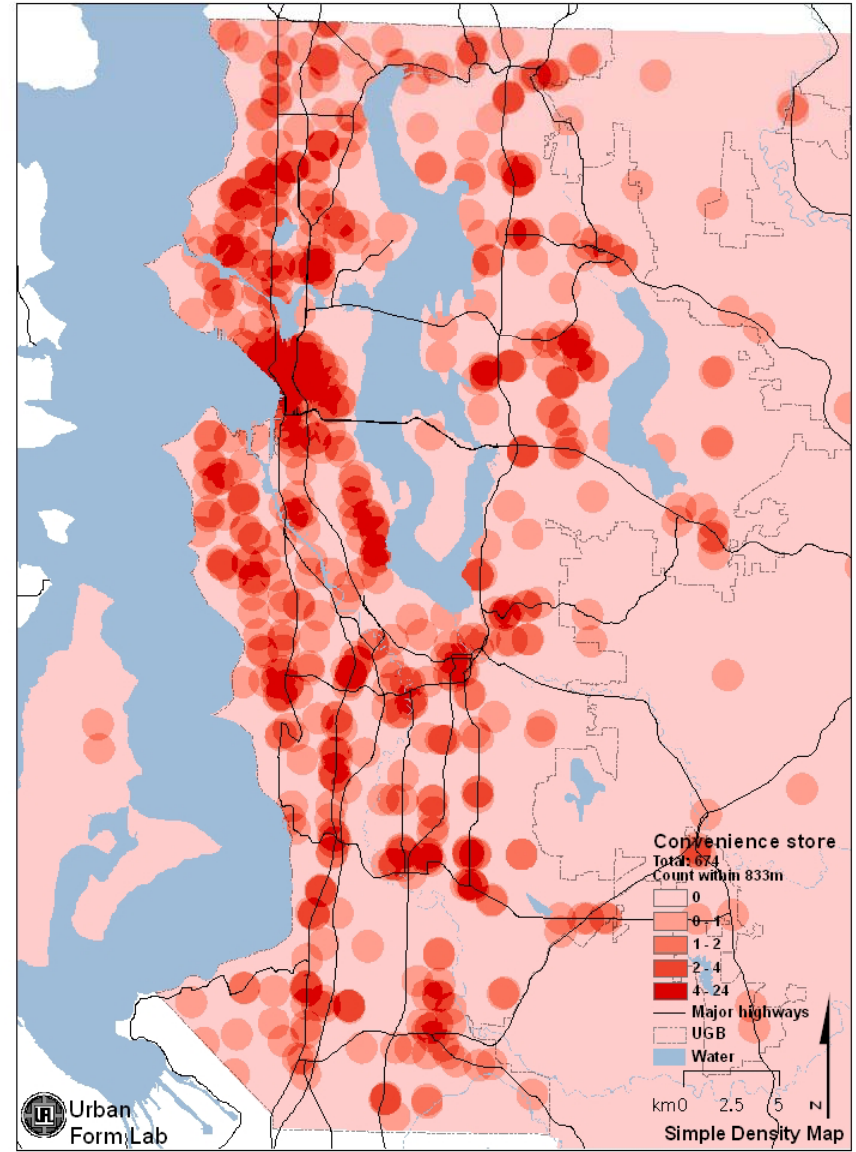
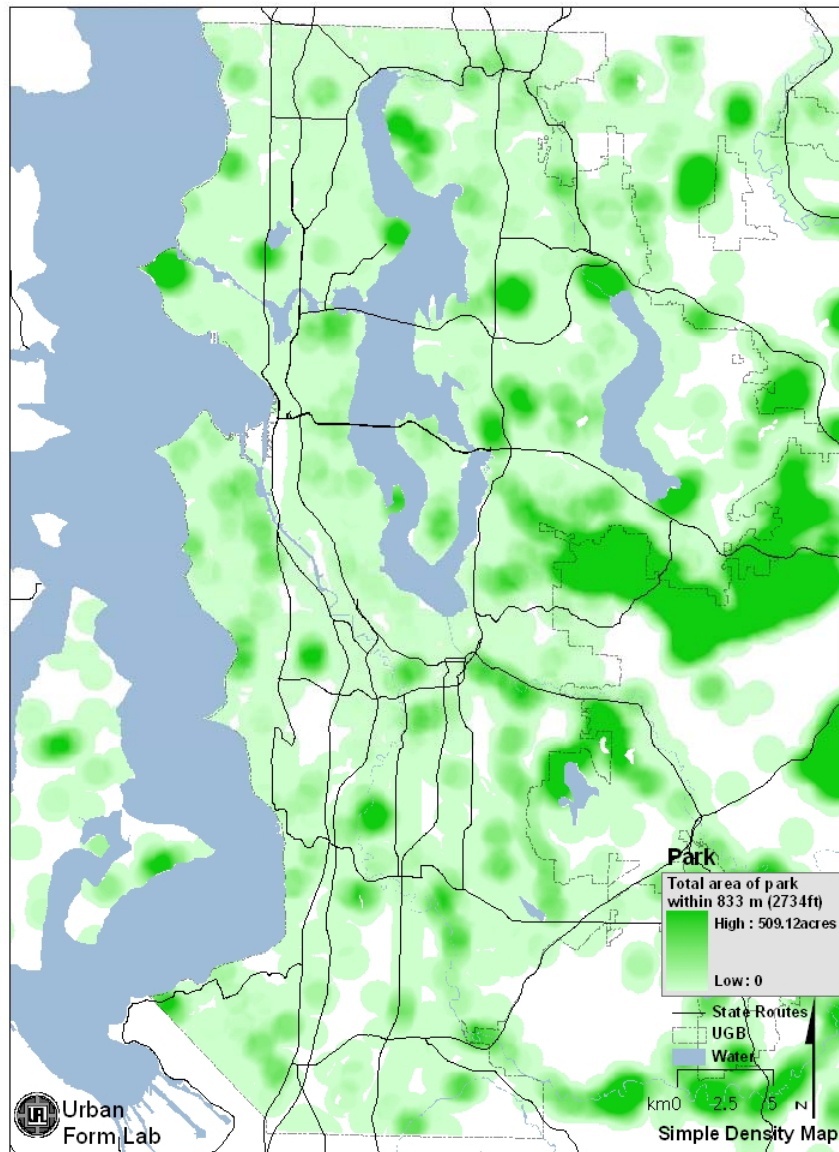


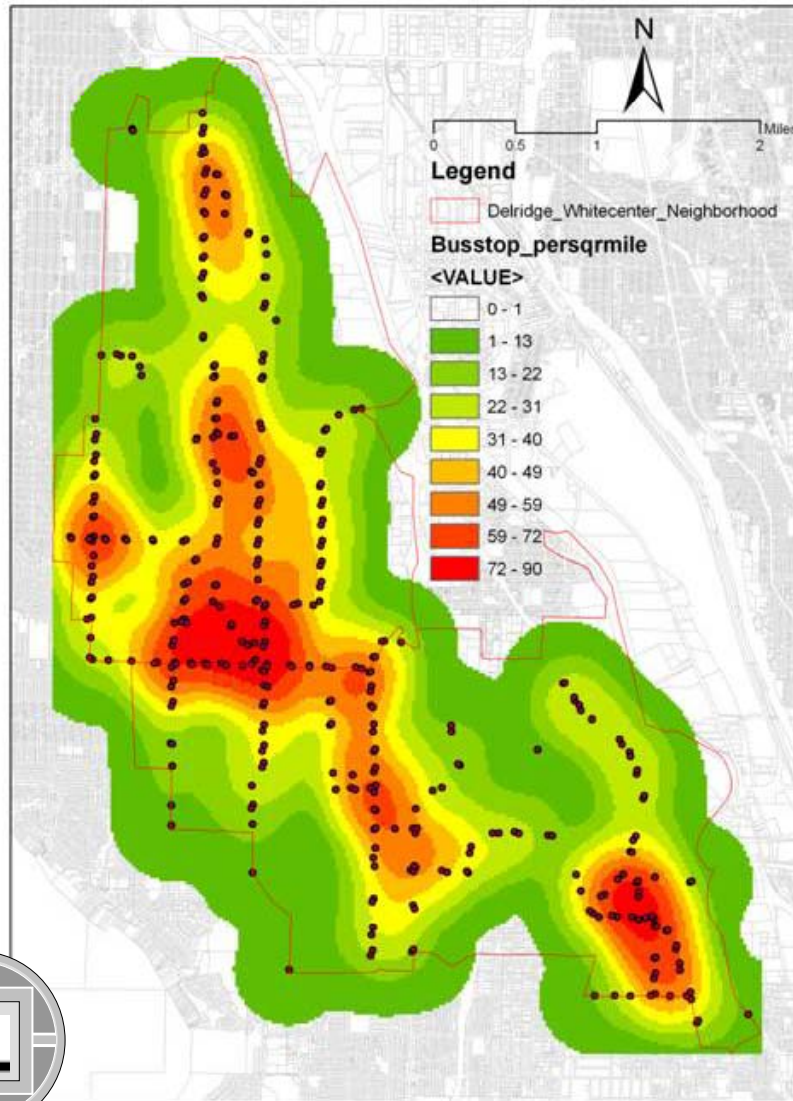
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Proximity and opportunity: Parks and convenience store density

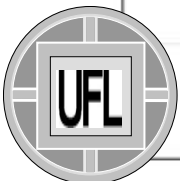
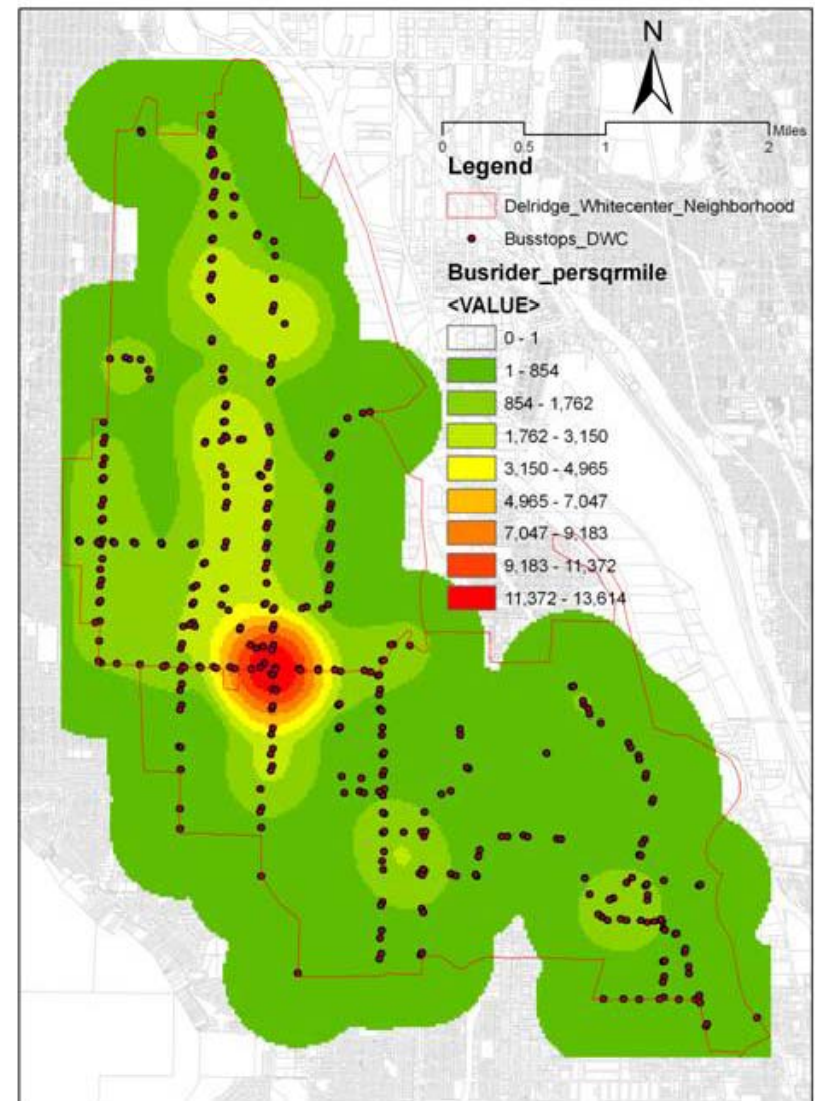


Transit: ENVIRONMENT (EXPOSURE) VS. BEHAVIOR (ACCESS)

KDE analysis of Bus Stops (stop/sqrmile)



KDE analysis of Bus Ridership (rider/sqrmile)



Discarded needles and the urban environment: A spatial analysis of attractors, deterrents and disposal options Luc de Montigny 2008



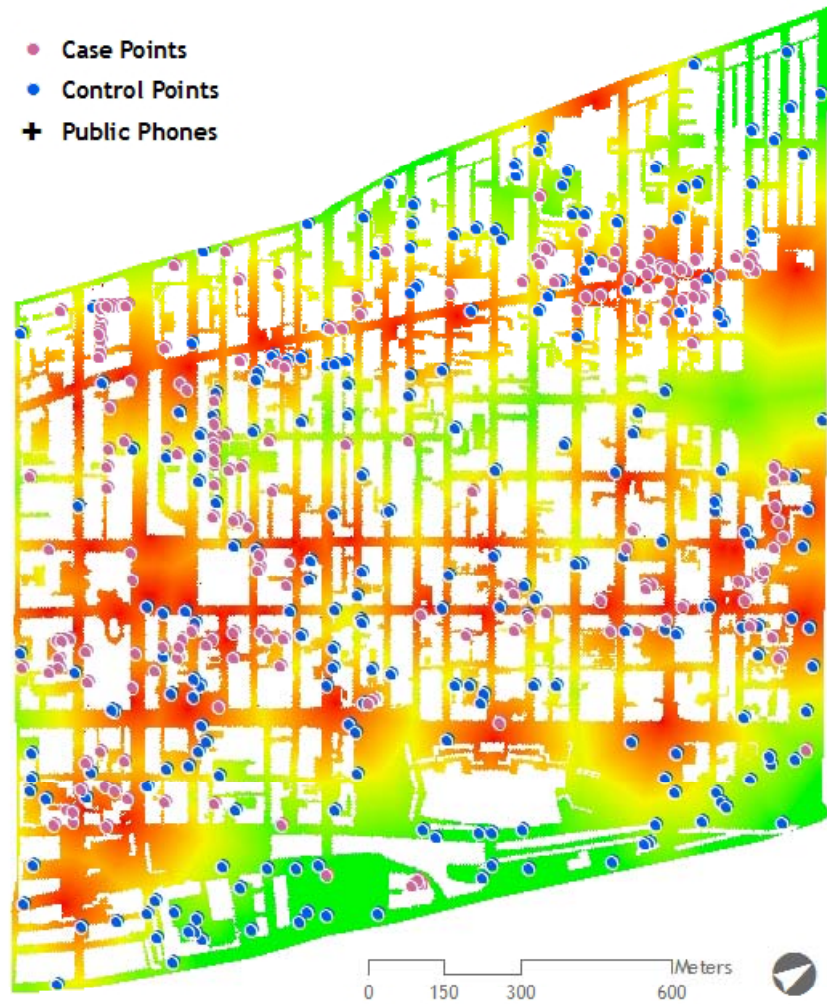
Figure 2: Map of study area



Figure 3: Map of locations of discarded needles collected in non-park open spaces

