Anchorage Bowl
Tree Canopy Assessment

December 2018

DAVEY
Resource Group

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Prepared for

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Introduction

Anchorage forestlands are the foundation for the health, sustainability, and economic well-being of Anchorage communities. These forests are an essential living and dynamic resource that provides critical support and ecosystem services to both people and wildlife. These benefits contribute greatly to quality of life and the identity of Anchorage, including providing a significant contribution to environmental, socio-economic, and human health.

Background

In recognition for the value of trees and forests, the Alaska Department of Natural Resources Division of Forestry Community Forestry Program (DNR) contracted with Davey Resource Group, Inc. (DRG) in 2018 to assess the current tree canopy cover within the Anchorage Bowl. DRG then compared the 2018 results with those from the February 2010 draft *Anchorage Forestland Assessment and Management Plan*. The 2010 Assessment established benchmarks for the extent and location of tree canopy across the municipality. The assessment, which considered 2009 high-resolution aerial imagery, included analysis of canopy cover relative to land use as well as an estimation of species composition.

This document reports the results of the 2018 assessment and a comparison to the 2010 assessment data.

Methodology

Using high-resolution aerial imagery (2018) and remote sensing software, DRG developed an updated GIS canopy and land cover layer for the Anchorage Bowl. This report summarizes the results of the 2018 assessment and the change that has occurred within the Anchorage Bowl since 2009.

The 2010 forestland assessment considered tree canopy only. In 2018, other primary land cover, including impervious surface, grass and low-lying vegetation, bare soil, and water, were included in the assessment (Map 1). The Anchorage Bowl encompasses 71,415 acres (111.6 square miles). The boundary has not changed significantly since 2010.

Key Findings

The following information characterizes 2018 land cover in the Anchorage Bowl and summarizes the key findings discussed in this report:

Landcover

- 39.4 square miles (25,232 acres) of tree canopy including trees and woody shrubs, an average of 35.3% canopy cover. This is a 2.1% (522.4 acres) increase since 2009.[1]

- 32.2 square miles (20,606 acres) of impervious surface including roads, structures, and parking lots, an average of 28.9%.

- 21.9 square miles (14,004 acres) of pervious surface including turf, grasslands, and other low-lying vegetation, an average of 19.6%.

- 16.4 square miles (10,510 acres) of bare soil including unvegetated areas and tidal planes, an average of 14.7%.

- 1.7 square miles (1,063 acres) of open water including lakes, rivers, and streams, an average of 1.5%.

Community Councils & Private Ownership

- Among Community Councils, Basher has the highest level of tree canopy (75.5%), followed by Hillside (64.5%) and Glen Alps (51.6%). Hillside also has the greatest amount of tree canopy (3,665 acres) within the Bowl. Downtown has the lowest canopy cover (8.3%) with 42.6 acres.

- 35.2 square miles (22,543 acres) of tree canopy is on private-owned parcels, representing 89.3% of all tree canopy in the Bowl.

Open Space, Parks, Waterbodies & Watersheds

- 14.7 square miles (9,399 acres) of tree canopy are in recreational and open space areas, including trails and parks. The average canopy cover in recreation and open space areas is 62.7%.

- Among parks, High Tide Park has the highest level of tree canopy cover (100.0%), followed by Clay Park (99.4%) and Nunaka Valley Park West (97.9%). Far North Bicentennial Park has the greatest amount of tree canopy (3,665 acres) within the Bowl. The average canopy cover in parks is 69.7%. Total tree canopy in parks has increased by 2.8% (206.6 acres) since 2009 (7,250 acres).

- 2.1 square miles (1,356 acres) of tree canopy provide a buffer to lakes, rivers, and streams, with an average canopy cover of 39.8%.

- 39.4 square miles (25,229 acres) of tree canopy are in watersheds, providing an average tree canopy cover of 38.3%.
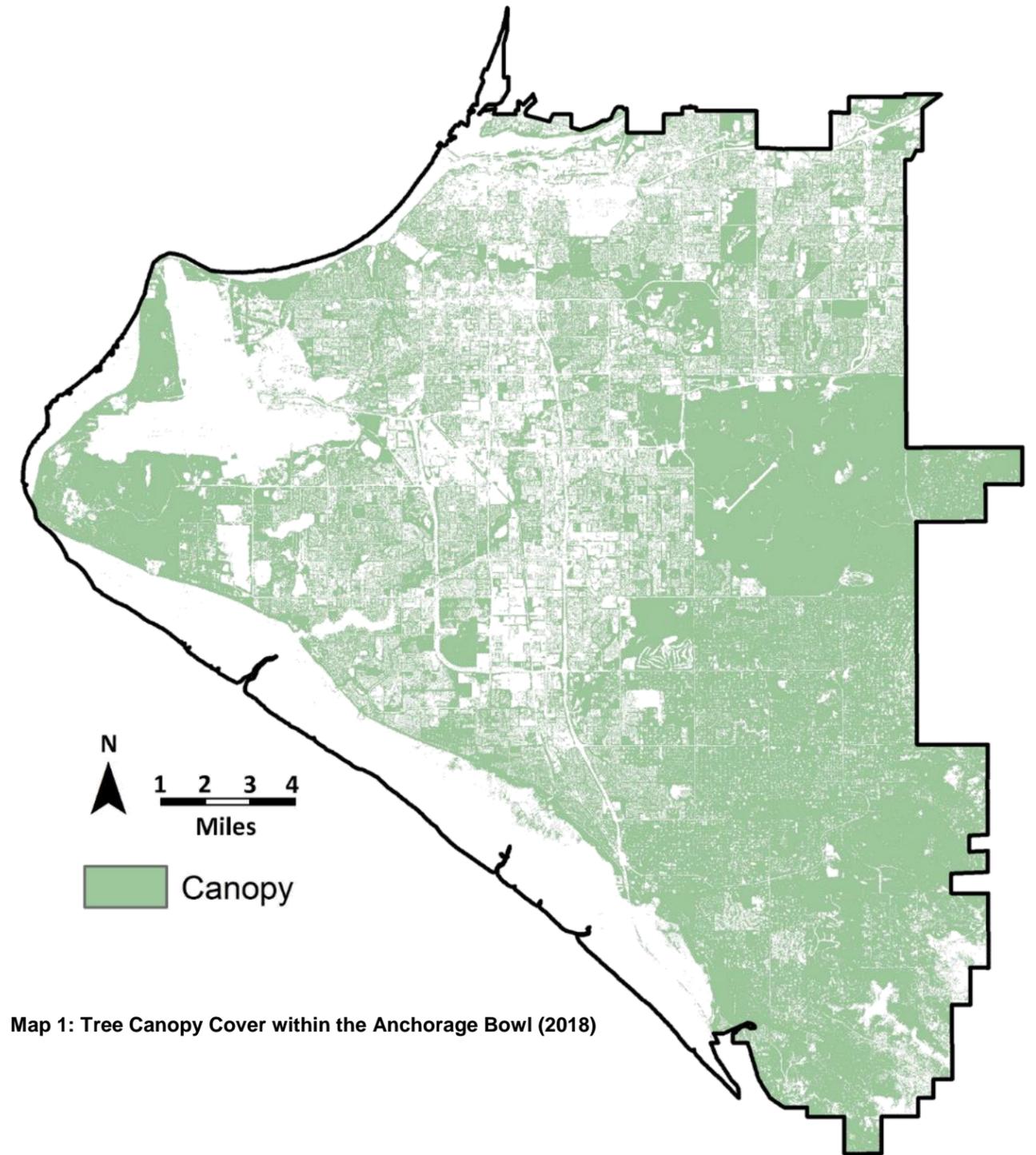
Map 1: Tree Canopy Cover within the Anchorage Bowl (2018)

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[1] Percent Canopy Change formula: ((2018 Canopy Acres - 2009 Canopy Acres) / 2009 Canopy Acres) X 100.

((25,232.3 - 24,709.9)/24,709) X 100=2.1%

A bridge on the Campbell Creek Greenbelt near Folker Street is flanked by trees

Anchorage Bowl Tree Canopy Cover

The Anchorage Bowl (Map 2) encompasses an area of approximately 112 square miles (71,415 acres). Within the Bowl, there are 25,232 acres of tree canopy and an average tree canopy cover of 35.3%. Since 2009, tree canopy in the Bowl has increased by 522 acres (+2.1%).

Other Land Cover

In addition to tree canopy, the 2018 Anchorage Bowl Tree Canopy Assessment included the identification and mapping of other primary land cover, including impervious surface (e.g., roads, parking lots, structures), pervious surface (e.g., turf, grasslands, low-lying vegetation), bare soil (e.g., unvegetated areas and tidal planes), and open water (e.g., lakes, rivers, streams). The resulting data provides a benchmark of the extent and location of these primary land cover classes (Figure 1), including:

- 28.9% (20,606 acres) impervious surface
- 19.6% (14,004 acres) pervious surface
- 14.7% (10,510 acres) bare soil
- 1.5% (1,063 acres) open water
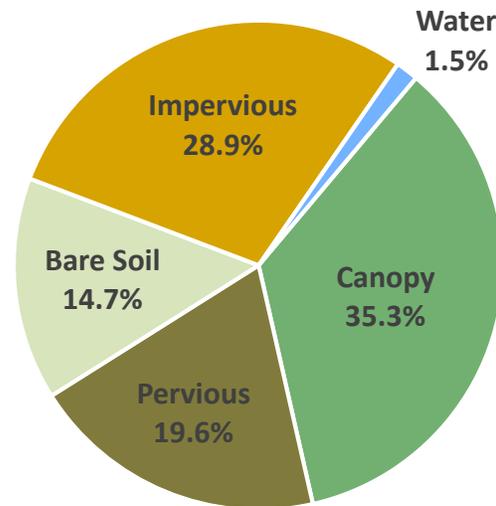
Figure 1. Anchorage Bowl Land Cover (2018)

The 2010 forestland assessment did not consider land cover other than tree canopy. As a result, the 2018 assessment is unable to identify changes in other land cover.

Canopy Potential

Considering impervious surface and open water, the 2018 assessment identified 21,669 acres within the Anchorage Bowl that will not reasonably support additional tree canopy. The 2010 assessment identified approximately 832 acres of bare rock, sand, and clay (including tidal flats) that does not have the potential to support trees. Considering the unsuitable planting acreage for both the 2010 and 2018 assessments, approximately 22,501 acres are unsuitable for tree planting.

