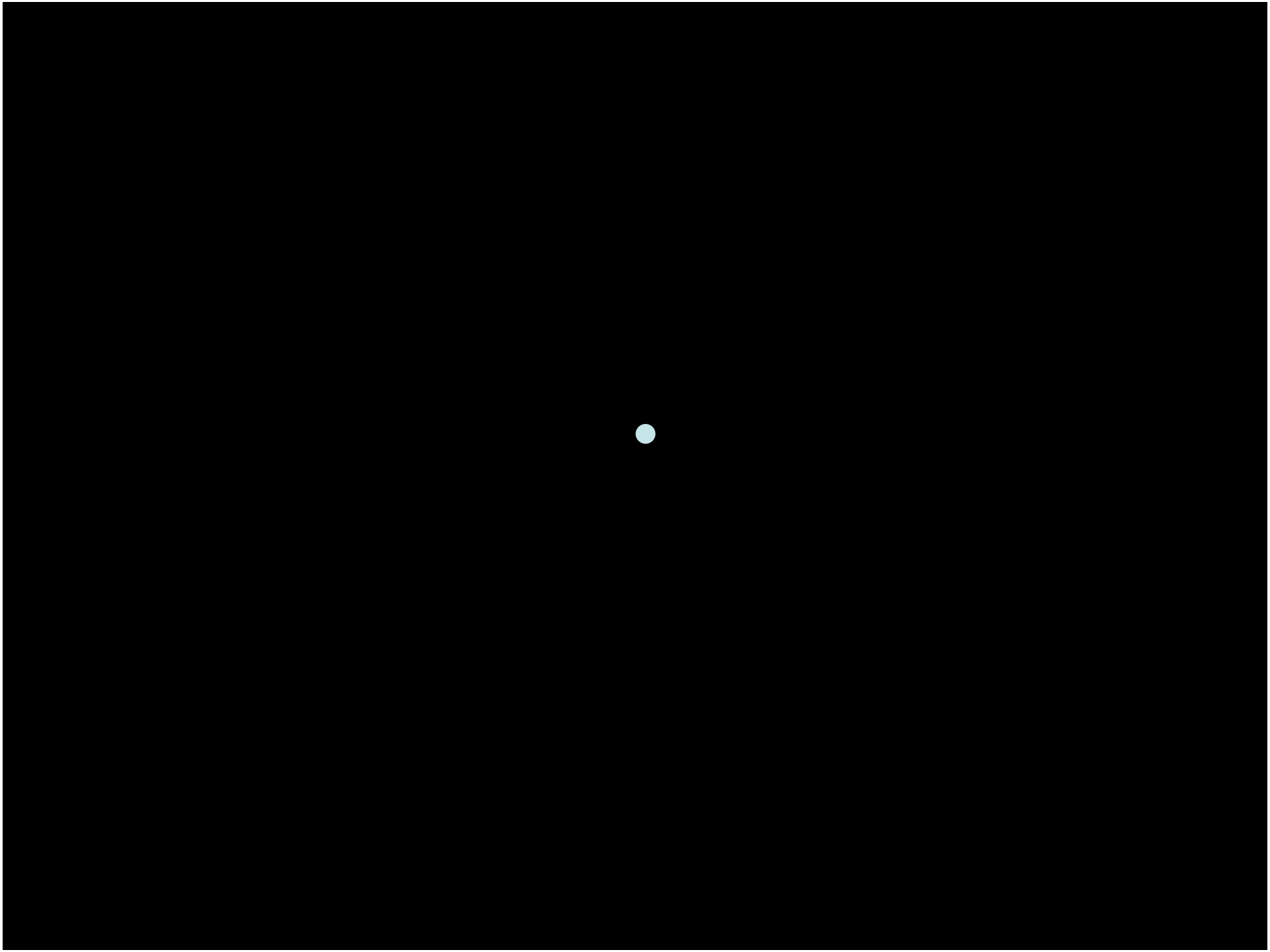


“Despite abundant evidence of historical human impacts across Puerto Rico and New England, the 1987 LTER proposals exclusively focused on natural ecological processes.

Avoidance of history and humans was an act of deliberate grantsmanship.

Both groups concluded that research on humans would review poorly in the ecological community and would not be funded by NSF.”

Conservation Lessons and Challenges from Ecological History **Forest History 2000**

LTER Network - 2007

Integrated Science for Society and the Environment

ISSE

Flexible and Comprehensive Framework

Research
Synthetic and interdisciplinary; site, regional and interregional; historical

Education
Undergraduate, graduate and informal

Applications
Conservation, planning, natural resource management

Harvard Forest-Hubbard Brook-Plum Island

New England Regional Framework

Human behavior

Regulatory

Market

Institutional

Individual

Q5

Press & Pulse Drivers

Land Use/ Cover Change
development, protection, harvesting

Pollution
CO_2, ozone, N dep.

Climate variability

Pests/pathogens
hemlock woolly adelgid, invasive plants

Natural disturbance
hurricanes, ice storms

Q1

Biotic structure & composition

Species, populations & communities
Plants (native & exotic), fungi, microbes, wildlife (moose)

Q2

Ecosystem function

1º/2º production, nutrient cycling, decomposition, atmospheric exchange, hydrology

Q3

Ecosystem services

Air quality, Water quality, Carbon storage, Timber, Food, Fuel, Recreation, Aesthetics

