WORK SESSION AGENDA

Casper City Council
City Hall Council Meeting Room
Tuesday, June 9, 2026, at 4:30 p.m.

Work Session Meeting Agenda		Recommendation	Beginning Time	Allotted Time
Recommendations = Information Only, Move Forward for Approval, Direction Requested				
1.	Meeting Follow-up		4:30	5 min
2.	Municipal Court Judges' Update		4:35	25 min
3.	Tree Inventory and Condition Report		5:00	45 min
4.	Agenda Review		5:45	10 min
5.	Council Around the Table		5:55	10 min
			Approximate End Time:	6:05

*** Reminder ***
Please silence cell phones during the City Council meeting.

June 1, 2026

MEMO TO: Janine Jordan, City Manager

FROM: Zulima Lopez, Parks, Recreation and Public Facilities Director
Randy Norvelle, Parks Manager
Katy Hallock, Parks Supervisor – Urban Forestry and Weed & Pest Sections

SUBJECT: City of Casper 2024-25 Municipal Tree Inventory Update and Urban Forestry Report

Meeting Type & Date
Work Session
June 9, 2026

Action Type
Information Only

Recommendation
Information Only

Summary
In March of 2024, the City Council approved a professional services contract to conduct the first comprehensive assessment of Casper's public trees since 2002. Over the past two decades, the City's urban forest has experienced significant change due to severe weather events, ongoing removals of dead or diseased trees, and the planting of hundreds of new trees, leaving prior inventory data outdated and insufficient for planning.

The 2024–2025 Municipal Tree Inventory Update provides the City of Casper with a comprehensive, data-driven assessment of its publicly managed urban forest, encompassing 15,017 trees across parks, streets, and public spaces. The report highlights the critical environmental, economic, and social benefits these trees provide, including stormwater interception, air quality improvement, energy savings, and increased property values. Inventory findings show that while a majority of trees are in good or fair condition, approximately 8% are classified as poor, dead, or hazardous, including 338 trees requiring urgent mitigation. The analysis also identifies a heavy reliance on a small number of species - particularly Green Ash and Siberian Elm - creating vulnerability to pests such as Emerald Ash Borer and increasing long-term risk to canopy stability.

The report recommends a proactive, strategic management approach focused on risk reduction, species diversification, and sustained investment in maintenance and replanting. By transitioning from reactive care to planned interventions, the City could increase canopy cover by up to 25% over the next 20 years and enhance ecosystem service benefits by 30–50%, while reducing long-term costs and liabilities. The inventory establishes a critical foundation for developing a comprehensive Urban Forest Management Plan and underscores the financial and community

value of the urban forest, which currently delivers more than $1.1 million annually in ecosystem services and represents an asset exceeding $13 million. Overall, the report positions continued investment in urban forestry as essential to maintaining public safety, fiscal responsibility, and long-term community resilience.

The City's consultant, William Scott, will present the report's key findings to Council. He and City staff will be available to answer questions about the report, as well as work already completed and planned in the near term, as the findings have already been used to guide and prioritize urban forestry efforts within the community.

Financial Considerations

Urban Forestry is funded by the General Fund, the McNamara Tree Fund, and through donations for Holiday Square. The FY27 budget for Urban Forestry operations, excluding personnel, is $57,000. This funding will pay for trees, materials, and supplies for tree maintenance and planting, as well as contracted tree work such as hazardous tree removals and the tree lighting installation for Holiday Square.

Council Adopted Goals

☒ Infrastructure
☒ Fiscal Stability
☒ Communication & Public Education

Oversight/Project Responsibility

Randy Norvelle, Parks Manager
Katy Hallock, Parks Supervisor – Urban Forestry and Weed & Pest Sections

Attachments

City of Casper 2024-25 Municipal Tree Inventory Update and Urban Forestry Data Summary Report

City of Casper
2024-25 Municipal Tree Inventory Update and
Urban Forestry Data Summary Report

City of Casper
2024-25 Municipal Tree Inventory Update
&
Urban Forestry Data Summary Report

Prepared for:
City of Casper, Wyoming
Parks & Recreation Department

Prepared by:
William R. Scott
ISA Board Certified Master Arborist (RM-2204BM)
ISA Certified Urban Forest Professional
Owner, Scott Ventures LLC
wscottnov17@gmail.com

Date:
June 2025

Introduction

This document presents an analysis of the results of the **2024-25 municipal tree inventory update**, conducted under contract by **Scott Ventures LLC** for the **City of Casper**. The field inventory and analysis were performed by **William R. Scott, ISA Board Certified Master Arborist (RM-2204BM)** and owner of Scott Ventures LLC.

Casper's publicly managed urban forest—comprising **15,017 trees** across parks, streets, boulevards, rights-of-way, and civic properties—plays a critical role in delivering environmental, economic, and social benefits. Trees provide shade, stormwater interception, carbon storage, air quality improvement, and increased property value. However, sustaining these benefits requires up-to-date data on tree condition, species diversity, and structural risk.

This report is **not a comprehensive management plan**, but a **technical document based on i-Tree ECO analysis** that provides:

- A validated dataset from the 2024-25 citywide tree inventory
- Analysis of tree composition, size class distribution, condition, and risk status
- Summarized ecosystem service estimates based on inventory data
- Operational and strategic recommendations to support future management planning

The updated inventory includes standardized information on species, DBH (diameter at breast height), health condition, and ISA TRAQ-based risk assessments, integrated with GIS for mapping and decision support. This foundational data can be used by the City to:

- Identify and prioritize hazardous or declining trees
- Plan for equitable replanting and species diversification
- Align tree care operations with public safety and budget goals
- Support the development of a future comprehensive Urban Forest Management Plan

All recommendations provided in this document are based on ANSI A300 standards, ISA Best Management Practices, and urban forestry risk and maintenance models widely adopted across North America. The report is intended as a resource to guide informed planning, budgeting, staffing, and policy development in support of a healthy, resilient urban forest for the City of Casper.

Table of Contents

Appendices

Conclusion

Executive Summary

The City of Casper's urban forest is a vital component of its public infrastructure, delivering measurable ecological, economic, and social benefits to residents. Public trees help moderate temperatures, improve air and water quality, reduce stormwater runoff, enhance property values, and support public health and livability.

In 2024-25, an inventory update of **15,017 municipally managed trees** across parks, boulevards, rights-of-way, and public properties was conducted. This dataset now forms the foundation for strategic, data-driven urban forest management and risk mitigation.

Key Findings from the Inventory Include:

- **53.92%** of trees are in **Good** condition, **37.89%** Fair, **3.75%** Poor, **2.19**% Dead**, and 2.25%** classified as **Hazardous.**
- **Over 20%** of all trees are either **Green Ash** (*Fraxinus pennsylvanica*) or **Siberian Elm** (*Ulmus pumila*), presenting a serious risk due to species overdominance and pest vulnerability—especially to **Emerald Ash Borer (EAB).**
- **338 trees** are rated **Hazardous**, requiring urgent mitigation to reduce public safety liabilities.
- **329 trees** are **Dead**, with most requiring removal due to risk exposure or irrecoverable decline.

This report proposes a proactive urban forest management strategy built around **risk reduction, scheduled maintenance, targeted replanting,** and **canopy equity investment.** If implemented, this approach is projected to:

- Improve overall tree health and structural stability
- Increase total canopy cover by up to **25%** over 20 years
- Enhance annual ecosystem services by **30–50%**, including carbon sequestration, pollution removal, and stormwater interception

By contrast, continuing with a **reactive or minimum-care model** is likely to result in:

- Accelerated canopy loss from unmitigated pests and aging populations
- Increased emergency removals, legal liability, and infrastructure damage
- Rising long-term costs due to litigation, contractor premiums, and deferred maintenance

Strategic Framework

The management strategy outlined in this report includes:

- **Realistic staffing and equipment plans** phased across five years
- **Annual maintenance and inspection targets**, aligned with risk and age structure
- **Species diversification and planting recommendations**, based on local climate and pest threats
- **Public education tools and outreach strategies**, to enhance transparency and community stewardship

All recommendations are grounded in **ISA Best Management Practices (BMPs)** and **ANSI A300 Standards** and are designed to scale within the City's existing (publicly visible) budget framework and interdepartmental coordination processes.

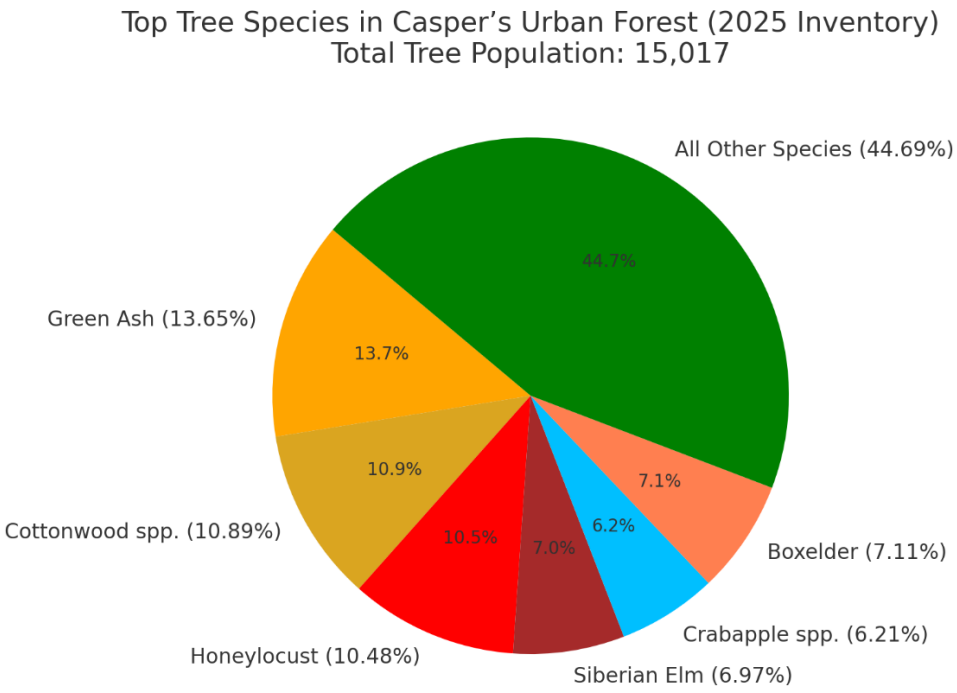
Tree Composition and Diversity

Casper's urban forest is moderately diverse but heavily weighted toward a few dominant species. The six most common species account for over 53% of the total inventoried population of 15,017 trees, which increases vulnerability to species-specific pests and diseases.

Top Six Tree Species by Population:

- **Green Ash** (*Fraxinus pennsylvanica*) – **13.65%**
- **Cottonwood spp.** (*Populus spp.*) – **10.89%**
- **Honeylocust** (*Gleditsia triacanthos var. inermis*) – **10.48%**
- **Boxelder (*Acer negundo*) – 7.11%**
- **Siberian Elm** (*Ulmus pumila*) – **6.97%**
- **Crabapple spp.** (*Malus spp.*) – **6.21%**

This concentration presents a significant management challenge. Green Ash is highly susceptible to Emerald Ash Borer (EAB), an invasive pest confirmed in nearby regions. Siberian Elm is structurally weak and prone to decay. Together, these two species make up **20.62%** of the city's entire urban forest, heightening vulnerability to pest outbreaks and structural failure.



Recommendations:

- Diversify new plantings to reduce reliance on any one species or genus to no more than 10% of total population.
- Gradually phase out vulnerable species through removals and natural attrition, replacing them with climate-adapted, pest-resistant trees.
- Implement a species selection policy guided by hardiness zones, water use, growth habit, and known pest resistance.

This proactive approach to tree diversity will support long-term canopy resilience, public safety, and urban forest sustainability**.**

Tree Condition and Risk

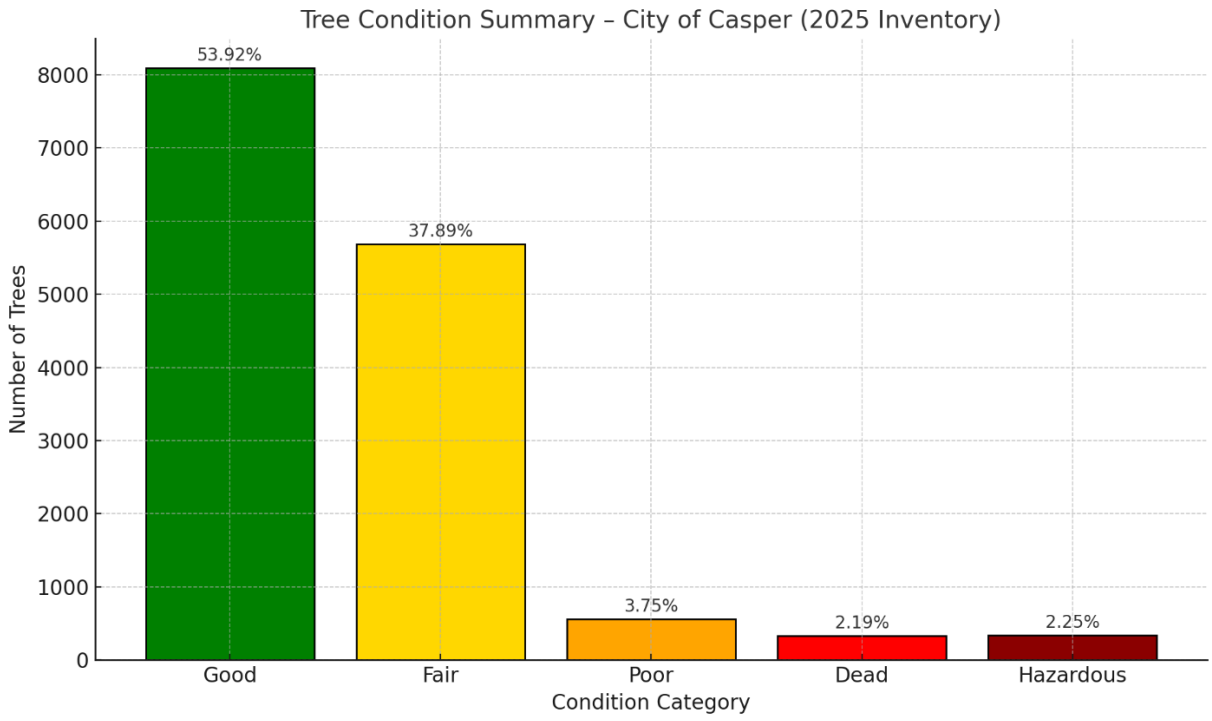
Condition assessments of Casper's public trees were conducted using ISA Best Management Practices and ANSI A300 Part 9 standards. Each of the 15,017 trees was evaluated for overall health, structure, and observed risk indicators.

Tree Condition Summary:

- **Good: 8,097 trees – 53.92%**
- **Fair: 5,690 trees – 37.89%**
- **Poor: 563 trees – 3.75%**
- **Dead: 329 trees – 2.19%**
- **Hazardous: 338 trees – 2.25%**

This distribution indicates that approximately **91.8%** of Casper's urban forest is in good or fair condition, a strong baseline for long-term canopy performance. However, **1230 trees (8.19%)** are classified as poor, dead, or hazardous and should be prioritized for management intervention.

Of particular concern are the **338 trees flagged as hazardous**, which exhibit structural instability, decay, root failure, or other defects requiring immediate mitigation. These trees are disproportionately located in high-use areas such as parks, boulevards, and civic spaces, posing significant safety liabilities.



Risk Management Recommendations:

- Perform TRAQ-Level 2 inspections for all hazardous and poor-condition trees to validate risk ratings and determine mitigation urgency.
- Implement an annual removal and pruning schedule targeting declining or structurally unsound trees.
- Prioritize trees in fair condition for preventive maintenance to reduce transition into poor or hazardous states.

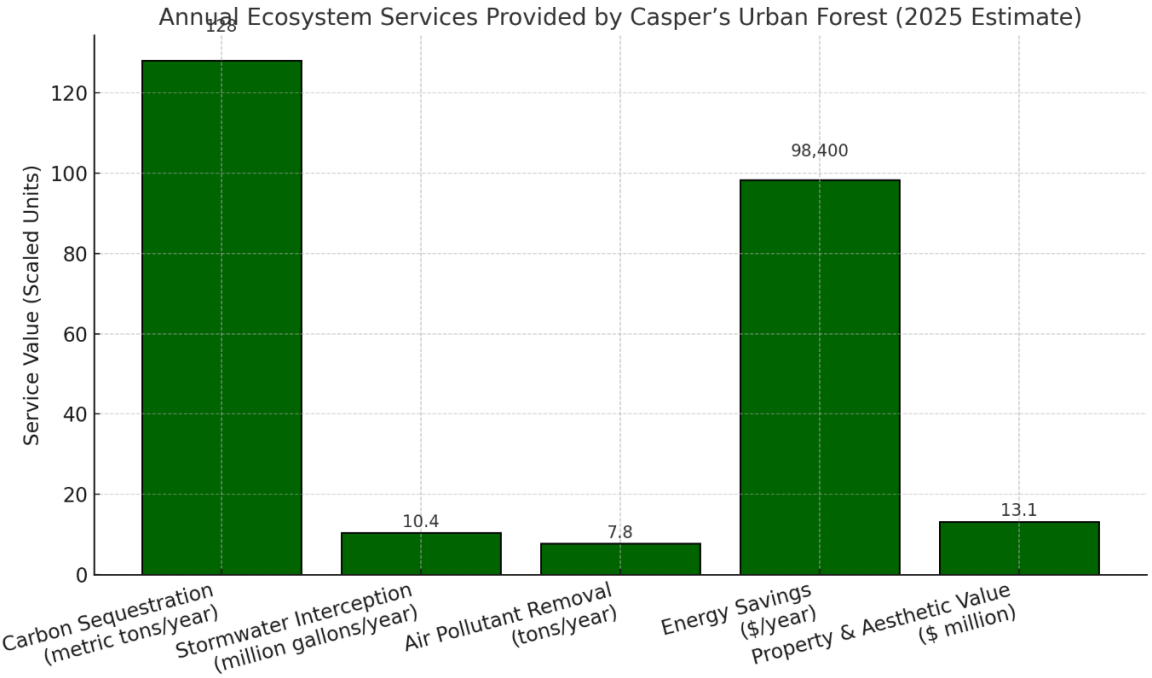
Structured condition monitoring, integrated with risk-based action plans, will help the City manage public safety obligations while improving overall tree health and extending canopy lifespan.

Ecosystem Services and Sustainability

Casper's urban forest plays a vital role in enhancing the city's environmental health, economic savings, and quality of life. Modeled through i-Tree Eco using data from 15,017 municipally managed trees, key ecosystem services include:

Annual Ecosystem Services (Estimated)

- **Carbon Sequestration:** ~128 metric tons/year
- **Stormwater Interception:** ~10.4 million gallons/year
- **Air Pollutant Removal:** ~7.8 tons/year, including ozone (O_3), nitrogen dioxide (NO_2), particulate matter (PM10), sulfur dioxide (SO_2), and carbon monoxide (CO)
- **Energy Savings:** ~$98,400/year in avoided heating/cooling costs
- **Property and Aesthetic Value:** ~$13.1 million in structural, visual, and market enhancement



Cumulative Ecosystem Benefits

- **Carbon Storage:** ~5,445 metric tons stored in tree biomass

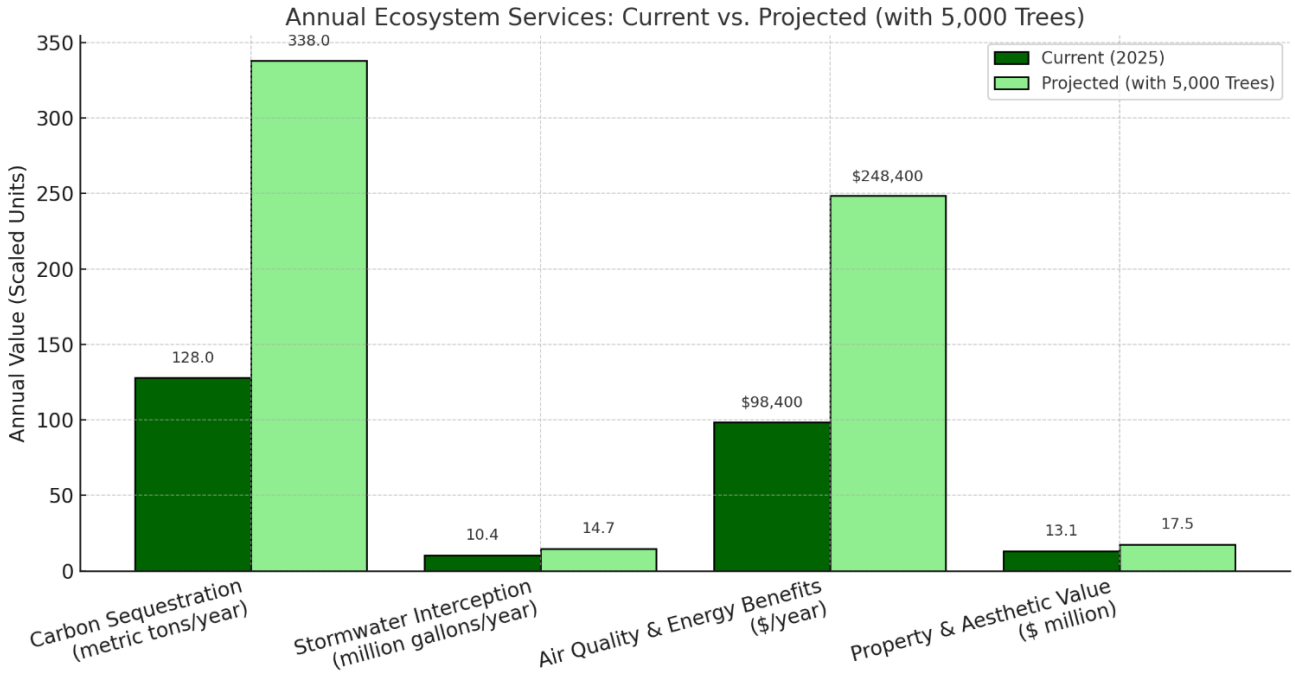
These figures illustrate the measurable return on investment in tree planting and maintenance, particularly when aligned with broader public health and sustainability goals.

