The Market Acceptance of Single-Family Housing Units in Smart Growth Communities

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Introduction

In this study, we address whether the smart growth price premium established earlier in the literature is sustained over time. Specifically, we analyze single-family house prices in the smart growth developments of Kentlands and Lakelands relative to prices of comparable houses in non-smart growth developments. To measure the possibility of a smart growth price premium and the sustainability of that premium, we employ the hedonic price methodology and a series of approximately 30 control variables. Using more than 4,700 actual single-family sale transactions in the years 1997-2005 in Montgomery County, Maryland, the analysis reveals a price premium for Kentlands and Lakelands of 16 percent and 6.5 percent, respectively, over comparable homes in surrounding conventional subdivisions. Additionally, the price premium in Kentlands and Lakelands is sustained or increasing over time, indicating a strong and sustained market acceptance of single-family housing units in smart growth communities.

The Need for New Housing Development

According to the U.S. Census, in the 1990s the number of housing units in the United States grew on average by 1.36 million units per year, and for the period 1940-2000, the number of housing units grew on average by 1.30 million units per year.[1] In the 2004-2013 decade, annual growth in the number of housing units is expected to be 1.32 to 1.63 million and, when replacement homes for the approximately 360,000 units torn down each year and second homes are included, 1.85 to 2.17 million new housing units are expected per year.[2] In the coming decades, as in past decades, the U.S. population will continue to grow, placing an increased strain on our natural resources, land resources, and municipal infrastructure. To accommodate this growth, we need to continue to innovate and thoughtfully consider how we will provide new housing.

[1] For the growth in the number of households, see the following web page: Census 2000 Gateway. http://www.census.gov/main/www/cen2000.html.

[2] For the Housing Alliance report entitled, "America's Home Forecast: The Next Decade for Housing and Mortgage Finance," see the following web page: http://www.freddiemac.com/news/pdf/americas_home_forecast.pdf.

Smart Growth

Smart growth is a development strategy that attempts to serve the needs for future growth while minimizing its impact on the environment. Instead of debating whether or not growth should be allowed, smart growth focuses on how and where new development should be accommodated. Utilizing a set of basic principles, smart growth projects attempt to address these issues by building healthy communities, creating economic development and jobs, and providing transportation choices (for further information about smart growth, see http://www.smartgrowth.org).[3]

Smart Growth Principles

Mix Land Uses
Take Advantage of Compact Building Design
Create a Range of Housing Opportunities and Choices
Create Walkable Neighborhoods
Foster Distinctive, Attractive Communities with a Strong Sense of Place
Preserve Open Space, Farmland, Natural Beauty, and Critical Environmental Areas
Strengthen and Direct Development Towards Existing Communities
Provide a Variety of Transportation Choices
Make Development Decisions Predictable, Fair, and Cost Effective
Encourage Community and Stakeholder Collaboration in Development Decisions

Source: Smart Growth Network. See www.smartgrowth.org

Smart growth principles embody a series of attributes that interactively create a living environment which is different from conventionally developed neighborhoods. As such, no single smart growth principle can be identified as the most critical to a smart growth community. The communities of Kentlands and Lakelands, in Montgomery County, Maryland, exemplify most of the smart growth principles listed above.

Measuring Market Acceptance of Smart Growth Developments

It is critical for developers and homebuilders to understand the market acceptance of housing units in smart growth communities in order for them to measure future unit profitability and absorption. One way of measuring market acceptance is to compare the price of housing units in a smart growth community to

[3] New urbanism and traditional neighborhood development share some of the same principles as smart growth. Therefore, a smart growth development in most instances can also be referred to as a new urbanist development or traditional neighborhood development (TND).

comparable units in non-smart growth developments. However, direct comparison of housing prices in these two types of developments is practically impossible as there are few, if any, examples where two houses are built with identical attributes, the only difference being that one is in a smart growth community and the other is not. Using a multiple-regression methodology called the hedonic pricing model,[4] the price differential generated by different community designs (i.e., smart growth development vs. conventional development) can be isolated and measured.[5]

Hedonic pricing models individually price the many attributes of a home and then sum them to determine the price of a house.[6] For instance, an additional bathroom might add 2 to 5 percent to the value of a home (over and above the average cost per square foot of a house), or the age of a home may negatively impact the price of a home by 1 percent per year (while a house is likely to appreciate over time, the effect of age on the price of a house is likely to be negative). Similarly, the value of a house located in a smart growth development relative to one in a conventional development can be estimated using hedonic pricing models.[7] Eppli and Tu (1999) employ hedonic pricing to examine the price differential between housing units in smart growth and non-smart growth developments.[8] Using four communities (Kentlands, Harbor Town, Laguna West, and Southern Village) and actual transaction data between 1994 and 1997, they found that houses in communities designed with smart growth principles sold for an average premium of 11 percent.

