Influence of Urban Tree Canopy on Single-Family Residential Structure Energy Consumption at the Community Scale in Hutchinson, Minnesota

A THESIS
SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL
OF THE UNIVERSITY OF MINNESOTA
BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
MASTER OF SCIENCE

Gary Johnson

July 2013

energy savings

via **tortuous trees**

"The trees are shown to have energy-saving potential by converting directed kinetic energy of the approaching wind into random turbulent energy by passing the air through tortuous paths in the tree crowns."

quote from (Harrje, Buckley, and Heisler 1982)

Acknowledgements

Community energy consumption analysis would not have been possible without the data provided by Jon Guthmiller from the Hutchinson Utilities Commission. The assistance of Brenda Chmielewski at the McLeod County Assessor's Office was most helpful. Special thanks to Valerie Price, Steve Ewest, and Casey Dabrowski for providing significant GIS analysis assistance. Thanks to Nick Bancks and Jeff Carol for conducting the iTree Canopy analysis. Also thanks to the University of Minnesota Extension and the University of Minnesota's Department of Forest Resources' Community Engagement and Preparedness Team along with the Hutchinson community leaders and volunteers that made the Community Preparedness Project a success. Gratitude is expressed to the Renewable Resources Extension Act (RREA) for generously funding the statistical analysis of this research. Thanks to the Evergreen Apartments and Park Towers for allowing me to take photos of trees from their buildings. Major thanks go to Mike Bahe for caring for the Hutchinson urban forest and for helping me out. Of course, thank you to my advisor Gary Johnson and committee members Joseph Knight and Patrick Huelman. The Statistical Consulting Service at the University of Minnesota and in particular Aaron Rendahl helped with the design and analysis of this study. I would also like to thank Jim Hermann and Ralph Sievert for their support through the whole processes. And thanks to John Elward for his unique pep. Also thank you to my family. The encouragement provided by my generous wife Abigail Liesch has been inspiring.

Dedication

In celebration of the careers of Jim Hermann and Paul Domholt, two foresters that have contributed much to field of urban and community forestry. If I could have half the impact of either of these gentlemen I would be proud.

Abstract

Community forests are vulnerable to invasive pests and a changing climate. Urban forests provide a host of environmental, social, and economic benefits to communities. Cold, long, and windy winters dominate the energy budget of upper Midwest communities. Hot and humid summers are becoming increasingly constant. Quantifying the relationship between energy use and trees has been simulated and estimated in a variety of ways. Few studies have successfully measured this interaction across the landscape, especially in heating dominated climates. Digitized urban tree canopy data at multiple scales has been correlated with weather adjusted normalized energy consumption data while controlling for a variety of housing characteristics. A significant relationship between increased tree canopy and reduced winter heating energy consumption is found at 500-1100 feet ($p<0.01$), and also from 400-1500 feet ($p<0.05$) from parcels. Summer cooling energy reduction from increased tree canopy at the parcel ($p<0.05$) and distances beyond 900 feet ($p<0.10$) was also found significant. Saving energy with urban forest canopy is a community scale opportunity and obligation.

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Introduction

According to the United Stated Census Bureau, as of 2010 over 80% of United States population (and 73% of Minnesotans) live in urban areas (U.S. Census Bureau Geography Division 2012). The benefits provided by trees to city dwellers have been measured and estimated by various means. Economic, environmental, and social benefits of urban forests help save communities money, create a sense of space, and provide habitat for both humans and animals to enjoy. As the climate changes and invasive pests become more prevalent, the need for a diverse and well cared for community forest has become imperative. The care of urban trees is accountable to multiple generations. Responsible use of limited resources and a holistic concern for the ramifications of our actions are at the core of working to make our communities sustainable systems.

Emerald Ash Borer

Emerald Ash Borer (EAB) is an iridescent green beetle of the Agrilus genus (specifically *Agrilus planipennis*). It is about the size of a penny. Discovered in 2002 in Michigan, it is native to Asia. When in its larval state, it feeds in a serpentine pattern under the bark in the phloem and cambium of ash trees (genus Fraxinus). Over time as more and more serpentine larval galleries physically damage the tree, the tree eventually becomes girdled and cannot transport the water and nutrients needed to support the branches and leaves in the canopy. Since the larva feeds under the bark and symptoms and signs of damage are not immediately evident after infestation, it is a difficult pest to monitor at low population levels. A tree typically dies within 1-4 years of infestation depending on tree size and EAB population level. The beetle is able to fly, and has flown more than three miles in lab testing, but is likely to spread less than one mile a year by flight. Spread of Emerald Ash Borer via the transportation of infected ash wood is effective in moving the pest over many miles in a short amount of time and is likely the most common method of spread (Poland and McCullough 2006; McCullough and Katovich 2004).

Emerald Ash Borer was found near the border of Saint Paul and Minneapolis in Minnesota in 2009. It has since been found in other locations in Saint Paul and Minneapolis, in Shoreview, and also further south in Houston and Winona Counties (Minnesota Department of Agriculture 2012). The nearest known infestation to Hutchinson, Minnesota is approximately 60 miles away in Minneapolis (see Appendix A. Cooperative Emerald Ash Borer Project distribution map October 2012) (USDA APHIS 2012).

There is no known method of eradication. Chemical treatments are effective in preventing individual tree mortality. Multiple organizations are currently in partnership on a “slow-the-spread” campaign to reduce the spread of Emerald Ash Borer as science develops and communities prepare for eventual infestation (USDA Forest Service 2010; USDA Forest Service et al. 2012).

Before the discovery of Emerald Ash Borer, ash trees were commonly planted in urban forests. Ash trees grow well in a variety of conditions including harsh urban environments. Since they are tough trees and large growing, ash trees are typically a significant part of urban forests across their range, especially in Minnesota prairie communities where few trees can survive the windy dry conditions. Since ash trees are predominant in many communities, Minnesota urban and community forests are at a significant risk. Community level preparation for this impending change is paramount (Minnesota Emerald Ash Borer Science Advisory Group 2008; Coalition for Urban Ash Tree Conservation 2011; Society of Municipal Arborists 2012).

Figure 1. Tree lined Adams Street in Hutchinson (Image from Hutchinson Leader).

Literature Review

Home energy loss and how trees are influential

It is necessary to provide a source of heat to keep homes and buildings comfortable during cold climate winters. Similarly, in climates where summer months are hot and/or humid, air conditioners are used to help lower interior temperature and reduce humidity. Once a home is at the desired temperate, during winter, the heater stops running. As the interior temperature lowers to a certain threshold, the heater turns back on. The fact that the heater needs to turn on again after heating the house to a comfortable temperature is a sign that heat is lost from the house to the cold outdoors. Essentially all heat that is generated during the heating season is eventually "lost". The term heat loss is used to describe the movement of heat from inside a house to the outdoors. There are three primary ways heat is lost from a house. Generally, one third of the heat is lost by the conductive flow of heat through walls, floors, and roofs. Another third of the heat is lost through conductive heat loss through the windows of the house. The remaining third is lost by the transfer of air through joints, pores, cracks, and other openings in the building envelope (DeWalle, Heisler, and Jacobs 1983; Jones and Oreszczyn 1987). See Figure 2 for a generalized pie graph of the home energy loss distribution.

Infiltration is the unintentional movement of outside air into a building, while exfiltration is the unintentional movement of air from inside to outside a building. This movement of air takes place as a result of a pressure gradient and is partially influenced by exterior wind and temperature. On a windy day, outside air enters a house through small openings on the side of the house that face oncoming wind via infiltration. The same amount of air leaves on the opposite side of the house via exfiltration (American Society of Heating Refrigerating and Air-Conditioning Engineers Inc. 2009). For the sake of simplicity the term infiltration or air infiltration is used throughout this text and is meant to represent both infiltration and exfiltration, since they act simultaneously.

Actual heat loss is slightly different from home to home and is dependent on the construction of the home, user patterns, and weather. Kadulski (1998) describes the windows of a typical home as contributing to 30%-50% of home heat loss. He also reports that air infiltration in an older drafty home can contribute to 50% of home heat loss. Infiltration loss increases when the temperature difference between inside and outside is at a maximum, as happens during cold winter weather or extreamly hot summer weather. Mattingly and Peters (1977) comment that the infiltration rate in a home can vary greatly between 5%-75% of total energy loss. Days with no wind and a small difference in temperature between exterior and interior would have very low infiltration, while a day with a window or door left open could lead to high infiltration loss. Harrje et al. (1975) report that air infiltration in homes can range from 10-50% of total heat loss in winter.

As a general rule of thumb the infiltration loss in a home is about one third of the energy budget of a house. This infiltration rate can be further subdivided into air movement impacted by stack effect, mechanically-induced pressures, and by exterior wind speed. One quarter of infiltration loss is generally from the stack effect. As hot air within a room rises cold air sinks. There is a pressure gradient in the room with higher pressure at the ceiling. In an exterior room, even with no exterior wind, cold air will be drawn into the room near the floor and hot air will leave from near the ceiling. The stack effect will increase with taller homes and on days when the temperature difference between interior and exterior is higher. The remaining three quarters of infiltration loss is attributed to mechanical forces and exterior wind speed. Mechanical forces in the home lose air through chimneys, exhaust devices, and imbalanced ductwork. Infiltration loss in a home is also attributed to exterior wind, which is driven by the pressure difference between the exterior and interior of the house surface. Higher wind speeds increase the pressure difference which increases the amount of air that moves between the inside and outside of a house. Thus, wind impacts 25% of a home's heating energy budget (Harrje 1976; Jones and Oreszczyn 1987). See Figure 2for a generalized graphic of heat loss in a typical home.

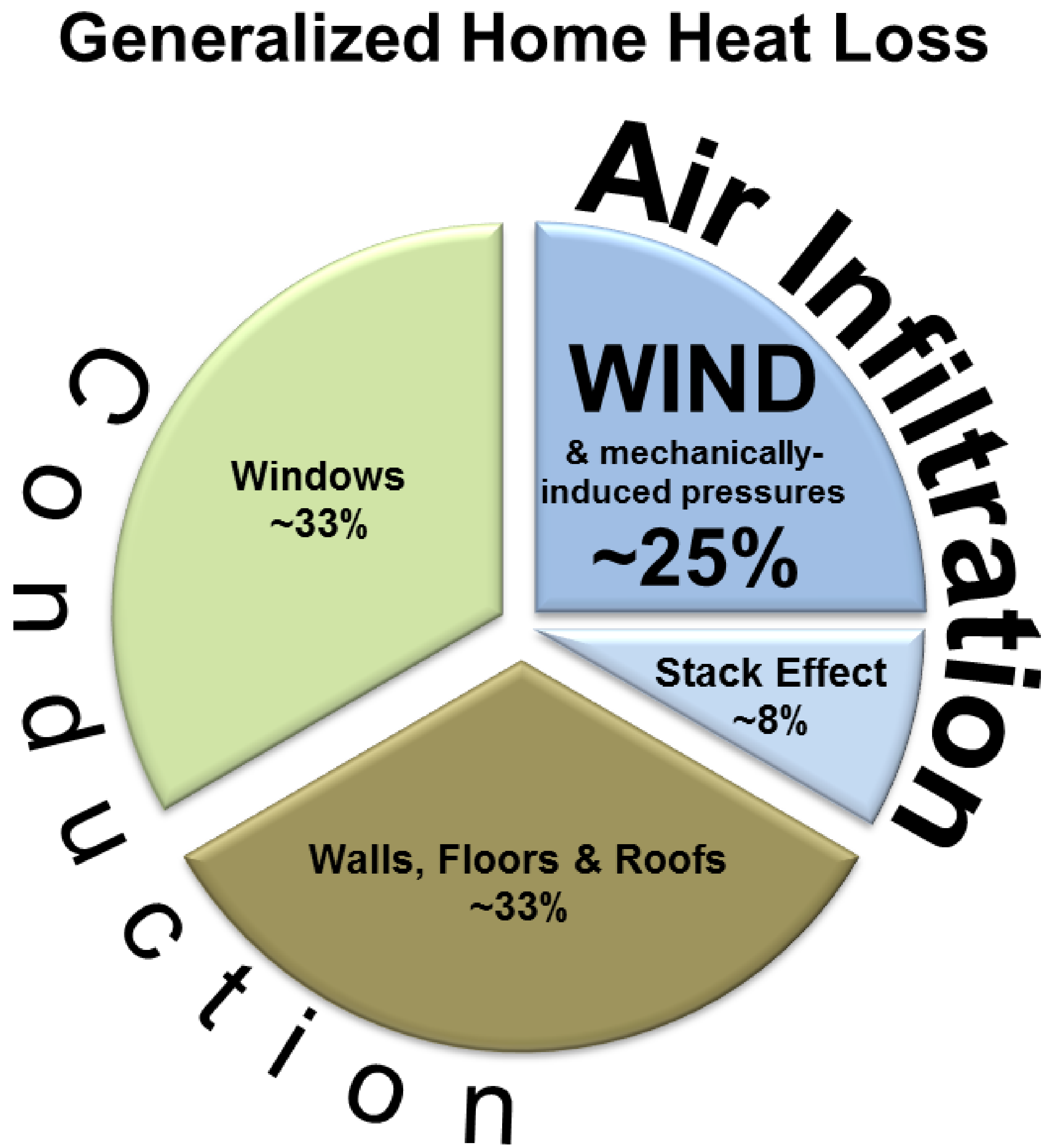

Figure 2. Generalized home heat loss (Harrje 1976; Jones and Oreszczyn 1987; DeWalle, Heisler, and Jacobs 1983; Kadulski 1998; Mattingly and Peters 1977; Harrje et al. 1975)**.**

The entire volume of air in a poorly sealed home can be changed 2-3 times per hour in windy conditions. With the same windy conditions, a newer home takes about 2-3 hours to change one volume of air (Heisler 1986a). Air change at a rate of 0.5 changes per hour is recommended for healthy interior air (Wang 2006).

Wind mostly impacts air infiltration but to a small factor wind also impacts conductive losses by removing or diminishing a thin layer of air away from a wall or window that would otherwise be aiding in insulating the home (Konzo 1939). Reduction of wind speed has multiple potential effects on a home's energy consumption. Slower wind speed will lessen air infiltration into a home, which reduces both heating and cooling energy use. Less winter wind can also increase convective solar gain on building surfaces decreasing heating load. In summer, reduced wind on surfaces that are open to the sun could increase the same convective solar gain which would increase cooling load. Less wind in a neighborhood would also lessen the amount of available wind for natural ventilation through open windows in summer. However, once air conditioning is turned on increased infiltration from high wind speed would lead to a loss in cooling energy. In older poorly insulated buildings, since heat transfer is dominated by infiltration and conduction, Simpson and McPherson (1996) claim evapotranspiration cooling and wind reduction are the most important energy influencing benefits from vegetation. In more energy efficient construction shading is more influential since solar heat gain through windows is more important in newer structures.

Trees do not provide protection by deflecting wind, but rather by letting wind pass through branches which randomizes the air flow. This randomizing leads to increased turbulence and random velocity down wind, thus reducing the pressure gradient at a house surface (Buckley et al. 1978; Harrje, Buckley, and Heisler 1982). A reduced pressure gradient means less movement of air through the house envelope as air infiltration.

Vegetation in residential neighborhoods influence energy use in two primary ways. Trees and other vegetation slow neighborhood wind speeds and block solar radiation. If air conditioners are used in summer, reduced solar radiation decreases energy use; while decreased wind speed could lead to increased air conditioning use. For heating consumption in winter, reduced wind speed decreases energy consumption; while decreased solar radiation can raise energy use (McPherson, Herrington, and Heisler 1988).

The shading effects of trees on a home are dependent on a number of site factors and house characteristics. The orientation of the house, height of these surfaces, and the area of these walls that is covered by windows are the main considerations. A home with a short wall facing south and few or no windows would not receive much of a cooling season benefit from the shade of a tree planted to the south of the home. Conversely a home with a high wall with many windows facing west would gain large cooling season benefits from the late afternoon shade of trees planted to the west of the home (McPherson and Simpson 1999).

Sand and Huelman (1993) reference the amount of solar gain that is admitted through windows depending on orientation. The daily July peak was 220 Btu per square foot admitted through east and west facing windows while only 120 Btu per square foot on south facing windows. In January the daily peak was 250 Btu per square foot for south facing windows and 140 Btu per square foot on east and west facing windows.

In a 16 city United States-wide single family home energy consumption simulation study, Minneapolis had the highest heating need and ranked 10th in cooling need (Ritschard, Hanford, and Sezgen 1992). Hunn et al. (1990) reports that the energy need to heat a typical Minneapolis home was ten times greater than the energy needed for cooling. This study reported 43%-50% of summer cooling energy use was to compensate for solar gain through windows. Heat loss through windows was reported as 22%-27% of the winter heat load. He also stated that air infiltration loss made up 34%-35% of heating season energy loss in a typical home, and was the largest factor affecting heating season energy use.

Impact of trees on human comfort

The impacts of trees on human comfort in urban areas have been measured by numerous methods. Trees have been shown to influence wind speed, exterior air temperature, provide shade, and affect the amount of energy needed to both heat and cool a building. Organized by the measurement method used, a variety of tree related impacts are presented.

Wind Tunnel

Woodruff (1954) used a wind tunnel to measure the impacts of the 10 row windbreak of trees. He used a scale of 1:60. He found that when the windbreak had leaves it reduced wind by 50% out to 14H (14 tree heights), 25% out to 30H (30 tree heights), and had a minimal effect still at 50H (50 tree heights). The windbreak with leaves also reduced evaporation by an average of 46% out to 18H (18 tree heights), with a maximum evaporation reduction of 70%. The leafless windbreak reduced wind by 50% out to 11H (11 tree heights), 25% out to 30H (30 tree heights), and had a minimal effect still at 59H (59 tree heights). The leafless windbreak also reduced evaporation by an average of 26% out to 18H (18 tree heights), with a maximum evaporation reduction of 40%. Woodruff also calculated winter heating reductions as a result of the windbreak. He calculated that the leafless trees provided a higher percent reduction in wind speed as the speed of the wind increased. This was previously found by Bates (1911) of a deciduous tree windbreak and later confirmed by Heisler (1989) of wind reduction from urban tree canopy. Woodruff found the heating reduction benefit of the windbreak ranged from 3%-41%. At 2H (2 tree heights) from the windbreak with winds at 35 miles per hour, heating energy use was reduced by 41%. At 18H (18 tree heights) from the windbreak with winds at 5 miles per hour, heating energy use was reduced by 3%.

Mattingly and Peters (1977) used a narrow, nearly two dimensional, wind tunnel with 1:48 scale 2-story townhouse and row of coniferous tree and found 40% reduction in air infiltration attributed to the trees.

Buckley et al. (1978) also used a 1:48 scale model. They modeled individual trees and a model home. Their study determined a single tree placed 60 feet from a house directly in line with oncoming winds provided 30% reduction in infiltration. Placing the tree only 20 feet from the house was the same as if no tree was present. With the tree at 120 feet mixing with other wind started to cause less of a benefit to air infiltration reduction. They also determined that adding more trees increased the infiltration reduction and allowed for a greater effective distance. Based on their findings, they recommended that shelter trees be placed at least 45 feet from the home. Shrubs and bushes placed closer to the home should be used to extend the stagnation zone and to smoothly deflect winds upwards over the home. They also calculated heating savings from trees based on the wind tunnel data. In Trenton, New Jersey trees were calculated to provide 3% reduction in heating and it was determined a more extensive planting could result in 15% heating reduction.

A wind tunnel study using a 1:48 scale modeled a 25 foot high windbreak placed 60 feet from a house to the north and west (Harrje, Buckley, and Heisler 1982; Heisler, Harrje, and Buckley 1979). Using measurements from the wind tunnel, heating savings from the windbreak in central New Jersey was calculated to be 9%. With three trees placed upwind of the building, heating saving were 3%.

In a validation study comparing wind-tunnel simulations with full scale measurements Grant, Heisler, and Herrington (1988) determined that in an urban setting relatively small, leafless deciduous trees significantly reduce wind speed.

Stathopoulos, Chiovitti, and Dodaro (1994) used a wind tunnel at a scale of 1:200 to measure the heating season effects of a dense windbreak placed 4H (4 tree heights) from and the same width as a nearby building. The windbreak reduced air infiltration by 60% and thus reduced heating energy use by 15%.

Heliodon

A heliodon is an instrument for modeling the motion of the sun and the resulting insolation from the sun or the shade on a given modeled surface (Dufton and Beckett 1932).

Heisler (1986) measured the amount of solar radiation, or insolation, reaching a house through trees with and without leaves using a heliodon with a 1:48 scale model house and model trees. Heisler modeled the sun tree house seasonal interactions in State College, Pennsylvania and in Grand Lake, Colorado. Leafless tree were reported to reduce insolation half as much as tree with leaves. His study measured desirable insolation reduction from tree shade in the summer cooling season and also undesirable insolation reduction during the winter heating season. He reported results as the ratio of desirable versus undesirable insolation reduction, where a higher ratio is better for energy savings. In State College a tree placed to the south of a house had a low ratio of 0.74 and a tree to the west had a high ratio of 4.6. In Grand Lake the south tree ratio was 0.55 and the west tree ratio was 3.3.

Computer Simulations

DOE-2

DOE-2 is an energy usage analysis computer program that predicts hourly energy use and energy cost for a building. The software uses hourly weather information and a description of the building, its operation, HVAC equipment, and utility rate structure as inputs from the user (Lawrence Berkeley National Laboratory 2013; Hirsch 2013).

A study conducted by Huang, Akbari, and Taha (1990) using DOE-2 modeled two vintages of homes in Minneapolis, MN with the addition of one, two, and three trees. The impacts of these trees on shading and wind reduction were considered. In a pre-1973 1400 square foot simulated home they found 3.7% reduction in heating and 6.7% reduction in cooling from the addition of a single tree (10% canopy) placed to the west of the house within the parcel. With the same tree placement in a 1980s 2000 square foot simulated home they found

3.8% reduction in heating and 8.2 percent reduction in cooling. With the same simulated homes an additional tree was added to the south (20% total tree canopy). The older home then had 5.1% reduction in heating and 15% reduction in cooling. The newer home had 4.5% reduction in heating and 15% reduction in cooling. A third tree was added to the south, also within the parcel, (30% total tree canopy) and the same homes simulated. The older home then had 6.8% reduction in heating and 19.7% reduction in cooling. The newer home then had 6.1% reduction in heating and 18.5% reduction in cooling. This study did not find a detrimental impact on heating from the shade of the south and west placed trees during winter.

A similar study was conducted by Heisler (1991) simulating a 1176 square foot home in Minneapolis, MN, Huron SD, and Minot, SD. Instead of simulating trees near the homes this study placed trees 50 feet from the homes in the form of windbreaks. Two windbreak orientations were simulated, both 40 feet tall. One was placed to the north and west. The other was placed to the south. The north and west windbreak saved more energy than the south placed windbreak. The north and west placed windbreak reduced heating by 13% in Minneapolis, 16.5% in Huron, and 19% in Minot. The same simulated windbreak reduced cooling 1% in Minneapolis, 1% in Huron, and less than 1% in Minot. The south placed windbreak reduced heating by 3% in Minneapolis, 5.5% in Huron, and 4% in Minot. The south placed windbreak reduced cooling by 1% in Minneapolis, 1%

in the Huron, and less than 1% in Minot. The primary impacts of the trees on energy use in this study are from wind reduction since the trees not close enough to the homes to directly shade them. Solar irradiance was included in the model. The author pointed out that solar irradiance reflected from the ground was underestimated in this model since it was set as a constant. It would have been more realistic if it was modeled to increase when snow was on the ground. If windbreaks were added on all sides of the homes, Heisler estimated savings from the north and west windbreak could increase by an additional 33%. That would be a heating savings of 17.3% in Minneapolis, 21.9% in Huron, and 25.3% in Minot if windbreaks were placed on all four sides of the homes.

Akbari and Taha (1992) simulated the effects of adding an additional three trees (30% tree canopy) around homes in four Canadian cities. Building cover was simulated to be 20%, which makes the total cover from trees and buildings 50%. The impacts from direct shade, wind reduction, and evapotranspiration were included in the model. Two sizes of homes were simulated, a 1-story 1084 square foot home and a 2-story 2170 square foot home, in each of the four cities. The 2-story home had a slightly higher reduction in heating in all four cities. In Toronto the 1-story home had 5.8% reduction in heating and 40% reduction in cooling from the three additional trees. The 2-story home in Toronto had 6.2% savings in heating and 34% reduction in cooling. In Edmonton the 1-story home had 4.4% savings in heating. The 2-story home in Edmonton had 4.8% savings in heating and 100% saving in cooling. In Montreal the 1-story home had 5.7% saving in heating and 47% savings in cooling. The 2-story home in Montreal had 6.1% savings in heating and 68% savings in cooling. In Vancouver the 1-story home had 4% reduction in heating and the 2-story home had 4.1% reduction in heating. Space conditioning for cooling is not needed in some of these cities. In one case the addition of the three trees makes an air conditioner unnecessary for keeping a home comfortable during the short warm season.

McDill (1993) simulated homes in Minneapolis, MN and in Fargo SD. A single tree was placed at various distances from a variety of modeled homes in the two cities. Only the shading effects of trees were considered. In the heating season trees were always found to be a detriment. The cooling season benefits outweighed the heating season detriment when the single tree was placed within close proximity to the west or east side of the simulated house. This study found less efficient homes had a higher benefit from the addition of a single tree. Although this study only considered the shading effects of trees on energy consumption, McDill recommends the removal of trees placed to the south of a home to help with energy savings.

Sand and Huelman (1993) also used DOE-2 to simulate the impact of trees on residential energy use in Minneapolis, MN and Fargo, SD. Their study modeled wind reduction and referred to McDill (1993) for shading impacts. The simultaneous impact of wind reduction and shading from similar treatments was not modeled. A medium efficiency 1-story and medium efficiency 2-story home was simulated in each city. Four treatments of trees within the parcel were simulated at each home, these include 2 trees (10% tree canopy), 6 trees (30% tree canopy), 10 trees (50% tree canopy), and 14 trees (70% tree canopy). Total annual energy reduction from wind shielding was reported for each treatment. They found no wind related energy impact from treatments with only 2 trees (10% canopy) within the parcel. With 6 trees (30% tree canopy) within the parcel the 1-story home in Minneapolis had 4.2% reduction in annual energy use, the 2-story home in Minneapolis had 3.7% reduction, the 1-story home in Fargo had 5.5% reduction, and the 2-story home in Fargo had 4.9% reduction. With 10 trees (50% tree canopy) within the parcel the 1-story home in Minneapolis had 8.6% reduction in annual energy use, the 2-story home in Minneapolis had 7.4% reduction, the 1-story home in Fargo had 11.3% reduction, and the 2-story home in Fargo had 10% reduction. With 14 trees (70% tree canopy) within the parcel the 1-story home in Minneapolis had 13% reduction in annual energy use, the 2-story home in Minneapolis had 10.8% reduction, the 1-story home in Fargo had 17.3% reduction, and the 2-story home in Fargo had 15.2% reduction. Wind shielding in Fargo was approximately 50% more beneficial than in Minneapolis. The benefit was 25% greater in 1-story homes than in 2-story homes, authors attributed this difference to higher heat loss in taller homes to greater stack effect. Independent of wind shielding, shading related cost benefit analysis over the life of a single tree ranged from an $83 for a shade tree planted to the west of a home to a cost of $223 for a conifer planted to the south of a home. On average a tree planted to the east or west provided $50 in present value savings from shade and a tree to the northeast or northwest saved $15. This report recommends placing trees to the west and east of windows in a home, avoiding trees to the south of windows, creating windbreaks, and increasing neighborhood canopy cover. Wind reducing benefits of trees were described as providing the greatest energy savings. Sand and Heulman also state the need for community scale investigation and strategies.

SALADDS – DDDIBM5 – Upfront

SALADDS, DDDIBM5, and Upfront are software created at the University of Minnesota for simulating and visualizing sun, tree, and building interactions (Sand 1991).

Sand (1991) used the above listed software to simulate the impact of insolation from the sun and shade from trees on modeled buildings year round in International Falls and the Twin Cities within Minnesota and Sioux Falls, South Dakota. She found that tree shade on windows in Minnesota could reduce summer cooling energy use by 32%. Sand also reports that Minnesota homes use significantly more energy for heating than for cooling. Five times more is reported for southern Minnesota, including the Twin Cities, and eight times more energy for heating compared to cooling in northern Minnesota. With 25 foot tall trees placed to the east and west of a Twin Cities home, overall annual energy use was decreased by 1%-2% from tree shade alone. Although not directly analyzed by this study, from a review of the literature at the time Sand points out the relative importance of wind shielding from community trees for decreasing winter energy consumption.

SPS - MICROPAS

MICROPAS is software that estimates hourly energy from user inputs that include thermal characteristics of the building, occupant behavior, and weather data (Enercomp 2013). SPS or the Shadow Pattern Simulator is software that can provide solar-heat gain related hourly surface shading coefficients to MICROPAS based on sun-plant-building geometry, tree size, shape, and crown density (McPherson 1994).

Simpson and McPherson (1996) describe how trees are incorporated into the models. Deciduous and coniferous trees within 50 feet of a residence are modeled for shading benefits or detriments. Conifers within 50 feet are also modeled to estimate wind sheltering effects. Neighborhood tree savings from summer cooling by temperature reduction and winter wind shielding for heating reduction are estimated for trees farther than 50 feet from the home. The neighborhood per tree benefits are estimated based on tree canopy and building percent cover estimates as well as tree size, tree type, and building vintage.

McPherson, Herrington, and Heisler (1988; McPherson 1987) conducted a study using MICROPAS and SPS with a simulated home in Madison, WI. The home was of modern construction with a flat roof and a 36 inch crawl space. A variety of simulated tree treatments were applied to the modeled home. Shading related impacts of trees were modeled separately from wind reduction impacts of trees. Shading from dense evergreens close to the home increased heating by 21% and decreased cooling by 68%. Shading from densely branched deciduous trees close to the home increased heating by 10% and decreased cooling by 36%. Shading from sparsely branched deciduous trees close to the home increased heating by 3% and decreased cooling by 11%. Roof and west wall shading most impacted cooling, while south and east shading were most impactful on heating. The wind shielding effects of trees were modeled by assigning percentage wind reduction and not directly linked to a type, quantity, or placement of trees. With 25% reduction in wind, heating was reduced by 5% and cooling increased by 23% for an overall annual saving of 3%. With 50% reduction in wind, heating was reduced by 11% and cooling increased by 18% for an overall annual saving of 7%. With 75% reduction in wind, heating was reduced by 16% and cooling increased by 14% for an overall annual saving of 10%. With 100% reduction in wind, heating was reduced by 22% and cooling was not impacted for an overall annual saving of 11%. McPherson also reports shade from densely branched versus sparsely branched deciduous trees is minor, 5%-3% increase on heating use. Infiltration increases linearly as wind speed increases. Increased wind speed leads to less solar heat gain through walls and ceilings. Wind diminishes the surface film of still air leading to greater heat loss. Conduction heat loss though walls, conductive heat loss through windows and solar heat gain through windows were only minimally influenced by a change in wind speed. In reference to northern climates like Minnesota, it is stated that since infiltration is a major part of heat loss in cold climates, wind reduction is beneficial for heating season energy conservation.

McPherson (1994) conducted a study of Chicago residential buildings using SPS and MICROPAS. Multiple building types were simulated, including 1-story, 2-story, and 3-story brick buildings, and also 1-story and 2-story wood frame buildings. When adding 3 trees per building (10% tree canopy) this study found 4% reduction in heating and 21% reduction in cooling, with an annual energy reduction from 5-10%. From adding a single 25 foot tall tree (3.3% tree canopy) to a 1-story brick home he found 0.2% increase in heating from shade, 3.8% decrease in cooling from shade, 1.5% heating reduction from reduced wind, 0.4% decrease in cooling from decreased wind, and 2.4% decrease in cooling from evapotranspiration, for an overall heating reduction of 1.3% and an overall cooling reduction of 6.6%, for total annual energy reduction of 2.4%. By adding the same single 25 foot tall tree (3.3% tree canopy) to a 1-story wood frame home he found a 0.4% increase in heating from shade, a 6.3% decrease in cooling from shade, 1.2% heating reduction from reduced wind, 0.2% decrease in cooling from decreased wind, and 1.9% decrease in cooling from evapotranspiration, for an overall heating reduction of 0.9% and an overall cooling reduction of 8.5%, for total annual energy reduction of 3.5%. From adding the same single 25 foot tall tree (3.3% tree canopy) to a 2-story wood frame home he found 0.6% increase in heating from shade, 6.8% decrease in cooling from shade, 1.3% heating reduction from reduced wind, 0.3% decrease in cooling from decreased wind, and 2.1% decrease in cooling from evapotranspiration, for an overall heating reduction of 0.7% and an overall cooling reduction of 9.1%, for total annual energy reduction of 3.9%. Another result of this study calculated the benefit to cost ratio for plating one tree per home as part of an energy conservation program. For every dollar spent on a tree the energy related benefit was calculated to be $1.35 for brick buildings and $1.90 for wood frame buildings.

A study conducted by E.G. McPherson and Simpson (1999) to quantify the carbon dioxide reduction provided by urban forests also used SPS and MICROPAS. Multiple United States locations were discussed and simulated in this study. In Boulder City, Nevada with 30% tree cover and 10% building cover the climate benefit of neighborhood trees (those farther than 50 feet from a building) were 2.5 times greater than the shading benefit of trees close to buildings. Also in Boulder City the detriment to heating related to winter shading from near trees was estimated to be 10% of the larger cooling benefit as a result of the summer shade. In Tucson, Arizona with 5% tree cover and 6% building cover the heating detriment from shade was less than 5% of the cooling benefit from shade. The climate benefits of neighborhood trees (farther than 50 feet from buildings) were about the same as the near home shading benefits. In Sacramento, California, modeled heating season saving from a single coniferous tree within 50 feet of a home was estimated to save between 0.8% and 5.2% of heating cost depending on size and shape of the tree. General methods from this study related to evapotranspiration across multiple locations modeled 0.05°C to 0.20°C reduction in temperature for every 1% increase in tree canopy cover. Wind reduction was modeled by 30% combined tree and building cover resulting in 29% wind reduction, 50% combined tree and building cover resulting in 37% wind reduction, and 80% combined tree and building cover resulting in 47% wind reduction. This study also pointed out that the SPS and MIRCOPAS model is designed for estimating effects over a large number of homes in a community over a long period of time and not for extreme events on individual homes. Of 11 reference cities referred to in the study, Minneapolis had the highest number of Heating Degree Days, was second to last in the number of Cooling Degree Days, was the second windiest, 6th highest in available sunshine, and the 4th highest in humidity.

Another study conducted in Chicago, Illinois made a comparison between neighborhoods with varying cover types (Jo and McPherson 2001). A neighborhood with 33% tree cover and 40% impervious cover (including pavement and buildings) had 1.2% increase in heating from shade, 7.2%

decrease in cooling from shade, 4.5% decrease in heating from wind reduction, 1.2% reduction in cooling from wind reduction, and 8% reduction in cooling from evapotranspiration. A neighborhood with 11% tree cover and 62% impervious cover (including pavement and buildings) had 0.2% increase in heating from shade, 0.6% decrease in cooling from shade, 2.6% decrease in heating from wind reduction, and 0.9% reduction in cooling from wind reduction. The study also found with a 10% increase in vegetation (trees, shrubs, and lawns) the summer temperature would be cooled by 0.5°C to 1°C.

CITYgreen

CITYgreen is software designed as an extension to ESRI's ArcGIS products. Based on local site conditions CITYgreen can be used to calculate the value of trees and vegetation. Monetary benefits reported include data on storm water runoff, air quality, carbon storage, and carbon sequestration (American Society of Landscape Architects 2013).

A CITYgreen study conducted of Steven Point, Wisconsin found that urban tree canopy reduced cooling costs by $126,859 (Dwyer and Miller 1999).

A study conducted in Carbondale, Illinois compared CITYgreen results with actual energy use data from 36 homes over two neighborhoods (Carver, Unger, and Parks 2004). Authors of this study found CITYgreen did a better job of estimating cooling season savings in an older (1950-1960s) neighborhood which had more tree cover. It underestimated savings in a newer (1980-1990s) development with less tree cover. Cooling savings ranged from 6%-18%

depending on house age, tree cover, and placement, with older more tree covered homes receiving the highest cooling benefit.

i-Tree

i-Tree is a software suite of urban forestry analysis and benefit assessment tools. The tools can be used to quantify the structure of community trees and the environmental services that trees provide (USDA Forest Service 2013).

UFORE is a precursor to i-Tree Eco. UFORE-E was the model component that estimated the effects urban trees have on a building's energy consumption. Trees within 59 feet of a building and over 20 feet tall are used to calculate the energy effect of the tree. Trees less than 20 feet tall and more than 59 feet from a building are considered to have no effect on building energy consumption by this model. Energy effect calculations are based on climate region, vintage building type, tree size class, leaf type, distance from building, and energy use (heating or cooling). All trees are assigned a shading effect, but only conifers are assigned a windbreak energy effect for heating (USDA Forest Service 2003; Nowak and Crane 2000).

A study conducted in Minneapolis, Minnesota used the i-Tree application STRATUM (currently called i-Tree Streets) to evaluate municipal street trees. Trees were estimated to save $12.58 in electricity and $21.78 in natural gas per tree ($34.36 combined annual saving) from the effects of shading, air temperature reduction, and wind reduction. Citywide savings were estimated to be $2.5 million or 32,921 MWh in electricity and $4.3 million or 441,355 MBtu in natural gas savings. Of the overall energy saved, 63% was from winter heating and 37% was from summer cooling. Savings by species were greatest from American elm (23%), green ash (16%), and Norway maple (11%). Annual above average per tree saving came from American elm ($79), other elms ($49), green ash ($37), and hackberry ($35). Air temperature was estimated to decrease by 0.4% for every 1% increase in tree canopy cover.

An i-Tree STRATUM study of urban areas across Indiana estimated that trees provide $9.7 million in annual energy reduction (Indiana Department of Natural Resources 2008).

i-Tree UFORE has been used by many communities across the United States (Nowak et al. 2008). A study conducted in Minneapolis used the iTree application UFORE (currently called i-Tree Eco) to evaluate all trees (both public and private) within the city (Nowak et al. 2006). This study measured the urban tree canopy as 26.4%. It also estimated 979,000 trees within Minneapolis and that these trees provide $221,000 in annual energy savings to residential buildings.

Cumming et al. (2007) used UFORE for an analysis of urban areas across Wisconsin. They found urban trees saved homeowners $24.3 million annually, 54% for heating season savings. Of non-forest urban trees, 31% were estimated to contribute toward energy conservation.

A study conducted in Chicago used the iTree application UFORE (currently called i-Tree Eco) to evaluate all trees (both public and private) within the city (Nowak et al. 2010). This study measured the urban tree canopy as 17.2%. It also estimated 3,585,000 trees within Chicago and that these trees provide $360,000 in annual energy savings to residential buildings.

Tas

Tas is modeling and thermal simulation software (EDSL 2013). It can be used to predict energy consumption, CO2 emissions, operating costs, and occupant comfort (US Department of Energy - Energy Efficiency & Renewable Energy 2013).

A study in windy Edinburgh, Scotland modeled two typical office buildings and a 60 foot tall 394 foot wide shelterbelt placed 120 feet / 3H (three tree heights) from one of the buildings (Wang 2006; Wang et al. 2011). Winter weather was simulated on the buildings. The study from 2006 reported that winter energy reduction was from 16%-42%. The 2011 study reported 4.45% heating energy reduction. The shelterbelt reduced wind by 50% when the wind was perpendicular to the shelterbelt, 30% when wind was at 15 degrees and 15% with the wind at 45 degrees. They also found that air changes per hour increased linearly as exterior wind speed increased. This study also determined that a building with more window area would receive a higher benefit from reduced wind.

ESP-r

ESP-r is energy modeling software that simulates thermal, visual, and acoustic performance. It also simulates the associated energy use and emissions. The software models heat, air, moisture, and electrical power flows (University of Strathclyde Engineering 2013).

Another winter season study in Edinburgh modeled a shelterbelt using ESP-r (Liu and Harris 2008). The shelterbelt was modeled as a single row of deciduous trees 1.2 times taller than the building height with shrubs at the base of the trees. The shelterbelt was modeled 5H (five tree heights) from the building and wide enough to protect the building. The shelterbelt reduced wind speed by 60% when winds were perpendicular to the shelterbelt, 50% when winds were at 15 degrees, 30% when winds were at 45 degrees, and 5% when winds were 60 degrees from perpendicular. The shelterbelt was attributed with reducing air infiltration by 17.6%. Convective heat loss from windows was estimated to be reduced by 7.8% and 4.4% reduced from walls. Wind speed reduction from the shelterbelt was associated with a higher reduced convective loss from windows compared to convective loss from wall surfaces. The shelter belt led to a lower air infiltration rate. More energy was used for heating on sunny days compared to cloudy days. Overall heating reduction from the shelterbelt was estimated to be 18.1%. Even though sunny days would mean the potential for solar gain through windows, the greater difference in temperature between interior and exterior on sunny days led to a higher need for heating energy use. Sunny days are typically colder in winter than cloudy days.

Estimation Model

Akbari, Rosenfeld, and Taha (1990) estimated national energy use savings of 11% from adding 1.5 trees per home or 15% urban tree canopy. Regional air temperature and wind speed reduction were estimated to save 7%, site level tree shade was estimated to save 4%, and site scale wind reduction savings to be minimal.

Simpson (1998) used modeling equations to estimate the impacts of adding an additional 7.1 trees per residence, with 2.4 within 66 feet of each home, in Sacramento County, California in both summer and winter. He determined the shade from trees would increase heating energy use by 3.8%, shade would decrease cooling by 11.9%, exterior temperature change from trees would not impact heating, exterior temperature change from trees would decrease cooling energy use by 10.9%, wind reduction from trees would decrease heating energy use by 4.3% and increase cooling energy use by 3.1%. Overall heating energy reduction from trees was 0.52% and 19.7% reduction to cooling.

Another study by Simpson (2002) used lookup tables to calculate the impact of urban tree canopy shade on residential energy use in Sacramento, California. Tree shade increased winter heating energy use by 4%-7% and decreased summer cooling energy use by 18%-28%.

Field Measurements

Windbreaks and Shelterbelts

The terms windbreak and shelterbelt have been used interchangeably in reference to single or multiple rows of trees or shrubs arranged linearly for some type of environmental benefit including: wind protection, control of blowing snow, wildlife habitat, energy savings, screening, odor reduction, and others. Windbreak seems to more typically be used to describe a relatively narrow planting while shelterbelt is often used to describe a more significant design.

The use of trees as windbreaks has been in use in the United States as settlers established farms and homesteads across the plains. The use of trees for shielding was so important that in 1873 Congress passed the Timber Culture Act to encourage tree planting on all new homesteads (Read 1964). Bates (1911) reported on the effects a tree windbreak has for the benefit of nearby plants, animals, and humans. These include shielding from mechanical damage, less evaporation, exaggeration of air and soil temperatures, and influence to air moisture distribution. The distance of impact from a windbreak is directly proportional to the height of the trees and is typically reported in the number of trees heights away.

In a handbook on windbreaks Read (1964) reports the percent wind speed reduction at various distances behind a windbreak. At 5H (5 tree heights) wind speed is reduced by 50%-75%, at 10H (10 tree heights) wind speed is reduced by 30%-50%, and at 15H (15 tree heights) wind speed is reduced by 20%-30%. Also, moderately dense windbreaks offer wind speed reduction at a greater distance than very dense windbreaks. Windbreaks with fairly open lower sections do not reduce wind as much as those with a denser lower section, but the maximum reduction is found further from the windbreak. In this case, the maximum reduction is at 10H (10 tree heights), with less reduction both closer to the windbreak at 5H (5 tree heights) and also less reduction further from the windbreak at 15H (15 tree heights). Narrow windbreaks are just as effective as wider windbreaks. A windbreak wider than 5H (5 tree heights) can be less effective at wind speed reduction than a narrower windbreak. Forcing wind through the windbreak has a farther-lasting impact on reducing wind speed than attempting to force wind upward with a dense inclined slope shaped windbreak. Windbreaks around a farmstead are recommended to be at least 100-150 feet from the buildings needing protection and no more than 300-400 feet away for maximum benefit in both winter and summer.

No buildings

Bates (1911) measured wind speed 5H (5 tree heights) downwind from windbreaks. He measured 75%-80% wind reduction from a white pine (*Pinus* strobus) windbreak, with a higher percent reduction when wind in the open was at a lower speed. He measured a 30%-50% wind reduction from an open cottonwood (*Populus deltoides*) windbreak, but with a higher percent reduction when wind in the open was at a higher speed. This was attributed to the difference in ground wind speed related to above ground wind speed and the accelerated mixing of the higher slower winds when wind in the open was faster.

Jones and Oreszczyn (1987) conducted a study of less than ideal single row shelterbelts in Milton Keynes, England. They found that more porous belts provided better overall shelter than more substantial belts by providing a broader and shallower profile of wind reduction. Foliated trees provided almost double the amount of wind reduction compared to leafless trees. Sheltered sites were as much as 1.8°F warmer than unsheltered sites. They also report that even a small 0.9°F increase in exterior temperature can reduce heating energy use by 9%.

Heisler and Dewalle (1988) measured a 20% reduction in wind speed at 25H (25 tree heights) from a windbreak and a reduction in wind speed was still measureable at 50H (50 tree heights). They also report that distance of effect from a windbreak is proportional to the height of the trees. A medium dense windbreak is more effective for a longer distance than a dense windbreak. A highly dense windbreak has a strong effect close to the windbreak but not for a great distance. Natural barriers that are taller than they are thick are more effective for farther distances than wide streamlined barriers. Single row windbreaks can have similar wind reducing effects as multiple row windbreaks. In systems with multiple successive windbreaks the first windbreak provides the highest percent reduction and the amount of reduction is diminished as the wind passes through subsequent windbreaks.

Small scale buildings

Bates (1945) measured the effects of windbreaks in winter in Holdrege, Nebraska. Near identical small-scale model homes were used to determine the windbreak effects. A 60% barrier constructed of 12 foot tall wooden slats placed 2H (2 barrier heights) from the buildings were used to model a windbreak. The 60% barrier reduced wind speed by 70.75%. Winter heating energy use was reduced by 34% from the wind reduction. This equates to a 0.48% reduction in winter energy use for every 1% percent reduction wind speed. Based on the measurements of this study, Bates estimated a 25% heating energy reduction from a windbreak placed to the north of a home, 33% heating energy reduction for a windbreak placed to the north and west, and a 40% reduction for a windbreak places on all sides of a home. Bates states that the use of trees as a means of saving on energy use has long been of interest to home dwellers. He refers to a 1935 survey of farmers from eastern South Dakota, some who had shelterbelts and some who did not, agreed that shelterbelts likely provide a 25% reduction in fuel consumption to heat a home in the winter. By the 1930s there was already a clear understanding about the direct impact wind velocity had on infiltration loss. Infiltration loss is the convective heat lost due to air exchange between the exterior and interior of a building. It was also understood how wind only slightly influences transmission loss, which is conductive heat lost through ceilings, walls, and floors. The radiant heat energy of sunlight through windows was understood to be more effective than sunlight on wall surfaces for adding heat to homes. Knowledge of the effects shelterbelts have on wind speed was also established. Shelterbelts reduce wind speed. As wind speed increases so does the percent reduction provided by the shelterbelt. Bates also found that there was a higher percent energy reduction with colder exterior temperatures. This is illustrated in Figure 3 where a 35% reduction in wind is related to a percent reduction in fuel use at various temperatures (C. G. Bates 1945).

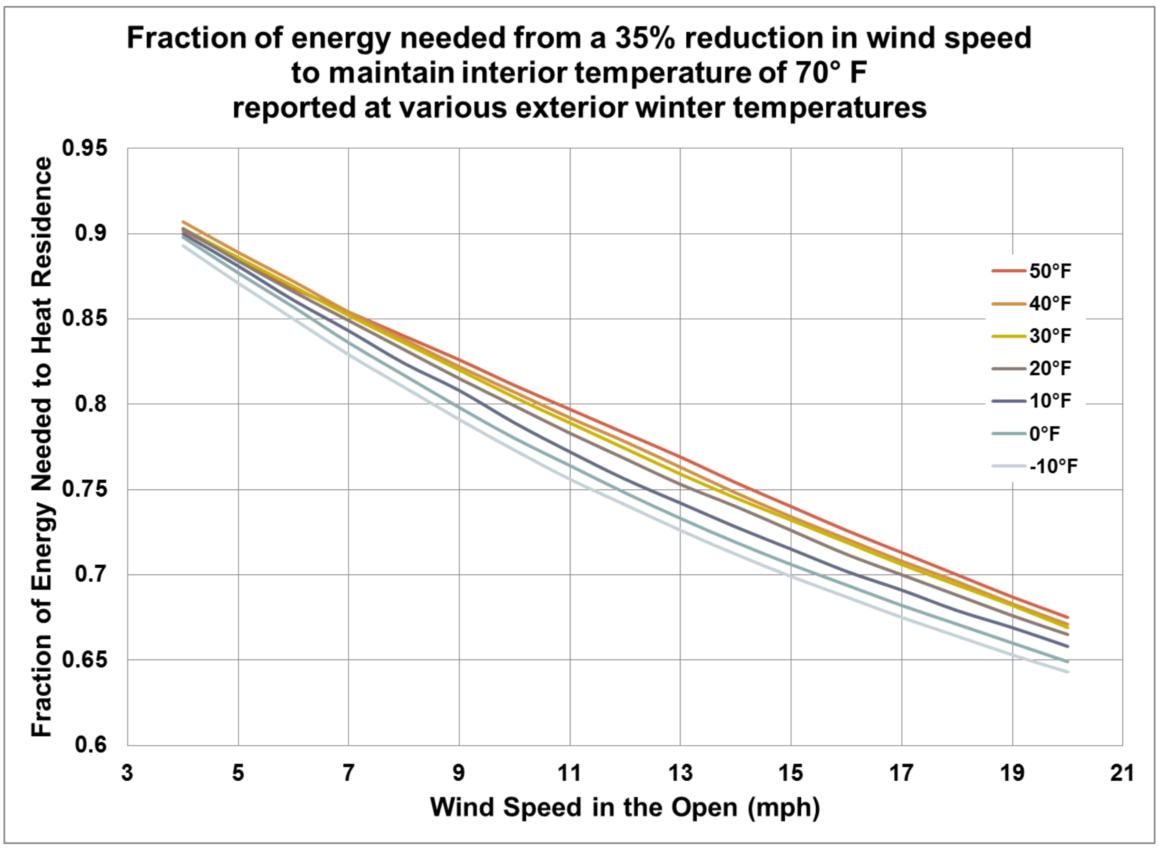

Figure 3. Fraction of energy needed to maintain an interior temperature of 70°F where wind speeds have been reduced by 35%, at various winter exterior temperatures. Adapted from Bates (1945, pg. 188)**.**

Jacobs (1979) measured the effects of a shelterbelt on a mobile home in Pennsylvania in the winter and found 15.4% heating energy reduction associated with a 75% reduction in wind speed. Based on this he estimated that 75% reduction in wind speed in the Great Plains region would yield 27% reduction in heating energy use.

A study in Twin Rivers, New Jersey measured the effects of an evergreen windbreak on a townhouse in winter (Mattingly, Harrje, and Heisler 1979). The windbreak reduced air infiltration by 42% and reduced energy consumption by 14% when the wind direction was perpendicular to the line of trees. In this scenario the wind direction would be perpendicular for 20% of the heating season, which would account for a 3% seasonal energy use reduction. Convective wind infiltration, from outside air entering the townhouse accounted for one-third of the winter heat loss. Conductive heat loss from heat transferring through walls, ceilings, and floors accounted for another third of the heat loss. The final third was attributed to conductive loss through windows.

Dewalle and Heisler (1983) measured windbreak effects on a mobile home in winter in Pennsylvania. Wind was reduced by 48%-54%, air infiltration by 41%-54%, and heating energy use by 17%-18%. Over the whole winter season this would result in 12% reduction in energy for heating, since the prevailing winds acting on the windbreak occur 65% of the season. They describe wind velocity reduction from a windbreak actually starting on the windward side of the windbreak 3H (3 tree heights) to 10H (10 tree heights) out in front of the windbreak. This is followed by an abrupt reduction in wind speed right after the windbreak with the minimum reduction of up to 10% within 10H (10 tree heights). After 20H (20 tree heights) to 50H (50 tree heights) downwind from the windbreak the speed of the wind will fully recover. They describe the reduction achieved from a windbreak as due to three actions taking place: wind deflected up by the windbreak leading to an increase in wind speed above the windbreak, the windbreak absorbs energy from the wind, and some of the horizontal motion of the wind is converted into turbulence. The distance from the windbreak where maximum energy savings was measured was at 1H (1 tree height) while the greatest wind reduction was at 2H-4H (2-4 tree heights). This difference is found because air infiltration into a home is a factor of the air pressure distribution and turbulence on the surface of the home. The point of lowest wind speed does not always coincide with the point of lowest infiltration (Dewalle and Heisler 1983).

Walk (1984) measured the effects of a 328 feet long 20 feet tall temporary white spruce (*Picea glauca*) windbreak placed at various distances from a 66 unit mobile home park near State College, Pennsylvania in winter. When the windbreak was placed at 3H (3 tree heights – 60 feet) wind was reduced by 9%, when at 13H (13 tree heights – 260 feet) wind was reduced by 8%, and when at 30H (30 trees heights – 600 feet) wind was not measurably reduced. Based on these findings Walk estimated a windbreak could reduce wind by 50% and reduce heating energy use by 5%.

Forest trees

Heisler (1989) states that wind behavior in forests are more analogous to the wind behavior in residential neighborhoods than to the behavior of wind around linearly shaped shelterbelts or windbreaks.

No buildings

Nägeli (1941) reported in Plate (1971) that a medium dense screen reduced wind speed by 20% for a farther distance when compared to a very dense screen or a very porous screen. He also reported nearly 40% wind speed reduction at 2-3H (2-3 tree heights) and 20% wind speed reduction at 12H (12 tree heights) from a leafless deciduous forest stand.

Small scale buildings

Jacobs (1979) measured the effects of a variety of forest settings on a mobile home in Pennsylvania during winter. At the edge of a red pine (*Pinus resinosa*) forest he found 73% reduction in wind speed and 8.4% reduction in heating energy use. In a typical coniferous forest he also found a 73% reduction in wind speed, but a 6.4% reduction in heating energy use. The difference in heating energy use between the edge and interior of a coniferous forest can likely be attributed to an increase in solar radiation heat gain in the edge site. The structure would likely have been easily impacted by differences in sun due to the lack of an attic and relatively light construction. In a typical deciduous forest he found 60% reduction in wind speed and 5.3% reduction in heating energy use.

DeWalle, Heisler, and Jacobs (1983) reported on either the same or a very similar study to the previously discussed thesis of Jacobs (1979) of a mobile home in forest settings in Pennsylvania. In a deciduous grove they reported 40% reduction in wind speed, 14% reduction in air infiltration, and 7% reduction in heating energy use. In a pine (*Pinus*) forest they reported 73% reduction in wind speed, 51% reduction in air infiltration, and 12% reduction in heating energy use. The deciduous grove reduced summer cooling by 75% and was attributed to shading. The deciduous grove reduced summer wind speed by 62% which reduced air infiltration by 38%.

The previous studies' reductions were found when a window on the mobile home was slightly open, to simulate loose construction, which contributed to an overall fractional infiltration rate of 0.34. The study was also conducted with the window closed leaving an overall fractional infiltration rate of 0.20 (DeWalle, Heisler, and Jacobs 1983; Jacobs 1979). The results from the 0.34 infiltration rate are included here because they more closely line up with the air infiltration rate found in homes (Mattingly, Harrje, and Heisler 1979). Shading in the forested sites had an impact on the need for additional heating at the 0.20 infiltration rate. However, since a mobile home does not have an attic and therefore much less insulation on the roof, it is much more likely to receive solar gain through an opaque surface than a typical home.

Community trees

No buildings

Myrup, McGinn, and Flocchini (1993) conducted a study of the effects of urban tree canopy during the summer in Davis, California. They found treed suburban sites were 18°F cooler than surrounding rural areas. Tree canopy at suburban sites reduced the amount of solar radiation building up on surfaces and also caused reduced wind speeds which led to less mixing of air. Their study also found that wind reduction from trees is closely related to the height of tree canopy. Locations with taller neighborhood trees had slower wind speeds than neighborhoods with shorter trees. Areas with tall trees also had less solar radiation.

Souch and Souch (1993) conducted a similar study during the summer in Bloomington, Indiana. They found temperature was reduced and humidity was higher under urban tree canopies. The greatest cooling of 2.3°F was found during the hottest hours of the afternoon. They reported trees in yards over grass were more effective at temperature reduction than street trees.

In another summer season study G.M. Heisler et al. (1994) compared weather data of Chicago, Illinois treed neighborhoods with nearby airport data. With 10% tree canopy and 40% building cover wind speed was reduced by 84%.

A summer study in Melbourne, Florida found that wind speed was less and temperature was cooler in neighborhoods with trees compared to neighborhoods without trees (Sonne and Vieira 2000). The percent wind reduction was greater at higher heights. Wind speed in the treed neighborhood was 2.2 times slower at 6.6 feet above the ground and 3.5 times slower at 29.5 feet above the ground. Temperature was 0.9°F-2.3°F cooler in the treed neighborhood compared to the treeless neighborhood.

A summer season study conducted in Huntington, West Virginia found a clear link between temperature and vegetation. Walz and Hwang (2007) found average temperature at various sites was less as vegetation increased (measured by remotely sensed Normalized Difference Vegetation Index - NDVI). In a related study of Huntington, Walz and Hwang (2007b) reported large trees that block sealed surfaces (like pavement) had a large impact on microclimate temperature. Exposed areas remained 3.6°F warmer than shaded areas in the morning after cooling all night from solar radiation that was soaked up the previous day. Sealed surfaces act as a radiator at night. Surfaces exposed to the sun during the previous day release heat all night and surfaces shaded from the sun release cooler temperatures.

Bloniarz and Brooks (2011) compared summer weather data between an area impacted by a tornado (>1% urban tree canopy) and a nearby un-impacted area (40% urban tree canopy) in Springfield, MA. Daytime temperatures in the now treeless area were 1.8°F-3.6°F higher compared to the area that still had trees. Mean humidity was slightly less in the treeless area during the day and slightly higher at night.

Small scale buildings

Deering (1956) studied the effects of the shade of a eucalyptus (*Eucalyptus*) grove on the west side of a structure and the complete structure shade of a fig (*Ficus*) tree during the summer on a mobile home in Davis, California. He found a 20°F reduction in interior temperature attributed to the dense shade of the tree canopies.

McPherson (1981) conducted a study of various tree cover on 1/8 scale buildings in Logan, Utah. Dense 90% shade of a Norway maple (*Acer platanoides*) east of the building reduced cooling energy use by 55%. Dense 90% shade of a Norway maple (*Acer platanoides*) west of the building reduced cooling energy use by 57%. Dense 90% Norway maple (*Acer platanoides*) shade on all sides of the building reduced cooling energy use by 100%. Sparse 70% shade from honey locust (*Gleditsia triacanthos*) reduced cooling energy use by 98%.

McGinn (1983) measured the impacts of differing tree canopy on small scale buildings during summer in Davis, California. Tree canopy was measured within a 1280 foot by 1280 foot square zone surrounding each building site. In a neighborhood with 55% tree canopy wind speed was reduced by 78%. In a neighborhood with 56% tree canopy wind speed was reduced by 60%.

Neighborhood tree canopy of 12% reduced wind speed by 33%. At 69% tree canopy wind speed was reduced by 67%. Tree canopy of 90% reduced wind speed by 73%. Wind speed, solar radiation, and the standard deviation of wind speed were all found to dramatically decrease as canopy density increases. The standard deviation of wind speed is a measure of eddies in the wind. A larger standard deviation would result from a broader range of data, representing stronger eddies. Decreased standard deviation in wind speed shows the wind becomes more uniform as it passes through the canopy of trees and travels around homes.

McPherson, Simpson, and Livingston (1989) measured the effects of foundation plantings and various ground covers on 1/4 scale buildings in Tucson, Arizona during summer. The foundation planting provided 92% shade to the south wall of the building, 78% to the west wall, 86% to the east wall, and 25% to the north wall. The shade reduced cooling energy use by 24%-28%. Their study also found air temperature above turf ground cover to be 7.2°F cooler then over rock.

Full scale residences

Heisler (1989; Heisler 1990) measured the effects of buildings and trees on wind speed around 15 houses in 4 neighborhoods in College Heights, Pennsylvania. Measurements were taken in both winter and summer. With 6% building cover and no trees wind speed was reduced by 22% in both summer and winter. With a building cover of 12% and tree canopy of 24% (between 300-

1000 feet from the homes) wind speed was reduced by 14% from trees and by 24% from surrounding buildings in winter. Summer wind in this neighborhood was reduced 28% by trees and 24% by buildings. In a neighborhood with 68% tree canopy (between 300-1000 feet from the homes) and 9% building cover wind was reduced by 37% from trees and 21% from surrounding buildings in winter. Summer wind in this neighborhood was reduced by 39% from trees and by 21% from surrounding buildings. A neighborhood with 77% tree canopy (between 300-1000 feet from the homes) and 10% building cover had 41% reduction in wind speed from trees and 24% reduction from buildings in winter. This neighborhood had summer reduction in wind speed of 46% from trees and 24% from buildings. There was more variation in wind reduction from trees and building at the lower canopy levels of 24% compared to high canopy levels 67%-77%. Average reductions from summer and winter and across three canopy density classes are in Table 1. Heisler also found that there wasn't a large difference between winter and summer wind reduction at the higher levels of canopy and that there was more variation at the lower canopy level between the seasons. See Figure 4 for a graphical representation of the reductions in winter wind speed caused by buildings and various tree canopy densities. In this study, sites where wind speed was measured had minimal onsite vegetation or other obstacles, like fences and outbuildings, since the emphasis was to measure the aggregate effect of neighborhood trees. In fact, Heisler's research supports that trees throughout a neighborhood are more important for a site's wind reduction than trees at that site. Results from Heisler's field data align with previous field collected data (C. G. Bates 1911) and wind tunnel findings (Woodruff 1954) that trees reduce wind at a greater rate when wind speeds are faster.

Table 1. Average fractional reductions in approaching wind speed by both trees and buildings (Total), and reductions in approaching windspeed from only trees (By Trees) listed by tree canopy density. Adapted from Heisler (1989, pg. 4)**.**

	Low Tree Density (24% Canopy)		Medium Tree Density (68% Canopy)		High Tree Density (77% Canopy)	
	Summer	**Winter**	Summer	**Winter**	Summer	**Winter**
Total	.52	.38	.60	.58	.70	.65
By Trees	.28	**.14**	.39	**.37**	.46	**.41**

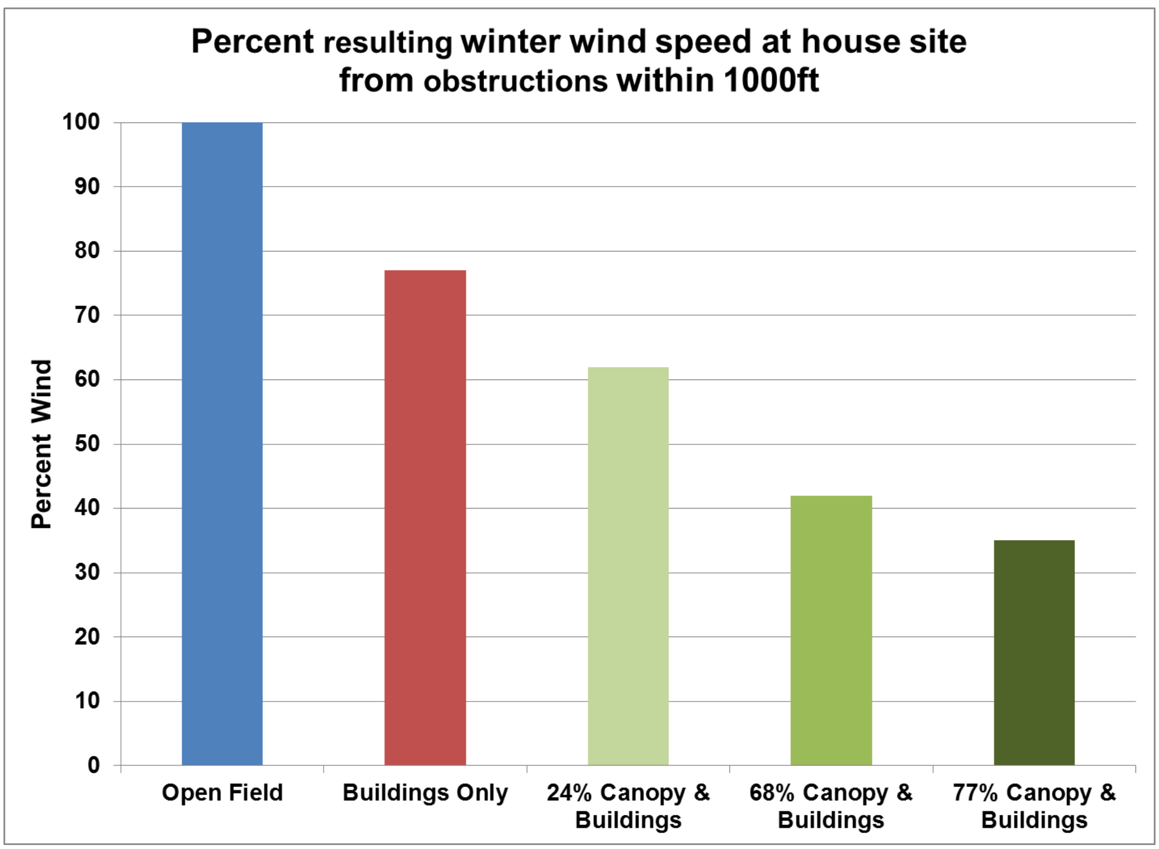

Figure 4. Resulting wind speed at a given house site as a result of buildings and various densities of tree canopy. Adapted from Heisler (1989, pg. 4)**.**

Laverne and Lewis (1996; Lewis 1994) conducted in study of tree cover and energy use of residential homes in Ann Arbor, Michigan in the summer and winter. Measuring the effects of vegetation on home energy use is challenging, since there are many influential factors. Laverne and Lewis primarily considered building characteristics and vegetation while leaving occupant behavior and other factors as “noise” or random variation. The studies revealed trends but were not conclusive. The methods used were nonintrusive to the homeowners and provided a ground work for methodology to quantify the effects of vegetation on home space conditioning. Besides the challenges encountered by dealing with so many confounding variables, their tree canopy measurement was only measured 200 feet from the homes. Their results may have mostly been influenced by the shading effects of trees and were too close to measure impacts of trees on wind reduction. Heisler found wind reduction most impactful within 1000 feet from a given property (Heisler 1989). Since tree canopy has greater wind reduction potential at greater distances, the scale of the Laverne and Lewis study may have been too tight and overlapping to measure these potentially important variables.

Akbari et al. (1997) measured the effects of temporarily placing 8 large and 8 small trees around two homes in Sacramento, California during the summer. They found 30% reduction in summer cooling energy consumption when the trees were added. They also found the DOE-2.1E computer simulation software under predicted the savings by up to a factor of two.

Jensen, Boulton, and Harper (2003) measured Leaf Area Index (LAI) via remote sensing, collected field data, and gathered electricity consumption data from homes across Terre Haute, Indiana during the summer. Although the correlation was weak, they determined for every one-unit increase in LAI that kilowatt-hour per day usage decreases by 4.17368. A likely contributor to the weak correlation was the challenge faced by the researchers of only proximally knowing the locations where the energy data was taken. This was a method for allowing anonymity to the homeowners. Since shading has such a site specific impact, it seems important to know specifically which homes' energy use to associate with the vegetation data.

Donovan and Butry (2009) estimated the effect of shade on summer electric energy use in 460 single-family homes in Sacramento, California. They found trees to the east and west of homes saved 5.2% of electric cooling consumption while trees to the north of homes increased electrical use by 1.5%. They also report a London plane tree (*Platanus x acerifolia*) growing to the west of a home is capable of reducing carbon emissions by 31% over a 100 year period.

Morzuch, Weil, and Hoque (2012) measured the effects of urban tree canopy on summer residential cooling energy consumption in Worcester, Massachusetts. They found with 34.5% tree canopy cooling energy use was reduced by 44% from direct shade. However, increased humidity caused an increase of 8% cooling energy consumption. The overall cooling energy use was reduced by 36%.

Problem Statement

Northern communities are at risk of losing significant green infrastructure. Invasive pests and a changing climate place our community forests in a threatened state. Urban forests provide a host of environmental, social, and economic benefits to communities. Cold, long, and windy winters dominate the energy budget of upper Midwest communities. Hot and humid summers are becoming increasingly constant.

Quantifying the relationship between energy use and trees has been simulated and estimated in a variety of ways. Few studies have successfully measured this interaction across the landscape, especially in heating dominated climates. The majority of research in this area has focused on the sun and shade interactions of trees to homes and has been focused at the site scale.

The objective of this study was to determine the impact of urban tree canopy on single family residential energy use at the community scale in Hutchinson, Minnesota. Urban tree canopy was measured at a community scale. Energy use data from sampled homes across Hutchinson was compared to tree canopy data, while controlling for house characteristics, to determine if and to what degree a correlation exists.

Study Site

Hutchinson, Minnesota, USA

The city of Hutchinson is located in McLeod County, in the state of Minnesota, in the United States of America (see Figure 6). Hutchinson was founded as a city in 1855 and has the second oldest park system in the nation (Hutchinson Chamber of Commerce Convention & Visitors Bureau 2007). Hutchinson has both been referred to as, "the little river town on the prairie" and as a "forest oasis on the prairie."

The population of Hutchinson as of 2010 was 14,178. The population density as of 2010 was 1,648 persons per square mile. Persons between the age of 18 and 64 years make up 59% of the population, while there are 26% under 18 and 16% 65 years of age or older (United States Census Bureau 2012).

Figure 5. Historic panoramic view of Hutchinson from 1901 (image from LakesnWoods.com courtesy US Library of Congress, original photo from Minneapolis Tribune Company.

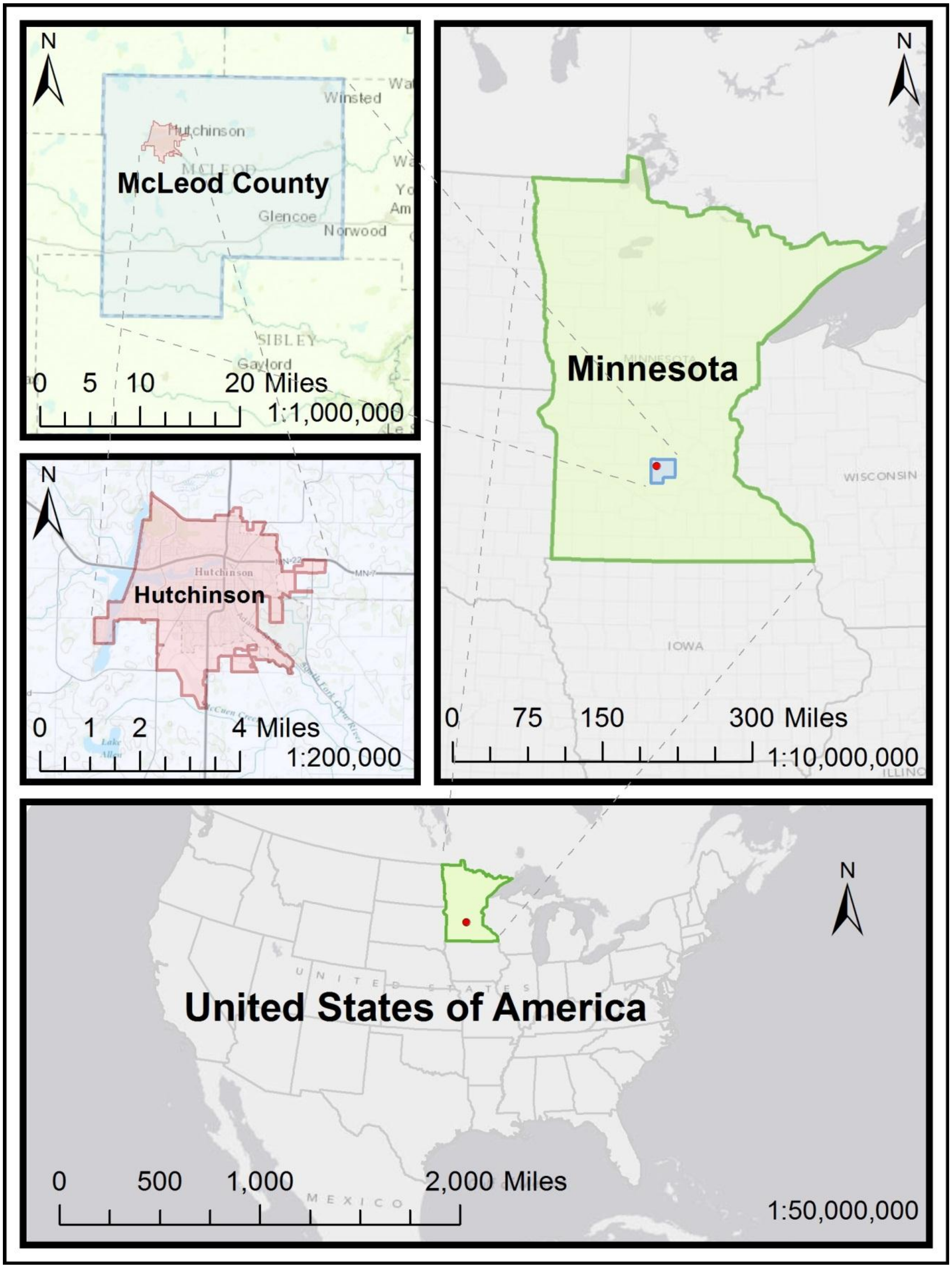

Figure 6. Geographical location of Hutchinson, Minnesota, USA.

Housing

The homeownership rate in Hutchinson from 2006-2010 was 72%. The median value of owner-occupied housing units was $157,400. The median income in that same period was $57,750. From 2006-2010 there were 6,527 total housing units in Hutchinson. Of the 5,853 occupied housing units in Hutchinson, 72% (4,239) are owner-occupied and 28% (1,614) are renter-occupied. The average household size in owner-occupied units is 2.57 people per unit. The number of 1-unit detached housing units in Hutchinson from 2006-2010 was 3,915, which is 60% of the total housing units. Across all structure types, 15% were built before 1939, 6% in the 1940s, 7% in the 1950s, 10% in the 1960s, 15% in the 1970s, 15% in the 1980s, 16% in the 1990s, 13% from 2000-2004, and 3% since 2004. The median number of rooms in a Hutchinson housing unit was 6. Of the occupied housing units in Hutchinson, 81% use utility gas as their home heating fuel, 14% use electricity for heating, 2% use bottles, tank, or LP gas, and all heating fuel types make up 1% or less of overall use. Of the 4,239 owner-occupied units, 71% have a mortgage and 29% do not have a mortgage. Of the homeowners with a mortgage, 43% spend less than 20% of their household income on selected monthly owner costs, 40% spends between 20-35%, and 17% of homeowners spend 35% or more of their income on selected monthly owner costs. As for homeowners without a mortgage, 77% spend less than 20% of their income on selected monthly owner costs, 9% spends between 20-35%, and 15% spends 35% or more of their income on selected monthly owner costs (United States Census Bureau 2012).

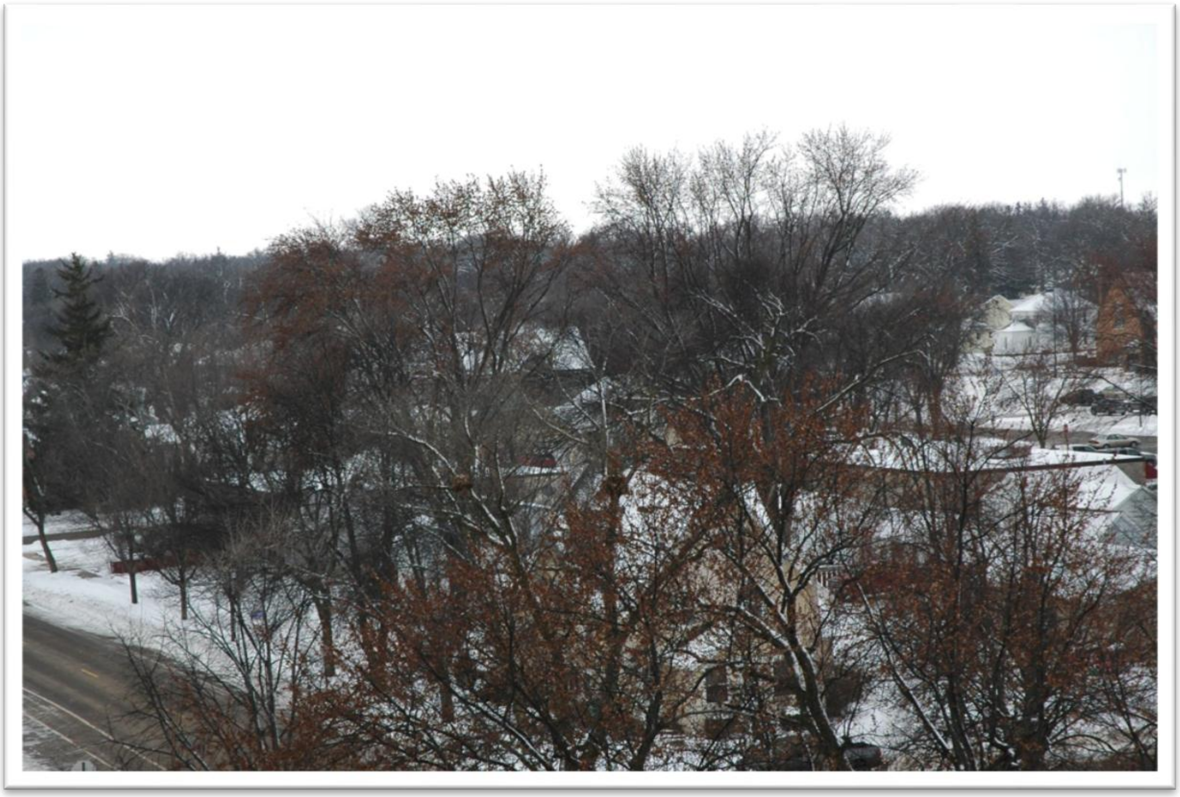

Figure 7. View of residential neighborhood and dense leafless tree canopy taken from upper floors of the Evergreen Apartments at 115 Jefferson St SE in Hutchinson.

Climate

As a state, Minnesota’s climate is humid continental, in that it is characterized by annual variations in temperature not influenced by a significant body of water. During the winter months continental polar air outbreaks are frequent and Arctic air outbreaks are occasional. During the summer, Minnesota experiences occasional periods of prolonged heat and humidity, as a result of warm air pushed northward from the southwestern United States and the Gulf of

Mexico. Comparatively, in all seasons, Pacific Ocean air masses from the western United States produce dry and mild weather (Minnesota State Climatologists 2012; McPherson 2010).

The mean annual temperature for Hutchinson is 44 degrees Fahrenheit (°F). Extreme temperatures range from -39 to 105°F. Monthly mean temperatures range from -1 to 84°F. The mean temperature in January averages 10°F, while the mean temperature for July averages 72°F. Seasonally Hutchinson has a mean temperature of 15°F in the winter, 45°F in the spring, 70°F in the summer, and 47°F in the fall (see Appendix E. Hutchinson Climate Data) (High Plains Regional Climate Center 2006). See Figure 8, Figure 9, Figure 10, Figure 11, and Figure 12 for comparison of Hutchinson temperatures with Minnesota and the rest of the United States.

Heating degree days (HDD) are used to measure the relative heating need from one location to another. One heating degree day is counted for every degree the average daily temperature is below a given base temperature and is accumulated daily. Heating degree days referenced in this paper are from a consistent base temperature of 65°F. Hutchinson accumulates an average of 8188 HDD annually (see Appendix E. Hutchinson Climate Data) (High Plains Regional Climate Center 2006). Averaged across the state, Minnesota accumulates an average of 8616 HDD annually. As a region, the Upper Midwest accrues 5809 HDD compared to the National average of the contiguous 48

States receiving 4411 HDD (National Climatic Data Center - National Oceanic And Atmospheric Administration 2012). See Figure 13, Figure 14, Figure 15, Figure 16, and Figure 17 for graphs and maps of heating degree day comparisons from Hutchinson, Minnesota, and the United States. Compared to the rest of the nation, Hutchinson has a heating-dominated climate with a heating need that exceeds most of the nation.

Similar to heating degree days, cooling degree days (CDD) are used to measure the relative cooling need from one location to another. One cooling degree day is counted for every degree the average daily temperature is above a given base temperature and is accumulated daily. Cooling degree days referenced in this paper are from a consistent base temperature of 65°F. Hutchinson accumulates an average of 629 CDD annually (see Appendix E. Hutchinson Climate Data) (High Plains Regional Climate Center 2006). Averaged across the state, Minnesota accumulates an average of 495 CDD annually. As a region, the Upper Midwest accrues 685 CDD compared to the National average of the contiguous 48 States receiving 1279 CDD (National Climatic Data Center - National Oceanic And Atmospheric Administration 2012). See Figure 18, Figure 19, Figure 20, Figure 21, and Figure 22 for graphs and maps of cooling degree day comparisons from Hutchinson, Minnesota, and the United States. Compared to the rest of the nation, Hutchinson has a smaller need for cooling. While not at the same level as much of the nation, for human comfort during the hottest season, a cooling source is important.

The dew point in Minnesota ranges from 6°F in January to 70°F in July (Minnesota State Climatologists 2012). For reference, people that are used to a continental climate start to feel uncomfortable when the dew point is between 59°F and 68°F, and feel oppressed when the dew point reaches 70°F and higher.

Sunlight can be measured multiple ways. Daylight length is amount of time the sun is above the horizon and could potentially be shining on a location if there were no clouds. Minnesota has a day length of 8.5 hours in December and 16 hours in June. The amount of possible sunshine that reaches a given surface varies by season. In Minnesota, November has the lowest amount of possible sunshine with 40%. The highest possible sunlight in Minnesota is experienced in July at 70%. The annual average for Minnesota is 58%. One final measure of sunlight is the amount of radiation or energy over a specific amount of surface area. In December, Minnesota receives an average of 1.395 kilowatt-hours per square meter per day and an average of 6.625 kilowatt-hours per meter per day in July (Minnesota State Climatologists 2012). See Figure 23 for a map that shows a national comparison for the average monthly and annual solar radiation available to a south-facing vertical surface like a window. See Figure 24 for the average sunshine hours by month and by year across the United States.

The wind resource potential of Minnesota is ranked 11th in the United States (American Wind Energy Association 2012). The prairies of southwestern Minnesota on the edge of the Great Plains experience some of the strongest winds in the United States. Based on data collected at the Hutchinson Municipal Airport between 1993 and 2011, the daily mean wind speed ranges from 0 to 32 miles per hour. Over the 18 year period the average daily mean wind speed was 8 miles per hour. The daily average maximum wind speed was 16 miles per hour, average maximum gust was 25 miles per hour, and the maximum gust was 68 miles per hour (Hutchinson Municipal Airport 2012). See Figure 25, Figure 26, Figure 27, and Figure 28 for maps comparing the wind in Hutchinson and Minnesota with the rest of the United States.

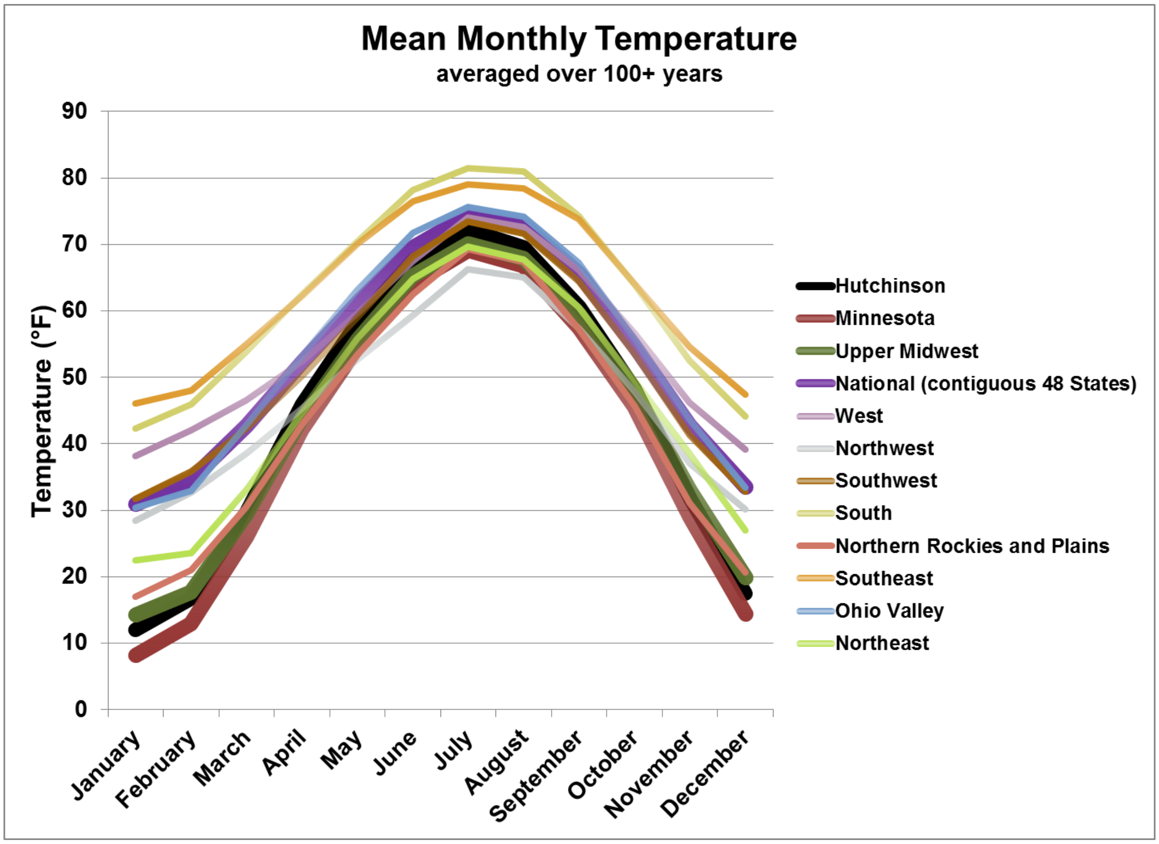

Figure 8. Mean monthly temperature in degrees Fahrenheit for Hutchinson (High Plains Regional Climate Center 2006), Minnesota, United States regions, and the contiguous 48 states (National Climatic Data Center - National Oceanic And Atmospheric Administration 2012). For climatic regions map see Appendix D. United States Climate Regions.

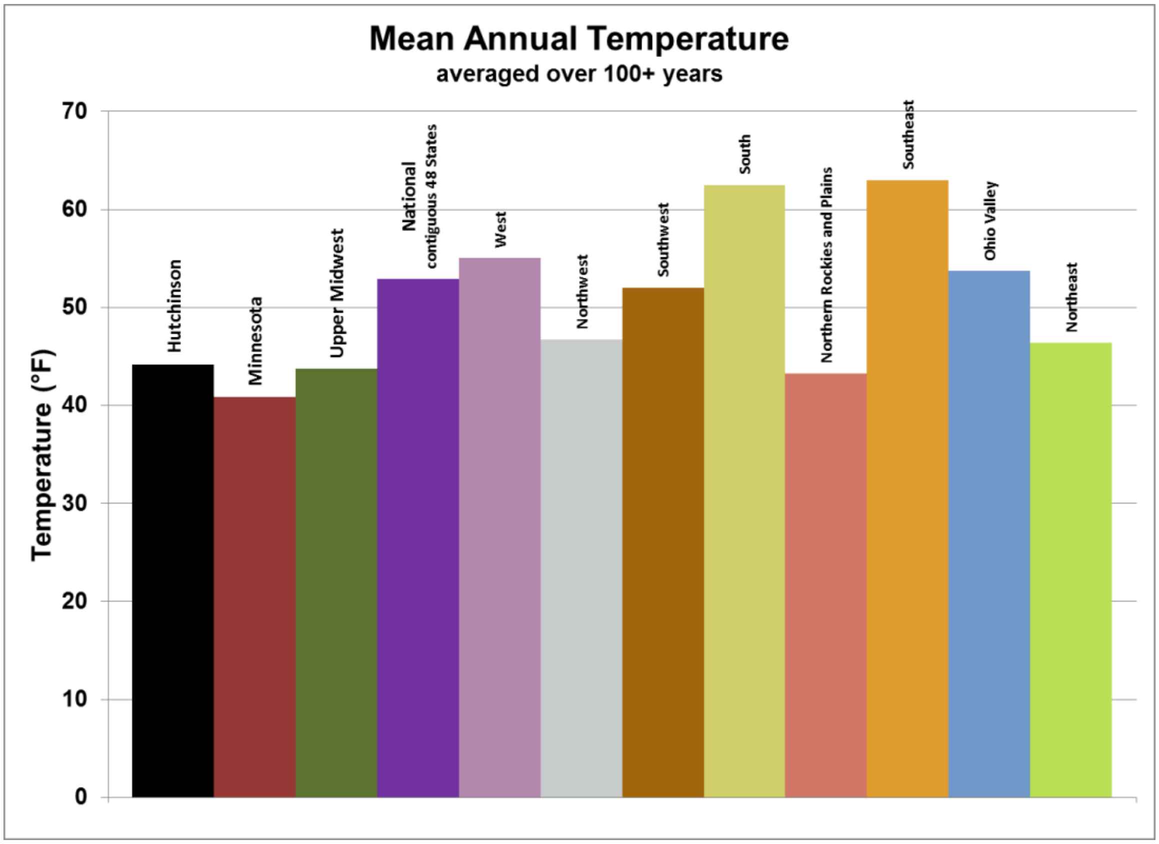

Figure 9. Mean annual temperature in degrees Fahrenheit for Hutchinson (High Plains Regional Climate Center 2006), Minnesota, United States regions, and the contiguous 48 states (National Climatic Data Center - National Oceanic And Atmospheric Administration 2012). For climatic regions map see Appendix D. United States Climate Regions.

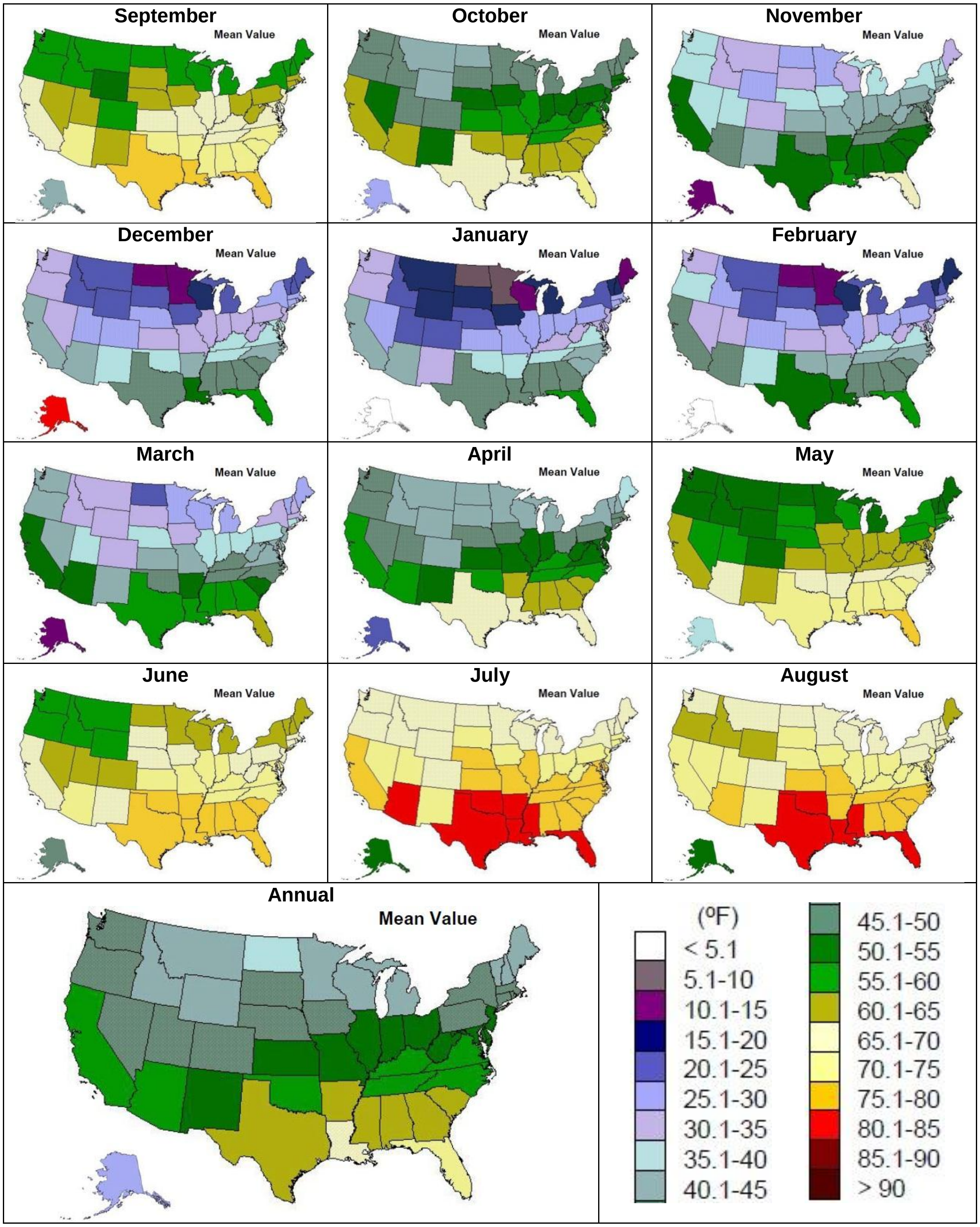

Figure 10. State normals maps of mean monthly and annual temperature in degrees Fahrenheit from 1931-2000 (National Climatic Data Center/NESDIS/NOAA 2002)**.**

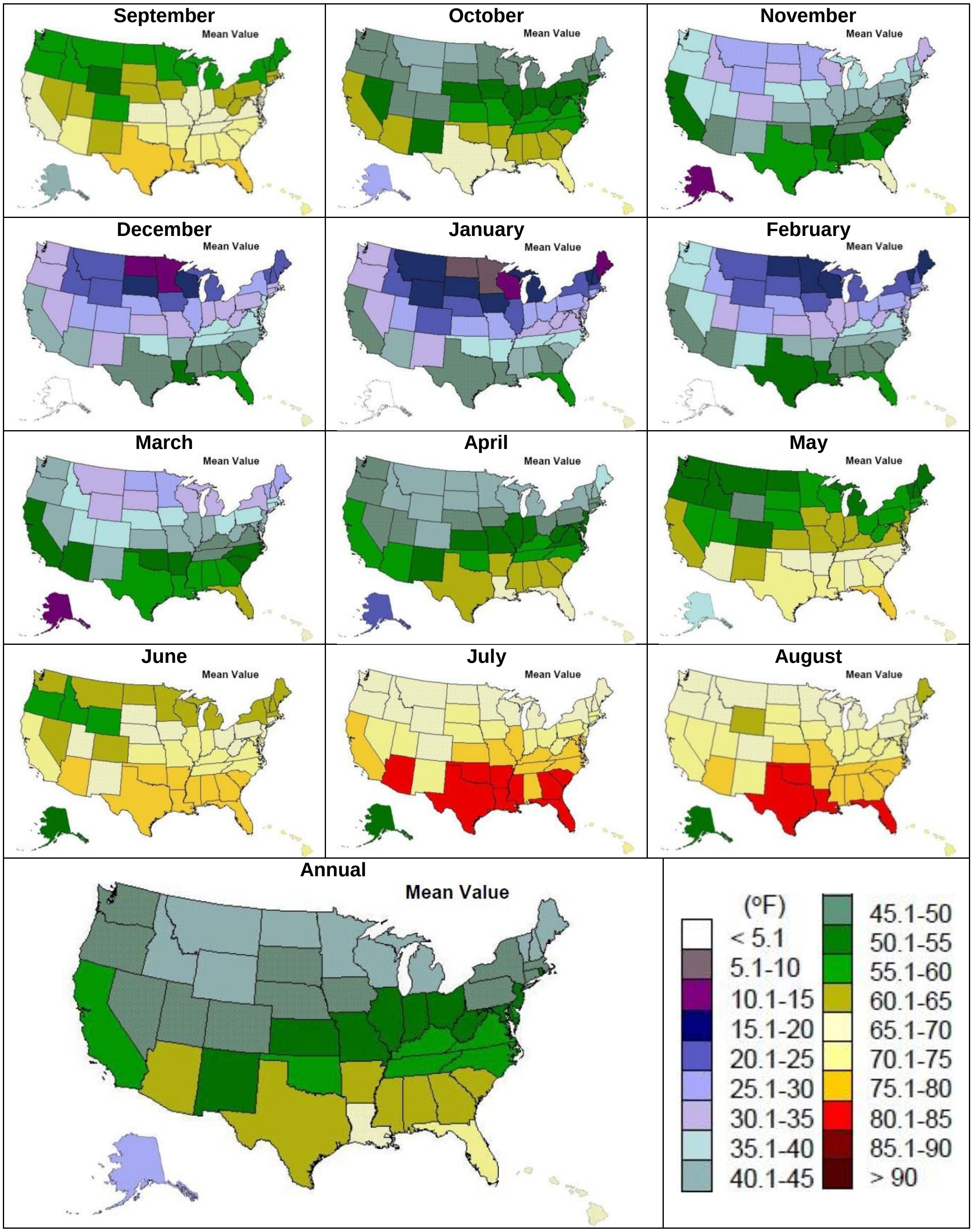

Figure 11. State normals maps of mean monthly and annual temperature in degrees Fahrenheit from 1971-2000 (National Climatic Data Center/NESDIS/NOAA 2002)**.**

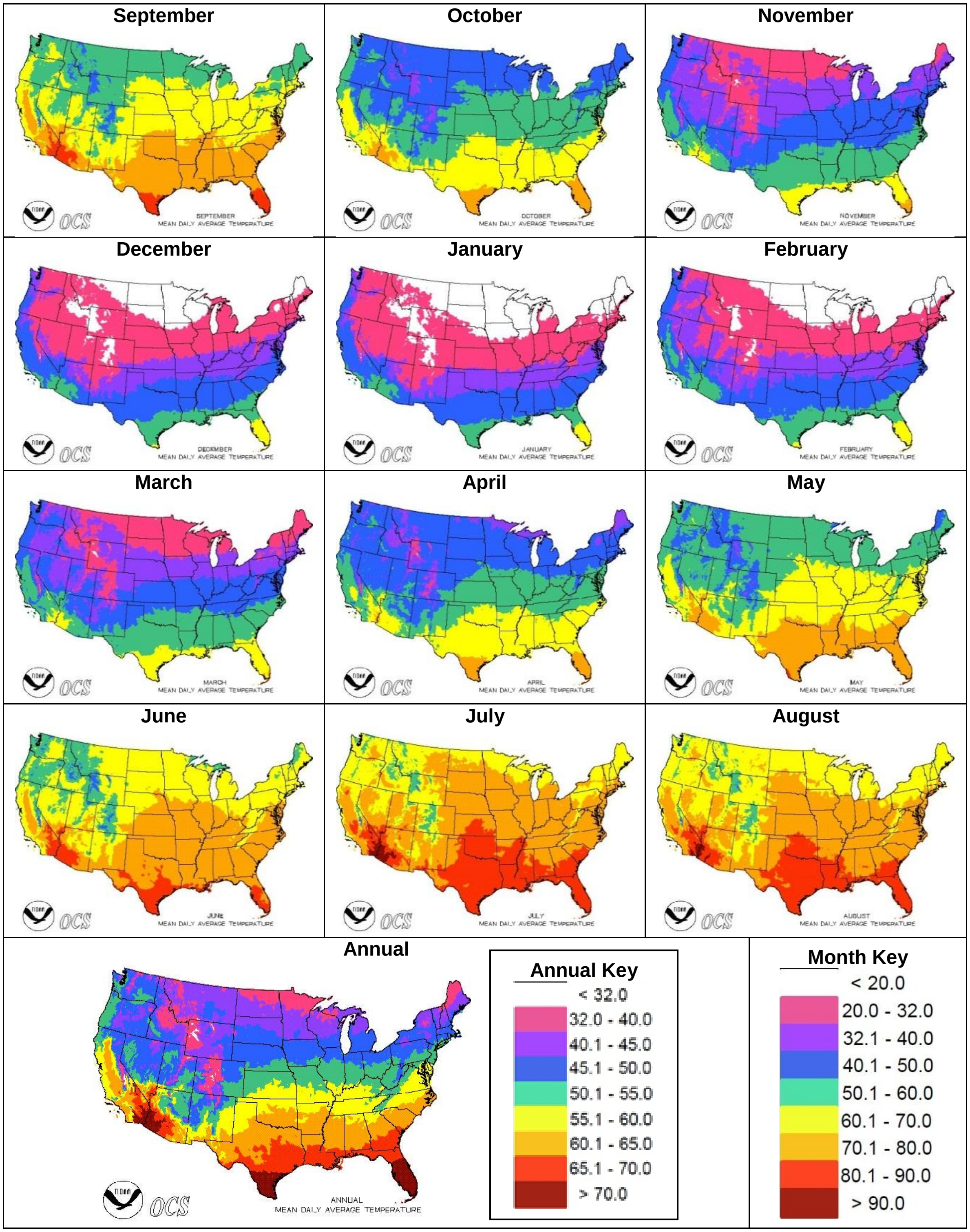

Figure 12. Mean daily average monthly and annual temperature in degrees Fahrenheit from 1961-1990 (Plantico et al. 2005)**.**

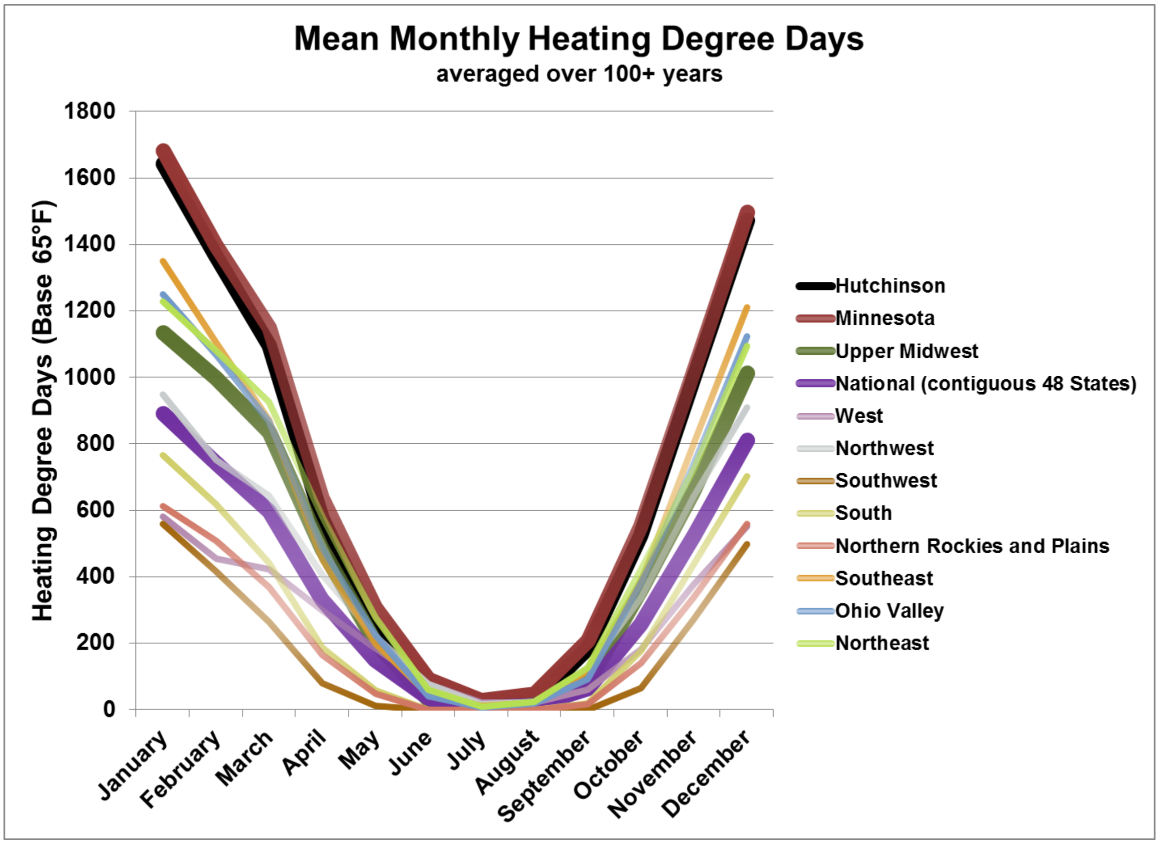

Figure 13. Mean monthly heating degree days for Hutchinson (High Plains Regional Climate Center 2006), Minnesota, United States regions, and the contiguous 48 states (National Climatic Data Center - National Oceanic And Atmospheric Administration 2012). For climatic regions map see Appendix D. United States Climate Regions.

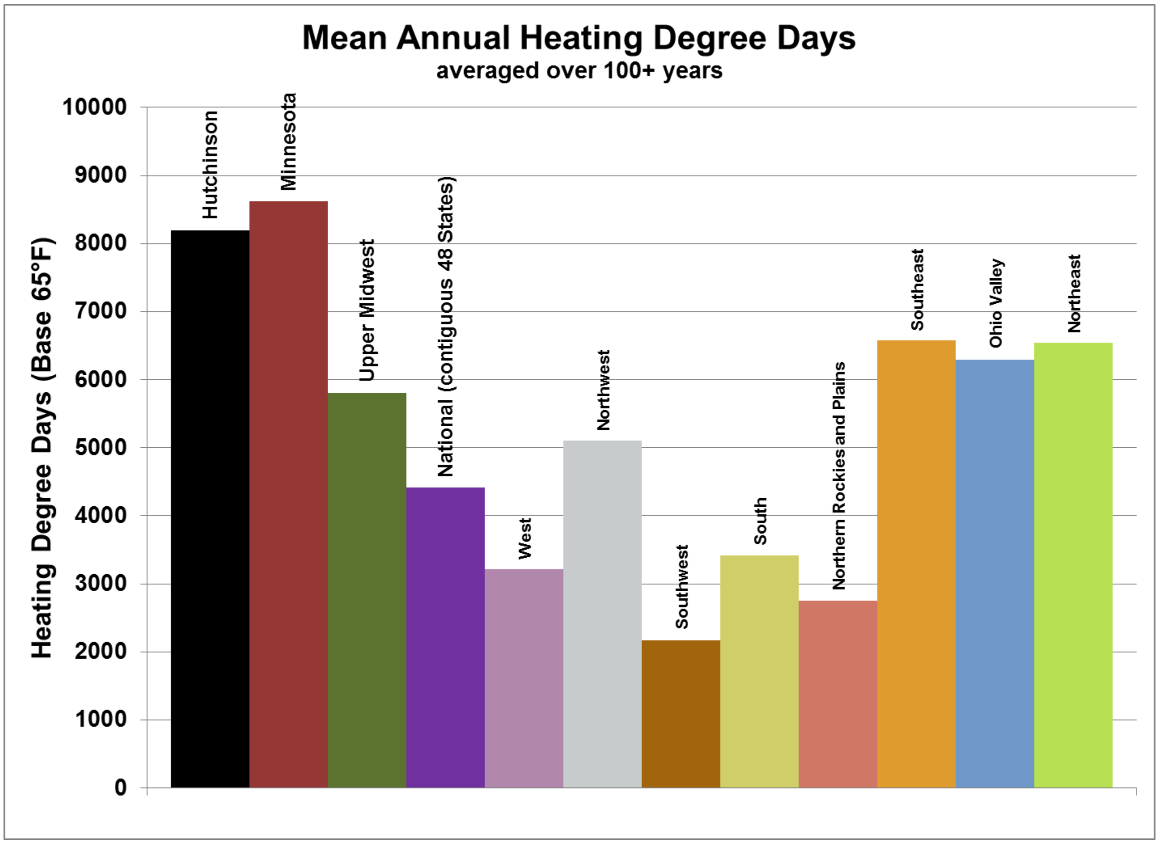

Figure 14. Mean annual heating degree days for Hutchinson (High Plains Regional Climate Center 2006), Minnesota, United States regions, and the contiguous 48 states (National Climatic Data Center - National Oceanic And Atmospheric Administration 2012). For climatic regions map see Appendix D. United States Climate Regions.

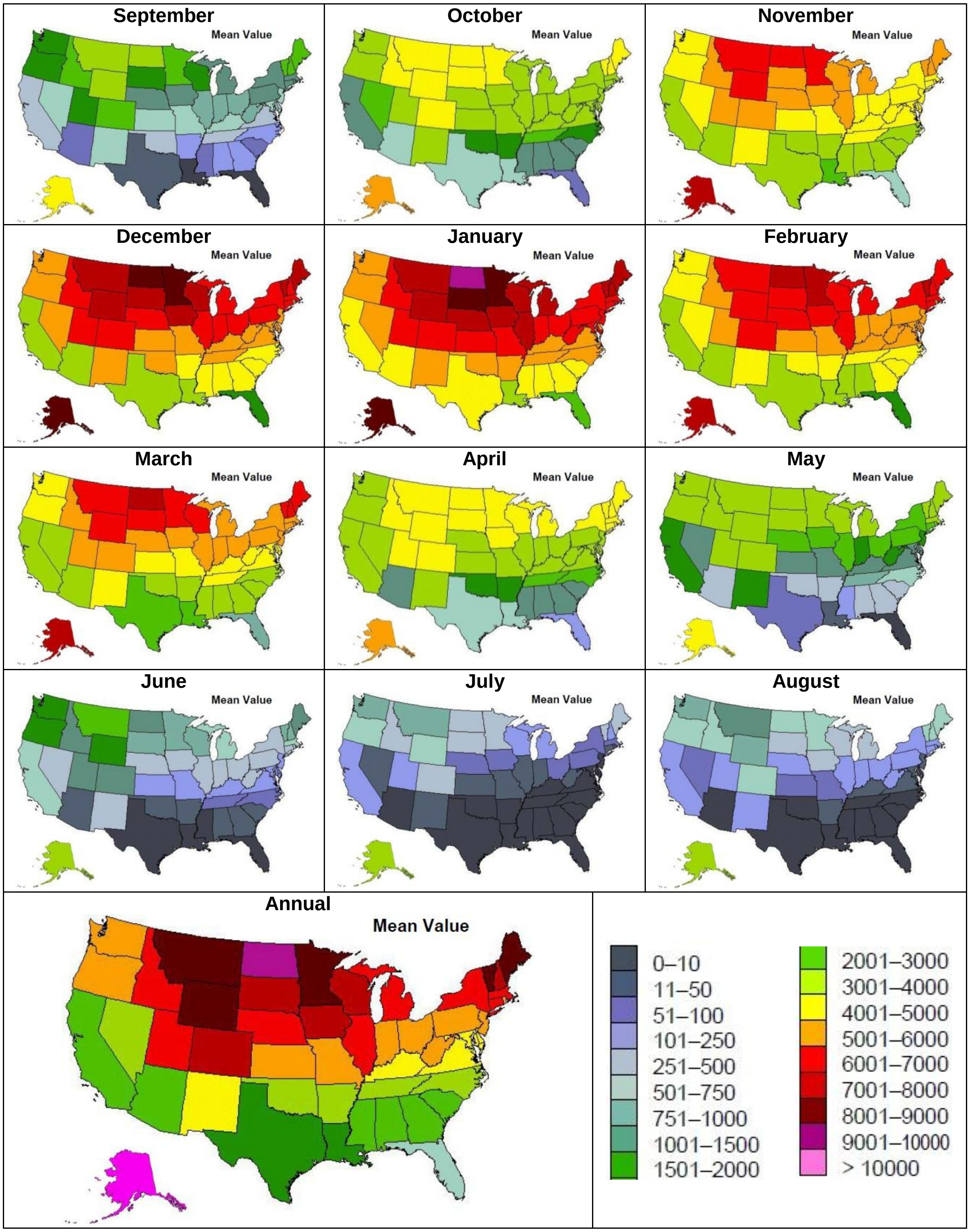

Figure 15. State normals maps of mean monthly and annual heating degree days (HDD) from 1931-2000 (National Climatic Data Center/NESDIS/NOAA 2002)**.**

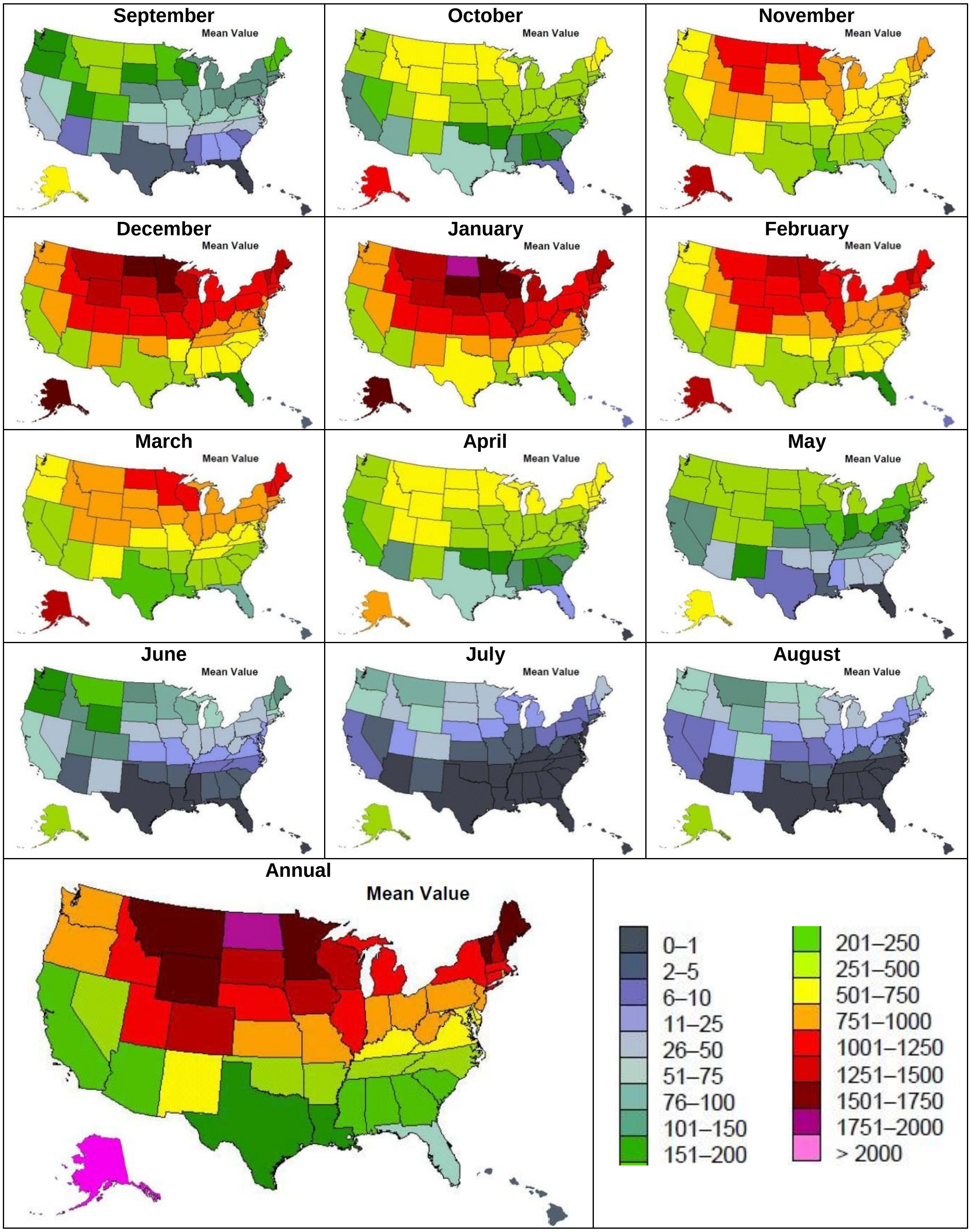

Figure 16. State normals maps of mean monthly and annual heating degree days (HDD) from 1971-2000 (National Climatic Data Center/NESDIS/NOAA 2002)**.**

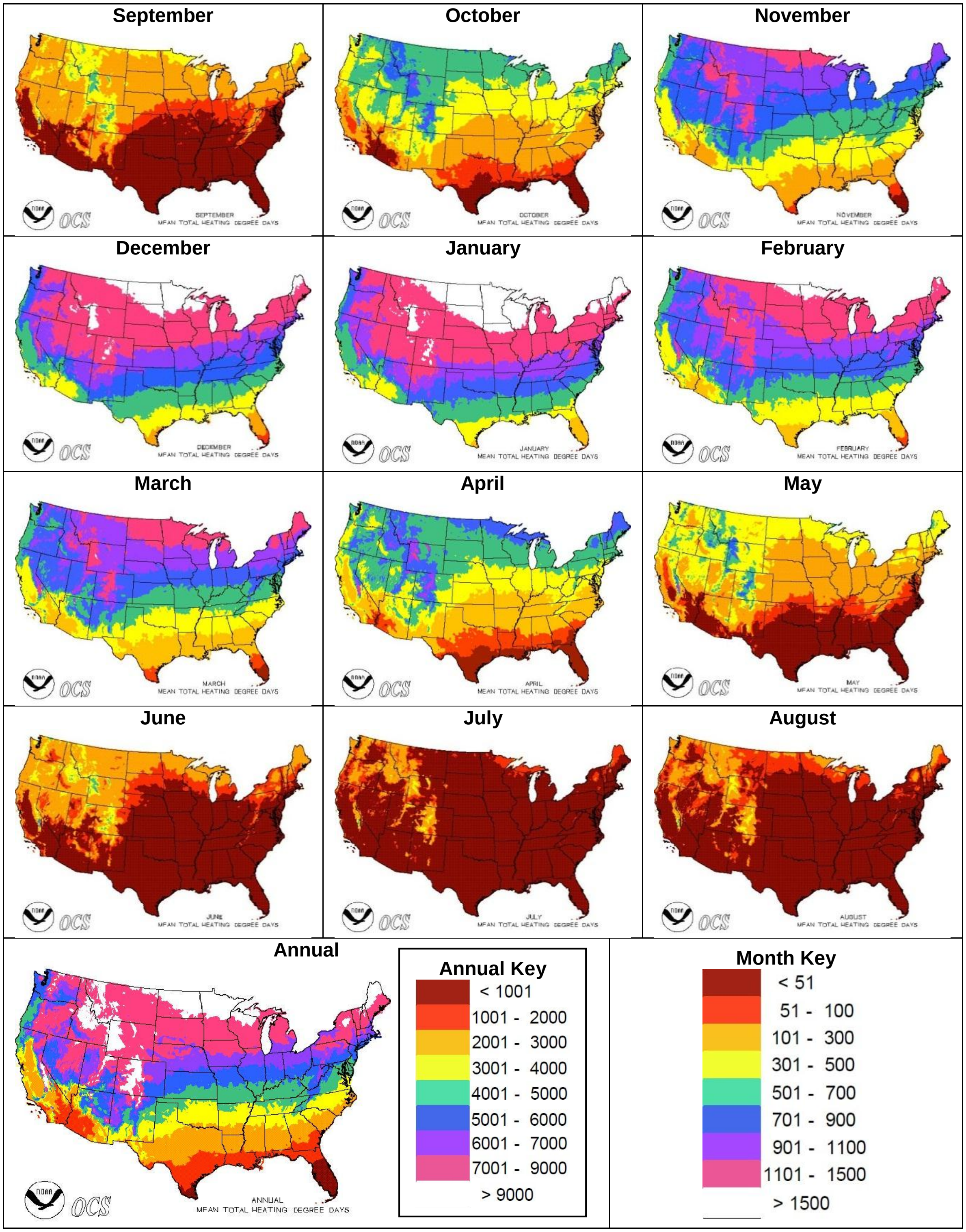

Figure 17. Mean total monthly and annual heating degree days (HDD) from 1961-1990 (Plantico et al. 2005)**.**

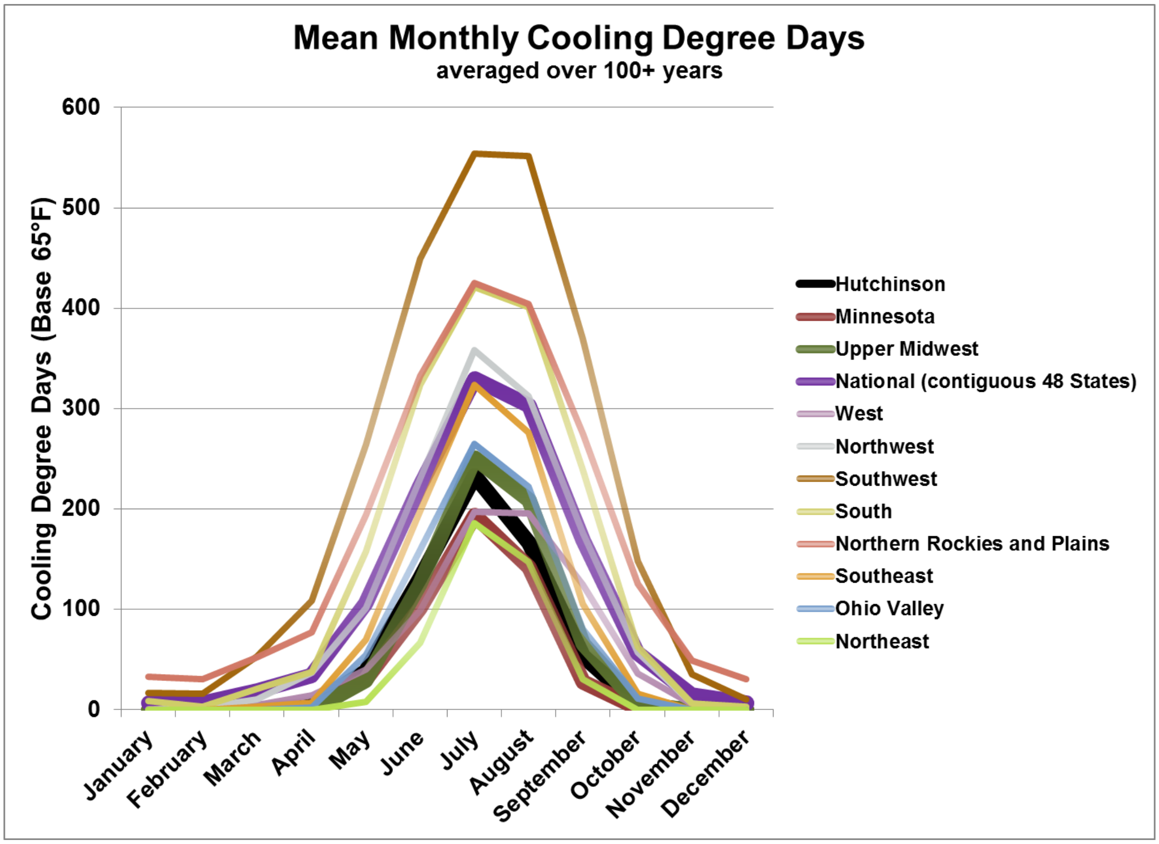

Figure 18. Mean monthly cooling degree days for Hutchinson (High Plains Regional Climate Center 2006), Minnesota, United States regions, and the contiguous 48 states (National Climatic Data Center - National Oceanic And Atmospheric Administration 2012). For climatic regions map see Appendix D. United States Climate Regions.

