PORTLAND PARKS & RECREATION

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Street Tree Inventory Report
Eastmoreland Neighborhood

November 2011

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Financial Support
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Volunteers guided by Portland Parks & Recreation Urban Forestry staff collected data on all 3,316 street trees within Eastmoreland neighborhood to compile the neighborhood's first complete street tree inventory. Data will be used to inform the creation of a Neighborhood Stewardship Plan to guide volunteers in caring for their community's trees.

Project Overview

This report provides results of a street tree inventory conducted in Eastmoreland neighborhood in 2011, along with Portland Parks & Recreation (PP&R) Urban Forestry staff recommendations to improve the condition of the urban forest.

Street trees were inventoried in Eastmoreland in summer 2011 by trained volunteers and PP&R Urban Forestry staff. Over the course of three monthly workshops, 55 volunteers contributed 330 hours collecting data on 3,316 trees. Street trees at every tax lot in the neighborhood were inventoried; data collected included tree type (species or genus), condition, size (diameter at breast height), planting strip width, and presence of overhead high voltage lines. Data analysis and recommendations were completed by PP&R Urban Forestry staff.

Volunteers experienced and trained in tree identification acted as team leaders, and data was collected in pairs on paper forms. Questions regarding species or site identification were answered by certified arborists or PP&R staff during data collection. Staff conducted spot checks on data to verify accuracy. Data was later digitized and entered into an ArcGIS geodatabase.

The Eastmoreland Tree Committee, a committee of the Eastmoreland Neighborhood Association, was essential to organizing workshops, recruiting volunteers, and promoting the project within the community. A special note of thanks is due to inventory organizers Catherine Mushel and Karen Williams for their tireless dedication to the project.

Funding for this project was provided by PP&R Urban Forestry and an East Multnomah Soil and Water Conservation District Partners in Conservation grant.

If you would like to get involved with Eastmoreland's urban forest, contact the Eastmoreland Tree Committee by visiting www.eastmoreland.org or contacting PP&R Urban Forestry.

Data from the inventory is available to the public in spreadsheet or ArcGIS format by contacting PP&R Urban Forestry.

Neighborhood Characteristics

Eastmoreland neighborhood is located in southeast Portland (Figure 1). Its borders are approximately SE McLoughlin Avenue to the west, SE Steele Street to the north, SE 39th Avenue to the east, and SE Crystal Springs Boulevard to the south.

Neighborhood landmarks include Reed College. Key neighborhood tree assets include the Reed College park blocks, Eastmoreland Golf Course, and Crystal Springs Rhododendron Garden. Eastmoreland is located in the Johnson Creek and Willamette watersheds.

Figure 1: Location of Eastmoreland neighborhood in Portland

According to 2000 Census data (Table 1), 89% of homes in Eastmoreland are owner-occupied. The median income is above $65,000/year with 7% percent of residents living below the poverty level. Compared to city-wide averages, Eastmoreland is more densely populated, has a higher median income, and a higher perentage of homeowners occupying properties.

Table 1: Neighborhood and citywide demographics

Demographics (2000 Census)	Eastmoreland	Portland
Area	744 acres	89,651 acres
Population	5,043	527,750
Density	7 persons/acre	6 persons/acre
Demographics	91% white; 9% non-white	72% white; 28% non-white
% of properties occupied by homeowners	89%	56%
Median income	$65,364	$43,958
% below poverty level	7%	11%

Tree Distribution

TREE TYPE DISTRIBUTION

Eastmoreland's public rights-of-way host a diverse array of tree types (trees identified to the species or genus level). The street tree population consists of 3,316 trees of 66 types (Appendix A). Fifteen tree types comprise nearly 86% of the resource, leaving the remaining types to represent 1% or less of the resource each (Table 2). Norway maples are the most common tree type, representing 33.0% of all street trees. Elms, lindens, and silver maples represent 11.3%, 8.4%, and 4.5% of the resource, respectively.

Table 2: Distribution of the 15 most abundant street tree types in Eastmoreland

Common Name	Species	Number of Trees	% of Total Trees	Mean DBH
maple, Norway	*Acer platanoides*	1,093	33.0%	24.7
elm	*Ulmus* spp.	374	11.3%	26.7
linden	*Tilia* spp.	277	8.4%	20.6
maple, silver	*Acer saccharinum*	149	4.5%	34.0
cherry	*Prunus* spp.	123	3.7%	16.3
maple, red	*Acer rubrum*	123	3.7%	10.8
sweetgum	*Liquidambar styraciflua*	119	3.6%	21.0
birch	*Betula* spp.	108	3.3%	18.0
dogwood	*Cornus* spp.	103	3.1%	8.7
maple, other	*Acer* spp.	87	2.6%	11.6
plum	*Prunus* spp.	86	2.6%	13.5
pear	*Pyrus* spp.	56	1.7%	11.5
oak	*Quercus* spp.	47	1.4%	11.5
zelkova	*Zelkova serrata*	47	1.4%	5.0
beech	*Fagus* spp.	44	1.3%	7.9

Twenty-nine tree families are represented in the neighborhood, and the fifteen most abundant families comprise nearly 97% of the resource (Table 3). Aceraceae (maple) dominates the resource, representing 45.6% of all trees. Other important families include Rosaceae (rose) with 13.2%, Ulmaceae (elm) with 12.7%, and Malvaceae (mallow) with 8.4%.

