## Harold L. Lyon Arboretum Summary of Matrix and Rubric Scores

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See narratives below.
Outreach/Extension Rubric Summary
Harold L. Lyon Arboretum

Program: Education

The Lyon Arboretum embodies the essence of a Hawaiian place of learning: the physical site at the head of the lush Mānoa Valley; the watershed in the historic ahupua‘a; the extensive collection of Hawaiian endemic, indigenous and cultural plants; and plant and natural resource conservation. These elements combine to form the basis of the Arboretum’s Education Programs, nurturing stewardship and a focus on biological and cultural diversity.

School programs are aligned with the National Science Standards and the Hawai‘i State Content and Performance Standards, and are an important source for STEM education for students. Demand for our school programs has grown exponentially, with nearly 6,000 students and teachers served in 2008. The 2009 program is already fully booked. In the last ten years, we have hosted over 32,000 elementary students on our STEM-based field trips. A large percentage of students are native Hawaiian, low-income, or represent under-served populations. Collaborations with the UH College of Education, Center on Disabilities Studies, GK12 program, and the STEM Inter Community Portal (SIP) link the Arboretum’s curriculum to the highest quality educational standards, educational equity, and cutting edge science and technology offered at the University. We are often the first exposure to UH for local students, fostering a connection to the University of Hawai‘i and paving the way for their University education.

Recent facility improvements to the Arboretum include a new Education Center with additional classroom space, and accessibility enhancements for those with disabilities. These improvements greatly enhance our ability to deliver inclusive programs and to expand the range of programs and educational opportunities as well as the number of people served.

University students from UH, LCC, HCC, KCC, WCC, HPU and Chaminade utilize the collections and grounds as an outdoor classroom. Students enrolled in botany, horticulture, education, art, geology, culinary arts, geography, medicine, travel, and biology visit the Arboretum as an integral part of their studies. Each year, internships are offered, exposing graduate students to public garden administration and plant sciences, giving them valuable and unparalleled professional work experience. University students also participate in service-learning at the Arboretum, providing real-world opportunities to their course work, and making viable student-community connections.

In 2008, approximately 50% of our visitors came from the US mainland and from 40 different countries, with the other 50% from Hawai‘i. The Arboretum provides a unique opportunity for sustainable tourism, education-tourism, and volun-tourism. Guided public tours are provided on a daily basis, enhancing the visit experience of our adult visitors, and providing valuable exposure to the natural and cultural heritage of Hawai‘i.

Adult Outreach and Education has a long history at the Arboretum. Non-credit classes foster plant-people connections, knowledge of traditional cultural practices, sustainable agriculture, invasive species information, and a wide range of plant related topics. The Arboretum’s classes and workshops are often taught by current or retired University faculty and staff, bridging University expertise into the community. These tours and classes are self-supporting, and generate revenue for our other Education programs and the Arboretum’s operations.

Volunteers provide thousands of hours annually to the Arboretum. They benefit with the community building spirit of their service, and by the knowledge that they are contributing meaningfully to their community. This is the essence of a University…connecting people through knowledge, action, and a shared mission.

All of this is accomplished with only three full-time staff. With additional staffing, the adult and children’s education programs can develop into new areas including certification programs in native plant propagation, restoration ecology, organic gardening, sustainability, and horticultural therapy. Additional staffing could develop new opportunities and programs that supported the “No Child Left Inside” movement, and fostering an early and lifelong affinity with nature.

The Arboretum’s Education and Outreach programs are thriving, and will continue to do so because of the universal appeal of botanical gardens, our identity as an urban oasis, and the Arboretum’s unique location at the intersection of cultural and natural diversity.
Outreach/Extension Rubric Summary
Harold L. Lyon Arboretum

Program: Research

The Lyon Arboretum is an extension of the University of Hawai'i at Mānoa and serves as a valuable interface between the University and researchers, government and private organizations, foreign visitors, and the general public. Lyon is an ideal facility to incorporate and disseminate information and material concerning the preservation, research, education, and cultural values of Hawai'i’s heritage and native plants.

Hawai'i is considered the endangered species capital of the world owing to the fact that 25% of its approximately 1200 native plant species are federally listed as endangered or threatened. In addition, many of the historically documented varieties of Polynesian taro and banana have been lost due to lack of interest in cultivation, disease, and loss of cultural knowledge. Lyon Arboretum has recognized the State’s need for an intervention program, and has responded by providing a novel approach to aid in the rescue and recovery of Hawaii’s most critically endangered native and culturally introduced plants. The Lyon Arboretum-Hawaiian Rare Plant Program (HRPP) utilizes micropropagation as a propagation and storage technique. HRPP is able to “bank” and to propagate large collections of living germplasm within a controlled and relatively germ-free environment. The micropropagation inventory currently consists of 16,268 native Hawaiian plants from 160 rare and endangered native Hawaiian plant species, approximately 65 Polynesian introduced taro varieties, and 8 Polynesian introduced banana varieties. The plant germplasm collection is maintained at 3 locations: the Lyon Arboretum Micropropagation Laboratory, its adjacent greenhouse, and at the UH Magoon Research Facilities through a MOA with UH-CTHAR. This program has become a model for other aspiring programs across the state.

