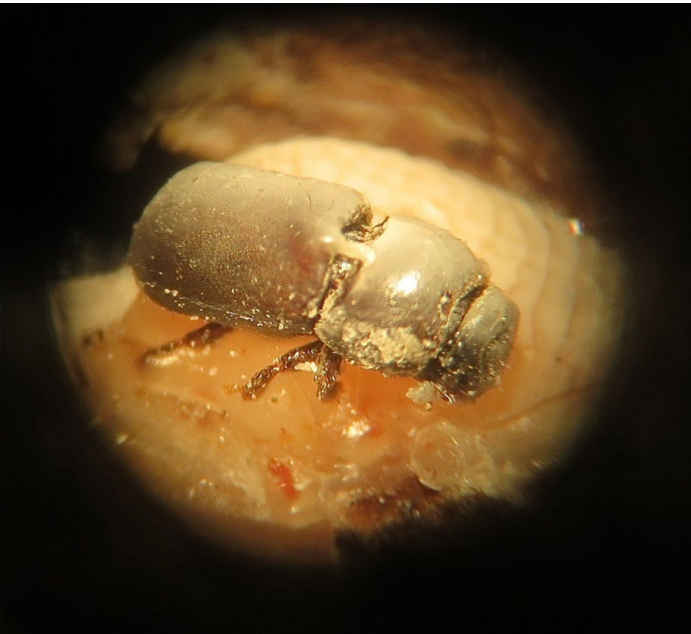


Southern Pine Beetle and the Fate of Pitch Pine



Claire Rutledge, CAES & Alicia Brays, CCSU

Forest Health Workshop

March 4, 2021



Acknowledgements

- Dan Evans – DEEP Forestry
- Emery Gluck – DEEP Forestry
- Jerry Milne – DEEP Forestry
- Dave Irvin – DEEP Forestry
- Jeremy Clark – DEEP Forestry
- Greg Decker – Friends of Oswegatchie Hills
- Whitney Adams – Groton Open Space
- Mioara Scott – CAES



Signs and Symptoms of Southern Pine Beetle



Signs and Symptoms of Southern Pine Beetle



Signs and Symptoms of Southern Pine Beetle



Signs and Symptoms of Southern Pine Beetle



Look Alikes

- **Black Turpentine Beetle (*Dendroctonus terebrans*)**
- The black turpentine beetle is another native insect that can be confused with SPB, but can be distinguished by the location and size of pitch tubes, as well as larval gallery shapes.
- Black turpentine beetle pitch tubes:
 - Are usually located at the bottom of the tree, under 12 feet;
 - Are about twice the size of SPB's (about 1 inch in diameter) and often runny;
 - Have "D" or fan shaped larval galleries that are short and rarely cause much damage to their host.

- **Pitch Mass Borer (*Synanthedon pinif*)**
- The pitch mass borer is a native species of moth that bores into spruce and pine throughout eastern North America. Although seldom encountered, they can cause their host tree to produce pitch tubes.
- Pitch mass borer pitch tubes:
 - Are usually very large and messy;
 - Are located near broken branches and pruning scars;
 - Have fresh pitch tubes that contain small moth larvae, which can be extracted to confirm their identity.



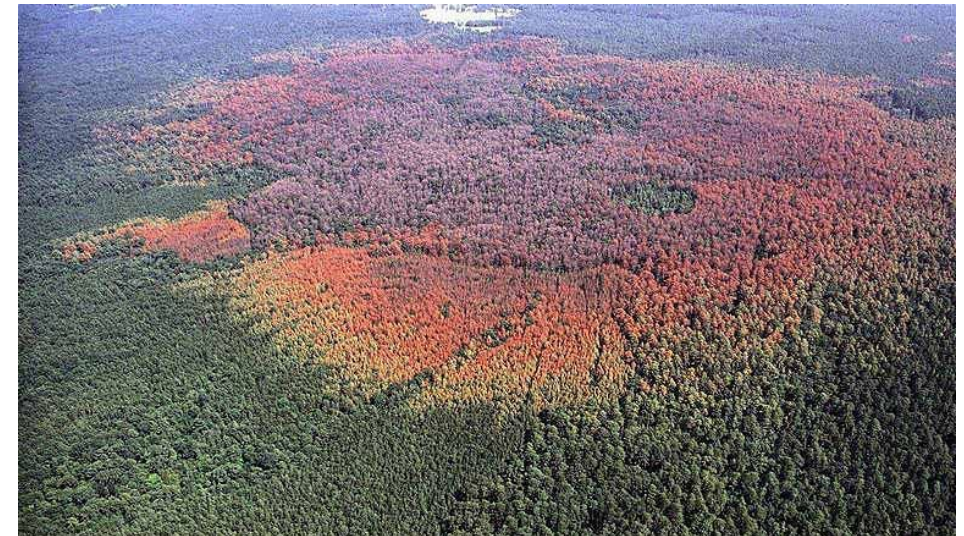
Endemic

vs.

Epidemic



- Low levels of SPB
- Unable to infest healthy trees
- Very hard to detect infested trees due to rarity



- High levels of SPB
- Able to infest healthy trees
- Easy to infested trees due to mass death



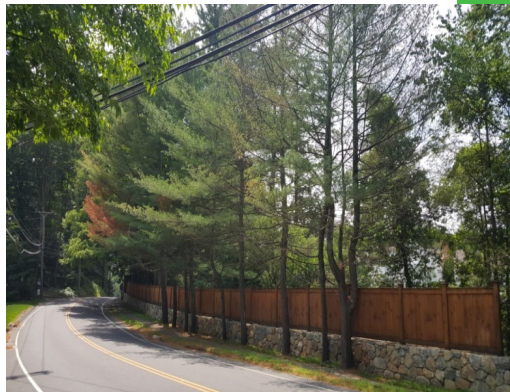
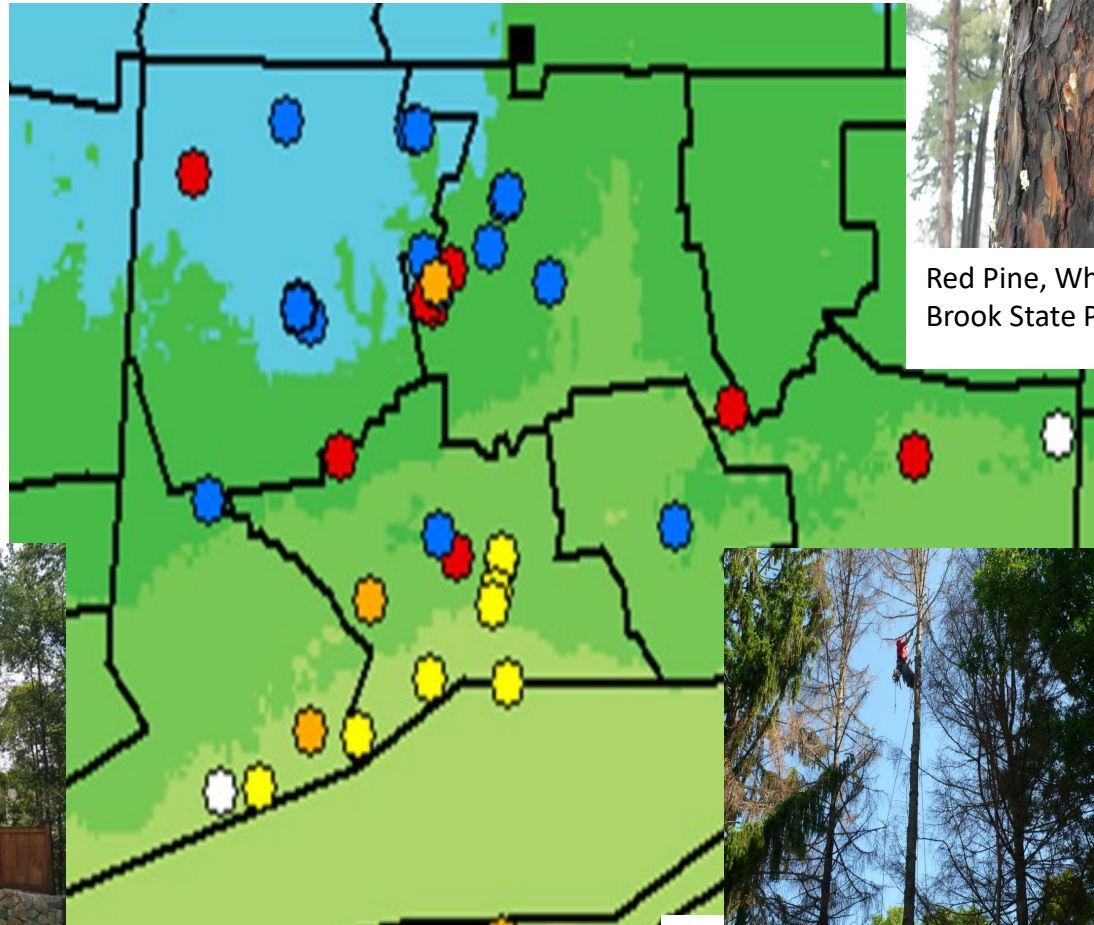
Southern Pine Beetle Distribution and Hosts Connecticut 2015



