CITIZEN FORESTER PROGRAM

Volunteer Handbook

HAWAII

The following guidelines may be updated periodically to reflect any updates to best-practice industry standards.

Smart Trees Pacific is a 501(c)3 nonprofit urban forestry organization working to support Kaulunani Urban and Community Forestry Program of the DLNR Division of Forestry and Wildlife. The organization is based on the island of Oʻahu serving the Hawaiian Islands and greater Pacific Region.

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Introduction

Citizen Forester Program

The Citizen Forester Program trains, certifies, and supports community members as citizen scientists to collect urban tree inventory data, plant and care for community trees.

Natural resources managers can better care for their trees with data collected to industry standards, and community members become informed ambassadors for the trees in their neighborhoods.

INVENTORY

Collecting location and condition data on public trees to better the management of Hawaii's public trees.

OUTPLANTING & CARE

Planting and establishing new public trees to ensure survival of our growing urban tree canopy.

ADVOCATE

Employs citizen science as a viable approach to gain knowledge and community support for urban forests.

Creating an Urban Tree Inventory

An urban tree inventory was identified as one of the top strategies in the Urban Forestry Section of Hawaii's Forest Action Plan. Like many regions, there is no formal inventory of city trees being used in Hawaii. This hinder efforts to manage, maintain, replace trees, and plan for disasters in the urban forest. Management of any resource begins with an inventory of that resource. Urban Forest Management is no exception. Trees are infrastructure! With this resource, work can be done to add more trees to our urban forests. An accurate inventory directly aids in city planning, environmental impact, and public health assessments while increasing community awareness of the benefits of trees. The program can also assess areas where trees are needed the most, by mapping potential planting sites, so work can be done to increase our green infrastructure.

Growing the Urban Tree Canopy

Sharing the benefits of trees with our community involves maintaining our current urban forest, and growing it. The Citizen Forester Program teaches community members how to properly select, care for and maintain trees as community foresters alongside public partners.

Increasing Awareness for our Urban Forests

Another key strategy that have been identified is improving the public perception of the value and benefits of urban trees. The Citizen Forester program looks to address these strategies by engaging communities in their urban forests through the use of citizen science to develop an urban tree inventory. The program employs citizen science as a viable approach to gain knowledge and community support for urban forests.

Program Partners

The Citizen Forester program is a collaborative project of federal, state, and city partners:

The United States Department of Agriculture Forest Service
USDA Forest Service is a federal agency; Urban and Community Forestry is part of the Forest Service's State and Private Forestry (S&PF) division. S&PF reaches across the boundaries of National Forests to States, Tribes, communities and non-industrial private landowners.

Division of Forestry and Wildlife
DLNR's Division of Forestry and Wildlife is responsible for managing and protecting Hawaii's watersheds, native ecosystems, and cultural resources and provide outdoor recreation and sustainable forest products opportunities, while facilitating partnerships, community involvement and education.

Kaulunani Urban and Community Forestry Program
Kaulunani is the urban and community forestry program of Hawaii's DLNR's Division of Forestry and Wildlife. Kaulunani focuses on improving the health and viability of trees in Hawaii communities through educational programs; financial support in the form of cost-share grants; technical training; promotions and public/private partnerships.

City and County of Honolulu's Department of Urban Forestry
The City and County of Honolulu Division of Urban Forestry (DUF) is under the Department of Parks and Recreation (DPR). DUF is comprised of three branches; Administration, Horticulture Services, and the Honolulu Botanical Gardens.

Kauai's Department of Parks and Recreation
The Department of Parks and Recreation in Kauai works to promote and enhance the quality of life for the residents of our island home Kaua'i. DPR strives to develop, improve and maintain quality recreational facilities and to coordinate, implement and maintain beautification and safety of County property.

Smart Trees Pacific
Smart Trees Pacific is a non-profit urban forestry organization serving Hawaii & the Pacific Region! Hawaii's tropical urban trees are a vital resource and STP works to raise awareness & support for our urban forests! Smart Trees Pacific manages the State's Kaulunani Urban & Community Forestry Program in partnership with DLNR, DOFAW.

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Urban Forestry

WHAT IS URBAN FORESTRY?

Urban forestry is generally defined as "the art, science and technology of managing trees and forest resources in and around urban community ecosystems for the physiological, sociological, economic, and aesthetic benefits trees provide society".

Urban forestry is practiced by municipal and commercial arborists, municipal and utility foresters, environmental policymakers, conservationists, city planners, consultants, educators, researchers, community activists, and Citizen Foresters!

WHAT IS AN URBAN FOREST?

Simply, urban forests are made up of the trees in our cities and urban areas. The portion of the **urban ecosystem** that consists of forest vegetation, water, soil, and wildlife in densely populated areas and adjacent lands.

WHY ARE URBAN FORESTS IMPORTANT?

Our urban forests are some of the strongest defenses we have against many psychological, sociological, economic and climatic issues we face today. The following several pages with go into more detail on the benefits that tree provide for us and our cities!

OPTIONAL READING:
- **The Guardian.** The importance of urban forests: why money really does grow on trees.
- **Arbor Day Foundation.** The Importance of Urban and Community Forestry

Benefits of Trees

What are some of your favorite **ECOLOGICAL**, **ECONOMICAL**, and **CULTURAL** benefits of trees?

How trees make our lives better

GROWING TREES MAKE GREAT NEIGHBORHOODS

Trees make the places we live feel like home

Trees provide privacy and more comfortable settings.

TREES SLOW TRAFFIC.

TREES REDUCE NOISE.

Trees help reduce crime.[1]

Trees are beautiful.

Trees clean the air and the water

Trees absorb odors and filter pollution out of the air by trapping them in their leaves and bark.

Tree foliage absorbs & filters rainwater helping slow down stormwater runoff during rainstorms.

Trees help reduce carbon that builds up in the air. This carbon build up increases temperatures and leads to changes in our climate.

TREES RENEW OUR AIR SUPPLY.

Trees absorb carbon dioxide and produce oxygen.

Trees help your family be healthy

Research shows views of trees improves recovery from stress within 5 minutes as indicated by changes in blood pressure and muscle tension.[2]

Creating natural places with views of trees supports outdoor activities reducing stress and violence, and positively affecting behavior which helps combat obesity.[3]

Kids living in areas with more street trees have less asthma.[4]

MORE REASONS TO Love Trees

One of the earth's greatest natural resources

An acre of average trees gives almost **20 people** clean air & shade annually

One large tree can provide enough oxygen for up to **4 people's** daily needs

A building can **reduce** it's air conditioning needs by **30%** if trees are properly placed

The net cooling effect of a young, healthy tree is equivalent to **10** room-size air conditioners operating **20 hours** a day

A mature tree removes almost **70 times** more pollution than a **newly planted** tree

Annually, **10 million** tons of newspaper are tossed in land fills...

If just **half** was recycled, it would save **75 million** trees. That's equivalent to 637 500 000 000 sheets of paper

Every ton of paper recycled saves **7,000** gallons of chemicals

Recycling paper needs **64% less** energy than creating new paper

Replacing your toilet paper to **recycled** ones can have a **huge impact**. We use more than **200,000 trees** every year just to wipe our bums

REFERENCES
http://www.savatree.com
http://www.sfenvironmentkids.org/water/The Pacific Garbage Patch Fact Sheet.pdf
http://environmentvictoria.org.au/content/why-waste-matters
http://answers.yahoo.com/question/index?qid=20081110082126AAaTArK
http://science.howstuffworks.com/environmental/green-science/question16.htm
http://www.zimbio.com/Earth+Day/articles/ZJP9HlhGoh/Earth+Day+15+Celebities+care
http://www.defra.gov.uk/environment/climate/government/

coolaustralia.org
Educating for a sustainable future

Benefits of Trees

HUMAN HEALTH: Trees have been proven to have a deep impact on our moods and emotions. A healthy urban forest is an essential element of human health. Trees improve physical and mental health by increasing energy levels and speed of recovery, while decreasing blood pressure, stress and even asthma. Students have even been recorded to have higher test scores and better focus when trees are in view.

US Forest Service - Urban Nature for Human Health and Well-Being (Website)
US Forest Service. 2018. Urban Nature for Human Health and Well-Being Full Report (PDF 11mb)

ENVIRONMENTAL HEALTH: Trees also improve the health of the environment by improving air quality, conserving water, reducing soil erosion, filtering runoff, reducing flooding and trapping pollutants such as dust, ash, pollen and smoke that can also damage human lungs. Trees are actually carbon sinks, meaning they absorb CO_2 and other harmful gases and, in turn, replenish the atmosphere with oxygen; Honolulu Trees absorb around 7.9 tons annually! An acre of trees will produce enough oxygen for 18 people every day while absorbing enough CO_2, each year to equal the amount you produce when you drive your car 26,000 miles.

US Forest Service. 2015. The Urban Forest and Ecosystem Services: Impacts on Urban Water, Heat, and Pollution Cycles at the Tree, Street, and City Scale (Downloadable PDF)

SAVE ENERGY: Trees also reduce the greenhouse effect by shading our homes, office buildings and city structures. This reduces air conditioning needs up to 30 percent, thereby reducing the amount of fossil fuels burned to produce electricity. It has been estimated that the total annual energy savings in Honolulu is around $621,760 dollars. If you are able to get professional assistance to assure correct selection of species and their placement, you can maximize energy savings even more.

US Forest Service (2017). Residential building energy conservation and avoided power plant emissions by urban and community trees in the United States
Home Energy Extension (2019). Tree planting for lower power bills.

CREATE WILDLIFE BIODIVERSITY: Trees provide habitat, food and protection to plants and animals, increasing urban biodiversity. Specifically, Hawaii is facing an extinction crisis unlike anywhere else on the planet and urban forests are some of the only refuge our native species have as our cities continue to expand and as their natural habitats decrease. Hawaii's native Manu o Kū, or the White Fairy Tern is one important native species that rely on Urban Forests!

Yale Environment 360. Urban nature: how to foster biodiversity in the worlds cities.
Hiraishi, K. (2017) Hawaii Public Radio. Native birds recolonize urban honolulu.

Benefits of Trees

ECONOMIC BENEFITS: Trees enhance community economic stability by attracting tourists and new businesses. Studies have shown that trees can increase property value by 10-20 percent! Areas with trees experience lower crime rates and in well-landscaped business districts consumers shop more often and longer. Consumers are willing to pay more for parking and pay 12 percent more for goods and services in well landscaped areas. The total annual benefit of trees on property values in Honolulu has been estimated to be around $3.16 Million dollars.

D. Nowak (2017). US Forest Service. Assessing the benefits and economic values of trees.

PROMOTE HEALTHY ACTIVITIES AND EXERCISE:
Trees create attractive landscaped amenities that preserve open land used for recreational activities. Green spaces encourage walking and biking, in fact studies have shown that people judge distances to be less in green spaces and are more likely to travel on foot, which has added health benefits.

University of Washington (2010). Active Living
Arbor Day Foundation (2018). 6 ways trees make you more active outdoors.

REDUCE NOISE POLLUTION: Trees absorb and block noise from the urban environment; a dense tall tree can reduce noise up to 50%! Trees also reduce wind speed, which helps when we are experiencing our 80 mph trade winds.

Trees for Energy Conservation Extension (2019).How does vegetation help reduce noise pollution in urban ecosystems?
Arboricultural Advisory and Information Service (2000).Trees and shrubs for noise.

REDUCE HEAT ISLAND EFFECT Cities suffer from the urban heat island (UHI) effect which describes how urban areas are warmer than its surrounding rural areas. These heat islands result from storage of thermal energy in concrete, steel and asphalt and human activities. Heat islands are 3 to 10 degrees warmer than the surrounding rural areas and trees are one of the main defenses and reduce this effect significantly. So trees can cool our most urban areas!

US EPA Using trees and vegetation to reduce heat islands. (Website)
All Things Considered, NPR (2019). Trees are key to fighting urban heat, but cities keep losing them

Urban Tree Canopy

WHAT IS URBAN TREE CANOPY?

An **Urban Tree Canopy** (UTC) refers to the layer of tree leaves, branches, and stems that provide tree coverage of the ground when viewed from above.

WHY IS UTC IMPORTANT?

Trees provide many benefits to communities, such as improving water quality, reducing storm water runoff, lowering summer temperatures, reducing energy use in buildings, reducing air pollution, enhancing property values, improving human health, and providing wildlife habitat and aesthetic benefits. Many of the benefits that trees provide are correlated with the size and structure of the tree canopy, which is the layer of branches, stems, and leaves of trees that cover the ground when viewed from above. Therefore, understanding tree canopy is an important step in urban forest planning. A tree canopy assessment provides an estimate of the amount of tree canopy currently present as well as the amount of tree canopy that could theoretically be established. The tree canopy products can be used by a broad range of stakeholders to help communities plan a greener future.

WHAT IS HAPPENING TO OUR CANOPY?

Take time to read through the full report

Honolulu is losing tree canopy.

In fact, we lost nearly 5% of our total urban tree canopy over four years.
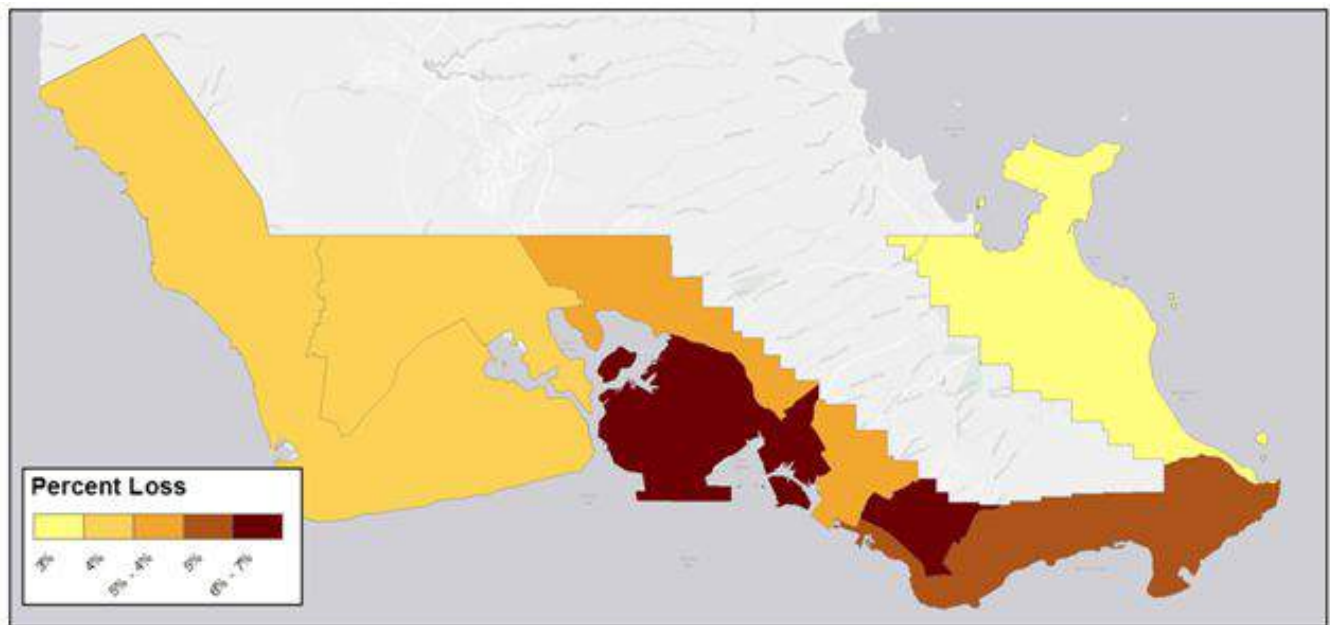

Figure 5: Percent loss in tree canopy for Council Districts, calculated as losses relative to 2010 conditions.. This chart compares the relative magnitude of losses between study units irrespective of gains.

Urban Tree Inventory

WHAT IS AN URBAN TREE INVENTORY?

An urban forest inventory collects relevant information on urban forests within municipalities or urban areas. Inventories can show where new trees can be planted, where undesirable or invasive trees are located, and also where hazardous trees are located. This is particularly important when planning for storm management.

Management of any resource begins with an inventory of that resource. Urban forest management is no exception.