Taking into account 25,232 acres of existing tree canopy and the remaining 24,514 acres of pervious and bare soil, there are approximately 49,746 acres in the Anchorage bowl with the potential to support tree canopy for an overall canopy cover potential of 68%. However, recognizing that available space may be used for a variety of purposes and land use, the actual canopy cover potential for the Anchorage Bowl may be significantly less.
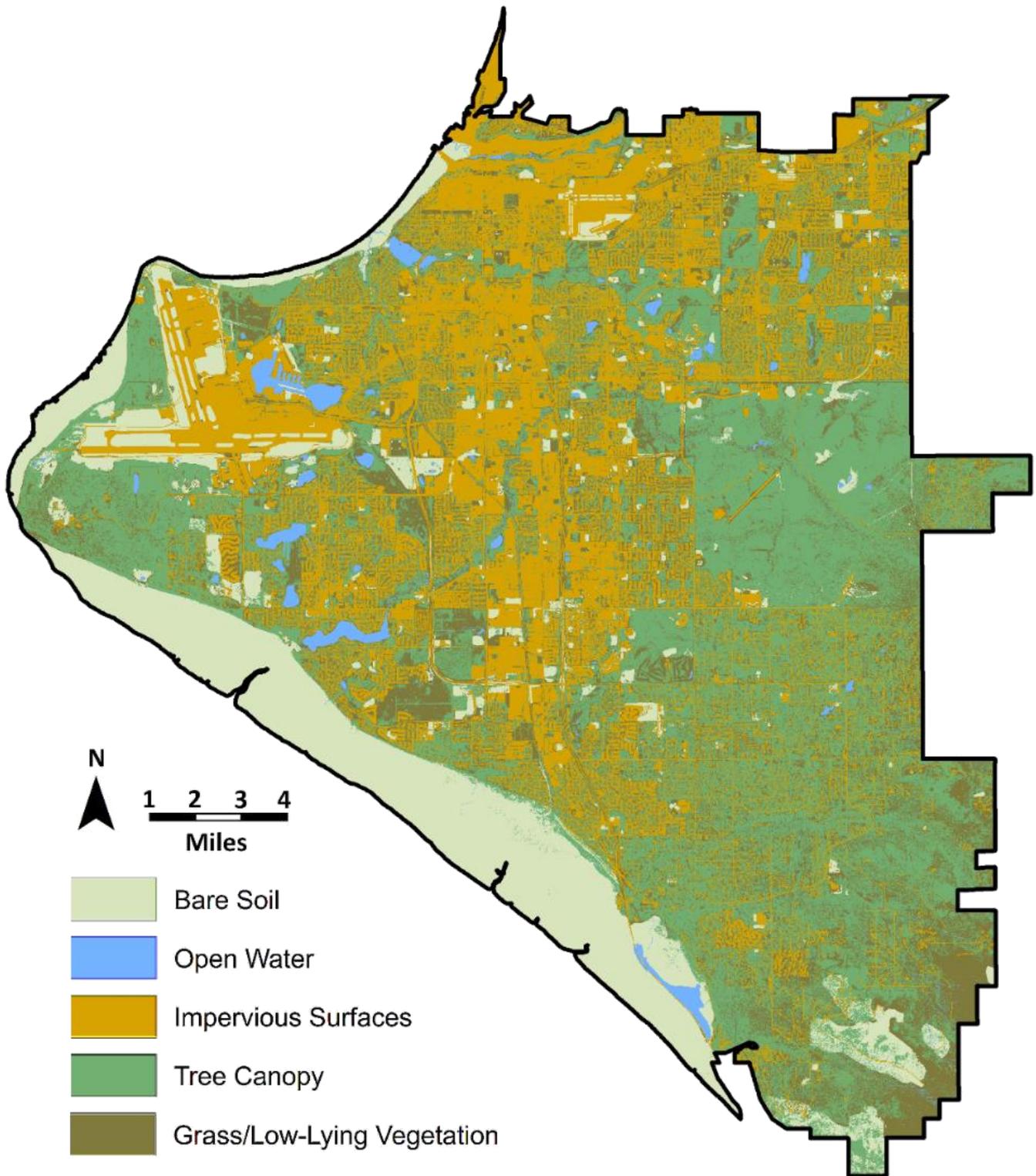
Map 2. Land Cover within the Anchorage Bowl (2018)

Legend:
- Bare Soil
- Open Water
- Impervious Surfaces
- Tree Canopy
- Grass/Low-Lying Vegetation

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Canopy Cover by Community Councils

Community Council boundaries can be used to better understand the distribution of tree canopy, as they tend to reflect geographies that are recognized by community members and leaders. Exploring canopy distribution at this level can help facilitate outreach and education activities as well as develop a deeper understanding of tree canopy at a meaningful scale.

The Anchorage Bowl has 28 Community Councils. Basher has the highest canopy cover (75.5%), followed by Hillside (64.5%) and Glen Alps (51.6%) (Figure 2, Table 1). In contrast, Downtown has the lowest canopy cover (8.3%).

Hillside has the greatest amount of tree canopy (3,665 acres) and Downtown has the least (43 acres).

The largest Community Council, Sand Lake, encompasses a total of 15.0 square miles (9,616 acres) including 4.7 square miles (2,988 acres) of tree canopy and an average tree canopy cover of 31.1%. Since 2009, tree canopy in Sand Lake has increased by 3.9% (+110.7 acres).

The smallest Community Council, Tudor Area (256 total acres) has 77 acres of tree canopy (30%). Since 2009, canopy cover in Tudor Area has decreased by 16% (-14.1 acres).

Considering percent change, Downtown recognized the greatest gain in canopy cover (+24%), followed by Taku/Campbell (+20%). Tudor Area (-16%) and Roger's Park (-15%) experienced the greatest loss.

Overall, tree canopy in Community Councils increased by 522.4 acres (+2.1%).
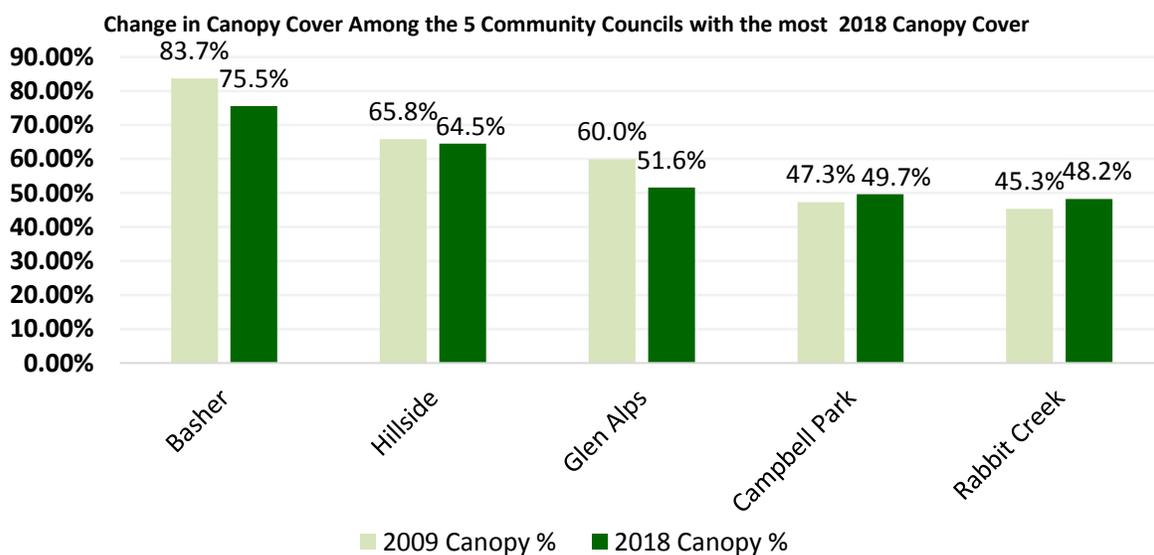
Figure 2. Historical Change in Canopy Cover Among Community Councils
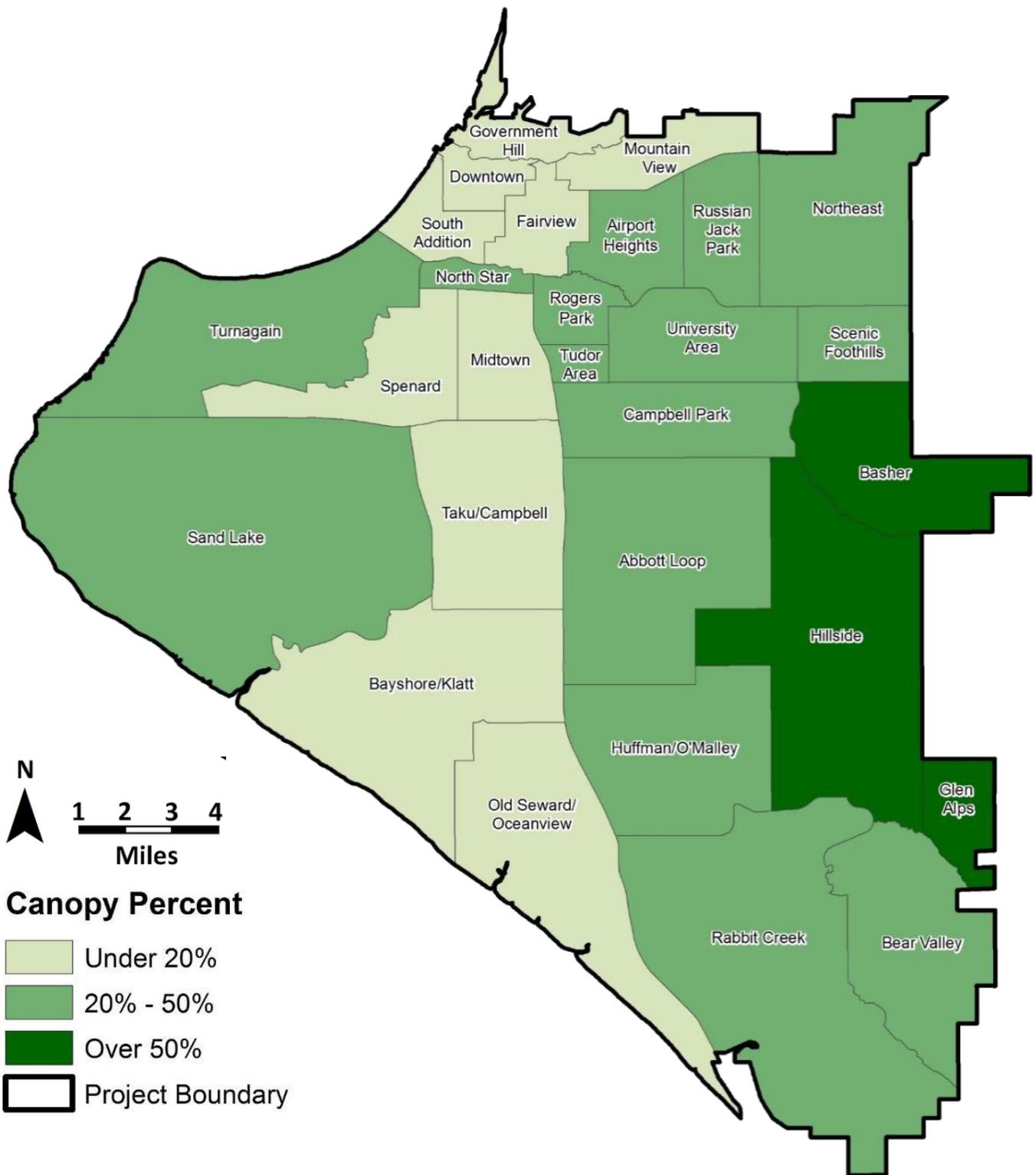
Map 3. Tree Canopy by Community Councils

