2021 Maple Webinar Series

Sugarbush Inventory Methods

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THE UNIVERSITY OF VERMONT EXTENSION

2021 Webinar Series (*August-December)*

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- **Sugarbush Inventory Methods** (August 25th), *Register Here- Aug 25*
- **Sap-Only Enterprises** (September 15th), *Register Here- Sept. 15*
- **Binding Contracts and Legal Agreements** (September 29th), *Register Here- Sept. 29*
- **Maple Forests and Carbon** (October 13th), *Register Here- Oct.13*
- **Northeast Forest Land Taxes and Programs** (October 27th), *Register Here- Oct. 27*

WHAT IS AN INVENTORY?

- Measures and records something of interest
- Allows for planning current and future activity
- Often involves estimation or gathering representative samples
- Hire a forester or DIY

www.uvm.edu/extension/agriculture/maple

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WHY DO A SUGARBUSH INVENTORY?

- Engagement with property
- Estimate tubing installation costs
- General assessment of tree diameter (DBH), health and regeneration
- Tap count vs complete inventory

WHY DO A SUGARBUSH INVENTORY?

Younger forest

Older forest

WHY DO A SUGARBUSH INVENTORY?

- Tree size matters, not every tap has equal potential.
- Relationship between DBH and yield. More sap per inch of DBH*
- Counting small trees as taps tends to overestimate potential yield

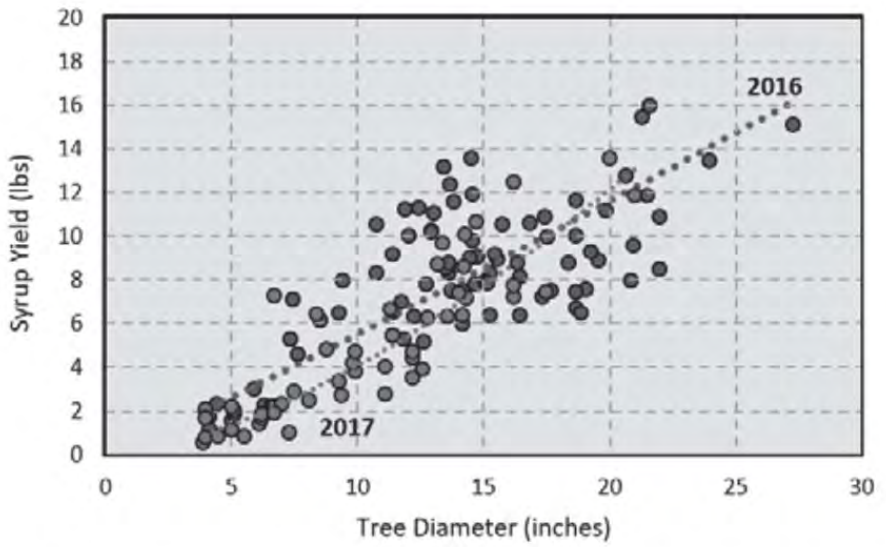

Figure 2. Relationship between tree diameter and syrup yield (lbs) for the 2016 (darker) and 2017 sap flow seasons in Underhill, Vermont. Best-fit trend lines are shown by dotted lines.

Isselhardt, Perkins and van den Berg 2018

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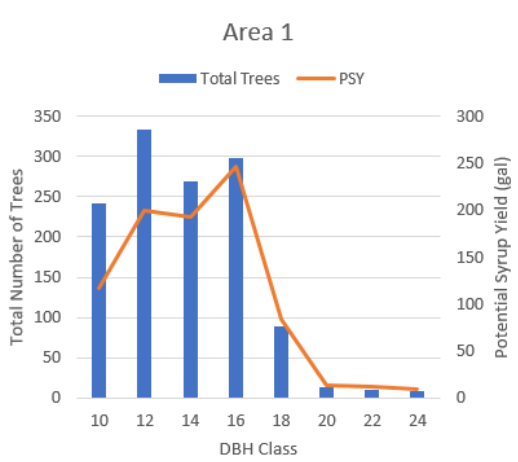
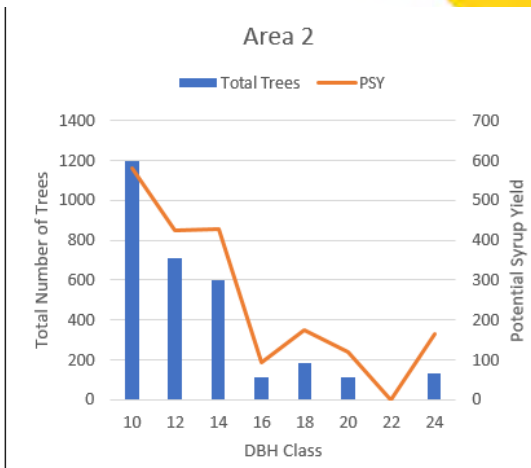
WHY DO AN INVENTORY?

- Not all stands have the same number or size of trees
- Number of plots/points depends on variability
- Permanent plots can help determine if prescriptions are having desired effect

