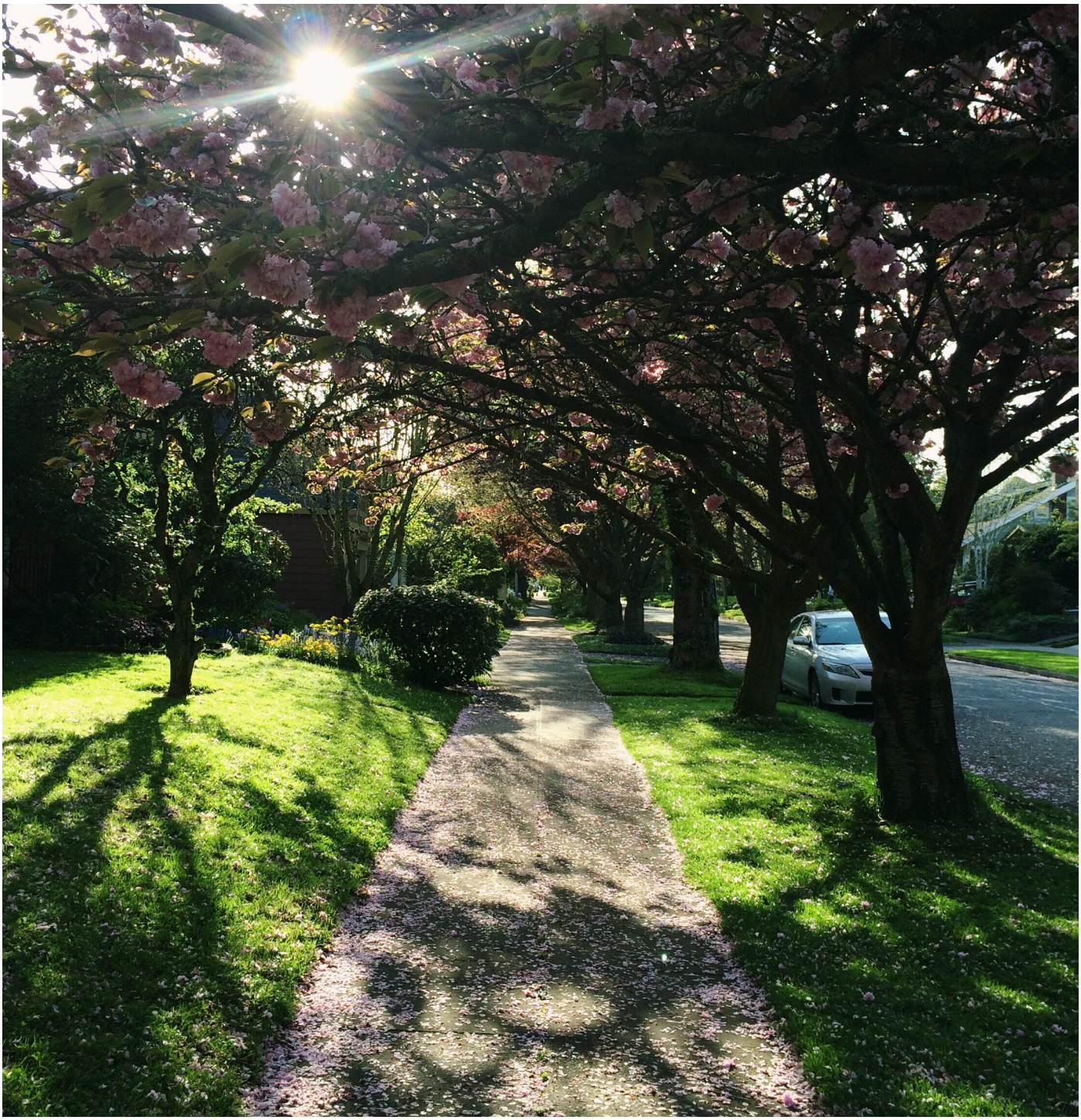
ASSESSMENT OF INEQUITIES IN URBAN CANOPY COVER

BASED ON RACE AND INCOME ACROSS THE PORTLAND-VANCOUVER METROPOLITAN AREA OF OREGON AND WASHINGTON

SUPPLEMENTARY INFORMATION



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This document contains detailed methods and additional tables for the report: *Assessment of Inequities in Urban Canopy Cover based on Race and Income Across the Portland–Vancouver Metropolitan Area of Oregon and Washington.*

COVER: Plant identification training for the workforce development program © Derron Coles/The Blueprint Foundation;
ABOVE: Blooming street trees. © Tanya Pavlova/Adobe Stock

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The region of interest for this assessment included the cities of Portland, Oregon, and Vancouver, Washington as well as urban areas surrounding the urban core (hereafter the "Portland–Vancouver metropolitan area"). The Portland–Vancouver metropolitan area (Assessment Report Fig 2) encompasses nearly 551 square miles, 27 cities, the urban areas of 4 counties, and a population of 2.1 million people in 2020 [1]. To center this assessment on urban areas—where people live and work and where the trees that benefit those people are located—we defined our geographic area of analysis as the maximum extent of either the Portland metropolitan urban growth boundary (UGB) [2], the Clark County urban growth area (UGA) [3], or the outer boundary of U.S. Census block groups [4] that have at least 75% of their area within the UGB or UGA. The inclusion of block group boundaries in the composition of the spatial extent allowed us to use U.S Census data to describe the socio-economic characteristics of communities. This study extent is smaller when compared to the official U.S. Census 'Portland-Vancouver-Hillsboro, OR-WA' metropolitan statistical area [5], which also includes the unincorporated rural areas of Clackamas, Columbia, Multnomah, Washington, and Yamhill Counties in Oregon State, and Clark and Skamania Counties in Washington State.

