

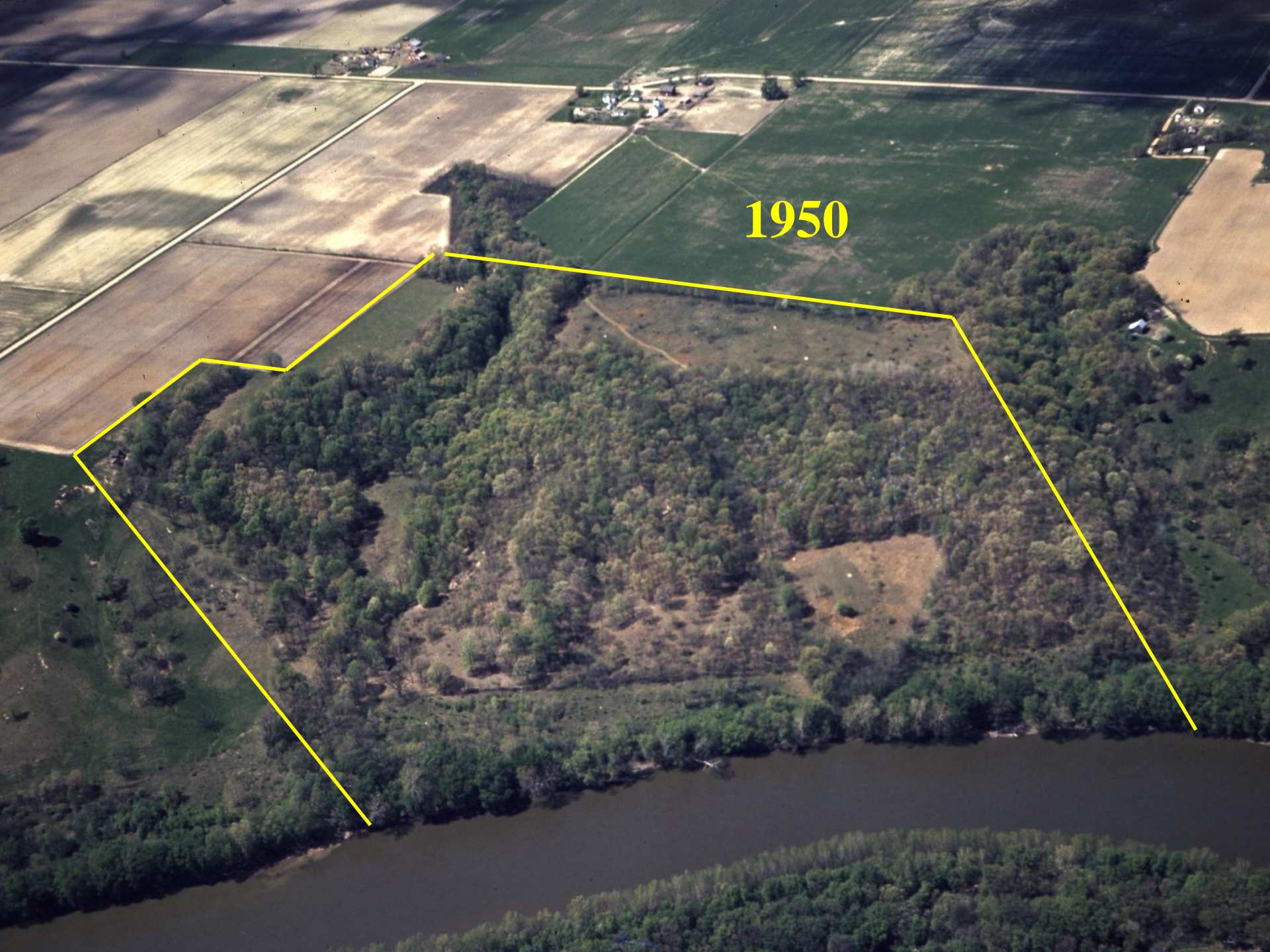


Ecological Succession in the forests of the Ross Biological Reserve, Purdue University, in the six decades 1949-2009.

When established, the Reserve was a patchwork of mature and partially logged forest with substantial open pasture that is now forest again. Dr. Alton Lindsey foresaw that this ‘living laboratory’ would pay dividends in understanding forest dynamics and the resilience of diverse ecosystems.

