

Adaptive Management Guidelines for Box Gum Grassy Woodlands

Management choices from this list should be made based on the current management and condition of the individual site.

Action	Objectives	Implementation guidelines
<p>Strategic Stock Grazing</p>	<p>Strategic grazing using domestic stock can be an effective method of assisting regeneration of both over-storey and understorey, particularly where the accumulation of ground-layer biomass is likely to inhibit regeneration or pose a perceived fire hazard. Grazing levels should not be increased above historical levels. E.g. if a site has never been grazed by livestock, then other methods (e.g. fire, no intervention) should be used for management.</p> <p>Strategic grazing may be more appropriate than stock exclusion for the maintenance or improvement of native grasslands, depending upon the past management and the species that are now present. Strategic grazing is more appropriate where there is a dense grass cover (either exotic or native), or herbaceous weeds can be best controlled using grazing. In some grassland communities of high native plant diversity or with particular ecological requirements for threatened species, the use of ‘pulse’ grazing may be the best form of strategic grazing for biomass control to maintain or increase native ground-layer diversity or fauna populations.</p> <p>Low Condition vegetation adjacent to remnant vegetation may be assisted to regenerate naturally if grazing is applied in the form of ‘pulse’ grazing to periodically reduce competition from exotic herbaceous species. In some situations this may be a cheaper and ecological preferable method of achieving an expansion of remnant size compared to supplementary planting or re-planting.</p>	<p>Use existing fencing or erect new fences around remnants to manage stock use of site.</p> <p>In sites that are in low to moderate condition the grazing strategy should concentrate on controlling the introduced annual pasture grasses and flat weeds through relatively short but intensive grazing, prior to seed set, between late winter and early spring. As well as reducing seed-set, this style of grazing can also open the ground layer to allow other plants to establish. Grazing should be removed after this time to allow the native perennial grasses and forbs, which often grow later in spring, to flower and seed.</p> <p>In sites that are in high to moderate condition the grazing strategy should concentrate on maintaining diversity by reducing thatch and maintaining inter-tussock spaces allowing other plants to continue to generate. The site must be monitored for flowering and seeding/fruitleting cycles, usually a spring and autumn phenomenon; however native plant cycles are reliant on rainfall and may occur earlier or later than usual. Exclude stock during these times.</p> <p>Maintain a minimum of 80% groundcover at all times and biomass not less than 2200kg/h</p> <p>Monitor the outcomes to determine the effects of your management. Adapt timing and stocking rate to prevent any adverse impacts.</p>

<p>Strategic Stock Grazing (Continued)</p>	<p>Strategic grazing can be used to reduce degradation of understorey habitat structure and components through trampling, compaction, biomass removal, increased nutrient levels, spread of weed species, loss of litter layer etc, or to assist habitat recovery from such damage due to past levels of domestic stock grazing.</p>	<p>At no time is supplementary feed to be brought into the remnant area as this can introduce weeds and nutrients to the site. Under this management action no application of fertilisers is permitted in the area. Application of fertilisers is likely to cause increased levels of weed growth that will compete with native species. Some native plant species, particularly in the family <i>Proteaceae</i> can be killed by even low levels of fertiliser containing Phosphorous.</p> <p>In addition landholders should leave an unfertilised buffer around the remnant to reduce risk of fertiliser drift onto the remnant during fertiliser application to adjacent farmland. A buffer will also assist to filter nutrients before they can reach the site.</p>
<p>Domestic Stock Grazing Exclusion</p>	<p>To promote natural regeneration of native vegetation in plant communities where grazing has a detrimental effect and regular biomass removal is not necessary.</p> <ul style="list-style-type: none"> • To allow remnant vegetation to be restored naturally (without the need for replanting) from ‘Moderate to Good Condition’. • Where one or more of the structural components of the vegetation (trees, shrubs, ground-layer species) is below benchmark for the Vegetation Type, the removal of grazing may allow these to regenerate without the need for supplementary planting or direct seeding action. • ‘Low Condition’ vegetation adjacent to remnant vegetation may in some circumstances also regenerate naturally if grazing is removed. If this can be achieved then this is likely to be a cheaper and ecological preferable method of achieving an expansion of remnant size compared to supplementary planting or replanting. 	<p>Permanent total exclusion of domestic stock is required by this action. This can be achieved using existing fences or by constructing new fences around the remnant, where necessary. Additional fencing may not be required where only cropping occurs adjacent to the area.</p> <p>Fencing must be maintained in good order to ensure stock from the property or neighbouring properties do not gain access to the site.</p> <p>Where sensitive riparian areas are to be fenced off, if necessary pipe river water to troughs in alternative locations for stock watering purposes.</p> <p>Where the objective is to increase the area of natural regeneration through stock exclusion, fencing should be situated at least one-mature-tree-height beyond the edge of the remnant.</p>

