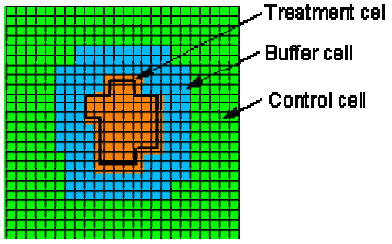
Evaluation of Treatment Blocks

One of the tasks performed by the Decision Algorithm (DA) for the Slow the Spread (STS) of Gypsy Moths project is to evaluate the success of treatments. Treatment success is based on male moth counts in pheromone traps in the treatment block area versus the surrounding area for the time before treatment as compared to the time after treatment. First the area to be compared must be defined, then the selection of data needs to be made, and finally the data is analyzed. The result is a number that represents the treatment efficacy where a successful treatment is represented as 1 and unsuccessful treatments are less than 0.33.

The treatment block analysis breaks up a treatment area into three sections. The first part is the actual area that represents the treatment block, this is defined by project personnel and fed into the system. The second area is a buffer zone, this is the area that is within 1.5 km of the treatment block. Also, this includes any area that is part of another treatment block or within 1.5 km of another treatment block. This area is not used in the treatment analysis. Finally, there is the control area, this is the area around the treatment block. If the length and width of the treatment block is less than 12 km, then the control area is the region that forms a 24 x 24 km area around the treatment block. If either the width or height of the treatment block is larger than 12 km, then the control area is twice the width and twice the length of the treatment block.



The data that is used depends on the type of treatment that was performed in the treatment block. In the case of Dimilin or BT, the treatment analysis is performed in the same year that the treatment is performed. In the case of Mating Disruption, the analysis must be performed the year after treatment. This is because, with Mating Disruption, accurate data cannot be attained in the year that Mating Disruption is used.

To determine the treatment success, average moth counts in the treatment block is compared with average moth counts in the control area. The equation is:

$$T = 1 - \frac{Tr_t}{Tr_{t-1}} * \frac{C_{t-1}}{C_t}$$

where:

- Tr_t = average moth count in the Treatment Block after treatment
- Tr_{t-1} = average moth count in the Treatment Block before treatment
- C_t = average moth count in the Control Area after treatment
- C_{t-1} = average moth count in the Control Area before treatment

The result is a number where

- Treatment was successful if $T > 0.67$
- Treatment was partially successful if $0.67 < T < 0.33$
- Treatment failed if $T < 0.33$

If $T > 0.67$, then there is at least 3 times reduction in moth counts after treatment. If the population was not treated, it would increase in numbers by 50-100% in the next year. Thus, 3 times reduction in moth counts corresponds to mortality of 78 - 84% caused by the intervention activity. These levels of mortality are usually considered satisfactory in field trials of pest control.