We included summaries of canopy and equity variables across multiple spatial scales to provide relevant information for readers with different interests. The spatial units we included—from largest to smallest— were the region, jurisdictions (cities and unincorporated urban areas of counties), and block groups. The urban areas of the four counties [6] in the region (Clackamas, Washington, and Multnomah counties in Oregon, and Clark County in Washington) which are located within the UGB or UGA were included. These urban unincorporated county areas were then merged with the 27 city boundaries [7] in the region to form a combined "jurisdictions" data layer. The spatial extent of the combined jurisdictions extends beyond the extent of the combined block groups since block groups with 25% or more of their area outside the UGB or UGA were excluded while the full extent of the jurisdiction was retained.

Sunrise at Portland Pittock overlook. © Kevin Bermingham/iStock

Race and Ethnicity, and Income

We selected variables from the U.S. Census 2020 U.S. American Community Survey (ACS) 5-year estimates [8] to describe race and ethnicity, and income at the block group scale (Table 1). Block groups are a U.S. Census spatial reporting unit and are the smallest unit for which these population characteristics are available.

Table 1. Data retrieved from the American Community Survey (ACS) 2020 5-year estimates to describe community characteristics at the block group level. Descriptions of these variables are available on Social Explorer [9].

Characteristic	Table Title	Table	Variables
Total population	Total Population	B01003	B01003001
Percent BIPOC	Hispanic or Latino Origin by Race	B03002	B03002003, B03002001
Percent Low income	Ratio of Income to Poverty Level in the Past 12 Months	C17002	C17002008, C17002001

The computed percentages for the equity variables were joined to the 2020 block group spatial boundaries [5]. Of the 1,312 block groups in the region, 5 had a total reported population of zero for one or the other variable and was eliminated from the analysis, leaving 1,307 block groups across the region. The block groups ranged from 5 to 7,800 acres in size and 292 to 5,132 people.

For this assessment, block group level equity variables were only reported at the block group level and not summarized up to larger spatial units. Since may block groups are not nested completely within one city or another, they can not be easily summarized to other spatial units without incoroporating additional error into the estimates. However, for informational purposes race, ethnicity and income variables are reported for cities and counties based on U.S. Census Place (an alternative census spatial unit) using equivalent census tables and variables. At the county level, estimates are based on U.S. Census Place for the entire county area, not only inside the urban area. Equivalent estimates for only the urban areas within the UGB or UGA were not available. Use of these county estimates requires that we assume the percent of BIPOC and low-income individuals remained consistent (homogenous) across the rural and urban areas of the counties.

Population

Population estimates were derived from several sources. A regional population estimate was derived by summing population count across the 1,312 Census block groups in the region. Population estimates for cities and towns were acquired from the U.S. Census Bureau places table [5]. Population estimates for the urban unincorporated county areas are from Table 1 in the *Connecting Canopies Portland-Vancouver Regional Urban Tree Policy and Programs Summary*. (2023) [10].

Canopy Cover and Canopy Change

To investigate patterns of canopy cover and canopy change across the region, we used high-resolution (1 meter) maps derived from NAIP (National Agricultural Imagery Program) imagery [11,12] for two time steps: 2013/2014 and 2019/2020. Image availability differed across the two states; in Oregon we used images from 2014 and 2020, however, due to the absence of images for those years in Washington, images from 2013 and 2019 were selected as alternatives. Image resolution also differed by year and state, therefore, images at 0.6 meter resolution were resampled to 1-meter resolution. Maps were derived using a machine learning (Random Forest) algorithm in an object-based approach implemented in Google Earth Engine. Image processing was done individually for each state and time step to produce a wall-to-wall land cover map, resulting in four maps, one for each time step for each state, which were then then mosaiced to two final maps: one for 2014 (comprised of the 2013 image for Washington and the 2014 image for Oregon) and 2020 (comprised of the 2019 image for Washington and the 2020 image for Oregon). The final land cover maps classify areas in to one of four categories: canopy of trees and tall shrubs; grass; shade and water; and bare soil or impervious surfaces. Map accuracy was independently assessed using 600 samples, resulting in an overall accuracy of 88.3% for 2013/2014 and 87.0% for 2019/2020 mosaics.