<p>Domestic Stock Grazing Exclusion (continued)</p>	<p>To prevent degradation of understorey habitat structure and components through trampling, compaction, biomass removal, increased nutrient levels, spread of weed species, loss of litter layer etc, or to allow habitat recovery from such damage due to past domestic stock grazing. Stock exclusion may also be desirable to prevent damage to certain tree species (Stringy barks, for example) through the chewing or rubbing of bark or hoof damage to tree surface roots.</p>	<p>This action is mutually exclusive of applying the ‘Strategic stock grazing’ management action.</p>
<p>Expansion And Connection Of Existing Remnants</p>	<p>Expansion of sites serves to increase the viability of sites. Connectivity is designed to enable dispersal of fauna, and pollen and seed of flora to prevent genetic isolation of populations.</p>	<p>A principle of conservation biology is that “larger is better”. This is critical because small sites may not provide enough resources to maintain populations of some species.</p> <p>In areas where the woody remnant is particularly small, revegetation may be an option to be used to increase the area. This may be particularly effective at sites surrounded by cropping or non-invasive exotic pasture. Revegetation should always use locally indigenous species and aim to eventually mimic the natural structure of the woodland.</p> <p>The size of many sites occupied by box-gum woodland can be determined by delineating the areas occupied both by the remnant woody vegetation and the areas of remnant native grassy ground-layer that may exist beyond the trees.</p> <p>Areas beyond the trees where the ground-layer is native have several advantages. They may provide:</p> <ol style="list-style-type: none"> 1. valuable resources for fauna species that prefer open habitat, but are not compatible with heavy grazing (i.e. seeding grasses for parrots and finches, sunny sites that some reptiles prefer; tall tussock structure for shelter and nest sites, etc);

<p>Expansion And Connection Of Existing Remnants (continued)</p>		<ol style="list-style-type: none"> 2. areas suitable for natural regeneration of trees and shrubs, because of the inherent lower fertility of such sites that favours this; or 3. areas that are suitable for revegetation of the woody layers. <p>In areas adjacent to small woody remnants, grazing regimes can be modified to encourage natural regeneration, more frequent seeding of native plants, and more coarse structure for other habitat values. Such areas could also be targeted for placement of logs and litter derived from clearing elsewhere.</p> <p>Primary production areas that are managed using such methods can be effective landscape linkages for many species. Many bird species and some mammals will travel over some distances, so sites need not necessarily be abutting to be considered to be connected for such species.</p> <p>For other species, roadside and riparian vegetation corridors may be effective. These may be made more effective by effectively increasing the size of the site by management, as described above.</p>
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Slashing	<p>Slashing may be an appropriate alternative to grazing or burning for biomass control in some grassland and grassy communities.</p> <p>Do not select this action unless a species occurs within the area that will clearly benefit from this action and slashing is required because the preferable beneficial action of burning is not possible.</p>	<p>Slash at appropriate times (e.g. in late summer or autumn after native ground layer plants have seeded and become dormant) with a “clean” implement. Where the slashed material is dense enough to form a thatch, this should be removed (e.g. using a hay rake) to avoid smothering native vegetation and causing weed infestations along the thatch rows. An alternative is to use a flail mower that disperses the cut material.</p> <p>Follow current best management practice (BMP) when implementing this type of management. Monitor the outcomes to determine the effects of this practice and identify any adverse impacts.</p>
Weed control (non-statutory exotic pest species only)	<p>Woody or herbaceous weeds can be highly invasive and if not controlled may replace many native plant species, leading to a decline in habitat quality. Sensitive removal of weeds may allow populations of some threatened plant species to increase in response to greater availability of habitat.</p> <p>Only select this action if it is clear that particular weeds are having an adverse impact at the site, or they pose a threat in the future.</p> <p>Very occasionally woody weeds may be providing important Shelter/Breeding habitat to threatened species (e.g. Blackberry bushes have been known to provide breeding refuge for Quolls). If such cases are identified then removal of the relevant weed should be undertaken after a successful planting program to replace the weed with suitable native plants.</p>	<p>Monitor and remove all weeds in high and medium condition sites annually.</p> <p>Non-herbicide based weed removal methods including strategic stock grazing or hand pulling preferred.</p> <p>Registered herbicide use must be limited to targeted non-drift spray methods. Pre-emergent herbicides should not be used.</p> <p>When treating areas adjacent to the remnant for weeds, the remnant must be protected from herbicide drift. This can be achieved by nominating a buffer beyond the remnant where herbicide application is by non-drift methods only.</p>

