2015

Towards the Measurement of the Value of Public Land Designations in the Adirondack Park

12/10/2015

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An Economics Research Report

Prepared for the

Adirondack Council

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1. Executive Summary

New York State continues to acquire additional land inside the Adirondack Park. The state recently bought much of the former Finch, Pruyn lands and will soon complete the purchase of the Boreas Ponds Tract. Once the state buys this tract, it's up to the Adirondack Park Agency to determine how it will be managed by classifying it using one of the categories spelled out in the Adirondack Park State Land Master Plan. Broadly, Forest Preserve land can be designated as wilderness, which prohibits motorized recreation, or wild forest, which allows the use of motorized vehicles including snowmobiles, ATVs, and floatplanes. This document reports the results of a study investigating the economic impact of these designations on nearby private lands, as measured through property values.

In order to explore the variation of property values across the greater Adirondack region and to study the relationship between property values and various spatial factors, including different land designations, we generated several maps using ArcGIS software and tested our research hypotheses with a preliminary hedonic analysis of over 77,000 real estate transactions in the greater Adirondack region between 2004 and 2013.

In general, results confirm that private properties inside the Adirondack Park, all else equal, have higher values than those outside the blue line. The results also suggest that proximity to protected land positively impacts property values. Specifically, we find that properties within 0.5 to 6 miles of wilderness are valued at up to a 25% premium. Being closer than this, however, did not provide any statistically significant premium.

This study is the most complete study to date on the complicated relationships between land-use regulation and property values in the Adirondack Park. We believe that it can inform policy and land classification decisions going forward.

2. Introduction

2.1 Wilderness Policy and Management in Adirondack

It is the policy of New York State to conserve its natural resources and to facilitate compatible recreational use of public Forest Preserve lands inside the Adirondack Park. From time to time, the state purchases private lands inside the Adirondack Park and adds them to the Forest Preserve. The NYS Open Space Conservation Plan identifies and prioritizes the state's acquisition plans for new public lands (and its purchases of conservation easements on private lands).

Among the top priorities identified for acquisition in the Adirondack Park are the former Finch, Pruyn & Co. timberlands, consisting of 161,000 acres spread across 32 Adirondack Park towns. To date, the state has purchased a conservation easement that protects roughly 95,000 acres of former Finch lands from development, but keeps them in private hands. In addition, the state has purchased another 50,000 acres of Finch lands that will be added to the Forest Preserve.

The state has a contract to purchase the final parcel of Finch lands – the 22,000-acre Boreas Ponds Tract in Newcomb and North Hudson, by March 31, 2016. Once it is purchased, the Adirondack Park Agency will recommend a land classification to the Governor. Once classified the Dept. of Environmental Conservation prepares a detailed Unit Management Plan, and the Adirondack Park Agency will determine whether the management plan complies with the Adirondack Park State Land Master Plan.

The six-million-acre Adirondack Park in New York State is the largest designated park in the contiguous United States, consisting of approximately three million acres of private lands, 2.6 million acres of public land plus water bodies. This region constitutes nearly 20 percent of the state's land area and is a mix of dense forests, mountains, wetlands, lakes, rivers and streams, with a diverse population of wildlife and 130 rural communities, 10 of which are incorporated villages. The park has 130,000 year-round residents and 200,000 seasonal residents. It attracts 10 million annual visitors. According the DEC, 2,800 large lakes and 9,400 km (5,640 miles) of streams exist in the park (New York State Department of Environmental Conservation, 2014). The Adirondack Park is accessible to over 60 million people who live within a day's drive. The abundant natural resources and large preserved wilderness area have made the Adirondack Park a famous destination for outdoor activities like hiking, fishing, boating, as well as a notable natural lab for education and scientific research.

The Adirondacks have long been a cradle for the wilderness preservation movement and have influenced notable conservationists such as Robert Marshall and Howard Zahniser (Dawson, 2000). In 1885, the New York State Legislature created the Adirondack Forest Preserve, which was the beginning of the official wilderness preservation movement in New York State. Public

lands in the Adirondack and Catskill regions were designated under the law as wild forest lands (Thorndike 1999). The Legislature passed a "forever wild" law protecting these lands from lease, sale, logging and development. However, when the Adirondack Park was formally established in 1892, the Legislature repealed the forever wild law. Two years later, the citizens of New York State held a Constitutional Convention that revived the forever wild law and made it part of Article VII of the NYS Constitution (later renumbered to Article XIV, Section1). It reads as follows:

> *"The lands of the state, now owned or hereafter acquired, constituting the forest preserve as now fixed by law, shall be forever kept as wild forest lands. They shall not be leased, sold or exchanged, or be taken by any corporation, public or private, nor shall the timber thereon be sold, removed or destroyed."*

These two sentences constitute the strongest wild lands protection policy in the United States. They apply to all Forest Preserve inside the Adirondack and Catskill parks. So, while all Forest Preserve is protected by the Constitution as "forever wild," not all Forest Preserve is managed in the same way.

The Adirondack Park Agency (APA) was created under Governor Rockefeller in 1972 and charged with developing and enforcing land-use designations for both private and public lands in the park. The APA established the State Land Master Plan (SLMP), which continues to provide a framework for stewardship of the Park's public lands. The agency also helped the Legislature draft the Private Land Use and Development Plan, which went into effect in 1973. The private land use plan categorized lands according to their ability to withstand development. Classification categories range from Hamlet (no minimum lot size) to Resource Management (43 acres required per principal residence).

The SLMP classifies public lands inside the Adirondack Park into different categories, including Wilderness, Primitive, Canoe, Wild Forest, Intensive Use, and Historic and State Administrative areas. The two broadest categories – Wild Forest and Wilderness -- contain most of the park's Forest Preserve acreage. Roughly 1.3 million acres of the Forest Preserve are classified as Wild Forest, while less than 1.1 million acres are classified as Wilderness. New York state requires wilderness parcels to consist of a minimum of 10,000 acres (Dawson and Thorndike 2002). Hunting, fishing and trapping are permitted on wilderness lands; motorized motor vehicles are not. Wild forest lands do allow motorized vehicles, including snowmobiles, ATVs and floatplanes.

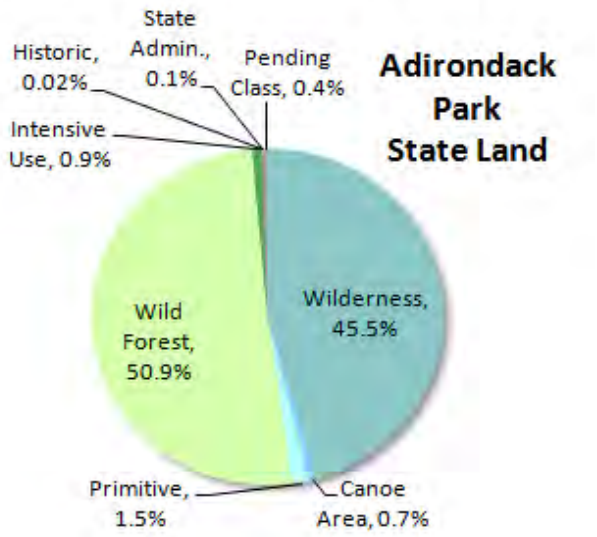

Table1. May 2014 Park State Land Acreage and Percent of all State Land

Wilderness	1,161,257	45.5%
Canoe Area	17,637	0.7%
Primitive	38,984	1.5%
Wild Forest	1,298,209	50.9%
Intensive Use	22,704	0.9%
Historic	531	0.02%
State Administrative	2,003	0.08%
Pending Classification	10,375	0.4%
All State Land	2,551,699	100.0%

Source: Adirondack Park Agency

Based on APA's 2014 statistics[1], the Adirondack Park has 5.8 million acres in total, consisting of 2.9 million acres of private land (50.42%) and 2.5 million acres state land (43.83%). In addition, the water bodies within the park constitute 334,000 acres in total (5.75%). The graphs above and below illustrate the details of the land use classification acreage within the Adirondack Park:

[1] To see more details about the statistics, go to APA website: http://apa.ny.gov/gis/stats/colc201405.htm

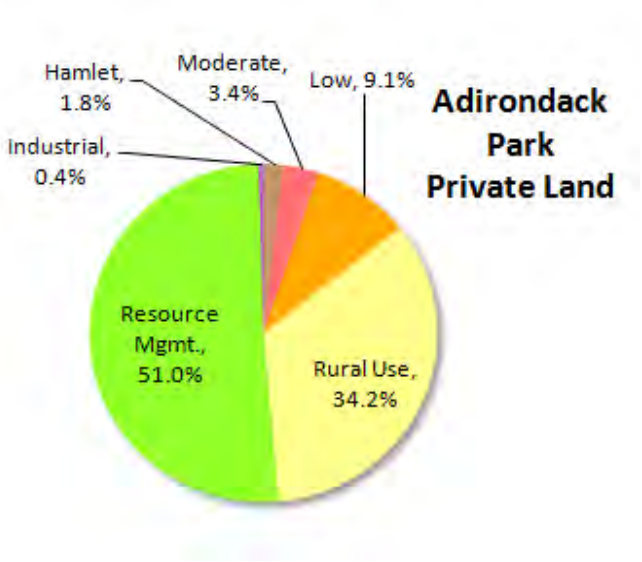

Table2. May 2014 Park Private Land Acreage and Percent of all Private Land

Hamlet	53,728	1.8%
Moderate Intensity	99,475	3.4%
Low Intensity	268,409	9.1%
Rural Use	1,004,664	34.2%
Resource Management	1,496,465	51.0%
Industrial Use	12,398	0.4%
All Private Land	2,935,138	100.0%

Source: Adirondack Park Agency

When classifying new additions to the Forest Preserve, the unifying theme of the SLMP is that the protection and preservation of natural resources on the state lands within the Park must be paramount. The land classification system and criteria for the SLMP are based on several factors:

(1) physical and biological characteristics of the land or water which impact its capacity to accept human interference;

(2) some intangible considerations (social or psychological) about the character of land, for instance, the sense of remoteness and degree of wildness;

(3) some more concrete considerations such as the ability of larger bodies of water to provide for adequately distributed motorboat use;

(4) established facilities on the land and the existing usage patterns.

