

# Legacy Tree Data:

A national repository of tree volume, weight, and wood properties measurements

**Phil Radtke** Forest Resources &  
Environmental Conservation



Timber Measurements Society, April 9, 2015

The  
Coeur d'Alene

# Broad-Scale Forest Assessments: Volume; Biomass; Carbon

- US Forest Service mandate: Timber resources
  - McSweeney-McNary, RPA
- Global carbon assessments
  - IPCC, NOAA, EPA, USDA
- Link from volume :: mass :: carbon
- Bioenergy production
  - DOE
  - Canada: ENFOR



# Need for Forest Assessments: Volume; Biomass; Carbon

- Stem volume is a starting point
  - We do it well
  - Much of the tree is in the stem
  - Weight and content by (density) conversion
- Allometry
  - Effort and time intensive
  - Expensive
  - Variation (large  $n$  helps)
    - Species, geography, growing conditions

# Legacy Data Compilation

- Goals:
  - Catalog past efforts to measure trees in detail
    - Location, species, dbh, height, ...
    - Stem attributes
      - Taper
      - Weight: green & dry
      - Density (lb/ft<sup>3</sup>)
      - Volume: inside & outside bark
      - Bark thickness
      - Stump dimensions
      - Growth rings
      - Wood/bark properties





# Legacy Data Compilation

- Goals: (cont.)
  - Catalog past efforts to measure trees in detail (cont.)
    - Branches
      - Diameter & length
      - Weight: green & dry
      - Number, position
    - Foliage
      - Mass
      - Leaf area
    - Roots



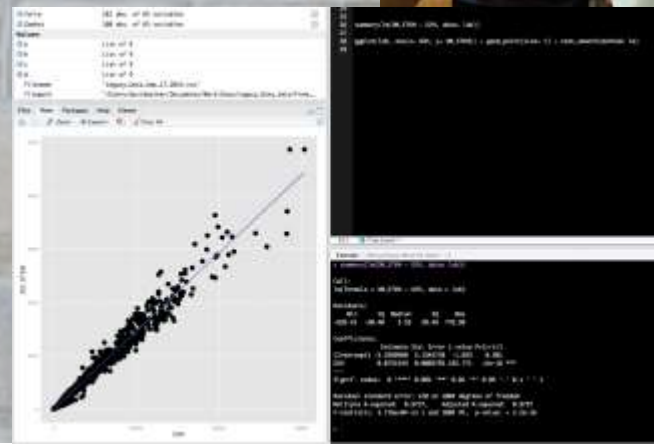


# Legacy Data Compilation

- Goals: (cont.)
  - Locate legacy data
  - Copy
  - Digitize
  - Analyze
  - Archive



| Date   | Time | Loc | Wind | Temp | Humid | Wind |     |     | Temp |     |     | Humid |     |
|--------|------|-----|------|------|-------|------|-----|-----|------|-----|-----|-------|-----|
|        |      |     |      |      |       | Dir  | Spd | Dir | Spd  | Dir | Spd | Dir   | Spd |
| 302/02 | 00   | 00  | 00   | 00   | 00    | 00   | 00  | 00  | 00   | 00  | 00  | 00    | 00  |
| 302/02 | 04   | 00  | 00   | 00   | 00    | 00   | 00  | 00  | 00   | 00  | 00  | 00    | 00  |
| 302/02 | 08   | 00  | 00   | 00   | 00    | 00   | 00  | 00  | 00   | 00  | 00  | 00    | 00  |
| 302/02 | 12   | 00  | 00   | 00   | 00    | 00   | 00  | 00  | 00   | 00  | 00  | 00    | 00  |
| 302/02 | 16   | 00  | 00   | 00   | 00    | 00   | 00  | 00  | 00   | 00  | 00  | 00    | 00  |
| 302/02 | 20   | 00  | 00   | 00   | 00    | 00   | 00  | 00  | 00   | 00  | 00  | 00    | 00  |
| 302/02 | 24   | 00  | 00   | 00   | 00    | 00   | 00  | 00  | 00   | 00  | 00  | 00    | 00  |
| 302/02 | 28   | 00  | 00   | 00   | 00    | 00   | 00  | 00  | 00   | 00  | 00  | 00    | 00  |
| 302/02 | 32   | 00  | 00   | 00   | 00    | 00   | 00  | 00  | 00   | 00  | 00  | 00    | 00  |





# Project Considerations



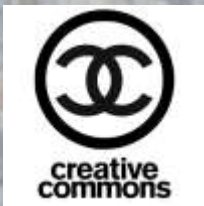
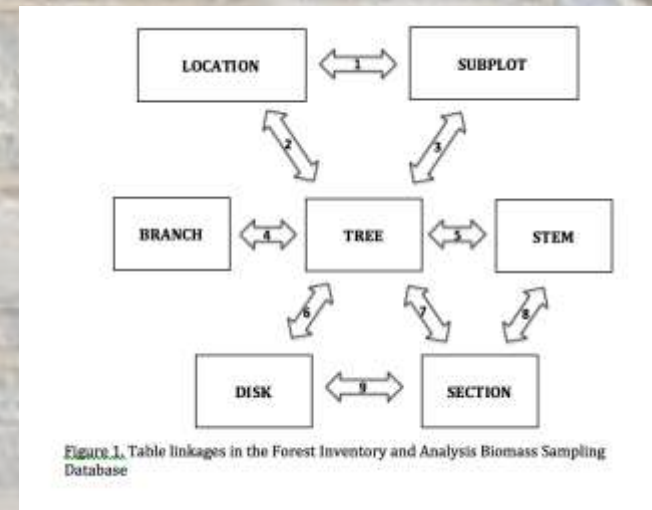
- Extent
- Search effort vs. cost
- Digitization costs, priorities
- Media
- Data quality





# Project Considerations

- Database
  - Robust, flexible, stable, expandable, accessible
  - Metadata & references
  - Documentation
  - Maintenance & accountability
- Licensing & attribution





