

Past and Present Invasive Plant Cover in Central New Jersey Forests



New Jersey Invasive Species Strike Team Conference
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Exotic Invasive Plant Species

2,200 native (indigenous) plant species in New Jersey...

4000 exotic species introduced to NJ

- 1,400 escaped into the wild
- 400 have become invasive

Ecological Impacts:

Compete with native species; Threat to endangered species; Disrupt ecosystem processes (nutrient cycling, pollination/dispersal, trophic interactions)

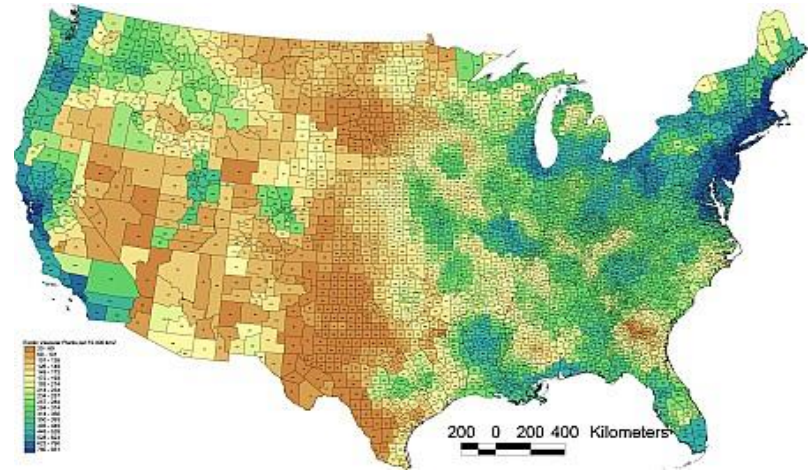
(Snyder and Kaufman 2004)

Economic Impacts:

Invasive species cause over **\$100 billion** of damage in the United States every year with **\$290 million** being in NJ alone!

(New Jersey Invasive Species Council 2009)

exotic species = 39% of state flora!!!



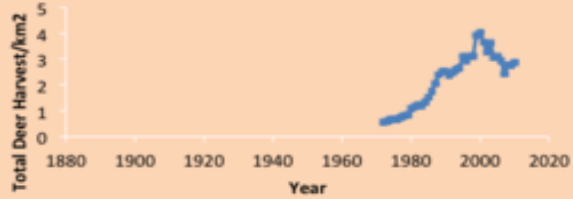
Density of Exotic Species - #/10,000 km²

(BONAP 2011)

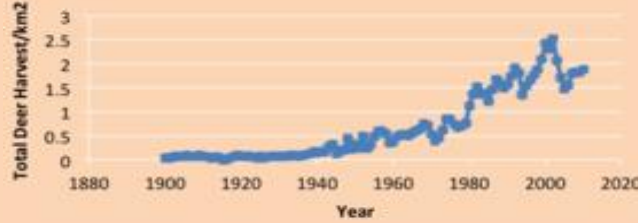


Deer Population Trends in the Northeastern US

New Jersey



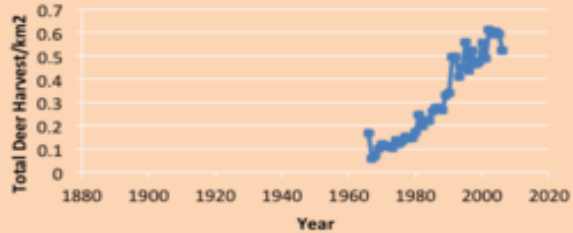
New York



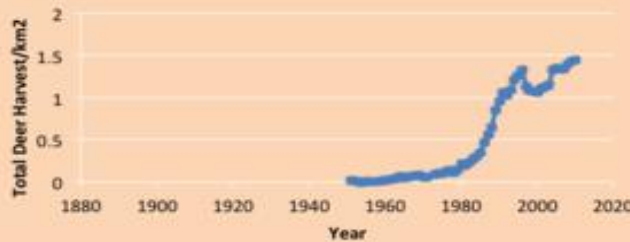
Connecticut



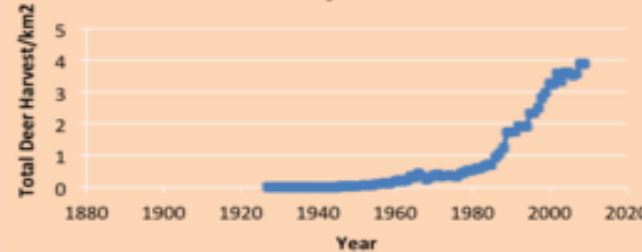
Massachusetts



Indiana



Maryland



Reasons for Deer Population Growth

1. Extermination of Predators
2. Cessation of Commercial Hunting
3. Warming Winters
4. Suburban Development

Infographic by
Peter Smallidge, Berndt Blossey
Cornell University



Deer Population Benchmarks

>10 deer/mi²

Impact preferred
browse species

>20 deer/mi²

Prevent forest
regeneration

>100 deer/mi²

Without deer
management

(Drake et al. 2002, Almendinger pers.
Comm.)

Historic: **8-11 deer/mi²**



Healthy forest with dense understory
vegetation and native plant species.

Current: **13-76 deer/mi²**



Overbrowsed forest at Hutcheson
Memorial Forest in Franklin Township
(2012)



Overbrowsed forest with invasive
barberry shrubs at Peter's Tract in
Bernardsville (2016)



Exotic vs. Native Species – Food Web Effects

Zelkova

Zelkova

Supports **0** different species of moths and butterflies.



Ulmus

Elm

Supports **206** different species of moths and butterflies.



Sorbaria

False Spiraea

Supports **2** different species of moths and butterflies.



Spiraea

Meadowsweet

Supports **86** different species of moths and butterflies.



(Tallamy n.d.)



Invasive Plant Species Effects on Food Web

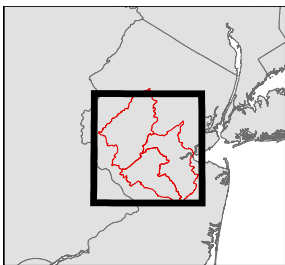
HOSTING CAPACITY OF ALIEN PLANTS INTRODUCED TO NORTH AMERICA

Plant Species	Herbivores Supported in Homeland	Herbivores Supported in North America	Years Since Introduction to North America	Reference
<i>Clematis vitalba</i>	40 species	1 species	100	Macfarlane & van den Ende 1995
<i>Eucalyptus stellulata</i>	48 species	1 species	100	Morrow & La Marche 1978
<i>Melaleuca quinquenervia</i>	409 species	8 species	120	Costello et al. 1995
<i>Opuntia ficus-indica</i>	16 species	0 species	250	Annecke & Moran 1978
<i>Phragmites australis</i>	170 species	5 species	300+	Tewksbury et al. 2002