To calculate change in canopy cover from 2014 to 2020, the land cover map for 2014 was subtracted from the 2020 land cover map ($LC_{2020} - LC_{2014}$). The canopy change map classifies the differences between the 2014 and 2020 land cover maps as areas of canopy persistence, canopy gain, and canopy loss (Assessment Report Fig 3). Map accuracy was independently assessed with the same 600 samples used in the land cover map accuracy analysis and stratified by class of the final change map, resulting in an overall accuracy of 82.8%.

The remotely sensed canopy raster layers were summarized for each spatial scale (region, jurisdictions, and block groups) using percent of total area. Percent canopy cover in 2020 was calculated as the percent of the area in canopy divided by the total area, for each spatial unit. The details of canopy change—canopy loss, gain, and persistence—were aggregated to net canopy change. Percent net canopy change for the period 2014 to 2020 was calculated as the percent of the area with canopy gain, minus the percent of the area with canopy loss, divided by the total area of each spatial unit. Negative values of percent net canopy change indicate areas where the total area of canopy loss exceeded the total area of canopy gain for the period.

For a finer look at the canopy dynamics, canopy cover and canopy change was summarized by land use type (see Land Use section) within each spatial unit. Patterns of canopy cover and canopy change differ across land uses, as do the potential opportunities and available space for increasing canopy cover.

Canopy Cover Goal

To provide a baseline comparison across block groups, jurisdictions, and for the region, we set a 35% canopy cover goal. This value is within the range of canopy targets set by cities in the region in their forest management and climate action plans (Table 2). Some cities (ex. City of Forest Grove, City of Gresham) reference American Forest's 40% tree canopy goal in their plans; however, American Forests no longer supports a universal 40% goal, instead they recommend that city-specific goals be established with consideration of climate, ordinances, land use patterns, and development densities [13]. Although a region-wide 35% goal is simplified, it is helpful as a starting point to discuss trends across the region. It is by coincidence only that the regional percent canopy cover was also 35% (Assessment Report Fig 4A).

Table 2. City-specific canopy cover targets within the Portland-Vancouver metropolitan area.

City	Canopy Cover Target	Reference
Forest Grove	30% by 2025, 40% by 2035	2016-2021 Urban Forest Management Plan, Forest Grove Oregon, April 2016
Milwaukie	20% by 2040	City of Milwaukie Urban Forest Management Plan, March 2019
Portland	33.3% by 2030	City of Portland Climate Action Plan Summary, June 2015
Tigard	40% by 2047	City of Tigard Urban Forestry Master Plan, November 2009
Vancouver	28% by 2030	Urban Tree Canopy Assessment, Vancouver, Washington, October 2021
Wilsonville	36% by 2046	City of Wilsonville Urban Forest Management Plan, November 2021

Land Use

Land use types were mapped across the region by combing information from several available data sources. The methods and data sources differed for the portions of the region in Oregon and the areas in Clark County, Washington.

For the Oregon portions of the region, we used the "Oregon Department of Revenue property classification for assessment codes" (Prop_code) attribute from the 2021 tax lots feature class [14] to define "Land Use Group" based on relationships described in the Statewide Land Use Data Assessment Phase 2 Project Report [15]. Then, to improve upon open space types beyond what was available from the first step, we overwrote areas with the RLIS Outdoor Recreation and Conservation Areas (ORCA) feature class [16]. Finally, several similar "Land Use Groups" were combined to reduce the total number of classes.

For Clark County, Washington, the Clark County Comprehensive Plan map [17] was used with the use class (USEDESC) attribute in the county tax lot data [18], and compared visually to imagery, to assign each parcel land use class. An attempt was made to match land uses to types included in the Oregon portion of the region.

The final land use types for the region include nine classes: single-family residential; multi-family residential; commercial; industrial; parks, natural areas, and all open space except HOA; open space: HOA (homeowner's association); agriculture; rural; and other. HOA open spaces are mapped separately from all other open space types to provide opportunity to examine tree related trends for residential-related open spaces. These land use types describe the intended use of an area and may not represent actual use.

Canopy Equity Analysis

Other studies have described lower canopy cover in areas where low-income people live, or areas where more BIPOC people live [19–22]. To explore the relationships between the canopy and equity variables across block groups in this dataset, we first examined correlation between the varaibles using the non-parametric Kendall's tau test (Fig 1). Generally, percent canopy cover is lower, and less variable, as percent BIPOC increases (Fig 1A) or as the percent low-income increases (Fig 1B). The correlation between canopy cover and percent low-income is stronger (τ = -0.33) than with percent BIPOC (τ = -0.18), though both correlations are fairly weak due to the wide variation in canopy cover for whiter and higher-income block groups. No consistent relationship is present for percent net canopy change and either equity variable (τ = -0.06 and τ = -0.02; Figs 2C and 2D). These results indicate that there is not a significant and direct relationship between the percent of net canopy change across block groups compared to either measure of equity.

