

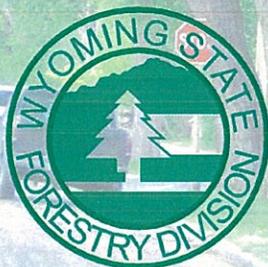
# **Community Tree Assessment:**

**Trees within the Public Right of Way**

**Laramie, Wyoming**

**Office of State Lands  
and Investments**

**Wyoming State  
Forestry Division**



**July 2008**

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## Introduction

In the summer of 2007, the Wyoming State Forestry Division began a 100 percent inventory of all public trees within the city boundaries of Laramie, WY. The objectives of this inventory were to (1) establish a status of Laramie's tree resources (2) make recommendations on long-term program needs and (3) to examine and rate trees for removal. By the fall of 2007 all public spaces maintained by the City of Laramie Parks and Recreation Department were inventoried. These areas included Greenhill cemetery, five detention ponds, three beautification areas (Spring Creek, downtown, and East Grand Avenue), thirteen parks and two recreation areas (the ice arena, recreation center). That portion of the project was completed in October, 2007 with a report submitted to the Laramie Parks, Tree and Recreation Board and the Laramie City Council.



In addition to these areas, all trees and clearly defined planting spaces within the public right of way (PRW) were inventoried. This portion of the inventory was completed in July of 2008. The following report is a summary of the trees and planting spaces found within the PRW and an overall look at the community forest in Laramie, WY. It is important to note that a tree inventory is a reflection of the tree population at a given time. The condition, needs and numbers of trees is constantly changing, making it necessary to update tree information on a regular basis.

### Summary of Past Conditions

Since the settlement of Laramie in 1868, the residents have recognized the benefits of planting trees in an urban environment. From the beautiful fall colors they produce to the protection they provide from harsh winter winds, trees are not often taken for granted. With proper tree species selection, placement and maintenance the trees in Laramie can improve air quality, reduce stormwater runoff and erosion, conserve energy, boost the local economy, increase wildlife habitat, and reduce stress.

It was through the recognition of these benefits that led the City of Laramie to conduct their first tree inventory in 1993. At this time 100 percent of the public trees in the City of Laramie were inventoried by the Wyoming State Forestry Division. There were 3,844 trees and 2,824 planting spaces included in the PRW portion of the inventory with a value of over \$5,800,000. Mature cottonwood trees dominated the population. The trees were generally in fair condition. However, poor placement was noted as a common problem. The overall recommendation was to implement a local tree ordinance and for public education.

Following the inventory, the City of Laramie did establish a local tree ordinance. This ordinance states that all trees and shrubs growing on the public right of way "shall be kept, maintained and trimmed by the owner or occupant of the adjacent property so as to not obstruct traffic, interfere with visibility or pedestrians, or cause any unsafe condition". There will be an eight foot clearance below all tree branches and stumps shall not project above the surface of the ground. All hazardous trees, shrubs, and woody

vegetation will be the responsibility of the property owner to remove. Contact the City of Laramie for a complete copy of the Comprehensive Tree Ordinance.

## Assessment Procedures

During the summers of 2007 and 2008, trees within the PRW in Laramie, WY were inventoried and assessed by the Wyoming State Forestry Division. A tree was counted in the inventory if any portion of the trunk appeared to be within the boundary of the PRW. A map of the PRW was loaded into a Trimble global positioning system (GPS) and used to determine if a questionable tree was within the boundary. The Trimble GPS was also used to record the location of each tree as well as the following attributes: species, placement, Dbh (diameter at breast height), height, condition, if the tree was a hazard, location or management unit, need and general comments. When a tree clumped into two or more trunks at or near the ground level, each trunk was counted as an individual tree. The exception to this was trees growing with multiple stems (ten or more) averaging two inches in diameter or less such as chokecherry or boxelder.

For this inventory trees were classified based on seven management needs: none, mulch, water, priority one, two, or three prune, or removal. The recommendations for pruning were based on these guidelines:

- **Priority 3 Prune** – Trees that needed to be pruned for form or structure, to promote a leader, to clean up one small dead or broken limb, or to provide clearance.
- **Priority 2 Prune** – Trees that need pruned due to several small dead, broken, or diseased limbs. These are limbs that if they fall as a result of weather conditions, will not cause major property damage or risk injury to a bystander (no more than a couple of inches in diameter).
- **Priority 1 Prune** – Trees that need immediate attention were recommended for priority one prune. These are trees that have large dead or hanging limbs in the canopy and could cause injury or property damage.

In addition to trees in the PRW, planting spaces were also recorded for neighborhoods designed with planting strips. These are the areas in town with a strip of grass between the sidewalk and street. In some of these areas, tree size (small, medium, or large) was recommended based on the largest tree that could adequately fit in that location. Recommended trees by size class are listed in Appendix B. Ultimately, the appropriate tree for a given location is based on the surroundings, planting density, growth characteristic of the selected tree, and city clearance regulations.

## Survey Results

Surveying 100% of all trees within the public right of way, a total of 5,205 trees were assessed with 51 different species identified. See Appendix A for a complete list of the PRW trees by species.

## Species

The most dominant species found within the public right of way was cottonwood with 1,932 trees (see Appendix B). Quaking aspen was the next most common species with 726 trees. The reason for the relatively high number of aspen trees was that they were often planted or allowed to root sucker in clumps with ten or more trees growing in a crowded location. The other common species included: crab apple (483 trees), chokecherry (366), and spruce (241). Thirty-eight species totaled nine percent of the total population, equaling less than one percent each.

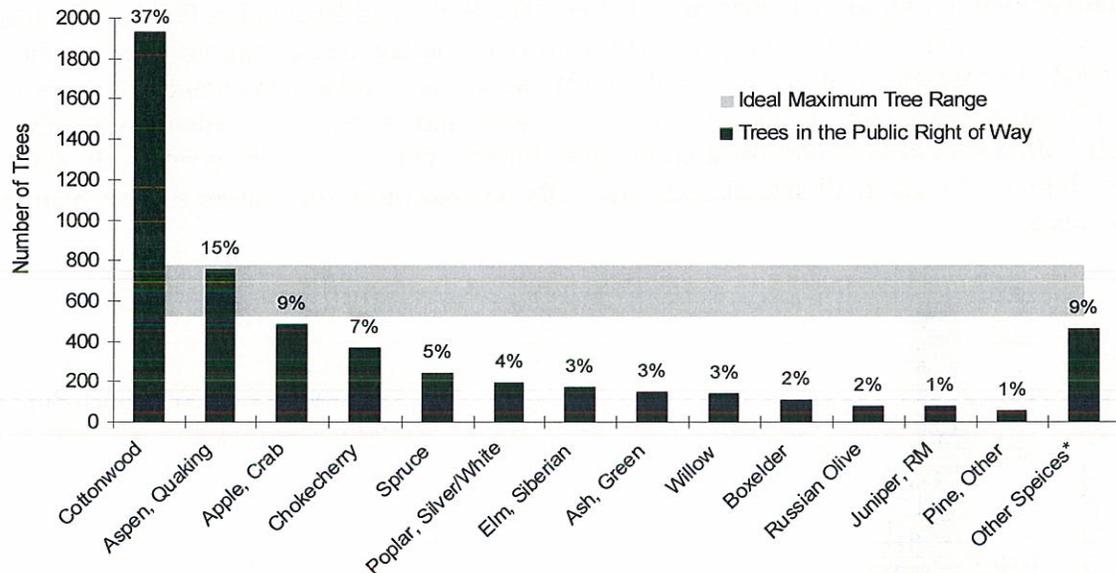


Figure 1. Number of trees within the public right of way by species compared to the ideal maximum range for a single species that should be found in a community. No species should command more than 10 to 15% of the tree population.

\*Other species is the combined total of 38 different species, all of which equal less than one percent of the population.



The seedpods of a honeylocust tree.

