

**UNAUTHORIZED TRAIL IMPACT
STUDY AT
WINTON WOODS FINAL REPORT
(NOVEMBER 15, 1994)**

**By Denis G. Conover, Ph.D. (contractual researcher
Hamilton County Park District)**

**IMPACT OF UNAUTHORIZED TRAILS ON NATURAL AREAS FINAL REPORT
(NOVEMBER 15, 1994)**

This study, conducted at Winton Woods, examined the impact of an unauthorized trail on vegetation. The trail is located on the east side of Winton Road across from the entrance to Andover Road. This trail is used by people riding bikes and on foot. The location of this trail and the experimental design are shown on the enclosed map.

Transects were set up to cross the trail at three different locations (see map). Five one-meter diameter plots (area = 0.79 m²) were placed along each transect: one centered in the trail itself, two at three meters to each side of the trail, and two at 20 meters to each side of the trail. Vegetation was monitored within each plot throughout the growing season. The species of plants and the numbers within each plot are presented in Table 1.

It is apparent that human activity on this trail has had several obvious negative impacts, including: 1) the elimination of most of the vegetation on the trail itself, resulting in fewer plants and less diversity (Figure 1 and Table 2); 2) increased erosion (Figure 2); and, 3) increased litter (Figure 2).

From columns A3, B3 and C3 in the tables, and Figures 1-3 it is clearly evident that vegetation along the trail has been reduced in terms of both the number of individual plants and in the number of species. The only plants found within the one-meter diameter plots centered on the trail were located at the extreme edges, away from the middle of the path. There were virtually no plants in the middle of the path. The average number of plants in the sample plots on the trail was 21.5 plants/m², compared to 99.1 plants/m² in the sample plots located away from the trail (Table 2). The average number of species of plants in the sample plots on the trail was 3.4 species/m², compared to 13.5 species/m² in the sample plots located away from the trail (Table 2). These results corroborate the findings of other researchers (Wagar 1964, Frissell and Duncan 1965, Merriam and Smith 1974).

This scarcity of vegetation is allowing severe soil erosion to occur at several locations along the trail (Figure 1). Since the trail runs alongside a creek for part of its length this erosion could be impacting the creek and ultimately Winton Lake by contributing to siltation.

Other researchers have reported an increase in alien species along trail edges (Cole 1982, Cole and Fichter 1983, Rankin 1986-1990). In the present study alien species were more common in terms of numbers of individual plants and in the number of species in the sample plots located away from the trail than they were in the plots located on the trail (Table 2). For instance, there were an average of 19.9 alien plants/m² in the plots off the trail, compared to 0.8 alien plants/m² in the plots on the trail. This is probably due to the fact that there are fewer plants of any kind in the plots on the trail. There were, however, more alien plants and more alien species in the plots located 3 meters off the trail (25.1 alien plants/m², 1.9 alien species/m²) than in the plots located 20 meters off the trail (14.8 alien plants/m²,

0.8 alien species/m²), which could be due in part to their proximity to the trail.

This section of the park has been invaded by several alien species. Three of particular note are the woody species Amur honeysuckle (Lonicera maackii), winged euonymus (Euonymus alatus) and wintercreeper euonymus (Euonymus fortunei). On casual observation Amur honeysuckle appears to grow larger and bear more fruit along the trail (Figures 3 and 4) than do honeysuckle bushes away from the trail. To test this, I counted all of the Amur honeysuckle bushes within one meter (two meter width) of two 405 meter long transects. One transect ran along the middle of the trail itself, while the other ran parallel to, but 20 meters off to one side of the trail. There were 15 bushes along the trail, all of which were over one meter in height. Several of these bushes along the trail had flowered and borne fruit. There were 19 bushes along the other transect which was 20 meters off of the trail. Most of these bushes were under one meter in height and none of them had berries.

These differences in growth and fruiting along the two transects are probably due to differences in the amount of light reaching the plants. Since the trail runs alongside a creek for part of its length the amount of light reaching the plants along the trail could be due to its proximity to the creek rather than to the trail itself. There appears to be greater light penetration along the creek than in areas away from the creek due to the gap created in the canopy by the creek. To take this factor into account I counted all of the Amur honeysuckle bushes within one meter of a third 405 meter long transect. This transect ran along the opposite side of the creek, being a mirror-image of the transect running along the trail. There were 30 bushes along this transect. Most of these were over one meter in height and several of them had berries. I believe that the increased vigour in the Amur honeysuckle bushes found along the trail is due to their proximity to the creek and aspect rather than to the presence of the trail itself.

