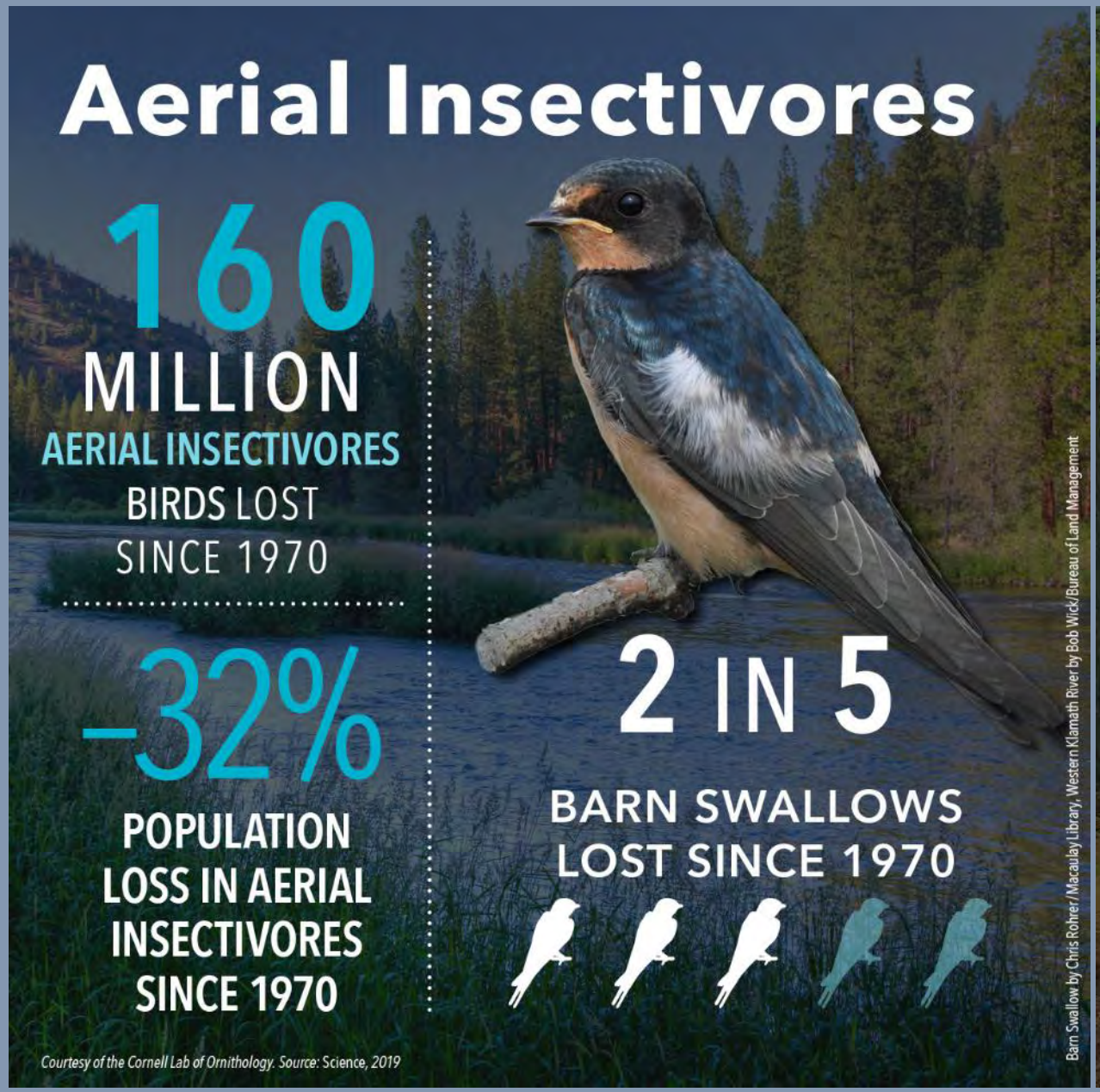
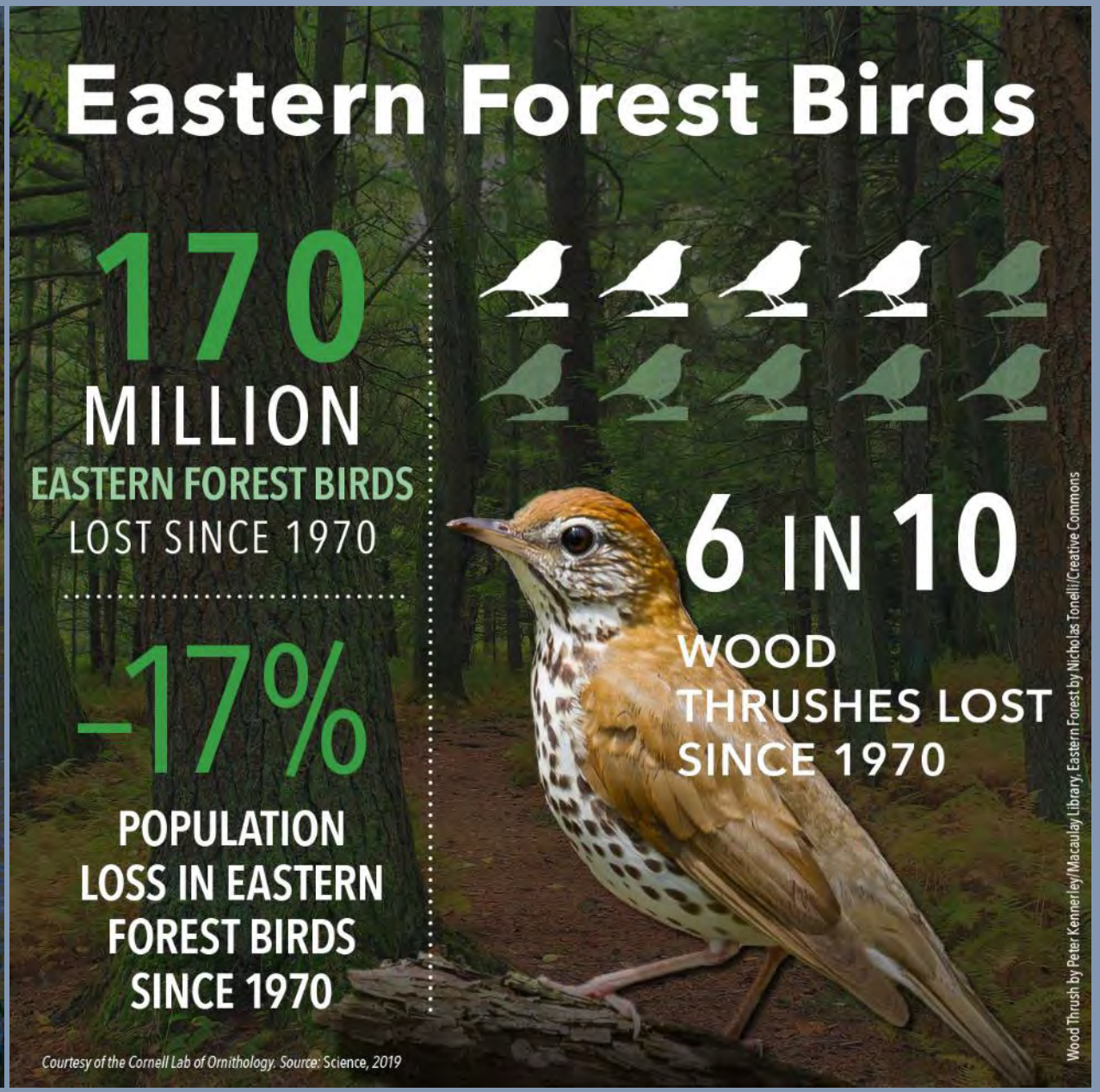
# A Multi-Regional Assessment of Eastern Whip-poor-will (*Antrostomus vociferus*) Occupancy Within Managed Forests Using Autonomous Recording Units

JT Larkin
University of Massachusetts-Amherst
Department of Environmental Conservation



