NEW MEXICO STATEWIDE COMMUNITY FOREST ANALYSIS AND MANAGEMENT PLANNING

STATEWIDE TREE INVENTORY SUMMARY

2018

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PREPARED FOR:

NEW MEXICO ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
AND THE STATE OF NEW MEXICO

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With
SOUND TREE
JORAN VIERS
VAN CITTERS HISTORIC PRESERVATION
URBAN AND COMMUNITY FORESTRY PROGRAM
NM STATE FORESTRY

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Overleaf: Carlsbad Library

Arizona Sycamore Trees - Roswell

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PROJECT OVERVIEW

Siberian Elm - Fort Sumner

PROJECT SCOPE AND NARRATIVE

This inventory is part of a statewide project to assess the condition of some of our oldest community trees in public places. Shade trees, including invasive Siberian elms, were actively planted in New Mexico's plazas, parks, courtyards, and streets. These trees are often at the core of our historic districts. Many of these trees are now over-mature and rapidly declining. New Mexico faces an impending loss of their significant cultural, environmental, aesthetic, and economic contributions. New Mexico State Forestry received a grant from the US Forest Service to develop an approach to our historic district tree management, transitioning into resiliency while maintaining the integrity of our cultural landscapes.

Tree inventories were conducted in 31 of the 33 New Mexico county seats, which represent the full range of environmental and socioeconomic conditions of the state. These inventories provide information to help gauge the overall composition and health of the community forest in New Mexico. The next phase of this project will utilize the data collected in these inventories, further research, interviews and focus groups to develop management plans to address common challenges. The management plans may be used in combination or separately to assist New Mexican communities in developing their own community forest management plans.

Project Goals include:
1. Provide communities a consistent, logical approach to historic district tree management.
2. Improve the health and composition of our historic district forests.
3. Better connect communities with the benefits that historic district forests provide.

The data collected in the inventories helps NM State Forestry assist New Mexican communities in understanding the benefits and costs associated with aging trees, and plan for a healthy urban forest long term. There are some considerations that need to be taken for trees in urban or developed locations when compared to trees in a more "natural" environment. Safety for people, requirements for care, appraised values, aesthetics, and conflicts with buildings, roads, sidewalks, utilities, and transportation are all important pieces of information that this project helps evaluate.

Willow Tree - Estancia

HISTORIC CONTEXT

Understanding how and why trees, both native and exotic, came to be planted in New Mexico's historic districts helps inform management decisions regarding the trees' care and replacement planting. Investigation into the role trees continue to play in the development of New Mexico's population centers also demonstrates the urban forest's ability to reflect community values, cultivating place identity and character. Historic districts in each community were identified through records searches. In some cases, trees were noted in the historic district designations.

Historic research was done to document the trail of trees to New Mexico from fruit trees brought by the earliest Spanish colonists to evergreens in a modern subdivision. To document this history, Van Citters Historic Preservation visited the University of New Mexico, Center for Southwest Research; Palace of the Governors Photo Archives; and New Mexico State Records Center and Archives. Online resources and numerous books about the history of trees, New Mexico, and transportation were also used to complete the study. Information from these resources were analyzed and integrated to develop the full report, summarized below.

Prior to Spanish and Mexican settlement and development of the land that is now New Mexico, native trees lined the rivers and dotted the mountains. Piñon, cottonwood, oak, and fir were plentiful. Other native species that we know today as urban trees were in the region, such as New Mexico locusts (*Robinia neomexicana)*, Rocky Mountain maples (*Acer glabrum*), Arizona sycamores (*Platanus wrightii*), Honey mesquite (*Prosopis glandulosa*), Netleaf hackberries (*Celtis laevigate* var. *reticulata*) and Arizona ash (*Fraxinus velutina*).

Imported trees first came to New Mexico with Spanish colonists. From 1598 until 1848, through the Spanish and Mexican periods, more than 100 fruit tree cultivars were brought into the area along the Camino Real. During that time, the colonists kept to the Rio Grande valley region for safety, and used the trees they found there for fuel and shelter, but overused and severely denuded the riparian forests. By the time American settlers came to Santa Fe along the Santa Fe Trail, both the fruit trees and native shade trees were largely gone. These settlers started transplanting native cottonwoods and other riparian species in the area for shade.

In 1850, as the U.S. won the Mexican-American war, the Catholic church established the vicariate apostolic of New Mexico, and named Father John Baptist Lamy as bishop. Lamy grew up and entered the priesthood in France, during a time when there was a frenzy of European enthusiasm for botany and trees. He served as a missionary in Ohio and Kentucky living amongst the stately shade trees of the Ohio River Valley, before coming to Santa Fe. He felt that trees were critical to grace and civilization and was responsible for bringing in new species of shade trees and many fruit trees, in addition to transplanting and cultivating native shade trees in urban landscapes. Notably, he was the first person documented in the research for this report to introduce the elm and horsechesnut genera to New Mexico, that are still

Cottonwood - Deming

Trees Near Lake - Chaparral Park, Lovington

part of New Mexico's urban forest today. Lamy personally planted and shared trees throughout the community of Santa Fe, bringing about the shaded town that the railroad saw when it entered the town in 1880. Lamy was finally joined by the first tree nursery in New Mexico, which appeared in Santa Fe in 1868. A nurseryman from Rochester, New York arrived via stagecoach, took orders and coordinated their delivery to Santa Fe. While the nursery primarily traded in fruit trees, they also offered "maple", "mountain ash", and other "ornamental trees".

The railroad brought enormous change to New Mexico and made a lasting impact on the landscape. The railroad brought general economic development, promoted irrigation and the development of agriculture, increased the numbers of fruit trees into the hundreds of thousands, and brought new shade and evergreen tree species to the area. Agents of nurseries back east would travel to New Mexico, take orders, and then deliver the trees in the springtime via rail. Railroad stations, wanting to provide a comforting stop for passengers, built depot parks with trees for shade, and were some of the first parks of New Mexico. The railroads were eventually augmented by a network of engineered roads that were used by automobiles and trucks. This greatly increased mobility and speed, and imported trees began to make their way to smaller communities in New Mexico.

The railroads ushered an influx of not only tree species, but research, and people from other areas of the country that had a deep interest in and ideas for tree planting, species selection, and tree care. Exotic tree species that had been imported and cultivated on America's East Coast in the latter half of the 1800s arrived in New Mexico, native tree species from other areas of the country were introduced, the US government established experimental nurseries and the New Mexico land-grant college, and acres of fruit trees were provided to Deming, the Rio Grande Valley, the Pecos Valley, and the Four Corners area. In 1891, the Territorial Legislature established the second Friday of March as New Mexico Arbor Day, over two decades before New Mexico was recognized as a state. In the early 1900s, horticultural and beautification organizations emerged across the state, and advice on selecting tree species and tree care appeared in newsletters and newspapers. The earliest urban forest management efforts of New Mexico emerged to address the growing issues that the cottonwoods presented to urban life, as their cotton created a nuisance and their health suffered as available water decreased.

As New Mexico moved through the first half of the1900s, the role of the government in promoting the planting and selection of trees became pronounced. The U.S. Forest Service gave away hundreds of evergreens to residents, and experimental nurseries run by the Forest Service, Soil Conservation Service, and the Agriculture College sold trees to New Mexico towns and developers. Government recommendations for tree species led to booms statewide in the planting of black locusts (*Robinia pseudoacacia*), only to see them discouraged for planting to instead make way for "Chinese elms" (primarily Siberian elm, *Ulmus pumila*). Clyde Tingley, during his administrations as governor of New Mexico and mayor of Albuquerque, promoted the planting of hundreds of thousands of trees statewide (mostly Siberian elm, *Ulmus pumila*) by taking advantage of Federal New Deal funding programs, and establishing a nursery in Albuquerque that raised and gave away tree seedlings. As part of national Arbor Day celebrations, many cities in New Mexico handed out thousands of trees to residents. To stay competitive in this age of giveaways, commercial tree nurseries provided trees and planting advice in conjunction with landscape design.

By the late 1950s, tree giveaway programs were on a significant decline. Cities instead began investing in developing and maintaining their park systems, and the Beautification Act of 1965 provided investment for efforts on public lands. At the same time, the new residential ranch house designs in vogue had landscaping that favored lower-growing plants with fewer shade trees. The Siberian elm (*Ulmus pumila*) was distinguished as a nuisance tree, with no new replacement promoted or provided in its wake. As the interstate highway system was developed, a huge number of new species, cultivars, and varietals traveled throughout the U.S., a trend that continues today.

Raton Library

In 1978, the New Mexico Legislature established the Forest Re-Leaf Act to help protect the environment and improve quality of life by encouraging and arranging the planting of trees throughout the state. In 1990, the USDA Forest Service established the national Urban and Community Forestry Program, and in 1992, New Mexico State Forestry began distributing seedlings and trees to communities under the New Mexico Forest Re-Leaf Program, re-establishing a state government role in tree planting.

Whatever values are placed on those actions, trees have played an important role in the development and landscape of New Mexico.

Measuring and Recording DBH - Tucumcari

Checking the Root Ball on a Young Tree - Socorro

METHODOLOGY

Data was collected on approximately 200 trees in each community. Locations for the inventories were selected based on three main factors:
1. Existence and location of historic district
2. Areas with social, cultural, and/or economic interest to the community
3. Community requests for support with specific trees

Information such as species, diameter, height, condition, hazards, existing or potential conflicts, and GPS locations were all collected using the Plan-it Geo Tree Plotter application on portable electronic devices. This information was used to generate the information in this report, as well as an interactive on-line map that can be referenced for future community forest management.

Following is a detailed list of the information collected and how it may be useful in planning for a healthier urban forest.

1. Genus and Species

Understanding the different tree genera in the community forest tells us about genetic diversity. This is important because it is an indicator of how well the trees will respond to stress, pests, and disease. If a community forest is made up entirely of one genus, it is possible that drought, a pest or particular disease could kill the majority of trees in the community. If the forest is made up of a variety of tree genera, it is more likely to adapt to environmental changes and problems without being lost all together.

Understanding diversity of tree species is important for the same reason as tree genus, but at a further level of detail which is important for management planning. Certain species of trees will be better adapted to a location's climate and conditions, and/or may be resistant to certain pests and diseases. By learning about the quantity of certain species in relation to others, we can see a few things:

1. Which species tend to be healthier and/or cope with certain environmental conditions in this specific location
2. How to balance species diversity by planting more or less of certain tree species

When our lead arborist, participating staff, and/or volunteers could not easily identify tree species, the National Arbor Day Foundation "What Tree is That?" guide was first used for species identification. More detailed tree species guides and on-line resources were referenced further if needed.

Data Collection - Los Alamos

2. Diameter at Breast Height (DBH)

DBH, or the diameter of the tree at 54", tells us generally how big a tree is and can be used as a rough estimate of age. Similar to genus and species diversity, it is generally good management practice to have trees in a variety of age ranges. The presence of many trees in the same age range can present challenges and safety concerns. Staggered planting of replacement trees (before older trees die) helps to create a more consistent and maintainable tree canopy.

Multi-stemmed trees: If the trunk begins branching below 54", the diameter is measured at the point just below where the branches separate. When the tree has more than one trunk or leader arising within one foot of the ground, each trunk is measured separately and averaged to produce one number.

3. Number of Stems

This quantifies the number of trunks or main leaders measured for DBH. Trees are documented as having one stem unless the branches separate within one foot of the ground, as noted in the DBH section above.

4. Tree Height

Tree height was measured as a rough estimate, and may be used in some cases in combination with DBH to estimate age. Tree height is also a critical consideration in understanding the risk associated with the tree, as a taller tree may impact a broader range of targets (people, buildings, assets), with higher possibility of damage than a smaller tree.

5. Observations

This section provides opportunity to note specific conditions trees are exhibiting that may indicate general health issues related to management practice. This allows us to identify frequent existence of a particular problem so the community may adjust tree care practices if needed to improve overall community forest health.

Conditions noted include canker, cavity decay, crown die-back, frost cracks, girdling roots, grate/guard, improper installation, improper mulching, improper pruning, mechanical damage, memorial status, nutrient deficiency, pest problems, poor location, poor root system, poor structure, the presence of improper hardware, and if the tree is in serious decline.

Mexican Elder - Alamogordo

6. Condition

The condition of the tree is evaluated using the tree rating system from the National Arbor Day Foundation's Classification of Tree Health, 2000, and is noted as follows:

Excellent: Healthy, vigorous tree with no apparent signs of insect or disease problems and no signs of mechanical damage. Little or no corrective work is recommended. The overall form of the individual is representative of the species.

Good: Average condition and vigor for the area. Some minor care, including pruning, may be required to maintain or improve tree health. Individual may lack some desirable characteristics of the species.

Fair: Tree is in general state of decline. Special care, including corrective pruning, is required to maintain or improve tree health. Tree may show signs of mechanical damage and/or non-lethal insect or disease problems, but is not at risk for death if the conditions are corrected.

Poor: Tree is in general state of decline which cannot be corrected through management. Management may be used to delay or retard decline. The tree will eventually die from the problem(s).

Dead / Dying: Tree is either dead or in significant state of decline.

In combination with other information collected on the tree, including items noted in the observations, and the tree's location in relation to buildings and people, the condition of the tree allows us to highlight trees that may pose a safety hazard. When reviewed for the entire area of trees inventoried, this category provides a general evaluation of the community forest's condition in this area.

7. Leaf Condition

This describes the general health of the tree crown. Poor leaf condition may be a symptom of a pest problem or crown dieback due to stress or other health issues. Leaf condition was categorized as Good, Fair, or Poor.

8. Crown Class

This describes the relationship the tree has with surrounding trees – whether it is open grown (not competing at all), or competing as in a dominant, co-dominant, intermediate, or over-topped tree. This tells us about the density of tree canopy in the urban forest, and may have implications for tree health. If trees are competing for space, nutrients, water, and sunlight, their growth may be impacted.

9. Maintenance Recommendation

This category includes information on whether the tree is large (over 20' tall) or small (under 20' tall) and if it needs routine maintenance, immediate attention, or if it presents a critical safety hazard. This information may be used as a management tool and an easy way to identify and prioritize tree care.

10. Further Assessment Needed

This category indicates that there may be an unsafe condition developing in the tree that needs further examination. Similar to the maintenance recommendation this information can be used as a management tool to prioritize potentially hazardous trees.

11. Tree Information Comments

For each tree, additional information may be included to describe a particular problem or explain a level of detail not available through the standard Tree Plotter checklist.

12. Photos

One or more photos of the tree may be attached to each tree entry. Additional photos of specific problems or conditions may also be included. This is helpful for confirming tree identification and documenting observations and maintenance recommendations.

13. Management Responsibility

This indicates whether the tree is managed by the municipality. This can be used to distinguish between trees maintained by different entities, (e.g. private, commercial) while providing more general information on the tree population as a whole.

14. Land Use

This categorizes where the tree is located, as a residential or commercial area, or as park/vacant/other to determine whether there are particular issues associated with trees in different areas of land use.

15. Clearance Conflicts

Clearance conflicts may include underground or overhead utilities, pedestrian or vehicular routes, buildings, or other obstacles conflicting with tree growth. This category identifies further information that can assist in prioritizing tree care – for example, if a limb should be trimmed to avoid injuring a pedestrian.

16. Wires

This notes further detail regarding the presence of wires and if they present a conflict with the tree. Conflict with wires may present a significant safety hazard.

