

Worth it? Relating Landscape Composition & Residential Property Value in Richmond, Virginia

Wyatt Carpenter

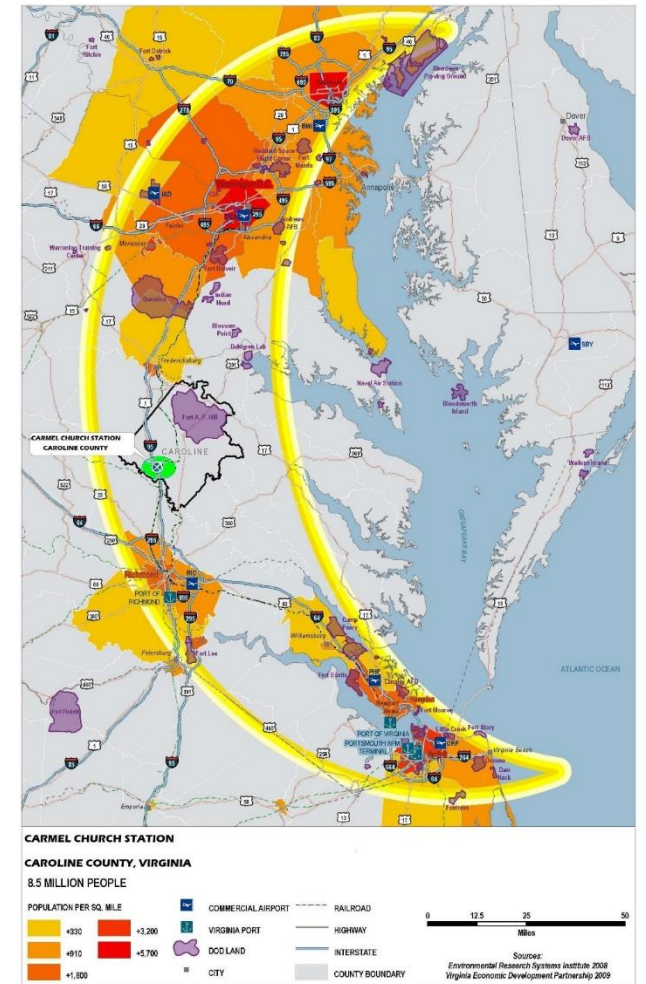
Virginia Commonwealth University
Center for Environmental Studies

Urban Development in Virginia

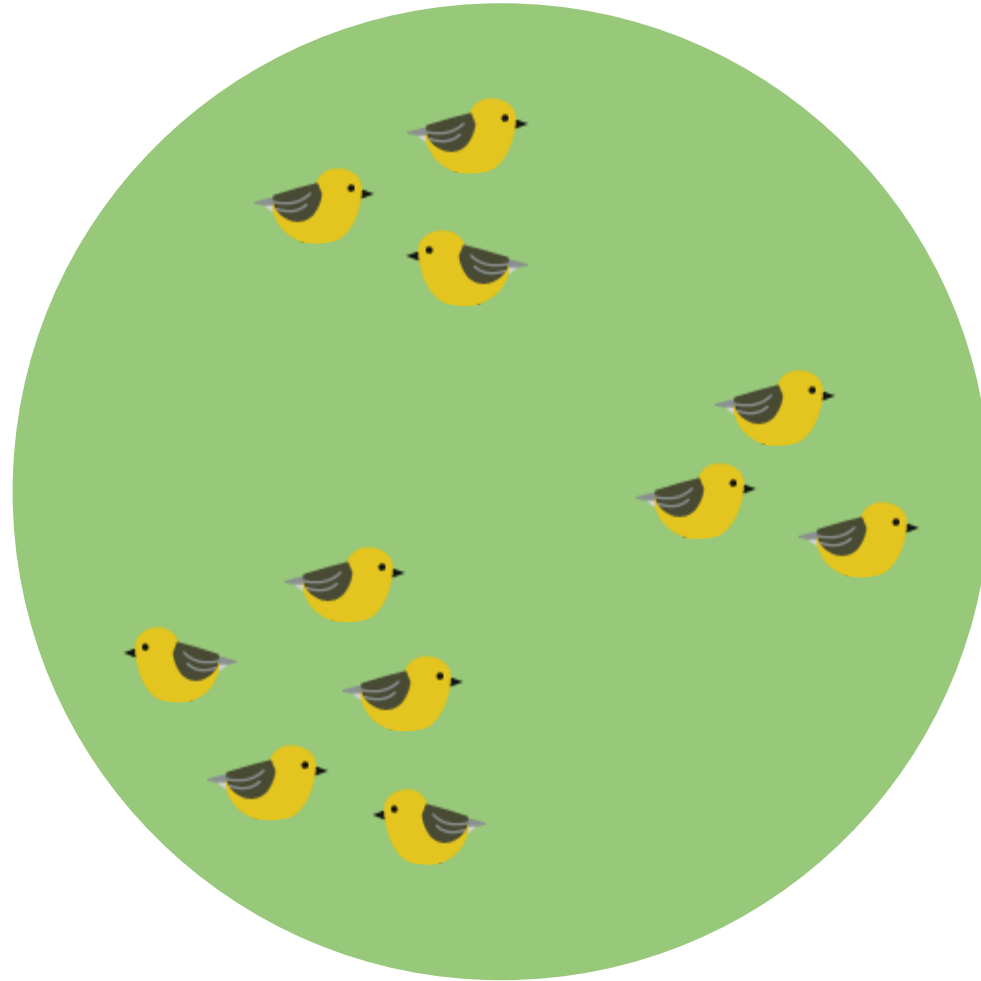
Virginia is projected to experience more development in the next 40 years than it has in the past 400 years. – VA CDR

