



**PORTLAND PARKS & RECREATION**

Healthy Parks, Healthy Portland



**Urban Forestry Elm Report 2014**  
**Background, Findings, & Recommendations**  
October 2014

# Urban Forestry Elm Report 2014

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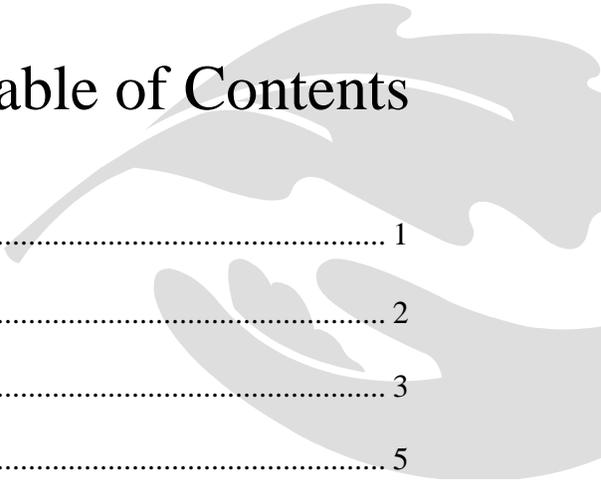
*Cover Photo:* American elm (*Ulmus americana*) in Wallace Park

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## Background

Dutch Elm Disease (DED) is a lethal, highly communicable disease of many members of the genus *Ulmus*, caused by the fungal pathogens *Ophiostoma ulmi* and *Ophiostoma novo-ulmi*. These fungi invade the vascular tissue of elms and prohibit water movement in the tree. An infected elm tree can die within weeks of showing the first symptoms of DED.

DED was first discovered in Europe in 1918, but the causal fungus was not identified until 1922 in the Netherlands. It was given the name Dutch elm disease in honor of the Dutch scientists who isolated the fungus, Bea Schwarz and Christine Buisman. The popular theory is that DED originated in Asia, since Asian elm species are resistant to the fungus. American and European elms are highly susceptible to the disease.

In 1930 DED appeared in Ohio, having spread to the U.S. via shipping crates made of infected elm wood. The disease hit the east coast hard and by 1972 the European bark beetle, the primary DED vector, was found in all but four states. The first case of DED in Oregon was discovered in 1973 in Ontario, likely transmitted from Boise, Idaho along the I-84 corridor. In 1976, a single case was discovered in Portland, in Overlook Park. The elm was quickly removed, leaving no further outbreaks of DED in western Oregon until 1986, when a dual outbreak occurred in Eugene and Portland. This second case of DED in Portland was discovered at 39<sup>th</sup> & E. Burnside St. Since then, Urban Forestry's elm monitoring program has worked to slow the spread of DED throughout the city.

There are three ways the DED fungus spreads: bark beetles, root grafts, and human activity. Both the native elm bark beetle, *Hylurgopinus rufipes*, and the smaller European elm bark beetle, *Scolytus multistriatus*, are DED vectors. Elm bark beetles breed and overwinter under the bark of dead or declining elms. In infected trees, spores of the DED fungus stick to the backs of bark beetles and are transported to new elms when beetles emerge in the spring and fly off to feed on healthy elms. The fungus spreads most rapidly through root grafts, which form between trees growing in close proximity. Human activity, such as transporting elm wood infested with bark beetles, also spreads the disease.

The fungus kills trees by invading and occluding the infected tree's xylem (vascular tissue), preventing water conduction and ultimately resulting in death. Visual symptoms of DED include localized leaf wilt and browning (termed *flagging*) and sapwood discoloration (termed *streaking*).

Infection can be prevented with commercial fungicides. There are several fungicides currently on the market, the most commonly used being Arbotect. The fungicides vary in their application systems and price ranges, but their mechanisms are similar. Fungicides help prevent DED infection by disabling fungal spores when infected beetles feed on an elm. Fungicides are not 100% effective at preventing DED, however a dedicated community with clear goals can take steps to slow the spread of DED in affected urban environments.