Action	Objectives	Implementation guidelines
<p>Re-planting (for use in ‘Low Condition’ vegetation)</p>	<p>Note: these communities were naturally open and grassy - thus the replanting of native perennial grasses (through locally-sourced tube stock or seed) is particularly encouraged, and should help to control weeds.</p> <p>This action is to be applied to sites in ‘Low condition’.</p> <p>The objective of this action is to achieve eventual replacement of the over-storey and mid-storey canopy cover to within the benchmark of the Vegetation Type occupying the site.</p> <p>By definition, in ‘Low Condition’ vegetation the tree, shrub, and ground-layer species are missing or greatly depleted from the community. Re-planting or direct seeding is likely to be required to achieve sufficient regeneration of these structural components to restore the cover to within the benchmark of the Vegetation Type occupying the site. Because of the difficulty and effort required to replace native groundcover, this management action when used in the PVP scheme does not include the replacement of ground-layer. The expected responses to this management action are based only on achieving a major improvement to the over-storey and mid-storey canopy components.</p>	<p>Look at a locally intact site to determine which species and the proportional mix of species, both over-storey and mid-storey, that should be used. Only locally indigenous species are to be planted and that preferably local provenances should be sourced.</p> <p>Plant or direct-seed into rip-lines only in low quality sites, or plant into individual holes, as appropriate for the size of area to be planted, the density of existing vegetation and the site conditions. Undertake appropriate site treatment (e.g. weed control) prior to planting. Use fencing if required to exclude or manage grazing by stock or native herbivores. Use tree guards to exclude rabbits, hares or native herbivores.</p> <p>This action includes the use of appropriately managed strategic grazing to control biomass competition to plantings post establishment. Grazing should not be permitted to damage the plantings whilst they are becoming established. Often it will not be appropriate to allow any grazing in site for the first 3-5 years. Where a shrub layer has been planted it may not be appropriate to allow any grazing, as this may damage the plantings, even once they are mature.</p> <p>This action is mutually exclusive of applying the ‘Supplementary Planting’ management action. These two actions have the same objective, but one or the other is likely to be more appropriate, depending on the site condition.</p>

