Developing management thresholds for the N.S.W. Office of Environment and Heritage framework for trialling horse riding on wilderness trails

Kelly de Bie and William K. Morris
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**SUMMARY**

In November 2012 the NSW Government released the *Strategic Directions for Horse Riding in NSW National Parks* (OEH, 2012) - the ‘strategy’. The strategy committed to providing horse riding opportunities in parks, including the implementation of a two-year pilot program involving a trial of horse riding in five wilderness areas, subject to adopted amendments to the relevant parks’ plan of management. The proposed pilot program was to be based on a strategic adaptive management framework. The framework for this pilot program involved implementing the following process in collaboration with user groups (particularly the National Parks and Wildlife Service (NPWS) Horse Riding Consultative Group), regional advisory committee members, NPWS field staff, specialists and an expert panel.

**Process:**

1. Identify and agree on known or potential impacts on important park values which may arise in the context of the pilot program and the relevant park and plan of management;
2. Choose and agree on appropriate social, economic and environmental indicators of change for each of the known or potential impacts;
3. Develop a methodology for scientifically credible and practical monitoring, analysis and reporting on these indicators and their trends;
4. Agree on acceptable limits of change (i.e. thresholds or triggers) following the measurement and analysis of baseline data for each indicator; and
5. Agree on appropriate management intervention options for responding to any unacceptable change or observable trend (i.e. trigger or threshold exceeded) in the indicators.

This is the first time that NPWS has used such a framework to the implementation of a new visitor activity program. The pilot program has therefore been informed by the similar approaches adopted in South East Queensland (Pickering, 2008) and has been informed by other related reviews (e.g. Newsome et al, 2008). The Monitoring Framework for Wilderness Horse Riding Trial (OEH, 2014) summarises the general approach to be taken in implementing Steps 1-3 above. The University of Melbourne has experience in helping agencies adopt similar adaptive management approaches and was therefore engaged to assist the NSW NPWS in working through steps 4 and 5 of this process. This was achieved through the running of four workshop sessions.

A structured decision making (SDM) approach was used throughout these workshops. This approach ensures that management thresholds are clearly connected to key management objectives and that the monitoring indicators represent the most appropriate way to measure the performance in achieving management objectives. The SDM approach also identifies management alternatives that are available to influence the management objectives.

The first workshop was held with NSW OEH staff and key stakeholders on the 4th April, 2014 at Hurstville, Sydney. The primary aim of the workshop was to outline the process for setting thresholds to form part of the monitoring framework. A structured decision making approach was used in the workshop and is outlined in this report.
Subsequent regional workshops were conducted for each trial site (Kosciuszko NP, Deua NP, Mummel Gulf NP) with the aim of developing quantitative thresholds for each of the objectives identified in the first workshop. Each workshop included local staff and interested stakeholder representatives. The aim of these workshops was to specify thresholds (decision points) and management actions that meet the local context for each trail. The workshops prioritised the objectives developed in the first workshop with local context; identified any local issues and operational/management options that should be considered in developing the thresholds; and contributed local knowledge and expertise to the development of values for thresholds and management actions.

This document builds on the Monitoring Framework for Wilderness Horse Riding Trial (OEH, 2014) and further explains the SDM process, as well as documenting the outcomes of each of the workshops.
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INTRODUCTION

This document compliments the Monitoring Framework for Wilderness Horse Riding Trial (OEH, 2014) by outlining the process used to establish management thresholds (acceptable limits of change) and providing the outputs from the four workshops held to achieve this end.

Threshold concepts in natural resource management

Thresholds are a useful tool for state-dependent, natural resource management decision-making. They provide a mechanism with which to decide when management should be implemented or altered, to prevent or reverse undesirable system changes (Nichols and Williams 2006, Lyons et al. 2008). In this context, management thresholds (referred to as standards in visitor management) are measurable statements that define limits of acceptable conditions. By specifying a limit on the amount of change that will be tolerated, thresholds narrow the focus of management from broad, qualitative statements of management intention, to specific statements about desired conditions that provide a basis for decisions. In visitor management, thresholds define the compromise between resource protection and access to (and quality of) recreational opportunities. Importantly, thresholds define the point past which conditions become unacceptable, they do not define desired or unacceptable conditions (Leung and Marion 2000).

