

Wilsonville 2021 Street Tree Inventory Report:

An Update to the 2018 Street Tree Inventory

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1. Executive Summary

The City of Wilsonville 2021 Street Tree Inventory served to update the 2018 inventory and generate data to provide insights into better tree planning and management practices following the 2021 ice storm. In the 2021 street tree inventory each street tree (planted within approximately 15 ft of a curb) was mapped and assessed on several attributes including tree status ("Damaged, may need removal – follow-up required", "Damaged, needs removal", "No damage", "Removed, no stump", and "Removed, stump present"), diameter at breast height (DBH), health, distance to curb, species, and height. In this analysis, trees with status marked as "Damaged, May Need Removal", "Damaged, Needs Removal" and "Removed, Stump Present" were associated with ice storm damage, as "Removed, No Stump" trees were assumed to have been ground down prior to the storm. To collect this data, the City's assets management system "Cartegraph" was used to map and add attribute information for each tree. To assess trees at the neighborhood level, the City was divided into 10 neighborhood zones for this analysis (See Appendix E.1, pg. 42).

The data from the 2021 Street Tree Inventory was used to identify several trends in the Wilsonville street tree population. Specifically, an unexpectedly high number of trees with tree status marked "Removed, No Stump" was found. Citywide, the five species with the most trees removed were red maple (Acer rubrum), Callery pear (Pyrus calleryana), Norway maple (Acer platanoides), Japanese maple (Acer palmatum), and paper birch (Betula papyifera). While trees within the "Removed, No stump" tree status category were found throughout Wilsonville, particularly high densities of trees in this category were found in the Charbonneau and Meadows neighborhood zones (See Appendix D, pg. 38). In cases such as the red maple, Norway maple, and Japanese maple, the high amount of trees removed appear to be a product of the species' large populations. Normalizing by population, species with the highest rates of removal were identified as paper birch (Betula papyrifera), cherry plum (Prunus cerasifera), silver birch (Betula pendula), and white spruce (Picea glauca) (See Appendix B.3, pg. 26). The data also revealed a high number of removed trees with a small DBH; 22.4% of removed trees were smaller than 1.5" and 51.66% smaller than 6". However, 18.89% of removed trees were found in the 9 to 14" DBH range (See Appendix C.3-4, pgs. 31-32). Closer examination of the removed trees in this DBH range revealed above average removal rates for red maples (Acer rubrum), Callery pear (Pyrus calleryana), cherry plum (Prunus cerasifera), and honey locust (Gleditsia triacanthos) in the 9 to 14" DBH category. (See Table 3-5, pgs. 10-11)

Looking at the "Damaged, May Need Removal", "Damaged, Needs Removal", and "Removed, Stump Present" tree status categories, potential correlations between specific attributes and susceptibility to ice storm damage were found. Normalized by population, the species most commonly found in these status categories were paper birch (Betula papyrifera), cherry plum (Prunus cerasifera), silver birch (Betula pendula), Raywood ash (Fraxinus oxycarpa), and scarlet oak (Quercus coccinea). Zelkova was the only species within the ten most populous tree species that had a high storm damage rate (See Appendix B.5, pg. 28). In total, the red maple (Acer rubrum) species lost the greatest number of trees to ice storm damage followed by cherry plum (Prunus cerasifera), Callery pear (Pyrus calleryana), paper birch (Betula papyrifera), and Japanese zelkova (Zelkova serrata). Zones with the highest numbers of trees affected by ice damage include Morey's Landing/Rivergreen (249 trees), Villebois (183 trees), and Village at Main St./Daydream (161 trees) (See Appendices, E.22, pg. 62; E.6, pg. 43; E.40, pg. 40). Here it can be observed a disproportionate number of trees with a tree status associated with ice storm damage were found in the Morey's Landing/Rivergreen and Village at Main St./Daydream neighborhood zones.

Since the previous survey in 2018, 1,862 street trees were added and 2,531 street trees were removed. Focusing on neighborhood zones, trends among net gains and losses of street trees were observed. Neighborhood zones which recorded a net gain of street trees since 2018 included Industrial (+55), Frog Pond (+309), and Villebois (+309). Neighborhood zones which recorded the highest losses in descending order included Charbonneau (-376), Meadows (-313), and Morey's Landing/Rivergreen) (-304) <u>(See Appendix D, pg. 40)</u>. However, it should be noted that the Charbonneau and Villebois zones were found to have significantly greater populations than the other seven zones. In descending order, the most populous street tree zones included Villebois (4,792 trees present), Charbonneau (4,637 trees present), followed by Meadows (2,928 trees present).

2. Introduction and Background

This report is a summary of the methods and findings for the street tree inventory conducted by the Public Works Department interns between May 2021 and July 2021. This project is an update to a previous street tree inventory that was completed by the City in April of 2018. The goal of this inventory is to fulfill the general need for current tree data, the update was also prompted by the severe tree damage sustained during the 2021 ice storm. In February of 2021, an ice storm wreaked havoc on Wilsonville's urban forest by causing limbs to break off and tree trunks to split open. Many trees were destroyed during the storm while others were damage to Wilsonville's street tree population. This report seeks to uncover trends in the characteristics of those trees that suffered damage in the storm and also provide a general overview of the changes in Wilsonville's street tree population since the last inventory was completed.

3. Data Collection Methods

For the previous inventory, any trees that fell within 20 feet of the curb were included as street trees. The distance to curb requirement was shortened to 15 feet for this inventory update, and some guidelines were outlined:

- A street tree can be planted in the public right of way or planted on private property, any tree that is planted within the public right of way is a street tree regardless of distance to curb.
- Any trees that were intentionally planted along the side of a road for aesthetic or landscaping purposes may be classified as a street tree regardless of distance to curb.
- Trees that are part of a natural area and are within the 15 foot distance to the curb are generally not included in the street tree inventory.
- Any trees in a park would also be considered street trees if they fall within 15 feet of the curb.

Data for all existing points (even those that fell outside of the 15 foot distance to curb) was updated, but only trees that met the updated street tree guidelines were added to the inventory.

The existing street tree data is stored in a geodatabase as a point feature layer which is integrated with the asset management system Cartegraph. The existing point layer is used as a reference for updating existing point attributes and new points were added to the layer for any newly planted trees or trees that were identified as street trees that had not

been previously included. The attribute used to classify tree change from the last inventory is "Tree status" with five possible values:

- 1. Damaged, may need removal follow-up required
- 2. Damaged, needs removal
- 3. No damage
- 4. Removed, no stump
- 5. Removed, stump present

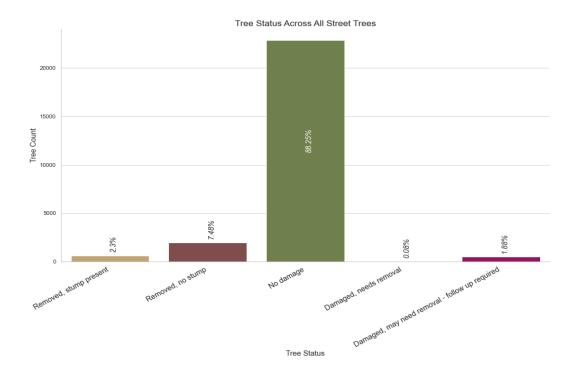
Other attributes updated for existing points and populated for new points were: Scientific Name, DBH (Diameter at Breast Height), Height, Health, Planter Width, and Distance to Curb. The possible values for the Health category included; Dead, Healthy, In Decline, or Stressed. A DBH tape measurer was used to collect trunk diameter values and a standard tape measurer to collect tree distance to curb values. Heights for newly collected trees were estimated using surrounding trees with existing height values as references. For trees replaced with a different tree, they were entered with a status of "removed, no stump'", "retired" within Cartegraph, and replaced with a new point. Once all tree points in the City had been collected, any trees with missing attributes were identified, and the missing data was updated. Finally, a quality control process was performed. This process entailed each intern being assigned 1300 random trees the other intern had previously surveyed, representing approximately 10% of the total inventory. The assigned trees were reviewed for tree attribute consistency and updated with accurate information.

4. Results

General Tree Population

After updating and inventorying every street tree in Wilsonville, there were 25,998 data points. Of the total, 23,398 of those points represented trees that were still standing while 2,536 represented trees that had been removed. Of particular note, 7.46% of surveyed trees were classified as "Removed, no stump". This is significant because the lack of stump indicates that the trees were likely removed before the ice storm. Trees removed since the ice storm would most likely still have some evidence of removal or have a stump present. Street trees require a permit for removal, so there is a concern that trees were removed by citizens without having gone through the proper permitting process or without replacing removed trees when required. Figure 3-1 provides a more in depth look at tree statuses.

Figure 3-1



In general the City of Wilsonville does not plant coniferous street trees. While the City does not currently plant coniferous trees as street trees, many existing coniferous trees fell within the definition of a street tree and were included in the inventory, so it is worthwhile to gain an idea of the respective sizes for coniferous and deciduous trees. See Figure 3-2 for coniferous and deciduous tree populations.

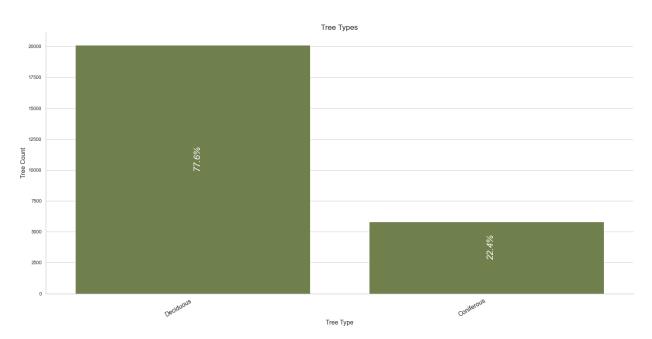


Figure 3-2

In addition to updating existing points, new points were added. Oftentimes these were trees that had been planted since the last inventory was completed, though added points may have been missed during the first inventory. Overall, *1,862* new trees were added to the inventory.

Tree Genera

In order to get a general overview of Wilsonville's street tree population, statistics were gathered on both genus and species. The maple genus represented the largest proportion of street tree genera in Wilsonville at 30.12% of the total population. Other large populations of street trees included oak (*Quercus*) (9.03%), pine (*Pinus*) (4.53%), cherry (*Prunus*) (4.08%), ash (*Fraxinus*) (4.03%), pear (*Pyrus*) (3.97%), fir/spruce (*Pseudotsuga*) (3.51%), cypress (*Chamaecyparis*) (3.08%), zelkova (*Zelkova*) (2.81%), and cedar/arborvitae (*Thuja*) (2.59%). <u>See Appendix A.1, pg. 18</u>

To get an idea of the quantity of trees removed the "Removed, no stump" and "Removed, stump present" categories were grouped together. It is no surprise maples had the most trees removed at 543 since they represent an exponentially larger portion of the street tree population than any other genus. Cherry (*Prunus*), pine (*Pinus*), birch (*Betula*), pear (*Pyrus*), oak (*Quercus*), cypress (*Chamaecyparis*), and spruce (*Picea*) all had at least 100 trees removed. <u>See Appendix A.2, pg. 19</u>

Besides looking at the number of trees removed, an analysis was done to see if any tree genera were removed at higher rates than others. Because there are a handful of tree genera that had very small populations, any trees with a population lower than 100 were filtered out. There are hundreds of tree genera that had very small populations and would have had a misleading 100% percent removal rate. By setting a 100 population cutoff, it avoided skewing the rates in favor of trees with low populations. The number of trees removed for each genus were normalized by the total number of trees for that genera to get the removal rate. The removal rate data could provide valuable insight to tree survivability in Wilsonville and help guide replanting efforts by letting decision-makers know which tree genera did not survive well since the last inventory.

The birch (*Betula*) trees did very poorly as they were removed at an alarmingly high rate of 37.95%. Fir (*Abies*) trees were also removed at a high rate while the rest of the genera had similar values. It is worth noting that the only tree genus that appeared in both the 10 most populous genera and the genera with the highest removal rates was cherry (*Prunus*). This means it was the only genus with a very high population that also had a high removal rate. <u>See Appendix A.3, pg. 20</u>

This inventory was conducted almost three months after the damage caused by the ice storm, in some cases it was difficult to distinguish between damage caused by the storm and other

miscellaneous damage, especially for trees that had been removed. Since stump grinding and removing any trace of a removed tree is a timely process, it seemed unlikely that any "Removed, no stump" trees could have been removed due to the storm. Thus those trees were removed from consideration when examining storm damage. That left "Removed, stump present", "Damaged, may need removal - follow up required", and "Damaged, needs removal" as potential storm damage categories. These were the categories grouped together to calculate storm damage numbers. In total, 1,107 trees likely sustained damage caused by the ice storm. The most storm damaged genus was maple (*Acer*) with 247 trees damaged. Cherry (*Prunus*) and birch (*Betula*) also had a lot of damaged trees. <u>See Appendix A.4, pg21</u>

In addition to storm damage numbers, storm damage rates were calculated for tree genera populations. Storm damage rates were calculated with the same population caveat as the removal rate analysis, so only genera with a population of at least 100 were considered. For each genus, the number of trees damaged by the storm were normalized for the genus total to get the storm damage rate.

Birch (*Betula*) trees had the highest rate of storm damage at 25.78%. It is noteworthy that the cherry (*Prunus*) (12.02%), zelkova (*Zelkova*) (8.37%), pear (*Pyrus*) (6.12%), and ash (*Fraxinus*) (5.74%) genera all appear in the high damage rate analysis since these are all trees that are in the 10 most populous genera. This is significant because not only were these genera damaged at a higher rate than other genera, but the damage to these genera is more impactful to the overall tree population since they represent a large portion of the population. <u>See Appendix A.5, pg. 22</u>

To get an idea of how the genus composition of street trees had changed since the last inventory, a summary of the trees added since the first inventory was done.

Once again the most common genera for trees added since the last inventory is the maple (*Acer*) genus. Given the previous removal and storm damage analyses, the maple (*Acer*) genus appears to be sturdy and resilient - it did not appear in the highest removal rates or highest storm damage rates despite representing 30% of the City's street tree population. <u>See Appendix A.6, pg. 23</u>

Tree Species

To analyze how individual species populations changed since the first inventory in 2017, all the statistics that were calculated for the genera were repeated for species.

There are several species from the maple (*Acer*) genus represented in the top 10 species, including red maple (*Acer rubrum*), Japanese maple (*Acer palmatum*), and Norway maple

(Acer platanoides) <u>See Appendix B.1, pg. 24</u>. It is worth noting that the Japanese maple (Acer palmatum) represents a large proportion of the maples since these are generally trees with small diameters and heights, and therefore may not require permitting for removal and could have been removed during landscaping projects. Analysis shows that those genera with a higher species diversity (maple (Acer), oak (Quercus)) represent a smaller fraction of the population when represented by species rather than genus, while those genera with lower species diversity (pear (Pyrus), zelkova (Zelkova), fir/spruce (Pseudotsuga)) are consistent between species and genus population analyses. By splitting the genera into species, removal and damage rates will more precisely represent the lower diversity species' performance against those genera with a higher species diversity.

Once again, the numbers provide a good overview for total amounts of trees removed, but in this case, they provide some preliminary insight into which tree species were disproportionately removed. It is noteworthy that the Callery pear (*Pyrus Calleryana*) were the second most removed despite being only the fifth most populous tree species. It was also observed that paper birch (*Betula Papyrifera*) is the fifth most removed even though it did not appear at all in the most populous species. A similar trend can be observed in the cherry plum (*Prunus Cerasifera*) and ornamental cherry (*Prunus*) species. <u>See Appendix B.2,</u> <u>pg. 25</u>

The same normalization and filtering logic was used for the tree species analysis as the genus analysis. This tree species removal analysis mirrors some of the findings of the genus analysis: the birch (*Betula*) and cherry (*Prunus*) genera are each represented twice within the top removal rates. The paper birch (*Betula Papyrifera*) fared terribly with a 50.55% removal rate. It is also worth noting that 5 of the top ten removal rate species are coniferous trees which are not planted by the City of Wilsonville <u>See Appendix B.3, pg. 26</u>. Anecdotally, many of the coniferous trees surveyed were small in height and diameter meaning they could easily be removed by homeowners and landscapers.

Again, the same criteria as the genus analyses were used to examine storm damage. As to be expected, red maple (*Acer Rubrum*) tops the list once more with 173 trees removed, but cherry plum (*Prunus Cerasifera*) (70 trees removed) and two birch (*Betula papyrifera*, 62 trees removed & *Betula pendula*, 29 trees removed) species appear in this damage analysis despite not being in the most populous species. Callery pear (*Pyrus calleryana*) moved up the rankings to the third most removed species with 63 trees removed. <u>See Appendix B.4, pg. 27</u>

The damage rates for species are similar to the genus damage rates, with a few notable exceptions. Paper birch (*Betula papyrifera*) topped that list with a 34.07% removal rate. Cherry plum (*Prunus cerasifera*) had the second highest removal rate at 26.02%, and silver birch (*Betula Pendula*) was removed at 16.29%. The willow (*Salix*), alder (*Alnus*), and hawthorn (*Crataegus*) genera are not represented in this species analysis. This makes sense since splitting the genera up by species will give genera with high damage rates more spots

in the top 10 species and move other species down. Cherry (*Prunus*), birch (*Betula*), zelkova (*Zelkova*), oak (*Quercus*), and ash (*Fraxinus*) are all constantly appearing in the top damaged categories. <u>See Appendix B.5, pg. 28</u>

Diameter at Breast Height Statistics

The inventory also served to uncover any tree status trends related to DBH (Diameter at Breast Height), especially since tree DBH is a factor in the City's tree removal permitting process. Notably, there are significant spikes in the lower DBH ranges for the "No damage" and "Removed, no stump" categories. This spike is less pronounced in the "Removed, stump present" category. See Figure 3-3.

This suggests a large portion of the current street tree population has a low DBH and this same trend is reflected in the trees removed without a stump. This makes sense since any trees with a large DBH require more effort and money for stump grinding. Also trees with smaller DBH's often do not require a permit to remove.

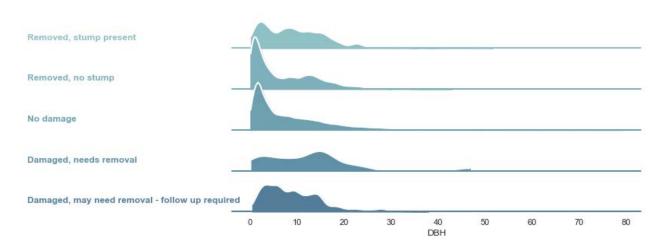
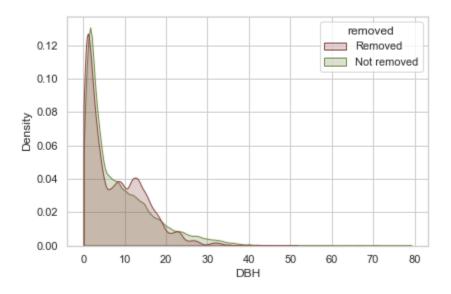


Figure 3-3

Figure 3-4 demonstrates the general shape of the data for removed trees versus not removed trees. The removed category has a similar shape to the not removed category, besides a small peak around the 9-14 DBH range. This deviation in data may have been caused by overrepresentation and high rates of removal of red maple (*Acer rubrum*), Callery pear (*Pyrus Calleryana*), honey locust (*Gleditsia triacanthos*), and cherry plum (*Prunus cerasifera*) in the 9 to 14 DBH range:

Figure 3-4



Red maple (*Acer rubrum*) comprises 17.7% of the tree species in the 9 to 14 DBH range, compared to the 10.83% they comprise of overall street tree population. Red maple (*Acer rubrum*) and Callery pear (*Pyrus calleryana*) make up more than a quarter of the trees in the 9 to 14 DBH range. Notably, Callery pear (*Pyrus calleryana*), honey locust (*Gleditsia triacanthos*), and cherry plum (*Prunus cerasifera*) represented significantly larger proportions of removed trees in the 9 to 14 DBH range than their respective population proportions for the same DBH range. Red maple (*Acer rubrum*), Callery pear (*Pyrus calleryana*), honey locust (*Gleditsia triacanthos*), and cherry plum (*Prunus cerasifera*) were removed at higher rates in the 9 to 14 DBH range than they were as species' overall *See Table 3-5*. Based on this discrepancy in removal rates, it can be concluded that all four of these species were more susceptible to being removed in the 9 to 14 DBH range than they were as in the 9 to 14 DBH range was in the Canyon Creek neighborhood in the north east sector of the City with other significant hotspots in Village at Main Street, Brown Road around Tranquil Park, and Morey's Landing. *See Appendix C.2, pg.30*

Table 3-5

Scientific Name	Percent of Trees in 9-14 DBH Range	Percent of Removed Trees in 9-14 DBH Range	Removal Rate in the 9-14 DBH Range	Overall Species Removal Rate
Acer Rubrum (Red Maple)	17.7%	17.5%	11.7%	7.6%
Acer Platanoides (Norway Maple)	15.3%	8.4%		
Pyrus Calleryana (Callery Pear)	8.2%	11.06%	15.9%	12.5%
Quercus Rubra (Red Oak)	4.8%	1.5%		
Pseudotsuga menziesii (Douglas Fir)	3.8%	1.3%		
Zelkova Serrata (Japanese Zelkova)	3.2%	1.7%		
Thuja Plicata (Western Red Cedar)	2.8%	1.0%		
Prunus cerasifera (Cherry Plum)	2.3%	9.0%	46.2%	33.83%
Gleditsia Triacanthos (Honey Locust)	2.1%	4.6%	25.6%	16.1%
Platanus Occidentalis (American Sycamore)	2.1%	0%		
Fraxinus Pennsylvanica (Green Ash)	1.9%	3.5%		
Other	35.8%	40.44%		

City Wide Spatial Trends

One purpose of this analysis is to identify specific areas which experienced high amounts of tree damage or removals. To illustrate the density of trees per status category, a series of heat maps were created <u>See Appendix D, pgs. 33-40</u>. Density was calculated using the ArcGIS Pro's Kernel Density tool for three categories: damaged (including both damaged, may need removal and damaged, needs removal), removed with no stump, and removed with stump present. In this analysis, both damaged categories were combined onto the same map due to the low number of trees marked as damaged, needs removal. To isolate each category, trees were selected in ArcGIS Pro by their tree status attribute and all trees with null (or "0") values for DBH and scientific name were filtered out to allow for further species and tree size analysis.

Viewing citywide heat maps of the trees marked as damaged, removed with stump present, and removed with no stump, some clear high density areas can be identified. Trees marked as "Damaged, May Need Removal" or "Damaged, Needs Removal" were highly concentrated in the Village at Main Neighborhood as well as Villebois. Trees marked as "Removed, Stump Present" were highly concentrated in Rivergreen as well as Village at Main. Trees marked as "Removed, No Stump" were most highly concentrated in Charbonneau and Wilsonville Meadows <u>See Appendix D, pgs. 33-40</u>. More detailed maps and statistics for Neighborhood Zones are available in the Neighborhood Maps section of this report.

A heat map was also created for newly added trees to illustrate areas of the City that had high concentrations of replanted trees. Newly added trees were concentrated in the Frog Pond neighborhood and some sections of Villebois. These are two areas that had recent housing developments constructed.

Neighborhood Zones

To gain more detailed insights regarding the spatial distribution of street tree attributes, the street tree data was separated into 10 zones. The zones include:

- Industrial
- Elligsen/Canyon Creek
- Frog Pond
- Meadows
- Village at Main St./Daydream
- Morey's Landing/Rivergreen
- Town Center
- Villebois
- Charbonneau

See Appendix E.1, pg. 42

In terms of overall tree population, the Charbonneau and Villebois zones had distinctly greater numbers of street trees, Villebois being the most populous zone. The Charbonneau Zone also had the highest total number of street trees marked "Removed, No Stump", followed by the Meadows Zone (the third highest in overall population) and Morey's Landing (the fourth highest in overall population). The Villebois Zone had the greatest number of street trees marked "Damaged, May Need Removal", followed by Morey's Landing/Rivergreen, and Village at Main St/Daydream. The Morey's Landing/Rivergreen Zone contained the highest number of trees marked "Removed, Stump Present" followed by the Village at Main St/Daydream Zone, and Charbonneau. <u>See Appendix E.2-5 pg.43-45</u>

Villebois Zone

As the most populous street tree zone, Villebois contained the greatest number of trees marked "Damaged, May Need Removal". In descending order, the most damaged species in the Villebois Zone included Japanese zelkova (*Zelkova Serrata*), scarlet oak (*Quercus Coccinea*), and red maple (*Acer Rubrum*) <u>See Appendix E.10, pg. 48</u>. The most common species marked "Removed, No Stump" included Nootka cypress (*Chamaecyparis Nootkatensis*), red oak (*Quercus Rubra*) and black hawthorn (*Crataegus Douglasii*) <u>See Appendix E.8, pg. 47</u>. The DBH of trees marked "Removed, No Stump" skewed positively, with most trees falling within the 0-2" range <u>See Appendix E.9, pg. 47</u>. The Villebois Zone's most common species overall included red maple (*Acer Rubrum*), Japanese zelkova (*Zelkova Serrata*), and tulip (*Liriodendron Tulipifera*). <u>See Appendix E.7, pg. 46</u>

See Appendix E, pg. 49-51, 107, for all Villebois Zone Tree Status Maps

Charbonneau Zone

As the second most populous street tree zone, Charbonneau contained the greatest number of trees marked "Removed, No Stump". A particularly high density of "Removed, No Stump" trees can be observed on SW Old Farm Rd and SW Arbor Glenn Loop in the northeast corner of the zone <u>See Appendix E.20, pg. 57</u>. The DBH of trees marked "Removed, No Stump" was also positively skewed, the majority of trees removed falling in the 0-4" range <u>See Appendix E.17, pg. 54</u>. The most commonly found species marked "Removed, No Stump" included hinoki cypress (*Chamaecyparis Obtusa*), Japanese maple (Acer Palmatum), and dwarf blue Scotch pine (*Pinus Sylvestris "Glauca Nana"*) <u>See</u> <u>Appendix E.16, pg. 54</u>. Charbonneau's overall most common species included northern red oak (*Quercus Rubra*), Japanese maple (Acer Palmatum), and hinoki cypress (*Chamaecyparis Obtusa*) <u>See Appendix E.15, pg. 53</u>.