APA notes in the text of the SLMP that the application of those factors can be subjective, because the agency lacks the tools to evaluate and measure the potential impact of its classification options.

The agency's rules and regulations require it to protect the environment first and foremost, as the SLMP mandates, bThe agency is also required to take economic impacts into consideration in its decision-making. Overall, the lack of objective measures of the value of these conflicting factors makes conflict between various stakeholders in and around the park inevitable.[2]

[2] "Essex Chain Lakes plan fuels debate: Economic versus wilderness values at issue" http://www.dailygazette.com/news/2015/jul/04/0704_essex/

2.2 The Economic Values and impacts of wilderness designation

Though not all of the benefits from wilderness preservation can be easily estimated and monetized, economists often apply several methods, including the travel cost method (TCM) (Beal and others, 1995), the contingent valuation method (CVM) (Reid, Stone and Whiteley, 1995; Pope and Jones, 1990) or the hedonic price method (HPM) (Snyder et al., 2007; Tuttle and Heintzelman, 2013), to do so. Other methods applied to determine economic benefits of wilderness preservation include meta-analysis, input-output methods and economic trend analysis (Cline, Weiler, and Aydin, 2011).

Using meta-analysis on wilderness-based TCM and CVM research, Loomis and Richardson (2001) suggest that economic values from the protection of natural environments can be grouped into the following categories: recreation, community, passive use, scientific, biodiversity, off-site, ecological services and education. In particular, recreation benefits are estimated as visitors' willingness to pay in addition to their existing trip costs. They estimate that the 10,000 acres of wilderness preservation in the eastern United States would yield approximately 11,000 visitor-days per year with an annual recreation value to visitors of $435,700.

The community benefits category accounts for any potential benefits to the local community resulting from the designation of wilderness areas. By Loomis and Richardson's estimation, 1,000 additional acres of designated wilderness would generate, overall, an additional $600,000 of personal income and create 24 new jobs across the nation. Wilderness protection would further help local counties by attracting new residents and businesses.

The passive use value refers to the combination of existence value and bequest values. They estimate the total passive value of wilderness in the U.S. is roughly $306 million per year. The authors also note several ways in which ecological services would benefit from wilderness designation, like wilderness watershed protection, carbon storage and nutrient cycling for waste treatments, which are estimated to be worth between $2 billion and $3.5 billion.

Loomis and Richardson further argue that wilderness preservation produces increased biodiversity, generates off-site benefits (i.e., property values increasing due to proximity to wilderness) and promotes educational value, but they are unable to estimate the dollar worth of those values. Overall, they estimate that designated wilderness creates $3 to $4 billion of value nation-wide. The following table summarizes the estimated annual economic values of wilderness in the lower 48 states:

Table 3. Summary of annual economic values of wilderness in the lower 48 states
(Loomis and Richardson 2001)

Use	Economic Value (Millions)	Economic Impact	Other Indicators
Recreation Value	$ 634		
Passive-Use Value (option, existence, bequest)	$ 306		
Ecological Services (carbon sequestration, etc.)	$ 2,000 to 3,400		
Scientific	$5		+ 400 journal articles
Biodiversity			+1 million acres protected 1/3 of U.S. Ecoregions
Community (recreation related)		26,822 Jobs	
Off-Site (Gain in local property values)	13%		

Pope and Jones (1990) use the contingent valuation method to explore the value of wilderness designation in Utah. They surveyed 291 households in Utah via questionnaire. Their analysis indicates that 86% of respondents believe it is “important” or “very important” to preserve some pristine, unique, natural areas as wilderness in Utah. Using this survey data, they estimate that the aggregate willingness-to-pay for wilderness preservation by households in Utah to be between $10 million and $38 million.

In research investigating the effect of federal wilderness designations on county growth, Duffy-Deno (1998), establishes the relationship between wilderness designation and two county growth indices: population density and total-employment-density using a disequilibrium model on 250 non-urban counties from eight states of the Intermountain West. He finds that these correlations are insignificant, which serves as strong evidence against the prevailing view that federally-owned wilderness areas in the study area hurt the local economies.

In another study, Phillips (2000) applies the hedonic price method to reveal a positive relationship between proximity to protected wilderness and market values in the Green Mountain National Forest wilderness area in Vermont. The regression results reveal that parcels located in towns that contain wilderness have a 13 percent higher sale price than those in towns without wilderness.

The earliest research estimating the economic value of wilderness preservation in the Adirondack Park was conducted by David H. Vrooman in the late 1970s. Vrooman (1978) used 284 vacant land parcel sales in the Adirondacks from 1971 through 1973 to test the hypothesis

that the value of private land in the Adirondack Park is enhanced through adjacent location to undeveloped state-owned land. The regression results suggest that, other factors being equal, a private parcel adjacent to state protected land is priced about $20 per acre higher than a similar parcel that is not adjacent to state land.

In a more recent economic analysis on land designation in the Adirondacks, Tuttle and Heintzelman (2013) investigated the effects of the APA's classifications on property values through the hedonic price method. Using 13,000 property transactions from 2001 to 2007 within the Adirondack region, the authors showed evidence that the land use restrictions and amenities provided by wild land do impact private property values. Their regression results indicate that lots in wilder, less developed areas generate a significant price premium compared to other similar parcels.

In general, even though different valuation methods may produce varying estimates of the economic benefits provided by wilderness areas, the majority of existing research agrees that wilderness land designations provide positive economic benefits and impacts on local economies.

2.3 Research objective

Given recent and expected acquisitions of former timberlands in the Adirondack Park, the New York State DEC must designate newly-acquired land under the SLMP. There is a heated political debate about which land designation would be most beneficial to the park's communities and economy. We seek to better understand the economic value provided to the park's residents and communities by the various land use designations, and we use property value impacts as a guide.

Our research objectives are two-fold:

(1) To map and visualize the relationship between property values and land designations (i.e., wilderness and wild forest), in order to generate a thumbnail sketch of how different topographic layers interact to affect property values and development pressures in the Adirondack Park;

(2) To conduct a preliminary hedonic price analysis using local area fixed effects while carefully controlling for endogeneity and omitted variables bias as well as spatial autocorrelation, which would result in the most robust comparison needed to accurately assess the impact of land use designations for property owners and would focus on the causative effects of land use designations on property values in the Park.

Property values also reflect the values and preferences of renters and vacationers since more attractive properties will fetch higher rents, which increase the sale value of a parcel. In order

to identify the effects of renter and vacationer values, we will control very carefully for other spatial factors, including the existence of developed amenities, which affect property values, in order to make accurate comparisons.

In addition to reflecting the existence of amenities, property values are also closely correlated with local economic activity. As economic activity in a local area increases, local businesses' profits will increase. This, in turn, will make property in the area more valuable as more businesses, attracted by profits, seek to locate in the area. This increase in demand will result in higher prices for property. Importantly, this is likely to be reflected in all types of properties. In this sense, residential property values, while not a perfect measure of economic activity, are definitely an indication of local economic success.

3. Research Methods

3.1 Mapping Methods

Three mapping methods are used to visualize the relationship between property values and land designations: overlay analysis, interpolation and spatial relationship modeling. All mapping work has been done in ESRI ArcGIS v10.3.

3.1.1 Overlay Analysis

The basic idea of overlay analysis is to extract useful information from integrated datasets generated by combining the characteristics of several independent datasets together. This approach is normally used for optimal site selection or suitability analysis. In this research, the overlay analysis toolkit in ArcGIS is used in conjunction with further spatial analysis. Specifically, we are using the feature overlay (overlaying points, lines, or polygons) to integrate the parcel layer, facilities layers, water body layer, land classification layer and other layers into one. The final, combined layer contains information from each involved layer. Further analysis, such as distance calculation, buffer zone estimation, etc., is performed based on this final layer. The final layer also visually provides us with a thumbnail sketch of how these different layers interact.

More importantly, the combined final layer is used for preparing variables indicating the relationship between private parcels and public protected lands (i.e., wilderness and wild forest) for further hedonic analysis. Instead of calculating the Euclidean distance between private parcels and protected land directly, we build multiple buffer zones (polygons) around each public land feature to a specified distance (i.e., 0.5 mile, 1 mile, 3 miles and 6 miles) to sort private parcels. We have in total 4 buffer zones for each protected land feature: within 0.5 miles, 0.5-1 mile, 1-3 miles and 3-6 miles. Each buffer zone looks like a donut encircling the protected land feature. Independent dummy variables are used to code private parcels located within each buffer zone. The following graph shows the buffer zones:

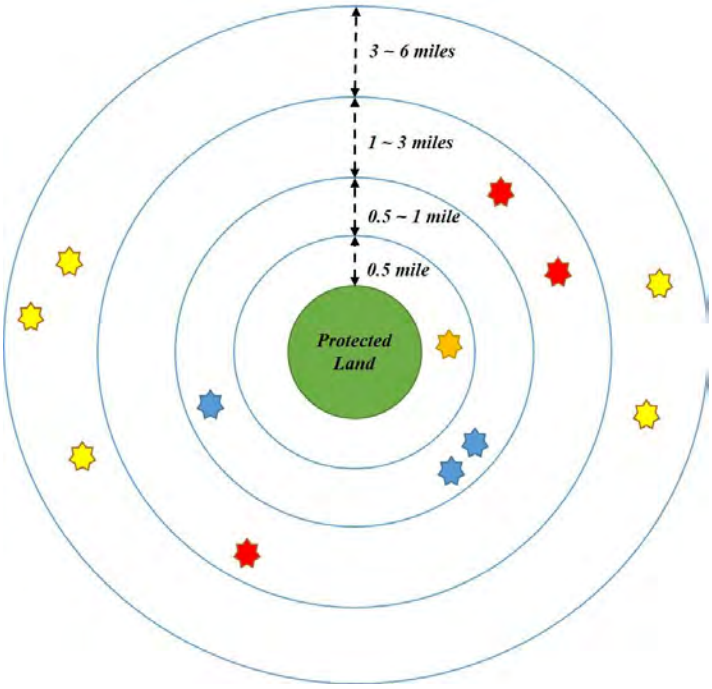

Figure 3. Donut Circle Buffer Zone for Sorting Private Parcels
(Independent dummy variables are used to code private parcels (stars with different colors) located within different buffer zones)

3.1.2 Interpolation (IDW)

In order to obtain a surface of private parcel values over the entire Adirondack Park, the interpolation toolset is used in ArcGIS to predict parcel prices from our discrete parcel sale price dataset. There are many different interpolation methods available in ArcGIS: inverse distance weighted (IDW), kriging, natural neighbor and spline[3]. We chose IDW for our research since it is the most-used method for interpolating cell values based on discrete observations and because it is efficient. The IDW method estimates parcel transaction prices by averaging prices of known data points in the neighborhood of each processing cell. It applies a linearly weighted combination of a set of sample points, which is a function of inverse distance. In our case, the IDW method assumes that the parcel transaction price decreases its influence on other transactions as its distance to those other parcels increases.

3.1.3 Spatial Relationship Modeling (OLS Residual Map)

Beyond analyzing and visualizing spatial patterns, applying spatial relationship modeling allows us to examine and/or quantify relationships among private parcel values and other features. The basic ordinary least squares (OLS) model is used to model the transaction price of private parcels in terms of its relationships to a set of explanatory variables. The explanatory variables

[3] For more information on those interpolation methods, please see ArcGIS Resources: http://resources.arcgis.com/en/help/main/10.1/index.html#//009z000000z4000000

include major house structure characteristics and locational variables, which can explain a large portion of sales price variation[4]. The OLS model is the best known of all regression techniques and provides a model of private parcel values covering the entire Adirondack Park. We also created a residual map to illustrate the OLS modeling results. In the residual map, locations where the actual private property values are larger or smaller than the model's estimated values are highlighted for further analysis.

3.2 Hedonic Analysis

Hedonic analysis (i.e., hedonic price method, HPM) is an econometric technique that relies on consumer behavior (i.e., revealed preferences) in related markets to estimate the non-market benefits of improving environmental amenities[5]. Simply speaking, hedonic analysis uses regression techniques to estimate a hedonic price function, which represents the impact of observable property characteristics, including environmental amenities (e.g., being adjacent to wilderness) and spatial factors, on the equilibrium prices of parcels. With sufficient information on property transactions and the market, we will be able to estimate how different land designations impact the values of different types of homes in different ways.

The hedonic method generally involves two stages. The first stage is to estimate the hedonic price function by regressing house prices on attributes using an econometric model, then the marginal implicit prices of the attributes can be recovered from the estimated coefficients. The second stage aims to derive the demand function for attributes based on the results of first stage. Our research only employs the first stage analysis, as the second stage requires more and different data as well as additional, restrictive assumptions about the underlying model.

The general form of the hedonic model applied in this study is:

$$\ln(Sale\ Price) = f(S, L, E)$$

where *Sale Price* is the real transaction price of private parcels, *S* is the structural characteristics, *L* is the locational characteristics, and *E* indicates environmental characteristics (e.g., dummy variables indicating the buffer zone in which a parcel is located). Like other studies, we employ a standard semi-log specification for our regression model (Kuminoff, Parmeter, and Pope 2010).

It is well known that analysts face a number of econometric challenges in using hedonic analysis. These include arbitrary functional form, omitted variable bias, endogeneity, spatial

[4] Due to the limitation of OLS analysis toolset in ArcGIS, we are unable to run the OLS model with all available explanatory variables as a hedonic analysis normally does. We only incorporate major variables we are interested in. To see how OLS regression works in ArcGIS, please see:
http://resources.arcgis.com/en/help/main/10.1/index.html#//005p0000002z000000

[5] The details of Hedonic Price Methods and the theory framework are beyond the scope of this report. Please see Rosen(1974) 's work for more information.

dependence and autocorrelation, heteroscedasticity, and multicollinearity. These should be addressed in order to avoid biased estimates (Tuttle and Heintzelman, 2013). We introduce spatial fixed effects to absorb the price effects of spatially clustered omitted variables. In addition, we allow clustered error terms for parcels within census block levels and enforce independence of error terms across census blocks to overcome spatial autocorrelation and heteroscedasticity problems.

4. Data

4.1 Data Description

Property value mapping and hedonic analysis are conducted based on a single real estate transaction dataset. The 2004-2013 real estate transactions dataset was provided by the New York State Office of Real Property Taxation Services (NYSORPTS). The transaction data covers real property transactions for all twelve counties constituting the Adirondack Park: Clinton, Essex, Franklin, Fulton, Hamilton, Herkimer, Lewis, Oneida, Saratoga, St. Lawrence, Warren and Washington. NYSORPTS also provided us with detailed parcel and property characteristics of all transactions. We projected and identified each transacted parcel with its detailed characteristic information on parcel reference shapefile via ArcGIS. Relying on the overlay analysis, we measured the distance from each parcel centroid to certain environmental and cultural amenities including population centers, facilities, lakes, roads, etc. Finally, we combined the dummy variables, indicating the buffer zone in which a parcel resides, with all other parcel information to derive our final dataset for hedonic analysis. Furthermore, we created dummy variables for all involved parcels to indicate how each parcel is classified among the APA private land classes. We cleaned the transaction dataset by removing outliers (e.g., sale price lower than $10,000) and observations with insufficient detailed characteristics information or without correct geographical coordinates. Eventually, we had a transaction dataset with 77,618 ready-to-use observations. Table 4 provides a listing of each dataset used in this research and its source.

Table 4. Summary of Data Sources

Data Description	Time Frame	Source
Census blocks Reference Shapefile	2010	U.S. Census Bureau
Cultural Amenities Reference Shapefile (e.g., Public facilities, trailhead, campsite, population centers, etc.)	Unknown	Adirondack Park Agency & New York State GIS Clearinghouse
APA land Classification Reference Shapefile	2014	Adirondack Park Agency
Easement Reference Shapefile	2015	NYDEC
Water body shapefile	Unknown	New York State GIS Clearinghouse
Parcel layer	2013	Provided by individual counties
Parcel level details	2013	NYSORPTS
Property sales	2004-2013	NYSORPTS

4.2 Variables Specification

All actual sale price data were deflated to the base year 2004 using the quarterly house price index (HPI) calculated by the Federal Housing Financial Agency. Specific HPIs for major metropolitan statistical areas, if available, were used; otherwise, the HPI for non-metropolitan New York State was used. This process helps to control for sample-wide and sub-sample time trends. The dependent variable in our hedonic model is the log of the deflated sale price.

As described earlier, we coded private parcels located within various buffer zones around wilderness areas as multiple dummy variables to indicate the relationship between private property values and adjacency to protected lands. Besides wilderness and wild forest, we also tested other measures of natural amenities in the Park, including the distance to protected land, which refers to all APA-designated public lands and all forest easements on private land within the Adirondack Park. We also included dummy variables to indicate how each parcel is classified according to APA private land classifications. Transacted parcels located outside of the Adirondack Park are coded independently as well. APA updates the statistics and property covered by each land class approximately annually, though the changes from year to year are small (Tuttle and Heintzelman, 2013). We assumed that the actual difference on properties in terms of APA land classification system is small enough to ignore. Therefore, in our hedonic analysis, all calculated distance variables and zoning dummy variables were derived based on 2014 APA land classification reference shapefile instead of referring to the land classification assigned at the time when the properties in the dataset were sold.

Locational characteristics include distance to nearest hospital, public school, public library, lake larger than 50 hectares in area, population center, trailhead, campsite, boat launch and state fishing access point. All those distance variables were calculated using the Euclidean distance from each parcel centroid. By checking the correlation between sale price and distance to nearest road, we found that this correlation is not linear. We therefore introduced the distance to nearest road in log form.

House structural characteristics include the number of bedrooms, kitchens, full bathrooms, half bathrooms and fireplaces. Other amenities, such as finished basements, basement and garage capacity and central air-conditioning, were also included. We also included the age of the building and the log of living area in square feet. Waterfront properties are identified by an independent dummy variable. In addition, all included parcels are classified into seven groups: single family residential, multiple family year-round residential, mobile, multi-purpose residential, rural residential, seasonal residence and estate. The condition of each property is measured in five tiers: bad (E), fair (D), average (C), good (B) and excellent (A), as defined by NYSORPTS assessment records. Summary statistics for the final transaction dataset are presented in Appendix 1.

5. Results and Discussion

We created three maps from the results of our mapping and visualization objective: (1) Adirondack Park easements and public lands; (2) property values in the Adirondack region; and (3) price residuals in the Adirondack Region. The first map (see Fig. 4) is the result of overlaying the easements, wilderness, wild forest and other public lands layers in the Adirondack Park, representing the relationship and distribution of those designated lands. This map suggests that wilderness and wild forest are clustered with each other; there is no apparent and uniform boundary to separate these two types of protected lands from the other. Based on the first map, the second map (see Fig. 5) integrates a continuous surface of real property sale prices over the entire Adirondack region. This map successfully demonstrates how property values vary across the study area. The average property value for all properties outside the Adirondack Park appears to be lower than that of properties located within the blue line. Property values are highest in the regions around Lake George, the Tri-Lakes region and Old Forge: major tourist destinations with beautiful scenery and active commercial sectors. Due to the unique landscape and distribution of wilderness and wild forest, it is not easy to identify the impacts of different land designations on surrounding private properties by simply examining this map. However, besides Lake George, the Tri-Lakes region, and Old Forge, the inconsistent color in other areas within the blue line indicates the existence of price variations, which provide the basis for further spatial analysis to distinguish the impacts of wilderness and wild forest on nearby private properties.