Growth in the Richmond Region

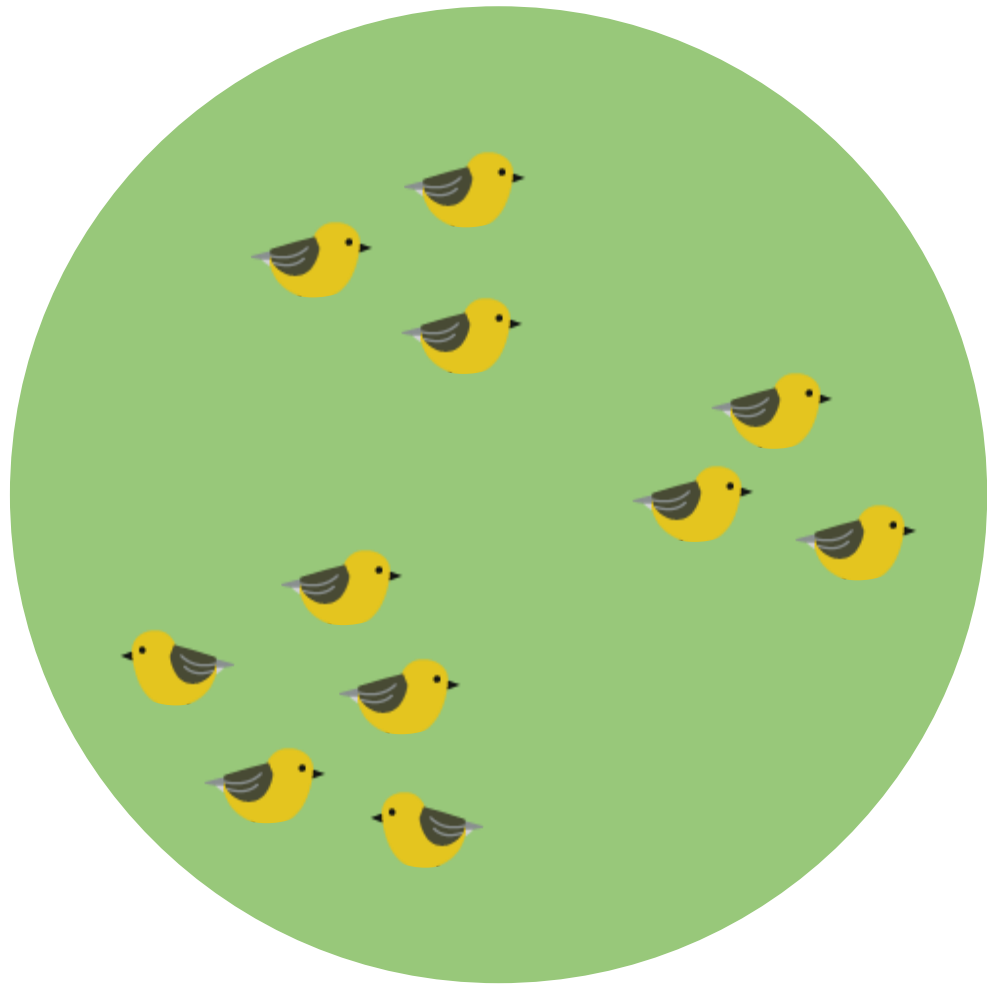
- 3.56%** - population growth between 2010 & 2014
- 4.92%** - population growth between 2014 & 2019
- 13.53%** - employment growth between 2012 & 2022



