



1

CTA Training – Module 2 – Tree Inventory = Know What You Have

Key Concepts

1. What does “% Canopy Cover” measure? How is it used to prioritize tree planting efforts?
2. Why do a tree inventory? What are the two (2) main reasons to do a tree inventory?
3. What question is being answered by “Determining the Performance of the Urban Forest”?
4. What are five (5) “indicators” of Performance?
5. Why is species diversity important?

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CTA Training – Module 2 – Tree Inventory = Know What You Have

Key Concepts

6. What are the seven (7) clues that can be used to identify tree species?
7. What are the three (3) different types of “leaf arrangements” on a stem?
8. What is the difference between a “simple” leaf and a “compound” leaf?
9. Be able to name at least three (3) fundamentally different fruit types
10. What is a “dichotomous key”?
11. Be able to identify seven(7) different species

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CTA Training – Module 2 – Tree Inventory = Know What You Have

Key Concepts

12. Be able to name at least five (5) things you should record during a tree inventory
13. What is GPS, and how is it used in a tree inventory?
14. What is GIS, and how is it used?
15. What is DBH and how is it measured?
16. What tool do you use to measure tree height?
17. What is a good tool to use to measure canopy spread?

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CTA Training – Module 2 – Tree Inventory = Know What You Have

Key Concepts

18. What are the seven (7) indicators you can use to determine tree condition?
19. What “maintenance need” do nearly all young trees require?
20. What is “data analysis”?
21. What are the three (3) primary way data can be displayed?

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Big Picture – Where are the Trees? % Canopy Cover

Can be estimated from analysis of satellite imagery and/or aerial photography

Can estimate canopy cover % for:

- County
- City
- Council District
- Neighborhood


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% Canopy Cover – Why?

1. Can use to prioritize where tree planting efforts should be focused
 - a. i.e., in areas where there is the lowest canopy cover
2. Can use to estimate environmental benefits of urban forest



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Why Do a Tree Inventory?

1. To determine **Performance of the Urban Forest**
2. To **Know What You Have**, so you can:
 - a. **Determine where you can plant trees** – good for developing community tree planting projects
 - b. **Determine if there are any species that are endangered by a particular pest or disease** – good for identifying tree species that should not be planted in the future
 - c. **Prioritize your tree pruning workload** – good for developing young tree training prune program
 - d. **Prioritize your tree removal workload** – good for remove and replace planting projects



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Determining Performance of Urban Forest

☐ **Do we have the Right Trees in the Right Place?**

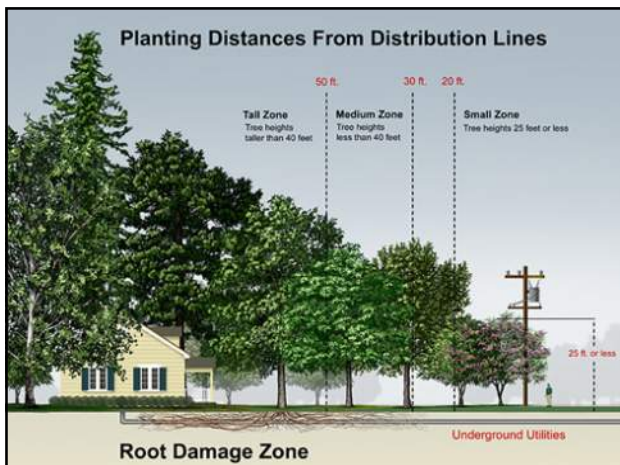
- Are Small Stature, Medium Stature and Large Stature trees planted in places suitable for their optimum growth?
- Avoid planting large or medium stature trees under power lines
- Plant trees in tree wells or narrow parkways that will not damage adjacent infrastructure
- Plant trees that will not require future root pruning
- Plant trees that people want



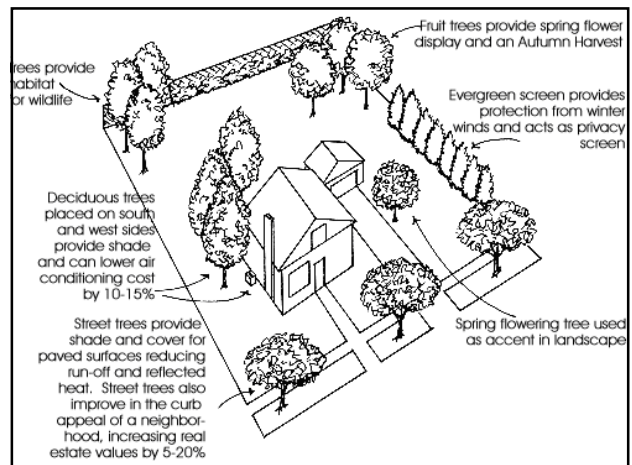
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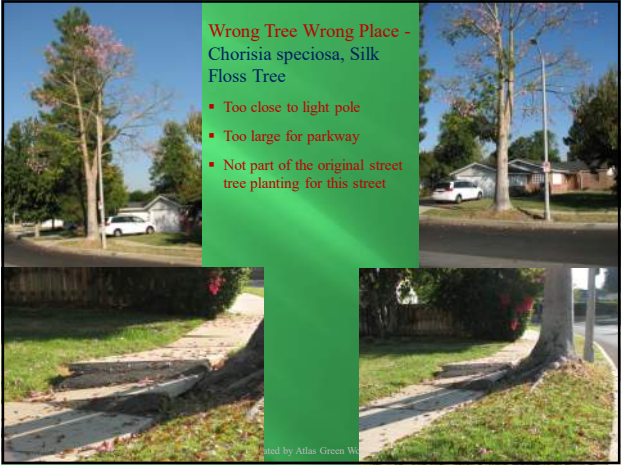
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Determining Performance of the Urban Forest