Action	Objectives	Implementation guidelines
<p>Supplementary planting (for use in 'Moderate to Good Condition' vegetation)</p>	<p>This action is to be applied to sites in 'Moderate to Good Condition' (>25% of benchmark crown cover, >50% perennial native ground cover).</p> <p>The objective of this action is to achieve eventual replacement of the over-storey and mid-storey covers to within the benchmark of the Vegetation Type occupying the site.</p> <p>This action should not be selected for a particular structural layer (i.e. over-storey or mid-storey) if the foliage cover of the vegetation structural layer in the site is within the benchmark range for that Vegetation Type. Only use 'Supplementary planting' if one or more of the structural layers are below benchmark and natural regeneration alone is unlikely to restore the vegetation to within the benchmark condition.</p> <p>In some areas, Noisy Miners have the ability to aggressively exclude other native birds from remnants, particularly those with poor understorey cover. They have also been implicated in accelerating the impacts of tree dieback caused by lerp infestations that are normally controlled by smaller leaf-gleaning birds. By encouraging regeneration or active revegetation of indigenous understorey shrubs and grasses, smaller birds will have protective cover from miners</p> <p>Establishment of diverse native vegetation around dams and along streams is encouraged as this will provide habitat for waterbirds, frogs, and other native species.</p>	<p>Areas occupied by moderate to high value Box-Gum Woodland should only have strategic planting of mid-layer species and those only planted in patches where the ground layer is of low value (i.e. dominated by exotics or where forb diversity is very low or non-existent). In such cases, the recommended planting regime is to use direct-seeding using locally indigenous mid-storey Acacia species. Alternatively, in areas where the ground-layer is of moderate to high diversity, there may be augmentation plantings of mid-layer wattles, planted at intervals of 10-20 meters (i.e. to reflect benchmark values). These should not be planted in rip lines. The preferred method is to hand-plant (e.g. using a Hamilton Planter), and locating planting holes so as to avoid areas of high forb diversity.</p> <p>Degraded parts of a site that need to be revegetated (where the ground-layer is highly modified and over-storey is lacking) can be planted with a dense planting of trees, shrubs, sub-shrubs and robust grasses and forbs. The recommended planting regime is to apply direct-seeding using locally indigenous mid-storey Acacia and Eucalyptus species with the aim of achieving a ratio of approximately one Eucalyptus tree per five to ten Acacia trees/shrubs. This seeding regime is designed to rehabilitate degraded areas and can be at a high density.</p> <p>To maintain a desired ratio, trees and shrubs may be judiciously thinned over time as they grow. Sub-shrubs and robust grasses and forbs could be included in the mix, depending on availability.</p>

Action	Objectives	Implementation guidelines
Supplementary planting (for use in 'Moderate to Good Condition' vegetation cont.)		<p>and could include species such as <i>Themeda australis</i>, <i>Poa sieberiana</i>, <i>Dianella</i> spp., <i>Lomandra</i> spp. and <i>Hardenbergia violaceae</i>.</p> <p>The use of locally indigenous species should be confined to using species found in Box-Gum Woodland.</p>
Feral and/or native herbivore control/exclusion fencing	<p>Sometimes it will be important to reduce grazing and browsing pressure on native vegetation to allow regeneration and assist recovery of threatened species and their habitats.</p> <p>Goats, rabbits, hares and other feral animals, as well as native herbivores can have a major impact in preventing regeneration of native vegetation, including many threatened flora species.</p> <p>Dams provide access to water for feral herbivores and some kangaroo species that can maintain high population numbers that can cause adverse grazing impacts on native vegetation. Restricting access to artificial water supplies can reduce feral and native herbivores, particularly in for Western grey Kangaroos in western NSW.</p> <p>Only select this action if browsing damage is identified as having an adverse impact within the area and it is practical and affordable to firstly control feral animal populations and then to construct effective fencing to keep feral animals out.</p> <p>Consider the potential impact of the proposed method of reducing browsing pressure on non-target species, especially threatened species.</p>	<p>Target species may include rabbits, hares, goats, deer, camels, horses, kangaroos and wallabies.</p> <p>Particularly in cases where threatened flora is being impacted by browsing, the erection of permanent exclusion fencing in conjunction with initial and/or ongoing culling is likely to be required for the positive effects of this action to be ongoing.</p> <p>Most of the larger feral species will be easily controlled before or after fencing is erected by mustering, trapping, shooting or poisoning as appropriate to assist in control and reduce risk of animals breaching the fencing. Use humane and effective methods that are not destructive to the habitat or plant community.</p> <p>Contact your local authority for current recommendations that have the least impact on the site.</p> <ul style="list-style-type: none"> • Minimal soil disturbance is crucial. • Where earth is brought into the site to rehabilitate rabbit warrens in must be extremely clean fill and be actively targeted for regeneration.

