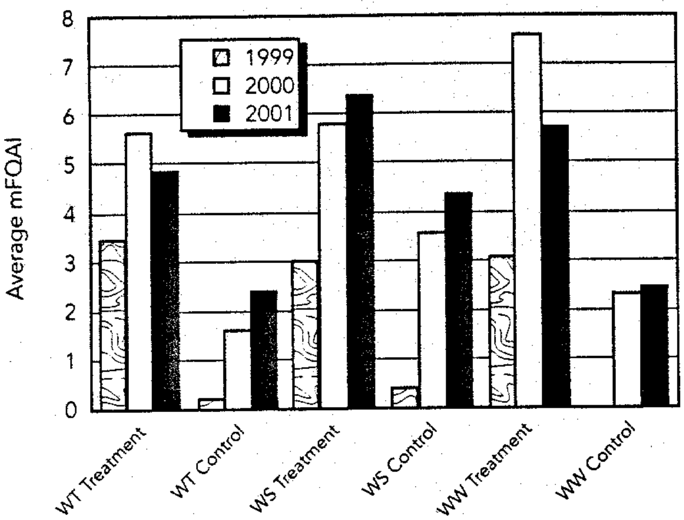

Figure 1. The average modified Floristic Quality Assessment Index (mFQAI) value for each of the plots for 1999, 2000, and 2001. WT = wetland topsoil amendment, WS = wetland sludge amendment, WW = wetland woodchip amendment.

bial community (activity, biomass, phospholipids fatty acid profiles), and arbuscular mycorrhizal fungi (percent root length colonized). Aboveground attributes included moisture, percent cover, dominant species, and the floristic quality assessment index (FQAI) value (Andreas and Lichvar 1995) of species identified in each plot. For this study, we used a modified FQAI (mFQAI) that includes non-native species in the calculation (Fennessy 1997). We compared experimental plots to control plots and compared plots between years using the Wilcoxon signed rank test. We also measured vegetative migration from the donor soil plots to the surrounding area.

During 1999 and 2000, comparisons of belowground attributes between donor and control plots were similar. With the exception of mycorrhizal colonization, all belowground attributes were significantly higher in donor soil plots than in control plots. We observed seasonal variation in the attributes, although variations in treatment and controls were generally similar. Using two years of data, it appears as though the wetlands with donor soils are progressing towards the reference condition.

Of all attributes, we determined that mFQAI most accurately reflected the conditions we were observing in the field. It was evident that the donor soils gave the wetland areas a significant jumpstart (Figure 1). During all three years of this study, we found significant differences (p=0.01) between the mFQAI scores of donor and control plots in all three wetland soil amendment types.

Migration of plants from the wetland donor soils occurred at such a rate that by the third year (2001), many — particularly bur-reed (*Sparganium americanum*) and creeping spike rush (*Eleocharis palustris*)— had colonized in neighboring experimental and control plots. After the first year, we noted that some plants were migrating more than 5 feet (1.5 m) from the center of the plot. The addition of the bur-reed was particularly helpful in keeping down the influx of common and narrow-leaved cattail (*Typha latifolia* and *T. angustifolia*).

Throughout the study we found that, compared to soils in control plots, donor wetland soils held moisture better, maintained a more active and diverse microbial community, had a greater diversity of desirable plants, and better facilitated the establishment of conservative wetland species. More importantly, the donor soils helped improve surrounding areas through vegetative migration. The plant propagules within the donor soils assisted in establishing the desired vegetative cover within the wetland project and these donor propagules colonized surrounding soils quickly. This colonization assisted in moisture retention, reduced undesirable plant establishment, added organic matter, and generally improved the wetland function.

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Monitoring Stages of Sphagnum Recolonization on Block-cut Peatlands (Quebec)

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Sphagnum (*Sphagnum* spp.) acts as a keystone genus in the restoration of nutrient-poor bogs (Rochefort 2000) by raising the position of the water table, decreasing pH, and efficiently using nutrients (van Breemen 1995). From the 1920s until the development of vacuum harvesters in the 1960s, commercial peat operations extracted sphagnum mosses in Canadian bogs by manually cutting blocks of peat. According to the Canadian Peat Moss Association (www.peatmoss.com), approximately 40,000 acres (16,187 ha) of peatland are currently being harvested in Canada and about 3,000 acres (1,214 ha) have been completely harvested. Block-cutting operations created a topography characterized by long (450 ft [137 m]), wide (30-35 ft [9 m-10.6 m] trenches separated by narrow ridges. Block-cut peatlands can naturally recover more than 90 percent of their original cover of ericaceous shrubs, vascular plants, and trees within five years of abandonment (Lavoie and Rochefort 1996). However, sphagnum colonies have much slower rates of recovery, often taking 20 years to recover only 10 percent of their original area. For this reason, we believe that the recovery of sphagnum demands attention (Desrochers and others 1998).

