Creating Diverse and Structurally Complex Forest Interior Habitat on the Urban fringe

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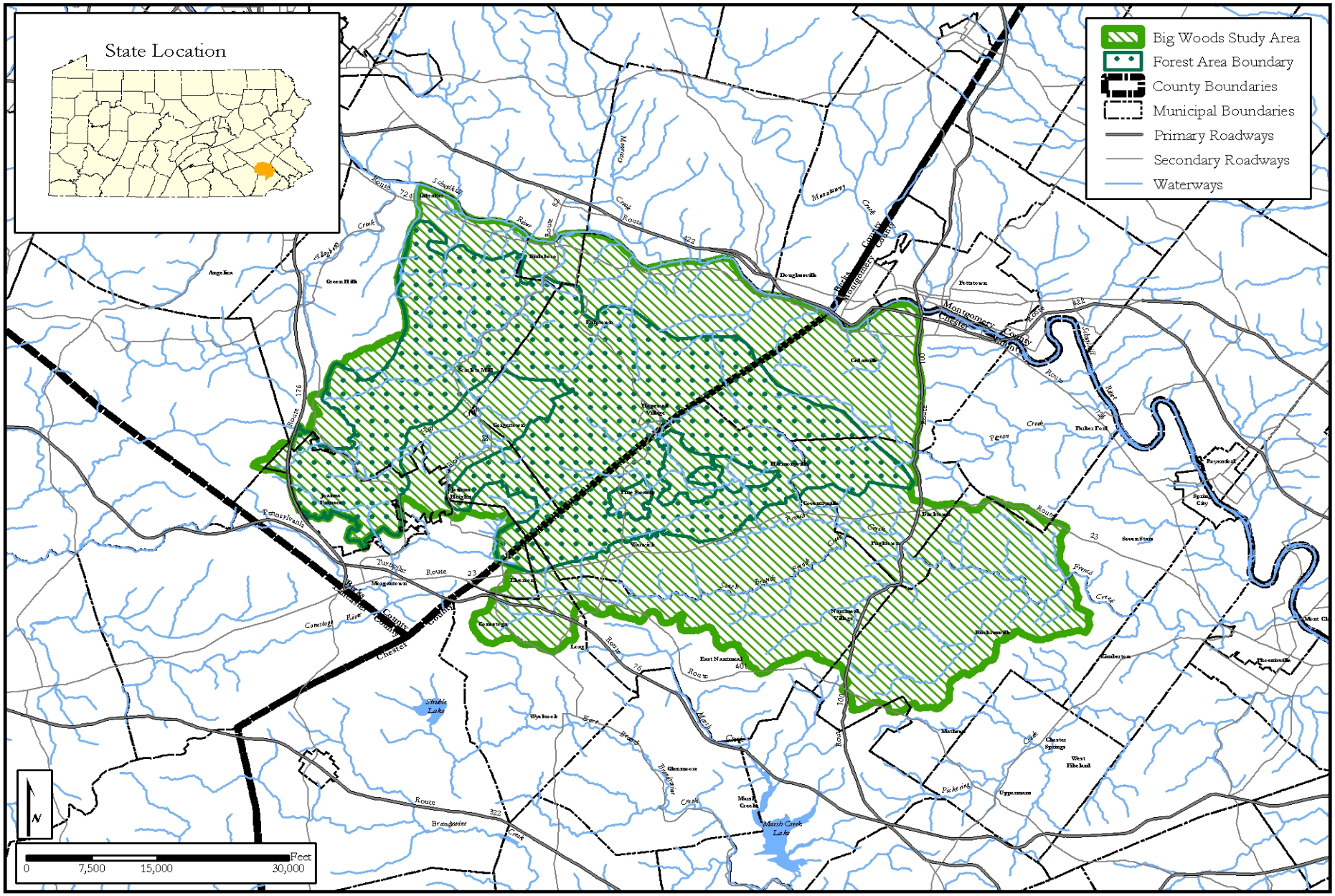

Hopewell Big Woods

Berks and Chester Counties, Pennsylvania

Location

Compiled by: DCR Date: 03/05/04

NOTES:
1. Roadways, waterways, county boundaries, municipal boundaries, and watershed boundaries received through Pennsylvania Spatial Data Access (www.pasda.psu.edu).
2. Forest boundary created using 1994 Aerial Photography with some on-site verification. Hay Creek boundary from watershed. Upper French Creek boundary from watershed. Schuylkill Corridor boundary created using forest boundary and edge of schuylkill river.

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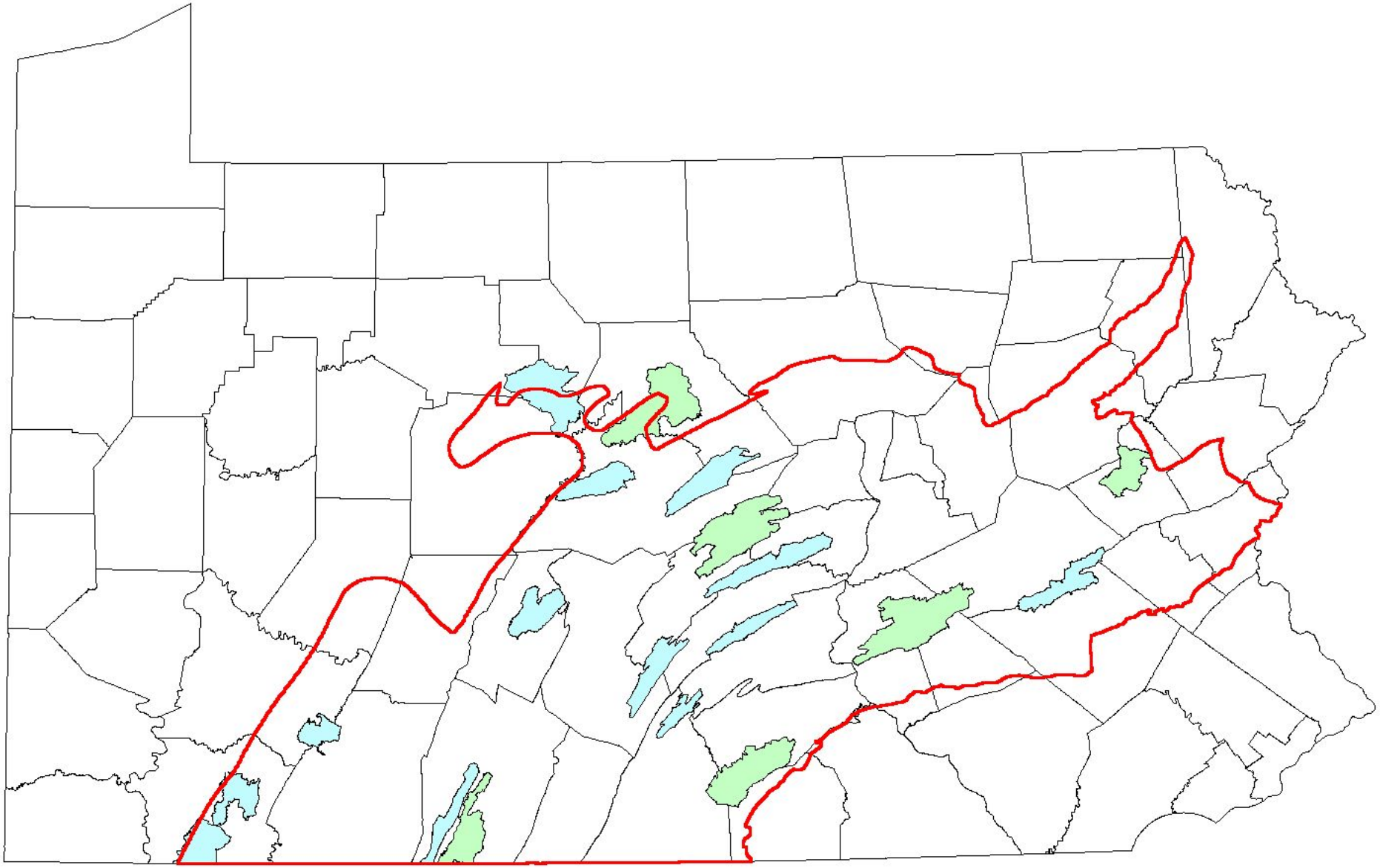
Hopewell Big Woods Project

