

Washington and Old Dominion Trail

A HEDONIC ANALYSIS OF PROXIMITY TO THE W&OD TRAIL ON HOUSING PRICES FAIRFAX COUNTY, VIRGINIA

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MGIS Capstone Proposal

GEOG 596A

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AGENDA

- Background
- Goals and Objectives
- Methodology
- Project Timeline
- Anticipated Results



BACKGROUND

- Benefits of trails often discussed, not always quantified
- Hedonic analysis used to assess impact of various features on housing prices
- Features can include proximity to amenities, such as rail stations, greenways and business/employment centers



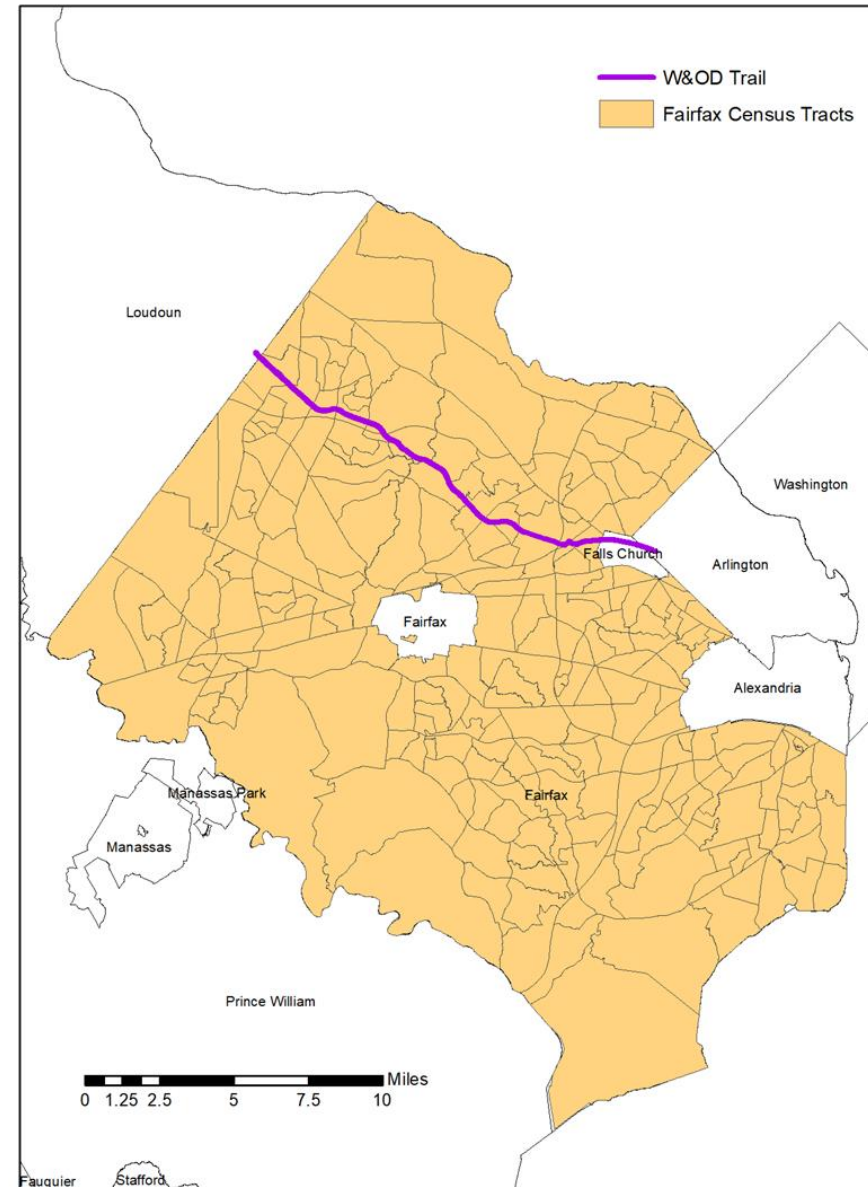
GOALS AND OBJECTIVES

The goal of this study is to assess whether the W&OD Trail impacts housing prices. Furthermore, the study will determine if hedonic analysis is the appropriate method to assess this (i.e., does it provide statistically significant results).

The objective is to use this project and associated data to test the hypothesis that proximity to the trail is a statistically significant feature of housing prices.