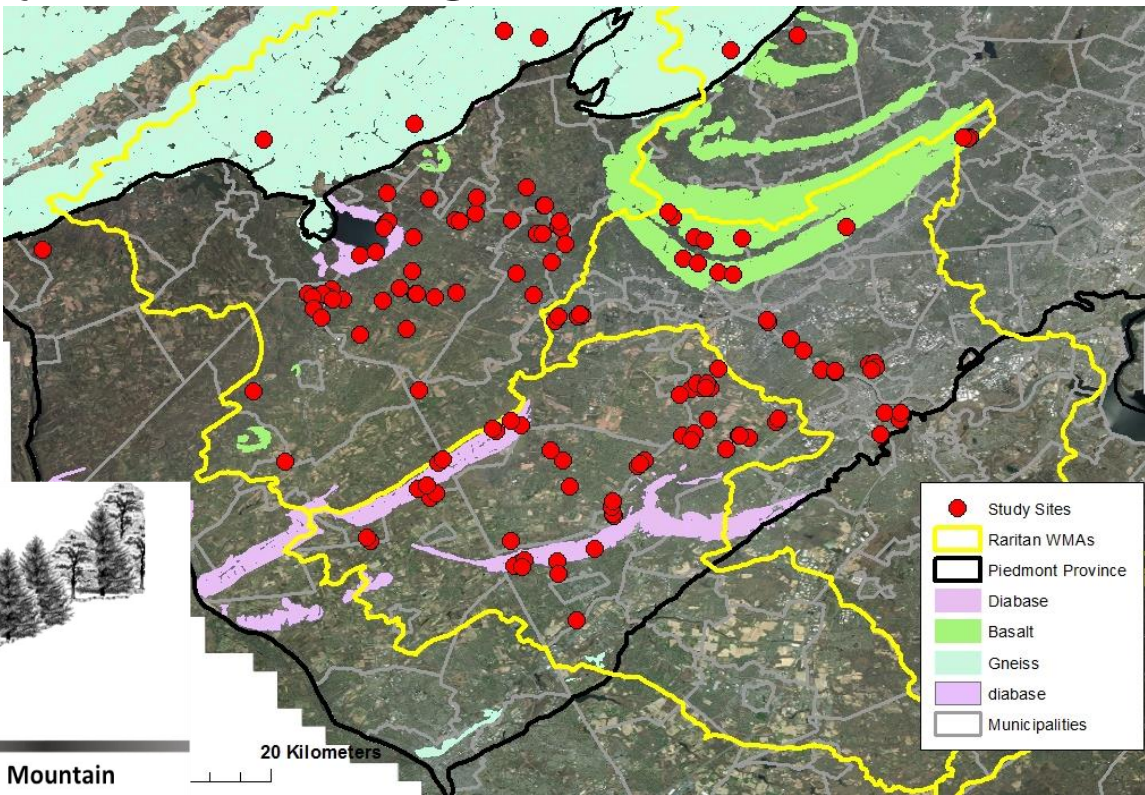
(Tallamy 2009)



Study Area and Design

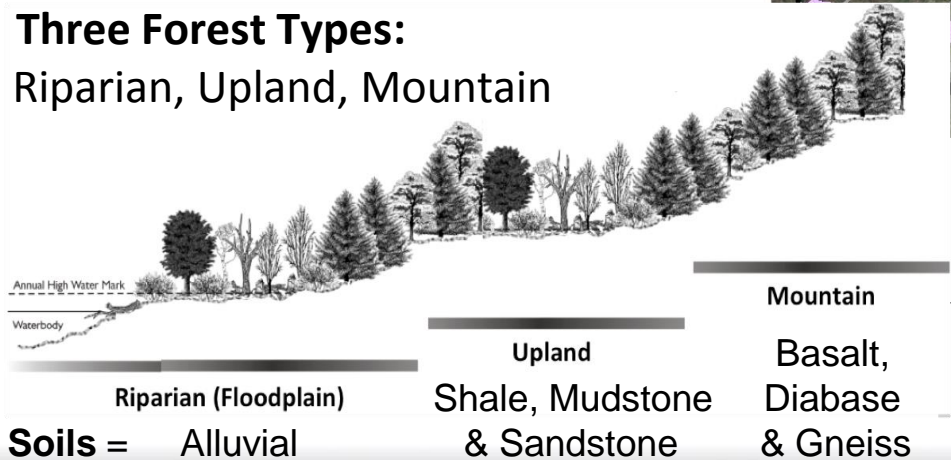


- *Raritan Watershed*
 - *Piedmont Province*
- 135 Study Sites**



- Study Sites
- ▭ Raritan WMAs
- ▭ Piedmont Province
- ▭ Diabase
- ▭ Basalt
- ▭ Gneiss
- ▭ diabase
- ▭ Municipalities

Three Forest Types:
Riparian, Upland, Mountain

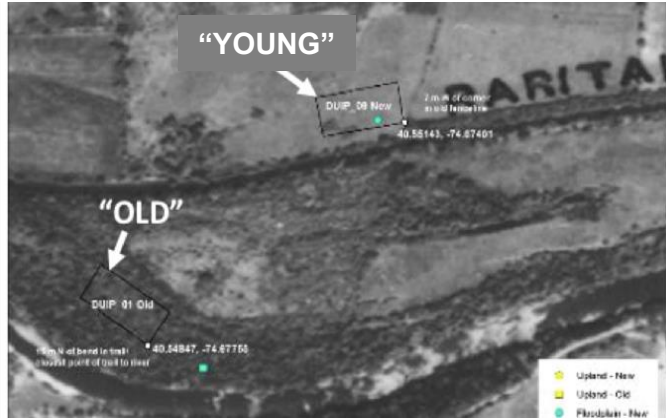


Soils = Riparian (Floodplain) Alluvial Upland Shale, Mudstone & Sandstone Mountain Basalt, Diabase & Gneiss

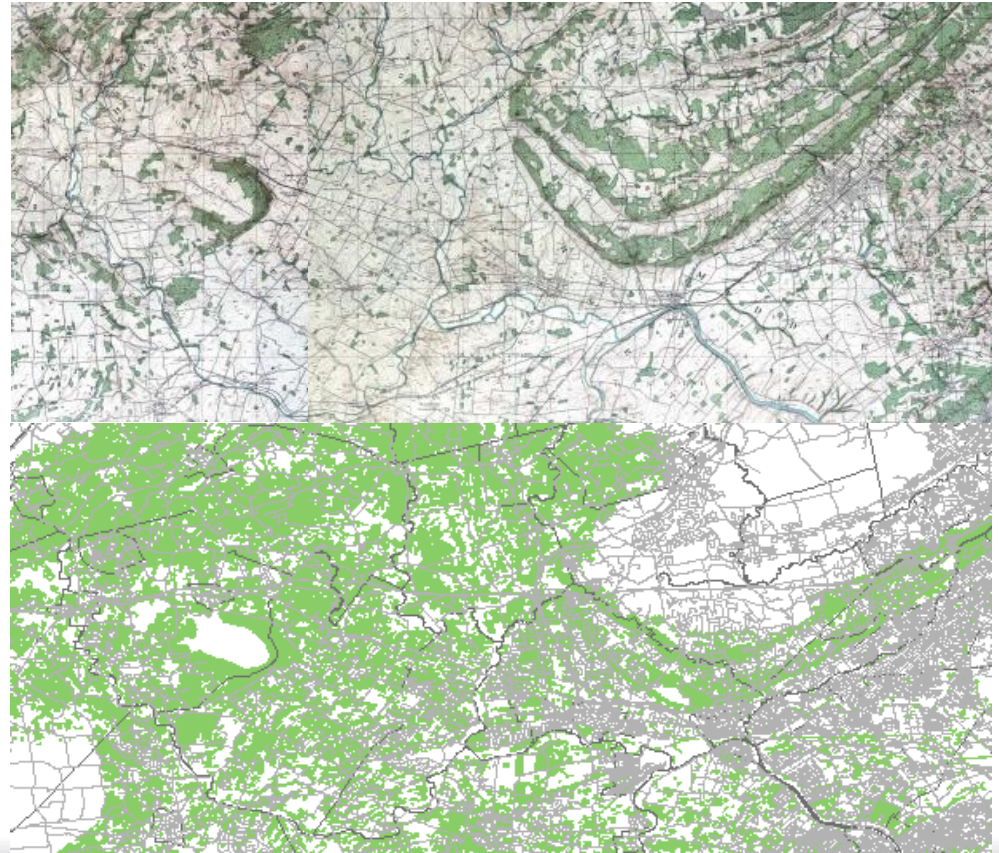


Forest Age

“Old” and “Young” (before or after 1930)



