The University of Washington and the College of Forest Resources' Center for Urban Horticulture: History and Programs.

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【Abstract】

The Center for Urban Horticulture is the first institution in the United States to combine scientific research and teaching with outreach programs and library facilities available to horticultural scholars, landscape professionals, urban managers, horticultural societies and the gardening public. The Center's mission is "to apply horticulture to natural and human-altered landscapes to sustain natural resources and the human spirit." The goal of the Center is to develop, apply and share the most current knowledge about plants and plant populations to the solution of horticultural problems found from urban to wildland environments. The Center is responsible for the management of the Union Bay campus and the Union Bay Natural Area. The Center also co-manages the 230-acre Washington Park Arboretum and is responsible for the management of campus wetlands and shorelines. Center facilities include demonstration and test gardens, the Douglas Research Conservatory and nursery, office space, research laboratories, the Otis Hyde herbarium and the Elisabeth C. Miller Horticultural Library. The Center also has a formal collaborative relationship with Washington State University/King County Cooperative Extension - through this collaboration, space is provided for programs in Master Gardening and Urban Food Gardening and their staff provides outreach support for the Center. In addition, the Center has partnerships with the Northwest Horticultural Society, the Seattle Garden Club, the Puget Sound Mycological Society, Seattle Youth Garden Works and the Northwest chapter of the Society for Ecological Restoration.

The Center's research deals with the complex problems of growing plants in urban areas, using them effectively, and maintaining their long-term health and functional value. Faculty associated with the Center have programs in restoration ecology, sustainable community landscapes, the planning and administration of landscapes along urban/wildland gradients, human perceptions of urban vegetative environments, the design, utilization, and management of public gardens, the conservation of biodiversity and the ecological interaction between native and introduced plant species. The Center's outreach and continuing education program has offerings for elementary and middle school students, families, adults and professionals. The demonstration gardens, the grounds at both Union Bay and the Washington Park Arboretum, the library, the herbarium and the various partnerships with support groups are all an integral part of an extraordinary outreach effort.

The demonstration and evaluation gardens, the Union Bay Natural Area, and the Washington Park Arboretum are the most prominent and recognized features of the Center's presence in the Pacific Northwest. Thousands of people enjoy these aspects of the extended campus of the University of Washington.

1. History

To understand the history of the Center for Urban Horticulture, one must begin with the history of the University of Washington and the Washington Park Arboretum. The University of Washington was founded on May 20, 1861 as a territorial university and was located on the current site of the Four Seasons Olympic Hotel in downtown Seattle. In 1894[2], Edmond S. Meany, as a member of both the Board of Regents[3] and the Washington State Legislature, secured new land for the University of Washington. "One of the main reasons urged for the dedication of this new land to University purposes was that in addition to all the other needs of the University, there could be established here a scientific arboretum for the cultivation, care and study of all kinds of trees and plants that will thrive in this climate.[4] " The first arboretum was located on the campus. With the construction of the buildings for the 1909 Alaska-Yukon Exposition, the arboretum was moved from the main part of campus to just north of the future ship canal. In 1924, the Regents selected Washington Park in Seattle as the Arboretum's permanent location.

1) The University of Washington and the College of Forest Resources' Center for Urban Horticulture

Then, ten years later, the Board of Regents and the City of Seattle formally agreed to "establish and maintain it.[5]" In 1936, the Seattle Garden Club donated $3000 to hire James F. Dawson and Frederick Law Olmsted, Jr. of the Olmsted Brothers landscape firm to design the first planting plan. Mr. Dawson was the chief designer of the plan.

During the 1970's, disagreements arose regarding the roles and interests of the University, the City, and the Arboretum's immediate neighborhood. As a result, the University and City negotiated a more detailed working partnership, summarized in a 1974 Letter of Clarification to the 1934 Agreement. This more detailed working partnership limited the ability of the University to fully realize some of Dawson's original and broader vision for the Arboretum (such as for a library, a greater research presence, etc.). As a consequence, the Northwest Horticultural Society, under the leadership of Betty Miller, donated $35,000 to the University of Washing tcn to initiate a study of the Union Bay site to explore this broader vision. University Acting President Cartwright appointed and charged a committee chaired by Professor Dale Cole of the College of Forest Resources to develop a plan for a Union Bay Teaching and Research Arboretum. In November 1976, Jones and Jones, Architects and Landscape Architects, prepared a Master Plan for this committee and the University of Washington. This plan was received and approved by the Board of regents in early 1977. Emerging from this study was a vision for a program in urban horticulture to be located on a 63 acre site at Union Bay (includes both the present Union Bay campus and the Union Bay Natural Area) (Fig.1).

Fig.1 Map of the campus of the University of Washington. The Center for Urban Horticulture and the Union Bay Natural Area are on the right side just above the body of water (Portage Bay of Lake Washington). Husky Stadium is in the lower center and the main campus is on the left side.