[4] In the hedonic pricing model, a single-family home is thought of as a bundle of attributes that can be individually priced. The bundle is likely to include site attributes (e.g., lot size), housing unit improvement characteristics (e.g., number of bedrooms, number of bathrooms, exterior façade, house size and age), location attributes (e.g., taxing districts and school districts), and market characteristics (e.g., year of sale). Hedonic pricing is well accepted in the academic literature as a credible method of pricing single-family housing. Hedonic models are also broadly used by municipalities and in other professional applications to estimate single-family house prices for real estate tax valuation and other purposes. For a detailed discussion of hedonic pricing and how to interpret its results, see Eppli, M and Tu, C. *Valuing the New Urbanism: The Impact of the New Urbanism on Prices of Single-Family Homes*. Urban Land Institute, 2000.

[5] Another means of assessing the market acceptance of housing units developed using smart growth principles is to analyze the days-on-market to sell a housing unit, which measures sales velocity. Days-on-market studies require local realtor data, which we have been unable to secure for a nine-year period. A days-on-market study would be an excellent complement to this research.

[6] The cost to build a house is not part of a hedonic price model, and therefore we are unable to assess builder profitability per housing unit using hedonic pricing models.

[7] The analysis technique in this paper uses the hedonic price methodology to isolate the effect of smart growth developments from other single-family site, structure, quality, and market characteristics. While the hedonic price model has been well developed and extensively used in housing market research, several empirical issues remain unresolved, including functional form, variable selection, and market delineation. Since no single form of the hedonic model is perfect, we estimate the semi-log form model, which is the most common functional form used in hedonic price models. To avoid omitted variable bias, we use as many housing characteristics as are consistently provided by the data sources while testing for collinearity. To prevent market aggregation bias, we draw data from narrowly defined geographical area. This strategy limits the impact of locational factors such as school district and tax district, which are the same across the subject and the comparable properties.

[8] See Eppli and Tu. *Valuing the New Urbanism.*.

Market Acceptance of Smart Growth Development Over Time

The 1999 study by Eppli and Tu was the first to use the hedonic statistical analysis to measure market acceptance of smart growth. While they found that housing units in smart growth communities sold for a significant premium during the examination period in the 1990s, this study did not determine whether the premium is sustained over time. Addressing the smart growth price premium over time is of critical importance to prospective homeowners and developers alike. If homeowners pay a price premium to live in a smart growth neighborhood only to see that price premium wither, the prospects of future homeowners purchasing in this type of development are likely to be significantly impaired. In short, if there is a "novelty" premium for housing units in smart growth developments that diminishes over time, the viability of smart growth and its future market acceptance is more likely to be low, and the development strategy may be a passing fad and not stand the test of time. ***In this study, we directly address whether the smart growth price premium established earlier in the literature is sustained over time.***[9]

Kentlands, Lakelands, and Comparable Properties

To properly measure the effect of smart growth development on single-family home prices over time, it is essential to identify communities that reflect smart growth principles and meet the requirements of the hedonic methodology. One of the requirements of hedonic pricing is that housing in surrounding conventional developments (i.e., the control group) be comparable to properties in the smart growth community in terms of general housing attributes. Analysis also requires a sufficient number of single-family home sales each year during the study period in both the smart growth community and the surrounding subdivisions. Kentlands is therefore selected for the current study. One advantage Kentlands has over other communities is the introduction of two other smart growth developments, Lakelands and King Farm, in Montgomery County, Maryland, in the late 1990s (Kentlands is also in Montgomery County). This allows us to investigate if there is a negative impact on the price premium for an existing smart growth development (Kentlands) from competitive smart growth projects (Lakelands and King Farm).[10]

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[9] While some market participants, such as homebuilders and residential developers, may have a greater interest in the profitability of smart growth developments, we are not privy to builder/developer cost data. Even if builder and developer cost data were available, consistently categorizing detailed construction cost, land carry costs, developer/builder overhead, and the like would be difficult to complete on a unit-by-unit basis.

