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City and County of Honolulu

Department of Parks and Recreation
Division of Urban Forestry (DUF)

Office of Climate Change, Sustainability and Resiliency (CCSR)



Urban Tree Plan

March 2019

City & County of Honolulu dpr PARKS & RECREATION

CITY AND COUNTY OF HONOLULU STATE OF HAWAII

RESILIENT O'AHU

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INTRODUCTION

Trees have always been an important part of the City and County of Honolulu (City). Urban forests across Honolulu have been and remain a vital environmental, economic, and social asset of the City. Though Honolulu's tree canopy coverage is near average for U.S. cities, we know that it is declining. The City is determined to maintain and conserve existing trees, and increase the area covered by tree canopy.

An urban tree canopy is defined as the layer of leaves, branches, stems and trunks of trees that cover the ground when viewed from above. Urban tree canopies not only protect the environment in which we live by reducing air pollution, and improving water quality, and providing wildlife habitat, but they also provide social and economic benefits. Trees reduce energy consumption by stabilizing temperature and thus save money; create shade and act as a wind and sound barrier; and reduce stormwater surface runoff. The improved aesthetic quality due to the presence of trees adds value to the properties in the area, as well as, improve mental health. Trees create places for active and passive recreation, and provide an opportunity to learn about plants and animals. They create a sense of place and pride in the community and bring the members of the community together. In short, trees provide many valuable and *free* benefits (see Appendix C).

In December 2017, Mayor Caldwell committed, via the Chicago Climate Charter[1], to the planting of 100,000 trees across the island of O'ahu by 2025. In early March 2018, Mayor Caldwell committed to increasing the urban canopy coverage across O'ahu to 35% by 2035[2]. By late March 2018, City Council passed Resolution 18-55[3], urging the City Administration to increase the city's urban tree canopy to at least 35% by 2035. As a City, we are committed to this urban canopy goal.

Neither tree goal is a City-only effort and will only be accomplished by increasing the number of trees planted and maintained on City properties (including street trees), State lands (urban, agriculture, and conservation lands), and private property (urban, agriculture, and conservation lands). This is a kākou effort.

A lead US Forest Service researcher whittles down 30 years of studying the economic value of forests to this advice: *If you can only plant one tree, plant it in an urban environment*.[4] Trees are critical urban infrastructure and necessary for the health of our communities. Often underappreciated, these environmental work horses provide multiple, and free, ecosystem services, and are important components of both climate change adaptation and mitigation. Trees are long-term investments in our future with significant returns on investment, providing critical environmental and social services for our communities. The heat mitigation and stormwater management benefits

[1] *https://www.resilientoahu.org/s/Chicago-Climate-Charter-Honolulu.pdf*
[2] *https://www.resilientoahu.org/s/Mayors-Tree-Proclamation.jpg*
[3] *http://www4.honolulu.gov/docushare/dsweb/Get/Document-204274/55.PDF*
[4] *https://www.citylab.com/solutions/2016/04/what-are-trees-worth-to-cities/478809/*

of a healthy urban forest can pay dividends on cooling and polluted runoff management costs, while also working to address other community environmental and social justice disparities.

As climate change is dually caused by heat trapping carbon emissions and loss of the ecosystem components which can capture those emissions, it is necessary to expand a shade-providing, carbon-sequestering urban forest as a mitigation and adaptation tool. For City street and park trees, it is important that we maintain accurate information on their numbers and condition for asset management. Based on a 2007 Municipal Forest Resource Analysis[5], for every dollar spent on tree care, Honolulu's trees provide $3 in benefits.

At the time of the analysis there were an estimated 235,800 municipal trees, 60% as street trees and the remainder in city parks. These trees provide the following benefits: 1) electricity saved – $8/tree/year; 2) carbon dioxide storage – 25,529 tons; 3) net carbon dioxide removal – 3,340 tons carbon dioxide/year, valued at $22,314; 4) stormwater runoff management – 35 million gallons/year, valued at $350,104. Trees are one of the few pieces of City infrastructure that accrues value over time.

At a time when we need increased investments in and stewardship of the urban forest, our urban tree canopy assessment shows a decline—nearly 5% of our total tree canopy in *just 4 years* (2010-2013).[6] The analysis showed that it is not from vast clearings, but from thousands and thousands of pinpricks across our communities, to a total of more than 76,600 trees. By maintaining and enhancing our urban forest we will foster the kinds of human environments that will allow residents to thrive in a changing world, while still having beautiful places that make us healthier and that we love.

This document describes the benefits of trees, sets goals, and a vision for the urban tree canopy in Honolulu. Implementation strategies to achieve those goals are then described in detail.

Mayor Kirk Caldwell at Thomas Square next to one of two Shower trees, planted in commemoration of the 150th anniversary of the first Japanese Immigration to Hawai'i,dedicated by Japanese Prince and Princess Akishino on June 5, 2018.

[5] https://www.resilientoahu.org/s/Hnl-Municipal-Forest-Resource-Analysis-2007.pdf
[6] http://www.smarttreespacific.org/projects/honolulu-urban-tree-canopy-assessment/

In summary, maintaining and enhancing Honolulu's urban forest can be defined in three categories[7]:

Policy & Planning

- **Acquire an up to date and complete assessment of Honolulu's urban canopy.** Using available services provided through 100RC partnerships, Honolulu can gather and analyze data as well as make a tool for urban forest planning. This also needs to be planned and budgeted for on a recurring 5-year cycle.
- **Update the comprehensive Urban Reforestation Master Plan.** All pertinent municipal departments must collaborate and devise a master plan for maintaining and enhancing Honolulu's urban forest.
- **Create a tree ordinance.** A more detailed and extensive ordinance for maintaining and protecting Honolulu's urban forest is necessary to uphold the Urban Forest Master Plan.
- **Acknowledge trees as public service providers in Revised Ordinances of Honolulu.** Trees must have the same rights as public utilities as they provide the public with similar services and benefits.

People & Implementation

- **Budget for and hire Community Foresters, Nursery Workers, and Landscape Architects.** An interface between the city and community is needed to implement an Urban Forest Master Plan, as well as, plant growers, and more support for internal City coordination on project design and project review.
- **Recruit and train volunteers.** As the city does not have staff to maintain all newly planted trees under this initiative, neighborhood champions must be identified and equipped with the skills and tools to maintain the trees in their neighborhood.