17. Planting Site Width

This indicates the general size of root space for the tree. When paired with information about tree condition, we can see patterns related to health and tree root zone. For example, it is generally expected for trees with less root space to be in poorer health.

18. Growing Space

Growing space describes where the tree is planted – whether it is in a median, a cutout, a front yard, alley or other maintained (or unmaintained) location. This provides confirmation of the tree location in the field, and can also highlight patterns related to tree health for trees in certain growing conditions.

19. Likelihood of Impacting Target

This category describes how likely it would be for the tree to impact a person or something else of value if it failed. Trees in areas with frequent foot traffic, such as a park or playground, or trees located over stationary features such as parked cars or buildings present a "high" likelihood of impacting target. Trees in open fields without significant foot traffic present a lower likelihood. This category, when paired with information about tree size and condition, assists in prioritizing tree care action.

20. Location Comments

For each tree, additional information may be included to describe a particular situation related to the location of the tree.

21. Latitude and Longitude and Address

Trees are located geographically through coordination points and physical address. This assists in confirming location of the tree in the field.

Green Ash - Reserve

Courthouse Grounds - Clayton

QUALITY CONTROL METHODS

Team leaders were ISA Certified Arborists with TRAQ (Tree Risk Assessment Qualification), and received extensive training with tree identification and Tree Plotter software. A representative from Plan-it Geo spent a day with the team to introduce them to the software and facilitate the first inventory at Spruce Park in Albuquerque.

At the beginning of every field session the team leader led an interactive training session with participants in a classroom setting and/or in the field. Trees were identified and logged into Tree Plotter software. Photographs were taken of each tree.

Team leaders then completed a post inventory checklist to report on field work and data collection. Finally, lead arborists spot checked and reviewed overall trends for accuracy.

Tree Assessment - Las Cruces

A Non Native Observer - Clovis

COMMUNITY ENGAGEMENT

The inventories started with a training session to introduce the Tree Plotter software and data collection methods. Initially, trainings were held inside in a classroom setting, but were purposefully transitioned to in-field training as it became apparent that this hands-on method was more effective. The lead arborist brought tree identification guide books, and the necessary tools for measuring and photographing trees.

Participants learned basic tree identification and how to assess tree maturity and conditions. Volunteers typically worked in teams of 2-3, with the lead arborists roaming between teams to answer questions and assist in tree evaluation. There was always a lot of excitement to learn to identify tree species, and to spend the day outdoors working on important information for each town. Overall, staff and volunteer responses were very positive and enthusiastic about the experience and what they learned from their participation.

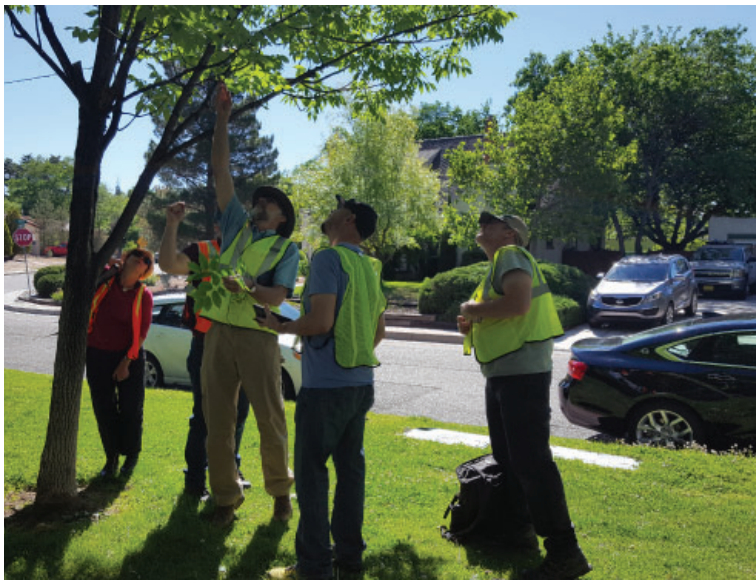
When municipal staff was available to participate, the lead arborists discussed management recommendations such as planting depth and spacing, the importance of structural pruning for young trees and maintenance pruning on mature trees. This in-field experience led to immediate positive change in many of the communities. One municipal maintenance staff member noted "This process made us slow down, which makes us realize how many trees we have, and how many of them need attention."

Tree Inventory Team - Grants

Measuring a Massive Cottonwood - Silver City

Inventory Team - Las Vegas

Thoreau High school Students - Gallup



Tree Plotter Software Training - Albuquerque

Master Gardeners Group - Santa Fe

Inventory Team - Carrizozo

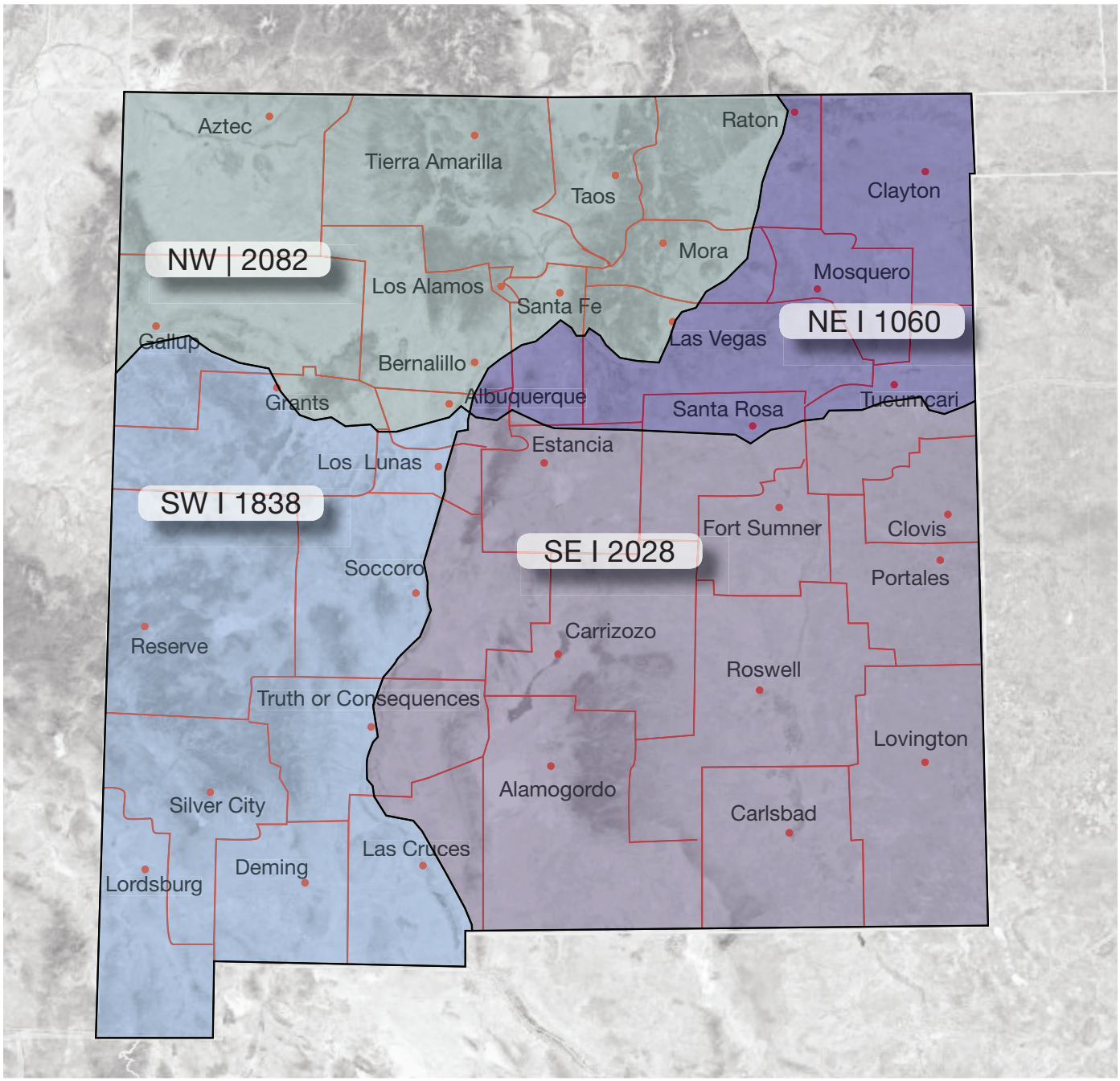
City Staff - Socorro

Inventory Team - Truth or Consequences

INVENTORY RESULTS

Assessing a Cottonwood Tree - Aztec

NEW MEXICO COUNTY SEAT QUADRANT MAP WITH TREE COUNT



TOTAL TREE COUNT: 7008

NW

Albuquerque
Aztec
Bernalillo
Gallup
Las Vegas
Los Alamos
Santa Fe
Taos

NE

Clayton
Mosquero
Raton
Santa Rosa
Tucumcari

SW

Deming
Grants
Las Cruces
Lordsburg
Los Lunas
Reserve
Silver City
Soccoro
Truth or Consequences

SE

Alamogordo
Carlsbad
Carrizozo
Clovis
Estancia
Fort Sumner
Lovington
Portales
Roswell

STATEWIDE INVENTORY DATA

The graphs and charts that follow are the aggregate of results from the 31 communities included in the statewide inventory. (Formal assessments were not completed in the county seats of Mora or Tierra Amarilla due to lack of municipal governments and public spaces; instead, story-collecting and school education projects were completed.) Several summaries are presented by regional quadrant, which roughly divide the state by Interstates 25 (north-south) and 40 (east-west). Each community received their own respective and separate report, which included information on the selected survey location(s), inventory experience, and a summary of trends observed and recorded during the inventory.

Examining trends in diversity, age, and condition statewide facilitates understanding of common issues and concerns, highlighting management priorities and assisting in the development of efficient and improved tree care practice. Overlaying this information with current management practice provides important reinforcement of successful methods while allowing for informed modification of less effective techniques. Sharing these insights with each community is already resulting in positive change and improved community forest management practice.

Review of statewide inventory data further assists in the understanding of statewide and regional trends in these areas. This information will be useful in the development of management plans in the second community forest management planning phase of the project.

The detailed inventory data is available on-line through the Tree Plotter website, and a full data set is available for further analysis. The summary data that follows has small discrepancies in total tree counts due to incomplete data collection.

DIVERSITY

This section focuses on the diversity of tree genera throughout the state. Genetic diversity is important to the resiliency of the community forest against pests and disease.

Ulmus (elm) was by far the most frequently inventoried genera at 21% of the total trees inventoried. Close to 85% of these are Siberian elm (*Ulmus pumila*). *Ulmus* is the highest genera in the northeast (34%), southeast (25%), and northwest (21%) quadrants of the state, with a relatively low population in the southwest (7%).

Populus (cottonwood, poplar, aspen) followed at 13% of the total trees inventoried, a percentage consistent among all the quadrants. Most of this genus is comprised of various species of New Mexico or regionally native cottonwood.

Fraxinus (ash), *Pinus* (pine), and *Morus* (mulberry) complete the top 5 genera for the total trees inventoried statewide. Together with the *Ulmus* and *Populus* genera, they make up the top 5 genera in the southwest and southeast quadrants. *Morus* is replaced in the top 5 genera in the northwest by Robinia (locust), and by *Juniperus* (juniper) in the northeast. In all quadrants, the top 5 genera comprise approximately 60% of the total trees inventoried.

It is important to note that community forest diversity is best evaluated at the individual community level to determine priorities for pest and disease management as well as recommendations for underplanting. For most of the communities, this evaluation showed that the level of genetic diversity is too low for a healthy community forest (the current recommendation is no more than 10% in any genus). Additionally, in many of the communities, individual landscapes have been planted with monocultures (for example, one species will dominate courthouse grounds, while another species dominates street tree planting).

Siberian elm (*Ulmus pumila*) is categorized as a noxious weed in New Mexico, meaning nearly 20% of the inventoried community forest will eventually need to be replaced. *Fraxinus* (ash), at 7% of the inventoried trees is now discouraged because of the threat of the emerald ash borer, a mortality pest advancing across the country. *Gleditsia* (honeylocust) at 4% of the inventoried trees, is also showing high mortality due to borers.

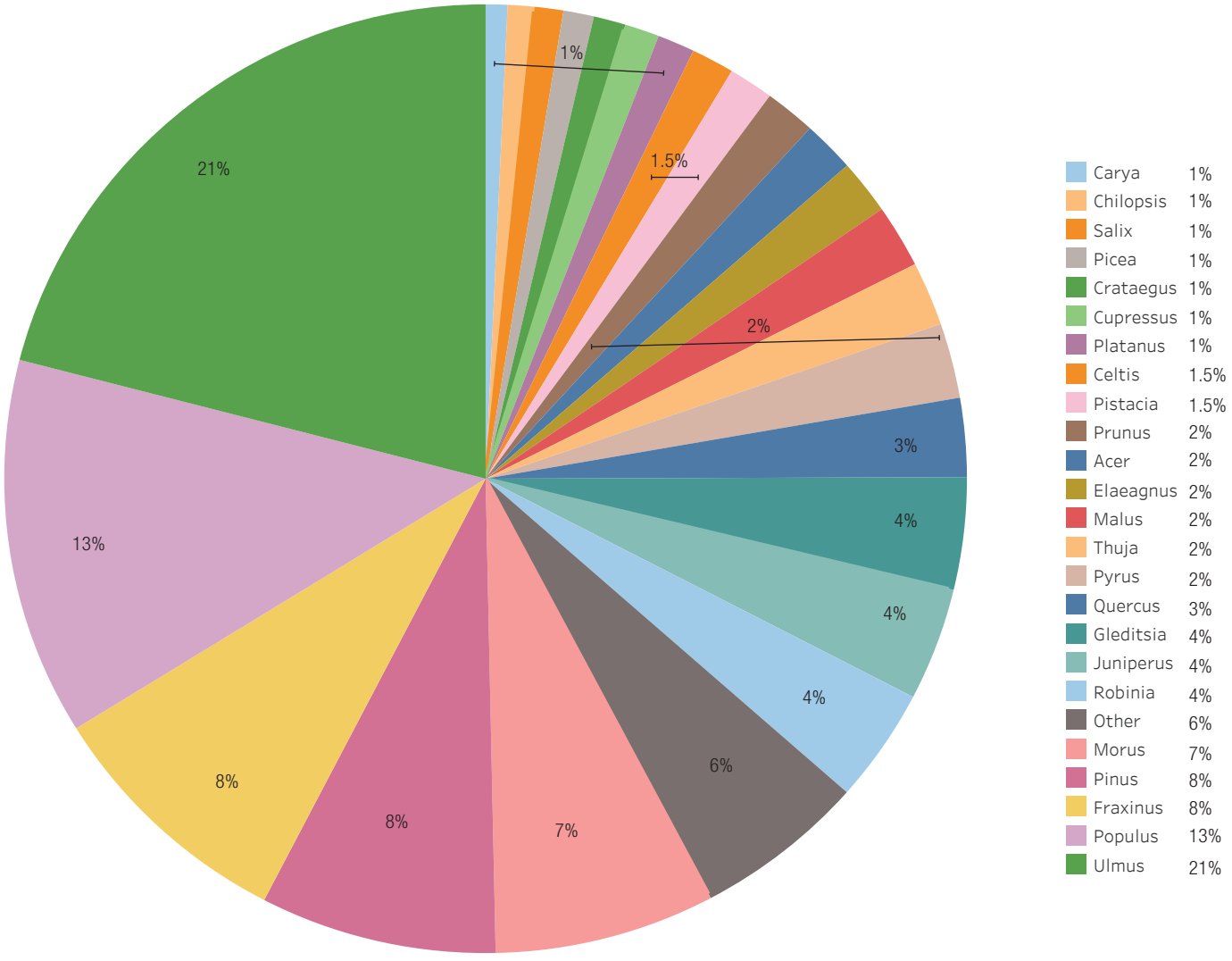
The 'Tree Counts by Genus in Regional Quadrant' charts show a variety of genera are present around the state, providing opportunity to observe these genera for success and potential increased use in replacement plantings.