[10] The empirical analysis in this study includes Kentlands and Lakelands, but not King Farm. Kentlands and Lakelands are both in the 20878 ZIP code in Gaithersburg, MD, but King Farm is in the 20850 ZIP code in Rockville, MD (approximately 4 miles east of Kentlands and Lakelands). To isolate the impact of location factors, we use a narrowly defined area in the hedonic model (the 20878 ZIP code); from a homebuyer's perspective, however, King Farm is an alternative to Kentlands and Lakelands.

The number of single-family residence sale transactions by transaction year for Kentlands, Lakelands, and the surrounding area is presented in Table 1.[11] Overall, there were 323 and 534 single-family sale transactions in Kentlands and Lakelands, respectively. Kentlands has an adequate number of transactions to complete a hedonic analysis across all years 1997 to 2005, with the exception of 2005, and Lakelands has an adequate number of transactions in all years 1999 to 2005. Additionally and importantly, in the developments surrounding Kentlands and Lakelands, there were 3,887 comparable property sales and no fewer than 312 comparable sales in each year of analysis (1997 to 2005).

More than 30 housing attributes are used in the hedonic analysis to control for housing price variance not caused by smart growth. They include site attributes (e.g., lot size), improvement characteristics (e.g., size of living area, number of bathrooms, exterior material, and house age), amenities (e.g., spa and pool), location attributes, and market attributes (e.g., year of sale). The variables used in the analysis are defined in Table 2, and their descriptive statistics are presented in Table 3.[12]

The variables used to measure the price differential between smart growth and conventional developments are two dummy variables: *KENTLANDS* and *LAKELANDS*. The Kentlands (Lakelands) variable has a value of 1 if the property is located in Kentlands (Lakelands), or 0 if it is not. The parameter estimate of the variable represents the percentage price difference between a house in Kentlands (Lakelands) and one with comparable attributes in a conventional subdivision. This price differential is caused by the *combined* effects of all available smart growth features in the community, such as mixed land uses, compact building design, open space, and a walkable neighborhood.

The Impact of Smart Growth on Single-Family House Prices

Table 4 presents the results of two hedonic models using 38 and 51 housing and market characteristics to estimate the impact of smart growth on home prices. In this analysis, we attempt to control for as many as possible of the factors that affect the price of single-family homes so that we can properly measure the impact of smart growth. The explanatory power of the two models is a strong 90%, which means that 90%

[11] Data used in this study are drawn from property data compiled by the Maryland Department of Planning and include single-family residence sale transactions in the ZIP code 20878 from 1997 to 2005. The 20878 ZIP code covers both the developments of Kentlands and Lakelands.

of the variance in the transaction prices is explained in the two models. Without exception, the parameter estimates for these many variables maintain the expected sign, are generally significant, and have reasonable magnitudes.[13] It is important for the results of a statistical analysis to be reflective of past research and consumer behavior, as it speaks to the credibility of the current analysis. The statistical measures and empirical results in analysis presented in Table 4 are very credible and reflect how consumers purchase single-family houses (for a more complete discussion on the estimation and interpretation of hedonic price models see *Valuing the New Urbanism.*[14]

With a credible estimation model that is well calibrated, we can now focus our energy on the *KENTLANDS* and *LAKELANDS* variables, which represent the price differentials between houses in the smart growth developments and comparable houses in surrounding developments. Specifically, Model 1 parameter estimates for *KENTLANDS* and *LAKELANDS* are positive, are significant at the 1% level, and have a magnitude of 0.1609 and 0.0648, respectively. The interpretation of these results is as follows:

> *After controlling for a series of site, interior, exterior, quality, and market characteristics, Model 1 reveals that over the study period (1997-2005), the price of single-family homes in Kentlands and Lakelands is estimated to be 16.1 percent and 6.5 percent, respectively, higher than comparable homes in surrounding conventional subdivisions.*

The price premium in Model 1 is the overall premium during the study period, without accounting for possible changes in the premium year by year. It is noteworthy that the 16.1 percent price premium for Kentlands is higher than the 13 percent premium found during the period 1994 to 1997.[15]

Model 2 allows the parameter estimates for *KENTLANDS* and *LAKELANDS* to change over time to reflect the change in the smart growth premium on a year-over-year basis, which allows us to assess whether this single-family house premium in a smart growth community is sustained. Overall price appreciation in the

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[12] Hedonic pricing models should include all property and neighborhood attributes that are important to a single-family home buyer when purchasing a home. However, some attributes may be removed if they are not statistically significant (i.e., porch) or if they are not measurable/measured (i.e., proximity to parks or open space).