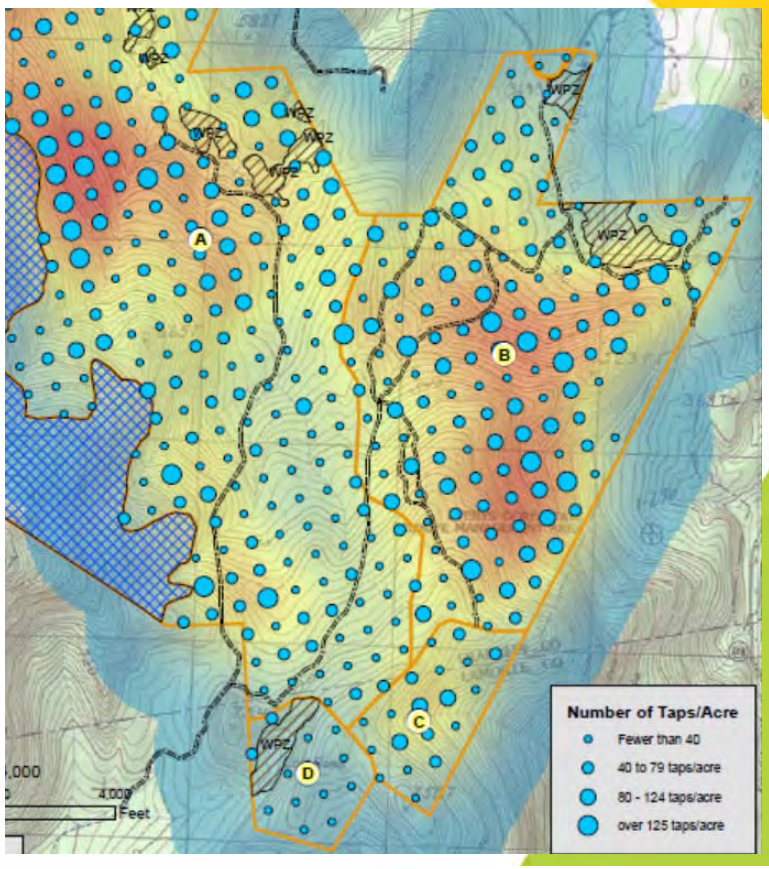




UVM unpublished 2021

WHY DO AN INVENTORY?

- 1” of diameter growth in 10 years is a good target for crop trees
- Knowing how many small trees will become tapable by next retubing is also helpful
- Some areas may not be worth effort



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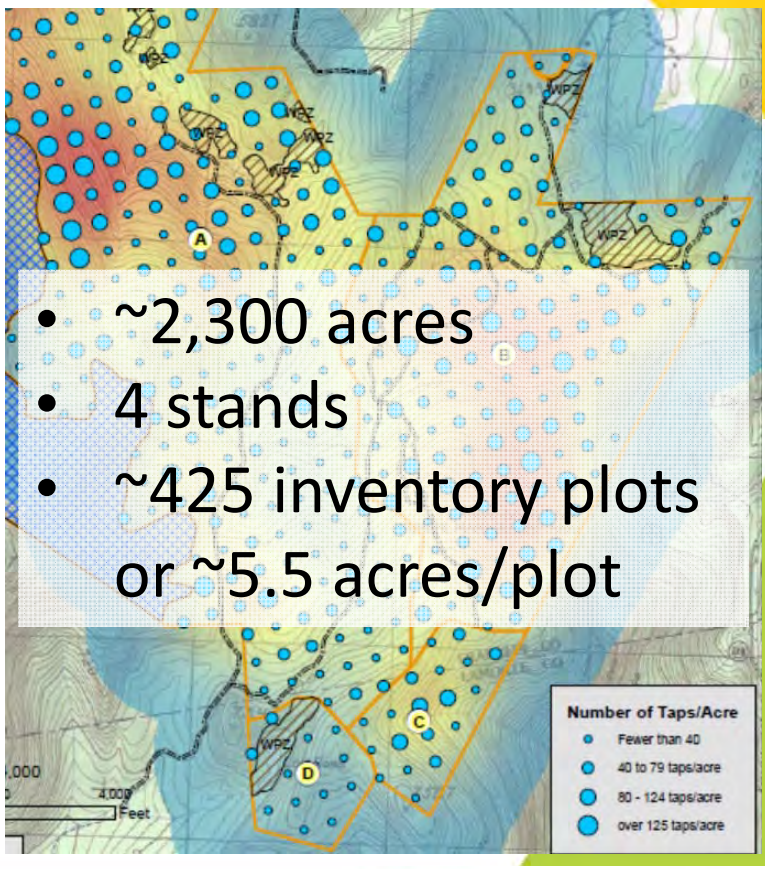
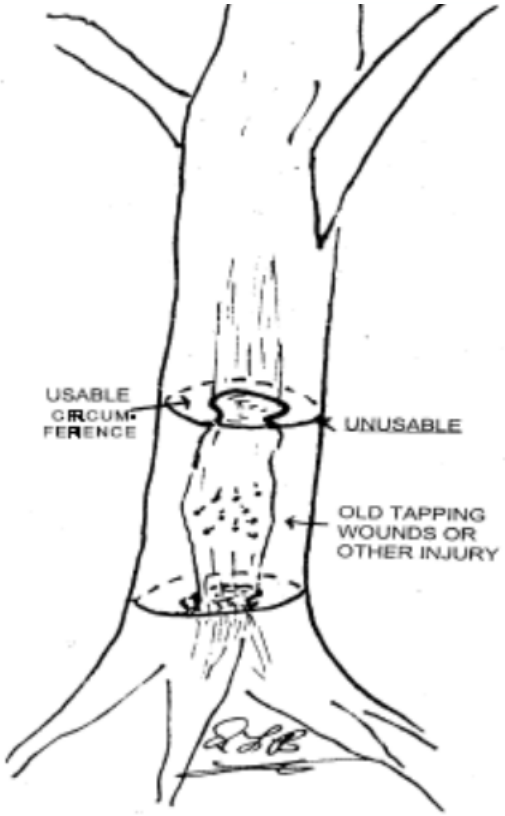


WHY DO AN INVENTORY?