## **Portland's Elm Strategy**

On June 10, 1987, Portland City Council passed Ordinance No. 159750, declaring Dutch elm disease-infected trees a nuisance and declaring a state of emergency for Portland's elm canopy. The ordinance specifies that it is unlawful for elm trees infected with DED to remain on any lot or parcel of land in the city. In line with this ordinance, Urban Forestry has an aggressive a five-pronged approach to prevent Dutch elm disease and contain elms that are already infected. With approximately 3,000 susceptible elms throughout the city, DED would have a catastrophic impact on Portland's urban forest if allowed to progress unchecked.

### MONITORING

Each summer, as the symptoms of DED become apparent, an elm monitor is hired to review the city's elms. The elm monitor looks for the visual symptoms of Dutch elm disease, such as flagging; a pronounced wilting and browning of leaves. The monitor samples – or directs the Urban Forestry crew to sample – elm trees that show possible DED symptoms. When a sample indicates the presence of DED it is sent to the Oregon State University Plant Pathology Clinic for cultivation and identification. If the lab culture is identified as the Dutch elm disease fungus, steps are taken to remove the tree. Elms that do not present signs of DED, but decline over the season are reviewed by Urban Forestry to determine if the tree should be removed.

### REMOVAL

Rapid removal lessens the opportunity for the infected tree to attract bark beetles or for the fungus to spread to adjacent trees via root grafts. Urban Forestry is currently funded to remove DED-infected elms in the right-of-way at no cost to adjacent property owners. The property owner must sign a removal permit and commit to replanting during the next planting season. For DED-infected elms on private property, the property owner is required to remove the tree within 15 days of notification, at their own expense. After removal, stumps must be ground to prevent infection via root grafts.

### SANITATION

All elm wood must be disposed of in a controlled manner by chipping, de-barking, or burying so as not to provide habitat for elm bark beetles. All tools in contact with infected elm trees are disinfected before and after use to prevent contamination with fungal spores. Portland also observes a moratorium on pruning elms between April 15<sup>th</sup> and October 15<sup>th</sup> each year. Bark beetles are active during the spring and summer months and are attracted to open wound sites left by pruning. Deadwood pruning is conducted during the winter months to reduce sites that could harbor bark beetles.

### INOCULATION

Urban Forestry inoculates approximately 140 elms per year with the fungicide Arbotect. Significant elms in Portland's parks and public spaces are targeted and put into a 3 year treatment rotation. The nonprofit Save Our Elms and their affiliates also raise money and organize neighborhood elm inoculations to treat elms with either with either Arbotect or Propiconazole.

### EDUCATION AND OUTREACH

The elm monitor serves as a liaison between Urban Forestry and the community; typical activities include meeting with homeowners and neighbors and providing educational programs to increase public awareness of Dutch elm disease. Working with community groups like Save Our Elms is also an important way to support neighborhood engagement with and stewardship of their elms. Continuing to build relationships with neighbors in areas that infrequently lose elms to Dutch elm disease also eases the acceptance of the removal process when it does occur.

## 2014 Dutch Elm Disease Findings

2014 was an average year for Dutch elm disease in Portland. 35 elms were removed due to Dutch elm disease or decline. (Table 1) 19 elms tested positive for DED and 17 were removed as in decline or dead. Of these 35 trees, 20 were in the public right-of-way or Parks property and 15 were on private property. Removed elms ranged from 1 to 50 inches in diameter, with 26 inches as the average diameter at breast height (DBH). (Appendix 3)

The majority of elms removed were in southeast Portland, which had 24. (Appendix 1) Sunnyside neighborhood had the most removals at 8, but these were all concentrated on one property and were small. Of those 8 removals, 5 were 3 inches or smaller and of the remaining 3, only 1 was over 10 DBH. Eastmoreland neighborhood was next at 7 removals, 6 of which were in pairs, testifying to the power of root grafts to transmit DED. The largest removal this year was the singleton in Eastmoreland at 50.1 DBH. Ladd's Addition had only 2 removals this year, after 7 in 2013 and 3 in 2012.

Southwest Portland lost 8 elms, the same number as last year. The Downtown neighborhood still represented the majority of these removals at 6; with 1 removal along SW 1<sup>st</sup> ending up in the South Portland neighborhood and 2 removals in Riverview Cemetery which is in Unclaimed Multnomah County. There was one case of DED in the South Park Blocks this year, in the same area as previous cases. There was one elm removal in Pettygrove Park this year.

