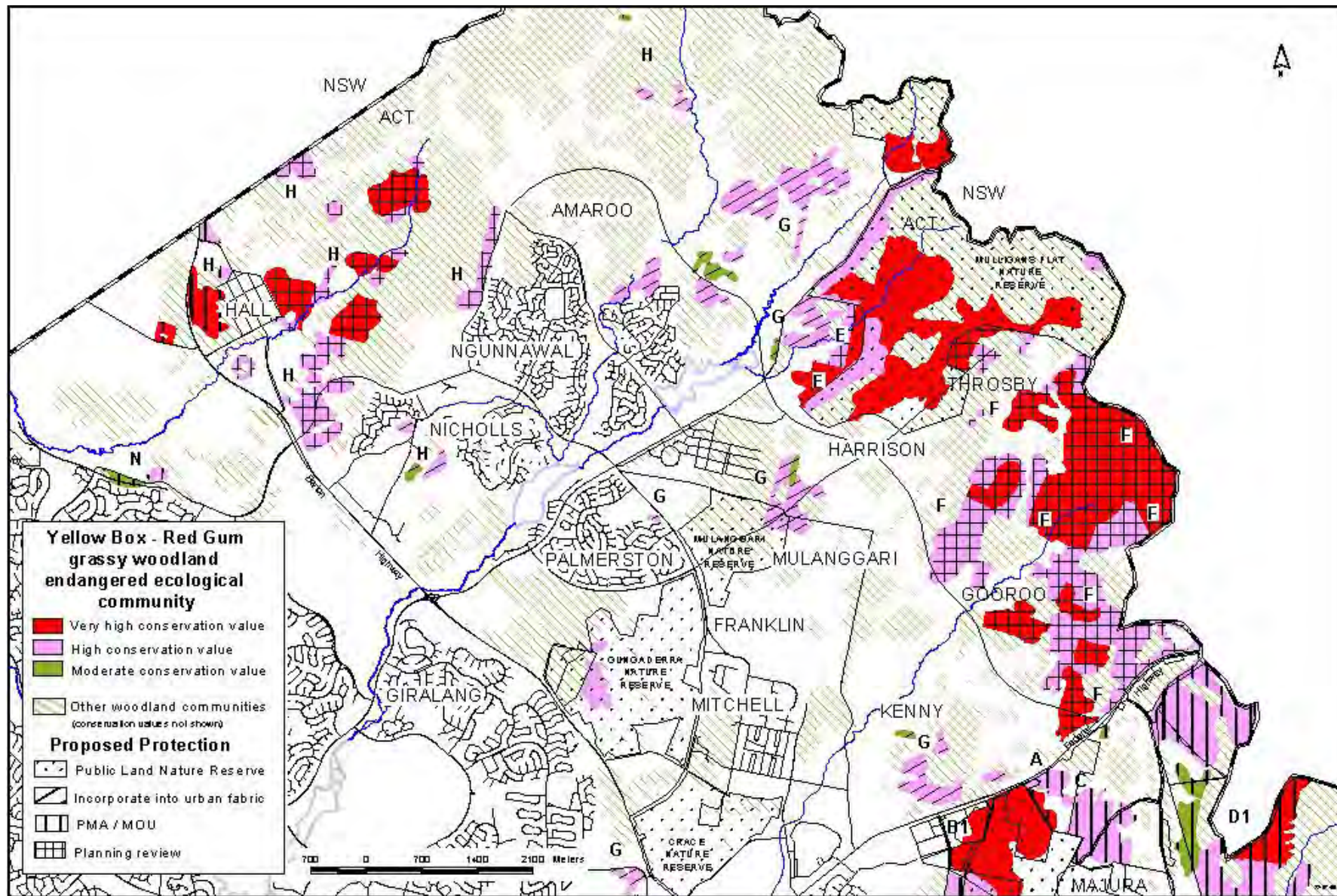
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