A photograph of a soil bank in a forest. The soil is a reddish-brown color and appears to be eroded, with many tree roots exposed and hanging down. In the foreground, there are several green, leafy plants growing. The background shows more trees and foliage.

Hurricane impacts on the herbaceous and woody ground layer vegetation in a mature coastal plain forest

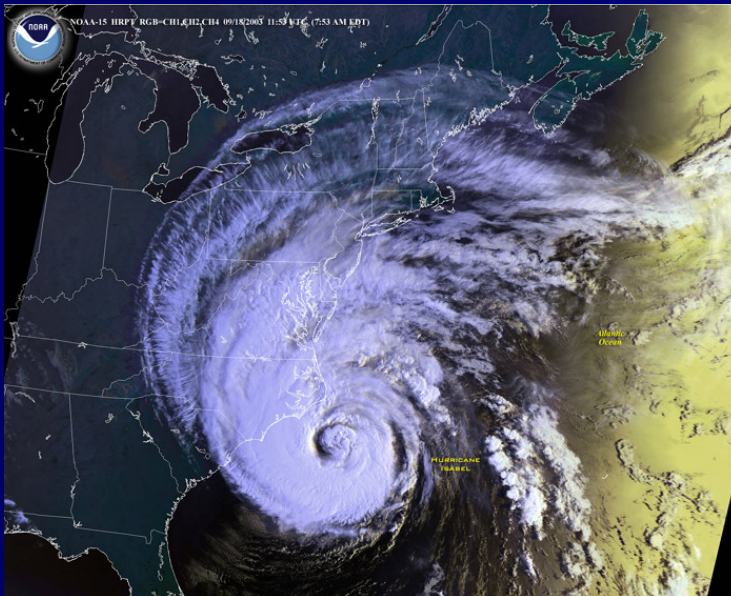
College of William and Mary REU Summer 2004

Jennifer Toy (Whitman College, Walla Walla, Washington)

Mentor: Dr. Stewart Ware

Background Info

- **Hurricane Isabel**
 - category 2
 - hit September 18, 2003
 - heavy rains and high winds



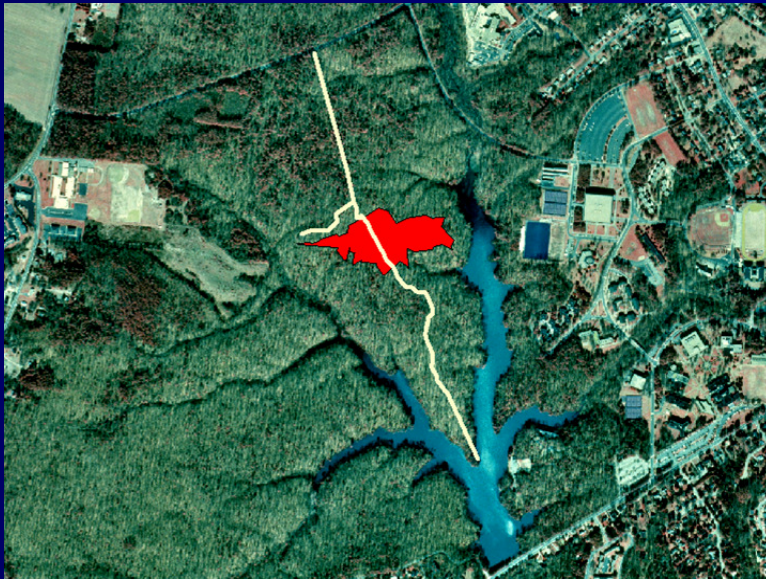
- **College Woods**
 - previously undisturbed
 - 150 years old
 - prime example of post-cultivation succession

Microburst :

Highly Damaged Area



A small downburst of wind that spins off from a hurricane at speeds of 150 knots or 172.6 mph

