Gypsy Moth
Background Information

The Gypsy Moth, Lymantria Dispar, is the most notorious insect pest of hardwoods in the eastern United States and is becoming a major pest in other parts of North America. In any given year, the Gypsy Moth can defoliate trees on millions of acres (hectares) of forest, parks, and residential home lots, giving trees a winter appearance in the spring and summer. The insect is an exotic species, brought into Massachusetts in 1869 by a French naturalist who was trying to develop the silkworm industry in the United States. The Gypsy Moth escaped from his laboratory. Because there are no natural control agents, such as predators, for the Gypsy Moth in North American forests, it colonized rapidly, expanding its range and becoming a first class pest. Since then, the social and economic costs have been enormous. They include loss of timber value, the cost to remove and replace park and private recreation areas because of the presence of “millions” of caterpillars.

Confrontational public meetings and neighborhood conflicts have arisen over control (such as use of insecticides) and cost issues. Some concerns over costs include the expense of conducting surveys, developing environmental impact statements and recommendations, and implementing control techniques.

In 1890, the insect was so abundant that it began to attract public attention. The Massachusetts legislature appropriated $25,000—a considerable sum then—to help control the pest. This was the beginning of a long history of unsuccessful attempts to stop the gypsy moth. By 1910, five north eastern states were infested. By 1992, 41 states had reported the presence of the Gypsy Moth.

Gypsy Moth Life Cycle

Gypsy Moth eggs hatch in the spring (about the time oak leaves begin to grow). During the next 6–8 weeks, the larvae will molt several times. This is the stage in which the Gypsy Moth does all of its damage. Each larva consumes about 10.8 square feet of leaves during its development. Finally, it crawls to a bark crevice or other protected place and pupates. During the 10–12 day pupal stage, the Gypsy Moth completes development. Adults emerge and mate, but do not feed. The female has white wings but cannot fly. She secretes a chemical called a pheromone, which attracts males. After mating, the female lays 200–800 eggs in a single mass and covers them with body hair so that they can survive the winter. The egg masses are laid primarily on trees, but interestingly, they are also laid on cars and other vehicles, a factor that contributes to the spread of the Gypsy Moth. In the spring, the eggs hatch, and the cycle begins again.

Effects of the Gypsy Moth defoliation vary. When more than 50 percent of the tree's leaves are eaten, the tree will re-leaf during the summer, although the leaves will be smaller. The refoliation process uses stored nutrients that would normally have been used the following year. This weakens the tree, making it more susceptible to opportunistic organisms such as the two-lined chestnut borer or shoestring root fungus. The tree can survive defoliation and refoliation for 1–2 years, but will most likely die if the opportunistic organisms are present.
Gypsy Moth Life Cycle

- Adult Moths
- Pupa
- Egg Mass
- Caterpillar
# Gypsy Moth Control Team Cards

## NO CONTROL
Your team advocates doing nothing, which will allow natural biological controls to function in the forest. Your team hopes that outbreak populations will be brought back to non-damaging levels by those controls before causing social or economic damage.

## CULTURAL CONTROL
Your team focuses on cultural practices, such as planting trees that Gypsy Moths do not prefer as a food source. Cultural practices also include improving the health of trees through watering and fertilization, so that trees can better withstand a Gypsy Moth attack.

## MECHANICAL OR MANUAL CONTROL
Your team focuses on mechanical practices that change the Gypsy Moth’s access to food and ability to reproduce. Your team advocates using traps to catch male Gypsy Moths so that they can’t mate. Your team also advocates picking egg masses from trees and dunking them into soapy water, plus using sticky barriers to prevent larvae (caterpillars) from crawling up tree trunks to reach the food source.

## BIOLOGICAL CONTROL
Your team focuses on biological controls, such as introducing natural enemies (parasites, predators and disease organisms) to maintain Gypsy Moth populations at non-damaging levels. You would consider conservation practices that would encourage insects (wasps, flies and beetles) that attack Gypsy Moth larvae as well as disease organisms, such as NPV (Nuclear Polyhedrosis Virus) or Bt (*Bacillus thuringiensis*). NPV and Bt sprays kill Gypsy Moth larvae when ingested. Bt will kill other butterfly and moth larvae that ingest it.

## REGULATORY CONTROL
Your team advocates strict quarantines to keep the moth from spreading. You might require inspection of household goods and camping equipment that are being moved out of an infected area.

## CHEMICAL CONTROL
Your team advocates using chemicals to eradicate or manage the Gypsy Moth. You advocate using broad-spectrum synthetic chemicals that are poisonous to many insects and other organisms. You also may recommend using sprays derived from natural products that are generally restricted to killing invertebrates.
Power of Persuasion

Here are a few tips to help persuade others to see your point of view:

- **Organize your thoughts and concepts logically.**
  You may want to jot on a note card your major points in order of priority so you don’t forget them.