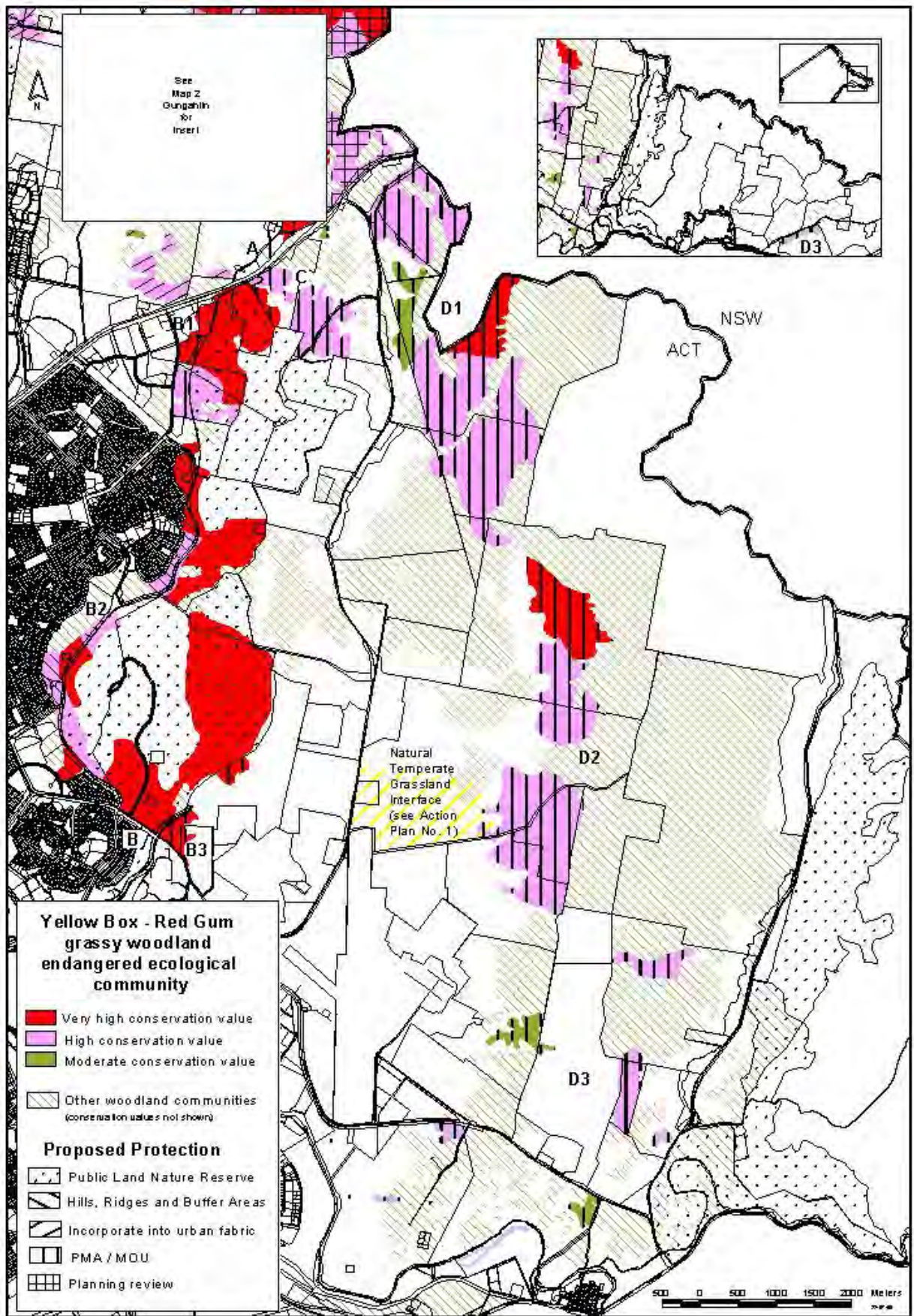
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