Table 3: Distribution of the 15 most abundant tree families in Eastmoreland

Family Scientific Name	Family Common Name	Tree Types Included in the Family	Number of Trees	% of Total Trees
Aceraceae	maple	boxelder, maple	1512	45.6%
Rosaceae	rose	apple, cherry, crabapple, dogwood, hawthorn, mountain ash, peach, pear, plum	438	13.2%
Ulmaceae	elm	elm, zelkova	421	12.7%
Malvaceae	mallow	linden	277	8.4%
Altingiaceae	sweetgum	sweetgum	119	3.6%
Betulaceae	birch	birch, hophornbeam, hornbeam	118	3.6%
Fagaceae	beech	beech, oak	91	2.7%
Oleaceae	olive	ash, Chinese fringe tree	44	1.3%
Fabaceae	legume	golden chain tree, Kentucky coffeetree, honey locust, mimosa tree, pagoda tree, redbud	42	1.3%
Ginkgoaceae	gingko	ginkgo	32	1.0%
Styracaceae	styrax	snowbell	31	0.9%
Cercidiphyllaceae	katsura	katsura	27	0.8%
Verbenaceae	verbena	glorybower	19	0.6%
Rhamnaceae	buckthorn	cascara	18	0.5%
Pinaceae	pine	arborvitae, cedar, cypress, juniper, western redcedar	17	0.5%

SPECIES DIVERSITY

A general rule of thumb for urban forest species diversity is the 10-20-30 rule (Santamour 1990). No species should represent more than 10% of the total, no genus should represent more than 20% of the total, and no family should represent more than 30% of the total.

Eastmoreland's tree species distribution does not meet this species diversity guideline. Maples are widely overrepresented: 45.6% of all trees belong to the maple family and genus, and 33.0% of all trees are Norway maple. The elm genus is also slightly overrepresented, with 11.3% of all street trees belonging to this genus.

FUNCTIONAL TREE TYPE AND MATURE TREE SIZE DISTRIBUTION

Broadleaf deciduous trees dominate the landscape, accounting for 98.9% of all street trees (Table 4). Broadleaf evergreen trees comprise 0.3% and coniferous evergreen trees comprise 0.8% of the total. Tree size designation (small, medium, and large) is determined by the mature size of the tree. Medium-sized trees account for 58.1% of the resource and small-sized trees account for 15.5%, while large trees account for 26.4%.

Table 4: Distribution of trees by functional tree type and mature tree size

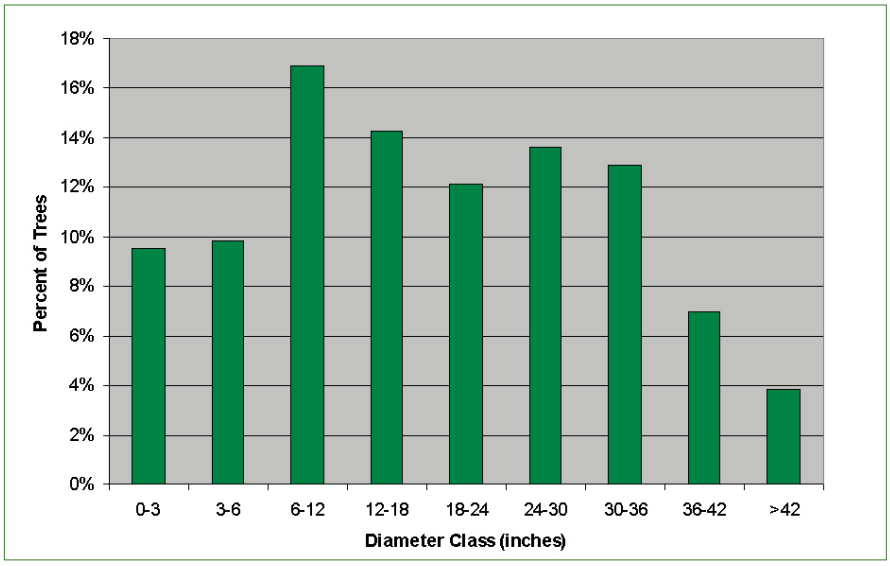
Functional Tree Type	Small	Medium	Large	Total
Broadleaf deciduous	15.3%	57.7%	25.8%	*98.9%*
Broadleaf evergreen	0%	0.3%	0%	*0.3%*
Coniferous evergreen	0.2%	0.1%	0.5%	*0.8%*
Palm evergreen	0%	0%	0%	*0%*
Total	***15.5%***	***58.1%***	***26.4%***	***100.0%***

Tree Size Distribution

TREE SIZE (RELATIVE TREE AGE)

The relative ages of trees may be approximated using size measured by diameter at breast height (DBH). Generally, trees increase in size with age, along with the value of the tree and the magnitude of the benefits that the tree provides. Trees were categorized into diameter classes to show the proportion of trees at various stages of maturity (Figure 2). Note that an uneven-aged population is desirable for managing tree maintenance costs over time. Age diversity ensures that canopy coverage and community complexity are not reduced with mortality.