The Center for Urban Horticulture is and has been a joint enterprise between the University and the horticultural community (paraphrased from former Provost George Beckmann, 1984). The center was designed to serve four functions: teaching, research, public service/display and stewardship with an emphasis on a vigorous continuing education and public service program (November 1976 Jones and Jones Master Plan). As stated by the Northwest Horticulture Society in 1984: "···[the Center for Urban Horticulture] is the first institution in the United States to combine scientific research and teaching with outreach programs and library facilities available to horticultural scholars, landscape professionals, urban managers, horticultural societies and the gardening public."

Professor Harold B. Tukey, Jr. was hired in 1980 from Cornell University to be the first director of the Center - he was responsible for setting program and facility directions and did so by hiring faculty and staff and by vigorously seeking donor and broader community funding for the facilities. Through his leadership, over 5 million dollars were raised between 1981 and 1985 and three buildings were built - Merrill, Isaacson and NHS Halls. Jones and Jones designed and supervised the construction of the campus and its associated landscaping. In 1982, Jones and Jones were given An Award of Merit from the American Society of Landscape Architects for their design. Additional donor support expanded both the buildings (Miller Library expansion and the new Douglas Conservatory and Research Greenhouse) and gardens (e.g., Goodfellow Grove and the Soest Garden) at the Center. Today the Center boasts a world-wide reputation, an associated and rapidly growing undergraduate and graduate student population (currently in excess of 80), and privately-funded buildings and grounds worth 13 million dollars. The Center directly or indirectly manages almost 50% of the Seattle campus - from Madison Street to the south to Surber Drive on the northeast, the Center has an extraordinary role and presence on the University of Washington-Seattle campus.

On May 21st, 2001, just after 3:00 am, the Earth Liberation Front, a domestic terrorist group, firebombed a faculty member's office and, as a result, destroyed or damaged most of Merrill Hall and its contents (Fig.2). Particularly hard hit were the research programs and the operation of the Miller Library and the numerous programs of Washington State University/King County Cooperative Extension and the Master Gardeners Association. Faculty, staff and graduate students are now housed in temporary trailers. Although this event has severely impacted the Center, outreach and continuing education programs continue, the Washington Park Arboretum is moving forward with its new Master Plan, the undergraduate and graduate student population continues to increase, and the gardens and grounds shine. On December 10th, 2001, greatly reduced versions of the Miller Library, its Plant Answer Line, the Master Gardeners' diagnostic clinic and the Otis Hyde Herbarium reopened for the public. As of March 2002, the University of Washington has committed over 6.5 million dollars to the recovery and rebuilding of Merrill Hall.

Fig.2 Right: The view of the Miller Library part of Merrrill Hall at 5:00 am on May 21st, 2001. Left: The inside of Merrill Hall on May 23rd showing extensive flame, soot and smoke damage. The ceiling has been completely burned and the roof is still present because it was made of steel. Most of the wooden supporting structure is gone.

2. Administration of the Center for Urban Horticulture

Initially (1980 - 1988) the Center was administratively housed in the Provost's office with academic appointments of faculty within the College of Forest Resources. In 1988, the Center became administratively and academically part of the College of Forest Resources. From 1980 to 1982, faculty were in the Division of Biological Sciences; from 1982 until 1992, they were in the Division of Forest Resources Management; from 1992 until 1997, they were in the Division of Urban Horticulture; and from 1997 until the present, they have been in the Division of Ecosystem Sciences. The Center's short history, its administrative definition as a center, its geographic isolation from the main campus of the University, and the numerous and somewhat varying administrative and academic linkages have created both opportunities and problems.

Since Dr. Tukey's original leadership, there have been two other directors of the Center, Professors Clement Hamilton (1992 - 1999) and Thomas M. Hinckley (1999 - present). Professor John Wott is the Director of the Washington Park Arboretum.

The current mission of the Center for Urban Horticulture was adopted in June 2000 and reaffirmed in July 2001. The mission ".... is to apply horticulture to natural and human-altered landscapes to sustain natural resources and the human spirit." To accomplish this mission, the Center relies on a balanced combination of teaching, research and public outreach and demonstration - the analogy of a three-legged stool is often used. Each of these activities is integral to the success of the others and it is in the synergy of these efforts that the Center has found its unique role and success. Although the importance of each leg of this stool and their balance seems self-evident, the May 21st terrorist bombing of Merrill Hall and the subsequent efforts to negotiate with the University about the rebuilding have strongly challenged this multi-faceted representation of the Center. The library, the continuing education program, the grounds and gardens, the undergraduate and graduate teaching programs and the research programs continue to be critical to how the Center is perceived, how the Center functions, and its role in the greater horticultural community.

Since the Center for Urban Horticulture is not an academic unit such as a Department or College, it is important to have a clear vision or definition of who "belongs" to the Center. Over the years, a definition of what and who comprises the Center emerged - this was formalized in mid-January 2002: "the faculty, staff, students and volunteers who are part of the Center for Urban Horticulture are those individuals who elect through action and interest to be associated with the mission and vision of the Center. Faculty, staff and students whose programs support and are themselves enhanced by being physically located at the Center will be given the highest priority for actual physical inclusion in both the Center as a facility and the Center as an organizing entity to accomplish its mission."