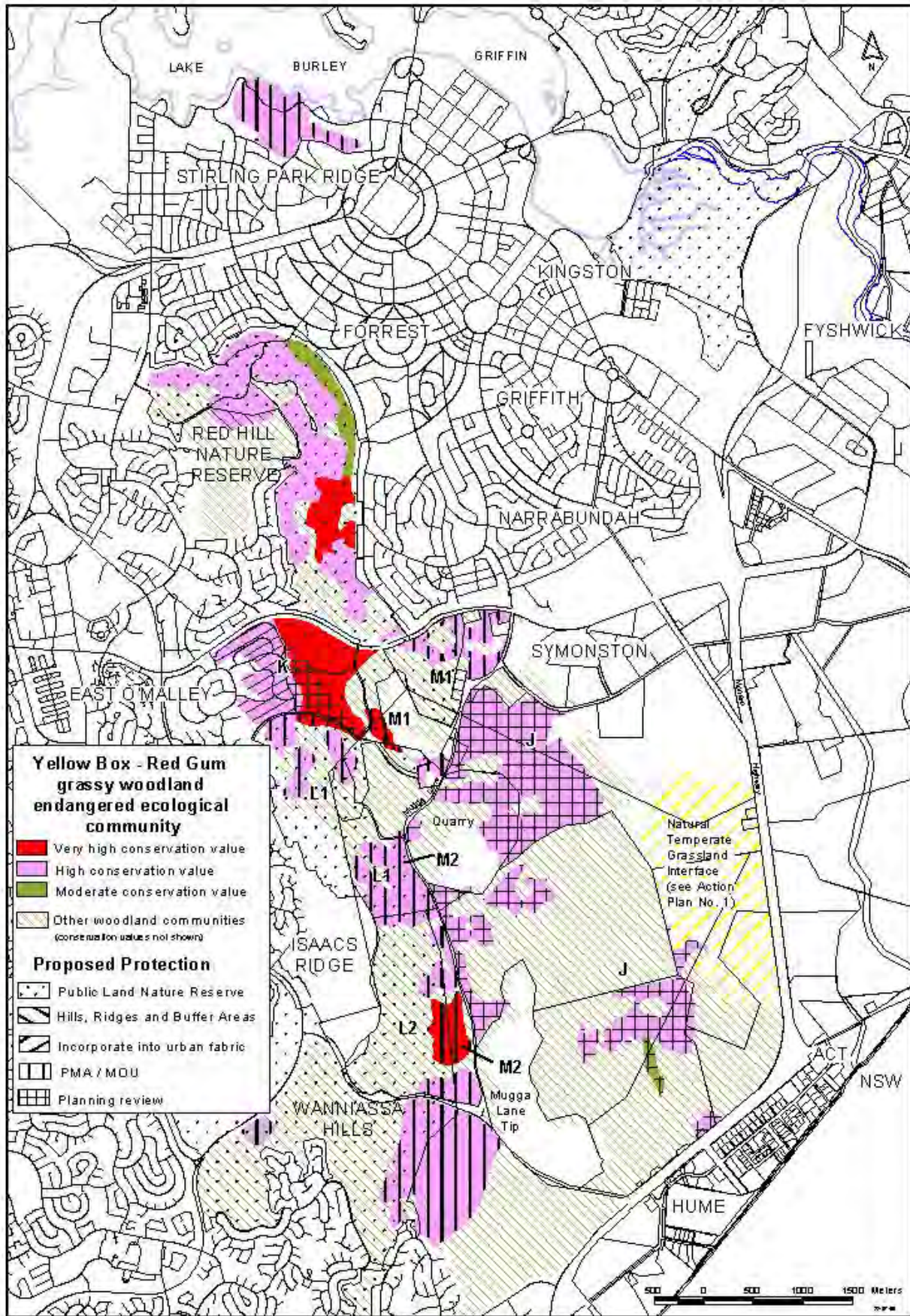


Map: 1 Distribution of woodland vegetation in the ACT.

