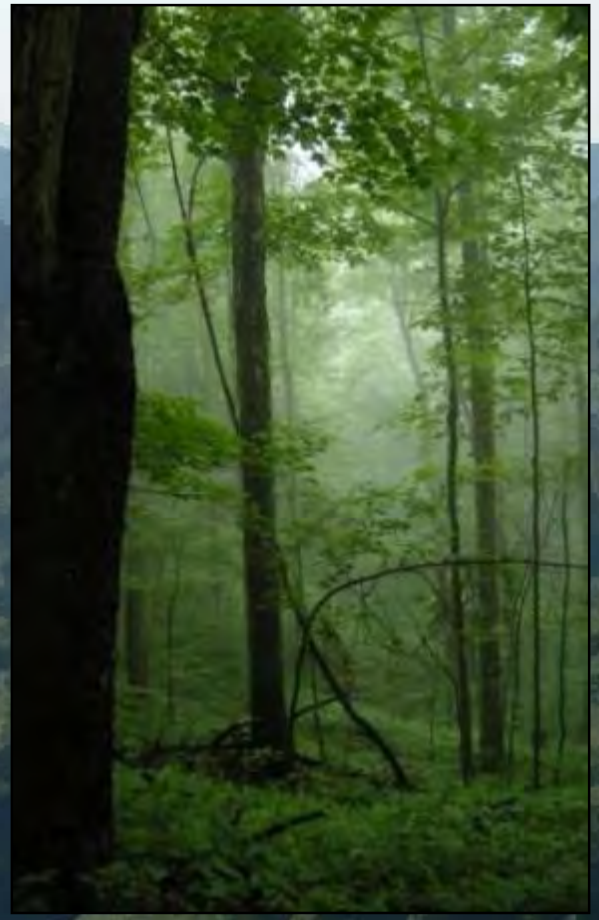
The Dynamic Forest Partnership: recovering declining forest wildlife through sustainable forestry applied at ecologically meaningful scales



Jeff Larkin

Pennsylvania's Forests

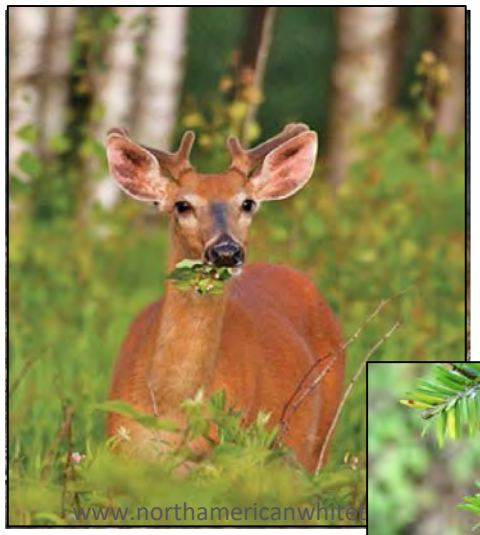
- PA hosts nearly 17 million acres of forest land (~60%)
- Significant part of our economy and natural heritage

PADCNR

Wiki commons

Threats to Eastern Forests

Invasive species
Excessive Deer Browsing
Disease
Conversion and Fragmentation
Unsustainable Harvest Practices



Step 1: Keep forests on the landscape!

Convince society that forests are important:
a) mitigating climate change; b) water quality; c) recreation; and d) rural/economic opportunities

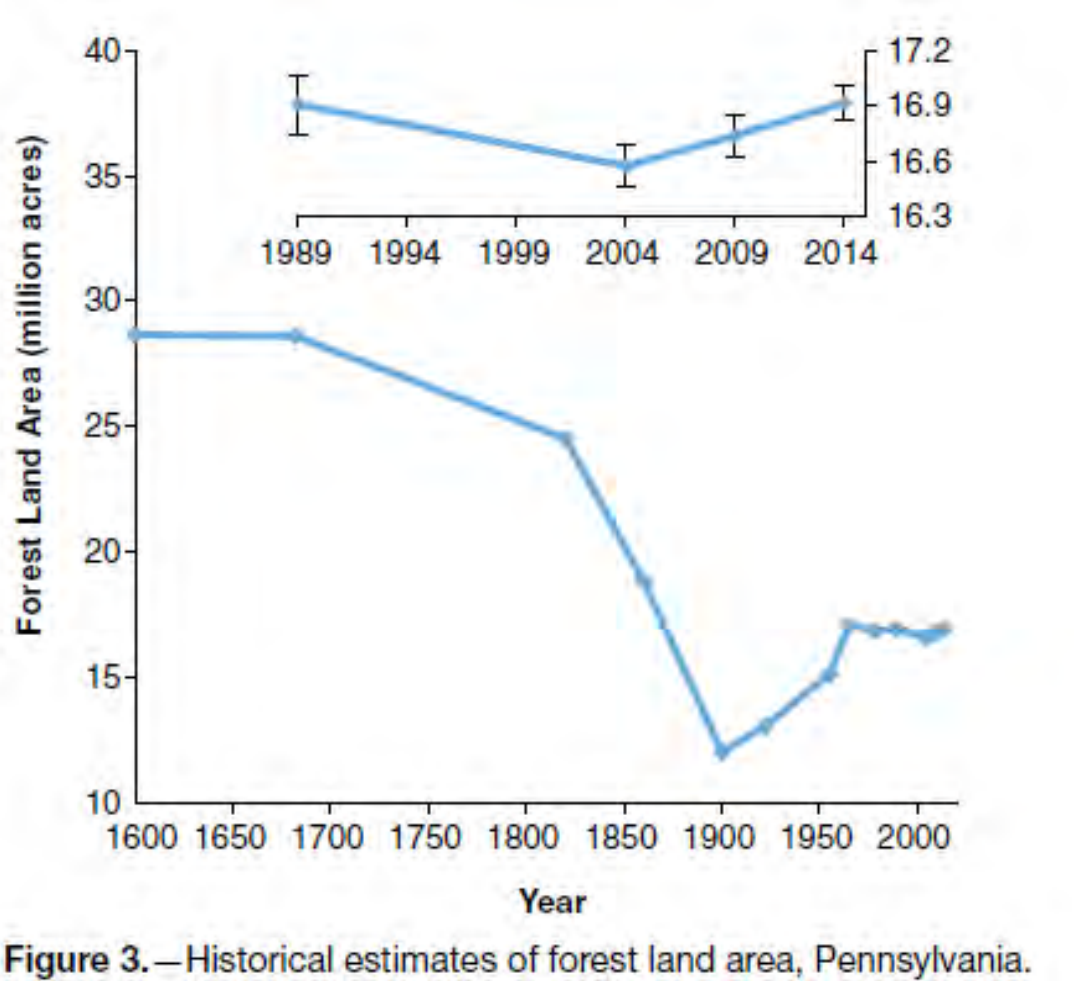


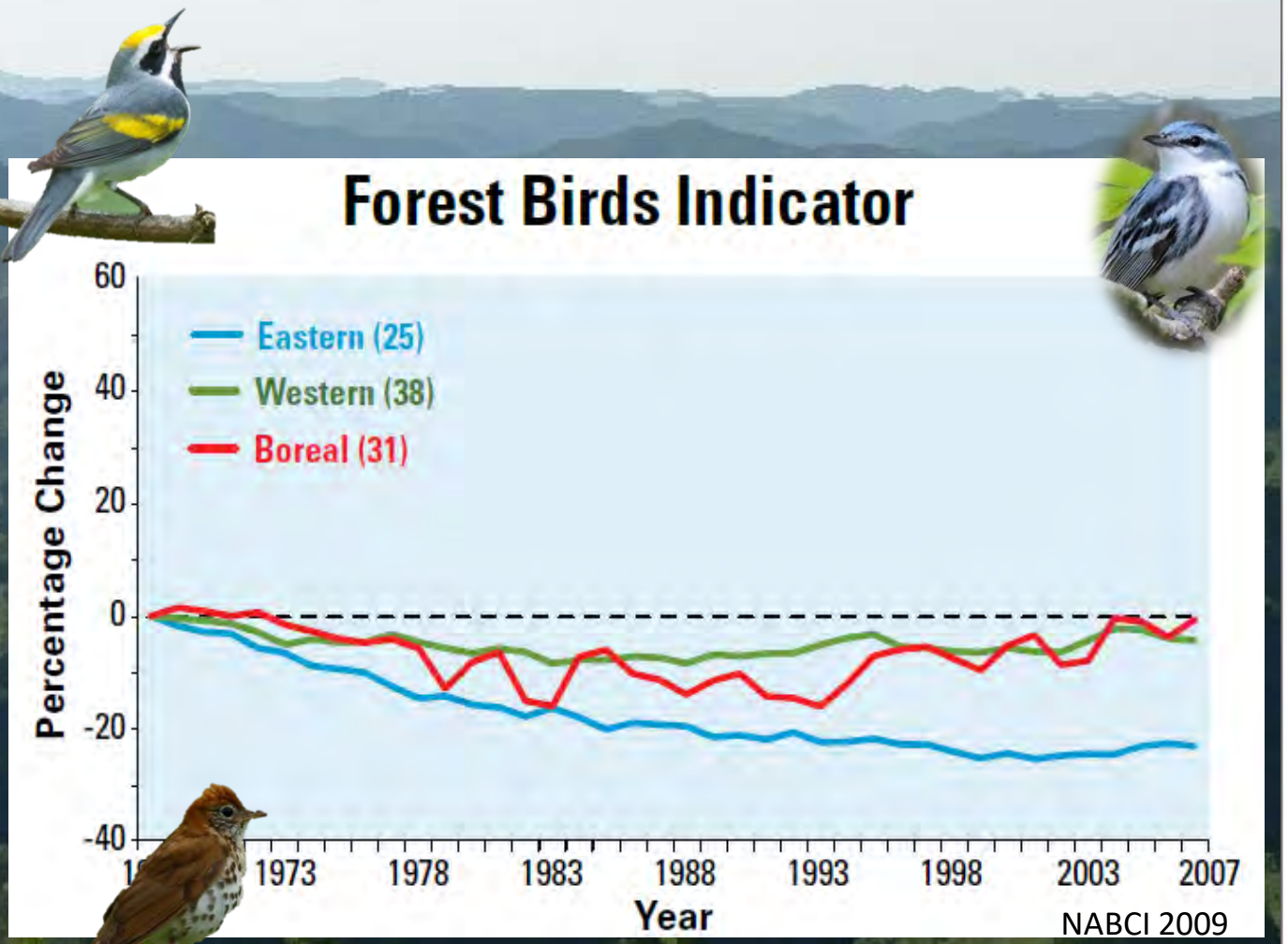
Figure 3.—Historical estimates of forest land area, Pennsylvania.

Step 2: Be good stewards of forests

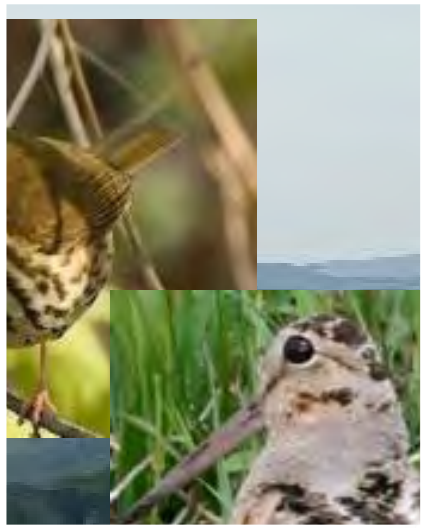
Society must understand and appreciate that forests require “tending/managing/restoring”

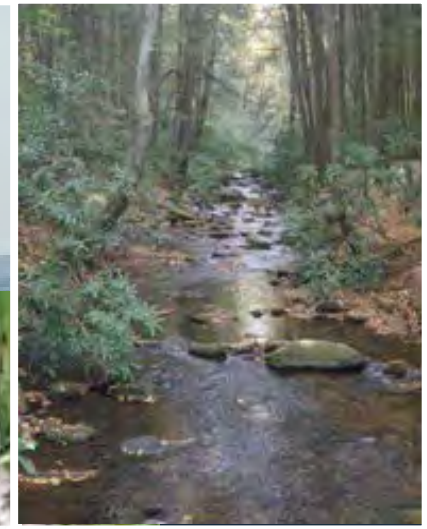
We MUST become better stewards of our forests!

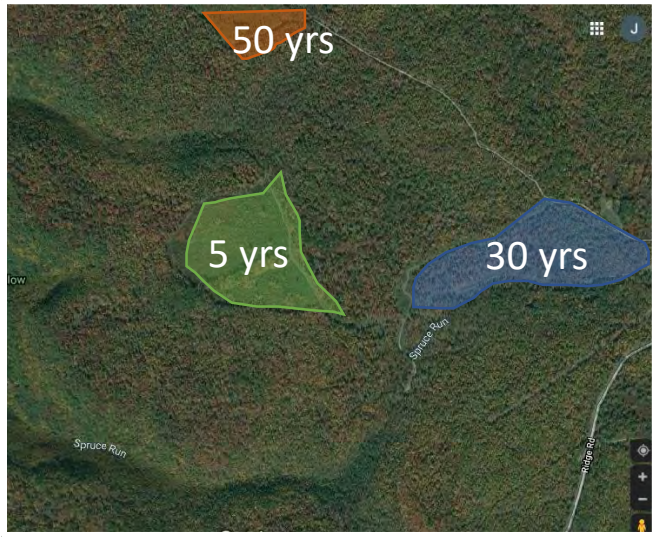
“Eastern Forest birds” are one of those wildlife groups that are “telling” us that we must do better!