Setting management thresholds ultimately involves inherently subjective and value-based management decisions. Meaningful and actionable thresholds need to be explicitly linked to fundamental management objectives via relevant indicators and appropriate management actions. It is desirable that thresholds are developed through a collaborative process with input from stakeholders.

Structured Decision Making

Structured decision making (hereafter SDM) is a tool for guiding managers through a decision process to facilitate transparent, logical and defensible decisions (Gregory et al. 2012). The SDM framework is applicable to a range of problem types, from localised decisions about specific issues to complex decisions with multiple stakeholders. Recently, SDM has been advocated as a useful approach for developing and setting thresholds for natural resource management (Martin et al. 2009, Gutenspergen 2014).

An SDM decision framework is driven by the objectives, or values, of those involved in the decision-making process. Essentially, the process involves an organised analysis of a problem to reach a decision that is focused explicitly on addressing fundamental objectives. This is accomplished through a core set of steps which help to structure and guide thinking about the decision problem (Runge 2011, Gregory et al. 2012). Each step of the SDM approach is undertaken formally and cooperatively to support defensible decision making. These steps are shown in Figure 1 and key definitions of common terms used are shown in Table 1. In the workshops, we worked through the first four steps of the framework.
Figure 1: Steps in a Structured Decision Making Framework (from Gregory et al 2012)

Table 1: Definition of keys terms used in SDM

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamental objectives</td>
<td>The broadest objective that will be directly influenced by the management alternatives and within the control of the decision maker. The outcome you really care about.</td>
</tr>
<tr>
<td>Role in SDM</td>
<td>Used to evaluate the performance of management alternative</td>
</tr>
<tr>
<td>Example</td>
<td>Minimise number of weed species</td>
</tr>
<tr>
<td>Means objectives</td>
<td>The specific methods for meeting fundamental objectives.</td>
</tr>
<tr>
<td>Role in SDM</td>
<td>Need to be separated from fundamental objectives and inform management alternatives</td>
</tr>
<tr>
<td>Example</td>
<td>Minimise soil disturbance</td>
</tr>
<tr>
<td>Process objectives</td>
<td>Reflect how the decision should be made, or the design of the decision process</td>
</tr>
<tr>
<td>Role in SDM</td>
<td>Present in objectives hierarchies but not included decision analysis as they reflect desires about the decision process but do not directly influence the outcome</td>
</tr>
<tr>
<td>Example</td>
<td>Scientific credibility of approach to monitoring, analysis and reporting</td>
</tr>
<tr>
<td>Indicator</td>
<td>A specific metric</td>
</tr>
<tr>
<td>Role in SDM</td>
<td>Defines how an objective will be measured and evaluated in decision context</td>
</tr>
<tr>
<td>Example</td>
<td>Dollars ($) is often used as the indicator of total resource</td>
</tr>
<tr>
<td>Objectives hierarchy</td>
<td>Categorising of objectives by type</td>
</tr>
<tr>
<td>Role in SDM</td>
<td>To distinguish between fundamental and means objectives</td>
</tr>
</tbody>
</table>
WORKSHOPS

Four participatory workshops were undertaken in order to engage staff and local stakeholders in the process of setting management thresholds. Details of the workshops are shown in Table 2.

Table 2: Details of the four workshops held in order to set management thresholds as part of the Monitoring Framework for Wilderness Horse Riding Trial

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Aim</th>
<th>Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hurstville</td>
<td>4/4/14</td>
<td>Apply a SDM framework (steps 1-3) to define decision context, develop objectives and indicators, and identify candidate management actions</td>
<td></td>
</tr>
<tr>
<td>Narooma</td>
<td>19/9/14</td>
<td>Specify management thresholds and management actions that meet the local context</td>
<td>Deua and Monga National Parks</td>
</tr>
<tr>
<td>Jindabyne</td>
<td>26/9/14</td>
<td>Specify thresholds and management actions that meet the local context</td>
<td>Kosciuszko National Park</td>
</tr>
<tr>
<td>Armidale</td>
<td>12/12/14</td>
<td>Specify thresholds and management actions that meet the local context</td>
<td>Mummel Gulf National Park</td>
</tr>
</tbody>
</table>

HURSTVILLE WORKSHOP

A structured decision making framework was utilised in the first Hurstville workshop. In the workshop, we worked through the first four steps of the SDM framework. The output from each step is outlined below.

