North American Plant Protection Organization

Organización Norteamericana de Protección a las Plantas

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Workshop: Asian Gypsy Moth
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Asian Gypsy Moth

Lymantria dispar asiatica

Lymantria dispar japonica

Asian Gypsy Moth Distribution

Lymantria dispar asiatica – Found throughout temperate Asia. Usually east of the Ural Mountains into Far East Russia, through most of China and Korea. It is not found east of the Himalayan range in India.

Lymantria dispar japonica – Found in Japan on all four major islands; Honshu, Shikoku, Kyushu and portions of southern and western Hokkaido.

Photo Credits:
Lymantria dispar asiatica - Alexander Schintlmeister
Lymantria dispar japonica – Ken Walker, Museum Victoria

Asian Gypsy Moth Life Cycle

Four Stages: Egg → Larva (caterpillar) → Pupae (cocoon) → and Moth

AGM is univoltine, egg masses are the overwintering stage and may be found on trees, stones, walls, logs and other outdoor objects. On average they are 3.8 cm long and 1.9 cm wide. An egg mass contains 100-1500 eggs. The mass is covered with a buff or yellowish color which comes from the abdomen hair of the female.

AGM eggs hatch in the spring. Larvae range from 2-3 mm to 60 mm long when mature. Larvae feed for 6-8 weeks.

Photo credits: Ferenc Lakatos, University of West-Hungary John H. Gent, USDA Forest Service,

Asian Gypsy Moth Life Cycle

AGM caterpillars stop feeding when they enter the pupal or cocoon stage. This begins in late June or July.

Photo Ferenc Lakatos, University of West-Hungary, www.ipmimages.org

Adults emerge in 10 to 14 days. AGM adults do not feed, only mate and lay eggs (1-3 weeks). Egg oviposition occurs between July and September. The eggs remain dormant during the winter and hatch in the following spring.

AGM Characteristics

- Variation in larval coloration and Asian larvae are larger.
- Evidence for adaptation to shorter egg chilling times suggesting that gypsy moth should be able to adapt to climates with warmer and shorter winters
- Flight capability of females also varies widely from less than 1 km up to 20-40 km
- Outbreak periodicity varies between locations: Siberia 6-10 years, Russian Far East – 6-8 years and China 6-10 years compared to the European strain of gypsy moth where outbreak intervals vary from 6 to 36 years