Equity & Climate Resilience Strategy

- Expand planting in under-canopied, heat-vulnerable areas, including low-income neighborhoods and pedestrian corridors
- Prioritize long-lived, drought-tolerant species that maximize ecosystem function over time
- Integrate GIS-based equity analysis to identify service gaps and track progress

Projected Impact of a 10-Year Canopy Expansion Plan - A focused effort to plant and maintain 5,000 additional trees in priority areas is expected to:

- Increase total canopy cover by ~7%
- Intercept an additional 4.3 million gallons/year in stormwater
- Deliver ~$150,000/year in added air quality and energy cost benefits
- Sequester over 2,100 metric tons of carbon



By treating the urban forest as critical green infrastructure, Casper can realize long-term environmental, economic, and social returns while addressing climate adaptation, equity, and livability.

Supplemental Tools and Templates

This report includes a comprehensive suite of appendices and program templates to support consistent, professional, and effective management of Casper's urban forest. These tools are designed to be field-ready and operationally integrated into daily practices.

Key resources include:

- A complete **species inventory and tree condition analysis**, categorized by location and risk level.
- **Hazardous Tree Summary**, priority rankings, and mitigation timelines.
- A **recommended species list** tailored to Casper's climate, wind exposure, and soil conditions—emphasizing resilience, diversity, and long-term performance.
- Printable **public education materials**, including watering reminders, planting guides, and multilingual outreach flyers.
- Emergency response protocols fully aligned with **ISA TRAQ, ANSI A300, ICS/FEMA standards**, including field inspection forms, chainsaw safety logs, and post-storm recovery assessment templates.
- **Operational templates** for tree risk assessment, pruning records, planting documentation, pest management logs, and weekly activity tracking.

Collectively, these tools provide a science-based, action-oriented roadmap to protect, diversify, and enhance Casper's urban forest. Their consistent use will help ensure that Casper's trees are not only preserved as vital green infrastructure, but actively contribute to public safety, environmental resilience, and long-term community livability.

Urban Forest Inventory and Condition Overview

The City of Casper's urban forest is composed of **15,017 publicly managed trees** located across rights-of-way, parks, boulevards, municipal buildings, and other city-maintained properties. The **2024–2025 GIS-based inventory update** marked the first comprehensive reassessment since 2007, utilizing field surveys conducted in accordance with **ISA Best Management Practices** and **ANSI A300 standards**. Each tree was evaluated for species, diameter, condition, and site type—resulting in a robust, georeferenced dataset that will guide **long-term planning, risk reduction, maintenance scheduling, and performance monitoring**.

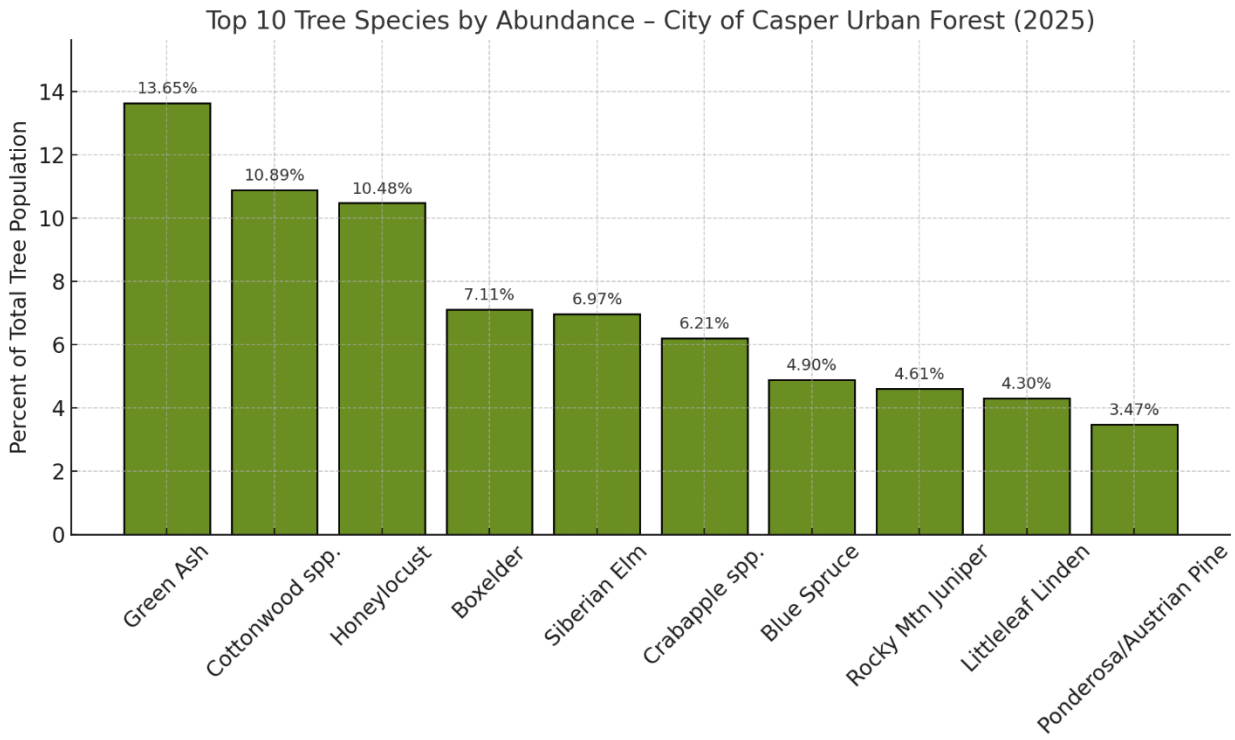
Inventory Snapshot

- **Total Trees Inventoried:** 15,017
- **Unique Species Represented:** Over 65
- **Top 10 Species by Abundance:**

Species	Percent of Total
Green Ash (*Fraxinus pennsylvanica*)	13.65%
Cottonwood spp. (*Populus spp.*)	10.89%
Honeylocust (*Gleditsia triacanthos var. inermis*)	10.48%
Boxelder (*Acer negundo*)	7.11%
Siberian Elm (*Ulmus pumila*)	6.97%
Crabapple spp. (*Malus spp.*)	6.21%
Colorado Blue Spruce (*Picea pungens*)	4.90%
Rocky Mountain Juniper (*Juniperus scopulorum*)	4.61%
Littleleaf Linden (*Tilia cordata*)	4.30%
Ponderosa/Austrian Pine (*Pinus ponderosa / nigra*)	3.47%

These ten species comprise **66.8%** of the urban tree population, reflecting moderate diversity but also indicating **overreliance on a few dominant genera**—notably *Fraxinus* and *Ulmus*. This imbalance increases Casper's vulnerability **to invasive pests, climate stress**, and **structural failure risks.**

- *Green Ash* remains highly susceptible to **Emerald Ash Borer (EAB)**, a pest now confirmed in nearby regions.
- *Siberian Elm*, while common, presents concerns due to **weak wood, brittle structure**, and **frequent limb failure.**

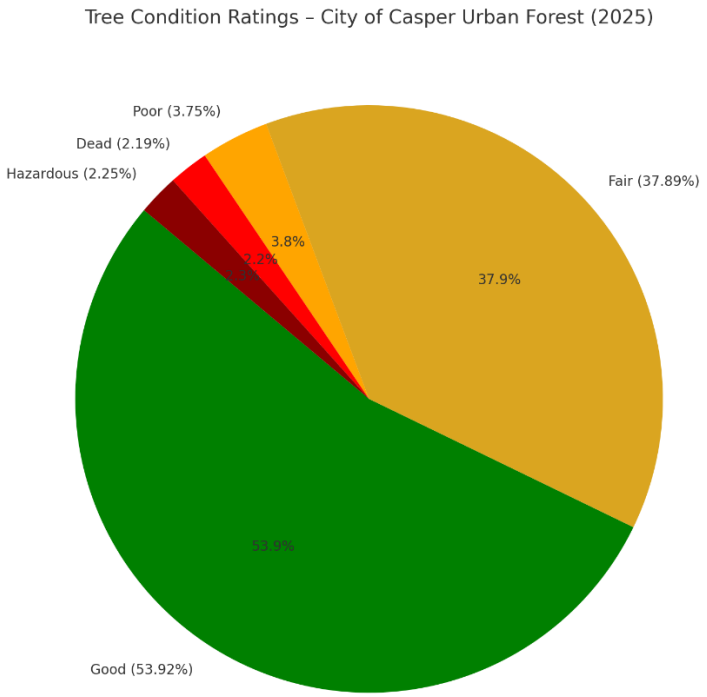


To build resilience, future planting should prioritize **genetic diversification** and reduce dependency on vulnerable or overrepresented species.

Tree Condition Ratings

Based on ISA Best Management Practices and ANSI A300 (Part 1) standards, tree conditions were assessed using field-verified visual inspections. The condition distribution across the 15,017 inventoried trees is as follows:

- **Good**: 8,097 trees – 53.92%
- **Fair**: 5,690 trees – 37.89%
- **Poor**: 563 trees – 3.75%
- **Dead**: 329 trees – 2.19%
- **Hazardous:** 338 trees – 2.25%



This distribution reflects a generally healthy urban forest, with over 90% of trees rated Good or Fair. However, the presence of **667 trees classified as either Dead or Hazardous** underscores the importance of proactive inspections, prioritized removals, and preventive maintenance—particularly in high-use public zones and aging infrastructure corridors where risks are most elevated.

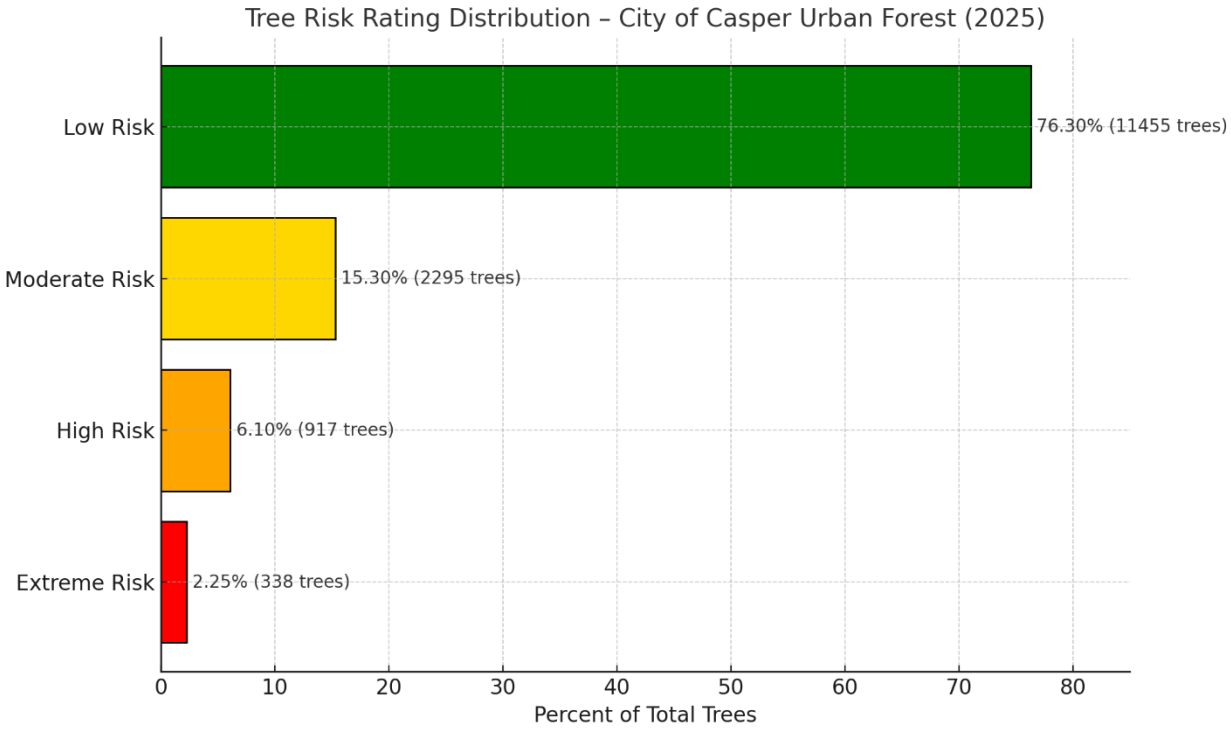
Risk Assessment Summary (ISA TRAQ Framework)

The City of Casper's tree risk assessment process follows the ISA Tree Risk Assessment Qualification (TRAQ) methodology, incorporating standardized evaluations of tree condition, structural defects, and proximity to targets (e.g., streets, buildings, sidewalks, utility lines). Each tree was assessed and classified into one of four risk categories:

Risk Rating Distribution (Based on Inventory Data)

- **Low Risk:** 76.3% (≈11,455 trees)
- **Moderate Risk:** 15.3% (≈2,295 trees)
- **High Risk:** 6.1% (≈917 trees)
- **Extreme Risk (Hazardous):** 2.25% (338 trees flagged explicitly)

Approximately **1,255 trees (8.35%)** fall into the High or Extreme Risk categories and require prioritized management to reduce safety hazards and prevent potential claims.



High-Risk Concentration Zones

- Along older rights-of-way with mature, structurally compromised trees
- In parks and cemeteries with declining legacy specimens
- Near schools, public facilities, and high-traffic corridors

Risk Assessment Methodology

- Visual inspections for structural defects (e.g., cracks, cavities, co-dominant stems, decay)
- Assessment of targets (pedestrian zones, utilities, structures, roads)
- Evaluation of site conditions such as compacted soils, limited rooting volume, and wind exposure
- Integration of incident history, including past storm damage and failure reports (when available)
- Data recorded with GIS-enabled mobile tools for geolocation, crew dispatching, and recordkeeping

Risk Management Implications - This updated risk data provides a robust baseline for:

- Targeting urgent removals or pruning in public spaces
- Prioritizing routine inspections using a rotating cycle
- Aligning maintenance planning with safety and legal standards
- Supporting budget forecasting for risk mitigation operations

Liability Consideration - Failure to inspect or address known high-risk trees exposes the City to legal liability in the event of injury or property damage. Exposure can be reduced by maintaining:

- A documented, cyclical inspection program
- Clear risk mitigation timelines
- Formalized assessments completed by ISA TRAQ-certified professionals

Recommended Risk Management Actions

- Immediate mitigation of all Extreme Risk (Hazardous) trees within 30 days of identification
- Pruning or removal of High Risk trees within 90–120 days
- Reinspection of all High and Extreme Risk trees within 12 months
- Ongoing training and re-certification for field personnel in ISA TRAQ protocols
- Use of mobile inventory systems to document risk level changes, completed actions, and future tasks

Staffing and Resources - Effective risk mitigation and hazard tree management require both qualified personnel and the appropriate technological tools. The City of Casper's proactive tree risk program should continue to prioritize staff certification, digital field systems, and public communication protocols to ensure safety, transparency, and accountability.

Certified Personnel Requirements

- All hazard tree inspections and mitigation decisions must be led by ISA Certified Arborists.
- At least one team member should hold ISA Tree Risk Assessment Qualification (TRAQ) certification to oversee formal risk ratings and ensure compliance with ANSI A300 Part 9 standards.
- Crews performing high-risk removals should also receive documented safety training (e.g., chainsaw use, aerial lift operation, rigging protocols) as outlined in ANSI Z133 standards.

Technology and Equipment

- Equip teams with 1–2 rugged mobile tablets preloaded with:
    - Casper's GIS-based tree inventory
    - Real-time digital work order tracking
    - Risk scoring tools with dropdown inputs and photo logging
- Ensure field data syncs to a central cloud-based system for:
    - Risk trend analysis
    - Reinspection reminders
    - Maintenance history tracking

Public Communication Protocols

- Notify adjacent property owners in advance of hazard tree removals, especially in residential areas or zones with high visibility and liability.
- Incorporate risk rating visuals (e.g., green/yellow/red coding) into public education materials to help residents understand removal and pruning priorities.
- Consider using QR-coded signage or website dashboards to share status updates on removal timelines, replanting plans, and risk reduction progress.

Strategic Benefits - Implementing this staffing and technology approach supports:

- Reduced legal liability through documented due diligence
- Improved efficiency in work order completion and tracking
- Greater public confidence through transparent, visual communication
- Long-term preservation of Casper's urban forest through safe, timely action

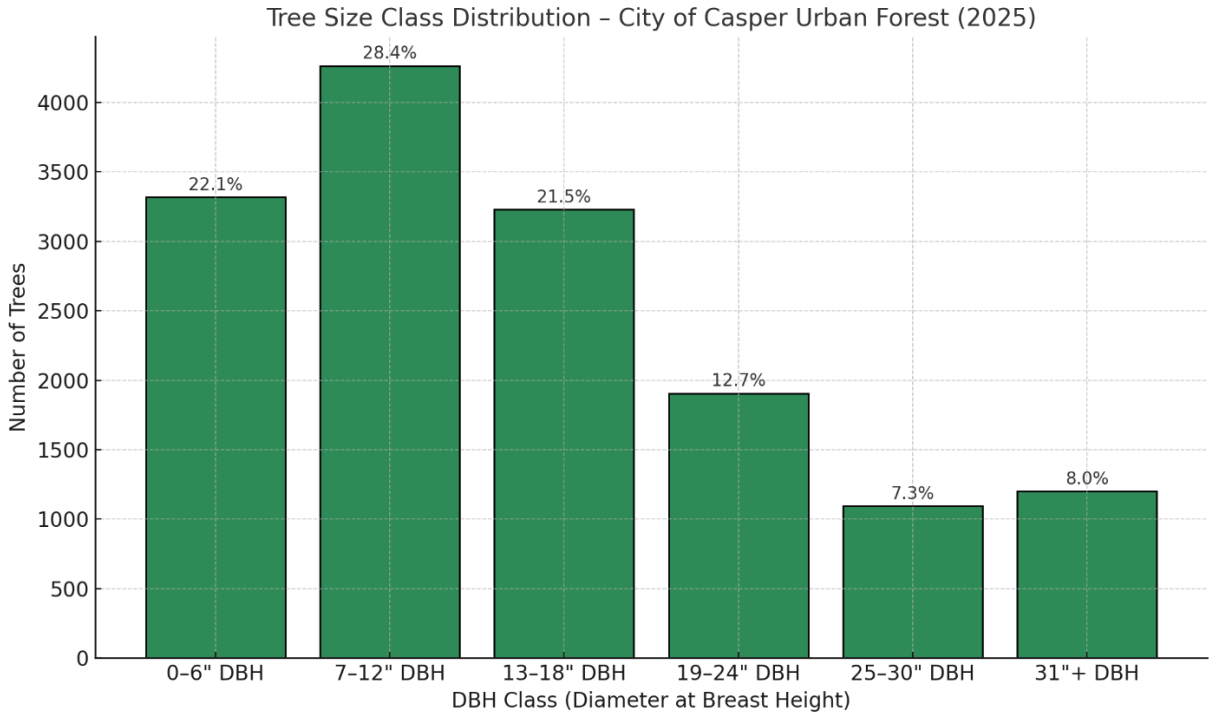
This defensible and transparent risk management framework helps Casper prioritize public safety, extend tree lifespan, and protect municipal assets through responsible, evidence-based urban forestry practices.

Size Class Distribution

Understanding the size class—or diameter-at-breast-height (DBH)—distribution of an urban forest is essential for assessing its age structure, health trajectory, and long-term sustainability. A well-balanced urban forest contains a mix of young, maturing, and mature trees, ensuring continual canopy replacement and ecological resilience.

The City of Casper's inventory of 15,017 municipally managed trees reveals the following DBH class distribution:

- **0–6 inches DBH:** 3,319 trees – **22.1%**
- **7–12 inches DBH:** 4,264 trees – **28.4%**
- **13–18 inches DBH:** 3,230 trees – **21.5%**
- **19–24 inches DBH:** 1,906 trees – **12.7%**
- **25–30 inches DBH:** 1,096 trees – **7.3%**
- **31 inches and larger:** 1,202 trees – **8.0%**



This distribution shows a relatively strong representation of small to mid-sized trees, especially in the 7–18 inch range, which together account for nearly **50%** of the total population. This suggests that Casper's urban forest includes a healthy cohort of maturing trees poised to deliver peak canopy services over the next 10–20 years.

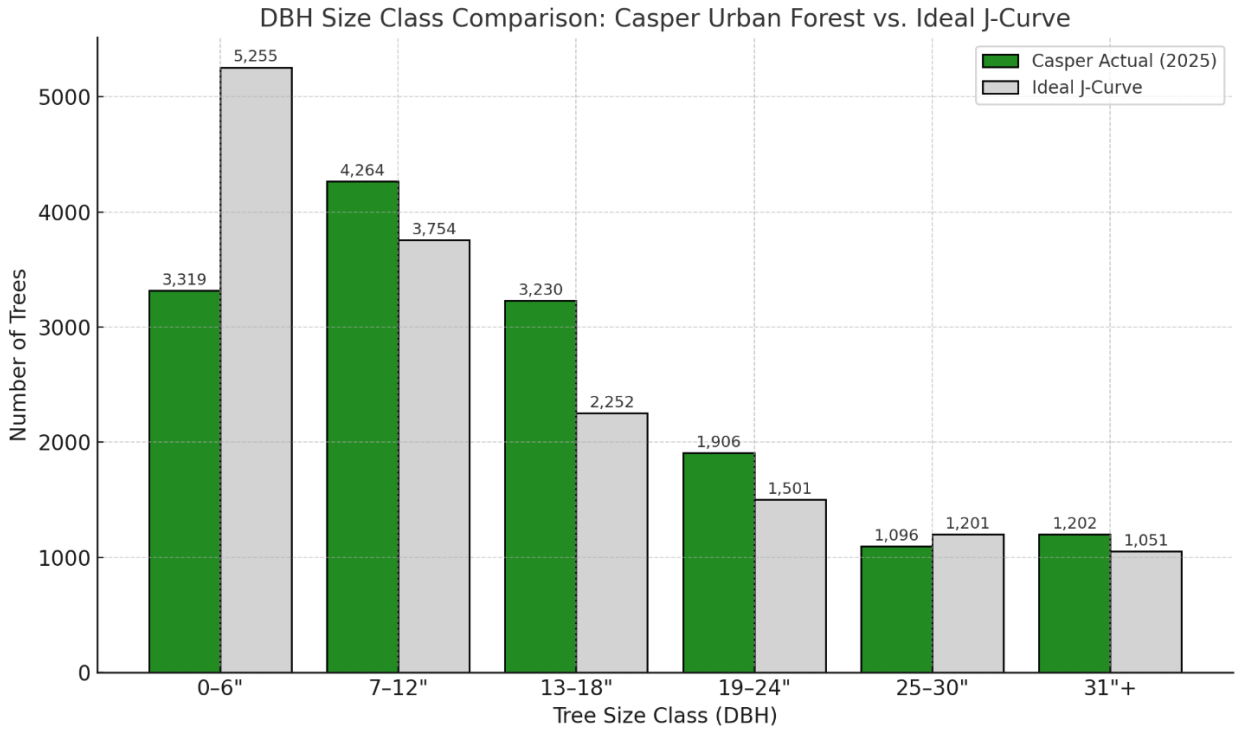
The presence of **22.1%** in the smallest DBH class reflects recent planting efforts, though these young trees will require structured care to ensure establishment and long-term survivability.