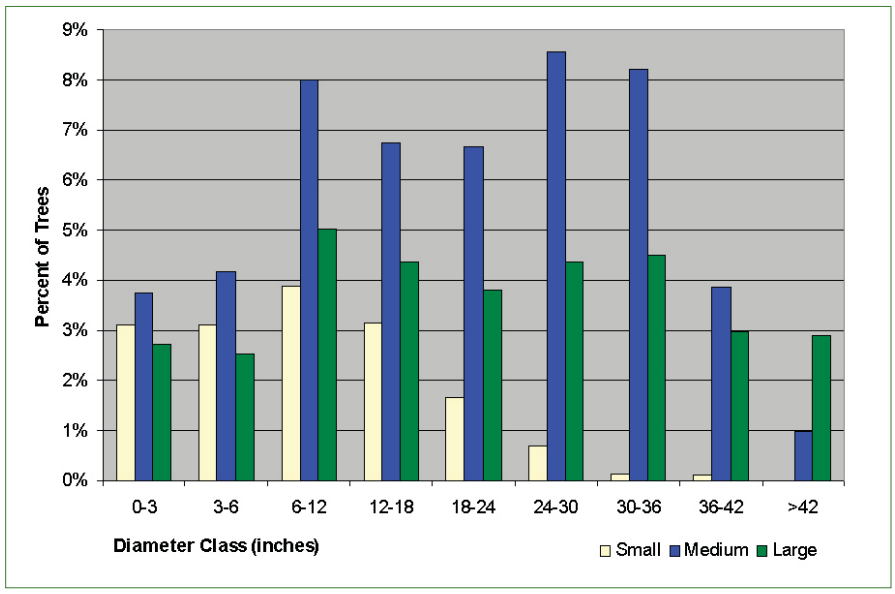
Figure 2: Relative tree age (tree size by diameter class)



Eastmoreland's streets host a wide range of tree sizes from the youngest sapling to the largest, a 65" DBH elm. Tree size distribution is fairly even, with most 6" size classes containing 12-18% of all trees (Figure 2). Tree size distributions are similar regardless of whether or not planting strips are located under high voltage power lines (Figure 3). Divided into functional size classes, Eastmoreland's medium form trees dominate all diameter classes under 42" DBH (Figure 4).

Figure 3: Relative tree age (tree size by diameter class) of trees in planting strips under high voltage wires and without high voltage wires

Figure 4: Relative tree age (tree size by diameter class) of trees by functional size class



Tree Condition

Tree condition was assessed by assigning trees to one of four categories: good, fair, poor, and dead. These general ratings reflect whether or not a tree is likely to continue contributing to the urban forest (good and fair trees) or whether the tree is at or near the end of its life (poor and dead trees). 43.1% of trees rated good, 36.5% rated fair, 20% rated poor, and 0.5% are dead (Table 5).

Table 5: Trees by condition class

Condition	% of Total Trees
Good	43.1%
Fair	36.5%
Poor	20.0%
Dead	0.5%

Of the most commonly found tree types, the healthiest trees were zelkova, oak, other maples, sweetgums, and red maples. At least 95% of trees of these types rated good or fair (Table 6). In poorest condition were cherry, plum, and birch. Over 40% of trees of these types rated poor.

Table 6: Condition class percentages and numbers of trees for the 15 most abundant tree types

Common Name	Species	% of Total Trees (Number of Trees)		
		Good	Fair	Poor
maple, Norway	*Acer platanoides*	31.1% (340)	40.3% (440)	28.6% (313)
elm	*Ulmus* spp.	38.5% (144)	45.2% (169)	16.3% (61)
linden	*Tilia* spp.	66.4% (184)	27.8% (77)	5.8% (16)
maple, silver	*Acer saccharinum*	21.5% (32)	45.6% (68)	32.9% (49)
cherry	*Prunus* spp.	17.1% (21)	38.2% (47)	44.7% (55)
maple, red	*Acer rubrum*	59.3% (73)	35.8% (44)	4.9% (6)
sweetgum	*Liquidambar styraciflua*	61.3% (73)	34.5% (41)	4.2% (5)
birch	*Betula* spp.	14.8% (16)	44.4% (48)	40.7% (44)
dogwood	*Cornus* spp.	30.1% (31)	51.5% (53)	18.4% (19)
maple, other	*Acer* spp.	62.1% (54)	35.6% (31)	2.3% (2)
plum	*Prunus* spp.	16.3% (14)	43.0% (37)	40.7% (35)
pear	*Pyrus* spp.	28.6% (16)	66.1% (37)	5.4% (3)
oak	*Quercus* spp.	59.6% (28)	38.3% (18)	2.1% (1)
zelkova	*Zelkova serrata*	91.5% (43)	6.4% (3)	2.1% (1)
beech	*Fagus* spp.	70.5% (31)	20.5% (9)	9.1% (4)

Stocking Level

STOCKING LEVEL

Street tree stocking level reflects the percentage of planting spaces that are currently occupied by trees. Eastmoreland's overall stocking level is 81% (Table 7).

