NEW JERSEY AUDUBON
www.njaudubon.org

Forest Conservation

New Jersey Pinelands

Collaborating and Partnering with

New Jersey Division of Fish and Wildlife

NJ Parks and Forestry

NJ Forest Fire Service

Local and County Government

USDA Natural Resources Conservation Service

Private Landowners and Agricultural Producers

USDA Forest Service

US Fish and Wildlife Service

National Fish and Wildlife Foundation

National Forest Foundation

William Penn Foundation

New Jersey Audubon Conservation Priority

Ensure that New Jersey's forests, and interwoven matrix of agricultural and grass lands, are managed sustainably and are providing habitat for rare, declining and common native species while supporting clean water, air and people.



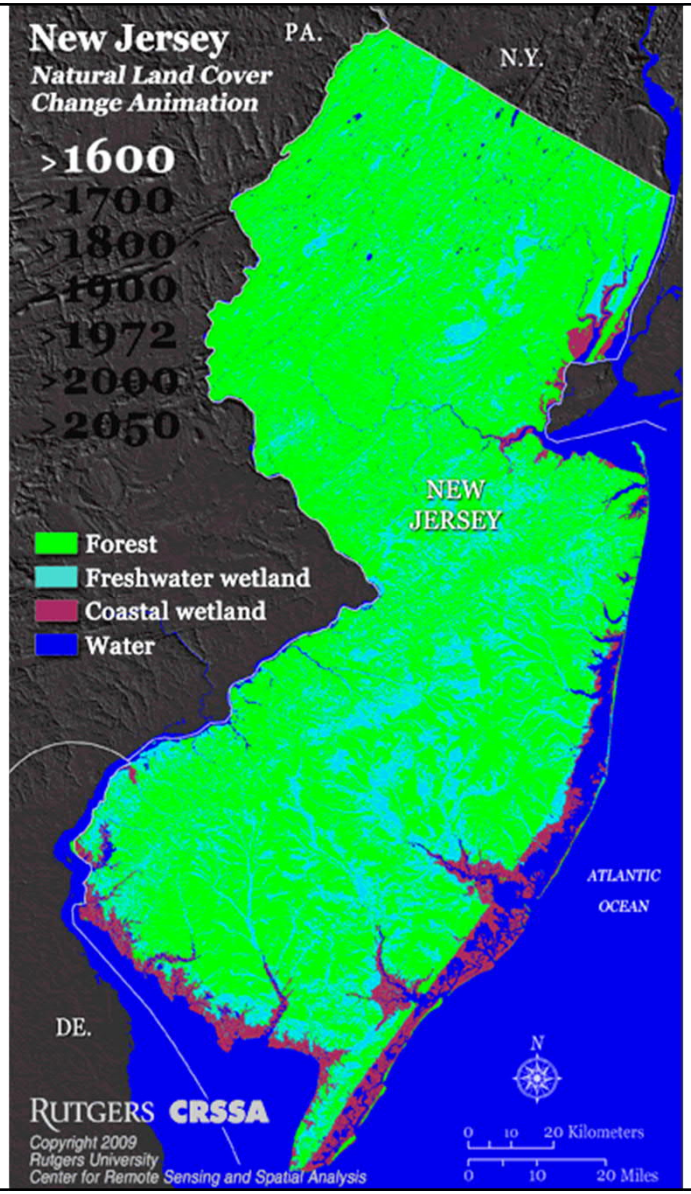









- History & Status of New Jersey's Forests
- Pinelands Forests
- Conservation Examples



1600 – Pre-colonization, mosaic of upland forests and shrublands, freshwater swamps and marshes, coastal wetlands and water;

1700 - River valleys provided avenues of European settlement;

1800 - Forests cleared for farming or cut for timber or charcoal;

1900 – Forests rebound from massive clearing that peaked in mid 1800s;

1950 – Suburbanization begins on active or abandoned farmland;

1972 - Sprawl begins - farm and forest lands converted for development;

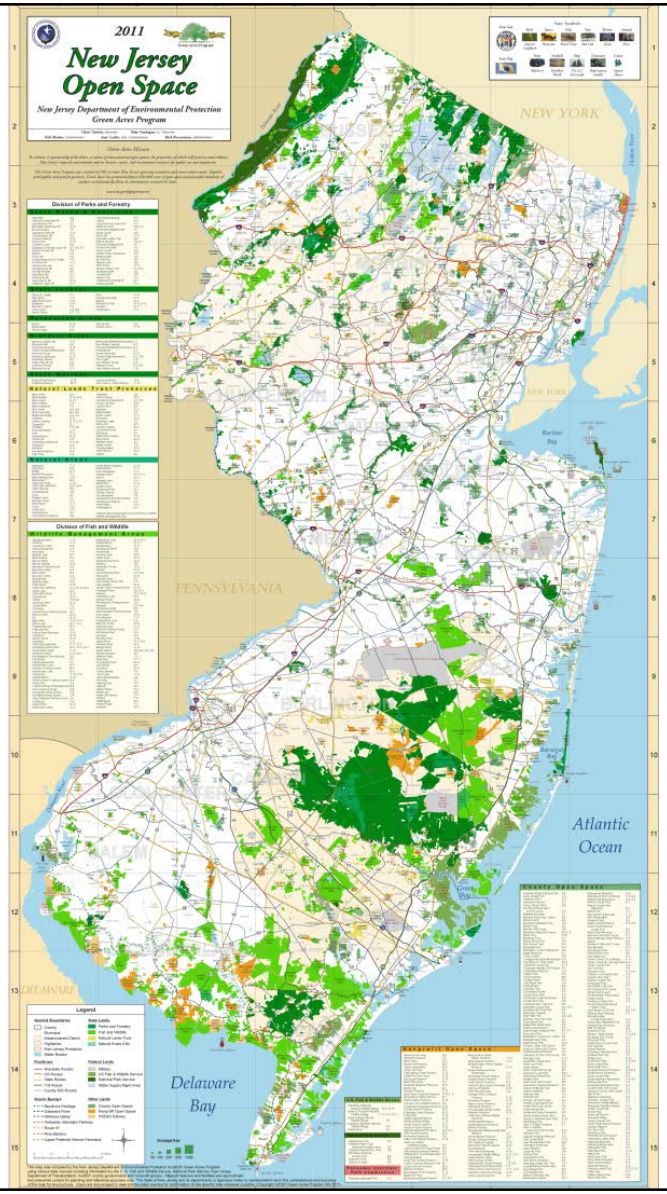
1978 - Jersey Pinelands National Reserve created;

1995 - Sprawl extends - completion/expansion highways;

2000 - Extensive clearing of forests due to increased residential development (2004 Highlands Act);

2050 - Projected future landscape shows continued forest conversion to development, though extensive forest lands remains in the Pinelands, Highlands and Kittatinny Ridge due to regional planning and open space protection efforts.

http://www.crssa.rutgers.edu/projects/lc/1600to2050

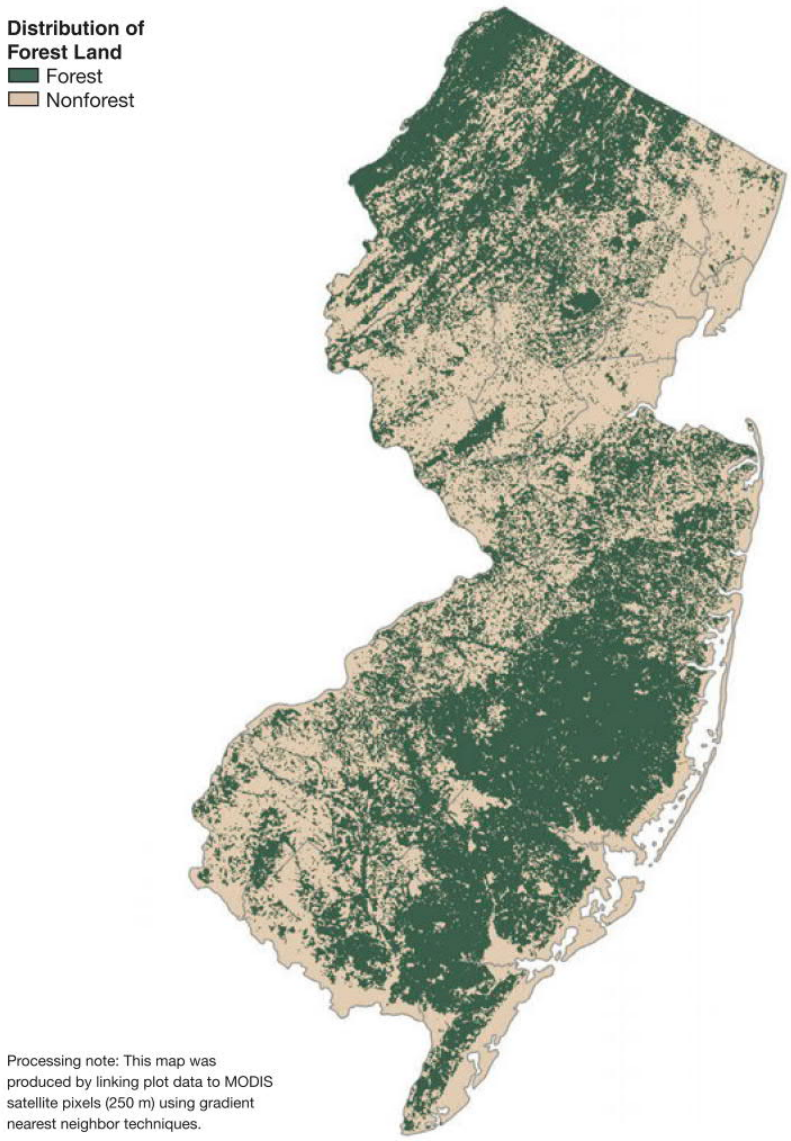


Acquisition Success

- NJ has had one of the best open space land acquisition programs in the country – Garden Space Preservation Trust
  (Green Acres, Farmland Preservation Trust, Blue Acres);
- NJ anticipated to be the first state in the country to reach complete build-out of developable land;
- Projections estimating that less than one million acres of developable land remain;
- Humans have deprived many natural systems of their ability to self-regulate.

New Jersey's Forests

- 2 million acres (40%) of NJ is forest;
- Forest area has remained relatively consistent since 1971;
- Nearly half of NJ forest land is privately owned;
- NJ forests are largely middle-aged, lacking a diversity of age classes;
- NJ forest land is projected to decrease in area over the next 50 years.



USDA Forest Service

Forest Inventory and Analysis (FIA)

Annually re-measure permanent inventory plots throughout the country

Goal to re-examine plots every five years (20 percent annually) to provide a rolling inventory