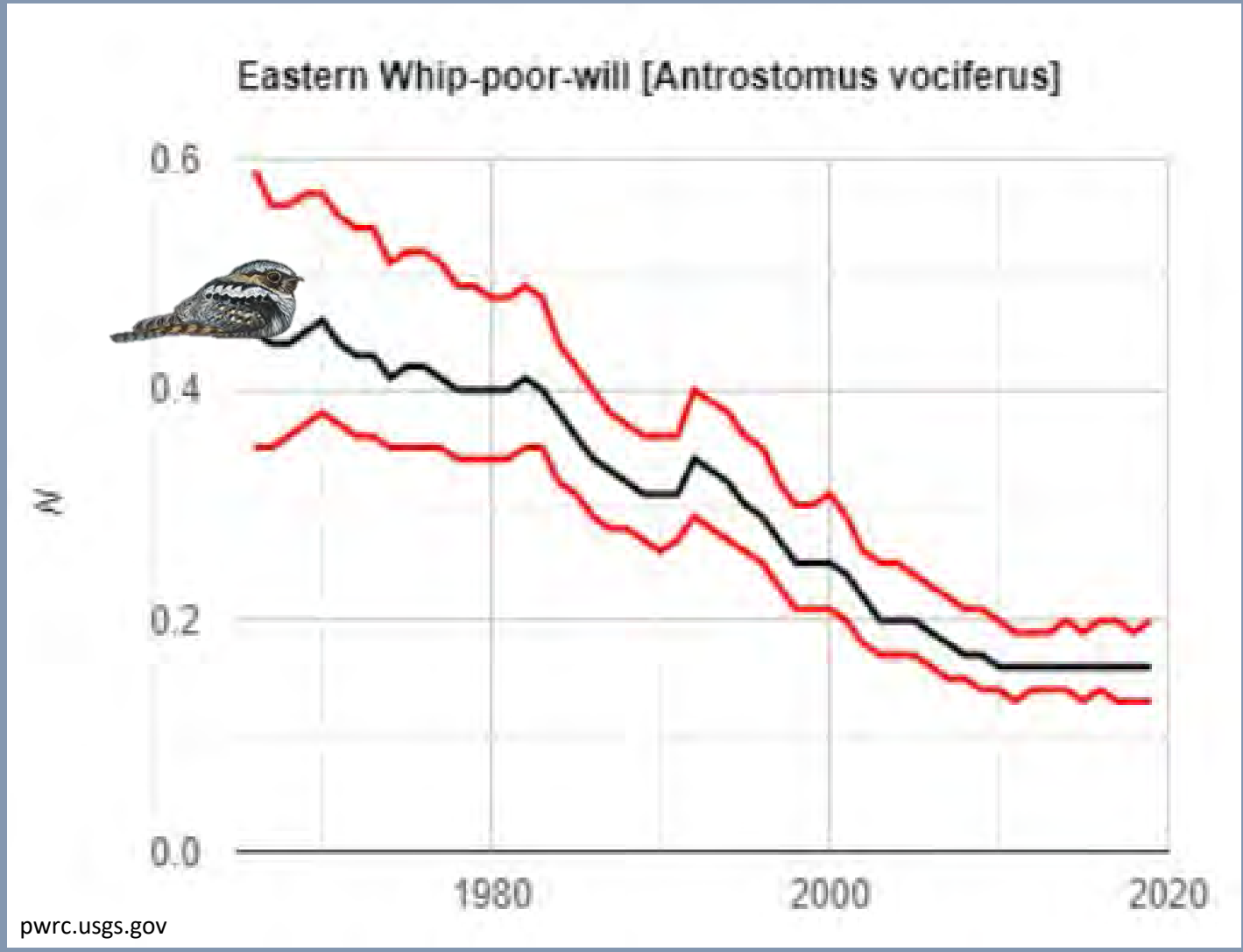

*Rosenberg et al. 2019*

# Eastern Whip-poor-will (*Antrostomus vociferus*)

- Nocturnal aerial insectivore
- Eastern forests
  - Diverse forest conditions

# Eastern Whip-poor-will (*Antrostomus vociferus*)

- Nocturnal aerial insectivore
- Eastern forests
  - Diverse forest conditions
- 64% population reduction (-1.9% per year; BBS)
  - Reduced food availability
  - Habitat loss and degradation



# Past Research

- Coniferous forests
  - Loblolly forests of North Carolina
  - Red Pine Forests of Ontario
  - Pitch pine-scrub oak barrens of Massachusetts
- Northern and southern extent of species range
- Public land
- Range mostly falls in landscapes dominated by deciduous forests which is mostly privately owned



# Private Land Conservation

- 144.5 million acres of forest-land in Eastern US
  - ~70% forest-land in PA is privately owned
- Private lands are important!


WORKING LANDS FOR WILDLIFE

# Habitat/Forest Management

- Efforts to create habitat for threatened and declining wildlife by agencies
  - NRCS and state agencies (e.g., PGC)
  - New England Cottontail and Golden-winged Warbler
- Monitoring for focal species has occurred, but not for whip-poor-will

# Traditional Whip-poor-will Surveys

- Nightjar Survey Network
- Constraints
  - Weather
  - Roadsides
  - ~6 minutes per point once a year
- Large-scale monitoring logistically difficult

# Autonomous Recording Units (ARUs)

- AudioMoths (Open Acoustics)
- Facilitate large-scale monitoring efforts
  - Less techs = more locations surveyed
  - Within timber harvests
  - No time/weather constraints
  - Verifiable results

# Objectives

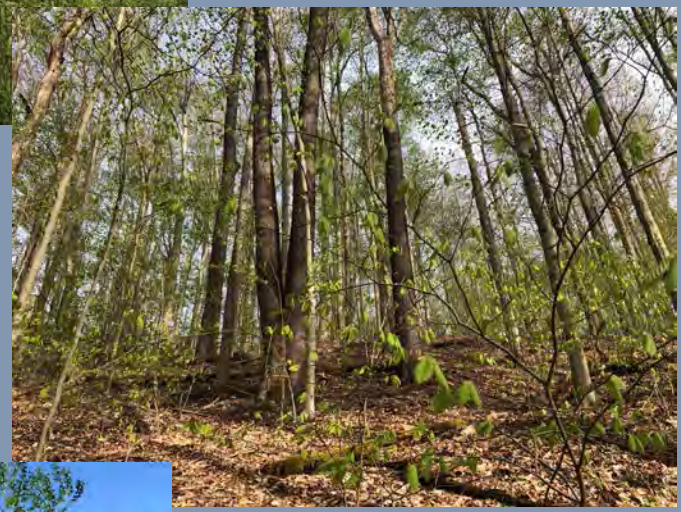
1. Assess whip-poor-will occupancy in forests managed by NRCS WLFW and RCPP programs

2. Identify landscape and micro-habitat variables that affect whip-poor-will presence and range wide distribution

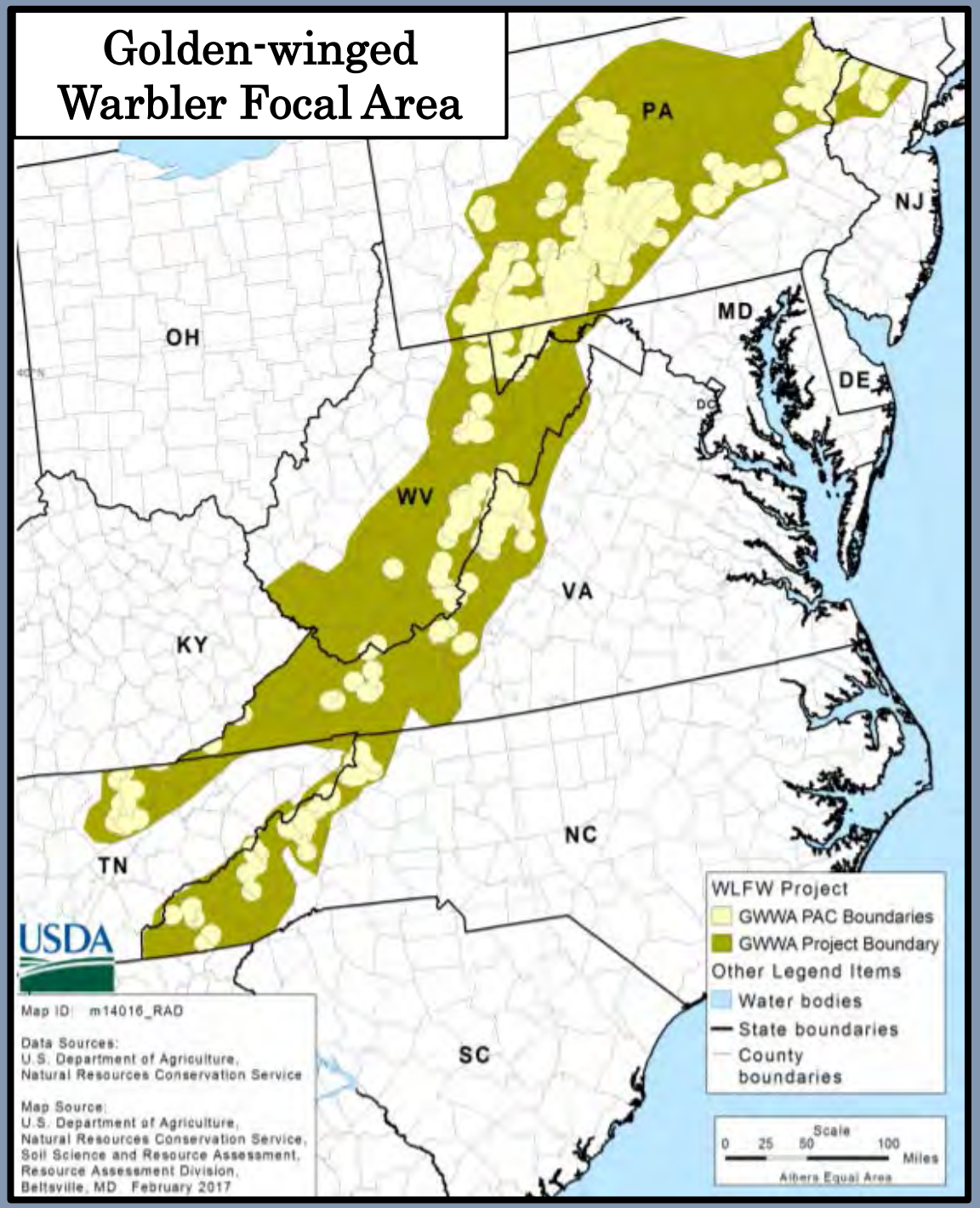
# 2020 Monitoring

- Bird-Deer Fence (56 units)
- American Woodcock (77 units)
- Cerulean Warbler (129 units)
- Dynamic Forest Restoration Block (220 units)

