

City of Bayfield Urban Forestry Operations Plan



Prepared by:

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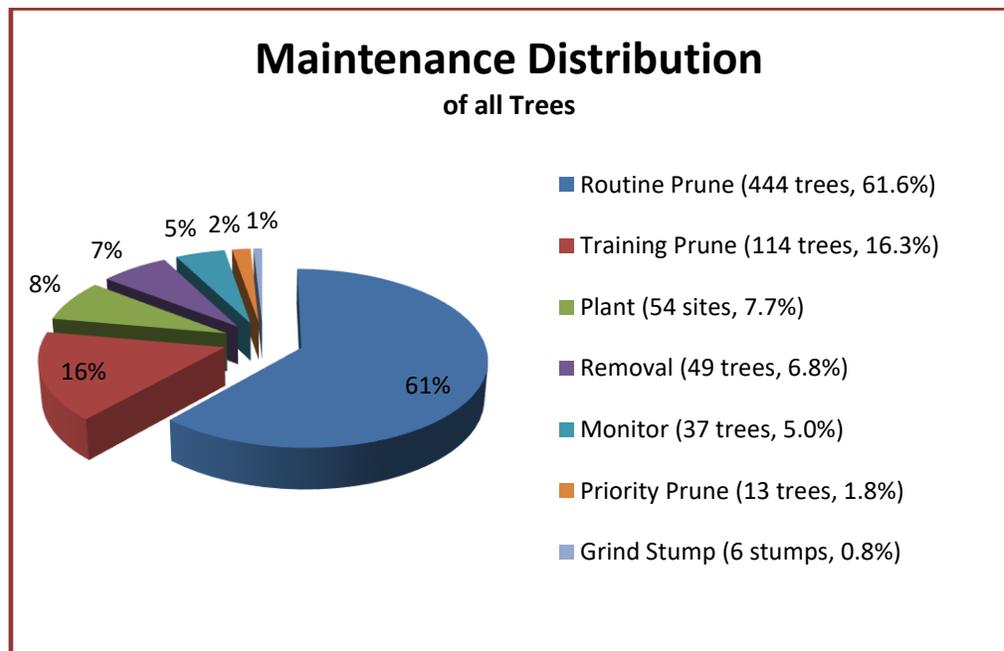
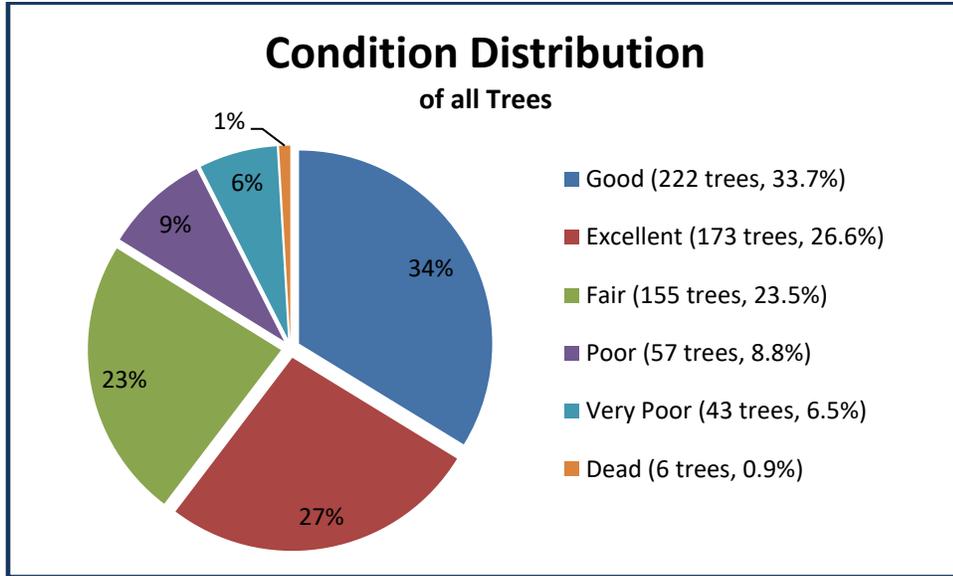
EXECUTIVE SUMMARY