Q4

Human value & perception filter

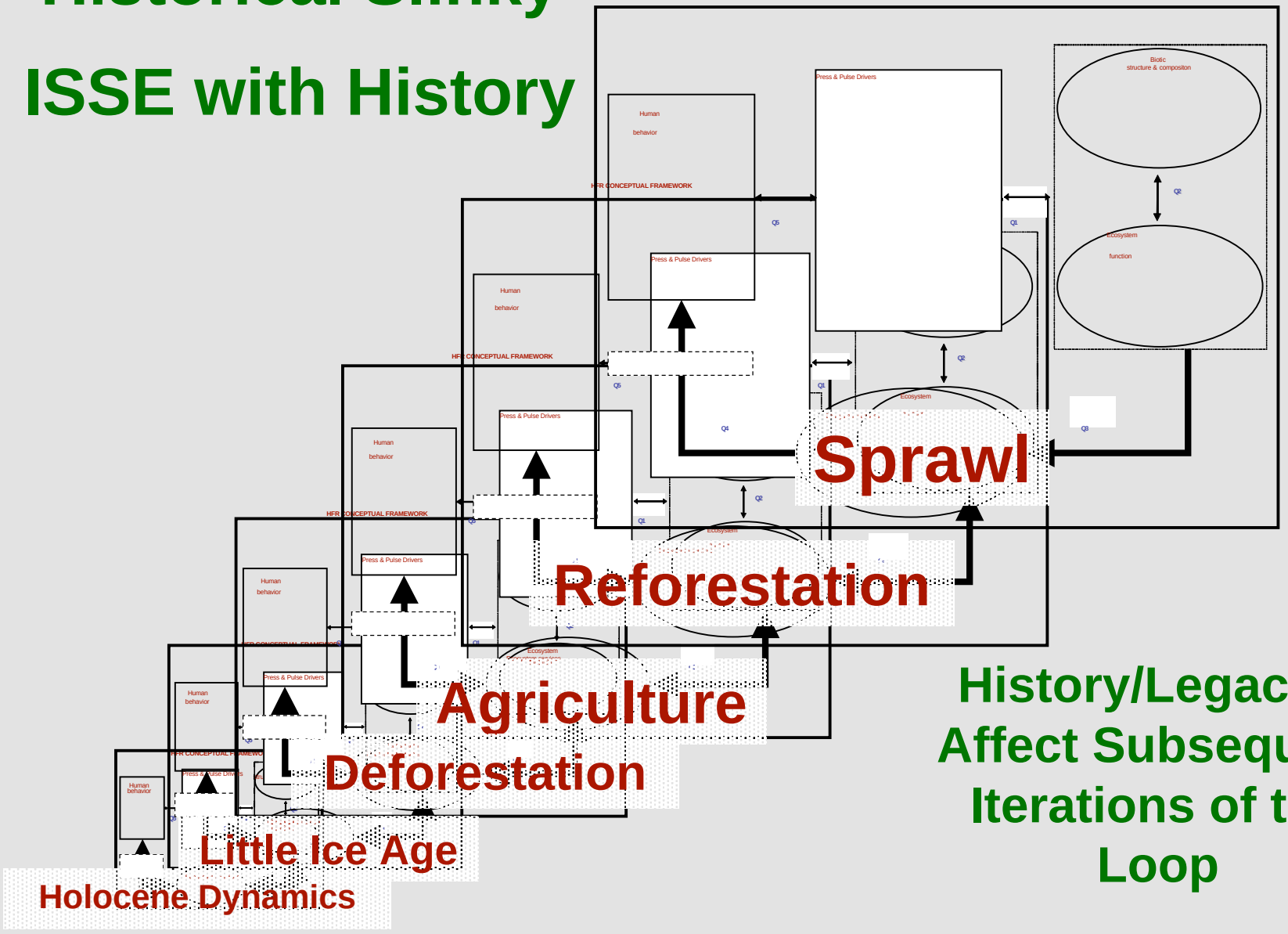
History

Time

Foster LTER Mini-symposium
3/8/07

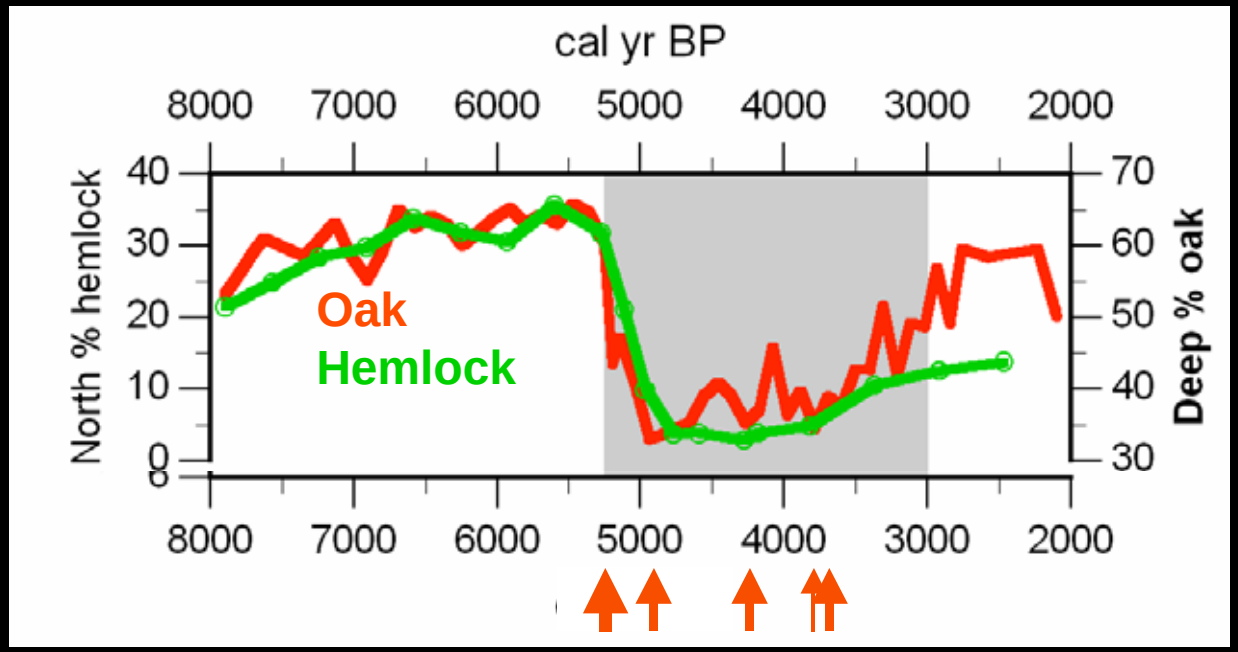
“Historical Slinky”