From Dr. Lindsey’s 1949 proposal: “...the resultant data would increase in scientific value year by year, and the opportunity to compare current status of the permanent sample plots with definitely known past developmental stages will prove a great stimulus to students ...”.

1950







1970



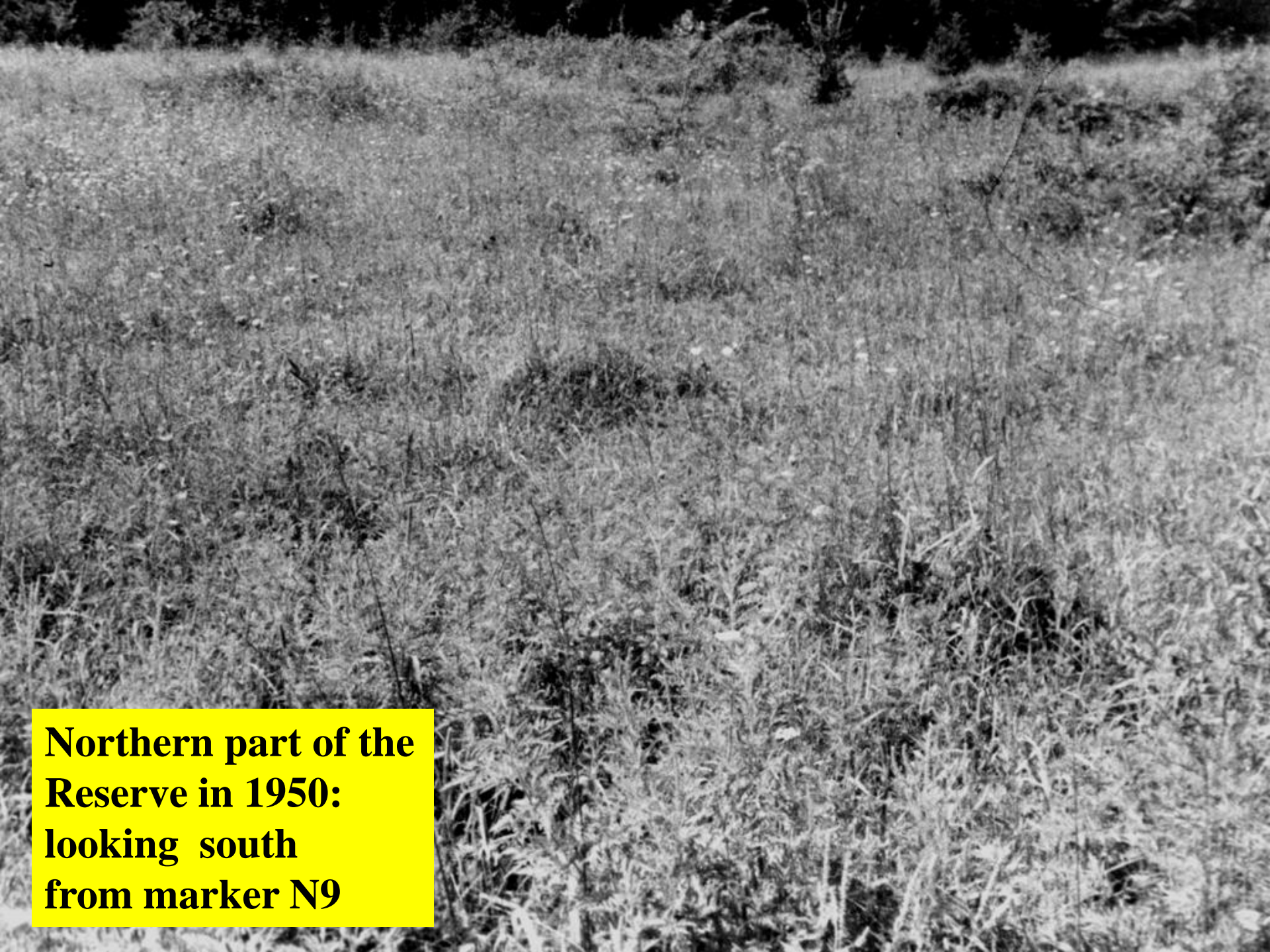
1999



“Headquarters” 1950



mature forest 2010



**Northern part of the
Reserve in 1950:
looking south
from marker N9**



S from N9 1960



S from N9 1970



S from N9 1990



S from N9 2010



S from N13 1950



S from N13 1970

A black and white photograph of a dense forest. The image shows numerous trees with thin trunks and a thick canopy of leaves. The lighting is somewhat dim, creating a sense of depth and texture within the woods. The trees are scattered throughout the frame, with some in the foreground and others receding into the background.

