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Peatland Restoration – Site Re-Vegetation

Jean-Marie Sobze, Marie-Eve Gauthier, Bin Xu, Amanda Schoonmaker

Introduction

Site re-vegetation is an important phase in peatland restoration. Prior to re-vegetating a peatland site, appropriate methods should be used to adjust the soil and address the hydrologic disturbance. At NAIT Boreal Research Institute (NBRI) we have successfully implemented the **Peat Inversion technique** to connect water flow between the surrounding natural peatland and the reclaimed site, thus facilitating the establishment and development of vegetation.

There are a number of pioneer species that play critical roles in the ecological restoration of boreal peatlands (Campeau 2012). *Polytrichum strictum* is one of these pioneer species, with a wide range of physiological tolerance for different environmental conditions and various disturbance regimes. The first step in peatland re-vegetation is to introduce appropriate pioneer species on site. This will facilitate the re-vegetation process of peatland specialists. Suitable donor sites must be selected for donor material consisting of a healthy combination of native, target mosses and shrub species. For more details on donor material/site selection see our technical note on **Harvest and Transfer of Donor Material for Peatland Re-vegetation**.

Several methods have been tested at the plot and site scales to re-vegetate peatlands. The method used at NBRI and described in this technical note is based on the North American Approach to the restoration of *Sphagnum* dominated peatland (Rochefort 2003).

Spreading of diaspores

Diaspores are any part of a plant (seeds, roots, spores, leaves, stems etc.) with the capacity to regenerate a new individual.
Diaspore spreading methods will vary depending on the site moisture, soil condition and season of operation.

When working during the summer months and if the site is relatively dry, the diaspores can be spread on site in a thin layer using a small manure spreader towed by an Argo (figure 1). The manure spreader is equipped with a bladed shaft at the rear. The bladed shaft is rotated by the wheel shaft as the spreader moves forward (Figure 2). The wheels should be wide enough to float on a relatively dry peat surface. In figure 2, the overall weight of the spreader is approximately 1000 lbs. and its bucket volume is 25 bushels.

Figure 1: Moss Spreader attached to an Argo

In general, field operation should aim to minimize soil trafficking and to avoid uneven tracks left by equipment. During summer months if the site is wet, the spreader is likely to be less effective as it will tend to sink and leave significant tracks on the site (figure 3). In this situation, donor material has to be spread by hand. Peat shoes" (snow shoes) are required during manual spreading to avoid leaving deep footsteps on site.

Figure 2: Moss Spreader

The donor material should be spread as a thin layer and ideally cover the whole surface with little spaces between fragments. In practice, however, there will tend to be some clumping of moss and root fragments (figure 4). The spreading effort in the North American approach is to meet the 1:10 ratio (i.e. using diaspores from $1m^2$ of donor site to re-vegetate $10m^2$ of the wellsite (figure 4)).

Moss fragments have a high regeneration potential. Each fragment of moss has the potential to grow into a new individual. Flat ground is ideal for moss regeneration as fragment contact with the substrate should be maximized. This implies that the importance of microsite heterogeneity, which is beneficial in upland forest reclamation, may be less appropriate for peatland re-vegetation.

Figure 3: Stranded Moss Spreader

Given the challenges to operate equipment on peatlands under summer conditions and the labor intensity when working manually, we recommend to capitalize on solid/frozen ground to collect and spread the donor material on site. This increases the flexibility in terms of equipment used to operationally complete the re-vegetation (moss spreading) and subsequent activities that require light or heavy equipment.

Protecting diaspores

Donor material spread on site needs to be protected from desiccation and wind erosion. It is recommended to protect the moss layer immediately after the propagules have been spread. Mulch made from freshly harvested green grasses leave and stems or wheat straw are appropriate protective material (figure 5). The protective layer increases the air relative humidity, reduces extreme temperature variation and creates an optimal microclimate for plant growth. A manure spreader attached to an Argo is an operational option to spread the protective material on moss fragments (figure 6).

Mulch spreading using a manure spreader is more challenging in windy conditions than moss spreading because of the light weight of the mulch.

A low concentration of phopsate fertilizer (i.e. rock phosphate 0-3-0) should be mixed in and spread simultaneously with the mulch. The fertilizer is known to enhance the growth of the pioneer moss *Polytrichum strictum.* 150kg/ha of fertilizer is recommended.

It is also recommended to avoid traffic on site after the re-vegetative material had been spread.

Figure 4: Moss spread using the spreader

Figure 5: Moss layer protected by straw mulch

Figure 6: Spreading straw mulch with moss spreader

It is not always necessary to artificially introduce woody plant species on the restored site because root propagules that exist in the donor material will regenerate (figure 7). Shrub and tree planting on the reclaimed site can however reduce the time to certification and provide more uniform coverage.

Figure 7: Shrub developing from donor material spread on reclaimed site. After the first growing season