

# **Tracking Parcelization Over Time: Updating the Vermont Database to Inform Planning and Policy**

## **Phase III Report**



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The conclusions and opinions in this report are those of the authors and not the NSRC, the Forest Service, or the USDA. Furthermore the specific recommendations in the report are those of the authors and not necessarily the steering committee members who helped to oversee this project. Steering committee members are listed on p. 53 of the report. We are grateful for their contributions and insights. In particular, Deb Brighton, Jim Duncan, Elizabeth Hunt, Jill Remick, and Keith Thompson provided valuable review of this report.

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A. Blake Gardner

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## **Abstract**

Parcelization, subdivision, fragmentation, and the conversion of forestland are threatening the economic and ecological integrity of the Northern Forests. Parcelization, or the breaking up of land into smaller and smaller parcels, typically occurs through subdivision. Subdivision, and subsequent land conversion and development, can negatively affect plant and animal species, wildlife habitat, water quality, recreational access, and the ability of forests to sequester and store carbon. Increasing parcelization and subdivision can also affect the contiguous ownership, management, and viability of forest parcels, and reduce their contribution to the working lands economy. While subdivision and conversion pressures have been identified as problems for decades, there has been no systematic tracking of trends to inform planning and resource management.

This project was designed to track and analyze parcelization trends on private land in Vermont. It uses state Grand List (tax) data, as well as Use Value Appraisal data, from 2004 to 2016 to establish a database of parcels in the state, compiled by size class and various other metrics. The analysis of this data aimed to:

- Quantify the extent of subdivision and the degree to which subdivision is affecting the availability of large parcels for resource management and conservation;
- Quantify the extent to which residential development is occurring relative to the maintenance of undeveloped woodland parcels; and
- Investigate and document trends that may be relevant for policies and programs that support resource management and/or discourage fragmentation.

The research in this report is intended to inform land use planning, focus forest stewardship and wildlife conservation efforts, assist with the administration of the Use Value Appraisal Program, and aid in the development of baseline data for various smart growth, climate change, and forest management policies. Although the research looks at woodland in particular, this report and a companion website provide many insights into land use change and parcelization trends across the state of Vermont.



## Background

The Northern Forest Lands Council was created to reinforce the traditional patterns of land ownership and uses of large forest areas in the Northern Forest of Maine, New Hampshire, New York and Vermont. Representatives from each state banded together to deal with the concern that the land boom of the 1980s was resulting in the development and fragmentation of forestland in undeveloped areas of the Northern Forest region at an “unprecedented” rate, threatening the economic and biological resources of the region (James W. Sewall Company 1993). To respond to this concern, James W. Sewall Company (engineering and natural resource consultants) designed a study to quantify land conversion on land parcels in the Northern Forest region during the 1980s. This Land Conversion Study Report formed the basis of a snapshot of information on parcelization and forestland conversion in the region in the 1980s (Brighton et al, 2010).

Decades later, the Northern Forest region has continued to experience land booms, yet our ability to track parcelization and conversion has not progressed to help communities integrate this information into their planning processes in a meaningful way. More than ever, our region is faced with resource challenges that require quantifying subdivisions and their impacts.

Various reports and action plans have recently highlighted the need to track parcelization rates in Vermont. A 2007 report produced by the Roundtable on Parcelization and Forest Fragmentation convened by Vermont Natural Resources Council developed twenty-seven priority action steps to address parcelization and forest fragmentation. The following were priority recommendations in the Roundtable Report:

- Track annual rates of parcelization in Vermont; and
- Integrate existing planning efforts at the local, regional and state level to better address parcelization and forest fragmentation (Fidel 2007).

The Roundtable identified that it was difficult to quantify the rate at which parcelization was occurring in Vermont, although anecdotal information suggested that parcelization was a problem in certain locations and may be contributing to decreased forest viability in the state. The Roundtable Report explained that data collection on parcelization is scattered among various government agencies, academic institutions, non-government organizations, and municipalities. The Roundtable identified the need to develop and fund a central clearinghouse or program to quantify the locations and rates of parcelization to better inform decision makers, planners, and forestland management and conservation efforts.

In 2014, in response to a growing awareness of parcelization and forest fragmentation, the Vermont Legislature enacted Act 118 (S.100), an Act Relating to Forest Integrity. Act 118 included the following findings:

- The forests of Vermont are a unique resource that provides habitat for wildlife, a

renewable resource for human use, jobs for Vermonters in timber and other forest-related industries, and economic development through a productive forest products industry;

- Large areas of contiguous forest are essential for quality wildlife habitat, to preserve Vermont's scenic qualities, to implement best practices in forest management, and to ensure the continued economic productivity of Vermont's diverse forest products industry; and
- The division of forests into lots for house sites or other construction fragments Vermont's forests and reduces their value as wildlife habitat, for forest industries, and to Vermont's tourist economy.

Act 118 called for a report assessing the current and projected effects of fragmentation and recommendations for how best to protect Vermont's forestland. In response to this request, the Commissioner of Vermont's Department of Forests, Parks, and Recreation and the Vermont Agency of Natural Resources produced the Vermont Forest Fragmentation Report in 2015. The Forest Fragmentation Report provided an in-depth examination of forest fragmentation in Vermont, highlighting the fact that:

The U.S. Forest Service's National Forest Inventory and Analysis Program (FIA) publishes periodic reports on the characteristics of the forests of Vermont. The most recent FIA figures from 2013 show a continuing though gradual loss of about 75,000 acres of forestland since 2007. It is clear from the FIA data that our forestland is no longer expanding and in the long term is vulnerable to land use conversion and fragmentation as slow but steady development growth resumes. These trends are verified by satellite imagery analyses (VT FPR 2015).

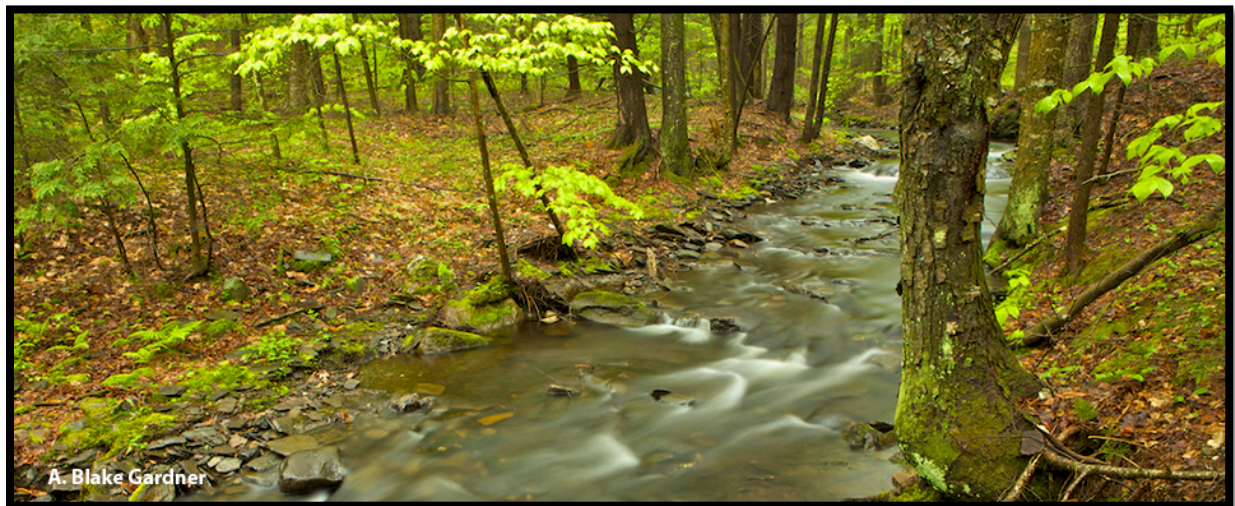
The Forest Service has been quantifying the distribution of forestland by parcel size periodically since 1953 through the FIA Program. Since the 2015 Forest Fragmentation Report was published, a more recent FIA analysis was conducted showing an even greater loss of about 102,000 acres of forestland from 2012 to 2017 (Morin 2018).

While the FIA data help to understand overall trends, because there are a limited number of sample points in Vermont, the analysis is perhaps most useful in illustrating the concerns and changing characteristics of landowners nationally and regionally, versus documenting the extent of subdivision or fragmentation of specific forest parcels, or analyzing patterns across Vermont.

Since parcelization and subdivision are often precursors to land development and fragmentation, the need to track subdivision trends over time and create a consistent approach to data collection became more apparent.

Data on subdivisions are available at the local level, since permit information is filed there. Local use of subdivision data for planning purposes generally focuses on the new lots that have been created and the effect they will have on the town services and facilities. The permit review process and data typically do not facilitate looking at the flip side—what is left after the subdivision and the viability of the remaining land to provide ecological services, agriculture, and forestry. Further, according to the Vermont League of Cities and Towns, approximately half of Vermont municipalities have not adopted subdivision regulations and therefore lack the most common tool for monitoring subdivision activity. Many of the communities that do regulate subdivisions lack administrative capacity to track subdivision trends, and rarely is such information shared, much less analyzed, on a regional basis.

At the state level, the Grand List data contain annual snapshot information about parcels and are compiled from local property tax records. Grand List data contain information including number of parcels, parcel sizes, and whether or not there is a dwelling or structure on each parcel. The Grand List data originate at the local level. It is possible for local planners in each town to use the data to look at a distribution of land by parcel size in their town, but this does not happen, perhaps because the people involved in planning are not familiar with the coding in the Grand List database, and most towns lack the administrative capacity to maintain such data for consideration in the local planning process.



## **Phase I Report**

To rectify these shortcomings, VNRC and project partners began a series of reports to analyze subdivision trends and Grand List data. Phase I had three specific goals:

- (1) Quantify the extent of subdivisions and the degree to which subdivision is affecting the viability of undeveloped land for resource management;
- (2) Quantify and understand the extent to which residential development is occurring on parcels that are larger than needed for a residence; and
- (3) Investigate and document patterns that may be relevant from policies and programs that support resource management and/or discourage fragmentation.

Phase I examined parcelization trends between 2003-2009, and the information was presented in the Phase I Report in 2010. The analysis highlighted the fact that forestland values appreciated significantly during the study period, which corresponded with increasing parcelization. Over the seven-year study period, the amount of land in parcels larger than 50 acres declined by about 42,000 acres, and undeveloped parcels comprising roughly 47,000 acres gained a dwelling.

The Phase I Report also sought to understand how zoning affects subdivision rates. It included case studies from eight towns of varying types across Vermont. Key conclusions of the Phase I report's look at zoning included the following:

- In the case study communities most subdivision activity appeared to be occurring at low densities in rural areas rather than in compact existing centers or planned growth areas;
- Subdivision in the case study towns occurred in a very incremental, albeit steady, pace with an average subdivision resulting in the creation of between 2.3 and 3.7 lots;
- More subdivision occurred in residential districts versus forest reserve or conservation oriented districts; and
- In general, subdivisions that occurred in the large acreage category of 100 acres or more typically retained a very large lot, thereby preserving at least some potential viability for long-term forest management and resource functions.

Phase I Report available at: <https://vtforesttrends.vnrc.org/reports>

## **Phase II Report**

The Phase II Report sought to investigate more deeply whether there is a correlation between certain types of zoning districts and subdivision patterns. Phase II also examined key questions such as the degree to which subdivisions triggered Act 250 review, and the implications of

subdivision activity on the Use Value Appraisal (UVA or Current Use) Program. In addition, VNRC and project partners conducted subdivision analysis in fourteen additional towns, and spatial analysis in four towns to look at land use patterns, especially in terms of whether subdivision of land was taking place in or near core forest blocks. Phase II yielded the following conclusions:

- Subdivision was decreasing the number of acres potentially eligible for the Current Use Program, but increasing the number of parcels that are eligible for enrollment;
- Intact forest blocks were being encroached upon by subdivision;
- Most subdivisions (79% of all subdivisions) were located either partially or fully within a rural residential zoning district, while fewer took place within natural resource related zoning districts; and
- Very few subdivisions were large enough to trigger Act 250 review. The average subdivision resulted in 2.1 to 3.9 lots, well below the threshold for triggering review.

Phase II Report available at: <https://vtforettrends.vnrc.org/reports>

### **Consistent Themes Between Phase I and Phase II Reports**

The Phase I and Phase II Reports revealed some consistent themes. Both phases documented the amount of subdivision in case study towns. In the Phase I study, 1,159 lots were created from 381 subdivisions on 24,555 acres of land. In the Phase II study, 1,580 lots were created from 544 subdivisions on a total of 46,272 acres of land. Most subdivisions in towns that had zoning and subdivision regulations (i.e., the so-called “10 acre towns” for Act 250 purposes) were not large enough to trigger Act 250 review based on the number of lots created, although a larger number of subdivisions were reviewed under amendment jurisdiction, meaning the parent parcel was already under jurisdiction.

A key conclusion is that most subdivision are being reviewed mostly at the local level, but only in communities that have either (1) stand-alone subdivision regulations (which is only approximately half of the towns in Vermont; these may also be integrated into unified bylaws), or (2) a provision in a local zoning bylaw that considers subdivision (i.e., where the act of subdividing land is captured within a municipality’s definition of “development,” and so reviewed under zoning).

### **Phase III Report**

This Phase III Report builds on previous efforts by creating a parcelization database to analyze parcelization data from 2004 to 2016 to better understand long-term trends. Furthermore, as part of the Phase III effort, VNRC and project partners developed an interactive website to access and examine the parcelization data, as well as scripts to update the website on an annual basis.

Phase 3 Report available at: <https://vtforesttrends.vnrc.org/reports>

## **Project Goals and Objectives**

The goal of the Phase III Report was to develop, document, and implement a detailed methodology for improving the Vermont parcelization and subdivision database that will allow annual updates to better inform land use planning, land management, land conservation, and policy implementation. Project objectives included:

- Quantifying the change in acreage of developed and undeveloped land by parcel size between 2004 and 2016 and identifying areas of rapid conversion within the state;
- Documenting and investigating changes in land ownership patterns and land values over time, including enrollment in the Use Value Appraisal (Current Use) program;
- Providing profiles of these changes at multiple spatial scales (e.g. town, county, Regional Planning Commission, statewide) and an interactive map interface for data exploration and dissemination; and
- Investigating the feasibility of replicating the database methodology in other Northern Forest states to track parcelization and subdivision in a consistent manner across the region.



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## Methodology

The analyses described in this report were based on two primary datasets, the Grand List (GL) and the Use Value Appraisal (UVA) database. The Vermont Department of Taxes – Department of Property Valuation and Review (PVR) provided GL and UVA data for 2003 – 2016. The data were reviewed to assess their consistency and quality over time. It was determined that 2003 should be excluded from the analysis due to errors and omissions in the data, and the lack of consistency in attribution (e.g. Category) with subsequent years. The remaining data were both cleaned (to omit or alter erroneous data; this is described more below) and standardized (to accommodate methodological changes in data collection over time).

Once a consistent dataset was prepared for all of the years included in the analysis, a suite of metrics to quantify and characterize changes in land ownership, land use and land value over time at the town, county, Regional Planning Commission (RPC) and state geographies was computed. The following paragraphs describe the data preparation and quality control methods applied and the analyses conducted throughout the project.

Grand List data include approximately forty characteristics for nearly 340,000 parcels in the state (depending on the year of data collection). An initial review of the data identified a number of missing and erroneous data (e.g. land value less than \$0, negative parcel size, no category value assigned), presenting a number of challenges for analyzing the data and producing valid and accurate results. As a result, a significant amount of effort went in to understanding the data structure, identifying problematic records, and, when possible, manually correcting the data to provide the most complete and consistent dataset possible for this analysis. This involved several steps.

The first step in this process was to create a separate database containing data for each year of the analysis. Once the data were imported into the databases, attribute names were standardized across all years, and a subset of the data (for each year) including only the information used in the analysis was created.

Next, records featuring unspecified values or values less than zero for the following attributes were deleted: Total Acres, Listed Real Value, Homestead Listed Value, Non-residential Value, Listed Land Value, Housesite Value, Education Grand List Value of Homestead, Education Grand

List Value Non-residential. In addition, parcel data for which the town or county field was null (not populated) are not included in the results. The maximum number of records deleted for any single year (1,977 in 2006) still only amounted to

Year	Deleted Records	% of All Records
2004	786	0.23%
2005	894	0.27%
2006	1,977	0.59%
2007	45	0.01%
2008	44	0.01%
2009	21	0.01%
2010	23	0.01%
2011	23	0.01%
2012	22	0.01%
2013	22	0.01%
2014	22	0.01%
2015	22	0.01%
2016	22	0.01%

*Table 1. This table shows the number and percent of records deleted in each year through the data cleaning process. Note that the table does not include records that were excluded from the analysis (i.e., exempt/public properties).*

0.59% of all records. Since 2007, the number of deleted records represents only 0.01% of all records (for any given year). Records where both the Education Grand List Homestead Value and Education Grand List Non-residential Value equal zero were also eliminated from the analysis, because these properties are exempt from taxes.

Once these problematic records were eliminated from the dataset, a search to identify duplicate School Property Account Numbers (SPAN) was conducted. The SPAN number is “a unique 11-digit identification number assigned by a municipality to each property.”<sup>1</sup> In cases where a duplicate record was found, prior and / or successive years’ data were examined to manually correct the duplicate records when possible.