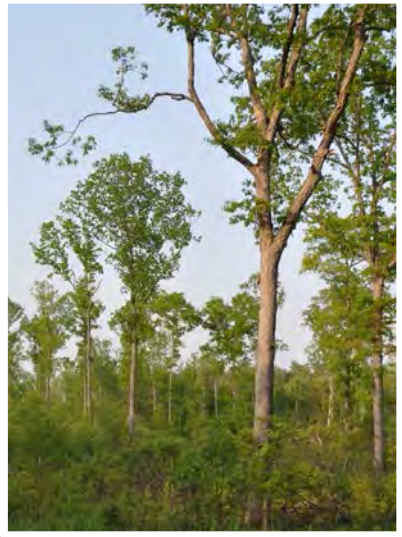


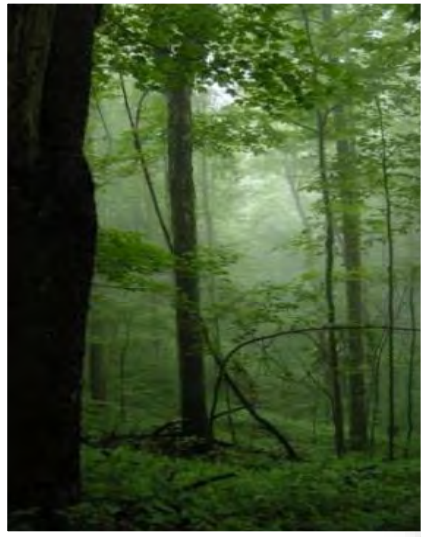
Forest Birds and Forest Structure/Composition







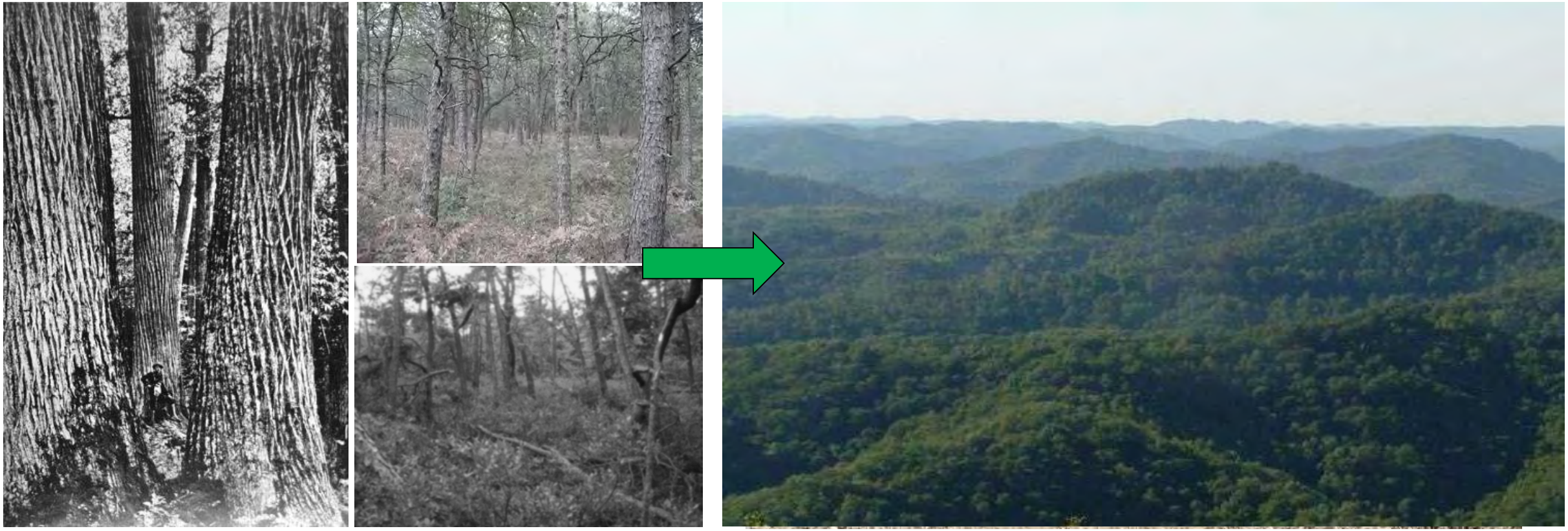




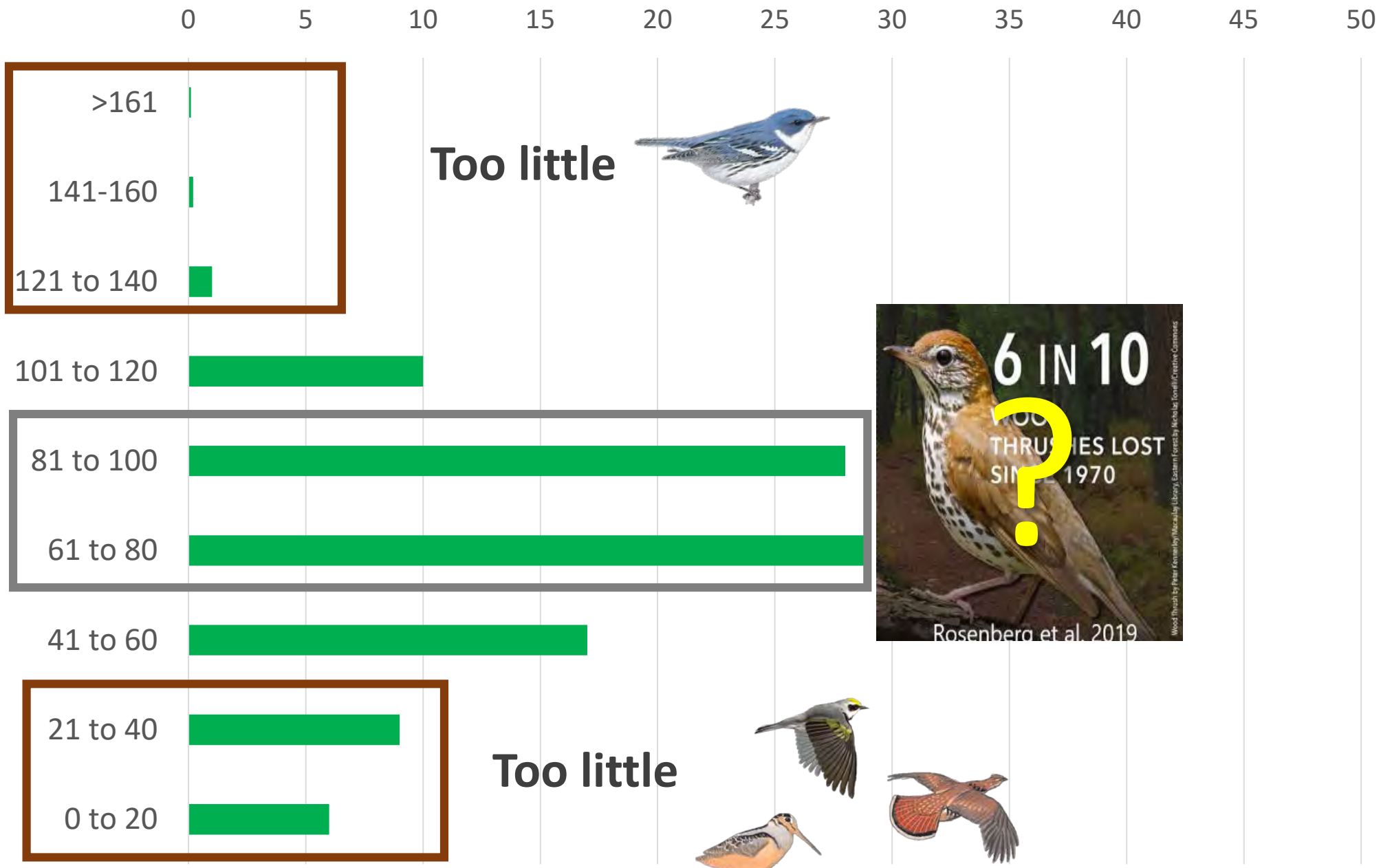
1) landscape context (i.e., % forest cover, forest type, age class interspersion)
2) structural complexity of vegetation (i.e., well-developed understory)

So Why Are Forest Birds in Trouble?

- Our forests are too simple…and now many forest-dependent species are paying for it
- In one mass sweep, we lost thousands of years of structural diversity/complexity in the making!



Forest age Class Distribution (%)



Albright et al. 2014; http://www.nrs.fs.fed.us/

“Diameter-limit cut”
“Select cut”
“High grade”

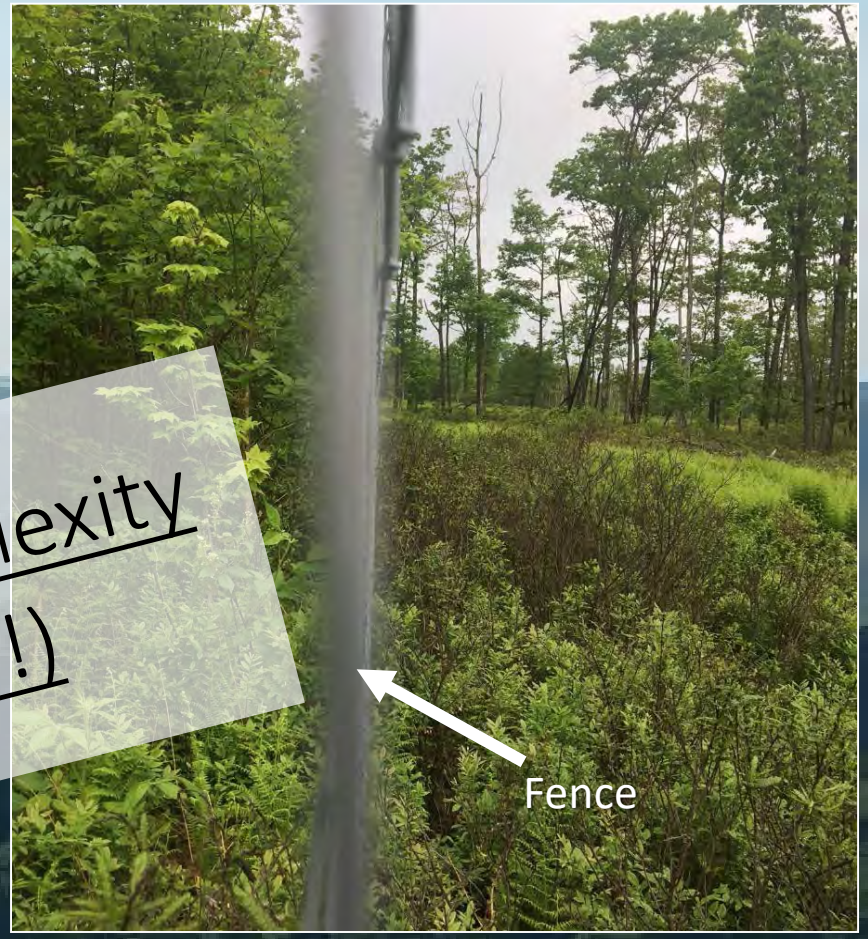
Threats of Forests Present

Green Mountain Club

Japanese stiltgrass

Japanese barberry

All reduce structural complexity of forests (aka. niches!)