However, large-size classes (trees with DBH ≥ 25 inches) represent only **15.3%** of the inventory. This tapering highlights a limited population of legacy canopy trees and points to the need for long-term planning to replace these vital contributors as they reach the end of their lifespans.

Urban Forest Structure and Planning Implications

A healthy urban forest ideally exhibits an inverted “J-curve” distribution, with many young trees supporting a gradually narrowing number of older, large-canopy trees. Casper’s current profile generally follows this pattern, but gaps in mid- to large-size classes highlight the need for:

- Continued planting of small-caliper trees (1.5"–2.5")
- Structured establishment care (watering, pruning, mulching)
- Strategic planting in underrepresented areas and along boulevards
- Long-term replacement planning for legacy trees



Integration into Management Planning - This DBH profile supports data-driven decisions on:

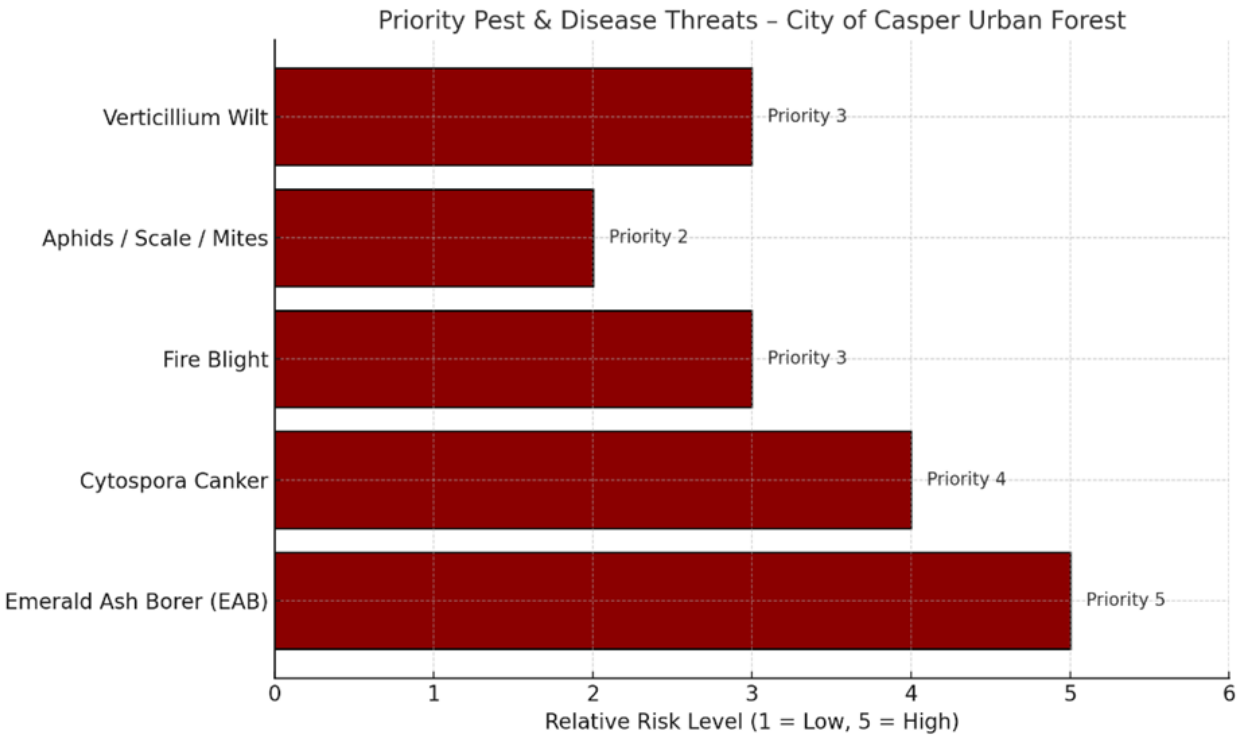
- Where to focus planting to ensure even age distribution
- How to prioritize young tree care to maximize survivability
- Budgeting and lifecycle planning for future canopy loss and replacement

These insights are incorporated into Casper's strategic recommendations for planting targets, maintenance cycles, and equipment/staffing budgets.

Pest, Disease, and Integrated Pest Management (IPM) Framework

The long-term health and sustainability of Casper's urban forest are increasingly influenced by the spread of invasive pests, climate-related stressors, and biotic diseases. The city's current species composition includes several taxa vulnerable to these threats—particularly Green Ash, Crabapple spp., and Colorado Blue Spruce.

Green Ash comprises 13.65% of the tree population and represents a high-priority concern due to its susceptibility to Emerald Ash Borer (EAB), a destructive invasive insect confirmed in nearby regions.



IPM Program Overview - Casper's IPM strategy follows guidelines from the ISA Best Management Practices and ANSI A300 (Part 10): Integrated Vegetation Management, focusing on early detection, ecological balance, and the use of least-disruptive treatments. The goal is to manage pests and pathogens using science-based, environmentally responsible methods that support tree health and ecosystem integrity.

Common Pests and Disease Threats in Casper

Emerald Ash Borer (Agrilus planipennis)

- *Targets:* Fraxinus spp. (Green Ash)
- *Notes:* Not yet confirmed in Casper, but present in surrounding states. Early detection is critical.

Cytospora Canker (Cytospora spp.)

- *Targets:* Picea pungens (Blue Spruce), Populus spp. (Poplar)
- *Symptoms:* Bark discoloration, branch dieback, resin flow.

Fire Blight (Erwinia amylovora)

- *Targets:* Malus spp. (Crabapple), Pyrus spp., Syringa spp. (Lilac)
- *Symptoms:* Wilted shoots, blackened tips, oozing cankers.

Aphids, Scale Insects, and Spider Mites

- *Targets:* Multiple broadleaf and conifer species
- *Notes:* Stress-inducing secondary pests that worsen drought impacts.

Verticillium Wilt (Verticillium dahliae)

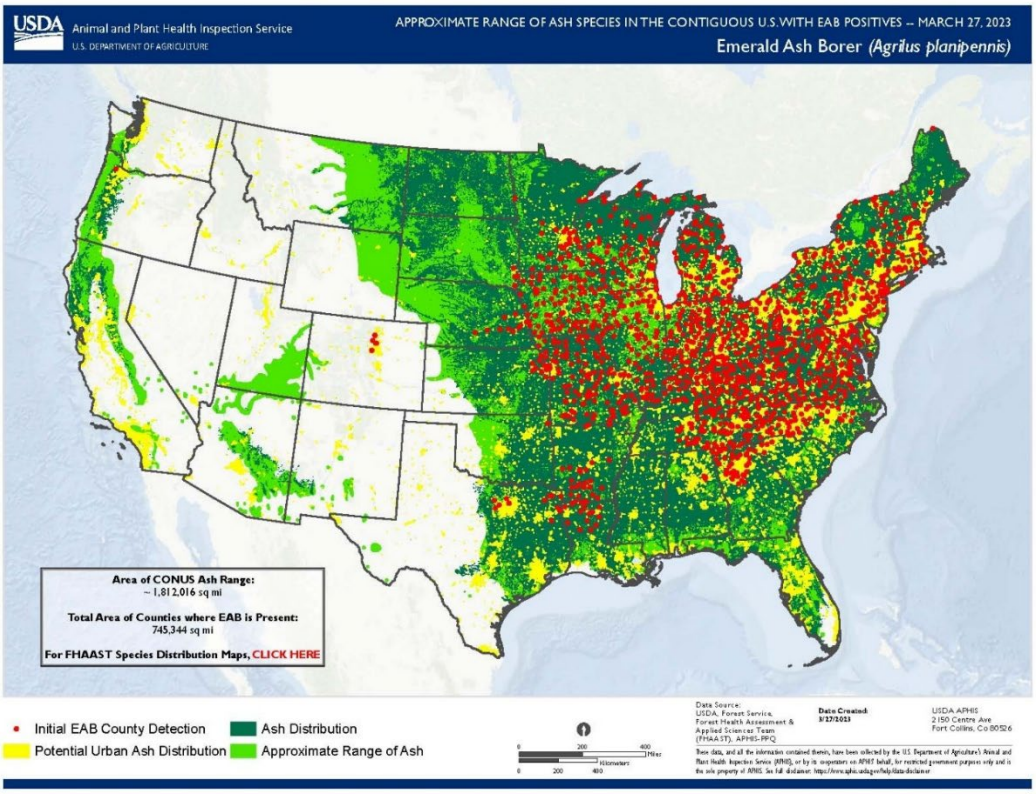
- *Targets:* Acer spp. (Maple), Gleditsia spp. (Honeylocust)
- *Symptoms:* Sudden branch dieback, leaf scorch, vascular staining.

IPM Implementation Components

- *Inventory Integration:* Pest-vulnerable species are tagged in the GIS-based tree database and scheduled for seasonal inspections.
- *Field Monitoring:* Includes visual inspections, canopy assessments, and pheromone traps in high-risk zones.
- *Preventative Management:*
    - Mulching to regulate soil conditions
    - Soil aeration and deep watering in compacted zones
    - Dormant-season pruning to reduce infection vectors
- *Treatment Protocols:*
    - Use of trunk injections and targeted sprays only when thresholds are met
    - Priority on cultural and biological controls over chemical applications
- *Public Education:*
    - QR-coded tree signage for citizen pest reporting
    - Outreach via flyers, kiosks, and city websites
    - Promotion of a hotline or reporting app for EAB or general tree health concerns

Emerald Ash Borer Response Strategy

- Conduct annual surveys for EAB signs (e.g., D-shaped exit holes, canopy thinning)
- Diversify planting selections to reduce reliance on ash
- Develop phased removal and replacement of declining ash based on condition and risk
- Train staff and volunteers on EAB ID, detection, and response protocols



Technology Tools

- GIS-based pest tracking layers for mapping threats and optimizing inspections
- Mobile forms with dropdown pest codes and photo upload capabilities
- Seasonal pressure maps to support Plant Health Care resource allocation

Casper's IPM framework provides a science-based, adaptive approach to managing pests and diseases while minimizing chemical inputs. It supports canopy resilience and aligns with broader sustainability and risk mitigation objectives.

Community Outreach and Planting Priorities

Building a resilient and equitable urban forest requires more than maintenance, it demands active community engagement and strategic replanting where ecosystem benefits are lacking.

Casper's canopy coverage remains uneven, with several neighborhoods and corridors showing significant deficits in tree cover. These areas are disproportionately affected by urban heat, air quality issues, and mental health disparities linked to limited green space access.

Priority Planting Areas (based on canopy gaps, demographic vulnerability, and heat island data):

- North Casper Residential Corridors (where possible)
- Paradise Valley Vicinity/West Casper
- Downtown Redevelopment Zones
- Commercial Corridors
- Rights-of-Way

Action Framework

- Prioritize planting and establishment care in under-canopied zones
- Focus on diverse, climate-adapted species that align with Casper's soil, wind, and water conditions
- Use equity-focused GIS overlays to guide planting decisions and grant applications
- Integrate canopy expansion goals into broader climate resilience and public health initiatives

By investing in these communities, Casper can ensure that every resident has access to the environmental, social, and economic benefits of a healthy urban forest.

Community Engagement Goals

A successful and resilient urban forest depends not only on professional management but also on community involvement, education, and shared ownership. Casper's community engagement strategy should foster public participation in tree planting, care, and decision-making—ensuring the urban forest thrives as a shared civic asset.

Engagement Objectives

- Increase public awareness of the environmental, social, and economic benefits provided by urban trees
- Foster community stewardship through hands-on planting programs and volunteer opportunities
- Improve young tree survival by educating residents on proper care practices (e.g., watering, mulching, pruning)
- Build public trust and transparency in the city's long-term tree replacement and risk mitigation efforts

Tactics and Tools

- Launch a "Trees for Casper" initiative, distributing 500+ trees annually to eligible residents, schools, and public spaces
- Host seasonal tree workshops, such as:
    - Spring: Tree selection and planting
    - Summer: Watering and stress management
    - Fall: Mulching and pruning basics
- Partner with local schools, civic groups, and neighborhood associations to co-host tree planting days and education events
- Create and distribute multilingual tree care materials to ensure inclusivity across Casper's diverse communities
- Establish an online tree request portal with interactive maps showing planting opportunities and program eligibility
- Integrate urban forestry performance metrics (e.g., trees planted, survival rates, canopy growth) into the city's public-facing data dashboards

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Equity and Environmental Justice Considerations

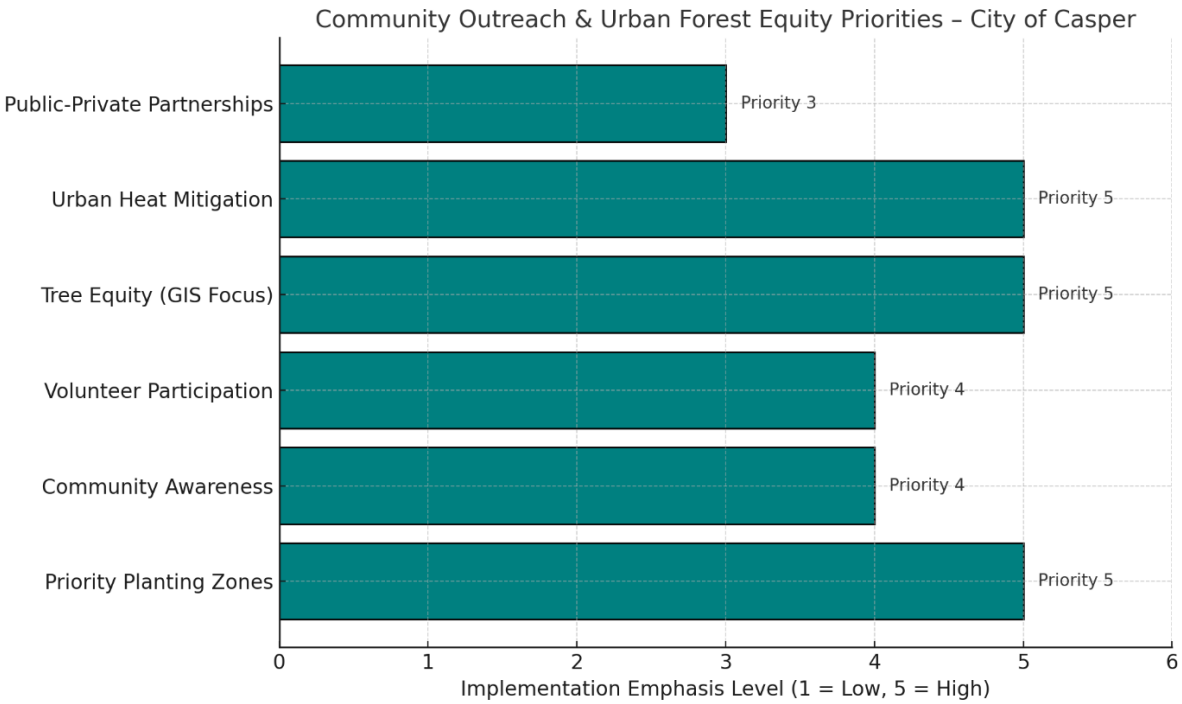
Planting efforts and outreach must intentionally target historically underserved and canopy-deficient neighborhoods. Casper should use GIS mapping overlays that incorporate:

- Tree canopy coverage
- Income level
- Age demographics
- Health vulnerability
- Urban heat island data

These overlays help identify “tree equity zones” that merit prioritized investment and tailored outreach. By centering equity in planning, Casper ensures all residents benefit from the urban forest’s ecosystem services.

Volunteer Program Development

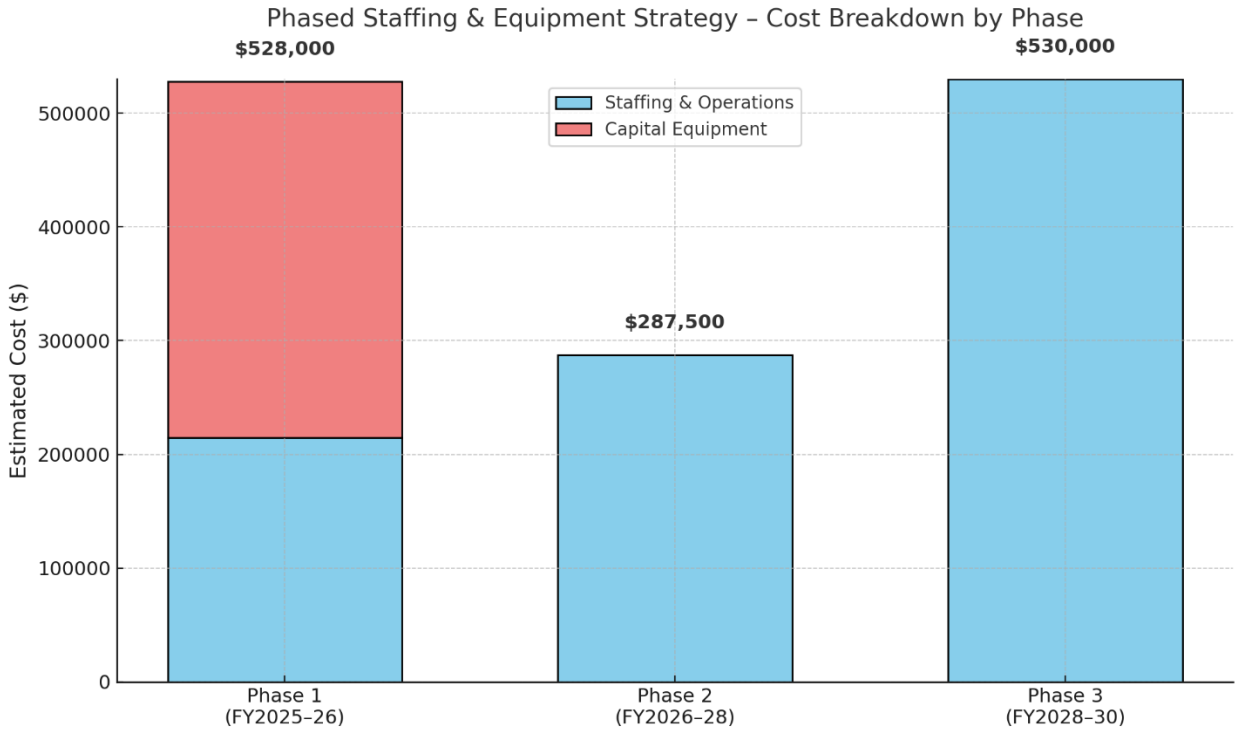
- Launch the “Urban Forest Stewards” program to train local volunteers as tree monitors and neighborhood advocates
- Offer incentives such as:
    - Certificates of service
    - Recognition at Arbor Day events
    - Inclusion in city newsletters or volunteer appreciation events
- Use GIS-enabled mobile apps for crowdsourced condition reporting, allowing citizens to log issues like dead branches, pests, or vandalism in real time



By aligning outreach strategies with Casper’s planting priorities, equity goals, and climate resilience planning, the city can expand both its canopy coverage and public support. Sustained engagement will ensure that residents become active co-stewards of their shared urban forest, strengthening environmental health, civic pride, and intergenerational stewardship.

Staffing, Equipment, and Budget Implementation Strategy

Effective urban forest management requires a skilled workforce, reliable equipment, and sustainable, phased funding. The City of Casper's plan includes a multi-phase approach to build internal operational capacity, reduce contractor reliance, and manage long-term equipment and maintenance costs. This section summarizes the strategy, with full operational models and financial breakdowns detailed in **Appendices G and H.**



Phased Implementation Timeline

- **Phase 1 (FY2025–26): Establish Core Capacity**
    - Staff: 1 Urban Forest Supervisor (ISA CA, CUFP) + 1 Certified Arborist
    - Tasks: Launch pruning/removals, inspections, GIS data integration
    - Equipment: Chainsaws, PPE, tablets
    - Budget Estimate: ~$528,000 total (including $215,000 Ops + $313,000 in Capital Equipment)
- **Phase 2 (FY2026–28): Expand Crew and Capabilities**
    - Add 1 Arborist and seasonal crew (1,200 hrs)
    - Launch PHC treatments, district pruning
    - Budget Estimate: ~$275,000–$300,000
- **Phase 3 (FY2028–30): Full Team and Capital Acquisition**
    - Full team of 5 (4 Arborists + Supervisor)
    - Add aerial lift, chipper, PHC rig
    - Launch Urban Forest Stewards program, public dashboard
    - Budget Estimate: ~$530,000/year (fully scaled)

Budget Model Summary (see Appendix G)

Category	Annual Cost (Phases 2–5)
Staffing (5-person team)	$392,000
Equipment O&M	$65,000
Tree Planting (500/year)	$137,500
Outreach & Training	$17,000
Technology (GIS, Cloud)	$12,500
Total Annual Budget	$624,000

The **initial Year 1 cost**, including capital equipment, is approximately $528,000. Lifecycle replacement and maintenance follow ANSI A300 and OSHA standards (see Appendix H).