Step 1: Clarify the decision context

Before the Hurstville workshop, the facilitators and OEH staff collaboratively defined the decision statement. This is an crucial step as it helps to bound and clarify what is important within the decision at hand (Gregory et al 2012).
The key elements of the decision statement include:
1. **Brief background/trigger** – NSW state government is expanding the range of recreational horse riding opportunities in parks, including on some select tracks and trails in wilderness.
2. **Who the ultimate decision maker is** – High level management in OEH
3. **Key stakeholders** – horse riders, other wilderness users, wilderness advocates, OEH staff
4. **What the decision is** – how to manage potential impacts on wilderness values and park assets during the trial period within levels of acceptable change that ensure values are not irreparably degraded while facilitating public appreciation. Key stakeholders for this decision are horse riders, other wilderness users, wilderness advocates and OEH staff. This decision is constrained by available resources, timing, and the requirement that horse riding is trialed on trails and tracks in wilderness. **Management of horse riding during the trial will contribute to a decision concerning this activity beyond the trial.**

**Step 2: Define objectives and indicators**

Workshop participants collaboratively developed an objectives hierarchy. Fundamental, process, and means objectives were identified. Effective decision support deals with exclusively with fundamental objectives. Fundamental objectives define the core reasons for being interested in the decision (Keeney 2007). The fundamental objectives identified here are shown in Table 3. Process objectives govern the methods by which the decision will be made, who will be included, and how the decision will be documented and communicated; often the process objectives are influenced by agency or institutional policy (Runge and Walshe 2014). The achievement of process objectives rests substantially on the facilitator’s capacity to assist decision-makers and stakeholders structure the decision problem appropriately and are not dealt with specifically during the steps of the framework. While process objectives may have an effect on the design of the decision process, they only relate indirectly to the outcome of the decision. Process objectives identified during the workshop are shown in Table 4.

Indicators are used to judge the performance of alternative actions with respect to the fundamental objectives. Indicators are measurable and on a scale that reflects the relative achievement of each fundamental objective (Runge and Walshe 2014). Here indicators were drawn from the monitoring framework and linked to the fundamental objectives that had been specified during Step 1 and shown in Table 3.
Table 3: Summary of fundamental objectives, indicators, the desired direction of change and associated management alternatives identified by participants in the Hurstville workshop (4 April 2014).

<table>
<thead>
<tr>
<th>Objective</th>
<th>Indicator</th>
<th>Preference</th>
<th>Management Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Track condition</strong></td>
<td>Erosion (cross sectional area)</td>
<td>Minimise</td>
<td>Site hardening (targeted action at the site where change detected)</td>
</tr>
<tr>
<td></td>
<td>Soil compaction (change in)</td>
<td>Minimise</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total track width (change in)</td>
<td>Minimise</td>
<td></td>
</tr>
<tr>
<td><strong>Weed species</strong></td>
<td>Number of species (change in)</td>
<td>Minimise</td>
<td>Treat and remove as per Regional Pest Management Strategy</td>
</tr>
<tr>
<td></td>
<td>Percentage cover (change in)</td>
<td>Minimise</td>
<td>Further monitoring</td>
</tr>
<tr>
<td><strong>Pathogens</strong></td>
<td>Visual presence</td>
<td>Minimise</td>
<td>Temporary or seasonal track closure</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Further monitoring</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Signs and notification</td>
</tr>
<tr>
<td><strong>Landscape Classification</strong></td>
<td>Landscape Class (change)</td>
<td>Minimise</td>
<td>Drill down (further investigation of the cause of change) to provide context for observed results</td>
</tr>
<tr>
<td><strong>Heritage Assets</strong></td>
<td>Presence of damage</td>
<td>Minimise</td>
<td>Regional process for maintenance and protection of heritage assets</td>
</tr>
<tr>
<td><strong>Social cohesion</strong></td>
<td>Number of incidents reported per user</td>
<td>Minimise</td>
<td>Separation of users in time and/or space</td>
</tr>
<tr>
<td><strong>Horse riding wilderness users</strong></td>
<td>Satisfaction index (%) per user</td>
<td>Maximise</td>
<td>Communication with user groups and education programs</td>
</tr>
<tr>
<td><strong>“Other” Wilderness Users</strong></td>
<td>Satisfaction index (%) per user</td>
<td>Maximise</td>
<td>Communication with user groups and education programs</td>
</tr>
<tr>
<td><strong>Resources</strong></td>
<td>Dollars</td>
<td>Minimise</td>
<td>Involve users of tracks and trails or other volunteers to undertake management actions/interventions</td>
</tr>
<tr>
<td>(staff time &amp; cost of management actions)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4: Process objectives identified by participants during the Hurstville workshop (4 April 2014)