Fence

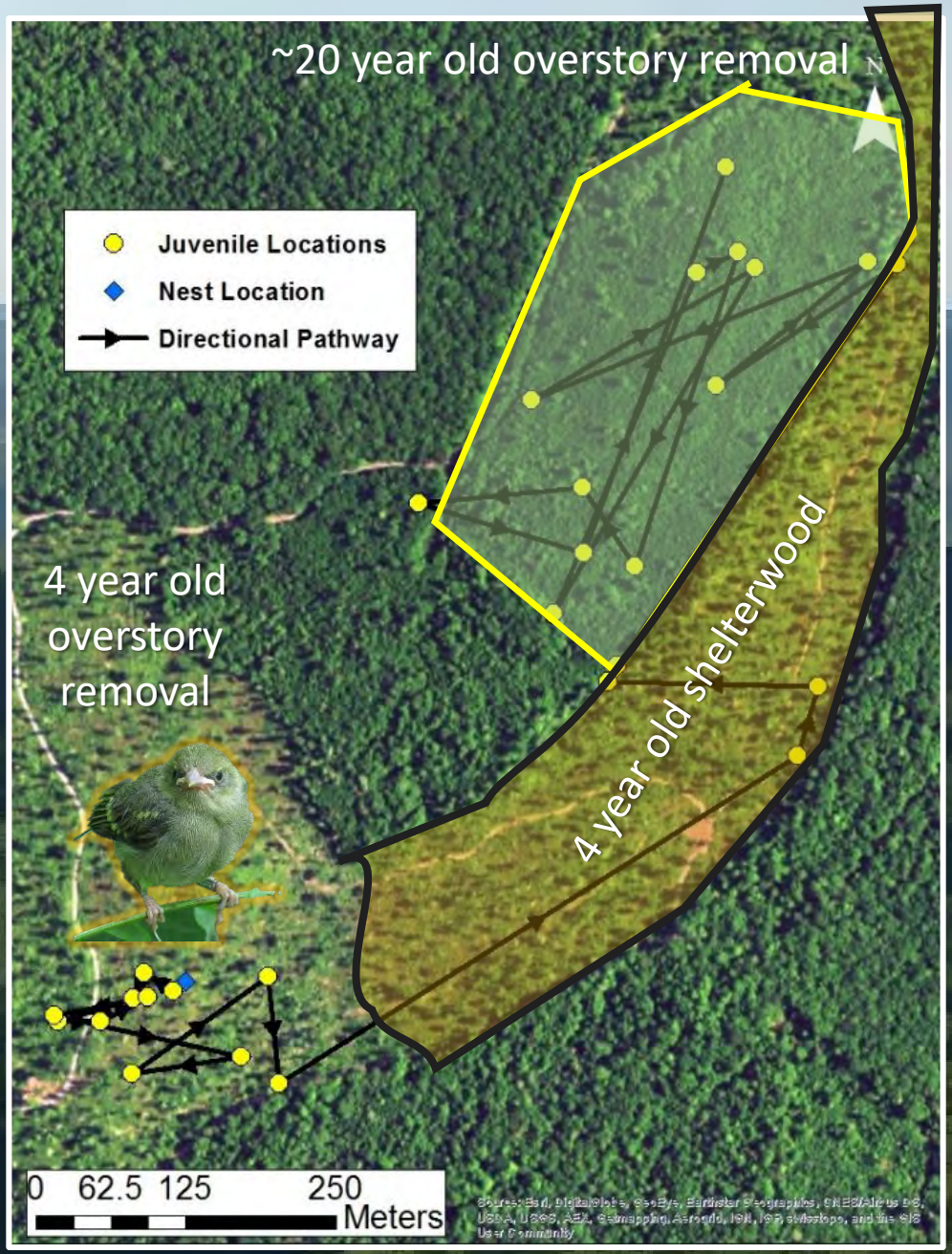
Hay-scented Fern

We must provide for **Full** Breeding Season Habitat Needs of Forest Birds

It’s not just about nests and nestlings

Golden-winged Warbler Full Breeding Season Habitat Needs

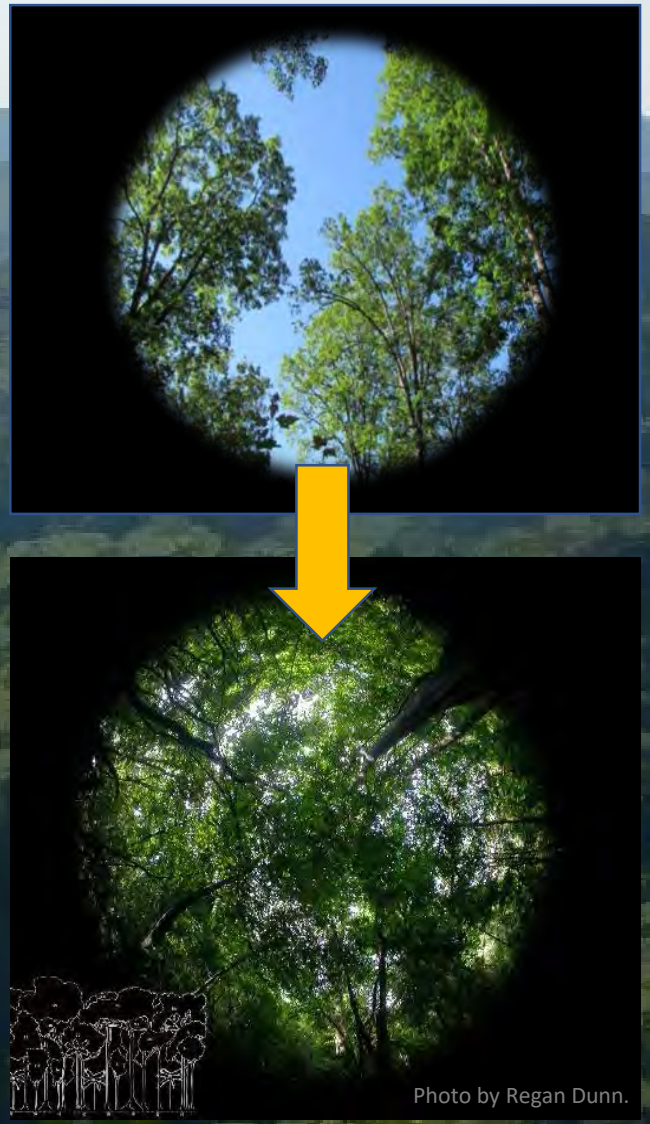
Fiss, C.J., D. J. McNeil, A.D. Rodewald, J.E. Duchamp, and J.L. Larkin. 2020. Post-fledging Golden-winged Warblers require forests with multiple stand developmental stages. Condor https://doi.org/10.1093/condor/duaa052



Golden-wings & Cerulean Warbler fledglings select for micro-habitat features that differ from nest sites during first 30-days out of nest

Cerulean Warbler; Raybuck et al. (2020)

Golden-winged Warbler; Fiss et al (2020, 2021)



Fledgling Movements

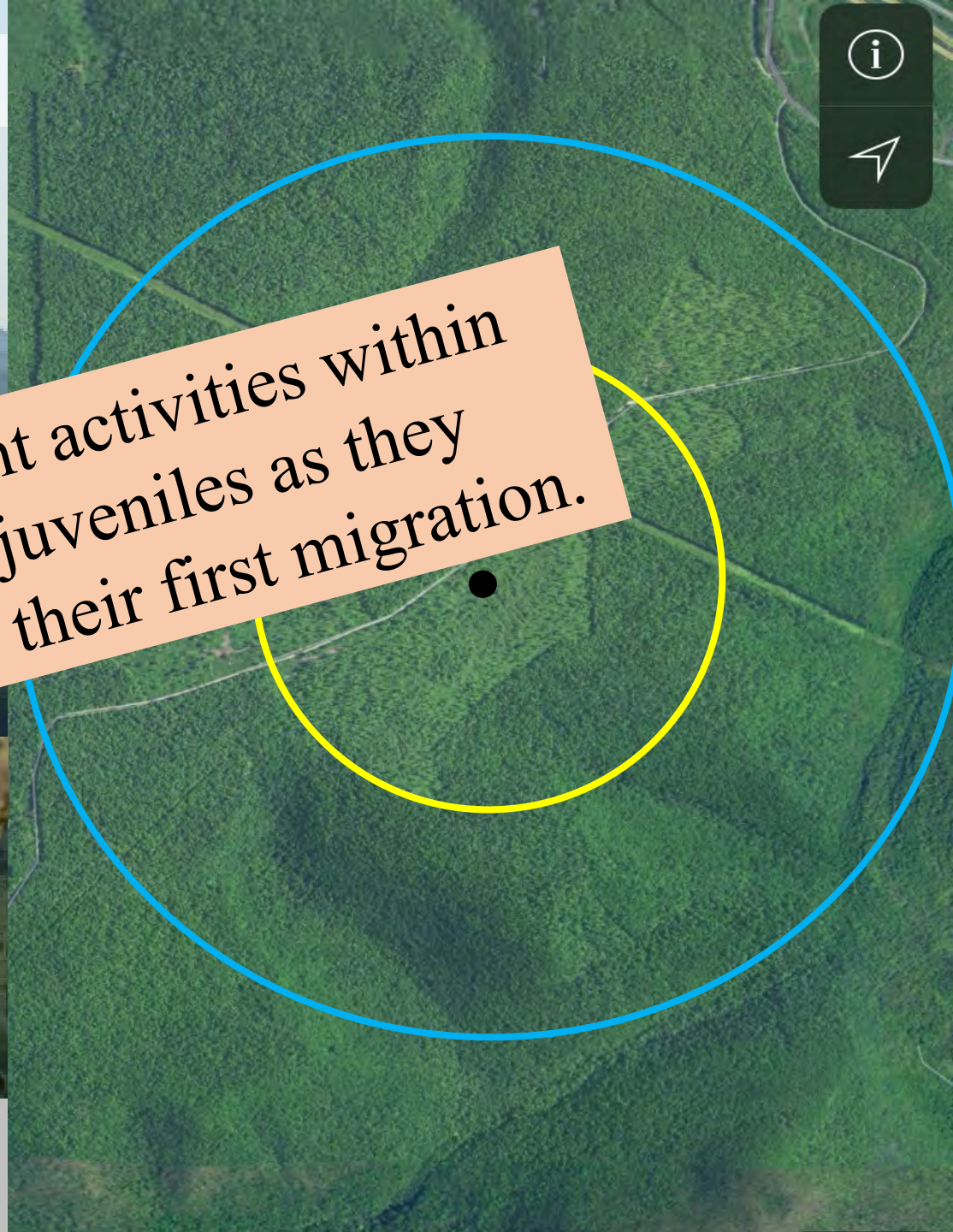
Average =710 m away from nest

Max

A mosaic of forest management activities within forested landscapes benefit juveniles as they develop, molt, and prepare for their first migration.

Average = **1605m** away from nest at independence (30 days)

Max = 5.2 km by 30 days



Post-fledging Dispersal, Habitat Use, and Home-range Size of Juvenile Wood Thrushes

Andres et al 1998; The Auk. 1 of many papers

"Habitats used after dispersal **differed** from natal habitats" (Anders et al. 1998).

"Our data suggest that in large tracts of mature deciduous forest, **a mosaic of early and mid-successional forest stands**, along with mature riparian forest, will accommodate both the breeding and post-dispersal habitat requirements of Wood Thrushes…"

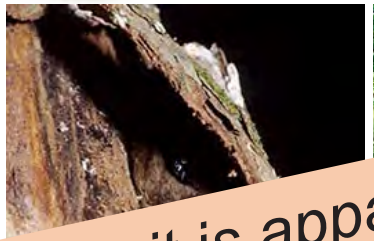
Abcbirds.org

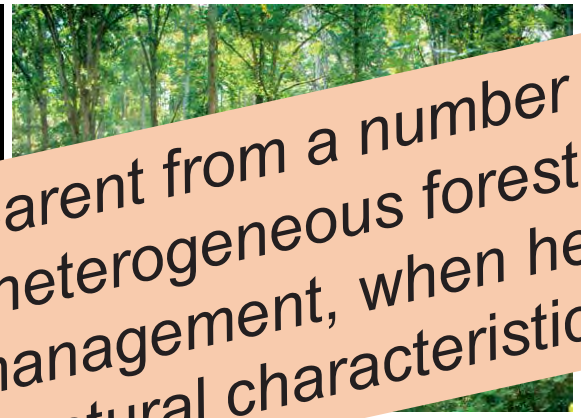
Landscape configuration effects on distribution and abundance of whip-poor-wills

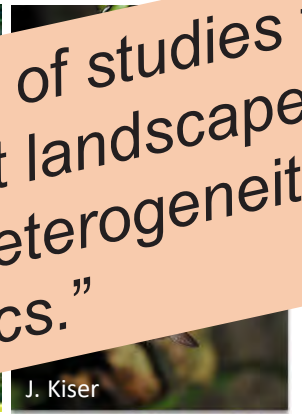
Wilson and Watts (2008);Wilson Journal of Ornithology

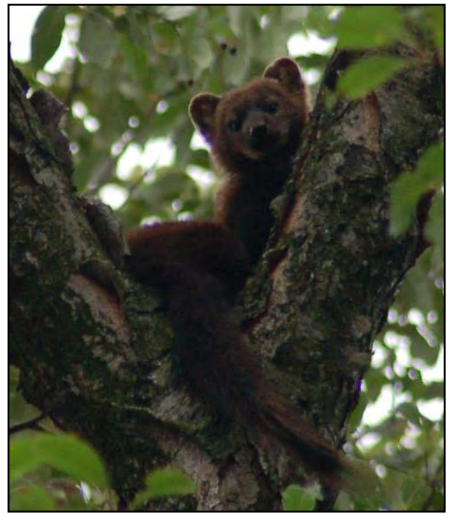
"Forest management for Whip-poor-wills should consider harvest strategies that maintain the availability of regenerating patches in close proximity to mature forests." (Wilson and Watts 2008).

Its NOT just forest birds!