Practice & Maintenance

- **Trees and streets.** Trees are an integral component of Complete Streets, therefore streets should be designed with accommodation for healthy shade trees.
- **Trees and stormwater.** Trees can and should be utilized as tools for managing stormwater.
- **Trees and private property.** An incentive program or credit on the future stormwater fee would be beneficial for addressing the challenge of getting trees planted and maintained on private property.

[7] *I ulu no ka lālā i ke kumu, Maintaining and Enhancing O'ahu's Urban Forest*. 2018. Office of Climate Change, Sustainability and Resiliency, City and County of Honolulu, supported by the University of Hawai'i Sea Grant College Program. [I ulu no ka lālā i ke kumu / The branches grow from the trunk.]

Benefits of Trees

An urban tree canopy provides many benefits to the community, including:

Environmental Benefits

- ***Improved water quality***
  Tree leaves, branches, and stems intercept falling rain, filter out pollutants, and absorb stormwater. Some of this intercepted water evaporates back to the atmosphere and some soaks into the ground reducing surface runoff and erosion. The absorption power of trees also reduces the amount of water that a containment facility (stormwater retention facility) must hold.

  When stormwater hits an impervious surface, it not only picks up various pollutants such as lawn fertilizers, salt, oil, and others, it also increases the water temperature. This heated and polluted stormwater flows into receiving waters resulting in serious water quality degradation. Trees help improve the overall quality of water by reducing stormwater runoff, and absorbing pollutants.

- ***Improved air quality***
  Urban trees and shrubs improve air quality by removing pollutants from the air including nitrogen oxides, carbon monoxides, halogens such as chlorine and fluorine, and ammonia. Trees also reduce carbon dioxide while releasing oxygen as they photosynthesize.

- ***Stabilized temperatures***
  Trees provide shade that not only lowers stream temperature but also the ambient temperature by an average of 3 to 10 degrees Fahrenheit. Urban trees also help minimize the urban heat island effect. The urban heat island effect is a phenomenon in which temperature in metropolitan areas is significantly higher than the surrounding countryside. This phenomenon is caused by the impervious surfaces of the built environment that absorb sunlight and convert it into heat energy. Temperatures in some city centers have been measured 5 to 9 degrees higher than in the surrounding countryside[8]. Trees help stabilize temperatures around communities by covering impervious surfaces with shade and absorbing heat generated by those surfaces, nearby buildings, and vehicles.

[8] *Schwab, J. C. (2009). Schwab, James C., Planning the Urban, January 2009. Planning the Urban Forest: Ecology, Economy, and Community Development, American Planning Association, Planning Advisory Service, Report Number 555.*

- ***Wildlife habitat***
  Urban forests provide food and habitat for a variety of birds, animals, and fish. They also provide valuable resting grounds for migratory and protected species, such as our City bird, the Manu-o-Kū. Trees within urban forest parcels, along meadow edges, and stream banks contribute to the food, cover, and nesting needs for a wide variety of species. Forested areas along linear urban infrastructure such as highways, railroads, and utility lines serve as wildlife green corridors. Small parcels with trees in residential backyards can also serve this purpose.

Social Benefits

- ***Aesthetic and sense of place***
  Trees significantly improve the aesthetic quality of an area. They provide attractive settings for houses, businesses, and urban public spaces. Trees and the surrounding landscapes mark the uniqueness of an area and create a sense of place, such as Kapiolani Boulevard's Monkeypods, Kalakau Avenue's, Ironwoods, or Honolulu Hale's Coconut Palms.

  Trees help soften the natural and manmade environments, and help mark seasonal changes with blossoms and new leaf growth.

- ***Active and passive recreation opportunities***
  Urban trees provide various opportunities for active and passive recreation and/or transportation. Urban trees make active recreational and transportation activities like walking, running, and bicycling more pleasant. They also provide ample opportunities for passive recreation including reading, bird watching, and nature photography.

- ***Social and educational opportunities***
  Trees have great social value, and can help communities come together. Residents of neighborhoods with more trees are likely to meet and socialize with their neighbors more often, thus forming strong social ties. Children in these neighborhoods are more likely to play outside and make friends with other children in the neighborhood. In these neighborhoods where neighbors know each other and are outdoors more frequently, residents feel safer and are better adjusted than residents of barren, but otherwise identical neighborhoods. Programs that involve local residents in conserving, planting, and maintaining trees can bring citizens together. This involvement will help boost the sense of community and belonging.

A study by University of Illinois researcher, F.E. Kuo[9] found that domestic violence and other forms of crime are less in housing projects surrounded by trees and other greenery. Trees reduce mental fatigue, help people relax, and reduce aggression. They also bring people together outdoors, increasing surveillance, and discouraging criminals. Trees also provide educational opportunities and value. Parks with trees and other environmental features can function as an open classroom where children and adults can learn about different plant and animal species, ecosystems, and the natural environment.

- ***Health benefits***
  The environmental benefits of trees translate into better physical and mental health for members of the community. Trees contribute to cleaner air and water and also provide increased opportunities for outdoor activities. This, in turn, helps people lead more active and stress free lifestyles. Sedentary lifestyles in urban environments increase the risk for obesity, cardio vascular diseases, certain types of cancer, and serious mental problems.

  Urban trees and shrubs improve air quality and clean air decreases the risk of asthma. Trees also help protect against the harmful sun exposure that causes skin cancer. Trees reduce harmful sun exposure in playgrounds and other outdoor urban environments as they provide shade and absorb light directly from sun as well as from the reflective surfaces of buildings and pavements. Research has shown that patients recover faster in an environment where trees are present.

Economic Benefits

- ***Business opportunities***
  The environmental benefits of trees are well known, but many people may not be aware of the economic benefits of trees and how businesses can benefit from them. Large trees along a retail strip make the area more inviting, therefore generating more business. Trees provide innovative business opportunities by making outside spaces suitable for dining, walkup window purchases, and displaying and attracting year-round activities. They also help to cut energy bills that add up in the cost of products and services. They make parking areas more pleasing and safe by providing shade and reducing glare during hot days. Trees also reduce stormwater management costs for property owners and the City by reducing stormwater runoff.