At this point, the data for individual years were merged into a single database for further quality control and assurance checks. Of particular interest at this point was tracking the changes in parcel size over time to ensure internal consistency of individual records. If a parcel increased / decreased in size by more than 500 acres, the record was flagged, and VNRC staff followed up with individual municipal offices to determine whether these changes were real. Staff identified 87 individual parcels and called 67 municipalities (some municipalities had multiple parcels that were flagged). If information to support the increase / decrease in parcel size was not available, those parcels were deleted from all of the individual year datasets. Otherwise, parcel size changes were updated with the best available information, or, when parcel size changes were verified, no edits to the dataset were made.

A parallel effort was conducted for the UVA data to remove or repair anomalous data. After importing all of the UVA data into a single database, the SPAN attribute was standardized (to match the format of the GL data) for all of the data. Then, data for each year were examined to ensure that no duplicate SPAN values were found within a single year. If duplicate SPAN values were found in more than one record, data from prior and successive years were examined to manually correct duplicate records when possible. Data with no SPAN value or erroneous SPAN values that could not be corrected were eliminated from the analysis. So too were records featuring duplicate SPAN values.

### **Phase III Parcelization Website**

As part of the Phase III Project, VNRC and project partners developed a website to access parcelization data between 2004 and 2016 and run queries through various data explorer tools, and then download or print the results. The data are available at the town, county, Regional Planning Commission, or state level based on the following metrics: parcel size, parcel category, land with dwelling, land value, and Use Value Appraisal (Current Use) Program.

The website has pages where the user can download the raw data and the Phase I, II, and III Parcelization Reports. The website is available at: <https://vtforesttrends.vnrc.org>

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<sup>1</sup> *Tax Glossary*, Vermont Agency of Administration, Department of Taxes. <http://tax.vermont.gov/home/tax-learning-center/glossary#s>. Accessed August 10, 2018.

## Uses and Limitations of the Data

As described in the methodology above, this project used Grand List data – collected by individual municipalities, and compiled by the Tax Department – as well as Use Value Appraisal data to understand how parcel sizes are changing across the state. Though inconsistencies between municipal Grand Lists have been minimized over the years, the dataset still required cleaning before it could be used, as described in the “Methodology” section above. With this process complete, the data can be relied upon to provide information about changes in parcel size over time, across various geographies, parcel sizes, and parcel types.

Despite this, as with any dataset, the data do have some specific characteristics to be aware of, as well as limitations. When reviewing and using the information that follows, as well as the data from the interactive website, users should be aware of the following.

### Ways the data can be used:

The best uses of this data are to:

- Identify trends over time;
- Identify regions where parcel sizes and land values are changing rapidly, which may be an indicator of vulnerability to subdivision and forest loss;
- Inform municipal and regional planning;
- Inform conservation planning; and
- Target technical assistance.

### Data should *not* be used for:

- Parcel-level decision making (such as site-level development decisions), though knowing about the trends in an area can help frame certain questions about a parcel and how it relates to the community or region;
- Reliance in real estate transactions;
- Estimating the land value of individual parcels; and
- The parcel type categories (woodland, farm, residential, other) should not be used to conclusively state the exact percentage of a land type in a town, region, or RPC at a single point in time, due to possible inconsistencies in applying these categories by listers in different communities across the state.

### Specific dataset characteristics of which users should be aware

- All charts and data reflect information about private land only. Approximately 80% of the land in Vermont is privately owned.
- The Grand List lists properties by town, so a parcel that crosses town lines shows up as two parcels, and contains just the acreage in that town. This means that the data *understates* acreage of land in large parcels.
- Listers have been directed to consider contiguous parcels under the same ownership as a single parcel for tax purposes, and more and more of them have done so each year in the study period. In contrast to the factor presented in the previous point, this change in

practice would show up as an *increase* in the acreage of land in large parcels when in reality there has been no change.

- Some private land shifted to public ownership during the study period. It is helpful to understand how much private land shifted to public land ownership to understand whether certain trends were influenced by public land acquisition. For example, a portion of the decrease in large parcel acreage and woodland acreage in the study may be attributed to land shifting to public ownership. It is important to note that the Grand List includes public land under the “exempt” category; however, there are many inputs into the exempt category and it is hard to differentiate how much private land shifted to public land in the Grand List. With this in mind, a survey was conducted to estimate public land acquisition. Please refer to the data limitation sections to understand how public land acquisition may have influenced certain trends.

#### Relationship to Phase I and Phase II Parcelization Reports:

VNRC has now produced three reports on the topic of subdivision trends. We recommend using this report as the most up to date data source regarding changes in parcel size over time.

Though the Phase I and Phase III reports looked at overlapping years – 2003-2009, and 2004-2016, respectively – Phase III represents the most comprehensive collection of data. We do not recommend mixing data from between reports when making observations about change over time. In particular, we do not recommend using 2003 data from Phase I to increase the range of the Phase III data set, for the reasons described in the methodology.

## **Main Report**

### **I. Introduction**

This study provides information on the status of subdivision and private land ownership in Vermont. Although subdivision does not necessarily mean a change in land use has occurred, at a minimum, it often means there is an increase in the number of owners of the subdivided piece of land. This can lead to varied land management between the parcels, which can make it difficult to maintain the ecological functions of the land into the future, as well as keeping the land intact as a working farm or forest.

In addition to increasing the number of owners of the land, subdivision also increases the ratio of boundary to interior, and decreases parcel size. Together, these factors present a number of challenges: Consistent management will be more difficult, conflicts with more neighbors will affect management decisions and options, public stewardship programs will be more costly and complicated to administer, and the value of the land will increase above a forest's use value, making it less likely that the land could be purchased for long-term management as forest—either by private, public, or non-profit buyers (Mondal et al 2013). In addition, the construction of a dwelling on an otherwise undeveloped parcel may impact wildlife habitat and further diminish some of the ecological functions of the land and potential for management (Hansen et al 2005; Stein et al 2005). The addition of a dwelling, particularly a valuable dwelling, increases the value of the parcel and may influence the ability of the parcel to be bought for long-term management as forest.

Since there are multiple values to keeping large parcels intact, this study examines land use trends with attention to the net effect of subdivision on parcels 50 acres or larger. While somewhat arbitrary, this threshold helps to understand whether parcels are remaining viable for forestry and valuable ecosystem services.

Each section of this report looks at parcel size, land ownership, and land use trends based on data between 2004 and 2016.

## II. Statewide Parcel Information

### Changes in Acreage

In 2016, although the median parcel size was less than 2 acres, a majority of land (approximately 70%) was in parcels 50 acres or larger.

During the study period, larger parcels lost acreage and smaller parcels gained acreage.

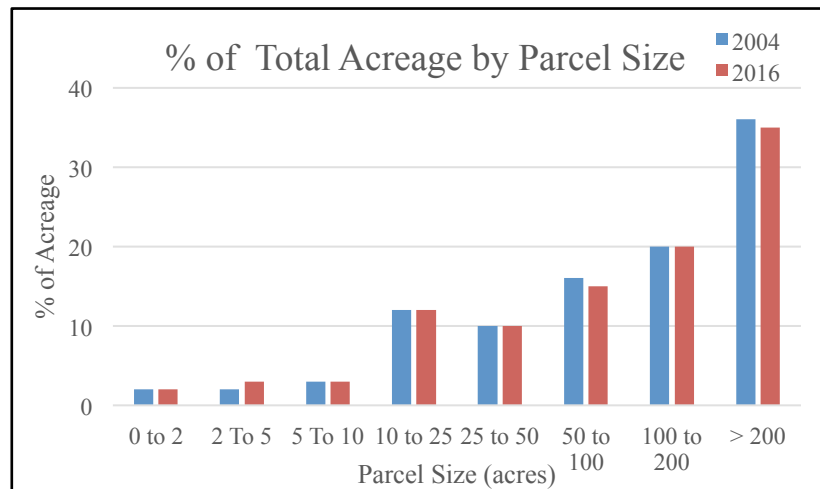


Figure 1

- The amount of land in parcels less than 50 acres increased by 45,708 acres. This represents an increase of 1.4 percentage points, from 28.2% to 29.6%, of the state's total acreage.
- The amount of land in parcels 50 acres or larger decreased by 110,291 acres. This represents a decrease of 1.4 percentage points to 70.4% of the state's total acreage.

Broken down into more specific parcel size categories, acreage shifted as follows:

Parcel Size (acres)	Change in Acreage	2004 Acreage	2016 Acreage	Percent Change
0-2	+ 2,155	92,101	94,256	+ 2.3%
2-5	+ 12,267	110,039	122,306	+ 11.2%
5-10	+ 19,504	123,102	142,606	+ 15.8%
10-25	+ 3,425	559,672	563,097	+ 0.6%
25-50	+ 8,357	478,562	486,919	+ 1.7%
50-100	- 15,133	752,078	736,945	- 2.0%
100-200	- 38,536	981,639	943,103	- 3.9%
200+	- 56,622	1,731,284	1,674,662	- 3.3%

Table 2

### *Analysis & Conclusions:*

Larger parcels lost acreage from 2004 to 2016, while small parcels gained acreage during the same period. Fortunately, a large percentage of Vermont's land remains in parcels that are 50 acres or larger. There is, however, a noticeable decrease in large parcels in the larger acreage categories over the study period. While some of this is attributable to land transferring to public ownership, the trend across the state is that more parcels are being created in smaller acreage categories, thus contributing to parcelization in Vermont.



#### *Data limitations:*

While the amount of land in parcels 50 acres or larger decreased by 110,300 acres, the amount of land in parcels less than 50 acres increased by about 45,700 acres, a difference of 62,800 acres. It is interesting to note that the acreage gained in the smaller parcel category does not equal the acreage lost in the higher acreage category. Part of this discrepancy in the numbers can be attributed to land in larger parcel categories going into public ownership – such as municipal, state, or federal ownership, which is difficult to track in the Grand List.

Based on consultation with organizations that conserved land during the study period, 2,109.74 acres of land transferred to federal ownership and 18,136.82 acres transferred to state ownership. A survey of major land trust organizations determined that a minimum of 5,455.30 acres also transferred to municipal ownership, although this number may be higher due to municipal acquisitions that may have occurred without land trust involvement.

In sum, then, and assuming that all of these public land transfers occurred on parcels 50 acres or larger, at least 25,701.86 of the 62,800 acres were transferred to public ownership. Therefore it is important to recognize that part of the acreage decrease in parcels larger than 50 acres can be attributed to those parcels going into public ownership.

#### Changes in Numbers of Parcels

During the study period, 8,645 new parcels were created in the 0 to 10 acre range.

- The number of parcels less than 50 acres increased by 8,746 parcels.
- The number of parcels 50 acres or larger decreased by 703 parcels.

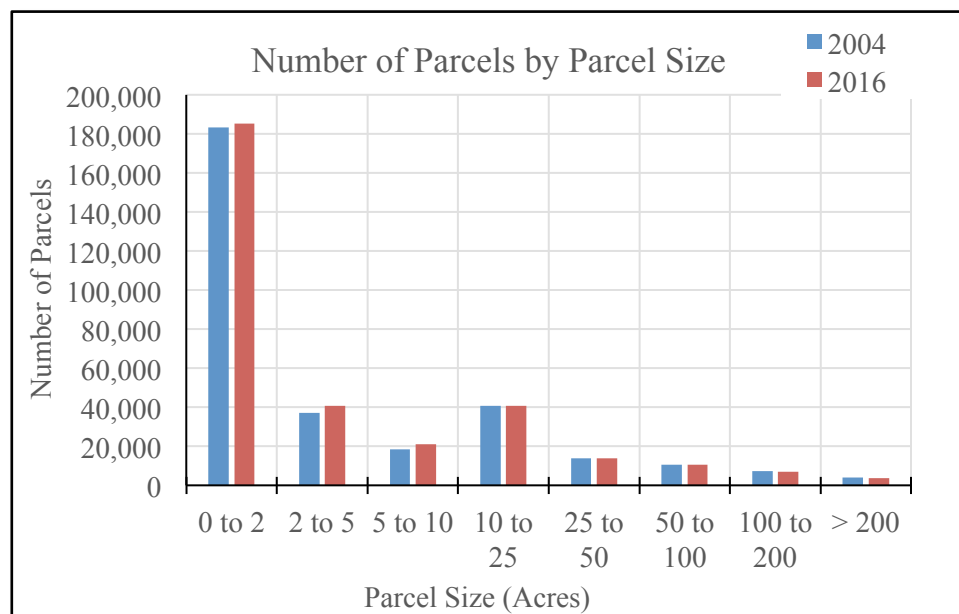


Figure 2

Broken down into more specific parcel size categories, the number of parcels changed as follows:

Parcel Size (acres)	Change in parcels	2004 Parcels	2016 Parcels	Percent Change
0-2	+ 2,067	183,195	185,262	+ 1.1%
2-5	+ 3,789	36,973	40,762	+ 10.3%
5-10	+ 2,789	18,300	21,089	+ 15.2%
10-25	- 108	40,692	40,584	- 0.3%
25-50	+ 209	13,729	13,938	+ 1.5%
50-100	- 209	10,705	10,496	- 2.0%
100-200	- 297	7,152	6,855	- 4.2%
>200	- 197	3,987	3,790	- 4.9%

Table 3

#### *Analysis & Conclusions:*

The number of small parcels is increasing in Vermont. While the number of larger (50+ acres) parcels decreased by 703 parcels, the number of smaller parcels increased by 8,746, showing that larger parcels are being divided into smaller parcels. The parcel size category of 100 to 200 acres lost the greatest number of parcels, while the parcel size category of 2 to 5 acres gained the greatest number of parcels. Parcels 200+ acres in size lost the highest percentage of parcels, about 4.9%. Parcels from 5 to 10 acres in size increased the fastest, by about 15.2%, gaining a total of 2,789 parcels. Parcels in the 2 to 5 acre category were close behind, growing by 10.25% during the study period.

Interestingly, there has been a greater increase in the number of parcels in the 2 to 5 and 5 to 10 acre categories than the 0 to 2 acre category. This may be influenced by zoning and minimum lot size requirements in certain towns. If the goal is to promote compact development patterns versus rural sprawl, it will be important to understand the pattern of parcelization and the degree to which parcels in the 2 to 10 acre category are fragmenting intact lands, versus occurring on the edges of those lands.

#### *Data limitations:*

The net losses or gains may not present the entire story. For instance, the subdivision of a very large parcel may result in one or more large parcels - for example: a 900-acre parcel subdivided into three 300-acre parcels shows a net increase in large parcels, even though the land was subdivided. In addition, some large parcels moved into public ownership, therefore they technically did not decrease in size, but rather shifted in ownership status in a way that meant they no longer appeared on the Grand List.

### III. Parcels 50 Acres or Larger

Although 50 acres is an arbitrary threshold, it is considered by many to be a minimum parcel size that is viable for forestry and maintaining ecosystem services.

#### Large Parcels – Statewide

- Between 2004 and 2016, the amount of land in parcels 50 acres or larger declined by about 110,300 acres, or roughly 8,485 acres per year.
- The number of parcels 50 acres or larger decreased from about 21,840 to about 21,140, a change of about 700 parcels.

#### *Analysis & Conclusions:*

The number of large parcels, and the acreage in large parcels, is decreasing in Vermont. Acreage in parcels 50 acres or larger decreased by 3.18% during the study period, but the trend was more noticeable from 2004 to 2009, when acreage decreased by 2.6%, versus 2009 to 2016, when parcels decreased at a slower rate, by 0.6 %.

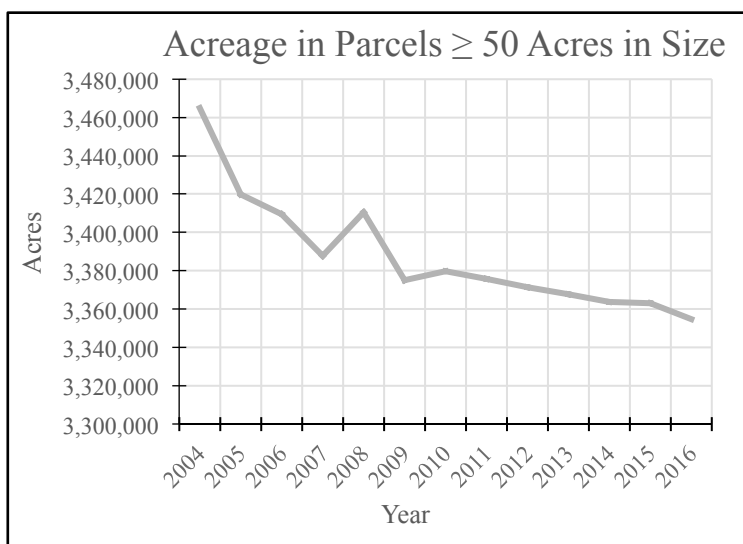


Figure 3

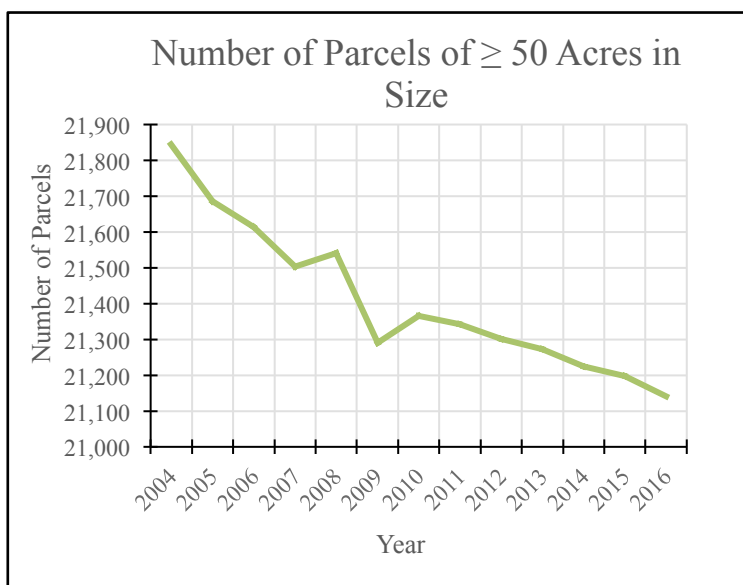


Figure 4

The decrease in the number of larger parcels followed a similar trend. The number of large parcels decreased by 3.22% during the study period. From 2004 to 2009, the number of large parcels decreased by 2.5%, but from 2009 to 2016 the number decreased by 0.7%.