Native Pollinators

Roberts & King 2016
Mathis et al 20[illegible]
[illegible]
Silvis et al. 2016
Wright et al. 2021

"However, it is apparent from a number of studies that these three species may benefit from heterogeneous forest landscapes such as those created by active forest management, when heterogeneity encompasses forest type, age, and structural characteristics."

Meso carnivore

Gess et al 2013
McNitt et al. 2020

A Paradox exists for many forest birds

"Water, water everywhere, nor [but not] a drop to drink"

- ***The Rime of the Ancient Mariner*, Samuel Taylor Coleridge**

"Forest, Forest everywhere, but not a place to nest or raise my young"

- Anonymous Eastern Forest Bird 2021

It's not just about the "Birds" or " Wildlife"!

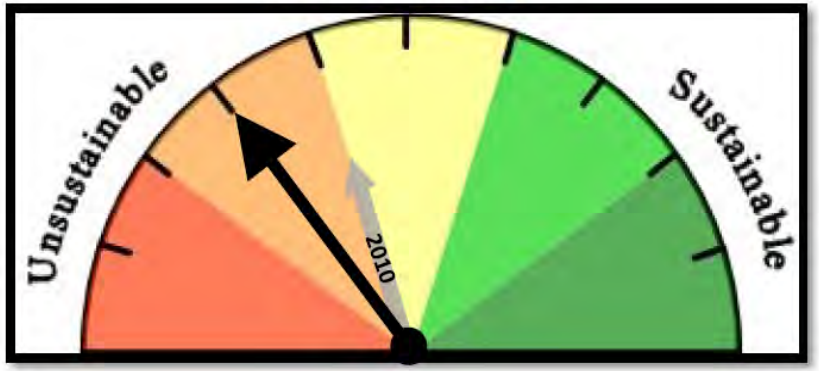
Addressing threats and balancing age classes are not only important to forest-bird conservation...they're also goals of foresters and forest managers, in general!

"Lack of diversity in age classes and successional stages, changing overstory species composition, threats from biotic and abiotic vectors, as well as poor management practices reduce the health and resiliency of the forest and produce poorer habitat for native species."

https://www.stateforesters.org/forest-action-plans/

Dynamic Forest Partnership: Recovering Wildlife by Improving Forest Health

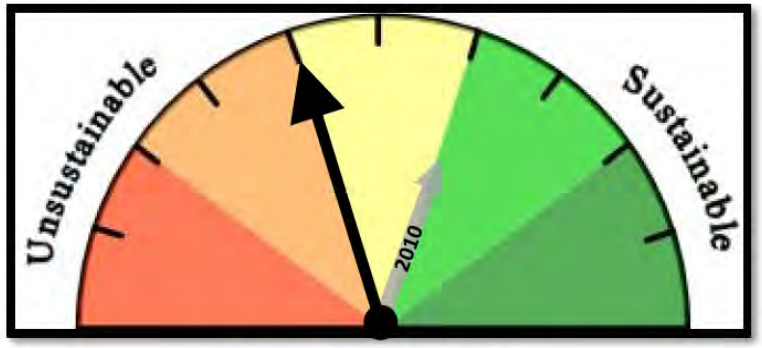
Indicator 2. Forest type, size class, age class, and successional stage



Dynamic Forest Partnership: Recovering Wildlife by Improving Forest Health

PENNSYLVANIA
WILDLIFE ACTION PLAN

Indicator 4. Status of forest/woodland communities and associated species of concern



Sustainability Meter

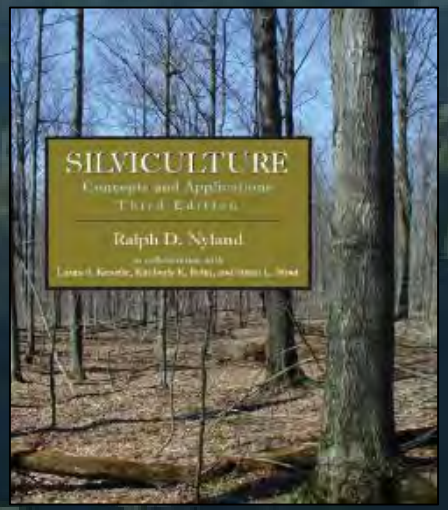
What is good for the forest is good for forest birds!

Sustainable forestry and succession provide a continuum of forest conditions for all bird species

So long as, habitat management is GROUNDED in responsible forestry and built upon a foundation of the best available science for forestry and wildlife ecology.

Foresters know how to mitigate threats through the implementation of various management practices

- Forest Stand Improvements
- Mechanical low shade removal
- Deer exclusion fencing
- Prescribed fire
- Herbicide
- Crop tree release



A well-stocked toolbox, a plan to work at biological meaningful scales will get us there!

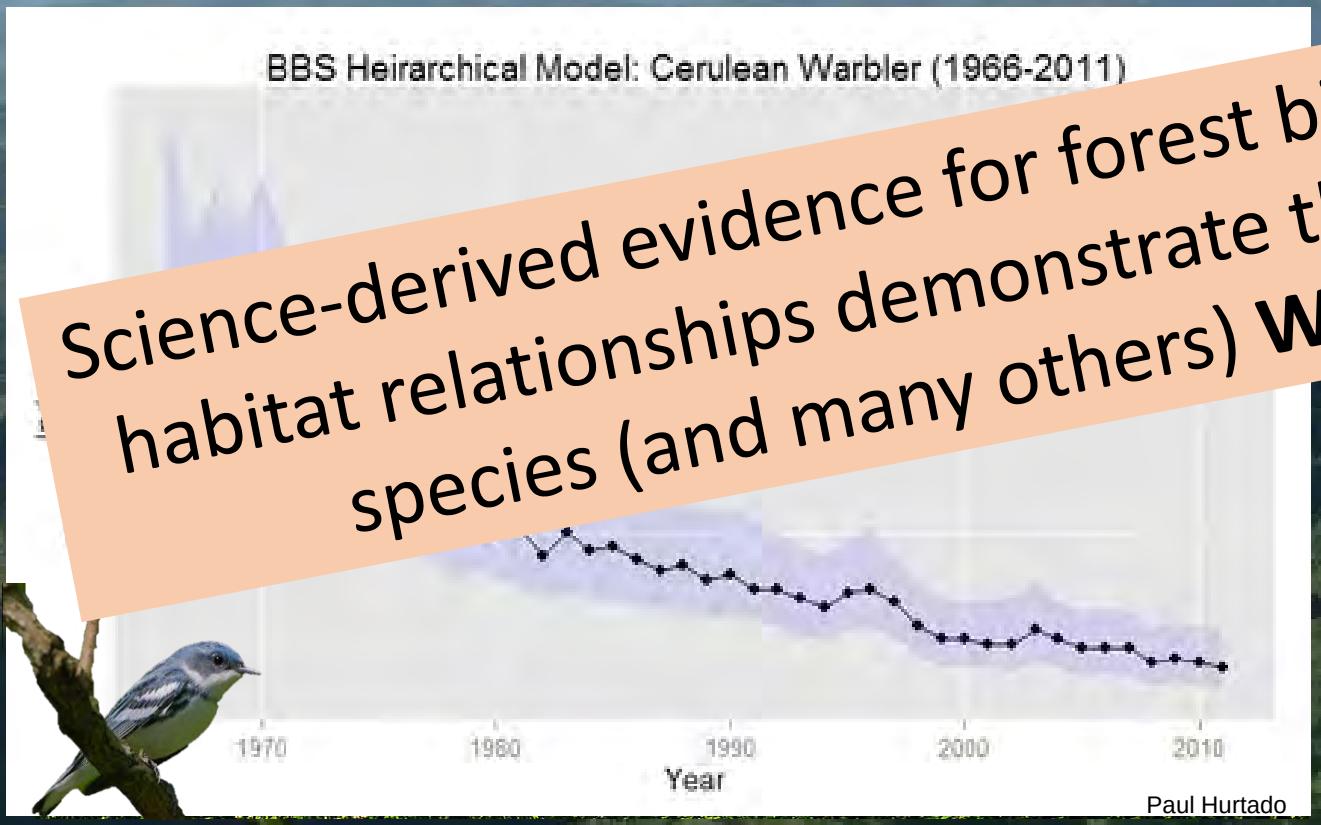
STAFF PHOTO/CHRIS LARABEE

Inaction is not the solution

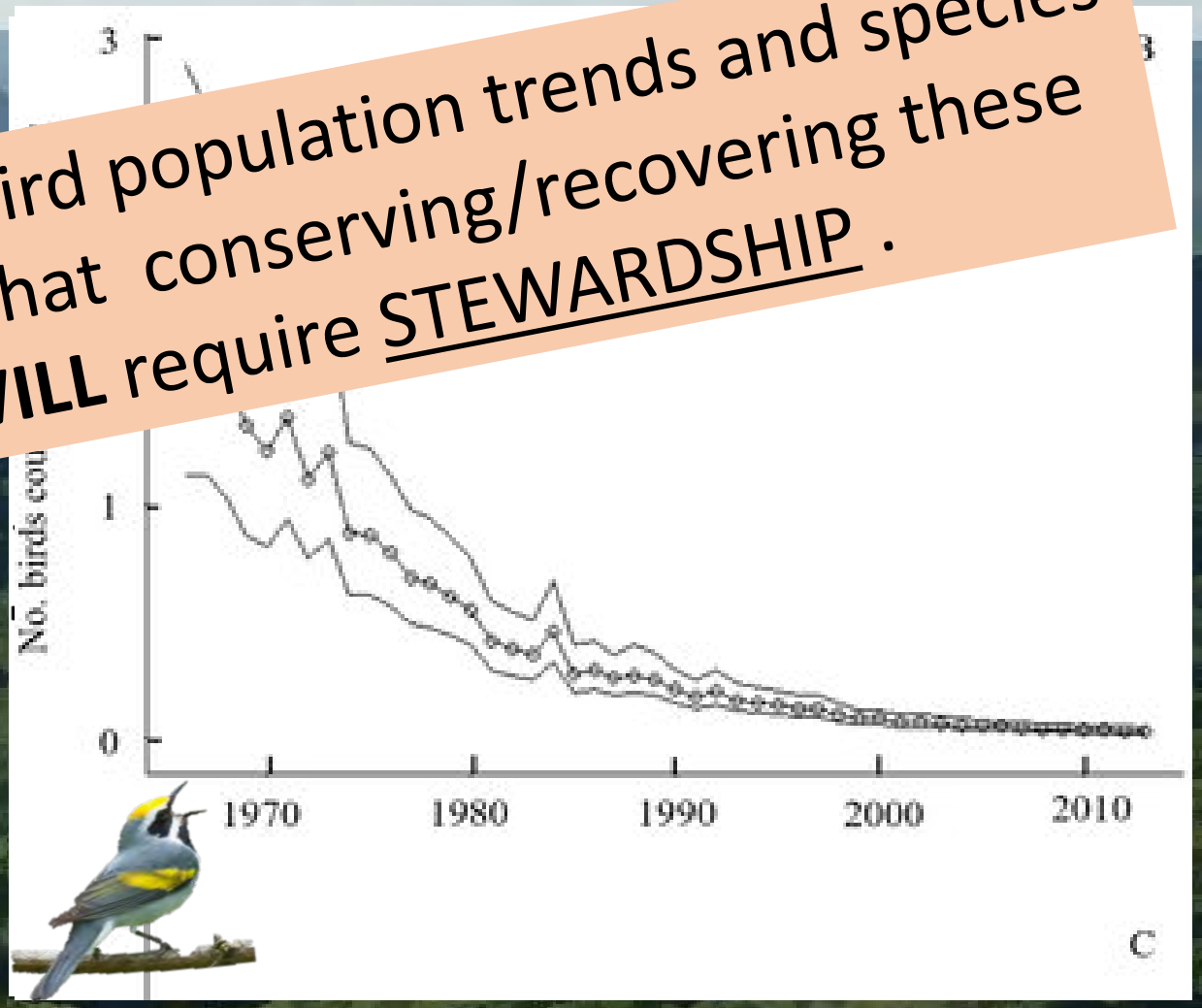
These forests will "<u>Uniformly</u> *grow old <u>without</u> management intervention*"

Shifley et al. (2014) "*Five Anthropogenic Factors That Will Radically Alter Forest Conditions and Management Needs in th Northern United States.* Forest Science 60.5: 914-925"

Science-derived evidence for forest bird population trends and species habitat relationships demonstrate that conserving/recovering these species (and many others) **WILL** require <u>STEWARDSHIP</u> .