See Appendix E, pg. 55-57, 108, for all Charbonneau Zone Tree Status Maps

Meadows Zone

As the third most populous street tree zone, the Meadows area contained a similarly high density of trees marked "Removed, No Stump" to the Charbonneau Zone. However, unlike Charbonneau the Meadows Zone had a much greater number of trees marked "Removed, No Stump" with a DBH larger than 2" <u>See Appendix E.24, pg. 60.</u> The Species most commonly marked "Removed, No Stump" in the Meadows zone included western red cedar (*Thuja Plicata*), paper birch (*Betula Papyrifera*), and green ash (*Fraxinus Pennsylvanica*) <u>See Appendix E.23, pg. 60</u>. The overall most common species in the Meadows Zone included red maple (*Acer Rubrum*), Japanese maple (*Zelkova Serrata*), and tulip (*Liriodendron Tulipifera*). <u>See Appendix E.22, pg. 59</u>.

See Appendix E, pg. 61-63, 109, for all Meadows Zone Tree Status Maps

Morey's Landing/Rivergreen Zone

As the fourth most populous street tree zone, Morey's Landing/Rivergreen contained the third highest number of trees marked "Removed, No Stump", the second highest number of trees marked "Damaged, May Need Removal", and the highest number of trees marked "Removed, Stump Present". One of the highest densities of street trees marked "Removed, Stump Present" can be found in the northeast corner of Rivergreen. <u>See Appendix E.35, pg. 69</u>.

Species most commonly marked "Removed, Stump Present" include Callery pear (Pyrus Calleryana), cherry plum (Prunus Cerasifera), and Scotch pine (Pinus Sylvestris) <u>See Appendix E.32, pg. 67</u>. The DBH of these trees were fairly varied with a substantial portion greater than 6" <u>See Appendix E.33, pg. 67</u>. The most common species among trees marked as "Removed, No Stump" included Callery pear (Pyrus Calleryana), cherry plum (Prunus Cerasifera) and Japanese maple (Acer Palmatum) <u>See Appendix E.31, pg. 66</u>. The most common species among trees marked as "Damaged, May Need Removal" were red maple (Acer Rubrum), Callery pear (Pyrus Calleryana), and eastern redbud (Cercis Canadensis). <u>See Appendix E.30, pg. 66</u>. The occurrence of Callery pear (Pyrus Calleryana) can be seen in all three top damaged and removed species lists.

See Appendix E, pg. 69-71, 110 for all Morey's Landing Zone Tree Status Maps

Town Center Zone

As the fifth most populous street tree zone, the Town Center area had comparatively low densities of street trees damaged or removed. The most common trees found in the Town Center zone were red maple (*Acer Rubrum*), Norway maple 'Emerald Queen' (*Acer Platanoides*), and northern red oak (*Quercus Rubra*) <u>See Appendix E.39</u>, <u>pg. 73</u>. Most trees marked "Removed, No Stump" were smaller than 4" DBH and red maple (*Acer Rubrum*), cherry plum (*Prunus Cerasifera*), and Callery pear (*Pyrus Calleryana*) were the most common species in that category <u>See Appendix E.40-41, pg. 74</u>.

See Appendix E, pg. 75-77, 111, for all Town Center Zone Tree Status Maps

Industrial Zone

As the sixth most populous street tree zone, the Industrial zone contained a low number of street trees considering it covers the largest geographic area. As a result, the density of each tree status category ("No Damage", "Damaged, May Need Removal", etc.) was comparatively low. However, one notable aspect of the industrial zone was the high number of trees marked "Removed, No Stump" with a DBH greater than 4" <u>See Appendix E.48, pg. 80</u>. The most common species found in the Industrial zone were common Norway maple (Acer Platanoides), 'Crimson King' Norway maple (Acer Platanoides), and red maple (Acer Rubrum) <u>See Appendix E.46, pg. 79</u>.

See Appendix E, pg. 81-83, 112 for all Industrial Zone Tree Status Maps

Village at Main St/Daydream Zone

The seventh most populous street tree zone, the Village at Main St/Daydream area contained the second highest number of trees marked "Removed, Stump Present" and the third highest number of trees marked "Damaged, May Need Removal". A particularly dense cluster of both categories can be found in the Village at Main Street neighborhood on Thomas St. in the northwest quadrant of the zone <u>See Appendix E.58</u>, pg.88. The most commonly found species in this zone were red maple (Acer Rubrum), Douglas fir (*Pseudotsuga Menziesii*), and Callery pear (*Pyrus Calleryana*) <u>See Appendix E.53</u>, pg. 85. The most common species marked in both the "Damaged, May Need Removal" and "Removed, Stump Present" categories were red maple (Acer Rubrum), Raywood ash (*Fraxinus Oxycarpa*), and green ash (*Fraxinus Pennsylvanica*) <u>See Appendix E.56-57</u>, pg. 87. Here the DBH range for trees marked "Removed, No Stump" also included a significant number of trees greater than 4" <u>See Appendix E.55</u>, pg. 86.

See Appendix E, pg. 88-90, 113, for all VM./Daydream Zone Tree Status Maps

Elligsen/Canyon Creek Zone

The eighth most populous street tree zone, the Elligsen/Canyon Creek area is notable for its high density of trees marked "Removed, No stump", found on Thorton Drive and Roanoake Drive in the Canyon Creek neighborhood <u>See Appendix E.67, pg. 96</u>. The most common species found in this tree status category were red maple (Acer Rubrum), Japanese maple (Acer Palmatum), and dwarf Scotch pine (Pinus Sylvestris "glauca nana" <u>See Appendix E.63, pg. 93</u>. The DBH of trees marked "Removed, No Stump" were predominately smaller than 2" although a significant number of trees fell within the 12-14" range See Appendix E.64, pg. 93

Overall, the most common species in the Elligsen/Canyon Creek zone were red maple (Acer Rubrum), gingko (Ginkgo Biloba), and northern red oak (Quercus Rubra) <u>See</u> <u>Appendix E.62, pg. 92</u>.

See Appendix E, pg. 94-96, 114 for all Elligsen/CC Zone Tree Status Maps

Old Town

The ninth most populous in street trees, the Old Town area had a low density of street trees overall. The most common trees found in the Old Town zone included Douglas fir (*Pseudotsuga Menziesii*), red maple (*Acer Rubrum*), and Callery pear (*Pyrus Calleryana*) <u>See Appendix E.69, pg. 98</u>.

See Appendix E, pg. 100-102, 115 for all Elligsen/CC Zone Tree Status Maps

Frog Pond

The least populous in street trees, the Frog Pond area also had a low density of overall street trees. At the time of the 2021 tree survey, new construction was underway on several residential blocks in Frog Pond. All street trees marked removed, no stump were identified as Oregon white oak (*Quercus Garryana*).

See Appendix E, pg. 105, 116 for all Frog Pond Zone Tree Status Maps

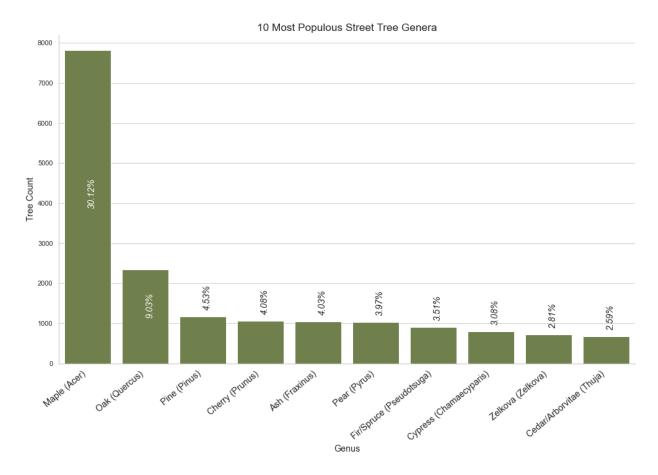
5. Summary Points

- 2,536 trees were removed and 1,862 trees were added to the inventory since the last inventory.
- The most common tree species are red maple (Acer rubrum), Norway Maple (Acer platanoides), and red oak (Quercus rubra).
- Tree species that had the most trees added were red maple (Acer Rubrum), Japanese maple (Acer Palmatum), and incense cedar (Calocedrus Decurrens)
- The tree species that were removed at the highest rate were paper birch (Betula Papyrifera), cherry plum (Prunus Cerasifera), silver birch (Betula Pendula), white spruce (Picea Glauca), and ornamental cherry (Prunus)
- The tree species that suffered ice storm damage at the highest rates were paper birch (Betula Papyrifera), cherry plum (Prunus Cerasifera), silver birch (Betula Pendula), Raywood ash (Fraxinus Oxycarpa), and scarlet oak (Quercus coccinea).
- Street tree population DBH distribution had high density in the 0 to 1.5 DBH range.

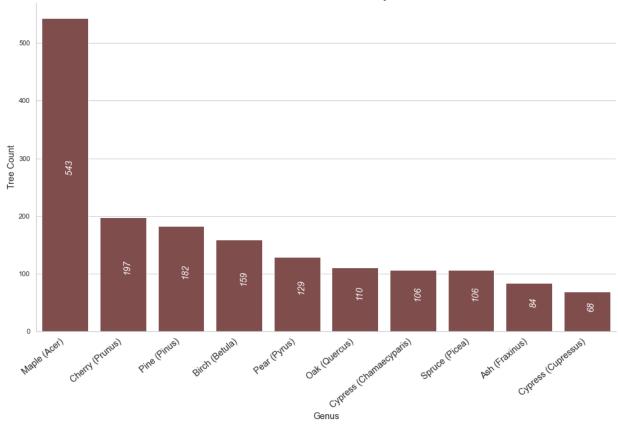
- There is a high density of street trees in the 0 to 3 DBH ranges for trees in the 'Removed, no stump', 'No damage', and 'Removed, stump present' tree status categories.
- The removed trees and 'Removed, no stump' trees follow a similar distribution to non-removed trees except for a peak in density around the 9 to 14 DBH range. This peak was caused by high removal rates for red maple (*Acer Rubrum*), cherry plum (*Prunus Cerasifera*), honey locust (*Gleditsia Triacanthos*), and Callery pear (*Pyrus Calleryana*) in this DBH range. These tree species are especially vulnerable to removal in the 9 to 14 DBH range.
- Charbonneau and Villebois zones contained the highest overall numbers of street trees.
- Charbonneau, Meadows, and Morey's Landing zones contained the greatest numbers of trees marked "Removed, No Stump" with particularly high densities of such trees found in Meadows and Charbonneau.
- Villebois, Morey's Landing/Rivergreen, and Village at Main St./Daydream contained the greatest numbers of trees marked "Damaged".
- The Morey's Landing/Rivergreen zone contained distinctly greater numbers of trees marked "Removed, Stump Present", followed by Village at Main St./Daydream and Charbonneau.
- The zones that experienced the largest net tree loss were the Meadows zone, the Rivergreen/Morey's Landing zone, and the Charbonneau zone.
- The streets that experienced the highest density of 'Removed, no stump' trees were Greens View Court in Charbonneau, Ironwood Court in Charbonneau, and Serene Place in Rivergreen/Morey's Landing.

Appendix A: Tree Genus Charts

1. Most Populous Genera of Street Tree

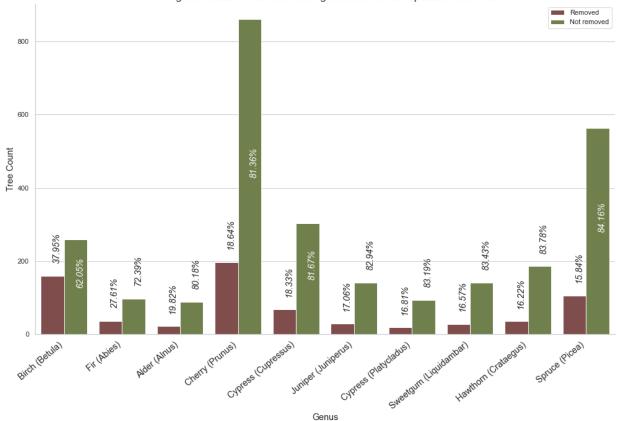


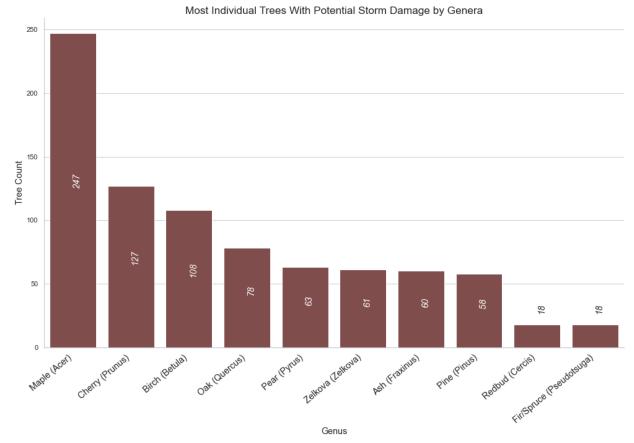
2. Most Individual Trees Removed by Genera



Most Individual Trees Removed by Genera

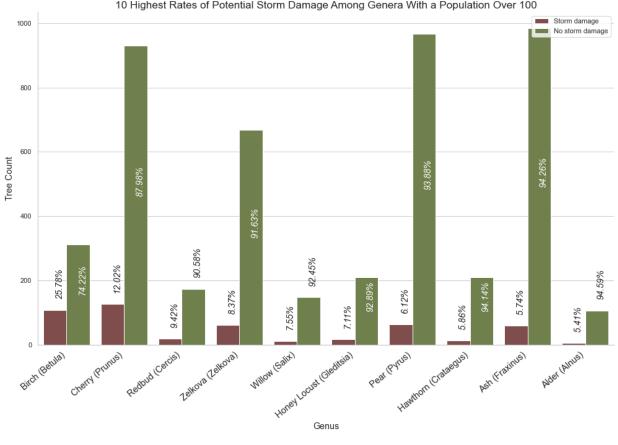


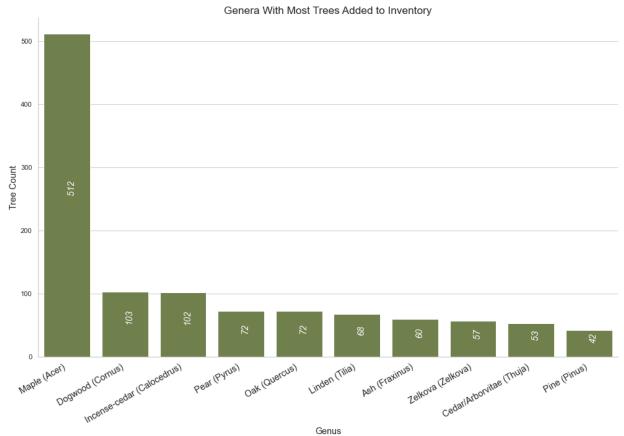




4. Most Individual Trees That Suffered Storm Damage by Genera

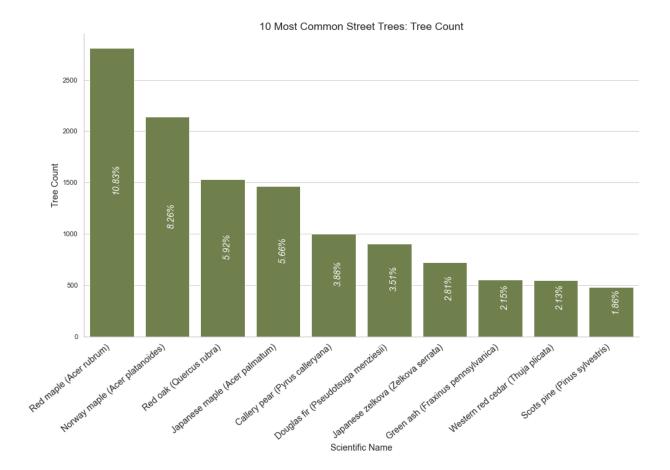
5. Genera With Highest Rate of Storm Damage





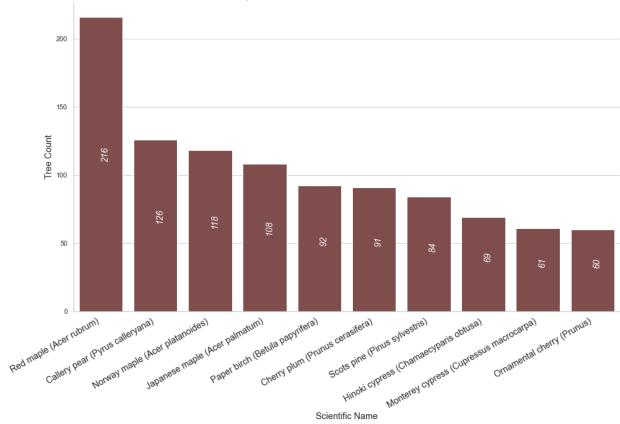
6. Genera With Highest Number of Trees Added to Inventory

Appendix B: Tree Species Charts



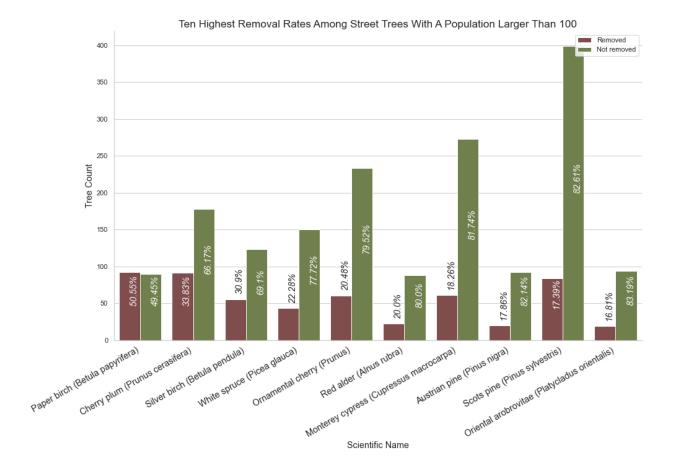
1. Most populous species of street trees

2. Which tree species had the most individual trees removed?

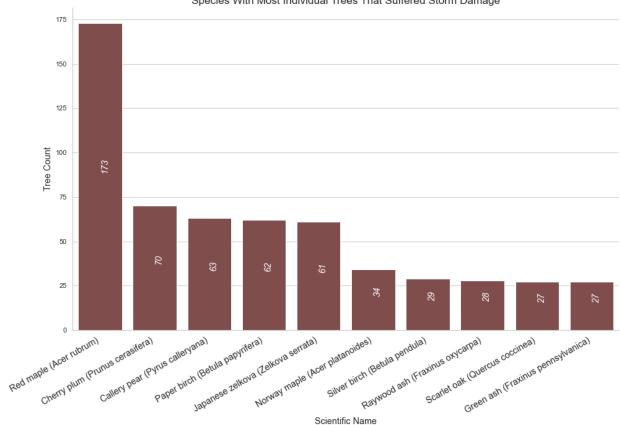


Species With Most Individual Trees Removed

3. Highest Rates of Removal for Species with Populations over 100

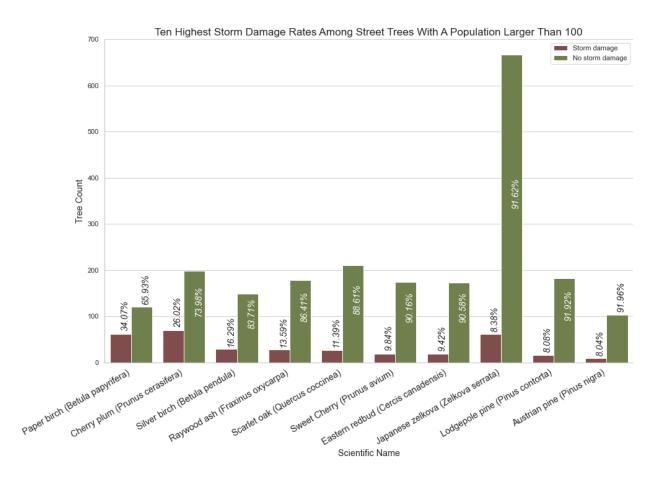


4. Most Individual Trees That Suffered Storm Damage by Species



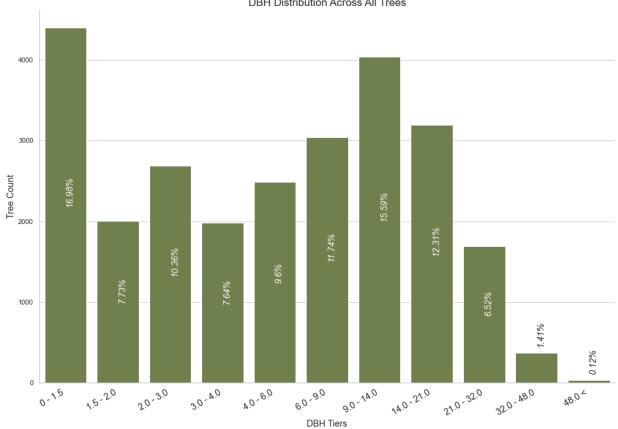
Species With Most Individual Trees That Suffered Storm Damage