Mulberries, Siberian Elms, and Cottonwoods Along the Pecos - Carlsbad

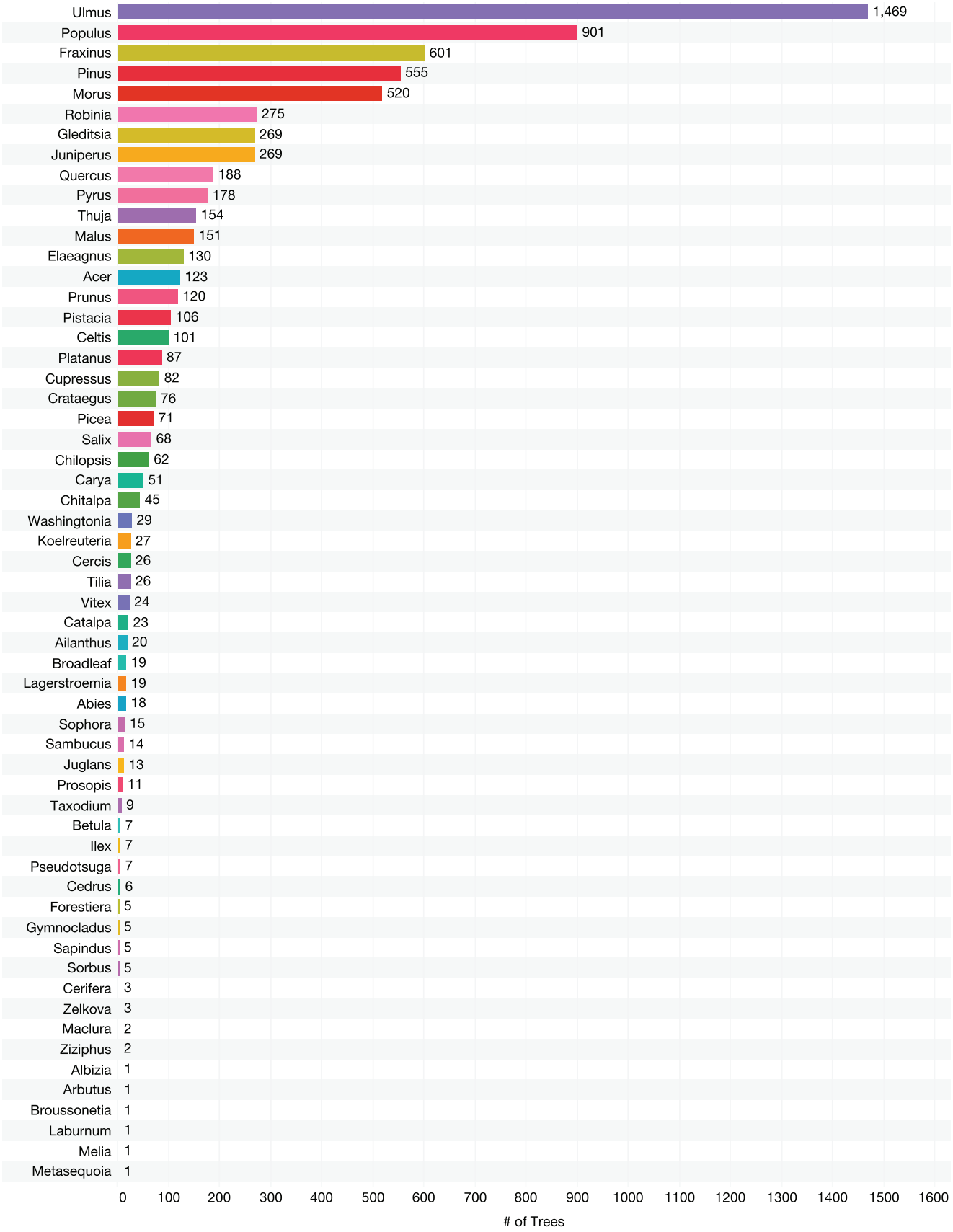
STATEWIDE GENERA DIVERSITY

The pie chart reflects the statewide percentage of diversity with genera of 50 or more recorded trees. The category “other” reflects genera recorded in less than 50 instances.

See page 27 for a key identifying common names for each genera listed.