Asian Gypsy Moth Egg Oviposition Preferred Sites Varies by Country

Vladivostok

All Russian Plant Quarantine Center

Lymantria dispar asiatica

Mean #Adult Males/Trap

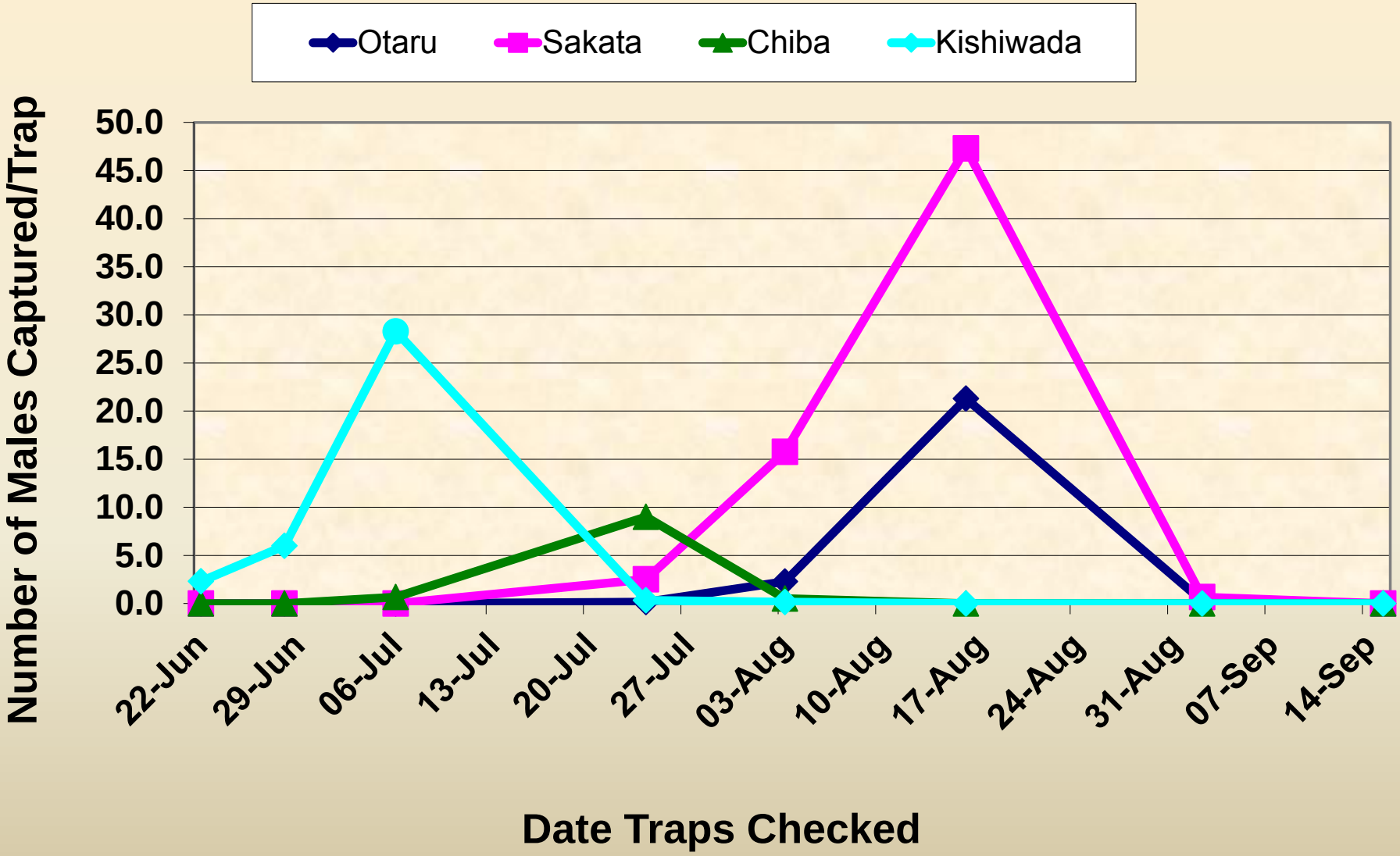
400
350
300
250
200
150
100
50
0

July 14
July 20
July 28
Aug 4
Aug 11
Aug 18
Aug 25
Sept 1
Sept 8
Sept 15

Date