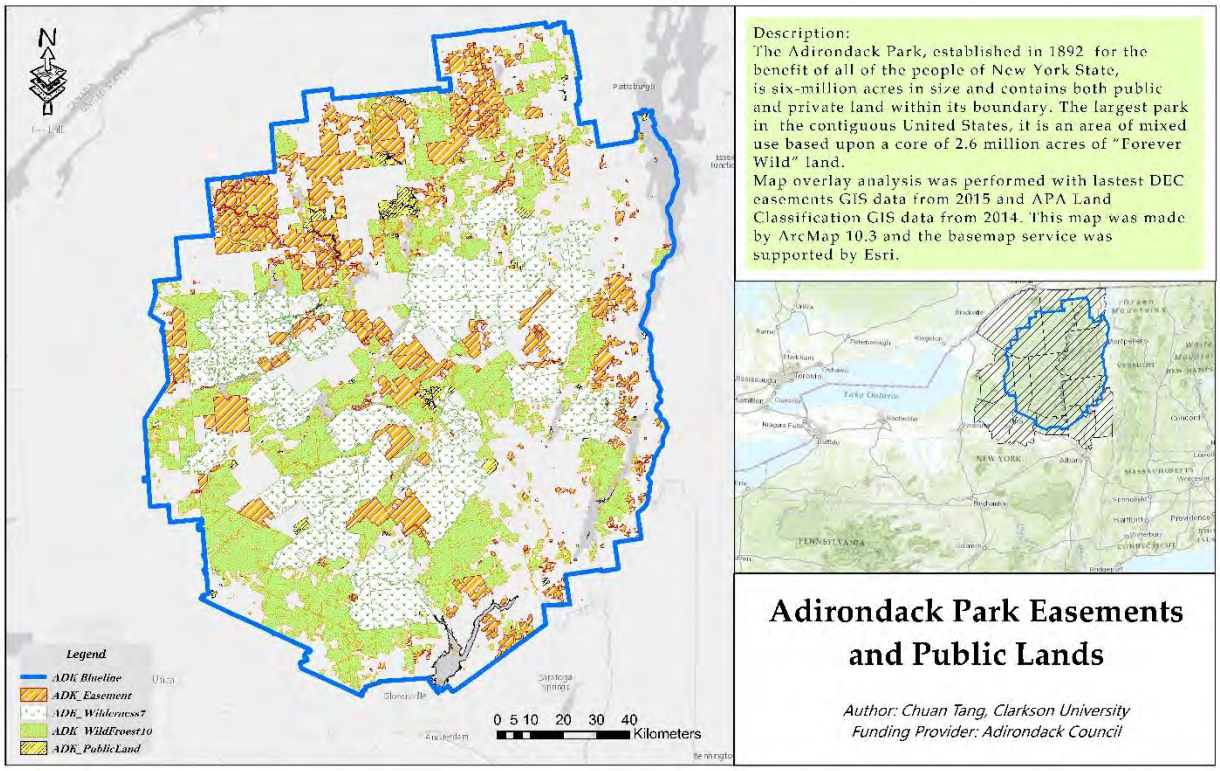

Figure 4. Adirondack Park Easements and Public Lands

The last map (Appendix 4) delineates the residual between actual observed price and the predicted price that comes from our OLS regression model. This residual indicates where the simple OLS model is unable to account for actual price variations. The red areas are locations where the actual property values are two standard deviations larger than what the model estimated, while the blue areas are locations where the actual property values are 2 standard deviations smaller (i.e., 2 standard deviation smaller) than the model estimated. Within the blue line, the red cells are clustered in regions closer to the center area of the park where wilderness or wild forest are abundant, while grey or blue cells crowd along the blue line park boundary, where wilderness and wild forest are not abundant. It is important to note that dummy variables indicating adjacency to wilderness and wild forest are not included in the OLS model. Therefore, it is logical to infer that wilderness or wild forest may have positive impacts on private property values.

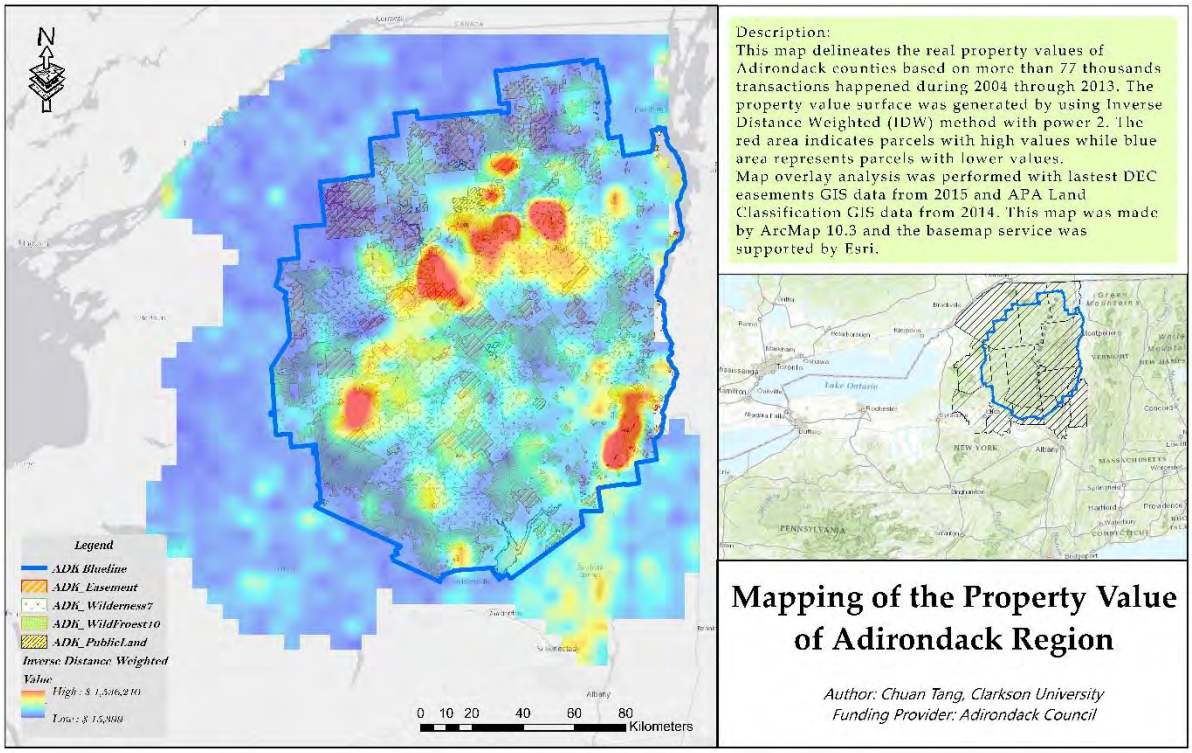

Figure 5. Property Values in the Adirondack Region

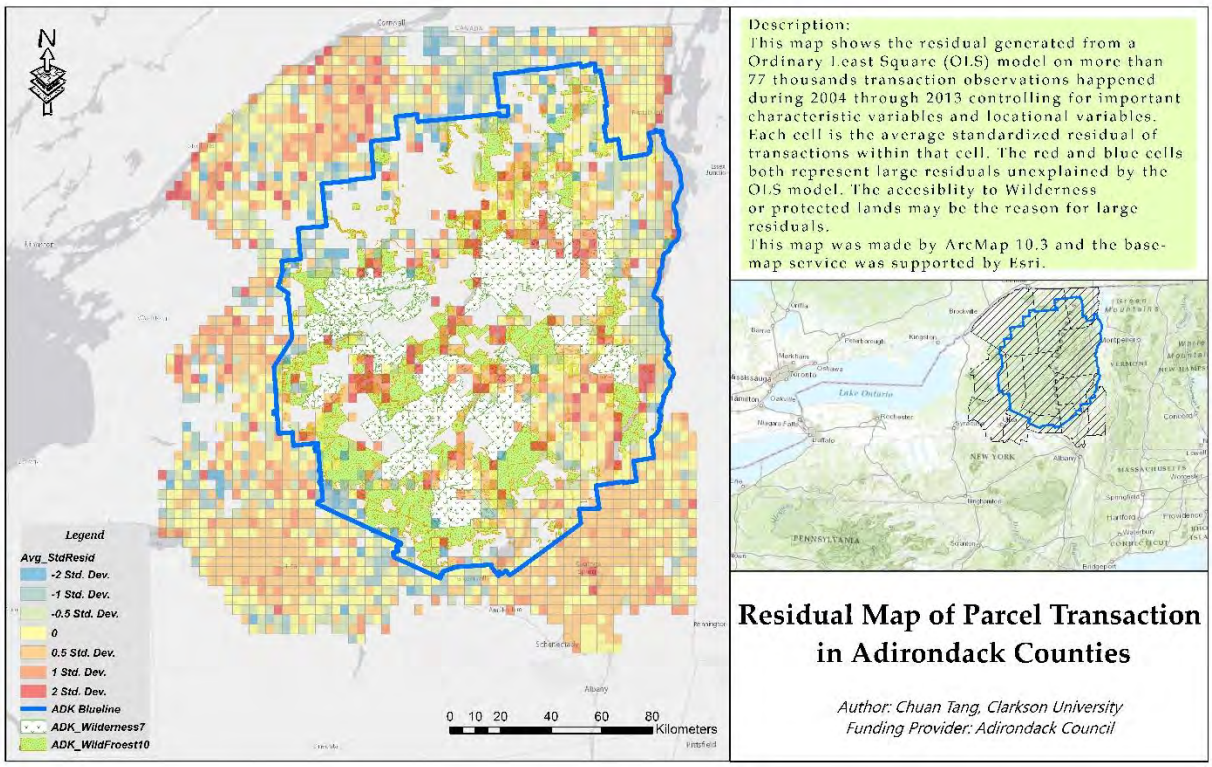

Figure 6. Price Residuals in the Adirondack Region

Unfortunately, this map only shows the result of the simple OLS model, which may be biased due to multiple econometric problems. One possible problem is omitted variable bias. There are numerous variables that affect the property sale price, many of which are not observable by researchers. If any of these unobserved variables are correlated with both included variables and property values, the estimated effects of the included variables will be biased, and the inference about the impacts of wilderness and wild forest on property values will be incorrect. The fixed effects hedonic analysis described below tackles these problems and provides much more reliable estimates of the effects of wilderness designation and other variables.