Trees are infrastructure!

| POTENTIAL PLANTING SITES | UNDESIRABLE SPECIES | HAZARDOUS TREES |

Example from West University City, Texas
Vibrant Cities Lab. Street Tree Inventory. (Website and online resource).
North Carolina Forest Service. Urban and Community Tree Inventories (Website).

The Citizen Forester Program is in the process of creating the state's very first systemic urban tree inventory for city-managed trees! This effort began in 2016, and as of 2020 there have been over 10,000 trees mapped on Oahu. The inventory is publicly accessible and can be viewed at PG-Cloud.com/Hawaii. Take a moment to scan the tree already on the map! Our inventory shows:

- **Where our trees are located**
- **Which trees need attention**
- **Where trees are needed**
- **What benefits our trees provide**

Visit Hawaii's Online Public Tree Inventory

What Can Be Done?

1. PLANT TREES

Plant & Plan for more urban trees! The Good News... We have room for an additional 7,924 acres of the urban land area that could be modified to hold. There is Potential for More Trees!

2. POLICY

Advocate for stronger policy supporting the growth and maintenance of our cities' trees. Let your representatives know that our urban forest is important! Find your representative.

3. JOIN THE CITIZEN FORESTER PROGRAM!

An accurate inventory directly aids in city planning, environmental impact, and public health assessments while increasing community awareness of the benefits of trees.

You are already doing something, thank you!

Opportunities for Improvement

Existing Tree Canopy	Available Green Space for Planting	Available Hard Surfaces	Not Suitable
✓	Government Lands 67% Rural Land 27% Residential Land 16% Commercial/Industrial 5%	Residential Land 52% Commercial/Industrial 21% Government Lands 18%	✗

Easiest — Hardest

Less — Impact — Highest
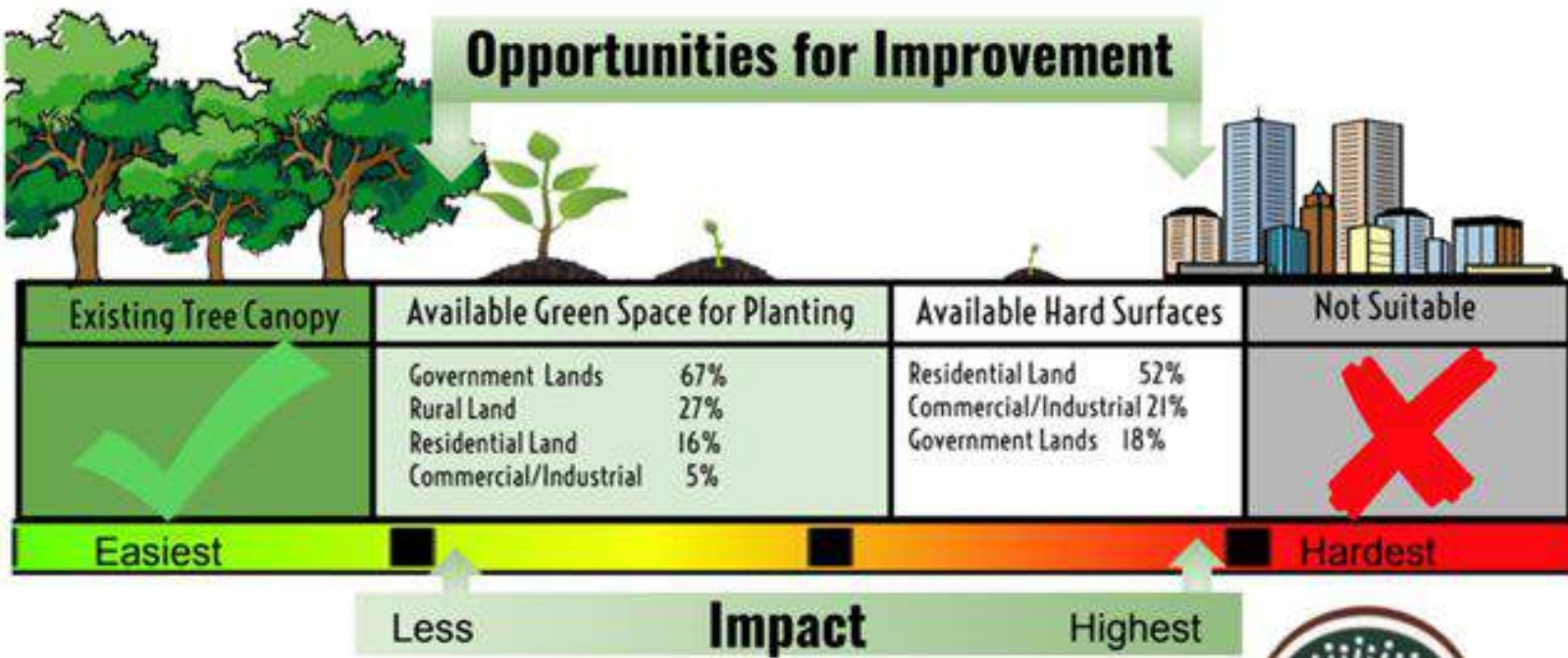
Tree Assessments

Overview

Tree Information:

- <u>Stems</u>

- <u>Diameter at Standard Height or DSH</u> (4.5 feet) – (How wide is the trunk)
    - Using measuring tape or pre-measured string, Determine standard height on each person, & Learn the Exceptions

- <u>Crown Density</u>
    - Crown of Tree versus crown of stems

- <u>Percent Dieback</u>
    - The amount of dead tips of the branches

- <u>Crown Spread</u>
    - 2 measurements; long & short drip line to drip line, using your own pace. Learn the exceptions - drip line is behind a fence, etc

- <u>Tree Height</u>
    - Range finder method, Stacking method

- <u>Live Crown Ratio</u>
    - The live leaf crown as a percent of the tree, observing from the side

- <u>Tree Condition</u>
    - What makes a Tree "good" condition?

Location Information

- <u>Wires</u> - conflict or no conflict

- <u>Land use</u> (Single Family, vacant lots, park, planting strip, unimproved sidewalk)

- <u>Location</u> (front, rear, left, right, park) - relative to buildings or park

- <u>Tree Comments</u> & <u>Photos</u> (of unusual observations or questions for arborist review - burned out holes, many water sprouts, hollow out trunk, bike chains, insect bore holes).

STREET ➡️		
TREE ID INFORMATION		
Status (Alive, Dead, Stump)		
Common Name		
Number of Stems		
DSH		
Density: (0-25, 25-50, 50-75, >75%)		
Dieback Percent: (0, <5, 10, 20, 40, >60%)		
Crown Spread (ft.)		
Crown Spread (ft.)		
Height Range		
Live Crown Ratio (0, 25%, 33%, 50%, 67%, 75%, >75%)		
Condition: (Good, Fair, Poor, Dead)		
Tree Comments		
Photos (Y/N)		
Land Use: (SF, MF, Comm., Industrial, Lg. Comm., Park, Vacant, Other)		
Location: (Front, Rear, Left, Right, Rear, Park)		
Growth Space: (unimproved sidewalk/ planting strip, etc)		
Wires (No/Present & No Conflict/Present & Conflict)		14
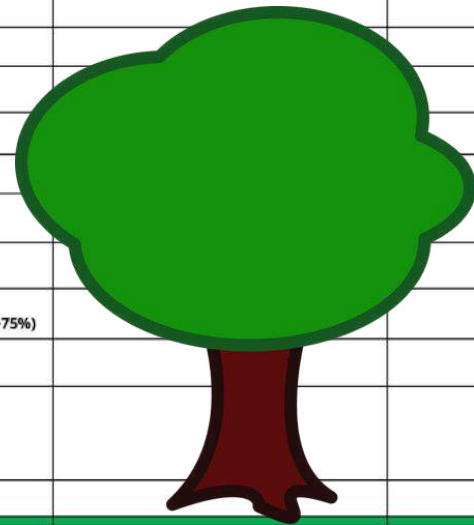
Tree Assessments

Equipment

❏ **CLIPBOARD & DATA SHEETS:** Our teams record all of our measurements on paper data sheets. Your team leader will provide these sheets during each mapping meetup.

❏ **DIAMETER TAPE:** is a calibrated measuring tape that uses circumference to find the estimated diameter of a circular object, in our case, a tree. We want to find the diameter of the tree, which would be if you drew a line straight through the center of the tree trunk. You may also remember from geometry class that the equation for diameter is Circumference divided by pi (π).

Fortunately for us, the tape is conveniently calibrated in divisions of π. The measure assumes the trunk has a circular cross-section and gives a directly converted reading of the diameter.

❏ **100 FOOT MEASURE TAPE:** is a large measuring tape with fractional inch and decimal foot scales. For this program, the 100ft tape is used to measure crown spread, as well as height when using the stick method. (You will learn these assessments in the next section!)

❏ **YARD STICK:** Some teams may also carry a yardstick in order to collect height using the "Stick method" which you will be learning in Tree Assessments

❏ **RANGEFINDER:** Nikon Laser Forestry Pro Rangefinder/Hypsometer 8381. This waterproof and fog-proof rangefinder is made to not only measure distance but also height, vertical separation, horizontal distance and angle. **How-to-Use Video**

❏ **OUTREACH MATERIALS:** Team leaders will be equipped with pamphlets/flyers to hand out when meeting community members!

❏ **TREE ID CARDS:** Each team is equipped with a mini booklet with common street tree identification cards! They are also accessible online: bit.ly/hawaiitrees

Citizen Foresters work outdoors, where there is oftentimes no shade. On top of the above equipment, **each volunteer should prepare by bringing the following:**

❏ Mask (if desired, but not required)
❏ Sanitation Materials (Gloves, Sanitation Wipes, Hand Sanitizer, etc)
❏ Mobile Device with Data Capabilities (Cell Phone, Tablet, Etc)
❏ High Visibility Shirt
❏ Sun Protection (Sunglasses. Hat. Sunscreen, Etc)

Tree Assessments

DSH

Goal: Accurately measure the DSH of a tree

**Purpose:** Estimate the *volume* of a tree for approximate carbon storage capacity.

Definition: DSH stands for Diameter at Standard Height. DSH is a standard method of expressing the diameter of the trunk or stem of a standing tree. DSH is also referred to as DBH, or Diameter at Breast Height, and the two are used interchangeably. For this program, we use DSH.

Methods: For this program, we use a diameter tape. When used correctly, the diameter will be a direct read from the tape. The conversion is done for you!

4.5 ft

Rounding: For this program: we round to the nearest whole number when recording DSH.
   For measurements **0.1 - 0.4 = round down**, **0.5 - 0.9 = round up**

Exceptions: Healed wounds, nodules, water sprouts. Move measure up or down to avoid unusual growth to area of trunk that best represents diameter. Note diameter measured AGL in "Tree Comments"
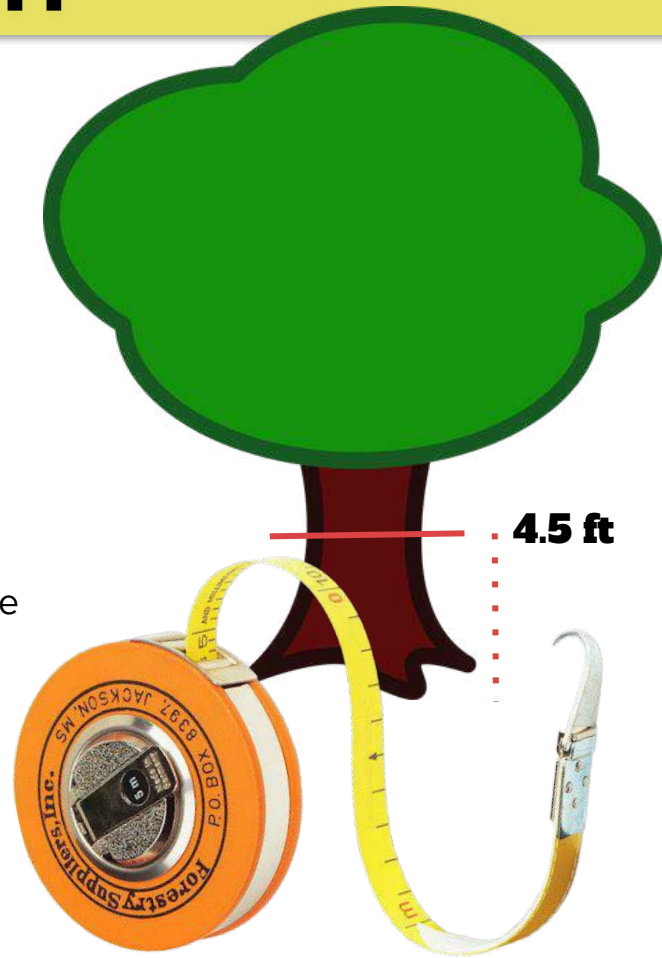
Tree Assessments
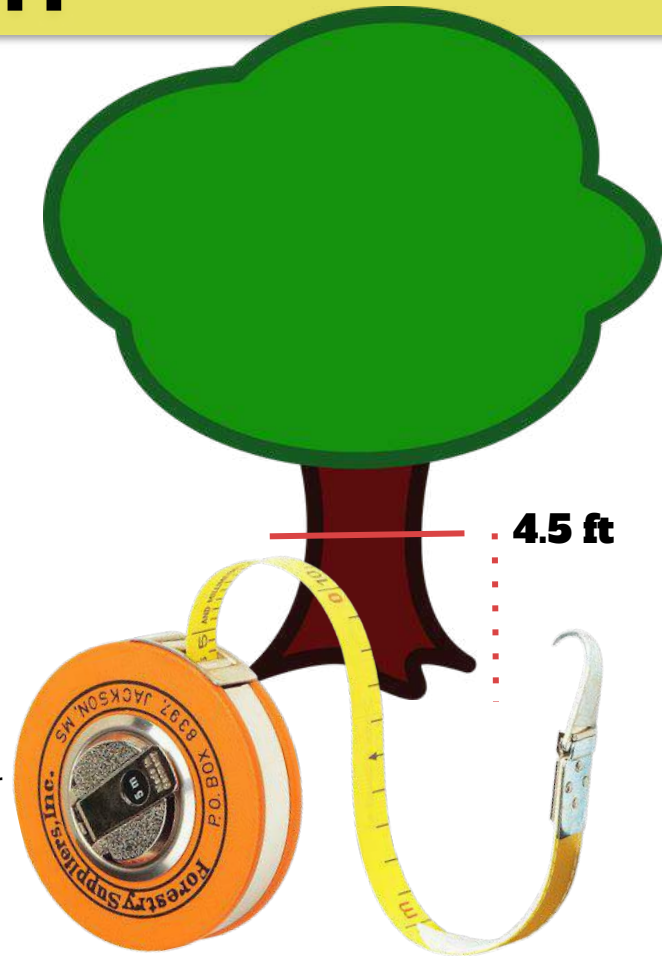
DSH

Unusual Measurements:

- <u>Leaning Stems:</u> measure at 4.5 feet high along trunk,

- <u>Large Stems</u>: use multiple tapes, or mark the trunk and reuse the tape.

- <u>Multiple Stems:</u> If the tree stems originate below 4.5 feet, measure each separate trunk At Ground Level (AGL). If stems are branch forms (not trunks) and originate below 4.5 feet, measure single trunk that best represents diameter.

    Make a Note in Tree Comments: "DSH @ AGL or __ft"

- <u>Tree on a slope</u>: Measure 4.5 ft on the up slope.

4.5 ft

- <u>Deformity or Obstruction at 4.5 ft</u>: Move up or down to avoid unusual growth to area of trunk that best represents diameter. Measure the height of where you took the diameter measurement. Make a Note in Tree Comments: "DSH @ __ft" (examples of obstruction: healed wounds, nodules, water sprouts, irregular growth, fence or other urban obstruction).