- Some trees have significant defects that can impact production (Buzzell “tapping shell” concept
- Reduces “functional” DBH due to decay or damage
- Could be included in inventory



Buzzell 1986

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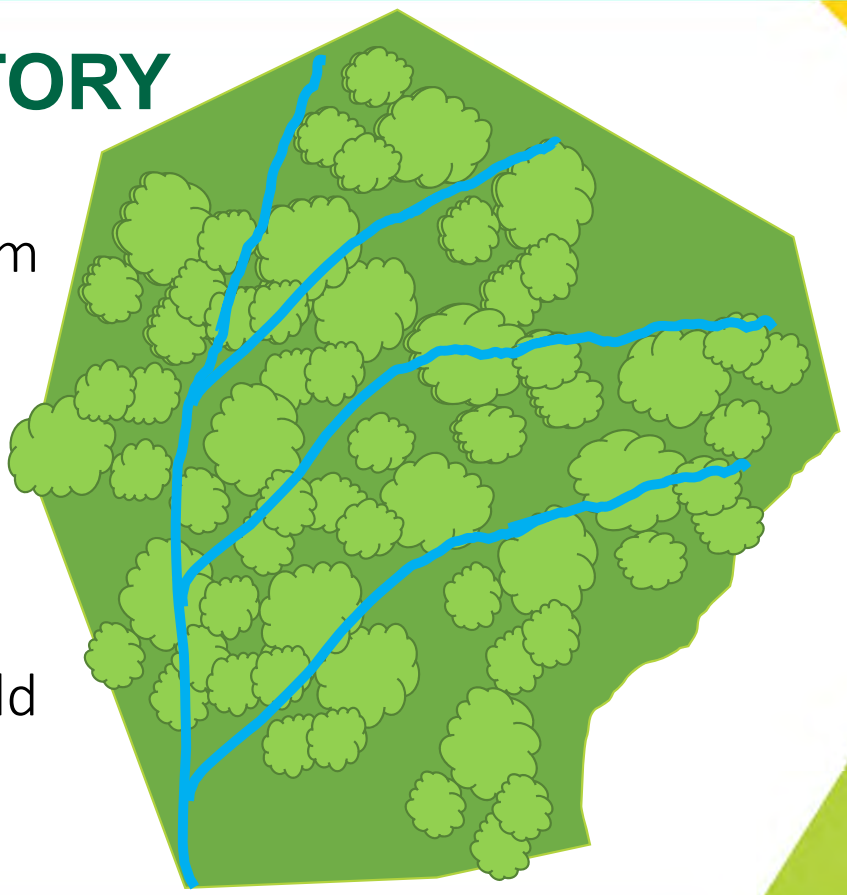
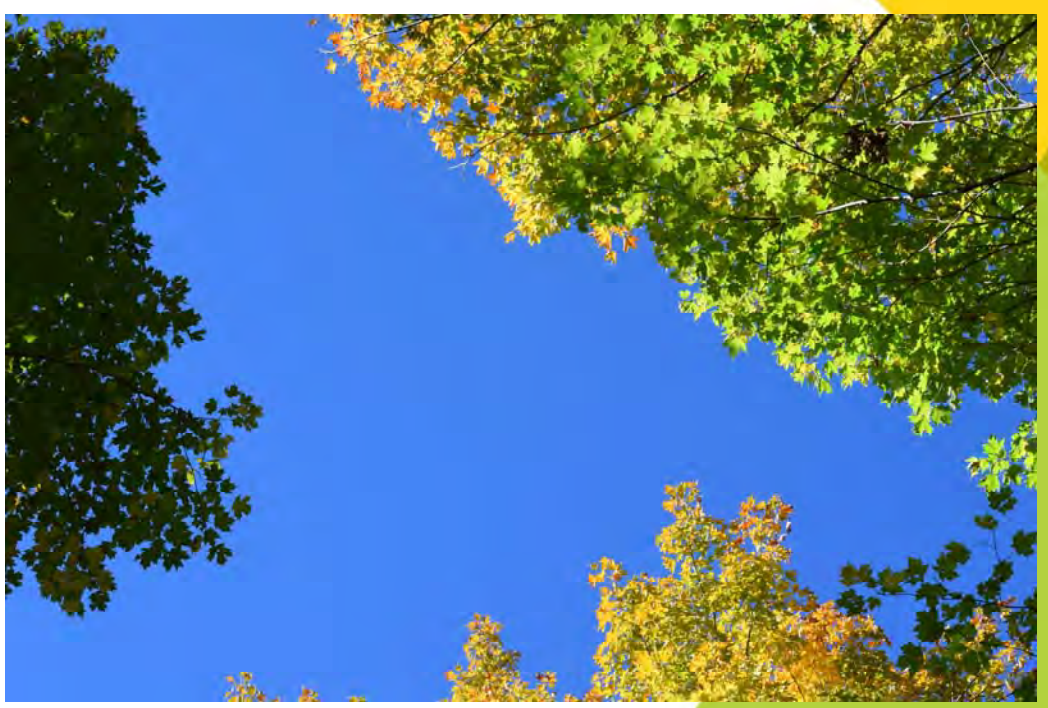
SUGARBUSH INVENTORY

- Understand where tubing system will likely be installed
- Better handle on roads and water quality issues
- Look at “legacy” roads that could be improved



SUGARBUSH INVENTORY

- Pros vs cons of taps/acre
- Limited growth when too many trees
- Limited sap production when too few



SUGARBUSH INVENTORY

- Range in taps/acre <20/acre to >100/acre.
- 50 taps/acre is considered good
- <20/acre is considered poor

MAPPING

- Know the extent of property
- Parcel data or “tax maps” do not represent survey grade information
- Free maps/GPS tools available (Google maps, Avenza, municipal parcel data)