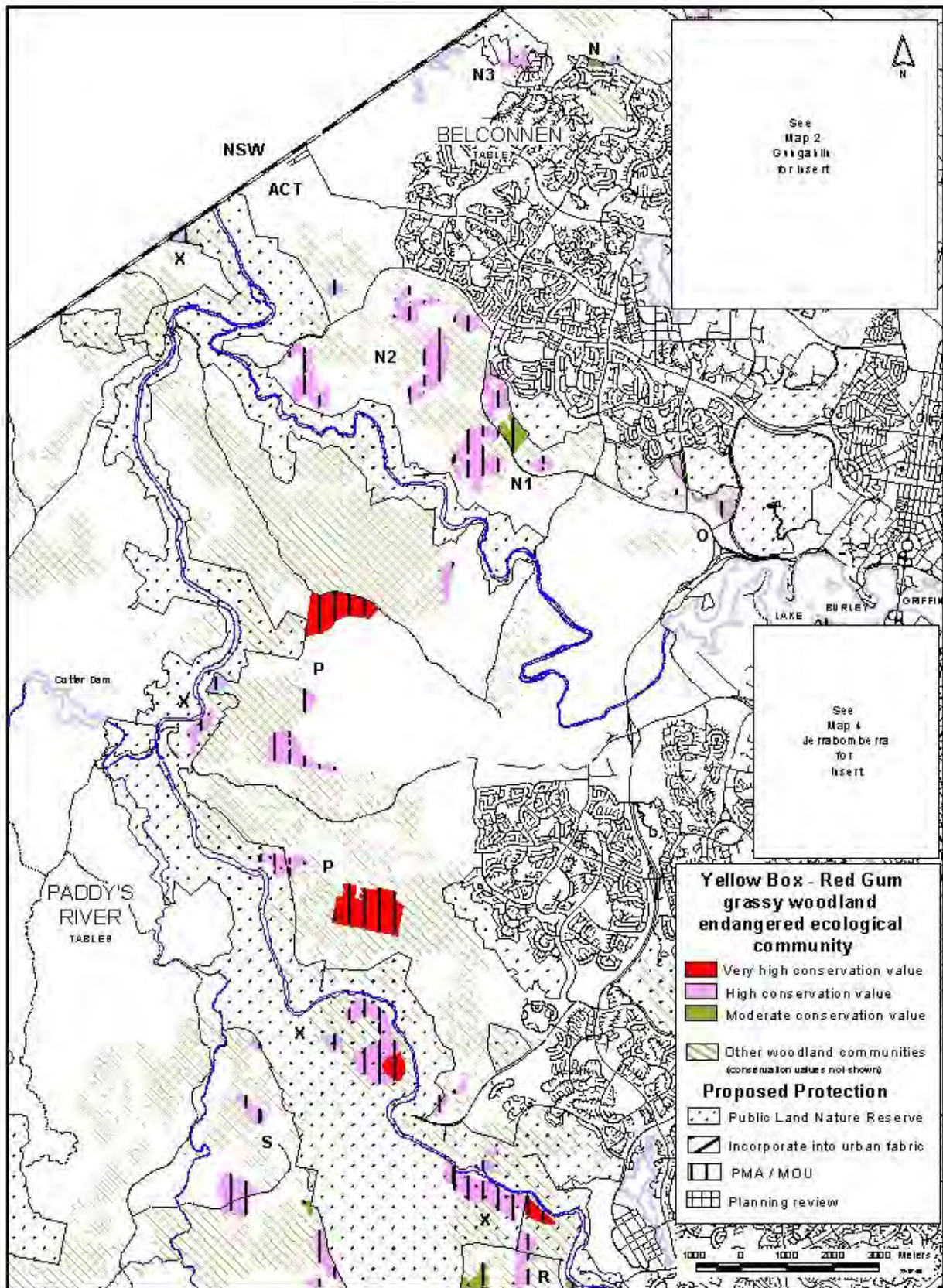


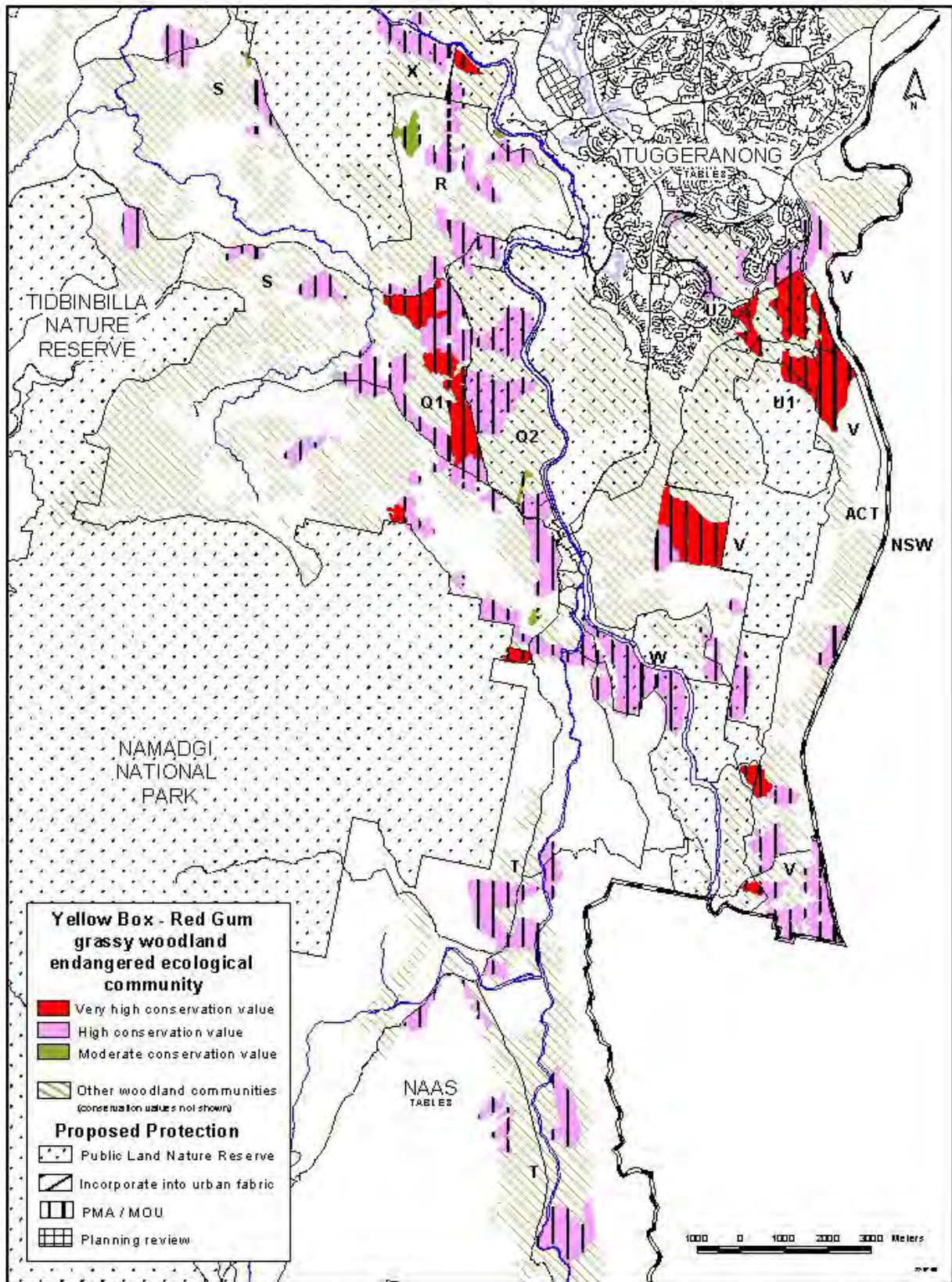


Map: 3 (REFER TABLE 5)



Map 4: (REFER TABLE 4)





Map: 5 (ii) (REFER TABLES 5.9)