Forest Development in Central NJ – late 1800’s to 2012





Historical Comparisons

Murray Buell Plant Ecology Lab

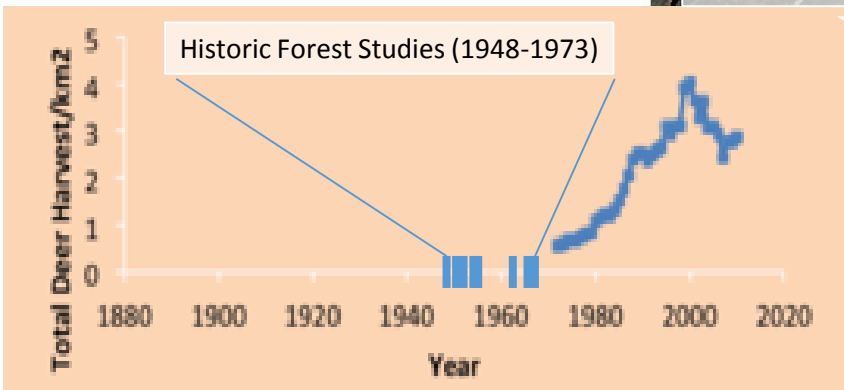
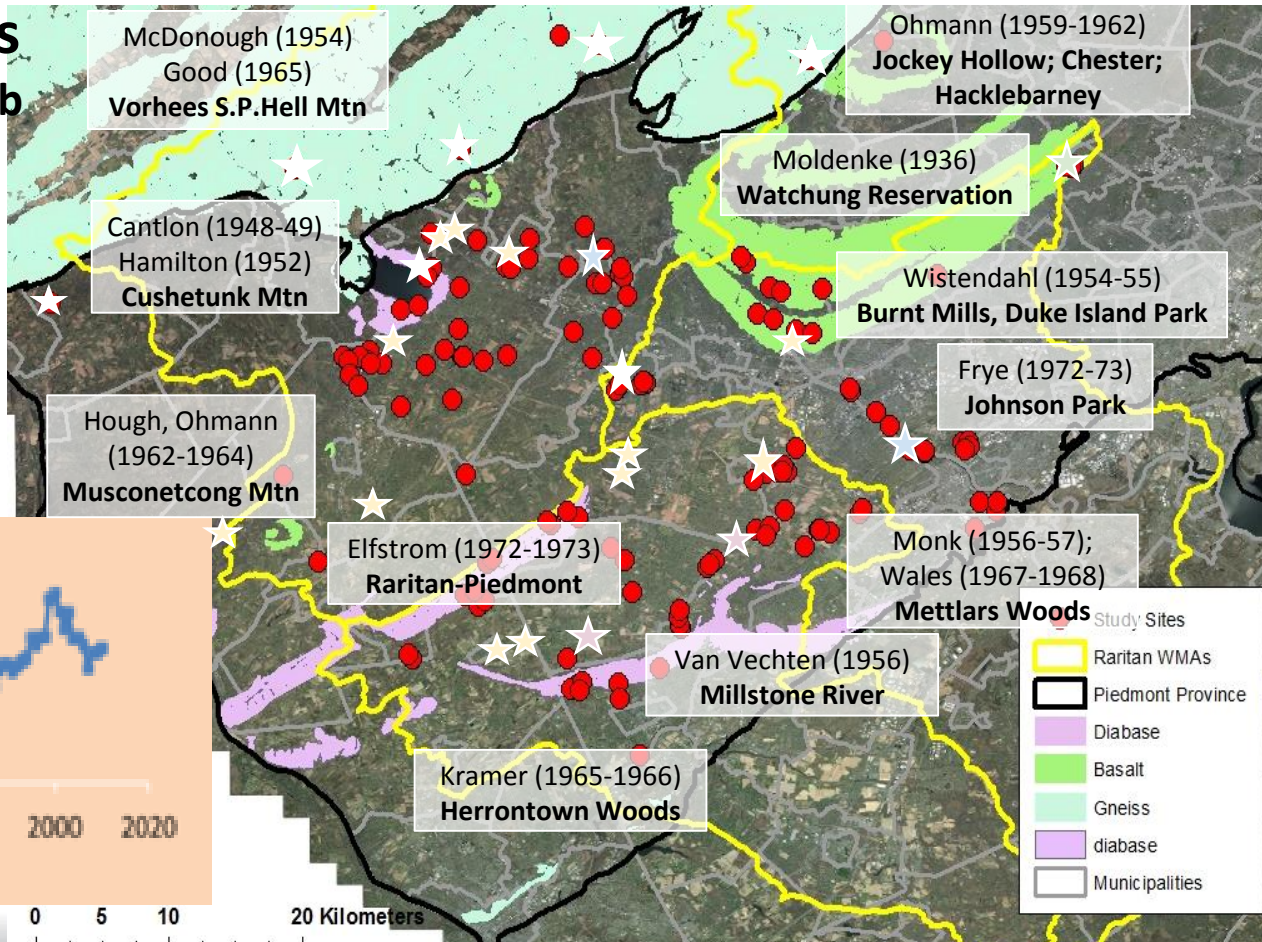
Rutgers University

(1948-1973)

>22 Studies

137 Locations; 216 Stands

NJ Deer Population Trends



0 5 10 20 Kilometers



Forest Study Methodology

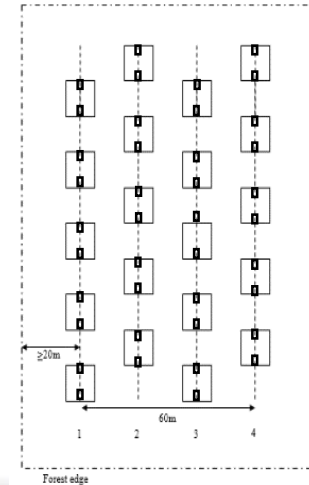
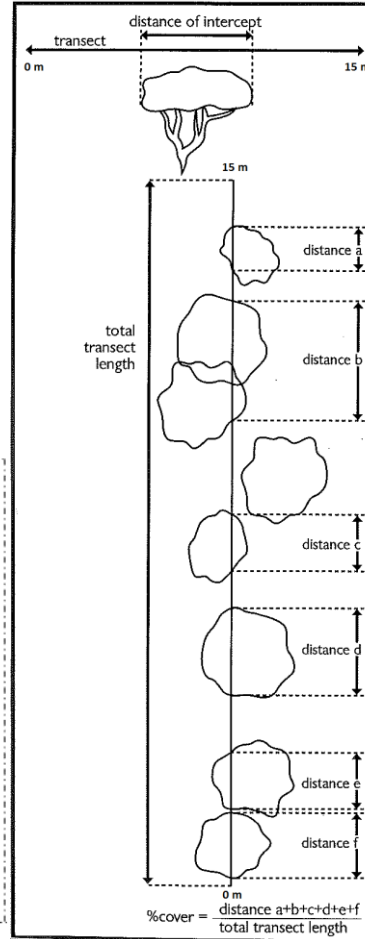
Four 100 m Transects (20 m apart)

- Line Intercept Method for Shrubs and Lianas (Woody Vines)

Twenty 100 m² plots (~0.5 acres)

Forty 1 m² plots (Herbaceous Cover)