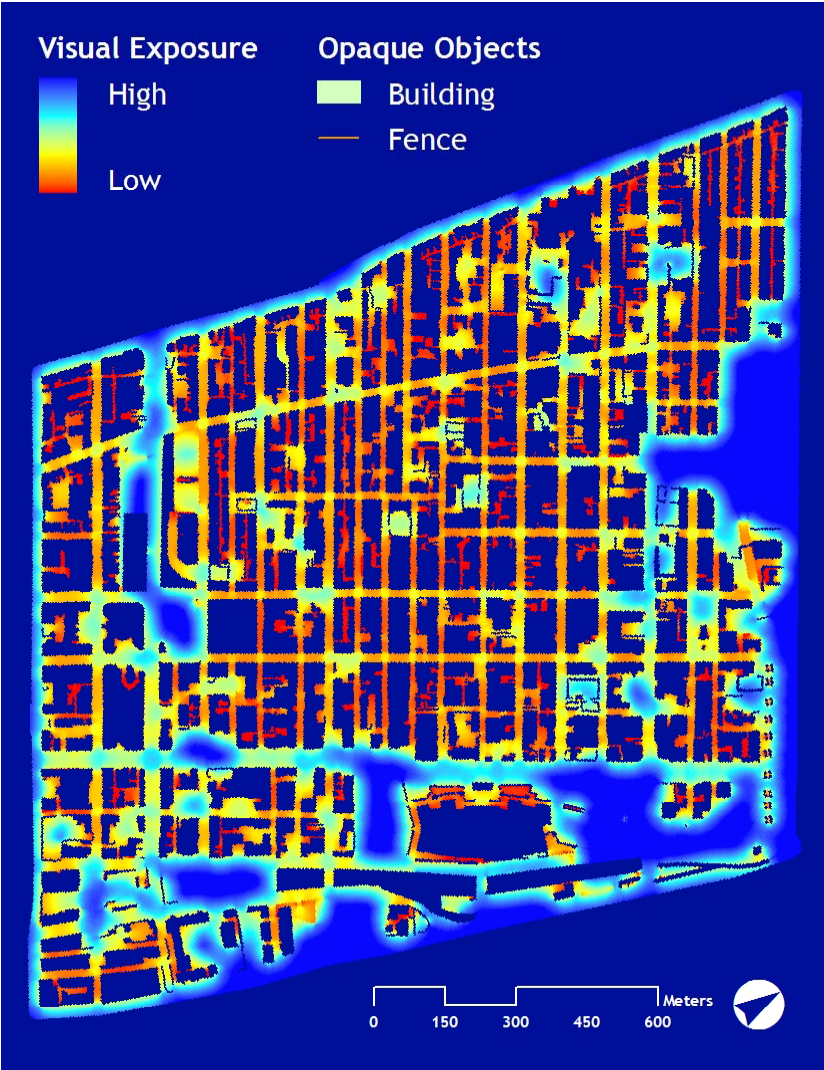
Measurement

Example of Proximity Measure



Measurement

Exposure



Luc de Montigny 2008

Walkable Area |



Figure 4: Map of "walkable" area

Sample Frame |



Figure 18: Map of the sample-frame

Luc de Montigny 2008

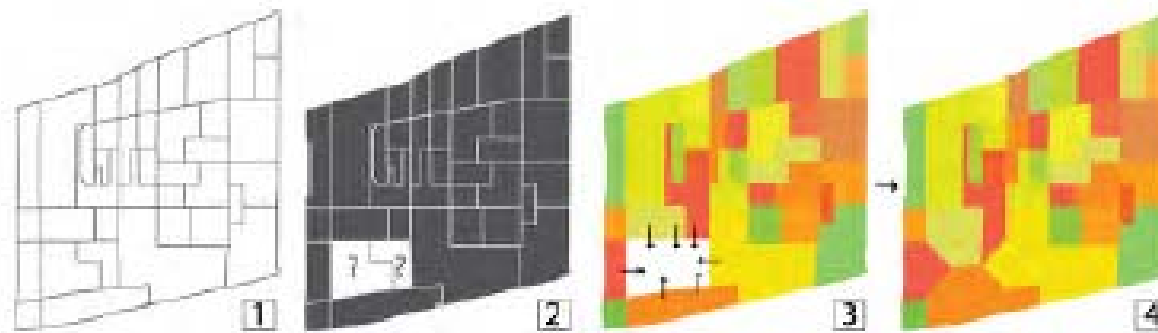


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Where, 1) Census units; 2) Units with missing data; 3) Interpellation; and
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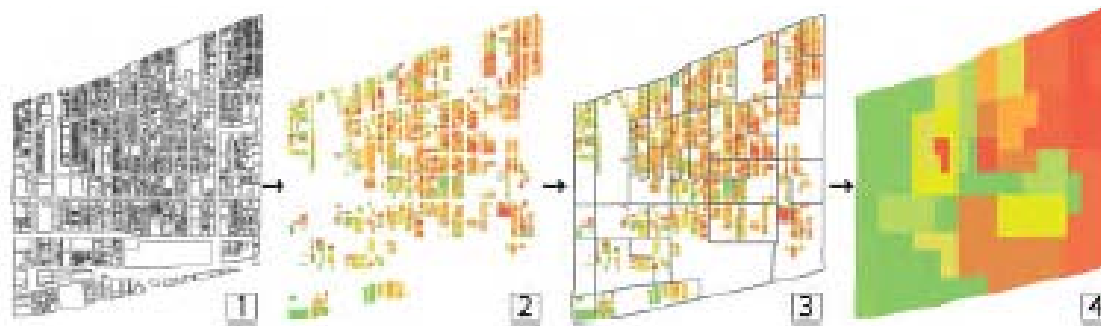


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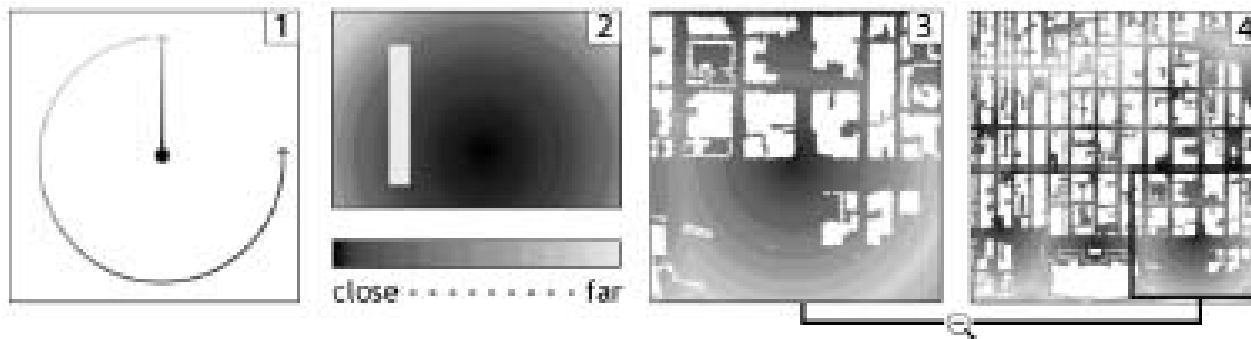


Figure 5: Measurement of proximity using Euclidean distance
 Where, 1) Straight-line distance; 2) Through barriers, and 3 & 4) Examples of application

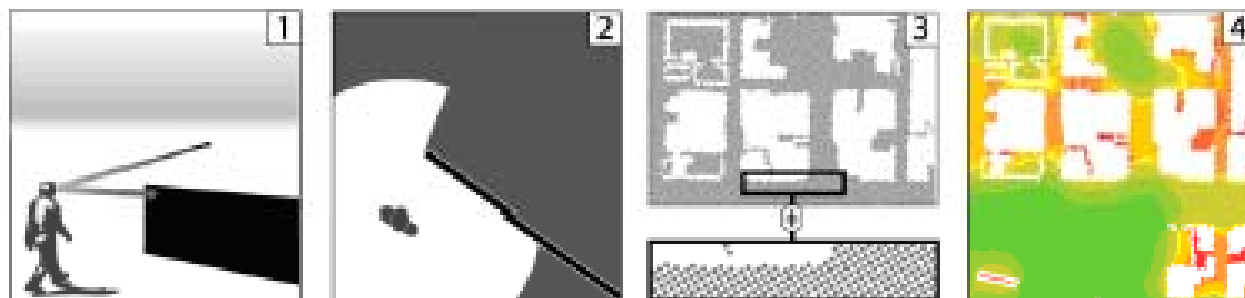


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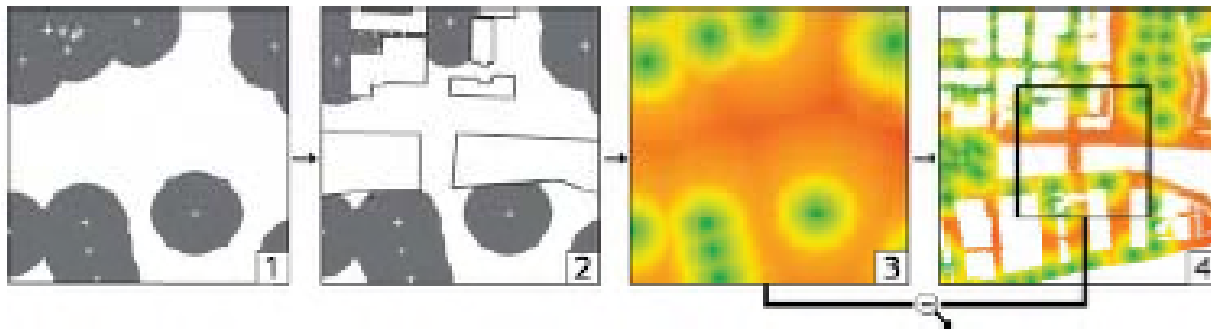


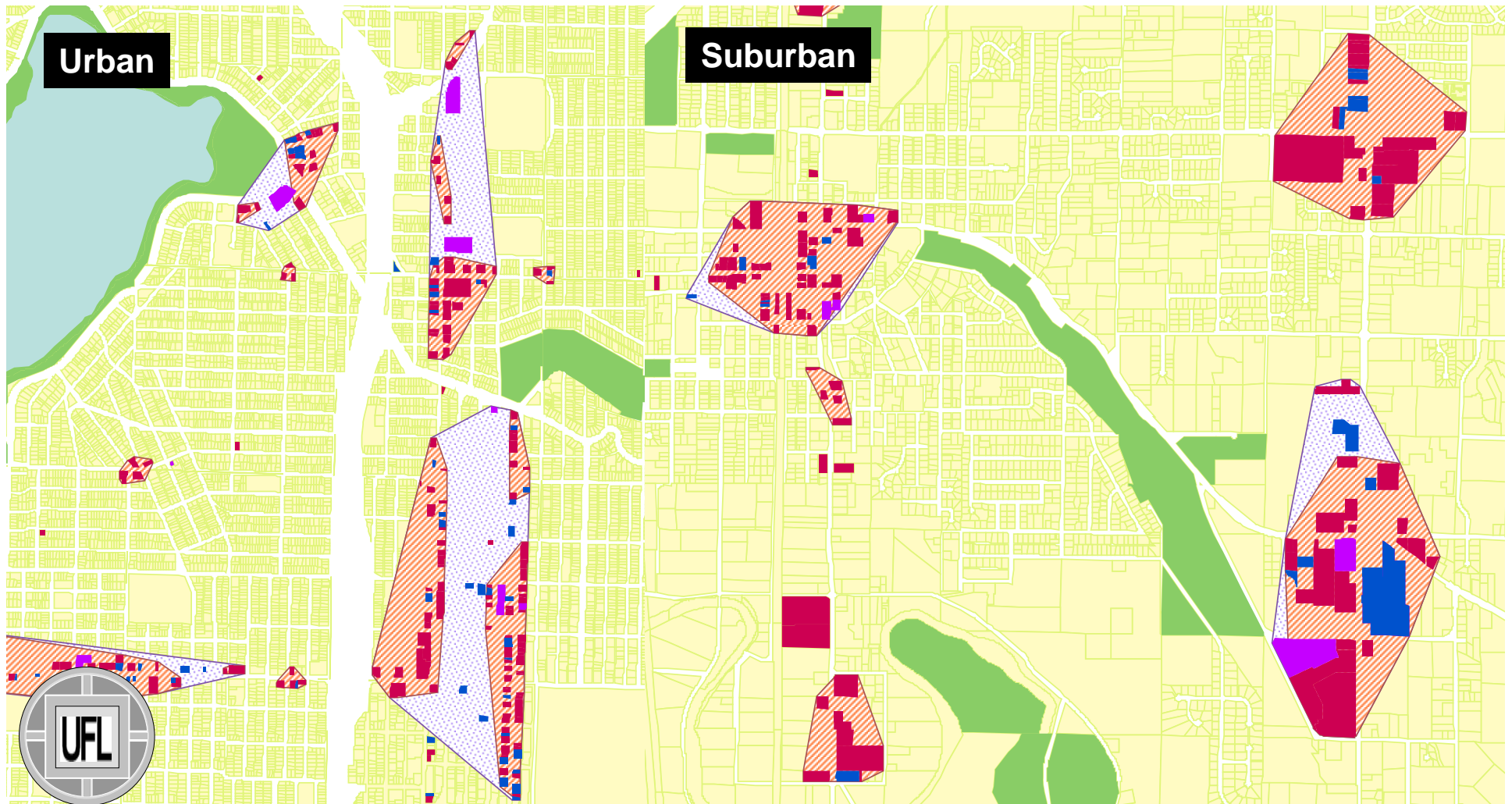
Figure 11: Measurement of artificial lighting
Where, 1) Uninterrupted Euclidean buffers; 2) Buffers and barriers; 3) Euclidean distance measure; and 4) Euclidean distance clipped by barriers

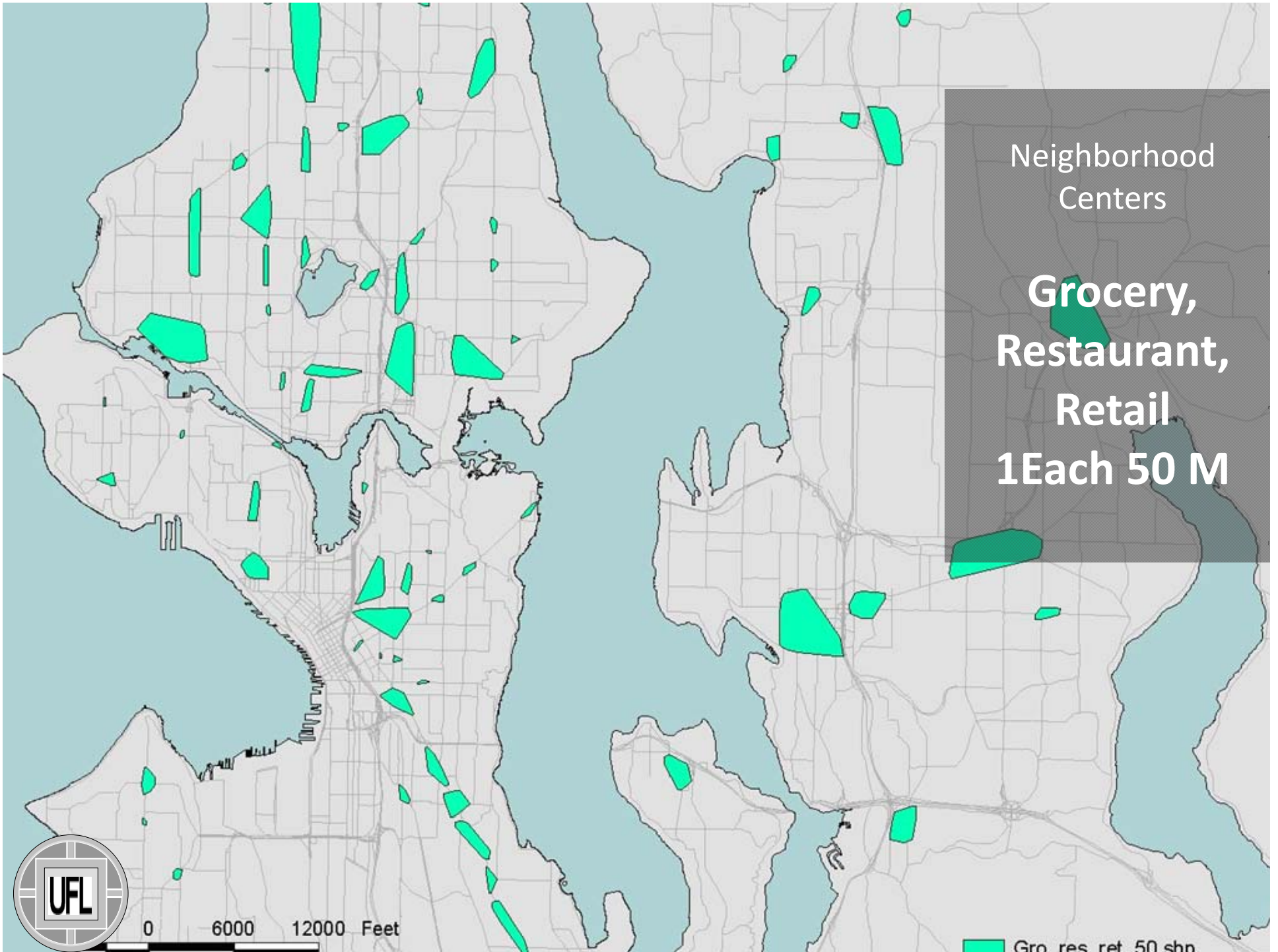
4.4. Cluster analysis

Neighborhood Centers

Neighborhood Centers

- Retail only (3 minimum within 50 M)
- Retail, Grocery, and Restaurant (1 of each, 3 minimum within 50 M)

