Urban Tree Canopy in the PNW

King Conservation District

Understanding the impacts of stormwater on frontline communities and how healthy urban forests can make a difference

Panelists

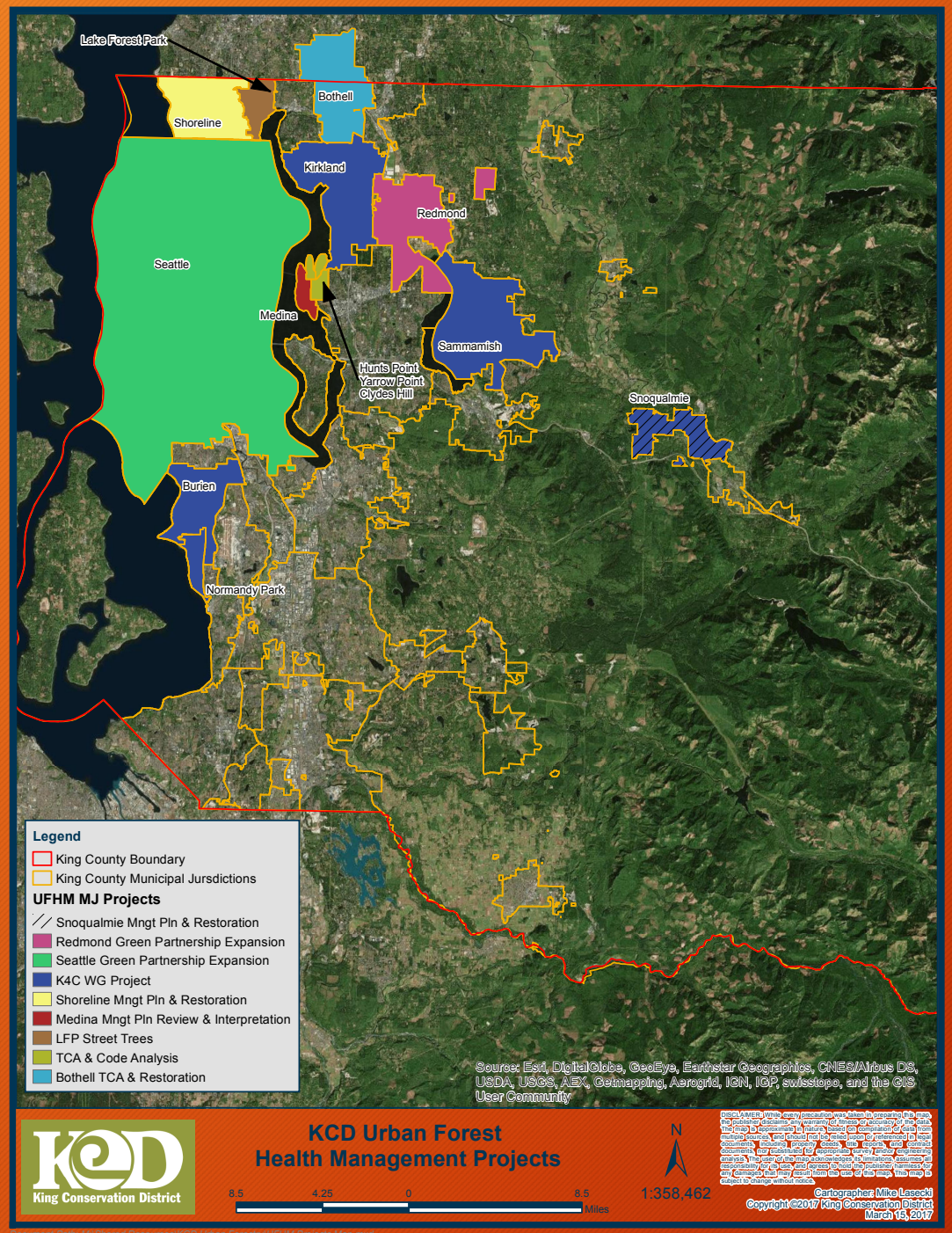
Brandy Reed, Intergovernmental Director, King Conservation District, *Facilitator*

Elizabeth Walker, KCD Urban Forestry Program Co-coordinator

Ann Boyce, Sustainable Business Specialist, ECOSS

Andy Rheaume, Mayor, City of Bothell

Richard Gelb, Performance Measures Manager, King County Department of Natural Resources and Parks



KCD Urban Forestry partnerships

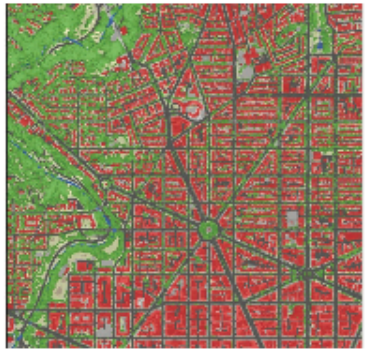
Elizabeth Walker, KCD

KCD – City of Redmond Urban Forestry partnership

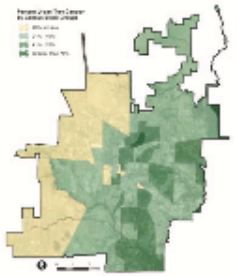
SERVICES AND DELIVERABLES PROVIDED TO PARTICIPATING CITIES

Mapping, Assessment & Analysis, and Planning & Communications Tools
KCD will engage with the city using GIS and remote-sensing technologies to map current tree canopy and other land cover classes city-wide. The land cover data are processed through a complex GIS model to provide metrics for city-specified geographies. These assessment results and subsequent analyses are assembled in an illustrative factsheet, summary report and web-based planning software to support planning, community development, and urban forest management.

1 Utilize the most recent 1-meter resolution multispectral NAIP imagery and LiDAR data (preferred, if available) to map all tree canopy and other land cover classes on public and private property. Optionally, half-meter (0.5) satellite imagery can be purchased by the city.



2 Process the land cover data through a GIS model to provide metrics (area and percent cover) for each land cover class citywide and by 6 geographic scales (see sidebar). This will produce citywide maps of tree canopy and overall land cover, summaries for each geography in an assessment spreadsheet, maps of canopy change



MAPPING

Conduct a detailed QA/QC GIS review and editing task yielding at least 92% overall accuracy for all land cover classes with a minimum mapping unit of 3x4 square meters .

Classes include tree canopy (generally above 15' in height/size), impervious surfaces (broken out by building, road, parking, etc. depending on available data sources from the city), low-lying herbaceous vegetation (grass, open space, shrub), barren soil / dry vegetation, and open water.

No field-based ground truthing of the land cover mapping is included. Instead, we use multiple imagery sources beyond the NAIP & LiDAR imagery to train the classification / OBIA process and to verify mapping accuracy including Google Street View, Google Maps/Earth, Bing, and city/county ortho imagery. This is especially important to distinguish tree canopy from shrub vegetation

Using available GIS data, areas deemed undesirable or unsuitable for increasing tree canopy will be compiled in order to remove them from the non-tree vegetation class to create the plantable spaces data layer. Our GIS technicians will manually map areas where data do not exist, such as the playing areas in golf courses and sports fields. This will create a "Possible Planting Areas" (PPA) data layer for analysis of priority planting areas.

DATA ANALYSIS

GIS assessment of land cover data metrics for the city boundary and up to 6 other geographies:

- Census block groups
- HUC-12 watershed (drainage areas)
- Land use (preferably county data for consistency across all KCD TCA cities with descriptions on each land use class)
- Two additional chosen by the City

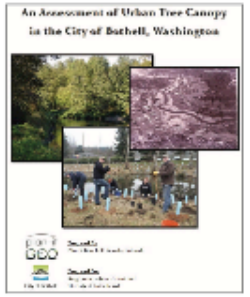
Delivery format in ESRI vector-based shapefile or geodatabase and raster-based TIFF or IMG for imagery and land cover with basic metadata

3 **Stormwater Benefits of Urban Canopy**
Conduct additional analysis using i-Tree Hydro (USFS, https://www.itreetools.org/) to produce a baseline of canopy cover impacts on stormwater capacity using current land cover conditions and hydrology. Results will quantify and illustrate the hydrological impacts at the citywide scale and will be incorporated into the Tree Canopy Assessment report.

4 Develop a 1-page factsheet and a summary report (10-15 pages plus appendix) with sections on the purpose, methods, data sources, findings/ maps, and broad recommendations.

FACT SHEETS

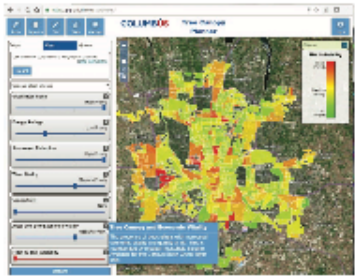
REPORTS



5 **Canopy Planner Online Software**
Provide online canopy planning tools with the mapping and data to allow both the public and city departments to interactively track planting and management while exploring possible grow-out scenarios.

1. The 'View' tool component of Canopy Planner allows users to easily choose a geographic scale and display % metrics or filter data with slider bars.
2. 'Plan' is a GIS-based prioritization tool with designated weights on city-specified criteria (ex. existing tree canopy, plantable space, and stormwater priorities.
3. The 'Grow' tool allows users to create canopy cover & planting scenarios in the map and save scenario reports.