- “Indicators” of Performance include:
 - Species diversity
 - Age distribution (DBH)
 - Size distribution (Tree Height & Canopy Spread)
 - Individual tree condition
 - Maintenance Need

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Indicators of Performance - Species Diversity

- Your Urban Forest should have:
 - No more than 10% of any one species of trees
 - No more than 20% of any one genus of trees
 - No more than 30% of any one family of trees

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Indicators of Performance - Species Diversity

Species	Count	%	Tree Size*	Approved Street Trees**
<i>Samanea saman</i> (RAINBOW SHOWER TREE)	368	7.2%	Large	Y
<i>Tachibaia formicivora</i> (PINK TILOMA TREE)	221	6.2%	Medium	Y
<i>Coccothrinax</i> (COCOONUT PALM)	219	5.2%	Large	Y
<i>Veitchia merrillii</i> (CHRISTMAS PALM)	249	4.9%	Small	Y
<i>Alseodaphne</i> (J.J.P.S. TREE)	150	3.6%	Small	N
<i>Conditia robusta</i> (COO) (HAWAII)	150	3.2%	Small	N
<i>Tachibaia argentea</i> (SILVER TRUMPET)	167	3.2%	Small	Y
<i>Lagerstroemia speciosa</i> (QUEEN CRAPPE MYRTLE)	160	3.2%	Medium	Y
<i>Sonneratia speciosa</i> (MONKEY POD TREE)	150	3.0%	Large	Y
<i>Chrysophyllum olivaceum</i> (SATIN LEAF)	136	2.9%	Small	N
<i>Delonix regia</i> (ROYAL POINCIANA)	131	2.7%	Medium	N
<i>Coccothrinax</i> (SAGO PALM)	124	2.6%	Small	N
<i>Casuarina cincta</i> (SILVER BUTTWOOD)	124	2.5%	Medium	Y
<i>Brasodendron integrifolium</i> (FALSE OLIVE)	118	2.2%	Small	Y
<i>Melaleuca quinquenervia</i> (CASHEW TREE)	114	2.2%	Medium	Y
<i>Thaunus cordata</i> (ARBORVITAE)	59	1.2%	Small	N
<i>Conditia subcordata</i> (TREE KOO)	83	1.7%	Medium	Y
<i>Platanus</i> (PLATANE)	81	1.6%	Small	Y
<i>Platanus</i> sp. (PLUMERIA)	81	1.6%	Small	N
<i>Alseodaphne</i> (PARAGUAY TEA)	81	1.6%	Small	N
<i>Calleryella</i> (HAWAIIAN BIRDWING)	79	1.6%	Medium	N
<i>Tachibaia chrysantha</i> (GOLDEN TRUMPET)	67	1.3%	Medium	Y
<i>Calleryella</i> (KAMANI TREE)	67	1.2%	Large	Y
<i>Alseodaphne</i> (DWARF PINE)	61	1.2%	Medium	Y
<i>Platanus</i> (PLUMERIA)	57	1.1%	Small	N
<i>Archontophoenix alexandrae</i> (ALEXANDRA PALM)	53	1.0%	Large	N
<i>Alseodaphne</i> (SUDANESSE TREE)	49	1.0%	Medium	N
224 Species Total	5143	1		

* Tree size is based on criteria shown in the City and County of Honolulu Official Street Tree List - Small - up to 25' tall, Medium - 26 - 35' tall, Large - over 35' tall
 ** Indicates whether the tree species is on the City and County of Honolulu Official Street Tree List

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Species Diversity – Why?

- Tree population dominated too heavily by one or a few tree species makes urban forest susceptible to devastation pest or disease specific to a single or few species
 - E.g., Chestnut Blight at beginning of 1900’s in Eastern U.S.
 - E.g., Dutch Elm Disease in mid to late 1900’s – wiped out American Elm Trees across U.S.
 - E.g., Emerald Ash Borer that is destroying Green Ash trees across U.S. now

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Species Diversity – National Pest Problems – Dutch Elm Disease

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Species Diversity – National Pest Problems

- Emerald Ash Borer is destroying Green Ash trees across U.S. now
- Has killed over 30 million ash trees
- Estimated impact in U.S. exceeds \$20 billion
- Over 7 billion ash trees at risk in eastern U.S.

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Species Diversity – Local Pest Problems

Eucalyptus Species Pests:

- ▣ Redgum Lerp
- ▣ Psyllid
- ▣ Longhorned Borers
- ▣ Tortoise Beetle

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Tree Identification – 7 Clues to Tree I.D.