Measuring Multi-stemmed Tree   **Measuring Existing Trees with an Angle or on Slope**   **Measuring Split Trunk Tree**

4½'   4½' 4½'   4½'   4½'
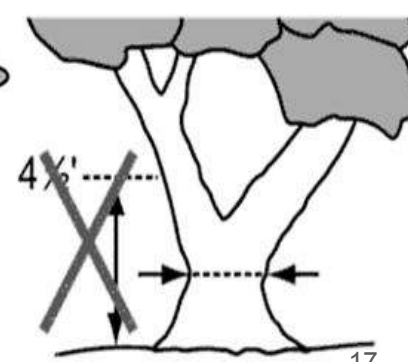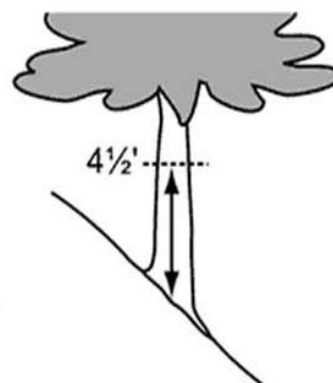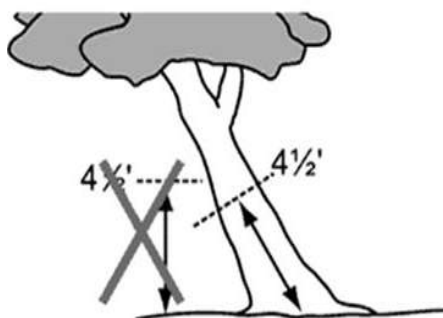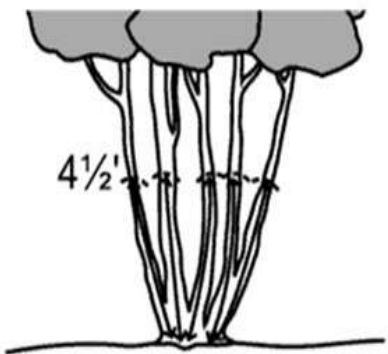
Tree Assessments

Density

Goal: Accurately determine the thickness of the tree crown uses percentages.

Purpose: By estimating the crown density, we are able to further define the "food" gathering potential of a tree's leaves. Photosynthesis happens in the leaves - where sunlight, water, and carbon dioxide (from the air) are converted into food and oxygen.

Definition: For this program, Crown Density is the amount of light and air penetration through crown. Crown Density includes the % of branches, foliage, and/or fruit that blocks light coming through the live crown.

For example: A crown is 100% dense if no light passes through the foliated branches. A tree crown is 0% dense if light is clearly visible with no live foliage blocking it.

Methods: Stand under tree and look up into crown. For trees of variable crown density, move around to 2 or 3 locations and estimate % of sky visible .

For this program, we record live crown ratio using the nearest percentage estimate in four categories: **0-25%, 25-50%, 50-75%, >75**

Exceptions: For this program, we record all palms as 0-25% unless clearly outside the norm.

Notes: Leaf size has no relation to this measure

0-25%	25-50%	50-75%	>75%
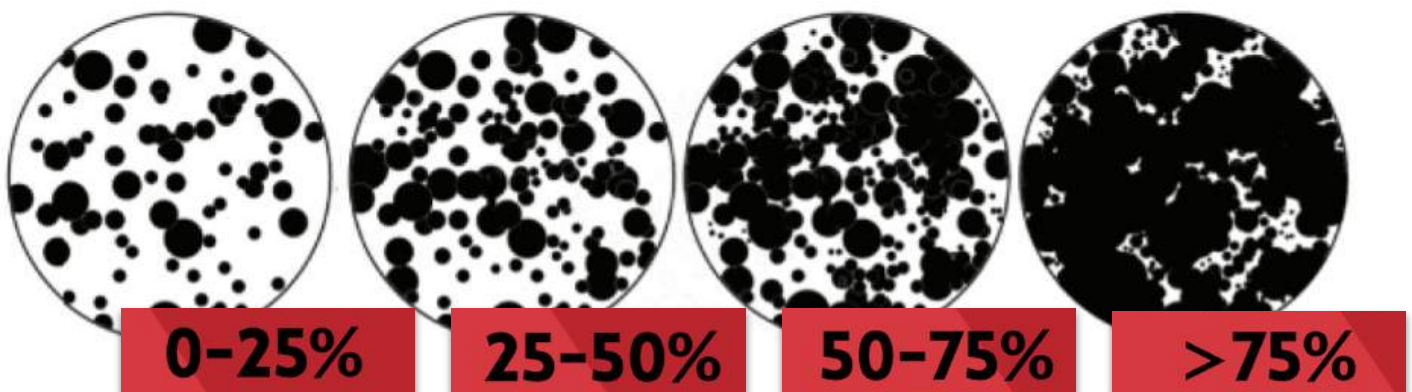
Dieback

Goal: Accurately assess the crown dieback and describe it using percentages.

Purpose: This observation helps us determine the tree's reaction to its environment. Crown dieback is an important indicator of tree health.

Definition: For this program, Tree Dieback refers to the death of ends of branches in upper and outer portion of crown. Dieback indicates loss of moisture at ends of branches most often caused by drought, root loss through disease or damage, water uptake restrictions through soil compaction, or vascular disease. Dieback is not caused by natural leave shedding.

Deciduous trees shed their leaves naturally at the end of their growing season. This occurs in the dry season in tropical and subtropical regions. In Hawaii, not all introduced trees that are deciduous in their native ranges shed their leaves in Hawaii due to the consistently warm climate. Their growing season is year-round!

For this program, we record percent dieback using the nearest percentage estimate using the following numbers: **0, <5%, 10%, 20%, 40%, 60%**

Ask yourself:

- Does this tree have dead branches?
- Do the dead branches show fine twig structure?
- Is this tree deciduous?

<5%   20%   60%

Crown Spread

Goal: To accurately measure the size of a tree's crown. The crown spread is often the first sign of a tree's size.

Definition: For this program, crown spread is the measurement taken at two (2) horizontal widths of the crown, taken from dripline to dripline.

Dripline: the outer boundary to the area located directly under the outer circumference of the tree crown. Imagine the tree as an umbrella, when the tree-umbrella gets wet, excess water from the top would roll down to the ground along the dripline of the umbrella - that is the dripline of the tree.

Methods: Cross method.

- 100 ft Measuring tape
- Pace
- Rangefinder

(if the spread is estimated to be greater than 50ft)
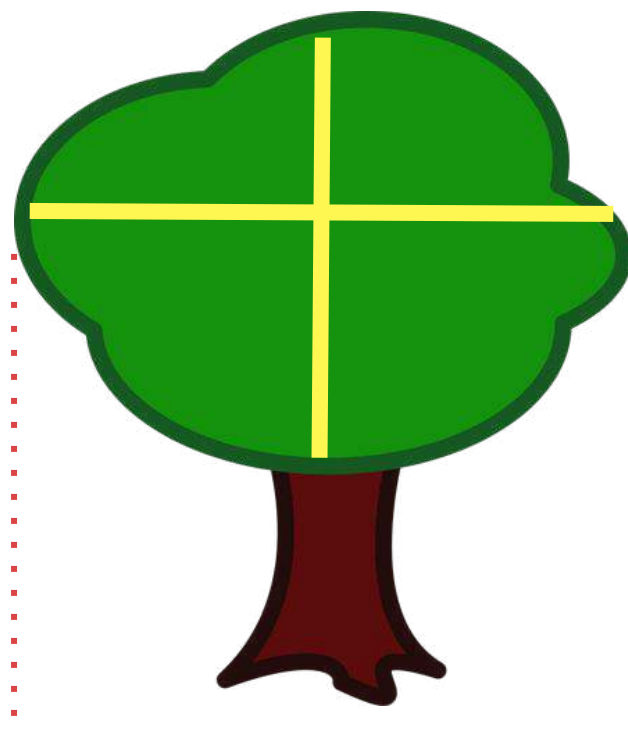
We record two (2) lengths, that make a cross:

- The longest spread from drip line to drip line (or edge to edge) across the crown
- The longest spread perpendicular to the first cross-section through the central mass of the crown. The measurements should be approximately right angles from each other. This is written in as the shorter measurement.

Note: Crown spread is taken independently of trunk position.

Tree Assessments

Crown Spread

Pace

Definition: For this program, we label "pace" as one walking stride; equal to two natural steps (left step, and right step).

Using 100ft Tape:
A pace is equal to two steps. To determine your pace, lay out a 100-foot measuring tape, and count every other step, remember to walk normally so your pace is accurate.

Formula: 100 / number of paces = one pace

Rangefinder

Set mode to 'HOR'

Accurately aim at a target (a person standing directly under the dipline) using the laser point and the viewfinder. Calibrate to find distance. Press the button and then you can conveniently read the result on the display.

Field Challenges: Drip line behind a fence, in a busy street, and intermixed canopies. Provide your best estimate.

Rounding: For this program: we round to the nearest foot (the nearest whole number) when recording Crown Spread.

- For measurements 0.1 - 0.4 = round down
- For measurements 0.5 - 0.9 = round up

Tree Assessments

Tree Height

Goal: Learn how to determine the height of a tree and measure using various methods

Definition: For this program, tree height begins at the ground level trunk (or stem) to highest point of the tree above ground level (the highest terminal branch tip).

Methods: Hypsometer, Stacking Method, Stick Method, Pencil Method

Laser Hypsometer or Rangefinder

Measurement example (two-point height measurement)

Top (Hgt2)

Base (Hgt)

Internal display

Hgt +Hgt2
3.2 YD

1st

Hgt and Hgt2 are solid

External display

[YD]
3.2
7.6°
24.5
24.5
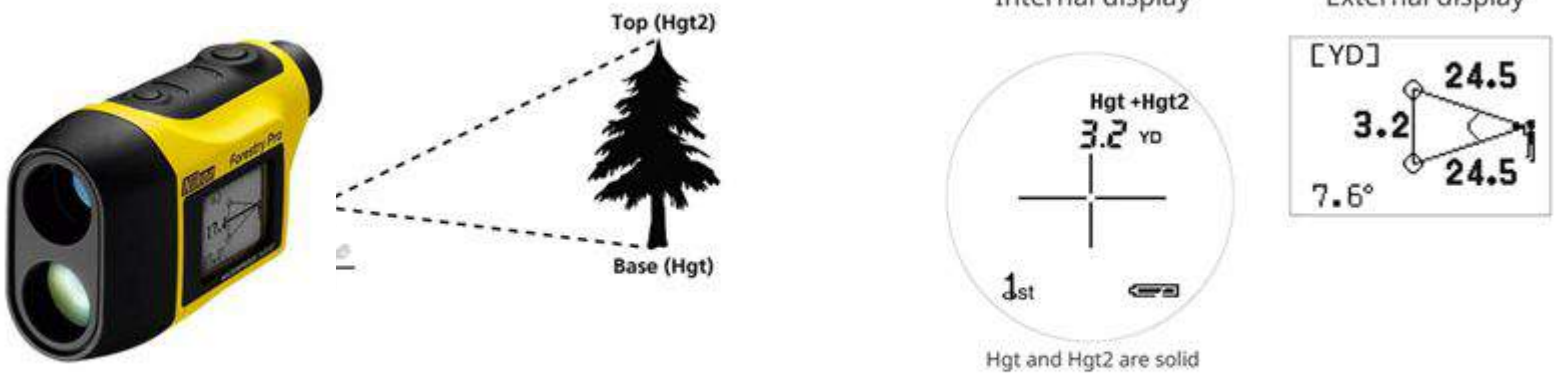
When the measurement is successful, you see the height from the base to the top displayed on the internal LCD with **Hgt+Hgt2** (solid).
For more information, refer to the external LCD.
"Base" and "Top" can be switched.

Stacking Method

Have a team member stand next to the tree. Approximate the size of your team member by measuring their height with your hand, then stack their height to the top of the tree. Multiple the number of stacks by their height.
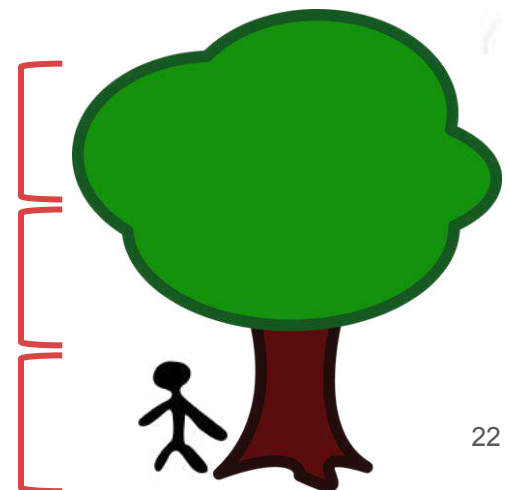
Tree Assessments

Live Crown Ratio

The "Shaka"

Goal: Accurately estimate the size of the crown as a percent of the total tree.

Purpose: By determining the crown ratio, we are able to estimate the "food" gathering potential of a tree, since all of the photosynthesis happens in the leaves!

Definition: For this program, Live Crown is the amount of height of the tree that is composed of live crown: branches and foliage.

Methods: The "shaka" estimation

For this program, we record live crown ratio using the nearest estimate of the following percentages: **0%, 25%, 33%, 50%, 67%, 75%, >75%**

Notes: Learning species-specific growth pattern may help to determine a pattern of abnormality from natural species form.

25%

33%

50%

Crown (50%)

Height (100%)

Tree Assessments
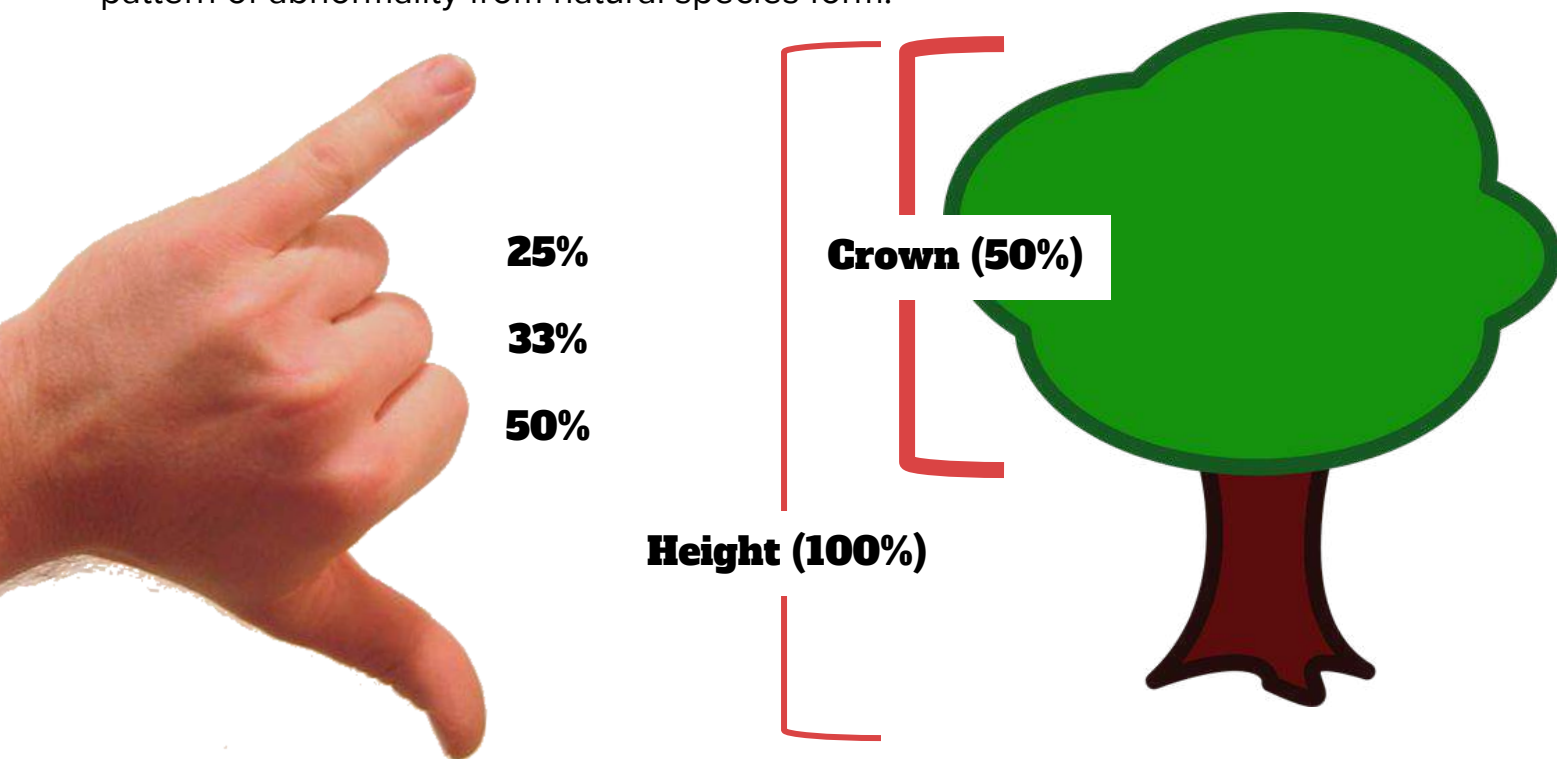
Condition

The Canopy Method

Goal: Accurately determine the overall wellbeing of the tree

There are many ways to assess tree condition. For this program, we use **"The Canopy Method."** This method considers:

- *Leaf color* (species and seasonal variation) - From healthy vibrant color to chlorotic or browning. Dark green leaves for mango, lighter green for true kou and reddish brown on the underside of a satin leaf tree leaf.
- *Leaf size* (species-specific) - The size and shape of the fully grown leaves as compared to normal for the species. Look for well-formed leaves.
- *Leaf density* (species and seasonal variation) - The density of leaves in the canopy during full-leaf season.
- *Dieback of branch tips* – The general volume of dead tips on branches throughout the crown. This can also be used for broadleaf trees during dormancy.
- *Shoot growth* (species and age specific) – The length of new growth compared with normal, annual growth, generally identified at the ends of branches with green stems.
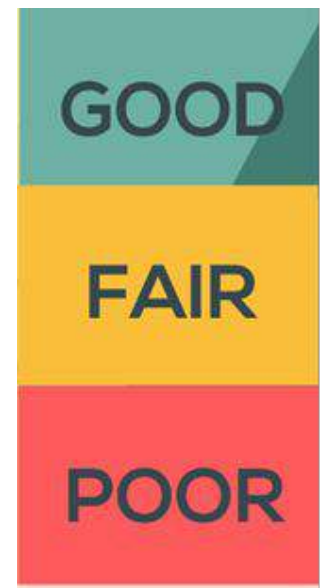
Other Conditions to Add In "Comments":

The following are basic risk assessment observations to flag for an Arborist check:

- Large dead branches (>2" diameter and 3' length)
- Unusual leans that includes mounding soil on backside of lean and > 45 degrees leans regardless of compounding conditions
- Areas of cavity or decay that exceed 30% of basal area of stem/branch
- Recent splits/cracks in main trunk or large scaffold branches
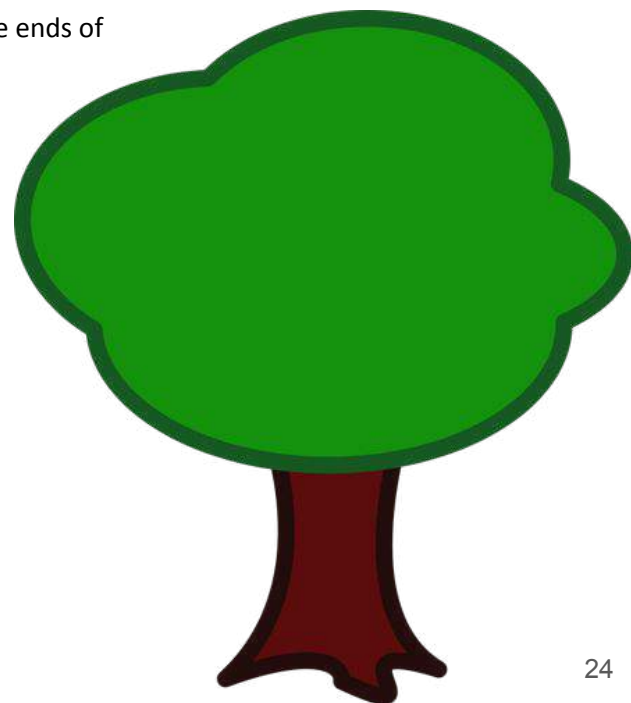
Tree Assessments

Tree Status

Stumps and Dead Trees

Goal: Locate where potential trees may be suitable for planting.

There is no need to collect any tree assessment data for stumps.
Record:
- Tree Status: "Stump", or "Dead"
- Common Name: "Stump" or "Dead Tree"

You should still collect location information (growing space, wires, etc).
If there are still alive shoots present on the tree, it should be recorded as "Alive", in POOR condition.

Photos

Please take photos to record the following:
- Document a problem (e.g. any conditional problems mentioned in the previous "Condition", any vandalized trees, pest infestations, etc)
- For help to identify a species.
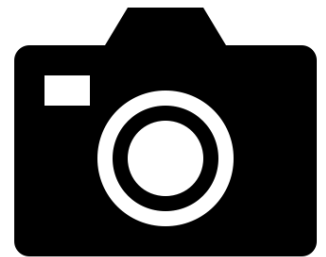
Photos are not required for every tree, but can be helpful for management!

To take proper photos for identification:
- Take up-close photos of key features such as: the **bark and leaves**, **pods** and/or **flowers**.
- Use your measuring tape to show scale.

Take photos or upload directly to to Tree Plotter

Tree Assessments

Exceptions

Palms

Palms provide less ecological benefits to the environment than trees do due to their biological composition. They are more closely related to grass than trees. Thus, there are some standard measurements we record for palm trees.

Live Crown Ratio: 25%
Density: 0-25%

Dieback is usually 0%
Areca palms do not need to be recorded for this inventory.

Groves

Occasionally, we come across ***maintained*** areas of trees that are growing in close proximity that are difficult to inventory. In these cases, the goal is to still capture measurements that will best reflect the ecological benefits of the trees, particularly the species type, DSH, and land use information. Groves are an option within Tree Plotter, but they do not calculate the ecological benefits of the trees.

Follow these tips for best measurements:

- Use the multi-stem calculator

    - Collect DSH of up to 6 trees and plug numbers into calculator. (Consider DSH at ground level if each tree is a multi-stem tree.

    - Approx other measurements from that area of crown spread.

*If the area is *unmaintained*, it does not need to be inventoried.

Location Information

Land Use

This field is required to calculate ecological benefits

How is the land being used in proximity to the tree?
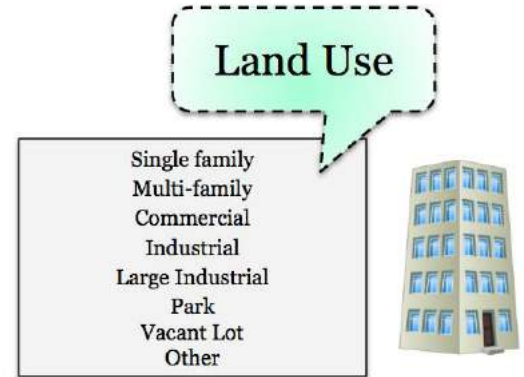
Growth Space

The "Growth Space" category documents the type of space the tree is growing.

For any trees in parks should be marked as "Bare Soil", unless the growing space is otherwise obvious, such as a planting strip or tree well. When in doubt, mark it as bare soil rather than leaving it blank.
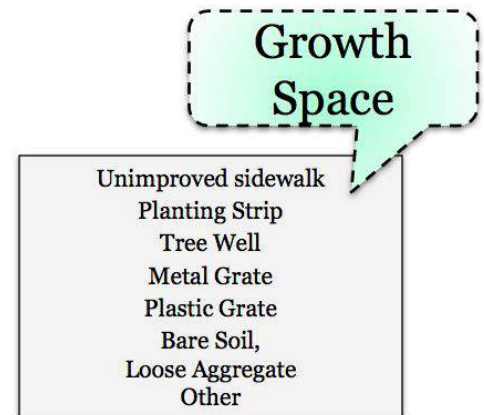
Location

This assessment is in relation to the "address" of the tree, from the **perspective of a maintenance worker** (not the homeowner) at the road.
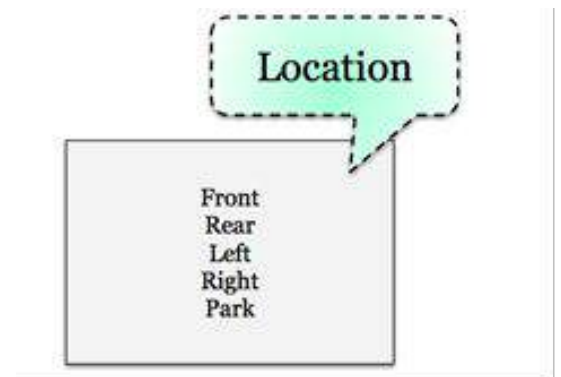
Wires

"Present/Conflict" when overhead wires are come in contact with the tree or if the wires are within 10 feet of the tree.

If the overhead wires are further than 10 feet from the tree, mark "Present/No Conflict"

Potential Planting Sites
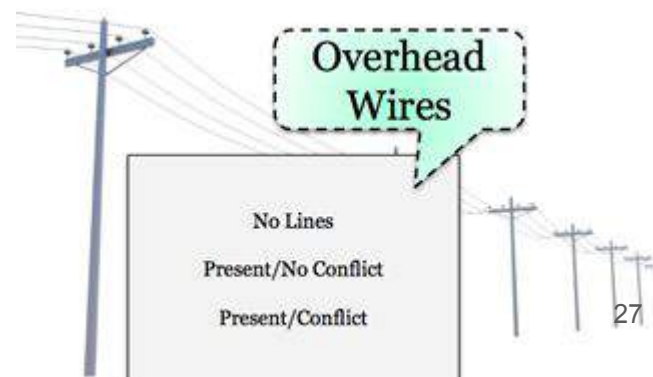
Site Criteria

Space to Grow

- ❏ Is there at least **10 ft of clearance** from any utilities?
  - Ie. Power or Communication lines, Service lines to homes, Street lights, Fire hydrants, Storm drains, Water meters, Gas lines
- ❏ Are there **no conflicts**?
  - i.e. existing landscaping, existing trees, existing infrastructure
- ❏ Is the **surface permeable**?
  - i.e. green space, gravel, soil, porous surfaces

Location

- ❏ Is the site within the **City Right-of-Way** or **City Park**?
- ❏ Is the site adjacent to a **single property**?
  - (This helps to to avoid future conflicts)
- ❏ Does the site allow for necessary **infrastructure**?
  - (i.e. street lights, signals, traffic signs, etc)

✓ **This is a potential planting site!**
Lets map it.

Data Collection

- ❏ GPS Location Tree Plotter
  - ○ Log in
  - ○ Select your "Organization"
  - ○ Find Your Location
  - ○ **"Add a Tree"** as normal
    - ■ **NEW Template:** Select **"Proposed Planting Site"**

- ❏ Photos
- ❏ Site Size (width & length)
- ❏ Location Status (proposed site- S/M/L)
- ❏ Land Use
- ❏ Location (from perspective of the address)
- ❏ Growth Space
- ❏ Utilities (wires)

Tree Identification

Overview

- **Plant Names**
  - Scientific and Common Names

- **Species Classifications**
  - Native
  - Introduced
  - Invasive

- **Observational Skills**
  - Leaves
  - Bark
  - Tree Crown Shapes
  - Other Tree Characteristics

- **Unknown Tree Species**
  - Unidentifiable Tree Form
  - Tree ID Cards
  - Outside resources
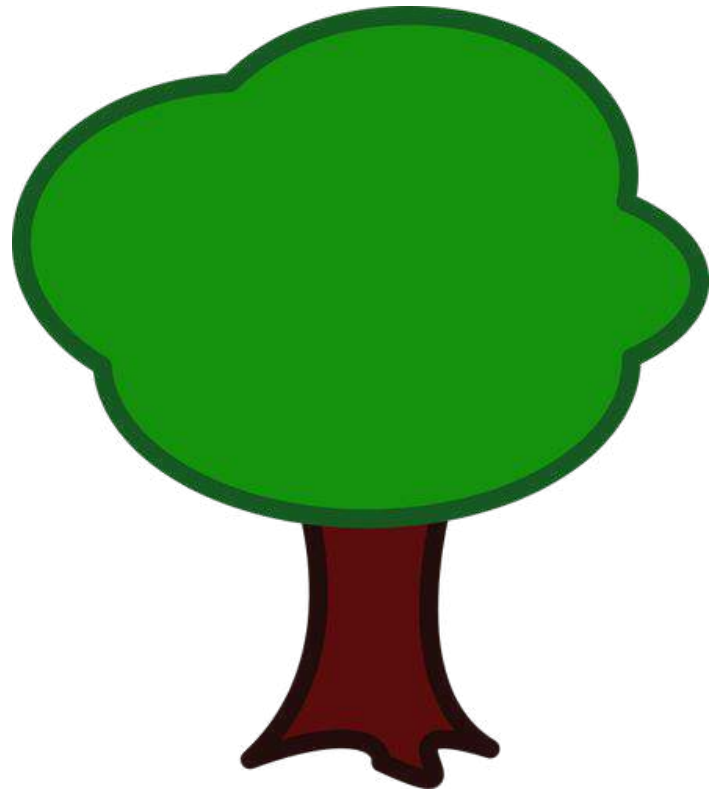
Plant Names

Scientific Name:
Cocos nucifera

Common Name:
Coconut Palm

Local Names:
Niu, Iru, Niyok, Coco

Common Name

For this Program, we record "Common Name".

This is decided upon by how the managing agency classifies the species. This does not mean other known names are wrong! (In the online inventory, trees can also be searched for by the scientific names.)

The colloquial or popular name for plants that is used locally and often varies by region or country. For example, coconut palms are native to many areas around the world. In English, their common name is "coconut palm" or "coconut tree", however, this is not the only current common name. In Hawaii the same plant is called **Niu**, in Palau it can be called **Iru**, and in Guam, **Niyok**.
Common names are important because they often give clues to the cultural uses or easily identifiable characteristics of a certain plant.
For example, the seeds of the Kukui (or Candlenut Tree) contain flammable liquids that can be used to create light (among other things).

HOWEVER, common names are not always useful for identifying specific plants because they are very general and do not always accurately describe their traits or relationships to other plants.
For example, Mountain Apple (Syzigium malacense) is not actually related to the Common Apple (Malus domestica). These plants probably have similar common names because their fruits are edible and can be used in some of the same ways. To avoid this confusion, botanists use scientific names.

Scientific Name

Unique names used by the scientific community to accurately and universally identify species . Taxonomists have established "scientific nomenclature" as a universal protocol to help avoid ambiguity and ensure consistency across regions. This nomenclature groups organisms together in a hierarchy that helps to describe shared traits amongst species. These traits are helpful for identification as well as understanding the specific growth conditions of each plant. Scientific names can be long, but usually plant species are referred to by the two most specific components of their name: Genus and species.

*NOTE: The genus and species of organisms are always italicized.

Tree Identification

Species Classification

Native

Arrived at geographic location via the **3W's: WIND, WATER, & WINGS**; *without* human intervention.

- **Indigenous**: Native to more than one place
- **Endemic:** Species that exist **in only one** geographic region

EXAMPLES: Hala, 'Ohia, Koa

Polynesian Introduced 'Canoe Plants'

Roots, cuttings, shoots, & seeds **brought by Polynesian voyagers on sailing canoes** for food, medicine, clothing, building, entertainment, and spirituality.

EXAMPLES: Coconut Palm, Kukui, 'Ulu, Milo

Introduced

Arrived at geographic location **with** human intervention

EXAMPLES: Shower trees, Pink Tecomas, Monkeypod, Plumeria

Invasive

- Non-native (or alien) to ecosystem
- Causes or is likely to cause harm to economy, environment, and/or human health.

EXAMPLES: Albizia, Octopus Tree, African Tulip Tree, Ironwood, Kiawe

Tree Identification
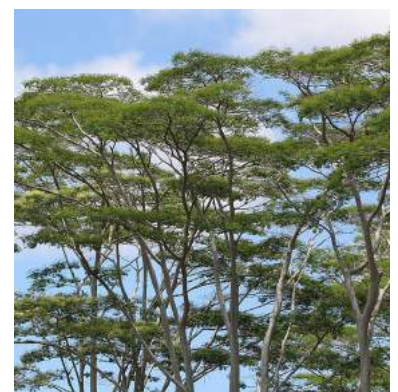
Observation Skills

Tree identification can be done by several parts of the tree. Often times the leaf orientation will be a key indicator of species type.

There are several tools available to help you identify Pacific Island trees in the field.