ISSE with History



Reconciling

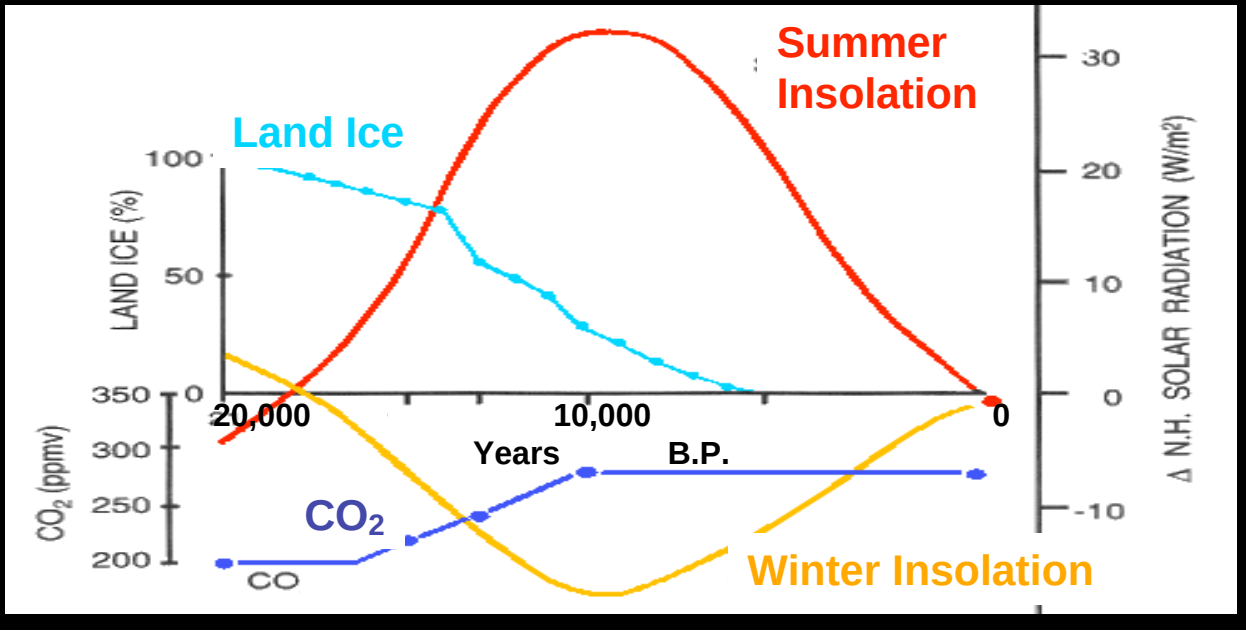
Abrupt Vegetation Response



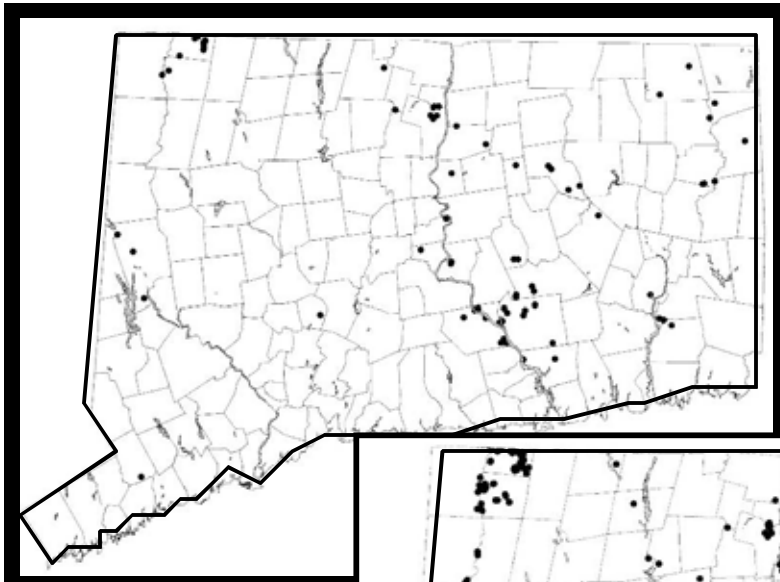
Pulses of Drought & Fire

with the

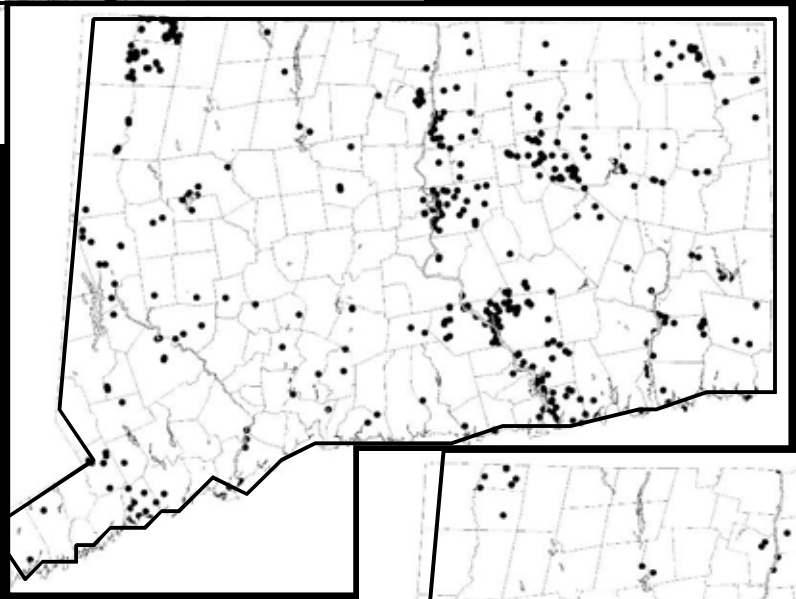
