**UConn Tree Sway Biomechanics Study**

**A part of the *Stormwise* Project** (stormwise.uconn.edu)

**Descriptions of Repository Data**

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**Title (1 of 3):** UConn Biomechanics study - Tree Table

**Description:**

This table provides descriptions of each of 41 subject trees that were monitored for this study. The following columns are included:

**Tag:** the identifying number for an individual tree

**Site:** which of 3 study sites the tree was growing on (see site table)

**Species:** which of 9 species in this study was this tree

**Modulus E (Mpa):** Modulus of elasticity for a clear, green section of wood of this species, as determined in *Green, D.W., Winandy, J.E. and Kretschmann, D.E., 1999. Mechanical properties of wood*.

* **DBH (cm):** Tree diameter at breast-height (1.4m)
* **HT (m):** Total tree height
* **Sensor HT (m):** Height of sensor placement on bole
* **D @ sensor HT (cm):** Diameter of bole at height of sensor placement
* **DBH·HT-2:** Slenderness as defined by the DBH divided by the HT-squared
* **DBH·HT:** Slenderness as defined by the interaction of DBH and HT
* **∆D·m-1:** Slenderness as defined by the change in bole diameter between 1.4m and sensor height
* **Crown radius N (m):** radial measurement from bole to the edge of the crown to the north
* **Crown radius E (m):** radial measurement from bole to the edge of the crown to the east
* **Crown radius S (m):** radial measurement from bole to the edge of the crown to the south
* **Crown radius W (m):** radial measurement from bole to the edge of the crown to the west
* **Average crown radius (m):** Average radial measurement of the 4 in cardinal directions
* **Ground-to-crown (m):** from the base of the tree to the bottom of the live crown
* **Crown-to-top (m):** From the bottom of the live crown portion of the tree to the top
* **Percent-crown (m):** The percentage of the total HT that is live crown
* **Crown volume (m3):** Volume defined as the area of the quadrilateral formed by the 4 radial measurements multiplied by the crown-to-top measurement
* **Crown closure (%):** Percentage of sky that is blocked by foliage as viewed in hemispherical photographs from beneath the tree as in (
* **Symmetry:** an index of crown symmetry about the trunk. It is a function of crown radial measurements and is equivalent to 0 in a perfectly symmetrical tree.
* **Relative height:** Position of the tree relative to others in the canopy
* **Position:** Whether the tree is interior or on an edge of the stand that is unforested.
* **Treatment:** Trees were either in an area that was thinned after the first year of monitoring (thinned) or in an area that was not (control). Analysis using all trees were conducted on data taken prior to the thinning of non-control trees.
* **Shel\_0\_90:** Shelter index for the 0-to-90-degree wedge surrounding the tree
* **Shel\_45\_135:** Shelter index for the 0-to-90-degree wedge surrounding the tree
* **Shel\_90\_180:** Shelter index for the 0-to-90-degree wedge surrounding the tree
* **Shel\_135\_225:** Shelter index for the 0-to-90-degree wedge surrounding the tree
* **Shel\_180\_270:** Shelter index for the 0-to-90-degree wedge surrounding the tree
* **Shel\_225\_315:** Shelter index for the 0-to-90-degree wedge surrounding the tree
* **Shel\_270\_0:** Shelter index for the 0-to-90-degree wedge surrounding the tree
* **Shel\_315\_45:** Shelter index for the 0-to-90-degree wedge surrounding the tree
* **FVF leaf-on, above freeze:** average sway frequency of a tree in the leaf-on/above-freezing condition.
* **FVF leaf-off, above freeze:** average sway frequency of a tree in the leaf-off/above-freezing condition.
* **FVF leaf-off, below freeze:** average sway frequency of a tree in the leaf-off/below-freezing condition.

**Contributors:**

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**Title (2 of 3):** UConn Biomechanics study - Site table

**Description:**

This table provides descriptions of each of 3 sites in which the 41 study trees were located (13 in Storrs, 14 each in Torrington and Orange). The following columns are included:

* **Site Township:** The town in CT, USA., in which the study site is located
* **Date established:** The date at which monitoring of tree sway and accompanying meteorological data began at a site.
* **Date thinned:** The date where monitoring was stopped so the forest could be thinned out. Monitoring was picked back up after the operation was complete.
* **Plot Size:** Length and width of the forest stands
* **Elevation:** Distance above sea level at which the site exists according to SGS National Topographic Maps.
* **Soil Type:** The type of soils the site is composed of according to USDA SSURGO NRCS Soil Survey database.
* **Species Distribution:** Percentages of distinct tree species composing the stand.
* **Size Distribution:** Percentages of size classes (measured by the DBH) of which the stand is composed.
* **Basal Area (pre-thin):** The amount of tree (as measured by DBH) per land area.
* **Stem Density (pre-thin):** The number of stems per land area.

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**Title (3 of 3):** UConn Biomechanics study - Weather Records

**Description:** This table provides the tree sway and weather data acquired monitoring the 3 sites. Each row is data for a particular tree in a ten-minute period of time. The following columns are included:

* **Treetag:** The identifying tag for the subject tree
* **Maxdisp:** The maximum distance to which the subject tree leaned from it’s resting position, within this 10-minute period. (m)
* **Fvf:** The sway frequency or fundamental vibrational frequency (FVF) calculated from the movement of this subject tree in the same 10-minute period. (hz)
* **Leaf:** A binary condition regarding whether the foliage was ON or OFF of the tree at the time.
* **Freeze:** A binary condition regarding whether the ambient temperature was ABOVE +5˚C or BELOW -5 ˚C.
* **Mxwspd:** The maximum wind speed (m/sec) recorded in the 10-minute period.
* **Medwspd:** The median of wind speeds (m/seec) recorded in the 10-minute period.
* **Sdwspd:** The standard deviation of wind speeds recorded in the 10-minute period. This was a way to quantify turbulence or fluctuation in speed.
* **Mxoav:** The maximum wind speed (mxwspd) divided by the mean average wind speed from the 10-minute period. This was a second way to quantify turbulence or fluctuation in speed.
* **Time:** The 3 classifications for the time at which the record was made are as follows: 1) Sunrise-to-noon 2) noon-to-sunset 3) sunset-to-sunrise.
* **Site:** Which of the three study sites this tree was from and the location associated with the record: STO = Storrs; TOR = Torrington; ORA = Orange

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