# Data Sources

- Literature

OCR

- Reports
- Theses & dissertations
- Articles

| DATA SET NO. | TREE NO. | SPECIES CODE | D.B.F. CM | HEIGHT M | LEAF WEIGHT KG | BRANCH WEIGHT KG | BOLE WEIGHT KG |
|--------------|----------|--------------|-----------|----------|----------------|------------------|----------------|
| 3            | 110      | 239          | 24.10     | 18.50    | 3.41000        | 20.950           | 217.060        |
| 3            | 104      | 239          | 26.40     | 21.50    | 3.56000        | 20.710           | 238.690        |
| 3            | 101      | 239          | 26.70     | 21.80    | 3.95000        | 23.610           | 243.910        |
| 3            | 102      | 239          | 28.40     | 20.60    | 6.14000        | 41.130           | 275.010        |
| 3            | 105      | 239          | 29.00     | 21.70    | 5.72000        | 32.660           | 262.700        |
| 3            | 108      | 239          | 35.00     | 19.90    | 4.47000        | 74.210           | 396.210        |
| 3            | 107      | 239          | 34.00     | 23.70    | 5.52000        | 31.730           | 433.090        |
| 3            | 103      | 239          | 40.80     | 26.20    | 16.51959       | 132.520          | 701.440        |

Table 1. Green weight data for willow oak trees from the state of Mississippi, USA.

| Tree | Dbh (cm) | Height (m) | L.C. (m) | Age (yr) | Green weight (kg) |         |         |
|------|----------|------------|----------|----------|-------------------|---------|---------|
|      |          |            |          |          | Wood              | Bark    | Crown   |
| 1    | 73.2     | 29.0       | 16.2     | 93       | 4,463.4           | 572.9   | 186.4   |
| 2    | 30.5     | 18.3       | 10.4     | 40       | 350.7             | 83.9    | 44.9    |
| 3    | 48.3     | 22.9       | 11.9     | 69       | 1,689.2           | 225.0   | 93.4    |
| 4    | 69.6     | 27.4       | 18.3     | 74       | 3,441.5           | 482.2   | 2,007.6 |
| 5    | 28.7     | 19.8       | 11.6     | 38       | 482.2             | 1,771.3 | 1,611.6 |
| 6    | 53.1     | 32.0       | 14.9     | 78       | 2,281.6           | 861.8   | 2,952.9 |
| 7    | 45.7     | 32.0       | 17.7     | 79       | 1,771.3           | 861.8   | 2,952.9 |
| 8    | 46.5     | 30.5       | 17.4     | 83       | 1,611.6           | 861.8   | 2,952.9 |
| 9    | 33.8     | 25.9       | 10.1     | 68       | 861.8             | 2,952.9 | 9.9     |
| 10   | 54.4     | 30.5       | 13.1     | 70       | 2,952.9           | 9.9     | 9.9     |

TABLE II  
BASIC SAMPLE TREE DATA

BREAST HEIGHT, TOTAL HEIGHT AND WEIGHT OF 10 SAMPLE TREES.

| Age | Height (Feet) | Diameter (Inches) | Oven-Dry Weight (Pounds) |          |         |
|-----|---------------|-------------------|--------------------------|----------|---------|
|     |               |                   | Stem                     | Branches | Foliage |
| 10  | 13.7          | 1.0               | 2.1                      | 0.7      | 0.6     |
| 12  | 23.0          | 2.3               | 16.8                     | 3.0      | 2.2     |
| 15  | 24.5          | 2.5               | 17.6                     | 3.5      | 2.3     |
| 18  | 17.3          | 1.7               | 6.0                      | 1.1      | 0.6     |
| 20  | 49.3          | 5.5               | 142.4                    | 26.0     | 6.5     |
| 21  | 42.2          | 4.5               | 346.3                    | 31.7     | 15.9    |
| 25  | 35.9          | 4.4               | 70.0                     | 10.0     | 4.9     |
| 29  | 57.6          | 4.6               | 91.3                     | 7.9      | 3.3     |
| 30  | 60.5          | 4.7               | 522.7                    | 144.2    | 31.2    |
| 30  | 52.3          | 7.5               | 278.0                    | 44.7     | 13.7    |
| 51  | 26.6          | 3.2               | 35.1                     | 3.2      | 2.4     |
| 53  | 63.7          | 6.8               | 600.8                    | 136.5    | 21.0    |
| 59  | 31.0          | 3.9               | 12.4                     | 3.7      | 3.7     |
| 62  | 60.3          | 7.1               | 318.5                    | 43.4     | 11.9    |
| 63  | 39.3          | 3.7               | 376.1                    | 93.7     | 10.1    |
| 64  | 61.6          | 8.2               | 487.9                    | 84.7     | 17.3    |
| 71  | 61.6          | 8.5               | 420.1                    | 62.9     | 16.3    |

High Forking Trees

| Age | Height (Feet) | Diameter (Inches) | Oven-Dry Weight (Pounds) |
|-----|---------------|-------------------|--------------------------|
|     |               |                   | Stem                     |
| 1   | 5.84          | 14                | 11.0                     |
| 1   | 11.0          | 1                 | 11.0                     |
| 94  | 94            | 5                 | 759                      |
| 12  | 12            | 13.7              | 1.0                      |
| 15  | 15            | 23.0              | 2.3                      |
| 17  | 17            | 24.5              | 2.5                      |
| 18  | 18            | 17.3              | 1.7                      |
| 20  | 20            | 49.3              | 5.5                      |
| 21  | 21            | 42.2              | 4.5                      |
| 25  | 25            | 35.9              | 4.4                      |
| 29  | 29            | 57.6              | 4.6                      |
| 30  | 30            | 60.5              | 4.7                      |
| 30  | 30            | 52.3              | 7.5                      |
| 51  | 51            | 26.6              | 3.2                      |
| 53  | 53            | 63.7              | 6.8                      |
| 59  | 59            | 31.0              | 3.9                      |
| 62  | 62            | 60.3              | 7.1                      |
| 63  | 63            | 39.3              | 3.7                      |
| 64  | 64            | 61.6              | 8.2                      |
| 71  | 71            | 61.6              | 8.5                      |