1. ## Tree Identification Cards

    Team leaders will be equipped with Tree Identification Cards, but you can access them online from the website, or bit.ly/hawaiiurbantrees. Remember, the cards are not comprehensive, you will most likely encounter species not on this list!

2. ## Pacific Island Tree Key and SelecTree

    This online tool is specifically created for Pacific Island tree identification and selection. This is a great reference in the field for confirming tree identification or working through their **dichotomous key**.

Think you know, but not 100%:

If you think you know the species of tree, but want confirmation, please do the following:
- Label the common name as "**Unknown**"
- Take photos like you are taking them for an unknown species
- In tree comments, include your guess/thoughts and the phrase "Tree ID needs Confirmation".
- Labeling the species as *unknown* is important, so we know to look it up in Tree Plotter later.

Leaf Morphology

Leaf Shapes

Simple Leaf — pinnate leaf venation, leaf blade, leaf veins, leaf axil, leaf stalk (petiole), axillary bud, stem, nodes

Pinnately Compound — terminal leaflet, leaflet, stipules, rachis

Bipinnately Compound — pair of terminal leaflets, secondary leaflet, primary leaflet

Palmately Compound — leaflet, midvein, secondary veins, secondary leaflet, leaf stalk

Tree Identification

Observation Skills

Leaf Morphology

Veins — netlike, netlike, parallel
Shapes — hand shaped, spear shaped, heart shaped, round, needle
Arrangement — simple, compound, compound
Edges — smooth, toothed, lobed
Arrangement on the Stem — alternate, opposite, whorled

© 2006 Encyclopædia Britannica, Inc.
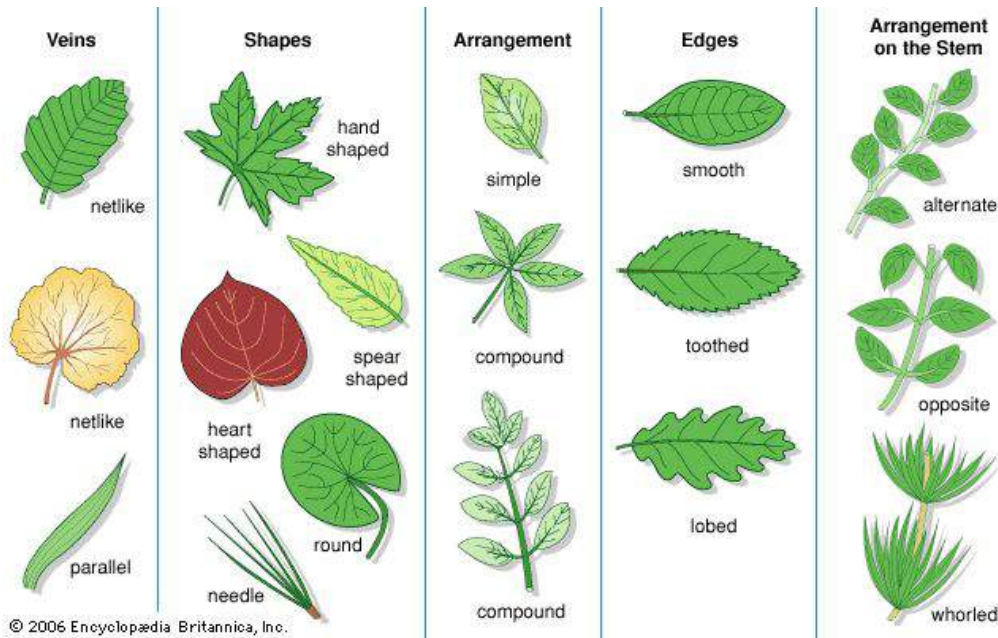
Studying the different shapes and designs of leaves is an important tool to identifying plant species. It describes the shape, color and arrangement of a plant's leaves including any of the various forms that leaves assume and any observable leaf structural components (such as vein alignment, color, or texture). Recognizing and categorizing the overall shape of the leaf, the outer edge of the leaf (leaf margin) and the pattern of leaf veins are key to developing strong observational skills.

FUN FACT: Botanists commonly use scent as way to determine a plant species.

Crown Shape

The crown shaft is the shape that a tree's branches grow into. This general shape can vary by species and can be indicative of certain trees. Trees can be conical, weeping, umbrella like, or any number of other shapes. Being able to identify crown shaft can help direct a species ID.

NOTE:
Don't forget that crown shapes refers to how a tree grows naturally without interference. Many street trees are regularly maintained by arborists who intentionally shape trees to decrease their hazard potential. Keep this in mind if you use crown shape to determine tree species.

Crown Shapes

Rounded
Weeping
Vase- to Funnel-shaped
Tabular to Spreading
Columnar to Conical

Adapted from *Japanese Flowering Cherries*, by Wybe Kuitert, Timber Press, 1999

33
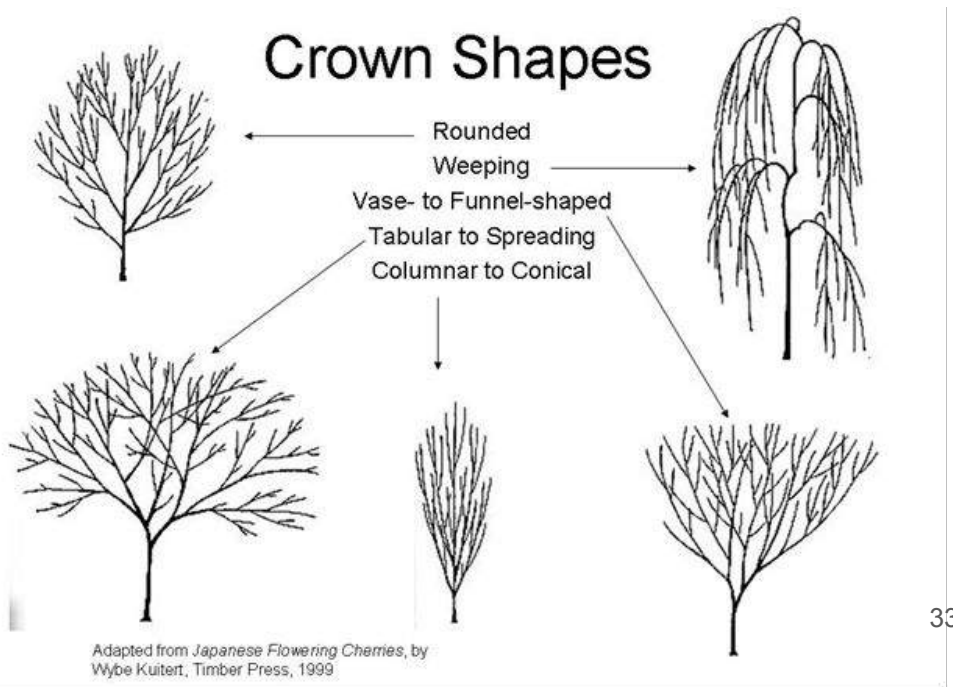
Observation Skills

Fruit Type

Fruit type is is key to species ID and can be extremely variable. Fruit type is determined by the arrangement of seeds, the number of individual fruits, if the fruit is fleshy or has a stiff outer seed coat--to name only a few characteristics. Many of us think of fruits, only as the edible components of plants, but most fruits are actually dispersed in a way that doesn't require them to be palatable. For example, buoyant fruits can be transported by water and therefore don't need to be consumed by a host.

FUN FACT: What about seed pods, you ask? Seed pods are actually considered the fruiting body of their associated plant because they encase and protect their seeds just like the fruit of a peach!

pod   silique   silicles   capsules   follicle

samara   samara   pair of samaras   nut and cup   pyxis   achene

mulberry   strawberry   pome   drupe   rose-hips

Flower Type

funnel-shaped   salverform   rotate   bell-shaped   urn-shaped   2-lipped   pea-like   banner   wing   keel

panicle   cyme   umbel   head   raceme   spike   open flower   bud

pedicel   bractlet   ray   bract   peduncle   leaf   involucel   involucre   bract   unisexual flower   catkin   asymmetric   bilateral   biradial   radial   symmetry

Flower type is one the most important characteristics for determining a plant's species. This includes the color, number, and shape of petals as well as length and style of pistils and stamens. Flowers contain the reproductive organs of plants and the arrangement of these organs is paramount to the way the plant attracts pollinators and produces offspring. Once pollinated, flowers become fruits (which are also important for identifying plant species).

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Tree Identification

Observation Skills

Bark Type

The color, texture and orientation of bark can be helpful in identifying certain tree species. The graphics below show examples of bark type and their corresponding names. Be aware however, that bark can appear differently on an individual tree over its lifetime. For example, a young tree may have smooth bark until it matures at which point, its bark can become rough. Certain types of environmental pressures can also influence bark type. Although helpful, bark type should be considered in relationship to other physiological characteristics to determine species.

Smooth   Lenticels   Peeling strips   Vertical cracks   Scales

Plates   Vertical strips   Intersecting ridges   Ridges broken horizontally   Uninterrupted ridges

From left to right: Royal, Pygmy Date, Aiphanes, Alexander, Fiji Fan, Manila, Coconut

FUN FACT: Palm trees are not true trees because they do not develop cambium, an important component in bark. Therefore, palms don't actually form bark at all! However, they do have regular variation in trunk texture and shape which can still be helpful for identification (Learn more here).

Login On

TREEPLOTTER INVENTORY

Tree Plotter is a web-based tree inventory software application designed for inventorying, managing, and informing decisions about trees. The application can be used to manage public or private trees in an online map. Tree Plotter replaces traditional GPS-based inventory programs with GIS and web cloud-hosting technologies. It can be used with any device with Internet connectivity (Mac, Windows, Android, etc.). It provides a read-only map viewer for the public as well.

There are three technological components for the data collection of tree inventory data:
1. **GPS** - use to locate the tree or a Satellite map of the data collection area. (location service)
2. **World Wide Web** - to display the location and enter the tree information (browser)
3. **Cellular Data service** - access the inventory database at Plan-it Geo (Phone data service)

Plan-it Geo's YouTube channel *There are several video tutorials for your reference. Please note the plan-it Geo web site is constantly improving, some of the screens and steps may not perfectly match the video.*

Helpful Hint! Save Tree Plotter to homescreen on your phone for easy access

Log In | **Login to TreePlotter**

Website	www.pg-cloud.com/_____Hawaii_____
Username	\<First Letter of First Name>\<Last Name> (**JDoe** for Jane Doe) case sensitive
Password	**TreesRus** (please change after 1st login)
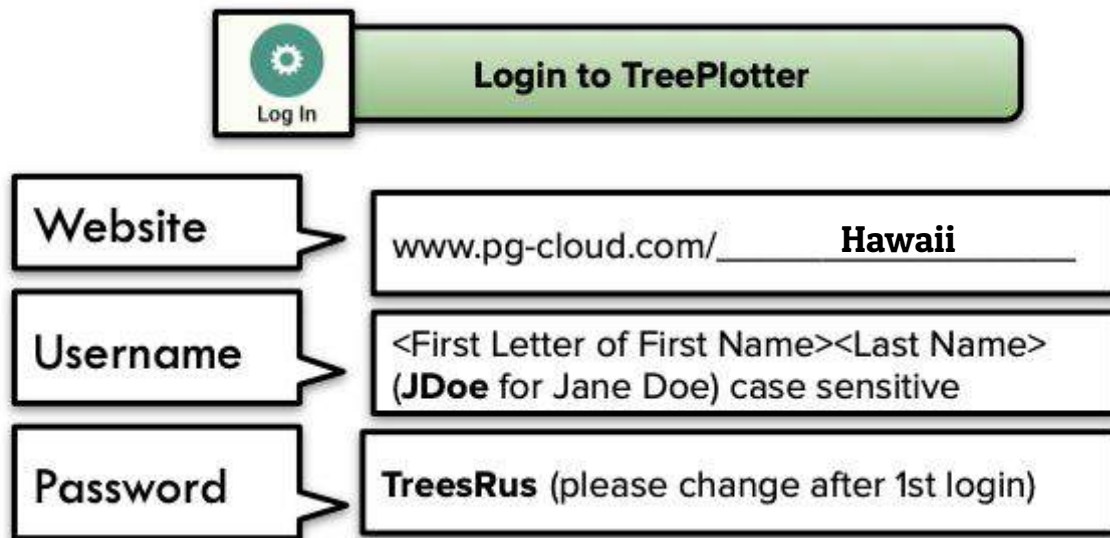
Find My Location not working? Check your settings:

Google Chrome: Settings > Advanced > Content Settings > Location
Safari: Safari -> Preferences > Privacy
iPad/iPhone: Settings > Privacy > Location Services
Android (may vary depending on exact device): Settings > Security and Location > Privacy > Location

Data Entry

Device Orientation

iPhone Orientation

If you have access to multiple 'organizations', you will need to **"Load Trees"** before adding a tree.

Screen Orientation

Desktop orientation

Data Entry

Add a Tree

Add a Tree to the Inventory

On a Smartphone, Tablet or Computer: Go to the Tree Plotter website: www.PG-CLoud.com/_____ & Log In with your username: JDoe (First Initial, Last Name - case sensitive) & Password: TreesRus

Select "_____" as the Organization in the Legend

Shrink the Legend by Clicking: <bottom arrow>, you can bring the legend back up with the icon shown on the left <-

Find your Location by Clicking: <GPS Icon>
(Your location settings may need to be adjusted in your device settings)
Click it again to clear the GPS ring

"Find an Address' by Clicking: <Globe Icon>

Enter Address: _____

Pan & Zoom in ➡ look for a tree ➡ pick any tree in Ala Moana Park.

Add a tree by Clicking "Add" <Pencil Icon> from upper right

Select "Tree" from Pop up "Template" Menu

Touch the Tree You've Chosen on the map, and a window should appear. Note the Primary ID #

Careful, every touch to your screen will create another tree. To stop adding, and to move around the map - Click the <stop icon> in the upper right, shown on the left <-

Data Entry

Enter Data

Enter data into the inventory:

Primary ID 22397
Tree
Last Modified — 01/06/2019
Common Name
Address — 52 Prospect Street
Height Range
Land Use
DSH
[Details] [Eco-Benefits] [Data Table]
[Street View] [Share]

Click on the Tree you just added. A pop up window should appear. Click <Details>

Details

Tree Details - 22397
[Delete] [Close]
* All changes are saved automatically

Tree Information | Location Information | Management Needs
Risk Assessment

Primary ID	22,397
Verified?	☐ Yes
Date Verified	[ ] Clear
Status	Alive
Common Name	
Latin Name	
Cultivar	
Genus	
Hawaiian Name	
Native Hawaiian	☐ Yes
Polynesian Introduced	☐ Yes
Introduced - Other	☐ Yes
WRA Score (Weed Risk Assessment)	
DSH	

A similar Popup window will appear when you create a New Tree.

Enter the following fabricated information into the data fields.
Take your time to get to know the fields.

Tree Information | Location Information | Management Needs

Tree Information

Status	<Alive>
Common Name	<Monkeypod>
DSH	<34>
Height Range	<57>
Number of Stem	<1>
Crown Spread L	<120>
Crown Spread S	<84>
Live Crown Ratio	<33>
Density	<75 >
Condition	<Good>
Percent Dieback	<None>
Comments	< Trashcan chained to Trunk>

Location Information

Land Use	<Park>
Growing Space	<Park>

Management Information

Wires	<Present no conflict>

[Close] Close AFTER you enter the above information

Data Entry

Move and Delete

Move a Tree in the Inventory
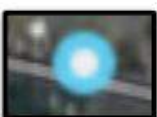
Let's move the Tree you just added, (in case the tree was added a bit off the canopy image)

MOVE — Move Tree by clicking <Move Icon> from the upper right (Which will deselect "Add")

ADD   MOVE   LOG OUT
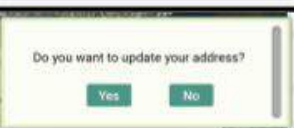
Click & Drag your white tree dot (it should outline in blue)

Are you sure you want to move this point?
Yes   No

Click <Yes> when asked "Are you sure you want to move this point?"

Do you want to update your address?
Yes   No

Click <Yes> when asked "Do you want to update your address?"

Your Tree is Moved!