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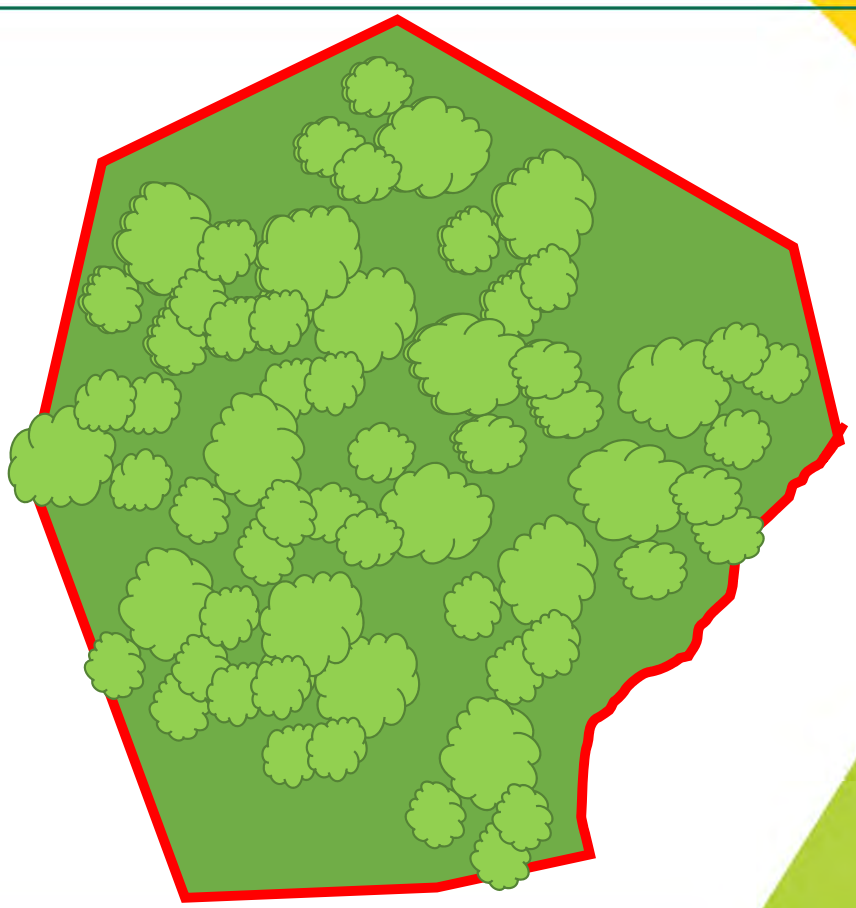
YOUR SUGARBUSH

- Part of a forested property
- Operator owned or leased
- Large properties often under forest management plan with tax benefits

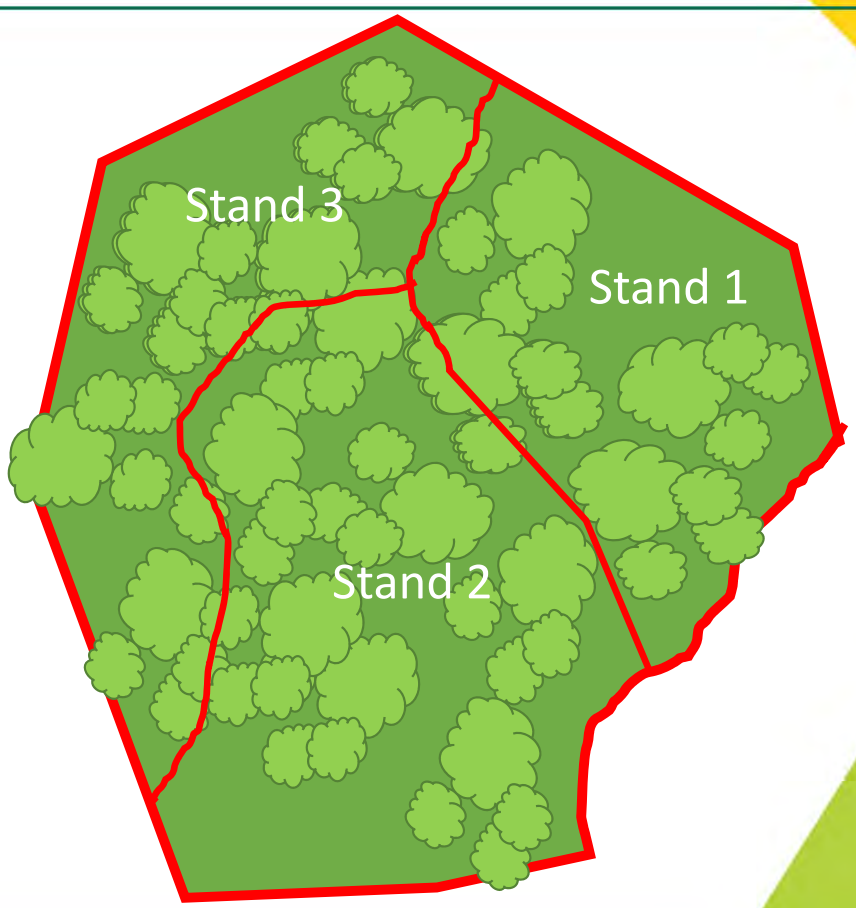
INVENTORY BASICS

- Know your boundaries
- If boundary evidence isn't visible; know the rules about who can refresh blazes



INVENTORY BASICS

- Identify forest stands (areas with similar distribution of trees and site characteristics)
- Stands tend to be several acres to hundreds of acres in size
- Divisions are based on site quality, structure/age, hydrology, etc.