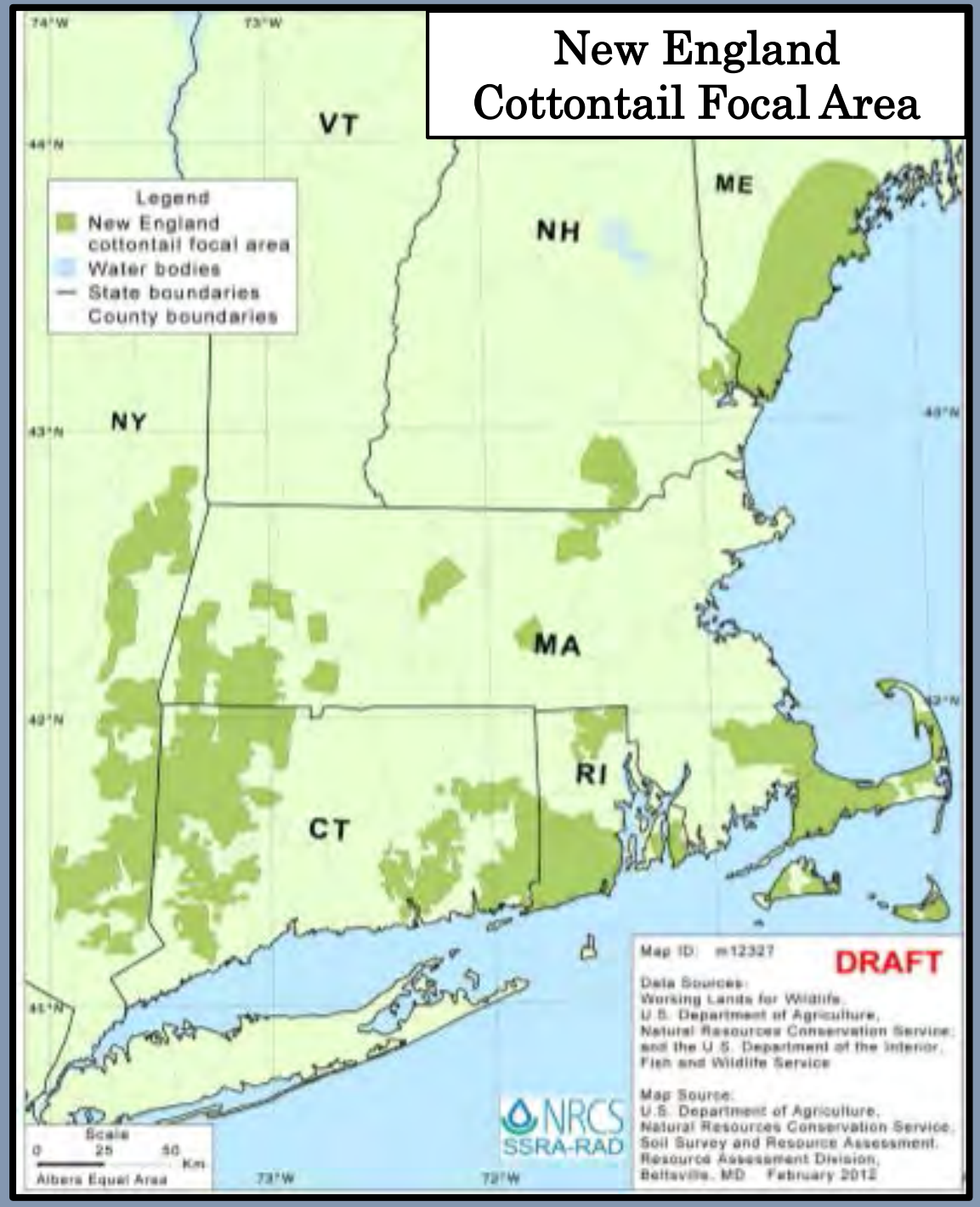
**Total: 482 ARUs**



# Golden-winged Warbler Focal Area

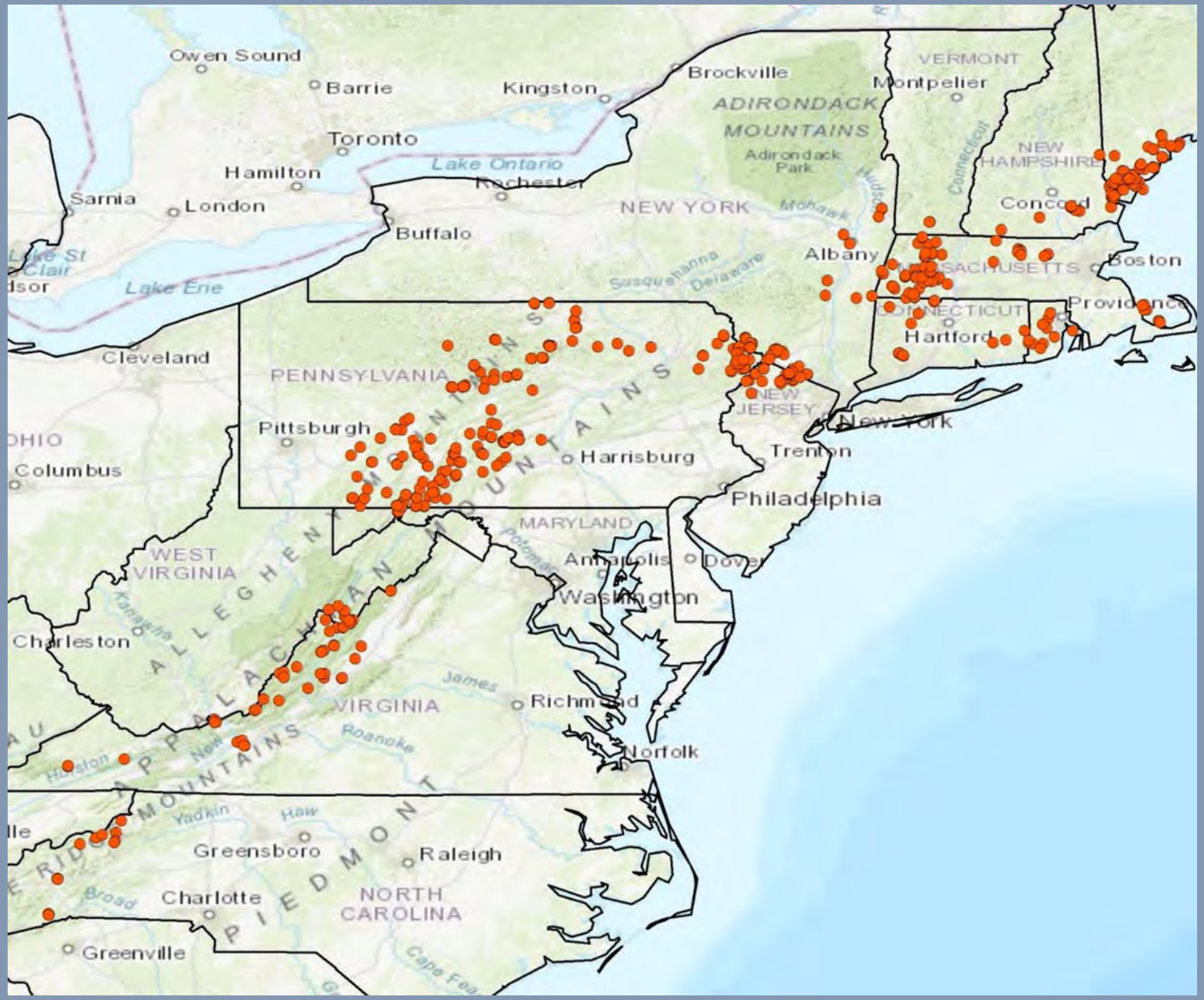



# New England Cottontail Focal Area



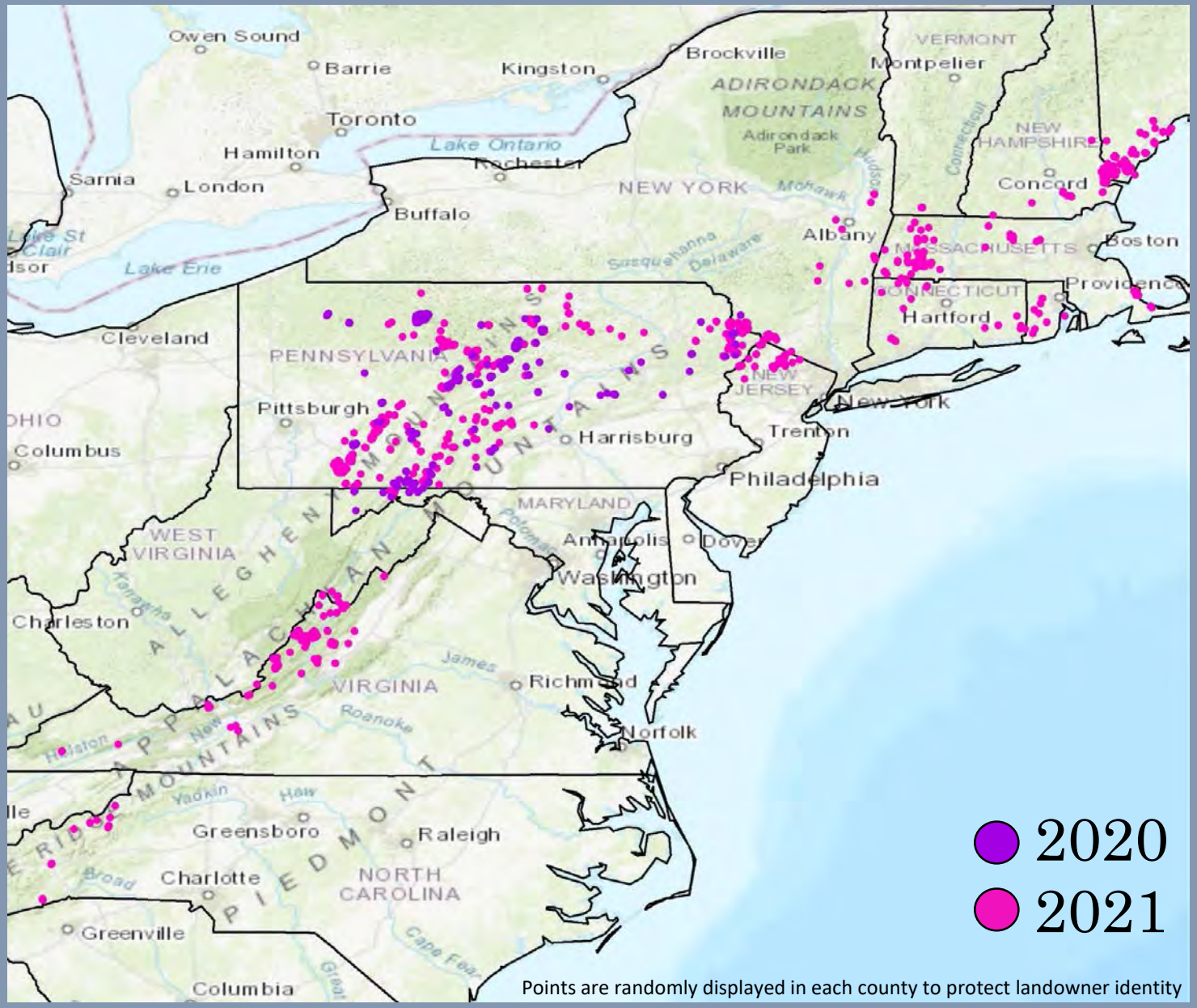
# 2021 Monitoring

- 501 ARUs at 317 public/private land sites
  - 310 GWWA
  - 191 NEC
- Early successional communities



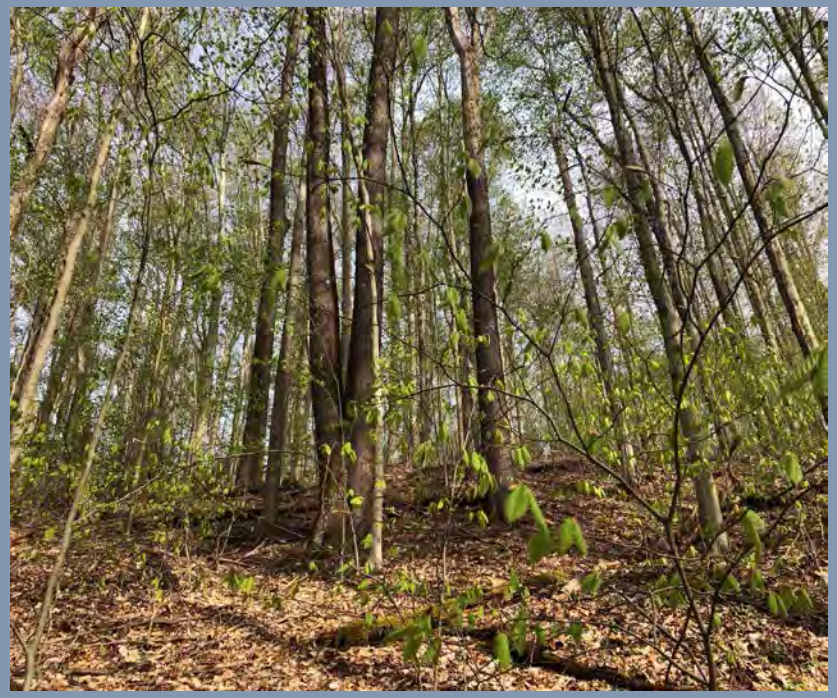

