Development of the oil sands has led to increasing atmospheric N deposition, with values as high as 17 kg N ha-1 yr-1; regional background levels <2 kg N ha-1 yr-1. To examine responses to N deposition, over five years, we experimentally applied N (as NH4NO3) to a poor fen near Mariana Lake, Alberta, at rates of 0, 5, 10, 15, 20, and 25 kg N ha-1 yr-1, plus controls (no water or N addition). In July of each year, we collected new growth of 5 species of vascular plants, returned them to the lab, cleaned them, dried and ground them, and ran them on a Flash EA 1112 Series CN Soil Analyzer Leaf N concentrations in C. calyculata, A. polifolia, and V. oxycoccos increased significantly with increasing N addition (Fig. 5). For C. calyculata and A. polifolia, there were differences in N concentrations between years, but the regression slopes describing the response to N addition were consistent across all years. Leaf N concentrations were unaffected by N addition for E. vaginatum and S. palustris, with the latter exhibiting interannual differences in leaf N concentrations. Water addition alone had no significant effect on N concentrations for any of the vascular plant species (p >= 0.67).