Table 1. Tree Canopy by Community Council 2009-2018

Community Council	2009 Canopy %	2018 Canopy %	2018 Canopy Acres	2018 Total Acres	% Change in Canopy 2009-2018
Basher	83.70%	75.54%	1,917.06	2,537.70	-9.75%
Hillside	65.84%	64.48%	3,664.56	5,683.50	-2.07%
Glen Alps	59.96%	51.60%	440.91	854.40	-13.93%
Campbell Park	47.28%	49.66%	993.01	1,999.43	5.05%
Rabbit Creek	45.30%	48.19%	3,469.82	7,199.56	6.38%
Huffman/O'Malley	42.43%	48.00%	1,559.41	3,248.62	13.12%
Bear Valley	49.96%	46.49%	1,406.22	3,025.02	-6.95%
Abbott Loop	39.84%	42.80%	1,977.27	4,619.47	7.44%
University Area	36.14%	37.63%	659.93	1,753.69	4.11%
Rogers Park	39.98%	33.88%	206.70	610.11	-15.27%
Scenic Foothills	28.73%	33.06%	319.12	965.41	15.04%
Russian Jack Park	29.31%	32.59%	390.43	1,198.09	11.20%
Sand Lake	29.93%	31.08%	2,988.21	9,615.64	3.85%
Tudor Area	35.42%	29.90%	76.65	256.35	-15.58%
North Star	34.01%	29.85%	99.82	334.37	-12.23%
Turnagain	25.26%	26.87%	1,141.21	4,247.31	6.35%
Airport Heights	23.03%	24.44%	283.28	1,159.10	6.11%
Northeast	23.93%	24.13%	759.06	3,145.60	0.85%
Bayshore/Klatt	18.18%	17.56%	871.70	4,964.20	-3.40%
Mountain View	15.57%	17.39%	176.74	1,016.61	11.64%
South Addition	19.27%	17.16%	127.86	745.06	-10.96%
Spenard	14.29%	16.95%	313.18	1,847.58	18.61%
Taku/Campbell	13.96%	16.73%	491.30	2,937.28	19.79%
Government Hill	11.68%	12.90%	108.64	842.00	10.45%
Old Seward/Oceanview	11.95%	12.54%	500.09	3,989.42	4.91%
Fairview	11.98%	12.09%	103.07	852.43	0.89%
Midtown	9.87%	11.54%	144.48	1,251.50	16.91%
Downtown	6.65%	8.26%	42.60	515.70	24.26%
Total	**34.60%**	**35.33%**	**25,232.32**	**71,415.14**	**2.11%**

Anchorage Bowl Tree Canopy Cover 2018

Canopy Cover on Public and Private Lands

Privately-owned land, including residential, commercial, and industrial parcels, account for most (75%) of the area within the Anchorage Bowl (53,447 acres) (Table 2). More than 22,500 acres of tree canopy and 89% of all tree canopy is located on private parcels. The average canopy cover on privately-owned parcels is 42%.

Public land, including state, federal, and municipal parcels accounts for approximately 19% (13,212 acres) of the Bowl. Less than 11% of all tree canopy is located on public land. The average canopy cover on public lands is 20%.

Since 2009, privately-owned parcels have lost 2.8 acres (<0.1%) of tree canopy (Figure 3). Conversely, public lands have gained 522.6 acres of tree canopy, an increase of more than 24%.

Table 2. Tree Canopy by Public and Private Lands

Land Use	2009 Canopy %	2018 Canopy %	2018 Canopy Acres	2018 Total Acres	% Change 2009-2018
Private	42.18%	42.18%	22,543.45	53,447.31	-0.01%
Public	16.23%	20.19%	2,667.58	13,212.30	24.36%
Unclassified	0.39%	0.45%	21.29	4,755.52	13.88%
Overall	**34.60%**	**35.33%**	**25,232.32**	**71,415.14**	**2.11%**

Change in Canopy Cover Among Private and Public Lands
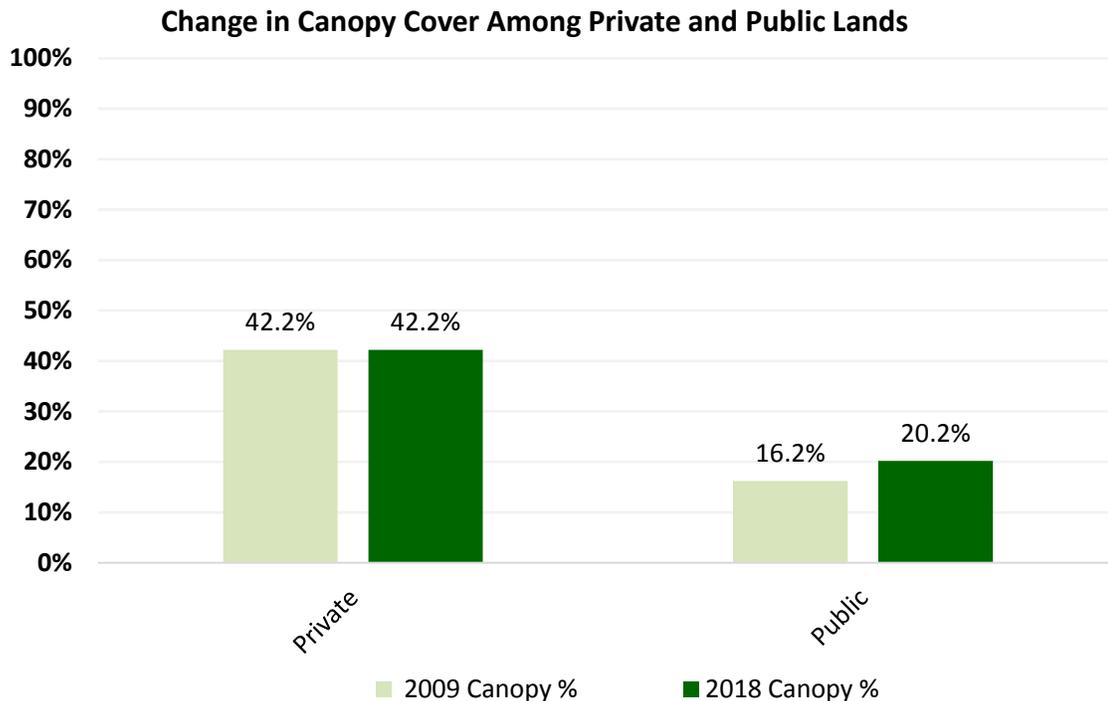
Figure 3. Historical Change in Canopy Cover Among Private and Public Lands

Canopy Cover by Land Use

The 2018 tree canopy assessment reviewed canopy cover by land use for residential, commercial, right-of-way, and recreational/open space parcels. Recreational and open space areas have the highest average tree canopy (58%) and commercial areas have the lowest (13%):

- 37.8% Residential
- 12.7% Commercial
- 20.2% Right-of-Way
- 62.7% Recreational and Open Space

Residential land use, including single-family and multi-family parcels, encompasses 19,549 acres and includes 7,382 acres of tree canopy (38%). Since 2009, tree canopy on residential parcels has decreased by 97.3 acres (-1.3%) (Table 3 and Figure 4).

Commercial and Industrial zoned parcels encompass 5,726 acres including 727 acres of tree canopy and an average canopy cover of 12.7%. Since 2009, canopy in commercial and industrial areas has increased 32.0% (+178.1 acres).

The Anchorage Bowl includes 9,245 acres of right-of-way (e.g., streets, alleys) with 1,865 acres of tree canopy and an average canopy cover of 20.2%. Since 2009, tree canopy in the right-of-way has increased 35.0% (+308.6 acres).

Recreational and open space areas encompass 16,202 acres including 10,165 acres of tree canopy and an average canopy cover of 62.7%. Since 2009, tree canopy in recreational and open space areas has increased 8.2% (+766 acres).

Right-of-way (+35.0%) and Commercial (+32.0%) land use areas saw the greatest change in canopy cover since 2009.

Table 3. Tree Canopy by Land Use

Land Use	2009 Canopy %	2018 Canopy %	2018 Canopy Acres	2018 Total Acres	% Change in Canopy 2009-2018
Residential	38.71%	37.76%	7,382.17	19,548.96	-2.45%
Commercial	9.62%	12.70%	727.14	5,726.26	31.98%
Right-of-Way	14.94%	20.17%	1,864.62	9,245.34	35.02%
Recreational and Open Space	58.01%	62.74%	10,164.83	16,202.07	8.15%
Overall	**34.60%**	**39.70%**	**20,138.76**	**50,722.63**	**14.75%**

Change in Canopy Cover Among Land Uses
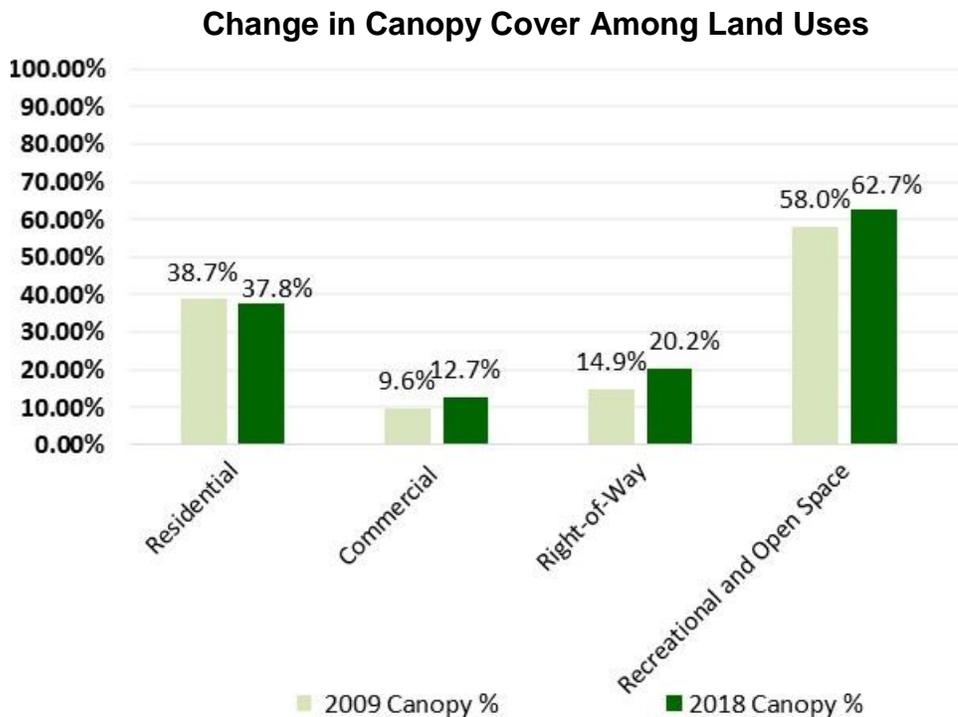
Figure 4. Historical Change in Canopy Cover Among Land Uses

Recreational and Open Space (parks, greenbelts, and trails)

Recreational and open space parcels (16,202 acres) include parks, greenbelts, trails, and open space. Overall, recreational and open space areas have an average canopy cover of 62.7%.