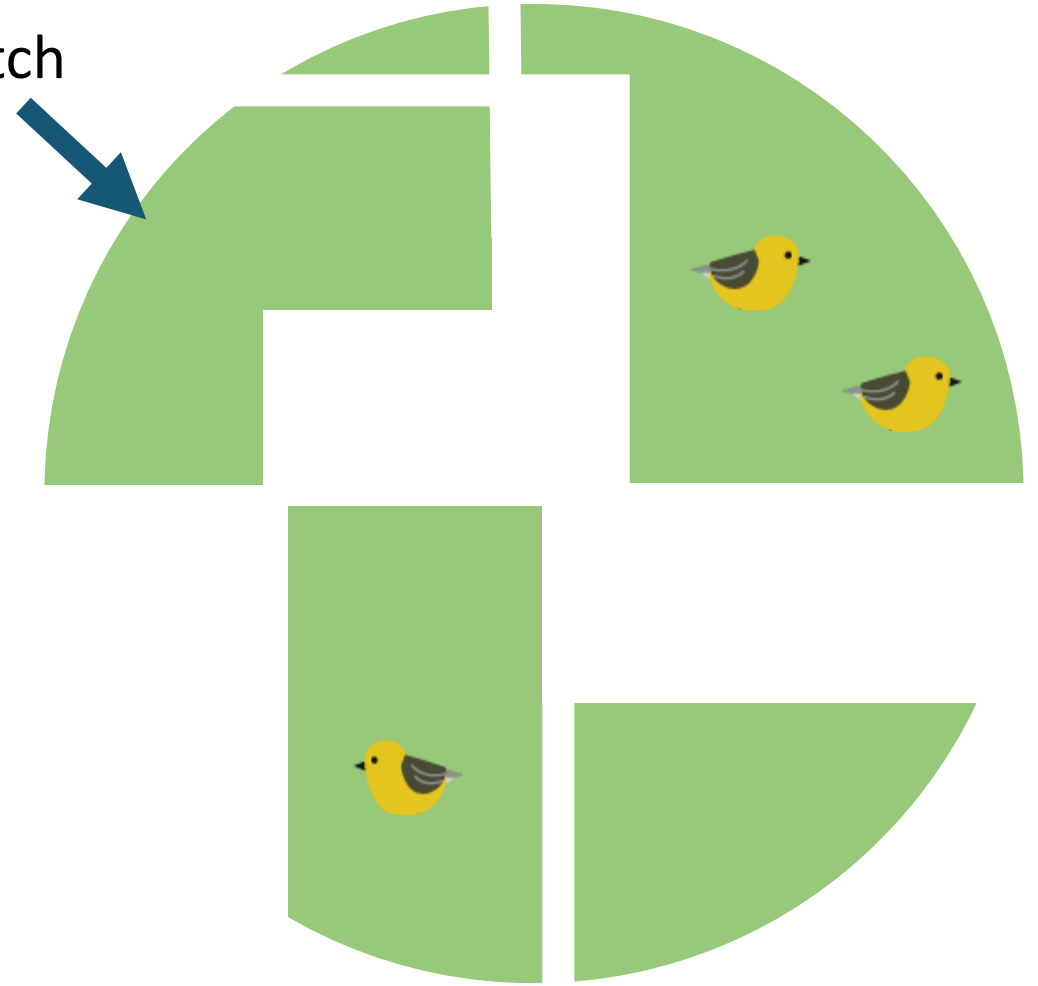
Pressures on Ecosystems



Pressures on Ecosystems



Patch

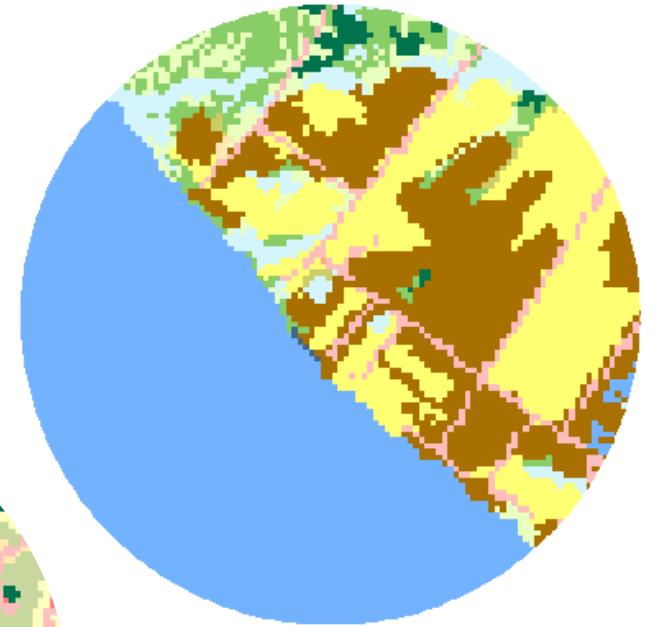
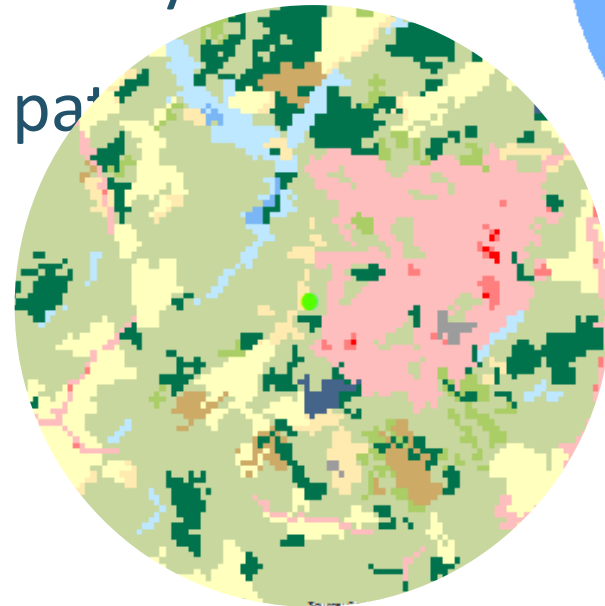


Quantifying Landscape Habitat Quality

Fragmentation is a drag because...

Landscape Indices

- Grew out of island biogeography theory
- Enables comparison of landscape patterns



Hedonic Pricing

We know what landscape features are ecologically valuable, but are these features valued by people?

Hedonic Pricing Method – widely used in estimating the value of environmental goods and services.



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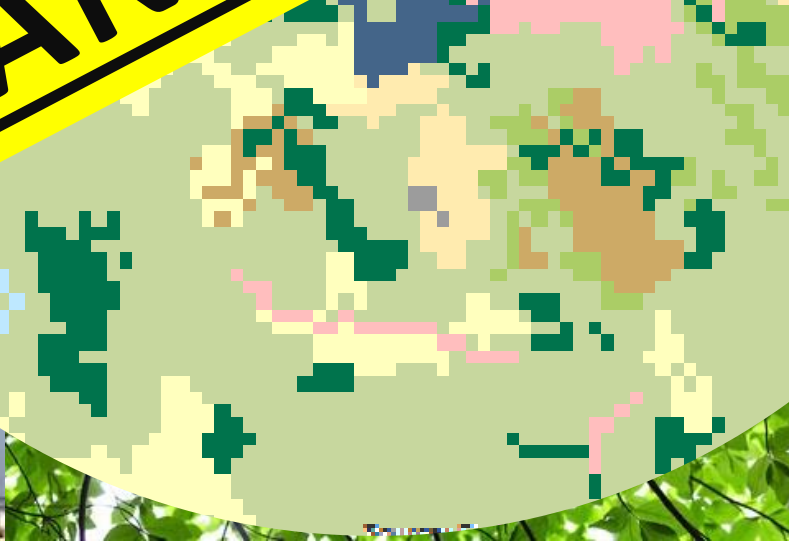
We know what
are these features

Hedonic Price
environment

very valuable, but

the value of

LAND COVER?