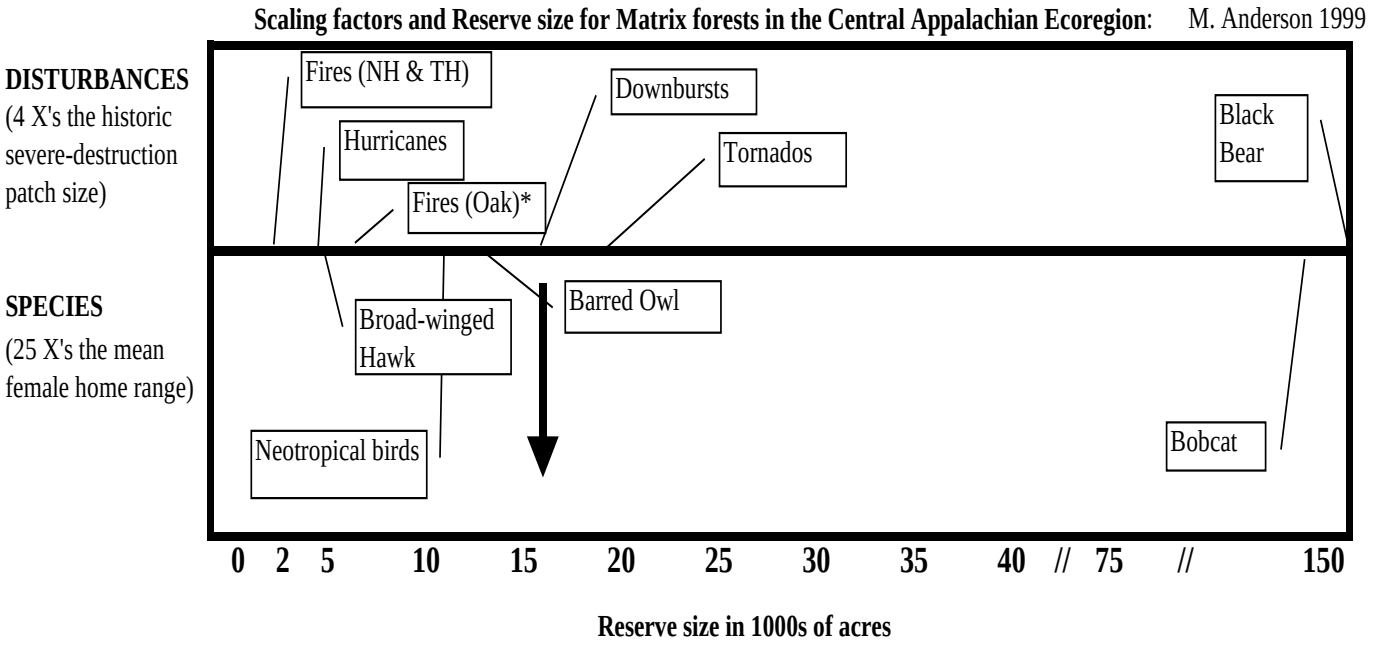
- 110 sq. mi., N. Chester, S. Berks
- Forest, birds, watersheds, rarity
- Public-private partnership
- Land protection and stewardship planning
- Land protection and work with local municipalities

Hopewell Big Woods Partnership

- What is the Partnership?
- Raises funds to support conservation work of Partners
- Advisory to DCNR Land Protection and Stewardship Plans
- Engaged in work to monitor and evaluate conservation success



Matrix block size graph



Factors to the left of the arrow should be encompassed by a 25,000 acre reserve NH = N. hardwoods (Maple-Beech-Birch)
TH = Transitional Hardwoods (High elevation Red Oak or Red Oak -Sugar Maple)
* Oak forests are dependent on relatively high-frequency, moderate fires, info on catastrophic fires is sketchy
Neotropical estimates based on Robbins et al. 1989, see text for full explanation.

Hopewell Big Woods Partnership

- What is the Partnership?
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NATURAL LANDS TRUST

Goal 1, The Forest

- 15,000 acres of unbroken forest: Up-to-date record of lands that are contiguous and in forest cover.
- Assessment of number of acres in each of the four stages of forest development (young, aggrading, mature and old growth).

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Hay Creek

Photo Credit: Bill Moses

Photo Credit: B. Mark Schmerling

Sixpenny Creek

Photo Credit: PA Fish and Boat Commission

Photo Credit: PA Fish and Boat Commission, James Gilson

Structural Compexity Enhancement

- Lack of old growth characteristics
- Even-aged forest–lack of layering
- Lack of horzontal heterogeneity
- Lack of early successional forest