Bluestem Forestry Consulting Inc. completed a public tree inventory update of existing data along street rights-of-way, as well as at numerous parks during the summer of 2022. Important points of the inventory and current tree management program include:

- *A total of 657 trees, 54 planting sites and 3 stumps were inventoried.*
- *607 of these trees are street trees and the remaining 50 are in parks.*
- *Planting sites along street rights-of-way were inventoried where a suitable sized growing site was present. There were 54 planting sites identified during the inventory.*
- *Only 8 trees are green, white, or black ash and therefore susceptible to Emerald Ash Borer (EAB). The average diameter of ash trees is 11.3". These trees are of importance and the City plans to treat these trees to prevent EAB and preserve them in the urban forest. They are all in good or fair health and this plan concurs that ash preservation is a worthy task and will benefit the City of Bayfield urban forest.*
- *There are 49 trees recommended for removal for safety reasons and these are labeled as 'Removal.' This is 6.8% of total maintenance needs. The average diameter of these removals is 26.4". A typical inventory averages removals between 3-10%. The most common defect is trunk decay/rot. Five of these removals are located in parks and the remainder are located in along street rights-of-way.*
- *Thirteen trees should be pruned for safety reasons or for cleaning/dead branches (1.8% of total inventoried population). A typical inventory averages 3-7% safety prune. The Tree Board typically prunes all trees that can be reached from the ground with hand tools. This has been very valuable and is one of the reasons the number of safety prunes is low.*
- *Ideally, the forest should be comprised of not more than 5% of any one species and 10% of any one genus. Four species are over-represented in Bayfield' public tree population. These are (in order of population size): crabapple, sugar maple, Colorado blue spruce and northern red oak. Limited species distribution could result in a population crash if an insect or disease were to attack any one particular species such as currently happening with ash and EAB. The largest genus represented is maple and they represent 26.4% of the total tree population. Plant maples only sparingly for the next several years.*
- *More staff time and funding need to be spent on forestry duties. This plan recommends an average of 21 workdays per year need to be devoted to forestry activities to maintain the urban forest properly and healthily. The average annual cost of contracted work/product is \$18,780.*
- *83.8% of the population is in fair, good or excellent health.*
- *The total estimated replacement value of all trees inventoried is \$3,190,545.68. This was determined by using the International Society of Arboriculture Valuation of Landscape Trees, Shrubs and Other Plants: A Guide to the Methods and Procedures for Appraising Amenity Plants (Ninth Edition) to determine valuation.*

TABLES and GRAPHS

The following tables and graphs illustrate some of the traits of Bayfield's inventoried tree population.



COUNT OF TREES PER AREA	
Park Name	Count of Trees
Beach Area	18
Memorial Park	12
Cooper Hill Park	5
East Dock Park	14
Halvor Reiten Park	1
TOTAL COUNT	50
<i>Private Parks (Dobson, Fountain, 6th Street)</i>	71

TOP TEN SPECIES SUMMARY TABLE		
Species and/or Cultivar	Count	Percentage of Total Population
Crabapple	90	14.0%
Sugar Maple	63	9.8%
Colorado Blue Spruce	44	6.8%
Northern Red Oak	41	6.4%
Crimson King Maple	30	4.7%
Red Maple	27	4.2%
Mountain-ash	25	3.9%
Japanese Tree Lilac	23	3.6%
Balsam Fir	20	3.1%
Hawthorn	20	3.1%
Other (50 other species represented)	260	40.4%

