Assessing the Condition of Civil War Battlefields:
Using Fragmentation Analysis

Once the resurvey is completed for a battlefield using historic military maps, GPS, and other techniques, the remote sensed data covering the battlefield area is compiled and reclassified into three land use / land cover categories. These are then used to evaluate the condition of the battlefield. As the maps visibly attest, encroachment by development can, in a few short years, fragment the battlefield landscape until there is very little left to interpret or visit. One issue is how can we measure this fragmentation process?

Landscape Ecologists at the University of Massachusetts – Amherst have developed a program, FRAGSTATS (McGarigal, K., S. A. Cushman, M.C. Neel, and E. Ene.2002, Available at www.umass.edu/landeco/research/fragstats/hragstats.html) that may help.

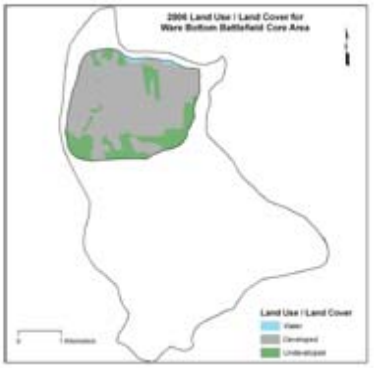
The CRGIS Facility has applied FRAGSTATS to the Ware Bottom Church Civil War Battlefield. The results are shown in the tables below the maps. They suggest the following observations:

The lifecycle of a battlefield moves from a pristine battlefield landscape to a battlefield that has lost its defining features. In its pristine stage, a battlefield would be expected to have: few patches (areas that remain undeveloped), large sized patches, short average nearest neighbor distances between patches, and of course, a high percentage of battlefield intact area.

At the end of its lifecycle, we can expect: few patches (just like the pristine stage), long distances between nearby patches (unlike the pristine stage), and of course, a low percentage of battlefield intact areas.

Between the pristine and "lost" stages is a continuum of intermediate levels of fragmentation denoted by large number of patches, smaller size patches, and increasing distances between nearest neighbors. So the lifecycle goes from pristine to fragmented to lost.

Ware Bottom Battlefield is in the final throes of being lost forever.



Fragmentation Statistics for Ware Bottom Church (VA054) Civil War Battlefield

	Nearest Neighbor Distance (m)	Undeveloped acres	Ave. Patch Size (acres)	Number of patches	Pct. Undeveloped	Water (acres)	Developed (acres)	Total Acres
VA054 Study Area 1992	13.35	5470.52	72.94	75	84.05	203.81	834.52	6508.85
VA054 Study Area 2000	7.93	5158.61	41.27	125	79.26	203.81	1146.43	6508.85
VA054 Study Area 2006	108.55	1955.40	72.42	27	30.04	203.81	4349.64	6508.85
VA054 Core Area 1992	13.76	1057.97	20.42	52	66.18	19.72	521.02	1598.71
VA054 Core Area 1992	6.77	1042.77	20.45	51	65.23	19.72	536.22	1598.71
VA054 Core Area 1992	132.84	368.08	36.81	10	23.02	19.72	1210.91	1598.71
VA054 Buffer Area	18.54	3670.43	24.05	148	66.47	663.42	1137.79	5371.64
VA054 Buffer Area	9.94	3484.7	19.69	177	64.87	663.42	1223.52	5371.64
VA054 Buffer Area	120.68	1586.36	33.14	44	29.53	663.42	3121.86	5371.64

Correlation Matrix

	Nearest Neighbor Distance	Undeveloped (acres)	Ave. Patch Size	Number of Patches	Pct. Undeveloped
Nearest Neighbor Distance	xxxxxxxxxxxxxxxxx				
Undeveloped acres	xxxxxxx	-0.55	0.29	-0.67	0.88
Ave Patch Size		xxxxxxxxxxxxxxxxx	0.38	0.66	xxxxxxxxxxxxxxxxx
Number of Patches			xxxxxxxxxxxxxxx	-0.34	-0.07
Pct Undeveloped				xxxxxxxxxxxxxxxxx	0.62
					xxxxxxxxxxxxxxx

Low Correlation | No Correlation | Suggestive Correlation | High Correlation