Scots Pine, Hamden CT



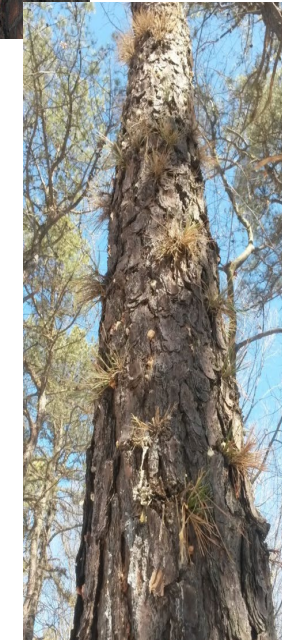
Red Pine, Wharton
Brook State Park



White Pine, Westport CT



Norway Spruce, North Haven CT



Pitch Pine, North
Haven CT

- Norway Spruce
- Pitch Pine
- Red Pine
- Scots Pine
- White Pine

Average Annual
Minimum
Temperature

-29 to -26

-26 to -23

-23 to -20

-20 to -18

-18 to -15

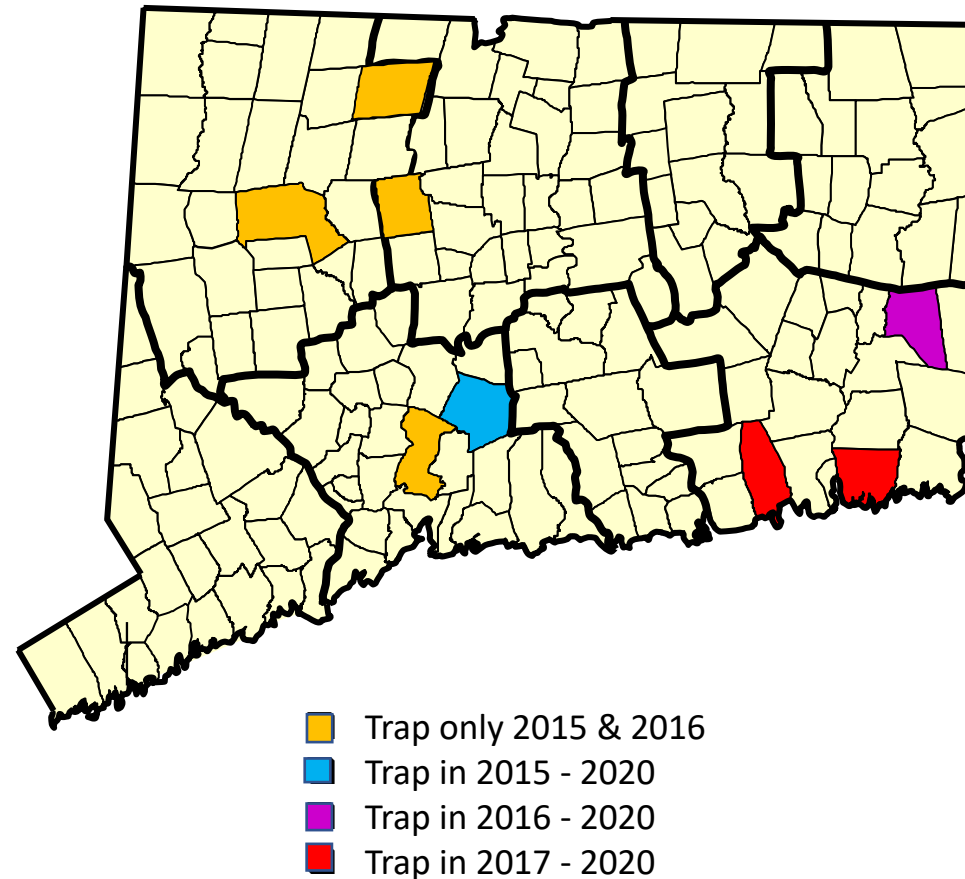


CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

SPB Trapping History 2015-2020

Trapping

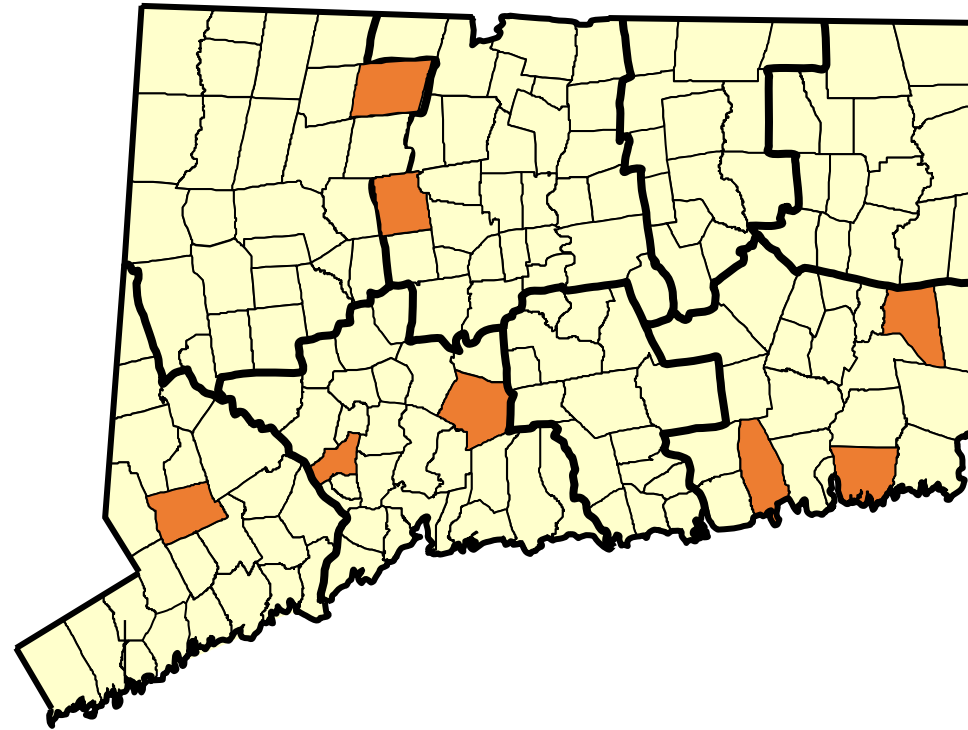
- Used black 12- funnel Lindgren Traps with standard 3- component SPB lures from Synergy Semiochemicals Corp. (Delta, BC, Canada).
- 2015 – May to September – biweekly, 7 sites on a North-South Transect. All within know infestations
- 2016 - May to July – 6 weeks, weekly at 8 sites, North-South
- 2017 – May to July – weekly at 4 sites. Focus on Pitch Pine (PP)
- 2018-2020 May to October – weekly at 4 sites. Focus on PP

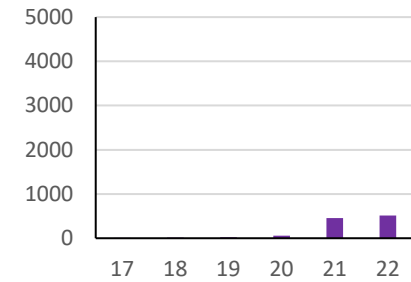
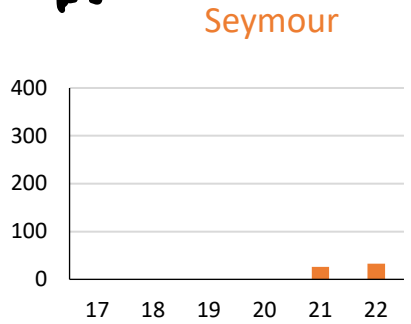
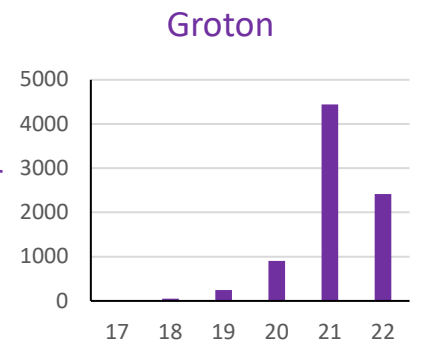
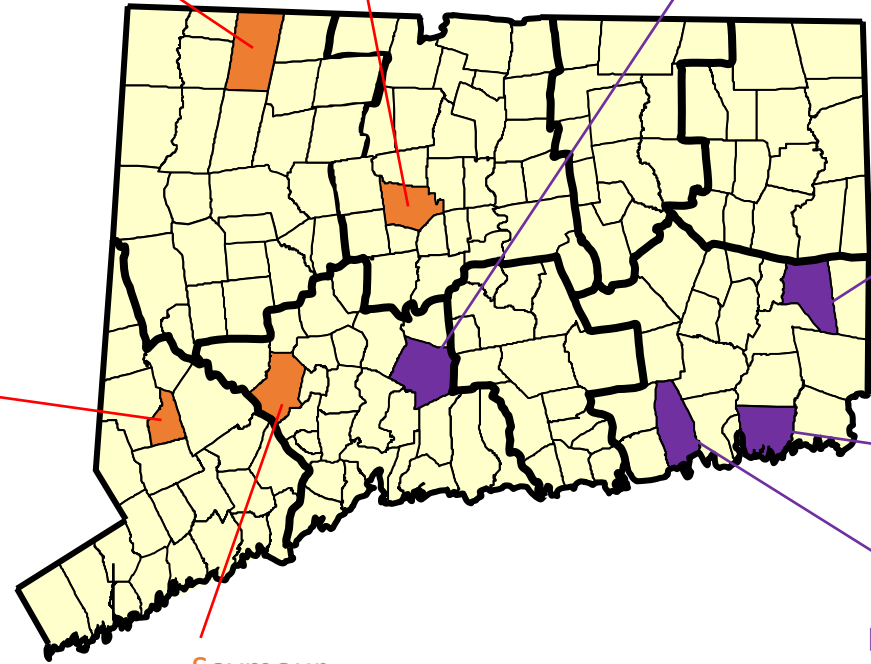
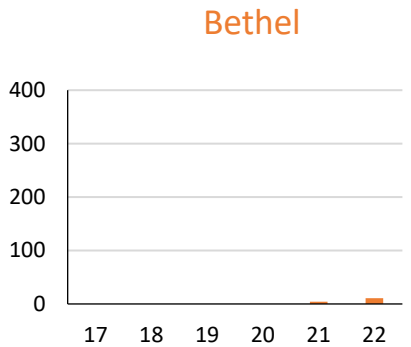
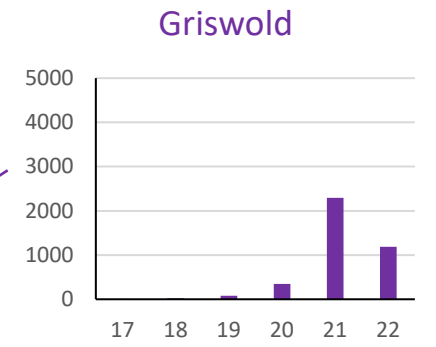
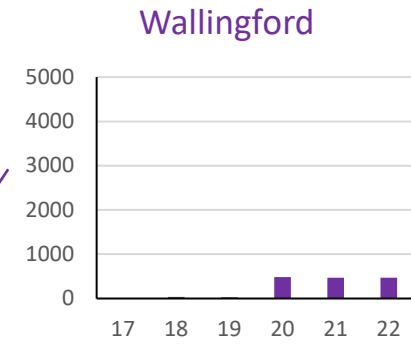
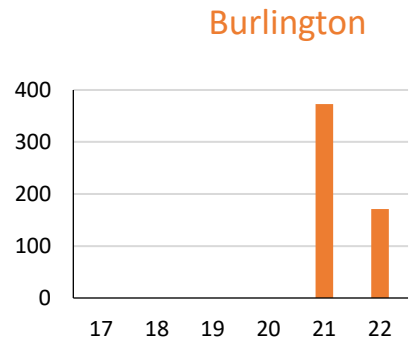
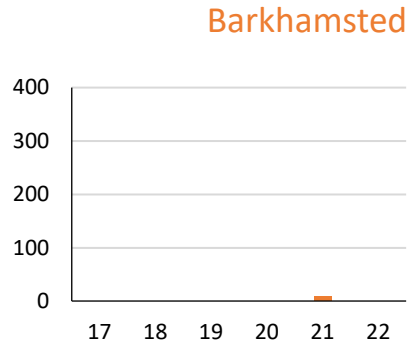