Parks

The Anchorage Bowl includes 251 areas identified as parks encompassing a total of 10,693 acres, including 7,457 acres of tree canopy and an average canopy cover of 69.7%. Since 2009, tree canopy in parks has increased 2.9% (+207 acres).

Among parks larger than one acre, High Tide Park has the highest canopy cover (100%) followed by Clay Park (99%) and Nunaka Valley Park West (98%) (Table 5). Snowshoe Park has the lowest canopy cover (85%). Appendix C includes a complete listing and details for all parks.

The largest municipal park, Far North Bicentennial Park (3,606 acres) has 2,887 acres of tree canopy and an average canopy cover of 80%. Since 2009, tree canopy in Far North Bicentennial Park has decreased 4.2% (-128 acres).

Among the top five largest parks, Far North Bicentennial Park is the only park were canopy cover has decreased since 2009 (Table 4 and Figure 5). Hillside Park (392.3 acres) experienced the greatest positive change (+19.4%), gaining 55.5 acres of tree canopy.

Table 4. Tree canopy in Parks >100 acres

| Anchorage Bowl Parks > 100 Acres	2009 Canopy %	2018 Canopy %	2018 Canopy Acres	2018 Total Acres	% Change in Canopy 2009-2018
Far North Bicentennial Park	83.59%	80.05%	2,886.72	3,606.29	-4.23%
Kincaid Park	69.45%	72.39%	1,090.27	1,506.05	4.23%
Ruth Arcand Park	62.65%	67.28%	359.64	534.52	7.39%
Hillside Park	72.77%	86.92%	340.96	392.26	19.44%
Section 36	62.74%	74.11%	281.14	379.37	18.11%
Russian Jack Springs Park	73.80%	72.95%	221.74	303.95	-1.15%
Campbell Park	53.47%	63.00%	169.93	269.72	17.83%
Connors Lake Park	33.43%	38.11%	97.68	256.31	13.85%
Point Woronzof Park	55.43%	63.11%	121.07	191.85	2.08%
Earthquake Park	75.90%	77.49%	100.13	129.23	14.00%
Margaret Eagan Sullivan Park	19.59%	20.25%	21.34	105.37	6.15%
Old Rabbit Creek Park	75.02%	79.64%	82.42	103.50	4.75%
Tikishla Park	77.54%	73.60%	74.60	101.36	-5.09%
All Other Parks	66.93%	57.20%	1,608.87	2,812.80	0.66%
Parks total	**67.80%**	**69.74%**	**7,456.53**	**10,692.57**	**2.85%**
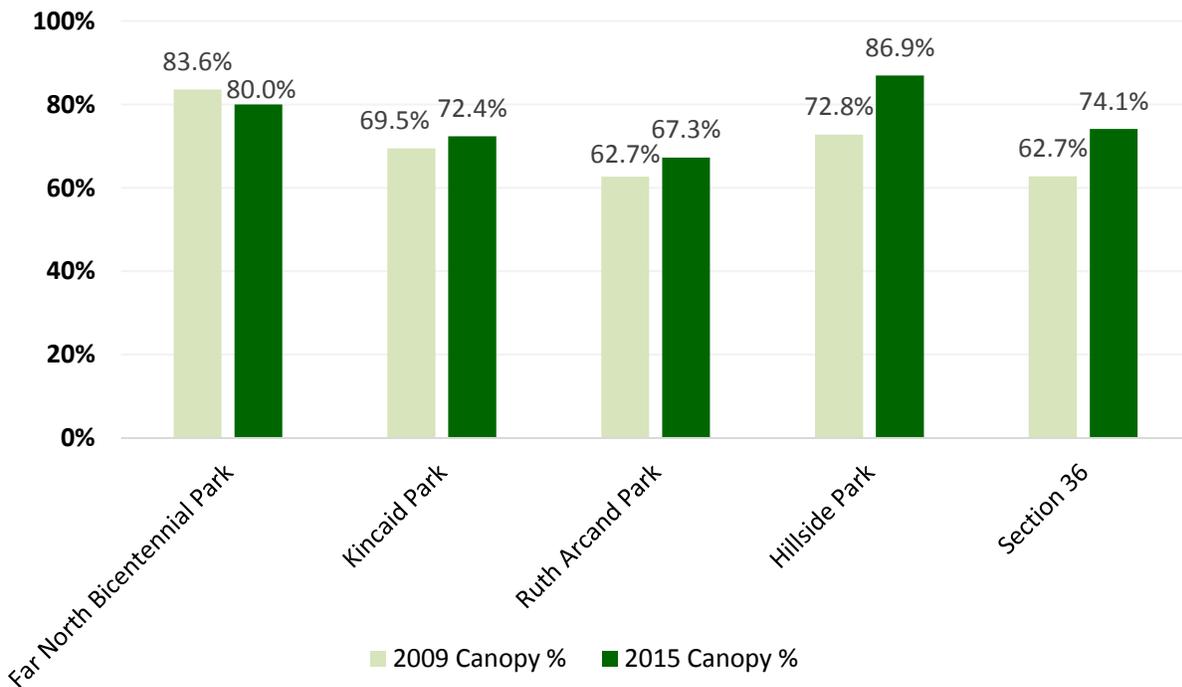
Figure 5. Historical Change in Canopy Cover Among 5 Largest Parks

Table 5. Parks >1 acre with the highest percentage of tree canopy cover

Anchorage Bowl Parks with Canopy >85%	2009 Canopy %	2018 Canopy %	2018 Canopy Acres	2018 Total Acres	% Change in Canopy 2009-2018
High Tide Park	99.98%	100.00%	1.60	1.60	0.02%
Clay Park	92.43%	99.43%	1.30	1.31	7.58%
Nunaka Valley Park West	90.18%	97.88%	8.89	9.08	8.54%
Huntington Park	82.85%	97.30%	1.86	1.91	17.44%
Nelva J Wilmoth Park	91.15%	95.78%	1.96	2.04	5.08%
Chester Valley Park	86.64%	94.44%	18.64	19.74	9.00%
Chester Creek Greenbelt- Part F	92.69%	93.66%	17.77	18.98	1.04%
Chester Creek Greenbelt- Part D	94.78%	93.36%	4.13	4.42	-1.49%
Chester Creek Greenbelt- Part G	93.46%	93.34%	1.79	1.92	-0.12%
J.B. Gottstein Park	69.11%	93.22%	3.18	3.41	34.89%
Point Woronzof Buffer Park	84.38%	93.18%	5.62	6.03	10.42%
Elmore Park	61.28%	93.12%	1.20	1.29	51.95%
Folker Park	91.39%	92.17%	1.85	2.00	0.86%
Alaska Botanical Garden	87.84%	92.02%	74.65	81.12	4.75%
Kobuk Park	80.77%	91.31%	4.54	4.97	13.04%
Fish Creek Greenbelt- Part A	72.67%	91.00%	1.03	1.13	25.22%
Arnold L Muldoon Park	74.57%	90.33%	60.85	67.36	21.14%
Little Rabbit Creek Bluff Park	82.56%	90.12%	61.89	68.67	9.15%
Campbell Creek Greenbelt - Part L	77.71%	89.94%	2.05	2.28	15.74%
Linden Park	85.40%	89.88%	3.54	3.94	5.24%
Seward Highway Buffer Park North	63.71%	89.51%	1.70	1.90	40.49%
Ure Park	81.07%	89.17%	1.47	1.64	10.00%
Chester Creek Greenbelt- Part B	89.67%	88.94%	5.03	5.66	-0.81%
Chester Creek Greenbelt- Part C	87.96%	88.36%	2.50	2.83	0.46%
Taku School Park	76.89%	87.99%	1.86	2.12	14.44%
Atkins Park	84.43%	87.88%	2.74	3.12	4.09%
Telequana Park	72.34%	87.65%	2.81	3.20	21.16%
Sand Lake Park	93.02%	87.57%	4.53	5.17	-5.86%
Bayshore Park South	85.15%	87.46%	9.27	10.60	2.72%
Mesa Verde Park	79.89%	87.14%	1.60	1.83	9.08%
Campbell Creek Greenbelt - Part D	90.86%	87.09%	5.63	6.46	-4.16%
Little Campbell Creek Greenbelt	73.31%	87.05%	15.28	17.55	18.74%
Hillside Park	72.77%	86.92%	340.96	392.26	19.44%
Potter Creek Ravine Park	80.50%	86.60%	8.70	10.05	7.58%
Rabbit Creek Park	72.18%	86.30%	14.05	16.28	19.56%
Forsythe Park	86.50%	85.69%	23.07	26.92	-0.94%
Half Park	80.02%	85.56%	3.78	4.42	6.92%
Davison Park	81.01%	85.51%	8.47	9.90	5.55%
Snowshoe Park	67.18%	85.00%	4.26	5.01	26.52%
All Other Parks	61.69%	68.14%	6720.51	9862.44	10.46%
Parks Total	**67.80%**	**69.74%**	**7,456.53**	**10,692.57**	**2.85%**

Trails

The Anchorage Bowl has 431 linear miles of trails. To assess tree canopy cover along the trail system, the assessment assigned a 25-foot buffer on the trail centerline and assessed all canopy cover within the resulting 50-foot corridor. Based on this methodology, the bowl has 5,510 acres of trail corridor, including 2,708 acres of tree canopy for an average canopy cover of 49.2%. Since 2009, canopy cover on trails has increased 26.0% (559.4 acres).

Tree Canopy Cover of Lakes, Rivers, and Streams

Using a 25-foot buffer on lake borders and a 70-foot-wide corridor to buffer streams, the analysis identified a total hydrologic buffer zone of 5.3 squares miles (3,408 acres), including 2.1 square miles of canopy (1,356 acres) for an average tree canopy cover of 33.2%. A historic comparison for lakes, rivers, and streams is unavailable because the previous assessment analyzed only stream buffer zones (1,952 acres).

Tree Canopy Cover of Watersheds

The analysis identified 103 square miles (65,828 acres) of watershed within the Anchorage Bowl. This area includes 39 square miles (25,229 acres) of canopy for a canopy cover of 38%. There was no previous land cover analysis performed on watersheds in the 2010 assessment. As such, so there is no historical comparison.

