HIT Uncertainty

Uncertainty in HIT's estimates is a product of the uncertainty in the various model inputs, and within the underlying models themselves (RUSLE and SEDMOD). For modeled areas, HIT assumes that the USDA's satellite-based Cropland Data Layer has accurately characterized the land cover, that the USDA's SSURGO soil survey accurately represented the soil properties, that the USGS National Hydrography Dataset has appropriately located the stream network, that the USGS digital elevation model has adequately estimated slope and runoff flow paths, that PRISM's estimates of precipitation intensity are appropriate, and that CTIC's conservation tillage surveys are representative of practices in the region. Furthermore, HIT assumes that RUSLE and SEDMOD are properly formulated models of erosion and sediment delivery.

Collectively these assumptions can add up to a high degree of uncertainty in HIT's estimates; however, such is the case with all models. All models are dependent upon the accuracy of their inputs. Statistician George E. P. Box famously wrote, "Essentially, all models are wrong, but some are useful" (Box and Draper 1987). When observed data is available, models can be calibrated to reduce the collective uncertainty and improve their utility. HIT has been difficult to calibrate because it only estimates sediment loading to the stream network; it does not route sediment downstream so that outputs could be adequately compared to a monitoring station. Alternative efforts have found the HIT approach to align with dredging records (Ouyang, et al. 2005) and spatial representation of relative sediment loading risk (O'Neil 2010). The USGS has recently implemented edge of field monitoring stations at select locations within the Great Lakes Basin. As more data from those efforts become available, better assessment of HIT outputs and potential calibration will be possible.

Despite the potential uncertainty in model outputs, HIT still provides a quick and easy means for estimating erosion and sediment loading in a specified area, prioritizing conservation areas, and evaluating relative changes resulting from land cover change or BMPs. Furthermore, the GLWMS allows the user to manually specify HIT parameters to minimize the uncertainty in model results (Figures 1 and 2 below). For example, after conducting a site visit to a particular field a user may have more detailed estimates of RUSLE or SEDMOD's parameters. Specifying those observed parameters within GLWMS will produce more reliable results than relying on the accuracy of underlying data from USGS, USDA, CTIC, and others.