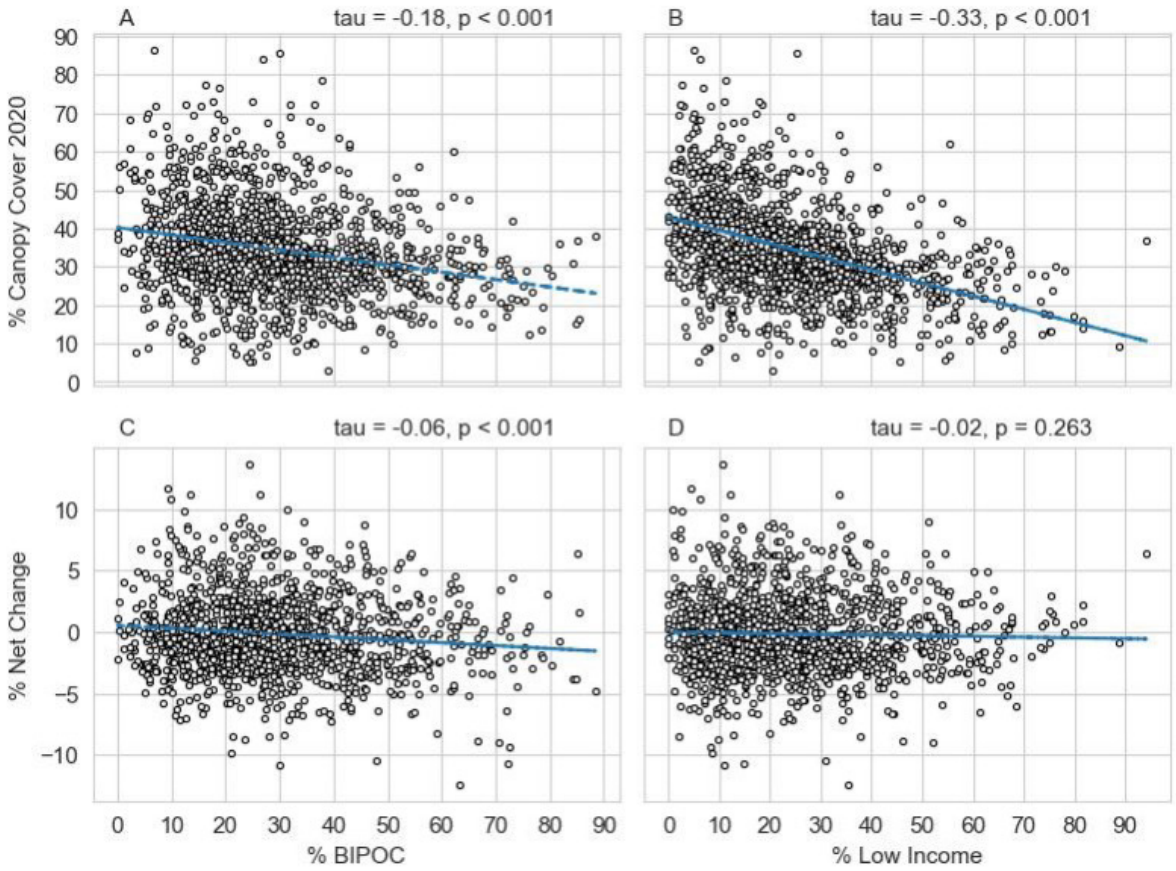

Figure 1. Relationship between equity metrics (percent BIPOC and low-income) and canopy (percent canopy cover 2020 and net change 2014–2020) variables summarized to block groups. For each, the best fit line for the points is shown, along with the Kendall's tau correlation results.

To further investigate canopy equity (or inequity) across block groups we looked for patterns across binned data. We ranked the block groups from low to high based on % BIPOC and divided the set in to quartiles (4 bins) so that the fourth bin contained the block groups with the greatest proprtion of people identifying as BIPOC (Fig 3 and Table 3). We repeated this process to also divide the block groups into quartile bins by % low-income, where in this case the fourth bin contained the block groups with the greatest proportion of low-income people. We used the non-parametric Kruskal Wallis H-test and Dunn's post-hoc pairwise test for multiple comparisons to identify differences in median percent canopy cover 2020, and percent net canopy change, across quartiles of each equity variable.

Median percent canopy cover in 2020 was significantly lower in block groups with the highest percent BIPOC populations compared to other bins (quartile bin 4 compared to bins 1, 2, and 3; Fig 3A). Similarly, canopy cover was significantly lower in block groups with the largest percent of low-income people compared to other bins (quartile bin 4 compared to bins 1-3, Fig 3B). Median percent net canopy cover change differed significantly between the block groups with the highest percent BIPOC populations compared to those with the lowest (quartile bins 3 & 4 vs bins 1 & 2, Fig 3C). Median percent net canopy change did not differ significantly across block groups based on percent low-income (p-value = 0.43, Table 3B; Fig 3D).

To examine more closely the differences in block groups with the highest percent BIPOC populations, and the highest percent low-income people, we collapsed bins 1, 2, and 3 for each variable in to a single bin and repeated the Kruskal Wallis H-test to test for difference between block groups in quartile bin 4 and all other block groups combined. Mean percent canopy cover in 2020 was significantly lower in block groups with the highest percent BIPOC populations compared to other bins ($p<0.001$, Table 4A) and in block groups with the largest percent of low-income people compared to other bins ($p<0.001$, Table 4B). Mean percent net canopy cover change differed significantly between the block groups with the highest percent BIPOC populations compared to those with the lowest ($p<0.001$, Table 4A), though did not a differ significantly between the block groups with the highest percent low-income and the other block groups (p-value = 0.56, Table 4B).