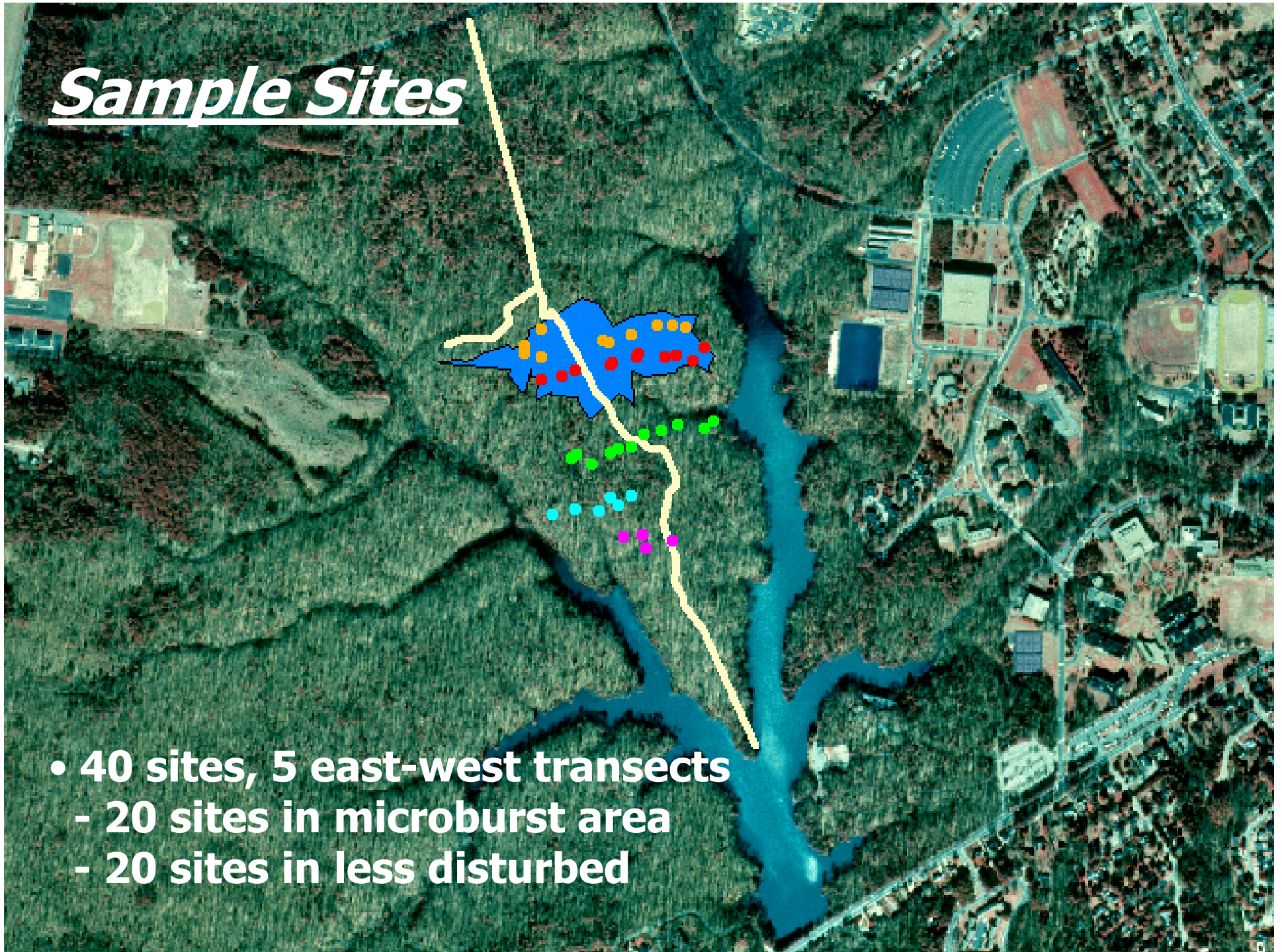


Purposes

- To investigate what happens to the ground layer vegetation in a mature coastal plain forest after a hurricane creates openings in the canopy
- To determine how different any changes are in herbaceous and woody ground layer vegetation in two areas with different degrees of hurricane damage
- To establish permanent sampling sites in the College Woods for future herbaceous vegetation research

Sample Sites

- 40 sites, 5 east-west transects
 - 20 sites in microburst area
 - 20 sites in less disturbed

