



A Guide to Regeneration Planning



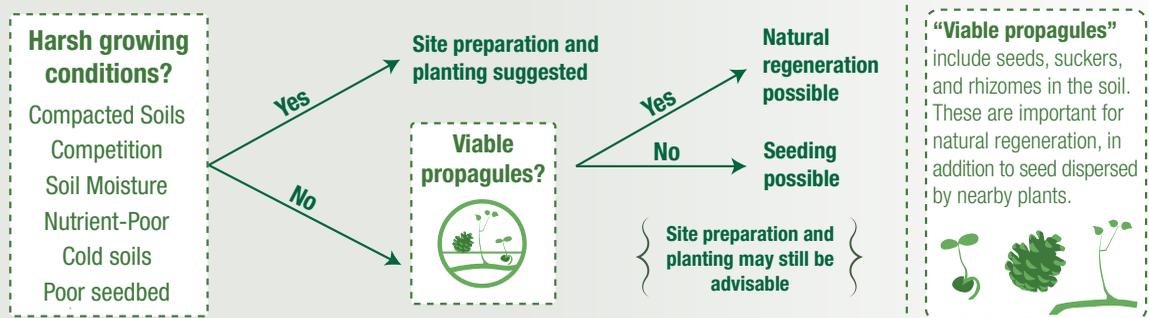
How do we restore native boreal forest ecosystems following industrial disturbance? A look at regeneration options and required timing.

A common goal of reclamation in the boreal forest is to establish diverse, native plant communities that are suited to the site's conditions and are on track to become a forest. Regeneration planning is a key step to help ensure that target vegetation is well established, leaving less room for competing non-target vegetation. Where return to forest cover is the goal, planting can advance regeneration speed by 5–10 years or more over natural regeneration and lead to more consistent establishment of trees on a reclaimed site.

When are planting and seeding appropriate?

Planting and seeding are necessary on reclaimed sites with conditions that may limit natural tree regeneration, specifically sites with few viable tree propagules (see Fig. 1). Even on sites with an abundant native seed source, natural regeneration may still be unreliable — harsh growing conditions may prevent desired species from becoming established at target densities. In many sites, planting will be a more reliable method for achieving targets than natural regeneration and seeding, which both carry risks of poor survival during the vulnerable germinant period (Fig. 1).

Figure 1. Generalized decision-making framework for selecting regeneration methods.



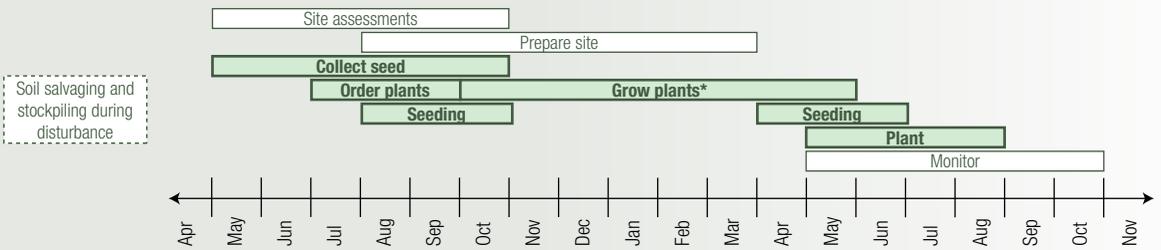
In practice, natural regeneration is not reliable for use on large-scale, severely disturbed sites; for example, it is not currently used to reclaim mined areas. But it may be appropriate on smaller-scale industrial sites, such as exploration well sites or seismic lines.

The importance of timing

Successful regeneration depends on careful forethought and planning. **A regeneration plan for each reclaimed site must be developed early to provide time to collect seed from appropriate seed zones, order plants and grow plants in nurseries** (Fig. 2). Early planning will ensure that seedlings are ready to be planted, or that seed is available for spreading, shortly after

recontouring and/or site preparation activities have been completed. The process of conducting a site assessment through to planting requires at least 1–1.5 years to complete; for some stock types, nursery orders must be placed two or even three years in advance to accommodate seedling growth.

Figure 2. Generalized timeline of regeneration activities.

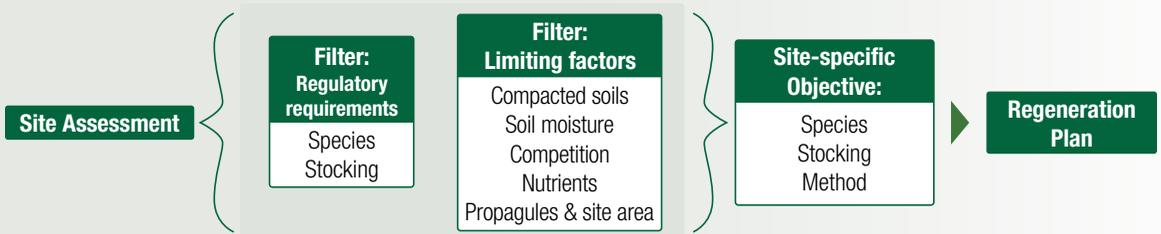


*Note: Plants should be ordered at least a year prior to planting, but some stock types and non-commercial tree species take longer to grow (up to three years).

How should regeneration be undertaken?

Regeneration planning begins with a site assessment, the results of which are used to determine the site-specific objective (Fig. 3). It is important to use tree species that are suited to a site and to set realistic density targets — this will be the foundation of a strong regeneration plan. On exploration sites or other lightly disturbed sites, targets based on the surrounding stand conditions may be most suitable.

Figure 3. Steps for developing a regeneration plan.



Regeneration options

Growing and planting trees: This is the most reliable technique to ensure target species establishment and a return to forest cover on a reclaimed site. Although planting incurs more up-front costs, it may be a more cost-effective technique in the long term. Some seedlings may be purchased directly from a nursery, or native seed may be collected and grown on contract. Collected or purchased seed must comply with the Alberta Forest Genetic Resource Management and Conservation Standards. Trees must be ordered from the nursery one to three years prior to planting, depending on the stock type. Timing is critical: trees and shrubs (if desired) should be planted immediately after site preparation to reduce the impact of competing vegetation (see Factsheet *A Guide to Planting* for more information).

Seeding: Applying seed directly on the site is less costly than planting, but seedlings need more time to become established and are vulnerable to competition during the establishment phase. It is possible to seed a large area quickly, but sites with irregular microsite distribution are likely to require follow-up work (e.g., in-fill planting) due to irregular stocking (see Factsheet *Natural Regeneration and Seeding* for more information).

Natural regeneration: This technique is inexpensive in the short term but the least reliable as it requires sufficient native propagules to revegetate the site, whether from the adjacent forest or the seedbank. It is only appropriate on smaller, lightly disturbed sites with large sources of healthy propagules within the topsoil or adjacent to the site (see Factsheet *Natural Regeneration and Seeding* for more information).

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Also available under the title : Guide sur la planification de la régénération – Comment pouvons-nous remettre en état les écosystèmes des forêts boréales indigènes après une perturbation industrielle? Coup d'œil sur les options en matière de régénération et les délais requis.

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