- ▣ **Based on morphology = parts of the tree**
 - Leaves – Needlelike, Scalelike or Broadleaf?
 - Leaves Arrangement – Alternate or Opposite?
 - Leaves – Simple or Compound?
 - Leaf Features – Lobed? General Shape? Features of the margins?
 - Fruit Types
 - Bark Features
 - Flowers

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Tree Identification – Reference

http://www.audubonguides.com/categories/Trees/text/tree_identification.html

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Tree Identification – Conifer Type Foliage

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Tree Identification – Broadleaf Type Foliage

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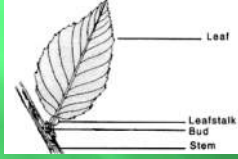
Tree I.D. – Leaf Arrangement

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Tree I.D. – Simple vs. Compound Leaves

SIMPLE LEAF



TYPES OF COMPOUND LEAF



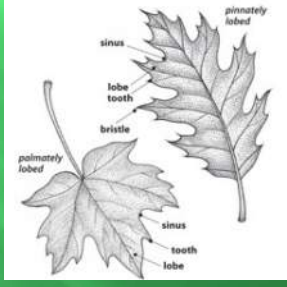
Pinnate Compound Palmate Compound Doubly-Compound

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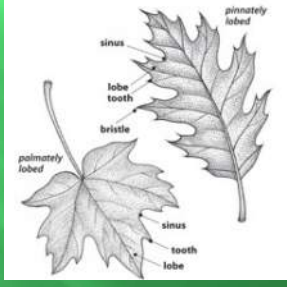
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Tree I.D. – Leaf Lobes

PALMATELY LOBED – MAPLES, SYCAMORES



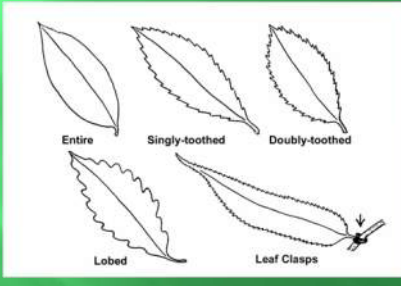
PINNATELY LOBED – MANY TYPES OF OAKS



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Tree I.D. – Leaf Edges




Entire Singly-toothed Doubly-toothed Lobed Leaf Clasp

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Tree Identification – Fruit Types




COMMON FRUITS

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Fruit, Nuts and Seeds




Pods Nuts Endocarp Exocarp Pellicle Accessory Tissue Wing

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Tree Identification – Fruit Types

CAPSULE – GOLDEN RAIN TREE



FOLLICLE – SWEET GUM, MAGNOLIA




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Tree Identification – Fruit Types

POD/LEGUME – JACARANDA TREE



POD/LEGUME – SILK FLOSS TREE




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Tree Identification – Fruit Types

SAMARA – MAPLE, ASH TREES




Wing

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Tree Identification – Fruit Types

NUT – OAK, WALNUT, PECAN



NUT – OAK TREES

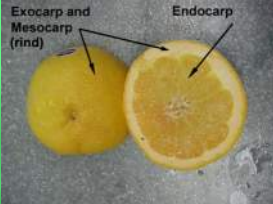


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Tree Identification – Fruit Types

FLESHY, SIMPLE, HESPERIDIUM - CITRUS



FLESHY, SIMPLE, DRUPE OR STONE - PEACH

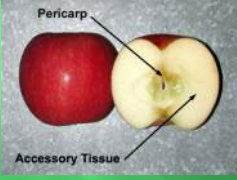


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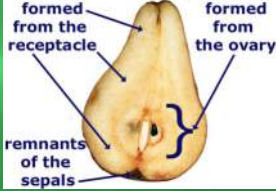
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Tree Identification – Fruit Types

POME - APPLE



POME - PEAR




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Tree Identification – Conifer Fruit Types

CYPRESS



JUNIPER



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Tree Identification – Conifer Fruit Types

PINE CONE



HEMLOCK CONE




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Tree Identification – Conifer Fruit Types

FIR CONE



CEDAR CONE



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Tree I.D. – Dichotomous Key

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Tree I.D. – Dichotomous Key Example

Classification Key of Evergreen Trees in Utah


1. a. Leaves scaly-like, cones are small, blue and berry-like..... go to 2
 b. Leaves needle-like, cones are large and brown..... go to 3
2. a. Leaves rough, berry-like cones are about 1 inch in diameter; trunk is forked..... Utah Juniper
 b. Leaves smooth, berry-like cones less than 1 in.; trunk has central stem..... Rocky Mtn. Juniper
3. a. Needles are in bundles of two or more, cone scales are woody..... go to 4
 b. Needles are not in bundles, they are single, cone scales are papery..... go to 5
4. a. Needles are about 2 inches long and twisted, cones are 1.5 inches long; trunk grows straight and tall..... Lodge pole Pine
 b. Needles less than 2 inches long, cones 1-3 inches with large edible seeds, trunk is short and bushy..... Piñon Pine
5. a. Needles are flat and blunt; not sharp to touch..... go to 6
 b. Needles are square, stiff and sharp to touch..... Blue Spruce
6. a. Needles point outward from twig, cone scales have fork-like tongue attached..... Douglas Fir
 b. Needles bend upward from twig..... White Fir