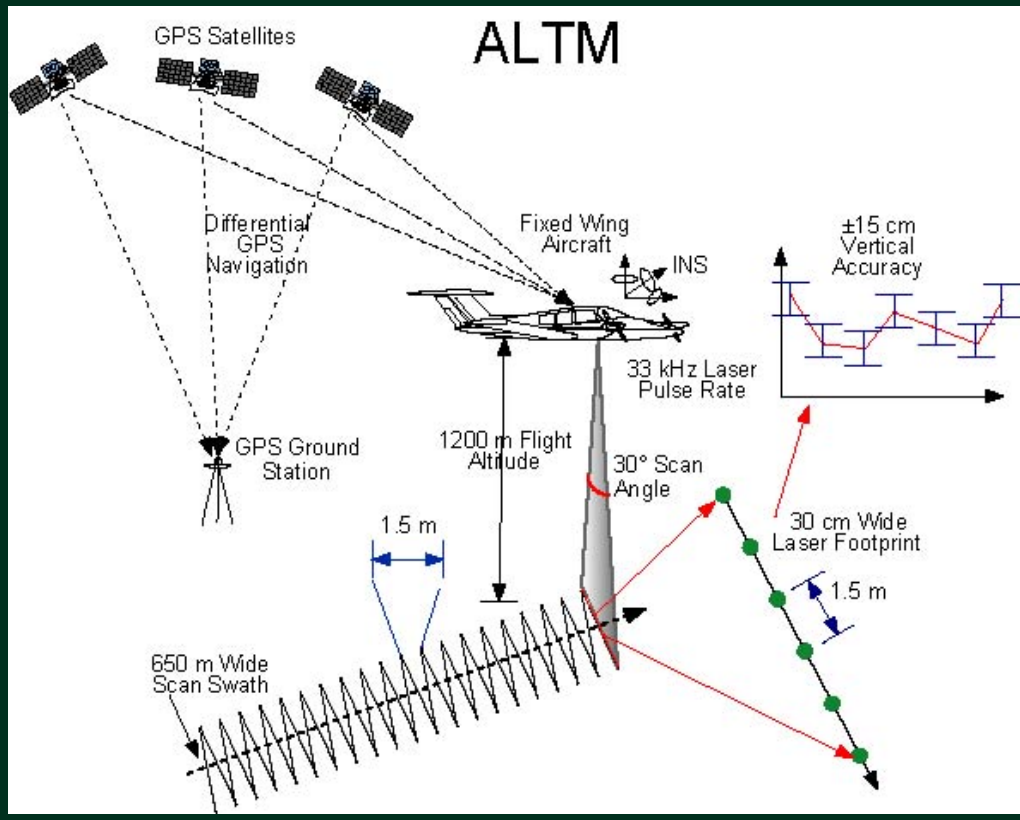
NATURAL LANDS TRUST

Lidar Basics

- Airborne Light Detection And Ranging
- Very fast, accurate and cost effective technology to measure and quantify reflective surfaces (elevations)
- Systems Components
  - Aircraft
  - Crew (Pilot & Instrument Operator)
  - Laser w/ mirror –
    - Uses its own energy source (NIR red laser)
    - Direct (active) acquisition of terrain
    - Allowing day or night operation
  - GPS Receivers (Aircraft & Ground)
    - Provides aircraft position
  - Inertial Measurement Unit
    - Provides aircraft orientation & direction
  - Post Processing Software & Specialized Technicians

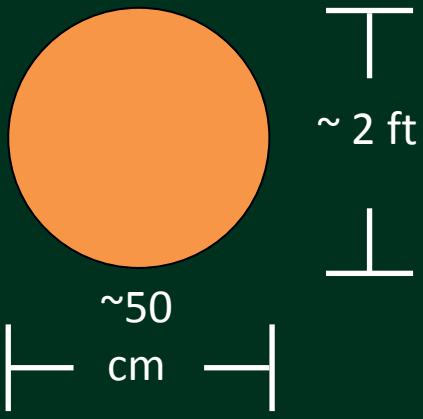
LiDAR Basics

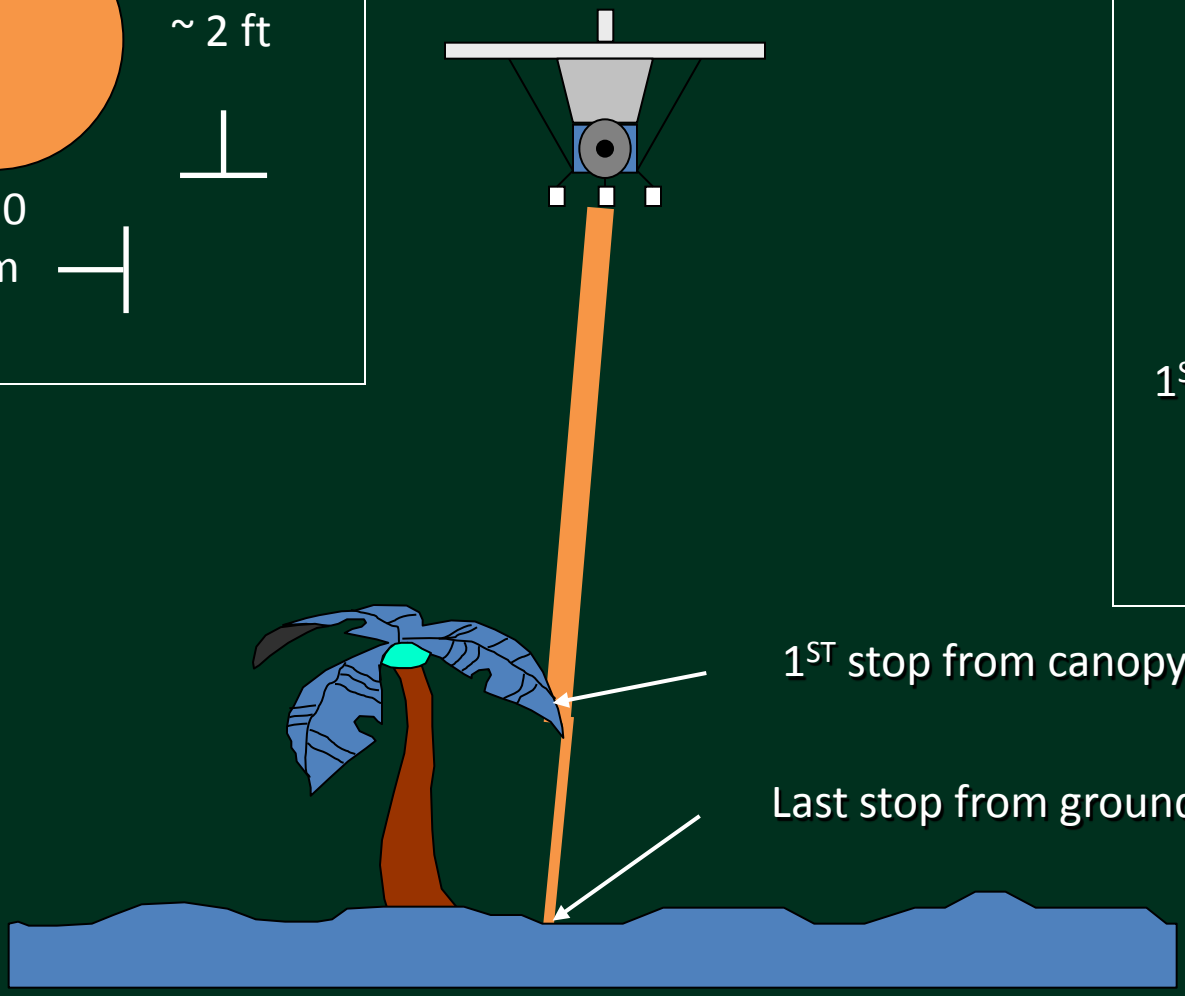
- Mirror sweeps laser beam across the ground.
- Range to target is measured by time interval between transmission and return of reflected laser pulse.
- Aircraft position is determined using GPS phase differencing techniques.
- Pointing direction of laser determined with Inertial Measuring Unit (IMU) and recording of mirror position.
- Data streams recorded and synchronized for post processing.