#### *Data limitations:*

As mentioned before, transfer of land to public ownership contributed to a portion of the decrease in large parcels; however, available data demonstrate that public land transfer likely accounted for only approximately a quarter of the 110,300 acre decrease in large parcels. Other factors, such as aggregation of land for tax purposes, and clerical errors could play role as well,

but there is confidence in the data that large parcels declined over the study period at a noticeable rate.

#### Number of Large Parcels - County Level

All counties experienced some decrease in large parcels, but the percent of change over the study period varied across the state.

County	Change in Parcels of 50+ acres	2004 Parcels	2016 Parcels	Percent Change
Addison	-162	1655	1493	- 9.8%
Windham	-105	2020	1915	- 5.2%
Orleans	-79	2075	1996	- 3.8%
Windsor	-52	2556	2504	- 2.0%
Orange	-50	2470	2420	- 2.0%
Essex	-43	918	875	- 4.7%
Caledonia	-39	1805	1766	- 2.2%
Lamoille	-34	975	941	- 3.5%
Chittenden	-29	1177	1148	- 2.5%
Franklin	-23	1704	1681	- 1.4%
Rutland	-20	1997	1977	- 1.0%
Bennington	-16	1174	1158	- 1.4%
Grand Isle	-15	209	194	- 7.2%

Table 4

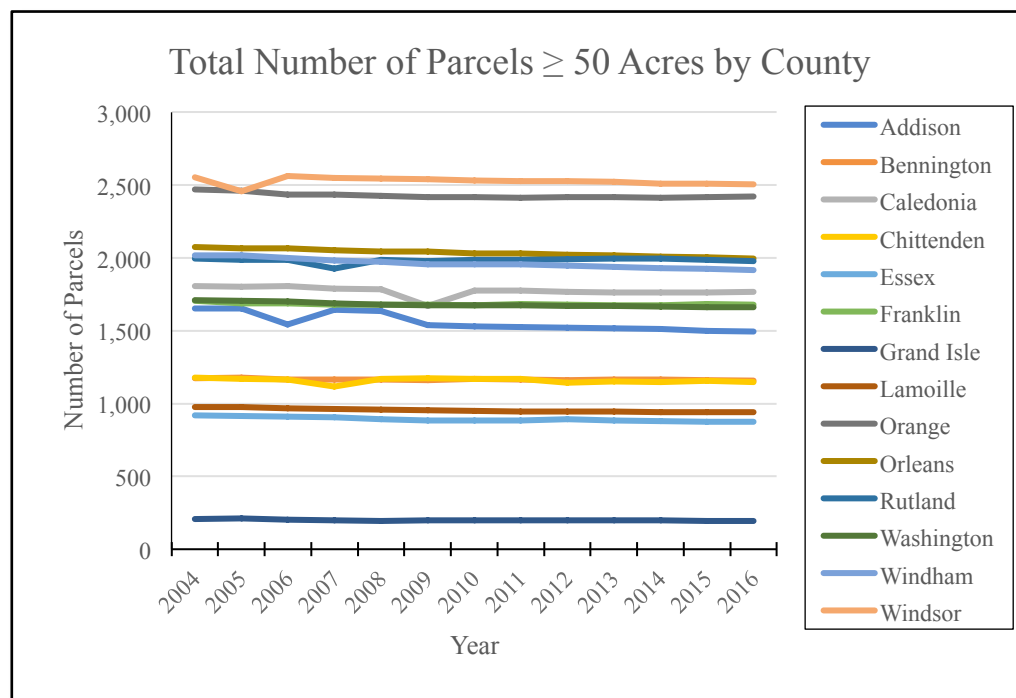


Figure 5

### *Analysis & Conclusions:*

From county to county, the number of parcels in the 50 acres or larger category was quite variable. Despite this, all counties experienced a decrease in the number of large parcels from 2004 to 2016. Although the decreases in number of parcels between counties had a wide range (between 15 and 162), it is important to consider that counties had a wide range in the number of large parcels to begin with. In 2004, Grand Isle only had 209 parcels of this size, so a decrease of 15 parcels to 194 parcels in 2016 was about a 7.2% decrease. On the other end, Windsor had 2,556 parcels of 50+ acres in 2004, which reduced to 2,504 parcels in 2016, a decrease of 52 parcels or 2% of the county's parcels of this size. Addison had the largest percent decrease in parcels of this size with a 9.8% decrease, while Rutland had the smallest percent decrease in parcels of this size with a 1% decrease.

### Acreage in Large Parcels - County Level

All counties experienced a decrease in acreage in large parcels, except Windsor County which showed an increase in acreage over the study period

<b>County</b>	<b>Change in Acreage in 50+ acre parcels</b>	<b>2004 Acreage</b>	<b>2016 Acreage</b>	<b>Percent Change</b>
Addison	-23,361	275,225	251,864	- 8.5%
Windham	-8,758	291,509	282,751	- 3.0%
Caledonia	-7,663	251,252	243,589	- 3.0%
Orleans	-7,229	317,457	310,228	- 2.3%
Washington	-6,667	245,213	238,546	- 2.7%
Rutland	-4,281	331,543	327,262	- 1.3%
Franklin	-4,501	289,871	285,370	- 1.6%
Orange	-4,285	319,857	315,572	- 1.3%
Lamoille	-2,761	171,143	168,382	- 1.6%
Bennington	-2,610	187,266	184,656	- 1.4%
Essex	-1,731	296,743	295,012	- 0.6%
Grand Isle	-1,507	24,917	23,410	- 6.1%
Chittenden	-1,042	158,369	157,327	- 0.7%
Windsor	+8,850	335,090	343,940	+ 2.6%

Table 5

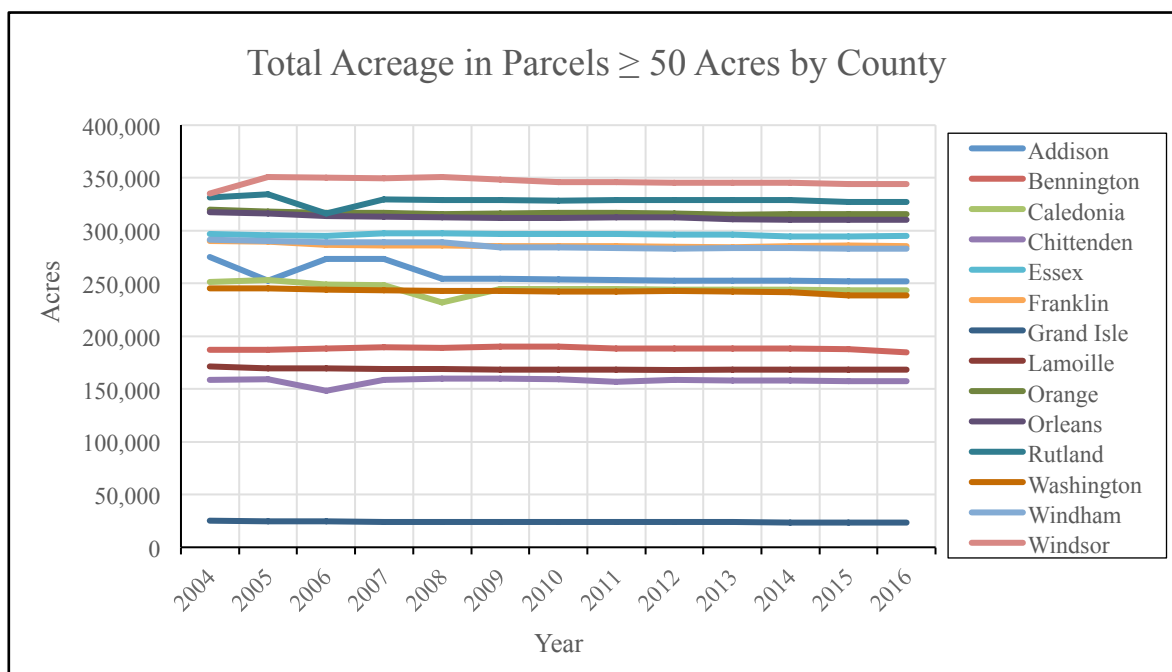


Figure 6

#### Analysis & Conclusions:

All counties except Windsor had a decrease in acreage in the 50+ acre parcel size category. From county to county, the acreage decreases are quite variable. Addison had the highest rate of decrease at 8.5%, while Chittenden had the lowest rate of decrease at 0.7%. Windsor County was the only county that had an increase at 2.6%, although please note the data limitations below.

Although there were a few counties that experienced periods of increase in acreage in the 50+ acre parcel size category during the study period, Windsor was alone in having an overall increase from 2004 to 2016, which indicates potential aggregation of land. Additionally, the amount of acreage in these large parcels was quite variable by county. In 2016, Grand Isle had about 23,410 acres in large parcels, while Windsor had about 343,940 acres in large parcels. The significance of these decreases vary by county considering their initial acreage and rate of loss. For instance, in counties with a lot of acreage in large parcels and a low rate of change, addressing the loss of large parcels may not be as urgent as in a county with less acreage in large parcels with a high rate of change.

Aggregation of land is likely influencing the trends in some counties, like Windsor County. Even if towns are consolidating parcels for tax purposes, this suggests a positive trend of landowners owning adjacent lots, which can lead to more coordinated land management – something that risks being lost when parcelization with multiple owners occurs. On the other hand, land that remains as a collection of individual parcels – rather than a single, large parcel that has been legally joined – may still be sold to multiple owners, possibly for development purposes.



*Data limitations:*

As described in the methodology, large (over 500 acre) changes in parcel size were verified through correspondence with town officials. Conversations with town clerks and listers indicated that changes that appeared as aggregation frequently had to do with changes in how parcels were tracked or recorded, rather than reflecting legal mergers. Specifically, in many cases, adjacent parcels owned by the same entity were combined under a single SPAN because of the statutory requirement that all contiguous land under the same ownership be recorded as one parcel for the Grand List. Training and awareness of municipal listers have highlighted this requirement, so more land has been recorded in this fashion. Therefore, the aggregation of land that appears to be taking place may in some cases be the legal merging of lots, while in other cases it reflects the consolidation of parcels for purposes of recording land in the Grand List.



#### IV. Parcel Type Information

In evaluating the subdivision of land, looking at changes in land classification can be another way to understand trends over time. For purposes of this study, parcel type is characterized into four categories: residential, farm, woodland and other (see glossary section of report).

##### Parcel Type - Statewide Acreage

Parcel Type	Acreage Change	2004 Acreage	2016 Acreage	Percent Change
Residential	+162,670 acres	2,326,959	2,489,629	+ 7.0%
Other	-26,163	932,394	906,231	- 2.8%
Woodland	-147,684	994,090	846,406	- 14.9%
Farm	-53,406	575,031	521,625	- 9.3%

Table 6

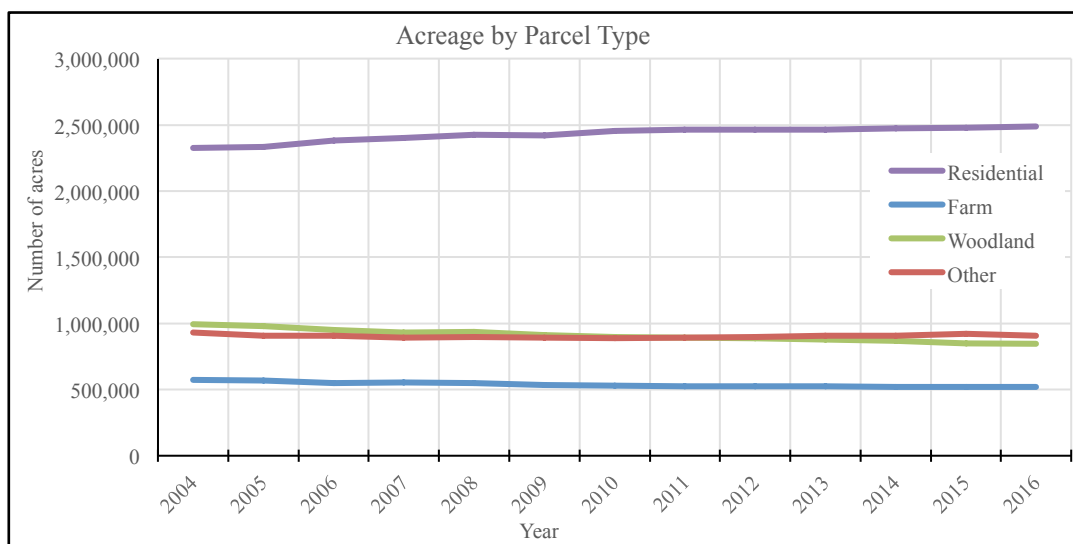


Figure 7

##### *Analysis & Conclusions:*

Statewide, acreage in farm and woodland (undeveloped forestland) is decreasing, while residential acreage is increasing. From 2004 to 2016, residential parcels had the highest amount of acreage among all categories. Residential acreage increased by about 7% over the study period, representing an average yearly increase of about 12,510 acres. Woodland acreage

decreased by about 14.9%, representing an average yearly decrease of about 11,360 acres. Farm acreage decreased by about 9.3%, representing an average yearly loss of 4,100 acres.<sup>2</sup>

The rate of loss of woodland is especially noteworthy, since it is the category of land decreasing fastest. Even though a portion of the decrease may be attributable to woodland transferring to public ownership, the increase in residential acreage strongly suggests that woodland is being reclassified to residential. This raises concerns not only about the rate of loss of undeveloped forestland, but the ensuing pattern of development in these areas. As residential development occurs in undeveloped forest, it is important to understand the degree to which forests are being fragmented and compromised in their ability to remain viable for forestry and ecosystem functions.

*Data limitations:*

The transfer of land to public ownership likely explains why a portion of the woodland acreage experienced a decline. Still, it is important to note that not all of the land transferred to public ownership was known to be undeveloped woodland. For example, some of the land that transferred to state or federal ownership consists of marsh, wetland, and non-forested land. Even if the bulk of land that transferred to public ownership is woodland, this would represent approximately 17% of the woodland decrease; therefore, a large amount of the decrease of woodland was due to conversion to another category, such as residential, farm or other.

Woodland Parcels at the County Level

As noted above, the land in the woodland category is particularly important because it includes the most intact forest parcels: By definition, woodland parcels include undeveloped land that is mostly wooded. Such parcels may have buildings of little value, such as the 100-acre parcel of forestland with a small deer camp of little value. Given the trend of woodland loss, along with increasing amounts of acreage in the residential category, the following section looks more closely at woodland at the county level to further understand these trends.

The following trends occurred at the county level for the amount of acreage in private woodland parcels.

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<sup>2</sup> Note that the “farm” category refers specifically to working farms with farm building(s) on them. Land that is farmed that doesn’t have buildings, or agricultural land that is not farmed, is classified differently.

County	Change in Acreage of Woodland	2004 Acreage	2016 Acreage	Percent Change
Essex	-35,131	237,373	202,242	- 14.8%
Orleans	-28,110	82,696	54,586	- 34.0%
Windham	-20,459	94,566	74,107	- 21.6%
Rutland	-15,842	80,795	64,953	- 19.6%
Orange	-13,581	77,934	64,353	- 17.4%
Lamoille	-13,189	76,854	63,665	- 17.2%
Caledonia	-10,107	55,519	45,412	- 18.2%
Addison	-7,213	36,379	29,166	- 19.8%
Windsor	-6,453	82,672	76,219	- 7.8%
Bennington	-5,054	64,308	59,254	- 7.9%
Franklin	-303	40,624	40,321	- 0.8%
Grand Isle	--	--	--	--
Washington	+462	57,905	58,367	+ 0.8%
Chittenden	+837	22,676	23,513	+ 3.7%

Table 7

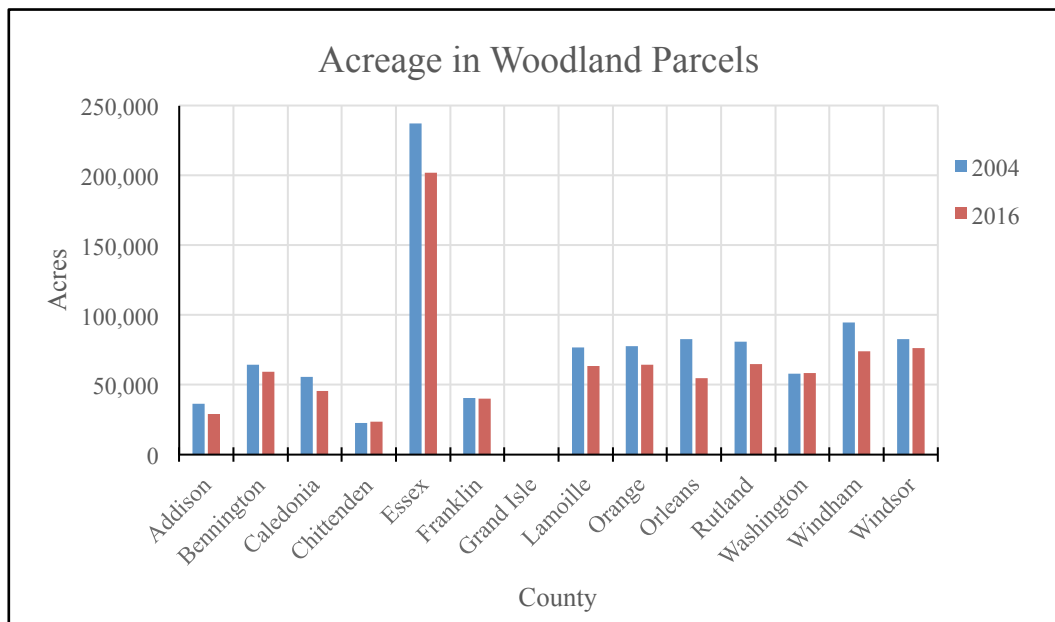


Figure 8

#### Analysis & Conclusions:

Generally, most counties experienced decreases in their woodland acreage. Orleans, Windham, and Addison counties experienced the highest rates of Woodland decrease: 34%, 21.6%, and 19.8% respectively. However, Essex had the largest decrease in actual acres at about 35,130.

