

Managing grazing on riparian land

Field Companion



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Section A: Introduction

The *Managing grazing on riparian land field companion* has been developed as an easy-to-use reference for riparian land managers who are experienced and competent using the *Managing grazing on riparian land decision tool and guidelines* (DELWP 2016)¹, hereafter referred to as the *Decision tool and guidelines* (available on the DELWP website www.delwp.vic.gov.au).

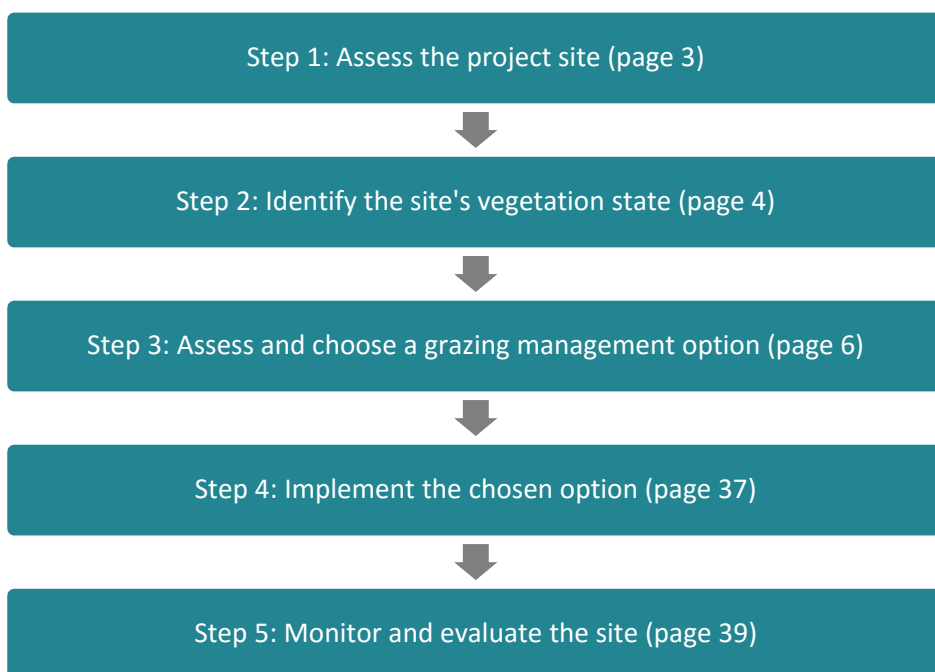
It is a companion document designed to allow easy access to the key elements of the *Decision tool and guidelines*, supporting decision making for riparian grazing projects and communication with landholders in the field.

Section B: Five step process

Managing grazing on riparian land - steps

There are five steps to determine the most suitable grazing management option for a riparian project site.

Five step grazing management process



Refer to the *Decision tool and guidelines* (DELWP 2016) for more detailed guidance and references.

¹ Department of Environment, Land, Water and Planning 2016, *Managing grazing on riparian land: Decision support tool and guidelines*. Victorian Government, East Melbourne, Victoria.

Step 1: Assess the project site

In this step you will collect information about the project site in order to determine the site goals and problems to address. You will also assess the current and potential impacts of grazing on waterway values and conditions and determine whether there are other riparian management options.

Consider what you are trying to achieve and your management options

Determine:

- the goal (or ecological objective) for the site
- the problems you are seeking to address
- other riparian management options (as well as, or in place of, grazing) to determine if they would be effective and practical in treating the problems and if they would create risks to on-site or off-site values.

Consider site conditions and values

The likely effects of grazing on waterway values and conditions are important considerations when deciding a management option. At some sites these may be so important for site goals that you must exclude grazing and protect the waterway from livestock, regardless of potential benefits from grazing for riparian vegetation.

Before using the decision support tools (Step 3), you should consider the impact of grazing on waterway values and conditions (including water quality, aquatic macrophytes, terrestrial flora and/or fauna species, streambank stability and riparian width).

Water quality

If water quality is a major issue you should exclude livestock from a site irrespective of the potential impacts on other values.

Aquatic macrophytes

Aquatic macrophytes can be important to the aquatic objectives of a site (e.g. habitat provision and water quality) and are often grazed heavily by livestock. If grazing will have a high impact on aquatic macrophytes you should exclude it unless you can isolate vulnerable stream edges from other areas of the project site.

Threatened species

If an action statement for a threatened species lists grazing as a threatening process, or if there is no action statement for a threatened species, you should take a precautionary approach and exclude livestock.

Eroding streambanks

If livestock are eroding streambanks, and you cannot isolate these streambanks from other areas of the project site, you should exclude livestock grazing.

Width of the project site

If the project site is too narrow (e.g. less than 10 m wide may lead to excessive trampling) or too wide (e.g. wider than 100 m may lead to both overgrazed and over-rested plants) for livestock movement or controlled grazing, you should exclude it.

More detailed advice regarding site assessment is available in Section 2 of the full *Decision support tool and guidelines* (DELWP 2016).

Record project background information in parts 1 - 6 of the field assessment sheet (Appendix A).

If you think that some form of livestock grazing might be an acceptable management option, go to Step 2.

Step 2: Identify the site's vegetation state

In this step you will identify the site as having one of 11 vegetation states based on the structure and composition of the vegetation. To identify the vegetation state, use the quick reference chart on the next page.

If you identify that the site has two or more vegetation states, use, for assessment purposes, use the state most sensitive to livestock grazing².

Use the vegetation state description and example images in Step 3 to confirm your identification³.

More detailed advice regarding vegetation state characteristics is available in Section 3 of the full *Decision support tool and guidelines* (DELWP 2016).

Record current vegetation state in part 7 of the field assessment sheet (Appendix A).

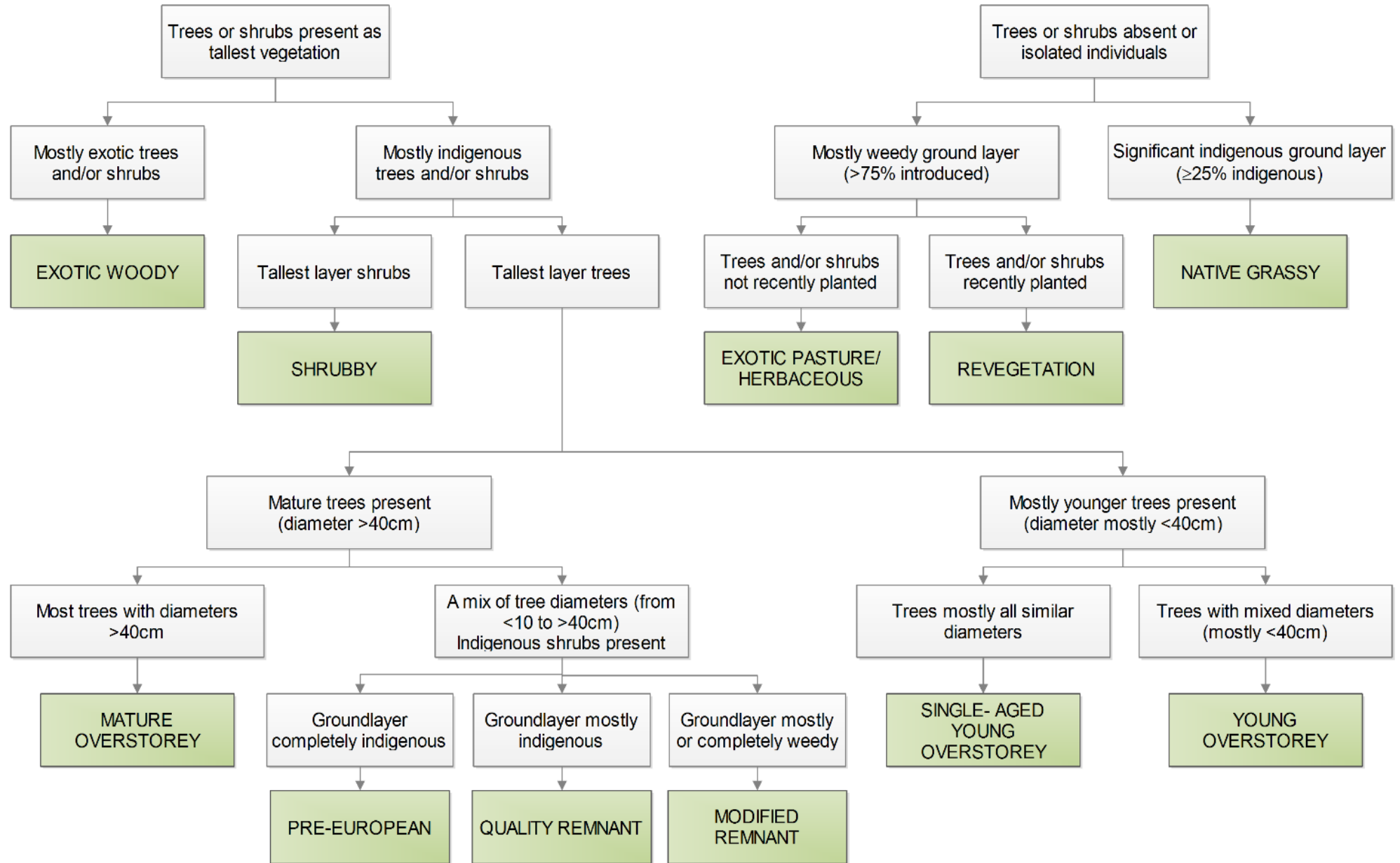
² Exceptions to this advice are:

- where one vegetation state covers almost all the project area, you might use that vegetation state
- where vegetation states can be isolated from each other (for example, by fencing), you should assess each vegetation state independently.

³ For EVC information, see <http://www.depi.vic.gov.au/environment-and-wildlife/biodiversity/evc-benchmarks>

Vegetation state quick reference chart

Vegetation state quick reference chart



Step 3: Choose a grazing management option

In this step, you will assess the grazing management options available for the site's vegetation state, and choose the most suitable option.

Four grazing management options are considered in this publication:

maintain the existing livestock grazing regime

- control the livestock grazing regime (to specified times of the year, duration and grazing intensities)
- exclude livestock grazing from all or part of the project site
- exclude livestock grazing and implement other interventions (e.g. weed management and revegetation).

Process for assessing and choosing a grazing management option:



Table 1 - Level of acceptability of grazing management options

Acceptability	Rationale
Not acceptable	It is highly likely the quality of the vegetation would decline to a lower-quality state
Tolerable*	There is a risk the structure and composition, or structure only, of the vegetation would decline but still stay in the same state: a tolerable option is never the preferred option
Acceptable	It is most likely there would be little or no change to the structure and composition of the vegetation (which includes that vegetation that is highly degraded can't degrade further)
Beneficial	The quality of the vegetation remains as it is now (for <i>Quality Remnant</i> and <i>Pre-European</i> states only), or it improves to a higher-quality state

*Tolerable options only apply to project sites where threatened species or streambank erosion restrict you from implementing acceptable or beneficial grazing management options.

More detailed advice regarding why each grazing management option is acceptable (or not) for each particular vegetation state is available in Section 3 of the full *Decision support tool and guidelines* (DELWP 2016).

To complete Step 3 go to the sub-section of Section C corresponding to the vegetation state you identified in Step 2 (pages 10 – 40).

For each vegetation state where grazing is acceptable, Section C provides a decision tree to help you determine which grazing management option to select, and if applicable, a controlled grazing decision tree to provide guidance regarding implementing this option.

Remember also that in Step 1 you may have identified that the site goals put such importance on site values and conditions that you must exclude grazing and protect the waterway from stock, regardless of the potential benefits from grazing for the riparian vegetation.

Record the preferred management option and levels of acceptability in parts 8 and 9 of the field assessment sheet (Appendix A).

Step 4: Implement the chosen option

Use the information in below to assist you to implement your chosen grazing management option.

Maintain the existing livestock grazing regime

No change to the existing livestock grazing regime.

Control the livestock grazing regime

In this publication 'control' means permitting a known population of livestock to graze in a defined area, at a specified time, for a specified duration.

If control the livestock grazing regime is your preferred livestock management option, ensure that you consider the factors listed below. Section C provides additional, specific guidelines for vegetation states where controlled grazing is a beneficial, acceptable or tolerable option.

More detailed advice regarding controlled grazing is available in Section 2.4 (generic advice) and Section 3 (vegetation state specific advice) of the full *Decision support tool and guidelines* (DELWP 2016).

Type of grazing animal

There are substantial differences in how cattle and sheep graze and the pressure this puts on riparian land.

You need to know the particular impacts of the grazing animals you have in mind, and consider these when considering options. For example:

- the grazing pressure by one cow is equivalent to: eight sheep, 11 goats, 12 kangaroos or 133 rabbits
- sheep are more selective grazers than cattle and graze closer to the ground (inhibiting regeneration)
- sheep prefer to graze and bed on upland areas, whereas cattle will enter wet lowland areas
- sheep tend to compact the soil more, but pug it less, than cattle
- cattle are easier to muster than sheep, so fencing for them is simpler and cheaper.

Optimum grazing times

Controlled grazing may involve excluding grazing at particular times. The optimum time for controlled grazing is when soil moisture is relatively low (to avoid or minimise soil impacts) and indigenous plants are likely to be dormant (usually from late summer to early winter).

Grazing exclusion periods

You should be flexible when using controlled grazing as seasonal conditions will vary from year to year and affect the species composition and vegetation structure of a project site.

Irrespective of the time of year, you should not use controlled grazing when:

- the soil is very moist (as this will result in pugging and soil compaction)
- the soil is very dry (as this may lead to leading to overgrazing and soil erosion)
- after floods or wildfire (as these events usually trigger native plants to germinate)
- there are juvenile plants or short-statured, understory species on the site
- native plants are in their annual growth phase, flowering or setting seed (usually in spring and early summer but you need to understand the life-cycle characteristics of site's species).

Grazing intensity

Controlled grazing may include controlling grazing intensity, which is a function of the stocking rate and the duration of grazing. The optimum level of each depends on the particular characteristics of the project site, including species present.