Study Objectives & Data

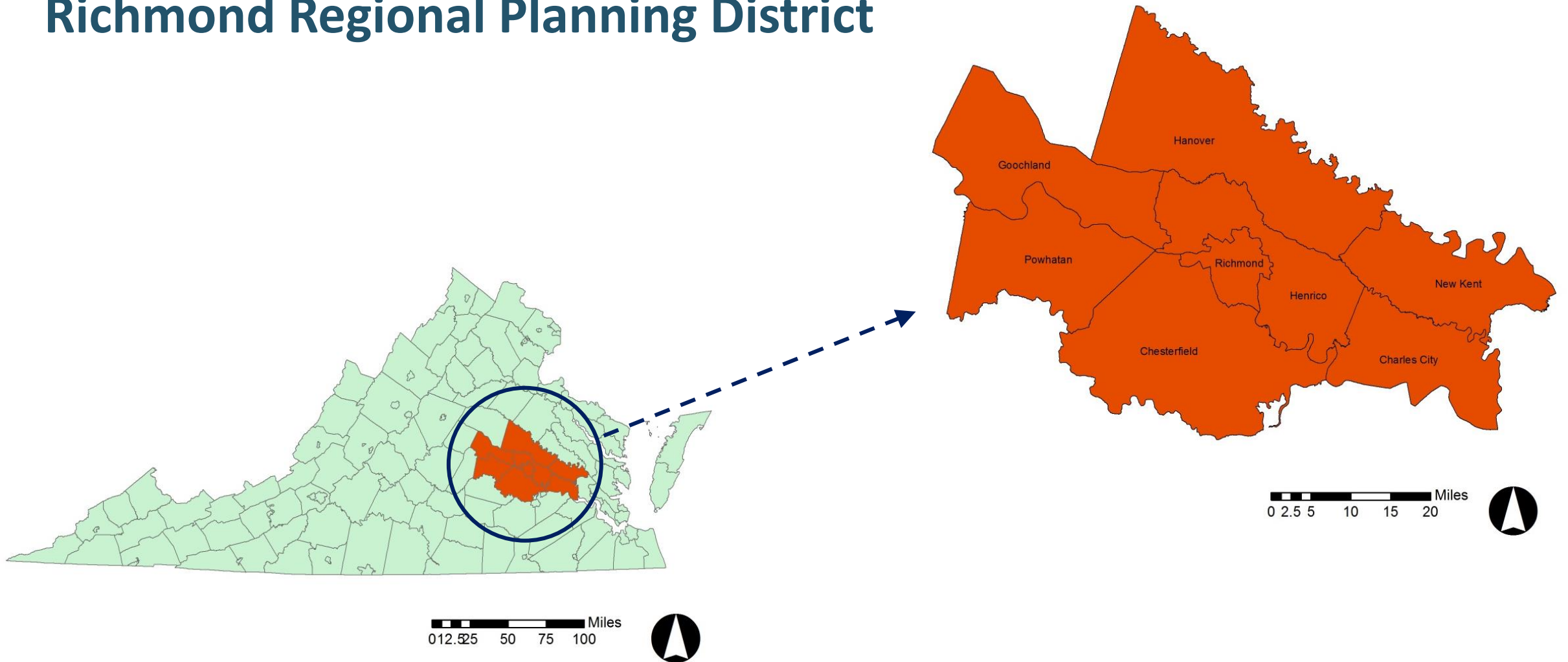
Investigate relationship between ecologically valuable landscape characteristics and residential property sale price.

Data

- Sale Price, single family homes – 2014 (14,270 records)
- Associated real estate data – beds, baths, etc.
- Neighborhood data – school district, median income, etc.
- NLCD land cover classification – 2011
- NLCD Impervious Surface Coverage – 2011
- FRAGSTATS landscape indices – applied to NLCD data

Study Area

Richmond Regional Planning District



Data

Real Estate Data

- Sale Price
- Bed Rooms
- Bathrooms
- Finished Square Feet
- Number of Stories
- Year Built
- Parcel Size (acres)
- Euclidean distance to nearest busy road