Table 5 shows the selected results of three hedonic analysis models. Results reported in table 5 are the main variables of interest and the full regression results are listed in Appendix 5. The three models use all 77,618 sales transactions that occurred in the involved 12 counties between 2004 and 2013. All three models include the APA private land classification dummy variable. All transactions outside the blue line are coded as zero in the APA land classification system and used as the reference level in those three regression models. Our results indicate that parcels that are classified as moderate intensity, low intensity, rural use and resource management sell at a consistently positive and significant premium in three models. This result, overall, coincides with the mapping exercise detailed above: that the mean property sale price within the Adirondack Park is higher than that outside of the park. The property values on industrial use land inside the park are found to not be significantly different from those located outside the park. This is not surprising, since industrial use lands usually have a negative impact on property values. In addition, a hamlet designation also has a significant and positive effect on property values in Model 1, but is insignificant elsewhere.

Table 5. Results for Adirondack Region Fixed Effect Hedonic Analysis

	Model 1 Log(Std _price)	Model 2 Log(Std_price)	Model 3 Log(Std_price)
Hamlet	0.0938**	0.0635	0.0559
	(0.0464)	(0.0467)	(0.0469)
Moderate Intensity	0.278***	0.244***	0.238***
	(0.0457)	(0.0461)	(0.0463)
Low Intensity	0.201***	0.167***	0.171***
	(0.0465)	(0.0469)	(0.0471)
Rural Use	0.178***	0.145***	0.145***
	(0.0453)	(0.0457)	(0.0459)
Resource Management	0.176***	0.131**	0.132**
	(0.0521)	(0.0526)	(0.0528)
Industrial Use	0.264	0.135	0.233
	(0.341)	(0.341)	(0.342)
Waterfront House	0.270***	0.271***	0.270***
	(0.0109)	(0.0109)	(0.0109)
Distance to lakes(>50 hectares)	-0.0000361***	-0.0000357***	-0.0000359***
	(0.00000414)	(0.00000414)	(0.00000414)
Log(Distance to Protected land)		-0.0350***	-0.0396***
		(0.00609)	(0.00646)
Wilderness 0.5 mile buffer zone			0.0571
			(0.0662)
Wilderness 0.5~1 mile buffer zone			0.246***
			(0.0633)
Wilderness 1~3 miles buffer zone			0.204***
			(0.0552)
Wilderness 3~6 miles buffer zone			0.186***
			(0.0461)
Wild Forest 0.5 mile buffer zone			-0.0349
			(0.0405)
Wild Forest 0.5~1 mile buffer zone			-0.0350
			(0.0382)
Wild Forest 1~3 miles buffer zone			-0.0284
			(0.0339)
Wild Forest 3~6 miles buffer zone			-0.0448*
			(0.0257)
Constant	7.317***	7.571***	7.578***
	(0.167)	(0.172)	(0.175)
R-squared	0.44	0.45	0.43
Year/Month Dummy	Y	Y	Y
Fixed Effect	Y	Y	Y
N	77618	77618	77618

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Waterfront properties or sites located close to a bigger lake (greater than 50 ha) enjoy a significant price premium (27%) compared to other non-waterfront properties. In model 2 and model 3, we include the distance to the closest protected land to evaluate, in general, whether being adjacent to any protected land will generate a premium to private properties. The protected land variable includes all designated public land by the APA land use classification system and forest easements on private land in the park. Both models suggest a 3.5% to approximately 4.0% premium resulting from proximity to protected land. These results, using current transaction data, agree with Vrooman's results.

Model 3 builds upon the previous models by adding variables indicating proximity to wilderness and wild forest. We find that private properties located in a range of 0.5 to 6 miles from wilderness generate a significant premium compared to any properties located more than 6 miles from wilderness. The premium decreases as the distance to wilderness increases. We do not find significant effects on private properties located 0.5 miles or less from wilderness land. This may imply that while people value living close to wilderness, once they are sufficiently close, there is no additional benefit to being even closer.

Wild forest variables, however, do not generate similar positive and significant effects. All coefficients for wild forest buffer zones are negative and the coefficient for the 3-6 miles buffer is significant, which suggests that wild forest lands do not provide any significant positive effects on local property values.

Overall, our results suggest that wilderness land has significant positive impacts on nearby property values, while wild forest lands do not. This result is reasonable since allowing motorized vehicle use in wild forest lands may destroy wildlife habitat, degrade the region's bio-integrity (Clark 2000), and produce undesirable effects like noise and pollution.

One caveat of our analysis above is that we are assuming that there is a single market for homes in the Adirondack Park. There may be separate markets for primary homes and secondary homes. This issue is critical since many people buy second homes within the park to use for vacation and leisure purposes, and the buyers in these respective categories may have different preferences for home characteristics and environmental amenities. Tuttle and Heintzelman (2013) found that, all else equal, buyers from outside of the north country paid 15 percent more for properties in their study area. They reason that this result could be related to whether purchases represent primary residences or second homes.

Table. 6 Results Non-NY buyers and NY buyers

	Non-NY buyers Log(Std_price)	NY buyers Log(Std_price)
Hamlet	0.918**	-0.157
	(0.455)	(0.332)
Moderate Intensity	1.045**	0.00584
	(0.457)	(0.332)
Low Intensity	1.010**	-0.0687
	(0.457)	(0.332)
Rural Use	1.025**	-0.109
	(0.449)	(0.332)
Resource Management	0.975**	-0.121
	(0.464)	(0.334)
Industrial Use	NA	NA
Log(living square feet)	0.483***	0.468***
	(0.0321)	(0.00666)
Waterfront House	0.241***	0.271***
	(0.0353)	(0.0122)
Log(Distance to Protected land)	-0.0368*	-0.0432***
	(0.0222)	(0.00733)
Wilderness 0.5 mile	0.382	-0.0366
buffer zone	(0.242)	(0.0763)
Wilderness 0.5~1 mile buffer zone	0.407*	0.194***
	(0.236)	(0.0729)
Wilderness 1~3 miles buffer zone	0.400*	0.144**
	(0.219)	(0.0632)
Wilderness 3~6 miles buffer zone	0.300	0.138***
	(0.200)	(0.0523)
Wild Forest 0.5 mile buffer zone	-0.178	-0.0490
	(0.255)	(0.0429)
Wild Forest 0.5~1 mile buffer zone	-0.112	-0.0475
	(0.252)	(0.0401)
Wild Forest 1~3 miles buffer zone	-0.0890	-0.0386
	(0.244)	(0.0349)
Wild Forest 3~6 miles buffer zone	0.0671	-0.0523**
	(0.211)	(0.0261)
Constant	7.505***	7.677***
	(0.837)	(0.187)
R-squared	0.39	0.36
Year/Month Dummy	Y	Y
Fixed Effect	Y	Y
N	7168	70450

Unfortunately, we were unable to definitively distinguish second house transactions in our final dataset. We made an assumption that all properties bought by buyers coming from other

states are being used as second houses. We ran separate regressions on all 7,168 transactions bought by non-NY buyers and the other 70,450 transactions bought by NY buyers exclusively for comparison. Results are listed in Table 6. Coefficients for waterfront variables and distance to protected lands are largely the same as in other models. The coefficients for APA private land use classes indicate that non-NY buyers pay more than 100 percent more for properties in the park than outside of the park, while NY buyers do not pay this premium for Adirondack properties. More importantly, non-NY buyers also pay a much higher premium for properties close to wilderness land, compared with NY buyers. Specifically, non-NY buyers pay approximately 3 times more for properties that are within 0.5 miles to 3 miles of wilderness lands. However, NY buyers value properties that are 3 to 6 miles away from the wilderness while non-NY buyers do not. Being too close (less than 0.5 mile) to wilderness has no significant impact on properties purchased by both non-NY buyers and NY buyers. Similarly, no positive significant impacts are found for wild forest on property values in either of these samples.

6. Conclusion

We investigated how different land use designations will impact the local economy as measured through the property-value metric. We generated maps to visualize how property values vary across the greater Adirondack region (including properties transacted outside the blue line but within the 12 counties comprising the Adirondack Park). By overlaying the property layer with other land and environmental amenities layers, we produced maps illustrating the relationship between property values and other spatial factors.

Based on more than 77,000 greater Adirondack real estate transaction price observations from 2004 to 2013, we conducted a hedonic analysis to investigate the economic impact of land designations on property values. Results confirm that private properties in the Adirondack Park have higher values than those outside the blue line. The results also suggest close proximity to protected land provides a positive impact on property values. We find that proximity to wilderness lands, from 0.5 miles to 6 miles away, generates up to a 25% premium on property values. This positive impact decreases as the distance to wilderness increases. Interestingly, being too close to wilderness, within 0.5 miles, provides no significant impact on property values. We do not find significant impact on property values adjacent to wild forest lands.