These results show a substantial disparity in canopy cover across communities. Canopy cover in block groups with the largest proportion of BIPOC individuals was on average 6% lower than all other whiter block groups (30% compared to 36%; Table 4A). And canopy cover in block groups with the largest proportion of low-income individuals was on average 10% lower than all other wealthier block groups (27% compared to 37%; Table 4B). Additionally, block groups with the highest proportion of BIPOC individuals experienced on average a net canopy loss, compared to a net canopy gain in the other block groups combined (Table 4A).

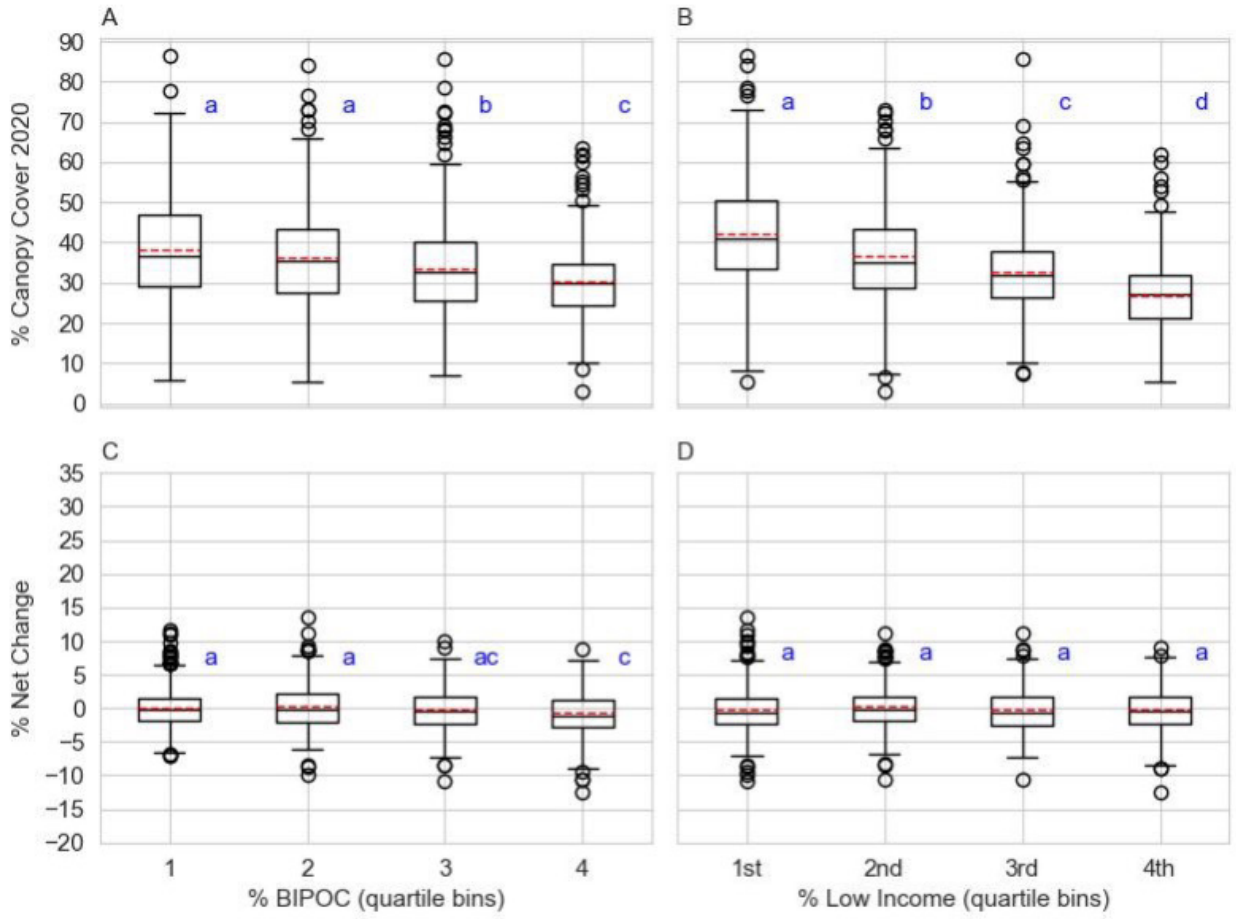

Figure 2. Relationship of equity variables (percent BIPOC and low-income) partitioned into quartile bins and canopy (percent canopy cover 2020 and percent net change 2014 to 2020) summarized to block groups. Matching lowercase letter labels within each graph indicate quartiles which are not significantly different.

Table 3. Summary of percent canopy cover and canopy change for block groups separated into quartile bins based on (A) % BIPOC and (B) % Low Income, each ranked from low to high prior to binning. Results from non-parametric Kruskal Wallis tests of significance are reported to identify differences in percent canopy cover and percent net change between quartile bins are reported. Associated results from Dunn multiple comparison are indicated in Figure 3.