Cost Savings and Funding

- In-house model reduces potential contractor reliance, saving ~$130,000/year.
- Equipment sharing with Streets/Fleet can offset $15,000–$25,000/year.
- Grant and interdepartmental fund opportunities include:
    - **USDA UCF, Arbor Day Foundation, FEMA BRIC, local utilities**
    - Stormwater and public safety budgets for tree planting and hazard abatement

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Policy Integration, Planning, and Emergency Alignment

To maximize the value and resilience of Casper's urban forest, policy must align with municipal regulations, capital planning, equity initiatives, and climate strategies. This section reviews current ordinances, identifies gaps compared to best practices (ANSI A300, ISA BMPs), and proposes actionable updates.

1. Tree Protection & Planting Ordinances

Current Code:

- Casper Chapter 12.32 governs arborist licensing and enforces trimming permits over 12 feet, $750 penalties for unlicensed work, and mandatory insurance for commercial arborists.
- Tree planting requires distance from curbs and sidewalks; planting or removal on public property requires Parks Dept. permission.
- Boulevard trees must maintain 8 ft clearance above sidewalks and 15 ft above streets/alleyways, enforced via code enforcement.

Gaps / Proposed Enhancements:

- Expand definitions to include **Tree Protection Zones (TPZs)** in private & development sites.
- Require **pre-/post-construction tree assessments** and developer-submitted **tree protection & replanting plans**, currently absent.
- Formalize **minimum planting setback rules**, such as no planting within 4 ft of curbs or sidewalks (already noted but not coded).
- Update replacement ratios to **2:1 canopy equivalency**, reflecting ANSI/ISA standards, with penalties up to **$1,000/tree,** enabling permit suspension for non-compliance.

2. Enforcement & Code Clarification

Current Code:

- Property owners must maintain parkways—trimming to 8'/15', remove trimmings via sanitation.
- Code Enforcement and Parks coordinate on dangerous trees, but ambiguity exists, resolved through recent amendments clarifying cost responsibility and ability-based assistance.

Gaps / Enhancements:

- Codify a **cost-sharing program** between property owners and city for parkway maintenance, rather than informal arrangements.
- Implement a **billing policy:** subsidies for seniors/disabled, fee recovery from owner violations, and an administrative fee for city-led removals.
- Clarify responsibility: private property owners handle private tree violations; city takes lead on public rights-of-way; only certified arborists may perform work.

3. Permitting, Commercial Arborist Licensing & Liability

Current Code:

- Licensing requires ISA certification within 3 years and $1M liability coverage; unlicensed tree work on public trees is a misdemeanor with $750 fines.
- Commercial permits managed via Chapter 12.32.

Gaps / Enhancements:

- Require **ISA Certified Arborist oversight** for any work on trees over 12 ft—already practice but should be explicit in code.
- Raise license insurance to **$2M aggregate**, matching ANSI recommendations.
- Publish a Certified Arborist list with contact info to improve compliance and transparency.

4. Integration with Capital Planning & Infrastructure

Current Code:

- Appendix B of Public Works Specs references tree planting standards, spacing, and material specs.
- Landscaping and buffering standards (Chapter 17 Appendix B/C) address spacing and species.

Gaps / Enhancements:

- Establish **inter-department workflows**—Urban Forestry must review site plans, CIP projects, and development permits.
- Formalize inclusion in **Stormwater and Climate Resilience programs**, justifying stormwater credit for tree investments.

- Require **utility coordination** (10 ft offsets from mains, 40 ft from curbs) before planting.

5. Equity, Canopy Goals & Sustainability Objectives

Current Code:

- No explicit equity or canopy coverage targets; the current focus is safety and maintenance.
- Dangerous vegetation rules applied equally across neighborhoods.

Gaps / Enhancements:

- Adopt **tree equity zones**, prioritizing low-canopy, high-vulnerability neighborhoods.
- Embed **canopy expansion targets** in Climate Action Plans and Sustainability policies.
- Incorporate urban forestry metrics (e.g., canopy growth, tree survival) into public dashboards.

6. Emergency Response & Risk Management

Current Code:

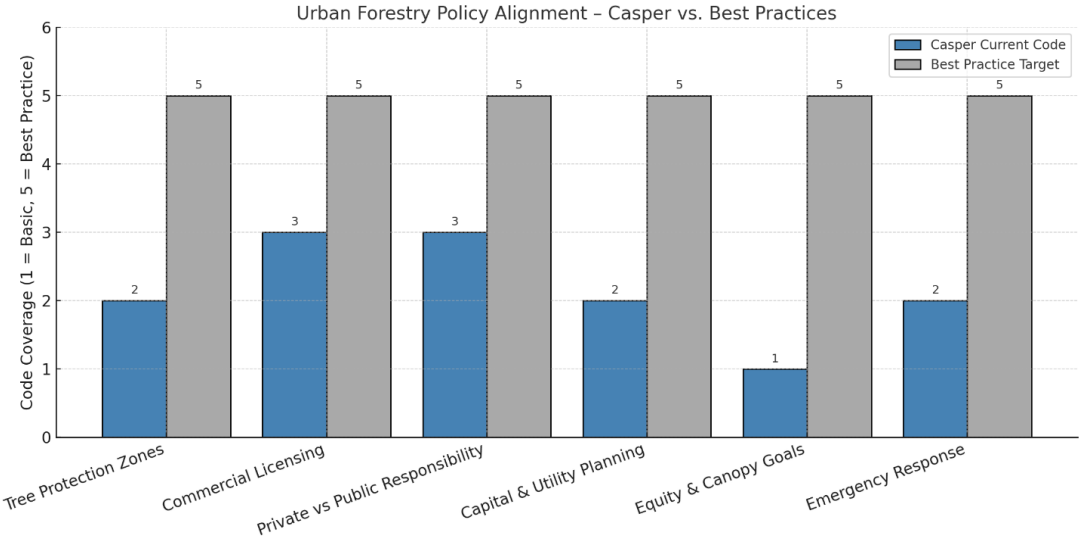
- Dangerous tree trimming is seen as a code enforcement/public safety issue; costs passed to owners.
- Standards require arborist-performed tree work; however, emergency frameworks are informal.

Gaps / Enhancements:

- Develop a **formal Urban Forestry Emergency Response** protocol integrated into the City's EOP.
- Specify **responsibility thresholds**, response timelines, documentation, and FEMA reimbursement procedures.
- Conduct **annual drills** involving Parks, Streets, and Emergency Management departments.

Summary Table – Code Comparison

Policy Area	Casper Existing Code Highlights	Gaps & Recommended Updates
Tree protection zones	Removal permits, setback rules	Code TPZ, pre/post assessments, replacement ratios
Commercial licensing	ISA certification, insurance	Require ISA onsite, $2M coverage, public list
Private vs public responsibility	Parkway maintenance by owner	Codify cost-share, billing, city responsibility
Capital & utility planning	Public Works specs reference	Formal review workflows across departments
Equity & canopy goals	Safety-focused only	Tree equity zones, canopy targets, sustainability links
Emergency response	Ad hoc enforcement role	Integrated EOP, FEMA eligibility, drills



By updating code in these priority areas, Casper can align its municipal regulations with ANSI A300 and ISA BMPs, strengthen enforcement, support equity outcomes, and integrate urban forestry into broader strategic planning.

Planning, Capital, Emergency Integration, and Technology, Monitoring & Data Strategy
Urban Forestry in Planning Department Operations

- Require formal coordination with Planning, Engineering, Parks, and Utilities:
    - Site plan and subdivision review
    - Tree preservation requirements
    - Post-construction inspections
- Include urban forestry representative in Capital Improvement Project (CIP) reviews:
    - Utility upgrades
    - Street and curb renovations
    - Sidewalk and stormwater improvements

Climate & Canopy Equity Alignment

- Embed tree canopy targets in:
    - Casper's Climate Action and Sustainability Plan
    - Stormwater mitigation policies
    - Air quality and public health initiatives
- Use Tree Equity Scores, Heat Island Maps, and Demographic Overlays to guide investments and prioritize planting in underserved areas.

Urban Forestry Emergency Response Framework

Preparedness Measures:

- Create preloaded GIS maps of critical canopy zones and infrastructure risks
- Conduct pre-storm pruning in high-exposure areas
- Maintain updated emergency contacts across Parks, Streets, and Public Works

Response Protocols:

- Activate the Urban Forestry Incident Team, led by the Urban Forest Supervisor
- Deploy ISA-certified arborist crews with mobile GIS tools and storm-tracking dashboards
- Document all damage and removals with photo-tagged inventory updates

Post-Event Recovery:

- Inspect and triage all public trees citywide
- Prioritize mitigation of hazard trees in schools, hospitals, roads
- Update the tree inventory with removals, losses, and replanting targets

Training and Reimbursement:

- Train staff in FEMA ICS protocols
- Conduct annual drills and tabletop simulations
- Track labor, fuel, and equipment use for FEMA reimbursement

Inventory & GIS Integration:

- Use cloud-based platforms (e.g., TreePlotter, ArcGIS Online) for:
    - Real-time tree updates and risk mapping
    - Integration with zoning, flood, and infrastructure layers
    - Tree ID tags and QR codes

Monitoring and Analytics:

- Use i-Tree Eco and i-Tree Canopy to:
    - Model ecosystem services
    - Monitor canopy change and planting impacts
- Audit 10–20% of tree population each year; full refresh every 5 years

Emerging Tools:

- Pilot drone inspections for high canopy zones
- Evaluate LiDAR canopy analysis
- Use AI for pest recognition and canopy decline alerts

Data Governance:

- Assign an official Data Steward role – including digital tree inventory maintenance
- Standardize naming conventions, metadata, and audit logs
- Monitor key performance indicators (KPIs):
    - % of trees inspected/year
    - Survival rate of newly planted trees
    - Avg. response time to hazard calls
    - Annual % canopy change

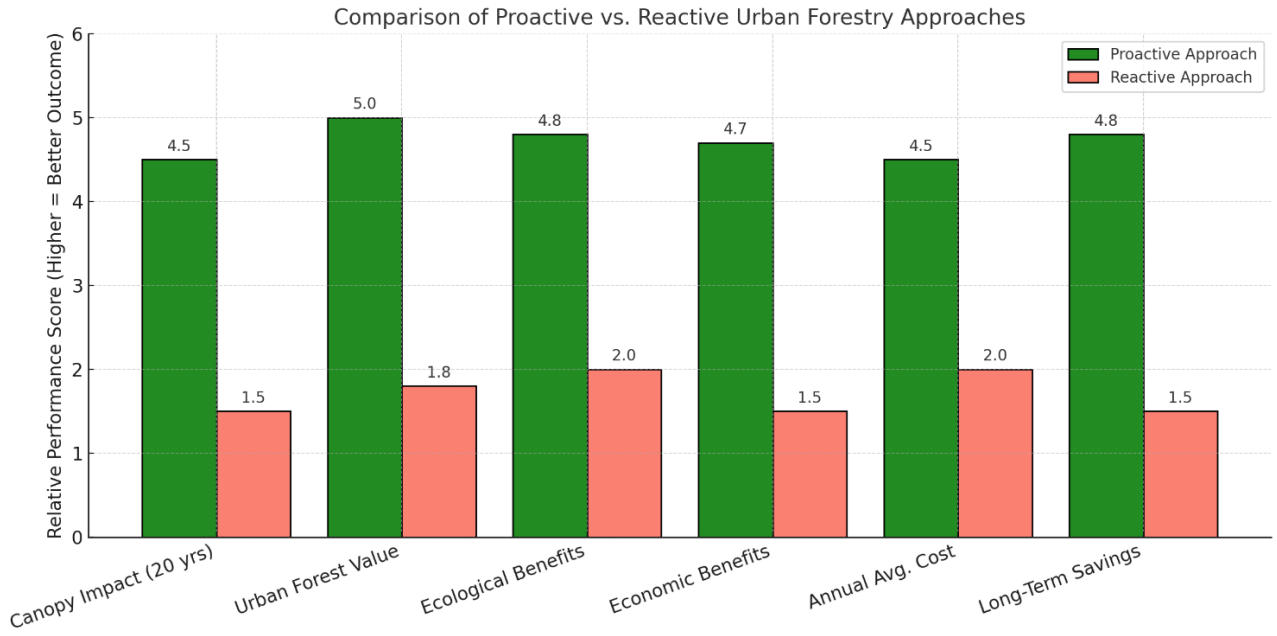
See Appendix H for the 5-Year Reassessment Schedule outlining inventory and canopy analysis milestones.

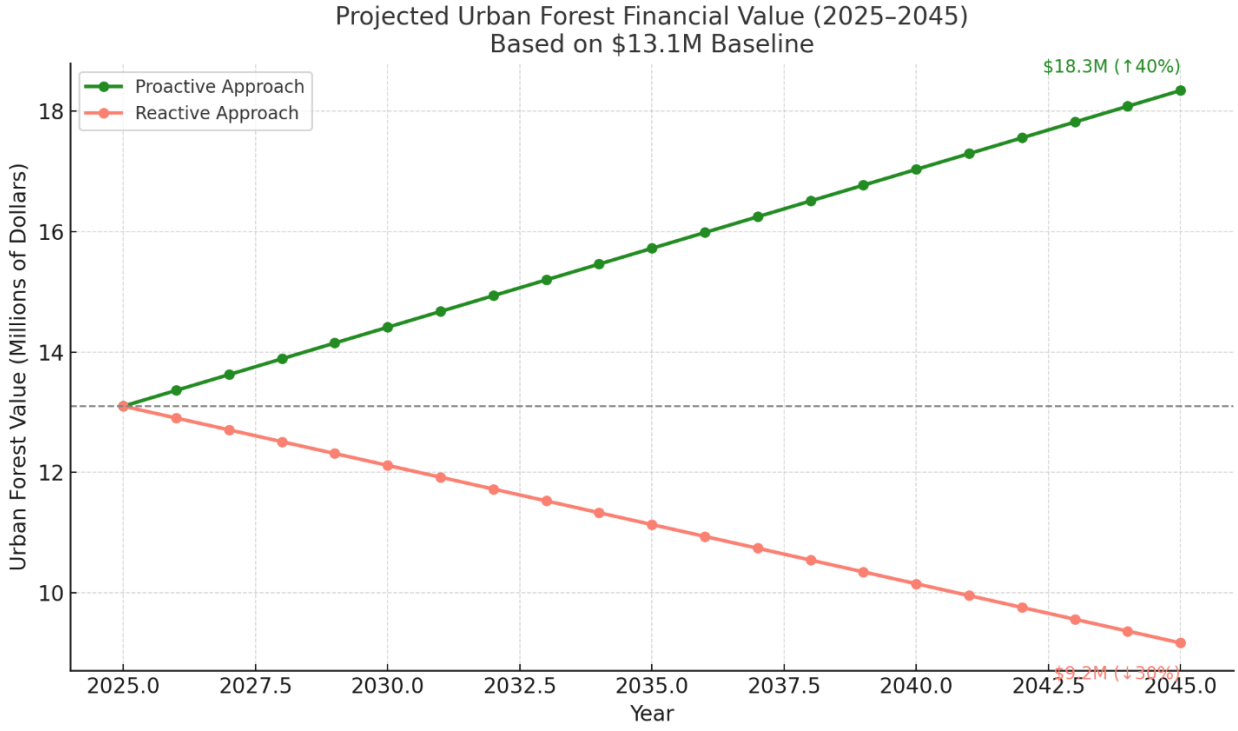
By institutionalizing forestry in codes, planning, and emergency frameworks—and pairing it with modern digital tools—Casper can build a responsive, transparent, and climate-resilient urban forest management program.

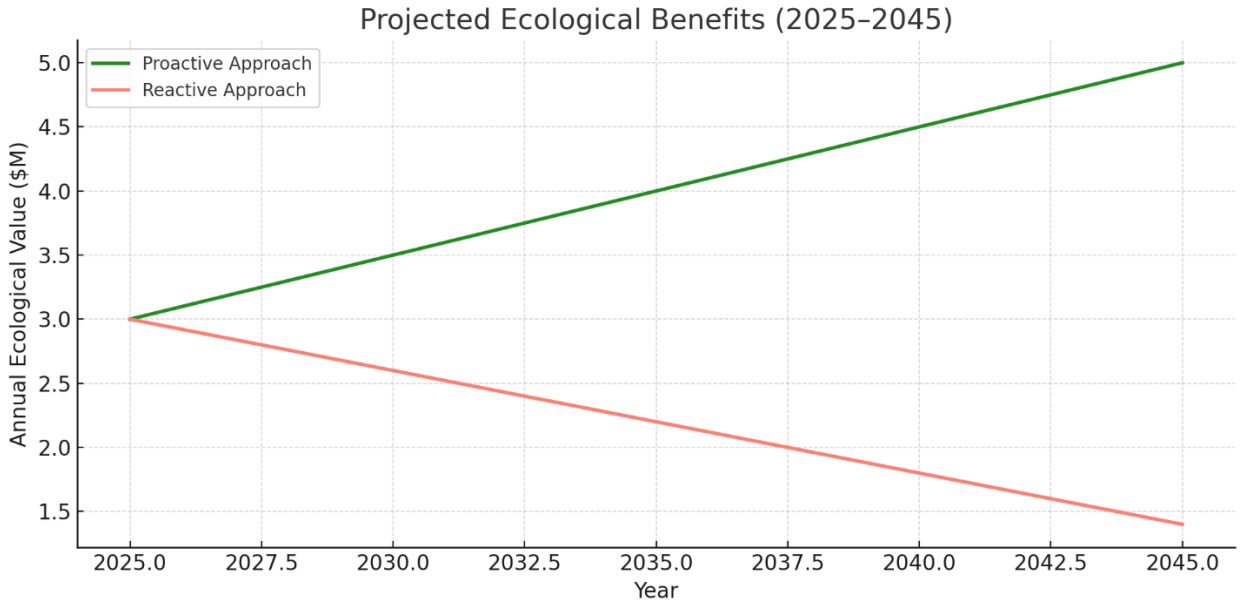
Comparison of Proactive vs. Reactive Urban Forestry Approaches

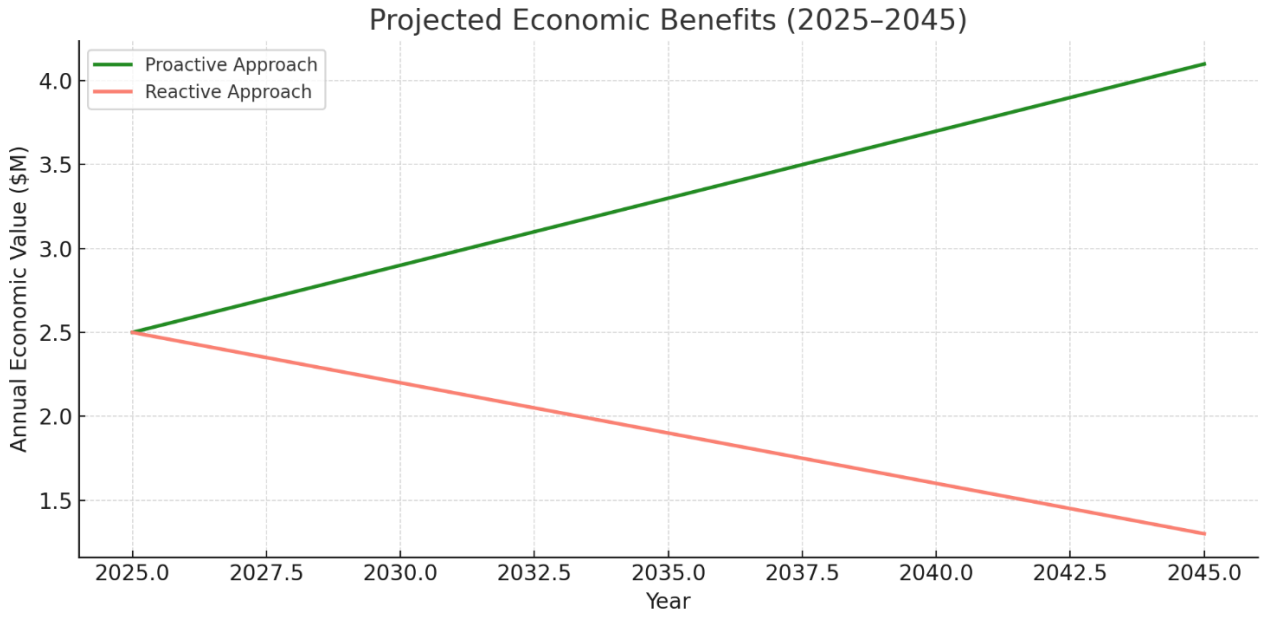
Establishing a proactive urban forestry management system yields significantly different outcomes from a reactive or minimum care approach. The table below outlines operational, financial, and ecological differences over a 20-year time horizon.