5. Species with Highest Rate of Storm Damage

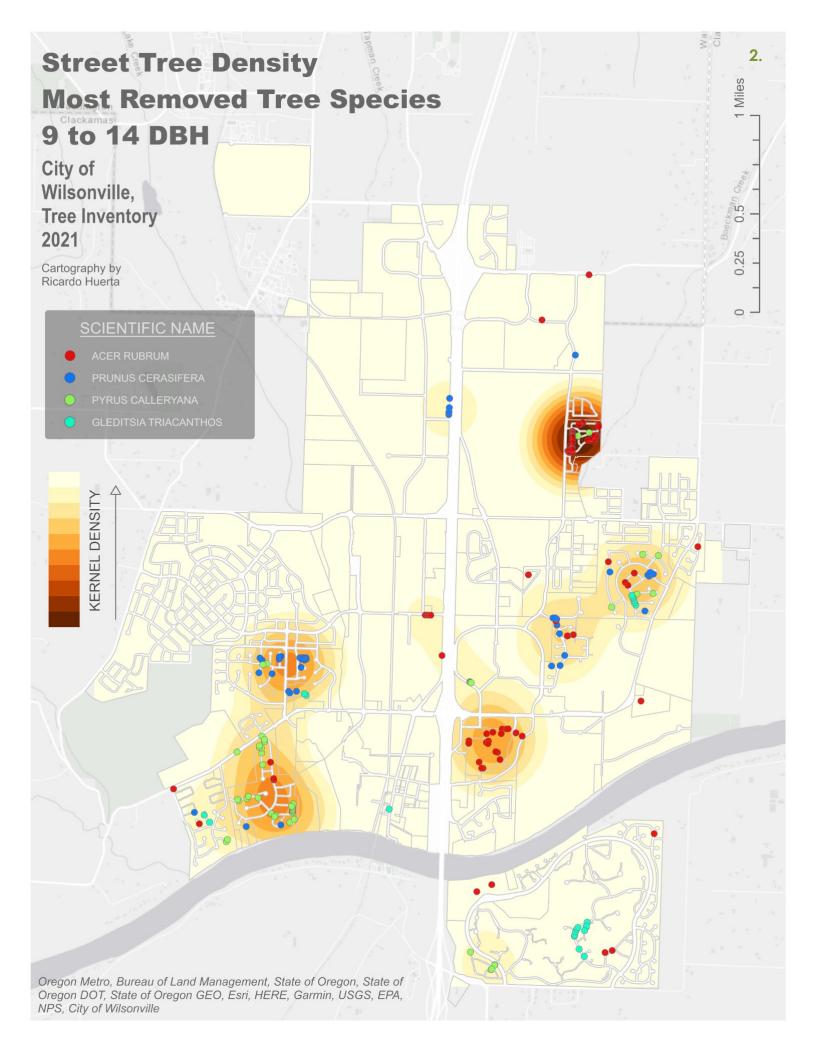


Appendix C: DBH Maps and Charts

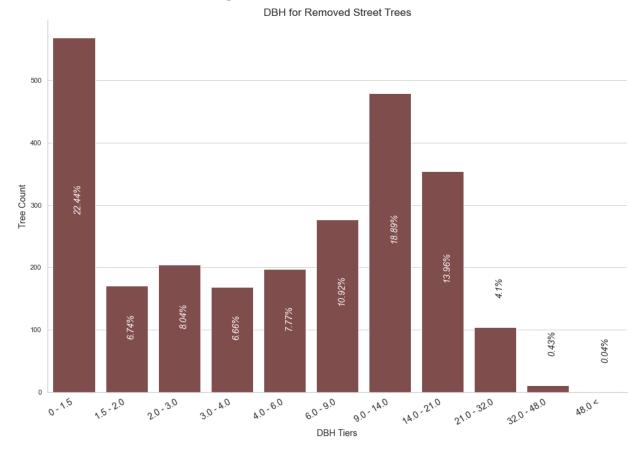
1. DBH Distribution Across All Trees

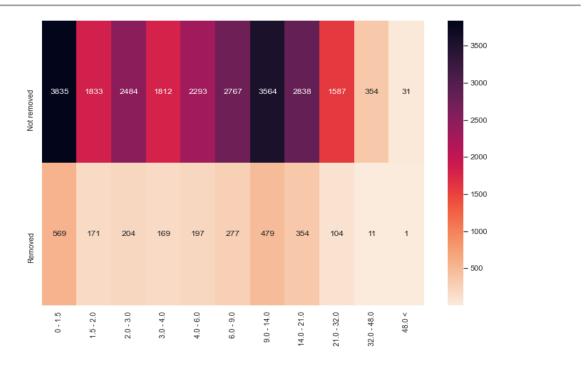


DBH Distribution Across All Trees

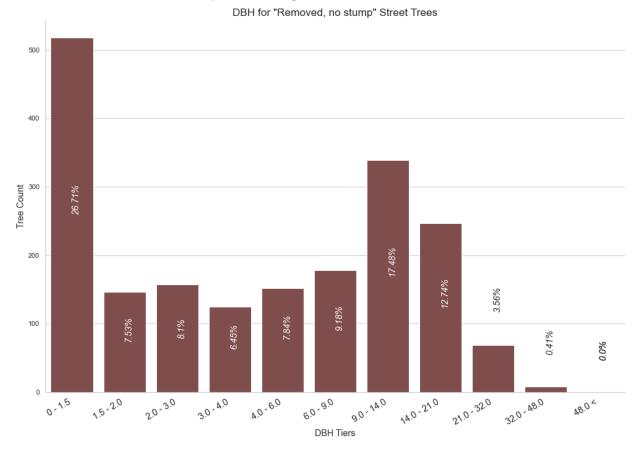


3. Tree Removal Rates by DBH

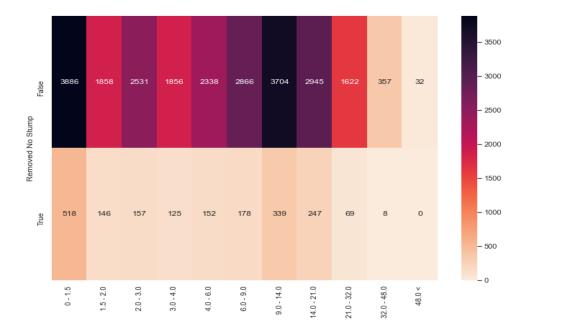




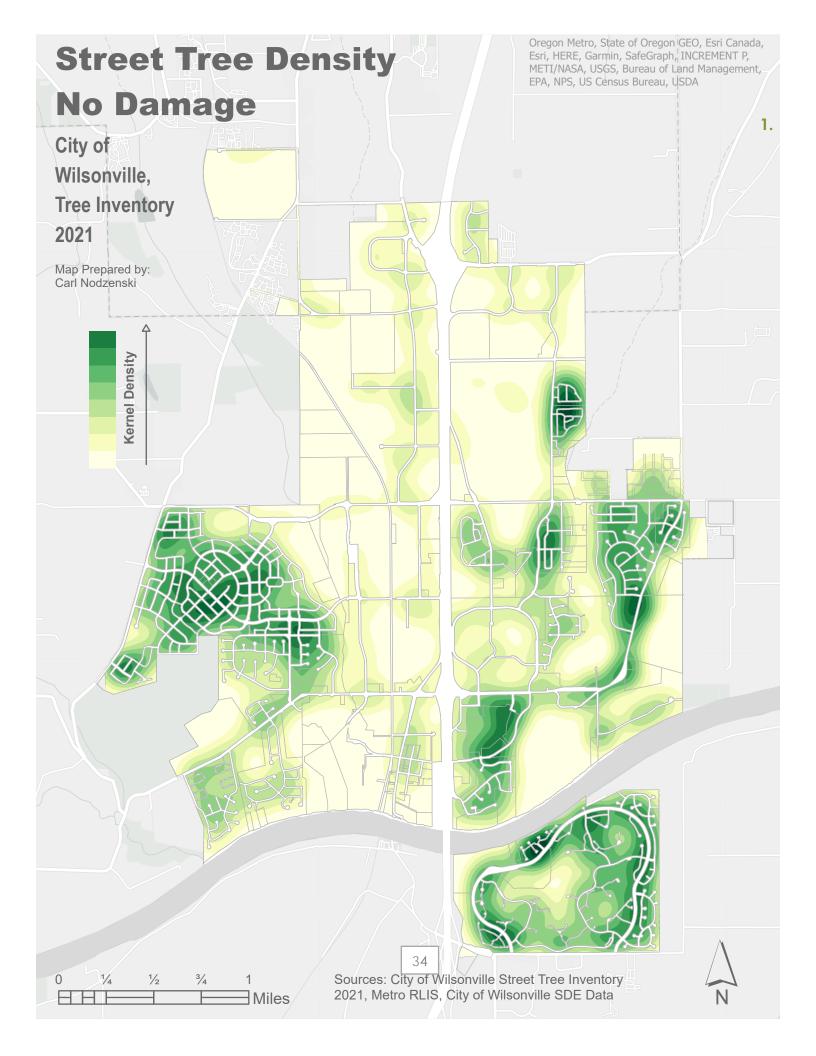
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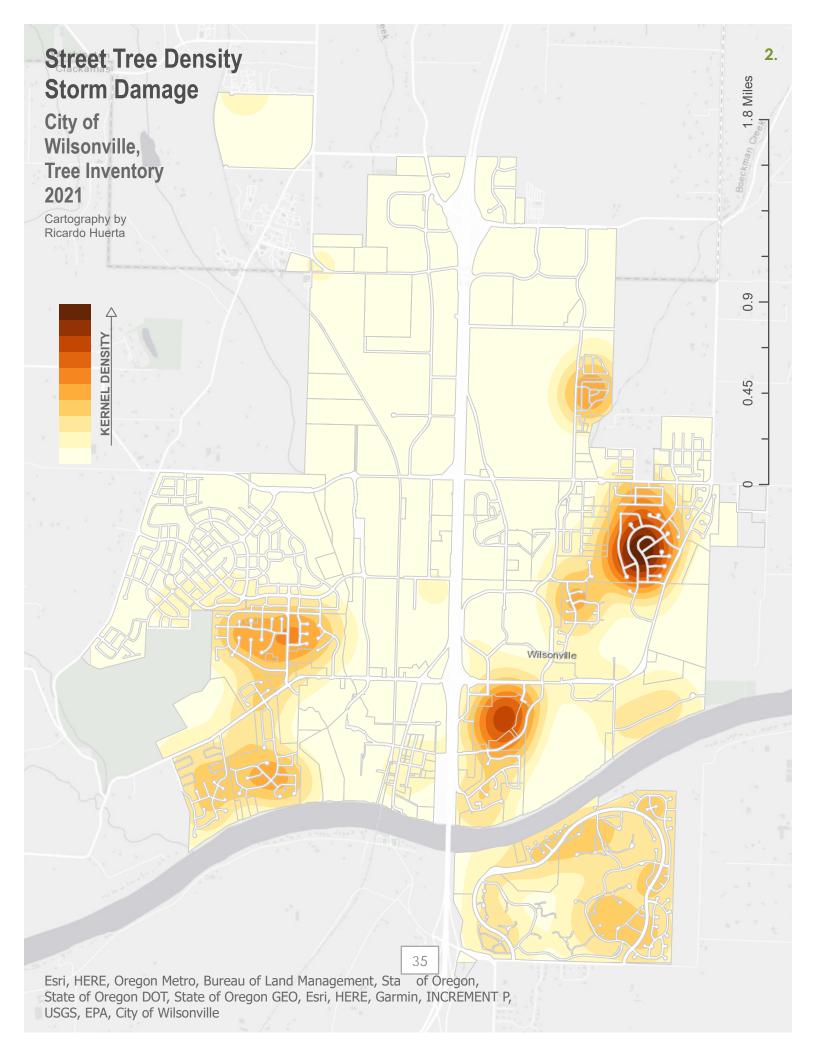


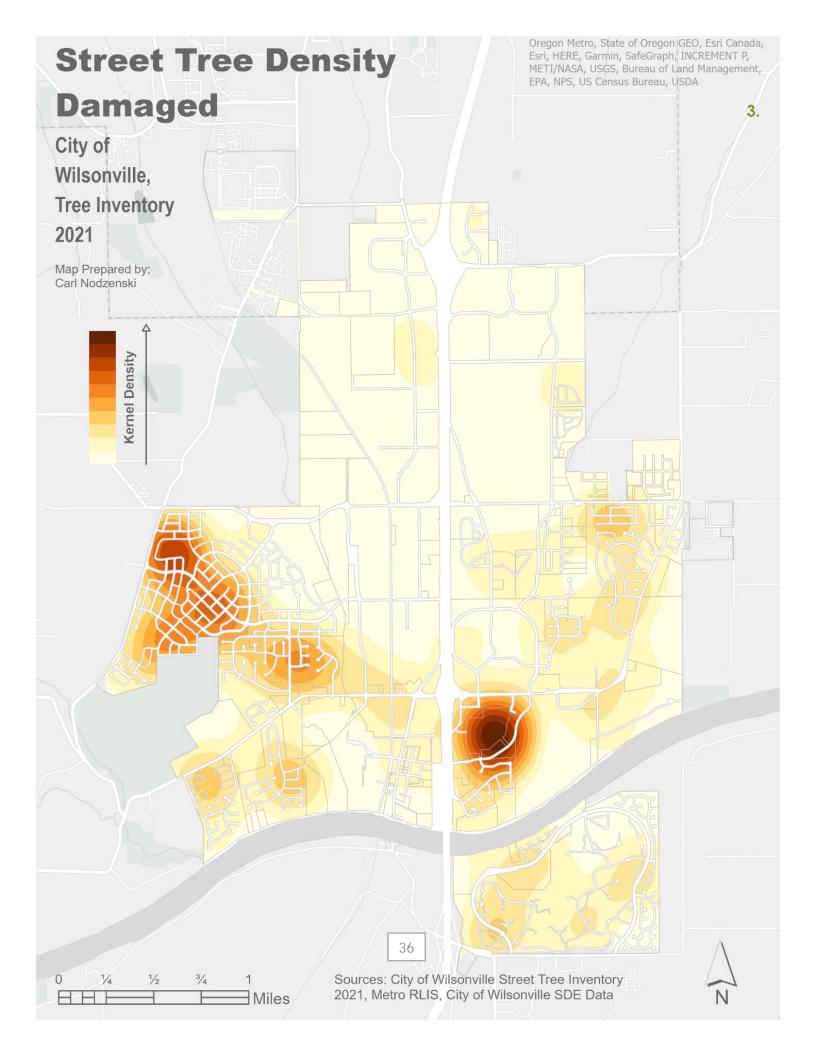
4. "Removed, no stump" Rates by DBH

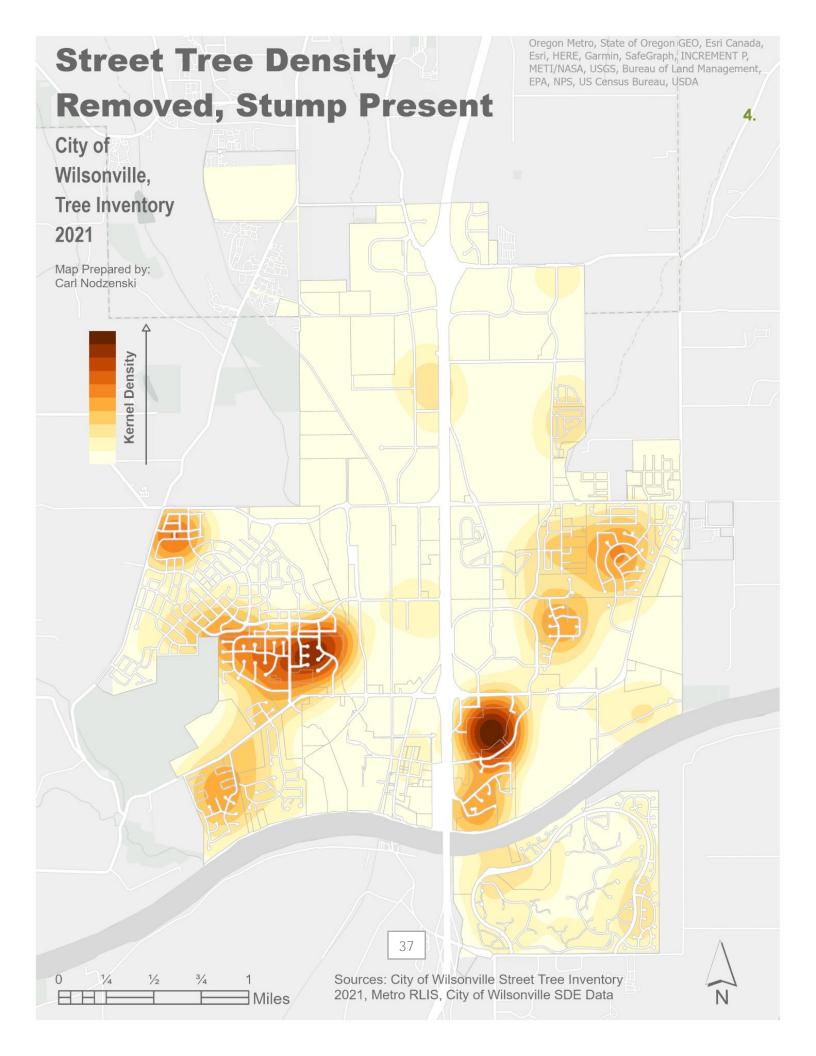


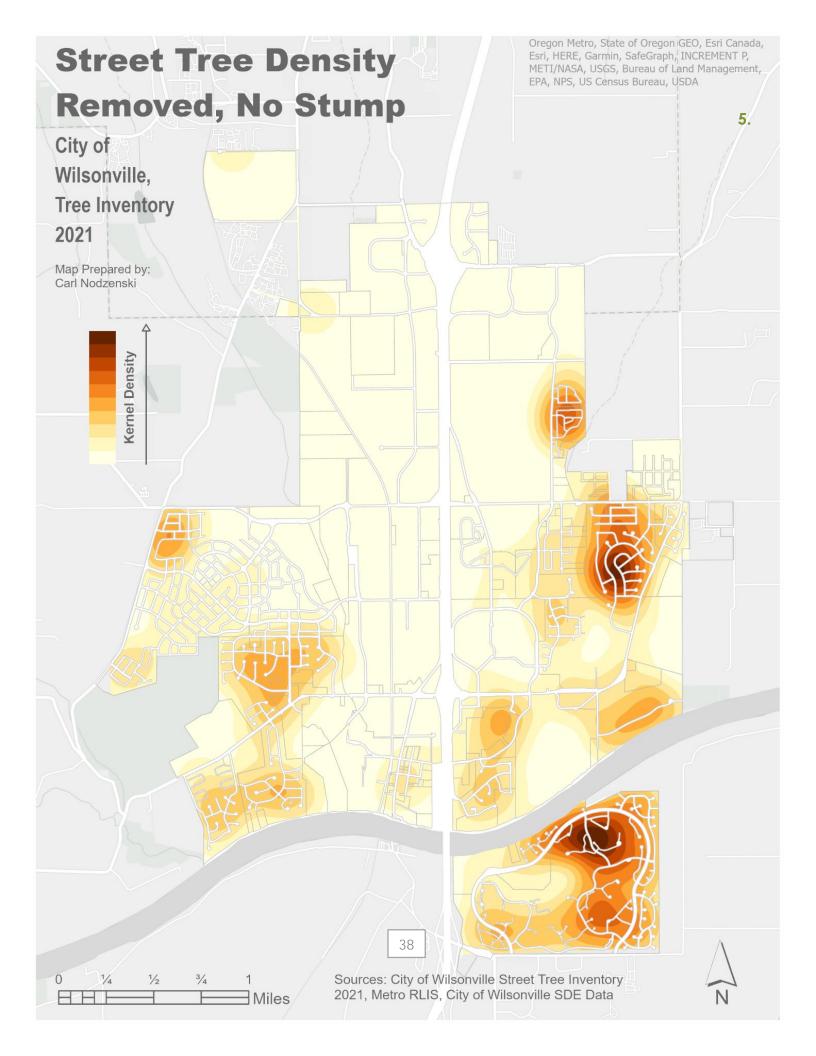
Appendix D: City Maps

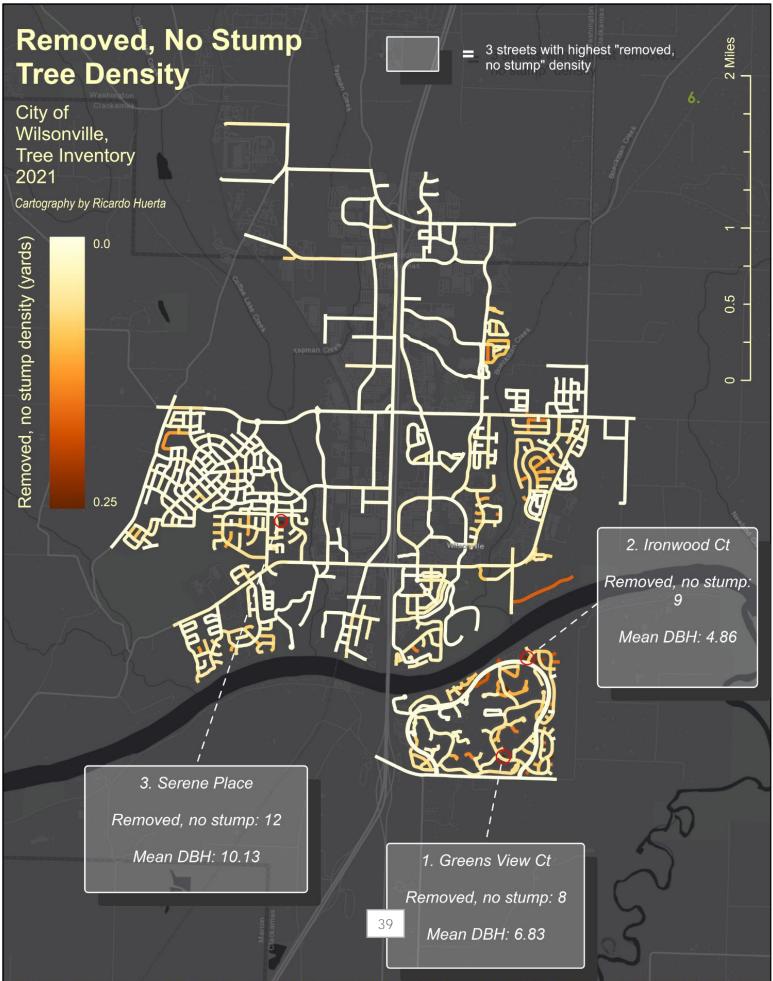




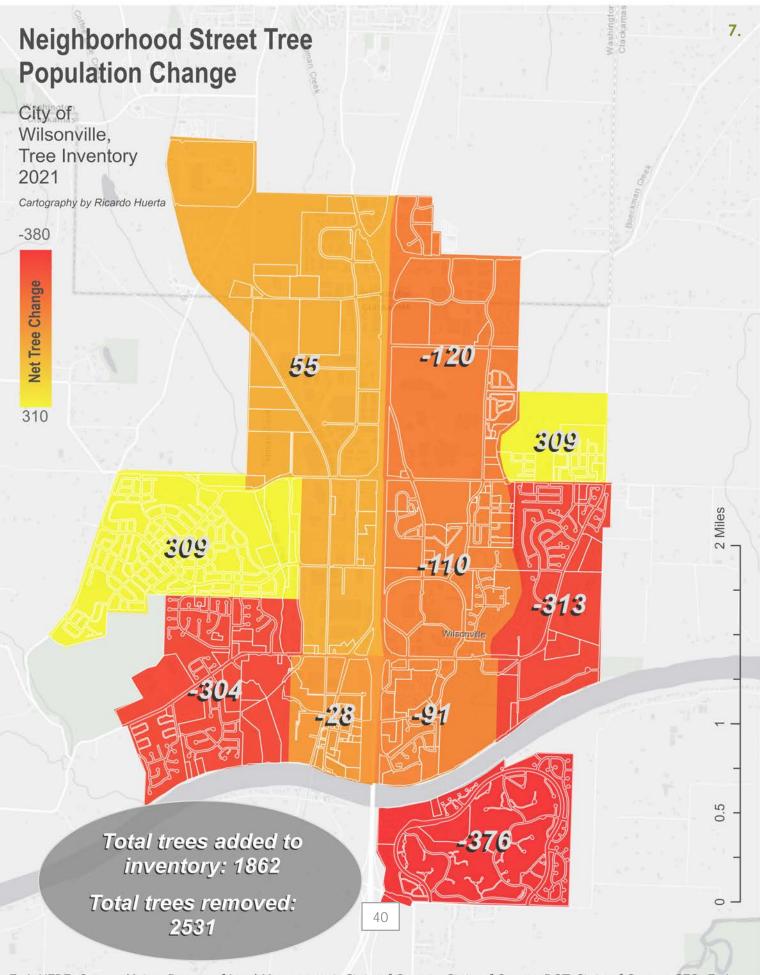








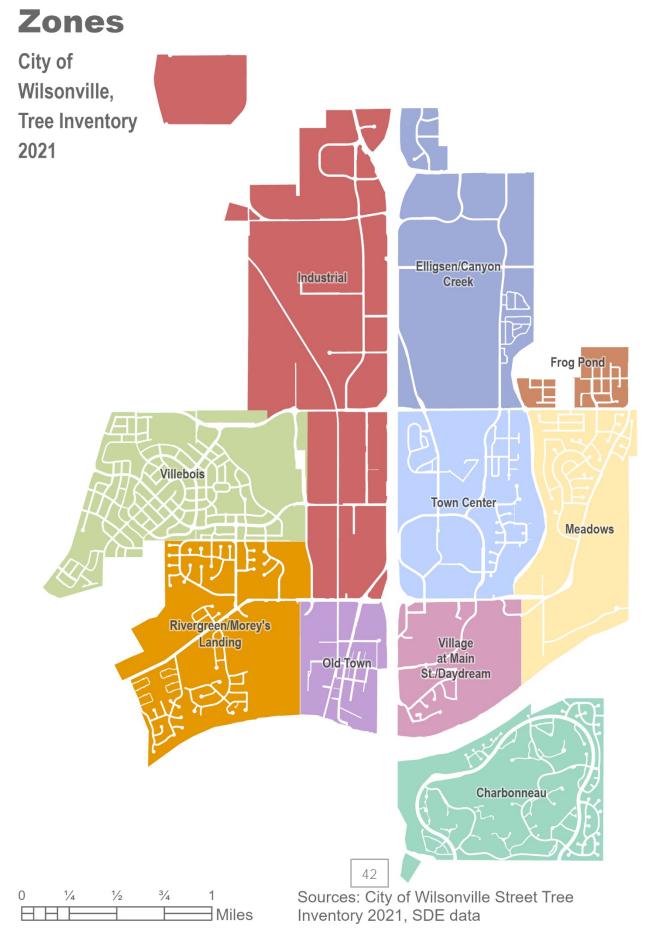
Esri, HERE, Oregon Metro, Bureau of Land Management, State of Oregon, State of Oregon DOT, State of Oregon GEO, Esri, HERE, Garmin, INCREMENT P, USGS, EPA, City of Wilsonville



Esri, HERE, Oregon Metro, Bureau of Land Management, State of Oregon, State of Oregon DOT, State of Oregon GEO, Esri, HERE, Garmin, INCREMENT P, USGS, EPA, City of Wilsonville

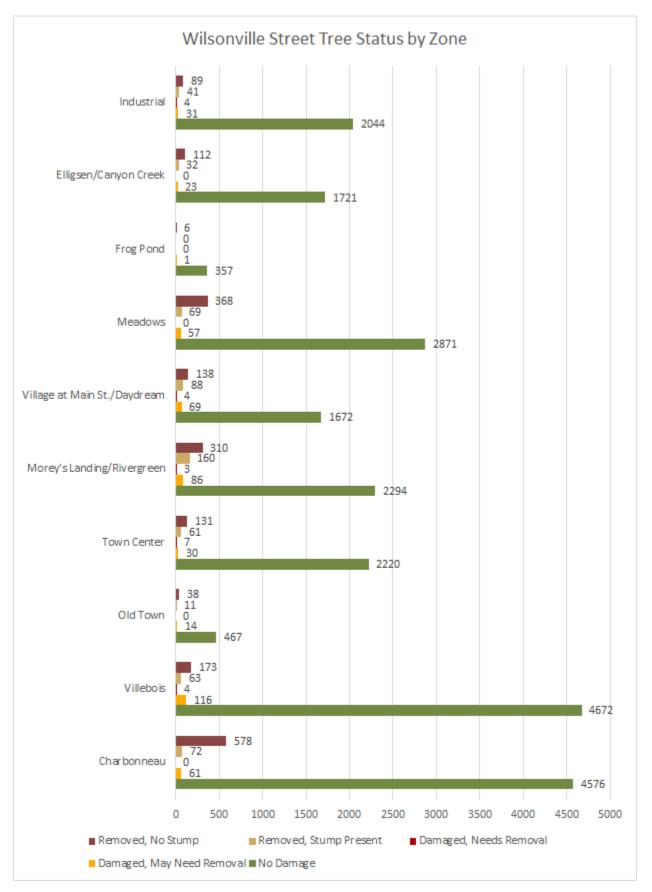
Appendix E: Neighborhood Zone Maps & Charts All Neighborhood Zones

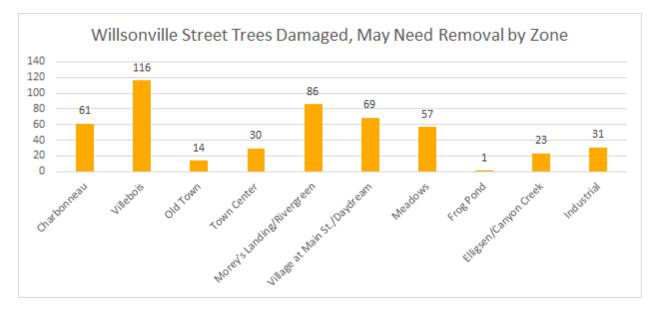
Wilsonville Neighborhood



1.

