Trembling aspen, *P. tremuloides*, plays an important role in promoting biodiversity, providing ecosystem services, and sequestering carbon. Aspen grows in many climates and environments throughout North America, ranging from the arid conditions of the southwest to mesic conditions of more northern latitudes. Exacerbated by warming temperatures and a lack of precipitation, aspen are experiencing a range contraction caused by Sudden Aspen Decline (SAD). A garden experiment was conducted to compare how aspen from three distinct climatological regions (Dixie, Uncompahgre, and White River National Forest) will physiologically respond to one-year drought treatment. To determine which population is more likely to have a less adverse response to drought; Chlorophyll fluorescence, stomatal conductance, and leaf water potential from each individual were analyzed. There was no change in physiological responses between population and treatment groups. Which could mean that all three populations have similar phenotypic adaptations to water stress, but further research is necessary. The results could also mean that one year of treatment drought is not enough, and the experiment could express different results with repeated years of drought. Future research in tree physiological responses to drought is crucial for designing restoration projects that provide long-lasting benefits for North American Forests.