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[9] Kuo, F.E. & Sullivan W.C. (2001). "Aggression and violence in the inner city: Impacts of environment via mental fatigue." Environment & Behavior, 33(4), 543-571. http://www.lhhl.uiuc.edu/violence.htm
Kuo, F.E., & Sullivan, W.C. (2001). "Environment and crime in the inner city: Does vegetation reduce crime?" Environment and Behavior, 33(3), 343-367. http://www.lhhl.uiuc.edu/crime.htm

Researchers such as K.L. Wolf[10] have found that shoppers are willing to pay more for goods and services and often stay longer in shops in downtown business districts that have many large, well maintained trees. In addition, quality landscaping along approach routes to business districts has been found to have a positive influence.

- ***Increased property value***
  The presence of trees on a residential property enhances the property value and increases the salability of the property as well. Even a few trees can add to the value of a property. Aesthetics provided by trees plays an important role in increased property value along with the many other benefits trees provide. Each large tree in the front yard adds about 1% to the resale value of a home. Large, specimen-sized trees can add 10% or more to property values.

- ***Energy savings***
  If placed strategically, trees lower energy bills by providing shade that lowers temperatures. Shade from two large trees on the west side of a house and one tree on the east side saves 50% of a typical residence's annual air conditioning costs (American Public Power Association). As trees absorb sunlight and provide shade, they prevent sunlight from reaching building surfaces, roofs, and pavement, all of which radiate heat. Trees also release water through tiny openings in their leaves and that water absorbs heat directly from air, therefore lowering air temperature (i.e., evapotranspiration). Urban trees also provide indirect cooling benefits by reducing urban heat island effects.

- ***Stormwater management***
  Trees can aid stormwater management. As trees filter stormwater runoff, there is more water returning to our aquifers and cycling back into the atmosphere, and less polluted runoff entering our streams and near shore waters. Trees role in stormwater management not only aids in water quality management, but can assist in flood mitigation as the canopy, leaves, branches, trunk, and subsurface roots intercept water before it reaches the ground and runs off the surface.

  The typical benefits from 100 trees over 40 years outweigh the cost by over 2 to 1. There are several programs that can quantify the benefits of urban forests. A software program called CITYgreen[11], developed

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[10] *Wolf, K.L. 2003. "Public response to the urban forest in inner-city business districts." Journal of Arboriculture 29 no. 3 (2003); Wolf, K.L. 2004. "Trees and business district preferences: A case study of Athens, Georgia US." Journal of Arboriculture 30, no. 6 (2004); Wolf, K.L. 2007. "The Environmental Psychology of Trees." International Council of Shopping Centers Research Review 14, 3:39-43; Wolf, K.L. 2005. "Business District Streetscapes, Trees and Consumer Response." Journal of Forestry, 103, 8, 396-400. http://www.cfr.washington.edu/research.envmind/consumer.html*

[11] *http://urbanwater-eco.services/project/citygreen/*

by American Forests, can calculate the dollar value of green infrastructure by applying scientific and engineering models. i-Tree[12] is a suite of programs from the U.S. Forest Service and is considered the industry standard for calculating the ecosystem service benefits of trees.

- ***Green infrastructure***
  The urban tree canopy acts as green infrastructure and can offset the need for traditional infrastructure to some extent. Green infrastructure is the interconnected network of open spaces, natural areas, such as greenways, wetlands, parks, forest preserves, and native plant vegetation that naturally manages stormwater, reduces flood risk, and improves water quality.[13] Green Infrastructure usually costs less to install and maintain when compared to the traditional forms of gray infrastructure. Green infrastructure projects also foster community cohesiveness by engaging all residents in planning, planting, and maintenance of the site.

  With technologies available today, it is possible to measure the existing tree canopy and the monetary value of benefits generated. It is also possible to calculate the potential canopy increase and the monetary benefit of this increase.

[12] *http://www.itreetools.org/*
[13] *http://greenvalues.cnt.org/*

100,000 TREE GOAL

The Department of Parks and Recreation Division of Urban Forestry (DUF) continues its efforts to accomplish the goal of planting 100,000 trees by 2025. DUF propagates, plants, trims, waters, and maintains shade trees along public roadways, and in City parks.[14,15] CCSR maintains a map toward the 100,000 tree goal, where both City and other tree plantings can be recorded toward this effort. This map, and the entry form, are available at, https://www.resilientoahu.org/urbanforest/—see Figure 1.

CCSR is working with DUF and the Honolulu Land Information System (HoLIS) within the Department of Planning and Permitting to improve this platform and facilitate City data collection. CCSR and DUF are working with other departments whose work also relates to the number of trees planted and maintained, and/or removed, to manage accurate records and ensure sound asset management of City trees. CCSR reports on urban forestry measures in the annual City Sustainability Report as required by City Charter[16] and is developing reporting systems with involved departments to produce monthly information for the City Administration.

In 2018, the City planted 1,679 trees and there were work orders to remove 432 trees[17]. A community effort planted approximately 1,100 on one Saturday in November[18], while another planted 1,024 on one Saturday in March 2019[19], however, these and other such efforts have not yet been logged via the tree app. The City trees are larger trees that meet size and clearance requirements in public areas, whereas the latter two examples were small trees, saplings, and/or seedlings on a private hillside and in a state forest reserve, respectively. Both are critical toward the achievement of this goal, and both require a method for recording progress toward the goal. Since it launched on November 3, 2018, 136 trees have been recorded into the tree reporting app. Additionally DUF and CCSR are working with other departments on a communications and outreach strategy to encourage more use of the submission platform toward this collective effort.

In order to plant 100,000 trees by 2025, more than 14,000 trees will need to be planted each year from 2019 through 2025. These trees will not all be planted by the City, but will involve other agencies and the general public.

In FY20 Budget, DUF will increase in-house plantings by 500 per year. DUF has requested three additional Nursery Worker I positions for the Nursery and Landscape

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[14] Revised Charter of the City and County of Honolulu 1973 (2017 Edition). Section 6-1408(f), pp. 60-61. http://www.honolulu.gov/rep/site/cor/Online_Charter_-_06.30.17.pdf

[15] http://www.honolulu.gov/parks/hbg/urban-forestry-horticulture-services.html

[16] Revised Charter of the City and County of Honolulu 1973 (2017 Edition). Section 6-107(f), p.36. http://www.honolulu.gov/rep/site/cor/Online_Charter_-_06.30.17.pdf

[17] For reasons due to poor tree health, infrastructure damage (e.g., sidewalks, sewer pipes, etc.), vehicle crashes, and vandalism.