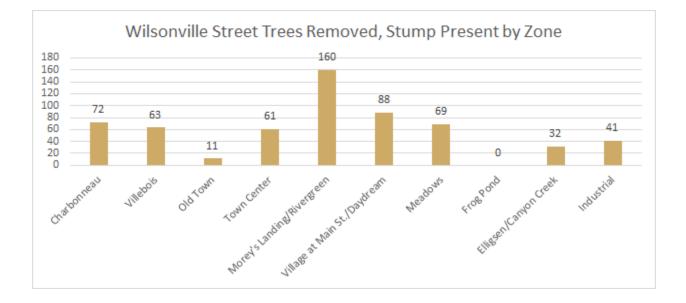
2. Street Tree Status





3. Damaged, May Need Removal Tree Comparison

4. Removed, Stump Present Tree Comparison

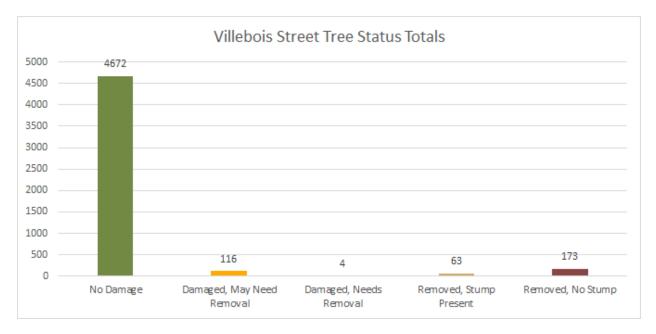




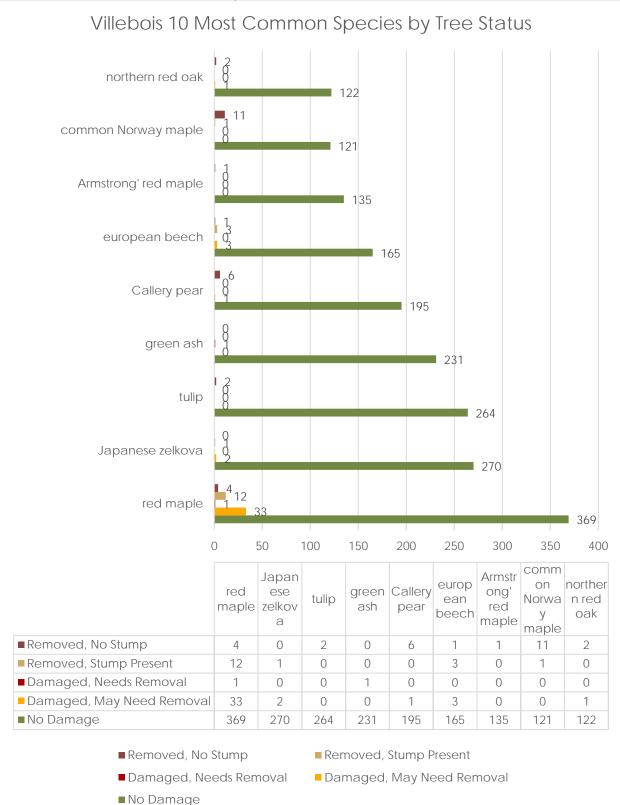
5. Removed, No Stump Tree Comparison

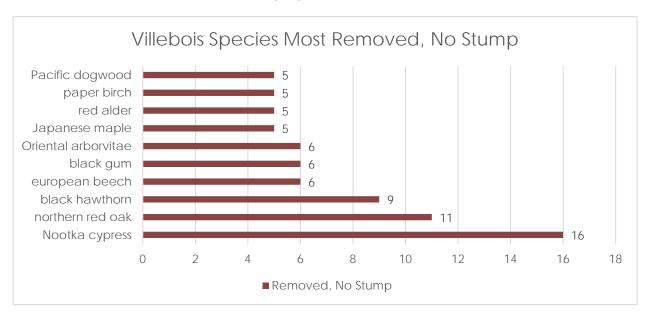
Villebois Zone Maps & Charts

6. Status Totals



7. 10 Most Common Tree Species & Status



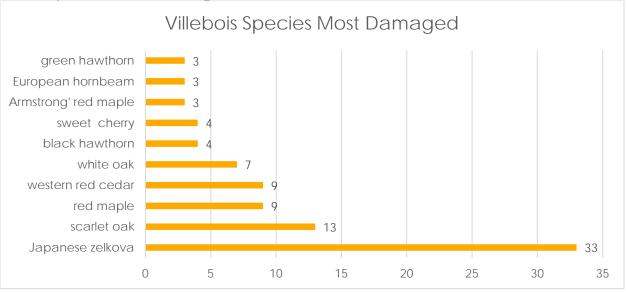


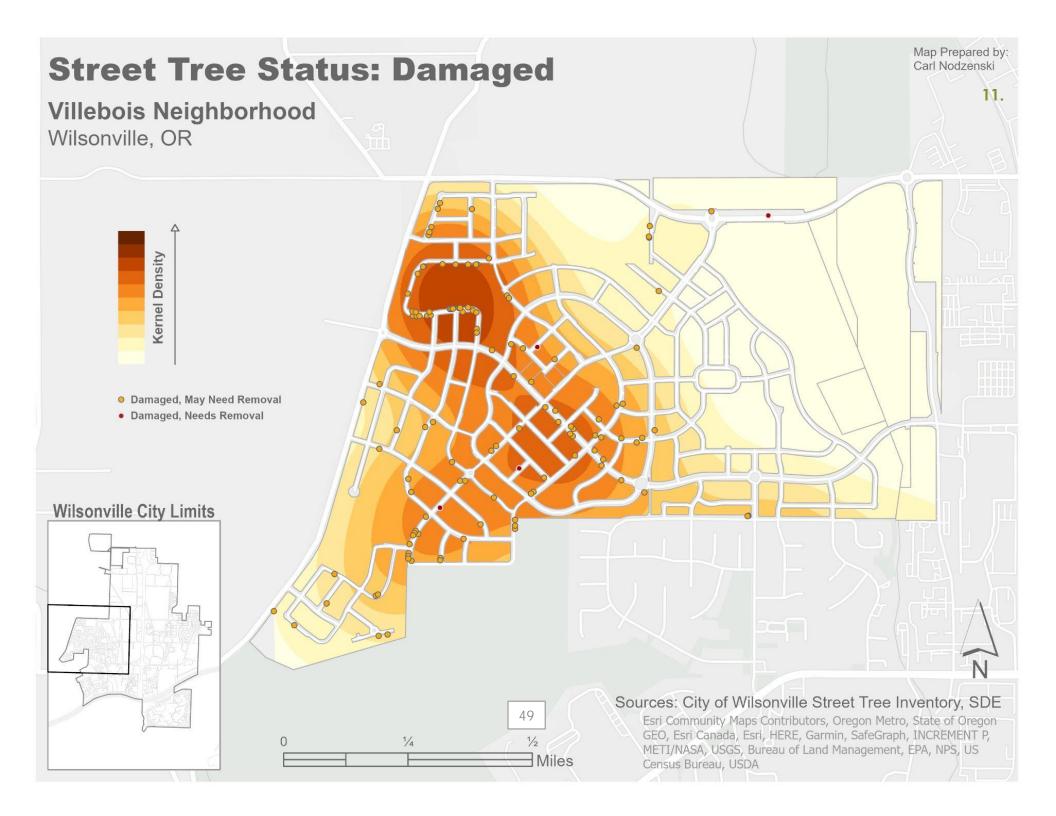
8. 10 Most Removed, No Stump Species

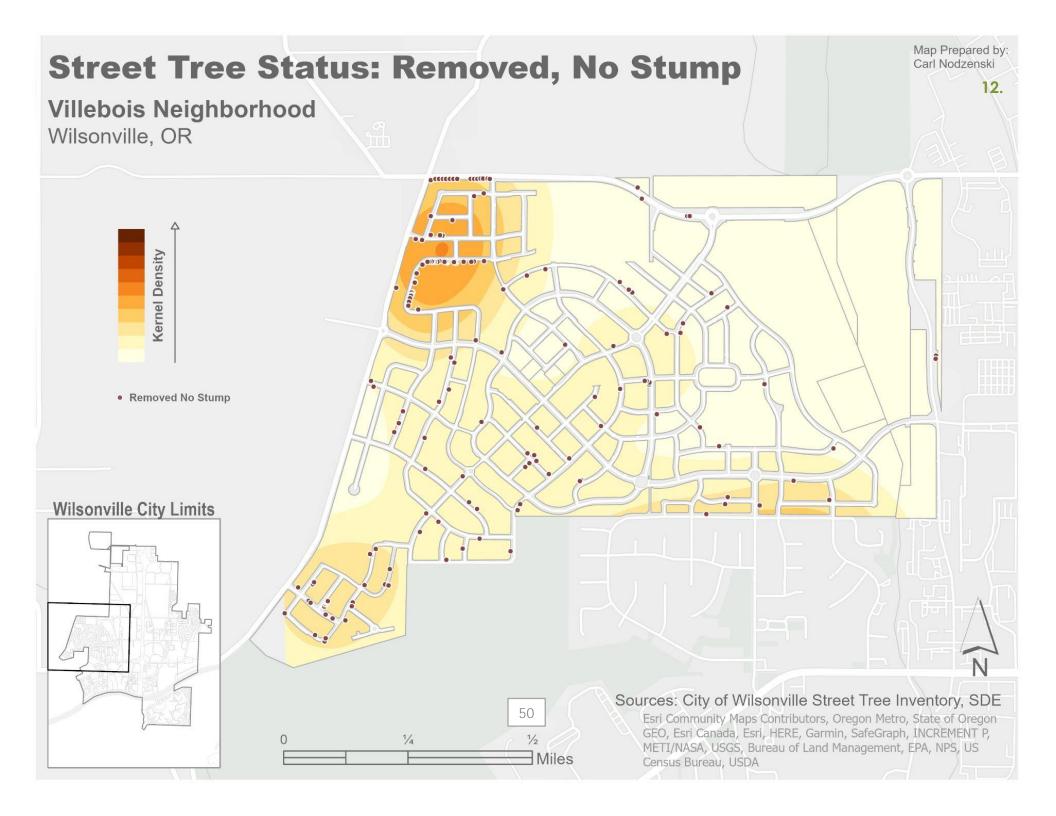
9. Trees Removed, No Stump by DBH

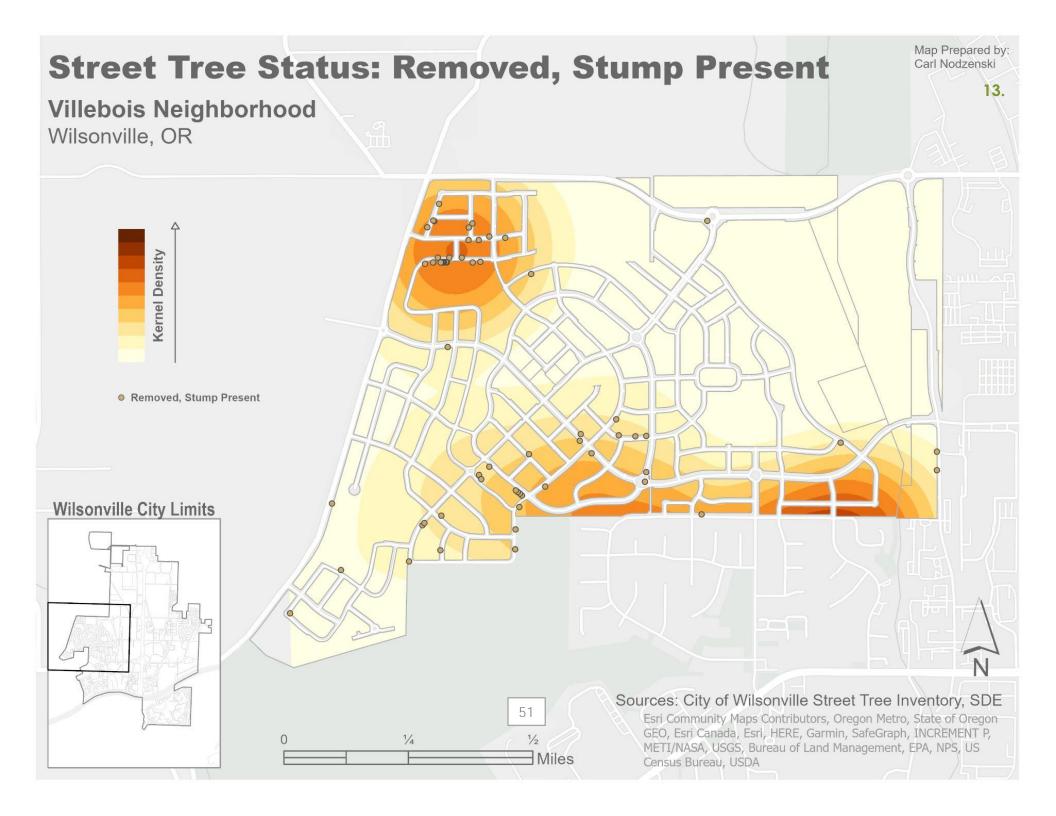


10. Species Most Damaged



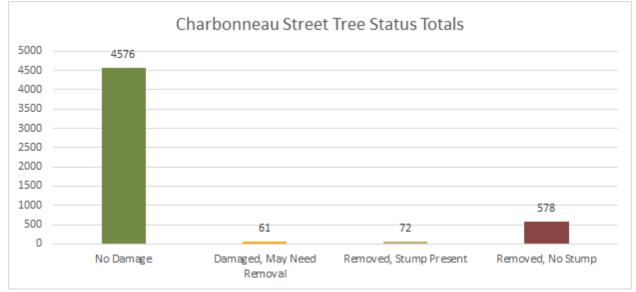


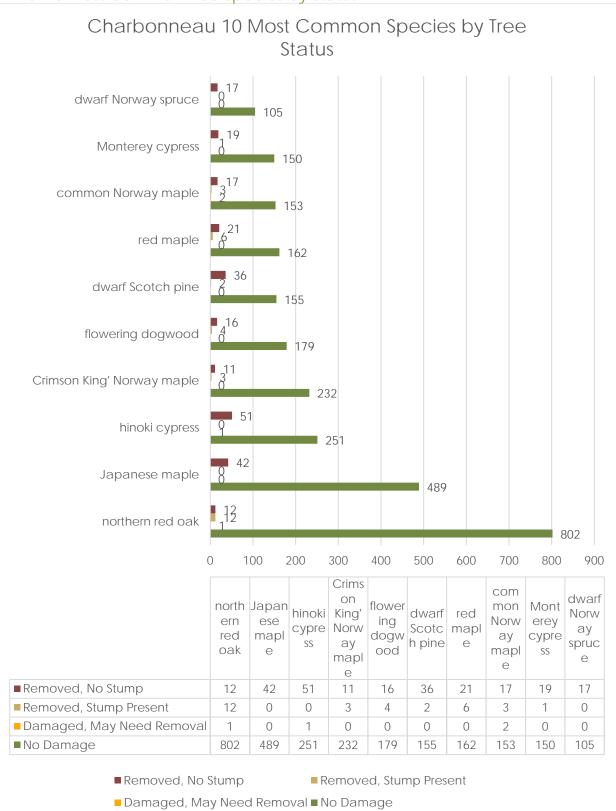




Charbonneau Zone Maps & Charts

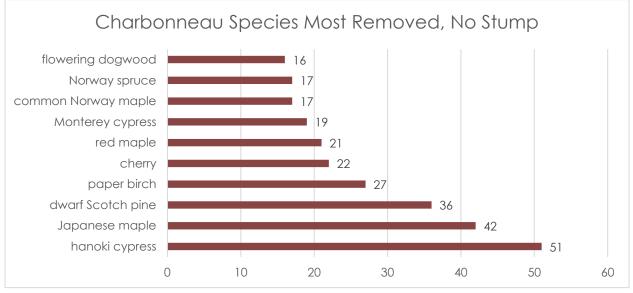
14. Status Totals



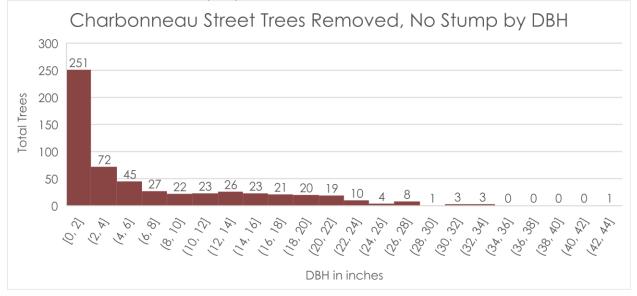


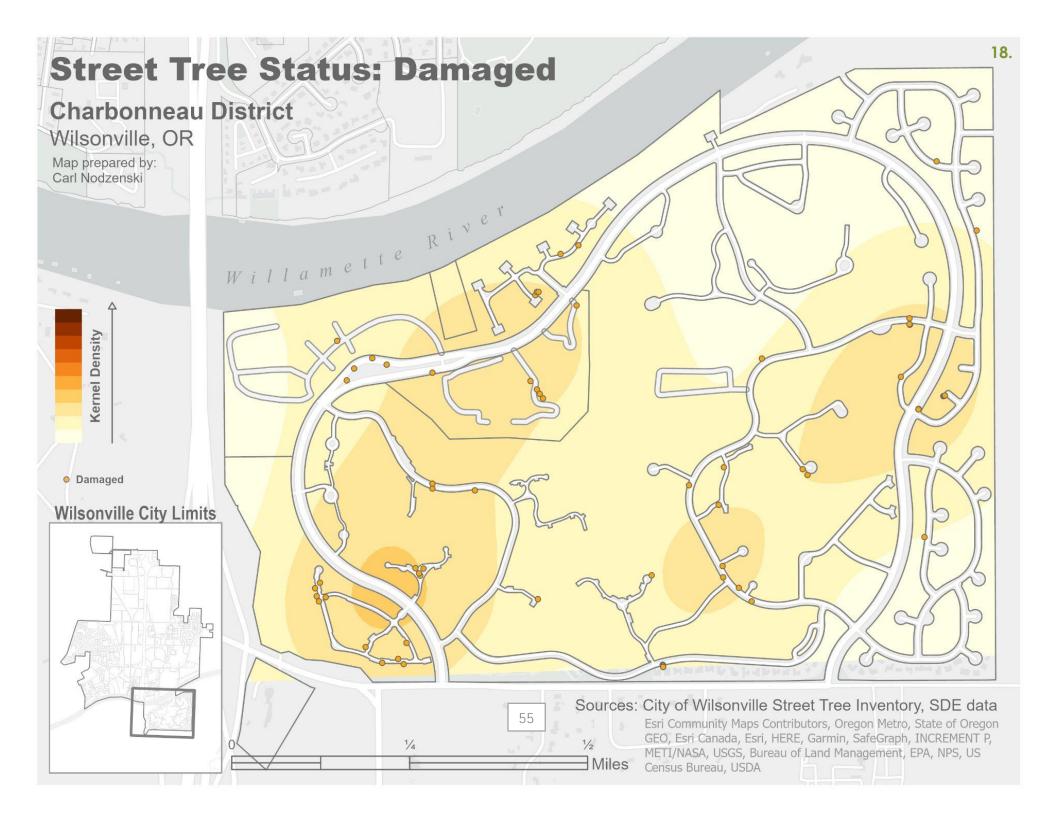
15. 10 Most Common Tree Species by Status

