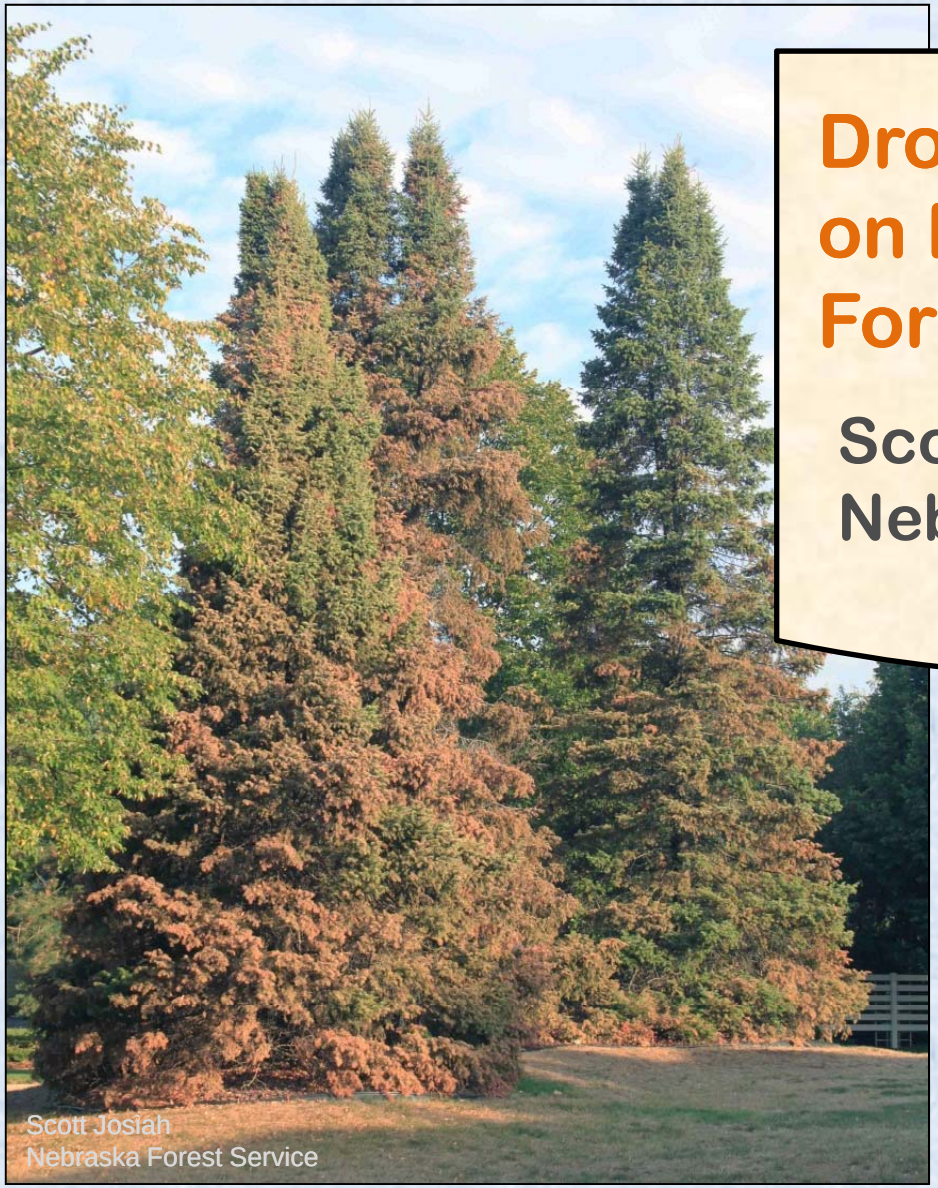


Drought and Its Impacts on Nebraska's Trees and Forests