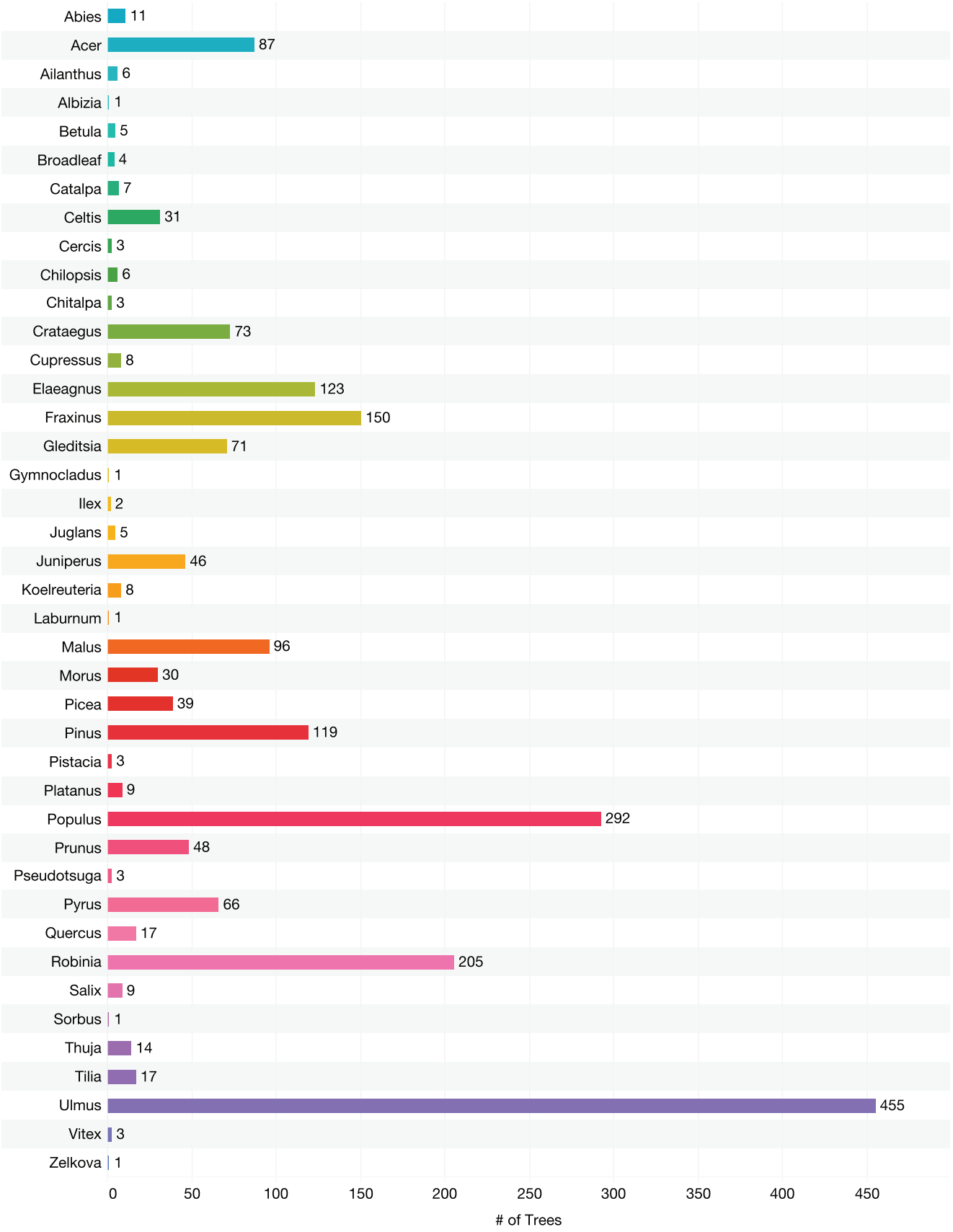


TREE COUNT BY GENUS I STATEWIDE



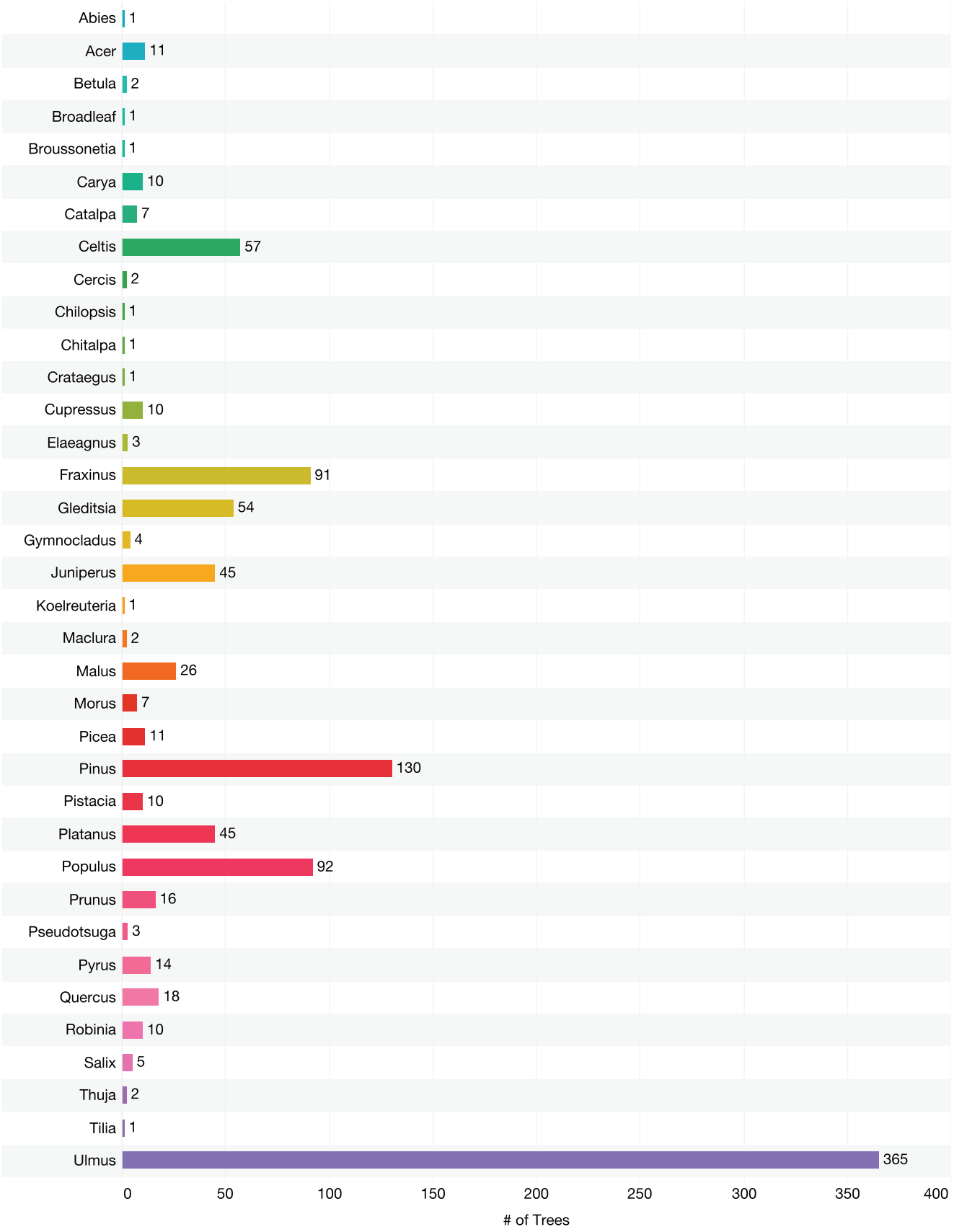
TREE COUNT BY GENUS I REGIONAL QUADRANT

NORTH WEST



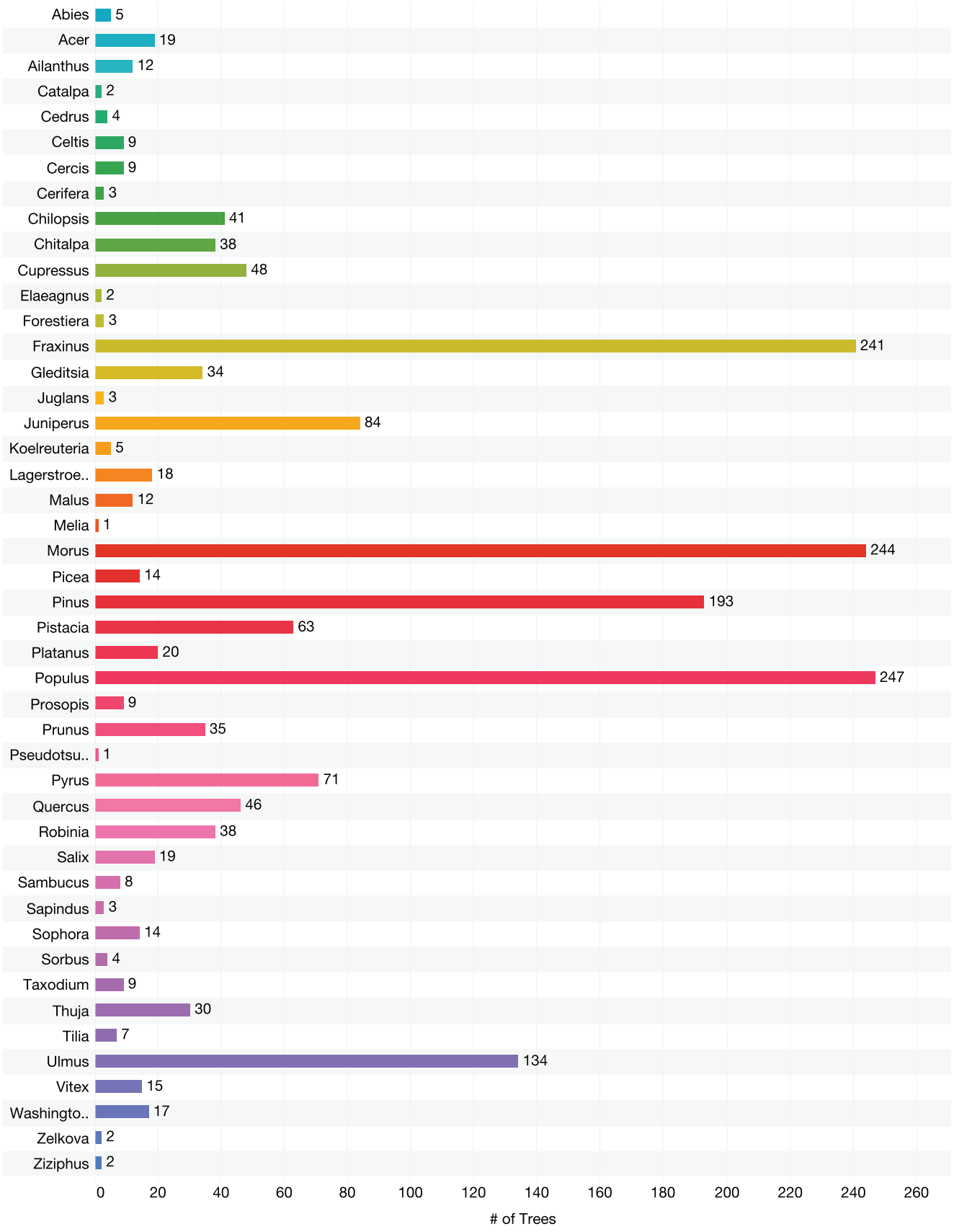
TREE COUNT BY GENUS I REGIONAL QUADRANT

NORTH EAST



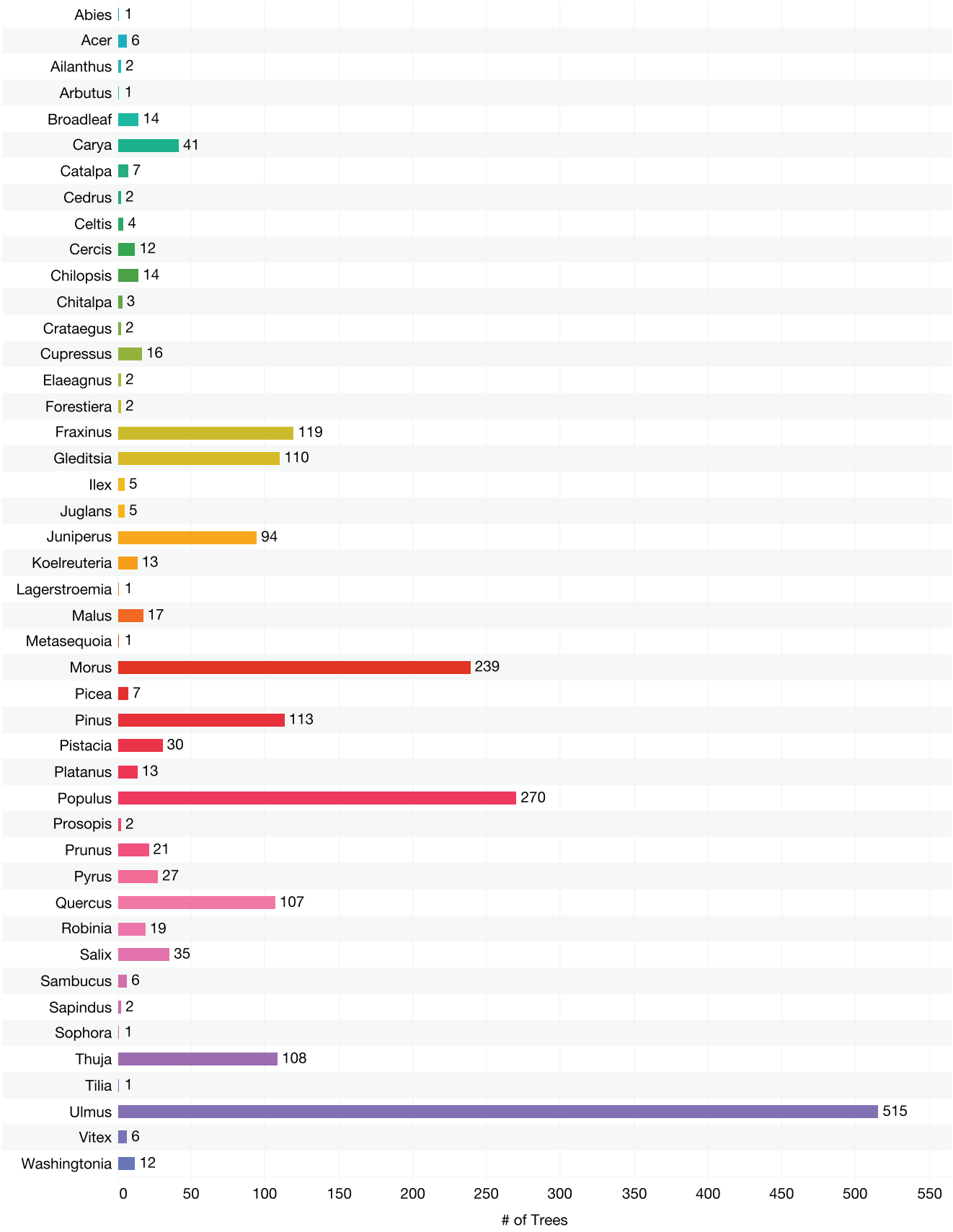
TREE COUNT BY GENUS I REGIONAL QUADRANT

SOUTH WEST



TREE COUNT BY GENUS I REGIONAL QUADRANT

SOUTH EAST



GENERA KEY

GENUS	COMMON NAME
Ulmus	Elm
Populus	Cottonwood, Poplar, Aspen
Fraxinus	Ash
Pinus	Pine
Morus	Mulberry
Robinia	Locust
Gleditsia	Honeylocust
Juniperus	Juniper
Quercus	Oak
Pyrus	Pears
Thuja	Arborvitae
Malus	Apples
Eleagnus	Russian olive
Acer	Maple
Prunus	Plums, Cherries
Pistacia	Pistache
Celtis	Hackberry
Platanus	Sycamore, London plane
Cupressus	Cypress
Crataegus	Hawthorn
Picea	Spruce
Salix	Willow
Chilopsis	Desert willow
Carya	Hickory
Chitalpa	Chitalpa
Washingtonia	Palms
Koelreuteria	Golden rain
Cercis	Redbuds
Tilia	Linden
Vitex	Vitex (Chaste trees)
Catalpa	Catalpa
Ailanthus	Tree-of-heaven
Lagerstroemia	Crepe myrtle
Abies	Firs
Sophora	Japanese pagoda
Sambucus	Elderberry
Juglans	Walnuts
Prosopis	Mesquite
Taxodium	Bald cypress
Betula	Birch
Ilex	Holly
Psuedotsuga	Douglas fir
Cedrus	Cedar
Forestiera	New Mexico Olive
Gymnocladus	Soapberry, Kentucky coffeetree
Sapindus	Lychee
Sorbus	Mountain ash
Cerifera	Wax myrtle
Zelkova	Zelkova
Maclura	Osage orange
Ziziphus	Jujube
Albizia	Mimosa
Arbutus	Madrone
Broussonetia	Paper mulberry
Laburnum	Golden chain
Melia	Chinaberry
Metasequoia	Giant sequoia

AGE

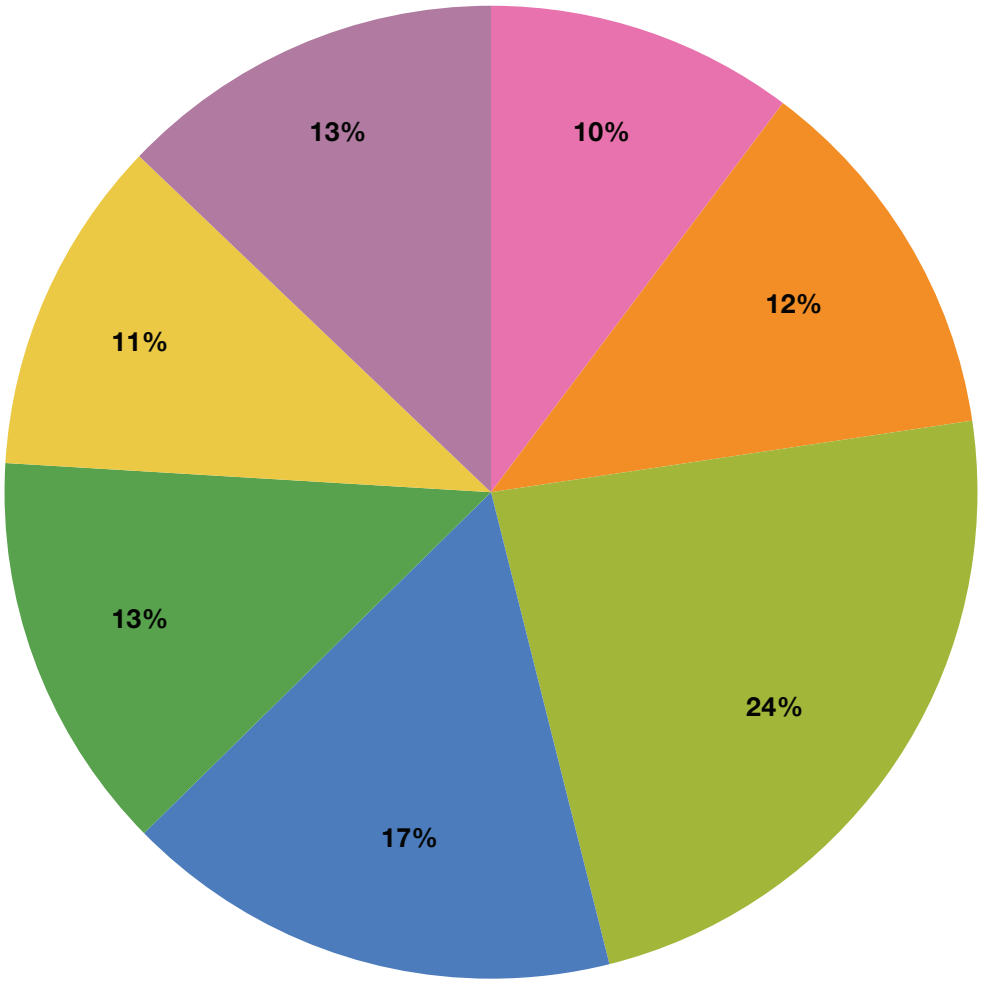
This section focuses on the age of trees throughout the state. The diameter at breast height (DBH) is used as an indicator of tree maturity, although different species of trees have markedly different DBH ranges. Like genus diversity, it is generally good management practice to have trees in a variety of age ranges. Balancing the prioritization of aging trees in decline with the care of newly planted trees is key for addressing current hazards while mitigating risk in the future.

Statewide, the trees inventoried were evenly distributed across DBH ranges. 54% of trees inventoried were measured to have a DBH larger than 12". 13% of trees inventoried had a DBH of over 30", and 10% had a DBH of less than 3". While on a statewide basis, this indicates that the rate of new plantings has largely kept pace with those trees approaching the end of their life, this data is very community-specific and location-specific within a community. For example, several communities have focused on planting trees in newly-established parks and street landscapes, but have not underplanted in parks with aging trees.

The 'DBH Range by Genus' charts show that the highest population genera (*Ulmus, Populus*) are also the oldest, consistent with the historical context of many of these trees being planted during the New Deal era, along with the *Morus* genus. Diversity in genera was higher among more recently planted trees (smaller than 6" DBH).

City Staff - Los Alamos

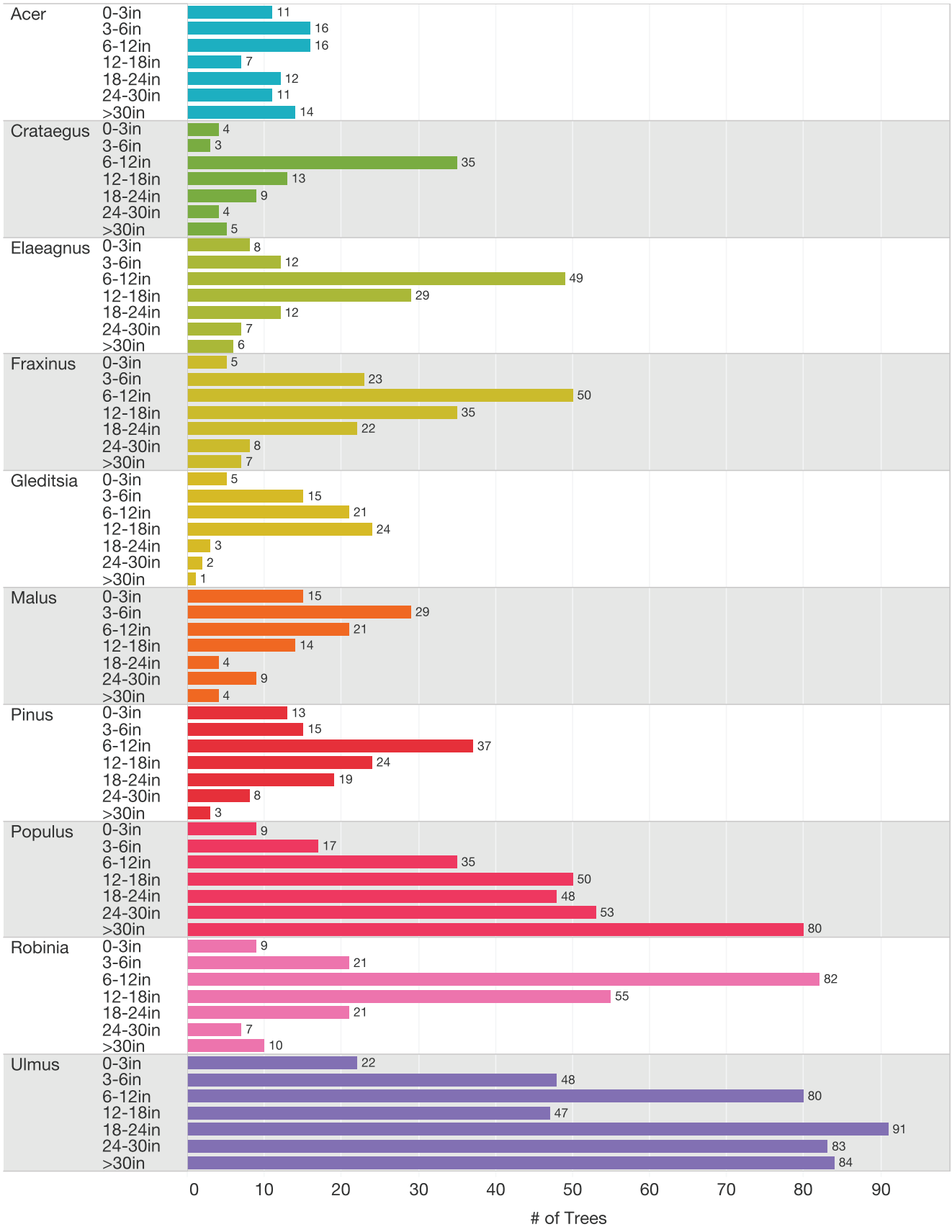
DBH RANGE | STATEWIDE



Size (inches)	# Amount
0-3	717
3-6	870
6-12	1644
12-18	1160
18-24	933
24-30	784
>30	900
Total	**7008**