Northeast Portland had 2 removals this year in Irvington and Alameda, while northwest Portland had one in the Northwest District. North Portland did not have any elm removals this year but did have one elm on private property test positive for DED. Frank Krawczyk, the Tree Inspector for elm removals is allowing the property owner to follow a protocol of pruning out the affected canopy and inoculating both elms on the lot. Even though this elm tested positive for DED it is not being removed, so it is not included in this year's data. The elms on this property will be closely monitored next year for possible mortality.

The number of elms removed in 2014 is average compared to the last decade of elm removals (Fig. 1). Cases of DED by location in 2014 also followed the trend of the last decade (Fig. 2), with most removals in southeast, followed by southwest. A total of 1,120 elm trees have been removed in Portland due to Dutch elm disease since the fungus appeared in the city in 1976. (Appendix 2) Assuming that the elm population was about 3,700 in 1986, 30.3% of the elm population has been lost due to DED between 1986 and 2014, an average of 1-1.2% of the elm population lost per year. This is a very small loss rate, especially compared to historic losses on the east coast, where often 30-50% of a town's elm population died within a year. A majority of the elms removed in Portland are replanted, often with hybrid elms that are resistant to DED, so Portland's elm population has actually remained fairly stable over time.

### TESTING

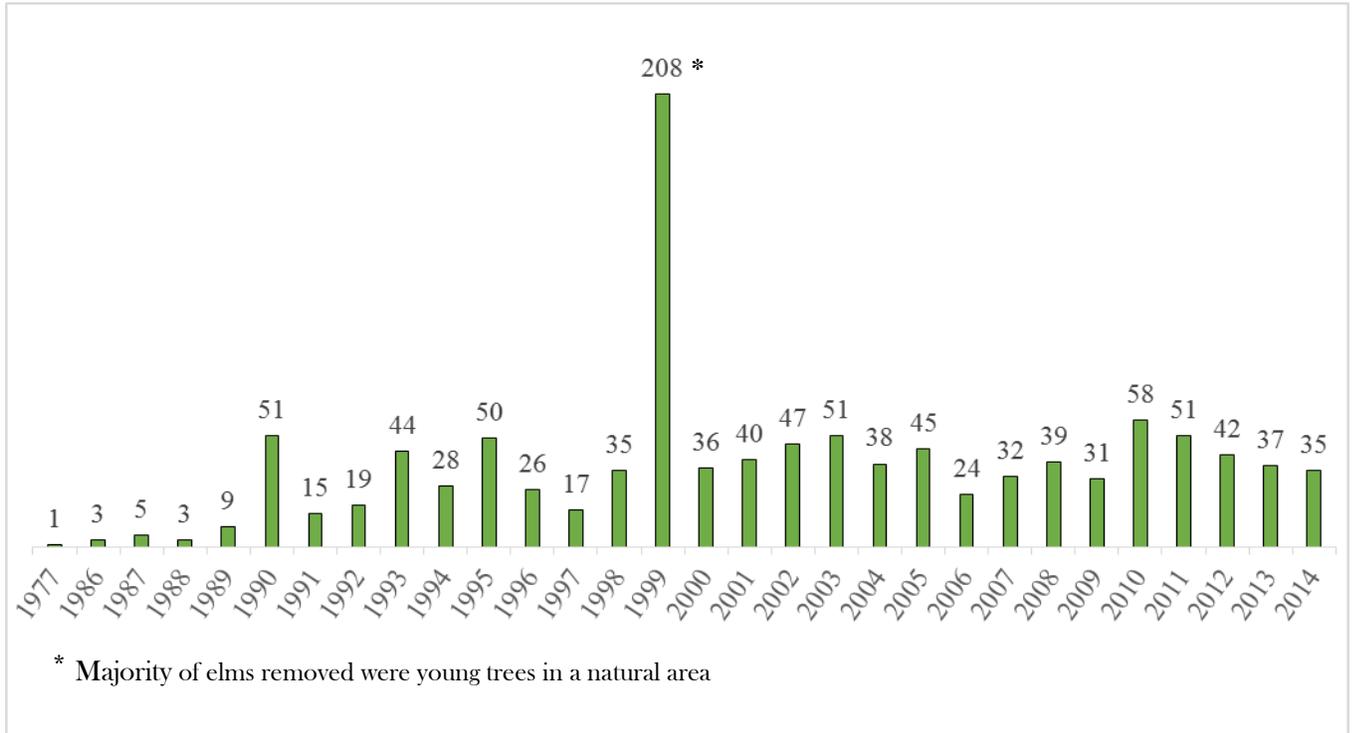
Twenty-nine samples were sent to the Oregon State University Plant Pathology Clinic to be tested for Dutch elm disease. Samples were only sent to the lab when streaking was found under the bark of examined branches. 19 samples came back positive for the DED fungus, for a positive rate of 66%. One sample, from Berkeley Park in Eastmoreland, was negative for DED but showed results for another fungus: *Phoma*. Two elms, at 3511 SE Rex and 111 SW Harrison respectively, did not present Dutch elm disease when sampled early in the season, but tested positive when re-sampled later.