SPB Trapping History 2021-2023

Trapping

- May to November – weekly at 8 sites. Added 4 ‘Western Sites’
- Used black 12- funnel Lindgren Traps with standard 3-component SPB lures from Synergy Semiochemicals Corp. (Delta, BC, Canada).
- Focus on Pitch Pine (PP)
- May - December



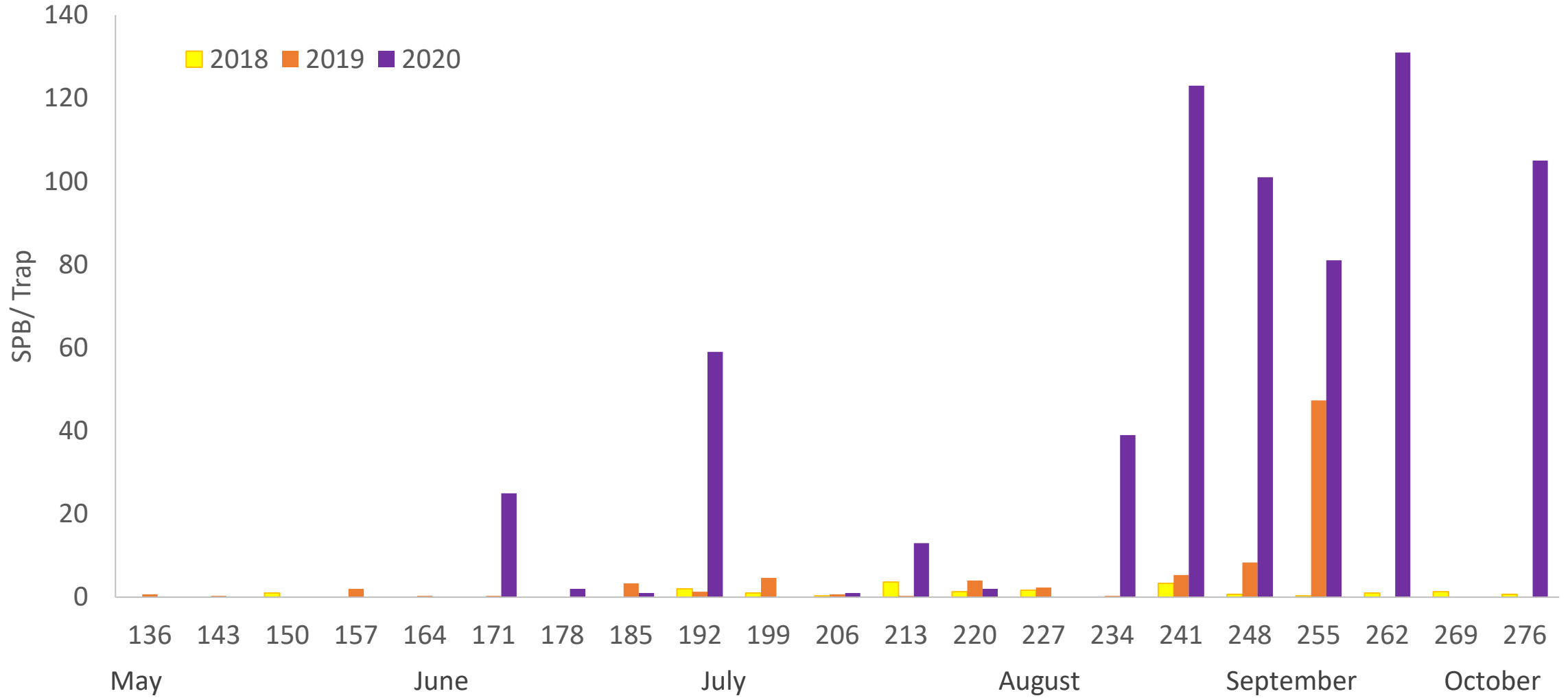


SBP totals. Note, trapping for 4 **western** sites was only in 20 and 21. Also note different scale of Y-axis in **east** and **west**.



Seasonality

Groton



Climate and SPB

SPB dies at -20 °C

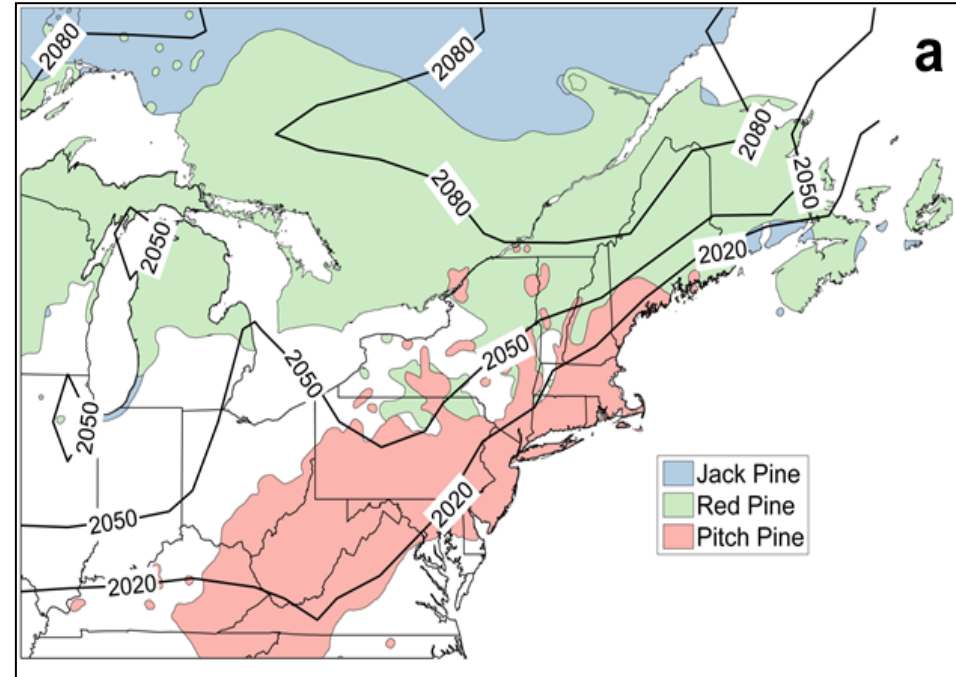
Lesk et al. 2017 predicted most of Connecticut would become suitable habitat for SPB by 2020. The polar vortex in Feb. 2016 may have delayed the spread across the state.

Minimum Winter Temps (°C) 2014 – 2024

Blue is <-21,

Purple is -19,-20 and -21,

Pink is > -19



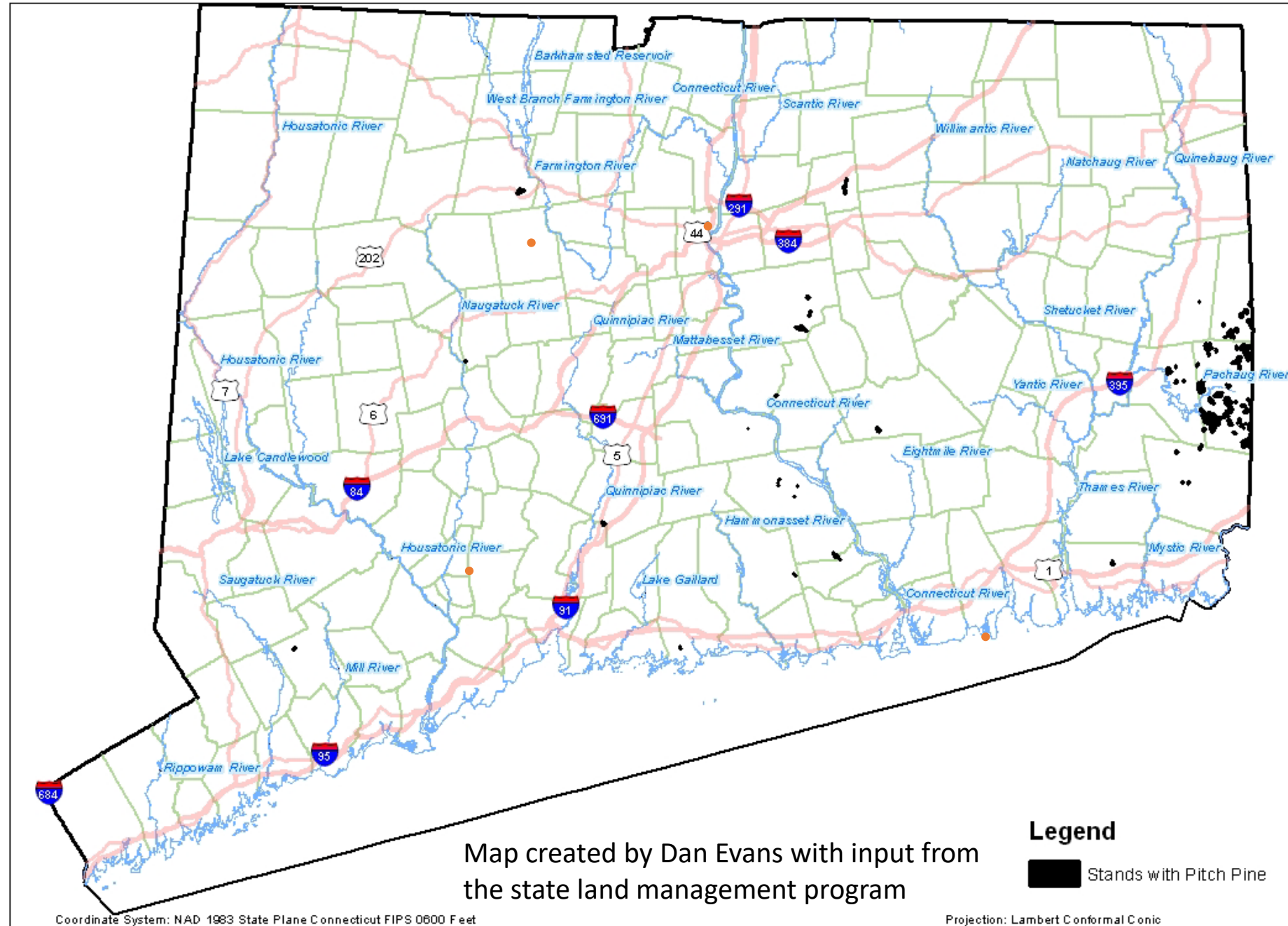
	14 - 15	15 - 16	16 - 17	17 - 18	18 - 19	19 - 20	20 - 21	21-22	22-23
East Lyme	-17	-22	-13	-19	-17	-13	-14	-14	-21
Groton	-20	-22	-13	-19	-17	-13.2	-12	-15	-21
Wharton	-23	-22	-19	-21	-19	-14	-17	-17	-14
Hopeville	-27	-23	-19	-21	-16	-14	-17	-22	-22
Barkhamsted	-25	-26	-15	-26	-22	-21	-20	-23	-27