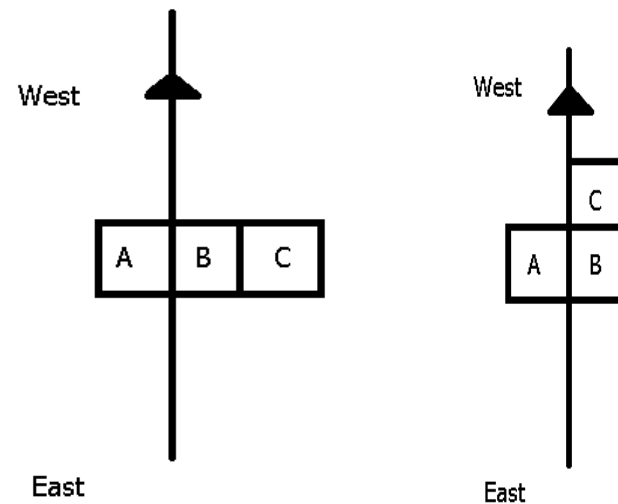


Methods:

The Breakdown



- *40 sites, 5 E-W transects*
- *each site has three plots*
- *each plot is 1 m²*



Methods: Sampling Technique



For each species present:

- Number
- Percent Cover
- Re-growth
- (Deer damage)

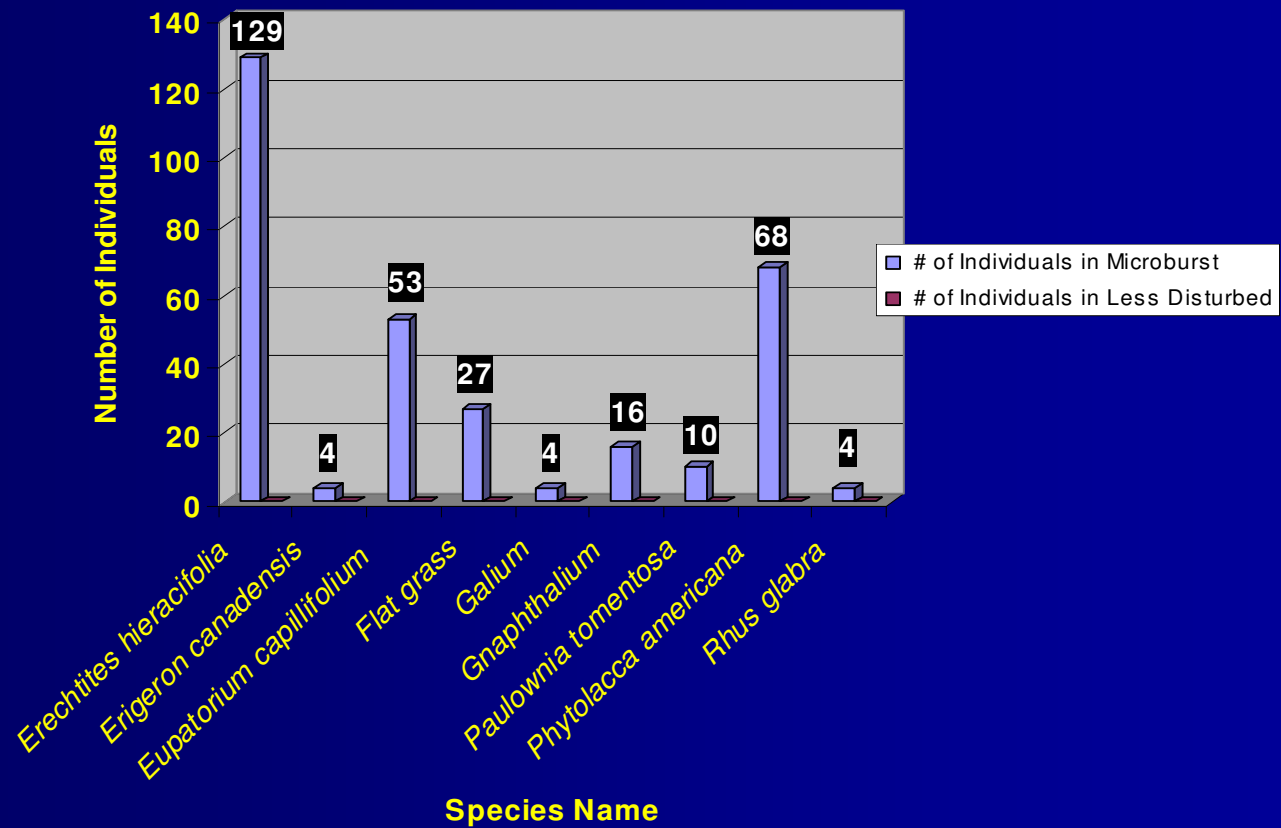
Results

**Comparison of Microburst and Less Disturbed Plots*

	Microburst Plots	Less Disturbed Plots
Total Number of Individuals	3424	927
Total Number of Species	53	37