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Tree I.D. – Dichotomous Key Exercise – Step 1

1. **Leaf Type**
 - a. Needles or scale-like leaves (conifer)
 - b. Ordinary leaves (broadleaf)



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Tree I.D. – Dichotomous Key Exercise – Step 2

2. **Simple or Compound Leaf**
 - a. Leaves are compound, composed of 3 or more leaflets
 - b. Leaves are simple, not made up of leaflets




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Tree I.D. – Dichotomous Key Exercise – Step 3

3. Leaf Vein Pattern

- There are 3 or more veins of similar size branching out at the leaf base (Palmately veined)
- The main veins branch off from a single large central vein (Pinnately veined)



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Tree I.D. – Dichotomous Key Exercise – Step 4

4. Leaf is lobed or not

- Leaf is lobed
- Leaf is not lobed



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Tree I.D. – Dichotomous Key Exercise – Step 5

5. Lobes pointed or rounded

- Lobes are pointed
- Lobes are rounded




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Tree I.D. – Dichotomous Key Exercise – Step 6

6. Leaves have soft hairiness on the topsides, and 7 to 11 deeply cut lobes, and the trunk bark is deeply checkered into squarish plates, or there are long, hanging branches or long acorns = Quercus lobata, Valley Oak



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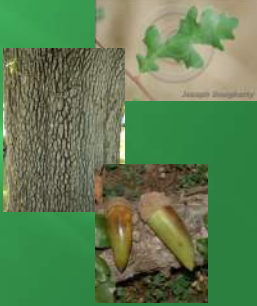
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Tree I.D. – Dichotomous Key Exercise – Final

☐ Quercus lobata, Valley Oak

- A shallow but heavily knobby cup holds the long, slender acorns shaped like a pointed bullet. It's pale grey bark is furrowed into cubes. The sinuses between the deep lobes of the leaves are rounded, not acute, at the apex.




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Tree Identification – Dichotomous Key Result: Quercus lobata, Valley Oak



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Tree Identification – Small Stature Species

A. Cercis occidentalis, Western Redbud



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Cercis occidentalis, Western Redbud

- ▣ **Type:** Deciduous
- ▣ **Shape:** Rounded or Umbrella
- ▣ **Size:** To 25 feet
- ▣ **Leaf Type:** Round blue-green heart shaped
- ▣ **Characteristics:** Showy red pink flowers; Prolific, Brown or Purple Pod, Large (1.50 - 3.00 inches) , fruiting in Summer or Fall







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Tree Identification – Medium Stature Species

B. Geijera parviflora, Australian Willow

C. Koelreuteria bipinnata, Chinese Flame Tree



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Geijera parviflora, Australian Willow

- ▣ **Type:** Evergreen
- ▣ **Shape:** Oval, weeping effect (drooping outer branches)
- ▣ **Size:** Height: to 40 feet; spread: 20 – 25 feet
- ▣ **Leaf Type:** Narrow, medium green, drooping (like on a weeping willow), Provides medium shade.
- ▣ **Characteristics:** Weeping habit gives willowy look. Small, creamy-white flowers bloom in early spring and early fall.








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Koelreuteria bipinnata, Chinese Flame Tree

- ▣ **Type:** Deciduous
- ▣ **Shape:** Spreading, flat-topped with age
- ▣ **Size:** Height: 20 – 40 feet; spread: same
- ▣ **Leaf Type:** alternate, pinnately to bipinnately compound leaves with 7 to 15 leaflets; medium green, 1-2" long leaflets; turns yellow or brown before dropping in the fall.
- ▣ **Characteristics:** Showy yellow flowers in late summer, and 2-inch salmon or red-colored papery seed capsules (resembling Chinese lanterns) in large clusters above leaves in autumn.









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Tree Identification – Large Stature Species

D. Alnus rhombifolia, White Alder

E. Platanus acerifolia, London Plane Tree

F. Platanus racemosa, California Sycamore


G. Populus fremontii, Western Cottonwood



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Alnus rhombifolia, White Alder

- Type: Deciduous
- Shape: Upright or spreading
- Size: Height: To 65 feet;
- Leaf Type: Rhomboidal Medium to Dark Green. Bronze or No Change in Fall
- Characteristics: Fruit is Brown or Orange Cone, Medium (0.50 - 1.50 inches) , fruiting in Fall, Winter or Summer. Smooth white grey bark with distinct "eyebrow" type markings at old branch scars




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Platanus x acerifolia 'Bloodgood', London Plane Tree

- Type: Deciduous
- Shape: Pyramidal, spreading
- Size: Height: 40 - 80 feet; spread: 30 - 40 feet
- Leaf Type: Light green, maple leaf-shaped, 4 - 10 inches wide. Turns yellow to brown and drops in autumn.
- Characteristics: Bark is patchy, ranging from creamy-white to olive-green.
- Fruit: Brown, ball-like bristly seed clusters hang singly or in strings of 2 (rarely 3) on pendent stalks throughout the winter. This differentiates them from the seed clusters of P. racemosa, which may hang in chains of as many as 5.