Animal hygiene

Controlled grazing must consider measures to ensure adequate animal hygiene, especially when entering and exiting a project site (to ensure that weeds seeds have passed through their systems and will not be transported) and when undertaking supplementary feeding (do not use or store supplementary feed sources on a project site).

Exclude livestock grazing

This option requires you to permanently exclude livestock from the site and not undertake other management activities.

Exclude livestock grazing and revegetate

This option requires you to permanently exclude livestock from the site and revegetate it. The *Output delivery standards* (DELWP 2015)⁴ provide guidance about revegetation techniques.

Record details regarding livestock type, stocking rate, season and duration in parts 10 - 13 of the field assessment sheet (Appendix A).

⁴ Department of Environment, Land, Water and Planning (2015). *Output Delivery Standards Version 2.1*. Victorian Government, East Melbourne, Victoria.

Step 5: Monitor and evaluate the site

Before implementing your chosen grazing management option, you should develop a monitoring program to assess the extent to which the option achieves your desired outcomes.

You should base the type, elements and frequency of the monitoring program on the vegetation quality and condition of the project site, with higher-quality sites (for example, *Quality Remnant*, *Modified Remnant* and *Native Grassy*) generally requiring a more rigorous program than lower-quality sites. This is because these sites are more likely to degrade if the grazing regime is wrong, and the consequences of degradation are higher (due to their higher quality).

Grazing livestock prefer younger plants to older plants, and annual and perennial grassy weeds to most indigenous species. Therefore, if implementing controlled grazing, you should monitor the project site and remove livestock before they start to graze key indigenous species.

Over time, for sites where you choose controlled grazing, you should collate a set of regionally specific controlled grazing reference photos. These will help staff of your organisation and landholders to determine when to remove livestock and when to consider restocking a site, to undertake controlled grazing.

You should also reassess the site after some time, to ensure the grazing management option you selected still suits the site's vegetation state (which may have changed).

You should provide the landholder with copies of *Appendix B: Grazing management options record sheet*. They should complete this form for each grazing event.
Record the next planned assessment date in part 13 of the field assessment sheet (Appendix A).

Section C: Grazing management options by vegetation state

Pre-European

Land in the *Pre-European* vegetation state has not been directly or indirectly disturbed by European settlement. It has only been disturbed by natural flooding regimes, natural and Aboriginal fire, and by grazing by native animals. There is little riparian land in a *Pre-European* state remaining in Victoria.

Typical *Pre-European* vegetation state characteristics

Overstorey	Shrub layer	Ground cover
<ul style="list-style-type: none"> • Overstorey is intact and multi-aged (structurally, to EVC benchmark) • Overstorey species and life forms are diverse (to EVC benchmark) • There are no introduced plants 	<ul style="list-style-type: none"> • Shrub layer is intact and multi-aged (structurally, to EVC benchmark) • Understorey species and life forms are diverse (to EVC benchmark) • There are no introduced plants 	<ul style="list-style-type: none"> • Groundcover is dominated by graminoids (sedges or tussock grasses such as <i>Poa labillardieri</i>), with a diversity of herbs and forbs • There are no introduced plants • There is a well-established and undisturbed litter layer overlaying well-structured and fertile soil

If you identified the vegetation state of your site as *Pre-European*, make sure you confirm your identification by checking the site's EVC to ensure that the vegetation structure and composition meet the benchmark. If the site does not reach the benchmark, it is highly likely it is *Quality Remnant*.

No grazing management options are acceptable for *Pre-European* vegetation state sites – do not proceed with the assessment.

Quality Remnant

Characteristics

Quality Remnant sites will never have experienced significant soil disturbance or fertiliser addition. The structure and composition of vegetation on these sites will be close to the EVC benchmark condition. Typical disturbances will have been: minor pest plant and animal invasion, minor soil disturbance, altered flooding and fire regimes, modified native animal grazing, and infrequent and low-intensity livestock grazing.

Typical *Quality Remnant* vegetation state characteristics

Overstorey	Understorey (shrub layer and ground cover)
Overstorey is largely intact, with multi-age classes represented	<ul style="list-style-type: none"> Understorey is probably not in <i>Pre-European</i> state (with subtle changes in composition due to land use changing since European settlement), but still largely unmodified Species that are promoted by, or tolerate, post-European settlement disturbance are likely to be more abundant (e.g. <i>Carex</i> spp) while disturbance-intolerant species (e.g. <i>Poa labillardieri</i>) are likely to be less-abundant There are some introduced species (which are not dominant, and probably minor components of the flora)

Confirm your identification by checking that the vegetation structure and composition are close to the site's EVC benchmark. If they aren't it is likely that the site is *Modified Remnant*.

Examples of *Quality Remnant* vegetation state sites

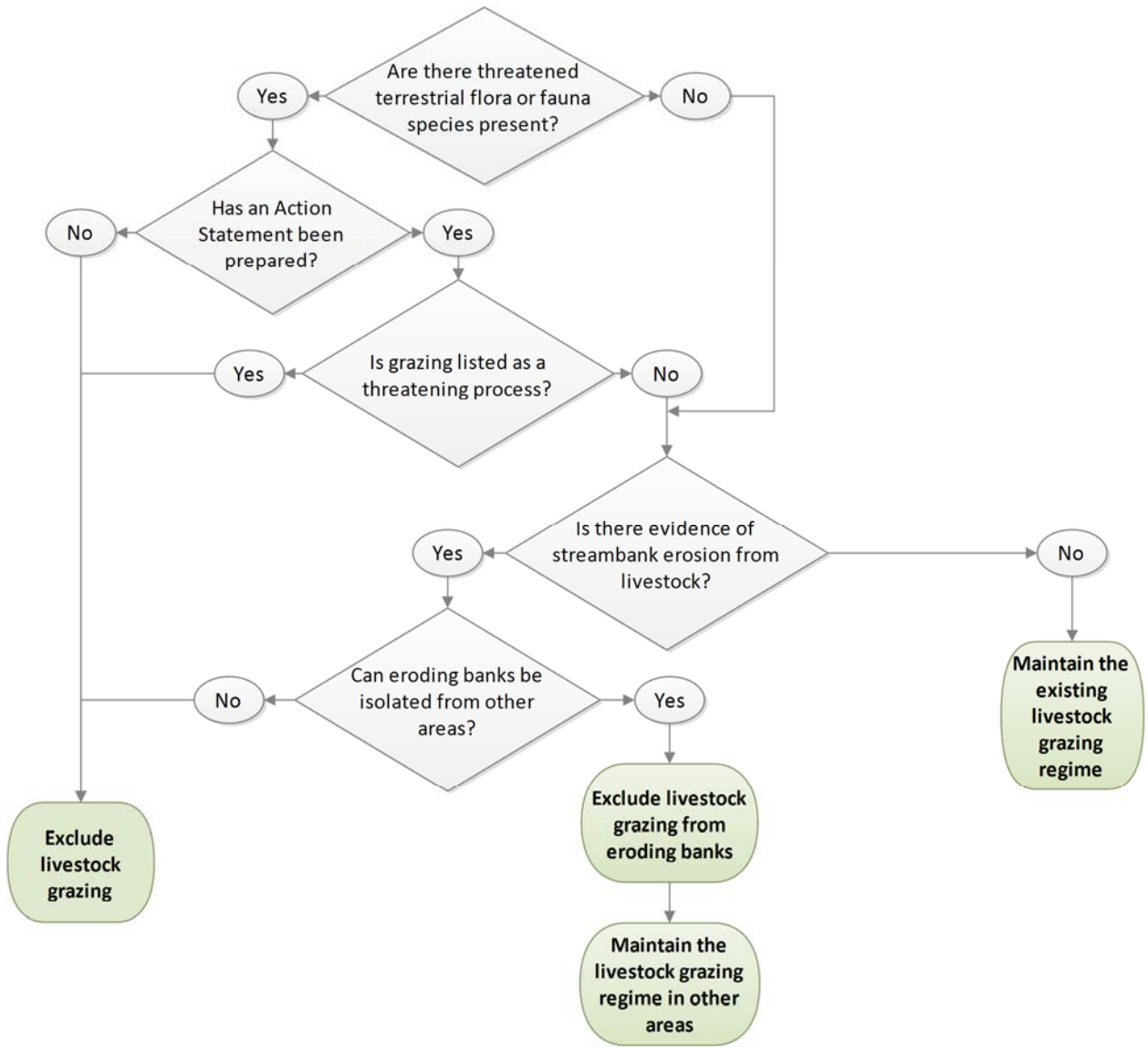


Grazing management options summary

Grazing management option	Predicted outcome	Acceptability
Maintain the existing livestock grazing regime	Site remains Quality Remnant, with little or no change to its structure and composition	Acceptable
Control the livestock grazing regime	Site may degrade	Not acceptable*
Exclude livestock grazing	Site remains Quality Remnant, with potential recruitment of previously known, or low abundance, species	Beneficial
Exclude livestock grazing and revegetate	Not applicable	

*Occasionally, short-duration, intense, livestock grazing may be acceptable (for example, to open up a dense indigenous graminoid ground layer that is shading and outcompeting smaller indigenous forbs). You should seek expert botanical advice if considering this option if the indigenous groundcover is $\geq 25\%$.

Grazing management options decision tree – Quality Remnant



Go to Step 4: Implement the chosen option (page 7).

Modified Remnant

Characteristics

Modified Remnant is a weedier version of *Quality Remnant*. It typically has a low-to-moderate intensity livestock grazing history, with some soil disturbance. It has probably not been cultivated or fertilised.

Typical *Modified Remnant* vegetation state characteristics

Overstorey	Shrub layer	Ground cover
<ul style="list-style-type: none"> Overstorey is usually older in profile, but areas often still contain several overstorey age classes (different and smaller-diameter classes) There has often been no recent tree recruitment There may be some individuals of exotic overstorey species (e.g. willows or poplars) 	<ul style="list-style-type: none"> Introduced species dominate the shrub layer Indigenous shrubs are still evident, even if sparsely distributed and old Shrub recruitment may be evident 	<ul style="list-style-type: none"> Introduced species dominate the ground cover, especially aggressive colonising weeds (such as annual grasses, blackberry, cocksfoot and phalaris) There may be some indigenous ground layer: if so, it may maintain a reasonable diversity of indigenous species (however, the distribution will likely be patchy)

Examples of *Modified Remnant* vegetation state sites



Grazing management options summary

Grazing management option	Predicted outcome	Acceptability
Maintain the existing livestock grazing regime	<25% indigenous species ground cover: Site remains <i>Modified Remnant</i> , with reduced recruitment opportunities	Not acceptable
	≥25% indigenous species ground cover: Site degrades to either: a lesser-quality version of this state (with less indigenous ground cover) OR Mature Overstorey	Not acceptable*
Control the livestock grazing regime	<25% indigenous species ground cover: Site remains <i>Modified Remnant</i> : grazing controls ground layer biomass and enable recruitment of indigenous groundcover and/or woody species	Acceptable
	≥25% indigenous species ground cover: Site may degrade to a lesser-quality version of this state	Not acceptable**
Exclude livestock grazing	<25% indigenous species ground cover: Site remains <i>Modified Remnant</i> , with some risk of degradation in vegetation structure	Tolerable
	≥25% indigenous species ground cover: Site improves to <i>Quality Remnant</i> through unassisted patterns of recruitment	Beneficial
Exclude livestock grazing and revegetate	<25% indigenous species ground cover: Site remains <i>Modified Remnant</i> , with an increase in vegetation structure	Acceptable
	≥25% indigenous species ground cover: Site improves to <i>Quality Remnant</i> through assisted control of herbaceous weeds	Beneficial

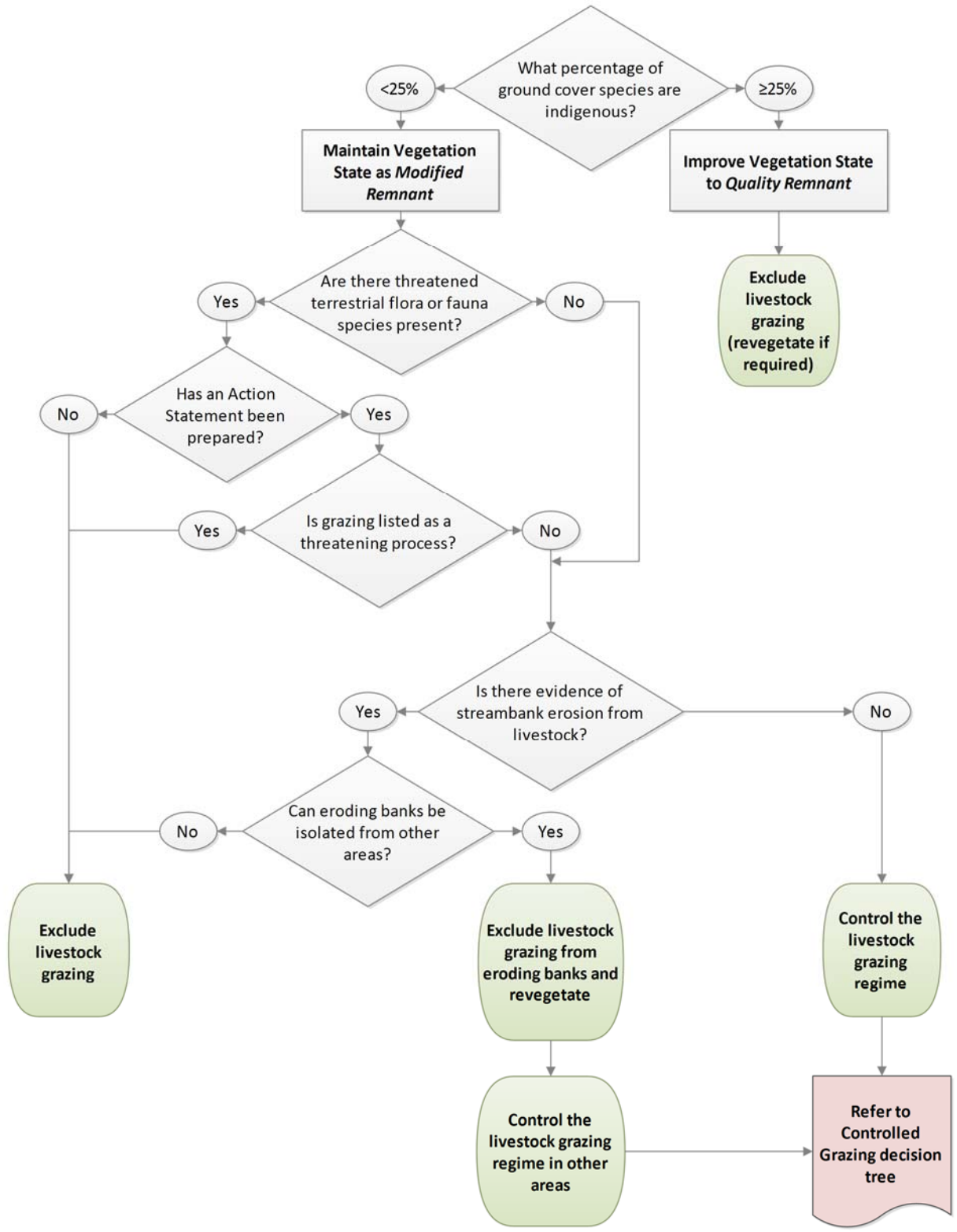
* Occasionally, the existing grazing regime is acceptable, most notably where a high level of indigenous ground cover is the result of current grazing practices.