These decreases indicate areas where more attention may be needed to keep woodland parcels intact. Acreage change varied from a decrease of about 35,130 acres in Essex County to an increase of about 840 acres in Chittenden County. It is important to understand whether acreage increases indicate an important trend in land aggregation, meaning multiple parcels are being combined under one ownership, or whether the increases indicate the consolidation of adjoining parcels for tax purposes, even though the parcels remain separate legal parcels. The latter still provides the opportunity for landowners to manage these adjacent, commonly owned parcels under a single management plan.

*Data limitations:*

As mentioned previously, some of the decrease in the woodland category at the county level is attributable to private land transferring to public ownership. In addition, the increase in acreage reflected in some of the counties means that some level of land aggregation – either legal or simply administrative - occurred. As described previously, conversations with town clerks and listers indicated that to a certain degree, aggregation had to do with how contiguous parcels are recorded, rather than reflecting legal mergers.

Parcel Type - Large Parcels

Public policy in Vermont favors retaining large parcels of land for the variety of functions they provide; therefore, the following provides trends for changing parcel types among larger parcels (50 acres or larger in size).

<b>Parcel Type</b>	<b>Parcel Change</b>	<b>2004 Parcels</b>	<b>2016 Parcels</b>	<b>Percent Change</b>
Residential	+ 63,969	1,387,053	1,451,022	+ 4.6%
Woodland	- 124,845	889,637	764,792	- 14.0%
Other	+ 3681	624,000	627,681	+ 0.6%
Farm	- 53,097	564,312	511,215	- 9.4%

*Table 8*

*Analysis & Conclusions:*

About 39% of the residential acreage increase was in parcels 50 acres or larger (63,970 acres out of 162,670 acres). Meanwhile, about 85% of the woodland acreage decrease was from parcels 50 acres or larger (124,840 acres out of 147,680 acres).

The decrease in the farm category over the study period occurred almost exclusively in large parcels. Approximately 99% of the farm acreage decrease was from parcels of 50 acres or larger (53,100 acres out of 53,400 acres).

In sum, most of the acreage decreases in both farm and woodland categories were from larger parcels. The gain in residential acreage in large parcels does not offset the decrease in large parcels in

woodland and farmland, further underscoring the division of large undeveloped woodland and farmland parcels into smaller, potentially less viable parcels as working lands.

#### *Data limitations:*

As mentioned above, a portion of the decrease in large parcels in the woodland category was due to transfer to public ownership.

#### Parcel Type - Large Parcel Composition

The percent of acreage in large parcels in the woodland and farm categories decreased over the study period, while the percent in residential increased.

Acreage in 50+	Residential	Woodland	Other	Farm
Figure 11	40%	25.7%	18%	16.3%
2004				
2016	43.3%	22.8%	18.6%	15.2%

Table 9

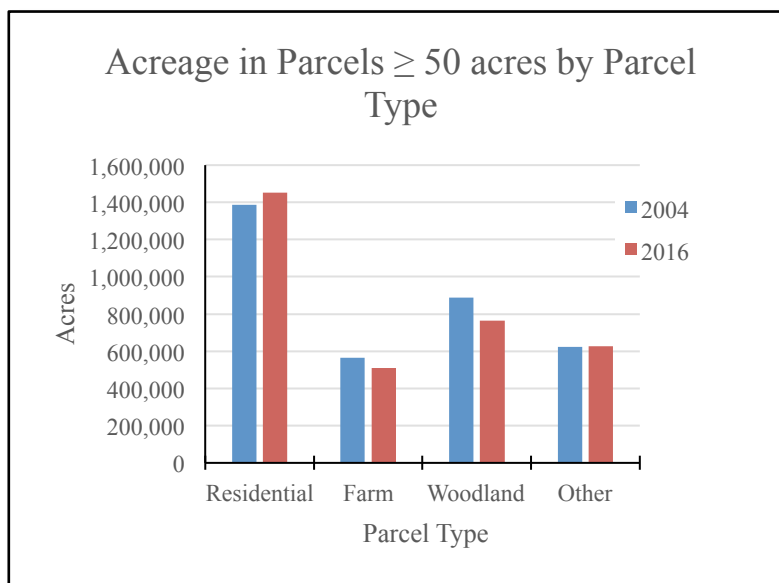


Figure 9

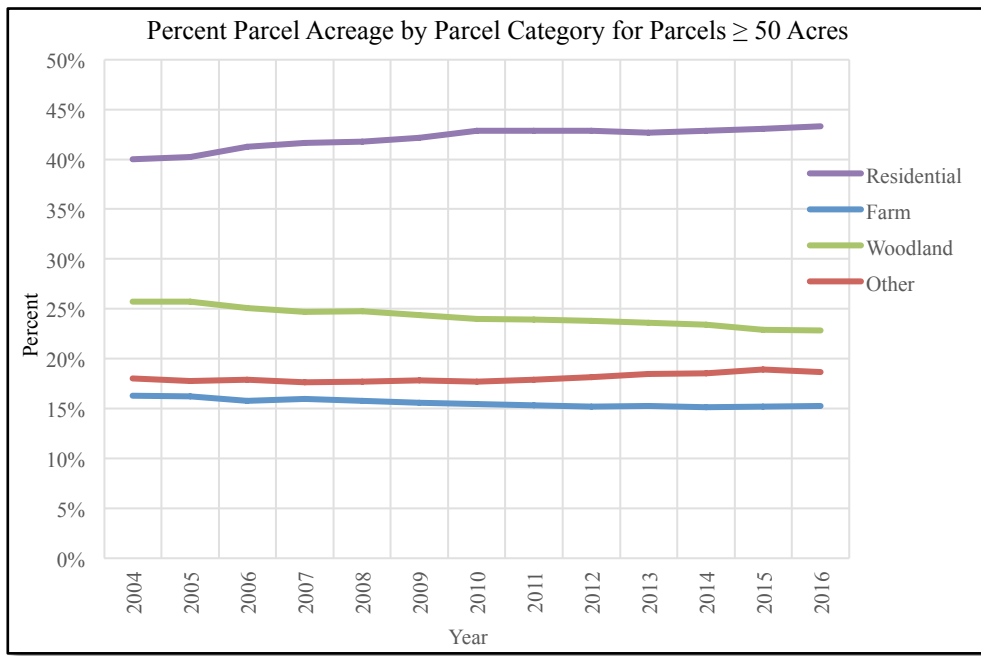


Figure 10

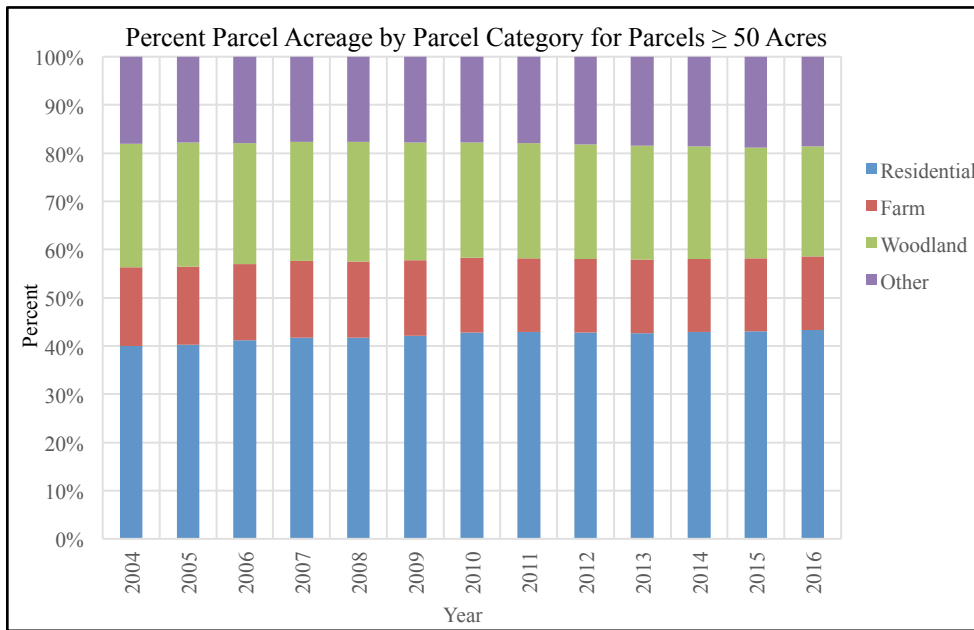


Figure 11

### Analysis & Conclusions:

The overall parcel acreage composition for large parcel acres shifted from 2004 to 2016, with a decrease in woodland and farm, and an increase in residential. Earlier in the report, it was noted that approximately 70% of the land base in Vermont is comprised of parcels 50 acres or larger, but it is important to note the increasing prominence of the residential category in this



percentage, versus undeveloped woodland, which makes up less than a quarter of the land in parcels 50 acres or larger.

In the 50 acre or larger size category, the residential category increased by about 3.3 percentage points and the “other” category increased by about 0.6 percentage points, while farmland decreased by about 1 percentage point and woodland decreased by about 2.9 percentage points.

*Data limitations:*

As mentioned above, part of the decrease in the state percentage of large woodland parcels was due to land transferring to public ownership.





## V. Land Values

Land values can play an important role in landowner decisions regarding their land. They may be a factor in whether to subdivide or conserve land, as well as a factor in deciding whether to invest in forestland for forest management purposes as opposed to development purposes.

### Land Values – Statewide

During the study period, statewide land value per acre increased by \$837, an increase of 185%.

#### *Analysis:*

Land value almost doubled from \$990 per acre to \$1,827 per acre over the study period. It is interesting to note that much of the increase occurred between 2004 and 2008 before the market crash, and then stabilized for the following years.

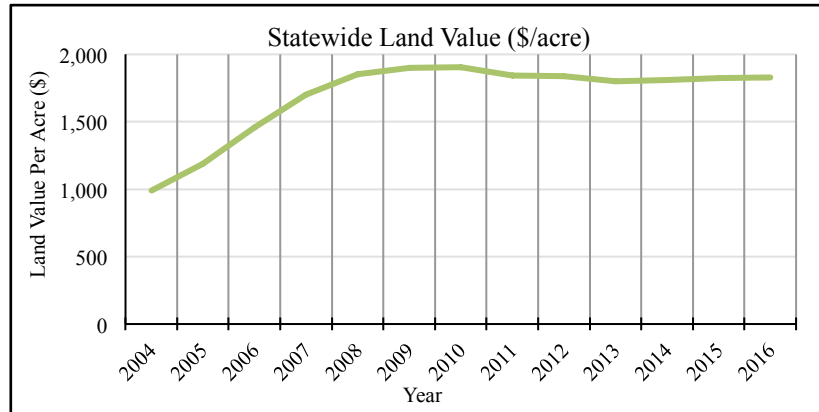


Figure 12

### Land Values Woodland – Statewide

Statewide woodland land value per acre increased by \$483, an increase of 183%.

#### *Analysis:*

Woodland land value almost doubled from \$581 per acre to \$1,064 per acre over the study period. Similar to overall land value, much of the increase occurred between 2004 and 2008 before the market crash, and then woodland land values stabilized.



Figure 13

Some of the increase in woodland value may be attributed to trainings by the Division of Property Valuation and Review for listers emphasizing that listers should assign a housesite value to any parcel that could have a house built on it. Historically in the past, the lister may have assigned a bulk land value to all of the acres on a parcel, but because of the trainings, some of the increase might be better attributed to better assessment practices rather than an overall increase in value.

While woodland is valued at \$1,064 per acre in 2016, the use value, or the value of the land for forest management (forestry), rather than its “fair market” (usually development) value – was drastically less: \$135/acre.<sup>3</sup> So, while it is true that woodland is cheaper than land in general, the wide discrepancy between use and development value for woodland makes investing in woodland for management a very challenging financial proposition. It should be noted that programs like Use Value Appraisal (Current Use Program) help to stabilize this discrepancy.

#### Land Values – County Level

Per acre land values at the county level increased across the state, with many counties experiencing over a 100% increase during the study period.

County	2004 land value	2016 land value	Change in land value (\$)	Percent change
Grand Isle	\$1,977	\$3,783	+ \$1,806	+ 91%
Lamoille	\$1,080	\$2,773	+ \$1,693	+ 157%
Bennington	\$991	\$2,244	+ \$1,253	+ 126%
Washington	\$1,144	\$2,292	+ \$1,148	+ 100%
Addison	\$892	\$1,984	+ \$1,092	+ 122%
Chittenden	\$2,075	\$3,015	+ \$940	+ 45%
Caledonia	\$524	\$1,408	+ \$884	+ 169%
Franklin	\$660	\$1,528	+ \$868	+ 132%
Windham	\$894	\$1,660	+ \$766	+ 86%
Orleans	\$598	\$1,324	+ \$726	+ 121%
Windsor	\$1,486	\$2,092	+ \$606	+ 41%
Orange	\$1,010	\$1,592	+ \$582	+ 58%
Essex	\$385	\$915	+ \$530	+ 138%
Rutland	\$842	\$1,265	+ \$423	+ 50%

Table 10

<sup>3</sup> The use value is established annually by the state’s Current Use Advisory Board, a citizen board.

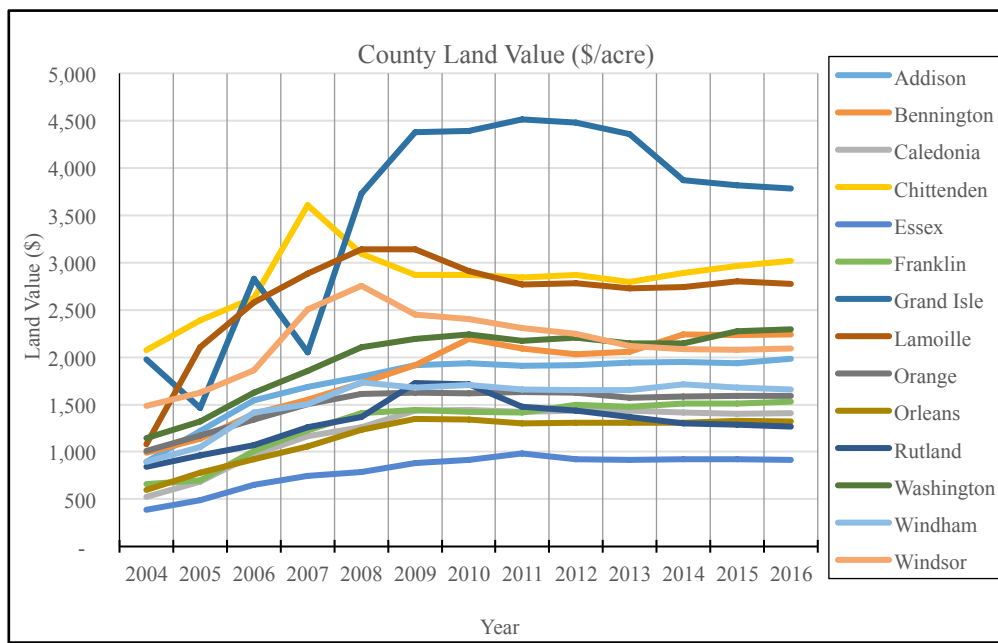


Figure 14

#### Analysis & Conclusions:

Land values are quite variable from county to county. For instance, Essex County had the lowest land value in the state, with a value of \$385 per acre in 2004, and only reached \$915 per acre in 2016. Meanwhile, Grand Isle had a land value of \$1,977 per acre in 2004, reaching \$3,783 per acre in 2016. Geographic location and certain trends described in the report factor into land value. For example, there is much less acreage in large parcels in Grand Isle than in the other counties, especially woodland parcels, which have a lower land value, versus residential.

Additionally, land value increased at differing rates. Caledonia County land value increased by 169%, while Windsor County land value increased by 41% during the study period. This indicates that more rural counties are seeing a significant shift in land value, which means there is potentially increasing pressure on landowners who may be trying to retain undeveloped land in rural areas where forest management is an important part of the economy.

#### Land Values Woodland – County Level

To provide further insight, the study evaluated woodland land value within each county. Grand Isle County did not include any land in the woodland category.