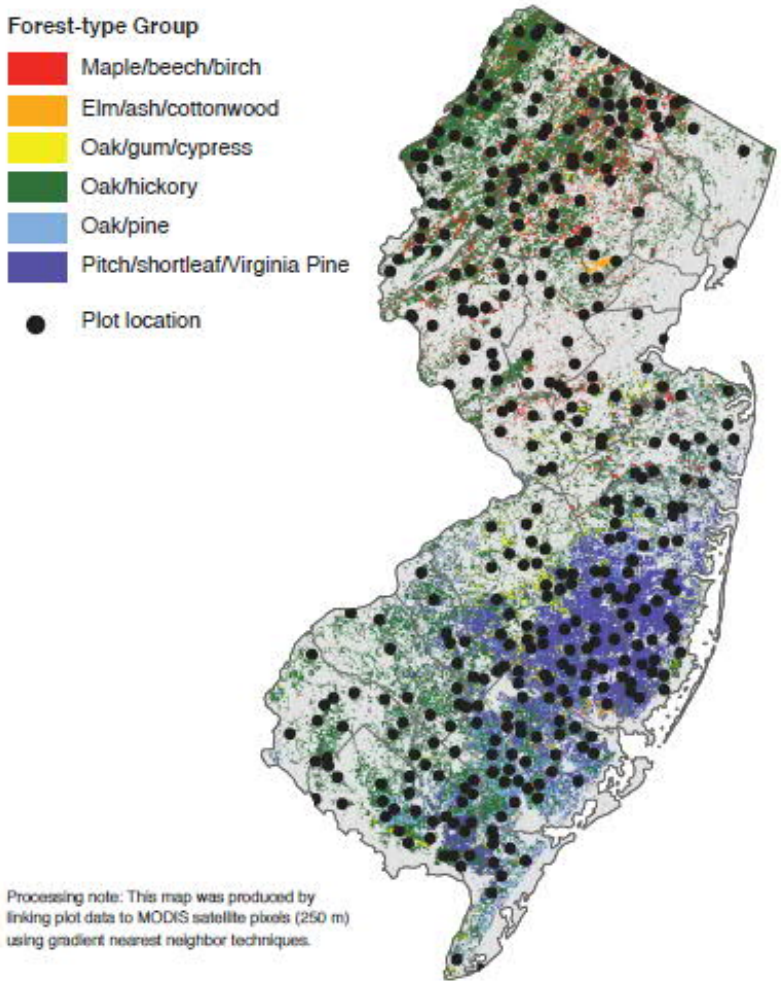
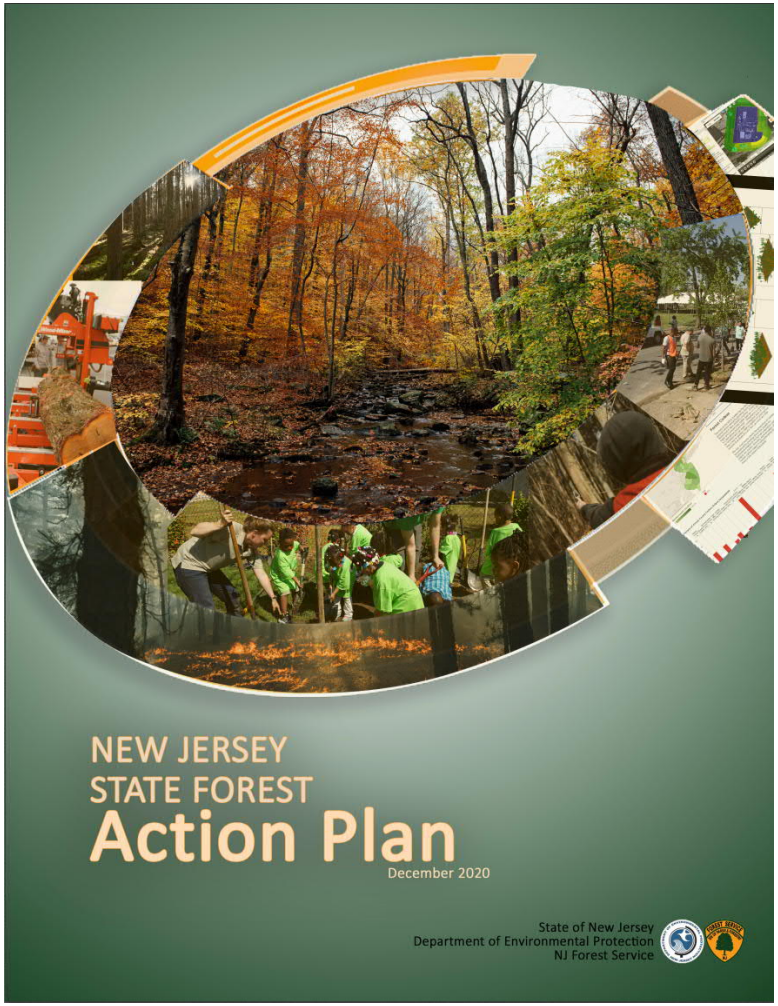
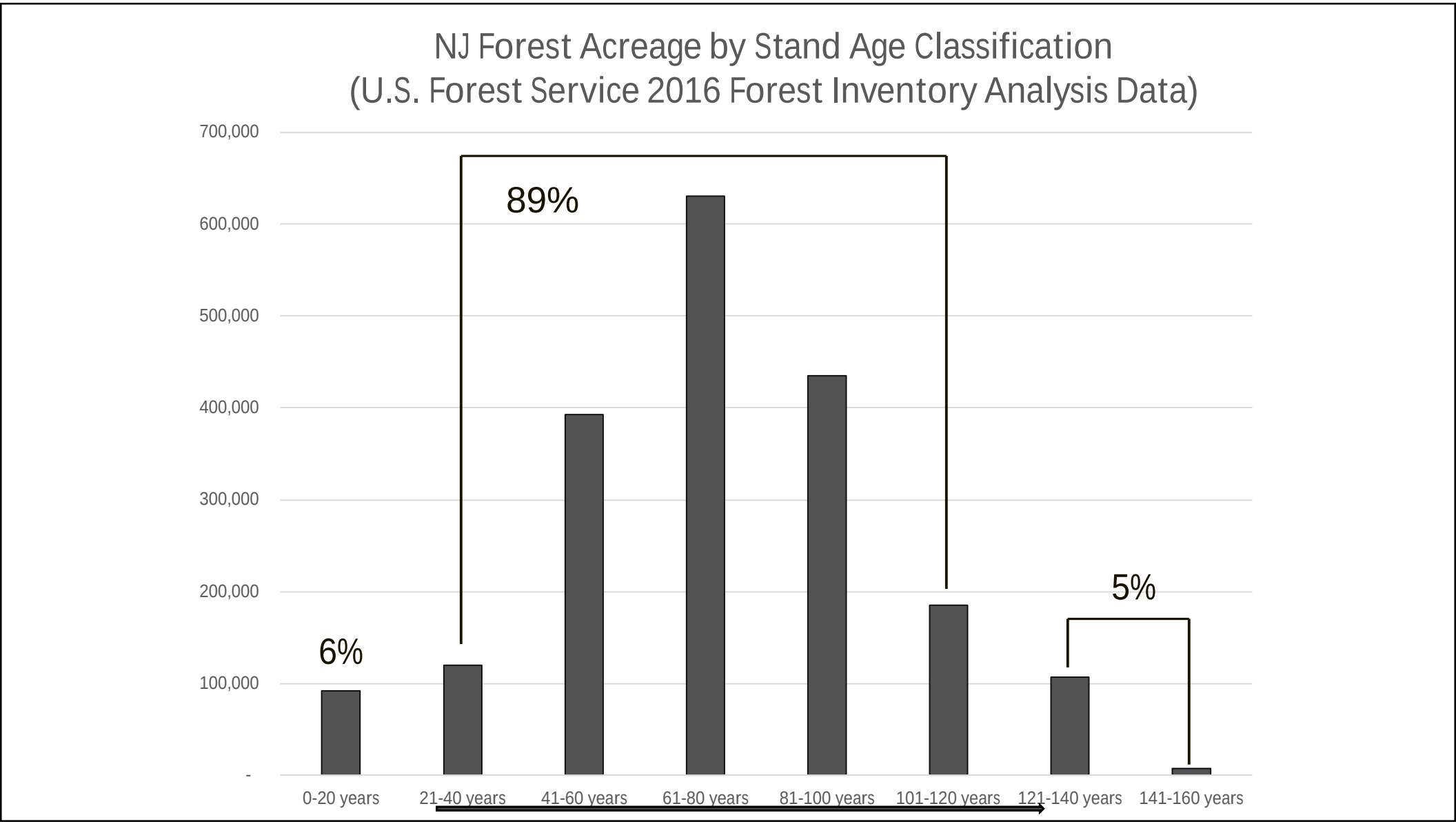


Figure 2.—Distribution of forested FIA plot locations and forest land by forest-type group, New Jersey, 2008. Plot locations are approximate.



New Jersey
State Forest Action Plan (NJSFAP)
https://www.njparksandforests.org/forest/njsfap/


NJ Forest Acreage by Stand Age Classification
(U.S. Forest Service 2016 Forest Inventory Analysis Data)
700,000
600,000
500,000
400,000
300,000
200,000
100,000
-
89%
6%
5%
0-20 years
21-40 years
41-60 years
61-80 years
81-100 years
101-120 years
121-140 years
141-160 years

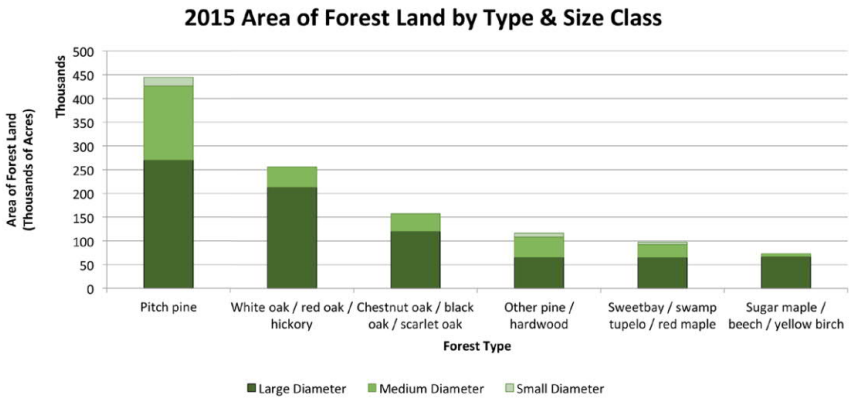


Figure 11. Area of forest land by forest type and size class in 2015. (FIA 2018)