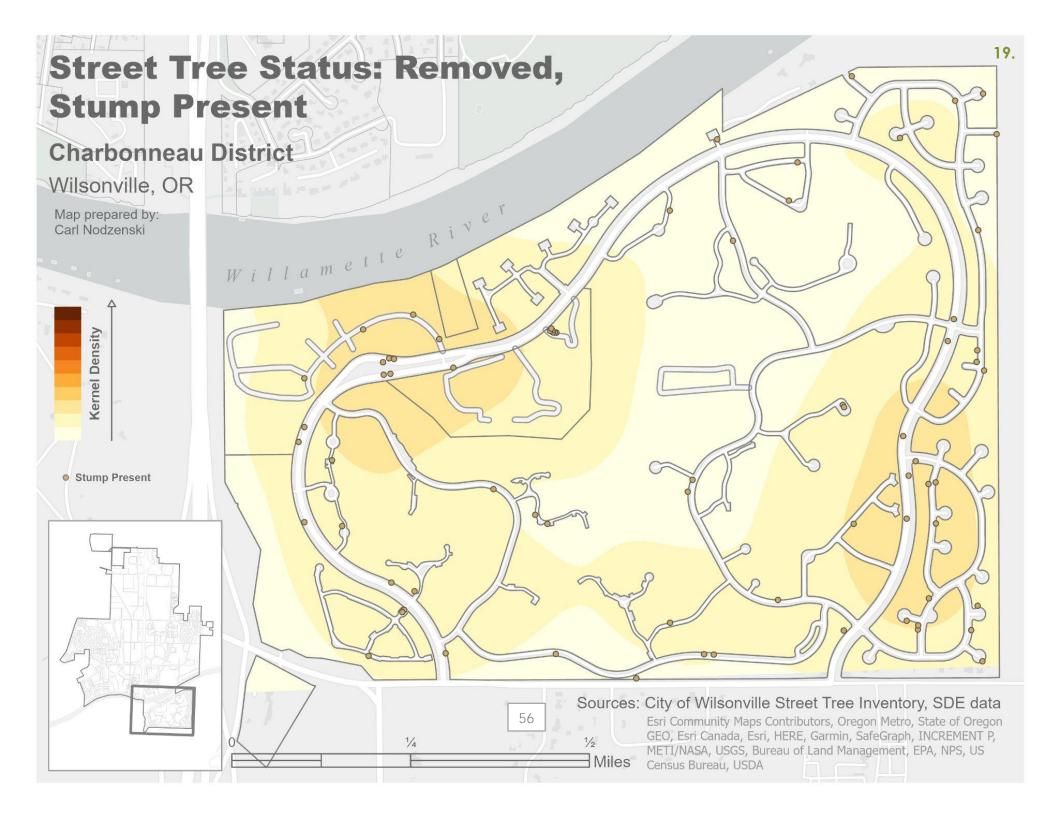
16. 10 Most Removed, No Stump Species

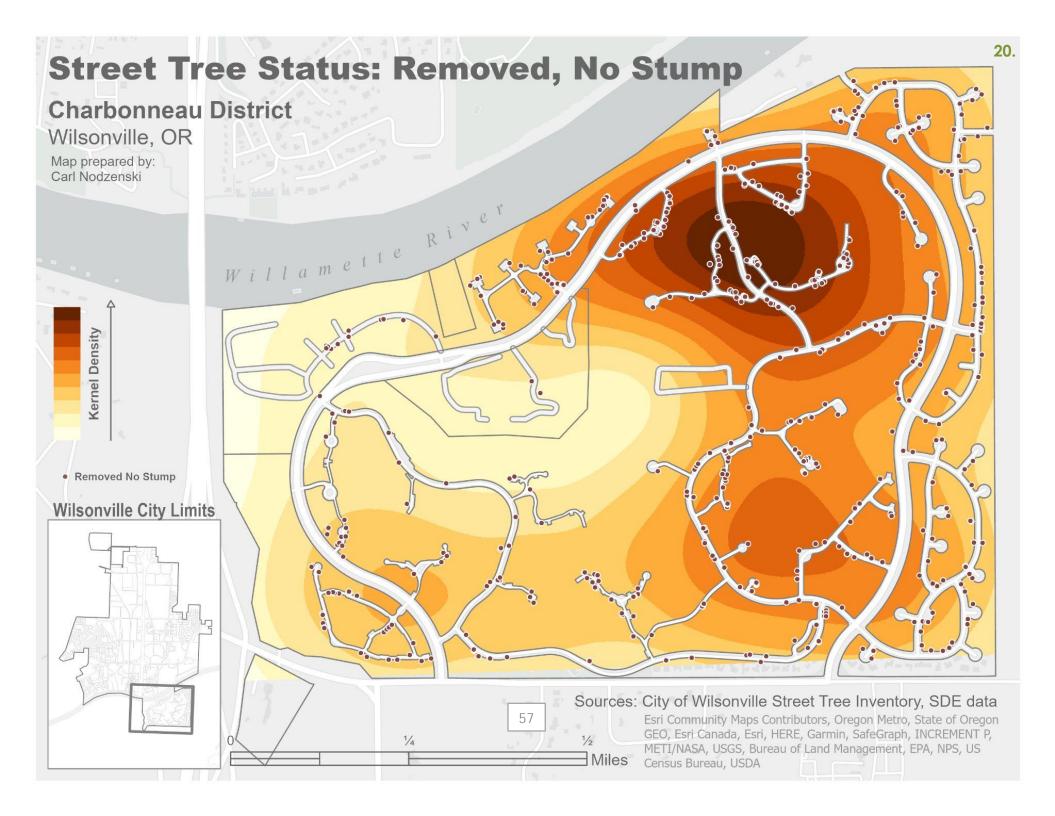


17. Removed, No Stump by DBH



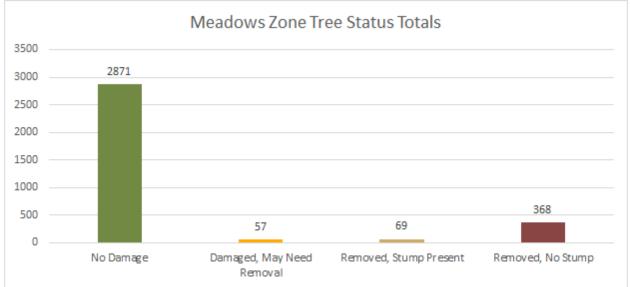




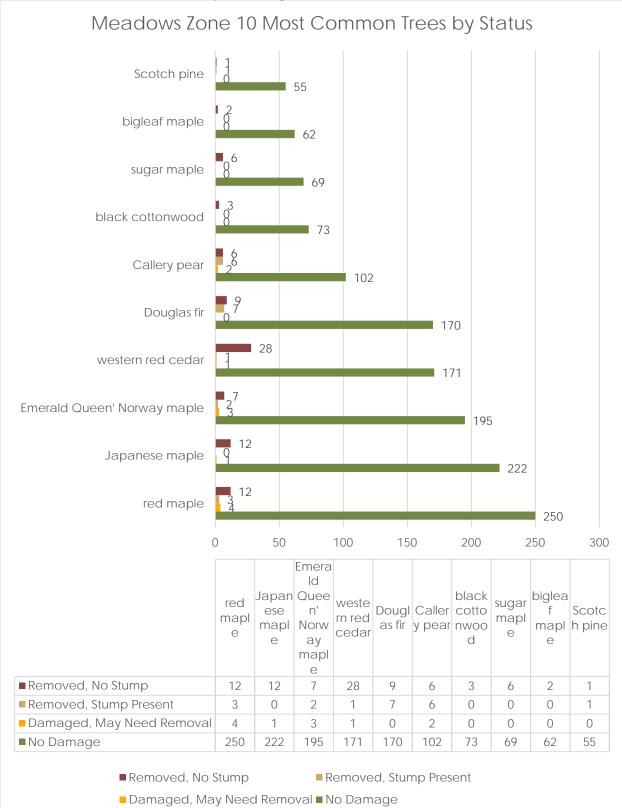


Meadows Zone Maps & Charts

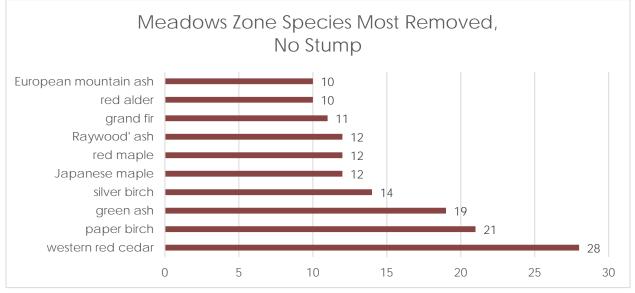
21. Status Totals



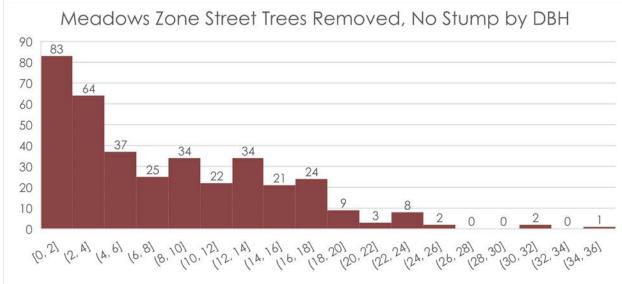


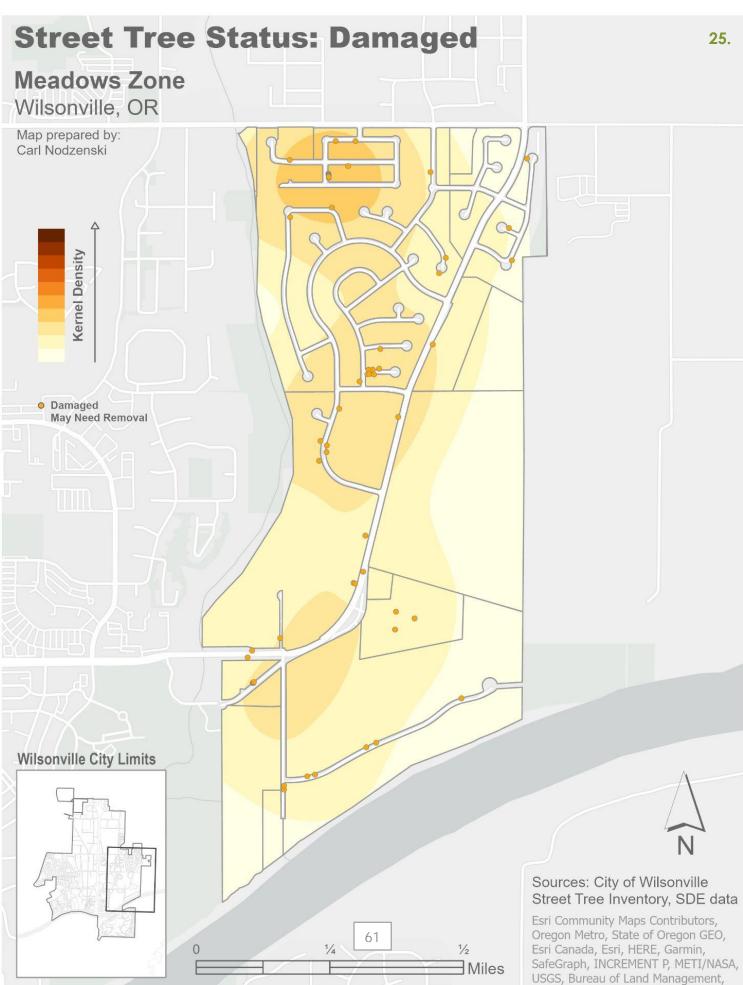


23. 10 Most Removed, No Stump Species



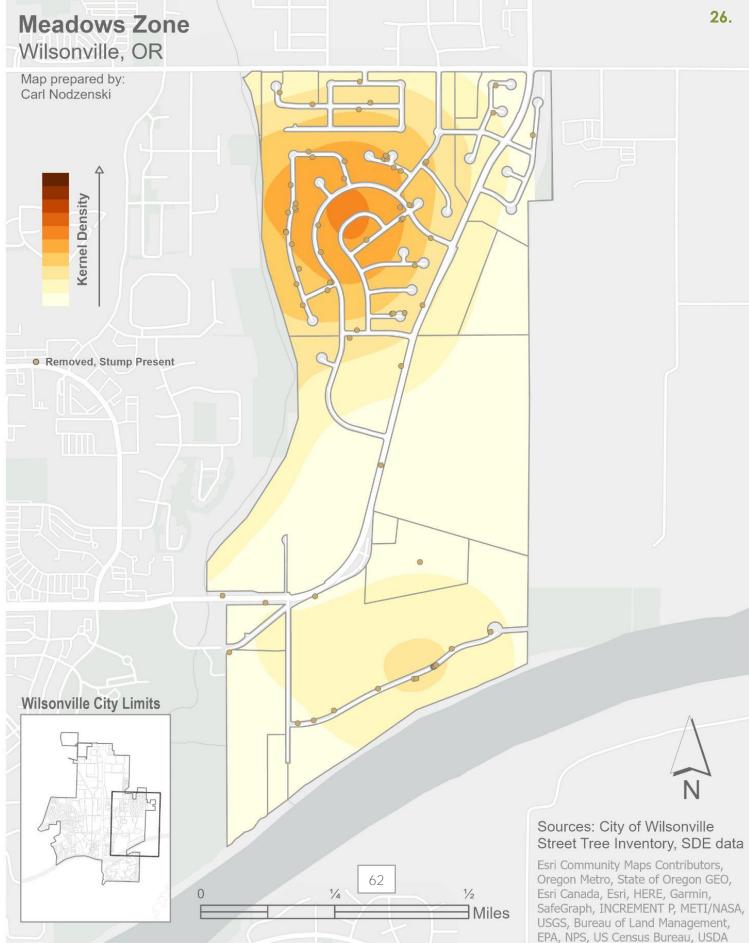
24. Removed, No Stump by DBH

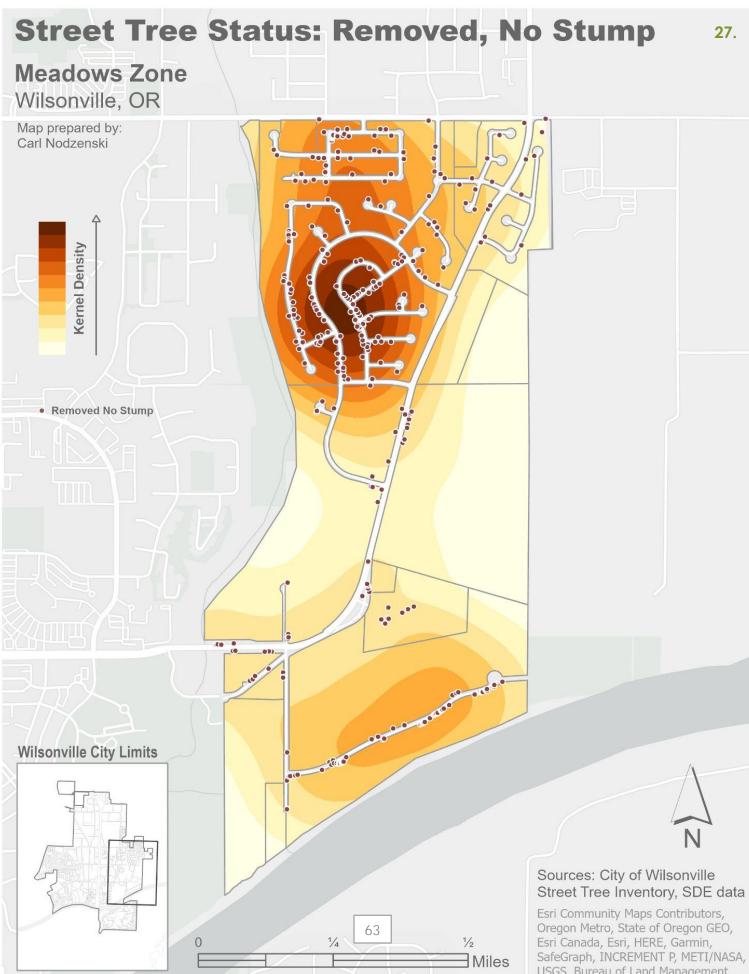




USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA

Street Tree Status: Removed, Stump Present

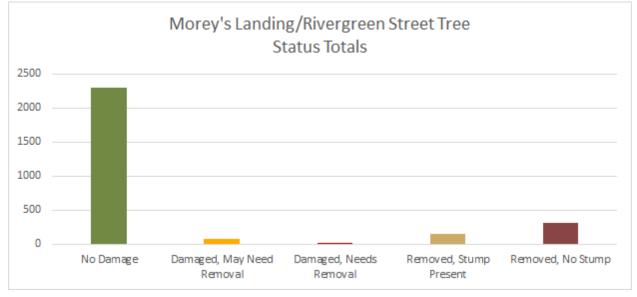




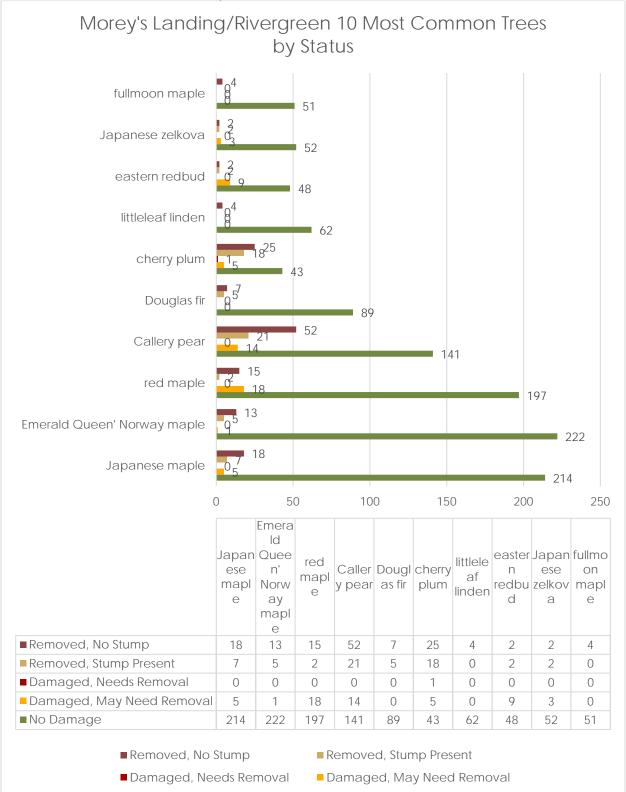
USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA

Morey's Landing/Rivergreen Zone Maps & Charts

28. Status Totals

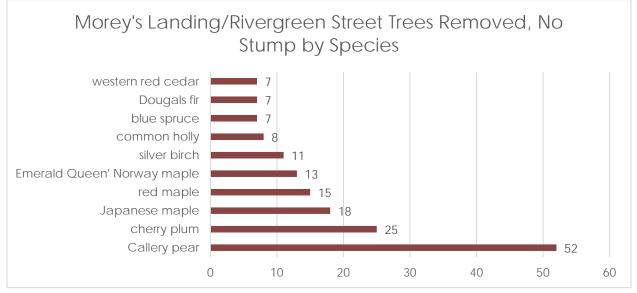


29. 10 Most Common Tree Species

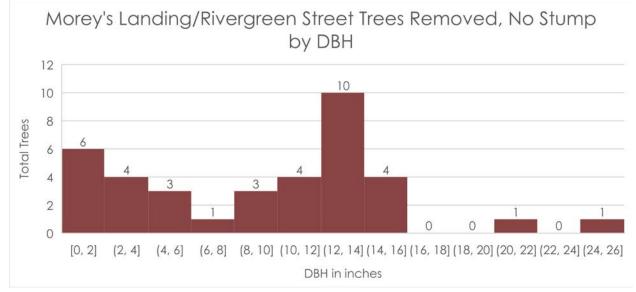


■ No Damage

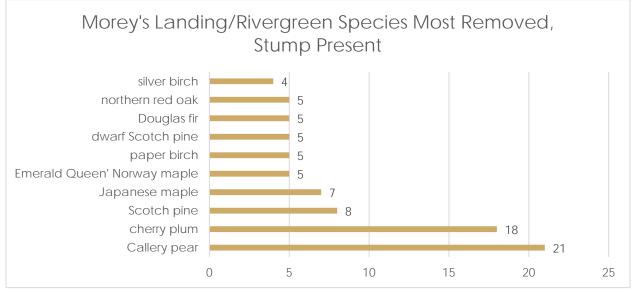
30. 10 Most Removed, No Stump Species



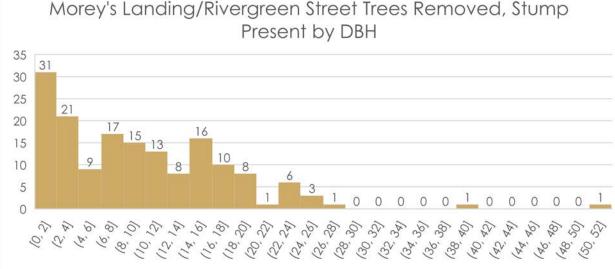
31. Removed, No Stump by DBH



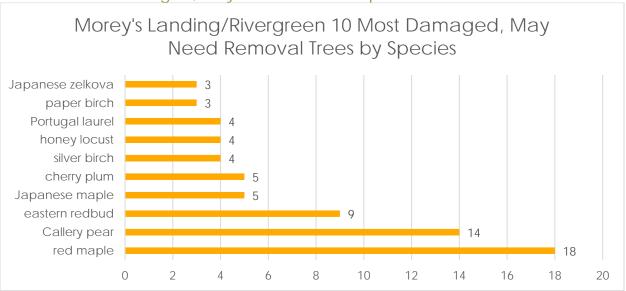
32. 10 Most Removed, Stump Present Species



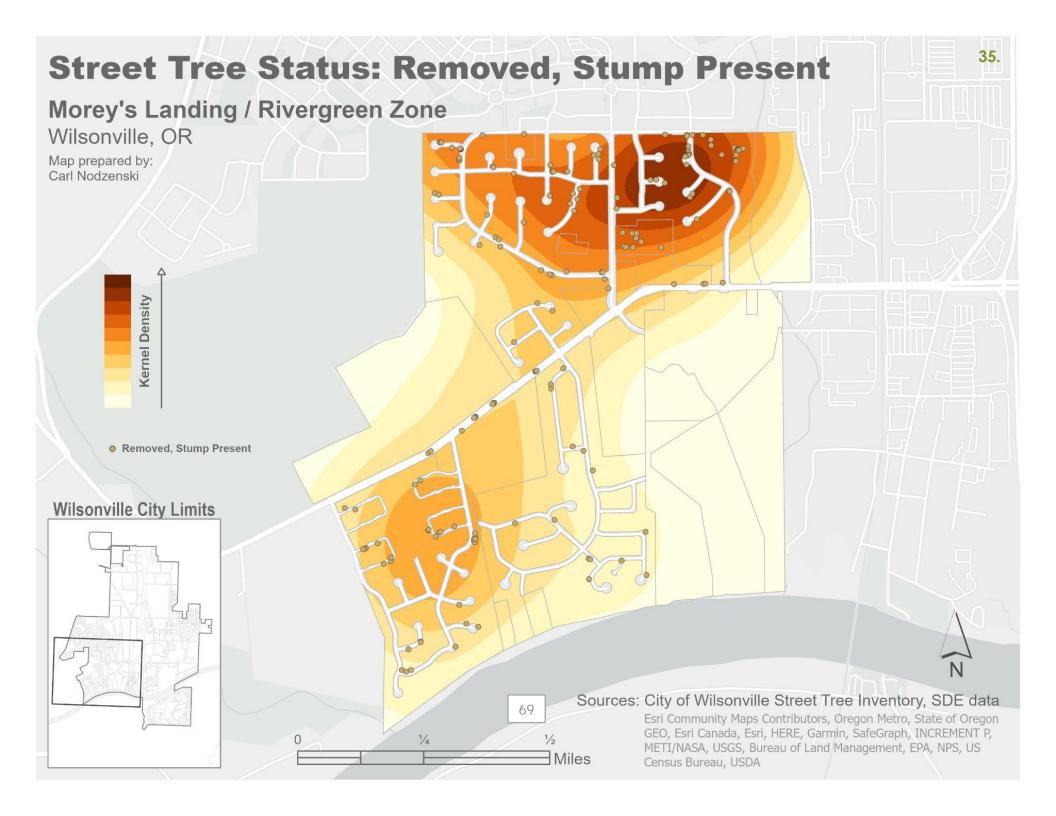
33. Removed, Stump Present by DBH

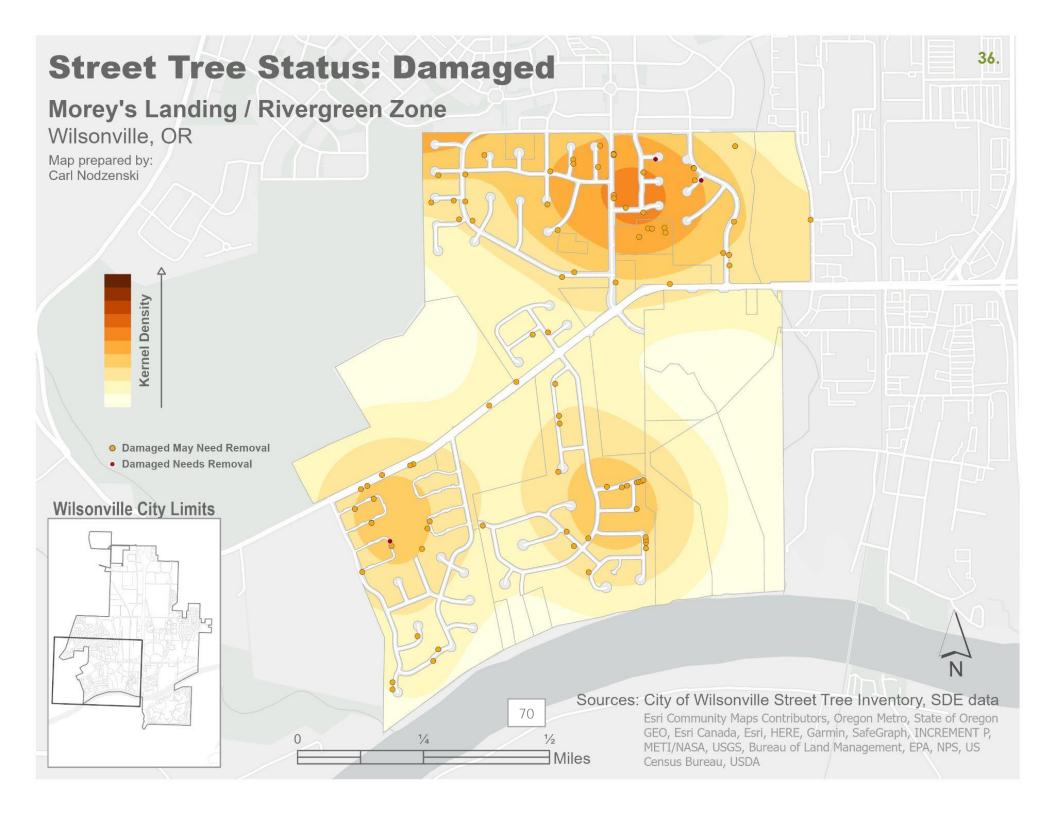


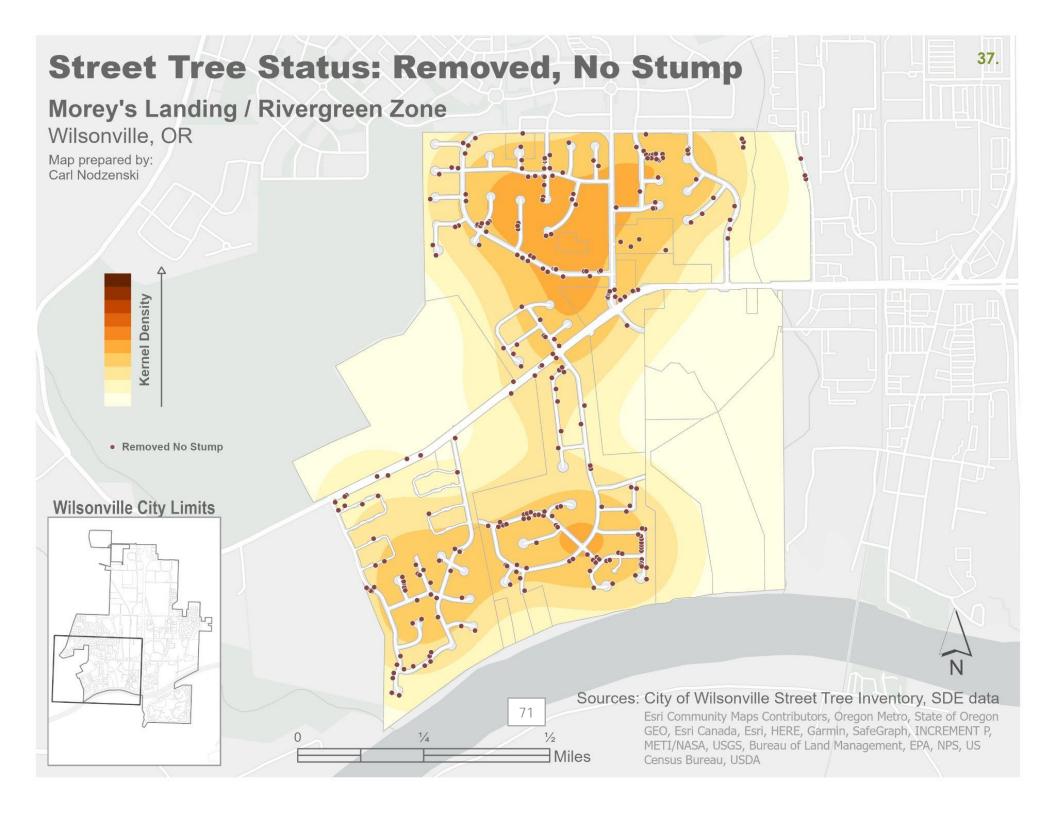
Morey's Landing/Rivergreen Street Trees Removed, Stump