To explore an example of these powerful tools, go to: https://pg-cloud.com/Columbus



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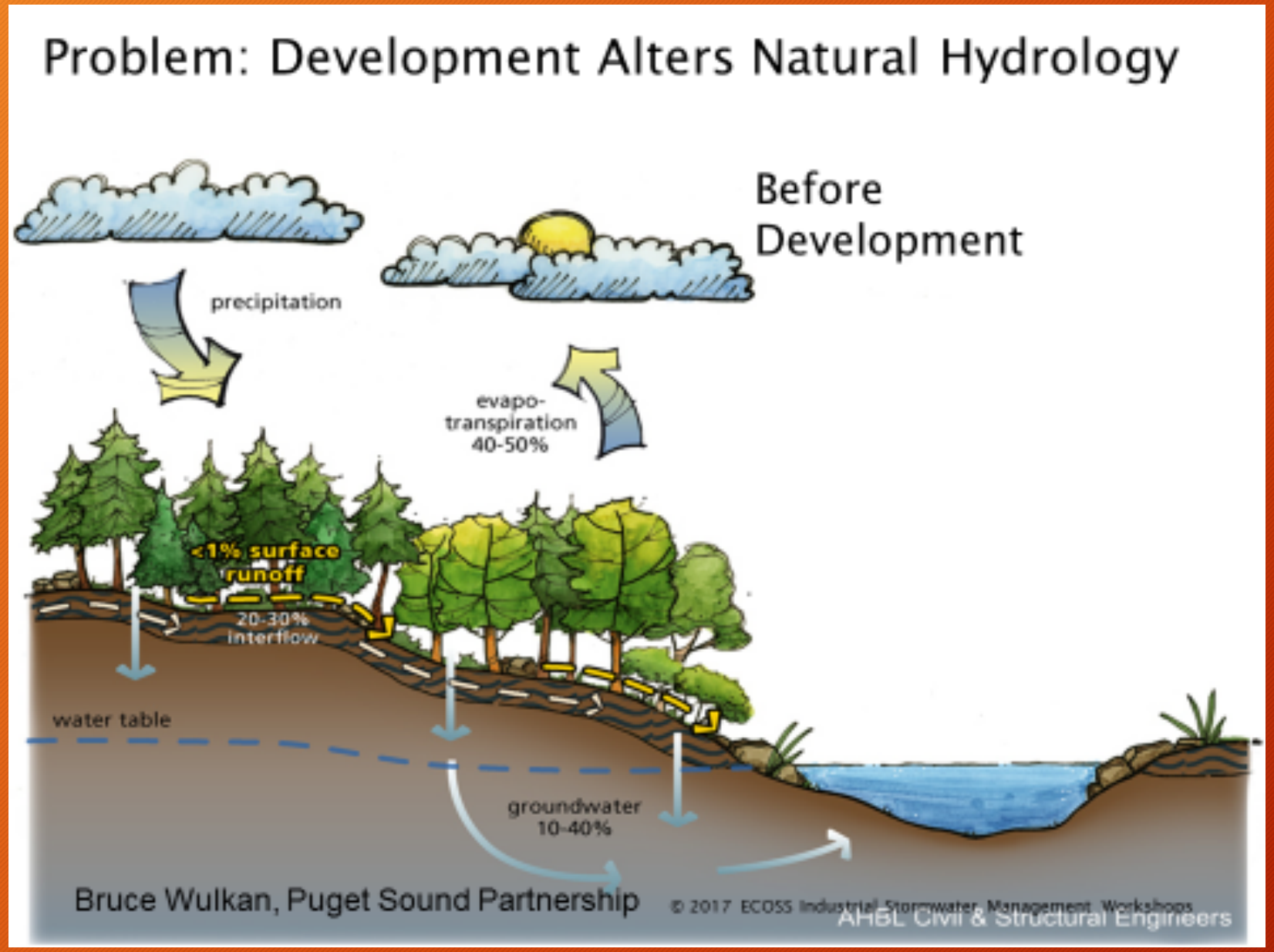
USA EPA

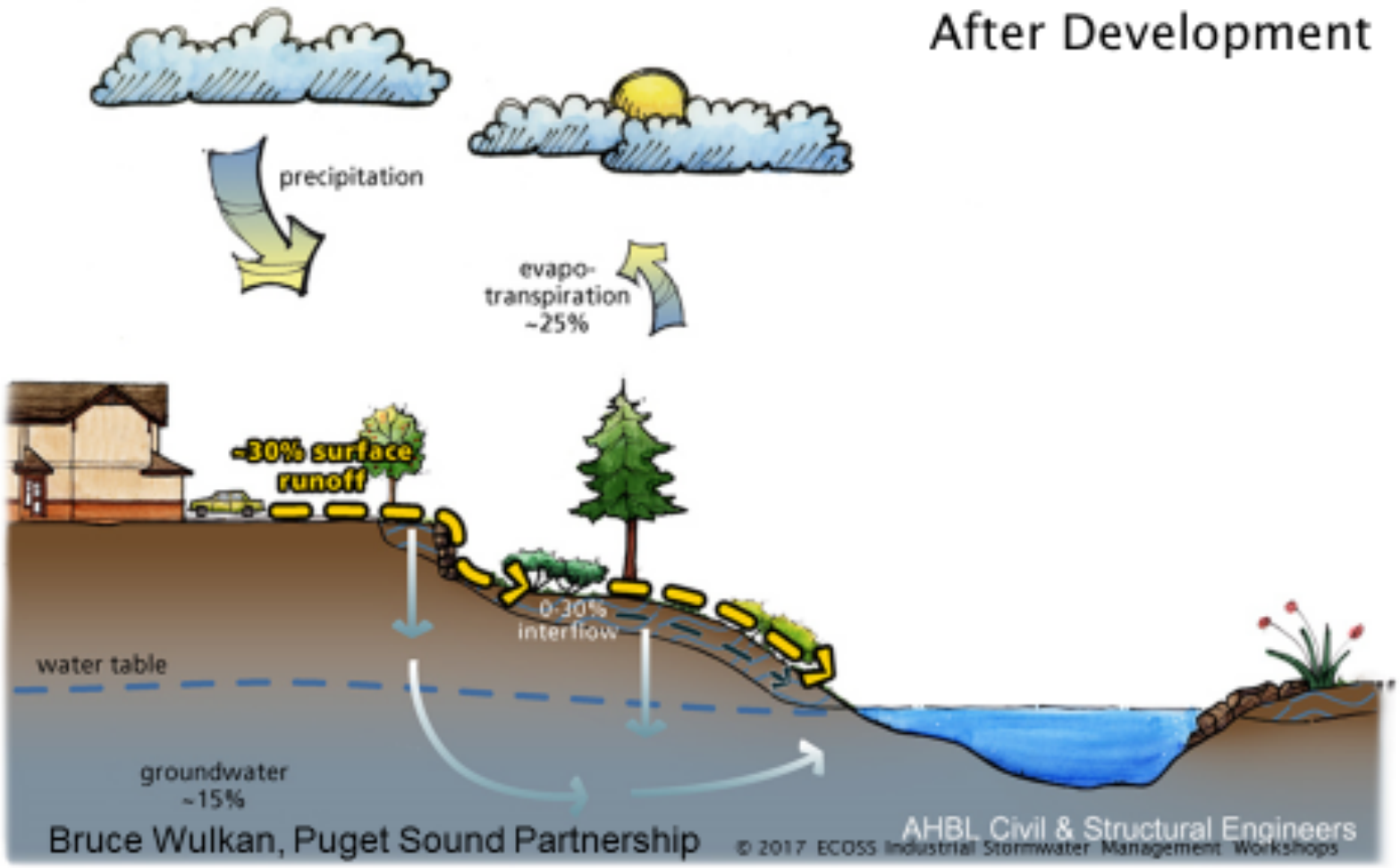
Puget Sound Urban Tree Canopy and Stormwater Analysis



Tree Canopy and water pollution

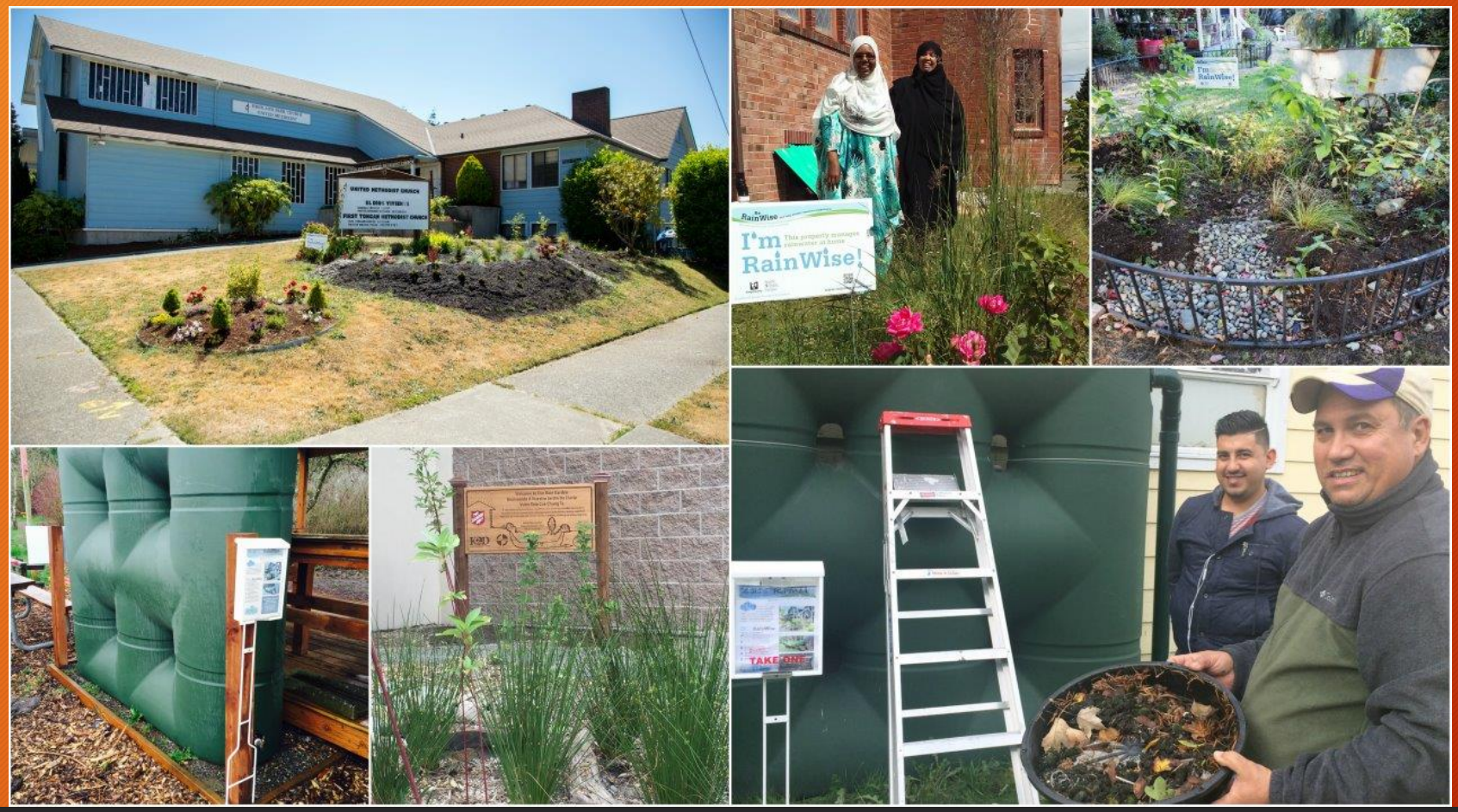
Ann Boyce, ECOSS

Problem: Development Alters Natural Hydrology



Pre- and Post-Development – Alteration of the Landscape and Effects on Stormwater Runoff