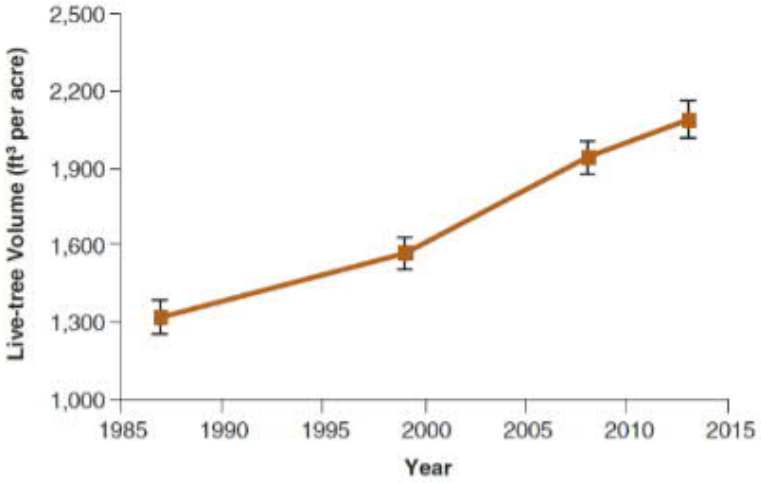
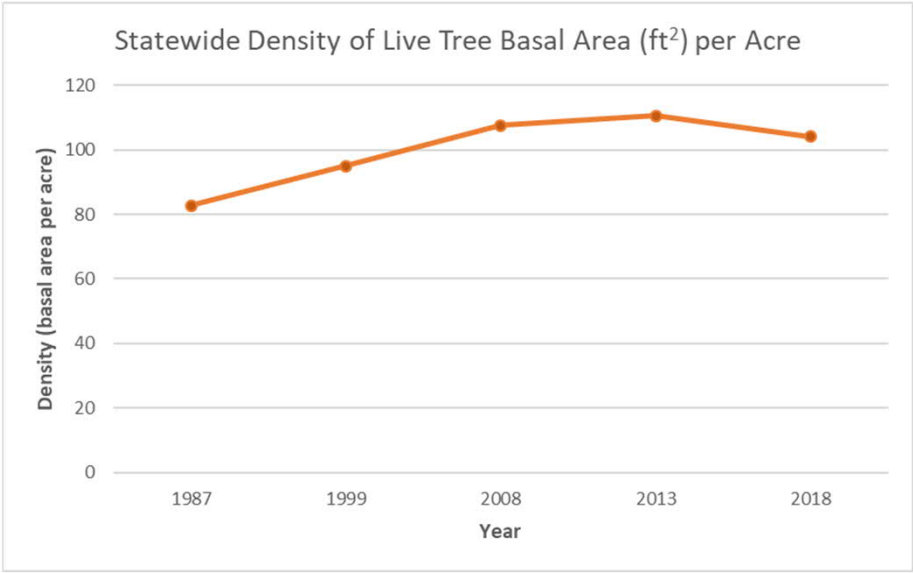
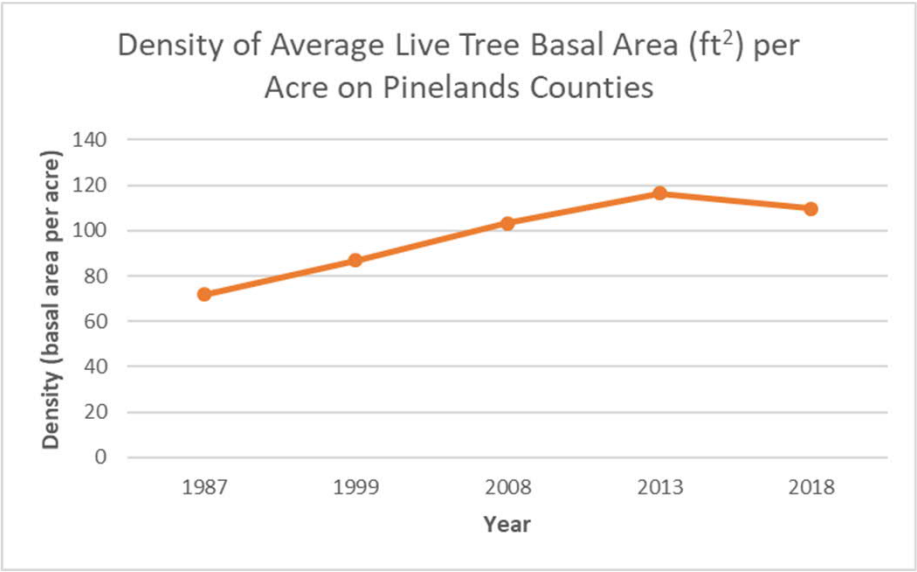
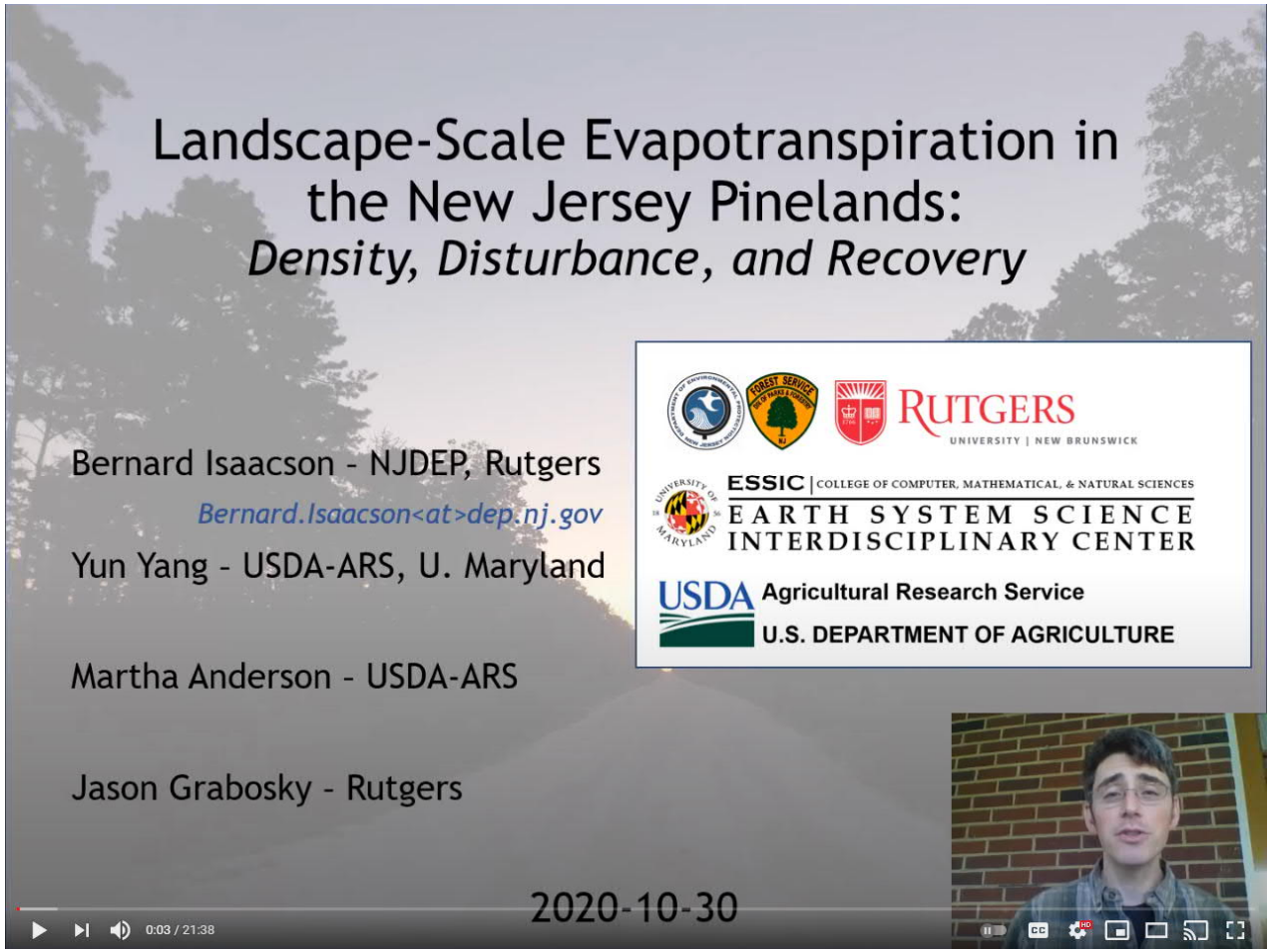
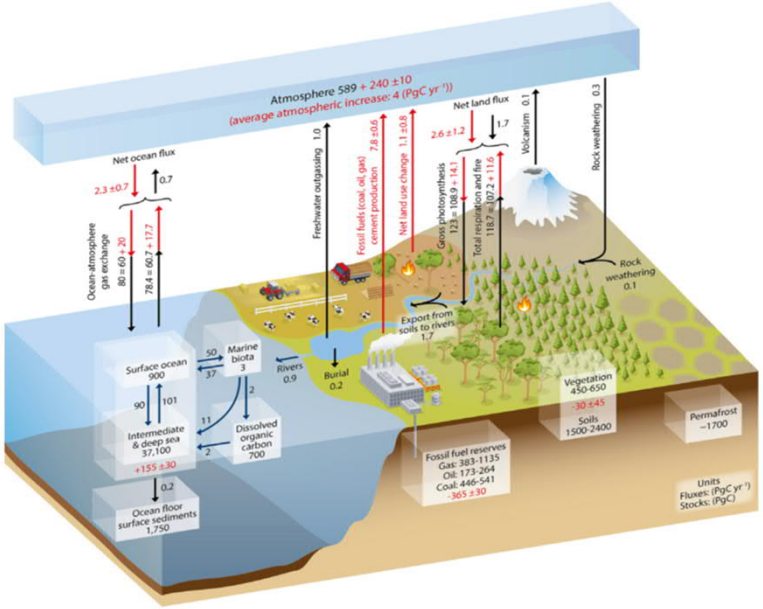


Figure 13.—Live-tree volume per acre on timberland by inventory year, New Jersey. Error bars represent a 68 percent confidence interval.

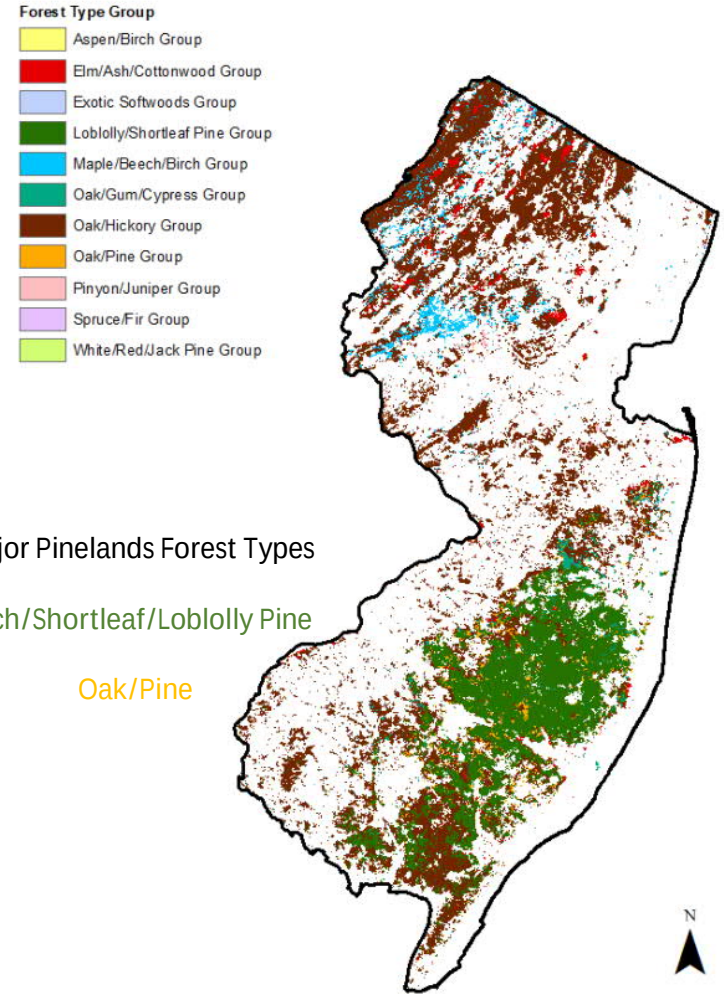








Evapotranspiration in the NJ Pinelands -
http://bit.ly/njevapo



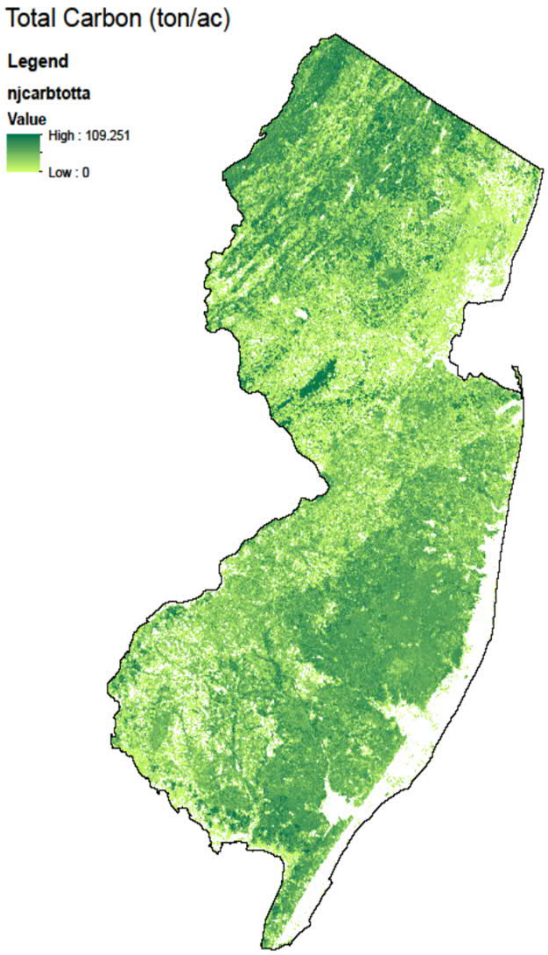
Major Pinelands Forest Types

Pitch/Shortleaf/Loblolly Pine

Oak/Pine

Figure 10. Major forest type-groups of New Jersey Forests. (NJFS, 2019) forest land by forest type and size class in 2015. (FIA, 2018)

Forest Carbon



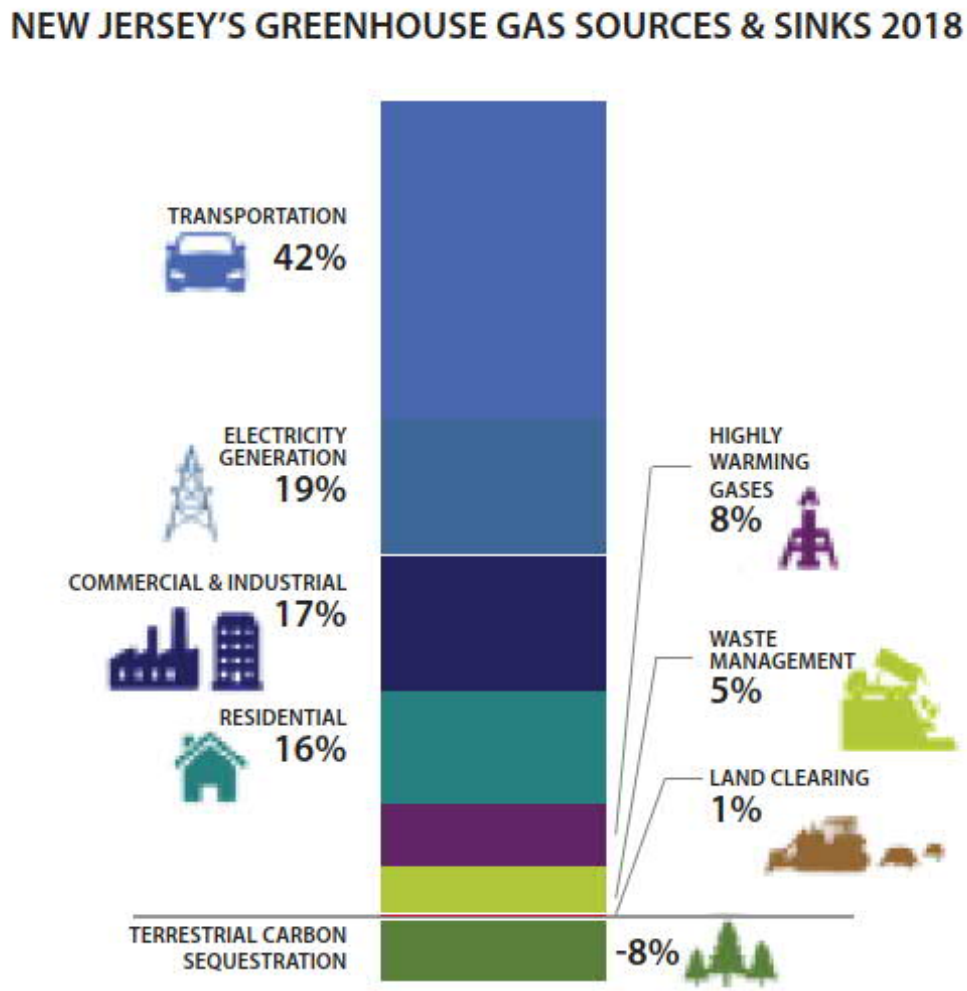


Figure 70. New Jersey's greenhouse gas sources and sinks. (RGGI Scoping Document, 2018)

- Two-thirds of statewide biomass contained in the stems of growing-stock trees
- Oak/hickory forest type-group contains largest amount of live tree aboveground biomass;
- Loblolly/shortleaf pine forest type-group is the next largest.