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Platanus racemosa, California Sycamore

- Type: Deciduous, Native
- Shape: Pyramidal, spreading irregular w/age
- Size: Height: 30 - 80 ft; spread: 30 - 40 ft
- Leaf Type: Deeply lobed, yellowish-green, 4 to 9 inches long. Turns yellow and brown in fall. Provides dense shade.
- Characteristics: Beautiful, patchy, buff-colored bark on large, often-leaning trunk and gracefully twisted branches.
- Fruit: Brown, ball-like bristly seed clusters hang singly or in strings of 3 to as many as 5 on pendent stalks throughout the winter. This differentiates them from the seed clusters of P. acerifolia, which hang in clusters of 2 (rarely 3).




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Populus fremontii, Western Cottonwood


- Type: Deciduous
- Shape: Upright; at maturity can be rounded or umbrella
- Size: Height: over 65 ft
- Leaf Type: Deltoid, light green; turns yellow in fall
- Characteristics: fast growing tree tolerant of wet or dry soil; prefers sandy loam to sandy soil



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CTA Training – Class One – In-Class Exercise – Tree Identification



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- Type: Deciduous
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- ☐ **Size:** Height: over 65 ft
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- ☐ **Characteristics:** fast growing tree tolerant of wet or dry soil; prefers sandy loam to sandy soil

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Tree Inventories – What to Record

- ▣ Location
 - Address
 - GPS Coordinates
 - Proximity to Other Infrastructure
- ▣ Species – requires knowledge and skills in Tree Identification
- ▣ Tree Size
 - DBH
 - Height
 - Canopy Spread
- ▣ Tree Condition
- ▣ Grow Space Size
- ▣ Maintenance Need



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Tree Inventory - Tools

- ▣ **Data Collection Tools:**
 - Pocket PC (PDA) or Paper Form– for field data entry
 - Digital Camera – for taking picture(s) of tree
 - Clinometer – used to determine tree height
 - DBH Tape – for measuring DBH of tree
 - GPS – for determining tree location to plot on maps
 - GPS = Global Positioning System
- ▣ **Computer Software:**
 - Tree Inventory Database Software
 - GIS = Geographic Information System mapping software to map the trees and planting sites in your database



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Tree Inventory - Tools





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Tree Inventory – Tools - GPS







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Data Collection - Measuring DBH

Can be done 3 different ways – measurement is taken at approx. 4.5 ft. up from base of tree:

1. Use DBH tape
2. Use measuring tape across trunk
3. Can also estimate to nearest 6 inch category






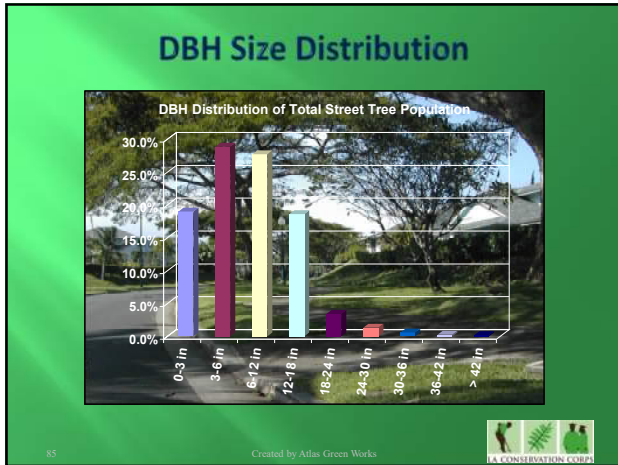
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Data Collection - DBH – How It’s Used

1. Often used as indicator of age diversity since too costly and potentially damaging to tree to directly measure age of trees
2. Helps City Arborist or Urban Forester to plan for tree replacement
3. Can use to quantify environmental benefits from trees
 - a. E.g., Used to determine amount of “greenhouse gas (GHG) reduction” (primarily carbon dioxide, CO₂)
 - i. Carbon dioxide is stored in trees and calculation requires knowing tree diameter (DBH)



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Data Collection - Measuring & Recording Height

Height of Tree = $h + B \times \tan(A)$

Where

- H** = your height
- B** = distance to base of tree
- A** = Angle measured with Clinometer or other device
- Tan** = Tangent of Angle A

Can use calculator to get a tangent if know Angle A

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Calculating Tree Height in Data Table

Calculating Tree Height Using a Clinometer & Measuring Wheel							
Tree No.	Dist. From Tree	Unit	Your Ht.	Unit	Angle	Unit	Tree Ht.
1	10	ft.	6	ft.	35	degrees	13 ft.
2	20	ft.	6	ft.	20	degrees	13 ft.
3	25	ft.	6	ft.	15	degrees	13 ft.
4	15	ft.	6	ft.	30	degrees	15 ft.
5	30	ft.	6	ft.	20	degrees	17 ft.
6	25	ft.	6	ft.	23	degrees	17 ft.
7	10	ft.	6	ft.	45	degrees	16 ft.
8	24	ft.	6	ft.	33	degrees	22 ft.
9	20	ft.	6	ft.	24	degrees	15 ft.
10	30	ft.	6	ft.	25	degrees	20 ft.