INVENTORY TYPES

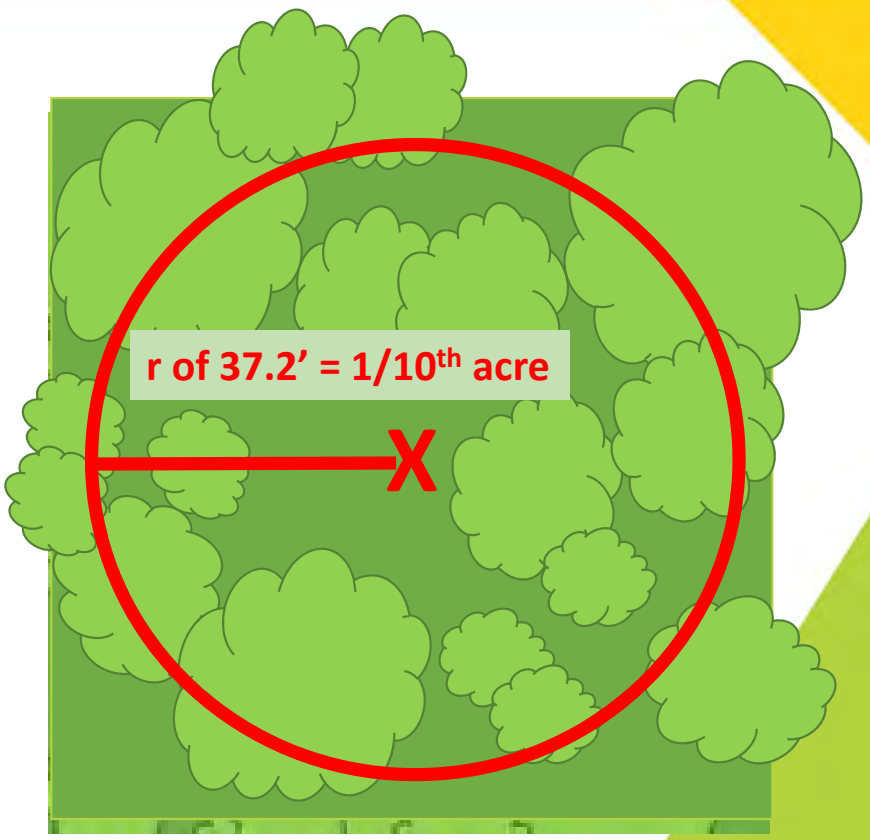
- 100% inventory or measure every tree
- Not practical above ~2-3 acres

PLOT SAMPLING

- Plots generally take longer than points

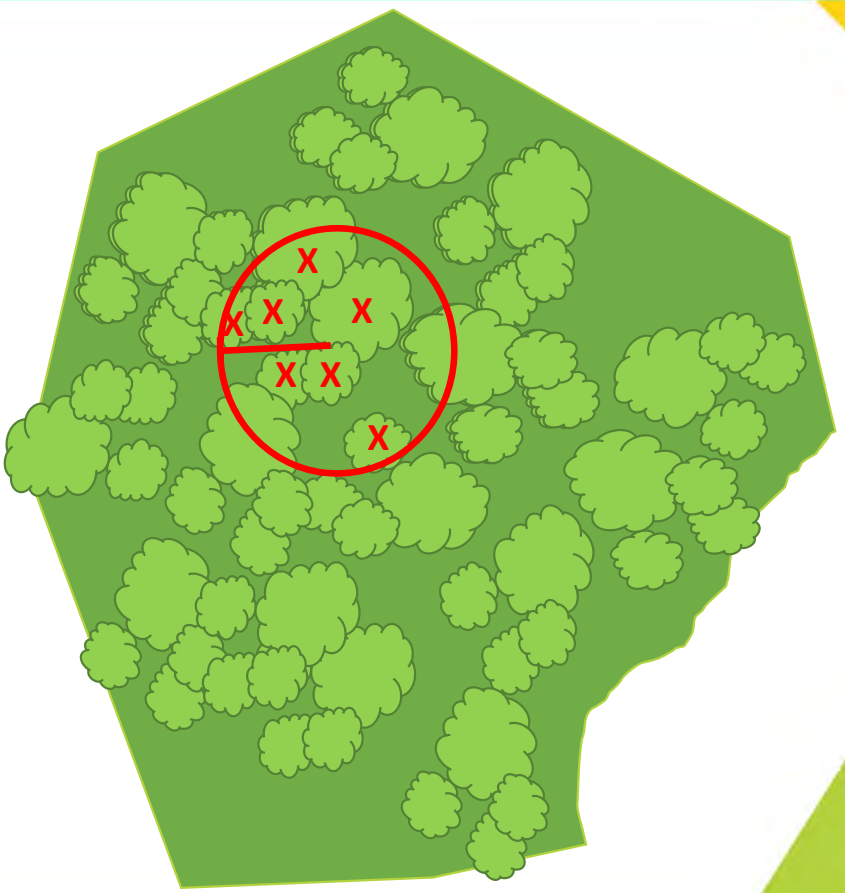
- 1/5th acre (52.6’ radius)
  1/10th acre (37.2’)
  1/20th acre (26.4’)