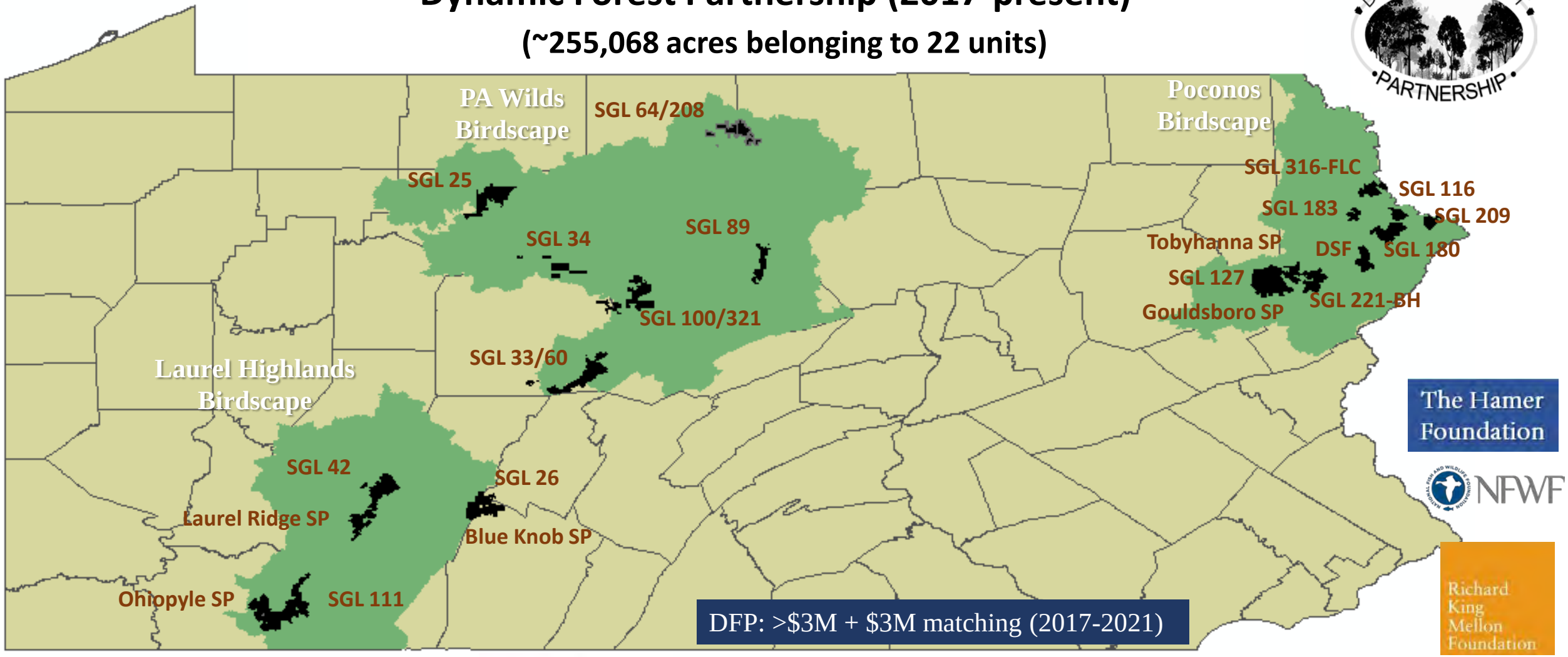
Paul Hurtado



Dynamic Forest Restoration Blocks: biologically meaningful landscape units (2500-25,000 acres) where we are focusing efforts to balance age classes, address threats, and improve forest structure.

Dynamic Forest Partnership (2017-present)

(~255,068 acres belonging to 22 units)



The Hamer Foundation

NFWF

Richard King Mellon Foundation

AMERICAN BIRD CONSERVANCY

pennsylvania GAME COMMISSION

IUP Indiana University of Pennsylvania

RUFFED GROUSE SOCIETY

NWTF

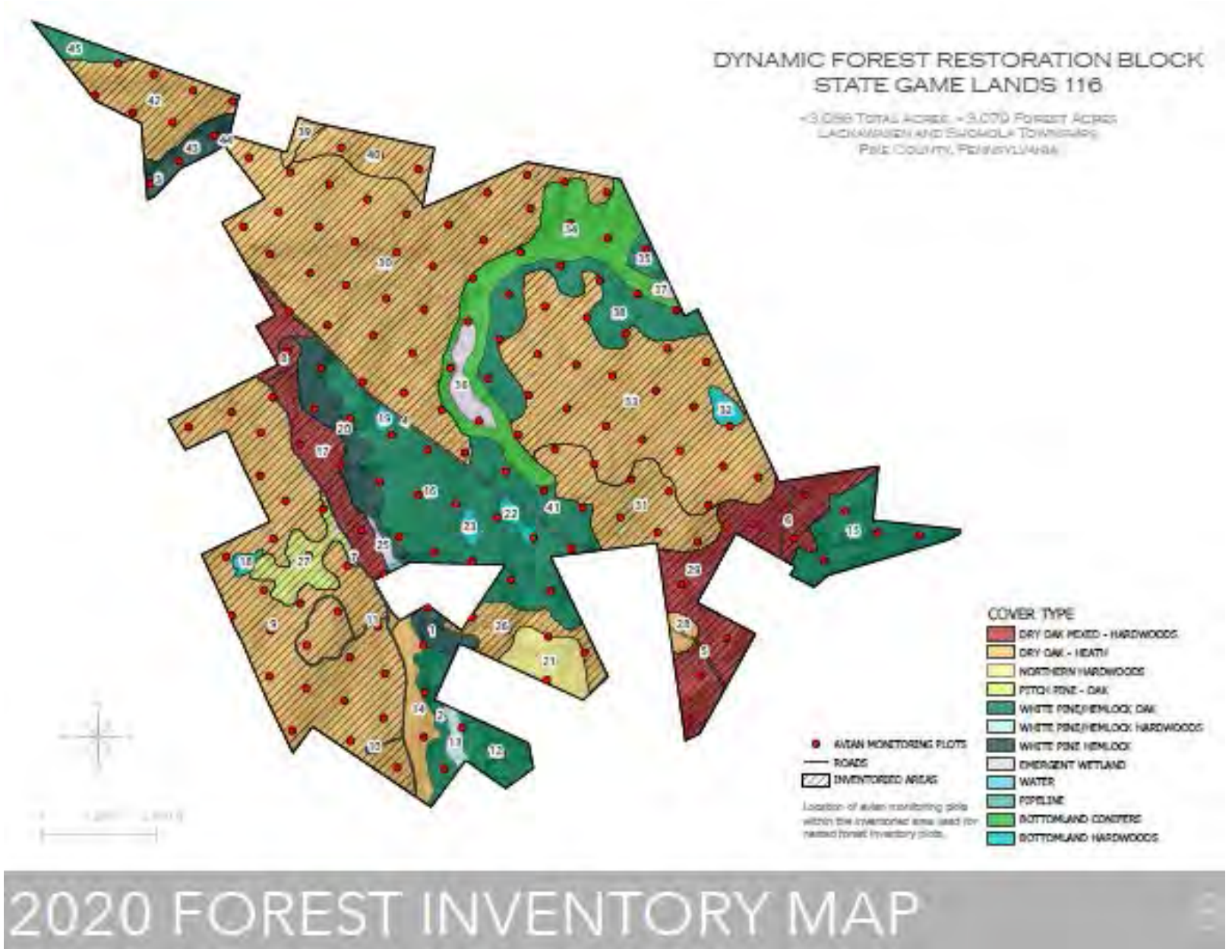
Audubon MID-ATLANTIC

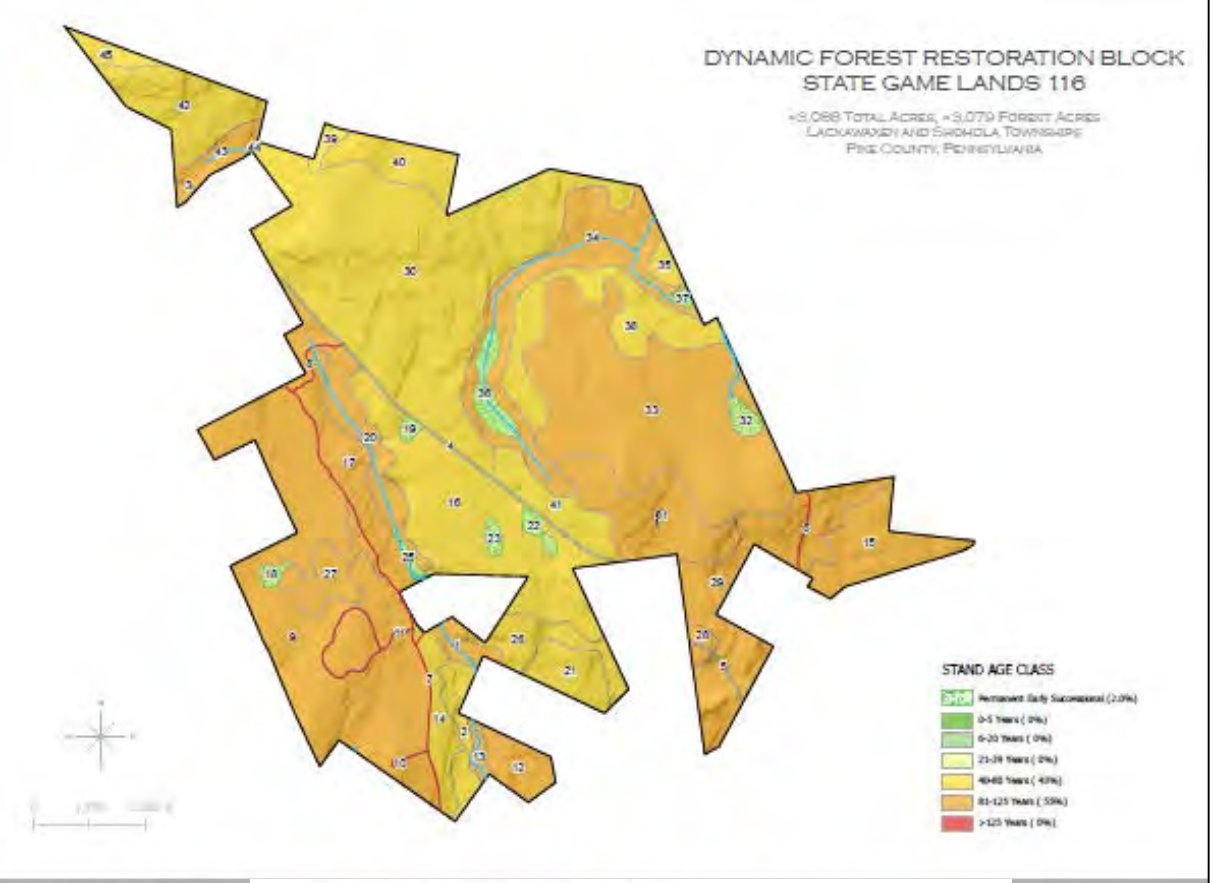
pennsylvania DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

Step 1: It all starts with a **Comprehensive** Plan!

SGL 116

~15% young forest (<20 yrs)
35-50% mixed age class (21-125 yrs)
35-50% late seral (>125 yrs)

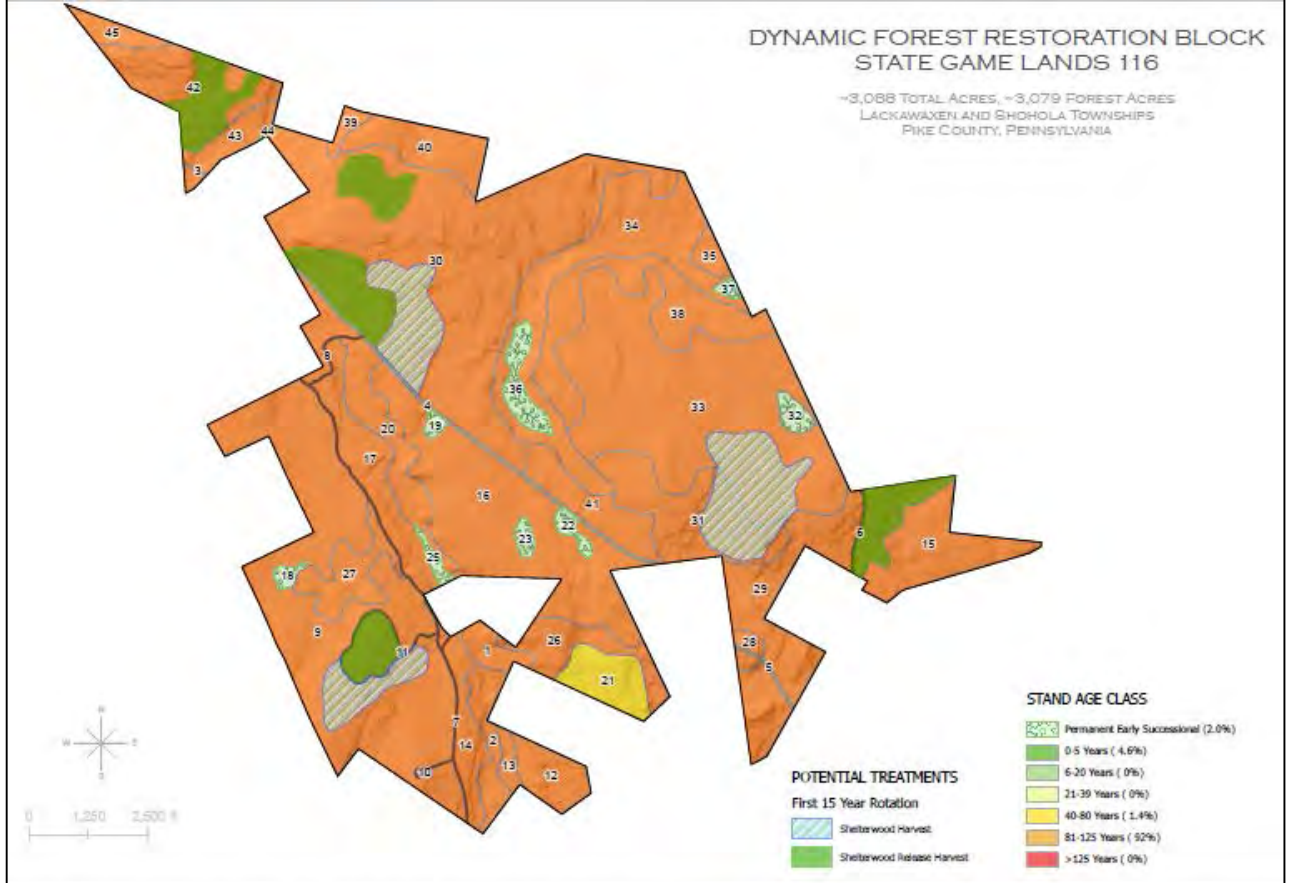




2020 FC

STAND AGE CLASS

- Permanent Early Successional (2.0%)
- 0-5 Years (0%)
- 6-20 Years (0%)
- 21-39 Years (0%)
- 40-80 Years (43%)
- 81-125 Years (55%)
- >125 Years (0%)