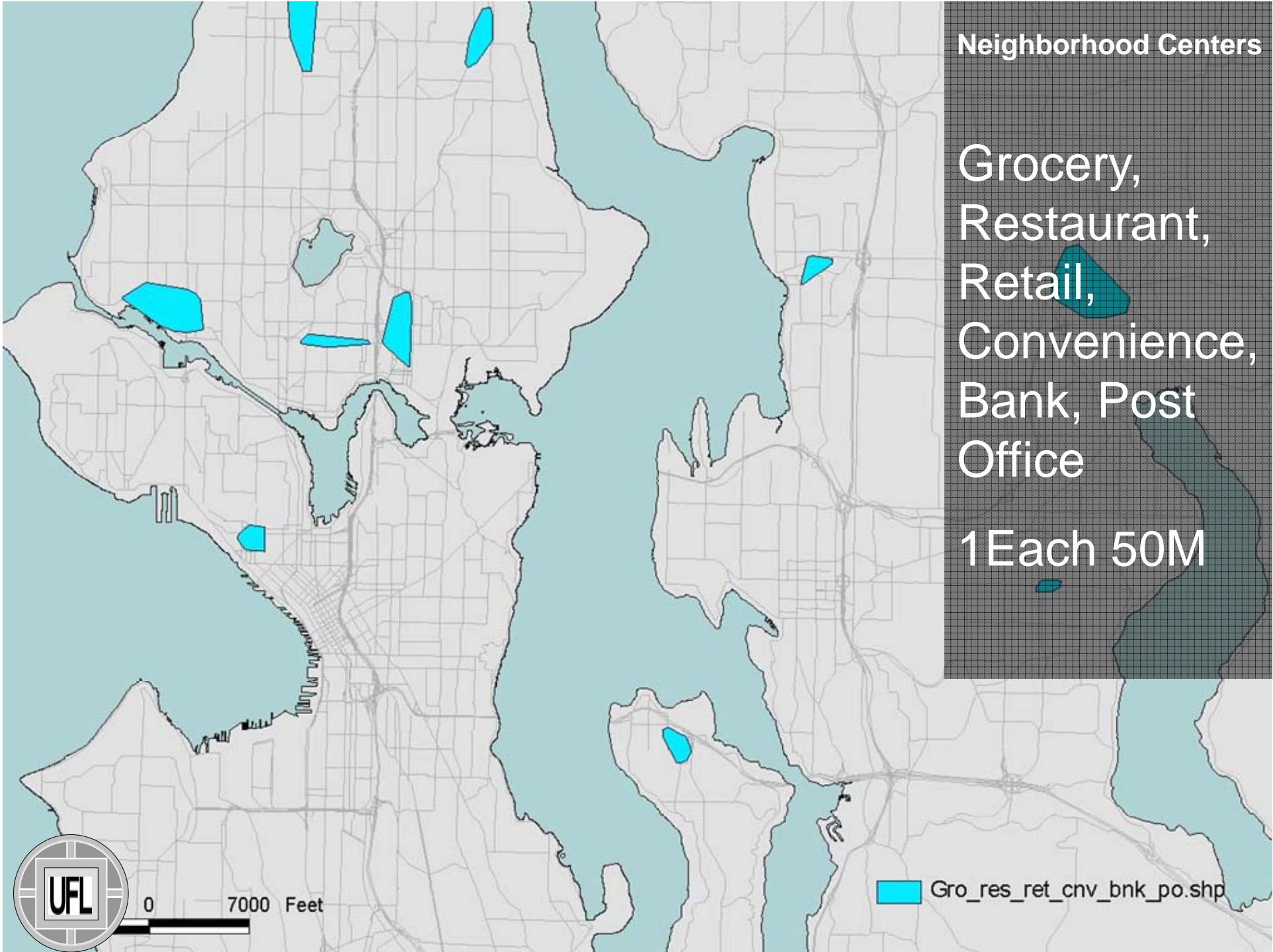




Neighborhood
Centers

**Grocery,
Restaurant,
Retail**
1 Each 50 M

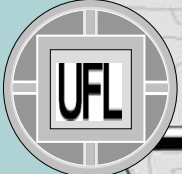
Gro res ret 50 shp



Neighborhood Centers

Grocery,
Restaurant,
Retail,
Convenience,
Bank, Post
Office

1 Each 50M



0 7000 Feet

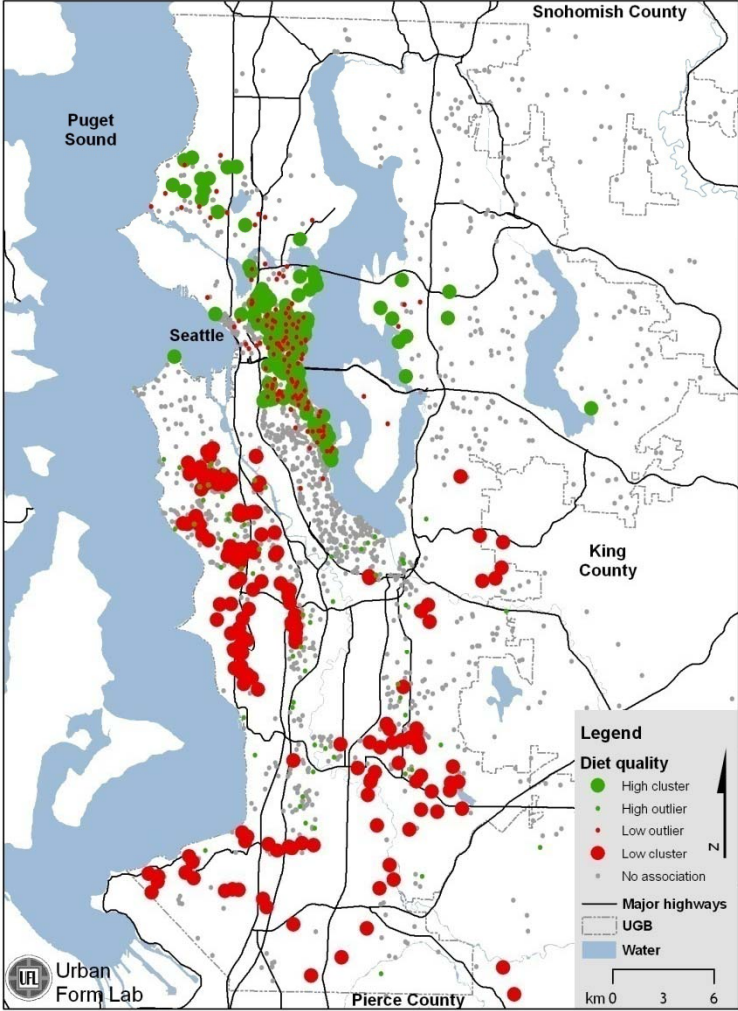
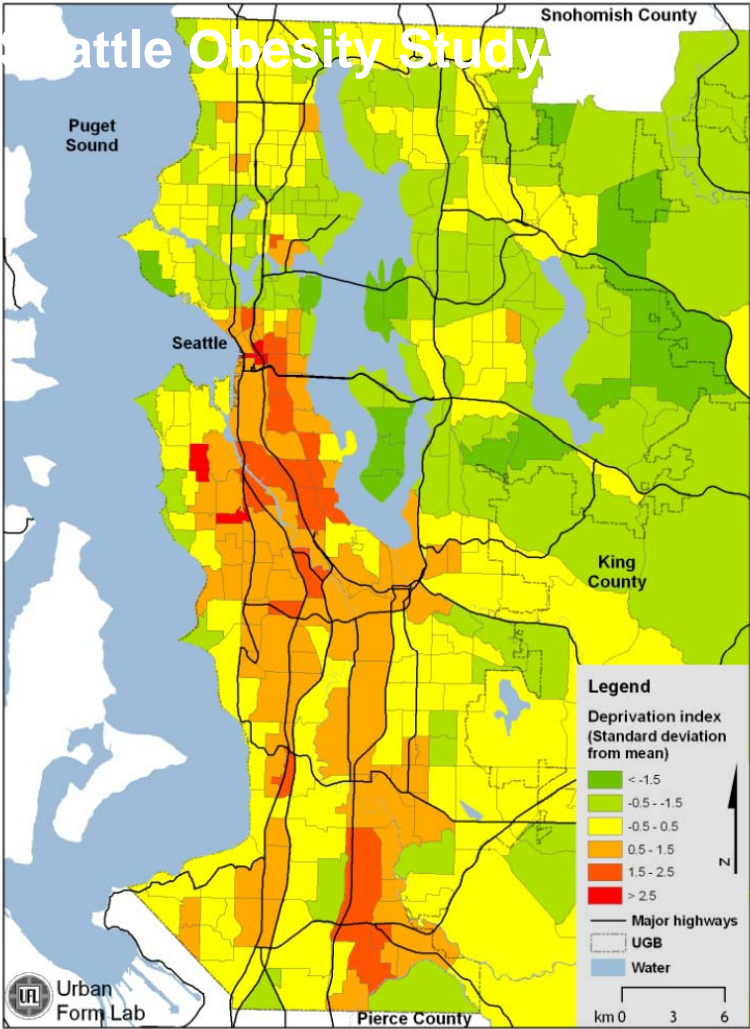
Gro_res_ret_cnv_bnk_po.shp

4.4. Cluster analysis Moran I's and SaTScan)

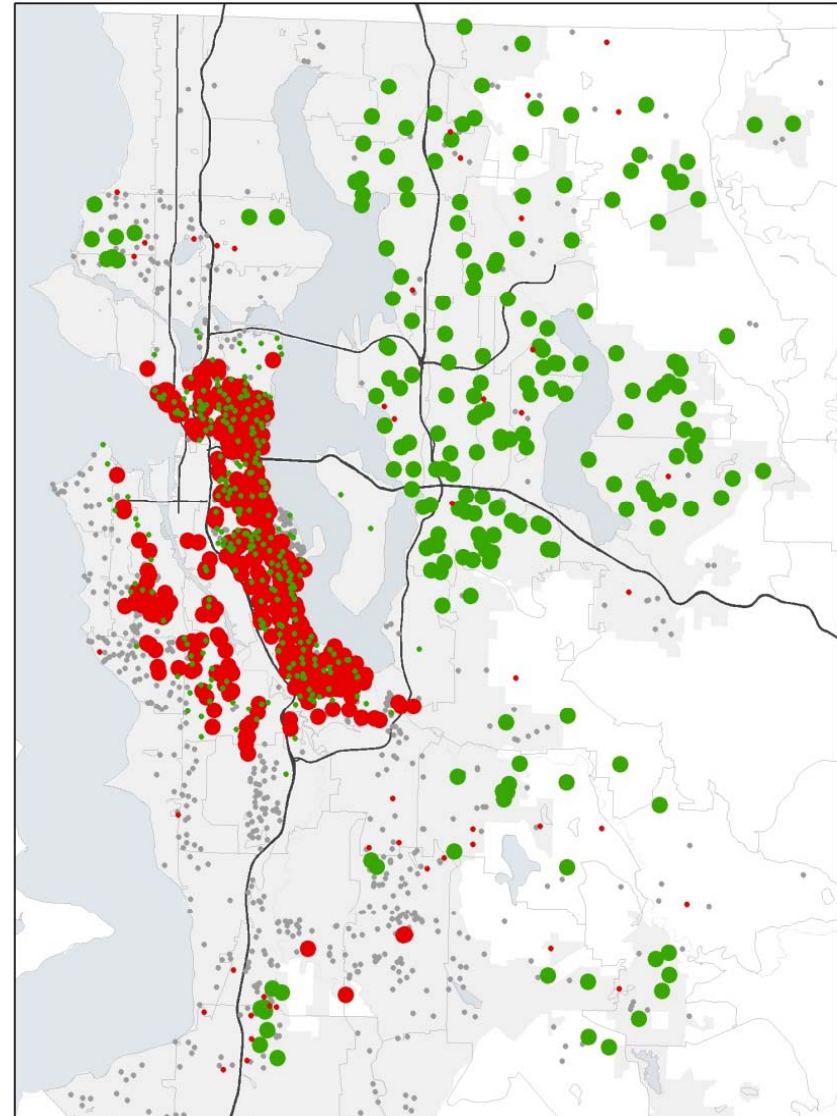
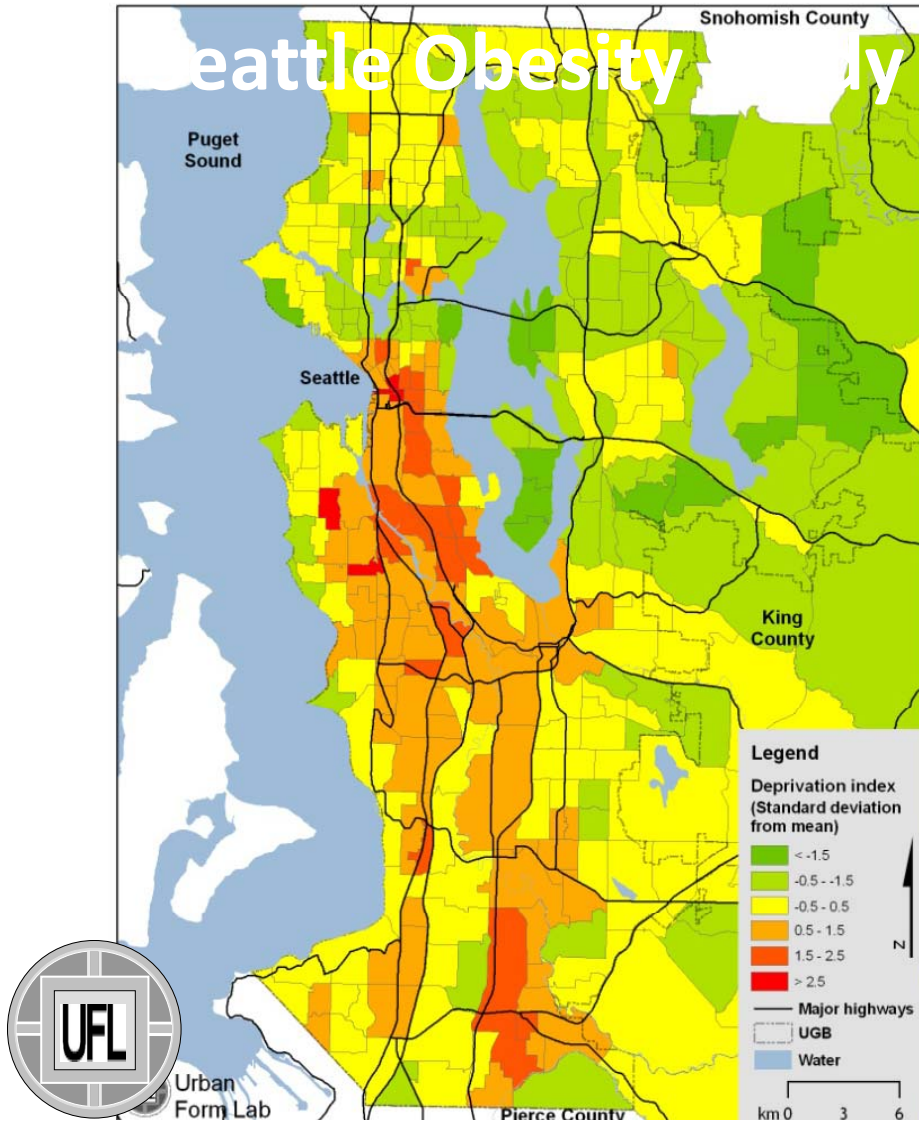


4.4. Geospatial analyses to measure and model the environment or behaviors (neighborhood centers; clustering Moran I's and SatScan)