[13] The *BRICKSIDING* parameter estimate of -0.2101 is larger than expected. However, only 12 observations are characterized with having *BRICKSIDING*.

[14] Eppli and Tu. *Valuing the New Urbanism*.

[15] Eppli and Tu. *Valuing the New Urbanism*.

market is accounted for by a series of variables that represent price changes from 1997, the base year (see *YEAR98-05* parameter estimates, which increase each year from a 3% price increase in 1998 to a 89% price increase in 2005 over the 1997 base-year house prices).

The estimated price premium to purchase a single-family house in Kentlands in 1997 over comparable houses in surrounding developments is 11.19% (see the *KENTLANDS* parameter estimate in Model 2 of Table 4). To measure the premium change to reside in Kentlands each year thereafter, we include a series of annual variables (see *KENT98* through *KENT05*) in Model 2. Each of the parameter estimates for *KENT98* through *KENT05* represents the change in price premium from the 1997 premium of 11.19%. All of the premium changes are positive (although six of the eight years are not statistically significant), indicating that the premium in each of the years after 1997 is equal to or higher than 11.19%, with the increase ranging from 1.2 percent to 9.4 percent.[16] Overall, we can make the following statement:

> *The price premium for single-family housing in Kentlands over comparable housing in conventional developments is maintained or increasing over time, indicating a strong and sustained market acceptance of single-family housing units in smart growth developments relative to surrounding conventional developments, with other smart growth developments being delivered in the market.*

Lakelands' price premium pattern over time differs from that of Kentlands. The base year for Lakelands is 2000, as there were an inadequate number of property sales in that development prior to 2000. In 2000, during the early stages of the development of Lakelands, the price premium was 2.2 percent, which is positive and statistically significant but relatively small. In 2001, there was a positive, but not a statistically significant, increase in the price premium. In contrast, in the years 2002 to 2005, the changes were positive and statistically significant and averaged 7.7 percent, indicating an average price premium of approximately 9.9 percent (the sum of the 2000 price premium of 2.2 percent and the average change). The increasing price premium for single-family houses in Lakelands over comparable houses in surrounding conventional developments suggests sustained-to-improved market acceptance for single-family houses in Lakelands, or that:

[16] In only two years are the changes in price premiums statistically significant, years 2000 and 2003. Therefore, while the premium is likely to be higher in each of the eight years after 1997, given the results, we can only state that for six of the eight

The market acceptance of single-family houses in Lakelands has strengthened over time as the price premium for housing units in Lakelands from 2002 to 2005 was approximately 9.9 percent over comparable units in conventional developments, which is significantly higher than previous years.

Conclusion

In this study we analyze whether the smart growth price premium embedded in single-family home prices established earlier in the literature is sustained over time. We compare the prices of single-family homes in two smart growth developments–Kentlands and Lakelands–with comparable homes in surrounding conventional developments. Using the hedonic price methodology, approximately 30 control variables, and 4,744 actual single-family sale transactions in the years 1997 to 2005, we find a price premium for Kentlands and Lakelands of 16.1% and 6.5%, respectively. Additionally, we find that the price premium for Kentlands and Lakelands is sustained or increasing over time, indicating a strong and sustained market acceptance of single-family housing units in smart growth communities.

While the study finds that homebuyers are willing to pay a premium for houses located in smart growth communities, we would like to mention a couple of caveats. First, no conclusions regarding the profitability of developing smart growth communities can be drawn directly from the findings. To assess profitability, one also needs to take into account the possible differences in sales velocity, as well as development costs, between smart growth and conventional projects. However, data from sales premiums can offer production homebuilders pricing strategies for units in subsequent phases or new smart growth communities. Additionally, the analysis measures the combined effect of all smart growth features available in Kentlands and Lakelands but does not assess the impact of individual ones. Simply offering a subset of smart growth features does not necessarily generate the price premium proportionately. Further research is necessary to address these issues.[17]

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years after 1997, the smart growth premium was not statistically different from that in 1997, suggesting at least a 11.19% premium in the years 1998, 1999, 2001, 2002, 2004, and 2005.