Action	Objectives	Implementation guidelines
Feral and/or native herbivore control/exclusion fencing (Cont.)		<p>Any control program needs follow up monitoring to ensure its effectiveness, including periodic checking of fencing. Monitoring can be undertaken by measuring impacts on the vegetation and by spotlighting rabbits at night.</p> <p>Removal of “rabbit harbour” (i.e. fallen timber and dense shrubs) is not recommended as this provides habitat for fauna.</p> <p>Erect appropriate fencing or individual guards for targeted threatened plants. Fencing is regarded as the most effective and reliable means to control damaging grazing impacts from feral and native herbivores.</p> <p>The fencing of stock dams and provision of an appropriate alternative water source for stock that is not accessible to target feral or native herbivores may be an alternative for reducing herbivore browsing pressure in some areas.</p> <p>The complete removal of stock dams is another option to reduce impacts from native and feral herbivores in some situations.</p>

Action	Objectives	Implementation guidelines
Retention of all dead (and alive) timber.	<p>Fallen and standing timber (coarse woody debris and dead branches, snags, stumps etc) provides essential or important breeding, foraging or shelter habitat for many threatened species. Tree hollows and hollow logs are a vital habitat element for many fauna in forest and woodland communities. Standing dead trees often contain hollows that continue to provide important denning and nesting habitat</p> <p>Sticks and leaf litter provide essential foraging and nesting habitats for many fauna species.</p> <p>Disturbance of this layer can also impact on threatened plants.</p> <p>The retention of fallen timber in streams and other water bodies may also be important in providing perching habitat for birds and Shelter for threatened fish species.</p>	<p>Retain all dead timber, including both standing and fallen trees and tree stumps. Protect live trees from threats such as ringbarking by stock. Avoid pruning older trees with hollows. Avoid removing ground litter for the purposes of 'tidying up'. Avoid burning, heavy grazing, and the collection of small branches and sticks. In a few cases it may be justified to allow a very small amount of timber extraction for on-farm purposes. In this case removal should focus on younger 'solid' trees that do not contain hollows.</p>
Retention of rocks	<p>Rocks provide essential habitat for several threatened fauna species and sometimes provide protection from herbivore grazing for native plants. This habitat may occur as loose surface rocks, rocks embedded into the soil, rocky outcrops, rock piles, caves or cliff faces.</p>	<p>Retain and avoid disturbance to all rocks and rock features on the site.</p> <p>Avoid disturbance to cave entrances, including the vegetation near cave entrances.</p>

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Exclusion of fire	<p>Some species and ecological communities are highly vulnerable to fire and provide habitat that has not been burnt for long periods. Whilst some fire sensitive species are likely to survive an occasional fire, many of these will not tolerate fires in relatively frequent succession.</p> <p>Some plant species are killed by fire and are slow to regenerate from a fire event. Fires in frequent succession can eliminate species from an area.</p> <p>Where fire sensitive species are known to be likely to be present then the exclusion of fire as far as practically possible is a desirable action. It is accepted that for most sites it may not be possible to prevent the occasional severe wildfire. If the exclusion of fire has been scored as a positive management action for a species then this is an indication that experts have identified that the species is susceptible to too frequent burning.</p>	<p>Avoid deliberate burning of sites. Develop appropriate fire-breaks and prepare a local fire suppression strategy to minimise the risk of wildfire spreading into the site.</p> <p>Where hazard reduction burning is essential, the fire frequency and area to be burnt should be clearly specified. In such cases it is recommended to apply mosaic burns within the hazard reduction zone to minimise impact of fire.</p> <p>In accordance with the <i>Bush Fire Environmental Assessment Code</i> (July 2003) no part of an EEC is to be subjected to successive fires more frequently than the minimum fire interval, and at least 50% of the EEC within each LGA must exist in a state that has been burnt less frequently than the minimum fire interval. For Box Gum Woodland the minimum fire interval is 'no fire more than once every 5 years'. Trittering and tree removal are not recognised as acceptable forms of hazard reduction in Box Gum Woodland.</p>
Control of feral pigs	<p>Feral pigs can have a major impact in destroying and preventing regeneration of native vegetation, including many threatened flora species, particularly herbaceous ground-layer species. Areas disturbed by pigs can also become colonised by weed species.</p> <p>Only select this action where feral pig damage can be identified as a problem within the area, or is likely to become a problem.</p>	<p>Use humane and effective methods including shooting, cage traps and poisoning. Contact your local authority for BMP.</p>