Long-term Press of Climatic Drivers



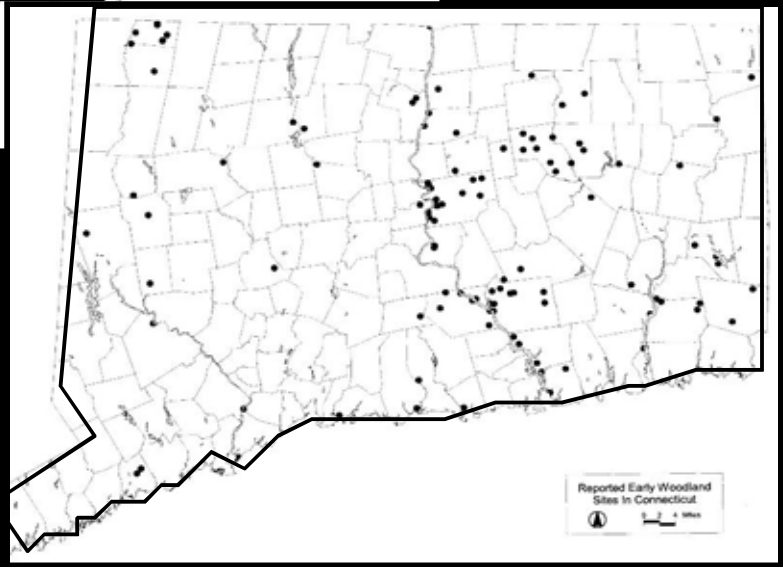
Pre-Historical Site Density Connecticut



Middle Archaic (**7-5000 Yrs B.P**.)
86 Sites



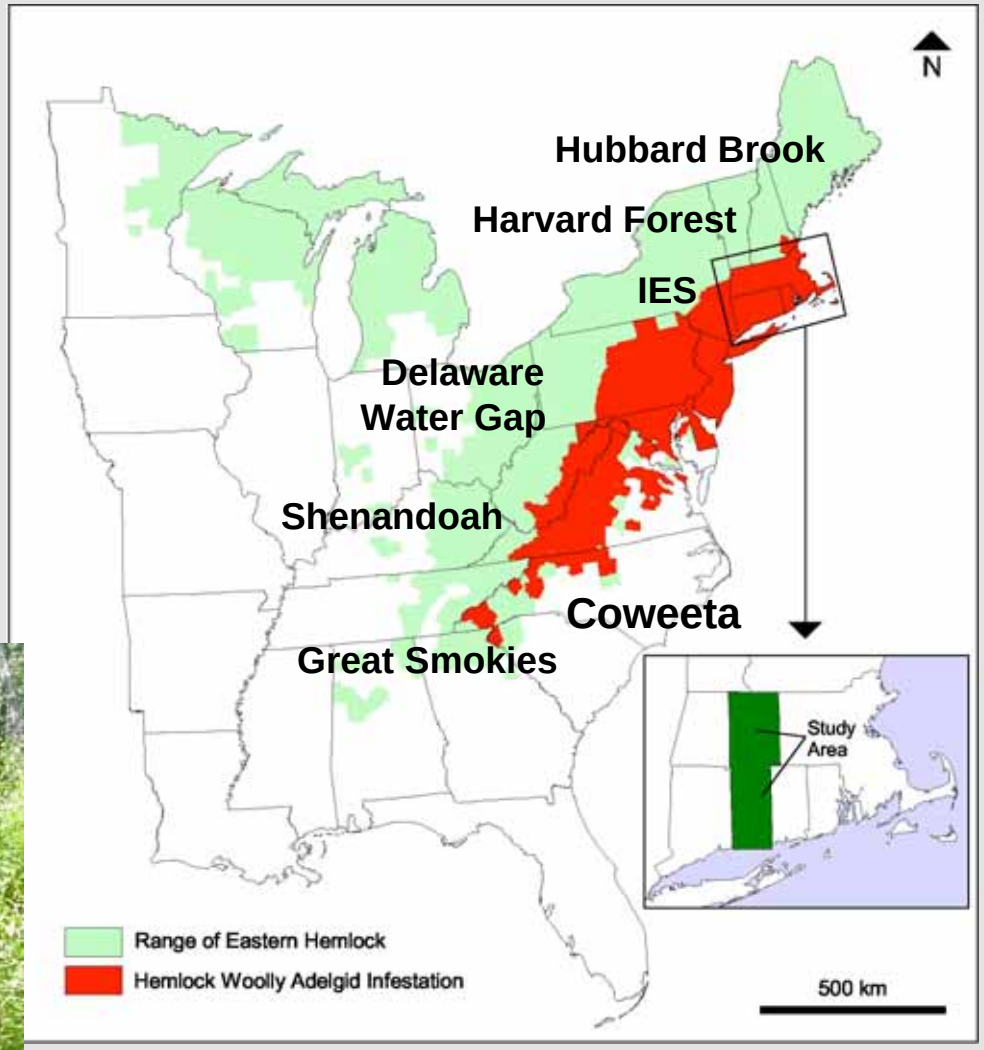
Late Archaic (**5-3000 Yrs B.P.)**
536 Sites