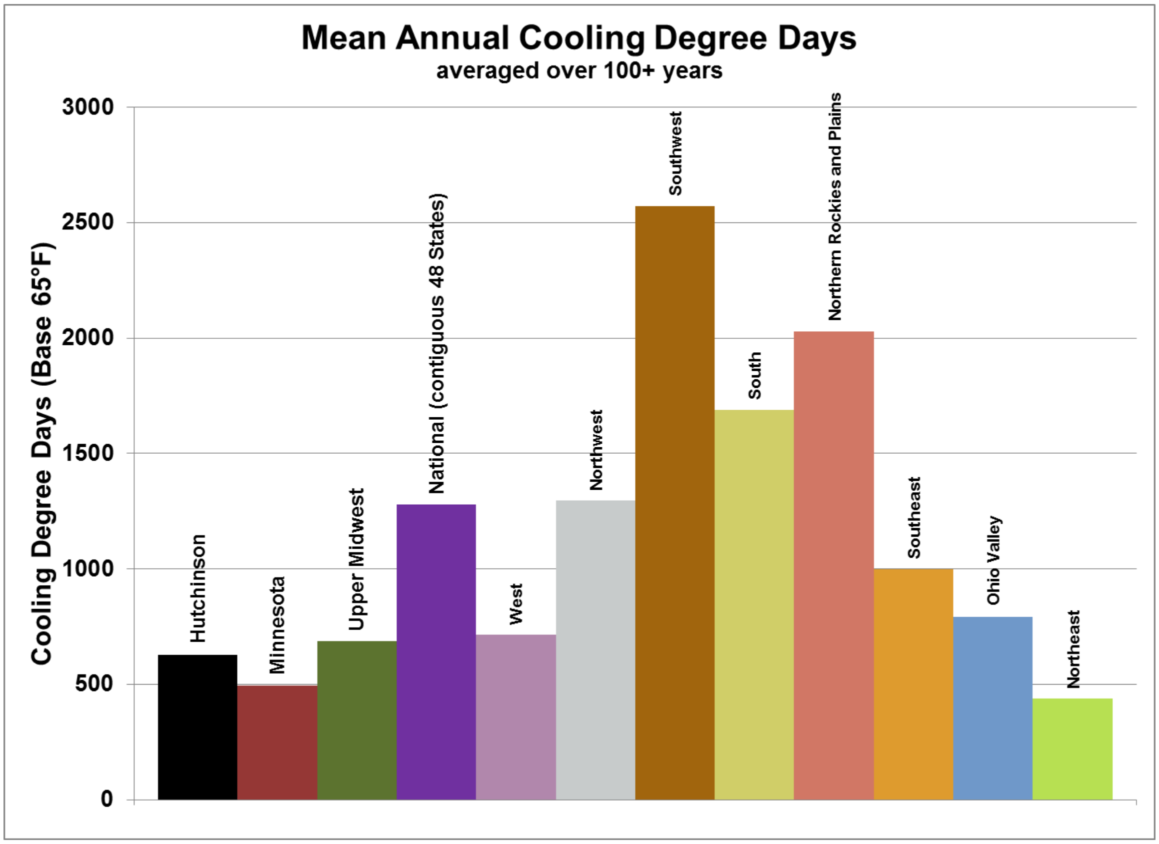

Figure 19. Mean annual cooling degree days for Hutchinson (High Plains Regional Climate Center 2006), Minnesota, United States regions, and the contiguous 48 states (National Climatic Data Center - National Oceanic And Atmospheric Administration 2012). For climatic regions map see Appendix D. United States Climate Regions.

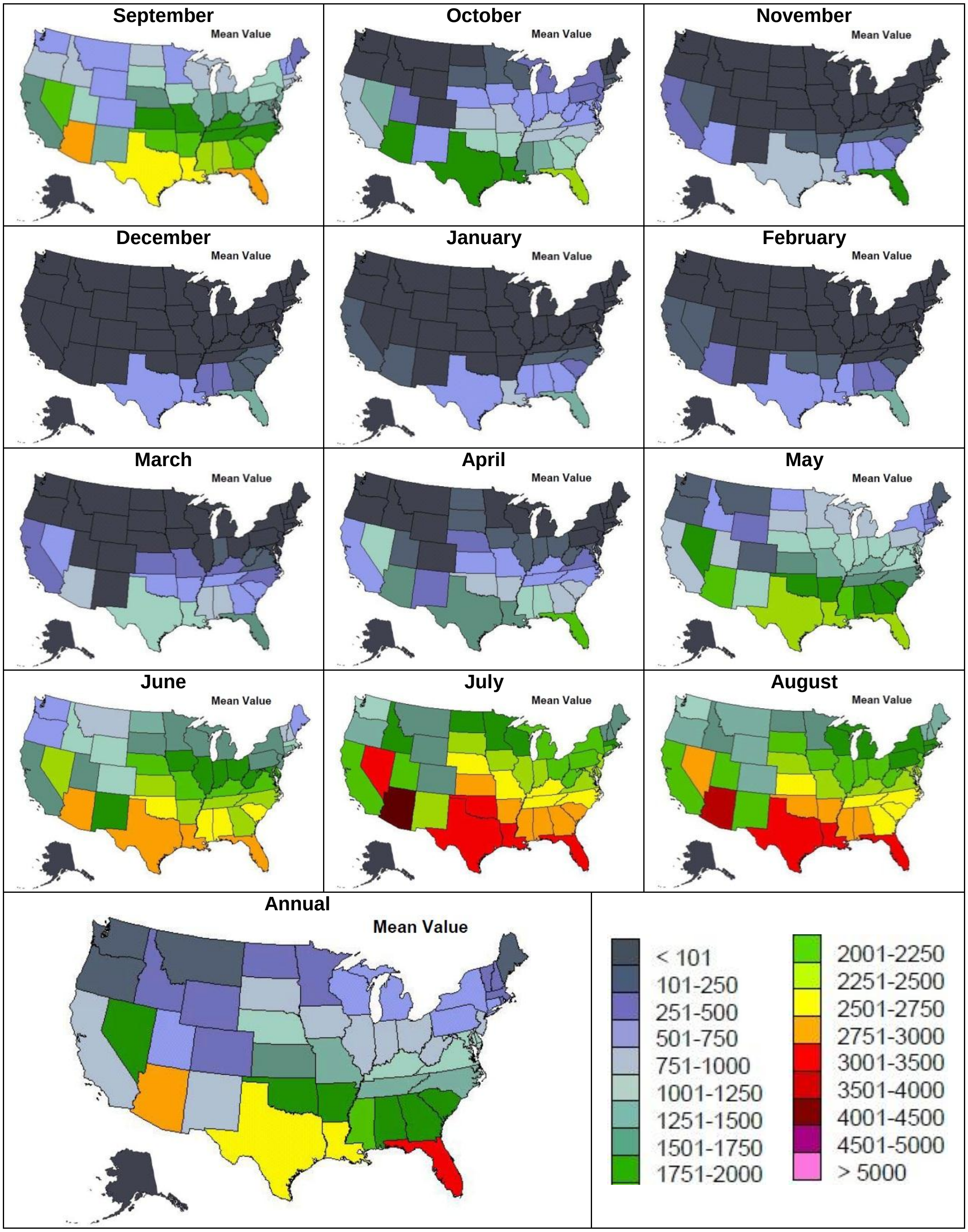

Figure 20. State normals maps of mean monthly and annual cooling degree days (CDD) from 1931-2000 (National Climatic Data Center/NESDIS/NOAA 2002)**.**

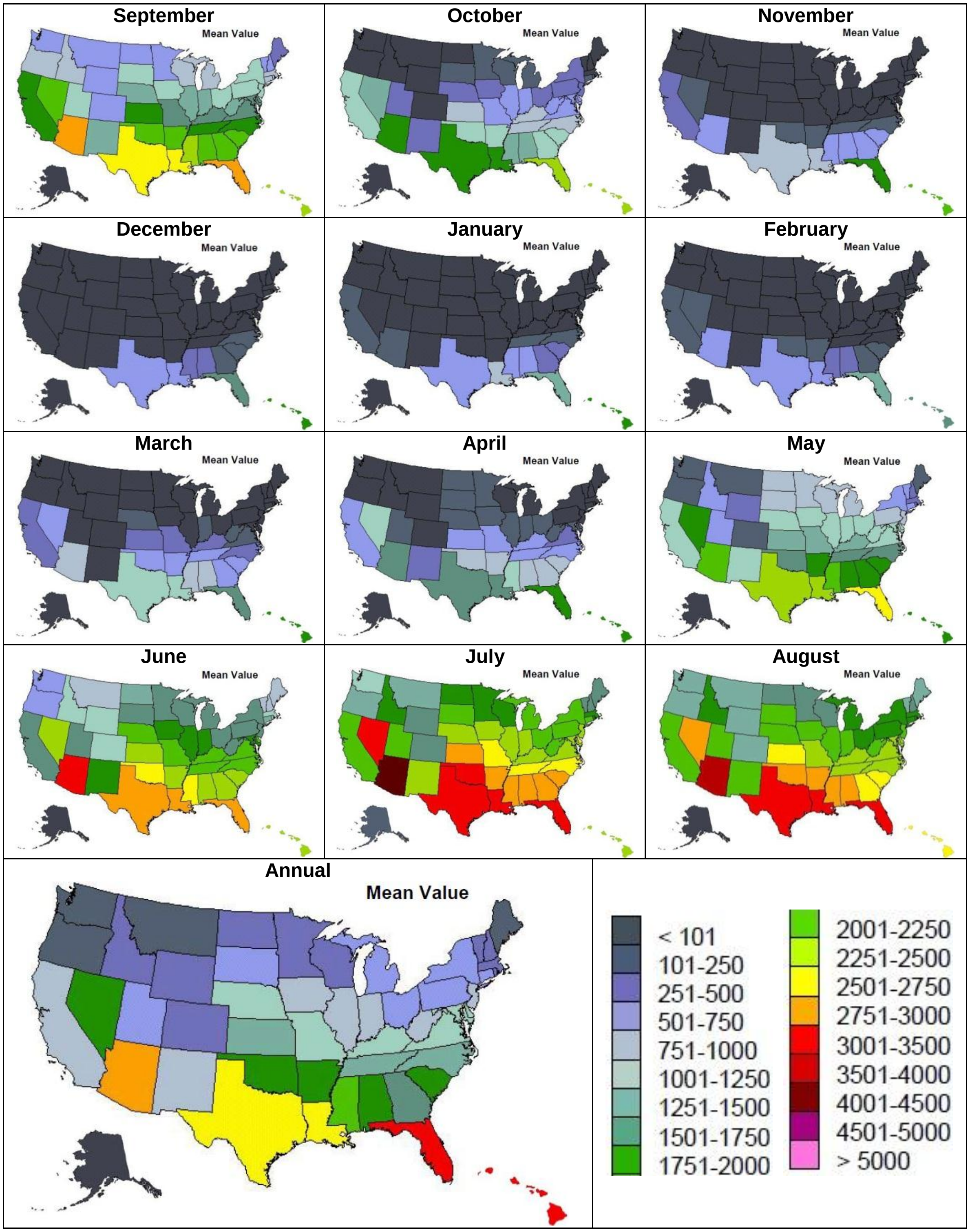

Figure 21. State normals maps of mean monthly and annual cooling degree days (CDD) from 1971-2000 (National Climatic Data Center/NESDIS/NOAA 2002)**.**

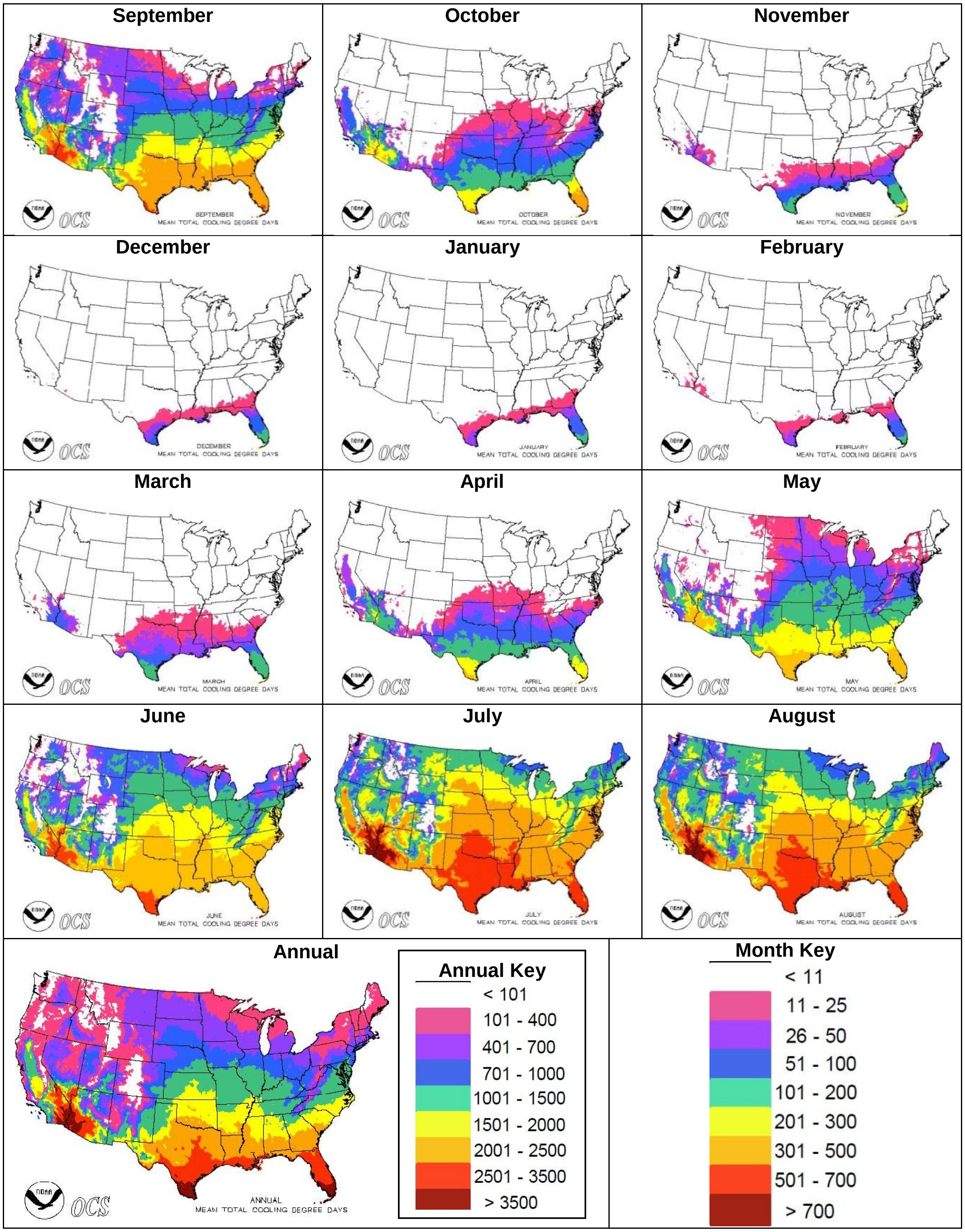

Figure 22. Mean total monthly and annual cooling degree days (CDD) from 1961-1990 (Plantico et al. 2005)**.**

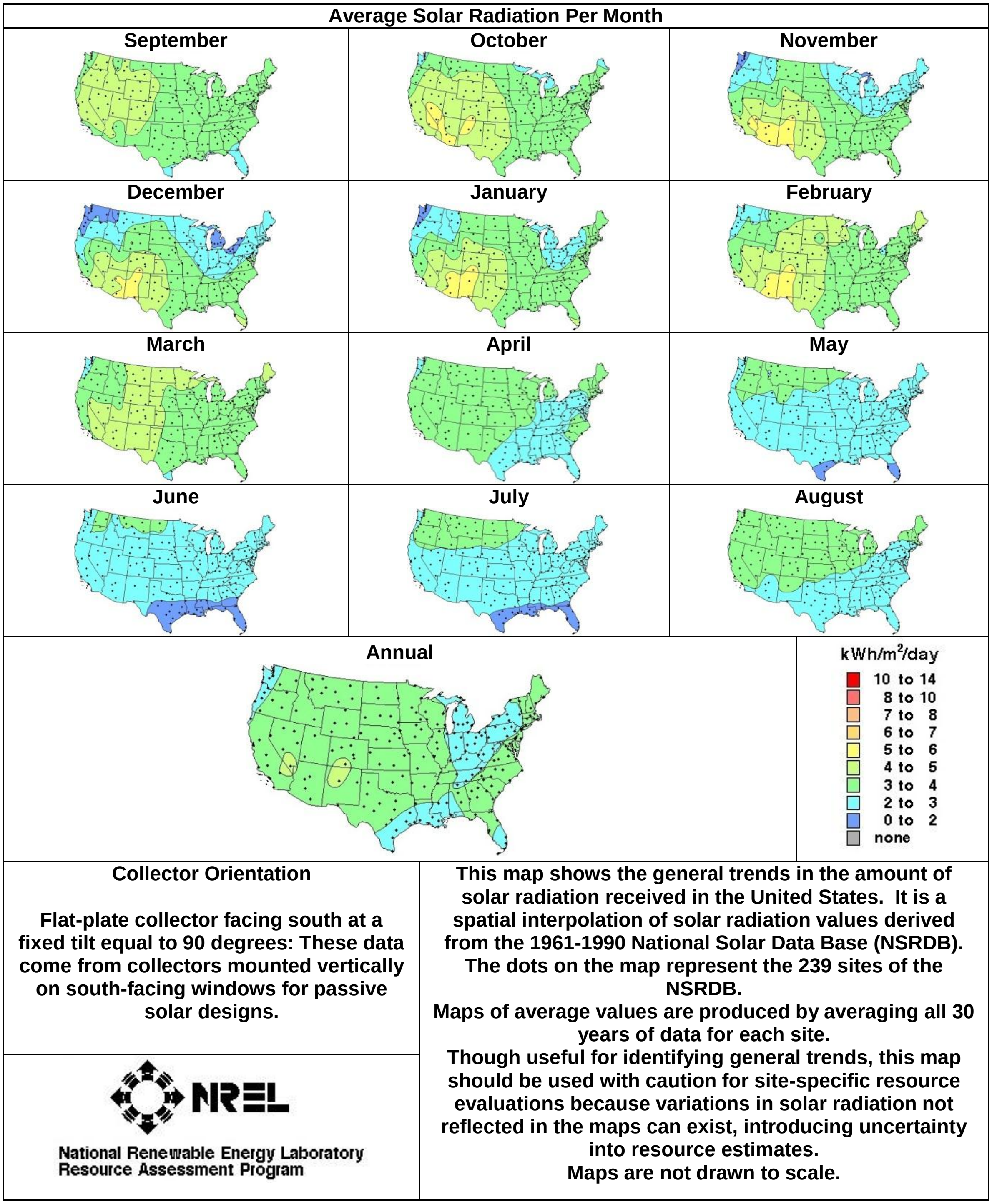

Figure 23. Average solar radiation measured at south facing vertical flat plate per month and annual average (Marion and Wilcox 1994)**. Displayed as a means to compare potential solar gain in study area with the rest of the United States.**

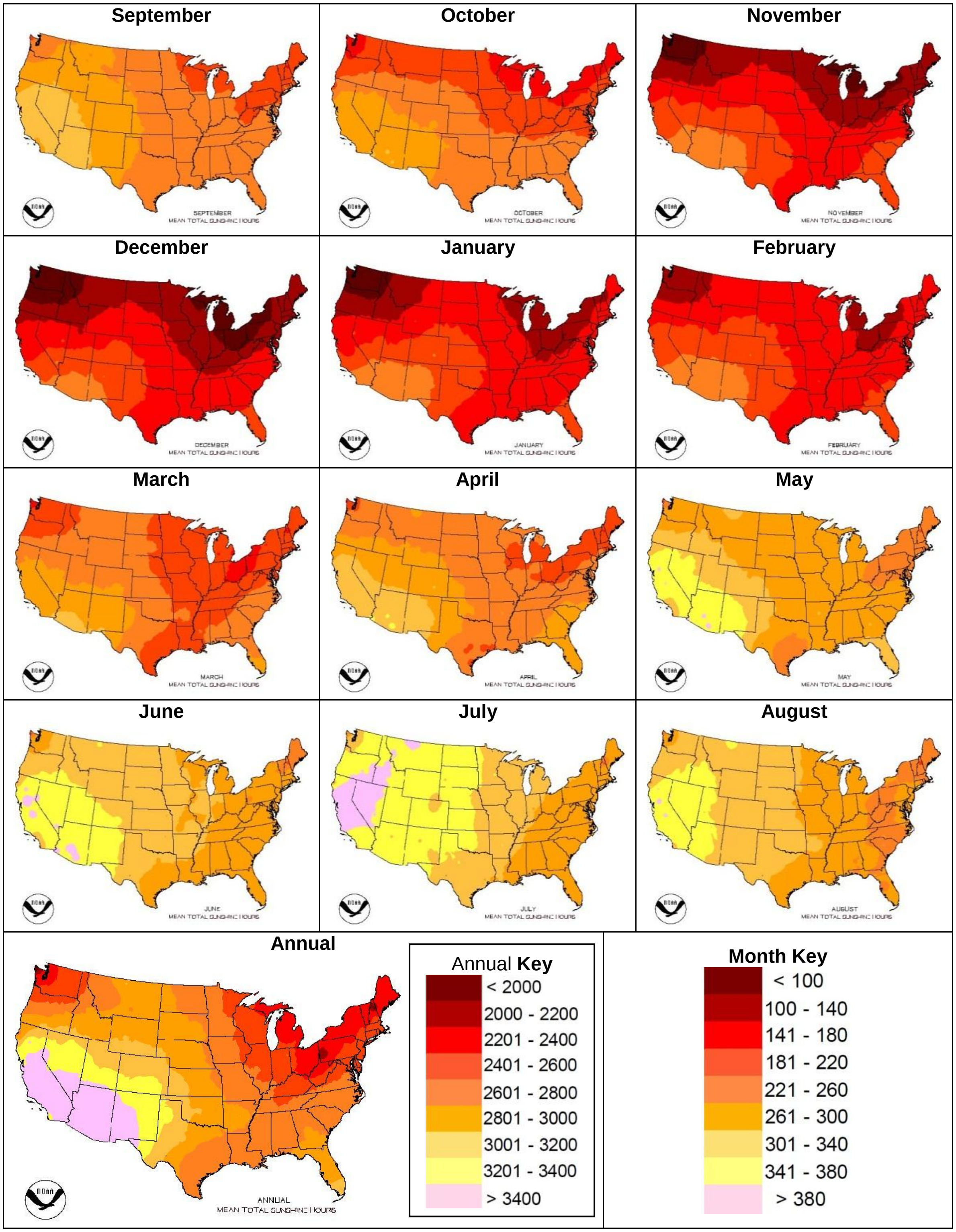

Figure 24. Mean total monthly and annual sunshine hours from 1961-1990 (Plantico et al. 2005)**.**

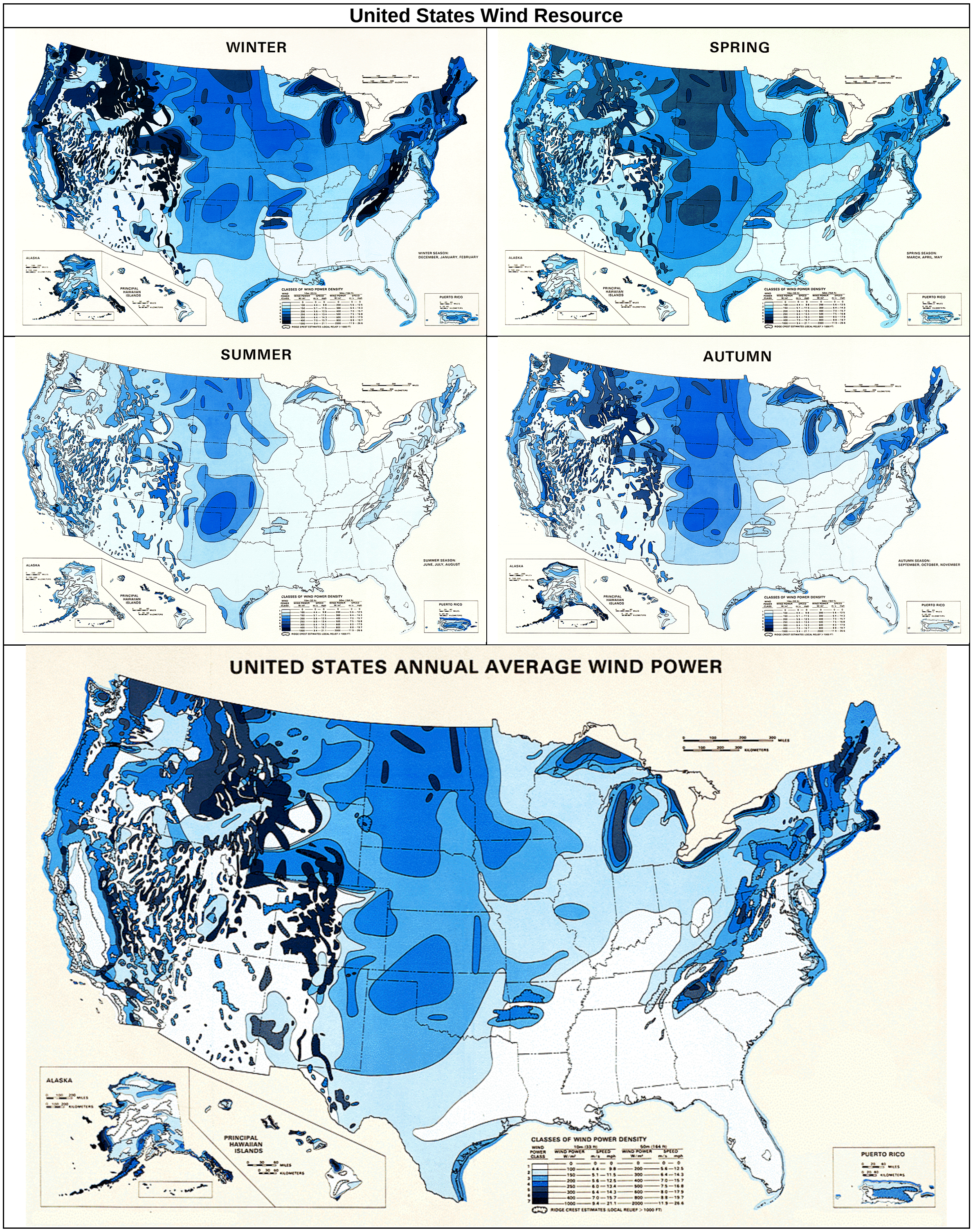

Figure 25. United States seasonal and annual wind resource maps. Data represented is from well exposed locations from the early 1980s (Elliot et al. 1986)**.**

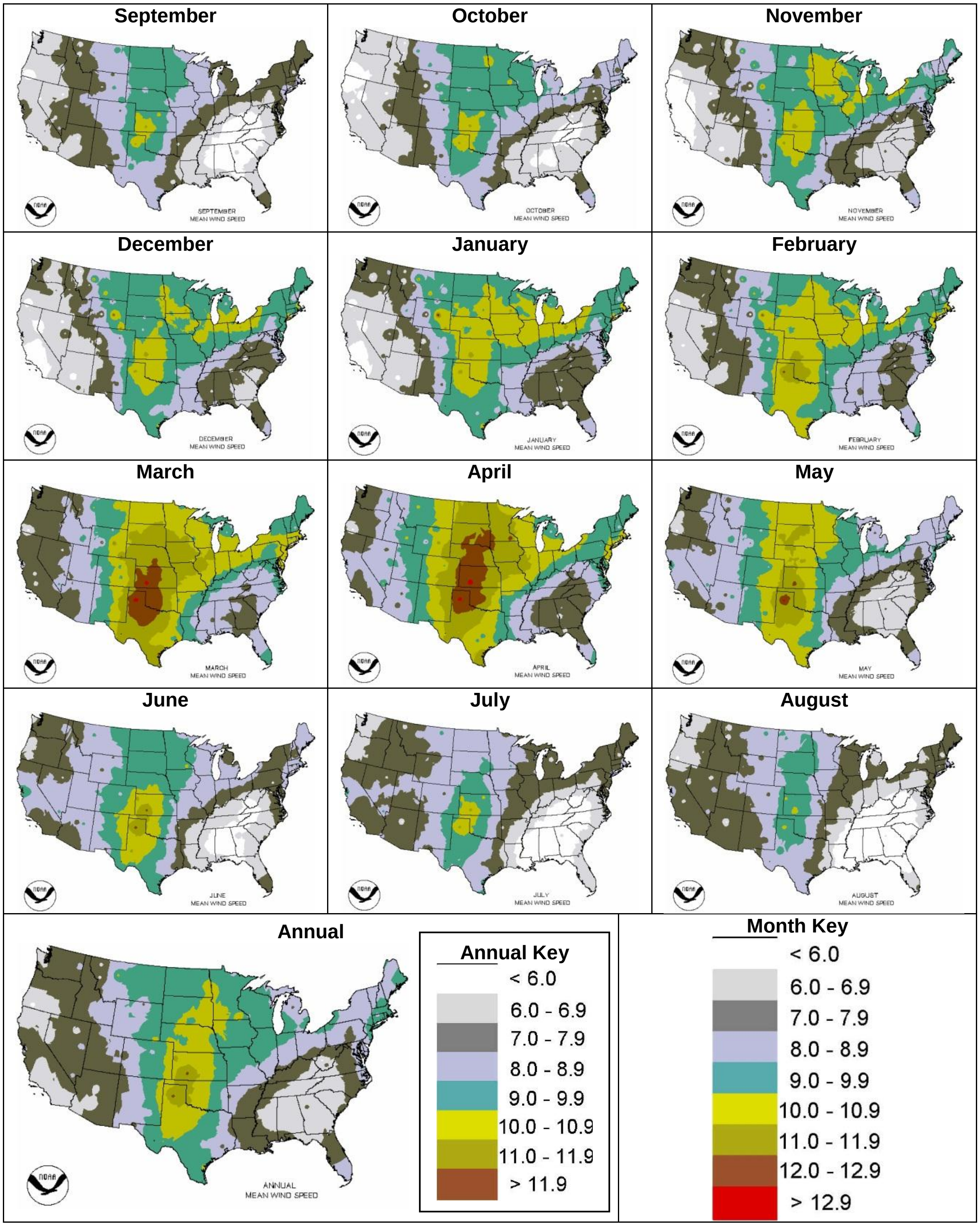

Figure 26. Mean monthly and annual wind speed in miles per hour from 1961-1990 (Plantico et al. 2005)**.**

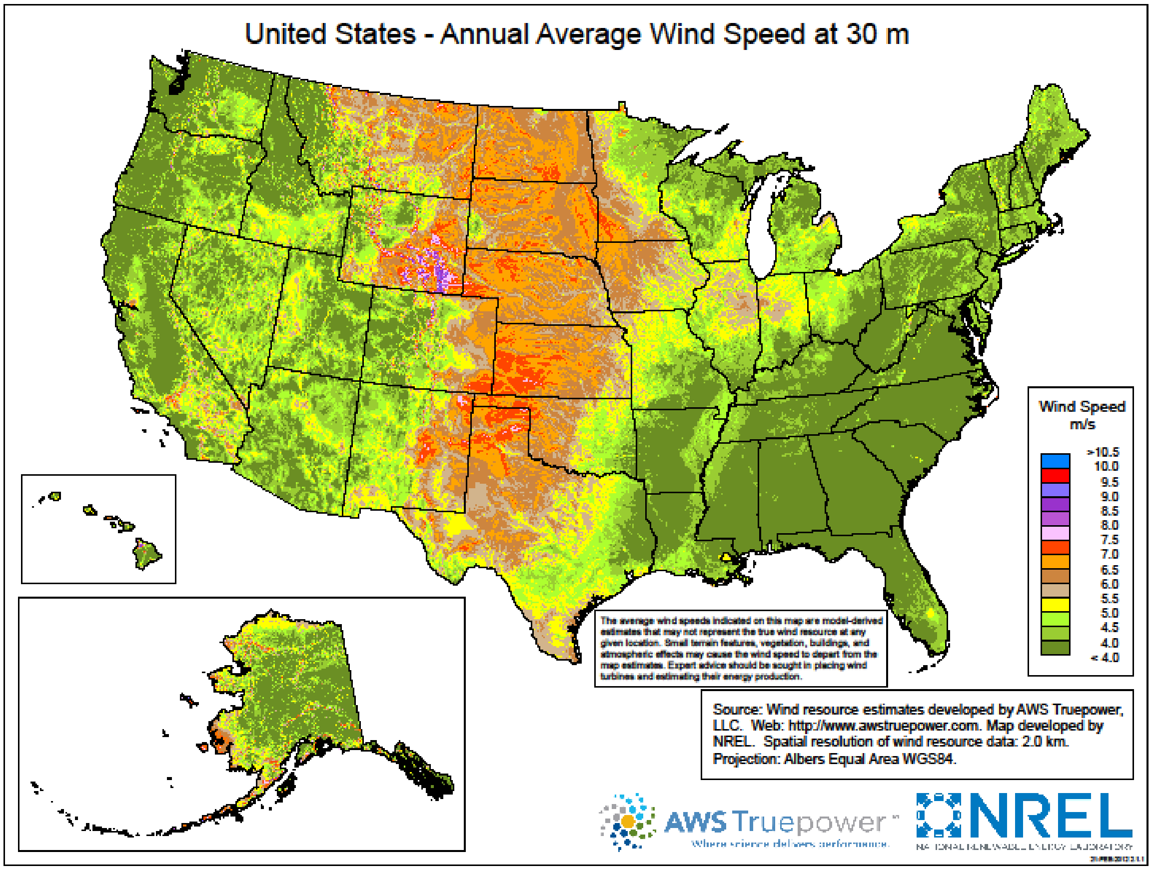

Figure 27. United States annual average wind speed at 30 meters (National Renewable Energy Laboratory 2012a)**.**

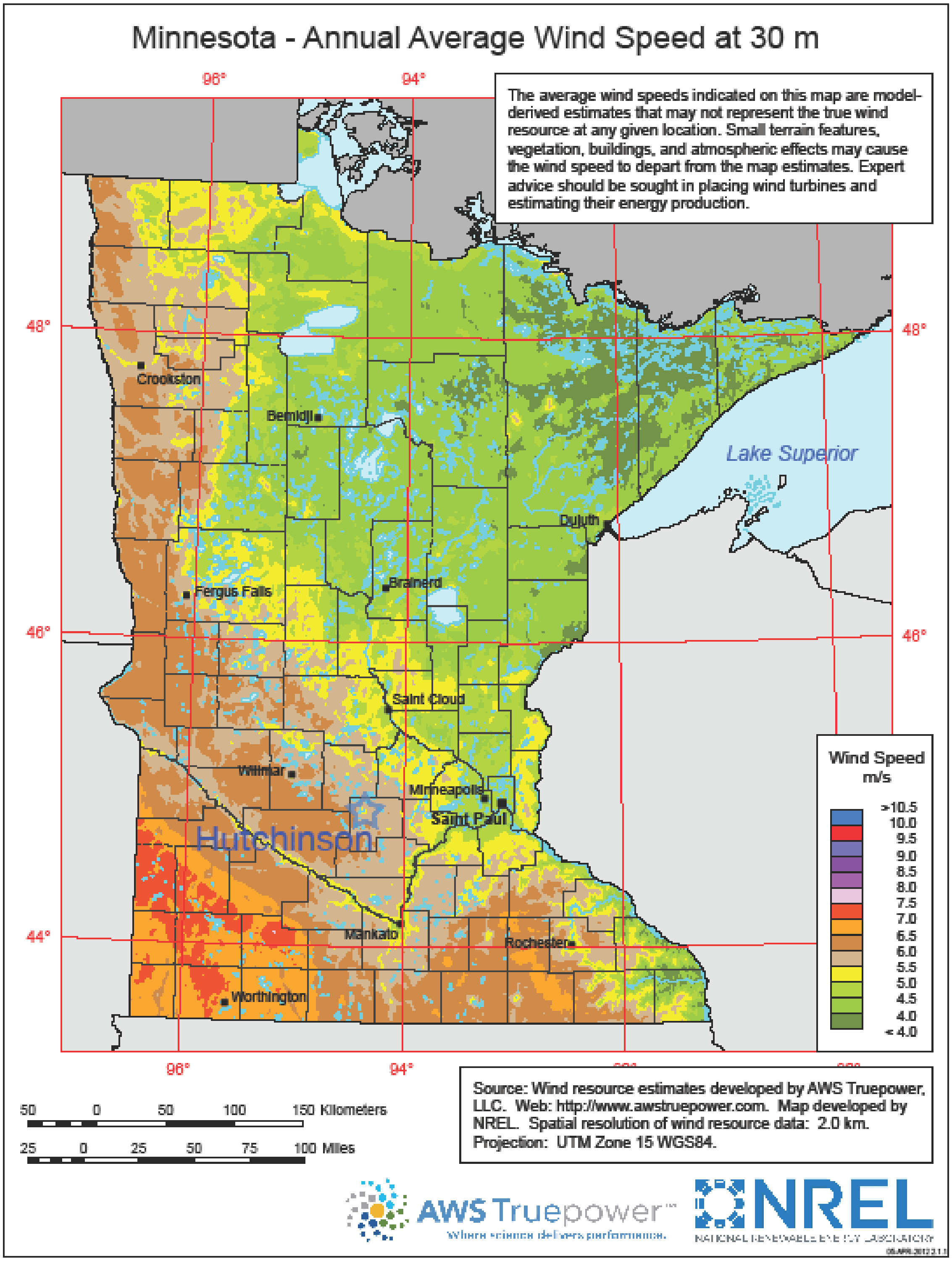

Figure 28. Minnesota annual average wind speed at 30 meters (National Renewable Energy Laboratory 2012b). **Hutchinson marked with blue star.**

Climate Change

The Minnesota State Climatology Office manages and reports on climate data dating back to 1819. Based on observed data, it reports that Minnesota has warmed by 2°- 4°F over the past 30 years and that this is at least partially human caused (Zandlo 2008).

Since trees and homes are both long-term investments and infrastructure of a community, the predicted future climate is relevant. The following are ways global climate change is likely to impact the Midwest United States as a region. Summer public health and comfort, especially in cities, will be challenged by increasing heat waves and reduced air quality. Warmer temperatures are also likely to bring increased insect populations and disease risk, both for people and trees. Increased moisture in winter and spring will likely lead to more flooding, while less predicted moisture in summer coupled with hot temperatures will bring increased evaporation and drought in summer months (T. Karl, Melillo, and Peterson 2009).

An even more recent draft report from the National Climate Assessment and Development Advisory Committee states the following likely changes to the Minnesota and Midwest climate (Pryor et al. 2013). If current greenhouse gas emission rates remain constant, this region will warm an additional 5°F in less than 40 years. The growing season will lengthen and carbon dioxide levels will rise. This could be favorable for some tree species, but the increased occurrence of extreme weather events like heat waves, droughts, and floods will bring added stresses. The predominant forests types will shift northward. This will allow introduction of new tree species but will stress other species that are used to cooler wetter climates (Pryor et al. 2013).

Besides the large scale changes that are taking place, our urban areas have been experiencing an additional type of change. According to McPherson and Rowntree (1993) there has been a steady rise in downtown temperatures since the 1940s across the US approximately 1°F per decade. They also report 3-8% of electric cooling demand as of 1993 was to compensate for this heat island effect.

Geography

Hutchinson, Minnesota covers approximately 9 square miles in area located between 44.853° and 44.914° latitude north and -94.422° and -94.328° longitude west at 1060 feet above sea level.

There are three main water bodies associated with Hutchinson. The South Fork Crow River flows directly through downtown. Campbell Lake and Otter Lake, both a part of the South Fork Crow River, are on the western edge of Hutchinson.

Based on the Public Land Survey, the pre-European settlement vegetation of Hutchinson would have been generally on the edge of the Eastern Deciduous Forest and the Tallgrass Prairie. More specifically, Hutchinson is on the edge of the Oak Woodland and Brushland and the Upland Prairie (Wendt and Coffin

1988). The Ecological Classification System, developed by the Minnesota Department of Natural Resources and the U.S. Forest Service, classifies land based on climate, geology, topography, soils, hydrology, and vegetation. Hutchinson is located at the edge of the Big Woods and the Minnesota River Prairie Ecological Subsections (Minnesota Department of Natural Resources 2000).

Figure 29. View of leafless tree canopy over a Hutchinson neighborhood. Image taken from upper floors of the Park Towers at 133 3rd Ave SW.

Based on viewing a variety of aerial imagery, the majority of the land area of Hutchinson is covered by residential housing with a range of tree cover.

Farmland, parks, water, and industrial land appear to make up the rest of the primary land uses.

Energy Provider

The electric and natural gas energy needs of the people of Hutchinson are met by the Hutchinson Utilities Commission. The Commission offers a rebate program, multiple energy conservation tips, and also funds the Energy Tree Planting Project (Hutchinson Utilities Commission 2012).

Urban Forest

The Energy Tree Planting Project (City of Hutchinson 2012a) was initiated in the 1990s by Mark Schnobrich, who was at that time the City of Hutchinson Urban Forester. This private tree planting program, although funded by the Hutchinson Utility Commission, is administrated through City of Hutchinson Urban Forestry and has planted over 8,000 since it was started (International Society of Arboriculture 2011). This project focuses on tree planting to shade air conditioners and windows and slow cold winter winds, with the goal of reducing the city's energy usage (National Arbor Day Foundation 2011). Besides administrating the Energy Tree Planting Project, the current Hutchinson City Natural Resource Specialist Mike Bahe is responsible for the planting, care, and removal of public trees. This includes trees in public parks, city property, and boulevards. Tree care includes routine pruning, storm damage maintenance, and also pest and disease monitoring and management. Hutchinson City

Forestry also provides expertise to citizens for tree planting and care (City of Hutchinson 2012b).

Minnesota DNR Community Tree Survey

In 2010 crews with the Minnesota Department of Natural Resources conducted limited visual ground surveys of the tree resource of 700 Minnesota communities. The survey sampled streets within residential and commercial neighborhoods. Public and private trees within 60 feet of the road were included in the survey. The goal of this project was to describe tree diversity by genera, size range, and the health condition of trees within Minnesota communities. The top five genera described by this survey in Hutchinson are Maple (27%), Ash (20%), Basswood (9%), Spruce (9%), and Apple (7%) (See Appendix C. Minnesota DNR Community Tree Survey for more details) (Minnesota Department of Natural Resources 2012). With ash making up 20% of the forest and with ash trees being one of the largest growing trees, the forest canopy cover is at significant risk to a dramatic change from Emerald Ash Borer, which has already been found in Minnesota.

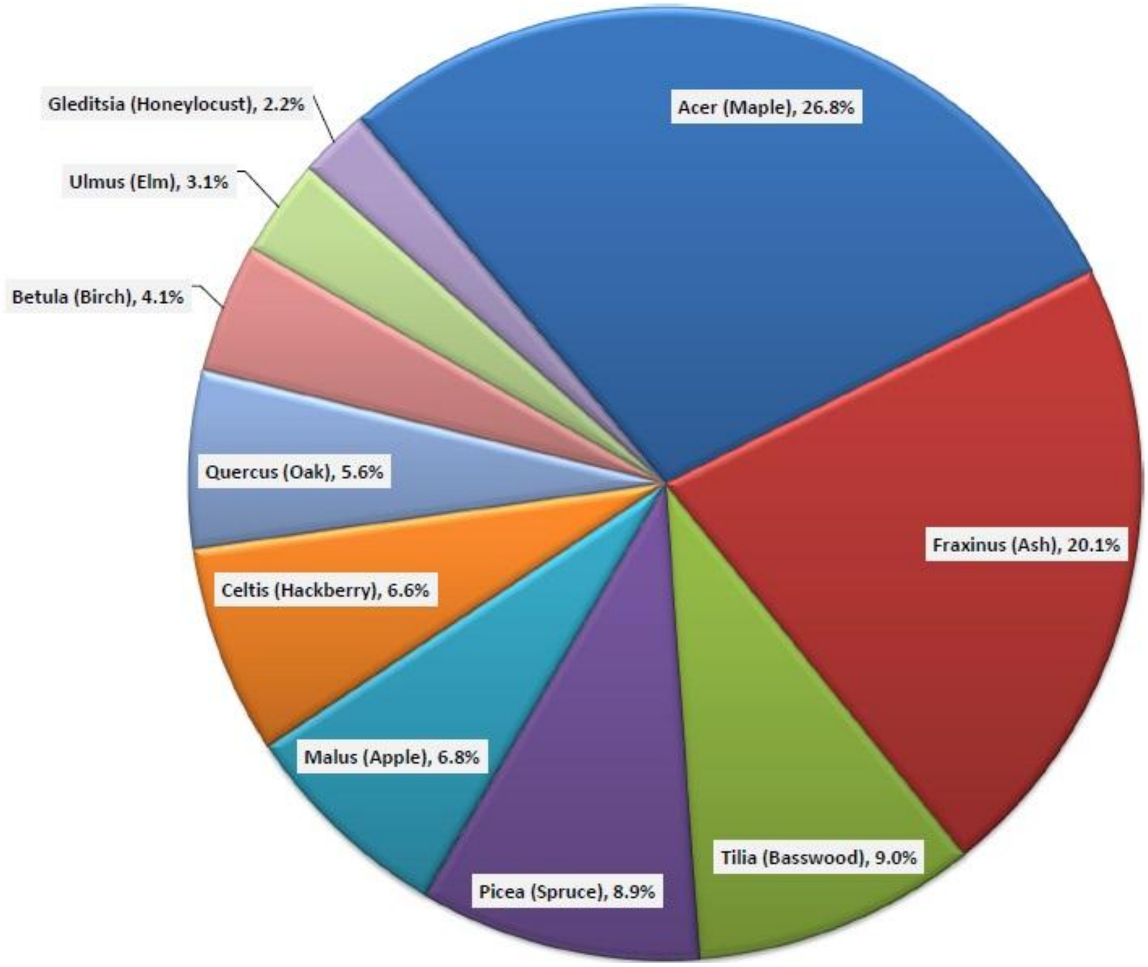

Figure 30. Top ten tree genera for Hutchinson, Minnesota (see Appendix C. Minnesota DNR Community Tree Survey) (Minnesota Department of Natural Resources 2012)**.**

Emerald Ash Borer Rapid Response Community Preparedness Project

City of Hutchinson Forestry proactively worked with the University of Minnesota Extension and the University of Minnesota's Department of Forest Resources' Community Engagement and Preparedness Team from 2009-2011 to train and mentor a team of community volunteers to conduct a tree survey to prepare for the threat of Emerald Ash Borer. This project collected data on tree diversity, age of the tree population, and the relative condition of the trees. Data collection was focused on community neighborhood trees and involved a pre-sample, random stratification sampling by block, and weighting by tree density. Accuracy was expected to be within 10% (Jaenson et al. 1992; Johnson 2011). Volunteer collected urban forest data has been shown to be valid and valuable in urban forestry management (Cozad, McPherson, and Harding 2005; Bloniarz and Ryan 1996).

Figure 31. Community tree inventory team member (image from Hutchinson Leader).

After collecting said detailed information about the urban forest resource, a community is well prepared to develop a proactive management plan for the inevitable arrival of Emerald Ash Borer. This project estimated 28,100 trees in Hutchinson with 21,500 on private properties and 6,600 on public properties. Of all private trees 17% are ash and of all public trees 24% are ash. Over 1,400 trees were estimated to be between 13-18 inches in diameter at 4.5 feet (DBH), over 1,200 between 19-24 inches DBH, another 1,200 from 7-12 inches DBH, and 500 from 25-30 inches DBH. The study estimated ash make up approximately 22% of the canopy area in Hutchinson. (see Figure 32 and Appendix B. Community Tree Fact Sheet Prepared for: Hutchinson, Minnesota) (Community Engagement Preparedness Team 2012). Like the DNR study, this more in-depth project indicated that ash trees are significant to the Hutchinson urban forest. This potential level of contribution from ash trees is at high risk and is vulnerable to dramatic change from the impact of Emerald Ash Borer.

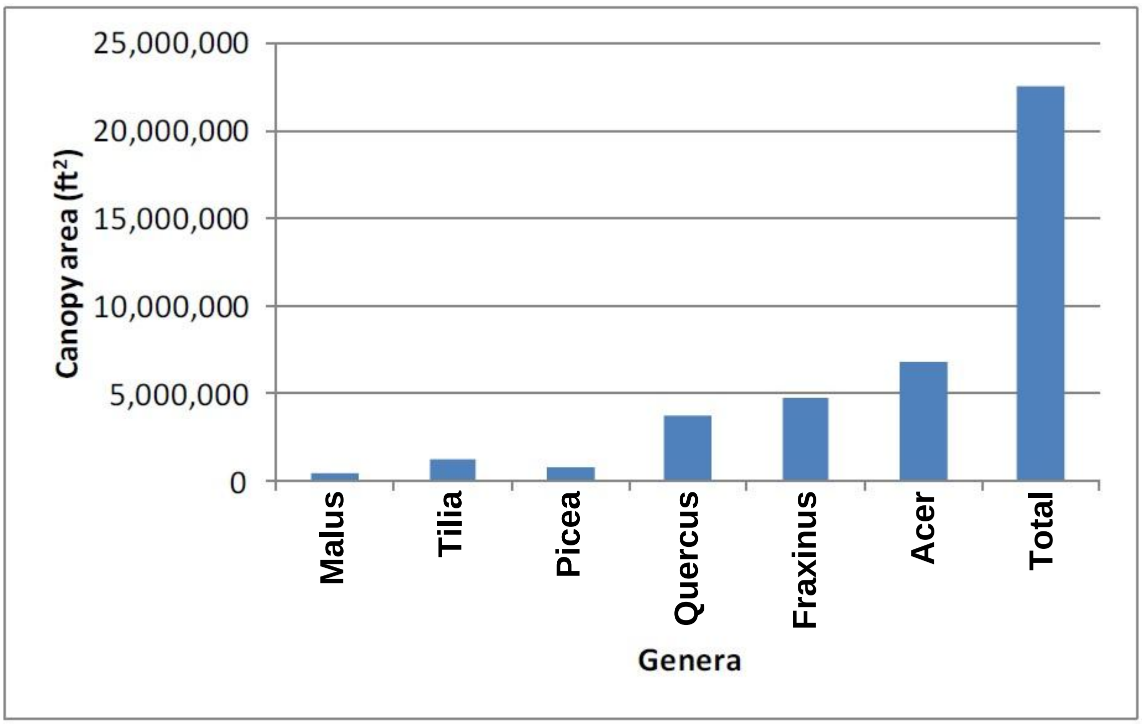

Figure 32. Relative crown spread by significant genera in Hutchinson. Relative crown spread refers to the average crown (canopy) area by genus combined with the frequency of each genus to present a relative crown spread that gauges the impact each genus has on the canopy cover of the community (see Appendix B. Community Tree Fact Sheet Prepared for: Hutchinson, Minnesota) (Community Engagement Preparedness Team 2012)**.**

Materials and Methods

Urban Tree Canopy (UTC)

Urban tree canopy was the independent variable in this study. UTC was measure as a percentage of area covered by trees from a two dimensional overhead perspective.

Assessment

The urban tree canopy (UTC) of Hutchinson was measured at two different scales and by four different methods. The various results were compared. One of the resulting urban tree canopy data was chosen for further analysis and comparison with energy consumption data.

Scale

Urban tree canopy was assessed over the entire municipal boundary of Hutchinson and was also calculated within a limited study area. The study area is focused on the residential and commerce centers of Hutchinson as defined by the previously discussed Emerald Ash Borer Rapid Response Community Preparedness Project (see Appendix B. Community Tree Fact Sheet Prepared for: Hutchinson, Minnesota) (Community Engagement Preparedness Team 2012). Team members used various aerial imagery and field assessment to determine the study area zones. See Figure 33 for a comparison of the municipal boundary with the study area.

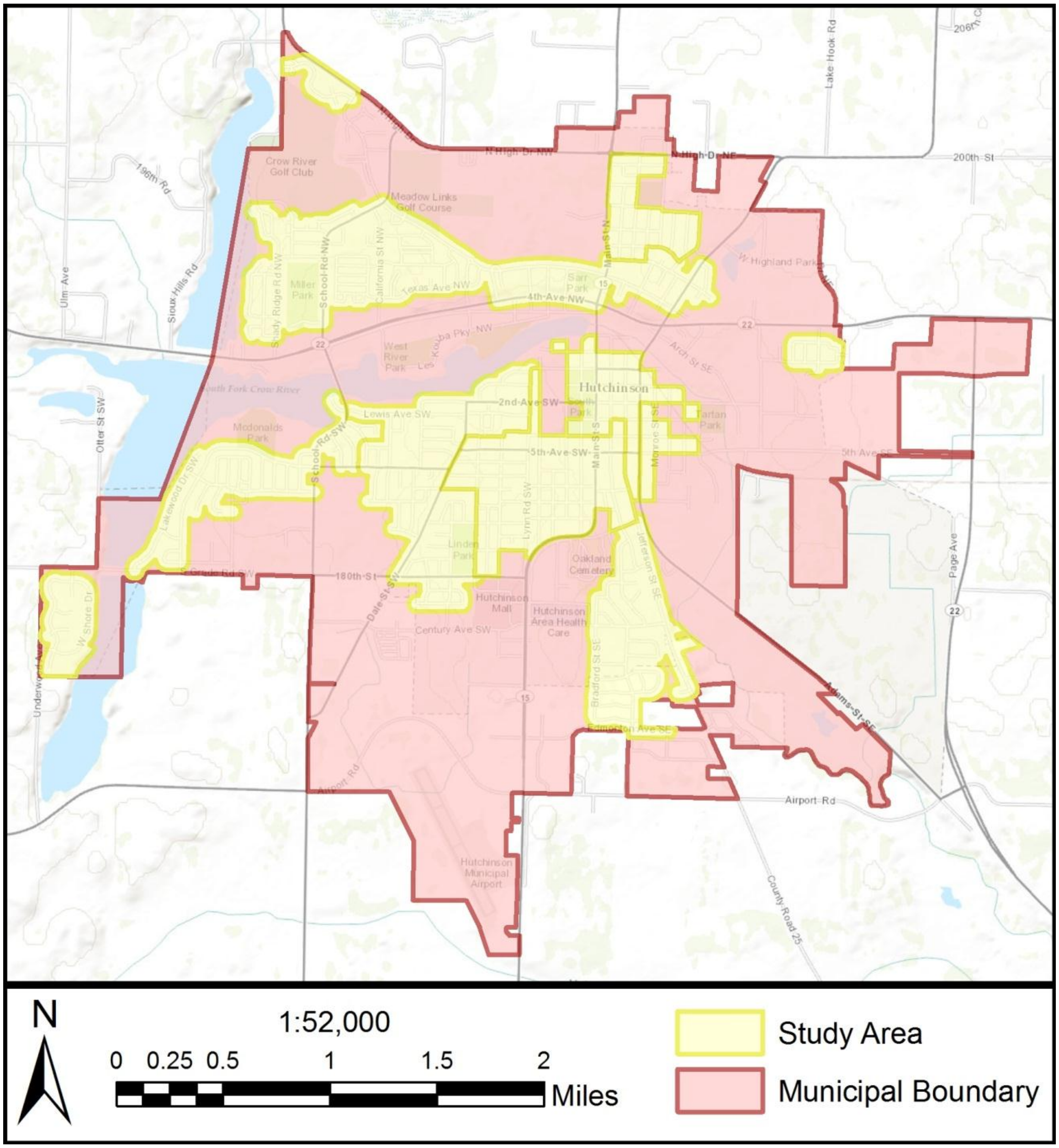

Figure 33. Comparison of Hutchinson municipal boundary to study area.

UTC Methods

Urban tree canopy was calculated by four different methods. Field measurements of canopy width from sampled blocks were extrapolated to estimate UTC within the study area. An estimate of UTC was calculated to the municipal boundary and study area by interpretation of randomly generated points. Technician photo interpretation of sampled blocks was extrapolated to estimate UTC in the study area. Technician photo interpretation was used to measure UTC in the study area and municipal boundary.

National Agricultural Imagery Program (NAIP) Digital Orthorectified Images from 2010 were used for technician interpretation (USDA Farm Service Agency Aerial Photography Field Office 2010). Images were downloaded using the MN Northstar Mapper (Minnesota Geospatial Information Office 2011). The imagery is summer “leaf-on” 3-band natural color imagery with 1 meter pixel resolution and is formatted to the UTM coordinate system using NAD83.

Google imagery was utilized to guide technician interpretations. Other leaf off imagery was also referenced where available, but was not used as a primary source of interpretation.

ESRI ArcGIS 10 was used for vector operations including area calculations, clipping raster images, digitizing tree canopies, and all related vector processing (ESRI 2011). iTree Canopy was utilized for point based classification (USDA Forest Service 2011).

Calculate UTC from field collected tree width measurements from sampled blocks

Tree inventory data was utilized to calculate UTC over the study area. This data was collected by the community tree inventory team as part of the Emerald Ash Borer Rapid Response Community Preparedness Project. Both publicly and privately owned trees were included in the inventory. Trees over maintained lawn were measured, but trees in natural or densely vegetated areas were not included. The community tree inventory team collected data on species, diameter at breast height, average crown width, and condition rating of trees within the sample blocks. The crown width measurements were utilized to estimate UTC within the study area. The tree inventory study was set up as a stratified random sampling method with blocks as the sampling unit stratified by zones. Zones were stratified based in canopy cover, building type, and street type (curvilinear or straight). The tree inventory design is based on A Statistical Method for the Accurate and Rapid Sampling of Urban Street Tree Populations (Jaenson et al. 1992).

The community tree inventory team collected two canopy width measurements and averaged them to report average canopy width per tree. These average canopy widths were equated to area by dividing the average canopy widths by 2 to get the radius of the canopy and then the radius was squared and multiplied by π (Area of Circle = πr^2). The sum of the areas of all the trees within a given block was used as an estimation of percent canopy for the block. This block level canopy data was used to estimate zone and community scale tree canopy by using an area based geographically weighted extrapolation equation (see Appendix F. Area based geographically weighted extrapolation equations). See Figure 34 for a representation of the blocks and zones that were utilized.

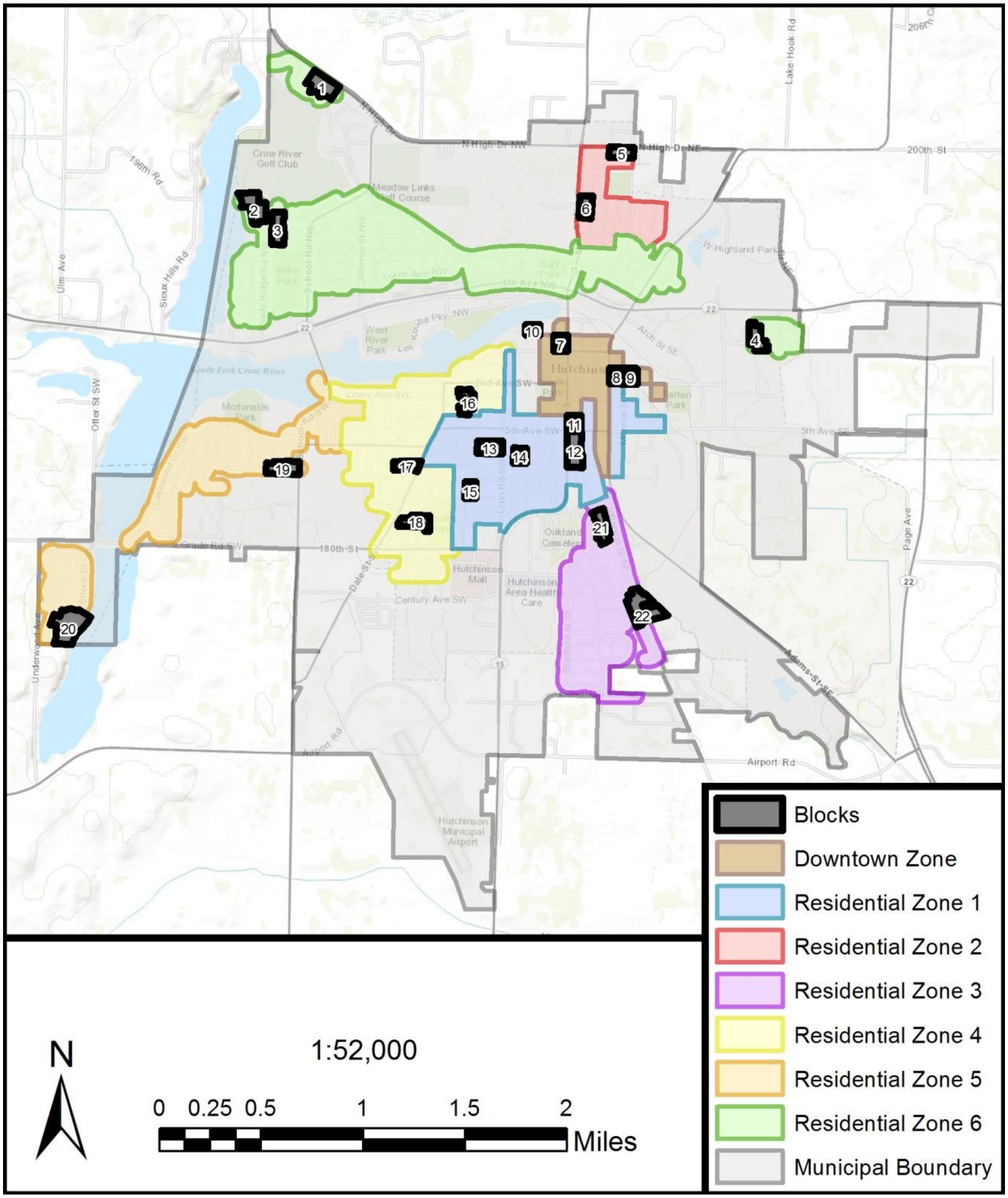

Figure 34. Hutchinson stratified zones and randomly sampled blocks with the study area.

Calculate UTC from randomly sampled points

iTree Canopy was utilized for the point based classification of both the study area and Hutchinson municipal boundary (USDA Forest Service 2011). iTree Canopy is a web application that guides a user through an interpretation process to determine a cover classification for a given area. The user sets a study area by uploading a shapefile to the software. The user then determines which classes they would like to classify and how many randomly generated points they would like to classify. The following cover classes were interpreted: tree, non-tree, and indiscernible. iTree Canopy uses Google Maps API to display randomly generated points within the study area. iTree Canopy provides a table and calculates percent cover along with standard error on the fly. It is also possible to download the results as a comma-separated values (CSV) file. The CSV file includes the cover classification data and geographical coordinates of the randomly generated points. There were 604 points interpreted within the Hutchinson municipal boundary used to estimate UTC. These points were displayed in ArcGIS and processed into a shapefile. Of the 604 points that were within the municipal boundary, 158 points were also within the study area. These 158 points were then moved into their own shapefile to be used to estimate UTC within the study area. See Figure 35 for a map of the randomly generated points within the study area and municipal boundary.

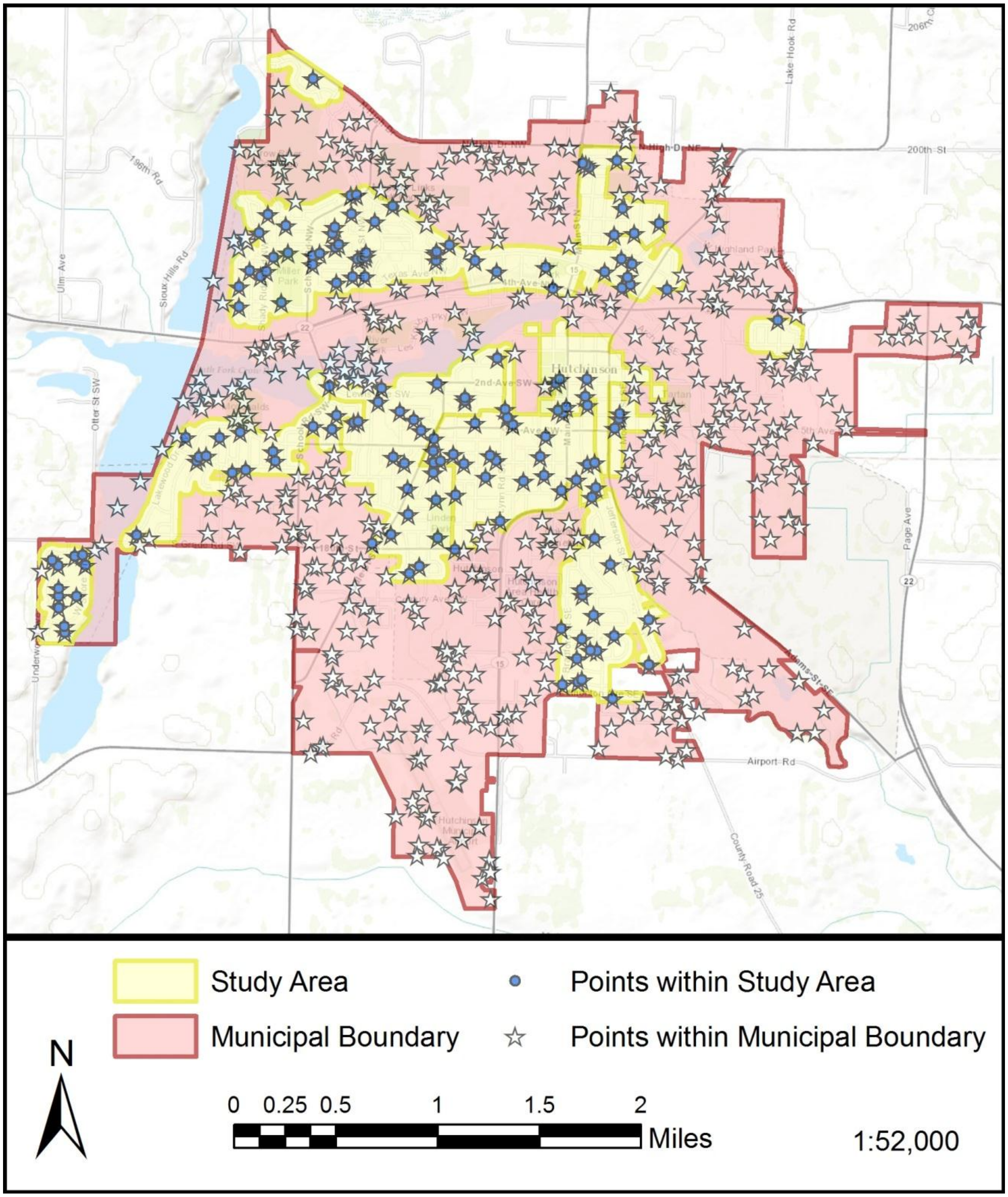

Figure 35. Randomly generated points from iTree analysis over study area and municipal boundary.

Measure UTC by technician photo interpretation

Urban tree canopy was measured over the entire municipal boundary and beyond. Technicians used ArcGIS to view, interpret, and digitize canopy by hand from the 2010 NAIP imagery discussed previously. There were two classifications as a result of this procedure, tree canopy and not tree canopy.

To prepare for comparison and analysis with the other canopy assessment methods the resulting shapefile was processed using multiple tools in ArcGIS. First, the multitude of polygons that made up the tree canopy were processed with the Dissolve tool into a single polygon with no attributes. The dissolved shapefile was then processed with the Identity tool by the municipal boundary to ensure canopy outside the boundary was not included and attributes of the boundary file were applied to the result. The Canopy of Municipal Boundary file was retained, canopy area was calculated, and canopy area was divided by area of the Municipal Boundary resulting in Percent Canopy of Municipal Boundary. The same process was followed to calculate the Percent Canopy of the Study Area. The Canopy of Study Area file was then processed with the Identity tool by the Zones that were generated for the tree inventory. Canopy of Zones file was retained, canopy area was calculated by zone, and canopy area by zone was divided by the area of each given zone resulting in Percent Canopy by Zone. Canopy of Zones file was then processed with the Identity tool by the Sampled Blocks that were generated for the tree inventory where field data was collected. The Canopy of Blocks file was retained, canopy area was calculated by block, and canopy area by block was divided by the area of each given block resulting in Percent Canopy by Block. See Figure 36, Figure 37, and Figure 38 for the full tree canopy coverage and detailed views of the digitization.

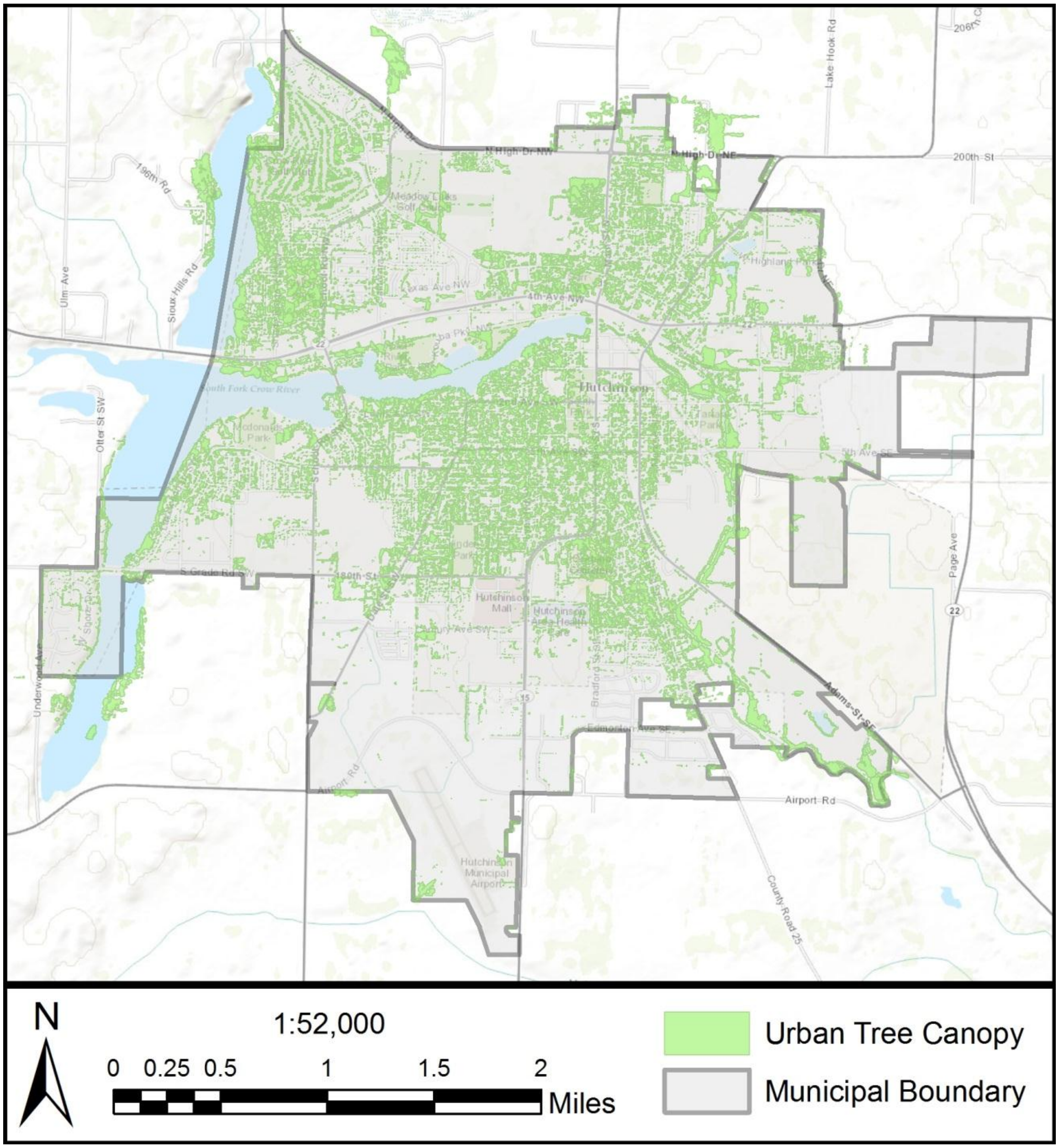

Figure 36. Digitized urban tree canopy and municipal boundary of Hutchinson.

Figure 37. Comparison of NAIP imagery before (left) and after (right) tree canopy digitization.

Figure 38. More detailed comparison of NAIP imagery before and after tree canopy digitization.

Calculate UTC by technician photo interpretation of sampled blocks

Urban tree canopy was estimated for the study area by extrapolating from technician photo interpreted sampled blocks. Essentially, technicians used ArcGIS to view, interpret, and digitize canopy by hand from the same 2010 NAIP imagery as above only within the sampled blocks that were generated for the tree inventory. In actuality, the block data was clipped from the UTC dataset that was digitized over the entire municipal boundary (as described above). This estimate has been performed to determine how close this less time intensive method compares to the other methods. Percent canopy by block was calculated by dividing canopy area per block by the area of each given block. Block level canopy data was used to estimate zone and community scale tree canopy by using an area based geographically weighted extrapolation equation (see Appendix F. Area based geographically weighted extrapolation equations). See Figure 39, Figure 40, and Figure 41 for images of the block UTC at full scale and at a detailed scale.

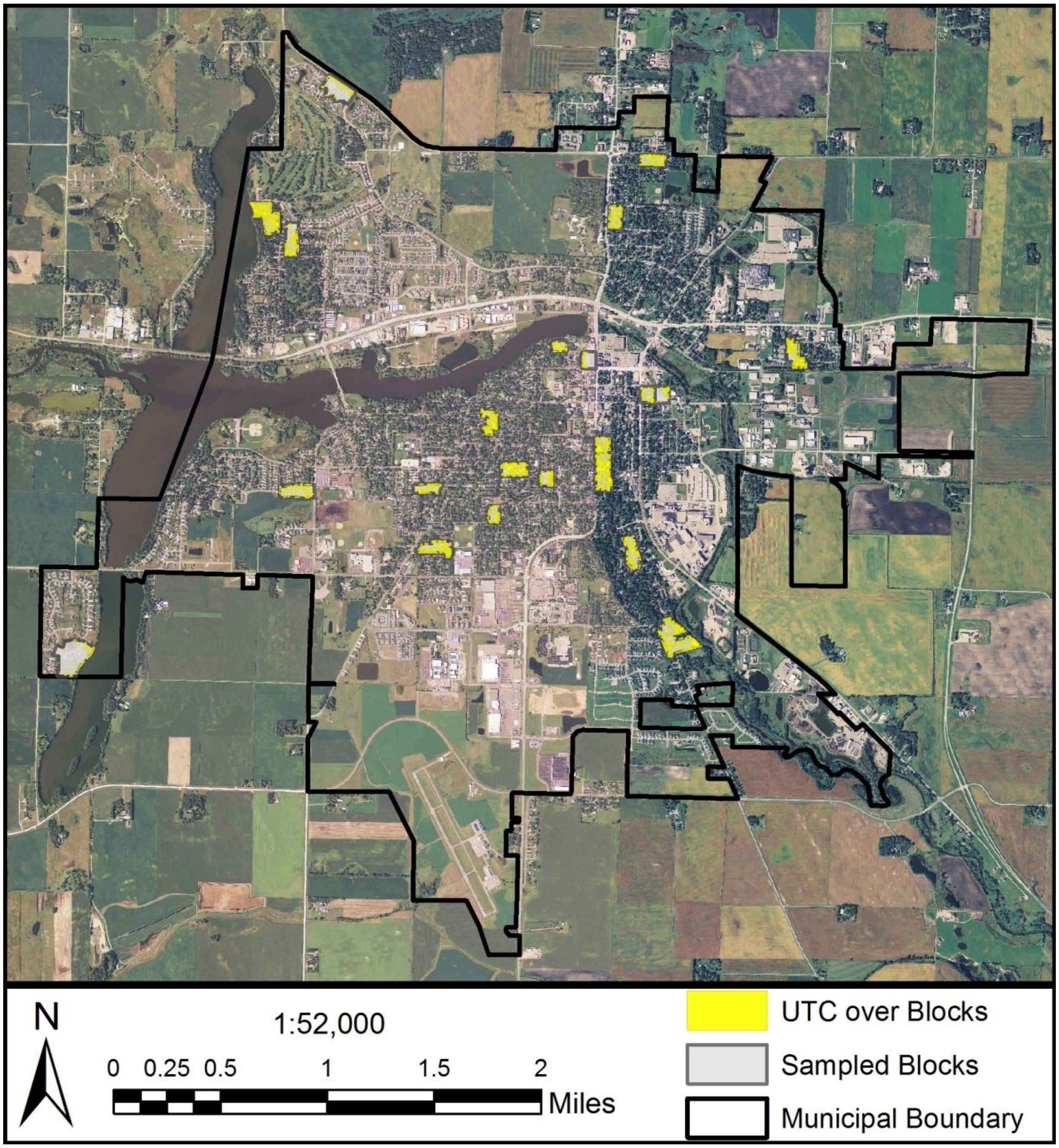

Figure 39. UTC digitized over blocks.

Figure 40. Detail of UTC digitized over three blocks.

Figure 41. Detail of UTC digitized over a block.

GIS Processing

The previously discussed blocks and zones shapefiles were digitized as part of the Emerald Ash Borer Rapid Response Community Preparedness Project. The municipal boundary shapefile was acquired from McLeod County GIS office. A parcel shapefile of parcels from within the sampled blocks was also acquired from the McLeod County GIS office. The blocks shapefile was built up from the parcel shapefile. Likewise the study area shapefile was built up from the zones shapefile. The technician interpreted UTC shapefile was selected for analysis against energy consumption data. The UTC data was prepared at the block scale and parcel scale. Multiple buffers at incremental distances were established for the analysis.

Block Scale UTC

Two buffers were established around each of the blocks. The buffers included the block itself. One buffer was set at 300 feet from the block and the other was set at 1000 feet from the block. These distances were selected because of the findings of Heisler (1989) related to wind speed reduction in residential neighborhoods with various tree canopy densities. Percent tree canopy by area was determined at each block, at each 300 foot buffer from block, and at each 1000 foot buffer from block. The methods used to determine the percent tree canopy within the block buffers was the same as the previously discussed block and zone UTC data. See Figure 42 for samples of the 300 foot and 1000 foot block buffers with the tree canopy data.

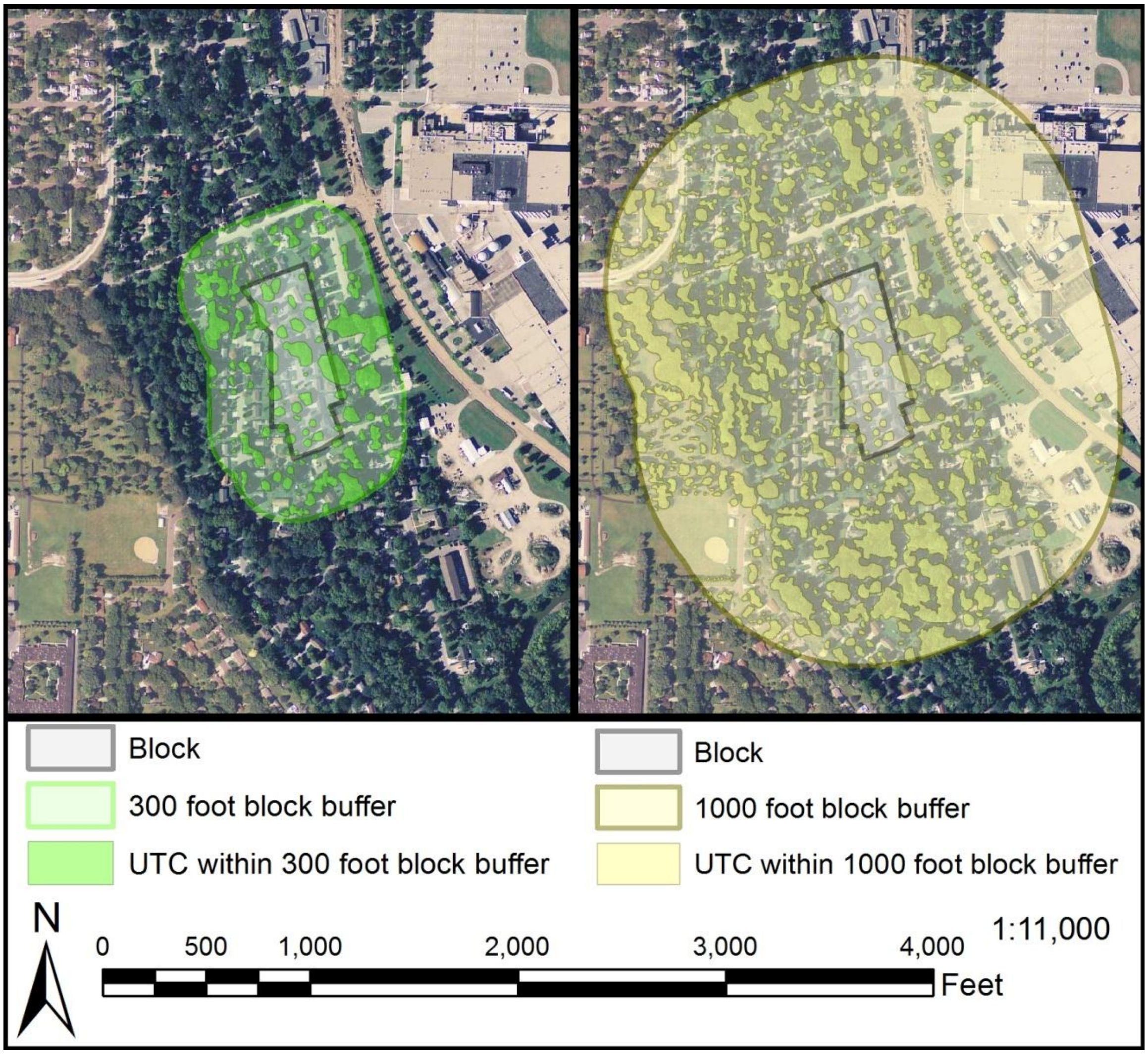

Figure 42. Example of 300 foot (left image) and 1000 foot (right image) block buffer with related urban tree canopy.

Parcel Scale UTC

After preliminary analysis of the block scale UTC against aggregated block scale energy consumption data, it was determined that parcel scale UTC should also be determined. Parcel scale urban tree canopy was prepared by establishing buffers surrounding each sampled parcel. Percent UTC by area was determined within each of the buffers.

Comprehensive parcel buffers

Buffers were set at 100 foot increments from 100 feet to 1500 feet. This first set of buffers included the parcel with the buffer. See Figure 43 and Figure 44 for sample images of the comprehensive parcel buffers with UTC.

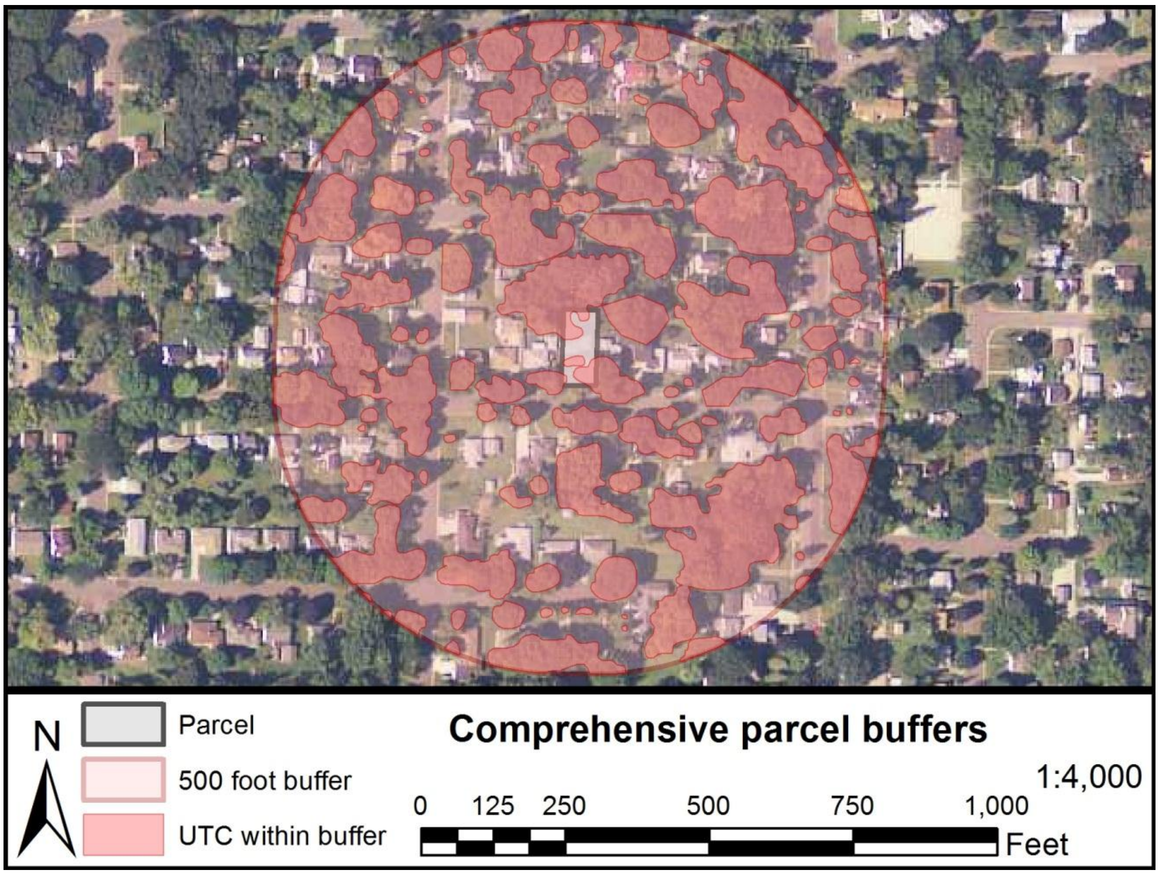

Figure 43. Sample detail of comprehensive parcel buffers.

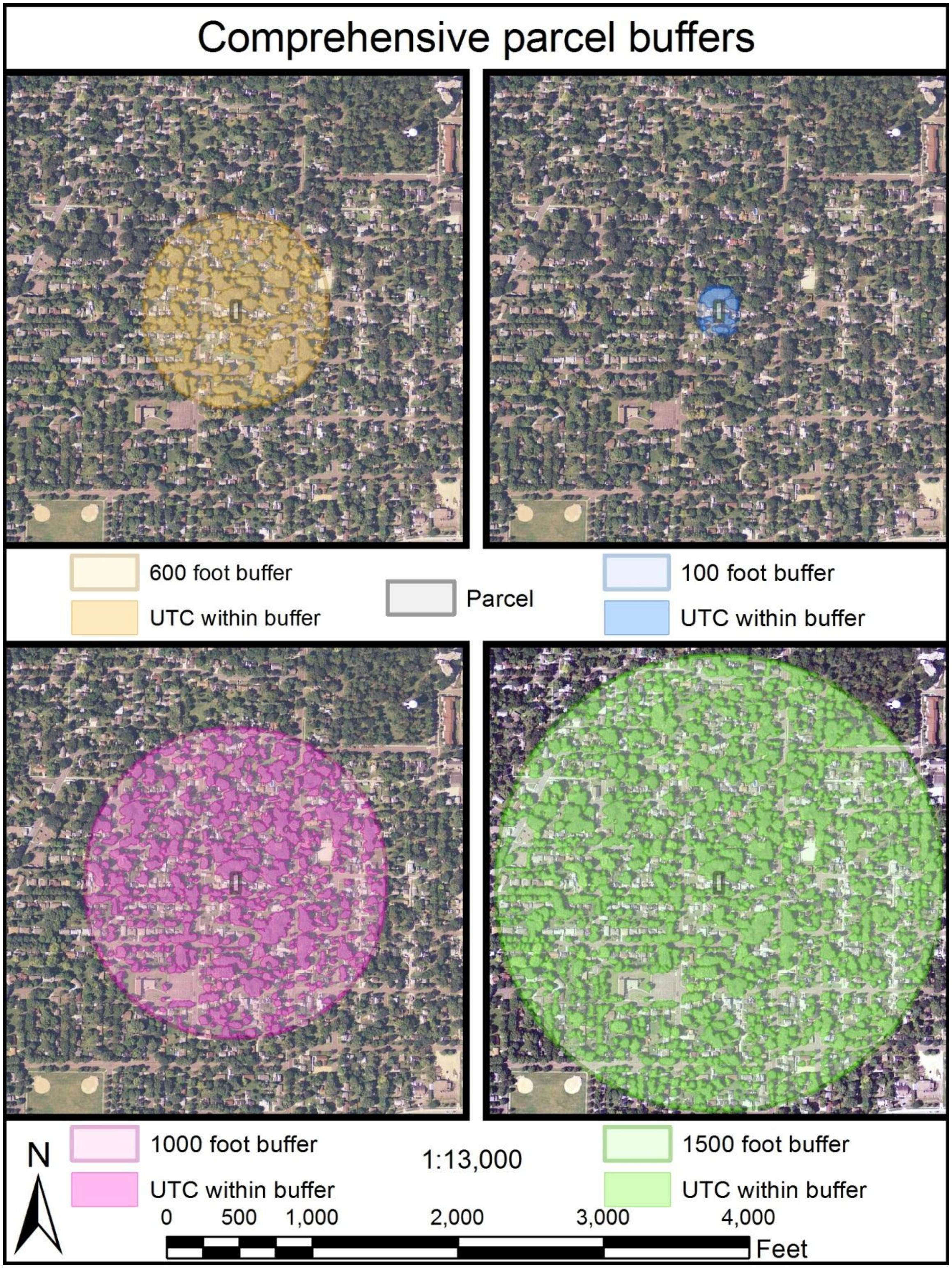

Figure 44. Samples of comprehensive parcel buffers.

Thin band parcel buffers

Another set of buffers was established that included only the incremental 100 foot distance between each buffer. For example, a buffer was set from 100 feet to 200 feet from the parcel. Then a buffer was set from 200 feet to 300 feet from the parcel. The next was from 300 feet to 400 feet from the parcel. These thin buffers were also set out to 1500 feet from the parcel. See Figure 46 and Figure 46 for sample images of the thin band parcel buffers with UTC.

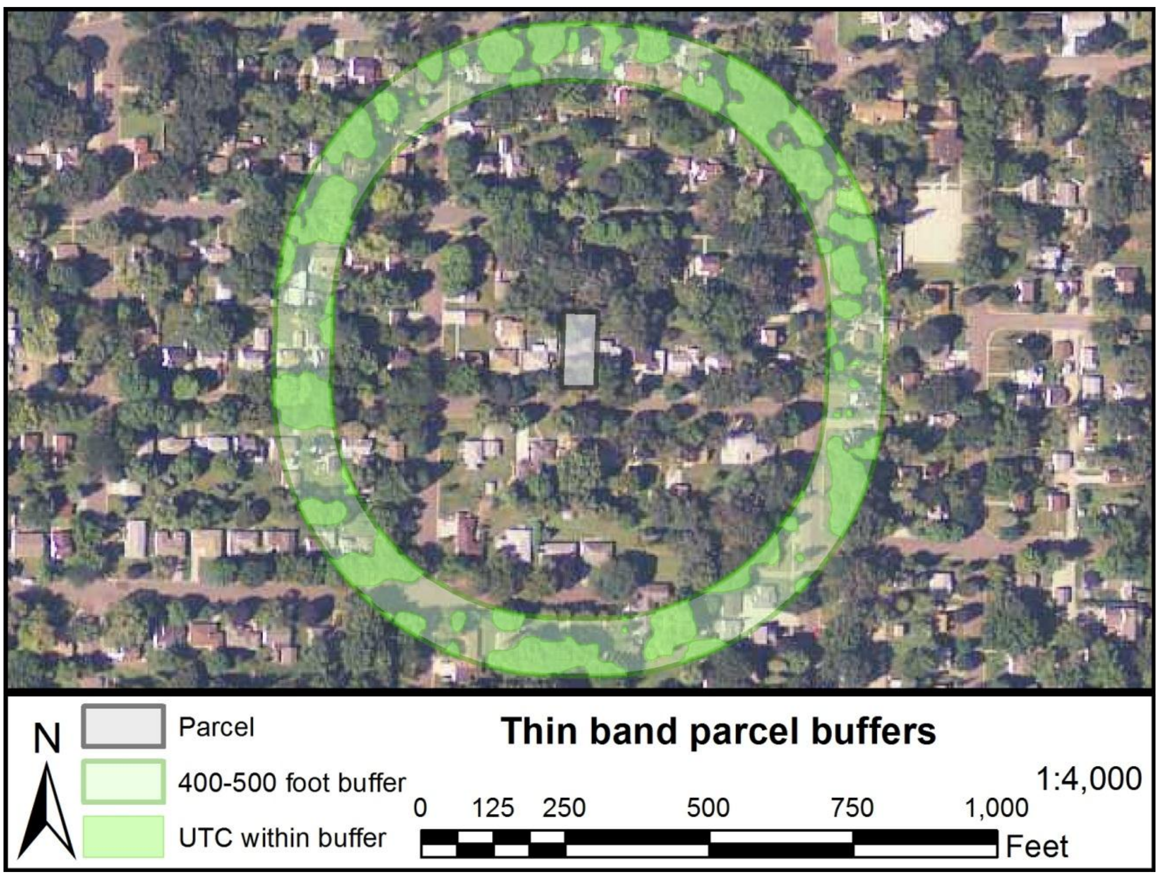

Figure 45. Sample detail of thin band parcel buffers.

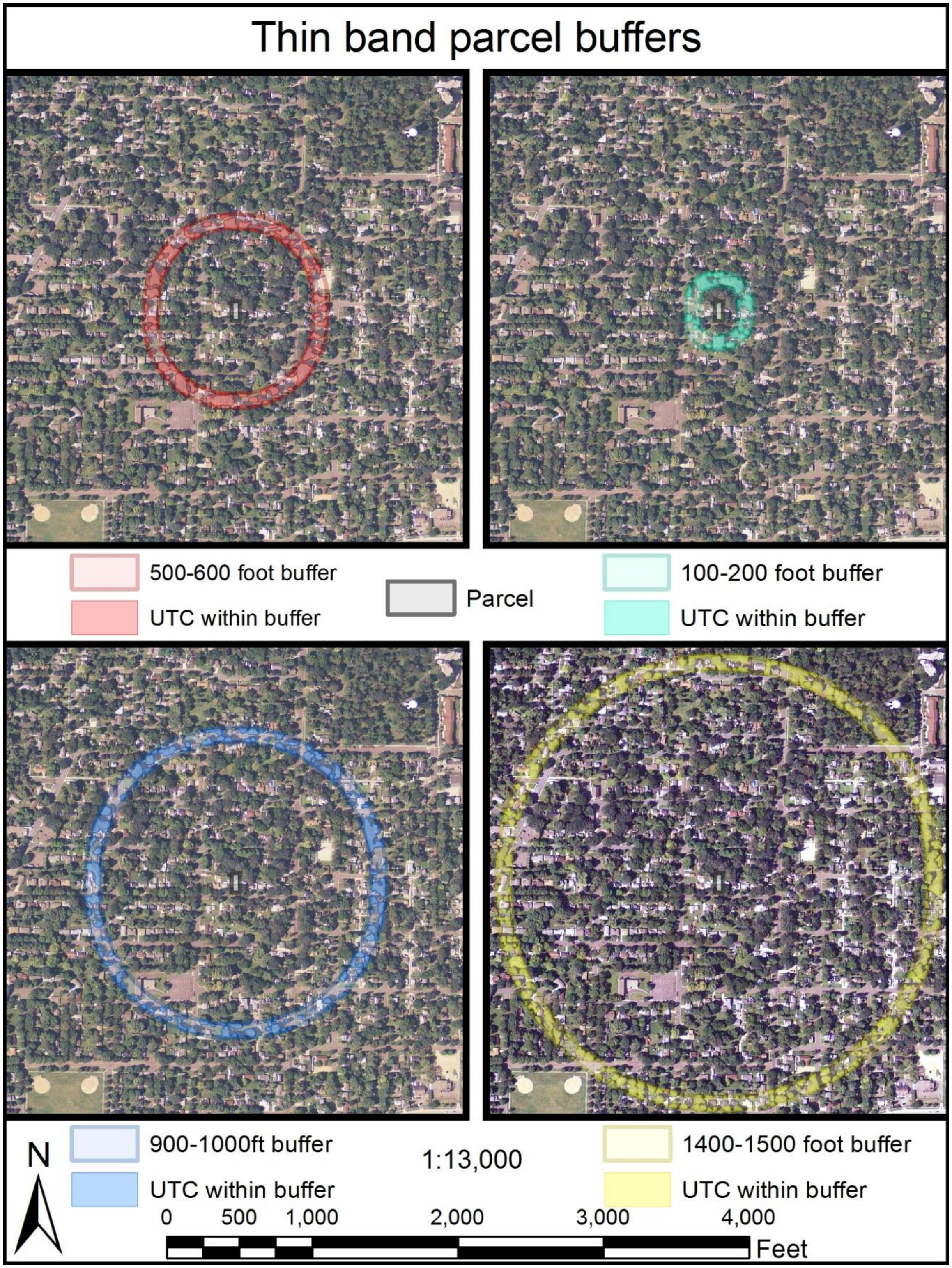

Figure 46. Samples of thin band parcel buffers.

Wide band parcel excluded buffers

The next set of buffers was similar to the first set but the parcel itself was excluded from the resulting buffer. Each buffer included the area from the parcel to the outside edge of the buffer excluding the parcel. The purpose for excluding the area around the homes was to separate the potential shading impact of trees from the potential wind impact of trees on home energy consumption. There were no directional distinctions used for this exclusion, even though trees to the north of a home do not cast a shadow on roof, walls or windows of homes in the northern hemisphere. See Figure 47 and Figure 48 for sample buffers with UTC.

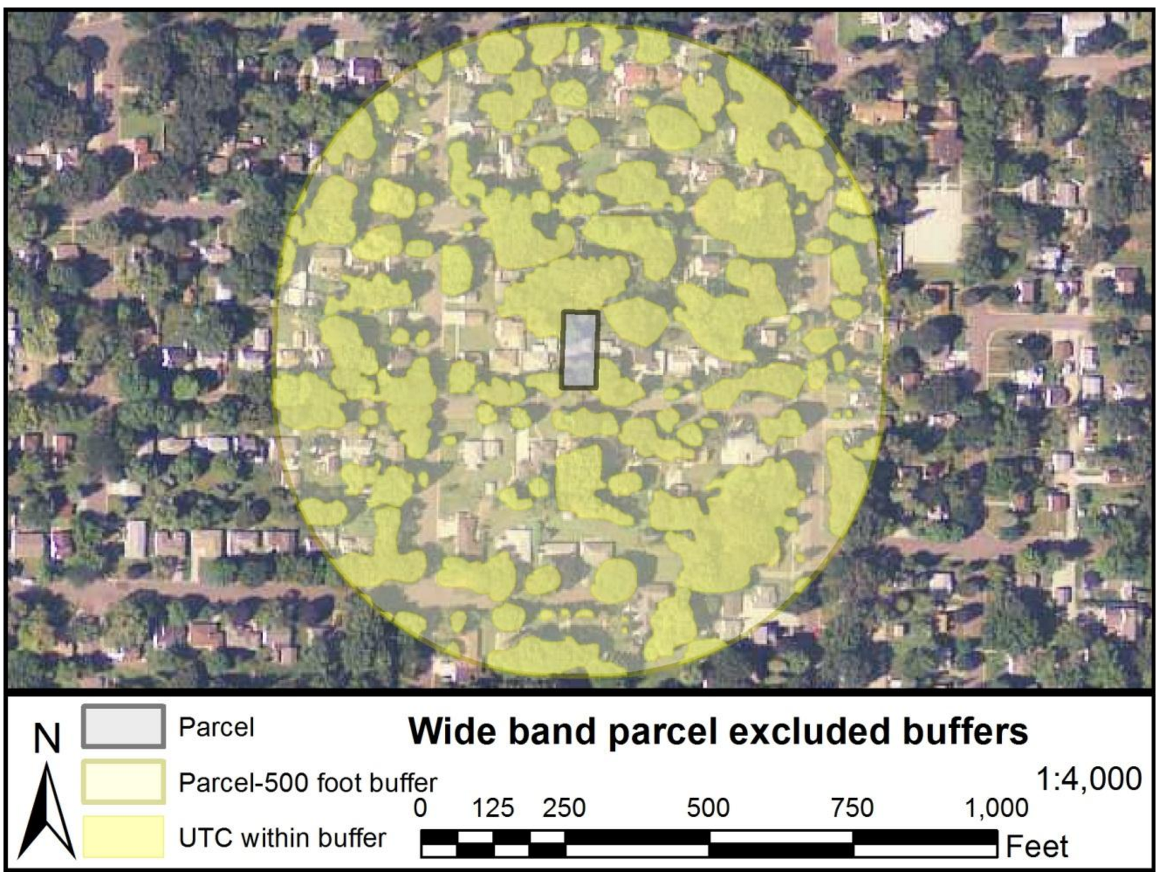

Figure 47. Sample detail of wide band parcel excluded buffers.

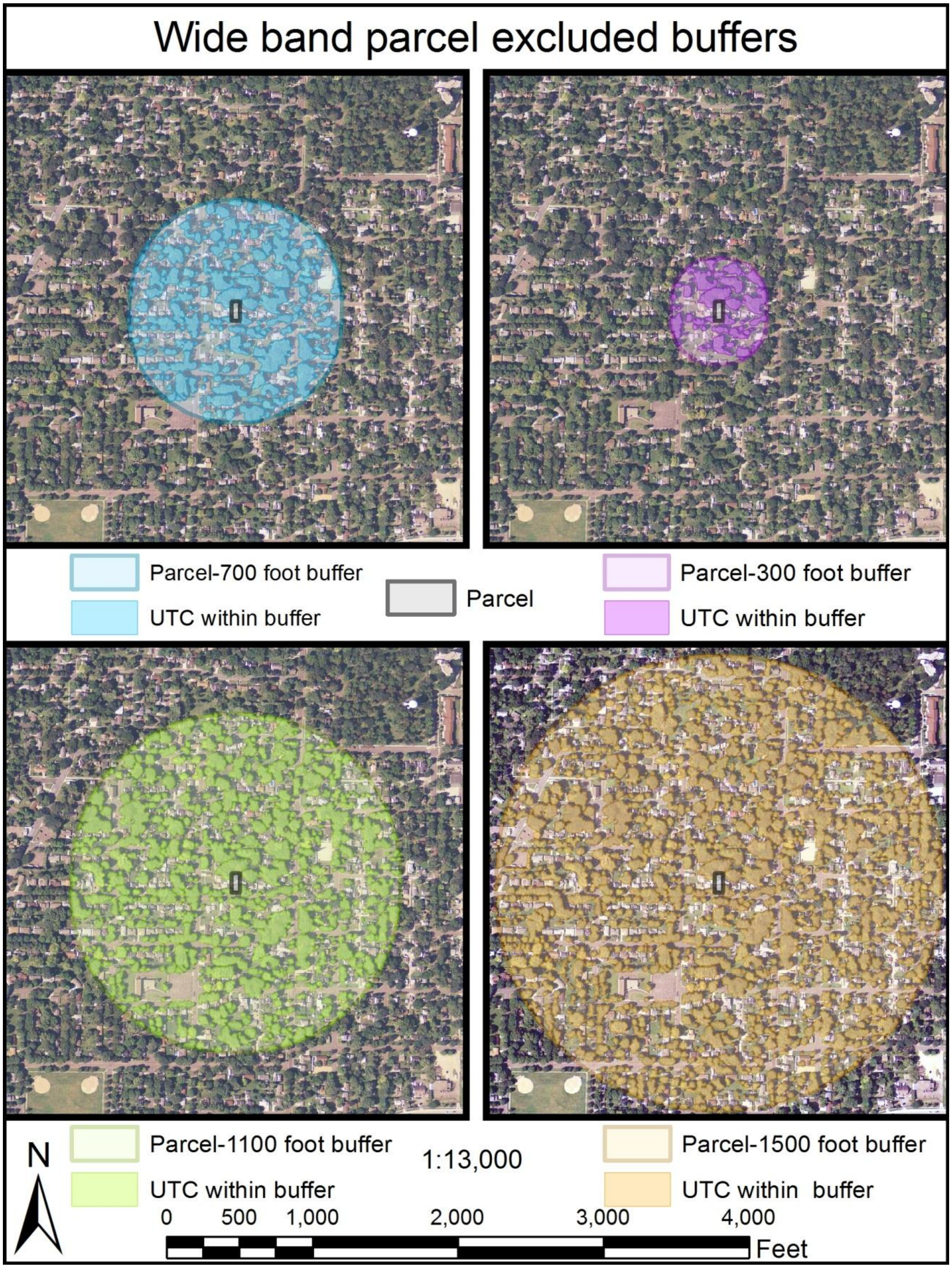

Figure 48. Samples of wide band parcel excluded buffers with UTC. Note: The parcel is not included.

Wide band parcel to 100 foot excluded buffers

The final set of buffers were similar to the previous set that was discussed, only instead of excluding only the parcel, 100 feet from the parcel was also excluded. This set of buffers was established for the same reason as the previous set of buffers - to separate the potential shade impact from the potential wind impact of trees on energy consumption. The wider exclusion zone was used since depending on tree placement and tree height, trees outside the parcel could also be casting shade on a nearby home. See Figure 49 and Figure 50 for sample images of the wide band parcel to 100 foot excluded buffers with UTC.

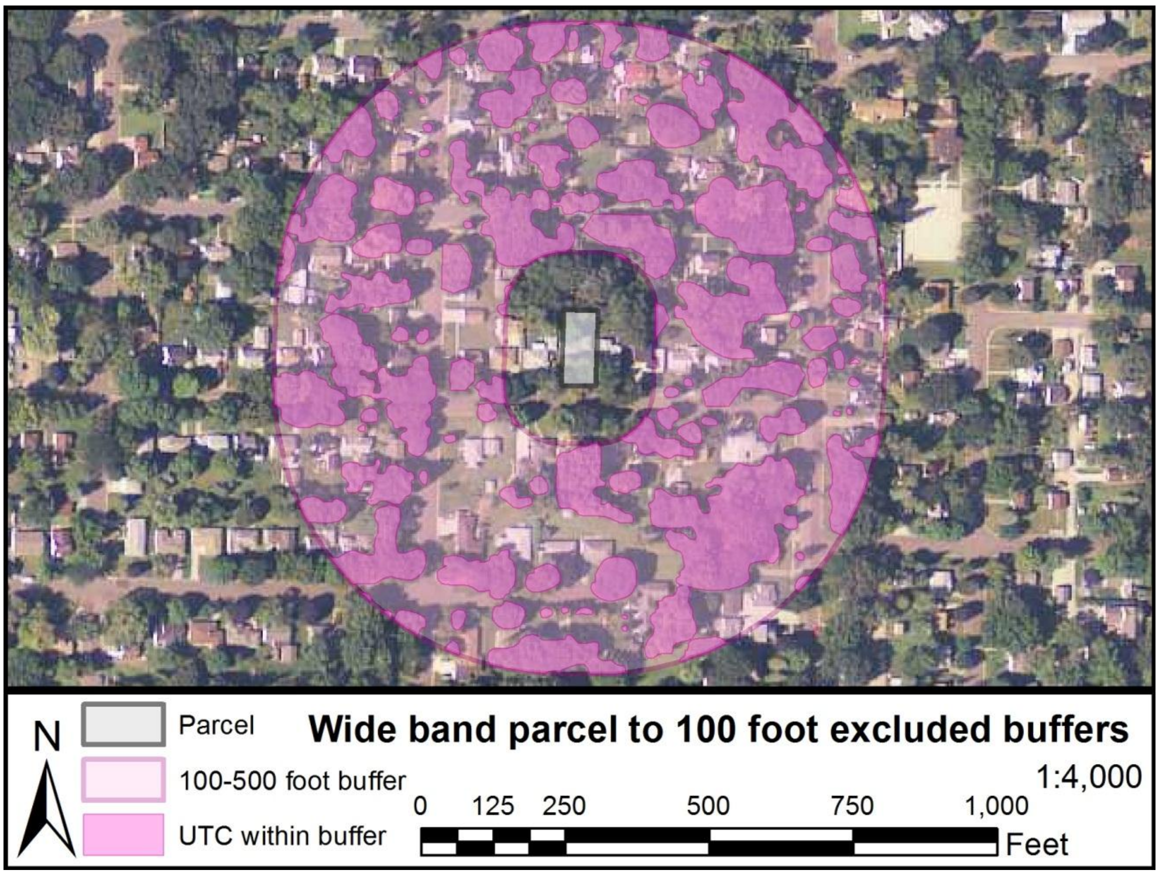

Figure 49. Sample detail of wide band parcel to 100 foot excluded buffers.

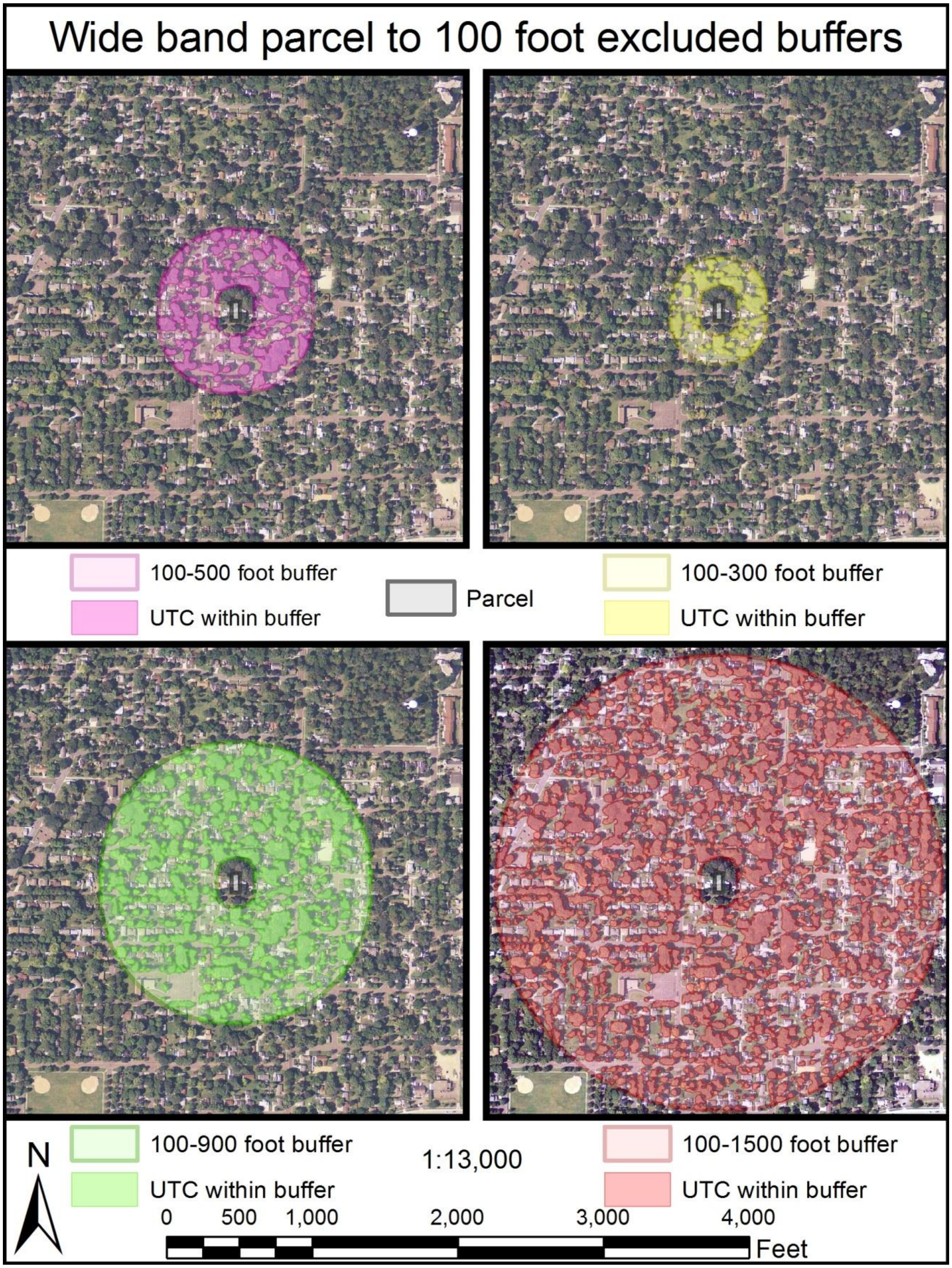

Figure 50. Samples of wide band parcel to 100 foot excluded buffers with UTC.

Energy Consumption

The dependent variables of this study were energy use used for heating and cooling the sampled homes. Heating energy was measured by natural gas use and cooling energy was measure by electricity use.

Consumption Data

Energy consumption data was acquired from the Hutchinson Utilities Commission. Both natural gas and electric data was acquired for the sampled homes. Monthly usage data from August 2008 to July 2011 was included in the dataset. This represents three heating and cooling seasons. Natural gas consumption was reported in cubic feet (CF) and electrical consumption was reported in kilowatt hours (kWh).

Initial data clean-up

The first analysis was limited to single-family detached residential structures that used natural gas as fuel for heating. Data from the utility company was cleaned-up by removing duplexes, apartments, and businesses. This determination was made based off addresses, aerial imagery, and online mapping tools from McLeod County, Bing Maps, and Google Maps. Next, homes were removed that either had no natural gas usage or levels were unusually low and did not have the typical seasonal rise and fall associated with natural gas heating. Some of these homes may not have been occupied during the winter season or were heating with a different fuel type. These determinations were made by viewing line graphs of gas and electric monthly usage by building.

Seasonally normalized heating energy use

Not all natural gas energy use in a home is used by the furnace for heating. These non-heating natural gas uses include water heaters, cloth dryers, ovens, and ranges. Although a portion of the heat from these appliances contributes to the energy budget of a house, they were not considered for this initial analysis. A normalization method was devised to remove the non-heating related natural gas uses and related variability in appliance type and usage pattern between homes.

Seasonal definitions

Winter, or the heating season, was defined as the billing periods most closely aligned with the months of December, January, and February. Summer, or the cooling season, was defined as the billing periods most closely aligned with June, July, and August. One reason for choosing relatively small seasons was to avoid the transition times between heating and cooling seasons and the associated seasonal variability during these transition periods. With the defined winter and summer periods, it is assumed furnaces were in use during winter and not in use during summer.

Normalization technique

For the first analysis, non-heating natural gas usage was adjusted for by subtracting average monthly summer gas usage from average monthly winter gas usage. Since this normalization was relatively coarse, a more precise method was used for the following analysis.

Weather-adjusted index of Normalized Annual Consumption (NAC)

For the second analysis, a weather-adjusted index of energy consumption was calculated for each sampled home. PRISM Advanced Version 1.0 was used to calculate the weather-adjusted index of consumption or Normalized Annual Consumption (NAC) (Fels et al. 1995). PRISM uses monthly billing data, daily temperature data, and long-term degree days to calculate NAC. The normalized annual consumption index provides an estimate of how much energy would be consumed during a climatically typical year. By PRISM's methods an atypical season or year does not skew the index (Fels 1986).

One of the benefits that set PRISM apart from other weather-normalization procedures was that it treats the break-even temperature for each house as a variable instead of as a constant. As discussed in the Climate section, both heating and cooling degree days are counted from a base temperature. In the case of heating, each degree the average daily temperature falls below the base temperature is counted as a degree day. The opposite is true for cooling degree days. PRISM determines the variable base temperature for each home, both heating and cooling, based on the exterior temperature at which the home's fuel consumption rises as the temperature decreases or increases, depending on the season (Fels 1986).

Besides the base temperature or reference temperature, PRISM also calculates heating slope and base-level consumption for each home. The heating slope is a measure of the energy-inefficiency of a house. Base-level consumption is a measure of appliance usage in a house. It is from these three parameters: reference temperature, heating slope, and base-level consumption, that PRISM calculates NAC (Fels 1986). The heating part and cooling part of NAC are also outputs from a PRISM analysis and were used as the dependent variables in this study.

Daily temperature data and long-term degree days

Daily temperature data from 1990-2011for the Hutchinson area was gathered from three weather stations for the normalization period of the PRISM analysis. The data was downloaded with the 'Closest Station' Climate Data Retrieval service of the State Climatology Office (Minnesota Climatology Working Group 2012). Data from three stations was used because a complete set of temperature data was not available from one location. The majority of the data is from two stations, one that replaced the other, along the northern edge of Hutchinson. The third station is located in the city of Brownton, about 8 miles south of Hutchinson. Four months of data was gathered from the Brownton station since the other stations were missing the data.

Temperature data from January 1990 – August 2009 was gathered from Hutchinson 1 W, MN US – GHCND:USC00213965 located at 44.897° latitude north and -94.371° longitude west at 1070 feet above sea level (Global Historical Climatology Network - National Climatic Data Center 2012a).

Temperature data from September 2009 – December 2009 was gathered from Brownton WWTP, MN US – GHCND:USC00211065 located at 44.733° latitude north and -94.341° longitude west at 1040 feet above sea level (Global Historical Climatology Network - National Climatic Data Center 2012b).

Temperature data from January 2010 – December 2011 was gathered from Hutchinson 1 N, MN US – GHCND:USC00213962 located at 44.909° latitude north and -94.367° longitude west at 1095 feet above sea level (Global Historical Climatology Network - National Climatic Data Center 2012c).

Temperature data was prepared following PRISM data preparation protocols into columnar form and then converted into a PRISM temperature file. This file was used to generate heating and cooling degree-days on a per-day basis.

Monthly utility billing data

As stated previously, monthly natural gas and electric consumption data was requested and gathered from the Hutchinson Utilities Commission for the buildings included in the study.

Exact dates of meter reading were not included for each home in the dataset. Instead a range of dates was provided by J.J. Guthmiller by e-mail communication on July 16th, 2012. Meters were read between the 28th and 32nd days of use per billing cycle. Meters were not read on the same day across service area. Two days preceding the last day of each month was selected as the reset date for the meter cycle. This date was applied across the dataset for all homes sampled. This selection was necessary to align energy consumption data with average daily temperature data for the PRISM analysis.

PRISM procedures

PRISM data preparation protocols were followed to align the natural gas and electric usage data into columnar form so that it could be processed into PRISM meter files. PRISM was then run on the natural gas usage data using the automated model selection process. This process determined if a heating model, cooling model, or if both were best suited for the fuel type in question. This model selection tool was also used to set up a variety of datasets as will be discussed in the Additional data clean-up section. Meter readings that may have been estimated were identified by PRISM using studentized residuals to determine high-low pairs. PRISM was then rerun with the likely estimated readings combined over a two month period. Outliers were identified using the PRISM diagnostics tools. These outliers were run through Robust PRISM to reduce their influence on the model estimates. Additional estimated readings were combined and then PRISM was rerun.

The recommended PRISM reliability criteria were set to determine which estimates were sufficiently reliable. The following criteria established reliability: $R^2 \geq 0.7$ and Coefficient of Variability (CV) of NAC or CV(NAC) ≤ 0.07, and also if CV(NAC) was low (4/7 of the previously specified CV(NAC) cutoff, independent of R^2) and the Flatness Index (FI) was less than 0.12. Buildings that did not meet this criteria for the natural gas heating dataset where removed from further analysis. The cooling dataset used the criteria above and also looser criteria as recommended by PRISM developer M. A. Marean by email communication on July 17th, 2012. The looser criteria differed from the criteria stated above with $R^2 \geq 0.6$ and $CV(NAC) \leq 0.10$.

House Characteristics

House characteristics were used as control variables in this study. There were multiple characteristics incorporated and each had its own unit of measure.

Home Owner Survey

Owners of buildings within the sampled blocks were contacted by mail. They were requested to respond to a survey asking questions about their building's characteristics. Respondents were invited to either return the self-addressed envelope or respond via an electronic version of the survey online.

The surveys were brief and collected categorical data about respondent's homes. To allow for anonymity, the survey data was not linked to individual addresses, but rather was linked to the sampled block. The survey determined if the building was a single family detached residential structure. The survey also determined age of home, conditioned square footage, exterior cladding material, improvements to siding, improvements to windows, improvements to insulation, and location of insulation if improved. See survey samples in Appendix L. Building Owner Survey.

County Assessor Information

After the initial analysis, which was at the block scale, it was determined more detailed data about specific homes would be beneficial for use in the analysis as covariates. Assessor data was acquired from the McLeod County Assessor. Assessor cards for each property were gathered and then electronically scanned. Selected data from the scanned cards was tabulated into Microsoft Excel.

The following data was gathered from the assessor cards for each home: siding type, year of residing, reroof year, window replacement year, notes on insulation, building type, number of stories, year built, remodeling notes, remodeling year, effective age year, basement type, heating system type, heating fuel type, fireplace type, air conditioning type, square feet of rooms, notes on garage heating, and notes about pools.

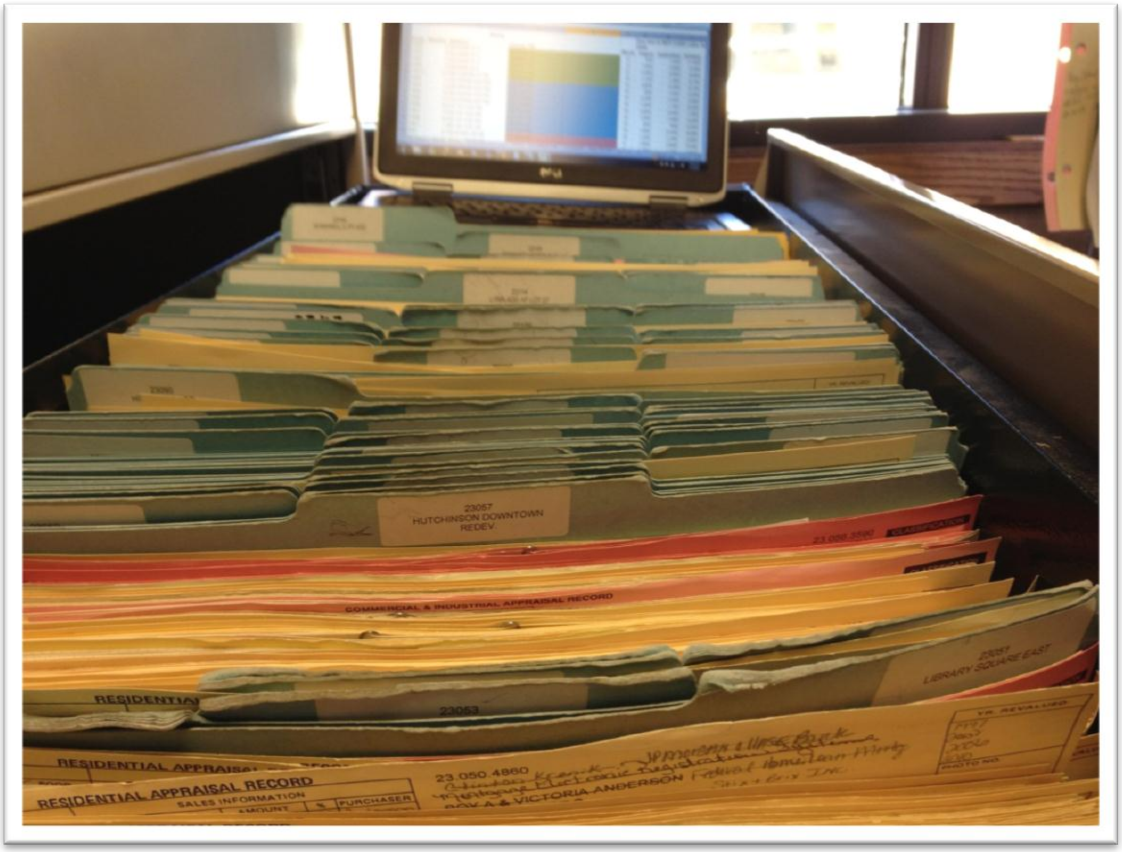

Figure 51. Collection of assessor card files at McLeod County Assessor's office.