Deprivation index and reported health status

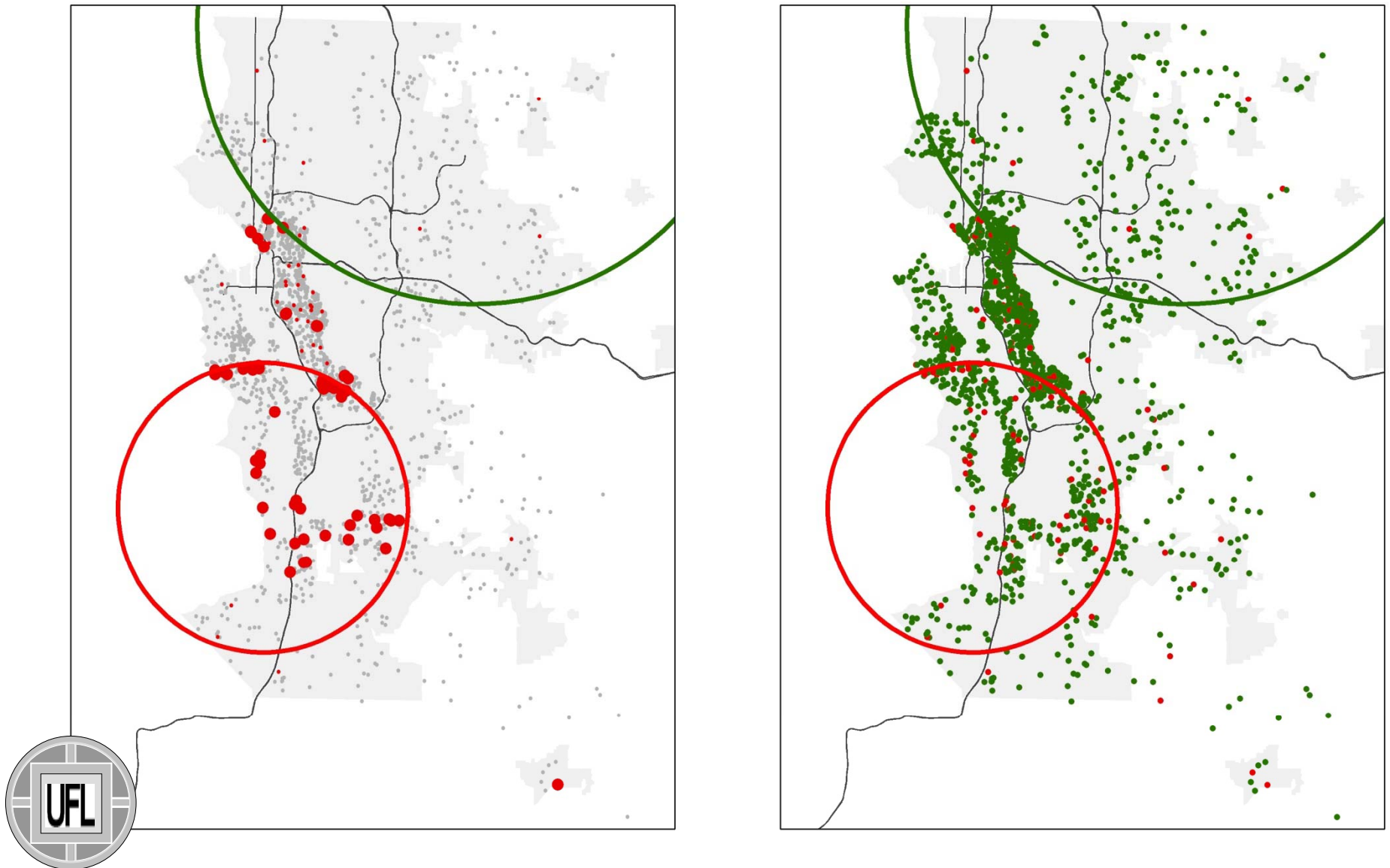


Perception of neighborhood crime



Self-reported diabetes

SatScan vs Moran's I



Summaries

- Scale & resolution
- Time-space dimensions
- Exposure vs. access/use
- Clustering (people & environment)



References

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- Rodriguez, D., A. Brown, P.J. Troped (2005). Portable global positioning units to complement accelerometry-based physical activity monitors. *Medicine & Science in Sports & Exercise*, S572-581
- Schuurman, N., Peters, P.A., Oliver, L.N. (2009). Are Obesity and Physical Activity Clustered? A Spatial Analysis Linked to Residential Density. *Obesity (Silver Spring)* 17(12): 2202-2209.
- Troped, P.J, M.S. Oliveira, M.S., C.E. Matthews, E.K. Cromley, S.J. Melly, and B.A. Craig (2008). Prediction of activity mode with global positioning system and accelerometer data. *Medicine & Science in Sports & Exercise*, 40(5) 972-978
- Wieters, M, J. Kim, C. Lee (2008). Assessment of available research instruments for measuring physical activity. Association of Collegiate Schools of Planning, Chicago, IL.

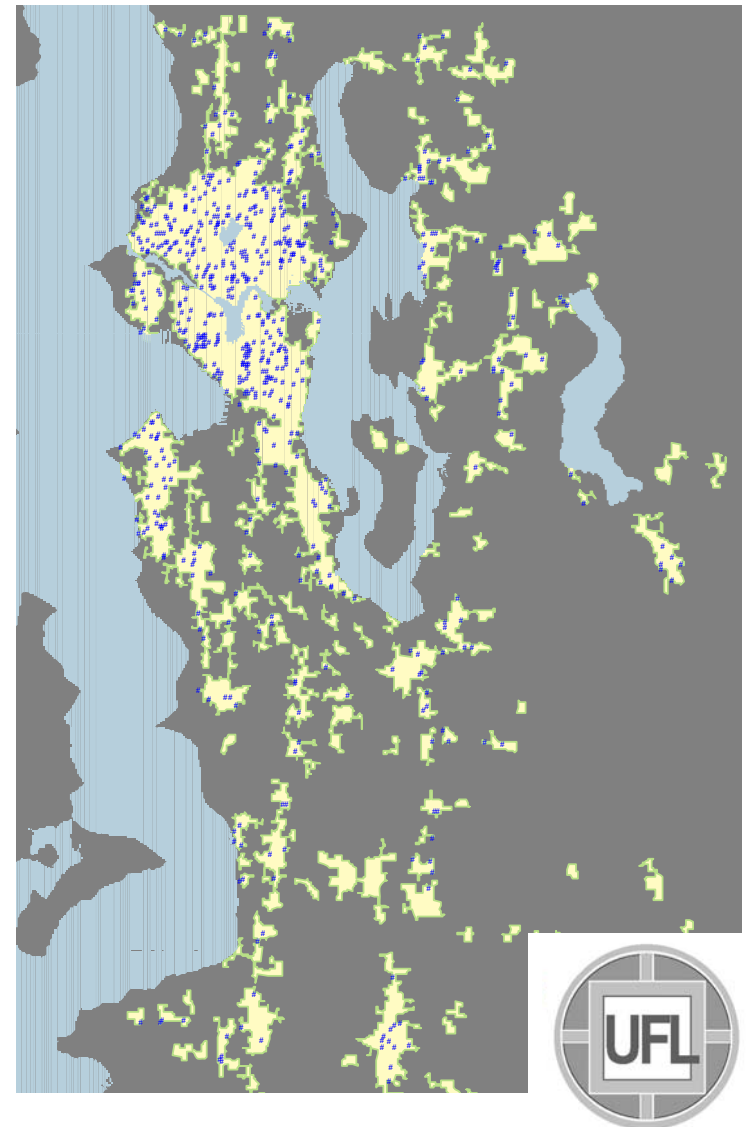
Objective 4

Learn and discuss about geospatial analyses to measure and model the environment or behaviors

4.1. Predicting behavior based on environmental exposure and access/use

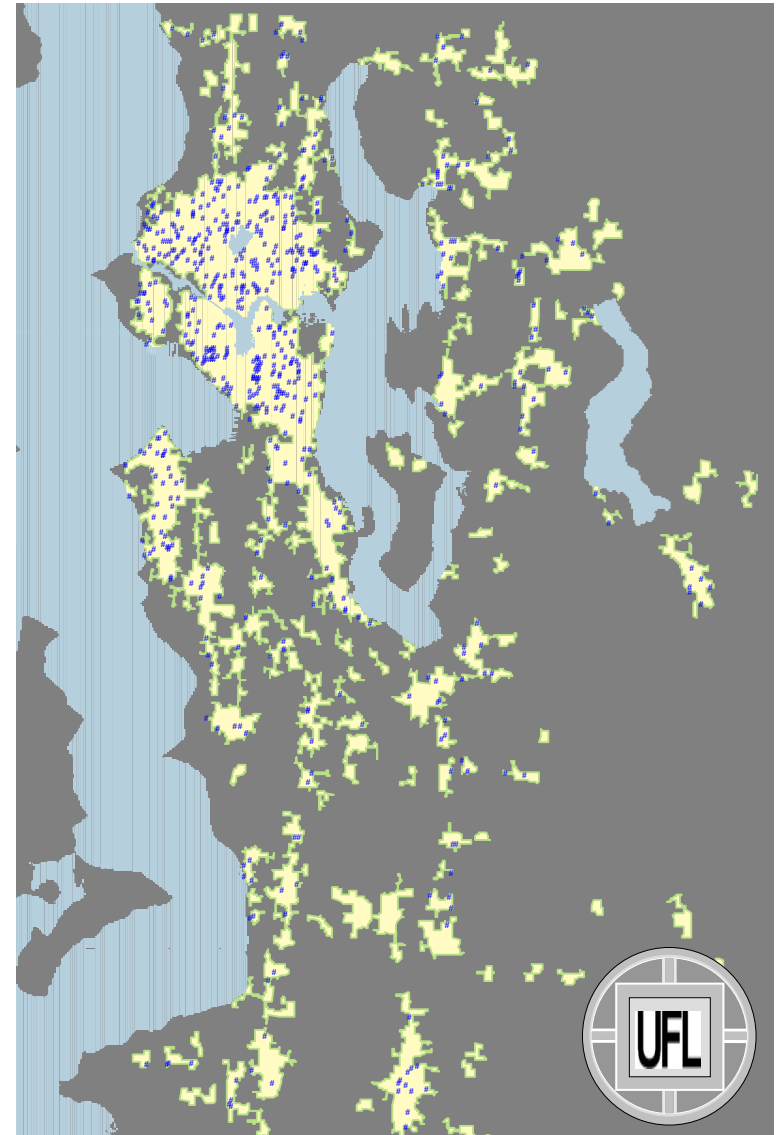
Surface Models

- LOCATIONS: 608 random sample of survey respondents in the sample frame
- ESTIMATING PROBABILITY OF WALKING: Multinomial logistic regression models were developed to estimate the probability of a “Moderate Walker” (1-149 min per week) or “Sufficient Walker” (≥ 150 min per week), relative to not walking (0 min walking per week).
- VALUES of LOCATIONS: values (probability of walking) are calculated using the regression



Methods

- Multinomial logit models estimating
 - odds of walking sufficiently (150+minutes per week, meeting the recommendation for health)
 - moderately (1-149 minutes per week),
 - relative to not walking
- Objective environmental variables that showed statistical significance in the models were translated into audit items.



Top predictors of walkability

Environmental Characteristic
(Threshold Value)

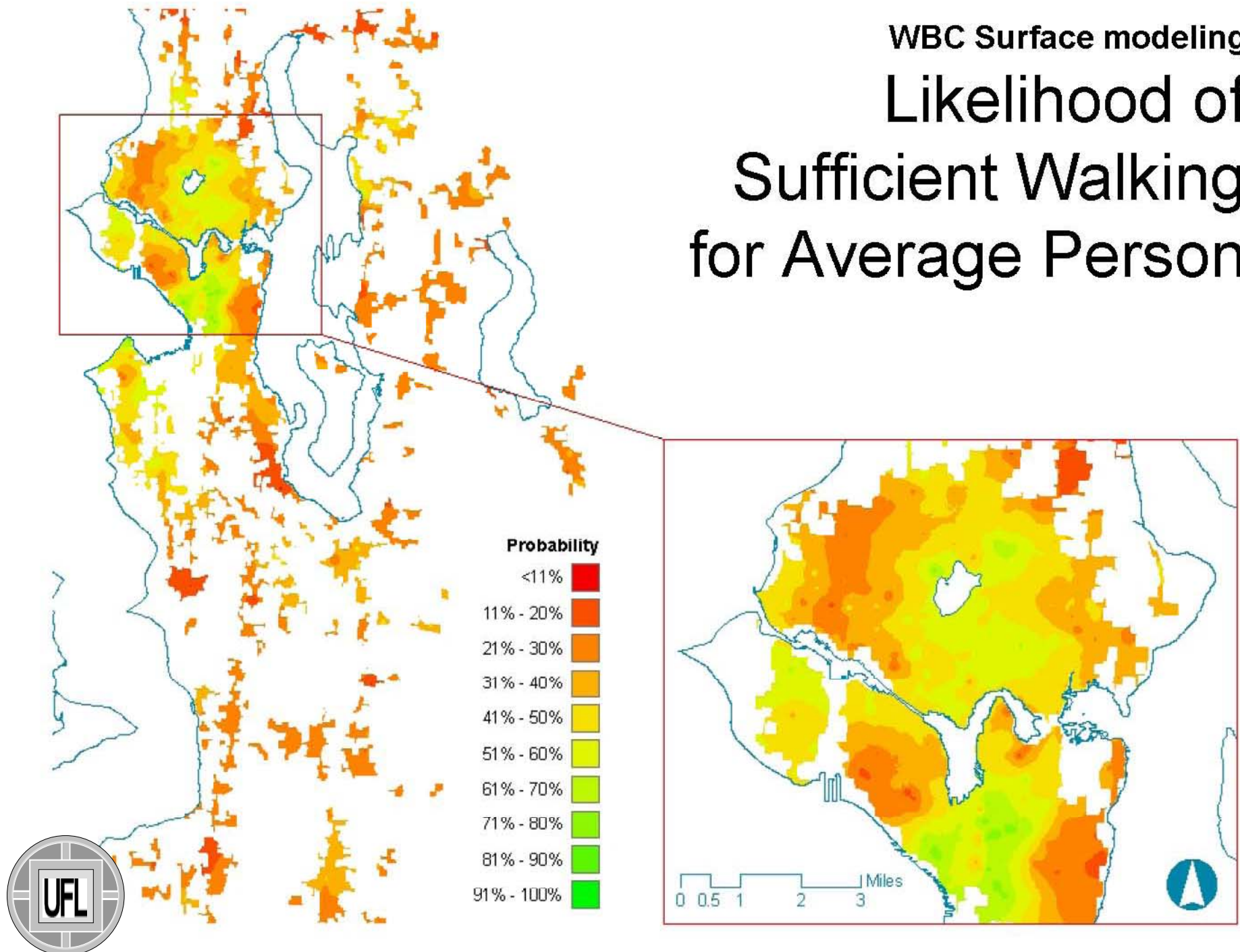
Odds ratio of walking >150 min/week vs. not walking
(airline measurement)

•Shorter distance to closest grocery store (<440 m)	2.257**
•Fewer grocery stores or markets within buffer (less than 3.7)	1.50*
•More grocery store/restaurant/retail clusters in 1km buffer (more than 1.8)	1.697**
•More dwelling units per acre of the parcel where the residence is located (more than 21.7 units/net acre)	1.959**
•Fewer educational parcels in 1km buffer (less than 5.1)	1.553*
•Smaller size of closest office complex (less than 36,659 m ² or 9 acres)	1.28*
•Longer distance to closest office/mixed use complex (more than 544 m)	1.27*§
•Smaller block size where residence is located (less than 23,876 m ² or 5.9 acres)	1.19*