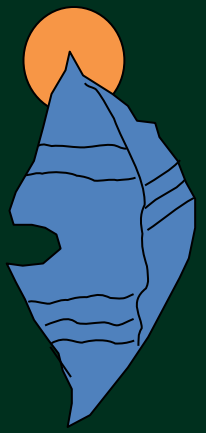
LIDAR 1st and Last Return

FOOTPRINT





TOP/MAP VIEW



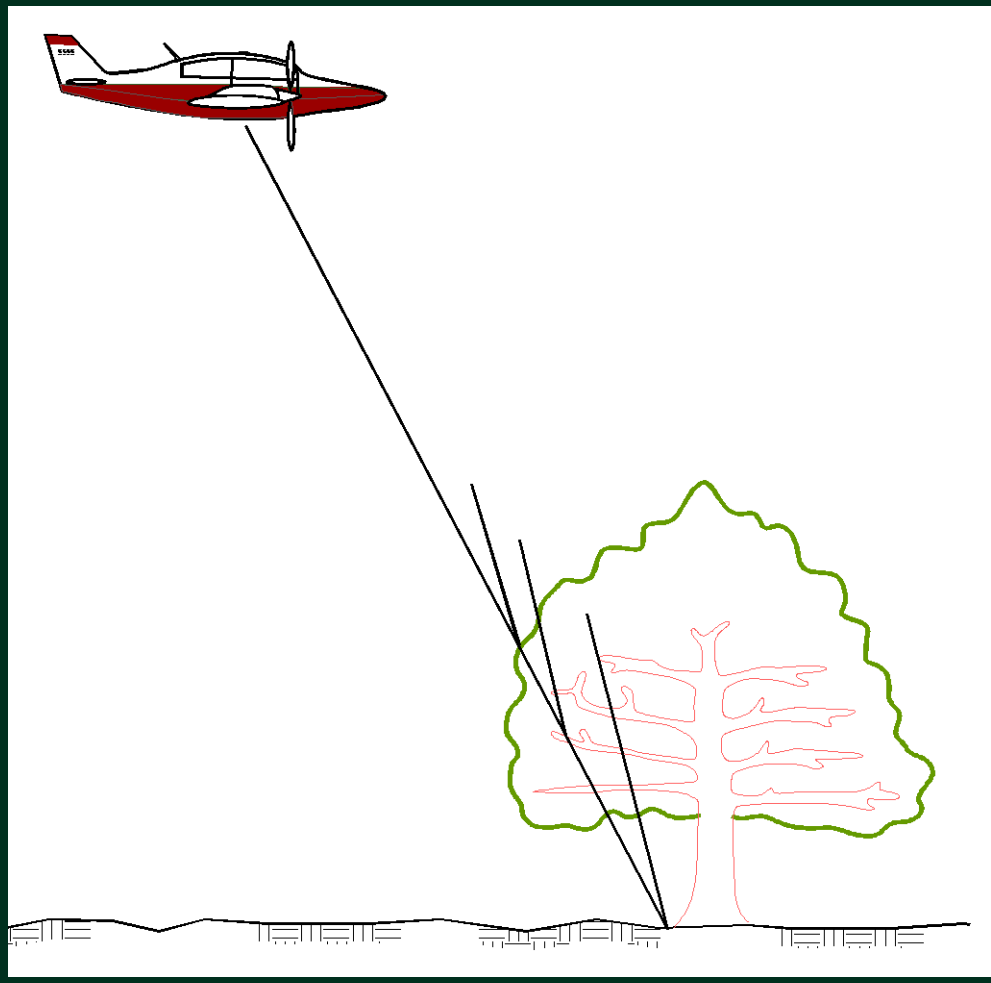
1ST STOP HITS LEAF, LAST STOP HITS GROUND

Lidar Basics

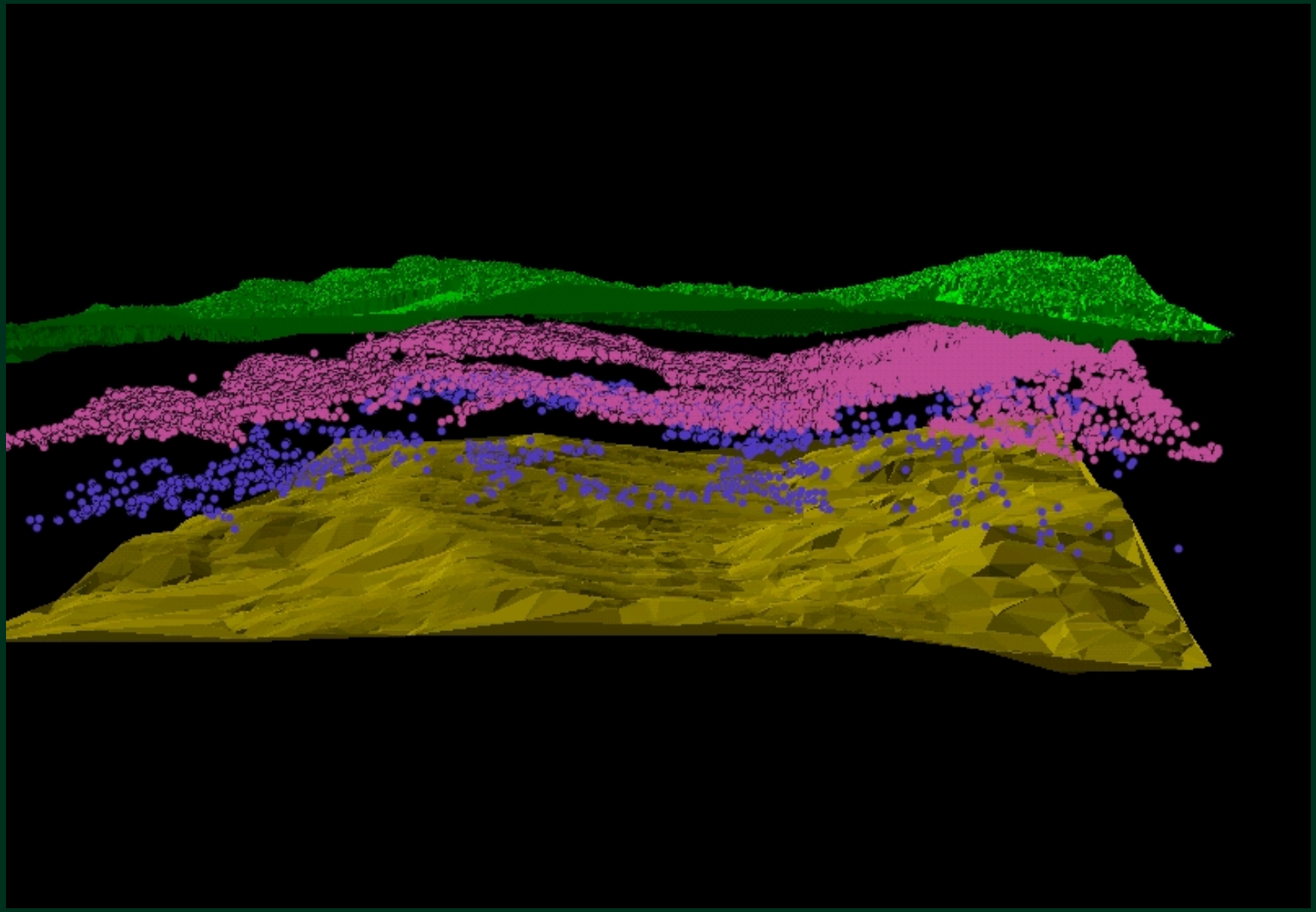
- Lidar is indiscriminate
- “Target” must be visible- it’s not an all weather sensor
- Does not “see through” trees but around them
- It is not imagery but can be shaded to look like imagery
- Newer systems can collect >300,000 elevation points per second!
- Capable of vertical accuracies of 15 cm RMSE or better
- Ability to collect multiple returns (4 or more) with both range (elevation) and intensity
- Multiple returns allows reflective surface mapping as well as creation of bare earth models

