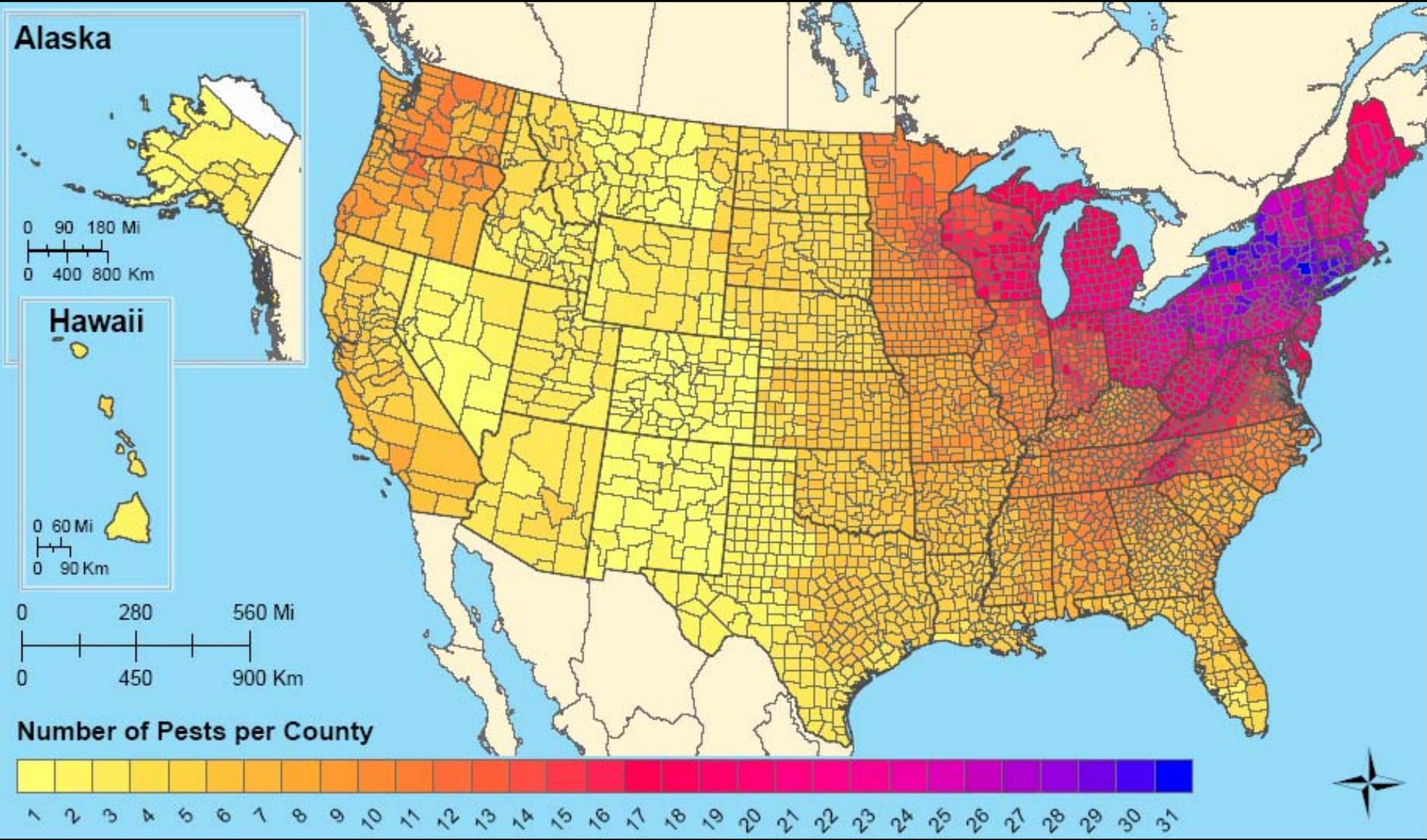


Alien Forest Pest Explorer

<http://www.fs.fed.us/ne/morgantown/4557/AFPE>



Forest Health Technology
Enterprise Team



2007: The Return of the Gypsy Moth!!!



Gypsy Moth Defoliation 2007

acres
defoliated

2006 1,303,777

2007 1,457,963

 Low (< 50%)

 High (\geq 51%)

190 95 0 190 Miles





Photo: Karl Mierzejewski, 2007, Centre County, PA



Photo: Karl Mierzejewski, 2007, Centre County, PA

More gypsy moths may threaten trees

Scientists and forest officials are reporting a sudden increase in egg clusters, which will hatch in the spring

By Dorcas Taylor

October 21, 2005

A sudden resurgence of gypsy moth egg clusters in Garrett County forests next spring.

Bob Tichenor, the chief of forest pest management at the Maryland Department of the Environment, says the new groupings are "some of the largest egg masses we've ever seen."

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September 20, 1999

Gypsy moths cause defoliation

Henry A. Virts, Maryland Secretary of Agriculture, said the Department of Agriculture is beginning egg mass surveys to determine the extent of the problem and to rate the potential for economic and environmental damage.



The Connecticut

founded 1875

Agricultural Experiment Station

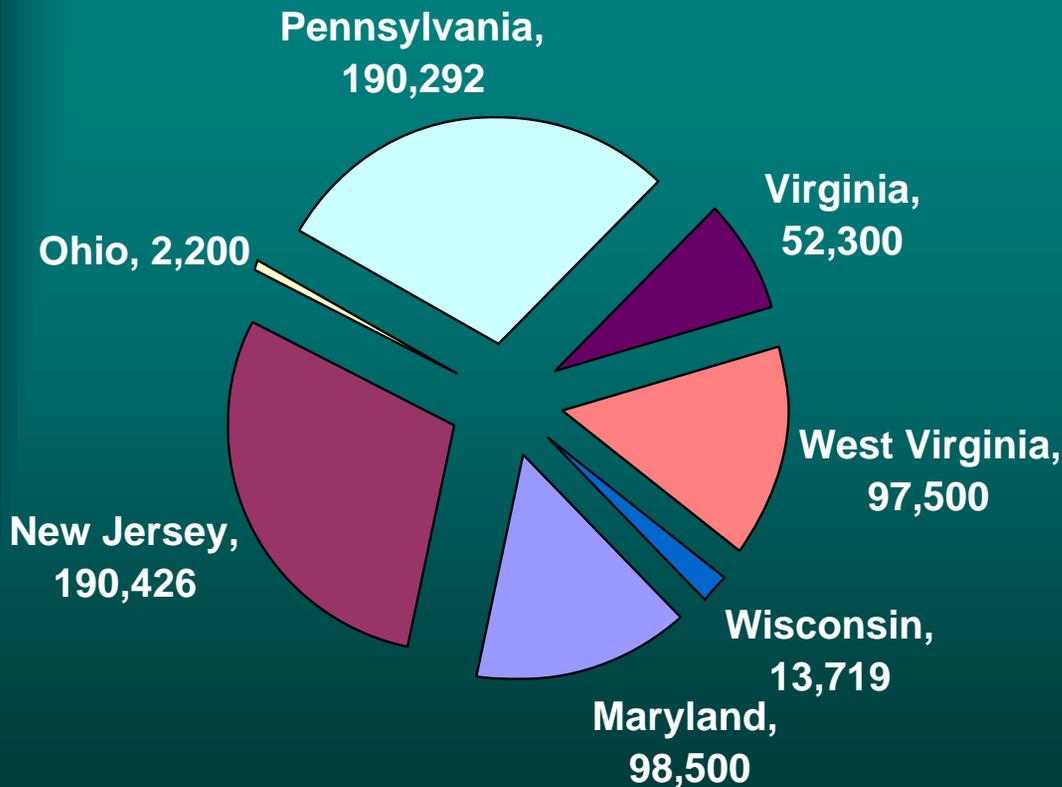
"Putting Science to work for society"

Gypsy Moths Active in 2005

Reported outbreaks of gypsy moth activity in eastern Connecticut in June 2005, with heavy defoliation of white pines. Some white pines have had their needles clipped by the caterpillars. Roadside surveys by plant pathologists at the Connecticut Agricultural Experiment Station indicate gypsy moth caterpillars are abundant from Guilford to Waterford and from the Connecticut River to the Massachusetts border.

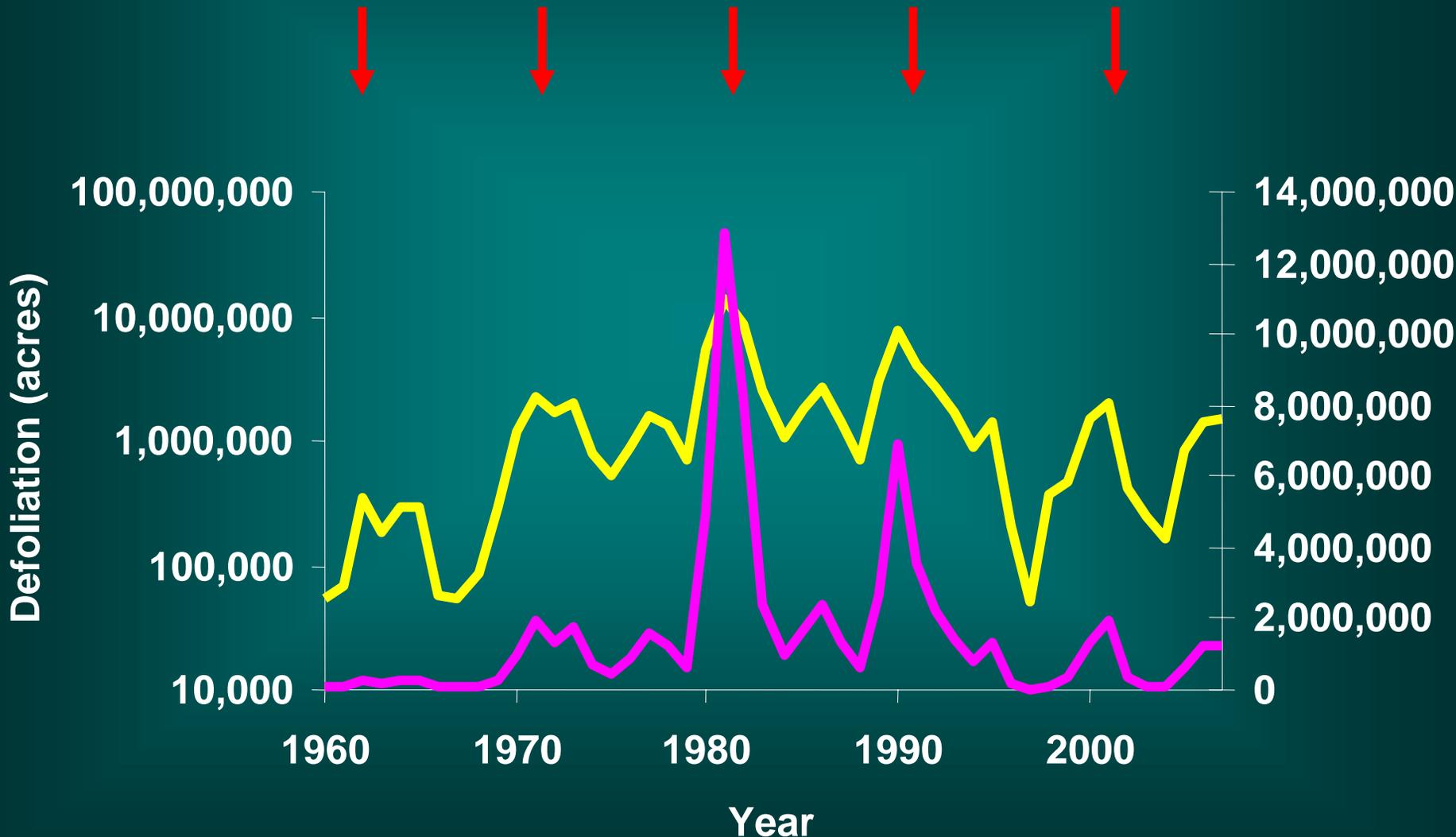


2008 Cooperative Gypsy Moth Suppression Projects



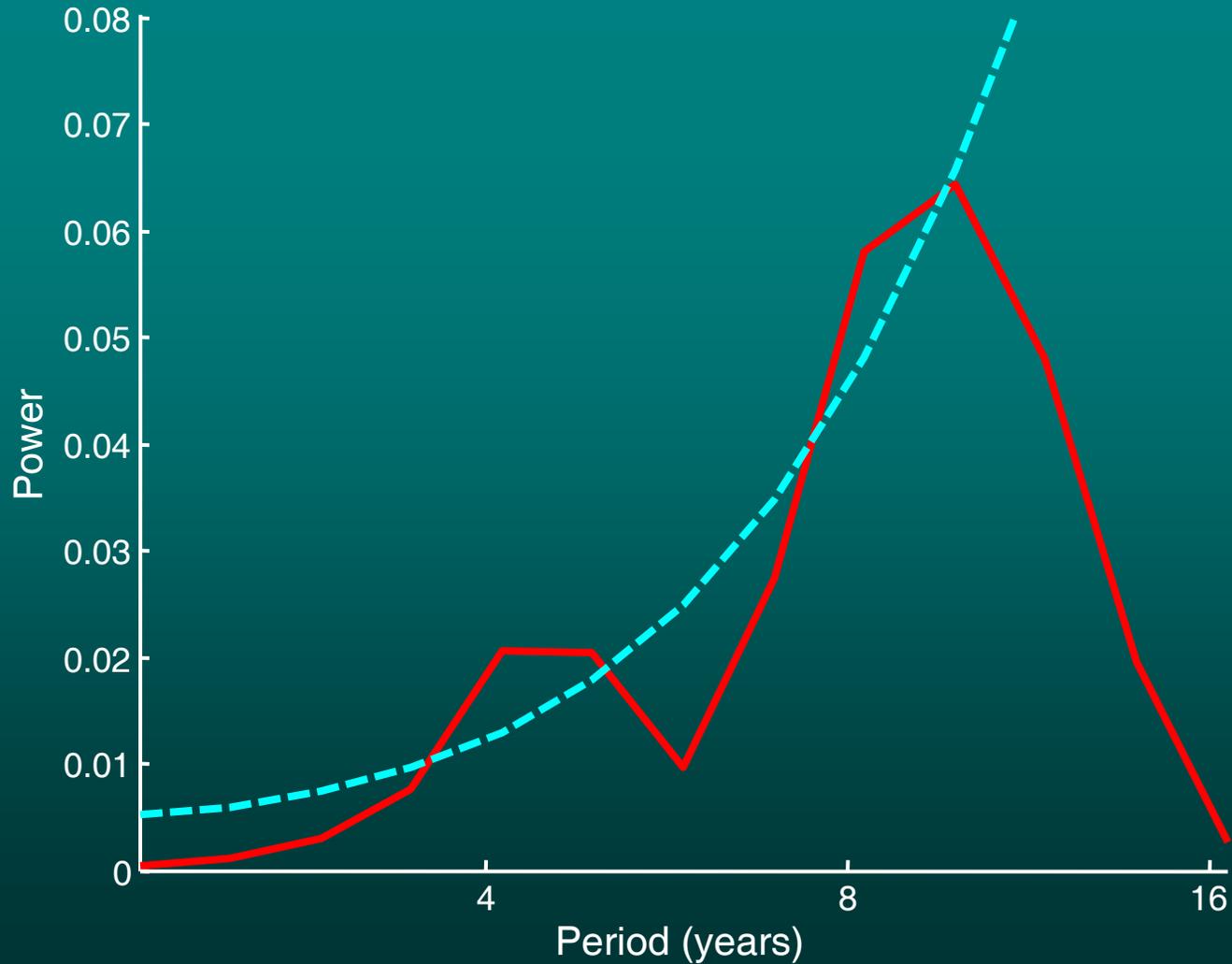
	Treatment Acres
Gypsy Moth Suppression	644,937
Slow the Spread	426,309