TABLE II

BASIC SAMPLE TREE DATA

| Age | Height (Feet) | Diameter (Inches) | Oven-Dry Weight (Pounds) |          |         |
|-----|---------------|-------------------|--------------------------|----------|---------|
|     |               |                   | Stem                     | Branches | Foliage |
| 10  | 13.7          | 1.0               | 2.1                      | 0.7      | 0.6     |
| 12  | 23.0          | 2.3               | 16.8                     | 3.0      | 2.2     |
| 15  | 24.5          | 2.5               | 17.6                     | 3.5      | 2.3     |
| 18  | 17.3          | 1.7               | 6.0                      | 1.1      | 0.6     |
| 20  | 49.3          | 5.5               | 142.4                    | 26.0     | 6.5     |
| 21  | 42.2          | 4.5               | 346.3                    | 31.7     | 15.9    |
| 25  | 35.9          | 4.4               | 70.0                     | 10.0     | 4.9     |
| 29  | 57.6          | 4.6               | 91.3                     | 7.9      | 3.3     |
| 30  | 60.5          | 4.7               | 522.7                    | 144.2    | 31.2    |
| 30  | 52.3          | 7.5               | 278.0                    | 44.7     | 13.7    |
| 51  | 26.6          | 3.2               | 35.1                     | 3.2      | 2.4     |
| 53  | 63.7          | 6.8               | 600.8                    | 136.5    | 21.0    |
| 59  | 31.0          | 3.9               | 12.4                     | 3.7      | 3.7     |
| 62  | 60.3          | 7.1               | 318.5                    | 43.4     | 11.9    |
| 63  | 39.3          | 3.7               | 376.1                    | 93.7     | 10.1    |
| 64  | 61.6          | 8.2               | 487.9                    | 84.7     | 17.3    |
| 71  | 61.6          | 8.5               | 420.1                    | 62.9     | 16.3    |

| Age | Height (Feet) | Diameter (Inches) | Oven-dry Weight (Pounds) |          |         |
|-----|---------------|-------------------|--------------------------|----------|---------|
|     |               |                   | Stem                     | Branches | Foliage |
| 3   | 9.1           | 1.4               | 2.58                     | 1.19     | 1.94    |
| 3   | 5.5           | 0.5               | 0.39                     | 0.19     | 0.47    |
| 5   | 13.8          | 2.3               | 6.31                     | 2.45     | 2.90    |
| 9   | 19.8          | 3.4               | 16.22                    | 5.81     | 3.95    |
| 9   | 21.2          | 4.7               | 24.97                    | 13.45    | 6.58    |
| 9   | 10.3          | 1.0               | 1.28                     | 0.39     | 0.33    |
| 9   | 12.0          | 1.8               | 3.57                     | -----    | 0.89    |
| 10  | 34.2          | 5.9               | 70.93                    | 24.50    | 10.31   |
| 10  | 31.4          | 4.5               | 38.63                    | -----    | 4.36    |
| 10  | 31.3          | 4.5               | 43.22                    | 17.16    | 4.31    |
| 11  | 24.7          | 2.7               | 13.95                    | 2.16     | 2.12    |
| 13  | 25.5          | 3.8               | 23.71                    | 5.34     | 3.12    |
| 13  | 31.0          | 4.7               | 46.57                    | 7.26     | 2.79    |
| 17  | 48.3          | 8.0               | 162.54                   | 37.78    | 15.47   |
| 18  | 46.5          | 6.1               | 108.32                   | 18.36    | 6.58    |
| 20  | 50.5          | 4.9               | 94.24                    | 10.06    | 4.33    |
| 20  | 50.0          | 6.2               | 160.47                   | 21.86    | 6.58    |
| 21  | 66.0          | 8.0               | 302.31                   | 33.89    | 17.25   |
| 21  | 58.3          | 6.8               | 203.01                   | 19.19    | 10.39   |
| 22  | 24.9          | 5.0               | 38.43                    | 15.94    | 7.93    |
| 22  | 30.9          | 6.8               | 89.50                    | 27.50    | 6.00    |
| 22  | 45.5          | 6.9               | 150.33                   | 21.02    | 10.90   |
| 26  | 60.3          | 9.4               | 263.24                   | 62.25    | 27.75   |

# Data Sources

- Paper files
- Data printouts

SLASH PINE COMPLETE TREE BIOMASS-17 YR PLANT, CALHOUN, CO, FL W/ROOTS 20:35 MONDAY, MAY 23, 1977

TREEND=1

|   |          |          |          |         |         |          |         |          |         |         |         |         |         |         |         |          |       |        |         |
|---|----------|----------|----------|---------|---------|----------|---------|----------|---------|---------|---------|---------|---------|---------|---------|----------|-------|--------|---------|
| 1 | 101.266  | 6.288711 | 194.964  | 0.47118 | 0.7     | 3.5      | 42.0    | 0.432    | 114.5   | 0.326   | 136.6   | 163.3   | 20.899  | 87.073  | 0.920   | 84.319   | 0.288 | 16.931 | 100.635 |
| 1 | 0.502948 | 87.5243  | 0.278297 | 16.9532 | 104.024 | 0.497008 | 90.3291 | 0.277787 | 15.606  | 102.979 | 0.500   | 87.260  | 0.275   | 15.8567 | 107.381 | 0.492124 |       |        |         |
| 1 | 61.8106  | 0.274399 | 17.273   | 134.277 | 0.444   | 130.815  | 0.271   | 32.4636  | 17.9798 | 60.7306 | 33.8587 | 29.453  | 55.1157 | 31.399  | 17.1716 | 62.9973  |       |        |         |
| 1 | 32.5759  | 28.6877  | 57.8467  | 31.0282 | 17.3422 | 63.1052  | 33.0073 | 28.571   | 58.1687 | 30.7233 | 17.1307 | 63.7142 | 33.2011 | 29.3643 | 58.1741 | 27.7189  |       |        |         |







# Data Sources

130-177. Maine Forest Survey. U. S. DEPARTMENT OF AGRICULTURE, BUREAU OF FORESTRY.

40-0 Squaw Mt. Township, ME.