Table 7: Street tree stocking level for Eastmoreland

Planting Strip Code and Description	Available Planting Spaces	Existing Trees	Total Spaces	Stocking Level
A 2.5-3' with or without wires	109	97	206	47%
B 3-4' with or without wires	126	180	306	59%
C 4-6' without wires	15	104	119	87%
D 4-6' with wires	17	50	67	75%
E 6-8.5' without wires	253	1,258	1,511	83%
F >6' with wires	200	1,100	1,300	85%
G >8.5' without wires	44	516	560	92%
Totals	*764*	*3,305*	*4,069*	*81%*

Planting space availability is subject to a number of guidelines, including width of the planting strip, presence or absence of high voltage power lines, and distance from conflicts (property lines, stop signs, etc). Throughout Eastmoreland, 764 empty spaces have been identified for tree planting. Planting spaces are categorized into planting strip categories based upon width and overhead wire presence. Higher stocking levels are generally observed in larger planting strips, and planting strips larger than six feet are at least 83% stocked.

RIGHT TREE IN THE RIGHT PLACE

Tree placement is vital for maximizing the benefits trees provide and minimizing avoidable costs. The right tree in the right place will experience fewer obstacles to reaching maturity and is easier to maintain.

Large planting strips (6' wide or greater) without high voltage power lines provide the best opportunity for expanding canopy and maximizing benefits from trees. A small-growing tree in a large planting strip represents a missed opportunity, as it will not live as long or grow as large as a larger-growing tree. In 6-8.5' wide planting strips without wires, 21% of trees are undersized for the strip (Table 8). In planting strips 8.5' or greater without wires, 18% of trees are undersized for the strip.

Table 8: Percentage and number of adequately sized trees growing in large planting strips without wires

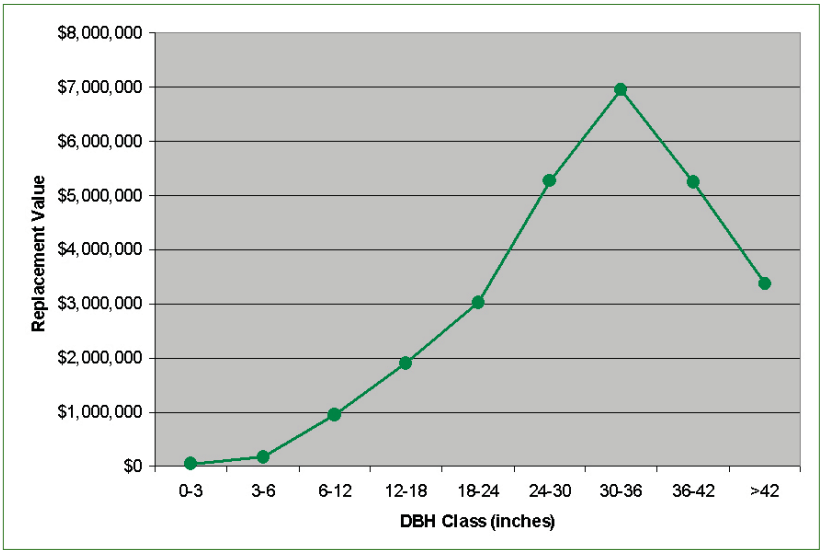
Planting Strip Code and Description	Tree species planted are large enough for strip	Tree species planted are too small for strip
E 6-8.5' without wires	79% (987)	21% (263)
G >8.5' without wires	82% (396)	18% (85)

Replacement Values

Replacement values for street trees in Eastmoreland were calculated using iTree Streets, an urban forest analysis software suite developed by the USDA Forest Service. A replacement value is an estimate of the full cost of replacing a tree in its current condition, should it be removed for some reason. Species ratings, replacement costs, and basic prices were obtained for each species from regional appraisal guides.

The replacement cost of Eastmoreland's tree population is valued at $26,932,932. The most valuable size classes of trees are those between 30" DBH and 36" DBH (Figure 5). Replacement values were the highest for Norway maple ($11,882,206), elm ($5,010,900), and linden ($2,692,976).

Figure 5: Replacement values of trees by diameter class (inches)



Environmental and Aesthetic Benefits

Using iTree Streets, Eastmoreland's street tree population was assessed to quantify the dollar value of annual environmental services and aesthetic benefits provided by trees: energy conservation, air quality improvement, carbon dioxide reduction, stormwater control, and property value increase. The model relies on tree size and species, as well as current pricing for electricity rates, median home resale value, regional stormwater interception costs, and costs of tree maintenance.

Eastmoreland's street trees provide nearly $523,000 annually in environmental and aesthetic benefits, as calculated by iTree Streets (Table 9). Annual benefits are valued by category at approximately $35,000 in energy savings, $6,000 in carbon sequestration, $12,000 in air quality improvement, $172,000 in storm water management, and $297,000 in aesthetic and other benefits. Each tree provides an average of $158 worth of benefits annually.

Table 9: Valuation of the environmental and aesthetic benefits provided annually by Eastmoreland's street trees

Benefits	Total ($)	$ / Tree
Energy savings	$35,448	$10.69
Carbon sequestration	$5,640	$1.70
Air quality improvement	$12,458	$3.76
Stormwater processing	$172,442	$52.00
Aesthetics	$296,700	$89.48
Total benefits	***$522,688***	***$157.63***

Of the most common tree types, elm, silver maple, oak, and Norway maple provided the highest annual per tree benefits, at least $197 per tree (Table 10). Dogwood, zelkova, and plum trees provided the least amount of benefits at $57 or less per tree.