Forest Carbon Pools

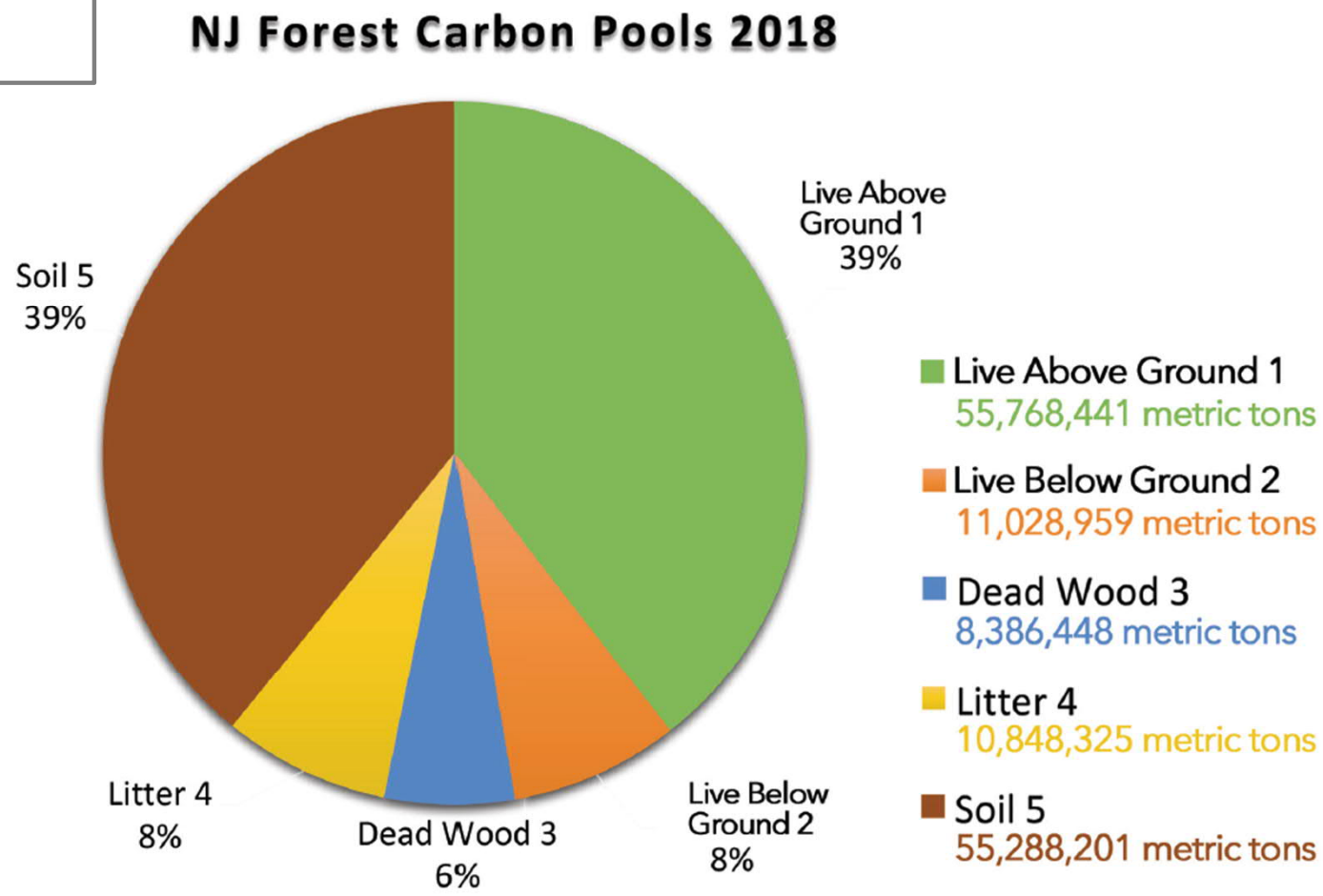
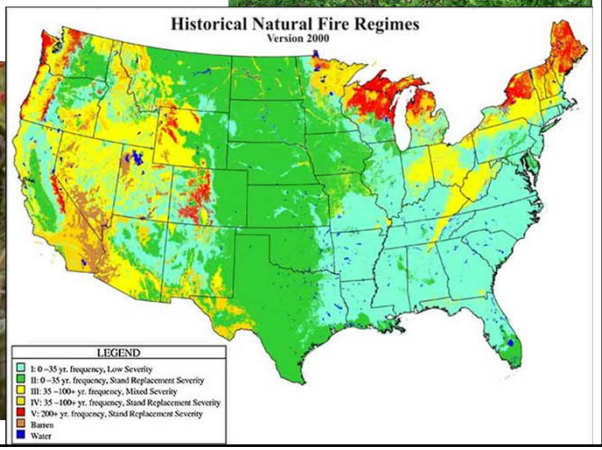


Figure 69. Forest carbon pools by percentage for New Jersey in 2018. (FIA)

Data:
USFS 2018
Figure:
NJFS 2019

Impacting Natural Resources

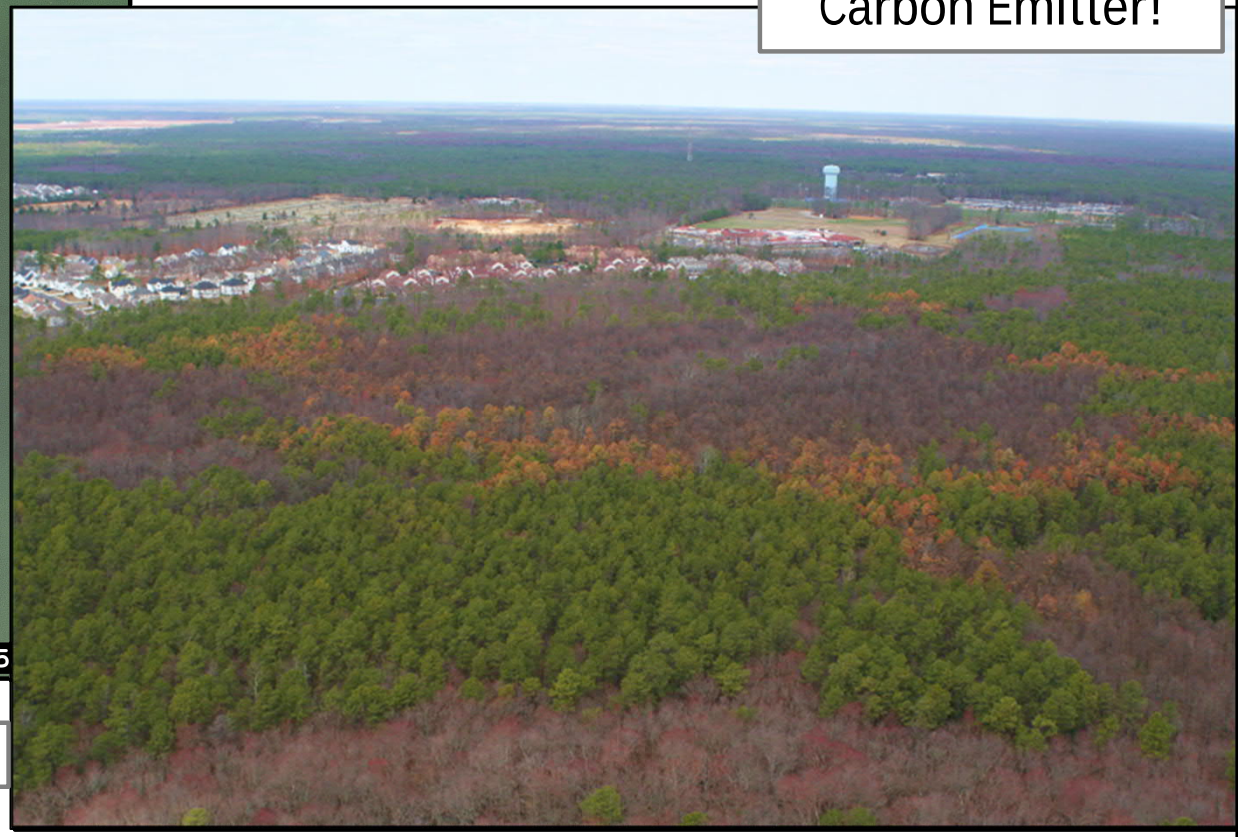
- Climate Change
- Fragmentation & Development
- Invasive Species
- Insects and Disease
- White-tailed Deer
- Fire Suppression
- Declining Species
- Forest Age Class / Structure



Southern Pine Beetle
(*Dendroctonus frontalis*)
Eruptive Outbreak

Erich G. Vallery, USDA Forest Service – SRS-4552, Bugwood.org

SFAP Goal:
Don't Let Forests Become a Net Carbon Emitter!



NJFS

Ronald F. Billings, Texas A&M Forest Service, Bugwood.org

Climate

- Warmer and wetter climate
- Increased storm frequency and severity
- Impacts of sea level rise
- Increasing growing degree days (forest pests)
- Tree species range shifts

NJ Wildfire History and NJ Wildfire Potential

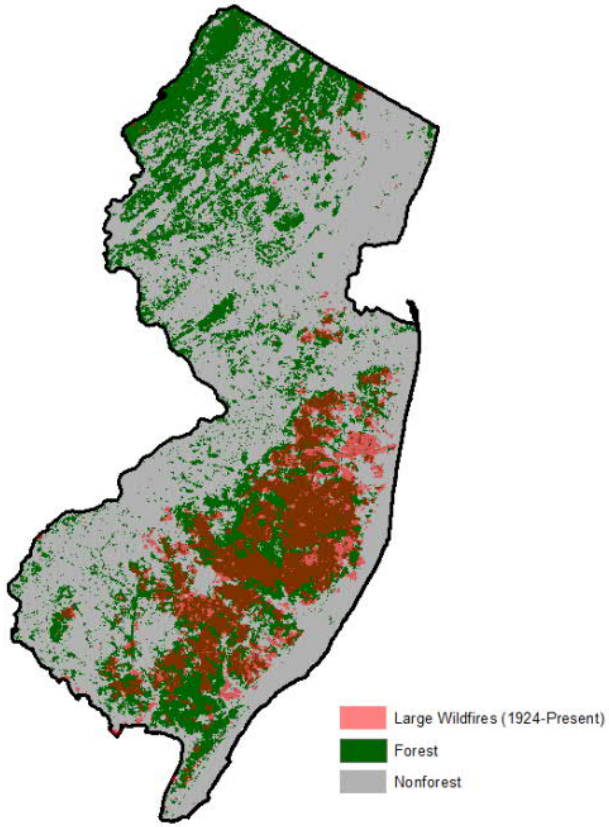


Figure 45. Spatial distribution of large wildfires from 1924-present for New Jersey. (NJ DEP 2020)

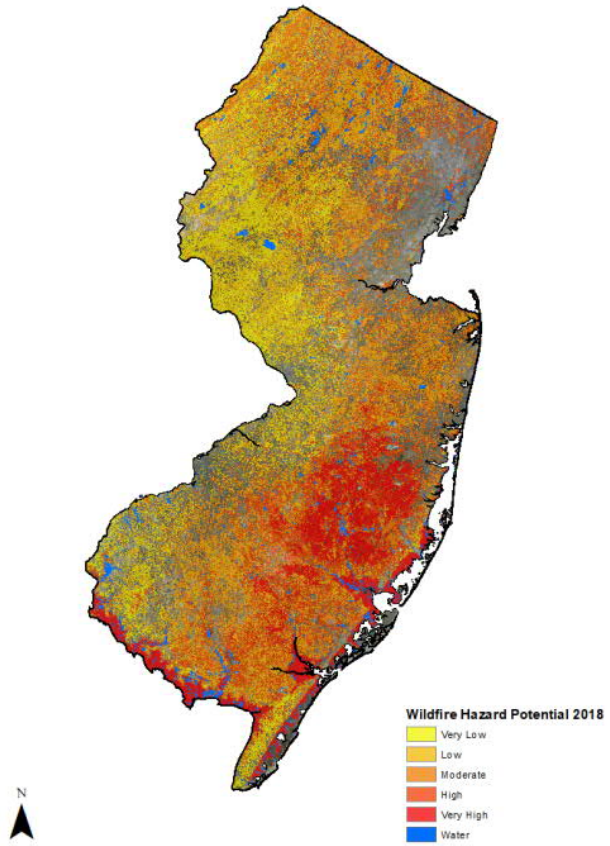


Figure 46. New Jersey wildfire hazard potential for 2018. (NJ DEP)

