Likely climate change impacts include damages to agricultural production resulting from increased exposure to extreme heat. Considerable uncertainty remains regarding impacts on crop insurance programs. We utilize a panel of U.S. corn yield data to predict the effect of warming temperatures on the mean and variance of yields, as well as crop insurance premium rates and producer subsidies. While we focus on corn, we demonstrate that the subsidy impacts are likely to carry over to other major program crops. We find that warming decreases mean yields and increases yield risk on average, which results in higher premium rates. Current legislation sets producer subsidy payments as a percentage of the premium, so we simulate the impact of a 1°C warming scenario and find that annual subsidy payments will likely increase by as much as $850 million, representing a 13% increase relative to current levels. This estimate increases to 2.2 billion (34%) under a 2°C warming scenario. We also find evidence of extensive spatial heterogeneity of the premium rate effects. Our results indicate that the program level effects of climate change will increase both the cost of obtaining insurance for producers, as well as the governmental outlay required to subsidize this purchase.