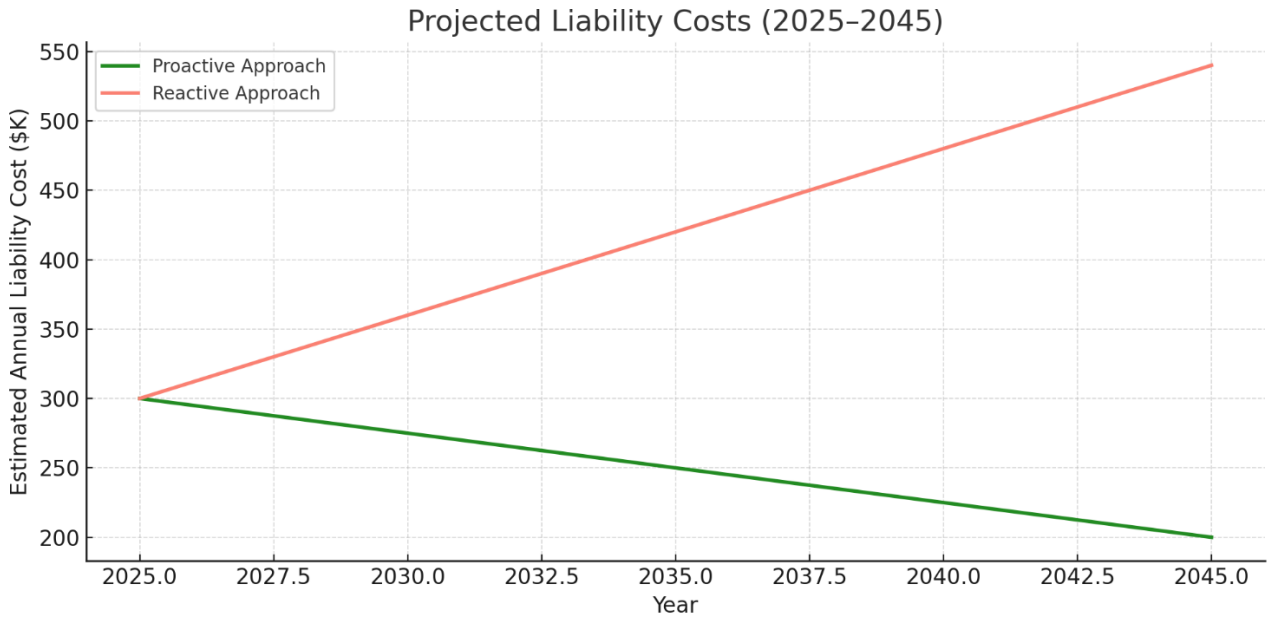
Feature	Proactive Management Approach	Reactive/Minimum Care Approach
Staffing	Full-time ISA Certified staff, phased hiring aligned with workload projections	Minimal staffing, reliance on emergency contractors
Inventory	Regularly updated digital tree inventory, risk scoring, canopy analysis via GIS/i-Tree	Infrequent updates, lack of structured database
Maintenance	Cyclical pruning, preventive PHC applications, and structured annual inspections	As-needed, complaint-driven removals only
Risk Management	TRAQ-compliant assessments, mitigation scheduling, and follow-up documentation	Limited or delayed inspections, elevated liability exposure
Public Engagement	Community outreach, volunteer stewards, transparency dashboards	Complaint-driven interaction only
Budget Planning	Multiyear forecasting, equipment lifecycle tracking, external grant pursuit	Short-term spending, no long-term equipment or staffing strategy
Legal Liability	Reduced claims through documented inspections and mitigation protocols	High litigation risk from unmanaged hazardous trees
Canopy Impact (20 yrs)	+15–25% canopy increase, improved age/species diversity, increased stormwater & climate resilience	−15–30% canopy decline, loss of mature trees, greater vulnerability to pests and heat
Urban Forest Value	+30–50% increase in property value, stormwater savings, carbon sequestration, and air quality services	−20–40% value loss from canopy reduction, increased urban heat, degraded aesthetics
Ecological Benefits	Enhanced habitat, biodiversity, reduced stormwater runoff, improved soil stability, better air quality	Diminished habitat, increased runoff and erosion, reduced air purification and shade benefits
Economic Benefits	Long-term return on investment through reduced utility costs, lower stormwater management expenses, increased tourism	Higher public health costs, infrastructure wear, storm damage cleanup, and reduced local revenue
Annual Avg. Cost	~$530,000–$583,000/year (phased, scalable, grant-leveraged with internal capacity savings)	$700,000–$1M+ (emergency removals, litigation, reactive contracting)
Long-Term Program Savings	10–20% cost savings from reduced removals, emergency response, and lawsuits over 20 years	15–30% increased cost from deferred maintenance, increased risk, and contractor premiums

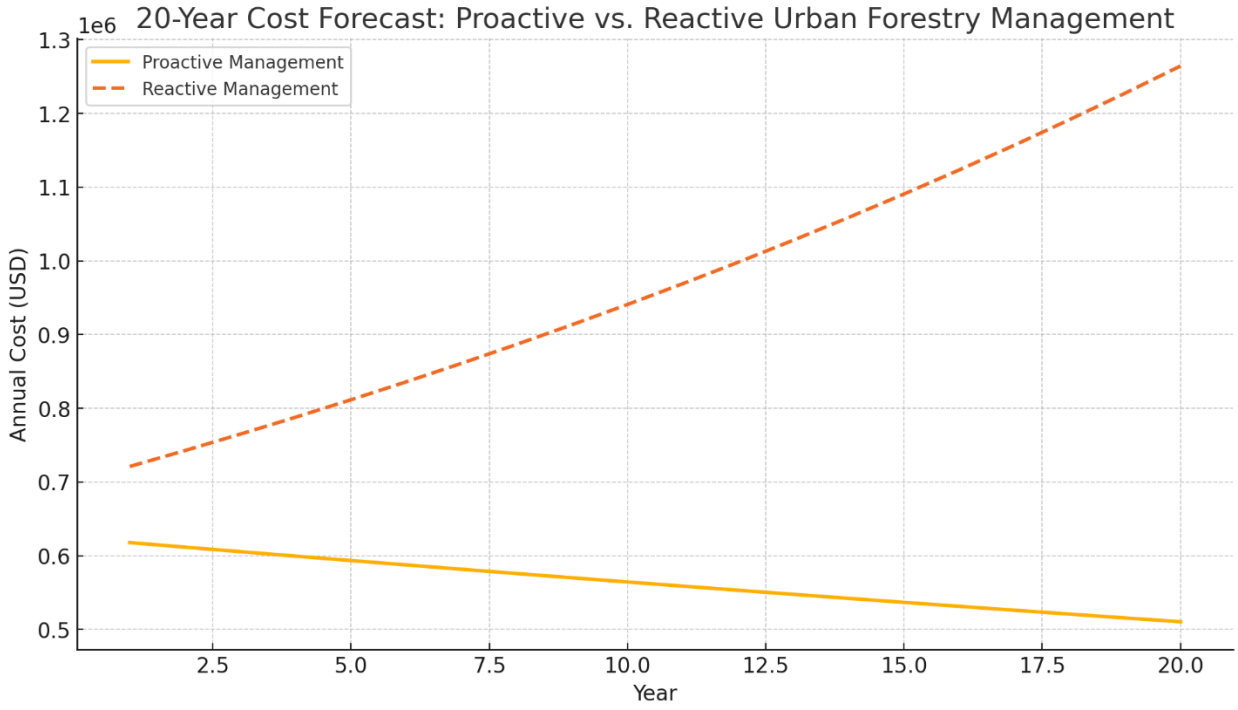

Comparison of Proactive vs. Reactive Urban Forestry Approaches
Relative Performance Score (Higher = Better Outcome)
Proactive Approach
Reactive Approach
4.5
1.5
5.0
1.8
4.8
2.0
4.7
1.5
4.5
2.0
4.8
1.5
Canopy Impact (20 yrs)
Urban Forest Value
Ecological Benefits
Economic Benefits
Annual Avg. Cost
Long-Term Savings


Projected Urban Forest Financial Value (2025–2045)
Based on $13.1M Baseline
Proactive Approach
Reactive Approach
$18.3M (↑40%)
$9.2M (↓30%)
Urban Forest Value (Millions of Dollars)
Year


Projected Ecological Benefits (2025–2045)
Proactive Approach
Reactive Approach
Annual Ecological Value ($M)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
2025.0
2027.5
2030.0
2032.5
2035.0
2037.5
2040.0
2042.5
2045.0
Year


Projected Economic Benefits (2025–2045)
Proactive Approach
Reactive Approach
Annual Economic Value ($M)
4.0
3.5
3.0
2.5
2.0
1.5
2025.0
2027.5
2030.0
2032.5
2035.0
2037.5
2040.0
2042.5
2045.0
Year





Key Insights:

- By Year 20, reactive management costs are significantly higher.
- Cumulative savings with a proactive strategy can exceed **$2 million** over 20 years.
- Proactive approaches also reduce litigation risk and improve ecological services.

A proactive urban forestry strategy is a sound investment in public safety, fiscal stability, and long-term livability. It delivers measurable ecological services, enhanced economic returns, and community resilience. In contrast, reactive systems tend to be costlier over time and produce fewer environmental and public health benefits, while also increasing exposure to legal and financial risk. Proactive management maximizes value and ensures the sustainability of Casper's urban forest.

Appendices and Supplemental Data

The following appendices provide detailed supporting datasets, technical documentation, operational frameworks, and implementation tools that substantiate the strategies and recommendations outlined in this report. These resources are designed for practical use by City of Casper staff, urban forestry professionals, planners, emergency management personnel, and elected officials involved in oversight, budgeting, and decision-making.

The appendices fulfill five core functions:

- **Data Validation**
  Include verified inventory data on species composition, tree condition, diameter class distribution, location, and risk ratings to ensure transparency and enable spatial and statistical analysis.
- **Operational Support**
  Provide maintenance cycle templates, risk inspection protocols, budget forecasting models, equipment lifecycle charts, and staff scheduling tools to assist daily field and administrative operations.
- **Policy Alignment**
  Reference national and international standards such as ANSI A300 (Parts 1–10), ISA Best Management Practices (BMPs), FEMA ICS protocols, and State Urban Forestry Program guidelines to ensure regulatory consistency.
- **Community Engagement Tools**
  Supply public education materials, sample communications, Tree Steward volunteer training guides, and stakeholder engagement templates to improve awareness and participation.
- **Performance Monitoring**
  Include key performance indicator (KPI) tracking sheets, canopy assessment methodology (i-Tree Canopy, i-Tree Eco), return-on-investment calculators for ecosystem services, and dashboards for goal progress reporting.

By institutionalizing the use of these appendices across departments and workgroups, the City of Casper will promote data-driven governance, reinforce accountability, and support long-term climate, safety, and equity goals for the municipal urban forest.

Appendix A – Tree Inventory Summary Data

This appendix presents validated findings from the City of Casper's 2024-25 urban tree inventory, encompassing all municipally managed trees located along boulevards, within parks, public rights-of-way, and around public facilities. This inventory forms the basis for risk analysis, species diversity evaluation, maintenance prioritization, and long-term urban forest planning.

Total Tree Population: 15,017

Detailed Inventory by Genus, Species, and Count

Genus	Species	Common Name	Count	% of Total
Fraxinus	*pennsylvanica*	Green Ash	2,049	13.65%
Populus	*spp. / deltoides*	Cottonwood spp.	1,636	10.89%
Gleditsia	*triacanthos var. inermis*	Honeylocust	1,574	10.48%
Ulmus	*pumila*	Siberian Elm	1,047	6.97%
Malus	*spp.*	Crabapple spp.	933	6.21%
Picea	*pungens*	Colorado Blue Spruce	736	4.90%
Juniperus	*scopulorum*	Rocky Mountain Juniper	692	4.61%
Pinus	*ponderosa / nigra*	Ponderosa / Austrian Pine	521	3.47%
Juniperus	*virginiana*	Eastern Redcedar	431	2.87%
Elaeagnus	*angustifolia*	Russian Olive	418	2.78%
Tilia	*cordata*	Littleleaf Linden	646	4.30%
Acer	*negundo*	Boxelder	1,068	7.11%
Pseudotsuga	*menziesii*	Douglas-fir	408	2.72%
Syringa	*vulgaris*	Common Lilac	307	2.04%
Quercus	*macrocarpa*	Bur Oak	203	1.35%
Salix	*babylonica*	Weeping Willow	176	1.17%
Betula	*papyrifera*	Paper Birch	158	1.05%
–	–	Various species (<1% each)	1,308	8.71%
—	**—**	**Total**	**15,017**	**100.00%**

Species Composition Summary

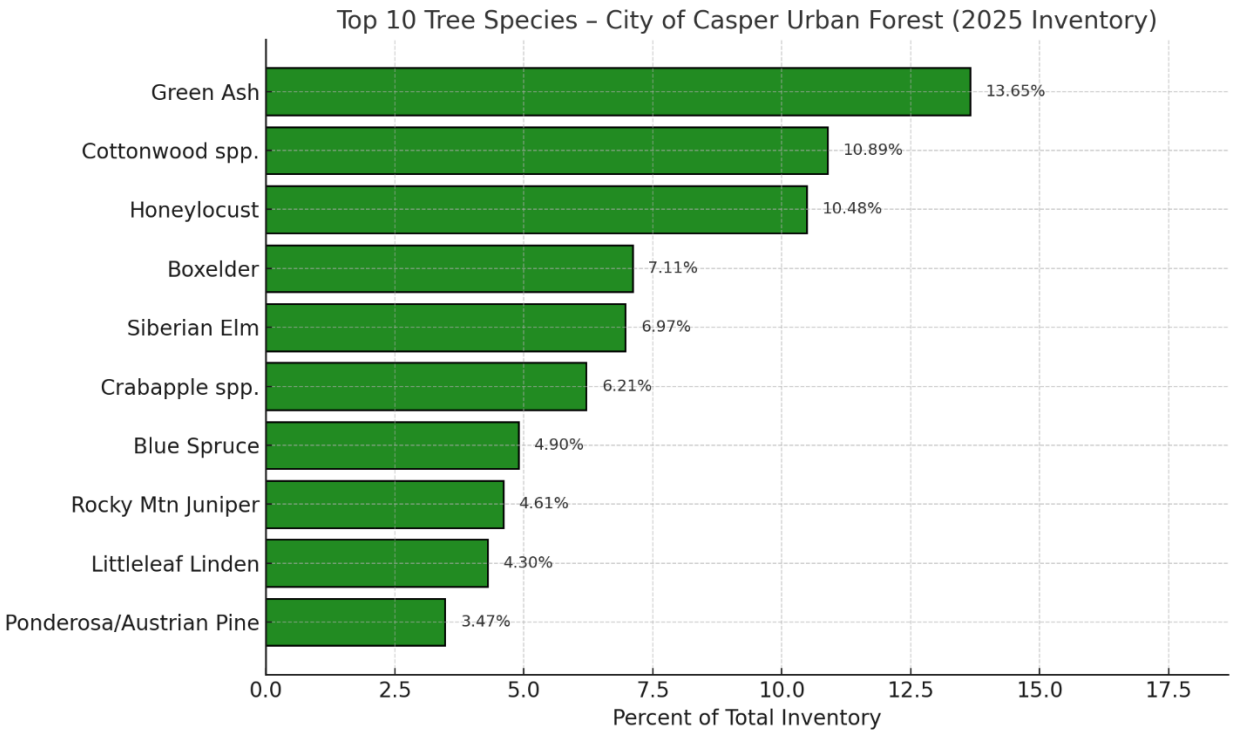
Casper's urban forest shows a high concentration of a limited number of species. The two most dominant—**Green Ash** (*Fraxinus pennsylvanica*, 13.65%) and **Siberian Elm** (*Ulmus pumila*, 6.97%)—together comprise **over 20%** of the entire municipal tree population. Casper's urban forest faces a **diversity imbalance**, with the **top five species accounting for nearly 50%** of all trees. This lack of biological diversity increases vulnerability to invasive pests (such as **Emerald Ash Borer**), structural decline, drought stress, and climate extremes. Enhancing both genus and species diversity remains a critical priority for long-term canopy resilience.

Top 10 Most Common Species (by % Composition)

1. **Green Ash** (*Fraxinus pennsylvanica*) – **13.65%**
2. **Cottonwood spp.** (*Populus spp.*) – **10.89%**
3. **Honeylocust** (*Gleditsia triacanthos var. inermis*) – **10.48%**
4. **Boxelder** (*Acer negundo*) – **7.11%**
5. **Siberian Elm** (*Ulmus pumila*) – **6.97%**
6. **Crabapple spp.** (*Malus spp.*) – **6.21%**
7. **Colorado Blue Spruce** (*Picea pungens*) – **4.90%**
8. **Rocky Mountain Juniper** (*Juniperus scopulorum*) – **4.61%**
9. **Littleleaf Linden** (Tilia cordata) – **4.30%**
10. **Ponderosa/Austrian Pine** (*Pinus ponderosa / nigra*) – **3.47%**

Key Observations

- **Three species account for nearly 35%** of the total inventory—highlighting a need for increased species rotation and structural diversity.
- **Several overrepresented genera**—notably *Fraxinus*, *Populus*, and *Ulmus*—are at elevated risk from pests and environmental stress.
- Strategic diversification through revised planting policies and capital improvement projects (CIPs) is essential to maintain canopy health and public safety.



Inventory data will guide cyclical pruning zones, species rotation plans, and long-term replanting strategies to improve structure and reduce future risk exposure.

Appendix B – Tree Condition Assessment Summary

A condition assessment of Casper's public trees provides essential insight into maintenance priorities, safety risks, and long-term urban forest management planning. In 2024-25, **all 15,017 municipally managed trees** were evaluated using standardized protocols aligned with **ISA Best Management Practices** and **ANSI A300 Part 9** for visual tree assessment and structural condition.

Condition Classification Criteria

- **Good** – Strong structure, full canopy, no significant defects or stress symptoms.
- **Fair** – Minor structural or health concerns; may require routine pruning or monitoring.
- **Poor** – Advanced decline or structural defects; limited vigor; targeted intervention may be needed.
- **Dead** – No viable growth; provides no canopy or maintenance value; scheduled for removal.
- **Hazardous** – Structural failure likely; poses risk to people/property; requires immediate mitigation.

Tree Condition Distribution

Condition Class	Tree Count	% of Total
Good	8,097	53.92%
Fair	5,690	37.89%
Poor	563	3.75%
Dead	329	2.19%
Hazardous	338	2.25%
Total	**15,017**	**100.00%**

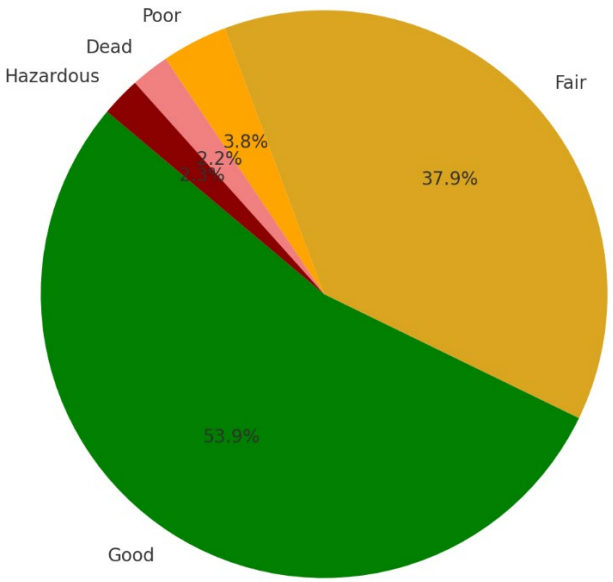
Management Implications

- Over **90%** of Casper's urban forest is classified as **Good or Fair**, establishing a strong baseline for long-term canopy health.
- **Fair condition trees (37.9%)** are critical for **preventive care**; routine monitoring and structural pruning can prevent decline.
- **Poor condition trees (3.75%)** may require phased removal, intensive care, or inspection to determine long-term viability.
- **Dead trees (2.19%)**, although not all immediately hazardous, should be removed as they no longer provide ecological or shade benefits and may pose emerging risk.
- **Hazardous trees (2.25%)** must be treated as **top safety priorities**, especially in high-use areas such as streets, parks, and schools.

Risk & Liability Consideration

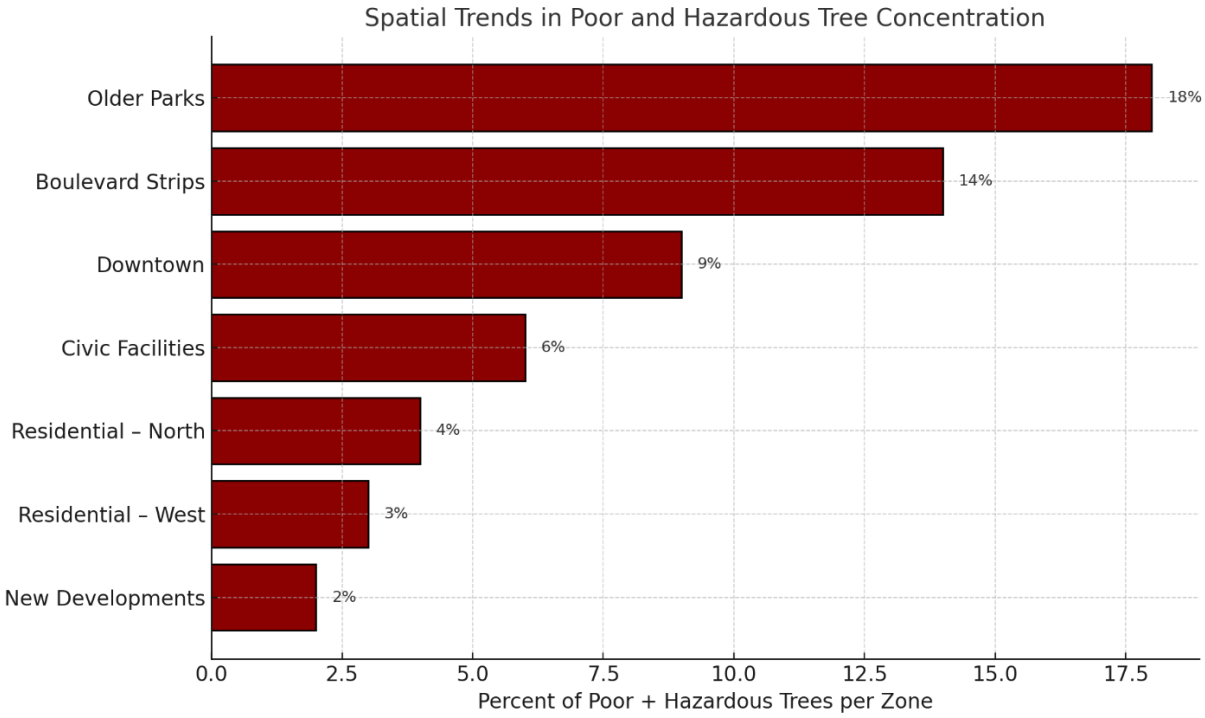
The inventory identified **338 trees with hazardous structural defects**, representing a measurable public safety and legal liability risk. If not proactively addressed, these trees could result in injury, property damage, or municipal claims. Immediate inspection, documentation, and mitigation should be conducted in accordance with **ISA TRAQ** and **ANSI A300 Part 9** standards to fulfill duty of care requirements and reduce exposure.

Appendix B – Tree Condition Summary (2025)



Spatial Trends:

Poor and hazardous trees are often concentrated in older parks, compacted boulevard strips, and high-traffic areas where inappropriate species were historically planted. These zones should be prioritized in risk management, replanting, and inspection strategies.