Action	Objectives	Implementation guidelines
<p>Application of ecological fire management</p>	<p>Occasional ecological burning may be appropriate in some Vegetation Types to assist in maintaining structural diversity and in the recruitment of many of the plant species comprising those communities (e.g. heathland) and/or to maintain species diversity by reducing competition through biomass control (e.g. in grasslands). Burning may be harmful to some fauna and the fire frequency and the proportion of the area to be burnt need to be carefully considered.</p> <p>Select this action only if it is clear that ecological burning is desirable and can be implemented by the landholder, or an appropriately qualified third party has agreed to assist with the action.</p>	<p>‘Status quo’ approach is usually appropriate. That is, if the site has a history of regular burning, continuing that regime is often the best way to maintain current values. Conversely, if the site hasn’t been burnt for a long time, burning should only be introduced for specific purposes (e.g. weed control as below, or to increase resilience to fire in the longer term for management purposes). However burning during drought should be avoided because perennial native grasses have more difficulty recovering at these times. Mosaic burning rather than whole site burning is recommended to benefit fauna. There are no set prescriptions for the application of ecological fire management. One option is to divide remnant into areas of up to 5% of the total area, decide on areas not to be burnt in the long-term (refuge areas) and burn up to 5% of total area per year, during cooler months.</p> <p>There are also some very specific ways of using fire to control exotic annuals and promote native grasses. This requires mid-spring burns, preferably in conjunction with addition of Themeda seed. It is appropriate for degraded sites with high exotic annual grasses, and is less appropriate for sites with significant broadleaf weeds such as Paterson’s Curse.</p> <p>Follow current best management practice (BMP) when implementing this type of control method. Monitor the outcomes to determine the effects of this practice and identify any adverse impacts.</p>

Action	Objectives	Implementation guidelines
Exclude miscellaneous feral species	<p>This action is to remove or control one or more of a variety of feral species that may be having an adverse impact. These threats will often be localised and specific to certain species.</p> <p>Feral species that may be having an adverse impact include, feral honeybees, introduced rodents, foxes and several introduced bird species including the European Starling, Common Myna and Feral Pigeon.</p> <p>Do not select this action if it is unlikely that a feral pest is adversely affecting any threatened species at the site.</p>	Contact your local authority for recommendation BMP.
Exclude commercial apiary sites	Competition from honey bees may have an impact on certain species through competition with nectar resource. This action is intended to reduce this affect by excluding the placement of commercial loads of bees within the site.	Do not permit commercial apiarists to place bee hives within the area. It is also desirable that the landholder agree not to allow on their property the placement of bees within 3 km of the area.
Maintain natural nutrient levels	<p>Increased nutrient loads can lead to a higher weed burden on the site and conditions unsuitable for local natives.</p> <p>High weed burdens can lead to nutrient cycling which means the weeds maintain the nutrient levels for their own advantage.</p>	<p>Prevent fertiliser spray drift and nutrient run on to the site.</p> <p>Some weeds are favoured (and perpetuated) by soil disturbances that cause release of nutrients from standing vegetation, so soil disturbance should be minimized (e.g. rabbit warrens, earth works, tracks etc).</p> <p>Where weeds dominate the site remove all vegetative parts from the site prior to seed set by slashing or grazing.</p> <p>Nutrient manipulation (through addition of carbon sources such as sugar) can be used in conjunction with seed addition to restore native grassy ground cover, follow current BMP to achieve this.</p>