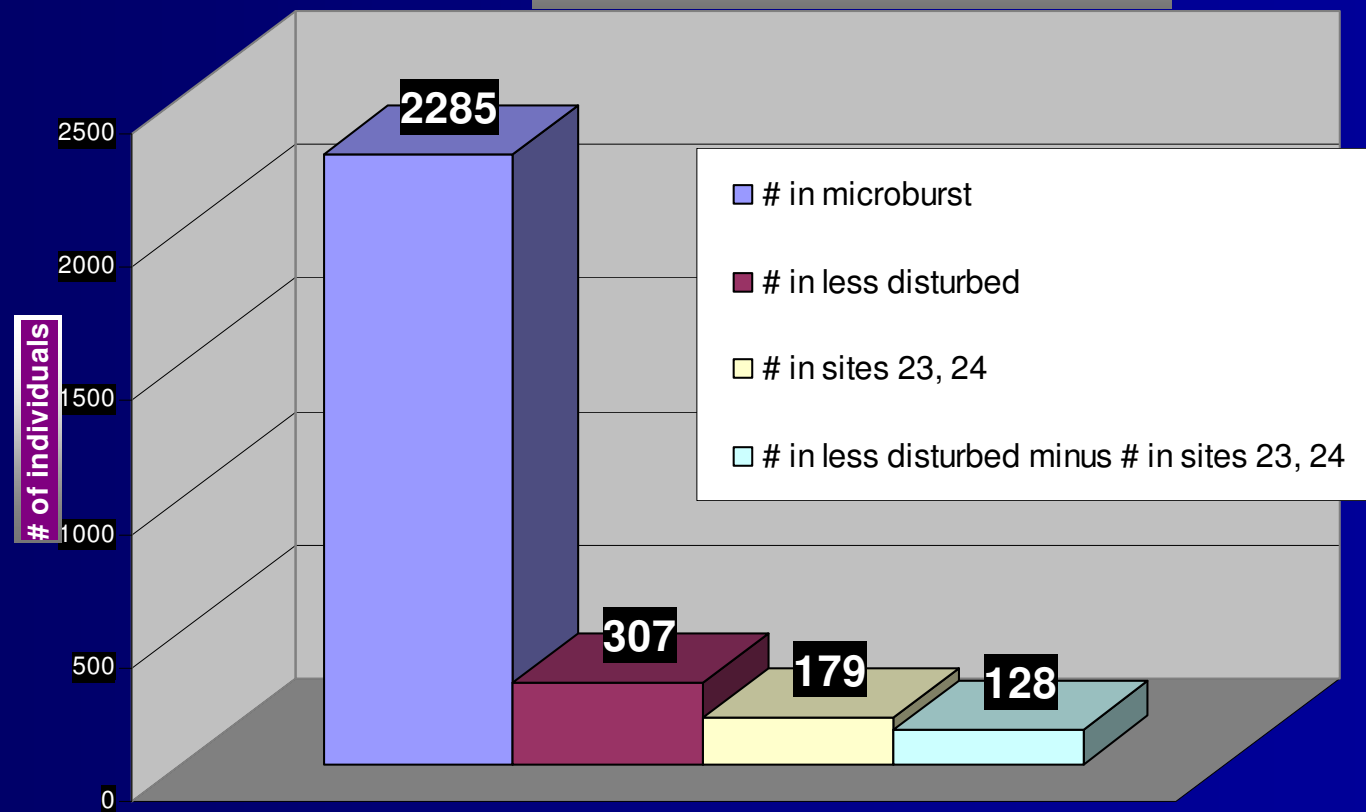
***53 – 37 = potentially 16 'invasive' species*

Number of Individuals in Microburst vs. Number of Individuals in the Less Disturbed Area (Informative Species)