Early Woodland
(**3-1000 Yrs B.P.)**
130 Sites

Hemlock Woolly Adelgid

Harvard Forest regional program initiated 1995

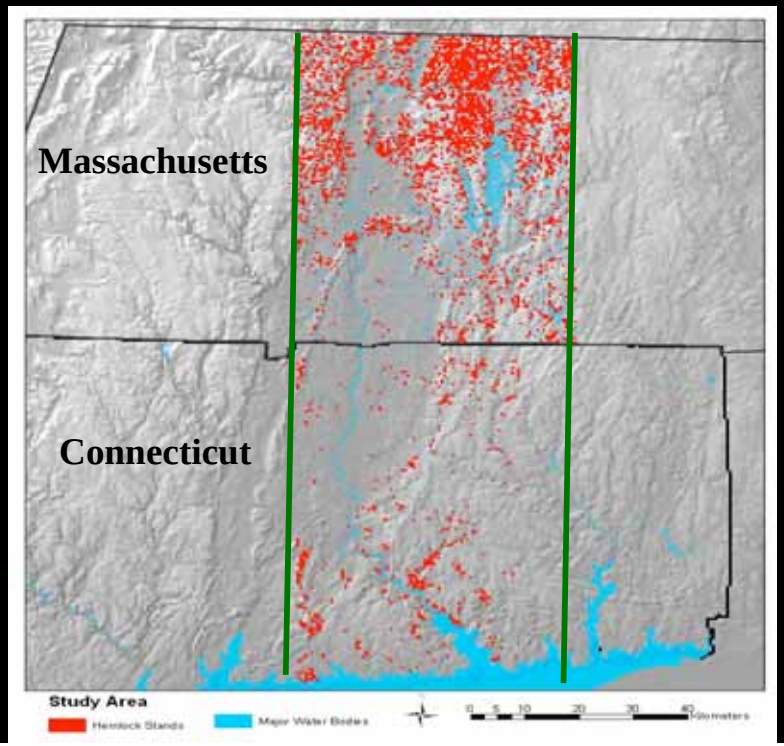


Foster LTER Mini-sy
3/8/07

Hemlock Forest Dynamics

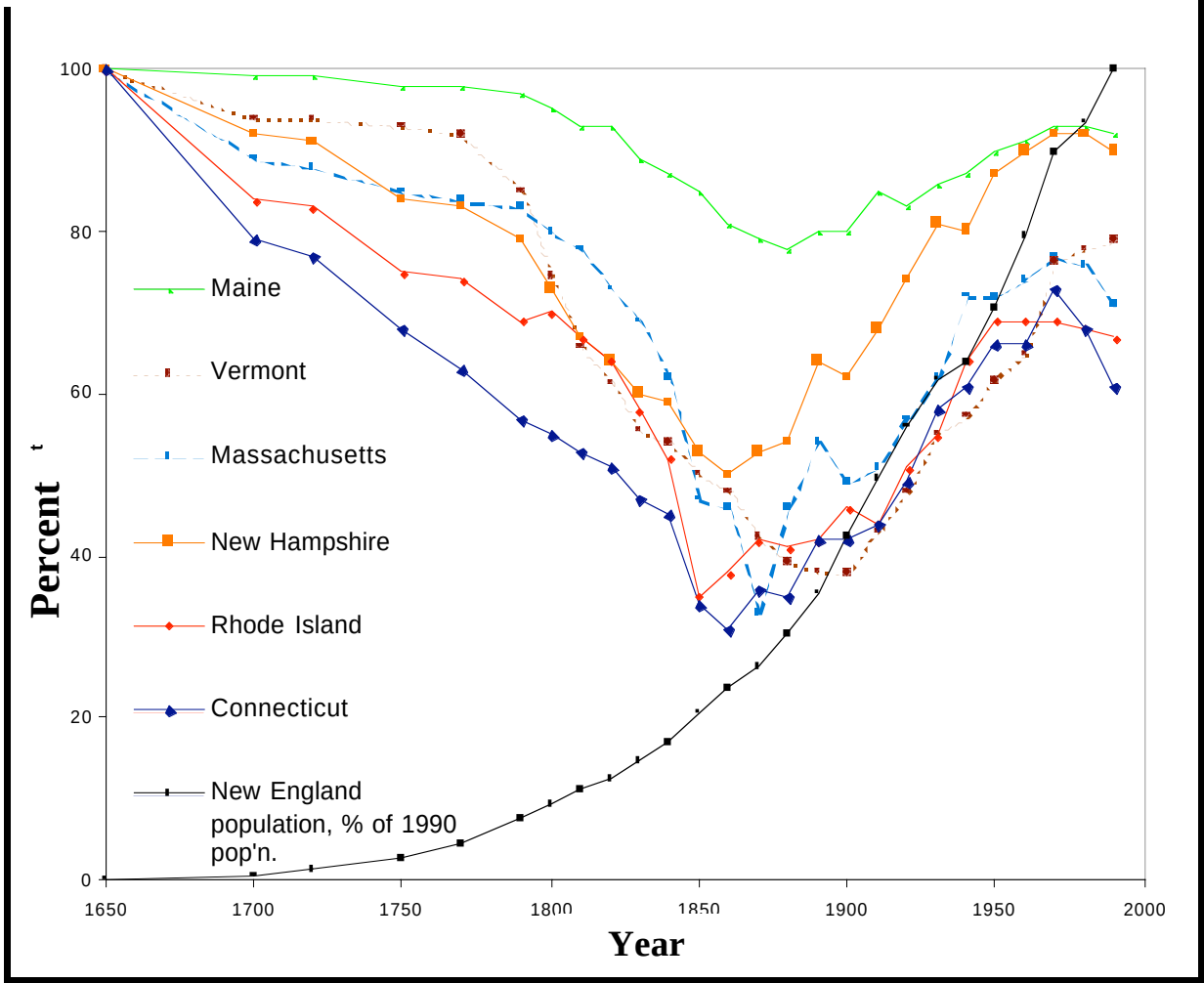
Critical Need for Integrated Studies:

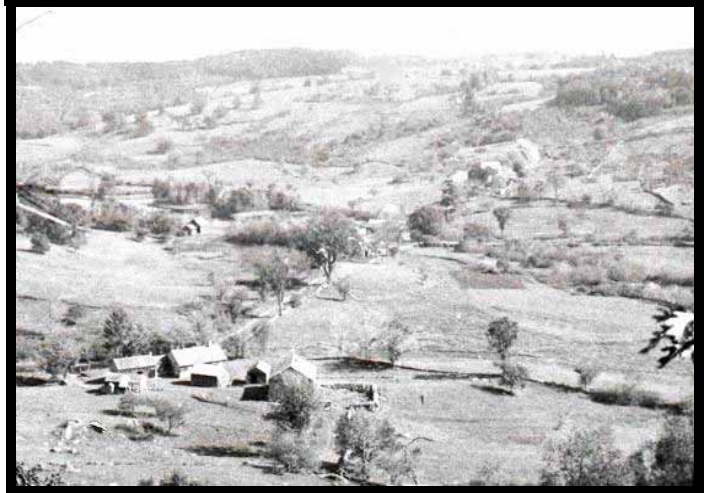
- Coupled Human and Natural Systems
- Historical, and Modern
- Inter-site and Regional
- Terrestrial, Aquatic and Atmospheric
- Input to Management, Policy & Outreach