USDA | WILDFIRE RISK TO COMMUNITIES | Search by state, county, community | Take Action | Download | Glossary

New Jersey

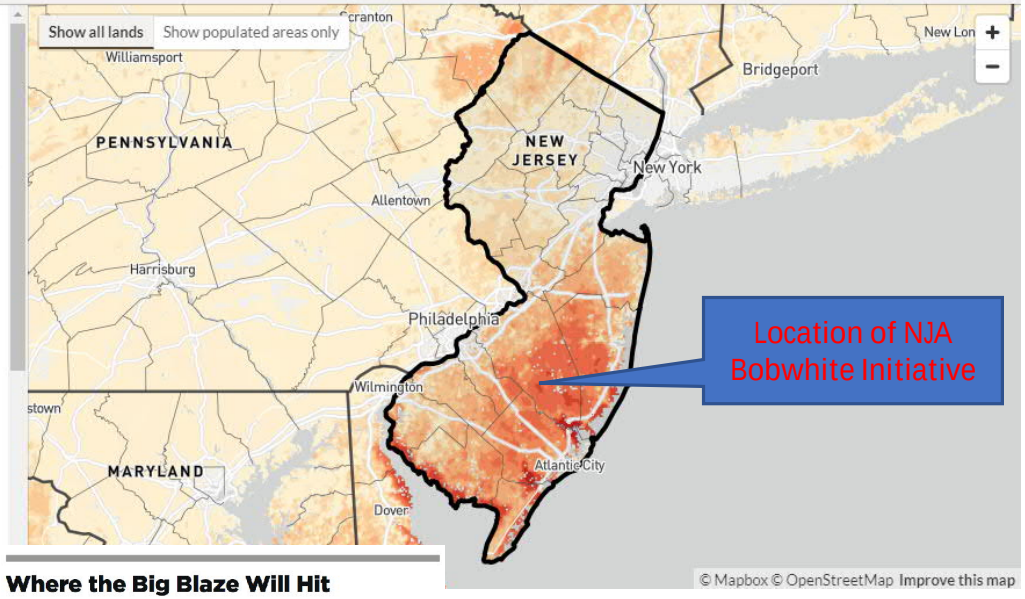
Risk to Homes | Exposure Type | **Wildfire Likelihood** | Vulnerable Populations

Wildfire Likelihood

Populated areas in New Jersey have, on average, greater wildfire likelihood than 50% of states.

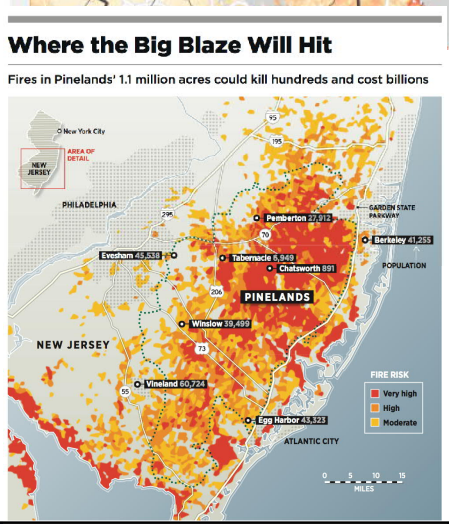
Wildfire likelihood
Lower — Higher

Population
Lower — Higher



Spring Hill Fire Penn State Forest April 2019

11,638 acres



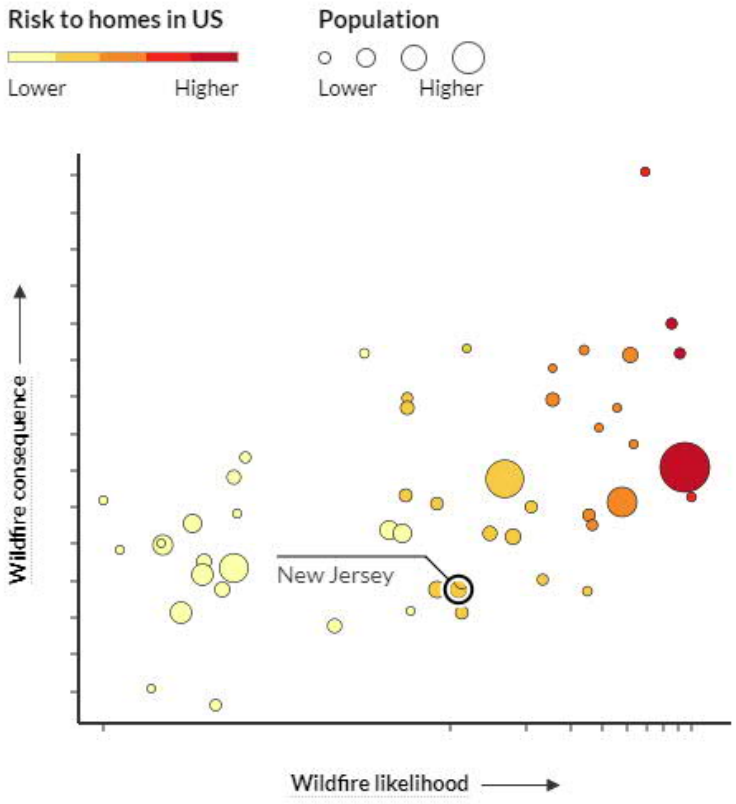
Winslow Big Timber Fire May 2020

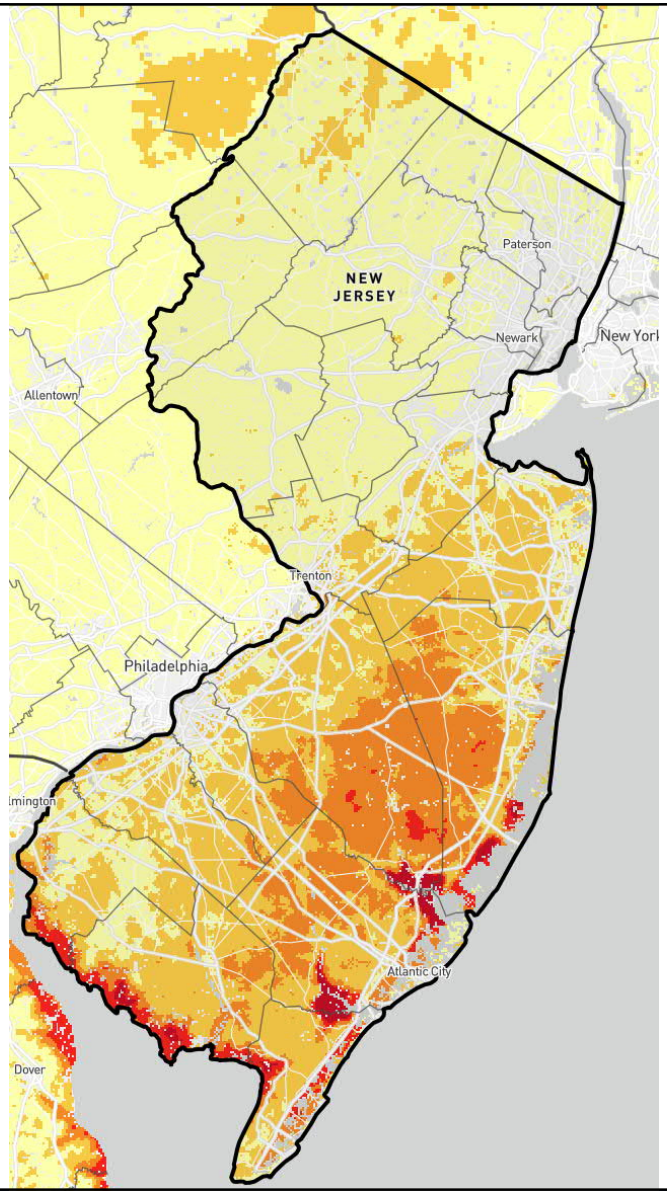
2,100 acres

New Jersey

Risk to Homes

Populated areas in New Jersey have, on average, greater risk than 54% of states.

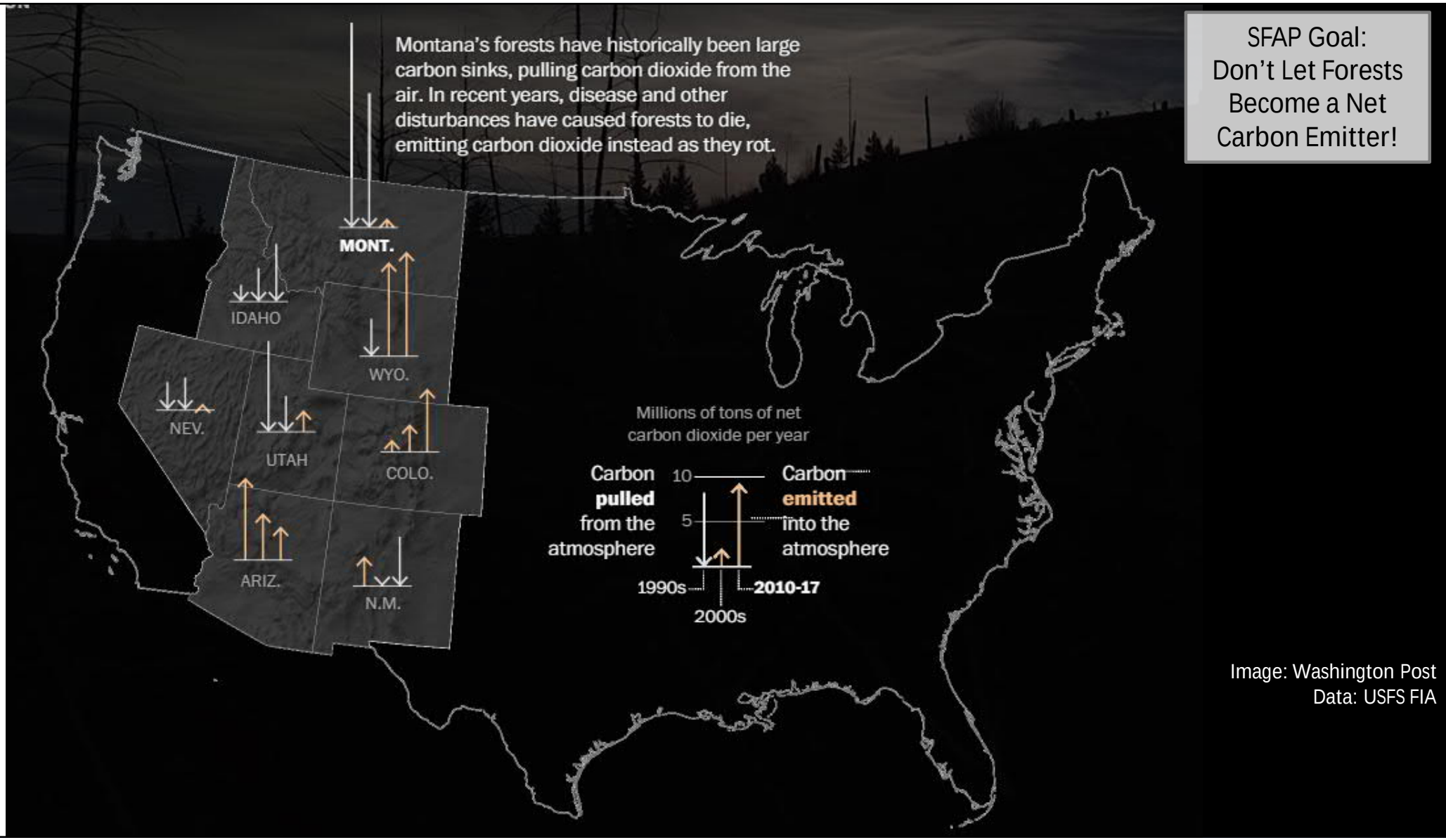




Climate Stress

- Competition Stress
  - Massive long-term pest risk
- Maladaptive Composition
  - Mesic-northern forest species replacing xeric-forest species
- Continuity of ecosystem processes* threatened
  - Can't count on stability

** as we understand and depend them*



SFAP Goal:
Don't Let Forests Become a Net Carbon Emitter!