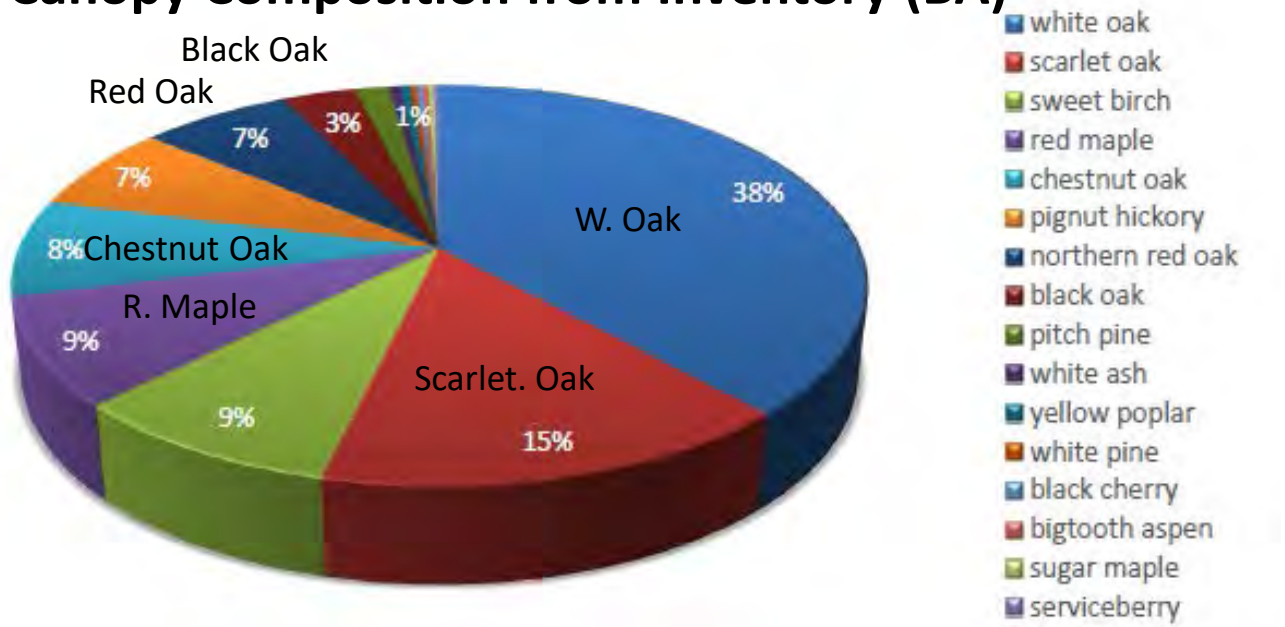


2035 FC

STAND AGE CLASS

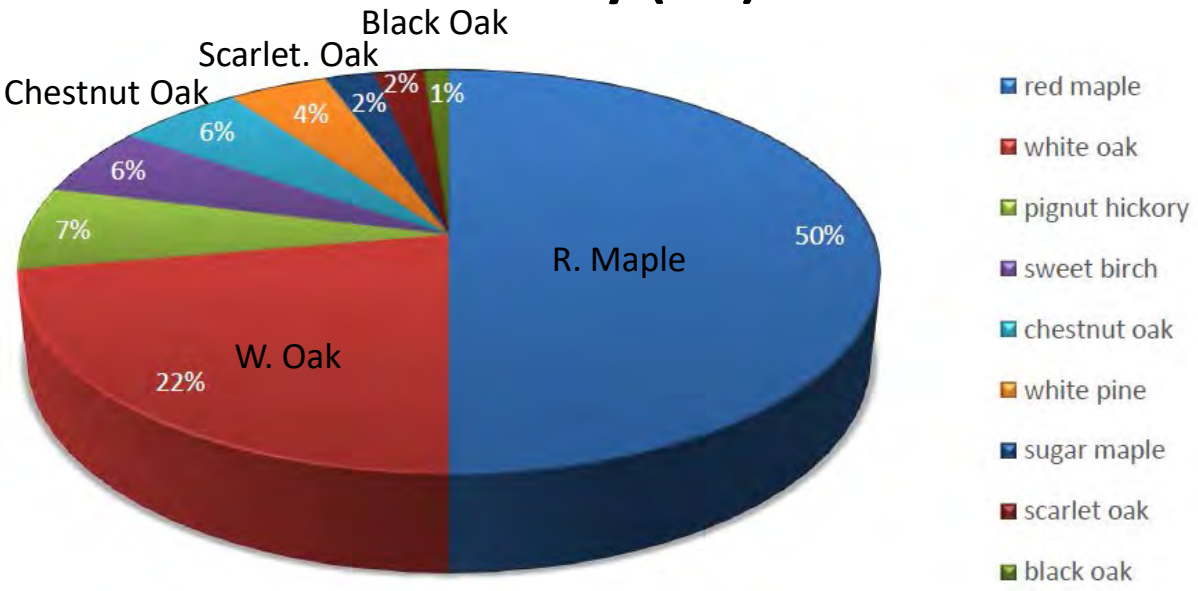
- Permanent Early Successional (2.0%)
- 0-5 Years (4.6%)
- 6-20 Years (0%)
- 21-39 Years (0%)
- 40-80 Years (1.4%)
- 81-125 Years (92%)
- >125 Years (0%)

Canopy Composition from Inventory (BA)



71% canopy composition = <u>5 oak</u> species
18% red maple and sweet birch

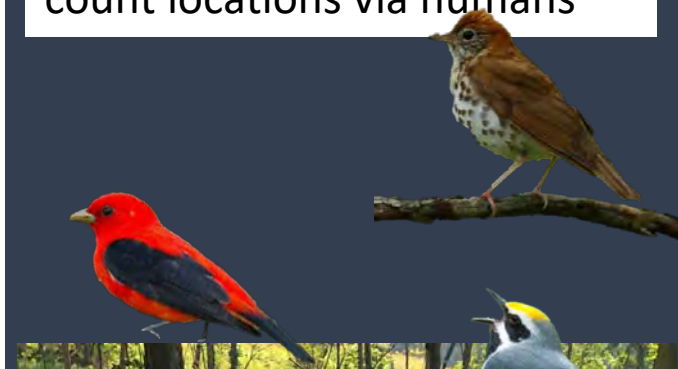
Midstory/suppressed composition from Inventory (BA)



31% potential for future canopy composition = <u>4 oak</u> species
57% red maple and sweet birch

Implement

2018-21: 2,218 unique point count locations via humans



Monitor

DYNAMIC FOREST RESTORATION BLOCK
STATE GAME LANDS 116

~3,088 Total Acres, ~3,079 Forest Acres
Lackawaxen and Shohola Townships
Pike County, Pennsylvania