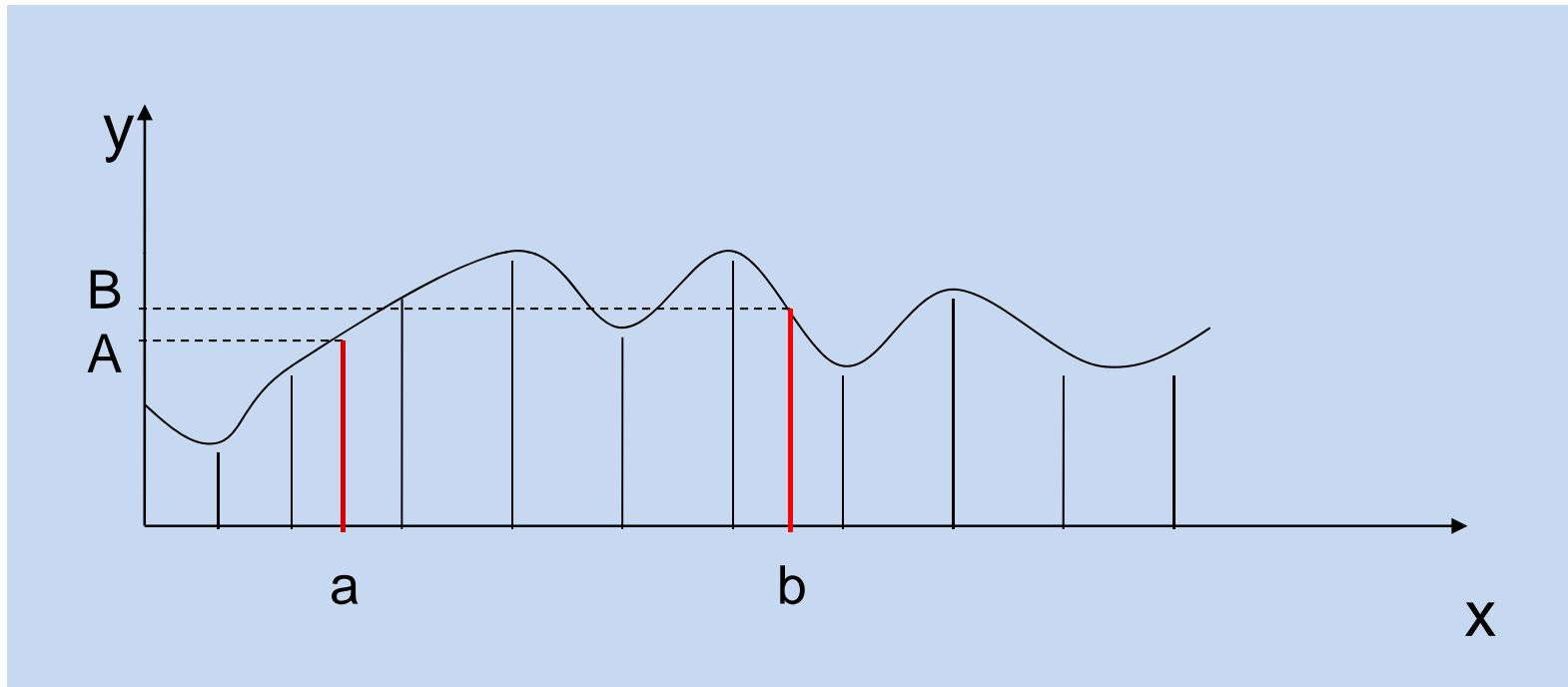
* p < 0.1; **p < 0.05

Adapted from Moudon AV, Lee C, Cheadle A, et al. Attributes of Environments Supporting Walking. Am J Health Promot. 2007;21(5):448-459. *: significant at 0.1 level; **: significant at 0.05 level

WBC Surface modeling Likelihood of Sufficient Walking for Average Person



Surface Modeling Algorithm



WBC Surface modeling

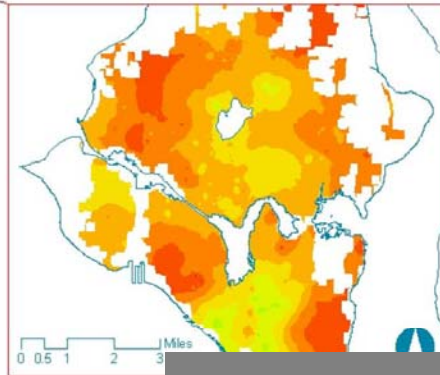
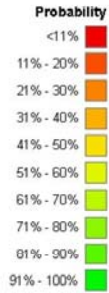
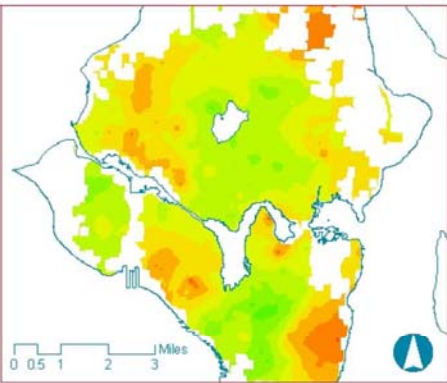


Likelihood of Sufficient Walking

(>150 minute a week)

Older Adult >65

Younger Adults <35



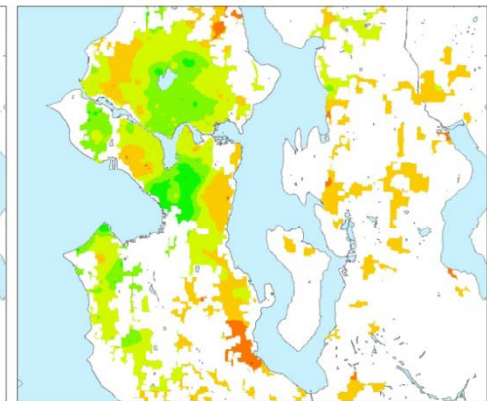
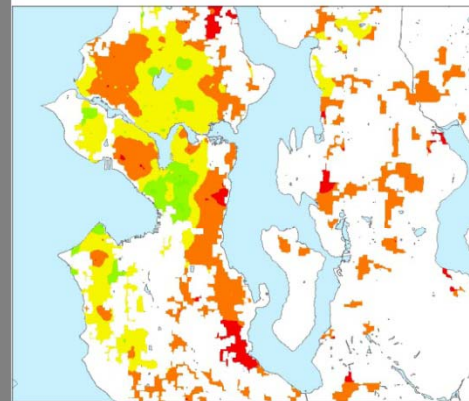
UW Urban Form Lab Walk and Bike Communities project



Probability of Walking Sufficiently

(>150 minute a week)

High / Low Reported Income
(>\$75,000 vs. <\$25,000)



Probability of Walking Sufficiently For Low Income



4.2. Maps in GIS can serve as data layers

E. Berke

Berke E, Koepsell T, Moudon A, Hoskins R. **Physical activity and obesity in older persons: association with the built environment.** American Journal of Public Health 97, 3:1-7

Berke EM, Gottlieb LM, Moudon AV, Larson EB. **Protective Association of Neighborhood Walkability with Depression in Older Males.** J Am Geriatr Soc. In Press.

Research Goal

–Evaluate the association of individual-level neighborhood walkability with depression and physical activity in older adults.

E. Berke

Subject Population

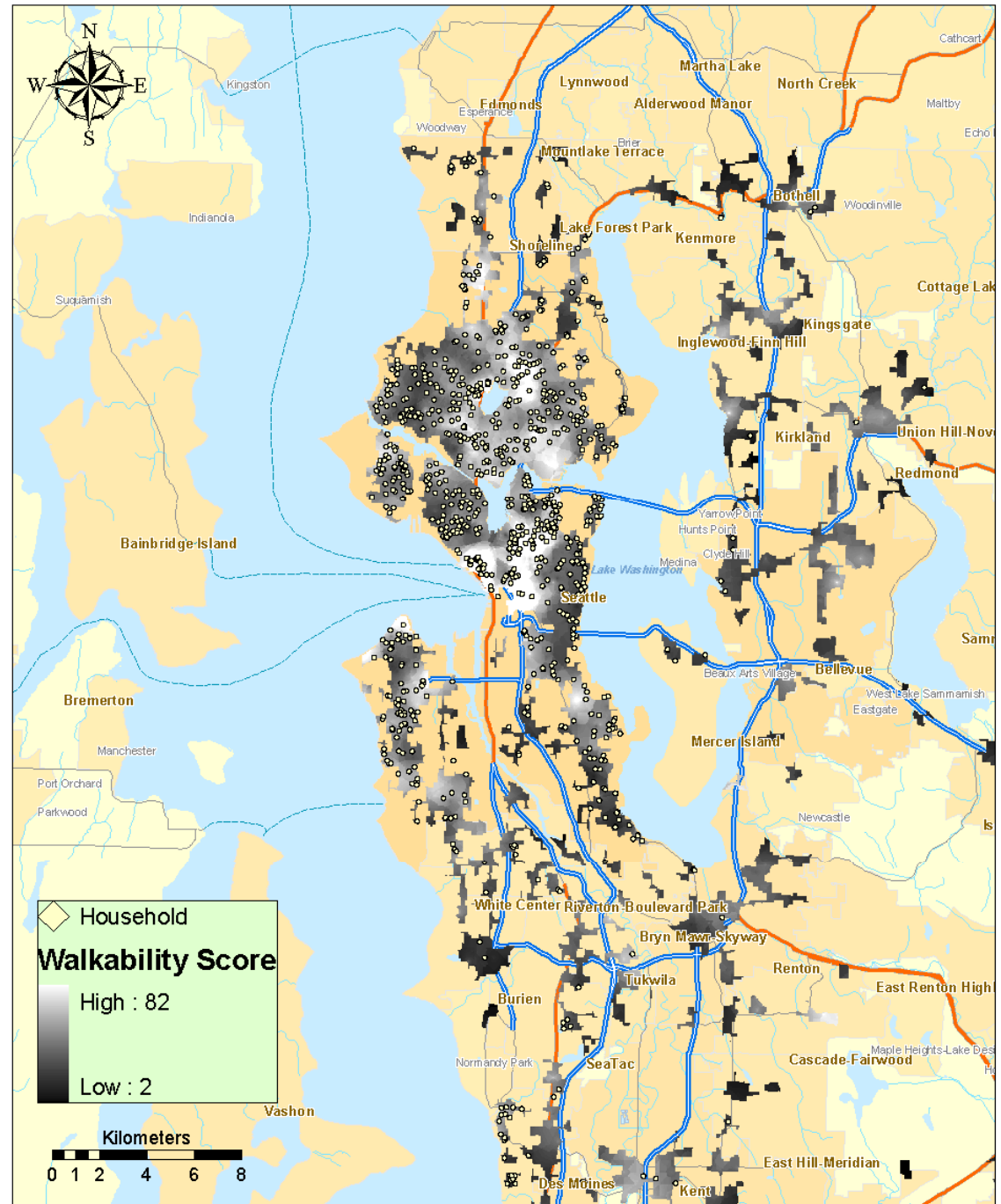
- Adult Changes in Thought (ACT) study
 - Group Health Cooperative study - 1994 - present
 - Prospective longitudinal design
 - ≥ 65 y/o
 - ~2500 subjects
 - Surveyed biennially
 - Information on BMI, self-reported walking, depression
 - Chronic dz burden, demographics, health conditions

Neighborhood

- Subjects geocoded at parcel level
 - 100m, 500m, 1000m, buffers
- Walkability score computed for each person at each buffer size

E. Berke Individual-Level Advantages

- Precise description of habitat immediately around subject's home
- Not census or other aggregate measure
- Reduced risk of ecologic fallacy



Results Walkability Score and Walking

Older adults (65-97; n = 936)

Berke E, Koepsell T, Moudon A, Hoskins R. Physical activity and obesity in older persons: association with the built environment. American Journal of Public Health 97, 3:1-7

- ✓ Higher walkability scores significantly associated with more walking for exercise across buffers of varying radii

(for men, odds ratio [OR]=5.86; CI=1.01, 34.17 to OR=9.14; CI=1.23, 68.11; for women, OR=1.63; CI=0.94, 2.83 to OR=1.77; CI=1.03, 3.04).
- ✓ A trend toward lower body mass index in men living in more walkable neighborhoods did not reach statistical significance.

Results

Walkability Score and Depression

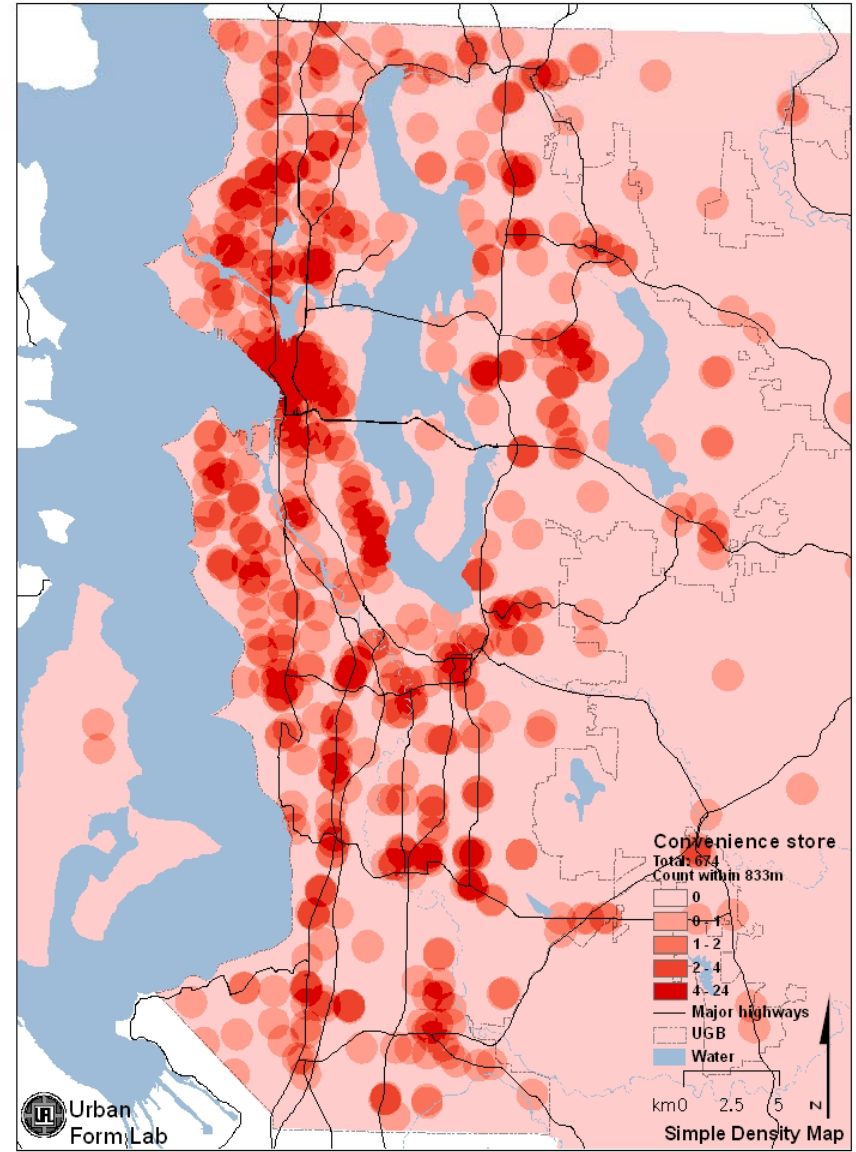
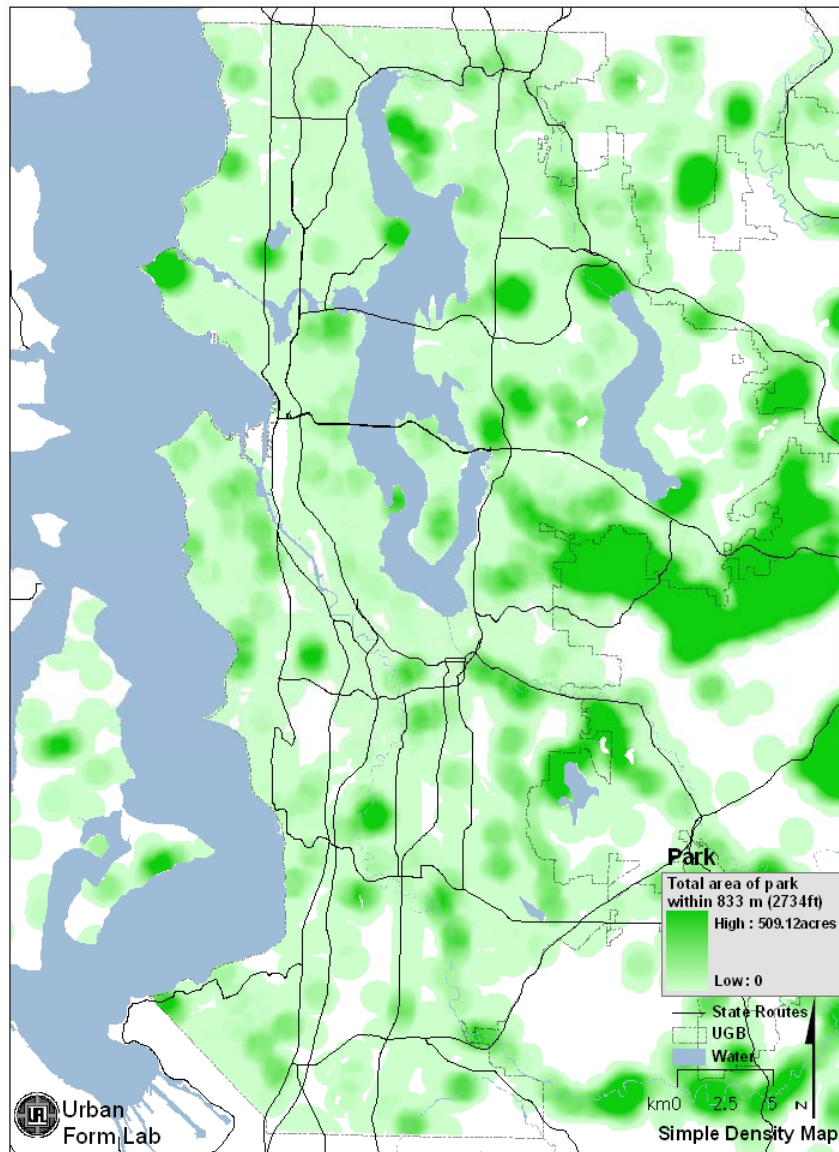
(n = 740; >65y)

Berke EM, Gottlieb LM, Moudon AV, Larson EB. Protective Association of Neighborhood Walkability with Depression in Older Males. J Am Geriatr Soc. In Press.