Photo credit: Keith Mountain



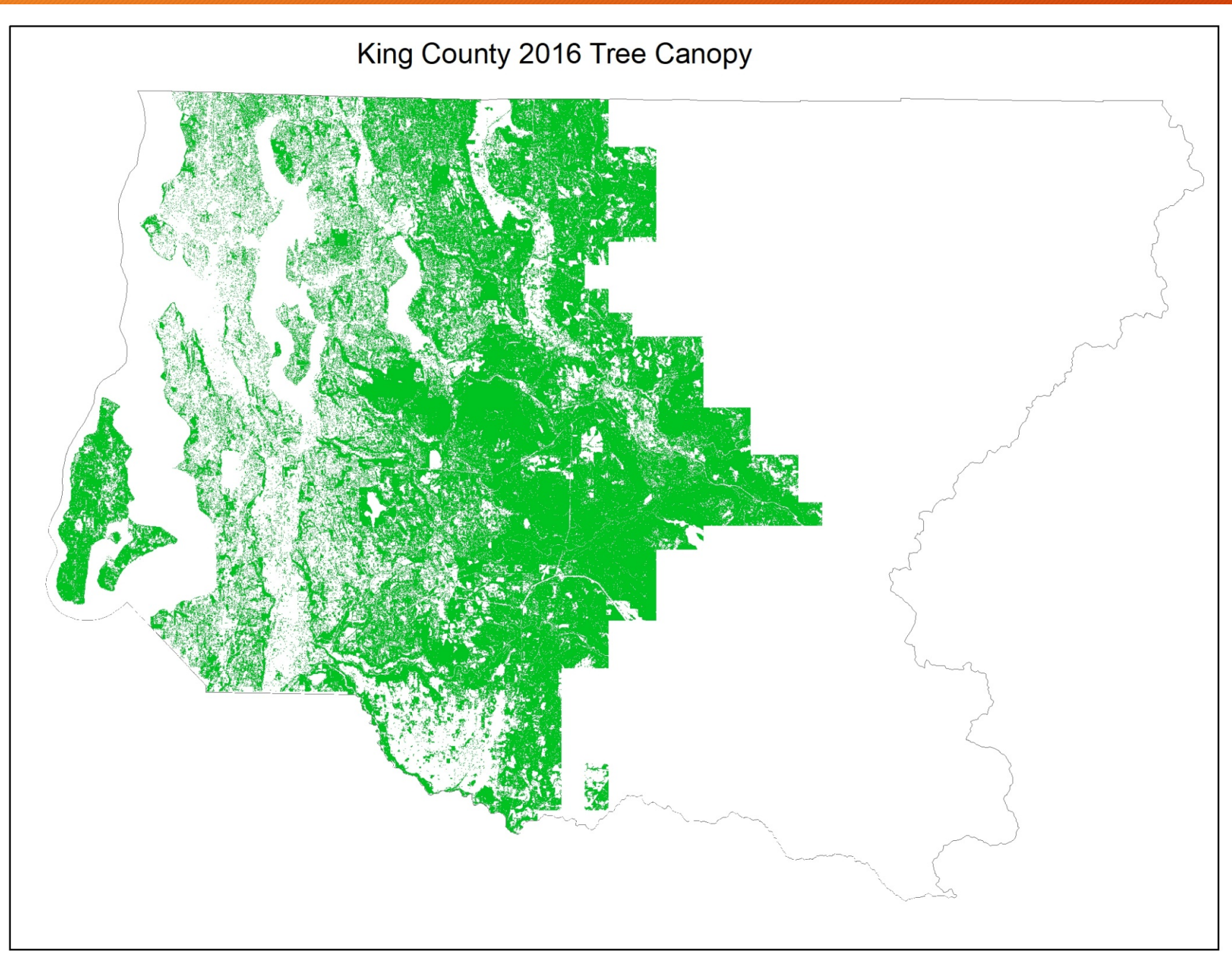
Rain gardens across south Seattle and King County

