

# 2020 HINDSIGHT: 28 YEARS OF RESTORING FIRE'S ROLE IN AN URBAN PINE BARRENS PRESERVE



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*LAKE STATES FIRE SCIENCE CONSORTIUM*  
*6<sup>th</sup> Annual Burning Issues Workshop &*  
*20<sup>th</sup> Michigan Prescribed Fire Council Annual Meeting*  
February 4 & 5, 2020



# OUTLINE

- Background and context: *Albany, Really?*
- Adaptive Management: *More than a buzz word.*
- Paradigm Shift: *Restoration -vs- maintenance.*
- Measures of success: *Are we getting anywhere?*
- Questions remain: *What more do we need to know?*



# Where & what is the Albany Pine Bush?

## Pine Barrens of the Northeast

- Suite of globally-rare, isolated ecological communities
- Fire-dependent but w/ unique fire regimes
- Important biodiversity and habitat for early-successional wildlife species
  - > 50% loss since the 1960s
  - Most reliant on active management



# Albany Pine Bush

## Why is it important?

- Two rare communities

- pitch pine-scrub oak barrens
  - G2/S1
- pine barrens vernal pond
  - G3-G4/S2

- 78 wildlife Species of Greatest Conservation Need

- 45 birds
- 3 amphibians
- 15 insects
- 8 reptiles
- 4 mammals
- 3 fishes

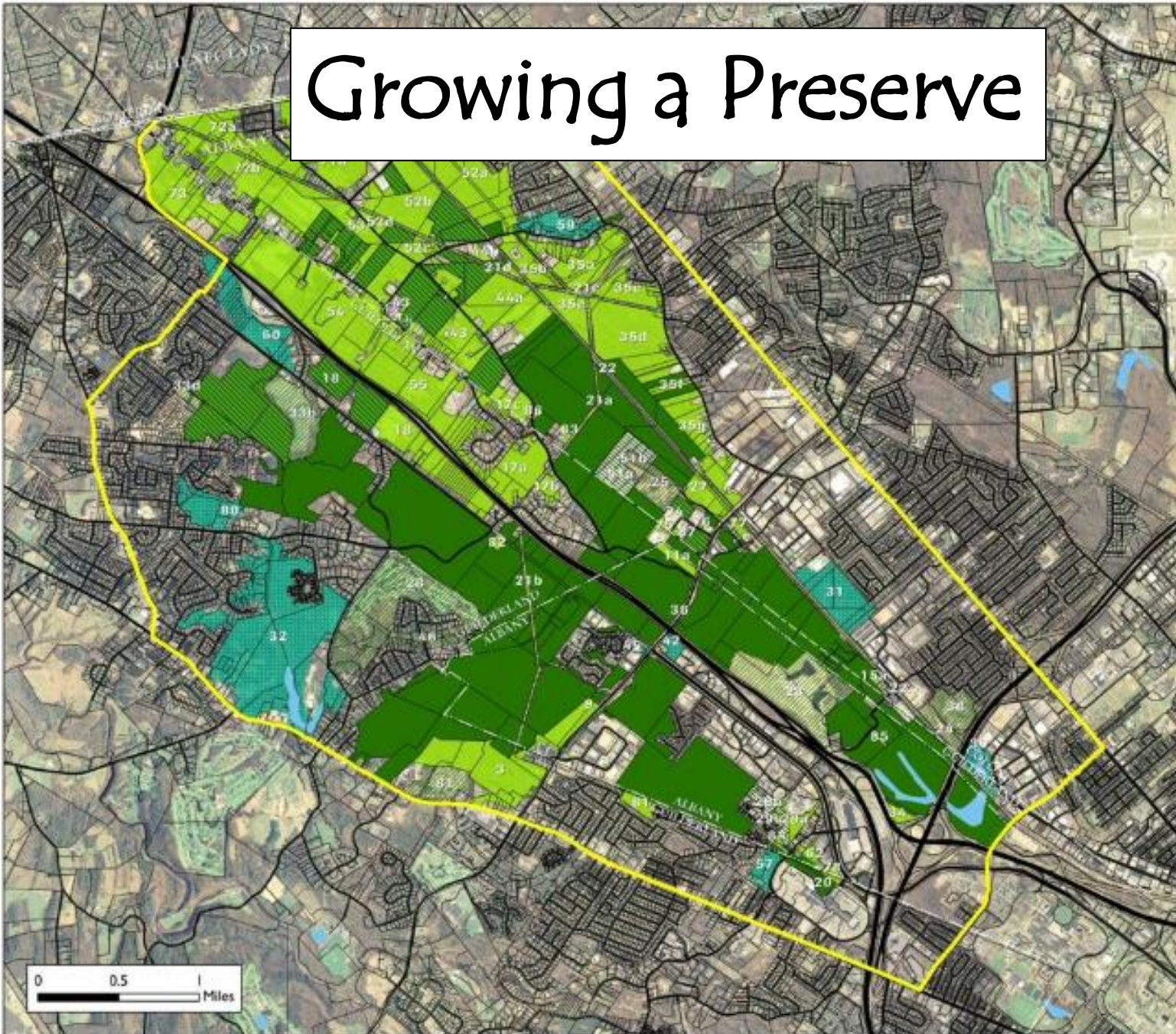




◊ Pitch Pine Scrub Oak Barrens (S1/G2)  
◊ Karner blue butterfly type locality



# Growing a Preserve



## Management Plan For The Albany Pine Bush Preserve

### Woodlawn Preserve



### Albany Pine Bush Study Area



### Vision for Protection

- Recommended Full Protection
- Recommended Partial Protection
- Recommended Open Space
- Protection Agreement/Easement
- Protected Lands
- Lands Protected since 2002

### Sources:

Imagery - 2007, 1 foot Natural Color Orthoimagery, New York State Office of Cyber Security & Critical Infrastructure Coordination.

Vision Map - 2002, Albany Pine Bush Preserve

Protected Lands - 2009, The Nature Conservancy

Prepared For:



Prepared By:



September 2010

Figure 10:  
2010 Protection Priorities/  
Preserve Vision

# ALBANY PINE BUSH PRESERVE COMMISSION

- NYSDEC
- NYSOPRHP
- Albany County
- Guilderland
- Colonie
- Albany
- The Nature Conservancy
- 4 private citizens



# Preserve Goals

- Ecological (Ecosystem Dynamics & Species)
- Programmatic (Fuels & People)



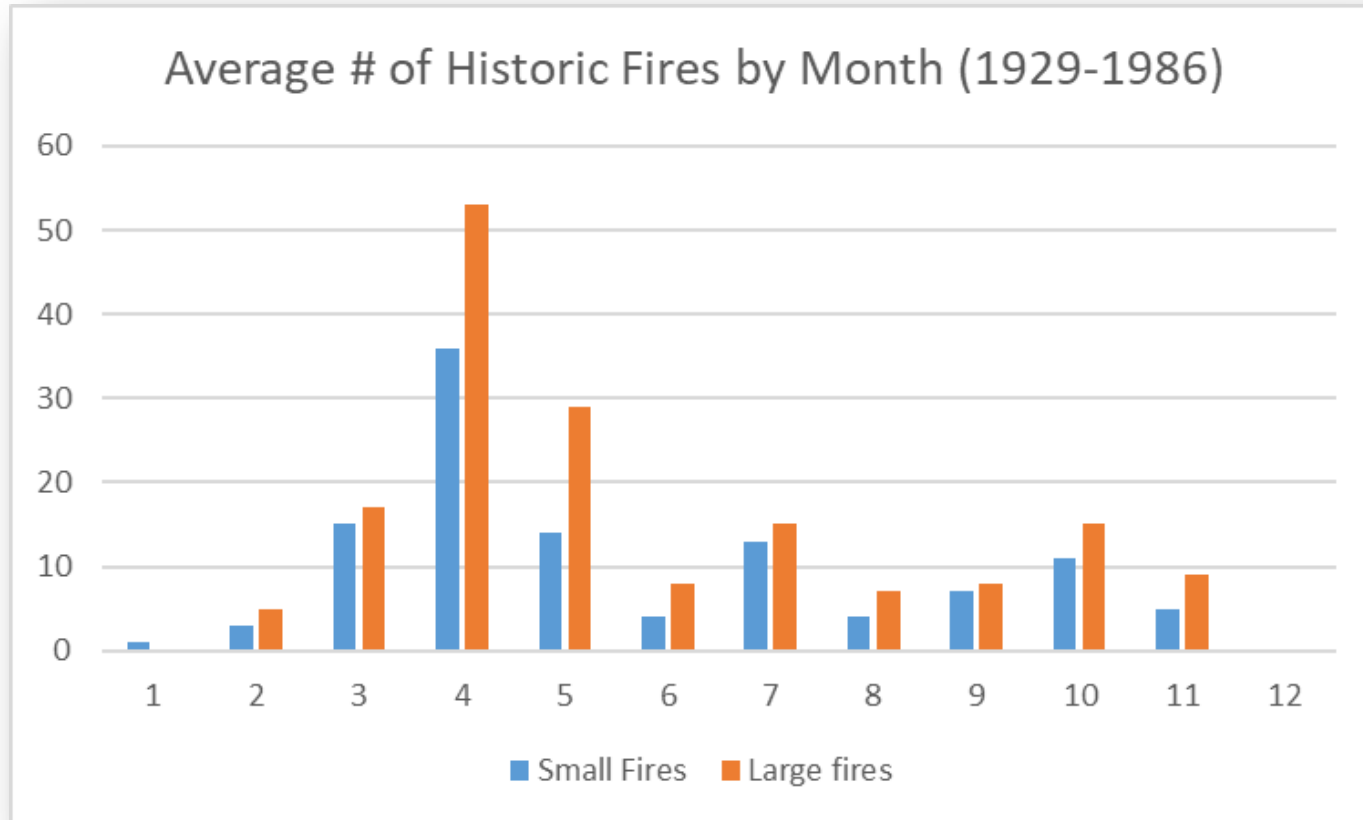
**NYS ENVIRONMENTAL CONSERVATION LAW ARTICLE 46**