Minimum 30 m from edge





2014-2017 Vegetation Studies: Forest Ecology Interns



Counted / Measured:

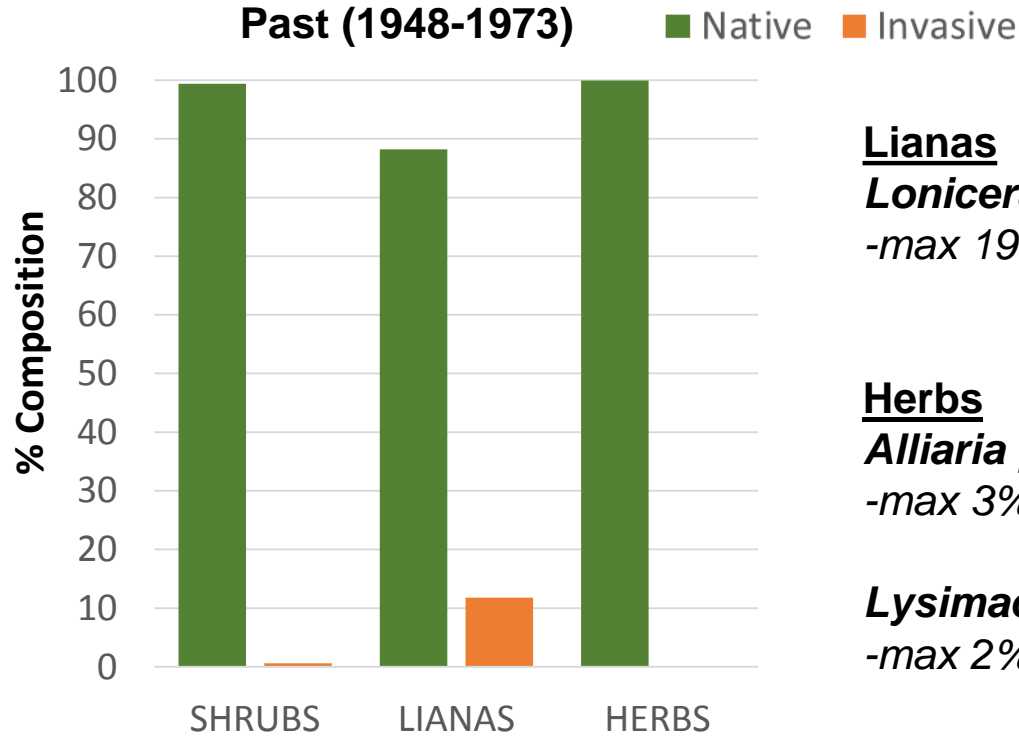
- >50,000 trees
- >550,000 seedlings
- >4,000 herb plots
- >22 km shrub/liana data





Invasive Plant Species in Forest Understories – 1948-1973

- ◆ Low Levels of Invasive Cover in Foresty Understories
- ◆ Much Higher Native Cover than Invasive