S from N13 1990



S from N13 2010

ENE from N11 1950

A black and white photograph showing a wide field of tall, dense vegetation, likely a meadow or prairie. The plants are tall and thin, with some showing seed heads. In the background, there is a thick line of trees, possibly a forest or wooded area. The sky is bright and overexposed. In the top right corner, there are some faint, handwritten markings that appear to be '11' and '11' stacked vertically. A yellow rectangular box is overlaid in the bottom left corner, containing the text 'ENE from N11 1950' in bold black font.



ENE from N11 1970



ENE from N11 1990



ENE from N11 2010



NW from D13 1950



NW from D13 2010
D13, NW, 2009

N9

E from N9 1950



E from N9 1970



E from N9 2010



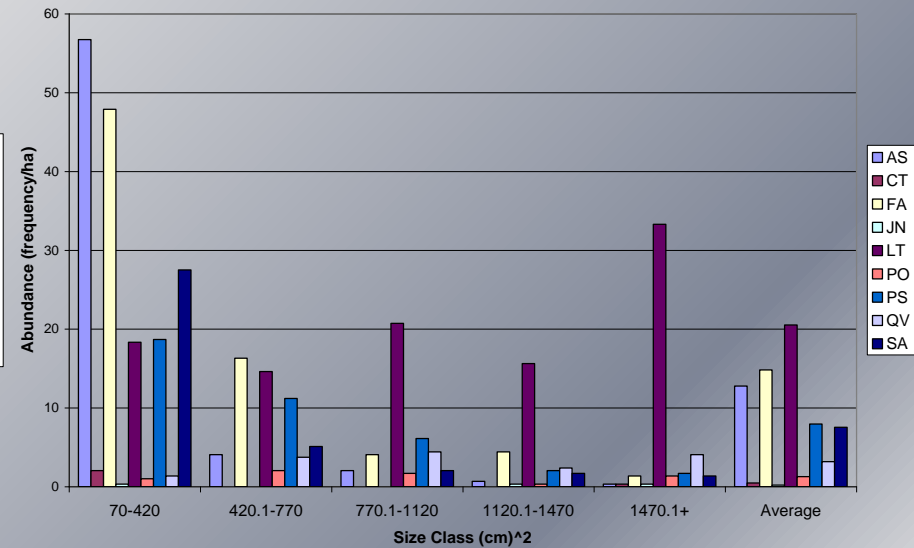
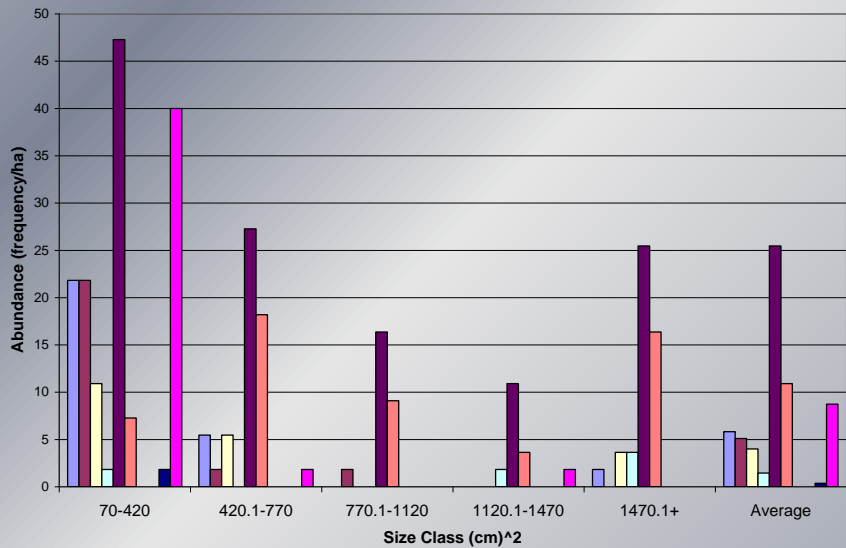
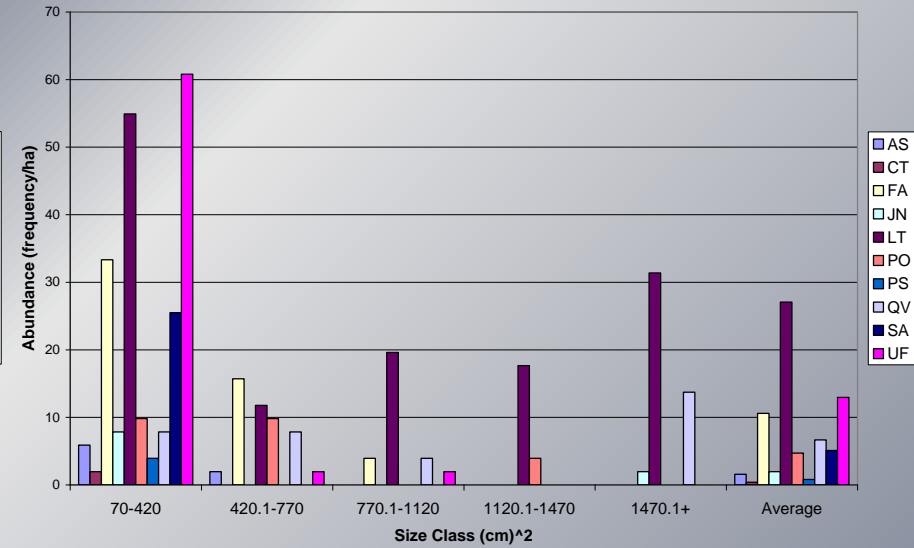
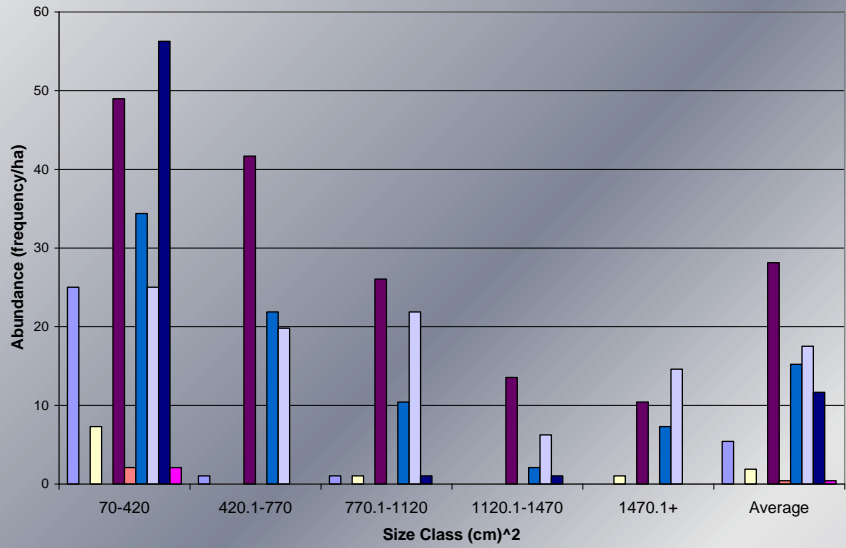
Former pasture in 2005