[18] https://www.hawaii.edu/news/2018/11/19/uh-manoa-plants-1000-trees/

[19] http://dlnr.hawaii.gov/blog/2019/03/09/nr19-048/

Section, Horticulture Services Branch to assist with planting and for ongoing maintenance.

DUF will coordinate with non-profit groups, other departments and governmental agencies, and the general public. DUF has requested a Community Forester position in FY19.

In the FY20 Budget, DPR has requested an additional $726,060 towards achieving the tree goals (see Appendix A). This includes four positions for Urban Forestry to maintain the tree planting program and the new Community Forester position to staff the Mayor's 100,000 Tree Initiative.

In FY21 Budget, DPR will request three positions (Landscape Architect, Arborist, Community Forester), and bring back one Horticulturist position from the Department of Facility Maintenance.

The newly-supported Community Forester Section will bolster the Citizen Forester Program[20] (see Figure 2) currently led by a partnership between State DLNR DOFAW Kaulunani Community and Urban Forestry Program and Smart Trees Pacific, which trains volunteers to inventory City street and park trees[21] and assist in the identification of potential planting locations. DUF currently supports the program through technical trainings and outreach. The volunteers provide great benefit, however, the program is limited in scope due to personnel. The Community Forester Section will also develop trainings and agreements with community volunteers and non-profits to plant and maintain City street and/or park trees. In cities with healthy and successful urban forestry programs, there is typically a strong non-profit partner that plays an integral role in the propagation, planting, and maintaining of public trees, supported by a city Community Forester team.

An additional Landscape Architect will bolster Urban Forestry considerations and elements in City project design and review; provide a stronger presence for interdepartmental coordination (e.g., Complete Streets Program, Stormwater Program, Planning & Engineering Sub-Cabinet, etc.); and lead the development of updated rules and design standards for tree planting, complete streets, and green stormwater infrastructure.

In the long-term, DUF will work on a reorganization to strive for improved efficiency and effectiveness. Wages are not competitive to private industry and recruitment has been difficult because the low wages make it hard to attract qualified applicants.

[20] *https://smarttreespacific.org/projects/citizenforester/*
[21] *https://pg-cloud.com/hawaii/*

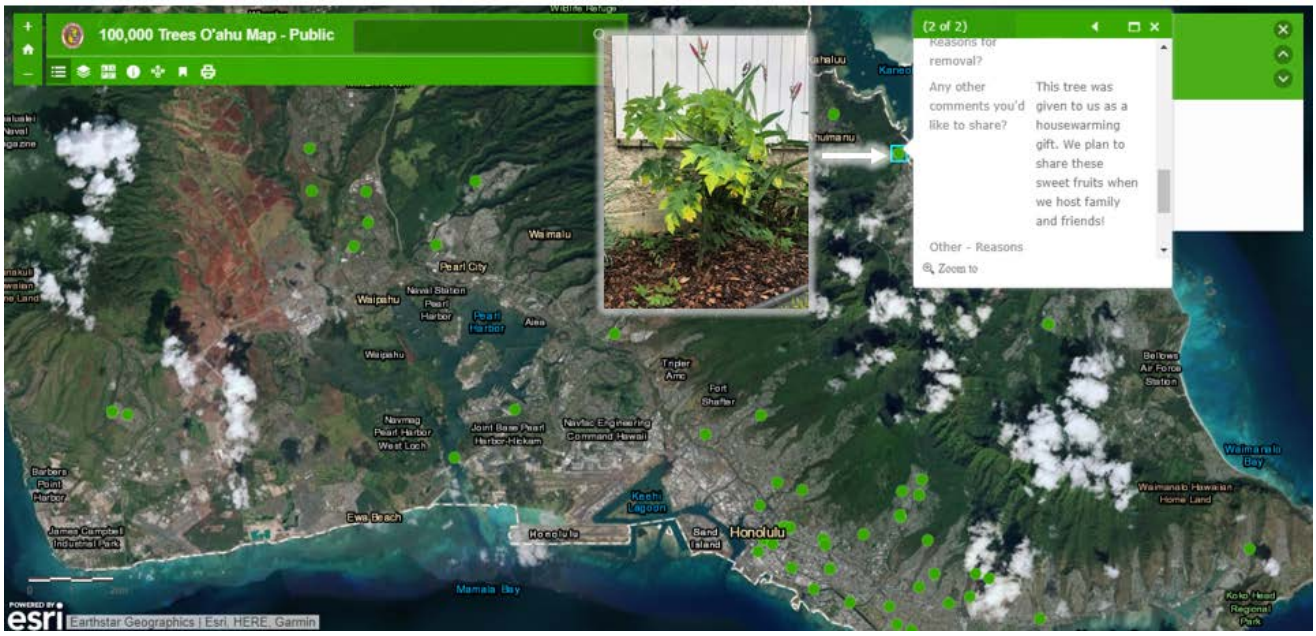

Figure 1 *Public 100,000 Trees O'ahu Map showing records entered by either the City, private individuals, or other entitites and organizations.*