Additional data clean-up

The assessor cards revealed addition buildings (businesses and duplexes) on parcels that were removed from the analysis since they were not single family detached residences.

Based on personal conversation with P.Huelman on July 3, 2012, criteria was established to acknowledge improvements to homes post a 1999 building code change that required more energy efficient materials and construction practices. Homes that were noted as having installed windows after 1998 were attributed with having improved windows. Homes that had installed siding after 1998 were attributed with likely having house wrap installed.

Sample Sets

Sample sets were established from within the single family residential structure sample set.

Heating

The first heating set (HeatSet1) excluded homes that likely had house wrap, had improved windows, use oil for heating fuel, had non-gas burning fireplaces, had a heated garage, had a pool, or failed the default PRISM reliability criteria.

The second heating set (HeatSet2) allowed homes that likely had house wrap and had improved windows. The second heating set excluded homes that use oil for heating fuel, had non-gas burning fireplaces, had a heated garage, had a pool, or failed the default PRISM reliability criteria.

The third heating set (HeatSet3) only excluded homes that failed the default PRISM reliability criteria.

Cooling

The first cooling set (CoolSet1) excluded homes that likely had house wrap, had improved windows, did not have air conditioners, had a pool, did not show a cooling signal in PRISM, or failed the default PRISM reliability criteria.

The second cooling set (CoolSet2) allowed home with a more relaxed PRISM reliability criteria. The second cooling set excluded homes that likely had house wrap, had improved windows, did not have air conditioners, had a pool, did not show a cooling signal in PRISM, or failed the loose PRISM reliability criteria

The third cooling set (CoolSet3) allowed homes that likely had house wrap and had improved windows along with the loose reliability criteria. The third cooling set excluded homes that did not have air conditioners, had a pool, did not show a cooling signal in PRISM, or failed the loose PRISM reliability criteria.

The fourth cooling set (CoolSet4) excluded homes that had a pool, did not show a cooling signal in PRISM, or failed the loose PRISM reliability criteria.

Clustered Data

During the parcel scale analysis using the established sample sets, data from a group of homes was noticed that were acting differently than the rest of the sample. These homes were investigated further.

Analysis that includes all sampled blocks is referred to as the Full Sample. Analysis that excludes blocks 1, 19, and 20 is referred to as Reduced Sample.

Heating Set

In the most inclusive heating set (HeatSet3), the comprehensive parcel buffer at 900 feet displayed a large gap in the results. The overall spread in UTC was from 2.0% to 36.4%. There was a gap, with no home representing UTC from 7.9% to 15.7%. There were 39 homes with less than 8% UTC and 202 homes with more than 15% UTC. From 15% to 36% every integer was represented. These same 39 homes showed a gap in UTC results at many scales from 600 feet to 1300 feet at most of the buffers types. The 39 homes are only from and represent all the homes in three blocks (1, 19, and 20). UTC within 500 feet of the parcels of the homes in blocks 1, 19, and 20 had a median of 4%, average of 5%, and range of 0.5%-11%. The rest of the sample set had a median of 29%, average of 29%, and range of 11%-40%. These removed homes have less canopy, are newer, larger, and use less natural gas for heating than the rest of the homes in the sample set. See Table 2 for a comparison of blocks 1, 19, and 20 with the rest of the heating sample set.

Table 2. Comparison of house characteristics between blocks 1, 19, and 20 with the rest of the heating sample set (HeatSet3).

	Heating Sample Set (241 homes)					
	Blocks 1, 19, and 20 (39 homes)			All other blocks (202 homes)		
	Year Built	Conditioned Space (square feet)	Heating Part of NAC (CF)	Year Built	Conditioned Space (square feet)	Heating Part of NAC (CF)
Median	1999	2,304	57,190	1958	2,204	69,892
Average	1993	2,489	61,532	1952	2,262	74,495
Range	1977-2004	1,480-5,826	29,604-116,624	1880-1994	616-4940	25,508-175,676

Cooling Set

It is not surprising that the same relationship is also evident in the cooling data, since there is overlap in the homes and UTC data between the sample sets. UTC within the parcel of the homes in blocks 1, 19, and 20 had a median of 6%, average of 7%, and range of 0%-26%. The rest of the sample set had a median of 33%, average of 35%, and range of 2%-82%. These homes have less tree cover, are newer, larger, and use more electricity for cooling than the rest of the homes in the sample set. See Table 3 for a comparison of blocks 1, 19, and 20 with the rest of the cooling sample set (CoolSet4).

Table 3. Comparison of house characteristics between blocks 1, 19, and 20 with the rest of the cooling sample set (CoolSet4).

	Cooling Sample Set (141 homes)					
	Blocks 1, 19, and 20 (26 homes)			All other blocks (115 homes)		
	Year Built	Conditioned Space (square feet)	Cooling Part of NAC (kWh)	Year Built	Conditioned Space (square feet)	Cooling Part of NAC (kWh)
Median	1998	2,496	1,308	1958	2,184	953
Average	1993	2,583	1,425	1955	2,261	1,234
Range	1978-2004	1,480-5,826	137-3,928	1880-1993	832-4668	66-4,082

Land Cover

Another major difference between blocks 1, 19, and 20 and the rest of the sample set is the surrounding land cover. These blocks are on the edge of the community and surrounded by large open fields. The homes on these blocks are surrounded by both less buildings and less tree cover compared to the rest of the community. See Figure 34 earlier in the text for an overview map with the locations of the sampled blocks. Figure 52, Figure 53, Figure 54, and Figure 55 show comparative photographs of blocks 20, 19, 12, and 14.

Figure 52. View from block 20, including adjacent field.

Figure 53. View of the back yards of block 19, including adjacent field.

Figure 54. View from block 14.

Figure 55. View of from within block 12.

Analysis

Block Scale Analysis

Block scale bivariate analysis was conducted using Microsoft Excel.

Seasonally normalized heating energy use

Bivariate analysis was conducted for urban trees and heating energy use. This initial analysis plotted seasonally normalized average monthly winter heating natural gas consumption (2008-2011) averaged by block against percent UTC by block. The energy data was plotted against urban tree canopy at the block, at 300 feet, and at 1000 feet from the parcel.

Weather-adjusted Normalized Annual Consumption (NAC)

After viewing results from the initial analysis, energy data was prepared in PRISM to calculate Normalized Annual Consumption (NAC). The bivariate block scale analysis was then repeated using NAC in place of the seasonally normalized energy data.

Heating part of NAC

The heating part of NAC natural gas consumption (2008-2011) averaged by block was plotted against percent UTC at the block, 300 feet, and at 1000 feet from the parcel.

Cooling part of NAC

The cooling part of NAC electric consumption (2008-2011) averaged by block was plotted against percent UTC at the block, 300 feet, and at 1000 feet from the parcel.

Parcel Scale Analysis

Based on the results from the block level comparison, it was determined necessary to seek more details about the homes within the sampled blocks. Following the collection of housing characteristics from assessor records, parcel scale analysis of energy use and tree canopy was conducted using housing characteristics as control variables.

Urban tree canopy (UTC) by all the various buffers and scales were utilized as the independent variable in the parcel scale analysis. The heating part and cooling part of normalized annual consumption (NAC) by parcel were utilized as the dependent variables in the analysis. Three heating (HeatSet1, HeatSet2, and HeatSet3) and four cooling sample sets (CoolSet1, CoolSet2, CoolSet3, and CoolSet4) each with varying levels of inclusivity were identified and each run through the analysis. Each of these datasets was run with (Full Sample) and without blocks 1, 19, and 20 (Reduced Sample) since they were identified as a district cluster behaving differently than the rest of the sample.

Analysis was performed in R using the lme4, car, and effects packages (R Core Team 2012; D. Bates, Maechler, and Bolker 2012; Fox and Weisberg 2011; Fox 2003).

For each dataset, a mixed model with fixed effects and a random effect for block was run. Two different fixed effects sets were used. The full set of fixed effects (Full Model) included year built, conditioned space in square feet, number of stories, siding type, improved insolation, heating system type, air conditioning type, improved siding, improved windows, fireplace, heated garage, and pool. A simplified set of fixed effects (Simple Model) included year built, conditioned space in square feet, number of stories, and heating system type. If a data set, as described in the Sample Sets section, was limited by a given variable it was not included as a fixed effect. For example, when running the Full Model, homes with heated garages and pools were excluded from the first and second heating set (HeatSet1 and HeatSet2), so the heated garage and pool variables were not included as fixed effects in these instances. However, heated garage and pool was included in the third heating set (HeatSet3), therefore in the Full Model it was included in this instance with the full set of fixed effects variables. Likewise variables like heating system type and air conditioning type that are seasonally specific were only used as fixed effect with the appropriate season's data set. The random effect for block accounts for the fact that houses located in a similar location are expected to be more similar than houses located in different locations (Tobler 1970). The fixed effects in these models were then summarized with ANOVA tables and effects plots.

The effect of percent urban tree cover at various distances and areas was investigated, and each treated separately. This was conducted for both the full sample set and the reduced sample set that excludes block 1, 19, and 20. Percent UTC was added to the model, using linear, quadratic, and cubic fit. To summarize the effect of percent UTC in each model, the pertinent line from each

ANOVA was reported, and an effect plot was created. Additionally, the quadratic model was compared with a linear model, and the cubic with the quadratic, to assess how much curvature was required.

Results

Urban Tree Canopy (UTC)

Calculated UTC from field collected tree width measurements from sampled blocks

Urban tree canopy was estimated to be 36.5% within the study area. UTC was not estimated to the municipal boundary by this method. UTC for the seven stratified zones and the sampled blocks are listed in Table 4. The percent tree canopy at each block is in bold text and highlighted in orange to denote that it is considered a measured result. The percent tree canopy in each zone and for the study area are considered calculated results and listed in plain text and highlighted in blue. See the first column of results in Table 4.

Calculated UTC from randomly sampled points

Urban tree canopy was estimated to be 27.8±3.6% within the study area. UTC was estimated to be 15.1±1.5% within the municipal boundary. These results are listed in the fourth column of Table 4 in plain text and highlighted in blue since they are considered calculated results. For more detailed results see Table 5 in Appendix G. Results of urban tree canopy from randomly sampled points – iTree Canopy.

Measured UTC by technician photo interpretation

Urban tree canopy was measured at 20.3% within the study area. UTC was measured at 12.4% within the municipal boundary. UTC for the seven stratified zones and the sampled blocks are listed in Table 4. All results in this category are listed in bold text and highlighted in orange to denote that they are considered measured results. See the second column of results in Table 4.

Calculated UTC by technician photo interpretation of sampled blocks

Urban tree canopy was estimated to be 26.1% within the study area. UTC was not estimated to the municipal boundary by this method. UTC for the seven stratified zones and the sampled blocks are listed in Table 4. The percent tree canopy at each block is in bold text and highlighted in orange to denote that it is considered a measured result. The percent tree canopy in each zone and for the study area are considered calculated results and listed in plain text and highlighted in blue. See the third column of results in Table 4.

Table 4. Urban tree canopy assessment results at various scales and by four methods. Measured results are in bold text and highlighted by light orange. Calculated estimates are in plain text and highlighted in blue.

			Percent (%) Urban Tree Canopy (UTC)			
			Calculated from field measured tree width from sampled blocks	Measured by technician photo interpretation	Calculated from technician photo interpretation of sampled blocks	Calculated from randomly sampled points
Municipal Boundary			-	**12.4**	-	15.1 ± 1.5
Study Area			36.5	**20.3**	26.1	27.8 ± 3.6
	Zones					
Study Area	Downtown		9	**11**	11	-
Study Area	Residential 1		44	**30**	37	-
Study Area	Residential 2		60	**25**	30	-
Study Area	Residential 3		12	**17**	30	-
Study Area	Residential 4		51	**24**	33	-
Study Area	Residential 5		12	**12**	7	-
Study Area	Residential 6		47	**20**	27	-
	Zones	Blocks				
Study Area	Residential 6	1	**5**	**4**	**4**	-
		2	**81**	**46**	**46**	-
		3	**49**	**20**	**20**	-
		4	**58**	**39**	**39**	-
	Residential 2	5	**20**	**32**	**32**	-
		6	**97**	**29**	**29**	-
	Downtown	7	**9**	**8**	**8**	-
		8	**11**	**14**	**14**	-
		9	**6**	**13**	**13**	-
	Residential 1	10	**23**	**28**	**28**	-
		11	**16**	**37**	**37**	-
		12	**52**	**41**	**41**	-
		13	**79**	**46**	**46**	-
		14	**21**	**27**	**27**	-
		15	**38**	**26**	**26**	-
	Residential 4	16	**76**	**38**	**38**	-
		17	**28**	**19**	**19**	-
		18	**44**	**37**	**37**	-
	Residential 5	19	**35**	**13**	**13**	-
		20	**2**	**4**	**4**	-
	Residential 3	21	**35**	**27**	**27**	-
		22	**0.1**	**32**	**32**	-

Buffered Blocks UTC

UTC within the sampled blocks had a range from 4%-46%. The median percent UTC at the block scale was 28%. UTC within the 300 foot block buffers ranged from 2%-39% with a median of 28%. UTC within the 1000 foot block buffers had a range from 4%-34% with a median of 34%. See Figure 56 for a summarization of this data in the form of box plots.

A box plot is a descriptive statistics tool used to graphically summarize and compare multiple data sets (McGill, Tukey, and Larsen 1978). The box part of the box plot shows the central 50% of the data. The box is cut into two parts by the median of the distribution. The lowest edge of the box is the first quartile or 25th percentile and the upper edge of the box is the third quartile or 75th percentile. The lines extending from the boxes, or whiskers, represent the tails of the distribution. They extend 1.5 times the height of the box or until the last data point, whichever is closer to the box. Beyond the whiskers are points that are considered outliers (Emerson and Strenio 1983). There are no outliers in the block scale data.

The full set of block scale results can be found in Appendix H. Results of urban tree canopy from buffered blocks.

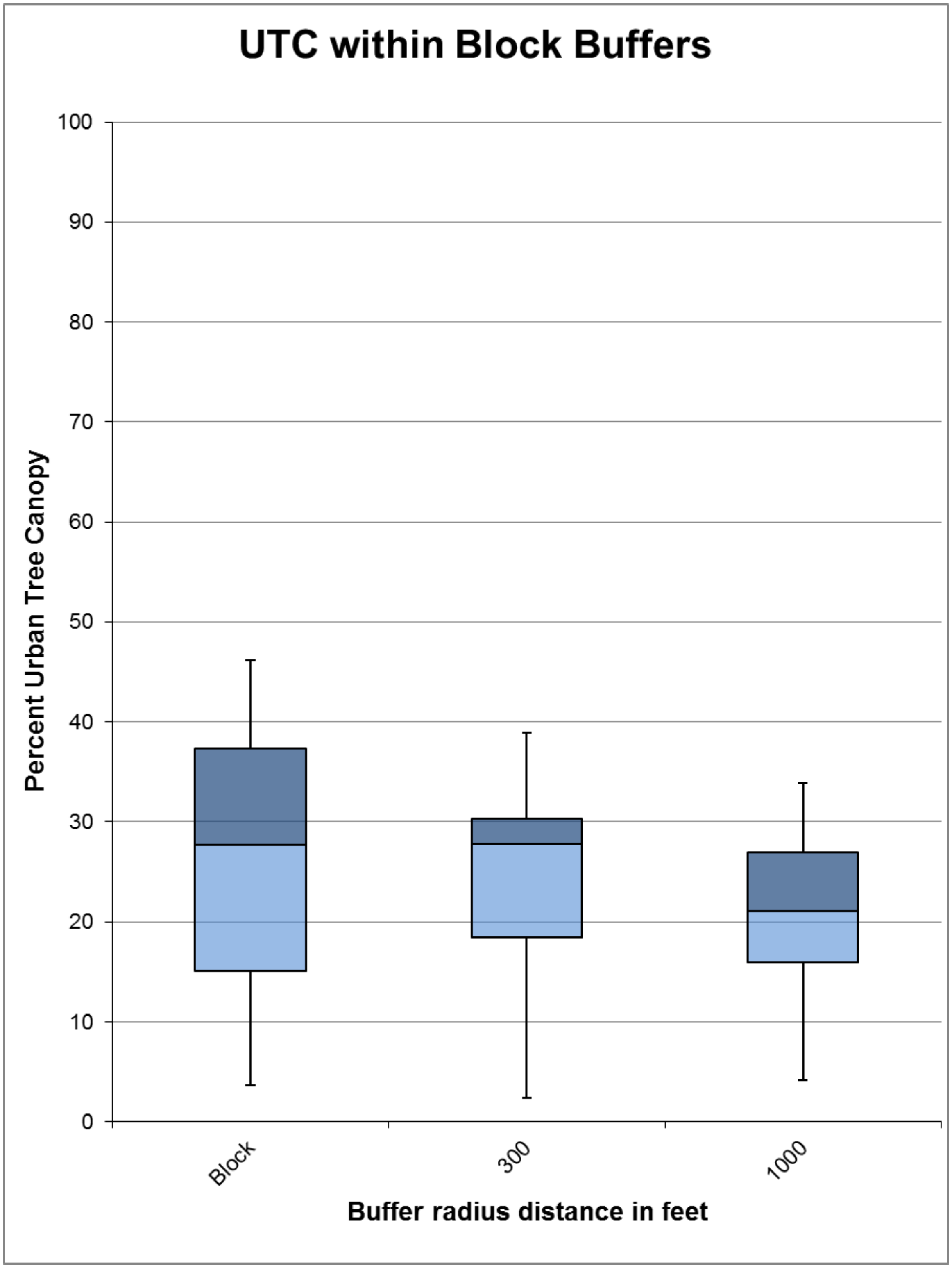

Figure 56. Box plots of UTC within block buffers.

Digitized UTC sample images at block scale

Figure 57, Figure 58, and Figure 59 show selected sampled blocks, buffers, and the resulting percent UTC as a way to compare various levels of UTC from an aerial perspective.

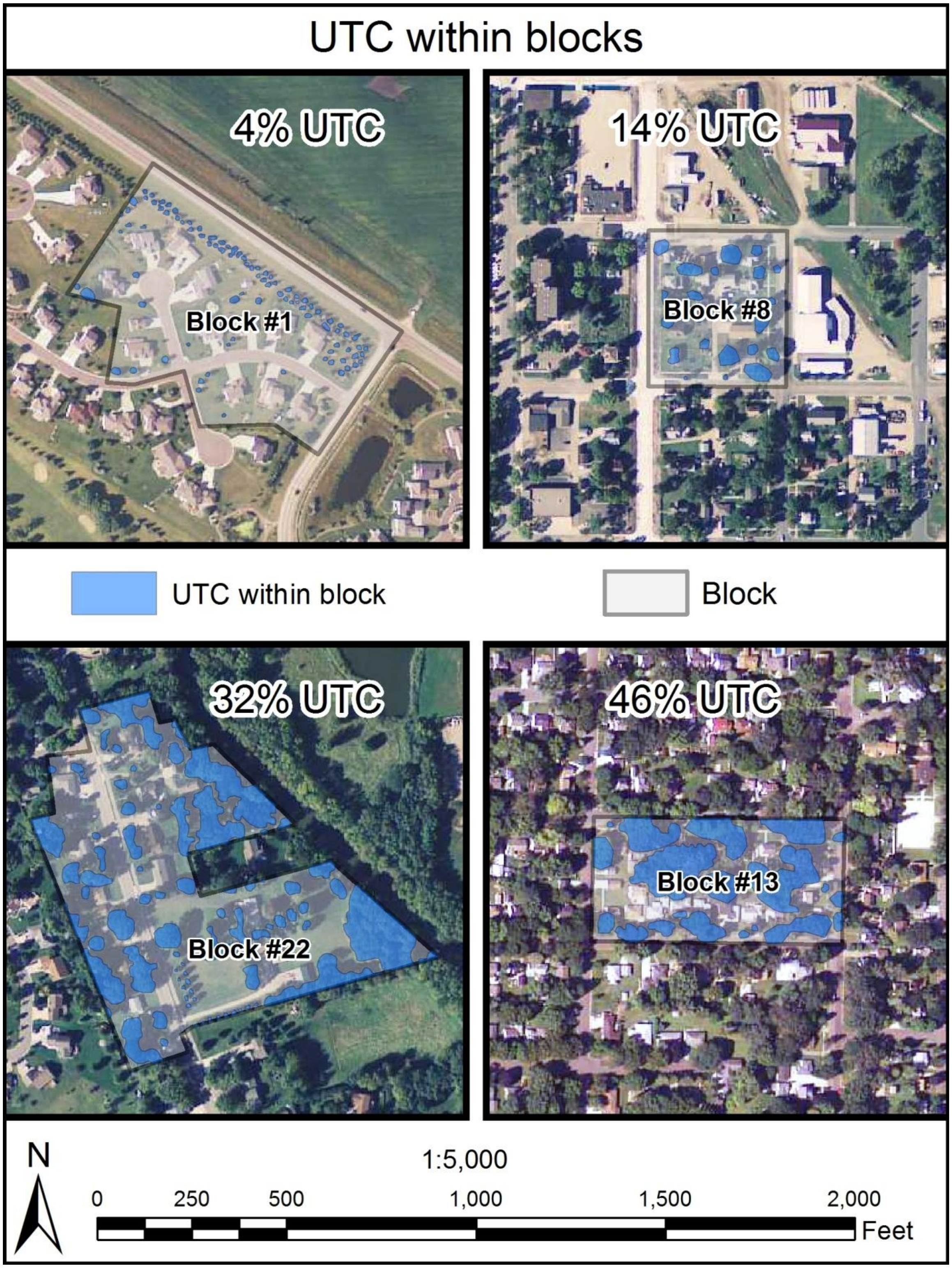

Figure 57. Percent UTC within selected blocks.

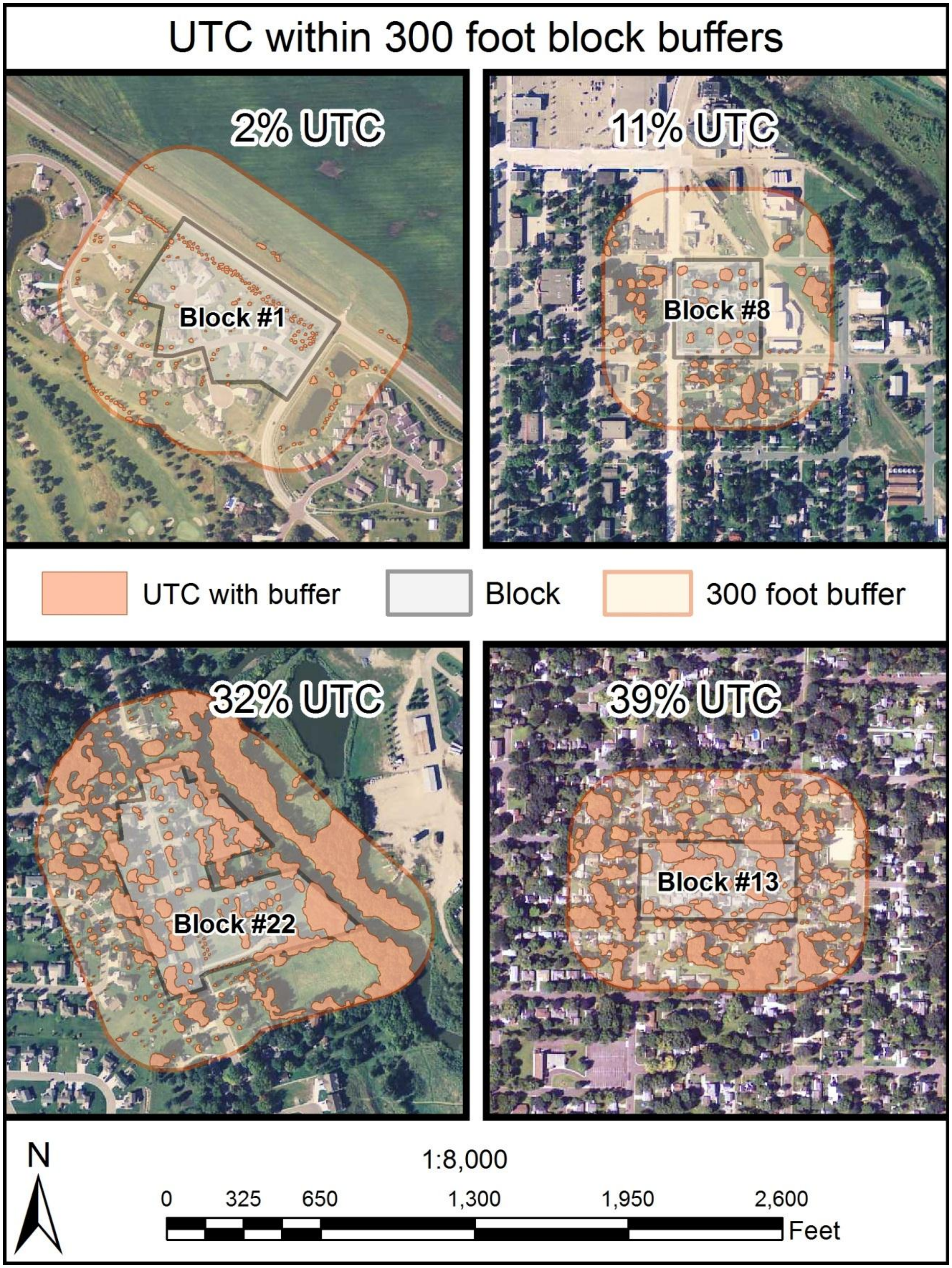

Figure 58. Percent UTC within selected 300 foot block buffers.

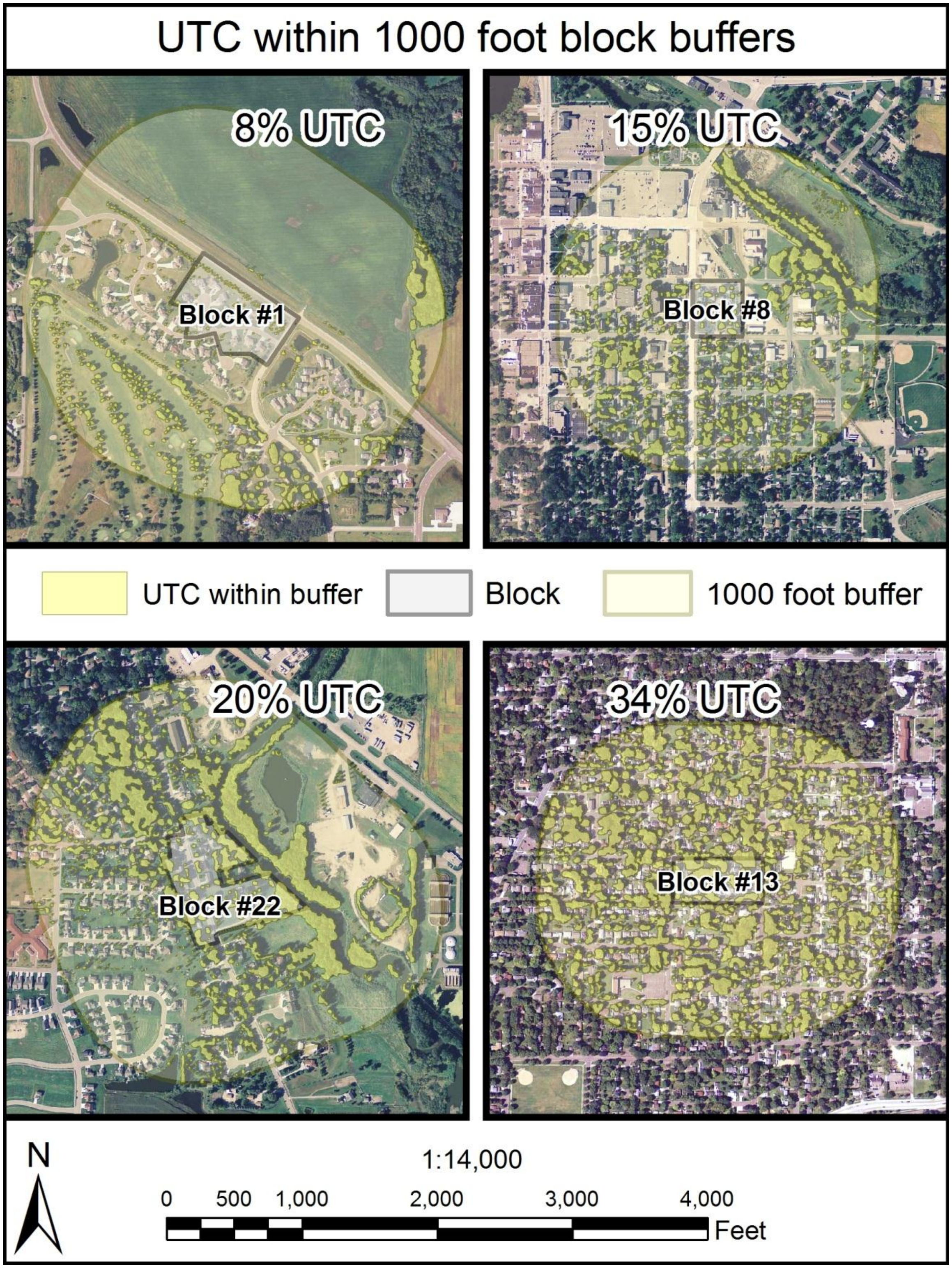

Figure 59. Percent UTC within selected 1000 foot block buffers.

Buffered Parcels UTC

Comprehensive parcel buffers

See Figure 60 for a summarization of the comprehensive parcel buffers urban tree canopy data in the form of box plots. The range, median, quartiles, and outliers are presented graphically. The full set of parcel scale results can be found in Appendix I. Results of urban tree canopy from buffered parcels.

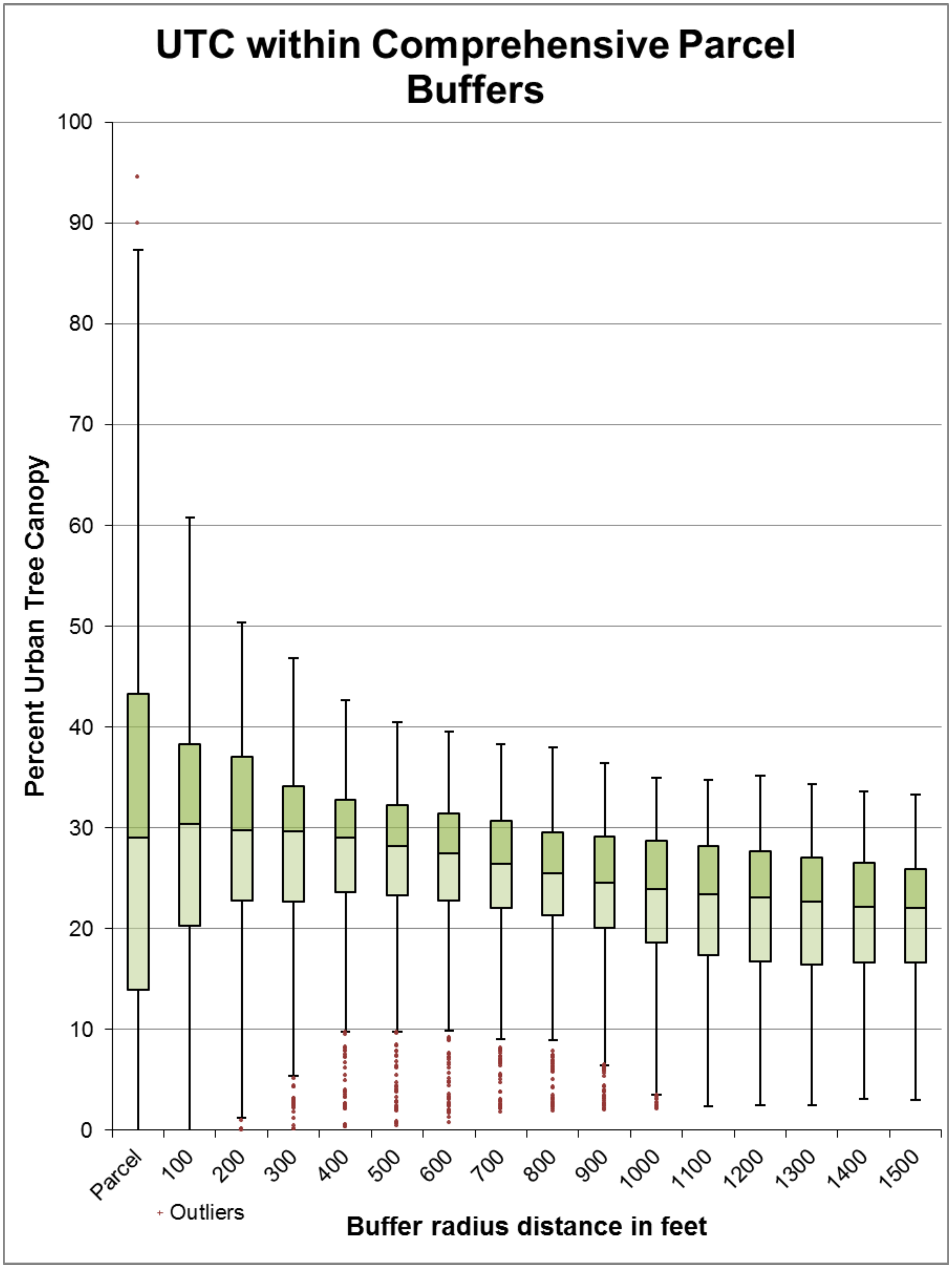

Figure 60. Box plots of UTC within comprehensive parcel buffers.

Thin band parcel buffers

See Figure 61 for a summarization of the thin band parcel buffers urban tree canopy data in the form of box plots. The range, median, quartiles, and outliers are presented graphically. The full set of parcel scale results can be found in Appendix I. Results of urban tree canopy from buffered parcels.

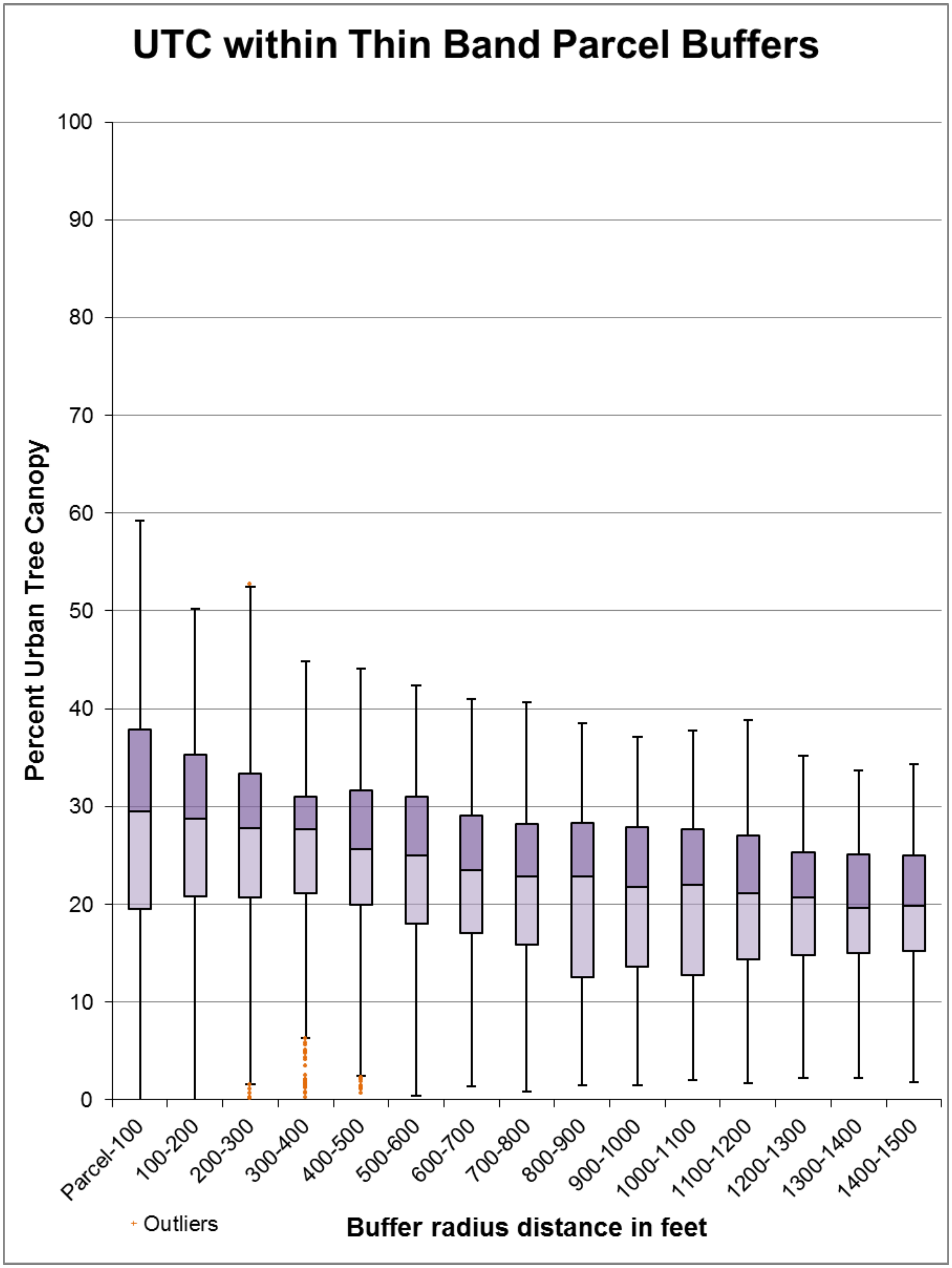

Figure 61. Box plots of UTC within thin band parcel buffers.

Wide band parcel excluded buffers

See Figure 62 for a summarization of the wide band parcel buffers urban tree canopy data in the form of box plots. The range, median, quartiles, and outliers are presented graphically. The full set of parcel scale results can be found in Appendix I. Results of urban tree canopy from buffered parcels.

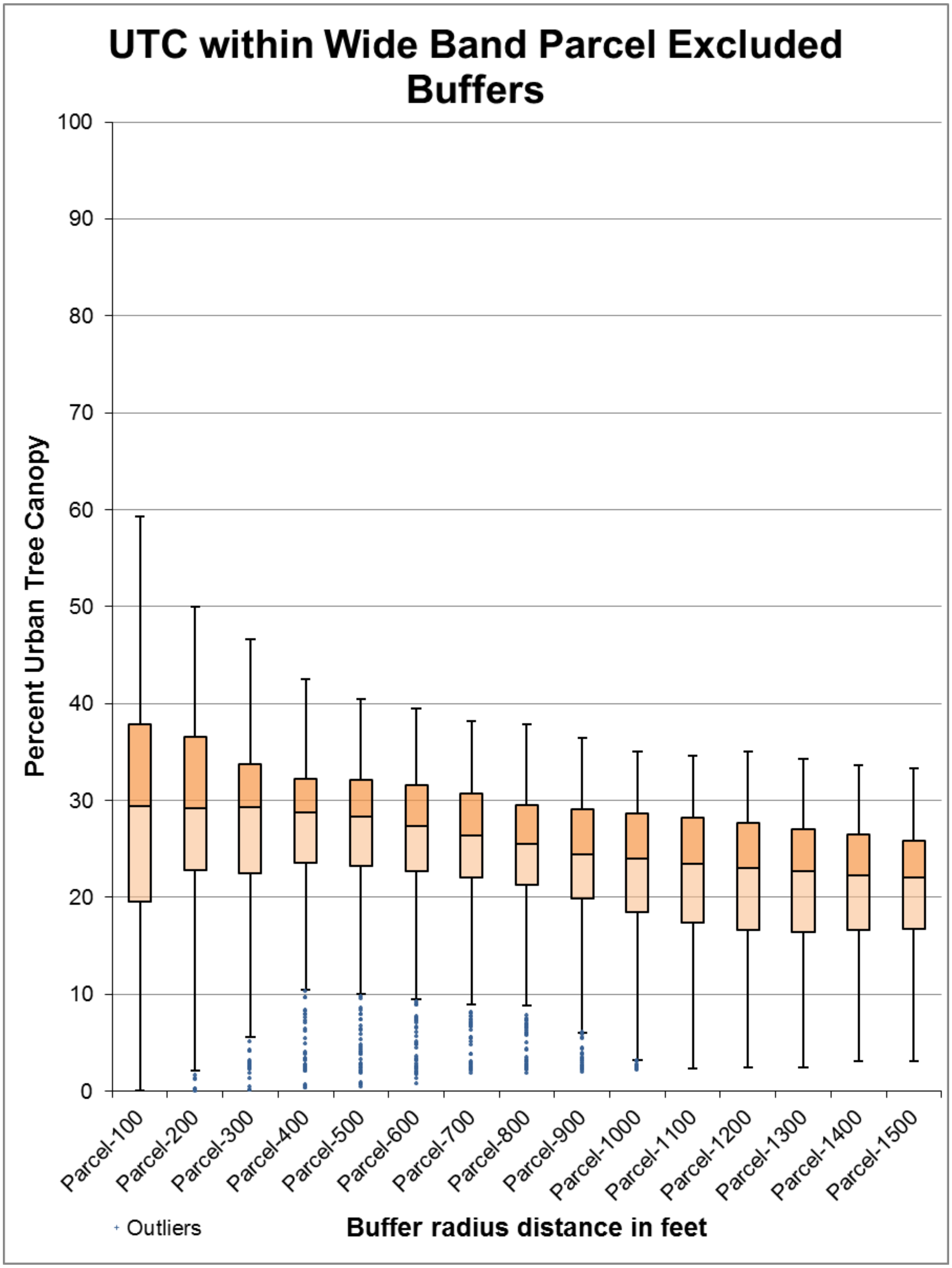

Figure 62. Box plots of UTC within wide band parcel excluded buffers.

Wide band parcel to 100 foot excluded buffers

See Figure 63 for a summarization of the wide band parcel excluded buffers urban tree canopy data in the form of box plots. The range, median, quartiles, and outliers are presented graphically. The full set of parcel scale results can be found in Appendix I. Results of urban tree canopy from buffered parcels.

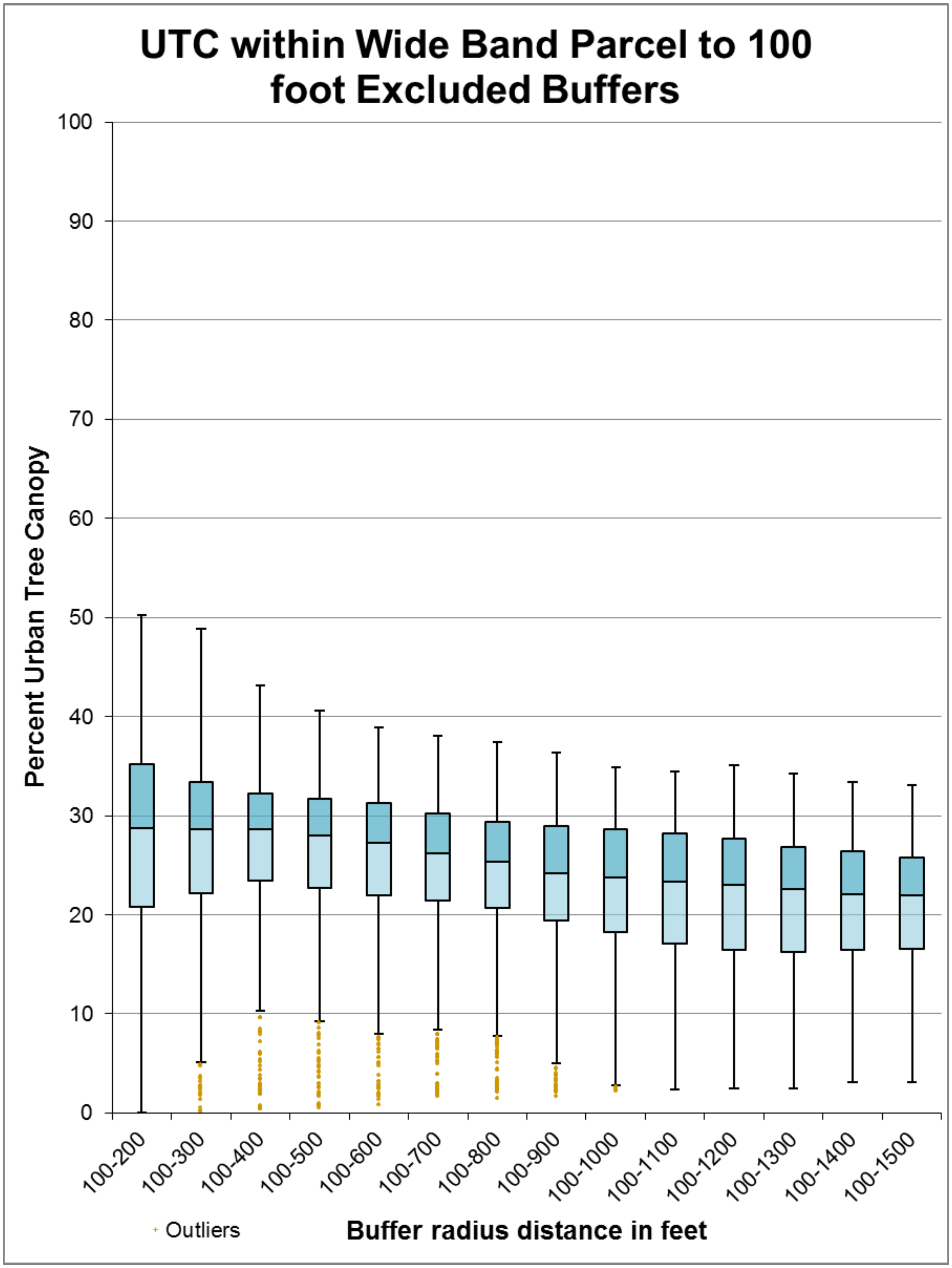

Figure 63. Box plots of UTC within wide band parcel to 100 foot excluded buffers.

Digitized UTC sample images at parcel scale

Figure 64, Figure 65, Figure 66, Figure 67, and Figure 68 show selected buffered parcels and the resulting percent UTC as a way to compare various levels of UTC.

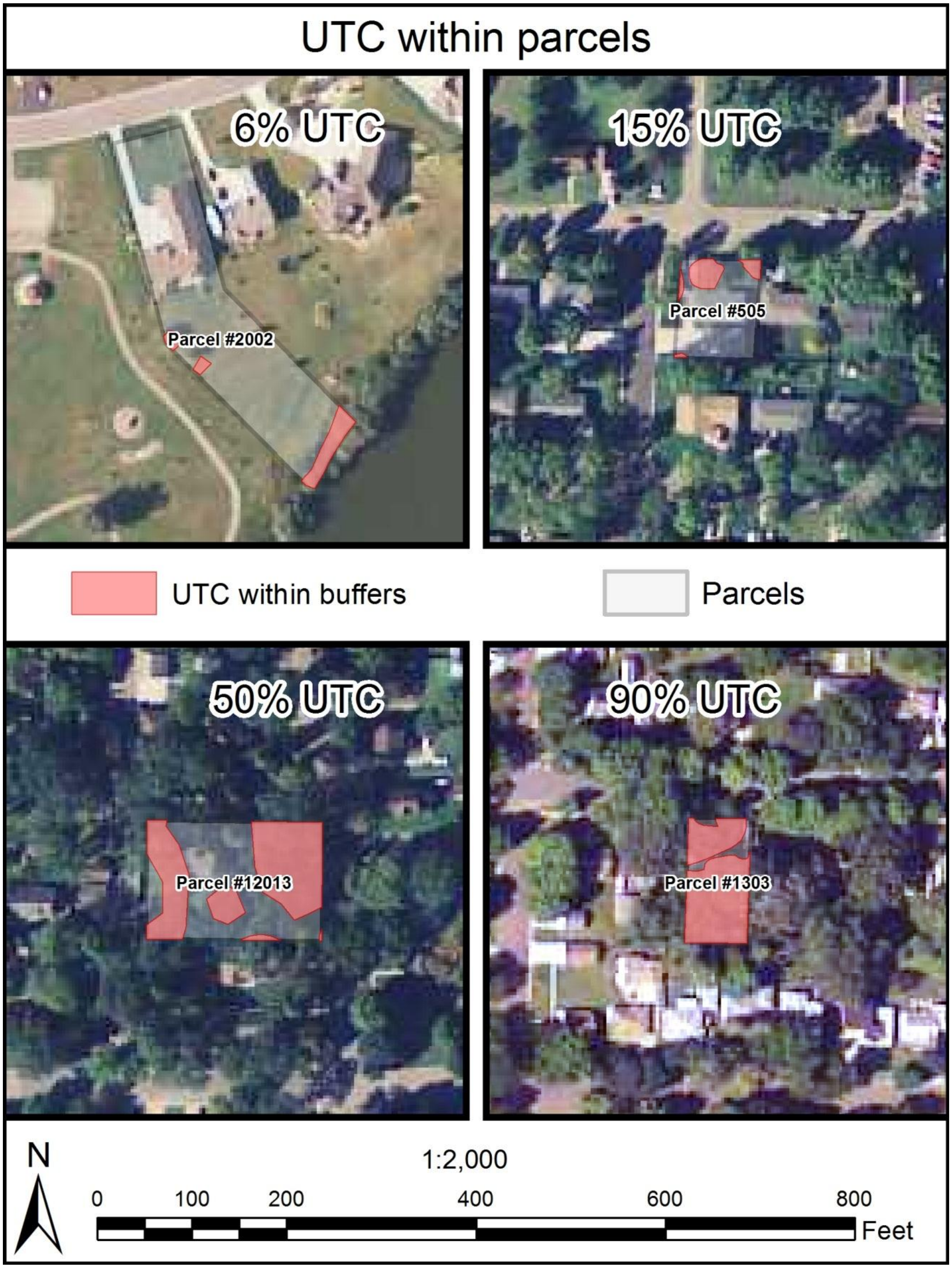

Figure 64. Percent UTC within selected parcels.

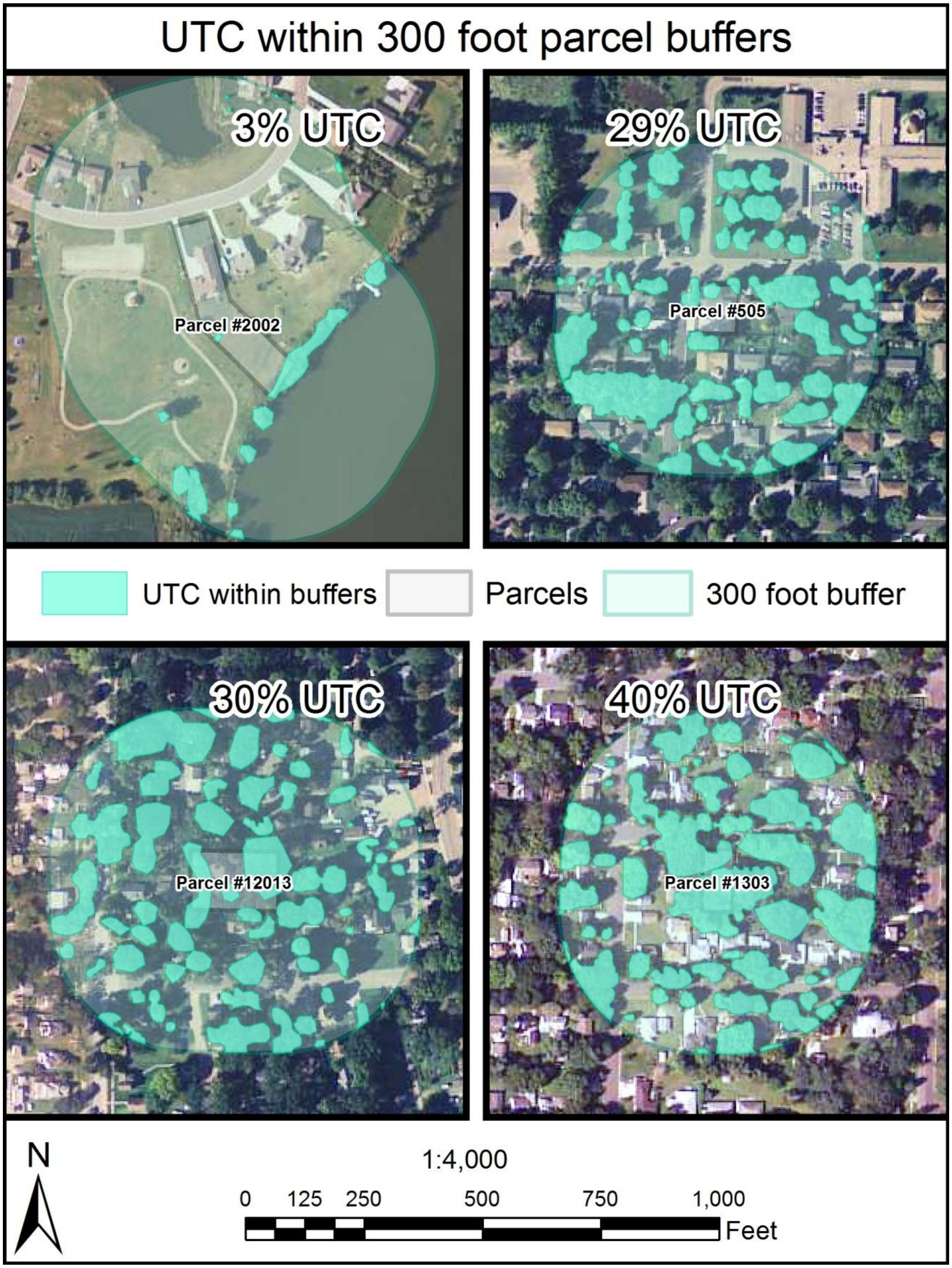

Figure 65. Percent UTC within selected 300 foot parcel buffers.

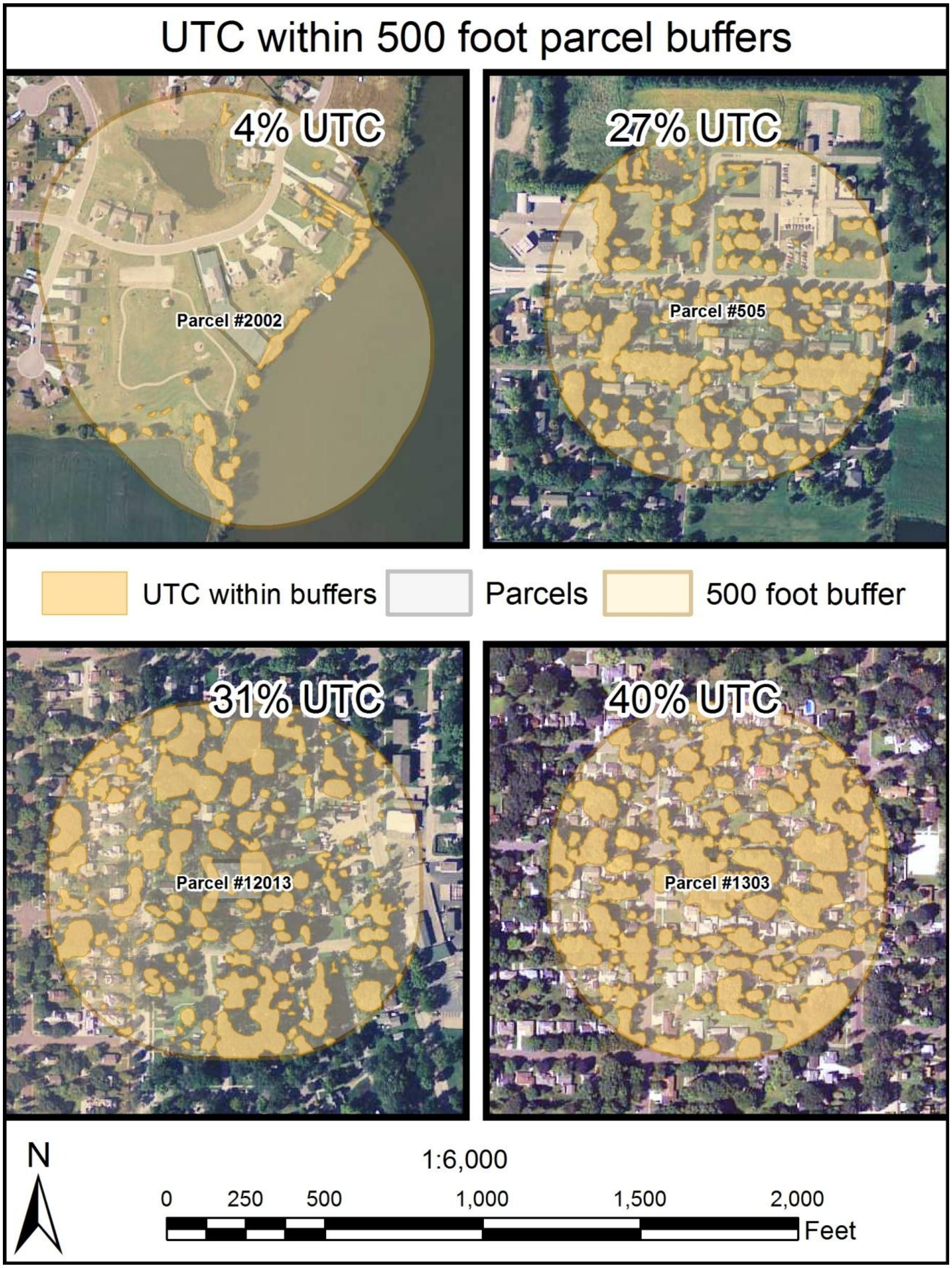

Figure 66. Percent UTC within selected 500 foot parcel buffers.

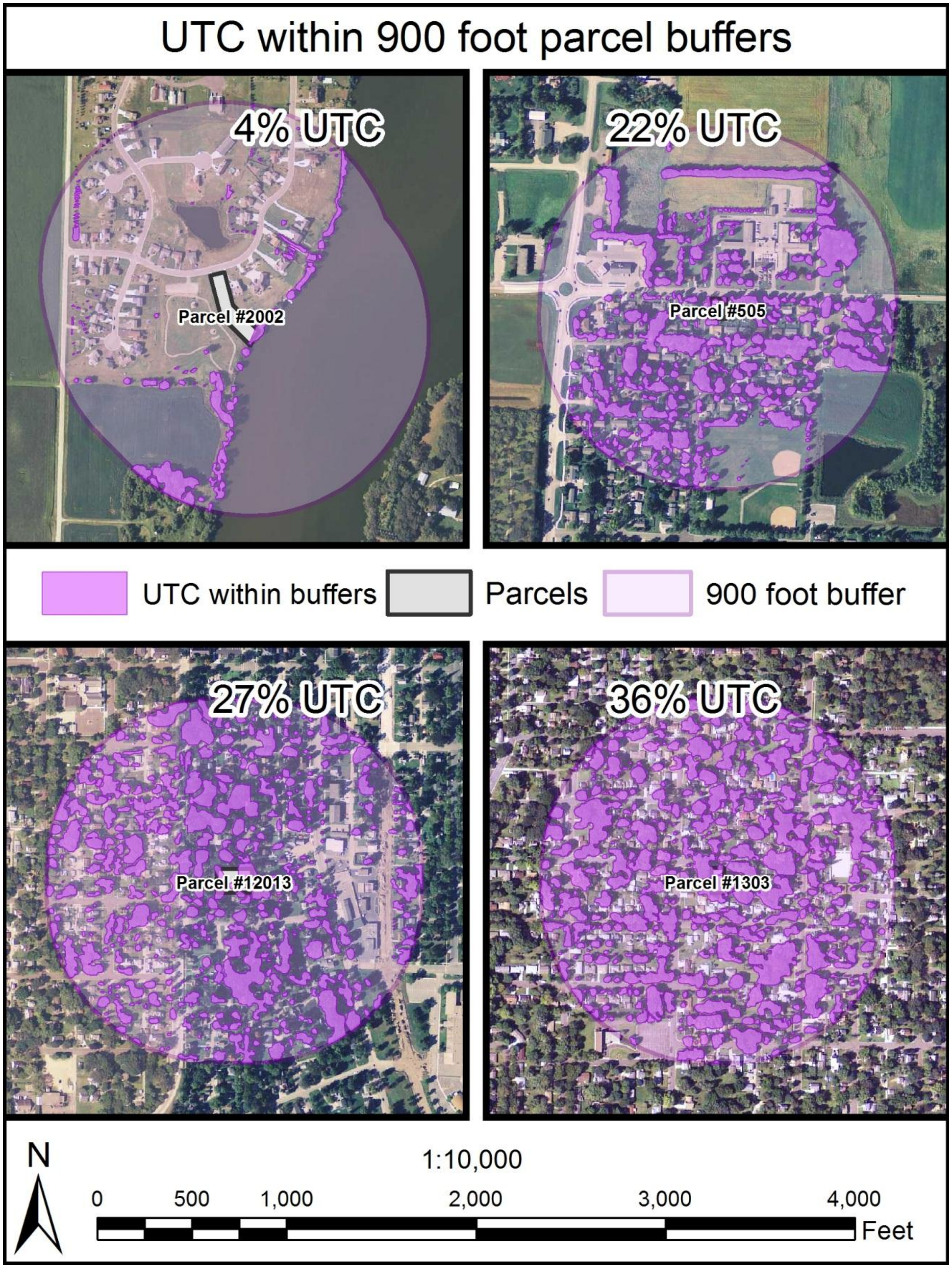

Figure 67. Percent UTC within selected 900 foot parcel buffers.

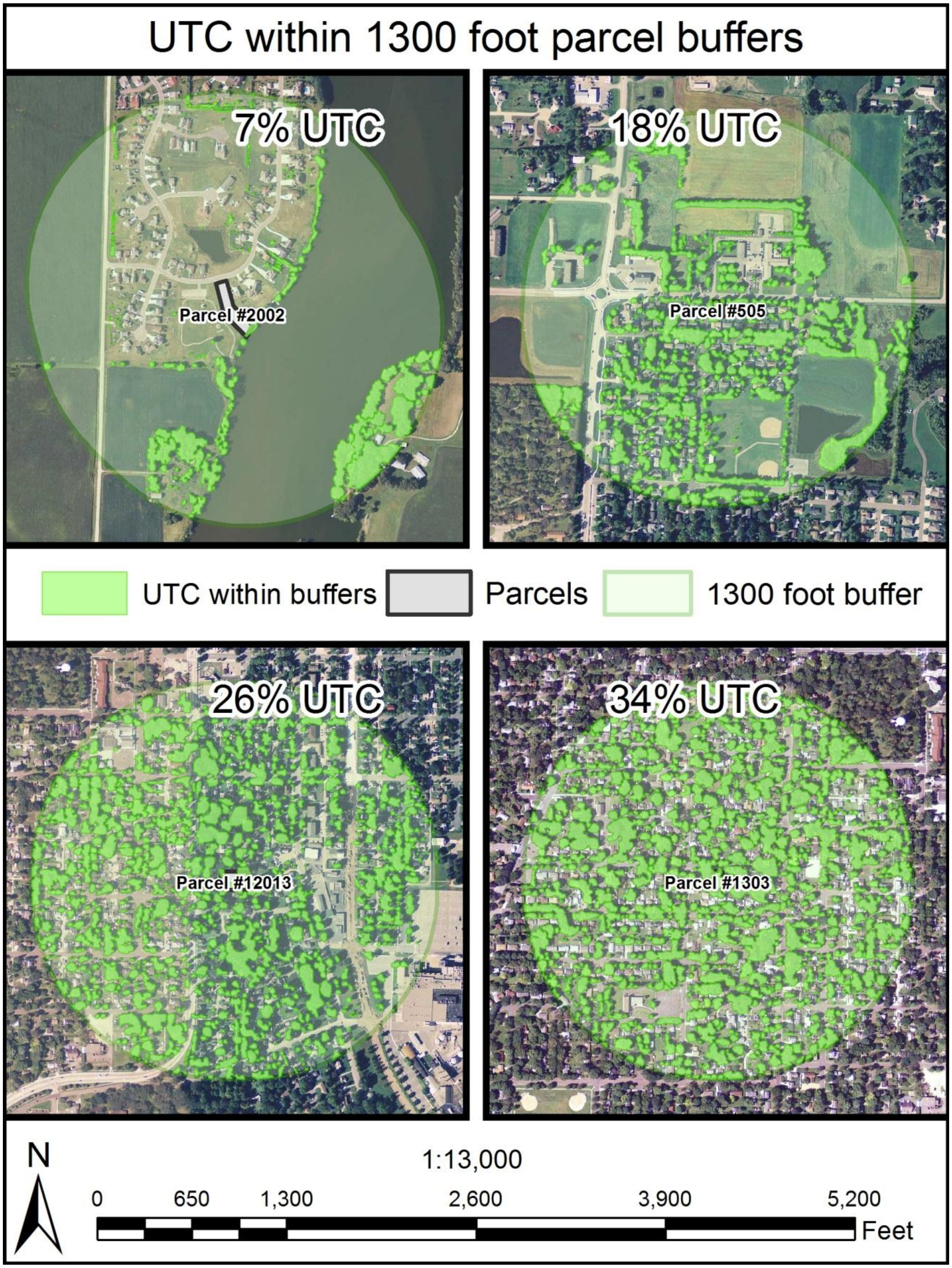

Figure 68. Percent UTC within selected 1300 foot parcel buffers.

Energy Consumption

Seasonally normalized heating energy use

Seasonally normalized average monthly winter heating natural gas use from 2008-2011 in shown in Figure 69 with each block's data summarized as a box plot. A combined box plot of all sampled homes is included. Outliers are displayed in the figure. The mean for each block with and without the influence of the outliers is also shown. See Appendix J. Results of seasonal normalization of heating energy use for block and parcel summary tables of this data.

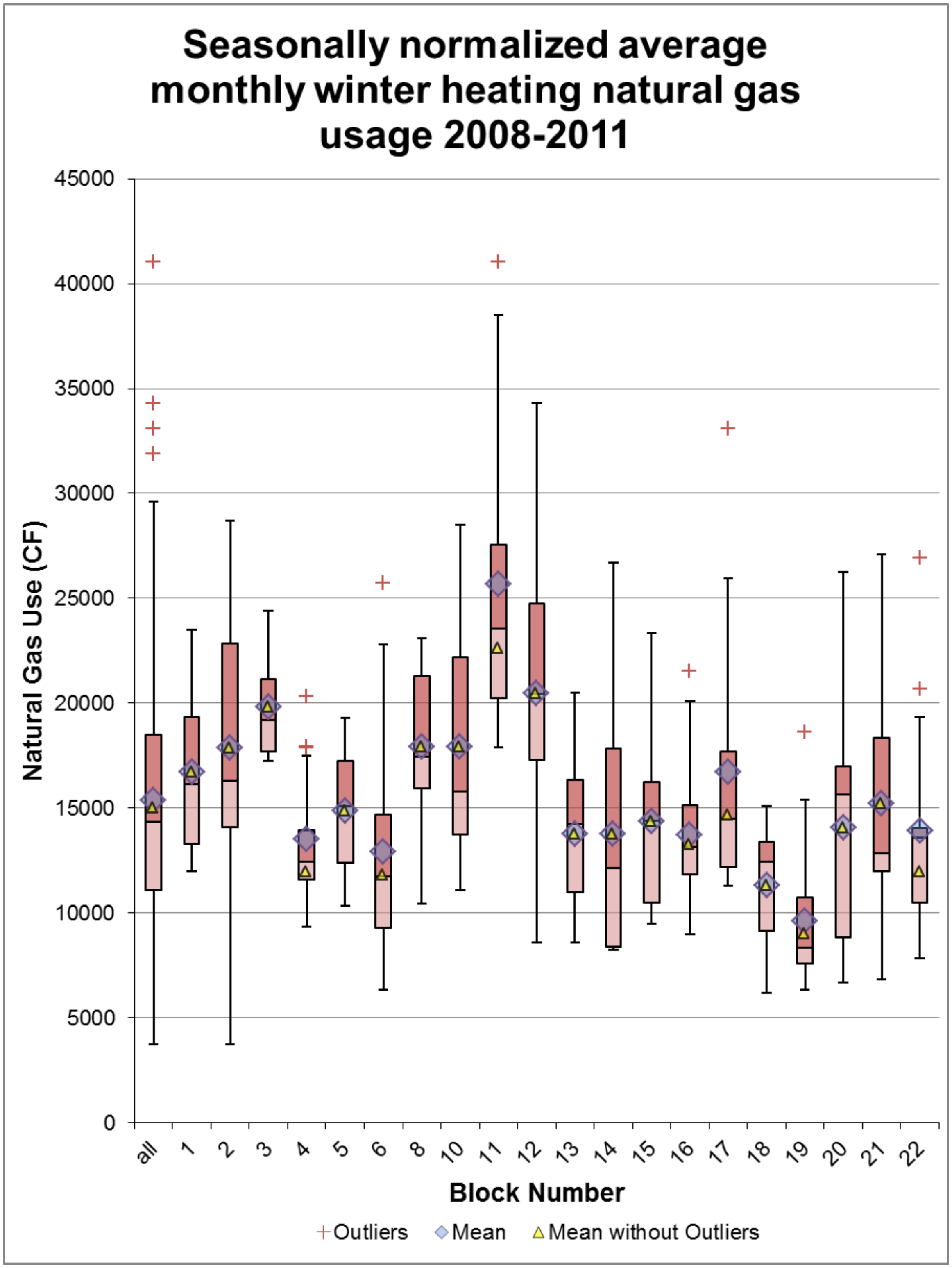

Figure 69. Seasonally normalized average monthly winter heating natural gas use from 2008-2011.

Weather-adjusted index of Normalized Annual Consumption (NAC)

Although consumption data was calculated and analyzed by individual parcels, it is presented here by block as a summary. The full result tables are in Appendix K. PRISM Results.

Natural gas – Heating

The heating part of the weather-adjusted Normalized Annual Consumption of natural gas use from 2008-2011 is shown in Figure 70 with each block's data summarized as a box plot. A combined box plot of all sampled homes is included. Outliers are displayed in the figure. The mean for each block with and without the influence of the outliers is also shown. For complete results of the natural gas heating PRISM analysis see Results by parcel and for block results see Summary of heating part of NAC by block, both are in Appendix K. PRISM Results.

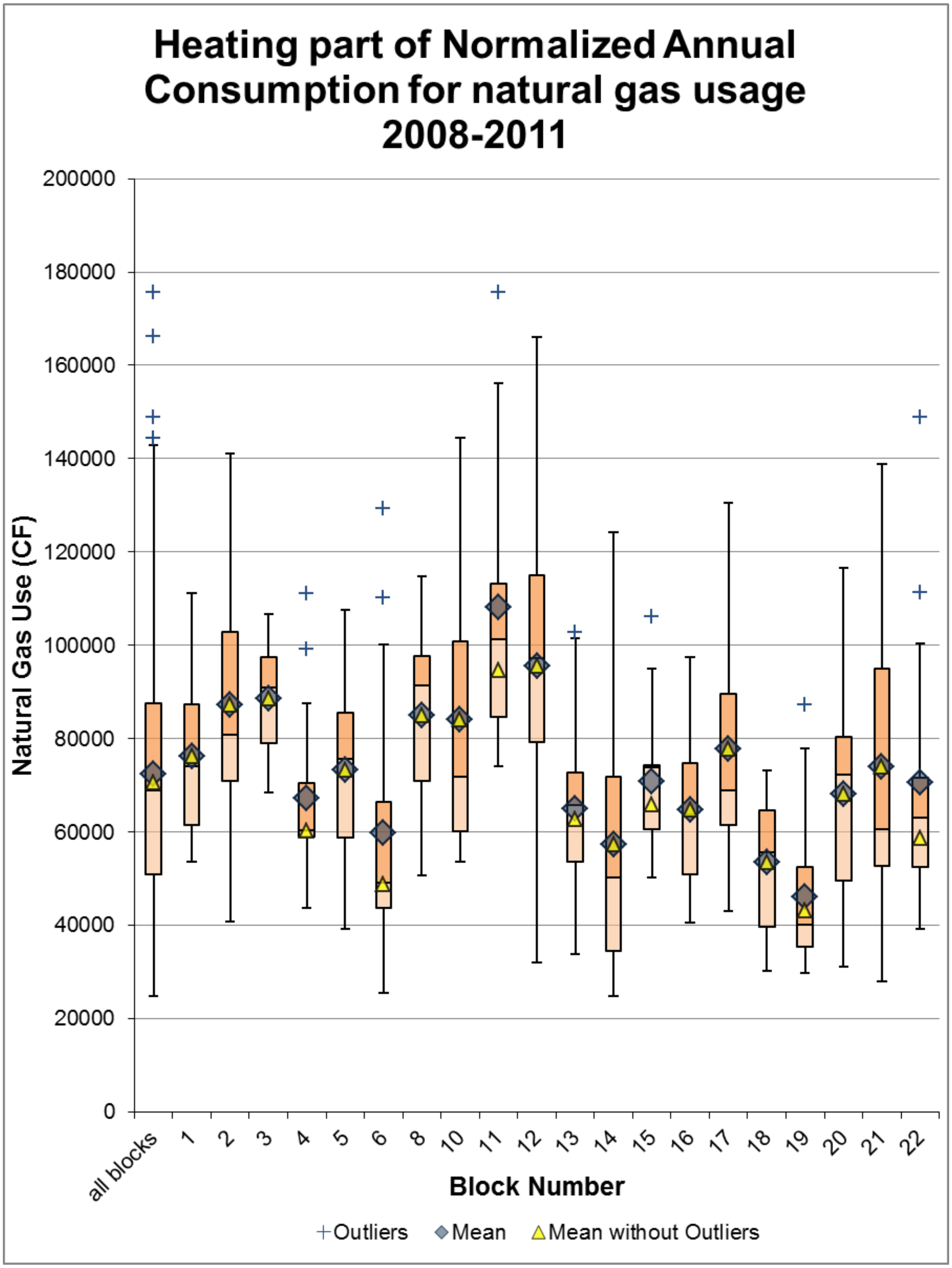

Figure 70. Heating part of Normalized Annual Consumption for natural gas usage 2008-2011.

Electric – Cooling

The cooling part of the weather-adjusted Normalized Annual Consumption of electric use from 2008-2011 is shown in Figure 71 with each block's data summarized as a box plot. A combined box plot of all sampled homes is included. Outliers are displayed in the figure. The mean for each block with and without the influence of the outliers is also shown. For complete results of the electric cooling PRISM analysis see Results by parcel and for block results see Summary of cooling part of NAC by block, both are in Appendix K. PRISM Results.

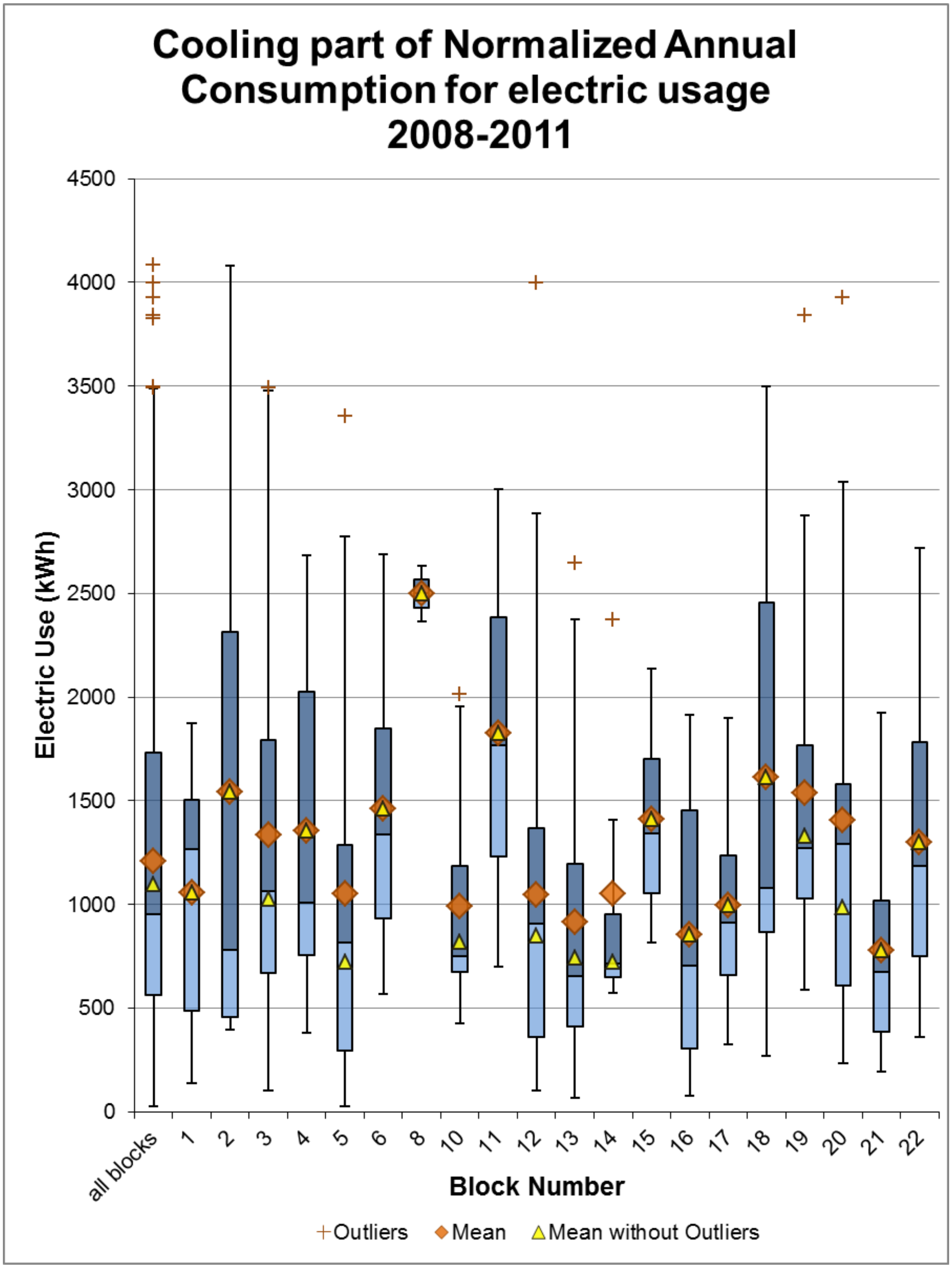

Figure 71. Cooling part of Normalized Annual Consumption for electric use 2008-2011.

House Characteristics

Home Owner Survey

There were 305 surveys that were mailed out and 28 were returned to sender. Of the 277 that were not returned, there were 99 respondents. Respondents of the surveys represented every sampled block. Of the 99 respondents, 87 were single family detached residential structures. See responses of the 87 respondents in the Survey Results section of Appendix L. Building Owner Survey.

County Assessor Information

After removing buildings that were not single family detached residential structures, 246 homes remained in the sample. Homes were built between 1880 and 2004. The median year was 1960. See Figure 72 for the age distribution of homes in the sample.

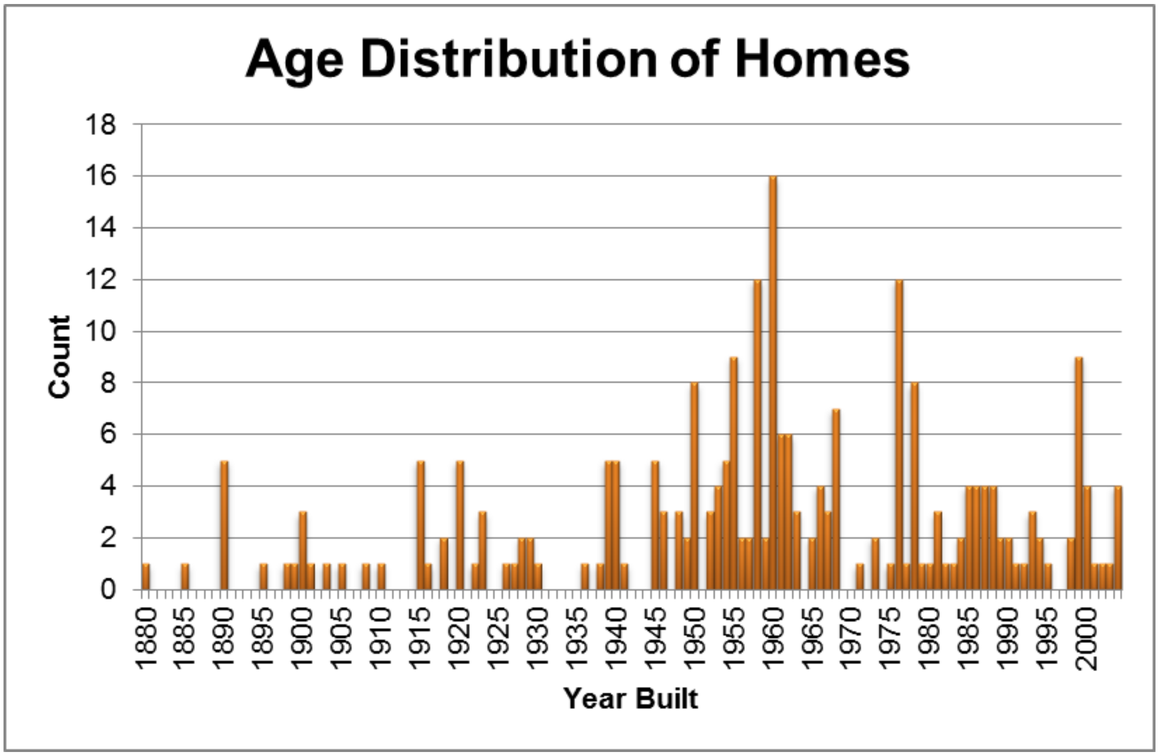

Figure 72. Number of sampled homes built per year according to assessor data.

On the assessor card, 63 homes showed a record of replacing siding since the home was built. The residing year ranged from 1981-2010 with a median year of 2001. There were 35 homes that met the criteria for likelihood of having house wrap installed. Siding type on homes included wood, vinyl, steel, aluminum, Masonite, stucco, brick, and stone. There were 44 homes with documented installation of windows. Window installation years ranged from 1983-2011 with a median of 2006. Improved windows were attributed to 38 homes.

The number of stories was also collected from the assessor cards. There were 142 single story homes, 46 with between 1.25-1.75 stories, 29 with 2-2.25 stories, and 29 homes that were either split level or split entry. A full basement was recorded for 231 of the homes. There were 8 homes that had a partial basement and 7 had none. The median conditioned area of the sampled houses was 2239 square feet and ranged from 616 to 5826 square feet.

The assessor data showed 203 homes with forced air heating, 37 with hot water, 2 with central gravity, and 4 with no heating system reported. Natural gas was either reported or likely for 221 homes, 24 with oil listed as a fuel type, and 1 home that was not determined by the assessor card data. Heated garages were reported by 28 of the homes. There were 71 homes within the sample that had a non-gas fueled fireplace or stove, 27 with fireplaces fueled by gas, 2 with electric fireplaces, and 146 not reporting a fireplace.

Central air conditioning units were reported for 204 residences, 22 with a window or wall air conditioner, and 20 with no air conditioner reported. There were 3 homes in the sample that had a pool or hot tub according to the assessor data.

To view tabulated data from the assessor cards see Appendix M. Assessor Data.

Sample Sets

After excluding the sample set to single family residential structures, 246 homes remained in the sample. The List of buildings that failed heating reliability criteria and the List of buildings that failed cooling reliability criteria both Default and Loose can be found in Appendix K. PRISM Results.

Heating

The first heating set was the most exclusive and had 106 homes in the set. The second heating set was looser and had 131 homes in the set. The third set was the most inclusive with 241 homes in the set.

Cooling

The first cooling set was the most exclusive and had 85 homes in the set. The second cooling set was looser and had 103 homes in the set. The third set was a step more inclusive and had 130 homes in the set. The fourth set was the most inclusive with 141homes in the set.

Clustered Data

Results of the investigation of the clustered data were presented in the Clustered Data part of the Materials and Methods section.

Analysis

Block Scale Analysis

Seasonally normalized heating energy use

Figure 73 displays seasonally normalized average monthly winter heating natural gas consumption (2008-2011) averaged by block plotted against percent UTC by block. Figure 74 displays seasonally normalized average monthly winter heating natural gas consumption (2008-2011) averaged by block plotted against percent UTC by 300 foot block buffers. Figure 75 displays seasonally normalized average monthly winter heating natural gas consumption (2008-2011) averaged by block plotted against percent UTC by 1000 foot block buffers. Averages used for these graphs are without the effects of outliers (as defined by a 1.5 interquartile range boxplot).

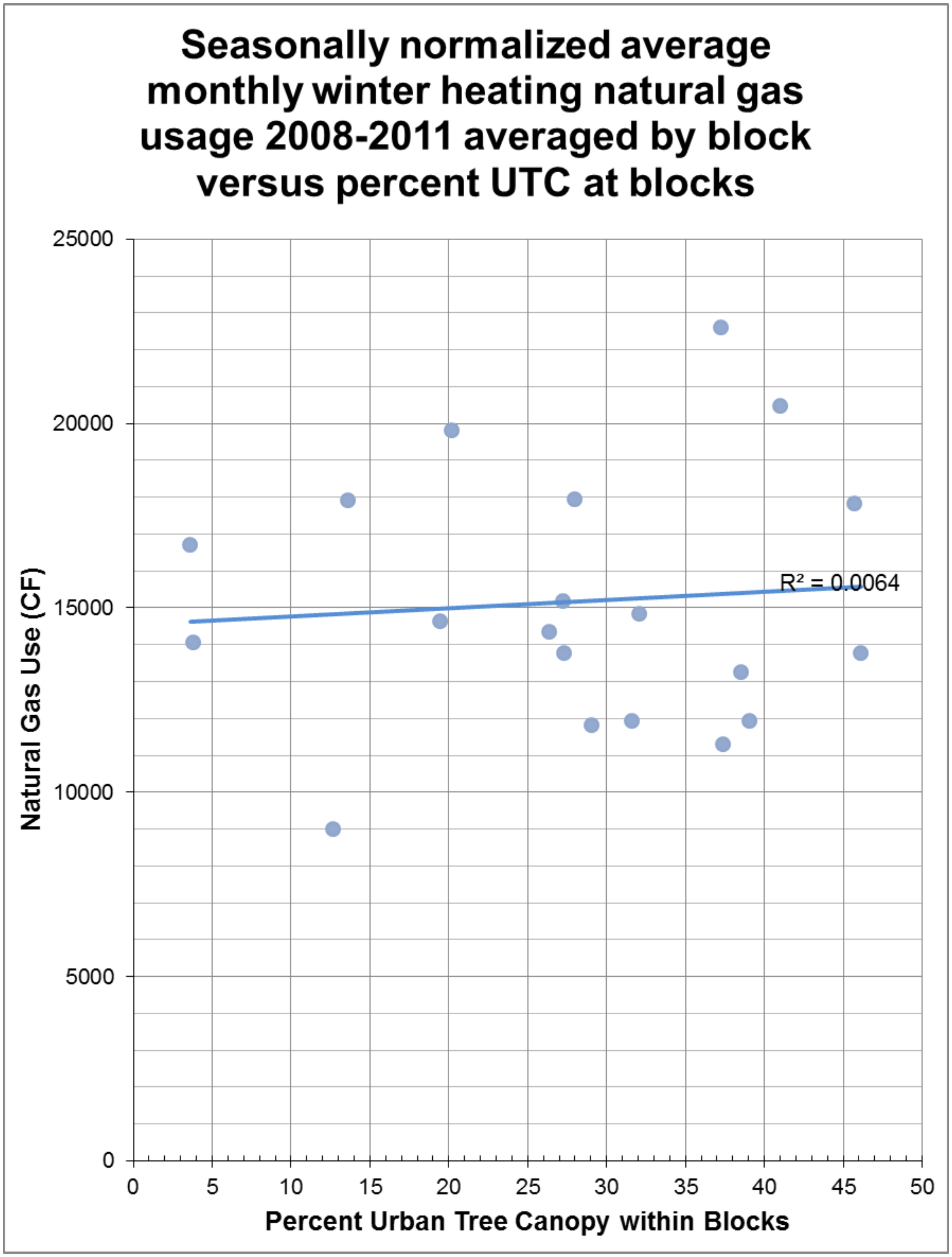

Figure 73. Seasonally normalized average monthly winter heating natural gas consumption (2008-2011) averaged by block plotted against percent UTC by block.

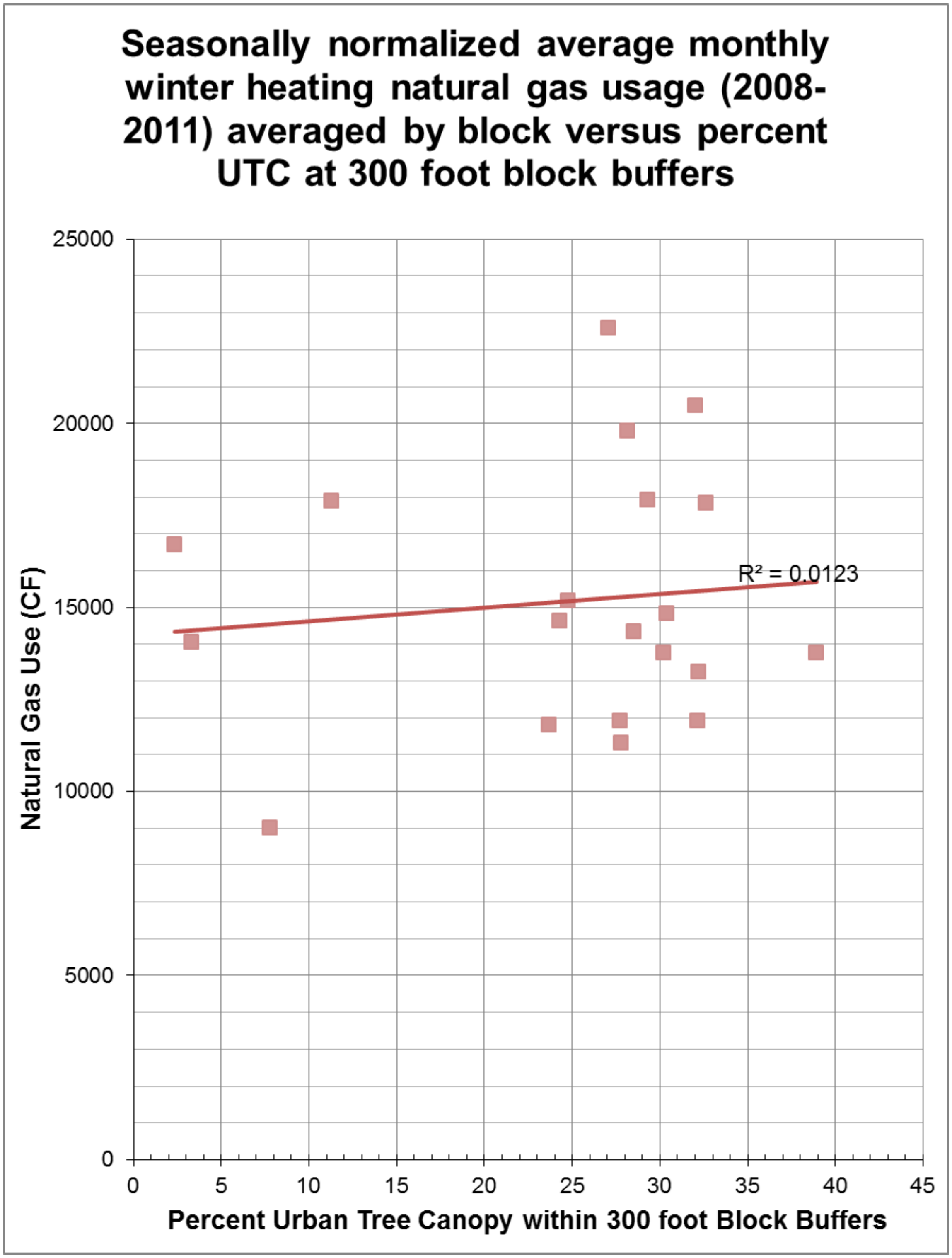

Figure 74. Seasonally normalized average monthly winter heating natural gas consumption (2008-2011) averaged by block plotted against percent UTC by 300 foot block buffers.

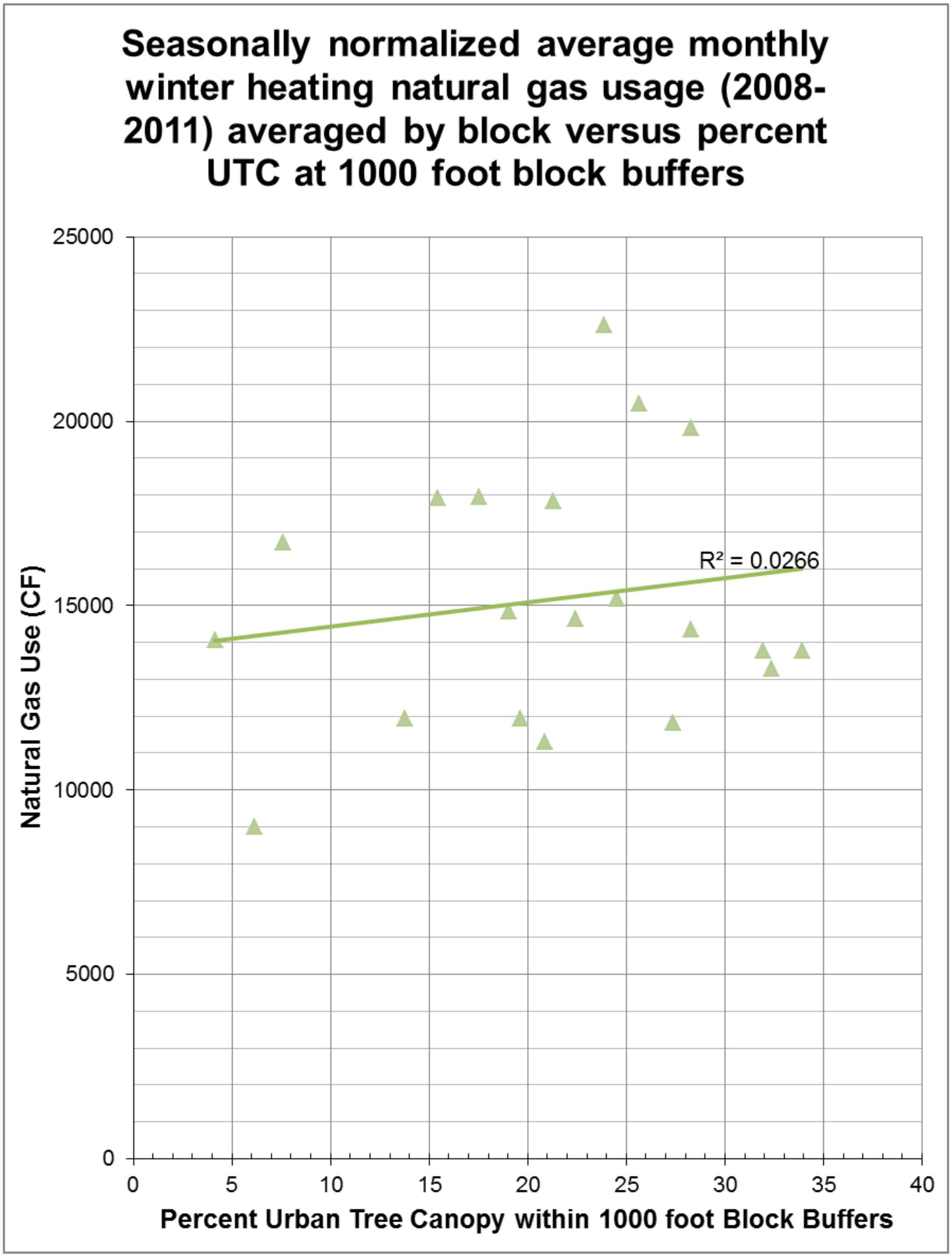

Figure 75. Seasonally normalized average monthly winter heating natural gas consumption (2008-2011) averaged by block plotted against percent UTC by 1000 foot block buffers.

Weather-adjusted Normalized Annual Consumption (NAC)

Heating part of NAC

Figure 76 displays the heating part of NAC natural gas consumption (2008-2011) averaged by block plotted against percent UTC by block. Figure 77 displays the heating part of NAC natural gas consumption (2008-2011) averaged by block plotted against percent UTC by 300 foot block buffers. Figure 78 displays the heating part of NAC natural gas consumption (2008-2011) averaged by block plotted against percent UTC by 1000 foot block buffers. Averages used for these graphs are without the effects of outliers (as defined by a 1.5 interquartile range boxplot).

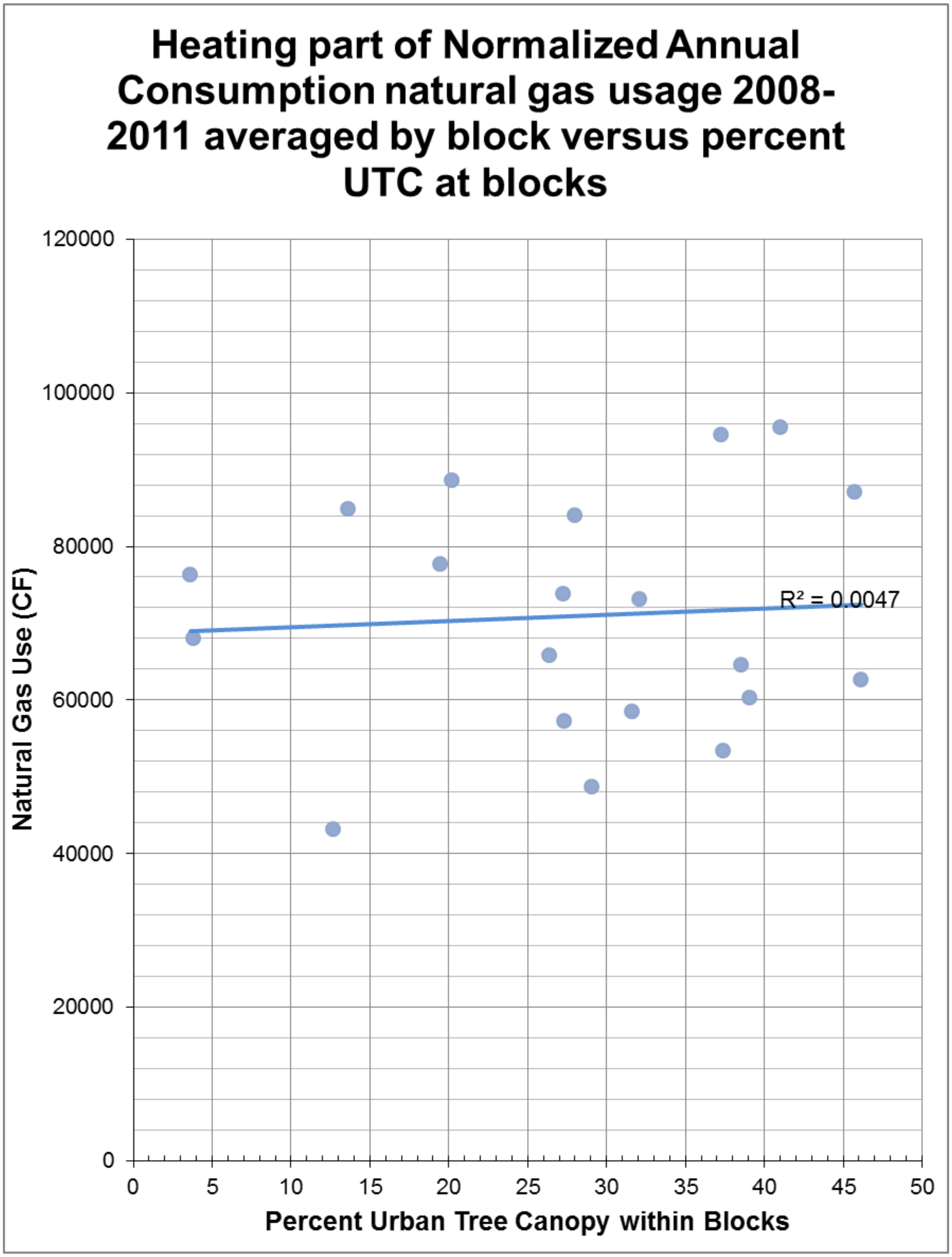

Figure 76. Heating part of NAC natural gas consumption (2008-2011) averaged by block plotted against percent UTC by block.

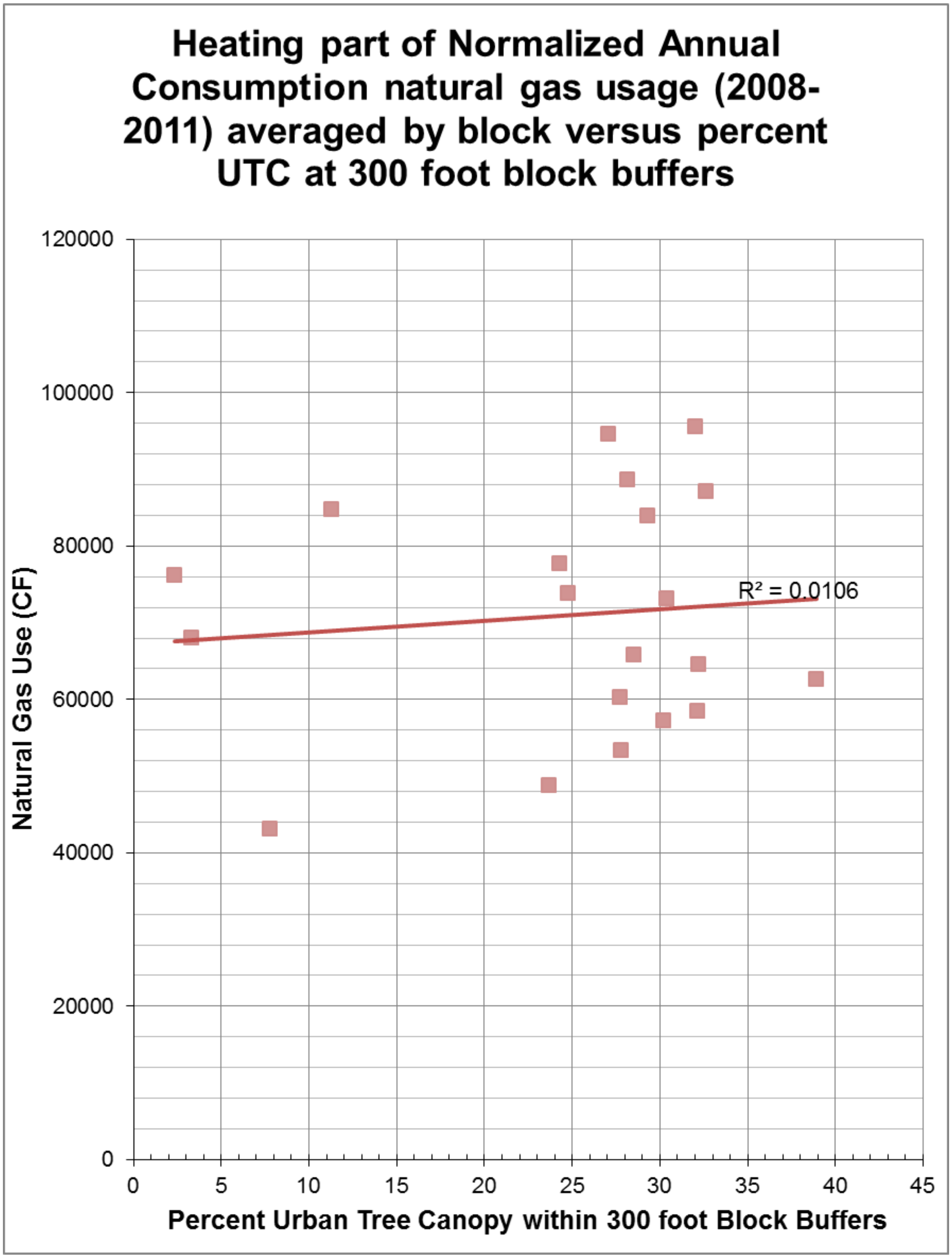

Figure 77. Heating part of NAC natural gas consumption (2008-2011) averaged by block plotted against percent UTC by 300 foot block buffers.

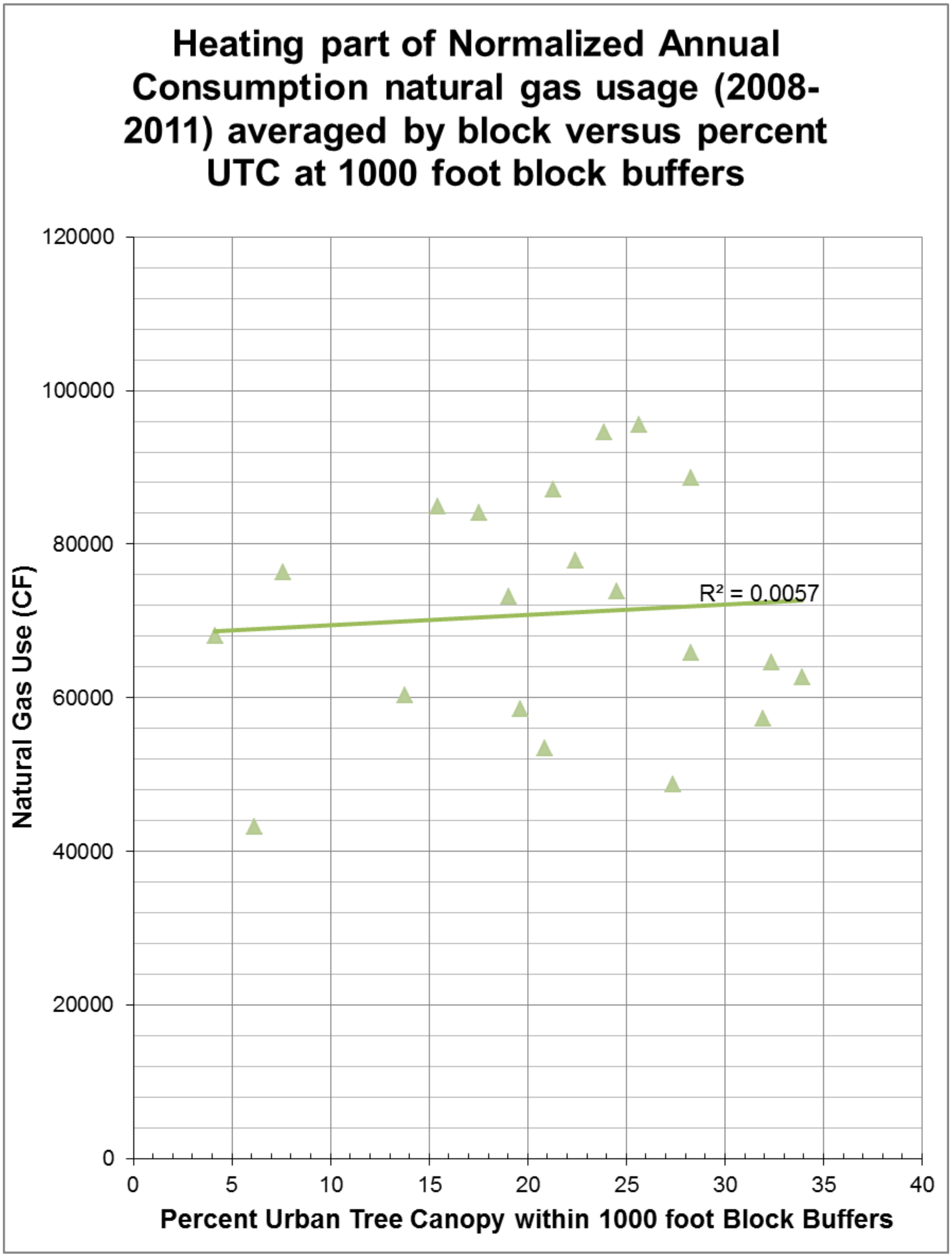

Figure 78. Heating part of NAC natural gas consumption (2008-2011) averaged by block plotted against percent UTC by 1000 foot block buffers.

Cooling part of NAC

Figure 79 shows the cooling part of NAC electric consumption (2008-2011) averaged by block plotted against percent UTC by block. Figure 80 shows the cooling part of NAC electric consumption (2008-2011) averaged by block plotted against percent UTC by 300 foot block buffers. Figure 81 shows the cooling part of NAC electric consumption (2008-2011) averaged by block plotted against percent UTC by 1000 foot block buffers. Averages used for these graphs are without the effects of outliers (as defined by a 1.5 interquartile range boxplot).

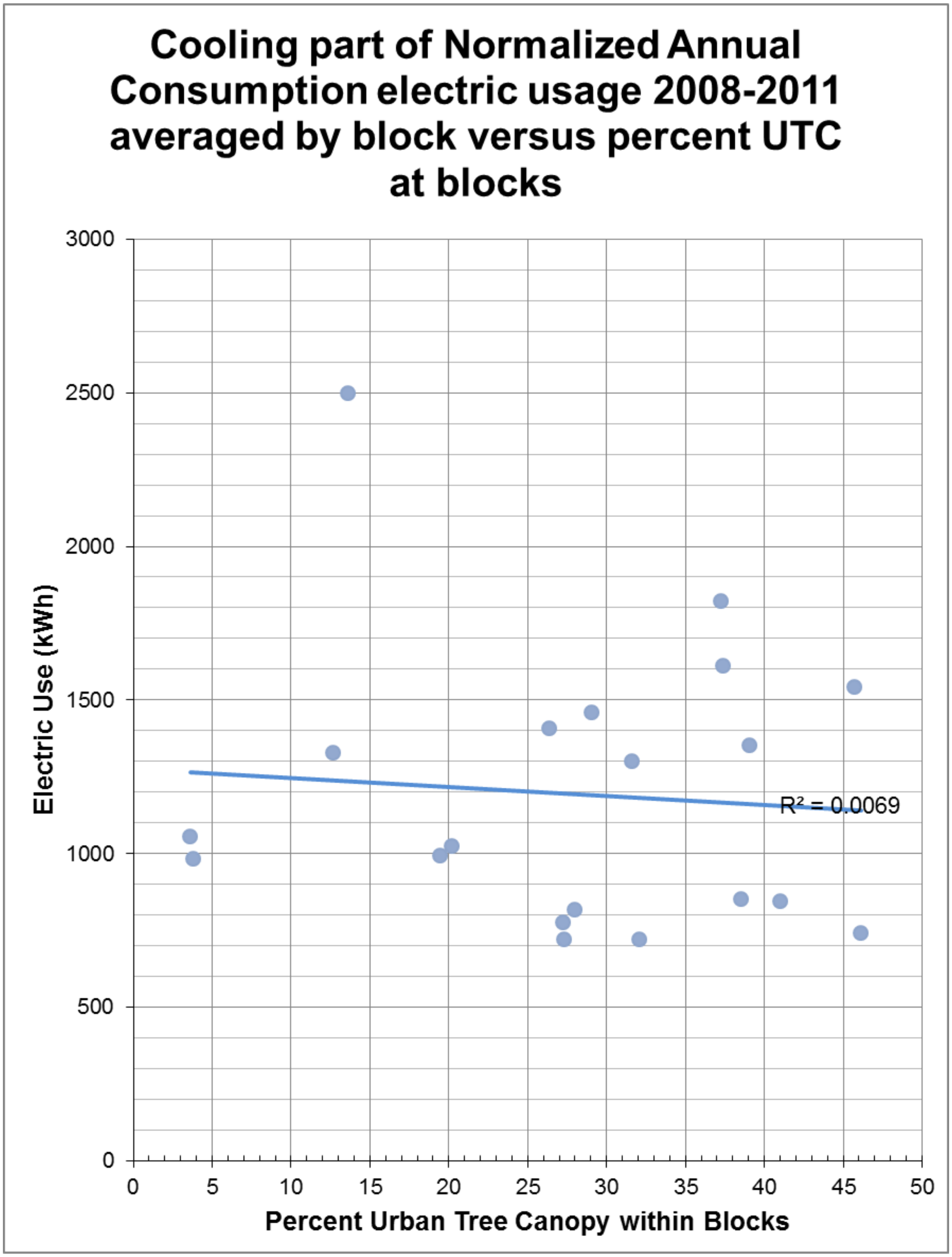

Figure 79. Cooling part of NAC electric consumption (2008-2011) averaged by block plotted against percent UTC by block.

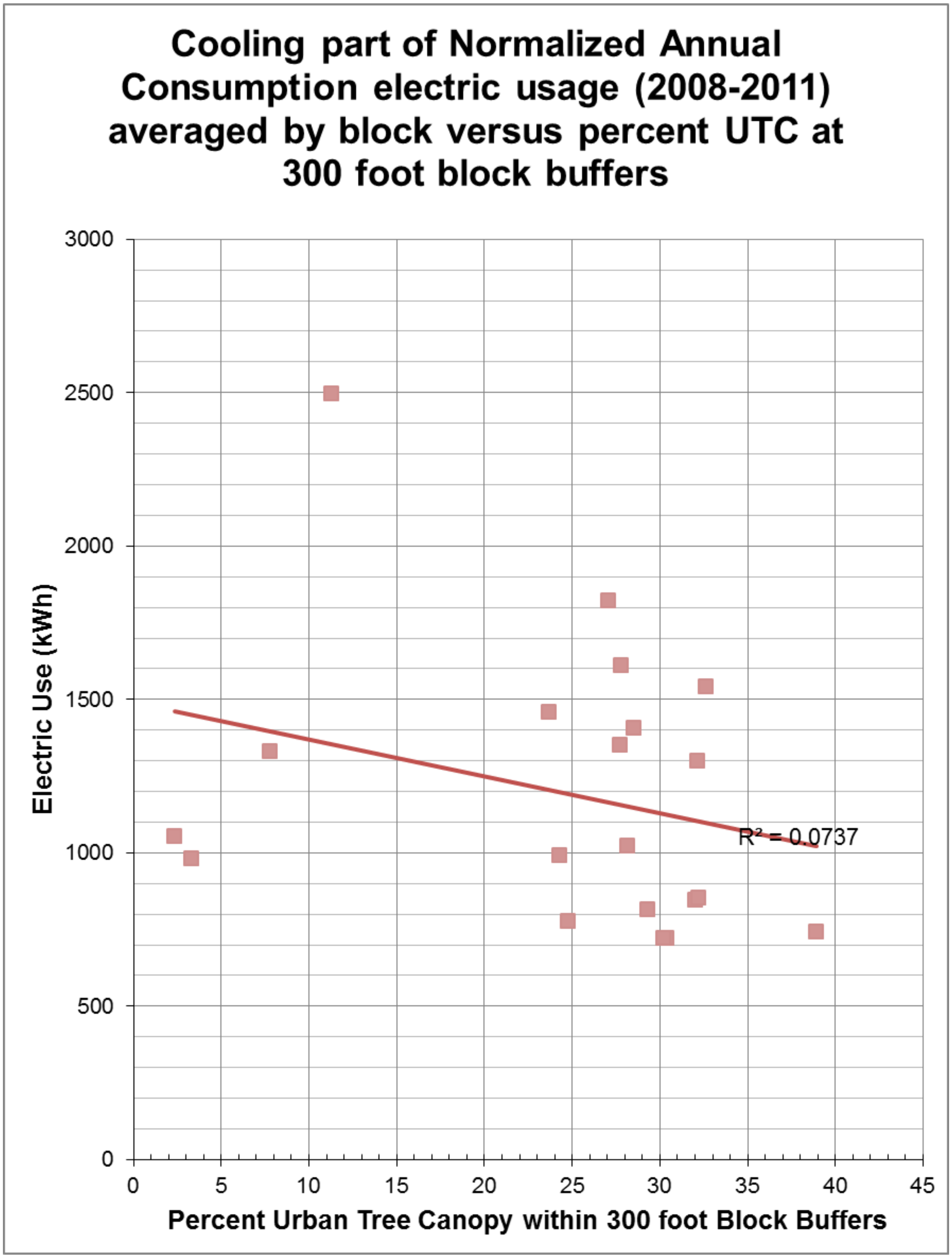

Figure 80. Cooling part of NAC electric consumption (2008-2011) averaged by block plotted against percent UTC by 300 foot block buffers.

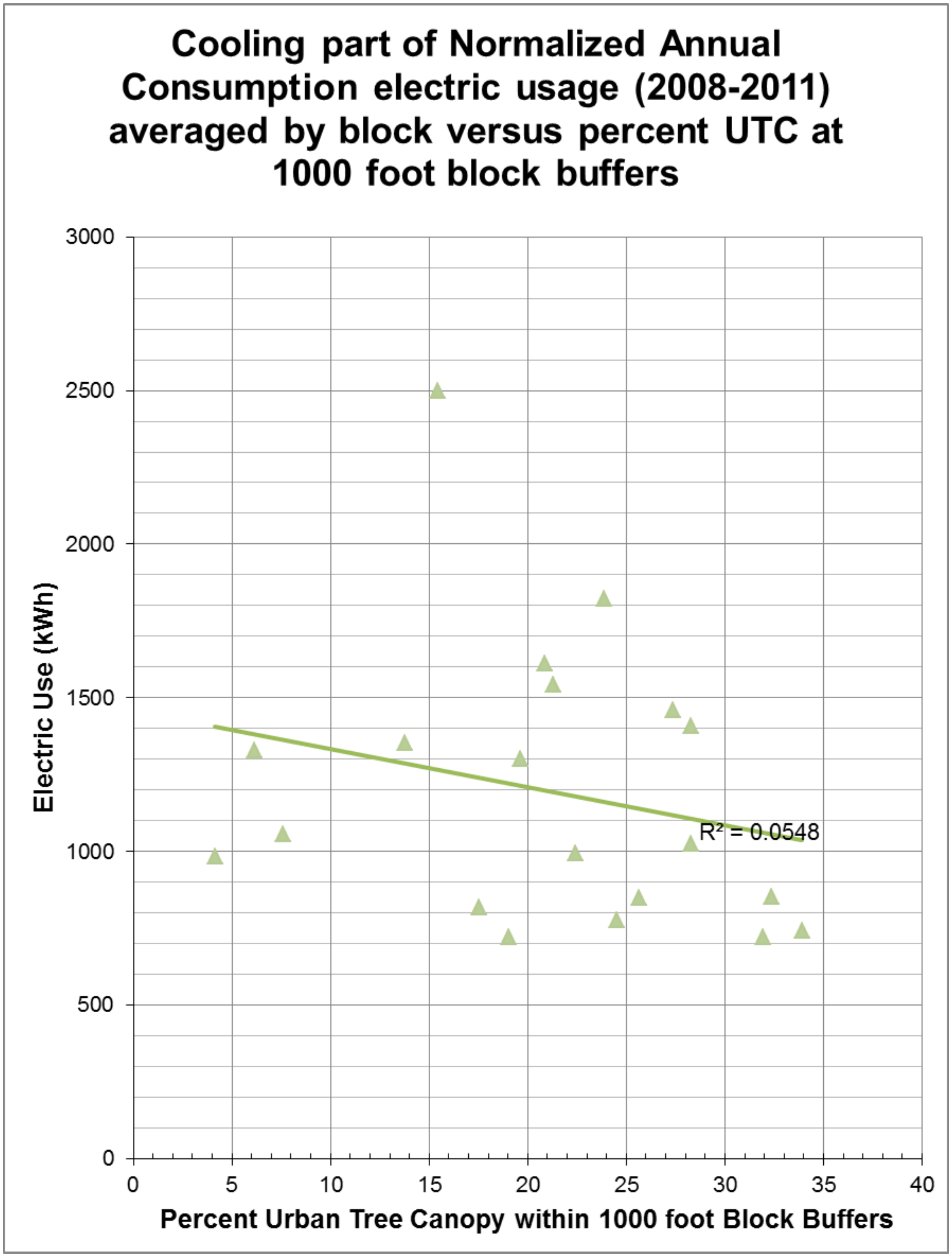

Figure 81. Cooling part of NAC electric consumption (2008-2011) averaged by block plotted against percent UTC by 1000 foot block buffers.

Parcel Scale Analysis

Summary ANOVA tables from the parcel scale analysis are in Appendix N. Parcel Scale Analysis ANOVA Tables. Effect plots of all covariates and significant linear fit relations follow. In both the appendix and this section, the p-value level of significance is displayed with a color code.

P-values in the following graphs have been added and color coded to show the level of significance related to the likelihood of rejecting the null hypothesis in the represented relationships. Green shows the lowest p-values of <0.001, indicating the most likely to reject the null hypothesis. Yellow shows the next level of significance with p-values <0.01. Red is next with p-values <0.05. Last is Pink showing p-values <0.10. Blue is used to show non-significant relationships for p-values >0.10 in the covariate effect plots. P-values are not listed if >0.10 in the effect plots that show the energy data against the various tree canopy data. In other words, if there are not numbers colored Green, Yellow, Red, or Pink in the plot the relationship is not considered significant (would not reject the null hypothesis).

P-value color code

Blue: not significant, > 0.10

Pink: < 0.10

Red: < 0.05

Yellow: < 0.01

Green: < 0.001

Variable definitions

HeatNAC: Heating part of Normalized Annual Consumption in cubic feet of natural gas

CoolNAC: Cooling Part of Normalized Annual Consumption in kilowatt hours

YearBuilt: year home was built

ConditionedSpace: conditioned square footage of home

Stories: number of levels in the home

SidingType: Type of exterior cladding on the home

ImprovedInsulation: Yes if any note was made on assessor card about insulation

HeatingSystemType: Type of heating system in the home

ImprovedSiding: Siding installed after 1998

ImprovedWindows: Windows installed after 1998

Fireplace: Type of fireplace

GarageHeated: Yes if garage noted as heated on assessor card

Pool: Yes if any type of pool listed on assessor card

AirConditioning: Type of air conditioner noted on assessor card

All effect plots, excluding the covariate plots, have percent urban tree canopy as the x-axis variable.