Of the removals that did not test positive for DED, they were either dead or showed rapid decline over the course of the season. These elms were in areas with a history of Dutch elm disease and often adjacent to current or historic elm removals for DED. There were 3 elms that were inspected as dead this year: 130 NW 19<sup>th</sup>, 1428 NE Schuyler and 3207 SE Crystal Springs.

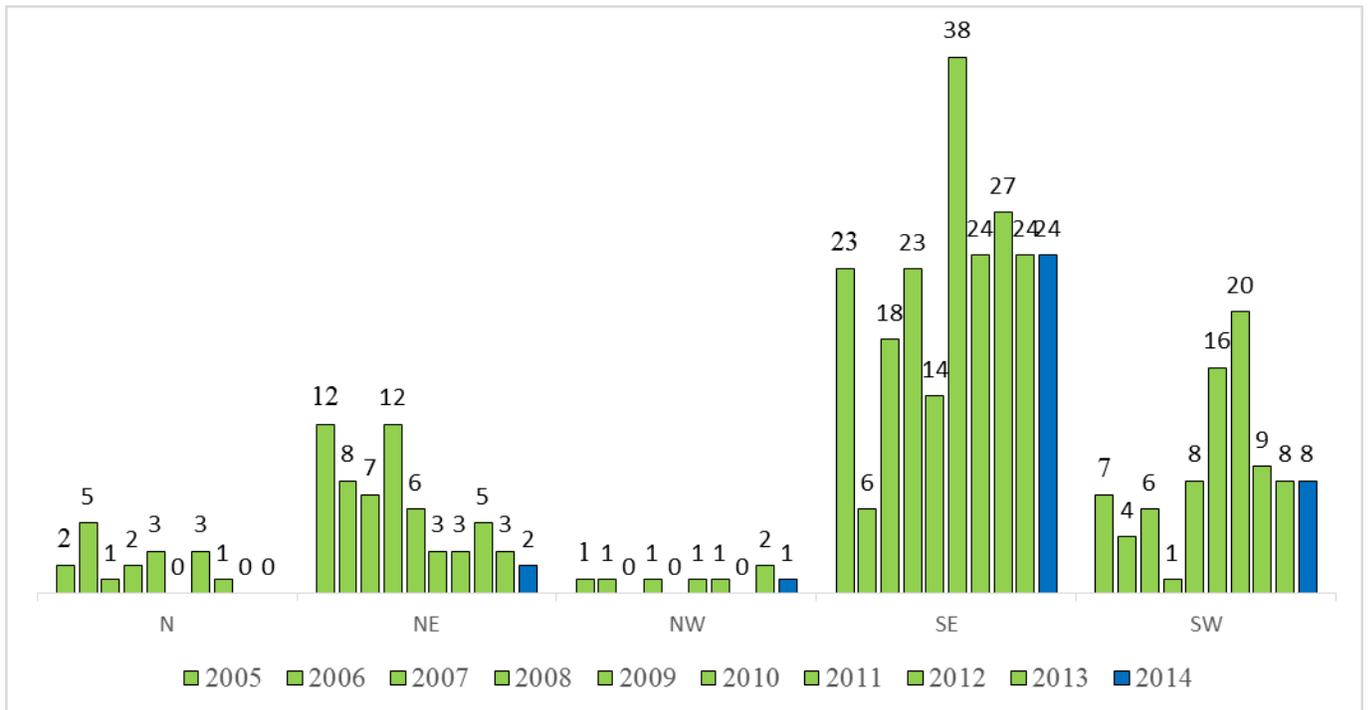
TABLE 1. LOCATION OF ELMS REMOVED IN PORTLAND IN 2014