Multiple Returns & Intensity

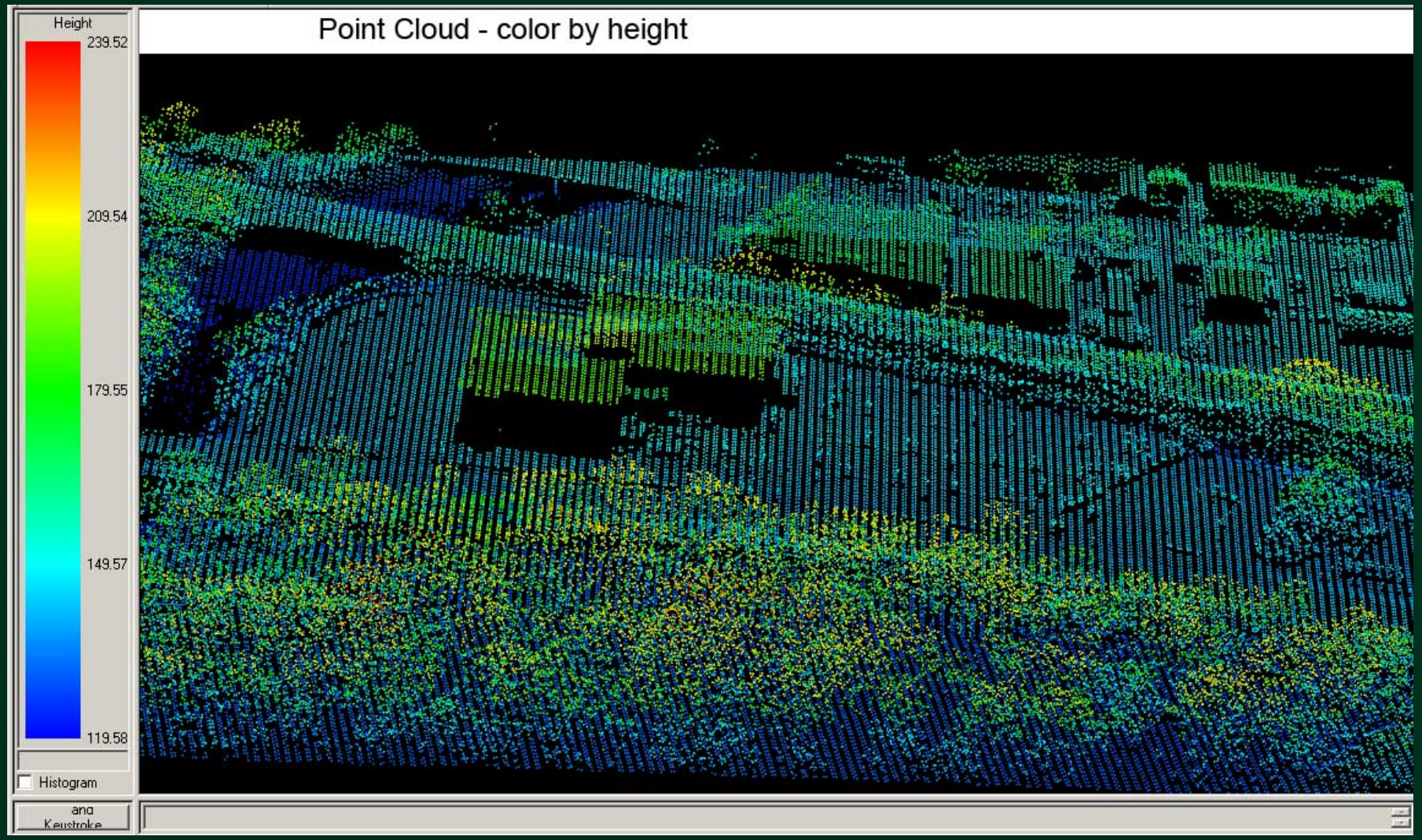
- Systems today have the ability to measure multiple returns and the intensity of the returned signal for each.
- This enables specialized applications using the full Lidar data.