Faculty: Although not formally associated with the Center, faculty are a critical part of the research, teaching and outreach programs. Their central role was recognized in the original Jones and Jones Master Plan (1976, accepted by the Board of Regents in 1977). Listed on the next page are the faculty who have been associated with the Center since its inception.

Staff: Key to the management and functioning of the Center have been staff (Fig.3). They have provided leadership, been an integral part of the management of the Center and provided long-term program stability. Their functions include Center administration and fiscal and facilities management (Sally Dickman, Barbara O'Neill, Becky Johnson, Fran Trinder, Ray Larson and Carrie Cone), Custodial (Pedro Borrayo-Alatorre), Outreach and Continuing Education (Van Bobbitt, David Stockdale, Sue Nicol, Dana Kirley Beegle, Lynda Ransley, Julie DeBarr, Monica Ravin), Center development (Joyce Brewster, Eugenia Fulkerson, Elizabeth Herman, Laurie Houck) and the Miller Library (Valerie Easton, Laura Lipton, Martha Ferguson, Brian Thompson, Tracy Mehlin). Perhaps the largest single group is the Grounds and Maintenance staff. This group is a dedicated core of professional horticulturists and arborists, all with pesticide certified licenses, who provide the care and maintenance of the 230-acre Washington Park Arboretum and the 65 acre Union Bay Campus including the Union Bay Natural Area (Tim Hohn, Joe Witt, Jan Pirzio-Biroli, Christina Pfeiffer, David Zuckerman, Lou Stubecki, Dean Powell, K.C. Watson, Neal Bonham, Rebecca Work and Randall Hitchin at WPA and Fred Hoyt, Jim Fiore, Barbara Selemon at UB/UBNA).

Faculty	Years	Subject area	Administrative Role
Harold B. Tukey, Jr.	1980 - present	Plant Physiology	Director CUH, WPA
John A. Wott	1981 - present	Outreach, public gardens	Director of WPA (1993 - present)
James Clark	1981 - 1991	Plant Physiology	
William Hatheway	1983 - 1991	Quantitative ecology	33% appointment, not considered a hire.
Barbara Smit	1984 - 1991	Plant Physiology	
Clement Hamilton	1985 - 1999	Taxonomy	Director CUH, WPA
Deane Wang	1985 - 1989	Plant Ecology	
Kern Ewing	1990 - present	Plant Ecology	
Rico Gonzales	1993 - 1995	Plant Physiology	
Linda Chalker-Scott	1997 - present	Plant Physiology	
Thomas M. Hinckley	1999 - present	Plant Physiology	Director CUH
Sarah H, Reichard	2000 - present	Plant Ecology/Taxonomy	
Research Faculty	Years	Subject area	Administrative Role
J. Alan Wagar	1988 - present	Urban Forestry	
H.D. Bradshaw, Jr.	1993-2001	Genetics & molecular biology	
Kathleen L. Wolf	1994 - present	Urban Forestry	
Sarah H. Reichard	1997 - 2000	Plant Ecology/Taxonomy	
Adjunct Faculty	Years	Subject area	Administrative Role
Iain M. Robertson	1988 - present	Landscape Design	Chair, Landscape Architecture
Gordon A. Bradley	1992 - present	Planning, Urban Forestry	
Robert I. Gara	1992 - present	Entomology	
Robert L. Edmonds	1992 - present	Pathology	
Thomas M. Hinckley	1992 - 1999	Plant Physiology	
Richard R. Horner	1993 - present	Wetlands	
Visiting Faculty	Years	Subject Area	Parent Institution
Friedrich Duhme	1988	Restoration ecology	Tech. Univ. Munchen, Freising
Martin Meyer	1988		University of Illinois
Kyung J. Lee	1992-1993	Plant Physiology	Seoul National University - Suwon

Fig.3 Center for Urban Horticulture collections staff at the Washington Park Arboretum.

Students: See Academic Programs

Volunteers: One manifestation of the partnership between the Center and the horticultural community has been the long-term role of volunteers (Wott 2000). Most important activities at the Center simply could not occur without the assistance of volunteers. The quality of programs at both Union Bay and the Washington Park Arboretum depend on the efforts and the commitments of more than 150 individuals who together contributed the equivalent of four full time staff positions during 2001 (Fig.4).

Fig.4 Planting groundcovers by staff and volunteers along Azalea Way in the Washington Park Arboretum. The ground cover plants are a gift of the Seattle Garden Club, one of the horticultural partners of the Center.

The help provided by volunteers in the hours, days and weeks immediately following the fire was especially invaluable. The recovery and cleaning of books, herbarium specimens, slides, research documents, administrative files, furniture and equipment required many long days under very difficult working conditions (Fig.5).