Image: Washington Post
Data: USFS FIA

Free to Grow…

1907
Annual Report
of the
Forest
Park
Reservation

...Competition Stress

Photo:
NJFS

Now a Net-Emitter

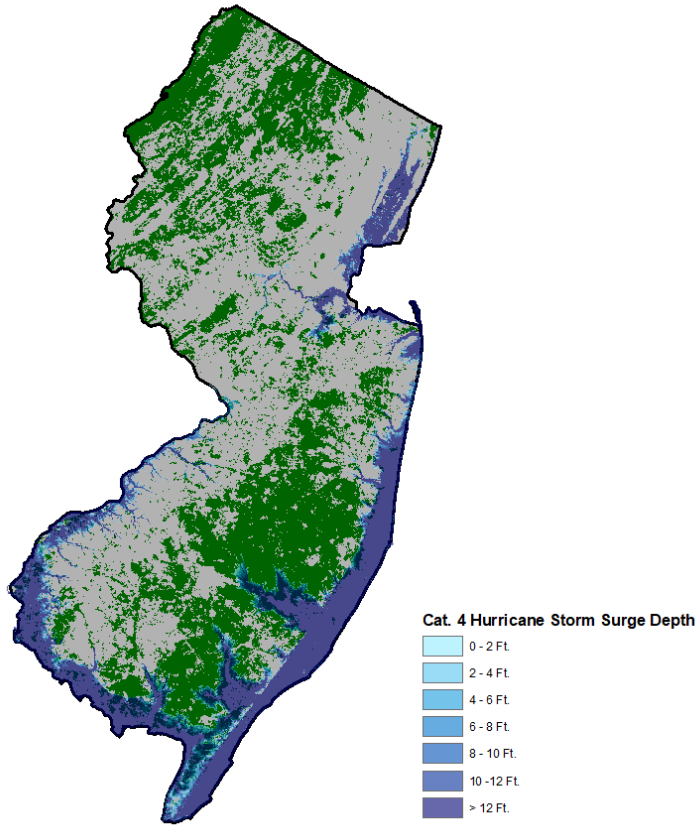
Photo: NJFS

Carbon and Forest Conservation

- Manage for more resilient forests

- Recognize impacts of climate change on management decisions

  - *Influence forest restoration site choices*
  - *Assisted migration of suitable species*
  - *Prepare for alterations in forest pest impacts, higher variation in rainfall, changing fire seasons, etc.*



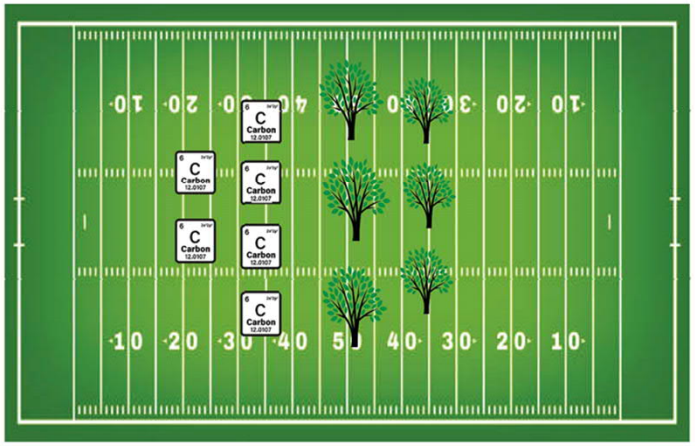
Carbon and Forest Conservation

BY MANAGING OUR FORESTS

CARBON DEFENSE

'Protect the Carbon Pool!'

- Manage density
- Restore ecosystem function
- Acquire and maintain forest land



CARBON OFFENSE

'Expand the Carbon Pool!'

- Plant trees
- Accelerate tree growth and store carbon in wood products
- Avoid emissions through Urban and Community Forestry

GOOD FOREST MANAGEMENT IS GOOD CARBON MANAGEMENT!

Manage Risk ----------> Increase Storage & Sequestration

Carbon and Forest Conservation

Good Forest Management is Good Carbon Management

Carbon Offense

- Afforestation
- Reforestation
- Forest Restoration
- Urban & Community Forests

Carbon Defense

- Avoided Emissions
- Avoided Conversions
- Urban Forest Stewardship

Findings of the U.S. Forest Service's Northern Forest Futures Project (2016)

- Northern forests lack age-class diversity and will uniformly grow old without management interventions or natural disturbances.
- The area of forest land in the North will decrease as a consequence of expanding urban areas.
- Invasive species will alter forest density, diversity, and function.
- Management intensity for timber is low in Northern forests and likely to remain so.
- Management for nontimber objectives will gain relevance but will be challenging to implement.

https://www.nrs.fs.fed.us/futures/

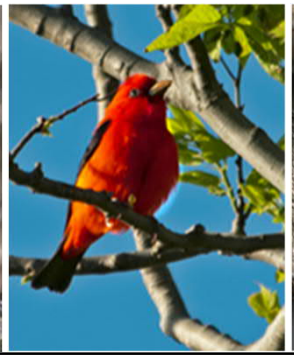
Forest Stewardship Planning & Implementation

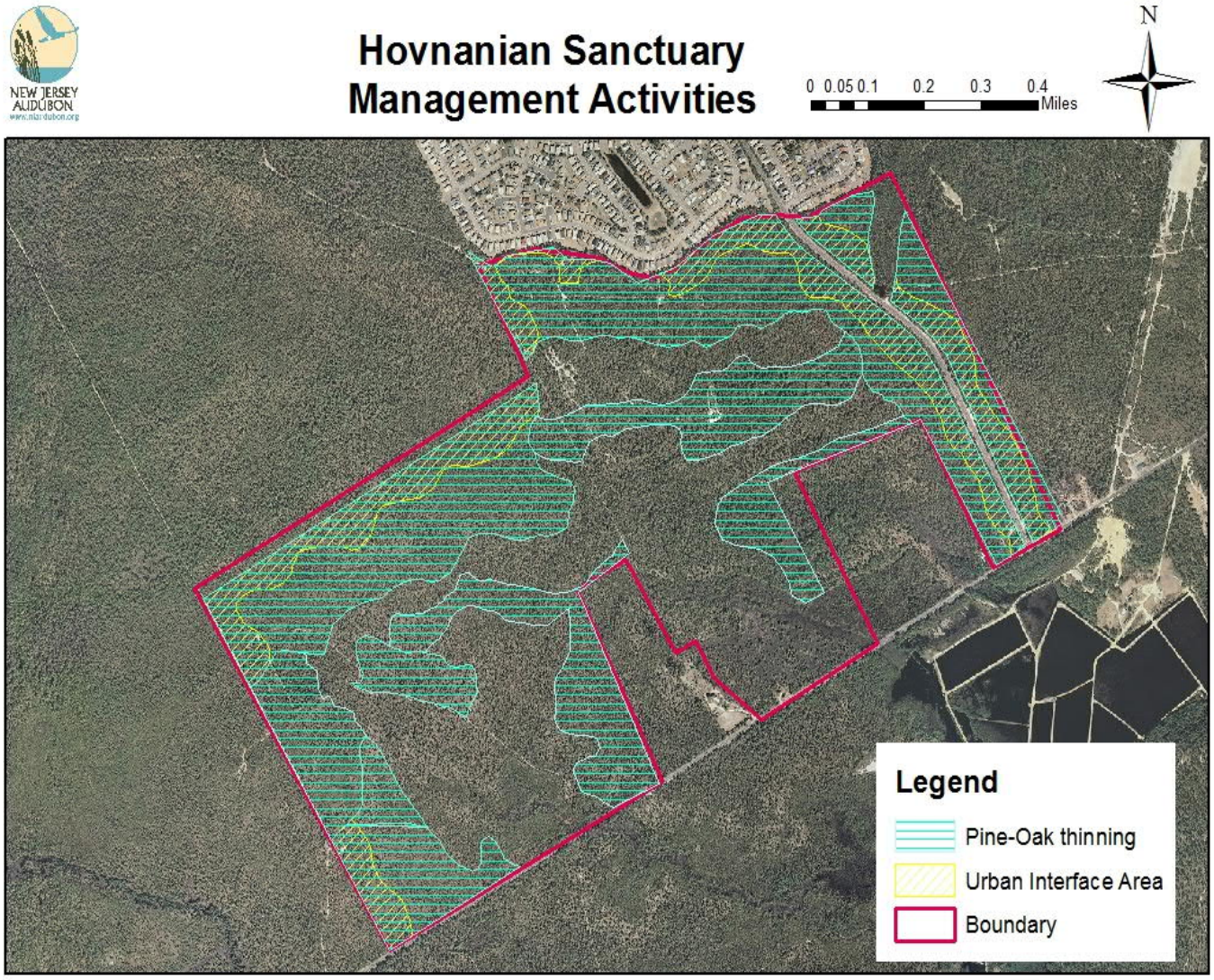
- Public & Private Lands
- Addressing Landowner Interests – wildlife, water, aesthetics, tax abatement
- Restoring Golden-winged Warblers, Northern Bobwhite, Young & Old Forest Species
- Outreach & Education
- Invasive Species Management
- Habitat & Species Monitoring
- Adaptive Management









This map was created by G. MacGregor of the New Jersey Audubon Society and updated January 2007. Datalayers are from NJDEP GIS coverages.

Hovnanian Sanctuary

Since 2011:

- 12 acres of Atlantic white cedar restoration
- 325 acres of fire adapted pitch pine restoration with urban interface treatments
- 250 acres prescribed burn
- Snake den enhancements

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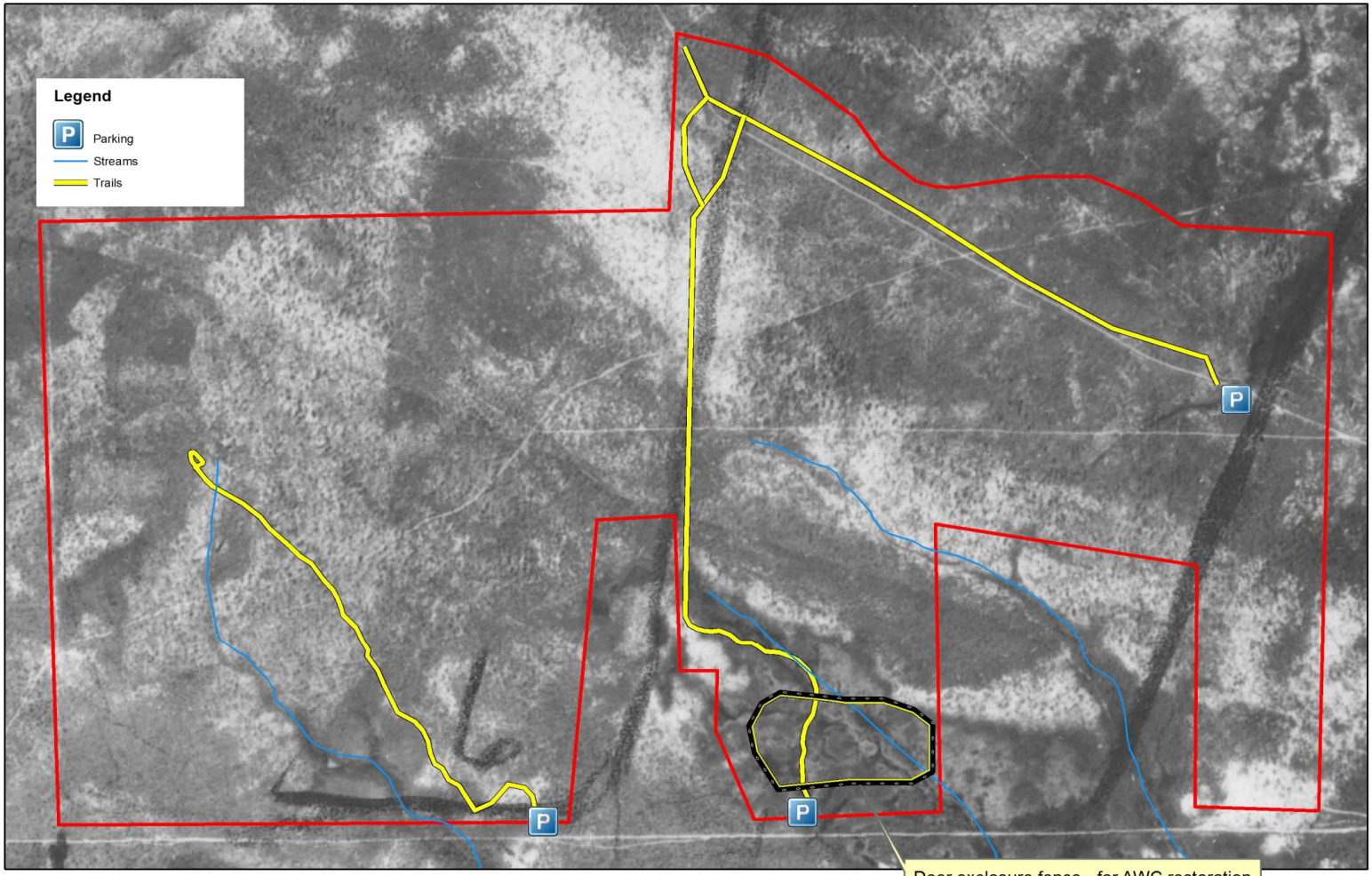
Hovnanian Sanctaury - 1930

N

0 0.05 0.1 0.2 0.3 Miles



This map was created by G. MacGregor of New Jersey Audubon and updated September 2015.