Scott Josiah
Nebraska Forest Service

Nebraska Forest Service

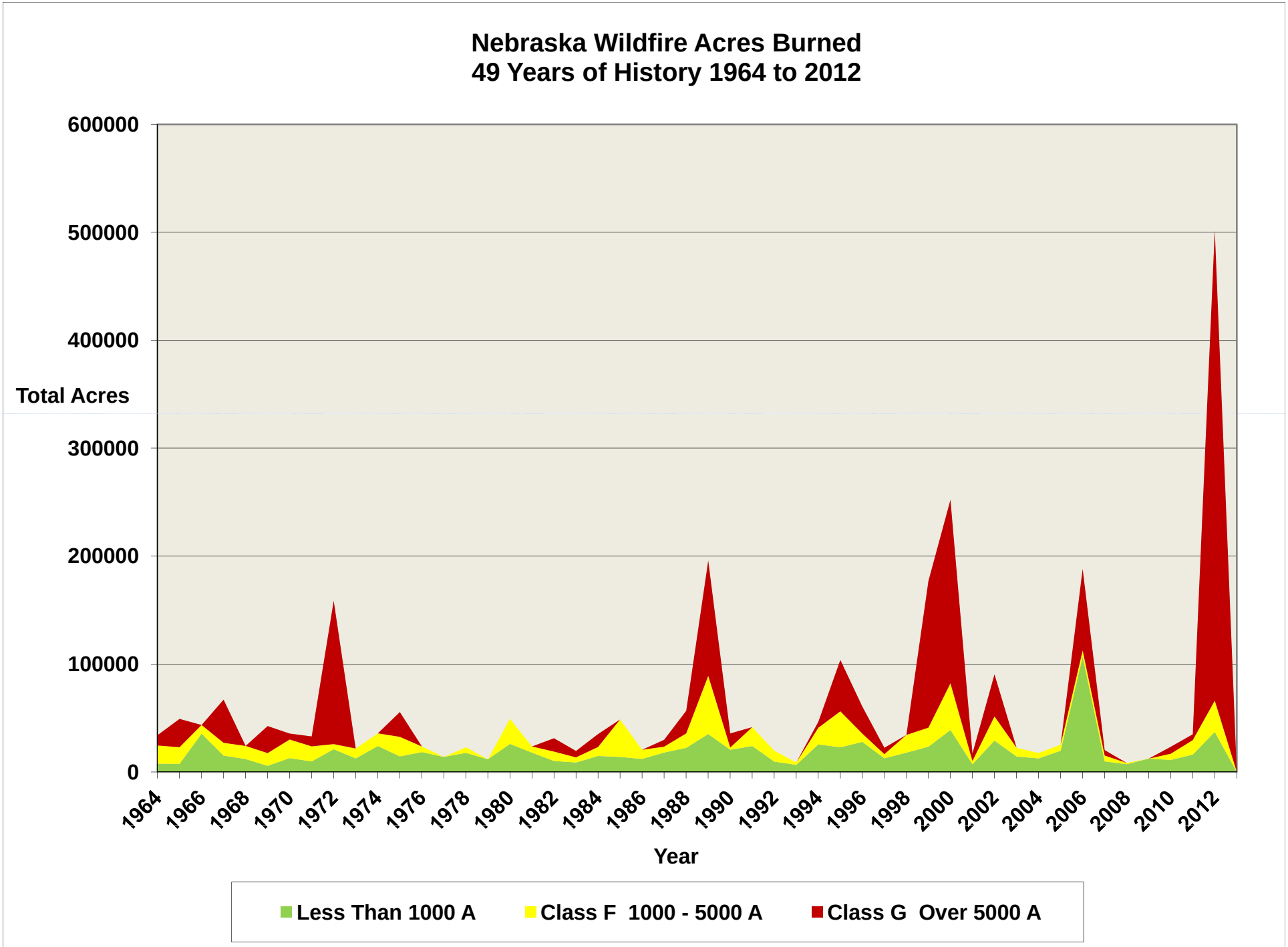
IANR