Location	Neighborhood	Property Type	# of Elms
<b>Northwest</b>			
130 NW 19th	Northwest District	Private	1
			<i>Total NW (1)</i>
<b>Northeast</b>			
2607 NE Mason	Alameda	ROW	1
1428 NE Schuyler	Irvington	Private	1
			<i>Total NE (2)</i>
<b>Southwest</b>			
1881 SW Naito Pky	Portland Downtown	ROW	1
111 SW Harrison	Portland Downtown	Private	1
South Park Blocks SW Jackson St & SW Park Ave	Portland Downtown	PP&R	1
Lovejoy Fountain Park SW 3rd Ave & SW Harrison	Portland Downtown	PP&R	1
SW 1st Median between Harrison & Lincoln	Portland Downtown	ROW	1
2501 SW 1st Ave	South Portland	ROW	1
0300 SW Taylors Ferry Rd	Unclaimed Multnomah County	Private	2
			<i>Total SW (8)</i>
<b>Southeast</b>			
1704 SE Ankeny	Buckman	ROW	1
1535 SE Alder	Buckman	ROW	1
3511 SE Rex St	Eastmoreland	ROW	2
Duniway School - 7700 SE Reed College Pl	Eastmoreland	ROW	2
3207 SE Crystal Springs	Eastmoreland	ROW	2
3414 SE Crystal Springs	Eastmoreland	ROW	1
2063 SE Ladd	Hosford-Abernethy	ROW	1
2107 SE Hemlock	Hosford-Abernethy	ROW	1
2133 SE Clinton	Hosford-Abernethy	ROW	1
Richmond School - 2276 SE 41st	Richmond	Private	3
6532 SE 20th	Sellwood-Moreland Improvement League	ROW	1
633-635 SE 29th	Sunnyside	ROW and Private	8
			<i>Total SE (24)</i>
			<i>Grand Total 35</i>

**FIGURE 1. NUMBER OF ELMS REMOVED EACH YEAR DUE TO DED IN PORTLAND (1977-2014)**



**FIGURE 2. NUMBER OF ELMS REMOVED EACH YEAR DUE TO DED PER QUADRANT OVER THE LAST TEN YEARS (2005-2014)**



In several cases, such as Pettygrove Park, 2063 SE Ladd and 2607 NE Mason, samples of the canopy did not show visual streaking but the trees continued to decline and it was suspected that they had acquired DED through a root graft and the fungus was present in the roots but had not traveled up into the canopy where we were taking samples. In all these cases the elms were adjacent to historic removal locations.

## ELM INOCULATIONS

Urban Forestry inoculated 148 elms in twelve locations with the Arbotect macroinjection technique in the summer of 2014 (Table 2). Neighborhood organizations inoculated 115 trees in Ladd’s Addition and the Eastmoreland neighborhood. (Table 3). Save Our Elms (SOE) in Ladd’s Addition has decided the macroinjection technique is most effective for them and contracts with Davey Tree to oversee their inoculations. The Eastmoreland Neighborhood Association uses the microinjection technique with community volunteers.

**TABLE 2. LOCATION AND NUMBER OF ELMS TREATED WITH ARBOTECT FUNGICIDE IN 2014 BY URBAN FORESTRY**

<b>Location</b>	<b># of Elms</b>
Gabriel Park	6
North Park Block #1 (Burnside - Ankeny)	6
North Park Block #2 (Burnside – Couch)	11
North Park Block #3 (Couch – Davis)	11
South Park Block #12 (Salmon – Main)	10
Pettygrove Park	7
South Park Block #1 (Jackson – College)	18
South Park Block #2 (Hall – College)	14
South Park Block #11 (Main – Madison)	11
South Park Block # 10 (Madison – Jefferson)	4
Eastmoreland Golf Course	15
Omaha Blocks	35
<b>Total</b>	<b>148</b>

**TABLE 3. LOCATION AND NUMBER OF ELMS TREATED WITH FUNGICIDE IN 2014 BY SAVE OUR ELMS (SOE) AND EASTMORELAND**

<b>Location</b>	<b># Elms Inoculated</b>	<b>Method</b>
Ladd's Addition	36	Arbotect (Thiabendazole)
Eastmoreland	79	Propiconazole
<b>Total</b>	<b>115</b>	

## OUTREACH

The elm monitor talked to many homeowners about their elms as well as several neighbors about the DED activity in their neighborhood. It was standard practice to knock on the door of any property being sampled when the elm monitor did the initial inspection. This helped owners prepare for activity around their elm(s) and the potential for removal. In several instances the removal posting initiated conversations with residents about Dutch elm disease in their neighborhood, so this posting seems to be working well. Monthly reports on the status of DED in the City were also published in the *Urban Forestry Report*, which served to update the Urban Forestry Commission and keep the general public informed about Dutch elm disease.

