## **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.

	Calculate a Ba	seline Change Com	pare 2 Scenarios	Results	
Click the 'Activate' ow erosion, sedime nore.	button to activate nt loading, runoff,	the digitizer, then drav or pollutant loading ma	v an area of land-cove ay change when comp	er change or a best ared to a best estir	-management practice (BMP) to see mate of the current condition. <u>Learn</u>
Digitizer: 🙆 De-	Clear	Digitized Features			
roject Name: 🕝	Project 1	(for saving a	nd organizing results		
lodel(s) to use:	HIT (for erosio	n and sediment loadin	g from ag lands) 🕜 and pollutant loading)	0	
lick on a column ti	tle for a descriptio	n)			
	rmaters +	HIT: LC Change/I	BMP	Acres	Cost/acre (\$)
dit optional HIT pa	10			36.6	Click to edit
dit optional HIT pa	1	Click to edit			

## Figure 1

View Baseline NPS	Calculate a Ba	seline Change	Compare	2 Scenarios	Results			
Click the 'Activate	button to activate	the digitizer, t	hen draw an a	area of land-co	over chan	Item description	n	
see how erosion, s Learn more.	ediment loading, ru	noff, or pollutar	nt loading ma	y change whe	n compare	C Factor: the con RUSLE.	ver-manageme	ent factor for
Digitizer: 🕜 De Project Name: 🥝	Project 1	Digitized Featu	ires	ganizing resul	lts)	The C-factor is cropping and ma rates. It is the fi the relative impo conservation pla the conservation	used to reflect magement pra- actor used mos acts of manage ans. The C-fac n plan will affect	the effect of ctices on erosio st often to comp ement options o tor indicates ho ct the average
Model(s) to use:	HIT (for erosid	on and sedimer urface run-off v	it loading from olumes and p	m ag lands) oollutant loadin	ng) 🕜	annual soil loss will be distribute activities, crop r schemes.	and how that s d in time durin rotations or oth	oil-loss potenti og construction ner managemen
(click on a column	title for a description	n)				More.		
Edit optional HIT p	armaters <sup>-</sup>							
1	D HIT: LC Change/BMP	Acres Cost	(/acre \$) C Fa	ctor K Fac	tor LS Fa	actor R Factor	Surface Roughness	Delivery Ratio
	1 Click to edit	36.6 Cli	ck to Clic	k to Click	to Clic	k to Click to	Click to	Click to

## Figure 2

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