Action Priorities:

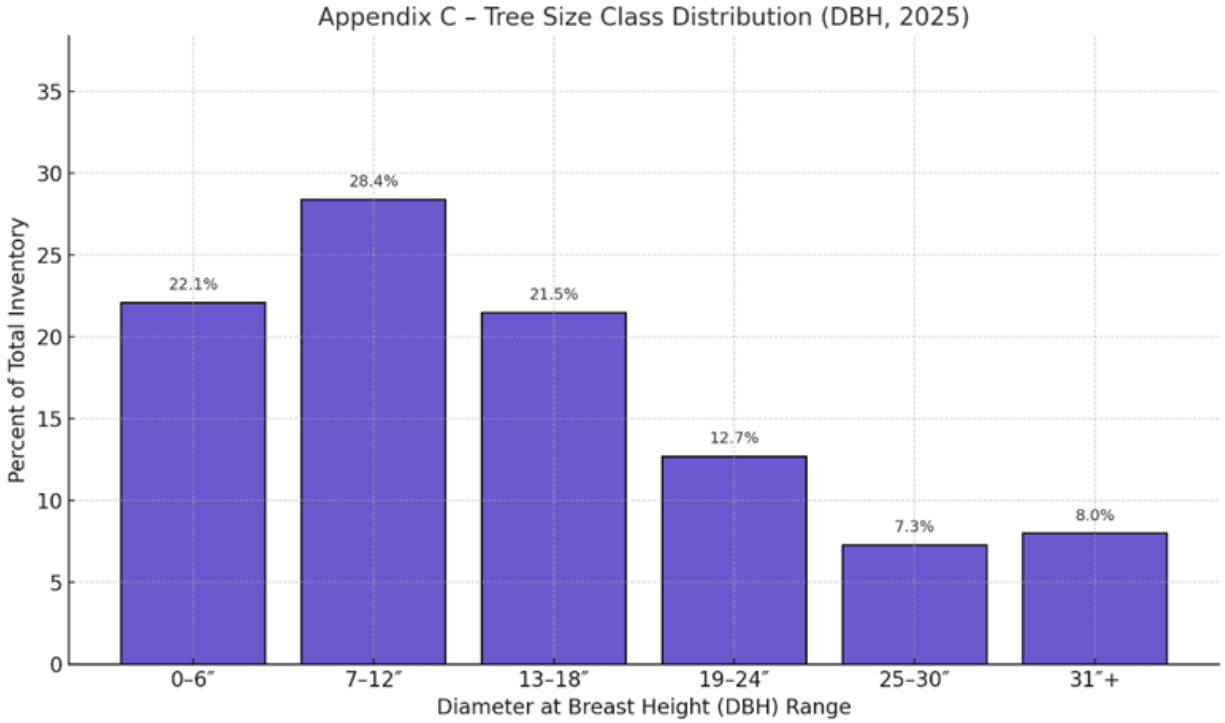
- Remove hazardous and non-viable trees in proximity to high-use infrastructure.
- Implement preventive maintenance for trees in Fair condition to preserve canopy longevity.
- Integrate condition data into GIS for spatial analysis, forecasting, and work order scheduling.
- Reassess inventory every 5 years to detect condition changes and adapt management strategy.

Appendix C – Tree Size Class Distribution

Understanding the diameter size class distribution of Casper's urban forest is essential for evaluating age diversity, canopy growth potential, and future replacement needs. All 15,017 municipally managed trees were categorized by Diameter at Breast Height (DBH) using ISA standards to inform planning and lifecycle forecasting.

Size Class Summary

DBH Range (inches)	Tree Count	% of Total
0–6"	3,319	22.1%
7–12"	4,264	28.4%
13–18"	3,230	21.5%
19–24"	1,906	12.7%
25–30"	1,096	7.3%
31"+	1,202	8.0%
Total	**15,017**	**100%**



Analysis

There is strong representation in the **7–18"** range (49.9%), reflecting a healthy core of mid-age canopy trees that will provide peak environmental services in the coming decades.

The **0–6"** class (22.1%) indicates recent planting activity and a solid investment in canopy succession. However, these young trees require structured establishment care—such as watering, staking removal, and pruning—to ensure survivability.

Large trees (≥25" DBH) make up **15.3%** of the inventory. These mature trees contribute significantly to stormwater management, shade, and carbon storage—but are also nearing the end of their lifespan and will require phased replacement.

Planning Implication

The decline in tree numbers above **18" DBH** suggests an incomplete reverse-J distribution. This imbalance signals an emerging gap in canopy succession. If not corrected through consistent planting, it could result in loss of urban forest services—such as shade, cooling, and aesthetic value—as mature trees age out.

Management Recommendations

- **Prioritize planting** of 1.5–2.5" caliper trees to support future canopy development.
- **Ensure establishment care** (mulching, pruning, watering) during the first 3–5 years post-planting.
- **Strategically plan replacements** for large, aging canopy trees using diverse, pest-resistant, and climate-resilient species.
- **Use GIS-linked inventory tools** to track DBH trends, forecast gaps, and inform targeted planting strategies.

Appendix D – High-Risk Tree Locations and Mitigation Priorities

This appendix identifies **trees within the City of Casper's municipal inventory that are classified as hazardous or high-risk** due to structural instability, advanced decline, or mortality indicators. These trees represent elevated safety concerns and must be prioritized through an **ISA TRAQ-compliant risk assessment framework** for inspection, documentation, and mitigation.

Summary of High-Risk and High-Concern Trees

Category	Tree Count	% of Total Inventory (15,017)
Hazardous (explicitly rated)	338	2.25%
Dead	329	2.19%
Poor Condition	563	3.75%
Total High-Concern Trees	**1,230**	**8.19%**

Note: While not all "poor" or "dead" trees are currently hazardous, they represent declining conditions that require proactive monitoring or phased removal.

Primary Risk Indicators

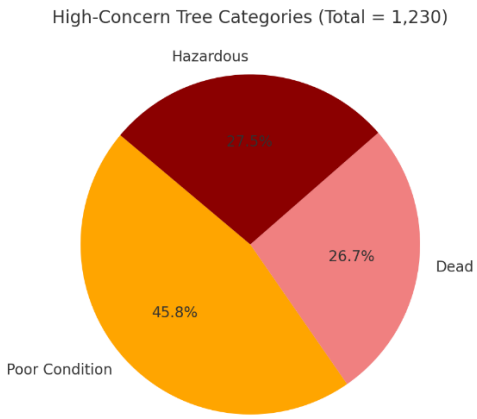
- Dead or declining canopy with no viable foliage
- Structural defects such as cavities, decay, cracks, or co-dominant stems
- Root plate instability, visible lean, or compromised anchorage
- Location in proximity to sidewalks, utilities, buildings, or high-traffic zones

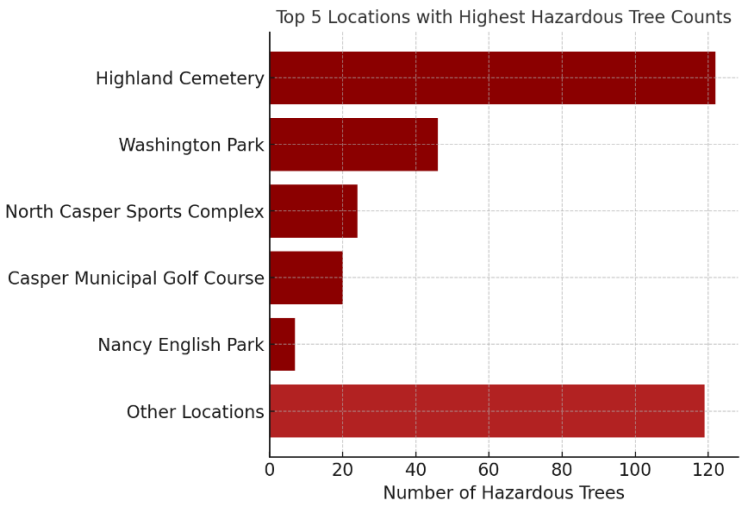
Risk-Based Condition Action Matrix

Condition	Tree Count	Recommended Action	Timeline
Hazardous	338	Immediate removal	Within 30 days
Dead	329	Priority removal	Within 90 days
Poor	563	Monitor or selective pruning	Within 6–12 months

Top 5 Locations with Highest Hazardous Tree Counts

Location	Hazardous Trees	Common Risk Issues
Highland Cemetery	122	Advanced decay, dead limbs, structural decline
Washington Park	46	Branch failure risk, co-dominant stems, decay
North Casper Sports Complex	24	Canopy dieback, decay-prone species
Casper Municipal Golf Course	20	Leaning trunks, broken limbs, cavities
Nancy English Park	7	Aging canopy, root instability, structural weakness





Note: An additional 119 hazardous trees are dispersed across boulevards, facilities, parks, and smaller sites. These must be documented and scheduled systematically to ensure full liability mitigation.

Recommended Program Actions

- Establish annual **hazard tree mitigation cycles** with enforceable response timelines.
- **Notify adjacent property owners** in high-visibility or residential areas prior to removals.
- Assign **ISA Certified Arborists** to all reinspections and risk rating confirmations.
- Update **GIS-linked tree records** immediately upon risk mitigation actions.
- Maintain detailed **digital logs and work orders** to support public transparency, insurance documentation, and FEMA eligibility.

Risk Mitigation Outcome

Proactive identification and removal of high-risk trees will substantially:

- Reduce public liability exposure
- Improve pedestrian and infrastructure safety
- Ensure long-term continuity of Casper's urban canopy through safe, prioritized action

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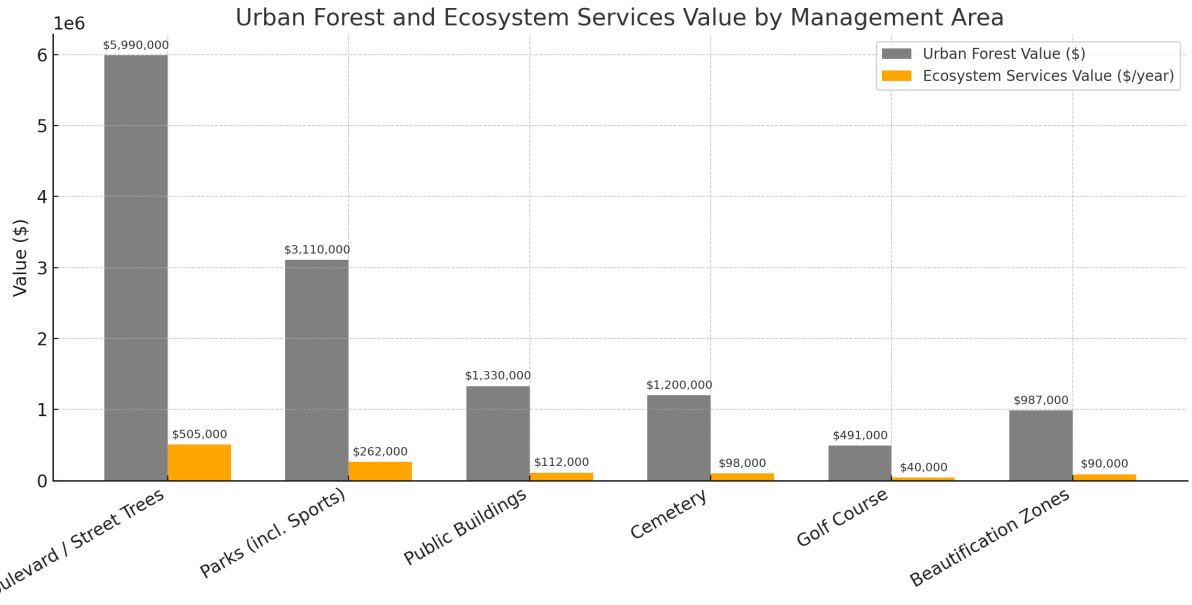
Appendix E – Tree Population and Species Composition by Management Area

This appendix summarizes the distribution of Casper's municipal tree population by major management area, highlighting total tree counts, dominant species, estimated urban forest asset values, annual ecosystem service contributions, and risk factors relevant to each zone.

Summary Table – Urban Forest Composition by Management Area

Urban forest value figures reflect structural/tree replacement estimates. Full property and aesthetic value across all sites is modeled at approximately **$13.1 million** based on i-Tree Eco analysis.

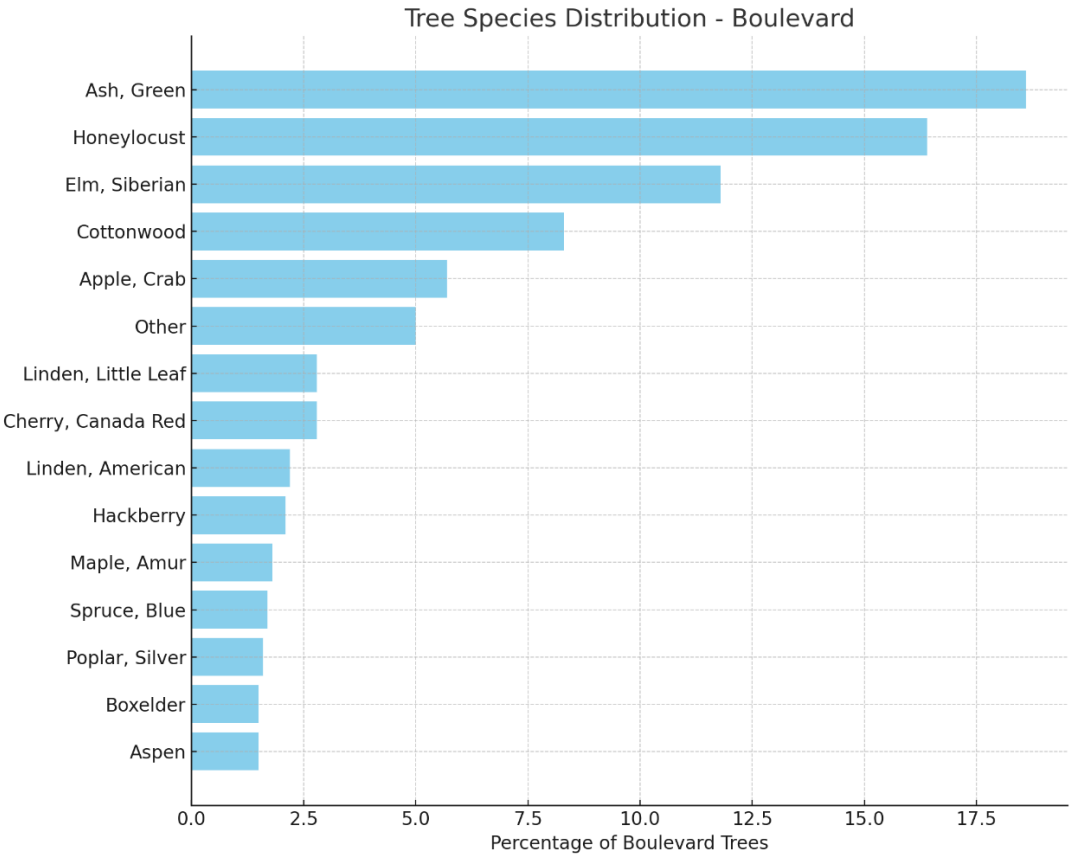
Management Area	Tree Count	% of Total	Estimated Urban Forest Value	Estimated Annual Ecosystem Services
Boulevard / Street Trees	6,858	45.7%	$5.99 million	$505,000
Parks (including Sports)	3,565	23.7%	$3.11 million	$262,000
Public Buildings	1,519	10.1%	$1.33 million	$112,000
Cemetery	1,375	9.2%	$1.20 million	$98,000
Golf Course	562	3.7%	$491,000	$40,000
Beautification Zones	1,138	7.6%	$987,000	$90,000
Total	**15,017**	**100%**	**$13.1 million**	**$1.107 million**



Species by Management Area

Boulevard / Street Trees (6,858 total)

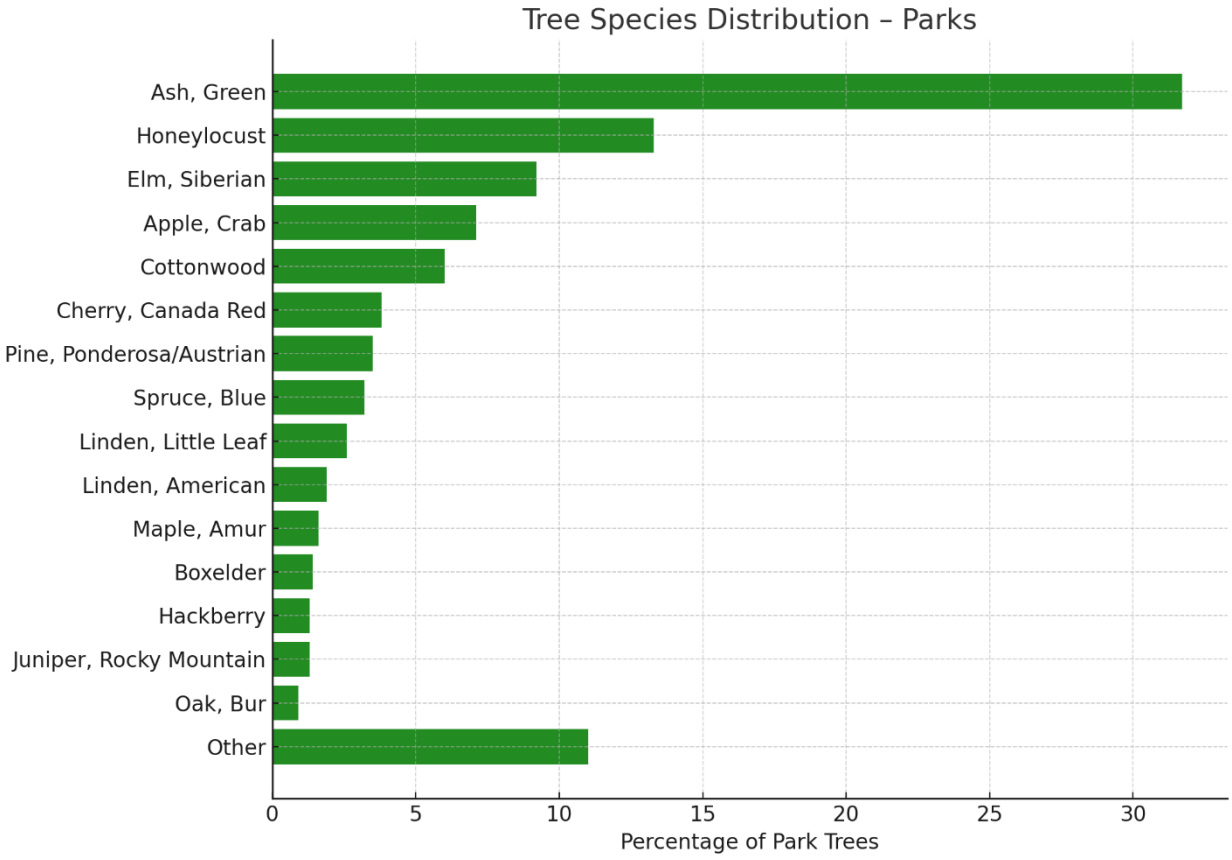
Ash, Green (*Fraxinus pennsylvanica*) – 1,273 trees (18.6%)
Honeylocust (*Gleditsia triacanthos var. inermis*) – 1,127 trees (16.4%)
Elm, Siberian (*Ulmus pumila*) – 809 trees (11.8%)
Cottonwood (*Populus deltoides* or *Populus spp.*) – 569 trees (8.3%)
Apple, Crab (*Malus spp.*) – 394 trees (5.7%)
Other (enter comment) – 343 trees (5.0%)
Linden, Little Leaf (*Tilia cordata*) – 195 trees (2.8%)
Cherry, Canada Red (*Prunus virginiana* 'Canada Red') – 190 trees (2.8%)
Linden, American (*Tilia americana*) – 148 trees (2.2%)
Hackberry (*Celtis occidentalis*) – 147 trees (2.1%)
Maple, Amur (*Acer ginnala*) – 125 trees (1.8%)
Spruce, Blue (*Picea pungens*) – 115 trees (1.7%)
Poplar, Silver (*Populus alba*) – 109 trees (1.6%)
Boxelder (*Acer negundo*) – 105 trees (1.5%)
Aspen (*Populus tremuloides*) – 102 trees (1.5%)



Risk Note: Ash-dominated corridors face elevated risk from Emerald Ash Borer (EAB).