34.10 Most Damaged, May Need Removal Species

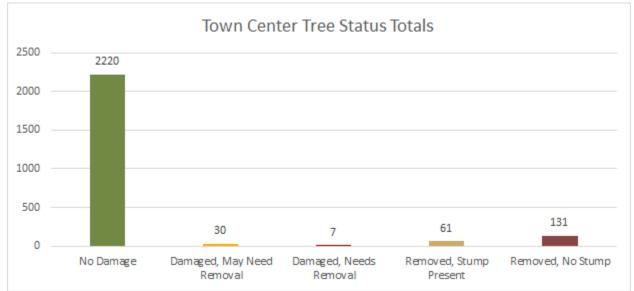


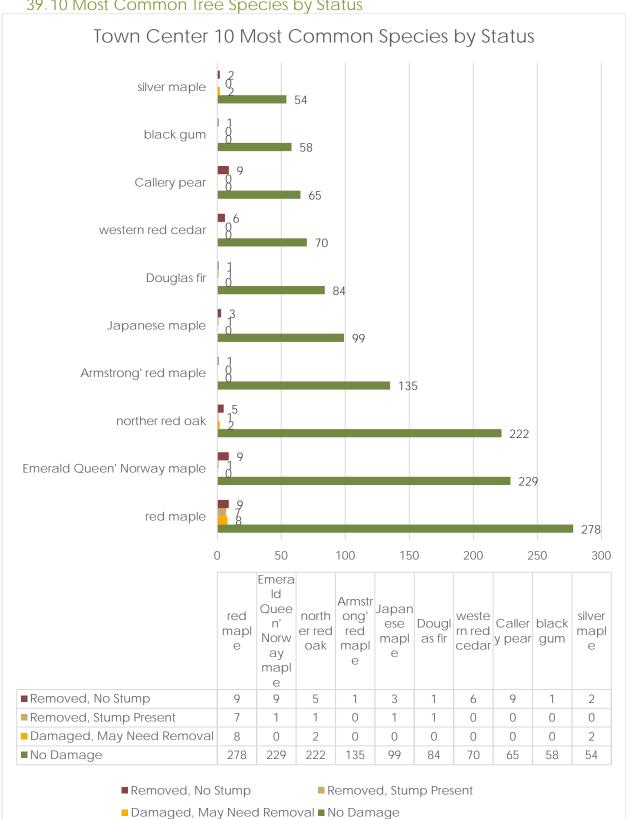




Town Center Zone

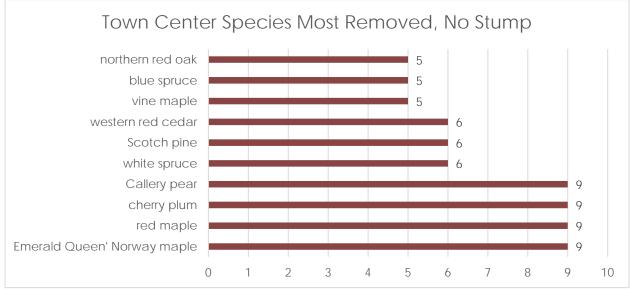
38. Status Totals



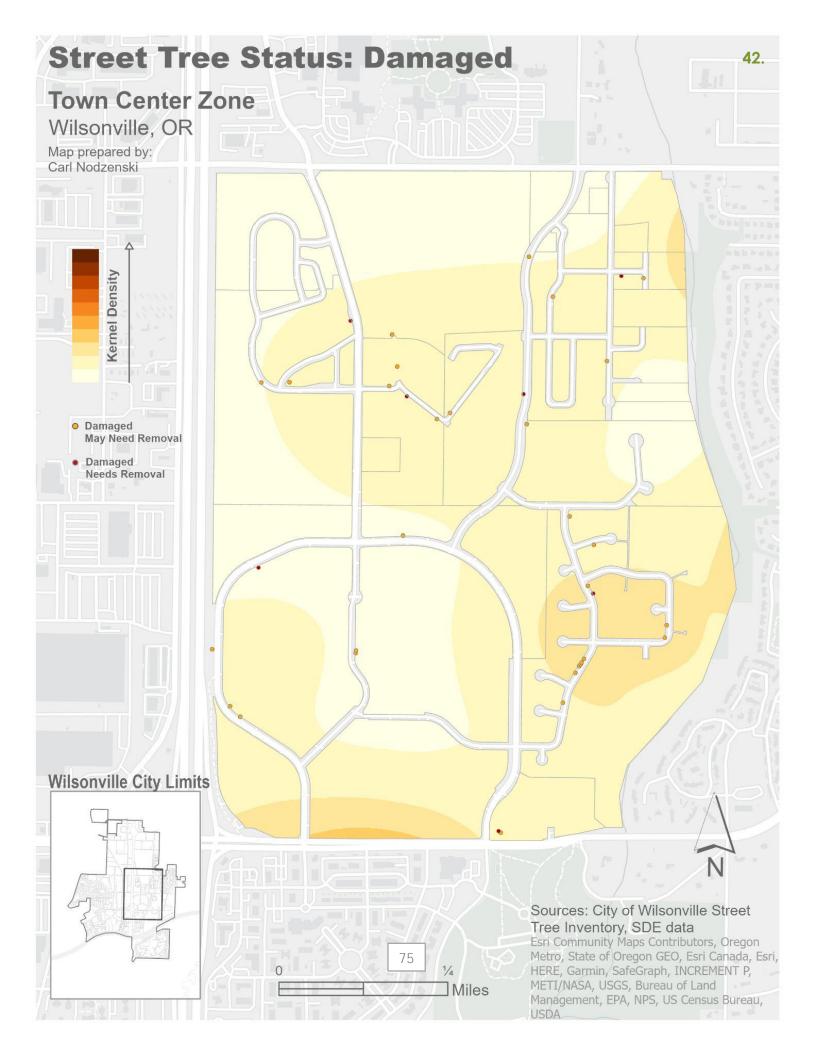


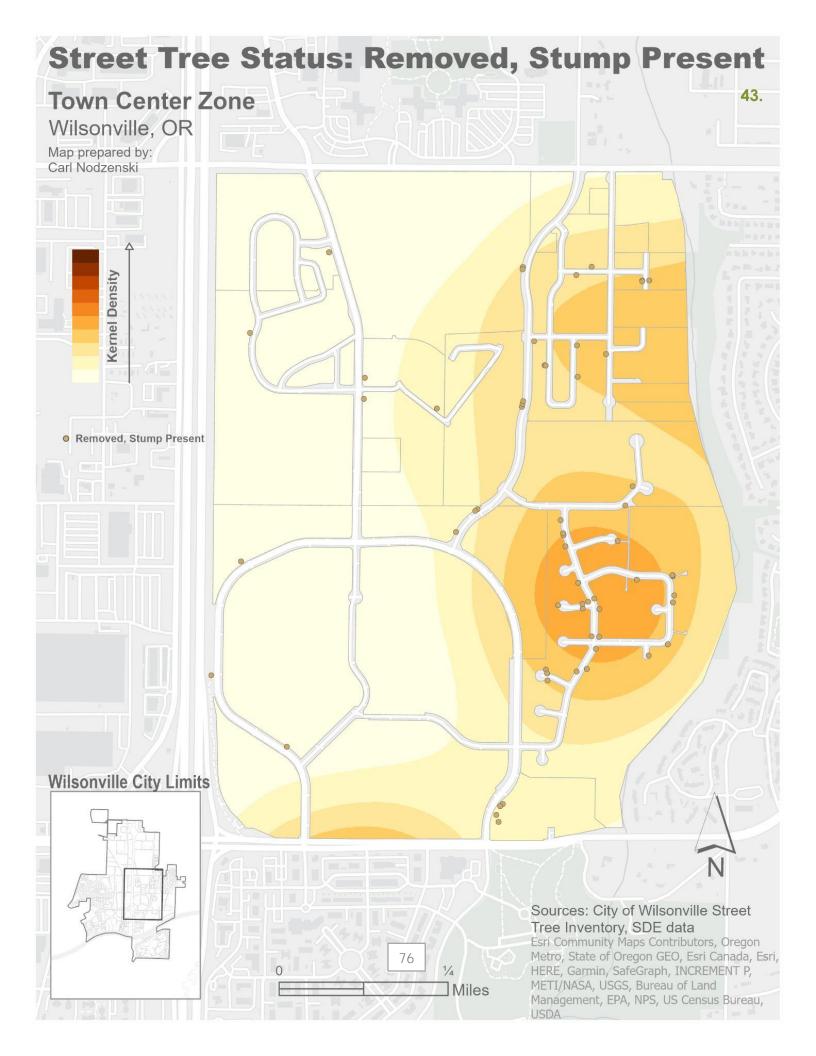
39.10 Most Common Tree Species by Status

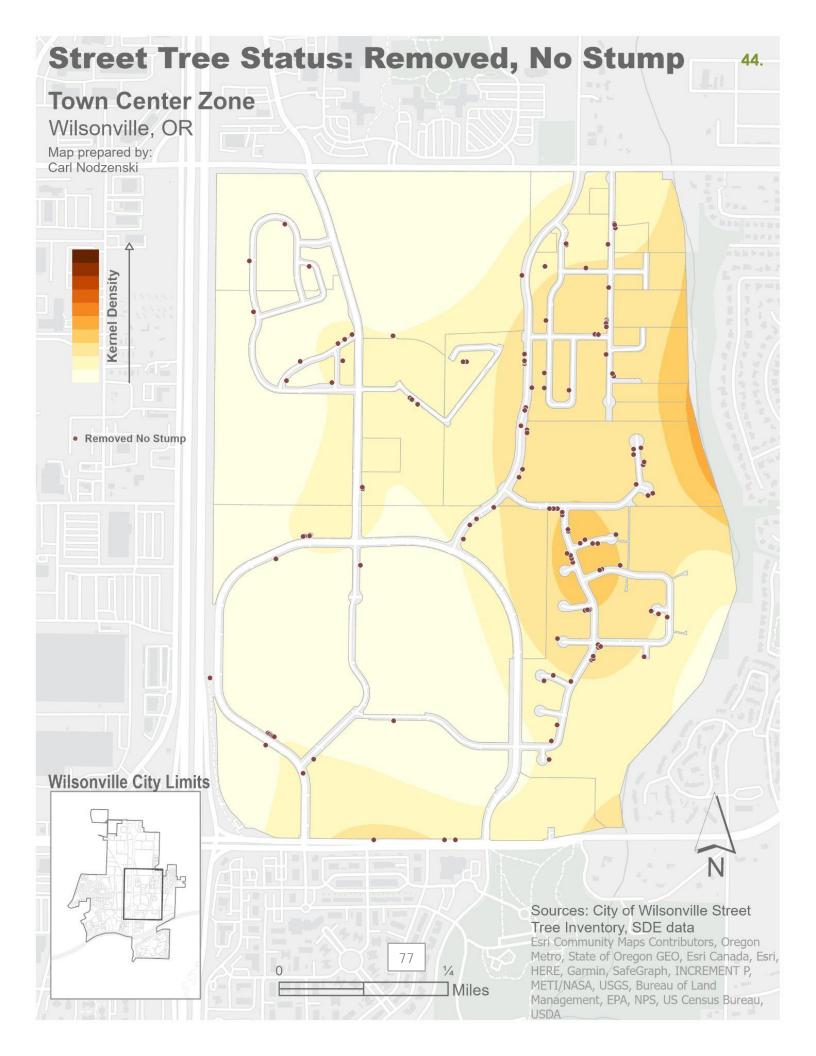
40.10 Most Removed, No Stump Species





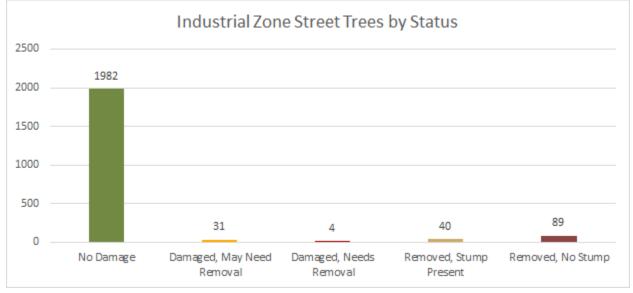


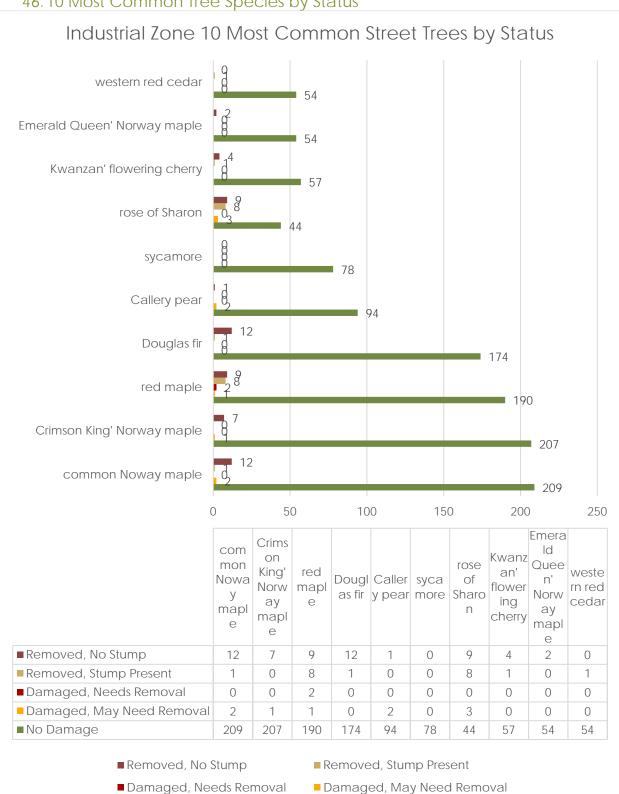




Industrial Zone

45. Status Totals



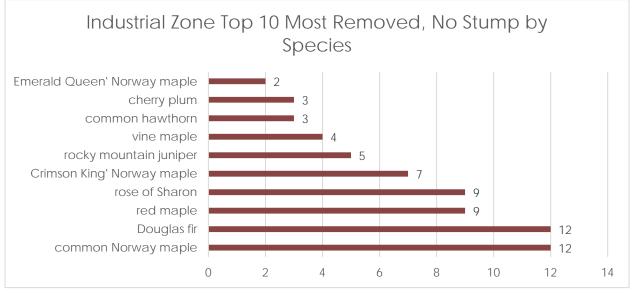


46.10 Most Common Tree Species by Status

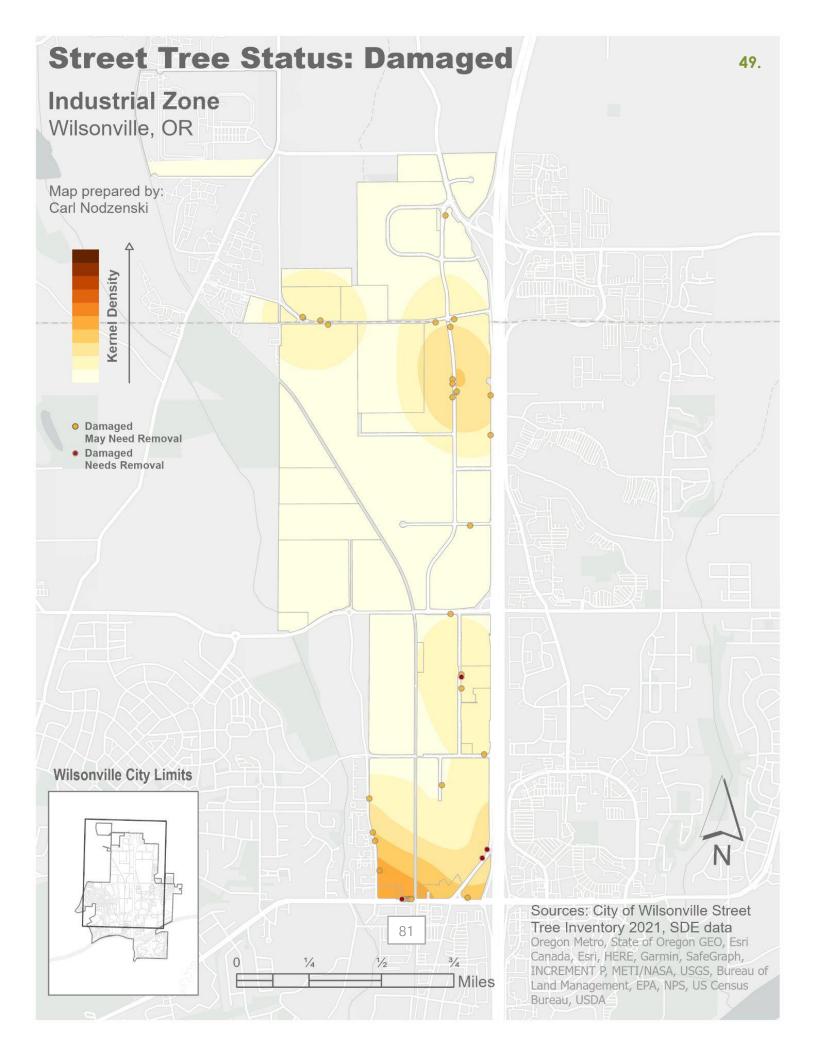
■ No Damage

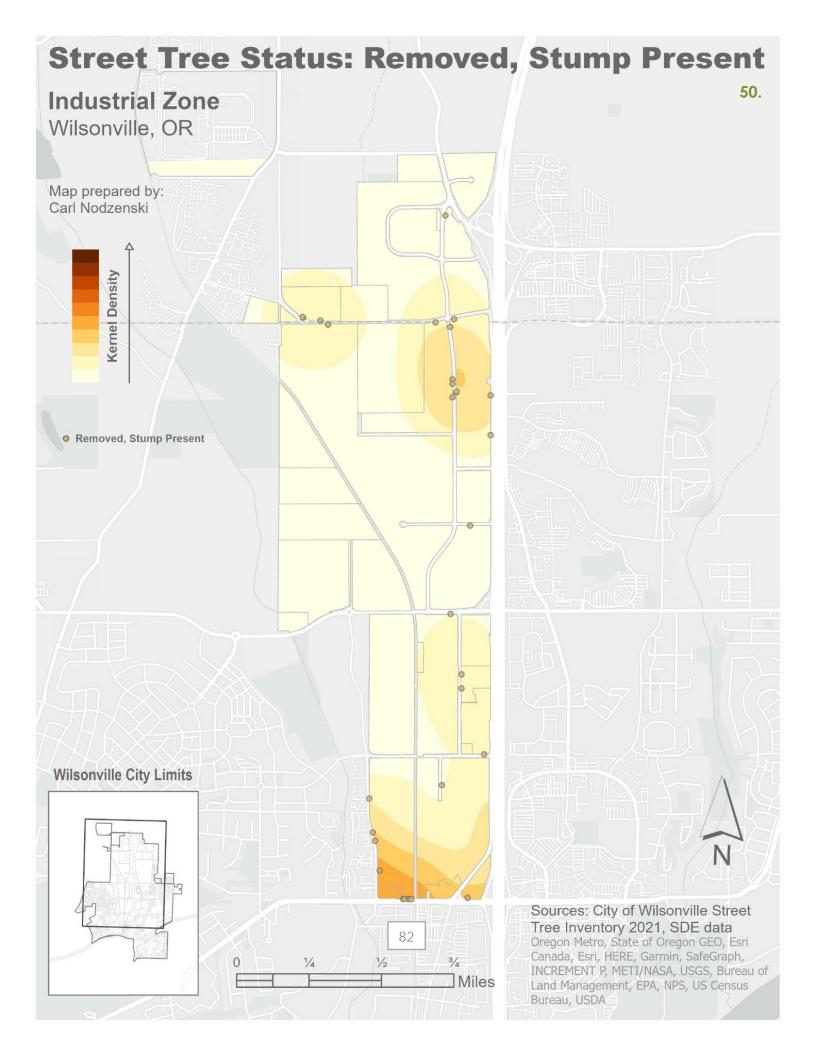
Damaged, May Need Removal

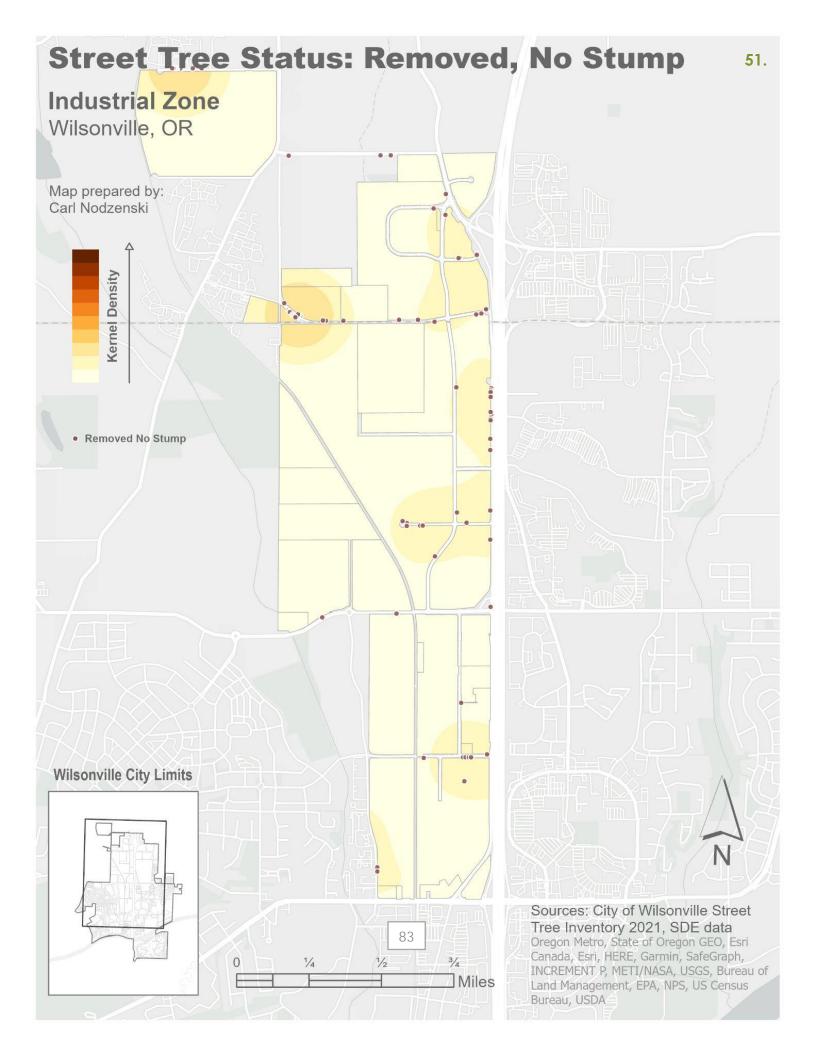
47.10 Most Removed, No Stump Species





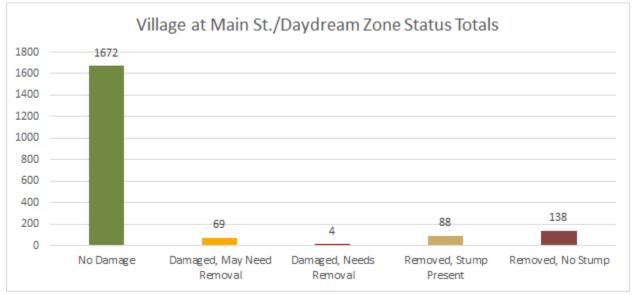




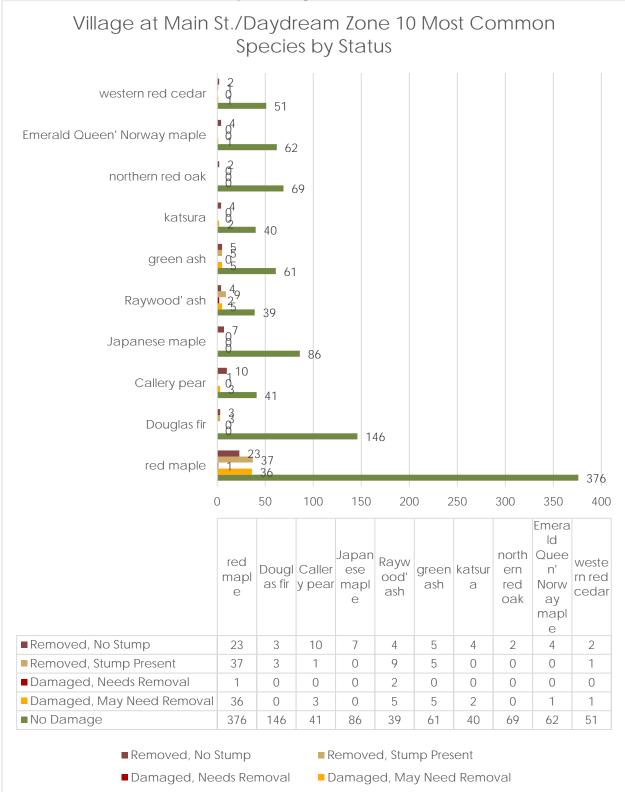




52. Status Totals



53.10 Most Common Tree Species by Status

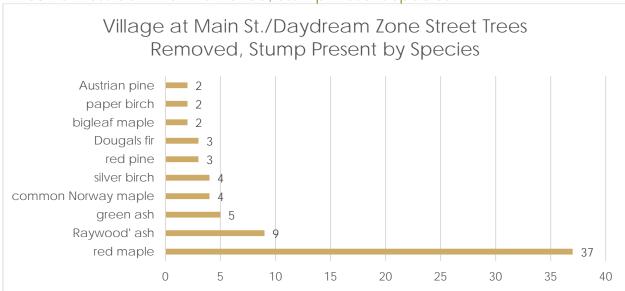


■No Damage

54.10 Most Removed, No Stump Species

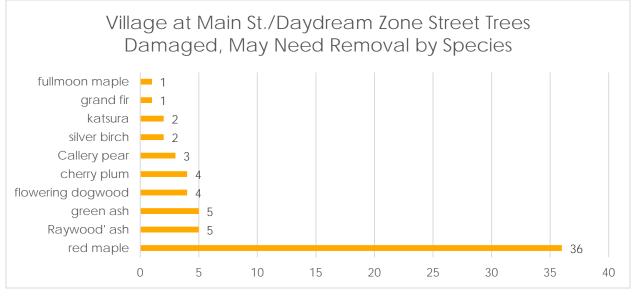






56.10 Most Common Removed, Stump Present Species

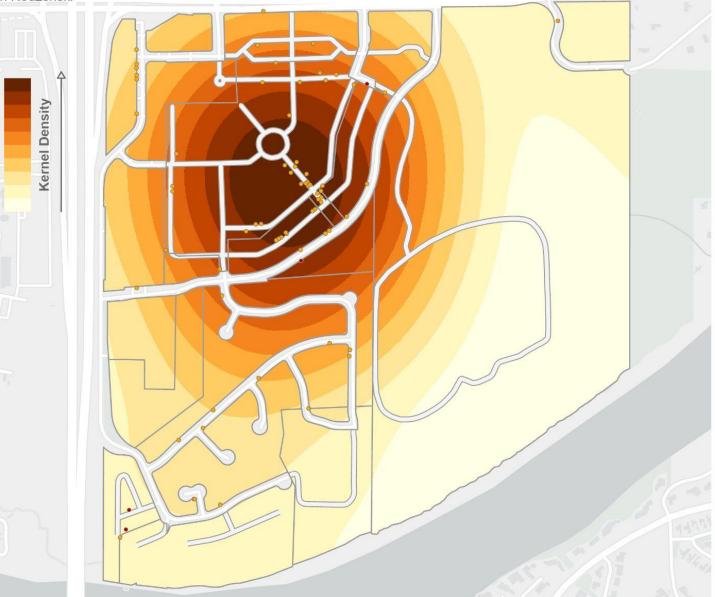
57.10 Most Common Damaged, May Need Removal Species



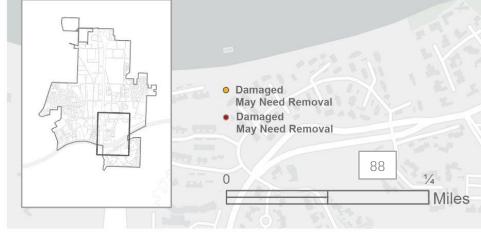
Street Tree Status: Damaged

Village at Main St./Daydream Zone Wilsonville, OR

Map prepared by: Carl Nodzenski



Wilsonville City Limits



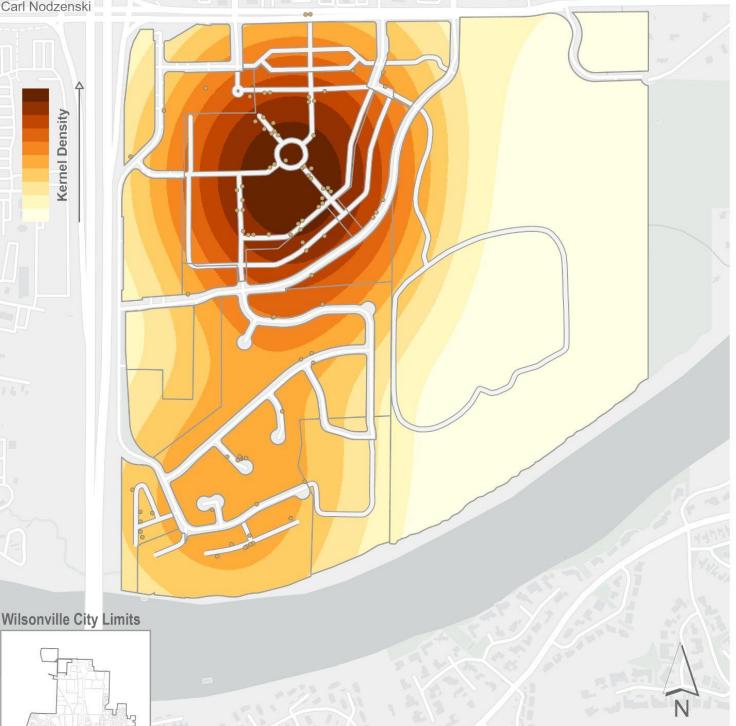
Sources: City of Wilsonville Street Tree Inventory, SDE data, RLIS Esri Community Maps Contributors, Oregon Metro, State of Oregon GEO, Esri Canada, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA

58.