MOVE — Click the <stop icon> in the upper right to stop moving Trees

Delete a Tree in the Inventory
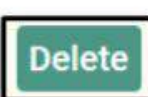
Let's delete the Tree you just added, (in case a tree was added by mistake)

Details — Click your white tree dot

Popup "Primary ID" window should appear
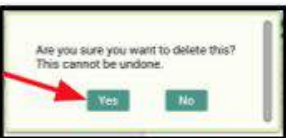
Click <Details> in bottom left

Primary ID 22397
Tree
Last Modified   01/06/2019
Common Name
Address   52 Prospect Street
Height Range
Land Use
DSH
Details Eco-Benefits Data Table
Street View   Share

Delete — Click <Delete> in the upper left

Tree Details
Delete   Close   Load Last

Are you sure you want to delete this? This cannot be undone.
Yes   No

Click <Yes> when asked "are you sure you want to delete this? This cannot be undone." to confirm deletion.

Your Tree is Deleted! & You are done with the exercise!

Data Entry

Offline Version

Training Video

This feature will be used primarily used by a team leader planning a mapping session for an area where there is no cell coverage.

The area needs to be saved offline BEFORE the mapping session.

Zoom in & out

Find an Address

Your Location

Map Settings

OFFLINE 2.65

Login

Save Map

Add Tree

Sync

Save Map

Select the Area and Organization

Lihue

Add Tree

Sync to save
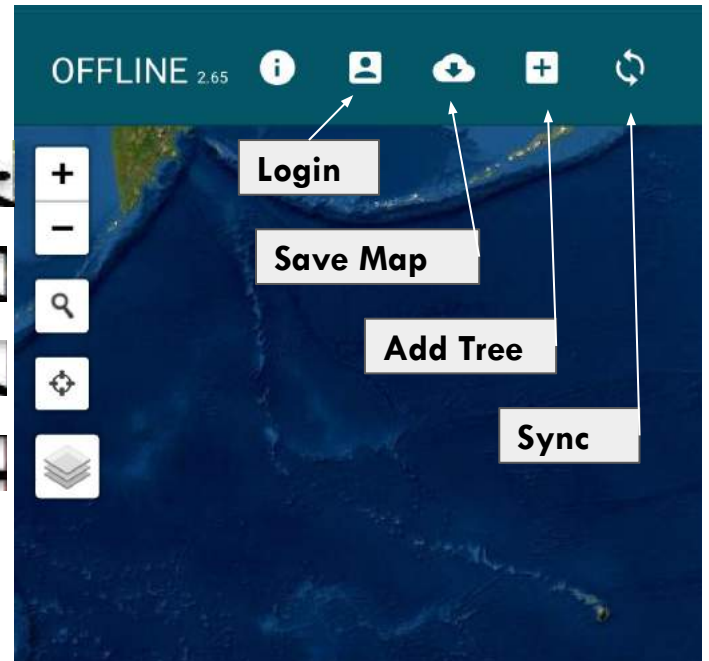
Interacting with the Community

CITIZEN FORESTERS ARE THE VOICES FOR OUR TREES!

An important component of the Citizen Forester program is communicating with the public. Urban foresters work in urban areas; "urban" by default means people will be around!

Citizen Foresters spend time on the streets, in parks, neighborhoods and communities with tree equipment and data sheets, looking up at and mapping public trees – sometimes that attracts attention!

We use this opportunity to spread the message of our urban forests.

While interacting with the community is mostly positive and fun, we want all of our ambassadors to feel comfortable and safe!
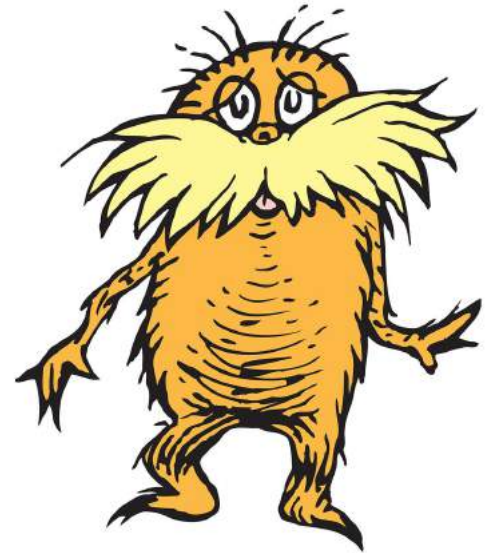
Defining Your Message

Citizen Foresters are often approached by community members, which provides a fun opportunity to educate your neighbors on the importance of our urban forest. Be sure to have an "elevator pitch" ready when someone asks you..

"Why are *you* mapping Trees?"

COMMON "AUDIENCES":

It may be appropriate to adjust your message depending on the audience.

- Residents
- Tourists
- Business Owners
- Home Owners

OUTREACH MATERIALS: Informational and educational hand-outs will be provided to each team leader to have on hand for each meetup that allows broad distribution to a large audience. Material can not only be used actively during outreach activities, but also given individually to people interested when out in the field.

REMAIN PROFESSIONAL. Please remember, while out in the field, you are representing the program and we ask you always remain professional.

PLEASE REPORT any abnormal interactions to program staff in your mapping report. Your team leader will be trained on this. Refer to your informational cards if anyone has questions about the program, and of course, have fun!

Interacting with the Community

Tips!

Tip #1 Make a Plan:

Assess your safety first and foremost. If you are uncomfortable in any way, let someone know. Have a plan in place with your team to leave or report the situation.

Tip #2 It's OK Not to Know:

People will surprise you with the questions they have about trees! You don't need to try and answer any questions you may not have the answer to, it is better if you are able to point them in the right direction to get the right answer instead.

Tip #3 Not Every is Going to Like Trees:

Yes, it may seem crazy to think that some people dont like trees, but its true! It may be a good opportunity to share why trees should be loved – but if you are dealing with someone who is unhappy with our activity, program or who is looking to cause a problem. It is best to kindly leave the conversation and/or the location.

Tip #4 Practice your Pitch:

What do *you* want people to know about trees? What is *your* message? This program gives volunteers a great platform to share your message with the community. Remember, this might be different depending on who you are interacting with.

Tree Planting

Planning ahead is the most important step you can take to ensure that the time and money you invest in planting a new trees is well spent. The key to successful landscaping is to plant *the right tree in the right place*.

What will the tree look like when it is mature? Above all, find out how tall and what shape your tree will be when it is fully grown to make sure that fits in the space and purpose you have for the tree.

Visit the [US Forest's Tree Owner's Manual](#) for a complete guide to planting

Selection

Site assessment
- Are there growth obstacles for the crown, trunk and roots?
  - Structures, walks, overhead and underground utilities, etc.
- What are the soil, water and light conditions? Will these conditions be suitable for this species?
- Can the tree thrive on this site for many years?

Installation

- Dig the hole 2-3x as wide as the rootball, and 90% as deep as the rootball.
- Backfill with parent soil
- Water to reduce air pockets
- Ensure roots spread
- *If staking,* use root support system
- Mulch!

The top of the tree ball should be slightly higher than the surrounding finish grade.

Water thoroughly to eliminate air pockets and settling, and to soak the ball and the surrounding soil.

Do not fertilize until late spring of the second year following planting.

2 to 4 inches of woody mulch: aged wood chips, shredded bark, or similar. NEVER MOUND MULCH at the tree trunk. Think donut, not volcano.

Planting base of undisturbed soil to support root ball and reduce settling.

Early establishment

Monitor general condition and well-being **weekly for first 3 to 6 months**
- Water needs
- Structural Pruning
- Weed management
- Mulch management,
- Insect and disease signs and symptoms

Long-term care

Monitor general condition and well-being **monthly for life of tree**
- Structural/corrective Pruning
  - Minimum pruning for safety and obstacle clearance *as required*
- Protection from damage
- Mulch management
- Weed management

FAQ & Example Responses

What is the Citizen Forester Program?	⟹ The Citizen Forester program is a community project that trains, certifies and supports volunteers to collect urban tree inventory data. (Hand them a postcard)
Do you work for the City? Who do you work for?	⟹ All Citizen Foresters are trained volunteers. The Citizen Forester program is a collaborative project of federal, state, and city partners, including: State and Private Forestry branch of the U.S. Forest Service, DOFAWs Kaulunani Urban and Community Forestry Program, the nonprofit Smart Trees Pacific and the Urban Forestry Division of the City and County of Honolulu. (Hand them a postcard)
Who do I call if I have a problem with my tree? A tree on my street?	⟹ The Urban Forestry Division of the City and County of Honolulu has several numbers for tree related inquiries. (Hand them a postcard and/or point them to Honolulu.gov)
Why are you mapping my tree? Why are you on my property?	⟹ Our volunteers should NEVER be on private property. The Citizen Forester program only maps trees in the city's "Right-of-Way". We ONLY work in public spaces and work from a map provided by the city. Sometimes it is difficult to distinguish a city-owned tree from a private tree, but our volunteers are trained to assess this. We are happy to share with you how we map and why its is important! (Hand them a postcard)
How can someone join the program?	⟹ The program offers trainings throughout the year. We are always happy to have more volunteers join the program. You can sign up online. (Hand them a postcard)

Safety Awareness

- Citizen Foresters don't map in construction zones, blindspots, busy roads without sidewalks, etc.

- Citizen Foresters are requested to wear provided t-shirts for visibility (Safety vests are also available).

- Citizen Foresters work in groups. We have a minimum of three (3) volunteers for a meetup to run.

- Team Leaders will designate a safety person during each session, and will hold a first aid kit.

- Citizen Foresters don't map in poor weather conditions, for safety reasons.

- Staff will notify volunteers when masks are required, based on State mandates and current COVID-19 count status.

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Glossary

COMMON NAME: a name by which a tree may be known to people in a particular region or discipline. A particular species may be known by a multitude of common names, and a particular common name may be used to refer to more than one species. (see: Latin Name). For the purpose of this program, we use common names based on city records to better align for management needs.

CONDITION: a general assessment of overall tree health.

CROWN: The upper part of a tree, typically composed of large, scaffold limbs that support smaller branches, twigs, leaves, and buds.

CROWN SIZE: Tree crown size is measured as diameter (in feet) of the width of the branches at their greatest extent.

CULTIVAR: a cultivated variety of a particular species.

DENSITY: refers to the relative transparency of the crown; the greater the density, the less wind or light can penetrate the crown.

DIEBACK: One measure of tree health is crown dieback. Dieback is measured as the percent of branch tips in the crown that are dead.

DSH: Diameter Standard Height; also referred to as DBH; the diameter of the trunk of a tree at breast height (4.5 ft or 1.37 m from the ground). Unit of measurement in our project is in inches.

GROWING SPACE: also referred to as site type; description of the tree's immediate location or planting site

HEIGHT: Tree height is the vertical distance between a horizontal plane running through the top most point of a tree and a horizontal plane running through the mid-slope point of the base at ground level.

RANGE FINDER/ HYPSOMETER: a tool that can be used to calculate tree height.

LAND USE: the way the property around (or adjacent to) the tree is used by humans

LATIN NAME: also referred to as a scientific name; Latin names are based on the binomial system of nomenclature, developed by Carl Linnaeus in the 1700s. The binomial system of nomenclature is structured so that the Latin name of a plant consists of two names: (1) the genus or generic name, and (2) the specific epithet or species name. Latin names are universal, meaning, they remain the same worldwide providing certainty that scientists are referring to the same species.

LIVE CROWN RATIO: the ratio of the height of the crown to the height of the tree {(crown height / tree height) × 100].

PIT SIZE: The area allocated for tree planting.

STEM: For the purpose of data collection, the stem is the main trunk of the tree. Normally, stems are the tree's structural axes that supports leaves. Trunk, limb, bough, branch, and twig are all names used to describe tree stems.

STICK METHOD: a method for estimating tree height.

WRA SCORE (Weed Risk Assessment): The weed risk assessment is a screening tool to assess a plant before it is imported or widely planted in Hawaii. Botanists look up published and on-line information to answer 49 questions about a plant's biology, ecology and invasive tendencies elsewhere. The answers to these questions result in a score that predicts whether a plant is likely to be invasive in Hawaii or other tropical Pacific islands sharing a similar climate. Learn more here: https://sites.google.com/site/weedriskassessment/

References

Urban and Community Forestry Resources in Hawaii

- Aloha Arborist Association: http://alohaarborist.com/
- Arbor Day in Hawaiʻi: http://www.arbordayhawaii.org/index.htm
- Landscape Industry Council of Hawaiʻi: http://www.hawaiiscape.com/
- Forestry Extension – University of Hawaiʻi College of Tropical Agriculture and Human Resources: http://www2.ctahr.hawaii.edu/forestry/
- The Outdoor Circle: http://www.outdoorcircle.org/
- University of Hawaiʻi Master Gardener Program: http://www.ctahr.hawaii.edu/uhmg/tropical-topics.asp
- Hui Manu-O-Kū (HONOLULU ONLY; Tree Trimming tips to protect white terns & citizen science monitoring): http://www.whiteterns.org/

Invasive Species Resources in Hawaii

- Hawaiʻi Invasive Species information portal (HISC, ISCs, CGAPS): http://www.hawaiiinvasivespecies.org/
- Hawaiʻi Pacific Weed Risk Assessment: https://sites.google.com/site/weedriskassessment/
- Plant Pono: http://www.plantpono.org/

Urban and Community Forestry Resources Outside Hawaii

- National Arbor Day Foundation: http://www.americanforests.org/
- American Forests website: http://www.americanforests.org/
- International Society of Arboriculture: http://www.isa-arbor.org/
- Trees Are Good – provides quality arboriculture/tree care related information: http://www.treesaregood.com/
- USDA Forest Service Urban and Community Forestry: http://www.fs.fed.us/ucf/

Manu o Kū

Learn more at
www.WhiteTerns.org

The **White Tern or Manu o Kū (*Gygis alba*)** is a seabird that nests on many islands in the tropical and subtropical Pacific, Atlantic, and Indian oceans.

They are common in the northwestern Hawaiian Islands, but in the main Hawaiian Islands **they live only on Oʻahu and only in urban Honolulu**.

The Manu o Kū is unique among tree roosting seabirds in that they *don't* build nests. Instead tern mothers lay a single egg directly on a tree branch or other flat surfaces. Cut branches provide nesting cups for Manu o Kū, improving nesting success rates, so arborists and tree trimmers may be *improving* white tern habitat by trimming trees while opening the canopy for the mature birds to easily access the upper branches of urban trees.

What Is The Law?

Under State and/or Federal law, no person shall or attempt to pursue, hunt, take, capture, kill, possess or transport any White Tern adult, egg, or chick, nor remove, damage, or disturb a White Tern nest.

Under Hawaii State law, the penalty for a first violation is a fine of not less than $250, imprisonment or both. In addition, the Department of Land and Natural Resources (DLNR) may impose an administrative fine of up to $5,000 per specimen.

Under Federal law, penalties can range from $150 up to $15,000 and may include imprisonment.

Tern chick is clearly injured, in tree or on the ground and/or clearly abandoned

Tern chick is on the ground and I don't know where it fell from

I see a brooding tern in a tree!

Tern chick is on the ground and I see where it fell from

Call the Manu o Kū Hotline (808) 379-7555

Attempt to put it back, carefully.

If you are unsure of how to handle the chick or if the bird is unsafe

Coconut Rhinoceros Beetle

Coconut Rhinoceros Beetle Information

SMART TREES PACIFIC

CRB RESPONSE

The Coconut Rhinoceros Beetle (CRB) is native to South East Asia and has spread through parts of the Pacific. It was detected on Oahu at the Honolulu Airport in Dec. 2013. Following this find, an emergency response program was created.

EGG
LARVA
PUPA

2.5 inches

Look-alike Beetles:

Dung Beetle

Oriental Flower Beetle

CRB
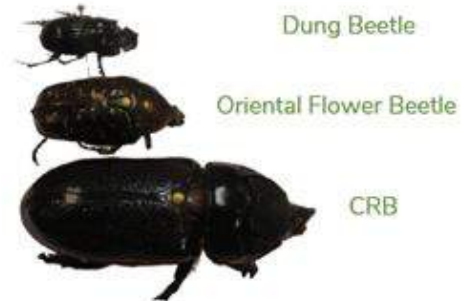
CRB are large black beetles with a horn. The can reach up to 2.5 inches in length as adults. The use their horns and strong arms to burrow into emerging fronds damaging the tree.