SIZE DISTRIBUTION		
<u>Existing</u>	<u>dbh*</u>	<u>ideal**</u>
49.2%	0-8"	40.0%
26.3%	9-16"	30.0%
12.0%	17-24"	20.0%
12.5%	25+"	10.0%
* diameter at breast height (4.5' above ground)		
** based on recommendations from 2011 Minnesota Shade Tree Short Course		

SPECIES/GENUS OVER RECOMMENDED LIMITS

5% of any one species, 10% of any one family

Species/Family	Count	Percentage of Total Population
Crabapple (Malus)	90	14.0%
Maple Genus (Acer)	170	26.4%
Sugar Maple	63	9.8%
Spruce Genus (Picea)	50	7.8%
Colorado Blue Spruce	44	6.8%
Oak (Quercus)	56	8.7%
Northern Red Oak	41	6.4%

In-House	Work contracted:
<p>Removals: 1-15" DBH & park trees (evaluate each tree for safety of crew completion)</p> <p>Routine Prunes: All trees (see above)</p> <p>Training Prunes: Tree Board</p> <p>Plantings: All</p>	<p>Removals & Pruning : ≥16" DBH & when unsafe to complete in-house</p> <p>Grind stumps: All</p>

EMERALD ASH BORER PLANNING

The Emerald Ash Borer (*Agrilus planipennis*) is an exotic pest native to Asia that was identified in southeastern Michigan near Detroit in the summer of 2002. The adult beetles munch on ash foliage but cause little damage. The real damage is caused by the EAB larvae that feed on the inner bark of ash trees, disrupting the tree's ability to transport water and nutrients. Once infested with EAB, ash trees typically decline and die over a period of 2-3 years depending upon insect volume. The burden of dealing with volumes of dead and dying trees within a short period of time can place an enormous strain on community budgets, personnel and resources. At present, the entire state of Wisconsin is under quarantine for EAB and the insect is confirmed within Bayfield..

Fortunately, there are only 8 public ash trees in Bayfield. The average ash diameter at breast height is 11.3". While they aren't particularly large trees, they are contributing a great deal to the urban forest in Bayfield through a variety of means including shade, reduced storm water runoff and lower cooling cost. All eight ash are in fair or good condition, and this is too important of a resource to removed from the population. It is recommended that these trees receive chemical treatment to prevent EAB and preserve the trees in the urban forest. Typically, the best time to apply treatment is in spring and early summer when the trees are actively moving water and nutrients from the root system to leaves.

It is recommended that Bayfield use an injectable treatment such as emamectin benzoate. This is recommended for a two-fold reason. First, the treatment is injected directly into the trunk of the tree resulting in a very targeted application. Second, the insecticide need only be applied every-other year. It has been scheduled into the budgets on odd years (2023, 2025, etc.).

DEFINITIONS OF TERMS

To assist in understanding the inventory data and this operations plan, the following definitions are provided.

Maintenance Definitions

Rating	Description
Excellent	A tree in excellent condition has no visible defects and appears to be in perfect health. The tree will exhibit all of the characteristics typical of its species. An excellent tree can be expected to live well into the future.
Good	A tree in good condition has a sound trunk and full canopy and has only minor mechanical injuries such as minor trunk scarring is likely to eventually heal. The tree will exhibit most of the characteristics associated with its species and can be expected to live for many years.
Fair	A tree in fair condition will be exhibiting minor to moderate defects. Some situations that warrant a fair rating include: a thinning canopy, twig growth may only be 1/2 of the expected rate, significant mechanical injury such as scarring on the trunk, insects or disease may be present but are controllable and the crown may be lacking the natural or desired symmetry characteristic to the species. If given routine maintenance such as pruning and mulching a tree that is graded fair will contribute to the forest for years.
Poor	A poor tree will be exhibiting low vigor and significant decline as evidenced by branch dieback, abnormal leaf size, early fall coloration, trunk decay due to injury or canker, or the production of new branches on the main stem. A tree in poor condition will most likely require removal, but may be improved with priority pruning.
Very Poor	A tree in very poor condition is on the verge of dying or presents a risk that must be eliminated via removal. Dieback is likely severe. Trunk or crown cavities or decay, severe crack or severe root problems may also be present. Removal for safety is required.
Dead	A tree in dead condition is a dead standing tree.