Neighborhood Data

- School District
- Median Household Income

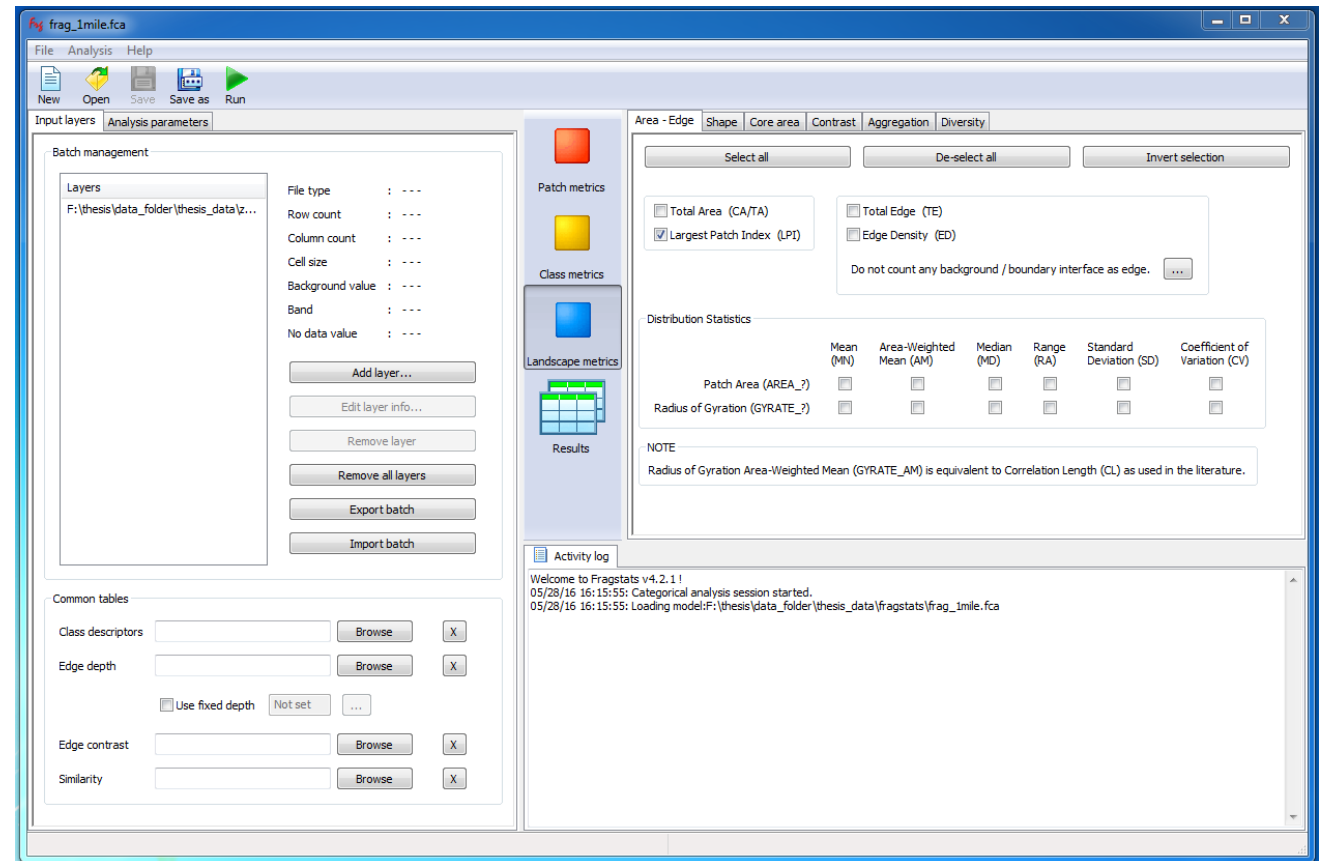
NLCD Data

- Land Cover
- Impervious Surface

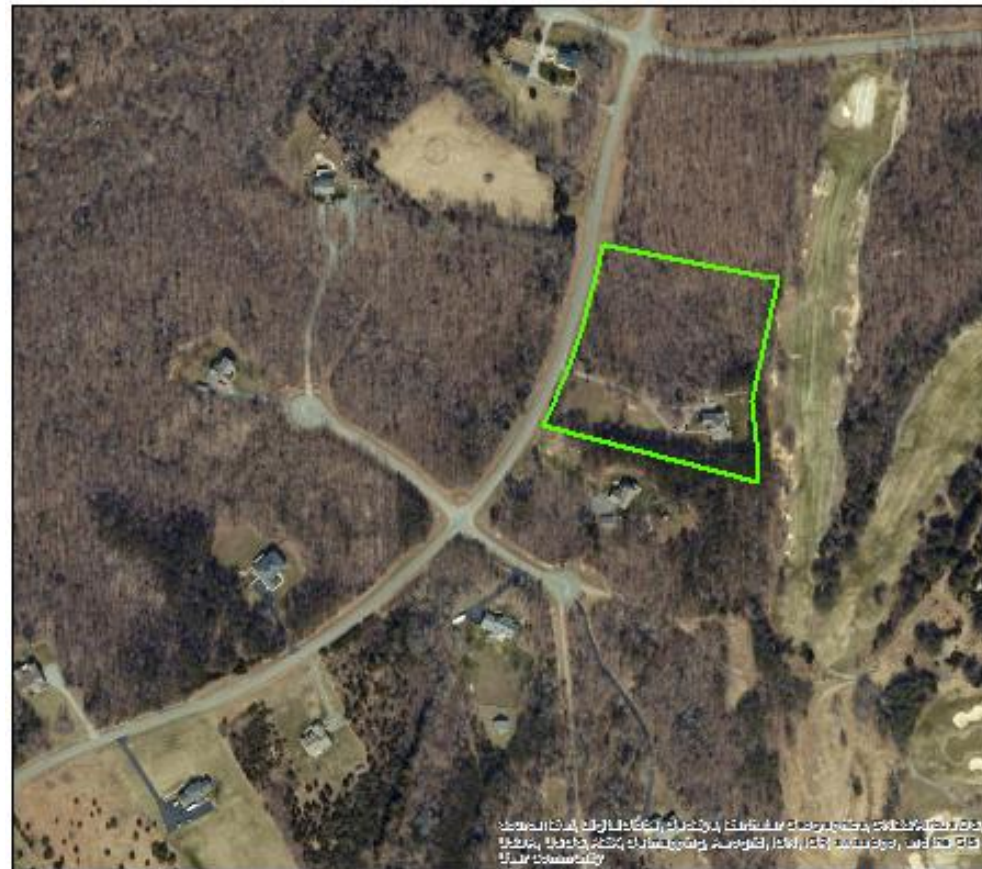
