**Table 1: Vegetation type assignment criteria and strata size.** Sites without vegetation and those with wetlands present were excluded from further analysis.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Vegetation Type** | **Tree Cover** | **Shrub Richness** | **Strata Size** | **Sampled (n)** | **Notes** |
| High | 30% native tree cover | > 5 native shrub genera | 10 | 5 |  |
| Medium Canopy | 30% native tree cover | No requirement | 22 | 3 |  |
| Medium Diverse | 15% tree cover | > 5 native shrub genera | 53 | 4 |  |
| Medium | 15% tree cover | > 5 shrub genera | 264 | 3 |  |
| Low | < 10% tree cover | < 5 shrub genera | 56 | 5 |  |
| No Vegetation | No trees | No shrubs | 71 | 0 | Excluded from further analysis |
| Wetlands | No requirement | No requirement | 10 | 0 | Wetland present, excluded from further analysis |

**Table 2: Definition of independent variables used in PERMANOVA and correlation analysis** Summary statistics for independent variables for both the population of office developments in Redmond and Bellevue and the sample of sites studied (405 and 20 sites, respectively). Median income ($) and proportion foreign born are included to compare patterns in commercial developments with patterns found significant in residential research. Data sources: Homer et al., 2015; King County Department of Assessments, 2014; King County GIS Center, 2014; United States Census Bureau, 2016; and Xian et al., 2011.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable Name** | **Definition** | **Data Source** | **Population** | **Sample** |
| 1. AGGREGATED AND PARCEL LEVEL SOCIO-ECONOMIC VARIABLES | | | | |
| Area (acre) | Site area, in acres. | King County Assessor | Range: 0.14-42.51;  Mean (SD): 3.61 (5.51) | Range: 0.63-5.39; Mean (SD): 2.57 (1.58) |
| Town | Location, Bellevue or Redmond. | King County Assessor | Bellevue: 281 Redmond: 123 | Bellevue: 13  Redmond: 7 |
| Building Age (years, in 2017) | Age of building on site (or mean age for multiple buildings) in 2017. | King County Assessor | Range: 4-99;  Mean (SD): 33.2 (11.8) | Range: 9-42;  Mean (SD): 32.1(9.8) |
| Building Quality | Categorical ‘quality class’ assigned to buildings on the site | King County Assessor | Below Average: 11 Average: 146 Average/Good: 96  Good: 120 Good/Excellent: 25 | Below Average: 0 Average: 7 Average/Good: 4  Good: 7 Good/Excellent: 2 |
| Appraised Land Value per Acre (USD) | Appraised land value divided by site area. Missing assessed land values were replaced with population median land value. | King County Assessor | Range: 214,673-6,086,305; Mean (SD): 1,845,520 (904,065) | Range: 578,266-3,028,353;  Mean (SD): 1,679,110 (623,031) |
| Impervious w/in 500 m (%) | Percent impervious surface within 500 m of the site’s perimeter. | National Land Cover Database 2011 Percent Developed Imperviousness dataset updated in 2014 | Range: 19.5-81.1; Mean (SD): 55.8 (11.6) | Range: 48.8-67;  Mean (SD): 56.8 (6.3) |
| Median Household Income (2014 USD) | The median household income of residents for the site’s block group. | American Community Survey 2014 5-year block group | Range: 42,368-194,107;  Mean (SD): 81,408 (24,957) | Range: 42,368-134,643; Mean (SD): 80,478 (22,179) |
| Percent Foreign-Born | The percent of residents born outside of the United States for the site’s block group. | American Community Survey 2014 5-year block group | Range: 14.6-86.1; Mean (SD): 39 (16.7) | Range: 14.6-86.1;  Mean (SD): 40.6 (18.3) |
| 2. DEVELOPMENT AND LANDSCAPING OUTCOME VARIABLES | | | | |
| Stands Predate Development | Binary variable indicating presence of a cluster of three+ trees that predate development. | Site survey | NA | Yes: 12  No: 8 |
| Median Height of Dominant Conifer (m) | Median height of five dominant native conifer trees; age proxy. | Site survey | NA | Range: 0-40.6;  Mean (SD): 25.8 (13.0) |
| Density of Native Conifers (trees/ acre) | Total density of Douglas-fir, western redcedar, and western hemlock. | Site survey | NA | Range: 0-61.3;  Mean (SD): 22.5 (19.3) |
| 3. GROUND COVER MATERIAL AND MAINTENANCE ACTION | | | | |
| Ground Cover Types (%) | Ground cover types on site including lawn, mulch, and impervious surface. | Site survey | NA | Mean (SD) Grass: 7.3 (6.9);  Impervious: 66.4 (10.5);  Dirt/Litter: 6.0 (8.0) |
| Dead Wood (count) | Total abundance of stumps, logs, and snags on site. | Site survey | NA | Range: 0-40.6;  Mean (SD): 25.8(13) |
| Irrigation | Binary variable indicating whether irrigation is used during the summer months. | Interviews and site survey | NA | Yes: 16  No: 3 |
| Mulch, Herbicide, and/or Fertilizer Application | Binary variables (3) indicating whether landscaping crew applies mulch, herbicides, or fertilizers to a site. | Interviews and site survey | NA | Mulch Y/N: 17/3 Herbicide: 13/4 Fertilizer: 15/3 |