Hovnanian Sanctuary - Woodland Management
2015 Proposed Area (hashed line)

0 0.1 0.2 0.4 0.6 Miles

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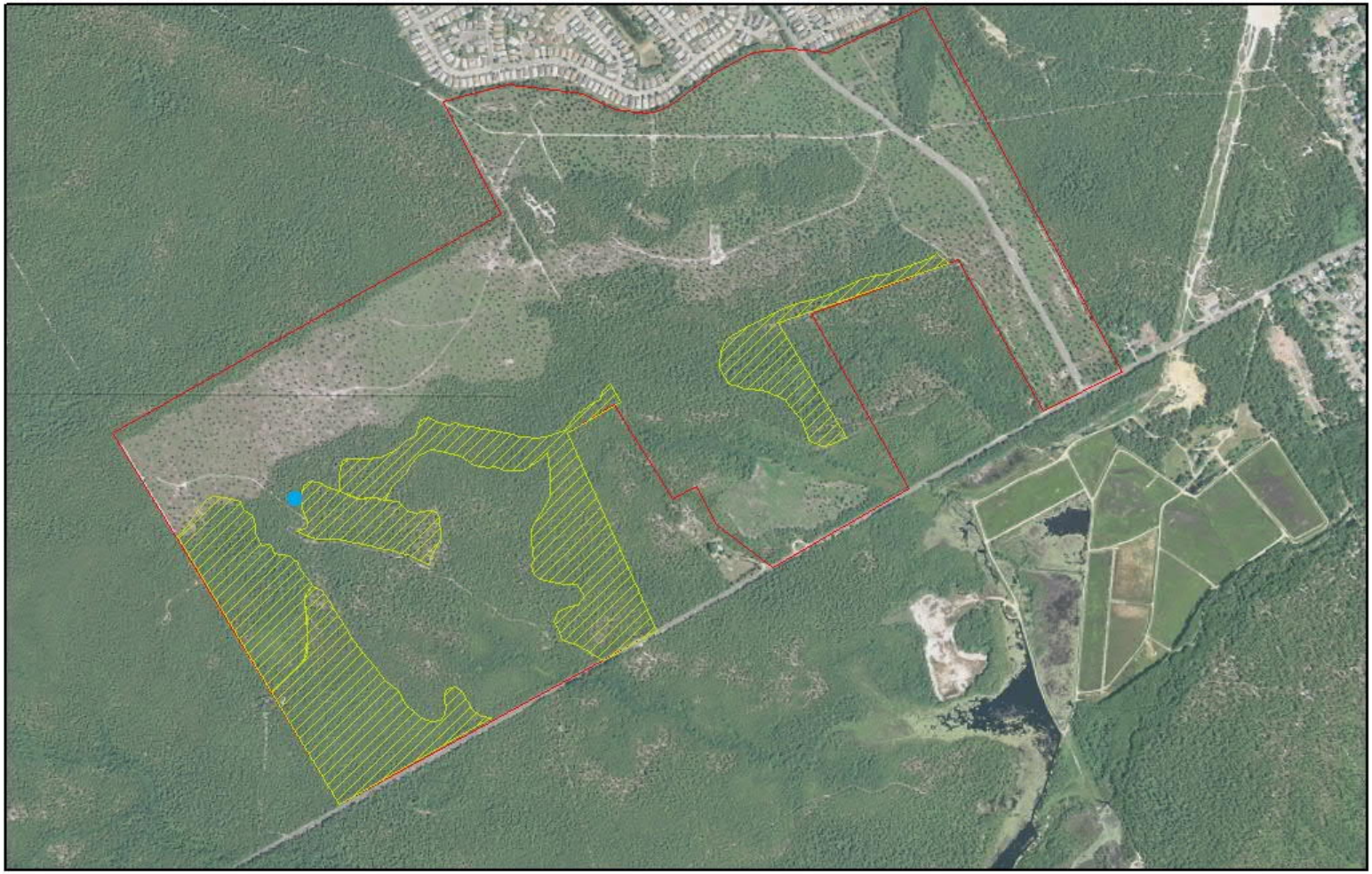

This map was created by G. MacGregor of New Jersey Audubon and updated January 2015. 2013 Imagery from NJDEP. Treatment areas from approved FSP.

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Northern Bobwhite Restoration Initiative

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TALL TIMBERS
Research Station & Land Conservancy

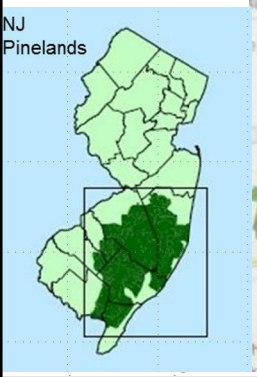
UNIVERSITY OF DELAWARE
1743

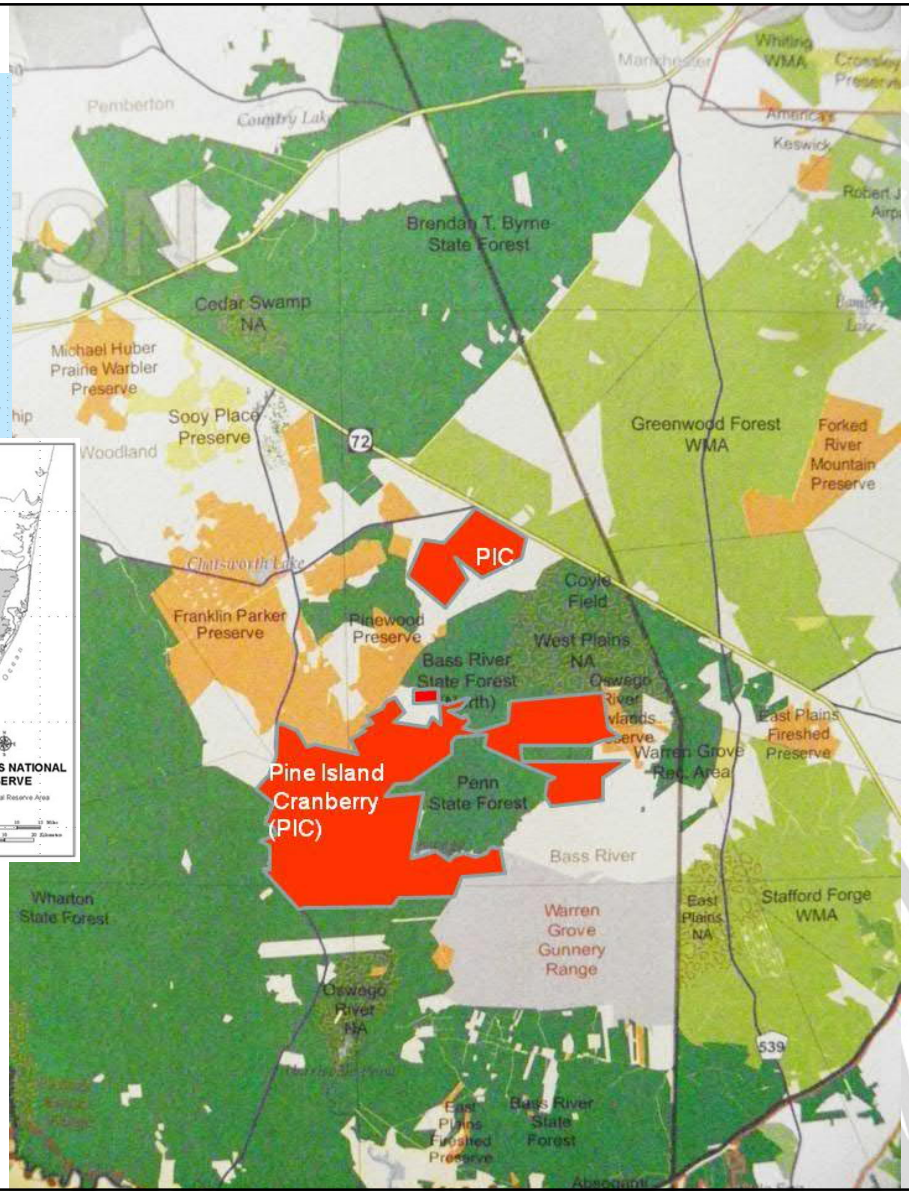
NEW JERSEY DIVISION OF
Fish and Wildlife

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

PINE ISLAND
CRANBERRY CO. INC.

Pine Creek Forestry LLC
2017 Award Recipient

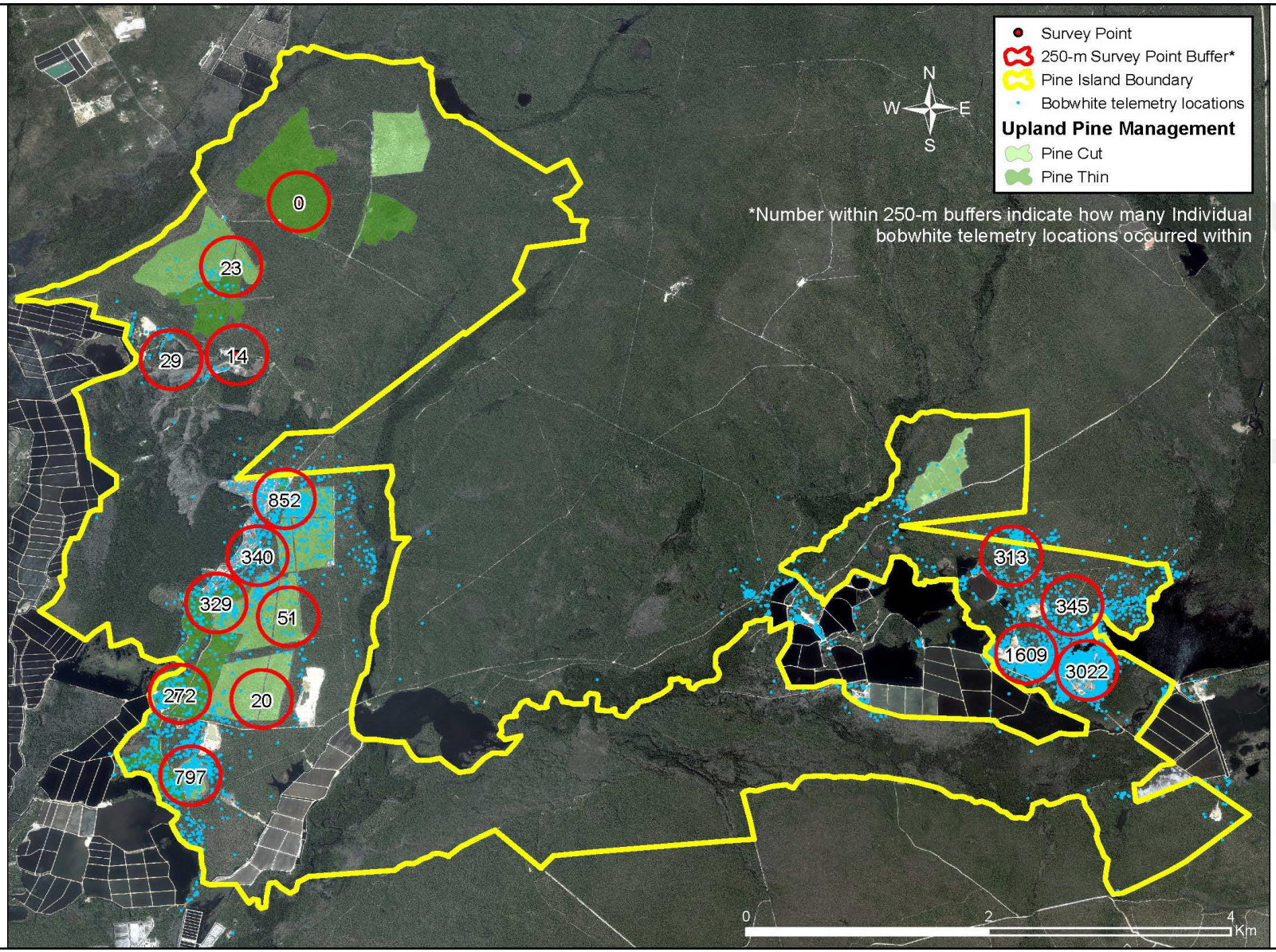




Pine Island Cranberry site
Encompasses over 17,000 acres of
Privately Owned Land

Area historically harbored wild Northern Bobwhite. Pen raised quail are not released on the property, no hunting of upland game birds in general is allowed on property.