University of Nebraska

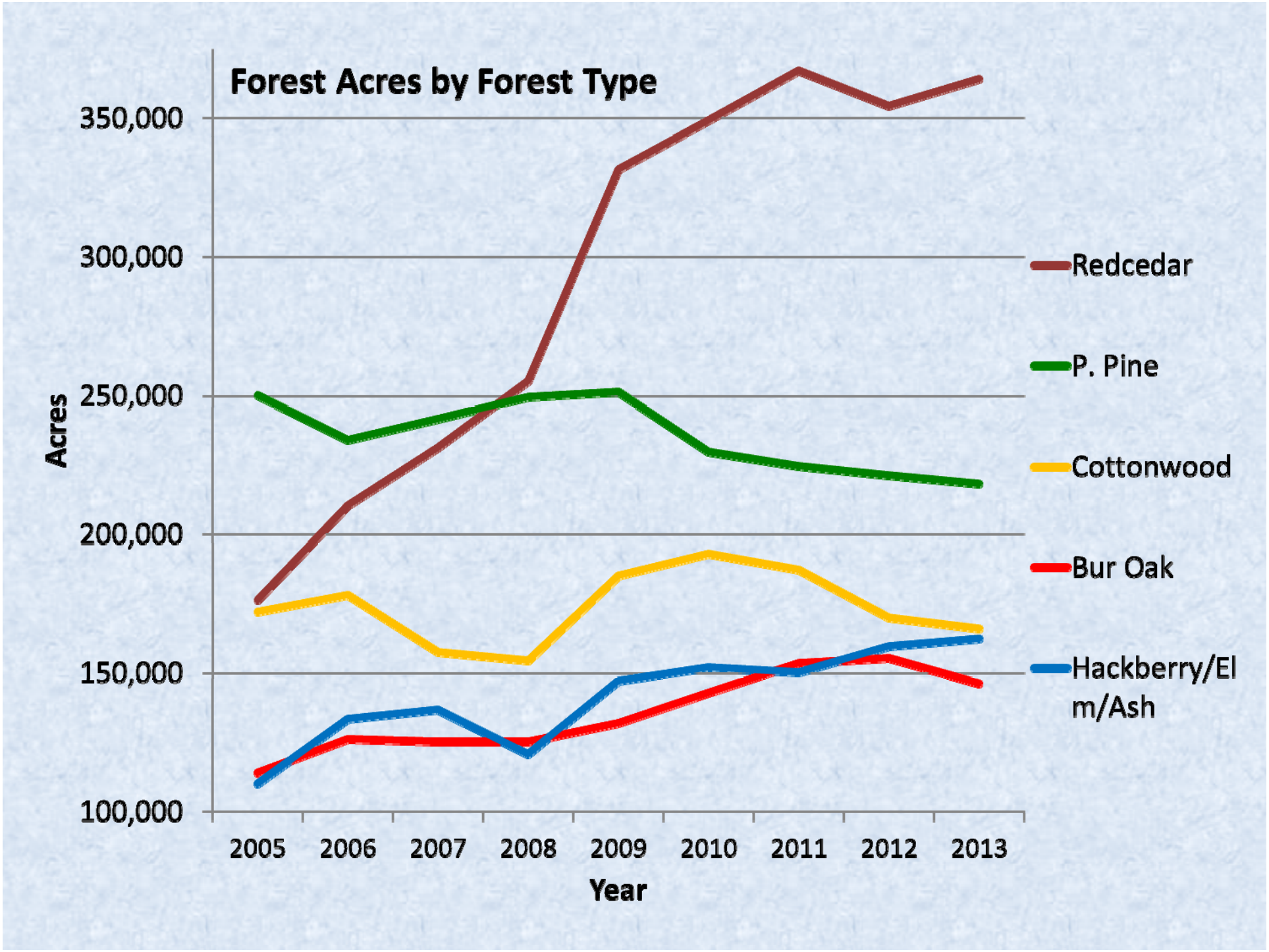
How Does Drought Affect Trees and Forests?