Gypsy Moth Outbreaks are Periodic with an Outbreak Period of ~10 yrs

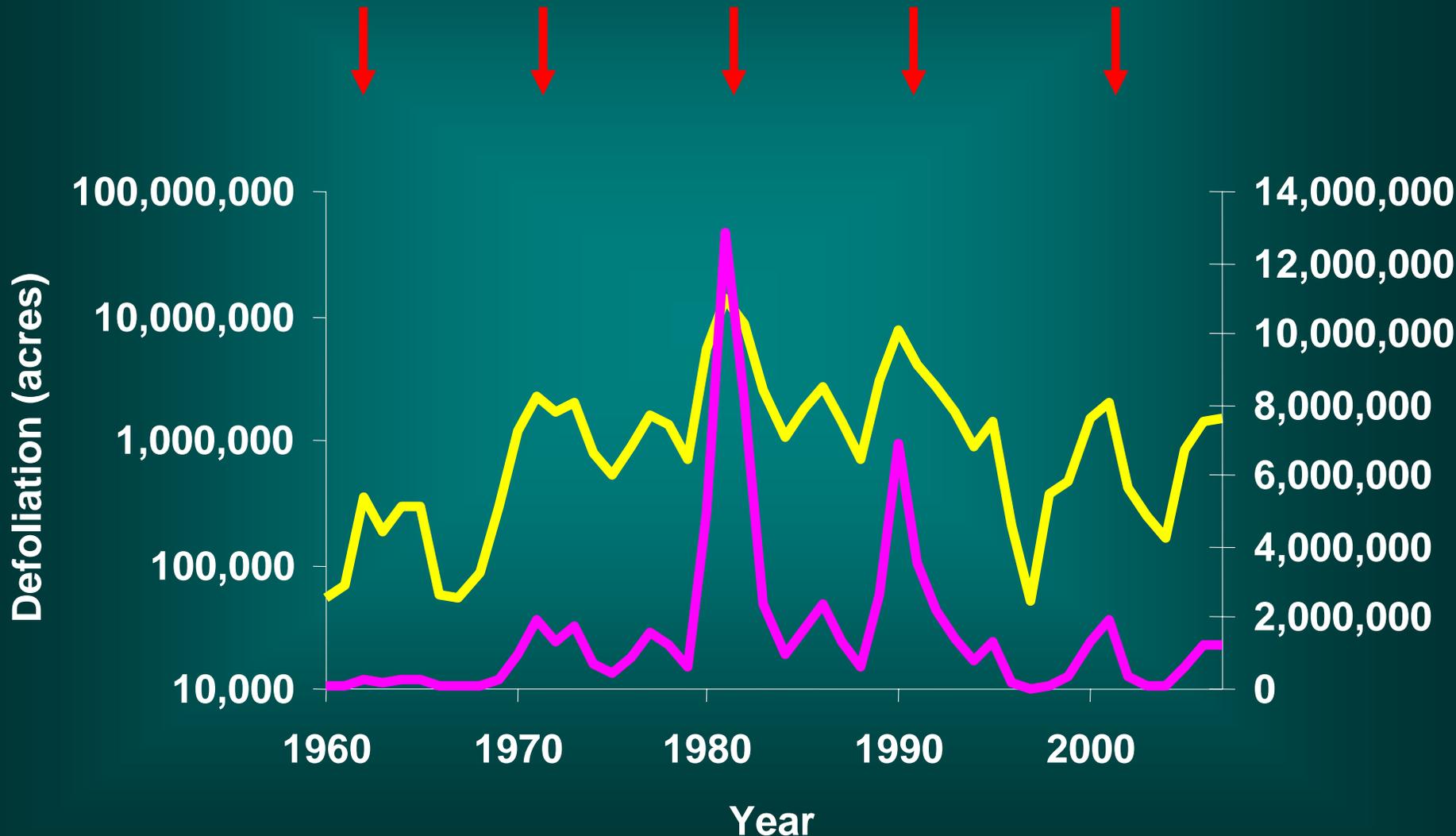


annual gypsy moth defoliation excluding MI

Periodogram: gypsy moth defoliation

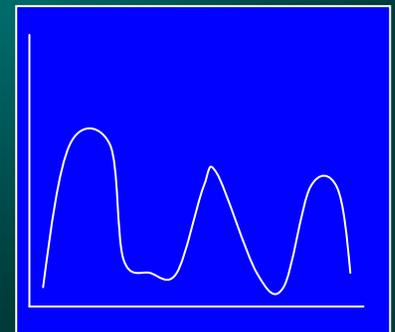
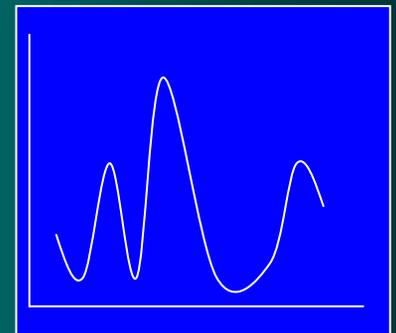
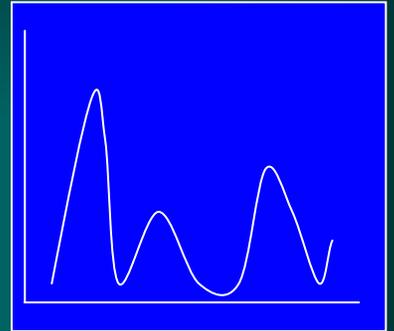
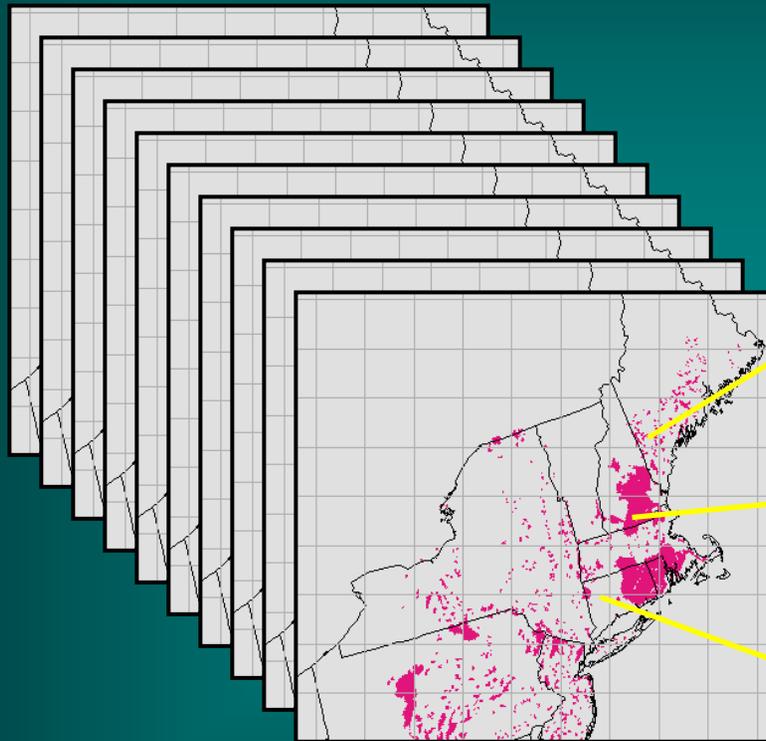


Gypsy Moth Outbreaks are Periodic with an Outbreak Period of ~10 yrs



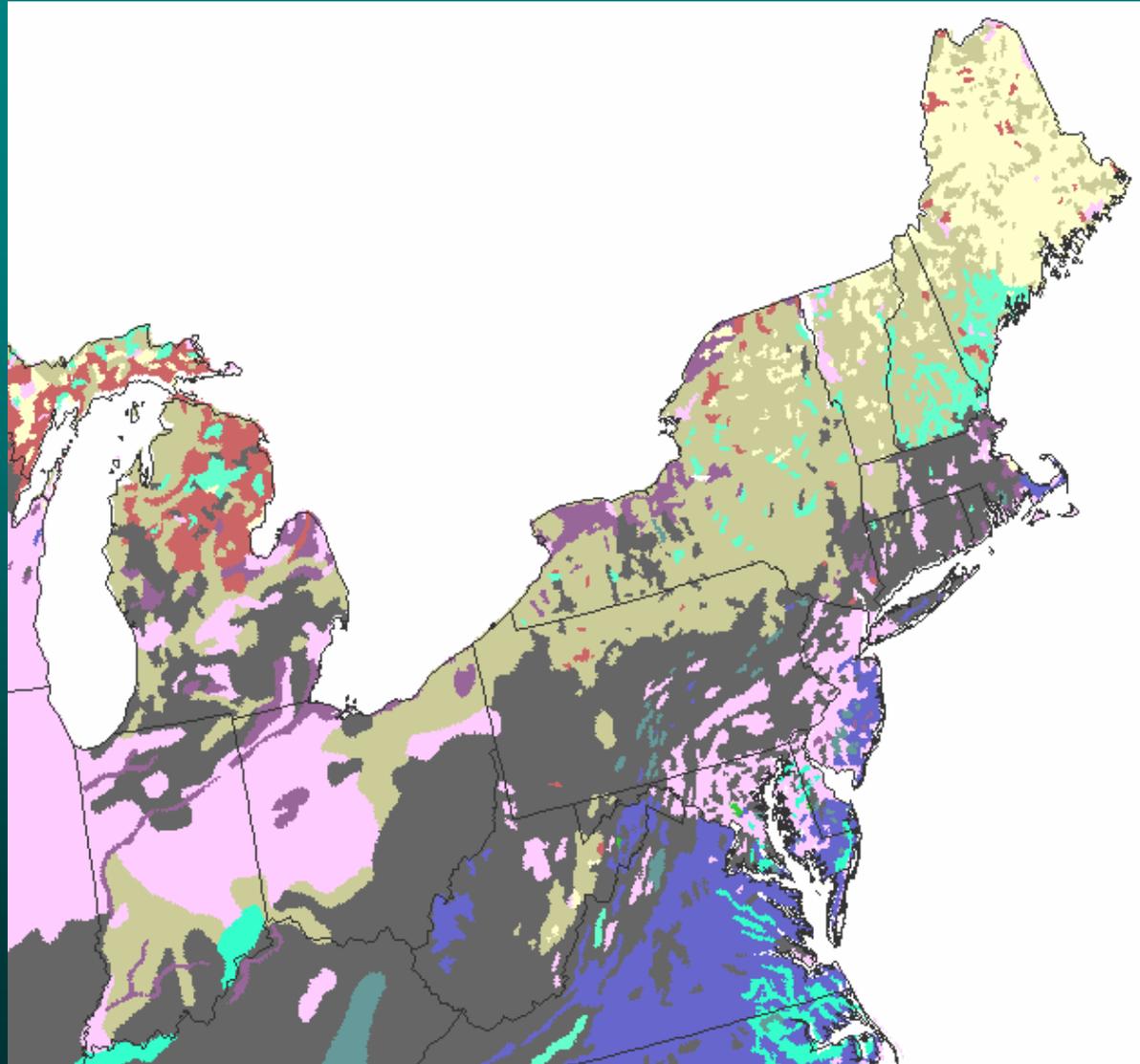
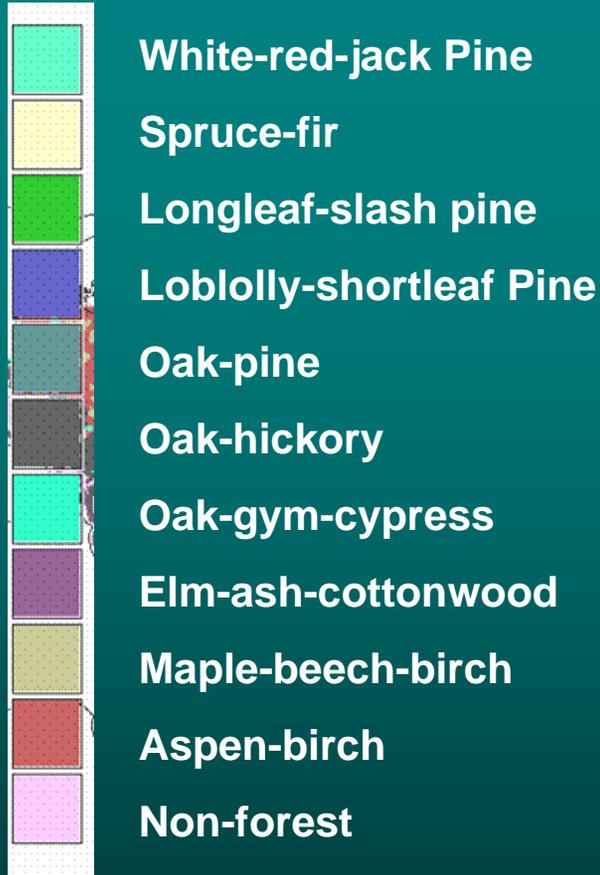
annual gypsy moth defoliation excluding MI

Defoliation time series for each 20 x 20 km cell is derived by overlaying defoliation maps from successive years



Forest Type Groups

(USDA Forest Service. 1993. Map of Forest Type Groups of the United States. In: Eyre, F. 1980. Forest Cover Types of the United States and Canada, Washington D.C.: Society of American Foresters)

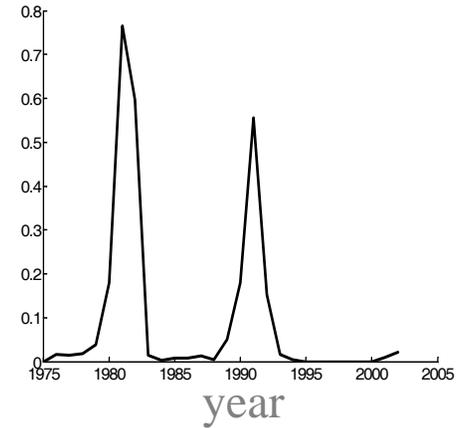
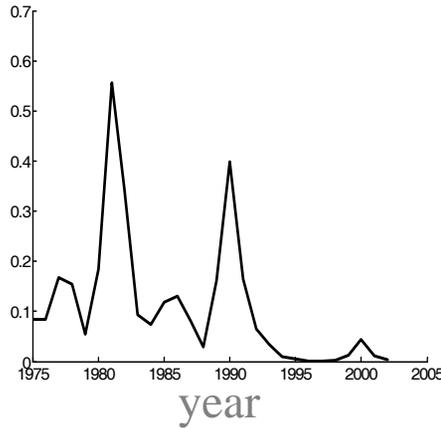
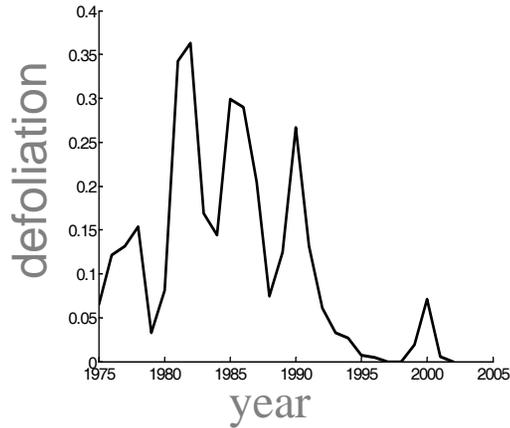


Oak – pine
(dry, low rodent
densities)

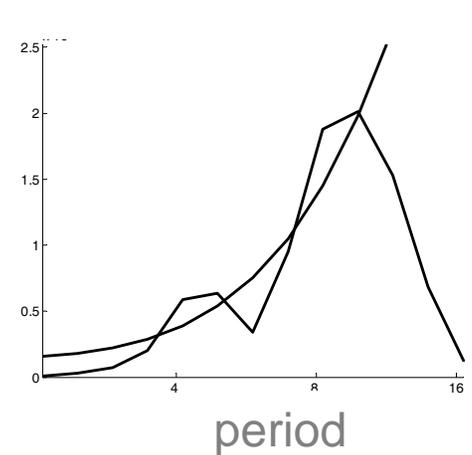
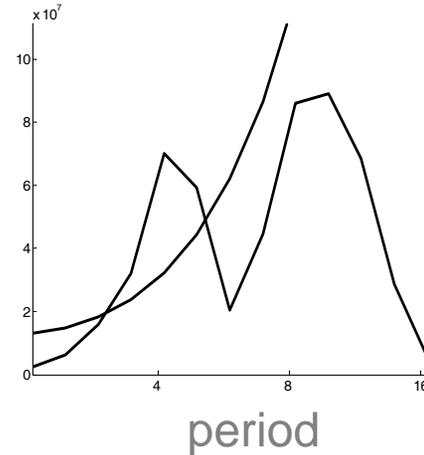
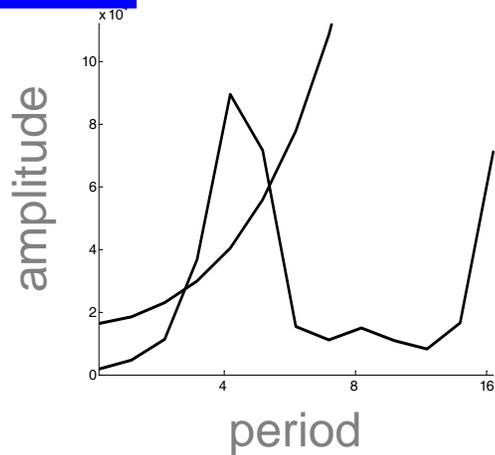
Oak – hickory
(intermediate)