While this study does not represent a full cost-benefit analysis of the upcoming land designation decisions, the results strongly suggest that the designation of land as wilderness areas is positively correlated with property values. This result may indicate more economic activity in a local region, and surely points to increased amenity values for nearby landowners. These results do not mean that, in order to maximize property values, all public lands should be designated as wilderness, but that, at the margin, additional wilderness areas are likely to

increase local property values. Economic theory suggests that as the amount of wilderness increases, each additional acre of wilderness will become less valuable than the last. Nonetheless, at current levels, the marginal value of additional wilderness is still positive.

7. Acknowledgments

This study was commissioned by the Adirondack Council. The authors would like to acknowledge the work of Virginia Wiltshire-Gordon, who did preliminary mapping analysis over the summer of 2015 as part of Clarkson's Research Experience for Undergraduates summer program, sponsored by National Science Foundation Grant No. EEC-1359256. We would also like to thank Sarah Harris for help in editing the final manuscript.

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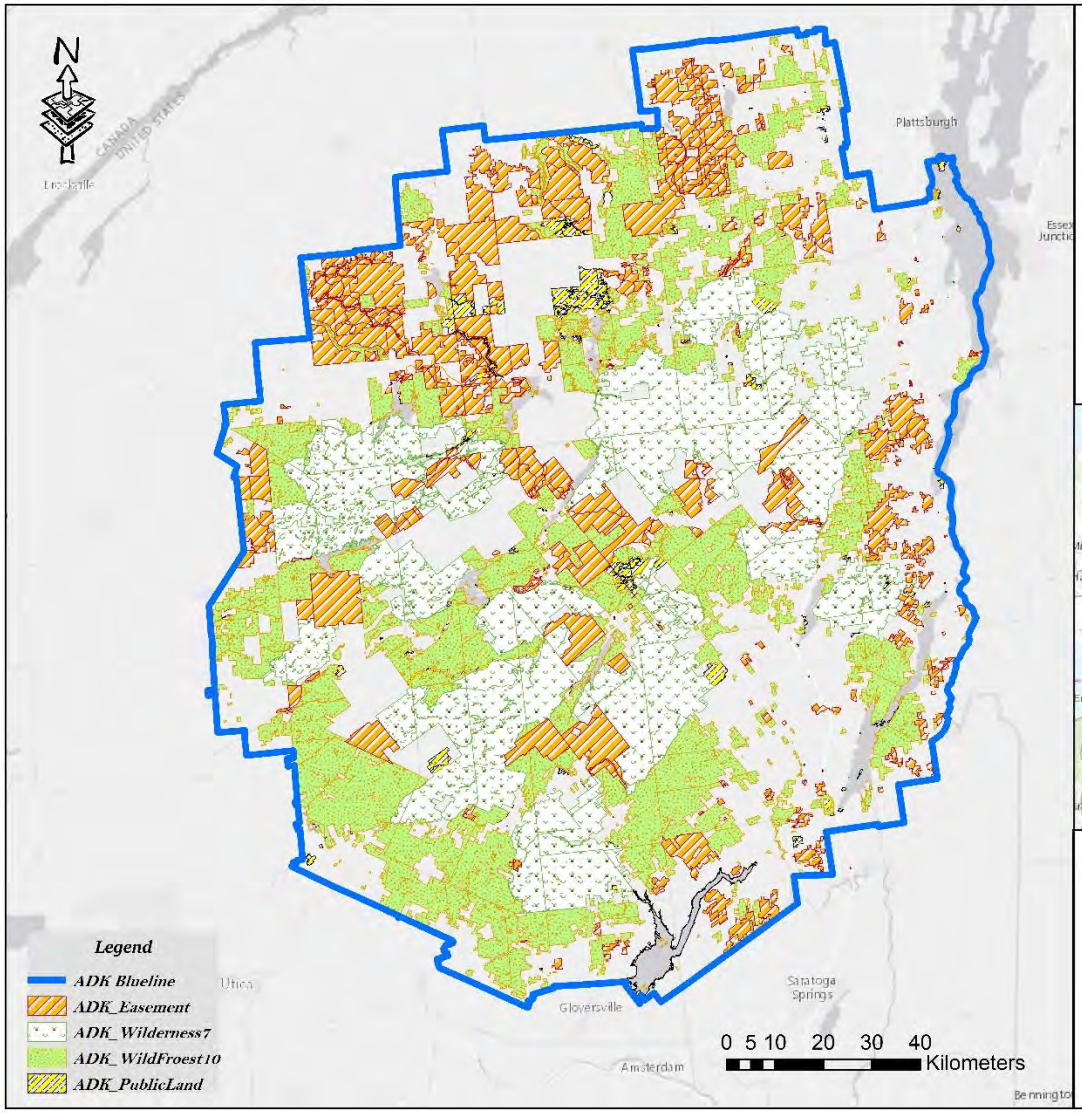
9. Appendix

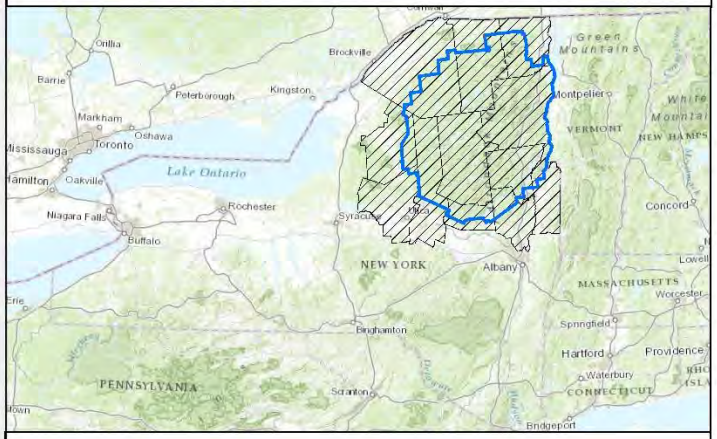
Appendix 1. Summary Statistics for Regression Variables

	Mean	Std. Dev.	Min	Max
Sale Price (Dollar)	171870	163367.9	10000	5800000
Std. Sale Price (2004 Dollar)	135836.9	126919.1	7266	4438490
Number of kitchens	1.088601	.3347523	0	5
Number of full baths	1.489307	.6505987	0	10
Number of bedrooms	3.129132	1.043316	0	21
Number of fireplaces	.3932325	.5715667	0	15
Living area(square feet)	1661.884	683.7241	50	15118
Owning central AC	.1579402	.3646872	0	1
Basement and garage capacity	.0970501	.3979183	0	6
Number of half baths	.3609343	.4995769	0	5
Grade Excellent	.0037105	.060801	0	1
Grade Good	.0804839	.2720426	0	1
Grade Average	.7961555	.4028573	0	1
Grade Fair	.1160169	.3202473	0	1
Distance to Hospital	11087.31	10199.93	52.08582	67751.85
Distance to Public school	2827.539	3103.749	37.25801	27489.35
Distance to Public Library	4112.333	3893.426	5.795679	34232.35
Distance to lakes(>50 hectares)	8224.069	7166.642	0	29635.91
Distance to trailhead	20367.84	14667.58	8.545954	58874.23
Distance to campsite	36838.68	22246.69	316.3114	88916.66
Distance to population center	3758.219	3581.791	.5886459	31080.47
Distance to boat launch site	12007.18	7314.718	22.84676	42804.57
Distance to fishing parking lot	14803.59	9596.255	50.99544	56310.42
Distance to road	46.60867	85.39495	.00729	7358.391
Building Age	56.88168	51.47777	0	949
Multiple Family Year-Round	.930815	.2537701	0	1
Rural Residence with Acreage	.0213224	.1444576	0	1
Estate	.0001417	.0119038	0	1
Seasonal Residence	.0383545	.1920518	0	1
Mobile Home	.0015589	.0394526	0	1
Multi-Purpose Residential	.0044448	.0665218	0	1
Hamlet	.0611971	.2396931	0	1
Moderate Intensity	.0401196	.1962409	0	1
Low Intensity	.0269396	.1619081	0	1
Rural Use	.0250715	.1563433	0	1
Resource Management	.007524	.0864148	0	1
Industrial Use	.0000644	.0080259	0	1
Distance to Protected land	19253.05	14816.17	0	62206.26
Wilderness 0.5 mile buffer zone	.0106419	.1026097	0	1
Wilderness 0.5~1 mile buffer zone	.0108222	.1034662	0	1
Wilderness 1~3 miles buffer zone	.0283182	.1658813	0	1
Wilderness 3~6 miles buffer zone	.021361	.1445856	0	1
Wild Forest 0.5 mile buffer zone	.0500657	.218082	0	1
Wild Forest 0.5~1 mile buffer zone	.0399778	.1959084	0	1
Wild Forest 1~3 miles buffer zone	.0957639	.294269	0	1
Wild Forest 3~6 miles buffer zone	.1249066	.3306151	0	1