[17] New research includes *Valuing Sustainable Urbanism*. Prince's Foundation for the Built Environment, 2008, and is available here: http://www.princes-foundation.org/files/0707vsureport.pdf. Accessed March 5, 2009.

Table 1: Number of Single-Family Residential Transactions by Development by Transaction Year

Year	Kentlands	Lakelands	Comparables
All Years	323	534	3,887
1997	30	–	346
1998	46	–	459
1999	46	22	466
2000	44	94	453
2001	54	158	446
2002	36	132	440
2003	41	72	485
2004	23	42	480
2005	3	14	312

Table 2: Variable Descriptions

Attribute	Description
Dependent Variables	
LOGPRICE	Natural logarithm of sale price
Site Characteristics	
LOT	Square footage of site
GARAGE	Size of garage in car stalls
Interior Characteristics	
AREA	Square footage of living area, excluding basement
FULLBATH	Number of full bathrooms with a shower or bathtub, sink, and toilet
HALFBATH	Number of half bathrooms with a sink and toilet
FIREPLACE	Number of fireplaces
BASEMENT	Binary variable; 1 if the house has a basement, 0 otherwise
Exterior Characteristics	
WSHINGLE[a]	Binary variable; 1 if the house has a wood shingle roof, 0 otherwise
SIDING	Binary variable; 1 if the house has aluminum/vinyl siding, 0 otherwise
BRICK	Binary variable; 1 if the house has a brick exterior, 0 otherwise
BRICKSIDING	Binary variable; 1 if the house has a pre-cast brick exterior, 0 otherwise
BRICKFRAME[b]	Binary variable; 1 if the house is brick with block frame, 0 otherwise
STORY[c]	Various binary variables representing number of stories
SPA	Binary variable; 1 if the property has a sauna, 0 otherwise
POOL	Binary variable; 1 if the property has a pool, 0 otherwise
Quality Characteristics	
GRADE[d]	Various binary variables representing the property quality
AGE	Property age in years
Market Characteristics	
CAMA[e]	Various binary variables representing different property locations
YEAR[f]	Various binary variables representing changes in property prices over time
KENTLANDS	Binary variable; 1 if the house is in Kentlands, 0 otherwise
LAKELANDS	Binary variable; 1 if the house is in Lakelands, 0 otherwise

[a] Composite shingle is the reference variable.
[b] Wood frame is the reference group.
[c] Two story is the reference variable.
[d] Construction quality is represented by groups of binary variables. The reference group is *GRADE5*. In Maryland, the quality of construction materials is defined by the Maryland State Department of Assessment and Taxation (MSDAT).
[e] Location differences within the market are captured using seven MSDAT defined areas represented by *CAMA0601, CAMA0602, CAMA0603, CAMA0903, CAMA0904, CAMA0905,* and *CAMA0906.*
[f] The year of transaction is represented by *YEAR98*, *YEAR99, YEAR00, YEAR01, YEAR02, YEAR03, YEAR04,* and *YEAR05*, with 1997 as the reference year.

Table 3: Summary Statistics (n = 4,744)