HRPP is the designated living germplasm facility for the State of Hawai'i DLNR-DOFAW and the US Army Natural Resources Division. It has received continuous financial support from both agencies for over 10 years. The two main services provided are: 1) propagation and multiplication of all of the submitted plant samples for the purpose of restoration/reintroduction, and 2) to maintain a sufficient representation of “living” plant germplasm for species listed by the Hawai'i’s Plant Extinction Prevention Program (PEP) or identified by the US Army Natural Resources through their Endangered Species Act mandate. All work conducted at HRPP is in accordance and alignment with the State of Hawai'i DOFAW-DLNR in the effort to pursue genetic representation of Hawai'i’s critically endangered plant taxa, which includes capture of the maximum genetic diversity remaining in wild populations.

In addition, HRPP propagates plant material for other restoration programs, education, research, other botanical gardens, forestry programs, cultural program, and other community and outreach functions. Because HRPP serves as a germplasm bank, there exists an array of plant species and cultural varieties, which growers and/or landowners are able to utilize. Further expansion of HRPP was accomplished in 2005 by the appointment of Nellie Sugii by DLNR-DOFAW to jointly manage DLNR's Pahole Rare Plant Facility Mid-Elevation Nursery for the island of O'ahu.

The Lyon Arboretum is also part of the Hawaii Rare Plant Restoration Group (HRPRG), a collaborative network of several organizations, agencies and private landowners co-chaired by the USFWS Pacific Region Plant Species Coordinator and the State Botanist from the Hawai'i Division of Forestry and Wildlife. This network includes the National Tropical Botanical Garden, Amy Greenwell Botanical Garden, Waimea Valley, Foster Botanical Gardens, DLNR, US Fish and Wildlife Service, US Army, Army National Guard, Center for Plant Conservation, The Nature Conservancy-Hawai'i, private landowners, and others. Lyon Arboretum is an institutional member of the Center for Plant Conservation, which is the nationally recognized plant conservation authority for the US Congress.

The HRPP received 929 volunteer hours in fiscal year 2008, from an average 5.5 volunteers/month. The Micropropagation laboratory and greenhouse received more than 361 visitors this past fiscal year. These visitations consisted of public school groups, University of Hawaii and Community College classes, interns, workshop participants, community groups, researchers and individuals. University students, and public and private school students utilize the program’s facilities and personnel for various purposes, such as science fair projects, research, in-service training, and guidance.
Outreach/Extension Rubric Summary
Harold L. Lyon Arboretum (Program: Collections and Grounds)

Centrality and Alignment
The Lyon Arboretum (LA) plant collections are linked explicitly to the “Land” aspect of UH as a Land-Sea-Space Grant institution by facilitating plant-based research, education, and outreach. Researchers from around the world (Russia, Austria, Estonia, China, UK, Mexico) and many parts of the US study our extensive living collections, including palms, heliconias, and gingers. LA is a rescue center for plants intercepted by the USDA. LA has been involved with research on alternative energy and cancer research. LA is a tourist destination, bringing greater awareness to visitors of the natural diversity of the islands and to the role of UH in conservation education and research. Stakeholders include UH, the native Hawaiian community, researchers, other universities, the general public, and the nursery/landscape industry.

Quality/Integrity
Non-traditional education and public outreach use our grounds. We do not formally evaluate our performance, but do analyze strengths and weaknesses, and make improvements when not constrained by limited resources. Lyon Arboretum has had at least 6 external reviews, the latest being the Chancellor’s Task Force and the Lyon Arboretum Community Steering Committee in 2005. An inadequate budget means we cannot hire sufficient staff, nor repair existing buildings. We lack adequate storage facilities for equipment, and a baseyard for stockpiling mulch, gravel, lumber, etc. Staff are nationally and internationally recognized for micropropagation, knowledge of ethnobotanical and native Hawaiian plants, seed storage, palms, heliconias, and gingers. Publications are limited because most collections staff spend their time managing the plants and providing services; however, we do edit the Bulletin of the Heliconia Society International.

External Demand
Education and public service for the community and the state is provided through distributions of plant materials for laboratory exercises, demonstrations, and for school gardens. Plant sales are highly valued and extend the reach of the University into the community. Staff provides expertise and a venue for professional training in myriad areas. A joint publication on invasive species has influenced state policy. Benefits to the state include plant introductions and sales, encouraging exercise (grant from DOH), and serving as a key tourist destination. Strong partnerships exist with the Mānoa community, and regional and international (e.g., Nong Nooch T.G.) botanic gardens, The Garden Club of Honolulu, Hawaii Bromeliad Soc., Sogetsu Hawai‘i, and Oahu Nursery Growers Assoc. Interactions with Native Hawaiian groups include serving as a field learning site for Halau Ku Mana charter school, activities with various halau, hosting the first Awa Festival (2004), harvesting of albizia trunks for canoe building (Anuenue Charter School) and harvesting dead koa wood for Hawaiian traditional weapons (Pā Ku‘i o Lu‘a). Government partners include NOAA, US Marine Corps (spectral reflectance of canopy vegetation), and Defense Department (materials testing through UH engineering).