**2010 MANAGEMENT PLAN AND FINAL ENVIRONMENTAL IMPACT STATEMENT**



# What did we know?

- Zaremba et al. 1991. Fire History
- 1-15 fires /year
- <1 - >300 acres



- Rare Species Occurrences
  - Kbb
  - PRAW
  - GWWA
  - EWPPW
- Human Element
  - Questionable support
  - Management needed
  - Need 2,000 burnable acres
  - Burn 200 acres/year
    - Givnish et al. 1988.

# Albany Pine Bush

## Inland Pine Barrens Ecological communities

Pitch pine-scrub oak barrens



- 20–60% PP cover
- 25–50% SO cover
- small patches of grassland

Pitch pine-scrub oak thicket



- < 60% PP cover
- > 50% SO cover

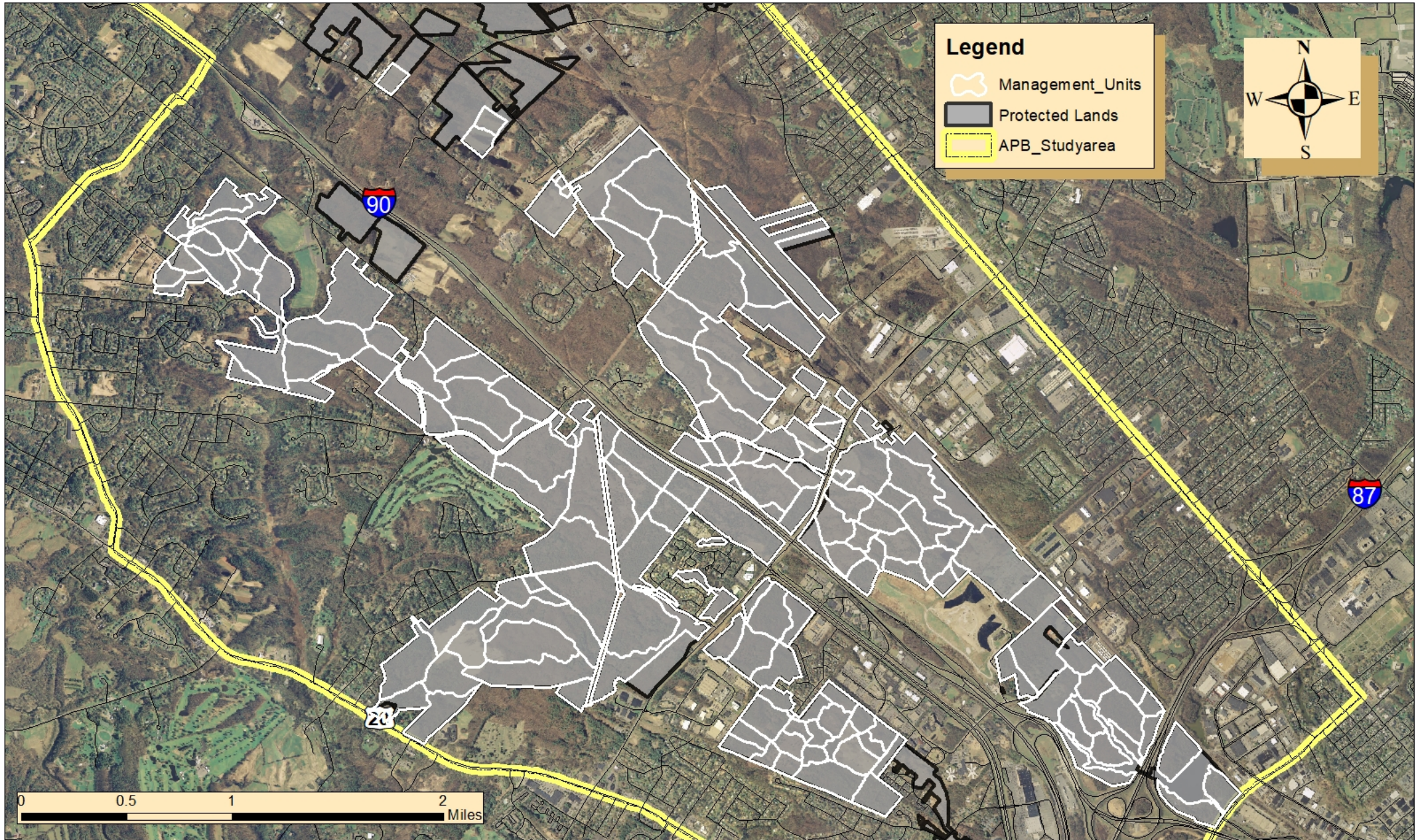
Pitch pine-oak forest



- > 60% PP and tree cover
- well-developed shrub layer



# Management Units in Albany Pine Bush Preserve (NY)



# Prescription Parameters

## 6. FUEL AND WEATHER PRESCRIPTION:

Weather and Fuel Parameters for Prescribed Fires in the Albany Pine Bush Preserve.

	MIN	MAX
Wind Direction	varies by unit - see table below	
Wind Gusts (mph) <sup>a</sup>	-	15
1-Hour Fuel Moisture (%)	5	18
100-Hour Fuel Moisture (%)	12	28
Atmospheric Mixing Height (ft.)	1,500	-
Air Temperature (°F)	33	95
Relative Humidity (%)	35	60
Keetch Byram Drought Index <sup>b</sup>	0	200
Days Since Rain	dependent on fuel type and time of year <sup>c</sup>	
<b>Growing Season Specific</b>		
Midflame Windspeed (mph) <sup>a</sup>	1 <sup>d</sup>	8
10-Hour Fuel Moisture	8	28
Live Fuel Moisture	60	300
<b>Dormant Season Specific</b>		
Midflame Windspeed (mph) <sup>a</sup>	2	8
10-Hour Fuel Moisture	10	24
Live Fuel Moisture	30	90



## Region G Acceptable Wind Direction

Unit Name	Recommended
Gandalf	NW, N
Greenland	NW*, N, NE*
Goldfinch	NE, E
Gulch	W, NW*
Gifford	W, SW, S, SE*
Garcia	SE, E
Grendel	N, NE*
Gossimer	W, NW, N, S*
Gopher	W, SW, S*
Grouper	W, SW, S*
Greenday	W, SW, S, SW*
Geotaxis	W, SW, S*, SE, NW*
Genus	N, NW, W, SW, S, SE, E, NE
Gabble	N, NW, W, E, NE, SE, SW
Grosbeak	W, NW, N, SW*
Ghana	NW, N, NE*
Griffis	W, NW, N, NE, E*, S*
Grandad	W, NW, N, NE, E
Gus	W, NW, N, NE, E, SE, S, SW
Glacier	S, SE
Gallery	W, NW, N, NE, E, SE, S, SW
Guatemala	NW, N, NE
Grizzle	N*, NE, E
Graspen	N, NE, E, S*, SE, SW*
Gherkin	N, NE, E, SE, S, SW, NW*
Gull	E, SE
Grackle	SE