**Occasionally, short-duration, intense livestock grazing may be acceptable (for example, to open up a dense indigenous graminoid ground layer that is shading and outcompeting smaller indigenous herbs and forbs. You should seek expert botanical advice if considering this option).

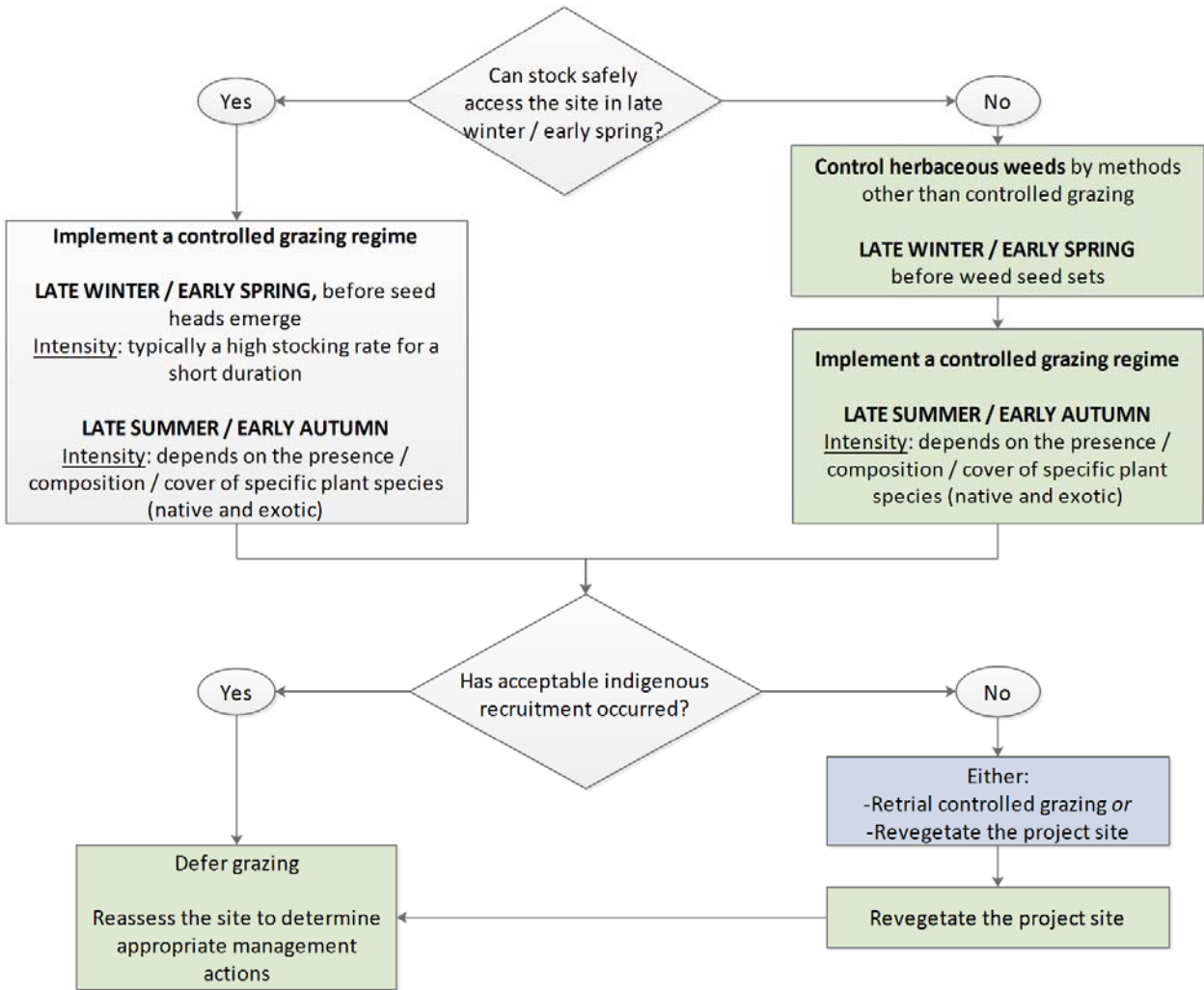
For further information regarding controlled grazing

If you decide to undertake controlled grazing in the *Modified Remnant* vegetation state, you should consult section 3.3.4 of the *Decision tool and guidelines* (DELWP 2016) for detailed advice.

Grazing management options decision tree - Modified Remnant



Controlled grazing decision tree - Modified Remnant



Go to Step 4: Implement the chosen option (page 7).

Young Overstorey

Characteristics

Riparian sites in the *Young Overstorey* vegetation state are most likely to have had significant low-to-moderate intensity livestock grazing, with some soil disturbance, but probably not to have been cultivated or fertilised.

Typical *Young Overstorey* vegetation state characteristics

Overstorey	Shrub layer	Ground cover
<ul style="list-style-type: none"> Overstorey is well-treed Overstorey has a younger profile and is multi-aged, but with no evidence of recent recruitment There are some older (larger diameter) individuals, but they are isolated and/or scattered There may be individuals of exotic overstorey species 	<p>A shrub layer is unlikely, due to direct clearance, the death of mature plants, and/or the continual loss of recruits through grazing</p>	<ul style="list-style-type: none"> Ground cover may have a reasonable diversity of indigenous species, mostly grazing-tolerant, but is likely to be patchy with low abundance Introduced species are likely to be the dominant vegetation

Examples of *Young Overstorey* vegetation state sites



Grazing management options summary

Grazing management option	Predicted outcome	Acceptability
Maintain the existing grazing regime	Site remains <i>Young Overstorey</i> , growing to <i>Mature Overstorey</i> over 20–30 years	Acceptable
Control the grazing regime	Site improves to the higher-quality <i>Modified Remnant</i> over 20–30 years, provided there is some natural recruitment of tree and shrub species	Beneficial
Exclude grazing	Site remains <i>Young Overstorey</i> , growing to <i>Mature Overstorey</i> over 20–30 years	Acceptable
Exclude grazing and revegetate	Site improves to the higher-quality <i>Modified Remnant</i> over 20–30 years through assisted natural recruitment and/or replanting	Beneficial

For further information regarding controlled grazing

If you decide to undertake controlled grazing in the *Young Overstorey* vegetation state, you should consult section 3.4.4 of the *Decision tool and guidelines* (DELWP 2016) for detailed advice.

Grazing management options decision trees – *Young Overstorey*

If the management objective is to maintain the vegetation state as *Young Overstorey* (shifting to *Mature Overstorey* over time) use Figure 1 below to determine the appropriate grazing management option for the site. If the management objective is to improve the vegetation state to *Modified Remnant*, use Figure 2.

Figure 1 - Grazing management options decision tree - maintain the vegetation state as *Young Overstorey*

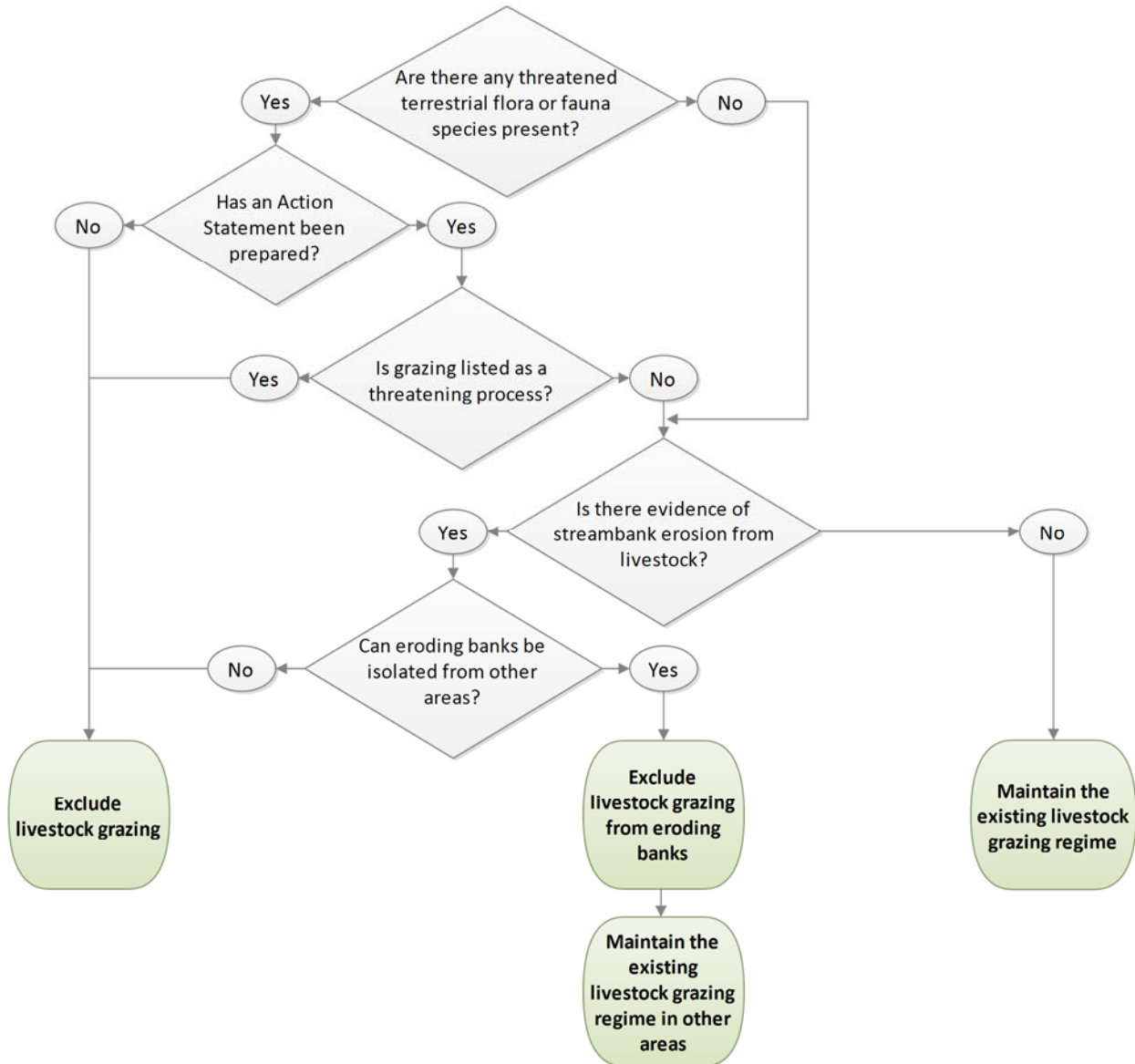
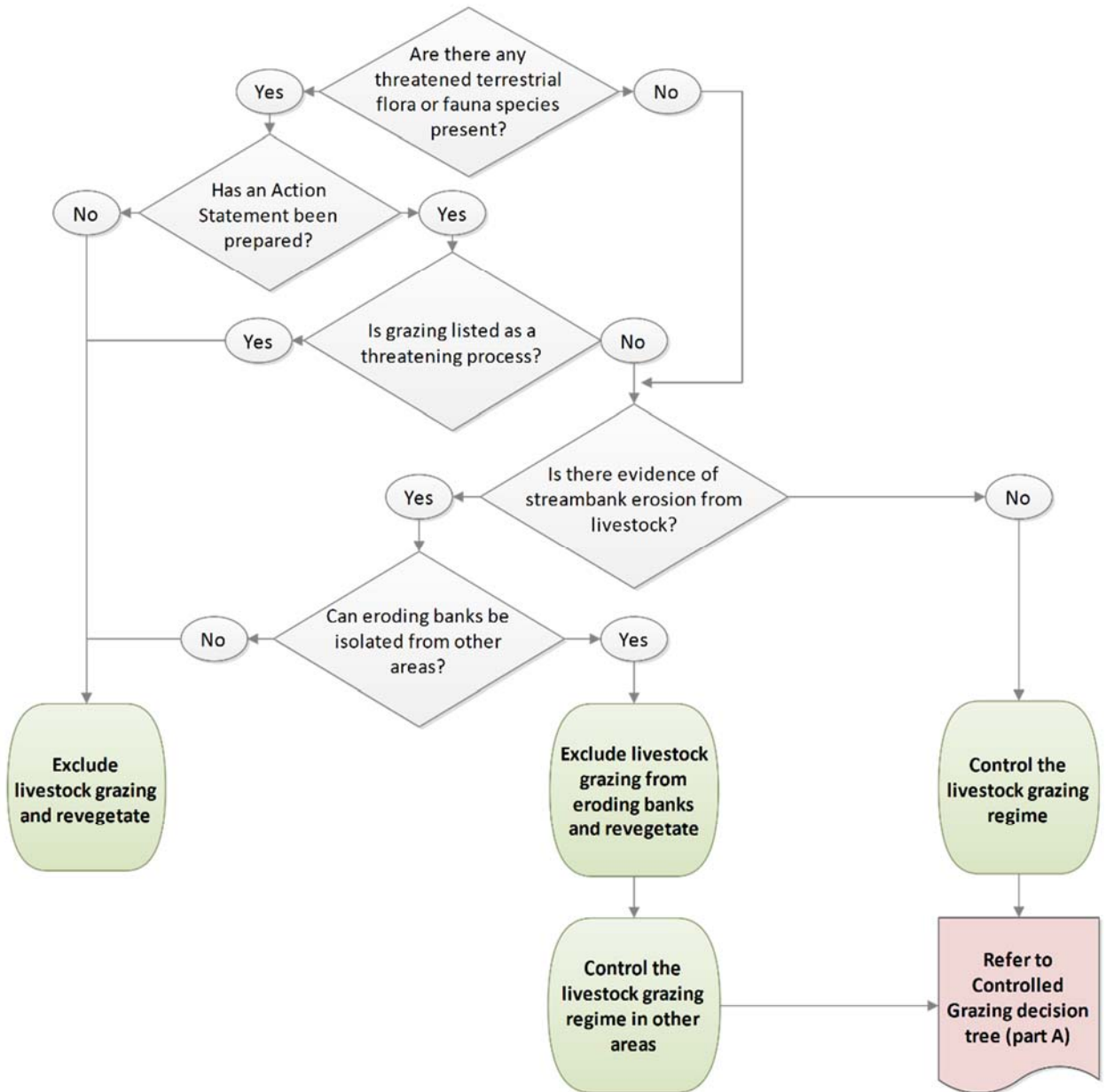