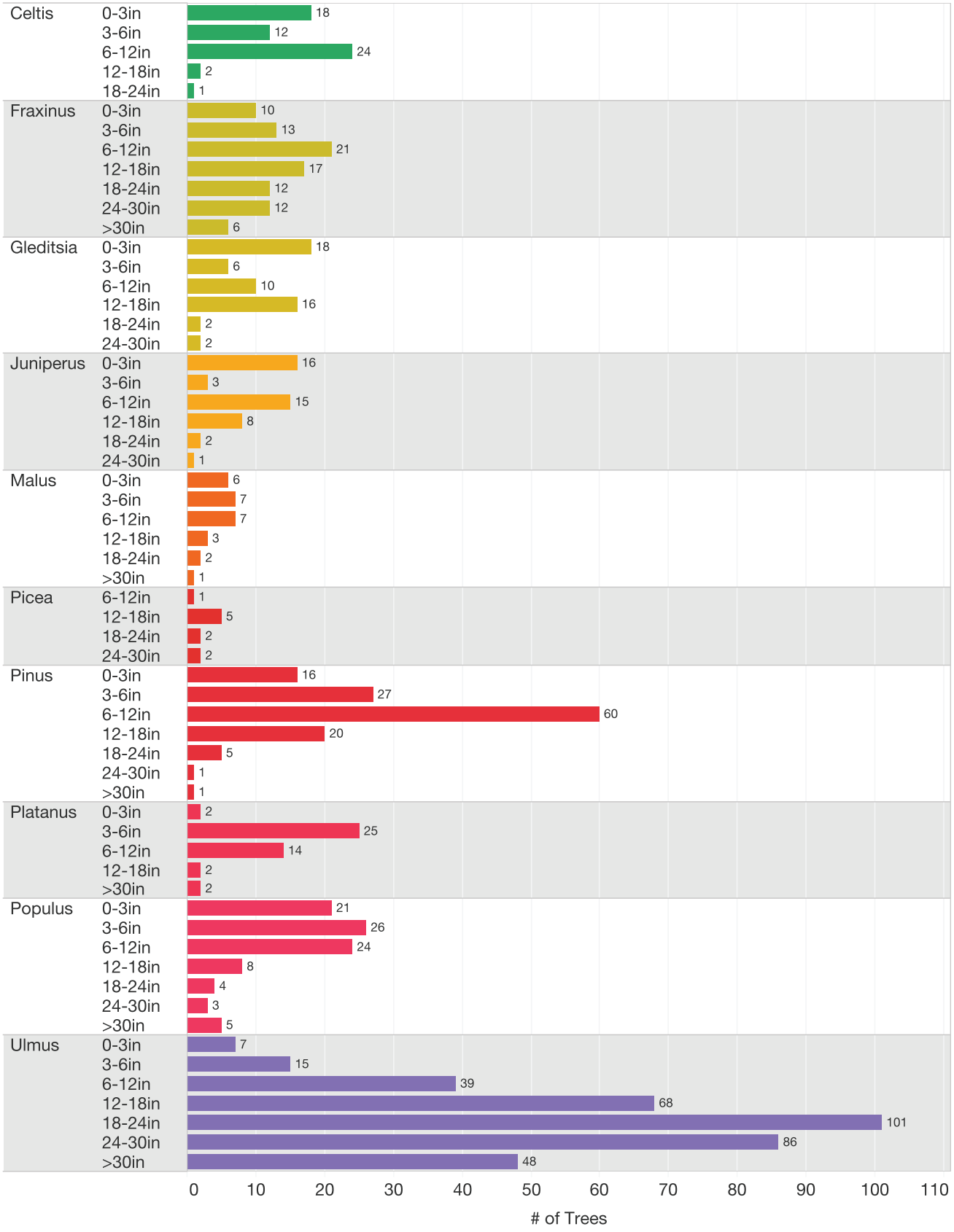
DBH RANGE BY GENUS | BY REGIONAL QUADRANT | TOP 10 GENERA

NORTH WEST



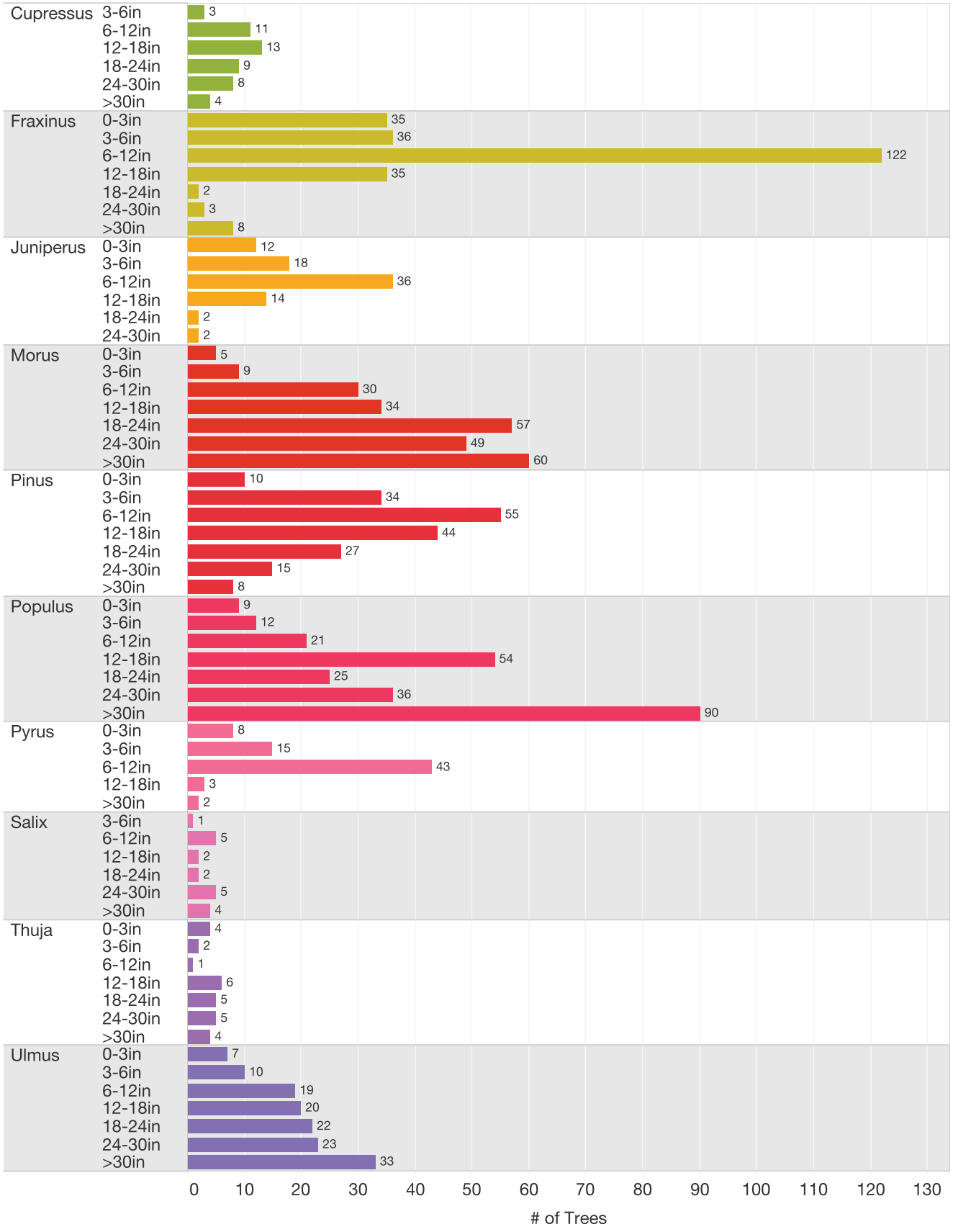
DBH RANGE BY GENUS | BY REGIONAL QUADRANT | TOP 10 GENERA

NORTH EAST



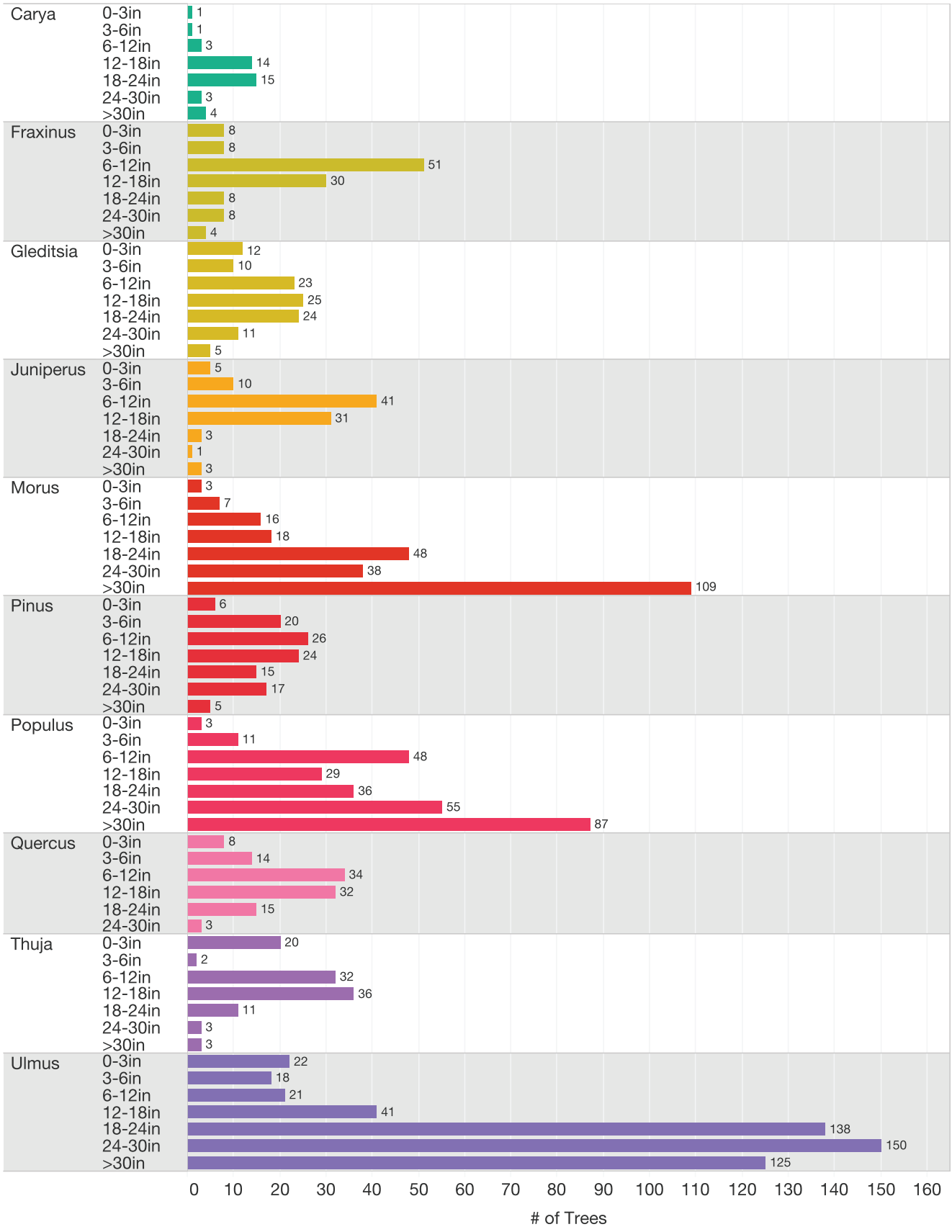
DBH RANGE BY GENUS | BY REGIONAL QUADRANT | TOP 10 GENERA

SOUTH WEST



DBH RANGE BY GENUS | BY REGIONAL QUADRANT | TOP 10 GENERA

SOUTH EAST



CONDITION

This section focuses on the condition of trees throughout the state. When reviewed across the entire area of trees inventoried, this category provides a general evaluation of the community forest's health.

The inventory data indicate that consistent tree conditions exist throughout the areas inventoried in the state. The highest population of trees inventoried in every quadrant were rated as being in "fair" condition, meaning that the tree needs special care to maintain or improve tree health (such as pruning). This level of care has not been planned for or resourced; without it, this large population of trees will decline beyond correctable levels and represents a future liability.

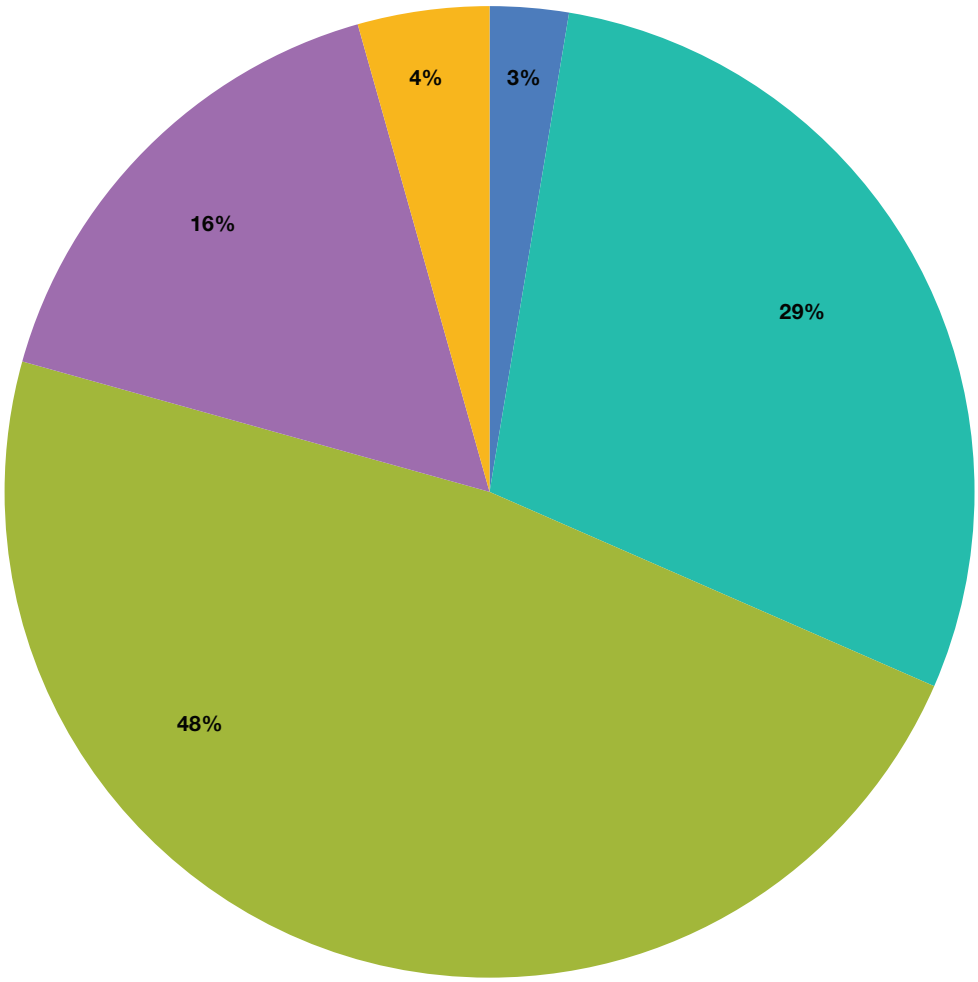
While trees in "good" and "excellent" condition slightly outweighed those that were observed to be in "poor" condition and "dead/dying", the trees that are already dead or at the end of their lives comprise 20% of the areas inventoried, indicating that replacement planting may need to be increased.

Review of tree condition by DBH reveals that of the trees inventoried, condition is fairly consistent across age. Trees within 6-18" DBH were more frequently assessed to be in "fair" or "good" condition than the youngest and oldest trees.

