2. Principles for the identification of rehabilitation priorities on the Central Plateau

With any large rehabilitation effort, it is necessary to decide where to start. This is certainly the case with broad scale erosion on the Central Plateau. Forms of degradation vary from the loss of vegetation creating bare ground, through to the partial or complete loss of soil profiles. This results in an ecosystem that no longer maintains the full range of natural features and functions. It also has implications for water quality and hydrology from degraded catchments.

The study area for this project covers almost 150,000 hectares. Of this, 11,000 hectares was mapped as having 10% or more bare ground in 1990. This erosion for the most part exists as a series of small patches dispersed through areas of presently stable soil and healthy vegetation. As a result, a further 20,000 hectares of presently vegetated land is within 100 m of a patch of bare ground, and so might be considered to be at risk of erosion should existing patches expand. If intervention is considered necessary to ensure the recovery of the area, this represents a huge rehabilitation task, even without taking into account the difficulties of access and suitable rehabilitation techniques and materials. For this reason, it is necessary to prioritise our actions.

The ultimate purpose of the prioritisation scheme discussed here is to identify the areas where rehabilitation of eroded ground should begin, and the order in which remaining areas should be tackled. However, as will be discussed below, the information required to assign priorities to degraded areas is not presently available. What follows is therefore a discussion of the priority categories that should be used, the principles on which they are based, and the information needed to apply them to the Plateau.

2.1.1. The underlying goals of this prioritisation scheme

When identifying priorities it is important to be explicit about the underlying goals and values that motivate the exercise. Management goals for the Plateau could relate to nature conservation, maintenance of water catchments and water quality, or maintenance of recreational facilities. Clearly, the Plateau presently serves all of these purposes, and any one could be used as a basis for identifying rehabilitation priorities. The result would be priority lists that overlap partially, but not completely, and may at times be in direct conflict.

The overall goal of management of the Tasmanian Wilderness World Heritage Area is "to identify, protect, present and, where appropriate, rehabilitate the world heritage and other natural and cultural values of the WHA, and to transmit that heritage to future generations in as good or better condition than at present" (Parks and Wildlife Service, 1999). These values include special values such as threatened species or significant landforms, or large areas of high ecological integrity that have escaped degradation by soil erosion at any stage.

The ultimate aim of the prioritisation discussed here is to protect and rehabilitate conservation values on the Plateau. We are working *towards* the goal of a natural soil profile, that is vertically and horizontally complete, with natural rates and magnitudes of disturbance, supporting a natural ecosystem that includes all the special conservation values that presently occur in the area. As discussed earlier in Section 1.2, this is not achievable within management timeframes. The immediate more achievable goal is an environment where soil loss has stopped, and natural soil forming processes are functioning.

2.2. Rehabilitation priorities on the Plateau

The basic aim underlying all prioritisation is to achieve the greatest possible progress towards achieving your goal that is possible with the resources available. Some basic principles underlie all efforts to identify priorities for rehabilitation for conservation purposes (for example, see Brierley and Nagel, 1994; Rutherfurd *et al*., 1999; Rutherfurd and Jerie, 2000; Brierley and Fryirs, 2005). These are described below, and are linked to priority activities in the context of the Central Plateau.

In addition to the broad categories described here, it is worth remembering to be both pragmatic and strategic. Identification of priority areas should also take into account issues such as developing good demonstration sites (easy to reach areas with a high probability of success) and promoting the benefits of rehabilitation in other agencies by achieving their goals as well as straight conservation goals (such as improvements to water catchments). However, these pragmatic issues are not addressed any further in this document.

2.2.1. Priority One: Protection of remaining assets

Rehabilitation is often difficult, time consuming, expensive and produces uncertain results. Rather than making degraded sites the top priority, it is more efficient to avoid the need for rehabilitation as far as possible, by identifying areas that still meet your conservation goal, and ensuring that they remain that way. Large areas of the Plateau that have not been degraded by soil erosion are valuable for their ecological integrity, particularly where they "contain all or most of the key interrelated and interdependent elements in their natural relationships" (UNESCO, 2002) and are of "sufficient size and contain the necessary elements to demonstrate the key aspects of processes that are essential for the long-term conservation of the ecosystems and the biological diversity they contain" (UNESCO, 2002).

> **Priority One**: Protection of large areas with high ecological integrity that have not suffered erosion, but are threatened by degradation in neighbouring environments.
> **Rank similar sites by**: Size of area (large is more valuable than small), degree of naturalness and strategic impact of site.
> **Action**: Protect against existing threats, such as advancing erosion scarps or excessive sediment from erosion upstream.
> Protect against new disturbances (eg fire or renewed grazing).