- **Start with an attention-getter.**
  Open with a powerful statement to grab the attention of your audience.

- **Clearly explain your point of view.**
  Give specific examples, if you can, to illustrate your position.

- **Be Concise.**
  Keep it short and simple! Short speeches are usually more powerful and memorable than longer ones.

- **Make eye contact.**
  Eye contact shows that you are sincere about your topic and that you acknowledge your audience.

- **Speak slowly.**
  Most people tend to rush when they talk before a group. Speak slowly and loudly enough so everyone can easily hear you.

- **Use visuals.**
  You may want to highlight major points by writing them on a chalkboard, easel pad or handout; showing slides, a poster or other pictures will help people remember important points.

- **Reinforce your position and your argument.**
  After you introduce your position and your argument, you should articulate your position, then conclude by reiterating the major points of your argument.
The Insecticide Predicament

When a population of insect pests is sprayed with a chemical insecticide, most, but not all, of the insects are killed. Insects that survive may have a tolerance or resistance to the insecticide. Why they are resistant is not clearly understood, but what is clear is that many species of insects can become resistant to certain chemicals and that such resistance — or immunity — may be inherited by, and in some instances strengthened in, the next generation of insects. Should subsequent generations of pests be treated again with the insecticide, many will survive. Even if stronger applications are used, the insects may continue to develop resistance and tolerance. Eventually, the insecticide may become ineffective.

A danger arises in the use of a chemical insecticide, which, in small or moderate amounts, can be tolerated by the environment. When the potency of the chemical is increased in an attempt to overcome the rising levels of immunity or resistance, it becomes a hazard to other life forms.

Insecticides can enter lakes, ponds and streams in several ways: surface runoff, point-source pollution and accidental contamination. Rain can wash insecticides into the water from areas that have been treated with insecticides (surface runoff). But no matter how the chemical enters the environment, the results can threaten or devastate many animal species and organisms that may otherwise help to naturally control certain pest species.

In the 1950s and 1960s, the powerful chemical insecticide DDT became part of the food web as farmers and homeowners began applying DDT to crops and plants. As birds fed on DDT-sprayed insects, the chemical caused a dangerous thinning of the egg shells of many species, including raptors such as eagles, causing their eggs to break in the nest. The reproductive rates of many birds dropped dramatically, as depicted in Rachel Carson's book Silent Spring. In 1973, DDT was banned and a slow recovery began among DDT-affected bird species.

Secondary insect outbreaks sometimes occur when insecticides are used. For example, under natural conditions an insect may not be a pest. However, when chemical (broad spectrum) insecticides are applied to control other pests, natural enemies of this insect may be eliminated. This situation allows normally non-pest insects to “outbreak” and become pest species. Thus creating an insecticide predicament.
Cooperation Versus Competition

Often, people have different ideas about how to solve controversial environmental issues, causing various “interest groups” to develop. Sometimes these groups can work out their differences and come up with a solution that all can live with. At other times, neither group is willing to compromise, and a stalemate occurs.

When people have different views on what the right solution is to an environmental problem, it’s often beneficial to hear all points of view and try to cooperate on a solution. In this manner, you are not competing with each other, rather you are trying to find a solution that is acceptable to all: a compromise. A technique that is useful in accomplishing this is consensus building.

Here are a few techniques that can be used to build cooperation and consensus:

• Remember to keep an open mind. Your position is not the only one.
• Let all have a chance to talk and present ideas. Encourage everyone to participate. Don’t let one person dominate the conversation.
• There are no bad ideas. Brainstorm ideas and have someone write them down on a piece of paper, or better yet, on an easel pad so everyone can see them.
• Don’t let hostility get in the way of cooperation.
• Discuss (or have individuals write down) the pros and cons of each idea. Once all have had a chance to present their ideas and the pros and cons of each idea have been determined, you can try to decide what the best solution is.
• One way to help achieve consensus is to have everyone rank the ideas that have been presented with a number. For example, if there are six ideas, each person would rank the choices from one to six, with six being the first choice. Total the number of points given for each idea; the one with the highest score represents the majority viewpoint. This technique is especially helpful when you have a large group trying to reach consensus.

Example:

**Gypsy Moth Control**

<table>
<thead>
<tr>
<th>Control</th>
<th>Peter</th>
<th>Chelsea</th>
<th>Nathan</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Control</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Cultural Control</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td>Mechanical/Manual Control</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Biological Control</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Regulatory Control</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Chemical Control</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>10</td>
</tr>
</tbody>
</table>

On the basis of this example, the control method would represent the majority choice, followed by regulatory control.