Maple-birch-beech
(wet, high rodent
densities)

Time-series

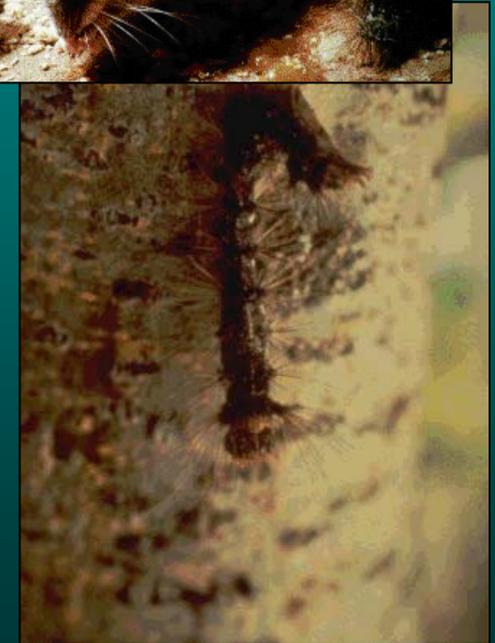
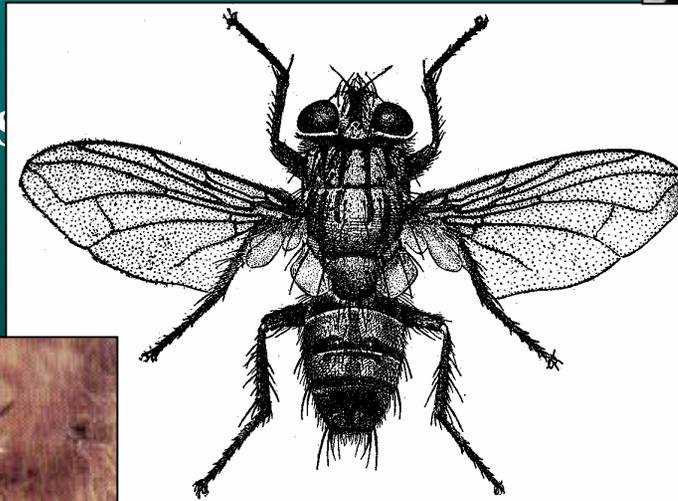


Spectra

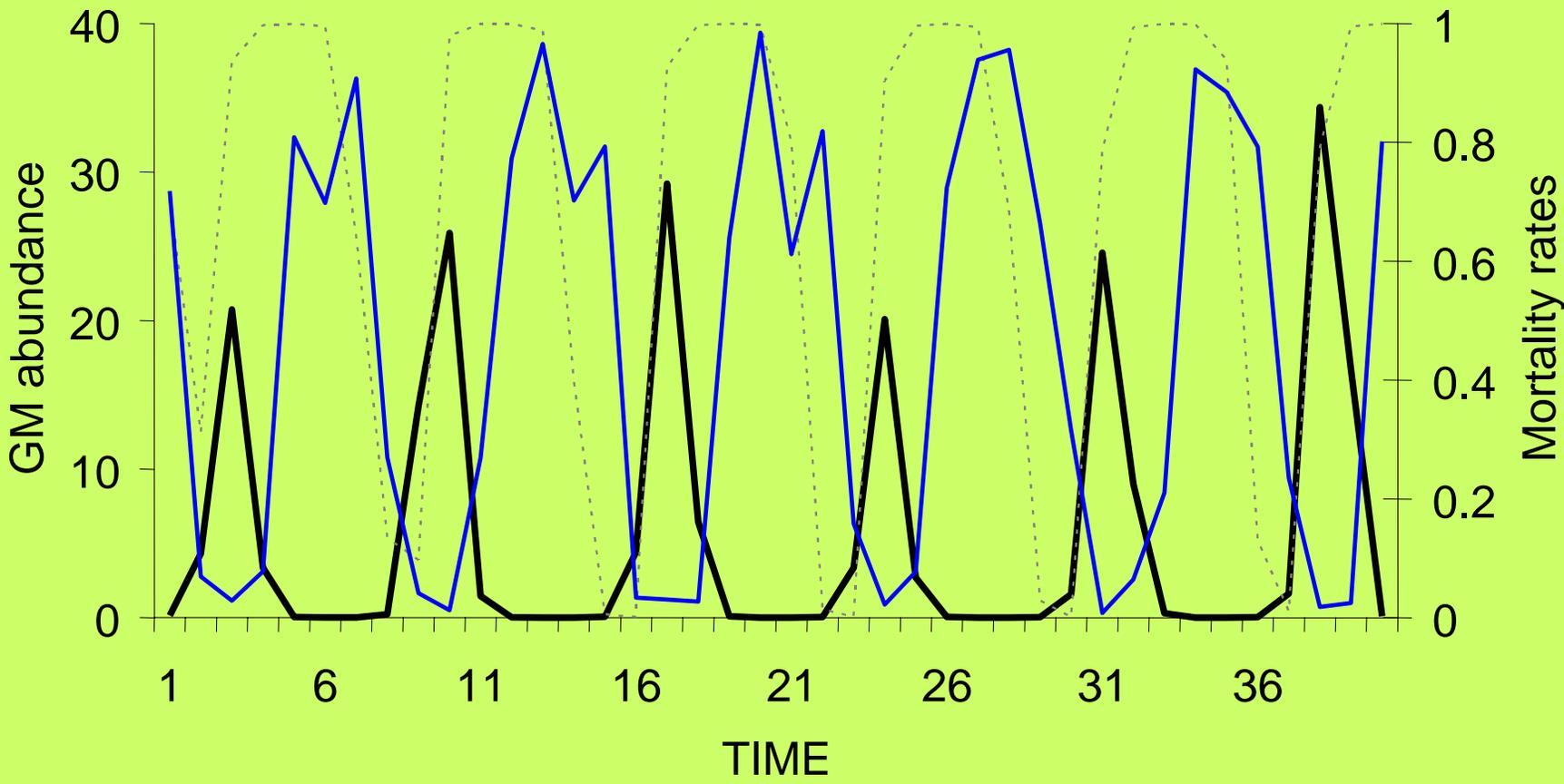


Factors affecting gypsy moth dynamics

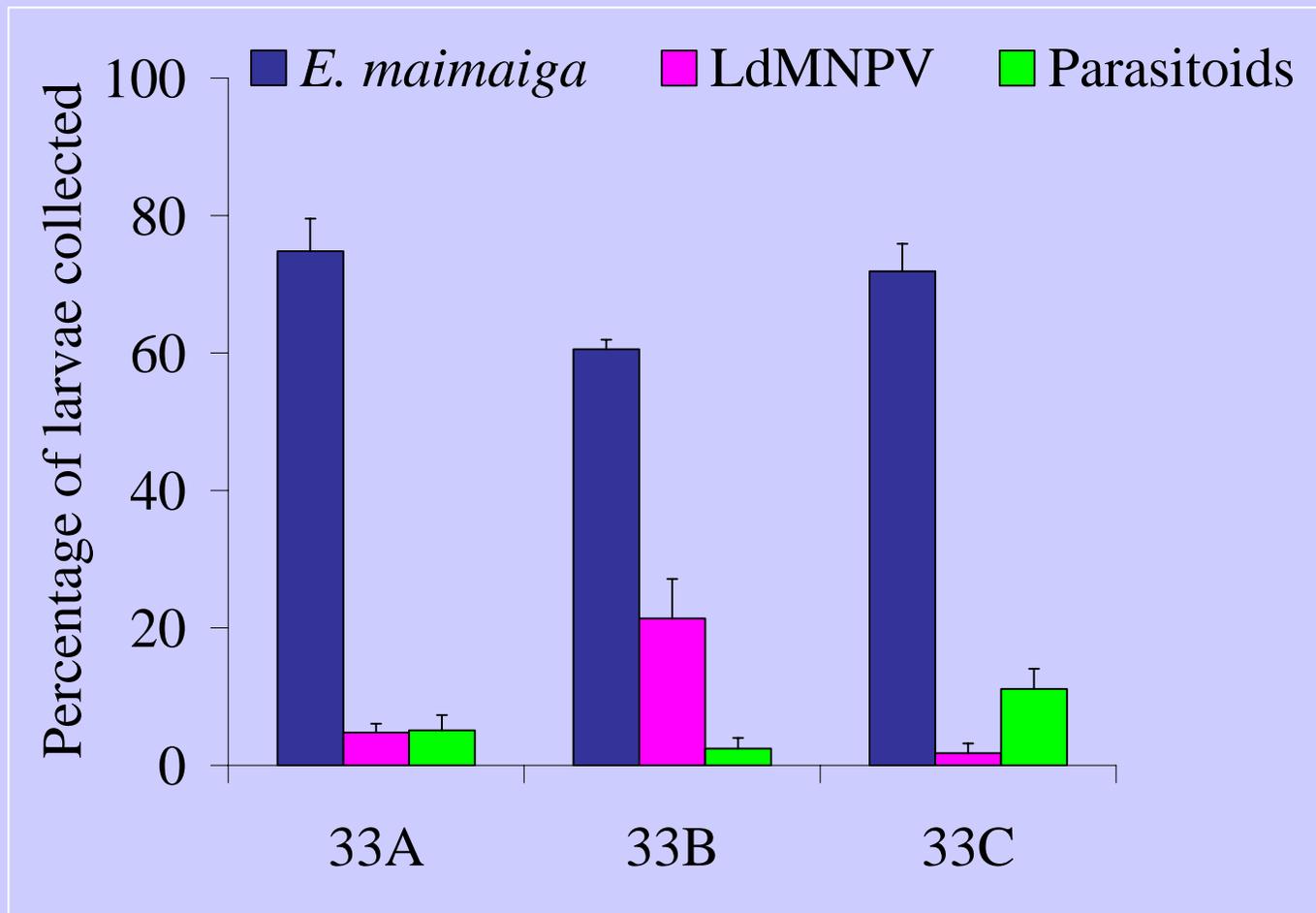
- Generalist predators
- Pathogens
- Induced host defenses
- Parasitoids



— Gypsy Moth
- - - Disease mortality
— Predation mortality



Is *Entomophaga maimaiga* replacing NPV as the primary gypsy moth pathogen?



Plymale, Hajek, Liebhold, Unpublished data, Centre Co., PA

“Eventually, *E. maimaiga* may cause the gypsy moth to behave more like a native insect, and less like an unquenchable exotic force.”

“The decrease in gypsy moth defoliation levels was due to increased spray efforts and the widespread occurrence of the fungus disease.”



“The continued effect of the fungus, *E. maimaiga*, and spraying may help keep the gypsy moth population at low levels”



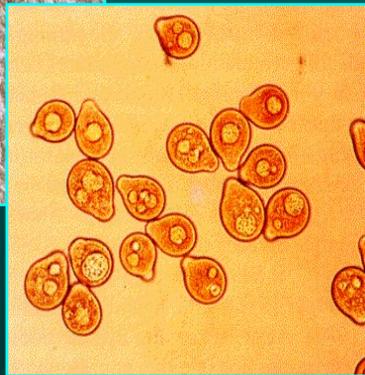
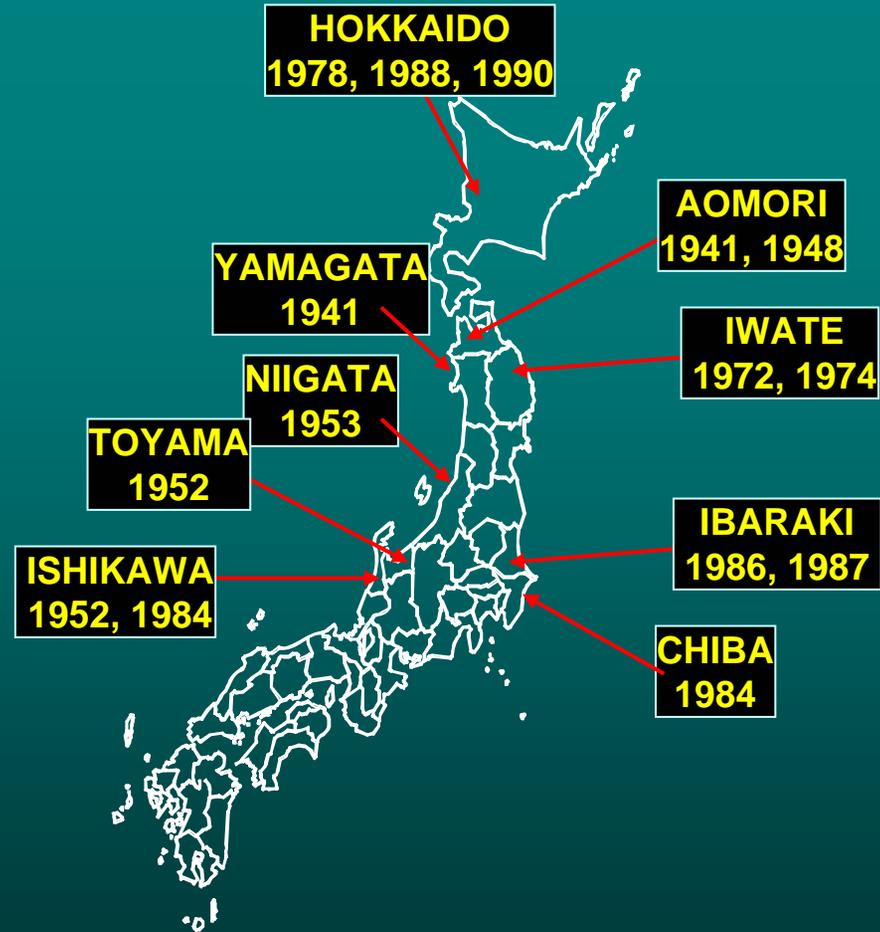
“There is general consensus among scientists and pest managers that *E. maimaiga* is probably responsible for the decline in gypsy moth outbreaks and damage over the last few years.”