CRB feed on palm hearts and emerging fronds, creating V-cuts or bore holes. As they feed they leave behind a distinct 45 degree cut with scalloped edges. On fan palms the leaf damage is similar to a paper snowflake. Extensive CRB damage results in the death of the palm. CRB are a pest to coconut, royal, date, and fan palms; as well as other tropical crops.

45 degree V-cuts

Borehole

Snowflaked pattern of fan palm

Additional Resources

Tree Related Inquiries

City and County of Honolulu, Oʻahu.

Neighbor islands may be directed to local contact.

Tree Incident	Department	Phone Number
Tree Emergency- fallen tree or branch (if someone is injured, state that it is an emergency)	Honolulu Police Department	911
Malicious tree damage or removal	Honolulu Police Department	911
Street trees: tree pruning, planting, or removal	Department of Parks and Rec - Horticulture Services Branch	808-971-7151
Manu-o-Ku Hotline: (Report a chick that fell from its nest or injured bird)	Hui Manu-O-Kū	808- 379-7555
Tree donations	Department of Parks and Rec - Horticulture Services Branch	808-971-7151
Sidewalk uplift and unauthorized plantings	Dept of Planning and Permitting - Residential Code Enforcement	808-768-8159
Tree interfering with voltage/power lines	Hawaiian Electric Vegetative Management	808-543-7836
Trees on State highways or adjacent to freeway/highway overpasses, on and off ramps	Department of Transportation	808-831-6712
Trees and shrubs located in/near streams; Uplift on roadway or medial curbing	Department of Facility Maintenance - Division of Road Maintenance	808-768-3600
Tree located in private property protruding into sidewalk area	Department of Parks & Rec -Residential Code Enforcement Branch	808-768-8159
Tree located in private property protruding into other private property	Civil matter, not under City jurisdiction	n/a

County of Kauai

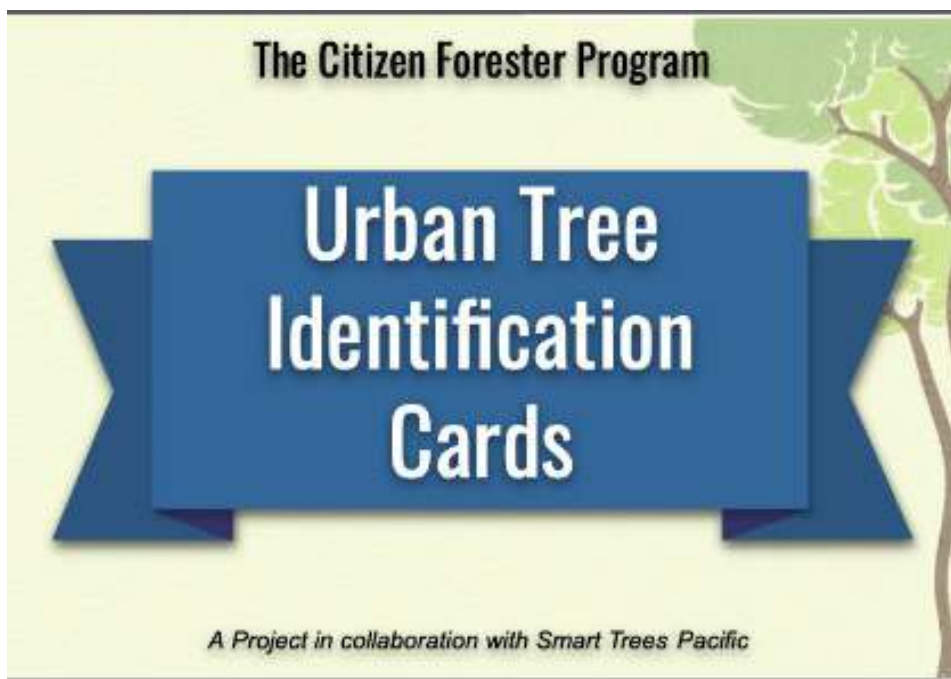| Tree Incident	Department	Phone Number
Tree Emergency- fallen tree or branch (if someone is injured, state that it is an emergency)	Kauai Police Department	911
Malicious tree damage or removal	Kauai Police Department	911
Street trees: tree pruning, planting, or removal	Department of Parks and Rec	(808) 241-4460

Common Name	Latin Name	Notes (Bark Type, Leaf Type, Seeds? Flowers? Nuts?)
Formosan Koa	*Acacia confusa*	Resembles native koa, invasive **Stem:** rough, both singular and multi-trunked common **Leaves:** 4'' long narrow, curved, parallel veins, waxy, leathery, alternately; smaller than true koa **Flowers:** at end of stem, balls of yellow flowers ½'' **Seed:** flat, green to brown linear spiral-like pods 4''
Baobab	*Adansonia digitata*	Deciduous and Large **Stem:** girthy trunk, bottle-shaped, smooth, shiny bark **Leaves:** simple, digitate, 5-9 dark green glossy leaflets **Flowers:** large, heavy, white, open for one-night, multiple stamens, die in 24 hours. Largest recorded Baobab is at the University of Hawaii at Manoa
Manila palm	*Adonidia merrillii*	**Stem:** grey, circular leaf scars, evenly spaced **Leaves:** large, pinnate, compound, arched upwards, leaflets droop down, light green crown shaft **Fruit:** Large bunches oviod drupes, green turn red w/ maturity **Flower:** grouped in 3, in long branches. More compact than Royal Palm
Alexander Palm	*Archontophoenix alexandrae*	Aka King Palm **Stem:** one light-grey trunk, smooth, circular marked multi-colored stem **Leaves:** large, stiff, feather-shaped, pinnate, dark-green top, silvery bottom **Fruit:** round, bright red when ripe **Flower:** creamy-white below crown shaft
False Wiliwili	*Adenanthera pavonina*	Deciduous **Stem:** slightly buttressed, greyish brown bark **Leaves:** bipinnately-compound, 2-6 pairs of leaflets **Flowers:** 2mm, star-shaped, white to dull orange **Fruit:** Seedpods thin, curved, green to mature woody black, coiled, splitting **Seeds:** 12 shiny red, hard, lens-shaped
African Yellowwood	*Afrocarpus sp.*	Conifer **Height:** +100ft **Stem:** flaky, ridged, grey-brown to reddish, trunk can reach ~3-10ft wide **Leaves:** spirals, small, narrow, 1.5'' long, leathery, waxy **Cones:** male cone is brown spiral scales, 1-6'' long, female cone 1 scale with 1 green-grey round seed <1'' long
Monkeypod	*Albizia saman*	Semi-deciduous **Stem:** crooked, wide spreading branches, yellow-grey-brown, smooth bark **Height:** ≤100ft **Leaves:** bipinnately compound, velvety w/ 4-8 leaflet pairs, opposite, fold/shrink in rain & evening **Flowers:** white below, pink above in leaf axils, fine hairy **Pods:** straight 1-2cm long
Candle-nut Tree	*Aleurites moluccanus*	**Stem:** DSH up to 36'' **Height:** <50-80ft **Leaves:** silvery-pale green, simple, ovate, or trilobed sometimes five-lobed **Nut:** round, 1.5-2.5'' diameter **Flowers:** terminal cymes, 10–15cm long. 5 creamy–white petals surrounded by smaller flowers
Norfolk island pine	*Araucaria heterophylla*	"Living Christmas Tree" (although not a true pine) Distinctively symmetrical **Stem:** Tall, straight, wide-spaced horizontal branches, grey-brown scaly bark **leaves:** awl-shaped **Cones:** squat globose, 10–12 cm long
Hong Kong Orchid	*Bauhinia blakeana*	Hybrid originating from Hong Kong in 1880 **Height:** 20-40ft **Stem:** often multi-trunked, drooping branches **Leaves:** large, thick, double-lobed, heart-shaped, butterfly-shaped, 3-4'' long **Flowers:** striking purple-pink, fragrant, 4-6'' across, white anthers **Fruit/Seed:** none! Hybrids are sterile
Alibangbang Orchid	*Bauhinia hookeri (syn)*	**Stem:** often multi-trunked, flaky bark **Leaves:** compound, 2 leaflets, sessile, round **Flowers:** white, 5 petals, long red anthers/stamens **Fruit/Seed:** flowering followed by flat pods containing multiple seeds
Tree Wisteria	*Bolusanthus speciosus*	Deciduous, semi-evergreen **Stem:** brown-grey, rough, deeply fissured, low drooping branching **Flowers:** Distinctive purple, pea-like in bunches **Seed:** Flowering followed by papery brown fruit pods, hang in clusters, never split drooping **Leaves:** spirally arranged not to be confused with jacaranda
Red silk cotton tree	*Bombax ceiba*	Deciduous **Stem:** straight, spikes tall **Flowers:** red, 5 petals, cup-shaped, **capsule** when ripe contains white fibers like cotton
Geometry, Jucaro	*Bucida buceras*	**Height:** 40-50ft **Stem:** smooth, dense crown **Leaves:** simple, obovate, pinnate, dark blue-green, leathery, 2-4'' long, clustered at branch tips **Fruit:** oval, 1/2'', black
Red Bottlebrush	*Callistemon citrinus (syn)*	**Height:** <20ft **Stem:** fibrous, papery bark **Leaves:** alternate, 1-4'' long, hard, flat, narrow, egg-shaped, narrower near base, visible veins & oil glands on both sides **Flower:** distinctive brush-like red, spikes, 2-4'' long, 30-45 stamens **Fruit:** woody, cup-shaped
True Kamani	*Calophyllum inophyllum*	**Stem:** twisted, low-branching, rough grey bark **Height:** ~20-60ft **Leaves:** dense foliage, +5 veins, irregular crown, large stiff, shiny, blunt tip, yellow-green midrib **Flowers:** 1'' paniculate, 4-15 flowers, flower perennially **Fruits:** round, green drupe, 1-1.6'', large seed
Be-Still Tree	*Cascabela thevetia*	Poisonous, evergreen tree, Yellow oleander **Leaves:** alternate, willow-like, linear, lanceolate, glossy, waxy **Flowers:** 3'' long funnel-shaped, fragrant yellow **Fruits:** dark red black, large seed 1" diameter. All parts of tree are toxic
Golden Shower	*Cassia fistula*	**Height:** ~33-66ft **Stem:** slightly droopy branches **Leaves:** pinnate, compound leaves, 4-8 pairs of leaflets, 3-8'' long **Flower:** Small, yellow flowers in racemes, flowers 1-3'' long w/ 5 petals **Seed:** distinctive long, brown seed capsules w/ several seeds	Not to mistake for **Rainbow Shower**

Common Name	Latin Name	Notes (Bark Type, Leaf Type, Seeds? Flowers? Nuts?)
Ironwood	*Casuarina equisetifolia*	Invasive **Height**: ≤100ft **Stem:** rough, grey-brown, flaky; drooping branches **Leaves**: Tiny, scale-like, in whorls of 6-8, 9-15'' long, pine needle-like **Flower**: light brown, tiny inconspicuous **Fruit:** rounds, ½-¾'' wide, hard, warty, pinecone-like, brown
Rainbow Shower	*Cassia x nealiae*	**Height:** ~33-66ft **Stem**: slightly droopy branches **Leaves**: pinnate, compound leaves, 4-8 pairs of leaflets, 3-8'' long **Flower**: Small, often multi-colored, pink to yellow in racemes flowers 1-3'' long w/ 5 petals **Seed**: none! Hybrids distinctively have no seeds or pods unlike Yellow showers
False Olive	*Cassine orientalis*	**Height**: 15ft-40ft **Leaves**: Juvenile leaves: shiny, narrow, bright red mid-rib, smooth edges; adult leaves: wide, oval, serrated margin
Yokewood	*Catalpa longissima*	Semi-deciduous **Stem**: DSH up to 36'' fissured, light grey bark **Leaves**: simple, opposite oval, pointed tips, 3-5'' long , **Flowers**: white to lilac w/ purple and yellow lines inside floral tube, 1'' long, panicle **Fruit** very long slender, thread-like capsule
Satin Leaf	*Chrysophyllum oliviforme*	**Height:** 10-30ft **Stem:** usually 1 trunk, thin gray-brown bark w/ fissures **Leaves**: simple, alternate, ovate, shiny, dark green on top, light brown on bottom, distinctive coloring **Flowers**: small, creamy yellow, 5 petals, 5 stamens **Fruit**: small green turning dark purple w/ several black seeds
Indonesian Cinnamon	*Cinnamomum burmannii*	**Stem**: average 5-15'' DSH, aromatic bark, smooth, angular branches **Height:** <25ft **Leaves**: glossy, green, oval 4'' long, 1.5'' wide **Flowers**: Small yellow **Fruits**: dark drupes.
Fiddlewood	*Citharexylum spinosum*	**Height**: up to 49ft **Stem**: fissured **Leaves**: leaves can have orange tone as tree ages, ovate to elliptic, 1.5-8'' long **Flowers**: orange petioles, small white flowers hang in racemes and panicles, 8-16'' long Fruit: red to black sub-globose drupes
Autograph tree	*Clusia rosea*	Epiphyte **Height:** 30-60ft **Flowers:** 3'', 6-8 broad round petals, last <24 hours **Seed:** 3'' diameter seed capsules. Dried, split into thick flower-like segments, w/ red seeds **Leaves:** thick, leathery, dark green, opposite, egg shaped
Coconut Palm	*Cocos nucifera*	Indigenous**,** Niu **Stem:** slender, leaning, ringed, swollen base **Leaves**: giant, pinnate, feather-like, downward facing **Fruit**/**Seed**: coconuts, 12-18'' in length, thick fibrous husk **Flower**: creamy-white, yellow, elongated clusters 4' long
Silver Buttonwood	*Conocarpus erectus*	**Height:** 15-20ft **Stem:** usually multi-trunked, dark brown, ridged, scaly bark **Leaves**: simple, alternate, oblong, pinnate, 2-4'', silver-blue-green color, silky hairs **Flowers**: small, green in dense cone-like heads **Fruit**: flowering followed by ½'' cone-like red-brown fruits
Geiger Tree	*Cordia sebestena*	Introduced **Stem:** naturally multi-trunked, droopy branches **Leaves**: dark green, leathery, alternate ovate 7'' long, wavy margins; smaller, rougher than True Kou **Flowers**: clusters, tubular, flaring, 2'' wide; darker orange flowers than True Kou **Fruit:** pear-shaped fleshy, white, fragrant
True Kou	*Cordia subcordata*	**Stem:** straight, erect, groove/fissures, flaky, pale grey bark **Leaves**: large, smooth, oval-shaped, alternate, wavy edges, blunt-pointed ends, visible veins, shiny tops, dull bottoms **Flowers**: clusters, scentless, bright orange, funnel-shaped, 5-7 wrinkled petals **Fruit:** dark, woody
Royal Poinciana	*Delonix regia*	**Stem:** large, buttressed trunk, horizontal branches **Leaves**: bipinnately compound, feathery, 20-40 pairs of leaflets, 10-20 pairs of secondary leaflets **Flowers**: large, 4 spreading red petals, 3'' long, 5th upright petal spotted w/ yellow-white **Fruit:** pods, green, flaccid turned dark-brown & woody
Earpod	*Enterolobium cyclocarpum*	**Stem**: light grey bark, prominent dark reddish-brown vertical fissures **Leaves**: alternate, bipinnate, compound, pinna w/ 40-70 leaflets, slender oblong **Fruit**: glossy, dark-brown spirally-organized pods, orbicular disks.
Indian Coral Tree	*Erythrina variegata*	aka Tiger claw Deciduous **Height**: ~30-50ft **Stem**: fluted trunk, thick ,sappy, some have spiked branches **Leaves**: alternate, pinnate, three 8'' leaflets, 8'' petiole, some are variegated **Flowers**: very showy, dense, dark clusters or racemes up to 8-10'' long, scarlet-red flowers, deep split on one side, claw-like **Fruit**: narrow, oblong pod, 4-6'' long, 5-10 dark brown seeds **Seed**: kidney-shaped, dark purple to red
Molucan albizia	*Falcataria moluccana*	**Invasive**, high risk, fastest-growing tree species in the world **Stem**: smooth, light, white-tan **Flower**: cream-white small **Leaves**: twice pinnately compound wide spreading, flat crown, large, long branches
Indian Banyan	*Ficus benghalensis*	**Stem**: aerial roots turn to woody trunks, large trunks, wide spreading crown **Height**: up to 100 ft **Leaves**: ovate to elliptic, prominent veins **Flowers**: monoecious **Fruits**: paired in leaf axils, red to orange when ripe
Benjamin Fig	*Ficus benjamina*	Weeping Fig **Stem:** bark is thin, greyish, drooping branchlets **Height:** large**,** 45ft-60ft **Leaves**: thick, glossy, 2-5'', oval, acuminate tips, some curly edges, alternate, simple leaf **Fruit**: red figs