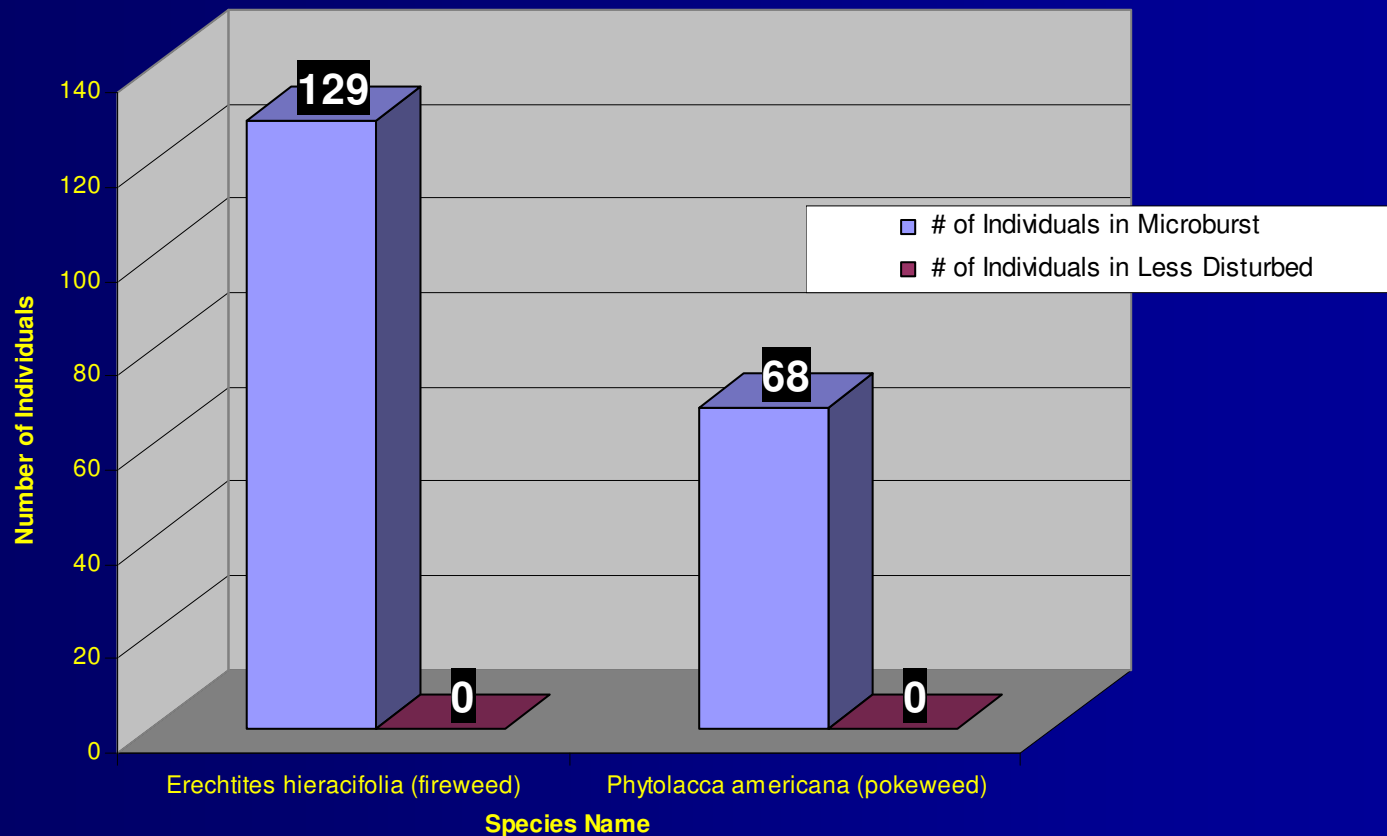
2,592 tulip trees later...