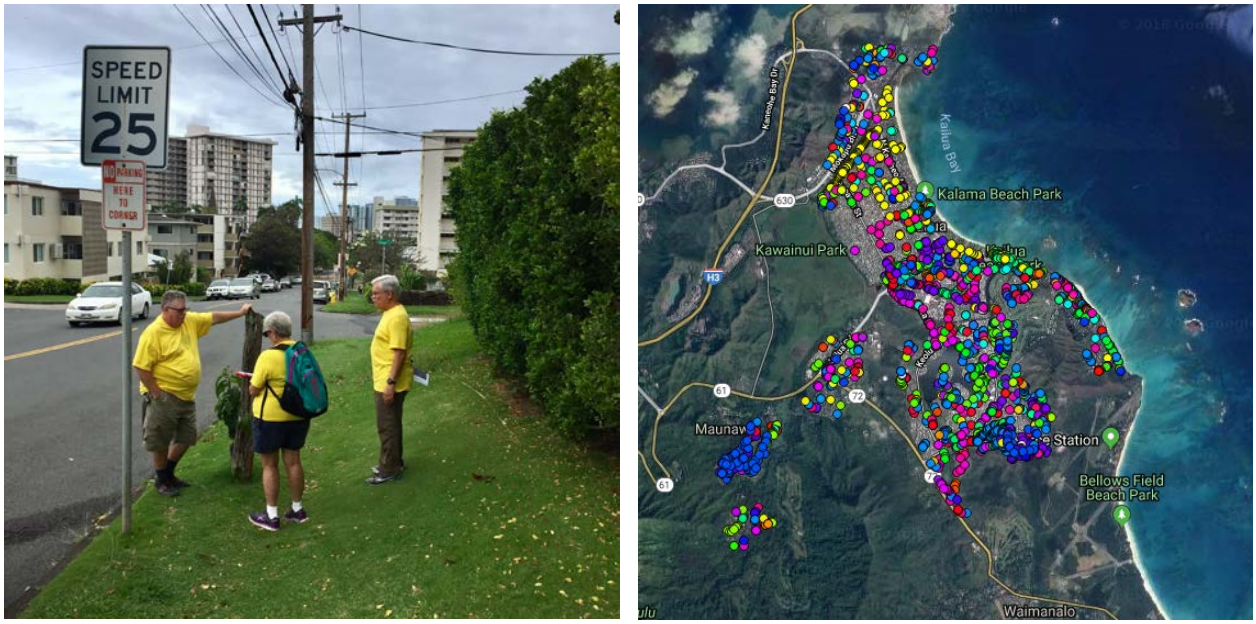

Figure 2 *(L) Volunteer Citizen Foresters reflect at and record a tree stump in Makiki. (R) City street and park tree inventory completed by Volunteer Citizen Foresters in Kailua, Lanikai, Enchanted Lakes, and Maunawili.*

URBAN TREE CANOPY GOAL

The City has developed a vision statement to guide the development of goals, objectives, and implementation strategies. The vision statement is a short focused statement about how and why trees are important to the community now and into the future. It provides an image of what the community wants to look like in the future and how it wants to function. The City strives to accomplish the goal of increasing the urban tree canopy to 35% by 2035.

O‘ahu’s first Urban Tree Canopy Assessment was conducted in 2010 and a change detection analysis was completed in 2013.[22] Neither study covered all of O‘ahu’s communities (i.e., “urban canopy” goal)—see Figure 3. Through the City’s participation in the 100 Resilient Cities network, CCSR is leading the effort to update and expand our Urban Tree Canopy Assessment to better inform the strategies and actions to plan for and progress with the tree goals as defined above. The following describes near- and long-term actions and recommendations for the City to progress on its urban forestry commitments.

Residents envision Honolulu as a City where:

- Trees are valued, nurtured, integral, diverse, attractive, and functional. Trees are everywhere. Trees are older, bigger, representative of the future, and an integral part of the planning process.
- Trees provide habitat for wildlife and a connection to and an understanding of nature. They are a path for a future. They provide shade, beauty, color, and a sense of place / community, character / shape to the community, recreational and tourism opportunities, education, and a sense of pride. They also provide food and the benefits of reduced stormwater and energy consumption.
- Trees help us celebrate nature, transform communities, and connect generations by passing continued appreciation of nature to the next generation.

Vision Statement

“Honolulu will focus on preserving the natural environment, protecting wildlife habitat, creating educational, social, and recreational opportunities, and increasing the quality of life of Honolulu residents by preserving and increasing its tree canopy.”

Goals*:*

Plant 100,000 trees by 2025 and increase the urban tree canopy to 35% by 2035.

[22] *http://www.smarttreespacific.org/projects/honolulu-urban-tree-canopy-assessment/*