<table>
<thead>
<tr>
<th>Process Objectives</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific credibility</td>
<td>The monitoring program and management decisions are scientifically credible</td>
</tr>
<tr>
<td>Quality monitoring</td>
<td>The monitoring plan appropriately targeted and meaningful, is able to detect change, differentiate between recreation impacts and natural variability (including climate change)</td>
</tr>
<tr>
<td>User groups working together</td>
<td>Both horse riding and non horse riding users work together to ensure sustainable use of wilderness areas</td>
</tr>
<tr>
<td>Practical links</td>
<td>Practical links between methods, thresholds and management</td>
</tr>
<tr>
<td>Balance</td>
<td>Finding a balance between the dual mandate of conserving the environment and providing recreation experiences</td>
</tr>
<tr>
<td>Increase appreciation</td>
<td>To increase appreciation and value of nature by creating visitor experience in wilderness areas</td>
</tr>
</tbody>
</table>

**Step 3: Identify management actions**

Management actions need to be able to influence objectives, by shifting the indicator in the desired direction. Within a SDM framework, alternatives can be a single action, or a management scenario that encompasses a range of management actions (Gregory et al 2012). We identified management actions for each of the objectives. This step ensures that for all indicators for which a threshold is set, decision makers have identified a potential response that can satisfy each fundamental objective. The management actions identified are outlined in Table 3.

**Step 4: Estimate consequences**

For this step, we developed a decision sketch that identified both positive and negative links between actions, indicators and objectives. The purpose of this is to determine any potential interactions between management actions associated with each objective and the other stated objectives. Any identified relationship should then be taken into account when determining the appropriate value of a threshold and how much variation for current conditions might be considered acceptable. For the purpose of this report, this decision sketch has been broken down into its components, and displayed in Table 5.
Table 5: The decision sketch broken down into individual actions and the interactions with all fundamental objectives*

<table>
<thead>
<tr>
<th>Action</th>
<th>Interaction</th>
<th>Objective (Indicator)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional process for managing heritage condition</td>
<td>Positive</td>
<td>Heritage Assets (condition/presence of damage)</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>Resource ($)</td>
</tr>
<tr>
<td>Temporary/seasonal closure + extra monitoring</td>
<td>Positive</td>
<td>Pathogens (presence/absence)</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>Weeds (% cover, # species)</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>Track condition (all measures)</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>Social cohesion (incidence reported)</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>Horse riding wilderness users (satisfaction)</td>
</tr>
<tr>
<td></td>
<td>Negative / positive</td>
<td>Other wilderness users (satisfaction) and resources</td>
</tr>
<tr>
<td>Treat and remove weeds as per strategy + extra monitoring for weeds?</td>
<td>Positive</td>
<td>Weeds (% cover, # species)</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>Horse riding wilderness users (satisfaction)</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>Other wilderness users (satisfaction)</td>
</tr>
<tr>
<td>Site hardening</td>
<td>Positive</td>
<td>Track condition (all measures)</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>Weeds (% cover, # species)</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>Landscape Class (LCS)</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>Horse riding wilderness users (satisfaction)</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>Other wilderness users (satisfaction)</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>Resources ($)</td>
</tr>
<tr>
<td>Communications with stakeholders and education initiatives</td>
<td>Positive</td>
<td>Horse riding wilderness users (satisfaction)</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>Other wilderness users (satisfaction)</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>Social cohesion</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>Resources ($)</td>
</tr>
<tr>
<td>Separation of users in time and space</td>
<td>Positive</td>
<td>Horse riding wilderness users (satisfaction)</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>Other wilderness users (satisfaction)</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>Social cohesion (incidence reported)</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>Resources ($)</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>Credible program (Process objective)</td>
</tr>
<tr>
<td>Drill down (further investigation of the cause of change) to provide context for observed results</td>
<td>Negative</td>
<td>Resources ($)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For this action to have a positive interaction with landscape condition, it would need a secondary action that would directly influence LCS rating</td>
</tr>
</tbody>
</table>