Rainwise program availability

City of Bothell™

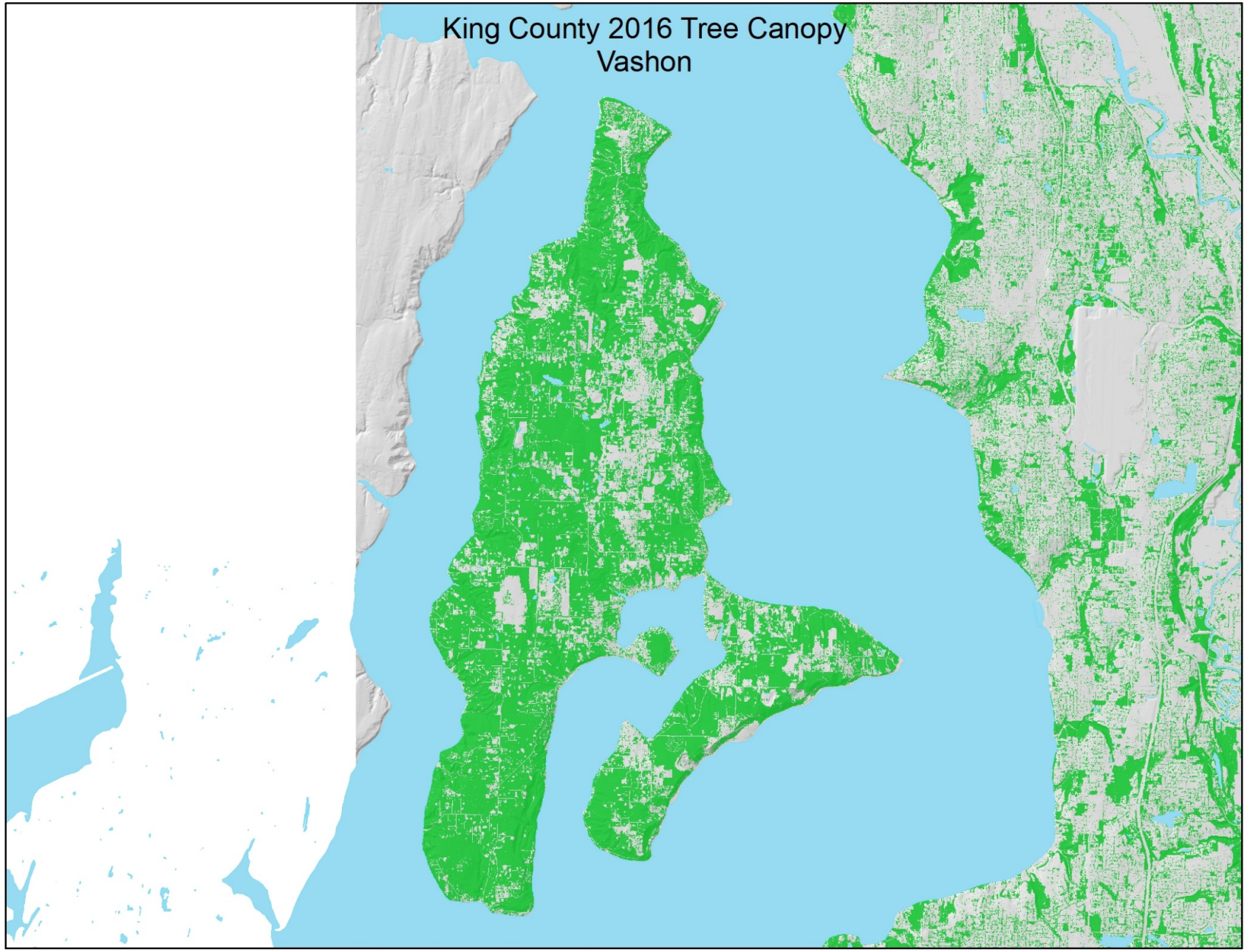
Tree planting along Parr Creek

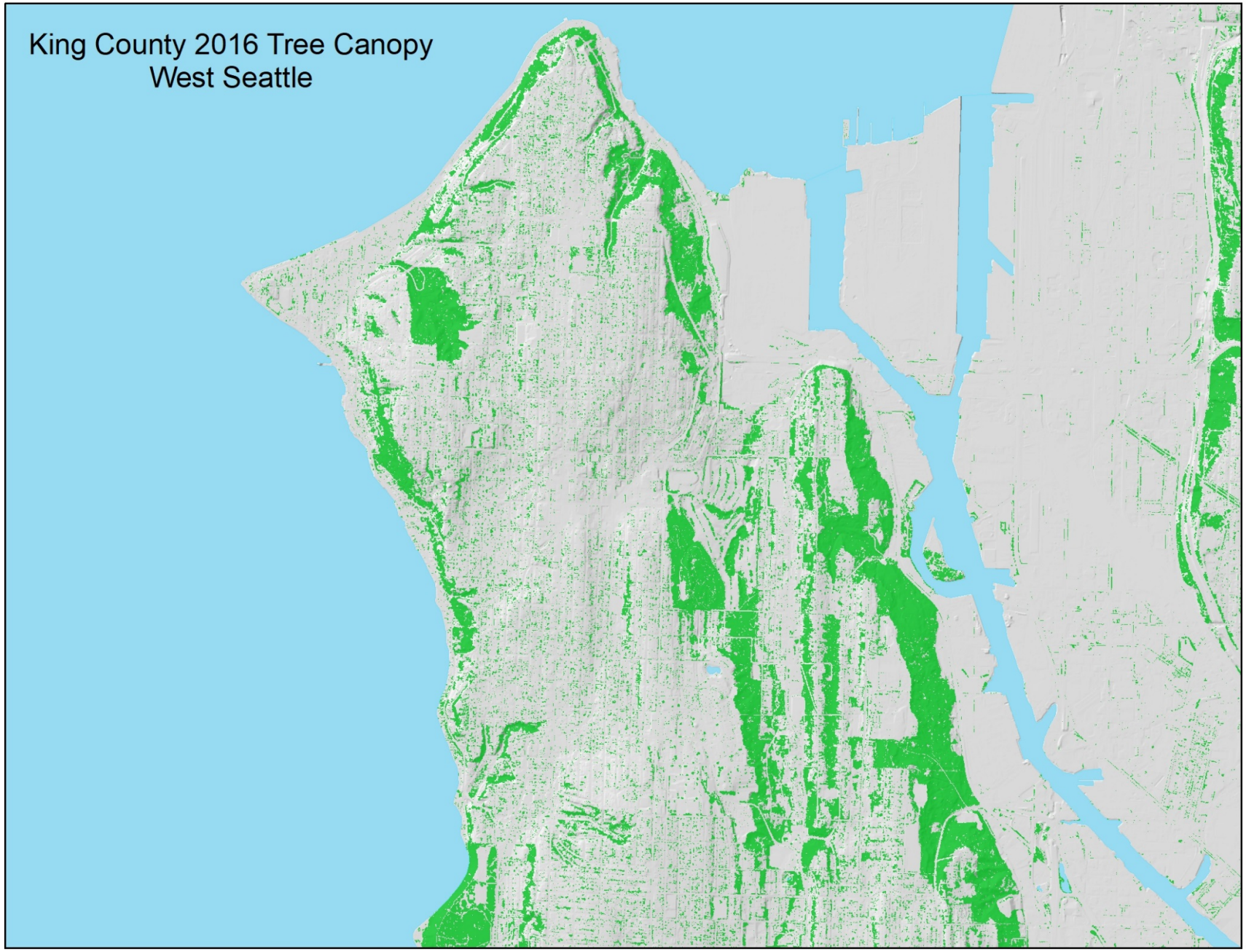
Andy Rheaume, Mayor, City of Bothell

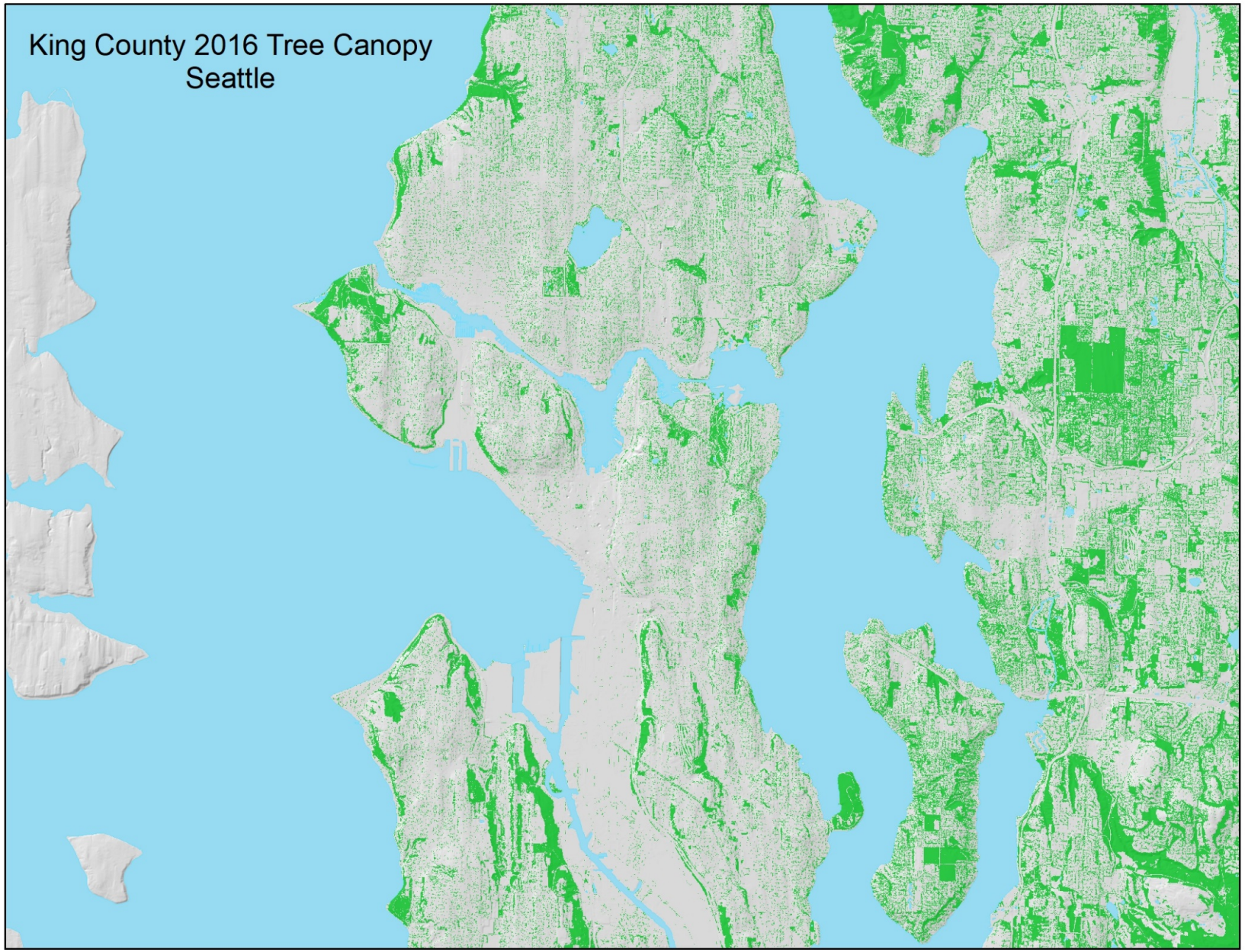


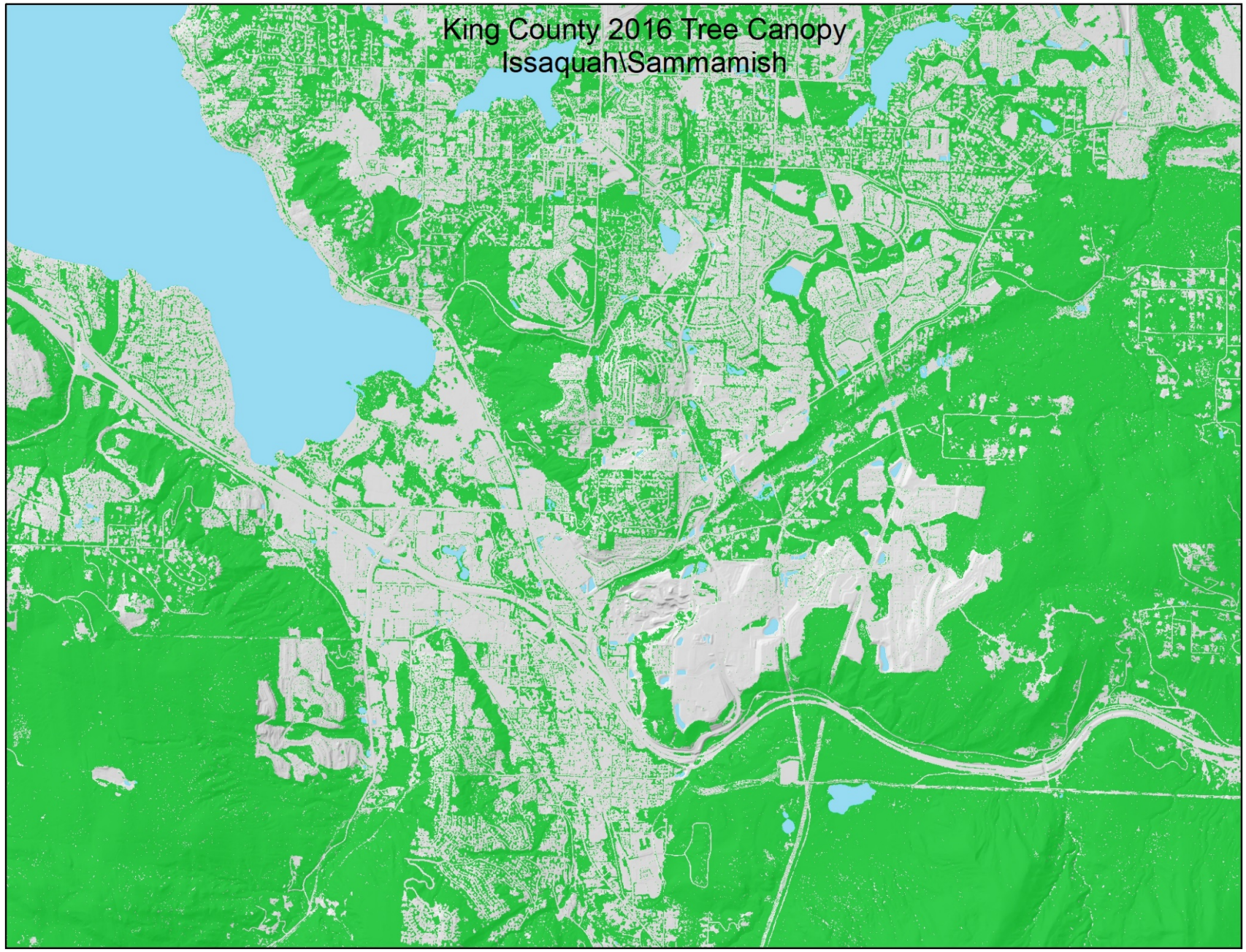
King County Tree Canopy Intel

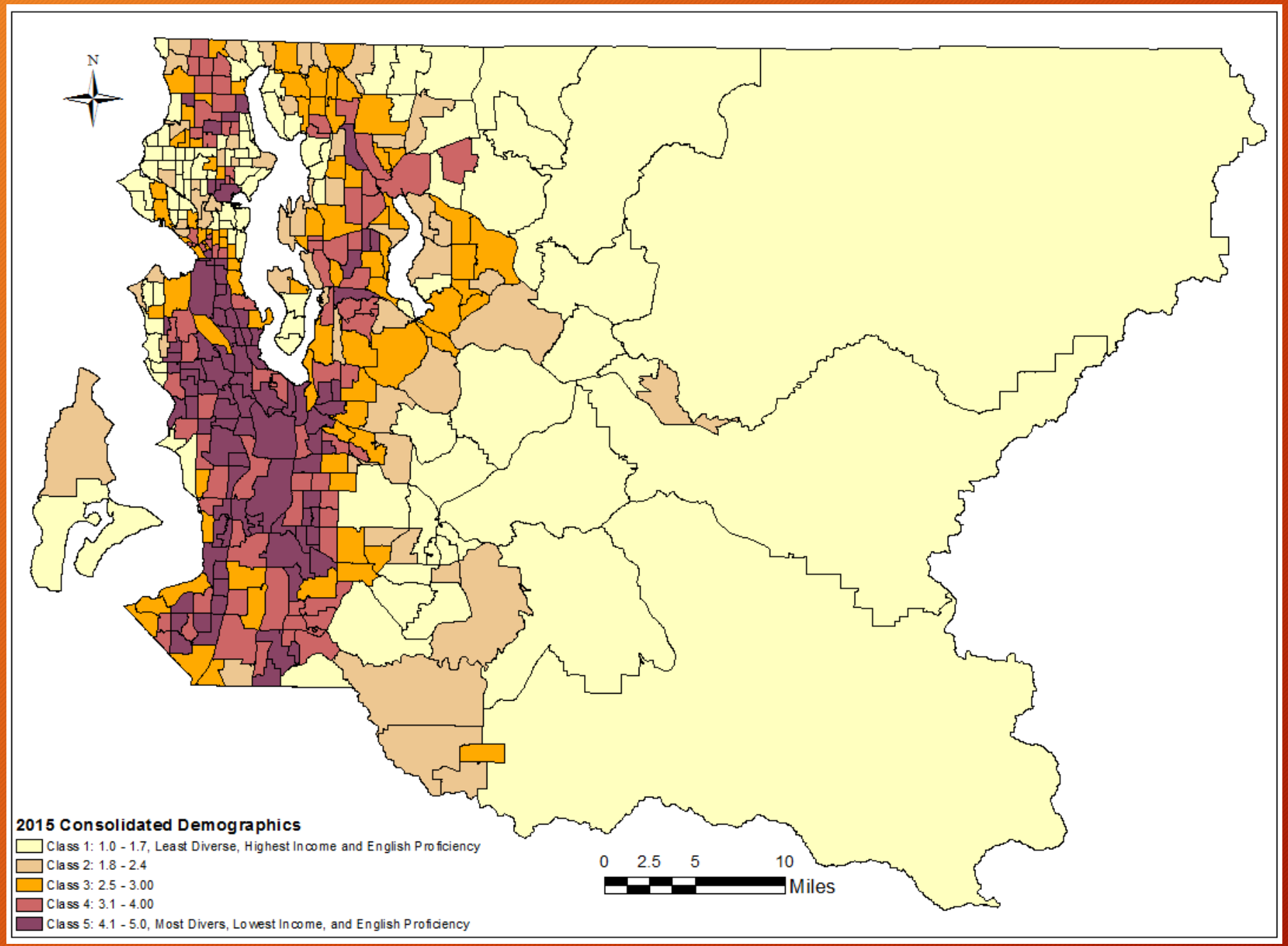
Richard Gelb, King County Department of Natural Resources and Parks