ISSE – Coupled Human–Natural Systems are Ecology

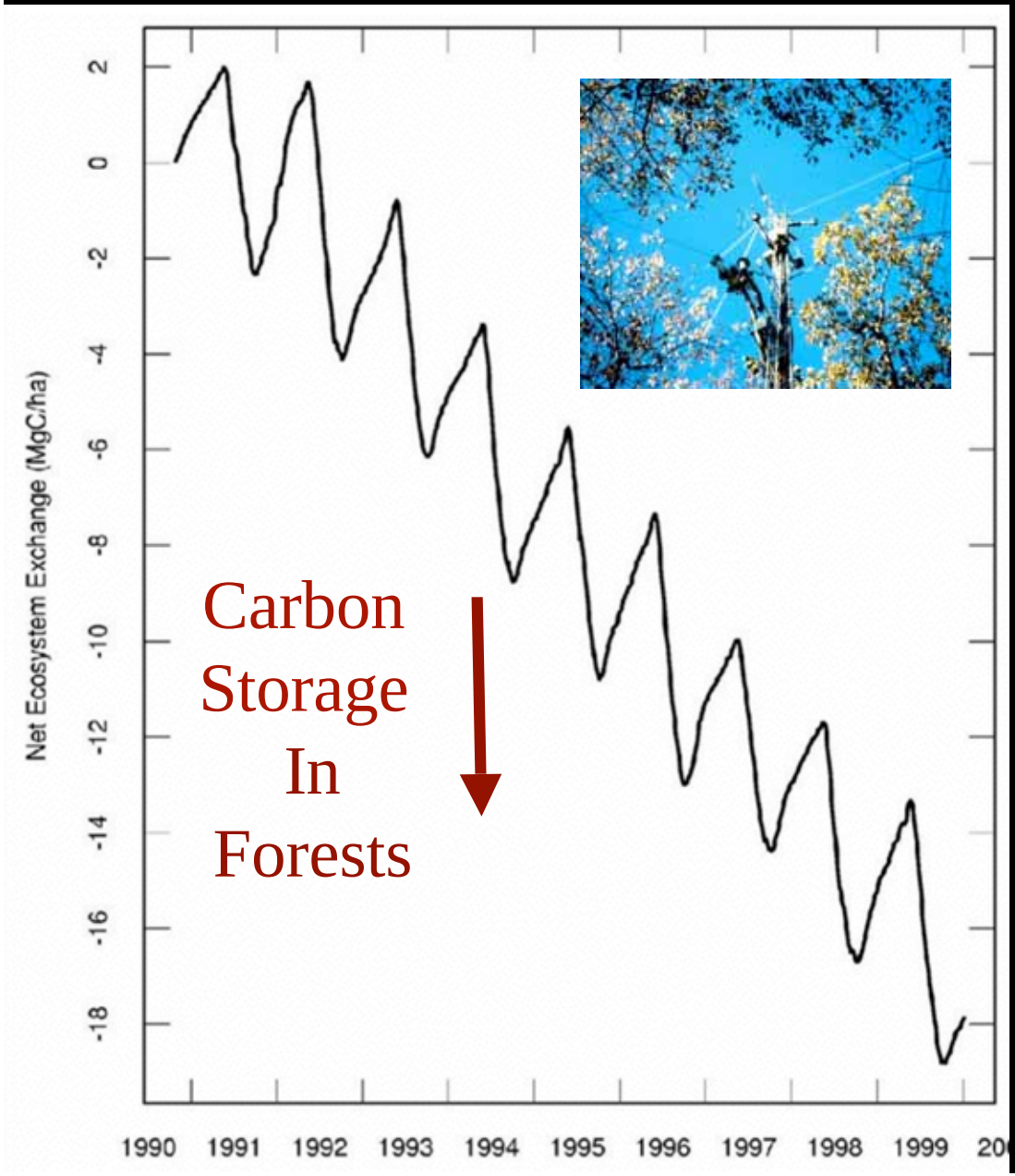
Forest Cover and Population Trends in New England