Points are randomly displayed in each county to protect landowner identity

# 2020-2021 Monitoring Effort




1,789 ARUs

Mature Unmanaged



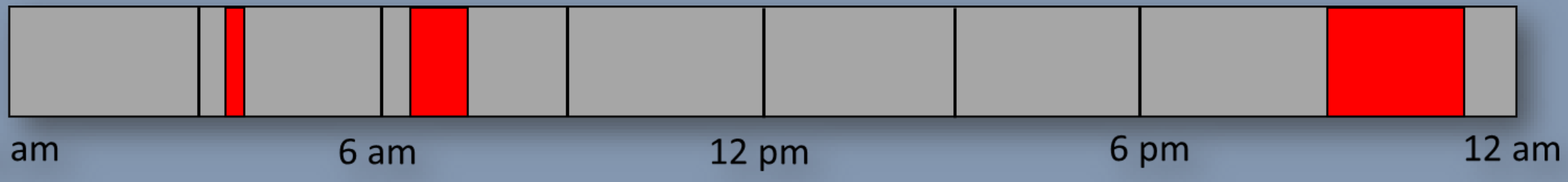
Shelterwood

Overstory Removal

Clearcut

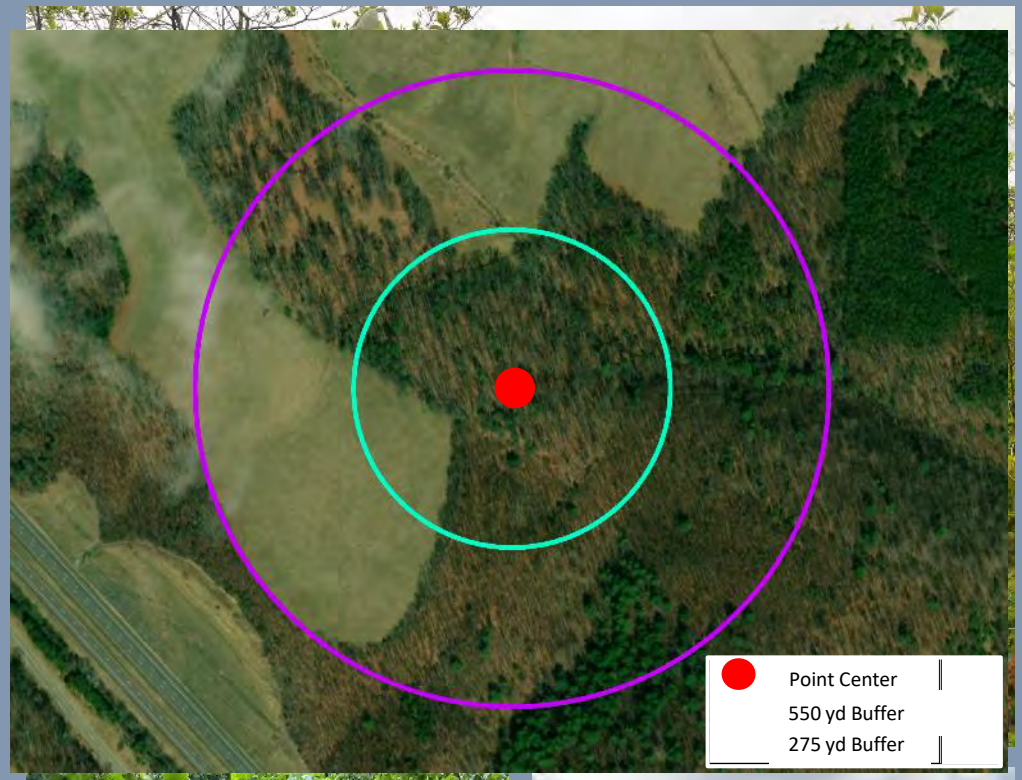
# Methods: ARUs

- Programmed to record 3 hrs/day
  - 3:30-3:45 am
  - 6:30-7:15 am (songbirds)
  - 9-11 pm
- Deploy units April 28 – May 18