PIC implementing forest stewardship plan since 2001 –large tracts of quality habitat currently exist.



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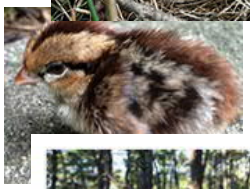
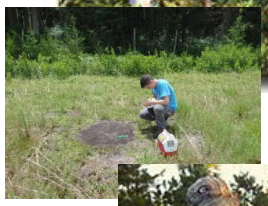
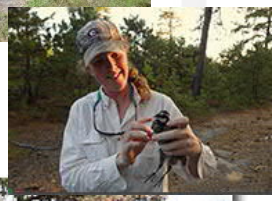
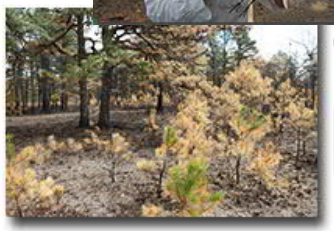
Highlights - Efficacy of Using Translocation to Recover Bobwhite Populations in the Mid-Atlantic States





A total of 320 wild birds have been released and radio tracked via telemetry at the PICC site

A total of 47 nests have occurred (1st confirmed nesting of wild Bobwhite in Pinelands since the 1980s)

173 confirmed chicks have hatched to date in the wild

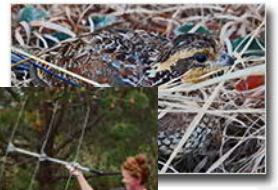
Translocated Bobwhite were confirmed to over-winter from year to year

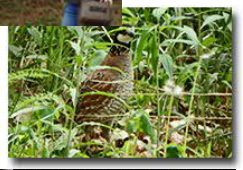
Translocated Bobwhite from previous years confirmed pairing with newly released Bobwhite

Confirmed nest success of double-clutching

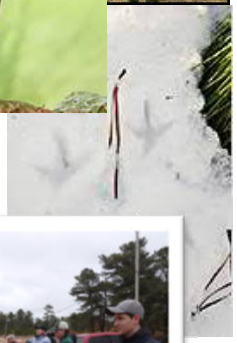
Confirmed nest success of a males incubating nest to fruition were also achieved.

Mammalian Predator Abundance Survey Complete – Site average score (4 years) 25.6%










NEW JERSEY AUDUBON

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Forest Values and Ecosystem Services

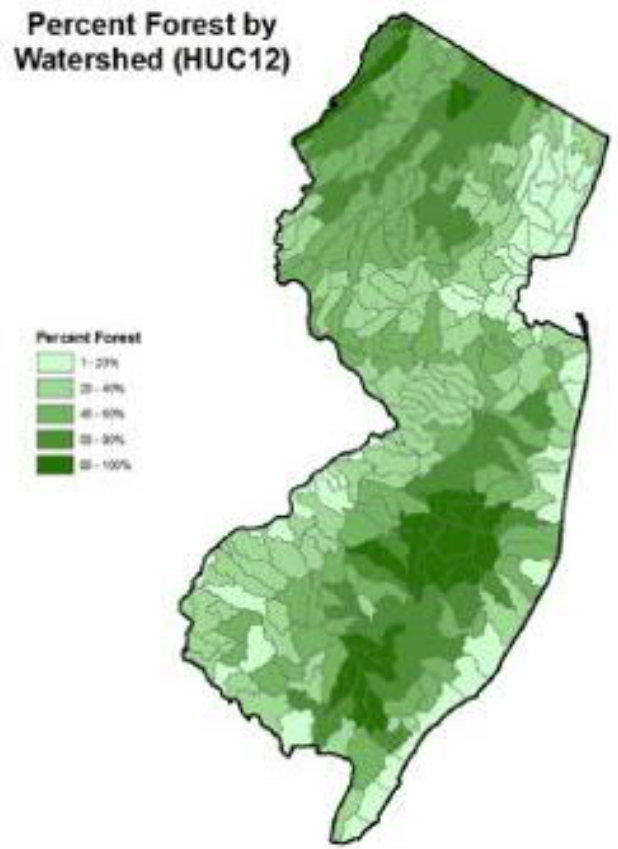
- Biodiversity tied to changes in ecosystem function (important for forest resilience and indicator of ecosystem health)
- Functioning forests impact water budget and quality
- Age class reflects how NJ was settled and land use changes
- Increased density (trees occupying greater growing space/outside historic range of natural variability)
  - Statewide concern i.e. fire risk, lack of diversity, even-age class, stress on water, carbon vulnerability

Forest Conservation

- Density management
- Fire mitigation
- Forest health and monitoring

Forest and Watershed Conservation

- Manage for diverse forest structure and composition
- Adapt to human pressures on forest ecosystem
- Encourage forest stewardship plans
- Manage to protect surface water and aquifer recharge
- Continue and improve forest monitoring



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United States Department of Agriculture
Natural Resources Conservation Service

NEW JERSEY AUDUBON SOCIETY

New Jersey Fact Sheet:
White-tailed Deer Impacts and Forest Management

Introduction
The white-tailed deer (*Odocoileus virginianus*) is a large native mammal that occupies most of North America and has a range extending throughout New Jersey. This species uses a wide variety of habitats, including forests, open grasslands, agricultural fields, wetlands and suburban land. Deer feed primarily on grasses, herbaceous plants, and fruits while providing food for large predators, such as gray wolves, cougars, bobcats, and coyotes. These animals are active year-round, and in late summer through winter they become more opportunistic, feeding on acorns, woody vegetation, and agricultural crops.

After European settlement, unregulated harvest of deer led to a significant decrease in the species, but many environmental and social changes have since led to a population explosion. In the early 1900s, strict regulatory action was implemented in many eastern states in an effort to increase the deer population. This effort was highly successful, but as the population recovered, large predators, such as the eastern cougar, were hunted in many areas to local extinction. Without pressures from predation, white-tailed deer flourished. In New Jersey large forest tracts have been fragmented and cleared for development, creating more open "edge" habitat, which provides valuable resources to white-tailed deer. These changes, along with a high reproductive rate, have caused the white-tailed deer population in New Jersey to reach numbers far above those of pre-settlement times. As of 2010, white-tailed deer in New Jersey numbered an estimated 111,250 individuals, with some areas having a density as high as

Male white-tailed deer (US Fish and Wildlife Ser

114 deer per square mile. At this densit
negatively impact forest health, ecosyst
activity, and the health of local deer pop

Impacts of Deer Overpopulation
White-tailed deer can have significant e
health, species composition, and econor
Because deer are herbivores, they dedic
amount of time to foraging, which can l
negative impacts when the population is

Ecological Impacts

- Deer may browse herbaceous plants
  seedlings, lowering local abundanc
- Browsing impairs plant regeneratio
  succession.
- Heavy browsing reduces the height,
  diversity of the forest understory an
  lowering habitat value for other ani
- Deer tend to avoid particular plants,
  ferns, Japanese barberry, and white
  leads to a shift in plant composition
  by non-native plants.
- Deer may transport seeds from inva
  native plants by consuming and exc

Signs
There are several signs a landowner can look for in order to determine if a forest stand has excessive browse. Typically, these indicators will be addressed in a Forest Stewardship Plan prepared by a professional forester.

The area up to the browse line, 5 feet above the ground, lacks vegetation and structure (National Parks Service, 2010)

Species that are unpalatable to deer, such as hay-scented fern, dominate the ground (USDA Forest Service, 2010)

Chew marks
plants (USD

NRCS
United States Department of Agriculture
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NEW JERSEY AUDUBON SOCIETY

NJ Biology Technical Note:
White-tailed Deer Impacts and Forest Management

Introduction
The white-tailed deer (*Odocoileus virginianus*) is a large, hooved native mammal that occupies most of North America and has a range extending througout New Jersey. This species can use a wide variety of habitats, including forests, open grasslands, agricultural fields, wetlands and suburban land. Typically, white-tailed deer thrive in areas made up of a mosaic of early to late successional forests as well as scrub-shrub meadows. As herbivores, deer play a crucial role in the ecosystem, providing food for large predators such as gray wolves (*Canis lupis*), cougars (*Puma concolor*), bobcats (*Lynx rufus*), and coyotes (*Canis latrans*). They feed primarily on grasses, herbaceous plants, fruits, and legumes and are active throughout the year. During the late summer through winter, white-tailed deer are more opportunistic, feeding on acorns, woody vegetation, and agricultural crops. After European settlement, the white-tailed deer population in eastern North America began to decline due to overexploitation and unregulated harvest. More recently, population trends over the past few decades have shown a rapid increase in the deer herd, particularly in New Jersey. As of 2010, the New Jersey white-tailed deer population was estimated at 111,250 individuals, with certain areas having a density as high as 114 deer per square mile. Although the population has decreased slightly since 1998, many areas still remain at a deer density that negatively impacts forest health, ecosystem balance, human activity, and the health of local deer populations.

Why Has the Population Increased?
Several environmental factors have influenced the deer population. These include predator abundance, habitat alteration, agricultural production, and

(Tom Stehn, USFWS, 2008)

Male white-tailed deer (US Fish and Wildlife Service, 2008)

land management regulations. When the deer population began to decline in the early 1900s, many eastern states implemented strict regulations to protect the species. This population recovery effort was very effective; however, the combination of this measure and other changes led to exponential growth. While the white-tailed deer population recovered, large predators, such as the eastern cougar (*P. concolor cougar*), were heavily hunted. Overexploitation of major carnivores in New Jersey eventually led to the extirpation of these species, so without pressure from predation, the white-tailed deer herd flourished. Land use in New Jersey has also changed dramatically, especially since the 1970s. Development has increased and large forest tracts have been fragmented and cleared to create agricultural land, roads, rights-of-way, and residential and commercial communities. This shift in land use throughout the state has created more open "edge" habitat, which provides valuable resources to white-tailed deer. When conditions are right, individual deer can reach sexual maturity in as little as 6 months and can give birth to 1 to 3 young per year. This potential to reproduce rapidly, along with changes to the ecosystem, has allowed white-tailed deer to reach numbers far above the presettlement population.

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Resources & Services

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- Forest Stewardship Plan Development
- FSP Implementation
- Grassland & Pollinator Habitat Guidance
- Property Management
- Educational Programs
- Wildlife & Habitat Monitoring
- NRCS Technical Documents to support Forest management

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Proforestation

William R. Moomaw et al., "Intact Forests in the United States: Proforestation Mitigates Climate Change and Serves the Greatest Good," Frontiers in Forests for Global Change 2 (2019): 1-10

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As characterized by Yale School of the Environment *The Forest School*:

- Proforestation is a recent political movement that aims to prevent forest management in the United States under the assumption that excluding humans from forests will serve as a climate change mitigation tool
- Omits important aspects of forest carbon science
- Appears to be premised on a single opinion article
- We lack a clear scientific answer to major questions related to forest carbon:
  - How do forest carbon dynamics change with forest succession, species composition, climate, and site characteristics?
  - What is the lifecycle of carbon in forest soils and how does this relate to disturbance, climate, species composition, forest succession, and human activity?
  - Under what circumstances might unmanaged forests store more carbon than managed forests, and how do time and natural disturbances factor in to this comparison?
  - How do methane emissions from forests differ between sites, species composition, and age structure?
  - What are the climate implications of multiple-use forest management which includes harvested forest products, compared to proforestation?
- Given such questions, proforestation is an undemonstrated, unwise approach as a climate solution while active management provides a suite of approaches that can be tailored to find solutions to known and emerging threats to forest carbon storage and health.
- The proforestation movement misleads us to believe that people are not part of natural forests
- Active forest management has been crucial through time for ensuring that our forests are healthy and resilient while meeting society's needs.

Proforestation

William R. Moomaw et al., “Intact Forests in the United States: Proforestation Mitigates Climate Change and Serves the Greatest Good,” Frontiers in Forests for Global Change 2 (2019): 1-10

As characterized by the New England Forestry Foundation:

- Not a well-established term with a history and track record of scientific study that provide an adequate basis for public policy
- Merely a hypothesis
- Term and authors focus on no-harvest approaches; forest reserves or hands off protected areas.
- Leakage—the increase in emissions in one country, stimulated by emission reductions in another, or in the context of forest management and tree harvesting the transfer of harvest to other locations, which may consume or cancel out 90% or more of any carbon accumulation locally.
- Moomaw et al. do not compare the effect of securing more intact forests to the effect of improving forest management on those same parcels
- They do not include the impacts of leakage or substitution on any carbon savings—both of which terms have been recognized as important principles of forest carbon accounting for 20 or more years.