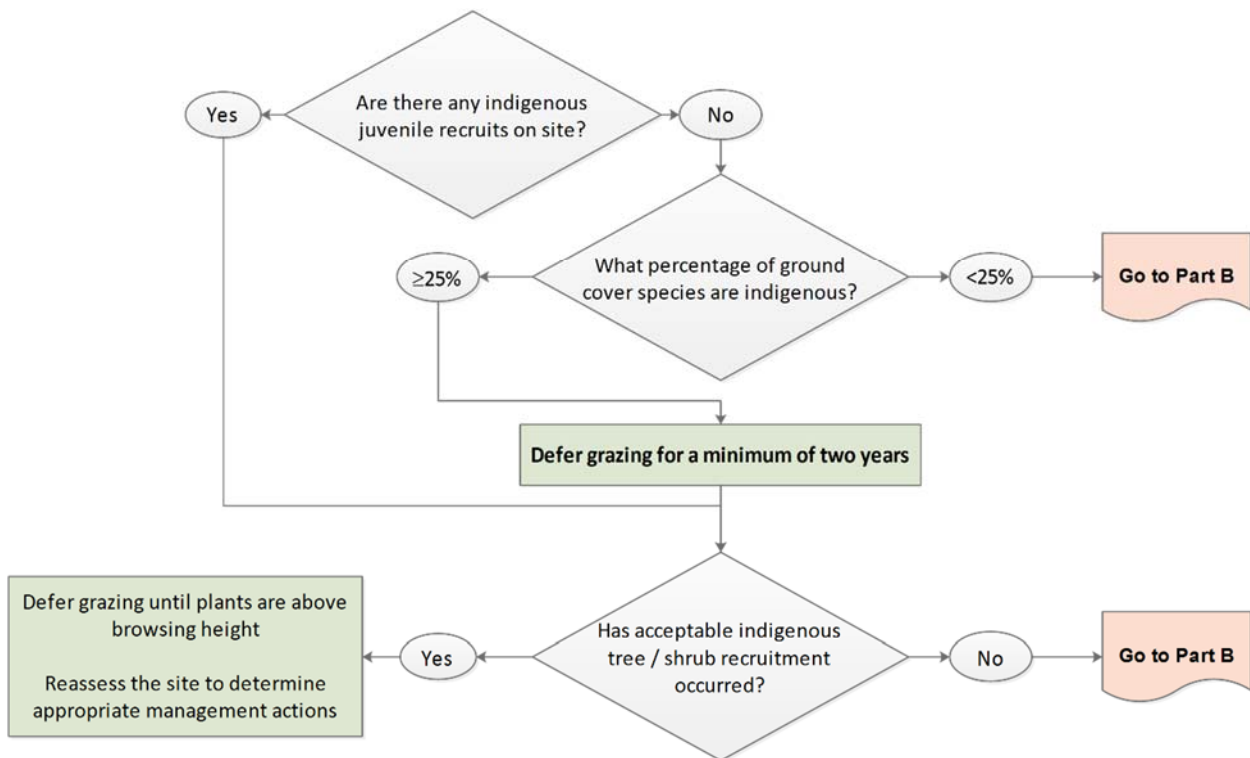
Figure 2 - Grazing management options decision tree - improve the vegetation state to Modified Remnant



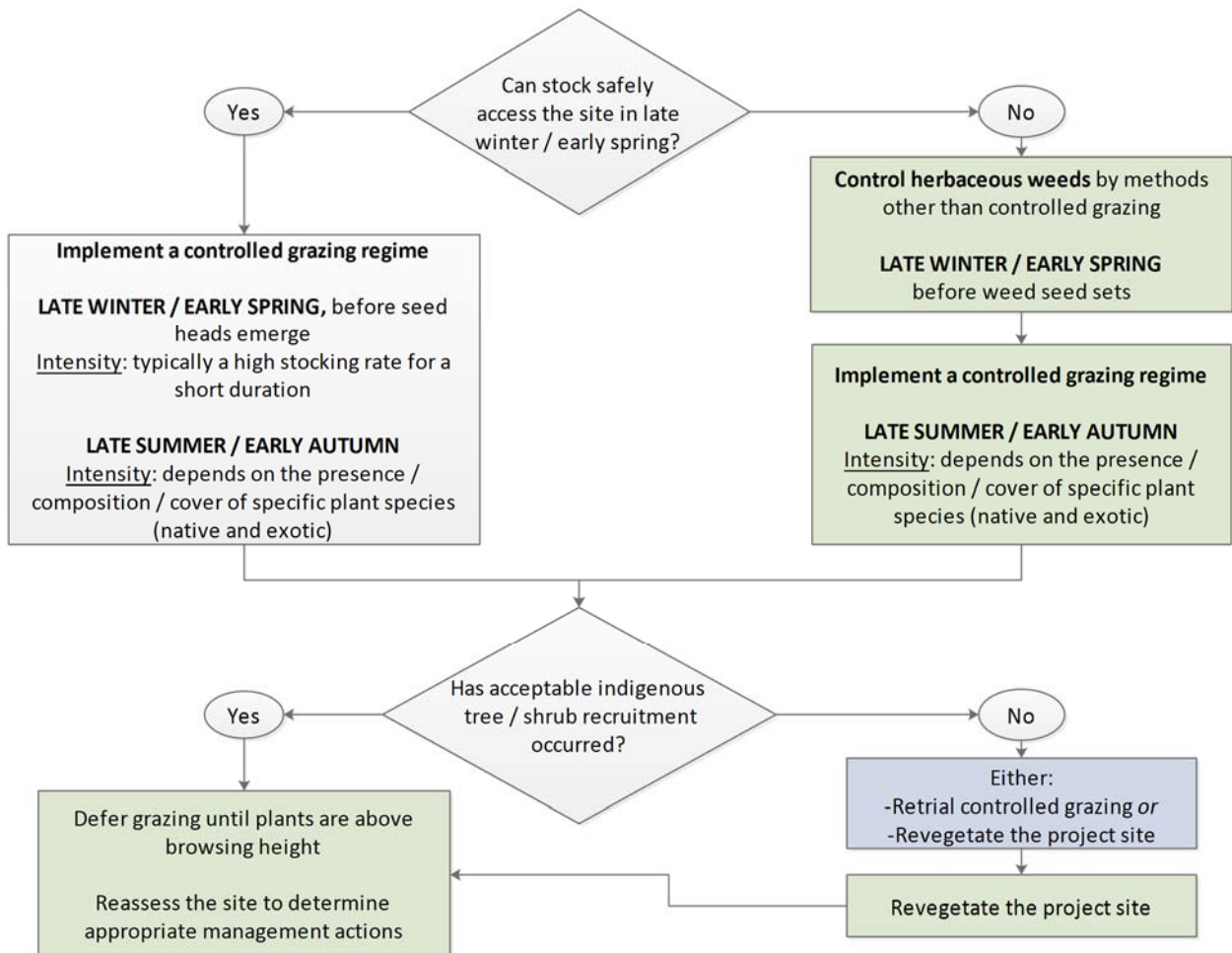
Young Overstorey

Controlled grazing decision trees – *Young Overstorey*

Controlled grazing decision tree for *Young Overstorey* (Part A)



Controlled grazing decision tree for *Young Overstorey* (Part B)



Go to Step 4: Implement the chosen option (page 7).

Native Grassy

Characteristics

Sites in the *Native Grassy* vegetation state have only been lightly grazed for much of their history. They are either naturally treeless, or were originally treed but the overstorey has been progressively cleared over time, with the shrub layer either cleared or progressively lost due to grazing pressure.

For naturally treeless sites (where the dominant strata is the graminoid layer), the understorey may be diverse and strongly indigenous. The ongoing presence of tussocky graminoid species suggests that *Native Grassy* sites have had minimal soil disturbance, and have not been cultivated or fertilised.

Typical *Native Grassy* vegetation state characteristics

Overstorey	Shrub layer	Ground cover
<ul style="list-style-type: none"> • There is no overstorey OR • Individuals are isolated/ scattered 	<ul style="list-style-type: none"> • There is no shrub layer OR • Individuals are isolated/ scattered 	<ul style="list-style-type: none"> • Ground cover is predominantly indigenous tussocky graminoids (grasses, rushes and sedges)* • There is low abundance/diversity of introduced species • There may be some indigenous herbs and forbs between tussocks

*Many of these species are tolerant to livestock grazing, or promoted by it.

Examples of *Native Grassy* vegetation sites



Grazing management options summary

Grazing management option	Predicted outcome	Acceptability
Maintain the existing livestock grazing regime	Naturally treeless sites: Site remains <i>Native Grassy</i> , with little or no change to vegetation structure and composition	Acceptable
	Originally treed sites: Site remains <i>Native Grassy</i> , but grazing inhibits the establishment of indigenous woody species	Tolerable
Control the livestock grazing regime	Naturally treeless sites: Site remains <i>Native Grassy</i> , with potential improvements in vegetation structure and composition	Acceptable*
	Originally treed sites: Site improves to <i>Shrubby, Single-Aged Young Overstorey</i> or <i>Young Overstorey</i> , depending on seed source availability	Beneficial**
Exclude livestock grazing	Naturally treeless sites: Site remains <i>Native Grassy</i> , with some degradation in vegetation structure	Tolerable
	Originally treed sites: Site remains <i>Native Grassy</i> , with some degradation in vegetation structure	
Exclude livestock grazing and revegetate	Naturally treeless sites: Site degrades to <i>Revegetation</i> , compromising the natural structure of the grassland	Not acceptable
	Originally treed sites: Site improves to <i>Shrubby, Single-Aged Young Overstorey</i> or <i>Young Overstorey</i> , depending on the species planted and the number of planting events	Beneficial

* However, more intense grazing than the historical intensity which maintained the site as naturally treeless is not acceptable. You should seek expert botanical advice if considering this option.

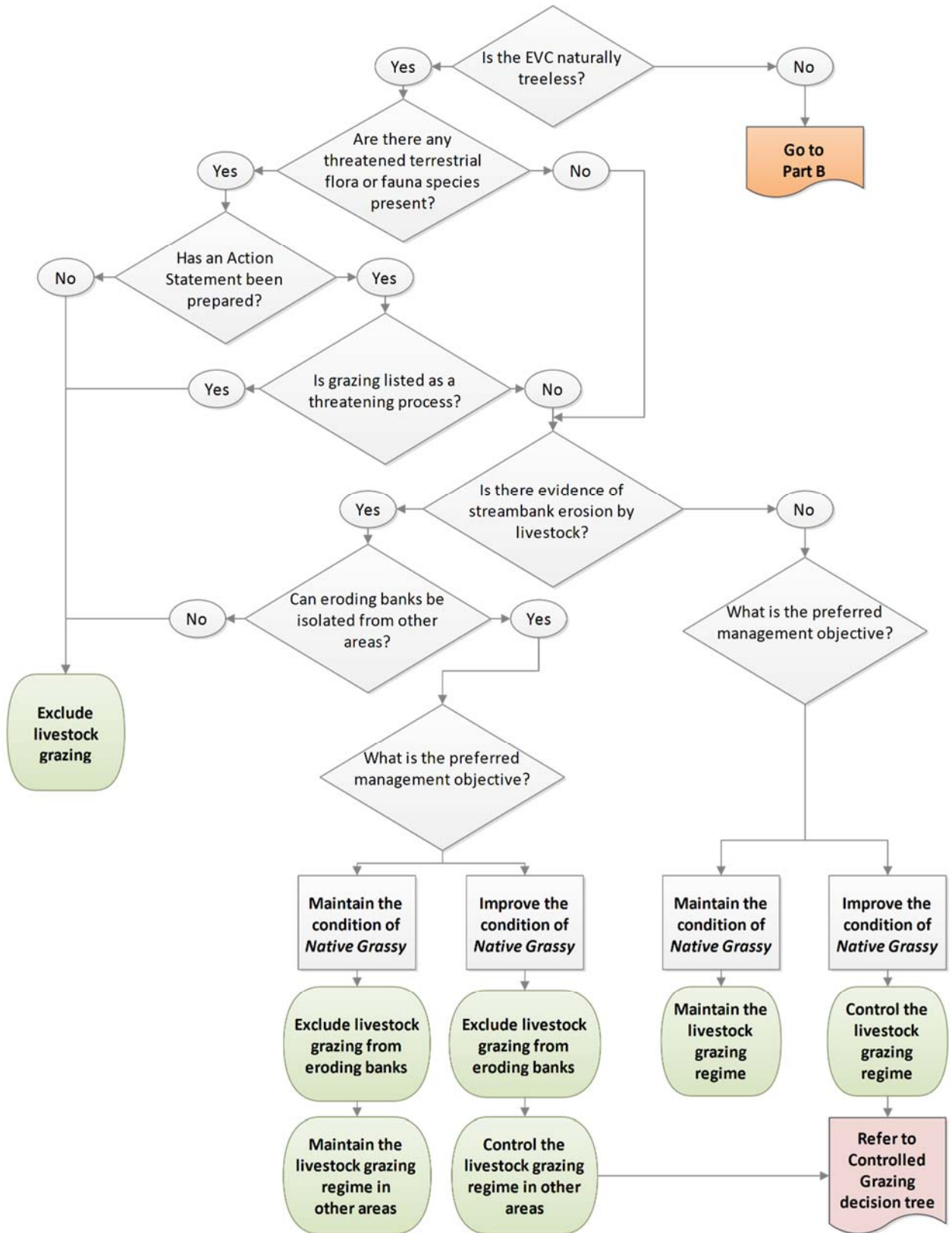
** You should seek expert botanical advice if considering this option.