County	2004 woodland land value	2016 woodland land value	Change in woodland land value (\$)	Percent change
Caledonia	\$401	\$1,055	+ \$654	+ 163%
Franklin	\$550	\$1,181	+ \$631	+ 115%
Washington	\$771	\$1,393	+ \$622	+ 81%
Windham	\$613	\$1,217	+ \$604	+ 99%
Addison	\$609	\$1,158	+ \$549	+ 90%

County	2004 woodland land value	2016 woodland land value	Change in woodland land value (\$)	Percent change
Orleans	\$347	\$865	+ \$518	+ 149%
Lamoille	\$717	\$1,214	+ \$497	+ 69%
Bennington	\$680	\$1,173	+ \$493	+ 73%
Chittenden	\$789	\$1,193	+ \$404	+ 51%
Essex	\$317	\$720	+ \$403	+ 127%
Windsor	\$678	\$1,052	+ \$374	+ 55%
Orange	\$832	\$1,139	+ \$307	+ 37%
Rutland	\$503	\$680	+ \$177	+ 35%
Grand Isle	--	--	--	--

Table 11

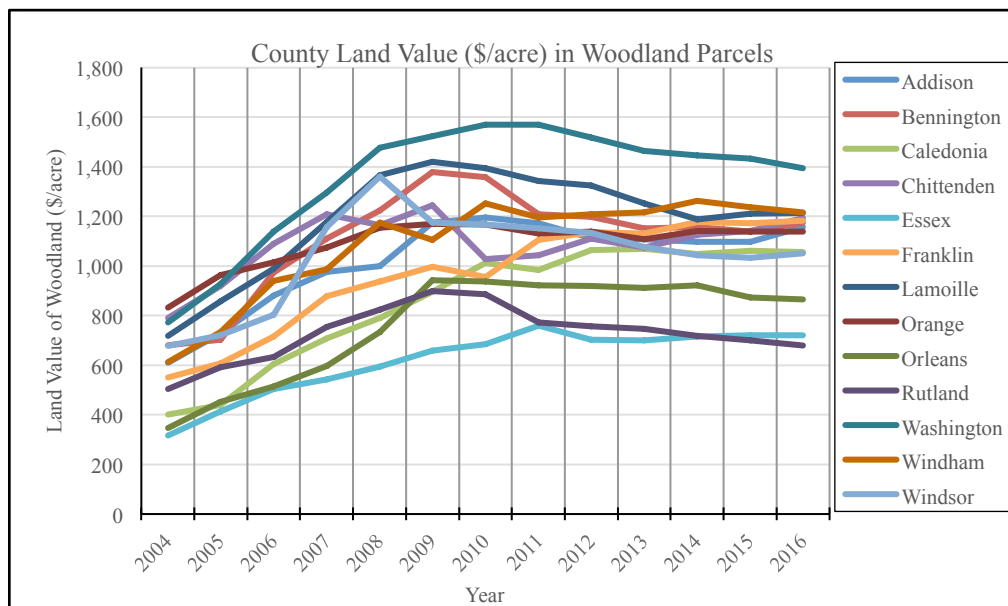


Figure 15

#### Analysis & Conclusions:

Woodland value increased in all counties, ranging from an increase of \$177 in Rutland to an increase of \$654 in Caledonia over the study period. Although all counties saw increases in woodland value, the rate of increase varied from county to county.

As would be expected, land value generally was higher than woodland land value (see table below). Lower woodland values help to maintain undeveloped land without resorting to development, but the magnitude of difference between these values could indicate where there is growing pressure to develop land.

For example, the relative affordability of woodland compared to land in general could make it appealing for development, such as parts of Lamoille County feeling development pressure from the nearby Chittenden County market.

County	Land Value Per Acre 2016 (\$)	Woodland Land Value Per Acre 2016 (\$)	Difference: Land Value Per Acre -Woodland Land Value Per Acre (\$)
Addison	1,984	1,158	826
Bennington	2,244	1,173	1,071
Caledonia	1,408	1,055	353
Chittenden	3,015	1,193	1,822
Essex	915	720	195
Franklin	1,528	1,181	347
Grand Isle	3,783	--	--
Lamoille	2,773	1,214	1,559
Orange	1,592	1,139	453
Orleans	1,324	865	458
Rutland	1,265	680	585
Washington	2,292	1,393	898
Windham	1,660	1,217	443
Windsor	2,092	1,052	1,040

*Table 12*

## VI. Number of Parcels with Dwellings

In 2016, 79.0% of the parcels with dwellings were smaller than 10 acres, and only 5.2% of the parcels were larger than 50 acres. During the study period, smaller parcels added dwellings at a slightly higher rate than larger parcels.

- Parcels less than 50 acres in size with dwellings increased by 20,747 parcels, which is an increase of 8.8%.
- Parcels 50+ acres in size with dwellings increased by 881 parcels, which is an increase of 6.7%.

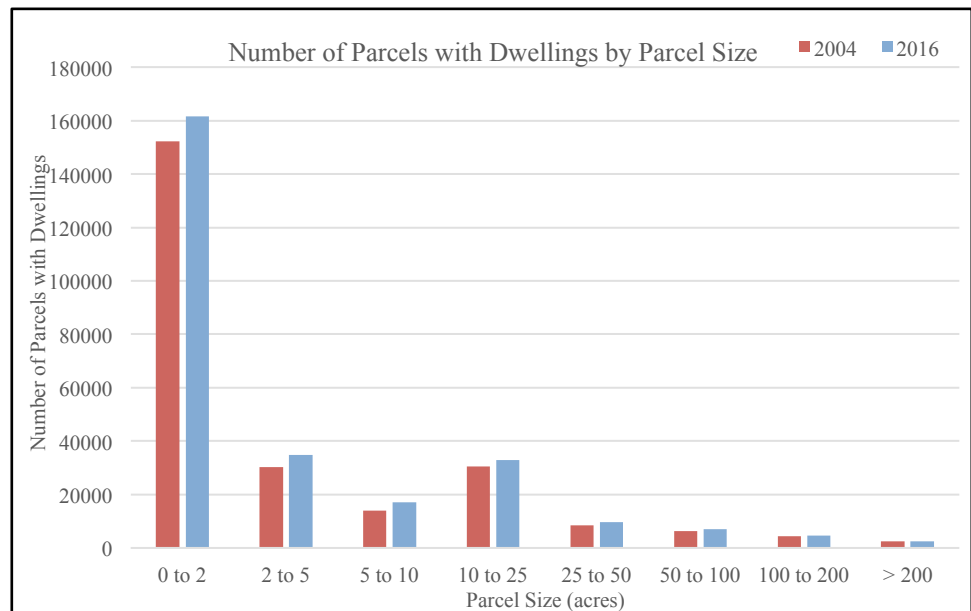


Figure 16

Parcel Size (acres)	Change in Parcels with Dwellings	2004 Parcels	2016 Parcels	Percent Change
0-2	+9,334	152,330	161,664	+ 6.1%
2-5	+4,633	30,240	34,873	+ 15.3%
5-10	+3,195	13,990	17,185	+ 22.8%
10-25	+2,421	30,488	32,909	+ 7.9%
25-50	+1,164	8,517	9,681	+ 13.7%
50-100	+635	6,386	7,021	+ 9.9%
100-200	+181	4,417	4,598	+ 4.1%
>200	+65	2,352	2,417	+ 2.8%

Table 13

### Analysis & Conclusions:

The number of parcels with dwellings is increasing in Vermont in all parcel size categories. The parcel size categories that had the greatest increase of dwellings – i.e., went from having no dwellings to having a dwelling – were the 5 to 10-acre category with a 22.8% increase, 2 to 5-acre category with a 15.3% increase, and the 25 to 50-acre category with a 13.7% increase.

Meanwhile, the parcel size category that had the smallest increase in the number of parcels with dwellings was the 200+ acre category with a 2.8% increase.

In general, more dwellings are being created on smaller parcels versus larger parcels, but dwellings on parcels in smaller acreage categories still have the potential to fragment the landscape, so planning efforts should take this into consideration.

#### In State Versus Out-of-State Ownership

The number of residential parcels owned by in-state owners increased by roughly 6% over the study period. The number of residential parcels owned by out-of-state owners decreased during the study period, but out-of-state owners nevertheless own a slightly higher percentage of residential acreage than they did at the start of study period. Interestingly, corporate ownership of resident parcels increased by close to 79% over the study period, indicating that more landowners may be setting up land ownership under corporate structures.<sup>4</sup> By the end of the study period in 2016, residential parcels owned by in-state owners represented 75% of overall acreage, while out-of-state owners represented 22% of the acreage, and corporate owners represented 3% of the residential acreage.

CATEGORY	RESIDENT OWNERSHIP	2004 PARCEL COUNT	2004 ACRES	2016 PARCEL COUNT	2016 ACRES	PERCENT CHANGE OF PARCELS	PERCENT CHANGE OF ACRES
<b>Residences (1-6)</b>	Owner lives in-state	196,745	1,910,905	207,871	1,877,821	+ 5.7%	- 1.7%
	Owner lives out-of-state	33,019	528,412	32,688	546,793	- 1.0%	+ 3.5%
	Corporate owned	2,384	53,167	4,267	77,041	+ 79.0%	+ 44.9%
	Unspecified	141	5,982	-	-	-	-
	<b>TOTAL</b>	<b>232,289</b>	<b>2,498,465</b>	<b>244,826</b>	<b>2,501,655</b>		

<sup>4</sup> "Corporate" owners may be residents or non-residents. The Tax Department notes that many seasonal or rental properties are owned by business entities. See the Glossary on p. 50 for additional information.

CATEGORY	RESIDENT OWNERSHIP	2004 PARCEL COUNT	2004 ACRES	2016 PARCEL COUNT	2016 ACRES	PERCENT CHANGE OF PARCELS	PERCENT CHANGE OF ACRES
<b>ALL CATEGORIES (1-15)</b>	Owner lives in-state	244,074	3,466,064	253,079	3,415,818	+ 3.7%	- 1.5%
	Owner lives out-of-state	59,041	1,180,880	57,642	1,177,627	- 2.4%	- 0.3%
	Corporate owned	18,763	766,381	24,018	1,015,458	+ 28.0%	+ 32.5%
	Unspecified	245	20,141	-	0	-	-
	TOTAL	322,123	5,433,467	334,739	5,608,903		

Table 14



## VII. Use Value Appraisal (Current Use Program Enrollment)

The Use Value Appraisal (UVA) Program (commonly referred to as the Current Use Program) allows land that is enrolled in the program to be taxed at a lower rate, one that reflects the capacity of the land to produce income as a working farm or forest, versus at fair market value (generally understood as the value of the land if developed). The Current Use Program is credited with keeping a large amount of land in Vermont undeveloped and viable as a working landscape that contributes to Vermont's rural economy.

*Please note that the following data related to the Use Value Appraisal (UVA) Program is being updated and should be considered incomplete until new data is published in early 2019!*

### UVA Enrollment – General Trends and Enrollment Breakdowns

The amount of land enrolled in the UVA Program increased by about 557,800 acres during the study period to a total of 2,425,200 acres in 2016.<sup>5</sup>

Local assessors categorize property ownership as Vermont resident, non-resident, or corporate (which, as noted above, may include resident or non-resident owners).

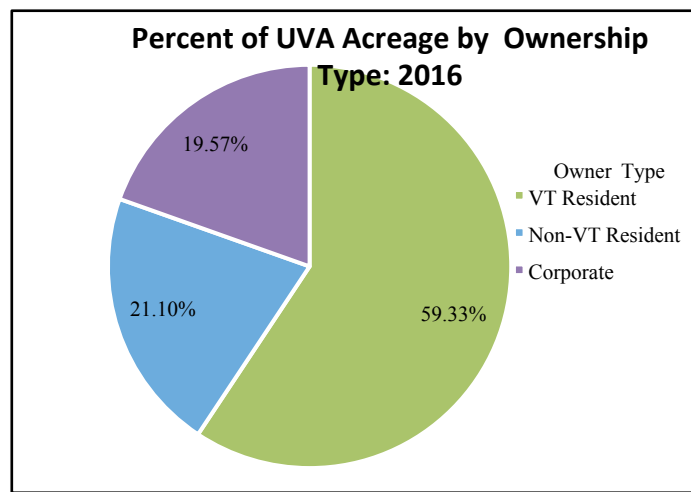


Figure 17

- In 2016, Vermont residents owned the majority of land enrolled in UVA (59.33%). Corporate ownership followed at 21.1% with non-resident ownership at 19.57%.
- Vermont resident-owned land enrolled in the UVA program increased by about 294,880 acres, representing a 25.8% increase in the amount of Vermont-resident owned land enrolled in UVA between 2004 and 2016.
- Non-VT resident land enrolled in the UVA program increased by about 151,330 acres, representing a 42% increase in the amount of non-resident owned land enrolled in UVA between 2004 and 2016.

<sup>5</sup> These statistics are based on the Division of Property Valuation and Review's Annual Report for the calendar year 2016. The statistics that follow are being updated and may not align with the Annual Report.

- Corporate owned land enrolled in the UVA program increased by about 111,580 acres, or a 30.7% increase based on the total amount of corporate ownership.
- UVA enrollment composition shifted from 2004 to 2016. Smaller parcels make up more of the parcels enrolled compared to larger parcels.

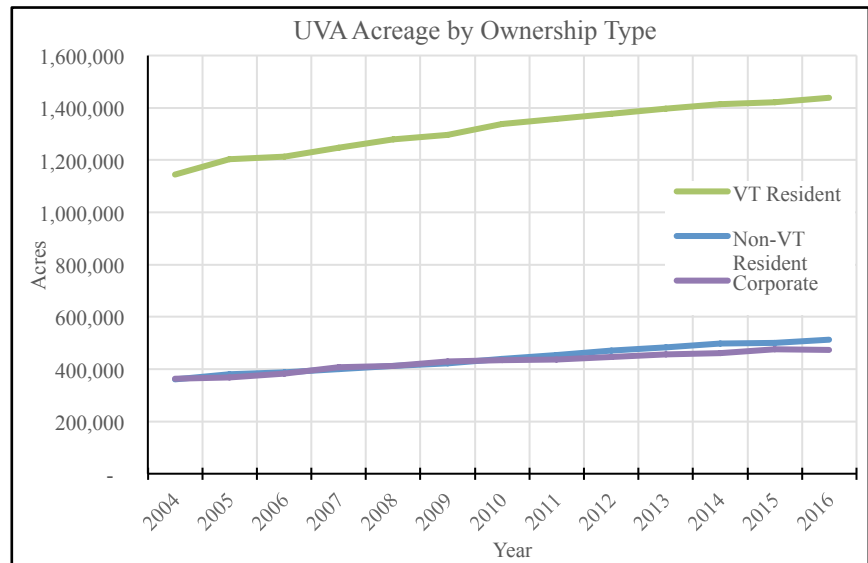


Figure 18

- The number of parcels between 25-50 acres in size enrolled in the UVA program increased by 3.1 percentage points, from 23.3% to 26.4%.
- The share of UVA parcels in the 100-200 acre category decreased by 2.1 percentage points, from 24.8% to 22.7%.
- The share in the 200+ acre category decreased by 2.7 percentage points, from 17.57% to 14.87%.

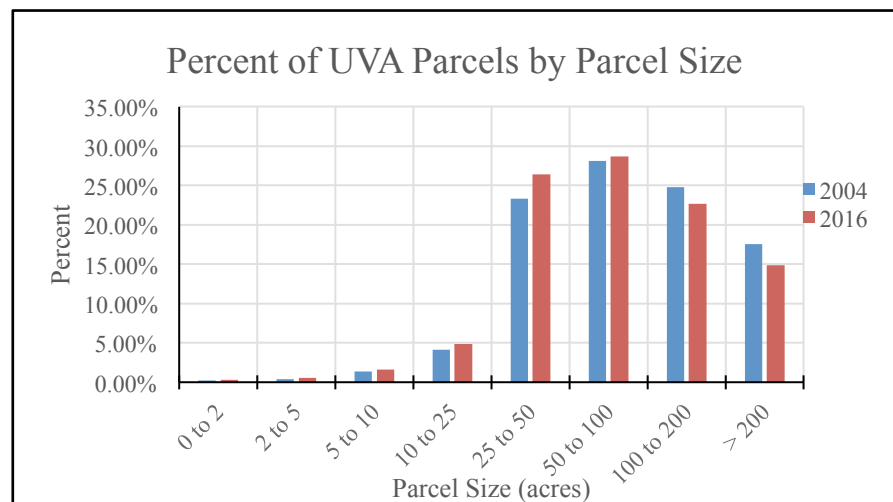


Figure 19

#### Analysis & Conclusions:

Vermont residents own the majority of land enrolled in the Use Value Program – close to 60% of the acreage – and over the course of the study period, Vermont residents enrolled more acreage in the program than non-residents or corporate owners. Non-residents own about 20% percent of the land in the Use Value Program, but over the study period enrolled at a higher rate (a 42% increase over the study period, compared to a 26% increase by Vermont residents), demonstrating that there is continuing interest in the program from residents and non-residents alike.

Additionally, although enrollment continues to rise, there is a trend of the parcels being enrolled being smaller. This increase in the number of smaller parcels enrolled means more

administrative oversight is needed as more landowners enroll in the program with smaller parcels. In addition, since smaller parcels tend to have a higher per-acre land value, this too has implications for the administration and cost of the program. Finally, the increase in corporate ownership in the Program indicates that more landowners may be setting up corporate structures for their land such as trusts or limited liability corporations. This study did not examine the breakdown of residential versus non-residential corporate ownership, but this would have been helpful to better understand corporate ownership trends.

