Spanning the Gap

The Gypsy Moths Are Here

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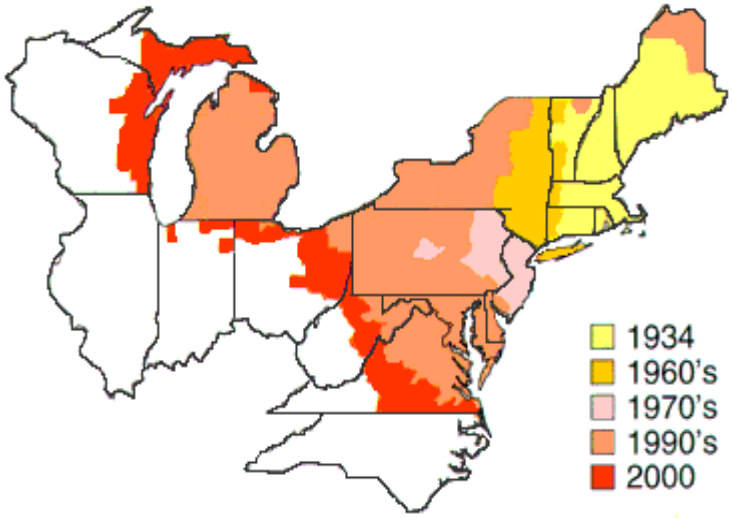

. *(Left)* Regulated area of gypsy moth infestation (Northeastern U.S.) since 1934, from a USDA pamphlet published in 2001. *(Map: United States Department of Agriculture)*

Many park visitors will become familiar with some stage of the gypsy moth *(Porthetria dispar L.*) when they visit the recreation area this year. It was introduced into the United States from Europe in 1869 by a French artist and amateur entomologist, Etienne Leopold Trouvelot (1827-1895), who hoped his experiments in crossing it with silkworms would produce a new, heartier silk-producing insect. The experiments were unsuccessful, and some of the moth larvae, or caterpillars, escaped. Within a few years the gypsy moth was well established in Massachusetts, and has spread steadily since. By 1989, the gypsy moth could be found as far south as Virginia and as far west as Oregon.

As the gypsy moth has moved, several national parks within infested areas have been strongly affected. To date the moth has reached high

The female covers the egg mass of 100 to 1000 eggs with yellowish-buff hairs from her abdomen, giving it an appearance of velvet. *(Photo: United States Department of Agriculture)*

populations at Catoctin Mountain Park in Maryland, Rock Creek Park in Washington, D.C., Shenandoah National Park in Virginia, the Blue Ridge Parkway in North Carolina and Virginia, and the Delaware Water Gap National Recreation Area in Pennsylvania and New Jersey. Many of these parks were initially infested with gypsy moth larvae transported unintentionally by visitors' vehicles traveling from other infested areas.

The gypsy moth produces one generation per year. Its life cycle has four major stages: egg, larva, pupa, and moth. Like many other tree-defoliating insects, it is most destructive during its larval developmental stages, called *instars*, when it feeds on leaves. No other life-stage of the gypsy moth is known to cause damage.

The buff-colored egg masses are most commonly laid during July, in clusters of 400 to 500 eggs deposited on the bark of trees, where they spend the winter. Their hatching usually coincides with the appearance of buds on hardwood trees, especially oak, during the spring.

When weather conditions are favorable, the newly-hatched *larvae* climb to the tops of trees and begin feeding. The larvae pass through several instars as they feed, shedding their skin as they grow. The larvae eat ravenously during the last two instars; each larva is capable of consuming several leaves per day. Between mid-June and mid-July the larvae eat about % of the total foliage they will consume in their lifetime. If population levels are high or food is scarce, the larvae will suspend themselves on silken threads and are easily picked up by the wind and dispersed to adjacent forests or communities. Wind is thus the primary method used by the gypsy moth to spread naturally to new areas.

After the feeding stages are over, the larvae change to *pupae* in reddish brown cocoons located in protected sites throughout the infested area. The pupa is a non-feeding stage and lasts about 2

Gypsy moth pupae. Eggs hatch in May, when oak leaves appear. The adult moth energes in late July and August; the case may remain behind on the tree. *(National Park Service photo)*

(Above) Gypsy moth caterpillars are from 1 1/2 to 2 1/4 inches in length. They have yellow markings around the head and distinctive pairs of spots -- 5 blue pairs and 4 red pairs -- on their backs. *(National Park Service photos)*

weeks.

At this point the adult moths emerge. The male moths emerge a few days before the feamles, who are flightless. Upon emerging from the pupal case, the female crawls to a site suitable for egg laying and there releases a strong scent, or pheromone, to attract the males. After mating, the females deposit their eggs on nearby objects and then die. The eggs will remain dormant until the following spring and then the cycle begins again.

In areas where the gypsy moth is native, such as Asia, Europe, and North Africa, it has many natural control agents that help to keep populations at manageable levels. Unfortunately, the gypsy moth was introduced into this country unaccompanied by any of these natural agents. Since 1905, major efforts have been made to establish some of these control agents in the United States. As of 1990, there were 9 parasites and several disease causing organisms that had been established. The future of gypsy moth control in the Unites States depends on the continued growth of these natural control agents.

The National Park Service is committed to implementing an *Integrated Pest Management Program* to control the gypsy moth and other pests. This strategy seeks to maximize the use of natural, mechanical, and cultural control techniques while minimizing chemical treatments. A variety of options exist within each of the treatment categories. Mechanical control options might include scraping or removing the egg masses into a can of oil, bleach, or alcohol. Another option might be banding affected trees with strips of burlap to create artificial resting sites. If this is done correctly, you can collect the resting larvae each morning from under the bands. In each case, the actual number of larvae collected can be quite high, but it will probably not noticeably decrease the infestation.

Many chemicals have been used in the past to combat the gypsy moth. Most have been discontinued because of their toxicity, but a few are

The adult male gypsy moth *(left)* is brown with black markings and has wing span of about 1 1/2 inches. They fly strongly, often low to the ground. The adult female gypsy moth *(right)* is whitish with black markings and has a wing span of about 2 inches. The female has a chunky, blunt body that is too heavy to fly. *(Photo: United States Department of Agriculture)*

Infestation at Blue Mt. Lakes on the park's New Jersey side in 1970. *(National Park Service photo)*

still used. In addition, repeated applications may also kill many beneficial insects. such as honeybees and butterflies. For this reason the National Park Service feels this product should be used with great caution.

National Park Service managers think that in the long run it probably will be more cost-effective, as well as more environmentally sound, to allow the gypsy moth to defoliate natural zone forest areas, to accept the tree mortality that may result, and to expect trees that are more resistant or less palatable to the gypsy moth to replace the dead trees. This strategy will also permit gypsy moth parasite and pathogen populations to build up and remain active in the area, thereby decreasing the size of future gypsy moth outbreaks by providing some continuous level of natural control of the populations.

Infestation can leave trees bare even in summer: this pohotgraph was taken at Blue Mt. Lakes in *July*. Unable to produce food through leaves, trees uses up stored energy and are weakened. Shade and fruit trees -- oak, birch, and poplar -- and some conifers in mixed areas are affected. *(National Park Service photo)*