In both the city maintained areas and the public right of ways, there was a high percentage of cottonwood trees present. In a location such as Laramie, no single species should command more than 10% to 15% of the population to prevent catastrophic losses from an insect or disease outbreak. Currently with a total population of 5,205 trees, this means that there should be no more than 520 to 781 trees of a given species within the PRW. This maximum ideal range is represented in Figure 1.

Surprisingly, there was greater diversity in the PRW trees than the trees in the city maintained areas. Not only was there a higher number of different species represented but also better distribution of species across the population. Some of the tree species more commonly found in the PRW included apple, quaking aspen, birch, boxelder, honeylocust, silver maple, mountain ash, plum, silver maple, poplar, and walnut.

## Size

The average diameter of the trees in the PRW was 13 inches diameter at breast height (Dbh), or 4.5 feet above ground. A large number of trees fell within the 1 to 4 inch size class, 1,945 trees. The majority were quaking aspen, crab apple, and chokecherry. As already mentioned the quaking aspen tended to be planted in groups. This high density planting impedes diameter growth.

Figure 2 demonstrates the size class distribution of trees in the PRW compared to those maintained by the city. The size class distribution of both of these populations was relatively similar up to 21 inches in diameter. The Parks and Recreation Department has done an excellent job of managing mature to over-mature trees, removing them when needed. In contrast, with the trees in the PRW there was a higher percentage of mature to over-mature trees (see Table 1). Figure 2 also shows what an “ideal” size class distribution should look like for a community forest. There should be a relatively equal distribution of trees in all size classes, gradually decreasing in the mature to over-mature size class.

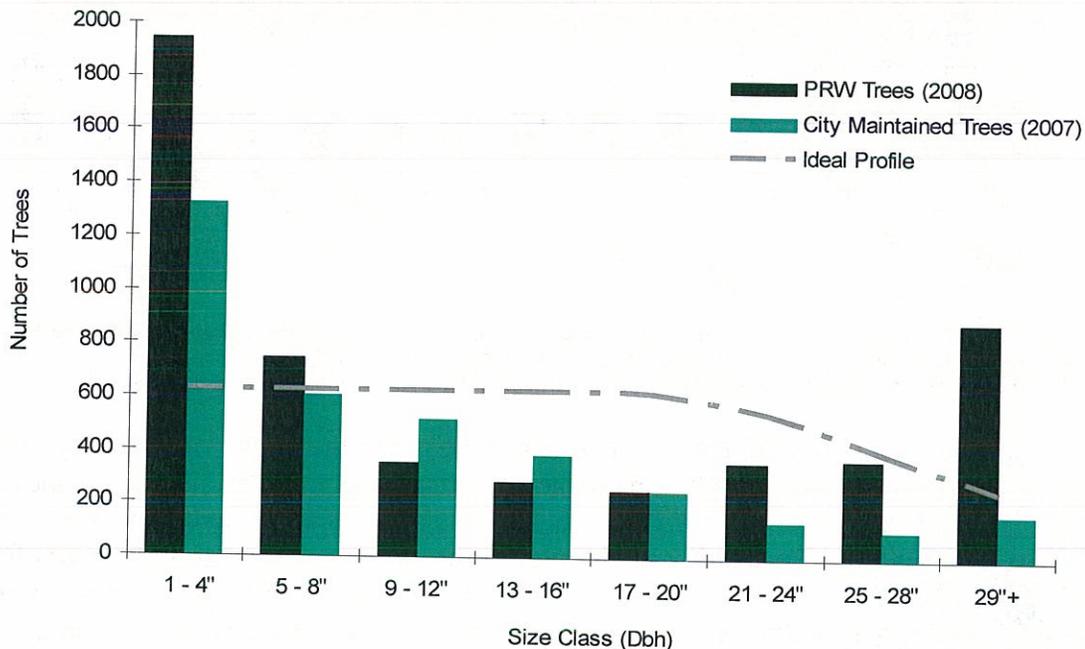


Figure 2. Size class distribution of 5,205 trees within the public right of way and 3,504 trees maintained by the City of Laramie, WY compared to an ideal profile.

There were 889 trees that were 29 inches or more in diameter. Four different species make up this mature to over-mature size class: cottonwood (711 trees), silver poplar (75 trees), willow (74 trees) and Siberian elm (12 trees). These species are all fast growing weak wooded species that are prone to dieback and decay. They should be checked on a regular interval for dead limbs, stubs, cracks in the trunk, mushrooms or conks growing at the surface, or discolored bark. If decay is caught early enough, there is the potential of pruning it out and stopping the spread. Take particular care to check these trees and other mature trees after major storm and wind events to ensure that no damage has occurred.

Table 1. Size Class Distribution of 5,205 Public Right of Way Trees Compared to 3,504 City Maintained Trees.

Size Class	Percentage of the PRW Tree Population	Percentage of the City Tree Population
1 - 4"	37%	38%
5 - 8"	14%	17%
9 - 12"	7%	15%
13 - 16"	5%	11%
17 - 20"	5%	7%
21 - 24"	7%	4%
25 - 28"	7%	3%
29"+	17%	5%
<b>Total</b>	<b>100%</b>	<b>100%</b>

### Condition and Management Recommendation

In 2008, eighty-four percent of the trees in the public right of way were in good or fair condition. The majority of the trees in good and fair condition required no or routine maintenance. However, as a result of improper placement there were a larger percentage of trees in good to fair condition recommended for removal compared to those found in the areas maintained by the city. This same problem was noted in the original 1993 tree inventory.

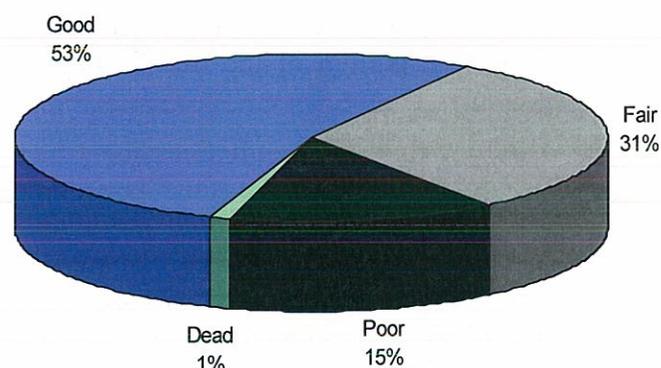


Figure 3. Condition of Trees within the Public Right of Way.

Fifteen percent of the trees (768) were in poor condition. For 407 of these trees, too much pruning would be required to eliminate the hazard. Consequently, removal was recommended. This damage tended to be numerous large dead limbs, trunk damage, or decay.

With consideration to all condition classes, the most common recommendation was priority three pruning. Educating the residents about the benefits and methods of proper pruning will help to establish a healthy community forest. More information on pruning can be found at Colorado State Forest Service: (<http://csfs.colostate.edu/allabouttrees.htm#prune>).

A total of 735 trees were recommended for removal. More than half of these were in poor condition and not surprisingly a large number were cottonwood trees. These trees varied greatly in Dbh from 3 inches up to 41". The other species that was most commonly recommended for removal was quaking aspen. Common problems with both the cottonwood and aspen trees included improper placement, canker, rot, and die back. Trees recommended for removal provide an excellent opportunity to replant and increase species diversity.

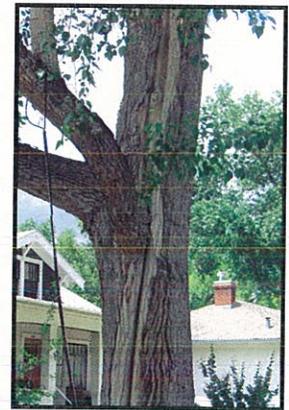
Table 2. The number of trees and average diameter by management need for PRW trees in Laramie, WY (2008).