Indiana University of Pennsylvania

ESF
State University of New York College of
Environmental Science and Forestry

University of Pittsburgh

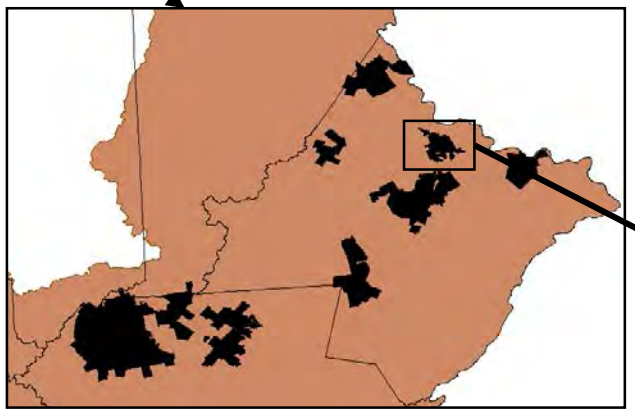
Streams
Roads
AVIAN MONITORING PLOTS

MANAGEMENT TYPE
Mixed Successional
Late Succesional
Reserve Forest
Non-Forested

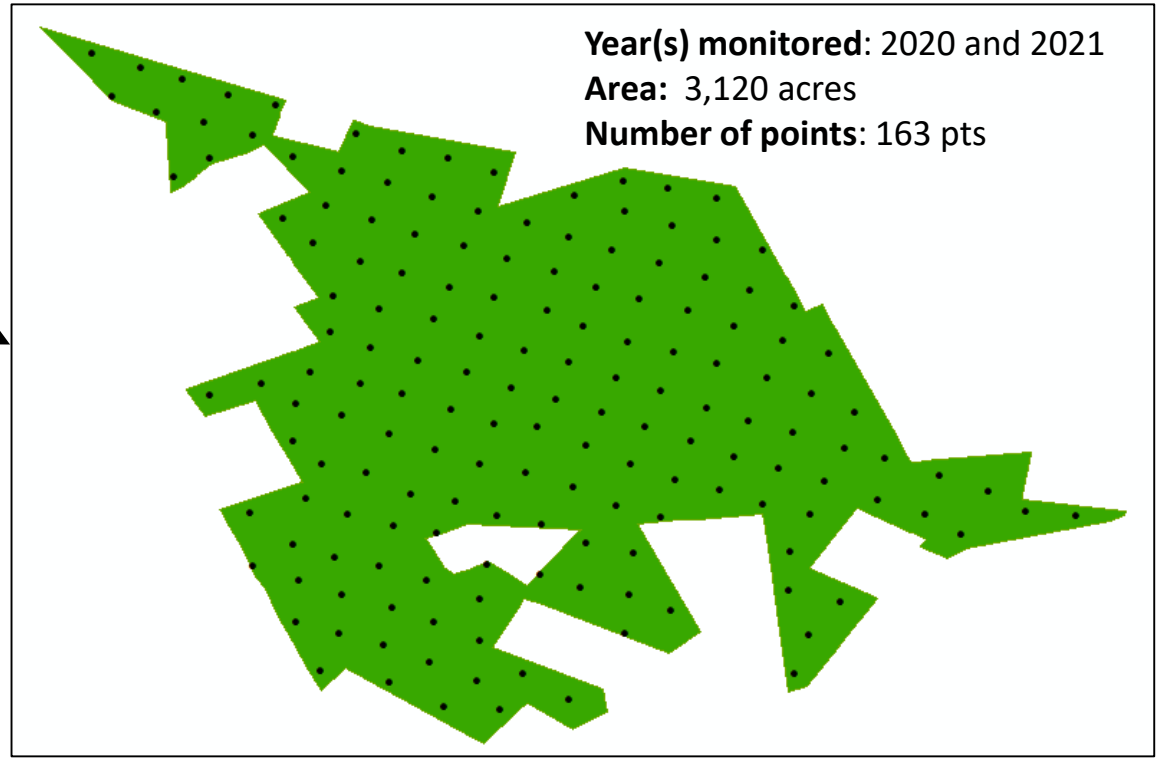
Richard King Mellon Foundation

NFWF

AVIAN MONITORING PLOT MAP



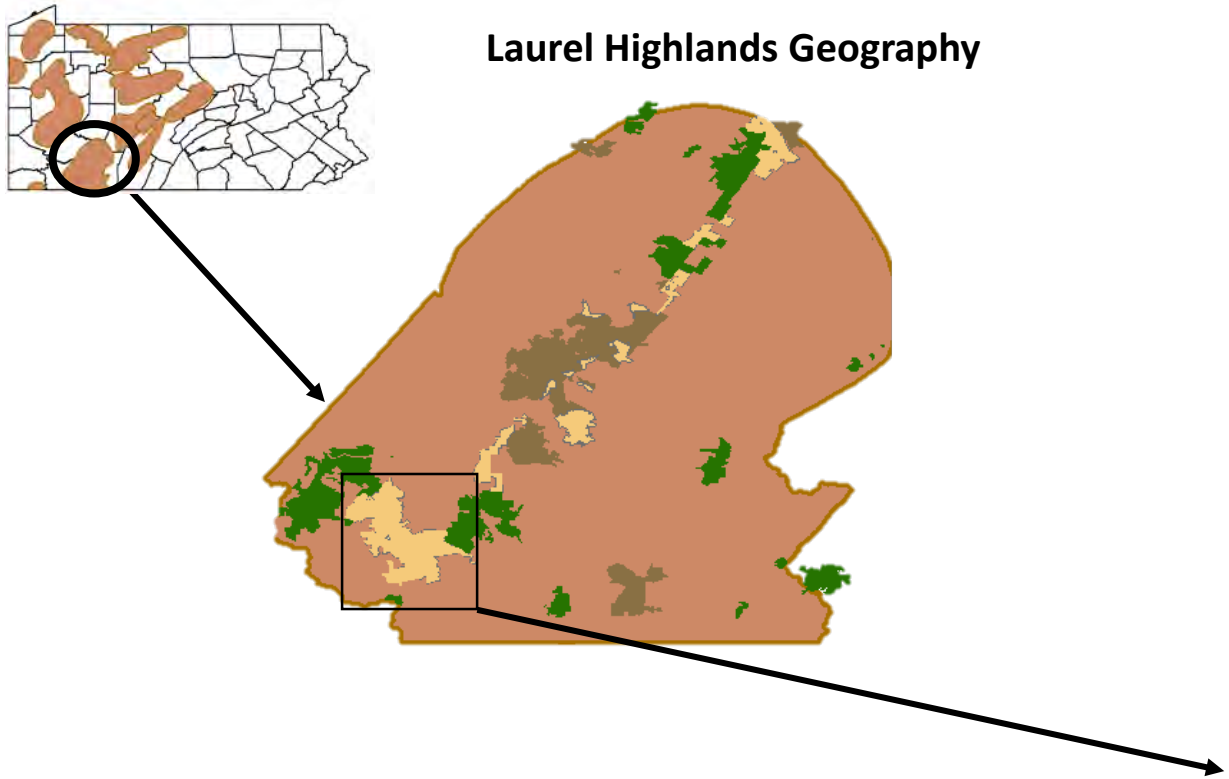
SGL 116 Dynamic Forest Restoration Block



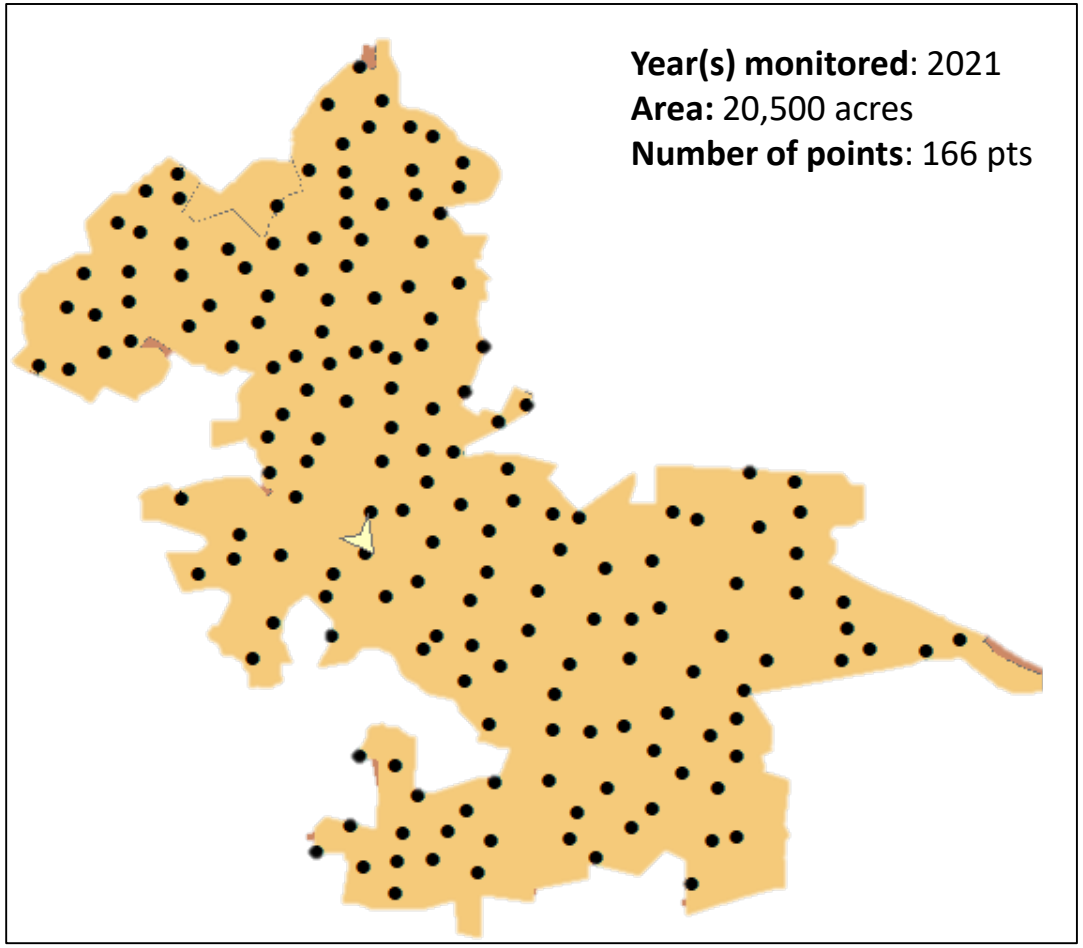
Focal Species	Naive Occupancy	# individuals observed	Modeled Abundance	95% Lower Limit	95% Upper Limit
GWWA	.01	2	3.4	0.4	11.3
CERW	.01	2	2.3	0.38	6
WOTH	0	0	-	-	-

Species Richness	Diversity (H')	Effective Species ($e^{H'}$)	Evenness	Rarified Species
75	3.5	31.7	0.80	47.6

Laurel Highlands Geography

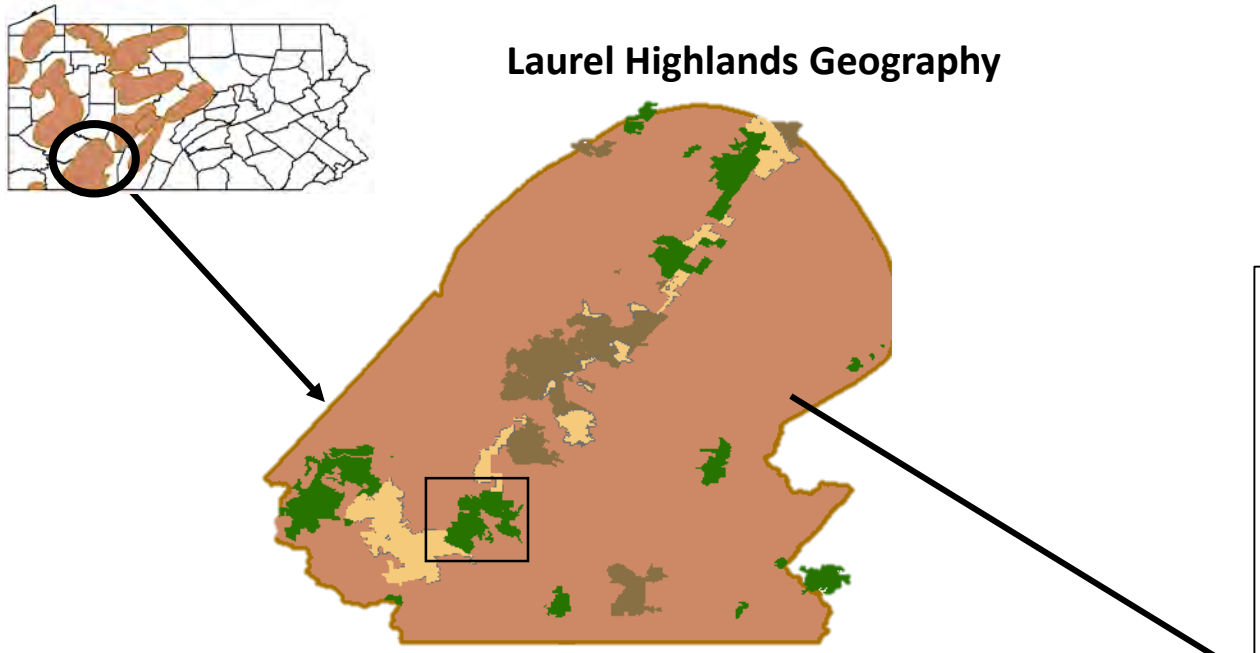


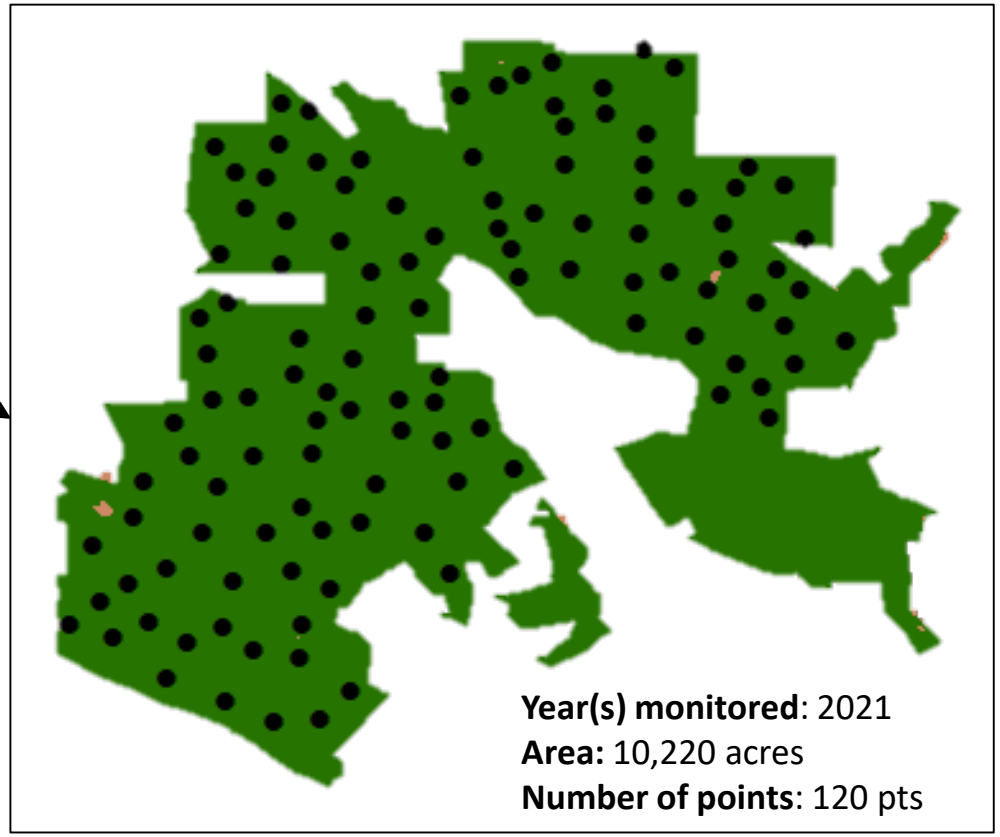
Ohiopyle Dynamic Forest Restoration Block



Focal Species	Naive Occupancy	# individuals observed	Modeled Abundance	95% Lower Limit	95% Upper Limit
GWWA	0.000	0	--	--	--
CERW	0.108	19	210.2	81.3	427.7
WOTH	0.789	193	1509	1200.9	1922.1

Species Richness	Diversity (H')	Effective Species ($e^{H'}$)	Evenness	Rarified Species
77	3.40	30.04	0.78	44.85





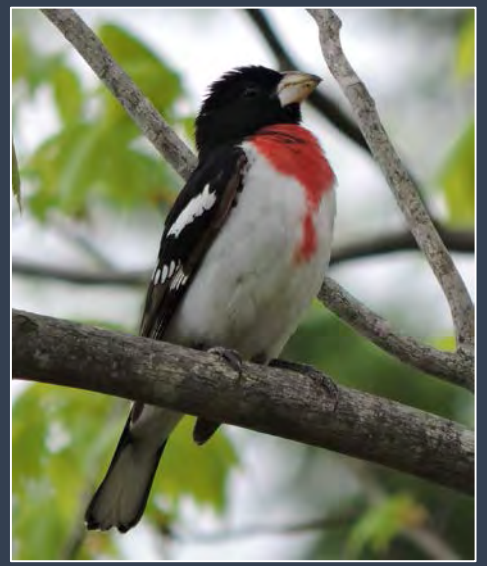
Focal Species	Naive Occupancy	# individuals observed	Modeled Abundance	95% Lower Limit	95% Upper Limit
GWWA	0.000	0	--	--	--
CERW	0.016	2	15.31	1.69	49.26
WOTH	0.440	56	283.7	207.9	378.5

Species Richness	Diversity (H')	Effective Species ($e^{H'}$)	Evenness	Rarified Species
67	3.37	28.97	0.80	43.72

Autonomous Recording Units

ARUs provide an opportunity to conduct within stand surveys for multiple taxa across large numbers of points across a large geography in a single year.