Locality, \_\_\_\_\_ Species, Red Spruce Date, Oct 14/02 No. 181 Stumpheight class, 2.5

Distance on average radius from center to ring—Inches.

| Tree No. | 1   | 2   | 3   | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   |
|----------|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1        | .10 | .45 | .80 | 1.10 | 1.37 | 1.72 | 2.05 | 2.50 | 2.90 | 3.35 | 3.70 | 4.10 | 4.53 | 4.85 | 5.20 | 5.75 | 6.35 | 6.95 | 7.45 | 7.95 | 8.47 |

| Tree No. | 1    | 2    | 3        | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19    | 20    | 21    |
|----------|------|------|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1        | 8.75 | 9.50 | Diameter |       |       | 10.25 | 11.00 | 11.75 | 12.50 | 13.25 | 14.00 | 14.75 | 15.50 | 16.25 | 17.00 | 17.75 | 18.50 | 19.25 | 20.00 | 20.75 | 21.50 |
| 2        |      |      | 9.53     | 10.25 | 10.98 | 11.70 | 12.42 | 13.14 | 13.86 | 14.58 | 15.30 | 16.02 | 16.74 | 17.46 | 18.18 | 18.90 | 19.62 | 20.34 | 21.06 | 21.78 | 22.50 |
| 3        |      |      | 9.08     | 9.80  | 10.52 | 11.24 | 11.96 | 12.68 | 13.40 | 14.12 | 14.84 | 15.56 | 16.28 | 17.00 | 17.72 | 18.44 | 19.16 | 19.88 | 20.60 | 21.32 | 22.04 |
| 4        |      |      | 8.63     | 9.35  | 10.07 | 10.79 | 11.51 | 12.23 | 12.95 | 13.67 | 14.39 | 15.11 | 15.83 | 16.55 | 17.27 | 17.99 | 18.71 | 19.43 | 20.15 | 20.87 | 21.59 |
| 5        |      |      | 8.18     | 8.90  | 9.62  | 10.34 | 11.06 | 11.78 | 12.50 | 13.22 | 13.94 | 14.66 | 15.38 | 16.10 | 16.82 | 17.54 | 18.26 | 18.98 | 19.70 | 20.42 | 21.14 |
| 6        |      |      | 7.73     | 8.45  | 9.17  | 9.89  | 10.61 | 11.33 | 12.05 | 12.77 | 13.49 | 14.21 | 14.93 | 15.65 | 16.37 | 17.09 | 17.81 | 18.53 | 19.25 | 19.97 | 20.69 |
| 7        |      |      | 7.28     | 8.00  | 8.72  | 9.44  | 10.16 | 10.88 | 11.60 | 12.32 | 13.04 | 13.76 | 14.48 | 15.20 | 15.92 | 16.64 | 17.36 | 18.08 | 18.80 | 19.52 | 20.24 |
| 8        |      |      | 6.83     | 7.55  | 8.27  | 8.99  | 9.71  | 10.43 | 11.15 | 11.87 | 12.59 | 13.31 | 14.03 | 14.75 | 15.47 | 16.19 | 16.91 | 17.63 | 18.35 | 19.07 | 19.79 |
| 9        |      |      | 6.38     | 7.10  | 7.82  | 8.54  | 9.26  | 9.98  | 10.70 | 11.42 | 12.14 | 12.86 | 13.58 | 14.30 | 15.02 | 15.74 | 16.46 | 17.18 | 17.90 | 18.62 | 19.34 |
| 10       |      |      | 5.93     | 6.65  | 7.37  | 8.09  | 8.81  | 9.53  | 10.25 | 10.97 | 11.69 | 12.41 | 13.13 | 13.85 | 14.57 | 15.29 | 16.01 | 16.73 | 17.45 | 18.17 | 18.89 |
| 11       |      |      | 5.48     | 6.20  | 6.92  | 7.64  | 8.36  | 9.08  | 9.80  | 10.52 | 11.24 | 11.96 | 12.68 | 13.40 | 14.12 | 14.84 | 15.56 | 16.28 | 17.00 | 17.72 | 18.44 |
| 12       |      |      | 5.03     | 5.75  | 6.47  | 7.19  | 7.91  | 8.63  | 9.35  | 10.07 | 10.79 | 11.51 | 12.23 | 12.95 | 13.67 | 14.39 | 15.11 | 15.83 | 16.55 | 17.27 | 17.99 |
| 13       |      |      | 4.58     | 5.30  | 6.02  | 6.74  | 7.46  | 8.18  | 8.90  | 9.62  | 10.34 | 11.06 | 11.78 | 12.50 | 13.22 | 13.94 | 14.66 | 15.38 | 16.10 | 16.82 | 17.54 |
| 14       |      |      | 4.13     | 4.85  | 5.57  | 6.29  | 7.01  | 7.73  | 8.45  | 9.17  | 9.89  | 10.61 | 11.33 | 12.05 | 12.77 | 13.49 | 14.21 | 14.93 | 15.65 | 16.37 | 17.09 |
| 15       |      |      | 3.68     | 4.40  | 5.12  | 5.84  | 6.56  | 7.28  | 8.00  | 8.72  | 9.44  | 10.16 | 10.88 | 11.60 | 12.32 | 13.04 | 13.76 | 14.48 | 15.20 | 15.92 | 16.64 |
| 16       |      |      | 3.23     | 3.95  | 4.67  | 5.39  | 6.11  | 6.83  | 7.55  | 8.27  | 8.99  | 9.71  | 10.43 | 11.15 | 11.87 | 12.59 | 13.31 | 14.03 | 14.75 | 15.47 | 16.19 |
| 17       |      |      | 2.78     | 3.50  | 4.22  | 4.94  | 5.66  | 6.38  | 7.10  | 7.82  | 8.54  | 9.26  | 9.98  | 10.70 | 11.42 | 12.14 | 12.86 | 13.58 | 14.30 | 15.02 | 15.74 |
| 18       |      |      | 2.33     | 3.05  | 3.77  | 4.49  | 5.21  | 5.93  | 6.65  | 7.37  | 8.09  | 8.81  | 9.53  | 10.25 | 10.97 | 11.69 | 12.41 | 13.13 | 13.85 | 14.57 | 15.29 |
| 19       |      |      | 1.88     | 2.60  | 3.32  | 4.04  | 4.76  | 5.48  | 6.20  | 6.92  | 7.64  | 8.36  | 9.08  | 9.80  | 10.52 | 11.24 | 11.96 | 12.68 | 13.40 | 14.12 | 14.84 |
| 20       |      |      | 1.43     | 2.15  | 2.87  | 3.59  | 4.31  | 5.03  | 5.75  | 6.47  | 7.19  | 7.91  | 8.63  | 9.35  | 10.07 | 10.79 | 11.51 | 12.23 | 12.95 | 13.67 | 14.39 |
| 21       |      |      | 0.98     | 1.70  | 2.42  | 3.14  | 3.86  | 4.58  | 5.30  | 6.02  | 6.74  | 7.46  | 8.18  | 8.90  | 9.62  | 10.34 | 11.06 | 11.78 | 12.50 | 13.22 | 13.94 |
| Average  |      |      |          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |

Squaw Mt  
Red spruce

U. S. DEPARTMENT OF AGRICULTURE.

Maine, by types.<sup>1</sup>

[CURVED.]

| Tree No. | Upper spruce slope, 87 trees. | Average of all types, 1,174 trees. |
|----------|-------------------------------|------------------------------------|
| 10       | Periodic annual growth.       | Time required to grow 1 inch.      |
| 10       | Periodic annual growth.       | Time required to grow 1 inch.      |
| 11       | Periodic annual growth.       | Time required to grow 1 inch.      |
| 12       | Periodic annual growth.       | Time required to grow 1 inch.      |
| 13       | Periodic annual growth.       | Time required to grow 1 inch.      |
| 14       | Periodic annual growth.       | Time required to grow 1 inch.      |
| 15       | Periodic annual growth.       | Time required to grow 1 inch.      |
| 16       | Periodic annual growth.       | Time required to grow 1 inch.      |
| 17       | Periodic annual growth.       | Time required to grow 1 inch.      |
| 18       | Periodic annual growth.       | Time required to grow 1 inch.      |
| 19       | Periodic annual growth.       | Time required to grow 1 inch.      |
| 20       | Periodic annual growth.       | Time required to grow 1 inch.      |
| 21       | Periodic annual growth.       | Time required to grow 1 inch.      |
| Average  | Periodic annual growth.       | Time required to grow 1 inch.      |

<sup>1</sup> From data secured by R. S. Hosmer, 1902, on partially culled land in Squaw Mountain Township, Me., and including trees of all crown classes.



# Data Sources

- Paper files

U.S. DEPARTMENT OF AGRICULTURE  
FOREST SERVICE

**FELLED TREE DATA SHEET**

|   |   |   |   |
|---|---|---|---|
| SADD NUMBER<br>LOCATION NUMBER<br>TREE NUMBER | WINDING (SHOULDER CODE) 15N<br>RIDGE (DISTRICT CODE) 151<br>DATE 10-27-52<br>PLOT WIND CODE 18N<br>STANDING TREE MEASUREMENT APPROX. DATE 12N | BREAST HEIGHT MEASUREMENTS:<br>AGE (YEARS) 126-30<br>HEARTWOOD DIA. (FEET) 130-41<br>10-YEAR RADIAL GROWTH 195-44<br>35-YEAR HEIGHT GROWTH 145-47 | SURFACE CHARACTERISTICS 195<br>GROWN RATIO 151<br>CROWN CLASS 152<br>DAMAGE CLASS 153-54<br>TREE CLASS 155-56 |
|---|---|---|---|

|   |  |
|---|--|
| STUMP MEASUREMENTS:<br>AGE (YEARS) 130-50<br>DIAMETER (INCHES) 120-50 | TREE CLASSIFICATION DATA:<br>SHEEP OR WOOD (STANDING TREE) 140<br>INTERNAL DEFECT ESTIMATE 145 |
|---|--|

| ROW | D.B.H. | DBH  | HT   | TOTAL CUMULATIVE + INITIAL |      |      |      | ACTUAL CUM. ONLY |      |      |      | Slope | Wind | Snow | Ice  | Other | Notes |      |
|-----|--------|------|------|----------------------------|------|------|------|------------------|------|------|------|-------|------|------|------|-------|-------|------|
|     |        |      |      | DBH                        | HT   | DBH  | HT   | DBH              | HT   | DBH  | HT   |       |      |      |      |       |       |      |
| 1   | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 2   | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 3   | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 4   | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 5   | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 6   | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 7   | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 8   | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 9   | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 10  | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 11  | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 12  | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 13  | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 14  | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 15  | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 16  | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 17  | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 18  | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 19  | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |
| 20  | 12.0   | 12.0 | 12.0 | 12.0                       | 12.0 | 12.0 | 12.0 | 12.0             | 12.0 | 12.0 | 12.0 | 12.0  | 12.0 | 12.0 | 12.0 | 12.0  | 12.0  | 12.0 |

Form SLIP-01  
1-1-52

# Data Sources – Many Untapped



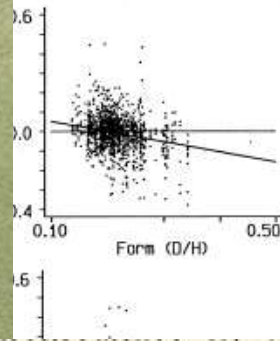
United States  
Department of  
Agriculture

Forest Service

Rocky Mountain  
Forest and Range  
Experiment Station

## Estimating Merchantable Tree Volume in Oregon and Washington Using Stem Profile Models

.. Czaplewski, Amy S. Brown, and Dale G. Guenther



TECHNICAL BULLETIN No. 305

JULY, 1932

## Volume Tables for *Pacific Northwest Trees*

(A Compilation)



Agriculture Handbook No.

U. S. Department of Agriculture

Forest Service

FOREST SERVICE—Circular 175.

HENRY S. GRAVES, Forester.