For further information regarding controlled grazing

If you decide to undertake controlled grazing in the *Native Grassy* vegetation state, you should consult section 3.5.4 of the *Decision tool and guidelines* (DELWP 2016) for detailed advice.

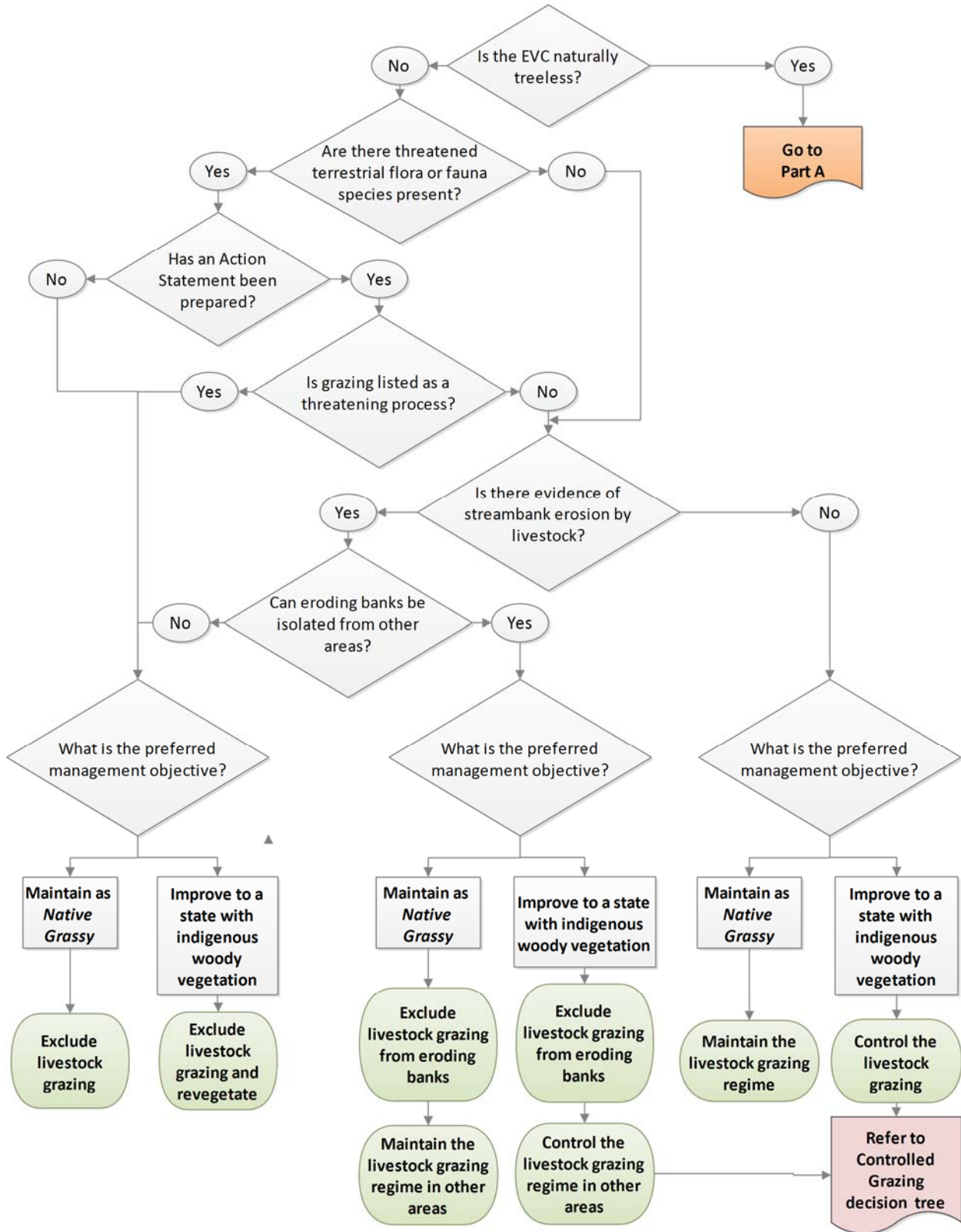
Grazing management options decision trees – *Native Grassy*

Grazing management options decision tree for *Native Grassy* (Part A – naturally treeless)

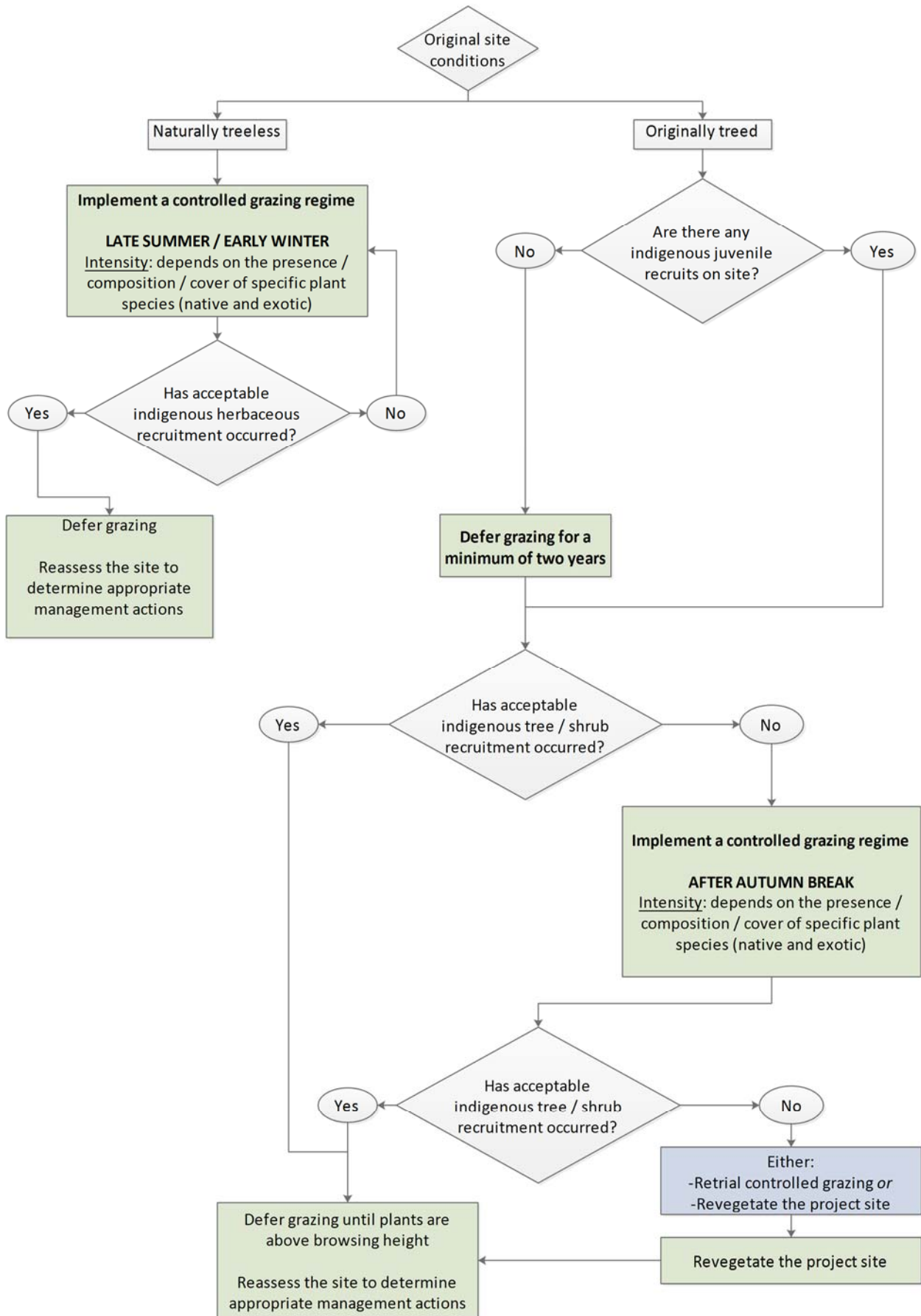


Native Grassy

Grazing management options decision tree for *Native Grassy* (Part B – originally treed)



Controlled grazing decision tree – Native Grassy



Go to Step 4: Implement the chosen option (page 7).

Mature Overstorey

Characteristics

Sites in the *Mature Overstorey* vegetation state will have had moderate-to-high-intensity livestock grazing, which will have significantly disturbed the soil. Younger and smaller-diameter trees would have been progressively cleared over time, with grazing preventing juvenile plants from becoming established.

Typical *Mature Overstorey* vegetation state characteristics

Overstorey	Shrub layer	Ground cover
<ul style="list-style-type: none"> Overstorey is usually older age classes, with no recent recruitment* There may be some exotic overstorey individuals 	There is no shrub layer, or only isolated individuals, and no shrub recruitment*	<ul style="list-style-type: none"> Introduced annual/perennial species usually dominate the ground cover There may be some indigenous ground cover, but it is likely to be very patchy and in low abundance

*You can categorise the site as *Mature Overstorey* even if there are some isolated/scattered younger individuals.

Examples of *Mature Overstorey* vegetation state sites



Grazing management options summary

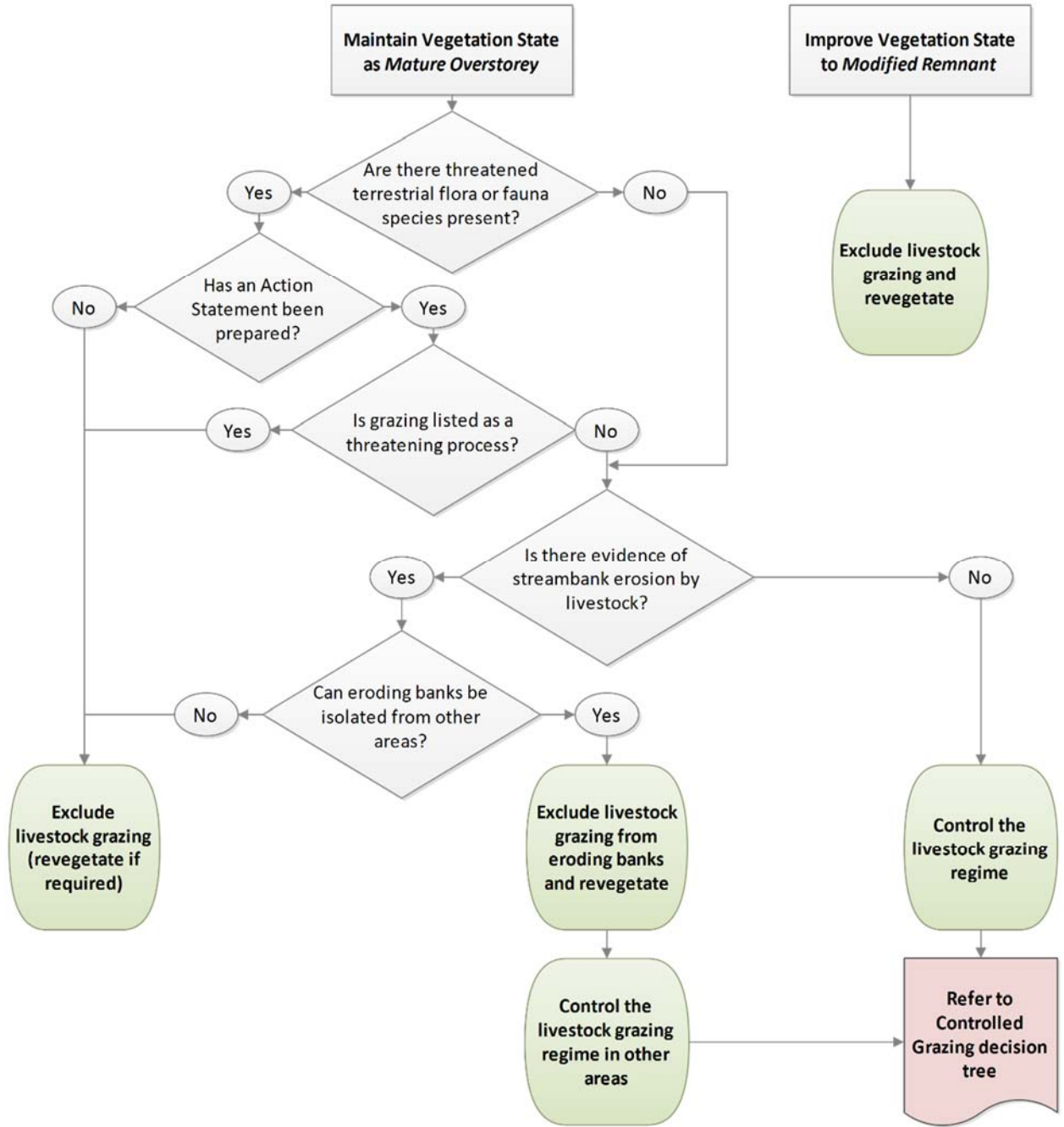
Grazing management option	Predicted outcome	Acceptability
Maintain the existing livestock grazing regime	Site remains <i>Mature Overstorey</i> for 20–50 years before degrading to <i>Exotic Pasture/Herbaceous</i>	Not acceptable
Control the livestock grazing regime	Site remains <i>Mature Overstorey</i>	Acceptable
Exclude livestock grazing	Site hydrologically connected to a river remains <i>Mature Overstorey</i>	Acceptable
	Site no longer hydrologically connected to a river degrades to the lesser-quality <i>Exotic Pasture/Herbaceous</i>	Not Acceptable
Exclude livestock grazing and revegetate	Site improves to the higher-quality <i>Modified Remnant</i> over 20–50 years	Beneficial

For further information regarding controlled grazing

If you decide to undertake controlled grazing in the *Mature Overstorey* vegetation state, you should consult section 3.6.4 of the *Decision tool and guidelines* (DELWP 2016) for detailed advice.