Table 10: Average annual environmental and aesthetic benefits provided by Eastmoreland's most abundant street tree types

Tree Type	Energy	CO2	Air Quality	Storm water	Aesthetic/ Other	Total ($) per tree
beech	$5.14	$1.17	$1.55	$17.22	$134.79	*$159.88*
birch	$7.14	$0.48	$2.35	$31.06	$47.61	*$88.62*
cherry	$5.36	$2.95	$1.93	$16.27	$72.26	*$98.77*
dogwood	$2.33	$0.98	$0.80	$6.16	$33.75	*$44.02*
elm	$18.25	$2.22	$7.09	$101.22	$155.54	*$284.32*
linden	$10.54	$1.84	$3.43	$46.78	$115.19	*$177.78*
maple, Norway	$14.41	$2.19	$5.16	$71.94	$93.39	*$187.09*
maple, other	$6.91	$0.79	$2.30	$25.90	$81.99	*$117.89*
maple, red	$6.55	$0.75	$2.11	$23.28	$90.37	*$123.07*
maple, silver	$18.33	$2.51	$6.78	$96.98	$69.09	*$193.70*
oak	$7.79	$1.22	$2.57	$36.37	$145.48	*$193.43*
pear	$5.75	$0.73	$1.31	$22.13	$87.92	*$117.85*
plum	$4.11	$2.10	$1.47	$12.04	$56.55	*$76.27*
sweetgum	$12.15	$1.78	$2.80	$52.93	$101.88	*$171.54*
zelkova	$1.74	$0.22	$0.40	$6.47	$43.96	*$52.80*

Recommendations

Based on street tree inventory data presented in this report, PP&R Urban Forestry staff make the following recommendations for Eastmoreland neighborhood.

PLANTING

- Eastmoreland's street tree stocking level is 81% and is considered good. However, planting opportunities still exist with 764 sites identified for planting trees.
- Plantings should focus on increasing species diversity within the neighborhood. In particular, planting trees other than maple (*Acer*), elm (*Ulmus*), and linden (*Tilia*) are recommended.
- Planting opportunities should be prioritized to plant large-form trees in wide planting strips without overhead wires. 297 planting spaces have been identified in planting strips 6' and larger without overhead wires.
- Planting in the smallest planting strips is not a priority, as they are more difficult to manage and provide very little return on investment. However, all plantings help contribute to a neighborhood "tree ethic" and encourage others to plant.
- Take advantage of existing planting programs, such as low cost trees through Friends of Trees. These plantings are currently subsidized by City funds for the next few years; afterwards cost and availability may change.

YOUNG TREE ESTABLISHMENT AND MAINTENANCE

- With 20% of trees being 6" DBH or less, special attention should be paid to properly water and establish these young trees. Small trees represent the future generation of street trees, and early care and training will pay off in future benefits.
- Young trees should be structurally pruned to promote proper form as street trees. This includes removing low limbs for pedestrian and traffic clearance and removing codominate leaders. Structural pruning is critical in the first ten years after planting.
- Educate property owners on how to properly care for trees (pruning, watering, and root barriers) in order to reduce and delay future problems and conflicts with infrastructure.

MATURE TREE MAINTENANCE

- With less 37% of trees being larger than 24" DBH, special care should be taken to maintain and care for larger trees. Trees provide the most benefits as they reach maturity, and tree care is the most expensive for these large trees. Increasing the level of maintenance of large, old trees will help prolong their lifespan, reduce hazards, and keep these high value members of the urban forest contributing to the neighborhood.

- Seek funding or assistance for low-income property owners to care for mature trees.
- Retain existing large trees in fair and good condition. Benefits and time are lost when older trees are removed and replaced with smaller and younger tree species.
- Promote the importance and benefits of large-form species and mature trees within the community.

REMOVALS

- Encourage removal and replacement of dead trees and trees in poor condition. Of the most common species, birch, plum, silver maple, and Norway maple trees are in the poorest condition, and their average size indicates they are near the end of their lifespan. Several of these trees are no longer considerate appropriate to plant as street trees, and as they are replaced the composition of the urban forest will change considerably. Special attention should be paid to the selection of replacement trees.
- Eastmoreland is likely to continue losing elm trees to Dutch elm disease, even with an aggressive sanitation and innoculation program. Continue with current innoculations and plan for the slow loss of these large trees and their replacements.
- Eastmoreland's trees exhibit a favorable age distribution, with even percentages of trees distributed amongst size classes. To maintain this age distribution, removals of poor condition trees should be spread evenly over time.
- Encourage replacement of underperforming species, including undersized trees in large rights-of-way, with higher functioning, appropriately sized trees.

References

City of Portland Office of Neighborhood Involvement and US Census Bureau. 2000. *2000 Portland Neighborhood Demographic Data. http://www.portlandonline.com/oni/index.cfm?c=28387*

Portland Parks & Recreation. 2007. *Portland's Urban Forest Canopy: Assessment and Public Tree Evaluation. http://www.portlandonline.com/shared/cfm/image.cfm?id=171829*

Santamour, Frank S., Jr. 1990. Trees for Urban Planting: Diversity, Uniformity, and Common Sense. *Proceedings of the 7th Conference of Metropolitan Tree Improvement Alliance (METRIA)* 7:57-65.

US Forest Service. *iTree Streets* (version 3.1). *http://www.itreetools.org*

Appendices

Appendix A: Methods

Street trees were inventoried in summer 2011 by trained volunteers and PP&R Urban Forestry staff. Street trees at every tax lot in the neighborhood were inventoried, except in industrial areas, which were excluded. Street trees are located in the public right-of-way, typically between the sidewalk and curb.