In the fall of 2000 near Riviere du Loup, Quebec, we began a large-scale experiment to restore sphagnum by creating drainage blockages and small pools in the trenches to change the hydrologic conditions. In doing so, we realized that we would have to develop a process for assessing stages that indicate progress toward reaching our restoration goal, rather than achievement of the goal itself. From our observations of other restoration trials conducted by Premier Horticulture of Rivière du Loup, we found that the stages of recovery for block-cut peatlands can be divided into the following short-, mid-, and longer-term categories: 1) hydrologic parameters (first season); 2) individual colony growth (1-3 years); and 3) community level changes (3-10 years). In this note, we summarize our initial monitoring efforts during the first growing season.

From May to October 2001, we monitored hydrologic parameters two to three times per week by recording the depth to the water table at a well network in each trench (both with and without drainage blockages). These measurements enabled us to examine both the changes in water retention and the variability of the water table, and thus assess whether the bog is achieving the high and stable water table characteristic of a natural bog. We measured the surface soil tension at similar intervals and are comparing the results against threshold values that were generated by examining naturally occurring colonies in block-cut peatlands (Price and Whitehead 2001).

At the start of the experiment, we placed narrow stakes at the perimeter of 72 colonies of sphagnum mosses occurring in the trenches, and then calculated the area of each colony. Over time, we can measure the expansion, calculate the growth rate, and compare the results between trenches with and without blockages. We conducted surveys at the end of the first growing season in October and will resurvey the site during the second growing season in summer 2002 in order to evaluate the effect of the rewetting. We mapped the current position of the sphagnum colonies using a 1-m x 1-m quadrat that was subdivided into eight sections on each side, creating 64 12.5 x 12.5-cm^2 sections. We then mapped the presence and shape of the sphagnum that line the minor ditches of each trench at ten positions per trench. We will do so again in 2002. By combining the hydrological indicators and differential growth rates, we can better predict the likelihood of the longer-term success of sphagnum regrowth.

Indicators of longer-term success include a decrease in the number of living trees, a change in the species composition of the shrub layer, and an increase in the percentage of sphagnum cover (Desrochers and others 1998). For example, we have observed widespread tree death on an abandoned bog that has been successfully rewetted by Premier Horticulture. Another good indicator is the presence of leatherleaf (*Chamaedaphne calyculata*), a shrub that dominates sites with high, stable watertables, but that does not compete well with Labrador tea (*Ledum groenlandicum*) and sheeps laurel (*Kalmia angustifolia*) on drier sites. Therefore, if the shrub layer dominance on our restoration site shifts from Labrador tea and sheeps laurel to leatherleaf, we can infer that the changes we made are making the environment more hospitable for sphagnum.

We conducted assessments of these community-level processes using point transect surveys. To obtain a good representation of the two major gradients in the trench system, we surveyed 10 feet (3 m) across the trench and every 45 feet (15 m) along its length. This data will serve as a baseline for further assessments in three to five years. We chose this time frame based on field trials conducted at the abandoned, rewetted bog, where the staff of Premier Horticulture found that it took at least three years after the installation of blockages and the rising of the water table before there were measurable increases in sphagnum colonization and changes in the vegetative community.

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16.1

Land Management Planning and Implementation Pursuant to Wetland Restoration in a Regionally Significant Watershed in Polk County, Florida. Neal Jr., H.V., PBS&J, 1560 N. Orange Ave., Winter Park, FL 32789; J. Thomson and B. Barnard.

The authors discuss the off-site wetlands mitigation project prompted by runway construction at the Orlando International Airport in Florida. The mitigation site, in the Reedy Creek/Lake Marion Creek watershed in Polk County, Florida, is an environmentally sensitive area that contains some disturbed wetlands. Ecologists used aerial shots from 1941 as a basis for the restoration. Restoration techniques included hydrologic restoration, elimination of cattle grazing, control of non-native species, and introduction of a fire regime. Ongoing monitoring shows that the target areas are transitioning from upland to wetland communities and that wildlife usage is increasing.