A. Quartile bins based on % BIPOC

		% BIPOC Population		% Canopy Cover 2020		% Net Canopy Change, 2014 -2020	
Quartile	**Count**	**Mean**	**Range**	**Mean**	**Range**	**Mean**	**Range**
1	327	11.0	0 to 17.3	38.2	5.7 to 86.6	0.11	-7.1 to 11.7
2	327	22.0	17.3 to 26.9	36.1	5.4 to 84.0	0.21	-9.9 to 13.6
3	326	32.2	26.9 to 38.7	33.6	7.1 to 85.7	-0.20	-10.8 to 9.9
4	327	52.0	38.7 to 88.5	30.2	3.1 to 63.5	-0.8	-12.4 to 8.7
Kruskal-Wallis Test				*H=80.9*		*H=14.75*	
H statistic and p-value				*p<0.001*		*p<0.01*	

B. Quartile bin based on % Low Income

		% Low Income		% Canopy Cover 2020		% Net Canopy Change, 2014-2020	
Quartile	**Count**	**Mean**	**Range**	**Mean**	**Range**	**Mean**	**Range**
1	327	6.6	0 to 11.5	42.1	5.4 to 86.6	-0.24	-10.8 to 13.6
2	327	16.4	11.5 to 21.6	36.5	3.1 to 72.9	0.18	-10.7 to 11.2
3	326	27.3	21.6 to 34.0	32.6	7.4 to 85.7	-0.27	-10.5 to 11.2
4	327	47.4	34.1 to 94.1	26.9	5.5 to 62.1	-0.30	-12.4 to 9.0
Kruskal-Wallis Test				*H=270.7*		*H=4.84*	
H statistic and p-value				*p<0.001*		*p=0.18*	

Table 4. Summary of percent canopy cover and canopy change for block groups in the fourth quartile bin compared to all others (those in first, second, and third quartile bins combined; Table 3) for (A) % BIPOC and (B) % Low Income. Results from non-parametric Kruskal Wallis tests of significance are reported to identify differences in percent canopy cover and percent net change between quartile bins are reported.

A. 4th quartile and all other bins combined, based on % BIPOC

		% BIPOC Population		% Canopy Cover 2020		% Net Canopy Change, 2014 -2020	
Quartile	**Count**	**Mean**	**Range**	**Mean**	**Range**	**Mean**	**Range**
1, 2, and 3	980	21.7	0 to 38.7	36.0	5.4 to 86.6	0.04	-10.8 to 13.7
4	327	52.0	38.7 to 88.5	30.2	3.1 to 63.5	-0.8	-12.4 to 8.7
Kruskal-Wallis Test				*H=57.5*		*H=13.6*	
H statistic and p-value				*p<0.001*		*p<0.001*	

B. 4th quartile bin and all other bins combined, based on % Low Income

		% Low Income		% Canopy Cover 2020		% Net Canopy Change, 2014-2020	
Quartile	**Count**	**Mean**	**Range**	**Mean**	**Range**	**Mean**	**Range**
1, 2, and 3	980	16.8	0 to 34.0	37.1	3.1 to 86.6	-0.11	-10.8 to 13.6
4	327	47.4	34.1 to 94.1	26.9	5.5 to 62.1	-0.30	-12.4 to 9.0
Kruskal-Wallis Test				*H=183.7*		*H=0.34*	
H statistic and p-value				*p<0.001*		*p=0.56*	

Block Group Prioritization

We used the results to identify which block groups to prioritize to address inequities in canopy cover. We defined priority block groups which meet the following three critiera:

1. those which are in the top 25% of all block groups based on % BIPOC; and
2. those which are in the top 25% of all block groups based on % low income; and
3. those which had a canopy cover below 35% in 2020 (see Canopy Cover Goal section).

This set of 151 priority block groups are those where the population was at least 38% BIPOC (quartile 4 Table 3A) and atleast 34% low income (quartile 4 Table 3B) and have less than 35% canopy cover. These are the block groups we recommend targeting for canopy-related actions given their significance in addressing equity disparities as well as having lower percent canopy cover.

Portland eastside highway interchange and waterfront. © Robb/Adobe Stock

Additional Tables and Figures

Table 5. Region and Jurisdiction level population and canopy cover summary for the Portland-Vancouver metropolitan region. County-level canopy estimates are estimated within the urban unincorporated areas of each county, excluding incorporated cities and unincorporated areas within each county. County-level estimates for the percent or people who identify as "black, Indigenous, or other people of color" (BIPOC) and the percent low-income are based on estimates for the entire county.