## THE GROWTH AND MANAGEMENT OF DOUGLAS FIR IN THE PACIFIC NORTHWEST.

By

THORNTON T. MUNGER,

## THE STRENGTH AND RELATED PROPERTIES OF REDWOOD

BY

R. F. LUXFORD  
*Associate Engineer*

AND

L. J. MARKWARDT

*Senior Engineer, Forest Products Laboratory  
Branch of Research, Forest Service*







# Legacy Tree Data: Current Status

# Biomass: 13,038 Trees from 132 Species

| Common Name     | Number Sampled | Common Name       | Number Sampled |
|-----------------|----------------|-------------------|----------------|
| loblolly pine   | 987            | northern red oak  | 207            |
| sweetgum        | 703            | sugar maple       | 186            |
| slash pine      | 583            | chestnut oak      | 169            |
| red maple       | 496            | scarlet oak       | 158            |
| ponderosa pine* | 479            | water oak         | 157            |
| Douglas-fir*    | 470            | water tupelo      | 150            |
| white oak       | 431            | black cherry      | 141            |
| yellow-poplar   | 388            | flowering dogwood | 140            |
| lodgepole pine* | 291            | red spruce        | 139            |
| hickory spp.    | 271            | shortleaf pine    | 130            |
| quaking aspen   | 240            | blackgum          | 128            |
| black spruce    | 238            | black oak         | 125            |
| ash spp.        | 229            | American beech    | 116            |

 Hardwood

 = Softwood


\* = Western US



# Taper: 86,225 Trees from 115 Species

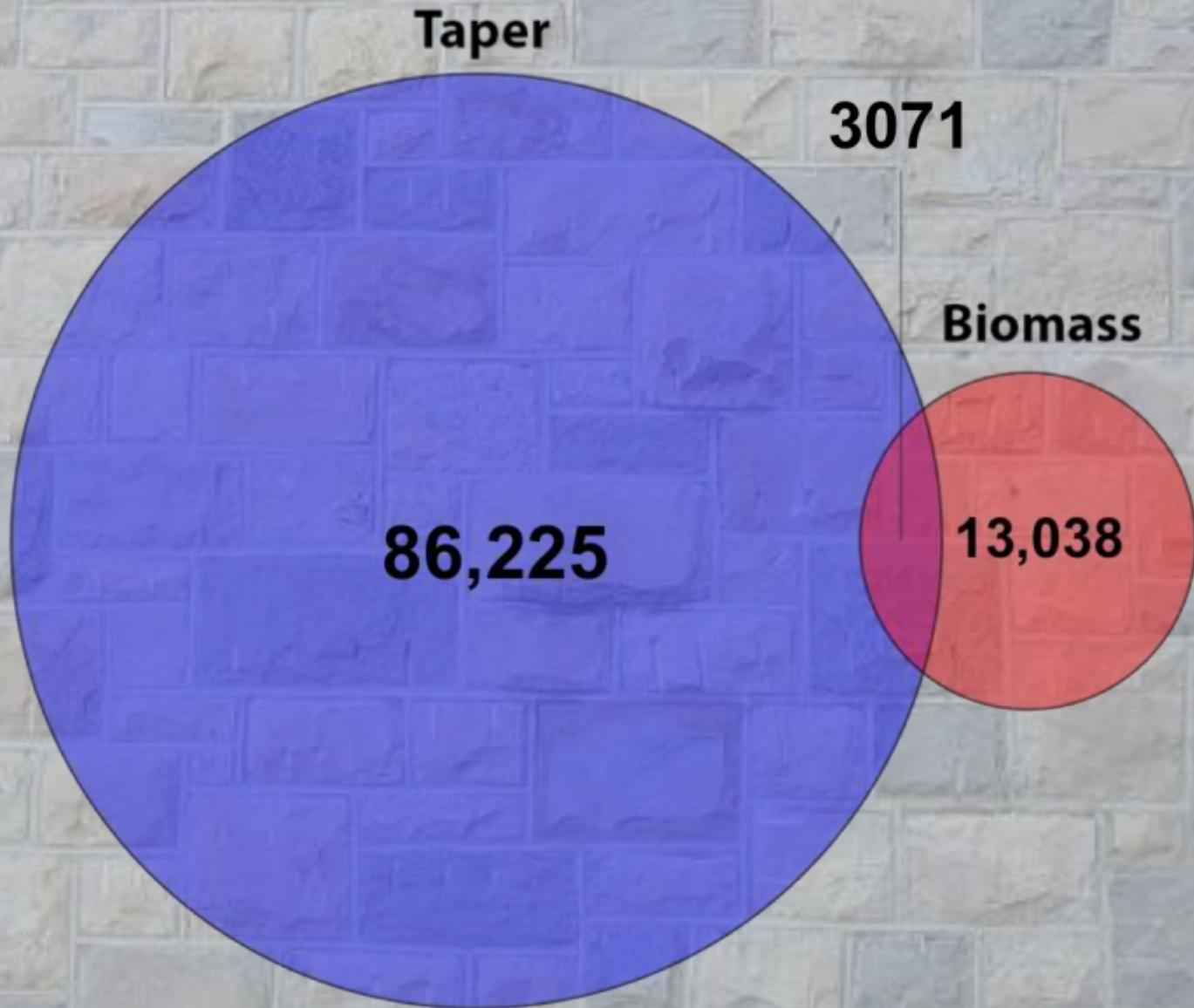
| Common Name        | Number Sampled | Common Name      | Number Sampled |
|--------------------|----------------|------------------|----------------|
| loblolly pine      | 8878           | ponderosa pine*  | 2026           |
| slash pine         | 5995           | hickory spp.     | 1948           |
| shortleaf pine     | 5139           | sugar maple      | 1846           |
| longleaf pine      | 4168           | Virginia pine    | 1838           |
| jack pine          | 3181           | yellow birch     | 1587           |
| balsam fir         | 2922           | chestnut oak     | 1580           |
| white spruce       | 2873           | paper birch      | 1443           |
| white oak          | 2859           | red pine         | 1428           |
| black spruce       | 2738           | scarlet oak      | 1171           |
| sweetgum           | 2620           | northern red oak | 1167           |
| eastern white pine | 2408           | black oak        | 1146           |
| red maple          | 2342           | swamp tupelo     | 1094           |
| yellow-poplar      | 2205           | southern red oak | 980            |