Heating

Full Model - Full Sample

HeatSet1

Covariate effect plots

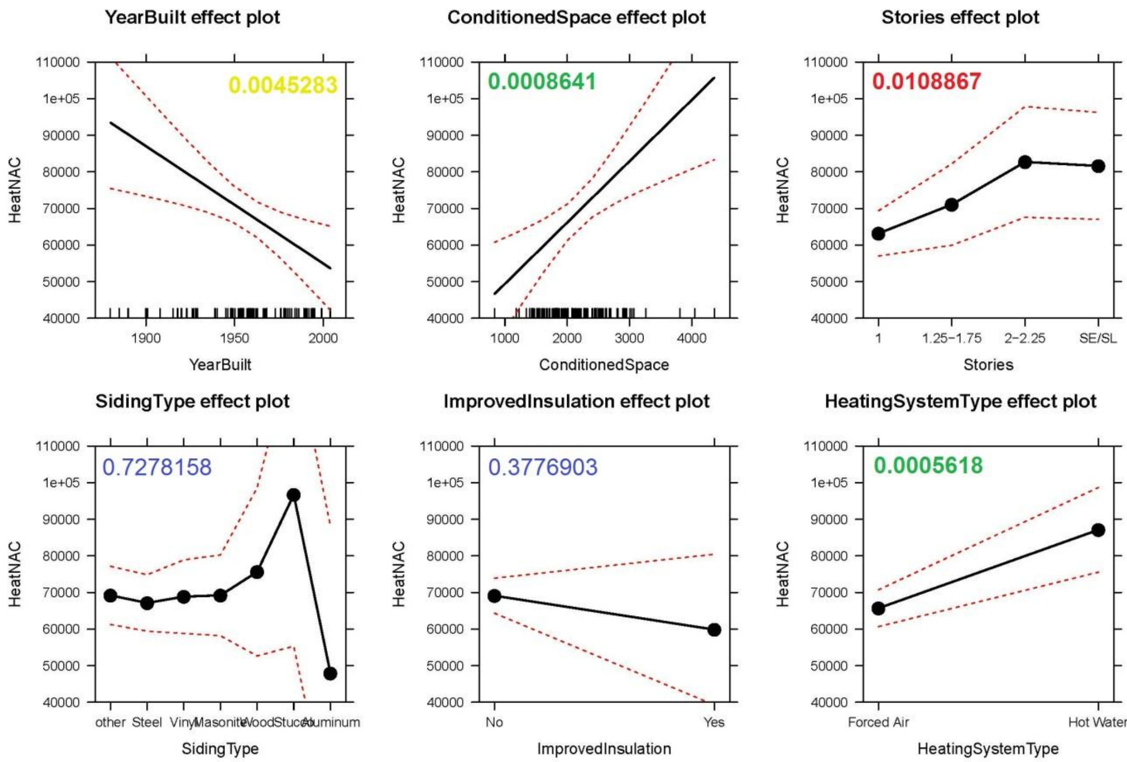

Figure 82. Covariate effect plots for HeatSet1 with the Full Sample running the Full Model.

Comprehensive parcel buffer effect plots

None of the comprehensive parcel buffer effect plots for HeatSet1 with the Full Sample running the Full Model were found to be significant.

Thin band parcel buffer effect plots

None of the thin band parcel buffer effect plots for HeatSet1 with the Full Sample running the Full Model were found to be significant.

Wide band parcel excluded buffer effect plots

None of the wide band parcel excluded buffer effect plots for HeatSet1 with the Full Sample running the Full Model were found to be significant.

Wide band parcel to 100 foot excluded buffer effect plots

None of the wide band parcel to 100 foot excluded buffer effect plots for HeatSet1 with the Full Sample running the Full Model were found to be significant.

HeatSet2

Covariate effect plots

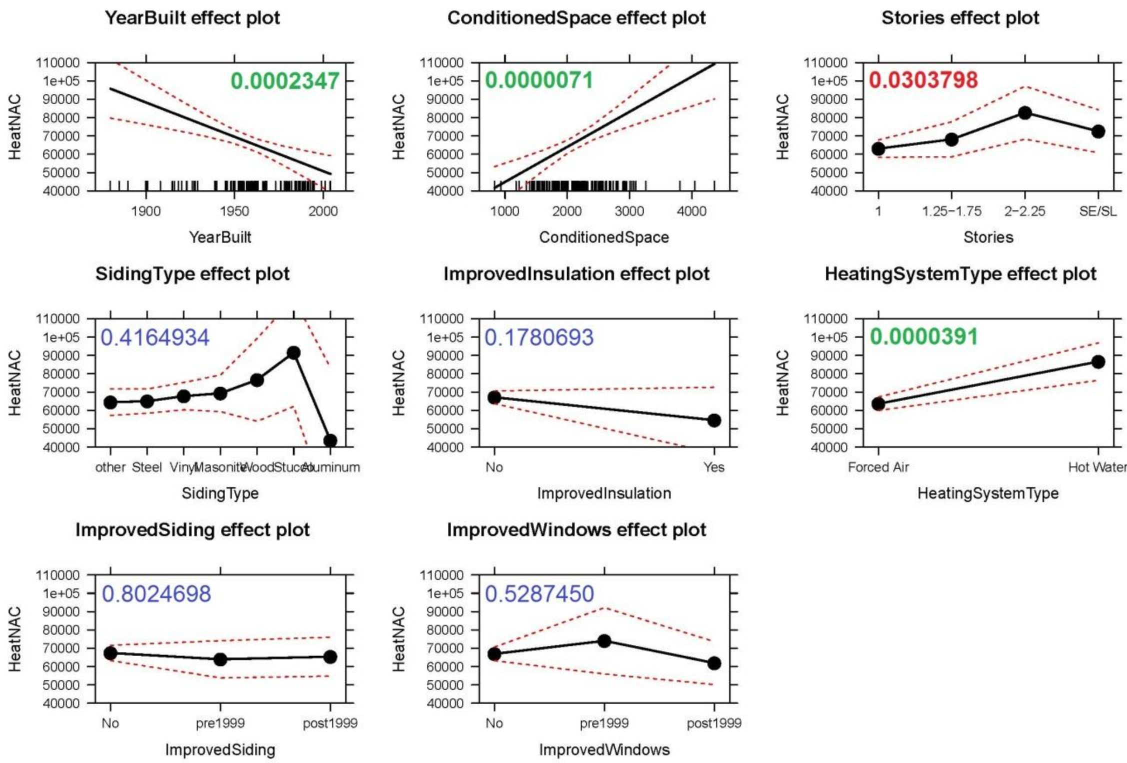

Figure 83. Covariate effect plots for HeatSet2 with the Full Sample running the Full Model.

Comprehensive parcel buffer effect plots

None of the comprehensive parcel buffer effect plots for HeatSet2 with the Full Sample running the Full Model were found to be significant.

Thin band parcel buffer effect plots

None of the thin band parcel buffer effect plots for HeatSet2 with the Full Sample running the Full Model were found to be significant.

Wide band parcel excluded buffer effect plots

None of the wide band parcel excluded buffer effect plots for HeatSet2 with the Full Sample running the Full Model were found to be significant.

Wide band parcel to 100 foot excluded buffer effect plots

None of the wide band parcel to 100 foot excluded buffer effect plots for HeatSet2 with the Full Sample running the Full Model were found to be significant.

HeatSet3

Covariate effect plots

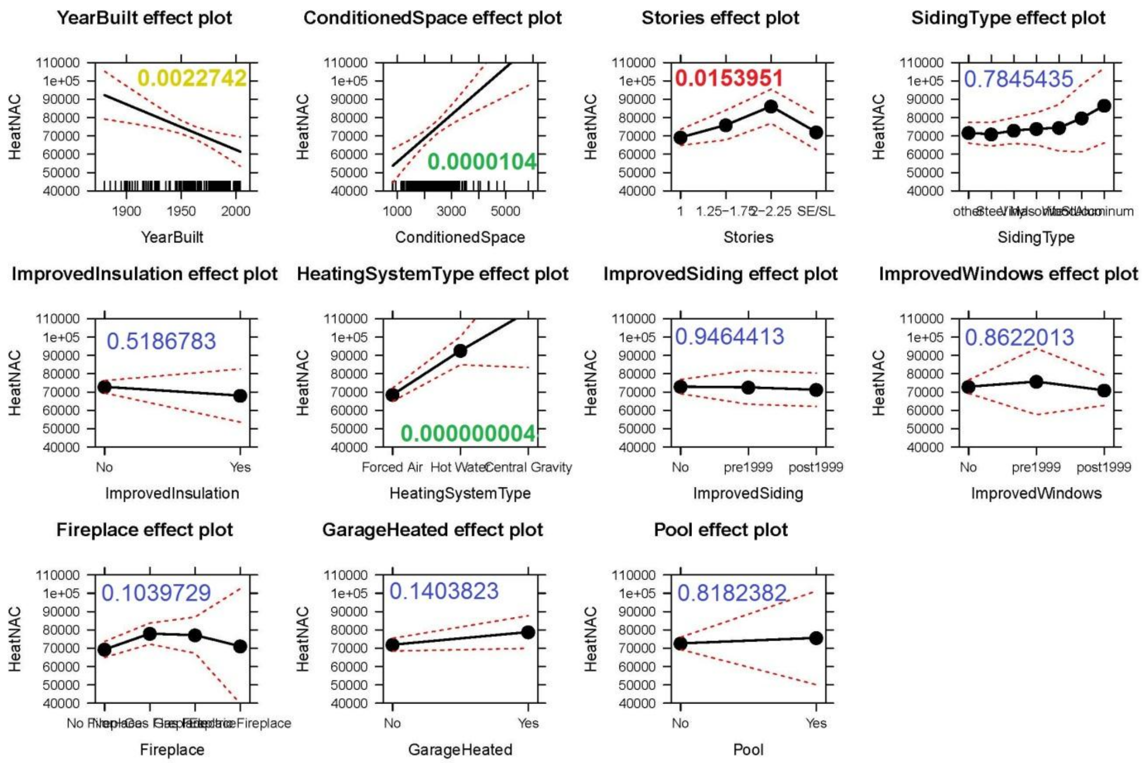

Figure 84. Covariate effect plots for HeatSet3 with the Full Sample running the Full Model.

Comprehensive parcel buffer effect plots

None of the comprehensive parcel buffer effect plots for HeatSet3 with the Full Sample running the Full Model were found to be significant.

Thin band parcel buffer effect plots

None of the thin band parcel buffer effect plots for HeatSet3 with the Full Sample running the Full Model were found to be significant.

Wide band parcel excluded buffer effect plots

None of the wide band parcel excluded buffer effect plots for HeatSet3 with the Full Sample running the Full Model were found to be significant.

Wide band parcel to 100 foot excluded buffer effect plots

None of the wide band parcel to 100 foot excluded buffer effect plots for HeatSet3 with the Full Sample running the Full Model were found to be significant.

Simple Model - Full Sample

HeatSet1

Covariate effect plots

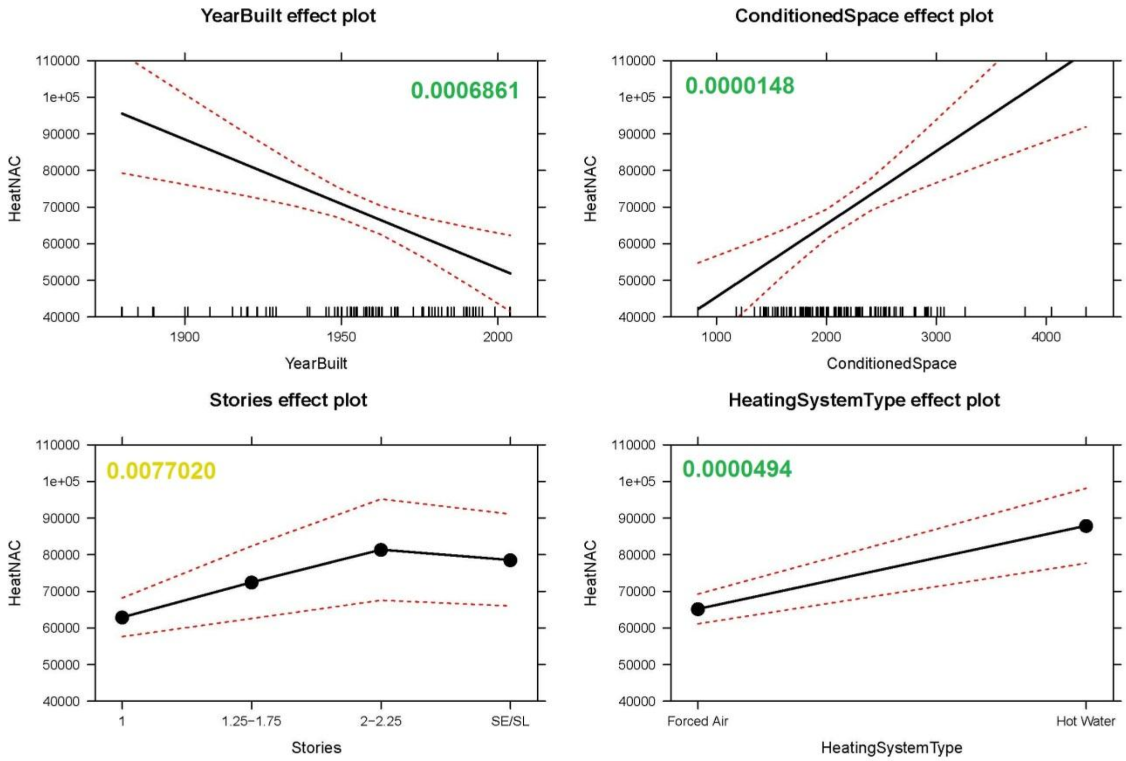

Figure 85. Covariate effect plots for HeatSet1 with the Full Sample running the Simple Model.

Comprehensive parcel buffer effect plots

None of the comprehensive parcel buffer effect plots for HeatSet1 with the Full Sample running the Simple Model were found to be significant.

Thin band parcel buffer effect plots

None of the thin band parcel buffer effect plots for HeatSet1 with the Full Sample running the Simple Model were found to be significant.

Wide band parcel excluded buffer effect plots

None of the wide band parcel excluded buffer effect plots for HeatSet1 with the Full Sample running the Simple Model were found to be significant.

Wide band parcel to 100 foot excluded buffer effect plots

None of the wide band parcel to 100 foot excluded buffer effect plots for HeatSet1 with the Full Sample running the Simple Model were found to be significant.

HeatSet2

Covariate effect plots

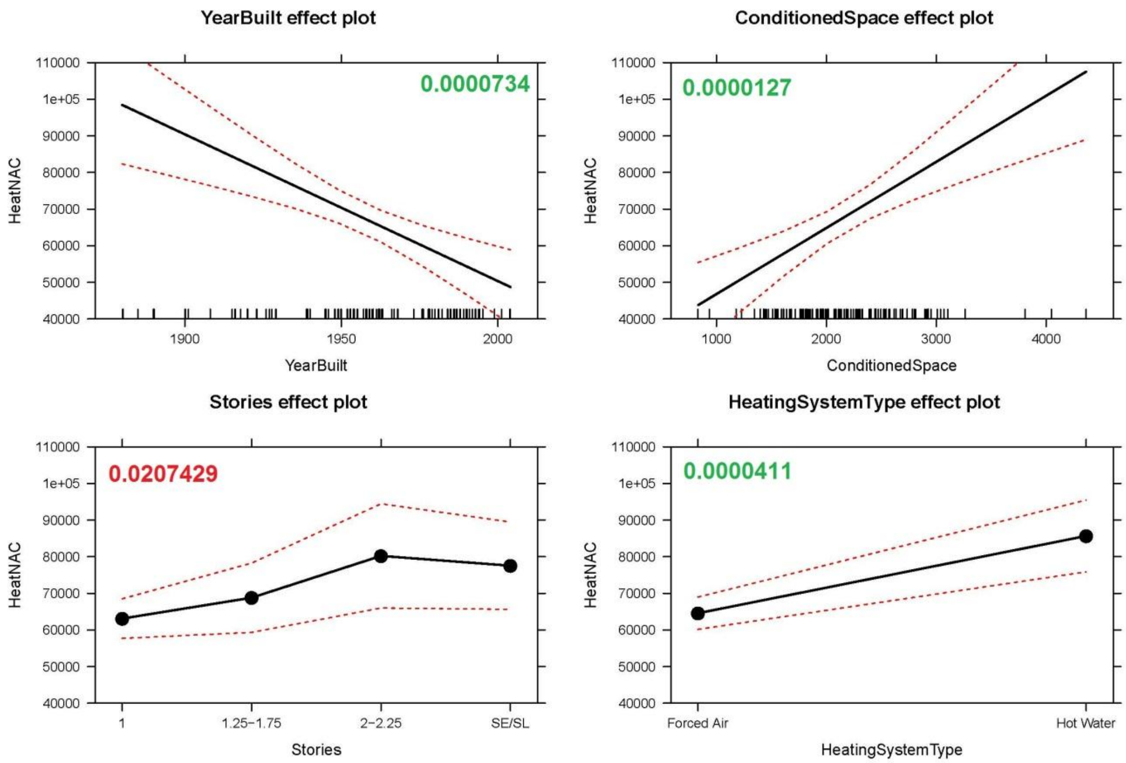

Figure 86. Covariate effect plots for HeatSet2 with the Full Sample running the Simple Model.

Comprehensive parcel buffer effect plots

None of the comprehensive parcel buffer effect plots for HeatSet2 with the Full Sample running the Simple Model were found to be significant.

Thin band parcel buffer effect plots

None of the thin band parcel buffer effect plots for HeatSet2 with the Full Sample running the Simple Model were found to be significant.

Wide band parcel excluded buffer effect plots

None of the wide band parcel excluded buffer effect plots for HeatSet2 with the Full Sample running the Simple Model were found to be significant.

Wide band parcel to 100 foot excluded buffer effect plots

None of the wide band parcel to 100 foot excluded buffer effect plots for HeatSet2 with the Full Sample running the Simple Model were found to be significant.

HeatSet3

Covariate effect plots

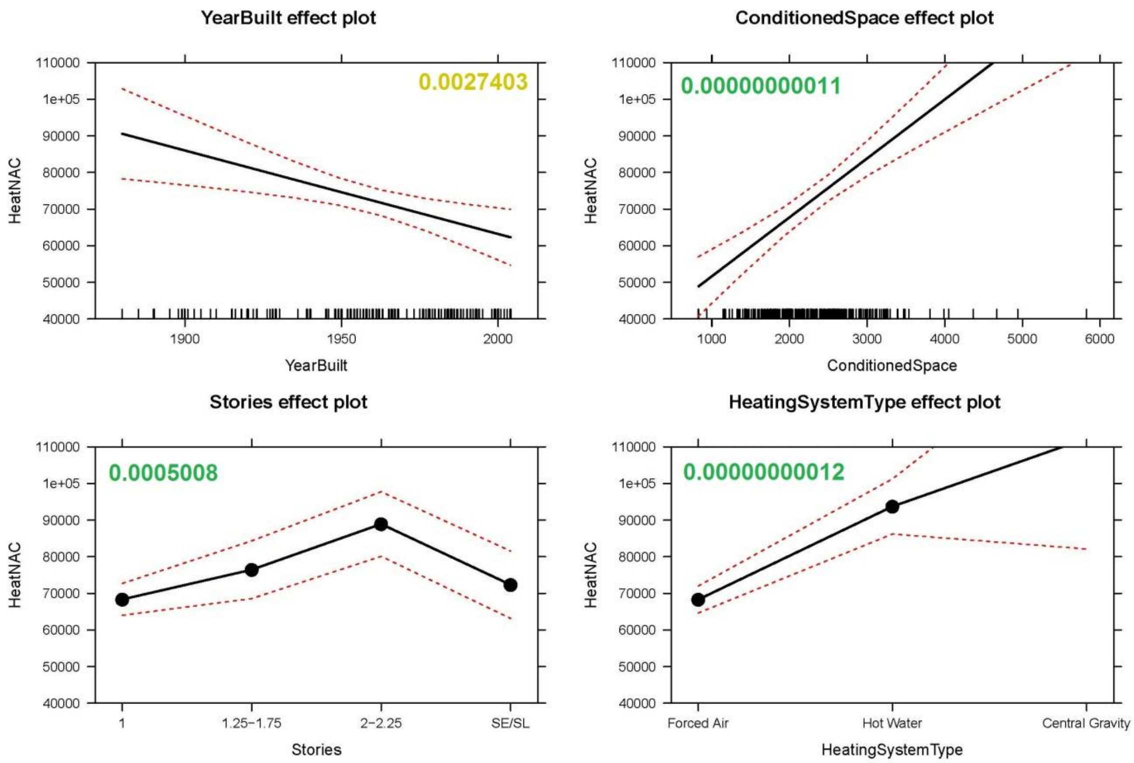

Figure 87. Covariate effect plots for HeatSet3 with the Full Sample running the Simple Model.

Comprehensive parcel buffer effect plots

None of the comprehensive parcel buffer effect plots for HeatSet3 with the Full Sample running the Simple Model were found to be significant.

Thin band parcel buffer effect plots

None of the thin band parcel buffer effect plots for HeatSet3 with the Full Sample running the Simple Model were found to be significant.

Wide band parcel excluded buffer effect plots

None of the wide band parcel excluded buffer effect plots for HeatSet3 with the Full Sample running the Simple Model were found to be significant.

Wide band parcel to 100 foot excluded buffer effect plots

None of the wide band parcel to 100 foot excluded buffer effect plots for HeatSet3 with the Full Sample running the Simple Model were found to be significant.

Full Model - Reduced Sample

HeatSet1

Covariate effect plots

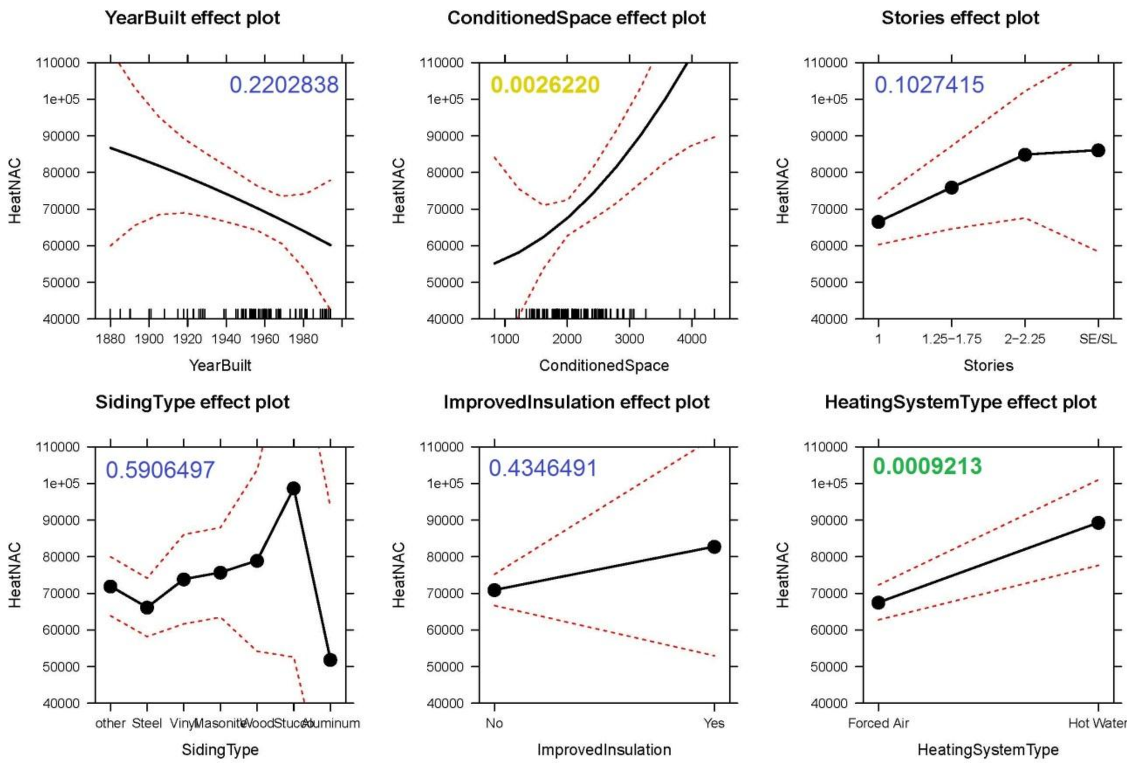

Figure 88. Covariate effect plots for HeatSet1 with the Reduced Sample running the Full Model.

Comprehensive parcel buffer effect plots

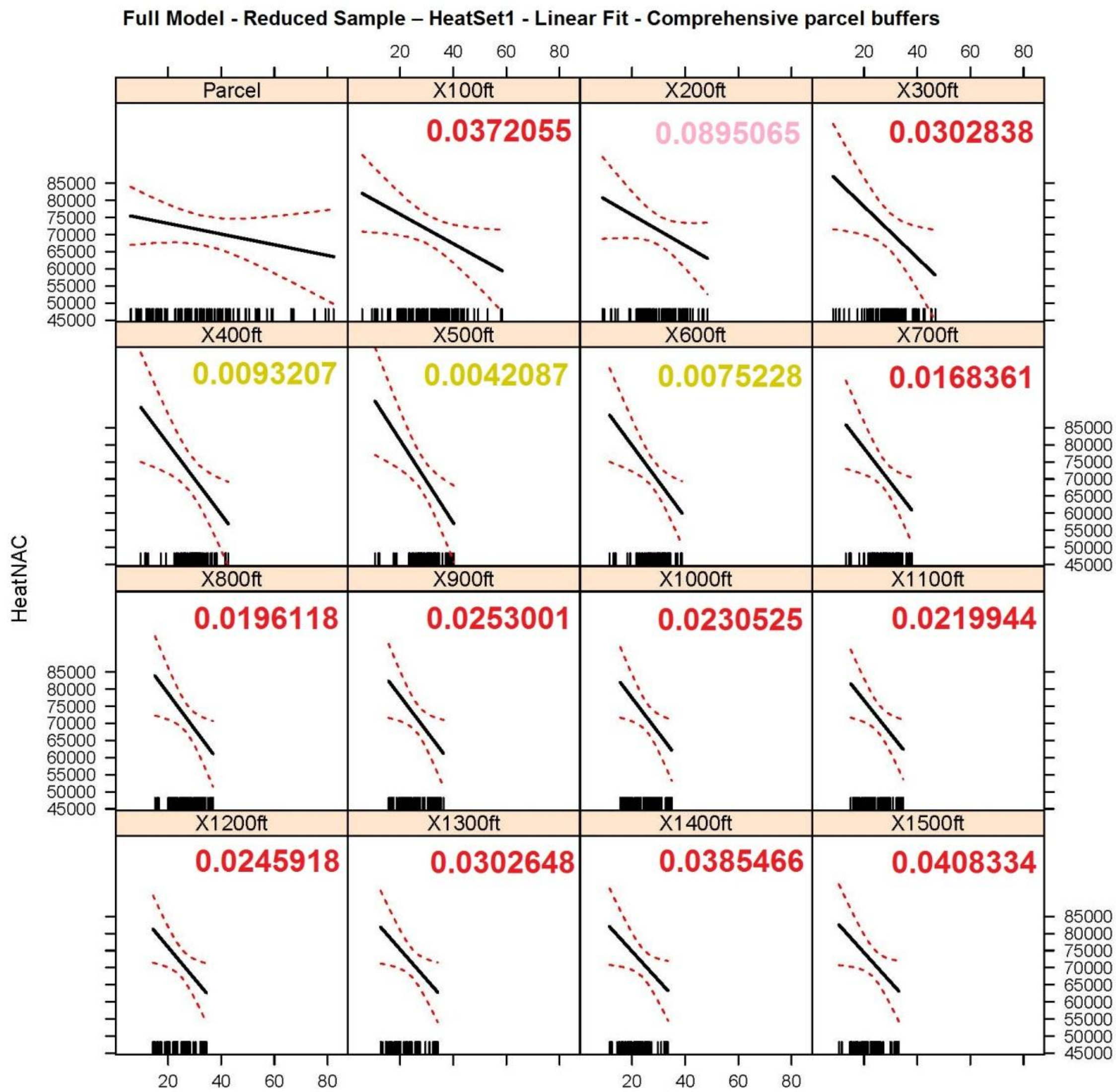

Figure 89. Comprehensive parcel buffer effect plots for HeatSet1 with the Reduced Sample running the Full Model.

Thin band parcel buffer effect plots

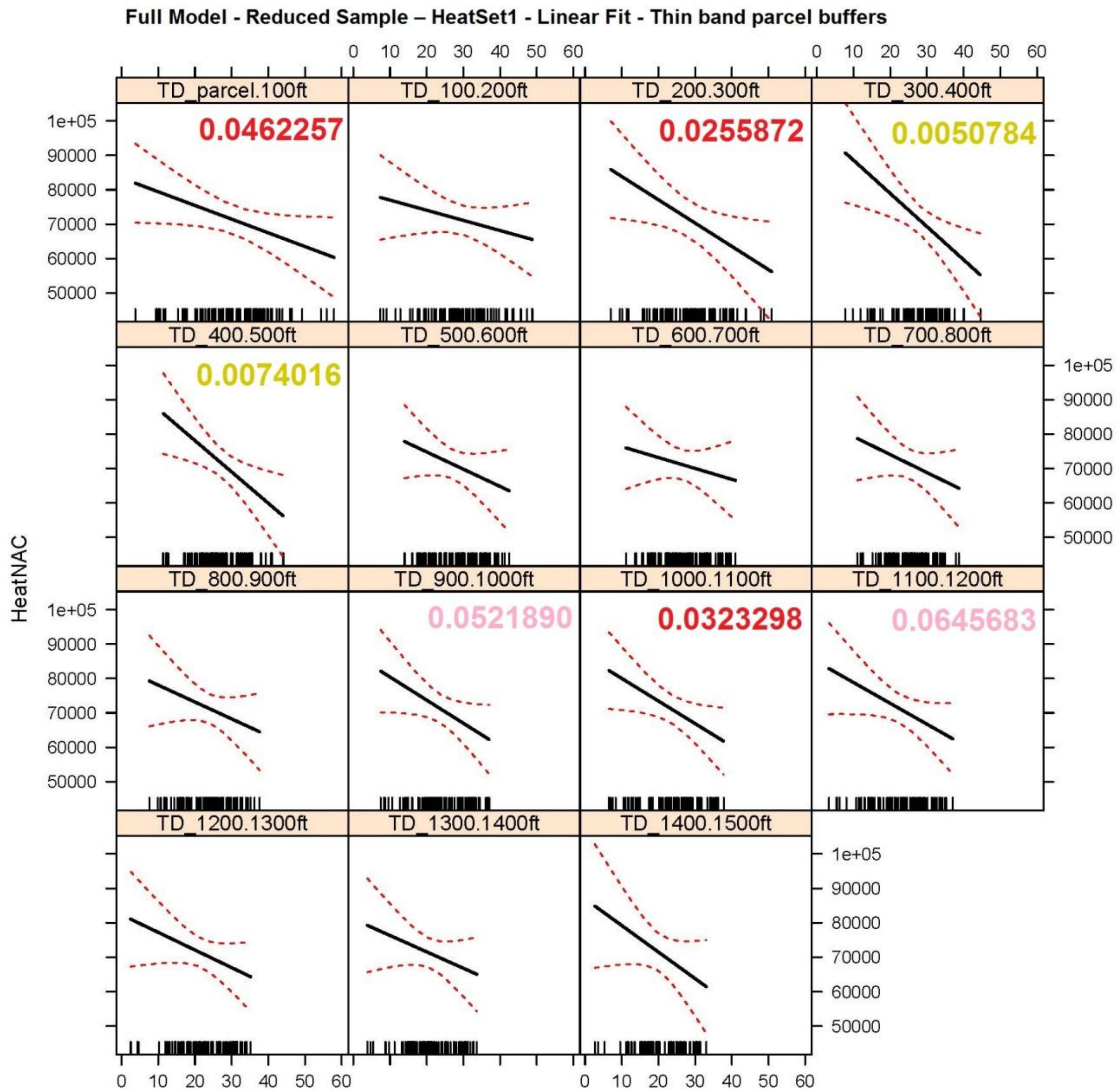

Figure 90. Thin band parcel buffer effect plots for HeatSet1 with the Reduced Sample running the Full Model.

Wide band parcel excluded buffer effect plots

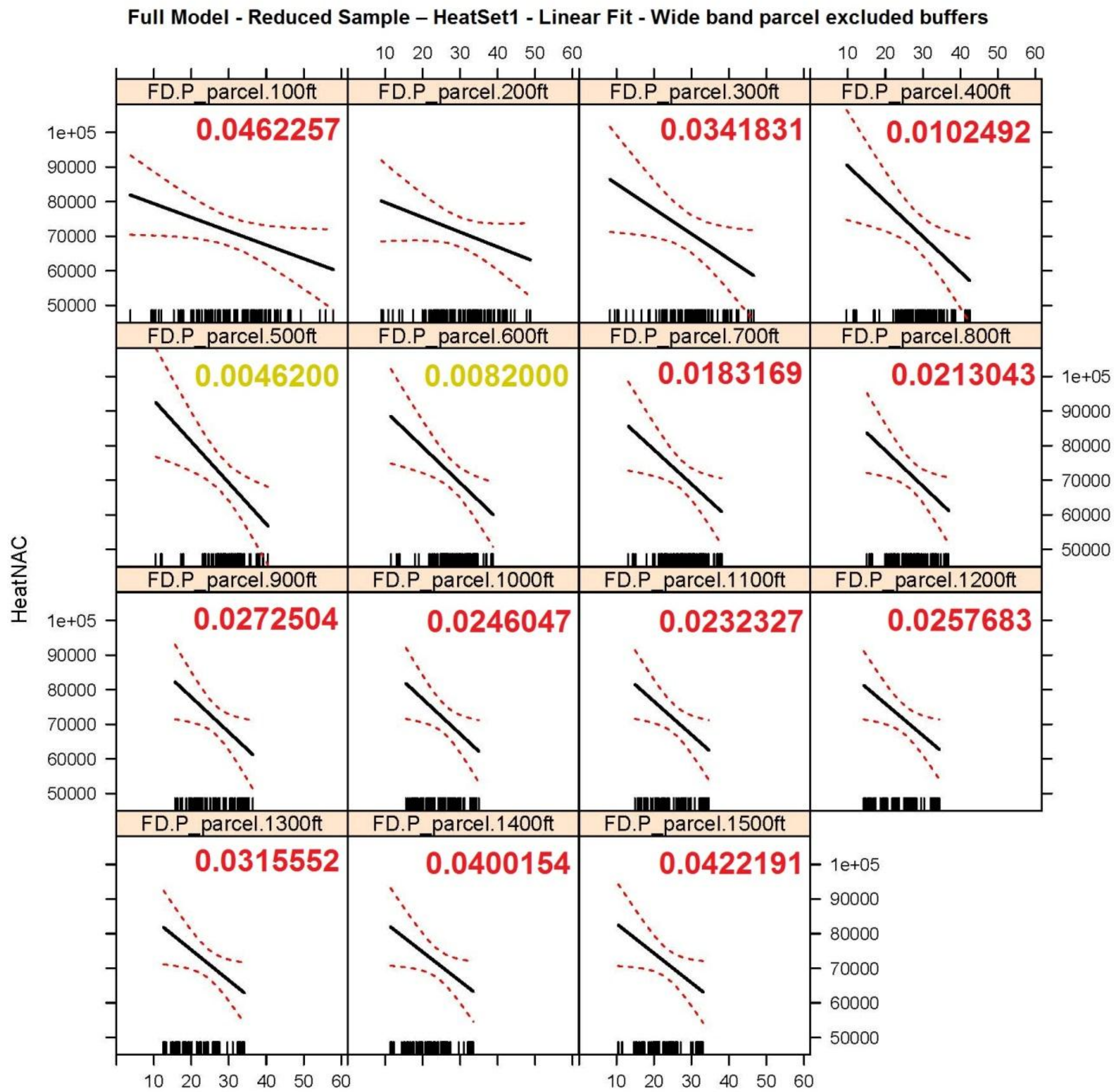

Figure 91. Wide band parcel excluded buffer effect plots for HeatSet1 with the Reduced Sample running the Full Model.

Wide band parcel to 100 foot excluded buffer effect plots

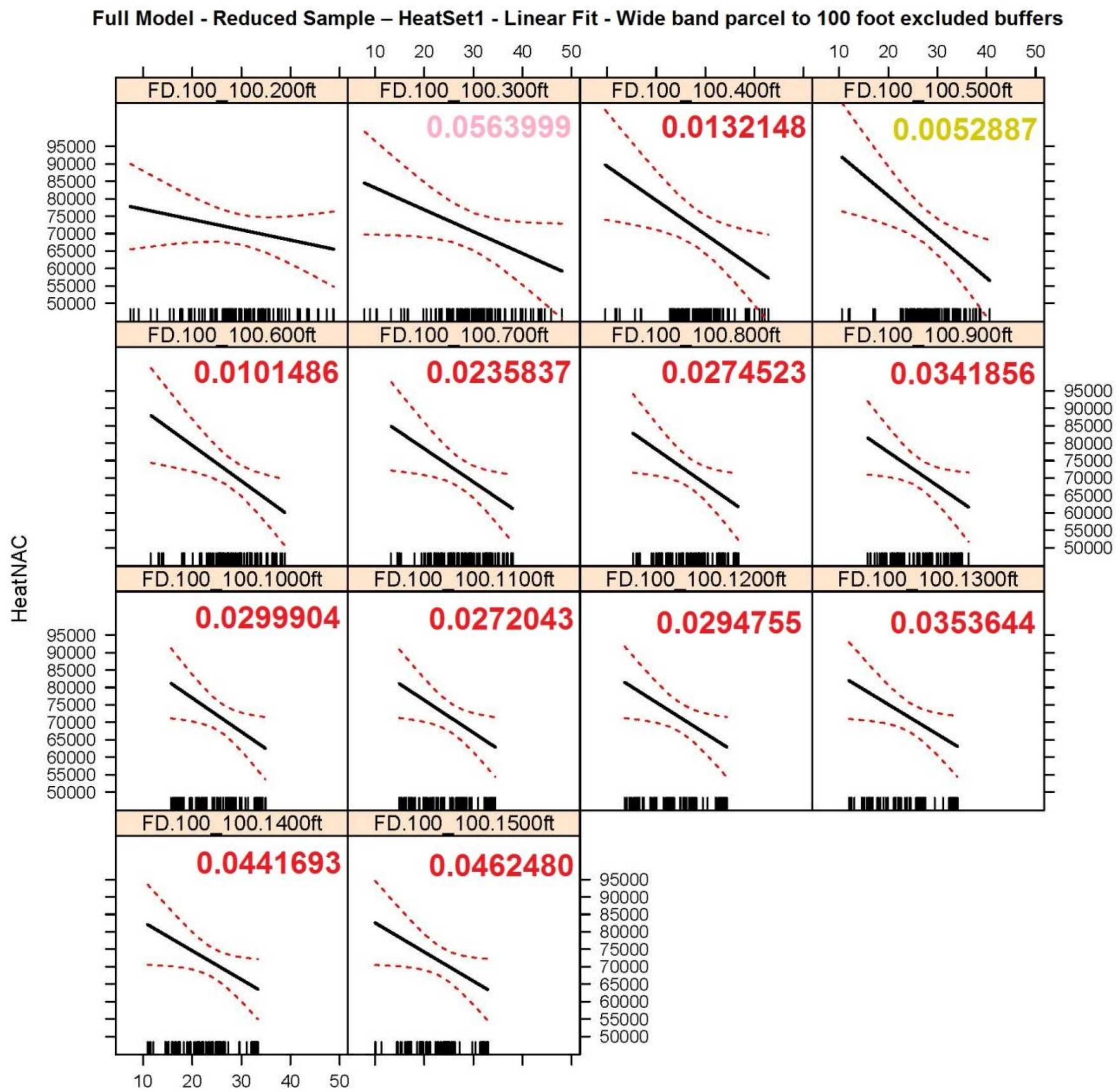

Figure 92. Wide band parcel to 100 foot excluded buffer effect plots for HeatSet1 with the Reduced Sample running the Full Model.

HeatSet2

Covariate effect plots

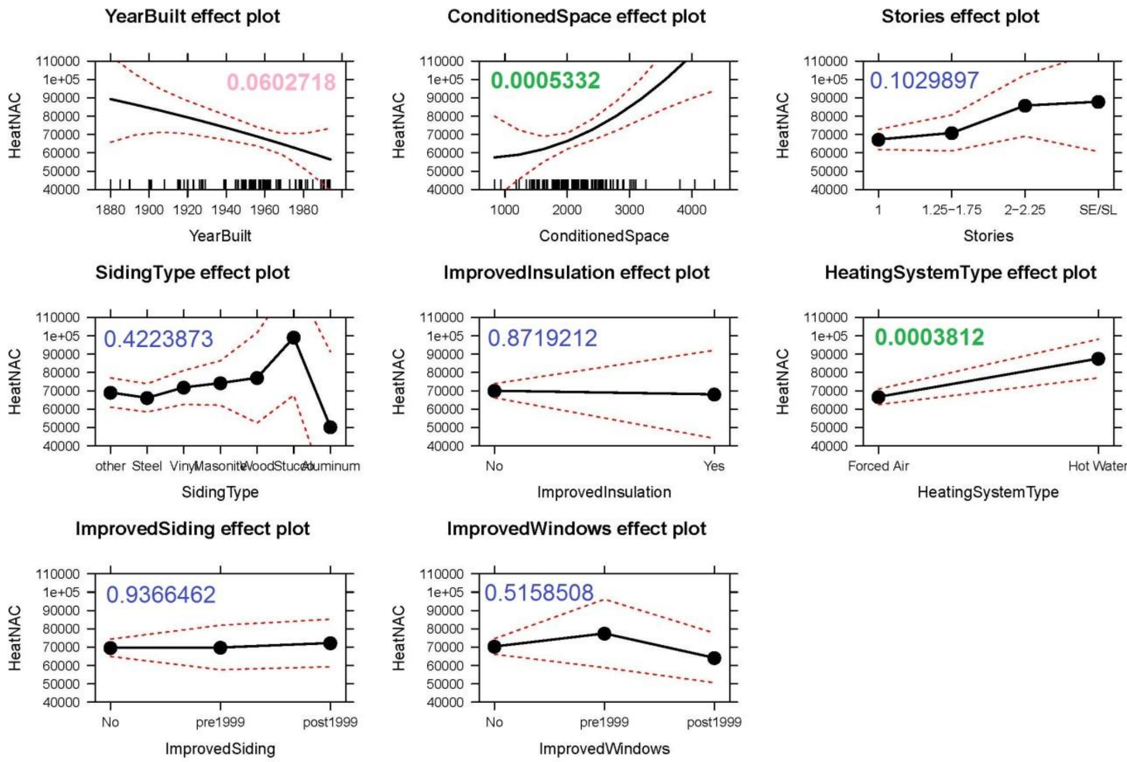

Figure 93. Covariate effect plots for HeatSet2 with the Reduced Sample running the Full Model.

Comprehensive parcel buffer effect plots

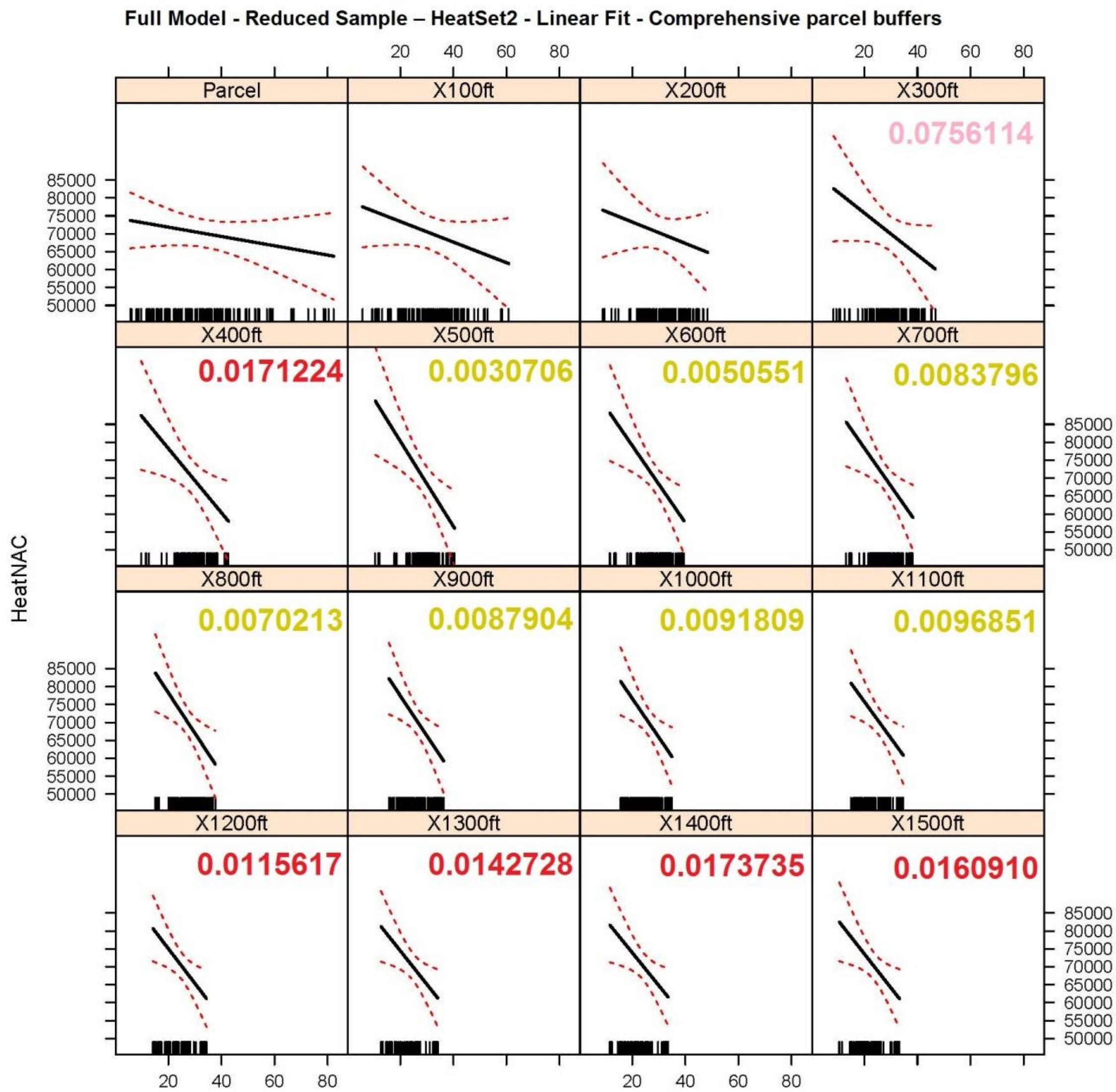

Figure 94. Comprehensive parcel buffer effect plots for HeatSet2 with the Reduced Sample running the Full Model.

Thin band parcel buffer effect plots

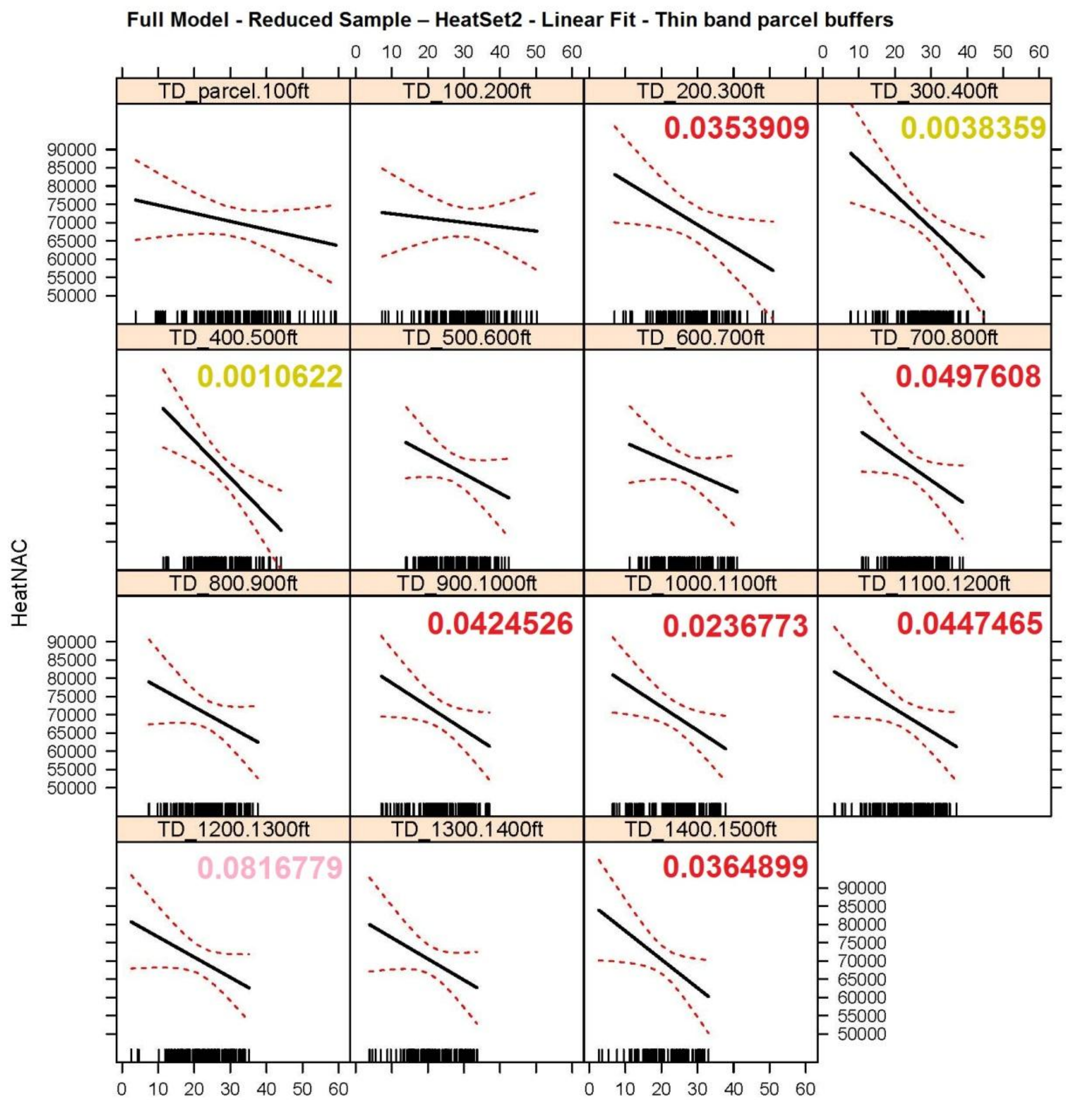

Figure 95. Thin band parcel buffer effect plots for HeatSet2 with the Reduced Sample running the Full Model.

Wide band parcel excluded buffer effect plots

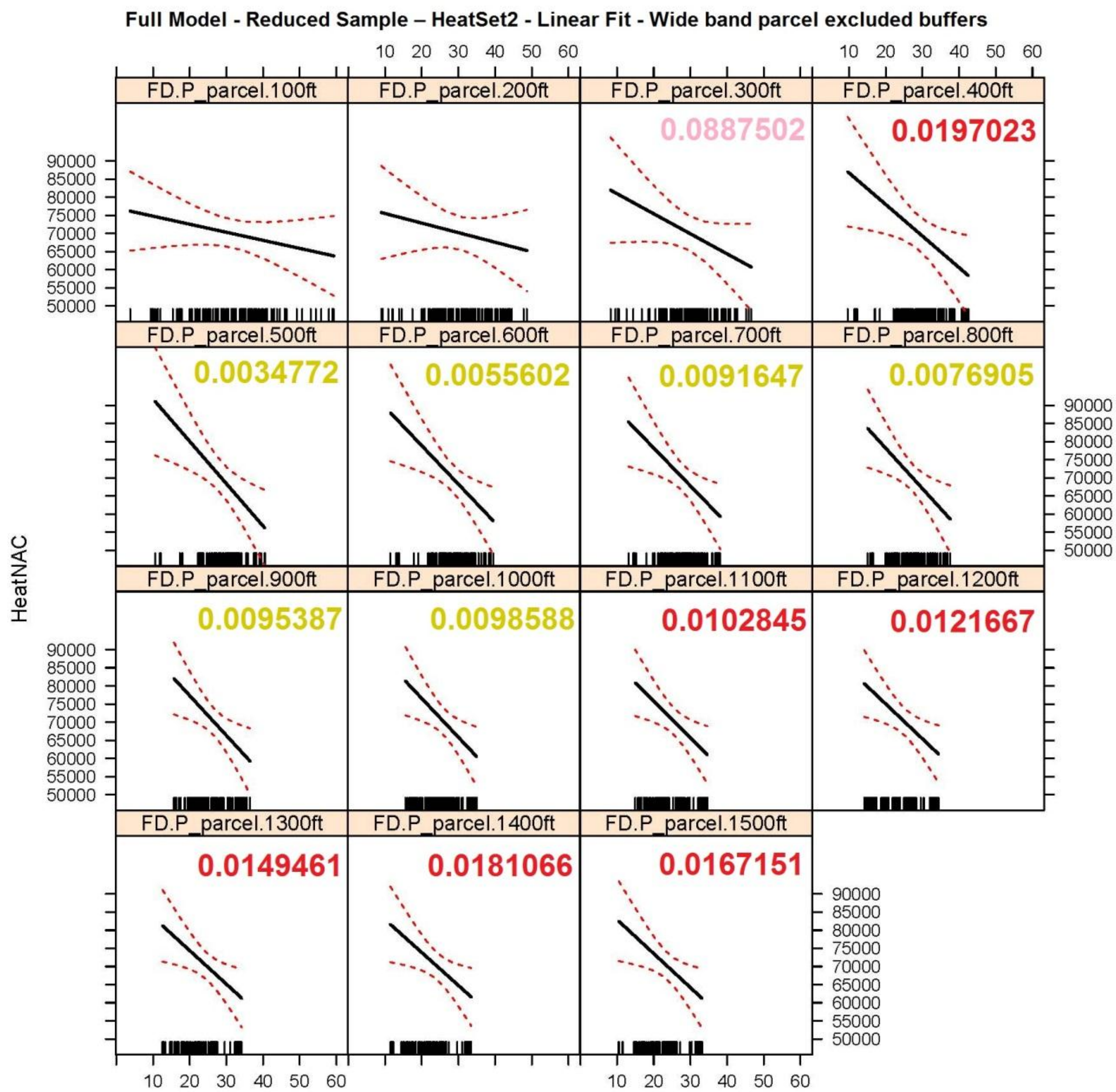

Figure 96. Wide band parcel excluded buffer effect plots for HeatSet2 with the Reduced Sample running the Full Model.

Wide band parcel to 100 foot excluded buffer effect plots

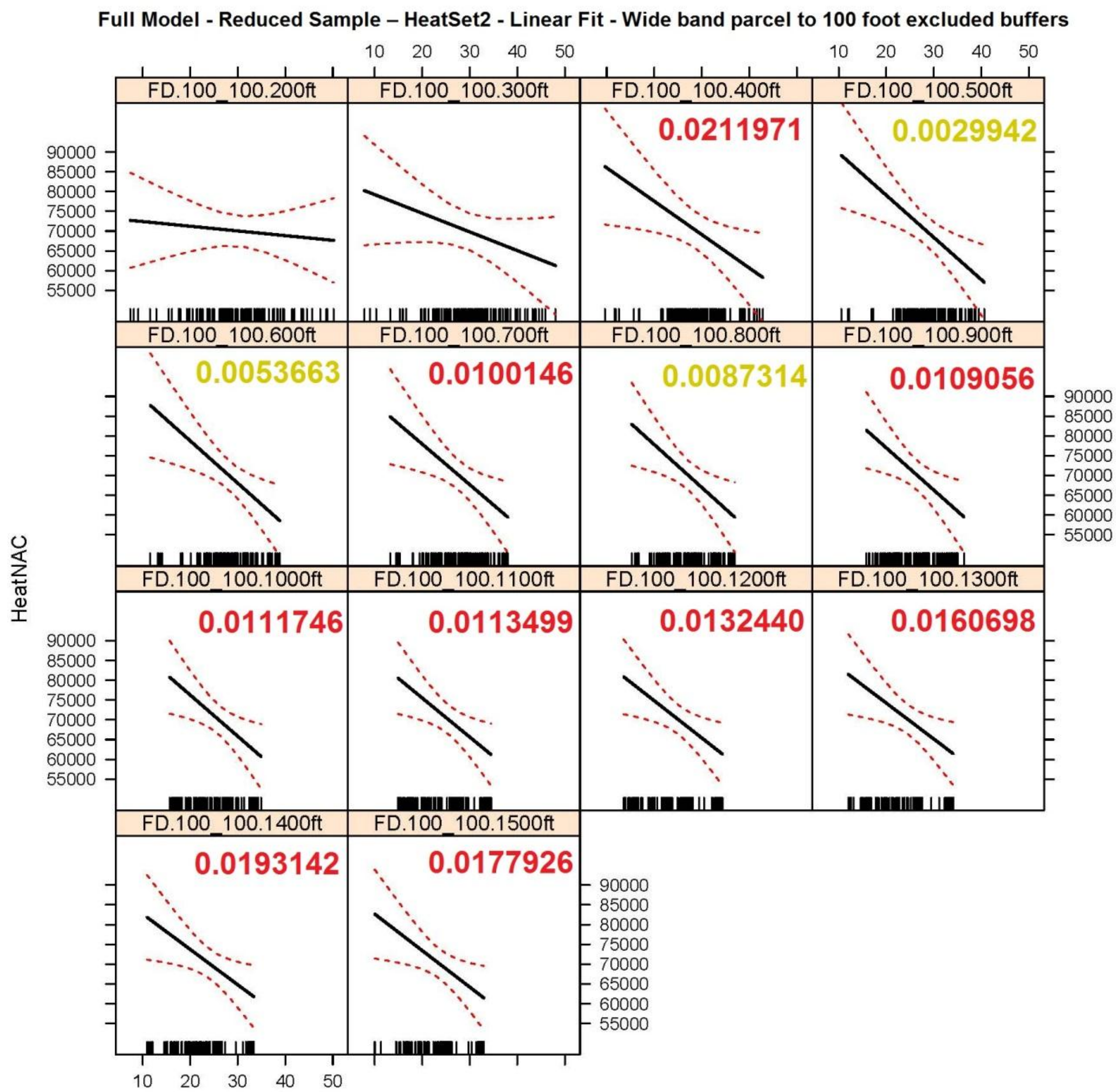

Figure 97. Wide band parcel to 100 foot excluded buffer effect plots for HeatSet2 with the Reduced Sample running the Full Model.

HeatSet3

Covariate effect plots

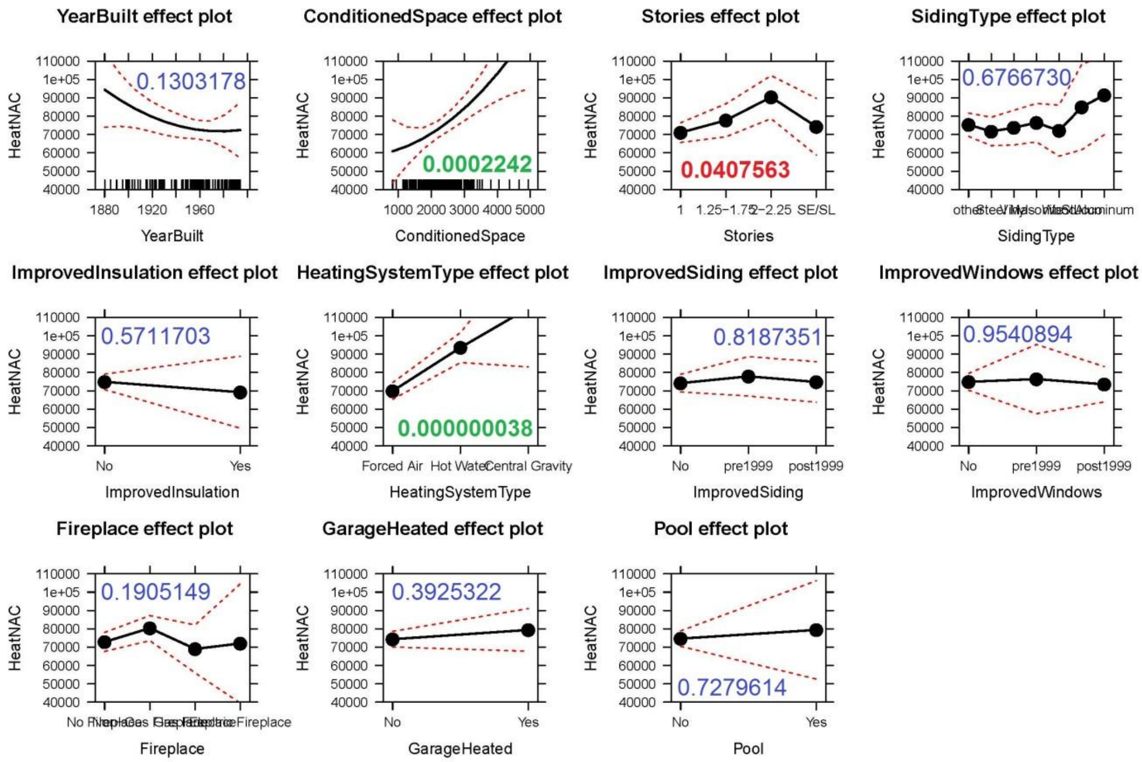

Figure 98. Covariate effect plots for HeatSet3 with the Reduced Sample running the Full Model.

Comprehensive parcel buffer effect plots

None of the comprehensive parcel buffer effect plots for HeatSet3 with the Reduced Sample running the Full Model were found to be significant.

Thin band parcel buffer effect plots

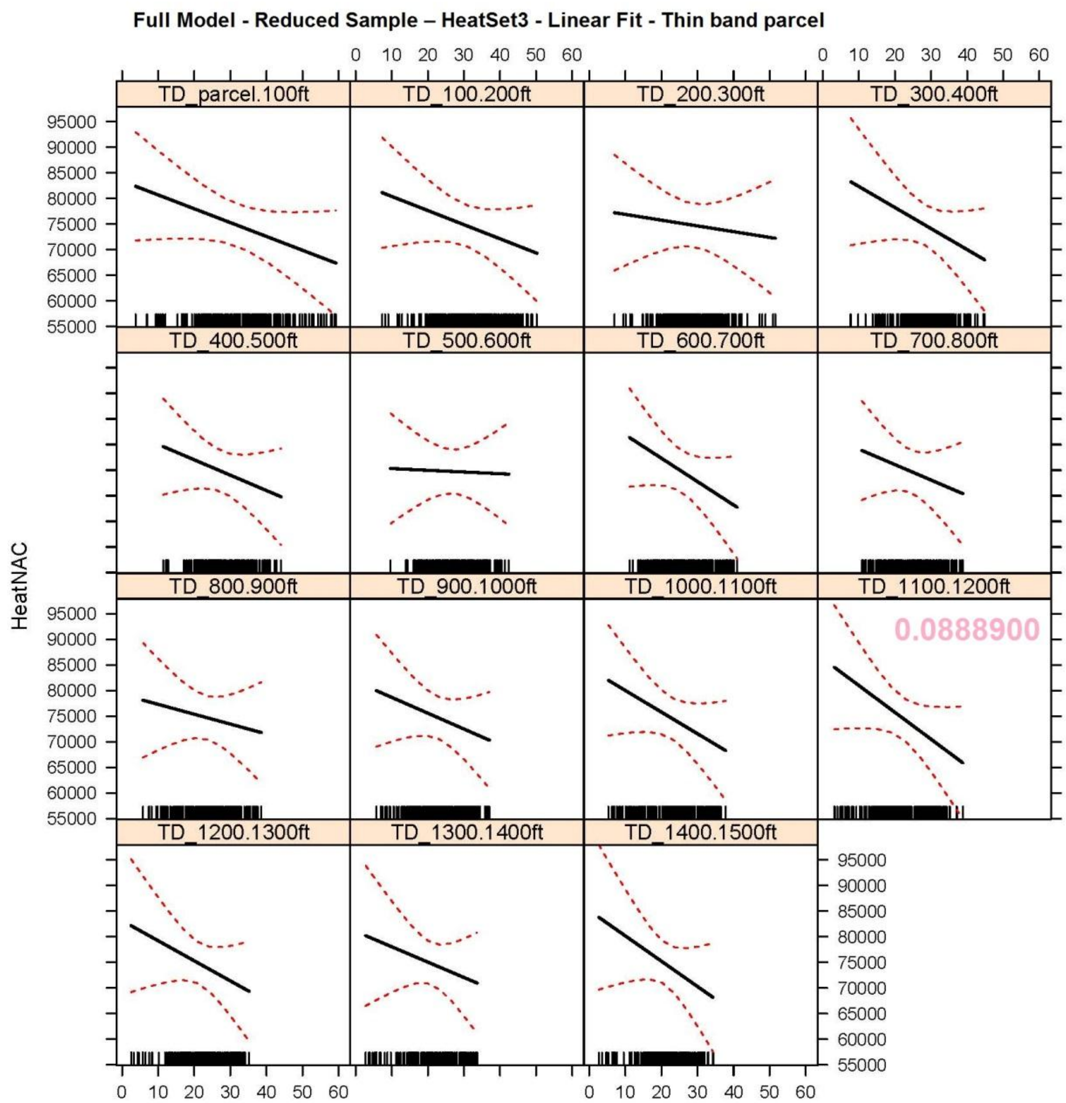

Figure 99. Thin band parcel buffer effect plots for HeatSet3 with the Reduced Sample running the Full Model.

Wide band parcel excluded buffer effect plots

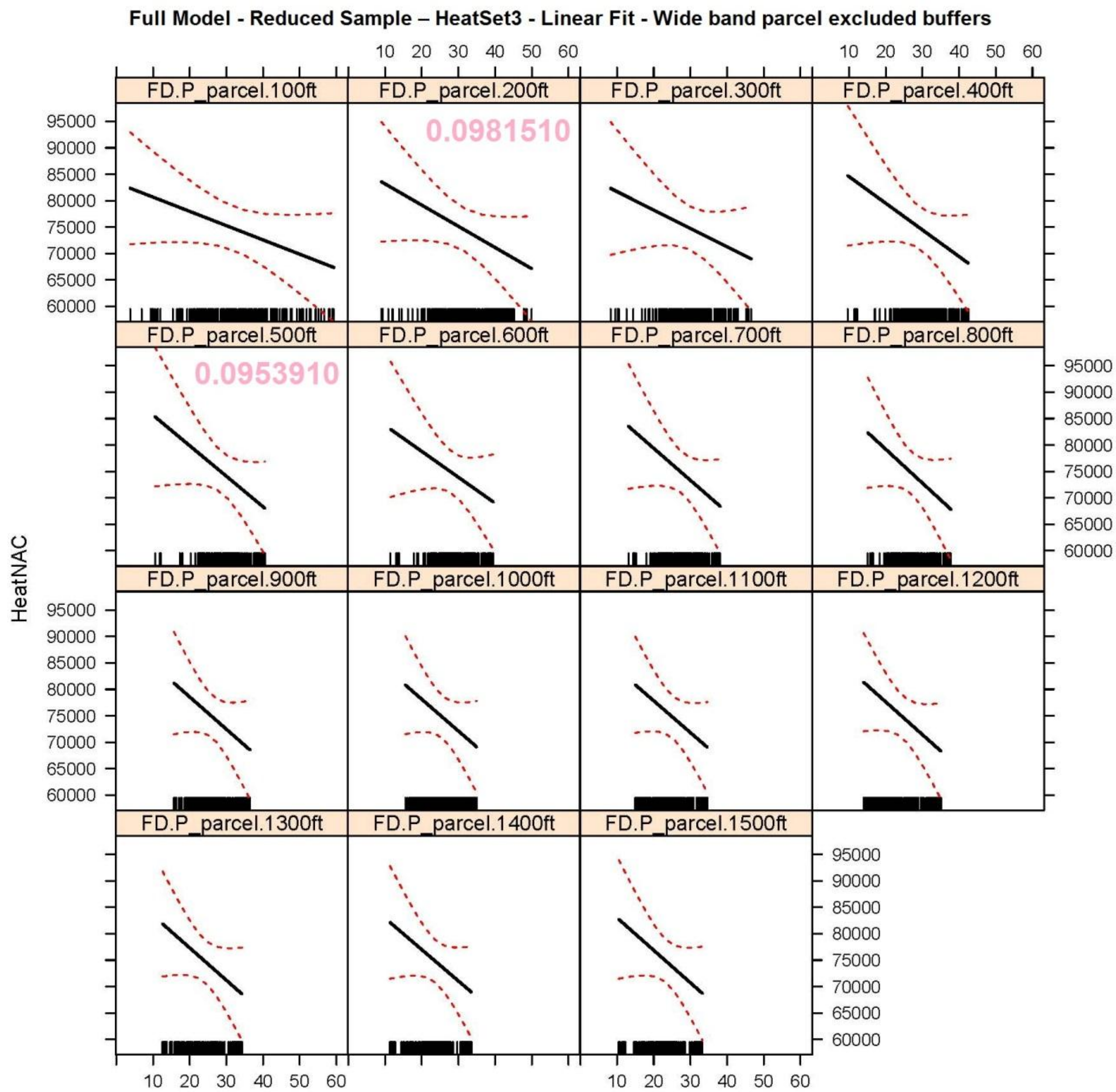

Figure 100. Wide band parcel excluded buffer effect plots for HeatSet3 with the Reduced Sample running the Full Model.

Wide band parcel to 100 foot excluded buffer effect plots

None of the wide band parcel to 100 foot excluded buffer effect plots for HeatSet3 with the Reduced Sample running the Full Model were found to be significant.

Simple Model - Reduced Sample

HeatSet1

Covariate effect plots

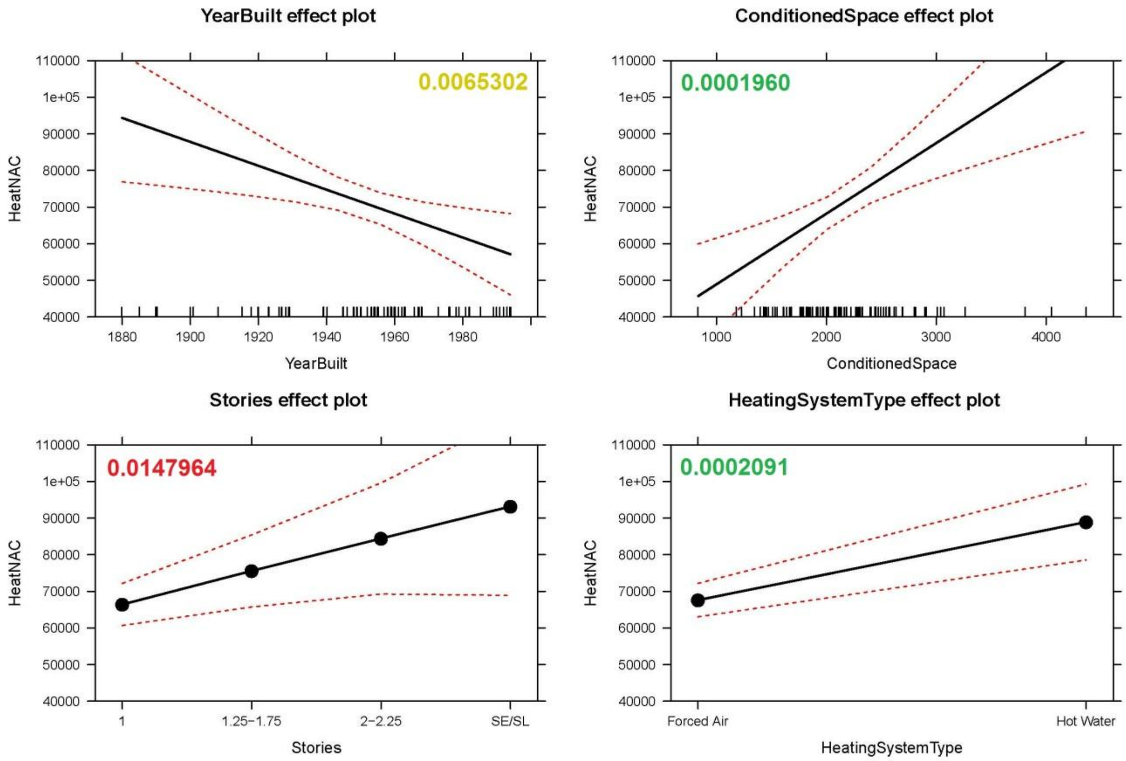

Figure 101. Covariate effect plots for HeatSet1 with the Reduced Sample running the Simple Model.

Comprehensive parcel buffer effect plots

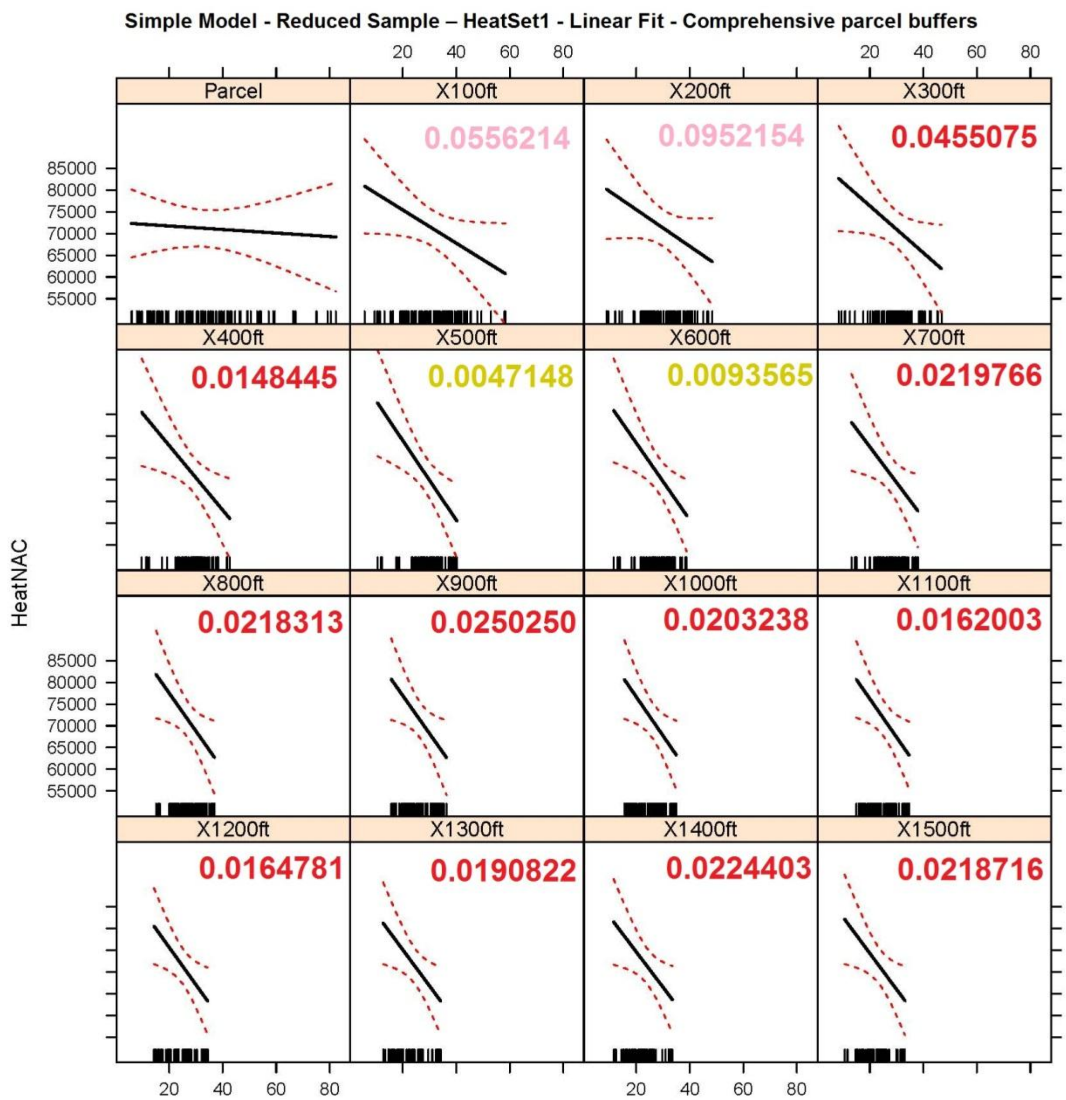

Figure 102. Comprehensive parcel buffer effect plots for HeatSet1 with the Reduced Sample running the Simple Model.

Thin band parcel buffer effect plots

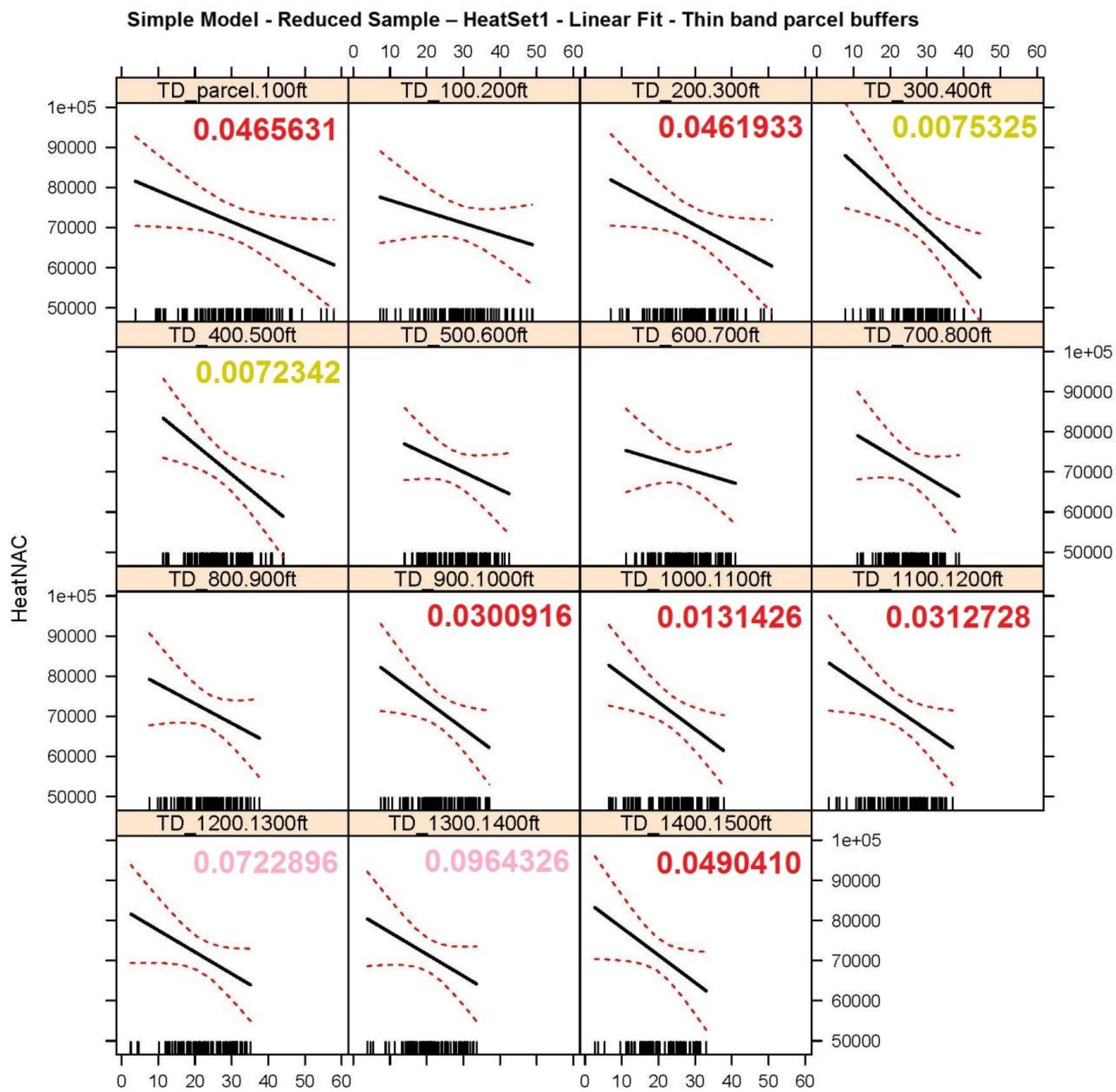

Figure 103. Thin band parcel buffer effect plots for HeatSet1 with the Reduced Sample running the Simple Model.

Wide band parcel excluded buffer effect plots

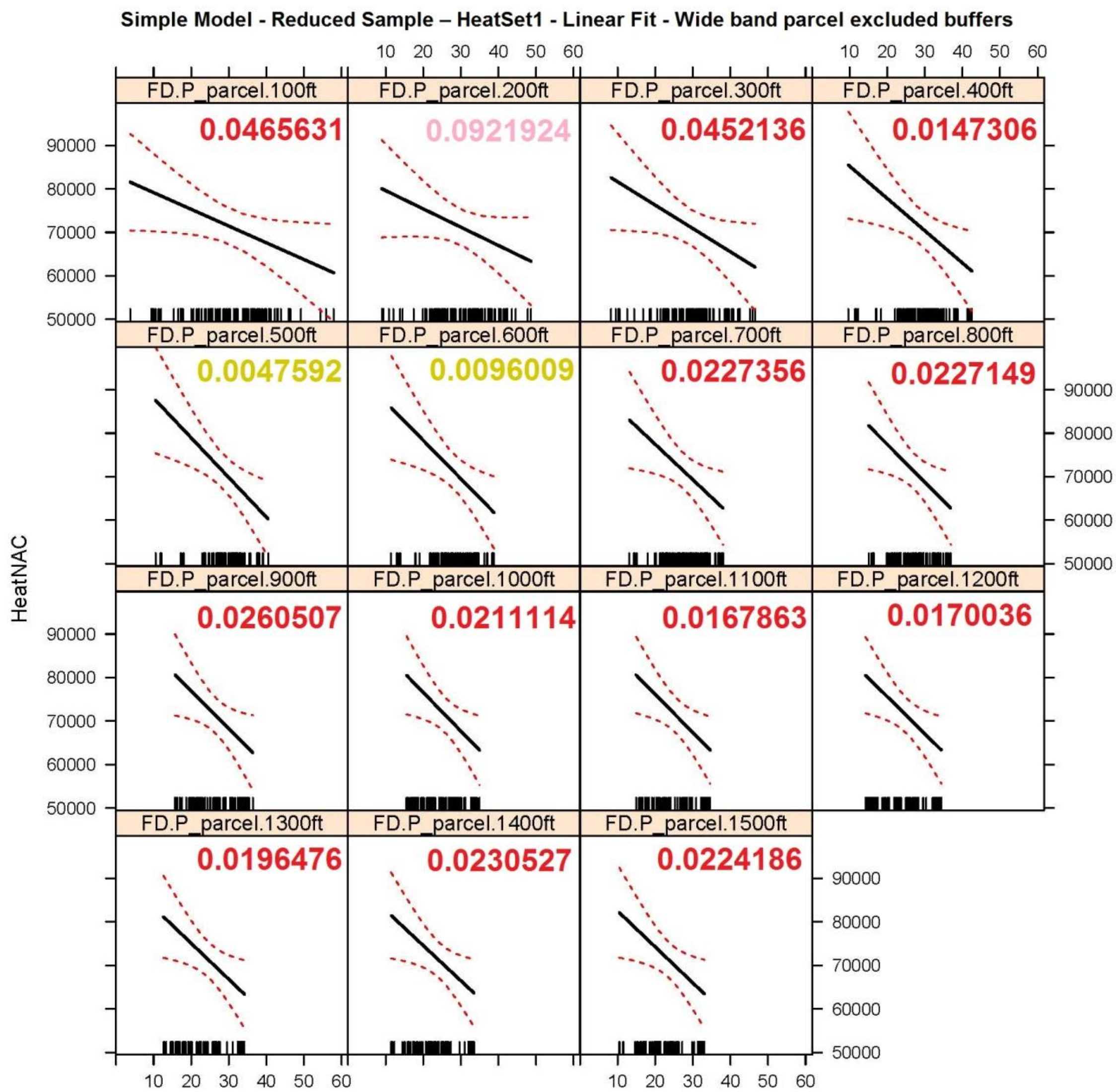

Figure 104. Wide band parcel excluded buffer effect plots for HeatSet1 with the Reduced Sample running the Simple Model.

Wide band parcel to 100 foot excluded buffer effect plots

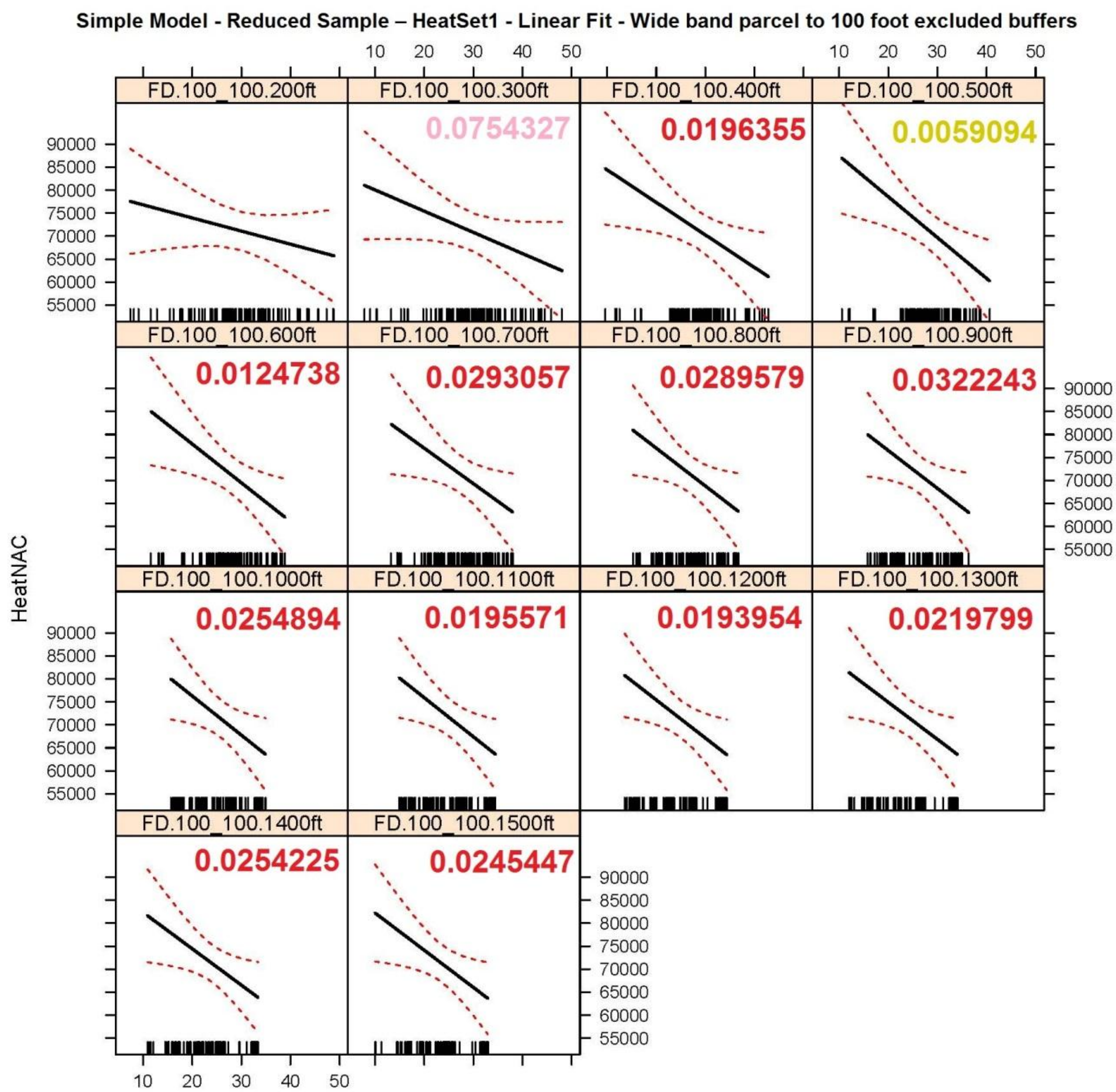

Figure 105. Wide band parcel to 100 foot excluded buffer effect plots for HeatSet1 with the Reduced Sample running the Simple Model.

HeatSet2

Covariate effect plots

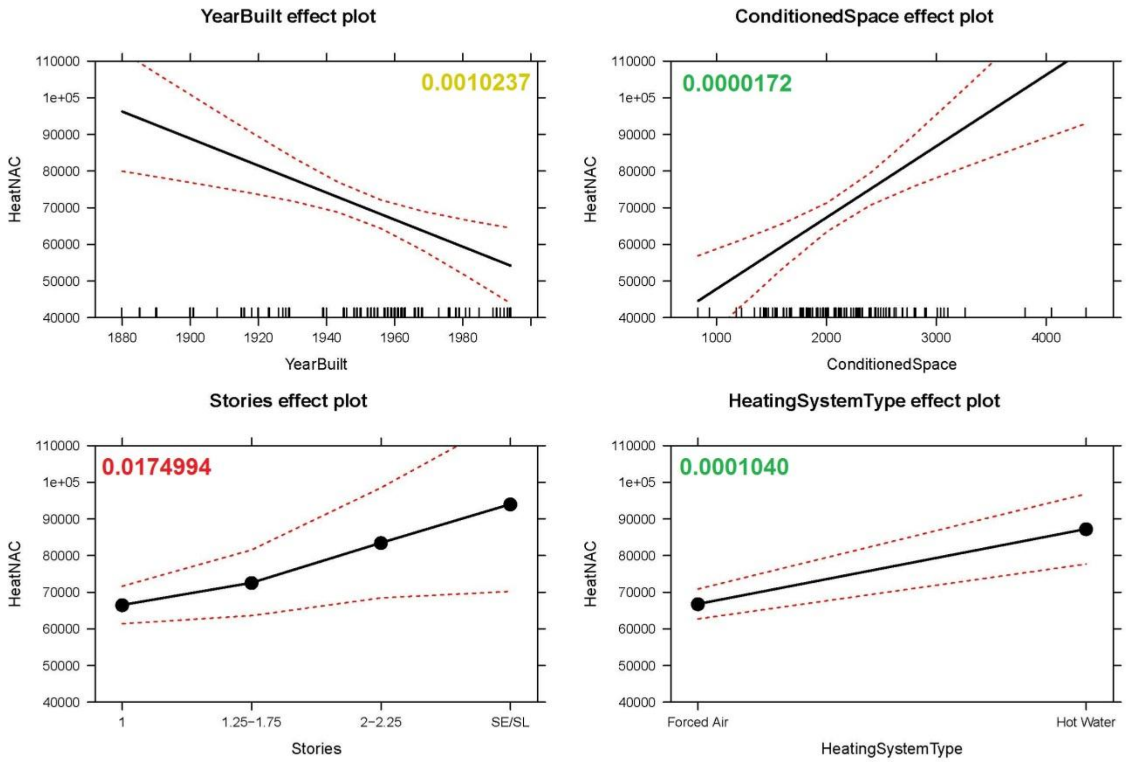

Figure 106. Covariate effect plots for HeatSet2 with the Reduced Sample running the Simple Model.

Comprehensive parcel buffer effect plots

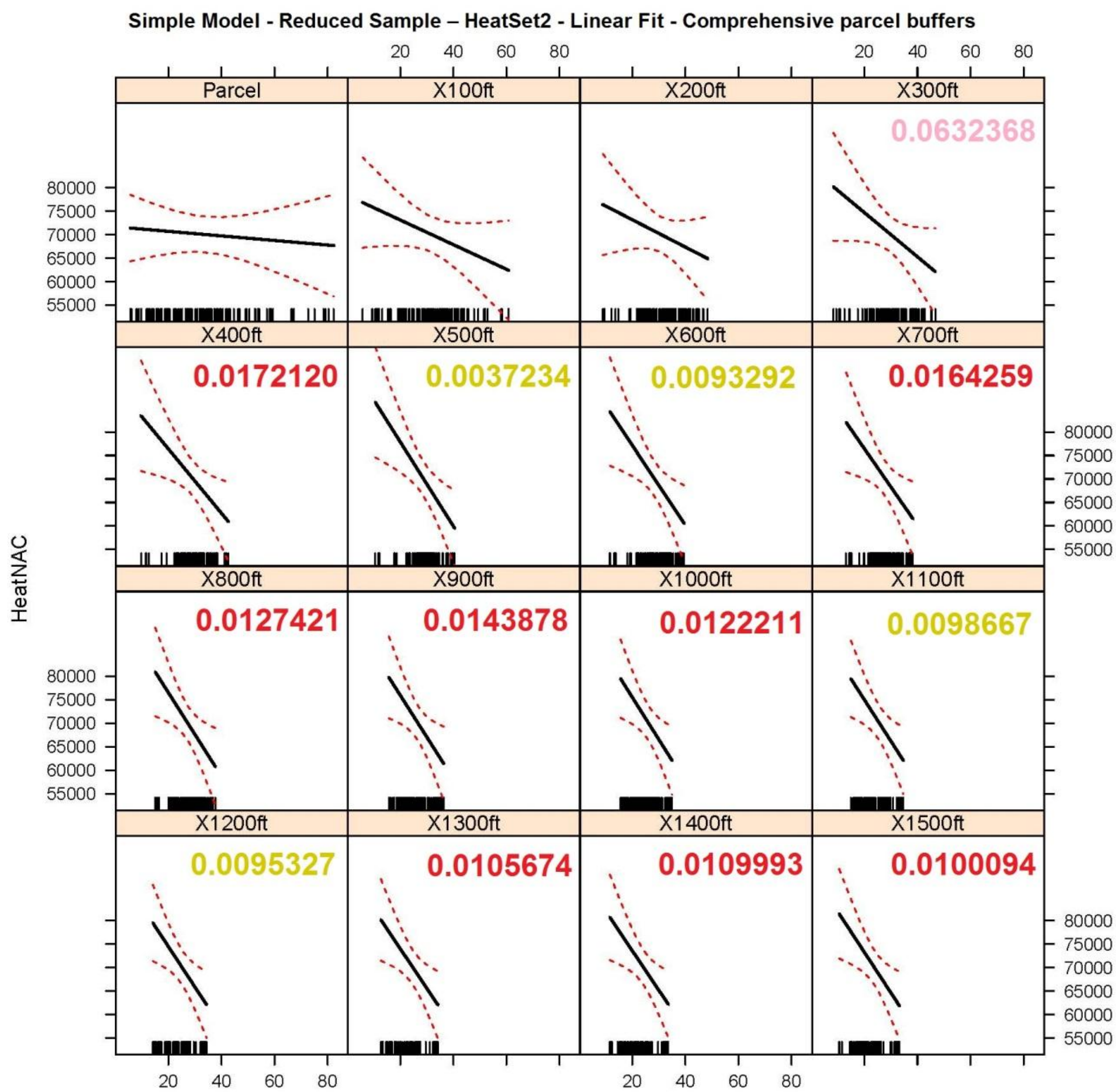

Figure 107. Comprehensive parcel buffer effect plots for HeatSet2 with the Reduced Sample running the Simple Model.

Thin band parcel buffer effect plots

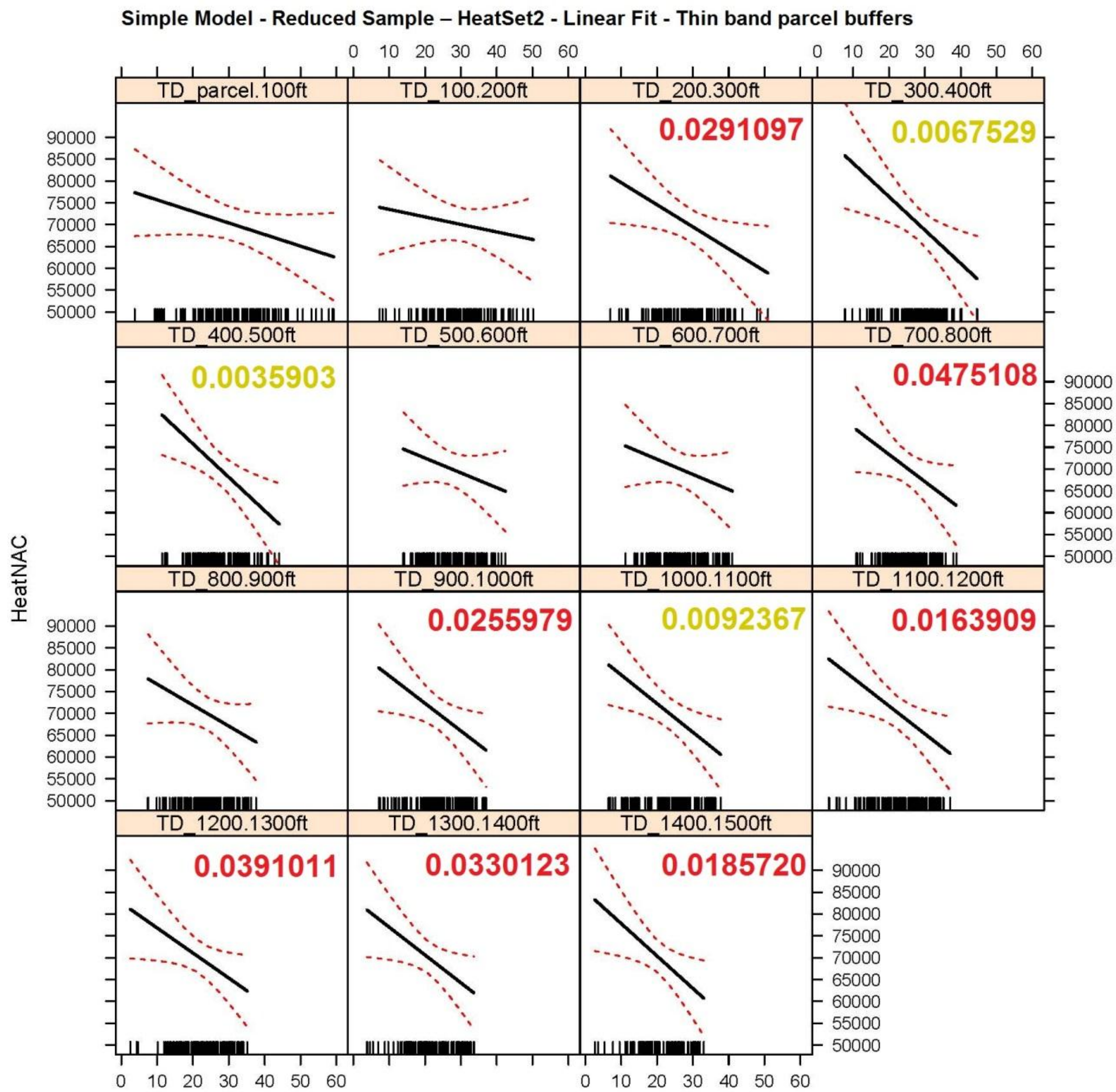

Figure 108. Thin band parcel buffer effect plots for HeatSet2 with the Reduced Sample running the Simple Model.

Wide band parcel excluded buffer effect plots

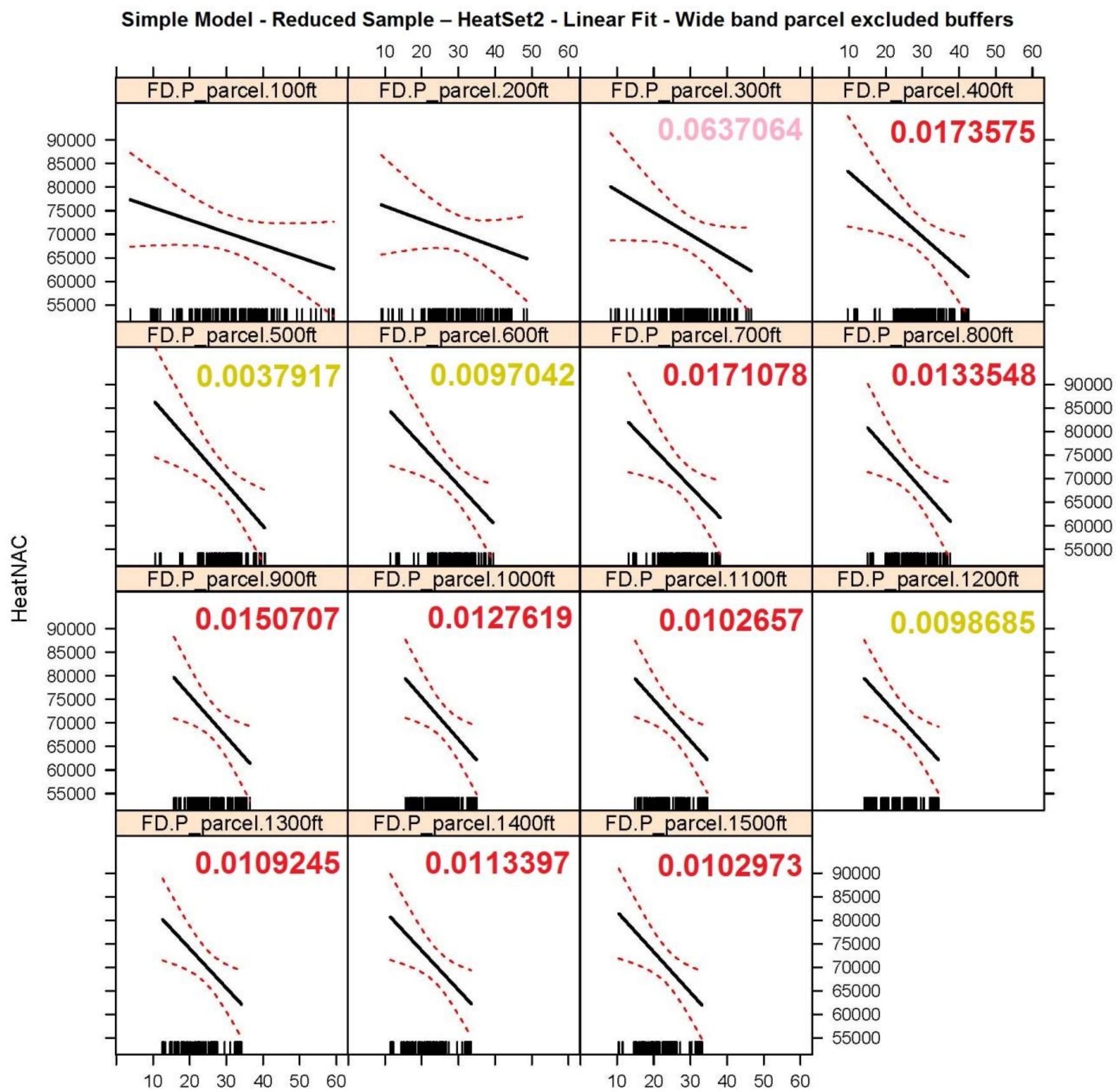

Figure 109. Wide band parcel excluded buffer effect plots for HeatSet2 with the Reduced Sample running the Simple Model.

Wide band parcel to 100 foot excluded buffer effect plots

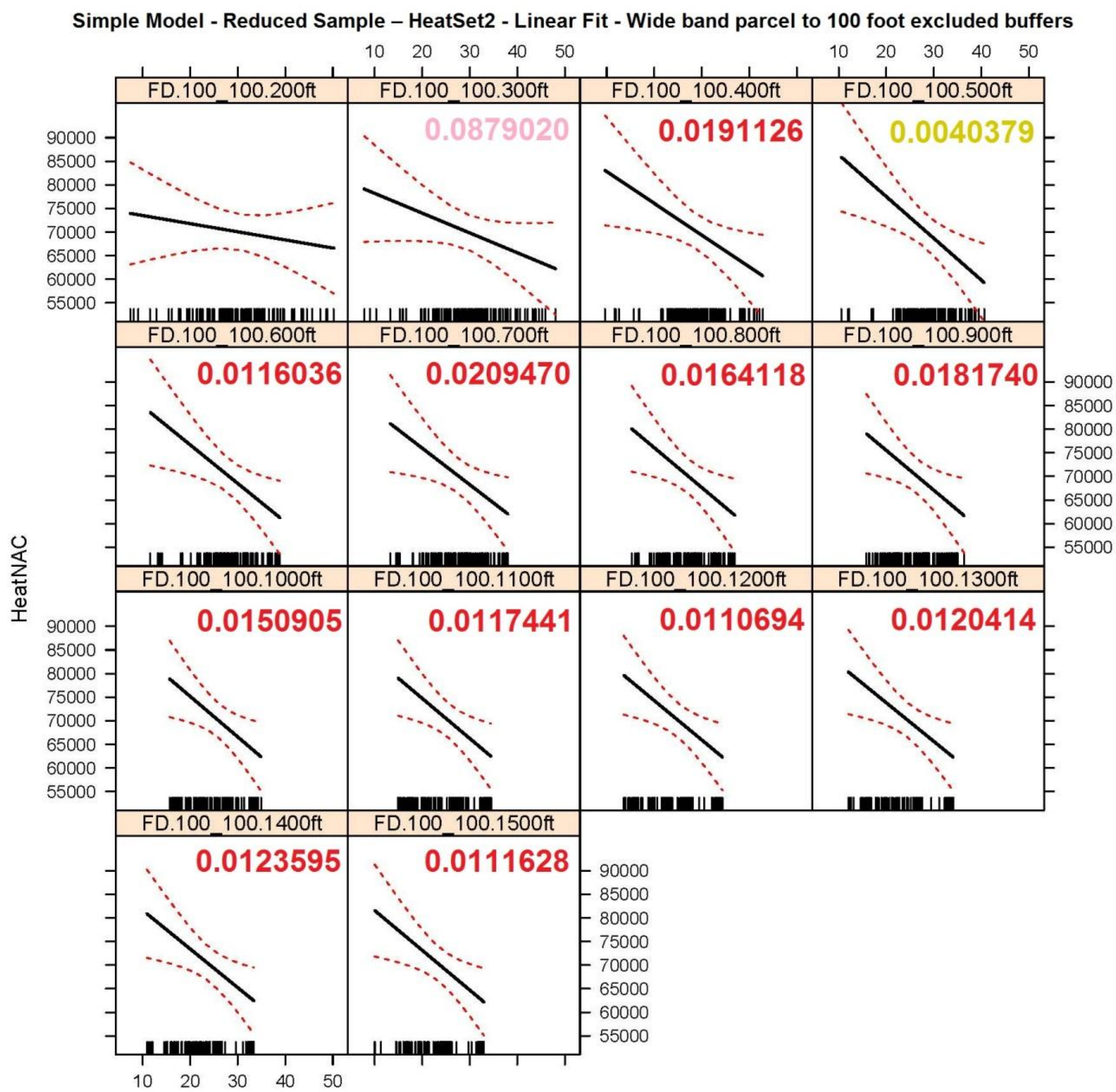

Figure 110. Wide band parcel to 100 foot excluded buffer effect plots for HeatSet2 with the Reduced Sample running the Simple Model.

HeatSet3

Covariate effect plots

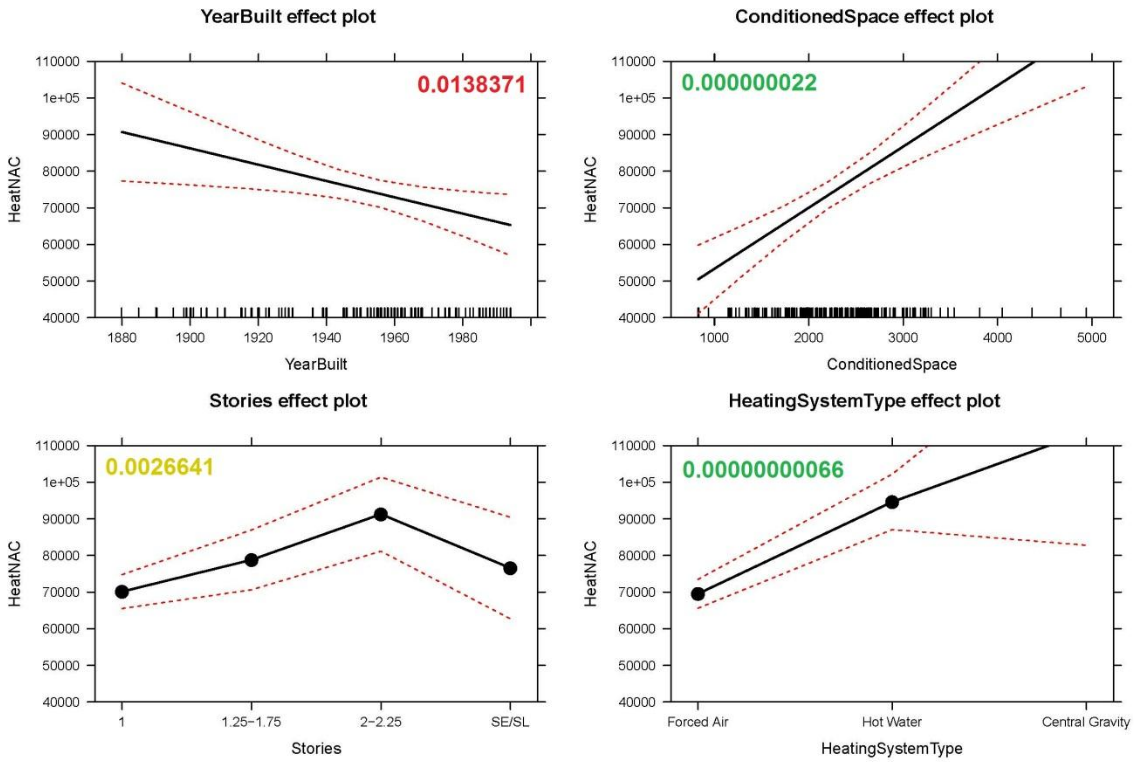

Figure 111. Covariate effect plots for HeatSet3 with the Reduced Sample running the Simple Model.

Comprehensive parcel buffer effect plots

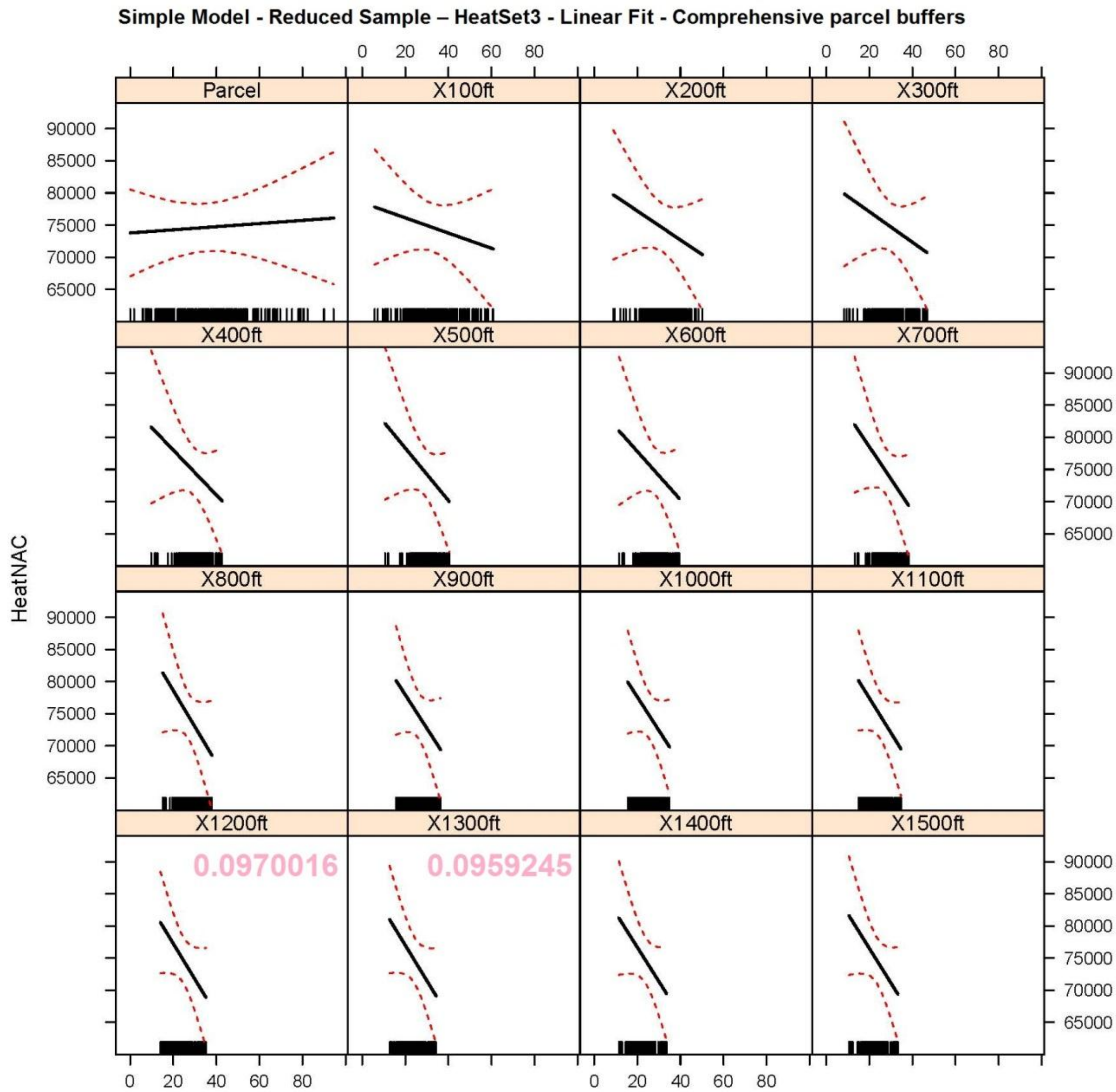

Figure 112. Comprehensive parcel buffer effect plots for HeatSet3 with the Reduced Sample running the Simple Model.

Thin band parcel buffer effect plots

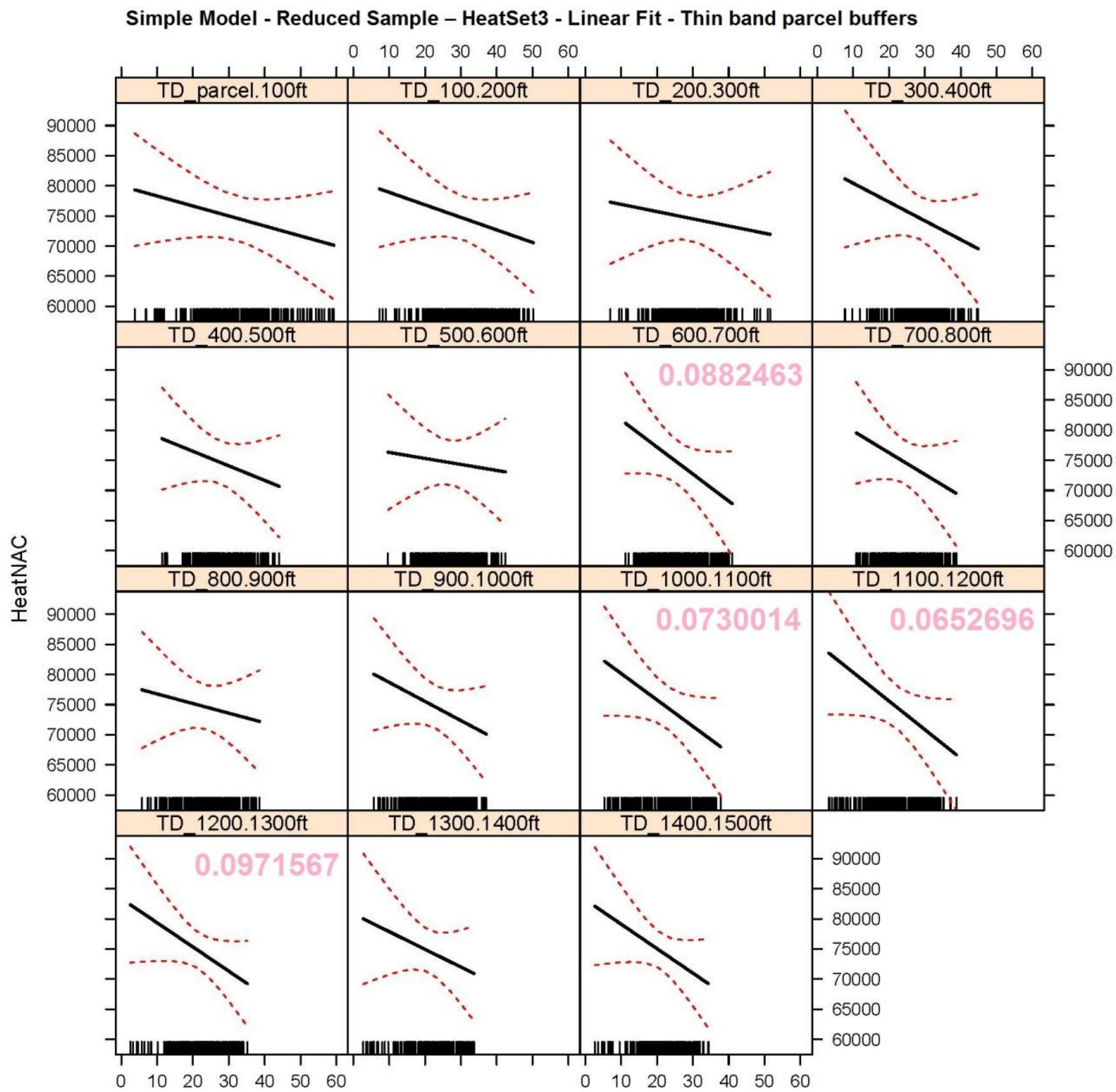

Figure 113. Thin band parcel buffer effect plots for HeatSet3 with the Reduced Sample running the Simple Model.

Wide band parcel excluded buffer effect plots

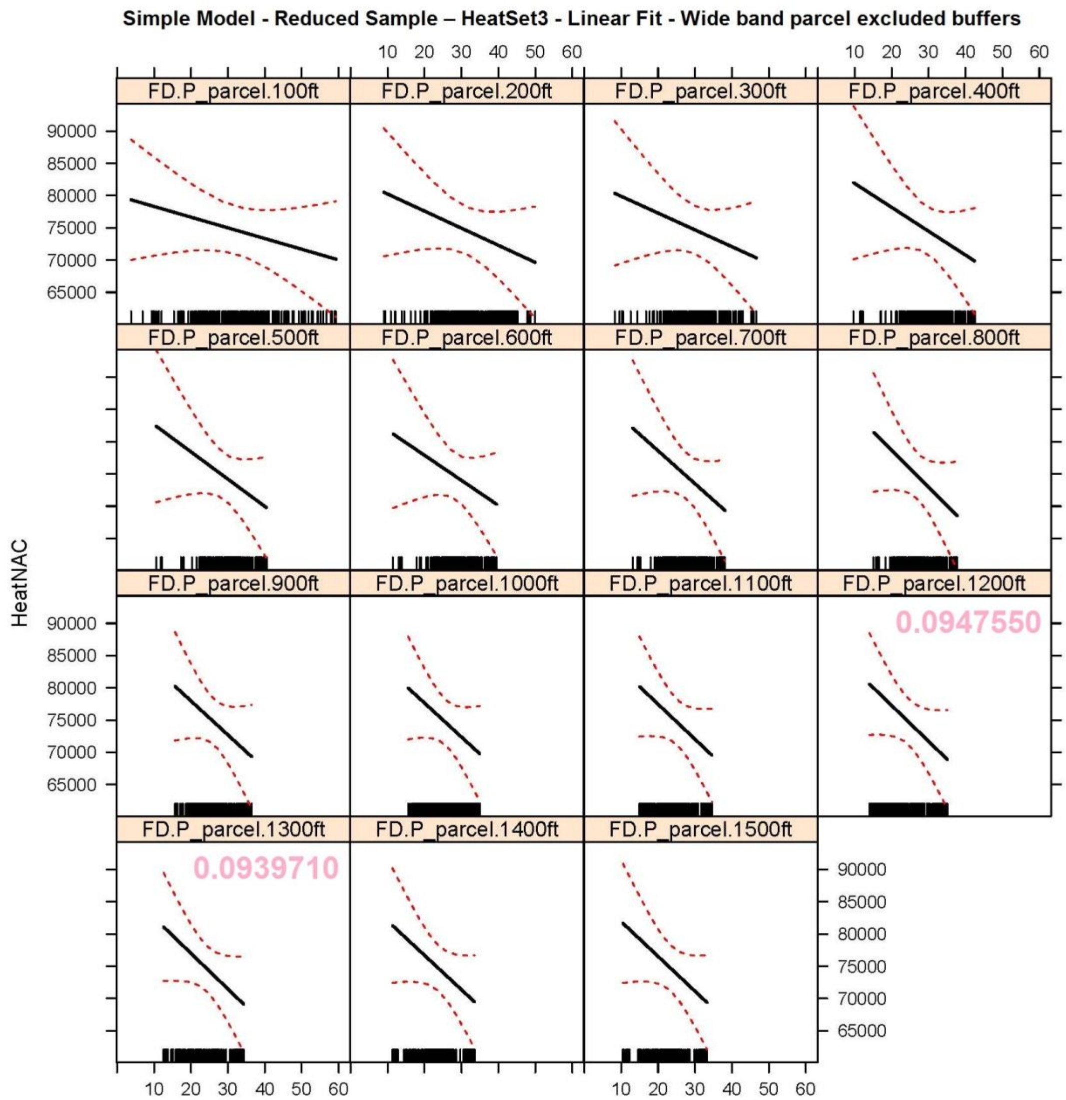

Figure 114. Wide band parcel excluded buffer effect plots for HeatSet3 with the Reduced Sample running the Simple Model.

Wide band parcel to 100 foot excluded buffer effect plots

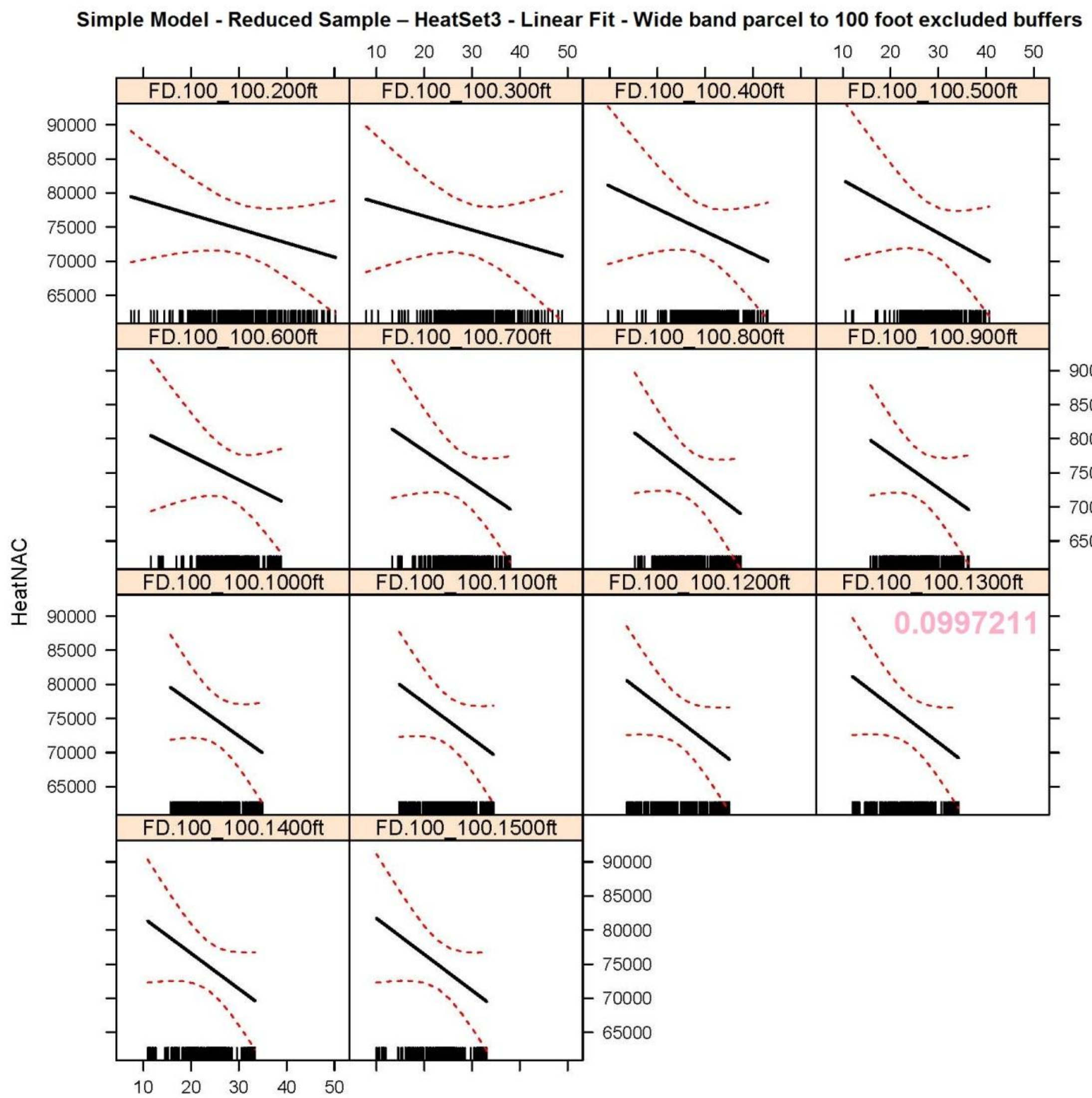

Figure 115. Wide band parcel to 100 foot excluded buffer effect plots for HeatSet3 with the Reduced Sample running the Simple Model.