# Prescribed Fire 1991 – 1997 in practice



- Logistics:
  - 8 wk dormant window
  - High ROS and FL
  - Lots of smoke
  - Stressful
- Effects:
  - Top-kill only
  - Exacerbate invasive spp
  - Maintain thickets
  - Little exposed mineral soil
  - No lupine expansion

# April 27, 1999 Escape



7 acres Rx fire  
65 acre wildfire



# Preserve Management

Prescribed Fire



Mowing

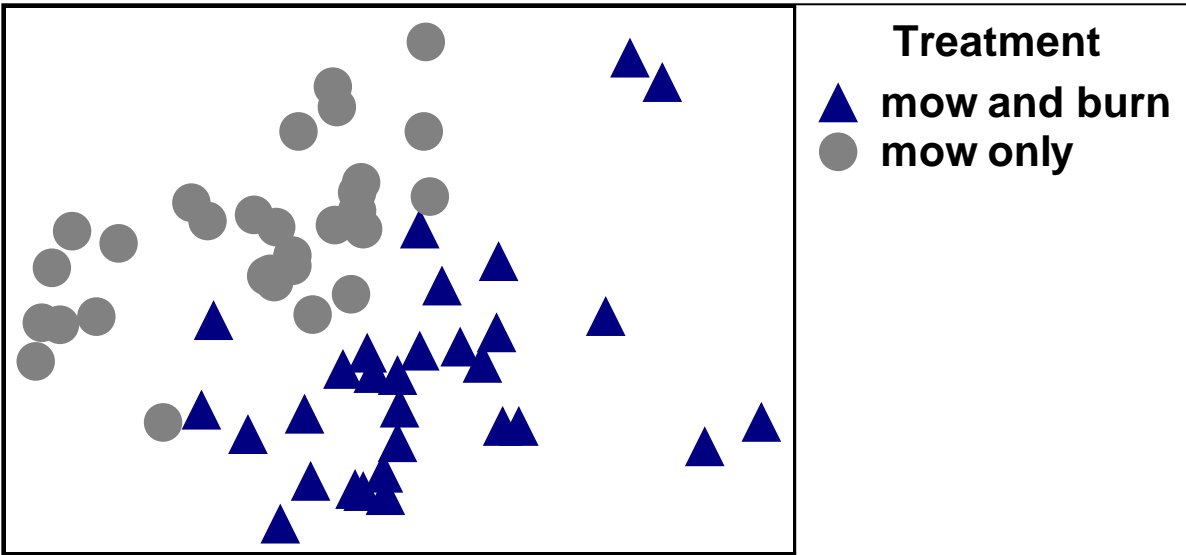


Restoration Seeding

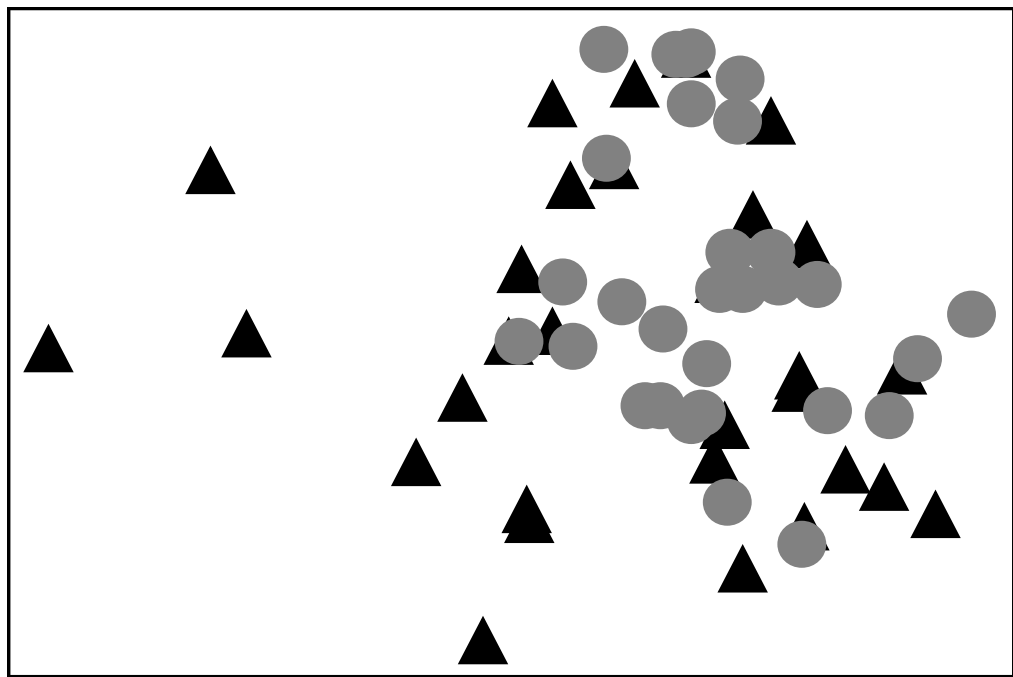
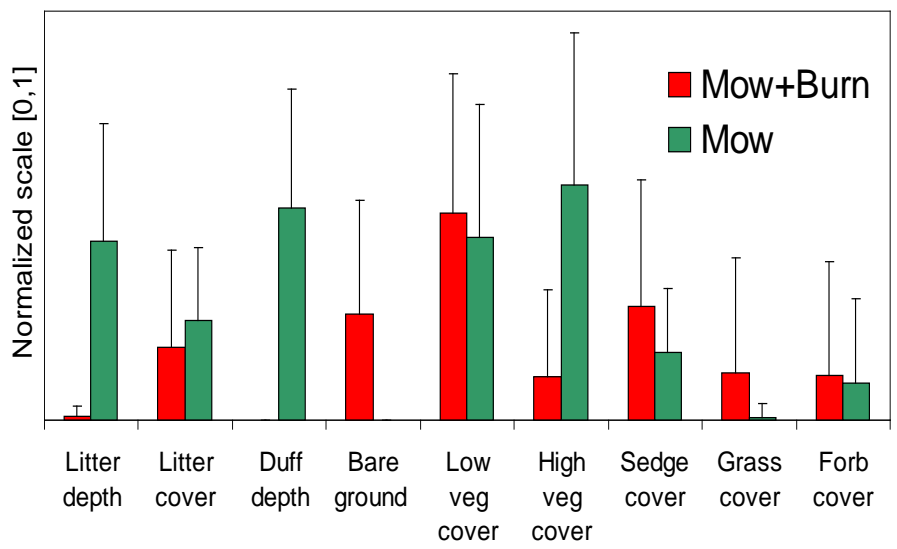