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Data Collection - Measuring Canopy Spread

- Use a tape
- Use a measuring wheel
- Or Estimate – if only are recording in 5 or 10 foot size ranges

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Data Collection – Grow Space Size

- Typically only measure for street tree planting spaces
- = surface area of the tree planting space
 - E.g., Tree Well is typically 4 feet x 4 feet
 - E.g., Parkway Planting Strip can be 1 to over 10 feet wide and can be an entire block long or be broken up by driveways
- Indicator of soil volume available for tree growth
 - Most tree roots are in top 3 feet of soil
 - Therefore, a 4 foot x 4 foot tree well contains
 - $4 \times 4 \times 3 = 48$ cubic feet of soil

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Grow Space Size – Why?

- ▣ **Studies have shown that** trees ideally need 2 cubic feet of soil for every square foot of canopy spread (diameter)
- ▣ **Example:** tree with 40 feet canopy diameter needs **1256** cubic feet of soil volume
- ▣ **Typical tree well grow space provides about 48 cubic feet of soil unless tree roots are able to grow under the sidewalk, street or adjacent landscape**

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Grow Space Size – Typical 4'x4' Tree Well



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Grow Space Size – Typical 4' Wide Parkway

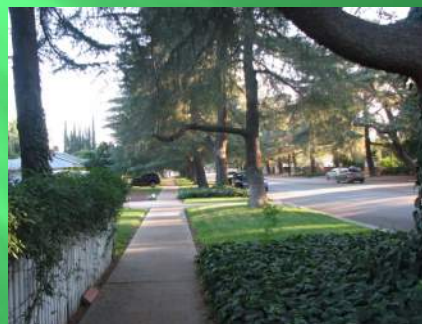


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Grow Space Size – 15' Wide Parkway



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Grow Space Size – Reverse Parkway with Tree Wells



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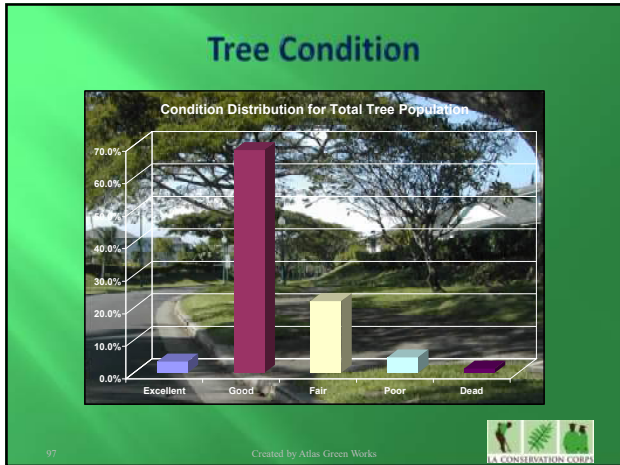
Data Collection - Tree Condition – Why?

1. % of trees in Good, Fair, Poor or Dead “Condition” **is an overall indicator of health of the urban forest**
 - a. Can target resources to increase % of trees in Good Condition
2. **Pinpoint location of problem trees are that need additional investigation, special care or replacement**
 - a. Can direct work where it is needed most to improve overall condition of urban forest
3. Can see which **species are performing better than other species**

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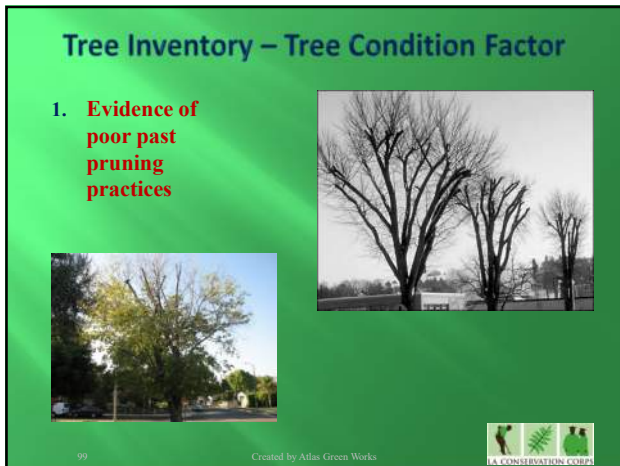




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- ### Determining Tree Condition – Look at:
1. Evidence of poor past pruning practices
 2. Evidence of non-pruning mechanical wounds or fire scars
 3. Evidence of trunk cavities or rot from root crown up
 4. Evidence of foliar discoloration not associated with normal autumn leaf color changes
 5. Evidence of bore holes or other evidence of pest infestation
 6. Evidence of tree vigor
 7. Evidence of canopy dieback
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Tree Inventory – Tree Condition Factor

5. Evidence of bore holes or other evidence of pest infestation (Pine Beetle)



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Tree Inventory – Tree Condition Factor

6. Evidence of Tree Vigor or Lack of



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Tree Inventory – Tree Condition Factor

7. Any dieback in the tree canopy



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105

Tree Inventory – Maintenance Need

- ❑ Focus on Young Trees – what is needed?
 - ✓ Training Prune
 - ✓ Remove Stakes
 - ✓ Replace Stakes
 - ✓ Training Prune & Replace Stakes
 - ✓ Corrective Prune (if tree is beyond training prune)
 - ✓ Remove & Replace Tree
 - ✓ Weed & Add Mulch or Soil
 - ✓ Plant Tree