Stands with Pitch Pine - Connecticut State Land

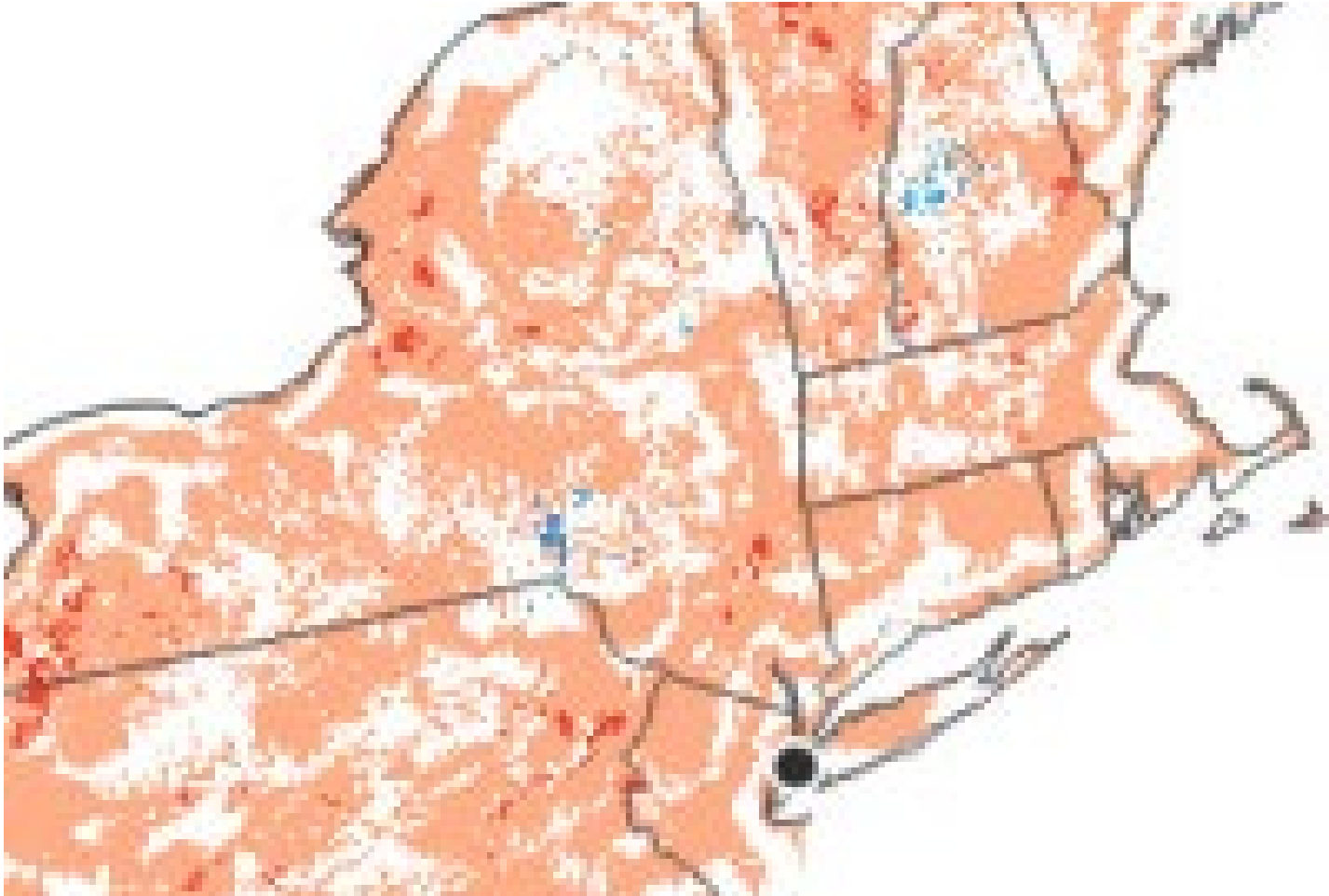
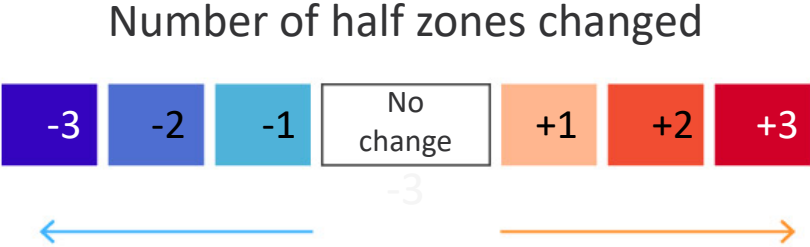
Pitch Pine in Connecticut

- Pitch pine- *Pinus rigida*
- Sandy plains, ridge tops
- Needs open areas to grow
- Some cones are serotinous
- Pitch pine-scrub oak barrens are one of 13 endangered habitats in CT
- Host to rare and endangered insects and birds
- Only 5% of original habitat left due to fire suppression and development
- 2,500-acres of area shown in map



Change in plant hardiness zones from 2012 to 2023

Each half zone represents a shift of plus or minus 5° F in average minimum temperature



Data: Axios analysis of USDA data; Map: Will Chase/Axios



	Connecticut	Long Island
Known Arrival SPB	2014	2014
Acres Pitch Pine	2,500	100,000
USDA plant hardiness Zone	6a, 6b, 7a	7a, 7b
Distribution	Highly Dispersed	Concentrated
Acres Killed by SPB	0-1 (from 2014)	> 5,000