## ELM INVENTORY OF PARKS PROPERTIES

It has been recommended for several years that a thorough update of the elm database be conducted, as it has not been updated since 2001. An inventory of elms increases the efficiency of the elm monitor as well as accuracy in our data and reports. It also ensures that the monitoring for Dutch elm disease is thorough and complete.

Elms in the City fall into 3 categories based on ownership: elms in the right-of-way, elms on Parks property and elms on private property or property owned by another public entity such as Metro. Elms in the right-of-way are captured during the Street Tree Inventory being conducted by Urban Forestry. Elms on Parks properties were inventoried in 2014 by the elm monitor in consultation with Parks Zone staff. Private property elms will be the focus for subsequent elm seasons as the data collection strategy will need to be slightly different.

In 2014, inventory data was collected on 636 elms, in 42 different Parks properties. (Table 4)

The largest elm on Parks property is in the Eastmoreland Golf Course with a DBH of 61.8

TABLE 4. PARKS WITH THE MOST ELMS

Park	# of Elms
South Park Blocks	210
North Park Blocks	90
Normandale Park	49
Lents Park	39
Pettygrove Park	31
All Other Parks	217
<b>Total</b>	<b>636</b>

To begin, existing records were reviewed to create an initial list of Parks we already knew had elms. Next, Parks Horticulturalists in all the zones were contacted and they reviewed their properties letting us know of any Parks that had elms that had so far escaped the database. In this way a complete list of Parks properties with elms was compiled.

The elm monitor then visited each of these parks and gathered data about the elms following a similar protocol to the Street Tree Inventory. Using an iphone, the elm was placed on a map in ArcGIS and other data was associated with that point, such as species, health and DBH. In the course of normal monitoring, private property elms were also encountered and 141 elms on private property were collected. These

points when combined with the street tree data begin to provide a complete digital map of the elms in Portland.

*Elm Inventory Recommendations:*

- Formulate a strategy for an inventory of elms on private property to create a data set in which we have a high degree of confidence.
- Develop the tools and processes necessary to use digital maps for monitoring elms.
- Plan to conduct an inventory of Parks properties every 5 years to keep data current. The next inventory would be in 2019.