- ✓ Physical activity known to be inversely related to depression in older persons
- ✓ Neighborhood Walkability Scores negatively associated with depression in older males [adjusted for individual-level risk factors of income, physical activity, education, smoking status, living alone, age, and chronic disease burden]
- ✓ OR (interquartile range of walkability score, 25th-75th percentile) = 0.32 to 0.34 for buffer radii of 100, 500, and 1000 m ($p = 0.01$ to 0.02)

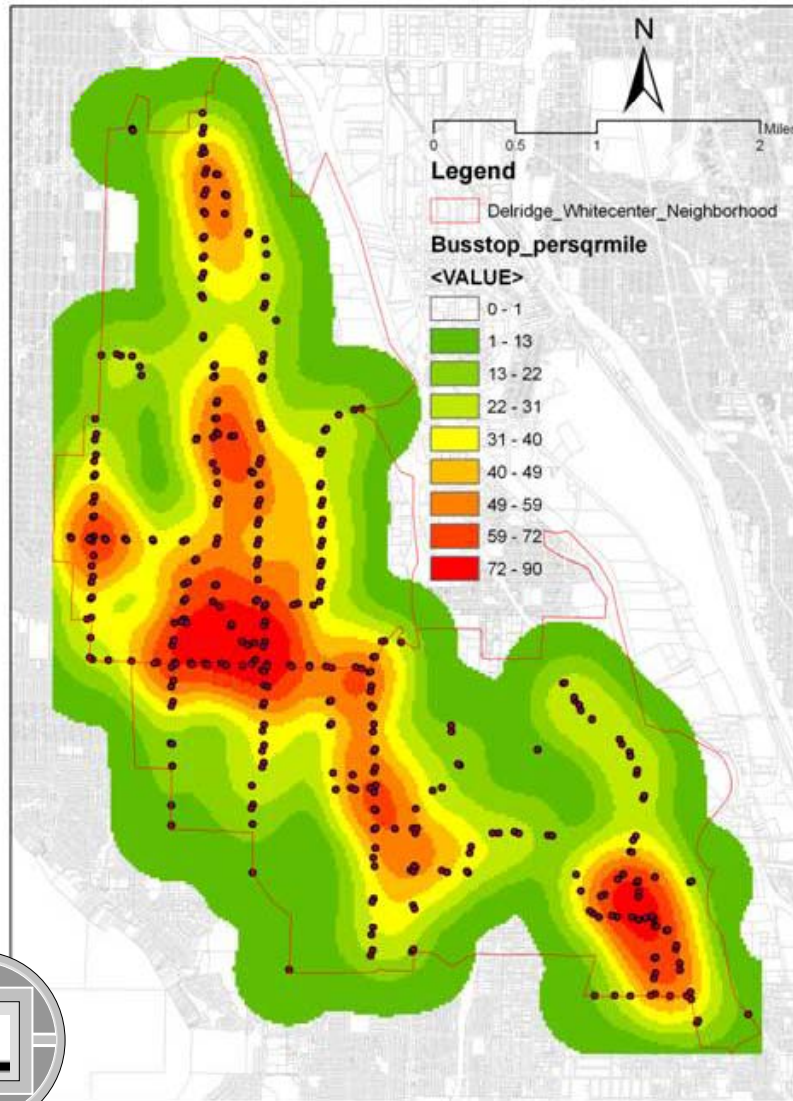
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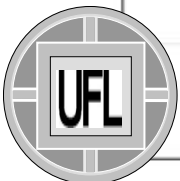
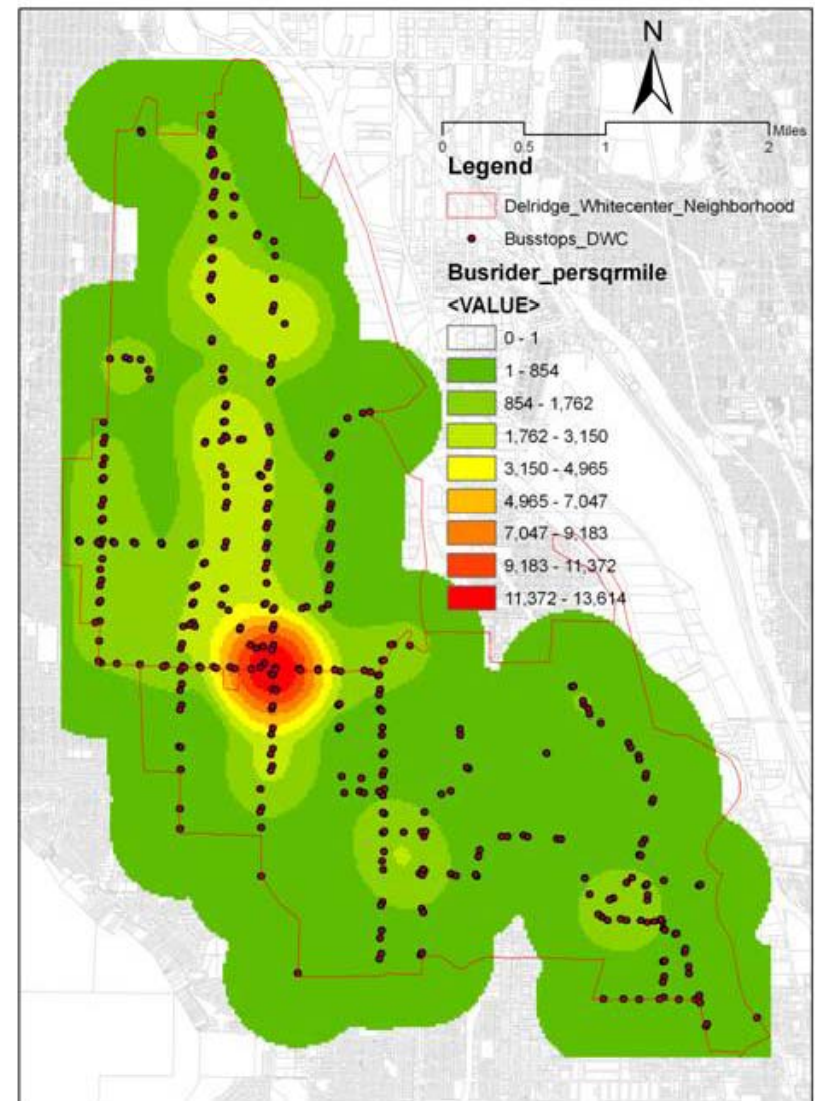


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KDE analysis of Bus Ridership (rider/sqrmile)



Discarded needles and the urban environment: A spatial analysis of attractors, deterrents and disposal options Luc de Montigny 2008



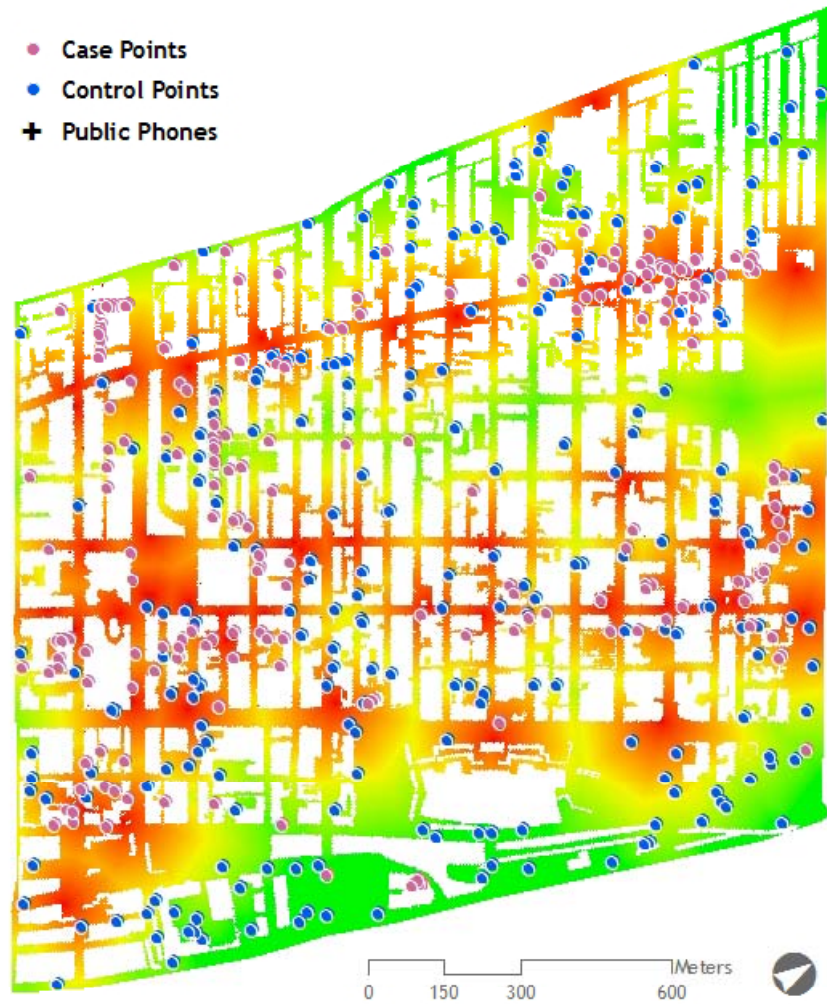
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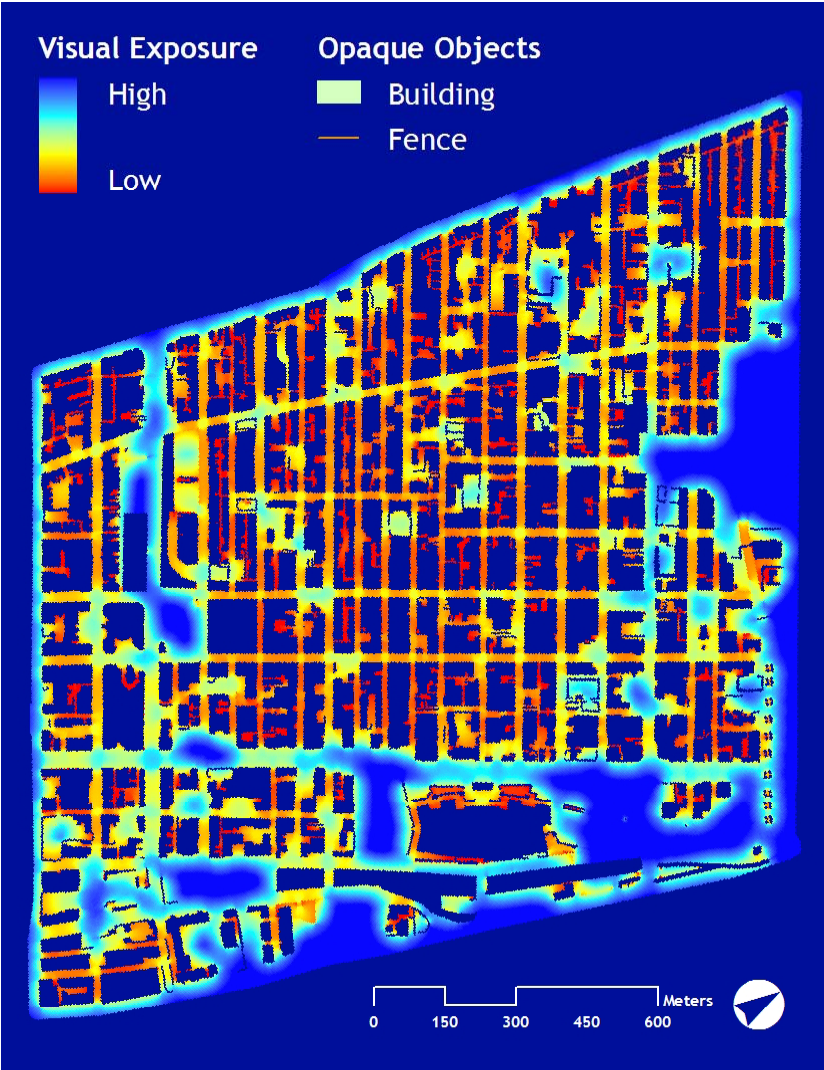
Measurement

Example of Proximity Measure



Measurement

Exposure



Luc de Montigny 2008

Walkable Area |



Figure 4: Map of "walkable" area

Sample Frame |

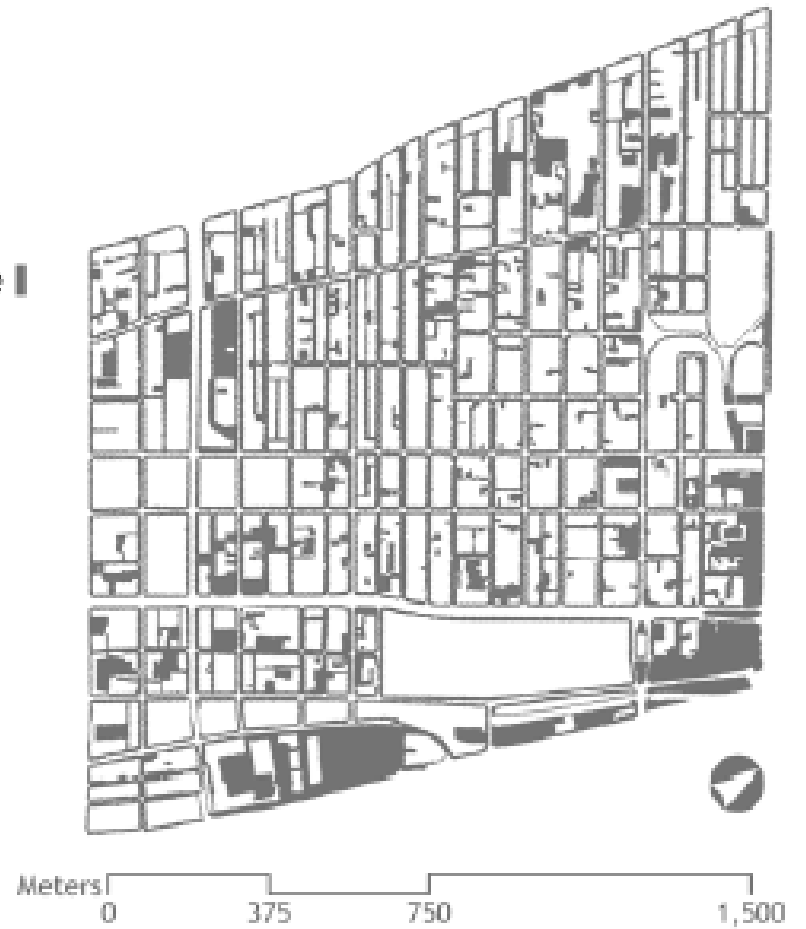


Figure 18: Map of the sample-frame

Luc de Montigny 2008

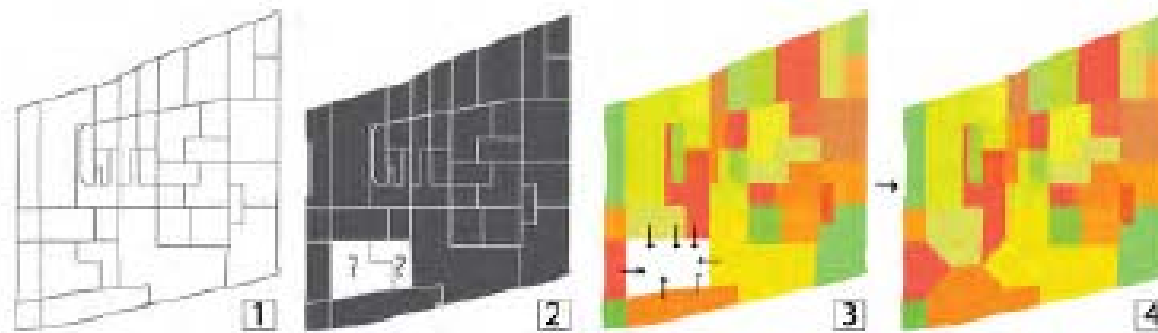


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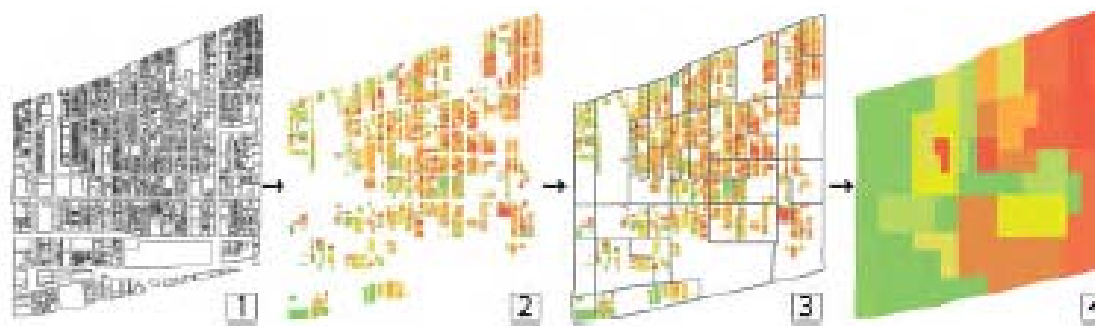