Condition Definitions

Rating	Description
Removal	Trees designated as a removal are either dead or have one or more defects that cannot be remedied. These trees will most likely have a severe trunk defect such as a cavity or extensive decay, have severe cracks associated with weak unions or have a large percentage of crown death and are safety risks. These trees must be removed immediately.
Prune Priority	These trees have severe deadwood, hangers or broken branches that require remediation as soon as possible. Trees with unattached hanging branches or dead attached branches will be listed in this maintenance category. Overall re-evaluation of the tree while pruning may result in removal of the tree if more extensive problems are noted. Prune Priority 1 have a larger or more serious defect than Prune Priority 2.
Monitor	These trees are experiencing decline or some other defect and need monitoring to be sure that they do not continue to fail and need removal.
Routine Prune	All trees need to be placed on a cycle of trimming to correct structural problems or growth patterns that will eventually affect the tree adversely. Routine pruning will result in a healthier, more vigorous tree and will extend the life of most trees. A routine pruning cycle of once every 5-8 years is ideal.
Training Prune	Training pruning is the structural pruning of all trees 10 years of age or younger. Removing poorly attached co-dominant, crossing and competing limbs while the tree is young, resulting in small cuts and wounds will produce a well-balanced mature crown. This is the most cost-effective form of all maintenance.
Grind Stump	Existing stumps.

PARKS/OTHER AREAS

Eight parks received an inventory update. These include: Memorial Park, the Beach area, East Dock Park, Cooper Hill Park, Halvor Reiten Park, Dobson Park, Fountain Park and 6th Street Park. Three of these parks are maintained by other entities. Dobson Park is privately owned, Fountain Park is maintained by the Bayfield Heritage Association and the park at 6th Street is a Bayfield County Park. All of these trees were updated, but only the five maintained by the City are included in discussions and budgets. The data for the three other parks is included in the inventory for distribution to the managing entities.

East Dock Park

East Dock Park is located between the marina and lake. It is a large park with play equipment, picnic areas and public restrooms. It is heavily used and a flagship park in Bayfield. There is one large willow in this park with extensive trunk decay that needs removed. Two other trees need monitored to be sure their health and condition do not deteriorate and to the point that the tree needs removed. Because this park is on the shoreline of Lake Superior it is very important that more trees be planted to prevent erosion from water, wind and winter conditions. The soil is very sandy and species planted here should be tolerant of dry soils and windy conditions. Suggestions include: swamp white oak, bur oak and white oak as well as white pine and larch/tamarack. Silver maple, cottonwood and willow will do well here in these soils. These three are not popular trees and tend to be shorter lived than oaks or pines, but they tolerate sandy soils and difficult growing conditions quite well. Plant silver maple, cottonwood and willow, but in moderation.

Memorial Park

Memorial Park is located between the marina and runs along the lakefront towards the public pier. Another lake front park, it is used for festivals and gatherings throughout the warm weather months. There are only eight trees in this park and planting of additional shade trees would be beneficial to the park as well as the many events hosted. Be sure to plant in areas that will not receive heavy foot traffic and place barriers such as fencing around these trees until they are established. Species are similar to those mentioned above.

Beach Area

The beach area is next in line from Memorial Park. It does have a public beach and a green space with public restrooms. There isn't a great deal of room to plant trees, particularly in the beach area, so it is especially important to care for the willow at the beach through regular pruning. The grassy area near the public restrooms has a good number of trees and should not need additional plantings. One Japanese tree lilac is dead and in need of removal.

Cooper Hill Park

Cooper Hill Park is located up the hill and is a small neighborhood park with playground equipment. There are five trees in the park, two of which are sugar maple in need of removal. One is dead and one has extensive trunk decay. These need removed as soon as possible due to the playground equipment present.

