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## SPONTANEOUS REVEGETATION OF CUTAWAY PEATLANDS OF NORTH AMERICA

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**Abstract:** Modern extraction methods permit peat to be extracted to the minerotrophic layer of ombrotrophic peatlands (bogs). As the environmental conditions of these harvested peatlands are similar to minerotrophic peatlands (fens), such sites should be restored towards a fen system. However, it is not known whether fen species would recolonize such harvested sites on their own. We surveyed vegetation and environmental variables in 28 harvested peatlands with minerotrophic residual peat across Canada and in Minnesota, USA, and compared them to 11 undisturbed fens. Compared to harvested bogs previously studied, the harvested fens sampled in this study revegetated remarkably quickly (50%–70% vegetation cover) when the hydrological conditions were suitable. However, revegetation was less extensive for sites that were still drained (25% vegetation cover). A high water table and a thin layer of residual peat were the most important factors contributing to rapid recolonization rates. Although the harvested fens were rapidly recolonized, species composition was not the same as observed on undisturbed fens. *Carex* and *Sphagnum*, dominant in undisturbed fens, generally did not recolonize harvested fens. Thus, whether the goal is to increase species richness or to ensure the return of peat accumulating functions, fen species may have to be actively introduced.

**Key Words:** fens, milled peatlands, restoration, succession, vacuum-harvest

### INTRODUCTION

Fen restoration projects on harvested peatlands in North America aim to restore a fen plant community on sites that were previously bogs (Cooper and MacDonald 2000, Cobbaert et al. 2004). In North America, the dominant succession for peatlands begins with fens (minerotrophic peatlands) and gradually develops into bogs (ombrotrophic peatlands) (Kuhry et al. 1993). Thus, when the *Sphagnum* peat layer is completely removed, the successional clock is set back to the peatland's earlier minerotrophic state. Peatlands that have been harvested to the minerotrophic layer are richer in mineral peat content and have a higher pH than bogs, which creates conditions that are sub-optimal for bog community restoration (Wind-Mulder et al. 1996, Wind-Mulder and Vitt 2000). Restoration towards a fen system is therefore more appropriate for such sites.

Spontaneous revegetation resulting from natural succession may lead to more stable, better acclimated vegetation communities and cost less than active, imposed restoration strategies (Bradshaw 2000, Prach et al. 2001). However, when spontaneous revegetation does not meet restoration objectives,

active restoration measures can 'fill in the gaps.' For example, plants that do not readily recolonize restoration sites can be reintroduced. Several studies have characterized the spontaneous colonization of harvested peatlands with ombrotrophic residual peat (harvested bogs) in northeastern Canada (Lavoie and Rochefort 1996, Girard et al. 2002, Lavoie et al. 2003, Poulin et al. 2005), but little research has addressed abandoned peatlands with minerotrophic residual peat. Such peatlands have been referred to as cutaway bogs with minerotrophic residual peat in Ireland (O'Connell 2000), but will be referred to as harvested fens in this paper. Studies on vacuum-harvested bogs have indicated that the vegetation cover of most vegetation strata was usually < 25%, and that *Sphagnum* moss was rarely present (Girard et al. 2002, Salonen 1992, Lanta et al. 2004, Poulin et al. 2005). Famous et al. (1991) found that harvested fens revegetated more rapidly than harvested bogs. Their study showed that 75% of the harvested fens were completely revegetated within seven years; however, the identity of the recolonizing plants was not reported. Harvested fens in Ireland and Finland were mostly colonized by weedy, ruderal species (Salonen 1992, Rowlands 2001).