Cooling

Full Model - Full Sample

CoolSet1

Covariate effect plots

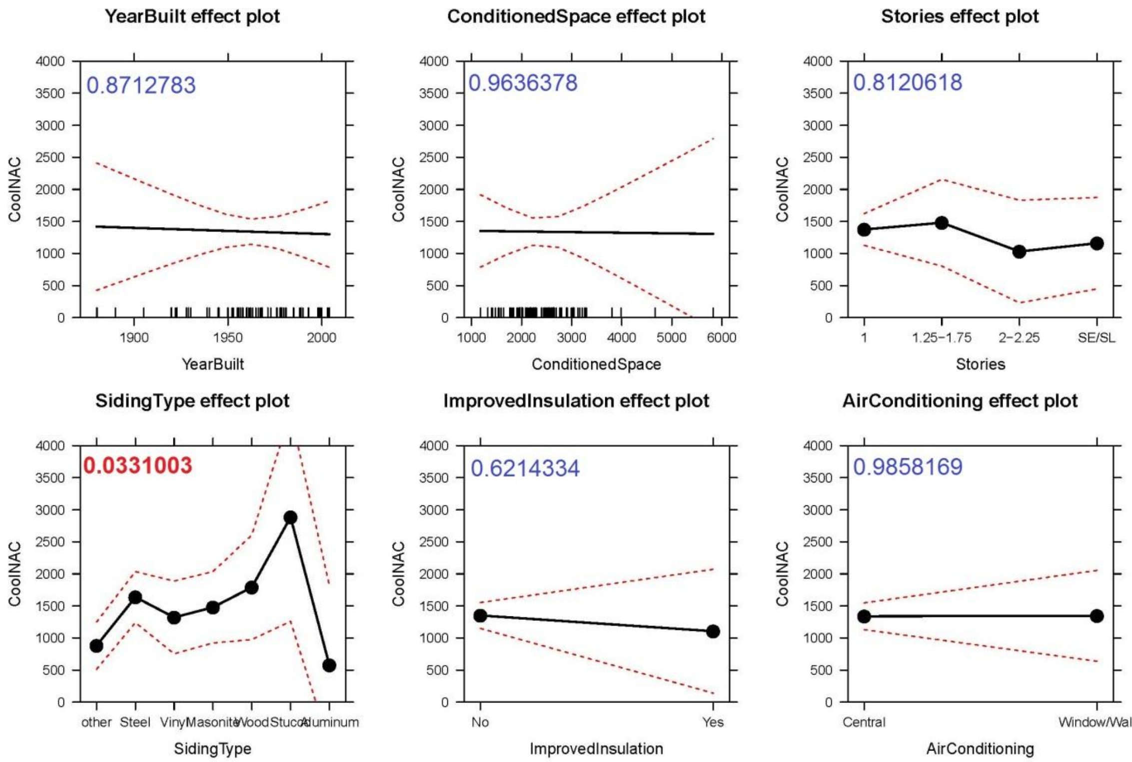

Figure 116. Covariate effect plots for CoolSet1 with the Full Sample running the Full Model.

Comprehensive parcel buffer effect plots

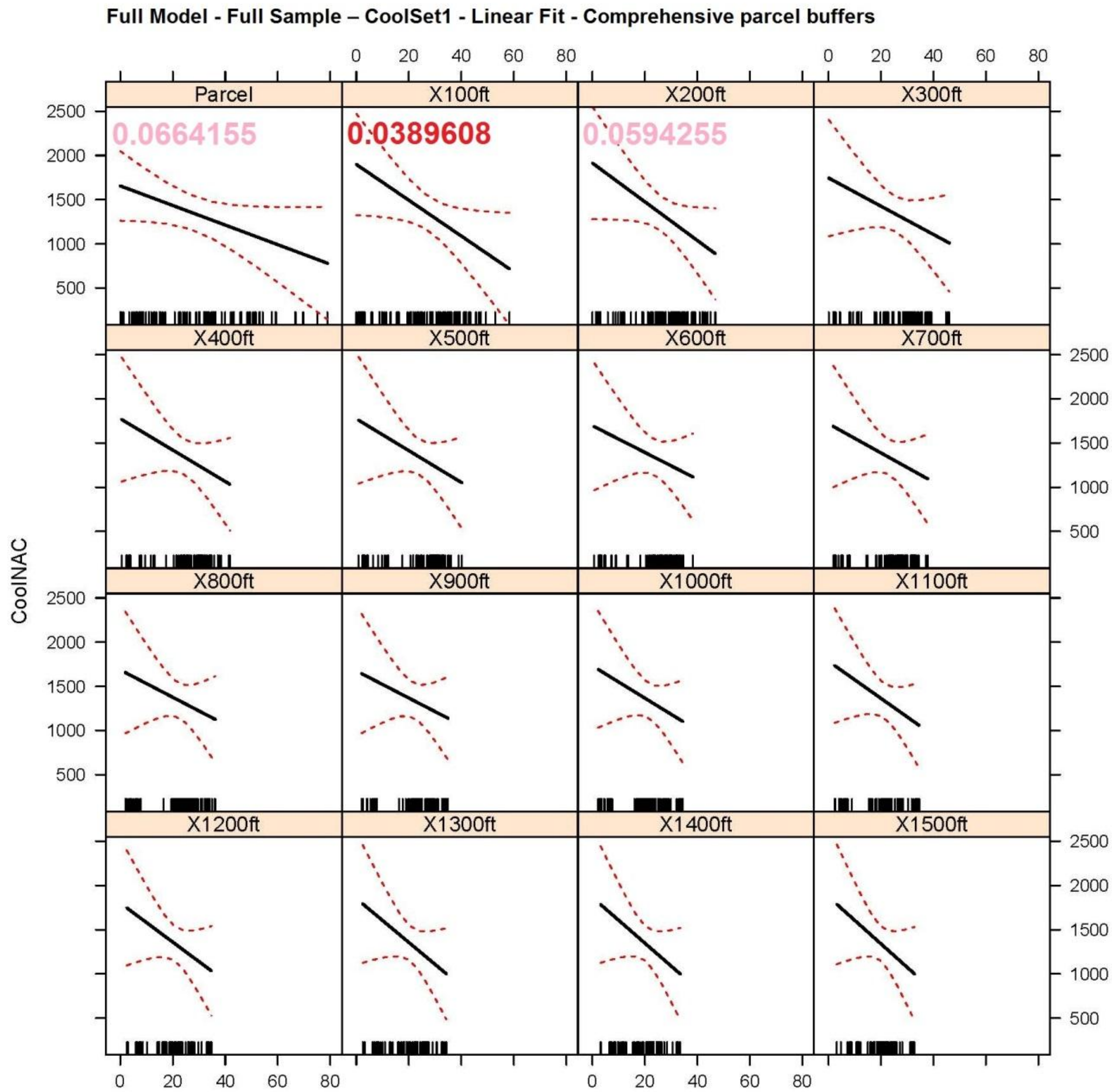

Figure 117. Comprehensive parcel buffer effect plots for CoolSet1 with the Full Sample running the Full Model.

Thin band parcel buffer effect plots

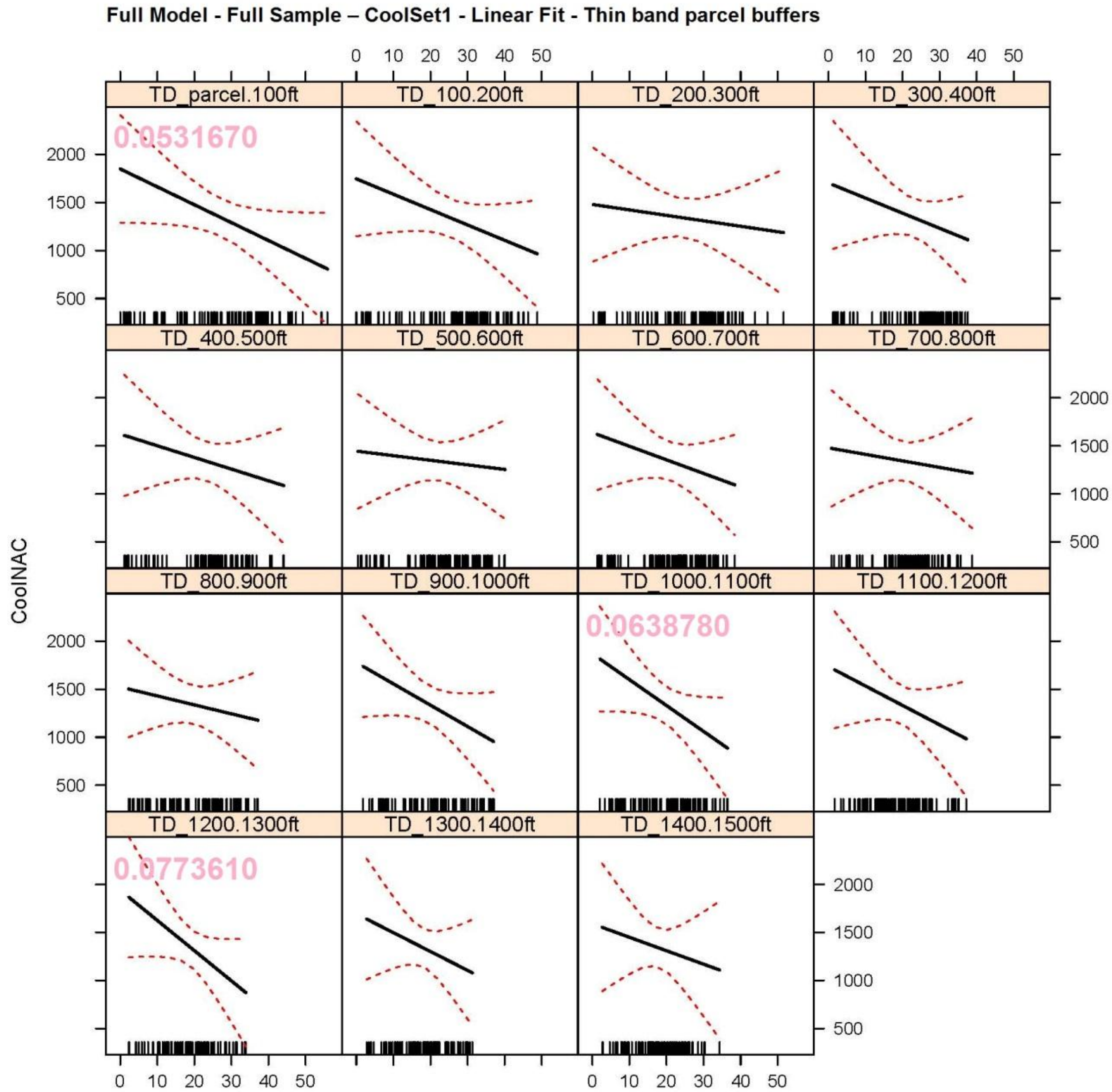

Figure 118. Thin band parcel buffer effect plots for CoolSet1 with the Full Sample running the Full Model.

Wide band parcel excluded buffer effect plots

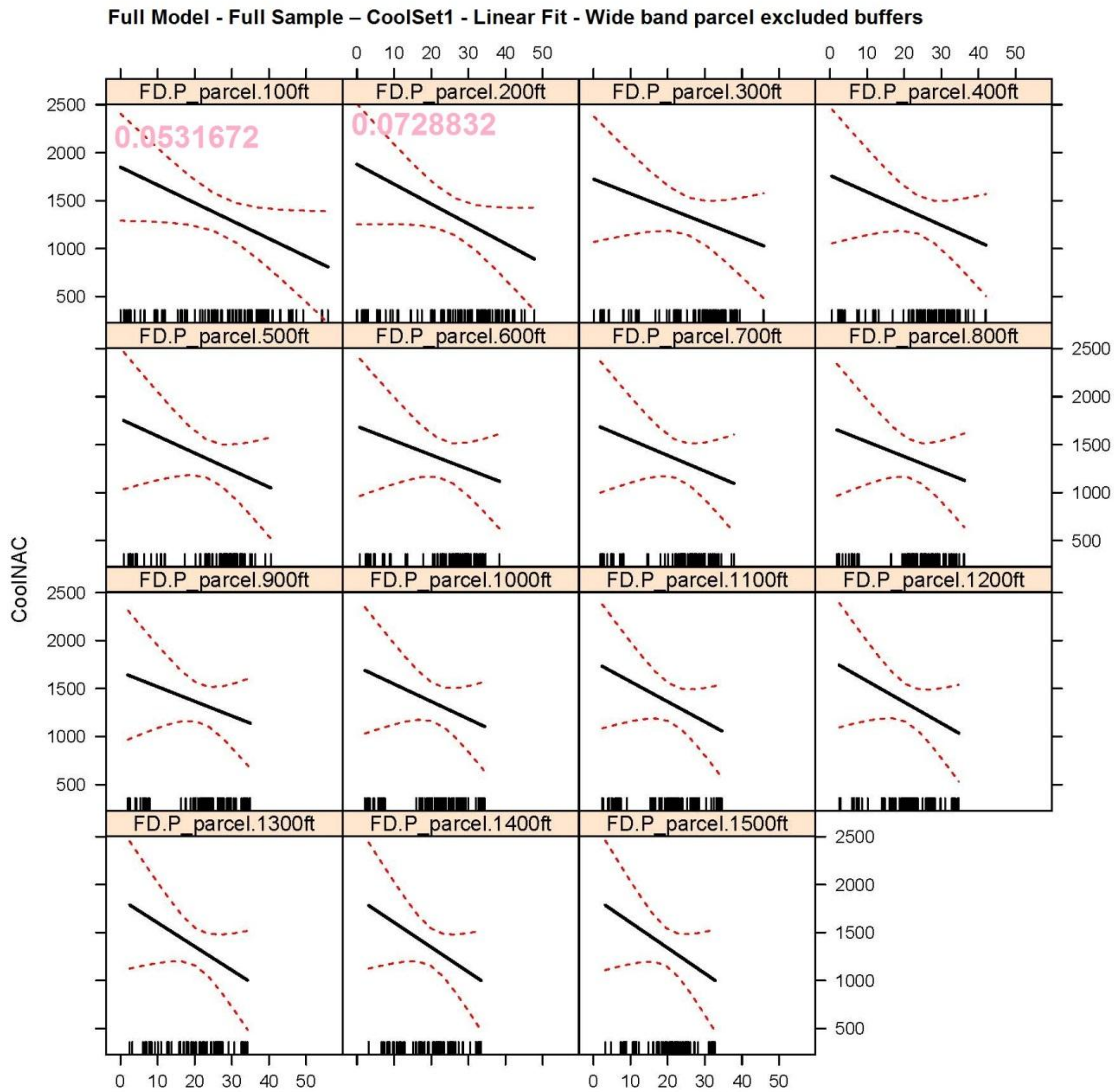

Figure 119. Wide band parcel excluded buffer effect plots for CoolSet1 with the Full Sample running the Full Model.

Wide band parcel to 100 foot excluded buffer effect plots

None of the wide band parcel to 100 foot excluded buffer effect plots for CoolSet1 with the Full Sample running the Full Model were found to be significant.

CoolSet2

Covariate effect plots

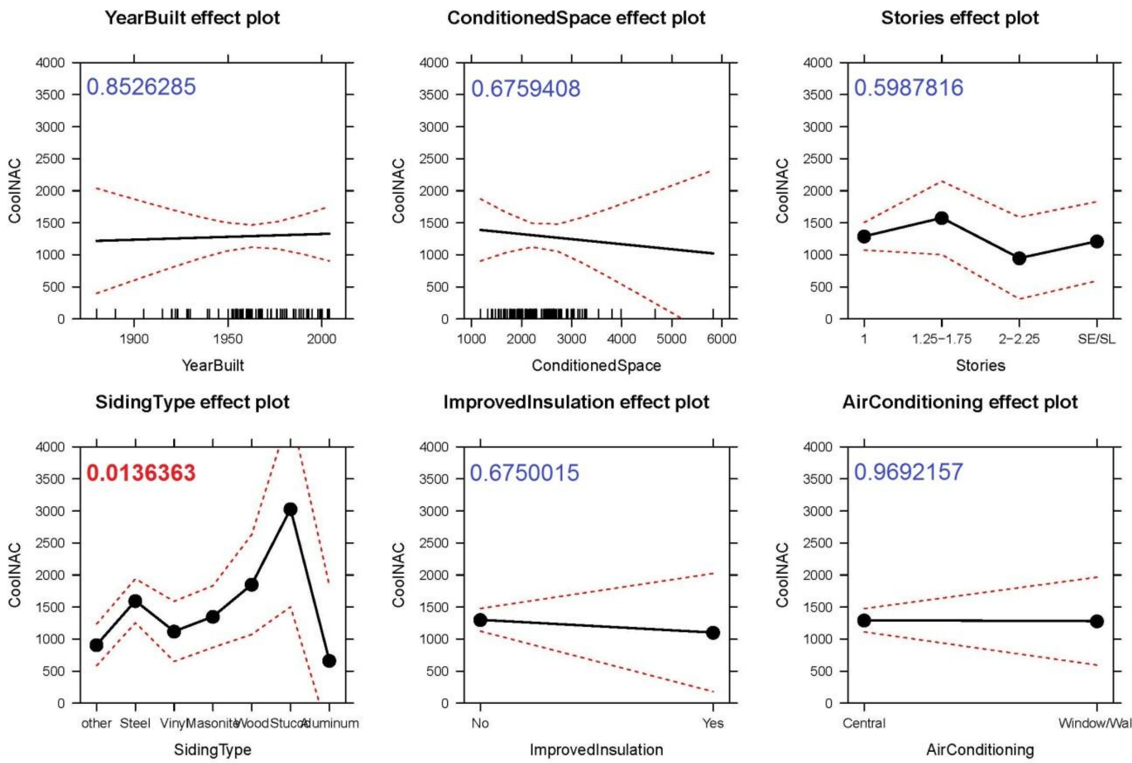

Figure 120. Covariate effect plots for CoolSet2 with the Full Sample running the Full Model.

Comprehensive parcel buffer effect plots

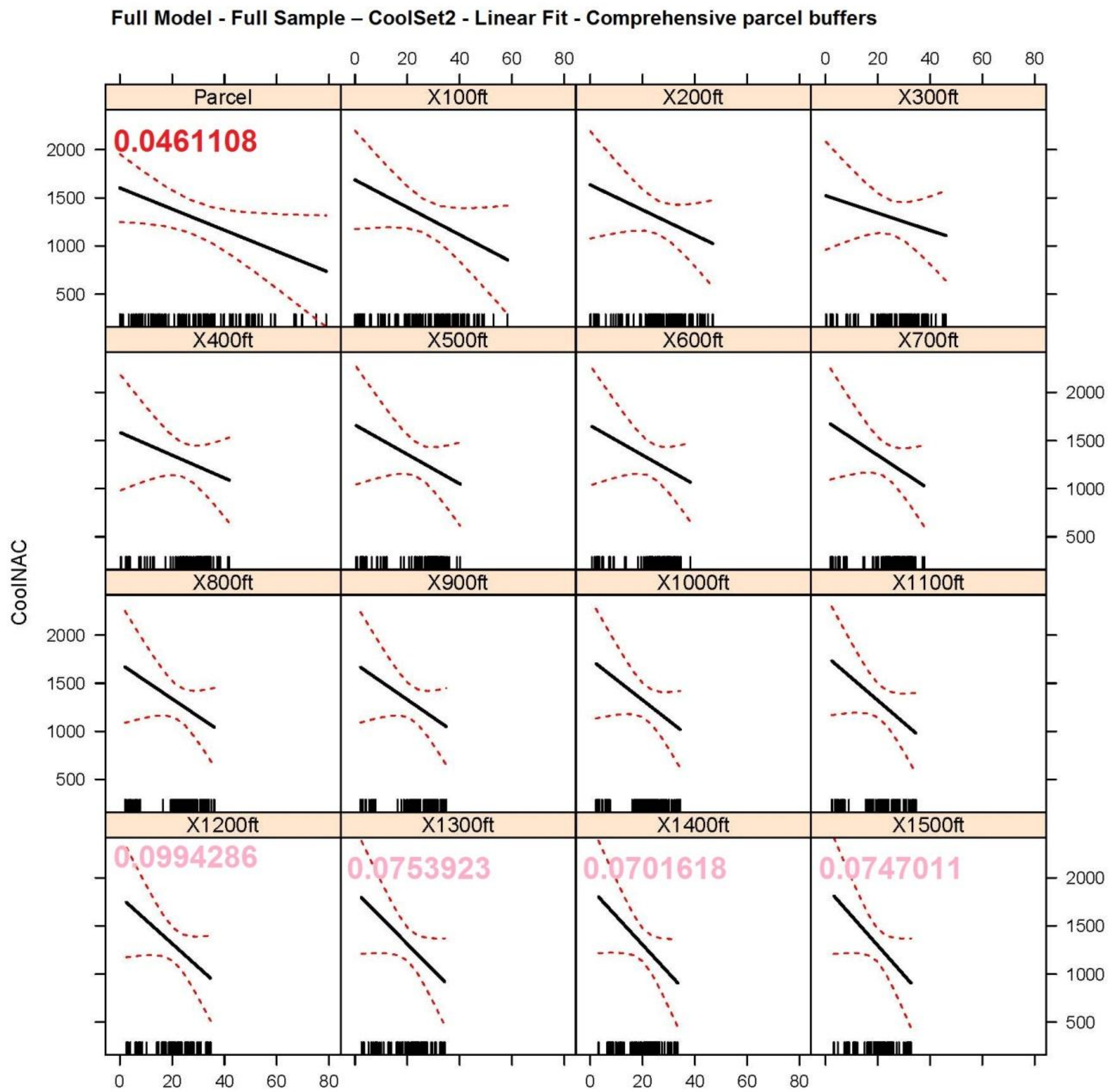

Figure 121. Comprehensive parcel buffer effect plots for CoolSet2 with the Full Sample running the Full Model.

Thin band parcel buffer effect plots

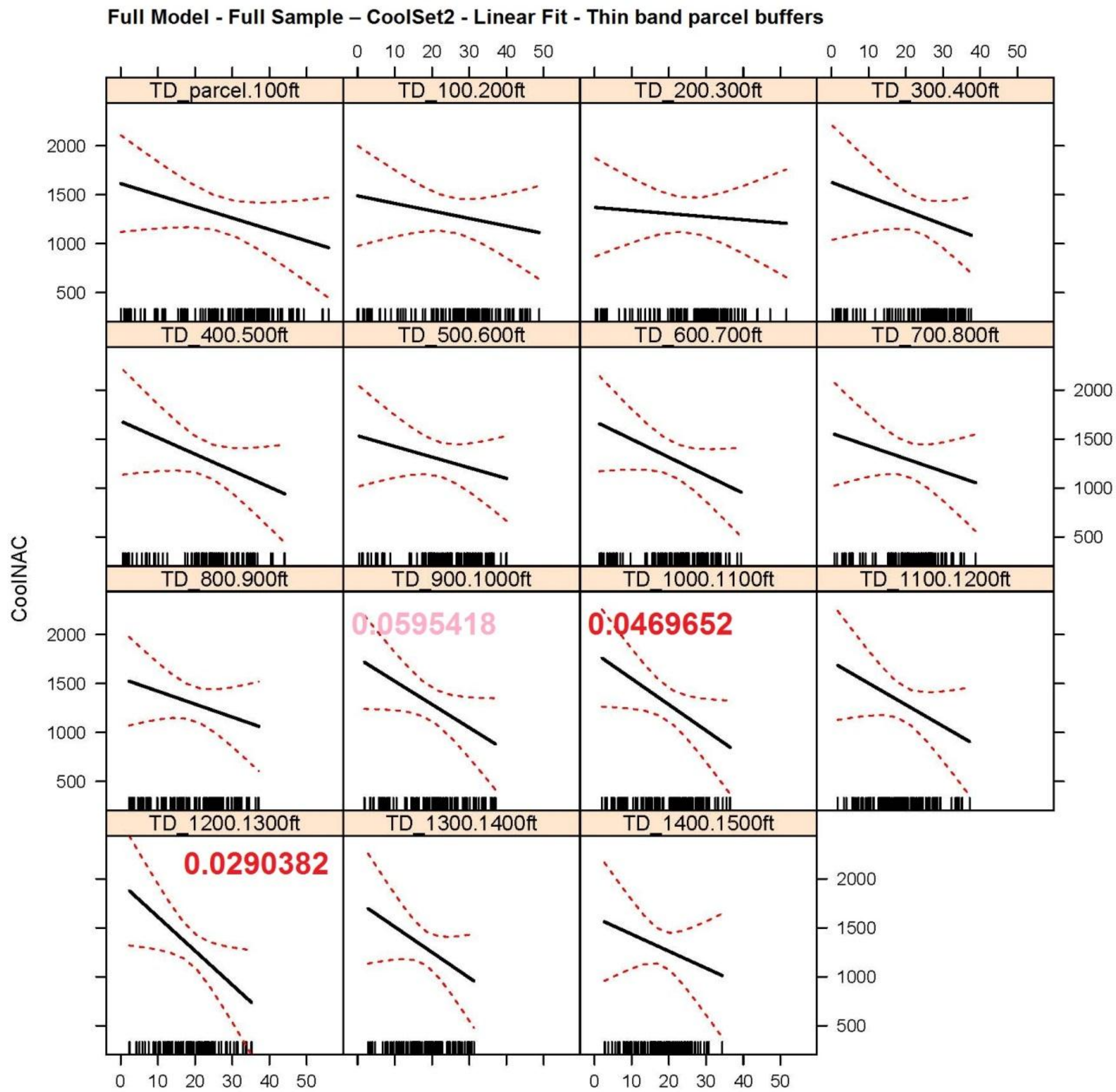

Figure 122. Thin band parcel buffer effect plots for CoolSet2 with the Full Sample running the Full Model.

Wide band parcel excluded buffer effect plots

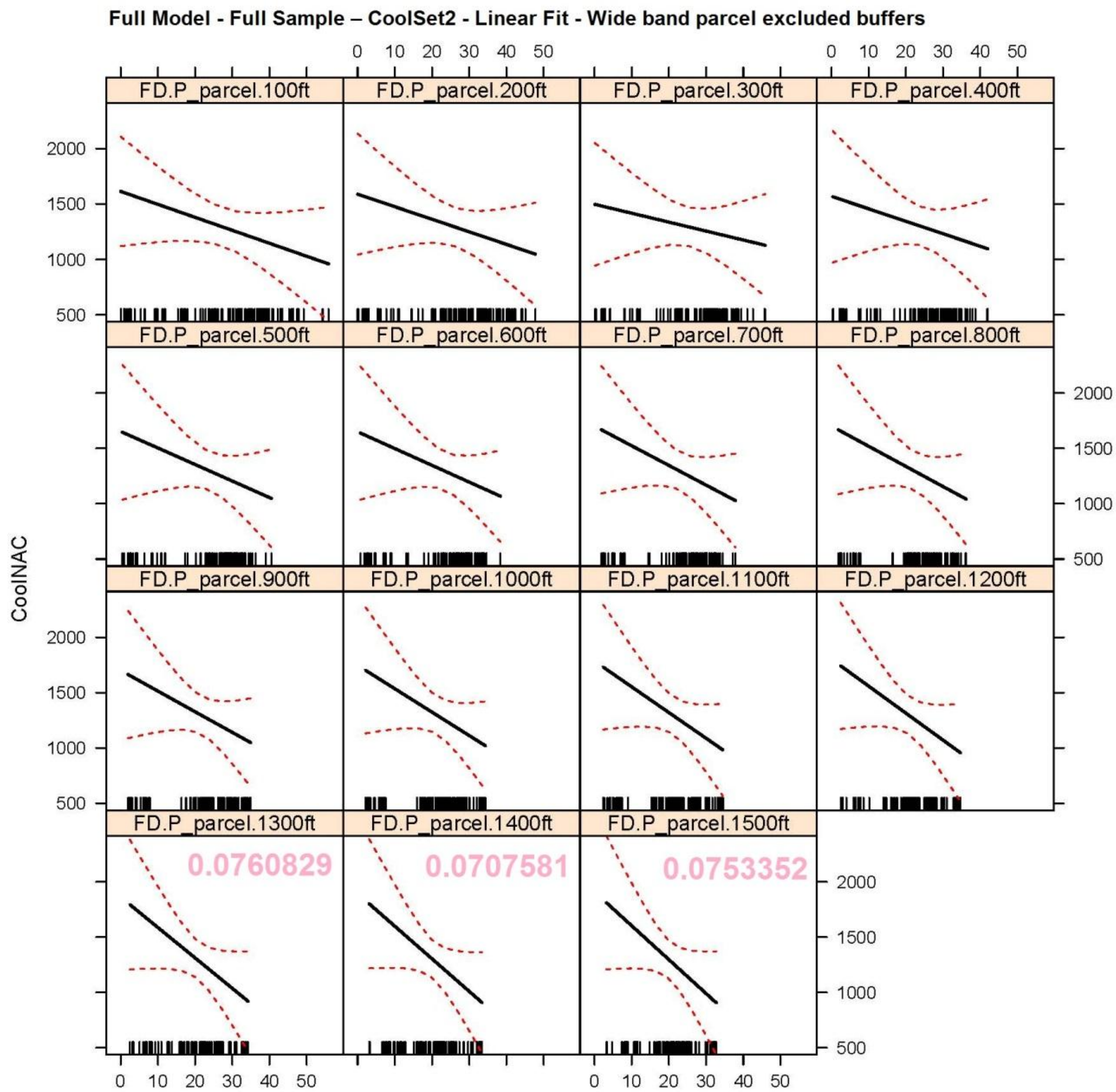

Figure 123. Wide band parcel excluded buffer effect plots for CoolSet2 with the Full Sample running the Full Model.

Wide band parcel to 100 foot excluded buffer effect plots

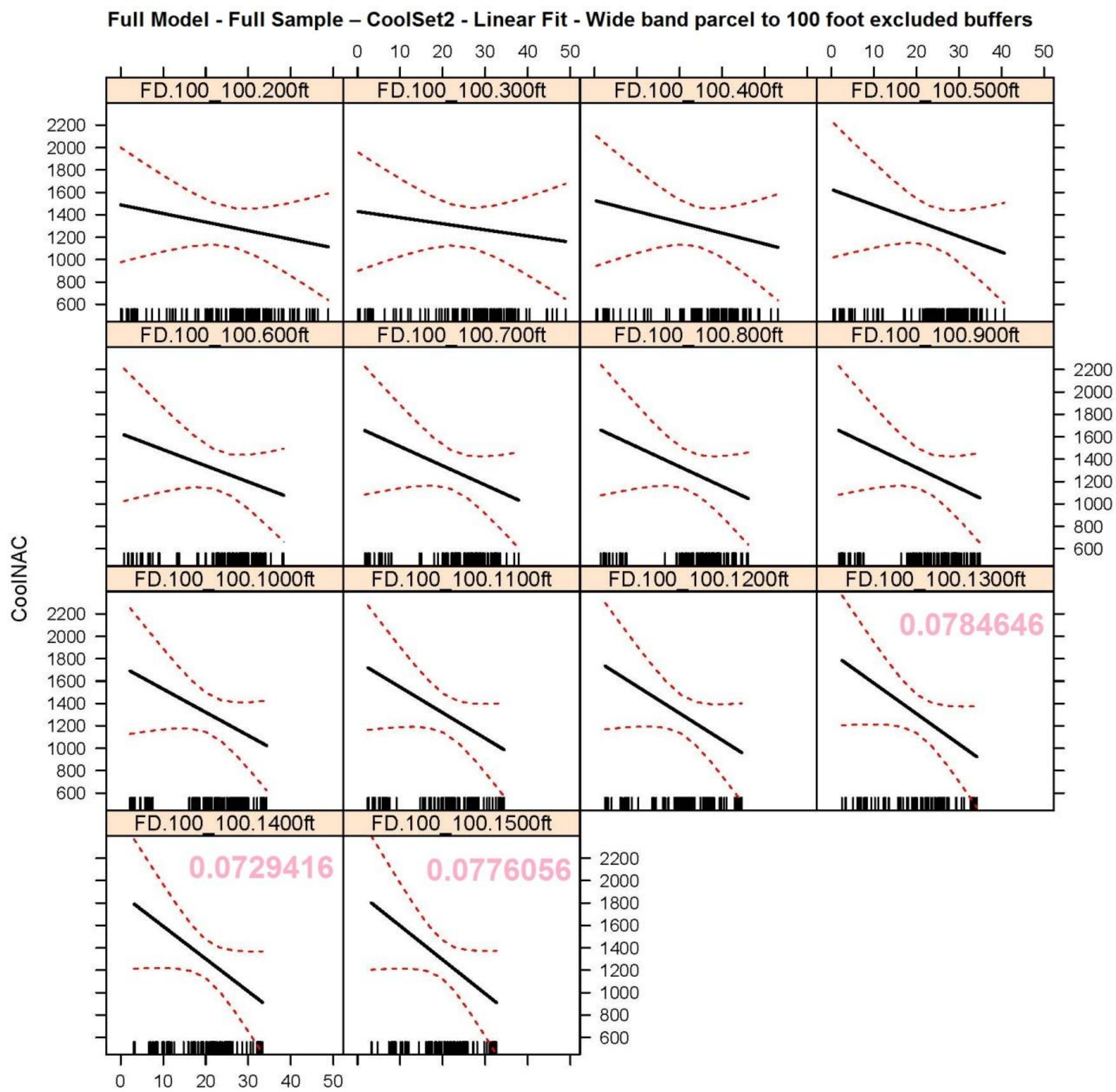

Figure 124. Wide band parcel to 100 foot excluded buffer effect plots for CoolSet2 with the Full Sample running the Full Model.

CoolSet3

Covariate effect plots

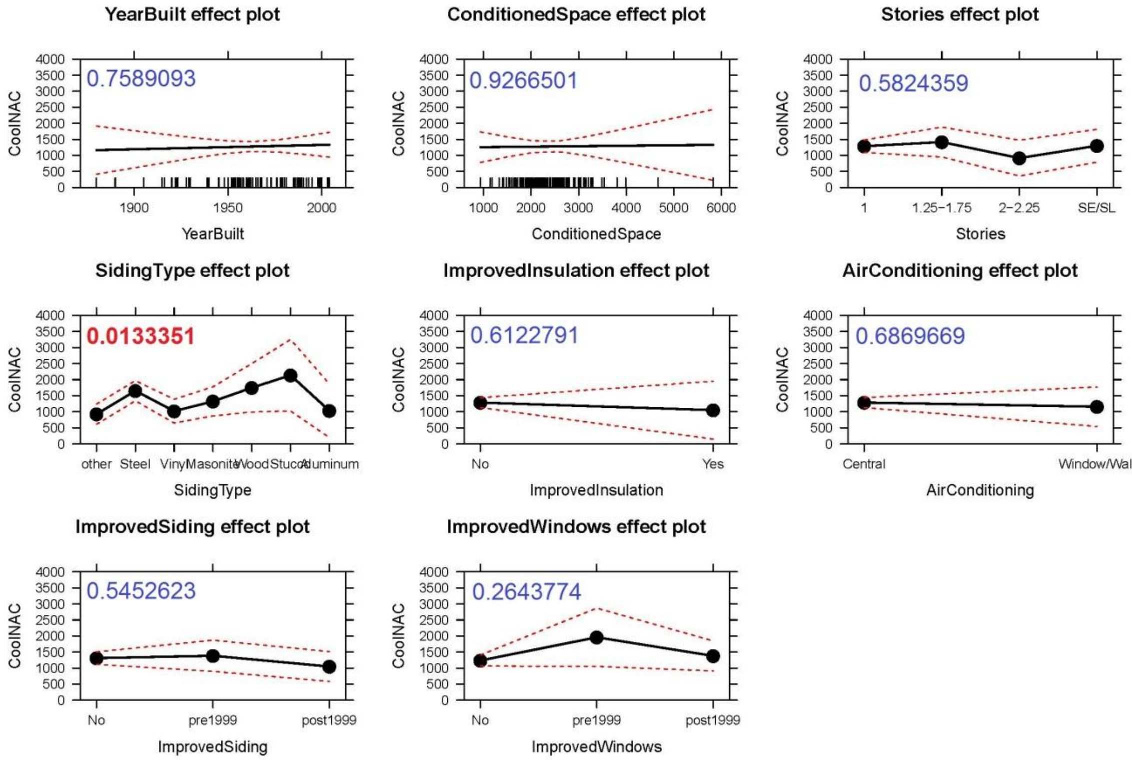

Figure 125. Covariate effect plots for CoolSet3 with the Full Sample running the Full Model.

Comprehensive parcel buffer effect plots

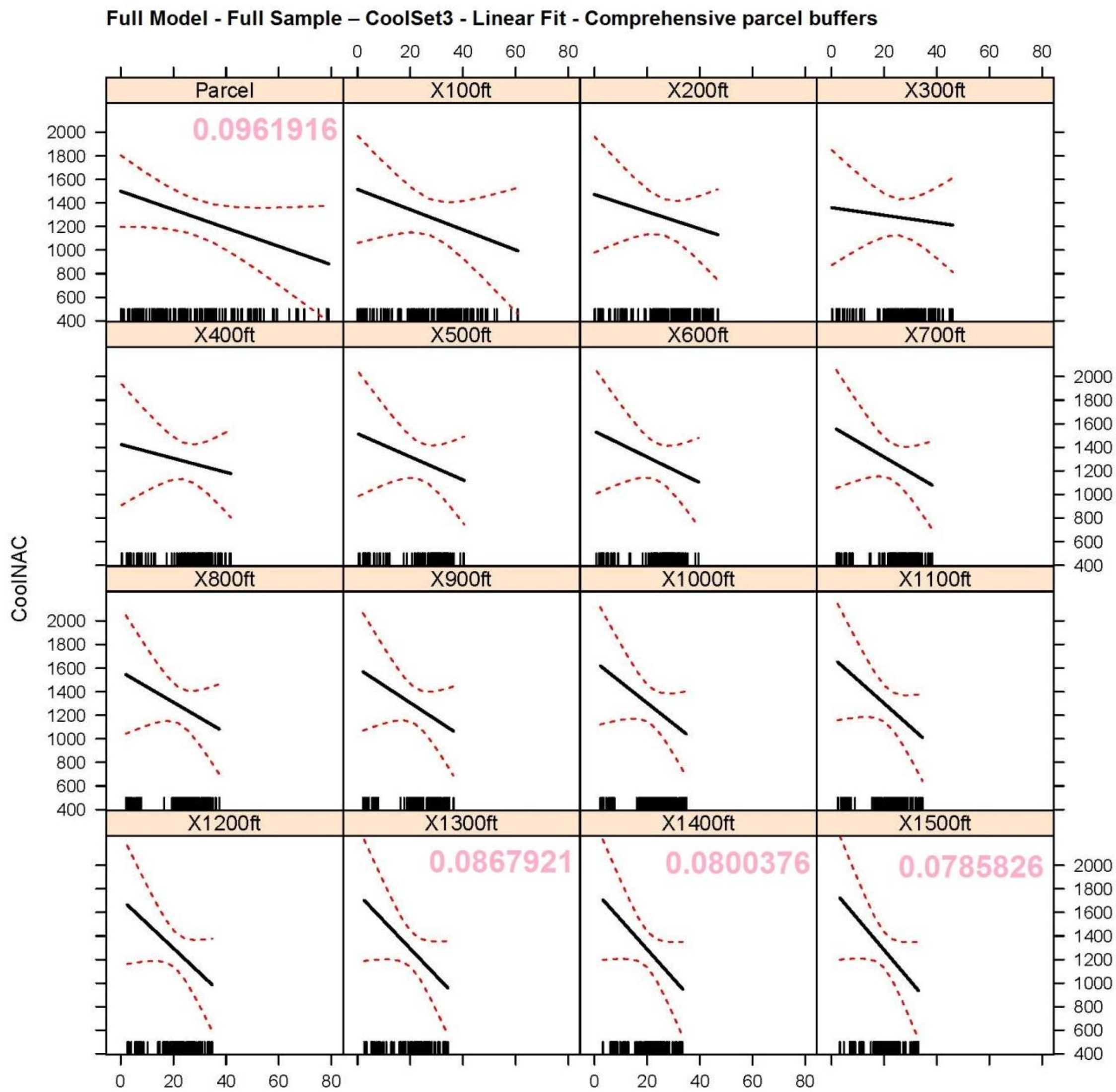

Figure 126. Comprehensive parcel buffer effect plots for CoolSet3 with the Full Sample running the Full Model.

Thin band parcel buffer effect plots

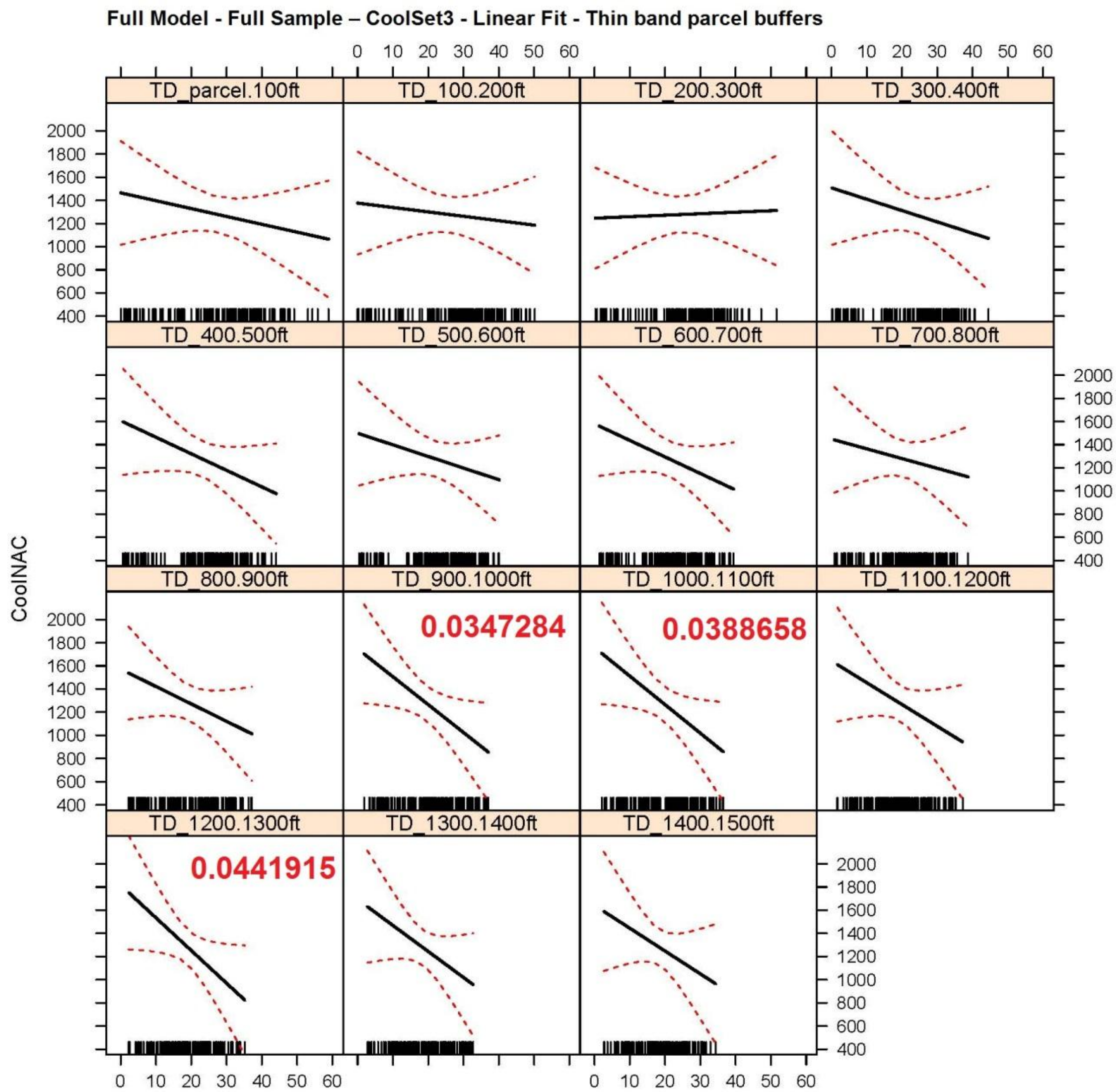

Figure 127. Thin band parcel buffer effect plots for CoolSet3 with the Full Sample running the Full Model.

Wide band parcel excluded buffer effect plots

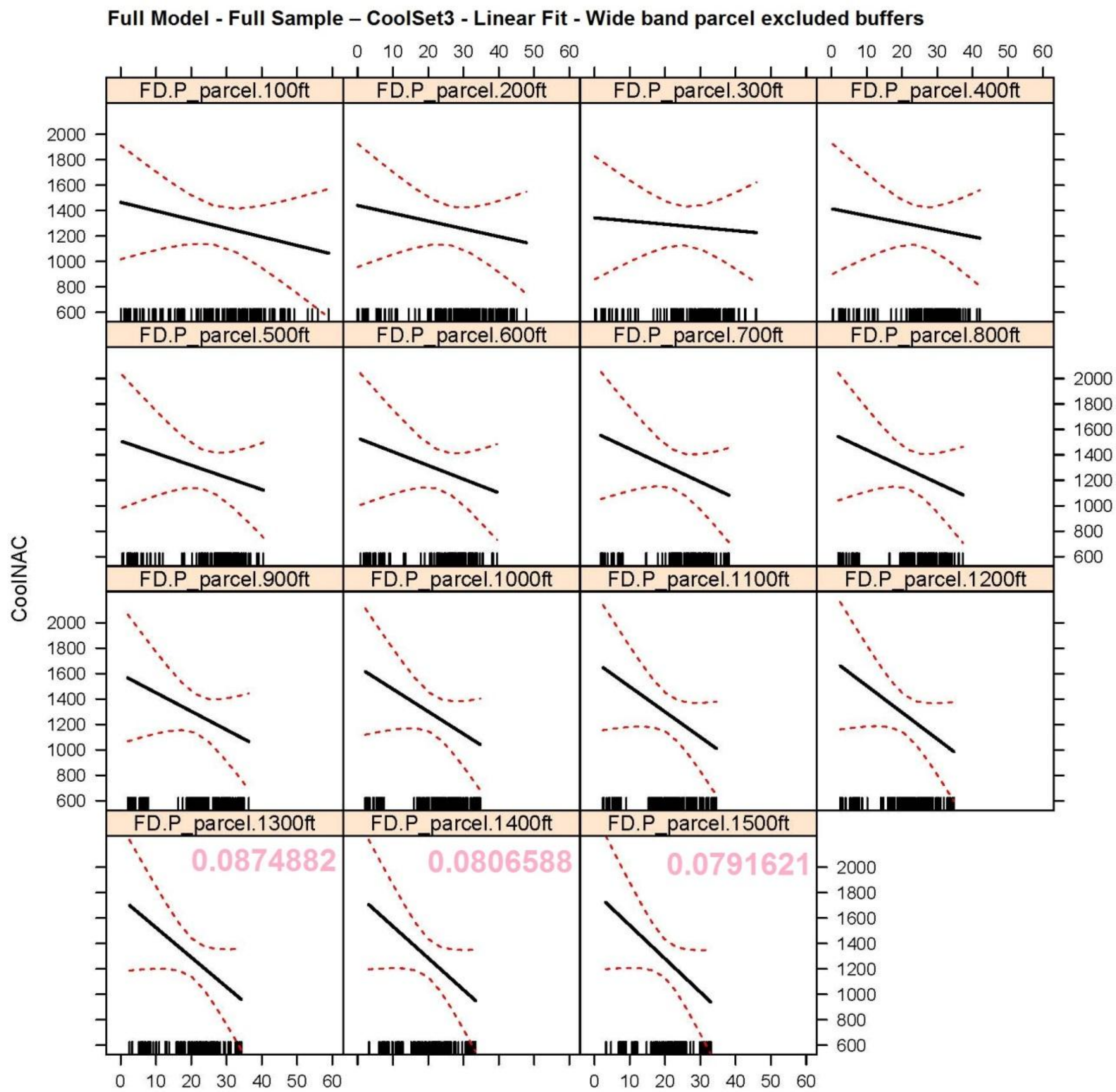

Figure 128. Wide band parcel excluded buffer effect plots for CoolSet3 with the Full Sample running the Full Model.

Wide band parcel to 100 foot excluded buffer effect plots

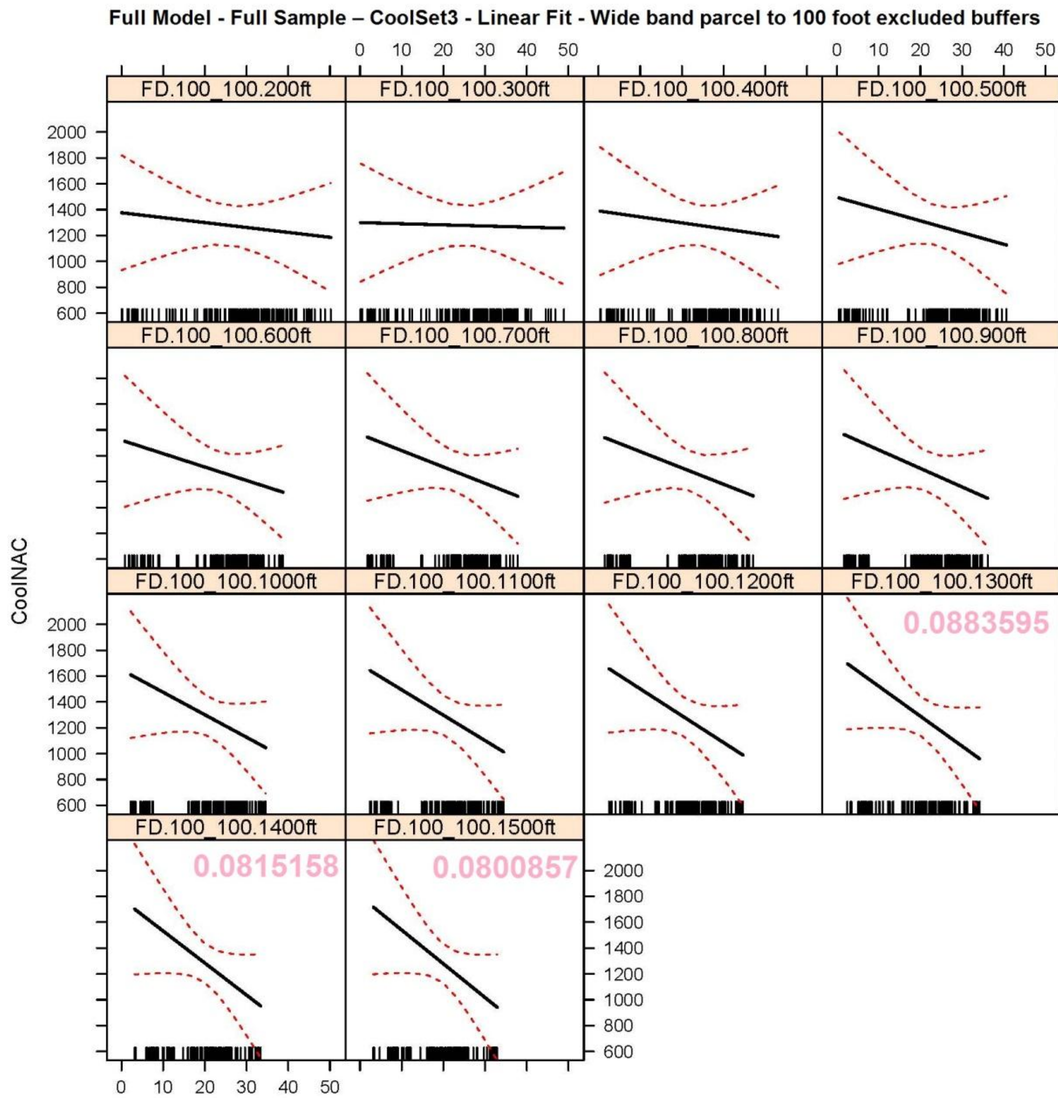

Figure 129. Wide band parcel to 100 foot excluded buffer effect plots for CoolSet3 with the Full Sample running the Full Model.

CoolSet4

Covariate effect plots

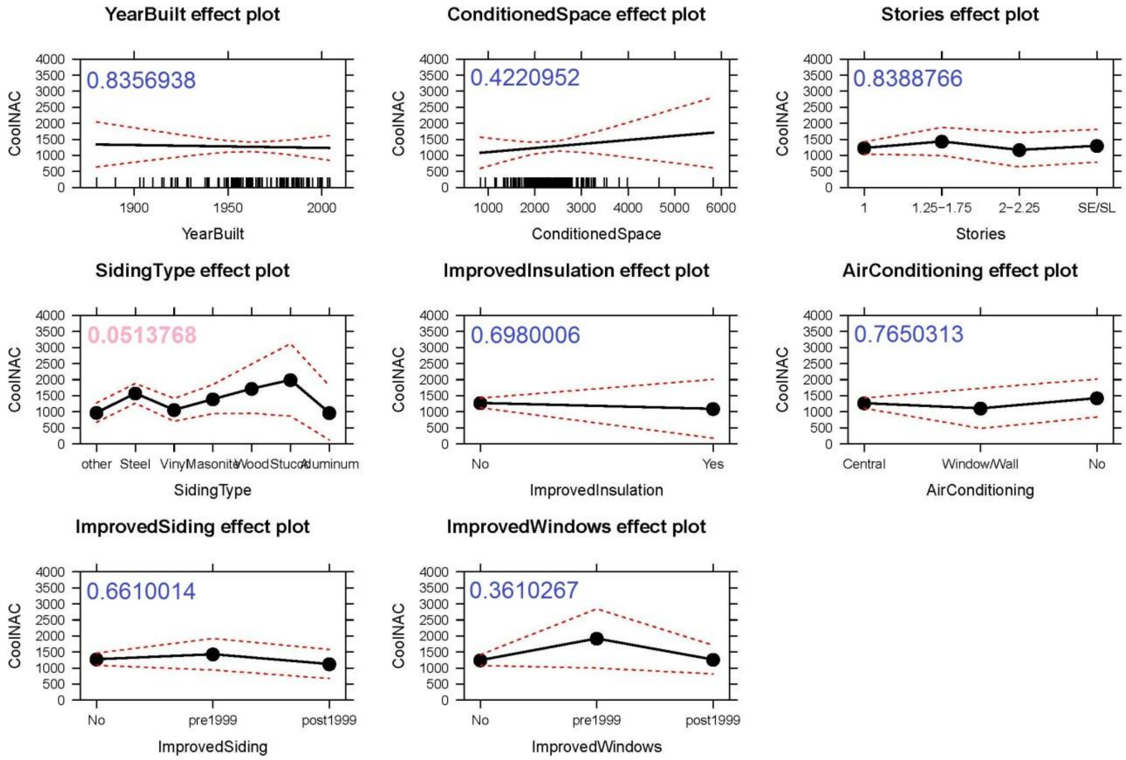

Figure 130. Covariate effect plots for CoolSet4 with the Full Sample running the Full Model.

Comprehensive parcel buffer effect plots

None of the comprehensive parcel buffer effect plots for CoolSet4 with the Full Sample running the Full Model were found to be significant.

Thin band parcel buffer effect plots

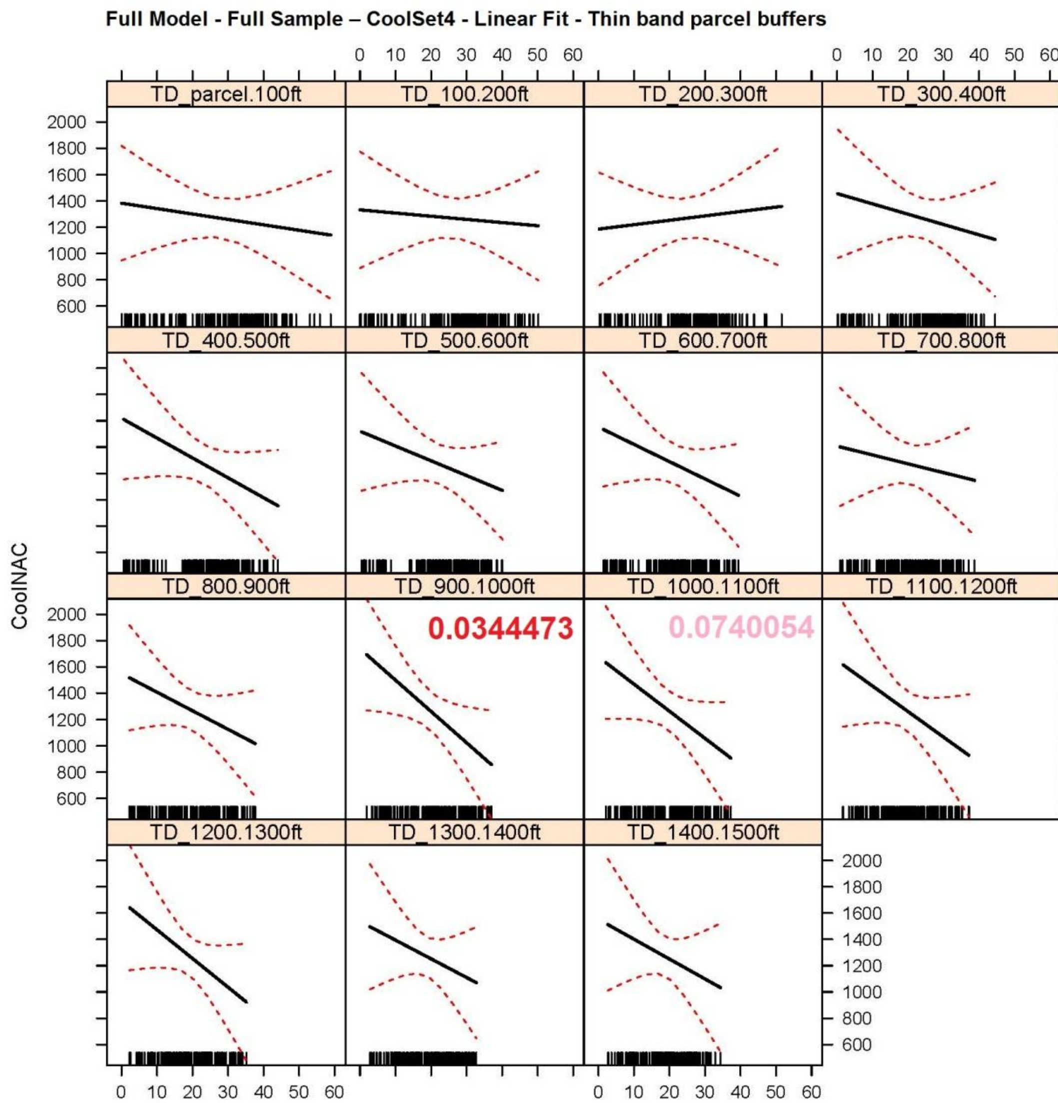

Figure 131. Thin band parcel buffer effect plots for CoolSet4 with the Full Sample running the Full Model.

Wide band parcel excluded buffer effect plots

None of the wide band parcel excluded buffer effect plots for CoolSet4 with the Full Sample running the Full Model were found to be significant.

Wide band parcel to 100 foot excluded buffer effect plots

None of the wide band parcel to 100 foot excluded buffer effect plots for CoolSet4 with the Full Sample running the Full Model were found to be significant.

Simple Model - Full Sample

CoolSet1

Covariate effect plots

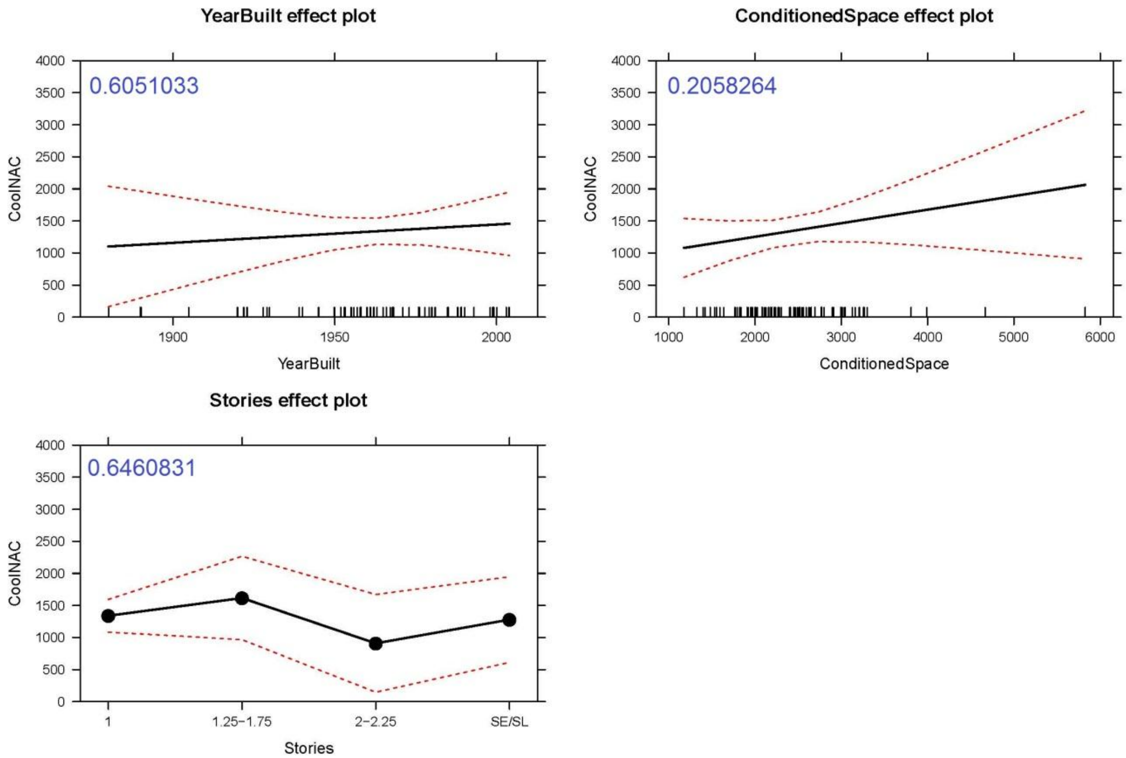

Figure 132. Covariate effect plots for CoolSet1 with the Full Sample running the Simple Model.

Comprehensive parcel buffer effect plots

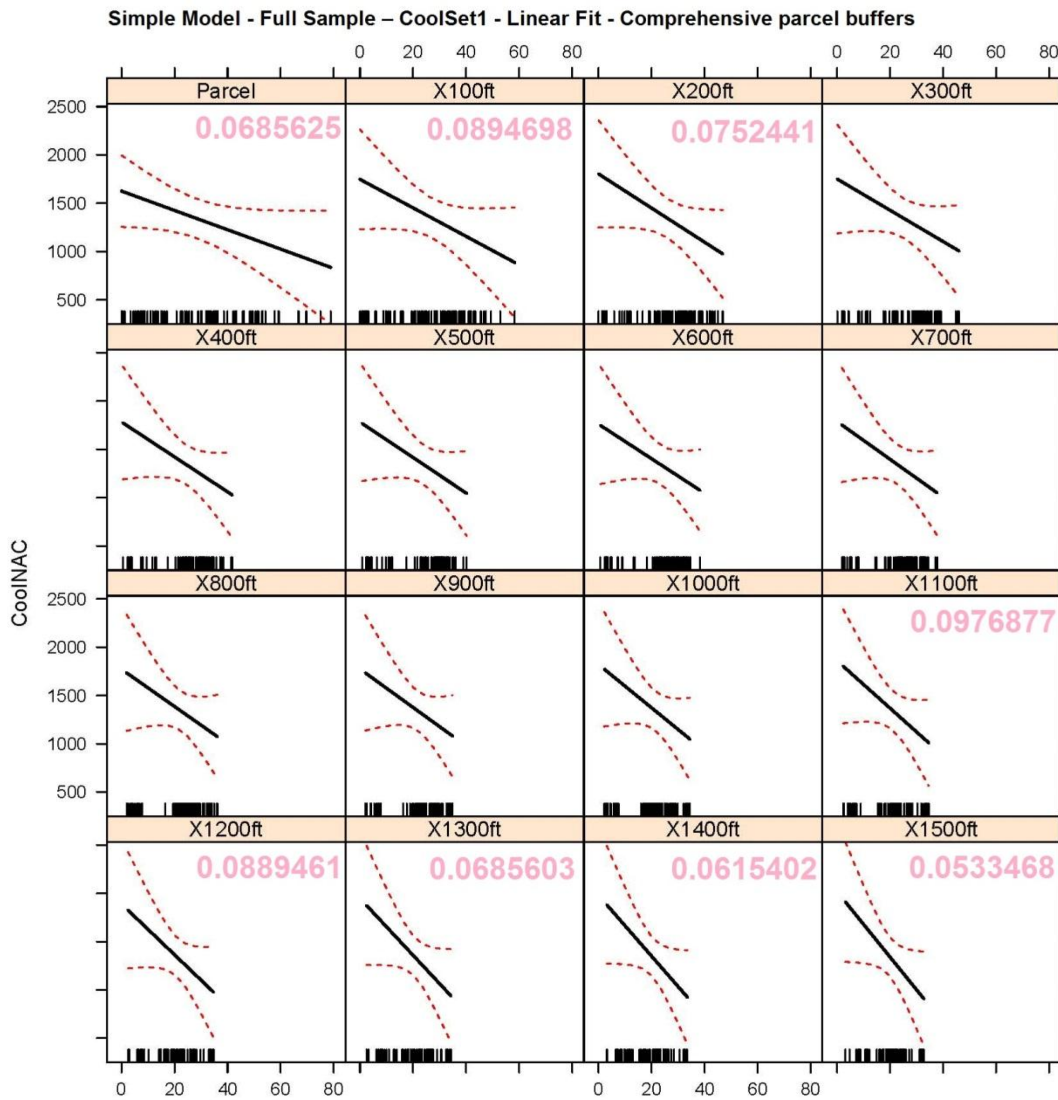

Figure 133. Comprehensive parcel buffer effect plots for CoolSet1 with the Full Sample running the Simple Model.

Thin band parcel buffer effect plots

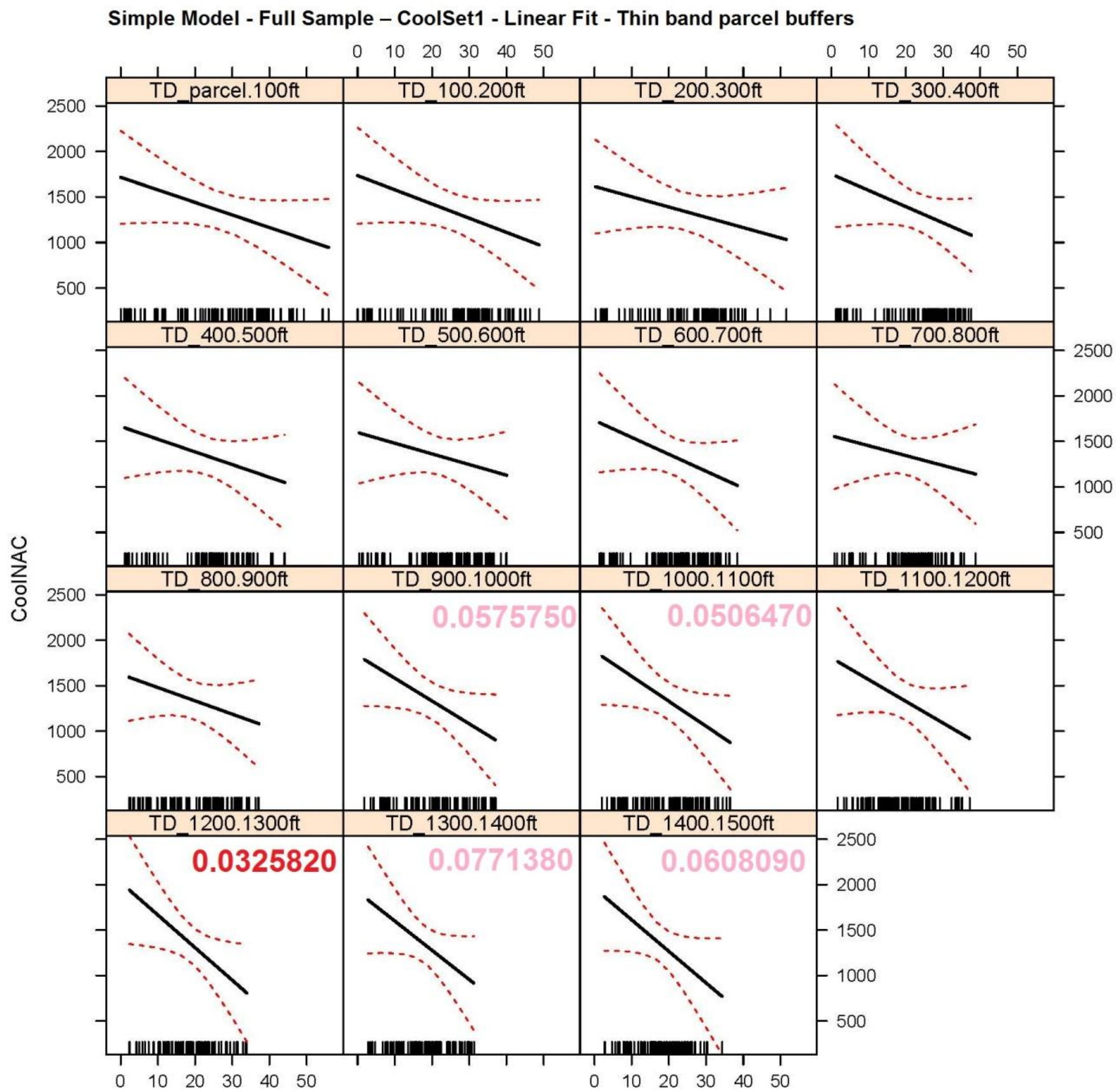

Figure 134. Thin band parcel buffer effect plots for CoolSet1 with the Full Sample running the Simple Model.

Wide band parcel excluded buffer effect plots

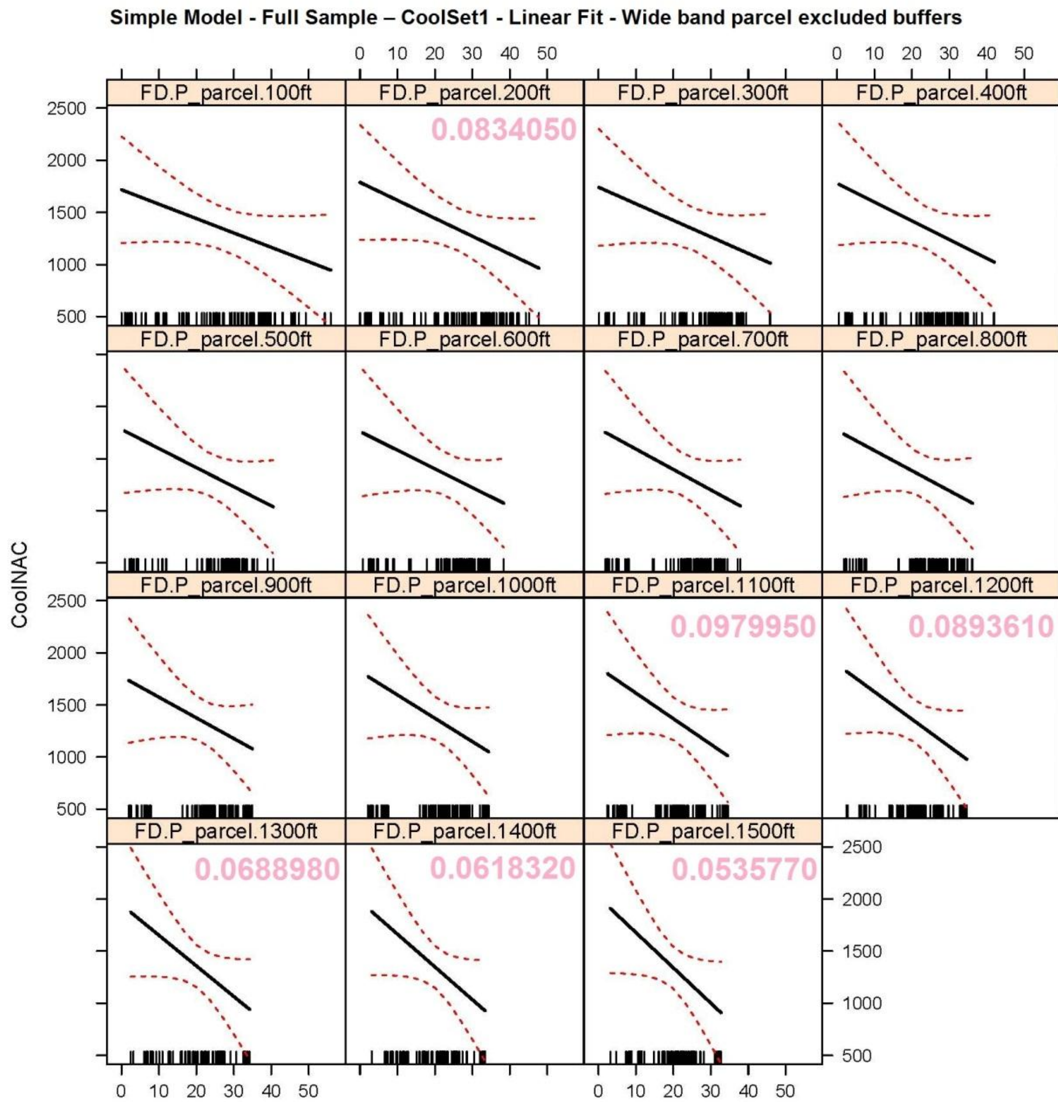

Figure 135. Wide band parcel excluded buffer effect plots for CoolSet1 with the Full Sample running the Simple Model.

Wide band parcel to 100 foot excluded buffer effect plots

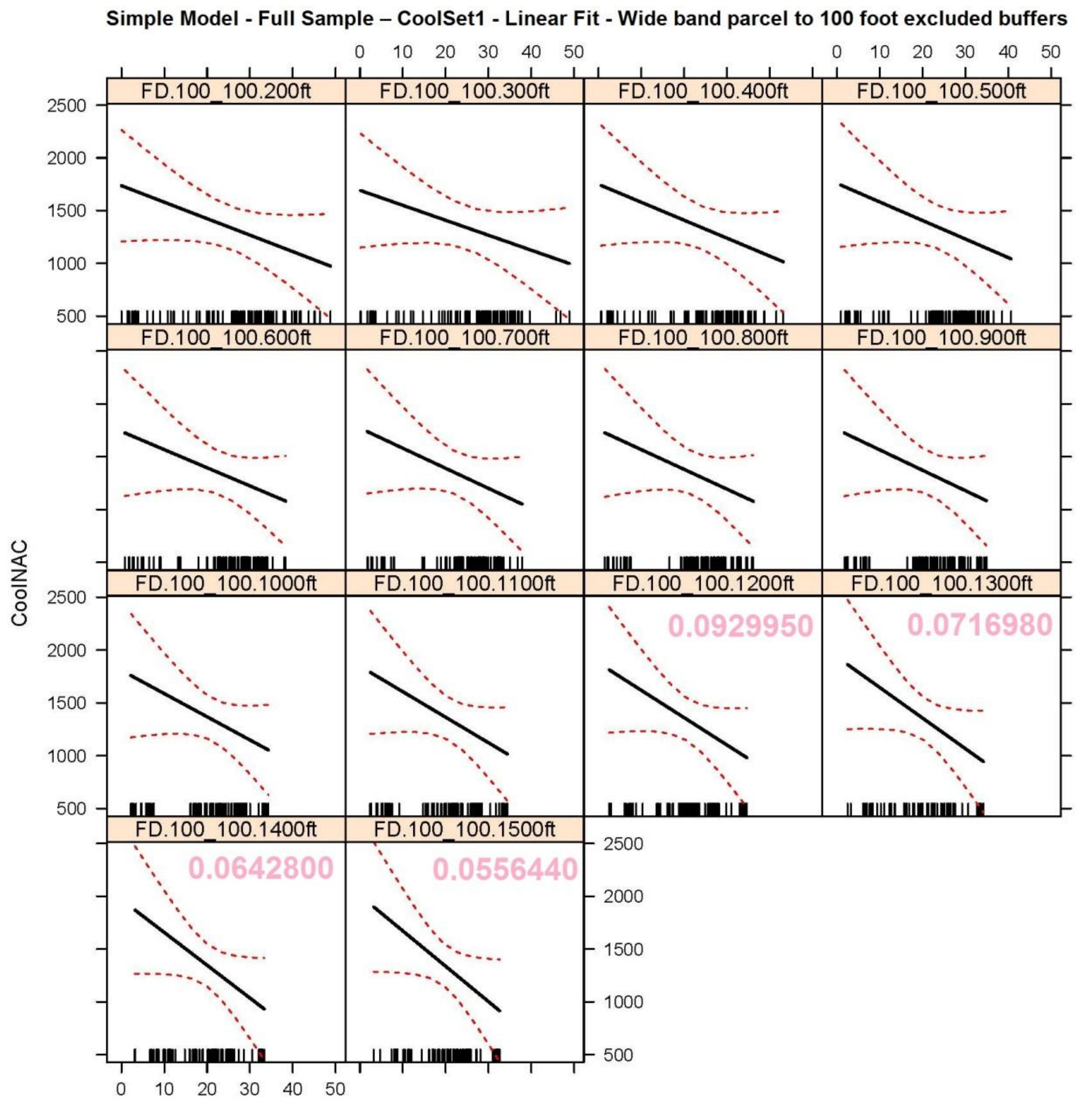

Figure 136. Wide band parcel to 100 foot excluded buffer effect plots for CoolSet1 with the Full Sample running the Simple Model.

CoolSet2

Covariate effect plots

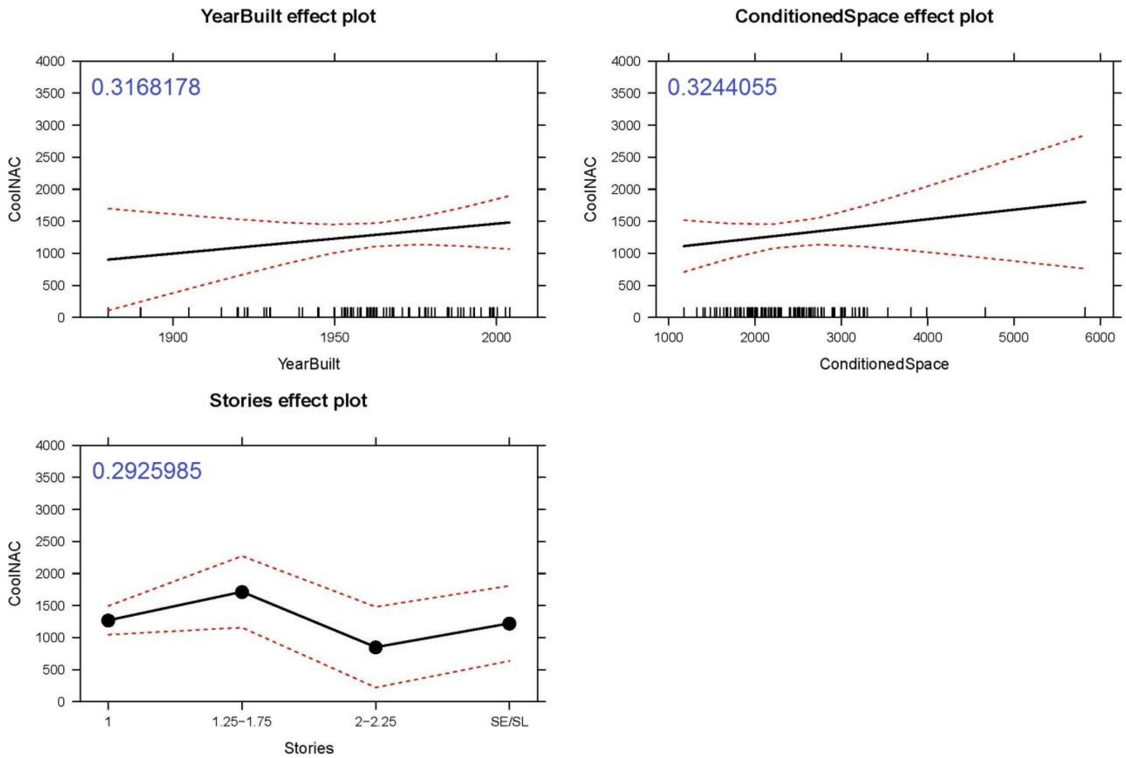

Figure 137. Covariate effect plots for CoolSet2 with the Full Sample running the Simple Model.

Comprehensive parcel buffer effect plots

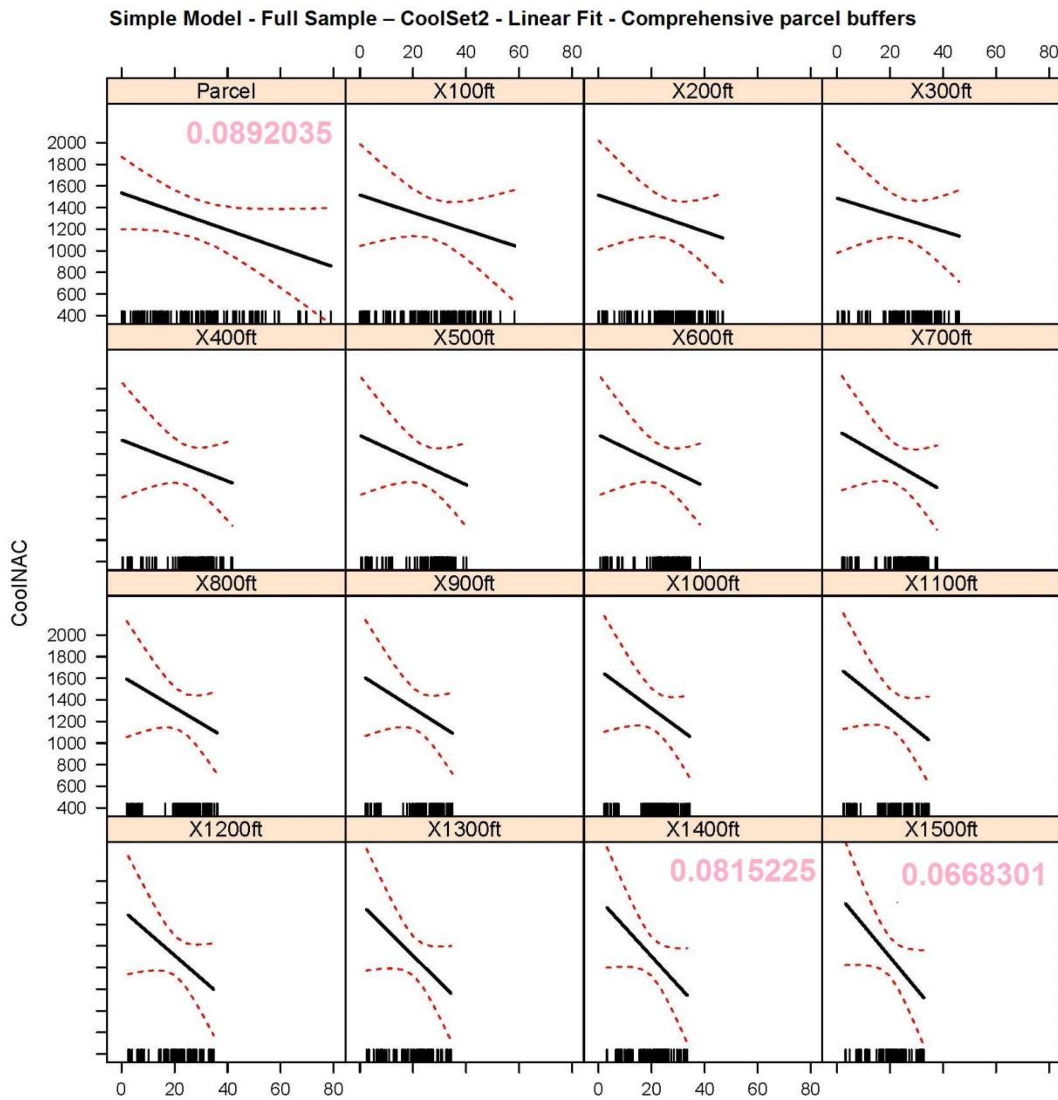

Figure 138. Comprehensive parcel buffer effect plots for CoolSet2 with the Full Sample running the Simple Model.

Thin band parcel buffer effect plots

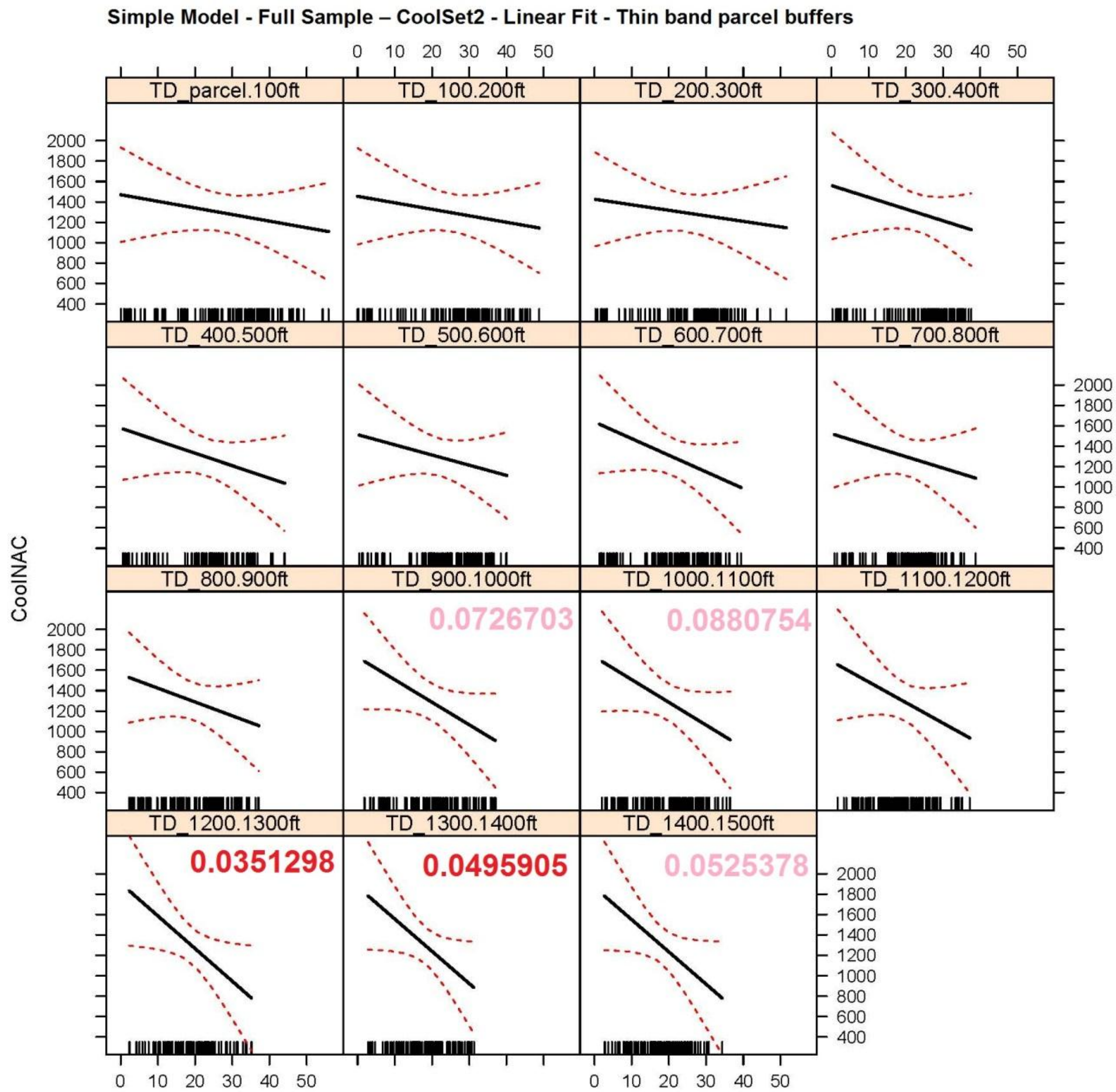

Figure 139. Thin band parcel buffer effect plots for CoolSet2 with the Full Sample running the Simple Model.

Wide band parcel excluded buffer effect plots

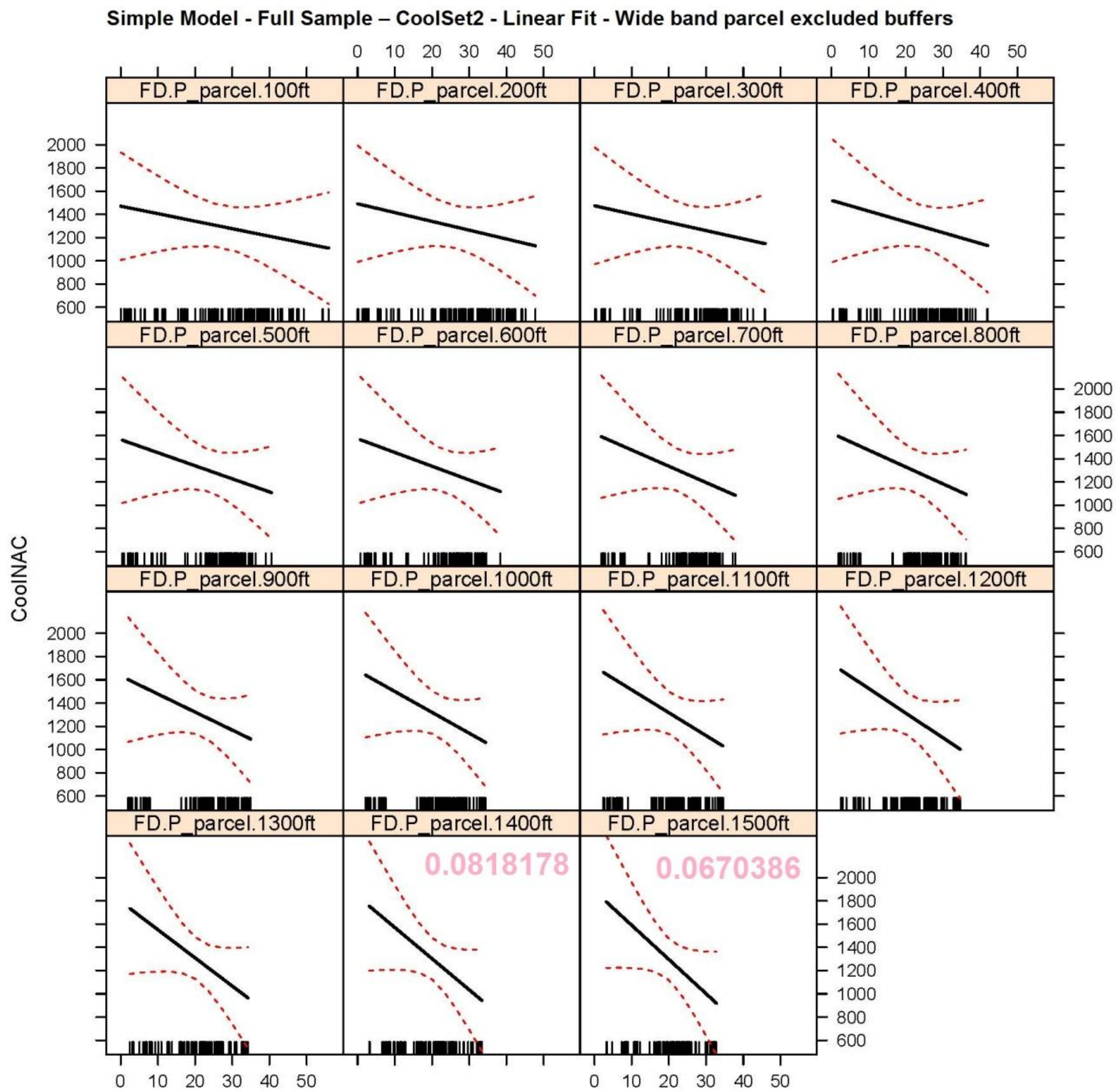

Figure 140. Wide band parcel excluded buffer effect plots for CoolSet2 with the Full Sample running the Simple Model.

Wide band parcel to 100 foot excluded buffer effect plots

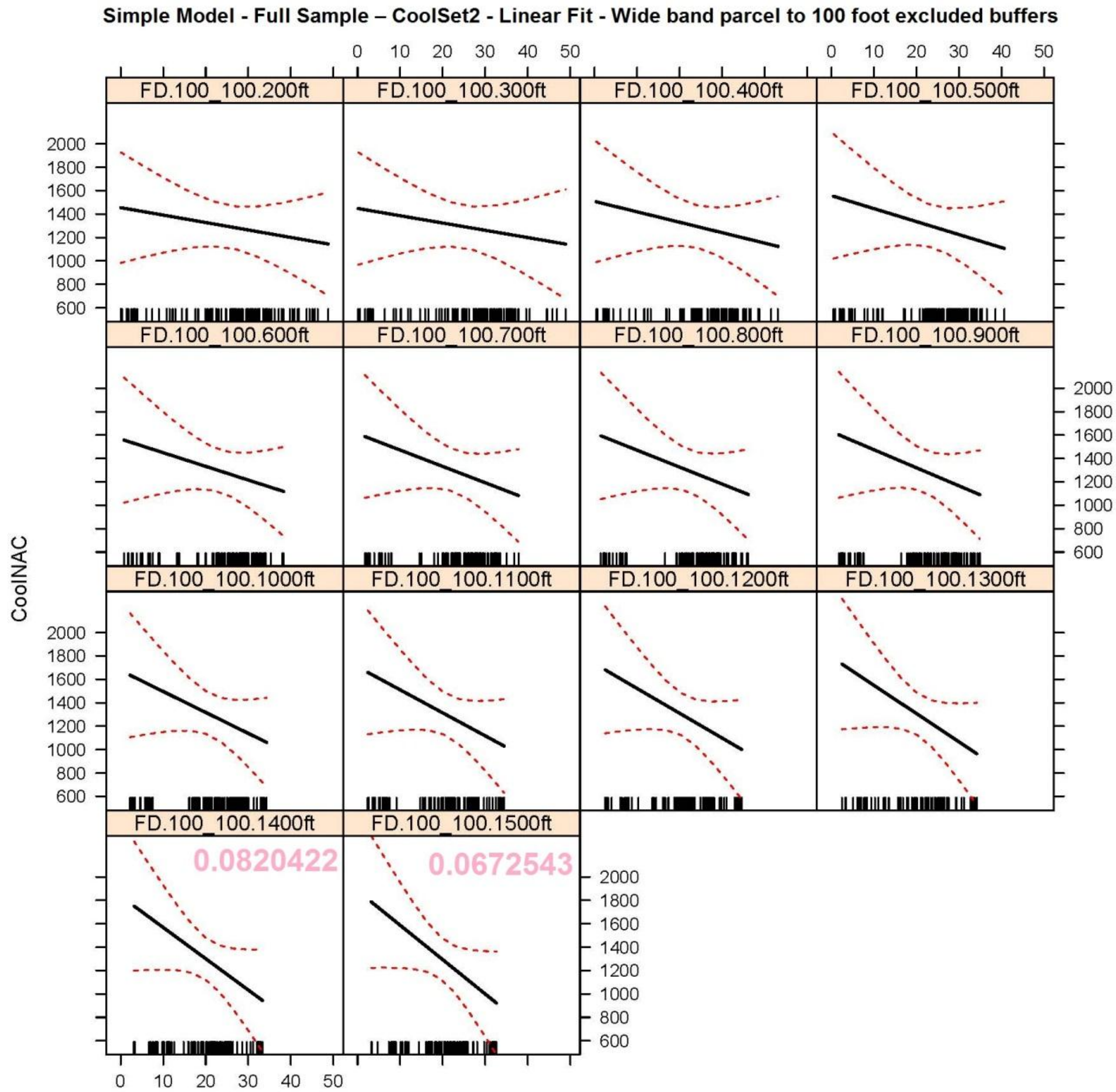

Figure 141. Wide band parcel to 100 foot excluded buffer effect plots for CoolSet2 with the Full Sample running the Simple Model.

CoolSet3

Covariate effect plots

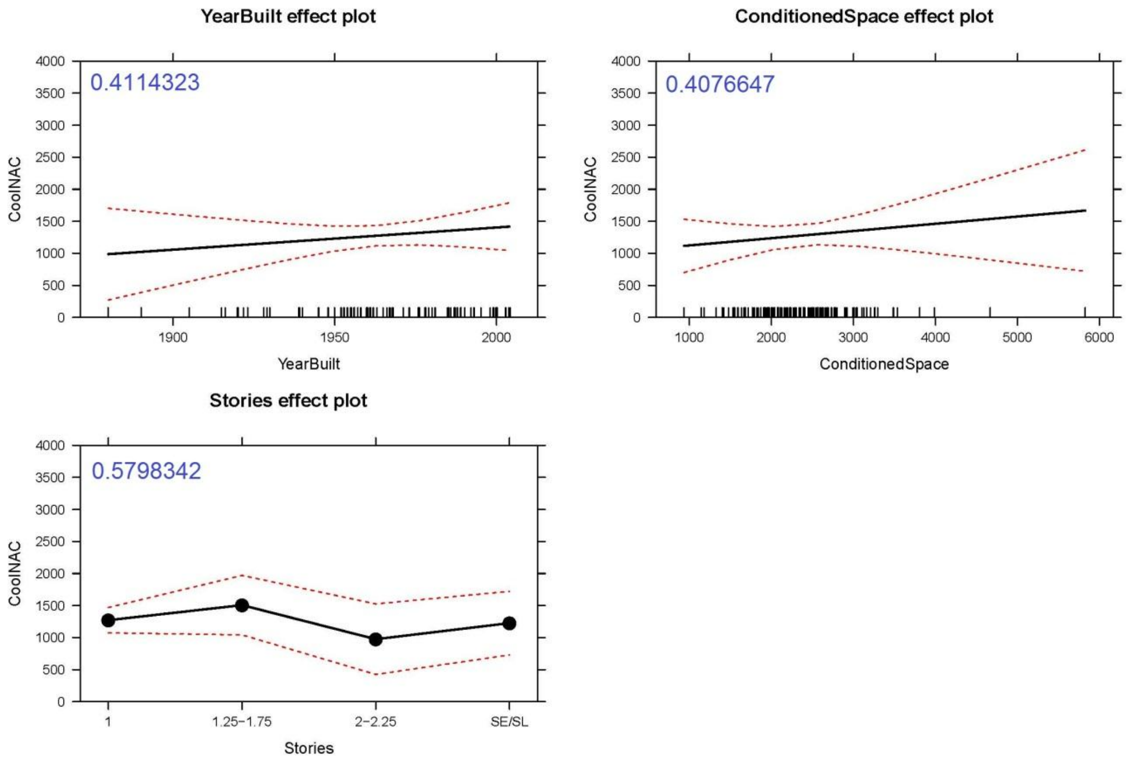

Figure 142. Covariate effect plots for CoolSet3 with the Full Sample running the Simple Model.

Comprehensive parcel buffer effect plots

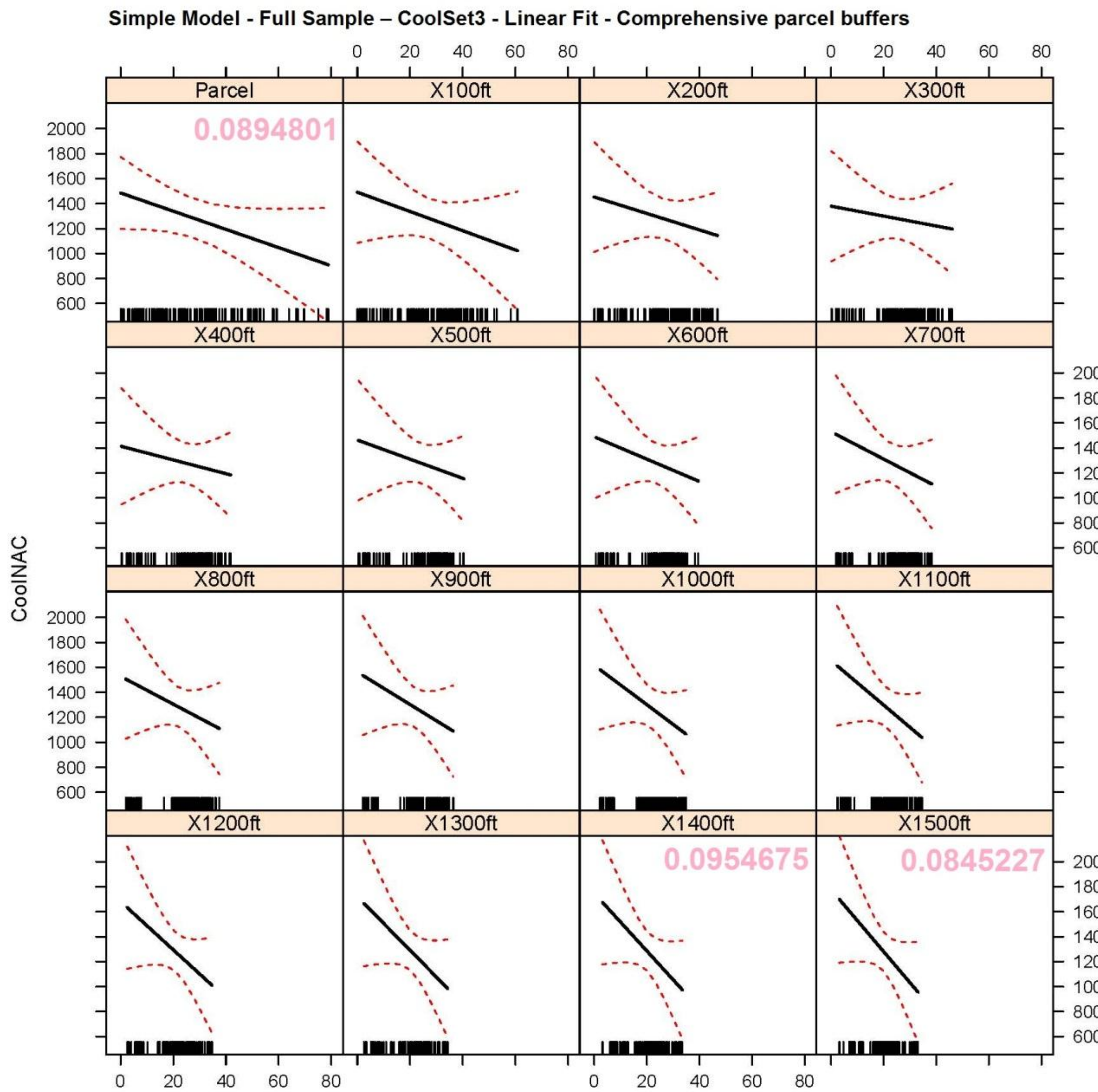

Figure 143. Comprehensive parcel buffer effect plots for CoolSet3 with the Full Sample running the Simple Model.

Thin band parcel buffer effect plots

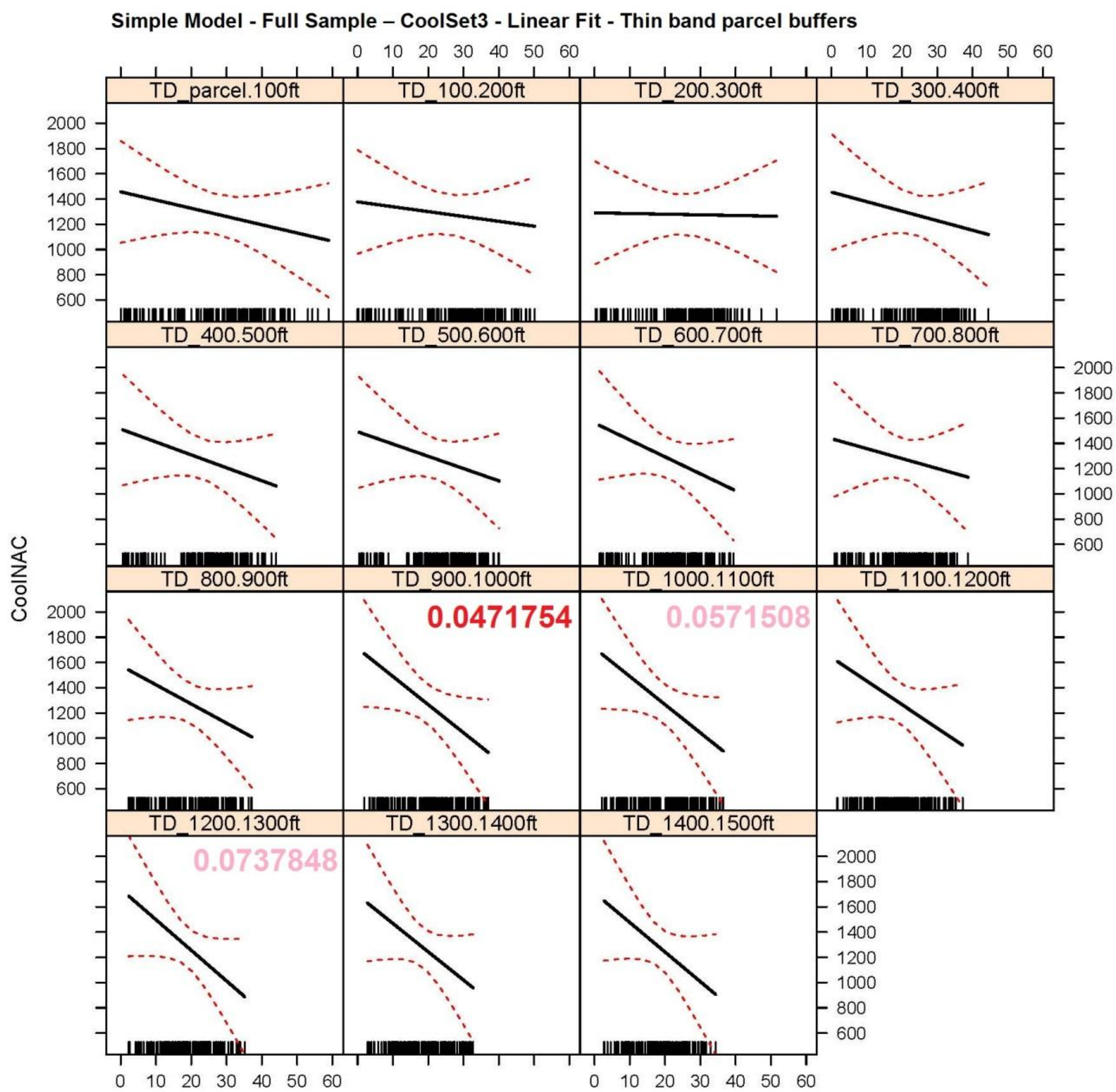

Figure 144. Thin band parcel buffer effect plots for CoolSet3 with the Full Sample running the Simple Model.

Wide band parcel excluded buffer effect plots

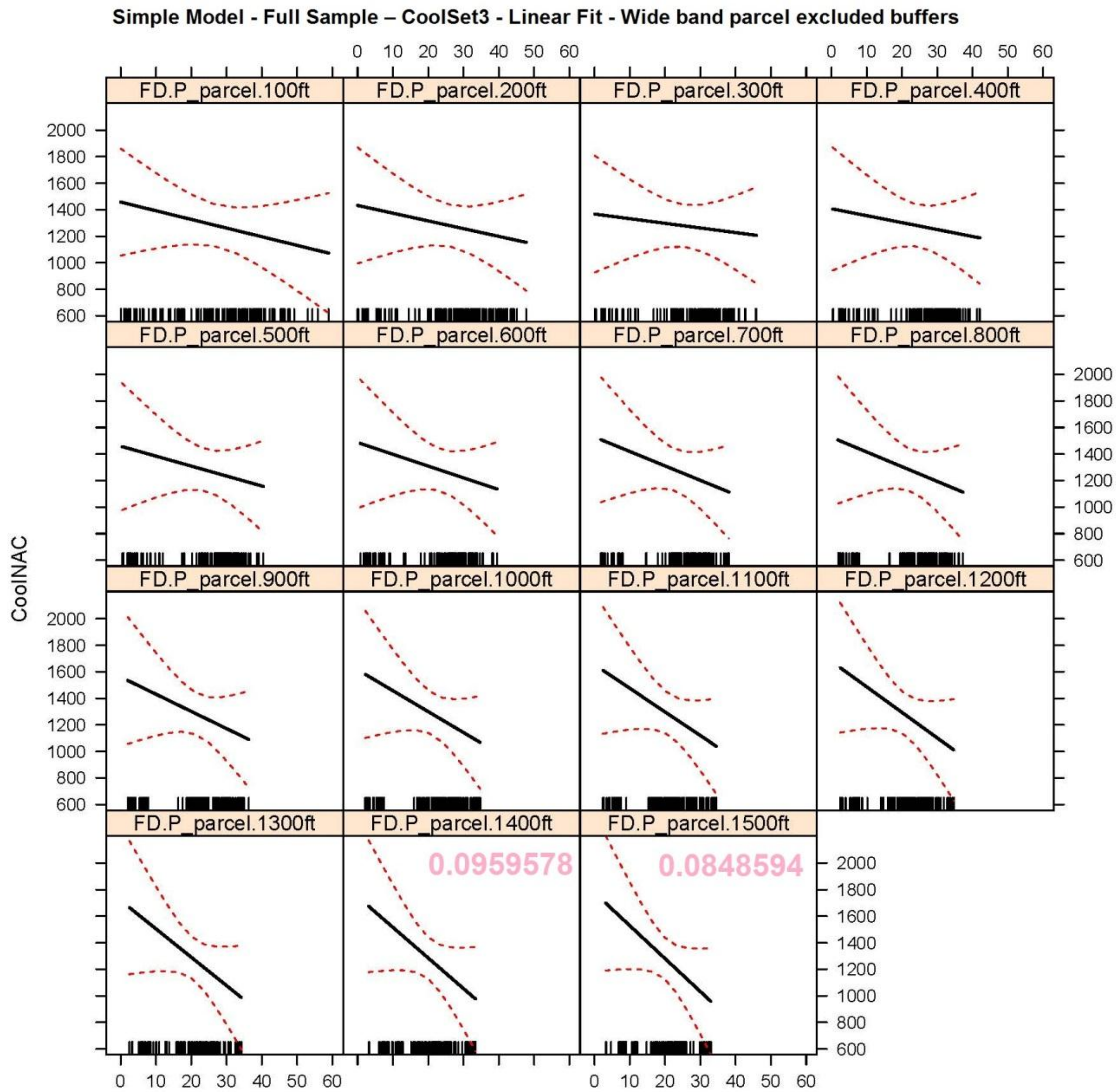

Figure 145. Wide band parcel excluded buffer effect plots for CoolSet3 with the Full Sample running the Simple Model.

Wide band parcel to 100 foot excluded buffer effect plots

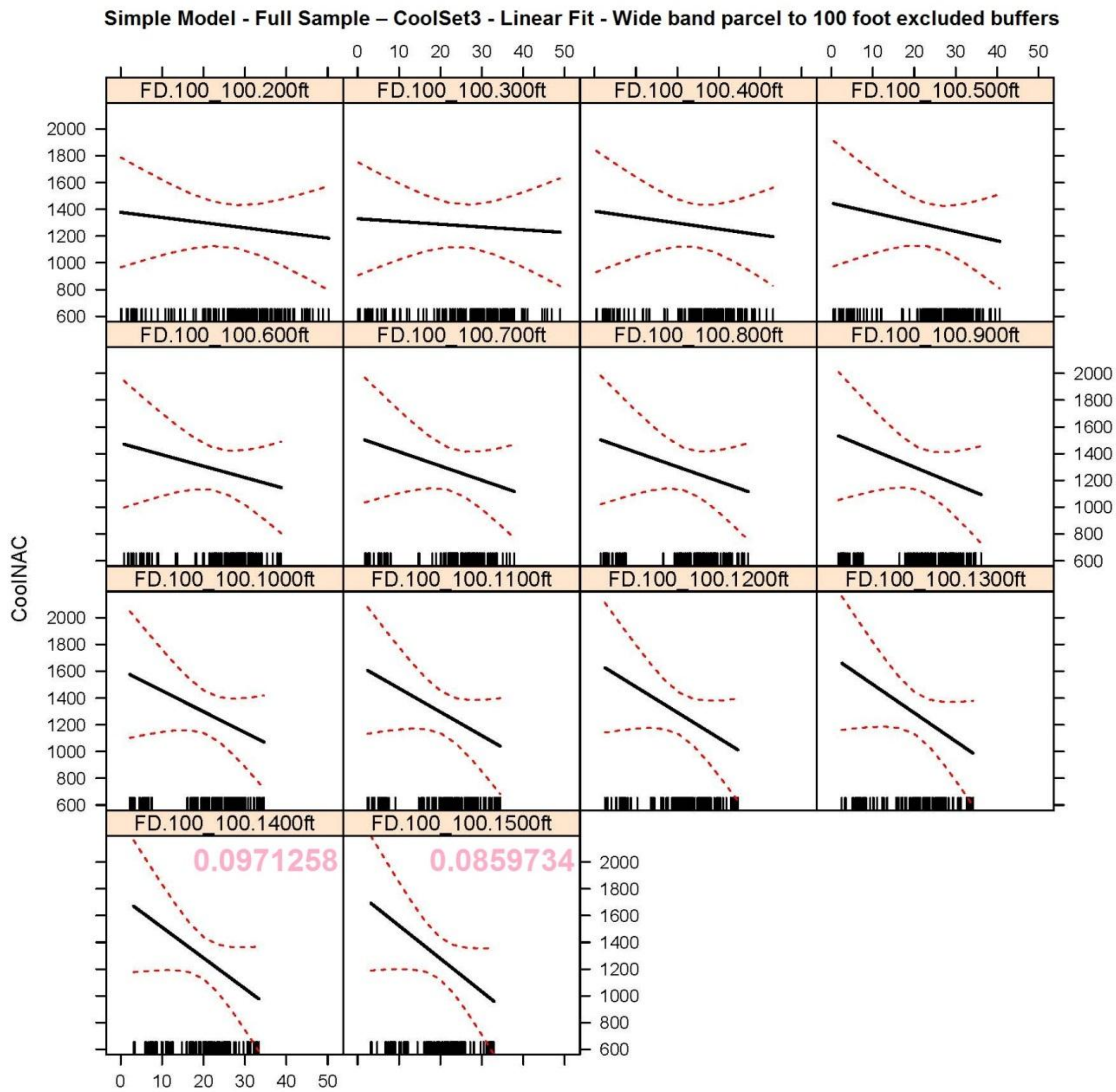

Figure 146. Wide band parcel to 100 foot excluded buffer effect plots for CoolSet3 with the Full Sample running the Simple Model.

CoolSet4

Covariate effect plots

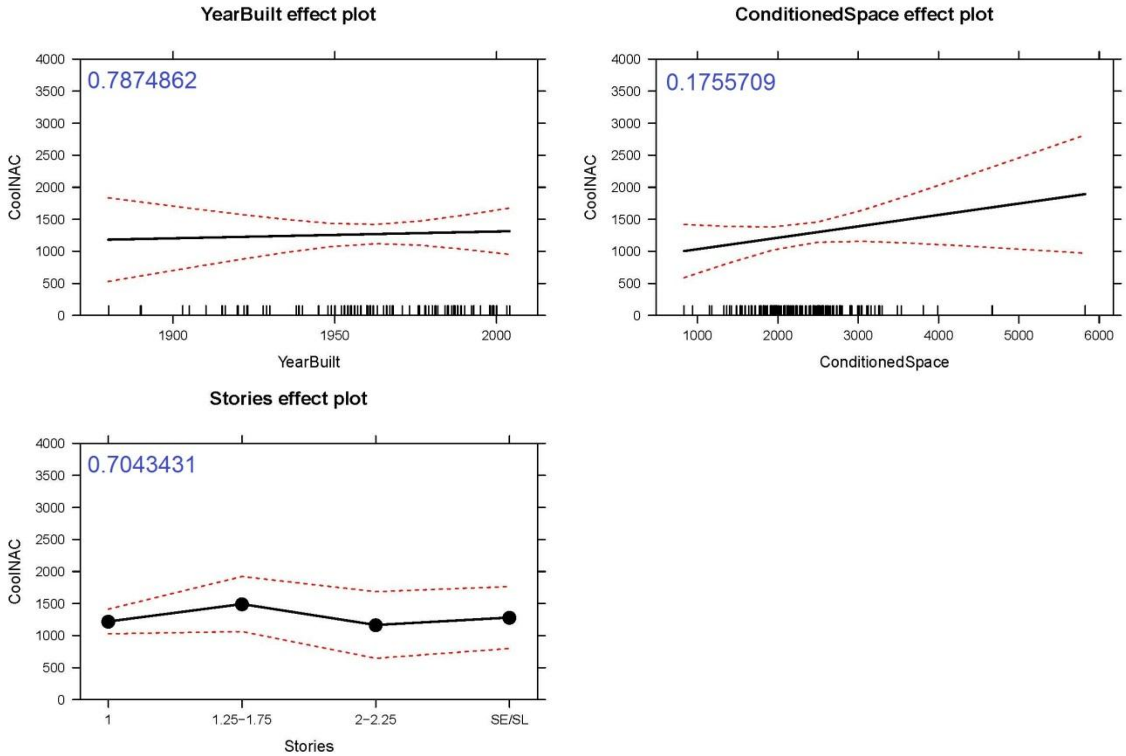

Figure 147. Covariate effect plots for CoolSet4 with the Full Sample running the Simple Model.

Comprehensive parcel buffer effect plots

None of the comprehensive parcel buffer effect plots for CoolSet4 with the Full Sample running the Simple Model were found to be significant.

Thin band parcel buffer effect plots

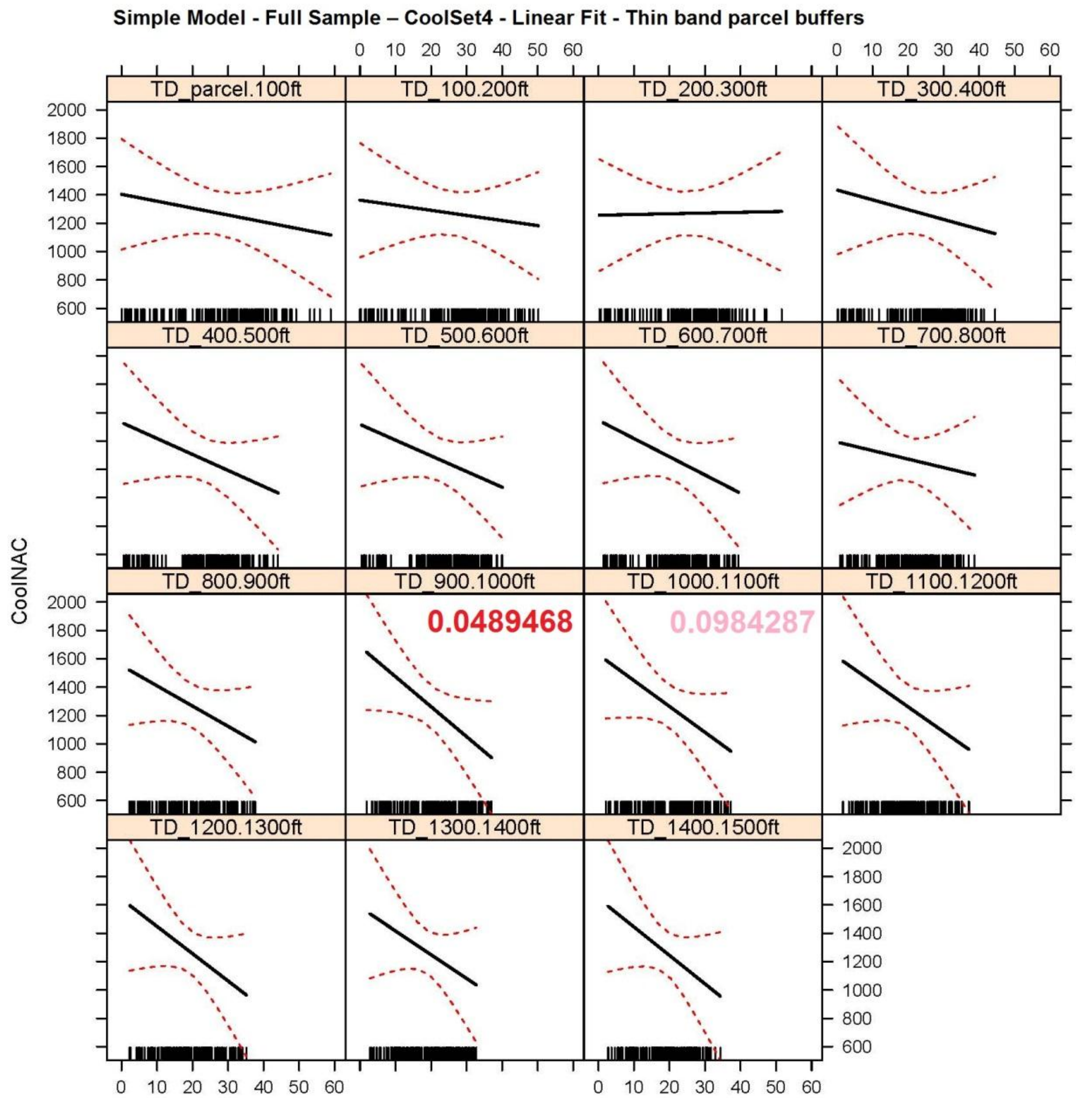

Figure 148. Thin band parcel buffer effect plots for CoolSet4 with the Full Sample running the Simple Model.