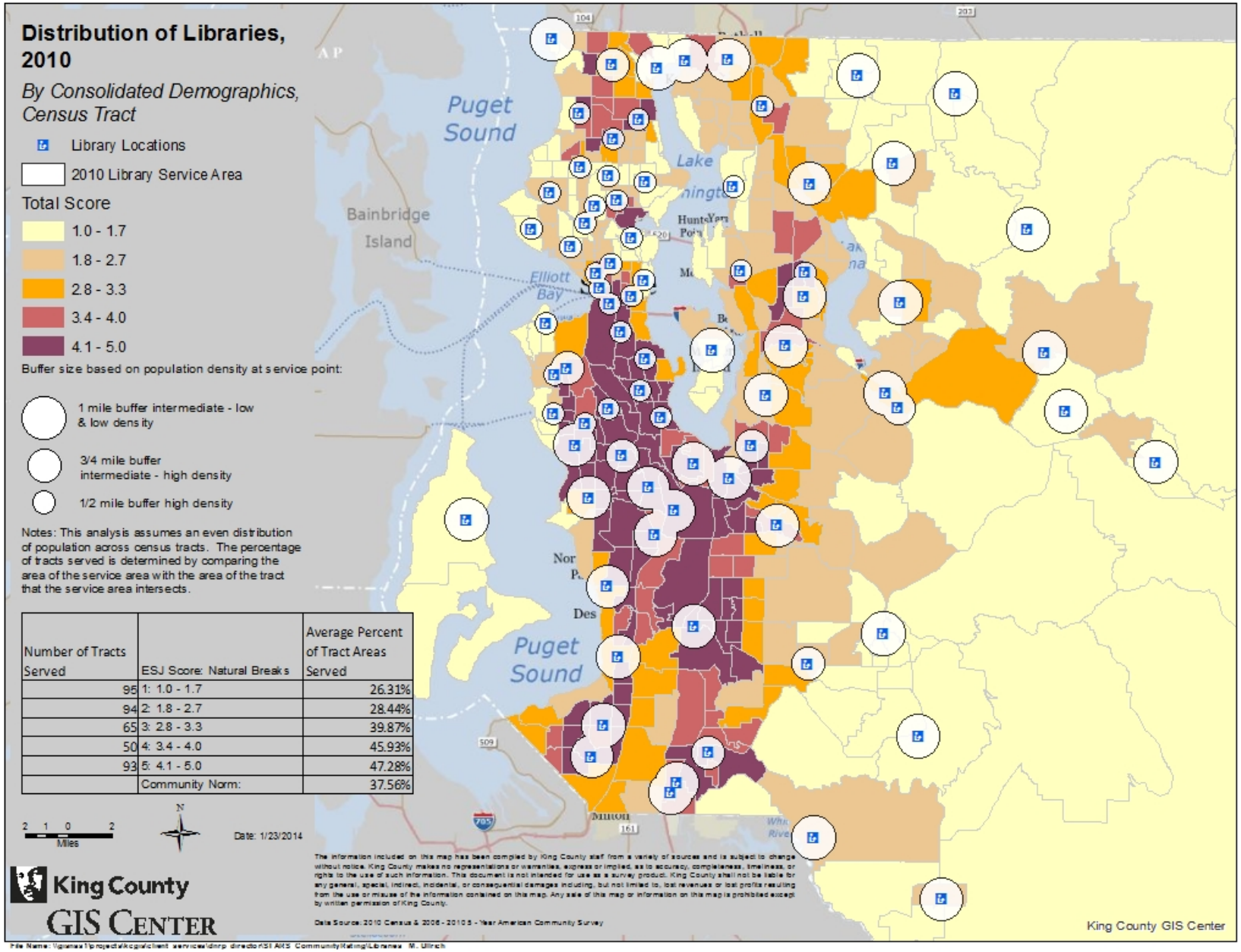

King County 2016 Tree Canopy
Vashon

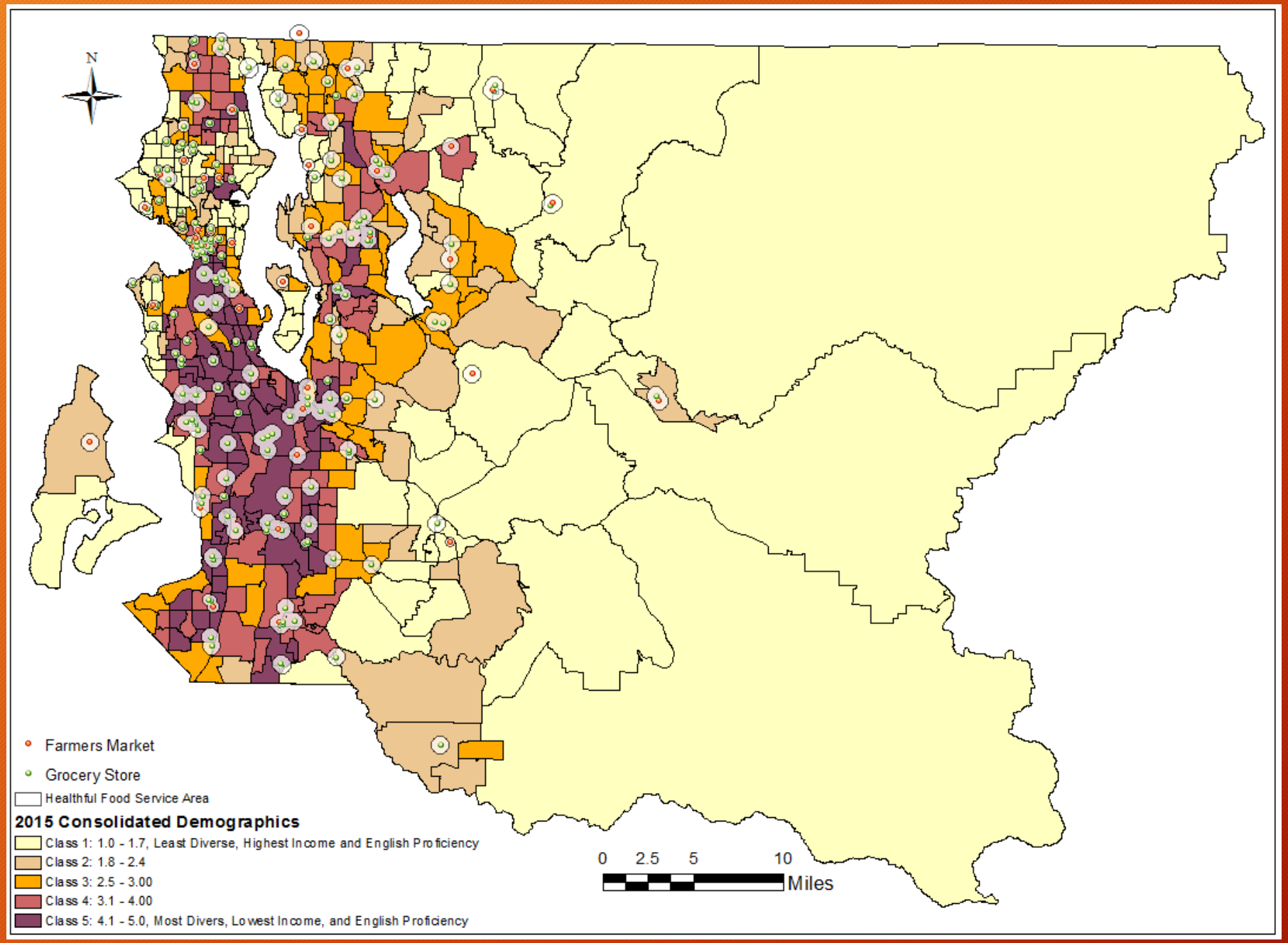

King County 2016 Tree Canopy
West Seattle

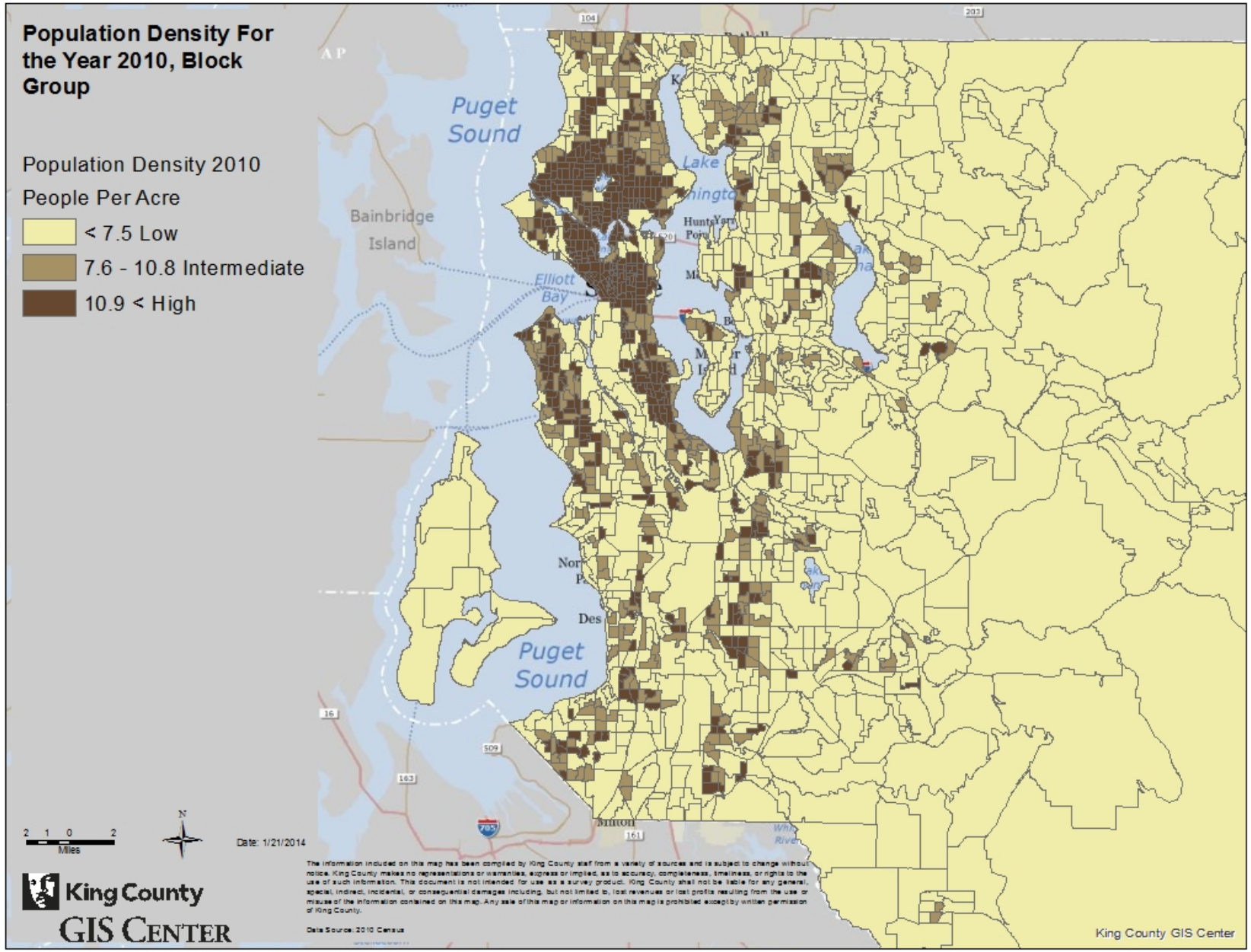

King County 2016 Tree Canopy
Seattle


King County 2016 Tree Canopy
Issaquah\Sammamish


N
2015 Consolidated Demographics
Class 1: 1.0 - 1.7, Least Diverse, Highest Income and English Proficiency
Class 2: 1.8 - 2.4
Class 3: 2.5 - 3.00
Class 4: 3.1 - 4.00
Class 5: 4.1 - 5.0, Most Divers, Lowest Income, and English Proficiency
0 2.5 5 10
Miles


Distribution of Libraries, 2010
By Consolidated Demographics, Census Tract
Library Locations
2010 Library Service Area
Total Score
1.0 - 1.7
1.8 - 2.7
2.8 - 3.3
3.4 - 4.0
4.1 - 5.0
Buffer size based on population density at service point:
1 mile buffer intermediate - low & low density
3/4 mile buffer intermediate - high density
1/2 mile buffer high density
Notes: This analysis assumes an even distribution of population across census tracts. The percentage of tracts served is determined by comparing the area of the service area with the area of the tract that the service area intersects.