Parks (incl. Sports Complex) – 3,565 total

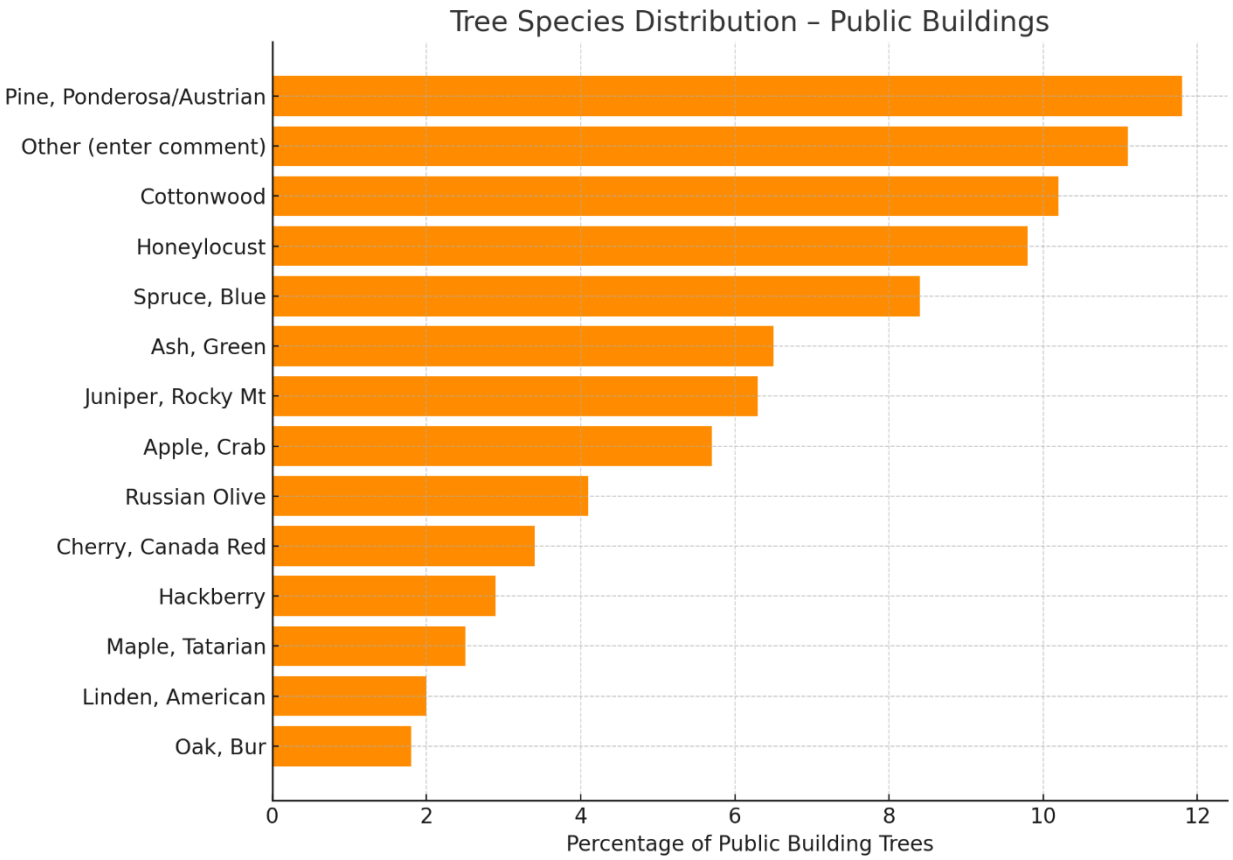
Ash, Green (*Fraxinus pennsylvanica*) – 1,129 trees (31.7%)
Honeylocust (*Gleditsia triacanthos var. inermis*) – 474 trees (13.3%)
Elm, Siberian (*Ulmus pumila*) – 329 trees (9.2%)
Apple, Crab (*Malus spp.*) – 252 trees (7.1%)
Cottonwood (*Populus deltoides* or *Populus spp.*) – 214 trees (6.0%)
Cherry, Canada Red (*Prunus virginiana 'Canada Red'*) – 136 trees (3.8%)
Pine, Ponderosa/Austrian (*Pinus spp.*) – 124 trees (3.5%)
Spruce, Blue (*Picea pungens*) – 113 trees (3.2%)
Linden, Little Leaf (*Tilia cordata*) – 92 trees (2.6%)
Linden, American (*Tilia americana*) – 66 trees (1.9%)
Maple, Amur (*Acer ginnala*) – 56 trees (1.6%)
Boxelder (*Acer negundo*) – 51 trees (1.4%)
Hackberry (*Celtis occidentalis*) – 48 trees (1.3%)
Juniper, Rocky Mountain (*Juniperus scopulorum*) – 46 trees (1.3%)
Oak, Bur (*Quercus macrocarpa*) – 33 trees (0.9%)
Other (enter comment) – 392 trees (11.0%)



Risk Note: Legacy ash and elm trees at risk of pest and structural decline.

Public Buildings – 1,519 total

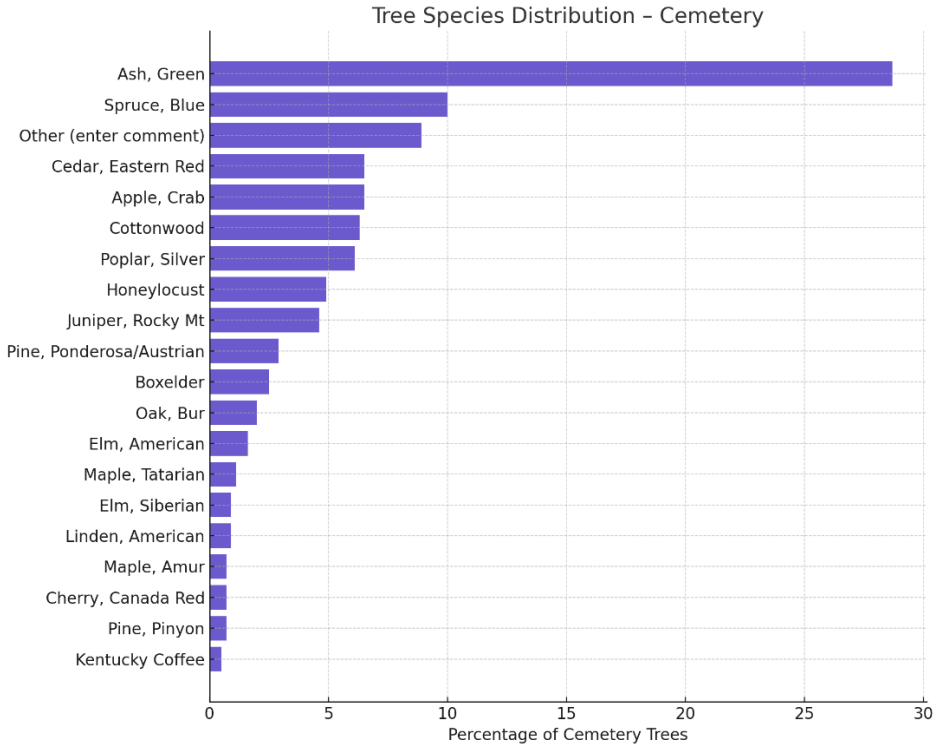
Pine, Ponderosa/Austrian (*Pinus spp.)* – 179 trees (11.8%)
Other (enter comment) – 374 trees (11.1%)
Cottonwood (*Populus deltoides or Populus spp.*) – 155 trees (10.2%)
Honeylocust (*Gleditsia triacanthos var. inermis*) – 149 trees (9.8%)
Spruce, Blue (*Picea pungens*) – 128 trees (8.4%)
Ash, Green (*Fraxinus pennsylvanica*) – 99 trees (6.5%)
Juniper, Rocky Mt (*Juniperus scopulorum*) – 95 trees (6.3%)
Apple, Crab (*Malus spp.*) – 87 trees (5.7%)
Russian Olive (*Elaeagnus angustifolia*) – 62 trees (4.1%)
Cherry, Canada Red (*Prunus virginiana 'Canada Red'*) – 51 trees (3.4%)
Hackberry (*Celtis occidentalis*) – 44 trees (2.9%)
Maple, Tatarian (*Acer tataricum*) – 38 trees (2.5%)
Linden, American (Tilia americana) – 30 trees (2.0%)
Oak, Bur (*Quercus macrocarpa*) – 28 trees (1.8%)



Risk Note: Prioritize aesthetic pruning and public safety near entrances and walkways.

Cemetery – 1,375 total

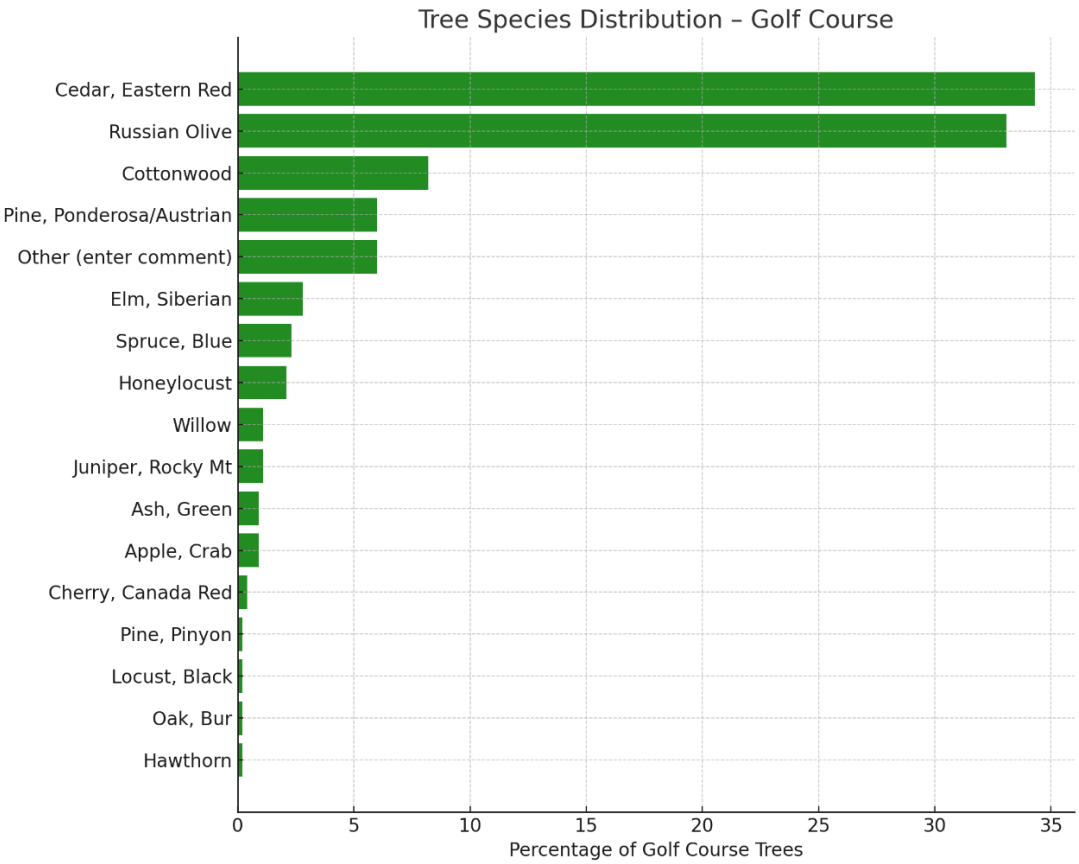
Ash, Green (*Fraxinus pennsylvanica*) – 395 trees (28.7%)
Spruce, Blue (*Picea pungens*) – 137 trees (10.0%)
Other (enter comment) – 123 trees (8.9%)
Cedar, Eastern Red (*Juniperus virginiana*) – 90 trees (6.5%)
Apple, Crab (*Malus spp.*) – 89 trees (6.5%)
Cottonwood (*Populus deltoides* or *Populus spp.*) – 86 trees (6.3%)
Poplar, Silver (*Populus alba*) – 84 trees (6.1%)
Honeylocust (*Gleditsia triacanthos var. inermis*) – 68 trees (4.9%)
Juniper, Rocky Mt (*Juniperus scopulorum*) – 63 trees (4.6%)
Pine, Ponderosa/Austrian (*Pinus spp.*) – 40 trees (2.9%)
Boxelder (*Acer negundo*) – 35 trees (2.5%)
Oak, Bur (*Quercus macrocarpa*) – 27 trees (2.0%)
Elm, American (*Ulmus americana*) – 22 trees (1.6%)
Maple, Tatarian (*Acer tataricum*) – 15 trees (1.1%)
Elm, Siberian (*Ulmus pumila*) – 13 trees (0.9%)
Linden, American (*Tilia americana*) – 13 trees (0.9%)
Maple, Amur (*Acer ginnala*) – 10 trees (0.7%)
Cherry, Canada Red (*Prunus virginiana 'Canada Red'*) – 10 trees (0.7%)
Pine, Pinyon (*Pinus edulis*) – 10 trees (0.7%)
Kentucky Coffeetree (*Gymnocladus dioicus*) – 7 trees (0.5%)



Risk Note: Aged trees increasing risk of storm-related branch failure.

Golf Course – 562 total

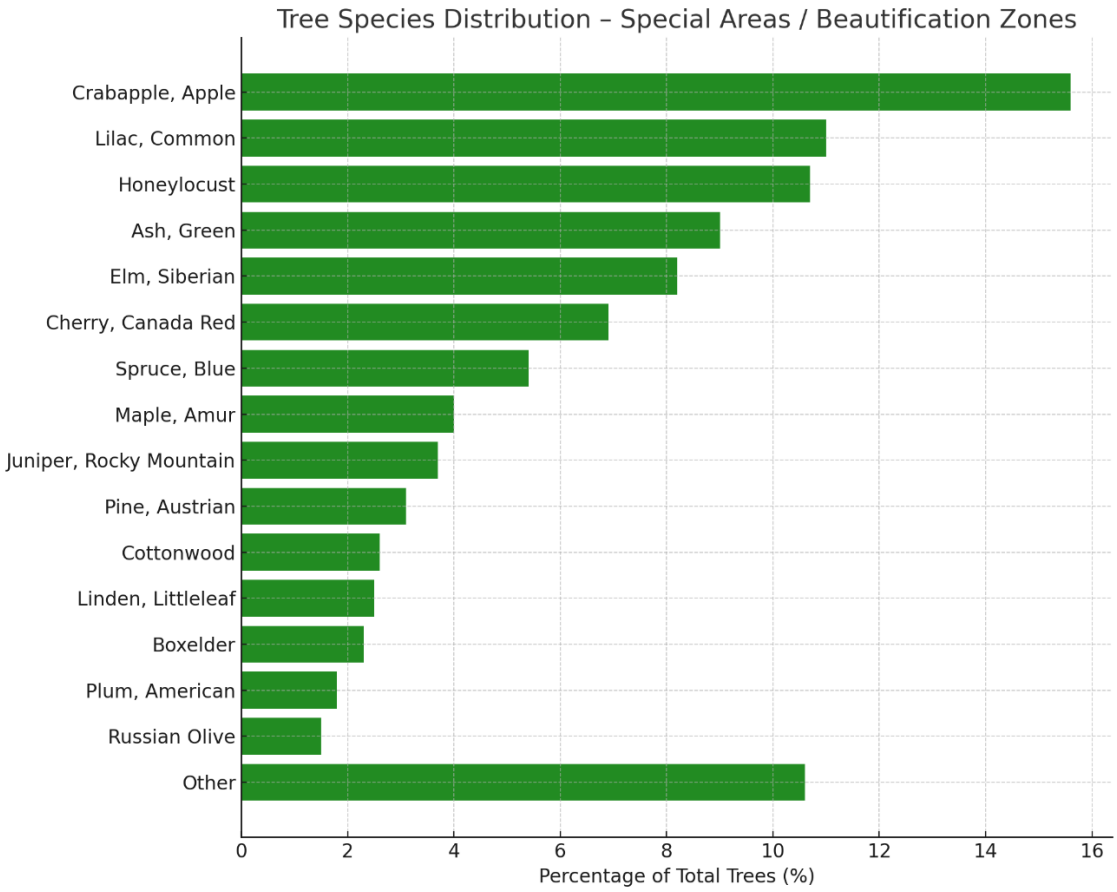
Cedar, Eastern Red (Juniperus virginiana) – 193 trees (34.3%)
Russian Olive (Elaeagnus angustifolia) – 186 trees (33.1%)
Cottonwood (Populus deltoides or Populus spp.) – 46 trees (8.2%)
Pine, Ponderosa/Austrian (Pinus ponderosa / Pinus nigra) – 34 trees (6.0%)
Other (enter comment) – 34 trees (6.0%)
Elm, Siberian (Ulmus pumila) – 16 trees (2.8%)
Spruce, Blue (Picea pungens) – 13 trees (2.3%)
Honeylocust (Gleditsia triacanthos var. inermis) – 12 trees (2.1%)
Willow (Salix spp.) – 6 trees (1.1%)
Juniper, Rocky Mt (Juniperus scopulorum) – 6 trees (1.1%)
Ash, Green (Fraxinus pennsylvanica) – 5 trees (0.9%)
Apple, Crab (Malus spp.) – 5 trees (0.9%)
Cherry, Canada Red (Prunus virginiana 'Canada Red') – 2 trees (0.4%)
Pine, Pinyon (Pinus edulis) – 1 tree (0.2%)
Locust, Black (Robinia pseudoacacia) – 1 tree (0.2%)
Oak, Bur (Quercus macrocarpa) – 1 tree (0.2%)
Hawthorn (Crataegus spp.) – 1 tree (0.2%)



Risk Note: Monitor for fungal issues including spruce canker and juniper tip blight.

Special Areas / Beautification Zones – 1,138 total

Crabapple, Apple (Malus spp.) – 178 trees (15.6%)
Lilac, Common (Syringa vulgaris) – 125 trees (11.0%)
Honeylocust (Gleditsia triacanthos var. inermis) – 122 trees (10.7%)
Ash, Green (Fraxinus pennsylvanica) – 103 trees (9.0%)
Elm, Siberian (Ulmus pumila) – 93 trees (8.2%)
Cherry, Canada Red (Prunus virginiana 'Canada Red') – 78 trees (6.9%)
Spruce, Blue (Picea pungens) – 62 trees (5.4%)
Maple, Amur (Acer ginnala) – 46 trees (4.0%)
Juniper, Rocky Mountain (Juniperus scopulorum) – 42 trees (3.7%)
Pine, Austrian (Pinus nigra) – 35 trees (3.1%)
Cottonwood (Populus deltoides or Populus spp.) – 30 trees (2.6%)
Linden, Littleleaf (Tilia cordata) – 29 trees (2.5%)
Boxelder (Acer negundo) – 26 trees (2.3%)
Plum, American (Prunus americana) – 21 trees (1.8%)
Russian Olive (Elaeagnus angustifolia) – 17 trees (1.5%)
Other (enter comment) – 121 trees (10.6%)



Risk Note: High density of ornamentals prone to fire blight and aesthetic decline.

Summary Insight:

Casper's urban forest is **spatially concentrated**, with major tree populations in **streets and parks**, which together represent **70% of the inventory** and more than **65% of urban forest value**. The continued dominance of **Green Ash** and **Siberian Elm** in key areas heightens long-term risks associated with invasive pests and structural failures. These zones should be prioritized for diversification, condition monitoring, and phased replanting.

Appendix F – Recommended Tree Species List

This species list promotes long-term urban forest resilience in Casper by increasing diversity, enhancing pest and climate adaptability, and improving canopy stability. All selected species are suited to Casper's semi-arid climate, alkaline soils, high wind exposure, and wide seasonal temperature swings. Recommendations follow ISA Best Management Practices and ANSI A300 guidelines for urban tree selection.

Recommended Tree Species by Functional Category

Large Deciduous Shade Trees

Common Name	Scientific Name	Notes
Bur Oak	*Quercus macrocarpa*	Native, drought-tolerant, long-lived
Kentucky Coffeetree	*Gymnocladus dioicus*	Hardy, pest-resistant, well-adapted to urban sites
Hackberry	*Celtis occidentalis*	Urban tough, supports pollinators and biodiversity
American Linden	*Tilia americana*	Broad canopy, pollinator-friendly, moderately tolerant

Medium-Sized Deciduous Trees

Common Name	Scientific Name	Notes
Amur Maple	*Acer ginnala*	Cold-hardy, tolerant of alkaline soils
Ohio Buckeye	*Aesculus glabra*	Spring flowers, compact form
Japanese Tree Lilac	*Syringa reticulata*	Hardy, ornamental blooms, manageable size
Ironwood (Hophornbeam)	*Ostrya virginiana*	Wind-resistant, dense wood, slow-growing

Small/Ornamental Trees

Common Name	Scientific Name	Notes
Pekin Lilac	*Syringa pekinensis*	Decorative bark, summer interest
Prairie Crabapple	*Malus ioensis*	Native, pollinator-supporting, spring flowers
Thornless Hawthorn	*Crataegus spp.* (thornless)	Berries for birds, drought-tolerant

Evergreens & Conifers

Common Name	Scientific Name	Notes
Ponderosa Pine	*Pinus ponderosa*	Native, drought-tolerant, long-lived
Austrian Pine	*Pinus nigra*	Wind-resistant, moderate salt tolerance
Douglas-fir	*Pseudotsuga menziesii*	Cold-hardy, best with some protection from wind
Rocky Mountain Juniper	*Juniperus scopulorum*	Native, low water need, good for screening

Species to Avoid in Future Plantings

Species	Reason for Exclusion
Siberian Elm (*Ulmus pumila*)	Invasive, brittle wood, weak structure, poor longevity
Boxelder (*Acer negundo*)	Short lifespan, high pest susceptibility
Cottonwood spp. (*Populus spp.*)	Aggressive roots, weak wood, high water demand
Green Ash (*Fraxinus pennsylvanica*)	High Emerald Ash Borer vulnerability

Implementation Note:

- This list should be **reviewed every 3–5 years** to account for:
    - New pest/disease developments
    - Climate shifts
    - Availability of improved cultivars
- Species dominance in the inventory should not exceed:
    - **10% per species**
    - **20% per genus**
      per ISA urban forest diversity benchmarks.

By selecting trees that match Casper's environmental conditions and future risk profile, this guide supports a more resilient, adaptable, and biologically diverse urban forest.

Urban Forest Design Advisory on Soil Volume Constraints & Impervious Surface Impacts

Urban trees require adequate **soil volume and rooting space** to thrive, particularly in high-density, paved environments like boulevards, downtown areas, and redeveloped corridors. The long-term viability of tree plantings is frequently compromised by **soil compaction, restricted root zones, and heat-reflective impervious surfaces** (asphalt, concrete).

Key Considerations:

- **Minimum Rooting Volume**: Large-canopy trees require 800–1,200 ft^3 of quality soil to reach maturity. Many current sites provide <200 ft^3, limiting growth and longevity.
- **Soil Compaction**: Parking lot islands and street medians often show >2.0 g/cm^3 bulk density—beyond root growth thresholds.
- **Stormwater Runoff**: Excessive impervious surface contributes to water stress, tree instability, and root rot in poorly drained sites.

Planning & Design Recommendations:

- Require **soil volume targets per tree** in new developments (e.g., 2 ft soil depth × 6 ft width minimum, continuous trenches or Silva Cells preferred).
- Encourage **green infrastructure** integration (tree trenches, bioretention basins, pervious pavers).
- Avoid tree pits smaller than 4'x4' and eliminate compacted subsoil under new planting areas.
- Prioritize tree placement with **sufficient spacing from hardscape** to reduce reflected heat and root girdling risks.

Strategic Integration: Incorporate these considerations into zoning, streetscape design, and CIP review processes to ensure tree longevity and reduce future removal/replacement costs.

Appendix G – Expanded Urban Forestry Budget Projection Model

This appendix provides a detailed five-year budget forecast aligned with Casper's phased implementation strategy. It includes staffing, equipment procurement, training, planting goals, technology investment, and public outreach. All projections incorporate realistic labor costs, inflation assumptions, and long-term lifecycle planning.