Attribute	Mean	Std. Dev.	Minimum	Maximum
PRICE	413,245	175,674	87,000	1,372,676
LANDAREA (000)	11.83	9.95	1.01	91.47
GARAGE	1.73	.68	0	3.00
AREA (000)	2.42	724	0.72	6.54
FULLBATH	2.48	.70	1.00	6.00
HALFBATH	.95	.35	0	3.00
BASEMENT	.60	.49	0	1.00
FIREPLACE	1.01	.50	0	6.00
WSHINGLE	.17	.38	0	1.00
SIDING	.34	.47	0	1.00
BRICK	.04	.19	0	1.00
BRICKSIDING	.00	.05	0	1.00
BRICKFRAME	.02	.14	0	1.00
STORY1	.08	.26	0	1.00
STORY3	.00	.04	0	1.00
CAMA0601	.00	.09	0	1.00
CAMA0602	.14	.35	0	1.00
CAMA0603	.30	.46	0	1.00
CAMA0903	.00	.07	0	1.00
CAMA0904	.00	.08	0	1.00
CAMA0905	.14	.35	0	1.00
CAMA0906	.05	.21	0	1.00
POOL	.02	.14	0	1.00
SPA	.05	.21	0	1.00
GRADE3	.01	.13	0	1.00
GRADE4	.48	.50	0	1.00
GRADE5	.43	.49	0	1.00
GRADE6	.07	.26	0	1.00
AGE	12.80	11.44	0	59.00
YEAR97	.05	.27	0	1.00
YEAR98	.08	.31	0	1.00
YEAR99	.11	.32	0	1.00
YEAR00	.11	.33	0	1.00
YEAR01	.12	.35	0	1.00
YEAR02	.14	.33	0	1.00
YEAR03	.13	.33	0	1.00
YEAR04	.11	.32	0	1.00
YEAR05	.07	.25	0	1.00
KENTLANDS	.07	.25	0	1.00
LAKELANDS	.11	.31	0	1.00

Table 4: Estimation Results of Hedonic Price Model

Dependent Variable: Log Price

	Model 1		Model 2	
Attribute	Parameter Estimate	t Value	Parameter Estimate	t Value
INTERCEPT	11.86	668.35	11.870	660.68
LANDAREA (000)	.0025	8.97	.0025	8.92
GARAGE	.0379	10.25	.0380	10.28
AREA (000)	.2046	41.78	.2028	41.58
FULLBATH	.0289	7.32	.0278	7.05
HALFBATH	.0220	3.12	.0215	3.06
BASEMENT	.0186	3.97	.0199	4.25
FIREPLACE	.0074	1.66	.0072	1.61
WSHINGLE	.0056	0.80	.0046	0.65
SIDING	-.0368	-7.70	-.0415	-8.44
BRICK	.0716	6.11	.0690	5.89
BRICKSIDING	-.2101	-5.40	-.2098	-5.40
BRICKFRAME	.0265	1.83	.0253	1.74
STORY1	-.0161	-1.43	-.0171	-1.53
STORY3	-.1194	-2.51	-.1321	-2.76
CAMA0601	-.0224	-0.90	-.0242	-0.97
CAMA0602	.0622	7.73	.0621	7.74
CAMA0603	.0812	12.84	.0805	12.75
CAMA0903	-.1127	-3.92	-.1130	-3.94
CAMA0904	-.1129	-4.34	-.1135	-4.38
CAMA0905	-.1070	-13.49	-.1075	-13.60
CAMA0906	-13.41	-12.24	-1336	-12.22
POOL	.0012	0.08	.0014	0.10
SPA	.0070	0.73	.0060	0.64
GRADE3	-.3055	-16.22	-.3084	-16.39
GRADE4	-.0960	-15.55	-.0975	-15.44
GRADE6	.0464	5.05	.0515	5.58
AGE	-.0028	-4.24	-.0029	-4.43
AGE2	-.0000	-0.90	-.0000	-0.10
YEAR98	.0303	3.32	.0259	2.73
YEAR99	.0944	10.47	.0920	9.78
YEAR00	.1801	20.17	.1794	18.91
YEAR01	.2906	32.17	.2973	30.85
YEAR02	.4416	49.00	.4300	44.49
YEAR03	.5889	65.21	.5779	60.50
YEAR04	.7421	79.55	.7379	76.05
YEAR05	.8890	83.97	.8839	81.48
KENTLANDS	.1609	14.96	.1119	4.21
KENT98	----	----	.0505	1.55

KENT99	----	----	.0489	1.50
KENT00	----	----	.0941	2.86
KENT01	----	----	.0121	0.38
KENT02	----	----	.0483	1.40
KENT03	----	----	.0814	2.44
KENT04	----	----	.0142	0.37
KENT05	----	----	.0618	0.76
LAKELANDS	.0648	7.30	.0220	1.46
LAKE01	----	----	.0126	0.68
LAKE02	----	----	.0800	4.15
LAKE03	----	----	.0821	3.75
LAKE04	----	----	.0660	2.59
LAKE05	----	----	.0811	2.09
Adjusted R-squared		.900		.901