Fig.5 Picture of a volunteer sorting and cleaning material removed from the library during the afternoon of May 21st.

3. Academic Programs

Since the arrival of the first faculty in 1981, graduate students have been an integral and critical part of the Center. Initially, graduate programs reflected the interest of the faculty and spanned from continuing education to stress physiology, from molecular systematics to urban forestry, from landscape design and maintenance to plant pathology. Over time, three to four areas emerged as concentrations: horticulture (plant selection, maintenance, physiology, etc.), urban ecology (including restoration ecology and conservation biology) and urban forestry. To date, some 78 MFR, MS and Ph.D. degrees have been awarded. Amongst the graduates are some well known individuals including William Bauerle (MS), Dan Hinkley (MS), Roger Kjelgren (Ph.D.), Darcy McNamara (MFR), Scot Medbury (MS), Dawn Neuman (Ph.D.), Sarah Reichard (MS, Ph.D.), Paul West (MFR), and Martha Wingate (MFR). Bauerle, Kjelgren, Neuman, and Reichard are faculty members at Clemson, Utah State University, the University of Nevada at Las Vegas, and the University of Washington, respectively. In 1991, an undergraduate program in Urban Forestry was initiated. As a result of the combined undergraduate and graduate programs in Urban Forestry, program graduates occupy key leadership positions in the municipal Urban Forestry programs of different communities in western Washington (Everett, Mercer Island, Olympia, Seattle, Vancouver). In 1999, the undergraduate program was revised and renamed Environmental Horticulture and Urban Forestry.

Faculty associated with the Center for Urban Horticulture offer undergraduate and graduate programs in Environmental Horticulture and Urban Forestry. Undergraduates may choose amongst three different areas: Environmental Horticulture, Public Horticulture and Urban Forestry. The environmental horticulture program focuses on applying horticultural knowledge in an ecological context. Students choosing this option focus on plant sciences from an eco-physiological viewpoint, applying the information to specific environments such as wetlands or disturbed urban landscapes. Included in this are restoration ecology, stress physiology, and management of rare and introduced plant species. The public horticulture program prepares students to enter careers that involve both plants and people, including management and curation of botanic gardens and arboreta, governmental positions, and education. Students may emphasize various aspects such as plant

aterials, plant care and maintenance, or education. The Urban Forestry option provides students with fundamental knowledge of tree science, forest ecosystems and forest management practices. In acknowledging the emerging field of urban and community forestry, students learn about the socio-cultural dimensions of managing forest resources in the midst of human settlement - including economics, political science, sociology and policy. These studies enable students to effectively manage forest systems for multiple purposes (e.g. environmental benefits, conservation, amenity and recreation) in cities and towns. Undergraduates can also seek a more general minor in Environmental Horticulture and Urban Forestry. There are currently 41 undergraduates in our programs.

Graduate programs for M.S., M.F.R., and Ph.D. degrees are tailored to the interests and needs of individual students. Currently faculty associated with the Center offer graduate work in the areas of habitat restoration, stress physiology, conservation of rare plant material, invasion biology, public garden curation, sustainable landscape management, and urban forestry. There are 44 graduate students currently enrolled in the program.

An innovative undergraduate program housed at the Center, and available to EHUF and non-EHUF students alike, is UW-REN - University of Washington Restoration Ecology Network. This is a three-campus (UW-Seattle, -Tacoma and -Bothell) program in restoration ecology. There is a linked series of course offerings on the three campuses. Students from the three campuses or from off-campus can receive a certificate in Restoration Ecology or take a single webcourse. Finally, there is the senior REN Capstone - a three quarter sequence culminating in the planning and implementation of a restoration project. In the Capstone, students of different academic backgrounds from the three campuses work together on four to five individual projects. Students learn about planning, design, installation, and monitoring of a restoration project using a client-contractor environment.

4. Cooperative Agreements and Partnerships

The Center also has formal collaborative relationships with Washington State University/King County Cooperative Extension programs in Master Gardening and Urban Food Gardening. The nature of the collaborative relationship is addressed in a memorandum of understanding. In addition, the Center has partnerships with the Northwest Horticultural Society, the Seattle Garden Club, the Puget Sound Mycological Society, Seattle Youth Garden Works and the Northwest chapter of the Society for Ecological Restoration. Such partnerships support Center programs, teaching, facilities and gardens and in turn the Center provides space and expertise to help community organizations achieve their goals.

5. Gardens and Grounds

The Center's gardens and grounds (Figure 1) are designed to serve three functions. They provide demonstrations for the visiting public (from garden options to restoring an urban wetland ecosystem), they are used for evaluation, research, and teaching and they illustrate the transition from a highly human-impacted urban landscape to a more natural landscape. These areas include the 10-acre Union Bay campus and the 55-acre Union Bay Natural Area.