Jurisdiction	2020 Population	BIPOC	Low-Income	Canopy Cover 2020	Canopy Change 2014 to 2020				Total Area
					Loss	Gain	Net		
		%	%	%	%	%	%	Acres	Acres
Region	2,078,127	28	24	35	5.9	6.3	0.4	1,348	353,285
Beaverton	97,495	37	22	37	6.8	5.5	-1.3	-167	12,582
Camas	26,467	21	10	38	5.7	7.7	2.0	203	10,079
Cornelius	12,780	54	34	20	5.6	6.1	0.5	8	1,494
Durham	1,941		30	64	4.5	6.1	1.7	4	260
Fairview	10,393	34	28	25	6.0	6.1	0.1	2	2,257
Forest Grove	26,230	32	29	28	3.8	10.1	6.3	243	3,855
Gladstone	12,031	22	29	36	9.0	5.5	-3.5	-56	1,591
Gresham	114,466	36	37	34	6.1	6.7	0.7	99	15,133
Happy Valley	24,038	33	8	44	6.8	8.2	1.4	103	7,415
Hillsboro	106,981	45	24	27	5.0	5.6	0.6	102	16,537
Johnson City	541	18	19	20	11.9	5.0	-7.0	-3	43
King City	5,176	18	28	30	5.4	7.7	2.2	11	501

Jurisdiction	2020 Population	BIPOC	Low-Income	Canopy Cover 2020	Canopy Change 2014 to 2020				Total Area
					Loss	Gain	Net		
		%	%	%	%	%	%	Acres	Acres
Lake Oswego	40,822	21	10	54	6.0	5.1	-0.9	-67	7,332
Maywood Park	832	16	16	47	5.7	6.2	0.6	1	107
Milwaukie	21,150	18	22	35	7.1	6.2	-1.0	-32	3,288
Oregon City	37,768	12	19	36	8.2	6.6	-1.6	-105	6,572
Portland	653,294	31	27	37	5.4	5.1	-0.3	-291	92,785
Rivergrove	544	23	3	49	7.7	7.9	0.2	<1	117
Sherwood	20,421	15	11	36	8.4	6.2	-2.2	-69	3,129
Tigard	55,015	28	18	38	7.5	5.7	-1.8	-145	8,174
Troutdale	16,301	28	8	32	5.2	8.2	2.9	110	3,719
Tualatin	27,891	32	19	33	6.2	6.1	-0.1	-6	5,357
Urban Clackamas Co	118,311	19	19	41	6.9	6.9	0.0	11	25,385
Urban Clark Co	195,579	23	23	27	5.1	8.4	3.2	1,195	37,011
Urban Multnomah Co	2,000	31	28	53	5.2	6.5	1.3	75	5,783
Urban Washington Co	239,100	35	21	41	8.3	5.6	-2.7	-807	29,935
Vancouver	191,259	30	30	24	4.9	6.9	2.0	665	33,442
Washougal	17,039	14	25	29	5.7	9.2	3.5	148	4,216
West Linn	27,382	17	12	50	5.7	5.1	-0.5	-27	5,213
Wilsonville	26,712	26	20	34	5.5	7.9	2.5	122	4,942
Wood Village	4,389	67	48	22	5.9	5.0	-0.9	-6	609

Table 6. Region and Jurisdiction level estimates of canopy (percent canopy cover in 2020) by land use types.

	All Uses Combined	Single-family Residential	Multi-family Residential	Commercial	Industrial	Parks, Natural Areas, Open Space	Open Space: HOA	Agriculture	Rural	Other
Region	**35**	**45**	**30**	**17**	**18**	**55**	**74**	**21**	**43**	**19**
Beaverton	37	46	35	19	17	52	71	38	32	25
Camas	38	40	44	37	43	64		24	62	11
Cornelius	20	26	32	9	12	29	58	10	22	11
Durham	64	73	31	34		88				40
Fairview	25	34	23	20	31	41	42	0	32	12
Forest Grove	28	38	19	22	6	28	62	16	31	22
Gladstone	36	46	25	25	32	49	90	46	37	16
Gresham	34	41	28	13	26	62	73	23	36	13
Happy Valley	44	40	26	26	17	71	74	23	55	18
Hillsboro	27	37	28	14	15	46	68	5	30	19
Johnson City	20		20							
King City	30	26	27	31		48	51		26	19
Lake Oswego	54	62	47	31	35	67	86		11	42
Maywood Park	47	59		24						28
Milwaukie	35	48	36	22	18	40	85	10	31	20
Oregon City	36	42	31	21	22	47	76	22	56	23
Portland	37	49	27	13	10	64	89	30	47	21
Rivergrove	49	56				33				25
Sherwood	36	42	37	18	17	57	50	28	37	24
Tigard	38	47	39	22	7	59	79	10	42	20
Troutdale	32	47	36	13	52	59	80	24	23	19
Tualatin	33	45	38	22	19	50	78	36	45	24
Urban Clackamas Co	41	50	34	20	14	48	60	24	60	21
Urban Clark Co	27	31	25	16	18	45		21	38	11
Urban Multnomah Co	53	69	28	61	2	69	84	34	50	18
Urban Washington Co	41	48	35	27	19	48	71	24	56	23
Vancouver	24	36	26	13	12	32		31	50	15
Washougal	29	42	24	19	7	43		11	52	11
West Linn	50	58	37	28	35	74	85	77	61	25
Wilsonville	34	41	49	24	27	44	66	37	36	22
Wood Village	22	39	22	14	2	61	74		6	11

Table 7. Region and Jurisdiction level estimates of canopy change (percent net canopy change 2014-2020) by land use types.