Liriodendron tulipifera



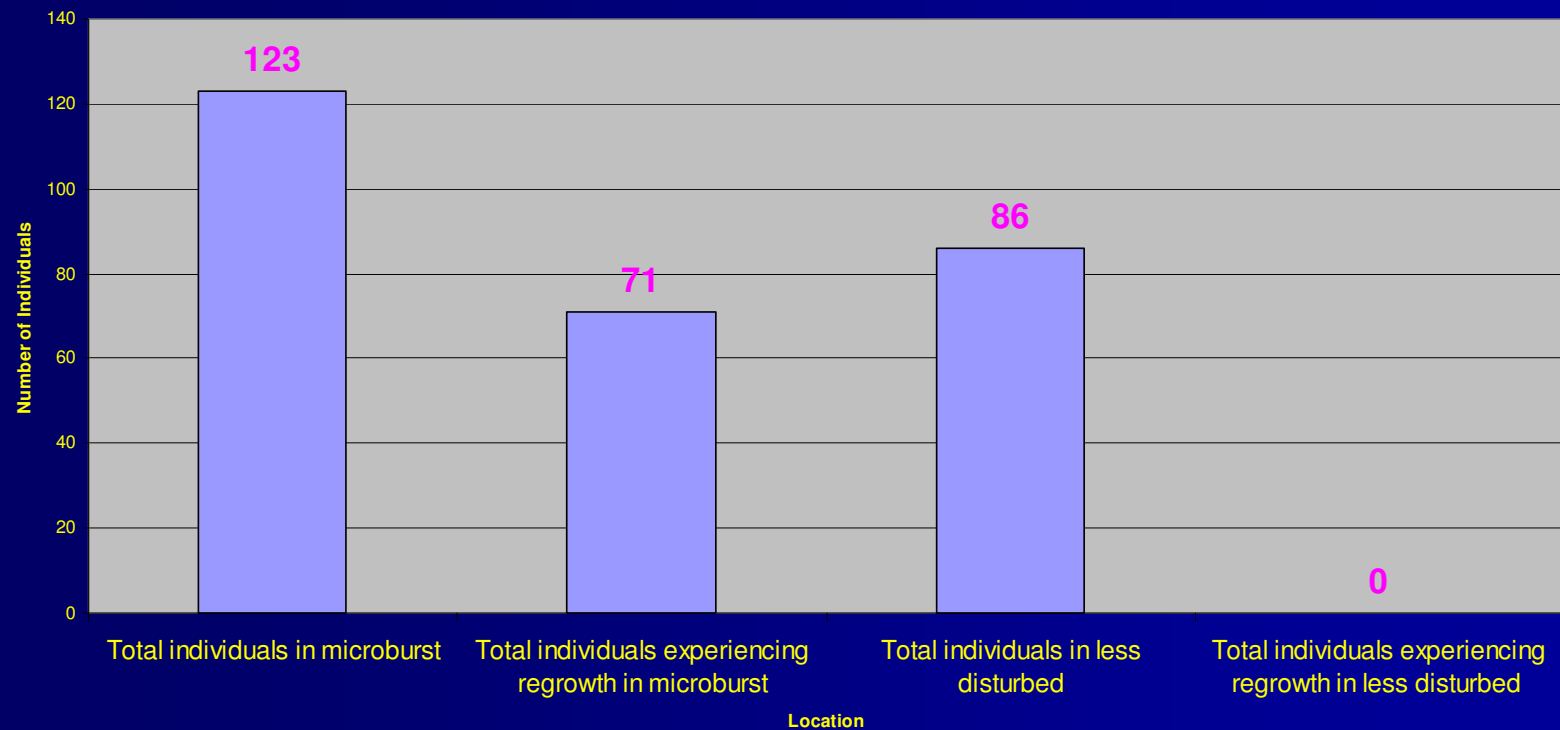
Erechtites and pokeweed

Number of Erechtites and Pokeweed
in Microburst vs. in Less Disturbed Area





Regrowth in Quercus alba



In summary...

- In response to openings in the canopy:
 1. Potentially 16 species are 'invaders'
 - changes in composition may lead to different rates and patterns of succession
 2. Established species continue to grow
 - i.e. *Q. alba*
 3. No signs of mortality yet



Additional Thoughts and Questions

- Different rates and patterns of succession may lead to changes in forest structure.
- How will deer damage affect competition between and among ground layer vegetation species?
- Would a mature coastal plain forest respond to a clear cut or man made disturbance in similar ways?
- How will hurricane damage to vegetation affect soil minerals, runoff, and water quality of Lake Matoaka?



Thank you...



...to my mentor, Dr. Ware, for sharing his vast knowledge of forest ecology and amazing enthusiasm for plants and trees.



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...Tim Russell for his GIS expertise.

...to Team Plant members Jeremy Wacksman and Kristin Pederson for their help in the field and moral support.