#### UVA Enrollment – Forestland Category<sup>6</sup>

- VT resident-owned land enrolled in the forestland category of the UVA Program increased by about 233,240 acres, which represents a 33.6% increase in this category over the study period.

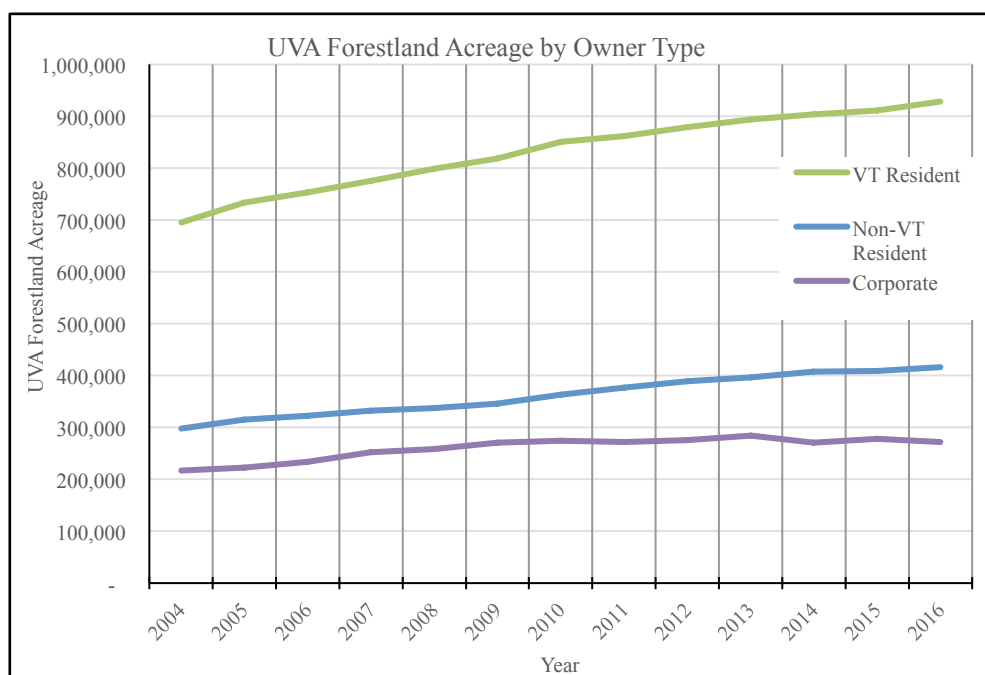


Figure 20

- Non-VT resident land enrolled in the forestland category of the UVA Program increased by about 118,770 acres, which represents a 40% increase in this category over the study period.
- Corporate owned land enrolled in the forestland category of the UVA Program increased by about 55,280 acres, which represents a 24.5% increase in this category over the study period.

<sup>6</sup> Landowners can enroll in the forestland category of the Use Value Appraisal Program if they own a minimum of 25 acres of forestland. It should be noted that the “woodland” category referenced in this report is for listers to classify undeveloped forestland for Grand List purposes. **The forestland category data is incomplete and will be updated in early 2019.**

### *Analysis & Conclusions:*

Trends for the enrollment of land enrolled in the forestland category of the UVA Program, mirror trends for overall enrollment, with residents enrolling more acreage, but non-residents enrolling at a higher rate. About 78.9% of the land enrolled by VT residents into the UVA Program during the study period was forestland (233,240 acres out of 294,880 acres enrolled). Similarly, about 78.5% of land enrolled by non-VT residents was forestland (118,770 acres out of 151,330 acres). About 50% of land enrolled by corporate ownership was forestland (55,282 acres of 111,579 acres enrolled).

### Retention of Woodland: UVA Versus Non-UVA Parcels:

Woodland parcels that were enrolled in the Use Value Appraisal Program in 2004 were less likely to be converted to other uses during the study period compared to land that was not enrolled. Of the parcels 50+ acres in 2004 that were listed in the woodland category in the Grand List, parcels not enrolled in the UVA Program were 1.7 times as likely to be subdivided into smaller parcels than those enrolled in the program.

The following applies to land in the woodland category in 50+ acre parcels:

- 84.16% of woodland enrolled in UVA in 2004 remained as woodland in 2016.
- 73.15% of woodland not enrolled in UVA in 2004 remained as woodland in 2016.

### *Analysis & Conclusions:*

For parcels 50+ acres in size enrolled in the forestland category in the UVA Program, land remained in the undeveloped woodland status at a higher rate over the study period than land that was not enrolled.

	In UVA in 2004	Not in UVA in 2004
(Woodland in parcels ≥ 50 acres)		
Remained as Woodland in 2016	84.16%	73.15%
Did Not Remain as Woodland in 2016	15.84%	26.85%

Table 15

## Key Findings

The following are the key findings that have emerged from VNRC's examination of subdivision trends between 2004 and 2016:

**Both the amount of land in parcels 50 acres and larger in size and the number of parcels are decreasing, while acreage and number of parcels under 50 acres is increasing.**

Over the 12 year study period, Vermont saw a net loss in the number of parcels 50 acres or larger (-3.22%), and a net increase in parcels under 50 acres (3%). The number of large parcels decreased in every county, and ranged from a loss of 15 large parcels (Grand Isle county) to 162 parcels (Addison County). Just as important as the number of parcels is the percent: The decrease of just 15 large parcels in Grand Isle nevertheless represents a 7.2% decrease in number of large parcels.

The fact that over 70% of Vermont's overall land base remains in parcels 50 acres or larger presents an opportunity for Vermont to maintain a critical mass of large parcels. However, attention to these changes is still warranted, especially since the ongoing loss of large parcels serves as a reminder that these parcels are decreasing at a quiet, incremental pace.

**The increasing number and acreage of small parcels is particularly notable in the 2-5 and 5-10 acre categories, a size commonly used for "rural residential" house lots.**

The increases in the number of parcels in the 2-5 and 5-10 acre categories are particularly striking: During the study period, they increased by 10.25% and 15%, respectively. (The next highest increase, in the 25-50 acre category, was just 1.52%.) At the same time, the number of parcels in the larger acreage categories decreased by between -2% and -4%. Though the smaller acreage categories represent a relatively small proportion of Vermont's land base (about 5.5% for the 2-5 and 5-10 acre categories combined) it again highlights the incremental but steady pace at which smaller parcels are being created.

**The number of acres in the "residential" category is increasing, while "farm" and "woodland" acreage is decreasing, with "woodland" acreage decreasing the fastest.**

During each year of the study period, the residential parcel type had more acreage in it than any other single acreage category. Residential acreage also grew at a faster rate than any of the other categories: It increased by about 7% from 2004-2016, meaning that 12,510 acres of land each year went from being farm, woodland, or "other" to having a house on it. At the same time, the amount of land considered "woodland" or "farm," decreased: Woodland acreage decreased by about 14.9%, and farm by about 9.3%. (Some of the decrease may be accounted for due to land going into public ownership.) Taken alongside the relatively rapid creation of 2-5 and 5-10 acre lots, this trend strongly suggests that woodland and farmland are vulnerable to conversion from scattered residential development.

**Of the different parcel type categories, "woodland" (which is privately owned) decreased the most during the study period, with 50% more woodland acreage being converted to other categories compared to farmland acreage.**

While both farm and forestland are decreasing at concerning rates, forests appear to be more vulnerable to conversion. This may be due to the increasing carrying cost of owning woodland, or the lower cost of woodland compared to residential property (more below). On the positive side, a portion of the decrease in woodland is from privately owned woodland transferring to public ownership, but percentage-wise, this may only account for up to 25% of the decrease based on available information. This means that the remaining undeveloped woodland acreage is being converted to other categories. As mentioned above, the rapid creation of small parcels, including those with new dwellings, suggests that woodland parcels are being converted to residential parcels.

**The loss of large (50+ acre) woodland parcels outpaced the loss of large parcels in general.**

Statewide, Vermont saw a 3.18% decrease in the amount of acreage in large (50 acres or larger) parcels during the study period. Within the woodland category, however, this change was much more dramatic: Woodland acreage decreased by 14%. This suggests that large woodland parcels are more vulnerable to subdivision than large parcels generally.

**Orleans, Windham, and Addison counties experienced the highest rate of woodland loss in large (50 acres or larger) parcels, while Franklin and Windsor counties saw the least loss.**

Woodland loss is happening across the state, with no clear geographic trends suggesting that certain areas are more vulnerable to woodland loss than others. In fact, all counties experienced a loss in the amount of acreage in large parcels. The fact that these trends are not concentrated in a particular region of the state means that there is value in having each county, town, and region examine its unique trends and needs to understand how parcelization is happening, in order to identify the best solutions for addressing it.

**Across the state, the per-acre value of land in Vermont nearly doubled during the study period, though increases varied greatly depending on location.**

During the study period, the value of land statewide went from \$990/acre in 2004 to \$1,827/acre in 2016 – an increase of 185%. Increase in values at the county level varied widely, however, with Windsor County seeing a 141% increase (from \$1,486 to \$2,092), and Caledonia County seeing a 269% increase (from \$524 to \$1,408). Relatively rapid increases in land values could result from a number of factors, but may suggest areas where demand for land is increasing. Especially in areas that have not traditionally faced such pressures, these trends should be monitored.

**The value of woodland also nearly doubled, though on average woodland remains less expensive per acre than land in general.**

Land values for woodland and land in general have increased at about the same rate statewide: 183% and 185%, respectively. The per acre cost for woodland (with a statewide average of \$1,064/acre as of 2016) remains substantially less than the per acre cost for land in general (statewide average of \$1,827 in 2016), which may slightly increase the chance of woodland being purchased for management purposes rather than development. At the same time, this lower cost relative to other types of land also could make woodland more affordable to buy for development.

**Though woodland is less expensive than land in general, the per-acre market value still far exceeds the use value, decreasing the chances of woodland being purchased for management rather than development.**

In 2016, the average-statewide per-acre value of woodland was \$1,064. However, the use value – in this case, the value of the land for forestry, rather than it's "fair market" (usually development) value – was drastically less: \$135/acre. So, while it is true that woodland is cheaper than land in general, the wide discrepancy between use and development value for woodland makes investing in woodland for management a very challenging financial proposition.

The challenge is particularly apparent considering the increase in the statewide per-acre value of woodland relative to the use value over the study period. The statewide per-acre value of woodland increased from \$581 in 2004 to \$1,064 in 2016 – an increase of about 83%. Use value, by contrast, stayed relatively stable (\$114/acre in 2004 versus \$135/acre in 2016 – an increase of only 18.4%). This demonstrates that it is becoming even more difficult to own woodland for forestry without preferential tax stabilization program like the Use Value Appraisal Program.

**As statewide land values increase, so do the number of parcels under 50 acres.**

As overall state land values increased, so too did the number of parcels under 50 acres. The total value of land in the state increased from just over \$13 billion in 2004 to over \$25 billion in 2016 – an increase of nearly 94%<sup>7</sup>. At the same time, the number of parcels under 50 acres increased from 292,887 to 301,632, an increase of approximately 8,700 parcels. While the positive correlation between the increase in state land values and the number of parcels under 50 acres does not mean that high land values cause people to subdivide, it points to how the economic considerations around land ownership may affect large parcels – particularly woodland parcels.

**Most dwellings are built on smaller parcels compared to larger parcels.**

In 2016, 79.0% of the parcels with dwellings were smaller than 10 acres, and only 5.2% of the parcels with dwellings were larger than 50 acres. As smaller parcels are created with dwellings, whether full time or seasonal homes, it is important to understand where the dwellings are being located, and whether growth is happening in smart growth locations, versus rural areas in a manner that is fragmenting the land.

**The majority of land enrolled in UVA (Current Use) is enrolled by Vermont residents.**

Of the land enrolled in UVA as of 2016, 59.3% of the land is owned by Vermont residents, 21.1% is owned by non-VT residents, and 19.6% is in the "corporate" ownership category. While the percentage of Vermont-owned UVA land decreased a small amount over the study period – by two percentage points – the program remains mostly utilized by Vermont residents.

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<sup>7</sup> Note: Dollar values are given in current dollars (i.e., the actual dollars in the study year, not adjusted to inflation or equalized to a single year).

**Vermont residents and non-residents enroll forestland into the UVA program at approximately the same rate, and most of the new forestland enrolled in UVA during the study period appears to have been enrolled by Vermont residents.**

About 78.9% of the land enrolled by VT residents into the UVA Program between 2004 and 2016 was forestland acreage, comparable to the amount of forestland enrolled by non-residents – 78.5%. About 50% of corporate enrolled land is forestland. However, Vermont residents are responsible for the majority of the new forestland in the program during the study period: They enrolled 233,244 acres in UVA during this period, non-residents enrolled about 118,800 new forestland acres, and corporate owners enrolled approximately 55,282 acres.

**UVA is playing a role in protecting large woodland parcels.**

The study found that woodland parcels enrolled in UVA in 2004 were more likely to remain as “woodland” (which means that they were not developed) in 2016. Of the woodland in parcels over 50 acres, about 84% remained as woodland after the study period if it was enrolled in the UVA Program. By contrast, only about 73% of the 50+ acre woodland not enrolled remained woodland after the study period.

**Enrollment in UVA is increasing most in the 25-50 acre category, while enrollment of 100+ acre parcels is decreasing.**

The number of parcels between 25-50 acres in size enrolled in the UVA program increased by 3.1 percentage points from 2004 to 2016 (from being 23.3% of parcels enrolled in the program to 26.4% of the parcels enrolled in the program). In addition, the majority of parcels between 25-50 acres enrolled in the program are on the smaller end of the spectrum: Parcels that are 27-30 acres in size make up 14.8% of all parcels enrolled in UVA, highlighting that landowners with a house may be enrolling in the minimum acreage required for enrollment in the forestland category (25 acres plus 2 acres for the homestead).

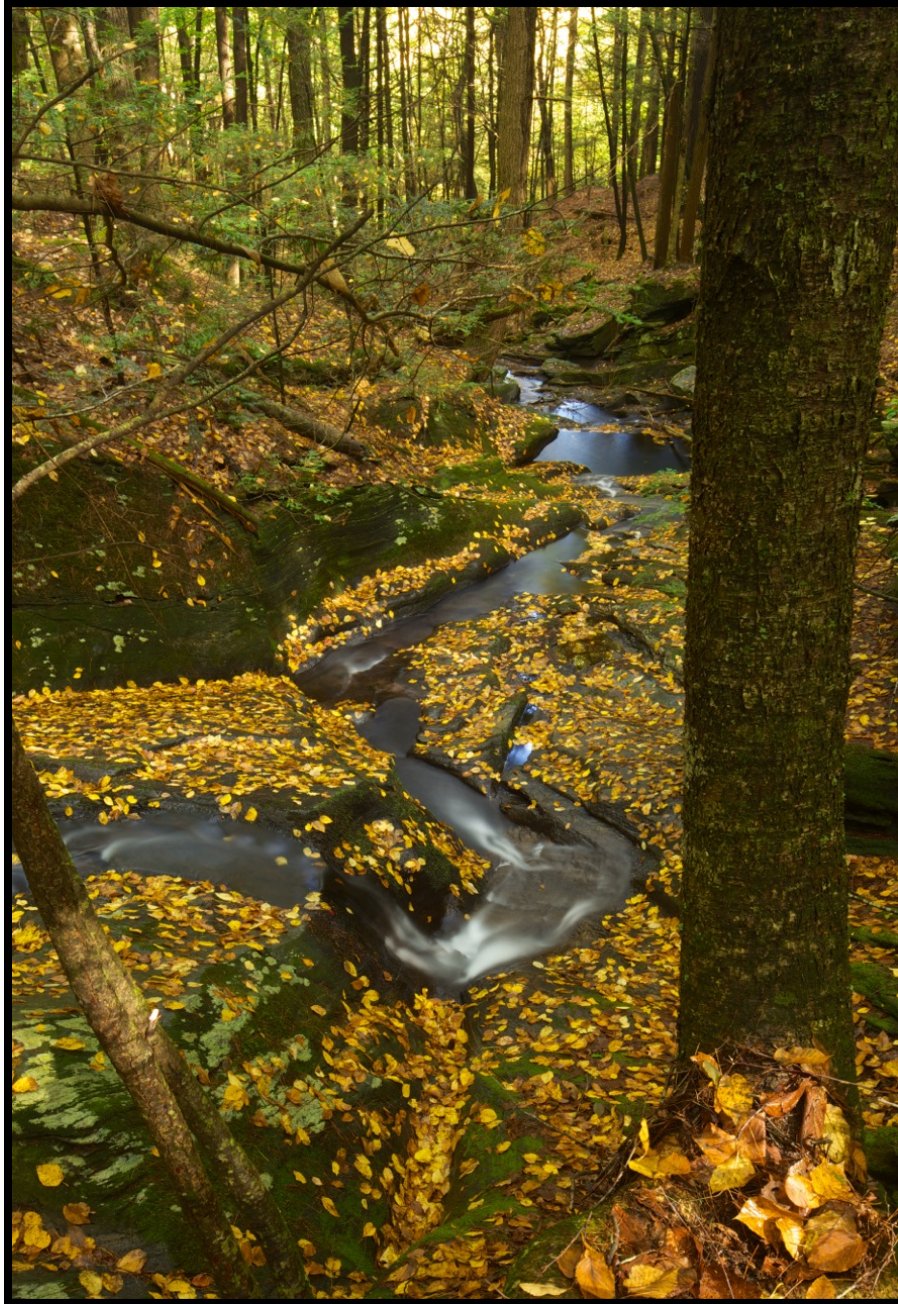
At the same time, the share of UVA parcels in the 100-200 acre category decreased by 2.1 percentage points (from 24.8% to 22.7%), and the share in the 200+ acre category decreased by 2.7 percentage points (from 14.57% to 14.87%). This increase in the number of smaller parcels enrolled means more administrative oversight is needed as more landowners enroll in the program with smaller parcels. In addition, since smaller parcels tend to have a higher per-acre land value, this too has implications for the administration and cost of the program.