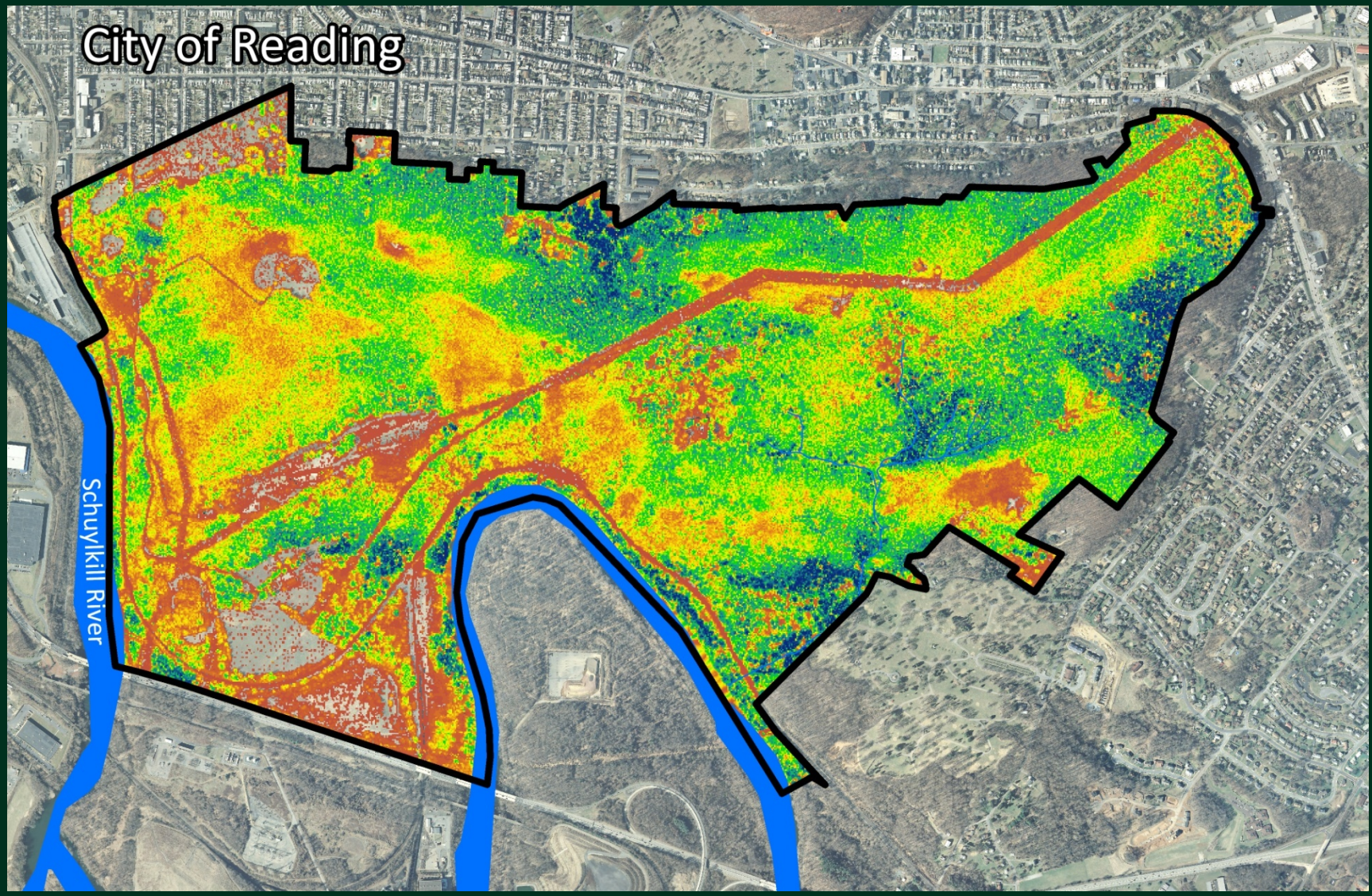
Multiple Returns in 3D



Point Cloud by Height

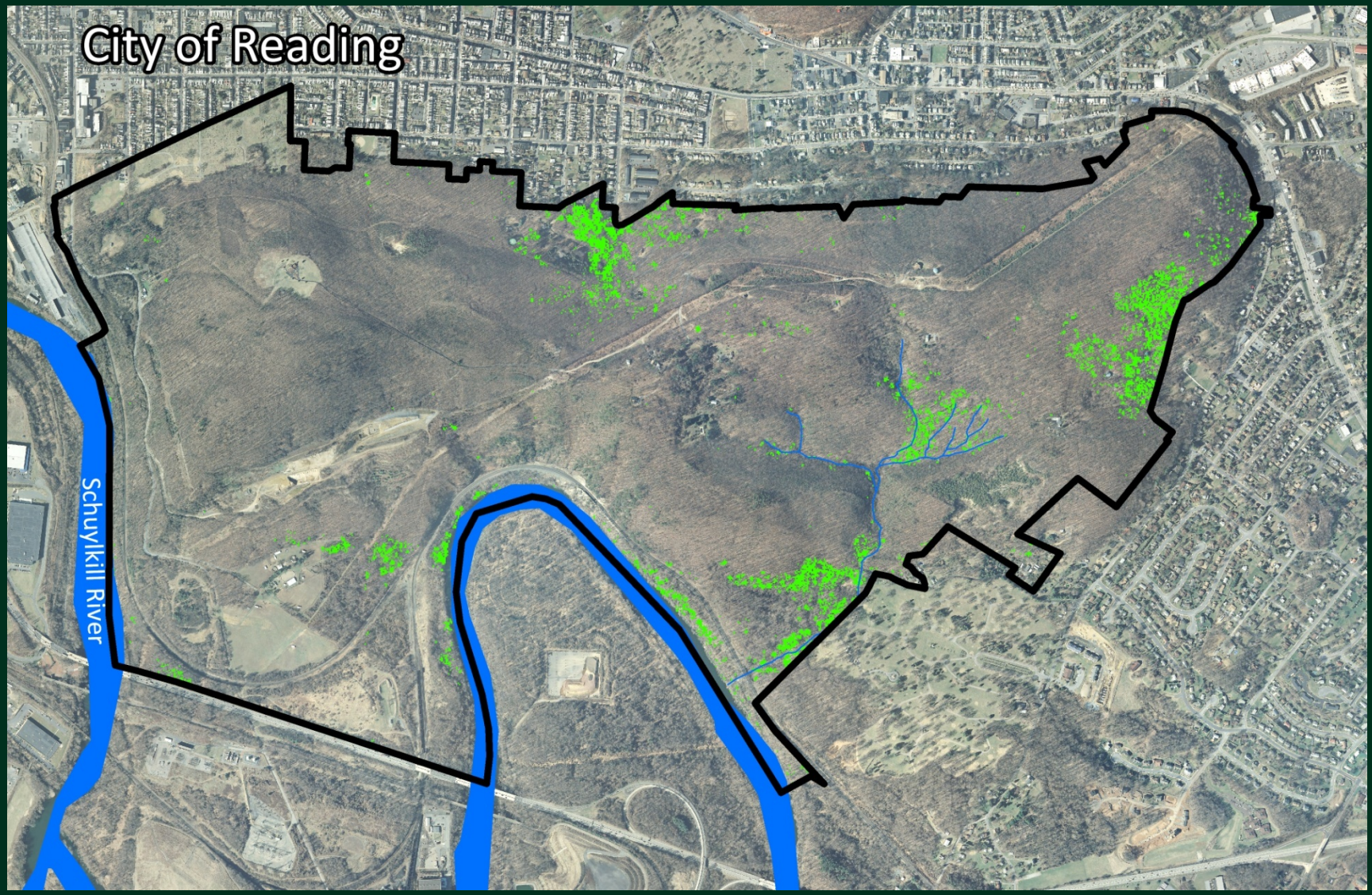