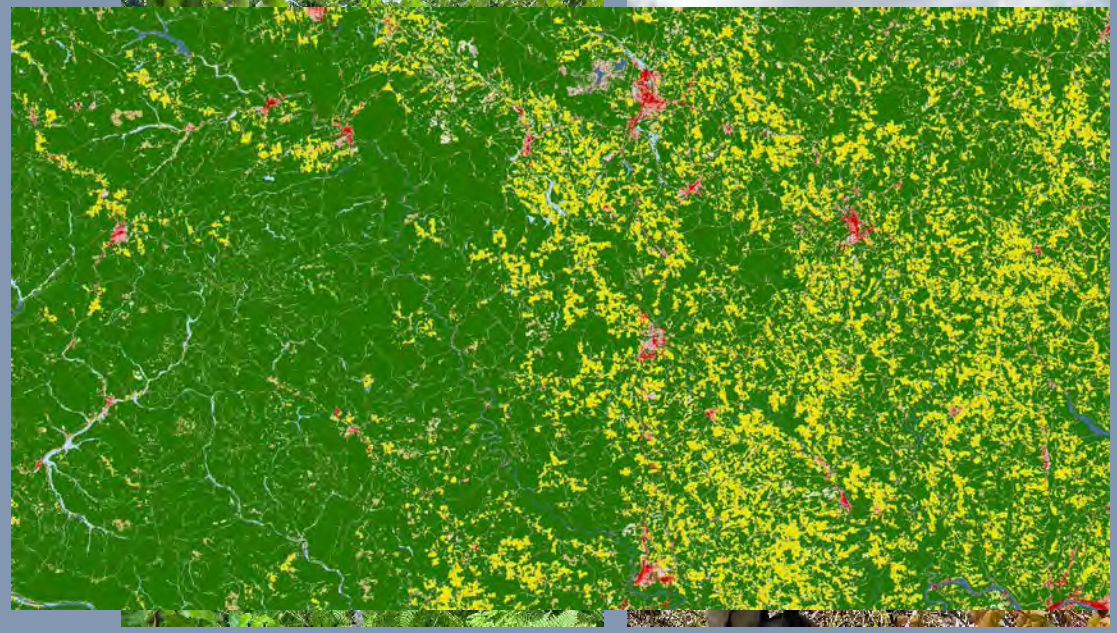
# Methods: Vegetation Surveys

- Quantify micro-habitat characteristics
- Late June-early July



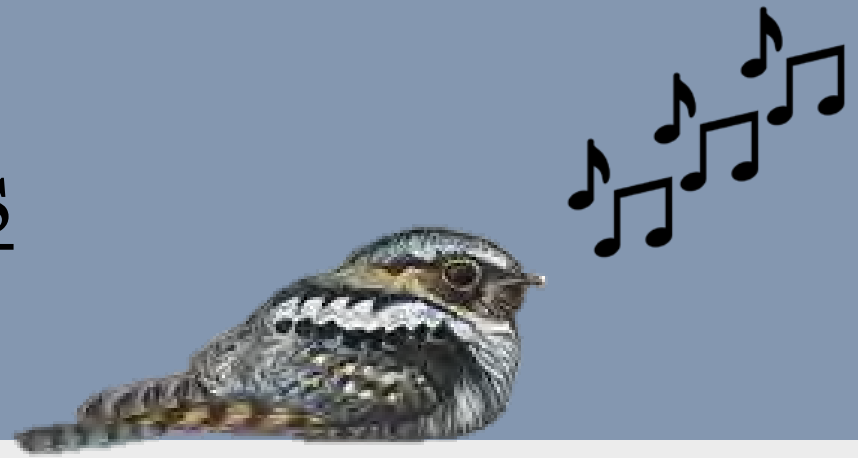

# Methods: Landscape Data

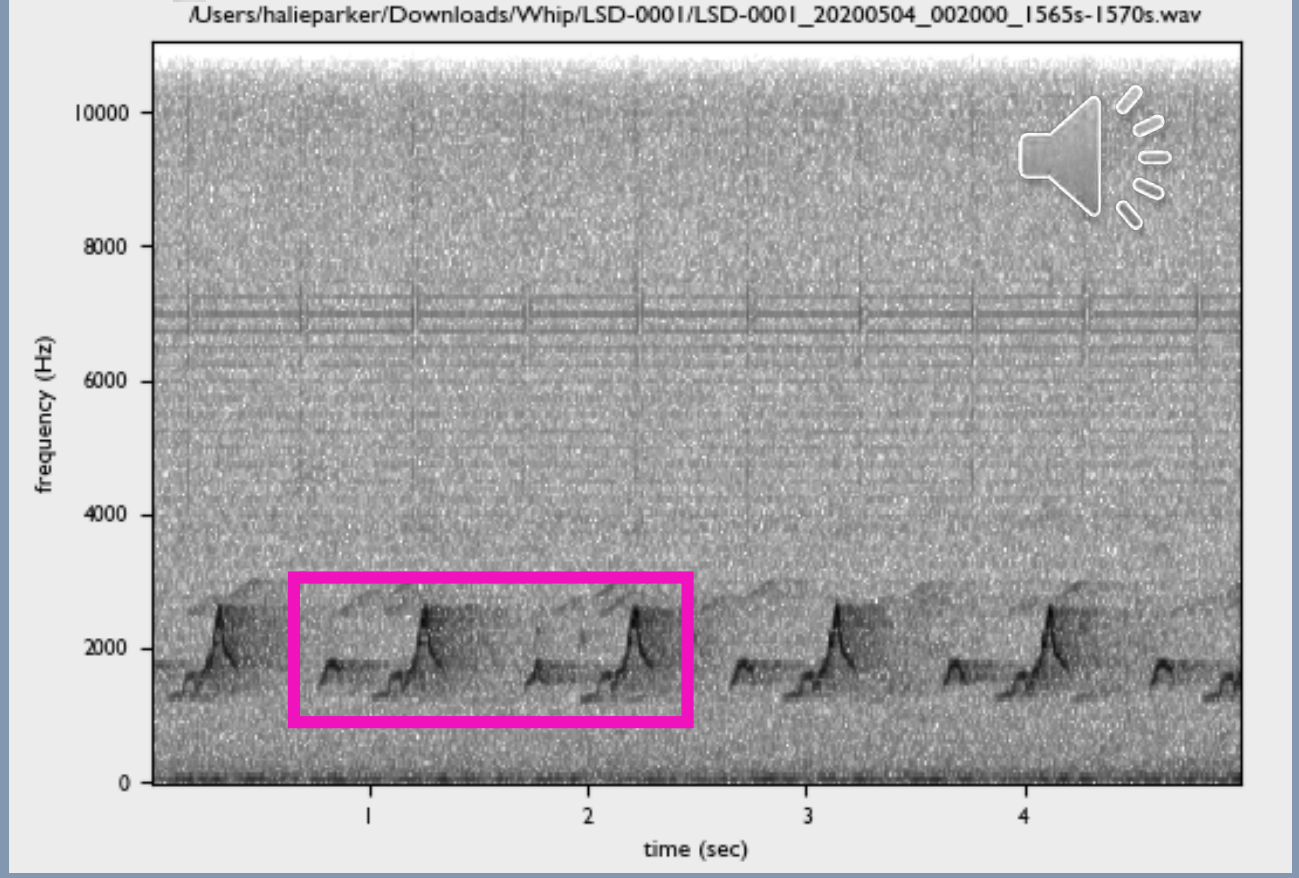
- Quantify variables at several spatial extents (i.e. 275 yds and 550 yds from each survey location)



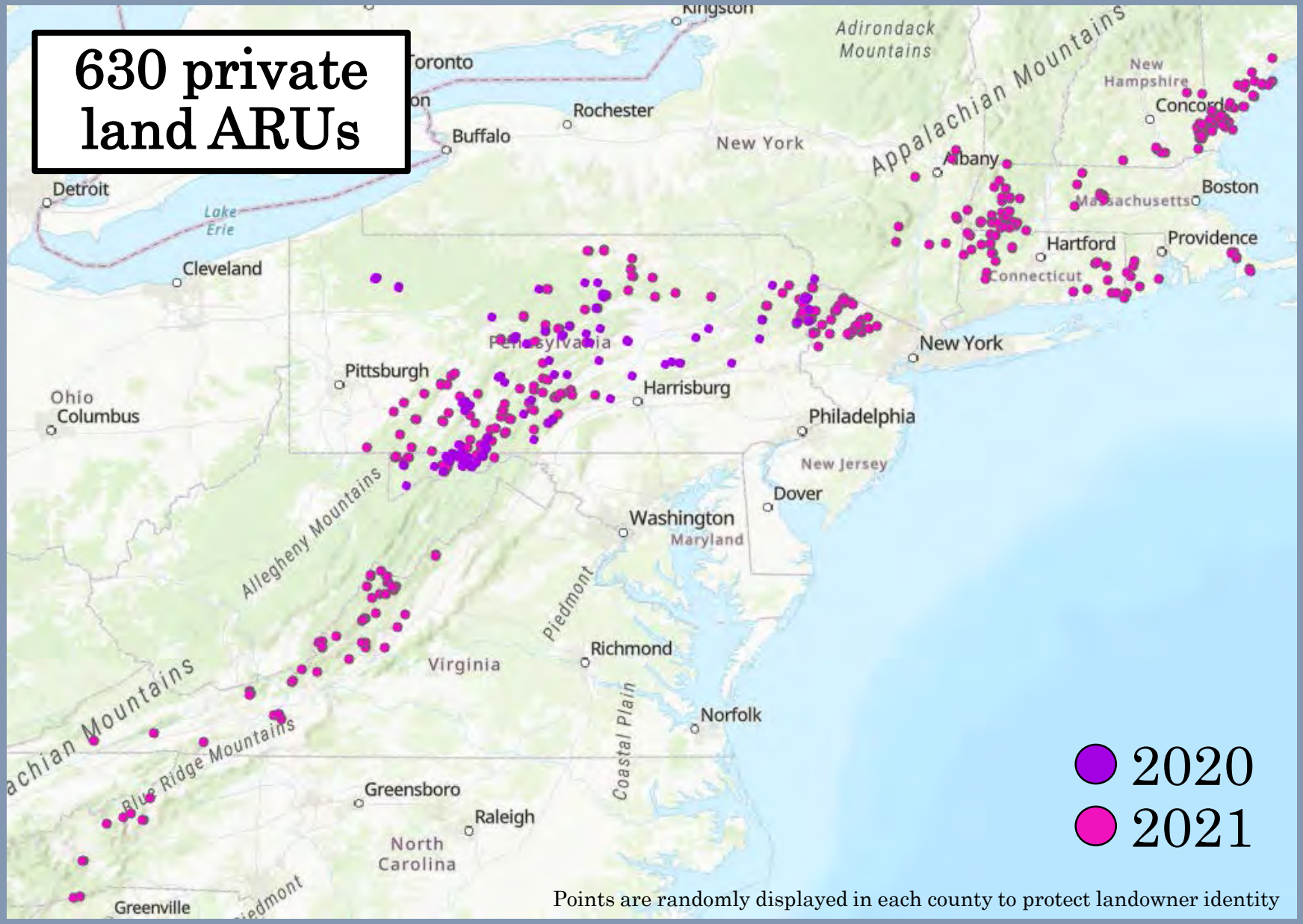
# Methods: Sound Analysis

- Develop machine learned classifier
- Splits recordings into 5-sec clips
- Run classifier on 5-sec clips
  - Generates score for each clip
- Listen high scoring 5-sec clips from each survey location
- Generate site occupancy data