W&OD TRAIL FAIRFAX COUNTY

- ~15 miles of study area (of 45-mile trail)
- “Skinniest park in Virginia”
 - 100 feet wide, 45 miles long
 - Old commuter rail
 - No associated greenway in Fairfax Co.
- Homogeneity:
 - One jurisdiction
 - One school district
 - Suburban throughout Fairfax County



Fairfax County Census Tracts with W&OD Trail

METHODOLOGY

Collect and assess the statistical significance of independent variables as features of the dependent variable (housing prices)

Independent Variable

- Housing sales data
 - Large enough sample size
- Real estate assessment value
 - Accuracy of assessment

METHODOLOGY (CONTINUED)

Dependent Variables

- Structural Variables
 - Lot Features
 - Tax & Neighborhood
 - Tax
 - School
 - Demographics
 - Location
 - Proximity to W&OD
 - Distance (straight-line or distance traveled)
 - Dummy variable (e.g., within half a mile)

STRUCTURAL VARIABLES

- All studies:
 - Square footage
 - Rooms
 - Age
- Some studies:
 - Amenities (e.g., garage, fireplace)
- Fairfax data includes subjective data:
 - Construction description
 - Physical condition description



FAIRFAX COUNTY STRUCTURAL DATA

Description
Parcel Identifier
Style
Year built
Effective year built from remodel
Year house remodeled
Bedroom count
Full bath count
Half bath count
Basement Rec room size (sq.ft)
Number of fireplaces
Basement garage (# of cars)
Model name
Basement bedrooms/dens count
Construction quality/grade
Above grade living area total sq ft
Basement description
Physical condition description

Dwelling Data

Dwelling Addition Data
1 to many relationship to parcels
Description
Parcel Identifier
Tax year
Line Number
Area (Square Feet) of the addition
Percent complete if under construction
Addition type on basement level description
Addition type on first level description
Addition type on second level description
Addition type on third level description

Dwelling Additional Data

FAIRFAX COUNTY DATA

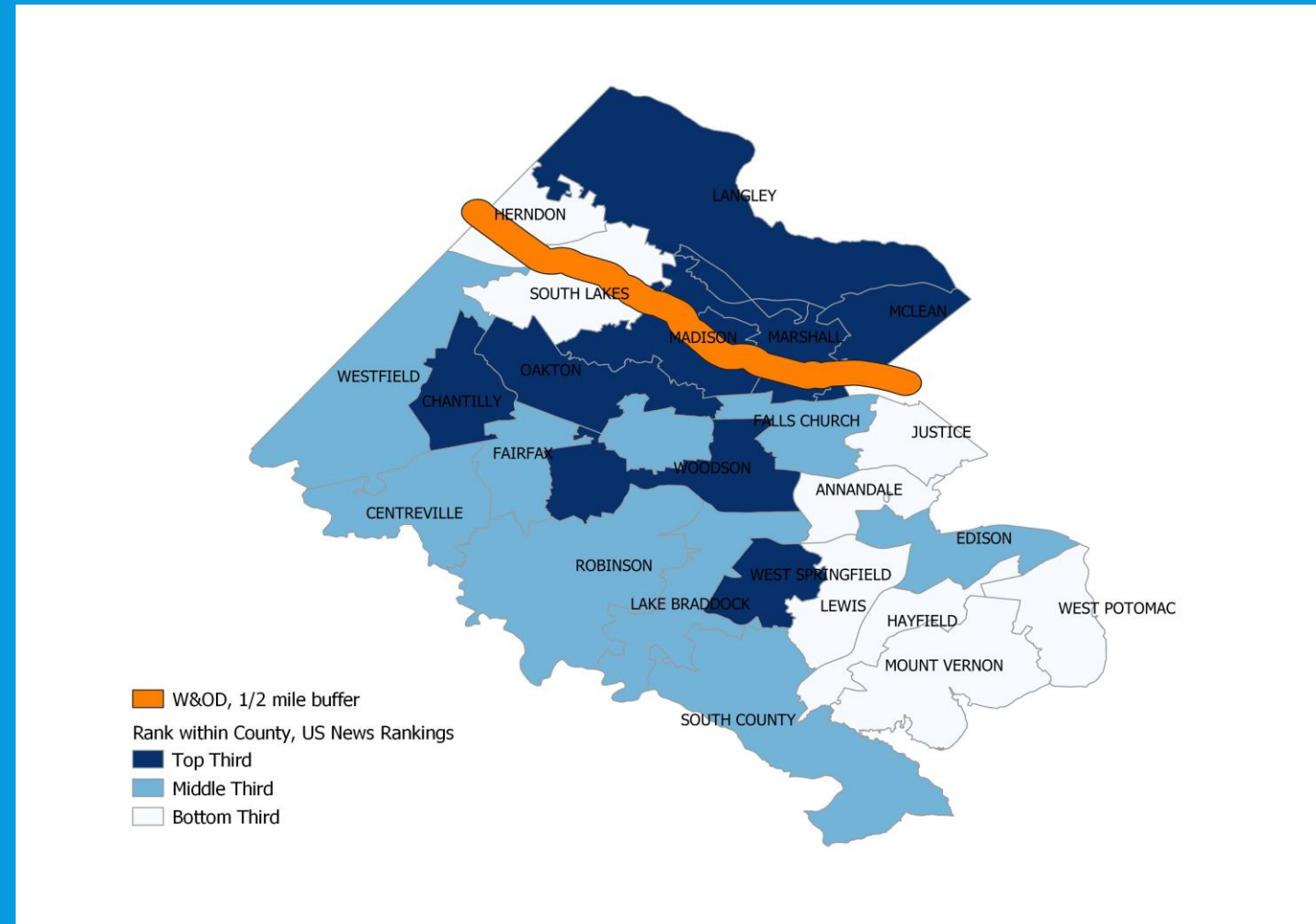
Example of complete housing data including dwelling and additions