Number of Tracts Served | ESJ Score: Natural Breaks | Average Percent of Tract Areas Served
95 | 1: 1.0 - 1.7 | 26.31%
94 | 2: 1.8 - 2.7 | 28.44%
65 | 3: 2.8 - 3.3 | 39.87%
50 | 4: 3.4 - 4.0 | 45.93%
93 | 5: 4.1 - 5.0 | 47.28%
Community Norm: | 37.56%
2 1 0 2 Miles
N
Date: 1/23/2014
King County GIS Center
Puget Sound
Lake
Bainbridge Island
Elliott Bay
Des
Puget Sound
King County GIS Center


N
Farmers Market
Grocery Store
Healthful Food Service Area
2015 Consolidated Demographics
Class 1: 1.0 - 1.7, Least Diverse, Highest Income and English Proficiency
Class 2: 1.8 - 2.4
Class 3: 2.5 - 3.00
Class 4: 3.1 - 4.00
Class 5: 4.1 - 5.0, Most Divers, Lowest Income, and English Proficiency
0 2.5 5 10
Miles


Population Density For the Year 2010, Block Group
Population Density 2010
People Per Acre
< 7.5 Low
7.6 - 10.8 Intermediate
10.9 < High
Puget Sound
Bainbridge Island
Elliott Bay
Lake
Des
Puget Sound
Milton
2 1 0 2
Miles
N
Date: 1/21/2014
King County
GIS Center
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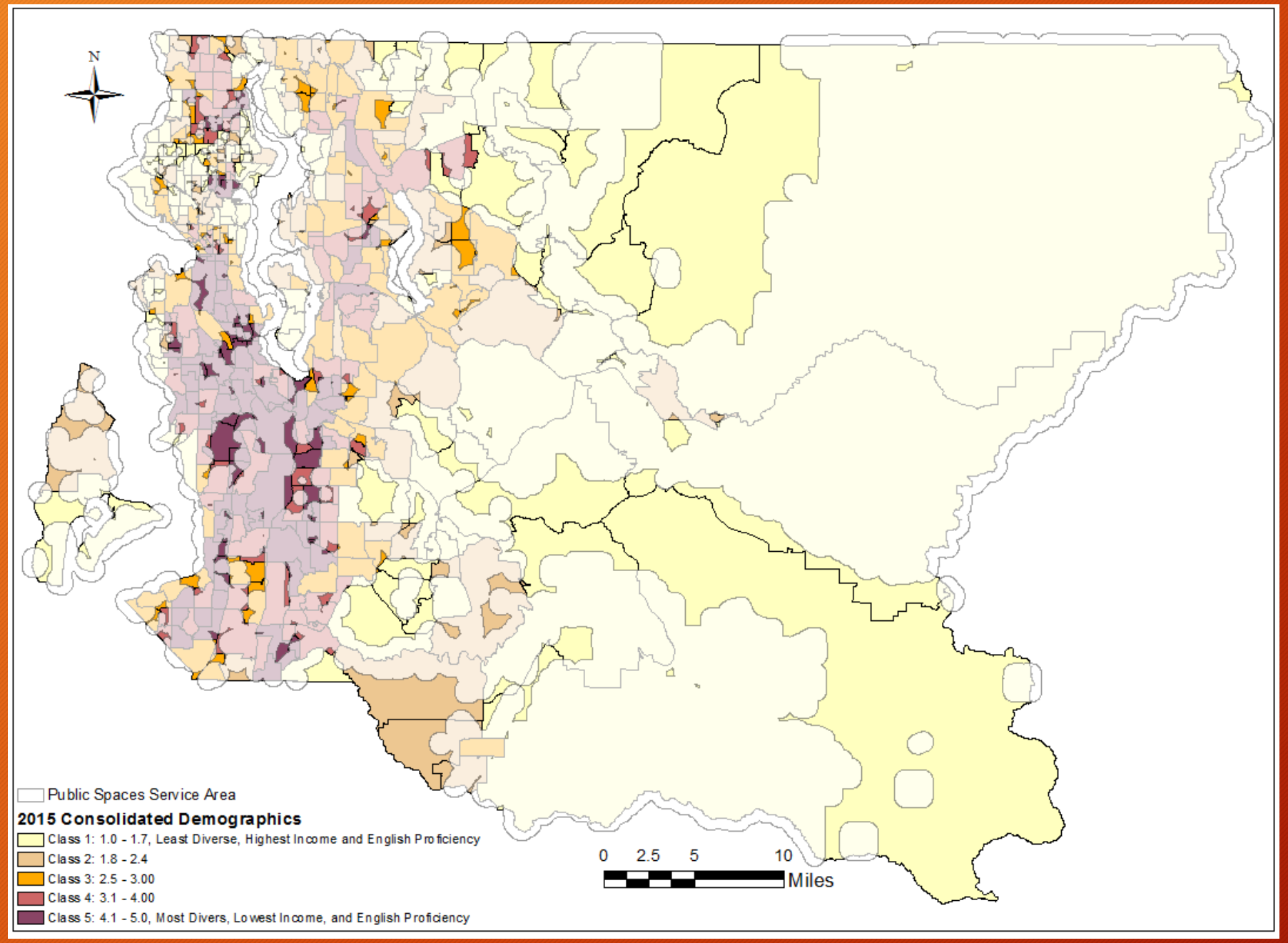
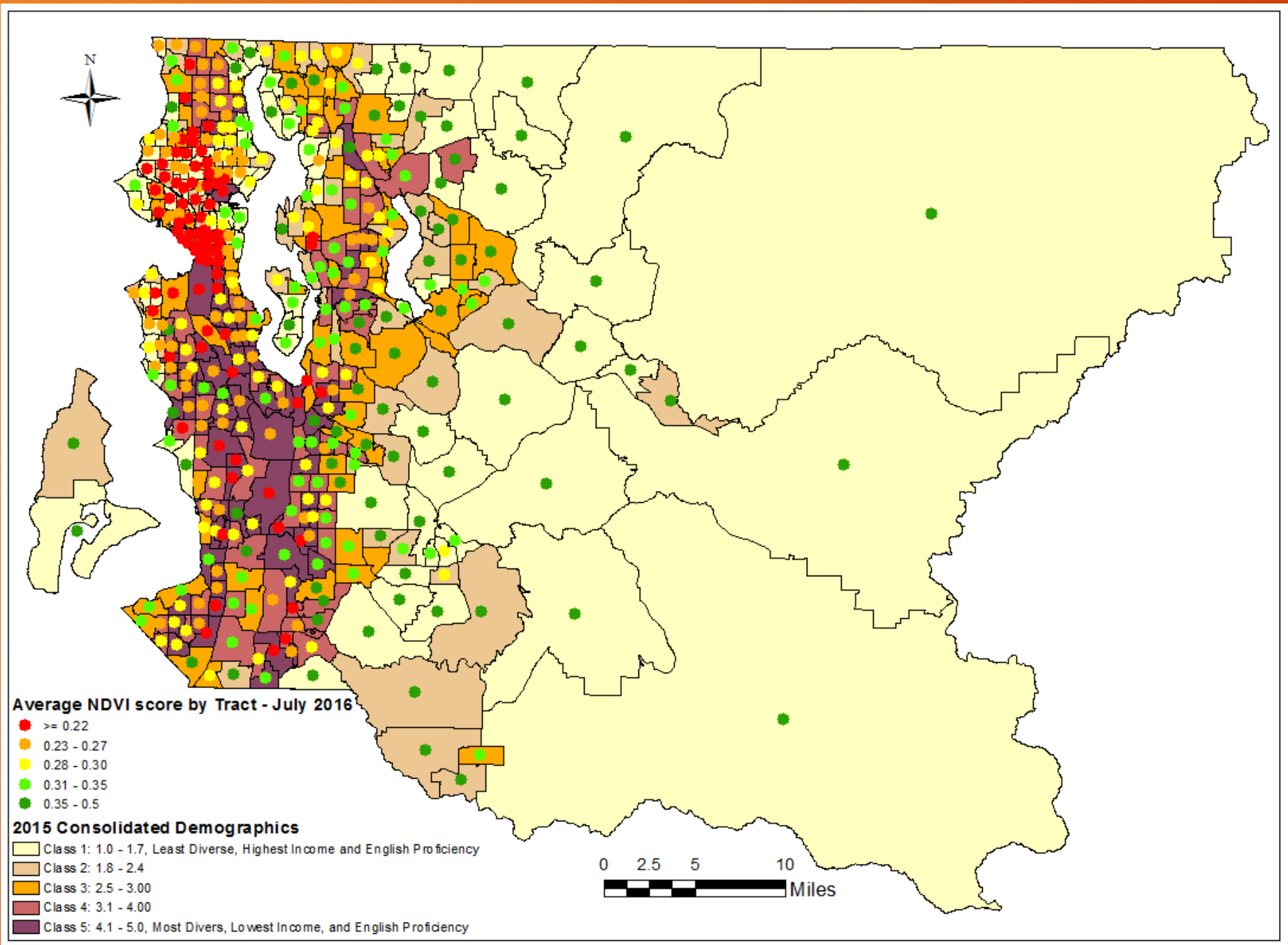
Data Source: 2010 Census
King County GIS Center