The Center's 10-acre Union Bay gardens and grounds include four named gardens originating from donations and three test gardens:

- Marilou Goodfellow Grove
- Seattle Garden Club Entry Shade Garden
- McVay Courtyard
- Orin and Althea Soest Herbaceous Display Garden
- Blooms of Bressingham Evaluation Garden
- 2001 Suntory Annual Evaluation Garden
- Vitex Evaluation Garden

The Marilou Goodfellow Grove demonstrates the use of native plants in a transition landscape, flowing from a highly maintained, intensively used space to a low-maintenance, "naturalistic" one. The transitional nature of this garden can be observed in the way the formality of the landscape adjacent to Center buildings gives way to more informal, low-maintenance plantings towards the Union Bay Natural Area. The garden features native plant species from the Pacific Northwest. Generally, the peak of bloom is mid spring to early summer, though autumn color can be outstanding.

The Seattle Garden Club Entry Shade Garden serves as an entry for the main cluster of buildings at the Center. From early spring to early summer, a variety of colors spread across the ground with early spring blooming bulbs, perennials, and shrubs. In fall, the leaves of the stripped maples are spectacular.

The McVay Courtyard contains a matrix of Japanese maples with an understory emphasis on grasses and

plants with grass-like foliage. This common characteristic unites the design while allowing subtle variety in leaf shapes, colors, and textures. Restricting the range of plants also makes for a distinctly different design that encourages people to notice and observe the details. The courtyard contains two concrete bands which flow from the east entrance to the main entrance doors of Merrill Hall. Within the concrete are imbedded small stones and textured marks that represent flow and riffles. This in essence represents the flow of horticultural knowledge through and out of the Center. The rocks and plant beds separate the central seating area from the main gathering space in front of the conference hall and from direct circulation around the perimeter of the space.

Built in the summer of 1998, the Orin and Althea Soest Herbaceous Garden is the Center's newest addition. This garden displays perennials and bulbs in eight different common urban conditions, with variable soil textures, watering regimes, and sun/shade environments so visitors will be able to determine which plants are most appropriate for particular home garden conditions. A great variety of bold, interesting, and colorful plants are always on show (Fig.6).

Fig.6 Picture of the Orin and Althea Soest Garden in early November 2001. The maples in the right middle ground are the striped bark maples of the Seattle Garden Club Entry Garden. The building in the middle is Isaacson Hall.

The three evaluation gardens, Blooms of Bressingham of North America, Suntory Plants and Vitex, are an important additional service the Center provides. The sponsors for these evaluations include Bear Creek Gardens, Inc., Suntory of Japan, Chicago Botanic Gardens, the Morton Arboretum and the Ornamental Growers Association of North Illinois.

In addition to these demonstration and evaluation gardens, the 10-acre portion of the Union Bay campus also includes a nursery area and facilities supporting Seattle Youth Garden Works. This organization works with homeless and at-risk youth in a gardening setting where students and mentors rear, harvest and market plants. The program has shown strong success in altering the lives of many of its youth participants.

The Union Bay Natural Area (UBNA) is 53 acres of emergent wetlands, shoreline, and upland woodland and meadows located on top of a former landfill. It provides a living classroom and a wildlife sanctuary within the urban context of the University of Washington's east campus. It is used as a restoration laboratory to support classes and the Restoration Ecology Network, as a campus greenbelt and as a well-known wildlife viewing area. The Center's management role in the UBNA led to its involvement and then leadership in campus wetland and shoreline management. The UBNA and the shoreline/wetland management are becoming a nucleus for a broader consideration of environmental stewardship for University lands.

6. Herbarium

The mission of the Otis Douglas Hyde Herbarium is to collect and house voucher specimens of all accessioned plants in the Washington Park Arboretum and the Center for Urban Horticulture; horticulturally significant plants; and plants that reflect the research and project efforts of faculty, staff and students at CUH and WPA. Recently, the herbarium has expanded its collections to include Bellevue Botanical Garden, the Union Bay Gardens and the Union Bay Natural Area. The herbarium seeks to become the depository for a collection illustrating weeds and invasive plants of western Washington.

Similar to the Center, the herbarium's roots lie in the Washington Park Arboretum. In the 1970's, several Arboretum Foundation volunteers started a new unit called the Herbarium Committee. Twice a month, they either traversed the Arboretum in search of specimens or mounted them. The specimens were stored in cabinets at the staff offices in the Arboretum.

When the Center was built in the early eighties, the Herbarium Committee advocated its movement to the Union Bay campus. Charles H. and Otis Douglas Hyde of Tacoma, Washington made a substantial gift to establish the herbarium. The Herbarium was opened in 1985 under the leadership of Dr. Clement Hamilton. In 1999,

Dr. Sarah Reichard became Curator of the Herbarium.

Thanks to the use of metal storage cabinets, the herbarium suffered relatively little damage as a result of the May 21st, 2001 terrorist fire. Faculty, staff, students and volunteers removed the material from the ground floor of Merrill and packed it for storage. On December 12th, the Herbarium, now located in one part of the basement of Isaacson, reopened.