In conclusion, the results of this study indicate that this unauthorized trail is having several negative impacts on this natural area. Its presence has resulted in the destruction of perhaps many thousands of individual native plants and reduced the diversity along its length. Since this path was not plotted out by professional park personnel, use of this trail may have resulted in the local extinction of one or more rare plant species. The trail is causing soil to erode and wash into the creek. In addition, there is increased littering along the trail and there is evidence that alien plants are more abundant in the woods closer to the trail (three meters away) than farther away from the trail (20 meters away).

BIBLIOGRAPHY

- Cole, David N. 1982. Wilderness campsite impacts: Effect on Amount of Use. U.S.D.A., Forest Service, Inter-Mountain Forest and Range Experiment Station.
- Cole, David N. and Fichter, R.K. 1983. Campsite Impact on Three Western Wilderness Areas. Environmental Management.
- Frissell, Sydney S. and Duncan, Donald P. 1965. Campsite Performance and Deterioration. Journal of Forestry.
- Merriam, L.C. and Smith, C.K. 1974. Visitor Impact on Newly Developed Campsites in the Boundary Waters Canoe Area. Journal of Forestry.
- Rankin, W.T. 1986-1990. Vascular Plant Surveys in the Hamilton County Parks.
- Wagar, J. A. 1964. The Carrying Capacity of Wildlands for Recreation. Forestry Science Monograph. Society of American Foresters, Washington D.C.

FIGURE LEGENDS

Map and Experimental Design. Experiment to study the effect of an unauthorized trail on vegetation at Winton Woods (1994).

Table 1. Check-list of vascular plant species found along transects crossing the unauthorized trail.

Table 2. Numbers of vascular plants and plant species found along transects crossing the unauthorized trail.

Figure 1. Photograph showing soil erosion on unauthorized trail (Spring 1994).

Figure 2. Photograph showing litter on unauthorized trail (Summer 1994).

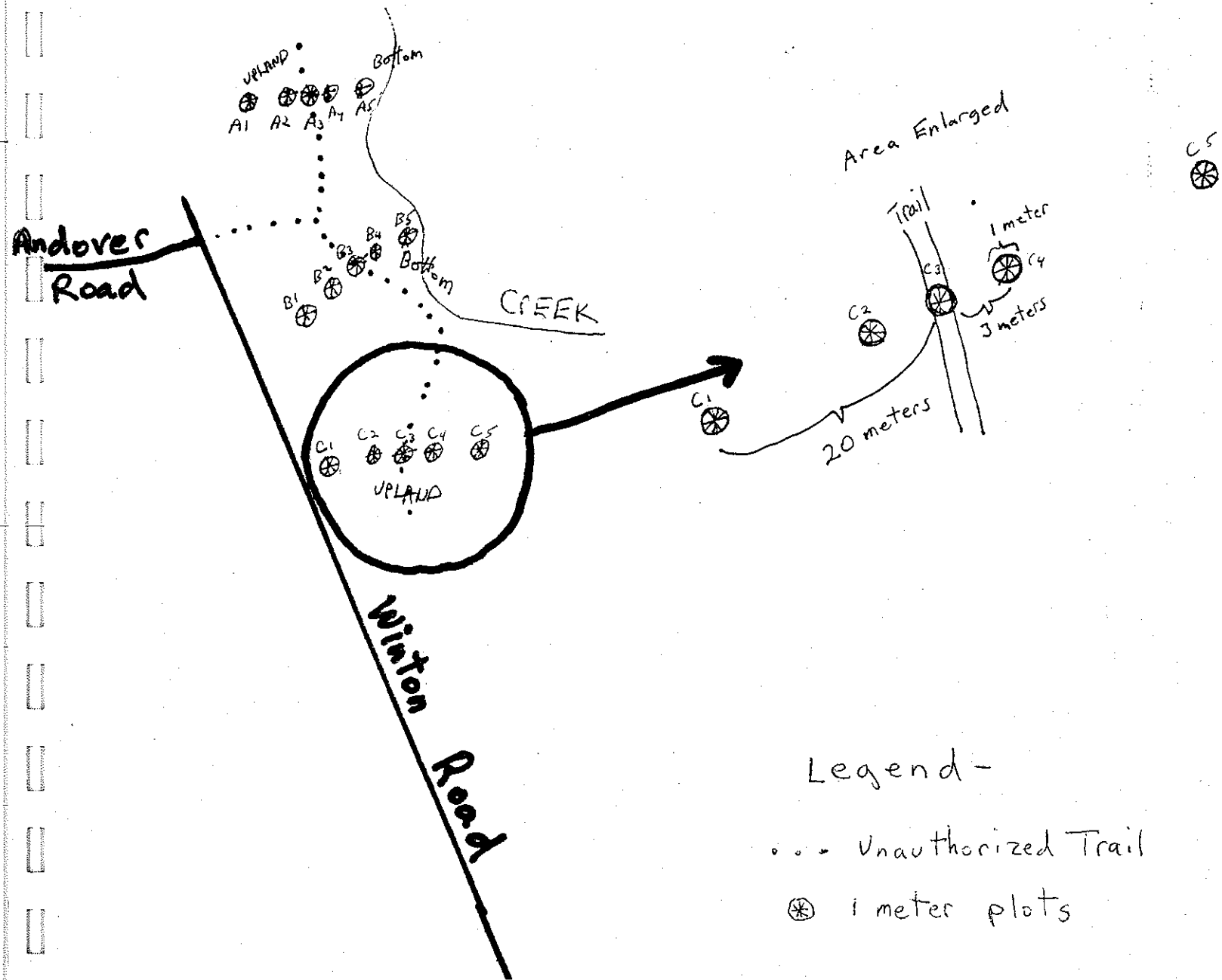
Figure 3. Photograph showing Amur honeysuckle bush growing alongside unauthorized trail (Spring 1994).