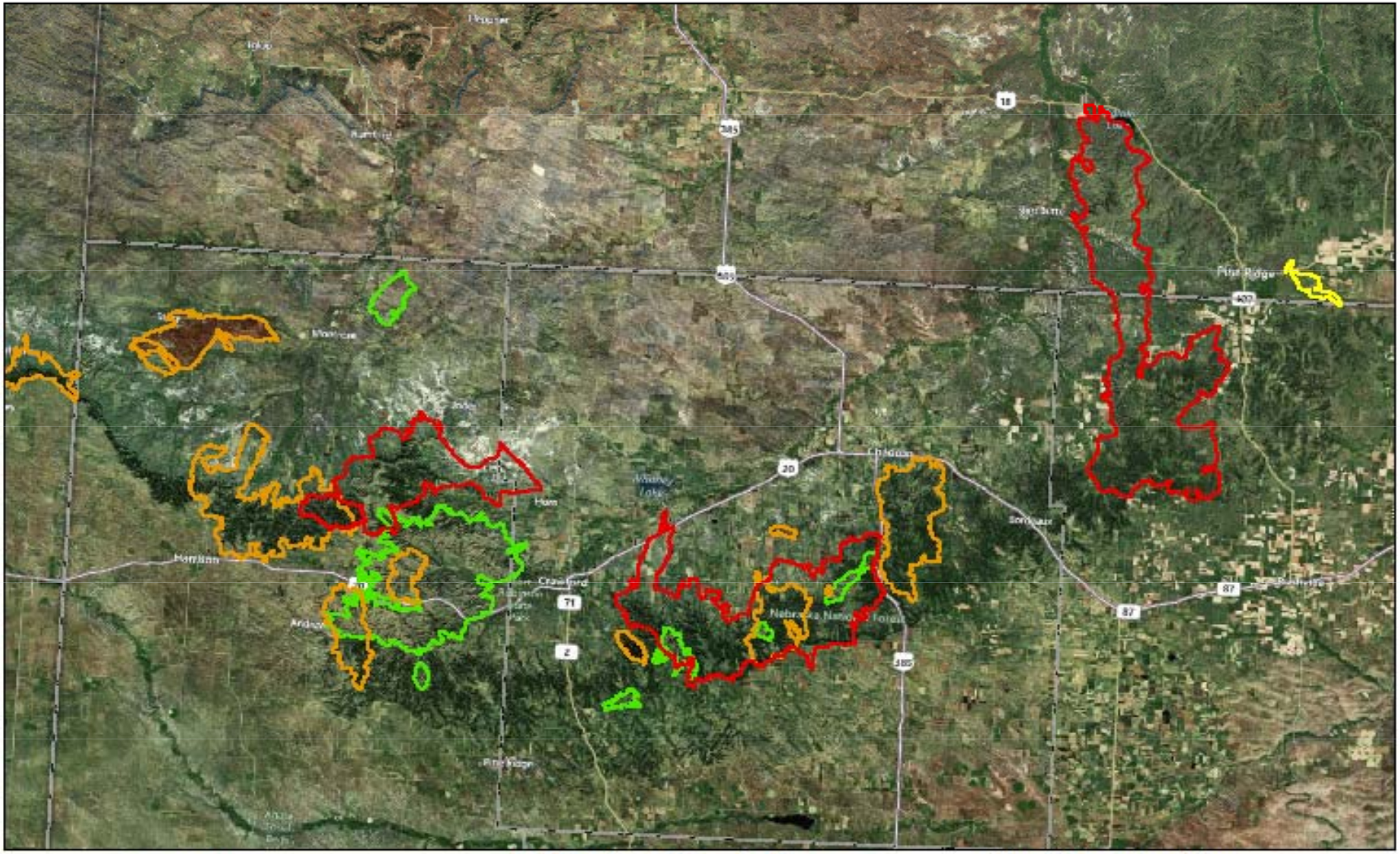
- Increased risk of catastrophic wildfire
- Higher mortality from drought stress and pests
- Reduced vigor
- Increased susceptibility to pests

