

Technical Note

Operational Vegetation Management

Introduction

Vegetation management is critical to establishing desirable plant species and to achieving reclamation objectives. For purposes of simplicity and clarity four Technical Notes on vegetation management have been developed. They are:

1. Principles of Vegetation Management
2. Vegetation Management Treatment Options
3. **Operational Vegetation Management** provides guidance on prescribing, integrating and deploying vegetation management treatments to cost effectively achieve reclamation objectives.
4. Special Considerations in Herbicide Use

Guidance in assessing vegetation, developing prescriptions and deploying treatments is given. Focus is on selecting and integrating treatments to achieve reclamation objectives effectively, while managing costs and risk to the environment.

Assessing Vegetation

Assessments should seek to identify species presence , size and abundance. If the objective has set triggers or thresholds to treatment, assessments can be pivoted on these. For example, a vegetation management plan might identify presence of noxious weeds as a trigger to treatment, tall shrub densities greater than 5000/ha as another trigger to treatment, and presence of "volunteer" tree saplings as a trigger to avoid treating a portion of the site to be reclaimed. Thus assessments must be spatially explicit - in this case - identifying areas not be treated with methods deleterious to tree species and areas where noxious weeds are found.

It is unlikely most plant species, with the exception of agronomic "reclamation" mixes, will be uniformly distributed across the wellsite; so some form of vegetation map is essential to accurate prescription and placement of treatments. To construct a vegetation map a quick grid based assessment is suggested. If the surveyor is inexperienced a grid survey (20-m X 20-m spacing) with plots at each grid point is suggested. Details of how to assess plant cover of herbaceous and low shrub species can be found in Appendix 1: University of Idaho Plant Cover Assessment Method. Tall shrub and tree species can be assessed using density and height. Use height classes is recommended, e.g. <0.25 m, 0.25 - 1 m, 1 - 2 m, > 2 m. Density can be determined by establishing 0.001 ha plots (1.78 m radius) at each grid point. (As woody plants become larger density counts need only be taken where woody plants are evident.)

Prescribing Vegetation Management Treatments

Before specific treatments are prescribed current vegetation conditions on the site should be compared to the previously defined objective and major discrepancies identified. Once discrepancies are identified a plan should be developed to shift the plant community toward the objective. In many cases the plan will require more than one step. For example, if high densities of agronomic grasses and patches of noxious weeds (say Canada thistle) are present on a site where a mixed native grass - forb community with native shrubs and trees is desired the vegetation management plan would identify three steps - control the noxious weeds, control or reduce grass density, introduce woody plant propagules.

Once the plan has been developed specific treatments can be prescribed. Treatment type and timing should be selected based on the following criteria:

1. Ensure initial treatments do not compromise later treatments.
2. Integrate treatments wherever possible.
3. Ensure treatments will not create inadvertent negative outcomes.
4. Focus on cost effectiveness.

In the example above a number of treatment options are available depending on other constraining factors on the wellsite. For example, if the site requires decompaction a very different set of treatments will be chosen than if the site does not...

Site does not require decompaction - Treatments can be chosen to focus on controlling both the agronomic grasses and noxious weed followed by introduction to desired plant species. Given the objective of establishing native herbaceous vegetation the following approach might work. First, use glyphosate as a patch spray to control the Canada thistle (this may require two applications of glyphosate - one per growing season for two years), spot spray 1-m diameter spots on a 2-m grid across the agronomic grass area (do this both times the noxious weeds are sprayed.) Immediately after the second spray application (allow 24 hours between) plant desired woody plants in the 1-m spots and seed a native forb-grass mixture into the sprayed Canada thistle patches.

Site requires decompaction - Broadcast spray the entire site with glyphosate prior to decompaction for both agronomic grass and noxious weed control. Spray the site with glyphosate, again, one or two months (growing season months) after decompaction. Immediately broadcast seed the site with native grass forb mixture - prior to seeding, cover planting spots with newspaper. Lift newspaper and plant tree/shrub seedlings. (The newspaper covers will provide small competition-free spots for woody plant establishment.)

Integration of Vegetation Management Treatments

Integration of vegetation management treatments can be used to considerable effect - especially if the complementary nature of treatments shown in the Vegetation Management Treatment Options Technical Note are used to develop the plan. In general, it is better to use treatments that reduce biomass before using treatments that reduce density. Likewise, it is better to manage both biomass and density of competitors before introducing woody species. Woody plants, while dominant when grown to size, tend to be very susceptible to competition effects at establishment.

Particular attention should be given to herbicide and cultivation treatments. Herbicides having the potential of soil persistence should be used with extreme caution. While soil persistence is known to affect many tree species, the effects of herbicide persistence on many native herbaceous species is unknown. Thus it is likely best to avoid persistent herbicides (refer to Vegetation Management Treatments Technical Note for guidance) as much as possible unless they are used in a highly targeted fashion (i.e. spot or patch application.) Cultivation treatments, while effective for reducing herbaceous biomass, also stimulate root reproductive structures **and** emergence of seedlings of species present in the soil seedbank (see Figure 1). Thus when cultivation treatments (including decompaction) are deployed, the need for a population management treatment (herbicide) or a growing space control treatment (cultural control) should be anticipated to ensure establishment of woody species.

Figure 1. Agronomic grass emergence 2 months after cultivation.

Implementing Vegetation Management Treatments

Risk Management

Vegetation management treatments act by affecting plants or site quality - so if applied inappropriately or where not prescribed they will affect vegetation not targeted for treatment. This concern is particularly important when using herbicides as herbicides can readily move offsite when applied under inappropriate conditions (see Special Considerations in Herbicide Use), for example foliar herbicides can move off site quickly if applied in windy conditions. Likewise treatments (Cultivation or Mechanical Mowing) that require heavy equipment as a prime mover can cause soil compaction or topsoil displacement if used under wet conditions.

Ensure Effectiveness

When making vegetation management treatments it is important that the desired effect is achieved - thus necessitating supervision of treatment delivery. Supervision should ensure that treatments are delivered in accordance with the prescription and provides the opportunity to ensure the prescribed effect is not compromising other objectives on the site. For example, using a mechanical mowing treatment on site previously treated to decompact the soil may result in compaction and compromise the effectiveness of the soil adjustment treatment if done inappropriately. Likewise making a broadcast herbicide treatment in windy conditions is likely to both compromise the effectiveness of weed control treatments (by blowing herbicide away before it contacts target plants and result in off target placement of herbicide killing or injuring desirable plants).