	All Uses Combined	Single-family Residential	Multi-family Residential	Commercial	Industrial	Parks, Natural Areas, Open Space	Open Space: HOA	Agriculture	Rural	Other
Region	**35**	**-0.4**	**-0.1**	**-0.1**	**0.6**	**2.5**	**3.9**	**-0.6**	**1.7**	**0.1**
Beaverton	37	-1.2	0.7	-1.3	-4.5	-0.8	-1.2	-28.4	-4.5	-0.9
Camas	38	1.7	-1.5	0.9	2.0	7.7		1.7	3.0	0.2
Cornelius	20	-0.1	1.3	0.3	2.2	5.1	10.9	1.6	-1.6	-0.7
Durham	64	0.5	4.1	0.7		3.6	0.0		0.0	2.7
Fairview	25	-2.9	-3.3	-1.2	3.1	4.8	5.8	0.0	-0.7	0.5
Forest Grove	28	7.8	2.6	5.2	1.5	8.3	21.4	2.4	5.6	5.7
Gladstone	36	-5.1	-3.6	-1.5	2.3	-1.0	2.5	-1.9	-0.8	-4.1
Gresham	34	0.1	0.6	-1.4	0.9	4.5	7.1	-2.7	-1.1	0.4
Happy Valley	44	-0.6	0.3	2.3	0.1	4.2	8.8	0.4	2.7	-1.1
Hillsboro	27	-1.1	0.3	-0.3	1.0	7.2	6.3	-0.2	0.3	-0.3
Johnson City	20	0.0	-7.0			0.0			0.0	
King City	30	0.4	-1.3	3.7		8.2	5.3		6.0	1.2
Lake Oswego	54	-1.7	-1.9	-1.6	-0.1	1.6	0.8	0.0	-0.2	-1.6
Maywood Park	47	0.7	0.0	-1.6		0.0				0.8
Milwaukie	35	-2.0	-0.3	-0.8	0.0	2.1	2.0	-1.0	-0.2	-0.7
Oregon City	36	-3.4	-2.5	0.5	-0.3	-0.4	6.1	-4.4	0.7	-0.5
Portland	37	-2.1	-1.1	0.0	-0.3	1.8	3.4	-0.4	2.9	0.0
Rivergrove	49	0.0	0.0			-0.3			0.0	0.7
Sherwood	36	-2.8	1.7	-2.8	0.9	2.2	3.3	-7.5	-9.1	-0.3
Tigard	38	-2.3	-2.2	-0.9	-1.8	1.1	1.1	-30.6	-1.3	-2.5
Troutdale	32	7.4	4.6	-1.0	6.2	5.1	7.6	-2.0	2.1	3.4
Tualatin	33	-2.1	-0.6	0.7	0.1	2.3	2.5	1.0	1.1	-1.0
Urban Clackamas Co	41	-1.4	-0.9	-0.2	-1.1	2.9	3.4	0.6	3.0	-0.5
Urban Clark Co	27	6.1	2.2	2.0	0.3	2.4		1.9	3.2	1.2
Urban Multnomah Co	53	1.0	-0.9	-0.3	-4.4	5.0	1.5	-1.2	3.8	0.5
Urban Washington Co	41	-2.9	-1.9	-3.0	-2.7	-1.0	1.2	-3.0	-3.1	-3.3
Vancouver	24	1.8	1.6	1.1	1.8	3.9		8.6	2.1	1.4
Washougal	29	5.6	2.1	2.5	0.2	3.2		1.7	3.7	2.7
West Linn	50	-1.6	-2.1	-1.2	-0.8	1.8	3.2	-10.1	2.8	0.1
Wilsonville	34	2.6	5.0	1.0	0.0	5.5	12.4	-13.8	1.5	2.6
Wood Village	22	-2.2	-2.5	-0.7	-1.6	5.3	4.2		3.4	-0.2

Table 8. Summary count and percentage of block groups in the four corners of the recommended actions diagram (Figure 9 of the Report). While in general, all areas would benefit from tree planting, maintenance, and protection activities, there isn't enough resources to do all activities everywhere. Therefore, we recommend targeting areas in the most need with the action that have the greatest potential to increase canopy cover and address equity disparities. The four corners of the actions diagram are formed by two dividing lines: zero (0%) percent net canopy change; and 35 (35%) percent canopy cover goal.

Canopy Dynamics	Priority Block Groups (151 total)		All Block Groups (1,307 total)		Recommended Actions
	Count	Percent	Count	Percent	
Low canopy cover and net gain	49	32%	332	25%	Planting and Maintenance
Low canopy cover and net loss	102	68%	420	32%	Planting and Protection
High canopy cover and net gain	None	None	246	25%	Maintenance
High canopy cover and net loss	None	None	309	24%	Protections

Tree foliage and Saint Johns Bridge tower, North Portland. © Wasim/Adobe Stock

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BACK COVER: Work party in winter deciduous forest. © Mitch Maxson/TNC

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