Year 1 Budget – Launch Phase (FY2025–26)

Category	Details	Cost
Staffing	Urban Forest Supervisor + 1 Arborist	$195,000
Equipment	Chainsaws, PPE, tablets (2 units)	$15,000
Training & CEUs	Onboarding, safety, ISA certification	$5,000
Year 1 Ops Total		$215,000

Capital Equipment	Items	Cost
Aerial Lift Truck	55–65 ft insulated	$195,000
Brush Chipper	Tow-behind unit	$58,000
PHC Spray Rig	Injection/spray combo	$44,000
GIS Software Licenses	Annual licenses, initial setup	$9,000
Mobile Tablets	Field-ready w/ data plans (x2)	$7,000
Capital Total		$313,000

Year 1 Grand Total: $528,000

Annualized Budget – Full Capacity (Years 2–5)

Category	Annual Cost
Staffing (5 FTE total)	$392,000
Equipment Maintenance	$65,000
Tree Planting (500 trees)	$137,500
Training & Outreach	$17,000
Technology (GIS, Cloud)	$12,500
Total Annual Budget	$624,000

Equipment Lifecycle Estimates

Equipment	Useful Life	Key Maintenance Requirements
Aerial Lift Truck	12–15 years	ANSI inspections, annual winterization
Brush Chipper	8–10 years	Greasing, blade rotation every 70 hours
PHC Rig	6–8 years	Calibration, backflow testing
Chainsaws + PPE	4–6 years	Weekly safety checks, annual replacements
GIS Tablets + Apps	5 years	Annual software updates, cloud sync integration

Lifecycle costs are embedded within the $65,000 O&M allocation to smooth replacement needs.

Inventory Update Planning

Activity	Frequency	Cost	Notes
Contracted Inventory Refresh	Every 5 years	$75,000	Includes full field verification, DBH check, species updates

Note: This refresh cost is separate from annual operations and should be reserved within capital planning or grant cycles.

Budget Reallocation Strategy

Source	Amount	Purpose
Parks contracted tree services	$50,000/year	Convert to in-house seasonal staffing/tools
Capital reserves (hazard fund)	$100–150k	PHC rig, large removals, emergency clearance
Stormwater budget	$25–50k/year	Tree planting in erosion/high runoff zones
Emergency Management Fund	Up to $75,000	Hazard reduction near roads/infrastructure
Streets/Fleet cost sharing	$15–25k/year	Bucket truck fuel, shared maintenance

This reallocation strategy supports Phases 1–2 with **no increase in total citywide budget.**

Funding Opportunities

- **USDA Forest Service Urban & Community Forestry (UCF)** Grants
- **FEMA BRIC or Hazard Mitigation** funds (for hazard tree removal)
- **Arbor Day Foundation Tree City USA** Growth Awards
- **Wyoming State Forestry Division** grants for canopy, risk reduction
- **Public/private partnerships** (e.g., utility and developer offset contributions)

Recommendations for further Additional Refinement

Topic	Issue	Recommendation
Inflation	No inflation escalator noted for Years 3–5	Add 3–5% inflation factor for salaries, fuel, and materials beyond Year 2
PHC Material Costs	Not separately itemized	Break out pesticide/injectable costs, mulch, or soil amendments annually under O&M
Emergency Storm Response	$75K cap may be low for major wind events	Add a contingency reserve or define a threshold trigger (e.g., >50 tree failures) for fund release

Topic	Issue	Recommendation
Tree Survival/Replacement	No allowance for replanting failed trees	Add 5–10% contingency (~$7,000–$14,000/year) to cover failed plantings and survival gaps
Training & Outreach	$17,000/year is fair but static	Build in escalation if workforce grows or digital/media platforms expand
Static Outreach Budget	Budget cap may not cover expanded communication needs	Gradually increase cap to support translation, signage, apps, and digital tools
Emergency Fund Ceiling	No formal policy guiding contingency use	Define a trigger for emergency use or establish a storm-specific contingency line
PHC Budget Clarity	PHC costs blended into general O&M	Create a dedicated sub-line for PHC chemical treatments (~$5,000–$8,000/year) for budgeting transparency

Strategic Takeaway:

By leveraging internal efficiencies and external grant funding, Casper can build a resilient, proactive urban forestry program on a sustainable budget. Phased growth, lifecycle equipment planning, and reallocation of existing funds reduce dependency on contractors and deliver higher service value over time.

Appendix H – Urban Forestry Maintenance Cycle and Lifecycle Plan

This appendix outlines Casper's long-term strategy for managing its 15,017-tree inventory through scheduled care, preventive maintenance, and equipment lifecycle tracking. The framework aligns with ANSI A300 standards and ISA Best Management Practices, using staffing and cost projections from Appendix G.

1. Pruning and Structural Maintenance

Tree Age Class	Activity	Frequency	Notes
Young Trees	Formative pruning	Every 3 years	Training structure, reduce defects
Semi-Mature	Structural pruning	Every 5 years	Establish permanent branch architecture
Mature Trees	Risk/reduction pruning	Every 5–7 years	Based on risk zone & condition
Declining Trees	Hazard mitigation	Annually	Remove deadwood, manage structural failure risk

One **5-year rotation** is assumed for mature street/park trees, with prioritization by risk zone and usage level.

2. Tree Planting and Establishment

Activity	Duration	Notes
Watering	2 years	Weekly during growing season
Mulching/Weed Control	2 years	3" depth, avoid trunk contact
Stake Removal	1 year	Remove after first full growing season

Supports goal of **500 trees planted per year** at an average cost of **$275/tree** ($137,500 total/year).

3. Risk Assessment and Hazard Management

Task	Cycle	Notes
TRAQ-Level 2 Inspections	Every 2 years	Conducted by ISA TRAQ-Certified personnel
Level 1 Visual Checks	Annually	Focus on boulevards, parks, high-use zones
Emergency Assessments	As needed	Storm response, public reports, infrastructure impact

Immediate follow-up required for hazardous trees (n = **338**) and dead trees (n = **329**).

4. Integrated Pest Management (IPM) and Plant Health Care (PHC)

Target Area	Cycle	Treatment
Green Ash (EAB)	Biennial	Trunk injection – emamectin benzoate
Lilacs	Annual	Prune/spray/mulch to manage lilac borer/blight
High-Risk Zones	Annual	Deep watering, soil compaction mitigation

IPM activities are budgeted within the **$65,000 annual O&M allocation**, with prioritization based on seasonal risk mapping.

5. Equipment Maintenance and Lifecycle Planning

Equipment	Lifecycle	Maintenance Activities
Aerial Lift Truck	12–15 years	Annual ANSI/OSHA inspections, winterization
Brush Chipper	8–10 years	Blade sharpening every 70 hrs, quarterly greasing
PHC Rig	6–8 years	Biannual calibration and backflow testing
Chainsaws + PPE	4–6 years	Weekly safety checks, usage logs, annual replacement
GIS Tablets + Software	5 years	Cloud sync and updates; linked to work orders/inventory

These costs are built into annual O&M to avoid budget spikes.

6. Monitoring and Evaluation

Activity	Cycle	Notes
Inventory Refresh (Contracted)	Every 5 years	Includes DBH, species, condition, geolocation
Canopy Analysis (LiDAR/Remote)	Every 5 years	May be grant-funded or internally partnered
Soil Testing (sample plots)	Annually	Full soil condition update every 5 years
Public Perception Survey	Biennially	Measures awareness, satisfaction, support trends

Inspection, Documentation, and Safety Protocols

- **Annual ANSI/OSHA inspections** for aerial and chipping equipment
- **Digital logs** integrated into GIS for pruning, removals, and inspections
- Tree work history tracked to inform performance trends and reinspection intervals
- Replacement and prioritization decisions based on condition, age, and risk trend data

This structured maintenance plan ensures Casper's tree inventory remains **safe, resilient,** and **sustainably managed** using a defensible, budget-aligned approach. When fully implemented, it will reduce emergency costs, extend tree lifespan, and maximize public safety and ecological return.

7. Reassessment Schedule (2025–2029)

To ensure long-term data integrity, adaptive planning, and accurate risk forecasting, Casper will follow a structured 5-year reassessment schedule:

Year	Activity	Description	Responsible Party	Notes
2025	**Baseline Inventory Complete**	Full tree inventory, condition ratings, risk assessments	Urban Forest Supervisor	Completed; foundation for future monitoring
2026	**Annual Audit (10%)**	Field audit of 10% of trees	In-house crew	Random sampling + hotspot reinspection
2027	**i-Tree Canopy & LiDAR Analysis**	Remote sensing and equity mapping	GIS/Forestry Coordinator	Evaluate canopy equity and stormwater impact
2028	**Annual Audit (10%)**	Repeat 10% sampling + targeted inspections	In-house crew	Align maintenance zones
2029	**Full Inventory Refresh**	100% reassessment of DBH, condition, risk	Consultant or in-house	Prepare for next strategic plan update

This reassessment cycle ensures consistent data accuracy, supports adaptive management, and fulfills urban forestry best practices for monitoring and planning.

Appendix I – Public Education and Outreach Materials

Community engagement is a core component of sustainable urban forestry. A well-informed and involved public enhances tree stewardship, reduces vandalism and mismanagement, and builds long-term political and budgetary support. This appendix outlines Casper's planned educational tools and outreach strategies to raise awareness, promote proper tree care, and increase public participation in urban forestry efforts.

Educational Flyers and Print Materials

Material	Purpose
Arbor Day Event Flyer	Template for community planting events and seasonal workshops
Tree Watering Door Hangers	Left at newly planted homes; includes watering tips and schedule
Mulching Tips Sheet	Explains best practices for mulch depth, placement, and weed control

All print materials will be:

- Formatted for both digital and paper distribution
- Translated into **Spanish** and other community languages as needed
- Designed to meet **ADA accessibility standards**

Digital Tools and Interactive Public Dashboards

Tool	Functionality
Urban Forestry Dashboard	Tracks planting progress, canopy trends, and equity maps (tree cover vs. demographics)
Interactive Tree Map (GIS)	Public-facing map with per-tree species, age, condition, and benefits (linked to inventory)
Tree Benefit Calculator	Embedded i-Tree tool lets residents estimate carbon, stormwater, and energy savings by tree

These platforms promote transparency and allow residents to monitor progress toward canopy, equity, and sustainability goals.

Signage and Interpretive Installations

Installation Type	Details
QR Code Tree Tags	Placed on newly planted public trees; links to species info, planting year, and growth habit
Park Kiosks	Permanent signage with infographics on Casper's canopy and tree benefits

QR-linked resources provide **low-maintenance, high-access education**. Park kiosks offer **visual, durable outreach** in high-use areas.

Outreach Campaigns and Programs

Urban Forest Stewards Volunteer Program

- Trains residents in basic tree ID, risk reporting, watering, and monitoring
- Participants use mobile apps (e.g., TreePlotter, Survey123) for condition updates

K–12 Curriculum Integration

- Partners with local schools to embed tree science, climate education, and hands-on learning

Neighborhood Canopy Walks

- Seasonal walking tours led by arborists to highlight urban tree diversity, threats, and planting strategy

Communication Strategy

Public outreach materials and dashboards will be promoted through:

- City of Casper website and social media
- Utility bill inserts and seasonal newsletter mailings
- Public libraries, community centers, and park kiosks
- Neighborhood association meetings and Tree Board events

Equity and Accessibility

All outreach efforts will be developed to support:

- **ADA compliance** for digital tools (screen reader-friendly, alt text, color contrast)
- **Multilingual content**, including Spanish, based on community demographics
- **Large-print options** for senior-focused outreach

Strategic Benefit:

By embedding urban forestry into **daily community life**, these tools increase:

- Public awareness of ecosystem services
- Support for budget and policy initiatives
- Resident participation in planting, care, and tree protection

Engagement is a key pillar of Casper's urban forest resilience strategy—ensuring not only canopy growth, but lasting public value and stewardship.

Appendix J – Urban Forestry Program Templates

To promote consistency, accountability, and regulatory compliance, the following standardized templates are recommended for use across all Casper urban forestry operations. These tools streamline documentation, enhance coordination, and ensure alignment with ANSI A300 standards and ISA Best Management Practices (BMPs).

1. Tree Risk Assessment Form (Hybrid ISA/Predictive Model)

- Combines ISA TRAQ Level 2 protocol with 5–10 year predictive failure risk scoring
- Fields include: Tree ID, species, DBH, defects, failure likelihood, target rating, overall risk score, mitigation recommendation, projected risk horizon
- Integrated with GIS and photo documentation

Sample Feature: Auto-calculating matrix; dropdowns for likelihood ratings; time-based failure forecast

2. Tree Removal Approval Checklist

- Ensures transparency and documentation of every removal decision
- Tracks: risk rating, arborist recommendation, public notice, supervisor approval, alternatives considered

Sample Feature: Checkbox structure + text fields for public notice date, justification, and final sign-off

3. Pruning Operations Work Order Template

- Used for pruning by objective (e.g., risk reduction, clearance, structure)
- Tracks: tree ID, pruning method, work date, crew ID, condition class

Sample Feature: Dropdown menus for pruning method (crown clean, raise, reduce), task timing log

4. Tree Planting & Establishment Plan Template

- Records planting specs and 2-year care plan
- Tracks: species, size, mulch, staking, watering schedule, “Right Tree, Right Place” site suitability

Sample Feature: GIS coordinates; condition tags; species dropdown; photo upload

5. Integrated Pest Management (IPM) Treatment Log

- Documents Plant Health Care applications for risk, compliance, and tracking
- Tracks: pest diagnosis, treatment method, location, applicator ID, EPA compliance

Sample Feature: Product lookup table with EPA registration verification; structured log for inspections and treatments

6. Weekly Urban Forestry Operations Tracker

- Summarizes crew activity by day/week
- Tracks: pruning, removals, planting, PHC, inspections, equipment use, labor hours

Sample Feature: Auto-summing spreadsheet; filters for task type, crew, and zone

7. Annual Urban Forestry Report Template

- Compiles annual outcomes for internal review and public reporting
- Includes: inventory changes, risk score trends, work completed, budget use, outreach stats

Sample Feature: Pre-formatted charts, KPIs, key metrics summaries, photo field

Implementation and Integration Recommendations

- All templates should be **stored and managed in a secure cloud system** with user access control and backups
- Integration with platforms such as **TreePlotter, CityWorks, or ArborScope** is recommended for real-time syncing with field teams and GIS dashboards
- Periodic training for staff on proper template use and digital workflows is advised

Strategic Outcome:

These standardized forms ensure:

- Consistent documentation across staff and contractors
- Efficient tracking of urban forestry activities
- Regulatory alignment with ANSI/ISA protocols
- Transparency and defensibility in risk and maintenance decisions

Adopting and institutionalizing these tools will enhance Casper's ability to manage its growing tree inventory professionally, safely, and cost-effectively.

Appendix K – Emergency Response Templates and Protocols

Casper's urban forestry program must be equipped to respond rapidly and effectively to natural disasters, severe weather events, and tree-related public safety hazards. This appendix outlines field-ready templates and standardized protocols aligned with **FEMA ICS** (Incident Command System), **ISA TRAQ**, and **ANSI Z133** safety standards to support emergency tree operations.

Urban Forestry Emergency Response Framework

- Urban Forestry is designated a **supporting agency** in the City's Emergency Operations Plan (EOP).
- **ISA Certified Arborists** lead storm risk assessments and response prioritization.
- Coordination is maintained across **Parks, Streets, Emergency Management**, and **Public Works**.

Emergency Response Phases and Roles

Phase	Action	Responsible Party
Phase 1 – Immediate	Flag extreme-risk trees (blocking roads, utility hazards)	Urban Forestry Team, Emergency Services
Phase 2 – Assessment	Conduct formal TRAQ risk assessments	Certified Arborists
Phase 3 – Mitigation	Remove or stabilize high-risk trees	In-house or Contracted Crews
Phase 4 – Restoration	Replanting and canopy recovery planning	Urban Forest Supervisor, Planning

Emergency Template Tools

1. ICS Tree Response Command Template

- Defines roles: Urban Forest Supervisor, Field Arborist Lead, Debris Mgmt. Officer
- Includes: Chain-of-command, contact lists, communication flowchart

2. Chainsaw Crew Pre-Operation Safety Checklist

- Verifies: PPE (helmet, chaps, gloves), chain brake, fuel/oil, inspection log
- Required before any field activity involving removals or storm response

3. Daily Briefing Log and Team Sign-In/Out Sheet

- Tracks: Crew assignments, safety briefings, equipment status, hours worked

4. Hazard Tree Field Inspection Form

- Fields: Tree ID, GPS, species, DBH, visible defects, TRAQ risk category
- Documents: Action taken (e.g., prune, remove, monitor) and responsible party

5. Storm Damage Mapping Sheet

- GIS-compatible or printed form for use during power outages
- Color codes: Green (safe), Yellow (monitor), Red (prune), Black (remove)

6. FEMA-Compatible Debris Tracking Log

- Logs: Volume (cubic yards), tree location, crew, time stamps, photos, disposal site
- Supports: FEMA reimbursement and audit trail

7. Post-Event Recovery Assessment Template

- Tallies: Tree loss count, % canopy lost, replanting needs
- Captures: Equipment/labor costs, contractor use, priority restoration zones

Annual Preparedness and Review Protocols

- **Annual multi-agency drills** with Parks, Streets, Emergency Management
- **Pre-season equipment checks:** Lifts, chainsaws, GPS units, radios
- **GIS mapping prep:** High-risk canopy areas, critical infrastructure overlays
- **Emergency contact verification:** Internal and contractor readiness checklists

Strategic Benefit:

Formalizing and exercising these emergency protocols allows Casper to:

- Rapidly assess and mitigate public hazards
- Qualify for FEMA disaster recovery reimbursement
- Maintain urban canopy integrity and public trust post-disaster

By embedding urban forestry in the city's emergency framework, Casper strengthens its climate resilience, protects infrastructure, and ensures public safety during crisis events.

Conclusion

The 2024-25 tree inventory update represents a significant milestone in the City of Casper's ability to manage and plan for its urban forest. With detailed assessments of **15,017 publicly managed trees** across parks, boulevards, and public facilities, the City now possesses an up-to-date, GIS-integrated dataset that reflects current species composition, size class distribution, condition ratings, and structural risk classifications.

This report does **not function as a comprehensive urban forest management plan**, but it provides the **critical technical foundation** upon which such a plan can be built. Through detailed analysis of the updated inventory data, this report identifies core strengths and emerging vulnerabilities within the urban forest and offers **strategic recommendations** for improving long-term canopy health, public safety, and operational efficiency.

Key findings from this update include:

- A heavy reliance on **two species—Green Ash and Siberian Elm—comprising over 20.6%** of all public trees, creating a significant vulnerability to pests like Emerald Ash Borer and weather-related failures.
- A total of **338 hazardous trees** and **329 dead trees** posing safety and liability risks that require structured, time-sensitive mitigation.
- A healthy distribution of maturing trees in the **7–18 inch DBH range**, suggesting future canopy potential, but a tapering in larger size classes that signals the **need for long-term replanting** and legacy tree replacement.
- Disproportionate concentrations of aging or at-risk trees in high-use areas like cemeteries, boulevards, and parks.

Strategic Value of Continued Investment

Urban trees are not just aesthetic amenities—they are **critical green infrastructure** that deliver measurable returns in public health, stormwater management, energy savings, air quality, property value, and climate resilience. The 2025 inventory confirms that Casper's urban forest provides **over $1.1 million annually** in direct ecosystem services and represents a **capital asset valued at over $13.1 million**. Protecting and enhancing this asset is both fiscally prudent and environmentally necessary.

As Casper grows and responds to new climate, development, and infrastructure challenges, a forward-looking urban forestry strategy can:

- Reduce emergency response costs through structured pruning and risk removal cycles
- Increase canopy equity in historically underplanted neighborhoods
- Attract grant funding for tree planting, hazard reduction, and community greening
- Strengthen community pride and civic identity through beautified streets and parks
- Enhance storm readiness and FEMA eligibility by documenting pre-event tree risk and mitigation actions

A Path Forward

This report provides not only an inventory, but a **call to action**. It highlights where strategic investment—whether in staffing, equipment, training, or public engagement—can yield long-term cost savings, improved safety, and community-wide benefits. The accompanying appendices and templates offer a ready-to-use framework for expanding proactive maintenance, public education, and data-integrated planning.

The City of Casper is now well-positioned to develop a comprehensive Urban Forest Management Plan, using this inventory as a baseline. With continued collaboration between departments, elected leadership, and engaged residents, the City can ensure that its urban forest remains a safe, sustainable, and enduring resource for decades to come.

Casper's Urban Forest – By the Numbers
2024–25 Tree Inventory Highlights

How many trees?
15,017 public trees grow throughout Casper's parks, streets, buildings, cemeteries, golf courses, and beautification zones.

What kinds?
Over 65 different species! But these 4 dominate the landscape:

- Green Ash – 13.65%
- Cottonwoods – 10.89%
- Honeylocust – 10.48%
- Siberian Elm – 6.97%

How healthy are they?

- Good: 53.9%
- Fair: 37.9%
- Poor/Dead/Hazardous: 8.19% (~1,230 trees)

Tree Risk Ratings (ISA TRAQ):

- Low Risk: 76.3%
- Moderate: 15.3%
- High/Extreme: 8.36%
- Hazardous trees: 338 need urgent action
- Dead trees: 329 slated for removal

Environmental Superpowers
Every year, Casper's trees:

- Intercept 10.4 million gallons of stormwater
- Remove 7.8 tons of air pollution
- Sequester 128 metric tons of carbon
- Save $98,400 in heating/cooling costs

Urban Forest Value

- Structural Asset Value: $13.1 million
- Annual Ecosystem Services: $1.1 million+

What's next?
To keep the canopy strong, Casper aims to:

- Plant 500 trees per year
- Diversify species (no more than 10% of any one type!)
- Focus on underserved areas
- Launch proactive pruning & removal programs
- Track progress using maps and modern tools

Certification Statement

This report was prepared for the City of Casper, Wyoming, to complement the 2024-25 municipal tree inventory update. It is based on field-collected data for 15,017 publicly managed trees and reflects industry-standard practices including ISA Best Management Practices and ANSI A300 Part 9 guidelines.

The findings, summaries, and recommendations have been reviewed for consistency with the verified inventory dataset and are provided to support the City's future urban forestry planning and decision-making efforts.

This document is offered as a technical reference. It is intended to inform operational strategy, risk mitigation, and long-term urban forest management. No legal warranty or guarantee is expressed or implied.

Certified By:

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Date: June 2025

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William R. Scott