- Multiply tally by plot size and divide by number of plots in stand



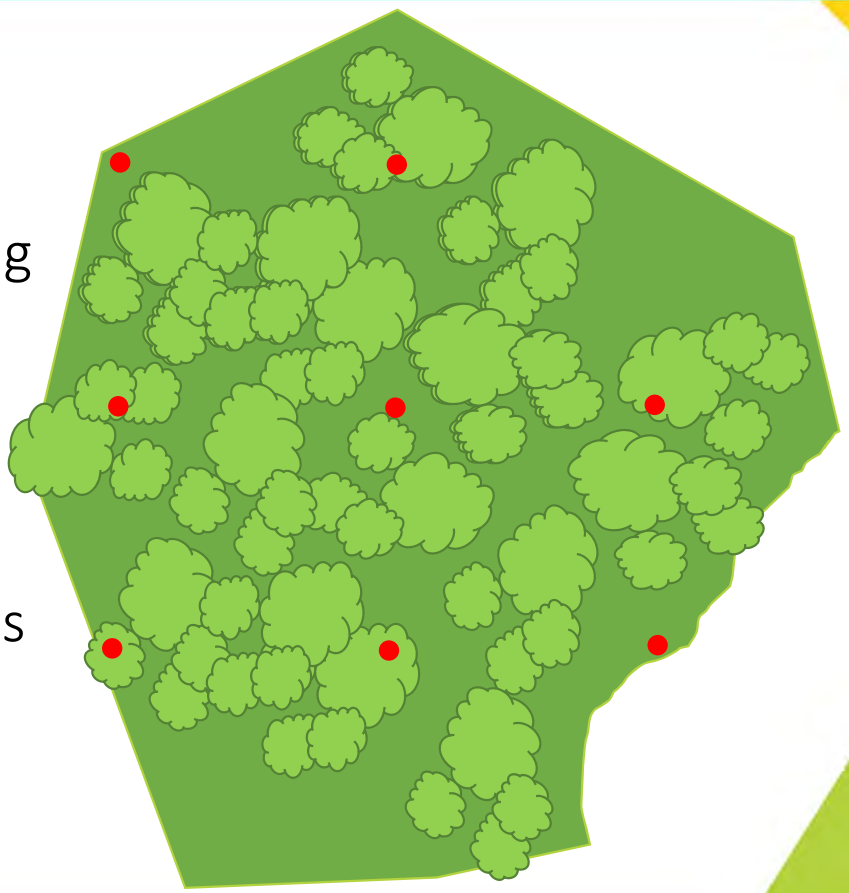
PLOT SAMPLING

- Fixed radius plot
- Measure every tree in plot then multiply by stand acreage
- 1 plot for every 4-5 acres
- Allows for establishment of permanent plots (growth rates)



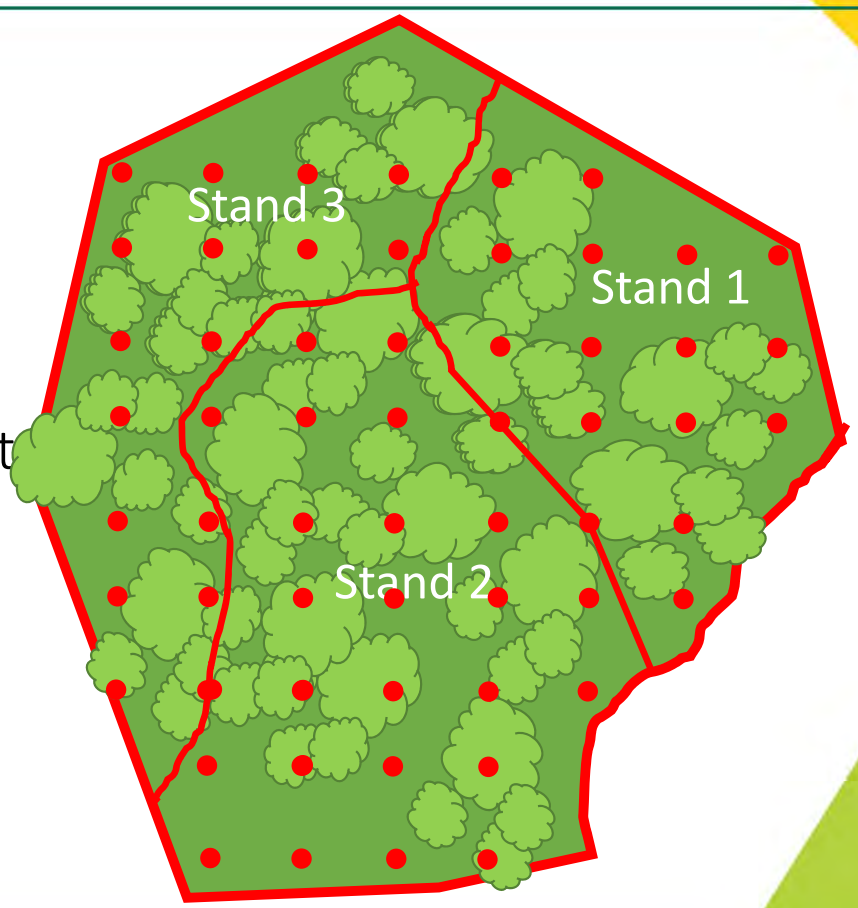
POINT SAMPLING

- Variable radius or point sampling
- Trees are measured based on diameter and distance to point
- Fast and accurate if correct tools and techniques are used
- Points need to be located without bias