Silviculture





Principal components ordination of treatment plots based on vegetation structure



Non-metric multidimensional scaling of treatment plots in plant species space

# Rx Fire Season



Dormant Season Rx

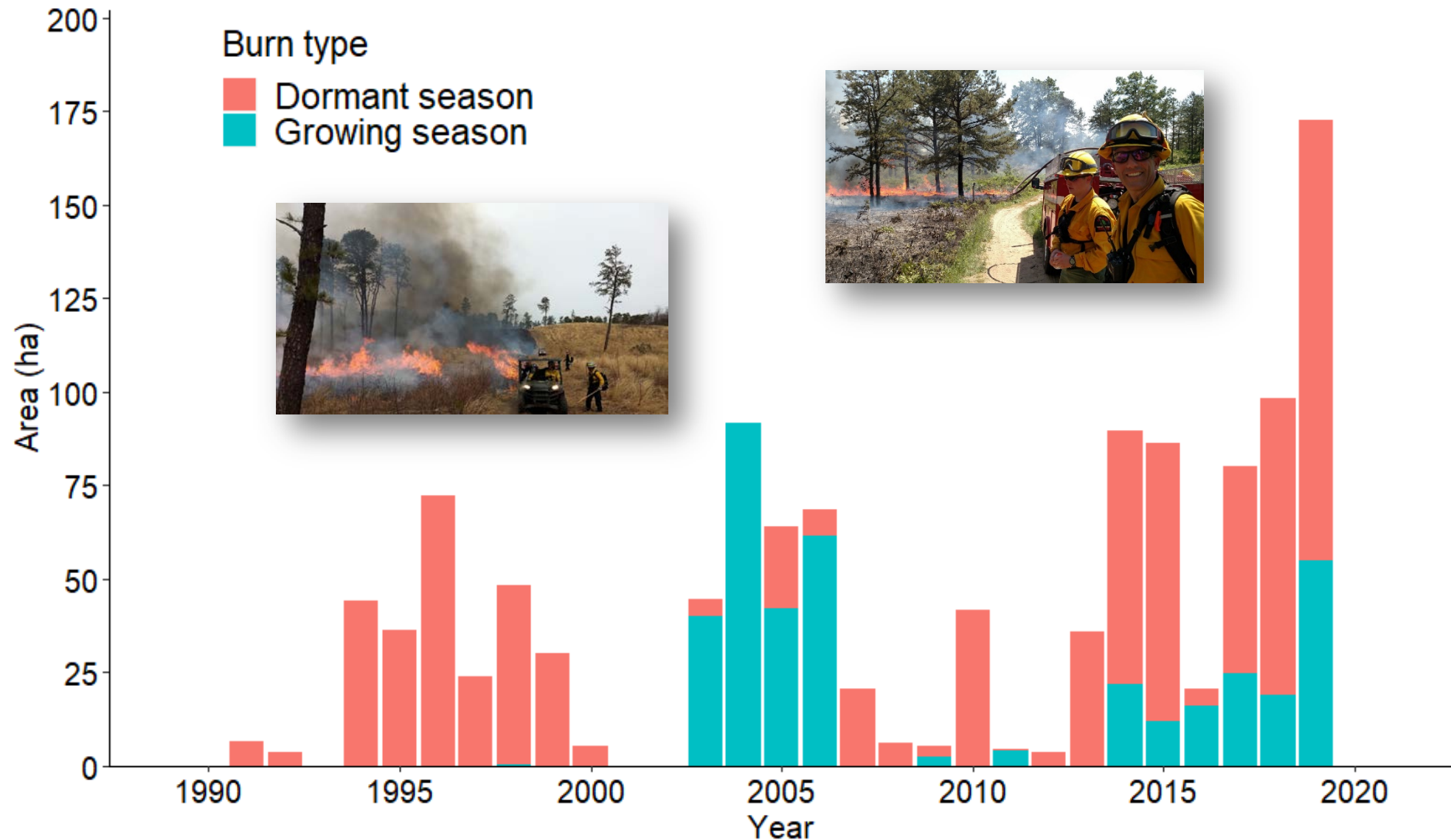


Growing Season Rx

# August 2019 Rx Fire

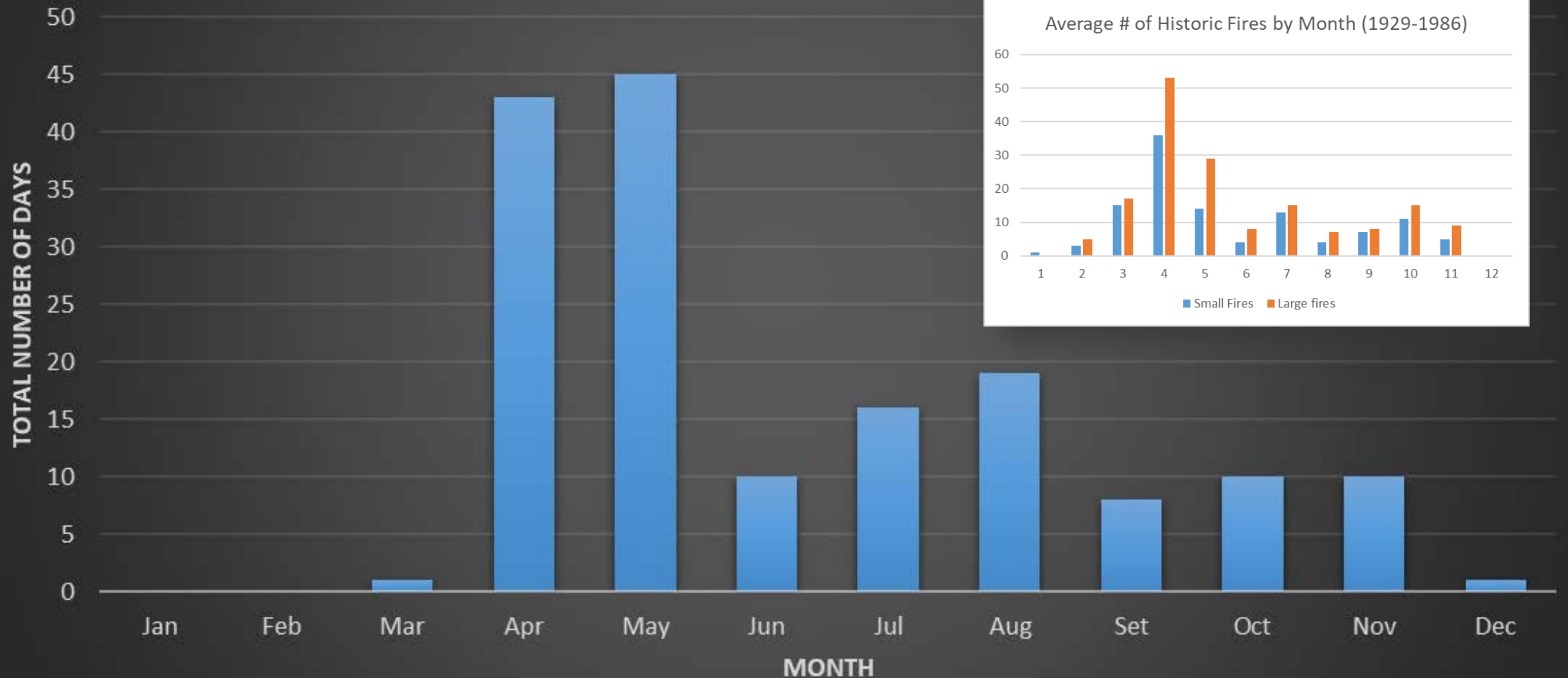


# Rx Fire in the Albany Pine Bush



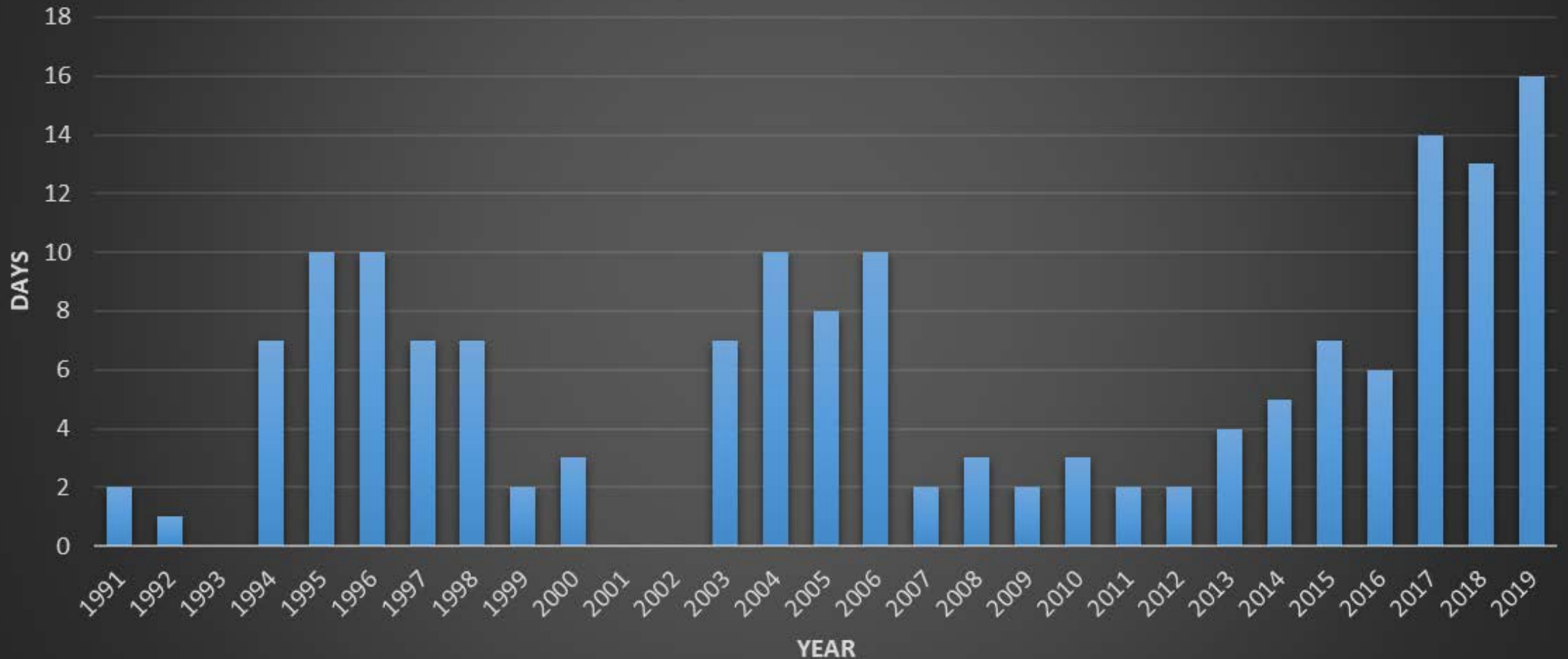
# Prescribed Fire in the Albany Pine Bush Preserve