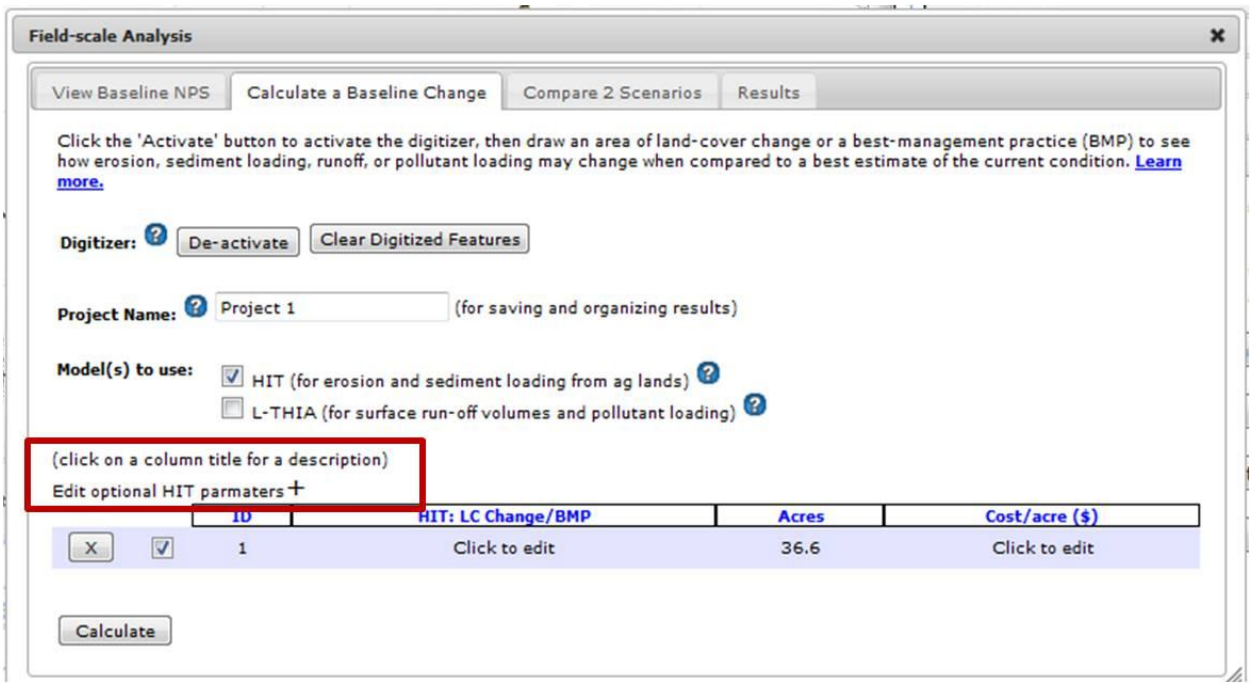

Figure 1

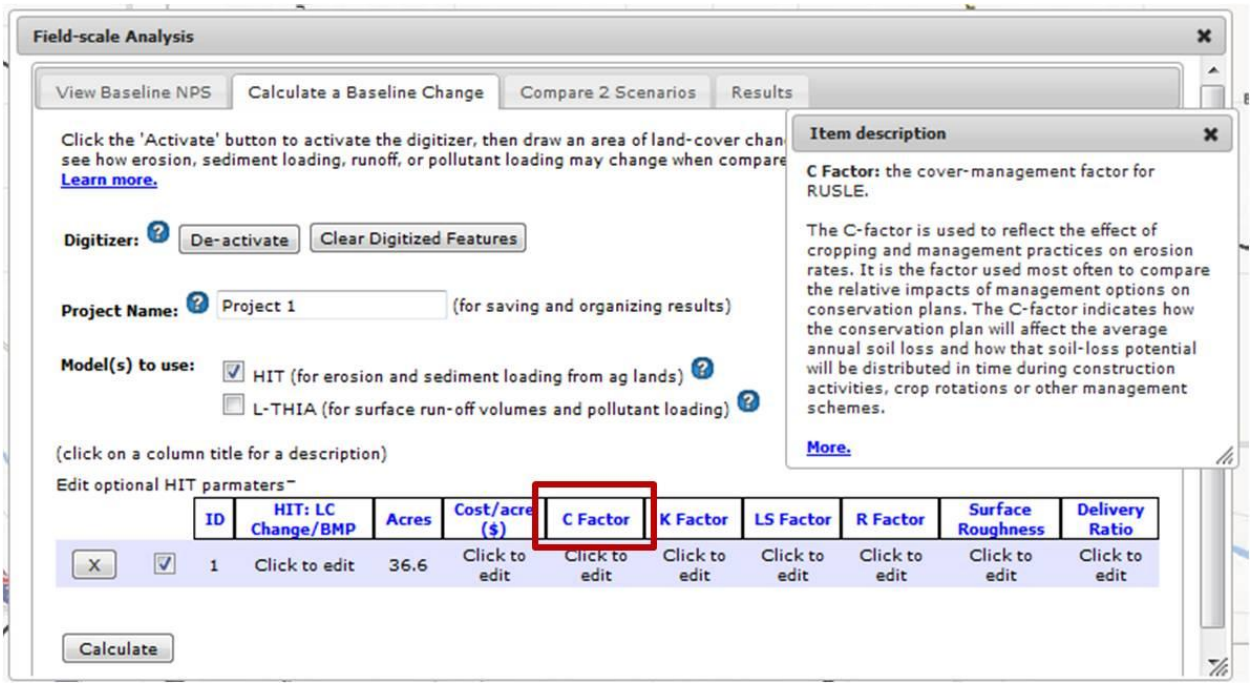

Figure 2

A summary of how HIT is employed within the GLWMS, and additional discussion of HIT uncertainty, is available here.