Shrubs

Berberis thunbergii

-max 1% cover

Ligustrum vulgare

-max 2% cover

Rosa multiflora

-max 4% cover

Rubus phoenicolasius

-max <1% cover

Lianas

Lonicera japonica

-max 19% cover

Herbs

Alliaria petiolata

-max 3% cover

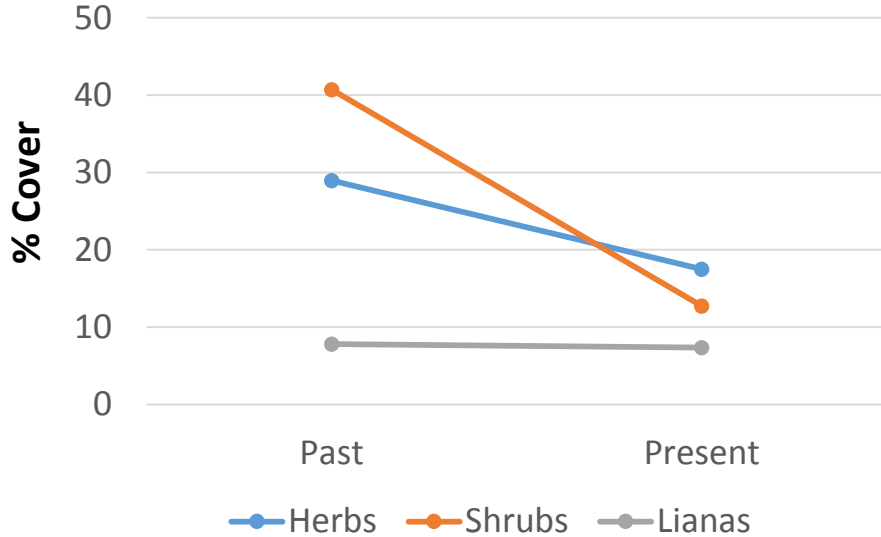
Lysimachia nummularia

-max 2% cover

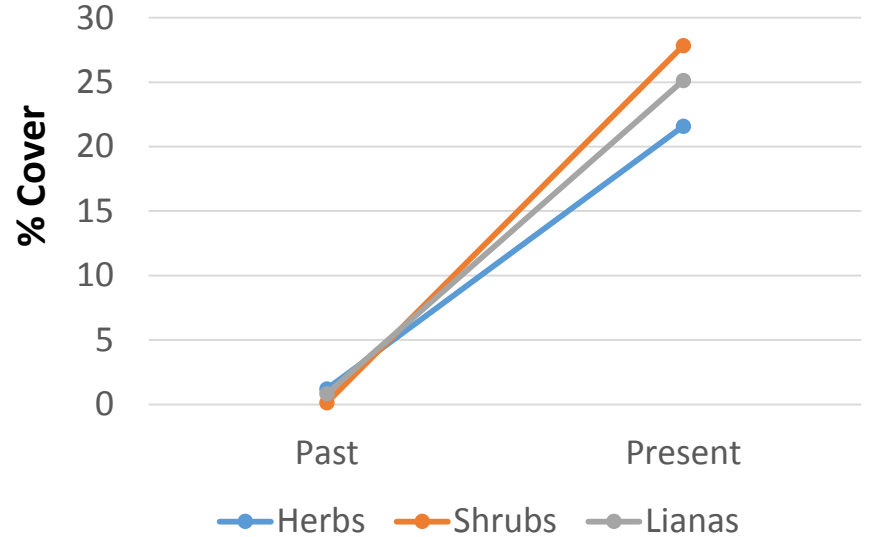


Changes in Native and Invasive Cover in Forests – *Past to Present*

Native



Invasive





Invasive Plant Species in Forest Understories – 2014-2017

Shrubs

Berberis thunbergii
-max 49% cover

Eleagnus umbellata
-max 59% cover

Ligustrum vulgare
-max 32% cover

Photinia villosa
-max 44% cover

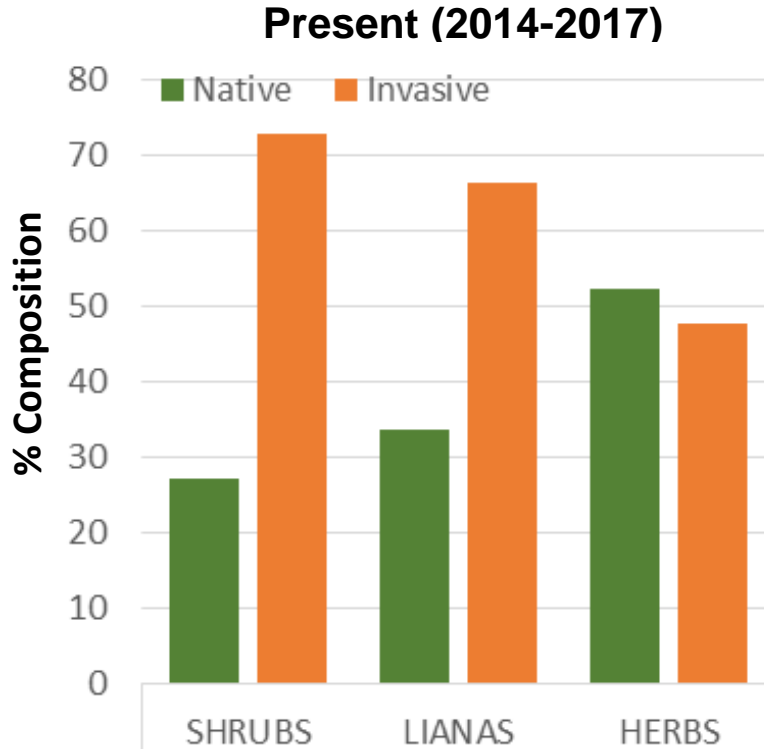
Rhamnus cathartica
-max 21% cover

Rosa multiflora
-max 83% cover

Rubus phoenicolasius
-max 46% cover

Viburnum dilatatum
-max 38% cover

- ◆ High Levels of Invasive Cover in Foresty Understories
- ◆ More Invasive Than Native in Most Forests