Data - FRAGSTATS

FRAGSTATS

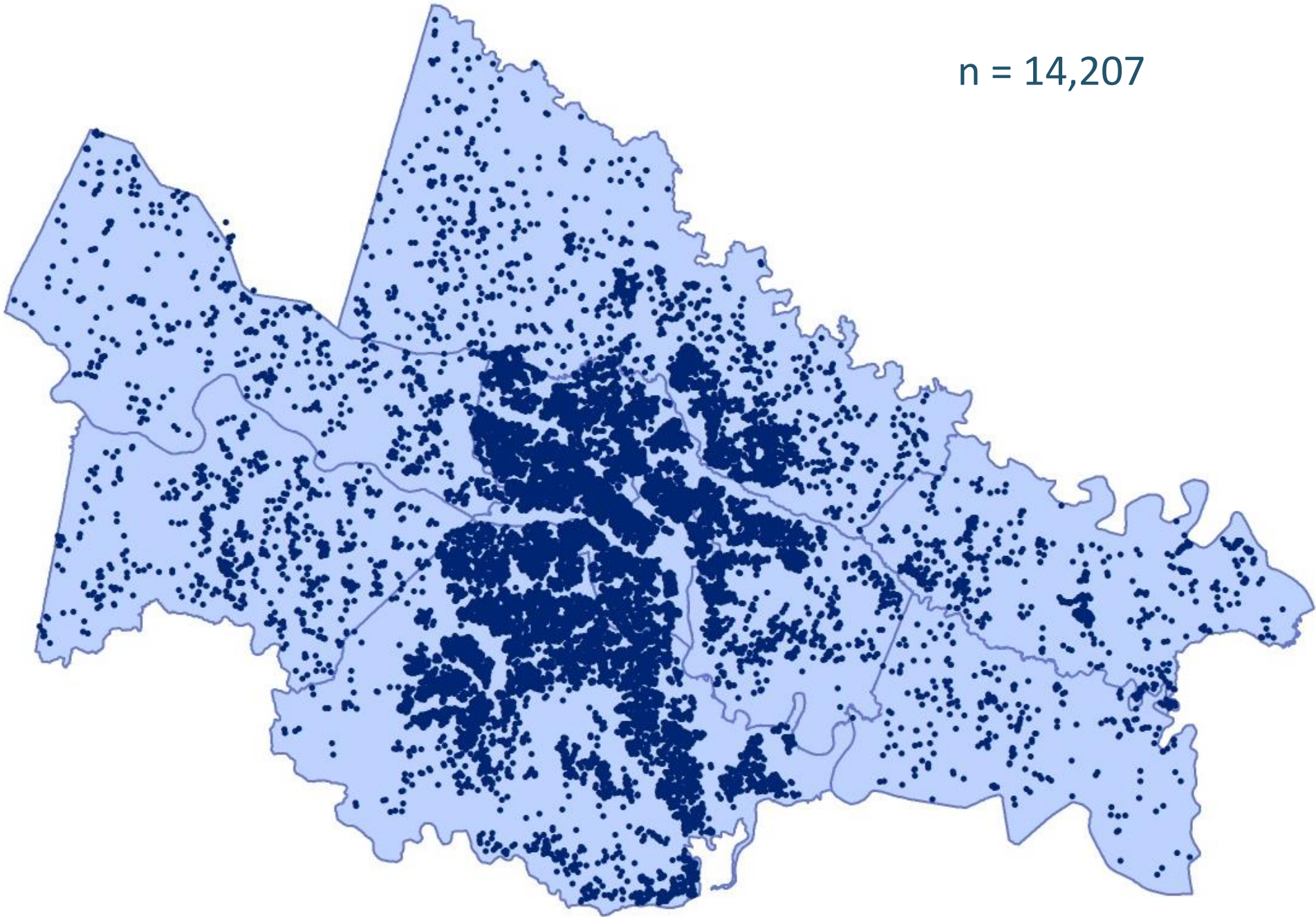
- Largest Patch Index
- Contagion
- Patch Richness
- Simpson's Diversity Index