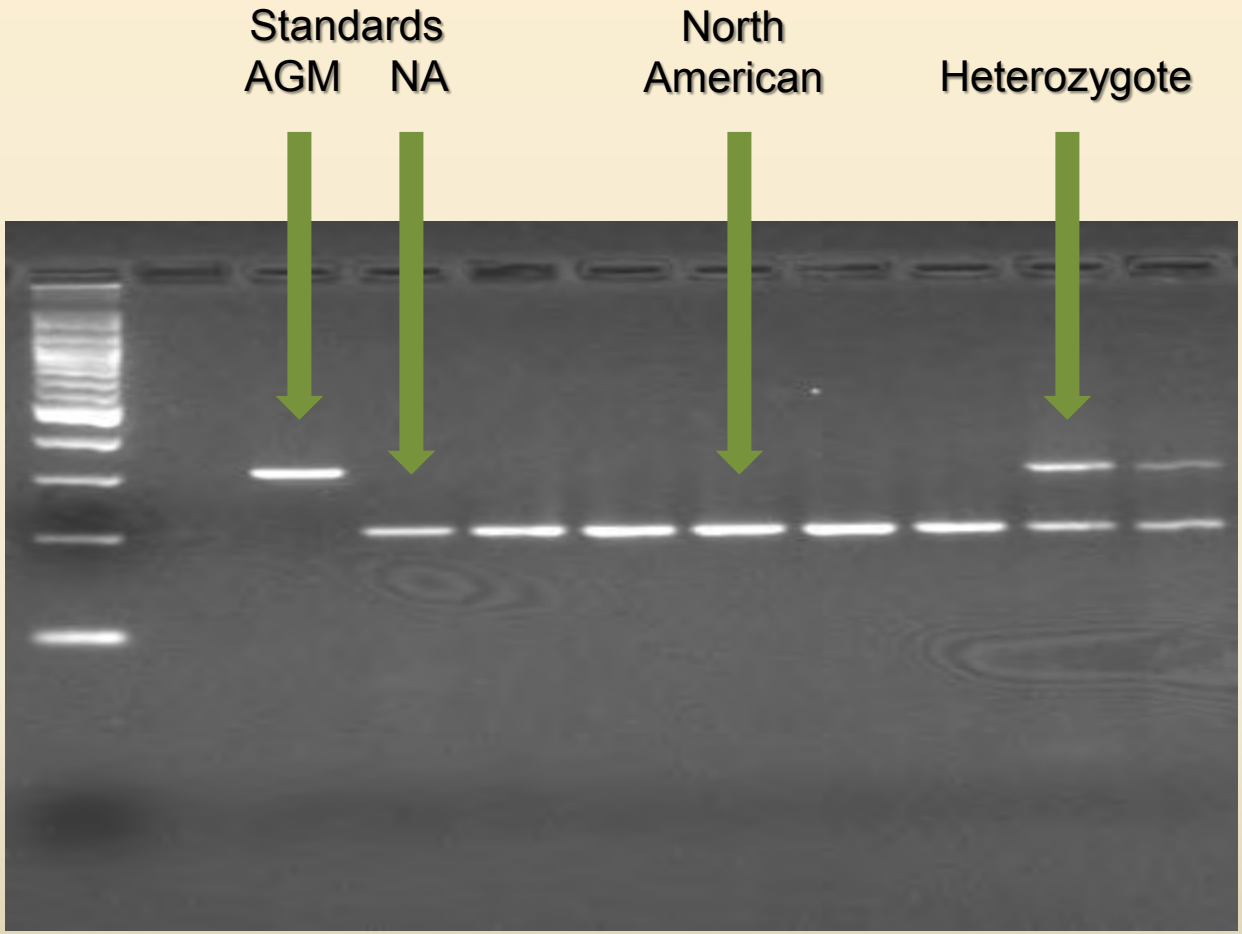
Monitored Japanese Ports

Lymantria dispar asiatica
Male Moth Flight Periodicity
Japan



FS1 nuclear marker

Two genetic markers are used to assess the genotype, the FS1 nuclear marker and a mitochrondrial marker



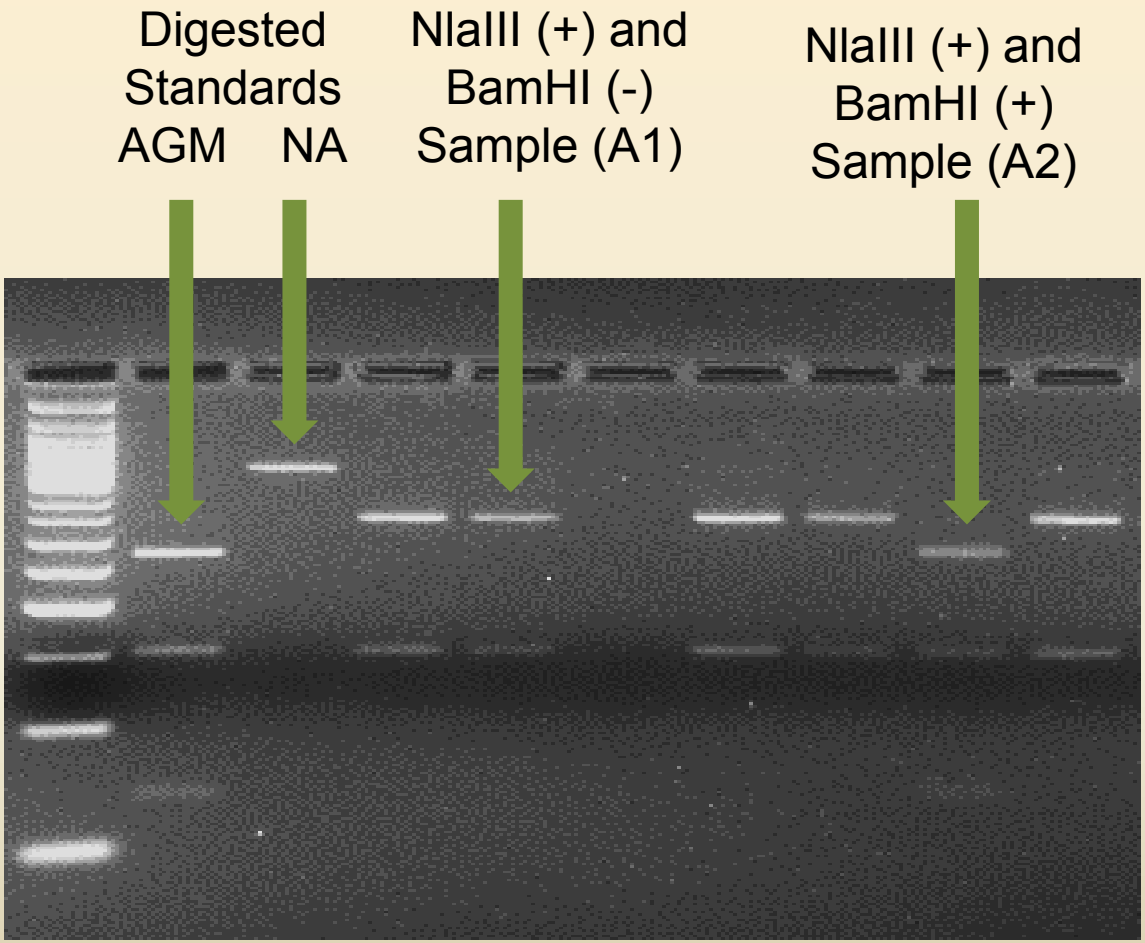
Standards:
AGM (Asian Gypsy Moth)
NA (North American Gypsy Moth)