Management Need	Number of Trees	Percent of Population	Average Condition	Average Diameter
Mulch	272	5.2	Good	2
Water	288	5.5	Fair	6
None	1,329	25.5	Good	8
Priority 1 Prune	517	9.9	Fair	27
Priority 2 Prune	556	10.7	Fair	25
Priority 3 Prune	1,508	29.0	Good	11
Removal	735	14.1	Poor	13

## Hazard Trees

Each tree was visually inspected for large cracks, areas of decay, dead limbs, mushrooms or conks growing at the surface. When these were found, it was determined whether or not the tree should be marked as a hazard tree. For this inventory a hazard tree is defined as a tree containing a structural defect that could result in the tree or a portion of the tree falling on someone or something of value.

There were 434 hazard trees identified within the public right of ways. Appendix B shows the hazard trees by location. The majority of hazard trees were mature to over-mature cottonwood trees. For over half of the hazard trees, pruning could eliminate the hazard and prolong the life of the tree. Although the recommended maintenance for all hazard trees should be a high priority, those located over busy streets need immediate action. Where hazard trees exist the homeowner should be notified including information about the City Tree Ordinance, the resident's responsibility, a deadline for eliminating the hazard, and appeal action that can be taken.



Large cracks that run up the tree significantly weaken the structure.

Table 3. Hazard trees by species and management recommendation.

Species	Priority One Prune	Remove	Average Dbh
Cottonwood	235	139	29
Willow	11	22	29
Poplar, Silver/White	11	2	30
Elm, Siberian	4	6	27
Boxelder	-	1	15
Ash, White	-	1	21
Ash, Green	1	-	9
<b>Total</b>	<b>262</b>	<b>171</b>	<b>29</b>

There is a significant increase in the percentage of hazard trees found in the public right of way, eight percent of the population, compared to the two percent in the city maintained areas. Education can help residents identify the dangers and know the liability of a hazard tree. In addition the residents should be aware of the importance of checking all mature to over-mature trees following major storm events.



Large dead limbs can often be pruned out to remove the hazard.

## Concerns

With the exception of the higher number of trees with poor placement, all other common problems and concerns with the PRW trees were similar to what was found in the city maintained areas. These problems include insect, disease, and environmental factors and were already covered in the initial report given to the City of Laramie in the fall of 2007. Below is a brief review.



Gall with exit hole from poplar twig gall fly.

### Insects and Disease

#### Bacterial Wetwood:

Host:	Cottonwood and willow
Signs and Symptoms:	Yellow-brown discolored bark, wet oozing slime with a foul odor.
Prevention:	Adequate water, root and stem protection.
Reference:	Colorado State University Cooperative Extension Fact Sheet: Bacterial Wetwood, no. 2.910 by W.R. Jacobi (1998) in Appendix D.

#### Cytospora canker:

Host:	Cottonwood
Signs and Symptoms:	Yellow or orange-brown to black discolored areas on the bark of the trunk or branches, liquid ooze, sunken dead areas of bark, pinhead sized pimples, masses of spores, reddish brown discoloration of inner bark and wood.
Prevention:	Adequate water, root and stem protection, plant resistance species.
Reference:	Colorado State University Cooperative Extension Fact Sheet: Cytospora Canker, no. 2.937 by W.R. Jacobi (1999).

#### Scale insects:

Host:	Spruce, pine, fir, and aspen
Identification:	A small insect protected beneath a hard covering. These insects attach to the bark or needles of the tree and feed on the sap. Scales can lead to decreased vigor, needle drop, dieback, and increased susceptibility to other insects and diseases.
Prevention:	Natural enemies include lady beetles and chalcid wasps. Insecticides or horticultural oils can be applied during the vulnerable crawler stage in the late spring to early summer.
Reference:	Colorado State University Cooperative Extension Fact Sheet: Oystershell Scale, no. 5.513 by W.S. Cranshaw (2003) and Colorado State University Cooperative Extension Fact Sheet: Oystershell Scale, no. 5.513 by W.S. Cranshaw (2003).

#### Poplar borer:

Host:	Hybrid cottonwood, aspen, poplar, and willow
Identification:	The larva of <i>Saperda calcarata</i> , a long horned beetle. The females lay their eggs in small slits near the middle of the tree from June to August. Signs of attack include exit holes where adults emerge, woodpecker activity, a varnished-like stain, reddish sap. They prefer open grown, stressed trees.
Prevention:	The best maintenance is to maintain the trees in good condition. Chemical controls are available.
Reference:	<a href="http://coopext.colostate.edu/4dmg/Pests/popborer.htm/">http://coopext.colostate.edu/4dmg/Pests/popborer.htm/</a> .

### Tent caterpillars:

Host:	Chokecherry
Identification:	There are several species of caterpillars that produce very visible silken tents where they congregate during the day for shelter or to feed.
Prevention:	Natural enemies include birds, predacious bugs, hunting wasps, parasitic wasps, and tachinid flies. There are also microbial and contact insecticides.
Reference:	Colorado State University Cooperative Extension Fact Sheet: Tent-Making Caterpillars, no. 5.583 by W.S. Cranshaw (1997).

### Poplar Twiggall Fly:

Host:	Aspen
Identification:	Galls develop on the twigs of aspen by the feeding of the poplar twiggall fly. The galls continue to grow and swell even after the fly has emerged. This creates a permanent disfigurement but does not seem to threaten tree health.
Prevention:	Problems with twiggall flies are most severe in succulent aspen. Do not over water or fertilize. Natural enemies include chickadees and other birds, as well as a parasitic wasp. There is also a systemic insecticide.
Reference:	Colorado State University Cooperative Extension Fact Sheet: Poplar Twiggall Fly, no. 5.579 by W.S. Cranshaw (2005).

### Bark beetles:

Host:	Pine and spruce trees
Identification:	These native beetles are small, about the size of a grain of rice, and brown to black. Look for boring dust on or around the tree and pitch tubes. The beetles kill the tree by creating egg galleries in the underlying phloem tissue and deposit their eggs. The beetles and the larvae feed off of the phloem and cut off the trees ability to transport water.
Prevention:	The best maintenance is to maintain the trees in good condition. Chemical controls are available.
Reference:	Wyoming State Forestry website – under Forest Health: <a href="http://slf-web.state.wy.us/forestry/health2.aspx">http://slf-web.state.wy.us/forestry/health2.aspx</a> The USFS Insect and Disease Leaflet (number 127) available on-line at: <a href="http://www.barkbeetles.org/spruce/SBFIDL127.htm">http://www.barkbeetles.org/spruce/SBFIDL127.htm</a>

As already mentioned, when a community forest has a large percentage of one or two species, there can be devastating affects from an insect or disease outbreak.

### Environmental and Placement Factors resulting in Common Problems

A community environment can be stressful for trees, particularly those growing in the PRW. As a result there were a greater number of problems for these trees compared to the trees maintained by the city. A large part of this was due to poor placement for both volunteer and planted trees. Below is a list of the observations made during the inventory. Taken one at a time, many of these problems do not typically cause tree mortality.



Volunteer aspen tree with poor placement.

Nevertheless, when a tree is stressed it is more susceptible to attack from insects and disease.

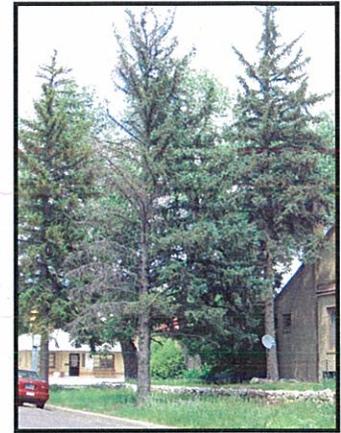
**Drought:** Compared to the twenty percent of the city maintained trees that required water, only five percent of the PRW trees were noticeably drought stressed. The majority of the drought stressed city trees were spruce trees and there was a significantly lower percentage of spruce trees in the public right of way, only five percent of the population. Still, many of the spruce trees did show signs of stress or decline.