Canopy Height



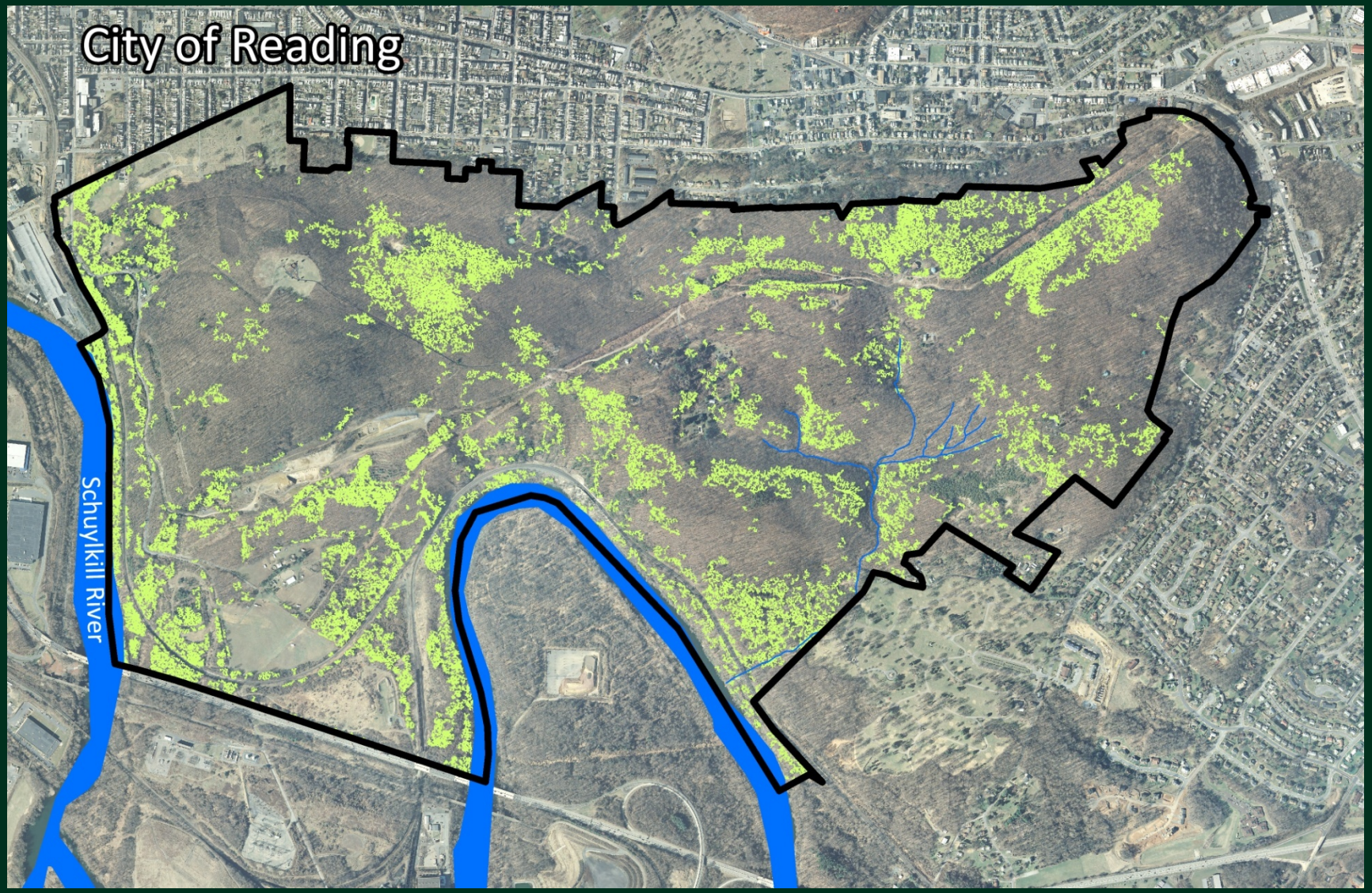
Blue = 100-130 ft, Light Green = 50-70 ft, Yellow = 30-50 ft