Internal Demand
Internal demand is extensive and cuts across colleges, departments, and campuses. UH departments using the grounds include Geography (climate, mapping/surveying), Archaeology (surveys), Biology (stream ecology), Botany (restoration and ethnobotany research and classes), Horticulture, Soils, NREM, Art (fiber arts), Hawaiian Studies, and the College of Education. All of the UH Community Colleges on O‘ahu have made use of the living collections for their botanical studies. Native forest restoration has been initiated, with the strong potential as a major training site for restoration ecologists at UH (Botany, NREM, Hilo) and from other organizations. With limited funds, LA has financially supported at least 3 graduate students in Botany and Horticulture.

Costs/Revenue Generation (Productivity)
The productivity UH has realized from LA, compared to its investment during the past 56 years would make any Fortune 500 company proud. Credit goes to the dedication of the staff and the use of volunteers. We raise funds through plant sales, gift shop sales, and donations. Recent construction and repairs depended on a special request to the state legislature. Hiring of several new staff resulted from an appeal directly to the legislature by the LA staff. Staffing levels and facilities are inadequate. We could conduct excellent scholarship with appropriate faculty positions and facilities.

Specialized Niche/Competitive Advantage
This is no other place at UH like LA. Even nationally, we are the only university-affiliated tropical botanical garden, and as such, offer unique possibilities for students and researchers alike. Our strong interest in native Hawaiian plants and Hawaiian ethnobotany makes us a natural for partnering with halau, charter schools, and cultural practitioners. Although our scholarship is limited we have in the past produced publications in several occasional series (Lyonia, Lyon Lecture Series, plant inventories), a book on Mānoa, articles on palms, heliconias, and gingers, and a chapter in the Tropical Garden Flora on palms. Publications by staff include Plants In Hawaiian Medicine, Plants In Hawaiian Culture, and the revised edition of Handbook of Hawaiian Weeds. The Arboretum website contains detailed information and photos of our plant collections and is continually expanding.
Outreach/Extension Rubric Summary
Harold L. Lyon Arboretum

Program: Facilities & Administration

For the purposes of this summary, “facilities” refers to the Lyon Arboretum infrastructure (buildings, key landscape features, and trails). Our living collections are considered separately. With respect to infrastructure, much of the Arboretum is literally falling apart and inaccessible to staff, UH faculty, students, and visitors. Although three buildings have been renovated or rebuilt with State funds appropriated several years ago, there continue to be major safety issues and additional buildings that are condemned. Many of the trails at the Arboretum are very difficult to negotiate, or impossible for those with disabilities.

To fully support all aspects of the UHM mission, and to retain and grow relevance to the community, state, and beyond, deferred maintenance needs to be addressed. Considering the current economy and steadily decreasing construction costs, now is an ideal time to make major progress without the infusion of large amounts of capital.

As current staff develop new successful programs, and as visitation continues to increase, the imperative to host in adequate facilities only mounts. Despite its history and less than ideal current level of support, the Arboretum is a hugely successful unit of the University and one this is widely respected. The Education program has been blessed with a new building, allowing it to continue its drive to exceed contemporary standards and explicitly consider STEM priorities within the state. The relationship to public schools, the community, and the university is remarkable and will continue.

The Arboretum’s plant germplasm conservation program is without peer in the state. In fact, other organizations are using our program as a model to replicate on other islands. This is both necessary (redundancy adds to the security of the conservation “safety net”) and flattering. As testimony to the value placed in our program, the state DLNR and Hawaii Community Foundation have provided generous, and unsolicited funding, to strengthen this key program. However, the current physical structure is hardly sterile and the unique and important in vitro collections are vulnerable to power outage.

Our living collections is almost without peer in the tropical world. It is widely acknowledged that our palm collection is one of the best in the world. Similarly, collections of heliconias and gingers are of international significance. More recently, we have begun adding native Hawaiian collections, including a Hawaiian garden near the Visitor Center, a new Hawaiian Section along our main trail, and a fine Hawaiian ethnobotanical garden. Access, however, is a major issue, as most trails are deteriorating. Only one trail is wheelchair accessible.

The Arboretum’s remaining facilities are barely adequate to maintain the status quo, much less to grow in scope and significance. As much as has been accomplished, and continues to be so, the facilities are not those that a major Land-Sea-Grant university should find acceptable. Each of the three major mission programs (education, research, and collections) is now treading water. With respect to accommodating visitors, we have added ADA compliant facilities and renovated the gift shop. Since reopening the Visitor Center, we have added Saturday hours and have seen visitation increase by about 20%. Recent prominent notice in local tourist guides and in an airline in-flight magazine, resulted in a two-fold increase in visitation. Thus, the potential to increase the Arboretum’s reach and influence is enormous. The limiting factor, however, is the lack of facilities, staff, and support to allow for significant growth and impact. It is our hope (and that of all our stakeholders) that the growth potential of all aspects of the arboretum can be realized.