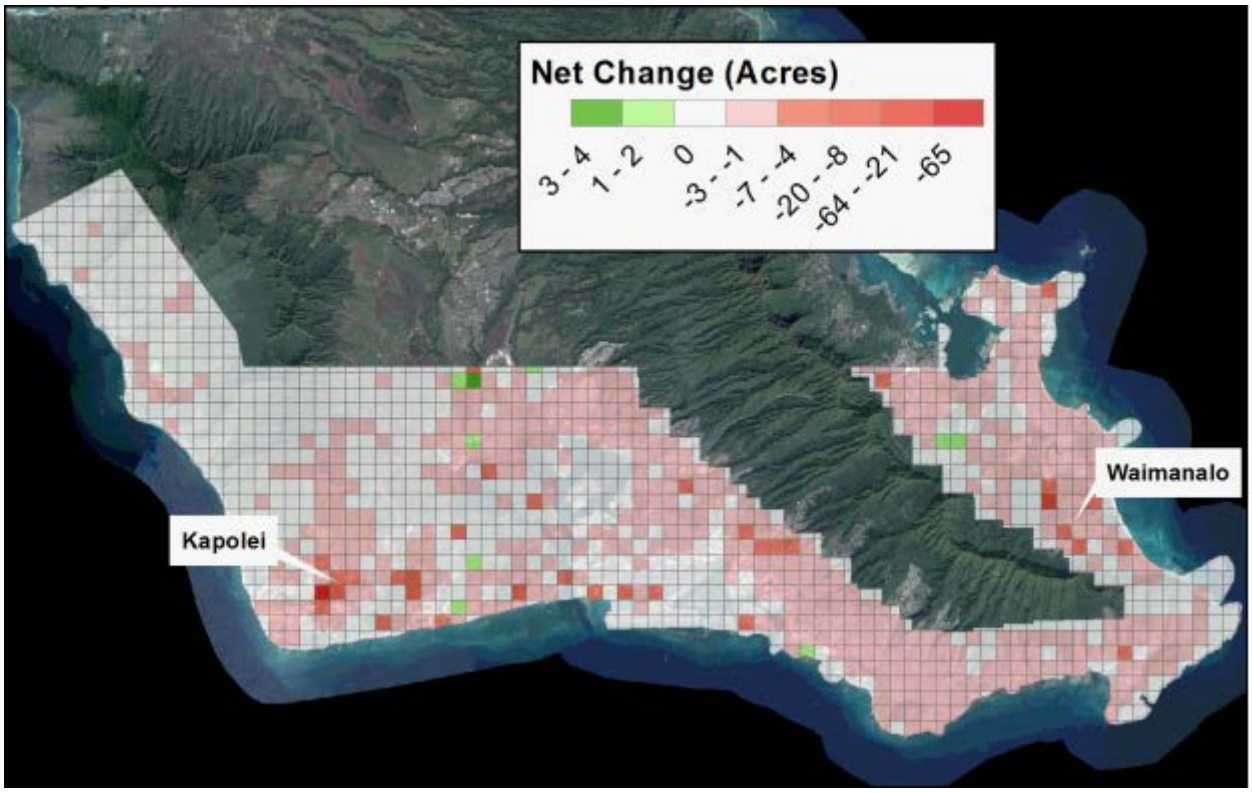

Figure 3 *Net change in tree canopy area (acres) during the period 2010-2013, as calculated for a grid network with 750x750-meter cells.*

RECOMMENDED STRATEGIES FOR THE CITY

The following strategies are within the categories of City Action, Regulatory, Public Education, and Community Volunteer.

Internal collaboration and coordination are important for the success of these efforts. City Departments need to internalize that the tree goals are not DUF's and CCSR's tree goals, but that they are the Mayor's and City's tree goals. This requires consistent messaging and conversations to influence business-as-usual work with respect to the urban forest. CCSR will lead these discussions through the development of department reporting systems with involved departments to produce monthly information for the City Administration.

Additionally, it is critical that existing rules and regulations that should result in the planting of trees be adhered to, and that if and when a City agency's actions result in the removal of a City tree due to contracts including road rehabilitation, sidewalk reconstruction, and/or ADA curb ramp construction, or otherwise, that at least one tree is replanted in the vicinity of the removed tree.

If we continue to allow trees to lose out to other real and/or perceived infrastructure and community planning and design conflicts, we will all lose out with respect to environmental and community quality and health.

City Action Strategies

- Identify and prioritize areas for tree planting and prepare a schedule.
  - ✓ The City should identify priority areas for tree planting so as to maximize benefits from the resources invested. The City should establish criteria for selecting those sites and indicators to measure their success. These criteria and indicators can be based on specific objectives such as environmental protection, economic development, aesthetic identity or social enhancement.
  - ✓ The City should also be careful about planting the right trees in the right place to optimize their prospect of success. The wrong tree in the wrong place is almost a guaranteed failure. Tree species should be selected on the basis of the nature of the site, the area available, the intended use and the intensity of the use. However, the City should also work to identify opportunities to make more room for trees where there is excessive or unused paved areas, creating new spaces for "right tree, right place." Cost issues are equally important while selecting the appropriate species. Both onetime costs of planting trees and long term maintenance costs should be considered while making such decisions. Since the success of these programs largely depends on the maintenance of trees after they are

planted, the City should prepare a schedule for planting as well as regular maintenance of trees.

- Prioritize budget
  - ✓ An Urban Tree Canopy Program makes economic sense and should have a strong financial footing. With the ability to quantify the environmental, social and economic benefits and the ability to express those benefits in dollar amounts, it is easier to compare the benefits of urban trees against cost. With increasing use of green infrastructure concepts, and recognizing the services provide by trees as described earlier, it is easier to view the investment in an urban tree program as comparable to any other infrastructure investment such as roads and waste water facilities.
  - ✓ The City should prioritize the budget for the Urban Tree Canopy Program. The City can use the above arguments to secure more funds. An Urban Tree Canopy program will probably always rely on the general funds; however there are other options available that can provide additional revenue streams. For example a tree-related fee can be established under development fees to support tree programs in newly developing areas of the city.
- Establish clear line of responsibilities
  - ✓ A successful Urban Tree Canopy Program requires coordination between different departments. Trees planted today will continue to grow for years to come and probably outlive the people who planted them. For the program to really work, a clear line of responsibility should be established among departments and among positions within a department for planting, caring and ongoing maintenance of trees. While assigning responsibilities, it is important to ensure that the office has qualified personnel and adequate resources to carry out assigned functions. Since it requires the involvement of many departments, one department can lead the program and coordinate with all the supporting departments.
- Update the 2006 *Urban Reforestation Master Plan*[23].
  - ✓ This will be led by the Community Forester to reflect current data, these initiatives, and evolution of DUF's Sections (i.e., Community Forestry), and the existing and support roles of CCSR. Additionally, DUF will lead and/or support the development of updated rules and design standards for tree planting, complete streets, and green stormwater infrastructure.

[23] *https://www.resilientoahu.org/s/Hnl-Reforestation-Master-Plan-2006.pdf*

Regulatory Strategies

- Establish a tree ordinance to:
  - ✓ The city should consolidate disparate tree-related ordinances into one chapter and incorporate the use of trees and shrubs for stormwater management while providing for, maintaining, or improving existing tree canopy.
- Update the Urban Reforestation Master Plan for use as the guiding document for DUF installations, as well as, for other City planning initiatives.
- Revise the Urban Reforestation Master Plan to introduce the concept of urban tree canopy as a Green Infrastructure component.
- Revise the Urban Forestry Management Plan to address the biological, community, and managerial needs.
- Include in the new Tree Ordinance, a section on Urban Tree Canopy to establish appropriate tree canopy requirements for parking lots.
  - ✓ The city should adopt a tree ordinance that will include the tree canopy requirements for parking lots. This requirement should be targeted towards large parking lots. Small parking lots may be exempted. A sliding scale should be used to require a higher percentage of shaded areas for larger lots.
- Amend the subdivision regulation to include forest and tree protection measures for new development on green fields when establishing areas for stormwater management.
  - ✓ The city should require a certain percentage of the site to be set aside to be preserved as open space. These open spaces should also comply with the tree canopy requirements. The percentage of the site dedicated for open space should be determined on the basis of the zoning category of the site and the type of development proposed. The City should offer higher densities for clustering and preserving larger areas as open space.
- Amend subdivision regulations to include numeric tree canopy requirement for each type of street in new developments.
  - ✓ Rather than trying to get trees planted after the streets have been built, tree canopy should be planned early in the process for new streets.
  - ✓ Subdivision regulations should require a certain percent of tree canopy for each type of street in the new development. To support the tree canopy requirements, develop street standards accordingly to provide room for tree planting. Also, encourage alternative street design to accommodate more trees than required by the regulation.
  - ✓ Require newly developed sites to set aside open space for stormwater management and to support tree canopy.