*Additions to this table suggested in the regional workshops can be found in Table 6
SETTING THRESHOLDS: APPROACH IN REGIONAL WORKSHOPS

Through the process of the Hurstville workshop we identified: fundamental objectives, indicators for these objectives, actions that can influence the objectives and the positive or negative outcomes for each objective given the management actions. We recommended that thresholds be set for all indicators where management alternatives were identified that could have a positive impact. The quantity or value of this threshold would be based on:

1. The *baseline data* for each indicator, on each trail
2. The *number of positive and negative interactions* with other objectives and the relative strength of these interactions.
3. Manager’s *weightings (values)* of each objective.

The setting of thresholds for each of the identified indicators was completed at secondary workshops held in the regions impacted by the trial. These regional workshops involved key parks staff and stakeholder representatives.

Thresholds were developed during the workshop through eliciting from parks staff what a response would be to a change in each indicator and then quantifying what level of change in each of the indicators would indicate the need for such a response. Some indicators required multiple thresholds with different associated responses. Thresholds were also set for both the site and average level for a number of indicators. A summary of the thresholds determined for each park can be found in Table 7, Table 8 and Table 9.

REGIONAL WORKSHOP RECOMMENDATIONS

**Deua and Monga National Parks**

1. The preferred terminology was ‘tracks’ rather than ‘trails’ to reflect the heritage values. The key European heritage assets for these parks are the tracks themselves. There are some passing lanes that have heritage value but are not impacted by the trial.

2. The presence/absence of trail braiding was suggested as an additional indicator of track condition.

3. The percentage bare ground was suggested as an additional indicator for erosion.

**Kosciuszko National Park**

1. The Lone Pine trail already has heavy horse rider use and is bordering a wilderness area, which may provide a reference for the kind of impact that could be expected with more intense usage over a longer timeframe.

2. North of the Tin Mine hut, the trail is similar to the trial area, but without horse riding. This provides potential for control/benchmark sites.
3. The presence/absence of trail braiding was suggested as an additional indicator of track condition. It was suggested that GPS locations could be recorded for any informal trails encountered.

4. Horse riding users can inform about presence of weed species. It was suggested that a formalised system be established for users reporting issues.

5. Soil compaction may be more relevant for monitoring camping areas than other measures used on trails.

Note that in Kosciuszko NP the trails will have seasonal use only, with closures in the winter, limiting the effective length of the two-year trail.

**Mummel Gulf National Park**

1. Erosion can be measured as bare ground as well as eroded area.

2. Trail braiding an issue with fan out points near water crossing sites.

3. Track width is not an issue with sites that are on the on the slope.

4. Seasonal closures is a management alternative for soil compaction of low, wet sites

5. Sites at different altitudes can be categorised as steep or low depending on the location. Different thresholds have been set for the two categories for some indicators. This categorisation will need to be formalised to ensure that each site can be accurately allocated.

6. The depth of track measure will be most problematic on steep slopes

7. Increases in erosion (eroded area) is more likely to be a problem at low sites.

8. The LCS be used to assess whether a planned management action is appropriate to the setting (i.e. that an action does not negatively affect the landscape class

9. See Table 6 for suggested additions to the interactions between landscape class and management actions presented in Table 5.
Table 6: Interactions between the Landscape Class objective and the suggested management actions.