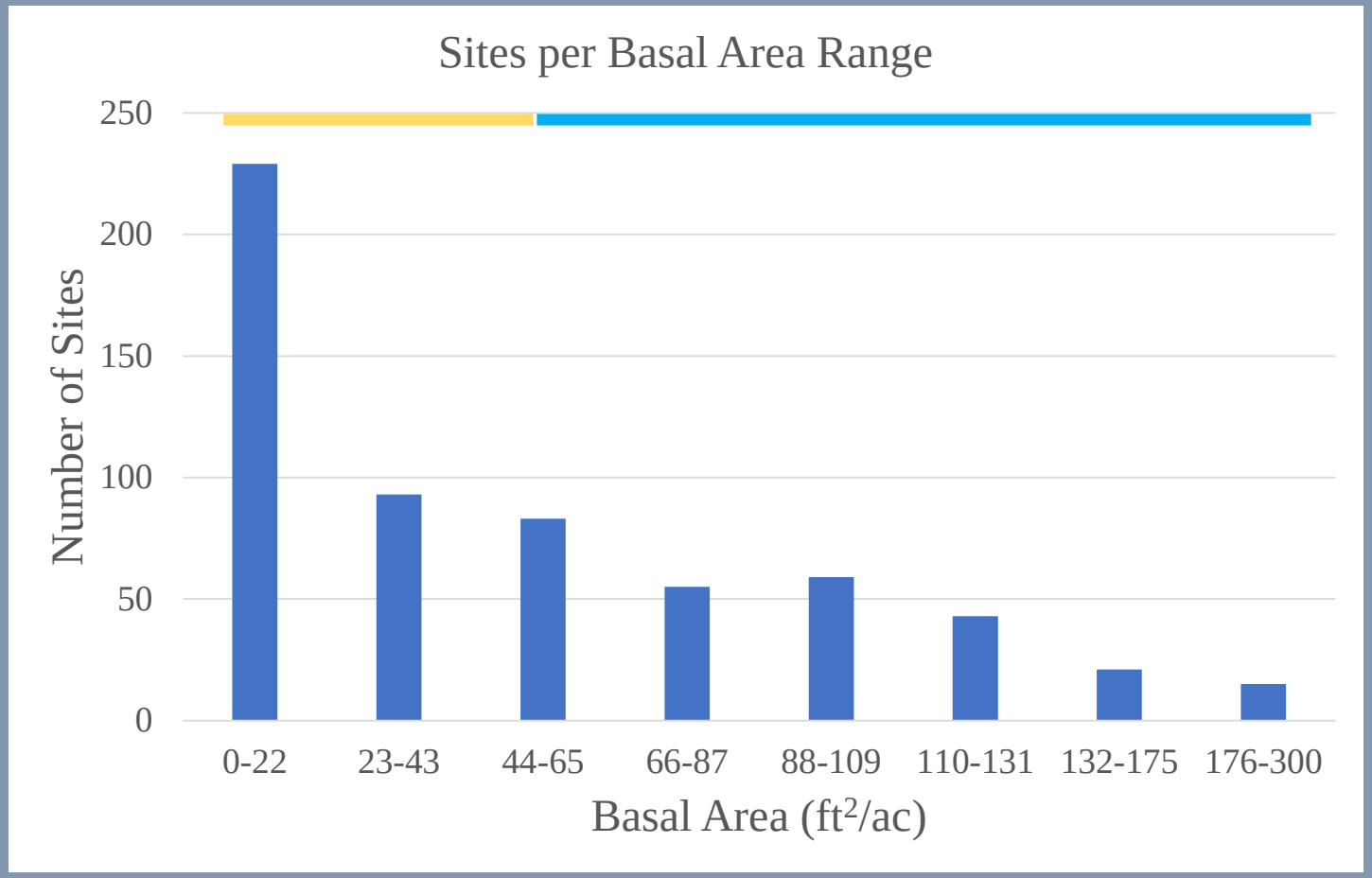
# Preliminary Analysis

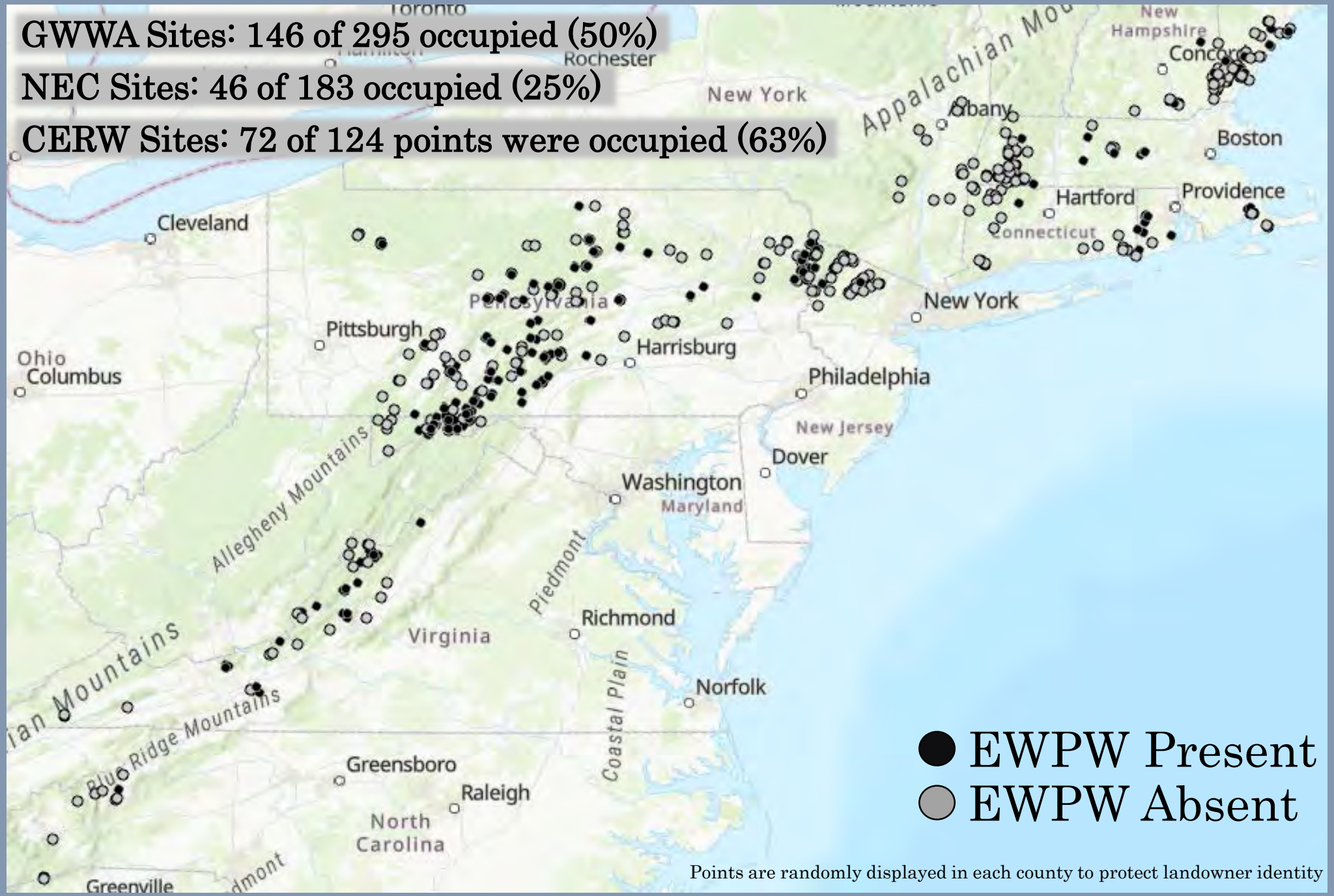



# ARU Failure


28 of 630 units either failed or were not recovered (~4%)