Mature Overstorey

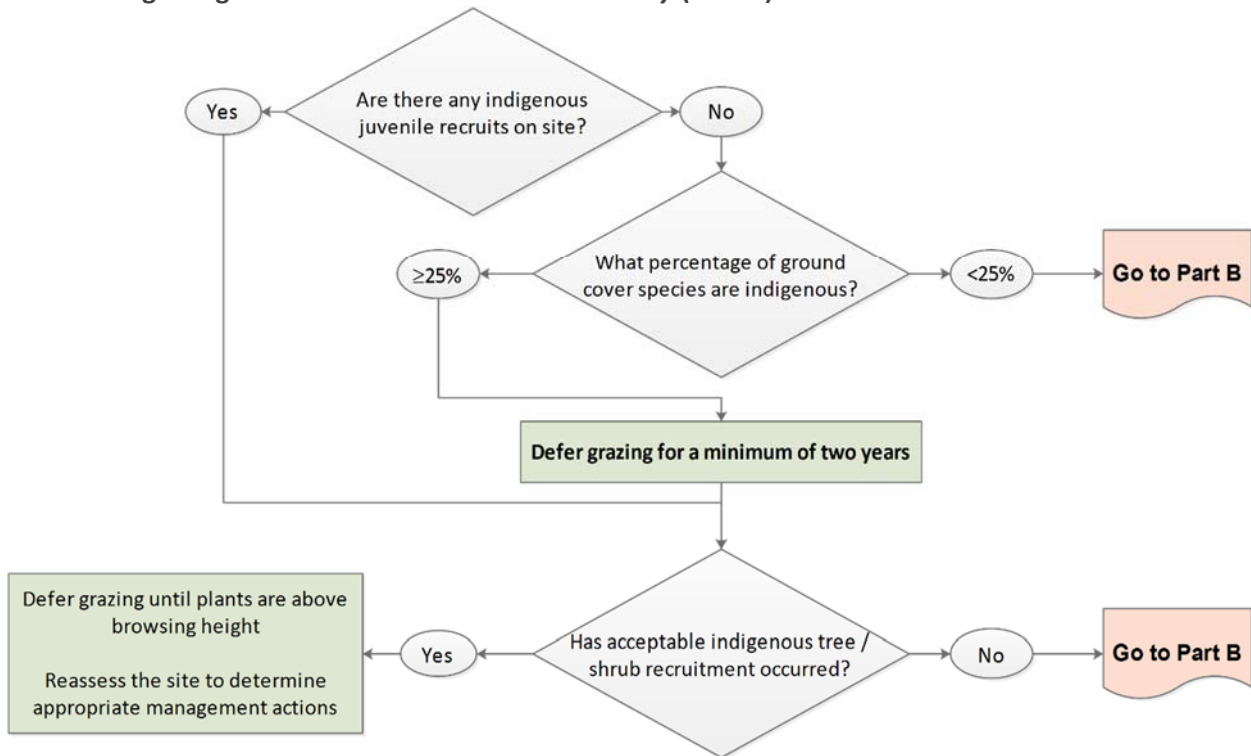
Grazing management options decision tree – *Mature Overstorey*



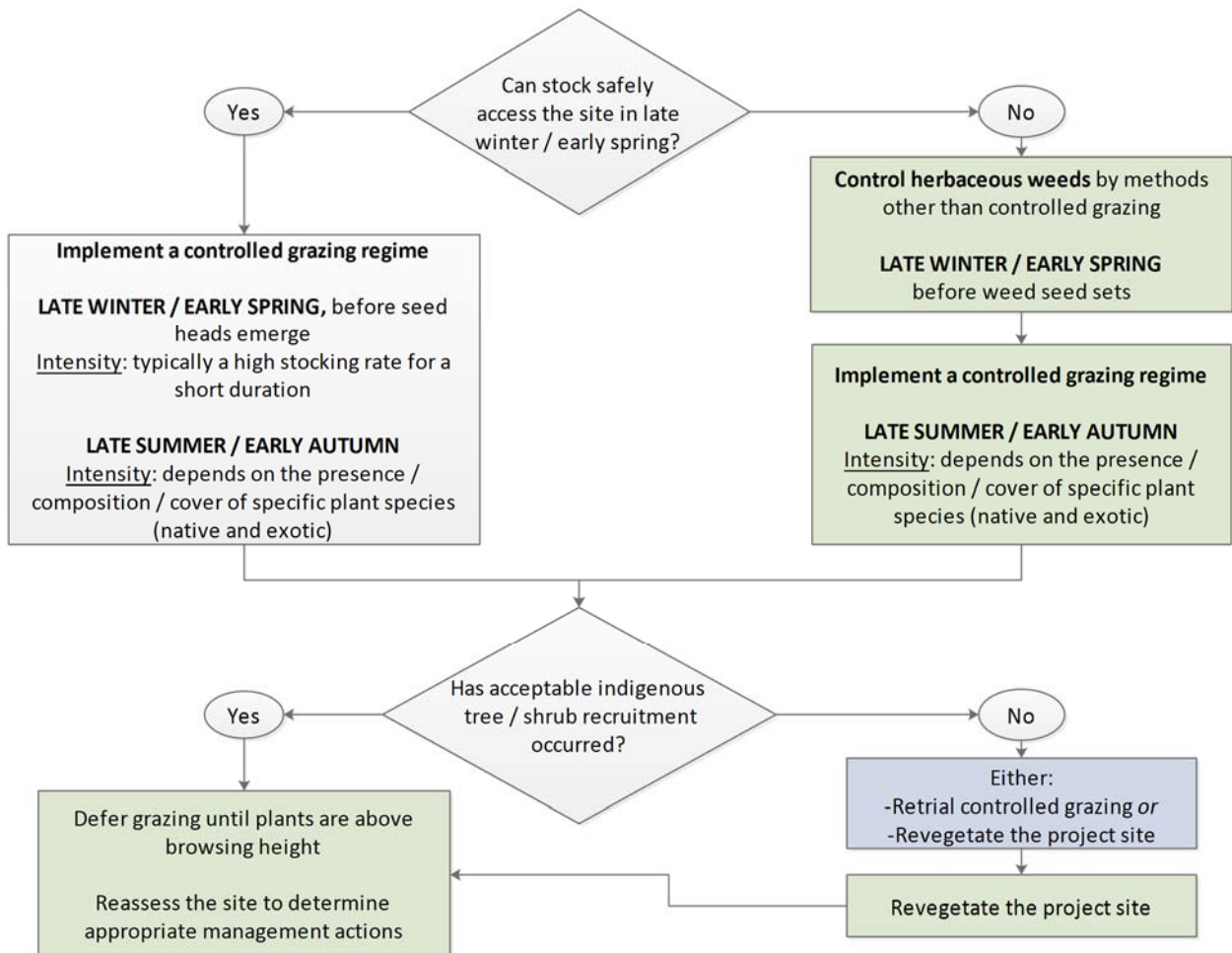
Mature Overstorey

Controlled grazing decision trees – *Mature Overstorey*

Controlled grazing decision tree for *Mature Overstorey* (Part A)



Controlled grazing decision tree for *Mature Overstorey* (Part B)



Go to Step 4: Implement the chosen option (page 7).

Single-Aged Young Overstorey

Characteristics

A riparian site in the *Single-Aged Young Overstorey* vegetation state is mostly comprised of younger overstorey individuals, beyond grazing height. This is due to a recent, single-event recruitment, or to revegetation that has now grown beyond grazing height.

Typical *Single-Aged Young Overstorey* vegetation state characteristics

Overstorey	Understorey (shrub layer and ground cover)
<ul style="list-style-type: none"> Overstorey is comprised of mostly younger individuals Tree stems may be very dense, depending on the time since recruitment—there may not have been enough time for natural thinning – or site circumstances* There could be exotic overstorey individuals 	Understorey may have some indigenous and introduced species, but their abundance will depend on the density of the overstorey

*You can categorise the site as *Single-Aged Young Overstorey* even if there are some isolated/scattered older individuals (with larger diameters).

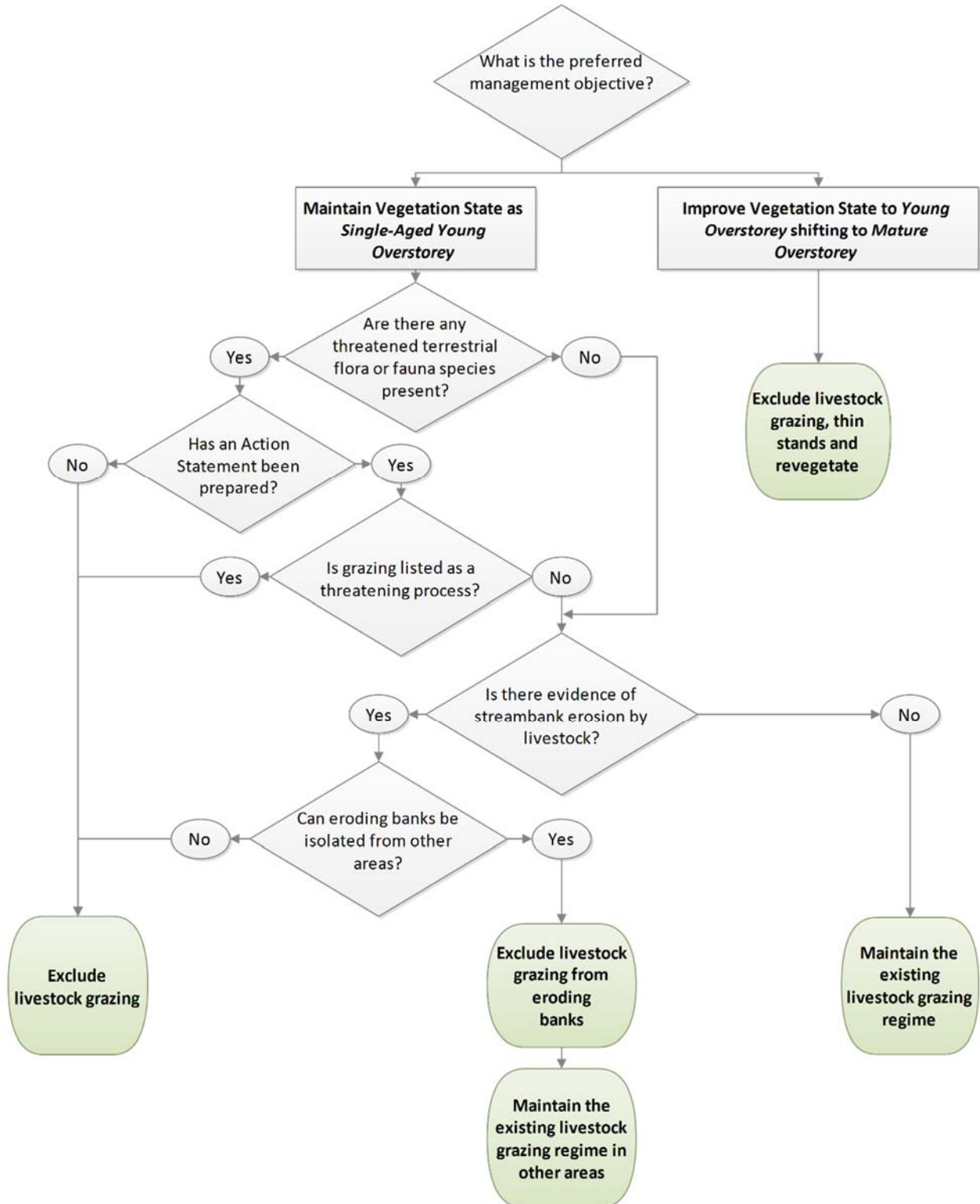
Examples of *Single-Aged Young Overstorey* vegetation state sites



Grazing management options summary

Grazing management option	Predicted outcome	Acceptability
Maintain the existing livestock grazing regime	Site remains <i>Single-Aged Young Overstorey</i> until there is natural thinning	Acceptable
Control the livestock grazing regime	Not applicable	
Exclude livestock grazing	Site remains <i>Single-Aged Young Overstorey</i> until there is natural thinning	Acceptable
Exclude livestock grazing, thin stands and revegetate	Site improves to <i>Young Overstorey</i> , then to <i>Mature Overstorey</i> , over 20–50 years	Beneficial

Grazing management options decision tree - *Single-Aged Young Overstorey*



Go to Step 4: Implement the chosen option (page 7).

Shrubby

Characteristics

Sites in the *Shrubby* vegetation state are likely to have had major tree clearing and/or tree mortality, as well as periods of grazing pressure. You will need to know the site's EVC to determine whether the site is naturally treeless or originally treed.

Typical *Shrubby* vegetation state characteristics

Overstorey	Shrub layer	Ground cover
Overstorey usually has no trees, and no evidence of recruitment of tree species*	<ul style="list-style-type: none"> A medium-to-tall shrub layer of only one or two species (from 1m high) dominates the shrub layer There may be evidence of recent recruitment of these species, depending on the recent grazing regime There may be areas which are naturally treeless (according to their EVC benchmark): if so, the understorey may be predominantly indigenous species 	<ul style="list-style-type: none"> The cover and abundance of the ground layer depends on the density of shrub stems The ground layer is likely to comprise introduced species, especially grasses

*You can categorise the site as *Shrubby* even if there are some isolated/scattered older individuals (with larger diameters).