Figure 4. Photograph showing berries on Amur honeysuckle bush growing alongside unauthorized trail (Fall 1994).

MAP AND EXPERIMENTAL DESIGN

EXPERIMENT TO STUDY THE EFFECT OF AN UNAUTHORIZED TRAIL ON VEGETATION AT WINTON WOODS (1994)

NORTH ↑



Scientific Name (Common Name)	Number of Plants Appearing During Season Per Location:														
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5
<i>Galium</i> sp. (Bedstraw)	18	7		3		5	10	3		6		3		2	4
<i>Hydrophyllum</i> sp. (Waterleaf)										10					
<i>Impatiens</i> spp. (Jewelweed)		5		3	7	10	20			6	1				
* <i>Lindera benzoin</i> (Spice bush)						1t 1s					5s				
* <i>Lonicera maackii</i> (Amur honeysuckle)								1t							
<i>Ornithogalum umbellatum</i> (Star of Bethelhem)											3				
<i>Osmorhiza claytoni</i> (Hairy sweet cicely)		1		1	2	1				1	1				
* <i>Ostrya virginiana</i> (Hop-hornbeam)												1t 1s		1s	
<i>Oxalis stricta</i> (Yellow wood-sorrel)				1											
* <i>Parthenocissus quinquefolia</i> (Virginia creeper)				1											
<i>Pilea pumila</i> (Clearweed)						5	7	5	15						
<i>Podophyllum peltatum</i> (Mayapple)	4				4										2
<i>Prunus serotina</i> (Wild black cherry)		1s											1t		
<i>Sanicula gregaria</i> (Clustered snakeroot)				5		3	2	5	16						
* <i>Taxus</i> sp. (Yew)												1s			
<i>Uvularia</i> sp. (Bellwort)												2			
<i>Viola papilionaceae</i> (Common blue violet)								1	5		1				1
<i>Viola pennsylvanica</i> (Smooth yellow violet)	1										1				

TABLE 2. NUMBERS OF VASCULAR PLANTS AND PLANT SPECIES FOUND ALONG TRANSECTS CROSSING AN UNAUTHORIZED TRAIL AT WINTON WOODS BASED ON OBSERVATIONS MADE BETWEEN MARCH 15 AND NOVEMBER 15, 1994 BY DR. DENIS G. CONOVER

NOTE: A3, B3 and C3 are the sample sites located on the trail. Any plants found within these sites were located at the extreme edges, away from the center of the path.