 Hardwood

 = Softwood

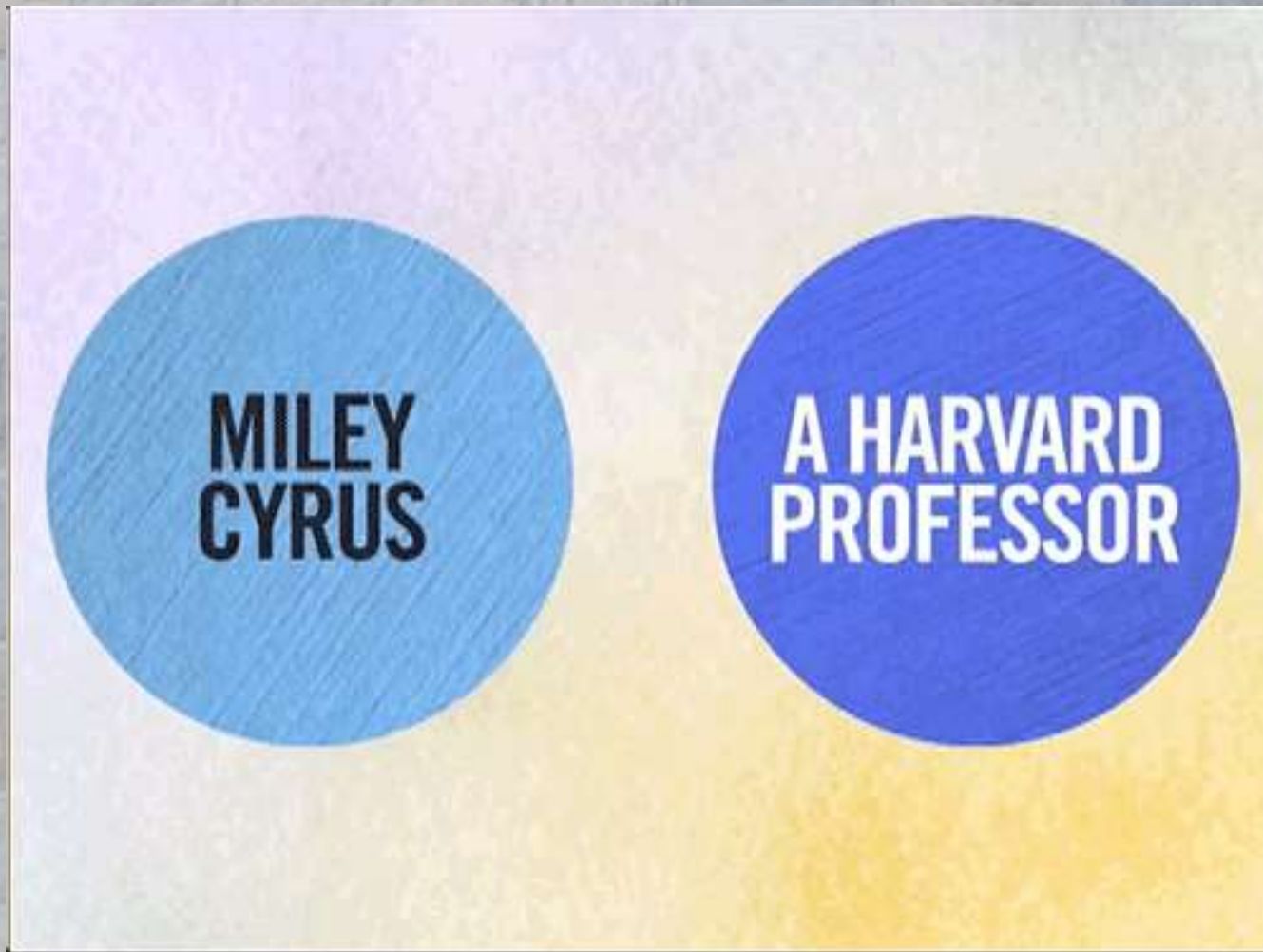
\* = Western US

# Legacy Taper and Biomass Trees



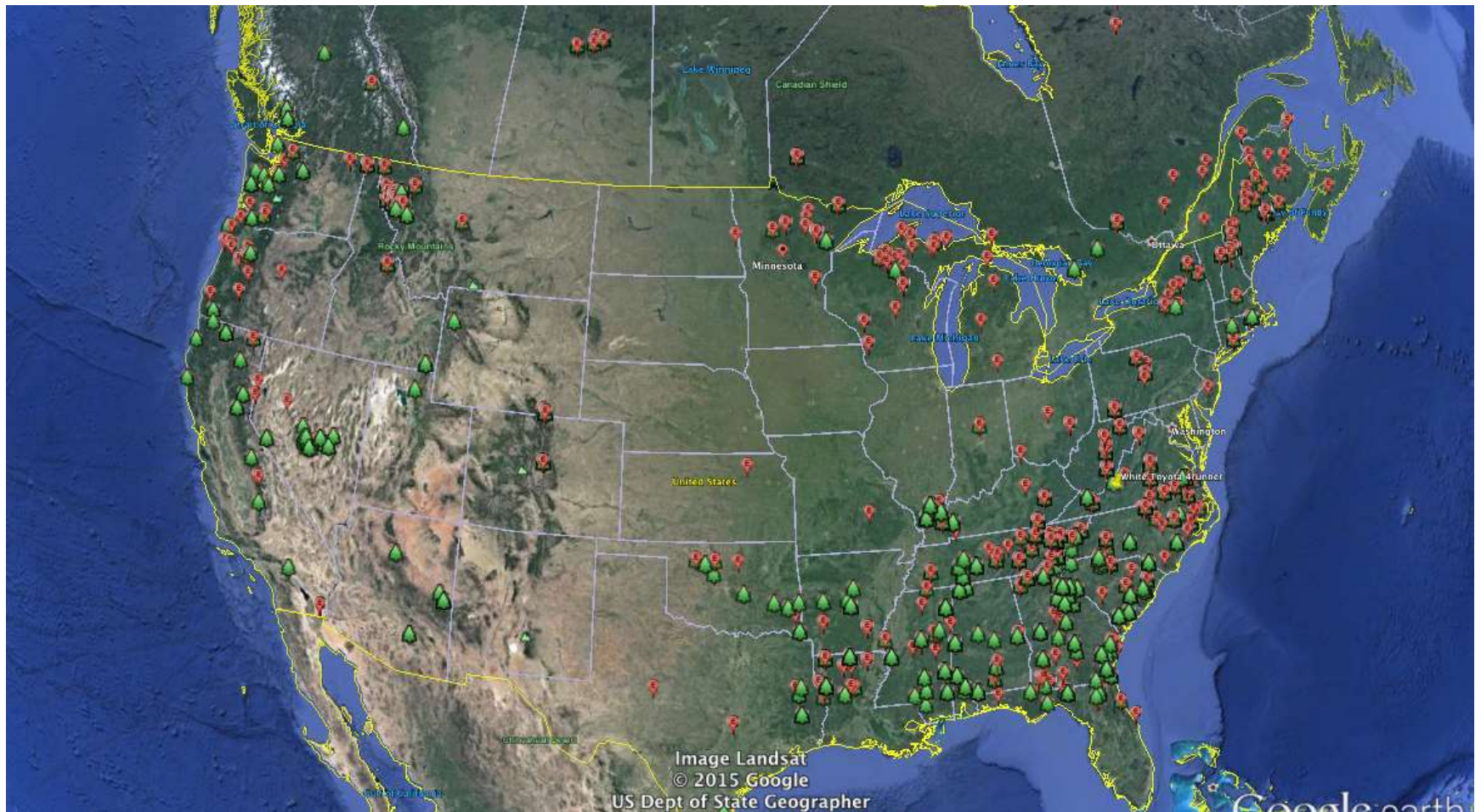