7. Library

The Elisabeth C. Miller Library is the foremost horticultural library in the northwestern United States. The library serves the academic community, the Washington Park Arboretum, horticultural professionals and the public. The library was founded in 1983 with a gift from Seattle attorney Pendleton Miller - the gift honored his wife, Elisabeth Carey Miller, who as president of the Northwest Horticulture Society played a leading role in the creation and sustaining of the Center.

The library opened in 1985 as part of the Center's new campus at Union Bay. The core of the original book collection came from the Washington Park Arboretum. The Arboretum's books and journals on woody plants, accumulated over many years, had long been in need of a home where they could be preserved and made accessible for wider use. In order to accommodate the library's growing collection and use, a generous gift from Mrs. Miller enabled a major expansion.

The library offers a wealth of horticultural source materials, including:

- A rare book collection approaching 700 volumes.
- Over 9000 books on horticultural science, landscape architecture and design, botany, plant pathology and entomology, urban plant management, the art and science of gardening, and plant taxonomy, including flora of many countries.
- 300 journal and newsletter subscriptions from botanical gardens and arboreta, professional organizations in horticulture and landscape management, regional plant societies, and the gardening press.
- Seed, bulb, and nursery catalogues from around the world.
- Pamphlets and brochures on horticultural topics
- Files on gardens and arboreta throughout the world.
- Special collections, including old and rare books, books for children, and books on Chinese gardens.
- Archives of the Washington Park Arboretum, Center for Urban Horticulture, and the Union Bay Natural Area.

In 2000, the Miller Library linked formally with the University of Washington's Library System to provide online and automatic cataloging. In 2000, the library received over 12,000 inquiries, over 25,000 webpage hits and almost 2000 borrowers. In early 2001, the Plant Answer Line was successfully initiated.

In spite of heroic action by the Seattle Fire Department, the terrorist fire of May 21st, 2001 caused water, smoke and soot damage to almost all of the books and journals in the Miller Library. All of the books and journals were removed within 36 hours of the fire and processed by staff, students and volunteers (Figure 4). It is estimated that about 15% of the collection, excluding the rare books, suffered severe damage. On December 10th, 2001, a much reduced version of the Miller Library and Plant Answer Line reopened in Isaacson Hall.

8. Outreach and Continuing Education

Outreach and continuing education officially began in 1981 when Professor John Wott was hired - in the first year, there were 106 students enrolled in continuing education courses. By 1988, there were 1150 participants in 49 classes. From the late eighties until the late nineties, the number of people contacted through courses, lectures, workshops, tours, etc. ranged from 15,000 to 25,000. For the number of personnel, this was the most successful outreach and continuing education program on the University of Washington campus (Gilmore Report 1997).

Union Bay Campus: The outreach and continuing education program at the Center have had a twenty plus year history of success. Professor John Wott, with Van Bobbitt and later David Stockdale as staff support, developed programs for adults and professionals. They worked with the local horticultural community to develop the Pro-Hort series and the annual NW Flower and Garden Show. David Stockdale left in late 1999. In early 2001, Sue Nicol began as coordinator of the outreach and continuing education program. She completely redesigned the quarterly Urban Horticulture newsletter (with a mailing list of 4500 people and organizations), the Pro-Hort newsletter (1200 professionals and firms) and the Center's web page. She was instrumental in re-linking the Center to the NW Flower and Garden Show. Over 1300 people participated in 54 CE classes during 2001.

Connections with other horticultural groups and programs continue to be an important part of the Center's effort. During 2001, there was cooperation with the Northwest Horticultural Society, Washington State University/King Country Cooperative Extension and Master Gardeners, the International Society of Arboriculture, Puget Sound Energy, Seattle Public Utilities, The Elisabeth C. Miller Botanical Garden and the College of Forest Resources to reach out to an ever-widening audience for programs. The Center offers courses that meet the standards set by the State of Washington Pesticide Licensing program as well as the ISA Certified Arborist program.

Washington Park Arboretum: It is estimated that some quarter to a third of a million people visit the Washington Park Arboretum each year. The Outreach and Continuing Education Programs at the Arboretum are designed to reach visitors from a range of age groups. For example, the Saplings School Program serves almost 3000 students from 14 school districts throughout the greater Puget Sound Area. Four curricular programs have been designed to meet the needs of these students: Plant Growth and Development, Wetland and Wetland Habitats, Ecosystems and Native Plants and People. The Arboretum's education group served 1,100 visits with its self-guided Pack Program. Using a grant from US Bank, a Teacher Professional Development Workshop was held and associated Library Resource Packs were developed. During the summer and in partnership with the University of Washington's Educational Outreach a one-week, all day summer camp was held for 4th and 5th graders. Finally, a series of Art and Culture Festivals were held.