Halvor Reiten Park

Halvor Reiten Park is a small beach park at the end of S. Broad Street. It is heavily used as the beach is in a small bay-type area. The park has a rain garden to the west and a large industrial building to the east and a shelter house. It also has a small gravel path that leads to an old pier. There is one willow in the park that is in need of pruning.

Typically, park use is static without much room for change or improvement, however, Halvor Reiten Park presents as the park most able to be improved in Bayfield. The path could be improved, filling in holes and leveling uneven terrain and the end of the pier could be converted and improved into a picnic area. Because it is so popular, defining the park boundaries and improving vegetation would be advantageous. The property line to the east could easily be defined and improved with the addition of trees and shrubs to form a sort of hedge. Cedars would be ideal for that purpose. To keep the shoreline intact, it would be wise to plant an additional tree at the beach and along the trail. Suggestions are similar to those at East Dock Park an in particular tamarack, cottonwood and swamp white oak would be suitable. Rehabilitating the rain garden would also greatly help reduce erosion during rain events. A report was recently produced by Metro Blooms Design +Build detailing steps to improve the park that echoes these suggestions and goes into greater detail regarding species selection for the rain garden. It is an excellent resource and their suggestions will help stabilize the resource and improve function.

2023-2027 Schedule of Activities

The following Schedule of Activities has been established as a guideline for The City of Bayfield for the next five years beginning in 2023. However, it is advised that high risk situations (removals, priority prunes) be addressed immediately. These recommendations were determined by assessing the tree population using the data collected during the inventory and through information gathered from City staff while keeping in mind the feasibility of staff to complete the operations with a reasonable budget.

In-House	Work contracted:
<p>Removals: 1-15" DBH & park trees (evaluate each tree for safety of crew completion)</p> <p>Routine Prunes: All trees (see above)</p> <p>Training Prunes: Tree Board</p> <p>Plantings: All</p>	<p>Removals & Pruning : ≥16" DBH & when unsafe to complete in-house</p> <p>Grind stumps: All</p>

The Schedule of Activities has specified many tasks for City staff including tree planting and structural pruning of young/small trees and others. It is highly recommended that staff receive training on these items. The easiest method to receive specific training is to contract with a consultant or through training provided periodically by the Wisconsin Arborist Association. It may be beneficial for the public to also receive these trainings when appropriate such as tree planting and structural pruning. Combining a morning session for staff and an afternoon or evening session for citizens would be a cost effective way to deliver training. This will encourage good care and maintenance for private trees as well.

The inventory data will be provided to the City and DNR in two formats that include MS Excel and an ArcGIS geodatabase.

2023 Activities

Activity	In-House or Contract	# of Trees	Contract Cost or Staff Hours Required	Misc. Comments
Tree Removals - Priority 1	Contract	30	\$31,900	Avg dbh = 32" Includes stump grinding and cleanup. Est. per tree = \$1,100
Tree Removals - Priority 2	In-House*	7	2 days for a 3 person crew	Avg dbh = 11" Crew averages 3 daily (includes pulling stump)
Priority Prune	Contract	13	\$7,150	Avg dbh = 32" Est. per tree = \$550
Treat Ash (<i>using emmamectin benzoate - on odd numbered years</i>)	Contract	8	\$800	Avg dbh - 11" Cost is \$8/diameter inch
Inspect Monitor and Poor Trees	ISA Certified Arborist	91	\$500	2 days for Arborist
Training (tree pruning, tree planting, training prunes)	Contract	n/a	\$1,000	Contract with consultant or DNR Training

TOTAL STAFF HOURS/COST* **6 days/\$1,008**

TOTAL CONTRACT COST **\$41,350**

Combined Total of Staff Cost & Contract Cost = \$42,358

*Cost (excluding benefits = \$21.00/hour.

Equipment costs not included.