Frequency of gypsy moth “alleles” based on the FS1 primers

Allele	Size	Frequency		
		North America	Siberia	Russian Far East
NA	~200 BP	96.5	8.6	0.7
AGM	~300 BP	3.5	91.4	99.3

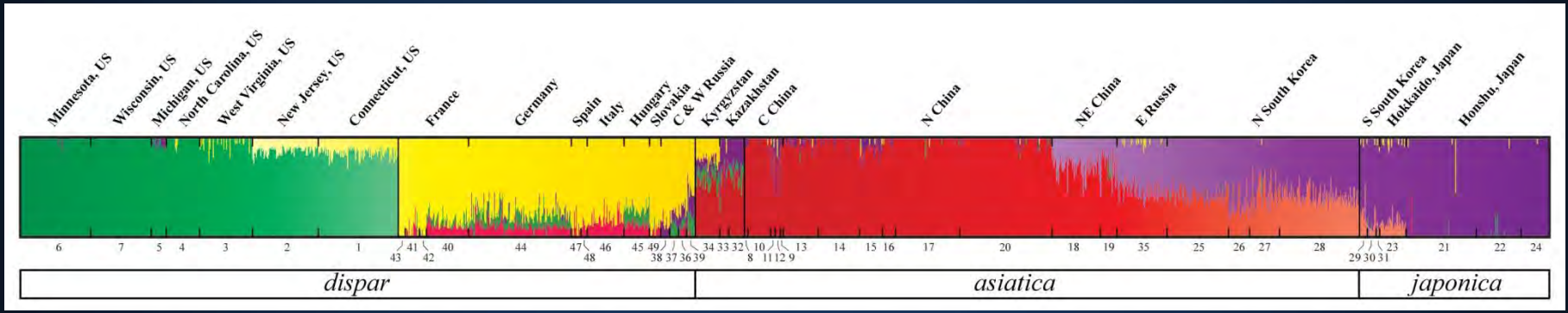
Two variations or alleles occur at the FS1 loci