# Venn Diagram, Seth Meyers\* Style



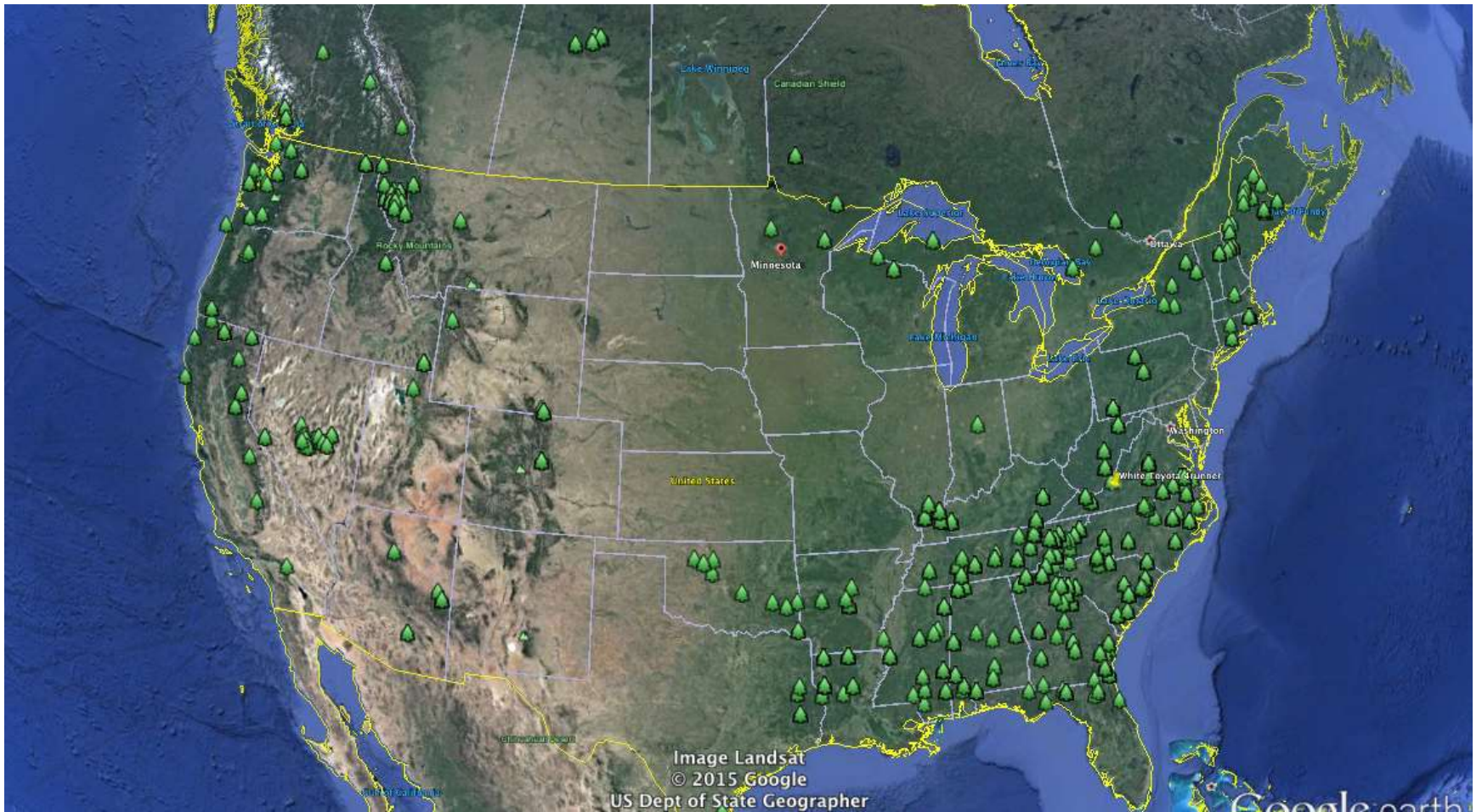
\*NBC late-night comedian

# Potential Sources





# Compiled



# Collaborators, Partners