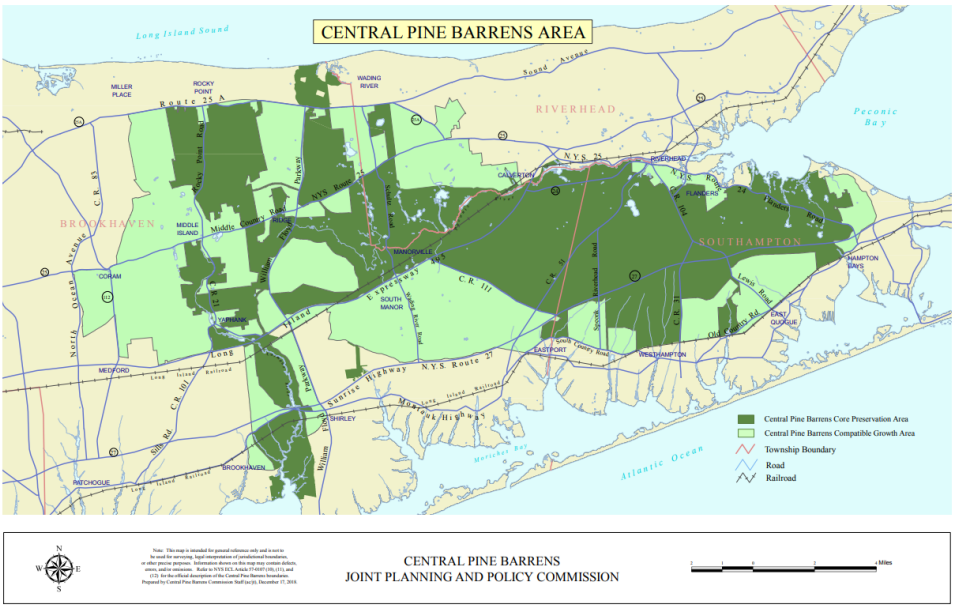
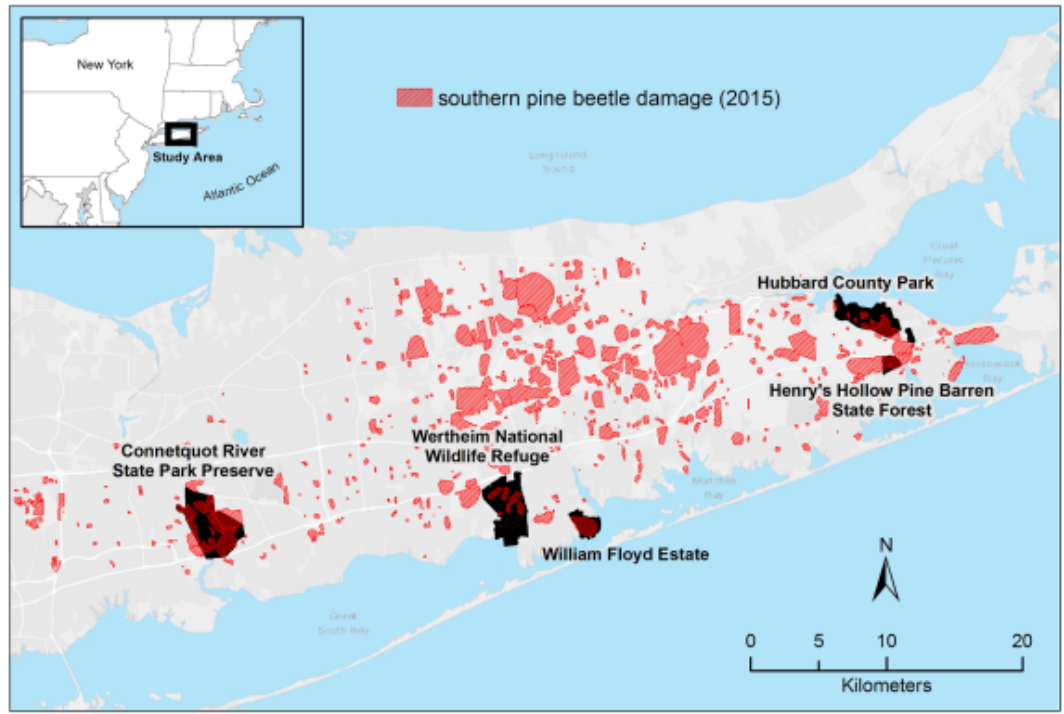
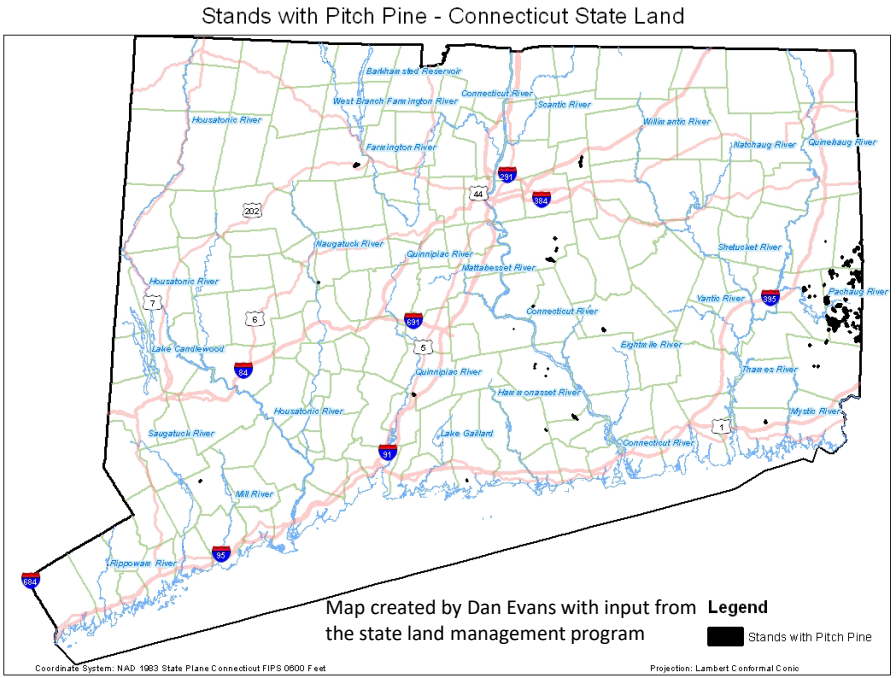


Fig. 1. Study area on Long Island, New York. Southern pine beetle damage was mapped during aerial insect and disease surveys, with suspect areas ground to confirm presence of the beetle. Properties containing study sites are shaded black.

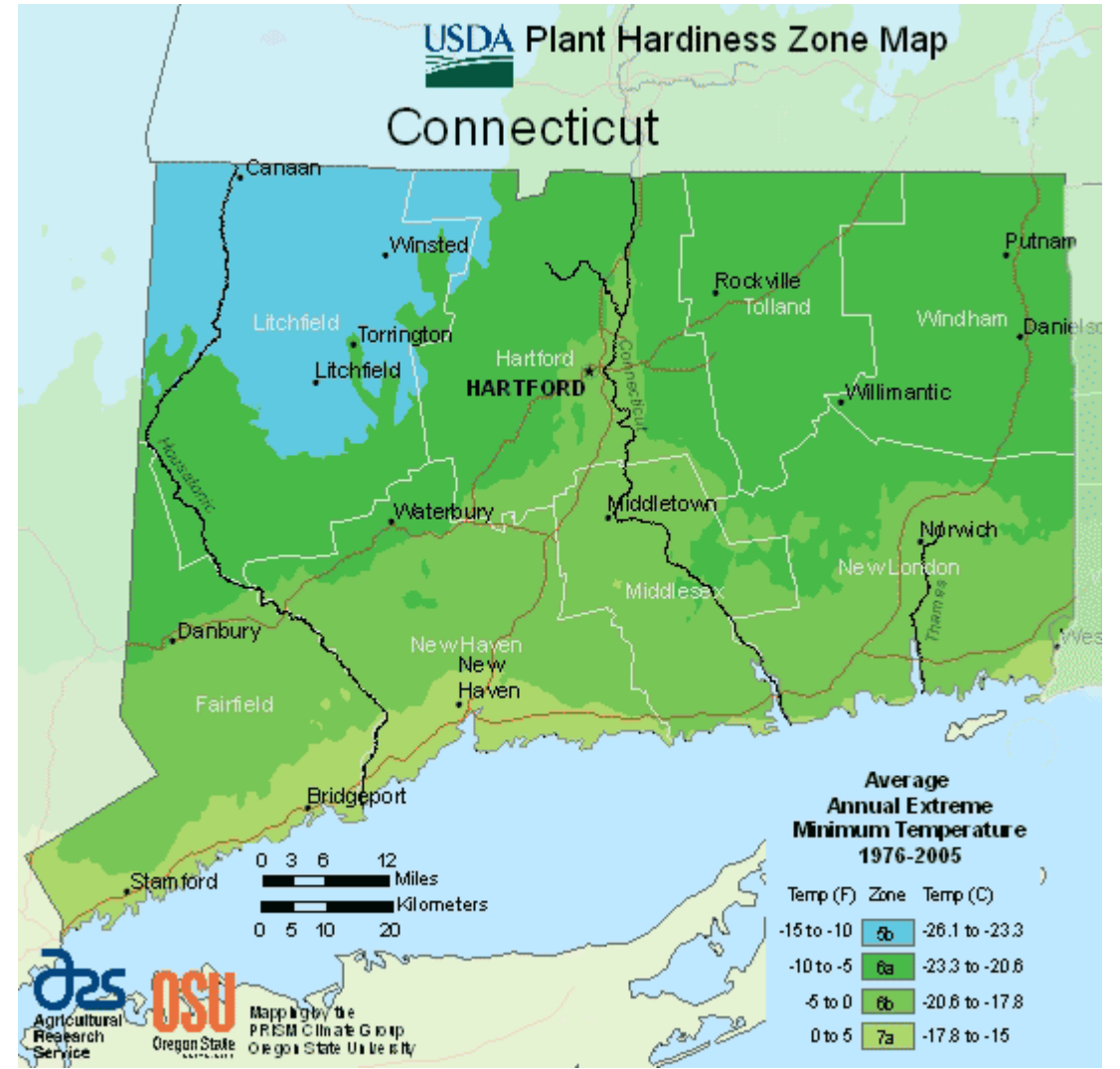
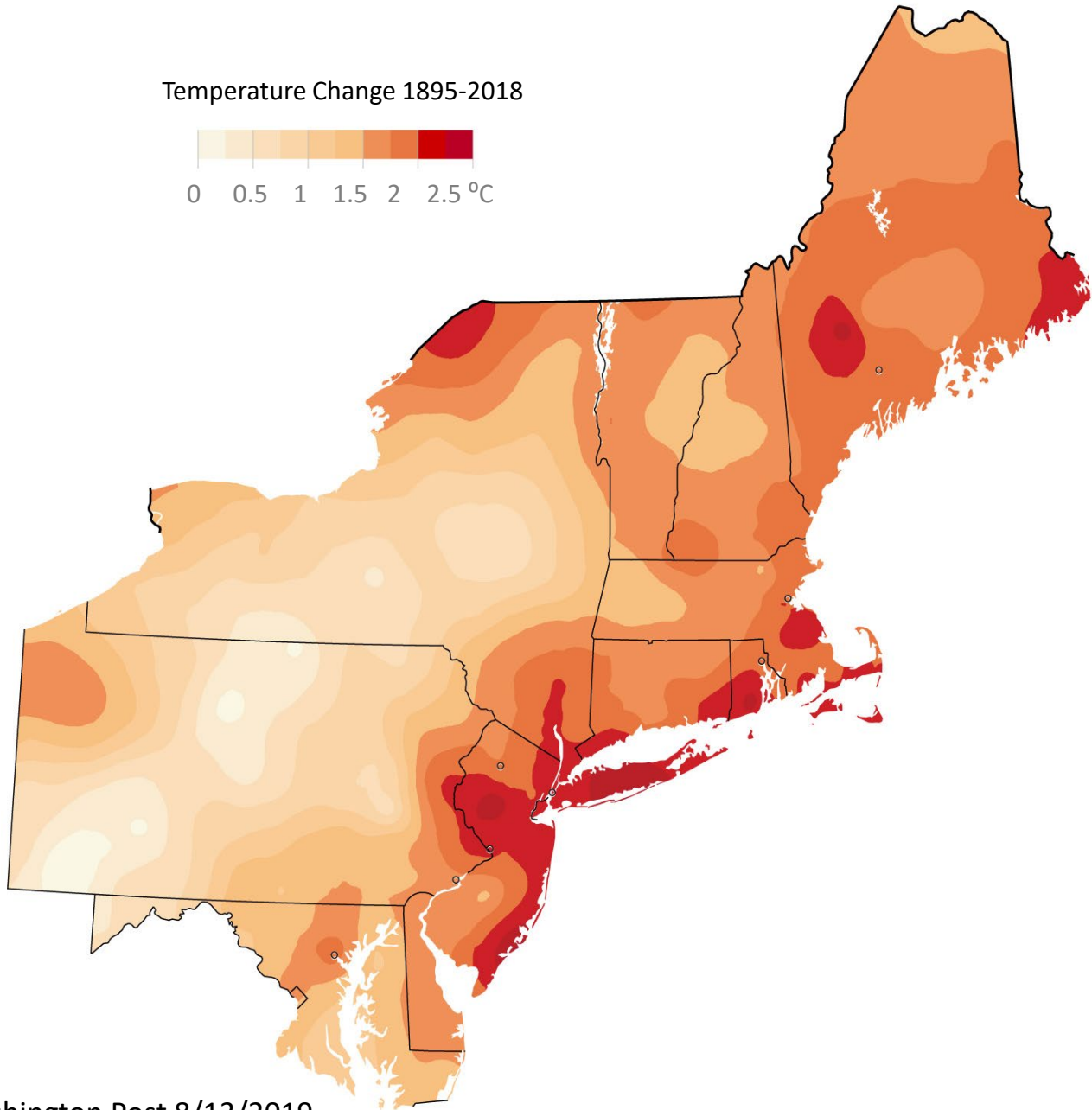
What's Coming and How to Help