Note that protecting these asset rich areas against the threat of degradation involves identifying and treating the sources of that threat, wherever they occur. This could involve actions such as attempts to keep new disturbances such as fire out of the area. It may involve rehabilitation works away from the priority area, in order to prevent disturbances such as an advancing erosion scarp or sediment deposition from impacting the previously undisturbed area.

To date, no areas of the Plateau have been identified that match this criteria. Reasons for this are discussed in Chapter 3 below.

2.2.2. Priority Two: Protection of special conservation values

Special conservation values include significant soils, landforms, threatened species or communities. The lunettes at Lake Augusta are an example of a landform with special conservation value (see Figure 13). These high altitude sand dunes are nationally and possibly internationally rare (Bradbury, 1994), and are listed on the Tasmanian Geoconservation Database. They are largely relict features, and are very susceptible to erosion. Areas with specific conservation values are a priority for protection or rehabilitation works, regardless of their present condition.

Numerous areas of this type will exist on the Plateau, but to date the systematic field work and data analysis necessary to identify them has not been completed.

Priority Two: Protection of areas that support significant soils, landforms, threatened species or communities, and that are threatened by erosion related disturbance.

Rank similar sites by: Relative conservation value (a landform that is internationally rare may be a higher priority than one that is uncommon locally), immediacy of threat and strategic impact of site.

Actions: Protect against existing threats, such as advancing erosion scarps or excessive sediment from erosion upstream.

Protect against new disturbances (eg fire or renewed grazing).

Figure 13. Rehabilitation works to protect the geoconservation value of the Lake Augusta Lunette.

2.2.3.   Priority Three: Partially degraded areas

It is notable that a large proportion of degraded land on the Plateau is only partially degraded (for example, see Figure 14). While these areas are sufficiently altered to not count as 'near natural condition', and may not support threatened species or significant landforms, considerable conservation value still exists in the remnants of soil and vegetation. As well as the existing values, such areas are of value because they have potential to return to a near natural condition in the future.

The vast bulk of degraded areas on the Plateau will fall into this category, which means that ranking within this priority class is important. Higher priority should be assigned to areas where significant degradation will continue to occur in the absence of intervention. These areas are important because the longer they are neglected, the more values are lost and the more difficult the rehabilitation task becomes. Higher priority should also go to areas that are causing neighbouring areas to degrade, through effects such as increasing wind fetch, changed water flow paths, water quality deterioration, or sedimentation. Lower priority is

assigned to areas that are presently stable but require some kind of intervention for recovery to occur.

Priority Three: Partially degraded areas that still retain some conservation value but are actively deteriorating or not recovering naturally.

Rank similar sites by: Trajectory (actively degrading before stable sites), off site effects, relative conservation value, size of site, degree of naturalness of site, ease of intervention, probability of success, conservation value of successfully treated site and strategic impact of site.

Actions: Protect against existing threats, such as erosion scarps or excessive sediment from erosion upstream.

Actively promote the recovery of the site.

Protect against new disturbances (eg fire or renewed grazing).

Figure 14. A partially degraded area north east of Lake Fanny.

2.2.4.   Priority Four: Areas where there are no known effective rehabilitation techniques

In some areas there is no evidence that any of the known rehabilitation techniques have the potential to be effective. This is in fact the case with some areas on the Plateau, where techniques that have been trialed such as fertilising and mulching with jute have failed (for example see Figure 15). Such areas may have considerable conservation values remaining. However, until techniques are identified that have a reasonable chance of success, there is no point spending rehabilitation efforts on these areas. In such cases, these sites may become a priority for research, rather than rehabilitation.

In this situation, the rehabilitation effort can easily be wasted. It is possible that resources could be more productively used elsewhere in the state, rather than working on these areas.

> **Priority Four:** Areas where rehabilitation is likely to fail because there is no known effective rehabilitation technique.
> **Rank similar sites by**: Relative conservation value, potential for successful treatment, the time over which intervention must occur, the cost of intervention and strategic impact of site.
> **Actions**: Trial new rehabilitation techniques
> Intervene to create stability and encourage recovery.

Figure 15. An aerial view of the rehabilitation trials at Bernacchi (jute treatments are visible as pale stripes). To date, no treatments have succeeded in increasing vegetation cover at this site. This work is described in more detail in Chapter 3.