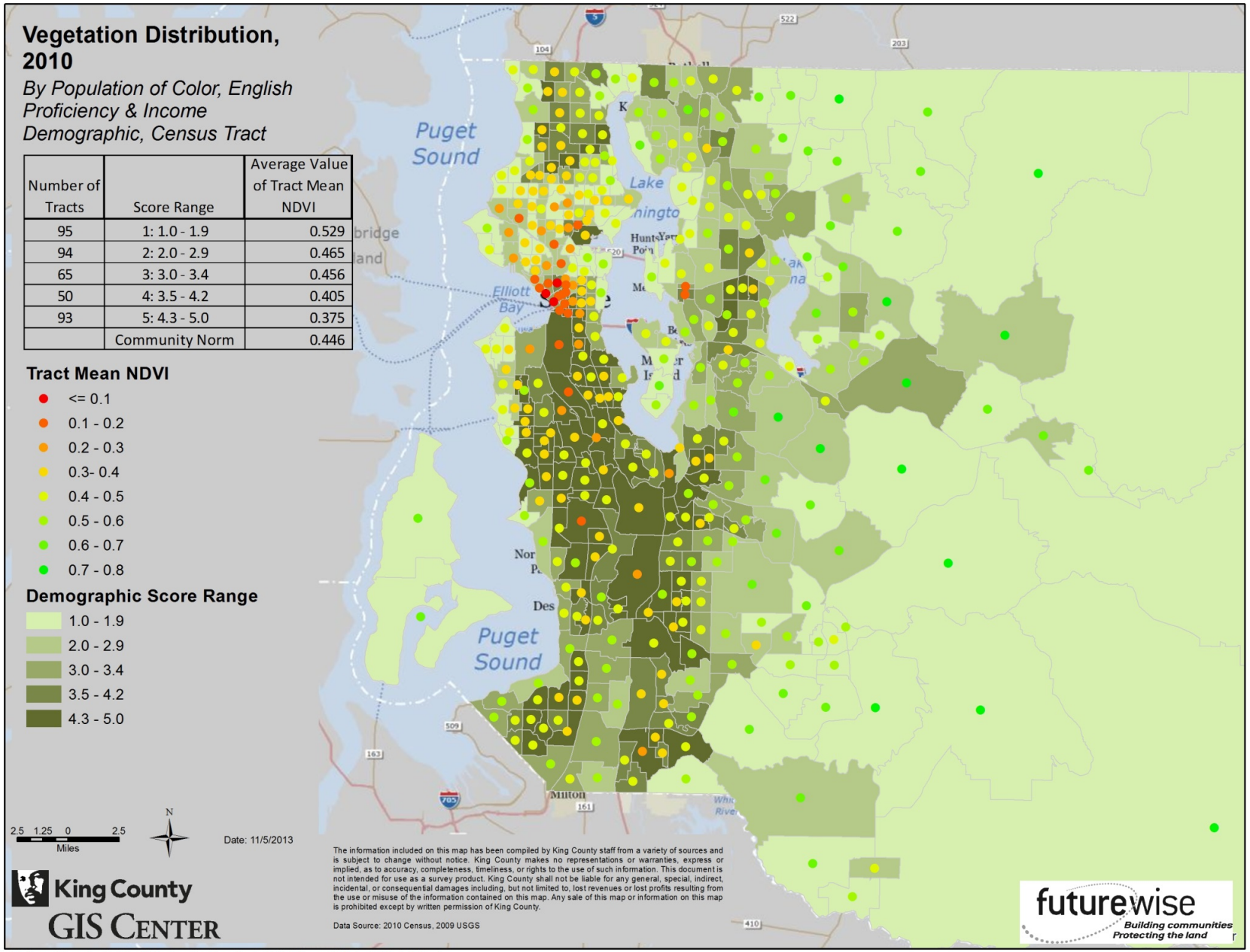

N
Public Spaces Service Area
2015 Consolidated Demographics
Class 1: 1.0 - 1.7, Least Diverse, Highest Income and English Proficiency
Class 2: 1.8 - 2.4
Class 3: 2.5 - 3.00
Class 4: 3.1 - 4.00
Class 5: 4.1 - 5.0, Most Divers, Lowest Income, and English Proficiency
0 2.5 5 10
Miles


N
Average NDVI score by Tract - July 2016
>= 0.22
0.23 - 0.27
0.28 - 0.30
0.31 - 0.35
0.35 - 0.5
2015 Consolidated Demographics
Class 1: 1.0 - 1.7, Least Diverse, Highest Income and English Proficiency
Class 2: 1.8 - 2.4
Class 3: 2.5 - 3.00
Class 4: 3.1 - 4.00
Class 5: 4.1 - 5.0, Most Divers, Lowest Income, and English Proficiency
0 2.5 5 10
Miles

Vegetation Distribution, 2010

By Population of Color, English Proficiency & Income Demographic, Census Tract

Number of Tracts	Score Range	Average Value of Tract Mean NDVI
95	1: 1.0 - 1.9	0.529
94	2: 2.0 - 2.9	0.465
65	3: 3.0 - 3.4	0.456
50	4: 3.5 - 4.2	0.405
93	5: 4.3 - 5.0	0.375
	Community Norm	0.446



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Data Source: 2010 Census, 2009 USGS