**The majority of residential parcels are owned by in-state owners and corporate ownership is increasing at the greatest rate.**

The number of residential parcels owned by in-state owners increased by roughly 6% over the study period. The number of residential parcels owned by out-of-state owners decreased slightly during the study period, but out-of-state owners own a slightly higher percentage of the total residential acreage than they did at the start of study period (21.1% in 2004 to 21.9% in 2016). Interestingly, corporate ownership of residences increased by close to 79% over the study period, suggesting that more landowners may be setting up corporate structures for their



land such as trusts or limited liability corporations. By the end of the study period in 2016, residential parcels owned by in-state owners represented 75% of overall acreage, while out-of-state owners represented 22% of the acreage, and corporate owners represented 3% of the residential acreage.



A. Blake Gardner

## **Recommendations to Address Parcelization & Fragmentation**

Based on the findings above, as well as on the research process to understand parcelization trends, the following recommendations are provided to address parcelization and fragmentation:

### Recommendations for state policy and investments

#### **The discrepancy between use and market values means that it is essential to invest in diversified strategies to reduce pressures on landowners to subdivide land.**

Consistent increases in land values over time, along with the wide discrepancy between use and development value, mean that there is very real economic pressure on landowners to subdivide their land. This pressure increases as landowners grow older and may find themselves needing to liquidate for retirement, health, or other financial reasons. Since these trends do not show signs of reversing, diversified investment in the maintenance of forestland is needed. This investment could take several forms including supporting new enrollment in the Current Use Program, boosting investment in land conservation and public land acquisition programs, and offsetting landowner costs for conservation easements. This investment should also include increasing incentives to landowners to conserve land, for example by providing a conserved land deduction or conservation tax credit to encourage the donation of conservation easements. Efforts to boost land conservation should occur at different ownership levels such as individual landowners, through the creation of community forests, cooperative ownerships, or other structures that benefit landowners of different economic means.

#### **Increase support to woodland landowners for succession planning in order to minimize the conversion of woodland to residential uses.**

Since 15% of Vermont's forestland is owned by people over the age of 75 (Butler et al 2015), a large amount of forestland will change hands, and could potentially be developed, in the near term. In order to discourage the conversion of woodland, efforts should be made to boost succession planning to woodland owners to promote the long-term ownership of intact forests. Since conversations about land are personal and complex, funding for succession planning programs must be increased so that the work can be sustained over time and available to landowners when they are ready. Recommendations to boost technical assistance efforts are included in a 2016 Intergenerational Transfer of Forestland Working Group Report to the Vermont Legislature (available at <https://legislature.vermont.gov/assets/Legislative-Reports/Intergenerational-Transfer-of-Forestland-2017-Final.pdf>)

#### **The Current Use Program must continue to be funded, and also given additional support in order to keep pace with new forestland enrollment that results from subdivision.**

The findings of this report demonstrate that UVA is playing a role in keeping woodland parcels intact, but that woodland is still being lost. The Legislature should continue to support and fund the Current Use Program to continue its success, and also consider ways to strengthen enrollment in the program, such as adding an incentive within the program to promote permanent conservation. In addition, recognizing that the increasing enrollment of smaller

parcels increases the administrative burden on the program, including county forester and tax department responsibilities, funding for administering the program should also be increased.

**Provide adequate funding for the Vermont Housing and Conservation Board (VHCB) and the Working Lands Enterprise Initiative.**

The Vermont Legislature should ensure that VHCB is fully funded with adequate annual revenue according to the statutory formula to achieve land conservation goals, including forest conservation projects with willing landowners. Other initiatives, such as the successful six-year old Working Lands Enterprise Fund, should continue to receive support in order to maintain rural working forests through targeted economic support for forest products businesses.

**Support the aggregation of land.**

This report highlights that some landowners may be aggregating multiple parcels of land into one legal entity. In addition, Vermont statute requires listers to consolidate adjoining parcels that are owned by one landowner for purposes of the Grand List. Outreach efforts and public policy should encourage landowners to aggregate land for conservation purposes, and in the case where landowners own multiple adjoining parcels, public policy should encourage landowners to continue to promote parcel management under a cohesive stewardship or conservation plan, versus leaving the individual parcels open to pressure for development. In addition, outreach efforts and public policy should encourage multiple adjoining owners to coordinate management and conservation opportunities to keep land intact.

**The Legislature should strengthen Act 250 to play a more meaningful role in reviewing the impacts of development on forestland.**

Previous VNRC studies on subdivision trends found that the majority of subdivisions do not trigger Act 250 review. Taken alongside this project's finding that woodland is being lost at a greater rate than any other land type, we conclude that Act 250 should be strengthened to address the continuing parcelization and fragmentation of forestland through land subdivision. This could include strengthening the criteria to minimize the fragmentation of priority forest blocks, with an opportunity for mitigation if this is not possible. Updates could also include lowering the threshold for Act 250 review in priority forest blocks, and reviewing secondary impacts of utility lines that penetrate into priority intact forest blocks.

**Recommendations for local actions**

The noticeable decrease in both woodland and large parcels, along with the increase in new lots in the 2-5 and 5-10 acre categories – parcel sizes that are desirable for development – suggests that there is an opportunity for local zoning, subdivision regulation, and town plan policies to minimize the ongoing parcelization and fragmentation of intact undeveloped forestland. In addition, previous subdivision research found that the majority of subdivision occurred in rural “default” districts – largely characterized by a mix of agricultural, forest, and low to moderate density residential uses, and typically between one and six acres in size (Zavez et al 2014, p. 21). This report's finding about the creation of lots in the 2-5 and 5-10 acre ranges

suggests that the same pattern may be continuing. As a result, we offer the following recommendations for local action.

**Municipalities that have zoning and subdivision regulations should review and strengthen natural resources protections, with a particular focus on their rural residential type districts.**

With subdivision creating lot sizes that are desirable for development (2-5 and 5-10 acres), municipalities should review the standards that exist within any zoning districts with similar lot sizes. Despite the “rural residential” designation, wildlife habitat blocks and other important natural resources are often located within these districts. Regulations should include standards that minimize forest and habitat fragmentation.

Other steps that municipalities can take to discourage parcelization include greater use of forest and other natural resource districts (which tend to have larger lots); adoption of conservation subdivision design, which designs development around the site’s natural resources; and zoning provisions that foster the creation of small building lots and low overall development densities in designated zoning districts.

**Municipalities that do not have subdivision regulations should adopt them in order to minimize the fragmenting impacts of subdivision on forestland.**

While zoning shapes where certain uses take place, and the size lots on which those uses will occur, subdivision regulations can affect pattern of development for the community. Site design – which affects the location of driveways, buildings and other infrastructure – is an element of subdivision regulations that can support continued access to working forests, protection of wildlife habitat, and reduced fragmentation. Communities without subdivision regulations should consider adopting them (with or without zoning).

Data and process recommendations

Using the state’s Grand List data to analyze subdivision trends provided a level of granularity that is important to parcelization research. Researchers also found some limitations to the data. The following address some of the limitations with the dataset discovered during this research.

It should be noted that the Tax Department is moving forward with an RFP to replace the Grand List software program, which has been in existence since 1995. Since the data are collected for the purposes of property tax implementation, as well as for the annual Equalization Study to set the tax rates for the following year, there are limitations to its use in the land use context, as discussed in the uses and limitations section earlier in this report. However, since these data have utility for the state well beyond simply property taxation, the Department is confident that the forthcoming, modern system will provide cleaner data, better opportunity for data testing and verification, and better reporting capabilities for use in longitudinal studies and policy-making.

**Support local listers in order to ensure data quality and consistency across municipalities.**

With 250+ communities submitting information, mostly collected by volunteer listers, addressing inconsistencies in data collection is a challenge (and one of which the Tax Department is well aware). For example, parcel categorization (i.e., “woodland,” “farm”) is sometimes inconsistent and can vary depending on the municipality and the lister. More consistent identification of land use categories such as woodland, residential, and farm would allow for easier tracking of parcel types. Funding should be made available for additional training for volunteer listers.

In addition, it is recommended that the Tax Department, either through tools available in its software system or via other means, perform minimal data testing to ensure data quality before approving town data (e.g. ensure no negative or null values for required fields). Finally, it is recommended that a technology standard be developed for listers to handle shapefiles and PDFs that would allow for better examination and sharing of spatial data and maps.

**Standardize approaches to parcel numbering and improve the connection of the Grand List to land use parcelization trends and GIS parcel data.**

The Grand List could be improved to collect information that informs land use trends, such as identifying contiguous parcels, how subdivided parcels relate to one another (i.e., parent and child parcels), when land is transferred to public ownership, and other factors. Developing a uniform parcel ID system that addresses these issues and ensures consistency across towns is recommended as part of any revisions to the state’s Grand Lists software. Some of this is underway, but researchers feel it is important to document this need in the report.

In addition, using the FIPS code to identify the town and county would enable better compatibility with the forthcoming GIS parcel maps. Lastly, the research revealed that sometimes when a parcel is in two municipalities, the parcel’s entire acreage is listed in a single municipality, leading to duplication of acreage. Changes to fields in any future system, along with training, could help deal with this issue.

**General recommendations****The State or other appropriate organization should keep a publically-accessible database of all public lands as well as conserved lands.**

Developing a comprehensive database of public and conserved land is recommended. The database should include a way to track any shift of lands from private to public ownership, or vice versa, so that these trends can be understood alongside parcelization data. A database of this kind could also be developed so that approved organizations could submit and maintain their own records.

**Promote use of parcelization data for planning, outreach and technical assistance, and investment.**

These data can be used in order to focus and prioritize resources (such as county forester outreach, land use planning efforts, and conservation dollars) to priority areas where there is a

threat to the loss of large parcels – and particularly to areas experiencing a higher rate of woodland loss.

### Recommendations for future research

This project undertook a comprehensive and replicable analysis of parcelization trends in Vermont, and generated extensive data about how parcel sizes and ownership trends are changing across the state. Taking the research to the next level would involve developing a better understanding of the causes of parcelization, as well as the specific factors driving it.

#### **Conduct additional research to understand how and if dwellings affect functions and integrity of forest blocks.**

While some research exists on how dwellings and associated infrastructure impact forested areas, additional research into these impacts is needed. Knowing the type and extent of impact would help ensure that the functions of forest blocks are maintained over time, rather than lost incrementally – something that this research suggests could be a risk given the steady decrease in the numbers of large parcels and woodland throughout the state.

#### **Utilize digital parcel maps, future LIDAR and other remote sensing data, and available modeling to understand any relationships between subdivision of land and subsequent development.**

This project could not analyze the degree to which parcelization of land – which happens when land is divided into smaller parcels – leads to fragmentation, which can happen when subdivided parcels are developed. In the future, spatial information such as digital parcel maps and LIDAR flight data (or other remote sensing products that may have more regular return intervals) should be integrated to determine the extent to which parcelization is a precursor to forest fragmentation. In addition, it would be beneficial to understand the full range of factors in Vermont that may have a significant correlation to parcelization. For example, modeling research is currently exploring how population density, distance to a road, topography, and property conservation status predict where forest loss will occur. Parcelization data could help inform the degree to which these factors are contributors to subdivision and forest loss.

#### **Maintain and enhance the parcelization website.**

The website created during this project provides a solid, basic tool for understanding parcelization trends over time. In the process of developing the website, researchers identified additional functionalities that would make the website even more useful, and these should be explored in future research. In addition, researchers have developed scripts to update the parcelization database and companion website on an annual basis to better inform planning, land management, and conservation in the state, but a funding source is needed to update the database on annual basis.

## **Key Contributors and Phase III Steering Committee**

As part of the Phase III Project, VNRC partnered with a team of researchers and resource professionals to provide feedback on the data collection and development of a companion website to review and access the data.

Brian Voigt, Ph.D, a researcher with the Gund Institute at the University of Vermont, compiled the Grand List data and developed metrics and scripts for reviewing the data and updating it on an annual basis.

Steve Sharp, GIS Operations Manager at Vermont Center for Geographic Information, created the website to review and access the Phase III data. See p. 12 for more information on the website.

A steering committee made up of the following state agency and land use and resource professionals met periodically to provide input on the development of the Grand List data, quality control and quality assurance, metrics to review the data, and the design of the parcelization website.

- John Adams, Director (Vermont Center for Geographic Information)
- John Austin, Lands and Habitat Program Director (Vermont Fish and Wildlife Department)
- Pam Brangan, GIS Data & IT Manager (Chittenden County Regional Planning Commission)
- Deb Brighton, Research Associate (Vermont Family Forests)
- Jim Duncan, Director (Forest Ecosystem Monitoring Cooperative)
- Erik Engstrom, GIS Project Supervisor (Vermont Agency of Natural Resources)
- Doug Farnham, Policy Director and Economist (Vermont Department of Taxes)
- Danielle Fitzko, Urban & Community Forestry Program Manager (Vermont Department of Forests, Parks, and Recreation)
- Jens Hilke, Community Wildlife Program (Vermont Fish and Wildlife Department)
- Elizabeth Hunt, Current Use Program Chief (Vermont Department of Taxes)
- Jon Osborne, GIS Director (Vermont Land Trust)
- Jennifer Pontius, Research Assistant Professor (UVM Rubenstein School of Environment and Natural Resources)
- Jill Remick, Director (Property Valuation and Review Division, Vermont Department of Taxes)
- Kim Royar, Wildlife Biologist (Vermont Fish and Wildlife Department)
- Steve Sinclair, Director of Forests (Vermont Department of Forests, Parks, and Recreation)
- Keith Thompson, Private Lands Program Manager (Vermont Department of Forests, Parks, and Recreation)

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## Glossary of Terms

### *Geographies*

- Town – Vermont municipalities
- County – Vermont county
- RPC – Regional Planning Commission; also “region” for shorthand. During the study period, four Vermont towns (Hartford, Hartland, Norwich, and Thetford) went from being in a bi-state regional planning commission (named Upper Valley Lake Sunapee Regional Planning Commission, which spanned Vermont and New Hampshire) to being part of the Two Rivers-Ottawquechee Regional Commission, which is a Vermont-only RPC. For the purposes of this study, the towns that changed are identified/coded as being part of their current RPC (TRORC) for all years of the data, in order to show a regional trend over time.
- State – State of Vermont

### *Metric terms*

- Parcel – The Vermont Tax Department defines parcel as “All contiguous land in the same ownership within a single town, together with all improvements thereon.” (32. V.S.A. 4152(a)(3)).
- Parcel size – Parcel size is measured in acres.
- UVA – Use Value Appraisal; also known as “Current Use.” This is a state tax stabilization program that enables eligible private lands where owners practice long-term forestry or agriculture to be appraised based on the property’s value of production of wood or food rather than its residential or commercial development value.
- Type – Land type definitions are adapted from the *Listers and Assessors Handbook: A Guide for Vermont Listers and Assessors*, Division of Property Valuation and Review, Vermont Department of Taxes, 6/2018; Pub. GB-1143;  
<http://tax.vermont.gov/sites/tax/files/documents/ListerAssessorHandbook.pdf>
  - Residential – Several Grand List categories were compiled to create the “residential” category for the study. The Grand List categories included are R1, R2, MHU, MHL, S1, and S2. This means that this category includes houses with four apartments and fewer, and non-operating farms with a highest and best use as year round residences (R1, R2). It also includes mobile homes, whether or not the owner of the mobile home owns the land on which the mobile home is placed (MHU, MHL). In addition, it includes seasonal properties such as summer homes without heating/insulation, ski chalets, hunting camps, camps and cottages on lakes and ponds, etc. (S1, S2).

- Farm – Operating farms with buildings involved. This does not include properties that were formerly farmed and now have a highest and best use as a residential or seasonal property. This does not include vacant land, even if it is used in the farming operation – it only includes operating farms with buildings. Per the tax department, a non-contiguous 15-acre parcel the farmer owns down the road, and upon which corn or hay is grown, is not a farm. It is vacant land and is to be coded as Miscellaneous.
- Woodland - This category refers to undeveloped land that is mostly wooded. Such parcels may have buildings of little value, such as the 100-acre parcel of forestland with a small deer camp.
- Other – In this data study’s set, the “other” category combines several of the tax department’s categories: Utility Electric, Utility Other, Other, Miscellaneous / Open Land. This means that the “other” category presented in this report is different from – and more expansive than – the “other” category used by listers. The categories included in this study’s “other” category are further defined below.
  - Utility electric - Property owned by a public utility and used in the production, transmission or distribution of electrical energy. This includes hydro plants, solar arrays, wind towers, substations, poles, lines and fixtures, etc. Property owned by a public utility that has a highest and best use other than for the production, transmission or distribution of electrical energy would be coded otherwise. For instance, an office building would be coded Commercial. Vacant land would be coded Miscellaneous.
  - Utility other - This includes real property owned by public utilities other than electric companies for which the highest and best use is in carrying on the business of that utility. This might include real property owned by a water companies, cell towers, and natural gas distribution pipelines.
  - Other – Used on a municipality by municipality basis for special circumstances, such as all of a municipality’s condominium properties, if there is a distinguishable market for such properties. Exempt properties are not included in this category.
  - Miscellaneous/open land - Includes undeveloped land that is not mostly forest covered. Includes shore lots, residential building lots, unimproved commercial lots, unimproved agricultural land, etc. Such parcels may have buildings of little or no value.
- Ownership
  - Corporate – May include residents or non-residents. This category includes corporations, partnerships and other entities (including governmental entities

and some family trusts). Includes all properties owned by these business entities—regardless of the category of property. This ownership coding applies to all types of property, not just to commercial, industrial and utility. For example, corporate structures are sometimes used by families as legal structures to protect and pass on assets. The Tax Department further notes that “The property does not have to be a large commercial or industrial property to warrant this type of ownership code. Many seasonal and residential properties are owned by business entities.” In sum, the “corporate” category represents a broad range of owner types.