Lianas

Lonicera japonica
-max 95% cover

Celastrus orbiculatus
-max 50% cover

Herbs

Alliaria petiolata
-max 10% cover

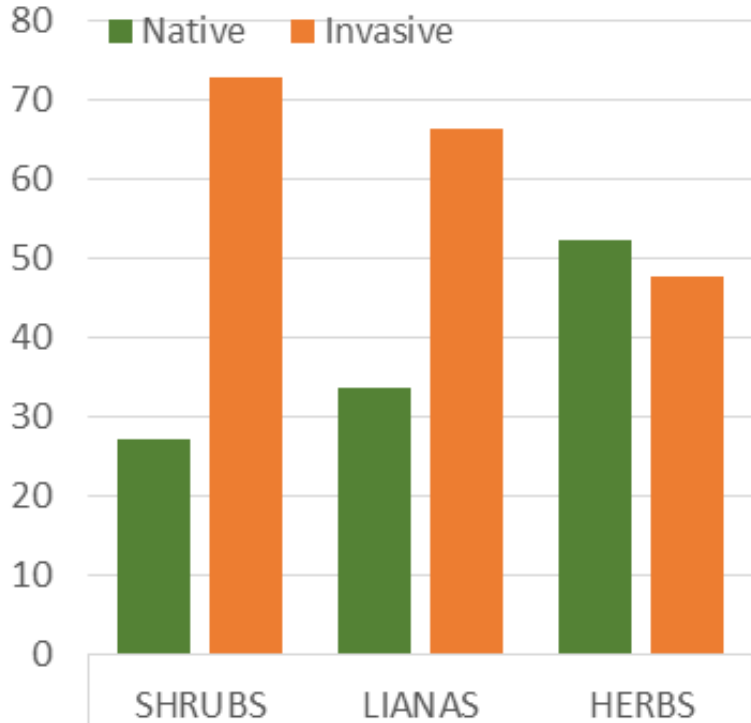
Lysimachia nummularia
-max 39% cover

Microstegium vimineum
-max 66% cover



Dominant Invasive Plant Species in Forest Understories – 2014-2017

◆ Single Species Dominate in Each Category



Japanese Stiltgrass – 87%



Multiflora Rose – 54%



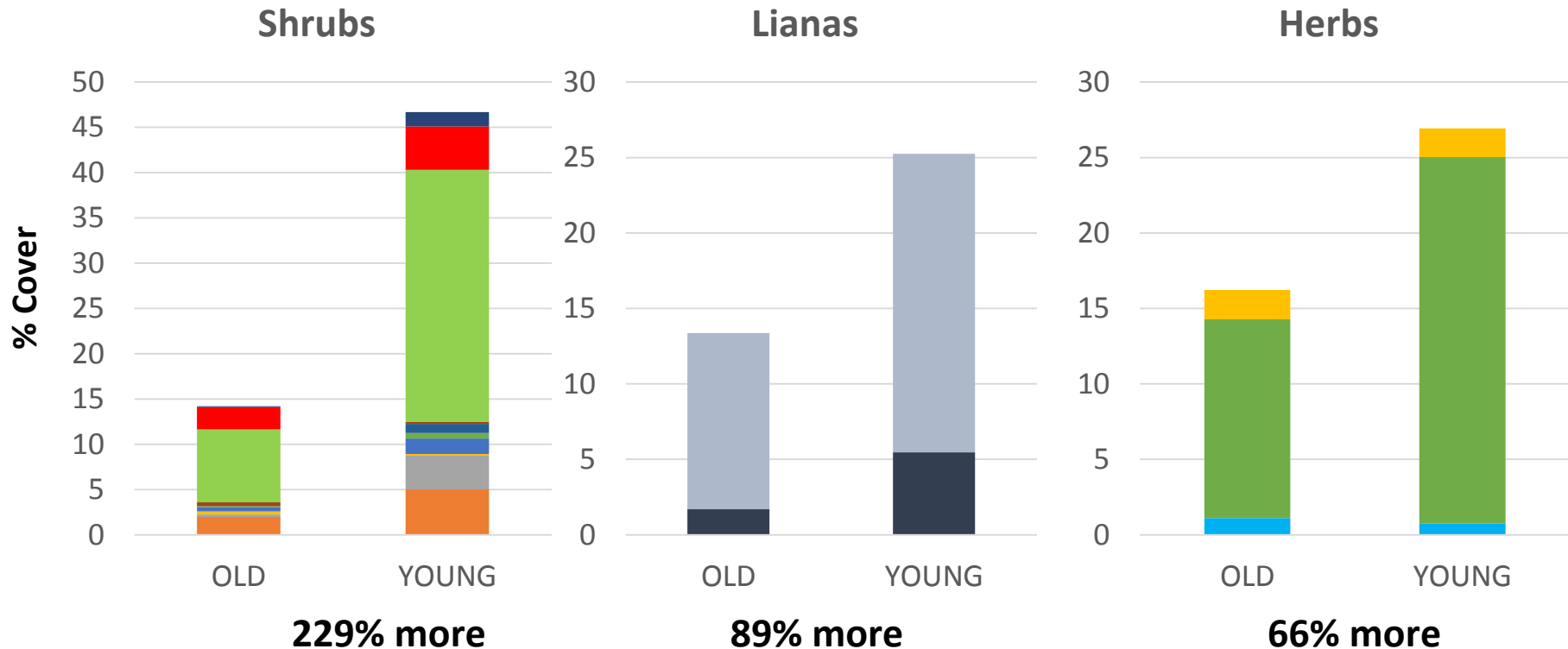
**Japanese Honeysuckle
85%**

UGA2308102



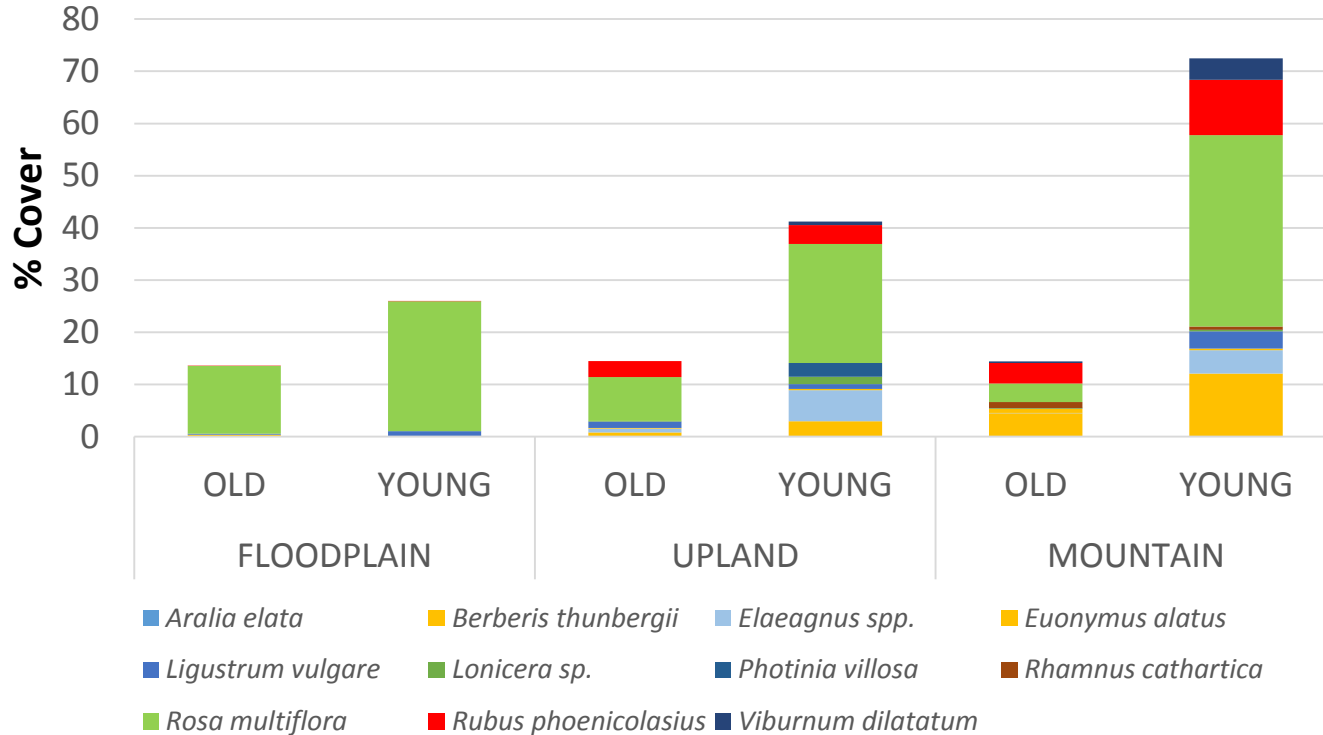
Invasive Plant Species in Forest Understories – *Young vs. Old Forests*

◆ More Invasive Cover in Young Forests Than Old





Shrubs – Young Mountain Forests have 403% more invasive shrubs than Old Forests and >70% invasive shrub cover on average

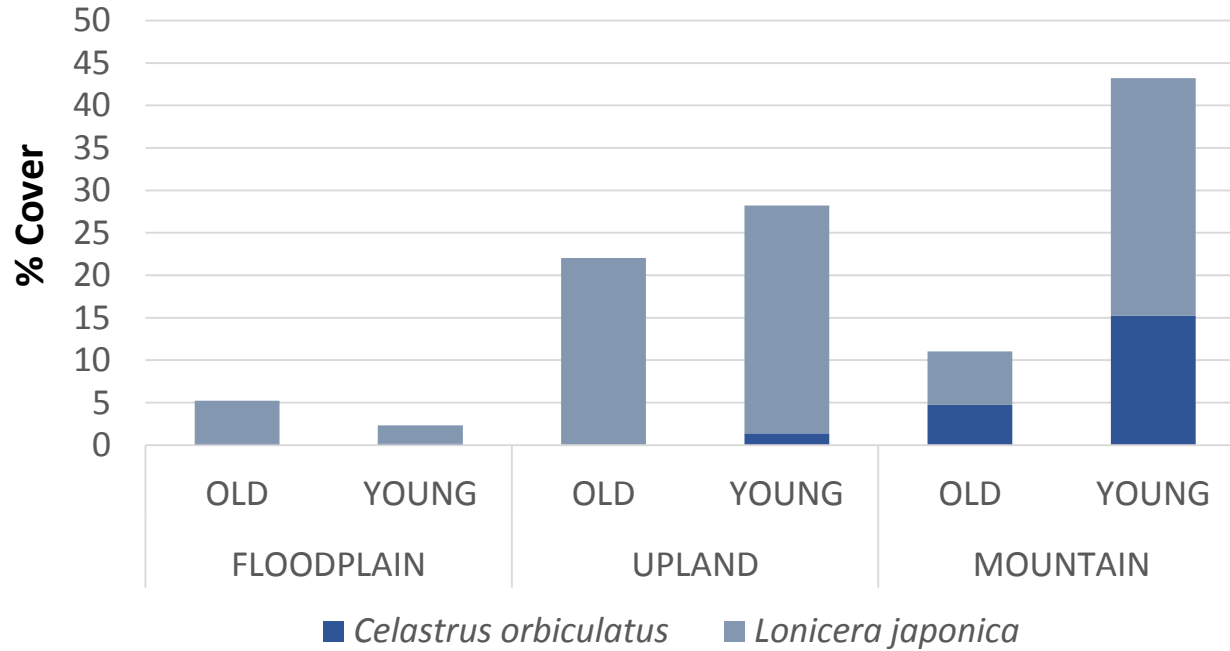


Japanese Barberry at the Scherman-Hoffman Wildlife Sanctuary

Dominant Invasive Shrub - Multiflora Rose (*Rosa multiflora*)



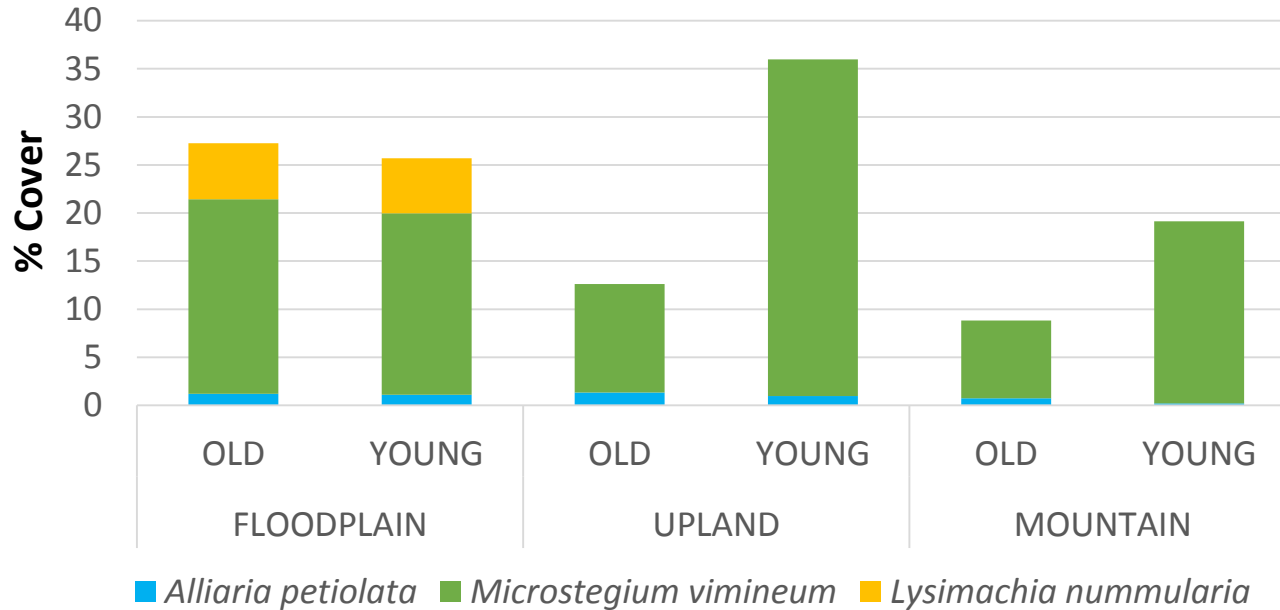
Lianas - Young Mountain Forests have 292% more invasive lianas than Old Forests and >40% invasive liana cover on average