Data collected included tree type (species or genus), condition, size (diameter at breast height), planting strip width, and presence of overhead high voltage lines.

Tree type: trees were identified to the genus or species. Six maple species were identified to the species level, and these are bigleaf (*Acer macrophyllum*) Japanese (*A. palmatum*), Norway (*A. platanoides*), paperbark (*A. griseum*), red (*A. rubrum*) and silver (*A. saccharinum*) maple. All other maple species were identified as "maple, other." Tree types of dead trees are listed as "unknown" as identification was difficult.

Tree condition: trees were rated as either good, fair, poor, or dead. These general ratings reflect whether or not a tree is likely to continue contributing to the urban forest (good and fair trees) or whether the tree is at or near the end of its life (poor and dead trees). The following guidelines were used.

Good: tree is healthy and vigorous with no apparent problems. Bark is undamaged, trunk is sound and solid, and crown is full.

Fair: Tree is in average condition. Tree many need some pruning and have some dead branches. Damage to bark is minimal and there is no decay on trunk. Other problems are minimal.

Poor: tree is in a general state of decline as indicated by the presence of cavities, conks, decay, and many dead branches.

Dead: Tree is dead or close to dying.

Tree size: Diameter at breast height (4.5' above ground) was measured with a diameter tape. Measurements of trees with branches, forks, or swelling at 4.5' were taken lower on the tree. Trees with multiple stems close to ground level were measured individually, and PP&R staff made final diameter calculations in the office.

Planting strip width: Planting strip width was measured from the inside of the curb to the sidewalk.

High voltage wires: Only high voltage wires were recorded.

Stocking level data was collected by PP&R Urban Forestry staff.

Volunteer neighborhood coordinators recruited volunteers to conduct street tree inventories during three Saturday work days. Volunteers interested in being inventory "team leaders" attended a 3.5 hour training to learn to identify tree species and site conditions, and how to collect and record data.

During work days, team leaders were paired with novice volunteers to collect data in a three to four block area. Groups were given a clipboard containing a map, data entry sheets, tree type abbreviations, and a list of trees planted by Friends of Trees in the neighborhood. Volunteers wore safety vests and carried a diameter tape, tree identification book, and bags for collecting samples.

In addition to PP&R staff, one or more volunteer "arborists-on-call" was available on inventory work days to assist volunteers with questions. Accuracy was stressed as highly important, and volunteers utilized the arborist-on-call to verify species identification as questions arose. Data was collected on paper maps and forms, and later digitized in ArcGIS by PP&R staff.

Accuracy of volunteer-collected data was checked by PP&R staff and corrections made as necessary. Remaining areas not completed during inventory work days were inventoried by volunteer team leaders and PP&R staff. In Eastmoreland, 90% of the inventory was collected by volunteers and 10% by PP&R staff. Spot-checks of the final data set found species identifications to be 95% accurate.

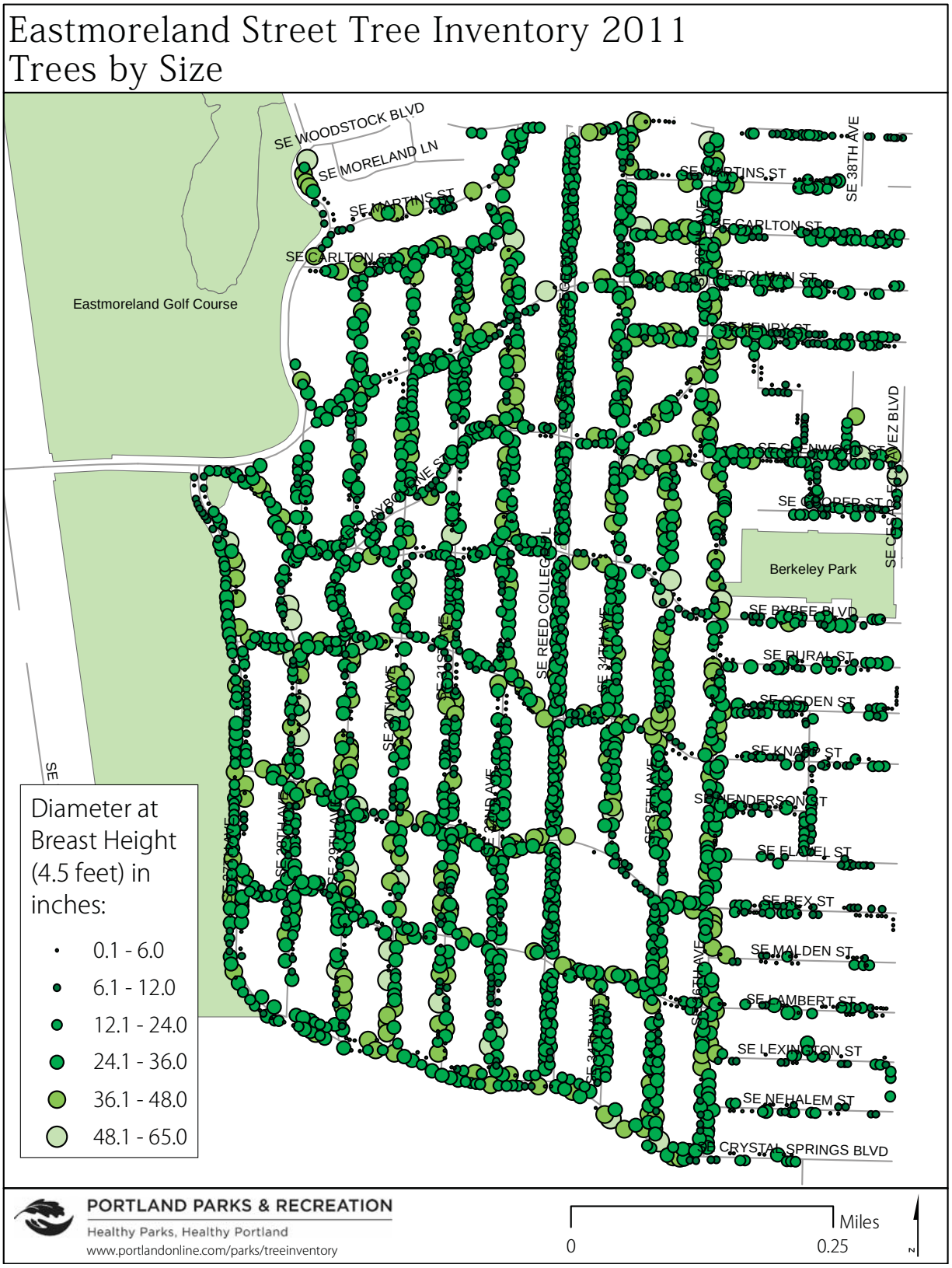
Appendix B: Trees of Eastmoreland by tree type