9. Research Programs

Under the leadership of Director Tukey, the initial focus of urban horticulture was on "the new science of growing and using plants in cities. Its focus is on the problems and opportunities unique to city gardening: pollution, restricted root systems, anomalies of wind, light and water in urban canyons, the use of plants as climate or noise controls, and so on (Tukey 1983, 1984)." Director Tukey's second (Clark), third (Smit) and fifth hire (Wang) all brought a basic science emphasis in physiology and ecology to these issues. Unlike traditional Departments of Horticulture, the Center for Urban Horticulture would not be concerned with the production of a relatively few economic crops, but would focus on a wider array of landscape, native and amenity plants. In contrast to production horticulture where one cultivar may be grown over large areas of greenhouse space or land, urban horticulture strives to understand the spatial and temporal dynamics of having several dozen to hundreds of species in a private or public garden. From this original core group of faculty, notable publications in the applied (Bradley et al. 1991, Clark and Kjelgren 1990, Smit 1989) and basic (Kjelgren and Clark 1992, Neuman and Smit 1992, Smit et al. 1989, Wang et al. 1995) horticultural sciences appeared. Research linked with the Center in urban forestry is recognized regionally and nationally. For example, faculty (Bradley and Wagar) worked with local groups to prepare community-based management plans for public and municipal lands. In addition, other faculty (Bradley and Wolf) have participated in state and national urban forestry policy organizations.

Today, this foundation on horticultural principles and practices is still present; however, it is being applied to a wider array of problems arising in human-impacted environments spanning from urban-industrialized areas to distant wilderness areas. Although much of the research in invasive plants (Reichard 1999, Reichard and Hamilton 1997, Reichard and White 2001), rare plants, restoration ecology (Ewing 2002, Mazer et al. 2001, Marzluff and Ewing 2001), sustainable practices, and urban forestry (Wolf 1999) is applied, researchers at the Center are often involved in very basic studies (Chalker-Scott 1999, Drake et al. 1998, Ewing et al. 1995, Giblin and Hamilton 1999). Following the College of Forest Resources' emerging theme in sustainability, much of the current emphasis at the Center is on matching plant and site choices to increased sustainability.

The Center has two research programs formally linked to it and a third associated with it. These are Rare Plant Care and Conservation Program, the Sustainable Community Landscapes Program and the Restoration Ecology Program, respectively. The description of the Restoration Ecology Program was covered in the Academic Program section.

The Rare Plant Care and Conservation Program (Faculty: Sarah Reichard, Staff: Laura Zybas) is dedicated to conserving Washington's native rare plants through methods including ex situ conservation, rare plant monitoring, reintroduction, and education. This program is the first plant conservation program focused exclusively on vascular plants designated as rare in

Washington state. Incorporating both in situ and ex situ methods of conservation, we are collecting plant material from wild populations and growing them in the greenhouse for eventual reintroduction into native sites. This method is described as inter situ conservation. Program staff, students and volunteers also monitor rare plant populations located throughout Washington. Goals of the program include the following:

- Collection, storage, and propagation of seeds of rare plants.
- Reintroduction of rare and endangered plants to native habitat.
- Monitoring of rare plant populations throughout Washington.
- Conservation research of rare species native to Washington.
- Training of students and volunteers to be involved in all aspects of the program.
- Joining a national network of institutions working to preserve biological diversity (the Center for Plant Conservation).
- Creating educational materials and programs for all ages.

This last year, 27 volunteers monitored 66 rare plant populations in Washington State. In the process of doing this, they discovered 18 new populations of the species to which they had been assigned. The propagation and reintroduction of the golden paintbrush, Castilleja levisecta, was continued and expanded in spite of the fire of May 21 (Fig.7). Considerable progress was made this year into the micropropagation of showy stickseed, Hackelia venusta, another rare plant.

Fig.7 Graduate students, staff and faculty planting in January 2002 golden paintbrush at Ebey's landing. Whidbey Island, Washington.

The Rare Care Program is made possible by grants from the Bullitt Foundation, the Miller Charitable Trust, the Hugh and Jane Ferguson Foundation, the National Fish and Wildlife Foundation, the Washington Native Plant Society, the Seattle Garden Club, the Lake Washington Garden Club, and the Northwest Horticulture Society, as well as contributions from individuals.

The second formally linked program is the program in Sustainable Community Landscapes (Faculty: Linda Chalker-Scott, Staff: Angie Cahill). This program serves to integrate regional efforts to create, rehabilitate, and manage landscapes in human-altered or urban areas. We have participants from K-12 and higher education, non-profit organizations, governmental agencies, industry, and the community. Through applying plant and soil sciences, we hope to increase the percentage of sustainable landscapes in the Puget Sound region. Our educational focus and outreach activities will allow us to increase awareness of sustainable management techniques, thereby reducing harmful practices that damage plants and ecosystems.