Damage from drought conditions and winter drying can not be reversed. For conifer trees, one way to lessen the impact is to get in the practice of watering conifer trees when the air and soil temperatures reach 45 degrees or above for a sustained period of time. Another beneficial practice is to mulch all trees. Mulch can conserve soil moisture with a 10 to 25 percent reduction in loss from evaporation. Finally, when selecting new planting spaces and trees, residents should consider placement carefully, not only the space above ground but also the trees ability for adequate root development.

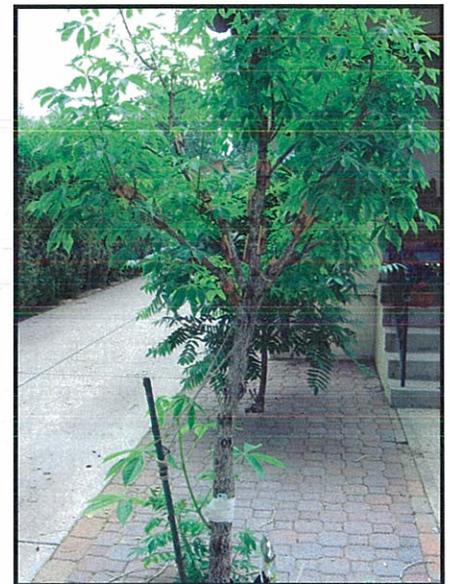
**Lawn equipment damage:** Another common problem noticed during the inventory was damage to the base of the tree by lawn care equipment. These wounds leave the tree susceptible to damage from insects and disease. The best way to prevent this type of injury is to apply mulch around the tree. Mulch was recommended for 272 trees and can benefit trees of all sizes. The area should extend three to six feet out from the base of the tree and be two to four inches deep after settling. Keep the mulch a few inches from the base of the tree to prevent bark decay.

**Human impacts:** Many of the trees were impacted by the residents for various reasons. Everything from tree houses, signs, ropes, soccer ball nets, and efforts to both encourage and discourage the presence of birds or squirrels in the yard have resulted in damage to trees. Often this damage is minimal but like many other factors has the ability to weaken a tree.

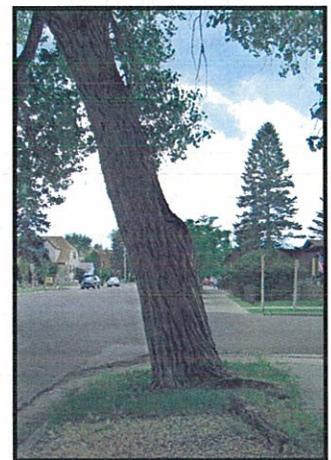
**Severed roots:** Cottonwoods are shallow rooted trees and raised sidewalks and severed roots were a common problem in the areas of town with large over mature trees. These large primary roots help to anchor the tree which is especially important in windy climates such as Laramie. Trees that have severed roots or a raised walk should be closely observed, particularly if they show any signs of root and trunk decay or begin to lean.



Spruce in decline.



Ohio buckeye with mouse traps and needles placed on the tree to discourage squirrels.



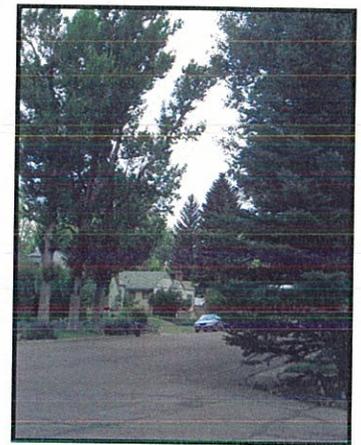
Tree with severed roots and leaning.

**Improper placement:** Not every location is appropriate for every type of tree. Large trees growing under power lines were a common problem. At right is a picture of how the trees can be pruned away from the wires.



Cottonwood trees pruned away from power lines.

Another common placement problem was trees improperly sized for the planting space. Conifers are not recommended for planting in public right of ways. When planted the conifer is small and seems to fit well into the space. However, as the tree matures they can pose a number of problems. First, because they retain their branches low to the ground, they can often outgrow the lawn section of the public right of way. Pruning to provide clearance causes unnecessary damage to the tree making it more susceptible to insect and disease. Second, conifers obstruct the vision of drivers, making it difficult to see pedestrians entering the street from the other side of the tree. Finally, conifers retain their needles in the winter. As a result, when they are planted on the south side of the street they shade the street surface and icy conditions can occur.



Restricted view of intersection due to spruce tree.

**Girdling roots:** On many of the mature cottonwoods, girdling roots were noticed around the base of the tree. These roots can cut off or restrict the movement of water and nutrients in the tree. With time, there will be reduced growth and dieback on the affected side of the tree. Girdling roots can be removed but only by further injuring the tree. The best option is proper planting, followed by inspecting the tree at a young age to correct the problem before it becomes too serious. Again education about proper planting will help reduce the occurrence of this problem.

It is important to note that many of the trees were impacted by more than one of these problems and that often they were interrelated. It is through this interaction that the tree's health is seriously impacted. The best preventative measure that can be taken is to maintain adequate environmental conditions for the tree, ensuring that it has the right amount of water, is protected by mulch, and that regular corrective pruning occurs during the fall or winter months.

## Tree Value

The value of each tree was determined based on the species, Dbh, and condition. With the Council of Tree and Landscape Appraisers formula and the Colorado State Forest Service tree values, each species was assigned a specific value and species factor and the following equation was used to determine tree value:

$$\text{Tree Value Formula} = \text{Species Value} * (.785 * (\text{Dbh}^2)) * \text{Species Factor} * \text{Condition Factor}$$

The formula breaks the trees down into six condition classes: excellent, good, fair, poor, very poor, and dead. For the Laramie Tree inventory only four condition classes were used. As a result, when trees were rated in good condition with no management need recommended, the excellent condition class factor was used in the tree value equation

(1.0). For the trees rated in good condition but needing management, the good condition class factor was used to calculate tree value (0.8).

The PRW trees were valued just over \$24,847,000. This is a valuable resource for the City of Laramie. As evident in Table 4, there were a higher number of trees in good condition but they had a lower value than the trees in fair condition. On average the trees in good condition had a lower Dbh. As indicated by the equation, tree value is directly related to size. As a tree grows the benefits provided to the environment increase. This includes rainfall interception, absorption of greenhouse gases, carbon dioxide sequestration, and lower air temperatures during the summer.

Table 4. Current Value of Public Trees.

Condition Class	Current Value	Number of Trees	Average Dbh
Good	\$9,430,442	2,769	8
Fair	\$11,399,999	1,615	19
Poor	\$4,016,857	768	20
<b>Total</b>	<b>\$24,847,298</b>	<b>5,205</b>	<b>13</b>

## Planting Spaces

Planting spaces were only recorded when there was a clearly defined public right of way. There were 3,488 planting spaces in Laramie (see Appendix B). Stocking density varied greatly around Laramie from the newly developed areas of town to the “tree area” with a canopy of mature cottonwoods. There were several long planting strips in Laramie without trees; for example along 30<sup>th</sup> St. by the golf course and south of town along Skyline Drive. If these areas are owned by the City, they should be considered for beautification efforts in order to increase both stocking density and species diversity. All areas could greatly benefit from additional tree plantings and overall the population could increase by 33 percent.

Encourage the residents to plant more trees through educational material about planting the right tree in the right place, proper tree planting methods, and appropriate species for Laramie. In addition, use the Park and Recreation Arbor Day tree sale to increase species diversity by offering plants other than cottonwoods.

## Changes in the Community Forest

Table 5 shows the difference in species diversity, number of trees, average Dbh, total value, and planting spaces from the 1993 inventory and the 2008 inventory. There has been a significant increase in the number of species and the number of trees represented in the PRW population. There is also a very drastic difference in the total tree value. At present there is greater knowledge on the benefits of community trees than in 1993. These additional values are incorporated into the ISA Rocky Mountain Chapter Species Factor Values formula. Finally, due to Laramie’s growth over the last 15 years, there were 664 additional planting spaces counted.