Street Tree Status: Removed, Stump Present

Village at Main St./Daydream Zone Wilsonville, OR

Map prepared by: Carl Nodzenski



Removed, Stump Present

0

89

1/4

] Miles

Sources: City of Wilsonville Street Tree Inventory, SDE data, RLIS Esri Community Maps Contributors, Oregon Metro, State of Oregon GEO, Esri Canada, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA

59.

Street Tree Status: Removed No Stump

60.

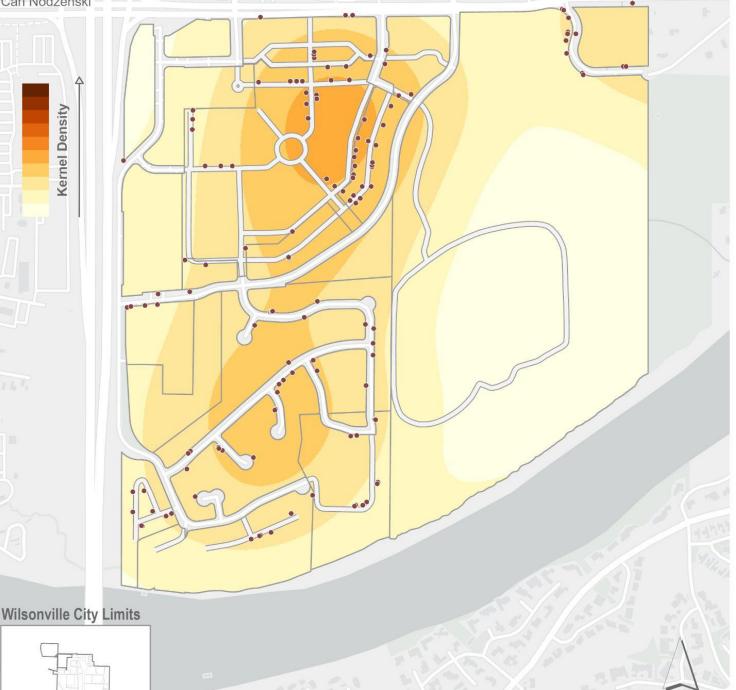
Village at Main St./Daydream Zone Wilsonville, OR

m

Removed No Stump

0

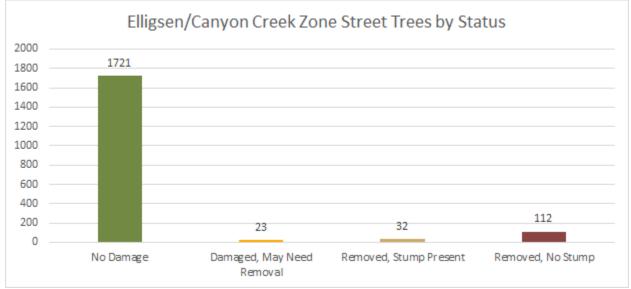
Map prepared by: Carl Nodzenski

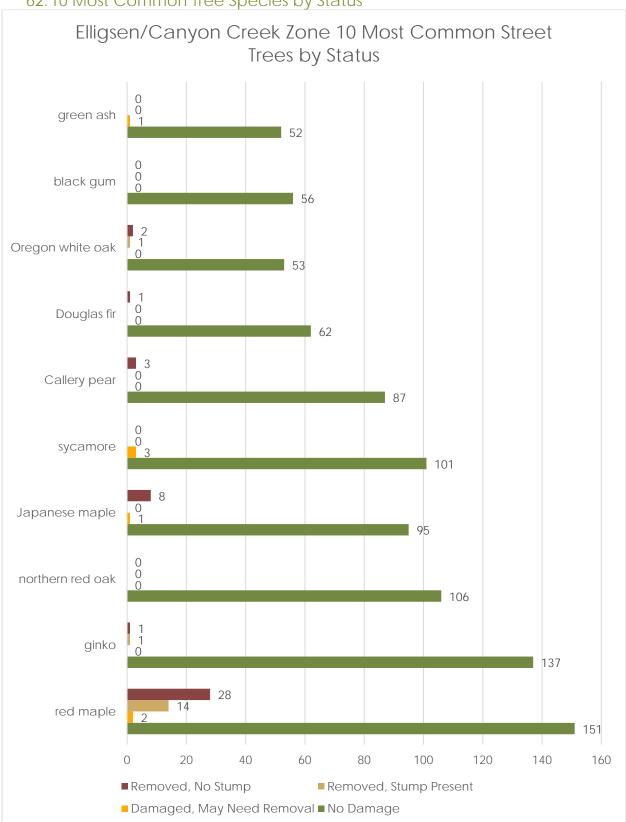


90 1/4 Miles Sources: City of Wilsonville Street Tree Inventory, SDE data, RLIS Esri Community Maps Contributors, Oregon Metro, State of Oregon GEO, Esri Canada, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA

Elligsen/Canyon Creek Zone

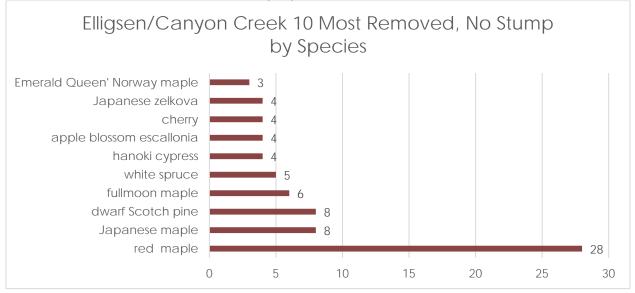
61. Status Totals

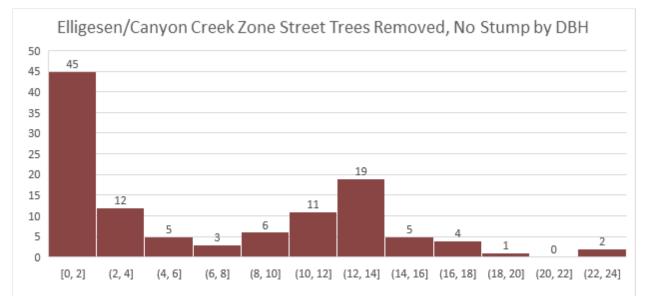


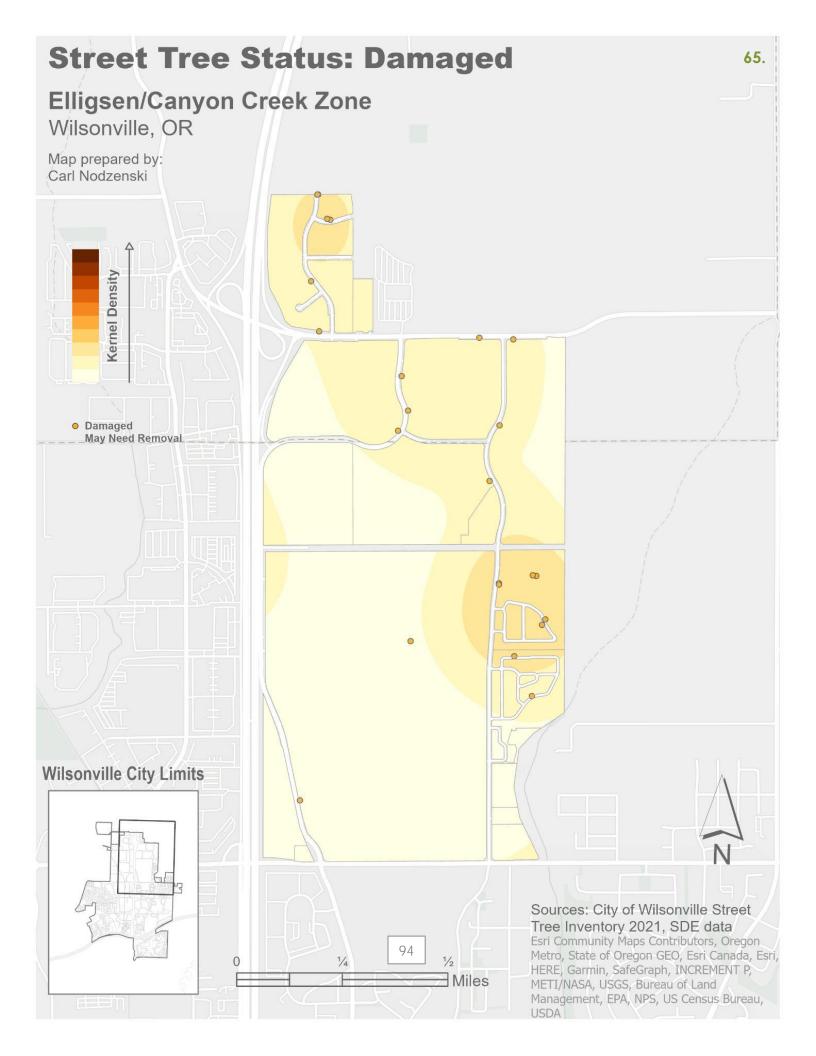


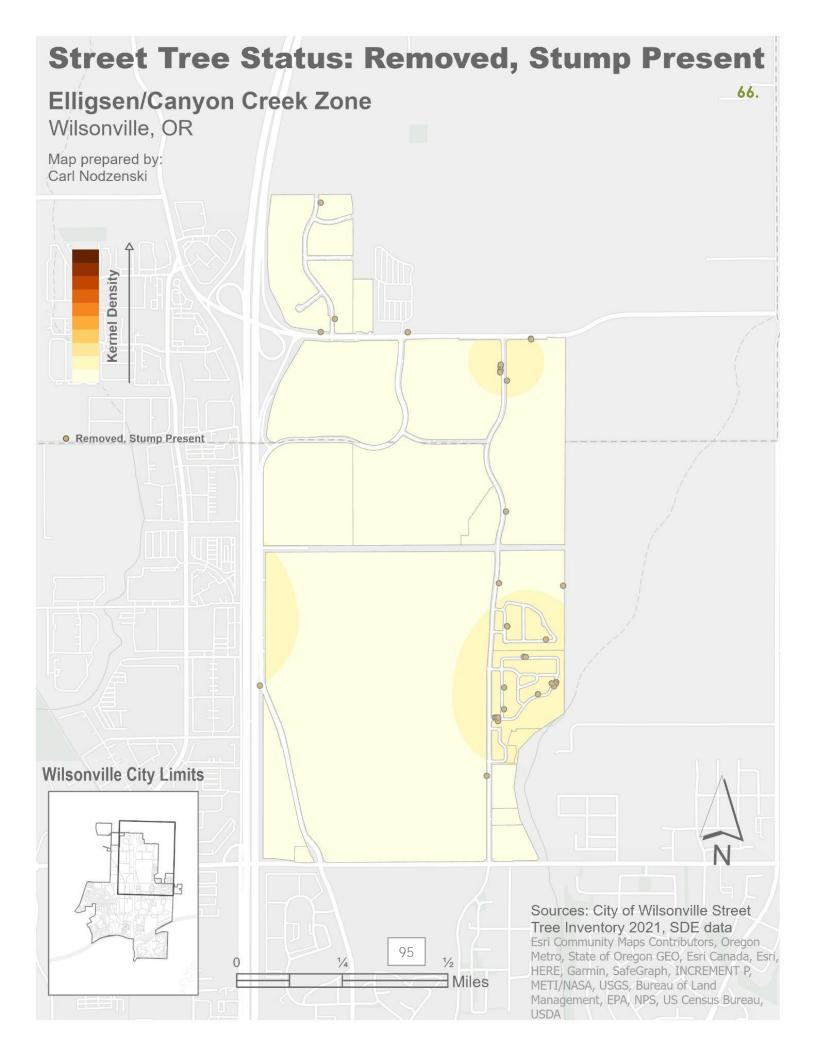
62.10 Most Common Tree Species by Status

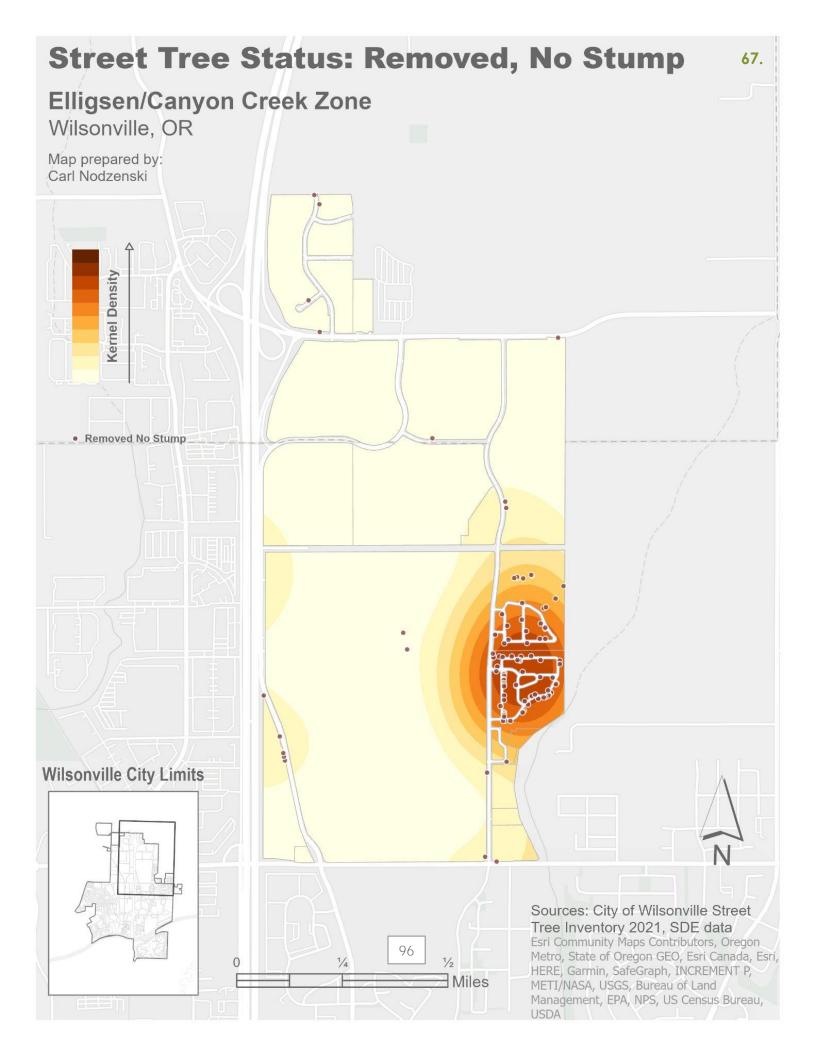
63.10 Most Removed, No Stump Species



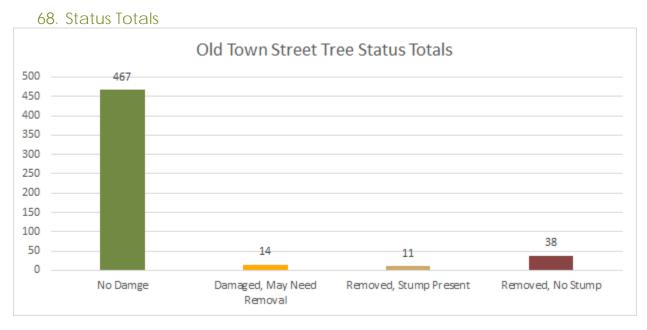




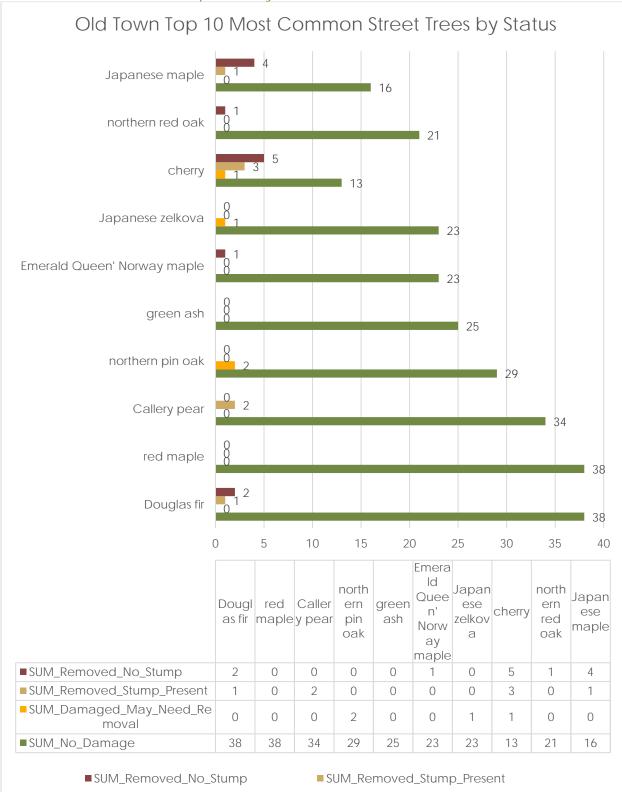




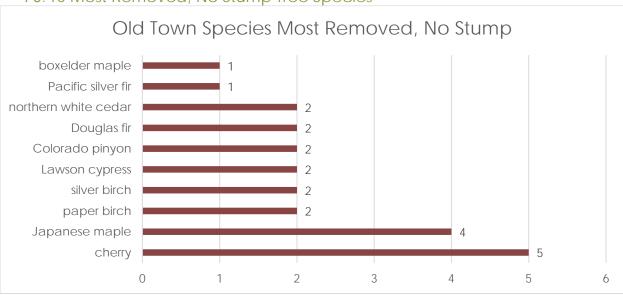
Old Town Zone



69.10 Most Common Species by Status

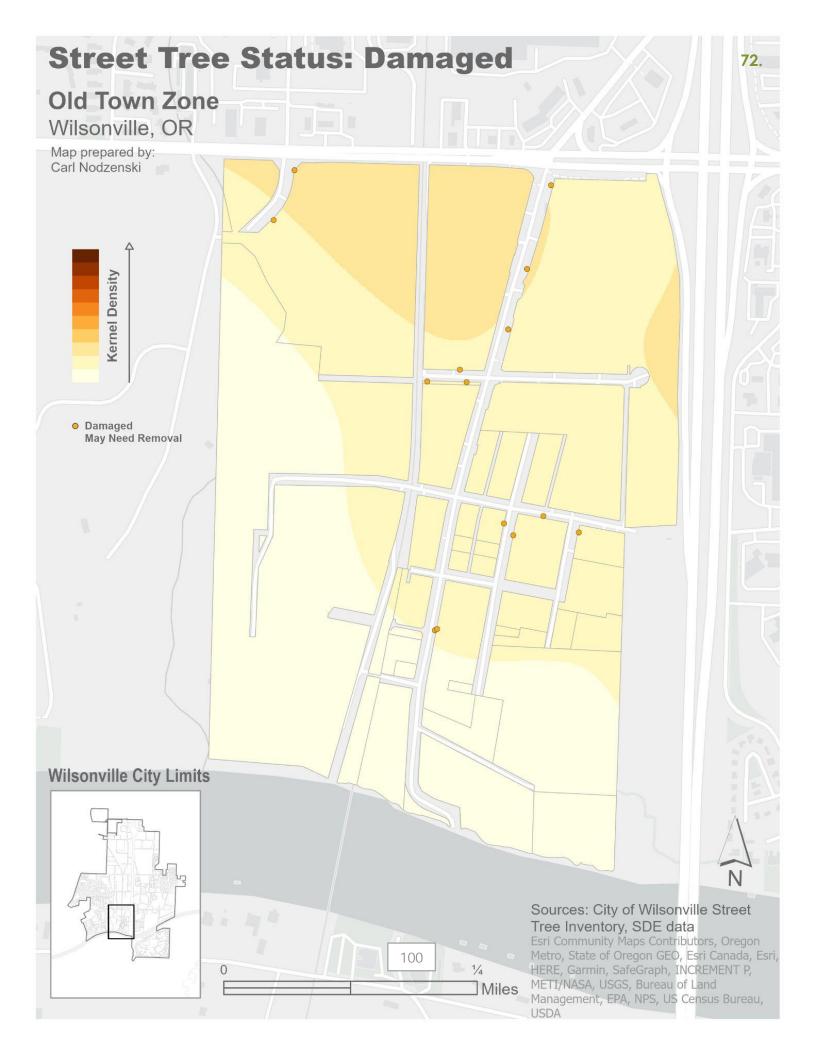


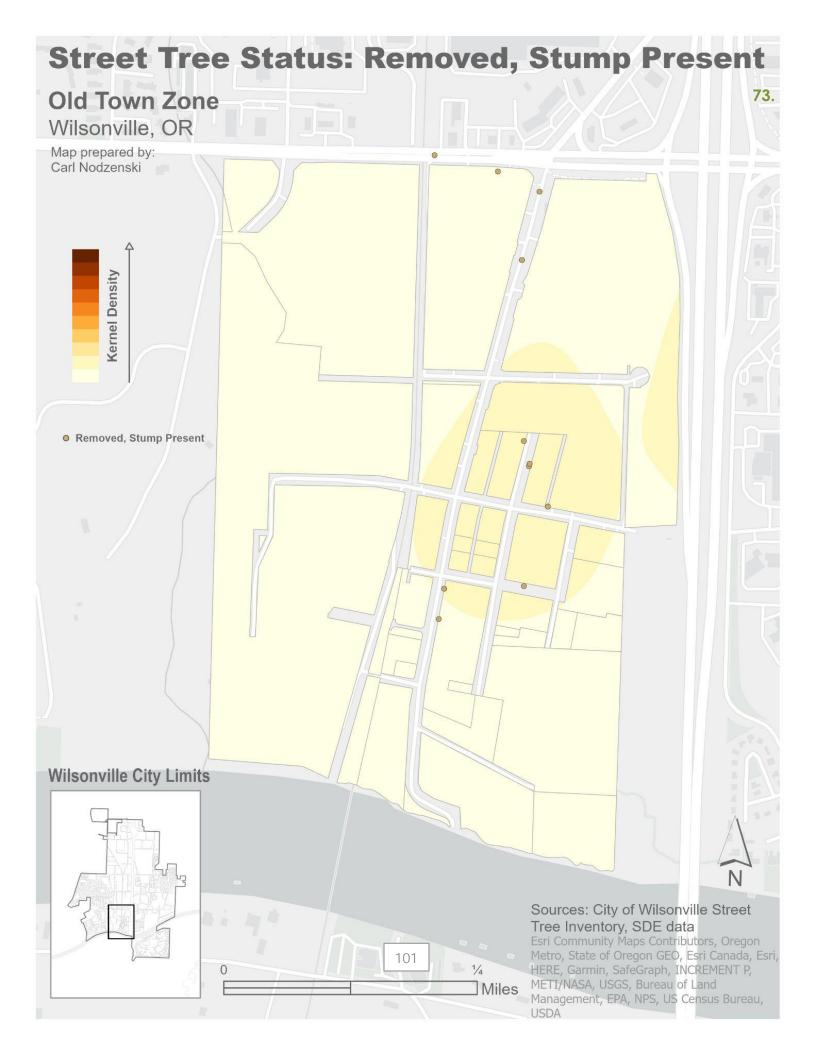
■ SUM_Damaged_May_Need_Removal ■ SUM_No_Damage