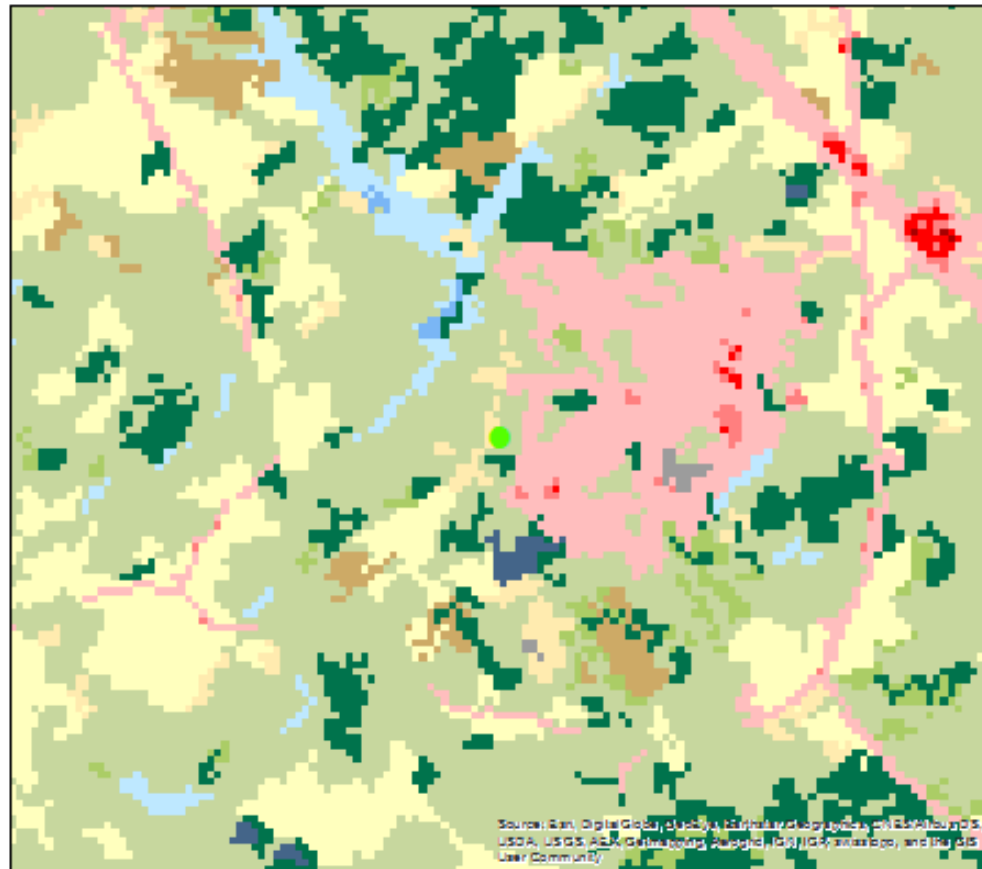
Methods – Real Estate Data



n = 14,207



Methods – NLCD Data



0 0.075 0.15 0.3 0.45 0.6 Miles

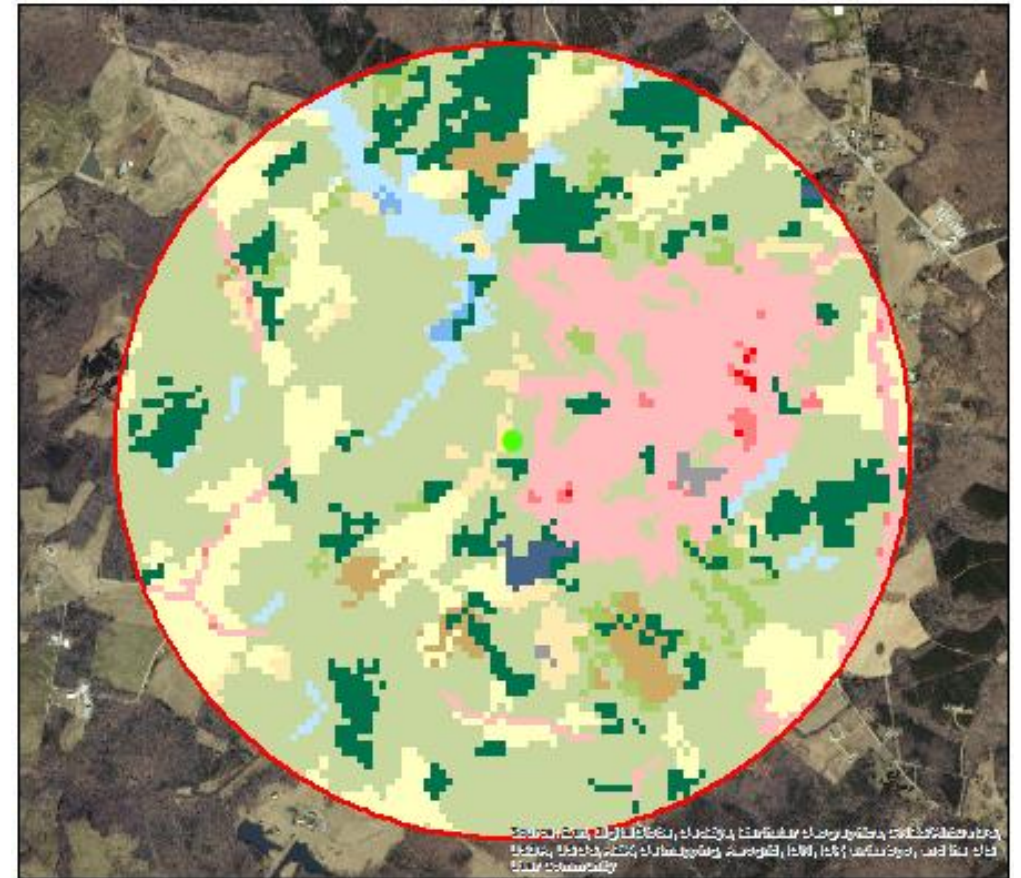
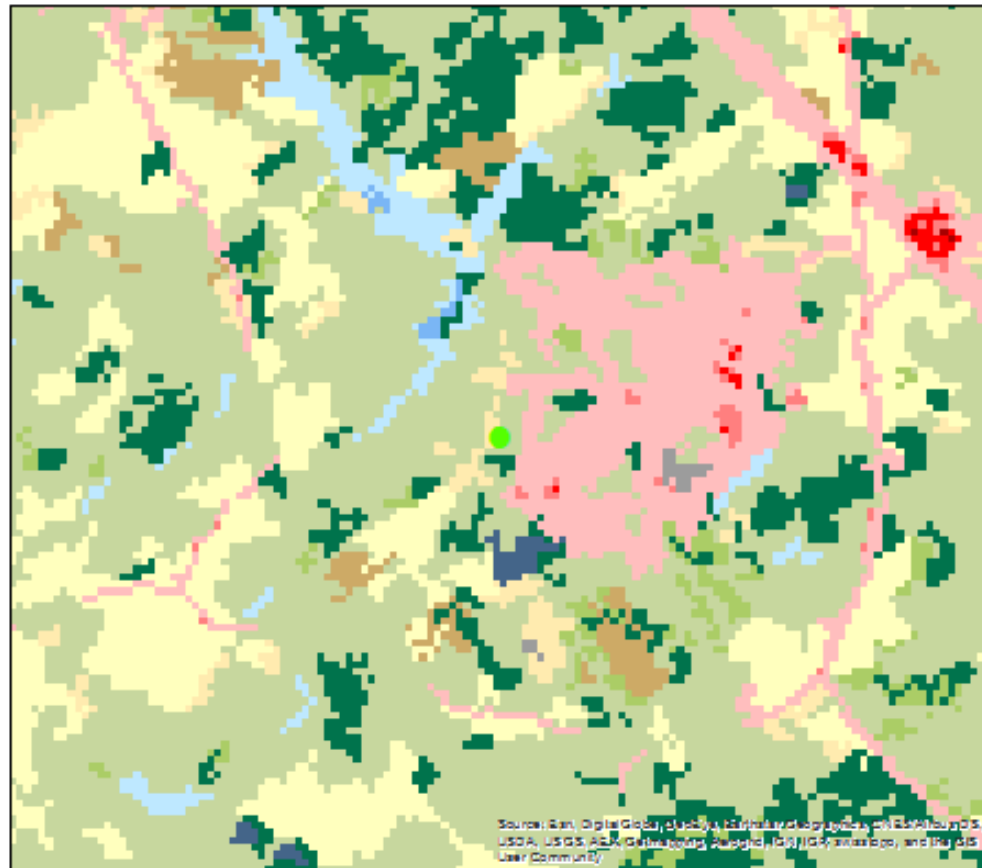