Table 5. Comparison of the PRW trees and spaces inventoried in 1993 to the 2008 inventory.

	Number of Species	Number of Trees	Ave. Dbh	Total Value	Planting Spaces
1993	34	3,844	11	\$5,876,000	2,824
2008	51	5,205	13	\$24,847,000	3,488

## Laramie's Community Forest

Combined there were 8,709 community trees in Laramie, WY and 55 different species. Table 6 lists the top fourteen species which totaled 92 percent of the population. Overall the community forest was young, with an average Dbh of 11 inches and in good to fair condition. Eighty-seven percent of the hazard trees were over mature cottonwoods. Table 6 also show the grand total for the community forest as a whole, including all species. The average value of a tree in Laramie was \$4,193 and the total value was approximately \$36,520,000. This is a tremendous resource for Laramie, WY and should be preserved through the cooperative efforts of the City and the residents.

Table 6. Summary of community trees in both the PRW and areas maintained by the City of Laramie (2008).

Species	Number of Trees	Percent of Population	Average Dbh	Condition	Number of Hazards	Average Value	Total Value
Cottonwood	3,097	35.6	19	2	425	\$7,206	\$22,316,409
Spruce	1,500	17.2	10	1	2	\$4,784	\$7,176,404
Aspen, Quaking	796	9.1	3	1	-	\$305	\$242,537
Apple, Crab	755	8.7	4	1	-	\$964	\$728,075
Chokecherry	484	5.6	3	1	-	\$353	\$170,949
Poplar, Silver	231	2.7	22	2	13	\$9,390	\$2,169,080
Ash, Green	217	2.5	5	2	1	\$1,075	\$233,260
Elm, Siberian	173	2.0	10	2	10	\$2,430	\$420,459
Willow	154	1.8	26	2	35	\$9,572	\$1,474,058
Juniper, RM	138	1.6	4	1	-	\$777	\$107,287
Boxelder	130	1.5	8	2	1	\$1,396	\$181,520
Pine, Austrian	124	1.4	6	1	-	\$1,738	\$215,480
Russian Olive	103	1.2	9	2	-	\$2,206	\$227,264
Pine, Ponderosa	94	1.1	9	2	-	\$2,940	\$276,401
<b>Grand Total</b>	<b>8,709</b>	<b>100.0</b>	<b>11</b>	<b>2</b>	<b>488</b>	<b>\$4,193</b>	<b>\$36,520,852</b>

## Recommendations

Recommendations specific to the city maintained areas were made in the initial report given to the City in the fall of 2007. Throughout this paper there have been recommendations specific to the PRW trees. Below is a summary of all recommendations.

- ◆ The first priority is to notify the homeowners where hazard trees exist. This notification should include information regarding the City Tree Ordinance, their responsibility, a deadline for eliminating the hazard, and appeal action that can be taken.

- ◆ A commitment from the residents is essential to maintain a healthy, beautiful community forest in Laramie. Use creative methods to encourage proper tree care and increase education through newspaper articles, door hangers, short courses, opportunities for involvement, brochures, and school programs. Educate the public on:
  - The Laramie Tree Ordinance
  - How to check for hazard trees
  - The value of species diversity and recommended tree species
  - How to choose the right tree for the right space
  - Proper planting techniques
  - Tree pruning methods
  - Common insects, disease and environmental problems
  - Winter water and the benefits of mulch
- ◆ Increasing species diversity is an absolute essential. The City of Laramie can help to increase diversity by doing its part to not over plant any given species.
- ◆ There are several planting strips in Laramie without trees. These are excellent locations to increase both stocking density and species diversity.
- ◆ Keep the database as up to date as possible and conduct another tree inventory in ten years.

Appendix A – Summary Table of Trees within the Public Right of Way

Average size indicates diameter at 4½ feet above the ground. Average condition indicates the following visual observations: Good - no visual problems, Fair - average tree needs if one or two minor problems, and Poor - tree declining in vigor, visual problem noted.

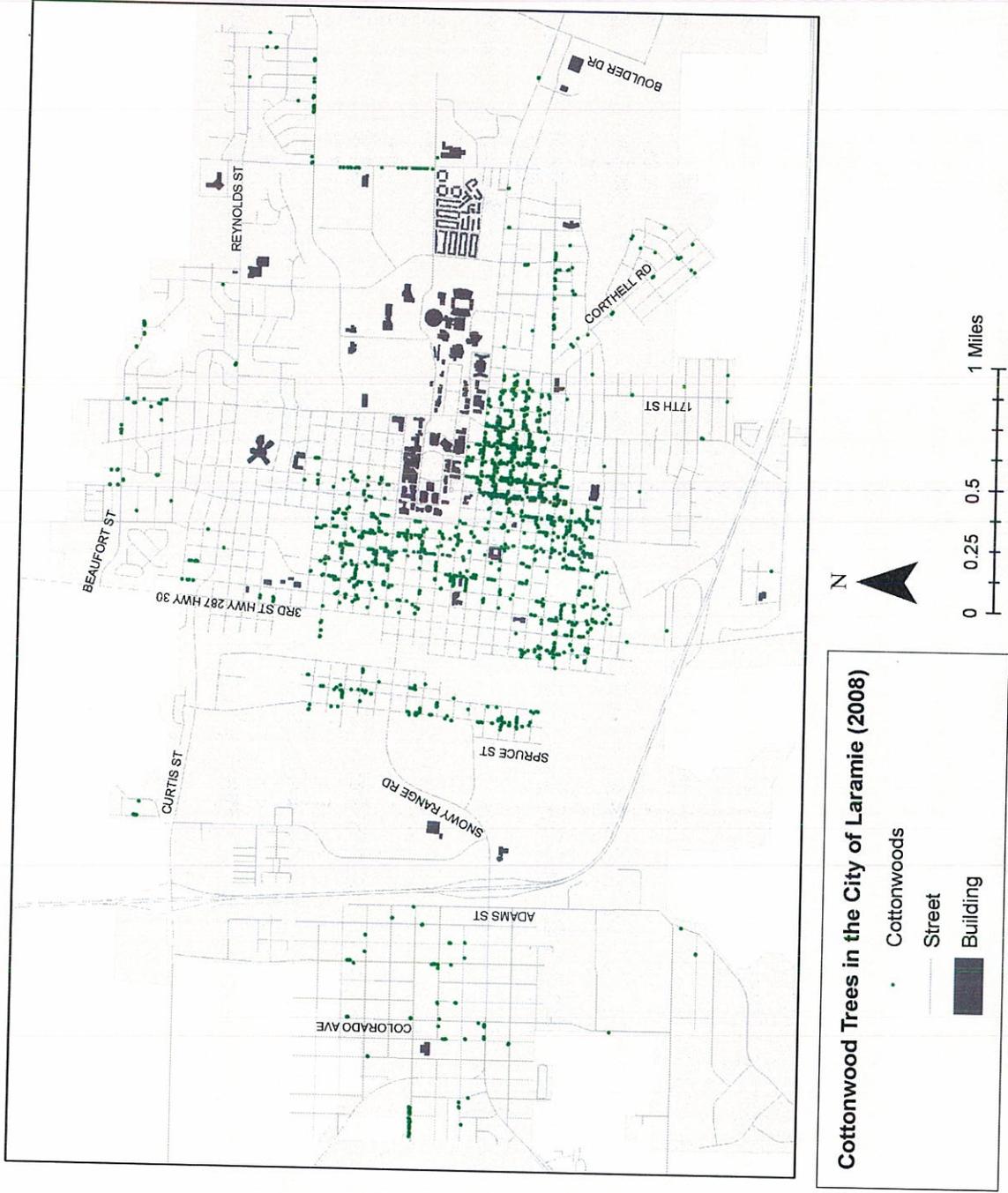
Trees within the Public Right of Way in Laramie, Wyoming (July, 2008).