Wide band parcel excluded buffer effect plots

None of the wide band parcel excluded buffer effect plots for CoolSet4 with the Full Sample running the Simple Model were found to be significant.

Wide band parcel to 100 foot excluded buffer effect plots

None of the wide band parcel to 100 foot excluded buffer effect plots for CoolSet4 with the Full Sample running the Simple Model were found to be significant.

Full Model - Reduced Sample

CoolSet1

Covariate effect plots

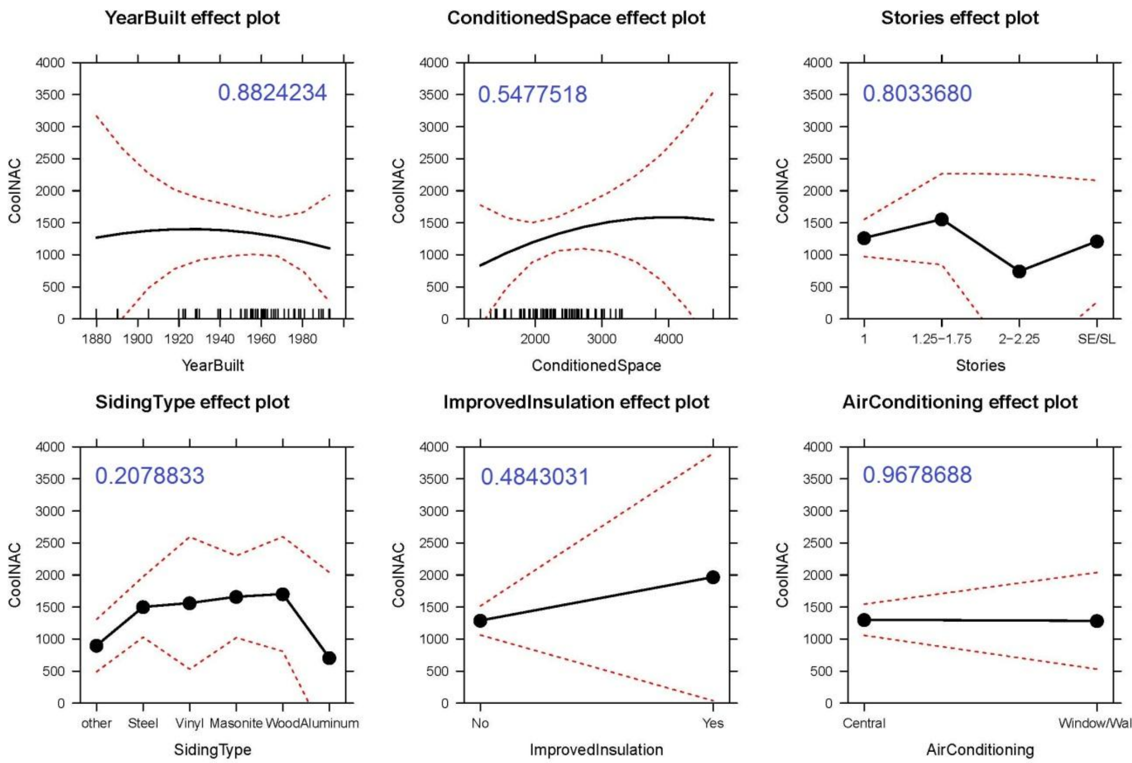

Figure 149. Covariate effect plots for CoolSet1 with the Reduced Sample running the Full Model.

Comprehensive parcel buffer effect plots

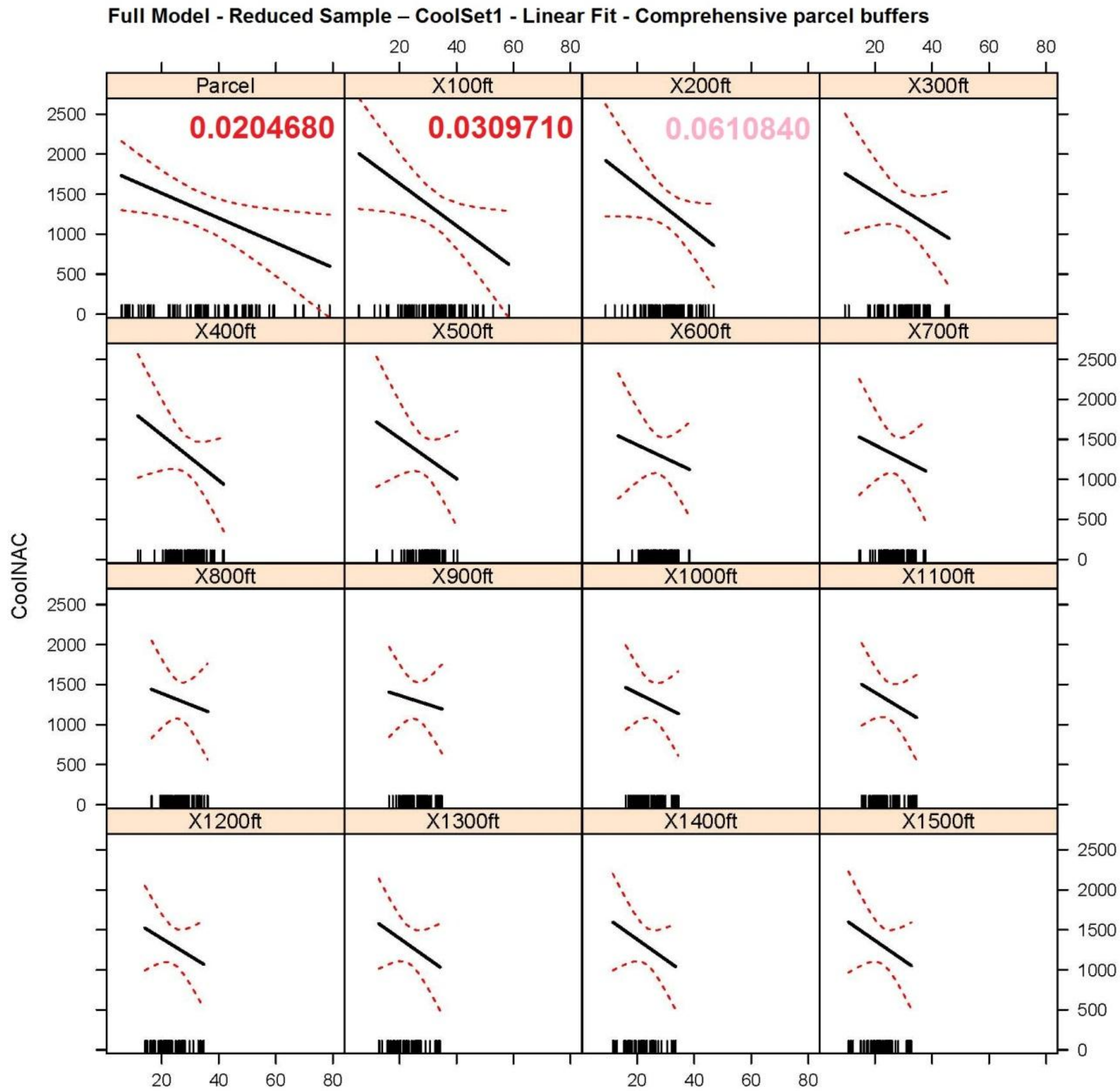

Figure 150. Comprehensive parcel buffer effect plots for CoolSet1 with the Reduced Sample running the Full Model.

Thin band parcel buffer effect plots

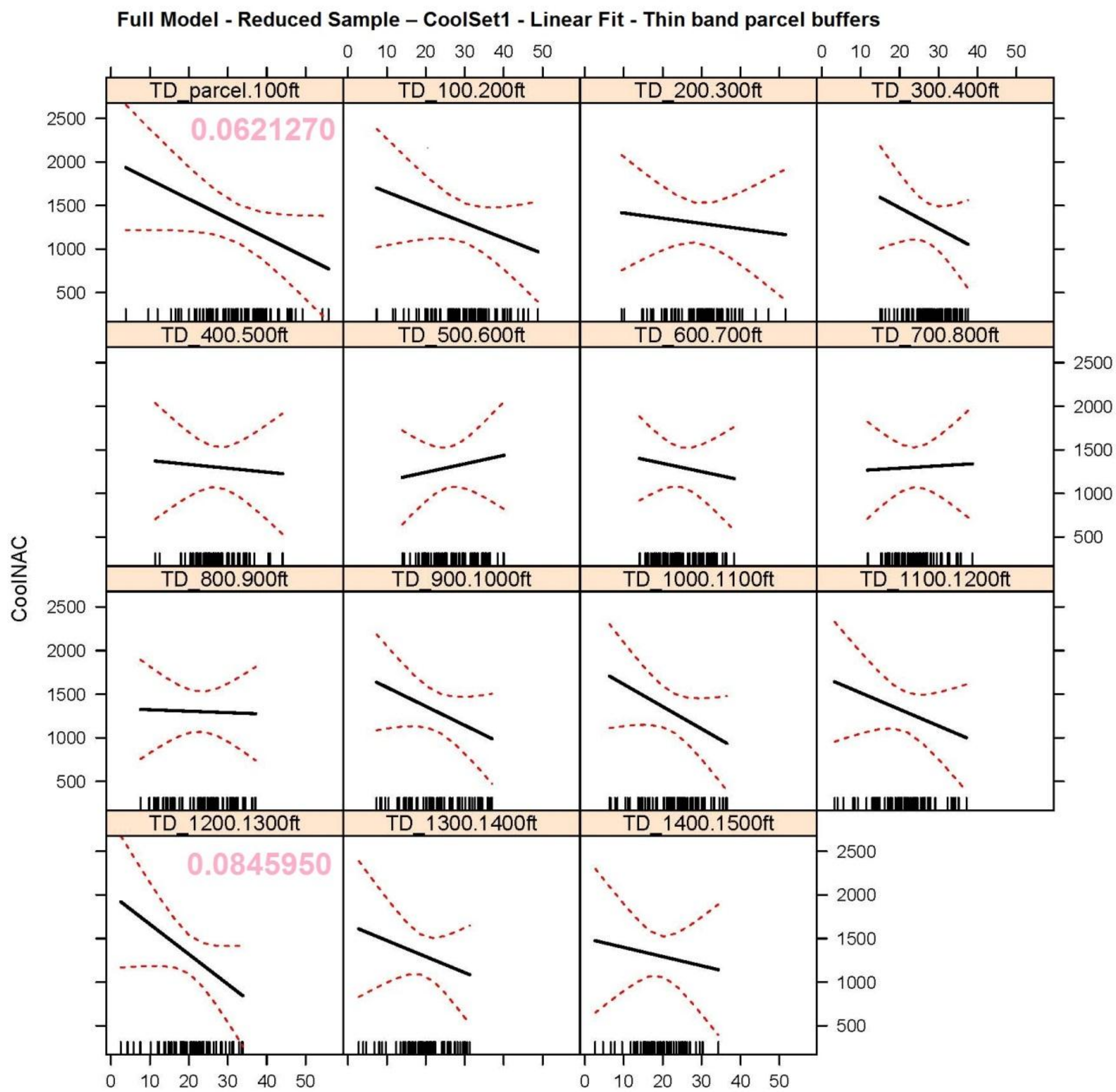

Figure 151. Thin band parcel buffer effect plots for CoolSet1 with the Reduced Sample running the Full Model.

Wide band parcel excluded buffer effect plots

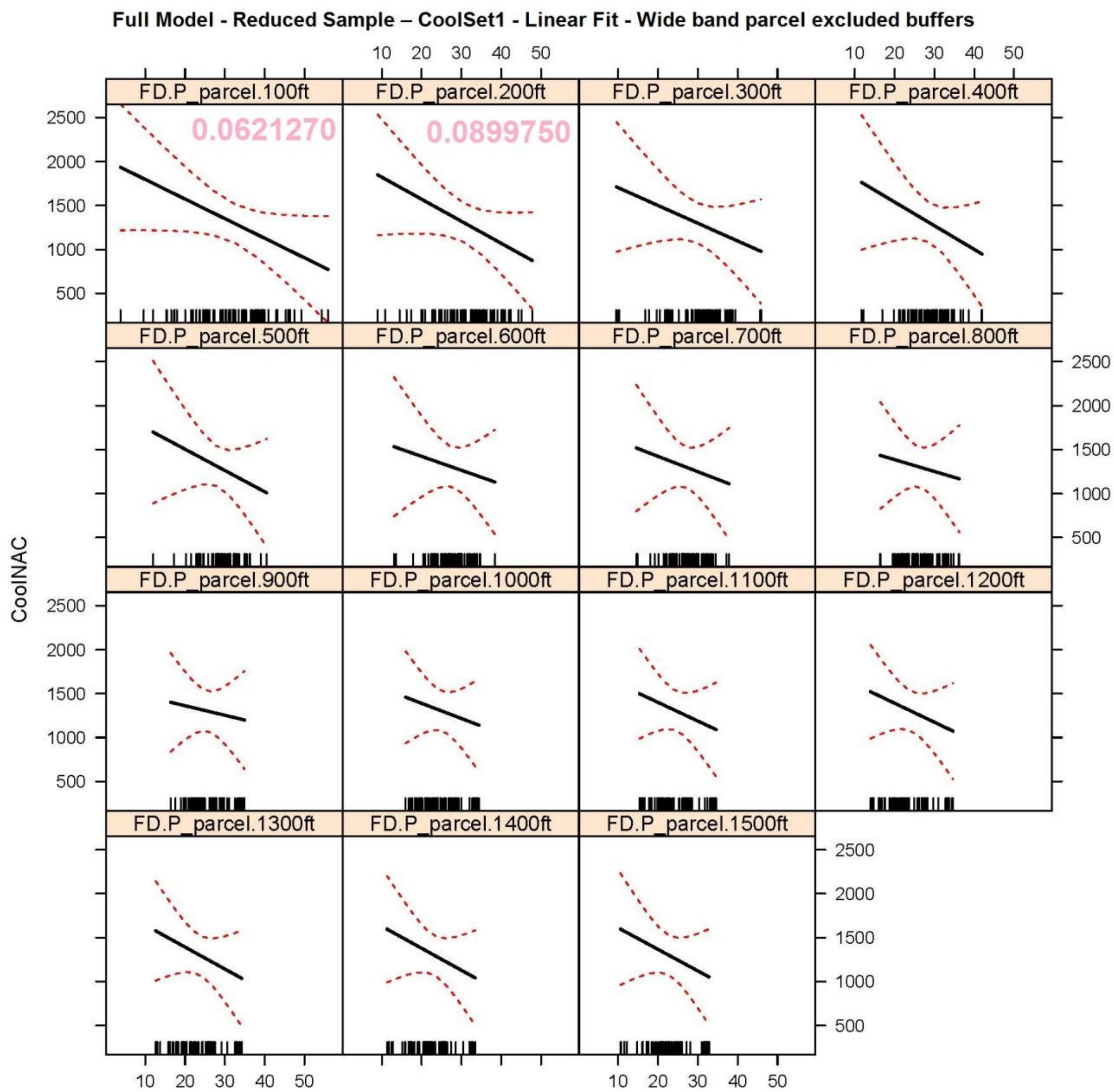

Figure 152. Wide band parcel excluded buffer effect plots for CoolSet1 with the Reduced Sample running the Full Model.

Wide band parcel to 100 foot excluded buffer effect plots

None of the wide band parcel to 100 foot excluded buffer effect plots for CoolSet1 with the Reduced Sample running the Full Model were found to be significant.

CoolSet2

Covariate effect plots

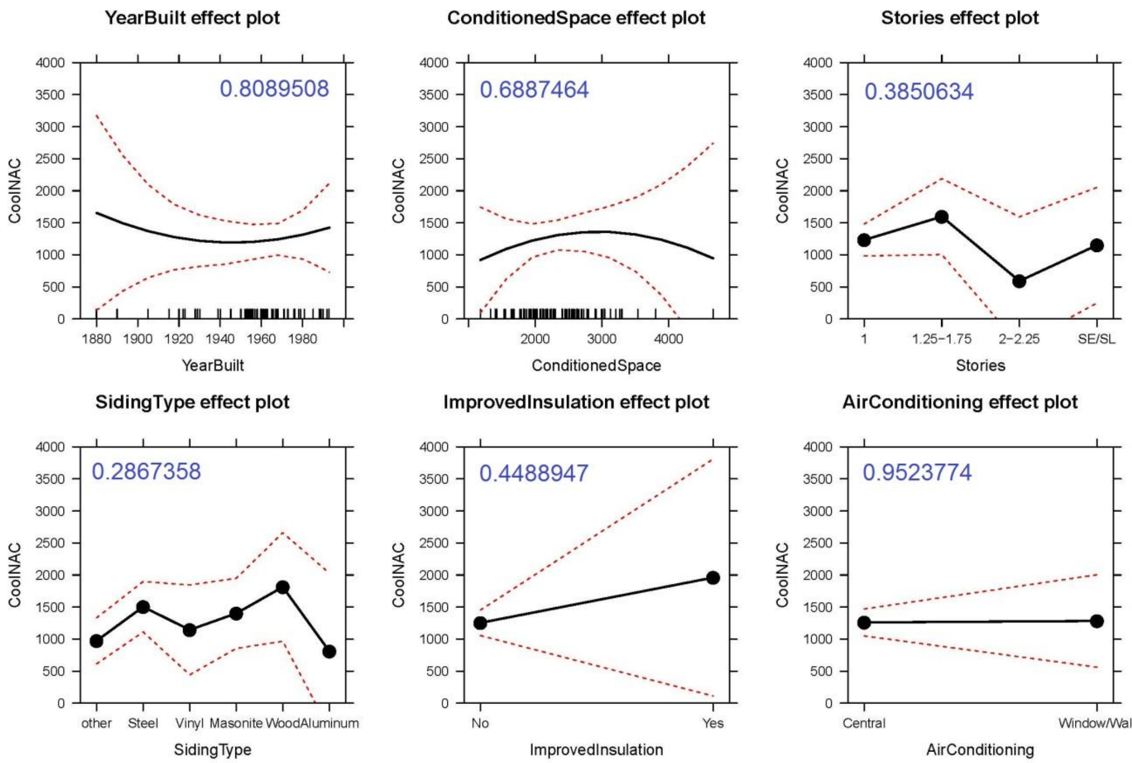

Figure 153. Covariate effect plots for CoolSet2 with the Reduced Sample running the Full Model.

Comprehensive parcel buffer effect plots

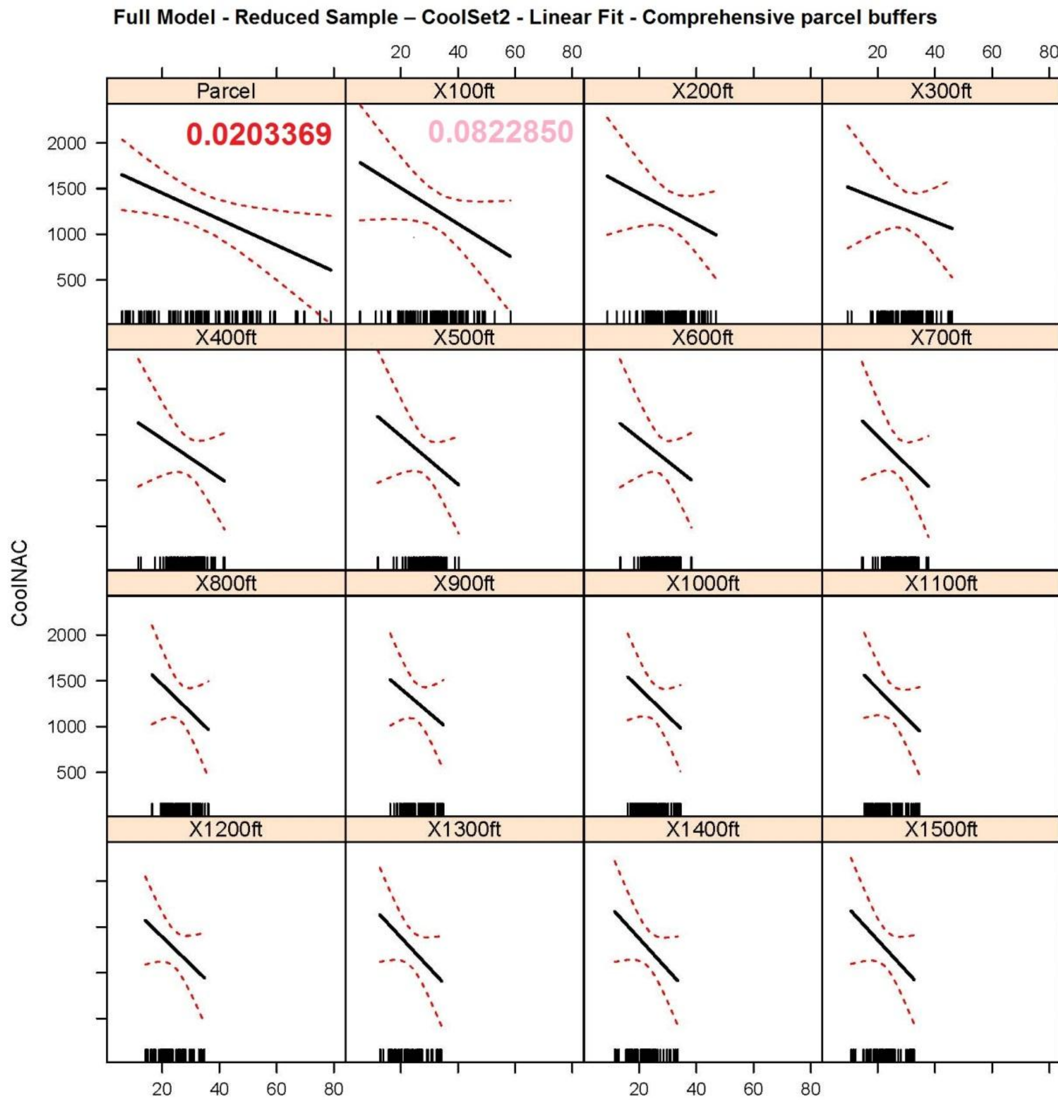

Figure 154. Comprehensive parcel buffer effect plots for CoolSet2 with the Reduced Sample running the Full Model.

Thin band parcel buffer effect plots

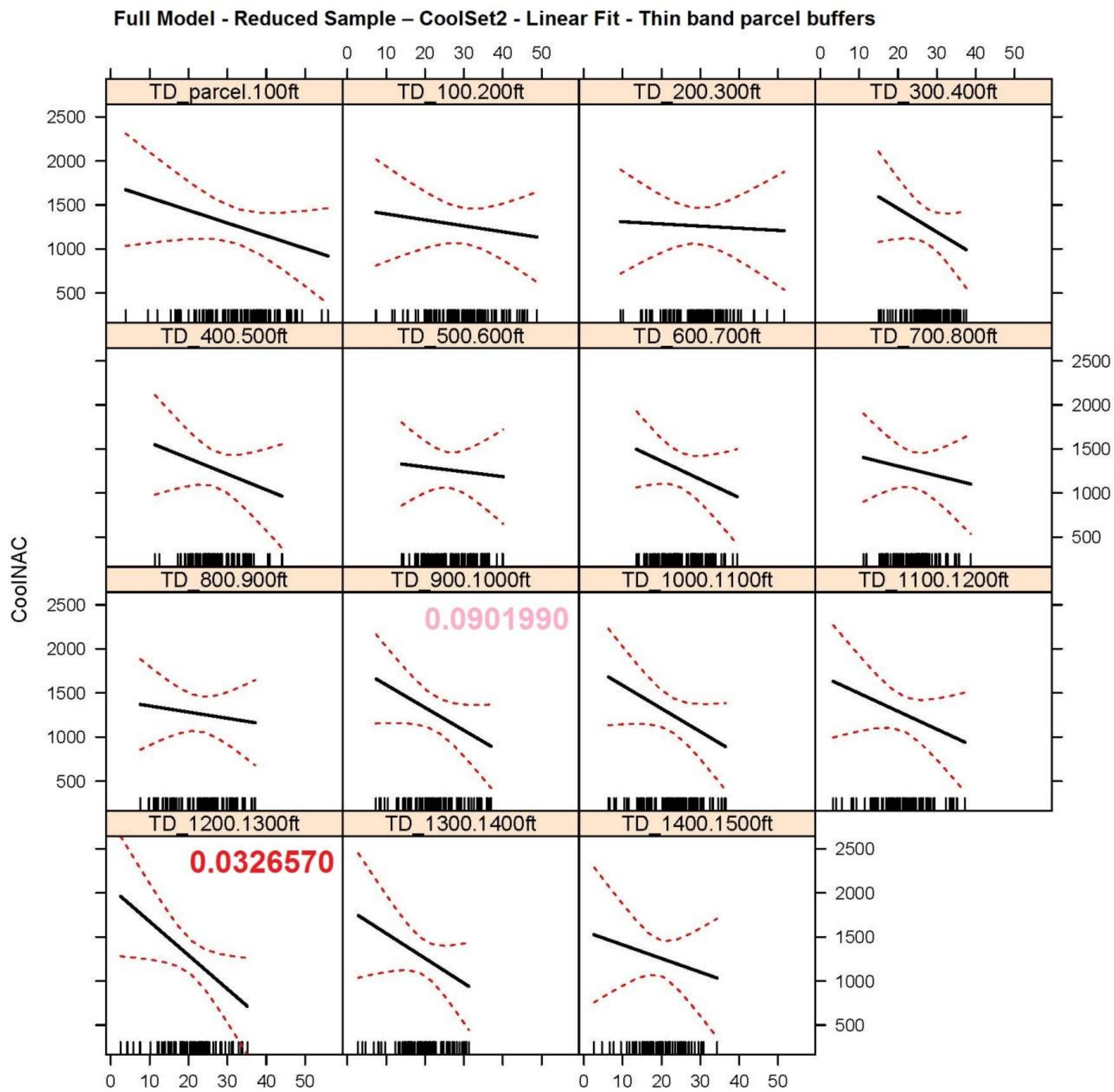

Figure 155. Thin band parcel buffer effect plots for CoolSet2 with the Reduced Sample running the Full Model.

Wide band parcel excluded buffer effect plots

None of the wide band parcel excluded buffer effect plots for CoolSet2 with the Reduced Sample running the Full Model were found to be significant.

Wide band parcel to 100 foot excluded buffer effect plots

None of the wide band parcel to 100 foot excluded buffer effect plots for CoolSet2 with the Reduced Sample running the Full Model were found to be significant.

CoolSet3

Covariate effect plots

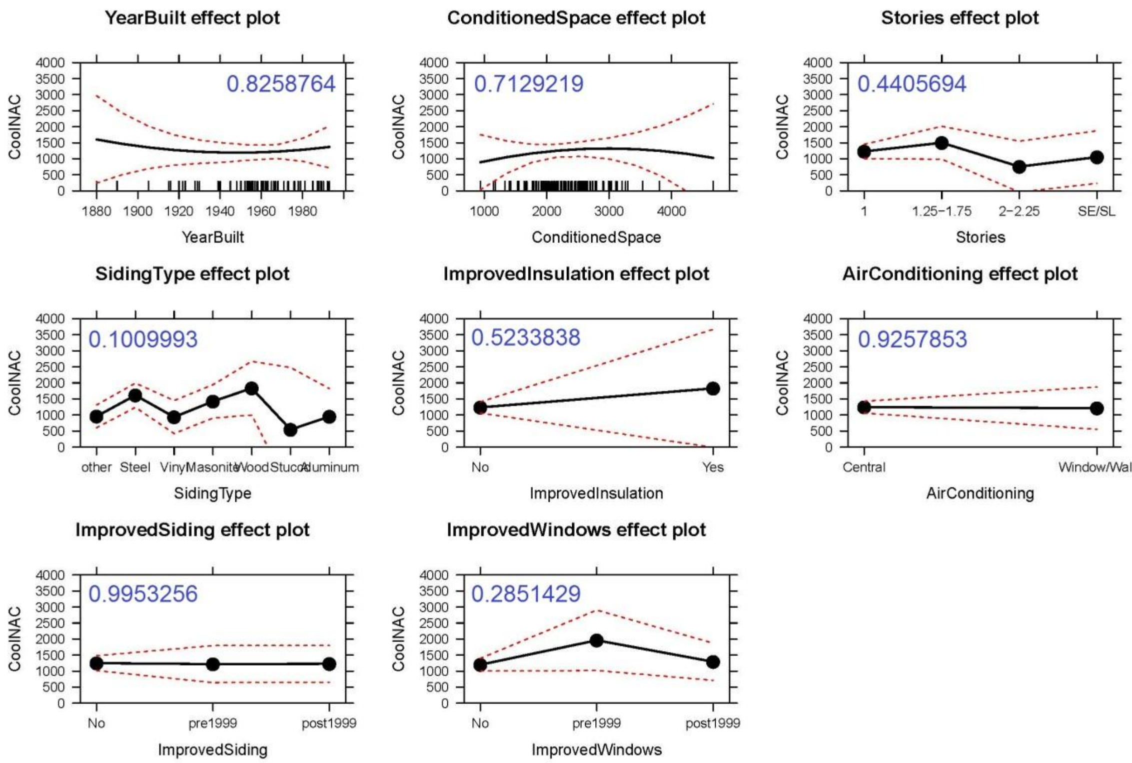

Figure 156. Covariate effect plots for CoolSet3 with the Reduced Sample running the Full Model.

Comprehensive parcel buffer effect plots

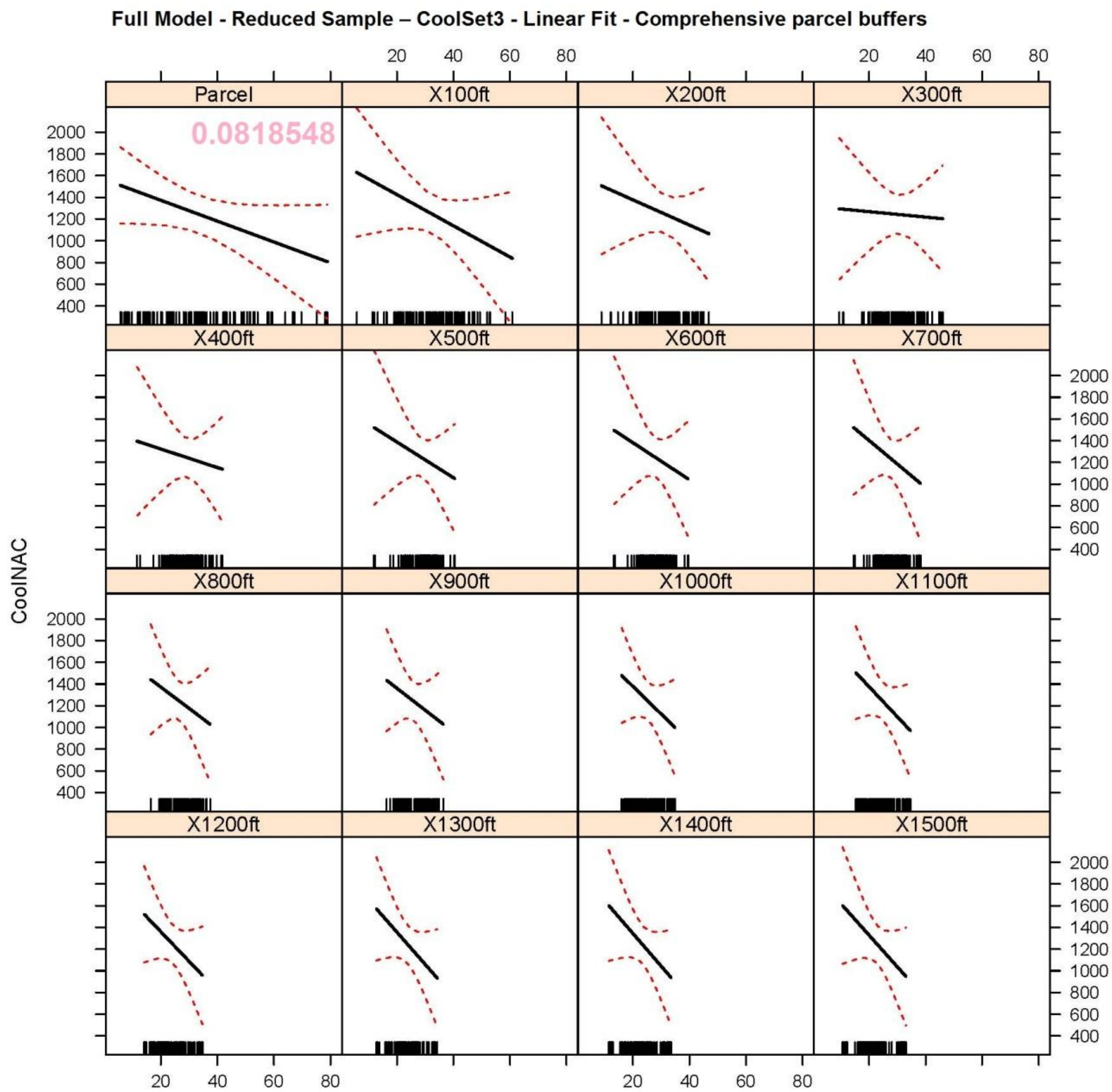

Figure 157. Comprehensive parcel buffer effect plots for CoolSet3 with the Reduced Sample running the Full Model.

Thin band parcel buffer effect plots

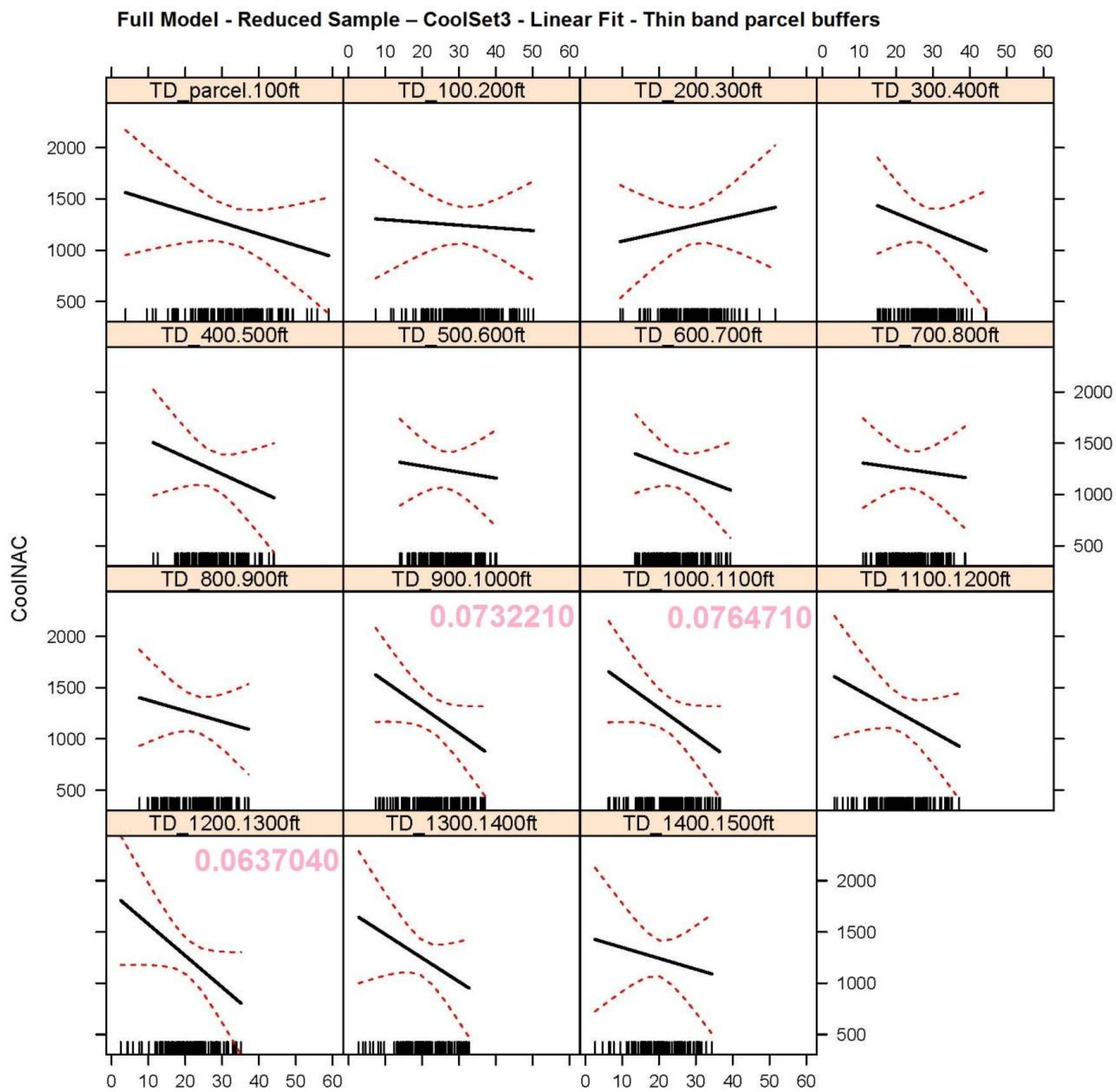

Figure 158. Thin band parcel buffer effect plots for CoolSet3 with the Reduced Sample running the Full Model.

Wide band parcel excluded buffer effect plots

None of the wide band parcel excluded buffer effect plots for CoolSet3 with the Reduced Sample running the Full Model were found to be significant.

Wide band parcel to 100 foot excluded buffer effect plots

None of the wide band parcel to 100 foot excluded buffer effect plots for CoolSet3 with the Reduced Sample running the Full Model were found to be significant.

CoolSet4

Covariate effect plots

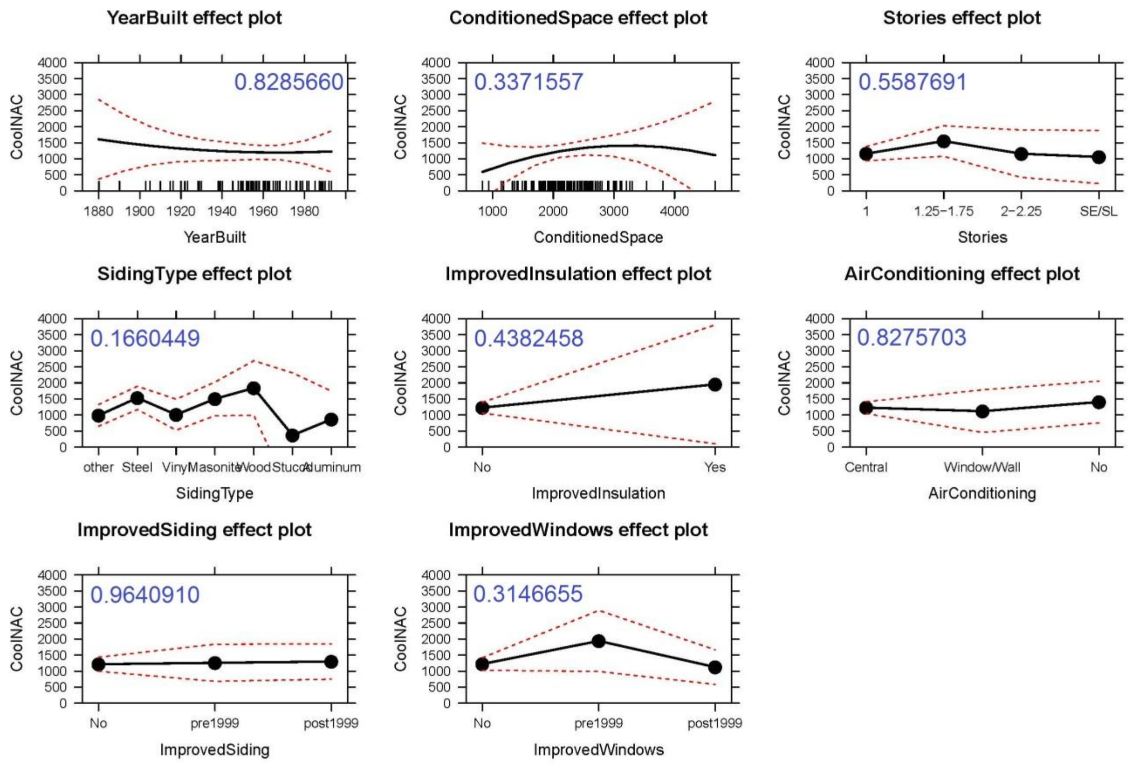

Figure 159. Covariate effect plots for CoolSet4 with the Reduced Sample running the Full Model.

Comprehensive parcel buffer effect plots

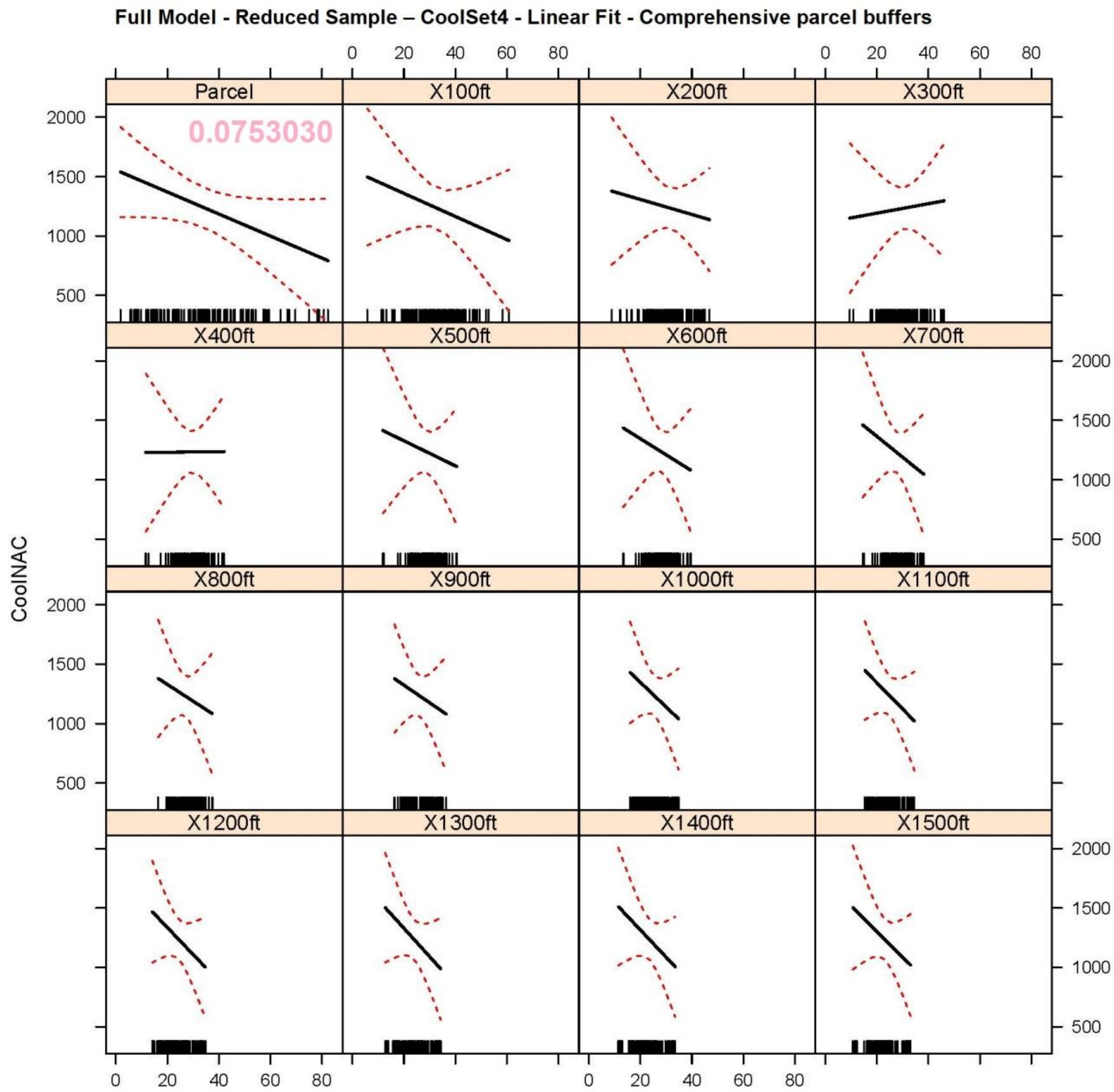

Figure 160. Comprehensive parcel buffer effect plots for CoolSet4 with the Reduced Sample running the Full Model.

Thin band parcel buffer effect plots

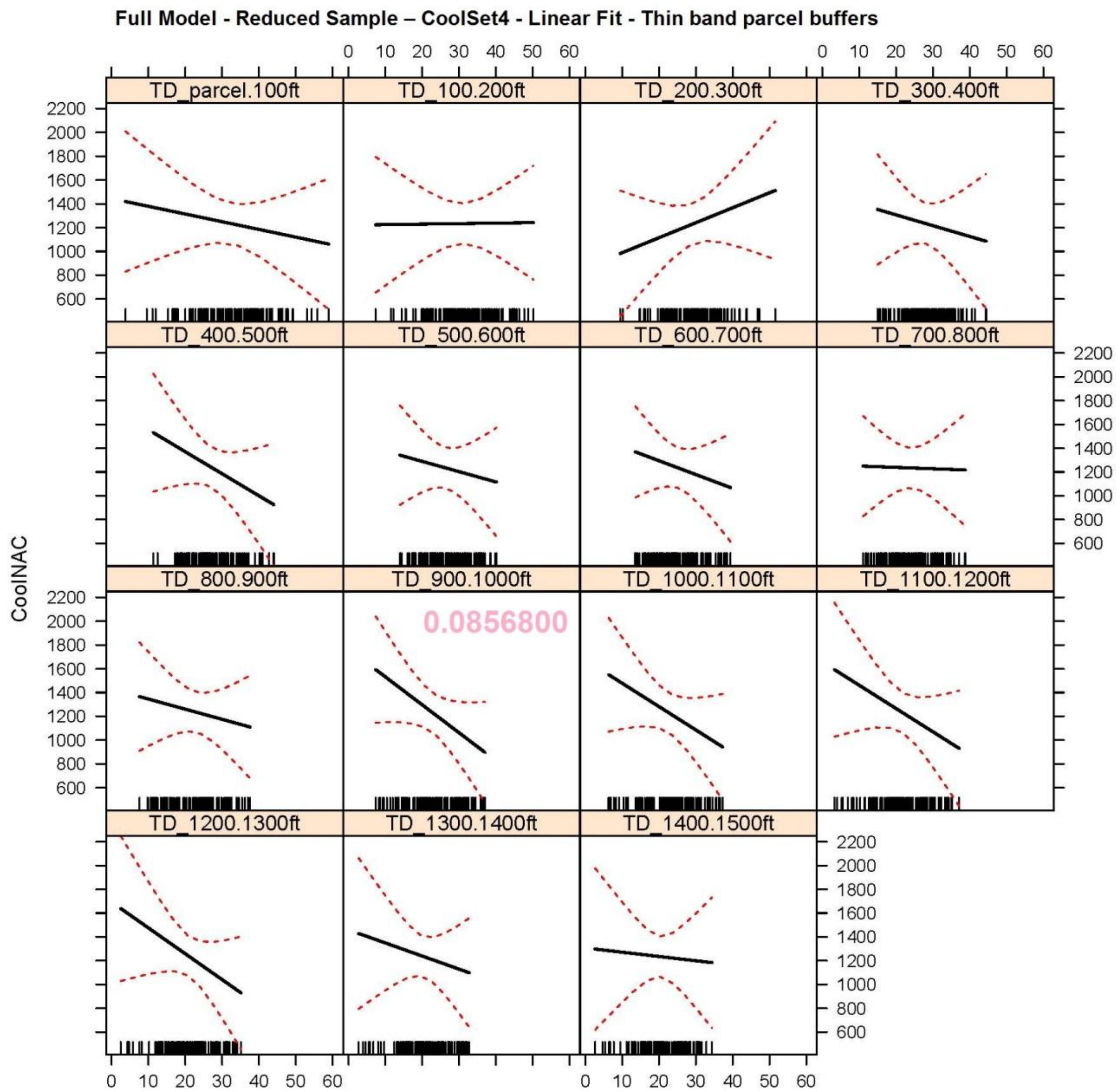

Figure 161. Thin band parcel buffer effect plots for CoolSet4 with the Reduced Sample running the Full Model.

Wide band parcel excluded buffer effect plots

None of the wide band parcel excluded buffer effect plots for CoolSet4 with the Reduced Sample running the Full Model were found to be significant.

Wide band parcel to 100 foot excluded buffer effect plots

None of the wide band parcel to 100 foot excluded buffer effect plots for CoolSet4 with the Reduced Sample running the Full Model were found to be significant.

Simple Model - Reduced Sample

CoolSet1

Covariate effect plots

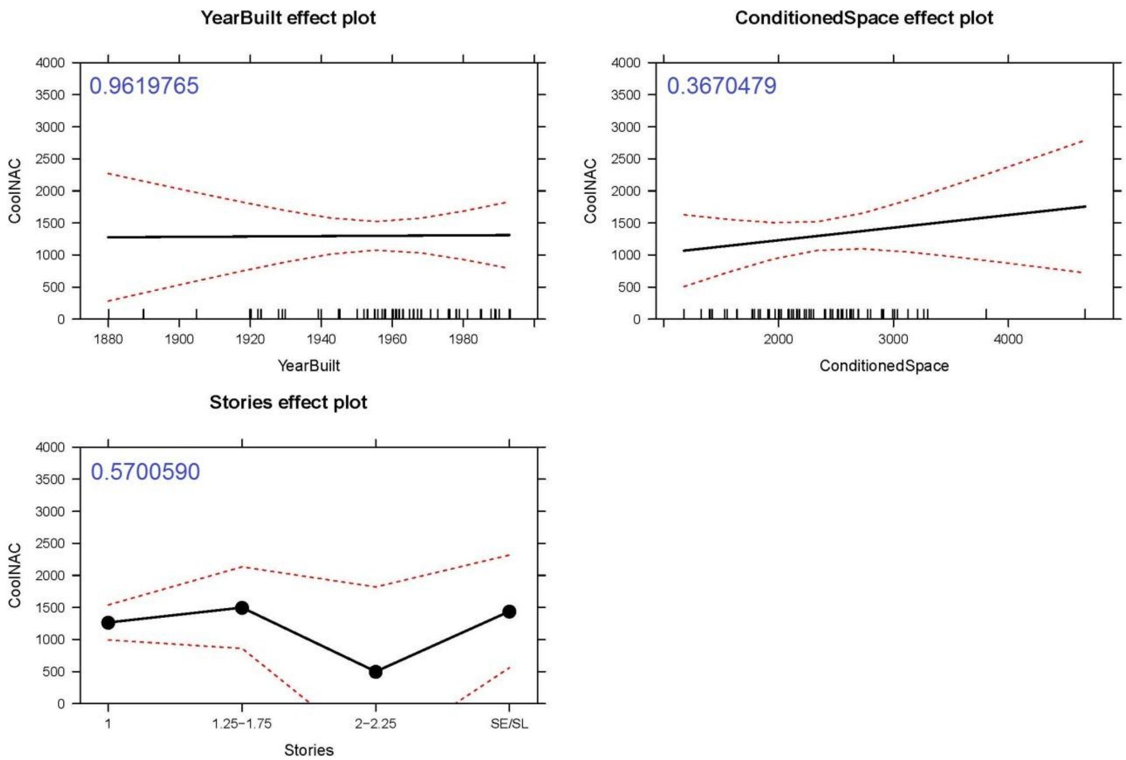

Figure 162. Covariate effect plots for CoolSet1 with the Reduced Sample running the Simple Model.

Comprehensive parcel buffer effect plots

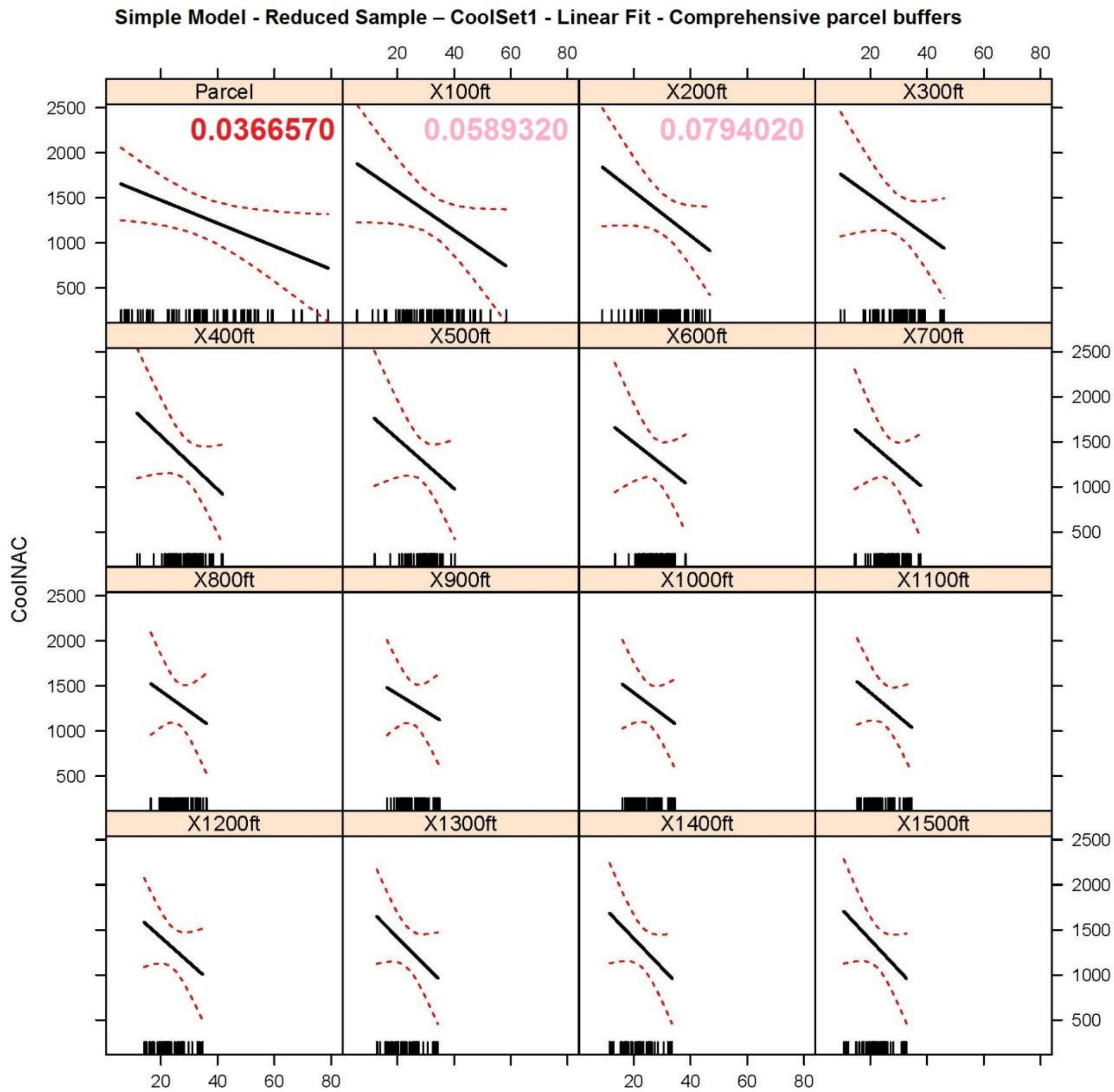

Figure 163. Comprehensive parcel buffer effect plots for CoolSet1 with the Reduced Sample running the Simple Model.

Thin band parcel buffer effect plots

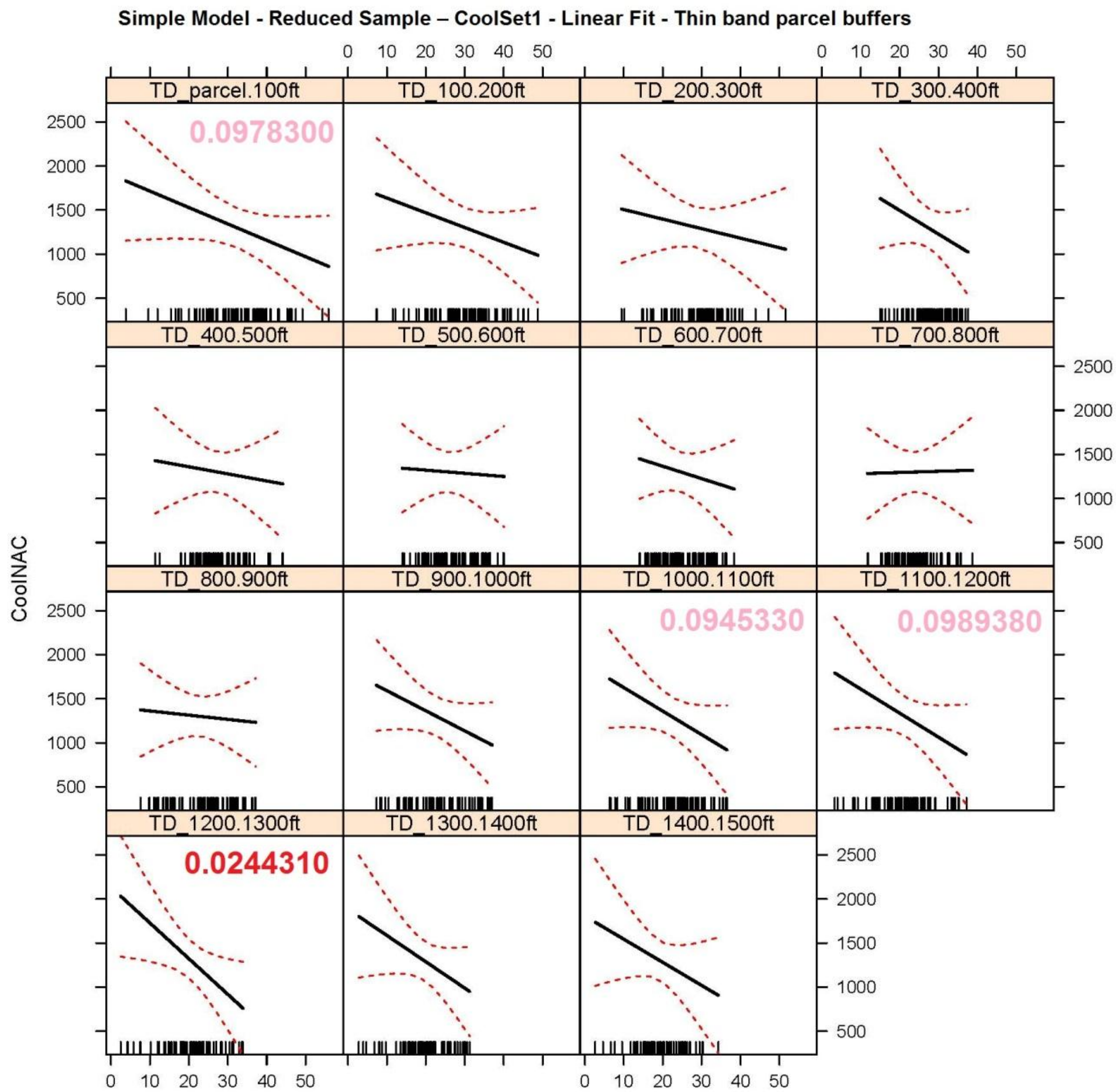

Figure 164. Thin band parcel buffer effect plots for CoolSet1 with the Reduced Sample running the Simple Model.

Wide band parcel excluded buffer effect plots

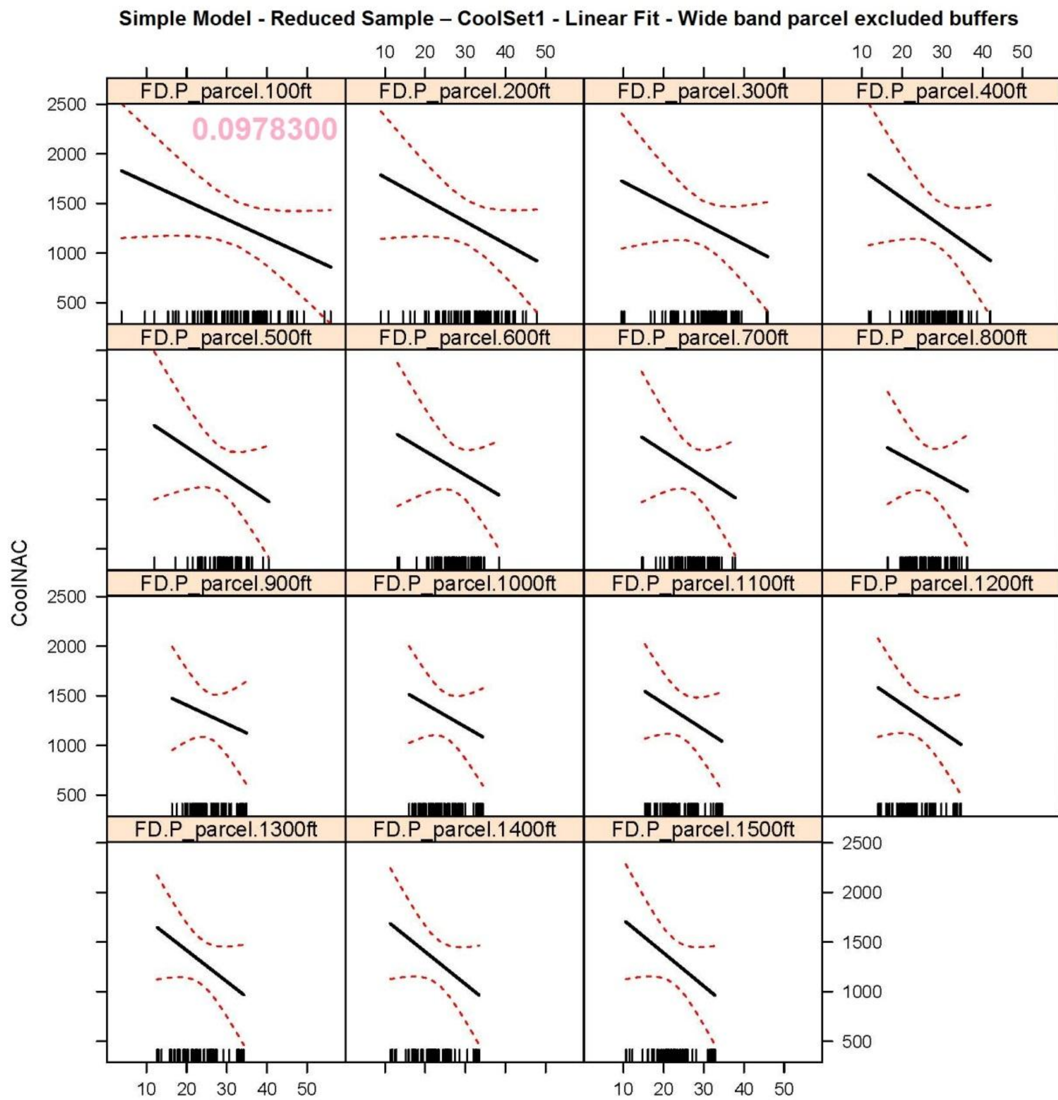

Figure 165. Wide band parcel excluded buffer effect plots for CoolSet1 with the Reduced Sample running the Simple Model.

Wide band parcel to 100 foot excluded buffer effect plots

None of the wide band parcel to 100 foot excluded buffer effect plots for CoolSet1 with the Reduced Sample running the Simple Model were found to be significant.

CoolSet2

Covariate effect plots

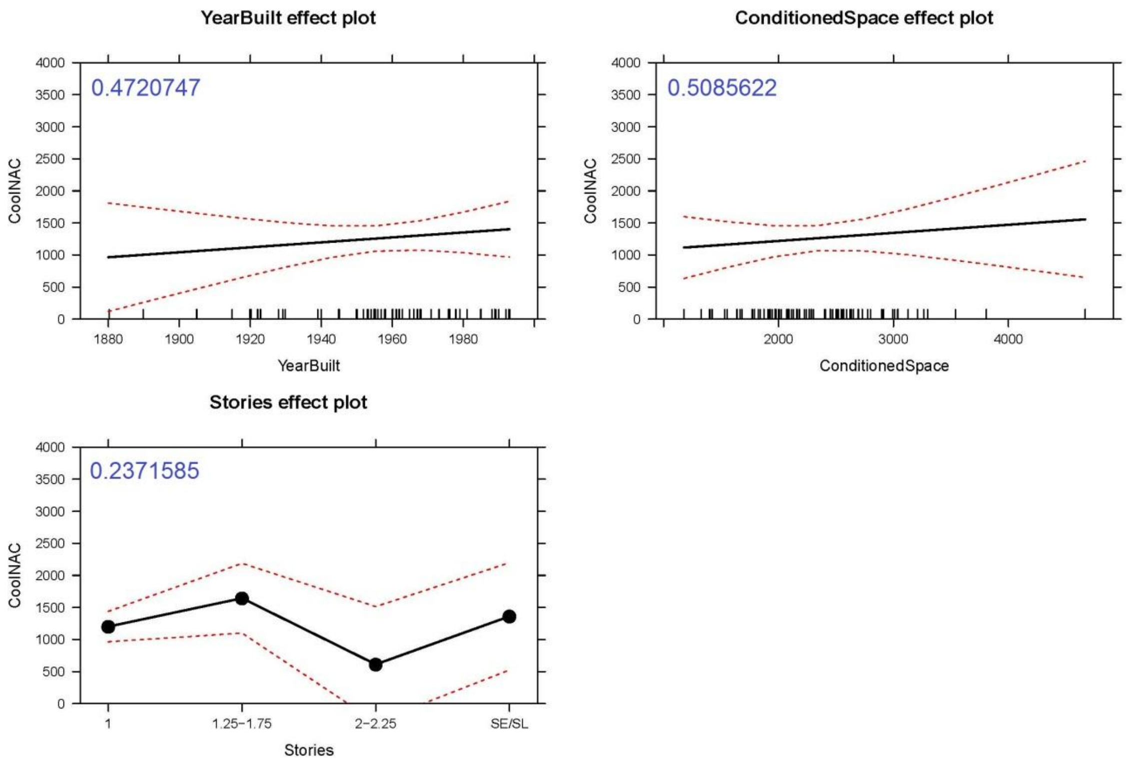

Figure 166. Covariate effect plots for CoolSet2 with the Reduced Sample running the Simple Model.

Comprehensive parcel buffer effect plots

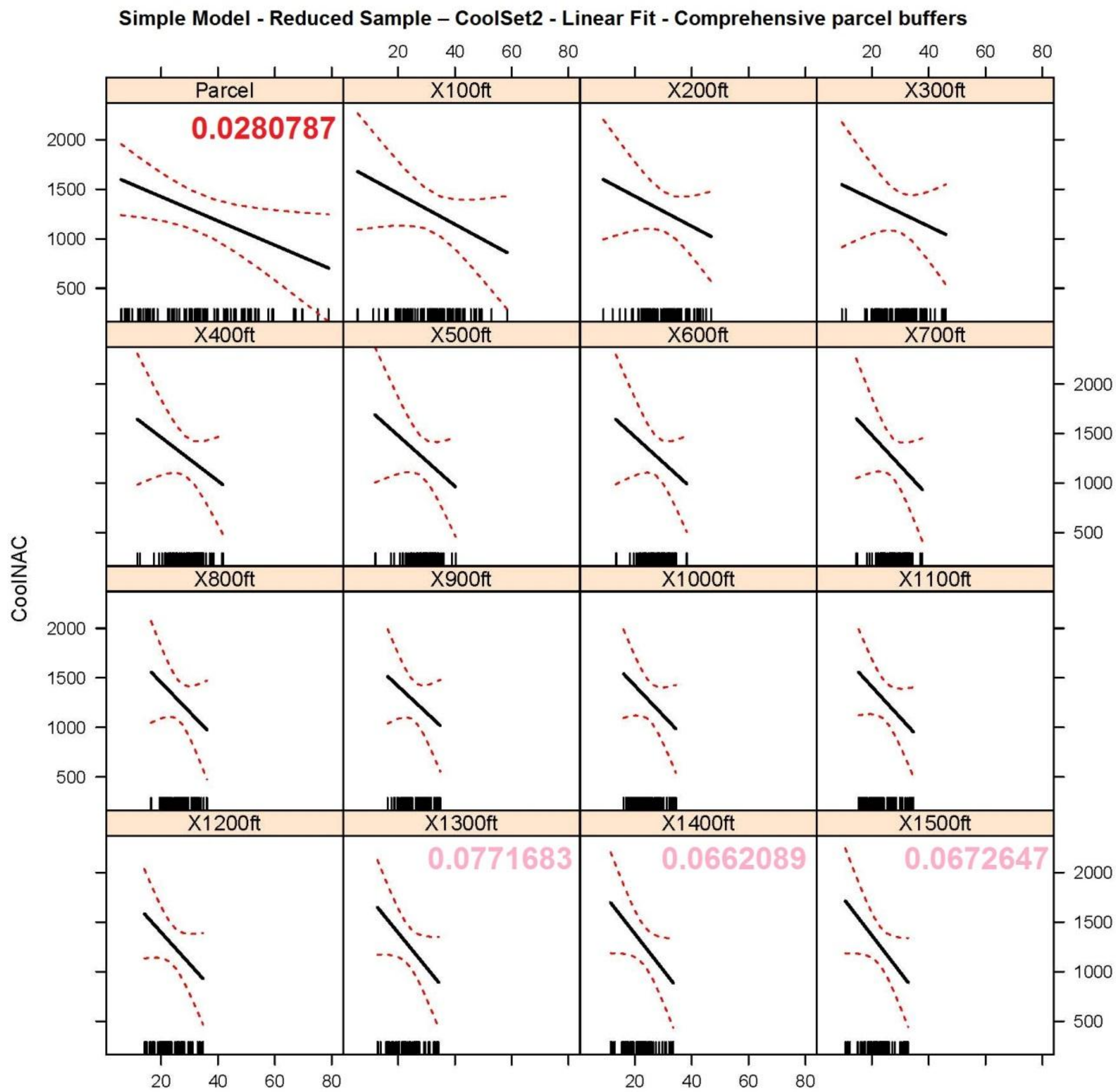

Figure 167. Comprehensive parcel buffer effect plots for CoolSet2 with the Reduced Sample running the Simple Model.

Thin band parcel buffer effect plots

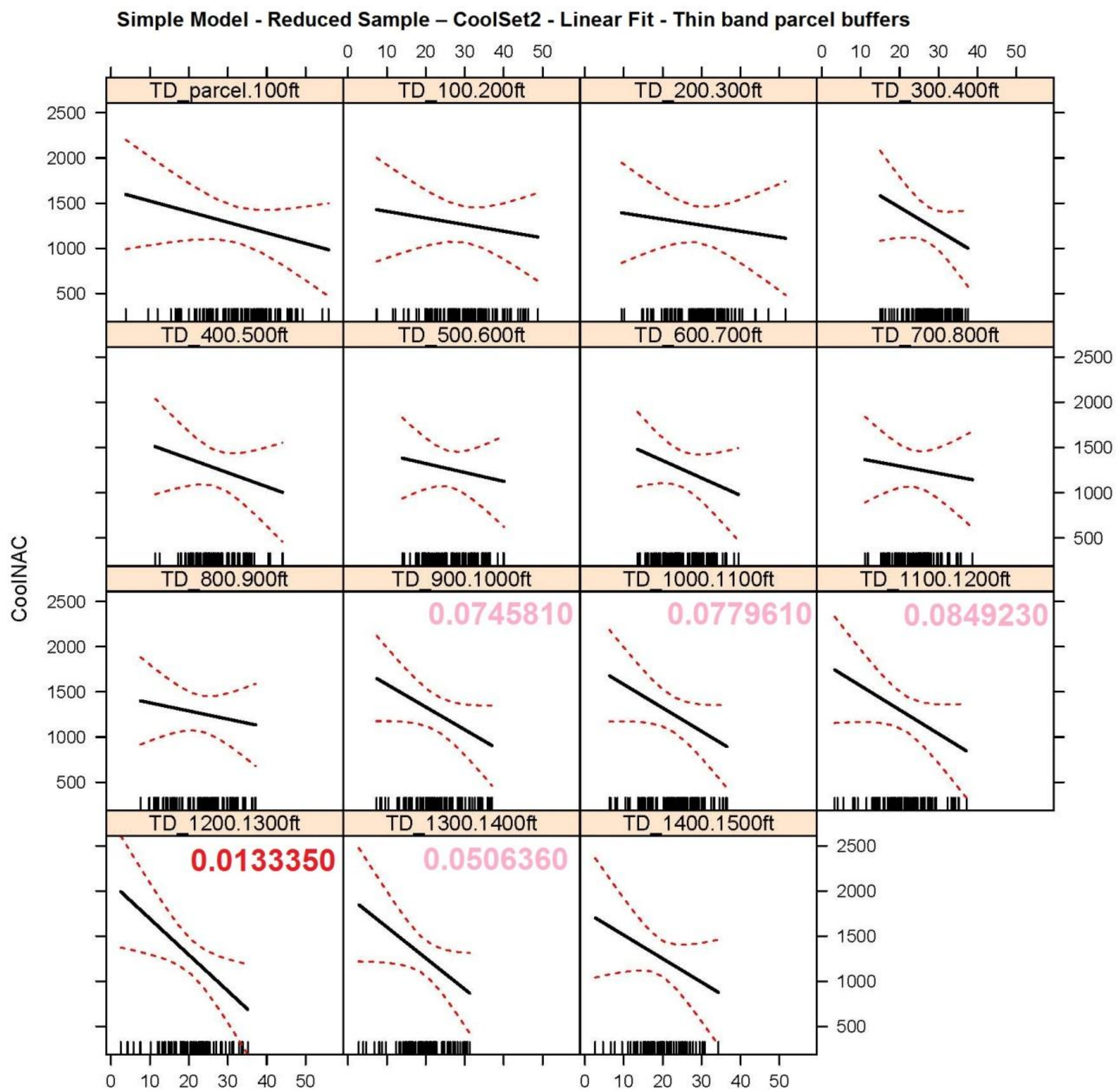

Figure 168. Thin band parcel buffer effect plots for CoolSet2 with the Reduced Sample running the Simple Model.

Wide band parcel excluded buffer effect plots

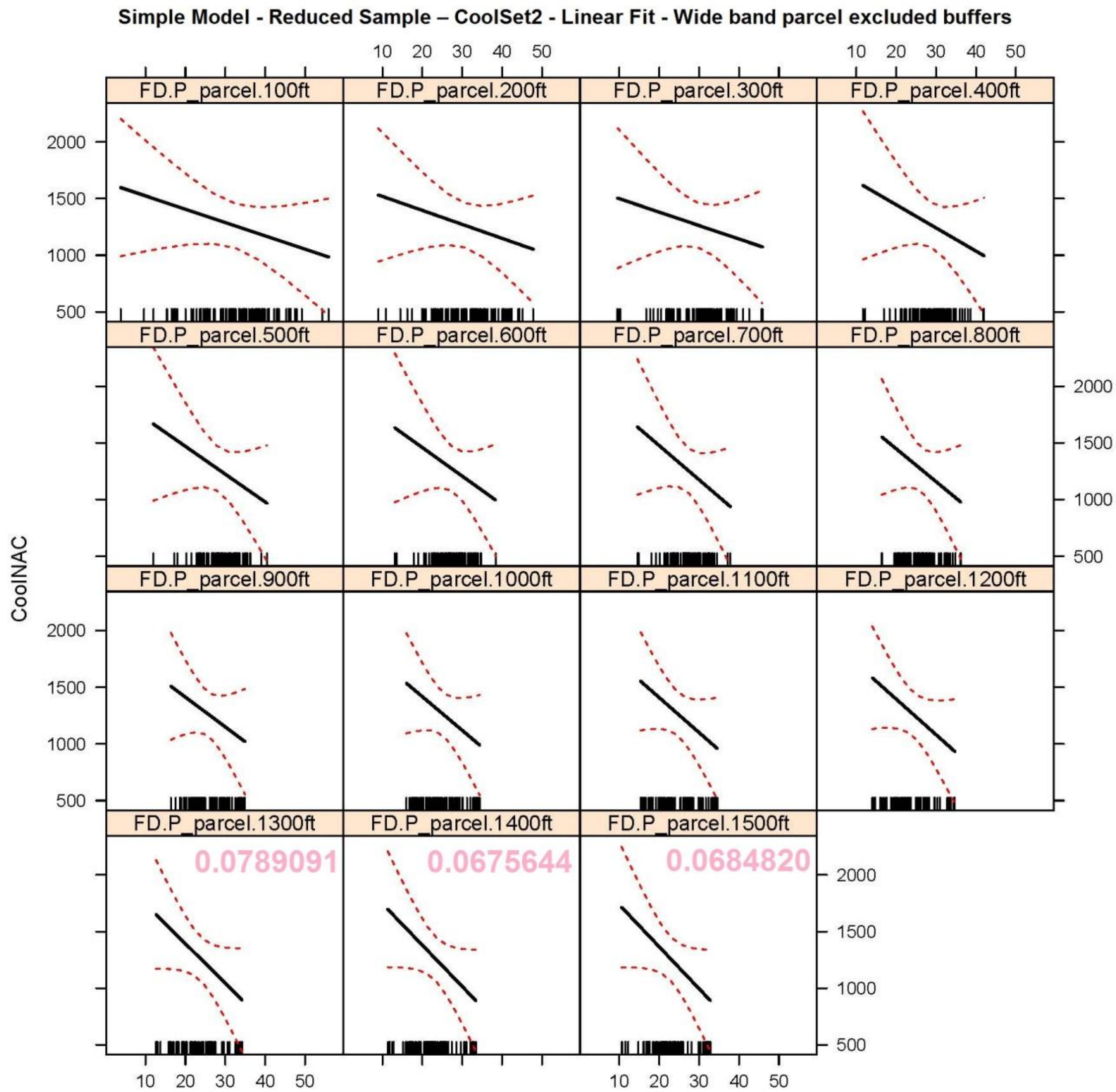

Figure 169. Wide band parcel excluded buffer effect plots for CoolSet2 with the Reduced Sample running the Simple Model.

Wide band parcel to 100 foot excluded buffer effect plots

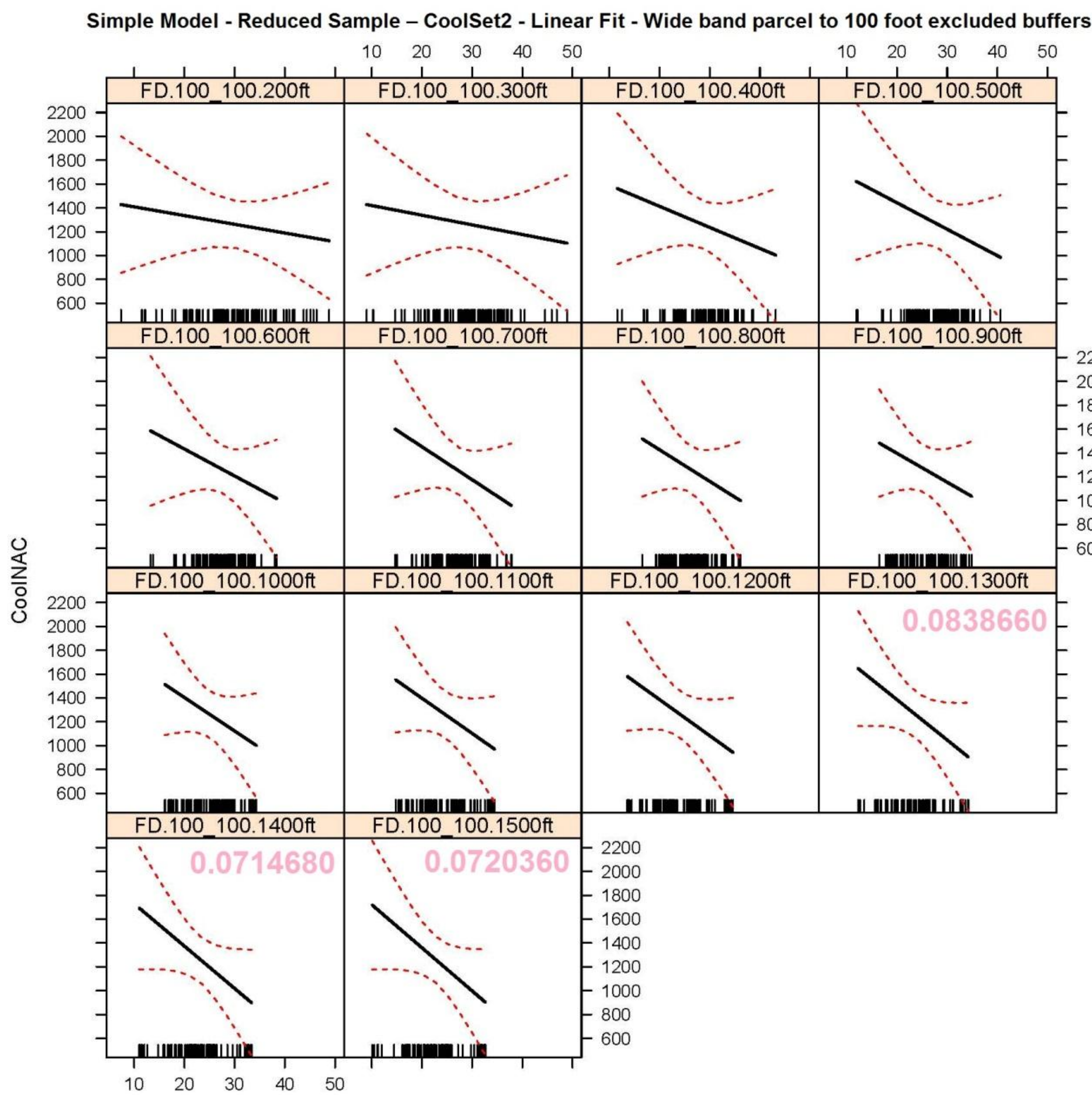

Figure 170. Wide band parcel to 100 foot excluded buffer effect plots for CoolSet2 with the Reduced Sample running the Simple Model.

CoolSet3

Covariate effect plots

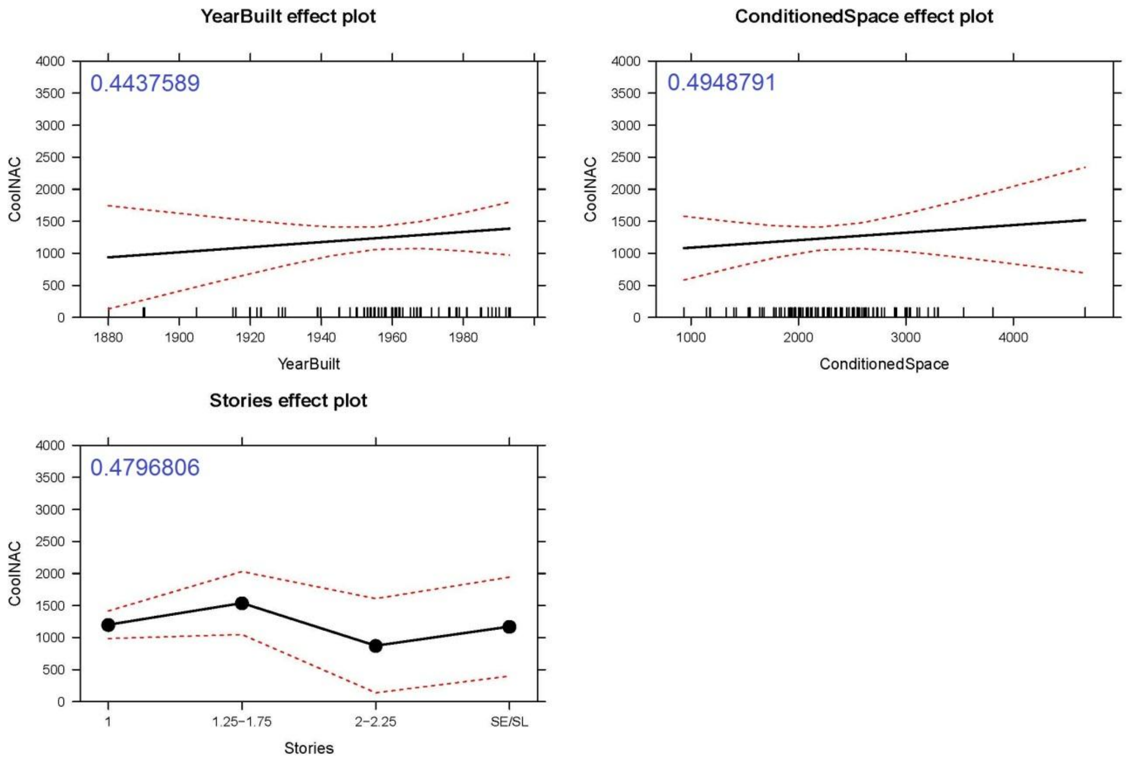

Figure 171. Covariate effect plots for CoolSet3 with the Reduced Sample running the Simple Model.

Comprehensive parcel buffer effect plots

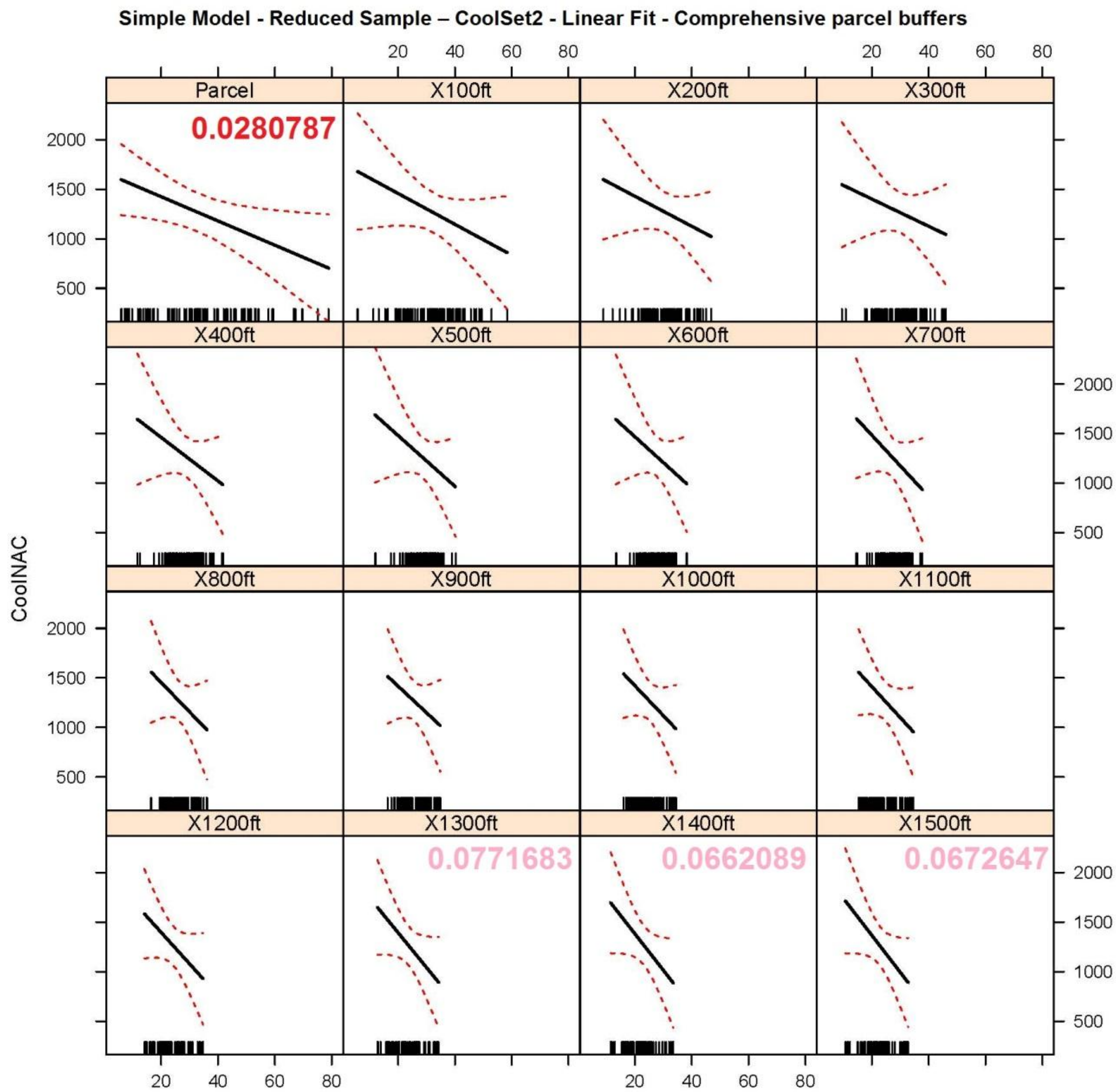

Figure 172. Comprehensive parcel buffer effect plots for CoolSet3 with the Reduced Sample running the Simple Model.

Thin band parcel buffer effect plots

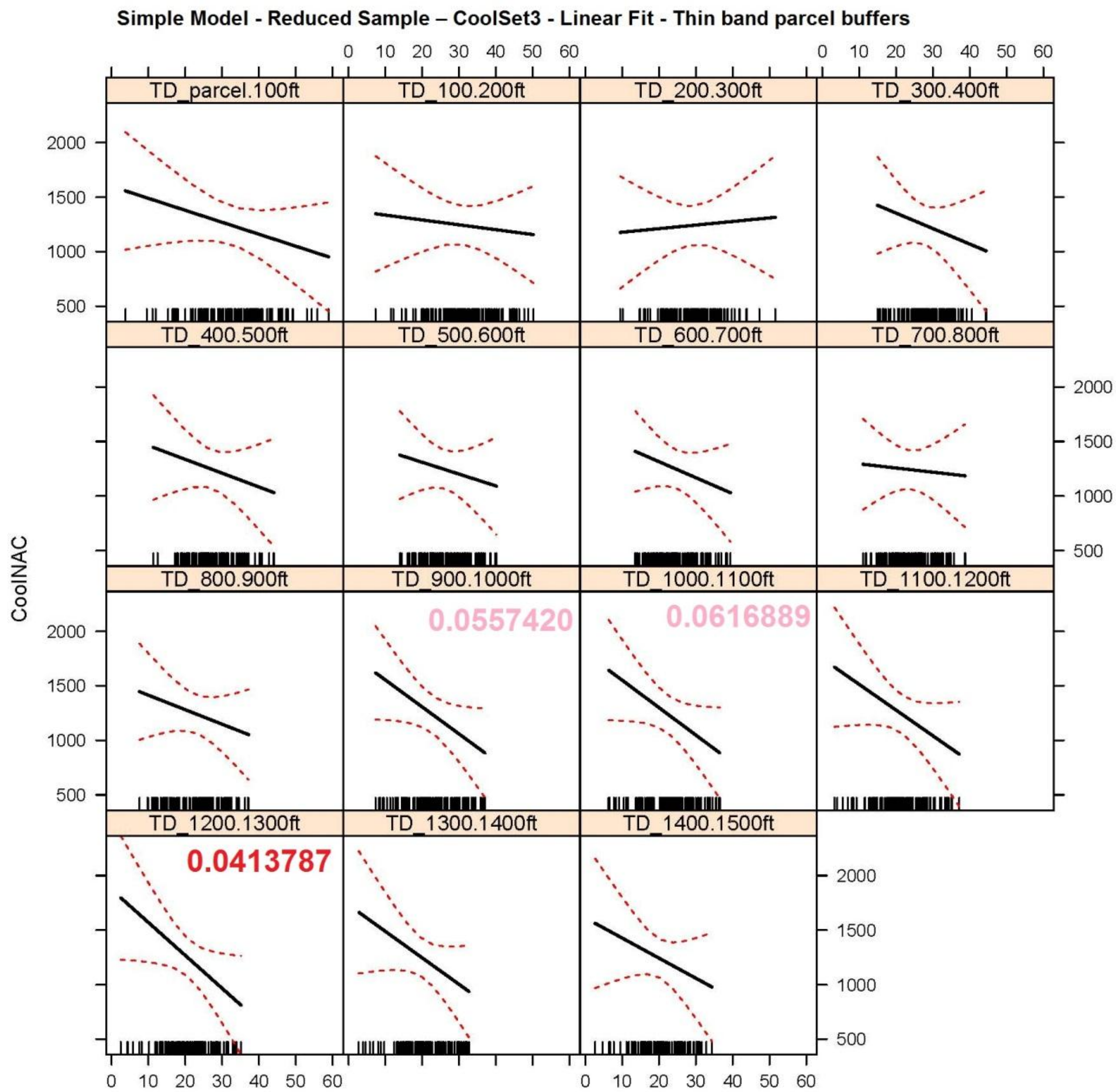

Figure 173. Thin band parcel buffer effect plots for CoolSet3 with the Reduced Sample running the Simple Model.

Wide band parcel excluded buffer effect plots

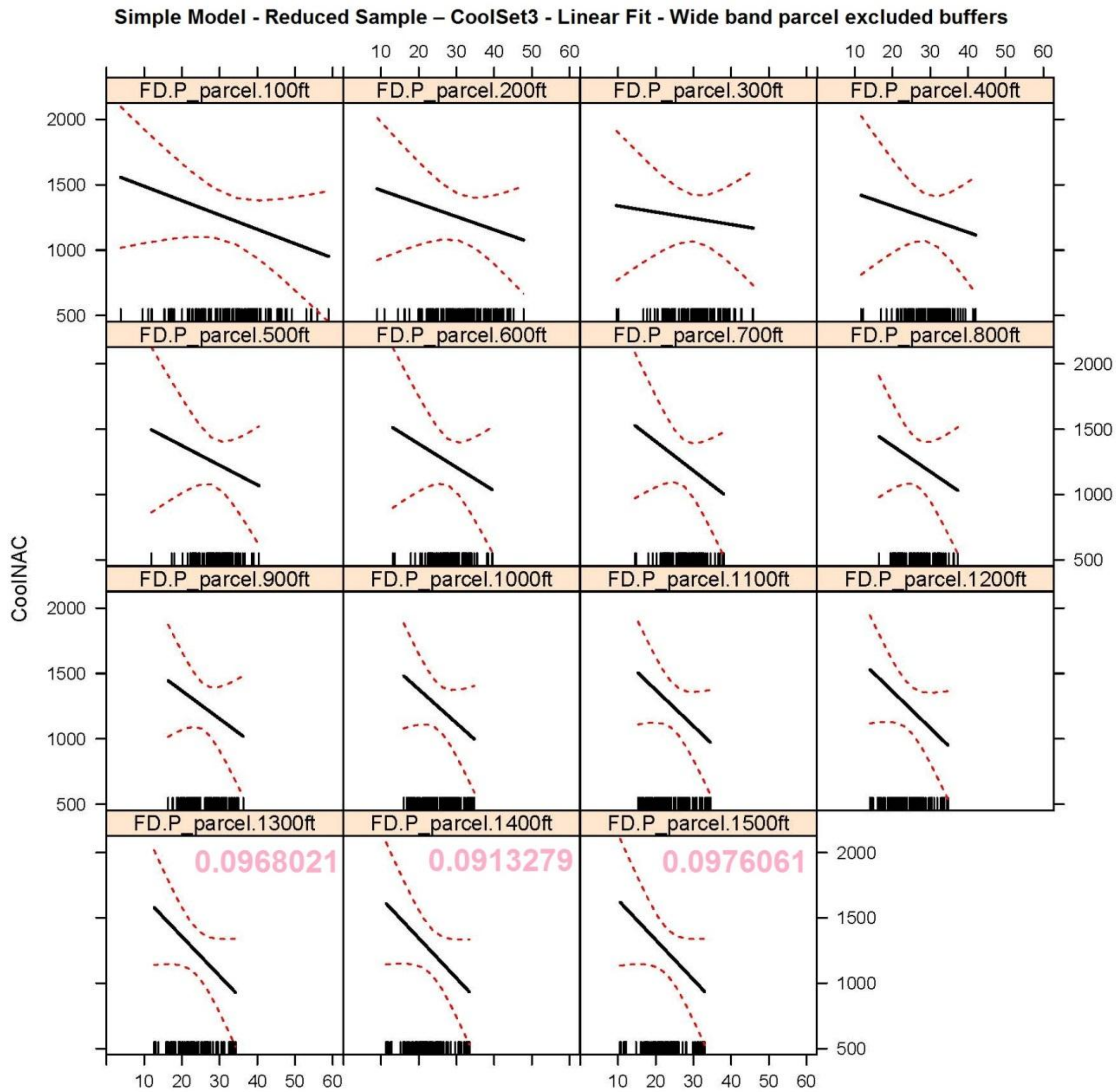

Figure 174. Wide band parcel excluded buffer effect plots for CoolSet3 with the Reduced Sample running the Simple Model.

Wide band parcel to 100 foot excluded buffer effect plots

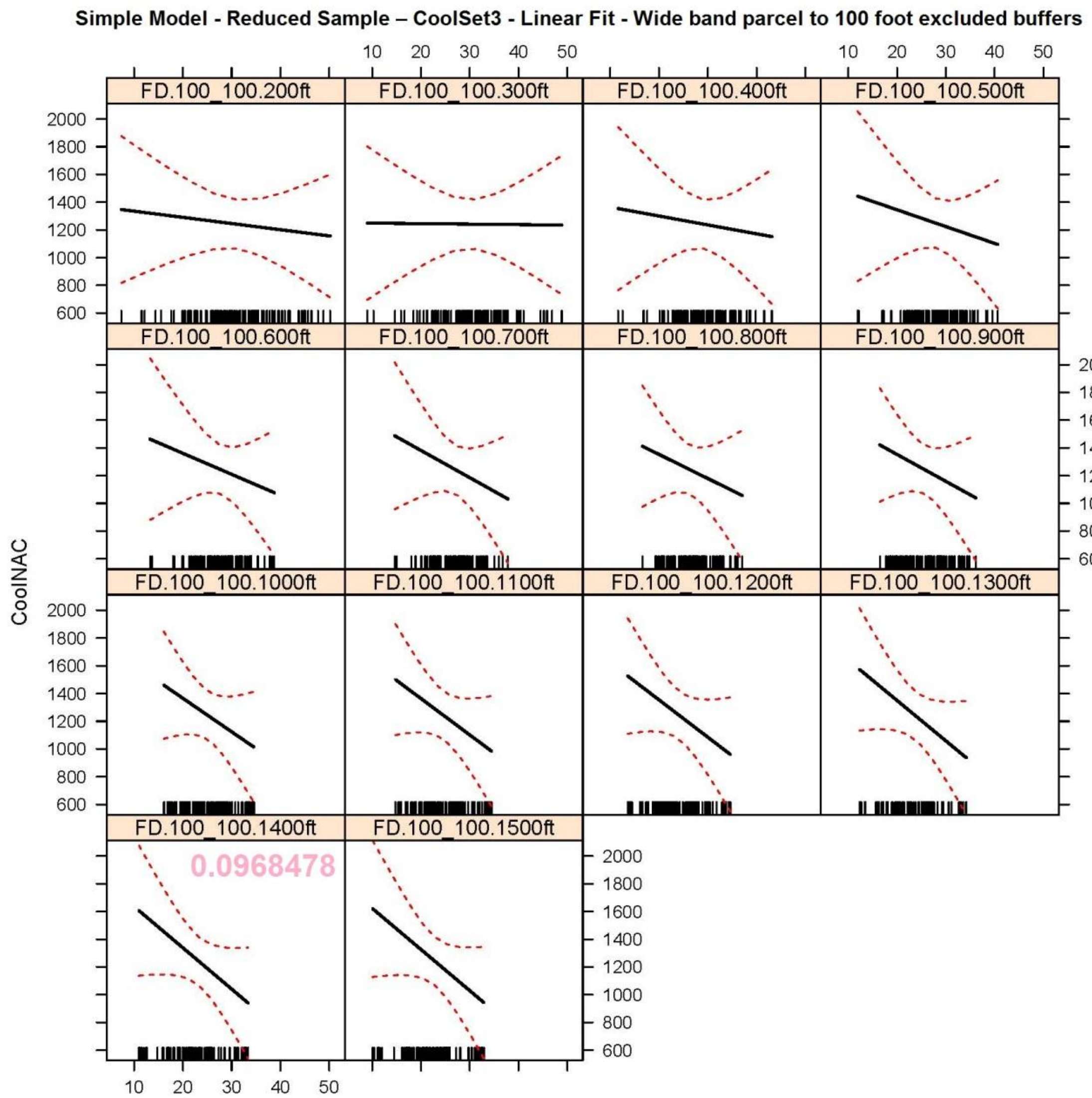

Figure 175. Wide band parcel to 100 foot excluded buffer effect plots for CoolSet3 with the Reduced Sample running the Simple Model.

CoolSet4

Covariate effect plots

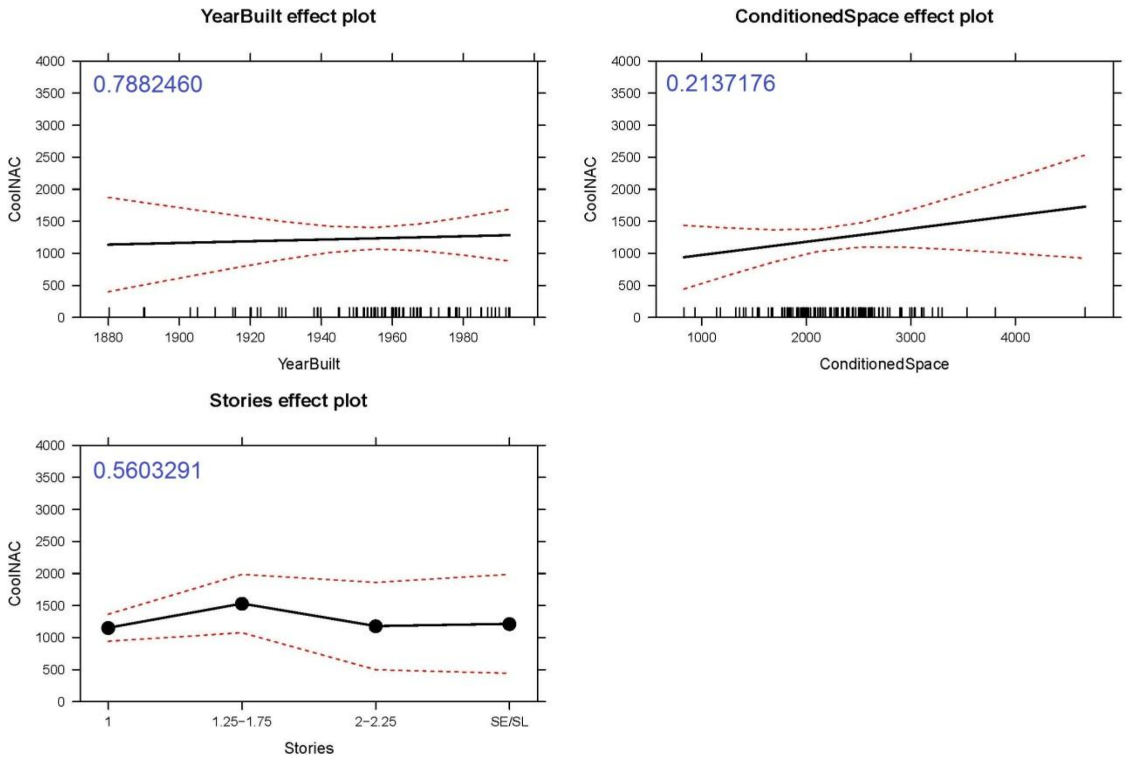

Figure 176. Covariate effect plots for CoolSet4 with the Reduced Sample running the Simple Model.

Comprehensive parcel buffer effect plots

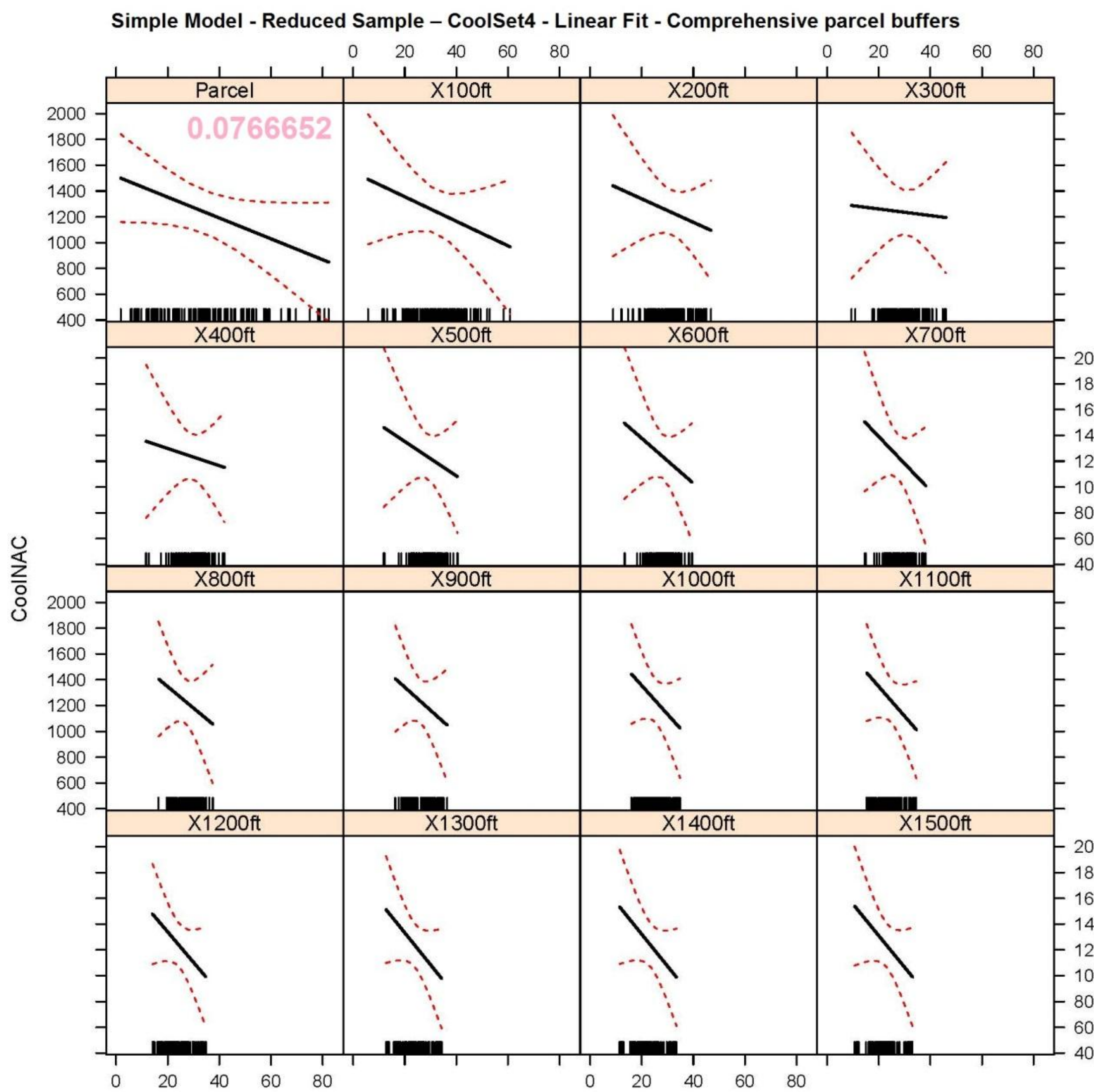

Figure 177. Comprehensive parcel buffer effect plots for CoolSet4 with the Reduced Sample running the Simple Model.

Thin band parcel buffer effect plots

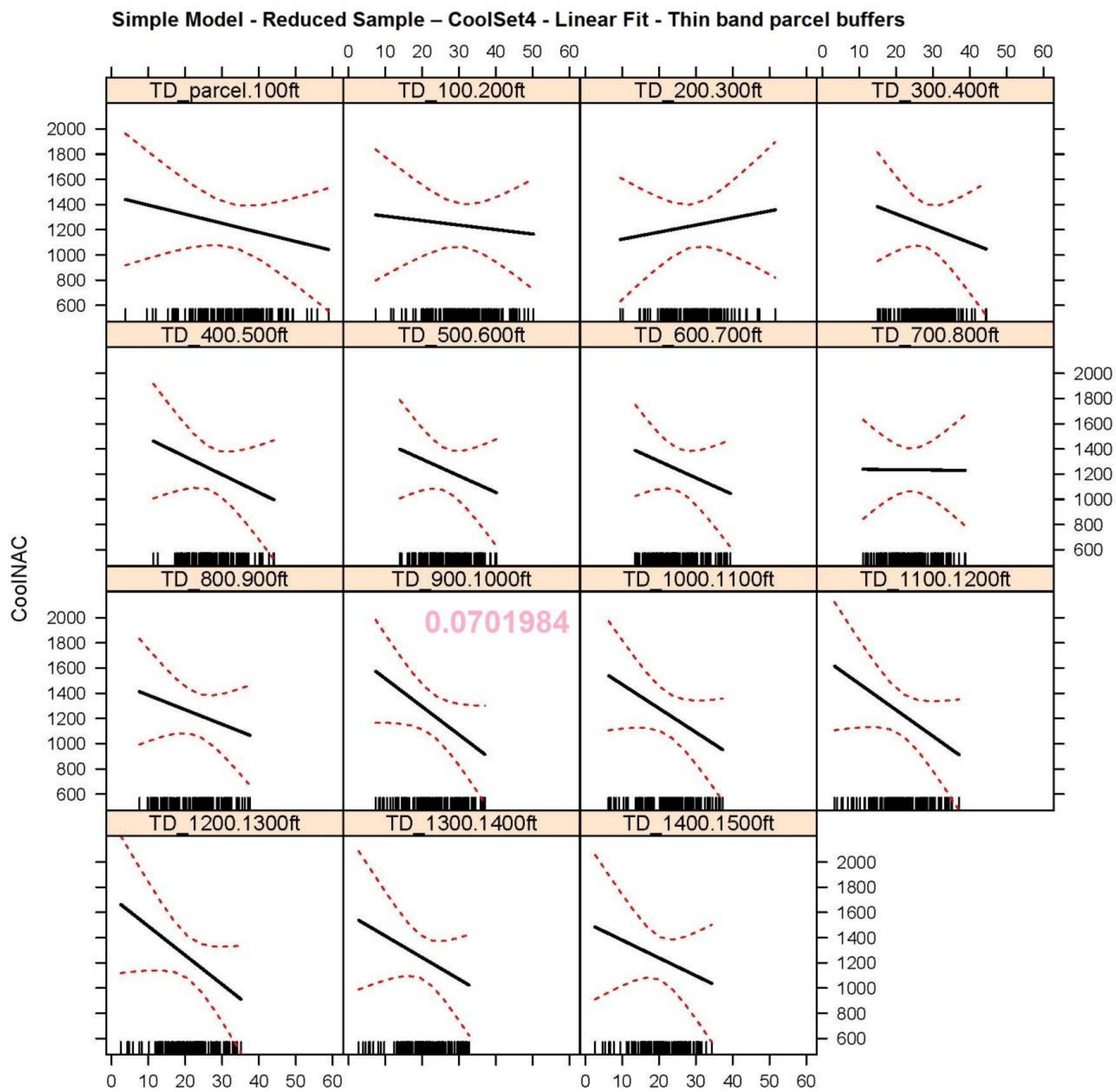

Figure 178. Thin band parcel buffer effect plots for CoolSet4 with the Reduced Sample running the Simple Model.

Wide band parcel excluded buffer effect plots

None of the wide band parcel excluded buffer effect plots for CoolSet4 with the Reduced Sample running the Simple Model were found to be significant.

Wide band parcel to 100 foot excluded buffer effect plots

None of the wide band parcel to 100 foot excluded buffer effect plots for CoolSet4 with the Reduced Sample running the Simple Model were found to be significant.

Discussion

Urban Tree Canopy (UTC)

Although tree canopy was measured by four methods, only one method was suitable for further analysis with the energy consumption data. Both the level of detail and breadth of coverage made the technician photo interpreted digitized UTC the ideal measurement. Geo-processing of this data by each parcel, at multiple distances, and with differing shapes made the investigation possible.

The link between the digitized canopy data and the field collected tree data was important for being able to infer management actions in light of the findings of this investigation. Digitized tree canopy data only measured the presence or absence of trees. The field collected data quantified the diversity and structural composition of the urban forest.

The field collected data had higher percentage results than the digitized tree canopy data, see Table 4. This difference in canopy measurement is not alarming considering the differences in data collection and processing methods.

The digitized canopy is essentially a flatted view of the community from above. Overlapping trees is not evident or measureable in this method. Field crews were not directed to make any special consideration for trees that overlap. The method used to extrapolate from the field measurement of each tree to the total block percent canopy would over estimate canopy if any of the trees were overlapping in reality. There were likely many instances with overlapping trees, based on the majority of instances where the digital canopy is less than the field extrapolated canopy.

In some instances the field data is less than the digitized data. The tree inventory field teams only measured trees that were above maintained lawn or landscaping. Wooded areas and dense clumps of trees were not measure. This difference would lead to field crews under estimating canopy spread on some blocks.

The extrapolation equations used on the field data assumed that a circle was a suitable representation for the area of the tree's canopy. Irregular shaped trees could have been either over or under estimated by this method.

Energy Consumption

Weather adjusted normalization of energy data was useful for this study. PRISM analysis separated out the part of energy use that was utilized for either heating or cooling the homes, depending on the season and fuel type. The PRISM analysis also helped clean up the datasets by revealing if energy was actually being used for heating or cooling. More specifically PRISM measured increases in energy consumption that coincide with temperature change. In summer months an increase in electric use as the temperature increased would have been picked up by PRISM whether the home had air conditioning or used more fans. The assessor card data only described if an air conditioner was present or not. PRISM actually tells if it or other electric devices have been used.

House Characteristics

Assessor card data was imperative for this study. Being able to control for multiple variables was important for the analysis. For instance, if the year of home construction was not included, the results would likely be flipped (as was the case in the block scale analysis where there were not control variables). As shown by the results of this study, there is a significant relationship between the amount of energy that is used in a home with the age of the home. Older homes tend to use more energy than newer more efficient homes. Older homes also tend to have more tree canopy than newer homes (this is an anecdotal conclusion based on trees typically being planted after homes are built). If the year of construction was not included as a covariate (as was the case with the block scale analysis), the data would likely show an association between higher tree canopy and increased energy use. When in actuality the age of the home might by more influential than the tree canopy.

As modeled by Sand and Huelman (1993), house characteristics play a big role in annual consumption. DOE-2 simulation software reported 3.7 times higher heating cost and 1.8 times higher cooling cost for a low efficiency Minnesota home compared to a high efficiency Minnesota home. Their study also points out how sizable heating costs are in Minnesota and the cost that is felt by those who own less efficient homes. A low efficiency home cost 7 to 16 times more to heat than to cool, while a high efficiency home cost 3 to 8 times more to heat than to cool.

Sample Sets

Setting up the different sample sets by exclusion according to housing characteristics and by the PRISM results was beneficial for being able to make accurate comparisons across similar populations.

Even after controlling for a number of housing characteristics, there was still a set of the newest homes in the sample set that were acting quite different than the rest of the sample. Analyzing the data with and without the newest homes helped to tease out the interaction that was taking place with the rest of the homes in the community. Newer homes are less influenced by vegetation because of more energy efficient construction practices (Simpson and McPherson 1996).

Of the 246 sampled homes, 226 had an air conditioner noted on the assessor card. Of these 226 homes, only 155 showed a cooling signal related to a rise in exterior temperature as found by the PRISM analysis. This leaves 71 homes that have an air conditioner, yet do not show an increase in energy consumption as the temperature rises in summer. Tree canopy at the parcel of these 71 homes range from 0%-94%, with a median of 29%, and an average of 34%. The cooling analysis only included homes that showed a cooling energy signal in the PRISM analysis. It seems possible that existing tree canopy is providing sufficient canopy to the point where air conditioning is not needed in some Hutchinson homes.

Analysis

Block Scale

The block scale analysis revealed that more investigation was needed. Most notably was the need for housing characteristics to be used as control variables.

Parcel Scale

Heating

Covariates

The correlation between heating energy use and the amount of conditioned space in a home was significant across both models, both samples, and all data sets. Of the sampled homes, larger homes used more energy for heating than smaller homes.

Heating system type was also significant across all models, samples, and sets. In this data, homes with forced air heating tended to use less energy than homes with hot water heat.

Age of the homes in the study was highly significant in nearly all models, samples, and sets. Significance of the year built variable was higher with the full sample. Newer homes in this study use less energy for heating than older homes.

The height of a home or number of levels was also significant across most iterations of the analysis. Number of stories was more significant with the full sample and also more so with the simple model. Taller homes tended to use more energy for heating than shorter homes, in this sample.

Tree Canopy

Although there was significance in covariates across both samples, a significant correlation between tree canopy and heating energy use was only found with the reduced sample. The correlation between tree canopy and energy use was most significant in HeatSet1 and HeatSet2. The most inclusive of the sample sets, HeatSet3, only showed the correlation slightly. This supports the importance of housing characteristic data being included in the analysis to enable comparison of like homes. Both HeatSet1 and HeatSet2 excluded homes that had other sources of heat not accounted for by natural gas consumption. These included oil for heating and non-gas burning fireplaces. HeatSet1 and HeatSet2 also excluded homes that would likely be using more natural gas than most other homes. These include homes with heated garages and homes that had pools. HeatSet3 included all these homes. The difference between HeatSet1 and HeatSet2 is that HeatSet1 excluded homes that had improvements to siding or windows after 1998.

For HeatSet1 and HeatSet2 within the reduced sample, homes with more tree canopy used less energy for heating across all tree canopy buffer shapes. Significant relationships were evident from 300 feet all the way to 1500 feet from the parcel. The relationship started closer to homes in HeatSet1 than in HeatSet2, leading to the conclusion that homes without improved siding or improved windows benefit more from increased canopy closer to the parcel (starting as close as 100 feet from the parcel).

The significance of the tree canopy to heating energy use correlation was high at 500 feet to 600 feet from the parcel with most buffer types, in both HeatSet1 and HeatSet2, and across both the simple and full models. A similar relationship is evident with tree canopy out to 1100 feet and 1200 feet from the parcel.

Based on the differences in the significance of the heating energy use and tree canopy relationship between the comprehensive parcel buffer, wide band excluded parcel buffer, and wide band parcel to 100 foot excluded buffer, there appears to be a trend that shows trees between 100 feet and 200 feet from a home play a sizable role in the potential for reducing heating energy. Relatively near trees along with trees out to 1200 feet and beyond show a significant relationship with decreased heating energy consumption as tree canopy increases.

There is also a trend across the heating energy use tree canopy data showing a higher benefit from canopy increase at far distances from the parcel as evident from the steepening slope when tree canopy is measured farther from the parcel.

Less heating energy use from homes that are surrounded by more tree canopy is likely related to the wind reducing qualities of leafless tree canopy.

Cooling

Covariates

The covariates used across the cooling data show no strong significant relationships. Within the full model and full sample there was slight significance in the siding type variable.

Tree Canopy

A significant trend exists across nearly all the cooling data. The trend shows increased canopy at and sometimes near the parcel to be linked with reduced cooling energy consumption and a similar trend at farther distances 900 feet to 1500 feet from the parcel. The near to the home, parcel relationship is likely showing that increased tree shade on a home reduces cooling energy use. The relationship that is evident at the farther distances could be picking up the microclimate evapotranspiration benefits of increased neighborhood tree canopy reducing cooling energy use.

Predicted Impact of Ash Canopy Loss

The percent urban tree canopy in the residential and commercial neighborhoods of Hutchinson is approximately 20%. Of this tree canopy, about one fifth is composed of ash (*Fraxinus)*. If Hutchinson loses all ash from its urban forest the overall tree canopy in residential and commercial neighborhoods would be reduced to approximately 16% urban tree canopy. Assuming this impact would be felt equally across the community and based on the trends from this study, a 4% reduction in urban tree canopy could increase winter home energy consumption in a typical Hutchinson home by approximately 4.3% (or 896 CF of natural gas per year) from the loss of winter tree canopy wind shielding. This estimate was calculated by interpolating within the slope associated with the relationship between percent urban tree canopy within the 500 foot comprehensive parcel buffers and heating energy use. This distance had the lowest correlation from the Full Model Reduced Sample HeatingSet2. This model, sample, and set combination had the most distances with low correlations.

With the same 4% loss of urban tree canopy, cooling energy use for a typical Hutchinson home could increase by approximately 8.6% (or 122.8 kWh of electricity per year) from the loss of neighborhood microclimate benefits of ash. The microclimate cooling estimate was calculated by interpolating within the slope associated with the relationship between percent urban tree canopy within 1500 foot comprehensive parcel buffers and cooling energy use. This distance had the lowest correlation from the Full Model Full Sample CoolSet3. This model, sample, and set combination had nearly as many distances with low correlations as other combinations yet had a higher sample size.

The shade impact to specific homes from ash canopy loss would have a lot of variation dependent on tree placement around each given home. Averaging the shading benefit across the community and using the same interpolation method as above, a 4% reduction in urban tree canopy would raise the typical Hutchinson home cooling energy use by 2.9% (or 39.9 kWh of electricity per year). The shade related cooling estimate was calculated by interpolating within the slope associated with the relationship between percent urban tree canopy within the parcel buffers and cooling energy use. This distance had a low correlation and is from the Full Model Full Sample CoolSet3. This model, sample, and set combination had a low correlation like other Sets yet had a higher sample size. This slope was also one of the more conservative options. Actual cooling energy saving from shade would likely be much higher for some homes and nonexistent for other home based on specific tree loss locations.

Based on the tree energy relationships of the sampled homes in Hutchinson, urban tree canopy at the community scale provides the following benefits. These benefits are presented as factor relationships where a percent change in UTC would have a certain percent change in a type of energy use. The relationship between percent UTC for wind shielding benefits and community scale home heating energy use was 1:1.1. The relationship of percent UTC for microclimate modification benefits and community scale home cooling energy use was 1:2.2. The relationship of percent UTC for shading related benefits and community scale home cooling benefits was 1:0.7. These factor relationships could be used to estimate how a decrease or increase in UTC in a community similar to Hutchinson would impact community scale winter and summer home energy consumption.

Although the factored tree canopy related savings was greater for cooling as a percentage than for heating, since the heating season is so much longer than the cooling season, the largest benefit to communities like Hutchinson from urban tree canopy is the reduction in winter home energy use.

Conclusions

Tree canopy was measured and weighed against energy use data while controlling for house characteristics. Of the houses sampled by this study, the following can be concluded. Larger homes used more energy for heating than smaller homes. Homes with forced air heating tended to use less energy than homes with hot water heat. Newer homes used less energy for heating than older homes. Taller homes tended to use more energy for heating than shorter homes.

Increase in urban tree canopy measured 500 feet to 1100 feet from a home was significantly ($p<0.01$) linked to reduced heating energy consumption. To a lesser degree the relationship held with significance ($p<0.05$) from 400 feet to 1500 feet. The amount of tree canopy from the parcel to 100 feet is related to and combined with canopy at further distances is beneficial to winter heating energy reduction. These benefits are likely from trees reducing wind speed around the sampled homes.

Increased tree canopy at and near the parcel was significantly ($p<0.05$) connected to reduced cooling energy use. These near parcel tree benefits are likely from trees providing shade to the sampled homes. Reduced cooling energy use from increased tree canopy at 900 feet to 1500 feet from the parcel was also significant ($p<0.10$). These farther away benefits could be linked to the microclimate modification benefits of neighborhood tree canopy.