Most of the trees inventoried were located in a maintained location, such as a park, cemetery, or other landscape. Surprisingly, condition distribution did not vary considerably across maintained locations, although trees inventoried in planting strips had a higher percentage of trees assessed as 'poor' or 'dead/dying'. The condition of trees located in cutouts and medians was expected to be generally worse, due to limited root soil volumes in these spaces; that this is not reflected in the data may be explained by the fact that two-thirds of these trees are less than 12" in DBH, and may not have reached their growth limitations yet. Trees located in unmaintained locations were assessed as being in slightly worse general condition than those in maintained locations.

American Elm - South Park Cemetery, Roswell

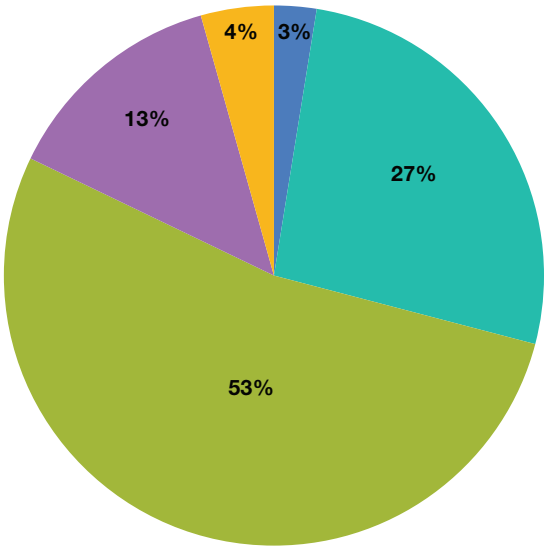
STATEWIDE CONDITION



Condition	# Amount
Excellent	182
Good- no apparent problems	2023
Fair - minor problems	3349
Poor - major problems	1144
Dead / Dying	306
Total	**7004**

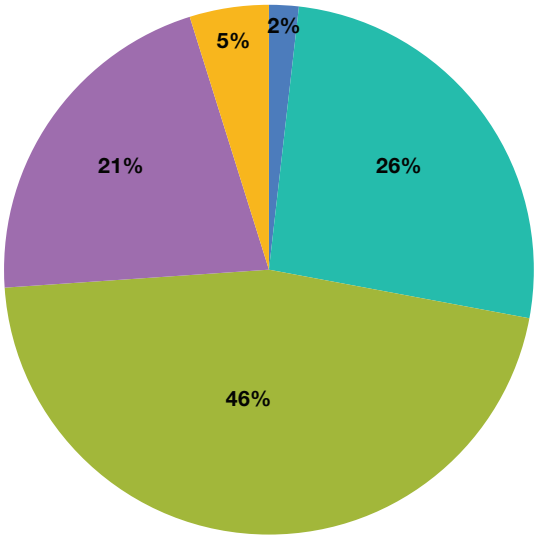
CONDITION BY REGIONAL QUADRANT

NORTH WEST



Condition	# Amount
Excellent	52
Good- no apparent problems	548
Fair - minor problems	1107
Poor - major problems	283
Dead / Dying	90
Total	**2080**

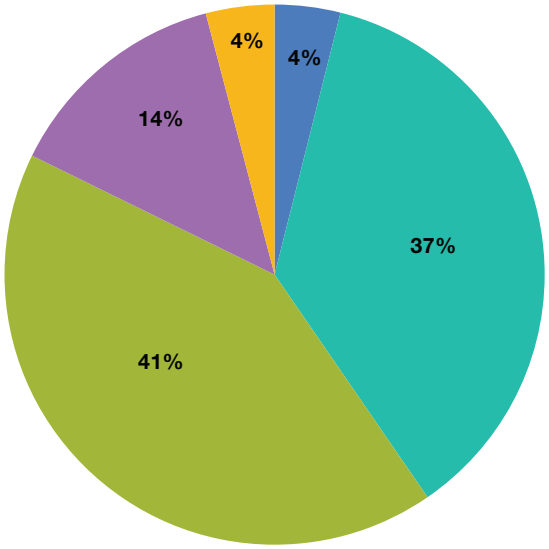
NORTH EAST



Condition	# Amount
Excellent	19
Good- no apparent problems	277
Fair - minor problems	487
Poor - major problems	225
Dead / Dying	51
Total	**1059**

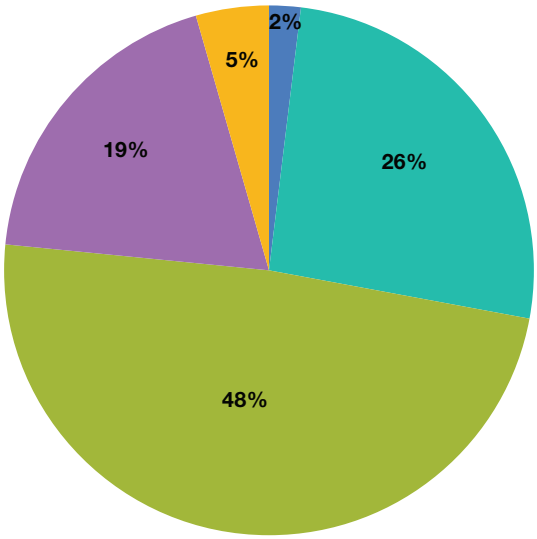
CONDITION BY REGIONAL QUADRANT

SOUTH WEST



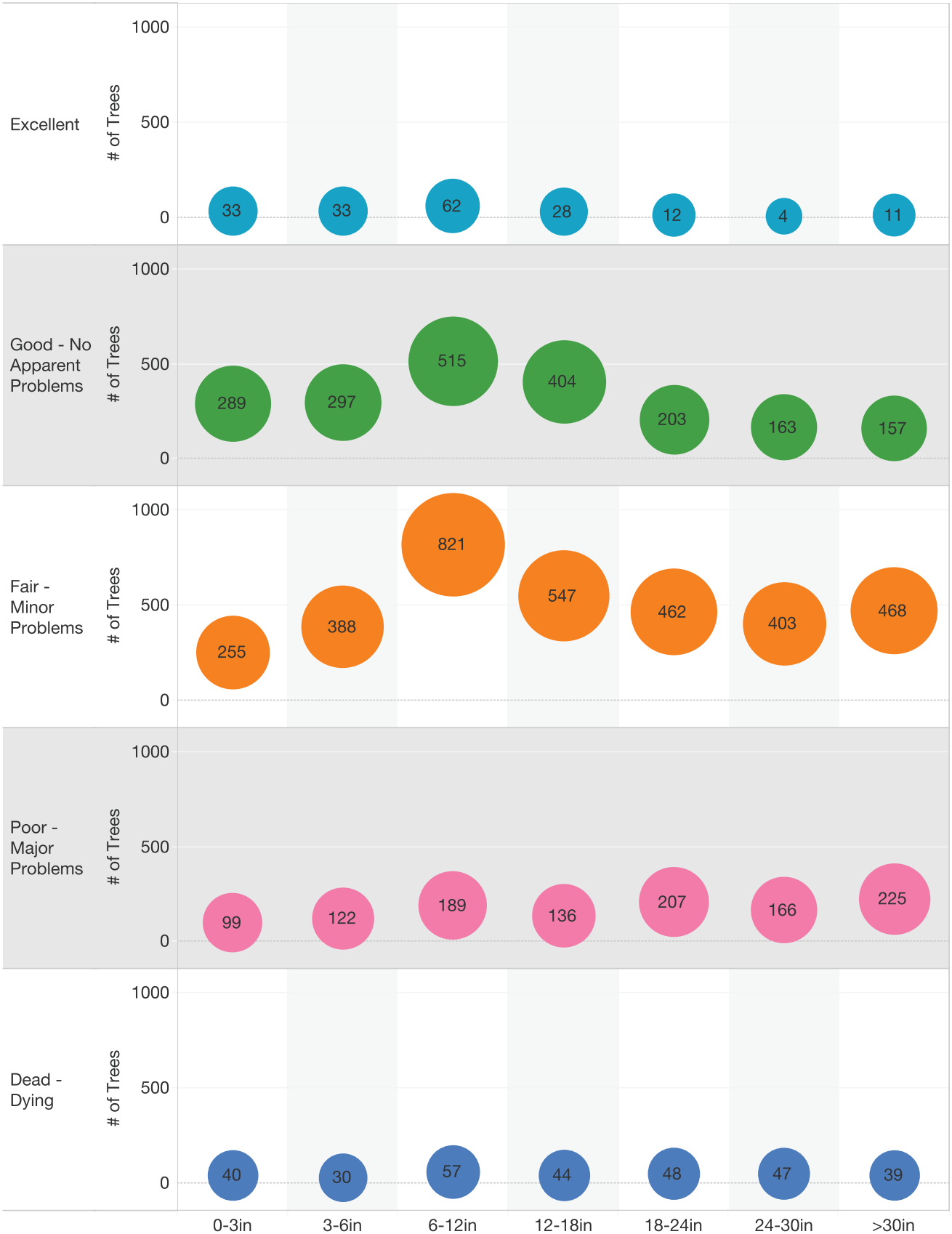
Condition	# Amount
Excellent	72
Good- no apparent problems	671
Fair - minor problems	769
Poor - major problems	251
Dead / Dying	75
Total	**1838**

SOUTH EAST



Condition	# Amount
Excellent	39
Good- no apparent problems	527
Fair - minor problems	986
Poor - major problems	385
Dead / Dying	90
Total	**2027**

OVERALL CONDITION BY DBH

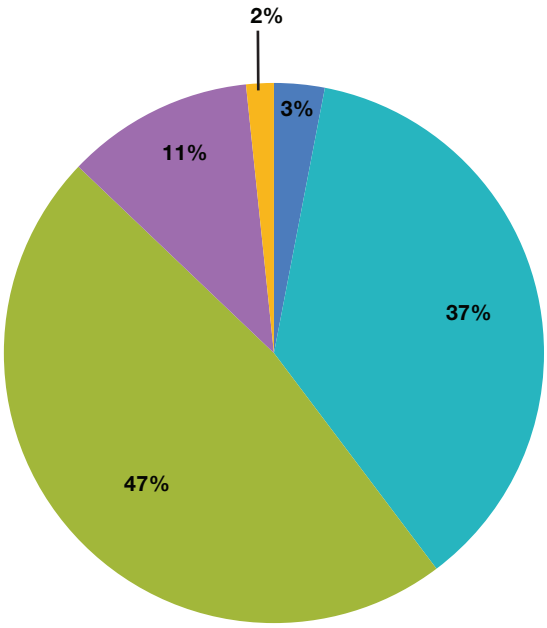


# of Trees	716	870	1644	1159	932	783	900

CONDITION BY LAND USE

This categorizes where the tree is located, as a residential or commercial area, or as park/vacant/other to determine whether there are particular issues associated with trees in different areas of land use.

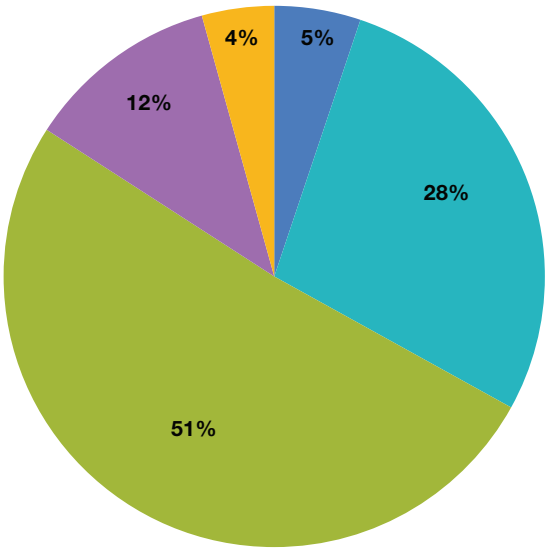
CUTOUT



A landscape located between walkways or sidewalks. Cutouts are most commonly located near street corners, where walkways or sidewalks intersect.

Condition	# Amount
Excellent	11
Good- no apparent problems	134
Fair - minor problems	173
Poor - major problems	41
Dead / Dying	6
Total	**365**

FRONT YARD

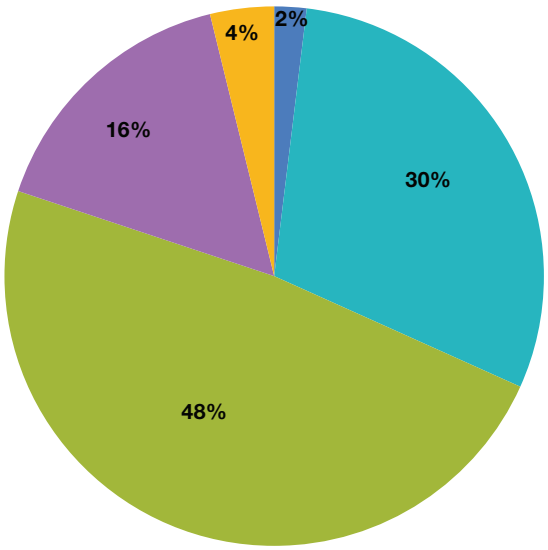


A landscape features in front of a house or public building sometimes in the public right of way.

Condition	# Amount
Excellent	12
Good- no apparent problems	65
Fair - minor problems	119
Poor - major problems	27
Dead / Dying	10
Total	**233**

CONDITION BY LAND USE

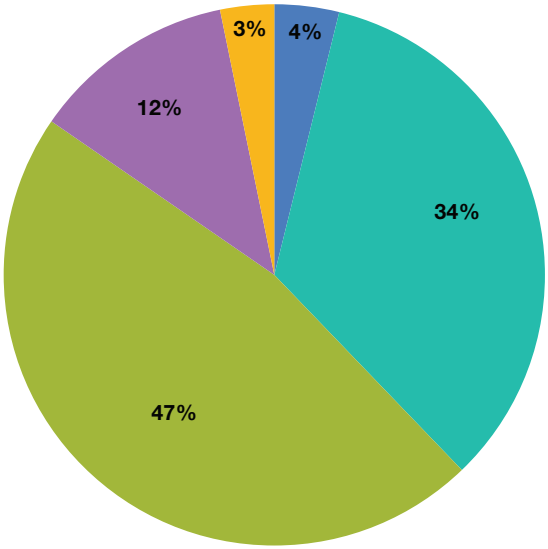
MAINTAINED



A landscape which receives some sort of maintenance, such as: watering, fertilization, pruning, and trimming. A common example of a maintained landscape is a public park.

Condition	# Amount
Excellent	93
Good- no apparent problems	1448
Fair - minor problems	2350
Poor - major problems	781
Dead / Dying	185
Total	**4857**

MEDIAN

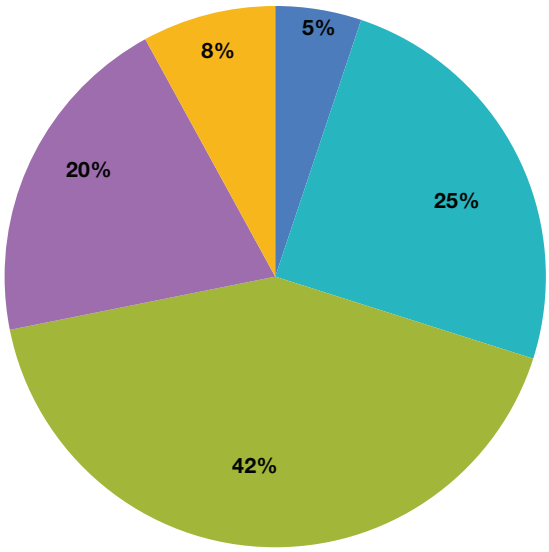


A landscape which separates streets running parallel to each other.