Appendix 2. Adirondack Park Easements and Public Lands



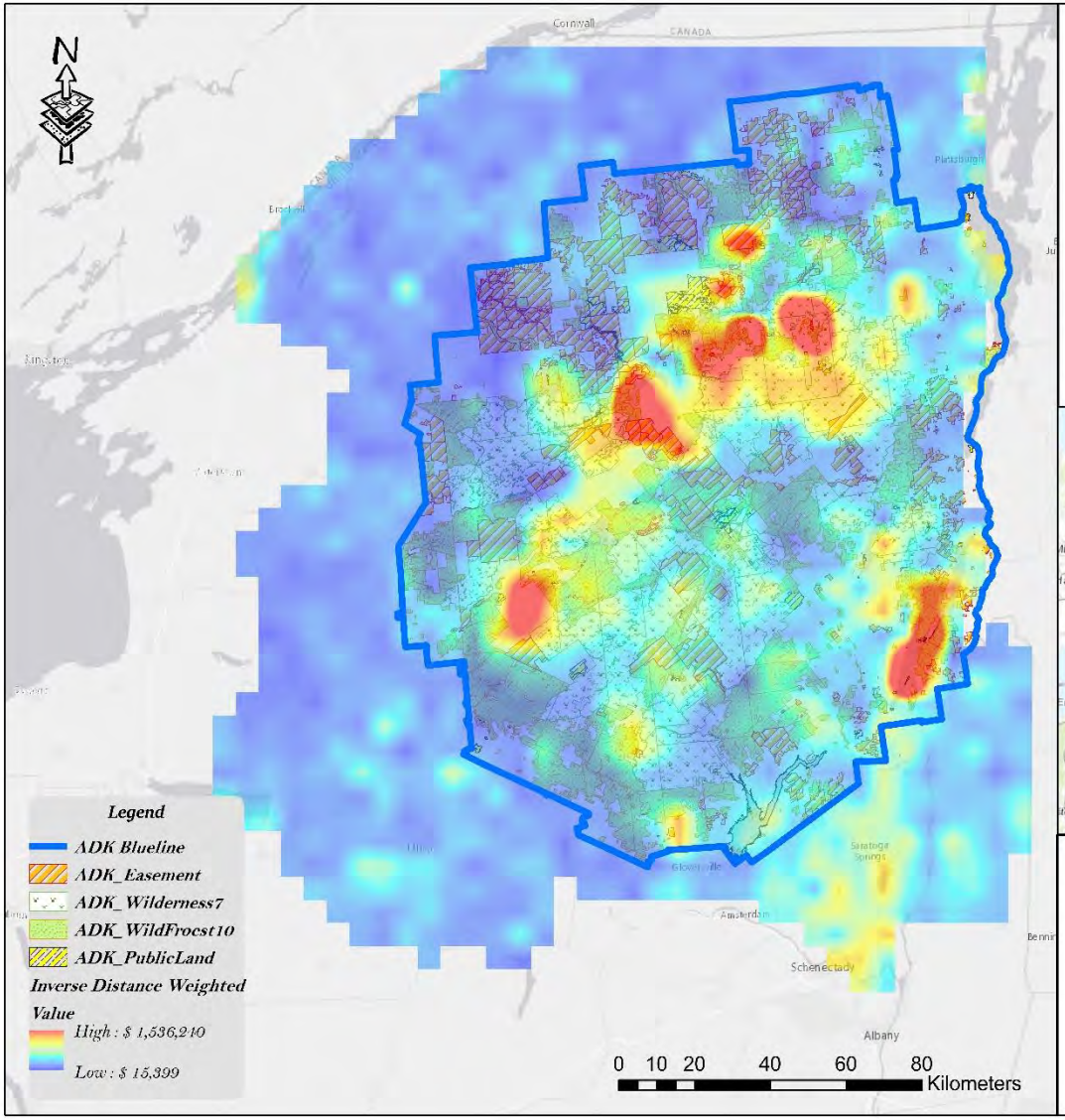
Description:
The Adirondack Park, established in 1892 for the benefit of all of the people of New York State, is six-million acres in size and contains both public and private land within its boundary. The largest park in the contiguous United States, it is an area of mixed use based upon a core of 2.6 million acres of "Forever Wild" land.
Map overlay analysis was performed with lastest DEC easements GIS data from 2015 and APA Land Classification GIS data from 2014. This map was made by ArcMap 10.3 and the basemap service was supported by Esri.



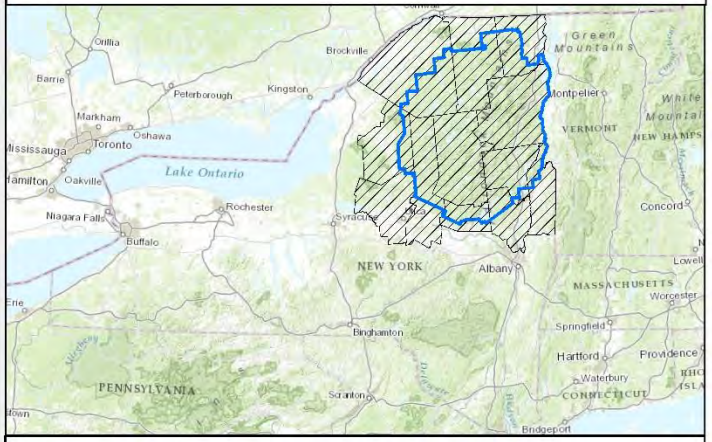
Adirondack Park Easements and Public Lands

Author: Chuan Tang, Clarkson University
Funding Provider: Adirondack Council

Appendix 3. Mapping of the Property Value of Adirondack Region



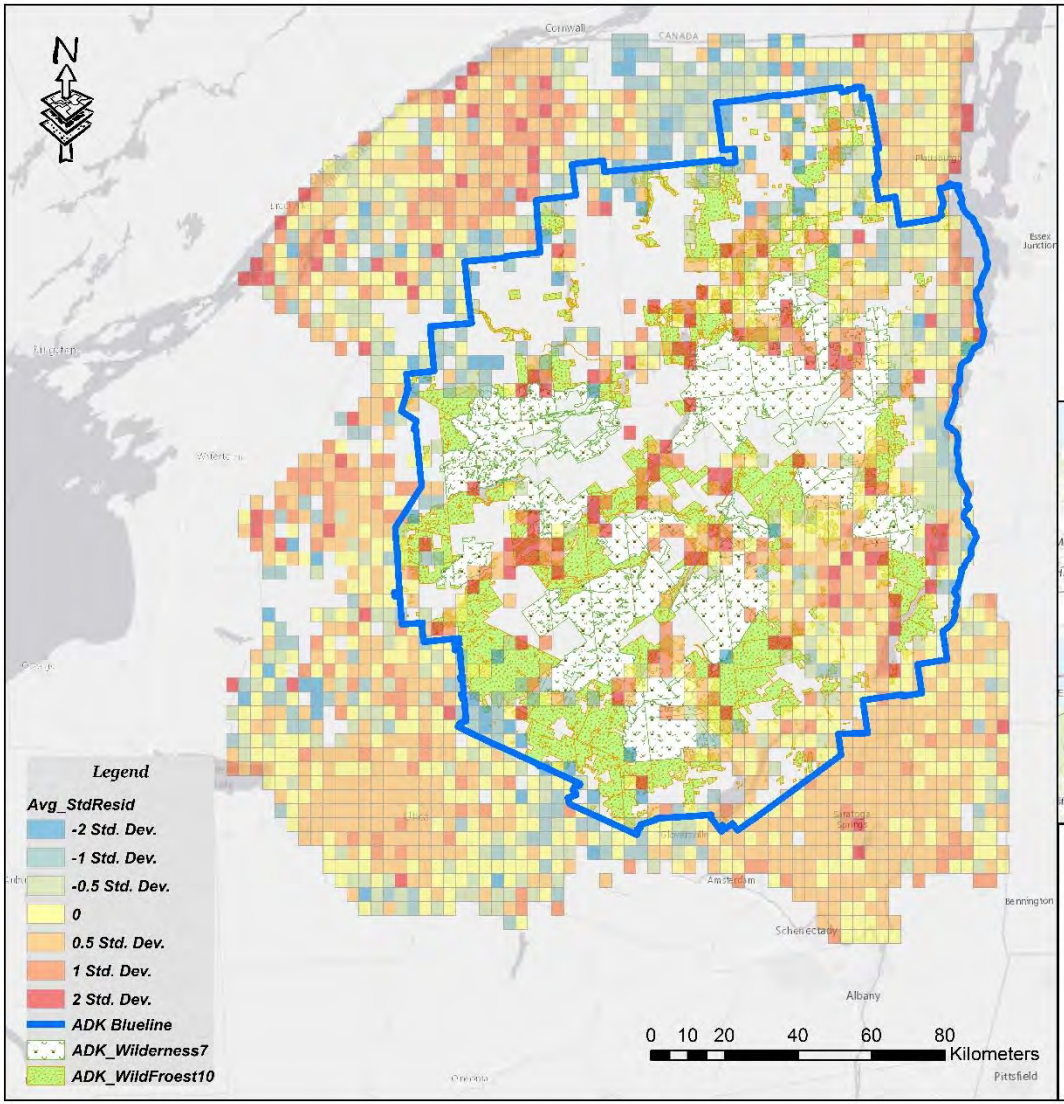
Description:
This map delineates the real property values of Adirondack counties based on more than 77 thousands transactions happened during 2004 through 2013. The property value surface was generated by using Inverse Distance Weighted (IDW) method with power 2. The red area indicates parcels with high values while blue area represents parcels with lower values.
Map overlay analysis was performed with lastest DEC easements GIS data from 2015 and APA Land Classification GIS data from 2014. This map was made by ArcMap 10.3 and the basemap service was supported by Esri.