Structure Size							
Above Grade Living Area Total Sq. Ft		3,276					
Basement Garage # Cars							
Attached Accessory Structures							
Structure		Size		% Complete			
Open Porch or Portico		204 SQ. FT.		100%			
Detached Accessory Structures							
Structure		Size		% Complete		Units	
Shed or Storage		360 SQ. FT.		100%			
Barn		810 SQ. FT.		100%			
SWIMMING POOL		576 SQ. FT.		100%			
Stable		960 SQ. FT.		100%			
Additional Details							
Card	Line	Structure (Lower)	Structure (First)	Structure (Second)	Structure (Third)	Year Built	Area
1	4		Open Porch or Portico				204

TAX AND NEIGHBORHOOD

One school district

- but varying performance levels among school pyramids



TAX AND NEIGHBORHOOD

- One jurisdiction
- One base tax rate
 - Some special tax districts may apply

Type of Rate	Unit	2020	2019	2018
Real Estate (base rate)	Per \$100 of Assessed Value	\$1.150	\$1.150	\$1.150
Commercial Transportation Tax District	Per \$100 of Assessed Value	\$0.125	\$0.125	\$0.125
Route 28 Improvement District	Per \$100 of Assessed Value	\$0.170	\$0.180	\$0.180
Phase 1 Dulles Rail Transportation Improvement District (commercial property only)	Per \$100 of Assessed Value	\$0.090	\$0.110	\$0.130
Phase 2 Dulles Rail Transportation Improvement District (commercial property only)	Per \$100 of Assessed Value	\$0.200	\$0.200	\$0.200
Tysons Service District	Per \$100 of Assessed Value	\$0.050	\$0.050	\$0.050

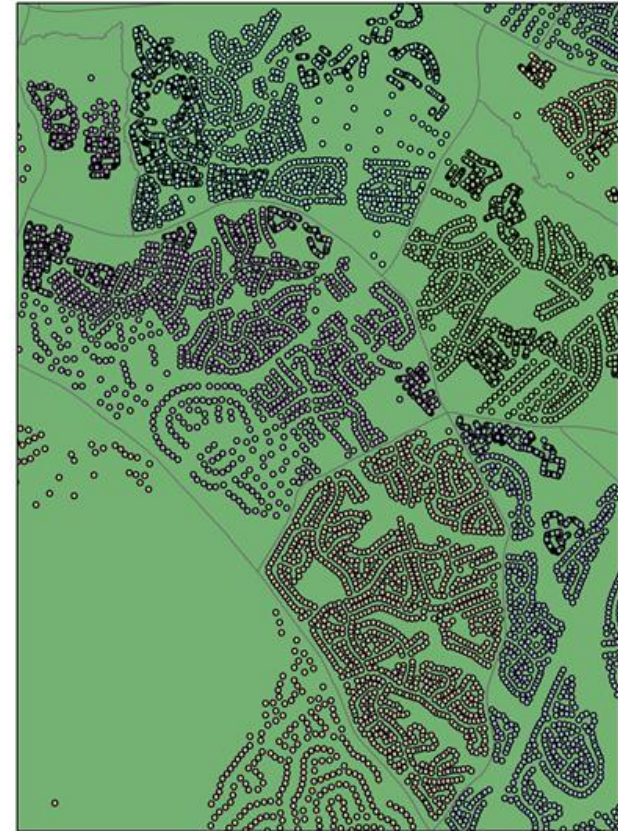
Fairfax County Real Estate Tax Rates Example