0.25 Mile Buffer

0 0.075 0.15 0.3 0.45 0.6 Miles



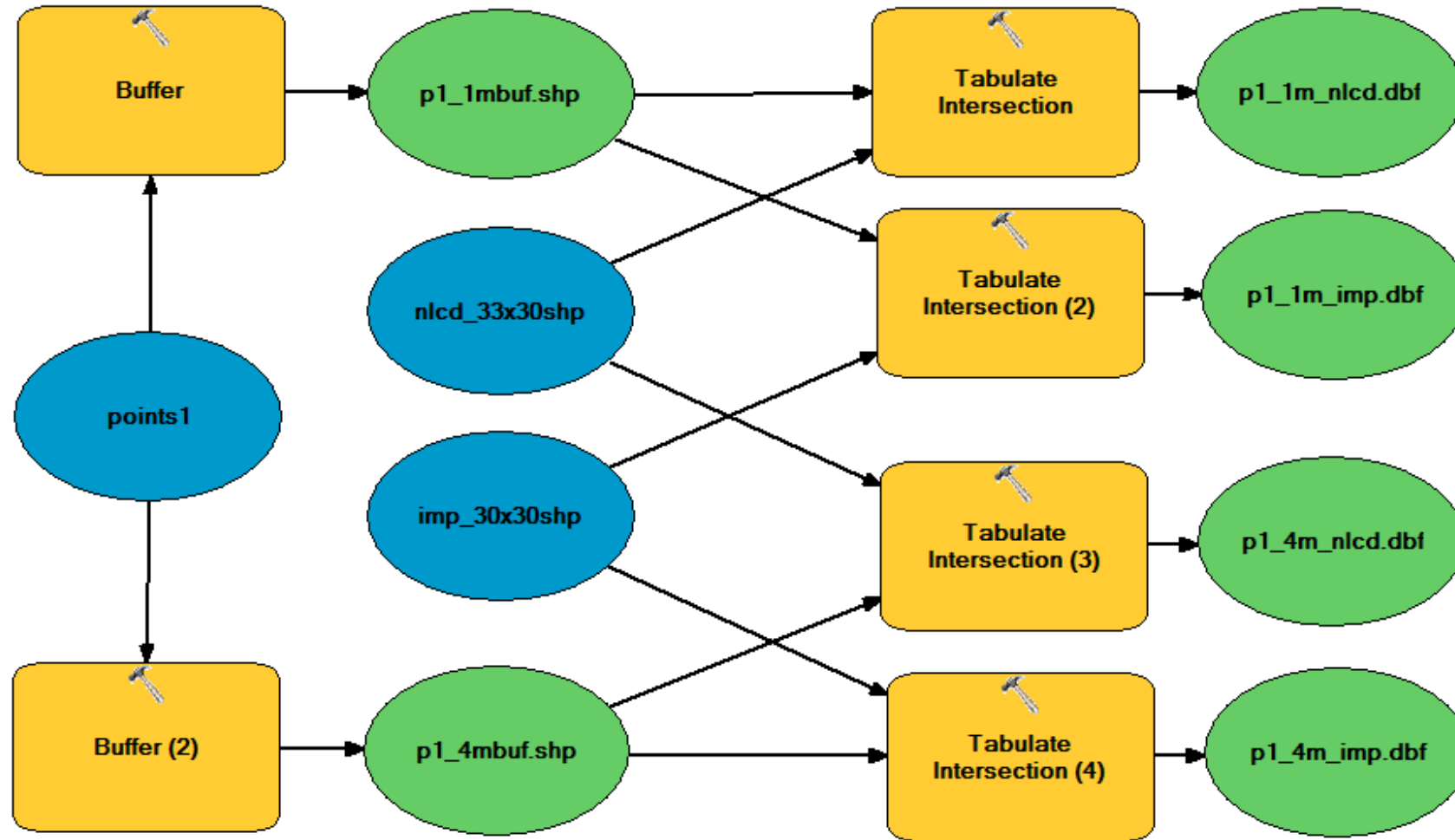
Methods – NLCD Data



1.0 Mile Buffer

0.0 0.15 0.3 0.45 0.6 Miles

Methods – Model Builder



Variable	Estimate	Std. Error	Z value	Pr(> z)
Finished Sq. Ft.	9.7647e+01	2.3680e+00	41.2363 <2.2e-16	<0.0001
Bed Rooms	-1.0206e+04	1.7215e+03	-5.9285	<0.0001
Full Baths	3.2357e+04	2.1690e+03	14.9180	<0.0001
Half Baths	1.9151e+04	2.5663e+03	7.4622	<0.0001
Stories	-9.1805e+03	2.4762e+03	-3.7076	0.0002093
Acres	6.7544e+03	1.6086e+02	41.9901	<0.0011
Median Income	3.9817e+00	1.8709e-01	21.2827	<0.0011
% Open Water	2.9152e+03	5.6841e+02	5.1287	<0.0001
% Evergreen Forest	1.5681e+03	4.8815e+02	3.2124	0.0013161
% Woody Wetlands	9.8175e+02	3.9729e+02	2.4711	0.0134683
10-19% Impervious	1.8925e+03	5.3065e+02	3.5665	0.0003618
60-69% Impervious	5.6358e+03	1.0940e+03	5.1514	<0.0001
80-89% Impervious	5.0923e+03	1.3192e+03	3.8601	0.0001134

Results

- % Open Water
- % Evergreen Forest
- % Woody Wetlands
- 10-19% Impervious
- 60-69% Impervious
- 80-89% Impervious

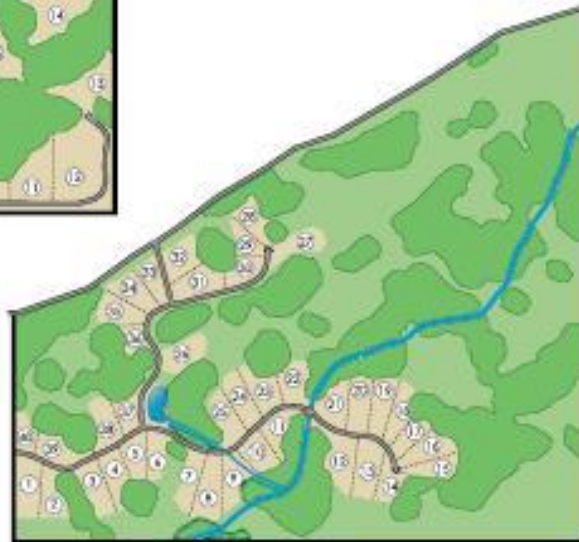
Big Picture



TOTAL SITE AREA: 230 ac
TOTAL LOTS: 40
LOT SIZE: 5 ac
PRESERVED AREA: 30 ac



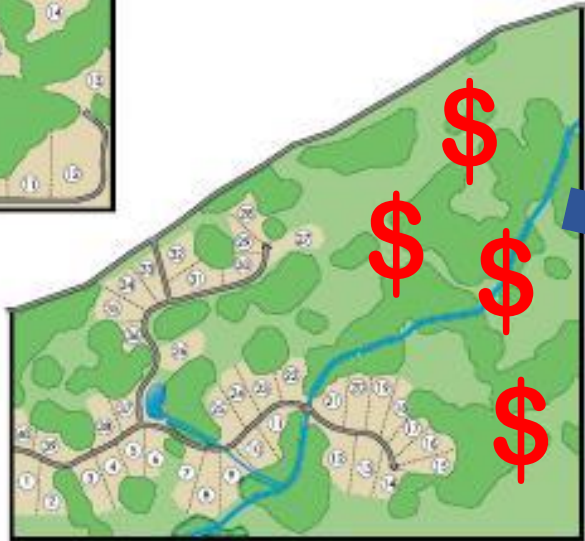
TOTAL SITE AREA: 230 ac
TOTAL LOTS: 40
LOT SIZE: 1 ac
PRESERVED AREA: 190 ac



Big Picture



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LOT SIZE: 1 ac
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Smart Growth



Special Thanks

Advisors: Dr. Cliff Fox & Jennifer Ciminelli

Committee Members

- Linda Fernandez
- A.J. Shriar
- D'Arcy Mays

Kevin McGarigal – University of Massachusetts,
FRAGSTATS developer

Questions?



Contact info

Wyatt Carpenter
carpenterlw@vcu.edu