## Total # of Prescribed Fires By Month 1991 - 2019 in the Albany Pine Bush Preserve



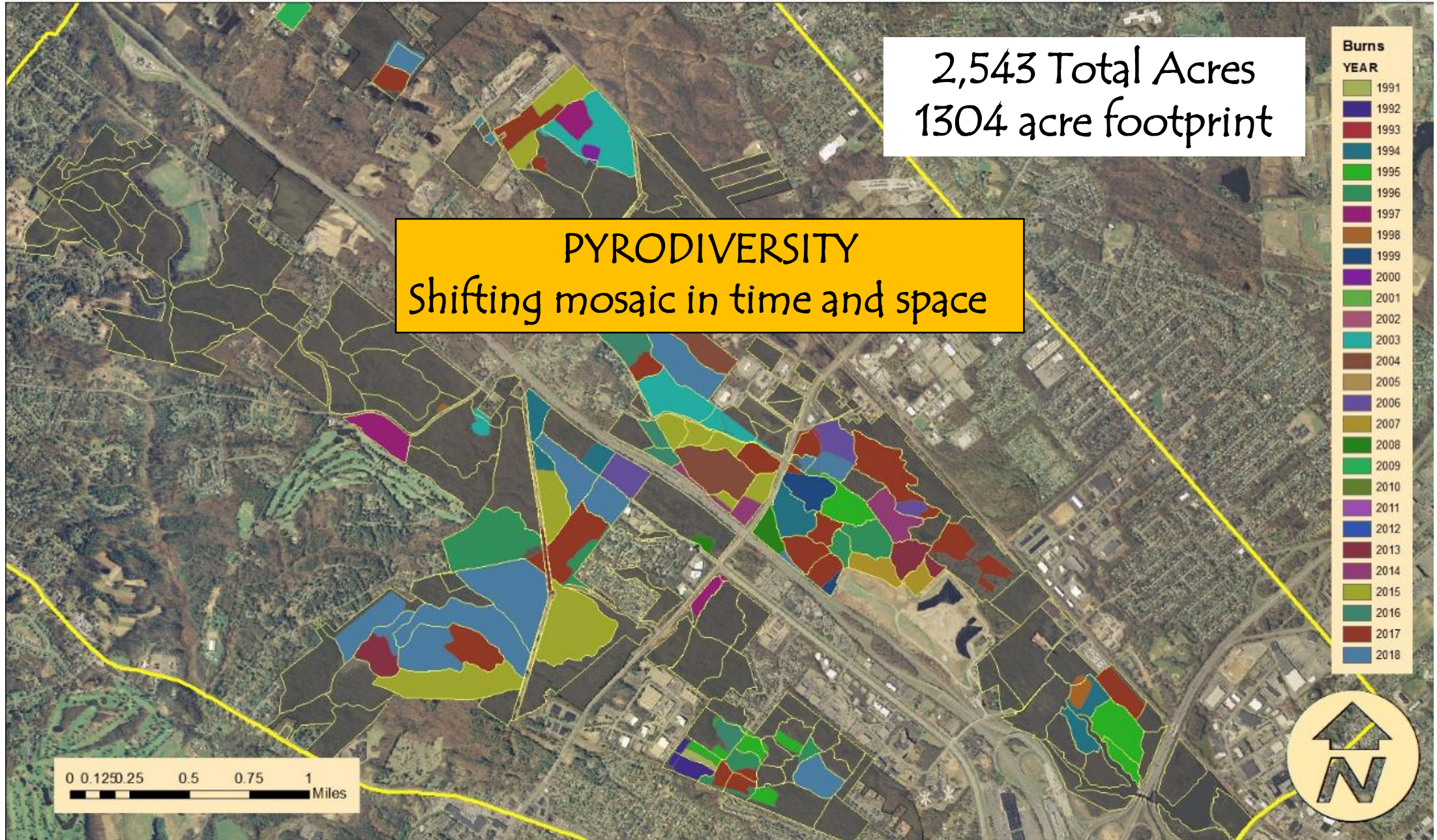
# Prescribed Fire in the Albany Pine Bush Preserve

**Total # of Prescribed Fire Days per year 1991 - 2019  
in the Albany Pine Bush Preserve**





# Prescribed Fire Management in the Albany Pine Bush Preserve 1991-2018





# Are we advancing ecosystem health?

1. Distribution and amount of Pine Barrens habitats.
2. Rare wildlife distribution and abundance is our best surrogate for ecosystem function/viability.

3. SGCN as Indicator species:
  - Karner blue butterfly
  - Inland barrens buckmoth
  - Eastern hognose snake
  - Shrubland birds
  - Rare moths



# Habitat

Inland Pine Barrens consists of four Ecological communities:

Successional northern  
sandplain grassland



- predominantly grasses
- < 25% shrub cover
- < 25% tree cover

**600 acres**

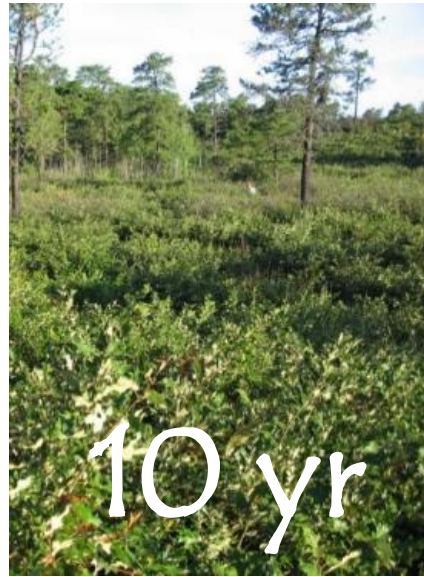
Pitch pine-scrub oak  
barrens



- 20-60% PP cover
- 25-50% SO cover
- small patches of grassland

**667 acres**

Pitch pine-scrub oak  
thicket



- < 60% PP cover
- > 50% SO cover

**28 acres**

Pitch pine-oak forest



- > 60% PP and tree cover
- well-developed shrub layer

**1,183 acres**

successional variants

# Karner blue butterflies and wild blue lupine



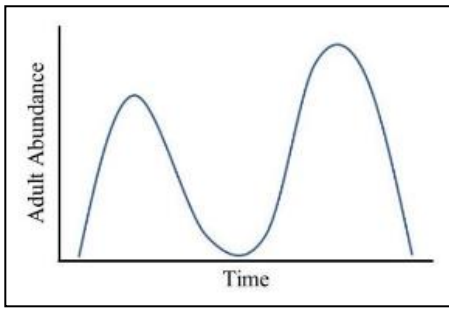
Listed as endangered range-wide by USFWS in 1992  
2003 Recovery Plan: 13 Recovery Units