Common Name	Scientific Name	Number of Trees	% of Total Trees	Mean DBH
apple	*Malus domestica*	10	0.3%	5.9
arborvitae	*Thuja arborvitae*	3	0.1%	9.3
ash	*Fraxinus* spp.	40	1.2%	6.3
beech	*Fagus* spp.	44	1.3%	7.9
birch	*Betula* spp.	108	3.3%	18.0
black locust	*Robinia pseudoacacia*	3	0.1%	12.7
boxelder	*Acer negundo*	8	0.2%	19.4
cascara	*Rhamnus purshiana*	18	0.5%	2.3
cedar	*Cedrus* spp.	8	0.2%	36.0
cherry	*Prunus* spp.	123	3.7%	16.3
Chinese fringe tree	*Chionanthus retusus*	4	0.1%	2.0
crabapple	*Malus* spp.	26	0.8%	5.4
crape myrtle	*Lagerstroemia indica*	7	0.2%	4.2
cypress	*Chamaecyparis* spp.	4	0.1%	2.5
dogwood	*Cornus* spp.	103	3.1%	8.7
elm	*Ulmus* spp.	374	11.3%	26.7
fig	*Ficus* spp.	2	0.1%	0.1
ginkgo	*Ginkgo biloba*	32	1.0%	5.2
glorybower	*Clerodendron* spp.	19	0.6%	5.6
golden chain tree	*Laburnum anagyroides*	1	0.0%	2.6
golden rain tree	*Koelreuteria paniculata*	4	0.1%	4.3
hawthorn	*Crataegus* spp.	21	0.6%	11.6
holly	*Ilex* spp.	3	0.1%	19.9
honey locust	*Gleditsia triacanthos*	14	0.4%	8.2
hophornbeam	*Ostrya* spp.	2	0.1%	3.1
hornbeam	*Carpinus* spp.	8	0.2%	3.7
horsechestnut	*Aesculus* spp.	1	0.0%	7.3
juniper	*Juniperus* spp.	3	0.1%	9.7
katsura	*Cercidiphyllum japonicom*	27	0.8%	4.2
Kentucky coffeetree	*Gymnocladus dioica*	1	0.0%	1.5
linden	*Tilia* spp.	277	8.4%	20.6
London plane	*Platanus acerifolia*	4	0.1%	7.7
magnolia	*Magnolia* spp.	6	0.2%	2.4
magnolia, southern	*Magnolia grandiflora*	1	0.0%	0.0
maple, other	*Acer* spp.	87	2.6%	11.6
maple, Japanese	*Acer palmatum*	29	0.9%	8.1
maple, Norway	*Acer platanoides*	1093	33.0%	24.7
maple, paperbark	*Acer griseum*	23	0.7%	4.1
maple, red	*Acer rubrum*	123	3.7%	10.8
maple, silver	*Acer saccharinum*	149	4.5%	34.0