A Spring day on Cambell Creek.

Watersheds

- Campbell Creek
- Chester Creek
- Fish Creek
- Furrow Creek
- Hood Creek
- Potter Creek
- Rabbit Creek
- Ship Creek
- Six Mile Creek
- Lakes
- Streams
- Project Boundary

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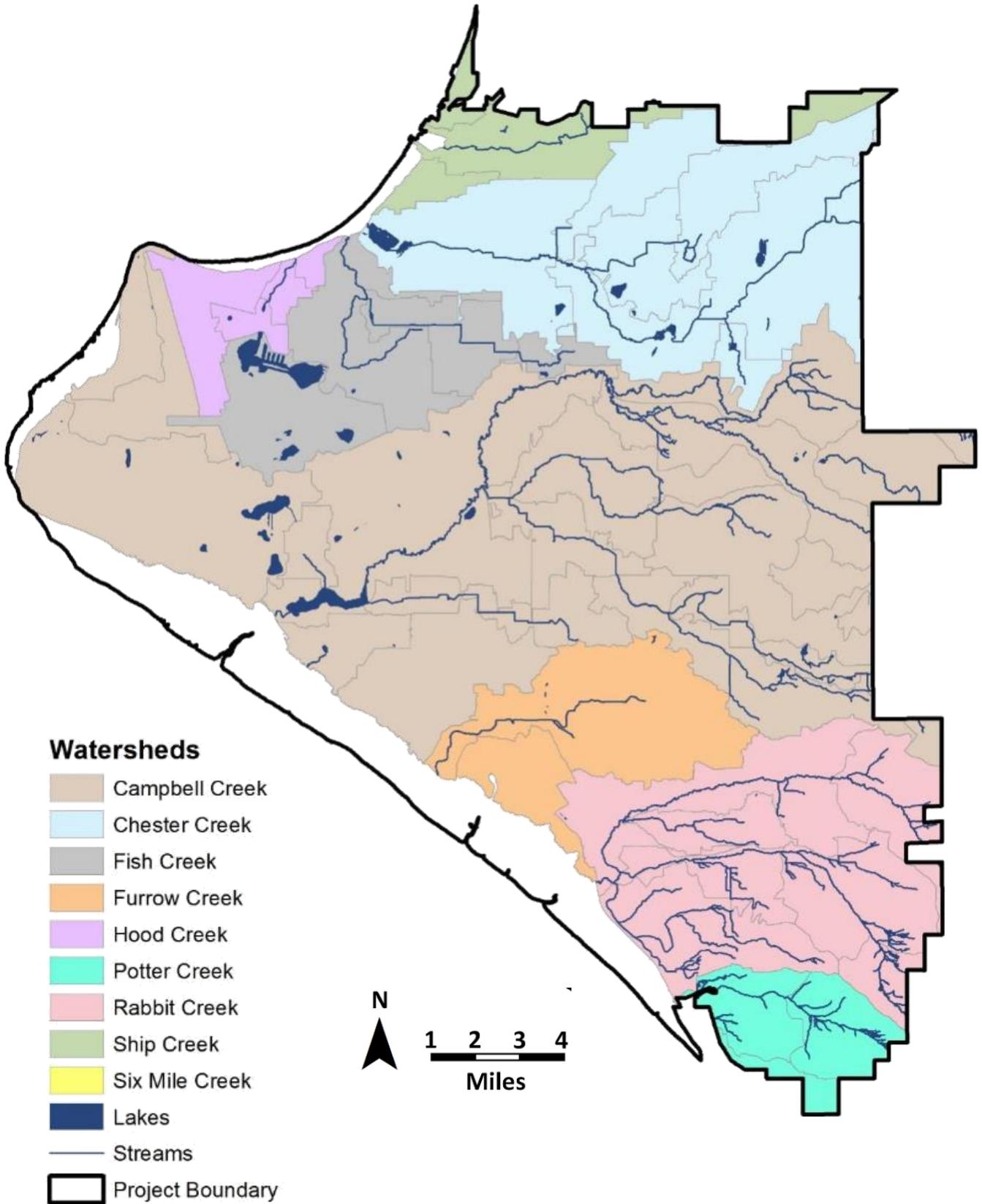
Map 3. Bodies of Water and Watersheds within the Anchorage Bowl (2018)

Invasive Plants

Invasive plants are species with the ability to thrive outside of their natural environment. Invasive plants often compete aggressively for available resources such as water, nutrients, and sunlight. Highly aggressive species can be a real threat to native forests, outcompeting native species for space and available resources and disrupting the natural ecosystem. Invasive plants are often introduced by unwitting gardeners as ornamentals or arrive as hitchhikers in potting media. Once introduced, they can quickly be spread by birds and other wildlife, wind, and water.

Consumer education and public outreach are critical for reducing the incidence of introduced exotic and invasive plant species. Enlisting the cooperation of retail and wholesale outlets to recognize invasive species, developing and practicing good weed management policies, and using sterile soil media, can greatly minimize the opportunities for introduction into landscapes and natural forests.

Mayday Tree/European Bird Cherry (*Prunus padus*)

While there are numerous invasive weed species in Anchorage, there is currently only one that threatens tree canopy composition in natural forests. The mayday tree (*Prunus padus*), commonly cultivated in the nursery industry as a fragrant ornamental, has spread into native forest stands. The mayday tree has earned an invasiveness rating of 74 on a scale of 100 on the Alaska Exotic Plants Information Clearinghouse (AKEPIC). The species exhibits a dense, shrubby growth up to 30 feet that reduces light, nutrient availability, and soil moisture for other species. Stands of mayday are outcompeting and eliminating native willow in riparian forests. In an effort to combat the negative impacts of this species, in 2017, Chapter 15.90 was added to the Anchorage Municipal Charter, which bans the sale of mayday tree or bird cherry tree (*Prunus padus*).

A recent study shows (Roon et al., 2014) that as the invasive populations of the mayday tree continue to spread along streams and riparian areas, the diversity and number of terrestrial invertebrates decreases and this is likley to have negative consequences to salmon streams. Additionally, the stems leaves and fruits of the mayday tree contain poisionous chemicals that can be deadly when consumed by wild life, and this has been documented in moose.

Mayday trees form a dense barrier behind this row of newly planted park trees.

Conclusion

Overall, tree canopy in the Anchorage Bowl has increased by 2% since the 2009 forestland assessment. While this results in only a slight change in average cover from 34.6% (2009) to 35.3% (2018), it represents a gain of 522 acres in tree canopy.

From 2009 to 2018, tree canopy on public lands increased by 24% (+522.6 acres). Conversely, private lands experienced a much smaller change, with a net loss of 2.8 acres (<0.1%) of tree canopy. Overall, parks gained 2.9% (+207 acres) of tree canopy.

The 2018 *Anchorage Bowl Tree Canopy Assessment* establishes a new baseline and historical perspective for monitoring changes in tree canopy cover throughout the community. This project augments the Municipality's GIS database with a landcover layer that identifies the location and extent of 2018 tree canopy along with other primary land cover classes. This data layer can be used in conjunction with other infrastructure layers to prioritize planting sites and strategically increase canopy cover by neighborhood, park, or land use. This data provides a foundation for developing urban forest management strategies and measuring the success of those strategies over time.

The urban forest is a dynamic, growing, and ever-changing resource that will continue to require sound and proactive management to fully realize its maximum potential. Community engagement and support are vital to a successful urban forestry program. Based on this assessment, urban forest managers have the following opportunities:

- Conduct a priority-planting analysis for the Anchorage Bowl. Prioritized grid maps provide a basis for a strategically focused planting plan to increase trees and canopy that will support stormwater management, reduce urban heat island impacts, mitigate soil erosion, and complement the existing urban infrastructure for the greatest impact and return on investment.

- Considering that 89% (22,500 acres) of all tree canopy is on privately-owned parcels, outreach and education to land owners should be a key priority. Proactive preservation, such as tree preservation incentives for developers, mitigation policies, and ongoing tree replacement can help ensure that canopy cover remains stable and continues to grow. Preservation requires recognition of the value of forests and the environmental services they provide.

- New urban tree plantings should be guided by strategies aimed at increasing canopy cover on both public and private property.

- Coordinate with nurseries to ensure that known invasive species are not readily available to consumers.

- Coordinate with USDA Forest Service and Alaska Division of Forestry to monitor pest activity and threats to Anchorage Bowl forestlands, and institute responsible and appropriate control measures with consideration to the level of threat, value of forest assets and availability of human and financial resources to address the threat.

- The 2018 land cover layer allows urban forest managers and municipal leaders to explore changes at any level from individual parcels and lots to the overall municipality. Understanding where and why tree canopy has decreased can provide insight and solutions for future preservation.

This report provides an overview of the existing tree canopy and an important outreach tool for engaging public interest and support. However, the accompanying GIS layer that maps the location and extent of existing landcover can support a vast range of additional analysis when used in conjunction with other data layers. The data supports analysis from an overall community level down to the parcel level and can provide an important tool for investigating the relationship of tree canopy in correlation with other important issues, including transportation, walkability, human health, and social and economic concerns.

Appendix A: References

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Appendix B: Methodology

Davey Resource Group Classification Methodology

Davey Resource Group utilized an in-house LiDAR canopy extraction model to process and extract tree canopy cover for the land cover classifications. The use of LiDAR data provides a highly accurate approach to assessing your community's existing tree canopy coverage. This supports responsible tree management, facilitates community forestry goal-setting, and improves urban resource planning for healthier and more sustainable urban environments.

Advanced image analysis methods were used to classify, or separate, impervious land cover layers from the overall imagery using Normalized Difference Vegetation Index (NDVI). The semi-automated extraction process was completed using Feature Analyst, an extension of ArcGIS®. Feature Analyst uses an object-oriented approach to cluster together objects with similar spectral (i.e., color) and spatial/contextual (e.g., texture, size, shape, pattern, and spatial association) characteristics. The land cover results of the extraction process was post-processed and clipped to each project boundary prior to the manual editing process in order to create smaller, manageable, and more efficient file sizes. Secondary source data, high-resolution aerial imagery provided by the client, and custom ArcGIS® tools were used to aid in the final manual editing, quality checking, and quality assurance processes (QA/QC). The manual QA/QC process was implemented to identify, define, and correct any misclassifications or omission errors in the final land cover layer.

Classification Workflow

1. Prepare imagery for feature extraction (resampling, rectification, etc.), if needed.

2. LiDAR collected in 2015 was also used for this project to distinguish between shrubs and trees. A canopy height model (CHM) was constructed from a digital surface model (DSM) and a bare earth digital elevation model (DEM). A threshold value of 10ft was used to separate trees and shrubs based on the information from the CHM.