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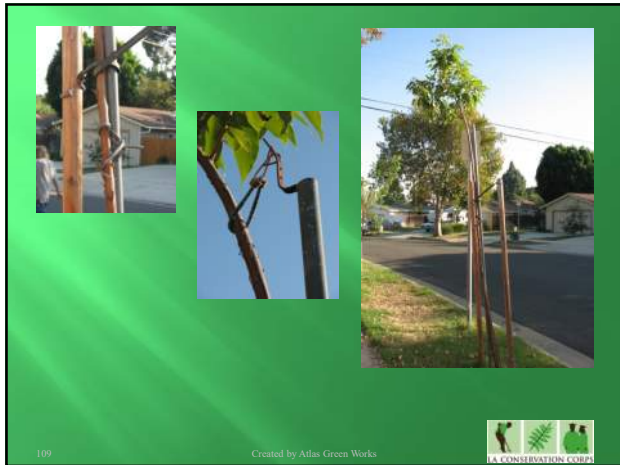
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Tree Inventory Data Collection Form

California Tree Academy Street Tree Inventory Form															
No.	Address	On Street	Side	To Street	From Street	GPS Coord.		Botanical Name	Common Name	DBH	Ht.	Spread	Cond.	Maint. Need	
						1	2								
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
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15															
16															
17															
18															
19															
20															
21															
22															
23															
24															

Key Notes:
 DBH = Diameter at Breast Height = 4.5 feet up from base of tree
 Condition: G = Good; F = Fair; P = Poor; D = Dead
 Maintenance: TP = Training Prune; RmS = Remove Stakes; RplS = Replace Stakes; CP = Corrective Prune; R&R = Remove & Replace Tree; PT = Plant Tree; WMS

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Data Analysis – What is it?

- ☐ To look at the relationship between two or more types of data
 - Example: Look at distribution of “Available Tree Planting Sites” by “Grow Space Type” – SEE DATA TABLE NEXT SLIDE
 - Example: Look at distribution of “Tree Condition” by “Tree Species”
 - Can look at these types of comparisons for an entire City, City Council District, or Neighborhood
- ☐ Why do we do data analysis of tree inventory data?
 - To prioritize work -
 - Example: Trees in poor condition should probably get more attention than trees in Fair or Good condition
 - To decide best places to plant different types of trees – SEE EXAMPLE NEXT SLIDE

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Data Analysis – How is it done?

- Compile raw data collected during tree inventory using a relational database program like Microsoft Access
- “Query” the database = ask questions of your data:
 - Example – How many vacant planting sites do I have in Council District 3?
 - Example – How many vacant planting sites do I have in Council District 3 that I can plant “large stature trees”?
 - Example – Where are the vacant planting sites in Council District 3 in which I can plant “large stature trees”?
- Display the data as per the Query you have made
 - Data Table
 - Graph – Line, Bar, Pie Chart
 - Map [using GIS software]




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Data Analysis – Using Data Table to Determine Right Place to Plant Small, Medium, Large Stature Trees

Distribution of Vacant Planting Sites by Grow Space Type x Grow Space Size x Overhead Utility Type For Council District 3

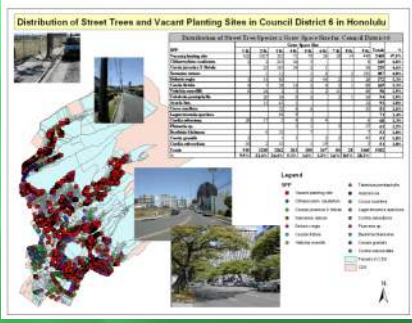

Grow Space Type	Grow Space Size	Overhead Utility Type						Totals
		None	10'	15'	20'	25'	30'	
Wall - Other	10'	0	0	0	0	0	0	0
Parkway - Unimproved	10'	0	0	0	0	0	0	0
Parkway - Unimproved	15'	0	0	0	0	0	0	0
Parkway - Improved	15'	0	0	0	0	0	0	0
Parkway - Improved	20'	0	0	0	0	0	0	0
Parkway - Improved	25'	0	0	0	0	0	0	0
Parkway - Improved	30'	0	0	0	0	0	0	0
Parkway - Improved	10'	0	0	0	0	0	0	0
Parkway - Improved	15'	0	0	0	0	0	0	0
Parkway - Improved	20'	0	0	0	0	0	0	0
Parkway - Improved	25'	0	0	0	0	0	0	0
Parkway - Improved	30'	0	0	0	0	0	0	0
Parkway	10'	0	0	0	0	0	0	0
Parkway	15'	0	0	0	0	0	0	0
Parkway	20'	0	0	0	0	0	0	0
Parkway	25'	0	0	0	0	0	0	0
Parkway	30'	0	0	0	0	0	0	0
Asphalt Drive	10'	0	0	0	0	0	0	0
Asphalt Drive	15'	0	0	0	0	0	0	0
Asphalt Drive	20'	0	0	0	0	0	0	0
Asphalt Drive	25'	0	0	0	0	0	0	0
Asphalt Drive	30'	0	0	0	0	0	0	0
Totals		0	0	0	0	0	0	0
Use Small Size Species in these locations								
Use Medium Size Species in these locations								
Use Large Size Species in these locations								
Planting Stock Container		None	10'	15'	20'	25'	30'	Totals
None		0	0	0	0	0	0	0
10'		0	0	0	0	0	0	0
15'		0	0	0	0	0	0	0
20'		0	0	0	0	0	0	0
25'		0	0	0	0	0	0	0
30'		0	0	0	0	0	0	0
Total		0	0	0	0	0	0	0