World Distribution of the Gypsy Moth

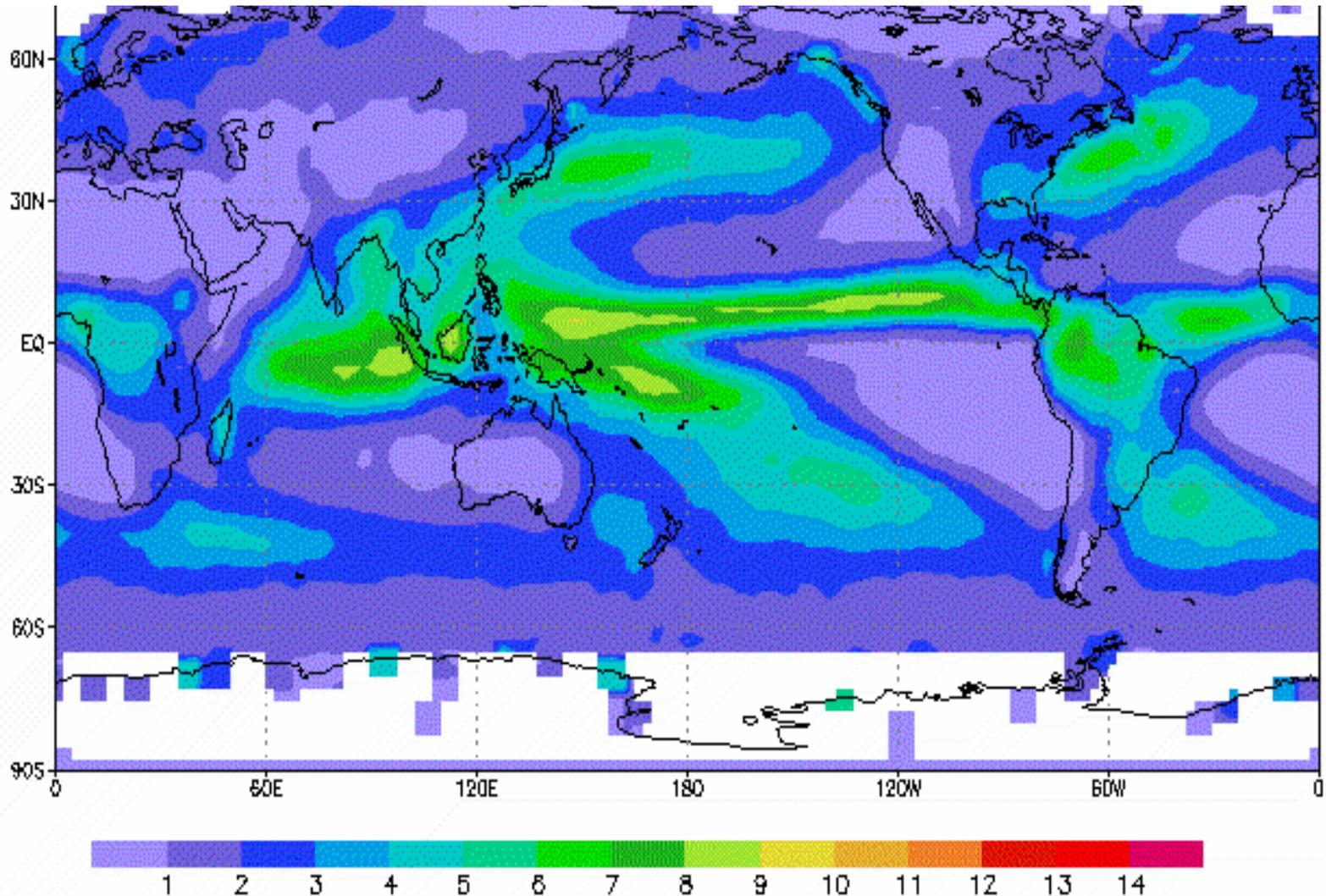


Records of *E. maimaiga* epizootics in Japan

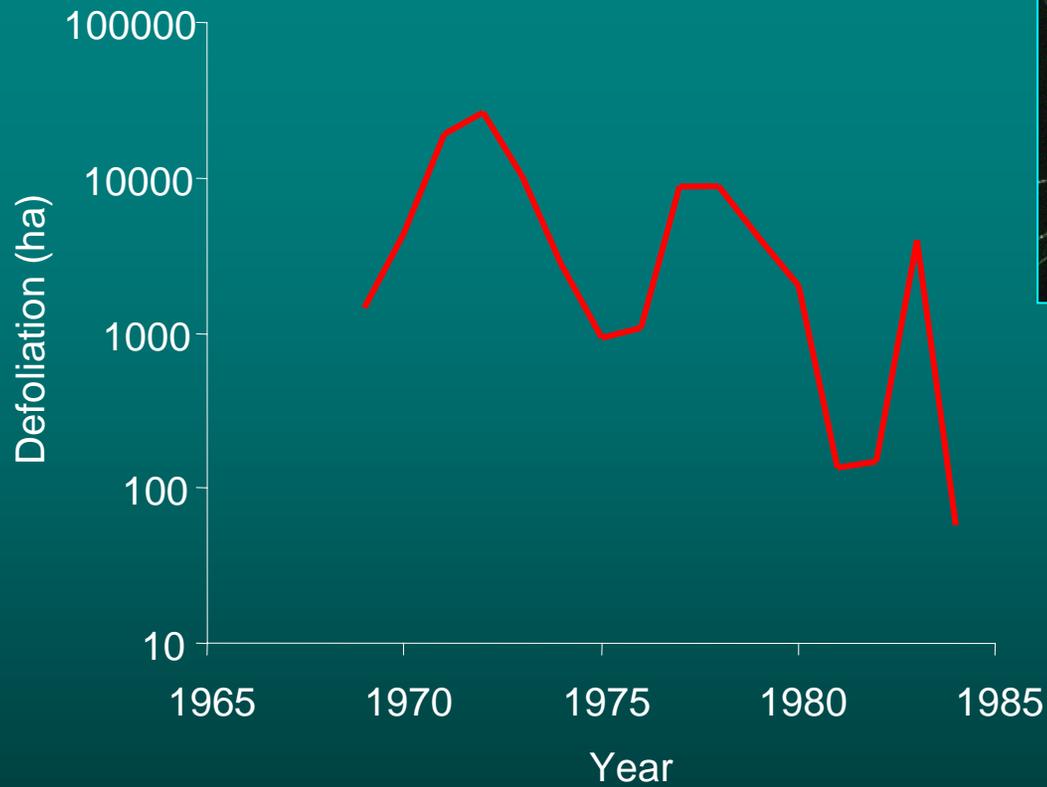
Compiled by Ann Hajek,
Cornell University



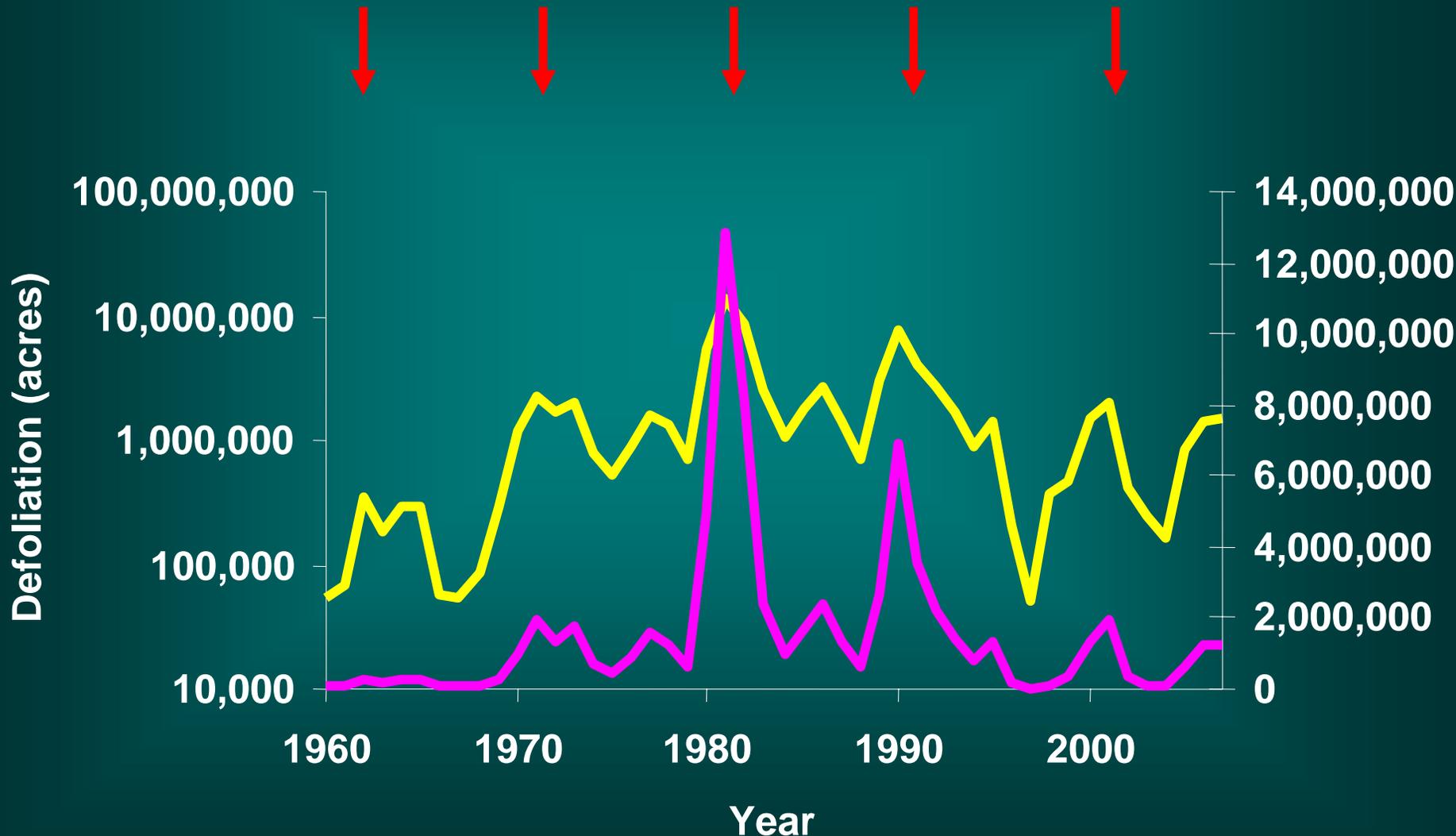
World Annual Average Precip. (mm/day) 1988-96



Time Series: Gypsy Moth Defoliation in Japan



Gypsy Moth Outbreaks are Periodic with an Outbreak Period of ~10 yrs



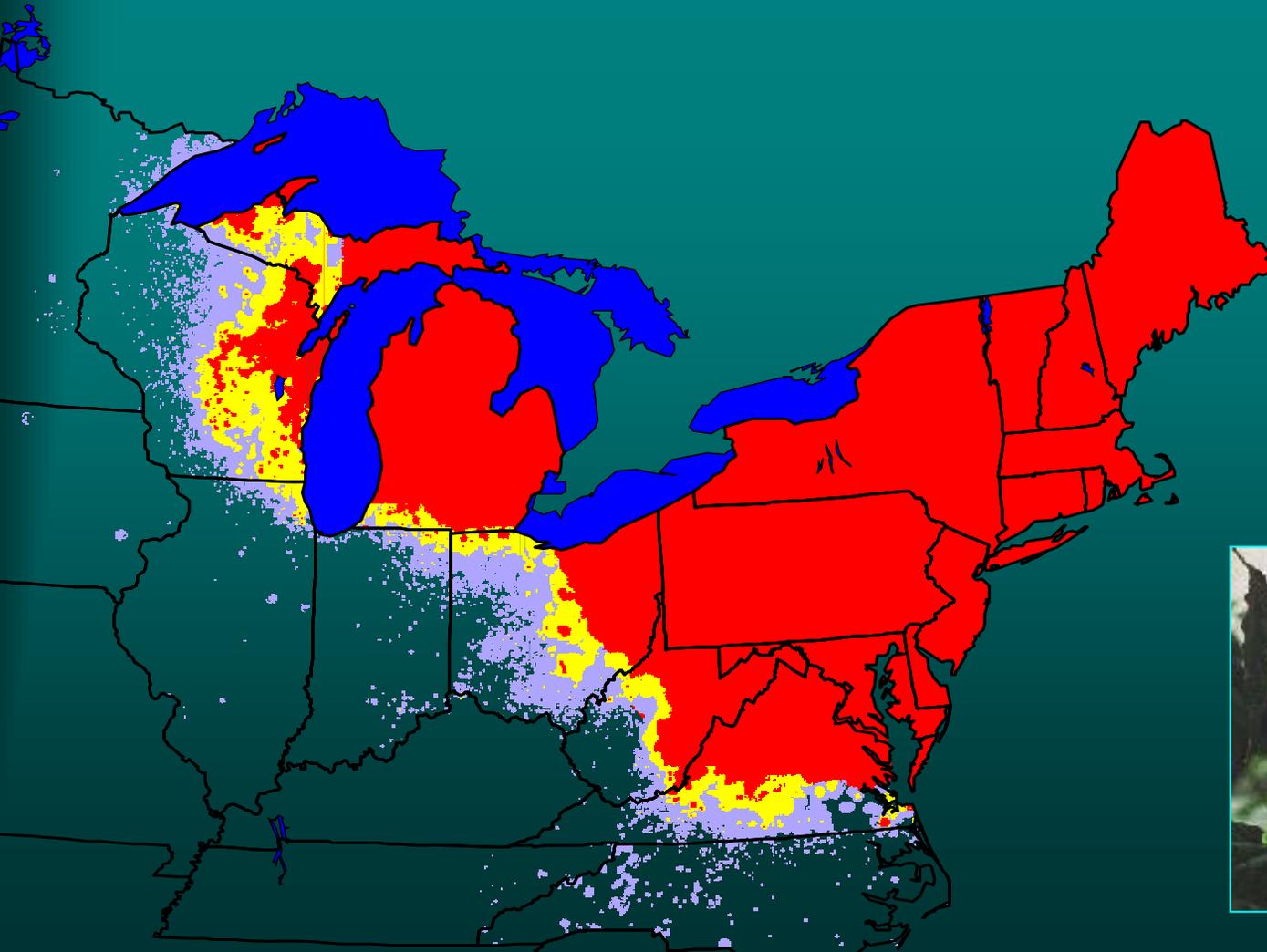
annual gypsy moth defoliation excluding MI

Gypsy Moth Management

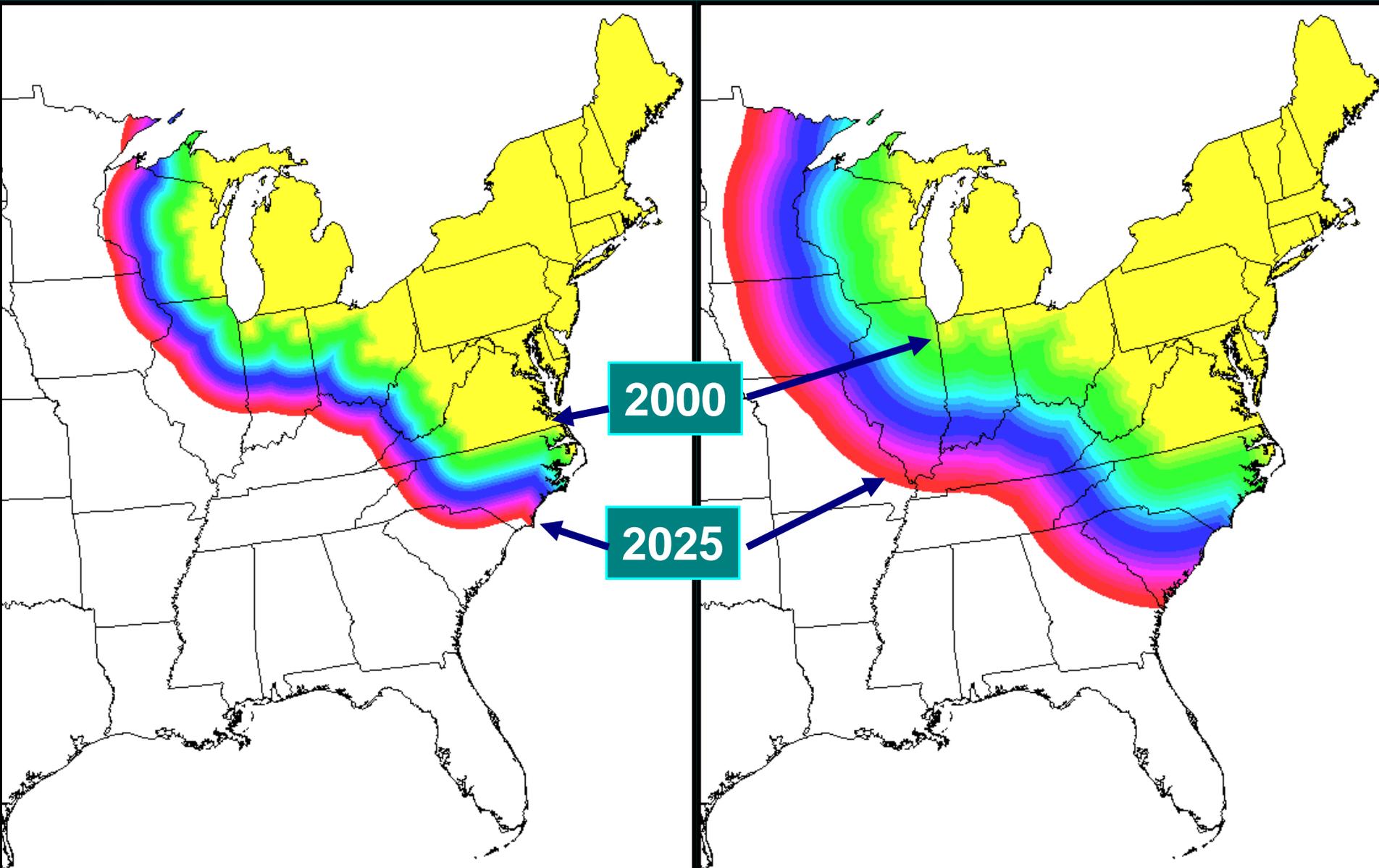
An aerial photograph of a forest with a helicopter spraying a forest. The helicopter is in the lower right quadrant, spraying a white substance onto the trees. The forest is dense and green, with some areas appearing lighter, possibly due to the spray or the lighting. The sky is a pale blue.