futurewise
Building communities
Protecting the land

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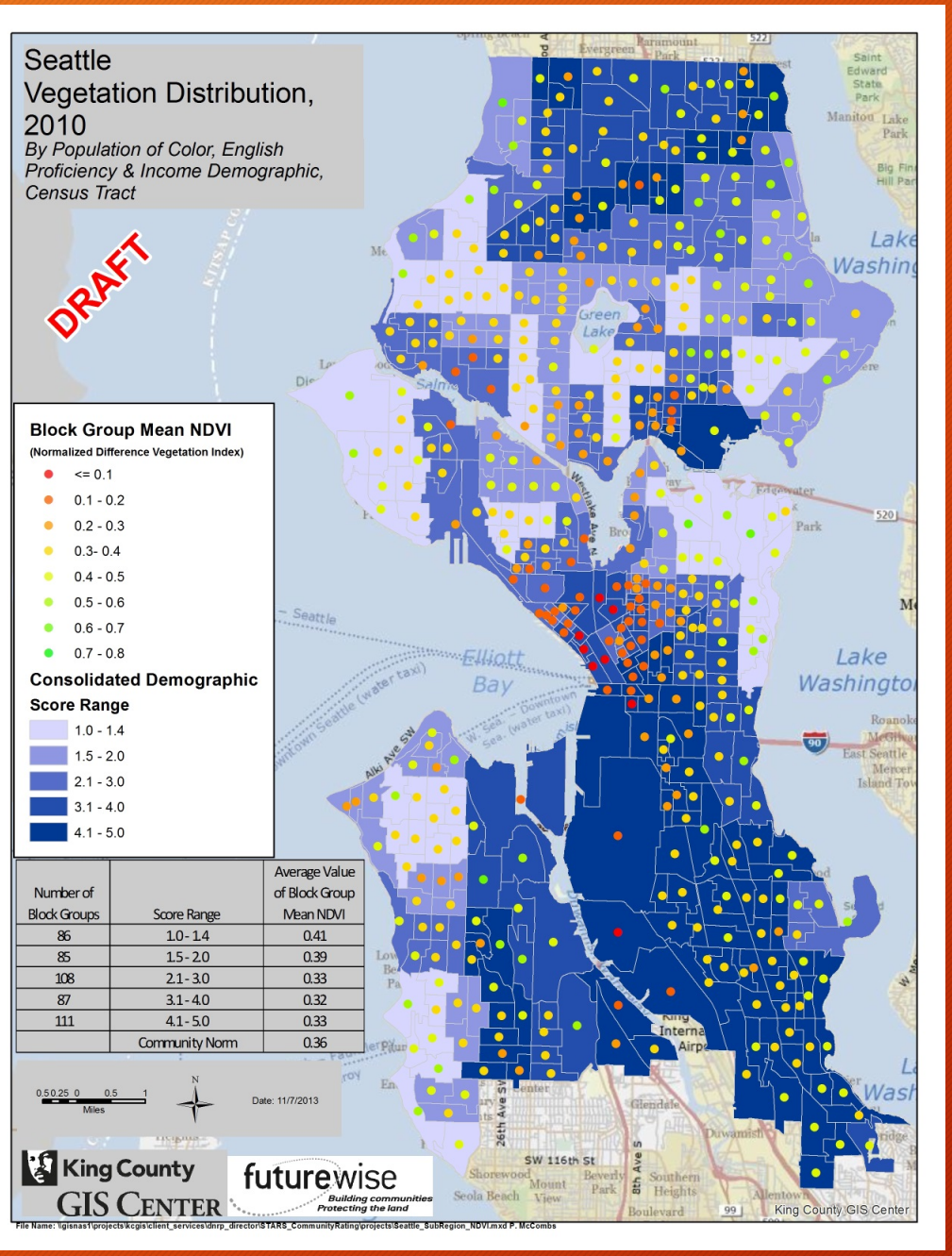
Seattle
Vegetation Distribution, 2010
By Population of Color, English Proficiency & Income Demographic, Census Tract
DRAFT
Block Group Mean NDVI
(Normalized Difference Vegetation Index)
<= 0.1
0.1 - 0.2
0.2 - 0.3
0.3- 0.4
0.4 - 0.5
0.5 - 0.6
0.6 - 0.7
0.7 - 0.8
Consolidated Demographic Score Range
1.0 - 1.4
1.5 - 2.0
2.1 - 3.0
3.1 - 4.0
4.1 - 5.0
Number of Block Groups | Score Range | Average Value of Block Group Mean NDVI
86 | 1.0 - 1.4 | 0.41
85 | 1.5 - 2.0 | 0.39
108 | 2.1 - 3.0 | 0.33
87 | 3.1 - 4.0 | 0.32
111 | 4.1 - 5.0 | 0.33
Community Norm | 0.36
0.5 0.25 0 0.5 1
Miles
N
Date: 11/7/2013
King County GIS Center
futurewise
Building communities Protecting the land
King County GIS Center
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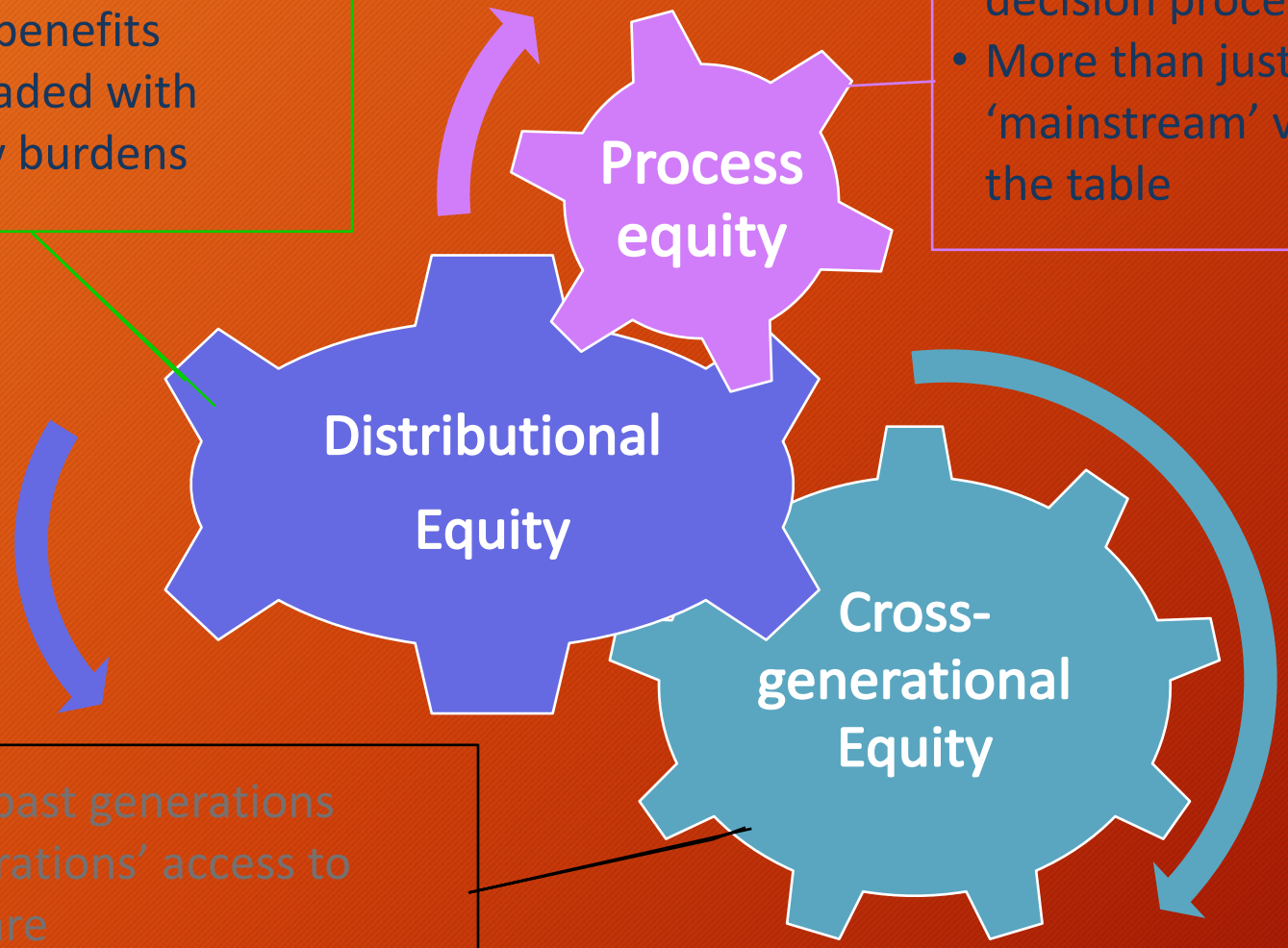
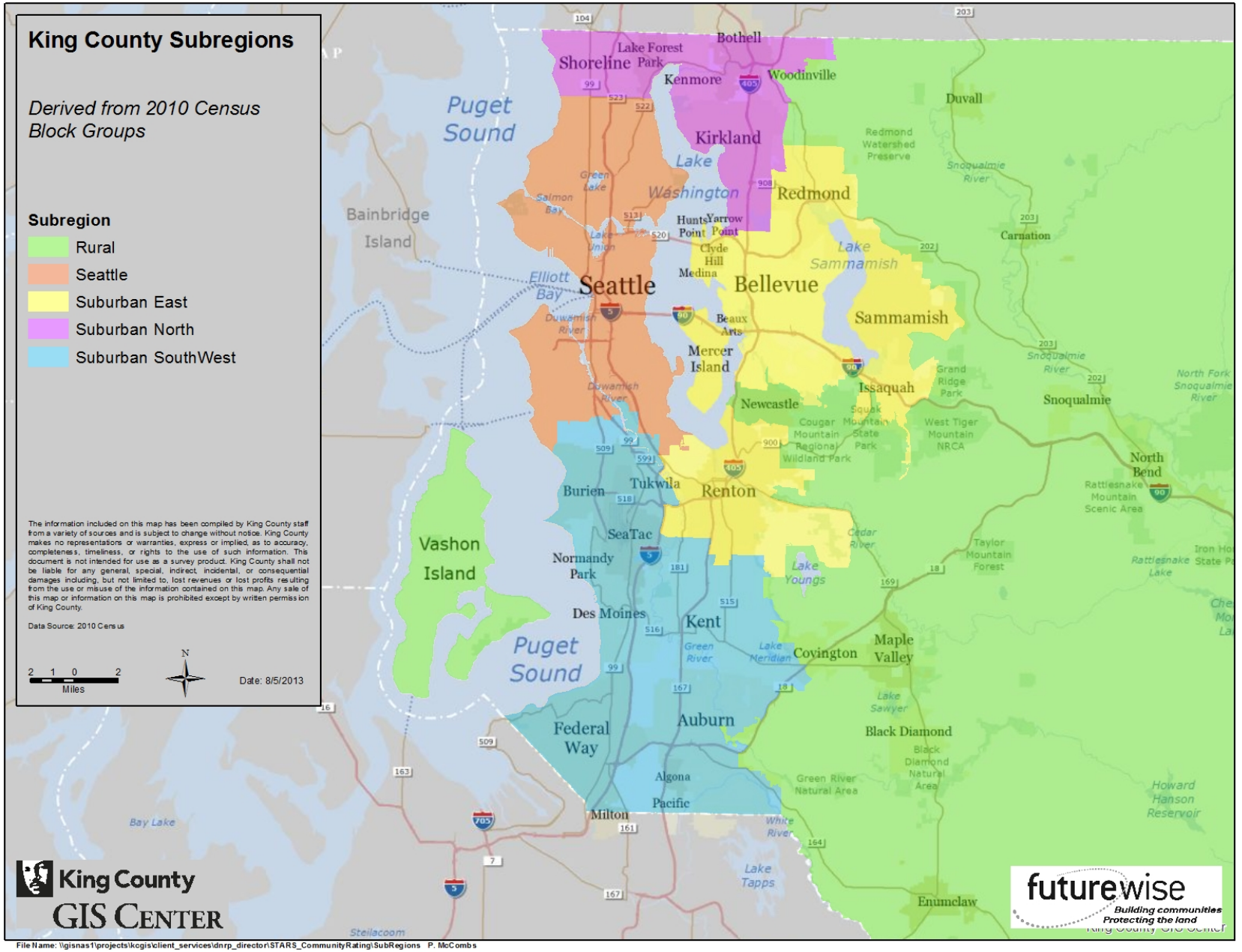
Equity and social justice dimensions

- Fair access to community resources/benefits
- Not overloaded with community burdens

- Inclusiveness in decision process
- More than just ‘mainstream’ voices at the table



- Respect for past generations
- Future generations’ access to their fair share
- Not inheriting disadvantages



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Questions?