Species	Number of Trees	Percentage of Total	Ave. Dbh (in.)	Ave. height (ft.)	Ave. Condition	Ave. Value	Total Value
Cottonwood	1932	37.1	23	49	Fair	\$9,071	\$17,525,518
Aspen, Quaking	756	14.5	3	17	Good	\$303	\$229,301
Apple, Crab	483	9.2	5	14	Good	\$1,222	\$590,427
Chokecherry	366	7.0	2	12	Good	\$289	\$105,667
Spruce	241	4.6	11	35	Good	\$6,020	\$1,450,733
Poplar, Silver/White	194	3.7	23	48	Good to Fair	\$9,610	\$1,864,389
Elm, Siberian	170	3.3	9	26	Good to Fair	\$2,343	\$398,284
Ash, Green	145	2.8	6	26	Good	\$1,442	\$209,142
Willow	143	2.7	26	37	Poor	\$9,921	\$1,418,640
Boxelder	109	2.1	8	25	Good	\$1,404	\$153,067
Russian Olive	80	1.5	9	23	Good to Fair	\$2,436	\$194,892
Juniper, RM	74	1.4	3	11	Good	\$602	\$44,535
Pine, Other	52	1.0	3	12	Good to Fair	\$380	\$19,759
Honeylocust, Common	47	< 1	5	21	Good	\$1,096	\$51,529
Pine, Ponderosa	46	< 1	11	29	Good	\$4,178	\$192,185
Pine, Austrian	44	< 1	10	25	Good	\$3,799	\$167,178
Birch	31	< 1	6	25	Good	\$776	\$24,063
Plum	29	< 1	1	6	Good	\$63	\$1,823
Pine, Bristlecone	27	< 1	3	11	Good	\$429	\$11,576
Apple, Other	25	< 1	3	10	Good	\$362	\$9,052
Maple, Silver	23	< 1	6	19	Good to Fair	\$548	\$12,595
Other	22	< 1	4	24	Good	\$713	\$15,693
Hawthorn	21	< 1	2	9	Good	\$175	\$3,685
Mountain-ash	20	< 1	2	11	Good	\$155	\$3,100
Pine, Pinyon	16	< 1	5	17	Good	\$743	\$11,892
Linden, Littleleaf	13	< 1	2	13	Good	\$178	\$2,319
Pine, Limber	13	< 1	10	29	Good	\$2,981	\$38,756
Pine, Mugo	12	< 1	2	10	Good	\$138	\$1,651

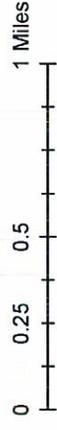
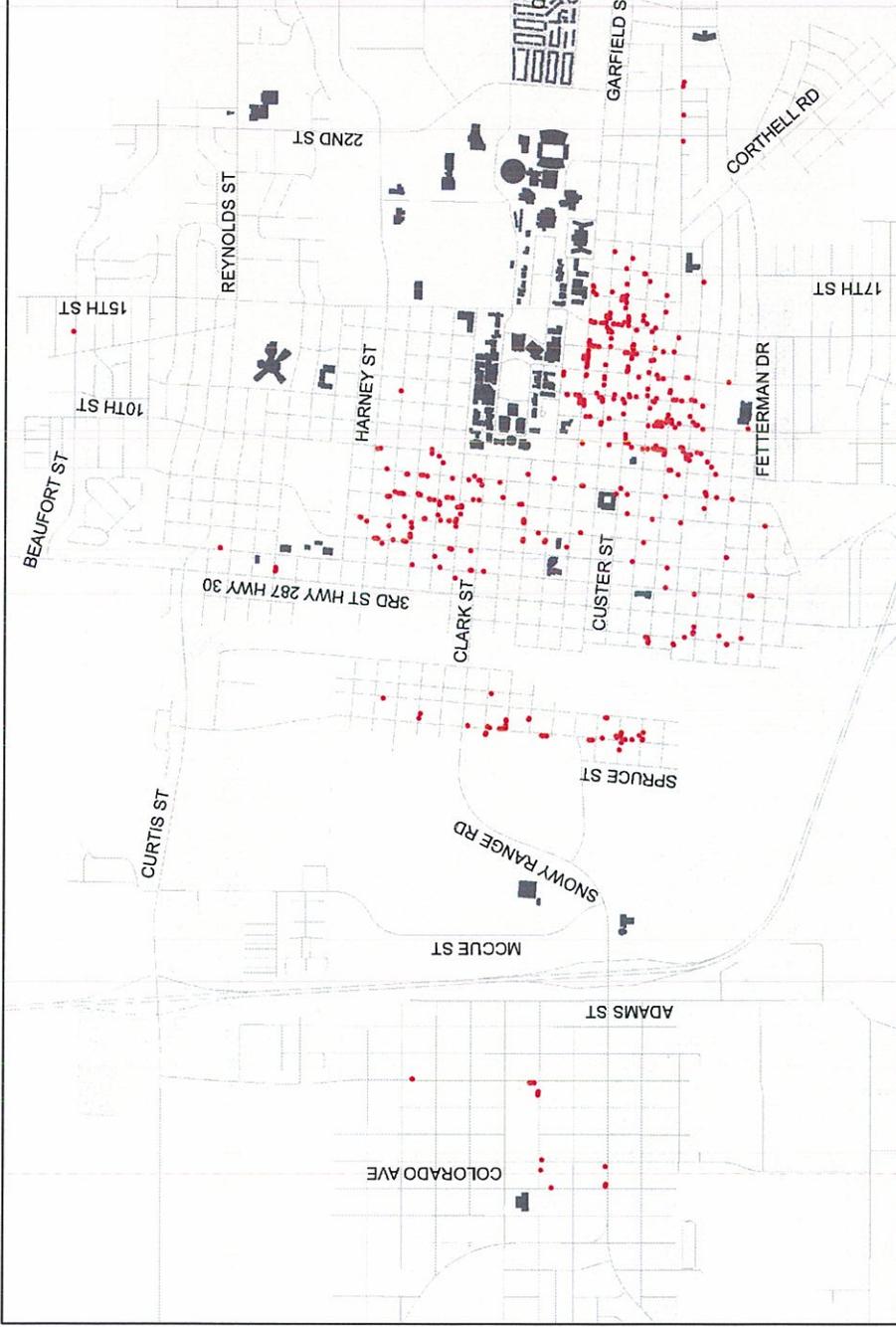
Appendix A – Summary Table of Trees within the Public Right of Way

Trees within the Public Right of Way in Laramie, Wyoming (July, 2008).

Species	Number of Trees	Percentage of Total	Ave. Dbh (in.)	Ave. height (ft.)	Ave. Condition	Ave. Value	Total Value
Maple, Norway	11	< 1	3	14	Good	\$330	\$3,629
Maple, Other	8	< 1	2	9	Good to Fair	\$117	\$934
Oak, Bur	7	< 1	1	9	Good	\$35	\$245
Oak, Other	7	< 1	2	10	Good	\$110	\$771
Locust	6	< 1	5	13	Fair	\$536	\$3,215
Larch	5	< 1	3	16	Good to Fair	\$527	\$2,635
Douglas-Fir	4	< 1	4	15	Good to Fair	\$531	\$2,124
Poplar, Hybrid	3	< 1	14	27	Fair	\$7,572	\$22,717
Buckeye, Ohio	2	< 1	4	13	Fair to Poor	\$220	\$440
Elm, Other	2	< 1	14	25	Fair	\$3,581	\$7,161
Fir, Other	2	< 1	8	23	Good	\$2,490	\$4,981
Walnut, Other	2	< 1	16	30	Poor	\$4,309	\$8,618
Apricot, Manchurian	2	< 1	3	10	Good	\$436	\$872
Ash, Other	1	< 1	3	20	Good	\$244	\$244
Ash, White	1	< 1	21	50	Poor	\$5,040	\$5,040
Aspen, Big Tooth	1	< 1	37	55	Fair	\$20,956	\$20,956
Buckhorn	1	< 1	3	10	Good	\$206	\$206
Cedar	1	< 1	1	4	Good	\$29	\$29
Hackberry, Common	1	< 1	17	45	Good	\$7,840	\$7,840
Pine, Lodgepole	1	< 1	5	15	Poor	\$350	\$350
Pine, Scotch	1	< 1	7	50	Good	\$1,714	\$1,714
Poplar, Lombardy	1	< 1	9	45	Good	\$1,094	\$1,094
Spruce, Alberta	1	< 1	1	1	Good	\$33	\$33
<b>Grand Total</b>	<b>5205</b>	<b>100</b>	<b>13</b>	<b>32</b>	<b>Good to Fair</b>	<b>\$4,774</b>	<b>\$24,847,298</b>