# Site Characteristics

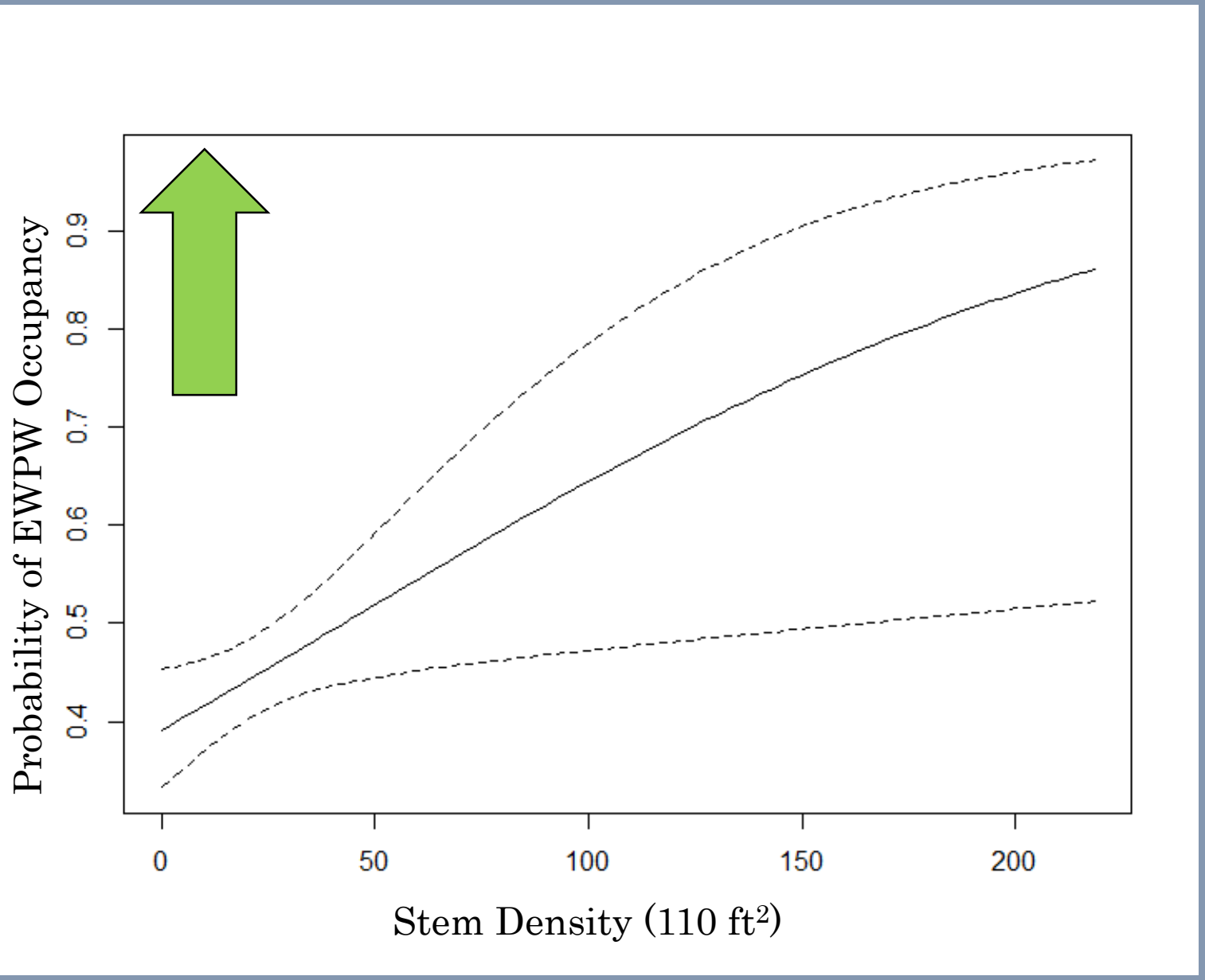



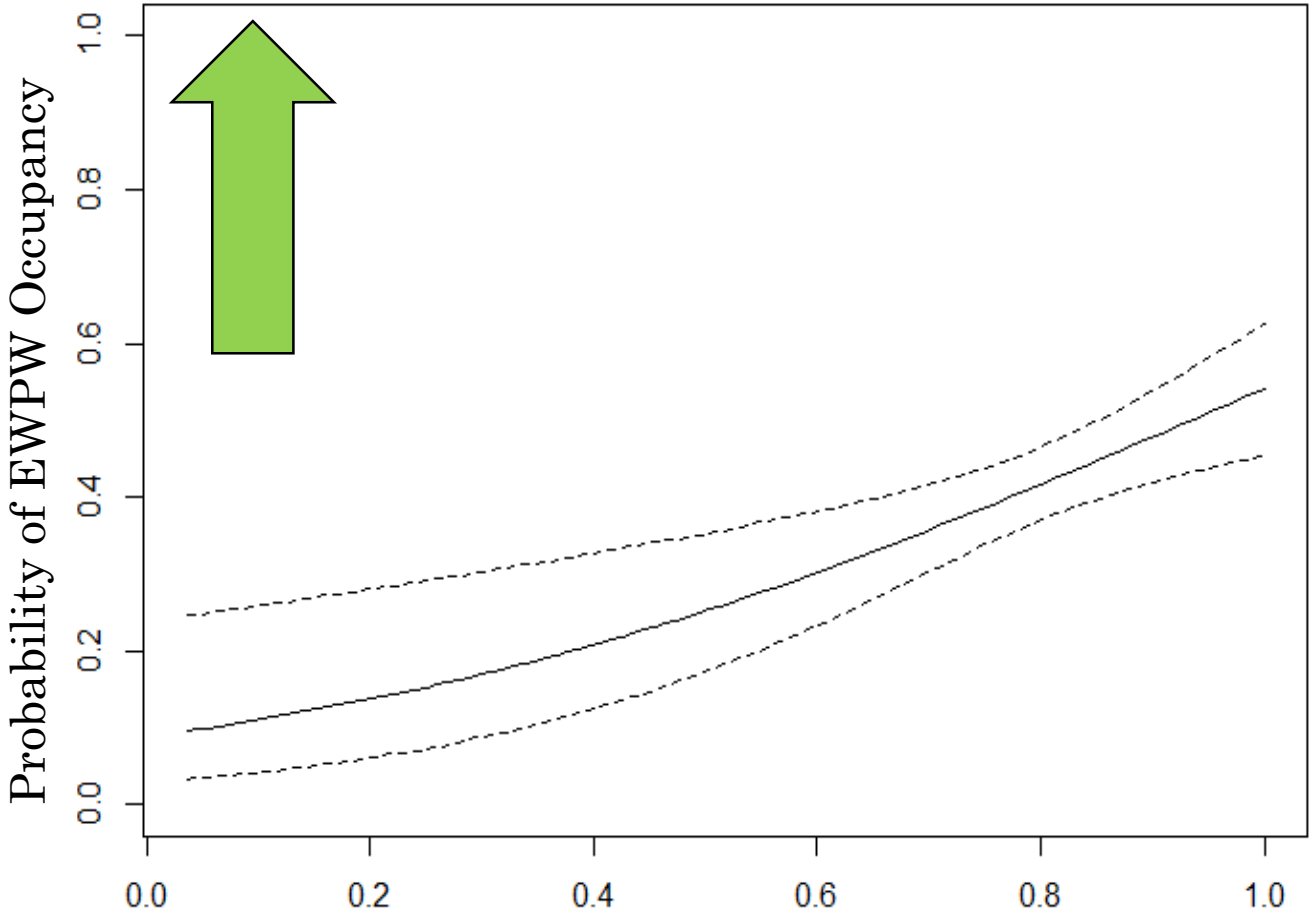


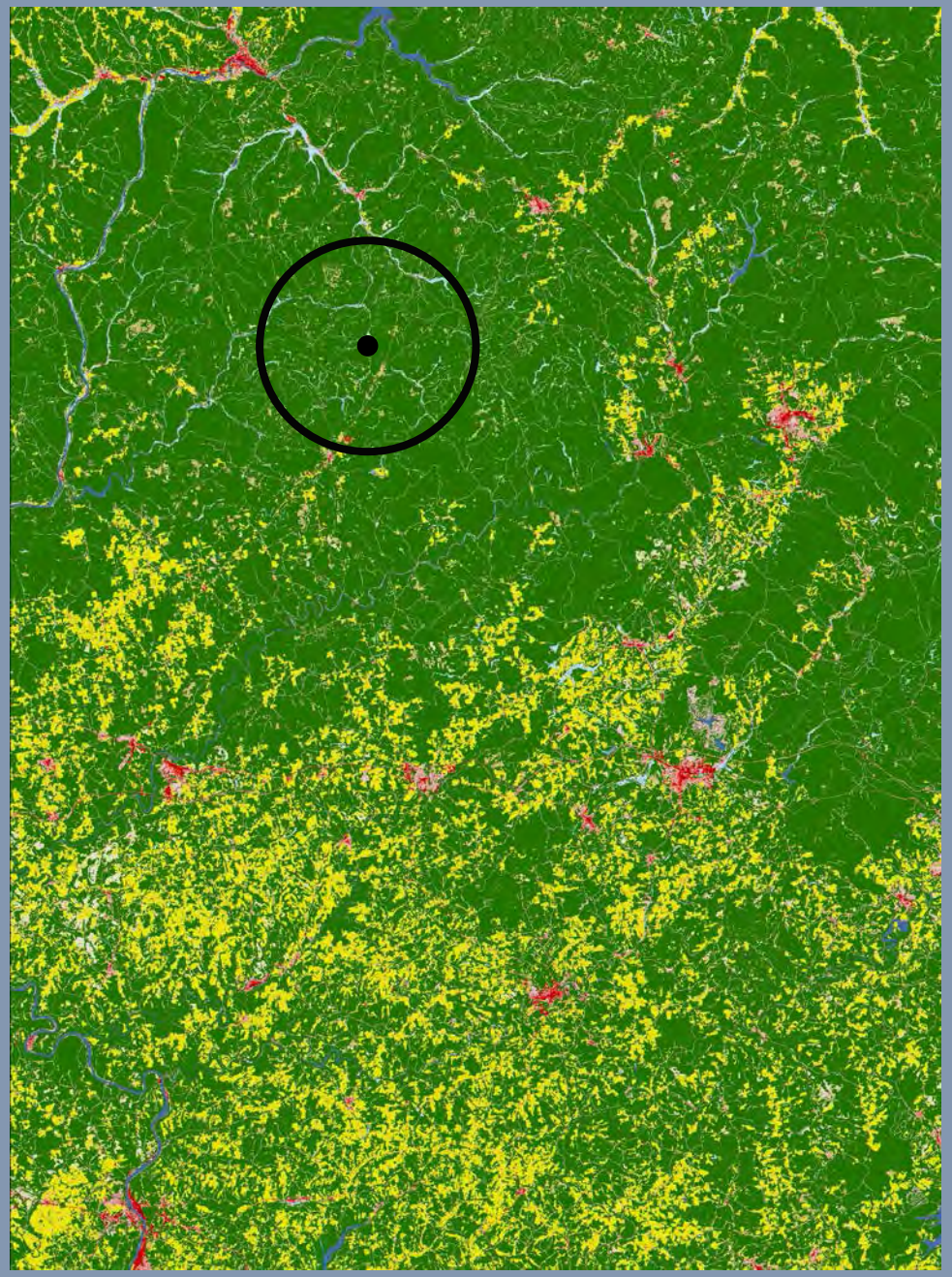

602 private land ARU locations

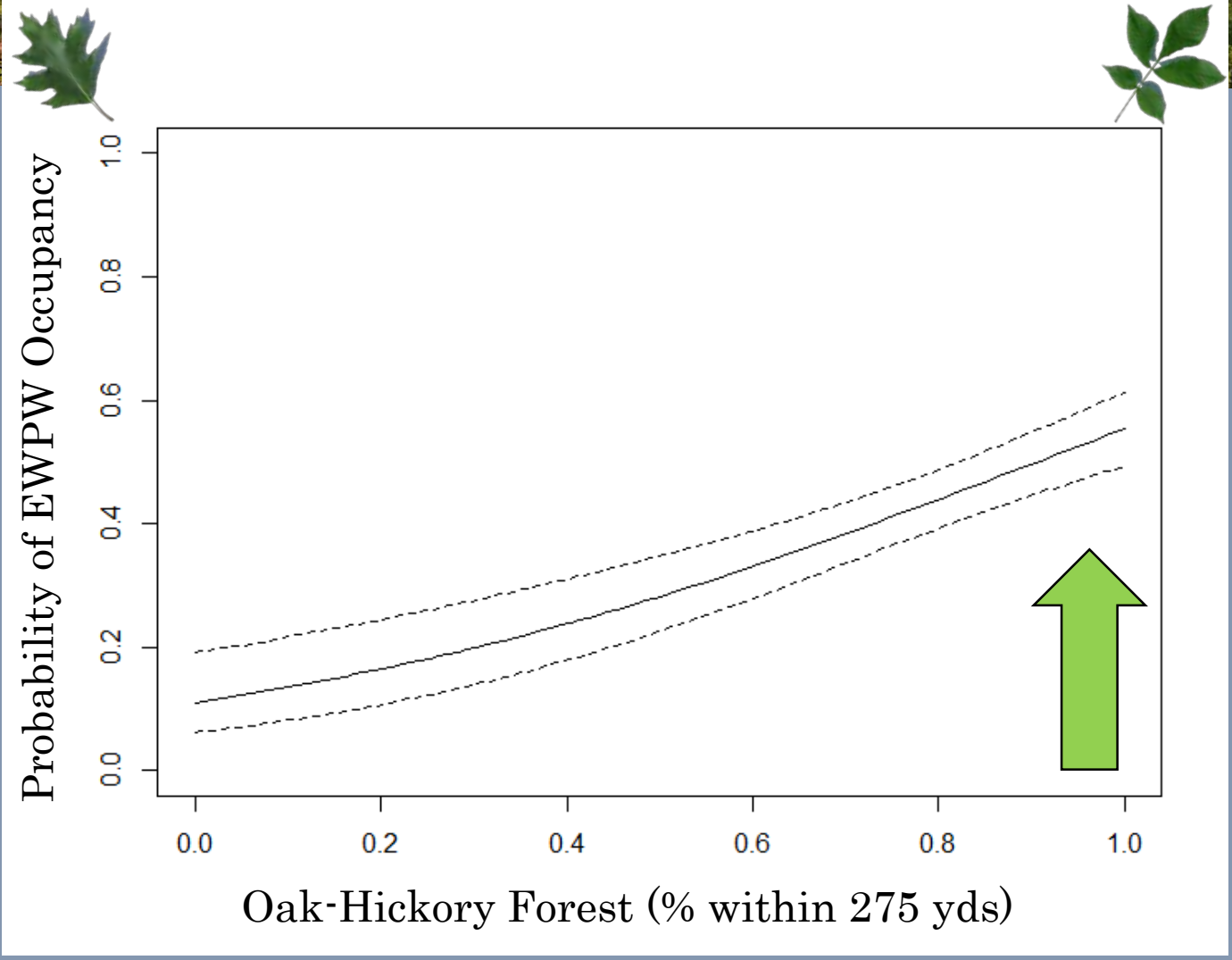
264 occupied
338 unoccupied

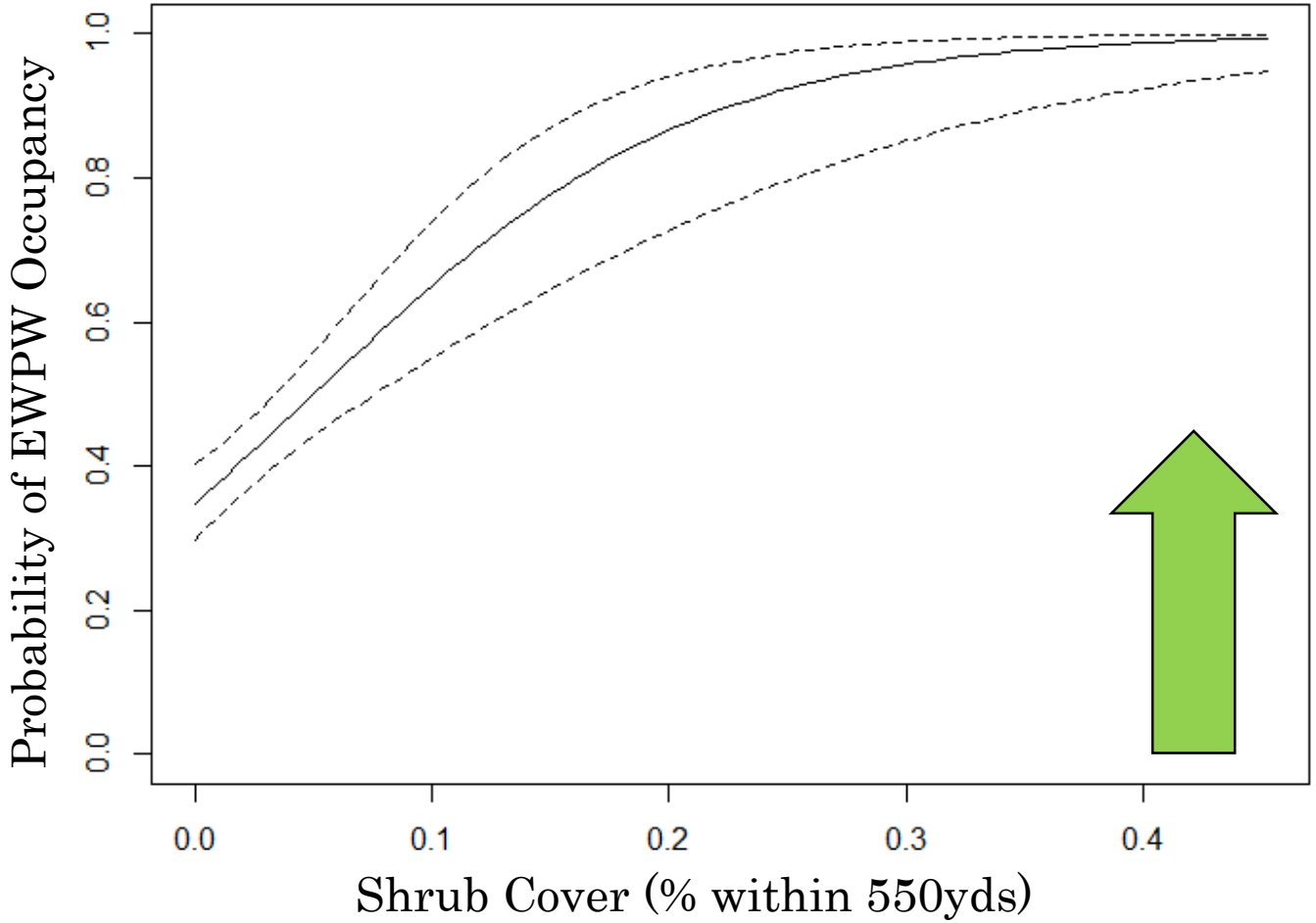
44% Naïve Occupancy


Probability of EWPW Occupancy
0.4
0.5
0.6
0.7
0.8
0.9
0
50
100
150
200
Stem Density (110 ft²)


Probability of EWPW Occupancy
0.0
0.2
0.4
0.6
0.8
1.0
0.0
0.2
0.4
0.6
0.8
1.0
Forest Cover (% within 550yd)




Probability of EWPW Occupancy
0.0
0.2
0.4
0.6
0.8
1.0
0.0
0.2
0.4
0.6
0.8
1.0
Oak-Hickory Forest (% within 275 yds)


Probability of EWPW Occupancy
0.0
0.2
0.4
0.6
0.8
1.0
0.0
0.1
0.2
0.3
0.4
Shrub Cover (% within 550yds)

# Preliminary conclusions

- Forest management on private lands that targets other species is benefiting EWPW
- Degree of benefits appear to be influenced by within stand and landscape level factors
  - Stem density (+)
  - Oak-Hickory forest type (+)
  - Forest cover (+)
  - Shrub cover (+)
- ARUs provide unique opportunities
  - Additional questions
  - Other species and taxa



# Acknowledgments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USDA United States Department of Agriculture
Natural Resources Conservation Service

University of Pittsburgh

ESF

University of Maryland

# Questions ?

jtlarkin@umass.edu