- Suppression
- Detection / Eradication
- Slow the Spread

Spread of the Gypsy Moth



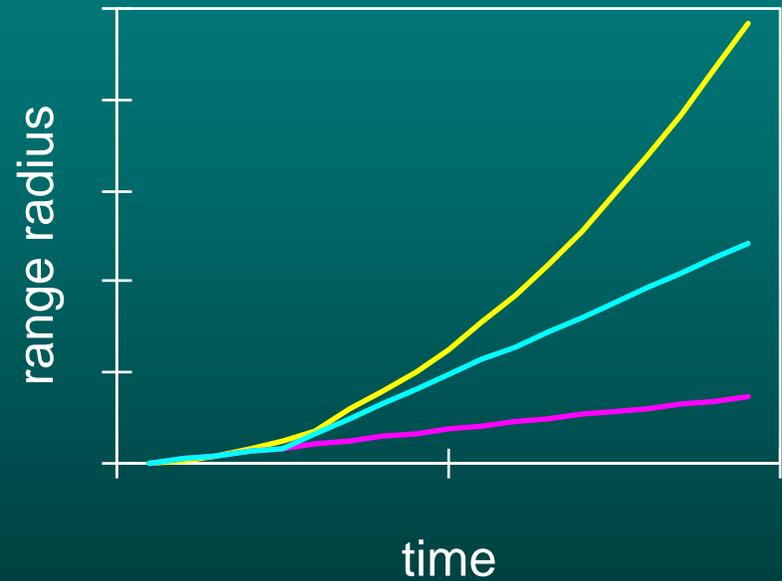
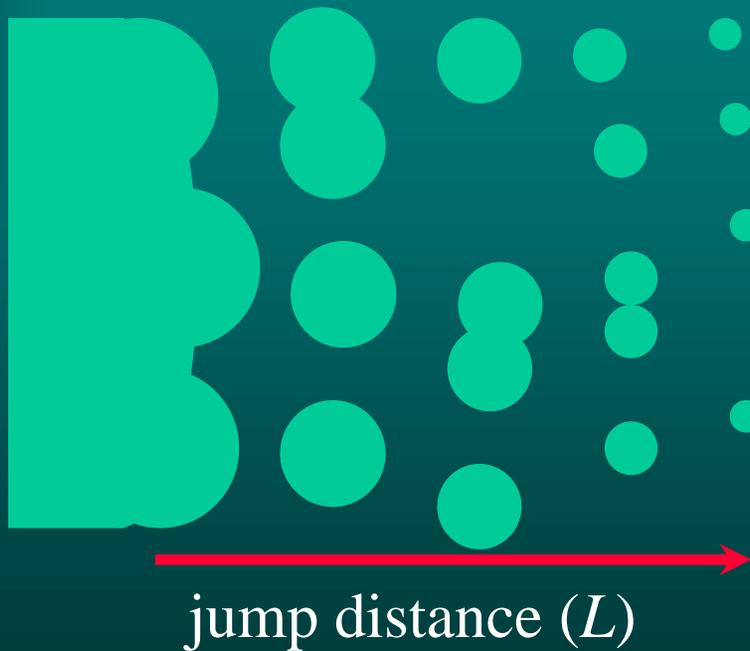
Predicted Gypsy Moth Spread by 2025



Shigesada et al. 1994

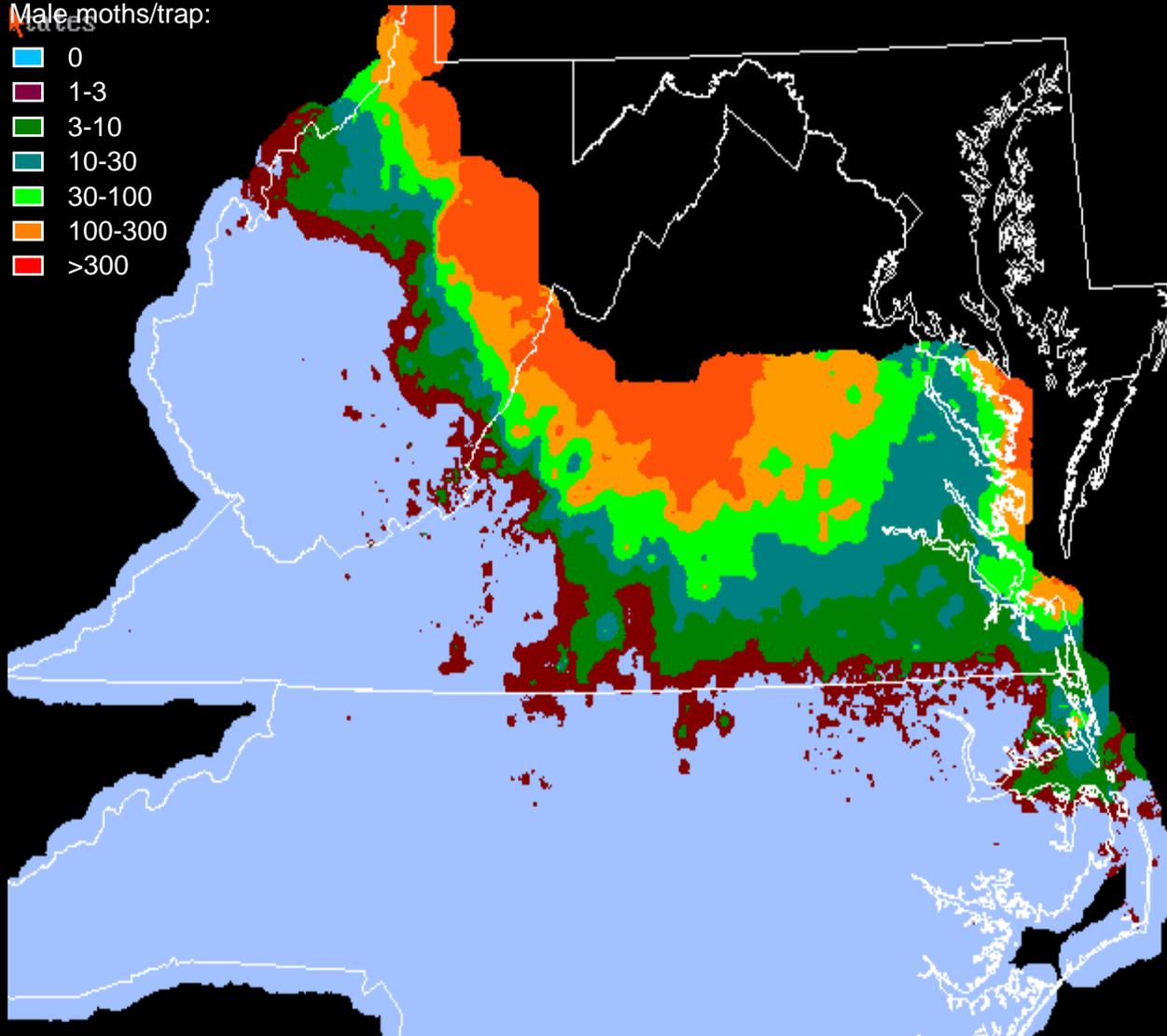
(American Naturalist 146:229-251)

Coalescing Colony Model

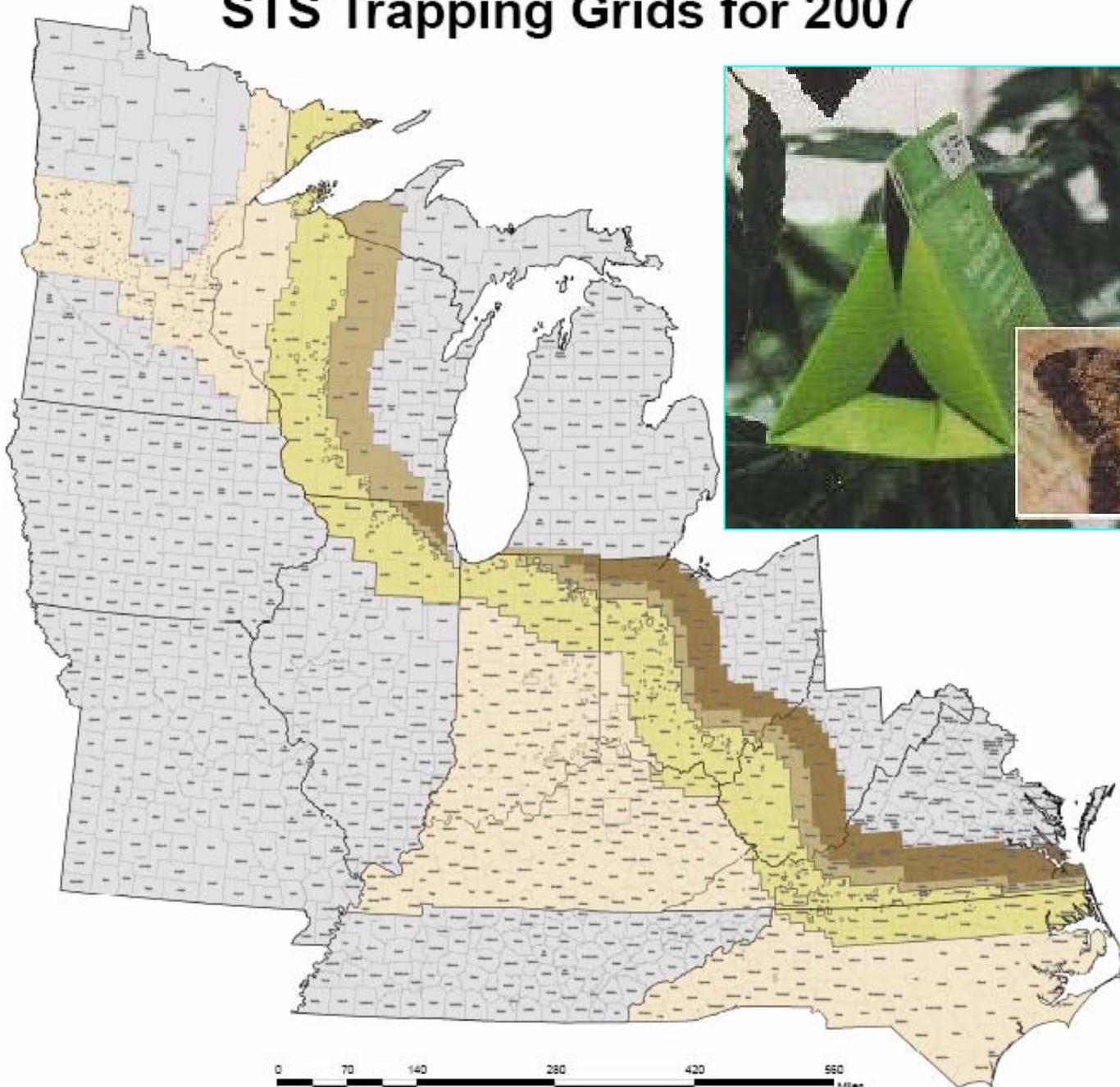


Gypsy Moth Counts in Pheromone Traps in 1995

Male moths/trap:



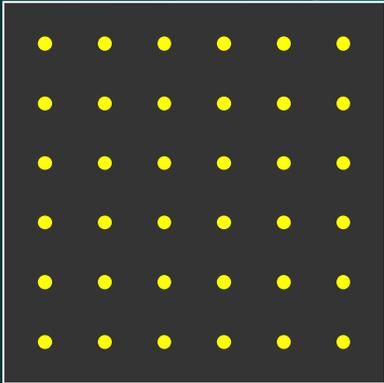
STS Trapping Grids for 2007



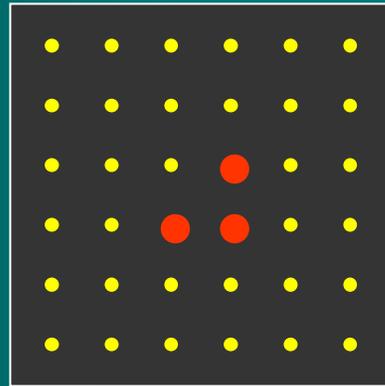
0 70 140 280 420 560 Miles

Flow chart of the Slow-the-Spread Strategy Process

2 km base grid

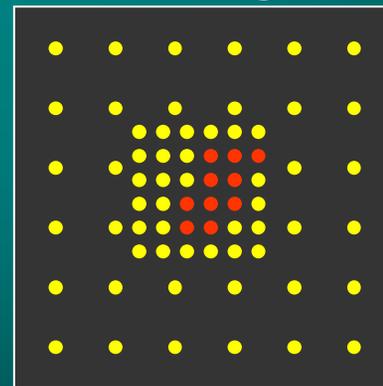


Isolated Colony Detected



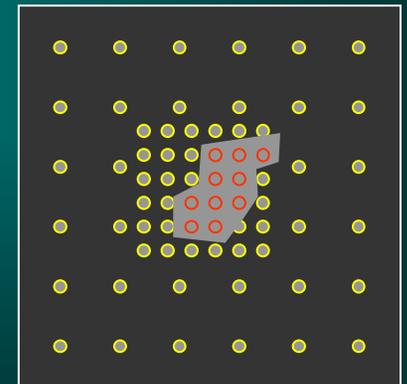
Year 1

Delimitation:
500 m grid



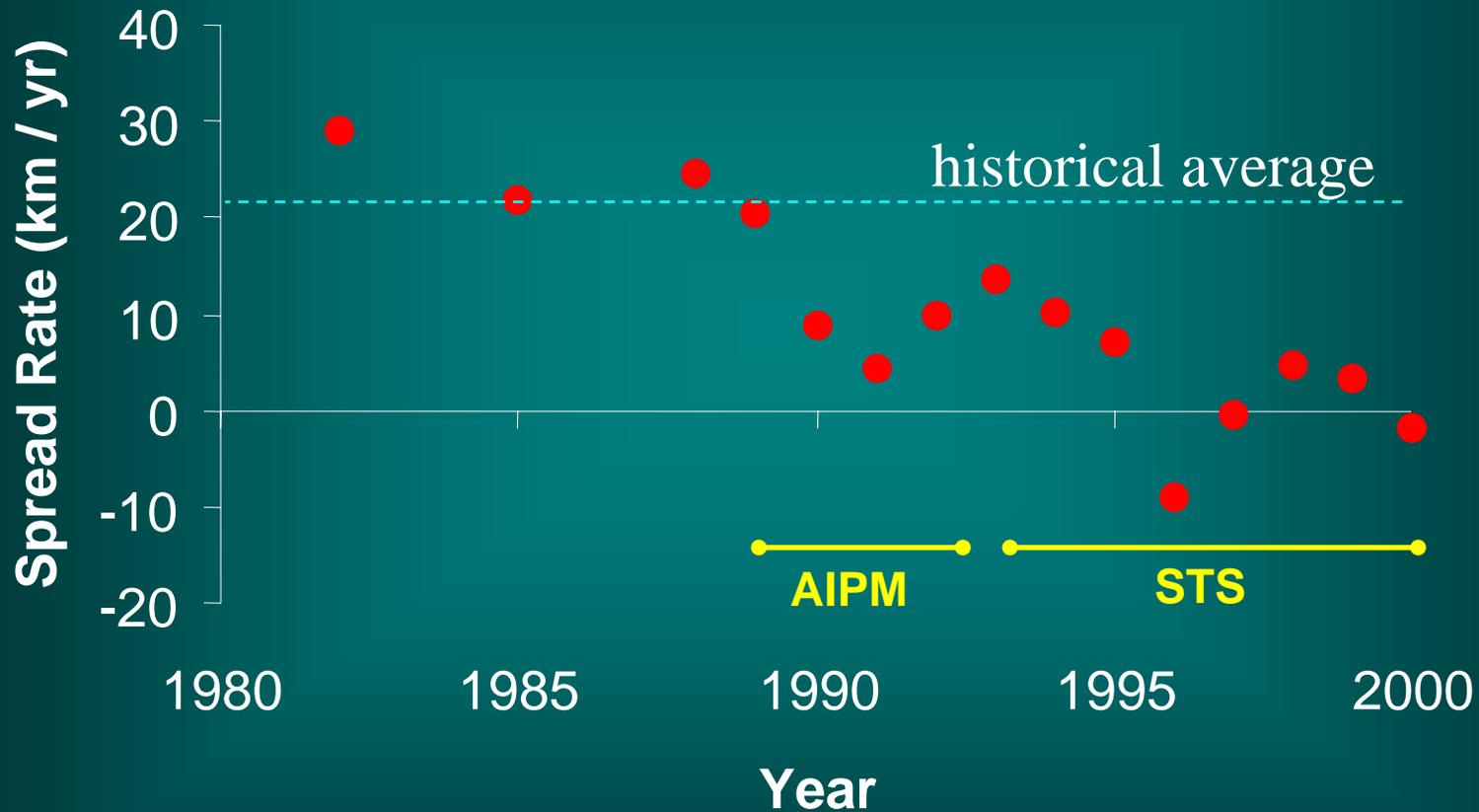
Year 2

Treatment

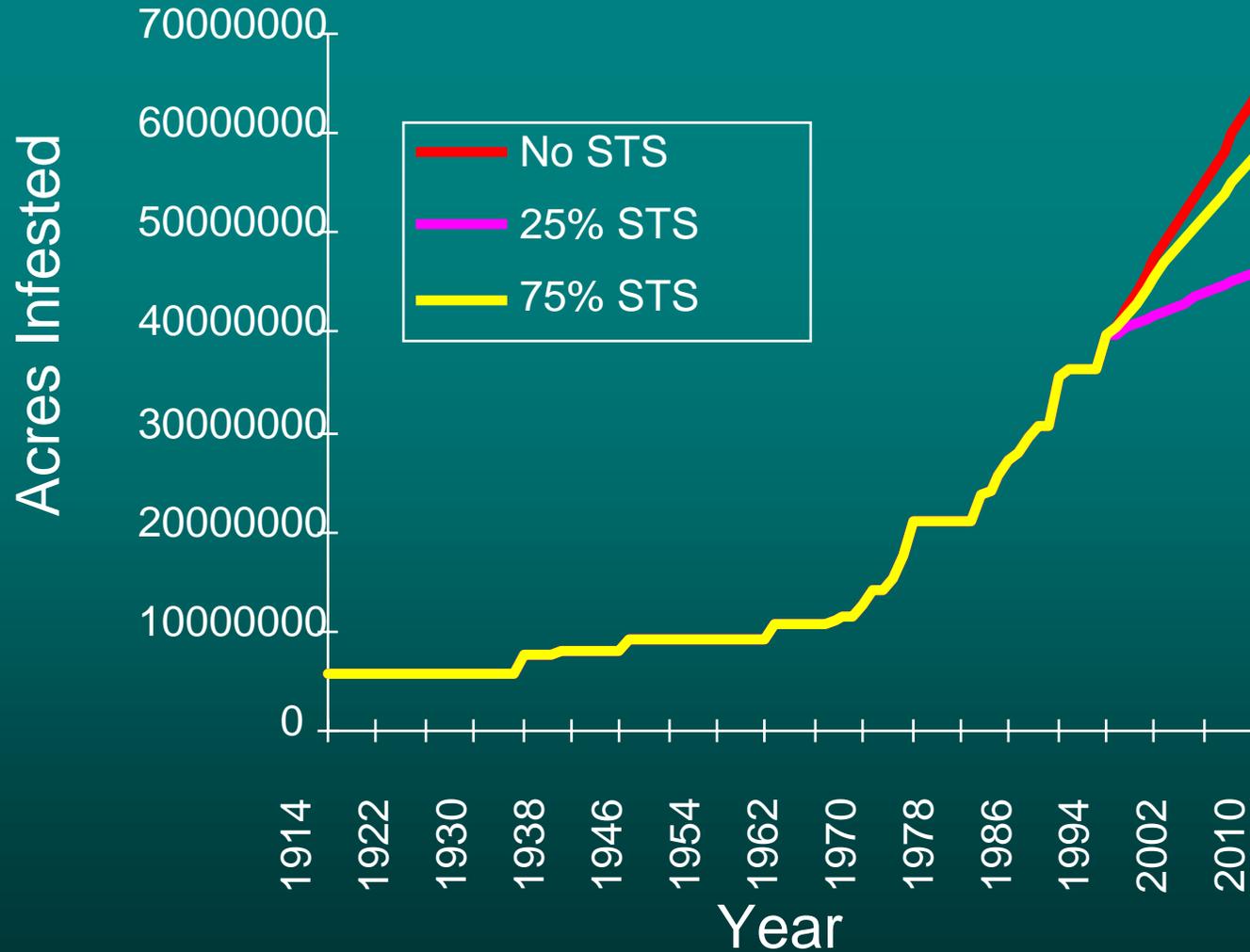


Year 3

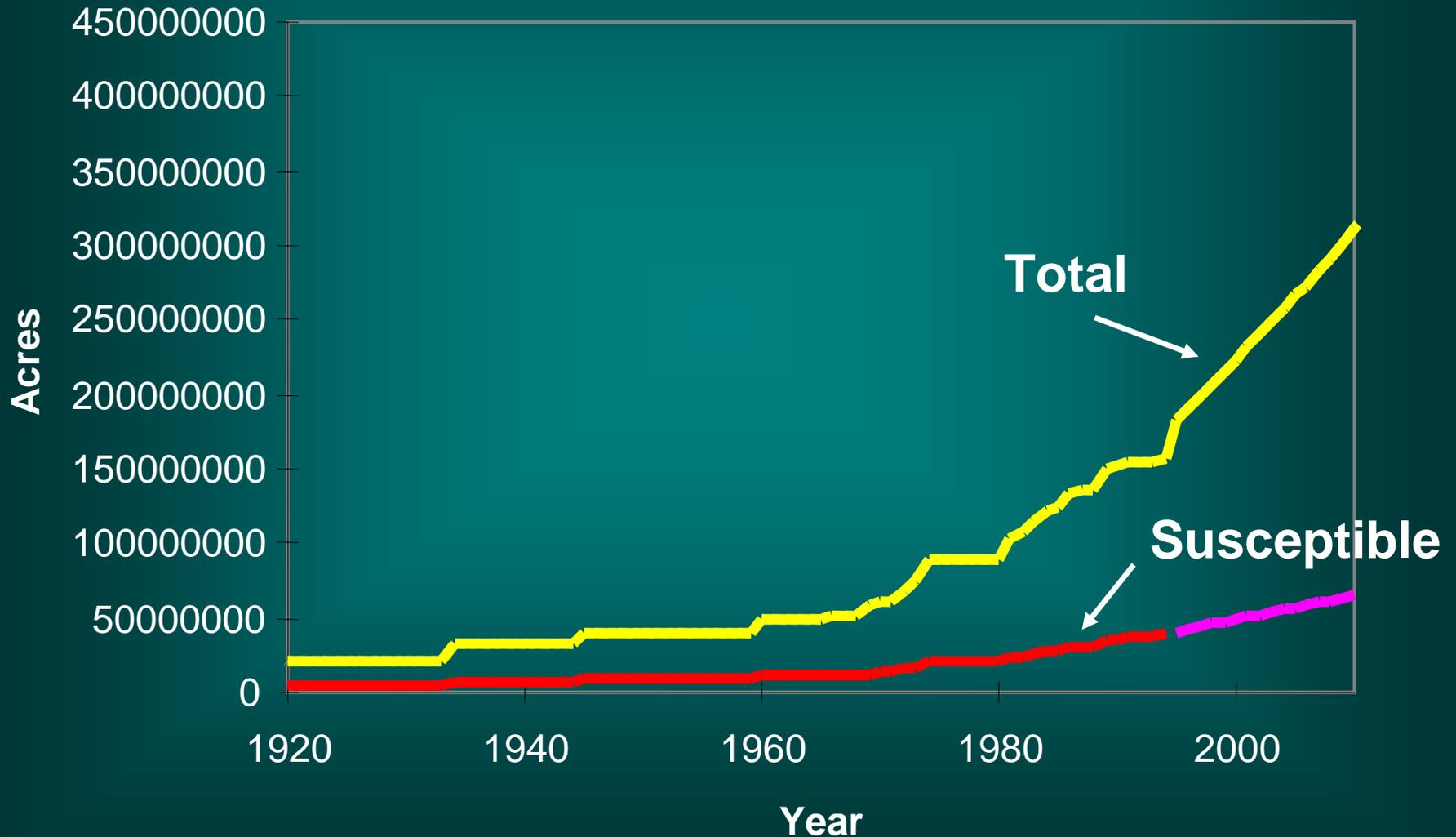
Historical Rates of Gypsy Moth Spread Virginia / West Virginia (1980 – 2000)



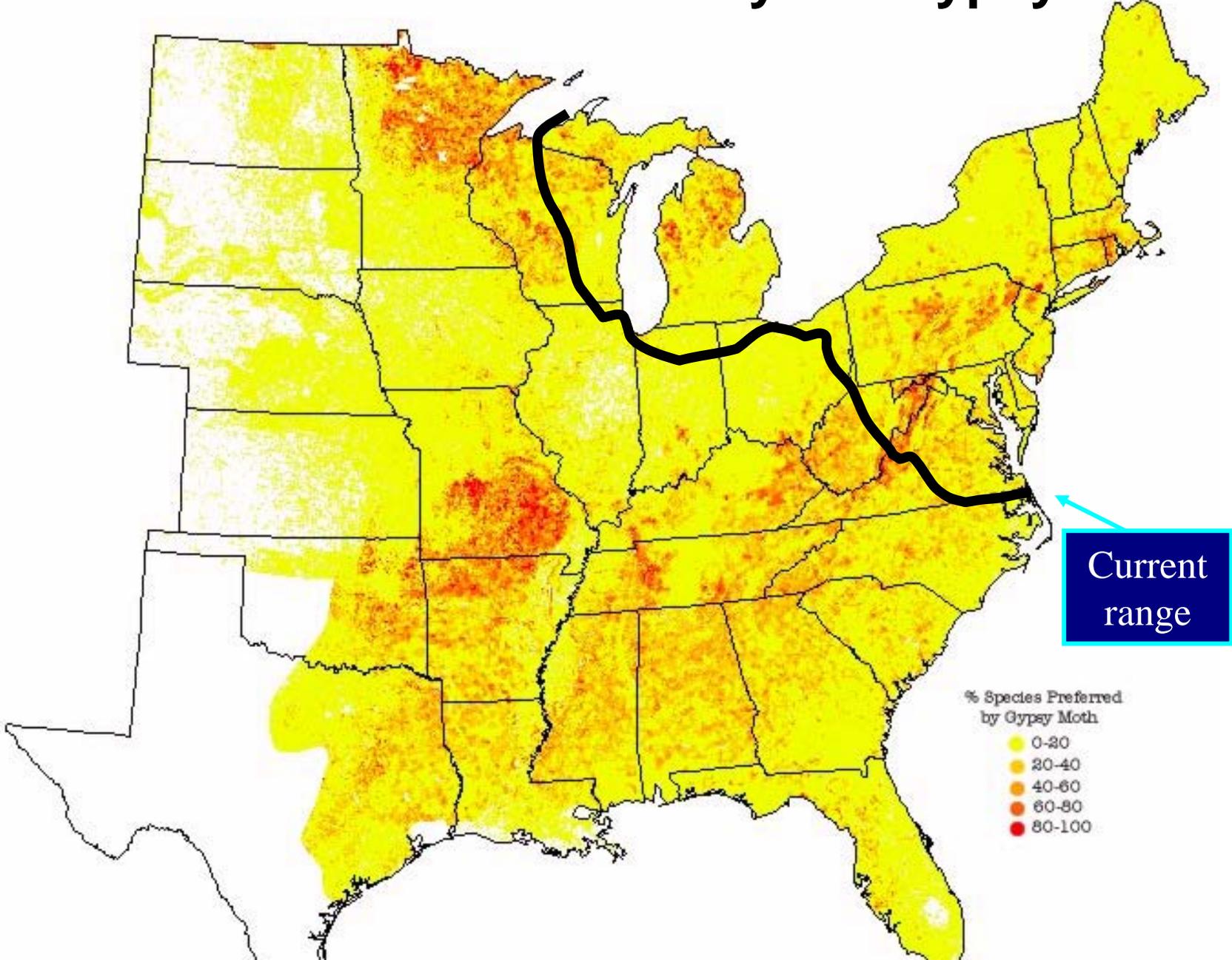
Projected Spread of the Gypsy Moth in the US