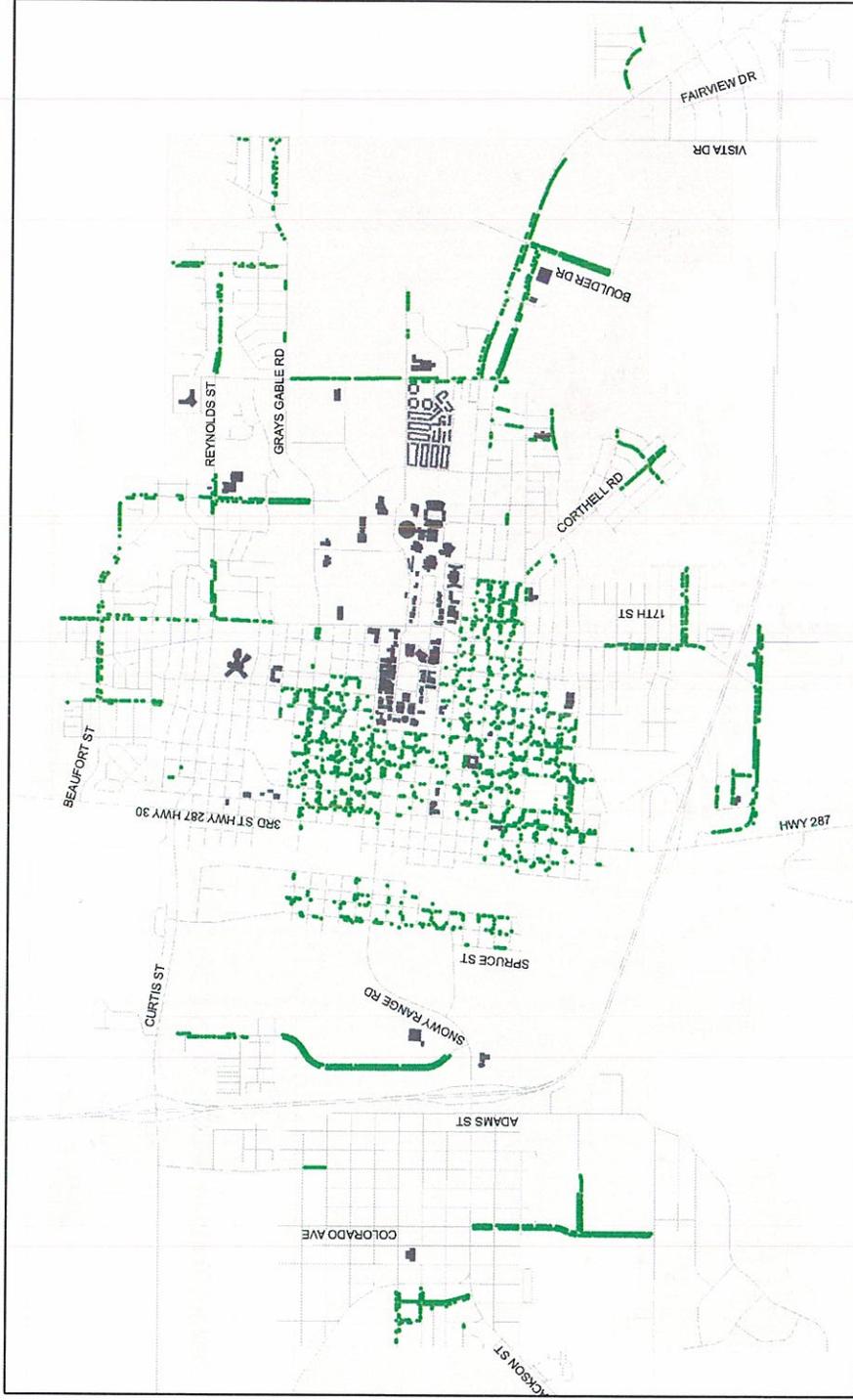


Appendix B – Public Right of Way Tree Inventory Maps



**Hazard Trees in the City of Laramie (2008)**

- Hazard\_Trees
- Street
- Building



**Planting Spaces in the City of Laramie (2008)**

- Planting\_Spaces
- Street
- Building

N

0 0.25 0.5 1 Miles

## Appendix C: Possible Trees for Laramie, WY.

Common Name	Latin Name	Description
<b>Small Trees</b>		
Apple, Common	<i>Malus pumila</i>	Most cultivated apples are hybrids of <i>M. pumila</i> and are distinguished primarily by their fruit characteristics.
Apricot, Manchurian	<i>Prunus armeniaca</i> <i>var. mandshurica</i>	Small fast-growing tree. Rounded, spreading form, winterhardy, and drought resistant. Attractive white flowers, golden orange fall color and edible fruit.
Cherry, Flowering	<i>Prunus spp</i>	There are many varieties of flowering cherry that produce beautiful spring colors and attract birds.
Chokecherry, Amur	<i>Prunus maackii</i>	A small to medium upright tree with white flowers. The distinctive bark provides year-round accent to any landscape.
Crabapple, Flowering	<i>Malus hybrids</i>	Ornamental crabapples are a group of small flowering trees used for landscape plantings.
Crabapple, Siberian	<i>Malus baccata</i>	Siberian crabapple is the hardiest species of the <i>Malus</i> genus and produces white flowers.
Hawthorn, Toba	<i>Crataegus x</i> <i>Mordenensis 'Toba'</i>	Broadly rounded, low-branched tree with wide-spreading. Attractive white flowers and red fruit, thorny stems.
Hawthorn, Russian	<i>Crataegus ambigua</i>	A small ornamental tree that will grow 15 to 20 feet in height. Resists cedar apple rust and has low to very low water needs.
Hawthorn, Thornless Cockspur	<i>Crataegus crus-galli</i>	An excellent small tree with a widespreading plant form. Foliage is dark green and very glossy.
Hawthorn, Downy	<i>Crataegus mollis</i>	Planted as an ornamental because of the large white flowers in the spring and crimson fruit in the fall. Fall color is yellow.
Ironwood (American Hop-hornbeam)	<i>Ostrya virginiana</i>	Also known as American Hop-hornbeam. A small, slow growing tree. Leaves resemble elm but it is in the Birch family.
Lilac, Japanese Tree	<i>Syringa reticulata</i>	A very large shrub or small tree with stiff, spreading branches. Large showy flowers. Attractive winter fruit display.
Maple, Amur	<i>Acer ginnala</i>	A tall shrub or small tree native to northern Asia. Outstanding bright reddish fall colors.
Maple, Bigtooth	<i>Acer</i> <i>grandidentatum</i>	Also known as western sugar maple. It is desirable for its beautiful red fall color and good drought tolerance.
Maple, Tatarian	<i>Acer tataricum</i>	A very tall shrub to small tree, slightly larger in stature than Amur maple. Duller foliage and yellowish fall color.
Mayday Tree	<i>Prunus padus</i>	One of the first trees to leaf out and bloom in spring. Has low to moderate water needs and is drought resistant.
Mountain-ash, Oakleaf	<i>Sorbus x hybridia</i>	Slow growing, compact and upright with grayish-green, oak-like foliage. Resistant to fireblight.
Pear, Ussurian (Harbin)	<i>Pyrus ussuriensis</i>	The hardiest of all pears, introduced from northeastern Asia. White flowers and semi-glossy foliage.
Plum, Princess Kay	<i>Prunus</i> <i>nigra 'Princess Kay'</i>	Fast growing small- to medium-sized flowering tree. Spectacular red fall color and winter form.
Plum, Stanley	<i>Prunus domestica</i> <i>'Stanley'</i>	The Stanley is by far the most popular plum variety. Late blooming, extremely cold hardy and reliable.
Serviceberry (tree form varieties)	<i>Amelanchier spp.</i>	Serviceberry species are excellent large shrubs or small trees that are well adapted to this area. Beautiful white flowers.
<b>Medium and Large Trees</b>		
Ash, Green	<i>Franxinus</i> <i>pennsylvanica</i>	A popular medium sized tree that tends to have good form and be resistant to disease.
Ash, White	<i>Fraxinus americana</i>	An excellent landscape tree in sites where it is adapted. Fall color develops early and ranges from yellow to redpurple.
Aspen, Quaking	<i>Populus tremuloides</i>	Aspen trees grow fairly straight and become clear of lower limbs over time. Rapidly recolonizes disturbed sites. Does better when planted in groups or clusters.