Tallest Trees



Taller than 100 ft

Shrub Layer

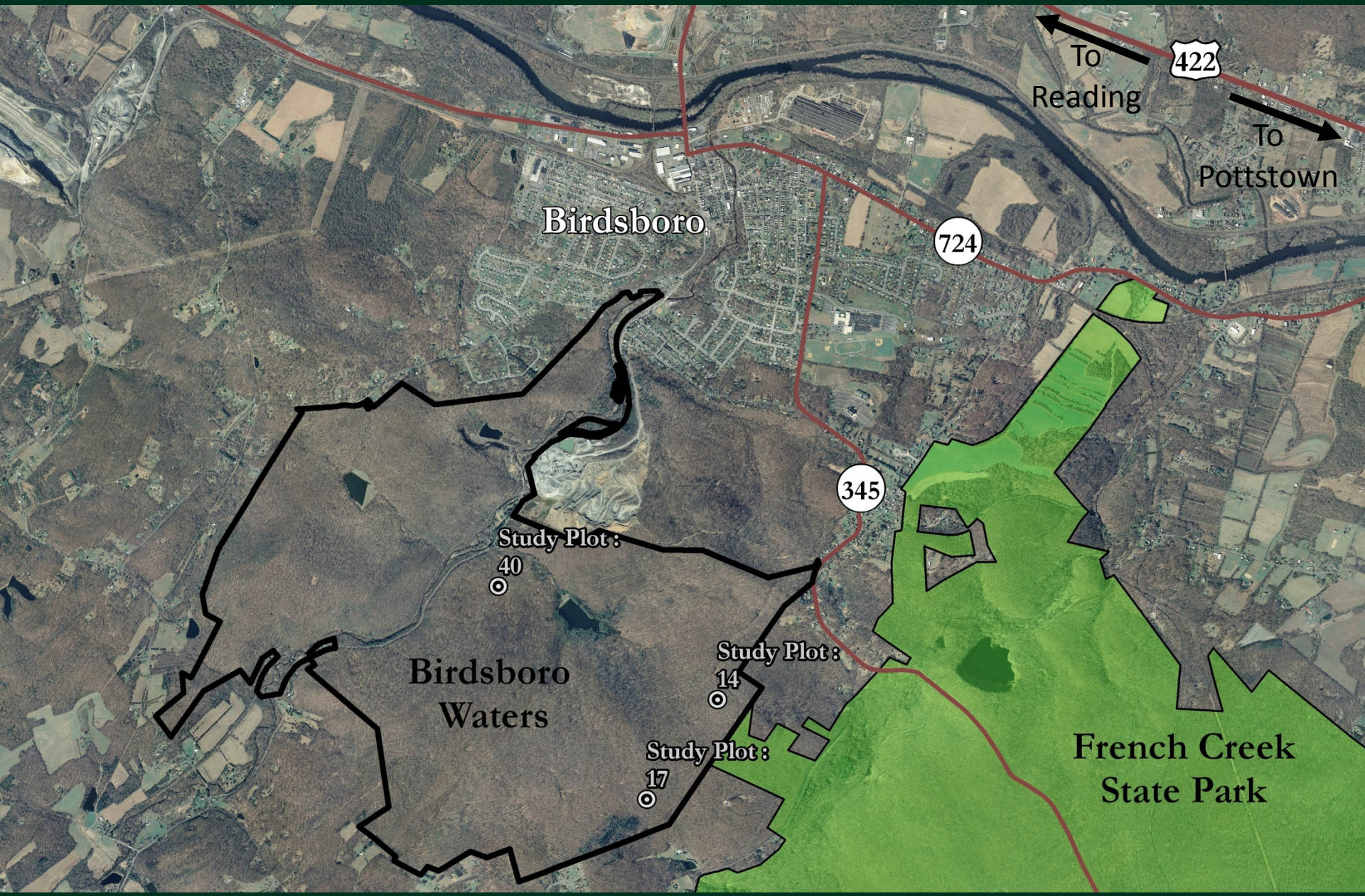


Presence of Vegetation from 0 to 25 Ft under a forest canopy

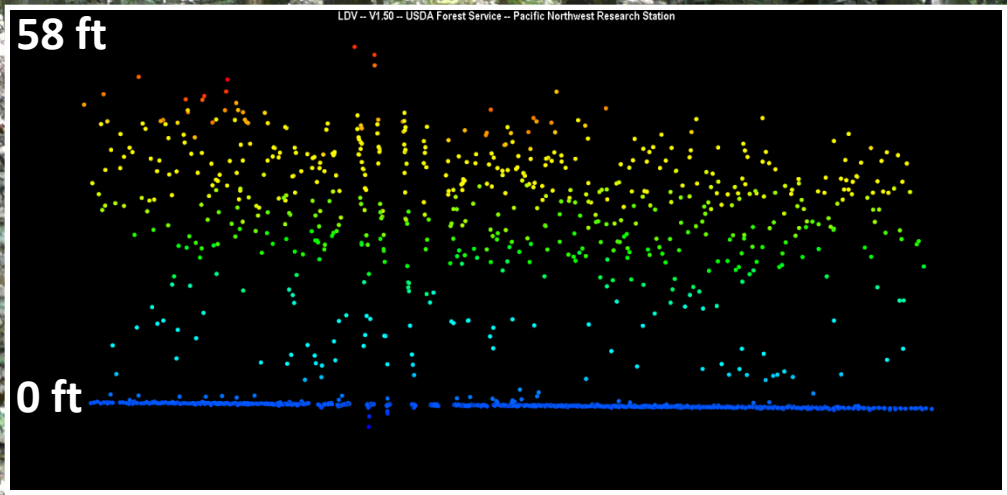
Birdsboro Waters

- Forest Legacy conservation easement 2008
- Current management for sustainable forestry
- How can we monitor and assess progress toward increasing structural complexity with LiDAR?
- What feedback can we give to forest managers?

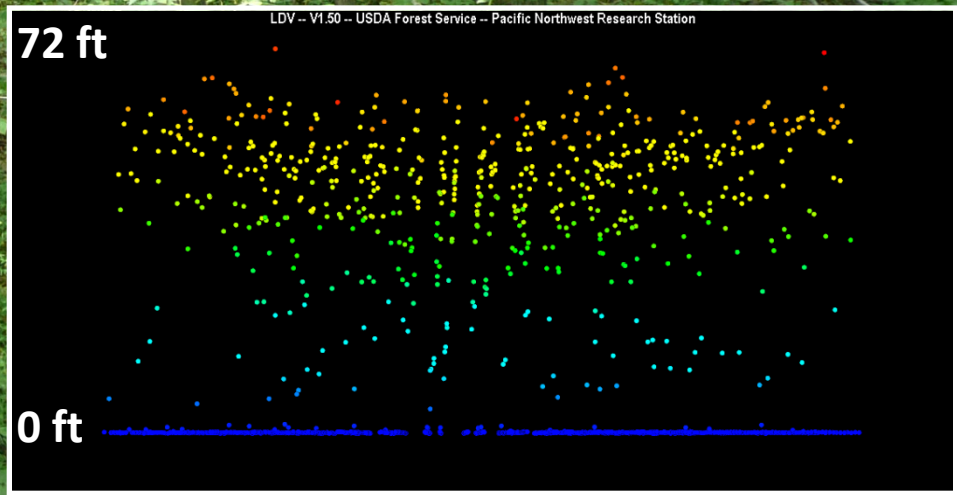
Location


To
Reading
422
To
Pottstown
Birdsboro
724
345
Study Plot :
40
Birdsboro
Waters
Study Plot :
14
Study Plot :
17
French Creek
State Park

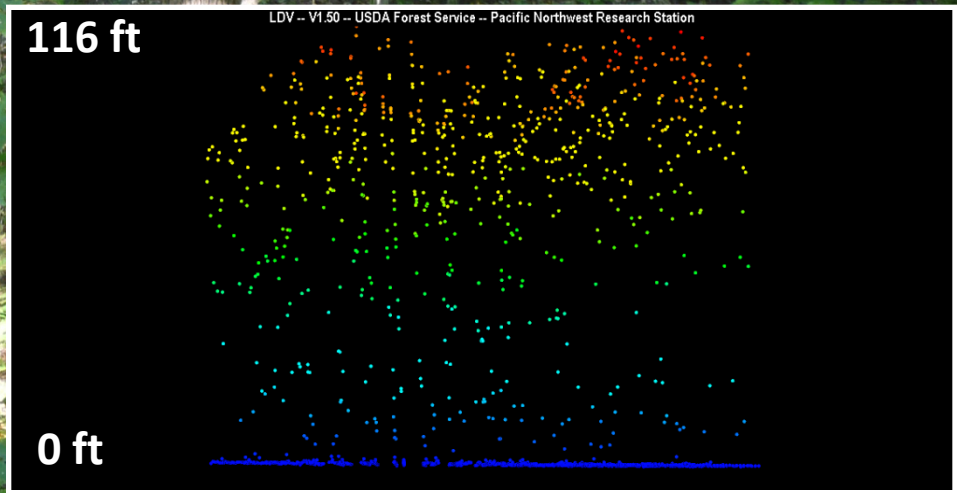
Plot 1


LDV -- V1.50 -- USDA Forest Service -- Pacific Northwest Research Station
58 ft
0 ft

Plot 2


LDV -- V1.50 -- USDA Forest Service -- Pacific Northwest Research Station
72 ft
0 ft

Plot 3


LDV -- V1.50 -- USDA Forest Service -- Pacific Northwest Research Station
116 ft
0 ft

Structural Complexity from Above