**Table 3 Metrics for tree and shrub communities on sampled office developments.** H’ is Shannon’s diversity index (Shannon and Weaver, 1949), effective species richness = exp(H’) (Jost, 2006), density = individuals per acre.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Metric** | **Minimum** | **Maximum** | **Mean** | **S.D.** | **Median** |
| Tree Abundance | 10 | 240 | 98.9 | 64.4 | 86 |
| Tree Density | 15.2 | 104.8 | 43.5 | 26.2 | 31.4 |
| Tree Species Richness | 3 | 16 | 8.6 | 3.7 | 7 |
| Native Tree Species Richness | 0 | 8 | 3.9 | 2.3 | 4 |
| Tree Shannon Diversity | 0.6 | 2.2 | 1.5 | 0.4 | 1.5 |
| Tree Effective Species Richness | 1.9 | 8.7 | 4.8 | 1.9 | 4.7 |
| Native Tree Shannon Diversity | 0 | 1.6 | 0.7 | 0.6 | 0.9 |
| Native Tree Effective Species Richness | 1 | 4.7 | 2.4 | 1.2 | 2.5 |
| Native Conifer Abundance | 0 | 216 | 49.8 | 57.6 | 28 |
| Native Conifer Density | 0 | 61.3 | 22.5 | 19.3 | 19.7 |
| Native Tree Abundance | 0 | 230 | 67.4 | 68.6 | 42 |
| Native Tree Density | 0 | 103.6 | 32.9 | 30.5 | 26.9 |
| Shrub Abundance | 71 | 1789 | 401.9 | 439 | 220.5 |
| Shrub Density | 39.6 | 404 | 153.1 | 99.7 | 125.7 |
| Shrub Species Richness | 8 | 40 | 18.1 | 7 | 18 |
| Native Shrub Species Richness | 0 | 10 | 4 | 2.6 | 4 |
| Shrub Shannon Diversity | 1.7 | 3 | 2.3 | 0.3 | 2.3 |
| Shrub Effective Species Richness | 5.7 | 20.6 | 10.5 | 3.5 | 10.1 |
| Native Shrub Shannon Diversity | 0 | 1.6 | 0.9 | 0.5 | 1.1 |
| Native Shrub Effective Species Richness | 1 | 4.9 | 2.9 | 1.2 | 2.9 |
| Native Shrub Abundance | 0 | 675 | 122 | 195.6 | 48.5 |
| Tree Sorensen | 0.273 | 1 | 0.665 | 0.160 | 0.667 |
| Tree Arrhenius Model z | 0.348 | 1 | 0.729 | 0.141 | 0.737 |
| Shrub Sorensen | 0.357 | 0.92 | 0.630 | 0.109 | 0.613 |
| Shrub Arrhenius Model z | 0.441 | 0.941 | 0.702 | 0.096 | 0.69 |

**Table 4 Rank abundance (count) of tree and shrub taxa for each community group as identified by flexible-beta analysis.** Asterisk indicates native tree and shrub species.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Rank** | **Native Tree Group** | **Ornamental Tree Group** | **Native Shrub Group** | **Ornamental Shrub Group** |
| 1 | Pseudotsuga menziesii\* (58.6) | Pseudotsuga menziesii\* (11.2) | Gaultheria shallon\* (106.1) | Prunus laurocerasus (57.3) |
| 2 | Thuja plicata\* (20.4) | Acer rubrum (10.9) | Berberis Mahonia gp. (84) | Rhododendron sp. (36.6) |
| 3 | Acer macrophyllum\* (19.4) | Acer platanoides (10.4) | Rhododendron sp. (25.7) | Cornus sericea gp. (23.4) |
| 4 | Acer rubrum (3.1) | Pinus nigra (8) | Cornus sericea gp. (18.9) | Lonicera pileata (15.1) |
| 5 | Alnus rubra\* (2.2) | Callitropsis nootkatensis\* (5.4) | Acer circinatum\* (18.3) | Viburnum davidii (13.7) |
| 6 | Arbutus menziesii\* (1.7) | Acer saccharum (4.8) | Vaccinium ovatum\* (16.1) | Berberis thunbergii (13.1) |
| 7 | Populus tremuloides (1.5) | Fraxinus americana (3.9) | Prunus laurocerasus (15.1) | Gaultheria shallon\* (11.1) |
| 8 | Liquidambar styraciflua (1.2) | Prunus subg. Cerasus (3.3) | Viburnum davidii (14.1) | Ilex crenata (10.1) |
| 9 | Prunus subg. Cerasus (0.8) | Thuja plicata\* (2.3) | Symphoricarpos\* (13) | Ornamental conifer (9.9) |
| 10 | Callitropsis nootkatensis\* (0.7) | Fraxinus pennsylvanica (1.9) | Ribes sanguineum\* (12.5) | Mahonia (9.2) |

**Table 5: PERMANOVA model summary comparing multivariate models of shrub community composition.** None of the models explain more than 25% of the variation in shrub community composition.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Model | Pseudo-F | p-value | AICc Value | Delta AICc |
| Median Douglas Fir Height | 3.08 | 0.002 | 35.1 | 0.00 |
| Tree Group Membership | 2.86 | 0.002 | 35.4 | 0.21 |
| Native Conifer Density | 2.82 | 0.003 | 35.4 | 0.25 |
| Tree Group + Median DF Height | 2.44 | 0.001 | 36.1 | 0.91 |
| Median DF Height + Native Conifer Density | 2.27 | 0.003 | 36.4 | 1.22 |
| Stands Predate Development | 2.26 | 0.012 | 35.9 | 0.79 |
| Median DF Height + Stands Predate Development | 2.20 | 0.001 | 36.5 | 1.35 |
| Tree Group + Native Conifer Density | 1.87 | 0.016 | 37.1 | 1.97 |
| Tree Group + Stands Predate Development | 1.80 | 0.021 | 37.3 | 2.11 |
| Stands Predate Development + Native Conifer Density | 1.80 | 0.013 | 37.3 | 2.11 |