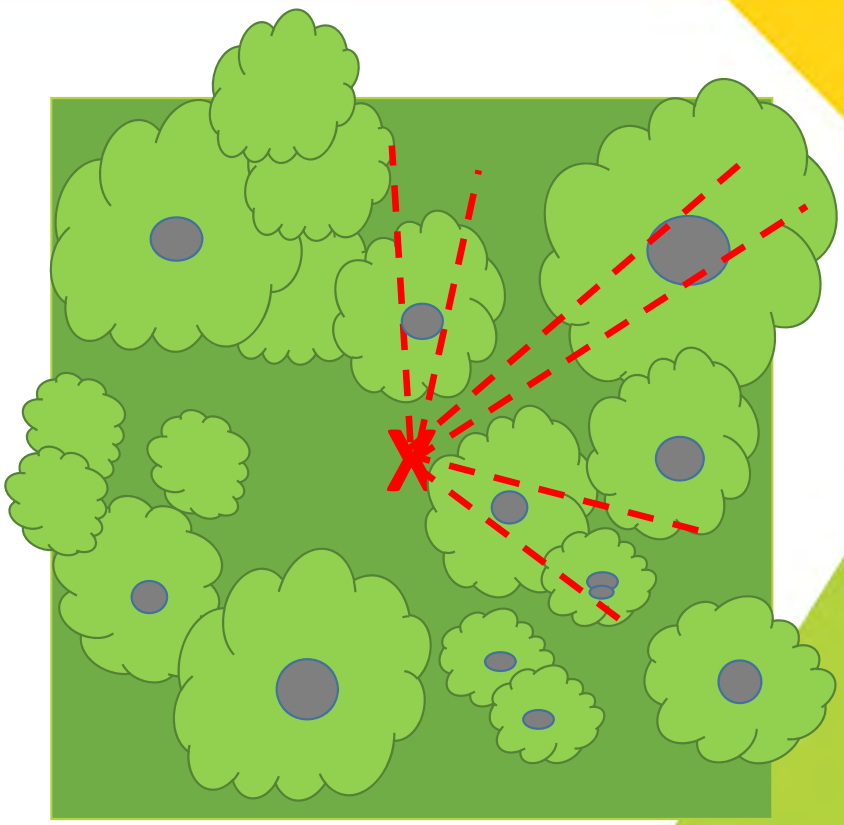
INVENTORY BASICS

- 1 plot/point per ~4-5 acres is a starting point
- More plots = more accuracy but more time
- Not all stands need the same number
- Limit bias where points fall



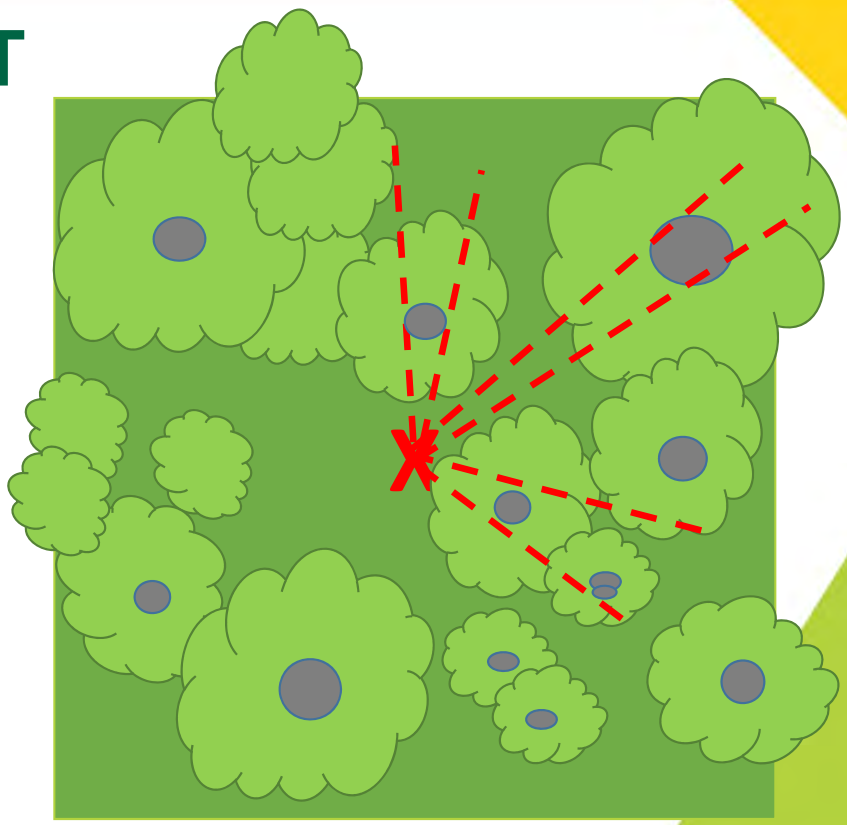
POINT SAMPLING

- Also known as variable radius plot
- Don’t need to measure out plot
- Diameter x multiplier
- Average by number of plots