~Trees under/around utility lines should be completed/cleared to a safe distance by We Energies.

~Trees under/around utility lines should be completed/cleared to a safe distance by utility.

2024 Activities

Activity	In-House or Contract	# of Trees	Contract Cost or Staff Hours Required	Misc. Comments
Tree Removals - Priority 2	Contract	1	\$800	Avg dbh = 18" Includes stump grinding and cleanup. Est. per tree = \$800
Tree Removals - Priority 2	In-House*	11	4 days for a 3 person crew	Avg dbh = 7" Crew averages 3 daily (includes pulling stump)
1/2 Young Tree Training Prunes	In-House	57	6 days	Average = 10 daily per person
Plant Trees**	Purchase From Supplier; Plant In-House	20	Trees = \$3,500; 2 days for a 2 person crew	Trees = \$175/each; Crew plants 10 daily
Inspect Monitor and Poor Trees	ISA Certified Arborist	91	\$500	2 days for Arborist
Training (tree pruning, tree planting, training prunes)	Contract	n/a	\$1,000	Contract with consultant or DNR Training

TOTAL STAFF HOURS/COST* **22 days/\$3,696**

TOTAL CONTRACT COST **\$5,800**

Combined Total of Staff Cost & Contract Cost = \$9,496

*Cost (excluding benefits = \$21.00/hour. Equipment costs not included.
 **Expect to purchase a potted 1.5-2.0" caliper tree for this price.

~Trees under/around utility lines should be completed/cleared to a safe distance by utility.

2025 Activities

Activity	In-House or Contract	# of Trees	Contract Cost or Staff Hours Required	Misc. Comments
Treat Ash (<i>using emmamectin benzoate - on odd numbered years</i>)	Contract	8	\$800	Avg dbh - 11" Cost is \$8/diameter inch
Grind Stumps (Existing)	In-House	6	\$2,550	Avg dbh = 17" Est. per tree = \$150
1/2 Young Tree Training Prunes	In-House	57	6 days	Average = 10 daily per person
Plant Trees**	Purchase From Supplier; Plant In-House	20	Trees = \$3,500; 2 days for a 2 person crew	Trees = \$175/each; Crew plants 10 daily
Inspect Monitor and Poor Trees	ISA Certified Arborist	91	\$500	2 days for Arborist
Routine Prune Zone 1 (1/7 of population ≥16" dbh)	Contract	16	\$7,200	Avg dbh = 23" Est. per tree = \$450
Routine Prune Zone 1 (1/7 of population 6-15" dbh)	In-House	53	9 days for a 3 person crew	Avg dbh = 13" Crew averages 6 daily
Complete Routine Removals (apprx 1% of population)*	In-House	5	\$2,000	Estimate
Training (tree pruning, tree planting, training prunes)	Contract	n/a	\$1,000	Contract with consultant or DNR Training

TOTAL STAFF HOURS/COST* **28 days/\$4,704**

Combined Total of Staff Cost & Contract Cost = \$22,254

TOTAL CONTRACT COST **\$17,550**

*Cost (excluding benefits = \$21.00/hour. Equipment costs not included. **Expect to purchase a potted 1.5-2.0" caliper tree for this price.

~Trees under/around utility lines should be completed/cleared to a safe distance by utility.

2026 Activities

Activity	In-House or Contract	# of Trees	Contract Cost or Staff Hours Required	Misc. Comments
1/2 Young Tree Training Prunes	In-House	57	6 days	Average = 10 daily per person
Plant Trees**	Purchase From Supplier; Plant In-House	20	Trees = \$3,500; 2 days for a 2 person crew	Trees = \$175/each; Crew plants 10 daily
Inspect Monitor and Poor Trees	ISA Certified Arborist	91	\$500	2 days for Arborist
Routine Prune Zone 1 (1/7 of population ≥16" dbh)	Contract	16	\$7,200	Avg dbh = 23" Est. per tree = \$450
Routine Prune Zone 1 (1/7 of population 6-15" dbh)	In-House	53	9 days for a 3 person crew	Avg dbh = 13" Crew averages 6 daily
Complete Routine Removals (apprx 1% of population)*	In-House	5	\$2,000	Estimate
Training (tree pruning, tree planting, training prunes)	Contract	n/a	\$1,000	Contract with consultant or DNR Training