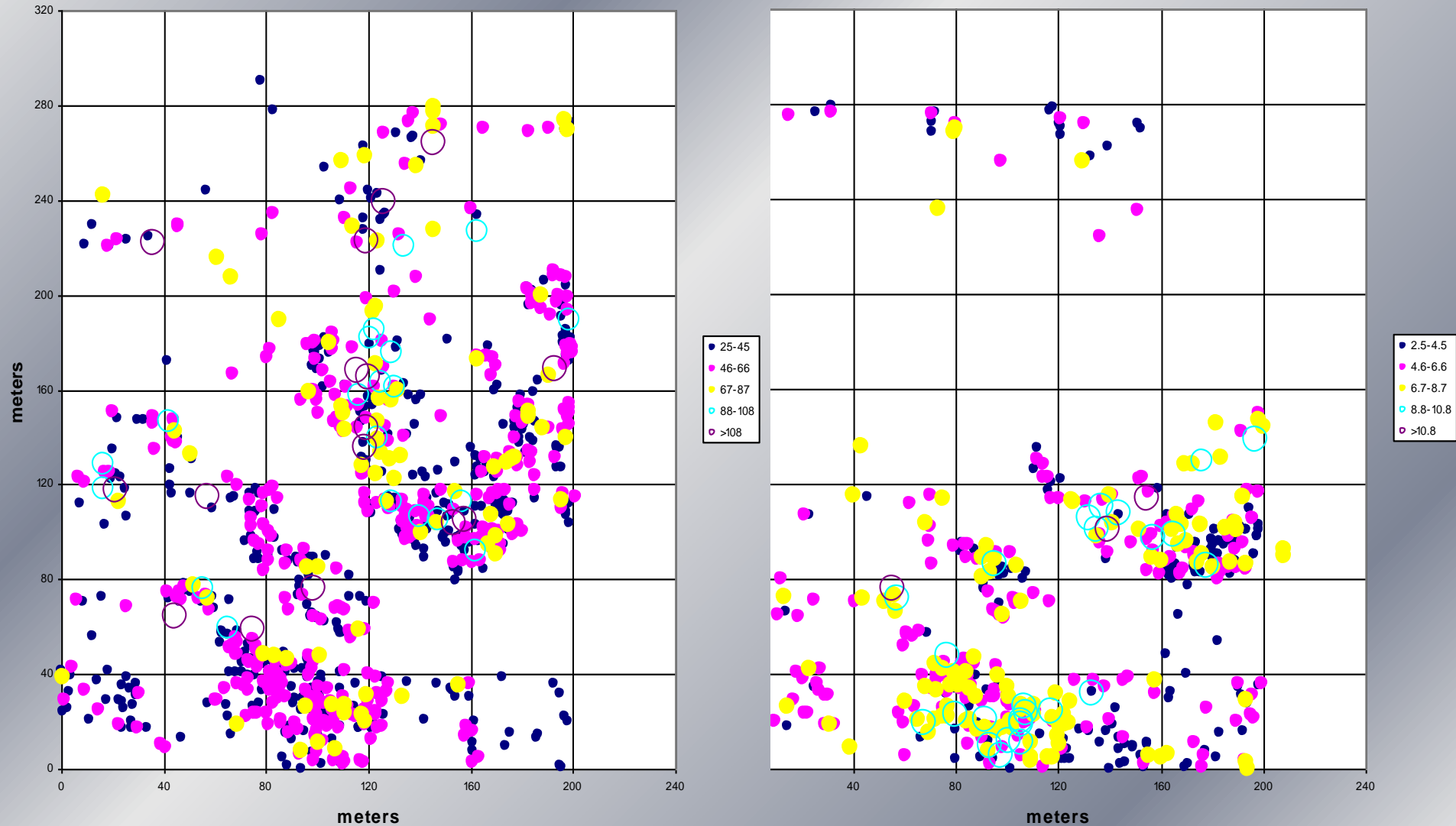
Former pasture in 2010

Forest succession is variable among former-pasture plots depending on the composition of surrounding mature forest. Data from four parts of the Reserve, from Nick Tackett's honors thesis, show tree species composition across five size classes.