- ✓ Develop street and sidewalk standards to ensure space required for tree planting.
- ✓ Encourage alternative street design in order to accommodate a larger number of trees.
- ✓ Include tree, landscaping, and vegetation buffering requirements in the checklist used for the final site plan approval process.
- ✓ Require a tree protection management plan prior to preliminary plan approval that will include proper methods to protect and reduce impact on trees from site planning and construction.

Public Education Strategies

- Develop a resource guidebook and publish it online. The resource guidebook will provide tree selection, planting, and proper maintenance guidance with illustrations and publish it online. The guidebook should include:
  - ✓ Types of native species and their characteristics;
  - ✓ Lists of invasive species in the area;
  - ✓ Tree selections for specific areas;
  - ✓ Tree canopy requirements from the Zoning Code and Subdivision Regulation, if applicable; where to plant and where not to. *(e.g. at driveway/roads, within certain distance from road intersections, in front yards if above a certain height, within a certain distance of utilities)*; and
  - ✓ Guidance for strategic tree planting to provide energy savings, visual screening and to act as noise barriers.
- Partner with local schools and colleges to educate school children.
  - ✓ Recognize schools and colleges that effectively manage their trees and help the City to meet its urban tree canopy goals. An example of such an approach is the Arbor Day Foundation's Tree Campus USA program. This program recognizes colleges and university campuses that efficiently manage their campus trees to develop connectivity with the community beyond campus borders to foster a healthy urban forest. The program strives to engage college students by providing service oriented learning opportunities on campus and communities outside campus through community forestry efforts. The City can establish a relationship with such programs to co-sponsor such activities and programs.
  - ✓ Directly involve students in tree related activities and recognize them. Engaging children in tree canopy activities increases their understanding of benefits of trees and helps them get involved in community tree programs. The potential partners are all the elementary, middle, and high schools in Honolulu.

- Promote the notion of green infrastructure.
    - ✓ Green Infrastructure is the interconnected network of green spaces that conserve natural ecosystem values and functions and provide associated benefits to human populations.[24] The concept of green infrastructure is getting popular and many local and state governments have started acknowledging them in their various plans.
    - ✓ Descriptions of existing conditions in such element should reflect an understanding of various benefits provided by the green infrastructure such as improved stormwater management and water quality.
    - ✓ Reflect on the benefits through other elements of the comprehensive plan with appropriate links to the one element that ultimately pulls it all together (i.e.: roadside trees can be discussed in the transportation element with a link to the green infrastructure element). The City should include this component and link it to other elements such as land use, transportation, and energy conservation.

Community Volunteer Strategies

- Develop a program to provide free or low cost trees to home-owners.
    - ✓ The program would provide education and financial incentives for growing trees on private properties. The program emphasizes citizens' participation as an important element of the program's success. It is a public-private partnership between the State, local nurseries and garden centers, and the local homeowners to encourage planting new trees on private residential land.
- Promote a reward program to publicize correct tree planting and maintenance.
    - ✓ Rewarding property owners and businesses for the work well done is a popular incentive. The City should encourage and reward its residents and businesses for good tree care through a program.
    - ✓ A tree's score is based on the circumference, height, and crown spread. An applicant can determine the score him/herself based on the instructions provided. After determining the score, the Community Forester is contacted. If the tree is larger than the average trees of the same species, it is registered as a Champion Tree. Owners of the tree in the register are awarded with a certificate.

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[24] Benedict, Mark A. Green Infrastructure: Smart Conservation for the 21st Century, Sprawl Watch Clearing House Monograph Series

- DUF and CCSR have identified a growing list of partners in trees (see Appendix B), and have begun the process of gathering past planting information and facilitating their use of the tree recording app to count their plantings moving forward. The partners are also island-wide community liaisons and advocates for the tree goals. This list also includes State agencies that have significant opportunities to support the tree goals or affect their success (e.g., DOT, DOE, DOFAW, etc.).
- Lastly, both DUF and CCSR, through their participation on the Advisory Council of the State Kaulunani Urban and Community Forestry Program, are currently working with a grantee whose project is developing a public awareness campaign on the benefits of trees. Outputs will be used by both agencies in their communications and promotion of City urban forestry efforts and to encourage individuals to record trees through the app and map.

EXISTING AND POSSIBLE TREE CANOPY

The first step in formulating a Strategic Implementation Plan for Urban Tree Canopy is to measure the existing tree canopy. Additionally, conducting a tree inventory is very helpful in determining the number of publicly owned trees, planning for new trees, and tracking their maintenance needs. However, an inventory alone might provide little information about the effect on the overall tree canopy goal of the City, and it will not account for the benefits provided by trees on privately owned land.

The City will focus on the following five areas to increase tree canopy coverage:

Public right-of-way

Planting street trees can make for a pleasant, comfortable, healthy, and safe walking experience. Street trees serve as filters for noise and pollution from the vehicular traffic. Trees not only provide a safe and pleasant walking environment for pedestrians, they also provide shade for vehicles parked on streets.

Street trees help create a sense of place and add to the beauty of the City. Trees' color, texture against the urban background, pattern of light and shade, and utilitarian aspect make a unique impression on the minds of people. That impression becomes the identity of that urban space. Lastly, trees are identified as integral to the achievement of our Complete Streets ordinance.

Commercial and industrial properties

It is very important to educate business owners in the area about the economic benefits of trees in commercial and industrial areas. Large trees along a retail strip make the area more inviting which generates more business. Studies of public perception show that customers will spend, on average, 11% more time and money in a well-treed business area. Trees provide more innovative business opportunities by making outside space suitable for dining, walkup window purchases, and displays. Year-round activities are more attractive as surrounding temperature is stabilized in areas with trees. As mentioned earlier, trees also help cut energy bills; they make parking areas more pleasing by providing shade; and they reduce glare during hot summer days. Trees also reduce stormwater management costs to property owners. In addition to these benefits some businesses may have a direct stake in urban forestry as a function of their own service such as nurseries, home and garden suppliers, and tree care providers.