Recovery Units   
Historic Range 



# Karner Blue (*Plebejus melissa samuleis*)



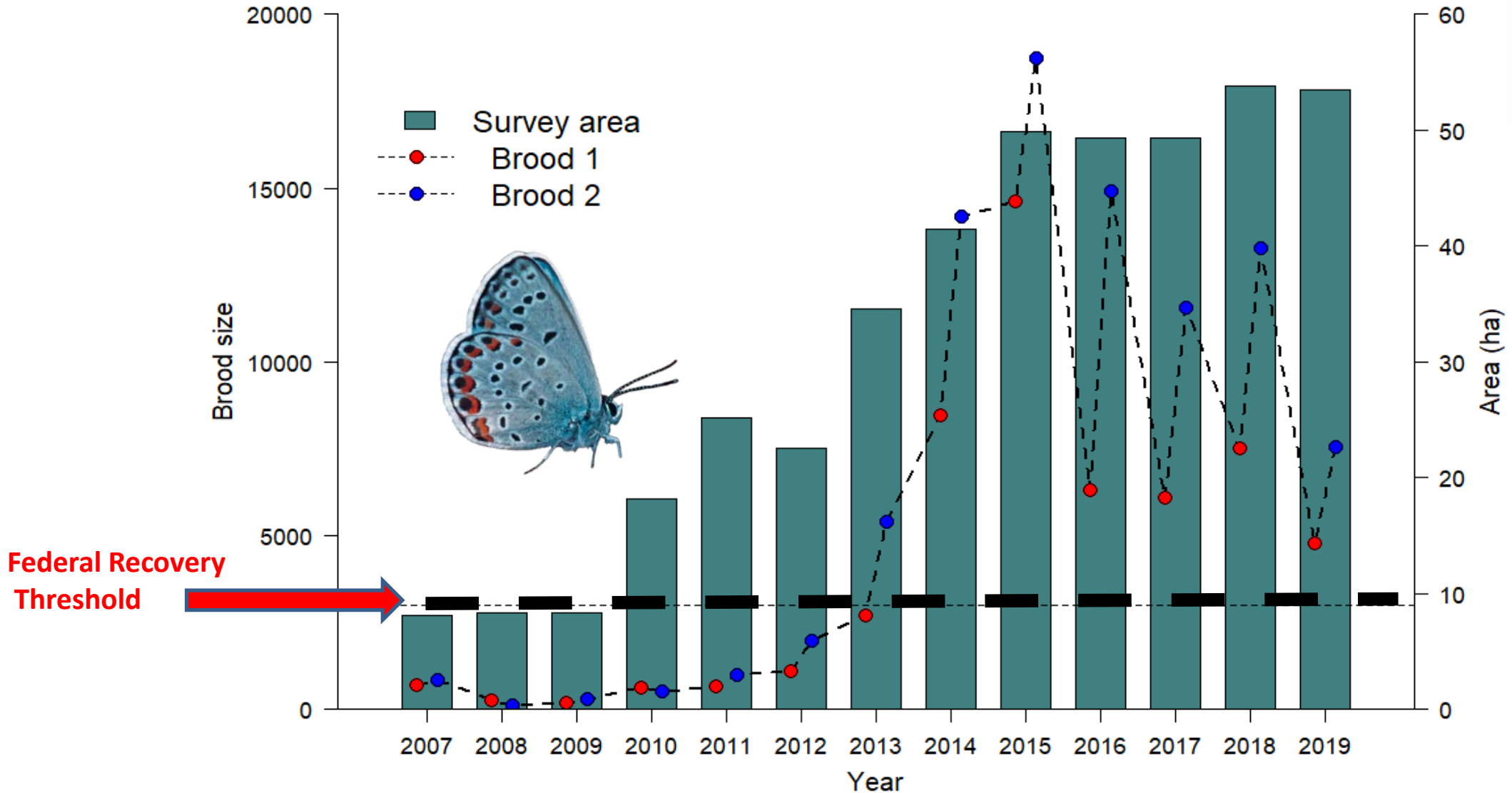
# Patch Dynamics

- ✓ 1/3 rule
- ✓ Seeing mosaic effects from maintenance burns
- ✓ Burned lupine re-sprouts & flowers
- ✓ Re-sprouted lupine lasts longer
- ✓ Re-sprouted lupine more nutritious.
- ✓ More & better lupine leads to greater fitness & productivity



**MAY 20, 2018**  
**Maintenance Rx FIRE**

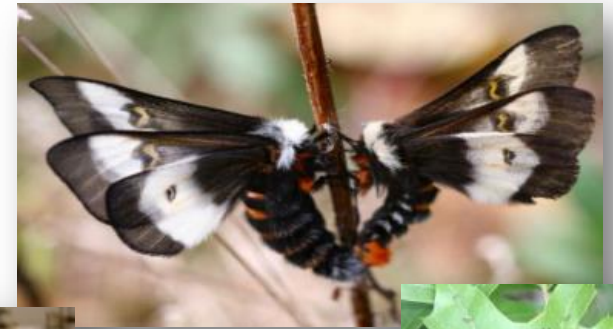
# Karner blue butterfly recovery



Brood size estimates of the Karner blue butterfly metapopulation at the Albany Pine Bush recovery unit, 2007-2018.

# Other Invertebrates

- Inland barrens buck moth, *Hemileuca maia*
  - *SUNY-ESF* Dylan Parry, PhD,  
Brian Hoven, Georgia Keene
- Solitary Bees and Wasps (>160 SPP)
  - *APBPC* A.M. Dillon,
- Ants (>50 SPP)
  - *UMASS Amherst* Grace Barber
- Moths
  - *SUNY-ESF* Neil Schopmann
    - 15 *PPSOB* obligates
    - *Waxed Sallow Moth*, rediscovered after >20 years
  - *NYSM* Tim McCabe
    - *Henry's Elfin*, thought extirpated, rediscovered in 2012





# Birds

Prairie Warbler

>100 pair in Preserve



Brown Thrasher

>100 in the Preserve



Eastern Towhee

>600 in Preserve

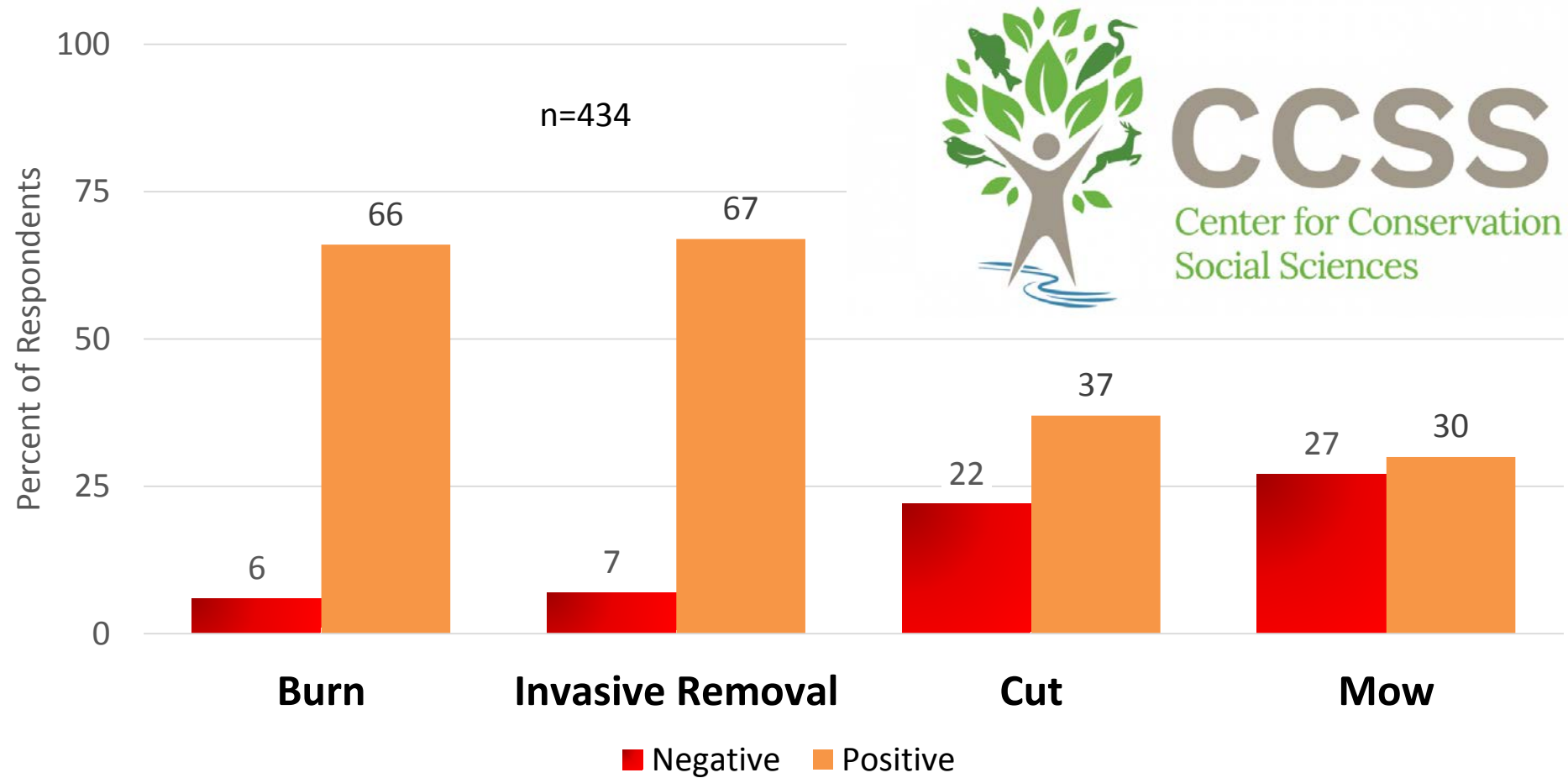


Eastern whippoorwill Surveys  
birds detected in 2007, 2008, &  
2009, 2016, 2017, 2018, 2019