Megafires


Nebraska Wildfire Acres Burned
49 Years of History 1964 to 2012
600000
500000
400000
300000
200000
100000
0
Total Acres
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
Year
Less Than 1000 A
Class F 1000 - 5000 A
Class G Over 5000 A

Heavy Fuel
Accumuulations


Forest Acres by Forest Type
350,000
300,000
250,000
200,000
150,000
100,000
Acres
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year
Redcedar
P. Pine
Cottonwood
Bur Oak
Hackberry/Elm/Ash


Historic Fires
of the
Pine Ridge
1:550,000
Miles
0 3 6 12 18 24
Map Created: 11.26.2012
Fire Perimeter Data Provided By:
Nebraska Forest Service (NFS)
Monitoring Trends in Burn Severity (MTBS)
National Interagency Fire Center (NIFC)
Imagery: Bing 2012
IANR
Fire Occurence Year
1973 - 1989
1990 - 1999
2000 - 2009
2012
N
W
E
S

Watershed Level Impacts

2012 West Ash Fire, Pine Ridge

Fort Robinson in 2011, 22 Years After 1989 Fire

Drought Mortality

Eric Gregory
Lincoln Journal Star

Mark Harrell
Nebraska Forest Service

Laurie Stepanek
Nebraska Forest Service

Tree death

Defoliation

Leaf scorch

Reduced vigor

(long term)

Dieback

Laurie Stepanek
Nebraska Forest Service

Kelly Hertz
Yankton Daily Press & Dakotan

Drought

↓

Reduced photosynthesis

↓

Less sugar

Sugar used for:

- growth and reproduction
- manufacture of defensive compounds

brome grass

Laurie Stepanek
Nebraska Forest Service

woodchip mulch

Increased Susceptibility to Pests

Mountain pine beetle

Manufacture of defensive compounds has lowest priority

Bark beetles

- Mountain pine beetle
- Ips engraver beetles
- Elm bark beetles (Dutch elm disease)
- Walnut twig beetle (thousand cankers disease)
- Ash bark beetle