	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5
Total Number of Plants	141	58	3	75	75	72	83	28	106	57	53	57	20	85	78
Average Number of Plants in Transects Off the Trail:	99.1 plants per square meter														
Average Number of Plants in Transects On the Trail:	21.5 plants per square meter														
Number of Species	9	8	2	13	11	12	11	5	12	15	9	9	1	11	8
Average Number of Species in Transects Off the Trail:	13.5 species per square meter														
Average Number of Species in Transects On the Trail:	3.4 species per square meter														
Total Number of Alien Plants	30	17	2	21	5	0	16	0	30	0	5	0	0	35	30
Average # of Alien Plants in Transects Off the Trail:	19.9 plants per square meter														
Average # of Alien Plants in Transects On the Trail:	0.8 plants per square meter														
Average # of Alien Plants in Transects 3m Off the Trail:	25.1 plants per square meter														
Average # of Alien Plants in Transects 20m Off the Trail:	14.8 plants per square meter														
Total Number of Alien Species	1	2	1	2	1	0	2	0	2	0	1	0	0	1	1
Average # of Alien Species in Transects Off the Trail:	1.1 species per square meter														
Average # of Alien Species in Transects On the Trail:	0.3 species per square meter														
Average # of Alien Species in Transects 3m Off the Trail:	1.9 species per square meter														
Average # of Alien Species in Transects 20m Off the Trail:	0.8 species per square meter														



FIGURE 1.

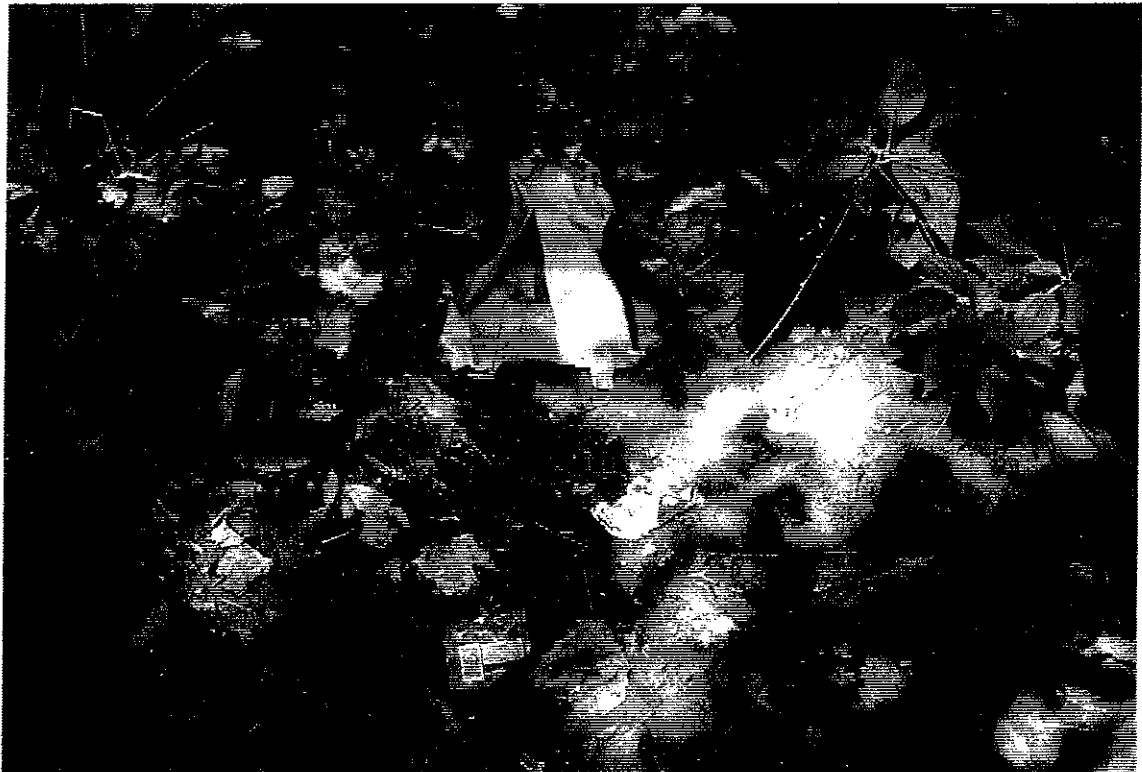


FIGURE 2.



FIGURE 3.



FIGURE 4.