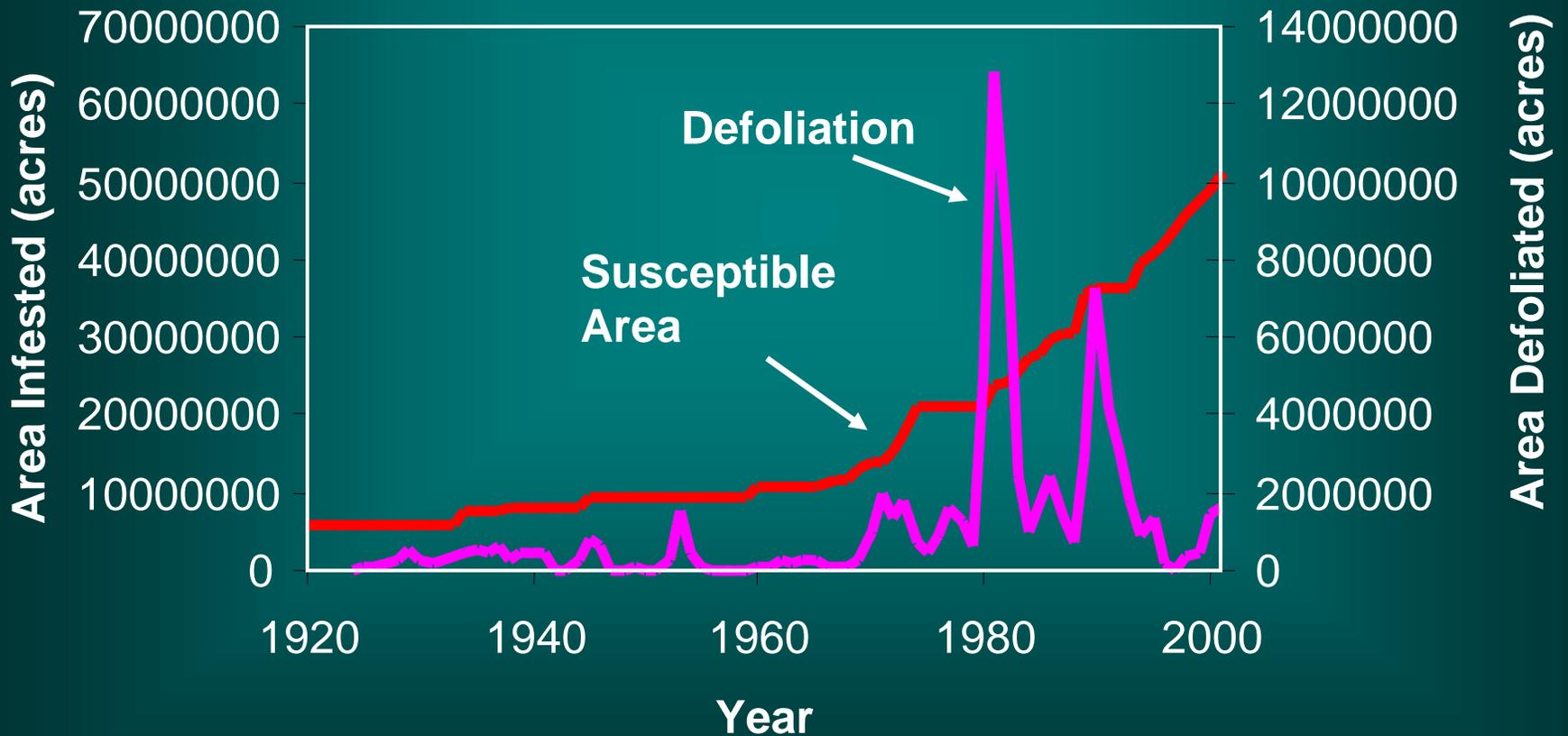
Growth of Gypsy Moth Quarantine Area



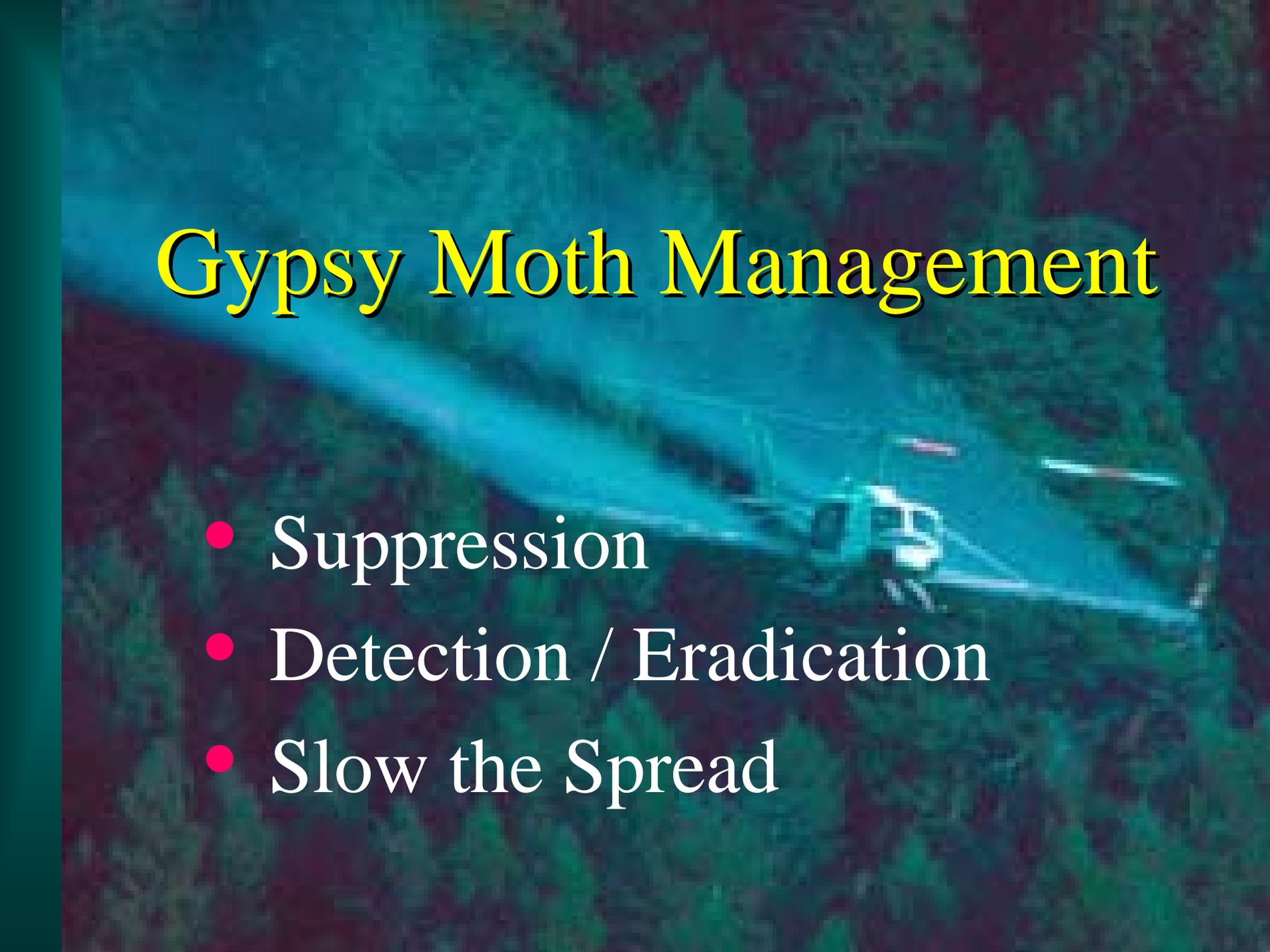
Percent Basal Area Preferred by the Gypsy Moth



Growth of Gypsy Moth Defoliation Area

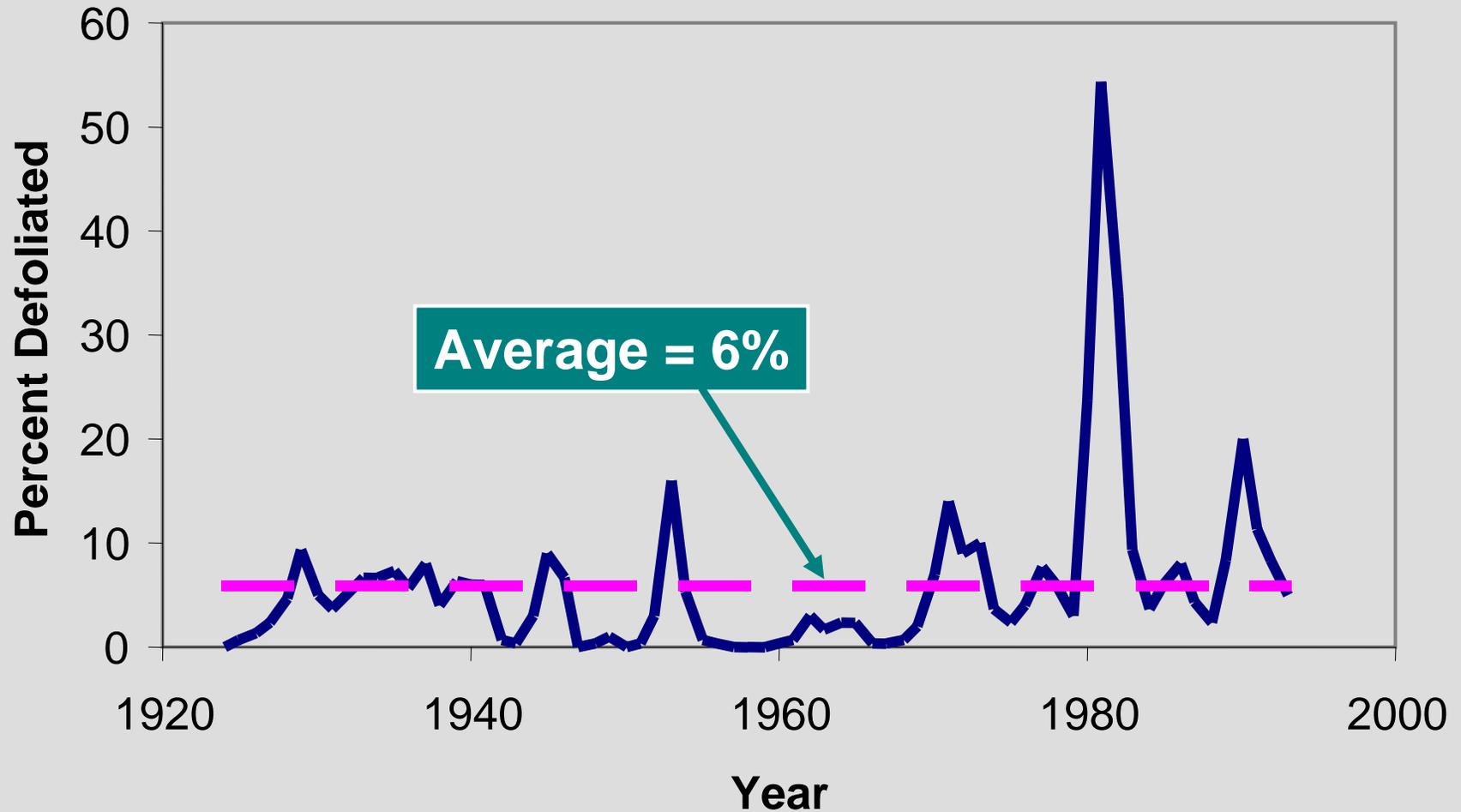


Gypsy Moth Management

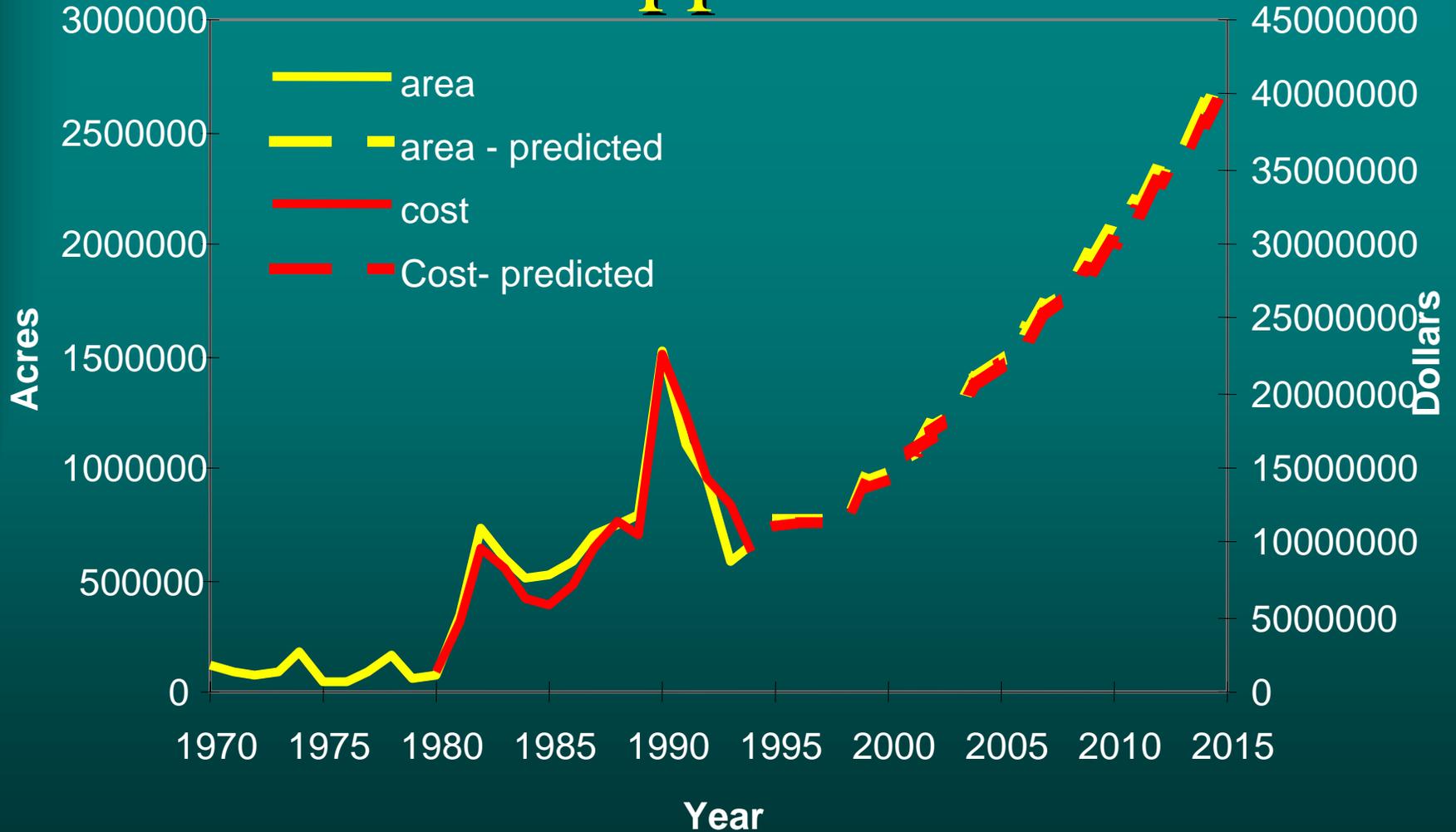
An aerial photograph of a forest, showing a helicopter in the lower right quadrant, likely engaged in pest control operations. The forest is dense and green, with some areas appearing lighter, possibly due to the spray or the helicopter's shadow.

- Suppression
- Detection / Eradication
- Slow the Spread

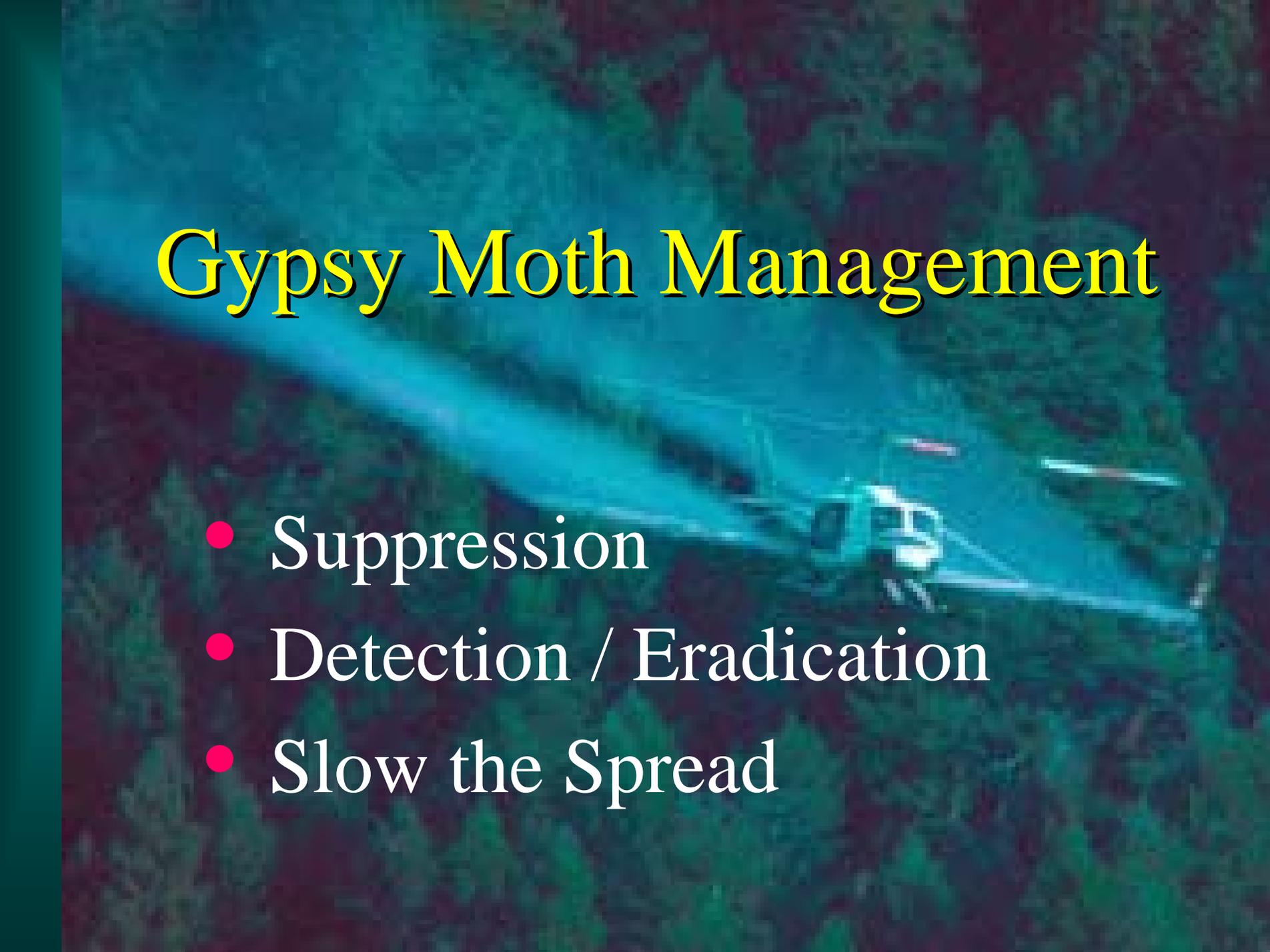
Annual Gypsy Moth Defoliation as a Percent of the Quarantined Susceptible Area