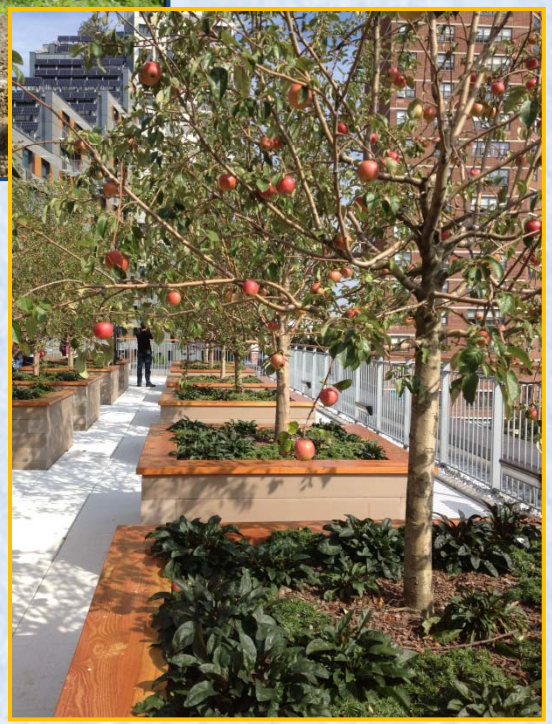
Laurie Stepanek
Nebraska Forest Service

Kathy Keatley Garvey
UC Davis

James Solomon
USDA Forest Service
Bugwood.org

Adaptations for a Drier, Hotter World

- Diversity
- Resilience
- Mitigation



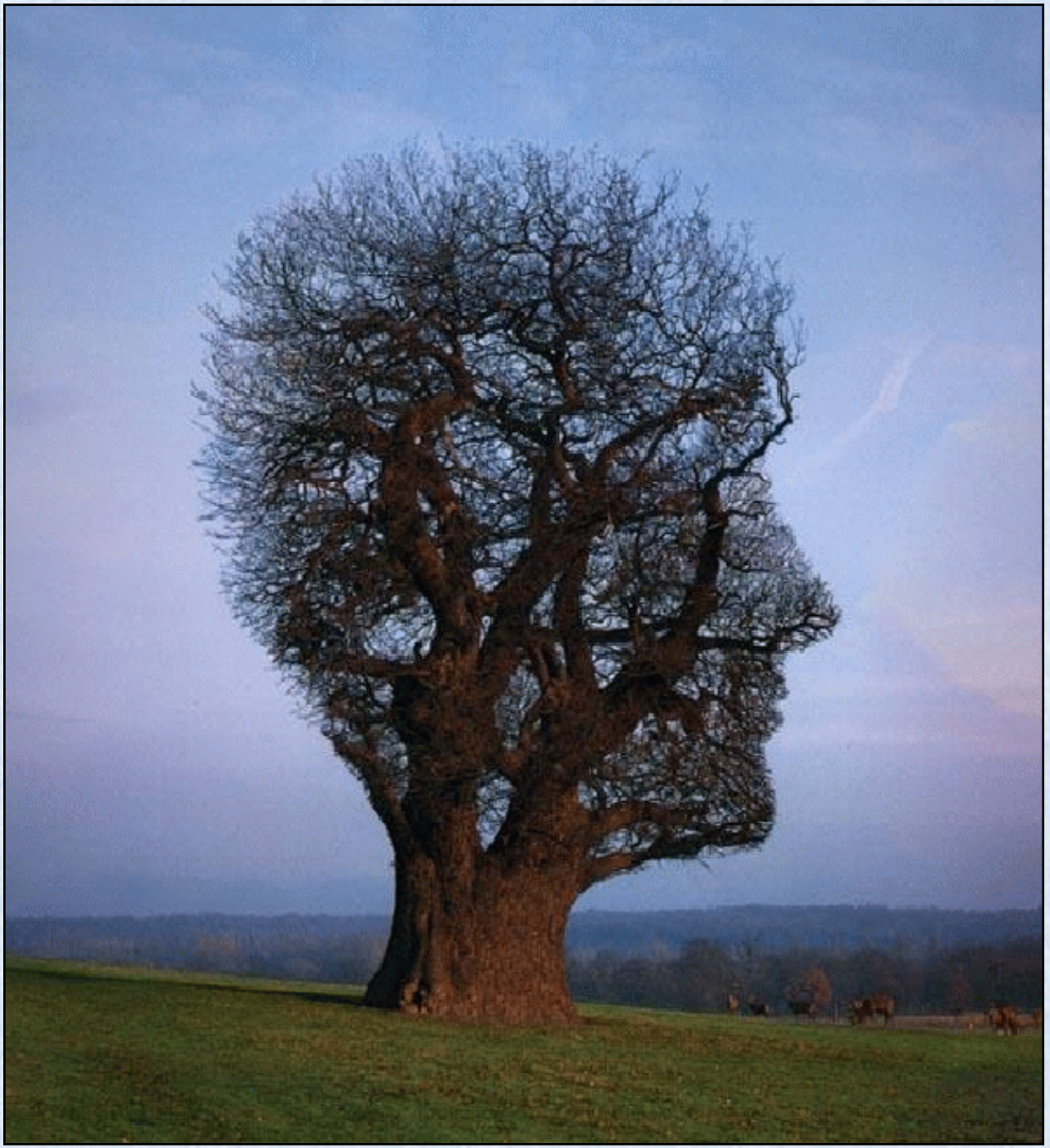
Emphasize Diversity

- **Wide selection of genera and species**
- **Choose seed sources that are adapted to broad climatic conditions**

Resilience: Designing for Extremes

- Emulate natural forest conditions in urban plantings
  - Mulch, mulch, mulch
  - Plant trees in clusters
  - Proper planting & watering techniques
  - Protect roots
- Reduce forest fuel loads and density to increase resilience and vigor

Mitigation

- C sequestration in woody plants
- Energy conservation in rural-to-urban homes, acreages & communities
- Reduce heat island severity

Questions?