- It is possible with the warm weather that SPB will become epidemic in some areas, swift removal of known infested trees and those in a 50' diameter is the standard practice for stopping epidemic 'spots' from growing.
- We don't see large numbers in spring, which means we can look through the summer for the 'nurse' trees.
- It is good that our pitch pines are widespread, less likely that beetles can spread easily.
- Keeping trees as healthy as possible will help to keep beetles endemic.
- Let folks know if you have seen SPB in your area (pitch pine or no).

Acknowledgements

- Alicia Brays - CCSU
- Dan Evans – DEEP Forestry
- Emery Gluck – DEEP Forestry
- Jerry Milne – DEEP Forestry
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Plant Hardiness Zones

Based on 30-year average ending in:

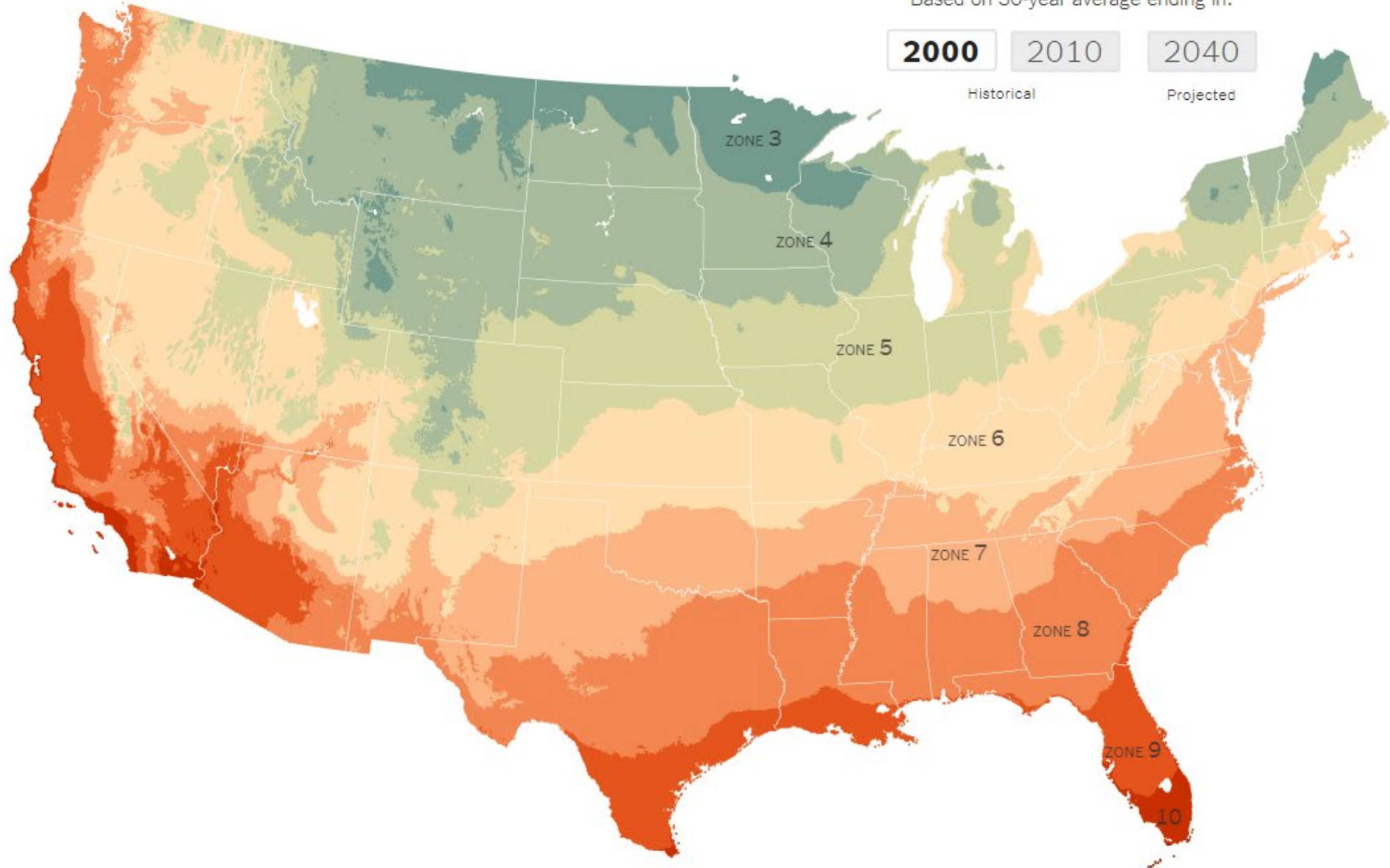
2000

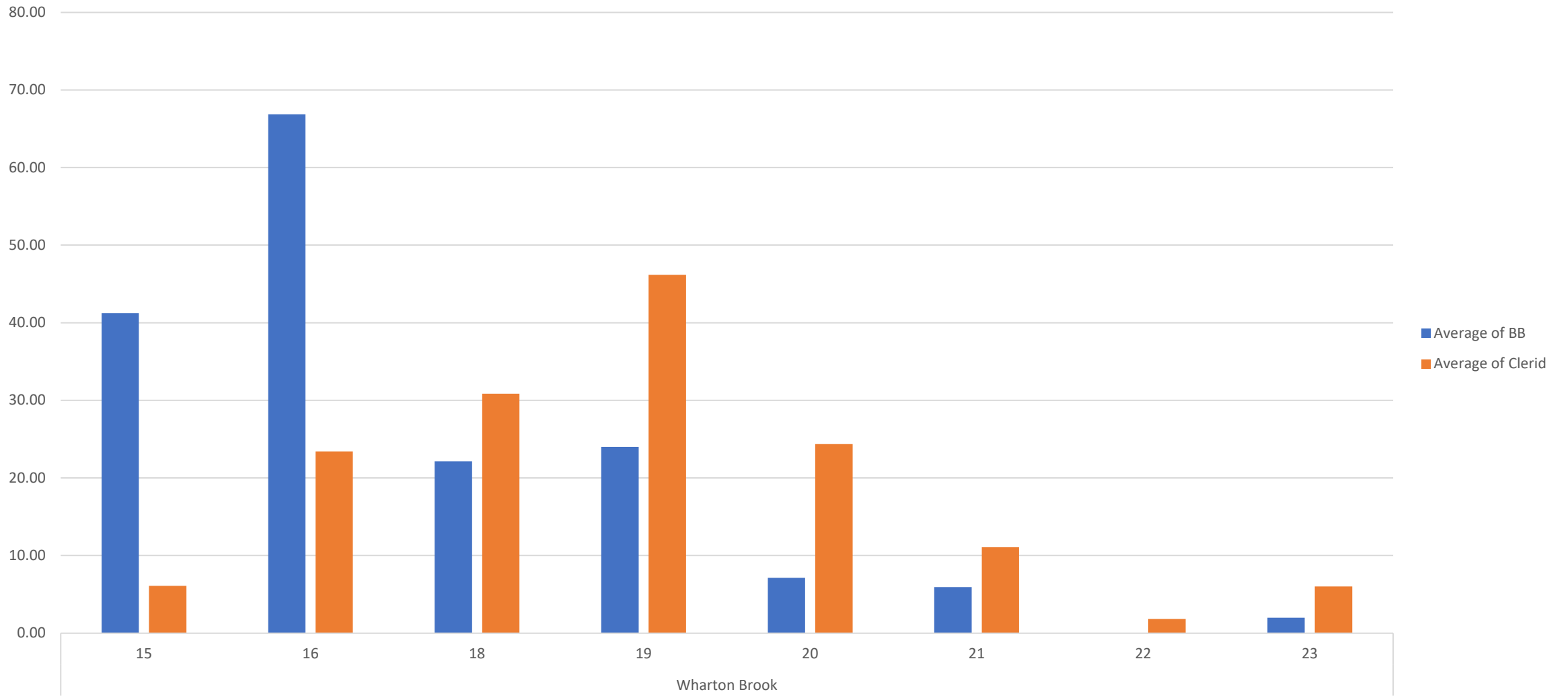
2010

2040

Historical

Projected



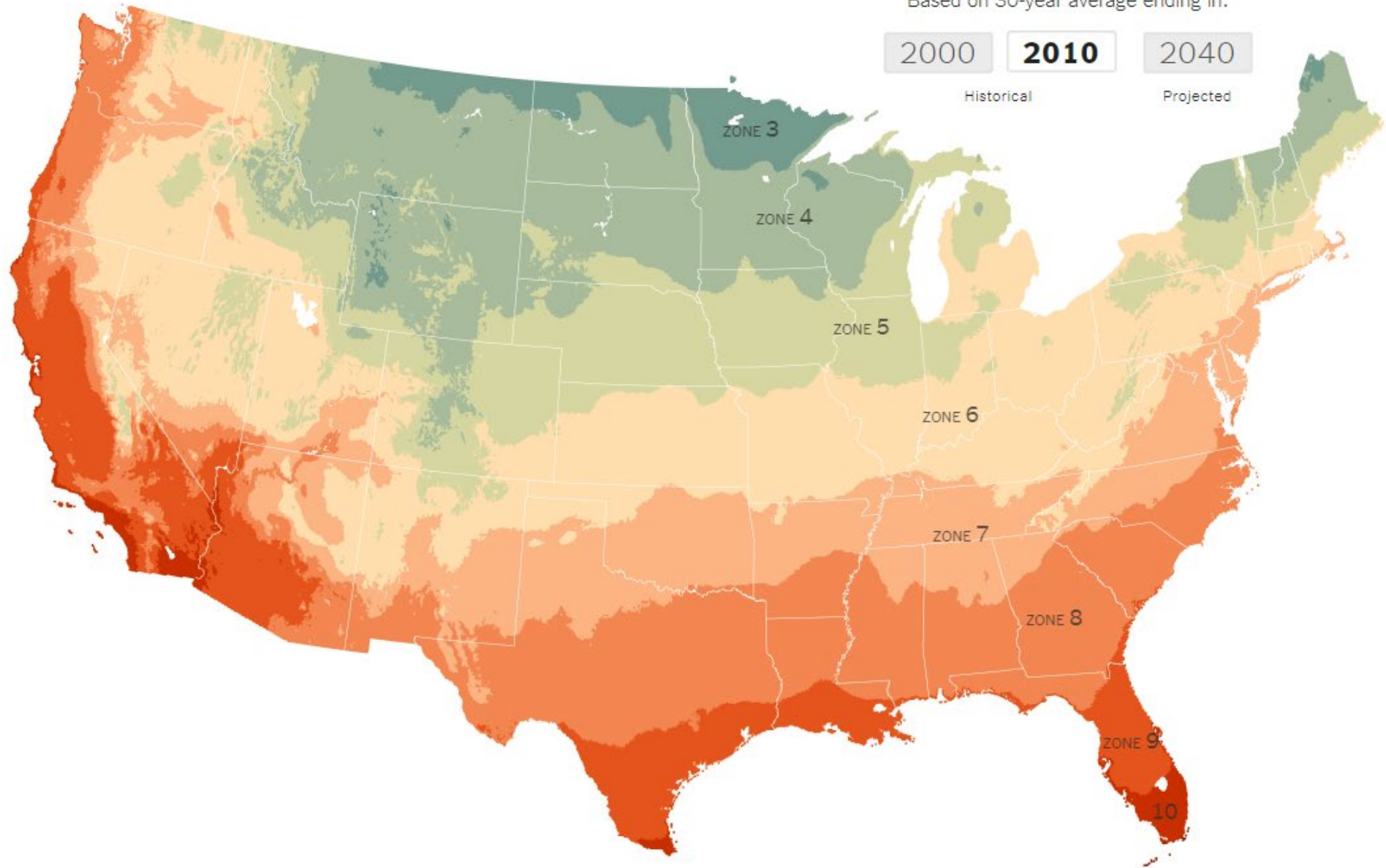


Plant Hardiness Zones

Based on 30-year average ending in:

2000 **2010** 2040

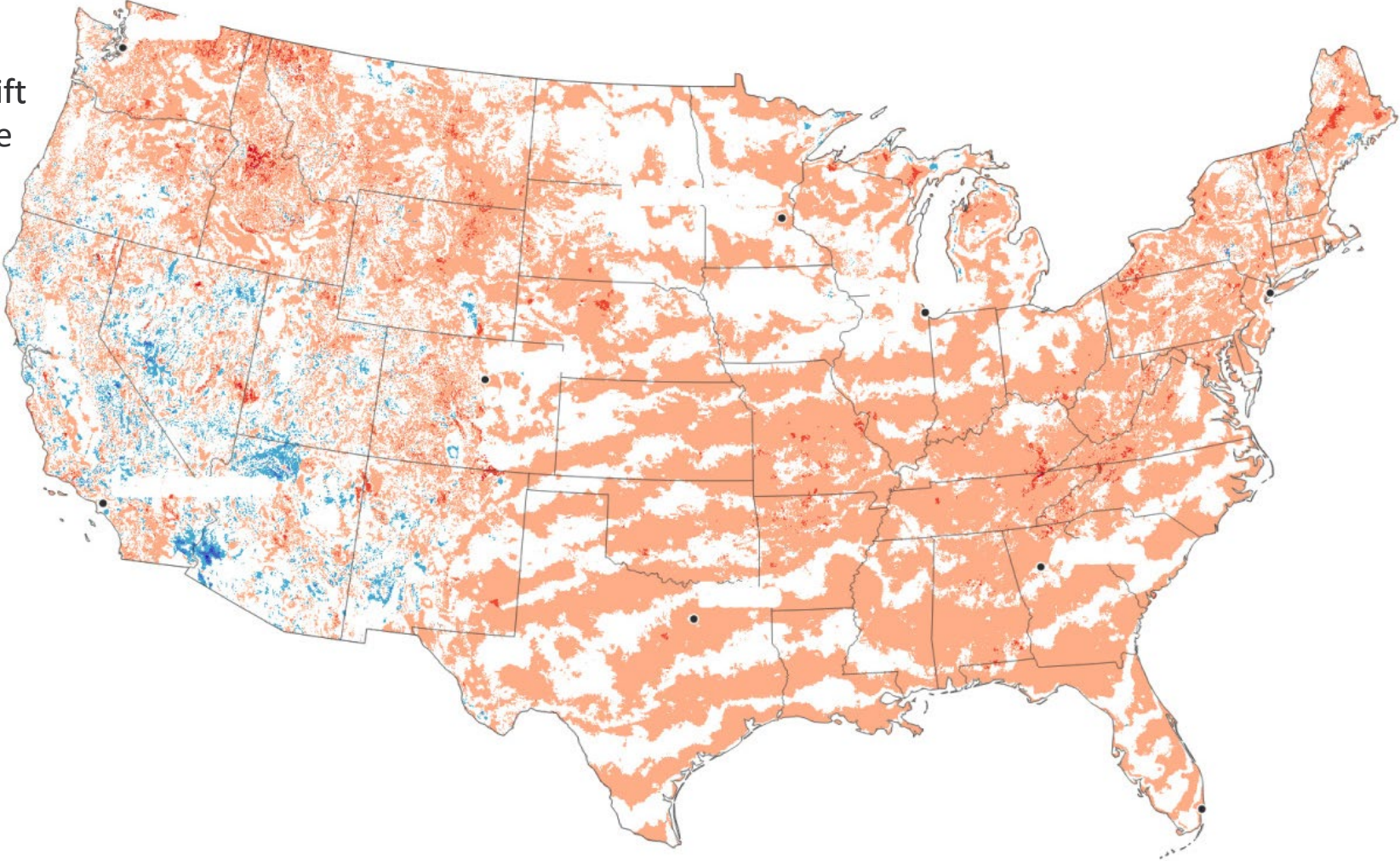
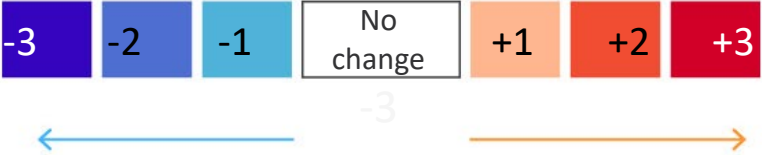
Historical Projected



Change in plant hardiness zones from 2012 to 2023

Each half zone represents a shift of plus or minus 5° F in average minimum temperature

Number of half zones changed



Data: Axios analysis of USDA data; Map: Will Chase/Axios

Plant Hardiness Zones

Based on 30-year average ending in:

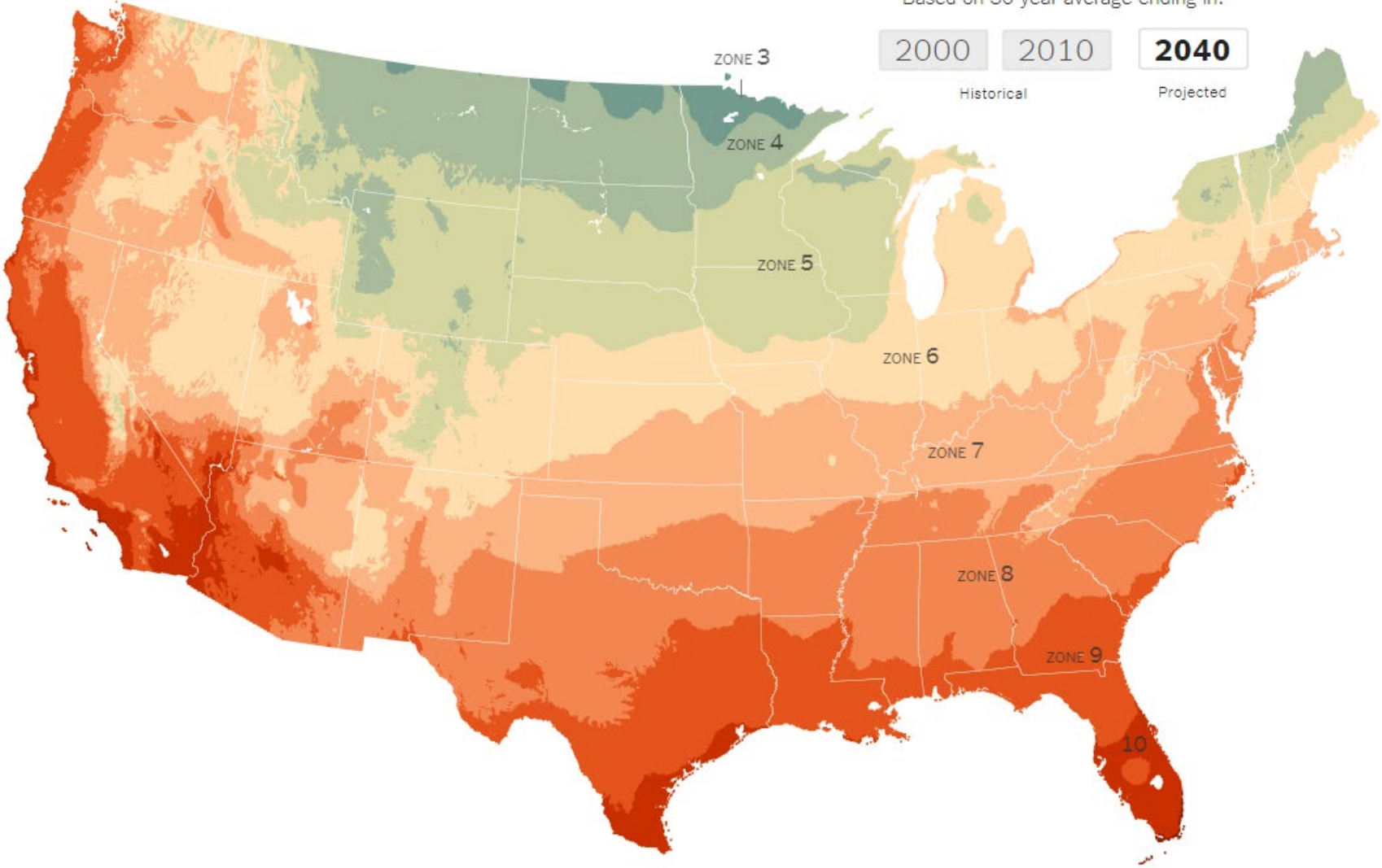
2000

2010

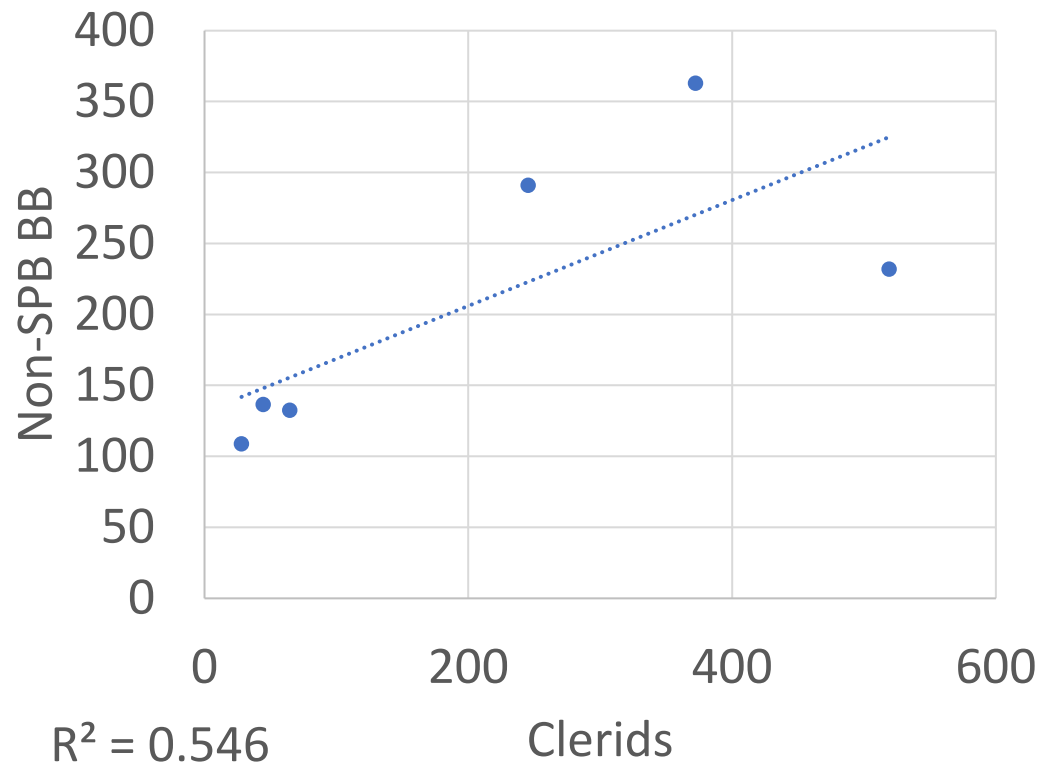
2040

Historical

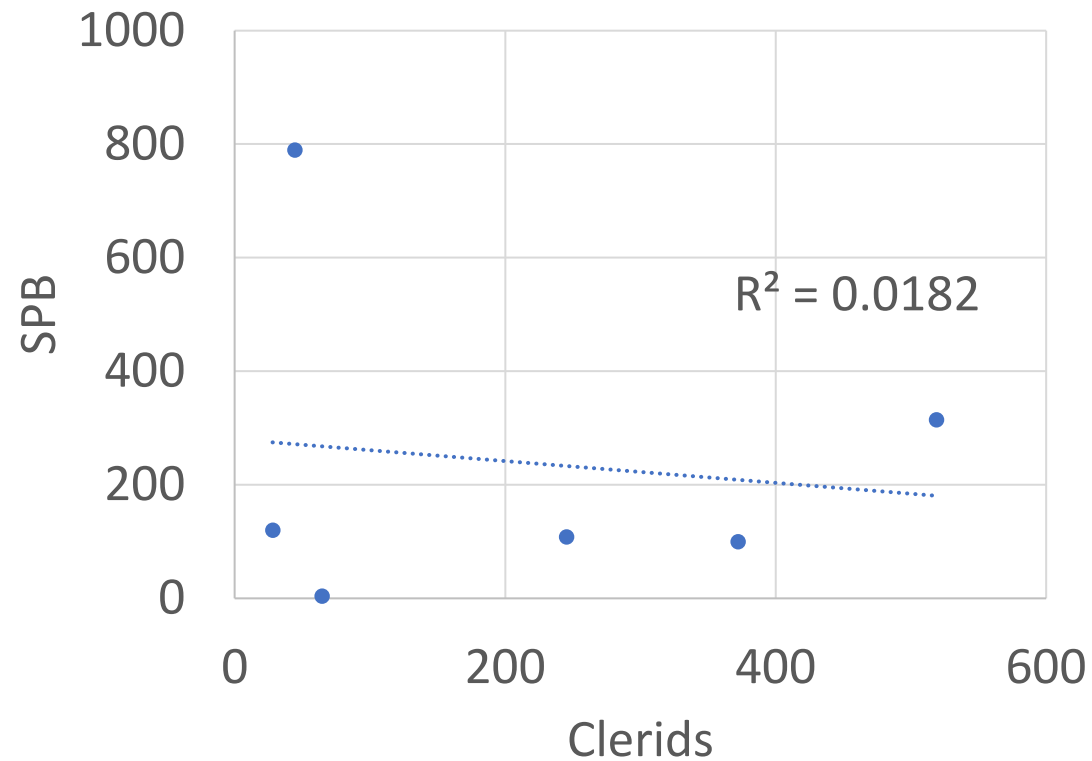
Projected



Average Clerid vs. BB by site



Average Clerid vs. SPB by site





Adaptive Silviculture for Climate Change

Workshop and Network of Silvicultural Trails

Resistance

Control invasive plants
Fell hazardous trees
Maintain snags and deadwood for wildlife

Regenerate oak and hickory:

- Tend understory regeneration
- Shelterwood cut
- Overstory removal 20+ years

Create reserves to protect key features

- Sensitive species
- Recreational areas
- Target geographic shelters from windthrow

Resilience

same

Increase species and structural diversity
- Fire or torches to control understory and encourage oak regen.
- 1/2 acre patch cuts centered on areas of canopy loss
- Plant blight-resistant American chestnut (& protect plantings from deer)

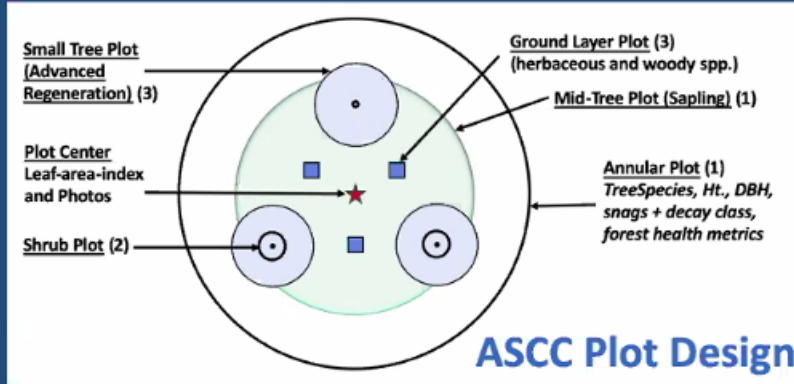
Low thinning to improve vigor and wind firmness of residual trees

Transition

same

Diversify species, age classes and structures
- 2 acre patch cuts, feathering edges over years, for oak regeneration and planting
- Planting blight-resistant chestnut
- Planting southern genotypes of present oaks and hickories

Reserves for structural diversity
- Target habitat & shade-tolerant species



ASCC Plot Design

Key Responses Monitored Across All Sites:

- Species composition, density, diversity (Over and Understory)
- Forest health (mortality, local indices)
- Productivity (increment, biomass)

Implementation & Replications

- At Mohegan and around southern New England

Wood Turtle (*Glyptemys insculpta*) Vtharpattas.org
Gypsy Moth Caterpillar (*Lymantria dispar*) Oycogp.Csoka
White-Tailed Deer Archevtrade.org, John.Hafner



Read more at <https://www.adaptivesilviculture.org/SNEoak>

From [Jim](#) to [Everyone](#):
Are these cats on the tapestry behind you Vicki?

From [Nicholas Zito](#) to [Everyone](#):
If folks would like CEUs for this event please shoot me an email at nicholas.zito@ct.gov with your forest practitioner number included

From [James Fischer](#) to [Everyone](#):
Is carbon accumulating at a higher rate due to the diversity of tree species in high grade?

From [Andrea Urbano, CT DEEP](#) to [Everyone](#):
Jeff, do you have stand age data for these sites? for the initial reports and current?

From [Jeffrey Ward - CAES](#) to [Everyone](#):
Scott has 4 screens like the Starship Enterprise

From [John Triana](#) to [Everyone](#):
Scott - Is the hunt with firearms? Archery only?

From [Andrew Hubbard](#) to [Everyone](#):
Shotgun and Muzzleloader

From [Jerry Milne](#) to [Everyone](#):
Droughts in 2016 and 2020 could kill urban maples?

To: [Everyone](#)

File

Type message here...

Tue 2/2/2021 12:37 PM