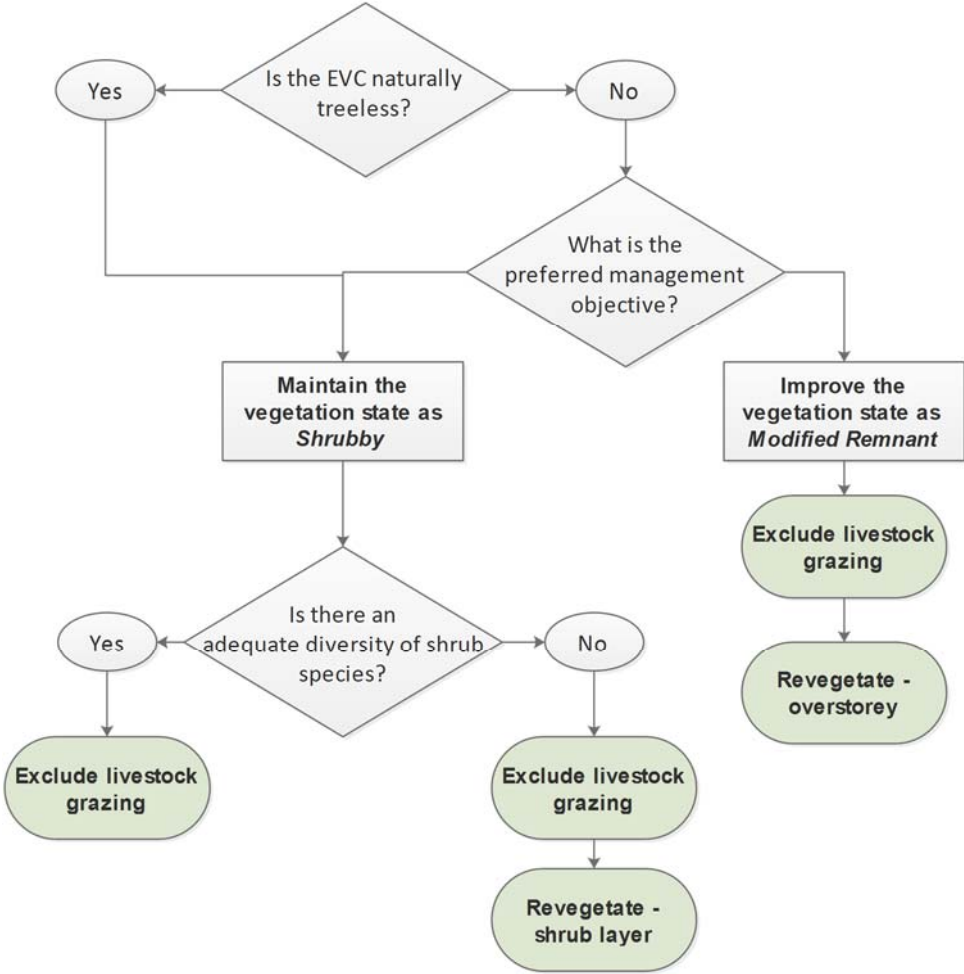
Examples of *Shrubby* vegetation state sites



Grazing management options summary

Grazing management option	Predicted outcome	Acceptability
Maintain the existing livestock grazing regime	Site degrades to poor-quality <i>Exotic Pasture/Herbaceous</i>	Not acceptable
Control the livestock grazing regime	Site remains <i>Shrubby</i> but possibly in a more degraded condition	Not acceptable
Exclude livestock grazing	Site remains <i>Shrubby</i> , and the vegetated area increases	Acceptable
Exclude livestock grazing and revegetate	Site improves to either <i>Modified Remnant</i> or a more diverse <i>Shrubby</i> state	Beneficial

Grazing management options decision tree - Shrubby



Go to Step 4: Implement the chosen option (page 7).

Exotic Pasture/Herbaceous

Sites in the *Exotic Pasture/Herbaceous* vegetation state will have experienced: the complete, or near complete, clearing of trees and other indigenous vegetation; significant soil disturbance; and enhanced soil fertility and diminished soil structure.

Typical *Exotic Pasture/Herbaceous* vegetation state characteristics

Overstorey	Shrub layer	Ground cover
<ul style="list-style-type: none"> • Most overstorey has been removed or is dead (as a result of a single event, progressive clearing and/or tree dieback) • There may be some scattered trees 	<p>No indigenous shrub layer remains (as living plants or dormant seed in the soil seed bank)</p>	<ul style="list-style-type: none"> • No indigenous ground cover remains (as living plants or dormant seed in the soil seed bank) • There is a reduced litter layer • Introduced annual and/or perennial species dominate, whether they were sown for a productive purpose or are opportunistic colonisers

Examples of *Exotic Pasture/Herbaceous* vegetation state sites



Grazing management options summary

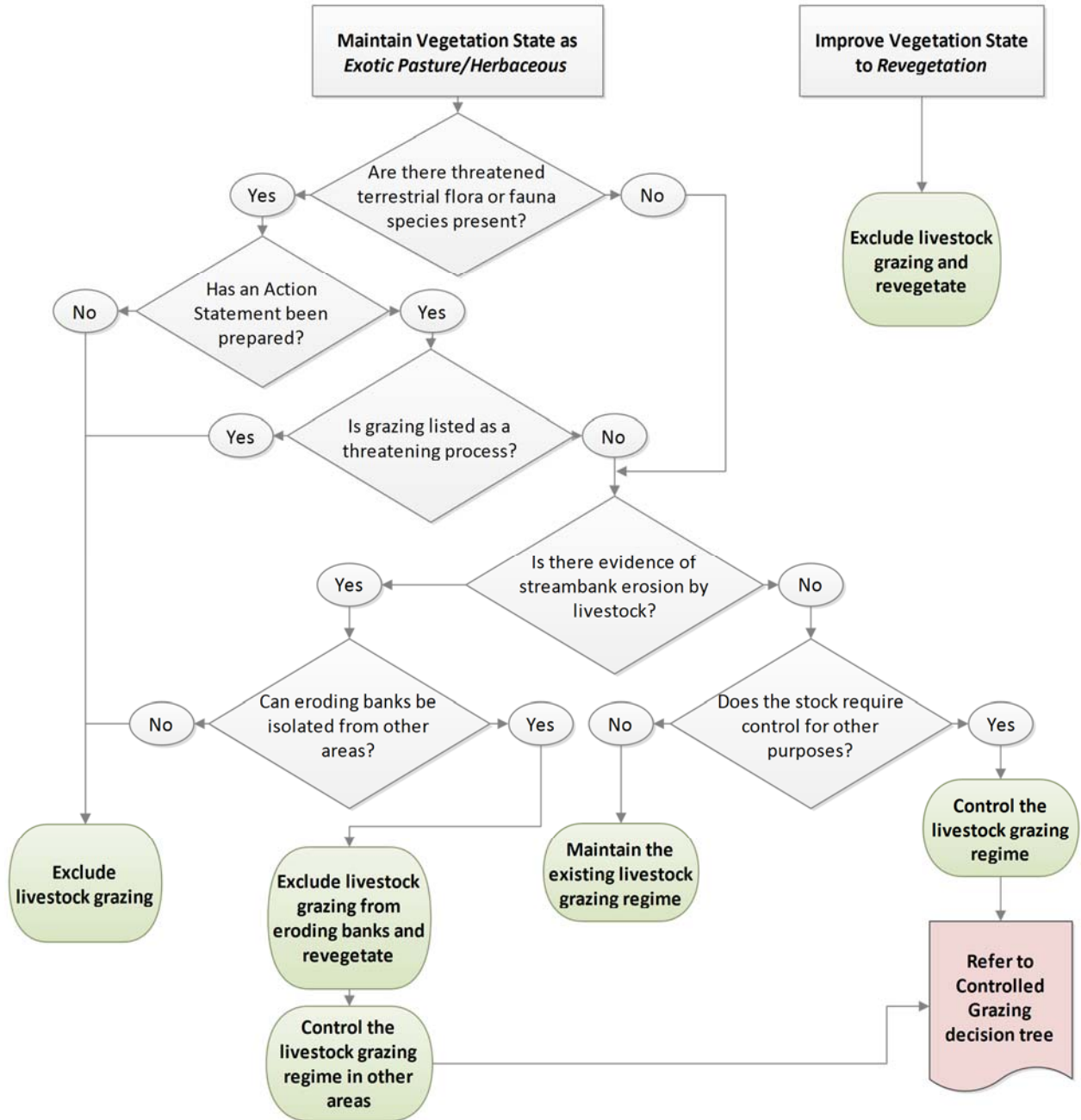
Grazing management option	Predicted outcome	Acceptability
Maintain the existing livestock grazing regime	Site remains Exotic Pasture/Herbaceous	Acceptable
Control the livestock grazing regime	Site remains Exotic Pasture/Herbaceous	Acceptable*
Exclude livestock grazing	Site remains <i>Exotic Pasture/Herbaceous</i> , with an increase in ground layer plant biomass	Acceptable*
Exclude livestock grazing and revegetate	Site improves to <i>Revegetation</i> state, with potential to improve to better-quality states	Beneficial

*The degree of acceptability depends on project objectives; these may include protecting the quality of a downstream remnant by using livestock to control weed seed production and reducing the perceived fire risk.

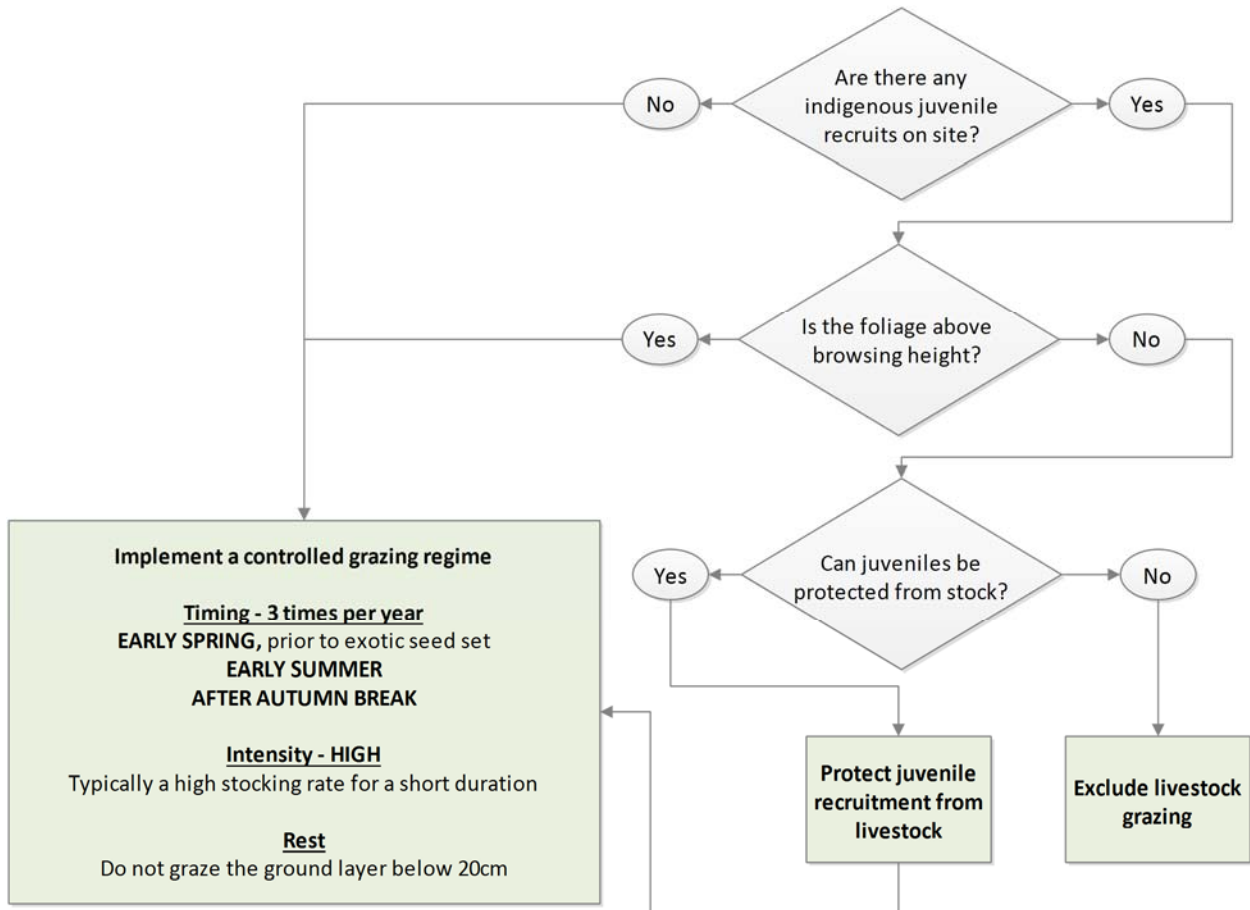
For further information regarding controlled grazing

If you decide to undertake controlled grazing in the *Exotic Pasture/Herbaceous* vegetation state, you should consult section 3.9.4 of the *Decision tool and guidelines* (DELWP 2016) for detailed advice.

Grazing management options decision tree - Exotic Pasture/Herbaceous



Controlled grazing decision tree - Exotic Pasture/Herbaceous



Go to Step 4: Implement the chosen option (page 7).

Exotic Woody

Characteristics

Sites in the *Exotic Woody* vegetation state are dominated by exotic tree and/or shrub species. They will have experienced: considerable clearing of indigenous vegetation; significant soil disturbance; and enhanced soil fertility.

Typical Exotic Woody characteristics

Overstorey	Shrub layer	Ground cover
<ul style="list-style-type: none"> The tallest layer/strata is exotic trees (such as willows and poplars) which dominate the site There are no, or few, indigenous overstorey individuals remaining 	<p>The tallest layer/strata is exotic shrubs (such as gorse and blackberry) which dominate the area</p>	<ul style="list-style-type: none"> Due to extensive shading and a deep exotic litter layer, there is little ground layer when the tallest layer is in leaf* If present, the ground layer will be dominated by introduced species or large areas of a thick litter layer in winter, with the seasonal opening of the canopy

* Not all dominant exotics species are deciduous.