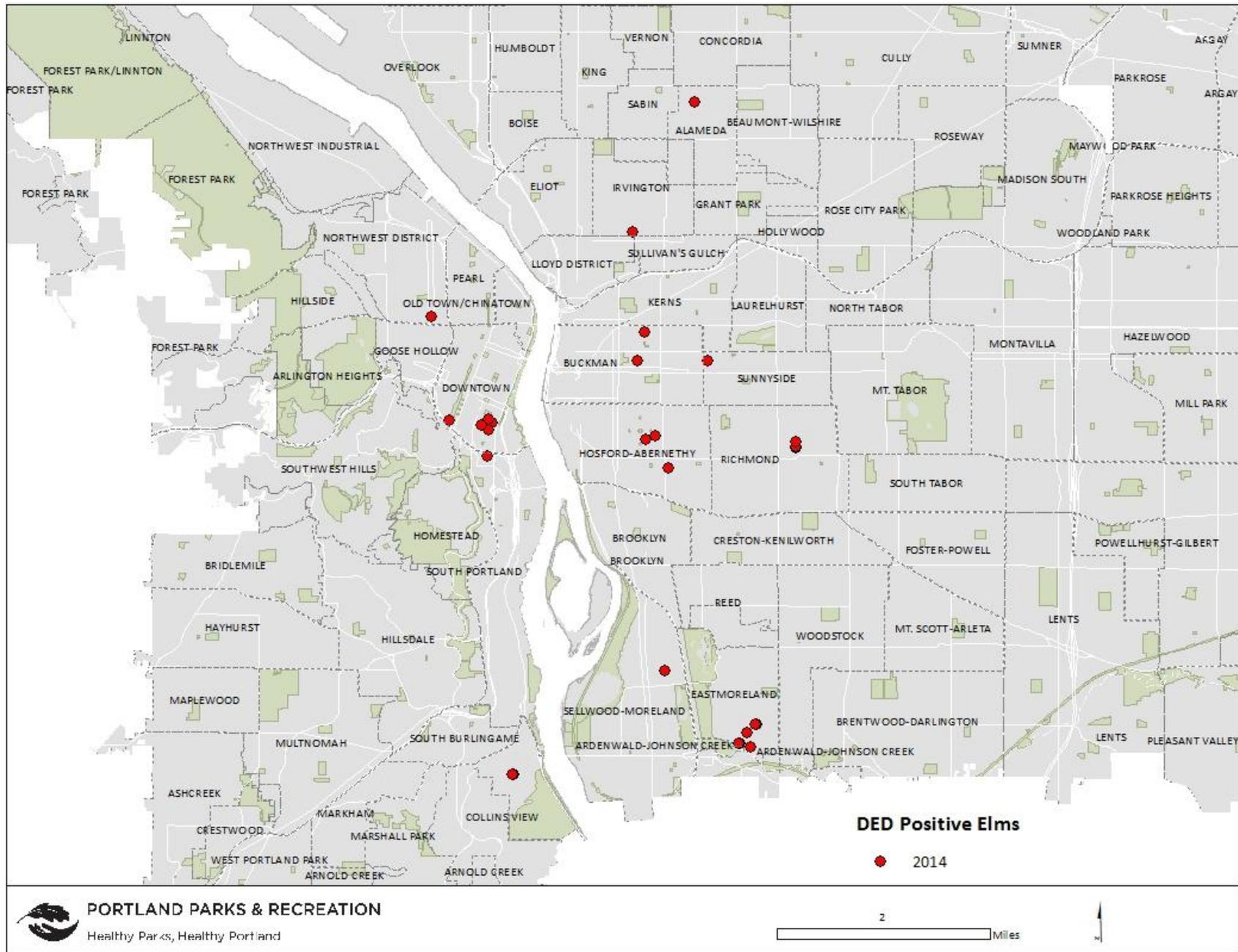
Elm Inoculation in the South Park Blocks