<table>
<thead>
<tr>
<th>Action</th>
<th>Interaction</th>
<th>Objective (indicator)</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary/seasonal closure + extra monitoring</td>
<td>Positive</td>
<td>Landscape Class</td>
<td>Temporary closure may provide for rehabilitation of physical disturbance and assist in maintaining Landscape Class</td>
</tr>
<tr>
<td>Treat and remove weeds as per strategy + extra monitoring for weeds?</td>
<td>Positive</td>
<td>Landscape Class</td>
<td>Treatment of weeds may provide for rehabilitation of physical disturbance and assist in maintaining Landscape Class</td>
</tr>
<tr>
<td>Communications with stakeholders and education initiatives</td>
<td>Negative or Positive</td>
<td>Landscape Class</td>
<td>Management inputs through the installation of signs could change the Landscape Class Use of online channels and mobile devices or off-site methods to communicate could achieve positive on-ground outcomes without the need for on-site management activity with possible change in Landscape Class</td>
</tr>
<tr>
<td>Separation of users in time and space</td>
<td>Positive</td>
<td>Landscape Class</td>
<td>Separation of users in space and time could reduce social impacts and assist in maintaining Landscape Class</td>
</tr>
</tbody>
</table>
Table 7: Deua and Monga indicators (including direction of change), management thresholds and management response. Note some thresholds have two levels if thresholds, indicated as (1), (2).

<table>
<thead>
<tr>
<th>Objective</th>
<th>Indicator</th>
<th>Monitoring level</th>
<th>Management threshold</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Track condition</td>
<td>Track width (+ change)</td>
<td>Average (1)</td>
<td>10%</td>
<td>Notify area manager and key groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2)</td>
<td>20%</td>
<td>Assess need for hardening</td>
</tr>
<tr>
<td></td>
<td>Soil compaction (change in)</td>
<td>Average</td>
<td>100%</td>
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<td>Eroded area (+ change)</td>
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<td>20%</td>
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<tr>
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<td>Depth in quadrat (+ change)</td>
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<td></td>
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</tr>
<tr>
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<td>Individual site</td>
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<td>Notify area manager and key groups</td>
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<td>All reports followed up and communicated to user groups</td>
</tr>
<tr>
<td>Objective</td>
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<td>Monitoring level</td>
<td>Management threshold</td>
<td>Response</td>
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<td>-----------------------------------------------</td>
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<td>Individual site (2)</td>
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<td>Drill down and treat cause</td>
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<td>Monitoring level</td>
<td>Management threshold</td>
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<td>Notify Area Manager, who will assess options including the need for</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td>minimal hardening or restricting with barriers (logs etc.) and implement</td>
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<td>20%</td>
<td>as necessary. Consider track head signage.</td>
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<td>minimal erosion control measures and implement as necessary</td>
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<td>Steep (- change)</td>
<td>Individual site</td>
<td>50%</td>
<td>Assess need for erosion control measures</td>
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<td>Low lands (- change)</td>
<td>Individual site</td>
<td>25%</td>
<td>Assess need for minimal track hardening and/or erosion control</td>
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<td>Average</td>
<td>40%</td>
<td>Notify Area Manager, who will assess options including need for track</td>
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<td></td>
<td></td>
<td></td>
<td>hardening and/or erosion control and implement as necessary</td>
</tr>
<tr>
<td></td>
<td>Site (steep)</td>
<td>Individual site</td>
<td>50%</td>
<td>Assess need for erosion control measures</td>
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<td>Assess need for track hardening and/or erosion control</td>
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<td></td>
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<td>Average</td>
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<tr>
<td>LCS</td>
<td>Increase in score</td>
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<td>Investigate and treat physical, social or managerial factor that caused</td>
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<td>User feedback</td>
<td>Trial area</td>
<td>Validated feedback</td>
<td>Reports followed up and communicate if necessary to users</td>
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</table>
REFERENCES