Recommendations

In light of the results of this study and the predictions of climate change, it is evident that trees ameliorate microclimate conditions and aid with comfort in urban communities. While cities are predicted to become increasingly warmer in summer months, properly placed trees can aid in both outdoor and indoor comfort, along with reducing energy consumption. Even though winters are predicted to be milder, the cost of heating is likely to remain significant. A large healthy urban forest spread throughout a community can help aid in reducing heating and cooling costs. The diversity of the forest should be a top priority as increased insect populations and risk of disease is also predicted (T. Karl, Melillo, and Peterson 2009).

Community ordinances could be utilized to encourage or mandate the necessity of a certain amount or location for community trees as a benefit to all (Parker 1990; Bernhardt and Swiecki 2001).

The arrival of Emerald Ash Borer to communities across Minnesota including Hutchinson is inevitable. Urban tree canopy provides much to a community, including energy savings as documented by this study. Communities that have a significant percentage of their tree canopy composed of ash (*Fraxinus*) or any single genus should maintain or develop management strategies that ensure tree canopy related benefits continue.

As the Midwest climate continues to change, the importance of planting and maintaining a healthy, diverse and thick urban forest in compounded. The microclimate provided by a forest of trees is beneficial for growing more trees. As longer periods of drought are predicted, areas with more trees will be better able to support existing and additional trees. Reduced wind speed lowers the rate of evaporation (Woodruff 1954). Considerations for what the climate will be like 40 years can help shape long term planting strategies.

Maintaining urban trees pay off. In a cost benefit analysis of urban trees in Chicago, Illinois benefits from trees related to energy conservation, air pollution mitigation, and avoided storm water run-off outweighed costs by almost threefold (specifically by 2.83) (McPherson et al. 1997).

Growing a tree in your yard can reduce energy consumption. Planting trees in yards across your neighborhood would be even more impactful to your year round energy budget. If you are community consciences and would like to help your neighbors reduce energy consumption, plant often. In addition, help develop strategies and plans to increase canopy on a large scale. Conserving energy with urban tree canopy takes a community-minded, consolidated approach.

Future Studies

Based on finding of this investigation, future studies could focus on replicating these methods to determine if the trends and relationships hold true in other areas. Communities where energy is provided by a public utility could be beneficial in more efficient data acquisition, as was the case in this study. Finding counties with digital assessor records might also speed data preparation.

Another future study could look at a larger scale region and try to find a change in consumption from a significant forest loss. Loss from invasive pests like emerald ash borer, Asian longhorned beetle, Dutch elm disease, or loss from a wind event could be situations where quantifying the previously provided benefits might be possible. Aggregate PRISM could be used to determine the normalized annual consumption and year-to-year changes in consumption pre and post forest loss (Fels 1986). Long-term utility sales data at the aggregate is potentially more easily acquired than individual building usage since monthly reports are typically produced by utilities and supplied to government agencies.

Futures studies may be able to take advantage of the Green Button data standards that have been developed that make it easier for energy users to view and analyze their own data (EnerNex 2012). Standardization across multiple energy providers could be advantageous for future studies. There might also be a means to streamline data acquisition.

Further investigation into the PRISM results could determine if the heating slope or lossiness of a house is linked to the level of benefit the home gains from tree canopy. Are looser homes more dependent on tree canopy?

While this project only digitized urban tree canopy, a future study generally following this model could digitize tree canopy and also building cover to better estimate wind shielding and related microclimatology of both trees and buildings, as investigated previously (Heisler 1989; McPherson and Simpson 1999).

Another future study could add daily wind speed as either a covariate or a third independent variable to investigate if more energy is consumed in homes with less tree canopy when it is windier.

The benefit from community trees with regards to reduction in energy consumption in Hutchinson, Minnesota is reported here. Fortunately these energy benefits are significant and it is even more fortunate that the trees measured here provide many more benefits to those who live and work under their canopies. The following quotation will likely resonate with Hutchinson and other communities as privileged to have such a benevolent community forest.

> *"Trees grouped together,...are a vital value...expressed as the reinforcement of peoples' morale that comes with shelter from the ever-prevailing winds, shade from the sun's glare, the improved appearance of the landscape, a greater pride in ownership, and a real increase in value of property - all culminating in a general sense of being at home on the land."*

Edited quote from 1935 in *Possibilities of Shelterbelt Planting in the Plains Region* by Raphael Zon (Read 1964).

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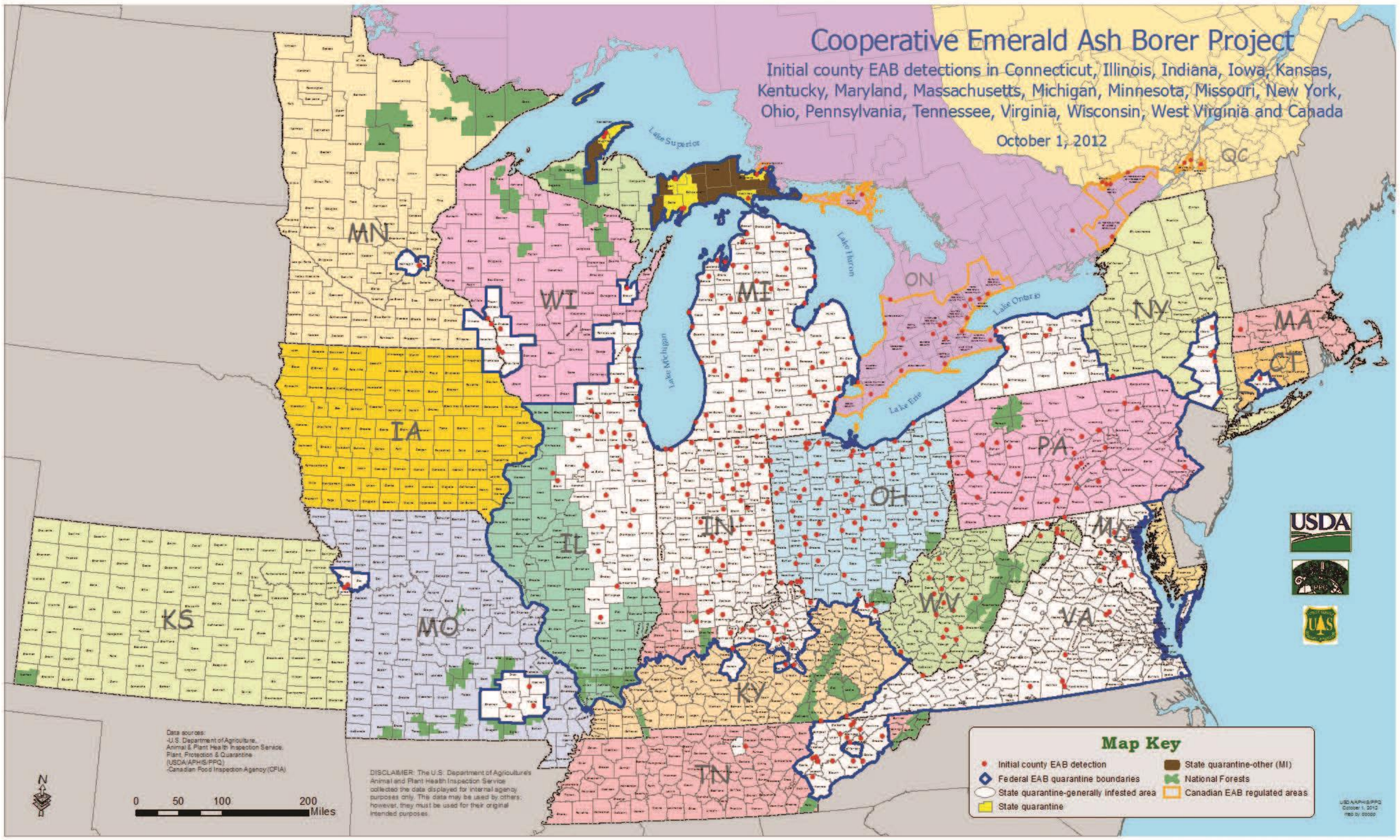
Appendices

Appendix A. Cooperative Emerald Ash Borer Project distribution map October 2012


Cooperative Emerald Ash Borer Project
Initial county EAB detections in Connecticut, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, Tennessee, Virginia, Wisconsin, West Virginia and Canada
October 1, 2012
MN
WI
MI
IA
IL
IN
OH
PA
NY
MA
CT
KS
MO
KY
TN
WV
VA
ON
QC
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
Map Key
Initial county EAB detection
Federal EAB quarantine boundaries
State quarantine-generally infested area
State quarantine
State quarantine-other (MI)
National Forests
Canadian EAB regulated areas
0 50 100 200 Miles
USDA

Appendix B. Community Tree Fact Sheet Prepared for: Hutchinson, Minnesota

Community Tree Fact Sheet
Prepared for: Hutchinson, Minnesota
Date: January 24, 2012

By: ***The University of Minnesota,***
Department of Forest Resources,
Urban and Community Forestry,
Community Engagement and
Preparedness (CEP) Team

Contents:

Executive Summary:

From 2009 through 2011, the University of Minnesota, Department of Forest Resources collaborated with the University of Minnesota Extension, the Minnesota Department of Natural Resources Division of Forestry, and the U.S. Forest Service to assist selected communities in Greater Minnesota prepare for potential significant losses to their urban forests. The immediate concern was for potential losses due to infestations of emerald ash borer (EAB), an invasive, exotic insect pest that was first identified in Minnesota during the spring of 2009. Since 2002 when it was first identified near Detroit, Michigan, EAB has been responsible for the loss of tens of millions of ash trees (Fraxinus species) in 15 northeastern states in the U.S.

In order to best prepare for and manage infestations of invasive pests, diseases or other natural disasters that can wreak havoc with a community's street, park and landscape trees, an inventory of its tree assets must be accomplished. The inventory reveals the vulnerability of a community to a particular problem by the character of its tree diversity, the age of the tree population and the relative condition of the trees. A community that has access to this information can develop a proactive management plan that allows for predictable losses yet sets a course of action for minimizing the losses and replanting a public and private landscape that is healthier, more genetically diverse and more resilient.

Emerald ash borer is specific to Minnesota's native ash trees: white, black and green ash. The best estimates for both urban, rural and forest ash trees places the Minnesota population at approximately 900 million trees, the most in the United States. The great unknown is the relative dependence of Minnesota communities on ash trees as providers of shade, as community wind break trees, as the portion of tree canopies that slow down rain water and lessen strains on their storm water systems, or as part of the overall value of a residential landscape.

The Community Engagement and Preparedness (CEP) team from the University of Minnesota's Department of Forest Resources served as mentors, technical support staff and data analysts for six communities in greater Minnesota during the original project time-period. Community volunteers were coordinated by the project team, received training for conducting tree inventories or surveys, and were provided with technical support throughout the process. At the conclusion of the tree inventories that took place on both public and private properties for a complete analysis of a community's urban forest, the CEP team analyzed the data and assembled the results in a clear, user-friendly format for the community to use as a management tool.

Hutchinson's Community Tree Fact Sheet elaborates on the following bulleted inventory results:

- Number of Trees in Community:
  - Privately Owned: ~21,513
  - Publicly Owned: ~6,600
- Percentage of all Trees that are Ash: ~19.18%
  - On Private Property: ~16.94%
  - On Public Property: ~23.15%
- Significant Trees*:
- Average Size (age) of Significant Trees: 15.65 inches in trunk diameter (d.b.h.)
- Average Condition of Significant Trees: 6.85 (trunk and canopy combined out of 8 pts.)

*Trees representing 5% or more of the entire tree population are considered "Significant Trees."

Project Description:

The Inventory. Depending on the projected number of trees in each community, either a complete inventory or a randomized sampling was conducted. If a community's tree population (both public and private) was estimated to be no more than 3,000 trees, a complete inventory was conducted. For a complete inventory, all trees in boulevards, street right-of-ways, and private properties were counted, identified, measured and with the exception of privately-owned trees, condition-rated.

For larger tree-populated communities, a sampling of trees on public and private properties was inventoried, with the data extrapolated to estimate the character of the community's urban forest. The technique used for sampling is a time-tested, very accurate sampling technique that involves a pre-sampling inventory of the community conducted by the CEP team. Based on this pre-sample, a protocol was developed that randomly selected entire block segments throughout the city for sampling that was representative of where most community trees occurred. As an example, the least number of block segments inventoried were typically in the business districts where the fewest trees normally grow. This sampling technique, described as a weighted/stratified/randomized sampling has an accuracy rate within 10% of real counts, which is an accuracy standard that most inventories ever achieve.

Inventory information collected included the following:

1. **Tree identification**, usually to the genus (e.g., Maple), occasionally to the species (e.g., Silver Maple). The specificity was determined by the individual cities.

2. **Size.** Two measurements were taken for size. D.B.H., which is the measurement of the diameter (width) of the tree trunk at a height of 4.5 feet above ground. This measurement is used to approximate the age of the tree as well as the potential cost for removal or chemical treatment for EAB in the case of ash trees. The second measurement was the width of the tree crown, which can be used to calculate overall canopy spread of trees for purposes of storm water management, carbon sequestration, or potential energy savings (winter fuel use, summer air conditioning).

3. **Condition.** Condition of trees was determined for public trees only. Each inventoried tree was evaluated for the condition of the stem (trunk) and the condition of the canopy (the leafy crown of a tree). Condition is an evaluation of both tree health and the integrity of its overall structure. To that end, measurable key factors are evaluated for the trunk that are different from the canopy. The evaluation is based on a point-system, rather than a descriptive-system; therefore, each tree has a recorded condition-rating ranging from 0 (dead) to 4 (no apparent defects) for both the trunk and the canopy. For example, a single tree may have a rating of 2.5:3.5, which translates to more de fects were present on the trunk (2.5 out of 4) than on the canopy (3.5 out of 4). This is a University of Minnesota, Department of Forest Resources system that is a modification of the US Forest Ser vice condition-rating system. Condition is not an evaluation of tree safety.



Project Description:

The Community Inventory Team. All tree inventory information was collected by trained community volunteers under the direction of the University of Minnesota, Department of Forest Resources' Community Engagement and Preparedness (CEP) team. Locally, the volunteers were supported by community officials, ranging from City Administrators to Departments of Public Works or Parks and Recreation.

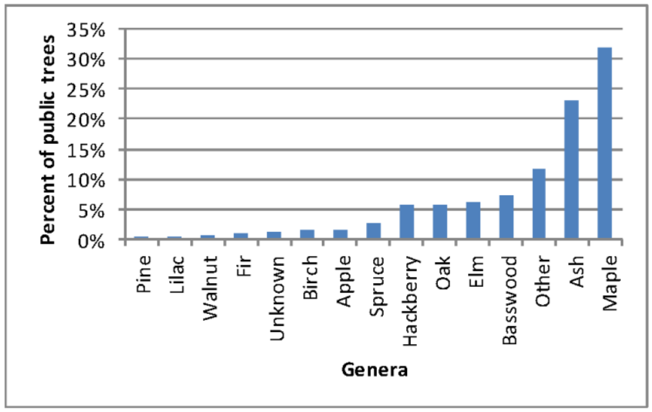
Community Inventory Team members were provided with training on tree identification, tree measurements, tree condition evaluation, data entry and interacting with the public. This training was provided by the CEP team and ranged from 12 –16 classroom hours, depending on the level of experience that each community inventory team members brought to the training. Upon completion of the training, Community Inventory Team leaders, those that completed the training, were issued green "Community Trees Inventory Team" tee shirts, identification badges, measurement equipment, tree identification books and "flash cards," complete training and resource manuals and data sheets necessary to complete the inventory.

The CEP Technical Support Team. Support team members from the University of Minnesota, Department of Forest Resources were available to assist with the inventories or surveys throughout the duration of the project and the completion of the data entry and evaluation. This support ranged from maintaining a dedicated tutorial web site for the project to on-site visits with the community volunteers if they encountered situations that necessitated technical guidance. The CEP technical support team did not enter private property or collect information as a rule. Rather, their role was to guide and support not conduct the inventory. Members of the support team included undergraduate and graduate students, research technicians and research fellows. All team members were trained and supervised by the project's principle investigator, a faculty member of the University of Minnesota's Department of Forest Resources, Urban and Community Forestry program.

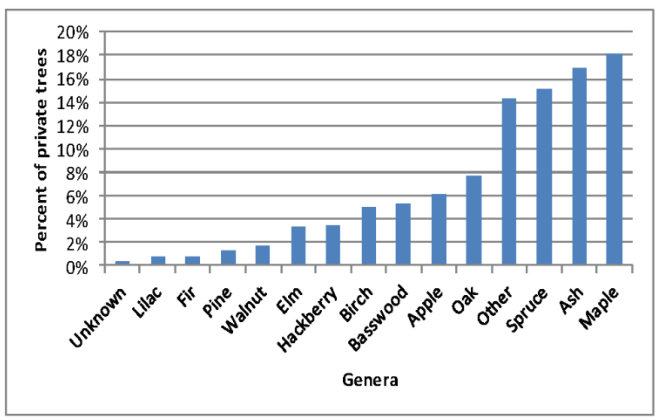
Community Tree Data Summaries: Community Tree Population

Table 1 Tree Population by Ownership*

A. Public



B. Private

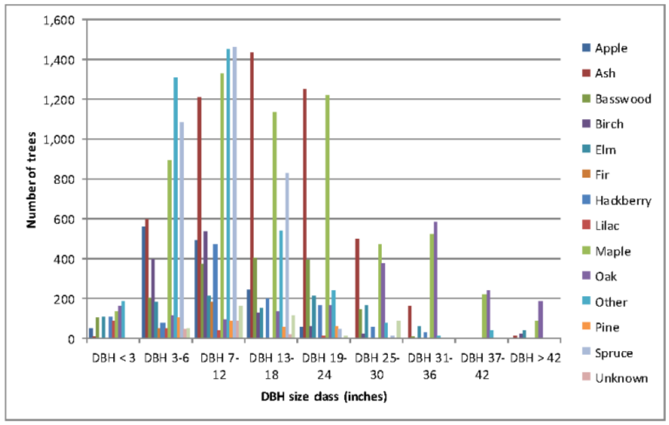


*Tree population is an estimate based on the community tree inventory or survey. Accuracy is reliably within 10%..

Ownership refers to trees located either on private property (residential, business) or public property (boulevards, schools, parks, government).

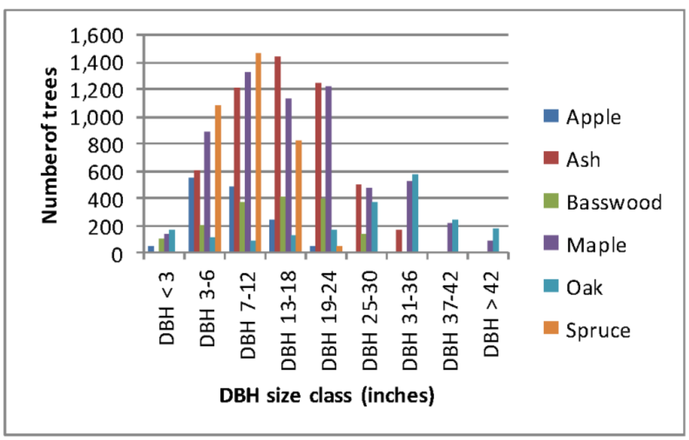
Community Tree Data Summaries: Community Tree Size Classes

Table 2 Tree Size—Trunk Diameter Classes*
A. Trunk Diameter Classes—All Genera**



*Trunk Diameter, also referred to as d.b.h. or diameter in inches at breast height, is a gauge of tree age. Larger sizes, older trees. **Genera is a scientific name for a group of trees with similar features, such as oaks, maples, ash, pines.

Table 2 Tree Size—Trunk Diameter Classes
B. Trunk Diameter Classes—By Significant Genera*



*Significant Genera are those that make up at least 5% of the entire tree population.

Community Tree Data Summaries: Community Tree Size Classes

Table 2 Tree Size—Trunk Diameter Classes
C. Trunk Diameter Classes—By Ownership

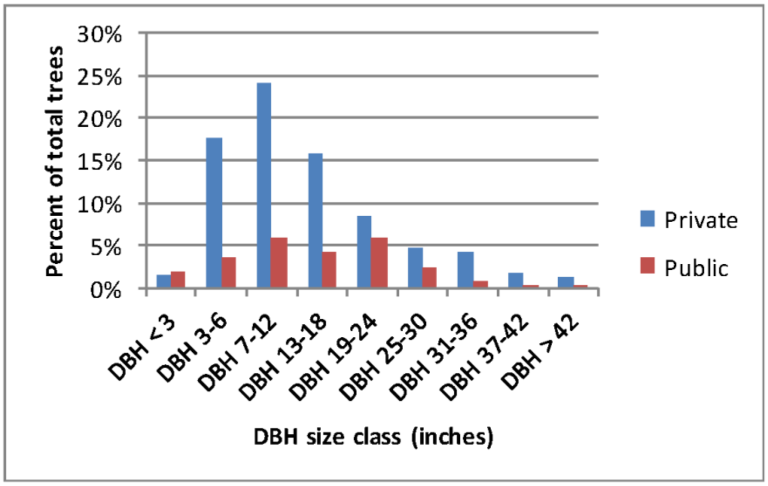
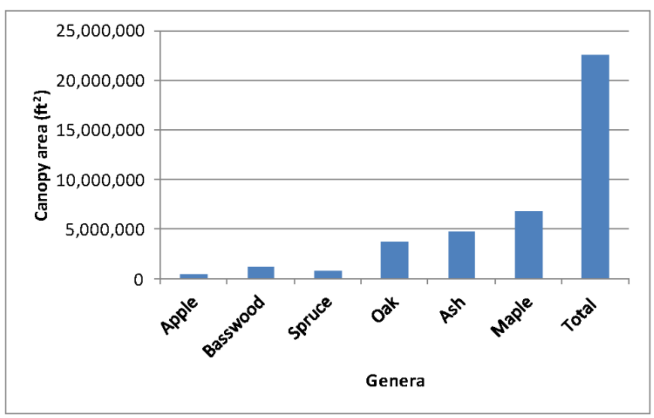


Table 3 Tree Size—Relative Crown Spread (RCS)* by Significant Genera

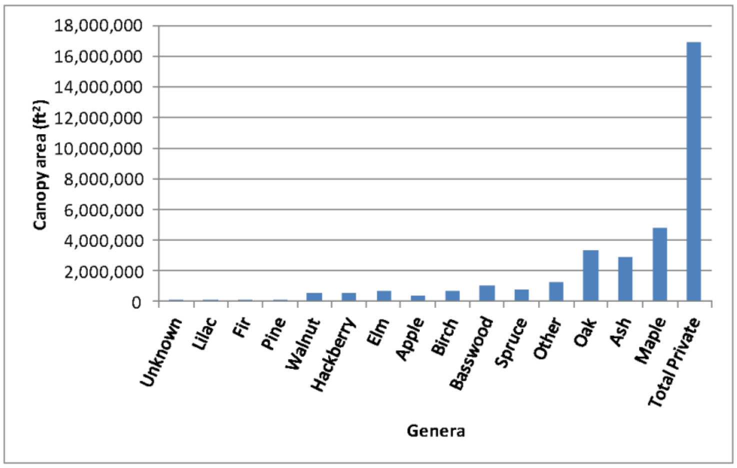


*Relative Crown Spread (RCS) refers to the average crown (canopy) area for a significant genera. This is then combined with the frequency of each genera to present a relative crown spread that gauges the impact one tree genera has on the canopy cover of an entire community.

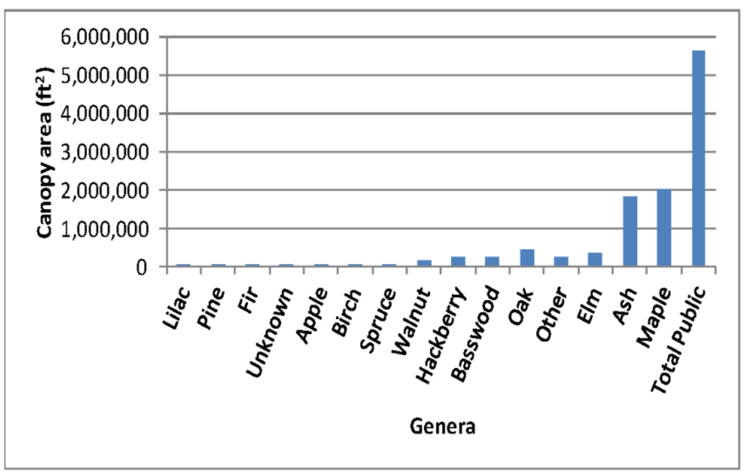
Community Tree Data Summaries: Community Tree Size Classes

Table 4 Tree Size—Relative Crown Spread (RCS) by Ownership

A. Private



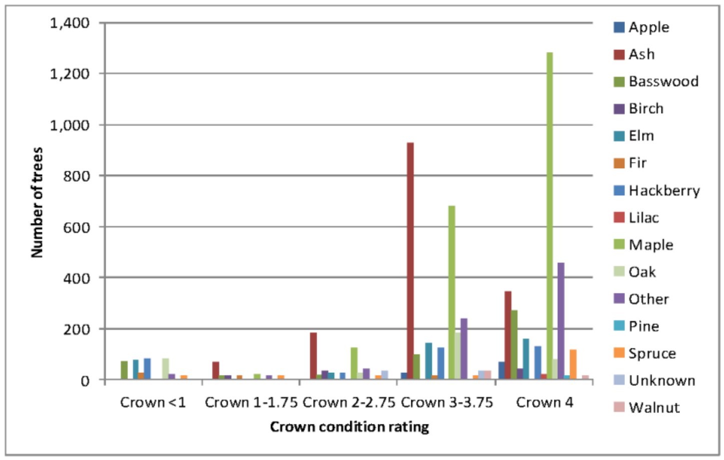
B. Public



*Relative Crown Spread (RCS) refers to the average crown (canopy) area for a significant genera. This is then combined with the frequency of each genera to present a relative crown spread for the impact that gauges the impact one tree genera has on the canopy cover of an entire community.

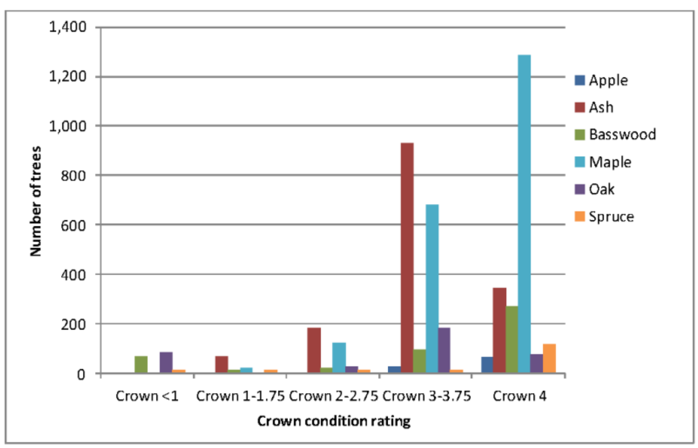
Community Tree Data Summaries: Tree Condition Ratings

Table 5 Tree Crown Condition Ratings*:
A. All tree genera



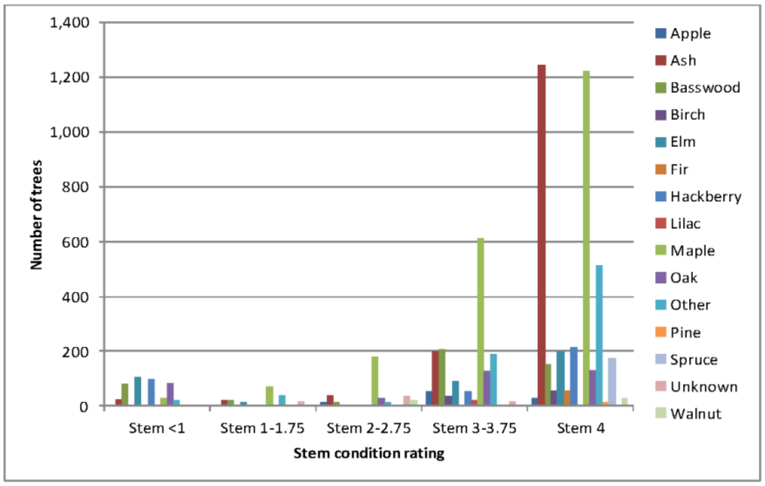
*Tree condition ratings were separately conducted on tree stems and tree crowns (canopies). The rating system is based on a 0-4 point system, with 4 points representing "no apparent defects." Only public trees were condition-rated.

Table 5 Tree Crown Condition Ratings*:
B. Significant genera only



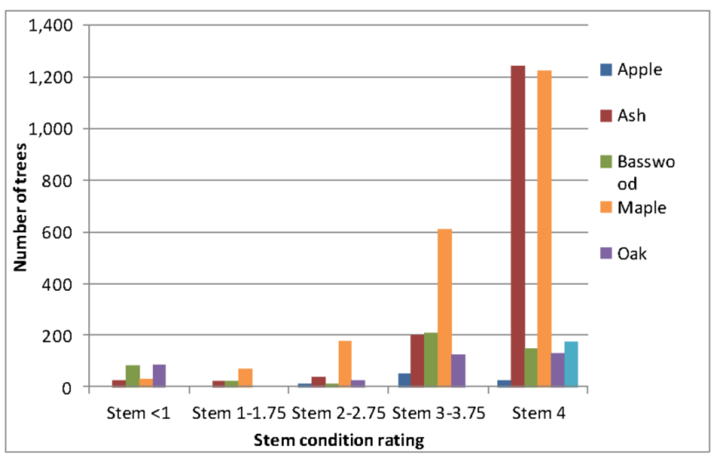
Community Tree Data Summaries: Tree Condition Ratings

Table 6 Tree Stem Condition Ratings*:
A. All tree genera



*Tree condition ratings were separately conducted on tree stems and tree crowns (canopies). The rating system is based on a 0-4 point system, with 4 points representing "no apparent defects." Only public trees were condition-rated.

Table 6 Tree Stem Condition Ratings*:
B. Significant genera only



Helpful Resources

1. The EAB Cost Calculator. This free, on-line software calculates the costs of removing trees, chemically treating trees or all combinations in between for long-term emerald ash borer management plans. The software can be accessed by: http://extension.entm.purdue.edu/treecomputer/.

2. For tree selections in Minnesota, there is a series of Recommended Trees for Minnesota, available on the University of Minnesota Extension web site: http://www.extension.umn.edu/gardeninfo/components/info_trees.html#selection.

3. For the most up-to-date information on Emerald Ash Borer Management tactics, the Minnesota Department of Agriculture offers this extensive web site: http://www.mda.state.mn.us/en/plants/pestmanagement/eab.aspx.

4. The U.S.D.A. Forest Service offers the Tree Owners Manual on-line, the most comprehensive "starter guide" for establishing trees available at: http://na.fs.fed.us/pubs/uf/tom_natl/tree_owners_manual_web_res.pdf.

5. To learn more about the ongoing research and outreach education offered by the University of Minnesota, access the Urban Forestry and Horticulture Institute's web site: www.trees.umn.edu.

6. To learn more about the ongoing community preparedness projects that are coordinated by the University of Minnesota, Department of Forest Resources, access the web site: www.mntreesource.com.

7. To learn more about Minnesota's volunteer program in urban forestry (Tree Care Advisors), one of the oldest programs in the United States, access their web site at: www.mntca.org.

8. To learn more about the Minnesota state tree board Minnesota Shade Tree Advisory Committee, access their web site at: www.mnstac.org.

9. To learn more about tree identification, the Beginner's Guide to Minnesota Trees is available from the University of Minnesota Extension on-line store www.extension.umn.edu/distribution. Follow this link to natural resources and then to trees and shrubs.

10. For guidance in diagnosing tree problems, connect with "What's Wrong With My Plant?" This on-line diagnostic tool is found on the University of Minnesota Extension web site under gardening information www.extension.umn.edu/gardeninfor/diagnostics.

Acknowledgements

Funding and support for this project was provided by:

- The University of Minnesota Extension
- The University of Minnesota Department of Forest Resources
- The U.S. Forest Service, State and Private Forestry, Northeastern Area
- The Minnesota Department of Natural Resources, Forestry Division

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Rebecca Koetter, Research Fellow

Sean Peterson, Research Technician

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Appendix C. Minnesota DNR Community Tree Survey Report

Minnesota DNR Community Tree Survey


Typical Minnesota street covered in a canopy of ash trees. Photo: Steve Nicholson.

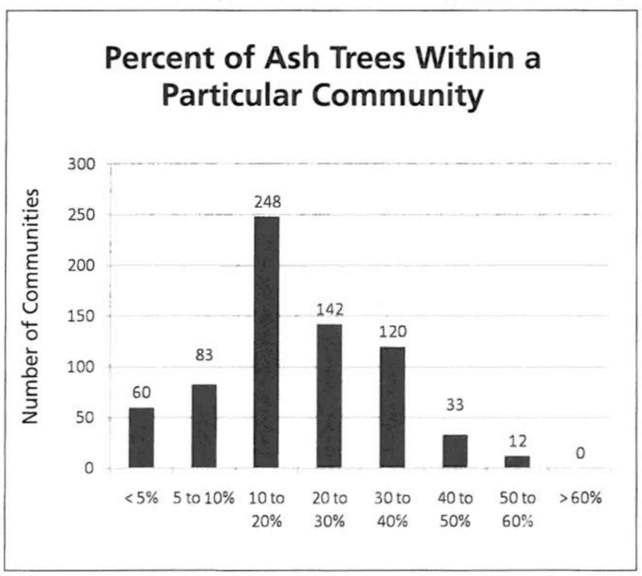
Detailed information for Minnesota communities to make informed decisions about their community forests.

Why does a tree survey matter?

- Documents your community's green capital assets
- Allows your community to better compete for grants and government funds
- Promotes sustainable community practices
- Aids in achieving accurate FEMA reimbursement after a natural disaster
- Depicts susceptibility to catastrophic events (natural, human, or invasive pest).

Emerald Ash Borer (EAB) a Reality:
Minnesota has more than 998 million ash trees in forests, communities, and agricultural areas throughout the state, and emerald ash borer management will cost cities millions of dollars in ash removal and replanting costs. These costs will also affect homeowners and landowners. However, individuals and cities can begin planning and taking steps now to reduce the impacts and costs of EAB.

Conducting the Survey:
In 2010 crews conducted field surveys of trees in 700 Minnesota communities to determine tree genera, range in sizes, and the general health of trees in residential neighborhoods and business corridors. The crews were on foot, walking pre-selected streets in each community, counting both public and private trees if they were within 60 feet of the roadway. The results of these surveys show how vulnerable many communities are to EAB due to the lack of tree species diversity. Nearly every community in Minnesota had an overabundance of maple and ash.



Ash population varies by community, ranging from 0.2 percent to 59.6 percent. On average, 20.3 percent of all trees within a particular community in Minnesota are ash. Of the 700 communities surveyed, 165 (23.6 percent) are highly susceptible to EAB infestation. The resulting ash mortality could decrease the community tree population by a third. Similar to Dutch elm disease, EAB poses a serious threat to urban forest health.

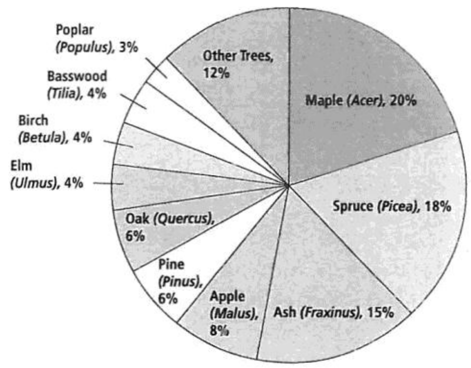
The need for diversity:

Communities increase their tree maintenance costs by planting only a few types of trees.

Communities close to or within EAB-infested areas should start to consider proactively removing poorly formed, stressed, and poorly placed ash trees, such as those growing under utility lines. This will spread out the costs of removing ash trees and replanting new trees over a few decades instead of a few years.

A diverse community forest is far less susceptible to devastation by a pest or disease that affects a single type of tree. Selecting a wide variety of trees native to specific areas of Minnesota and providing proper care helps ensure that replacement trees will be strong and healthy—while reducing vulnerability to forest pest invaders in the future.

Top Tree Genera in Minnesota Communities



A diverse community forest has:

- 10 percent or less of a single species (red maple, sugar maple)
- 20 percent or less of a single genus (maple, oak, ash)
- 30 percent or less of a single family (maple and box elder are in the same family).

Trees = Money

When properly cared for, trees provide benefits worth three times the investment in planting and care.

1 Healthy Tree (20 years after planting)

= $31/yr

According to U.S. Forest Service estimates, Minneapolis' 200,000 street trees

- Save $6.8 million annually in energy costs
- Save $9.1 million in storm water treatment
- Add $7.1 million to aesthetic and property values.

Trees are community assets, beautifying our landscape and providing food and shelter for wildlife. Trees provide shade, act as wind breaks, and reduce storm water runoff. In addition, mature trees remove and store carbon dioxide and other pollutants, improving air quality and mitigating global climate change.

How to use this information...

- Share data with the community tree board, forester or tree maintenance crews
- Begin preparing for the arrival of EAB
- Minimize planting of overused trees in your community and increase planting of underused trees
- Consider conducting a more complete survey or inventory of your public trees.

Your trees provide many benefits to your community, but require long-term commitment to maintenance to achieve their maximum potential.

Resources:

Minnesota Department of Natural Resources Division of Forestry
mndnr.gov/forestry/urban

University of Minnesota, Forest Resources Extension
www.myminnesotawoods.umn.edu

Minnesota Shade Tree Advisory Committee (MnSTAC)
www.mnstac.org

USDA Forest Service: Northeastern Area, State and Private Forestry
na.fs.fed.us/fhp/eab

Department of Natural Resources
500 Lafayette Road
St. Paul, MN 55155-4040
651-296-6157 (Metro Area)
1-888-MINNDNR (646-6367) (MN Toll Free)

mndnr.gov

This project was funded in part by the USDA Forest Service.

Printed on recycled paper containing 30% post-consumer fiber.

DNR 2010 Community Tree Survey for the City of Hutchinson, McLeod County

DNR 2010 Community Tree Survey for the City of Hutchinson, McLeod County

** Only maintained areas are surveyed. Maintained areas are periodically mowed or fall within an artificial surface, (e.g. parking lot).

Table 1. Diversity of tree genera, size class distribution, and healthy tree population and percents.

	Dead trees are included in population numbers & all percents.		Size Classes ++				Only live trees are included in numbers & percents. All Classes		
Genera	Population	Genera %	Small	Medium	Large	Super	Population	Genera %	Healthy
Acer (Maple)	16,000	26.9%	19.7%	30.8%	34.2%	15.4%	16,000	26.8%	95.4%
Fraxinus (Ash)	12,000	20.1%	4.9%	36.6%	39.9%	18.5%	12,000	20.1%	95.1%
Tilia (Basswood)	5,400	9.0%	33.0%	43.1%	22.9%	0.9%	5,400	9.0%	97.2%
Picea (Spruce)	5,300	8.9%	10.2%	59.3%	26.9%	3.7%	5,300	8.9%	100.0%
Malus (Apple)	4,000	6.8%	67.1%	32.9%	0.0%	0.0%	4,000	6.8%	91.5%
Celtis (Hackberry)	3,900	6.6%	21.3%	22.5%	27.5%	28.8%	3,900	6.6%	100.0%
Quercus (Oak)	3,400	5.6%	36.8%	17.6%	7.4%	38.2%	3,400	5.6%	97.1%
Betula (Birch)	2,400	4.0%	24.5%	46.9%	28.6%	0.0%	2,400	4.1%	93.9%
Ulmus (Elm)	1,900	3.1%	10.5%	50.0%	13.2%	26.3%	1,800	3.1%	100.0%
Gleditsia (Honeylocust)	1,300	2.1%	23.1%	38.5%	30.8%	7.7%	1,300	2.2%	100.0%
Boxelder	700	1.2%	57.1%	0.0%	35.7%	7.1%	700	1.2%	92.9%
Sorbus (Mountain Ash)	600	1.0%	66.7%	25.0%	8.3%	0.0%	600	1.0%	83.3%
Juglans (Black Walnut)	500	0.8%	0.0%	20.0%	40.0%	40.0%	500	0.8%	90.0%
Prunus (Plum)	300	0.5%	0.0%	83.3%	16.7%	0.0%	300	0.5%	100.0%
Aesculus (Buckeye)	200	0.4%	0.0%	20.0%	80.0%	0.0%	200	0.4%	100.0%
Japanese Lilac	200	0.4%	100.0%	0.0%	0.0%	0.0%	200	0.4%	100.0%
Morus (Mulberry)	200	0.3%	75.0%	25.0%	0.0%	0.0%	200	0.3%	100.0%
Ostrya (Ironwood)	200	0.3%	0.0%	75.0%	25.0%	0.0%	200	0.3%	100.0%
Pinus (Pine)	200	0.3%	25.0%	25.0%	50.0%	0.0%	200	0.3%	100.0%
Catalpa	<100	0.2%	0.0%	50.0%	0.0%	50.0%	<100	0.2%	50.0%
Ginkgo	<100	0.2%	100.0%	0.0%	0.0%	0.0%	<100	0.2%	100.0%
Juniperus (Red Cedar)	100	0.2%	0.0%	0.0%	100.0%	0.0%	100	0.2%	100.0%
Populus (Poplar)	100	0.2%	33.3%	66.7%	0.0%	0.0%	100	0.2%	100.0%
Robinia (Black Locust)	<100	0.2%	50.0%	50.0%	0.0%	0.0%	<100	0.2%	100.0%
Salix (Willow)	<100	0.2%	50.0%	50.0%	0.0%	0.0%	<100	0.2%	100.0%
Abies (Fir)	<100	0.1%	100.0%	0.0%	0.0%	0.0%	<100	0.1%	100.0%
Gymno (Kentucky Coffeetree)	<100	0.1%	0.0%	100.0%	0.0%	0.0%	<100	0.1%	100.0%
Magnolia (Magnolia)	<100	0.1%	100.0%	0.0%	0.0%	0.0%	<100	0.1%	100.0%
Thuja (White Cedar)	<100	0.1%	0.0%	0.0%	100.0%	0.0%	<100	0.1%	100.0%

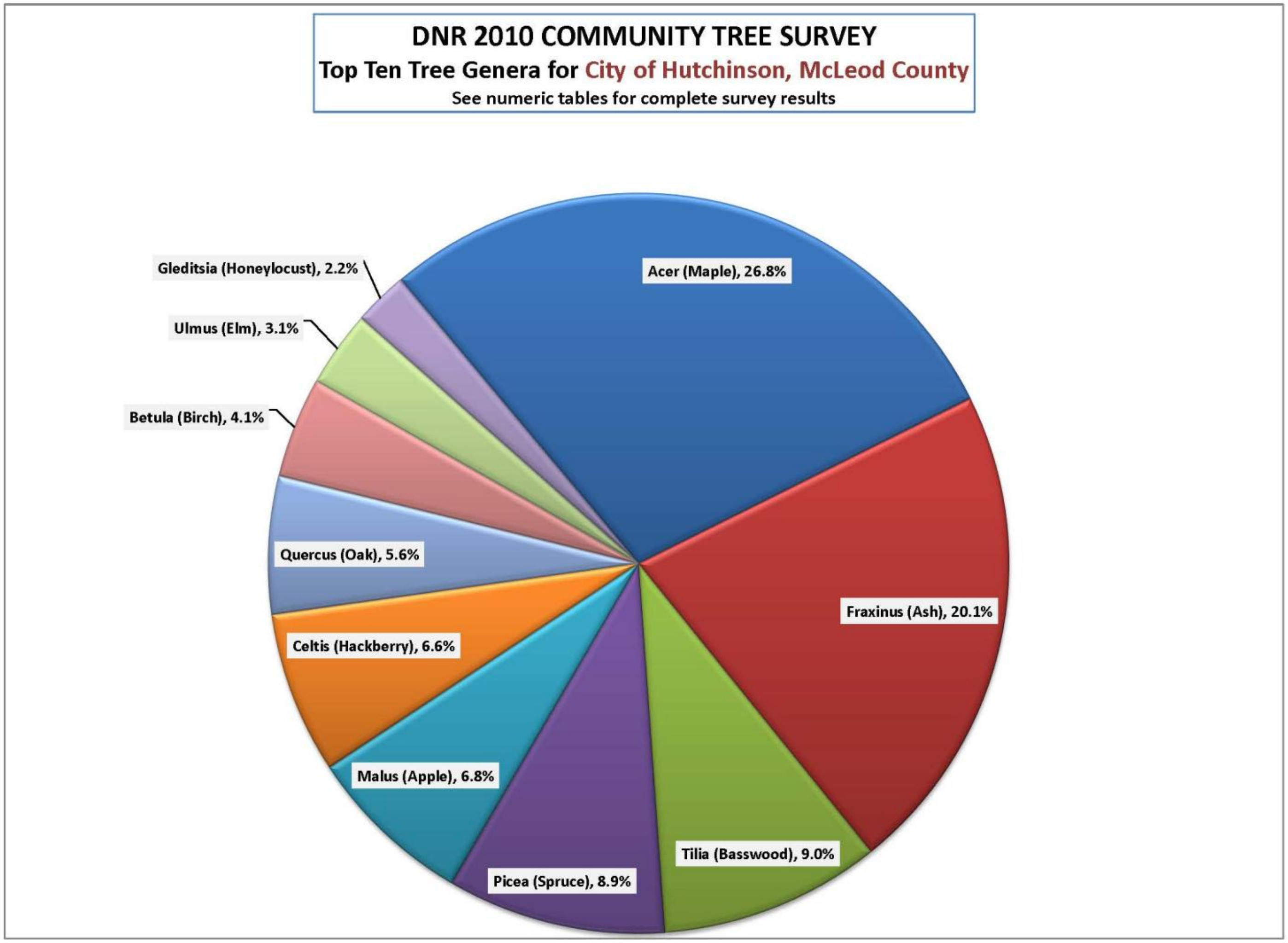
Table 2. Tree condition by size class.

Size Classes ++	Population	Size Class %	Healthy	Dieback	Discolor	Both	Dead
Small (1" - 4.9")	13,500	22.6%	94.9%	4.4%	0.4%	0.0%	0.4%
Medium (5" - 11.9")	21,300	35.6%	95.8%	4.2%	0.0%	0.0%	0.0%
Large (12" - 20.9")	16,700	27.9%	96.7%	3.0%	0.0%	0.0%	0.3%
Super (21" +)	8,200	13.8%	96.4%	3.6%	0.0%	0.0%	0.0%

The numbers above (both tables) do not include shrub-like trees (e.g. Arbovitae) or non-maintained areas such as vacant areas.

**Area within city limits is 5.108 acres. The Business & Residential area is 3.047 acres, of which 100.0% (3.047 acres) is considered Maintained while 0.0% (<1 acres) is considered Non-Maintained.

DNR 2010 Community Tree Survey – Top Ten Tree Genera for City of Hutchinson, McLeod County


DNR 2010 COMMUNITY TREE SURVEY
Top Ten Tree Genera for City of Hutchinson, McLeod County
See numeric tables for complete survey results
Gleditsia (Honeylocust), 2.2%
Acer (Maple), 26.8%
Ulmus (Elm), 3.1%
Betula (Birch), 4.1%
Quercus (Oak), 5.6%
Fraxinus (Ash), 20.1%
Celtis (Hackberry), 6.6%
Malus (Apple), 6.8%
Tilia (Basswood), 9.0%
Picea (Spruce), 8.9%

Appendix D. United States Climate Regions

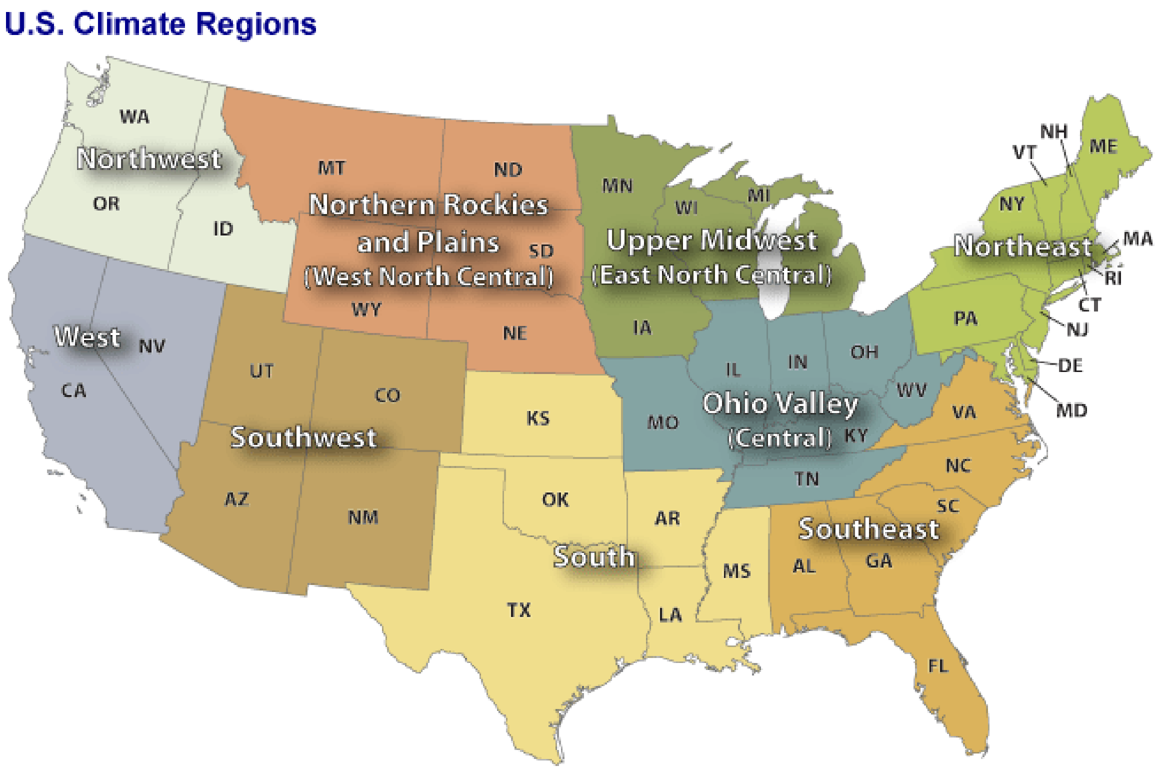


Figure 179. Climatically consistent regions as defined by the National Climatic Data Center (T. R. Karl and Koss 1984)**.**

Appendix E. Hutchinson Climate Data

Temperature

HUTCHINSON 1 N, MINNESOTA

Period of Record General Climate Summary - **Temperature**

Station:(213962) HUTCHINSON 1 N

From Year=1893 To Year=2009

	Monthly Averages			Daily Extremes								Monthly Extremes				Max. Temp.		Min. Temp.	
	Max.	Min.	Mean	High	Date			Low	Date			Highest	Year	Lowest	Year	>=	<=	<=	<=
												Mean		Mean		90 F	32 F	32 F	0 F
	F	F	F	F	day	mon	year	F	day	mon	year	F	-	F	-	# Days	# Days	# Days	# Days
January	21.6	2.4	12	61	24	1	1981	-39	18	1	1994	25.9	2006	-0.9	1977	0	23.8	30.8	14.1
February	26.4	6.9	16.7	60	26	2	1896	-36	2	2	1996	31.1	1987	1.5	1917	0	18.1	27.2	10
March	39.1	20.2	29.7	83	30	3	1968	-32	1	3	1962	41	1968	15.9	1899	0	8.6	26.4	2.8
April	56.8	35	45.9	95	21	4	1980	3	3	4	1975	53.7	1977	37.5	1920	0.2	0.4	12	0
May	70.1	46.7	58.4	99	15	5	2001	20	3	5	1967	66.7	1977	52.4	1997	0.8	0	1.5	0
June	78.8	56.4	67.6	102	25	6	1988	33	5	6	1897	73.9	1988	61.1	1969	2.4	0	0	0
July	83.5	60.9	72.2	105	24	7	1901	40	8	7	1895	77.8	1916	64.5	1992	5.7	0	0	0
August	81	58.1	69.5	104	1	8	1988	31	30	8	1896	76	1983	63.3	2004	3.5	0	0	0
September	72.3	49	60.6	99	17	9	1895	16	18	9	1896	65.9	2004	52.2	1965	1	0	1	0
October	59.4	37.2	48.3	89	1	10	1963	6	28	10	1919	58.4	1963	36.8	1917	0	0.3	10.1	0
November	40.3	23	31.7	81	9	11	1999	-18	26	11	1977	44.6	2001	16.6	1896	0	7.6	24.6	1.3
December	26.1	8.9	17.5	65	2	12	1998	-34	19	12	1983	28.1	1965	-0.2	1983	0	20.6	30.5	9
Annual	54.6	33.7	44.2	105	24	7	1901	-39	18	1	1994	48.2	1987	37.9	1917	13.6	79.4	164.3	37.2
Winter	24.7	6.1	15.4	65	2	12	1998	-39	18	1	1994	24.5	1987	4.2	1917	0	62.4	88.5	33.1
Spring	55.3	34	44.7	99	15	5	2001	-32	1	3	1962	52.3	1977	38.8	1917	1	9	39.9	2.8
Summer	81.1	58.5	69.8	105	24	7	1901	31	30	8	1896	74	1988	64.7	1992	11.6	0	0	0
Fall	57.3	36.4	46.9	99	17	9	1895	-18	26	11	1977	53.5	1963	37.5	1896	1	7.9	35.8	1.3

Table updated on May 22,
For monthly and annual means, thresholds, and sums:
Months with 5 or more missing days are not considered
Years with 1 or more missing months are not considered
Seasons are climatological not calendar seasons
Winter = Dec., Jan., and Feb. Spring = Mar., Apr., and May
Summer = Jun., Jul., and Aug. Fall = Sep., Oct., and Nov.

High Plains Regional Climate Center.

Figure 180. Historical climate summary temperature data for Hutchinson, Minnesota (High Plains Regional Climate Center 2006)**.**

Heating Degree Days

HUTCHINSON 1 N, MINNESOTA													
Period of Record General Climate Summary - **Heating Degree Days**													
Station:(213962) HUTCHINSON 1 N													
From Year=1893 To Year=2009													
Heating Degree Days for Selected Base Temperature (F)													
Base	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
65	**1643**	**1364**	**1095**	**577**	**242**	**52**	**10**	**26**	**185**	**523**	**1000**	**1472**	**8188**
60	1488	1223	940	435	139	17	1	6	98	380	850	1317	6893
57	1395	1139	848	356	92	7	0	2	61	302	760	1224	6185
55	1333	1082	786	305	67	4	0	0	43	254	700	1162	5738
50	1178	941	635	194	25	1	0	0	15	152	554	1007	4702

Heating Degree Day units are computed as the difference between the base temperature and the daily average temperature. (Base Temp. - Daily Ave. Temp.) One unit is accumulated for each degree Fahrenheit the average temperature is below the base temperature. Negative numbers are discarded. Example: If the days high temperature was 65 and the low temperature was 31, the base 50 heating degree day units is 50 - ((65 + 31) / 2) = 2. This is done for each day of the month and summed.

Table updated on May 22,

Months with 5 or more missing days are not considered

Years with 1 or more missing months are not considered

High Plains Regional Climate Center.

Figure 181. Historical climate summary heating degree days data for Hutchinson, Minnesota (High Plains Regional Climate Center 2006)**.**

Cooling Degree Days

HUTCHINSON 1 N, MINNESOTA

Period of Record General Climate Summary - **Cooling Degree Days**

Station:(213962) HUTCHINSON 1 N													
From Year=1893 To Year=2009													
Cooling Degree Days for Selected Base Temperature (F)													
Base	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
55	0	0	1	32	172	382	533	451	211	46	1	0	1830
57	0	0	1	23	135	325	471	390	170	32	0	0	1547
60	0	0	0	12	89	245	379	301	116	17	0	0	1160
65	**0**	**0**	**0**	**4**	**38**	**130**	**233**	**166**	**53**	**5**	**0**	**0**	**629**
70	0	0	0	1	11	53	112	69	19	1	0	0	265

Cooling Degree Day units are computed as the difference between the daily average temperature and the base temperature. (Daily Ave. Temp. - Base Temp.) One unit is accumulated for each degree Fahrenheit the average temperature is above the base temperature. Negative numbers are discarded. Example: If the days high temperature was 95 and the low temperature was 51, the base 60 heating degree day units is ((95 + 51) / 2) - 60 = 13. This is done for each day of the month and summed.

Table updated on May 22,

Months with 5 or more missing days are not considered

Years with 1 or more missing months are not considered

High Plains Regional Climate Center.

Figure 182. Historical climate summary cooling degree days data for Hutchinson, Minnesota (High Plains Regional Climate Center 2006)**.**

Appendix F. Area based geographically weighted extrapolation equations

Below are the equations that were used to extrapolate from block level tree canopy data to zone level and then to the community scale. In the equations below, community is replaced with the term village to avoid potential confusion between the variables used to represent canopy and community. Since the Study Blocks were all different sizes, they were weighted by the proportion of area they hold within the Zone they are contained by. Likewise the Zones were weighted by the proportion of area they hold within the Study Area.

Definition of variables:

Village X (vX); Area of Village X = A vX
  Zone Q (zQ); Area of zQ = A zQ
    Study Block 1 (sb1); Area of sb1 = A sb1
    Study Block 2 (sb2); Area of sb2 = A sb2
    Study Block 3 (sb3); Area of sb3 = A sb3
  Zone R (zR); Area of zR = A zR
    Study Block 4 (sb4); Area of sb4 = A sb4
    Study Block 5 (sb5); Area of sb5 = A sb5
  Zone S (zS); Area of zS = A zS
    Study Block 6 (sb6); Area of sb6 = A sb6
    Study Block 7 (sb7); Area of sb7 = A sb7

Equations:

Geographic Weight of Study Block 1 = (A sb1 /A zQ)
Percent Canopy of Study Block 1 = C sb1
Estimated Percent Canopy of Zone Q = C zQ
  = [(A sb1 / A zQ) * C sb1] + [(A sb2 / A zQ) * C sb2] + [(A sb3 / A zQ) * C sb3]
Estimated Percent Canopy of Zone R = C zR
  = [(A sb4 / A zR) * C sb4] + [(A sb5 / A zR) * C sb5]
Estimated Percent Canopy of Zone S = C zS
  = [(A sb6 / A zS) * C sb6] + [(A sb7 / A zS) * C sb7]
Estimated Percent Canopy of Village X = C vX
  = [(A zQ / A vX) * C zQ] + [(A zR / A vX) * C zR] + [(A zS / A vX) * C zS]

Appendix G. Results of urban tree canopy from randomly sampled points – iTree Canopy

Table 5. Results of technician interpretation of sampled points for municipal boundary and study area. (n=number of points in a given category, %=percent, and SE=Standard Error)

	Interpretation Results of Sampled Points									
	Total	Tree			Not Tree			Indiscernible		
		n	%	SE	n	%	SE	n	%	SE
Municipal Boundary	604	91	15.07	1.46	512	84.77	1.46	1	0.17	0.17
Study Area	158	44	27.85	3.57	113	71.52	3.59	1	0.63	0.63

Appendix H. Results of urban tree canopy from buffered blocks

Table 6. Percent UTC within blocks, 300 foot and 1000 foot block buffers.

	Percent (%) Urban Tree Canopy (UTC)		
Block	Block	300 foot block buffer	1000 foot block buffer
1	4	2	8
2	46	33	21
3	20	28	28
4	39	28	14
5	32	30	19
6	29	24	27
7	8	8	13
8	14	11	15
9	13	17	17
10	28	29	18
11	37	27	24
12	41	32	26
13	46	39	34
14	27	30	32
15	26	28	28
16	38	32	32
17	19	24	22
18	37	28	21
19	13	8	6
20	4	3	4
21	27	25	25
22	32	32	20

Appendix I. Results of urban tree canopy from buffered parcels

Comprehensive parcel buffers

Table 7. Percent UTC within comprehensive parcel buffers.

		Percent (%) Urban Tree Canopy (UTC) Comprehensive parcel buffers (in feet)															
Parcel Code	Block	Parcel	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
101	1	0	1	3	2	3	4	4	5	6	6	6	7	9	10	11	11
102	1	0	1	3	3	2	4	5	5	6	6	7	9	10	11	11	12
103	1	5	3	3	3	2	2	3	3	3	4	4	5	6	8	10	11
104	1	1	1	1	2	4	4	5	5	6	6	7	7	8	9	10	11
105	1	3	3	2	3	3	4	5	5	5	5	6	6	6	7	7	9
106	1	7	4	4	2	2	2	2	3	3	4	4	6	7	9	10	12
107	1	1	2	3	3	3	3	3	4	4	4	5	5	6	7	8	10
108	1	7	5	3	2	2	2	2	3	3	4	5	7	9	10	11	12
109	1	9	4	3	3	2	2	2	2	3	3	3	3	4	5	7	9
1010	1	6	2	3	3	3	2	4	4	4	4	5	5	6	6	7	7
1011	1	7	3	3	3	2	2	2	2	3	3	3	4	4	5	6	7
1012	1	6	4	3	3	2	2	2	2	3	3	4	4	6	7	9	10
201	2	23	37	32	33	35	37	35	32	29	27	26	25	24	23	22	22
202	2	67	41	33	31	32	36	34	32	29	26	25	24	23	23	22	21
203	2	51	49	34	31	33	34	33	30	28	27	25	23	22	22	22	21
204	2	48	44	37	33	32	33	30	29	28	26	25	23	22	22	21	21
205	2	41	42	42	39	36	32	30	26	24	23	23	22	21	21	21	22
206	2	61	41	43	42	36	31	28	25	23	21	21	21	21	21	21	22
207	2	59	47	38	31	28	26	24	21	21	20	20	21	21	21	22	22
208	2	65	51	42	35	31	29	26	24	23	21	20	20	20	20	21	21
209	2	53	43	45	46	38	34	30	27	25	23	22	21	20	21	21	22
2010	2	41	37	40	46	40	34	32	29	26	24	23	21	20	21	21	22
2011	2	25	31	39	45	41	36	32	30	27	24	23	22	21	21	22	22
301	3	33	28	30	31	32	33	33	32	31	31	29	29	28	27	26	25
302	3	46	38	26	24	23	24	27	29	30	30	29	28	27	26	25	24
303	3	52	35	30	32	37	38	38	37	35	34	32	30	29	28	27	26
304	3	28	32	35	37	38	38	37	34	32	32	31	29	28	28	27	26
305	3	33	31	21	18	22	22	23	25	28	30	29	28	26	25	25	23
306	3	17	6	15	23	24	24	26	27	29	29	28	27	26	24	23	22
307	3	36	37	26	29	35	36	37	36	34	32	31	30	28	27	26	26
308	3	9	7	19	22	25	27	26	28	30	30	29	28	26	25	24	23
309	3	12	16	23	26	26	28	30	33	32	31	29	28	27	26	25	24
3010	3	25	27	26	29	31	34	35	36	33	32	30	29	28	27	26	25
3011	3	16	21	25	29	29	31	32	35	33	31	30	28	28	26	25	24
401	4	59	58	40	32	30	28	25	22	20	19	17	16	14	13	12	11
402	4	67	43	42	38	33	30	28	25	22	20	18	16	14	13	11	11
403	4	75	58	41	31	29	28	26	24	22	20	18	16	15	13	12	11
404	4	36	54	37	30	29	28	26	25	23	20	18	17	15	13	12	11
405	4	57	36	32	30	30	27	26	25	23	21	18	17	15	13	12	12
406	4	43	41	34	36	31	30	29	27	23	20	18	16	14	13	12	12
407	4	33	29	39	34	32	30	29	27	23	20	18	16	14	13	12	12
408	4	28	34	37	33	32	30	28	26	23	20	17	15	14	13	12	12
409	4	37	39	38	32	29	28	27	24	22	20	17	15	14	13	12	11
4010	4	9	43	39	31	26	26	26	23	21	19	17	15	14	13	12	11
4012	4	58	38	32	31	29	27	26	24	22	20	18	16	15	14	13	12
4013	4	64	44	40	31	28	25	23	22	20	19	18	16	15	14	13	12
4014	4	42	49	35	30	27	23	19	19	19	18	17	16	15	14	12	12
501	5	44	20	31	33	31	28	25	22	21	20	20	20	20	20	21	22
502	5	42	25	30	27	28	29	27	26	23	21	19	19	19	18	19	20
503	5	63	27	29	27	27	27	28	26	24	22	19	18	18	18	18	19
504	5	21	25	28	28	28	27	27	26	25	22	19	18	18	18	18	19
505	5	15	15	28	29	28	27	25	26	25	22	19	18	17	18	18	18
506	5	19	27	31	32	30	28	26	25	25	22	20	19	19	19	19	19
507	5	16	29	32	31	30	28	27	26	25	23	20	19	19	19	19	19
508	5	8	34	32	32	28	28	28	26	25	22	20	20	20	19	19	19
509	5	36	40	33	30	29	29	27	26	24	22	21	21	20	19	19	19
5010	5	14	43	33	28	30	29	26	24	23	21	21	21	20	19	19	20
5011	5	20	40	32	31	30	29	26	23	22	22	22	21	20	20	20	21
601	6	34	19	23	23	25	27	29	32	31	31	30	28	27	25	24	23
604	6	23	24	23	23	24	27	28	28	28	29	29	28	27	26	25	24
605	6	38	20	24	22	23	26	27	26	27	28	28	28	27	26	25	24
606	6	12	21	25	22	23	25	25	25	26	26	27	27	27	26	25	25
607	6	43	20	24	21	22	23	24	25	25	25	26	27	27	26	25	25
608	6	25	22	25	20	21	22	22	24	24	25	26	27	27	26	26	25
609	6	38	28	24	22	22	23	24	25	25	25	26	26	26	26	26	26

		Percent (%) Urban Tree Canopy (UTC)																
		Comprehensive parcel buffers (in feet)																
Parcel Code	Block	Parcel	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
6010	6	31	29	25	23	24	24	25	26	26	26	26	27	27	26	26	26
6011	6	25	31	25	25	24	24	26	27	26	26	26	27	27	26	26	25
6012	6	25	29	26	24	25	25	27	27	27	27	27	27	27	26	26	25
6013	6	29	31	26	23	27	26	28	28	28	28	28	27	27	27	26	25
6014	6	27	35	24	23	26	27	28	29	29	29	28	28	27	26	25	24
6015	6	30	34	25	23	26	27	29	30	30	29	29	28	27	26	25	24
801	8	14	10	10	8	10	11	12	13	15	16	16	15	15	15	14	15
803	8	10	9	14	13	11	12	13	15	16	16	17	16	15	15	15	15
804	8	13	11	12	14	12	12	14	15	16	16	17	16	16	15	15	15
805	8	43	13	12	11	13	12	13	15	16	18	17	17	16	16	16	16
806	8	12	11	9	11	12	12	13	14	17	17	17	16	16	16	16	16
807	8	6	11	9	9	12	12	14	14	16	16	16	16	16	16	16	16
808	8	35	9	7	9	11	12	14	15	16	16	15	16	16	16	16	16
1001	10	14	30	41	39	35	32	28	25	23	21	20	19	18	17	17	18
1002	10	49	28	32	30	29	28	25	23	22	21	20	18	17	17	17	17
1003	10	37	31	25	30	29	26	24	23	22	20	19	18	17	17	17	17
1004	10	34	28	24	28	28	25	23	23	21	20	19	17	16	16	17	17
1005	10	2	30	28	25	25	24	22	21	20	19	18	17	16	16	17	17
1006	10	19	34	34	31	30	27	25	23	20	19	18	17	17	16	16	17
1007	10	82	32	33	35	32	28	26	24	22	20	19	18	17	17	17	17
1008	10	22	37	35	37	34	30	27	24	22	20	19	18	18	17	17	17
1101	11	12	32	36	30	26	26	26	26	25	26	25	25	24	24	24	25
1102	11	81	48	38	34	33	31	29	27	28	27	26	25	24	25	25	25
1103	11	45	38	36	31	30	29	28	27	26	25	25	24	24	24	24	24
1104	11	53	32	32	29	28	27	27	27	25	24	24	24	24	24	24	24
1105	11	40	28	29	28	27	25	26	26	25	24	24	24	24	23	24	24
1106	11	14	20	23	26	25	24	25	25	25	24	23	23	23	23	23	23
1201	12	30	41	43	41	36	34	32	30	28	27	26	25	26	26	25	25
1202	12	79	48	44	39	37	35	34	31	29	28	27	26	26	26	26	26
1203	12	68	57	44	39	36	36	33	31	30	28	28	27	26	26	26	26
1204	12	79	45	47	38	35	35	33	31	30	29	28	27	26	27	26	26
1205	12	43	45	40	41	36	33	32	31	30	29	28	27	27	27	27	26
1206	12	42	41	38	39	37	33	31	31	30	29	28	27	28	27	27	26
1207	12	24	40	34	34	34	33	31	30	30	29	28	28	28	27	27	26
1208	12	8	35	32	32	32	32	31	30	29	29	28	28	28	27	26	26
1209	12	43	30	31	31	30	31	32	29	28	29	28	28	28	27	27	26
12010	12	43	25	28	30	29	31	31	29	29	29	28	28	28	27	27	27
12011	12	29	29	31	31	30	29	28	27	26	27	28	28	27	26	26	26
12012	12	33	37	31	30	29	30	29	27	26	27	28	28	27	26	26	25
12013	12	50	37	33	30	30	31	29	27	27	27	28	28	27	26	26	25
12014	12	43	39	36	33	31	31	29	28	28	27	28	28	27	27	26	25
12015	12	46	38	38	36	32	31	29	29	28	27	28	28	27	27	26	25
12016	12	32	42	42	39	33	31	30	30	28	27	27	27	27	27	26	25
12017	12	59	47	43	38	34	32	30	30	29	28	27	27	27	27	26	25
12018	12	40	53	45	37	35	33	30	30	28	28	27	27	27	26	26	25
12019	12	78	61	45	37	36	33	31	30	28	28	27	27	27	26	26	25
12020	12	59	52	41	38	36	33	31	30	28	27	26	26	26	26	26	25
12021	12	54	44	41	40	36	33	31	30	28	27	26	26	26	26	26	25
12022	12	13	33	41	40	36	33	30	29	27	26	26	26	26	26	25	25
12023	12	14	26	40	39	35	33	30	29	27	26	25	25	25	26	25	24
1301	13	19	37	40	40	38	37	39	38	37	36	35	34	33	33	33	33
1302	13	78	47	42	39	40	39	38	38	37	36	35	34	33	33	33	33
1303	13	90	55	43	40	40	40	37	38	38	36	35	34	33	34	33	33
1304	13	73	61	44	42	41	40	38	38	38	36	35	34	34	34	33	33
1305	13	59	53	50	43	42	39	38	38	37	36	34	34	34	34	34	33
1306	13	42	53	48	45	42	38	39	38	37	35	34	34	34	34	34	33
1307	13	29	55	47	45	42	38	38	38	37	35	34	34	34	34	33	33
1308	13	80	48	45	43	42	40	37	37	36	35	34	35	34	34	33	33
1309	13	39	51	41	41	41	39	37	36	36	35	35	35	34	34	33	33
13010	13	32	40	38	42	42	38	37	37	36	35	34	34	34	34	33	33
13011	13	66	37	38	43	42	38	36	37	36	35	34	34	34	33	33	33
13012	13	57	42	43	47	43	38	37	37	36	35	34	34	34	33	33	33
13013	13	23	43	47	45	42	39	38	37	36	35	34	33	34	34	33	33
13014	13	49	50	45	42	41	40	39	38	36	35	34	34	34	33	33	33
13015	13	43	52	44	39	41	40	40	37	36	35	34	34	33	33	33	33

		Percent (%) Urban Tree Canopy (UTC)																
		Comprehensive parcel buffers (in feet)																
Parcel Code	Block	Parcel	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
13016	13	48	46	43	38	40	40	39	37	36	35	34	34	34	33	33	33
13017	13	13	36	41	39	38	40	38	38	36	35	34	34	34	33	33	32
13018	13	16	32	39	39	37	38	38	37	36	35	34	34	34	33	32	32
1401	14	47	25	22	28	29	33	34	34	34	34	33	33	33	33	33	32
1402	14	28	27	25	27	28	32	34	33	33	34	33	33	32	32	33	32
1403	14	41	30	28	25	29	30	32	33	33	34	33	32	32	32	32	32
1404	14	24	30	30	28	28	29	30	33	33	34	33	32	32	32	32	31
1405	14	27	32	30	30	29	28	29	32	33	34	33	32	31	32	31	31
1406	14	2	24	28	33	30	29	31	32	34	34	33	33	32	32	31	31
1407	14	34	23	28	30	30	30	32	33	34	34	34	33	33	32	31	31
1408	14	9	20	24	27	29	33	35	34	34	34	34	34	33	33	32	32
1409	14	0	18	25	26	29	34	35	35	34	34	34	34	33	32	32	32
14010	14	20	12	25	26	30	34	35	36	35	34	34	34	33	33	33	32
1501	15	7	23	22	27	28	31	30	28	29	29	30	30	30	29	28	28
1502	15	45	20	25	27	28	30	30	28	28	29	29	29	29	28	28	28
1503	15	20	24	24	30	29	28	29	29	28	28	28	28	28	28	27	27
1504	15	28	27	28	31	30	27	29	28	29	28	27	27	27	27	27	26
1505	15	16	23	31	28	28	28	27	27	28	28	27	27	27	27	27	26
1506	15	6	25	27	27	27	28	27	28	28	27	28	28	28	28	27	27
1507	15	16	21	27	24	27	28	29	28	28	28	29	29	29	28	28	28
1508	15	18	23	21	24	27	30	29	28	29	29	29	30	30	29	28	28
1601	16	18	23	28	32	31	32	33	32	32	32	31	31	30	31	31	30
1602	16	15	25	31	31	31	33	32	32	32	32	31	31	30	31	31	30
1603	16	42	38	34	32	31	31	30	31	31	30	30	30	30	30	30	30
1604	16	35	35	35	36	33	31	32	33	33	33	34	33	33	33	33	32
1605	16	51	32	30	35	35	31	31	31	31	31	32	32	31	31	31	31
1606	16	24	32	30	32	35	33	31	32	32	32	32	32	32	31	31	31
1607	16	24	31	31	32	34	33	32	32	32	33	32	33	33	32	32	32
1608	16	27	32	35	32	33	33	32	31	33	33	33	34	33	33	32	32
1609	16	39	35	38	34	32	32	32	32	33	33	33	34	34	34	33	32
16010	16	35	44	38	35	33	31	32	33	33	33	34	34	34	34	33	32
16011	16	94	42	37	33	32	32	33	35	33	34	34	35	35	34	33	33
16012	16	70	41	35	31	30	33	34	33	33	33	34	34	35	34	33	32
16013	16	45	37	33	30	31	34	34	33	33	33	33	34	34	34	33	32
16014	16	59	33	29	30	32	33	34	33	33	33	33	34	34	33	33	32
16015	16	49	28	27	33	32	33	33	33	32	33	33	32	33	33	32	31
16016	16	54	41	35	35	33	31	32	34	35	34	34	35	34	34	33	33
16017	16	53	38	40	32	32	32	32	34	34	34	34	34	34	34	33	32
16018	16	10	42	36	33	31	33	33	33	33	33	34	34	34	33	33	32
1701	17	19	26	27	25	23	21	20	19	19	20	20	21	21	21	20	21
1702	17	36	22	26	27	25	24	23	22	22	22	22	22	23	23	23	23
1703	17	8	23	26	25	23	25	22	20	21	21	21	22	22	23	23	23
1704	17	15	26	22	22	24	23	20	19	19	20	21	21	21	22	23	23
1705	17	60	31	29	27	26	24	21	20	20	21	22	21	21	22	22	22
1706	17	12	27	31	29	27	25	24	24	23	23	23	22	22	22	22	23
1707	17	44	28	23	26	27	24	24	25	24	23	23	23	23	24	23	24
1708	17	24	22	23	25	26	27	26	25	25	24	24	24	24	24	24	24
1709	17	6	22	28	27	28	27	27	26	25	24	23	23	23	23	23	23
1801	18	36	40	36	34	34	30	27	26	25	24	23	23	22	22	21	21
1802	18	32	36	35	33	32	29	26	25	24	24	23	23	23	22	21	21
1803	18	43	34	31	29	29	27	25	24	24	24	24	23	23	23	22	21
1804	18	8	29	28	23	24	24	23	23	24	24	24	24	24	23	22	21
1805	18	42	46	35	29	26	25	23	22	21	21	22	22	22	21	21	20
1806	18	49	41	41	34	31	28	25	22	21	22	22	22	22	21	21	20
1807	18	37	37	42	40	34	30	26	23	22	22	22	21	21	21	20	20
1808	18	22	31	43	42	37	32	28	24	23	22	22	21	21	20	20	20
1809	18	51	49	39	30	27	25	22	22	20	20	20	21	21	20	19	19
18010	18	31	33	41	42	38	32	29	26	24	22	22	21	20	20	20	19
18011	18	58	39	39	38	34	31	30	28	26	23	21	21	20	19	18	18
18012	18	27	30	33	34	33	30	30	28	26	23	22	20	19	18	18	17
18013	18	29	25	33	35	32	31	29	28	26	23	22	21	20	19	18	18
18014	18	43	43	39	33	31	31	30	28	26	24	23	22	21	21	20	20
1901	19	8	16	14	11	10	9	8	7	7	7	6	6	6	7	8	8
1903	19	21	15	17	15	12	10	9	8	7	7	6	6	7	7	8	8
1904	19	21	13	12	13	13	11	9	8	7	7	7	7	7	8	8	8

		Percent (%) Urban Tree Canopy (UTC)															
		Comprehensive parcel buffers (in feet)															
Parcel Code	Block	Parcel	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
1905	19	7	11	11	12	12	11	9	8	7	7	7	7	7	8	8	8
1906	19	7	9	11	11	10	10	9	8	7	7	7	7	8	8	9	9
1907	19	13	16	10	8	7	6	7	8	8	8	8	7	8	8	9	9
1908	19	7	6	6	5	5	5	5	7	7	7	7	8	7	8	8	8
1909	19	15	8	6	6	6	5	6	7	7	7	7	7	7	7	8	8
19010	19	3	7	6	6	6	6	6	7	7	7	7	7	7	7	8	8
19011	19	4	5	6	6	8	7	7	7	7	7	7	6	6	7	7	8
19012	19	6	6	6	7	8	8	7	7	7	7	6	6	6	6	7	7
19013	19	11	6	8	8	8	8	7	7	7	6	6	6	6	6	7	7
19014	19	1	8	10	8	8	8	8	7	6	6	6	6	6	6	7	7
19015	19	5	13	10	8	8	7	7	7	6	6	6	6	5	6	6	7
19016	19	22	17	10	8	7	7	7	6	6	6	6	6	5	6	6	7
19017	19	26	15	8	7	7	6	6	6	6	6	6	5	5	5	6	7
2001	20	5	5	3	3	4	4	3	3	3	3	4	5	6	7	7	8
2002	20	6	5	3	3	4	4	3	3	3	4	5	5	6	7	7	7
2003	20	9	10	6	4	3	3	2	2	2	2	3	4	6	7	7	7
2004	20	1	2	2	2	3	3	3	3	2	3	3	3	2	2	3	5
2005	20	0	1	1	1	2	2	2	3	3	3	2	3	3	3	4	5
2006	20	0	0	0	0	0	0	2	2	3	3	3	3	3	3	3	3
2007	20	0	0	0	0	0	1	1	2	2	2	2	3	3	3	3	3
2008	20	0	0	0	0	1	1	1	2	2	2	2	2	3	3	3	3
2009	20	11	10	6	4	4	3	2	2	3	2	3	4	6	8	8	8
20010	20	0	0	0	0	1	1	2	2	2	2	2	3	3	3	3	3
20011	20	5	6	6	4	3	3	3	3	3	3	3	5	6	8	8	8
2101	21	40	33	29	25	27	28	28	27	27	26	26	26	25	24	23	22
2103	21	33	32	27	29	28	28	27	26	26	27	26	25	25	24	23	22
2104	21	35	25	26	27	30	28	28	27	27	27	26	26	25	24	23	23
2105	21	10	26	23	24	29	28	28	28	28	27	26	26	25	24	24	23
2106	21	28	19	23	22	27	29	29	29	29	27	27	27	25	24	24	23
2107	21	33	19	19	21	26	29	31	31	29	28	27	27	26	25	24	24
2108	21	24	24	17	23	24	29	32	31	29	29	28	27	26	25	24	24
2109	21	30	20	21	22	26	29	32	32	31	29	27	26	26	26	25	25
21012	21	17	31	32	29	25	24	24	24	24	24	24	24	23	23	22	22
21013	21	53	36	35	30	25	23	23	23	23	24	24	23	23	22	22	22
21014	21	40	37	36	31	25	23	23	23	22	23	23	23	23	23	22	22
21015	21	15	38	33	31	25	24	22	22	23	23	23	23	22	23	22	21
21016	21	39	27	30	28	26	23	22	22	23	22	22	23	22	23	22	21
21017	21	16	20	24	25	25	23	23	23	22	22	22	23	23	22	22	21
21018	21	8	16	19	22	23	23	25	23	23	22	23	22	22	23	22	21
2201	22	52	33	32	35	36	33	30	27	26	25	23	22	21	20	19	19
2202	22	34	35	38	35	35	35	32	29	27	25	23	22	22	21	20	20
2203	22	38	32	34	41	38	34	33	31	29	27	25	24	23	22	21	21
2204	22	32	29	25	27	27	26	26	26	26	25	24	24	22	22	21	20
2205	22	20	31	28	25	23	22	24	24	25	25	24	23	22	21	20	19
2206	22	15	25	26	29	29	31	30	29	27	26	25	23	22	21	19	19
2207	22	48	39	25	23	20	21	21	23	24	24	23	22	21	20	19	18
2208	22	67	36	24	20	19	19	19	22	23	23	23	21	20	19	19	18
2209	22	29	29	22	19	17	18	19	20	21	23	22	21	20	19	18	17
22010	22	35	32	35	33	31	29	26	24	22	20	19	18	17	16	15	15
22011	22	43	21	19	18	17	18	18	18	20	22	21	20	19	18	17	16
22013	22	35	24	24	29	30	29	29	28	27	26	25	24	23	22	21	20

Thin band parcel buffers

Table 8. Percent UTC within thin band parcel buffers.

		Percent (%) Urban Tree Canopy (UTC) — Thin band parcel buffers (in feet)														
Parcel Code	Block	Parcel-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800	800-900	900-1000	1000-1100	1100-1200	1200-1300	1300-1400	1400-1500
101	1	1	4	2	3	8	5	6	9	7	8	13	16	19	15	15
102	1	2	3	3	2	7	7	7	8	8	13	17	17	15	14	14
103	1	3	3	2	2	2	4	4	5	6	7	7	13	21	20	21
104	1	1	1	3	7	6	5	8	8	8	7	9	13	18	15	19
105	1	3	2	3	4	6	7	6	5	7	7	8	8	11	10	18
106	1	3	3	1	2	2	2	6	4	7	7	12	17	21	18	21
107	1	2	3	4	2	3	4	6	6	5	7	7	7	13	17	24
108	1	4	2	2	2	1	2	7	4	7	12	14	20	18	19	19
109	1	3	3	2	2	1	1	3	4	5	3	5	7	12	20	23
1010	1	1	3	3	3	2	7	4	6	5	6	8	10	9	8	12
1011	1	2	3	3	2	1	2	3	5	5	4	5	8	8	10	19
1012	1	3	3	3	1	1	4	2	7	4	5	7	13	18	21	21
201	2	39	29	34	38	40	32	19	19	18	19	21	23	16	15	20
202	2	35	27	30	34	44	30	24	17	16	18	20	19	18	16	19
203	2	48	23	28	35	36	31	22	20	20	15	17	18	18	20	20
204	2	43	33	27	30	36	23	24	25	20	17	13	16	21	19	20
205	2	42	41	35	31	23	22	15	16	20	19	17	16	18	24	26
206	2	35	45	41	24	22	17	18	13	16	17	22	19	22	22	25
207	2	43	31	20	23	22	16	14	17	18	22	25	23	22	23	25
208	2	48	34	26	26	25	16	17	19	12	16	20	21	22	22	24
209	2	41	46	47	23	25	20	17	19	14	15	15	16	23	25	25
2010	2	35	43	53	30	21	25	21	15	15	16	13	14	25	27	25
2011	2	33	45	52	36	24	21	23	17	12	16	17	17	22	25	22
301	3	27	32	33	33	35	33	30	28	27	21	26	24	23	17	18
302	3	37	18	22	21	25	36	36	31	31	24	25	20	21	18	17
303	3	32	28	33	45	42	35	34	29	29	22	23	21	21	23	20
304	3	33	37	40	39	36	34	26	25	29	28	21	23	22	22	19
305	3	31	14	15	27	22	27	33	36	37	28	20	18	18	20	16
306	3	4	20	32	26	23	31	31	35	31	23	23	18	15	17	16
307	3	37	19	32	45	38	41	33	27	25	24	23	21	21	20	20
308	3	7	27	25	29	31	26	34	37	31	24	19	17	17	17	17
309	3	17	28	30	27	32	36	39	30	26	22	23	20	20	17	16
3010	3	28	25	32	36	38	37	40	25	24	23	25	22	20	20	18
3011	3	22	28	32	30	34	37	41	29	21	23	23	23	19	17	19
401	4	58	29	22	28	22	20	11	15	12	11	8	6	3	4	4
402	4	39	42	32	26	23	23	14	12	11	8	6	4	4	3	7
403	4	56	30	21	26	26	21	16	15	12	9	8	6	2	4	3
404	4	57	27	22	29	26	19	22	16	9	8	9	5	3	4	5
405	4	32	29	28	32	21	23	22	16	11	7	7	5	5	5	5
406	4	41	30	38	22	29	27	19	12	8	10	6	3	4	5	10
407	4	29	45	29	29	24	28	19	11	7	7	8	3	5	7	8
408	4	35	39	28	30	26	22	20	14	6	7	5	7	6	7	7
409	4	39	37	25	25	26	24	16	15	8	6	7	7	8	5	6
4010	4	47	36	22	19	24	25	16	12	11	7	8	8	6	8	5
4012	4	34	28	30	26	23	23	17	16	10	8	7	9	8	7	8
4013	4	41	37	22	23	18	17	20	15	15	9	9	7	8	6	6
4014	4	51	26	23	23	12	10	20	16	15	15	8	7	6	6	7
501	5	17	37	36	27	21	18	14	16	17	22	17	18	23	27	28
502	5	23	32	24	28	33	22	21	13	11	14	15	18	17	19	27
503	5	22	29	26	26	28	32	19	16	13	7	12	20	19	17	23
504	5	25	29	28	29	25	27	23	19	12	7	8	20	19	19	21
505	5	15	35	31	26	24	19	30	19	10	9	10	15	21	20	20
506	5	28	33	34	27	25	21	22	22	12	11	11	20	21	19	21
507	5	30	34	31	28	24	25	23	20	14	8	14	20	18	18	22
508	5	37	31	32	22	28	27	21	19	13	10	19	18	16	19	21
509	5	41	28	27	27	28	24	20	18	13	17	20	15	15	18	22
5010	5	46	27	23	32	27	20	18	19	15	20	20	14	15	19	25
5011	5	43	27	30	29	27	18	14	18	23	20	18	17	16	21	27
601	6	17	25	24	27	31	35	39	31	27	27	22	19	14	13	20
604	6	24	23	22	25	34	30	27	29	33	29	24	21	20	19	17
605	6	17	27	19	25	33	29	25	28	31	31	25	23	21	19	18
606	6	22	28	19	25	28	28	25	29	25	33	29	27	20	18	20
607	6	17	27	18	25	25	25	28	26	25	31	33	26	22	19	20
608	6	22	26	15	23	22	25	28	27	26	29	33	28	23	21	19
609	6	27	22	20	22	24	27	28	25	25	30	28	27	24	23	24

		Percent (%) Urban Tree Canopy (UTC) Thin band parcel buffers (in feet)														
Parcel Code	Block	Parcel-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800	800-900	900-1000	1000-1100	1100-1200	1200-1300	1300-1400	1400-1500
6010	6	29	23	21	24	24	30	27	24	27	26	32	27	22	24	24
6011	6	32	21	24	24	24	32	28	25	27	25	29	29	22	22	22
6012	6	29	25	21	28	26	30	28	27	28	26	25	28	24	23	20
6013	6	31	24	20	32	26	32	29	27	30	25	24	26	25	20	18
6014	6	36	18	22	31	28	30	31	29	28	26	25	24	21	20	17
6015	6	35	20	20	31	30	33	33	30	27	26	27	22	16	18	18
801	8	10	9	7	12	12	14	18	22	18	15	12	14	13	14	16
803	8	9	16	11	10	12	16	20	19	18	20	11	11	13	16	16
804	8	11	13	17	8	13	19	19	20	16	21	13	12	12	15	17
805	8	10	12	9	15	11	16	20	22	22	16	14	14	16	15	16
806	8	11	8	12	14	12	16	18	24	19	14	13	17	14	16	17
807	8	12	7	10	15	12	18	17	23	16	14	15	17	15	16	18
808	8	5	6	11	13	14	18	20	18	15	14	17	16	17	15	16
1001	10	32	48	37	28	25	17	19	13	13	15	15	13	13	16	20
1002	10	26	33	28	27	26	19	16	19	16	15	11	8	18	20	17
1003	10	31	21	36	27	20	18	19	18	15	14	10	10	17	21	17
1004	10	27	22	32	27	19	18	22	13	18	13	9	12	16	21	17
1005	10	34	27	23	25	21	18	19	14	15	16	10	10	18	19	17
1006	10	36	34	27	28	20	21	17	11	12	14	15	14	14	15	20
1007	10	26	34	38	28	19	21	18	13	12	14	14	15	13	16	19
1008	10	39	34	39	30	21	21	16	15	11	13	15	14	14	17	20
1101	11	34	39	24	19	26	25	26	22	28	23	22	21	23	24	30
1102	11	42	31	30	31	27	23	24	28	23	21	22	20	26	28	24
1103	11	38	35	26	29	26	25	25	22	21	25	22	24	24	21	26
1104	11	29	33	26	25	26	26	27	18	22	24	23	22	24	21	26
1105	11	26	30	28	24	22	27	27	21	21	22	25	22	23	24	24
1106	11	21	25	29	24	22	26	26	23	20	19	27	22	23	25	22
1201	12	43	44	38	28	31	25	22	24	22	19	24	28	24	24	26
1202	12	43	42	34	34	32	29	24	22	23	21	23	24	27	26	24
1203	12	55	37	32	31	36	27	24	24	22	24	21	23	29	26	24
1204	12	40	47	29	30	34	28	24	27	26	20	23	23	30	24	24
1205	12	46	37	42	28	28	28	27	27	28	21	24	26	27	24	21
1206	12	41	36	40	33	26	26	29	29	25	22	25	29	25	23	20
1207	12	42	30	35	32	31	25	29	28	24	27	28	27	24	20	20
1208	12	38	30	32	31	33	30	25	26	27	26	29	28	23	20	23
1209	12	29	32	30	30	33	32	22	26	29	28	27	28	22	23	23
12010	12	23	29	33	26	34	31	23	28	29	26	26	28	24	27	23
12011	12	29	32	30	28	26	28	24	21	32	30	28	22	24	24	23
12012	12	38	26	30	28	31	27	21	21	31	34	25	24	21	22	23
12013	12	33	30	26	31	33	23	22	25	31	30	27	23	21	22	20
12014	12	38	34	30	27	31	25	25	25	26	29	29	24	22	21	19
12015	12	37	38	33	25	30	25	26	25	25	29	28	24	23	21	18
12016	12	43	42	35	25	25	29	28	24	24	27	27	26	25	21	20
12017	12	45	41	33	27	27	27	28	25	24	25	26	28	23	22	21
12018	12	54	40	29	31	28	24	29	23	24	24	26	28	23	25	20
12019	12	59	35	29	33	26	26	28	22	25	22	26	28	23	25	21
12020	12	51	35	34	34	26	26	25	23	23	22	27	27	24	25	20
12021	12	43	39	38	30	26	26	26	22	22	23	25	26	26	24	18
12022	12	35	46	40	29	27	23	26	20	23	23	24	27	27	22	18
12023	12	28	49	38	28	29	22	26	21	23	21	25	27	27	22	19
1301	13	39	42	40	35	36	42	36	32	35	28	29	29	31	33	33
1302	13	44	39	36	41	37	37	38	35	32	28	29	30	33	32	33
1303	13	51	35	37	41	40	31	39	38	27	29	30	31	34	31	33
1304	13	59	34	39	40	37	32	40	36	27	30	31	32	33	33	32
1305	13	52	49	36	39	34	36	38	34	30	28	33	34	31	33	30
1306	13	54	46	42	36	30	41	34	34	29	30	34	33	31	32	30
1307	13	58	43	42	36	32	37	37	33	28	32	34	34	32	30	31
1308	13	44	43	40	40	35	31	37	34	30	32	36	33	30	31	31
1309	13	53	35	41	42	34	33	34	36	31	32	33	34	28	33	32
13010	13	41	37	47	41	28	34	38	34	31	28	37	30	32	31	31
13011	13	34	38	48	40	30	33	38	32	31	30	34	32	31	34	29
13012	13	40	44	51	36	28	35	36	34	28	32	31	34	32	30	31
13013	13	46	49	44	36	33	37	33	32	29	31	31	35	34	30	30
13014	13	50	42	38	39	40	36	32	29	32	29	31	34	32	32	30
13015	13	53	39	34	44	39	37	28	34	30	30	33	32	32	32	32

		Percent (%) Urban Tree Canopy (UTC) Thin band parcel buffers (in feet)														
Parcel Code	Block	Parcel-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800	800-900	900-1000	1000-1100	1100-1200	1200-1300	1300-1400	1400-1500
13016	13	46	41	33	43	41	36	32	32	29	31	32	33	29	33	31
13017	13	39	44	37	38	44	33	36	31	30	31	31	34	28	31	30
13018	13	34	43	38	36	39	40	34	32	30	31	32	32	29	30	31
1401	14	22	20	35	31	41	39	33	33	33	32	32	30	33	33	30
1402	14	27	24	29	31	38	39	33	34	35	29	31	30	34	33	29
1403	14	29	27	21	36	32	36	37	35	38	29	26	32	34	31	29
1404	14	31	30	25	29	31	32	40	36	36	30	25	31	34	30	29
1405	14	32	29	30	26	27	32	39	39	37	28	28	29	33	29	31
1406	14	26	31	39	25	26	36	35	41	35	30	32	29	27	28	26
1407	14	21	31	33	31	30	36	37	37	35	31	31	30	28	29	27
1408	14	21	27	30	32	41	38	34	33	34	34	31	29	30	30	29
1409	14	19	28	26	34	43	39	35	33	33	33	32	30	29	32	30
14010	14	11	32	27	36	43	39	37	32	31	32	34	31	29	33	31
1501	15	26	22	32	30	37	27	24	31	30	34	32	26	25	24	25
1502	15	17	29	29	30	32	30	25	27	30	32	29	28	26	24	25
1503	15	24	24	36	28	25	31	29	27	27	29	27	27	27	25	22
1504	15	26	28	34	29	22	32	27	30	23	23	29	24	28	25	23
1505	15	24	36	25	28	26	25	29	29	27	24	28	26	25	27	24
1506	15	27	28	27	28	30	25	30	27	26	32	29	24	27	26	26
1507	15	22	30	21	32	30	31	26	27	31	32	29	28	25	25	29
1508	15	23	21	27	31	36	27	25	31	33	30	33	27	24	26	29
1601	16	24	31	35	30	35	36	29	33	29	29	29	28	35	31	26
1602	16	26	34	32	30	36	31	30	34	29	26	31	27	33	32	28
1603	16	37	31	30	30	32	27	33	30	29	29	28	28	29	31	31
1604	16	35	34	37	29	29	32	35	33	37	34	31	34	31	30	26
1605	16	29	29	41	35	25	29	33	30	31	36	30	27	28	30	34
1606	16	33	28	35	39	29	28	34	31	32	34	31	30	28	32	31
1607	16	31	32	33	38	31	28	31	33	36	31	35	32	30	28	31
1608	16	32	37	29	34	34	29	29	38	35	31	38	31	31	29	26
1609	16	34	40	29	30	33	32	32	35	36	33	36	33	34	27	24
16010	16	45	35	31	31	26	36	36	33	35	36	35	34	33	28	25
16011	16	36	34	28	31	32	36	39	27	39	36	35	39	29	27	30
16012	16	38	31	28	28	40	35	32	32	35	36	37	37	32	26	27
16013	16	36	30	28	31	41	35	28	34	32	36	36	37	31	25	27
16014	16	30	27	32	36	36	35	29	33	32	34	36	35	29	29	26
16015	16	25	26	39	32	34	34	33	28	34	33	31	35	31	28	26
16016	16	40	32	35	30	27	36	38	39	30	37	35	33	33	29	27
16017	16	35	41	24	31	32	34	39	32	34	36	35	32	32	29	27
16018	16	46	33	29	29	36	35	33	35	32	37	35	32	29	31	29
1701	17	26	28	23	20	18	16	17	19	21	22	22	23	19	19	25
1702	17	20	28	29	21	22	21	21	22	21	22	24	25	26	22	25
1703	17	25	28	23	21	28	14	16	23	23	22	25	24	25	28	20
1704	17	27	20	21	29	19	14	16	21	23	24	24	21	27	26	21
1705	17	27	28	24	24	19	15	16	21	25	24	19	22	23	21	24
1706	17	29	34	27	22	20	22	23	21	23	21	18	25	23	22	25
1707	17	26	19	30	27	19	23	28	20	19	25	24	24	25	22	26
1708	17	22	24	26	28	29	24	22	24	21	25	22	21	25	27	25
1709	17	24	32	26	29	25	26	24	22	19	21	22	21	21	26	25
1801	18	40	35	32	34	22	17	24	24	16	21	20	20	18	19	15
1802	18	37	34	31	31	22	18	20	24	20	21	22	21	20	16	16
1803	18	32	29	26	30	22	19	20	24	23	23	23	22	20	15	15
1804	18	32	27	17	27	25	20	24	24	24	26	23	23	18	16	14
1805	18	46	28	22	21	23	19	18	19	21	25	22	21	19	16	14
1806	18	40	42	26	25	22	19	12	19	23	22	22	20	20	15	13
1807	18	37	45	37	25	22	16	14	16	24	20	21	21	17	17	17
1808	18	32	50	42	29	21	17	15	17	18	20	21	17	17	18	17
1809	18	49	32	21	22	20	14	20	17	18	22	23	20	18	14	15
18010	18	34	46	44	31	19	20	18	15	16	19	17	16	20	16	17
18011	18	37	38	37	27	26	29	21	18	12	12	17	16	15	12	16
18012	18	31	35	35	31	24	28	22	17	12	15	14	13	12	14	13
18013	18	25	38	38	27	30	24	22	17	14	17	14	15	14	12	14
18014	18	43	37	25	29	31	27	20	18	15	17	17	18	18	17	16
1901	19	17	13	8	9	4	5	5	5	6	6	7	6	9	13	10
1903	19	14	18	12	8	5	7	4	5	4	5	6	11	10	10	9
1904	19	12	11	14	14	7	4	5	5	3	7	7	10	12	11	8

		Percent (%) Urban Tree Canopy (UTC) Thin band parcel buffers (in feet)														
Parcel Code	Block	Parcel-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800	800-900	900-1000	1000-1100	1100-1200	1200-1300	1300-1400	1400-1500
1905	19	11	11	12	12	9	5	5	5	5	7	5	11	13	11	9
1906	19	9	12	12	7	10	7	5	6	8	4	7	11	13	11	9
1907	19	16	6	7	6	4	9	10	8	8	6	5	11	13	11	9
1908	19	6	5	5	5	4	6	11	8	9	8	8	7	9	9	9
1909	19	7	5	6	5	5	6	10	9	6	7	8	7	9	10	9
19010	19	8	5	6	6	7	7	9	8	6	6	7	7	9	10	10
19011	19	5	7	6	10	7	7	8	6	6	6	5	7	10	10	10
19012	19	6	7	8	10	7	6	8	5	6	5	5	7	8	11	10
19013	19	5	9	8	8	9	5	6	5	6	4	5	7	6	12	11
19014	19	9	11	6	8	7	7	4	5	6	5	3	6	6	12	12
19015	19	14	9	5	8	6	7	5	5	5	7	2	5	8	9	12
19016	19	16	5	6	7	6	6	5	5	5	6	3	4	7	9	13
19017	19	14	3	6	6	5	6	4	7	5	5	5	5	5	11	12
2001	20	5	2	3	5	4	2	2	2	4	10	12	12	12	10	9
2002	20	5	2	3	6	3	2	2	3	6	10	10	12	11	9	8
2003	20	10	3	2	1	2	1	1	1	3	6	13	17	11	9	10
2004	20	2	1	2	4	3	3	2	2	4	4	2	2	2	7	16
2005	20	1	1	2	5	2	3	4	3	2	2	3	6	6	7	14
2006	20	0	0	1	0	1	5	5	3	3	2	3	6	5	3	4
2007	20	0	0	0	1	1	3	5	3	2	2	4	6	5	3	3
2008	20	0	0	0	1	1	0	5	3	2	2	3	6	5	3	3
2009	20	10	3	3	2	1	1	3	3	2	6	9	19	17	12	6
20010	20	0	0	0	1	1	5	3	3	1	3	6	5	4	2	2
20011	20	6	6	2	2	3	3	2	1	3	8	13	15	16	11	6
2101	21	32	27	21	30	30	28	24	26	25	24	26	20	17	16	20
2103	21	32	24	30	28	28	24	25	27	27	23	22	23	21	17	16
2104	21	24	26	28	34	24	28	24	28	27	23	23	23	19	17	18
2105	21	27	22	26	37	27	27	28	27	26	21	26	21	18	19	19
2106	21	18	25	22	35	33	30	30	25	23	24	25	20	18	20	19
2107	21	18	20	23	34	36	35	31	23	24	24	22	21	20	19	22
2108	21	24	12	29	27	40	40	28	23	25	23	21	22	21	20	23
2109	21	18	22	23	33	36	40	29	27	21	20	22	23	24	22	20
21012	21	33	32	27	19	21	23	25	26	23	21	24	19	21	20	21
21013	21	34	35	24	19	18	24	21	24	25	24	21	22	19	20	21
21014	21	37	35	26	17	19	22	21	22	26	25	20	21	22	19	19
21015	21	41	30	30	16	21	19	21	24	23	25	21	20	25	19	16
21016	21	25	33	25	24	17	19	23	24	21	24	23	22	24	19	15
21017	21	21	26	27	24	20	23	23	18	22	22	25	23	21	19	16
21018	21	17	21	25	25	23	29	19	20	18	26	21	23	23	17	15
2201	22	26	31	40	37	27	20	18	21	18	15	15	14	15	14	13
2202	22	35	42	30	35	35	23	19	18	15	18	17	18	19	14	13
2203	22	30	37	49	33	26	28	24	21	17	16	18	20	16	15	15
2204	22	29	22	29	26	23	28	26	23	23	20	20	15	17	16	13
2205	22	33	26	20	21	21	29	25	27	25	20	18	16	15	15	13
2206	22	26	26	32	30	35	29	23	22	23	17	12	16	14	12	17
2207	22	37	16	20	16	21	23	30	26	25	21	16	15	15	12	13
2208	22	30	16	16	18	17	22	28	28	24	21	15	14	13	13	11
2209	22	29	18	16	14	19	22	22	27	28	20	13	15	12	11	12
22010	22	29	40	29	25	25	17	14	12	13	13	12	11	10	9	12
22011	22	17	18	16	17	18	20	18	27	29	18	14	13	12	10	13
22013	22	23	24	34	32	28	29	23	24	24	19	18	20	17	15	13

Wide band parcel excluded buffers

Table 9. Percent UTC within wide band parcel excluded buffers.

		Percent (%) Urban Tree Canopy (UTC) Wide band parcel excluded buffers (in feet)														
Parcel Code	Block	Parcel-100	Parcel-200	Parcel-300	Parcel-400	Parcel-500	Parcel-600	Parcel-700	Parcel-800	Parcel-900	Parcel-1000	Parcel-1100	Parcel-1200	Parcel-1300	Parcel-1400	Parcel-1500
101	1	1	3	2	3	4	4	5	6	6	6	7	9	10	11	11
102	1	2	3	3	2	4	5	5	6	6	7	9	10	11	11	12
103	1	3	3	2	2	2	3	3	3	4	4	5	6	8	10	11
104	1	1	1	2	4	5	5	5	6	6	7	7	8	9	10	11
105	1	3	2	3	3	4	5	5	5	5	6	6	6	7	7	9
106	1	3	3	2	2	2	2	3	3	4	4	6	7	9	10	12
107	1	2	3	3	3	3	3	4	4	4	5	5	6	7	8	10
108	1	4	3	2	2	2	2	3	3	4	5	7	9	10	11	12
109	1	3	3	2	2	2	2	2	3	3	3	3	4	5	7	9
1010	1	1	2	2	2	2	4	4	4	4	5	5	6	6	7	7
1011	1	2	2	2	2	2	2	2	3	3	3	4	4	5	6	7
1012	1	3	3	3	2	2	2	2	3	3	4	4	6	7	9	10
201	2	39	33	33	35	37	36	32	29	27	26	25	24	23	22	22
202	2	35	30	30	31	35	34	32	29	26	25	24	23	22	22	21
203	2	48	32	30	32	33	33	30	28	27	24	23	22	22	22	21
204	2	43	37	32	31	33	30	29	28	26	25	23	22	22	21	21
205	2	42	42	39	36	32	29	26	24	23	22	22	21	20	21	21
206	2	35	41	41	35	31	27	25	22	21	20	21	20	21	21	21
207	2	43	35	28	26	25	23	21	20	20	20	21	21	21	21	22
208	2	48	39	33	30	29	25	23	22	20	20	20	20	20	20	21
209	2	41	44	46	37	34	30	27	25	23	22	21	20	20	21	21
2010	2	35	40	46	40	34	32	29	26	24	22	21	20	21	21	22
2011	2	33	40	46	42	36	32	30	27	24	23	22	21	21	22	22
301	3	27	30	31	32	33	33	32	31	31	29	28	28	27	26	25
302	3	37	25	24	22	23	27	29	30	30	29	28	27	26	25	24
303	3	32	29	31	36	38	38	37	35	34	32	30	29	28	27	26
304	3	33	35	38	38	38	37	34	32	32	31	29	28	27	27	26
305	3	31	20	18	21	22	23	25	28	30	29	28	26	25	24	23
306	3	4	15	23	24	24	26	27	29	29	28	27	26	24	23	22
307	3	37	25	29	35	36	37	36	34	32	31	30	28	27	26	26
308	3	7	20	22	25	27	26	28	30	30	29	28	26	25	24	23
309	3	17	24	27	27	28	30	33	32	31	29	28	27	26	25	24
3010	3	28	26	29	32	34	35	36	33	32	30	29	28	27	26	25
3011	3	22	26	29	29	31	33	35	33	31	30	28	28	26	25	24
401	4	58	39	31	30	27	25	22	20	19	17	16	14	13	11	10
402	4	39	41	37	33	30	28	24	22	20	18	16	14	13	11	11
403	4	56	39	30	29	28	26	23	22	20	18	16	15	13	12	11
404	4	57	37	30	29	28	26	25	23	20	18	17	15	13	12	11
405	4	32	30	29	30	27	26	25	23	21	18	16	15	13	12	11
406	4	41	34	36	30	30	29	27	23	20	18	16	14	13	12	12
407	4	29	39	34	32	30	29	27	23	20	18	16	14	13	12	11
408	4	35	37	33	32	30	28	26	23	20	17	15	14	13	12	12
409	4	39	38	32	29	28	27	24	22	19	17	15	14	13	12	11
4010	4	47	40	31	27	26	26	23	21	19	17	15	14	13	12	11
4012	4	34	31	30	29	27	26	24	22	20	18	16	15	14	13	12
4013	4	41	39	30	28	24	22	22	20	19	17	16	15	14	13	12
4014	4	51	35	29	27	22	19	19	18	18	17	16	15	13	12	12
501	5	17	30	33	30	27	25	22	21	20	20	20	20	20	21	22
502	5	23	29	27	27	29	27	26	23	21	19	19	19	18	19	20
503	5	22	27	27	26	27	28	26	24	22	19	18	18	18	18	19
504	5	25	28	28	28	27	27	26	25	22	19	18	18	18	18	19
505	5	15	28	30	28	27	25	26	25	22	19	18	17	18	18	19
506	5	28	31	33	31	29	27	25	25	22	20	19	19	19	19	19
507	5	30	32	32	30	28	27	26	25	23	20	19	19	19	19	19
508	5	37	33	32	28	28	28	26	25	22	20	20	20	19	19	19
509	5	41	32	30	29	29	27	26	24	22	21	21	20	19	19	19
5010	5	46	34	29	30	29	26	24	23	22	21	21	20	19	19	20
5011	5	43	32	31	30	29	26	23	22	22	22	21	20	20	20	21
601	6	17	22	23	25	27	29	31	31	31	30	28	27	25	24	23
604	6	24	23	23	24	27	28	28	28	29	29	28	27	26	25	24
605	6	17	24	21	23	26	27	26	27	28	28	28	27	26	25	24
606	6	22	26	22	23	25	26	25	26	26	27	27	27	26	25	25
607	6	17	23	20	22	23	24	25	25	25	26	27	27	26	25	25
608	6	22	24	20	21	21	22	24	24	25	26	27	27	26	26	25
609	6	27	24	22	22	23	24	25	25	25	26	26	26	26	26	25
6010	6	29	25	23	24	24	25	26	25	26	26	27	27	26	26	25

		Percent (%) Urban Tree Canopy (UTC)														
		Wide band parcel excluded buffers (in feet)														
Parcel Code	Block	Parcel-100	Parcel-200	Parcel-300	Parcel-400	Parcel-500	Parcel-600	Parcel-700	Parcel-800	Parcel-900	Parcel-1000	Parcel-1100	Parcel-1200	Parcel-1300	Parcel-1400	Parcel-1500
6011	6	32	25	25	24	24	26	27	26	26	26	27	27	26	26	25
6012	6	29	26	23	25	25	27	27	27	27	27	27	27	26	26	25
6013	6	31	26	23	26	26	28	28	28	28	28	27	27	27	26	25
6014	6	36	24	23	26	27	28	29	29	29	28	28	27	26	25	24
6015	6	35	25	22	26	27	29	30	30	29	29	28	27	26	25	24
801	8	10	9	8	10	11	11	13	15	16	16	15	15	15	14	15
803	8	9	14	13	11	12	13	15	16	16	17	16	15	15	15	15
804	8	11	12	14	12	12	14	15	16	16	17	16	16	15	15	15
805	8	10	11	10	12	12	13	15	16	18	17	17	16	16	16	16
806	8	11	9	11	12	12	13	14	17	17	17	16	16	16	16	16
807	8	12	9	10	12	12	14	14	16	16	16	16	16	16	16	16
808	8	5	6	8	10	12	13	15	16	16	15	16	16	16	16	16
1001	10	32	42	40	35	32	28	25	23	21	20	19	18	17	17	18
1002	10	26	31	29	29	28	25	23	22	21	20	18	17	17	17	17
1003	10	31	25	30	29	26	24	23	22	20	19	18	17	17	17	17
1004	10	27	24	28	28	25	23	23	21	20	19	17	16	16	17	17
1005	10	34	29	26	26	24	22	21	20	19	18	17	16	16	17	17
1006	10	36	34	31	30	27	25	23	20	19	18	17	17	16	16	17
1007	10	26	31	34	32	27	26	24	21	19	18	18	17	17	17	17
1008	10	39	36	37	34	30	27	25	23	20	19	18	18	17	17	17
1101	11	34	37	30	26	26	26	26	25	26	25	25	24	24	24	25
1102	11	42	35	33	32	30	28	27	27	26	25	25	24	24	25	25
1103	11	38	36	31	30	29	27	27	26	25	25	24	24	24	24	24
1104	11	29	32	29	27	27	27	27	25	24	24	24	24	24	24	24
1105	11	26	28	28	27	25	26	26	25	24	24	24	24	23	24	24
1106	11	21	24	26	25	24	25	25	25	24	23	23	23	23	23	23
1201	12	43	44	41	36	34	32	29	28	27	26	25	26	26	25	25
1202	12	43	42	38	36	35	33	31	29	28	27	26	26	26	26	26
1203	12	55	43	38	35	36	33	31	29	28	27	26	26	26	26	26
1204	12	40	45	37	34	34	32	30	30	29	27	27	26	27	26	26
1205	12	46	40	41	36	33	32	31	30	29	28	27	27	27	27	26
1206	12	41	38	39	36	33	31	31	30	29	28	27	28	27	27	26
1207	12	42	34	34	34	33	31	30	30	29	28	28	28	27	27	26
1208	12	38	33	32	32	32	31	30	29	29	28	28	28	27	27	26
1209	12	29	31	30	30	31	32	29	28	29	28	28	28	27	27	26
12010	12	23	27	30	29	30	31	29	29	29	28	28	28	27	27	27
12011	12	29	31	31	30	29	28	27	26	27	28	28	27	26	26	26
12012	12	38	30	30	29	30	29	27	26	27	28	28	27	26	26	25
12013	12	33	31	29	30	31	29	27	27	27	28	28	27	26	26	25
12014	12	38	36	33	31	31	29	28	27	27	28	28	27	27	26	25
12015	12	37	38	35	31	31	29	29	28	27	28	28	27	27	26	25
12016	12	43	42	39	33	31	30	30	28	27	27	27	27	27	26	25
12017	12	45	42	38	34	31	30	30	28	28	27	27	27	26	26	25
12018	12	54	45	37	35	33	30	30	28	28	27	27	27	26	26	25
12019	12	59	43	37	35	32	30	30	28	27	27	26	27	26	26	25
12020	12	51	41	37	36	33	31	29	28	27	26	26	26	26	26	25
12021	12	43	40	39	36	32	31	29	28	27	26	26	26	26	26	25
12022	12	35	42	41	36	33	30	29	27	26	26	26	26	26	26	25
12023	12	28	41	40	35	33	30	29	27	26	25	25	26	26	25	24
1301	13	39	41	40	38	37	39	38	37	36	35	34	33	33	33	33
1302	13	44	41	38	39	39	38	38	37	36	35	34	33	33	33	33
1303	13	51	41	39	40	40	37	38	38	36	35	34	33	33	33	33
1304	13	59	43	41	41	40	37	38	38	36	35	34	34	34	33	33
1305	13	52	50	43	42	39	38	38	37	36	34	34	34	34	34	33
1306	13	54	49	45	42	38	39	38	37	35	34	34	34	34	34	33
1307	13	58	48	45	42	38	38	38	37	35	35	34	34	34	33	33
1308	13	44	44	42	41	39	37	37	36	35	34	35	34	34	33	33
1309	13	53	41	41	41	39	37	36	36	35	35	35	34	34	33	33
13010	13	41	39	43	42	38	37	37	36	35	34	34	34	34	33	33
13011	13	34	37	42	41	38	36	37	36	35	34	34	34	33	33	33
13012	13	40	42	47	43	38	37	37	36	34	34	34	34	33	33	33
13013	13	46	48	46	42	39	38	37	36	35	34	33	34	34	33	33
13014	13	50	45	42	41	40	39	38	36	35	34	33	34	33	33	33
13015	13	53	44	39	41	40	40	37	36	35	34	34	33	33	33	33
13016	13	46	43	38	40	40	39	37	36	35	34	34	34	33	33	33
13017	13	39	42	39	39	40	38	38	36	35	34	34	34	33	33	32

		Percent (%) Urban Tree Canopy (UTC)														
		Wide band parcel excluded buffers (in feet)														
Parcel Code	Block	Parcel-100	Parcel-200	Parcel-300	Parcel-400	Parcel-500	Parcel-600	Parcel-700	Parcel-800	Parcel-900	Parcel-1000	Parcel-1100	Parcel-1200	Parcel-1300	Parcel-1400	Parcel-1500
13018	13	34	40	39	38	38	39	37	36	35	34	34	34	33	33	32
1401	14	22	21	27	29	33	34	34	34	34	33	33	33	33	33	32
1402	14	27	25	27	28	32	34	33	34	34	33	33	32	32	33	32
1403	14	29	28	25	29	30	32	33	33	34	33	32	32	32	32	32
1404	14	31	30	28	28	29	30	33	33	34	33	32	32	32	32	31
1405	14	32	30	30	29	28	29	32	33	34	33	32	31	32	31	31
1406	14	26	29	34	30	29	31	32	34	34	33	33	32	32	31	31
1407	14	21	27	30	30	30	32	33	34	34	34	33	33	32	31	31
1408	14	21	25	27	29	33	35	35	34	34	34	34	33	33	32	32
1409	14	19	25	26	29	34	35	35	35	34	34	34	33	33	32	32
14010	14	11	25	26	30	34	35	36	35	34	34	34	33	33	33	32
1501	15	26	23	27	28	31	30	28	29	29	30	30	30	29	29	28
1502	15	17	25	27	28	29	29	28	28	28	29	29	29	28	28	27
1503	15	24	24	30	29	28	29	29	28	28	28	28	28	28	27	27
1504	15	26	28	31	30	27	29	28	29	28	27	27	27	27	27	26
1505	15	24	32	28	28	28	27	27	28	28	27	27	27	27	27	26
1506	15	27	28	27	27	28	27	28	28	27	28	28	28	28	27	27
1507	15	22	27	24	27	28	29	28	28	28	29	29	29	28	28	28
1508	15	23	22	24	27	30	29	28	29	29	29	30	30	29	28	29
1601	16	24	28	32	31	32	34	32	32	32	31	31	30	31	31	30
1602	16	26	31	32	31	33	32	32	32	32	31	31	30	31	31	30
1603	16	37	33	32	31	31	30	31	31	30	30	30	30	30	30	30
1604	16	35	35	36	33	31	32	33	33	33	34	33	33	33	33	32
1605	16	29	29	35	35	31	31	31	31	31	32	32	31	31	31	31
1606	16	33	30	32	35	33	32	32	32	32	32	32	32	31	31	31
1607	16	31	32	32	35	34	32	32	32	33	32	33	33	32	32	32
1608	16	32	36	32	33	33	32	31	33	33	33	34	33	33	32	32
1609	16	34	38	34	32	32	32	32	33	33	33	34	34	34	33	32
16010	16	45	38	35	33	31	32	33	33	33	34	34	34	34	33	32
16011	16	36	35	32	31	32	33	34	33	34	34	34	35	34	33	33
16012	16	38	33	31	30	33	34	33	33	33	34	34	35	34	33	32
16013	16	36	32	30	31	34	34	33	33	33	33	34	34	34	33	32
16014	16	30	28	30	32	33	34	33	33	33	33	34	34	33	33	32
16015	16	25	26	32	32	33	33	33	32	33	33	32	33	33	32	31
16016	16	40	35	35	33	31	32	34	35	34	34	35	34	34	33	33
16017	16	35	39	32	32	32	32	34	34	34	34	34	34	34	33	32
16018	16	46	37	33	32	33	33	33	34	33	34	34	34	33	33	32
1701	17	26	28	25	23	22	20	19	19	20	20	21	21	21	20	21
1702	17	20	25	27	24	24	23	22	22	22	22	22	23	23	23	23
1703	17	25	27	25	23	25	22	20	21	21	21	22	22	23	23	23
1704	17	27	23	22	25	23	20	19	20	20	21	22	21	22	23	23
1705	17	27	28	26	25	23	21	20	20	21	21	21	21	21	21	22
1706	17	29	32	30	27	25	24	24	23	23	23	22	22	22	22	23
1707	17	26	22	26	26	24	23	25	24	23	23	23	23	24	23	24
1708	17	22	23	25	26	27	26	25	25	24	24	24	24	24	24	24
1709	17	24	29	28	28	27	27	26	25	24	24	23	23	23	23	23
1801	18	40	36	34	34	30	27	26	25	24	23	23	22	22	21	21
1802	18	37	35	33	32	29	26	25	24	24	23	23	23	22	21	21
1803	18	32	30	28	29	27	25	24	24	24	23	23	23	23	22	21
1804	18	32	29	23	25	25	23	24	24	24	24	24	24	23	22	21
1805	18	46	34	29	26	25	23	22	21	21	22	22	22	21	21	20
1806	18	40	41	34	31	28	25	22	21	22	22	22	21	21	20	20
1807	18	37	42	40	34	30	26	23	22	22	22	21	21	21	20	20
1808	18	32	44	43	37	32	28	24	23	22	22	21	21	20	20	20
1809	18	49	38	30	27	25	22	21	20	20	20	21	21	20	19	19
18010	18	34	41	43	38	32	29	26	24	22	22	21	20	20	20	19
18011	18	37	38	37	33	31	30	28	26	23	21	20	20	19	18	18
18012	18	31	34	35	33	30	30	28	26	23	22	20	19	18	18	17
18013	18	25	33	35	32	31	29	28	25	23	22	21	20	19	18	18
18014	18	43	39	32	31	31	30	28	26	24	22	22	21	21	20	20
1901	19	17	14	11	10	9	8	7	7	7	6	6	6	7	8	8
1903	19	14	17	14	12	9	9	8	7	7	6	6	7	7	8	8
1904	19	12	11	12	13	11	9	8	7	7	7	7	7	8	8	8
1905	19	11	11	12	12	11	9	8	7	7	7	7	7	8	8	8
1906	19	9	11	11	10	10	9	8	7	7	7	7	8	8	9	9

		Percent (%) Urban Tree Canopy (UTC) Wide band parcel excluded buffers (in feet)														
Parcel Code	Block	Parcel-100	Parcel-200	Parcel-300	Parcel-400	Parcel-500	Parcel-600	Parcel-700	Parcel-800	Parcel-900	Parcel-1000	Parcel-1100	Parcel-1200	Parcel-1300	Parcel-1400	Parcel-1500
1907	19	16	10	8	7	6	7	8	8	8	8	7	8	8	9	9
1908	19	6	5	5	5	5	5	7	7	7	7	8	7	8	8	8
1909	19	7	5	6	5	5	6	7	7	7	7	7	7	7	8	8
19010	19	8	6	6	6	6	6	7	7	7	7	7	7	7	8	8
19011	19	5	6	6	8	7	7	7	7	7	7	6	6	7	7	8
19012	19	6	7	7	8	8	7	7	7	7	6	6	6	6	7	7
19013	19	5	8	8	8	8	7	7	7	6	6	6	6	6	7	7
19014	19	9	10	8	8	8	8	7	6	6	6	6	6	6	7	7
19015	19	14	11	8	8	7	7	7	6	6	6	6	5	6	6	7
19016	19	16	9	7	7	7	7	6	6	6	6	5	5	6	6	7
19017	19	14	7	6	6	6	6	5	6	6	5	5	5	5	6	7
2001	20	5	3	3	4	4	3	3	3	3	4	5	6	7	7	8
2002	20	5	3	3	4	4	3	3	3	3	5	5	6	7	7	7
2003	20	10	6	4	3	3	2	2	2	2	3	4	6	7	7	7
2004	20	2	2	2	3	3	3	3	2	3	3	3	2	2	3	5
2005	20	1	1	1	3	2	3	3	3	3	2	3	3	3	4	5
2006	20	0	0	0	0	0	2	2	3	3	3	3	3	3	3	3
2007	20	0	0	0	0	1	1	2	2	2	2	3	3	3	3	3
2008	20	0	0	0	1	1	1	2	2	2	2	2	3	3	3	3
2009	20	10	5	4	3	3	2	2	2	2	3	4	6	8	8	8
20010	20	0	0	0	1	1	2	2	2	2	2	3	3	3	3	3
20011	20	6	6	4	3	3	3	3	3	3	3	5	6	8	8	8
2101	21	32	29	25	27	28	28	27	27	26	26	26	25	24	23	22
2103	21	32	27	28	28	28	27	26	26	27	26	25	25	24	23	22
2104	21	24	25	26	30	28	28	27	27	27	26	26	25	24	23	23
2105	21	27	24	25	29	29	28	28	28	27	26	26	25	24	24	23
2106	21	18	22	22	27	29	29	29	29	27	27	27	25	24	24	23
2107	21	18	19	21	26	29	31	31	29	28	27	27	26	25	24	24
2108	21	24	16	23	24	29	32	31	30	29	28	27	26	25	24	24
2109	21	18	21	22	26	29	32	32	31	29	27	26	26	26	25	25
21012	21	33	32	30	25	24	24	24	25	24	24	24	23	23	22	22
21013	21	34	34	29	25	23	23	23	23	23	23	23	23	22	22	22
21014	21	37	35	31	25	23	23	22	22	23	23	23	23	23	22	22
21015	21	41	34	32	25	24	23	22	23	23	23	23	22	23	22	21
21016	21	25	30	27	26	23	22	22	23	22	22	23	22	23	22	21
21017	21	21	24	26	25	23	23	23	22	22	22	23	23	22	22	21
21018	21	17	20	22	24	23	25	23	23	22	23	22	22	23	22	21
2201	22	26	29	34	35	32	29	27	26	24	23	21	20	20	19	18
2202	22	35	39	35	35	35	32	29	27	25	23	22	22	21	20	19
2203	22	30	34	41	38	34	33	31	29	26	25	24	23	22	21	21
2204	22	29	24	26	26	25	26	26	26	25	24	24	22	22	21	20
2205	22	33	29	25	23	22	24	24	25	25	24	23	22	21	20	19
2206	22	26	26	29	29	31	31	29	27	27	25	23	22	21	19	19
2207	22	37	23	22	20	20	21	23	24	24	23	22	21	20	19	18
2208	22	30	21	19	18	18	19	21	23	23	23	21	20	19	18	18
2209	22	29	22	19	17	18	19	20	21	22	22	21	20	19	18	17
22010	22	29	35	33	30	29	26	23	21	20	19	18	17	16	15	15
22011	22	17	17	17	17	17	18	18	20	22	21	20	19	18	17	16
22013	22	23	23	28	30	29	29	28	27	26	25	24	23	22	21	20

Wide band parcel to 100 foot excluded buffers

Table 10. Percent UTC within wide band parcel to 100 foot excluded buffers.

