

The Decision Algorithm

The Decision Algorithm (DA) is a part of the Slow the Spread (STS) project. The set of programs that make up the DA are used to provide various types of information. The first part that the DA does is to analyze the input catch data to determine the current Gypsy Moth population characteristics. From this information, suggestions on treatment locations is made by the DA and used by project coordinators in deciding where treatments should be made. Finally, the DA evaluates treatments that were done to see if individual treatments were successful or not and also does a project wide spread analysis to determine if the project as a whole is working correctly. These three parts combine together in make a very key part of the STS project.

At the end of the trapping season, catch data is submitted along with coordinates to the central database. After some processing there, the database exports a file with catch data and attributes for the DA to load into the system. To help smooth out some of the peaks and find the data that is needed, the catch data is run through a program that creates a kriged surface of the moth catches.

This data is used in defining the Potential Problem Areas (PPAs). These are places where the moth counts indicate that there might be a potential outbreak. The gypsy moth population spreads by forming isolated colonies in front of the population front and then having these colonies coalesce together to form the new population front. The first check that is done in the search for PPA's is by looking in the catch data to see if there is a catch that exceeds the 98th percentile of catches in a 40 X 40 km area. Next the kriged surface is examined to see if there are any peaks in the surface that exceed the 92nd percentile in the same 40 X 40 km area. The test search that the DA performs is to examine the product for the kriged surface for the given year and the previous year to see if there are any peaks that exceed the 92nd percentile in the same area. If an area matches any of these three criteria, it is marked as a PPA.

The next step in the program is to assign priorities to all the PPAs. This priority is generated based on several factors. The first criterion that is used is the average moth catch in the PPA compared to the surrounding area. Next the distance to the action zone is taken into account. Next, the number of traps in the block is taken into account. Finally, the position of the PPA relative to other PPAs is taken into account. These priorities are used to determine which action is recommended for a given PPA. A block can have three things done, first of all nothing can be done. Second, the block can have a more intensive trapping grid placed over it to get more data. Finally, it can be determined that the block needs to be treated to eradicate the moths in the PPA. Because the number of traps in the PPA affects the priority the blocks will be recommended for intensive delimiting before a treatment is recommended. All this information is given to the project coordinators so that a plan of action can be determined.

The last part of the DA is the evaluation of the success of treatments and the program as a whole. First, individual treatments are examined to see if the population around the treatment block went down compared to the population in the surrounding area. This is done either in the year of treatment or the year after treatment depending on the method of treatment used. Finally, all the moth lines are averaged together to produce an overall spread rate. Also, a compression value is determined to see how close the moth lines are to each other. These two statistics determine how well the overall success of the program is going.