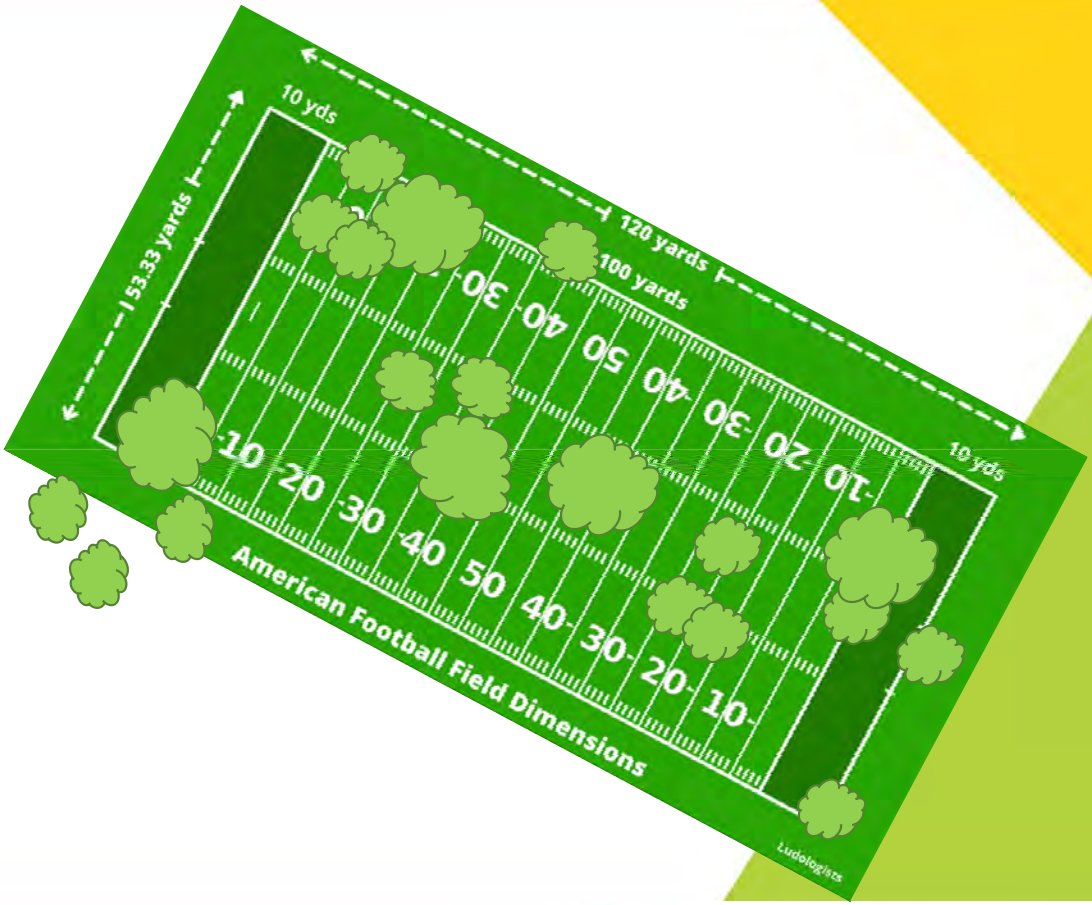
VARIABLE RADIUS PLOT

- Consistent starting point (North)
- Work clockwise
- Don’t need to measure out plot
- Diameter x multiplier
- Average by number of plots



QUICK AND DIRTY

- The area of a football field as one acre
- If you can't see a football fields worth of woods, estimate what % you do see and count taps
- ½ to 2/3's of an acre is more likely



INVENTORY TOOLS

- Diameter tape or Biltmore
- Angle gauge or prism
- Measuring tape (for radius measurement
- Map and compass
- Datasheet

INVENTORY TOOLS

- Measuring DBH at 4.5’ above the ground
- Always measure on high side of base of stem

INVENTORY TOOLS

- Diameter tape converts circumference to diameter
- Make sure measuring tape is level and not twisted

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POINT SAMPLING TOOLS

- Angle gauge
  - Simple, inexpensive (~$15)
  - Held at set distance from eye
  - Count tree if it “fills” angle
  - Rotate around plot center

POINT SAMPLING TOOLS

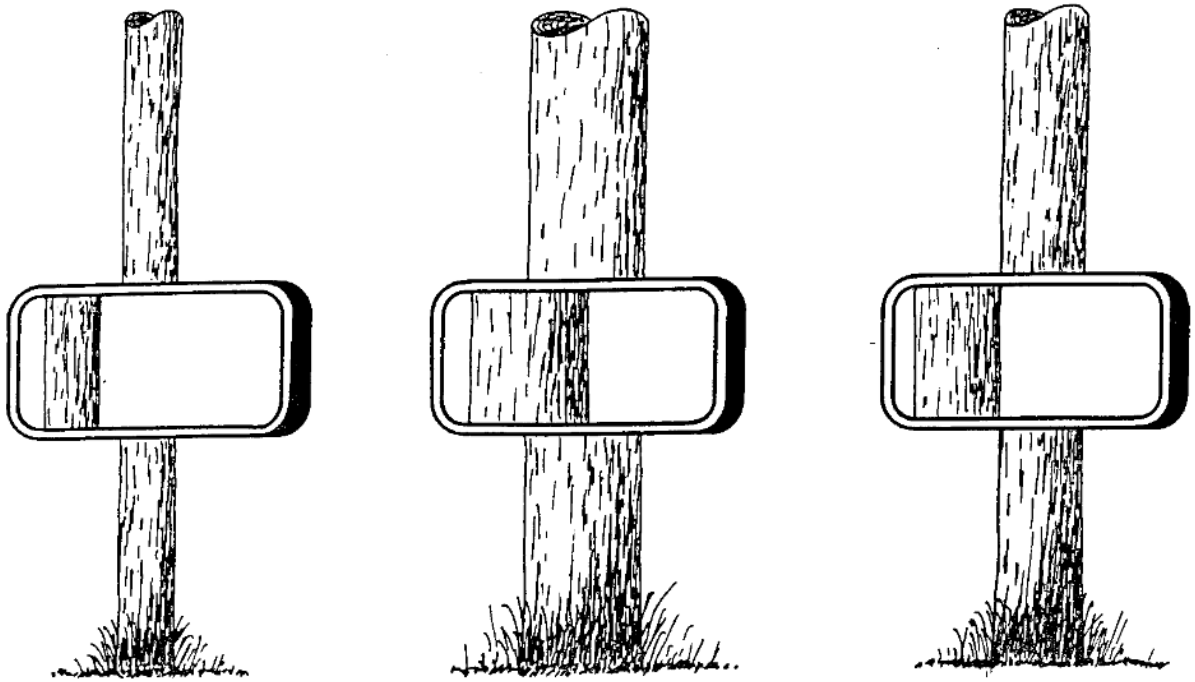
- A penny approximates a 10 factor angle gage

- Will tally slightly fewer trees

POINT SAMPLING TOOLS

- Prism more expensive (~$40-80)
- Probability of being tallied is proportional to stem diameter
- Held over “point center”
- Count tree if stem “overlaps” in the prism view

POINT SAMPLING TOOLS



Mitchell et al. 1995

POINT SAMPLING TOOLS

RECORDING DATA

- Use datasheet that captures what is important for inventory
- Stand number
- DBH
- Number of plots/point
- Plot size

PLOT SAMPLING

- Datasheet for summarizing plots in 10th acre plot

Point #	<8”	9-11”	12-14”	15-17”	18-19”	20-22”	Total
Trees	III	III	II		I		
Plot factor	1/10	1/10	1/10	1/10	1/10	1/10	
# Taps/acre	30	30	20		10		**90**

POINT SAMPLING

- Datasheet for summarizing point

Point #	10” (9-11”)	12”	14”	16”	18”	20”	Total
Trees	III	II		I	II		
Plot factor	18.3	12.7	9.4	7.2	5.7	4.6	
# Taps/acre	54.9	25.4		7.2	11.4		**98.9**

QUESTIONS?

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