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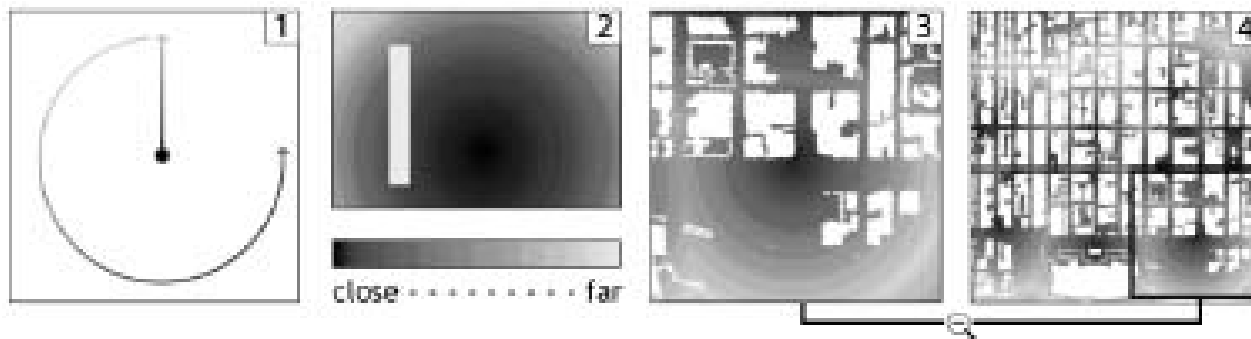


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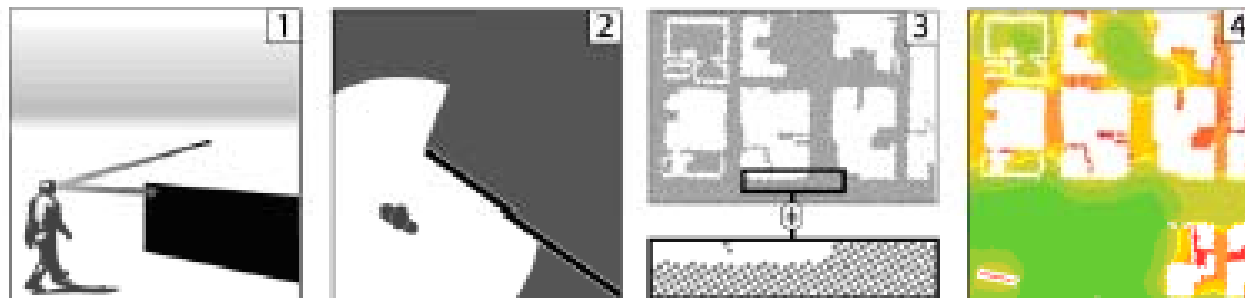


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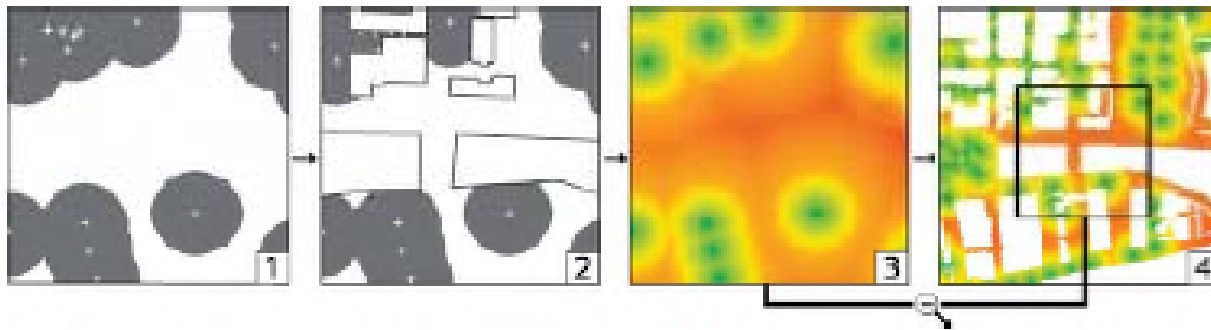


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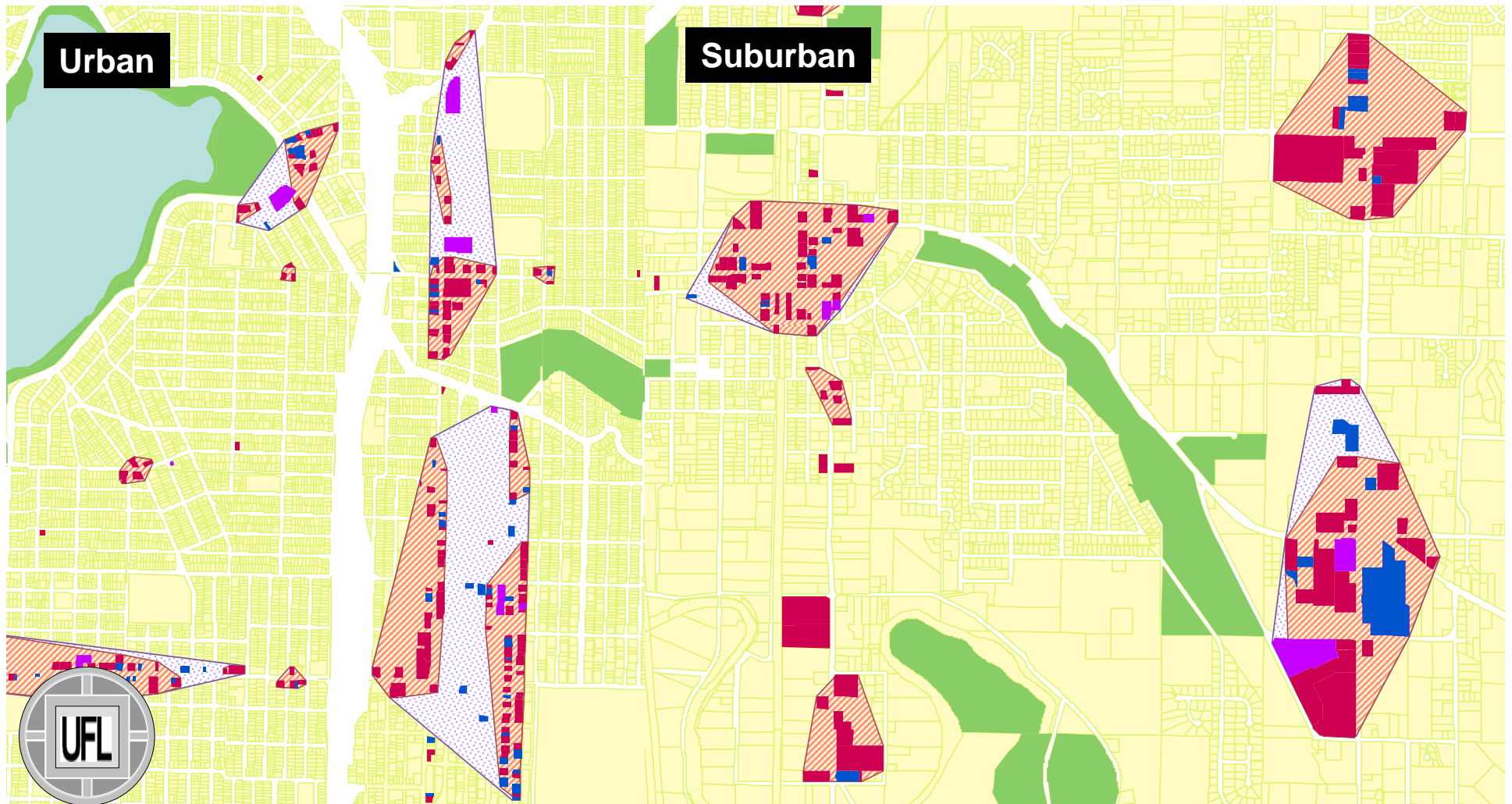
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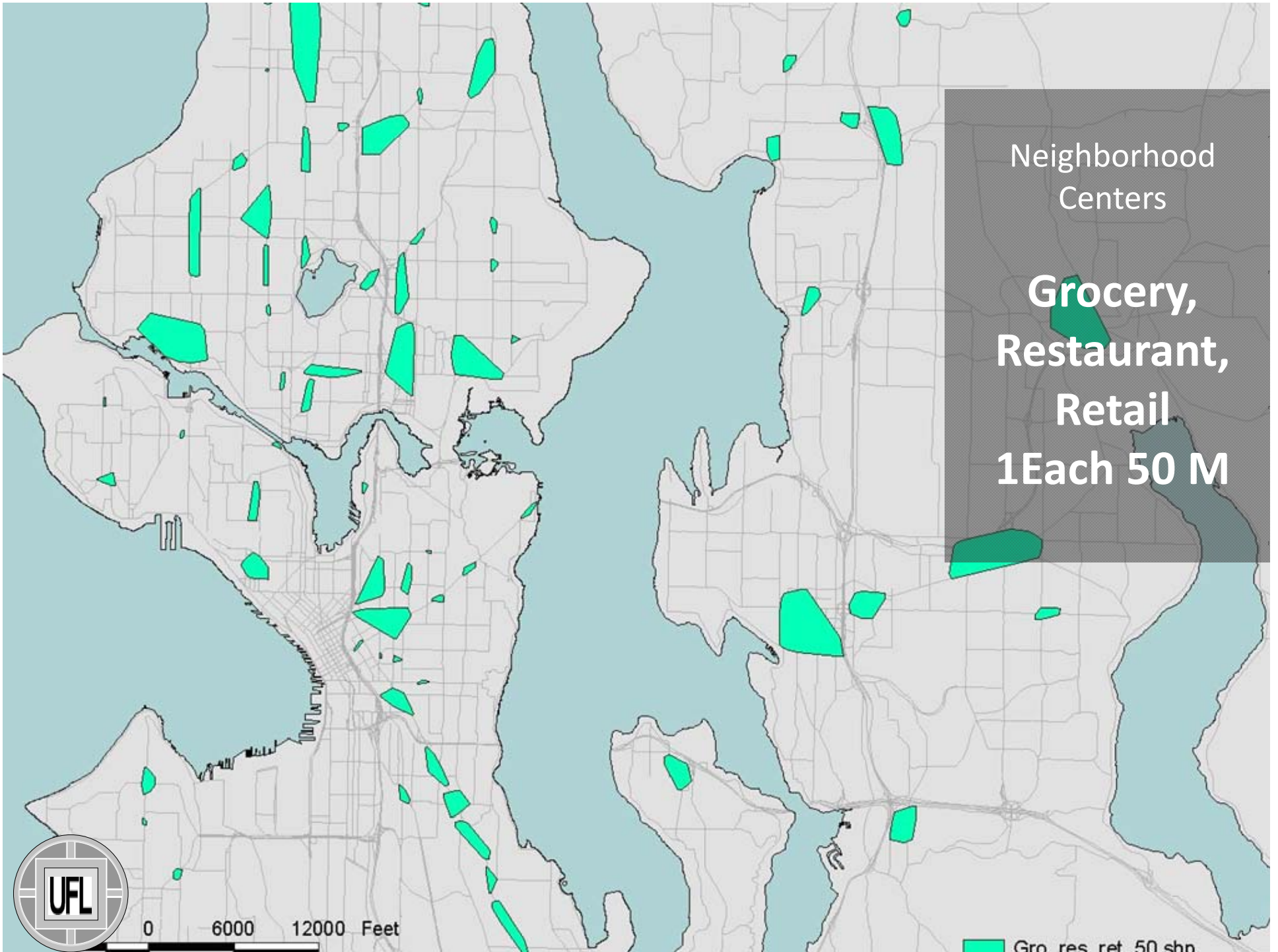
4.4. Cluster analysis

Neighborhood Centers

Neighborhood Centers

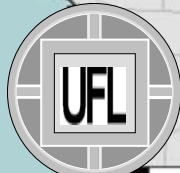
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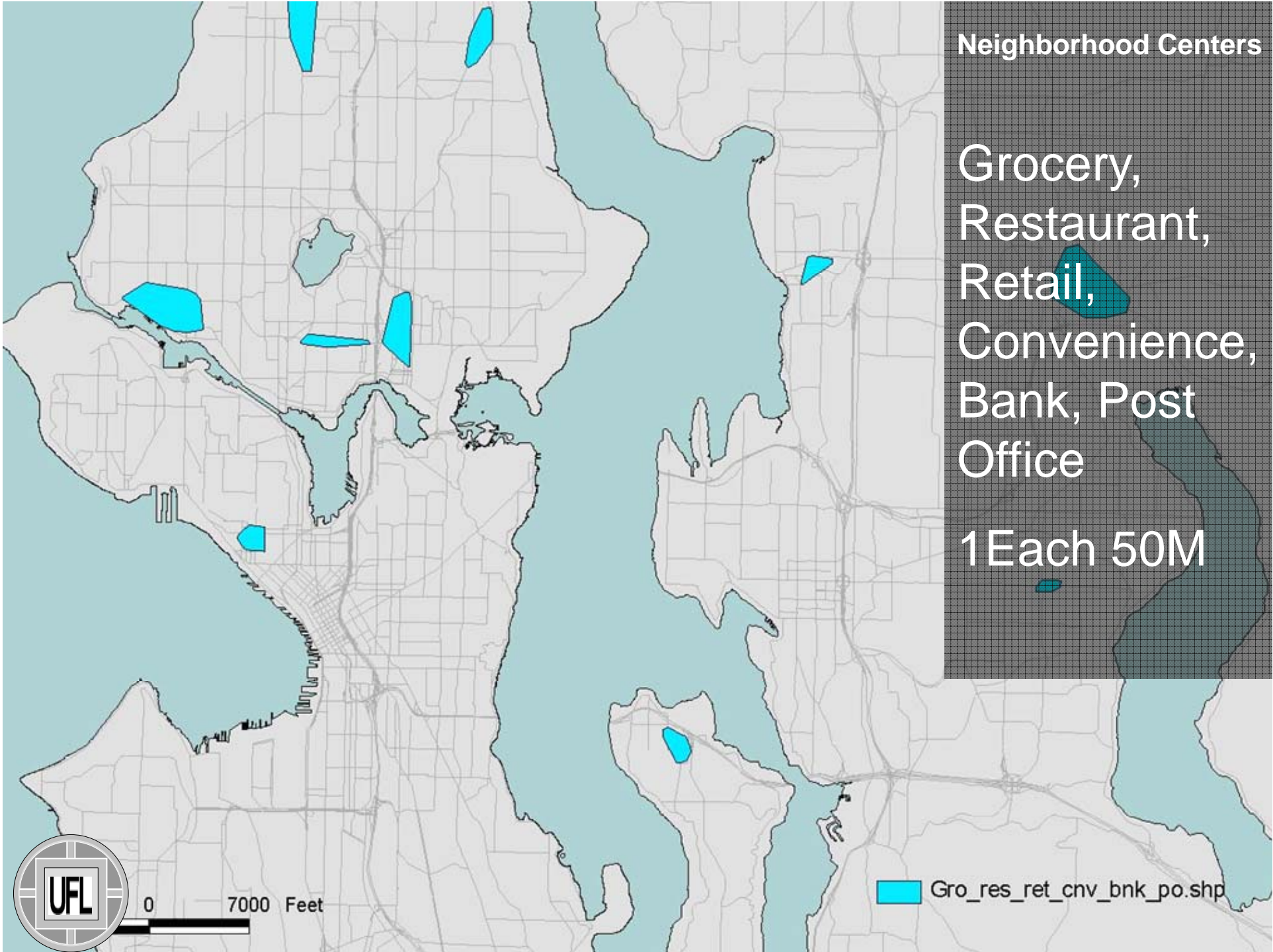
Neighborhood
Centers