Continuing support of the business community is important not only for tree planting and long-term care and maintenance of trees in commercial areas but these community members can be powerful contributors to the

urban tree canopy through financial support. The City should initiate an education program targeting business owners and explain the economic benefits of trees and how they influence business activities.

Government and institutional land (County, State, Federal, and Non-Governmental Organization Owned Land)

Government land, institutional land, and other tax exempt properties provide ample opportunities for increasing the urban tree canopy. As these parcels are usually larger in size and in some cases are under government control, there are opportunities for the City to directly engage in a large-scale tree canopy initiative.

The City can coordinate with institutions as potential partners such as University of Hawai‘i at Mānoa, who in turn can also support advocacy and education efforts. Potential partners include hospitals, universities, schools, and other institutions.

Residential properties

The development regulations affecting private properties alone cannot be as effective because these regulations deal largely with preservation and planting, but not with long-term maintenance. Continuing support from home owners and owners associations is vital to the success of an urban tree canopy program.

The City should focus on educating homeowners and residents of the benefits of trees and provide incentives for planting and maintenance of the trees. A comprehensive resource guidebook should be developed that will provide information pertaining to tree selection, planting, and proper maintenance of trees including strategic tree planting to reduce energy consumption.

Residents’ participation can be encouraged through volunteer involvement and stewardship programs, as well as, potential credits toward the future stormwater fee.

Parks and open spaces

Trees can be used for active or passive recreation. As the City has full control over public parks and open space, implementing programs related to tree conservation and increases in tree canopy can be effective.

The recreational and social values of parks are well-known. To add to the list of benefits of parks, city parks can be used as open classrooms to educate people about the different species of trees, planting, and maintenance techniques.

FUNDING

The Urban Tree Canopy Program should be financially sustainable. In the past, Urban Tree Canopy was viewed as a cost intensive program. Now with the technologies to quantify social, economic, health, and environmental benefits of Urban Tree Canopy and the ability to translate this into monetary value, urban tree programs are considered wise public investment and urban trees are seen as public infrastructure.

The concept of Green Infrastructure makes it easy to argue that the investment in Urban Tree Canopy is the same as the investment in any other public infrastructure, such as roads, stormwater management, etc. With this argument the Urban Tree Canopy Program can use a variety of other funds besides general funds set aside for this specific program. The City can also use several other methods to raise money for the Urban Tree Canopy Program.

Funding Strategies:

- Seek additional sources of funding besides General Funds such as grants, sponsorships, taxes, fines, donations, fees, etc.
- Seek funding from capital improvement funds for Green Infrastructure.
- Establish a yard waste recycling center; offer free trimming and pruning of trees and pick up of organic yard waste; and sell back the compost, mulch, and woodchips to the home owners.
- Coordinate Urban Tree Canopy efforts with other plans such as Parks and Recreation Urban Reforestation Master Plan, Pedestrian Plan, Bicycle Plan, Storm Water Management Plan, etc., and seek funding from those planning activities.
- Lastly, to ensure measurements and tracking of the urban canopy the City should budget for the allocation of necessary satellite or other Light Detection and Ranging (LiDAR) data ($25,000), as well as, services to process and analyze the data to develop an updated Urban Tree Canopy Assessment and Change Detection Analysis ($40,000). This should be done on a five-year cycle.

APPENDICES

Appendix A – DUF Proposed FY20 Costs

Description	Qty	Unit Cost	Total
SALARIES			
One (1) Park Ground Improvement Supervisor II (Community Forester II Position)	1	$ 59,616	$ 59,616
Three (3) Nursery Worker I	3	47,148	141,444
	TOTAL SALARIES		**$ 201,060**
CURRRENT EXPENSE			
Additional plants for in-house planting HS	500	$ 250	$ 125,000
Plants for giveaways to non-profits and public (1 gal)	2500	7	17,500
Plants for giveaways to non-profits and public (4 in)	7500	3	22,500
Redwood stakes	1000	15	15,000
Rubber ties	2000	1	2,000
Contract planting	100	3,000	300,000
* Additional plants for in-house planting HBG	200	50	10,000
Additional nursery supplies; media, pots, fertilizer, etc.	misc.	misc.	20,000
Additional field supplies; stakes, ties, fertilizer, etc.	misc.	misc.	13,000
	TOTAL CURR EXP		**$ 525,000**
	GRAND TOTAL		**$ 726,060**

* HBG is already under budgeted in OC 2153. FY17 actual expenditures were $63,000 but the FY19 allotment is only $45,000. The tree planting initiative will require an increase of $25,000 over and above the actual $63,000.

Appendix B – Growing Partners in Trees (Alphabetical)

Aukupu (Makakilo)
Baha‘i Faith
Breadfruit Institute of the National Tropical Botanical Garden
Disney VoluntEARS
Garden Club of Honolulu
Hawaiian Legacy Hardwoods/Legacy Trees
Healthy Climate Communities
Homeowners Associations
Honolulu Board of Realtors
Hui Kū Maoli Ola
Hui o Ko‘olaupoko
Kāko‘o ‘Ōiwi
Ko‘olau Mountains Watershed Partnership
Kupu
Lani-Kailua Outdoor Circle
Livable Hawai‘i Kai Hui
Mālama Learning Center
Mālama Maunalua
Natural Resources Conservation Service
North Shore Community Land Trust
O‘ahu Army Natural Resource Program
Paepae O He‘eia
Papahana Kuaola
Pearl City Urban Garden Center
Sierra Club
Smart Trees Pacific, Inc.
Soil and Water Conservation Districts
State of Hawai‘i Department of Education
State of Hawai‘i Department of Land and Natural Resources (DOFAW, State Parks)
State of Hawai‘i Department of Transportation
State of Hawai‘i DLNR DOFAW Kaulunani Urban and Community Forestry Program
The Home Depot Foundation
The Nature Conservancy of Hawai‘i
The Trust for Public Land
Trees for Honolulu’s Future
U.S. Department of Defense
University of Hawai‘i Campuses
Verizon Green
Wahiawa Botanical Garden volunteers
Wai‘anae Mountains Watershed Partnership