Common Name	Latin Name	Notes (Bark Type, Leaf Type, Seeds? Flowers? Nuts?)
Fiddle-leaf Fig	*Ficus lyrata*	Commonly starts as epiphyte (in the crown of another tree) **Height:** up to 30-50ft **Leaves**: distinctive - lyrate, variable, broad apex, narrow middle, resemble a fiddle, up to 18'' long leathery, **Fruit:** green fig, but rarely bloom in HI
Moreton Bay Fig	*Ficus macrophylla*	**Stem**: can be massive, thick buttressing, ~8ft diameter, grey-brown, blemished bark, aerial roots **Height:** can reach 200 ft **Leaves**: large, elliptic, alternate, leathery, dark green top, brownish underside, 6-12in long **Fruits**: small, round, greenish, purple when ripe
Chinese Banyan	*Ficus microcarpa*	Epiphytic, **Stem**: smooth, light-gray bark, aerial roots, thick trunk **Height:** ~40ftt (world's tallest in Kauai 110ft!) **Leaves**: variable, coriaceous, oblong, elliptic to broadly elliptic or obovate **Fruit**: Sessile, depressed pyriform 8x10mm **Seeds**: less than 1mm
Fern tree	*Filicium decipiens*	**Height:** ≤98ft **Stem**: smooth, whitish bark **Leaves**: glossy, alternate, 5-10 pairs of narrow long leaflets up to 6'' long, wavy margin **Flowers**: narrowly paniculate, 5 sepals, 5 yellow petals **Fruit**: elliptical, drupe-shaped, turns shiny purple when mature with 1 seed
Lignum Vitae	*Guaiacum officinale*	"Tree of Life" Listed as Endangered by IUCN **Stem**: ~24in DSH **Height:** ~33ft **Leaves**: compound, 1'' in length **Flowers**: Blue, 5 petals **Fruits**: bright, yellow-orange with red flesh & black seeds
Golden Trumpet	*Handroanthus ochraceus subsp. neochrysanthus*	Not to be confused with gold tree or tecoma, Deciduous **Height**: ~25-50ft **Stem**: crooked, ~11-20 DSH **Leave**: palmately compound, oval leaflets, grey-green, gold underside is light brown and fuzzy **Flowers**: yellow, fragrant **Seed**: large brown pod over 3''
Tulipwood	*Harpullia pendula*	**Height:** ~20ft **Stem**: irregular, fluted, grey & scaly bark **Leaves**: dense crown, pinnate, alternate, 3-8 leaflets, short, blunt-pointed tip, visible veins & raised midrib on both sides **Flower**: panicles, greenish-yellow ½'' diameter **Fruit:** 2-lobed capsule, yellow or red, 2 shiny dark seeds
Looking Glass	*Heritiera littoralis*	**Stem**: pinkish/whitish-grey bark, smooth, flaky/fissured w/ age **Leaves**: spirally arranged, stalked leaves, leathery, stiff, egg-shaped, wavy, dark green above, silvery white to brown underside, 4-15cm **Flowers**: dull purple, bell-shaped, yellow clusters **Fruit**: woody, shiny, flattened
Jack in the Box Tree	*Hernandia nymphaeifolia*	**Stem**: light wood **Height:** over 16ft **Leaves**: narrow, broadly ovate, sub-circular 5-9 veins are palmate **Flowers**: white or greenish, fragrant **Fruits**: fleshy, waxy red or white **Seeds**: round, brown
Sea Hibiscus	*Hibiscus tiliaceus*	**Height**: 13-33 ft **Stem**: natural form is a bramble, can be pruned into tree form, Intertwined trunks & branches **Leaves**: simple, heart-shaped, 8'' long, pointed tip, hairy underside sometimes variegated **Flowers**: funnel-shaped, 5 overlapping petals, lasting only one day
Paraguay-Tea	*Ilex paraguariensis*	Yerba Mate, perennial **Height:** <50ft **Leaves**: evergreen, 1- 4'' long, 1-2'' wide, serrated margin **Flowers**: small, greenish-white, 4 petals **Fruits**: red drupes ¼'' in diameter in clusters
Jacaranda	*Jacaranda mimosifolia*	Can be Deciduous **Flower**: Distinctive Clusters of purple, fragrant, trumpet-shaped **Leaves**: fern-like, bipinnate compound leaves up to 20'' long
Sausage tree	*Kigelia africana*	**Stem**: wood is pale brown, yellowish, undifferentiated, spreading branches **Height:** up to 66ft **Leaves**: opposite or in whorls of 3, 12-20'', long, pinnate, 6-10 oval leaflets **Flowers**: panicles, bell-shaped, orange-maroon 4'' turn into fruit **Fruits**: up to 2ft long, weighs 15lbs looks like sausage
Crape-myrtle	*Lagerstroemia indica*	Deciduous **Stem**: Pinkish-grey, mottled, papery sheds yearly **Height:** <25ft **Leaves**: small, smoothed-edged, circular, oval, dark green to yellow in autumn **Flowers**: bright cone-shaped, crimped petals in panicles, 3 ½ ''
Giant Crape-myrtle	*Lagerstroemia speciosa*	Deciduous **Stem**: Smooth, mottled, exfoliating bark **Height**: 66ft Stem: Pinkish-grey, mottled, sheds yearly **Leaves**: Large, 8-12'' long, 4'' wide, grey-green, egg-shaped **Flowers**: erect panicles, 8-16'' long, white to purple, blossoms reach 3'' each Distinctive Pods
Magnolia	*Magnolia grandiflora*	**Height**: up to 90-100ft **Stem**: typically, single stem **Leaves**: simple, broadly ovate, smooth margins, stiff, leathery, large, dark-green, 8'' long, often rough underside w/ yellow-brown pubescence **Flowers**: wide, large, white, 12'' diameter, lemony fragrance, 6-12 petals, waxy texture **Fruit**: rose-red, ovoid, 3-4'' long
Paperbark	*Melaleuca quinquenervia*	**Height:** 30-70ft **Stem:** conspicuous white-beige-grey papery flaky bark **Leaves**: grey-green, egg-shaped **Flowers:** arranged in spikes at end of branches, 5-18 groups of 3 flowers, white-cream **Fruit**: woody, cylindrical capsules .2'' clustered

Common Name	Latin Name	Notes (Bark Type, Leaf Type, Seeds? Flowers? Nuts?)
African Mimusops	*Mimusops caffra*	**Stem**: twisted, dark grey bark, wrinkled longitudinally. $\leq$50 cm (20 in) DSH **Height:** 12–82ft **Leaves:** alternate, hard, leathery, rounded tips. **Flowers**: white star-like, 0.39–0.79'' in bunches **Fruits**:.59–1'' long, fat, roundish to oval, red or orange-red when ripe
Mock Orange	*Murraya paniculata*	**Height**: up to 23ft **Leaves**: glabrous, glossy, 3-7 odd pinnate leaflets, elliptic to rhombic **Flowers**: terminal, small, white-cream, fragrant **Fruit**: small orange to red fruit like kumquats, not at trees bear, 1'' long
Madagascar-Olive	*Noronhia emarginata*	**Stem:** smooth bark, flattened terminal twigs **Leaves:** simple, leathery, opposite, elliptical, 6'' long, yellow veins; dense crown **Flower**: small yellow fragrant, 4 lobed corolla **Fruit:** greenish-yellow, turning dark purple
Hala / Screwpine	*Pandanus tectorius*	**Height:** ~15-30ft **Stem**: conspicuous prop roots, prickly stems **Leaves**: sword-like, 2-6ft long, sharp toothed margins, some variegated **Flower**: males produce highly fragrant, cream-white flowers **Fruit**: conspicuous pineapple-shaped
Yellow Poinciana	*Peltophorum pterocarpum*	Deciduous **Stem**: straight, cylindrical, sometimes buttressed **Leaves**: bipinnate, 10-25'' long, 20 pinna w/ 20-40 oval leaflets **Flower**: yellow, large compound racemes, 8'' long **Fruit**: pod 2-4'' long, start red, black when ripe, 1-4 seeds
Allspice	*Pimenta dioica*	Evergreen tree **Stem**: highly branched, commonly ~30cm **Height:** 20-40ft **Leaves**: 3-6'' long oblong, leathery, aromatic **Flowers**: Creamy white in panicles **Fruits**: drupes ¼'', green, in clusters
Opiuma	*Pithecellobium dulce*	**Height:** 30-49ft **Stem**: spiny **Leaves**: bipinnate, single pair or ovate leaflets, 1-1.5'' long **Flowers**: greenish-white, fragrant, coiling, sessile, 4.7'' length **Fruit/Seed**: Flowers produce pod, pink when ripe, opens to expose seed, black shiny seeds
Plumeria	*Plumeria Sp.*	Mostly Deciduous **Stem**: widely spaced, thick succulent branches, thin, grey bark **Flowers**: 2-4'' tubular, 5 rounded, overlapping petals highly fragrant, multiple colors white, yellow, pink, and red. **Leaves**: alternate, round or pointed tips, smooth or corrugated, glossy or dull green; some spoon shaped, visible veins; large-leaved foliage, leathery, fleshy, clusters near the branch tips, which may be evergreen depending on the type.
False Ashoka / Mast	*Polyalthia longifolia*	aka Cemetery Tree. **Height**: ~30ft Stem: yellow-white, light soft bark straight trunk, willowy-weeping branches **Leaves**: juvenile leaves are coppery brown, soft, delicate; older leaves become light to dark green, lance-shaped, wavy edges **Fruit**: clusters, 10-20 green turning purple-black. Can be pruned into tall, narrow form
Kiawe	*Prosopis pallida*	Introduced; the first kiawe was planted in Hawaii in 1828; Deciduous **Stem**: Bearing spines, irregular, often crooked, DSH $\leq$25'', corrugated **Leaves**: twice compound, gray-green when dry, 6-15 pairs per pinna **Seed**: elongated seedpod, 10 - 25cm long **Flowers**: fluffy, yellow, arranged in elongated clusters, 5-14cm
Gold	*Roseodendron donnell-smithii*	Deciduous with vase-shaped crown **Height:** up to ~80 ft **Leaves**: simple, 3-7 leaflets **Flowers**: bright yellow, clusters at branch ends, flowers when tree is leafless **Seed:** thin, flat, surrounded by papery wing, elongated pods 9-19'' long
Narra	*Pterocarpus dalbergioides*	Semi-deciduous, listed as Vulnerable **Stem**: straight, cylindrical w/ ascending branches, buttressed roots, corrugated bark **Leaves**: alternate, pinnately compound, 5-9 leaflets **Flowers**: small, yellow, panicle at branch-ends **Fruit**: flat, round, winged w/ single kidney-shaped seed
Octopus Tree	*Schefflera actinophylla*	aka Brassaia Epiphytic, Weedy **Height:** $\leq$40-49ft **Stem:** usually multi trunked **Leaves**: alternate, palmately compound, 7-8 leaflets **Flowers**: top of tree, 3ft wide flower clusters, racemes <6.5ft long, 1000 small red flowers, octopus like, Similar to Trumpet, but green underside not white (Trumpet)
Pepper Tree	*Schinus molle*	Bark, leaves & berries are aromatic **Height**: <50ft **Stem**: grayish bark, twisted, drips sap **Leaves**: pinnately compound, 19-41 alternate leaflets **Flowers**: small, white, panicles, on drooping branches **Fruit**: small round drupes w/ woody seeds turn from green to purple-pink
Panama	*Stercula apetala*	Perennial and deciduous. **Stem**: straight, cylindrical, large buttresses **Height:** Tall **Leaves**: alternate, palmate, 5 lobes, clustered **Flowers**: purple & yellow, 5 sepals,2.5-3.5 cm **Fruits**: compounds of <5 follicles, <30cm. with seeds & orange hairs. **Seeds**: black ellipsoids, 2.5 x 1.5 cm
African-tulip Tree	*Spathodea campanulata*	**Stem**: greyish, furrowed, rough bark **Leaves**: glossy, pinnate, compound, 18'' long, 7-19 oval leaflets 4-6'' long; new leaves bronze becoming green, light green underside **Flower**: Clusters of velvet brown claw-like buds, 5'' long trumpet-shaped red-orange flowers
West Indian Mahogany	*Swietenia mahagoni*	Deciduous in drought **Height**: up to 50ft **Stem**: often short trunk, multi-branched, buttressed **Leaves**: compound, 4-8 leaflets **Flower**: white to greenish, small, 5 petals **Seed**: flowering followed by large, brown pod

Common Name	Latin Name	Notes (Bark Type, Leaf Type, Seeds? Flowers? Nuts?)
Fiji Fan palm	*Pritchardia pacifica*	**Height:** 10-20ft **Stem:** one trunk, fiber pattern at base, smooth, ~20'' DSH **Leaves**: palmate, fan-shaped, 7'x6', no spines along petioles **Fruit**: green spherical, turn red then black when ripe, single seed **Flower**: fragrant, brownish, growing among leaves.
White Tecoma	*Tabebuia berteroi*	**Height:** ~20-30 ft **Leaves**: palmately compound, oval, 3-5 leaflets, 2.5'' long, smaller than pink tecoma, dull, dark green leathery upper w/ lighter scaly underside **Flowers**: pale magenta-white, bell-shaped blooms 1-2'' long **Fruit/Seed:** elongated pods
Pink Tecoma	*Tabebuia heterophylla*	**Height:** ~20-30 ft **Leaves**: palmately compound, oval, opposite, 2-4'' **Flowers**: pink-white, bell-shaped blooms in spring/summer followed by seed pods **Fruit/Seed:** brown, elongated dry pods
Silver Trumpet Tree	*Tabebuia aurea*	Often Deciduous **Stem:** crooked, usually 2-3 trunks, thick bark **Leaves**: palmately compound, long w/ 5-7 leaflets, each 2-7'' long, green with silvery scales both above & below. **Flowers**: bright yellow, 2-3'' diameter, clustered in loose panicle **Fruit:** slender 4'' long capsules
Lechoso	*Stemmadenia litoralis*	**Height**: 25ft **Leaves**: oval, glossy, large, visible veins, wavy edges **Flower**: tubular white, very fragrant **Seed**: distinctive pods, double horned, orange, split when mature
Tamarind	*Tamarindus indica*	**Height:** 15-20ft **Stem:** single trunk **Leaves**: dense crown, alternate, pinnately lobed, elliptic-ovular, close in the evening like monkeypod **Flowers**: inconspicuously red, yellow elongated flowers, 1'' **Fruit**: Distinctive long, brown, hard shelled legume, pod-like, fleshy edible inside
False Kamani	*Terminalia catappa*	aka Tropical Almond **Height**: up to 115ft **Stems**: horizontal branches **leaves**: 6-9'' long, broad, ovoid, glossy, dark green, leathery can turn red before fallen **Flower**: white to greenish, inconspicuous with no petals **Fruit**: drupe 2-3'' long, red when ripe, single seed, edible tastes like almond
Milo	*Thespesia populnea*	**Height:** ≤33ft **Leaves**: spirally arranged, stalked, leathery, triangular heart-shaped, distinct yellow veins **Flowers**: bell-shaped, solitary, yellow w/ maroon center Fruit: brown capsules, round to pear-shaped, 1-5cm across, can split into 5 parts
Beach heliotrope	*Tournefortia argentea*	Coastal tree found at 0-50ft elevation **Stem**: light brown, dark grey, deeply corrugated **Height**: ~20ft **Leaves**: simple, alternate, silvery gray sheen, silky 4-122'' in length **Flowers**: small white sessile, arranged in multi- branched cymes. 0.24'' in diameter **Fruit**: small, smooth .3'' long

The Citizen Forester Program

Urban Tree Identification Cards

A Project in collaboration with Smart Trees Pacific

Use the downloadable infield guide that includes pictures when you're out in the field for quick reference!

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