# Communications



# General Attitudes towards Management Practices



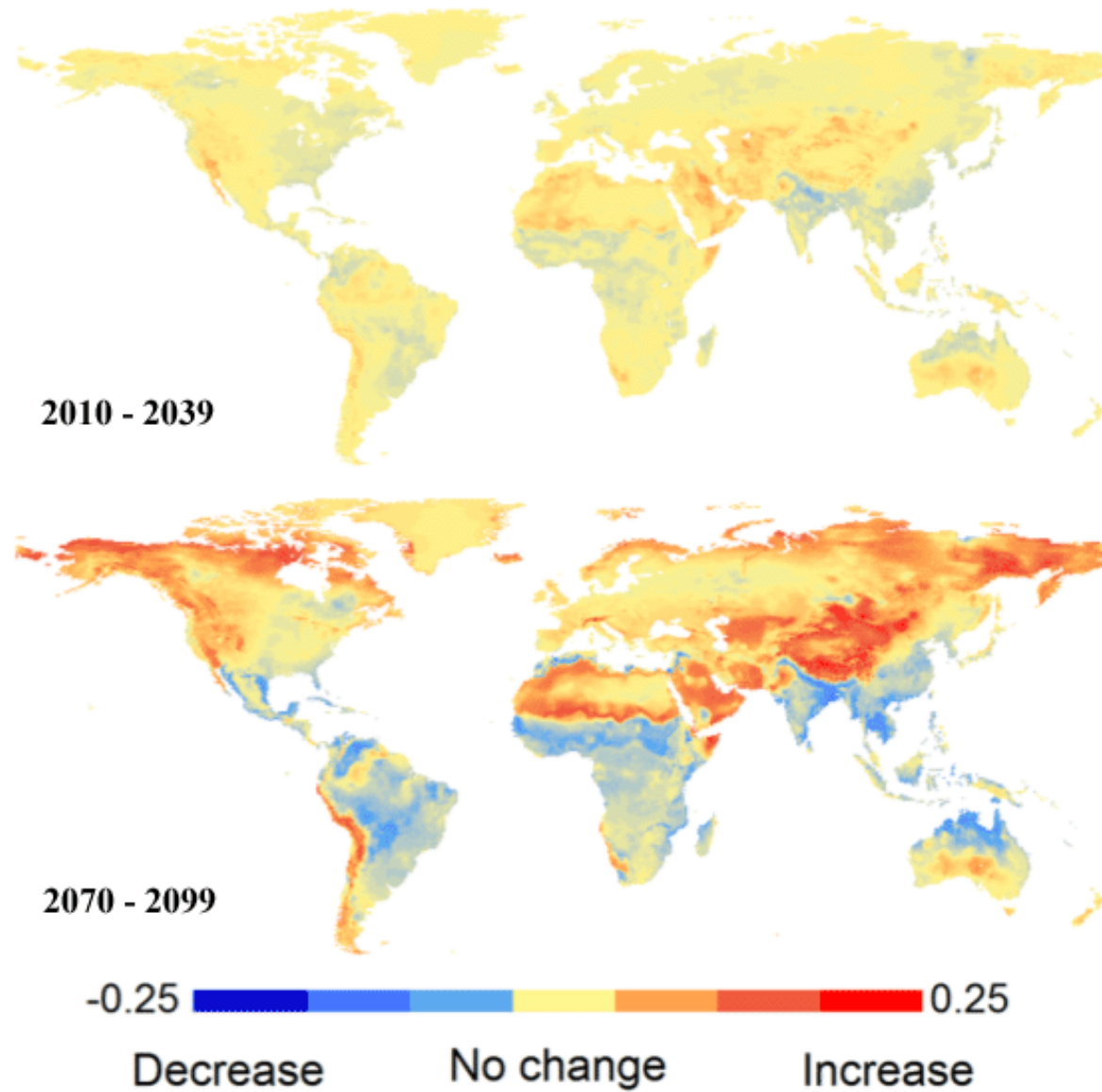
**Naiman, S.M., S.B. Allred, N. Gifford, E. Kinal, and C. Buckler.** 2018. Understanding Support for Actively Managed Protected Areas: The Case of the Albany Pine Bush Preserve. Center for Conservation Social Sciences Publ. Series 18-2. Dept. of Nat. Resources., Coll. Agric. and Life Sci., Cornell Univ., Ithaca, NY. 137 pp.

This report is available electronically at: <https://ccss.dnr.cals.cornell.edu/>

# Outstanding Questions

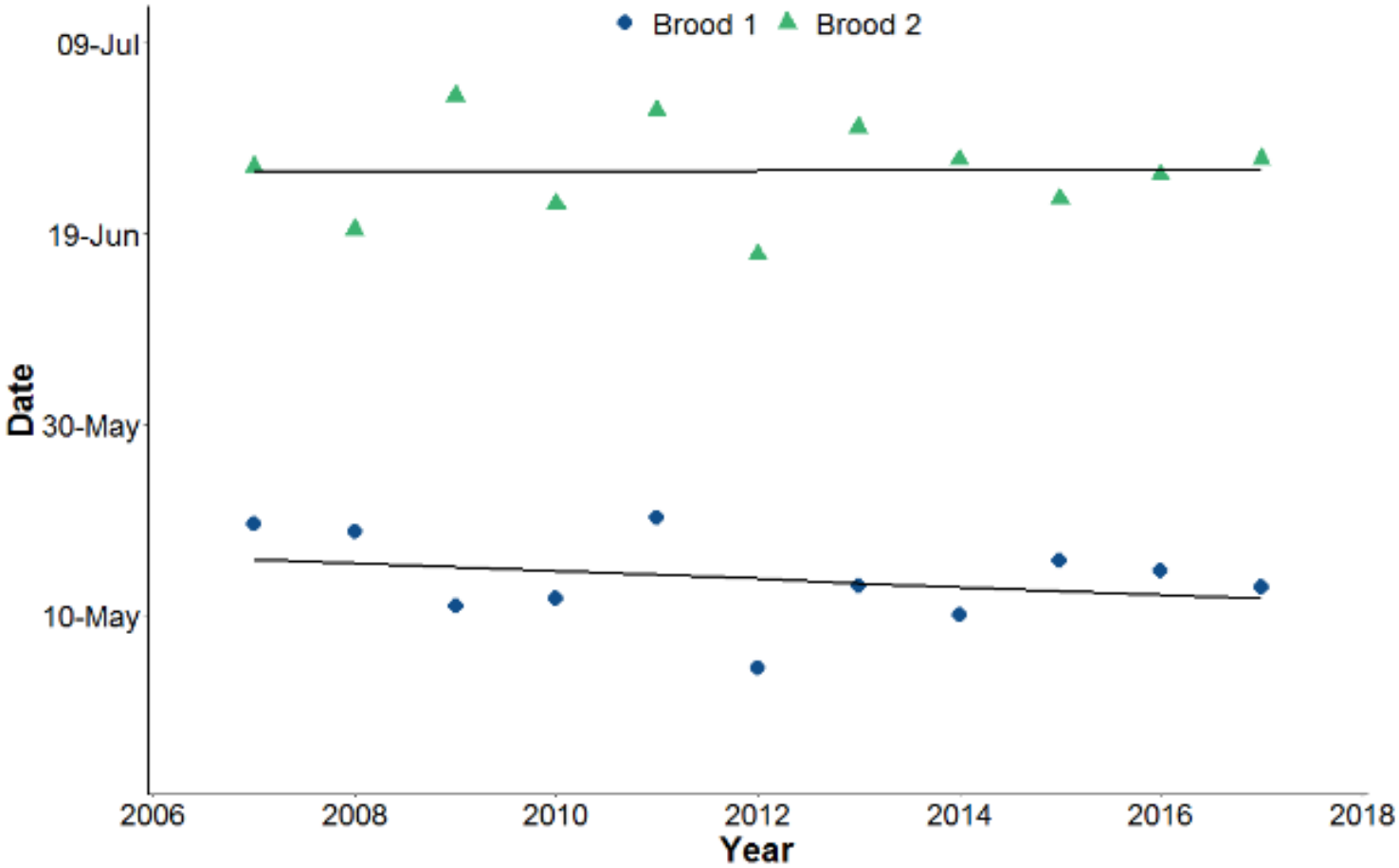
- What really is the maintenance fire regime needed for each variant and rare spp?
- Fire Effects vary with season – how will climate change influence our ability to burn when we need to, to get the desired effect?
- What is the future role of the APBP as an assisted migration recipient site