Abundance of Species in the Triangle



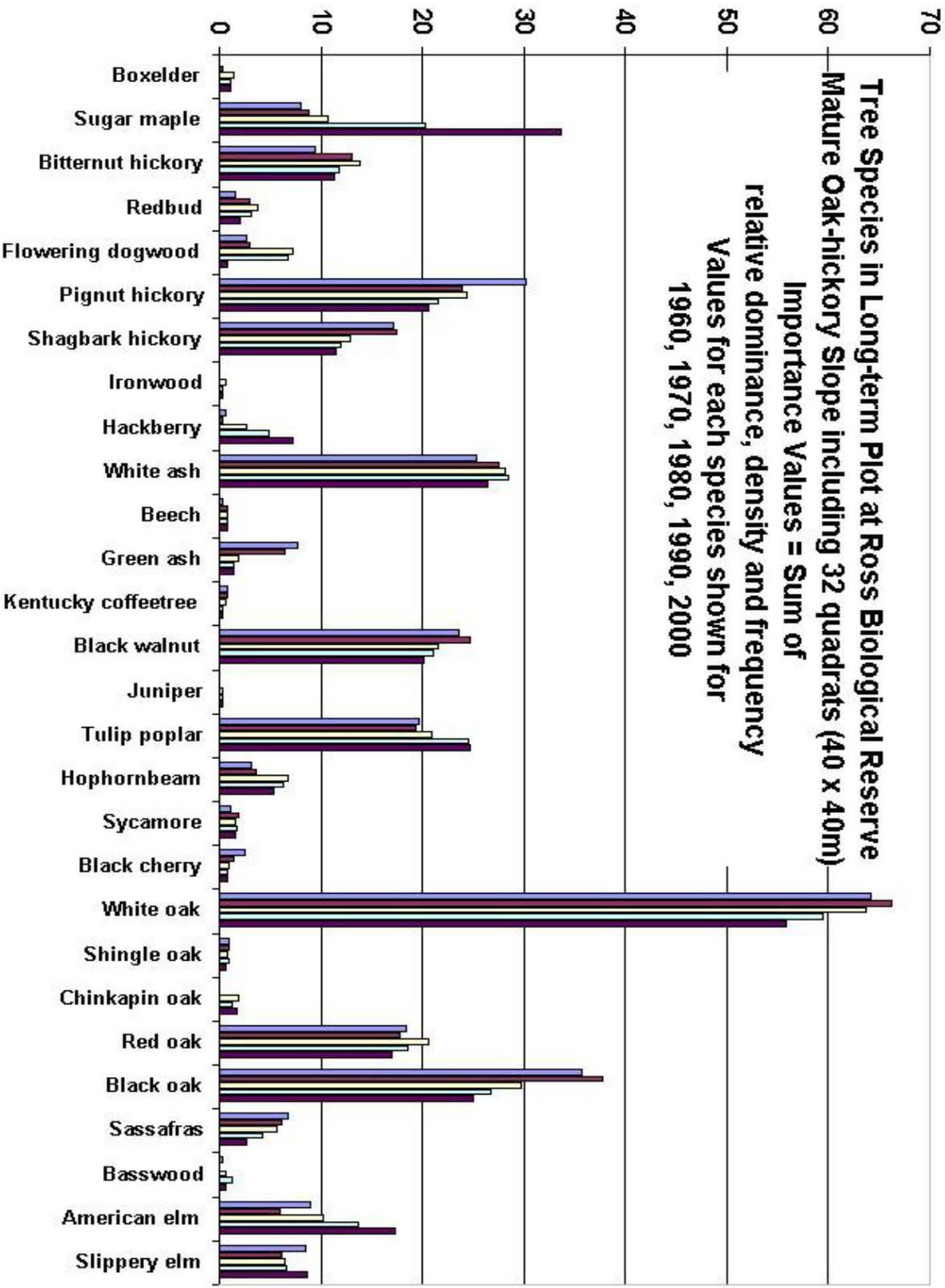
Even in mature-forest plots, forests have changed substantially since 1950. Maps of flowering dogwood (*Cornus florida*) in an 8ha plot in 1983 (left) and 1999 (right), from the doctoral dissertation of Bill Bromer and the masters thesis of Aaron Pierce, show density reduced by half in just 16 years.







Tree Species in Long-term Plot at Ross Biological Reserve
Mature Oak-hickory Slope including 32 quadrats (40 x 40m)
Importance Values = Sum of
relative dominance, density and frequency
Values for each species shown for
1960, 1970, 1980, 1990, 2000



All forest types have been invaded by exotic plants like Amur honeysuckle,





garlic mustard,

and autumn olive.



Forests of the Ross Biological Reserve have proven to be both diverse across the landscape of soil types and variable in time. Change has occurred on several time scales. Over the last century, fire has no longer been used to manage the forests, and species composition of mature forest has changed in favor of moisture-loving trees like sugar maple. In sixty years of protection, ecological succession has replaced forests that were once cut, although not yet to their original composition. Exotic species have invaded more recently, changing the forest floor. As Alton Lindsey foresaw, long-term studies have revealed these changes and a resilience in the forest ecosystem that promotes optimism for restoration efforts underway throughout the country. Thousands of students have benefitted from first-hand exposure to these dynamic ecosystem processes.