Condition	# Amount
Excellent	6
Good- no apparent problems	53
Fair - minor problems	73
Poor - major problems	19
Dead / Dying	5
Total	**156**

CONDITION BY LAND USE

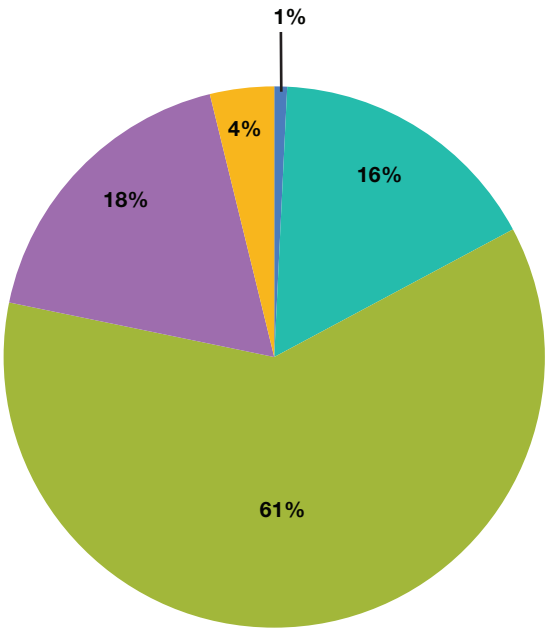
PLANTING STRIP



A landscape located between street and sidewalk.

Condition	# Amount
Excellent	58
Good- no apparent problems	280
Fair - minor problems	474
Poor - major problems	228
Dead / Dying	90
Total	**1130**

UNMAINTAINED



A naturally occurring or self-sustaining landscape that does not receive maintenance

Condition	# Amount
Excellent	2
Good- no apparent problems	43
Fair - minor problems	160
Poor - major problems	47
Dead / Dying	10
Total	**262**

MANAGEMENT

This section focuses on observations related to maintenance practices and management, and identifies potential risk from trees. On an individual community level, this analysis provided specific management recommendations. When reviewed across the entire area of trees inventoried, this analysis can identify management trends and needs for statewide training and funding.

Each tree was categorized as being large (over 20' tall) or small, and assigned a primary maintenance recommendation. The statewide chart of primary maintenance recommendations demonstrates that most trees inventoried (85%) require routine maintenance; this is consistent across the four quadrants. This data aligns with the charts in the previous section noting the majority of trees inventoried were in "fair" condition or better. The remaining 15% of trees surveyed were assessed as needing immediate attention, removal, or present a critical safety concern. Considering that the trees inventoried are in public spaces, it is concerning that the percentage is this high.

Assessors noted problems, or "observations", for each tree. The highest recorded observations statewide were:

- **Crown dieback:** leaf loss can be caused by many tree health issues, but the most frequent cause of crown dieback is lack of proper irrigation. (There was no separate observation in the data collection application for "irrigation problems".) It is significant that almost half of the trees inventoried statewide had this observation.
- **Poor structure:** usually an indicator that the tree was improperly pruned, resulting in co-dominant lead branches, "lions-tailing", or other issues that may lead to branch failure.
- **Improperly pruned:** in young trees, the improperly pruned observation usually indicates that structural pruning has not been performed; in all trees, this can indicate poor pruning cuts, including topping, bark stripping, or flush cuts.
- **Mechanical damage:** in most cases, mechanical damage indicated damage from weed whackers and/or lawnmowers, which can cause trunk girdling; however, this observation also included damage caused from vandalism, or branch interference with buildings, etc.
- **Cavity decay:** cavities typically form as a result of bacteria or fungus entering tree wounds.

These observations are significant to management prioritization and practice because they are all preventable or reversible through improved management practice. Understanding the most frequently occurring problems with tree health in our urban forests can assist our communities in providing more targeted and appropriate training for maintenance and facilities staff caring for trees.
The same top five observations were evenly distributed between large and small trees. This is of some concern as it demonstrates that the same problematic management practices which created issues with older trees are still being practiced with younger trees, emphasizing the need for training.

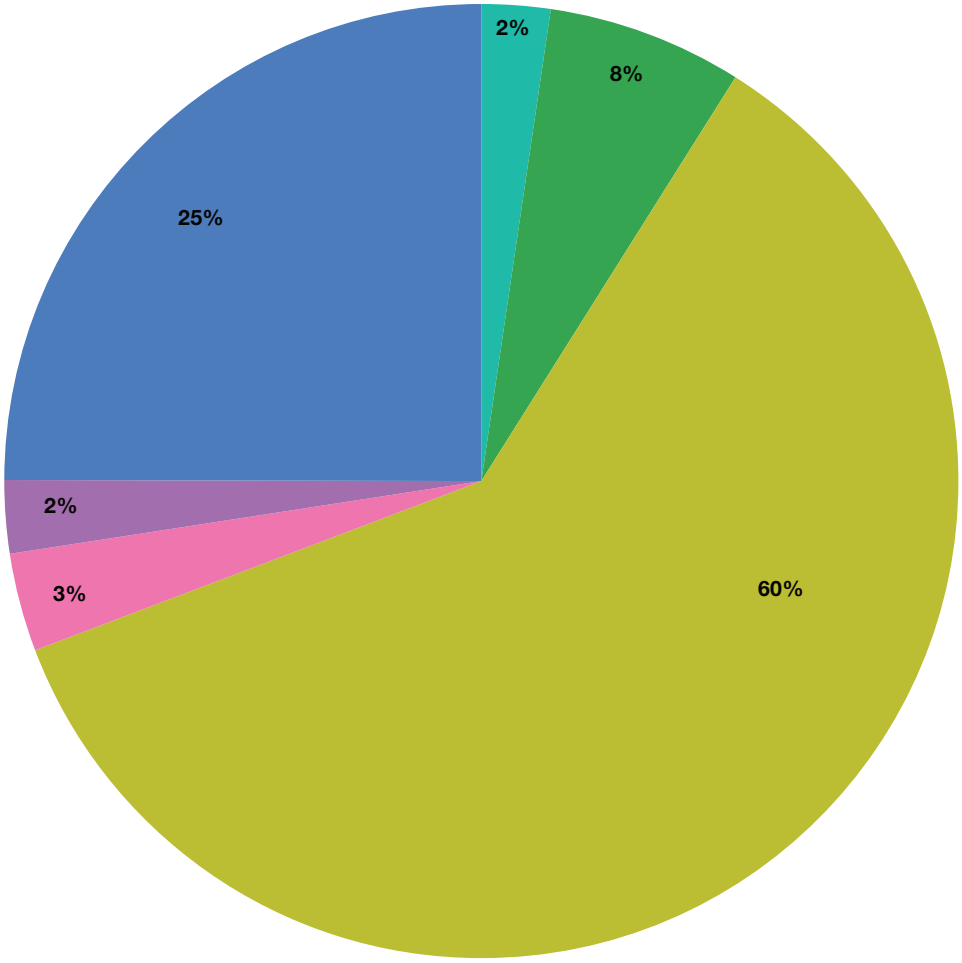
An evaluation of tree condition in relation to the type of dedicated tree care staff demonstrates that communities with trained tree care professionals tend to have trees in better health. Communities that do not have maintenance staff trained specifically in the care of trees exhibit a much higher percentage of trees in "fair," "poor" and "dead/dying" condition. This information is significant in that it clearly demonstrates the value of engaging appropriately trained staff in the care of the urban forest. We see a direct correlation between the level of staff training and reduction in risk posed to the community due to trees in poor condition.

Inventory Team - Silver City

STATEWIDE | PRIMARY MAINTENANCE

Trees were assessed by six categories of maintenance recommendations. From critical concern to routine pruning.

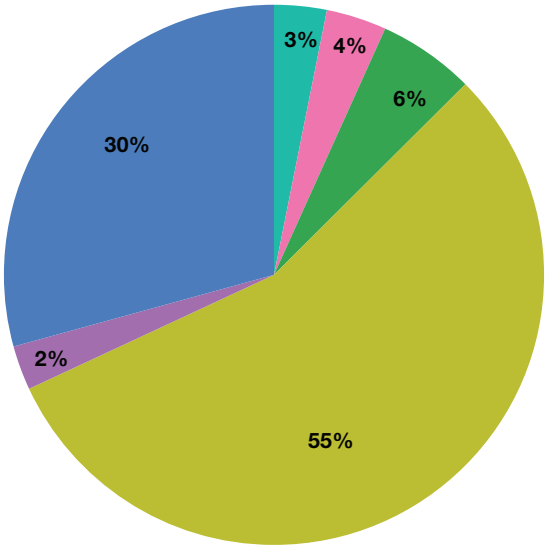
Note: Total tree count for this section does not match the statewide total. The total excludes trees recorded in Albuquerque because primary maintenance information was not recorded at the time of this inventory.



Primary Maintenance	# Amount
Critical Concern (Safety)	157
Remove Tree	227
Large Tree (immediate)	449
Large Tree (routine)	4092
Small Tree (immediate)	167
Small Tree (routine)	1693
Total	**6785**

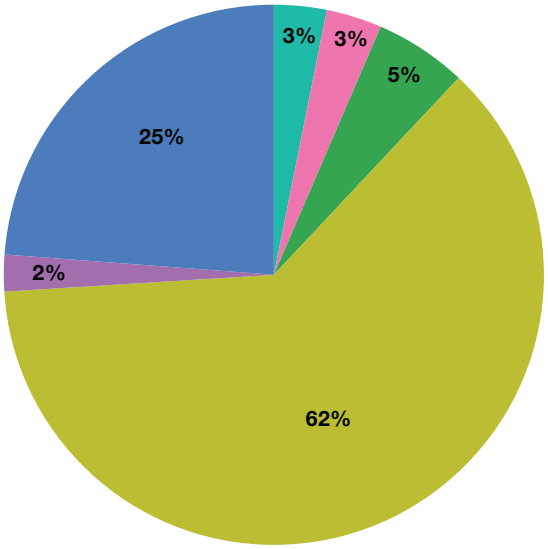
PRIMARY MAINTENANCE BY QUADRANT

NORTH WEST



Condition	# Amount
Critical Concern (safety)	59
Remove Tree	68
Large Tree (immediate)	109
Large Tree (routine)	1046
Small Tree (immediate)	50
Small Tree (routine/train)	551
Total	**1883**

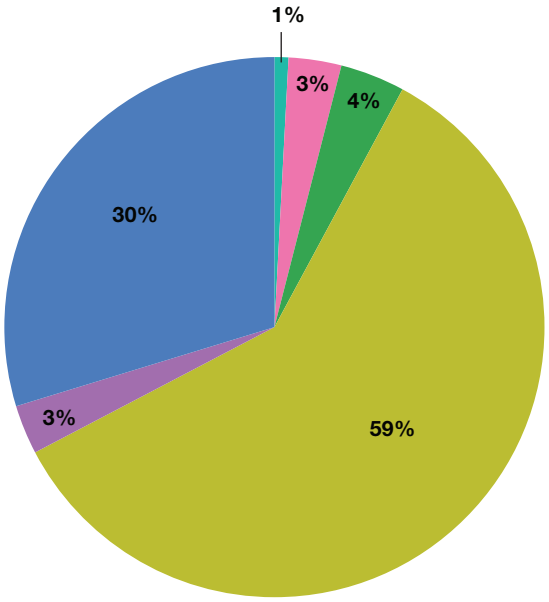
NORTH EAST



Condition	# Amount
Critical Concern (safety)	33
Remove Tree	35
Large Tree (immediate)	58
Large Tree (routine)	652
Small Tree (immediate)	23
Small Tree (routine/train)	250
Total	**1051**

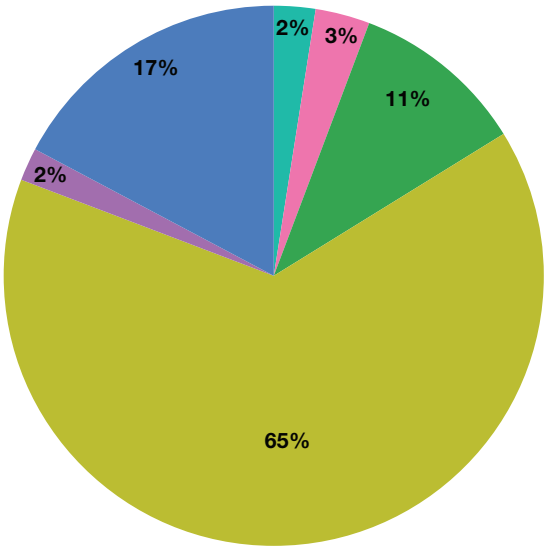
PRIMARY MAINTENANCE BY QUADRANT

SOUTH WEST



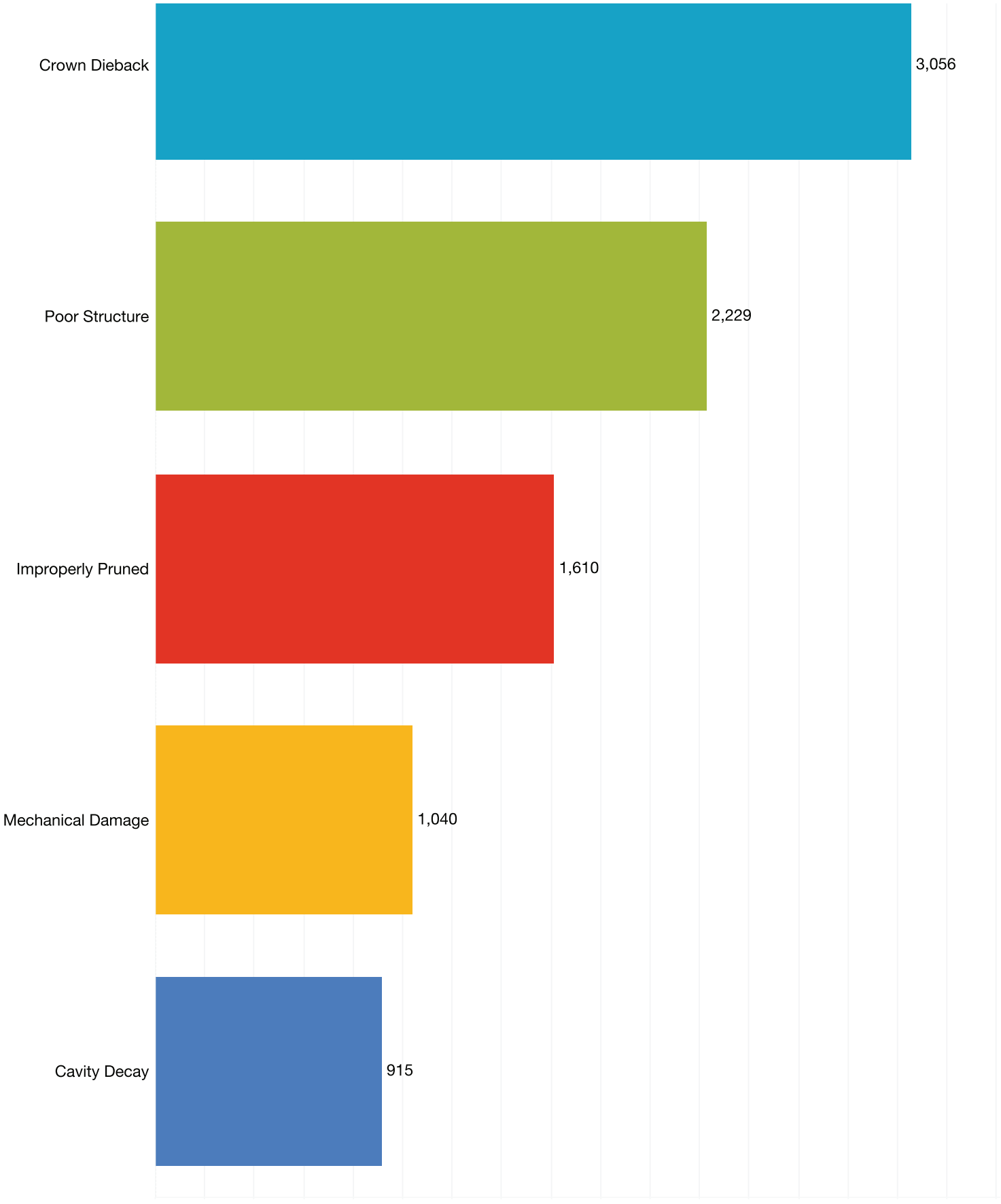
Condition	# Amount
Critical Concern (safety)	15
Remove Tree	58
Large Tree (immediate)	71
Large Tree (routine)	1089
Small Tree (immediate)	54
Small Tree (routine/train)	554
Total	**1831**