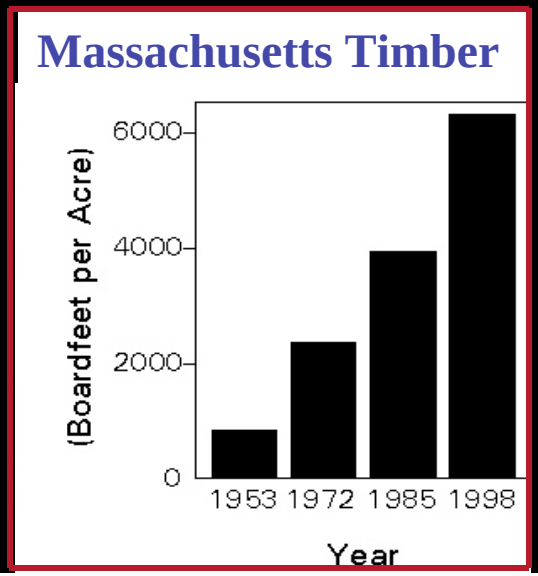




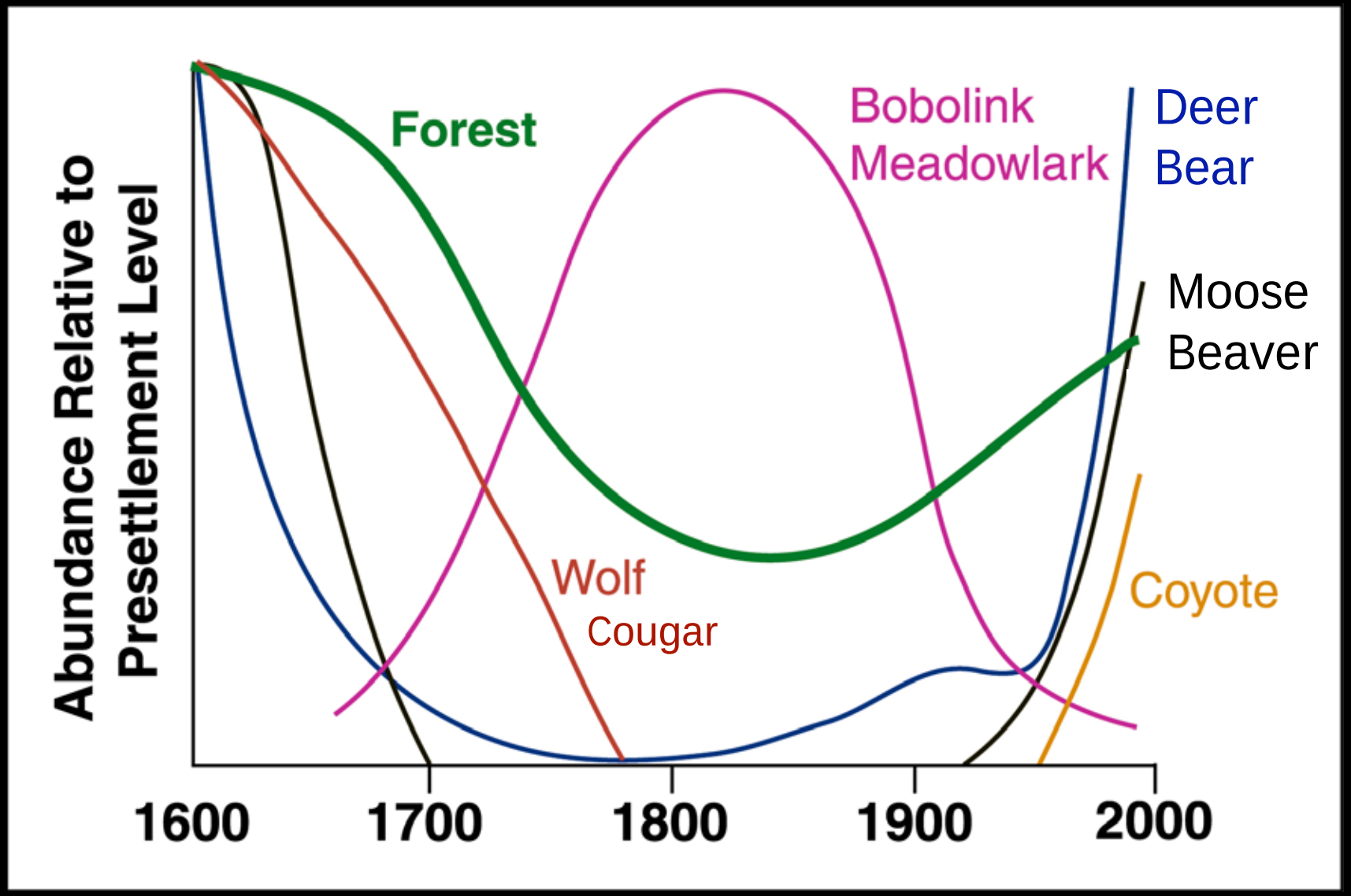
Carbon Uptake by New England Forests

Measured by Eddy Covariance at the Harvard Forest



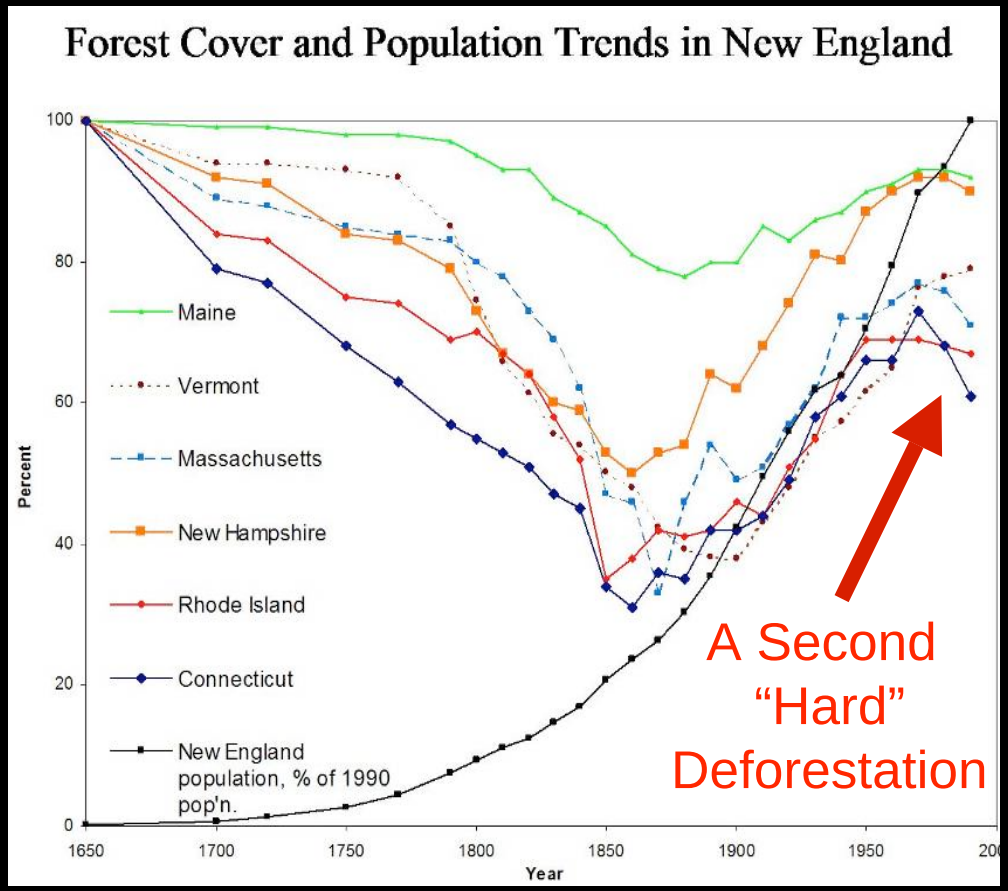


Wildlife Dynamics in the New England Landscape



Foster et al. 2002
Bernardos et al. 2003

Historical ISSE as Context for Conservation



1880s – Agriculture dominated

1990s – Forest dominated

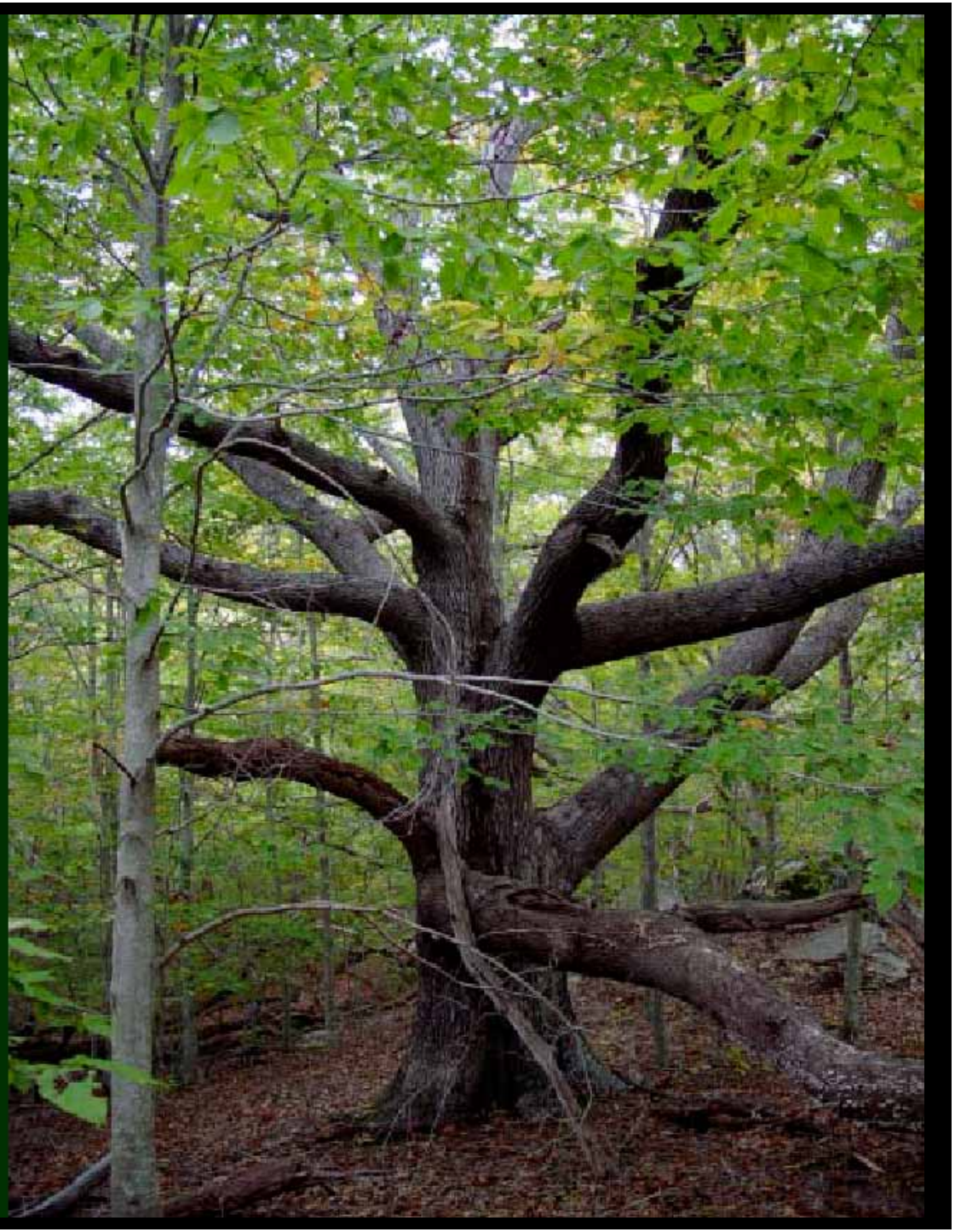
2050 – Both in Houses???

Wildlands and Woodlands

A Vision for the Forests of Massachusetts

2006

David Foster, David Kittredge, Brian Donahue, Glenn Motzkin, David Orwig, Aaron Ellison, Brian Hall, Betsy Colburn and Anthony D'Amato



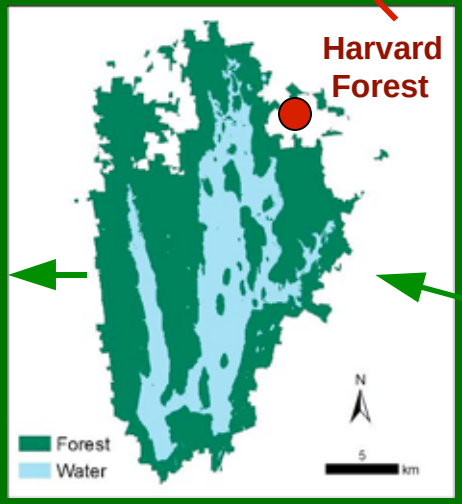
Forests Provide Critical Infrastructure

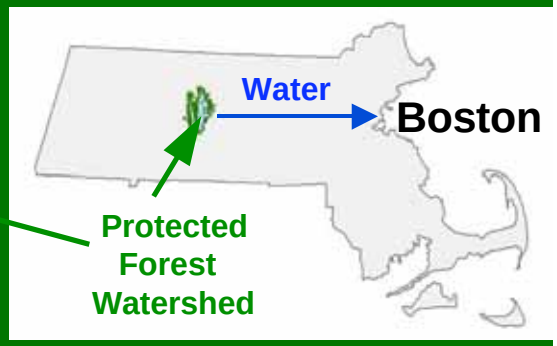
For Us and Natural Processes

One Argument for Conservation Investment

Green Infrastructure - The Quabbin Reservoir Example

- Quabbin -- unfiltered drinking water for 40% of the Massachusetts
- 85% of the watershed is protected managed forest
- Filtration plant = $750 million, plus operation
- EPA – The forest filtration plant makes this unnecessary





Historical ISSE as Context for Education

HARVARD MUSEUM of NATURAL HISTORY

The Museum of Comparative Zoology
Harvard University

Harvard University Herbaria

New Permanent and Traveling Exhibit -- *2009*

HARVARD FOREST

Established 1907 Long Term Ecological Research Site since 1988

"Reading and Conserving New England "

- Lecture Series
- General Readership Volume
- Children's Book
- Alumni Trips
- Field Exploration

- Landscapes and people through time
- Forest biology, diversity and function
- Nature as infrastructure
- Conservation history and future

Historical ISSE is all about Synthesis

New England Center for Ecological Synthesis

Physical & Virtual

- **Resources for scientists, students, and professionals in ecology & conservation**
- **Melding digital, document, and physical collections with long-term data**
- **Securing and distributing data & facilitating collaborative research & education**

Harvard Management Group

David Foster, Emery Boose, Aaron Ellison, Julie Pallant

Advisory Committee

Ecology: Jerry Melillo, John Aber, Kathleen Donohue, Paul Moorcroft, Jim Hanken

Social Science: Billie Turner, Brian Donahue, Elizabeth Chilton, Dave Kittredge

Computer and Physical Science: Alyce Goodman, Lee Osterweil, Steve Wofsy

Library and Archival Science: Judy Warnement, Sheila Connor, Martha Mahard