## Future changes in fire probability from 16 climate models



*Climate change and disruptions to global fire activity, Moritz et al., 2012, from the journal Ecosphere.*

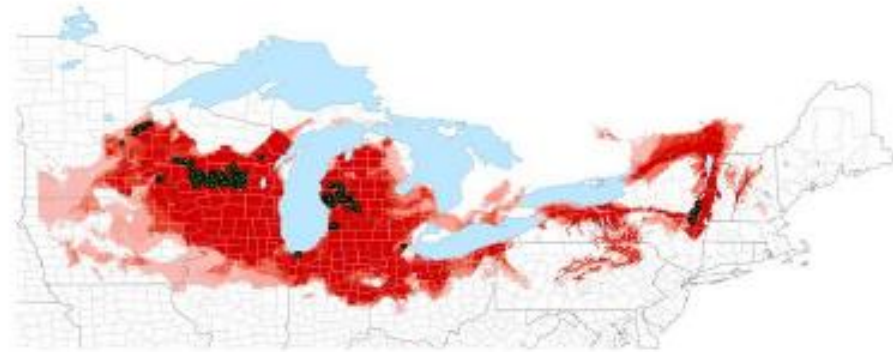
# Effects of Climate Change – Date of First Eclosion



# Effects of Climate Change – Climate Envelope Modeling USGS and University of Notre Dame

- used Genetic Algorithm for Rule-set Production (GARP) model to understand current climatic envelope and shifts under climate change:
  - 955 occurrence points from throughout its range
  - 23 bioclimatic variable layers
  - CCCMA A2 2080 climate forecast
- GARP successfully recreated current and recent historic distributions
- models forecast potential future range
- Burning for desired effects will mean understanding and adapting our burning to these changes

## GARP (Current)



## GARP (2080)



# Conclusions

- Rx fire to achieve specific outcomes in an urban landscape is complicated!
- Pre-treatments are essential
- Restoration regime is different from maintenance regime.
- Monitoring a suite of SGCN wildlife is our best window into management effects and what needs to change as we continue the restoration process.
- Maintenance Rx fire will be frequent, low-moderate severity, with 1:1 mix of dormant and growing season.
- There is more to learn about fire effects in a changing world.





# Funding

- ❖ NYS Environmental Protection Fund
- ❖ USDA Forest Service: Wildfire Risk Reduction Grant



# Thank You



Globally Rare, Nationally Significant & Locally Distinct



# Albany Pine Bush SGCN

American eel  
Blue-spotted salamander  
American Black Duck  
Common Nighthawk  
Eastern whip-poor-will  
Semipalmated sandpiper  
Upland Sandpiper  
Horned Lark  
Grasshopper Sparrow  
Vesper sparrow  
Bobolink  
Eastern Meadowlark  
Rusty blackbird  
Yellow-breasted chat  
Brown thrasher  
Bay-breasted Warbler  
Canada Warbler  
Cape May Warbler  
Golden-winged Warbler

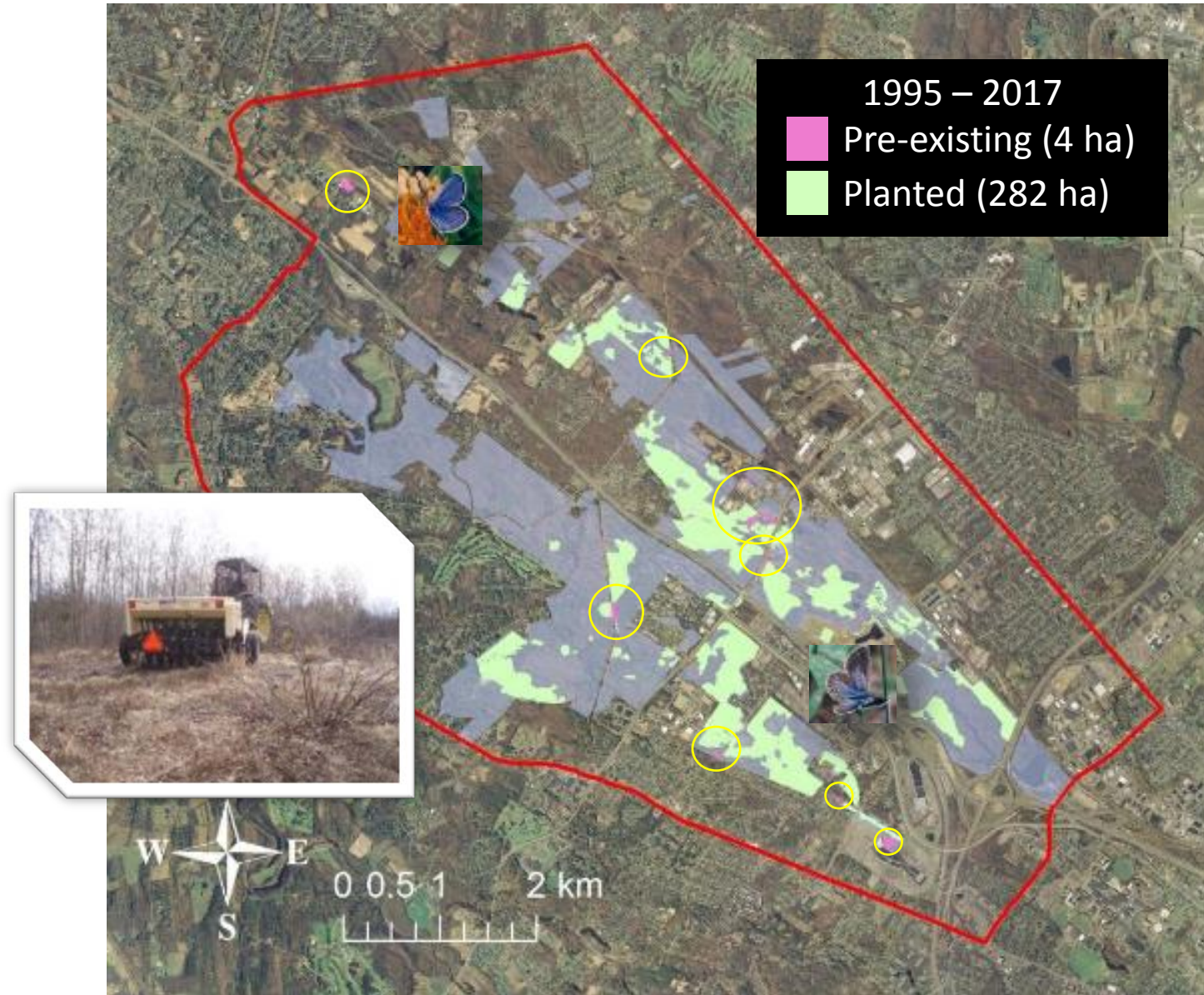
Olive-sided flycatcher  
Red-headed Woodpecker  
Rusty-patched bumble bee  
Ashton's cuckoo bumble bee  
Yellow bumble bee  
American bumble bee  
Yellow-banded bumblebee  
Broad-lined catopyrrha  
Mottled duskywing  
Frosted elfin  
Henry's elfin  
Karner blue  
Little brown myotis  
Eastern hognose snake  
Eastern box turtle  
Spotted turtle  
Wood turtle  
Musk turtle  
Longnose sucker  
Brook trout

Fowler's toad  
Eastern spadefoot  
Bald Eagle  
Northern goshawk  
Northern harrier  
Red-shouldered hawk  
Blue-winged teal  
Bonaparte's Gull  
Laughing Gull  
American Woodcock  
Greater yellowlegs  
Black-billed Cuckoo  
American kestrel  
Peregrine Falcon  
Ruffed grouse  
Scarlet tanager  
Black-throated blue warbler  
Blue-winged Warbler  
Cerulean warbler  
Louisiana waterthrush

Prairie warbler  
Worm-eating warbler  
Wood thrush  
American Bittern  
Great egret  
Horned grebe  
Pied-billed Grebe  
Brown-bordered geometer  
Chaetagnaea cerata  
Chytonix sensilis  
Inland barrens buckmoth  
Eastern red bat  
Hoary Bat  
Silver-haired bat  
Smooth greensnake  
Worm snake  
Snapping turtle

**NYS High Priority SGCN**  
SGCN

# Karner Blue Habitat Restoration



# Accelerated Colonization

## Captive Rearing and Release