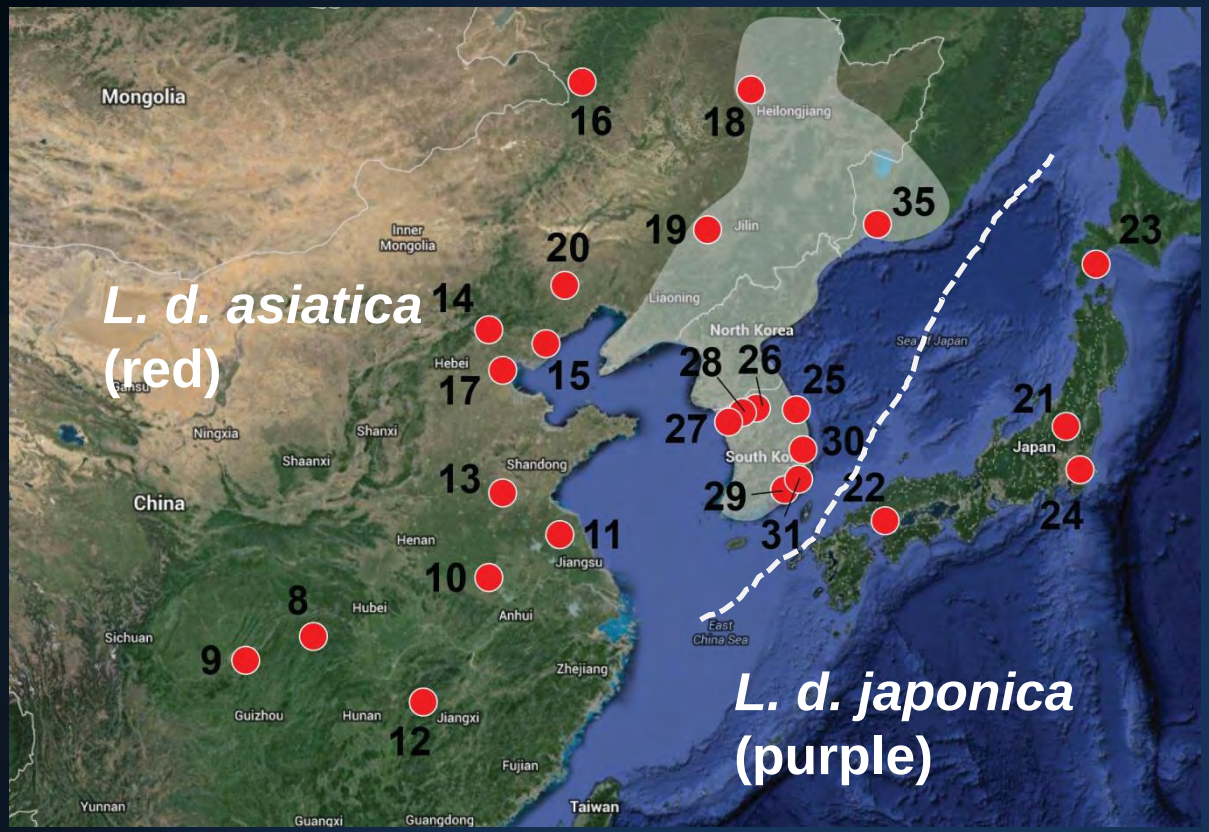
NlaIII/BamHI Double Digestion Enzymes



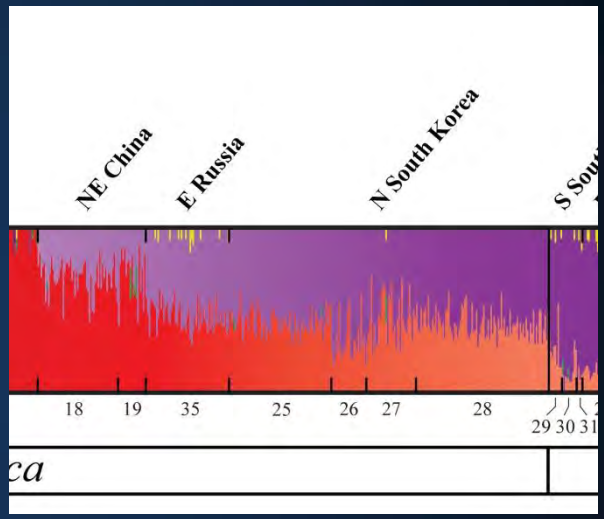
For the NA haplotype neither enzyme digests the amplified DNA, Western to Central Russia the enzyme cuts the fragment into two pieces one (+) and one (-), Far East Russia and the Orient both fragments are (+)

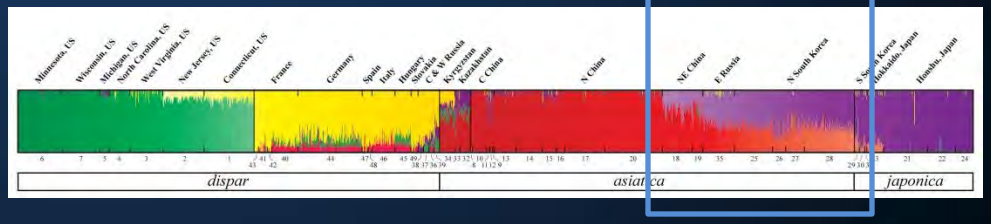
Estimated population structure of *L. dispar* based on STRUCTURE analysis of microsatellite data





From North to South





Asian Gypsy Moth Impacts

- 500 species of trees and shrubs, including many conifers and hardwoods, although *Quercus* is a preferred host. Other common hosts include *Alnus, Betula, Corylus, Larix, Malus, Populus*, *Salix and Tilia*

- In the US, over 126 million hectares of susceptible forests exist for the North American strain of gypsy moth, susceptible forest acreage is far greater for AGM
- Heavy or repeated defoliation causes tree mortality and increases susceptibility to other insect and disease agents

- In recreation sites and urban areas dead trees are a safety hazard and affect property values in urban sites
- Develop a rash (contact dermatitis) or irritation of the eyes or respiratory tract due to fine hair like structures on the larval body

Asian Gypsy Moth Impacts

- During outbreaks, frass droppings cover large areas affecting outdoor activities such as camping, barbecues, swimming and picnics. Reduced attendance in recreational areas and/or resorts may occur during outbreaks periods

- Reforestation can create a loss of biodiversity
- Wildlife impacts due to loss of overstory or increased understory growth can be positive or negative depending on the species.
- AGM defoliation can increase water yield and lower water quality.

- Costs associated with eradication/suppression programs. In 2016 costs associated with the AGM eradication program in the Pacific NW are estimated to approach 5 million

Thank You!