TOTAL STAFF HOURS/COST* **19 days/\$3,192**

TOTAL CONTRACT COST **\$14,200**

Combined Total of Staff Cost & Contract Cost = \$17,392

*Cost (excluding benefits = \$21.00/hour. Equipment costs not included.
**Expect to purchase a potted 1.5-2.0" caliper tree for this price.

~Trees under/around utility lines should be completed/cleared to a safe distance by utility.

2027 Activities

Activity	In-House or Contract	# of Trees	Contract Cost or Staff Hours Required	Misc. Comments
Treat Ash (<i>using emmamectin benzoate - on odd numbered years</i>)	Contract	8	\$800	Avg dbh - 11" Cost is \$8/diameter inch
1/2 Young Tree Training Prunes	In-House	57	6 days	Average = 10 daily per person
Plant Trees**	Purchase From Supplier; Plant In-House	20	Trees = \$3,500; 2 days for a 2 person crew	Trees = \$175/each; Crew plants 10 daily
Inspect Monitor and Poor Trees	ISA Certified Arborist	91	\$500	2 days for Arborist
Routine Prune Zone 1 (1/7 of population ≥16" dbh)	Contract	16	\$7,200	Avg dbh = 23" Est. per tree = \$450
Routine Prune Zone 1 (1/7 of population 6-15" dbh)	In-House	53	9 days for a 3 person crew	Avg dbh = 13" Crew averages 6 daily
Complete Routine Removals (apprx 1% of population)*	In-House	5	\$2,000	Estimate
Training (tree pruning, tree planting, training prunes)	Contract	n/a	\$1,000	Contract with consultant or DNR Training

TOTAL STAFF HOURS/COST* **28 days/\$4,704**

TOTAL CONTRACT COST **\$15,000**

Combined Total of Staff Cost & Contract Cost = \$19,704

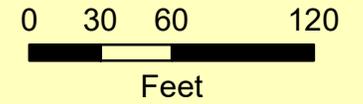
*Cost (excluding benefits = \$21.00/hour.
Equipment costs not included.
**Expect to purchase a potted 1.5-2.0" caliper tree for this price.

~Trees under/around utility lines should be completed/cleared to a safe distance by utility.

Mapping

The following maps help identify and illustrate the inventoried population in Bayfield.

PARK TREE LOCATIONS



Fountain Park

City of Bayfield
Urban Tree Inventory
2022

 Park Tree

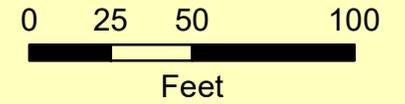
 City Tree

 Streets



Map Created On:
November 1, 2022

PARK TREE LOCATIONS



Cooperhill Park

City of Bayfield
Urban Tree Inventory
2022

● Park Tree

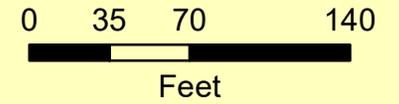
● City Tree

— Streets



Map Created On:
November 1, 2022

PARK TREE LOCATIONS



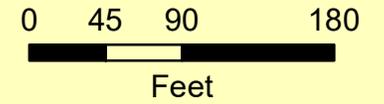
**Memorial
Park**
City of Bayfield
Urban Tree Inventory
2022

-  Park Tree
-  City Tree
-  Streets



Map Created On:
November 1, 2022

PARK TREE LOCATIONS



East Dock Park

City of Bayfield
Urban Tree Inventory
2022

● Park Tree

● City Tree

— Streets



Map Created On:
November 1, 2022