Appendix B continued

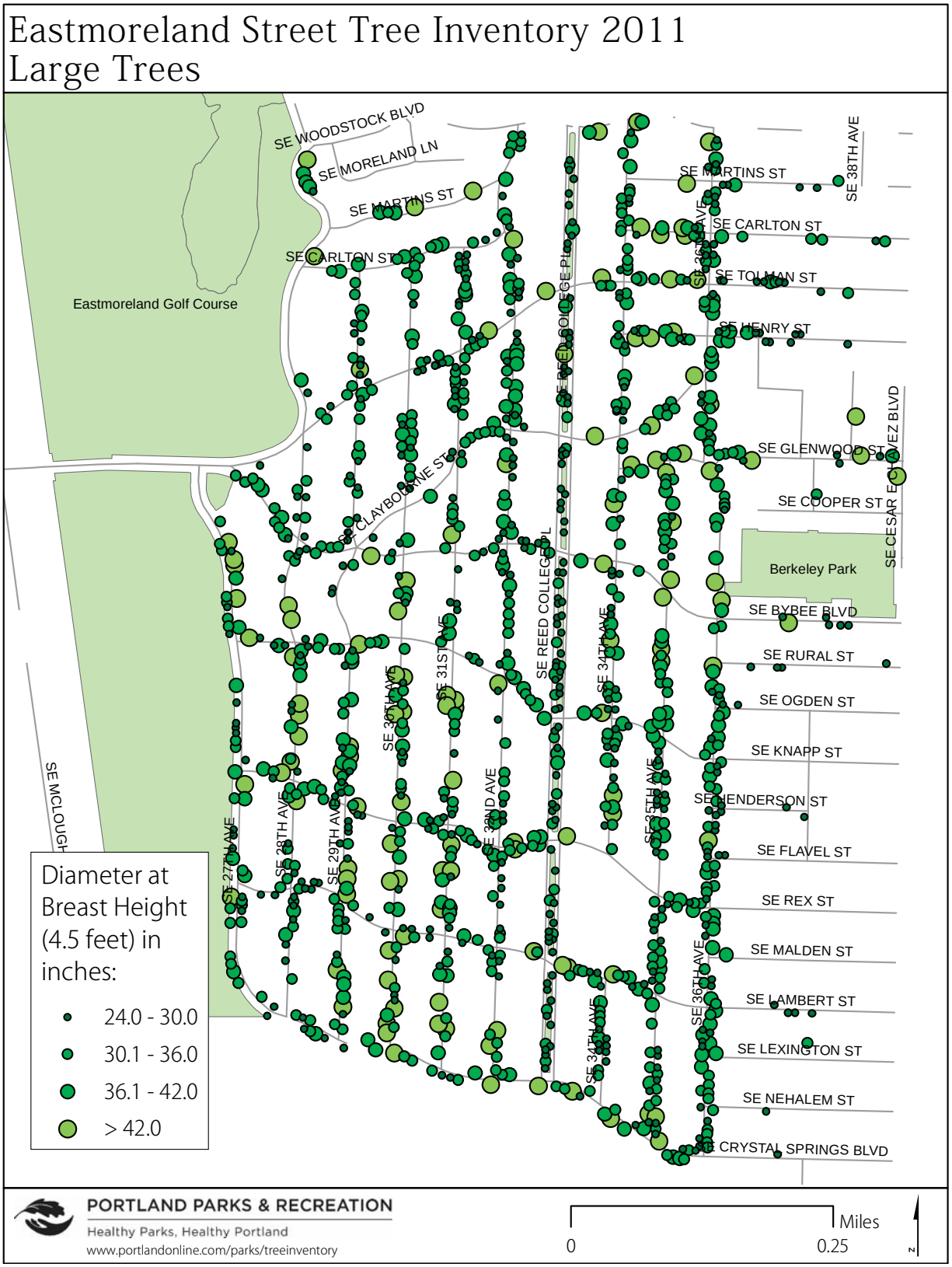
Common Name	Scientific Name	Number of Trees	% of Total Trees	Mean DBH
mimosa tree	*Albizia julibrissin*	3	0.1%	13.8
mountain ash	*Sorbus* spp.	4	0.1%	19.6
mulberry	*Morus* spp.	1	0.0%	20.1
oak	*Quercus* spp.	47	1.4%	11.5
pagoda tree	*Sophora japonica*	4	0.1%	11.0
peach	*Prunus persica*	4	0.1%	10.4
pear	*Pyrus* spp.	56	1.7%	11.5
pecan	*Carya* spp.	6	0.2%	2.4
Persian ironwood	*Parrotia persica*	15	0.5%	3.8
pine	*Pinus* spp.	9	0.3%	15.1
plum	*Prunus* spp.	86	2.6%	13.5
Prunus, other	*Prunus* spp.	4	0.1%	15.8
quince	*Cydonia oblonga*	1	0.0%	1.0
redbud	*Cercis canadensis*	16	0.5%	8.8
smoketree	*Cotinus* spp.	1	0.0%	5.2
snowbell	*Styrax* spp.	31	0.9%	4.8
sourwood	*Oxydendrum arboreum*	2	0.1%	2.0
stewartia	*Stewartia pseudocamellia*	11	0.3%	3.7
sweetgum	*Liquidambar styraciflua*	119	3.6%	21.0
tulip poplar	*Liriodendron tulipifera*	4	0.1%	32.1
tupelo	*Nyssa sylvatica*	8	0.2%	3.0
unknown	unknown	16	0.5%	7.9
walnut	*Juglans* spp.	5	0.2%	30.4
western redcedar	*Thuja plicata*	1	0.0%	13.4
willow	*Salix* spp.	2	0.1%	12.2
zelkova	*Zelkova serrata*	47	1.4%	5.0
Grand Total		*3,316*	*100.0%*	*19.3%*

Appendix C: Street trees of Eastmoreland by size



Appendix D: Small street trees (trees < 6" DBH)

Appendix E: Large street trees (trees > 24" DBH)



Appendix F: Poor and dead street trees

Appendix G: Available street tree planting spaces

Appendix H: Priority street tree planting spaces

Appendix I: Elm Trees