3. Extract impervious layer from 2018 4 Band SPOT imagery utilizing NDVI values.

4. Gather training set data for bare soil. Water samples are not always needed since hydrologic data are available for most areas. Training data for impervious features were not collected because they were extracted using NDVI values.

5. Extract canopy layer only; this decreases the amount of shadow removal from large tree canopy shadows. Fill small holes and smooth to remove rigid edges.

6. Edit and finalize canopy layer at 1:2000 scale. This process is done to speed up editing time and improve accuracy by including smaller individual trees.

7. Extract remaining land cover classes using the canopy layer as a mask; this keeps canopy shadows that occur within groups of canopy while decreasing the amount of shadow along edges.

8. Edit the impervious layer to reflect actual impervious features, such as roads, buildings, parking lots, etc. to update features.

9. Using canopy and actual impervious surfaces as a mask; input the bare soils training data and extract them from the imagery. Quickly edit the layer to remove or add any features. Davey Resource Group tries to delete dry vegetation areas that are associated with lawns, grass/meadows, and agricultural fields.

10. Assemble any hydrological datasets, if provided. Add or remove any water features to create the hydrology class. Perform a feature extraction if no water feature datasets exist.

11. Use geoprocessing tools to clean, repair, and clip all edited land cover layers to remove any self-intersections or topology errors that sometimes occur during editing.

12. Input canopy, impervious, bare soil, and hydrology layers into Davey Resource Group's Five-Class Land Cover Model to complete the classification. This model generates the pervious (grass/low-lying vegetation) class by taking all other areas not previously classified and combining them.

13. Thoroughly inspect final land cover dataset for any classification errors and correct as needed.

14. Perform accuracy assessment. Repeat Step 11, if needed.

Automated Feature Extraction Files

The automated feature extraction (AFE) files allow other users to run the extraction process by replicating the methodology. Since Feature Analyst does not contain all geoprocessing operations that Davey Resource Group utilizes, the AFE only accounts for part of the extraction process. Using Feature Analyst, Davey Resource Group created the training set data, ran the extraction, and then smoothed the features to alleviate the blocky appearance. To complete the actual extraction process, Davey Resource Group uses additional geoprocessing tools within ArcGIS®. From the AFE file results, the following steps are taken to prepare the extracted data for manual editing.

1. Davey Resource Group fills all holes in the canopy that are less than 30 square meters. This eliminates small gaps that were created during the extraction process while still allowing for natural canopy gaps.

2. Davey Resource Group deletes all features that are less than 9 square meters for canopy (50 square meters for impervious surfaces). This process reduces the amount of small features that could result in incorrect classifications and also helps computer performance.

3. The Repair Geometry, Dissolve, and Multipart to Singlepart (in that order) geoprocessing tools are run to complete the extraction process.

4. The Multipart to Singlepart shapefile is given to GIS personnel for manual editing to add, remove, or reshape features.

Accuracy Assessment Protocol

Determining the accuracy of spatial data is of high importance to Davey Resource Group and our clients. To achieve to best possible result, Davey Resource Group manually edits and conducts thorough QA/QC checks on all urban tree canopy and land cover layers. A QA/QC process will be completed using ArcGIS® to identify, clean, and correct any misclassification or topology errors in the final land cover dataset. The initial land cover layer extractions will be edited at a 1:2000 quality control scale in the urban areas and at a 1:2500 scale for rural areas utilizing the most current high-resolution aerial imagery to aid in the quality control process.

Table 6. Land Cover Classification Code Values

Land Cover Classification	Code Value
Tree Canopy	1
Impervious	2
Pervious (Grass/Vegetation)	3
Bare Soil	4
Open Water	5

To test for accuracy, random plot locations are generated throughout the municipality area of interest and verified to ensure that the data meet the client standards. Each point will be compared with the most current SPOT high-resolution imagery (reference image) to determine the accuracy of the final land cover layer. Points will be classified as either correct or incorrect and recorded in a classification matrix. Accuracy will be assessed using four metrics: overall accuracy, kappa, quantity disagreement, and allocation disagreement. These metrics are calculated using a custom Excel® spreadsheet.

Land Cover Accuracy

The following describes Davey Resource Group's accuracy assessment techniques and outlines procedural steps used to conduct the assessment.

1. *Random Point Generation*—Using ArcGIS, 1,000 random assessment points are generated.

2. *Point Determination*—Each point is carefully assessed by the GIS analyst for likeness with the aerial photography. To record findings, two new fields, CODE and TRUTH, are added to the accuracy assessment point shapefile. CODE is a numeric value (1–5) assigned to each land cover class (Table 5) and TRUTH is the actual land cover class as identified according to the reference image. If CODE and TRUTH are the same, then the point is counted as a correct classification. Likewise, if the CODE and TRUTH are not the same, then the point is classified as incorrect. In most cases, distinguishing if a point is correct or incorrect is straightforward. Points will rarely be misclassified by an egregious classification or editing error. Often incorrect points occur where one feature stops and the other begins.

3. *Classification Matrix*—During the accuracy assessment, if a point is considered incorrect, it is given the correct classification in the TRUTH column. Points are first assessed on the SPOT imagery for their correctness using a "blind" assessment— meaning that the analyst does not know the actual classification (the GIS analyst is strictly going off the SPOT imagery to determine cover class). Any incorrect classifications found during the "blind" assessment are scrutinized further using sub-meter imagery provided by the client to determine if the point was incorrectly classified due to the fuzziness of the SPOT imagery or an actual misclassification. After all random points are assessed and recorded; a classification (or confusion) matrix is created. The classification matrix for this project is presented in Table 6. The table allows for assessment of user's/producer's accuracy, overall accuracy, omission/commission errors, kappa statistics, allocation/quantity disagreement, and confidence intervals (Table 7).

Table 7. Classification Matrix

Reference Data	Classes	Tree Canopy	Impervious Surfaces	Grass & Low-Lying Vegetation	Bare Soils	Open Water	Row Total	Producer's Accuracy	Errors of Omission
	Tree Canopy	347	0	14	0	0	361	96.12%	3.88%
	Impervious	4	281	8	1	0	294	95.58%	4.42%
	Grass / Vegetation	19	8	164	4	0	195	84.10%	15.90%
	Bare Soils	3	5	5	124	0	137	90.51%	9.49%
	Water	1	0	0	1	11	13	84.62%	15.38%
	Column Total	374	294	191	130	11	1000		
	User's Accuracy	92.78%	95.58%	85.86%	95.38%	100.00%		Overall Accuracy	92.70%
	Errors of Commission	7.22%	4.42%	14.14%	4.62%	0.00%		Kappa Coefficient	0.8991

4. Following are descriptions of each statistic as well as the results from some of the accuracy assessment tests.

> *Overall Accuracy* – Percentage of correctly classified pixels; for example, the sum of the diagonals divided by the total points ((347+281+164+124+11)/1,000 = 92.70%).

User's Accuracy – Probability that a pixel classified on the map actually represents that category on the ground (correct land cover classifications divided by the column total [347/374 = 92.78%]).

Producer's Accuracy – Probability of a reference pixel being correctly classified (correct land cover classifications divided by the row total [347/361 = 96.12%]).

Kappa Coefficient – A statistical metric used to assess the accuracy of classification data. It has been generally accepted as a better determinant of accuracy partly because it accounts for random chance agreement. A value of 0.80 or greater is regarded as "very good" agreement between the land cover classification and reference image.

Errors of Commission – A pixel reports the presence of a feature (such as trees) that, in reality, is absent (no trees are actually present). This is termed as a false positive. In the matrix below, we can determine that 7.22% of the area classified as canopy is most likely not canopy.

Errors of Omission – A pixel reports the absence of a feature (such as trees) when, in reality, they are actually there. In the matrix below, we can conclude that 3.88% of all canopy classified is actually classified as another land cover class.

Allocation Disagreement – The amount of difference between the reference image and the classified land cover map that is due to less than optimal match in the spatial allocation (or position) of the classes.

Quantity Disagreement – The amount of difference between the reference image and the classified land cover map that is due to less than perfect match in the proportions (or area) of the classes.

Confidence Intervals – A confidence interval is a type of interval estimate of a population parameter and is used to indicate the reliability of an estimate. Confidence intervals consist of a range of values (interval) that act as good estimates of the unknown population parameter based on the observed probability of successes and failures. Since all assessments have innate error, defining a lower and upper bound estimate is essential.

Table 8. Confidence Intervals, Accuracy Assessments, and Summary Metrics

Confidence Intervals				
Class	Acreage	Percentage	Lower Bound	Upper Bound
Tree Canopy	25,232.30	35.30%	35.20%	35.50%
Impervious Surfaces	20,605.60	28.90%	28.70%	29.00%
Grass & Low-Lying Vegetation	14,003.90	19.60%	19.50%	19.80%
Bare Soils	10,509.90	14.70%	14.60%	14.80%
Open Water	1,063.40	1.50%	1.40%	1.50%
Total	71,415.10	100.00%		

Accuracy Assessments						
Class	User's Accuracy	Lower Bound	Upper Bound	Producer's Accuracy	Lower Bound	Upper Bound
Tree Canopy	92.80%	91.40%	94.10%	96.10%	95.10%	97.10%
Impervious Surfaces	95.60%	94.40%	96.80%	95.60%	94.40%	96.80%
Grass & Low-Lying Vegetation	85.90%	83.30%	88.40%	84.10%	81.50%	86.70%
Bare Soils	95.40%	93.50%	97.20%	90.50%	88.00%	93.00%
Open Water	100.00%	100.00%	100.00%	84.60%	74.60%	94.60%

Statistical Metrics Summary	
Overall Accuracy =	92.70%
Kappa Coefficient =	0.8991
Allocation Disagreement =	6%
Quantity Disagreement =	1%