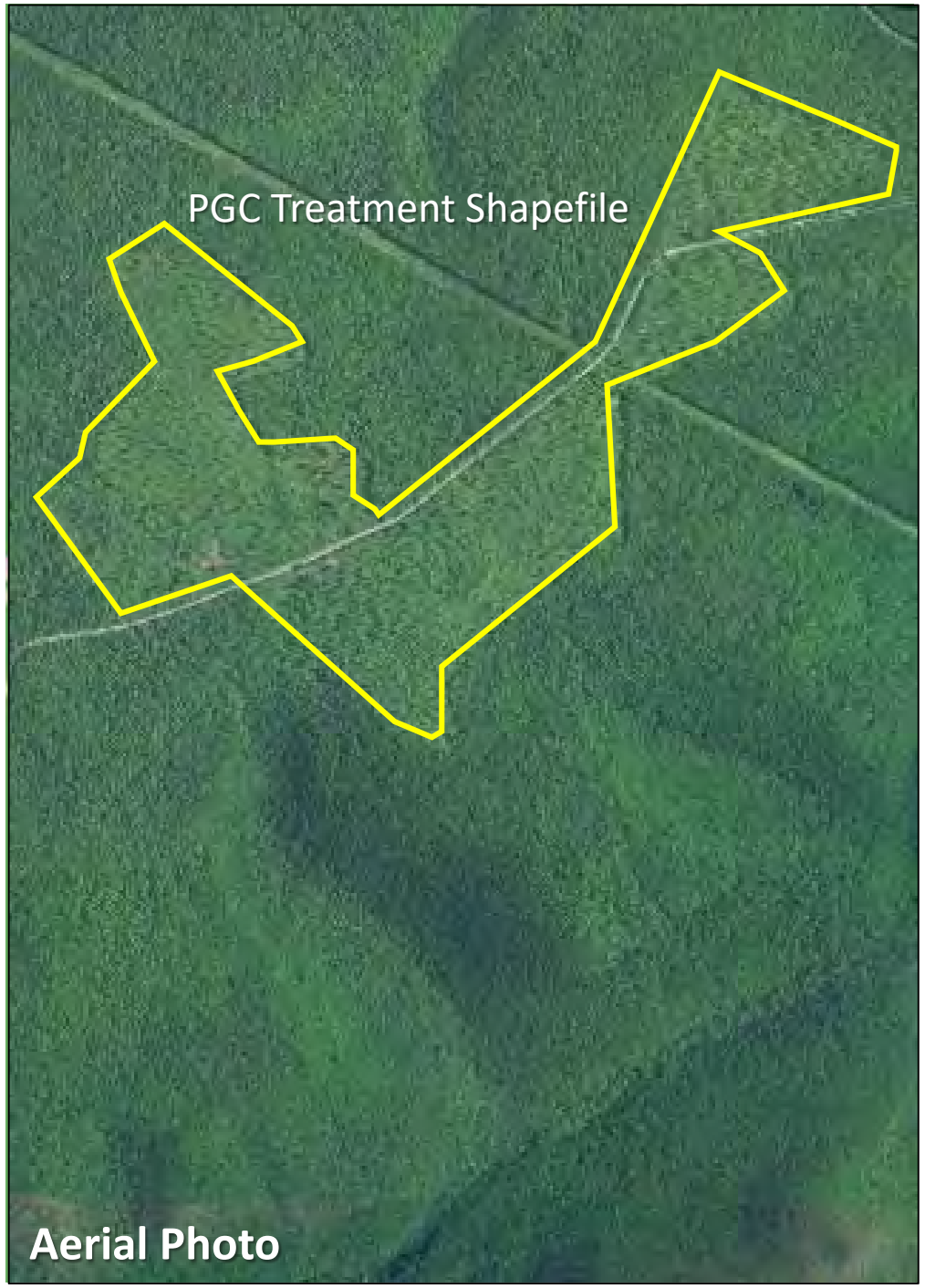
2020-21: placed autonomous recording units (ARUs) at about 800 of these locations.



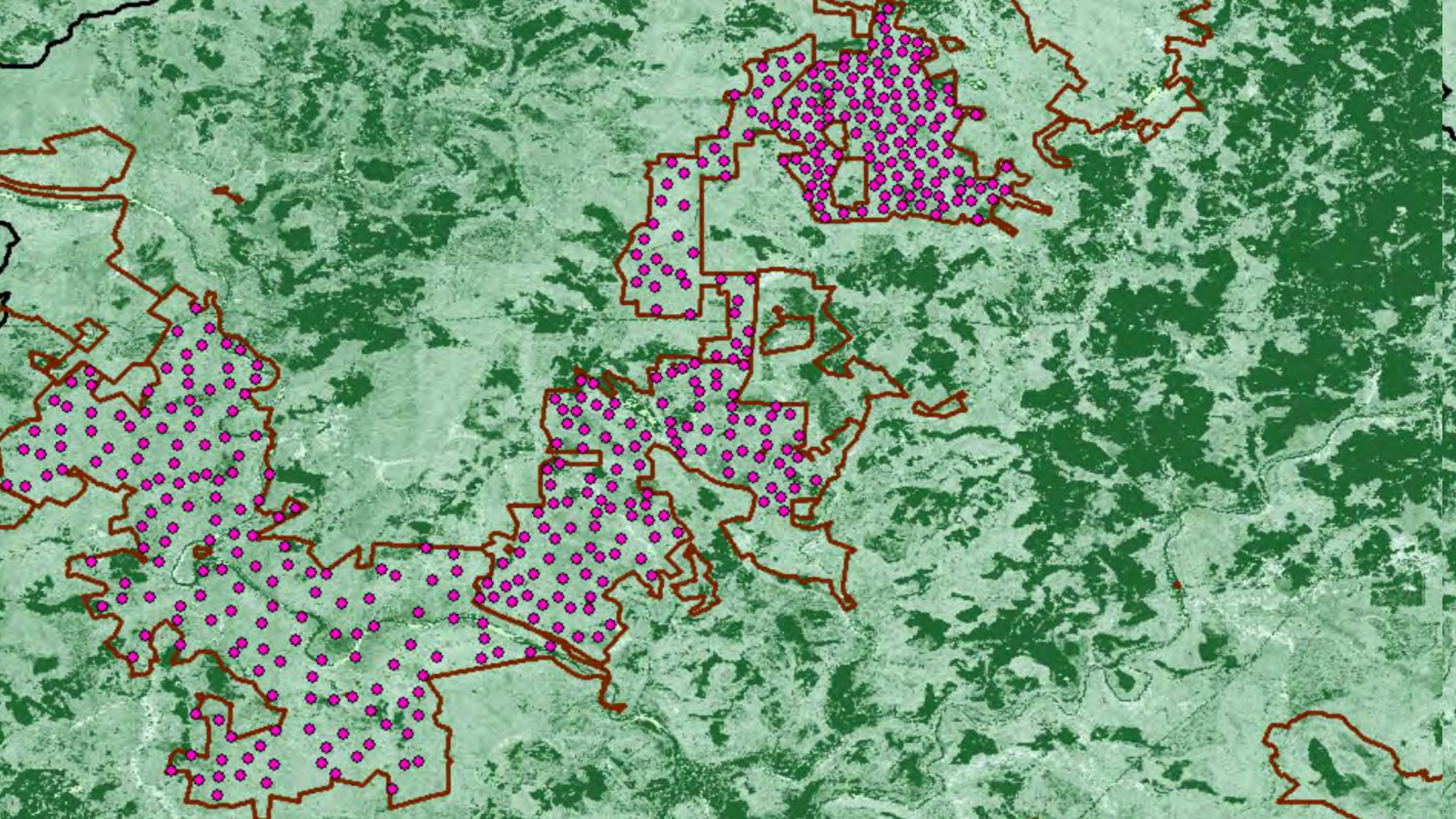
Implementation Outcomes

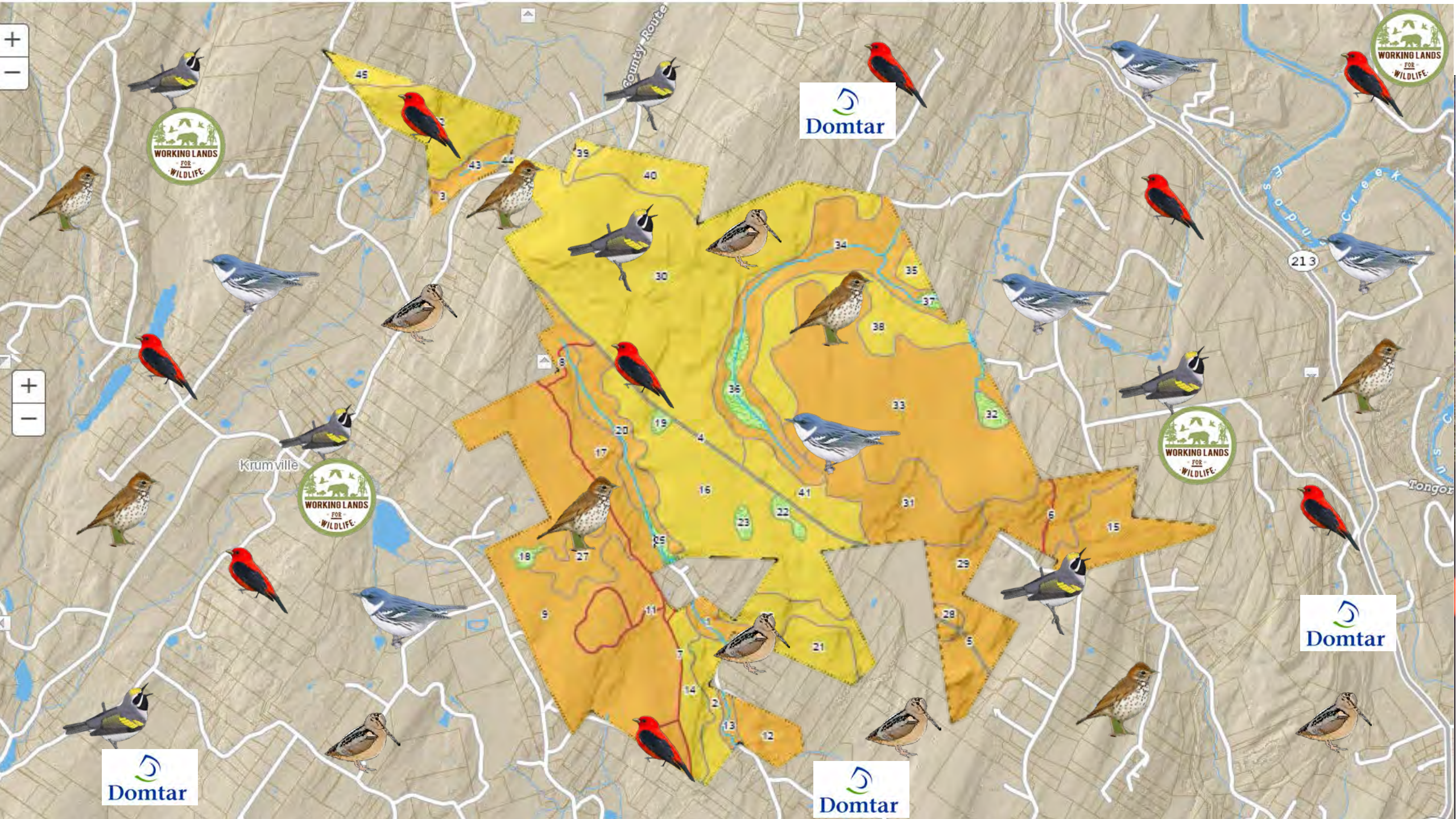
2012-2021: **14,120** acers across 304 private forest owners

2018-2021: **14,466** acers across within 14 Dynamic Forest Restoration Blocks


PGC Treatment Shapefile
Aerial Photo


2019-2020 LiDAR: % first returns below 5m




Domtar
WORKING LANDS FOR WILDLIFE
Krumville
County Route
Esopus Creek
213

Thank you!

"The easy things are done in courtrooms, on paper, and at the ballot box. The hard things are done on the land, with honest conversations among stakeholders and property owners. These are not the easy things, but they are the things worth doing." – Richard Knight, 1999

Questions?

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