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). Data collected of the growing season using the crank wire method allowed for the calculation of NPP of the dominant 3 mosses. Tissues were also collected and analyzed for total Nitrogen and Carbon. While we found a modest increase in linear growth and net primary production of S. magellanicum with increasing N addition in three of the 5 years, S. fuscum and S. angustifolium growth were unaffected by N addition. At Mariana Lake Bog, S. fuscum linear growth was unaffected by N addition, although there was evidence for inhibition of NPP S. angustifolium linear growth and NPP were stimulated by fertilization in the first year of fertilization, but by the fourth year fertilization had no effect. Sphagnum capitulum N concentrations were also unaffected by N addition. Given the paucity of data on Sphagnum growth in boreal acidic poor fens, with or without experimental N addition, it is difficult to make generalizations, although it appears that S. fuscum, S. magellanicum, and S. angustifolium responses to increasing N deposition may be species-specific and may differ between bogs and acidic poor fens with much of the N coming from N-fixation.