Dominant Invasive Liana - Japanese Honeysuckle (*Lonicera japonica*)



Herb Layer – Young Upland Forests have 185% more invasive herbs than Old Forests and >35% invasive herb cover on average



Dominant Herbaceous Invasive - Japanese Stilt Grass (*Microstegium vimineum*)



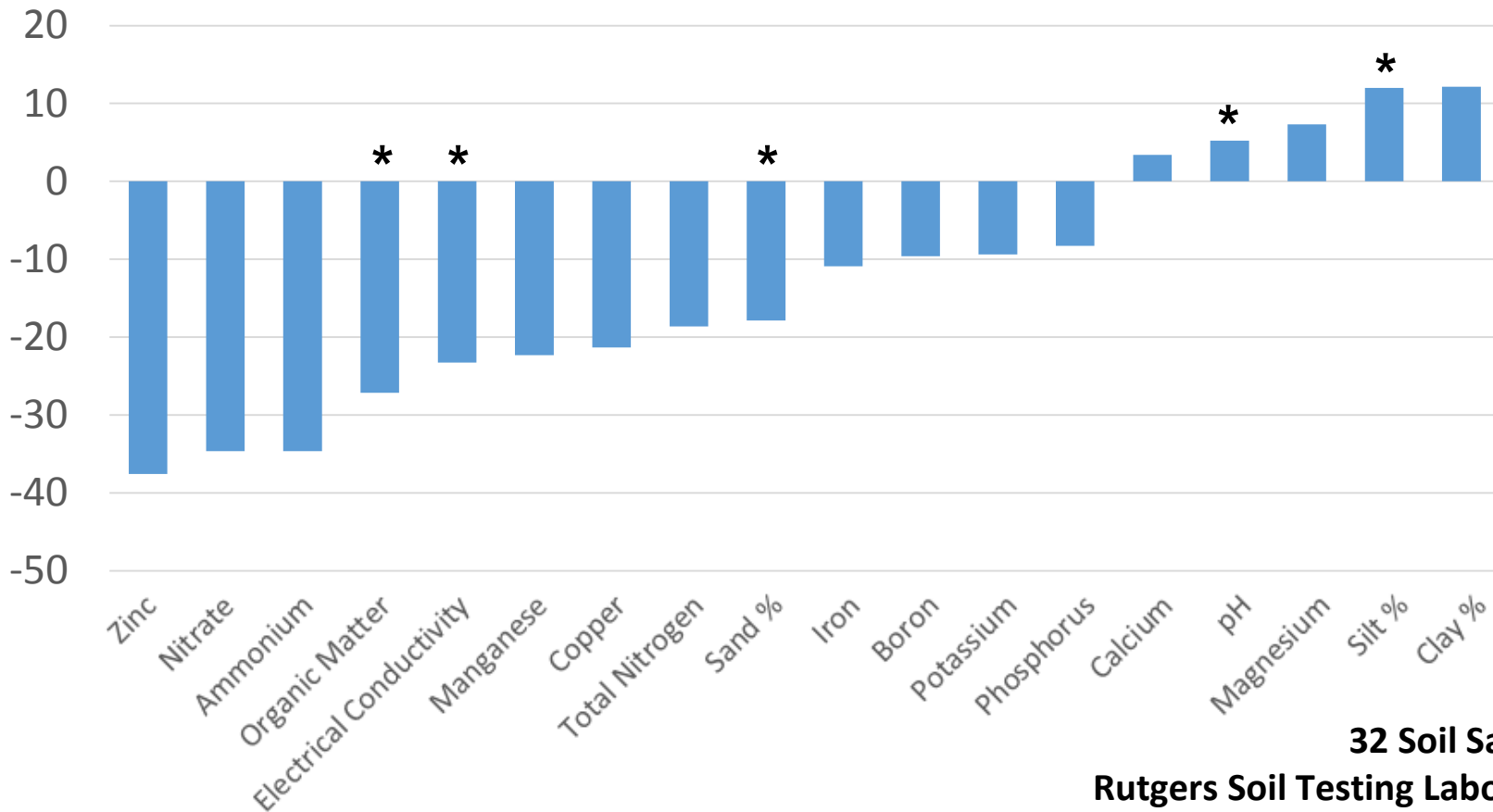
Old

(Back Wall)

Young



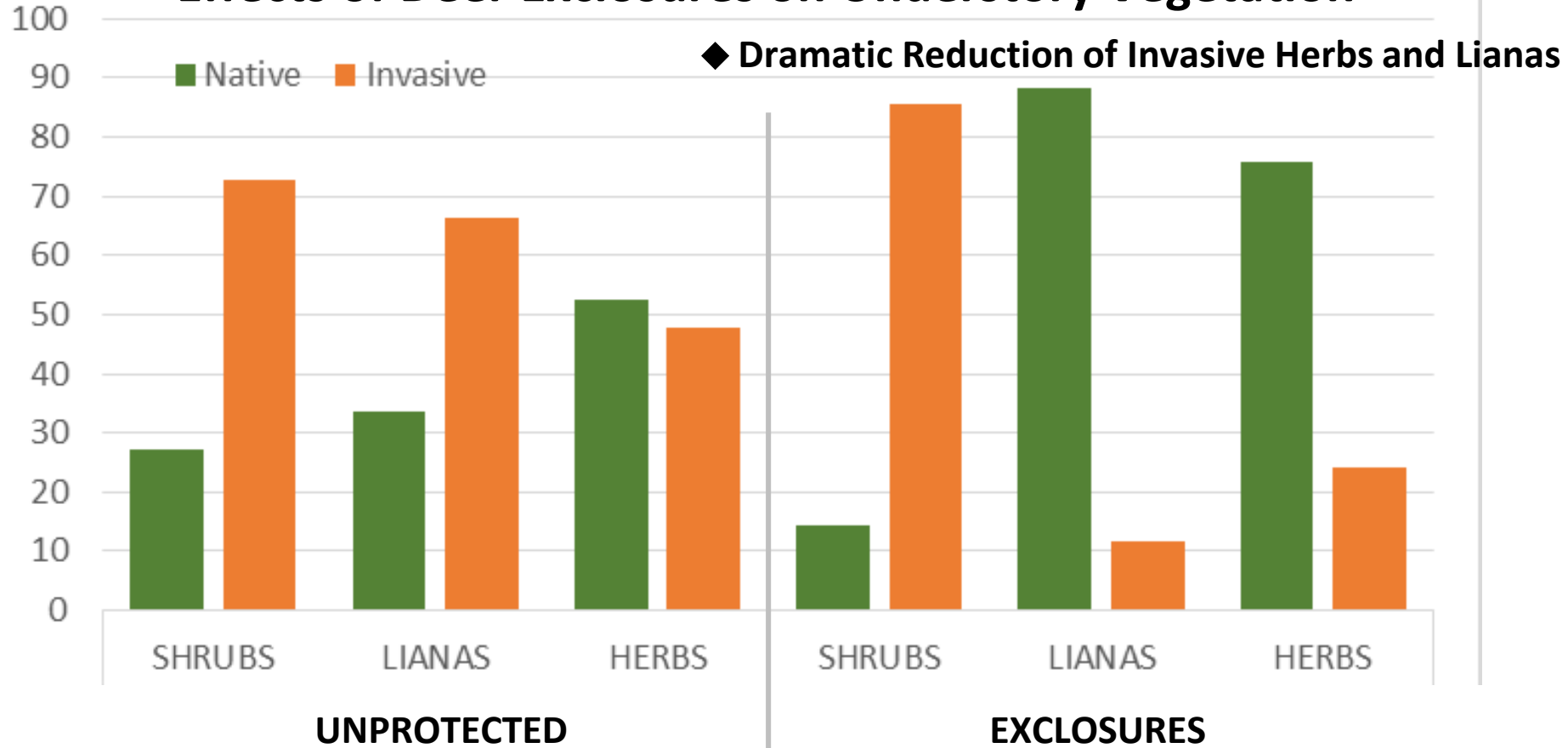
% Difference of Soil Variables (Young vs. Old Forests)