SOUTH EAST



Condition	# Amount
Critical Concern (safety)	50
Remove Tree	66
Large Tree (immediate)	211
Large Tree (routine)	1305
Small Tree (immediate)	40
Small Tree (routine/train)	348
Total	**2020**

STATEWIDE | TOP FIVE OBSERVATIONS

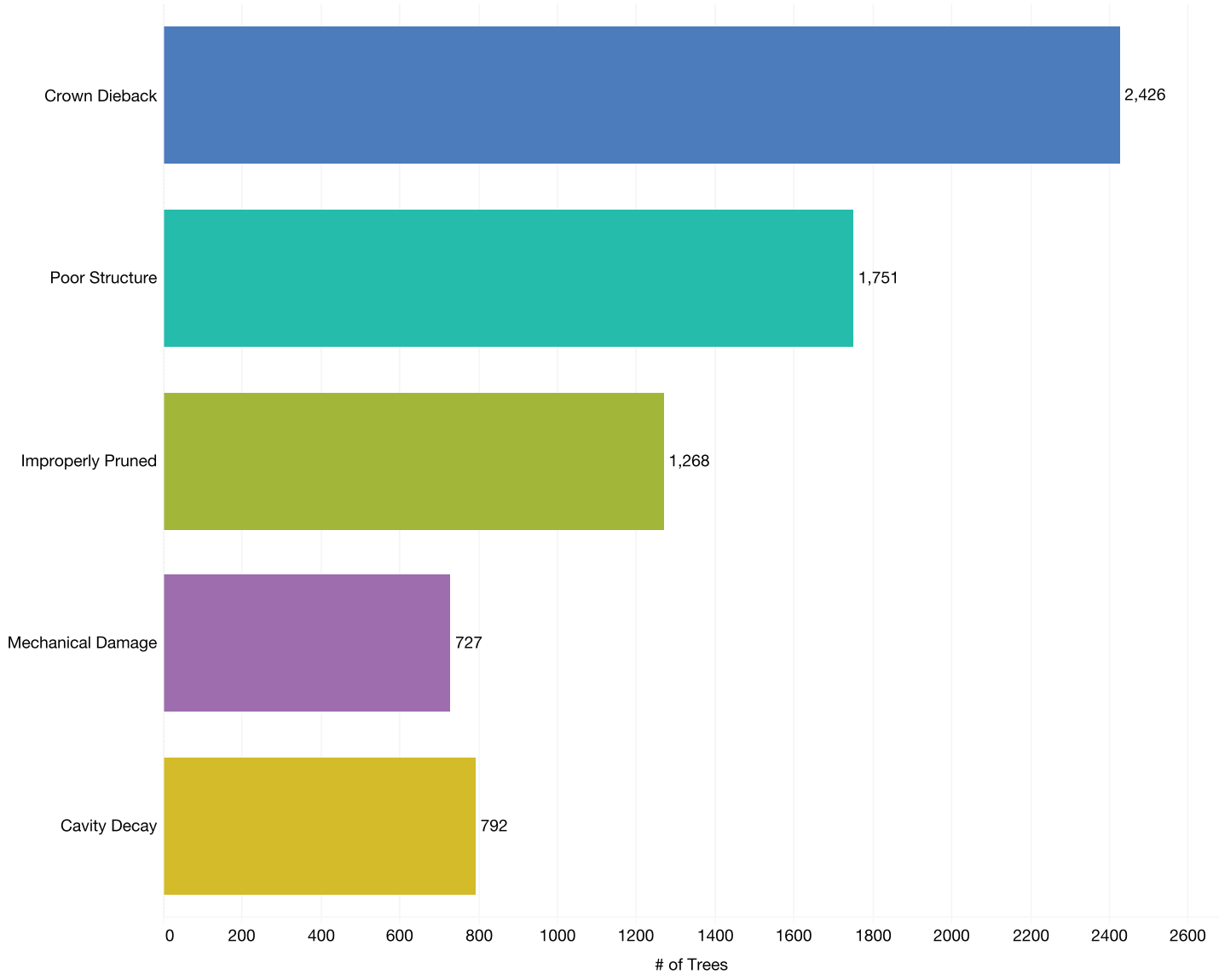


OBSERVATIONS BY SIZE

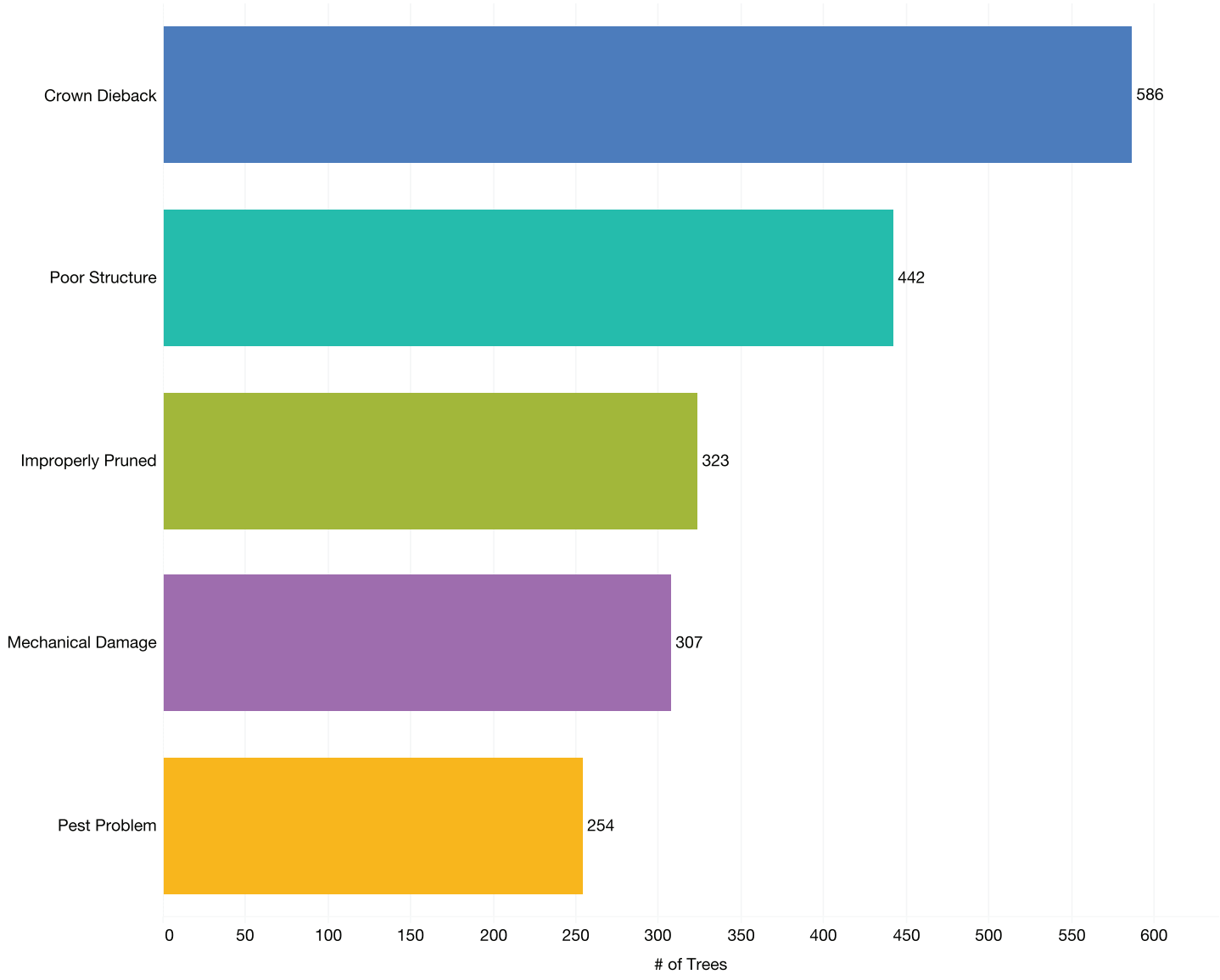
Tree height was estimated, and is a critical consideration in understanding the risk associated with the tree, as a taller tree may impact a broader range of targets (people, buildings, assets), with higher possibility of damage than a smaller tree.

The totals below reflect the number of observations not the total tree count, because some trees have multiple observations.

LARGE I over 20ft. Tall



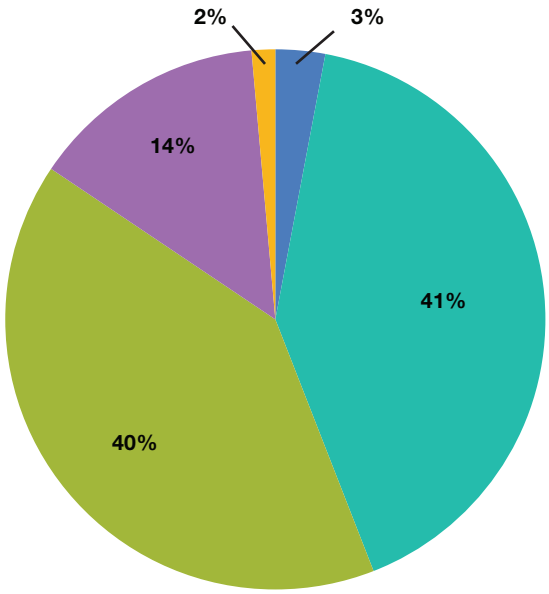
SMALL I under 20ft. Tall



MAINTENANCE | CONDITION BY DEDICATED STAFF

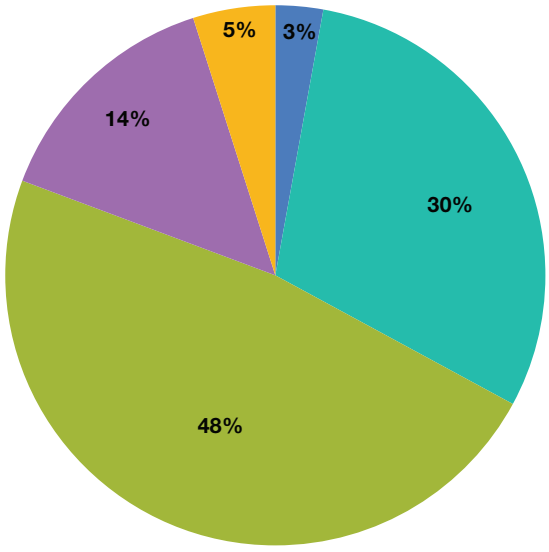
This indicates the relationship between level of training and tree care expertise held by staff tasked with tree care and the health of the urban forest.

DEDICATED ARBORIST/ FORESTER



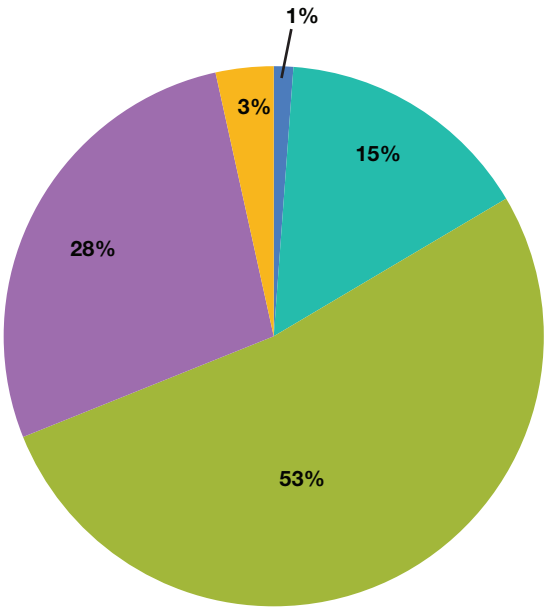
Condition	# Amount
Excellent	19
Good- no apparent problems	264
Fair - minor problems	259
Poor - major problems	91
Dead / Dying	9
Total	**642**

DEDICATED GROUNDS STAFF



Condition	# Amount
Excellent	151
Good- no apparent problems	1599
Fair - minor problems	2543
Poor - major problems	765
Dead / Dying	261
Total	**5319**

FACILITIES - STAFF ONLY



Condition	# Amount
Excellent	12
Good- no apparent problems	160
Fair - minor problems	547
Poor - major problems	288
Dead / Dying	36
Total	**1043**

SUMMARY

The data collected within each community inventoried resulted in specific management and planting recommendations in the individual community reports, tailored to the unique challenges within that community forest.

The statewide data compilation and analysis identified four pervasive challenges that will be addressed in the next management planning phase of the project:

Historic District Replanting. In many of the communities inventoried, the historic districts are still dominated by the large shade trees introduced during the arrival of the railroad, and later distributed during the New Deal era. Parks, plazas, courthouse grounds, cemeteries, school grounds, and streets all house these trees, many of which are Siberian elms (*Ulmus pumila*). As communities plan for the eventual replacement of these trees and/or redesign of the landscapes, it will be important to understand whether these are culturally significant landscapes, and if so, how historic preservation requirements may impact tree species selection.

Risk Management in the Public Right-of-Way. The inventory confirmed that in many of the communities, neighborhood street trees were established in long rows within the public right-of-way. The responsibilities and liabilities related to the management and care of these street trees are not well understood by either municipalities or homeowners. Because those communities that have dedicated grounds staff are often focused in Parks and Recreation departments, street trees are often completely excluded from proactive management.

Work Prioritization. The New Deal funding resulted in many communities receiving hundreds, if not thousands, of trees. The inventory showed that these trees are now aged and will require increased care. The sheer volume of these trees can be overwhelming for municipalities to resource appropriately. Establishing basic work prioritization and risk assessment models and skills can help address 'worst first' within limited resource budgets.

Cross-ownership management. No communities, even the small ones, are sharing tree management across municipal, county, and school government boundaries. Knowledge, skills, and resources are not shared, and as a result, tree management is inconsistent and often poor. Finding or creating models where skills can be shared across ownership boundaries could improve the health of the community forest.

The data collected in these inventories will combine with further research, interviews, and focus groups to develop management plans to address these challenges.

FIELDWORK IMAGES

Bernallilo

Taos

Santa Rosa

Los Lunas

Portales

Mosquero

Lordsburg