Common waterhemp has become a serious problem for many farmers. In a no-till system, farmers rely primarily on herbicides to manage weeds. A common recommendation for minimizing the influence of glyphosate-resistant weeds has been to include preplant or preemergence residual herbicides. An ideal scenario for no-till farmers would be to combine winter annual and summer annual weed control using an effective residual herbicide applied once several weeks in advance of planting. In this research we compare two residual herbicide mixtures in regards to their rate, timing of application, and use of split applications on management of common waterhemp. Burndown and residual herbicides were applied the fall before planting (Fall), 4 weeks before planting (EPP) or at planting (PRE). The residual herbicides were flumioxazin plus chlorimuron-ethyl (F+C) and sulfentrazone plus chlorimuron-ethyl (S+C). Single application rates were high (F+C – 105+36 g ha⁻¹; S+C – 418+52 g ha⁻¹) or low (F+C – 79+27 g ha⁻¹; S+C – 219+27 g ha⁻¹). Split rates were F+C (40+14 g ha⁻¹) or S+C (110+14 g ha⁻¹) applied either Fall+EPP, Fall+PRE, or EPP+PRE. The research was conducted on university-associated farms associated in Urbana, Murphysboro, and Macomb, IL in 2012, 2013 and 2014. Data from eight site years were included in the analysis. Time of application was the most important factor in waterhemp control at planting and four weeks after planting (4WAP). Weed control efficacy declined as time between application and evaluation increased, e.g., waterhemp control where residual herbicides were applied in the fall was 75% at planting and 50% 4WAP. There was no difference in waterhemp control between the high and low herbicide rates at planting or 4WAP. The two residual herbicide mixtures provided the same level of weed control. Waterhemp control 28 DAP with the split application treatments was equal to the low rate single application treatments, but was less than the high rate single application treatments. Yields where single applications of residual herbicides were least for the Fall timing (3288 kg ha⁻¹), greatest for the EPP timing (3604 kg ha⁻¹), or intermediate for the PRE timing (3449 kg ha⁻¹), p=0.05.