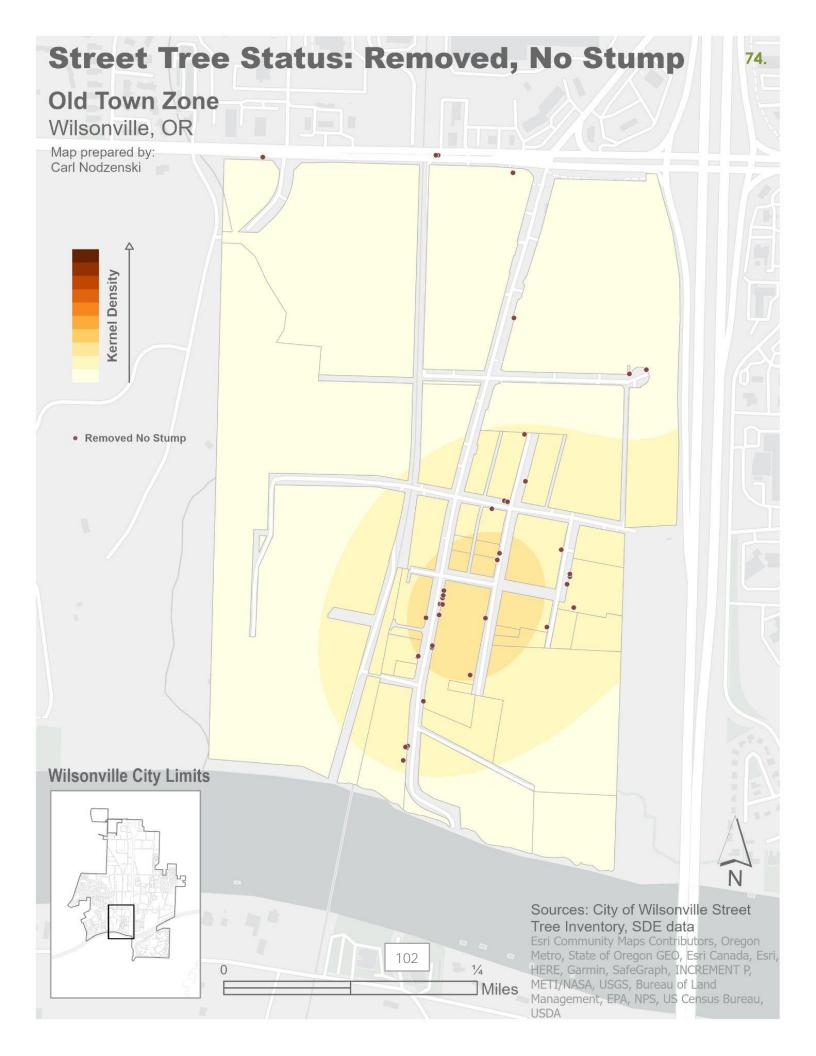


70.10 Most Removed, No Stump Tree Species



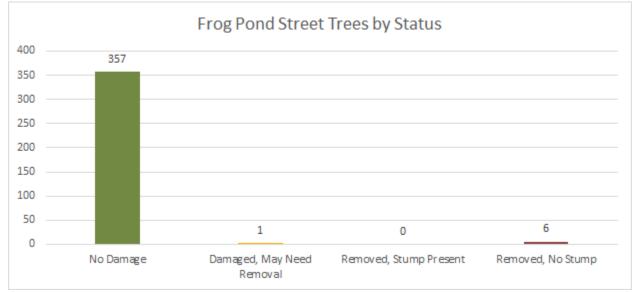


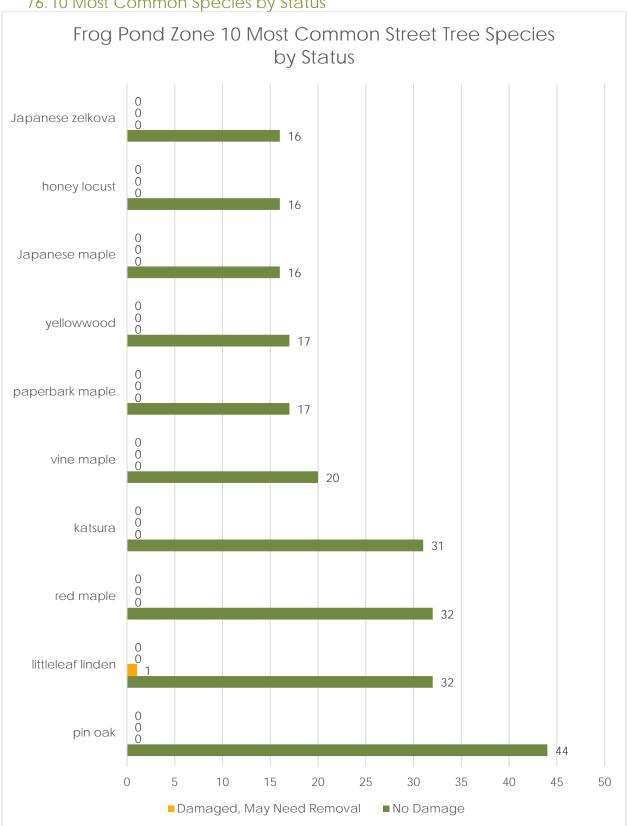




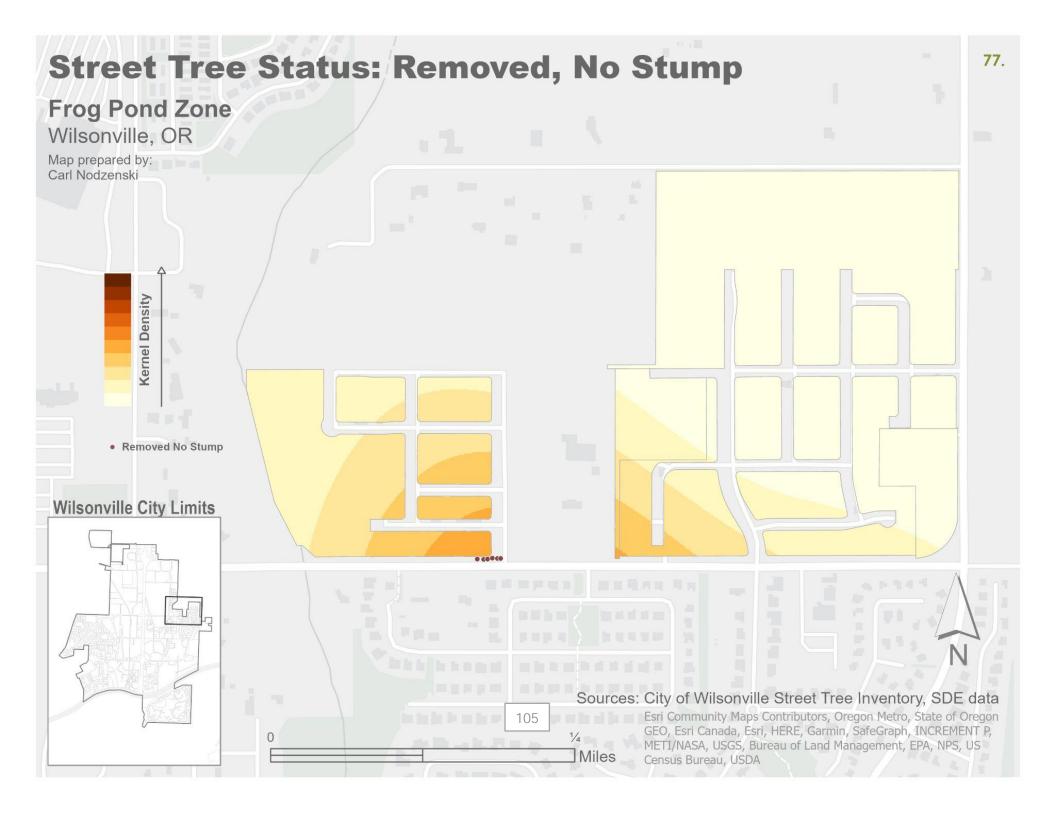
Frog Pond Zone

75. Status Totals



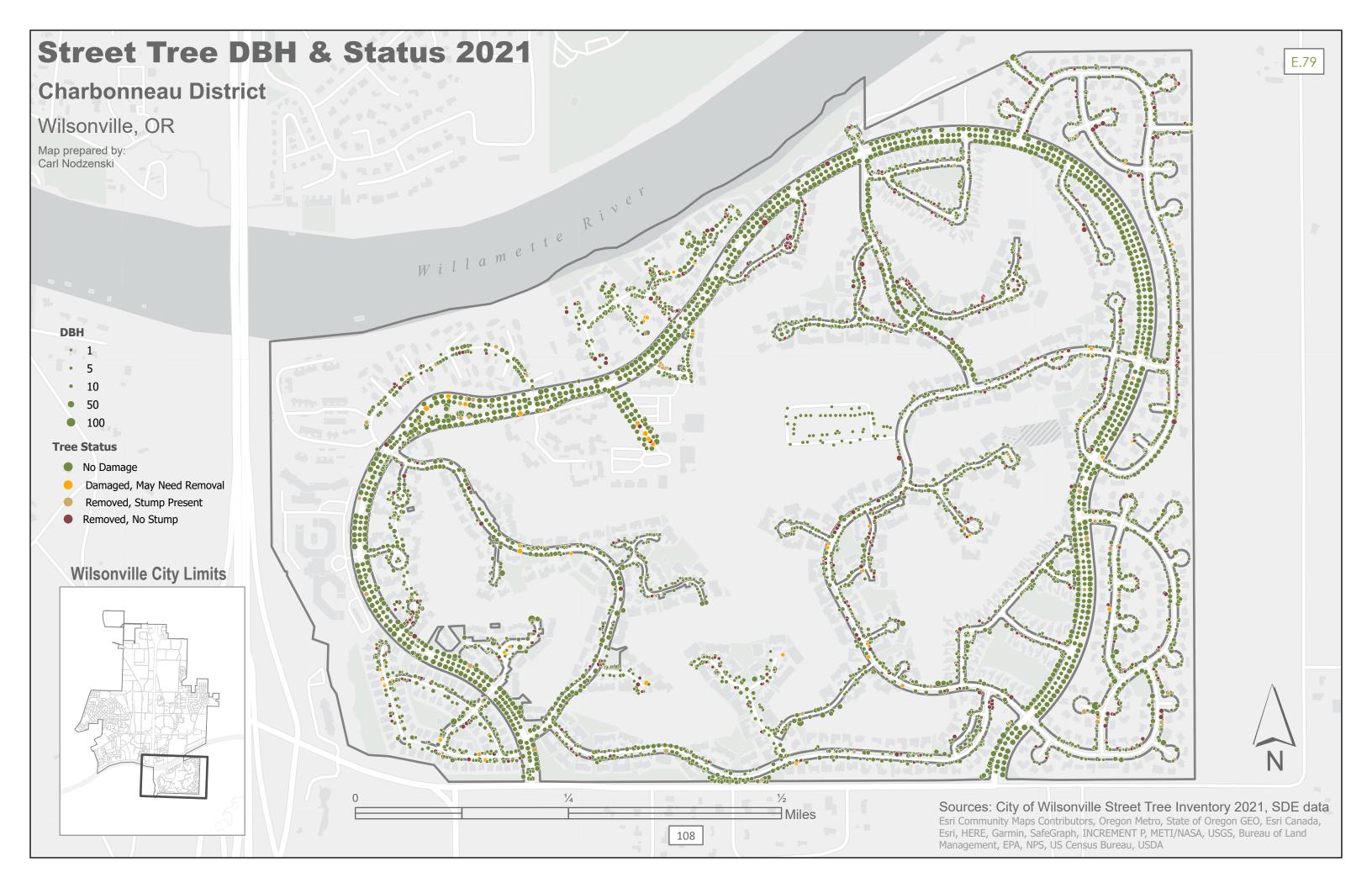


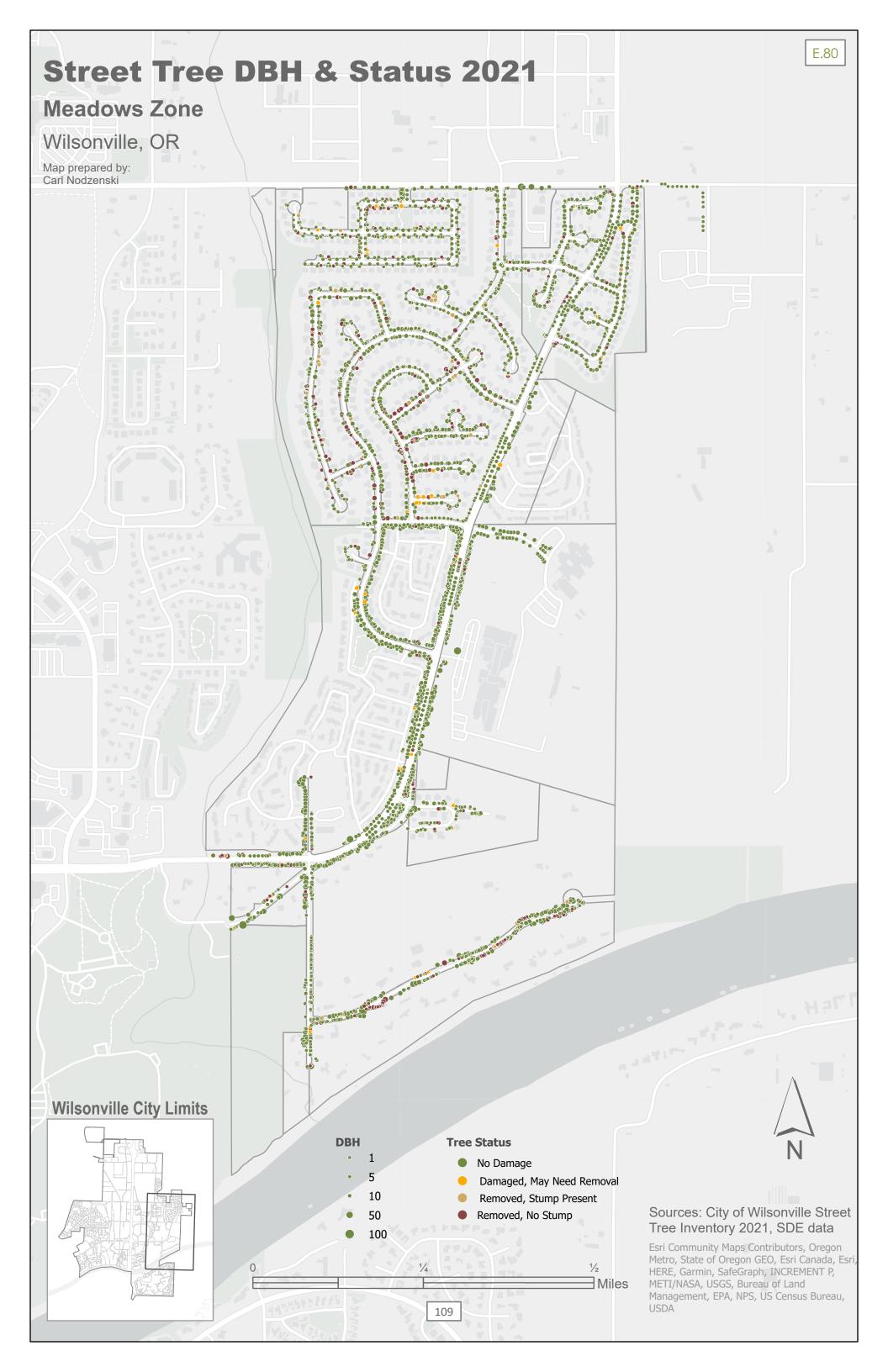
76.10 Most Common Species by Status

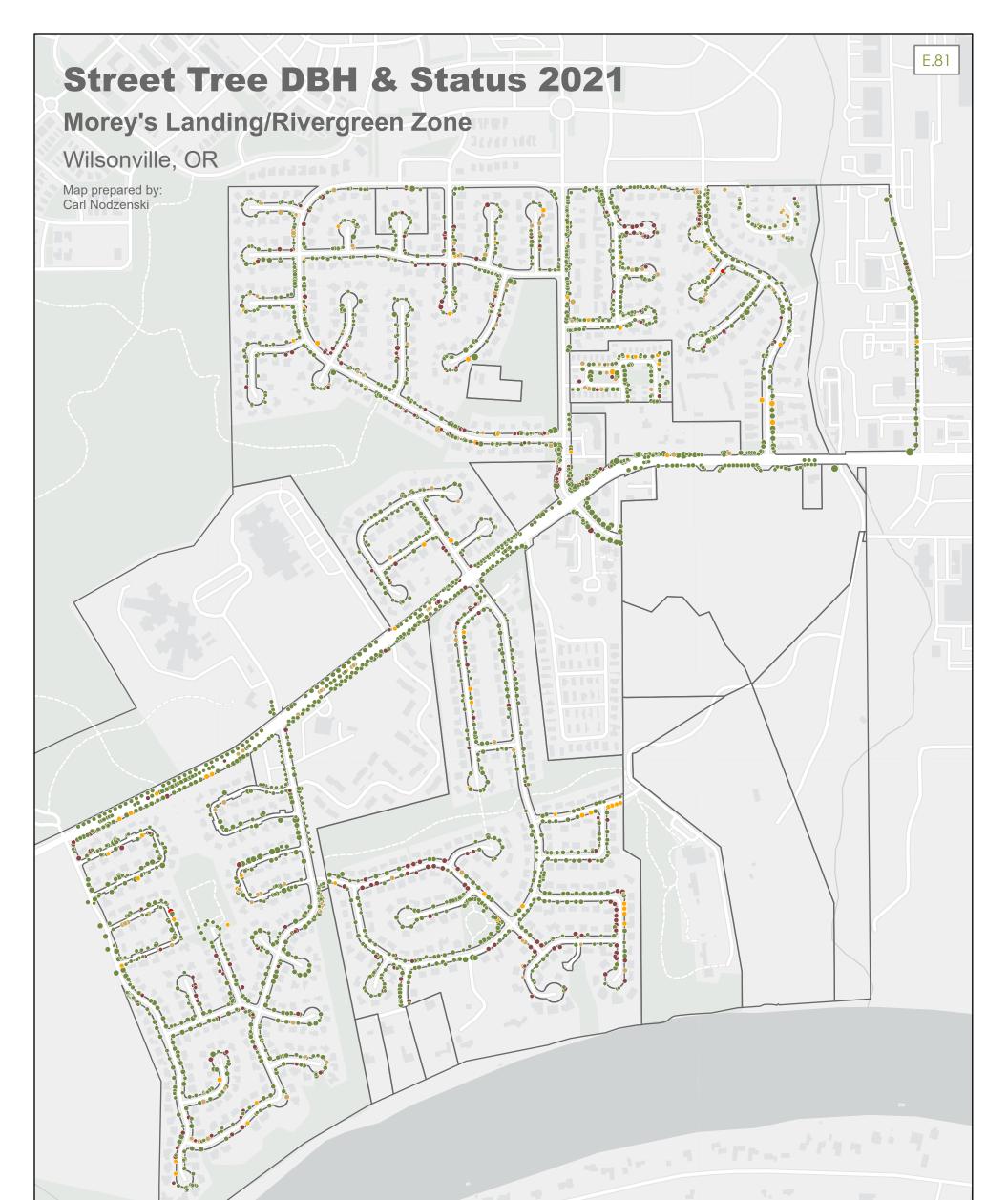


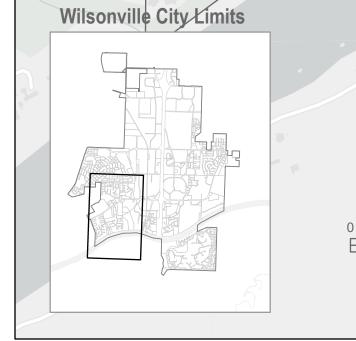
All Trees in Neighborhood Zones

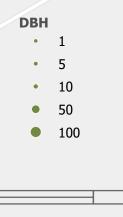












Tree Status

110

No Damage

Damaged, May Need Removal

Damaged, Needs Removal

Removed, Stump Present

Miles

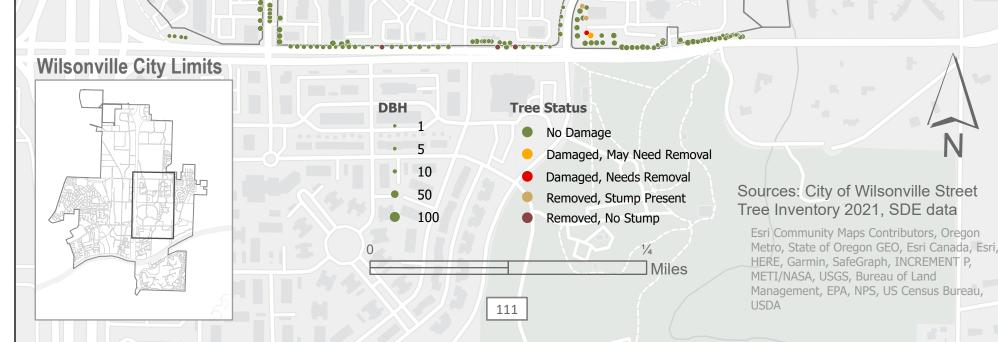
Removed, No Stump

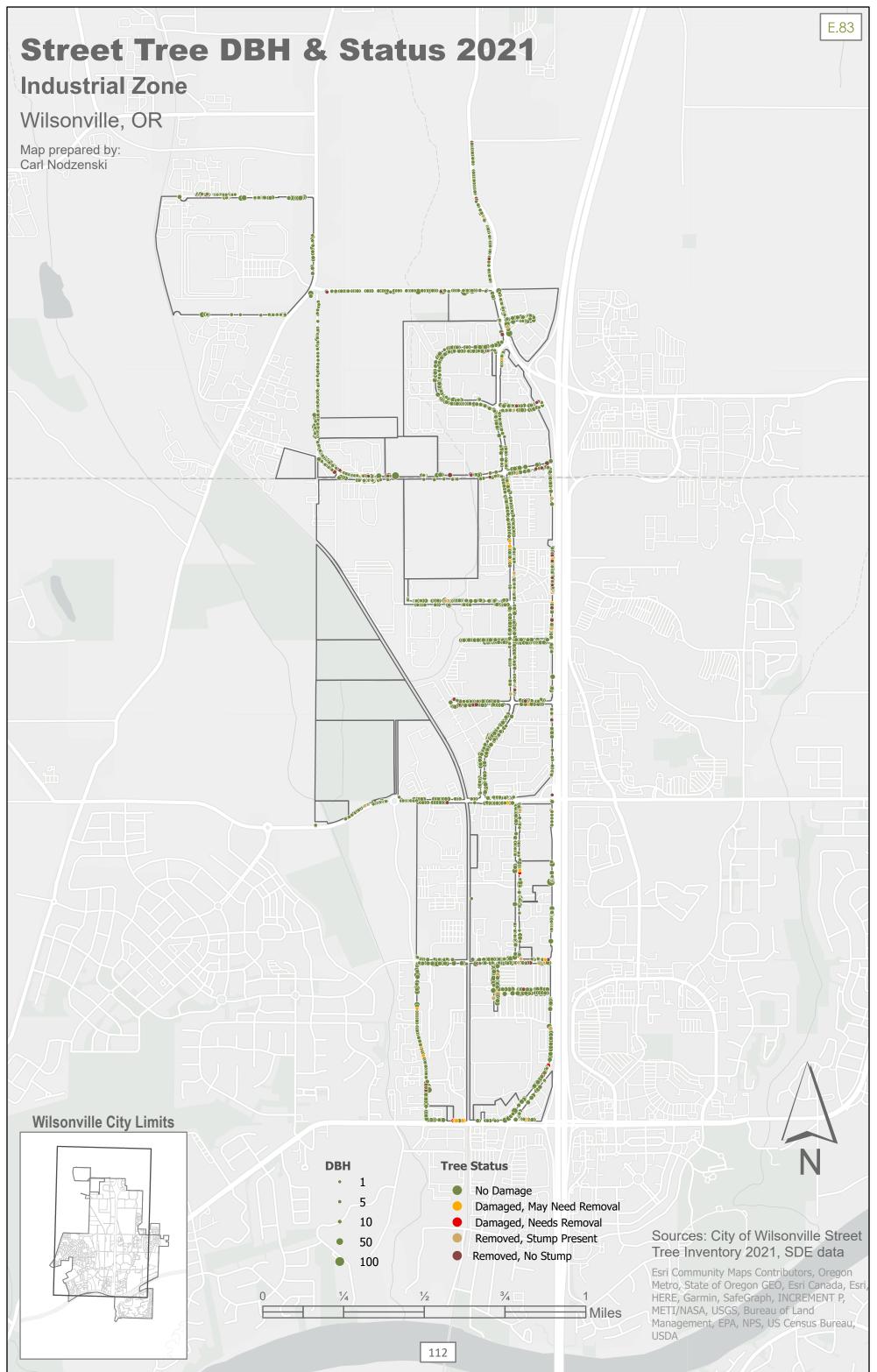
1/4

Sources: City of Wilsonville Street Tree Inventory 2021, SDE data

Esri Community Maps Contributors, Oregon Metro, State of Oregon GEO, Esri Canada, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA









Wilsonville City Limits



- Damaged, May Need Removal
- Damaged, Needs Removal
- Removed, Stump Present
- Removed, No Stump

Sources: City of Wilsonville Street Tree Inventory 2021, SDE data

Esri Community Maps Contributors, Oregon Metro, State of Oregon GEO, BuildingFootprintUSA, Esri Canada, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA USGS, Bureau of Land Management, EPA, NPS US Census Bureau, USDA