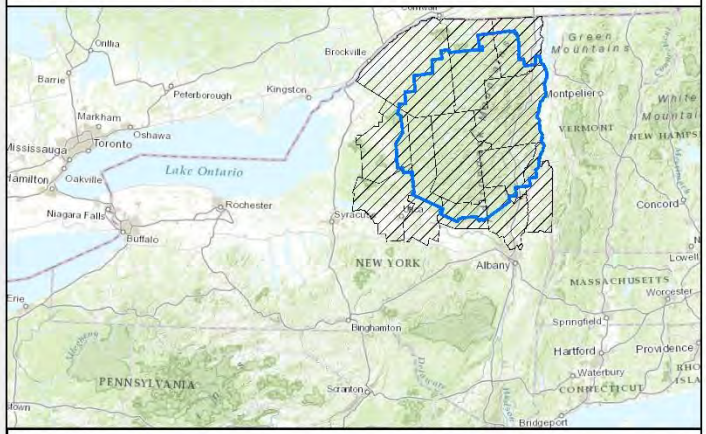
Mapping of the Property Value of Adirondack Region

Author: Chuan Tang, Clarkson University
Funding Provider: Adirondack Council

Appendix 4. Residual Map of Parcel Transaction in Adirondack Counties



Description:
This map shows the residual generated from a Ordinary Least Square (OLS) model on more than 77 thousands transaction observations happened during 2004 through 2013 controlling for important characteristic variables and locational variables. Each cell is the average standardized residual of transactions within that cell. The red and blue cells both represent large residuals unexplained by the OLS model. The accesiblity to Wilderness or protected lands may be the reason for large residuals.
This map was made by ArcMap 10.3 and the base-map service was supported by Esri.



Residual Map of Parcel Transaction in Adirondack Counties

Author: Chuan Tang, Clarkson University
Funding Provider: Adirondack Council

Appendix 5. Full Regression Results for Adirondack Region Fixed Effect Hedonic Analysis

	Model 1 Log(Std_price)	Model 2 Log(Std_price)	Model 3 Log(Std_price)	Non-NY buyers Log(Std_price)	NY buyers Log(Std_price)
Number of kitchens	-0.192***	-0.192***	-0.192***	-0.211***	-0.195***
	(0.00578)	(0.00578)	(0.00577)	(0.0325)	(0.00602)
Number of full baths	0.0965***	0.0965***	0.0965***	0.0684***	0.0976***
	(0.00344)	(0.00344)	(0.00344)	(0.0182)	(0.00358)
Number of bedrooms	-0.0107***	-0.0106***	-0.0105***	-0.0163	-0.00998***
	(0.00201)	(0.00201)	(0.00201)	(0.0107)	(0.00210)
Number of fireplaces	0.0619***	0.0619***	0.0618***	0.107***	0.0581***
	(0.00303)	(0.00303)	(0.00303)	(0.0162)	(0.00315)
Owning central AC	0.0420***	0.0419***	0.0420***	-0.00286	0.0427***
	(0.00488)	(0.00488)	(0.00487)	(0.0320)	(0.00494)
Basement and garage capacity	-0.00182	-0.00199	-0.00168	-0.00480	-0.00182
	(0.00377)	(0.00377)	(0.00377)	(0.0200)	(0.00390)
Number of half baths	0.0684***	0.0684***	0.0684***	0.0642***	0.0678***
	(0.00341)	(0.00341)	(0.00341)	(0.0201)	(0.00352)
Grade Excellent	0.862***	0.864***	0.862***	0.884***	0.869***
	(0.0385)	(0.0385)	(0.0385)	(0.146)	(0.0434)
Grade Good	0.732***	0.733***	0.732***	0.675***	0.745***
	(0.0276)	(0.0276)	(0.0276)	(0.126)	(0.0294)
Grade Average	0.571***	0.571***	0.570***	0.446***	0.590***
	(0.0267)	(0.0267)	(0.0267)	(0.122)	(0.0286)
Grade Fair	0.330***	0.330***	0.329***	0.272**	0.350***
	(0.0268)	(0.0268)	(0.0268)	(0.123)	(0.0286)
Distance to Hospital	0.00000383	0.00000316	0.00000370	0.0000225	0.000000728
	(0.00000350)	(0.00000350)	(0.00000352)	(0.0000139)	(0.00000381)
Distance to Public school	0.0000103**	0.00000937**	0.00000905*	-0.000000268	0.0000117**
	(0.00000474)	(0.00000474)	(0.00000476)	(0.0000199)	(0.00000510)
Distance to Public Library	0.0000132***	0.0000135***	0.0000134***	0.0000113	0.0000109**
	(0.00000460)	(0.00000460)	(0.00000463)	(0.0000182)	(0.00000500)
Distance to lakes(>50 hectares)	-0.0000361***	-0.0000357***	-0.0000359***	-0.0000532***	-0.0000328***
	(0.00000414)	(0.00000414)	(0.00000414)	(0.0000191)	(0.00000439)
Distance to trailhead	0.00000235	0.00000422	0.00000305	0.0000227	0.00000363
	(0.00000475)	(0.00000476)	(0.00000478)	(0.0000215)	(0.00000513)
Distance to campsite	0.00000785*	0.00000857**	0.0000105**	0.0000131	0.00000694
	(0.00000433)	(0.00000433)	(0.00000437)	(0.0000168)	(0.00000478)
Distance to population center	0.00000530	0.00000527	0.00000592	0.0000169	0.00000682
	(0.00000467)	(0.00000467)	(0.00000469)	(0.0000195)	(0.00000498)
Distance to boat launch site	0.00000177	0.00000310	0.00000272	-0.00000979	0.00000370
	(0.00000381)	(0.00000381)	(0.00000383)	(0.0000158)	(0.00000412)
Distance to fishing parking lot	-0.0000125***	-0.0000127***	-0.0000133***	-0.0000258*	-0.0000110***
	(0.00000347)	(0.00000347)	(0.00000349)	(0.0000149)	(0.00000383)
Log(Distance to road)	0.0608***	0.0612***	0.0614***	0.0501***	0.0586***
	(0.00265)	(0.00265)	(0.00265)	(0.0116)	(0.00285)
Building Age	-0.00183***	-0.00183***	-0.00183***	-0.00198***	-0.00180***
	(0.0000453)	(0.0000453)	(0.0000453)	(0.000303)	(0.0000467)
Multiple Family Year-Round	0.0746***	0.0756***	0.0746***	-0.248	0.0874***
	(0.0251)	(0.0251)	(0.0251)	(0.226)	(0.0259)
Rural Residence with Acreage	0.312***	0.312***	0.310***	-0.108	0.321***

	(0.0278)	(0.0278)	(0.0278)	(0.236)	(0.0290)
Estate	0.449***	0.449***	0.419***	-0.167	0.499***
	(0.129)	(0.129)	(0.129)	(0.388)	(0.157)
Seasonal Residence	0.0723***	0.0718***	0.0702***	-0.240	0.0680**
	(0.0270)	(0.0270)	(0.0270)	(0.228)	(0.0284)
Mobile Home	-0.416***	-0.414***	-0.414***	-1.905***	-0.372***
	(0.0468)	(0.0468)	(0.0468)	(0.605)	(0.0480)
Multi-Purpose Residential	0.375***	0.377***	0.376***	0.139	0.382***
	(0.0335)	(0.0335)	(0.0335)	(0.246)	(0.0352)
Hamlet	0.0938**	0.0635	0.0559	0.918**	-0.157
	(0.0464)	(0.0467)	(0.0469)	(0.455)	(0.332)
Moderate Intensity	0.278***	0.244***	0.238***	1.045**	0.00584
	(0.0457)	(0.0461)	(0.0463)	(0.457)	(0.332)
Low Intensity	0.201***	0.167***	0.171***	1.010**	-0.0687
	(0.0465)	(0.0469)	(0.0471)	(0.457)	(0.332)
Rural Use	0.178***	0.145***	0.145***	1.025**	-0.109
	(0.0453)	(0.0457)	(0.0459)	(0.449)	(0.332)
Resource Management	0.176***	0.131**	0.132**	0.975**	-0.121
	(0.0521)	(0.0526)	(0.0528)	(0.464)	(0.334)
Industrial Use	0.264	0.135	0.233	NA	NA
	(0.341)	(0.341)	(0.342)		
Log(living square feet)	0.470***	0.469***	0.469***	0.483***	0.468***
	(0.00634)	(0.00634)	(0.00634)	(0.0321)	(0.00666)
Waterfront House	0.270***	0.271***	0.270***	0.241***	0.271***
	(0.0109)	(0.0109)	(0.0109)	(0.0353)	(0.0122)
Log(Distance to Protected land)		-0.0350***	-0.0396***	-0.0368*	-0.0432***
		(0.00609)	(0.00646)	(0.0222)	(0.00733)
Wilderness 0.5 mile buffer zone			0.0571	0.382	-0.0366
			(0.0662)	(0.242)	(0.0763)
Wilderness 0.5~1 mile buffer zone			0.246***	0.407*	0.194***
			(0.0633)	(0.236)	(0.0729)
Wilderness 1~3 miles buffer zone			0.204***	0.400*	0.144**
			(0.0552)	(0.219)	(0.0632)
Wilderness 3~6 miles buffer zone			0.186***	0.300	0.138***
			(0.0461)	(0.200)	(0.0523)
Wild Forest 0.5 mile buffer zone			-0.0349	-0.178	-0.0490
			(0.0405)	(0.255)	(0.0429)
Wild Forest 0.5~1 mile buffer zone			-0.0350	-0.112	-0.0475
			(0.0382)	(0.252)	(0.0401)
Wild Forest 1~3 miles buffer zone			-0.0284	-0.0890	-0.0386
			(0.0339)	(0.244)	(0.0349)
Wild Forest 3~6 miles buffer zone			-0.0448*	0.0671	-0.0523**
			(0.0257)	(0.211)	(0.0261)
Constant	7.317***	7.571***	7.578***	7.505***	7.677***
	(0.167)	(0.172)	(0.175)	(0.837)	(0.187)
R-squared	0.44	0.45	0.43	0.39	0.36
Year/Month Dummy	Y	Y	Y	Y	Y
Fixed Effect	Y	Y	Y	Y	Y
N	77618	77618	77618	7168	70450