- Non-resident – People who live outside the state of Vermont.
  - Vermont resident – People who live in Vermont.
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- Land value – Land value per acre in actual dollars in the study year. In each year the listed values are adjusted by that year’s common level of appraisal (CLA)<sup>8</sup> to estimate fair market value.

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<sup>8</sup> For more information about the CLA, visit the Vermont Department of Taxes website:  
<http://tax.vermont.gov/property-owners/understanding-property-taxes/education-tax-rates/faqs>

## Appendix

### Changes in Acreage

Parcel Size Category	Total Acreage Change: 2004 to 2016 (ac.)	Percent Change: 2004 to 2016	Percent Change: 2004 to 2009	Percent Change: 2009 to 2016	Average Acreage Lost/Gained Per Year (ac./yr.)	Percent of Total Acreage in 2004	Percent of Total Acreage in 2016
Greater than 50 acres	-110,291.18	-3.18 %	-2.60 %	-0.60 %	-8483.94	71.76 %	70.42 %
200+ acres	-56,621.97	-3.27 %	-2.70 %	-0.59 %	-4355.54	35.86 %	35.15 %
100 to 200 acres	-38,536.01	-3.93 %	-3.09 %	-0.86 %	-2964.31	20.33 %	19.80 %
50 to 100 acres	-15,133.20	-2.01 %	-1.72 %	-0.30 %	-1164.09	15.58 %	15.47 %
less than 50 acres	+45,708.27	+3.35 %	+1.71 %	+1.62 %	+3516.02	28.24 %	29.58 %
25 to 50 acres	+8,357.48	+1.75 %	+0.42 %	+1.32 %	+642.88	9.91 %	10.22 %
10 to 25 acres	+3,425.37	+0.61 %	+0.29 %	+0.33 %	+263.49	11.59 %	11.82 %
5 to 10 acres	+19,503.62	+15.84 %	+8.90 %	+6.38 %	+1500.28	2.55 %	2.99 %
2 to 5 acres	+12,266.81	+11.15 %	+6.29 %	+4.57 %	+943.60	2.28 %	2.57 %
0 to 2 acres	+2,154.99	+2.34 %	+1.90 %	+0.43 %	+165.77	1.91 %	1.98 %

Appendix Table 1

### Changes in Number of Parcels

Parcel Size Category	Total Parcel Unit Change: 2004 to 2016	Percent Change: 2004 to 2016	Percent Change: 2004 to 2009	Percent Change: 2009 to 2016
Greater Than 50 acres	-703	-3.22 %	-2.53 %	-0.70 %
200+ acres	-197	-4.94 %	-3.21 %	-1.79 %
100 to 200 acres	-297	-4.15 %	-3.22 %	-0.97 %
50 to 100 acres	-209	-1.95 %	-1.82 %	-0.13 %
Less than 50 acres	+8,746	+2.99 %	+1.76 %	+1.20 %
25 to 50 acres	+209	+1.52 %	+0.26 %	+1.26 %
10 to 25 acres	-108	-.27 %	-0.17 %	-0.09 %
5 to 10 acres	+2,789	+15.24 %	+8.58 %	+6.13 %
2 to 5 acres	+3,789	+10.25 %	+5.82 %	+4.19 %
0 to 2 acres	+2,067	+1.13 %	+0.80 %	+0.32 %

Appendix Table 2

Parcels 50 acres or larger - county level

County	Total Parcel Change: 2004 to 2016	Percent Change: 2004 to 2016	Percent Change: 2004 to 2009	Percent Change: 2009 to 2016	Average Number of Parcels Lost/ Gained per year (p./yr.)	Rank of County by Percent Loss: 2004 to 2016
Addison	-162	-9.79 %	-7.07 %	-2.93 %	-12.46	1
Bennington	-16	-1.36 %	-1.02 %	-0.34 %	-1.2	12
Caledonia	-39	-2.16 %	-7.53 %	5.81 %	-3.00	9
Chittenden	-29	-2.46 %	-0.08 %	-2.38 %	-2.23	8
Essex	-43	-4.68 %	-3.49 %	-1.24 %	-3.31	4
Franklin	-23	-1.35 %	-1.53 %	0.18 %	-1.77	13
Grand Isle	-15	-7.18 %	-4.31 %	-3.00 %	-1.15	2
Lamoille	-34	-3.49 %	-1.95 %	-1.57 %	-2.62	6
Orange	-50	-2.02 %	-2.11 %	0.08 %	-3.85	11
Orleans	-79	-3.81 %	-1.59 %	-2.25 %	-6.08	5
Rutland	-20	-1.00 %	-1.00 %	0.00 %	-1.54	14
Washington	-50	-2.92 %	-1.99 %	-0.95 %	-3.85	7
Windham	-105	-5.20 %	-3.12 %	-2.15 %	-8.08	3
Windsor	-52	-2.03 %	-0.55 %	-1.50 %	-4.00	10

Appendix Table 3

#### Acreage in large parcel-county level

County	Total Acreage Change: 2004 to 2016 (ac.)	Percent Change: 2004 to 2016	Percent Change: 2004 to 2009	Percent Change: 2009 to 2016	Average Acreage Lost/Gained Per Year (ac./yr.)	Rank of County by Percent Loss: 2004 to 2016
Addison	-23,360.9	-8.49 %	-7.64 %	-0.92 %	-1,796.9	1
Bennington	-2,610.28	-1.39 %	1.50 %	-2.85 %	-200.7	9
Caledonia	-7,663.57	-3.05 %	-2.62 %	-0.44 %	-589.50	3
Chittenden	-1,041.57	-0.66 %	0.95 %	-1.59 %	-80.12	12
Essex	-1,730.94	-0.58 %	0.09 %	-0.67 %	-133.15	13
Franklin	-4,500.97	-1.55 %	-1.56 %	0.01 %	-346.23	8
Grand Isle	-1,506.97	-6.05 %	-2.78 %	-3.36 %	-115.92	2
Lamoille	-2,760.66	-1.61 %	-1.61 %	0.00 %	-212.36	7
Orange	-4,284.87	-1.34 %	-1.13 %	-0.21 %	-329.61	10
Orleans	-7,228.69	-2.28 %	-1.69 %	-0.60 %	-556.05	6
Rutland	-4,281.35	-1.29 %	-0.80 %	-0.49 %	-329.33	11
Washington	-6,667.28	-2.72 %	-0.97 %	-1.77 %	-512.87	5
Windham	-8,757.72	-3.00 %	-2.59 %	-0.42 %	-673.67	4
Windsor	+8,848.8	2.64 %	3.88 %	-1.19 %	+680.68	14

*Appendix Table 4*

#### Parcel Type-Statewide Acreage

Parcel Category	Total Acreage Change: 2004 to 2016 (ac.)	Percent Change: 2004 to 2016	Percent Change: 2004 to 2009	Percent Change: 2009 to 2016	Average Acreage Lost/Gained Per Year: 2004 to 2016 (ac./yr.)
Residential	+162,669.65	+6.99 %	+4.17 %	2.71 %	+12,513.05
Farm	-53,405.41	-9.29 %	-6.68 %	-2.80 %	-4,108.11
Woodland	-147,684.18	-14.86 %	-8.42 %	-7.03 %	-11,360.32
Other	-26,162.23	-2.81 %	-4.46 %	+1.73 %	-2,012.48

*Appendix Table 5*

### Parcel Type-Large Parcels

Parcel Category	Total Acreage Change: 2004 to 2016 (ac.)	Percent Change: 2004 to 2016	Percent Change: 2004 to 2009	Percent Change: 2009 to 2016	Average Acreage Lost/Gained Per Year (ac./yr.)
Residential	+63,969.47	+4.61 %	+2.63 %	+1.94 %	+4,920.73
Farm	-53,096.93	-9.41 %	-6.75 %	-2.85 %	-4,084.38
Woodland	-124,844.88	-14.03 %	-7.53 %	-7.03 %	-9,603.45
Other	+3,681.16	+0.59 %	-3.42 %	+4.15 %	+283.17

Appendix Table 6

### Parcel Type-Large Parcel Composition

Parcel Type	Percentage Parcel Acreage: 2004	Percentage Parcel Acreage: 2009	Percentage Parcel Acreage: 2016	Percentage Point Difference 2004 to 2016
Residential	40.00 %	42.17 %	43.29 %	+3.29%
Farm	16.28 %	15.59 %	15.24 %	-1.04 %
Woodland	25.72 %	24.39 %	22.83 %	-2.88 %
Other	18.00 %	17.85 %	18.64 %	+0.64 %

Appendix Table 7

### Woodland Parcels

County	Total Woodland Acreage Change: 2004 to 2016 (ac.)	Percent Change: 2004 to 2016	Percent Change: 2004 to 2009	Percent Change: 2009 to 2016	Average Woodland Acres Lost/Gained Per Year (ac./yr.)
Addison	-7,213.42	-19.83 %	-13.05 %	-7.80 %	-554.89
Bennington	-5,053.32	-7.86 %	-7.12 %	-0.80 %	-388.72
Caledonia	-10,107.20	-18.20 %	-30.16 %	+17.12 %	-777.48
Chittenden	+837.23	+3.69 %	-3.74 %	+7.72 %	+64.40
Essex	-35,131.36	-14.80 %	-2.21 %	-12.88 %	-2,702.41
Franklin	-302.69	-0.75 %	-4.97 %	+4.45 %	-23.28
Grand Isle	0	0 %	0 %	0 %	0
Lamoille	-13,189.26	-17.16 %	-3.65 %	-14.02 %	-1,014.56
Orange	-13,581.07	-17.43 %	-13.02 %	-5.07 %	-1,044.70
Orleans	-28,109.99	-33.99 %	-19.34 %	-18.16 %	-2,162.31
Rutland	-15,842.35	-19.61 %	-18.61 %	-1.22 %	-1,218.64
Washington	+462.31	+0.80 %	-2.42 %	+3.30 %	+35.56
Windham	-20,459.34	-21.63 %	-9.19 %	-13.70 %	-1,573.80
Windsor	-6,452.88	-7.81 %	-0.52 %	-7.32 %	-496.38

Appendix Table 8

### Land Values-Statewide

	Total Value Change Per Acre	Percent Change in Land Value Per Acre	Average Value Lost/Gained Per Year (\$/yr.)
Statewide Land Data: 2004 to 2016	+ \$837	+84.62 %	+ \$64.41
Statewide Land Data: 2004 to 2009	+ \$911	+92.09 %	+ \$70.10
Statewide Land Data: 2009 to 2016	- \$74	-3.89 %	- \$5.69

Appendix Table 9



### Land Values Woodland-Statewide

	Total Value Change Per Acre	Percent Value Change	Average Value Lost/Gained Per Year (\$/yr)
Woodland Value: 2004 to 2016	+ \$483	+83.07 %	+ \$37.13
Woodland Value: 2004 to 2009	+ \$519	+89.26 %	+ \$39.89
Woodland Value: 2009 to 2016	- \$36	-3.27 %	- \$2.77

Appendix Table 10

### Land Values-County

County	Land Value Change Per Acre: 2004 to 2016	Percent Land Value Change: 2004 to 2016	Percent Land Value Change: 2004 to 2009	Percent Land Value Change: 2009 to 2016	Average Value Gained Per Acre Per Year: 2004 to 2016 (\$/yr)	Rank of County by Percent Value Gained Per Acre: 2004 to 2016
Addison	+ \$1,092	+122 %	+114 %	+4 %	+ \$83.9	6
Bennington	+ \$1,253	+126 %	+93 %	+17 %	+ \$96.39	5
Caledonia	+ \$884	+169 %	+173 %	-2 %	+ \$68.00	1
Chittenden	+ \$940	+45 %	+38 %	+5 %	+ \$72.32	13
Essex	+ \$530	+138 %	+129 %	+4 %	+ \$40.81	3
Franklin	+ \$869	+132 %	+119 %	+6 %	+ \$66.82	4
Grand Isle	+ \$1,805	+91 %	+121 %	-14 %	+ \$138.86	9
Lamoille	+ \$1,693	+157 %	+191 %	-12 %	+ \$130.19	2
Orange	+ \$582	+58 %	+61 %	-2 %	+ \$44.74	11
Orleans	+ \$726	+121 %	+125 %	-2 %	+ \$55.81	7
Rutland	+ \$423	+50 %	+105 %	-27 %	+ \$32.55	12
Washington	+ \$1,148	+100 %	+92 %	+4 %	+ \$88.29	8
Windham	+ \$766	+86 %	+88 %	-1 %	+ \$58.92	10
Windsor	+ \$606	+41 %	+65 %	-15 %	+ \$46.63	14

Appendix Table 11

### Land values woodland-county

County	Woodland Value Change: 2004 to 2016	Percent Woodland Value Change: 2004 to 2016	Percent Woodland Value Change: 2004 to 2009	Percent Woodland Value Change: 2009 to 2016	Average Value Gained Per Acre per Year: 2004 to 2016 (\$/yr.)	Rank of County by Percent Value Gained Per Acre: 2004 to 2016
Addison	+ \$549	+90 %	+93 %	-1 %	+ \$42	6
Bennington	+ \$493	+72 %	+103 %	-15 %	+ \$38	8
Caledonia	+ \$654	+163 %	+124 %	+18 %	+ \$50	1
Chittenden	+ \$404	+51 %	+58 %	-4 %	+ \$31	11
Essex	+ \$403	+127 %	+108 %	+9 %	+ \$31	3
Franklin	+ \$632	+115 %	+81 %	+19 %	+ \$49	4
Grand Isle	\$0	0 %	0 %	0 %	\$0	14
Lamoille	+ \$497	+69 %	+98 %	-14 %	+ \$38	9
Orange	+ \$307	+37 %	+41 %	-3 %	+ \$24	12
Orleans	+ \$518	+150 %	+172 %	-8 %	+ \$40	2
Rutland	+ \$177	+35 %	+78 %	-24 %	+ \$14	13
Washington	+ \$622	+81 %	+98 %	-9 %	+ \$48	7
Windham	+ \$604	+99 %	+80 %	+10 %	+ \$46	5
Windsor	+ \$374	+55 %	+73 %	-10 %	+ \$29	10

Appendix Table 12

### Parcels with Dwellings

Parcel Size Category	Total Parcel Change: 2004 to 2016 (parcels)	Percent Change: 2004 to 2016	Percent Change: 2004 to 2009	Percent Change: 2009 to 2016	Average number of parcels gained/lost per year: 2004 to 2016 (p./yr.)
Greater than 50 acres	+881	+6.70%	+5.85%	+0.80%	+67.77
200+	+65	+2.76%	+5.10%	-2.22%	+5
100 to 200 acres	+181	+4.10%	+2.99%	+1.08%	+13.92
50 to 100 acres	+635	+9.94%	+8.10%	+1.71%	+48.87
Less than 50 acres	+20,747	+8.81%	+6.01%	+2.64%	+1595.92
25 to 50 acres	+1,164	+13.67%	+9.03%	+4.25%	+89.54
10 to 25 acres	+2,421	+7.94%	+5.77%	+2.05%	+186.23
5 to 10 acres	+3,195	+22.84%	+13.65%	+8.08%	+245.77
2 to 5 acres	+4,633	+15.32%	+9.13%	+5.68%	+356.38
0 to 2 acres	+9,334	+6.13%	+4.57	+1.49%	+718

*Appendix Table 13*

### Use Value Appraisal Enrollment - General Trends

Ownership Type	Total Ownership Change enrolled in UVA: 2004 to 2016 (ac.)	Percent Change: 2004 to 2016	Percent Change: 2004 to 2009	Percent Change: 2009 to 2016	Percent Composition of Ownership: 2004	Percent Composition of Ownership: 2016	Average Acreage Gain Per Year: 2004 to 2016 (ac./yr.)
VT resident	+294,878.03	+25.77 %	+13.34 %	+10.97 %	61.27 %	59.33 %	+22,682.93
Non-VT resident	+151,330.18	+42.00 %	+17.16 %	+21.20 %	19.29 %	21.10 %	+11,640.78
Corporate	+111,578.85	+30.74 %	+18.15 %	+10.66 %	19.44 %	19.57 %	+8,582.99

*Appendix Table 14*

## UVA enrollment – Woodland

Ownership Type	Total Ownership Change: 2004 to 2016 (ac.)	Percent Change: 2004 to 2016	Percent Change: 2004 to 2009	Percent Change: 2009 to 2016	Average Acreage Gain Per Year: 2004 to 2016
VT Resident	+233,244.61	+33.56 %	+17.77 %	+13.41 %	+17,941.89
Non- VT Resident	+118,767.56	+39.91 %	+16.44 %	+20.16 %	+9,135.97
Corporate	+55,281.62	+25.48 %	+24.73 %	+0.60 %	+4,252.43

*Appendix Table 15*