Appendix C: Tables

Table 9. Complete Table of Parks, Greenbelts, and Open Space

PARK NAME	2009 Canopy %	2018 Canopy %	2018 Canopy Acres	2018 Total Acres	% Change in Canopy 2009-2018
5th Avenue (Glenn Hwy.) Buffer Park	82.67%	33.95%	0.34	1.00	-58.93
A/C Couplet Buffer Park	39.28%	44.12%	1.30	2.96	12.32
Abbott Loop Community Park	35.94%	43.55%	13.70	31.45	21.17
Al Miller Memorial Park	72.70%	74.29%	0.72	0.97	2.18
Alaska Botanical Garden	87.84%	92.02%	74.65	81.12	4.75
Alderwood Park	76.51%	74.53%	1.84	2.47	-2.59
Arctic Circle Park	97.21%	98.69%	0.28	0.28	1.53
Arctic/Benson Park	44.49%	53.16%	1.08	2.02	19.48
Arnold L Muldoon Park	74.57%	90.33%	60.85	67.36	21.14
Atkins Park	84.43%	87.88%	2.74	3.12	4.09
Atwood Park	36.96%	81.79%	0.07	0.09	121.32
Balto Seppala Park	22.09%	29.47%	5.28	17.92	33.46
Bancroft Park	68.18%	66.70%	9.83	14.74	-2.17
Barbara Streeet Park	51.37%	64.90%	0.56	0.86	26.34
Barrow Park	49.73%	47.88%	0.31	0.64	-3.73
Baxter Bog Park	48.82%	59.13%	35.54	60.11	21.11
Bayshore Park North	95.96%	81.94%	8.89	10.85	-14.61
Bayshore Park South	85.15%	87.46%	9.27	10.60	2.72
Bear Tracks Park	95.74%	74.01%	0.76	1.02	-22.70
Ben Crawford Memorial Park	57.14%	55.89%	0.55	0.99	-2.19
Bentzen Lake Park	39.90%	47.21%	4.93	10.45	18.32
Bob and Arlene Cross Park	60.93%	68.42%	6.29	9.19	12.30
Brown's Point Park	34.18%	41.58%	0.24	0.57	21.65
Campbell Creek Estuary	64.70%	55.24%	32.86	59.49	-14.63
Campbell Creek Greenbelt - Part A	51.52%	48.21%	0.83	1.72	-6.42
Campbell Creek Greenbelt - Part B	64.94%	61.25%	4.00	6.53	-5.68
Campbell Creek Greenbelt - Part C	55.41%	57.27%	3.04	5.30	3.36
Campbell Creek Greenbelt - Part D	90.86%	87.09%	5.63	6.46	-4.16
Campbell Creek Greenbelt - Part E	73.61%	41.87%	0.16	0.38	-43.12
Campbell Creek Greenbelt - Part F	62.35%	63.91%	6.62	10.36	2.50
Campbell Creek Greenbelt - Part G	58.37%	63.88%	4.37	6.84	9.46
Campbell Creek Greenbelt - Part H	67.65%	59.90%	4.90	8.19	-11.46
Campbell Creek Greenbelt - Part I	43.25%	65.41%	9.13	13.96	51.25
Campbell Creek Greenbelt - Part J	78.03%	82.48%	11.83	14.34	5.70
Campbell Creek Greenbelt - Part K	29.57%	39.75%	5.12	12.88	34.44
Campbell Creek Greenbelt - Part L	77.71%	89.94%	2.05	2.28	15.74
Campbell Creek Park	62.45%	54.96%	10.44	18.99	-11.99
Carl Park	78.31%	83.99%	0.63	0.75	7.25
Carlson Park	20.48%	24.84%	0.59	2.36	21.27
Carr-Gottstein Park	41.99%	36.48%	4.72	12.93	-13.13
Castle Heights Park	30.40%	48.48%	0.67	1.39	59.48
Centennial Park	64.74%	77.01%	56.48	73.34	18.96

PARK NAME	2009 Canopy %	2018 Canopy %	2018 Canopy Acres	2018 Total Acres	% Change in Canopy 2009-2018
Chanshtnu Muldoon Park	53.34%	60.98%	16.35	26.81	14.32
Charles Smith Memorial Park	67.09%	66.01%	4.77	7.22	-1.61
Cheney Lake Park	32.68%	35.89%	16.21	45.17	9.81
Chester Creek Greenbelt - Part A	87.20%	98.33%	0.84	0.86	12.76
Chester Creek Greenbelt - Part B	89.67%	88.94%	5.03	5.66	-0.81
Chester Creek Greenbelt - Part C	87.96%	88.36%	2.50	2.83	0.46
Chester Creek Greenbelt - Part D	94.78%	93.36%	4.13	4.42	-1.49
Chester Creek Greenbelt - Part E	82.30%	78.79%	0.45	0.57	-4.27
Chester Creek Greenbelt - Part F	92.69%	93.66%	17.77	18.98	1.04
Chester Creek Greenbelt - Part G	93.46%	93.34%	1.79	1.92	-0.12
Chester Creek Greenbelt - Part H	68.48%	72.51%	10.65	14.68	5.89
Chester Creek Sports Complex	12.63%	12.40%	7.29	58.84	-1.88
Chester Valley Park	86.64%	94.44%	18.64	19.74	9.00
Chuck Albrecht Softball Complex	32.19%	39.01%	13.07	33.50	21.18
Chugach Foothills Park	44.26%	47.82%	5.43	11.36	8.05
Clay Park	92.43%	99.43%	1.30	1.31	7.58
Coffey Park	49.86%	81.66%	0.07	0.09	63.79
Cope Street Park	55.87%	54.66%	0.36	0.65	-2.17
Creekside Park	20.22%	27.09%	2.28	8.43	33.97
Cunningham Park	0.00%	0.00%	0.00	0.05	0.00
Cutty Sark Park	63.60%	76.02%	0.61	0.80	19.53
Dave Rose Park	17.64%	35.58%	5.27	14.80	101.70
David Green Memorial Park	31.02%	29.70%	0.85	2.87	-4.24
Davis Park	61.50%	62.30%	43.54	69.89	1.31
Davison Park	81.01%	85.51%	8.47	9.90	5.55
Delaney Park	7.70%	7.41%	2.17	29.31	-3.85
DeLong Lake Park	63.63%	67.54%	12.96	19.18	6.15
Didlika Park	21.29%	23.64%	0.10	0.41	11.05
Duldida Park	25.97%	37.45%	0.21	0.57	44.19
Earl and Muriel King Park	16.07%	27.10%	0.62	2.28	68.58
East Bluff	60.37%	69.50%	8.61	12.38	15.14
East Northern Lights Buffer	53.57%	84.14%	0.43	0.52	57.07
Eastchester Park	72.76%	73.24%	62.97	85.97	0.66
Echo Hills Park	82.39%	76.24%	42.76	56.09	-7.47
Edgewater Park	1.28%	0.36%	0.11	30.70	-71.58
Edna M Fisk Memorial Park	94.39%	94.47%	0.58	0.61	0.09
Eisenhower Memorial/Anchorage Rotary	0.36%	0.00%	0.00	0.07	-100.00
Elderberry Park	33.79%	26.72%	0.40	1.48	-20.93
Elmore Park	61.28%	93.12%	1.20	1.29	51.95
Emerald Hills Park	73.53%	70.75%	37.00	52.30	-3.78
Fairbanks Park	12.04%	11.52%	0.06	0.48	-4.29
Fairview Lions Park	3.06%	8.97%	0.49	5.47	192.77
Fairview Park	7.08%	21.42%	0.21	0.97	202.53
Fairview Recreation Center	4.42%	11.35%	0.24	2.09	156.84
Fish Creek Estuary	25.63%	33.17%	10.16	30.64	29.40
Fish Creek Greenbelt - Part A	72.67%	91.00%	1.03	1.13	25.22

PARK NAME	2009 Canopy %	2018 Canopy %	2018 Canopy Acres	2018 Total Acres	% Change in Canopy 2009-2018
Fish Creek Greenbelt - Part B	95.67%	74.41%	0.67	0.89	-22.22
Fish Creek Greenbelt - Part C	97.38%	89.91%	0.86	0.95	-7.67
Folker Park	91.39%	92.17%	1.85	2.00	0.86
Forsythe Park	86.50%	85.69%	23.07	26.92	-0.94
Foxhall Park	64.74%	82.13%	3.25	3.95	26.86
Frontier Land Park	5.46%	11.84%	0.23	1.98	116.70
Furrow Creek Park	63.64%	78.54%	3.69	4.69	23.42
Goose Lake Park	65.72%	64.45%	59.60	92.48	-1.94
Griffin Park	92.69%	78.76%	15.78	20.04	-15.02
Half Park	80.02%	85.56%	3.78	4.42	6.92
Hamilton Park	30.94%	37.26%	0.66	1.77	20.43
Harvard Park	27.12%	28.21%	1.49	5.29	4.00
Heatherstone Park	31.05%	36.20%	0.73	2.01	16.57
Helen Louise McDowell Sanctuary	62.63%	58.92%	8.21	13.94	-5.93
Henson Park	2.38%	36.55%	0.15	0.40	1433.33
High Tide Park	99.98%	100.00%	1.60	1.60	0.02
Hills Park	72.45%	88.73%	0.37	0.42	22.48
Hostetler Park	37.91%	44.40%	0.07	0.17	17.12
Huffman Park	76.50%	83.56%	9.59	11.47	9.23
Huntington Park	82.85%	97.30%	1.86	1.91	17.44
Iliamna Park	85.32%	90.44%	0.23	0.25	6.00
Independence Park	69.24%	70.26%	5.69	8.10	1.47
Ira Walker Park	66.72%	70.62%	5.25	7.44	5.85
J.B. Gottstein Park	69.11%	93.22%	3.18	3.41	34.89
Jacobson Park	81.96%	79.09%	8.15	10.31	-3.50
Jade Street Park	17.08%	18.84%	2.63	13.95	10.33
James Vernon Nash Park	85.05%	80.86%	1.84	2.27	-4.92
Javier DeLa Vega Park	16.30%	22.55%	8.19	36.32	38.35
Jewel Lake Park	48.20%	33.77%	9.56	28.31	-29.95
Johns Park	67.76%	68.84%	40.38	58.65	1.60
Kanchee Park	36.76%	49.42%	1.09	2.21	34.46
Kedaya Park	91.03%	79.03%	0.19	0.25	-13.18
KFQD Park	19.30%	32.10%	2.61	8.13	66.30
Kiwanis Fish Creek Park	50.73%	53.30%	3.16	5.93	5.05
Kobuk Park	80.77%	91.31%	4.54	4.97	13.04
LaHonda Park	83.11%	90.94%	0.69	0.76	9.42
Lake Otis Buffer Park North	32.68%	38.28%	0.86	2.25	17.14
Lake Otis Buffer Park South	26.89%	74.78%	0.17	0.22	178.10
Lincoln Park	47.05%	76.58%	0.19	0.24	62.77
Linden Park	85.40%	89.88%	3.54	3.94	5.24
Little Campbell Creek Greenbelt	73.31%	87.05%	15.28	17.55	18.74
Little Dipper Park	16.49%	35.65%	0.90	2.52	116.28
Little Park	59.89%	42.94%	0.08	0.17	-28.30
Little Rabbit Creek Bluff Park	82.56%	90.12%	61.89	68.67	9.15
Lloyd Steele Park	49.69%	64.17%	8.96	13.96	29.14
Louie G. Mizelle Park	29.16%	44.00%	0.21	0.48	50.89
Lyn Ary Park	32.08%	43.90%	6.28	14.30	36.83