32 Soil Samples
Rutgers Soil Testing Laboratory



Effects of Deer Exlosures on Understory Vegetation





Restoration Priorities – *Old Forests!*

Bing Maps



1930's Aerials



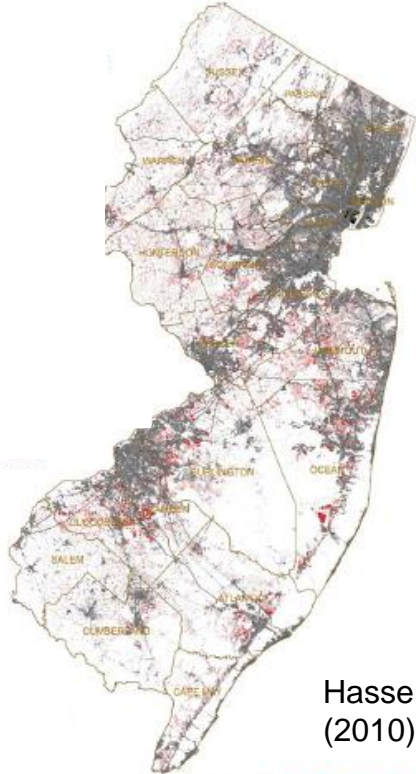
1899 Forest Map



Conservation Blueprint (www.njmap2.com)

An Ounce of Prevention

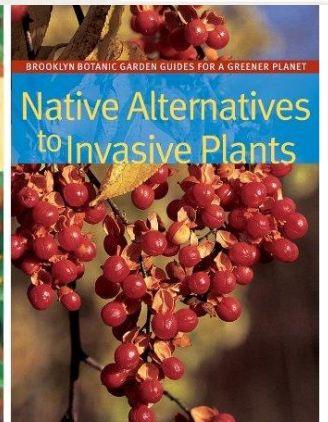
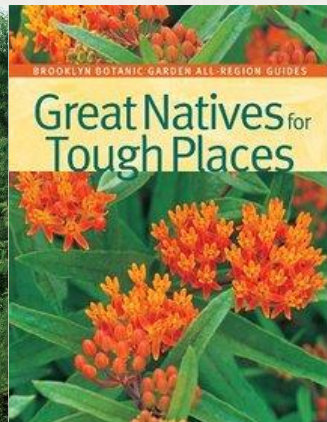
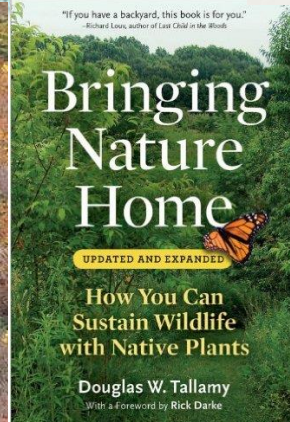
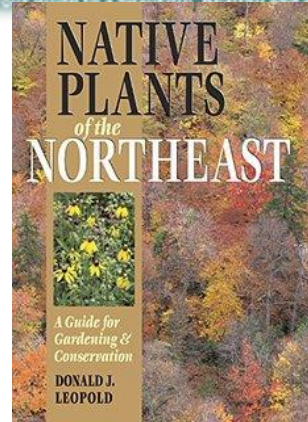
Planting Natives Instead of Exotic Invasives



Impervious Increase 1986 - 2007



Hasse and Lathrop (2010)



Native Plant Nursery



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availability list here

2018 NATIVE PLANT CATALOG




<http://wildridgeplants.com/>

<http://www.toadshade.com/>

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Upcoming Events

Tuesday, March 27th, 2018 7:30 pm. Highland Park Chapter of the [Native Plant Society of NJ](#), Eugene Young Environmental Education Center, 20 River Road Highland Park, NJ 08904 "Native Plants and the Creatures that Love Them." Native plants and seeds will be for sale. For more information contact Mary at highlandpark@npsnj.org

Thursday, March 29th, 2018 9:30 am to 12:30 pm. [Master Gardeners of Passaic County](#), Passaic County Public Safety Academy, 300 Oldham Road, Wayne, NJ 07470 "Landscaping with a Purpose: What's Diversity got to do with it?". Native plants and seeds will be for sale.

When buying wildflowers, make sure they are propagated, not removed from the wild! If you have any doubt, ask! Some plant species have been driven to extinction in the wild due to the collection of wild plants!

There is always music amongst the trees in the garden, but our hearts must be very quiet to hear it.

Minnie Aumonier

Grow Native Plants

Home > GROW Native Plants > Native Plant Nursery

NATIVE PLANT NURSERY

Buying Native Plants
Native Plant Catalog
Grow Houses
Nursery News

NATIVE PLANT NURSERY

Buying Native Plants

Join us for the opening of the Native Plant Nursery on April 14, 2018, during the Preserve's Spring Celebration Weekend! Learn more about this exciting event.

The Native Plant Nursery at Bowman's Hill Wildflower Preserve is open April 14 - October 31.



<https://bhwp.org/grow/native-plant-nursery/>

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**Greenbelt
Native Plant Center**

[GNPC Home](#)

Mission

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Programs

Projects In Partnership

History

Education, Volunteers, and Interns

Contact Us/Staff

Website funding provided by NYC Environmental Fund



The Greenbelt Native Plant Center is a facility of the New York City Department of Parks & Recreation. We are a 13-acre greenhouse, nursery, and seed bank complex. We are located on Staten Island, NY.

<https://www.nycgovparks.org/greening/greenbelt-native-plant-center>



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- Project Partners: NJ Audubon – Dr. Nellie, Tsipoura, Kelly Wenzel, Mike Allen, Dale Rosselet; Citizen Scientists;
- RVCC Student Interns – Rebekah Buczynski, Lee Minicuci, Jason Hafstad, Cory Snyder, Dylan Hardy, Jessica Ray, Adam Kohler, Ali Severino, Dani Yashinovitz, Bri Primiani, Zachary Sparta, Kristen Greaney, Alvin Chin, Willie Grosch, Eric Williams, Bonnie Semmling
- Public Partners: Duke Farms; Great Swamp Watershed Association; Somerset, Hunterdon and Middlesex County Parks Systems; NJDEP; Readington Twp Open Space Advisory Board; Rutgers University; Raritan Township; Greenbrook Sanctuary



References



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