<https://www.fairfaxcounty.gov/taxes/real-estate/tax-rates>

Accessed 30 Nov 2020

TAX AND NEIGHBORHOOD

Demographic data can be obtained at the census tract level



Current Housing Units by Census Tract - Detailed View

TAX AND NEIGHBORHOOD

- Location
 - Distance to CBD or employment centers
 - Metro DC is more complex than a single CBD
 - Tysons – Edge City
 - Proxy for business/employment centers:
 - Industrial/Commercial Floor Area

Table 10.7

**Industrial and Commercial Gross Floor Area by General Activity by Census Tract
Fairfax County, January 2019**

Census Tract	Activity Type			Total Gross Floor Area
	Industrial	Office	Retail	
4922.01	6,365			6,365
4922.02	2,376		46,616	48,992
4922.03			301,034	301,034
4925		6,488	45,683	52,171
9801		2,400,000		2,400,000
9802	760,000			760,000
9803		3,046,518		3,046,518
Fairfax County	44,691,405	130,560,723	98,491,287	273,743,415

Source: Fairfax County Department of Management and Budget, 2019.

Note: All data in square feet. Countywide totals may vary by table depending on how well the geographic layer aligns with actual county boundaries.

PROXIMITY TO W&OD TRAIL

- Distance
 - straight-line
 - distance traveled
 - At some distance, proximity is irrelevant
- Dummy variable
 - Yes/No - “within a half mile”
 - Concentric rings from the trail



ANALYSIS OF DATA

GIS used to determine properties that are located within the study area (i.e., proximate to the trail)

- Create buffer for trail feature and include all houses within buffer as proximate
- Study area could be entire county or limited to census tracts that lie within a certain distance from trail

MATLAB for regression analysis to determine statistical significance of independent variables including proximity to the trail.

Regression Learner - Response Plot

REGRESSION LEARNER VIEW

Data Browser

History

1.6	☆ Tree	RMSE: 143.9	6/6 features
1.7	☆ Tree	RMSE: 150.36	6/6 features
1.8	☆ SVM	RMSE: 135.97	6/6 features
1.9	☆ SVM	RMSE: 120.12	6/6 features
1.10	☆ SVM	RMSE: 134.86	6/6 features
1.11	☆ SVM	RMSE: 154.24	6/6 features
1.12	☆ SVM	RMSE: 114.62	6/6 features
1.13	☆ SVM	RMSE: 136.16	6/6 features
1.14	☆ Ensemble	RMSE: 121.72	6/6 features
1.15	☆ Ensemble	RMSE: 136.55	6/6 features
1.16	☆ Gaussian Process Regression	RMSE: 106.73	6/6 features
1.17	☆ Gaussian Process Regression	RMSE: 106.41	6/6 features
1.18	☆ Gaussian Process Regression	RMSE: 104.27	6/6 features
1.19	☆ Gaussian Process Regression	RMSE: 108.64	6/6 features

PROJECT TIMELINE

- Project Proposal Presented: 9 Dec
- Data gathering and analysis: Jan-May 2021
- GEOG 596B – Summer or “Fall 2” of 2021
- Presentation:
 - “Fall 2” 2021
 - Conference is TBD, but likely urban studies related (such “The Constructed Environment”)

ANTICIPATED RESULTS

The results are expected to show that proximity to the trail is positively correlated to housing prices and the proximity is statistically significant in the regression analysis.