PARK NAME	2009 Canopy %	2018 Canopy %	2018 Canopy Acres	2018 Total Acres	% Change in Canopy 2009-2018
Lynnwood Park	52.53%	65.90%	33.98	51.57	25.45
Mariner Park	70.28%	72.39%	3.29	4.55	3.01
Marston Drive Park	77.51%	79.82%	0.30	0.38	2.97
Meadow Street Park	42.60%	50.78%	4.74	9.34	19.20
Mesa Verde Park	79.89%	87.14%	1.60	1.83	9.08
Michael J. Shibe Park	60.08%	83.13%	21.43	25.77	38.37
Minnesota Park	2.06%	8.50%	0.21	2.46	313.17
Moen Park	34.77%	41.36%	4.14	10.01	18.95
Muriel Park	37.52%	44.11%	0.09	0.19	17.57
Nadine Park	81.46%	83.30%	2.58	3.10	2.26
Nancy Park	19.09%	22.66%	0.24	1.07	18.72
Needle Park	3.72%	5.58%	0.00	0.05	50.00
Nelva J Wilmoth Park	91.15%	95.78%	1.96	2.04	5.08
Nichols Park	6.00%	9.76%	0.13	1.28	62.50
Nickleen Park	78.64%	70.97%	2.92	4.12	-9.76
Northwood Park	38.70%	46.55%	6.86	14.74	20.28
Nulbay Park	11.00%	12.24%	0.06	0.46	11.33
Nunaka Valley Park North	21.12%	24.10%	1.29	5.34	14.13
Nunaka Valley Park South	52.99%	55.77%	17.13	30.71	5.24
Nunaka Valley Park West	90.18%	97.88%	8.89	9.08	8.54
Oceanview Bluff Park	15.40%	16.18%	10.74	66.40	5.04
Oceanview Park	67.78%	75.26%	5.28	7.02	11.04
Old City Hall Park	14.13%	7.29%	0.03	0.39	-48.42
Old Hermit Park	64.21%	68.13%	0.92	1.34	6.10
Old Seward Highway Buffer Park	86.04%	91.16%	0.86	0.94	5.95
Orca Park	44.02%	47.31%	0.17	0.35	7.47
Pamela Joy Lowry Memorial Park	70.32%	73.94%	6.42	8.68	5.15
Papago Park	22.87%	31.76%	0.60	1.88	38.88
Patterson Street Park	60.68%	74.46%	2.18	2.93	22.71
Peratrovich Park	40.89%	38.38%	0.15	0.39	-6.13
Pete's Park	78.75%	91.89%	0.18	0.20	16.69
Pfleiger Park	50.30%	51.20%	2.56	5.00	1.80
Pioneer Park	3.59%	8.61%	0.43	4.96	140.19
Pleasant Drive Park	86.16%	97.76%	0.35	0.35	13.46
Point Woronzof Buffer Park	84.38%	93.18%	5.62	6.03	10.42
Point Woronzof Overlook	30.56%	41.13%	9.30	22.61	34.56
Pop Carr Park	56.68%	67.14%	5.47	8.15	18.46
Potter Creek Ravine Park	80.50%	86.60%	8.70	10.05	7.58
Quyana Park	12.30%	21.42%	0.44	2.04	74.06
Rabbit Creek Park	72.18%	86.30%	14.05	16.28	19.56
Ray E. Storck Homestead Park	37.99%	38.76%	9.61	24.79	2.02
Red Bridge Park	46.14%	62.72%	0.58	0.92	35.95
Resolution Park	36.54%	57.45%	0.43	0.74	57.23
Richardson Vista Park	3.52%	12.40%	0.10	0.80	251.75
Roosevelt Park	21.95%	54.77%	0.29	0.54	149.58
Rovenna Park	46.70%	52.22%	17.06	32.67	11.84
Russian Jack School Park	59.97%	65.58%	13.94	21.26	9.36

Appendix C: Tables 2018

PARK NAME	2009 Canopy %	2018 Canopy %	2018 Canopy Acres	2018 Total Acres	% Change in Canopy 2009-2018
San Antonio Park	30.38%	65.37%	0.59	0.90	115.17
Sand Lake Park	93.02%	87.57%	4.53	5.17	-5.86
Scenic Park	62.61%	70.56%	3.17	4.49	12.69
Seward Highway Buffer Park North	63.71%	89.51%	1.70	1.90	40.49
Seward Highway Buffer Park South	53.36%	52.12%	0.38	0.72	-2.31
Shadow Park	86.12%	98.71%	0.87	0.88	14.62
Shady Birch Park	66.97%	74.22%	1.43	1.92	10.83
Ship Creek Overlook Park	9.50%	6.40%	0.04	0.65	-32.67
Sisterhood Park	0.00%	1.95%	0.15	7.75	0.00
Sitka Street Park	44.08%	40.53%	3.46	8.54	-8.06
Snowshoe Park	67.18%	85.00%	4.26	5.01	26.52
South Anchorage Park	84.29%	78.51%	54.12	68.94	-6.86
South Anchorage Sports Park	2.74%	8.35%	5.11	61.26	204.64
Southport Park	11.34%	8.73%	0.74	8.44	-23.03
Southwood Park	77.39%	80.00%	1.04	1.30	3.37
Spenard Beach Park	12.90%	20.63%	1.41	6.83	59.96
Spenard Recreation Center Park	0.00%	10.00%	0.32	3.16	0.00
Springer Park	36.19%	34.59%	1.60	4.63	-4.42
Spruce Park	65.12%	73.99%	6.69	9.04	13.62
St. Mary's Park	66.86%	59.59%	7.21	12.09	-10.87
Standish Park	36.13%	52.28%	0.12	0.24	44.70
Stanley Park	57.20%	84.51%	0.85	1.01	47.75
Stephenson Park	49.28%	67.04%	0.93	1.38	36.06
Stonegate Park	40.79%	47.01%	1.70	3.62	15.26
Sunset Park	24.28%	27.74%	1.55	5.58	14.26
Suzan Nightingale McKay Memorial Park	4.57%	10.62%	0.19	1.75	132.20
Taku Lake Park	44.04%	56.95%	27.87	48.94	29.33
Taku School Park	76.89%	87.99%	1.86	2.12	14.44
Tanglewood Park	66.55%	69.50%	28.47	40.97	4.44
Telequana Park	72.34%	87.65%	2.81	3.20	21.16
The Cuddy Family Mid-Town Park	8.09%	12.61%	2.06	16.30	55.99
Timberlane Park	59.61%	84.06%	9.32	11.09	41.01
Town Square Park	17.26%	40.27%	0.75	1.86	133.31
Turinski Park	86.05%	80.62%	3.47	4.30	-6.32
Turnagain Refuge Park	5.67%	3.23%	1.85	57.15	-43.01
Turpin Park	18.90%	26.46%	1.14	4.30	40.03
University Lake Park	42.54%	52.41%	33.67	64.25	23.20
University Park	83.38%	78.69%	2.20	2.80	-5.63
Ure Park	81.07%	89.17%	1.47	1.64	10.00
Valley of the Moon Park	61.16%	61.51%	13.80	22.43	0.57
Valley Street Park	66.36%	67.50%	1.87	2.77	1.71
W. B. Lyons Park and Mountain View Recreation Center	3.03%	4.41%	0.10	2.33	45.61
Waldron Park	18.37%	20.81%	3.52	16.91	13.29
Ware Park	58.01%	55.22%	1.33	2.41	-4.81

PARK NAME	2009 Canopy %	2018 Canopy %	2018 Canopy Acres	2018 Total Acres	% Change in Canopy 2009-2018
West Bluff / Government Hill Greenbelt	80.22%	79.38%	7.55	9.51	-1.04
Whisper Faith Kovach Park	8.63%	21.02%	0.99	4.73	143.46
Whitehall Street Park	42.50%	61.55%	0.26	0.42	44.83
Wickersham Park	10.32%	12.28%	0.15	1.22	18.98
Willawaw Park	37.95%	67.91%	5.66	8.34	78.93
Wilson Street Park	77.63%	67.54%	1.39	2.05	-13.00
Winchester Park	47.05%	55.76%	2.66	4.77	18.51
Winderness Park	83.56%	83.74%	0.80	0.96	0.22
Windsong Park	23.19%	29.54%	4.29	14.51	27.35
Wolverine Park	52.69%	68.94%	1.95	2.82	30.83
Wonder Corridor Park	78.65%	82.35%	0.32	0.39	4.70
Woodland Park	63.45%	81.94%	5.66	6.90	29.14
Parks total	**67.80%**	**69.74%**	**7,456.53**	**10,692.57**	**7.57%**

Table 10. Location of Multi-Parcel Greenbelts

Park Name	Park Address
Campbell Creek Greenbelt - Part A	W of Folker, N of 46th, E of Laurel, S of Happy
Campbell Creek Greenbelt - Part B	W of Wright, N of 48th, E of Folker, S of 46th
Campbell Creek Greenbelt - Part C	W of Piper N of 45th, E of Wright, S of 46th
Campbell Creek Greenbelt - Part D	W of Blackstone, N of Dimond, E of MacInnes, S of 47th
Campbell Creek Greenbelt - Part E	W of Lake Otis, S of 47th, N of Homestead, E of Blackstone
Campbell Creek Greenbelt - Part F	W of Seward HWY, N of INternational, E of Old Seward, S of 50th
Campbell Creek Greenbelt - Part G	W of Old Seward, N of 56th, E of Fairbanks, S of INternational
Campbell Creek Greenbelt - Part H	W of Old Seward, N of Dowling, E of Fairbanks, S of 56th
Campbell Creek Greenbelt - Part I	W of King, N of 76th, E of C, S of 72nd
Campbell Creek Greenbelt - Part J	W of C, N of Dimond, E of Arctic, S of 81st
Campbell Creek Greenbelt - Part K	W of Northwood, N of Dimond, E of Arlene, S of 88th
Campbell Creek Greenbelt - Part L	W of Angela, N of Dimond, E of NOrthwood, S of 90th
Chester Creek Greenbelt - Part A	W of L Street, N of Minnesota, E of Spenard, S of 16th
Chester Creek Greenbelt - Part B	W of Seward Highway, N of 21st, E of Fairbanks, S of 20th
Chester Creek Greenbelt - Part C	W of Fairbanks, N of 21st, E of Eagle, S of 20th
Chester Creek Greenbelt - Part D	W of Eagle, N of 22nd, E of Barrow, South of 21st
Chester Creek Greenbelt - Part E	W of Barrow, N of 22nd, E of A Street, South of 21st
Chester Creek Greenbelt - Part F	W of Eagle, N of 21st, E of A Street, S of 20th
Chester Creek Greenbelt - Part G	W of C Street, N of 17th, E of D Street, S of 16th
Chester Creek Greenbelt - Part H	W of Arctic, N of 20th, E of Minnesota
Fish Creek Greenbelt - Part A	W of Forest Park, N of Northern Lights, E of Lahonda, S of Saratoga
Fish Creek Greenbelt - Part B	W of Iowa, N of 36th, E of Barbara, S of 34th
Fish Creek Greenbelt - Part C	W of Barbara, N of Kona, E of Turnagain, S of 34th