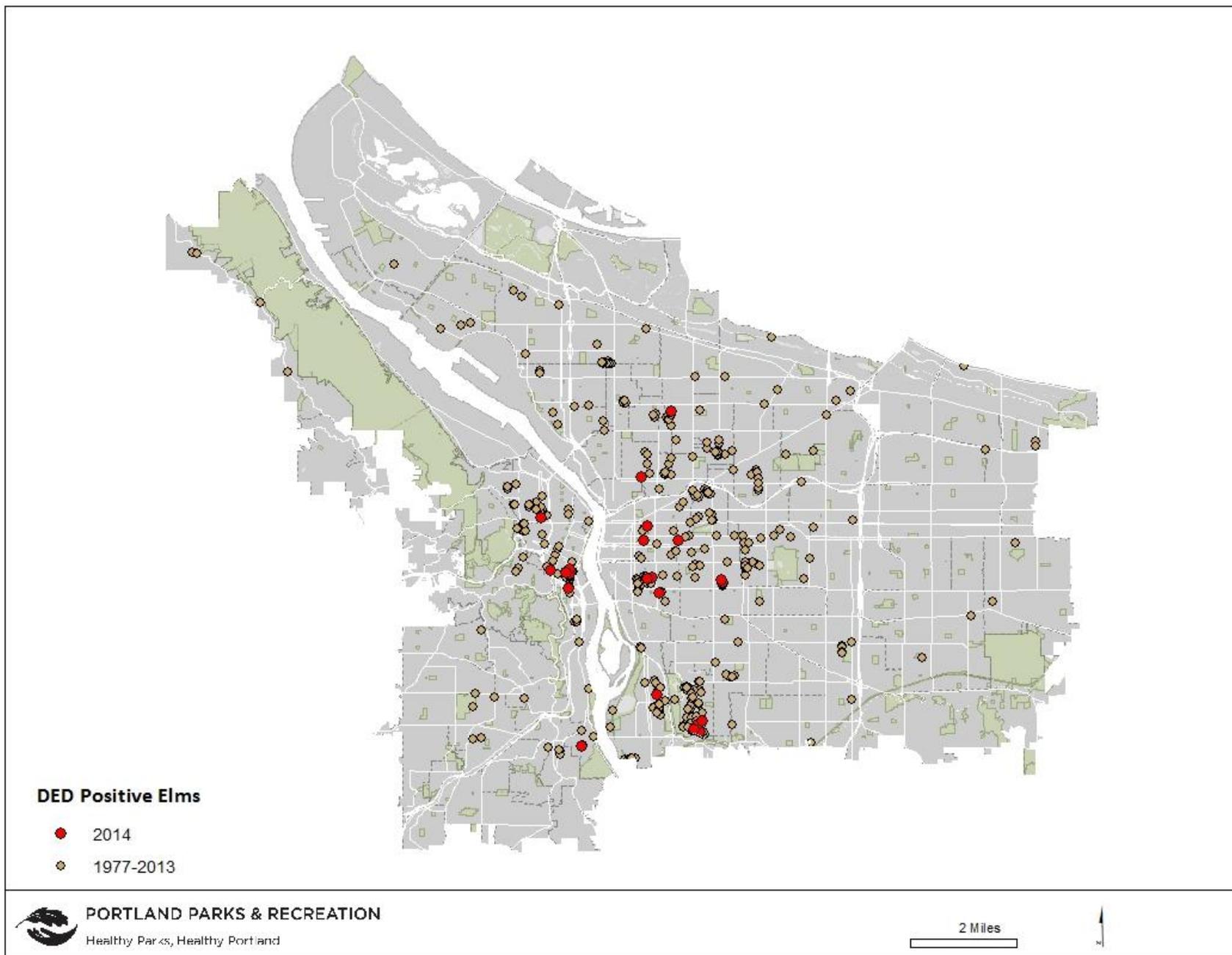
## **APPENDIX**



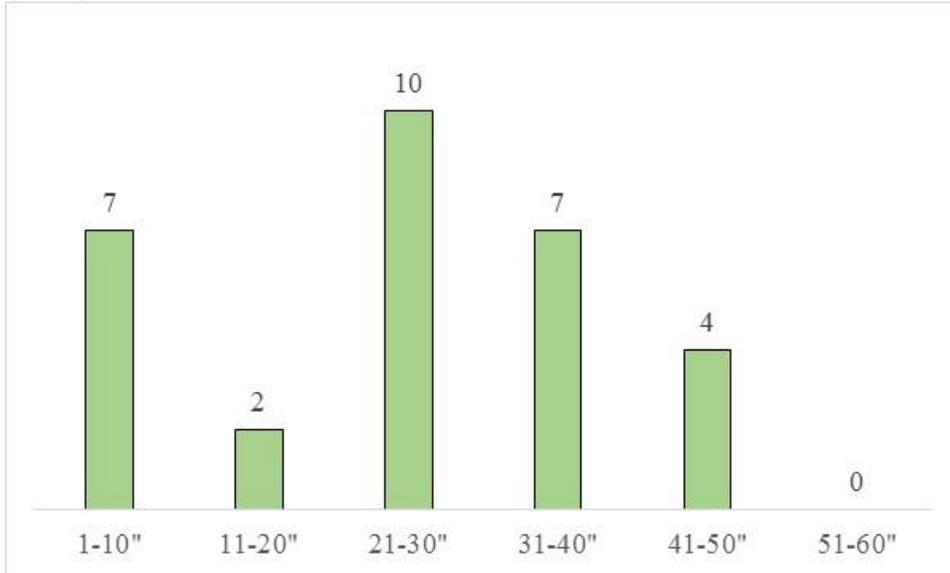
APPENDIX 1. LOCATIONS OF DED-POSITIVE ELMS IN PORTLAND 2014



APPENDIX 2. 2014 DED-POSITIVE ELMS COMPARED WITH 1977-2013 CASES



**APPENDIX 3. ELMS LOST TO DUTCH ELM DISEASE BY DBH SIZE CLASS IN INCHES (2014)**



**APPENDIX 4. ELMS LOST TO DUTCH ELM DISEASE BY DBH SIZE CLASS IN INCHES (1990-2014)**