**Grocery,
Restaurant,
Retail**
1 Each 50 M



0 6000 12000 Feet

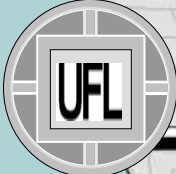
Gro res ret 50 shp



Neighborhood Centers

Grocery,
Restaurant,
Retail,
Convenience,
Bank, Post
Office

1 Each 50M



0 7000 Feet

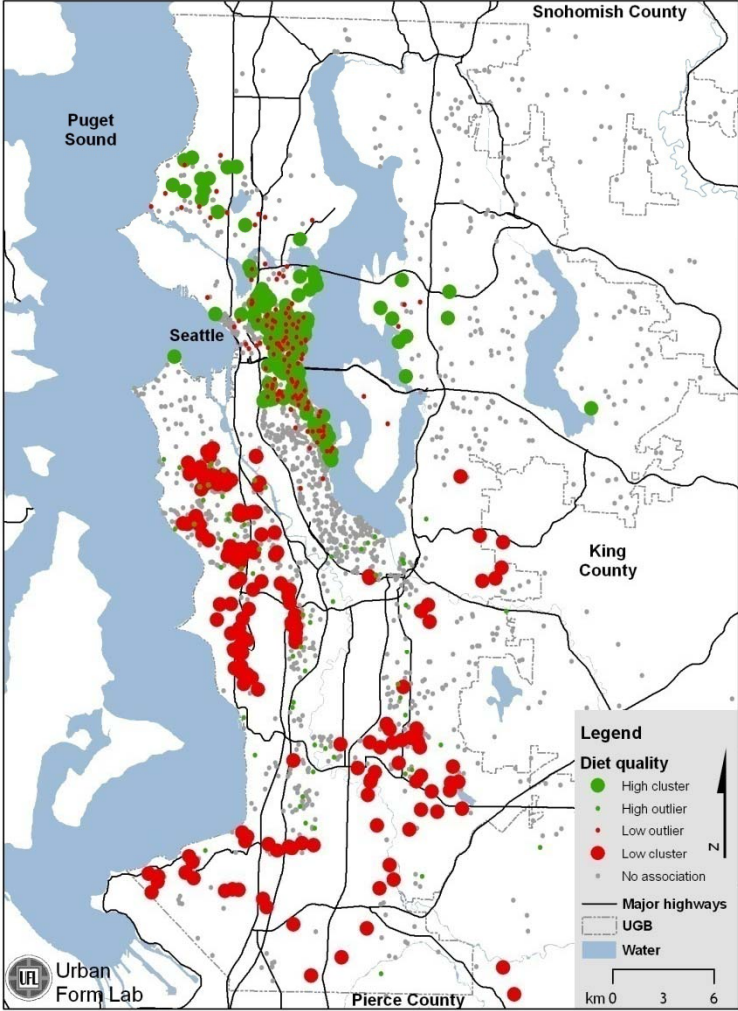
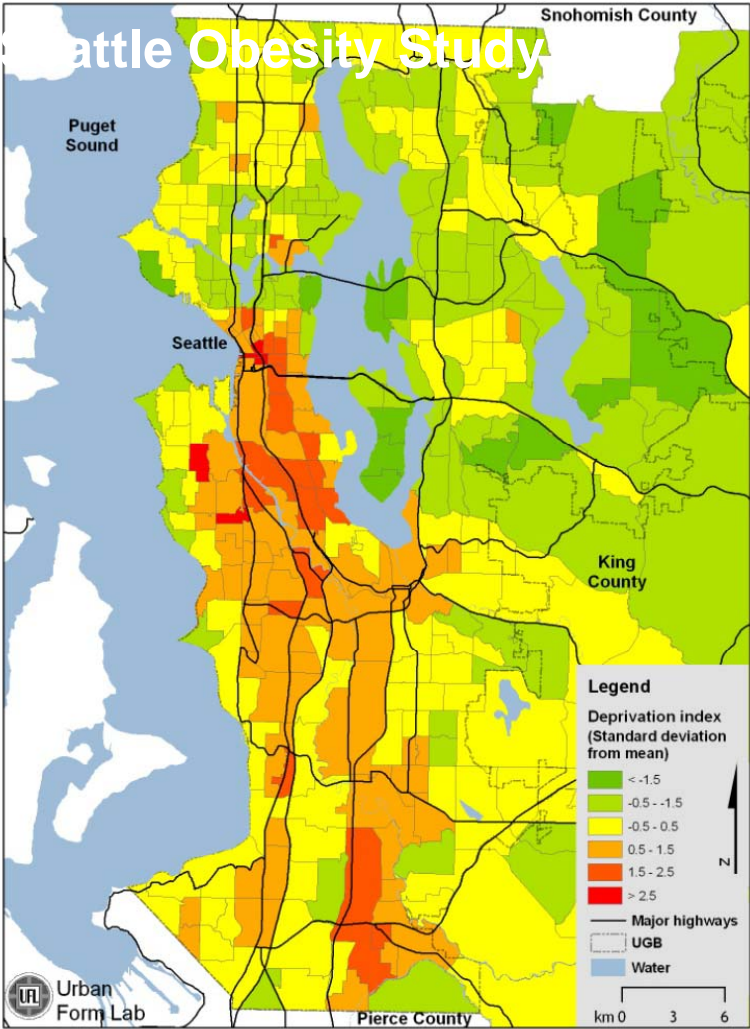
Gro_res_ret_cnv_bnk_po.shp

4.4. Cluster analysis Moran I's and SaTScan)

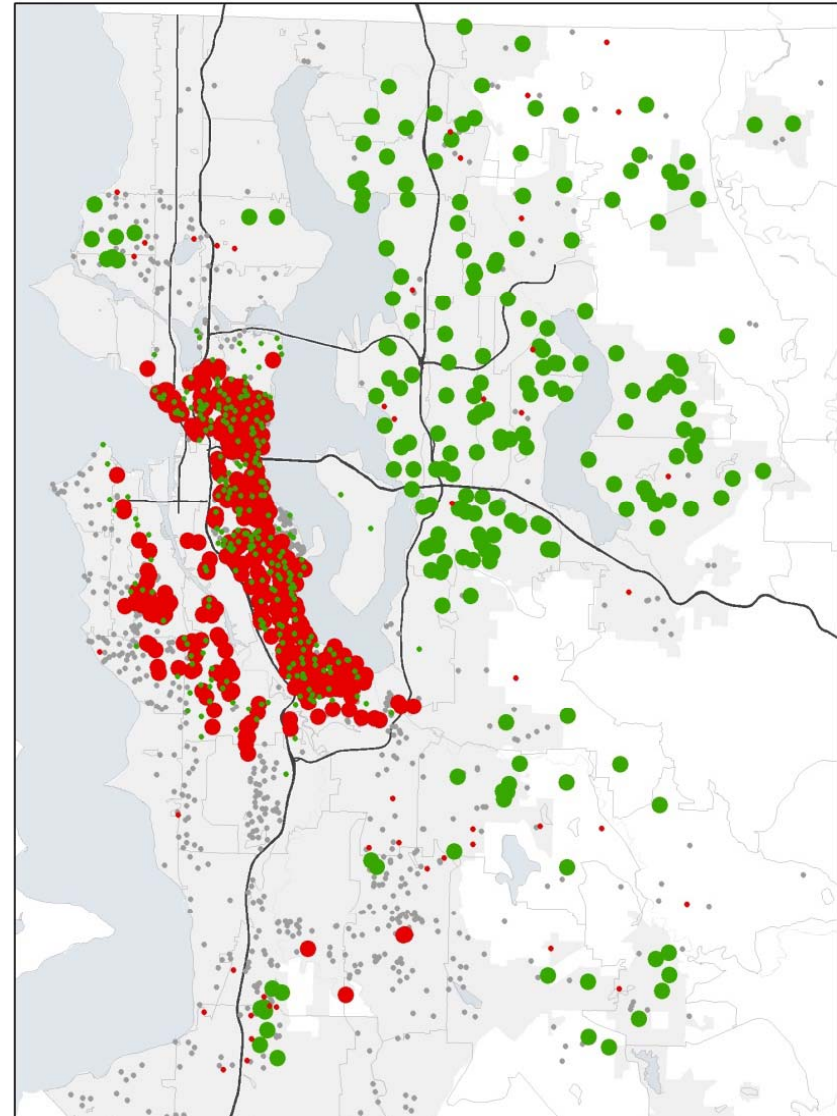
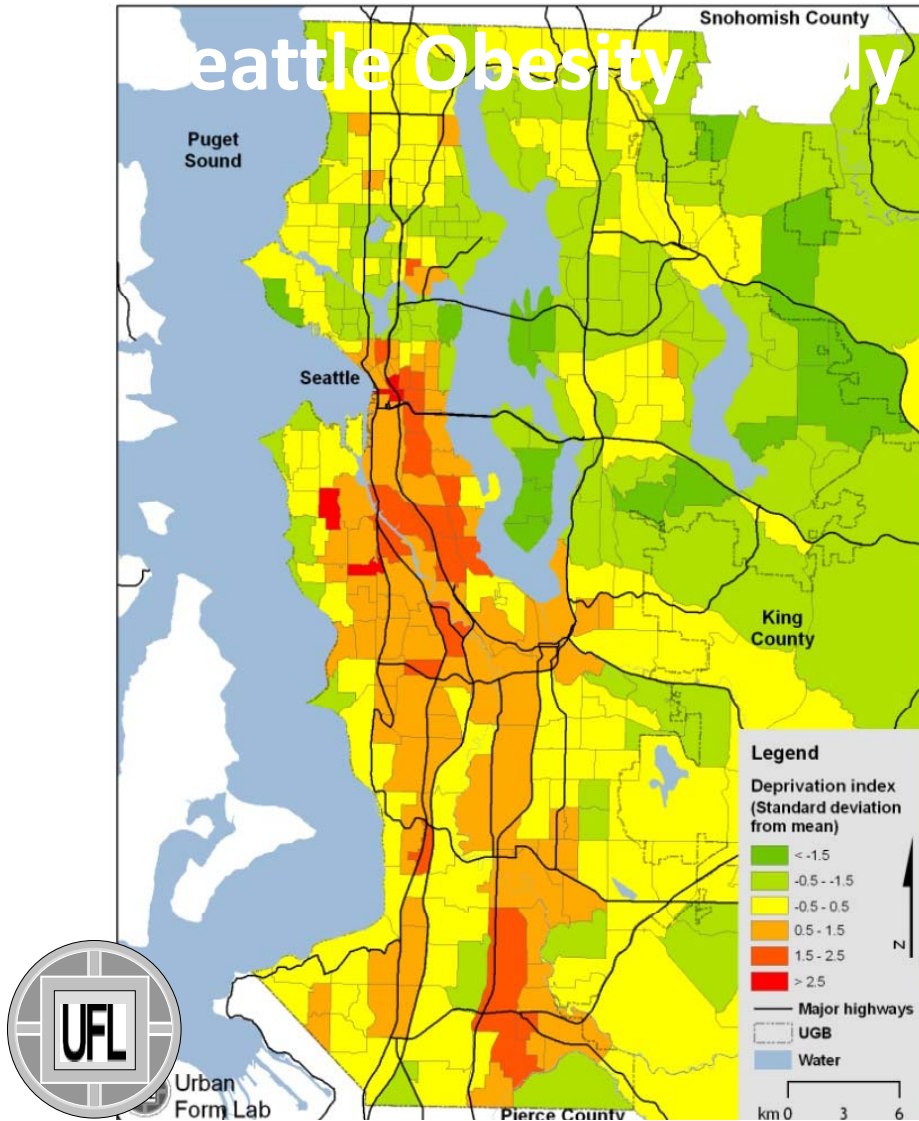


4.4. Geospatial analyses to measure and model the environment or behaviors (neighborhood centers; clustering Moran I's and SatScan)

Deprivation index and reported health status

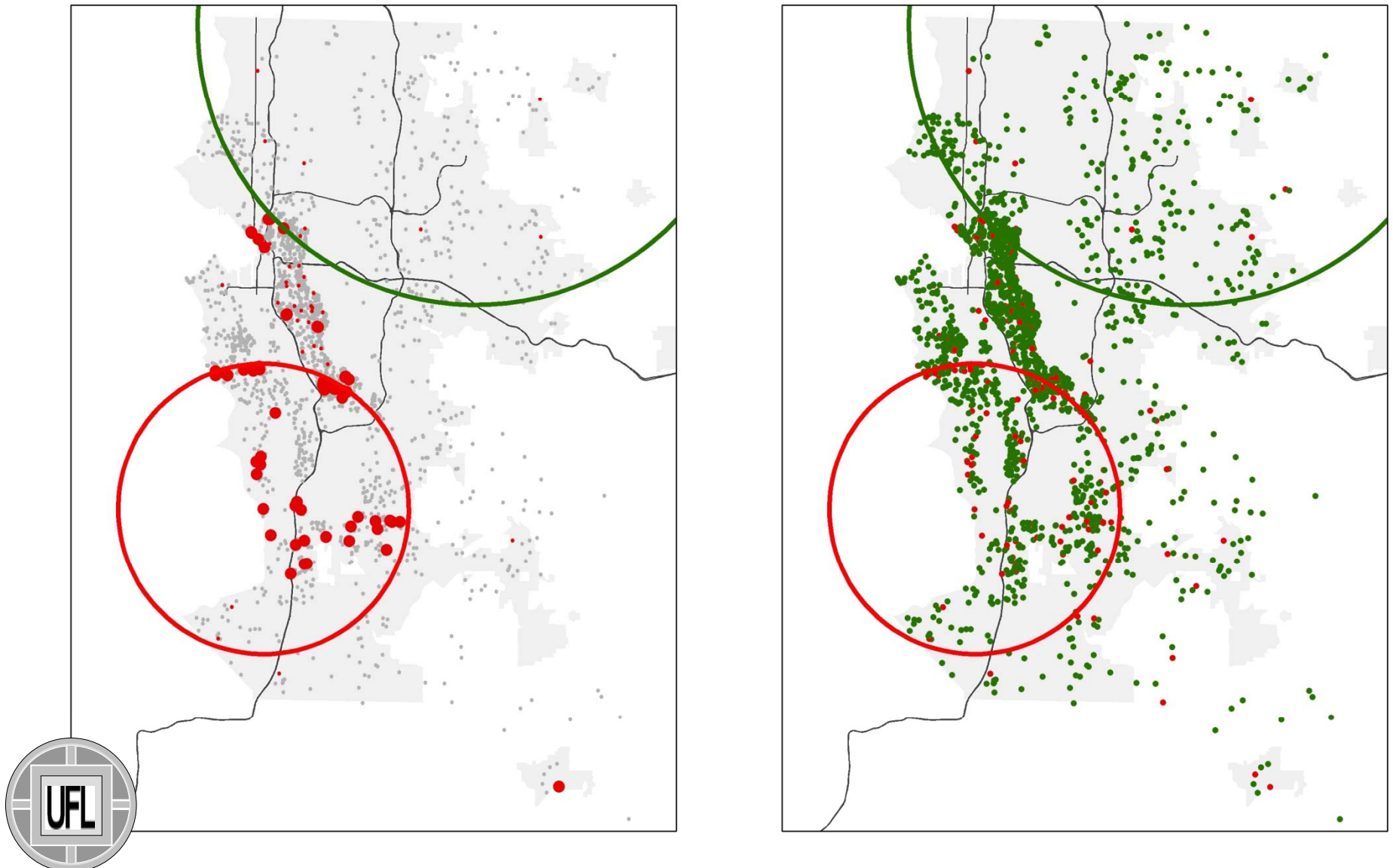


Perception of neighborhood crime



Self-reported diabetes

SatScan vs Moran's I



Summaries

- Scale & resolution
- Time-space dimensions
- Exposure vs. access/use
- Clustering (people & environment)



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