Examples of *Exotic Woody* vegetation state sites



Grazing management options summary

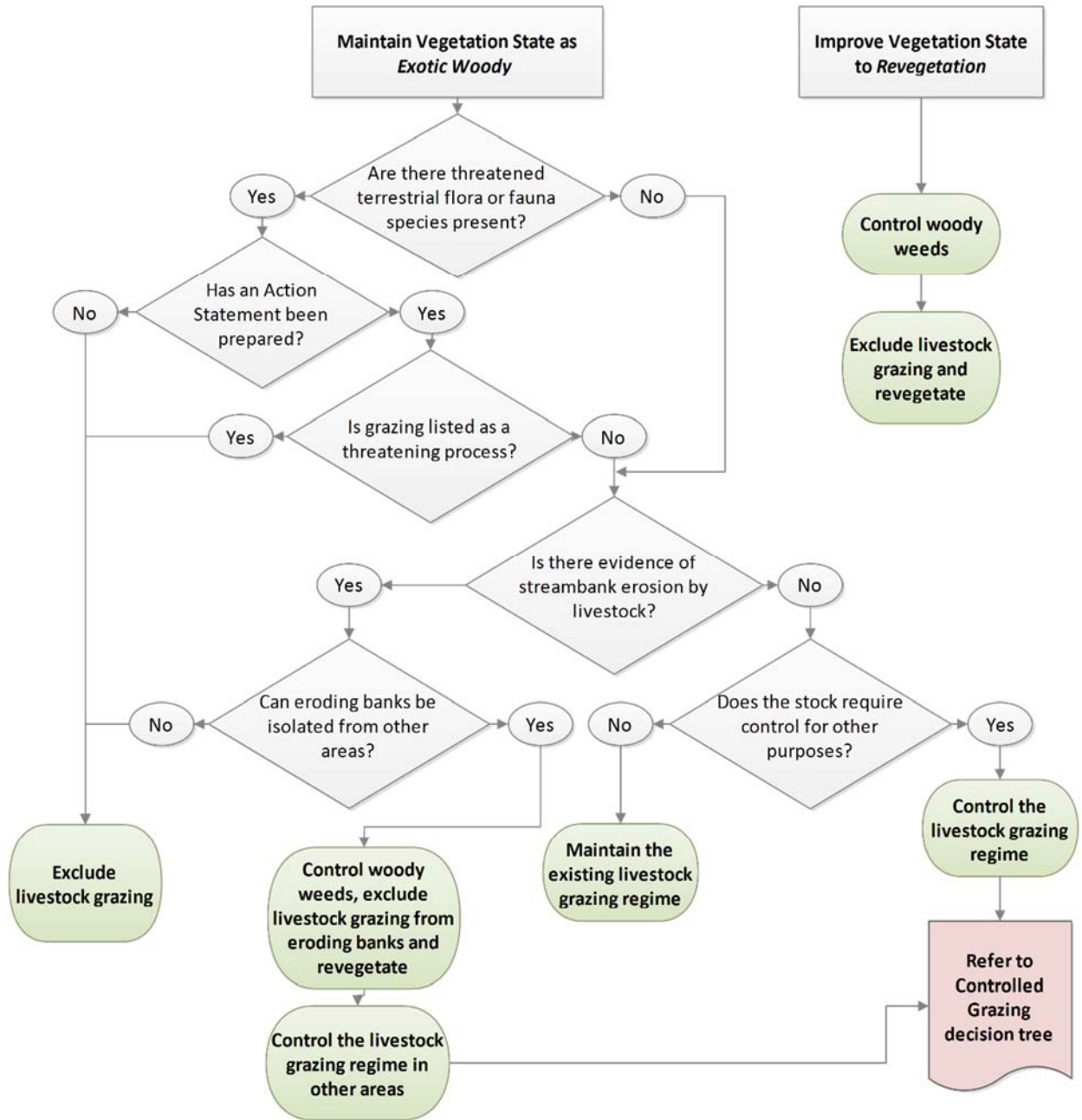
Grazing management option	Predicted outcome	Acceptability
Maintain the existing livestock grazing regime	Site remains <i>Exotic Woody</i>	Acceptable
Control the livestock grazing regime	Site remains <i>Exotic Woody</i>	Acceptable*
Exclude livestock grazing	Site remains <i>Exotic Woody</i> , with an increase in ground layer plant biomass	Acceptable*
Control woody weeds THEN exclude livestock grazing and revegetate	Site improves to <i>Revegetation</i> state, with potential to improve to higher-quality states	Beneficial

*The degree of acceptability depends on the project objectives. For example, project objectives may include protecting the quality of a downstream remnant by using livestock to control weed seed production in late winter through early spring and reducing the perceived fire risk.

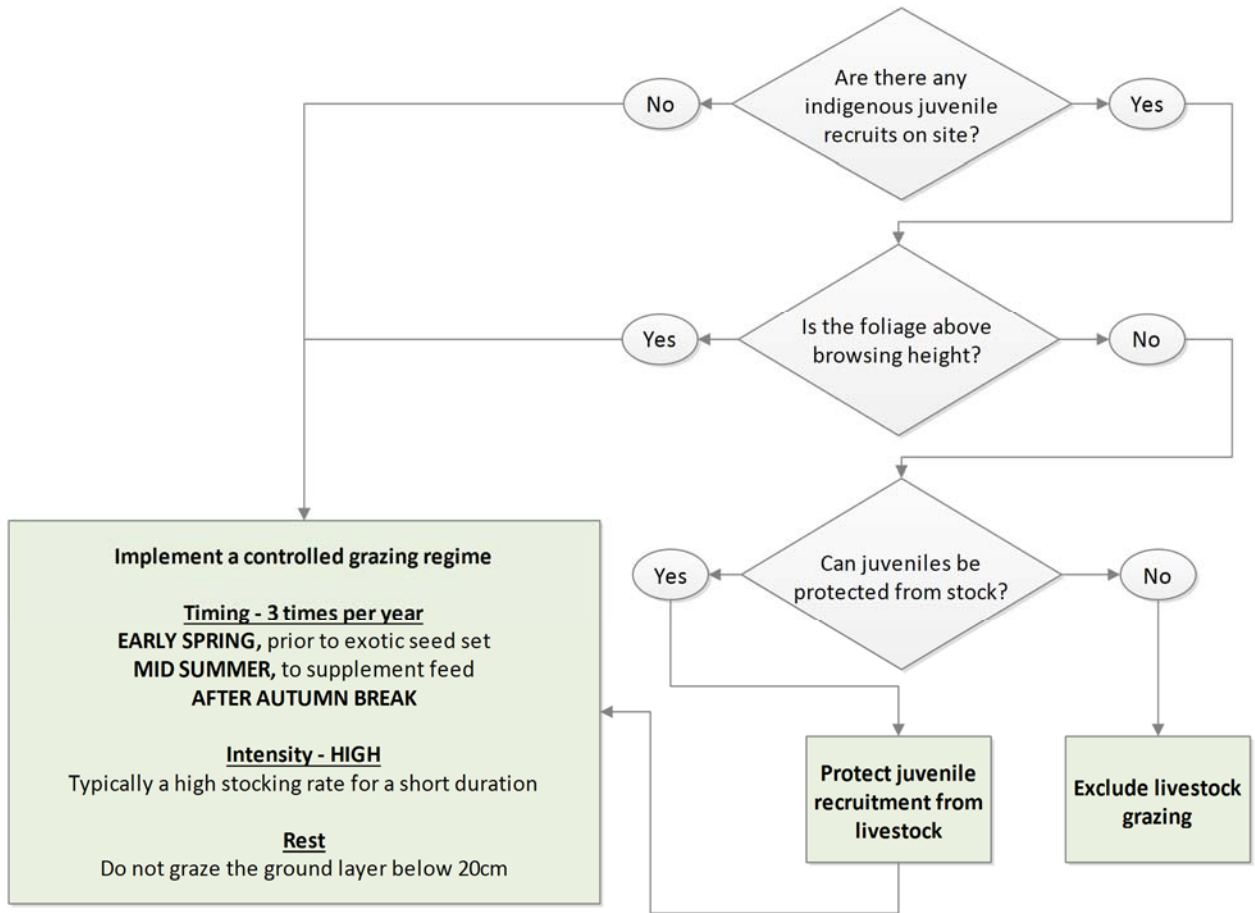
For further information regarding controlled grazing

If you decide to undertake controlled grazing in the *Exotic Woody* vegetation state, you should consult section 3.10.4 of the *Decision tool and guidelines* (DELWP 2016) for detailed advice.

Grazing management options decision tree - *Exotic Woody*



Controlled grazing decision tree - Exotic Woody



Go to Step 4: Implement the chosen option (page 7).

Revegetation

Characteristics

Sites in the *Revegetation* state would have been *Exotic Pasture/Herbaceous* before revegetation works. These sites will have experienced: the clearing of indigenous vegetation (with no effective indigenous soil seed bank for most species); significant soil disturbance; and enhanced soil fertility.

Typical *Revegetation* vegetation state characteristics

Overstorey	Shrub Layer	Ground Cover
Generally, revegetation of these sites is either even-aged or multi-age stands of planted overstorey	<ul style="list-style-type: none"> A variety of woody understorey species may have been planted Older plantings generally have fewer understorey species planted 	The ground cover is mostly introduced annual/perennial species

Examples of *Revegetation* vegetation state sites



Grazing management options summary

Grazing management option	Predicted outcome	Acceptability
Maintain the existing livestock grazing regime	Site degrades to poor-quality <i>Exotic Pasture/Herbaceous</i>	Not acceptable
Control the livestock grazing regime	Site degrades to poor-quality <i>Exotic Pasture/Herbaceous</i>	Not acceptable
Exclude livestock grazing	Site improves to <i>Shrubby</i> or <i>Single-Aged Young Overstorey</i> , depending on species planted	Beneficial
Exclude livestock grazing and revegetate	Not applicable	

Go to Step 4: Implement the chosen option (page 7).

Appendix A: Grazing management options field assessment sheet (for agency field staff)

1. Background information

Landholder name	Project works name/number	Date of record
Property address		

2. **What is the project site location?** (Use the start and end of the project site as minimum photo point locations: that is, 'end point, looking in')

Mapping coordinates (eastings and northings)			
Start		Finish	
E	N	E	N

3. **What is the grazing history of the project site?** (For example, the intensity and type of animal)

4. What is the current grazing regime?

Uncontrolled stock access
 Controlled stock access
 No stock access

If 'Controlled stock access', what are the rules? (For example, the stocking rate, timing and frequency)

How is the current grazing regime performing? (For example, is the site condition improving or degrading? Has weed cover increased/decreased? Is there bare ground? Is there negligible livestock impact?)

5. Which, if any, threatened terrestrial flora and fauna species are present?

Common name	Scientific name	Has an action statement been prepared?		Is grazing a listed threat?	
		<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
		<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
		<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
		<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Other flora and/or fauna species of significance:

6. Are there bank instabilities?

Is there evidence of streambank erosion from livestock? Yes No

If yes, can eroding banks be isolated from other areas? Yes No

7. What is the current vegetation state?

Pre-European
 Quality Remnant
 Modified Remnant
 Young Overstorey

Native Grassy
 Mature Overstorey
 Single-Aged Young Overstorey
 Shrubby

Exotic Pasture/Herbaceous
 Exotic Woody
 Revegetation

What percentage of groundcover is indigenous? < 25% ≥ 25%

If Native Grassy, what is the origin of the site? Naturally treeless Originally treed

8. What is the preferred management objective?

- Maintain the condition of the current vegetation state
- Improve the condition of the current vegetation state

9. For the current vegetation state, what is the level of acceptability of each grazing management option?

Option	Not acceptable	Tolerable	Acceptable	Beneficial
Maintain the existing livestock grazing regime	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Control the livestock grazing regime	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exclude livestock grazing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exclude livestock grazing and revegetate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other option (describe):	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ONLY complete the questions below if you identified controlled livestock grazing as a possible grazing management option.

10. What is the desired outcome from implementing the controlled livestock grazing regime?

- To open up the indigenous graminoid layer
- To reduce herbaceous weeds
- To create site conditions for regeneration of indigenous trees and shrubs

Other outcomes: _____

11. What factors affect the timing, stocking rate and/or duration of controlled grazing?

Can livestock safely access the site in late winter/early spring? Yes No

Other site-specific factors: _____

12. What is the initial controlled grazing regime?

	Late winter/ early spring	Early summer	Late summer/ early autumn	After autumn break	Late summer/ early winter	Deferred
Timing:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Type of animal:	Rate (animals/ha):					
Duration (days):						

What will be the effect of this timing on both native and introduced species?

13. How will the controlled grazing regime be monitored?

Will the landholder document the grazing episodes? Yes No

When will the site be reassessed? _____ / _____ / 20____

Is the landholder capable of effectively managing the controlled grazing episode?

Other comments/information relevant to the site:

Appendix B: Grazing management record sheet (for landholder use)

To be completed by the landholder for each grazing event

Background information

Landholder name	Project works name/number	Date of record
Property address		

****Please attach the following (labelled) photos of the site****

Before the grazing episode

Start of project site (looking into site): End of project site (looking into site):

After the grazing episode

Start of project site (looking into site): End of project site (looking into site):

Grazing regime

	Late winter/ early spring	Early summer	Late summer/ early autumn	After autumn break	Late summer/ early winter	Deferred
Timing:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Type of animal:	Rate (animals/ha):					
Duration (days):						

Before grazing

Ground cover rating (immediately before controlled grazing)

Bare ground (negligible cover)	25% or less ground cover (plants widely spaced with obvious bare ground)	50% ground cover (half of the area has ground cover)	75% ground cover (minimal bare ground)	100% ground cover (no bare ground visible)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

After grazing commences

Ground cover rating (immediately after controlled grazing)

Bare ground (negligible cover)	25% or less ground cover (plants widely spaced with obvious bare ground)	50% ground cover (half of the area has ground cover)	75% ground cover (minimal bare ground)	100% ground cover (no bare ground visible)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Is there any evidence of perennial grass recruitment? Yes No
If yes, it is native or exotic? Native Exotic I'm not sure

Assessment of controlled grazing implementation

Was the controlled grazing successful?
Were there any adverse effects from the controlled grazing on native plants?
When is the next planned grazing episode (i.e. 120 day rotation; after Autumn break etc.)

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