Projected Gypsy Moth Suppression

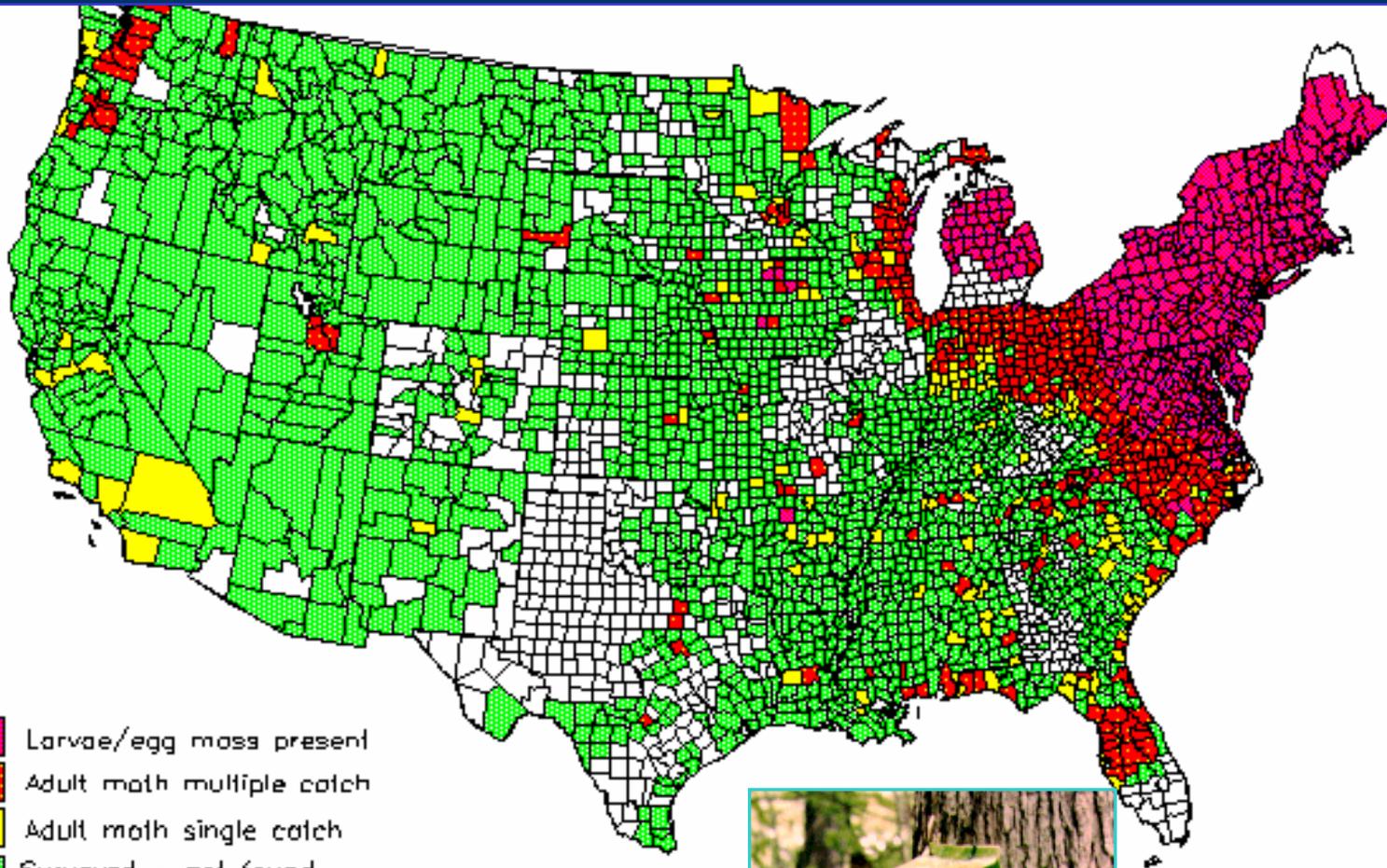


Gypsy Moth Management

An aerial photograph of a forest, likely in the Pacific Northwest, showing a helicopter in the process of spraying a forest. The helicopter is positioned in the lower right quadrant of the image, with a white plume of spray trailing behind it towards the upper left. The forest is a mix of green and brown, suggesting some areas of defoliation or damage. The overall scene is captured from a high angle, looking down on the forest.

- Suppression
- Detection / Eradication
- Slow the Spread

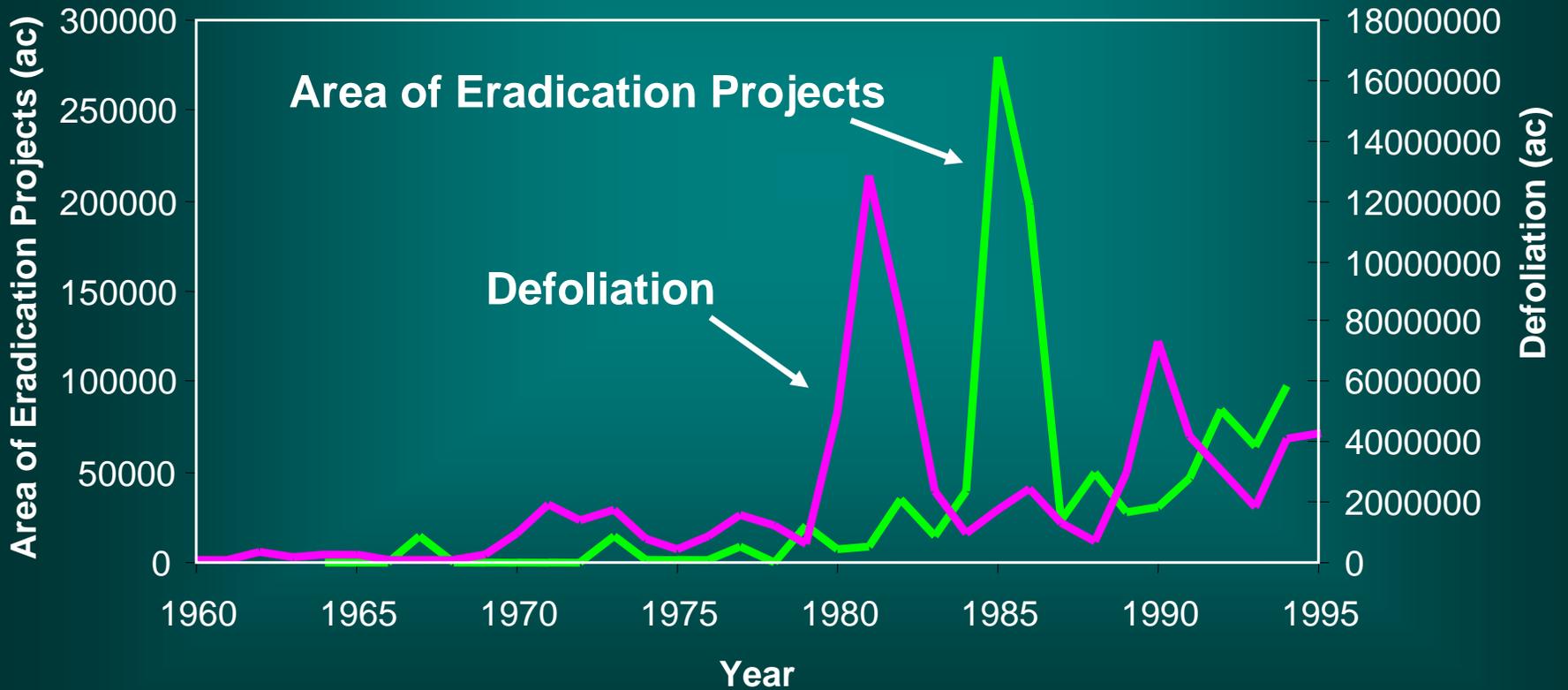
Gypsy Moth Detection Survey Results, 1993



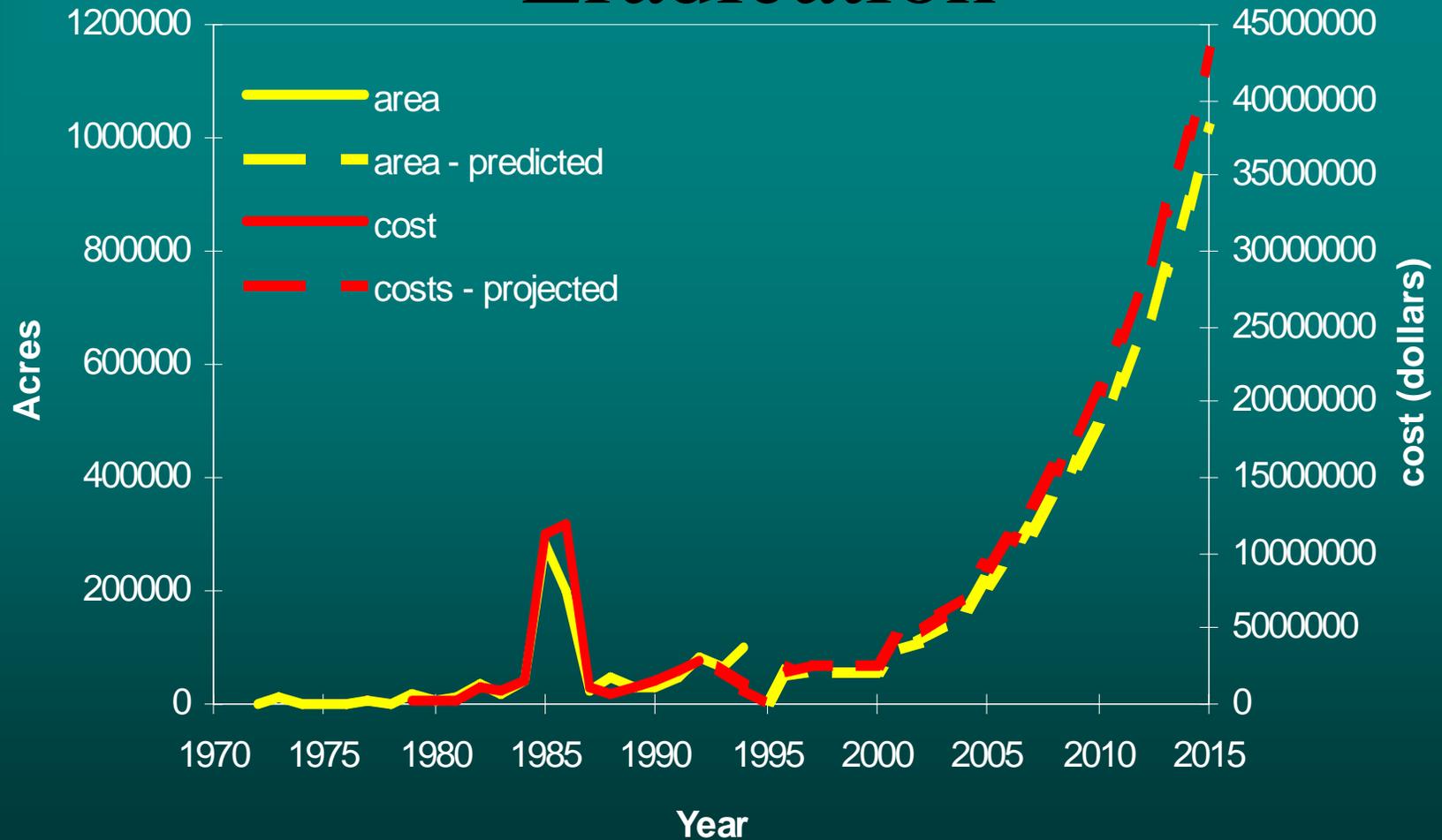
-  Larvae/egg mass present
-  Adult moth multiple catch
-  Adult moth single catch
-  Surveyed - not found
-  Not Surveyed



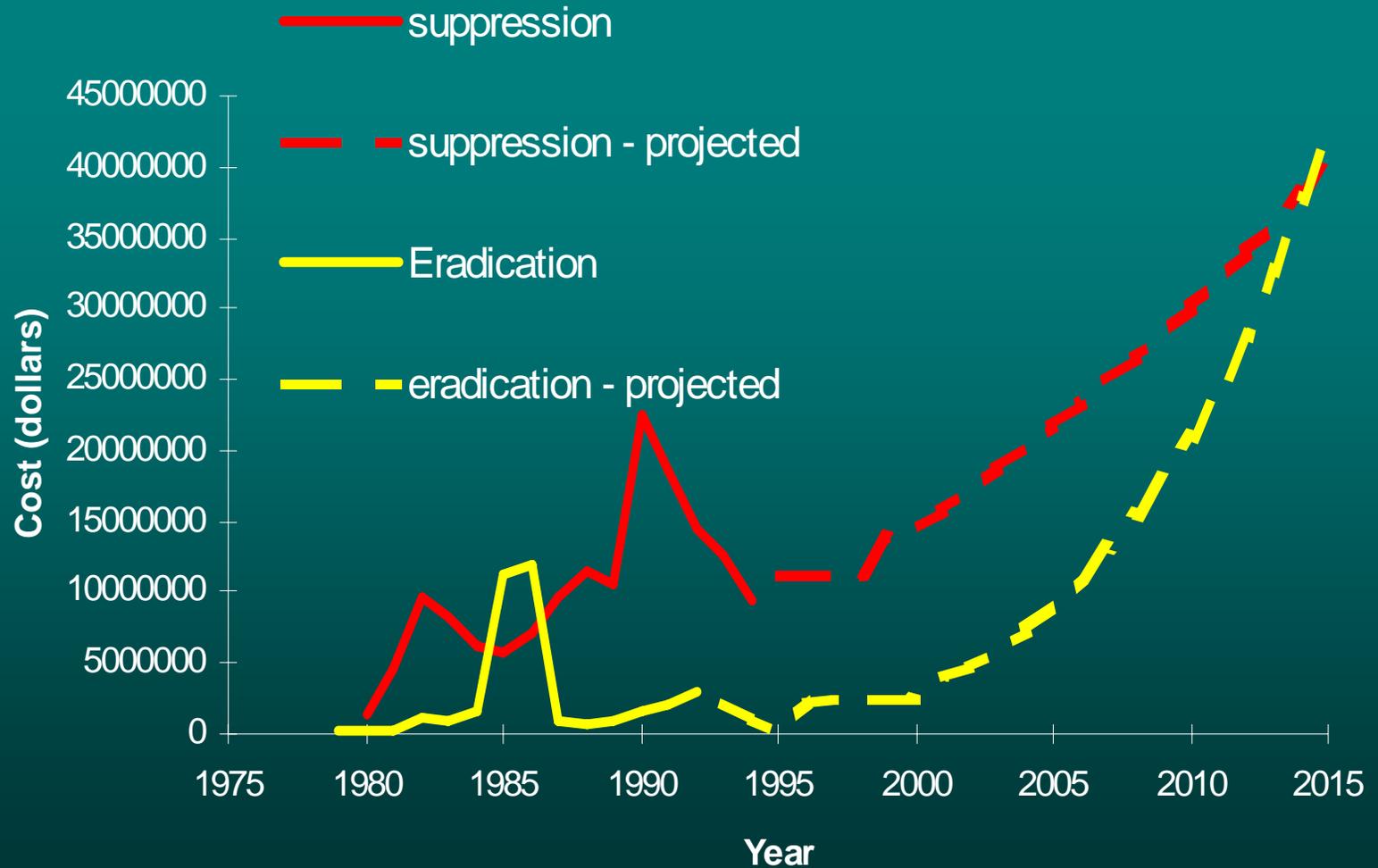
Eradication Projects Track Lagged Defoliation



Projected Gypsy Moth Eradication



Projected Suppression and Eradication Costs



Percent Basal Area Preferred by the Gypsy Moth