Over the last year, the Sustainable Community Landscape program accomplished a number of activities (see web page for full details: http://www.cfr.washington.edu/research.mulch). Four panel discussions with almost 100 attendees were held. With student and community group support, three landscape renovations were installed (Fig.8) and five public sites were analyzed for potential landscape renovation. After analysis, design and management plans were developed for these five sites. The program monitored two research projects (mulch as a low

Fig.8 A NOVA High School student helping dig a hole in preparation for tree installation

maintenance method for restoration projects and fertilizer runoff from turf - a major landscape element in western Washington).

10. Washington park arboretum

The Washington Park Arboretum has been called a "200-acre art museum," and a "symphony of plants." It is dedicated to growing, studying, conserving, and displaying some 40,000 specimens of trees, shrubs, vines, and other plants (Wott 1998). Its management is a coordinated partnership between the City of Seattle's Department of Parks and Recreation and the University of Washington. [6]This public land trust is one of the oldest public gardens west of the Mississippi River. The Arboretum is utilized widely by community and educational groups and is enjoyed by many visitors each year. The UW, its major educational user, offers some 40 courses each year using the Arboretum collections in fields such as urban horticulture, botany, forestry, and landscape architecture. Moreover, horticulture programs at Edmonds Community College and South Seattle Community College have made extensive use of the facility, as have hundreds of UW and thousands of area K-12 students.

The Arboretum was declared an official State Arboretum in 1995. As a result of earlier discussions by the Arboretum Foundation, the Arboretum and Botanical Garden committee (composed of representatives of the City, University, Arboretum Foundation, local community and Governor's Office) was charged with developing a new master plan (Wott 1999). The Portico Group was hired in 1996 to begin the scoping and design phase of the new plan. After three written versions, 5000 written responses, hundreds of public sessions, a draft and a final Environmental Impact Statement, a final version of the Master Plan, "Renewing the Washington Park Arboretum," was approved by the Seattle City Council and the University of Washington's Board of Regents.[7] The plan calls for improvements and renovations totaling 50 million dollars over the next 20 plus years. To quote from the Master Plan: "The Washington Park is at once a collection of woody plants of international significance and a public park, treasured by residents of Seattle and the surrounding area. The brilliance of the Washington Park Arboretum lies in the rare blending of these two qualities. It is the overriding and explicit intent of this Master Plan to preserve and foster both of these qualities into the future. This Master Plan seeks to improve the care, expand the content and increase the accessibility of the collection, while at the same time maintaining undiminished, the natural, informal ambience of the park. To the extent that the plan is successful a visitor so inclined will be able to gain information more easily than has been possible heretofore, while other visitors will be able to relax, stroll, and play."

Due to the partnership between the City of Seattle and the University of Washington, Center staff (Figure 3), under the guidance of a curator, historically, and director, presently, are charged with the development, installation, care, restoration, and maintenance of the 4,400 accessioned plants in the collection. Many of the accessions are rare or endangered. Taking care of this living collection means matching site requirements and minimizing abiotic and biotic stresses -- dealing with the individual plant, its environment and its placement within the matrix of the native woodland are all the responsibility of the staff. Highlights for 2001 include the completion of the installation of a major drainage system for the Sorbus collection, major improvements to the Pinetum Collection, restoration of three targeted native woodland areas (Figure 4), the pruning and care of 44 large trees, 11 hazard removals, work on particular disease (e.g., phypthophthora root rot of Port Orford cedars) and insect problems (e.g., the cherry bark tortix), support of University of Washington courses and coordination with City of Seattle Parks and Recreation staff, the staff of the Arboretum Foundation and other friends and volunteers associated with the Arboretum.

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1. Director, Center for Urban Horticulture, College of Forest Resources, University of Washington, Seattle, 98195-4115, USA.

2. The cornerstone from the old Territorial University was transferred to Denny Hall in 1894.

3. Under Washington State law the Board of Regents has full control of the University and its property.

4. UW Regents, 1899, upon adopting a plan for the development of the present campus grounds

5. The site of the University of Washington Arboretum had been leased in December 1934 to the University of Washington by the City of Seattle, and the City had agreed "to use such funds as it may have available for the establishment of said Arboretum, and to cooperate with second party (UW) in the establishment and maintenance of said Arboretum and botanical garden and, to that end, to donate such seeds, plants, shrubs, trees, equipment and lawn as may be possible." Broadly, the City owns the land and maintains grounds, roads and security, cooperates with the University. The University controls and maintains the collection of plant material making up the Arboretum and Botanical Garden.

6. Management of the Arboretum is coordinated between the UW and the City of Seattle. The UW owns the plant collections and manages the functions of the

and its public programs and activities. The College of Forest Resources has been charged with the overall administration of the Arboretum. The City, on the other hand, is responsible for all infrastructure support, turf, security, the Waterfront Trail, Japanese Garden, and native plant areas. A non-profit organization, The Arboretum Foundation, which has some 3,000 members, has supported the Arboretum with nearly $5 million in donations since 1935.

7. Adopted by Seattle City Council Resolution 30317, May 7, 2001. Adopted by the University of Washington Board of Regents, May 18, 2001