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Data Analysis – Using GIS Maps to Show Locations of Available Planting Sites in a Council District


Distribution of Street Trees and Vacant Planting Sites in Council District 6 in Honolulu

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CTA Training – Module 2 – Quiz Instructions






- Match the tree in the following slides with the tree species listed on your Quiz sheet.
- There are 7 tree species on your sheet and there are 7 slides of tree species.
- You will have 30 seconds to look at each slide and identify the tree species.
- Place the number of the slide next to the tree species that you believe it is on your Quiz sheet.



118

1

- Type: Deciduous, Native
- Shape: Pyramidal, spreading irregular w/age
- Size: Height: 30 – 80 ft; spread: 30 – 40 ft
- Leaf Type: Deeply lobed, yellowish-green, 4 to 9 inches long. Turns yellow and brown in fall. Provides dense shade.
- Characteristics: Beautiful, patchy, buff-colored bark on large, often-leaning trunk and gracefully twisted branches.
- Fruit: Brown, ball-like bristly seed clusters hang singly or in strings of 3 to as many as 5 on pendent stalks throughout the winter. This differentiates them from the seed clusters of P. acerifolia, which hang in clusters of 2 (rarely 3).

119

2

- Type: Deciduous
- Shape: Rounded or Umbrella
- Size: To 25 feet
- Leaf Type: Round blue-green heart shaped
- Characteristics: Showy red pink flowers; Prolific, Brown or Purple Pod, Large (1.50 - 3.00 inches) , fruiting in Summer or Fall










120

3

- ▣ **Type:** Evergreen
- ▣ **Shape:** Oval, weeping effect (drooping outer branches)
- ▣ **Size:** Height: to 40 feet; spread: 20 – 25 feet
- ▣ **Leaf Type:** Narrow, medium green, drooping (like on a weeping willow). Provides medium shade.
- ▣ **Characteristics:** Weeping habit gives willowy look. Small, creamy-white flowers bloom in early spring and early fall.




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4

- ▣ **Type:** Deciduous
- ▣ **Shape:** Upright; at maturity can be rounded or umbrella
- ▣ **Size:** Height: over 65 ft
- ▣ **Leaf Type:** Deltoid, light green; turns yellow in fall
- ▣ **Characteristics:** fast growing tree tolerant of wet or dry soil; prefers sandy loam to sandy soil

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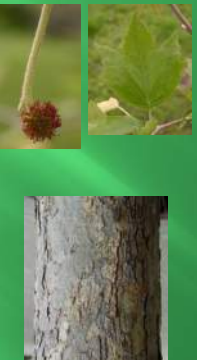


122


5

- ▣ **Type:** Deciduous
- ▣ **Shape:** Pyramidal, spreading
- ▣ **Size:** Height: 40 - 80 feet; spread: 30 - 40 feet
- ▣ **Leaf Type:** Light green, maple leaf-shaped, 4 - 10 inches wide. Turns yellow to brown and drops in autumn.
- ▣ **Characteristics:** Bark is patchy, ranging from creamy-white to olive-green.
- ▣ **Fructs:** Brown, ball-like bristly seed clusters hang singly or in strings of 2 (rarely 3) on pendent stalks throughout the winter. This differentiates them from the seed clusters of P. racemosa, which may hang in chains of as many as 5.








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123

6

- ▣ **Type:** Deciduous
- ▣ **Shape:** Upright or spreading
- ▣ **Size:** Height: To 65 feet;
- ▣ **Leaf Type:** Rhomboidal Medium to Dark Green . Bronze or No Change in Fall
- ▣ **Characteristics:** Fruit is Brown or Orange Cone, Medium (0.50 - 1.50 inches) , fruiting in Fall, Winter or Summer. Smooth white grey bark with distinct "eyebrow" type markings at old branch scars

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7

- ▣ **Type:** Deciduous
- ▣ **Shape:** Spreading, flat-topped with age
- ▣ **Size:** Height: 20 – 40 feet; spread: same
- ▣ **Leaf Type:** alternate, pinnately to bipinnately compound leaves with 7 to 15 leaflets; medium green, 1-2" long leaflets; turns yellow or brown before dropping in the fall.
- ▣ **Characteristics:** Showy yellow flowers in late summer, and 2-inch salmon or red-colored papery seed capsules (resembling Chinese lanterns) in large clusters above leaves in autumn.






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CTA Training - Module 2 Part 2

Tree Inventory Field Exercise

- ▣ **Inventory local street trees**

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