Appendix C: Possible Trees for Laramie, WY.

<b>Common Name</b>	<b>Latin Name</b>	<b>Description</b>
<b>Medium and Large Trees</b>		
Birch, Paper	<i>Betula papyrifera</i>	Paper Birch is noted for its thin, white papery bark which is very noticeable and attractive. Nice yellow color in the fall. Needs winter watering
Birch, Western Water	<i>Betula occidentalis</i>	This smaller tree of many stems prefers wet stream beds. It has smooth reddish-brown bark with horizontal lenticles.
Boxelder, Sensation	<i>Acer negundo</i> 'Sensation'	A relatively fast-growing, short-lived, medium to tall tree of irregular form. Stronger wood, red fall color.
Buckeye, Ohio	<i>Aesculus glabra</i>	It has a dense oval to round form, branching quite low. The leaves are palmately compound with large globose fruits.
Cottonwood, Highland	<i>Populus acuminata</i> <i>x sarg.</i>	An upright oval tree with good disease resistance. Good for smaller spaces compared to other larger varieties.
Cottonwood, Lanceleaf	<i>Populus x acuminata</i>	These tree has tear drop shaped. It is native along streams and produces numerous root suckers.
Cottonwood, Narrowleaf	<i>Populus angustifolia</i>	The narrowest leaf of the cottonwoods with a somewhat narrow crown. Needs abundant water and has weak wood and/or branch structure.
Cottonwood	<i>Populus deltoides</i>	Native throughout the west in moist soils along streams and wetlands. Branches have a tendency to break during storms.
Elm, American	<i>Ulmus americana</i>	A large, fast growing tree with a broad vase shape. Leaves are medium green, turning yellow in the fall.
Elm, Hybrid	<i>Ulmus x spp.</i>	A disease resistant variety of elm that resembles American elm. It it tolerant of most urban conditions.
Elm, Japanese	<i>Ulmus davidiana</i> <i>var. japonica</i>	Has a form more similar to the American Elm than most other species. Resistant to Dutch Elm Disease.
Hackberry, Common	<i>Celtis occidentalis</i>	A good replacement tree for the American Elm because of its similar form. The bark is gray and has a warty texture.
Honeylocust, Common	<i>Gleditsia triacanthos</i>	A fast-growing medium-sized tree adapted to a wide variety of soils. Seedlings are very susceptible to winter dieback.
Horsechestnut	<i>Aesculus hippocastanum</i>	Horsechestnut is very adaptable to a wide range of favorable or harsh environmental conditions.
Linden, American (Basswood)	<i>Tilia americana</i>	An excellent landscape tree for large scale sites. Desirable for its large stature, shade and aromatic flowers.
Linden, Littleleaf	<i>Tilia cordata</i>	Desirable specimen tree in the landscape. The flowers are highly fragrant. Widely used as a street tree and for landscaping.
Maple, Autumn Blaze	<i>Acer x freemanii</i>	A hybrid between Silver and Red Maple. Combines the aesthetic qualities of Red with the tolerance of Silver.
Maple, Norway	<i>Acer platanoides</i>	An attractive landscape tree that is tolerant of urban conditions. Has a dense, round to broad oval crown.
Oak, Bur	<i>Quercus macrocarpa</i>	Bur Oak is a large, rugged tree. It is extremely adaptable to a wide range of environmental conditions.
Oak, Gambel	<i>Quercus gambellii</i>	A shrub or small tree growing 6 to 30 feet tall. The Gambel oak is used by deer and elk as browse.
Oak, Northern Red	<i>Quercus rubra</i>	A handsome large tree. Leaves are dark green and develop excellent fall colors. One of the faster growing oaks.
Walnut, Black	<i>Juglans nigra</i>	Considered the most valuable timber tree. The tree is borderline hardy and seedlings may experience some winter dieback.
<b>Conifers</b>		
Douglas-Fir, Rocky Mountain	<i>Pseudotsuga menziesii</i> var. <i>glauca</i>	A large forest tree native to the Rocky Mountains. Very important tree in the lumber industry.
Fir, White (Concolor)	<i>Abies concolor</i>	An attractive conifer and outstanding landscape plant. It has a formal pyramidal shape. Excellent as accent plant in landscape.

Appendix C: Possible Trees for Laramie, WY.

<b>Common Name</b>	<b>Latin Name</b>	<b>Description</b>
<b>Conifers</b>		
Juniper, Rocky Mountain	<i>Juniperus scopulorum</i>	A small to medium tree, typically with a dense pyramidal crown. Can be used effectively for screens or hedges.
Larch, European	<i>Larix decidua</i>	A large growing species with graceful pendulous branchlets. Makes an excellent landscape tree where space permits.
Pine, Austrian	<i>Pinus nigra</i>	Crown develops a picturesque spreading crown with age. Adapts to urban conditions better than most pines.
Pine, Limber	<i>Pinus flexilis</i>	A small to medium pine with an uneven crown. Often multi-stemmed. less susceptible to salt and winter burn injury than others.
Pine, Lodgepole	<i>Pinus contorta</i> var. <i>latifolia</i>	This tree is a major timber species for dimension lumber. In dense stands it forms clean, gradually tapering shafts
Pine, Mugo	<i>Pinus mugo</i>	A small to large sized shrubby evergreen which varies in form and size. Dark green color year-round and resists winter burn.
Pine, Pinyon	<i>Pinus edulis</i>	A bushy, resinous tree with a short trunk. Prefers full sun and is very drought resistant.
Pine, Ponderosa	<i>Pinus ponderosa</i>	In the landscape, Ponderosa Pine has a broad pyramidal form when young, developing a rounded crown with age.
Pine, Scotch	<i>Pinus sylvestris</i>	A medium to large tree, pyramidal when young, becoming more rounded and open with age. Orange brown peeling bark.
Spruce, Black Hills	<i>Picea glauca</i> var. <i>Densata</i>	A large tree, very dense and pyramidal when young. Not as drought tolerant as Colorado Spruce.
Spruce, Colorado (Blue)	<i>Picea pungens</i>	Colorado Spruce is a stiffly pyramidal evergreen conifer. Foliage occurs in a wide range of colors from green to silver blue.
Spruce, Englemann	<i>Picea Englemannii</i>	A major component of high-elevation forests. Mature trees have a narrow, pyramid form and short, compact branches.
Spruce, Norway	<i>Picea abies</i>	The fastest growing of the spruces. It has a pyramidal form, developing long, pendulous branchlets with age.