2.2.5.   Priority Five: Areas that are so degraded that rehabilitation is unlikely to succeed

Some areas are degraded to such an extent that rehabilitation is unlikely to succeed. These sites are so completely altered that very few original natural values remain, and there is little chance of developing any sort of healthy ecosystem within management timeframes, regardless of rehabilitation effort. On the Central Plateau, this 'basket case' category includes sites where soil has been completely lost over a large proportion of the area, leaving a bedrock sheet or shallow and unstable gravelly regolith. Large areas of this type exist on Wild Dog Tier (Figure 16). In this situation, rehabilitation is likely to be costly, very time consuming, and highly likely to fail altogether.

Again, rehabilitation effort spent at these sites can easily be wasted. Resources could potentially be more productively used elsewhere in the state, rather than working on these areas.

> **Priority Five**: Areas where rehabilitation is likely to fail because of the extent of degradation.
> **Rank similar sites by**: Relative conservation value, potential for successful treatment, the time over which intervention must occur, the cost of intervention and strategic impact of site.
> **Actions**: Intervene to create stability and encourage recovery.

Figure 16. An extensively degraded area at Wild Dog Tier. This area is close to 1,300 m asl and is very exposed to prevailing winds. There are large expanses of very shallow remnant gravels and some exposed bedrock. Rehabilitation of such areas is unlikely to succeed.

2.2.6.   Priority Six: Areas that are undergoing active natural recovery

These areas have suffered some degradation in the past, but degrading processes are no longer occurring, and natural recovery is occurring at such a rate that the condition is improving naturally. Under these circumstances, doing nothing is not likely to produce any negative results, because degradation has already ceased. Rehabilitation may be worthwhile if it can notably speed or augment the recovery process. However, there is relatively little to gain from such intervention, and often there is a risk associated with rehabilitation works. This is particularly the case in a harsh and marginal environment such as the Central Plateau, where any activity involving disturbance to existing soil or vegetation risks exacerbating the erosion problem.

Such sites need to be monitored to ensure that they do in fact continue to recover. Should the trajectory reverse, and the sites begin to suffer deterioration, then they are likely to fall within much higher priority categories. However, while natural recovery continues, rehabilitation efforts can easily be wasted on these sites. It is likely that resources could be more productively used elsewhere in the state, rather than working on these areas.

Priority Six: Partially degraded areas that still retain some conservation value and are recovering naturally.
Rank similar sites by: Relative conservation value, the degree of improvement to the rate of recovery or value of the final result, the risk of causing detrimental side effects, and strategic impact.
Actions:Monitor to ensure recovery continues.
        Intervene to speed recovery.
        Protect against new disturbances (eg fire or renewed grazing).

Figure 17. A naturally recovering area near Mt Jerusalem mapped by Cullen (1995) as 40 – 70% bare ground, now less than 5% bare.

2.2.7.   Concluding comments on rehabilitation priority classes

The priority classes discussed here are a way of broadly categorising the large area of eroded ground on the Plateau according to the urgency with which it requires rehabilitation attention. The intention of this scheme is to include all areas of the Plateau that are either degraded or threatened by degradation. This does not imply that all areas that fit into a priority category should be considered an important target for rehabilitation. Priorities 1 – 3 are areas where appropriate rehabilitation work should be an important part of management. However, priorities 4 – 6 area may never be seen as targets for rehabilitation action. This does not mean that they should be ignored, as research into rehabilitation methods (particularly for priority 4 areas) and monitoring of natural trajectory (particularly in priority 6 areas) will be very important.

2.3. Identification of priority areas

Identifying areas that fit into the priority classes described above depends upon knowledge of:
1.   the present condition of the area,
2.   the relative conservation value of the area,
3.   the trajectory of the area, and
4.   the cost and probability of success of appropriate rehabilitation techniques.

Knowledge of the present condition is needed to differentiate areas that show no sign of present or historical degradation (Priority 1) from partially degraded areas (Priority 3) and extensively degraded areas (Priority 5).   The location and relative value of conservation values is needed to identify remaining assets and areas with special conservation values (Priority 1 and 2).   The trajectory of the degradation is very important information for differentiating between areas that are presently degrading (Priority 3) and areas that are presently recovering and may not need rehabilitation (Priority 6).   The probability of success of different rehabilitation techniques in different environments is important for differentiating between sites that can be successfully treated (Priorities 1-3) from those that cannot (Priority 4)

At present, there is not sufficient information relating to points 1 – 4 above to make any meaningful attempt at identifying priority areas.   The field based component of this project has begun to assess points 1, 3 and 4.   This work is described in Chapter 3.   Unfortunately, even with this work there is insufficient knowledge of points 2, 3 and 4 to allow any breakdown of the mapped 11,000 ha of degraded land into these priority categories.   See Chapter 4 for a discussion of this.