		Percent (%) Urban Tree Canopy (UTC) Wide band parcel to 100 foot excluded buffers (in feet)													
Parcel Code	Block	100-200	100-300	100-400	100-500	100-600	100-700	100-800	100-900	100-1000	100-1100	100-1200	100-1300	100-1400	100-1500
101	1	4	3	3	5	5	5	6	6	6	8	9	10	11	11
102	1	3	3	3	4	5	6	6	6	8	9	10	11	11	12
103	1	3	2	2	2	3	3	3	4	4	5	6	8	10	11
104	1	1	3	4	5	5	6	6	7	7	7	8	9	10	11
105	1	2	3	3	4	5	5	5	5	6	6	6	7	7	9
106	1	3	2	2	2	2	3	3	4	4	6	7	9	10	12
107	1	3	3	3	3	3	4	4	5	5	5	6	7	8	10
108	1	2	2	2	2	2	3	3	4	5	7	9	10	11	12
109	1	3	2	2	2	2	2	3	3	3	3	4	5	7	9
1010	1	3	3	3	3	4	4	4	4	5	5	6	6	7	7
1011	1	3	3	2	2	2	2	3	3	3	4	4	5	6	7
1012	1	3	3	2	2	2	2	3	3	4	4	6	7	9	11
201	2	29	32	35	37	35	31	29	27	25	24	24	23	22	22
202	2	27	28	31	35	34	31	28	26	24	24	23	22	21	21
203	2	23	26	30	32	32	29	27	26	24	23	22	21	21	21
204	2	33	30	30	32	29	28	27	26	24	22	21	21	21	21
205	2	41	38	35	31	28	25	23	22	22	21	20	20	21	21
206	2	45	42	35	30	26	24	22	21	20	20	20	20	21	21
207	2	31	24	24	23	21	19	19	19	19	20	21	21	21	21
208	2	34	29	28	27	24	22	21	19	19	19	19	20	20	21
209	2	46	47	37	33	29	26	25	23	21	20	19	20	21	21
2010	2	43	49	41	34	31	29	26	24	22	21	20	20	21	22
2011	2	45	49	43	37	32	30	27	24	23	22	21	21	22	22
301	3	32	32	32	33	33	32	31	31	29	29	28	27	26	25
302	3	18	21	21	22	26	29	29	30	29	28	27	26	25	24
303	3	28	31	37	39	38	37	35	34	32	30	29	28	27	26
304	3	37	39	39	38	37	34	32	32	31	29	28	27	27	26
305	3	14	15	20	21	22	25	28	29	29	28	26	25	24	23
306	3	20	27	27	25	27	28	30	30	29	28	26	25	24	23
307	3	19	27	35	36	37	36	34	32	31	29	28	27	26	25
308	3	27	26	27	28	28	29	31	31	30	28	26	25	24	23
309	3	28	29	28	29	31	33	33	31	30	28	27	26	25	24
3010	3	25	29	32	34	35	36	34	32	30	29	28	27	26	25
3011	3	28	31	30	31	33	35	34	31	30	29	28	27	25	24
401	4	29	25	26	25	23	20	19	18	16	15	14	12	11	10
402	4	42	36	32	29	27	24	21	19	17	15	14	12	11	10
403	4	30	25	25	25	24	22	20	19	17	15	14	12	11	10
404	4	27	24	26	26	24	23	22	19	17	16	14	13	11	11
405	4	29	28	30	27	26	25	23	20	18	16	15	13	12	11
406	4	30	34	29	29	28	26	23	20	18	16	14	13	12	11
407	4	45	35	33	30	29	27	23	20	18	16	14	13	12	11
408	4	39	32	31	30	27	25	23	19	17	15	14	13	12	11
409	4	37	30	28	27	26	24	22	19	17	15	14	13	12	11
4010	4	36	28	24	24	24	22	20	18	16	15	14	13	12	11
4012	4	28	29	28	26	25	23	22	19	17	15	14	13	13	12
4013	4	37	28	26	23	21	21	19	19	17	16	14	13	12	12
4014	4	26	24	24	20	17	18	17	17	17	15	14	13	12	11
501	5	37	36	32	28	25	22	21	20	20	20	20	20	21	22
502	5	32	27	28	30	27	26	23	21	19	19	19	18	18	19
503	5	29	27	27	27	29	26	24	22	19	18	18	18	18	19
504	5	29	28	29	27	27	26	25	22	19	17	18	18	18	19
505	5	35	33	30	28	25	27	25	22	19	18	17	18	18	19
506	5	33	34	31	29	26	25	25	22	20	19	19	19	19	19
507	5	34	32	30	28	27	26	25	23	20	19	19	19	19	19
508	5	31	31	27	28	27	26	24	22	20	20	19	19	19	19
509	5	28	28	28	28	27	25	23	21	20	20	19	19	19	19
5010	5	27	25	28	28	25	23	22	21	21	21	20	19	19	20
5011	5	27	29	29	28	25	22	21	22	21	21	20	20	20	21
601	6	25	24	26	27	30	32	32	31	30	29	27	25	24	23
604	6	23	22	24	27	28	28	28	29	29	28	27	26	25	24
605	6	27	22	23	27	27	27	27	28	28	28	27	26	25	24
606	6	28	22	23	25	26	26	26	26	27	28	27	26	25	25
607	6	27	21	23	24	24	25	25	25	26	27	27	27	26	25
608	6	26	19	21	21	22	24	25	25	26	27	27	26	26	25
609	6	22	21	21	22	24	25	25	25	26	26	26	26	26	25
6010	6	23	22	23	23	25	26	25	26	26	27	27	26	26	25

		Percent (%) Urban Tree Canopy (UTC)													
		Wide band parcel to 100 foot excluded buffers (in feet)													
Parcel Code	Block	100-200	100-300	100-400	100-500	100-600	100-700	100-800	100-900	100-1000	100-1100	100-1200	100-1300	100-1400	100-1500
6011	6	21	23	24	24	26	27	26	26	26	27	27	26	26	25
6012	6	25	22	25	25	27	27	27	27	27	27	27	26	26	25
6013	6	24	21	26	26	27	28	28	28	28	27	27	27	26	25
6014	6	18	20	25	26	27	28	29	28	28	27	27	26	25	24
6015	6	20	20	25	26	28	29	29	29	28	28	27	26	25	24
801	8	9	8	10	11	12	13	15	16	16	15	15	15	14	15
803	8	16	13	12	12	13	15	16	16	17	16	15	15	15	15
804	8	13	15	12	12	14	15	16	16	17	16	16	15	15	15
805	8	12	10	13	12	13	15	17	18	17	17	16	16	16	16
806	8	8	10	12	12	13	14	17	17	17	16	16	16	16	16
807	8	7	9	12	12	14	15	17	16	16	16	16	16	16	16
808	8	6	9	11	12	14	15	16	16	16	16	16	16	16	16
1001	10	48	41	35	32	27	25	22	20	19	19	18	17	17	17
1002	10	33	30	29	28	25	23	22	21	20	18	17	17	17	17
1003	10	21	30	29	26	24	22	22	20	19	18	16	16	17	17
1004	10	22	28	28	25	23	22	20	20	19	17	16	16	17	17
1005	10	27	24	25	23	22	21	19	18	18	17	16	16	16	17
1006	10	34	30	29	26	24	22	20	18	18	17	17	16	16	17
1007	10	34	36	33	28	26	24	21	19	18	18	17	17	17	17
1008	10	34	37	34	29	27	24	22	20	19	18	17	17	17	17
1101	11	39	30	25	25	25	25	25	25	25	24	24	24	24	25
1102	11	31	31	31	29	27	26	27	26	25	25	24	24	25	25
1103	11	35	29	29	28	27	26	25	24	25	24	24	24	24	24
1104	11	33	29	27	27	27	27	25	24	24	24	24	24	23	24
1105	11	30	29	27	25	26	26	25	24	24	24	23	23	24	24
1106	11	25	27	26	24	25	25	25	24	23	23	23	23	24	23
1201	12	44	40	35	34	31	29	28	27	25	25	25	25	25	25
1202	12	42	37	36	34	33	31	29	27	26	26	26	26	26	26
1203	12	37	34	33	34	32	30	29	27	27	26	25	26	26	26
1204	12	47	36	34	34	32	30	29	29	27	26	26	27	26	26
1205	12	37	40	35	32	31	30	29	29	27	27	27	27	26	26
1206	12	36	38	36	32	31	30	30	29	28	27	27	27	27	26
1207	12	30	33	33	32	30	30	29	28	28	28	28	27	26	26
1208	12	30	31	31	32	31	30	29	28	28	28	28	27	26	26
1209	12	32	31	30	31	32	29	28	29	28	28	28	27	27	26
12010	12	29	32	29	31	31	29	29	29	28	28	28	27	27	27
12011	12	32	31	30	29	28	27	26	27	28	28	27	26	26	26
12012	12	26	29	28	29	29	27	25	27	28	27	27	26	26	25
12013	12	30	28	29	31	28	27	26	27	28	28	27	26	26	25
12014	12	34	32	30	30	29	28	27	27	27	28	27	26	26	25
12015	12	38	35	31	30	29	28	28	27	27	27	27	26	26	25
12016	12	42	38	32	30	29	29	28	27	27	27	27	27	26	25
12017	12	41	36	32	30	29	29	28	27	27	27	27	26	26	25
12018	12	40	34	32	31	29	29	28	27	26	26	26	26	26	25
12019	12	35	32	32	30	29	29	27	27	26	26	26	26	26	25
12020	12	35	34	34	31	30	29	27	26	26	26	26	26	26	25
12021	12	39	39	35	32	30	29	27	26	26	26	26	26	26	25
12022	12	46	42	36	33	30	29	27	26	26	25	26	26	25	25
12023	12	49	42	36	33	30	29	27	26	25	25	25	26	25	24
1301	13	42	41	38	37	39	38	37	36	35	34	33	33	33	33
1302	13	39	37	39	38	38	38	37	36	35	34	33	33	33	33
1303	13	35	36	38	39	36	37	37	35	34	34	33	33	33	33
1304	13	34	37	38	38	36	37	37	35	34	34	33	33	33	33
1305	13	49	41	40	38	37	37	37	35	34	34	34	33	33	33
1306	13	46	43	40	37	38	37	36	35	34	34	34	34	33	33
1307	13	43	42	40	37	37	37	36	35	34	34	34	34	33	33
1308	13	43	42	41	39	37	37	36	35	34	34	34	34	33	33
1309	13	35	38	40	38	36	36	36	35	34	34	34	33	33	33
13010	13	37	43	42	37	36	37	36	35	34	34	34	33	33	33
13011	13	38	44	42	38	36	37	36	35	34	34	34	33	33	33
13012	13	44	48	43	38	37	37	36	34	34	33	34	33	33	33
13013	13	49	46	42	39	38	37	36	34	34	33	34	34	33	33
13014	13	42	40	40	40	39	37	35	35	34	33	33	33	33	33
13015	13	39	36	40	39	39	36	36	34	34	33	33	33	33	33
13016	13	41	36	39	40	39	37	36	34	34	34	33	33	33	32
13017	13	44	40	39	41	38	38	36	35	34	34	34	33	33	32

		Percent (%) Urban Tree Canopy (UTC)													
		Wide band parcel to 100 foot excluded buffers (in feet)													
Parcel Code	Block	100-200	100-300	100-400	100-500	100-600	100-700	100-800	100-900	100-1000	100-1100	100-1200	100-1300	100-1400	100-1500
13018	13	43	40	38	39	39	38	36	35	34	34	34	33	32	32
1401	14	20	29	30	34	35	34	34	34	34	33	33	33	33	32
1402	14	24	27	29	32	34	34	34	34	33	33	32	33	33	32
1403	14	27	24	29	30	32	33	33	34	33	32	32	32	32	32
1404	14	30	27	28	29	30	33	33	34	33	32	32	32	32	31
1405	14	29	30	28	28	29	32	33	34	33	32	31	32	31	31
1406	14	31	36	31	29	31	32	34	34	33	33	32	32	31	31
1407	14	31	32	31	31	32	33	34	35	34	33	33	32	32	31
1408	14	27	29	30	34	35	35	35	34	34	34	33	33	32	32
1409	14	28	27	30	35	36	36	35	35	34	34	33	33	33	32
14010	14	32	29	32	36	37	37	36	35	34	34	34	33	33	33
1501	15	22	28	29	32	30	29	29	29	30	30	30	29	29	28
1502	15	29	29	29	30	30	29	28	29	29	29	29	29	28	28
1503	15	24	31	30	28	29	29	29	28	28	28	28	28	27	27
1504	15	28	32	30	27	29	28	29	28	27	27	27	27	27	26
1505	15	36	29	29	28	27	27	28	28	27	27	27	27	27	26
1506	15	28	27	27	28	27	28	28	28	28	28	28	28	27	27
1507	15	30	25	28	29	29	28	28	29	29	29	29	28	28	28
1508	15	21	24	27	30	29	28	29	30	30	30	30	29	28	29
1601	16	31	33	32	33	34	33	33	32	31	31	30	31	31	30
1602	16	34	33	32	33	33	32	32	32	31	31	30	31	31	30
1603	16	31	30	30	31	30	31	30	30	30	30	29	29	30	30
1604	16	34	36	32	31	31	32	32	33	34	33	33	33	33	32
1605	16	29	36	35	31	31	31	31	31	32	32	31	31	31	31
1606	16	28	32	35	33	31	32	32	32	32	32	32	31	31	31
1607	16	32	32	35	34	32	32	32	33	32	33	33	32	32	32
1608	16	37	32	33	33	32	31	33	33	33	34	33	33	32	32
1609	16	40	34	32	32	32	32	33	33	33	34	34	34	33	32
16010	16	35	33	32	30	32	33	33	33	34	34	34	34	33	32
16011	16	34	31	31	31	33	34	33	34	34	34	35	34	33	33
16012	16	31	29	29	33	34	33	33	33	34	34	35	34	33	32
16013	16	30	29	30	34	34	33	33	33	33	34	34	34	33	32
16014	16	27	30	32	33	34	33	33	33	33	34	34	33	33	32
16015	16	26	34	33	33	34	34	32	33	33	33	33	33	32	31
16016	16	32	33	32	30	32	34	35	34	34	34	34	34	33	33
16017	16	41	31	31	31	32	34	34	34	34	34	34	34	33	32
16018	16	33	31	30	32	33	33	33	33	34	34	34	33	33	32
1701	17	28	25	23	21	20	19	19	20	20	20	21	21	20	21
1702	17	28	28	25	24	23	22	22	22	22	22	23	23	23	23
1703	17	28	25	23	25	22	20	21	21	21	22	22	23	23	23
1704	17	20	21	24	22	20	19	19	20	21	21	21	22	23	22
1705	17	28	26	25	23	21	19	20	21	21	21	21	21	21	22
1706	17	34	30	27	24	24	24	23	23	23	22	22	22	22	23
1707	17	19	26	26	24	23	25	24	23	23	23	23	23	23	24
1708	17	24	25	26	27	26	25	25	24	24	24	24	24	24	24
1709	17	32	29	29	27	27	26	25	24	24	23	23	23	23	23
1801	18	35	33	34	29	26	25	25	23	23	22	22	21	21	20
1802	18	34	32	32	28	25	24	24	23	23	23	23	22	21	21
1803	18	29	27	28	26	24	23	23	23	23	23	23	23	22	21
1804	18	27	21	24	24	23	23	23	23	24	24	24	23	22	21
1805	18	28	25	23	23	22	21	21	21	21	22	22	21	20	20
1806	18	42	33	29	27	24	21	21	21	21	21	21	21	20	19
1807	18	45	40	34	30	26	23	21	22	21	21	21	21	20	20
1808	18	50	45	38	32	27	24	22	22	21	21	21	20	20	20
1809	18	32	26	24	23	20	20	19	19	20	20	20	20	19	19
18010	18	46	45	38	32	28	26	23	22	21	21	20	20	19	19
18011	18	38	37	33	30	30	28	26	23	21	20	20	19	18	18
18012	18	35	35	34	30	29	28	25	23	21	20	19	18	17	17
18013	18	38	38	33	32	30	28	26	23	22	21	20	19	18	18
18014	18	37	30	29	30	29	27	25	23	22	21	21	20	20	19
1901	19	13	10	10	8	7	6	6	6	6	6	6	7	8	8
1903	19	18	14	12	9	9	7	7	6	6	6	7	7	8	8
1904	19	11	12	13	11	9	8	7	6	6	6	7	8	8	8
1905	19	11	12	12	11	9	8	7	7	7	7	7	8	8	8
1906	19	12	12	10	10	9	8	7	7	7	7	8	8	9	9
1907	19	6	6	6	6	6	7	8	8	7	7	8	8	9	9

		Percent (%) Urban Tree Canopy (UTC)													
		Wide band parcel to 100 foot excluded buffers (in feet)													
Parcel Code	Block	100-200	100-300	100-400	100-500	100-600	100-700	100-800	100-900	100-1000	100-1100	100-1200	100-1300	100-1400	100-1500
1908	19	5	5	5	5	5	7	7	7	7	8	7	8	8	8
1909	19	5	5	5	5	6	7	7	7	7	7	7	7	8	8
19010	19	5	6	6	6	6	7	7	7	7	7	7	7	8	8
19011	19	7	7	8	8	7	7	7	7	7	6	7	7	7	8
19012	19	7	7	8	8	7	7	7	7	6	6	6	6	7	8
19013	19	9	8	8	9	8	7	7	6	6	6	6	6	7	7
19014	19	11	8	8	8	8	7	6	6	6	6	6	6	7	7
19015	19	9	7	7	7	7	6	6	6	6	5	5	6	6	7
19016	19	5	5	6	6	6	6	6	6	6	5	5	5	6	7
19017	19	3	5	5	5	6	5	6	5	5	5	5	5	6	7
2001	20	2	2	3	4	3	3	3	3	4	5	6	7	8	8
2002	20	2	3	4	4	3	3	3	3	5	5	6	7	7	7
2003	20	3	2	2	2	2	2	2	2	3	4	6	7	7	7
2004	20	1	2	3	3	3	3	2	3	3	3	2	2	3	5
2005	20	1	1	3	3	3	3	3	3	3	3	3	3	4	5
2006	20	0	1	0	0	2	3	3	3	3	3	3	3	3	3
2007	20	0	0	0	1	1	2	3	2	2	3	3	3	3	3
2008	20	0	0	1	1	1	2	2	2	2	2	3	3	3	3
2009	20	3	3	2	2	2	2	2	2	3	4	6	8	8	8
20010	20	0	0	1	1	2	2	2	2	2	3	3	3	3	3
20011	20	6	4	3	3	3	3	2	2	3	5	6	8	8	8
2101	21	27	24	27	28	28	27	27	26	26	26	25	24	23	22
2103	21	24	28	28	28	26	26	26	26	26	25	25	24	23	22
2104	21	26	27	30	28	28	27	27	27	26	26	25	24	23	23
2105	21	22	24	30	29	28	28	28	27	26	26	25	24	24	23
2106	21	25	23	28	30	30	30	29	28	27	27	26	25	24	23
2107	21	20	21	27	30	31	31	29	28	28	27	26	25	24	24
2108	21	12	22	24	30	33	32	30	29	28	27	26	25	24	24
2109	21	22	23	27	30	33	32	31	29	27	26	26	26	25	25
21012	21	32	29	24	23	23	24	24	24	23	24	23	22	22	22
21013	21	35	28	24	22	23	22	23	23	23	23	23	22	22	22
21014	21	35	29	24	22	22	22	22	23	23	23	22	22	22	21
21015	21	30	30	24	23	22	21	22	22	23	22	22	22	22	21
21016	21	33	28	26	23	22	22	22	22	22	22	22	23	22	21
21017	21	26	27	26	24	23	23	22	22	22	23	23	22	22	21
21018	21	21	23	24	24	25	24	23	22	23	22	22	23	22	21
2201	22	31	36	36	33	29	27	25	24	23	21	20	20	19	18
2202	22	42	35	35	35	32	29	26	24	23	22	21	21	20	19
2203	22	37	44	39	35	33	31	29	26	24	23	23	22	21	20
2204	22	22	26	26	25	26	26	25	25	24	24	22	21	21	20
2205	22	26	23	22	21	24	24	24	24	24	23	22	21	20	19
2206	22	26	30	30	32	31	29	27	27	25	23	22	21	19	19
2207	22	16	18	18	19	20	22	23	23	23	22	21	20	19	18
2208	22	16	16	17	17	18	21	22	23	22	21	20	19	18	17
2209	22	18	17	16	17	18	19	21	22	22	20	19	18	17	17
22010	22	40	34	30	29	26	23	21	19	18	17	16	16	15	14
22011	22	18	17	17	17	18	18	20	22	21	20	19	18	17	16
22013	22	24	30	31	30	30	28	27	26	25	24	23	22	21	20

Appendix J. Results of seasonal normalization of heating energy use

Block summary table

Table 11. Mean seasonally normalized average monthly winter heating natural gas consumption by block, with and without the effects of outliers (as defined by a 1.5 interquartile range boxplot).

	Seasonally normalized average monthly winter heating natural gas usage (CF)	
Blocks	**Mean**	**Mean without Outliers**
all	15345	15019
1	16719	16719
2	17840	17840
3	19812	19812
4	13500	11941
5	14848	14848
6	12894	11826
8	17905	17905
10	17936	17936
11	25680	22613
12	20482	20482
13	13765	13765
14	13781	13781
15	14362	14362
16	13732	13273
17	16693	14646
18	11315	11315
19	9612	9011
20	14064	14064
21	15187	15187
22	13920	11947

Parcel summary table

Table 12. Seasonally normalized average monthly heating use from 2008-2011 by parcel.

Parcel Code	Block	Average monthly winter natural gas usage (CF)	Average monthly summer natural gas usage (CF)	Seasonally normalized average monthly winter heating natural gas usage (CF)
101	1	21044	2178	18867
102	1	27556	4322	23233
103	1	16978	3963	13015
104	1	18278	3711	14567
105	1	25867	2356	23511
106	1	20500	2733	17767
107	1	15478	2088	13390
108	1	13822	1833	11989
109	1	14733	1333	13400
1010	1	23178	2322	20856
1011	1	18811	1133	17678
1012	1	13856	1500	12356
201	2	29122	3222	25900
202	2	13589	600	12989
203	2	13978	1467	12511
204	2	16350	1167	15183
205	2	26222	3678	22544
206	2	16256	400	15856
207	2	29522	817	28706
208	2	18544	2244	16300
209	2	23500	400	23100
2010	2	6989	3267	3722
2011	2	21578	2144	19433
301	3	19489	2244	17244
302	3	21411	2889	18522
303	3	21456	638	20818
304	3	26300	1911	24389
305	3	23033	3133	19900
306	3	22367	4278	18089
307	3	24567	744	23822
308	3	18344	1067	17278
309	3	23644	2189	21456
3010	3	21567	2400	19167
3011	3	19800	2556	17244
401	4	14267	1275	12992
402	4	22583	2257	20326
403	4	13933	1722	12211
404	4	12189	1533	10656
405	4	16067	2122	13944
406	4	14922	2478	12444
407	4	19456	1589	17867
408	4	12500	911	11589
409	4	19856	1967	17889
4010	4	16556	2811	13744
4012	4	12511	2389	10122
4013	4	12700	300	12400
4014	4	9944	633	9311
501	5	22300	3022	19278
502	5	18200	320	17880
503	5	21922	3622	18300
504	5	13333	1433	11900
505	5	15978	1733	14244
506	5	16622	1533	15089
507	5	17922	1311	16611
508	5	16244	600	15644
509	5	10456	100	10356
5010	5	14011	1178	12833
5011	5	12611	1422	11189
601	6	13156	1438	11718
604	6	16200	2333	13867
605	6	28244	2533	25711
606	6	9700	3356	6344
607	6	9022	744	8278
608	6	17089	2411	14678
609	6	14822	0	14822

Parcel Code	Block	Average monthly winter natural gas usage (CF)	Average monthly summer natural gas usage (CF)	Seasonally normalized average monthly winter heating natural gas usage (CF)
6010	6	10000	100	9900
6011	6	10856	250	10606
6012	6	9178	0	9178
6013	6	9583	300	9283
6014	6	15050	2089	12961
6015	6	21233	956	20278
801	8	22022	856	21167
803	8	21389	0	21389
804	8	18717	3000	15717
805	8	17811	388	17424
806	8	18078	1944	16133
807	8	25456	2378	23078
808	8	10578	150	10428
1001	10	14478	1422	13056
1002	10	24989	1356	23633
1003	10	12778	1711	11067
1004	10	18500	2144	16356
1005	10	18022	2822	15200
1006	10	24111	2400	21711
1007	10	14622	656	13967
1008	10	31122	2622	28500
1101	11	21000	1311	19689
1102	11	43089	2075	41014
1103	11	18889	1000	17889
1104	11	23056	1078	21978
1105	11	26467	1322	25144
1106	11	28467	100	28367
1201	12	34967	3089	31878
1202	12	36344	2044	34300
1203	12	29133	2611	26522
1204	12	19867	1322	18544
1205	12	23244	1422	21822
1206	12	26550	1600	24950
1207	12	11133	1700	9433
1208	12	9922	1344	8578
1209	12	12267	300	11967
12010	12	20489	800	19689
12011	12	23456	1356	22100
12012	12	29622	1844	27778
12013	12	24233	1367	22867
12014	12	19300	2300	17000
12015	12	25144	600	24544
12016	12	19278	1178	18100
12017	12	30322	3978	26344
12018	12	12578	1744	10833
12019	12	20878	1625	19253
12020	12	19100	1544	17556
12021	12	21144	717	20428
12022	12	26733	2278	24456
12023	12	12314	175	12139
1301	13	20378	2167	18211
1302	13	18011	3311	14700
1303	13	9533	129	9405
1304	13	12256	100	12156
1305	13	8867	100	8767
1306	13	18267	1767	16500
1307	13	21656	1167	20489
1308	13	12667	133	12533
1309	13	9675	1089	8586
13010	13	15789	1644	14144
13011	13	14078	922	13156
13012	13	19317	2200	17117
13013	13	10744	2056	8689
13014	13	15078	200	14878
13015	13	19200	1550	17650

Parcel Code	Block	Average monthly winter natural gas usage (CF)	Average monthly summer natural gas usage (CF)	Seasonally normalized average monthly winter heating natural gas usage (CF)
13016	13	10933	350	10583
13017	13	15622	1300	14322
13018	13	16744	856	15889
1401	14	16000	0	16000
1402	14	15478	711	14767
1403	14	19722	1286	18437
1404	14	19200	122	19078
1405	14	27678	978	26700
1406	14	10525	2200	8325
1407	14	9878	400	9478
1408	14	10222	2011	8211
1409	14	9289	833	8456
14010	14	8356	0	8356
1501	15	16211	822	15389
1502	15	10400	914	9486
1503	15	16975	833	16142
1504	15	11829	1189	10640
1505	15	11622	1633	9989
1506	15	15289	1944	13344
1507	15	17838	1267	16571
1508	15	24856	1522	23333
1601	16	13611	1678	11933
1602	16	19211	2567	16644
1603	16	9867	200	9667
1604	16	14067	1056	13011
1605	16	15433	1100	14333
1606	16	18567	1311	17256
1607	16	9067	100	8967
1608	16	10878	856	10022
1609	16	13767	800	12967
16010	16	15167	200	14967
16011	16	10011	0	10011
16012	16	16356	1678	14678
16013	16	12744	914	11830
16014	16	14433	2589	11844
16015	16	15500	300	15200
16016	16	13700	400	13300
16017	16	20122	1111	19011
16018	16	21533	0	21533
1701	17	34900	1833	33067
1702	17	20544	1111	19433
1703	17	15333	2222	13111
1704	17	18911	1333	17578
1705	17	20433	2756	17678
1706	17	16989	2511	14478
1707	17	13044	1600	11444
1708	17	13700	1522	12178
1709	17	12289	1022	11267
1801	18	13422	1478	11944
1802	18	11089	1900	9189
1803	18	16300	1878	14422
1804	18	10211	1089	9122
1805	18	14456	1033	13422
1806	18	17067	2000	15067
1807	18	15300	2056	13244
1808	18	9044	1033	8011
1809	18	10889	100	10789
18010	18	14989	1889	13100
18011	18	7956	1756	6200
18012	18	16389	1678	14711
18013	18	7311	1078	6233
18014	18	16556	3600	12956
1901	19	12267	1889	10378
1903	19	20378	1756	18622
1904	19	9578	2189	7389

Parcel Code	Block	Average monthly winter natural gas usage (CF)	Average monthly summer natural gas usage (CF)	Seasonally normalized average monthly winter heating natural gas usage (CF)
1905	19	15689	1267	14422
1906	19	7789	150	7639
1907	19	6844	200	6644
1908	19	8889	2356	6533
1909	19	9378	1356	8022
19010	19	13978	3444	10533
19011	19	10700	2100	8600
19012	19	11233	822	10411
19013	19	8267	525	7742
19014	19	9044	1244	7800
19015	19	9600	3267	6333
19016	19	12488	1250	11238
19017	19	12889	1411	11478
2001	20	20322	3044	17278
2002	20	18644	1967	16678
2003	20	19800	4156	15644
2004	20	18133	1922	16211
2005	20	8456	0	8456
2006	20	8989	400	8589
2007	20	9267	200	9067
2008	20	12856	711	12144
2009	20	21333	3622	17711
20010	20	6678	0	6678
20011	20	28822	2578	26244
2101	21	16656	2275	14381
2103	21	19578	2156	17422
2104	21	13420	957	12463
2105	21	14200	1767	12433
2106	21	14100	1250	12850
2107	21	23644	1978	21667
2108	21	20411	1144	19267
2109	21	17433	678	16756
21012	21	6833	0	6833
21013	21	10789	150	10639
21014	21	11722	150	11572
21015	21	11778	1911	9867
21016	21	13956	1200	12756
21017	21	28333	1233	27100
21018	21	26356	4556	21800
2201	22	30800	3889	26911
2202	22	17122	3000	14122
2203	22	12189	1478	10711
2204	22	7933	100	7833
2205	22	13533	150	13383
2206	22	13383	200	13183
2207	22	15156	1378	13778
2208	22	16389	2556	13833
2209	22	15478	1467	14011
22010	22	9944	100	9844
22011	22	22189	1522	20667
22013	22	10422	1656	8767

Appendix K. PRISM Results

Natural gas – Heating

Results by parcel

Table 13. PRISM natural gas results from the "Spread" file. Columns related to cooling have been omitted.

Parcel Code	Label	Pre/ Post	Units	Heating Model Identifier	Number data points	Start Month	Start Day	Start Year	End Month	End Day	End Year	Flatness Index	R^2	τ Tauh (heating)	se(τ Tauh)	α Base level	se(α Base level)	β Heating slope	se(β Heating slope)	Heating part of NAC	se(Heating part of NAC)	NAC	se(NAC)
101	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.836	0.9694	53.79	2.19	76.096	14.384	15.136	0.824	80743.82	4245.75	108537.8	2971.5
102	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.761	0.9673	52.61	2.21	142.328	18.474	19.576	1.112	99549.93	5407.24	151535.4	3884.48
103	Part	PRE	CF	HO------M-D	34	8	29	8	7	29	11	0.595	0.9273	59.87	3.99	121.999	19.813	9.374	0.74	62997.46	6079.55	107557.6	3293.52
104	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.664	0.9597	54.5	2.54	122.513	13.283	11.625	0.714	63772.72	3963.06	108520.6	2669.72
105	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.826	0.9591	58.85	2.77	71.537	24.045	17.177	1.005	111223.7	7401.12	137352.4	4298.65
106	Part	PRE	CF	HO------M-D	34	8	29	8	7	29	11	0.78	0.9227	58.48	3.92	85.044	25.659	13.026	1.082	83221.06	7968.36	114283.4	4647.15
107	Part	PRE	CF	HO------M-D	34	8	29	8	7	29	11	0.785	0.9371	51.55	3.12	75.553	15.095	11.335	0.925	55179.19	4316.67	82775.03	3160.65
108	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.774	0.9732	55.66	2.12	59.01	9.143	9.333	0.46	53588.45	2749.26	75141.69	1775.08
109	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.793	0.9604	62.76	2.93	34.729	15.042	9.069	0.488	67534.3	4776.51	80218.92	2367.12
1010	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.807	0.9781	57.84	2.03	73.61	15.239	15.412	0.672	96126.09	4678.97	123012.2	2749.13
1011	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.866	0.9702	60.27	2.4	30.867	15.715	12.356	0.596	84253.16	4941.37	95527.49	2682.63
1012	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.796	0.9514	58.41	2.99	47.436	13.642	8.976	0.57	57189.63	4199	74515.65	2438.82
201	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.79	0.9638	59.01	2.59	96.975	25.402	18.814	1.01	122532.5	7908.61	157952.6	4429.84
202	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.97	0.9446	63.49	3.05	-6.725	17.999	10.211	0.542	77987.56	5816.45	75531.39	2663.68
203	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.875	0.9129	53.46	3.75	48.722	16.856	10.265	0.966	54041.98	4975.51	71837.6	3482.23
204	Part	PRE	CF	HO-R----M-D	34	8	29	8	7	29	11	0.939	0.9588	60.96	2.31	29.42	11.961	9.897	0.461	69179.29	3771.41	79924.89	2066.88
205	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.85	0.8839	55.68	3.97	117.713	29.97	16.322	1.509	93780.01	9012.17	136774.5	5818.77
206	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.984	0.9702	57.41	2.35	9.505	13.609	11.84	0.6	72687.03	4178.74	76158.73	2455.21
207	Part	PRE	CF	HO------M-D	33	8	29	8	6	28	11	0.886	0.9602	61.07	3.14	8.631	36.889	20.101	1.116	141052	11351.3	144204.4	5365.67
208	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.742	0.95	62.29	3.27	65.563	20.547	11.036	0.667	80851.67	6524.75	104798.7	3233.51
209	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.037	0.969	57.51	2.4	-3.516	20.608	17.541	0.909	108057.5	6327.79	106773.2	3717.89
2010	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.439	0.5432	87	-9	78.528	22.973	2.637	0.477	40686.2	-9	69368.57	3755.59
2011	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.762	0.9622	63.18	2.99	60.67	22.353	12.903	0.674	97466.92	7223.58	119626.7	3308.08
301	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.822	0.9691	50.5	2.08	85.858	12.24	14.672	0.838	68346.41	3539.92	99706.01	2704.6
302	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.843	0.9518	47.18	2.56	101.134	16.016	17.497	1.349	70372.08	4608.9	107311.2	3765
303	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.002	0.9318	55.23	3.4	24.282	25.467	16.085	1.282	90811.55	7658.22	99680.68	4944.59
304	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.878	0.9499	56	3	68.537	26.197	18.352	1.236	106739.4	8007.74	131772.7	4858.73
305	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.76	0.9387	57.28	3.4	100.704	24.534	14.681	1.082	89664.92	7533.13	126447.1	4426.08
306	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.699	0.9502	53.34	2.77	139.172	17.934	14.771	1.027	77397.36	5293.59	128230	3704.85
307	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.047	0.9005	54.73	4.15	21.753	34.58	18.565	1.859	102786.5	10317.01	110731.7	6950.08
308	Part	PRE	CF	HO------M-D	34	8	29	8	7	29	11	0.886	0.9673	59.75	2.48	31.198	15.282	12.028	0.627	80501.59	4763.62	91896.54	2696.67
309	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.784	0.9482	62.49	3.35	62.252	26.969	14.169	0.876	104535.3	8564.2	127272.8	4244.21
3010	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.767	0.9721	60.56	2.34	71.092	16.536	13.392	0.628	92265.05	5199.37	118231.3	2822.7
3011	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.72	0.9283	65.53	4.48	65.509	30.928	11.204	0.792	91686.85	10182.89	115613.8	4144.17
401	Part	PRE	CF	HO------M-D	20	8	29	8	4	28	10	0.77	0.9274	58.26	5.21	37.88	28.399	9.525	0.973	60352.52	8236.32	74188.07	4507.57
402	Part	PRE	CF	HO------M-D	26	8	29	8	10	29	10	0.818	0.9643	61.97	3.09	67.397	22.678	13.685	0.834	99116.05	7265.7	123732.7	3846.9
403	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.784	0.9727	58.91	2.25	47.526	10.311	9.077	0.431	58907	3173.63	76265.71	1843.28
404	Part	PRE	CF	HO-R----M-D	33	8	29	8	7	29	11	0.756	0.9406	67.11	4.47	26.519	21.788	7.513	0.453	64813.73	7465.09	74499.83	2509.51
405	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.71	0.9743	63.22	2.45	60.62	13.196	9.306	0.398	70393.06	4264.34	92534.38	1952.88
406	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.778	0.972	48.7	2.03	81.381	8.505	11.544	0.671	49712.66	2473.65	79437.15	1943.06
407	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.709	0.9721	73	4.83	10.875	42.245	10.622	0.388	110989.7	15175.47	114961.8	2538.94
408	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.853	0.9423	62.9	3.48	21.816	15.67	7.979	0.509	59689.88	4976	67658.27	2465.98
409	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.794	0.9267	60.72	3.91	61.952	25.525	12.417	0.969	86043.98	8025.79	108671.8	4357.14

Parcel Code	Label	Pre/ Post	Units	Heating Model Identifier	Number data points	Start Month	Start Day	Start Year	End Month	End Day	End Year	Flatness Index	R²	τ Tauh (heating)	se(τ Tauh)	α Base level	se(α Base level)	β Heating slope	se(β Heating slope)	Heating part of NAC	se(Heating part of NAC)	NAC	se(NAC)
4010	Part	PRE	CF	HO------M-D	34	8	29	8	7	29	11	0.728	0.9691	54.04	2.13	92.791	10.728	11.14	0.597	60013.78	3208.68	93905.7	2180.54
4012	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.671	0.952	57.46	3.01	75.368	11.147	7.566	0.492	46534.93	3422.56	74062.95	2010.92
4013	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.951	0.9718	62.68	2.46	-4.664	11.813	8.495	0.384	63084.06	3751.16	61380.57	1858.98
4014	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.895	0.9537	58.23	2.9	18.17	10.178	6.884	0.425	43569.25	3132.84	50206.03	1819.59
501	Part	PRE	CF	HO------M-D	34	8	29	8	7	29	11	0.717	0.9171	66.74	5.52	75.012	43.569	12.625	0.993	107611.9	14675.58	135010.1	5257.03
502	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.983	0.9432	60.43	3.38	0.111	23.378	13.093	0.887	89806.53	7350.65	89846.98	3990.61
503	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.721	0.9516	56	2.94	118.922	20.072	14.32	0.947	83288.48	6135.57	126724.8	3722.78
504	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	1.18	0.5983	54.63	8.27	39.651	26.412	7.1	1.42	39150.13	7880.11	53632.6	5308.45
505	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.756	0.9361	64.42	4.13	45.976	23.602	9.594	0.652	75633	7692.28	92425.78	3292.6
506	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.857	0.9136	61.75	4.29	41.417	24.293	10.445	0.854	75075.13	7699.79	90202.85	3962.48
507	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.864	0.9252	59.73	3.89	39.652	24.227	12.099	0.964	80906.42	7542.6	95389.43	4224.83
508	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.915	0.9457	65.65	3.87	-8.611	25.411	10.657	0.651	87571.15	8366.38	84425.99	3404.89
509	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.045	0.9525	57.31	2.98	-0.822	11.647	7.969	0.514	48723.88	3576.16	48423.48	2101.17
5010	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.876	0.9401	56.04	3.3	39.088	15.862	10.102	0.748	58857.1	4848.44	73134	2941.81
5011	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.763	0.8749	65.69	6.69	39.064	29.385	7.134	0.753	58696.48	9674.62	72964.65	3937.31
601	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.853	0.9173	55.59	3.82	44.852	16.501	9.327	0.831	53396.36	4961.94	69778.4	3203.71
604	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.799	0.899	53.03	4	79.514	20.262	11.471	1.161	59341.33	5980.77	88383.64	4185.79
605	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.792	0.948	62.39	3.35	73.823	33.451	17.58	1.086	129225.7	10622.48	156189.4	5264.24
606	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.542	0.8726	46.67	4.53	110.07	9.846	6.492	0.892	25507.82	2859.2	65710.99	2349.53
607	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.929	0.9438	52.32	2.9	24.586	8.805	7.076	0.53	35560.76	2577.19	44540.76	1851.42
608	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.762	0.9323	55.98	3.48	81.656	18.248	11.409	0.919	66296.21	5487.37	96121.06	3542.96
609	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.038	0.9648	58.07	2.5	-4.209	14.207	11.115	0.594	69924.92	4372.91	68387.63	2539.83
6010	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	1.011	0.9352	62.08	3.84	-4.089	14.447	6.591	0.469	47917.73	4587.59	46424.17	2273.5
6011	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.166	0.9599	49.29	2.34	3.03	9.06	9.883	0.654	43695.03	2626.15	44801.64	2028.87
6012	Part	PRE	CF	HO------M-D	31	8	29	8	7	29	11	1.077	0.9491	56.29	3.68	-0.873	10.84	6.967	0.563	40975.27	3526.43	40656.42	2139.93
6013	Part	PRE	CF	HO------M-D	28	8	29	8	7	29	11	1.111	0.9621	62.76	3.05	-3.112	10.617	6.576	0.396	48961.37	3514.81	47824.87	1854.99
6014	Part	PRE	CF	HO------M-D	32	8	29	8	7	29	11	0.866	0.8342	43.62	5.14	94.365	19.519	13.231	2.317	44910.54	5852.3	79377.31	4996.07
6015	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.839	0.9388	66.43	4.53	13.02	37.571	13.069	0.849	110242.2	12565.81	114997.6	4488.75
801	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.917	0.9768	59.33	2.08	22.785	16.402	15.221	0.652	100327.5	5106.59	108649.7	2860.35
803	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.059	0.9838	55.5	1.63	-0.501	12.569	16.657	0.633	95051.49	3779.46	94868.48	2440.23
804	Part	PRE	CF	HO------M-D	22	9	28	9	7	29	11	0.995	0.9612	51.88	2.97	26.156	20.475	15.404	1.204	76023.34	5666.55	85576.67	4274.68
805	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.917	0.9576	64	3.29	-2.069	23.206	11.762	0.641	91398.02	7563.16	90642.45	3237.33
806	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.861	0.9753	50.47	1.85	69.209	10.509	14.151	0.719	65830.29	3039.35	91108.7	2322.16
807	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.8	0.9647	61.26	2.7	66.904	23.979	16.257	0.843	114861.3	7600.21	139297.9	3911.24
808	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.006	0.974	59.11	2.19	-2.048	8.829	7.743	0.351	50621.53	2748.66	49873.55	1539.61
1001	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.795	0.9627	59.75	2.69	43.388	12.577	9.068	0.5	60692.52	3915.76	76539.89	2193.33
1002	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.842	0.9429	63.87	3.77	31.377	32.651	15.056	0.984	116491.8	10551.39	127952.1	4832.07
1003	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.724	0.9471	62.08	3.35	49.569	14.071	7.355	0.457	53475.36	4468.26	71580.51	2214.36
1004	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.772	0.9501	58.18	3.01	71.06	17.902	11.654	0.748	73615.52	5510.24	99570.13	3200.4
1005	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.693	0.9298	59.85	3.77	92.431	20.138	10.385	0.801	69745.85	6269.65	103506.1	3511.82
1006	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.849	0.9499	56	3	72.912	23.442	16.424	1.106	95528.66	7165.5	122159.6	4347.7
1007	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.979	0.9596	53.96	2.54	21.657	11.952	10.845	0.685	58244.7	3528.02	66154.91	2469.17
1008	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.77	0.9522	64.95	3.58	68.784	38.197	17.993	1.055	144395	12448.69	169518.5	5328.53

Parcel Code	Label	Pre/ Post	Units	Heating Model Identifier	Number data points	Start Month	Start Day	Start Year	End Month	End Day	End Year	Flatness Index	R^2	τ Tauh (heating)	se(τ Tauh)	α Base level	se(α Base level)	β Heating slope	se(β Heating slope)	Heating part of NAC	se(Heating part of NAC)	NAC	se(NAC)
1101	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.987	0.9712	49.52	1.99	47.637	13.809	17.806	0.997	79496.27	4002.87	96895.69	3092.47
1102	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.969	0.9788	53.61	1.8	69.017	26.018	33.173	1.49	175675.7	7679.98	200884	5375.02
1103	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.98	0.9449	52.01	2.83	38.322	18.259	14.92	1.099	74043.03	5344.49	88040.02	3839.41
1104	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.902	0.9636	59.26	2.62	31.396	21.238	15.634	0.845	102763.6	6612.07	114231.2	3703.61
1105	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.068	0.9023	48.67	3.94	49.787	33.178	23.234	2.617	99934.5	9649.51	118119.2	7579.74
1106	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.113	0.9348	51.39	3.1	17.005	31.141	24.13	1.988	116718.7	9036.24	122929.7	6698.19
1201	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.834	0.9691	57.3	2.38	101.148	27.586	23.626	1.216	144408.3	8470.15	181352.6	4976.63
1202	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.863	0.9605	61.1	2.85	56.592	36.904	23.654	1.297	166126.6	11697.14	186796.7	6019.61
1203	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.798	0.9637	60.31	2.66	83.076	26.081	18.517	0.99	126445.4	8200.66	156788.9	4452.08
1204	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.887	0.9693	57.67	2.4	39.206	16.238	13.862	0.716	85932.19	4985.82	100252	2929.42
1205	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.885	0.9682	59	2.42	39.317	20.053	15.898	0.798	103519.1	6243.37	117879.6	3497.09
1206	Part	PRE	CF	HO------M-D	32	8	29	8	7	29	11	0.925	0.9421	54.96	3.4	66.438	27.446	19.142	1.565	106925.3	8440.62	131191.9	5752.49
1207	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.756	0.9652	53.17	2.28	57.104	7.758	7.732	0.444	40222.65	2289.97	61079.86	1602.69
1208	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.882	0.933	45.39	3.17	45.146	8.717	8.626	0.859	31908.39	2551.52	48397.9	2125
1209	Part	PRE	CF	HO------M-D	34	8	29	8	7	29	11	0.967	0.9478	63.45	3.53	-4.079	16.384	8.069	0.507	61521.56	5298.75	60031.7	2453.88
12010	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.965	0.9628	60.44	2.71	2.548	20.282	14.18	0.77	97271.16	6377.33	98201.84	3462.2
12011	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.963	0.9235	52.31	3.42	55.465	26.942	18.361	1.622	92248.13	7885.92	112506.8	5665.14
12012	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.836	0.9692	62.76	2.57	44.865	27.238	18.71	0.885	139329.9	8649.4	155716.7	4286.43
12013	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.776	0.9152	70.56	6.31	13.595	64.545	13.541	0.922	130833.8	22447.21	135799.3	5737.68
12014	Part	PRE	CF	HO------M-D	34	8	29	8	7	29	11	0.765	0.9553	61.1	3	68.066	19.296	11.802	0.699	82907.66	6122.58	107768.9	3184.74
12015	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.022	0.9444	56.5	3.22	11.955	28.438	18.682	1.342	110793.4	8692.68	115160	5274.32
12016	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.897	0.957	58.71	2.83	31.602	19.013	13.267	0.794	85477.08	5852.22	97019.88	3399.03
12017	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.79	0.9581	54.56	2.59	131.02	24.437	20.935	1.313	115138	7290.83	162993	4911.49
12018	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.769	0.9544	55.33	2.76	57.637	10.881	8.491	0.548	48127.37	3272.13	69179.16	2112.67
12019	Part	PRE	CF	HO------M-D	34	8	29	8	7	29	11	0.943	0.9659	49.66	2.23	53.707	15.335	17.253	1.065	77525.68	4380.33	97142.19	3349.87
12020	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.861	0.959	57.4	2.77	48.251	17.886	13.195	0.789	80958.36	5491.99	98582.05	3226.81
12021	Part	PRE	CF	HO------M-D	34	8	29	8	7	29	11	1.007	0.9417	58.53	3.41	9.814	25.905	15.191	1.087	97228.57	8073.83	100813.2	4686.33
12022	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.83	0.9494	59.19	3.1	71.439	28.197	17.498	1.122	114726.7	8778.64	140819.7	4917.17
12023	Part	PRE	CF	HO------M-D	30	8	29	8	7	29	11	1.134	0.9091	58.33	4.33	2.81	19.27	9.251	0.906	58774.58	6126.98	59800.84	3695.93
1301	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.795	0.915	61.28	4.3	61.208	29.149	12.399	1.024	87668.34	9238.91	110024.4	4754.55
1302	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.706	0.9329	58.93	2.98	99.765	15.083	10.037	0.63	65191.22	4642.59	101630.3	2696.46
1303	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.064	0.9205	57.86	3.99	-2.301	13.551	6.981	0.598	43583.5	4160.83	42742.97	2444.7
1304	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	1.264	0.8917	52.89	3.03	-2.974	13.243	10.31	0.797	53042.09	3876.13	51955.85	2784.56
1305	Part	PRE	CF	HO------M-D	34	8	29	8	7	29	11	1.183	0.9166	49.57	3.47	5.861	10.123	7.565	0.748	33858.48	2953.12	35999.27	2291.99
1306	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.903	0.9595	54.07	1.95	54.51	11.827	13.335	0.636	71933.32	3528.64	91843.25	2377.08
1307	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.859	0.9252	63.62	4.33	26.043	33.468	13.4	1.009	102792	10815.17	112304.2	4952.87
1308	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.958	0.9285	63.8	4.25	-5.955	20.113	8.23	0.606	63526.45	6499.62	61351.53	2976.54
1309	Part	PRE	CF	HO------M-D	33	8	29	8	7	29	11	0.864	0.9266	57	3.62	31.364	11.437	6.453	0.531	38993.6	3530.04	50449.33	2118.09
13010	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.778	0.9509	60.82	3.17	49.08	15.88	9.55	0.603	66408.41	4993.25	84334.88	2710.8
13011	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.939	0.8862	63.32	4.9	19.349	25.567	9.014	0.771	68438.16	8262.14	75505.52	3783.7
13012	Part	PRE	CF	HO-R----M-D	27	8	29	8	7	29	11	0.832	0.9586	56.31	2.29	71.606	15.242	13.998	0.753	82395.84	4638.95	108550	2891.31
13013	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.686	0.9291	56.18	3.63	65.302	11.345	6.585	0.535	38566.36	3467.72	62417.77	2104.05
13014	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.987	0.9554	61.49	3.07	-6.371	17.012	10.179	0.598	72499.02	5391.96	70172.14	2774.82

Parcel Code	Label	Pre/ Post	Units	Heating Model Identifier	Number data points	Start Month	Start Day	Start Year	End Month	End Day	End Year	Flatness Index	R²	τ Tauh (heating)	se(τ Tauh)	α Base level	se(α Base level)	β Heating slope	se(β Heating slope)	Heating part of NAC	se(Heating part of NAC)	NAC	se(NAC)
13015	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.833	0.9101	62.79	4.54	37.933	29.848	11.619	0.969	86594.35	9478.31	100449.3	4697.22
13016	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.941	0.9563	64.09	3.35	-5.524	14.174	7.065	0.392	55059.18	4619.29	53041.63	1977.24
13017	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.881	0.9446	56.7	3.24	37.712	16.33	10.711	0.771	63993.56	4991.65	77767.97	3028.7
13018	Part	PRE	CF	HO------M-D	32	8	29	8	7	29	11	0.952	0.9018	60.5	4.4	25.23	24.105	10.579	1.003	72751.75	7633.26	81967.07	4292.61
1401	Part	PRE	CF	HO-R----M-D	27	8	29	8	7	29	11	1.246	0.9014	55	4.18	1.128	21.651	12.086	1.265	67623.35	6901.42	68035.38	4668.26
1402	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.121	0.9089	47.23	3.62	22.04	17.623	13.662	1.484	55093.88	5071.29	63144.05	4142.73
1403	Part	PRE	CF	HO-R----M-D	32	8	29	8	4	28	11	0.878	0.9199	59.2	3.84	43.142	25.865	12.427	0.954	81508.85	7852.2	97266.42	4306.52
1404	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.225	0.9279	48.21	3.26	1.804	20.77	17.37	1.639	73210.7	6040.6	73869.47	4744.92
1405	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.93	0.9143	60.5	4.23	26.918	40.272	18.057	1.528	124155	12662.87	133987	6874.57
1406	Part	PRE	CF	HO-R----M-D	34	8	29	8	7	29	11	1.467	0.7887	34.92	3.71	10.481	7.336	11.796	1.838	24692.4	2221.54	28520.41	2147.46
1407	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.019	0.9342	59.57	3.61	-1.877	12.759	6.84	0.507	45477.94	3972.29	44792.2	2225
1408	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.696	0.9224	53.36	3.51	64.792	10.036	6.522	0.575	34198.06	2962.26	57863.39	2073.21
1409	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.968	0.9404	55.56	2.31	26.46	6.022	5.631	0.303	32199.87	1810.8	41864.52	1169.15
14010	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.135	0.9229	53.29	3.49	0.081	10.169	6.643	0.583	34732.72	3001.59	34762.48	2100.74
1501	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.863	0.9446	62.31	3.45	21.482	19.928	10.138	0.647	74316.35	6328.28	82162.54	3136.14
1502	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.823	0.9015	76.68	11.17	-19.279	63.1	6.351	0.32	74324.11	23024.07	67282.31	2192.01
1503	Part	PRE	CF	HO-R----M-D	34	8	29	8	7	29	11	0.971	0.8697	66.21	5.14	16.058	28.487	8.744	0.66	73199.79	9523.63	79065.05	3444.98
1504	Part	PRE	CF	HO------M-D	28	8	29	8	7	29	11	0.909	0.9137	59.89	4.51	36.089	15.987	7.446	0.736	50093.4	5237.33	63275.07	3099.71
1505	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.713	0.9287	62.61	3.77	47.154	14.481	6.785	0.47	50247.57	4598.42	67470.52	2278.87
1506	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.767	0.9384	60.26	3.51	55.173	17.457	9.394	0.662	64037.47	5488.96	84189.34	2979.91
1507	Part	PRE	CF	HO-R----M-D	34	8	29	8	7	29	11	0.926	0.9278	56.55	3.57	42.528	20.738	12.545	1.044	74519.72	6329.15	90053.25	3886.17
1508	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.885	0.9582	58.11	2.73	47.937	23.527	16.833	0.983	106044.6	7241.51	123553.6	4205.94
1601	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.727	0.9426	63.3	3.73	48.688	16.83	7.798	0.507	59158.35	5438.8	76941.74	2490.73
1602	Part	PRE	CF	HO------M-D	34	8	29	8	7	29	11	0.784	0.9141	59	4.09	75.118	24.612	11.563	0.989	75291.13	7694.48	102728.1	4345.17
1603	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.047	0.9467	56.45	3.15	1.521	11.034	7.421	0.521	43911.71	3372.67	44467.34	2046.38
1604	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.815	0.9573	61.18	2.97	32.896	14.174	8.714	0.498	61381.55	4492.64	73396.83	2312.01
1605	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.867	0.9221	61	4.5	28.547	24.195	9.815	0.85	68696.79	7668.91	79123.45	3946.59
1606	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.753	0.9441	69.73	4.73	20.323	35.707	10.36	0.577	97429.24	12261.67	104852.1	3492.24
1607	Part	PRE	CF	HO------M-D	34	8	29	8	7	29	11	1.003	0.9395	57.49	3.52	1.133	11.648	6.565	0.485	40409.28	3524.76	40823.15	2012.16
1608	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.88	0.9428	60.53	2.94	22.581	10.997	7.11	0.417	48943.71	3457.87	57191.45	1877.25
1609	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.807	0.9468	69.2	4.58	2.33	26.501	7.924	0.429	73246.48	9100.49	74097.4	2591.91
16010	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.908	0.938	67	4.66	-11.825	28.705	9.302	0.591	79962	9710.05	75642.78	3233.52
16011	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.054	0.953	57.74	3.01	-3.065	10.716	7.32	0.473	45485.81	3290.37	44366.44	1933.25
16012	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.811	0.9053	57.33	4.32	60.372	22.423	10.59	0.989	64807.6	6884.96	86858.36	4045.25
16013	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.921	0.9351	57.39	3.52	21.876	15.167	8.788	0.669	53903.28	4656.99	61893.66	2736.21
16014	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.718	0.9173	53.97	3.72	85.027	15.001	9.302	0.859	49967.98	4428.04	81024.25	3099.07
16015	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.95	0.9521	62.51	3.22	-2.333	18.726	10.252	0.608	75679.01	5946.57	74826.96	2946.97
16016	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.989	0.9458	59.77	3.28	0.989	15.806	9.37	0.629	62742.43	4921.08	63103.64	2756.44
16017	Part	PRE	CF	HO-R----M-D	34	8	29	8	7	29	11	0.957	0.9281	50	3.5	53.043	20.587	15.404	1.482	70226.31	6127.06	89600.39	4631.25
16018	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.11	0.9307	54.42	3.37	-0.335	25.58	16.828	1.375	92053.19	7631.84	91930.72	5141.2
1701	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.116	0.7942	50.44	5.91	60.269	66.653	28.083	4.563	130469.6	19275.98	152482.8	14727.42
1702	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.845	0.9654	64	2.96	21.261	22.921	12.926	0.633	100442.8	7470.32	108208.3	3197.6
1703	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.71	0.955	61.84	3.11	66.393	15.418	9.138	0.542	65894.63	4886.79	90144.73	2514.85

Parcel Code	Label	Pre/ Post	Units	Heating Model Identifier	Number data points	Start Month	Start Day	Start Year	End Month	End Day	End Year	Flatness Index	R^2	τ Tauh (heating)	se(τ Tauh)	α Base level	se(α Base level)	β Heating slope	se(β Heating slope)	Heating part of NAC	se(Heating part of NAC)	NAC	se(NAC)
1704	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.84	0.9628	61.3	2.78	35.42	18.315	12.083	0.644	85493.12	5804.95	98430.31	2987.36
1705	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.821	0.7308	63.97	9.33	71.155	61.842	11.546	1.864	89637.29	19984.46	115626.8	9152
1706	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.715	0.9487	60	3.16	78.265	17.15	10.205	0.651	68910.82	5392.36	97496.93	2927.47
1707	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.855	0.9219	47.48	3.37	61.285	12.577	10.542	1.059	42988.34	3619.19	65372.53	2956.5
1708	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.799	0.9446	61.36	2.96	45.338	13.984	8.652	0.491	61334.7	4432.39	77894.48	2281.01
1709	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.828	0.9633	61	2.73	26.486	11.767	7.851	0.414	54947.48	3729.61	64621.37	1919.34
1801	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.855	0.947	53	2.82	47.827	12.04	9.67	0.69	49962.95	3553.9	67431.92	2487.29
1802	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.733	0.9549	54.17	2.65	59.623	8.838	7.339	0.475	39735.08	2636.94	61512.5	1776.38
1803	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.725	0.9387	63.92	3.92	56.194	20.495	9.097	0.618	70507.77	6623.09	91032.59	3033.08
1804	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.877	0.9687	51.94	2.16	33.444	6.789	7.637	0.433	37781.28	1969.94	49996.66	1460.24
1805	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.766	0.9615	68.03	3.81	18.493	21.826	8.236	0.393	73242.44	7452.04	79997.15	2250.75
1806	Part	PRE	CF	HO-R----M-D	32	8	29	8	7	29	11	1.002	0.9188	51.38	3.14	53.799	16.805	13.066	1.176	63169.87	4962.96	82819.8	3770.88
1807	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.737	0.9154	62.07	4.31	60.223	21.997	8.94	0.714	64973.7	6985.04	86969.98	3461.62
1808	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.788	0.9605	58.49	2.69	31.165	7.914	5.794	0.331	37019.77	2435.93	48402.89	1414.81
1809	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	1.04	0.9696	57.44	2.37	-1.909	9.311	8.015	0.411	49248.3	2859.01	48551.05	1679.81
18010	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.78	0.9093	59.26	4.25	56.88	20.524	9.294	0.816	61094.47	6389.76	81869.74	3579.09
18011	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.72	0.7296	68.46	10.72	43.475	32.508	4.378	0.586	39497.66	11099.09	55377.08	3352.27
18012	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.777	0.9629	61.17	2.76	48.996	15.108	10	0.531	70428.19	4788.58	88324.03	2464.31
18013	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.773	0.9241	58.74	3.83	29.383	9.087	4.688	0.38	30234.5	2797.05	40966.68	1624.56
18014	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.631	0.9193	58.8	3.97	114.184	18.929	9.437	0.791	61006.25	5826.28	102712.1	3383.97
1901	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.913	0.891	55.5	2.87	54.559	10.432	7.844	0.525	44754.36	3136.9	64681.98	2025.36
1903	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.89	0.9043	58.07	4.25	47.061	30.198	13.878	1.262	87292.94	9294.9	104482.1	5398.58
1904	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.635	0.9279	55.77	3.57	70.687	9.597	5.82	0.483	33551.33	2885.79	59369.68	1863.23
1905	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.841	0.9561	59.98	2.95	35.624	15.705	10.368	0.625	69976.31	4889.6	82988.13	2738.81
1906	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.982	0.9495	61.55	3.28	-2.682	9.61	5.383	0.338	38425.08	3045.9	37445.61	1567.49
1907	Part	PRE	CF	HO-----M-D	34	8	29	8	7	29	11	1.076	0.9419	57.37	3.28	-0.448	8.173	5.1	0.369	31256.55	2515.89	31093.07	1491.99
1908	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.59	0.902	57.41	4.41	73.526	10.797	4.997	0.476	30676.36	3315.24	57531.73	1947.87
1909	Part	PRE	CF	HO-----M-D	34	8	29	8	7	29	11	0.737	0.9183	61.21	4.16	40.531	12.576	5.549	0.453	39121.16	3992.31	53925.09	2075.94
19010	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.617	0.9197	58.75	3.5	109.786	13.984	7.887	0.584	50879.5	4304.17	90979.02	2499.91
19011	Part	PRE	CF	HO-R----M-D	34	8	29	8	7	29	11	0.717	0.9028	54.38	3.78	68.929	11.43	6.731	0.633	36753.43	3419.89	61929.68	2323.74
19012	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.862	0.927	60.6	3.89	22.191	15.04	7.349	0.571	50712.09	4729.05	58817.49	2567.36
19013	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.953	0.964	62.03	2.73	-1.289	8.828	5.652	0.287	41024.91	2803.49	40554.07	1389.34
19014	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.798	0.9385	56.42	3.39	35.953	9.776	6.098	0.461	36052.39	2988.18	49184.27	1813.09
19015	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.529	0.913	53.94	4.11	100.881	9.822	5.516	0.563	29603.69	2899.14	66450.3	2029.03
19016	Part	PRE	CF	HO-R----M-D	34	8	29	8	7	29	11	0.916	0.8957	60.35	4.82	27.282	21.136	8.321	0.822	56898.06	6657.07	66862.98	3651.27
19017	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.799	0.9278	61.7	3.99	36.552	17.618	8.135	0.619	58373.14	5584.11	71723.93	2873.71
2001	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.688	0.8244	67.78	8.5	86.153	58.919	10.553	1.212	93091.76	19930.7	124559	6637.07
2002	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.845	0.9102	56.47	4.17	61.421	24.728	12.554	1.167	74365.77	7558.72	96799.93	4586.28
2003	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.648	0.9242	59.53	3.43	129.781	20.532	11.576	0.817	76852.63	6392.46	124255	3580.61
2004	Part	PRE	CF	HO-----M-D	35	8	29	8	7	29	11	0.831	0.926	56.89	3.81	59.725	21.439	12.001	1.012	72225.48	6553.43	94040.22	3976.32
2005	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	1.096	0.9342	55.68	2.77	-1.568	8.787	6.856	0.442	39389.95	2642.43	38817.39	1706.11
2006	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	0.998	0.9593	62.28	2.66	-3.183	10.295	6.793	0.334	49736.65	3269.09	48574.2	1620.08
2007	Part	PRE	CF	HO-----M-D	34	8	29	8	7	29	11	0.983	0.9484	64.05	3.62	-7.125	13.634	6.31	0.386	49123	4445.73	46520.56	1925.09

Parcel Code	Label	Pre/ Post	Units	Heating Model Identifier	Number data points	Start Month	Start Day	Start Year	End Month	End Day	End Year	Flatness Index	R^2	τ Tauh (heating)	se(τ Tauh)	α Base level	se(α Base level)	β Heating slope	se(β Heating slope)	Heating part of NAC	se(Heating part of NAC)	NAC	se(NAC)
2008	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.877	0.9179	63.17	4.5	14.386	21.626	8.277	0.652	62511.42	6988.43	67765.8	3200.39
2009	Part	PRE	CF	HO------M-D	34	8	29	8	7	29	11	0.747	0.9004	58.56	4.38	103.711	28.988	13.112	1.242	84016.36	8944.8	121896.7	5244.43
20010	Part	PRE	CF	HO-R----M-D	35	8	29	8	7	29	11	1.186	0.9054	63.54	3.32	-4.822	7.788	4.066	0.235	31099.58	2516.74	29338.16	1152.55
20011	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.87	0.9085	56.92	4.28	80.511	38.84	19.359	1.833	116623.6	11872.27	146030.4	7203.54
2101	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.77	0.9582	59.2	2.81	61.452	15.444	10.588	0.614	69452.88	4808.24	91898.4	2693.24
2103	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.769	0.9723	61.26	2.38	61.309	15.857	12.174	0.557	86012.21	5026.04	108405.2	2586.52
2104	Part	PRE	CF	HO------M-D	22	8	29	8	8	27	10	0.963	0.9185	58.49	4.48	28.42	18.375	8.541	0.926	54574.01	5816.26	64954.34	3680.35
2105	Part	PRE	CF	HO------M-D	32	8	29	8	7	29	11	0.812	0.9479	54.31	2.84	57.581	10.616	8.491	0.617	46237.53	3234.39	67268.91	2219.95
2106	Part	PRE	CF	HO------M-D	34	8	29	8	6	28	11	0.832	0.9705	58.15	2.35	33.906	11.88	9.598	0.47	60567.67	3603.7	72951.96	2042.82
2107	Part	PRE	CF	HO------M-D	34	8	29	8	7	29	11	0.848	0.9269	61.48	4.15	53.006	34.448	15.561	1.225	110792.2	11059.94	130152.8	5682.15
2108	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.804	0.9739	66.59	2.91	18.874	22.641	12.275	0.512	104086.6	7572.27	110980.4	2704.96
2109	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.894	0.9467	62.24	3.38	14.518	21.518	11.185	0.699	81772.17	6833.06	87074.78	3386.3
21012	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.16	0.9721	50.62	1.99	-0.052	4.749	5.985	0.325	28021.04	1373.29	28002.06	1049.23
21013	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.007	0.978	59.16	2.01	-2.686	8.144	7.783	0.324	50973.57	2535.48	49992.68	1420.2
21014	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.036	0.9484	58.55	3.1	-3.073	13.634	8.667	0.57	55504.68	4196.7	54382.14	2437.49
21015	Part	PRE	CF	HO------M-D	34	8	29	8	7	29	11	0.751	0.9001	56.3	4.33	60.378	15.132	7.434	0.74	43738.77	4630.54	65791.69	2838.66
21016	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.861	0.9516	56.73	3.02	38.263	13.865	9.756	0.654	58356.72	4238.2	72332.34	2571.54
21017	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.859	0.9675	63.69	2.8	24.784	29.099	18.056	0.877	138834.2	9403.34	147886.7	4306.31
21018	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.643	0.9519	66.33	3.98	122.534	35.696	14.11	0.807	118634.9	11938.67	163390.4	4264.73
2201	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.722	0.9289	66.88	4.95	88.816	54.403	17.385	1.23	148827.6	18195.1	181267.6	6499.65
2202	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.713	0.9353	54.26	3.22	101.813	16.458	11.273	0.885	61255.68	4910.24	98442.89	3307.79
2203	Part	PRE	CF	HO------M-D	33	8	29	8	7	29	11	0.822	0.9137	57.64	4.34	46.673	17.844	8.75	0.83	54175.89	5558.95	71223.1	3307.34
2204	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.001	0.9616	60.64	2.77	-3.601	8.269	5.67	0.314	39177.54	2600.09	37862.31	1411.57
2205	Part	PRE	CF	HO------M-D	34	8	29	8	7	29	11	1.035	0.9449	60.38	3.32	-4.848	17.86	10.203	0.685	69858.09	5637.15	68087.33	3086.48
2206	Part	PRE	CF	HO------M-D	26	5	29	9	7	29	11	1.147	0.9398	58.89	3.79	-1.436	16.792	9.526	0.826	61783.86	5395.03	61259.37	3409.41
2207	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.843	0.9365	58.18	3.42	42.474	17.735	10.167	0.741	64218.7	5458.81	79732.34	3170.53
2208	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.715	0.9473	61	3.3	73.305	17.846	9.854	0.627	68964.19	5656.36	95738.85	2910.89
2209	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.778	0.9325	66	4.73	30.794	27.76	9.202	0.628	76499.96	9284.31	87747.35	3316.54
22010	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	1.06	0.9324	58.05	3.52	-3.33	13.408	7.45	0.56	46835.59	4127.09	45619.28	2397.06
22011	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.791	0.9583	65.93	3.39	34.089	27.908	13.407	0.715	111221.8	9188.57	123672.9	3739.5
22013	Part	PRE	CF	HO------M-D	35	8	29	8	7	29	11	0.698	0.9554	60.75	3.01	49.784	9.757	6.175	0.37	42845.56	3067.81	61029.3	1665.49

Summary of heating part of NAC by block

Table 14. Mean heating part of NAC natural gas consumption by block, with and without the effects of outliers (as defined by a 1.5 interquartile range boxplot).

	Heating part of Normalized Annual Consumption for natural gas usage 2008-2011	
Blocks	Mean	Mean without Outliers
all	72246	70511
1	76282	76282
2	87120	87120
3	88646	88646
4	67171	60283
5	73211	73211
6	59689	48772
8	84873	84873
10	84024	84024
11	108105	94591
12	95580	95580
13	64850	62618
14	57289	57289
15	70848	65820
16	64628	64628
17	77791	77791
18	53422	53422
19	45959	43204
20	68094	68094
21	73837	73837
22	70472	58562

List of buildings that failed heating reliability criteria

Table 15. List of buildings that failed the heating PRISM default reliability criteria.

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PRISM (Advanced Version 1.0)
List of Buildlings that Fail Reliability Criteria *

Meter File: C:\PRISM\METER\H_GAS0.MTR
Weather Files: C:\PRISM\TEMPS\HUT90_11.TPS, .HNM, and .CNM
Output File: C:\PRISM\METER\H_GAS0.SPR


For R² >= 0.70 and CV(NAC) <= 7.0%
                                  Pass Ratio      Fail Ratio
                                 =============   =============
a) With [R²,CV(NAC)]:            241/246 = 98%    5/246 = 2%
b) With [R²,CV(NAC),Flat Index]: 241/246 = 98%    5/246 = 2%

 Building ID                           R²      CV(NAC)%  Failed
===============================================================
#40 504: PRE                        *0.60        *9.9     a & b
#100 1406: PRE                       0.79        *7.5     a & b
#121 1701: PRE                       0.79        *9.7     a & b
#125 1705: PRE                       0.73        *7.9     a & b
#156 2010: PRE                      *0.54         5.4     a & b
```

Electric – Cooling

Results by parcel

Table 16. PRISM electric results from the "Spread" file. Columns related to heating have been omitted.

Parcel Code	Label	Pre/Post	Units	Cooling Model Identifier	Number data points	Start Month	Start Day	Start Year	End Month	End Day	End Year	Flatness Index	R^2	τ Tauc (cooling)	se(τ Tauc)	α Base level	se(α Base level)	β Cooling slope	se(β Cooling slope)	Cooling part of NAC	se(Cooling part of NAC)	NAC	se(NAC)
101	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.227	0.6046	54	5.91	31.218	1.232	0.936	0.348	1874.85	323.66	13277.07	327.09
102	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.252	0.7119	62.76	2.86	23.937	0.81	1.625	0.488	1415.62	196.69	10158.69	237.95
103	Part	PRE	kWh	CO-R----M-D	34	8	29	8	7	29	11	0.276	0.4582	63.55	4.2	30.786	1.308	1.911	0.894	1505.88	334.64	12750.57	394.87
104	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.242	0.0862	84	-9	29.142	1.16	-62.568	35.466	137.12	-9	10507.05	417.74
105	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.231	0.4975	70.9	3.2	30.664	1.089	3.87	2.307	856.47	234.7	12056.55	354.7
106	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.303	0.2403	.	.	22.424	1.613	.	.	.	.	8893.9	442.51
107	Part	PRE	kWh	CO------M-D	34	8	29	8	7	29	11	0.405	0.0091	80	-9	48.357	3.439	-13.252	24.411	174.25	-9	17487.97	1232.35
108	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.238	0.8056	61	2.65	19.927	0.534	1.187	0.288	1265.79	130.79	8543.95	153.92
109	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.347	0.2523	79.1	5.95	28.502	1.688	25.425	49.592	484.94	169.88	10895.3	588.69
1010	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.338	0.786	62.76	2.29	19.823	0.82	2.054	0.494	1787.42	199.25	9027.6	241.04
1011	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.176	0.3929	.	.	36.786	1.128	.	.	.	.	14089.95	350.96
1012	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.234	0.5807	.	.	32.87	1.15	.	.	.	.	12982.17	360.8
201	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.262	0.4676	72.58	3.47	26.008	1.042	5.214	3.642	781.4	226.38	10280.71	345.3
202	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.375	0.4172	68	4.47	18.687	0.905	2.026	1.239	802.12	216.86	7627.42	281.13
203	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.299	0.0661	61	20.3	21.209	1.426	0.414	0.769	441.95	349.34	8188.45	411.13
204	Part	PRE	kWh	CO------M-D	33	8	29	8	7	29	11	0.433	0.2001	82	6.04	22.811	1.7	67.982	106.83	397.29	326.8	8729.05	632.56
205	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.436	0.8343	60.54	2.33	27.58	1.466	3.41	0.721	3822.57	360.19	13896	417.24
206	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.184	0.1091	.	.	32.786	1.138	.	.	.	.	12273.49	339.05
207	Part	PRE	kWh	HO------M-D	34	8	29	8	7	29	11	0.329	0.3916	.	.	25.645	4.412	.	.	.	.	15541.48	717.52
208	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.244	0.6035	.	.	22.391	0.816	.	.	.	.	8906.87	252.15
209	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.327	0.7435	60.58	3.06	45.747	2.065	3.656	1.016	4082.22	507.36	20791.19	587.73
2010	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.175	0.3704	.	.	38.601	1.651	.	.	.	.	15337.4	377.19
2011	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.199	0.2058	71	8.29	28.699	1.041	2.173	3.039	469.88	227.94	10952.26	343
301	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.214	0.4052	75.41	2.17	41.057	1.372	11.551	6.434	785.74	200.94	15781.93	454.71
302	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.219	0.546	55	7.5	34.01	1.453	0.931	0.457	1726.05	380.9	14148.1	388.98
303	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.366	0.6225	.	.	24.54	2.858	.	.	.	.	12395.78	498.44
304	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.486	0.2106	54	14.15	25.207	3.131	0.994	0.884	1990.03	822.44	11197.04	831.17
305	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.199	0.4188	63	5.67	39.27	1.396	1.589	0.927	1342.42	340.42	15685.71	411.6
306	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.42	0.9032	58	2.19	23.307	0.953	2.429	0.406	3492.56	243.15	12005.54	265.84
307	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.637	0.2263	81.01	2.35	21.301	2.329	83.266	51.914	726.92	301.26	8506.96	815.66
308	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.201	0.1196	76	5.91	11.855	0.425	1.834	2.486	102.46	64.21	4432.35	141.03
309	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.346	0.2906	74	4.15	16.726	1.015	4.826	4.259	493.51	172.62	6602.81	335.28
3010	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.192	0.3961	.	.	36.047	1.221	.	.	.	.	13886.77	377.16
3011	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.562	0.1902	.	.	24.605	5.332	.	.	.	.	11467.3	1035.18
401	Part	PRE	kWh	HO------M-D	23	8	29	8	7	29	10	0.547	0.2445	.	.	14.778	2.676	.	.	.	.	6467.07	720.63
402	Part	PRE	kWh	CO------M-D	26	8	29	8	10	29	10	0.227	0.4303	70.65	3.79	23.102	1.002	3.737	3.14	875.49	212.21	9313.5	324.3
403	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.277	0.769	64	2.54	26.866	0.895	2.438	0.674	1809.59	219.11	11622.42	266.09
404	Part	PRE	kWh	HO-R----M-D	33	8	29	8	7	29	11	0.959	0.0269	.	.	15.349	3.352	.	.	.	.	6144.24	641.2
405	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.17	0.5856	62	4.27	11.078	0.286	0.414	0.172	394.29	69.54	4440.42	84.12
406	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.201	0.5978	66.74	2.66	29.044	0.852	2.145	0.751	1059.23	206.1	11667.69	258.29
407	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.25	0.5685	.	.	15.24	1.132	.	.	.	.	6781.57	197.42
408	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.562	0.174	.	.	16.289	2.779	.	.	.	.	7194.68	663.04
409	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.504	0.2956	62	7.83	32.243	3.553	2.799	2.14	2667.17	863.16	14443.84	1044.21

Parcel Code	Label	Pre/Post	Units	Cooling Model Identifier	Number data points	Start Month	Start Day	Start Year	End Month	End Day	End Year	Flatness Index	R^2	τ Tauc (cooling)	se(τ Tauc)	α Base level	se(α Base level)	β Cooling slope	se(β Cooling slope)	Cooling part of NAC	se(Cooling part of NAC)	NAC	se(NAC)
4010	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.451	0.9005	63.91	1.35	20.84	0.82	3.57	0.544	2681.27	199.92	10293.12	241.72
4012	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.217	0.6983	69.91	1.84	26.187	0.682	3.493	1.101	955.95	152.24	10520.58	219.69
4013	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.302	0.1658	64	9.66	24.989	0.711	0.509	0.535	378.09	173.9	9505.34	211.18
4014	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.22	0.6419	.	.	20.121	1.19	.	.	.	.	8867.21	207.5
501	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.327	0.0194	68	29.13	24.126	1.312	0.45	1.795	178.23	314.3	8990.35	407.46
502	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.213	0.1668	.	.	41.815	1.724	.	.	.	.	15818.9	557.21
503	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.348	0.1071	67	10.97	32.486	2.371	1.769	2.519	834.82	561.36	12700.37	726.21
504	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.453	0.0061	85.45	-9	11.333	0.896	35.206	78.489	26.91	-9	4166.15	322.51
505	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.236	0.3091	62.9	6.4	22.704	1.048	0.928	0.631	794.47	254.67	9087.23	308.09
506	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.456	0.6733	58.12	4.13	24.747	1.761	2.358	0.75	3355.52	449.23	12394.22	491.15
507	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.312	0.5447	61	4.94	25.492	1.387	1.657	0.749	1767.77	339.92	11078.69	400.04
508	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.313	0.6768	62.93	3.11	17.352	0.726	1.319	0.437	1124.64	176.32	7462.45	213.31
509	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.171	0.0596	.	.	52.351	1.693	.	.	.	.	19372.55	573.22
5010	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.18	0.1803	73.27	6.4	27.234	0.893	2.642	3.464	331.15	169.55	10278.39	293.7
5011	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.345	0.4665	.	.	28.123	1.895	.	.	.	.	11752.7	557.47
601	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.324	0.4911	54.73	6.83	20.321	1.352	0.851	0.382	1613.02	354.99	9035.17	358.75
604	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.319	0.8415	59.87	2.36	25.597	0.908	2.027	0.416	2437.35	227.69	11786.64	255.34
605	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.337	0.3208	.	.	19.705	1.287	.	.	.	.	7898.52	388.57
606	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.347	0.3663	.	.	50.002	3.74	.	.	.	.	20675.28	1079.59
607	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.202	0.5077	53	8.33	22.013	0.828	0.433	0.217	933.62	217.82	8973.77	217.2
608	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.25	0.2326	72	7.13	36.923	1.67	4.52	5.837	777.6	362.8	14263.8	553.39
609	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.202	0.1811	68	8.6	31.115	1.229	1.429	1.682	565.7	294.41	11930.51	381.67
6010	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.363	0.1022	.	.	13.398	0.997	.	.	.	.	5129.13	322.04
6011	Part	PRE	kWh	CO------M-D	33	8	29	8	7	29	11	0.484	0.6294	70.66	2.44	22.848	1.682	7.895	3.432	1847.83	352.01	10192.96	541.04
6012	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.406	0.6486	69	2.7	12.701	0.723	2.883	1.167	945.56	161.29	5584.59	232.75
6013	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.533	0.3843	.	.	11.205	1.07	.	.	.	.	5064.34	224.89
6014	Part	PRE	kWh	CO------M-D	31	8	29	8	7	29	11	0.392	0.3225	62.69	6.83	21.529	1.954	1.519	1.069	1334.85	446.69	9198.26	551.31
6015	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.563	0.8482	53.47	2.52	10.437	0.766	1.289	0.201	2687.71	201.56	6499.69	200.99
801	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.21	0.7486	.	.	7.281	0.239	.	.	.	.	3061.42	58.17
803	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.135	0.2137	.	.	12.011	0.302	.	.	.	.	4498.24	96.94
804	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.378	0.3538	.	.	67.841	4.733	.	.	.	.	27227.59	1529.04
805	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.558	0.6754	56.7	3.58	13.522	1.065	1.465	0.372	2363.64	279.53	7302.56	285.64
806	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.443	0.8469	.	.	10.666	0.51	.	.	.	.	4764.4	157.61
807	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.463	0.8125	64.97	2.04	21.011	1.328	4.063	1	2634.67	324.99	10309.05	394.67
808	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.277	0.3335	.	.	22.692	1.337	.	.	.	.	9090.59	385.96
1001	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.186	0.6864	68.44	2.68	21.194	0.514	1.808	0.704	662.19	123.18	8403.24	159.69
1002	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.22	0.6801	32.49	7.95	7.276	0.381	0.11	0.024	689.85	121.25	3347.34	72.19
1003	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.235	0.0541	.	.	27.799	2.193	.	.	.	.	9285.88	353.54
1004	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.238	0.6209	65.86	2.68	26.84	0.927	2.21	0.767	1255.46	219.34	11058.88	280.17
1005	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.344	0.6015	72.8	2.37	15.822	0.757	5.312	2.646	751.11	164.43	6530.01	250.81
1006	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.399	0.5727	69.67	2.6	30.704	1.861	6.988	3.005	2011.92	415.43	13226.44	599.51
1007	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.139	0.4481	75.35	2.27	35.027	0.757	6.182	3.549	427.52	110.84	13220.97	250.81
1008	Part	PRE	kWh	CO------M-D	34	8	29	8	7	29	11	0.336	0.693	61	3.64	12.838	0.661	1.049	0.349	1118.75	159.61	5807.98	188.61

Parcel Code	Label	Pre/Post	Units	Cooling Model Identifier	Number data points	Start Month	Start Day	Start Year	End Month	End Day	End Year	Flatness Index	R^2	τ Tauc (cooling)	se(τ Tauc)	α Base level	se(α Base level)	β Cooling slope	se(β Cooling slope)	Cooling part of NAC	se(Cooling part of NAC)	NAC	se(NAC)
1101	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.19	0.1939	.	.	22.43	0.645	.	.	.	.	8346.47	206.82
1102	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.342	0.8046	59.91	2.67	29.729	1.272	2.51	0.582	3004.41	319.03	13862.88	357.77
1103	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.239	0.6274	.	.	9.741	0.442	.	.	.	.	4001.61	121.38
1104	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.282	0.2625	67.93	5.02	22.002	1.202	1.74	1.277	697.85	284.6	8733.9	368.17
1105	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.349	0.7768	38	5.64	10.46	0.757	0.355	0.067	1767.72	225.37	5588.12	158.52
1106	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.295	0.2718	.	.	15.031	1.008	.	.	.	.	6032.64	283.93
1201	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.324	0.295	75.78	2.31	42.406	2.361	17.055	11.07	1031.2	345.73	16519.82	782.36
1202	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.201	0.1874	72	8.17	25.629	0.943	2.227	3.298	383.12	204.96	9744.26	312.63
1203	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.257	0.734	.	.	28.454	1.027	.	.	.	.	12125.34	256.46
1204	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.277	0.6242	.	.	31.397	1.3	.	.	.	.	12711.55	397.14
1205	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.244	0.5336	52.92	6.7	24.321	1.156	0.697	0.282	1512.24	308.7	10395.61	299.53
1206	Part	PRE	kWh	CO------M-D	32	8	29	8	7	29	11	0.427	0.0293	82	17.67	16.184	1.266	-17.038	78.29	99.57	239.65	5811.67	469.2
1207	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.32	0.3988	75.71	1.9	28.086	1.441	12.89	6.758	796.93	211.06	11055.3	477.62
1208	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.66	0.8979	48.9	2.35	9.954	0.98	1.413	0.167	3999.31	266.74	7635.16	239.2
1209	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.288	0.0742	.	.	33.567	2.246	.	.	.	.	12797.04	656.65
12010	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.191	0.5669	.	.	46.86	1.726	.	.	.	.	18873.27	431.1
12011	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.15	0.1869	79	7.18	44.429	1.124	14.486	33.026	285.72	113.13	16513.42	392.04
12012	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.287	0.6885	71.28	2.58	15.8	0.556	3.55	1.622	723.28	121.61	6494.29	183
12013	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.794	0.1471	.	.	8.914	1.126	.	.	.	.	3469.11	401.13
12014	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.241	0.6361	64.83	3.16	22.723	0.769	1.541	0.579	1019.55	188.17	9319.02	228.51
12015	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.206	0.0296	65	23.85	31.909	1.397	0.413	1.156	266.23	330.56	11920.89	422.24
12016	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.244	0.1461	25	37.75	16.59	1.464	0.081	0.066	674.11	514.93	6733.45	235.11
12017	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.271	0.6825	71.98	2.04	33.097	1.098	7.841	3.204	1357.27	240.26	13446.04	361.53
12018	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.376	0.7042	49.92	5.02	10.518	0.736	0.528	0.14	1403.78	198.35	5245.62	183.82
12019	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.227	0.3648	56	9.69	28.105	1.341	0.713	0.469	1219.91	352.2	11485.4	359.9
12020	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.211	0.0174	.	.	32.691	1.578	.	.	.	.	12115.74	464.12
12021	Part	PRE	kWh	CO------M-D	34	8	29	8	7	29	11	0.512	0.0407	81	6.3	12.139	1.154	15.181	25.309	133.07	147.06	4567	403.2
12022	Part	PRE	kWh	HO------M-D	34	8	29	8	7	29	11	0.266	0.0261	.	.	24.305	1.543	.	.	.	.	9083.29	445.41
12023	Part	PRE	kWh	CO------M-D	31	8	29	8	7	29	11	0.492	0.391	69	4.85	26.877	2.665	5.487	3.97	1799.73	559.58	11616.63	834.35
1301	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.598	0.8564	.	.	0.92	0.202	.	.	.	.	769.26	31.72
1302	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.244	0.5447	43	8.92	23.843	1.338	0.462	0.163	1816.26	379.83	10524.92	301.12
1303	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.629	0.7753	.	.	29.562	9.802	.	.	.	.	26541.08	1450.65
1304	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.367	0.7884	.	.	43.805	2.761	.	.	.	.	22134.63	580.6
1305	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.408	0.3384	66	5.38	22.442	1.801	2.443	1.588	1356.31	435.76	9553.29	546.11
1306	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.703	0.4025	79	4.19	10.73	1.203	26.542	35.345	523.51	121.08	4442.49	419.56
1307	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.24	0.3886	.	.	29.966	1.726	.	.	.	.	12259.6	394.4
1308	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.135	0.0435	.	.	37.583	1.802	.	.	.	.	13038.46	296.48
1309	Part	PRE	kWh	CO------M-D	34	8	29	8	7	29	11	0.43	0.0192	83	-9	28.068	2.137	33.987	42.925	124.14	-9	10376.04	769.39
13010	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.401	0.7463	59.94	3.14	22.499	1.326	2.217	0.607	2645.74	332.56	10863.65	372.95
13011	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.329	0.1696	.	.	13.237	0.794	.	.	.	.	5071.52	256.93
13012	Part	PRE	kWh	CO------M-D	32	8	29	8	7	29	11	0.594	0.3311	69	7.29	8.725	1.048	1.995	2.095	654.24	269.14	3841.03	352.28
13013	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.243	0.6432	69.72	2.36	25.741	0.885	3.639	1.429	1036.52	197.6	10438.37	285.15
13014	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.388	0.1212	77	7.3	18.196	1.339	7.375	12.547	296.31	202.44	6942.34	439.28

Parcel Code	Label	Pre/Post	Units	Cooling Model Identifier	Number data points	Start Month	Start Day	Start Year	End Month	End Day	End Year	Flatness Index	R^2	τ Tauc (cooling)	se(τ Tauc)	α Base level	se(α Base level)	β Cooling slope	se(β Cooling slope)	Cooling part of NAC	se(Cooling part of NAC)	NAC	se(NAC)
13015	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.146	0.1561	84.3	-9	16.876	0.397	35.215	14.251	65.69	-9	6229.67	142.88
13016	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.195	0.0489	.	.	24.731	0.915	.	.	.	.	9179.03	273.04
13017	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.253	0.593	65	3.45	12.053	0.462	0.942	0.382	608.24	109.37	5010.78	139.7
13018	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.472	0.2266	71	7.79	21.593	1.956	4.341	5.709	938.61	428.17	8825.55	644.29
1401	Part	PRE	kWh	CO------M-D	26	8	29	8	7	29	11	0.547	0.1964	82	6.97	29.104	3.2	97.924	177.243	572.27	545.22	11202.37	1155.95
1402	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.489	0.0641	.	.	1.932	0.198	.	.	.	.	742.22	63.86
1403	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.582	0.6031	74.25	1.94	9.051	0.774	7.47	3.249	714.78	131.68	4020.83	255.75
1404	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.128	0.2198	.	.	22.675	1.011	.	.	.	.	8721.67	149.63
1405	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.163	0.0902	.	.	25.152	11.584	.	.	.	.	8535.05	230.83
1406	Part	PRE	kWh	HO-R----M-D	26	10	29	8	7	29	11	1.198	0.0162	.	.	4.006	2.585	.	.	.	.	1103.74	366.6
1407	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.217	0.2761	69	5.94	41.003	1.602	2.905	2.586	952.89	357.51	15929.2	515.93
1408	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.383	0.9033	52.89	2.64	15.374	0.712	1.092	0.174	2372.81	190.13	7988.15	184.49
1409	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.463	0.7	.	.	24.889	2.287	.	.	.	.	12112.17	610.19
14010	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.264	0.5389	67.35	3.22	14.402	0.6	1.46	0.637	649.78	142.05	5909.96	183.76
1501	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.267	0.6827	69.7	1.94	19.28	0.57	2.857	0.92	817.27	127.13	7859.17	183.46
1502	Part	PRE	kWh	HO------M-D	34	8	29	8	7	29	11	0.16	0.3559	.	.	12.772	0.396	.	.	.	.	4916.08	117.81
1503	Part	PRE	kWh	CO------M-D	34	8	29	8	7	29	11	0.545	0.2201	53	14.49	16.331	2.454	0.721	0.626	1553.92	636.24	7518.64	634.38
1504	Part	PRE	kWh	HO-R----M-D	30	8	29	8	7	29	11	0.453	0.2158	.	.	20.543	3.011	.	.	.	.	8958.46	678.54
1505	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.352	0.1222	.	.	20.914	1.907	.	.	.	.	6396.87	298.73
1506	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.349	0.6165	64	3.73	27.582	1.552	2.879	1.168	2136.61	379.89	12210.83	461.34
1507	Part	PRE	kWh	CO-R----M-D	34	8	29	8	7	29	11	0.358	0.476	65	4.7	20.154	1.19	1.751	0.964	1129.79	277.46	8491	356.43
1508	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.182	0.1615	.	.	47.776	1.878	.	.	.	.	18130.51	559.68
1601	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.26	0.6242	80.82	3.71	9.377	0.283	21.641	48.266	206.77	111.72	3631.7	158.24
1602	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.735	0.8903	73.4	1.01	12.07	0.773	14.098	2.997	1707.85	146.68	6116.54	254.09
1603	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	1.219	0.8515	76.87	0.55	4.232	0.549	20.7	3.211	874.5	82.96	2420.33	182.2
1604	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.215	0.612	74.77	1.66	29.888	0.834	8.373	3.498	689.32	141.78	11605.74	275.38
1605	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.357	0.8406	63.73	1.86	20.547	0.759	2.446	0.503	1884.42	184.96	9389.11	223.64
1606	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.326	0.7517	68.82	2.02	17.867	0.725	3.206	0.992	1091.26	173.64	7617.35	225.11
1607	Part	PRE	kWh	HO------M-D	34	8	29	8	7	29	11	0.204	0.3504	.	.	24.076	1.05	.	.	.	.	9454.41	295.46
1608	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.382	0.1587	.	.	20.03	1.662	.	.	.	.	7877.08	503.79
1609	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.259	0.6614	79	2.46	19.944	0.582	21.86	17.092	431.16	58.55	7715.87	202.9
16010	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.311	0.1311	.	.	34.984	1.797	.	.	.	.	13161.7	649.75
16011	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.235	0.5204	.	.	36.187	2.826	.	.	.	.	15692.34	418.22
16012	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.146	0.0836	74	8.8	24.906	0.685	1.537	2.874	157.17	116.49	9254.26	226.26
16013	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.192	0.3121	84	-9	44.136	1.245	147.3	38.07	322.81	-9	16443.31	448.41
16014	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.307	0.638	66.95	2.51	33.846	1.546	4.026	1.364	1915.86	374.25	14277.93	469.02
16015	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.148	0.1958	73	6.73	28.536	0.756	2.235	2.931	298.72	143.45	10721.41	248.49
16016	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.226	0.0974	79	10.48	10.808	0.434	3.829	12.737	75.53	43.63	4023.03	151.2
16017	Part	PRE	kWh	CO------M-D	34	8	29	8	7	29	11	0.42	0.2698	69.27	5.66	15.574	1.273	2.29	2.017	713.89	280.09	6402.11	407.3
16018	Part	PRE	kWh	CO------M-D	34	8	29	8	7	29	11	0.259	0.7272	68	2.32	29.468	0.934	3.981	1.279	1576.2	230.84	12339.4	292.44
1701	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.569	0.7533	.	.	39.58	4.058	.	.	.	.	20455.13	1171.37
1702	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.277	0.4836	52	8.18	12.806	0.736	0.382	0.18	884.81	196.58	5562.36	190.74
1703	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.386	0.7573	68	2.78	24.352	1.336	4.798	1.828	1899.51	320.02	10794.08	414.87

Parcel Code	Label	Pre/Post	Units	Cooling Model Identifier	Number data points	Start Month	Start Day	Start Year	End Month	End Day	End Year	Flatness Index	R^2	τ Tauc (cooling)	se(τ Tauc)	α Base level	se(α Base level)	β Cooling slope	se(β Cooling slope)	Cooling part of NAC	se(Cooling part of NAC)	NAC	se(NAC)
1704	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.217	0.6175	74.12	2	12.152	0.337	3.26	1.416	323.64	57.38	4762.14	111.45
1705	Part	PRE	kWh	CO------M-D	34	8	29	8	7	29	11	0.475	0.1026	82.37	-9	24.6	1.908	-116.298	60.786	585.93	-9	8399.31	711.42
1706	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.27	0.5679	62.62	3.94	23.245	1.019	1.506	0.614	1334.57	247.69	9824.7	299.64
1707	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.339	0.1688	.	.	29.579	2.903	.	.	.	.	12083.34	663.29
1708	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.371	0.4037	.	.	12.265	1.426	.	.	.	.	5554.73	294.49
1709	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.345	0.8546	69	1.73	13.525	0.459	2.858	0.74	937.37	102.36	5877.31	147.71
1801	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.506	0.8449	60	2.44	10.371	0.638	1.482	0.314	1757.56	156.66	5545.65	181.47
1802	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.269	0.5394	67.97	2.74	39.02	1.653	4.362	1.756	1736.72	391.34	15988.6	506.25
1803	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.277	0.1059	.	.	26.041	2.181	.	.	.	.	8257.76	350.8
1804	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.252	0.7417	67.01	2.24	17.126	0.515	1.884	0.548	887.6	122.02	7142.89	157.85
1805	Part	PRE	kWh	CO------M-D	34	8	29	8	7	29	11	0.328	0.623	67.88	2.23	14.771	0.719	2.351	0.777	952.61	174.21	6347.65	221.99
1806	Part	PRE	kWh	HO------M-D	27	8	29	8	7	29	11	0.91	0.0769	.	.	5.098	4.16	.	.	.	.	3687.06	666.68
1807	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.212	0.2248	74	4.94	22.059	0.826	3.303	3.465	337.81	140.43	8394.83	272.75
1808	Part	PRE	kWh	CO------M-D	34	8	29	8	7	29	11	0.56	0.8661	64.71	1.72	17.657	1.114	5.194	1.152	3498.14	278.38	9947.41	338
1809	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.161	0.162	74	6.14	34.962	0.811	2.607	3.403	266.59	137.93	13036.48	267.9
18010	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.437	0.6962	56	4.85	23.054	1.774	1.885	0.62	3222.82	465.84	11643.21	476.03
18011	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.298	0.3922	68.93	3.9	27.261	1.44	3.247	1.97	1081.1	344.93	11038.04	447.16
18012	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.235	0.4423	68	4.41	26.224	0.942	2.134	1.29	844.95	225.74	10423.22	292.64
18013	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.385	0.7749	45	4.83	19.089	1.36	0.889	0.185	3148.85	374	10121.06	318.52
18014	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.307	0.5623	.	.	39.798	2.382	.	.	.	.	16963.25	647.54
1901	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.477	0.5456	55.8	5.64	16.905	1.486	1.205	0.468	2095.68	389.59	8270.19	397.85
1903	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.267	0.0727	.	.	23.774	1.617	.	.	.	.	9106.61	399.22
1904	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.357	0.8173	58.86	2.78	34.662	1.538	2.893	0.655	3838.78	392.44	16499.15	429.05
1905	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.221	0.6982	65.58	2.41	21.237	0.607	1.664	0.502	987.21	143.6	8744.12	183.43
1906	Part	PRE	kWh	CO------M-D	34	8	29	8	7	29	11	0.161	0.3759	60.09	7.13	35.77	1.091	0.886	0.567	1040.76	273.61	14105.91	315.79
1907	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.175	0.4572	60.71	5.54	36.826	1.148	1.108	0.565	1219.8	282.1	14670.36	326.79
1908	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.274	0.7336	54.69	4.06	20.333	0.833	0.884	0.235	1680.34	218.74	9107.09	221.06
1909	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.339	0.6127	.	.	28.429	2.064	.	.	.	.	12642.4	503.09
19010	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.302	0.577	73.98	2.11	31.643	1.433	11.072	5.559	1139	272.07	12696.77	471.29
19011	Part	PRE	kWh	HO------M-D	34	8	29	8	7	29	11	0.301	0.3583	.	.	24.394	1.432	.	.	.	.	9707.97	435.79
19012	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.257	0.801	66.68	1.64	23.437	0.646	2.661	0.57	1326.89	156.45	9887.11	196.07
19013	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.26	0.2926	62	7.89	24.482	1.273	0.996	0.767	949.15	309.41	9891.06	374.31
19014	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.402	0.3282	71.82	4.53	13.678	0.984	3.257	2.873	585.83	215.49	5581.66	324.26
19015	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.293	0.7359	60.42	3.57	27	1.162	1.784	0.572	2026.73	285.56	11888.4	330.79
19016	Part	PRE	kWh	HO------M-D	32	8	29	8	7	29	11	0.576	0.1929	.	.	14.158	3.898	.	.	.	.	6775.8	664.43
19017	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.228	0.5078	55	7.2	29.621	1.276	0.853	0.402	1580.89	334.65	12399.96	341.74
2001	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.655	0.1186	.	.	53.803	7.81	.	.	.	.	14547.68	1261.67
2002	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.321	0.5976	69.79	2.38	16.067	0.739	2.974	1.192	834.72	164.83	6703.26	237.87
2003	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.239	0.4916	69	3.73	38.374	1.421	4.104	2.295	1346.1	317.21	15362.32	457.77
2004	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.281	0.5504	69.54	2.83	29.702	1.24	4.361	2.001	1288.87	276.68	12137.45	399.27
2005	Part	PRE	kWh	HO------M-D	34	8	29	8	7	29	11	0.243	0.0028	.	.	35.498	1.808	.	.	.	.	13031.46	579.37
2006	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.459	0.1739	74.87	4.09	19.655	1.194	4.753	5.009	378.4	203.02	7557.43	394.32
2007	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.209	0.0292	.	.	33.63	1.434	.	.	.	.	12459.52	460.77

Parcel Code	Label	Pre/Post	Units	Cooling Model Identifier	Number data points	Start Month	Start Day	Start Year	End Month	End Day	End Year	Flatness Index	R^2	τ Tauc (cooling)	se(τ Tauc)	α Base level	se(α Base level)	β Cooling slope	se(β Cooling slope)	Cooling part of NAC	se(Cooling part of NAC)	NAC	se(NAC)
2008	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.153	0.0942	75	6.7	36.049	1.028	3.08	4.818	235.15	150.46	13401.98	340.47
2009	Part	PRE	kWh	CO------M-D	34	8	29	8	7	29	11	0.411	0.8079	50	3.94	23.807	1.516	1.486	0.312	3928.34	412.81	12623.71	390.96
20010	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.4	0.9033	.	.	25.978	1.334	.	.	.	.	13380.09	318.42
20011	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.204	0.2402	61	9.69	77.341	2.793	1.699	1.507	1812.4	684.18	30061.06	805.21
2101	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.355	0.5557	62	4.53	24.263	1.486	2.021	0.895	1926.15	361.03	10788.16	436.75
2103	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.376	0.7153	67.43	2.26	7.295	0.342	1.176	0.363	516.45	80.98	3180.91	104.75
2104	Part	PRE	kWh	CO-R----M-D	27	8	29	8	3	29	11	0.908	0.03	80	-9	12.043	2.068	-67.314	77.875	885.11	-9	3513.7	1146.5
2105	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.416	0.246	.	.	30.915	2.54	.	.	.	.	12305.99	820.46
2106	Part	PRE	kWh	CO------M-D	34	8	29	8	7	29	11	0.376	0.2574	67.77	5.39	12.234	0.937	1.268	0.975	523.72	218.62	4992.08	284.49
2107	Part	PRE	kWh	HO-R----M-D	34	8	29	8	7	29	11	0.357	0.4079	.	.	25.755	1.68	.	.	.	.	10466.06	502.66
2108	Part	PRE	kWh	CO------M-D	34	8	29	8	7	29	11	0.313	0.5891	51.9	6.22	15.151	0.963	0.586	0.209	1365.37	255.33	6899.29	242.53
2109	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.577	0.7667	75.59	0.71	15.643	0.58	14.418	2.72	927.83	84.95	6641.33	192.23
21012	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.149	0.1121	76	6.04	38.145	1.044	4.402	6.104	245.97	157.69	14178.54	346.34
21013	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.166	0.1078	65	11.99	33.224	1.133	0.665	0.937	429.37	268.07	12564.33	342.43
21014	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.188	0.0632	80	41.02	43.833	1.426	-14.735	243.346	193.75	563.26	15816.31	797.79
21015	Part	PRE	kWh	CO------M-D	34	8	29	8	7	29	11	0.354	0.2101	54.85	13	24.22	2.141	0.688	0.588	1290.78	554.08	10137.1	560.13
21016	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.448	0.819	.	.	17.314	0.931	.	.	.	.	7800.84	282.09
21017	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.63	0.2436	81.53	1.76	6.082	0.648	27.425	14.445	198.19	83.83	2419.7	226.97
21018	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.207	0.6676	64.74	2.8	18.997	0.54	1.235	0.406	827.74	132.14	7766.26	160.47
2201	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.19	0.2528	67	6.53	51.025	1.843	2.31	1.958	1090.04	436.34	19726.97	564.47
2202	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.308	0.537	63	4.47	28.631	1.499	2.165	0.995	1828.91	365.51	12286.4	441.93
2203	Part	PRE	kWh	HO------M-D	34	8	29	8	7	29	11	0.492	0.202	.	.	23.502	5.914	.	.	.	.	11118.4	887.71
2204	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.586	0.1193	.	.	16.989	2.528	.	.	.	.	6973.1	724.7
2205	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.209	0.2468	79	6.01	34.393	1.178	18.121	34.595	357.41	118.51	12919.45	410.67
2206	Part	PRE	kWh	HO-R----M-D	35	8	29	8	7	29	11	0.438	0.6222	.	.	25.671	1.924	.	.	.	.	12258.24	404.49
2207	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.252	0.3284	61	7.72	19.822	0.996	0.761	0.537	811.42	244.02	8051.51	287.18
2208	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.278	0.2714	74	4.35	24.678	1.195	5.418	5.016	554.15	203.27	9567.7	394.82
2209	Part	PRE	kWh	HO------M-D	35	8	29	8	7	29	11	0.17	0.4379	.	.	17.714	1.004	.	.	.	.	7287.01	163.71
22010	Part	PRE	kWh	CO-R----M-D	35	8	29	8	7	29	11	0.316	0.6339	62.14	3.82	26.588	1.179	1.882	0.71	1765.84	286.45	11477.02	346.54
22011	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.306	0.8051	60.93	2.41	31.699	1.161	2.528	0.571	2716.86	285.24	14295.07	330.43
22013	Part	PRE	kWh	CO------M-D	35	8	29	8	7	29	11	0.342	0.6897	61	3.62	14.398	0.737	1.201	0.398	1280.87	180.67	6539.69	212.63

Summary of cooling part of NAC by block

Table 17. Mean cooling part of NAC electric consumption by block, with and without the effects of outliers (as defined by a 1.5 interquartile range boxplot).

	Cooling part of Normalized Annual Consumption for electric usage 2008-2011	
Blocks	Mean	Mean without Outliers
all	1210	1096
1	1056	1056
2	1542	1542
3	1332	1024
4	1353	1353
5	1052	723
6	1460	1460
8	2499	2499
10	988	817
11	1823	1823
12	1044	847
13	915	742
14	1053	722
15	1409	1409
16	853	853
17	994	994
18	1612	1612
19	1539	1330
20	1403	983
21	778	778
22	1301	1301

List of buildings that failed cooling reliability criteria

Default

Table 18. List of buildings that failed the cooling PRISM default reliability criteria.

PRISM (Advanced Version 1.0)
List of Buildings that Fail Reliability Criteria *

Meter File: C:\PRISM\METER\H_ELC2.MTR
Weather Files: C:\PRISM\TEMPS\HUT90_11.TPS, .HNM, and .CNM
Output File: C:\PRISM\METER\H_ELC2.SPR

For R^2 >= 0.70 and CV(NAC) <= 7.0%

	Pass Ratio	Fail Ratio
a) With [R^2,CV(NAC)]:	45/246 = 18%	201/246 = 82%
b) With [R^2,CV(NAC),Flat Index]:	159/246 = 65%	87/246 = 35%

	ID	R^2	CV(NAC)	%Failed
#1	101: PRE	*0.60	2.5	a
#3	103: PRE	*0.46	3.1	a
#4	104: PRE	*0.09	4.0	a
#5	105: PRE	*0.50	2.9	a
#6	106: PRE	*0.24	5.0	a & b
#7	107: PRE	*0.01	*7.0	a & b
#9	109: PRE	*0.25	5.4	a & b
#10	201: PRE	*0.47	3.4	a
#11	202: PRE	*0.42	3.7	a
#12	203: PRE	*0.07	5.0	a & b
#13	204: PRE	*0.20	*7.2	a & b
#15	206: PRE	*0.11	2.8	a
#16	207: PRE	*0.39	4.6	a & b
#17	208: PRE	*0.60	2.8	a
#19	301: PRE	*0.41	2.9	a
#20	302: PRE	*0.55	2.7	a
#21	303: PRE	*0.62	4.0	a & b
#22	304: PRE	*0.21	*7.4	a & b
#23	305: PRE	*0.42	2.6	a
#25	307: PRE	*0.23	*9.6	a & b
#26	308: PRE	*0.12	3.2	a
#27	309: PRE	*0.29	5.1	a & b
#28	401: PRE	*0.24	*11.1	a & b
#29	402: PRE	*0.43	3.5	a
#31	404: PRE	*0.03	*10.4	a & b
#32	405: PRE	*0.59	1.9	a
#33	406: PRE	*0.60	2.2	a
#34	407: PRE	*0.57	2.9	a
#35	408: PRE	*0.17	*9.2	a & b
#36	409: PRE	*0.30	*7.2	a & b
#37	501: PRE	*0.02	4.5	a & b
#38	502: PRE	*0.17	3.5	a
#39	503: PRE	*0.11	5.7	a & b
#40	504: PRE	*0.01	*7.7	a & b
#41	505: PRE	*0.31	3.4	a
#42	506: PRE	*0.67	4.0	a
#43	507: PRE	*0.54	3.6	a
#44	508: PRE	*0.68	2.9	a
#45	509: PRE	*0.06	3.0	a
#46	601: PRE	*0.49	4.0	a
#48	605: PRE	*0.32	4.9	a & b

#49	606:	PRE	*0.37	5.2	a & b
#50	607:	PRE	*0.51	2.4	a
#51	608:	PRE	*0.23	3.9	a
#52	609:	PRE	*0.18	3.2	a
#54	803:	PRE	*0.21	2.2	a
#55	804:	PRE	*0.35	5.6	a & b
#56	805:	PRE	*0.68	3.9	a
#59	808:	PRE	*0.33	4.2	a & b
#60	1001:	PRE	*0.69	1.9	a
#61	1002:	PRE	*0.68	2.2	a
#62	1003:	PRE	*0.05	3.8	a & b
#63	1004:	PRE	*0.62	2.5	a
#64	1005:	PRE	*0.60	3.8	a
#65	1006:	PRE	*0.57	4.5	a & b
#66	1007:	PRE	*0.45	1.9	a
#67	1008:	PRE	*0.69	3.2	a
#69	1011:	PRE	*0.39	2.5	a
#70	1012:	PRE	*0.58	2.8	a
#71	1101:	PRE	*0.19	2.5	a
#73	1103:	PRE	*0.63	3.0	a
#74	1104:	PRE	*0.26	4.2	a & b
#76	1106:	PRE	*0.27	4.7	a & b
#77	1201:	PRE	*0.30	4.7	a & b
#78	1202:	PRE	*0.19	3.2	a
#80	1204:	PRE	*0.62	3.1	a
#81	1205:	PRE	*0.53	2.9	a
#82	1206:	PRE	*0.03	*8.1	a & b
#83	1207:	PRE	*0.40	4.3	a & b
#85	1209:	PRE	*0.07	5.1	a & b
#87	1302:	PRE	*0.54	2.9	a
#90	1305:	PRE	*0.34	5.7	a & b
#91	1306:	PRE	*0.40	*9.4	a & b
#92	1307:	PRE	*0.39	3.2	a
#93	1308:	PRE	*0.04	2.3	a & b
#94	1309:	PRE	*0.02	*7.4	a & b
#95	1401:	PRE	*0.20	*10.3	a & b
#96	1402:	PRE	*0.06	*8.6	a & b
#97	1403:	PRE	*0.60	6.4	a & b
#98	1404:	PRE	*0.22	1.7	a
#99	1405:	PRE	*0.09	2.7	a
#100	1406:	PRE	*0.02	*33.2	a & b
#101	1407:	PRE	*0.28	3.2	a
#104	1501:	PRE	*0.68	2.3	a
#105	1502:	PRE	*0.36	2.4	a
#106	1503:	PRE	*0.22	*8.4	a & b
#107	1504:	PRE	*0.22	*7.6	a & b
#108	1505:	PRE	*0.12	4.7	a & b
#109	1506:	PRE	*0.62	3.8	a
#110	1507:	PRE	*0.48	4.2	a & b
#111	1508:	PRE	*0.16	3.1	a
#112	1601:	PRE	*0.62	4.4	a & b
#114	1603:	PRE	0.85	*7.5	a & b
#115	1604:	PRE	*0.61	2.4	a
#118	1607:	PRE	*0.35	3.1	a
#119	1608:	PRE	*0.16	6.4	a & b
#120	1609:	PRE	*0.66	2.6	a

#122	1702:	PRE	*0.48	3.4	a
#124	1704:	PRE	*0.62	2.3	a
#125	1705:	PRE	*0.10	*8.5	a & b
#126	1706:	PRE	*0.57	3.0	a
#127	1707:	PRE	*0.17	5.5	a & b
#128	1708:	PRE	*0.40	5.3	a & b
#131	1802:	PRE	*0.54	3.2	a
#132	1803:	PRE	*0.11	4.2	a & b
#134	1805:	PRE	*0.62	3.5	a
#135	1806:	PRE	*0.08	*18.1	a & b
#136	1807:	PRE	*0.22	3.2	a
#138	1809:	PRE	*0.16	2.1	a
#139	1901:	PRE	*0.55	4.8	a & b
#140	1903:	PRE	*0.07	4.4	a & b
#142	1905:	PRE	*0.70	2.1	a
#143	1906:	PRE	*0.38	2.2	a
#144	1907:	PRE	*0.46	2.2	a
#146	1909:	PRE	*0.61	4.0	a
#147	2001:	PRE	*0.12	*8.7	a & b
#148	2002:	PRE	*0.60	3.5	a
#149	2003:	PRE	*0.49	3.0	a
#150	2004:	PRE	*0.55	3.3	a
#151	2005:	PRE	*0.00	4.4	a & b
#152	2006:	PRE	*0.17	5.2	a & b
#153	2007:	PRE	*0.03	3.7	a
#154	2008:	PRE	*0.09	2.5	a
#156	2010:	PRE	*0.37	2.5	a
#157	2011:	PRE	*0.21	3.1	a
#158	2101:	PRE	*0.56	4.0	a & b
#160	2104:	PRE	*0.03	*32.6	a & b
#161	2105:	PRE	*0.25	6.7	a & b
#162	2106:	PRE	*0.26	5.7	a & b
#163	2107:	PRE	*0.41	4.8	a & b
#164	2108:	PRE	*0.59	3.5	a
#166	2201:	PRE	*0.25	2.9	a
#167	2202:	PRE	*0.54	3.6	a
#168	2203:	PRE	*0.20	*8.0	a & b
#169	2204:	PRE	*0.12	*10.4	a & b
#170	2205:	PRE	*0.25	3.2	a
#171	2206:	PRE	*0.62	3.3	a
#172	2207:	PRE	*0.33	3.6	a
#173	2208:	PRE	*0.27	4.1	a & b
#174	2209:	PRE	*0.44	2.2	a
#175	3010:	PRE	*0.40	2.7	a
#176	3011:	PRE	*0.19	*9.0	a & b
#178	4012:	PRE	*0.70	2.1	a
#179	4013:	PRE	*0.17	2.2	a
#180	4014:	PRE	*0.64	2.3	a
#181	5010:	PRE	*0.18	2.9	a
#182	5011:	PRE	*0.47	4.7	a & b
#183	6010:	PRE	*0.10	6.3	a & b
#184	6011:	PRE	*0.63	5.3	a & b
#185	6012:	PRE	*0.65	4.2	a & b
#186	6013:	PRE	*0.38	4.4	a & b
#187	6014:	PRE	*0.32	6.0	a & b
#189	12010:	PRE	*0.57	2.3	a

#190 12011:	PRE	*0.19	2.4	a
#191 12012:	PRE	*0.69	2.8	a
#192 12013:	PRE	*0.15	*11.6	a & b
#193 12014:	PRE	*0.64	2.5	a
#194 12015:	PRE	*0.03	3.5	a
#195 12016:	PRE	*0.15	3.5	a
#196 12017:	PRE	*0.68	2.7	a
#198 12019:	PRE	*0.36	3.1	a
#199 12020:	PRE	*0.02	3.8	a
#200 12021:	PRE	*0.04	*8.8	a & b
#201 12022:	PRE	*0.03	4.9	a & b
#202 12023:	PRE	*0.39	*7.2	a & b
#204 13011:	PRE	*0.17	5.1	a & b
#205 13012:	PRE	*0.33	*9.2	a & b
#206 13013:	PRE	*0.64	2.7	a
#207 13014:	PRE	*0.12	6.3	a & b
#208 13015:	PRE	*0.16	2.3	a
#209 13016:	PRE	*0.05	3.0	a
#210 13017:	PRE	*0.59	2.8	a
#211 13018:	PRE	*0.23	*7.3	a & b
#212 14010:	PRE	*0.54	3.1	a
#213 16010:	PRE	*0.13	4.9	a & b
#214 16011:	PRE	*0.52	2.7	a
#215 16012:	PRE	*0.08	2.4	a
#216 16013:	PRE	*0.31	2.7	a
#217 16014:	PRE	*0.64	3.3	a
#218 16015:	PRE	*0.20	2.3	a
#219 16016:	PRE	*0.10	3.8	a
#220 16017:	PRE	*0.27	6.4	a & b
#222 18010:	PRE	*0.70	4.1	a & b
#223 18011:	PRE	*0.39	4.1	a & b
#224 18012:	PRE	*0.44	2.8	a
#226 18014:	PRE	*0.56	3.8	a
#227 19010:	PRE	*0.58	3.7	a
#228 19011:	PRE	*0.36	4.5	a & b
#230 19013:	PRE	*0.29	3.8	a
#231 19014:	PRE	*0.33	5.8	a & b
#233 19016:	PRE	*0.19	*9.8	a & b
#234 19017:	PRE	*0.51	2.8	a
#236 20011:	PRE	*0.24	2.7	a
#237 21012:	PRE	*0.11	2.4	a
#238 21013:	PRE	*0.11	2.7	a
#239 21014:	PRE	*0.06	5.0	a & b
#240 21015:	PRE	*0.21	5.5	a & b
#242 21017:	PRE	*0.24	*9.4	a & b
#243 21018:	PRE	*0.67	2.1	a
#244 22010:	PRE	*0.63	3.0	a
#246 22013:	PRE	*0.69	3.3	a

Loose

Table 19. List of buildings that failed the cooling PRISM loose reliability criteria.

PRISM (Advanced Version 1.0)
List of Buildlings that Fail Reliability Criteria *

Meter File: .MTR
Weather Files: .TPS, .HNM, and .CNM
Output File: C:\PRISM\METER\H_ELC2.SPR

For R^2 >= 0.60 and CV(NAC) <= 10.0%

	Pass Ratio	Fail Ratio
a) With [R^2,CV(NAC)]:	83/246 = 34%	163/246 = 66%
b) With [R^2,CV(NAC),Flat Index]:	200/246 = 81%	46/246 = 19%

Building ID			R^2	CV(NAC)%	Failed
#3	103	: PRE	*0.46	3.1	a
#4	104	: PRE	*0.09	4.0	a
#5	105	: PRE	*0.50	2.9	a
#6	106	: PRE	*0.24	5.0	a
#7	107	: PRE	*0.01	7.0	a & b
#9	109	: PRE	*0.25	5.4	a
#10	201	: PRE	*0.47	3.4	a
#11	202	: PRE	*0.42	3.7	a
#12	203	: PRE	*0.07	5.0	a
#13	204	: PRE	*0.20	7.2	a & b
#15	206	: PRE	*0.11	2.8	a
#16	207	: PRE	*0.39	4.6	a & b
#19	301	: PRE	*0.41	2.9	a
#20	302	: PRE	*0.55	2.7	a
#22	304	: PRE	*0.21	7.4	a & b
#23	305	: PRE	*0.42	2.6	a
#25	307	: PRE	*0.23	9.6	a & b
#26	308	: PRE	*0.12	3.2	a
#27	309	: PRE	*0.29	5.1	a
#28	401	: PRE	*0.24	*11.1	a & b
#29	402	: PRE	*0.43	3.5	a
#31	404	: PRE	*0.03	*10.4	a & b
#32	405	: PRE	*0.59	1.9	a
#33	406	: PRE	*0.60	2.2	a
#34	407	: PRE	*0.57	2.9	a
#35	408	: PRE	*0.17	9.2	a & b
#36	409	: PRE	*0.30	7.2	a & b
#37	501	: PRE	*0.02	4.5	a
#38	502	: PRE	*0.17	3.5	a
#39	503	: PRE	*0.11	5.7	a & b
#40	504	: PRE	*0.01	7.7	a & b
#41	505	: PRE	*0.31	3.4	a
#43	507	: PRE	*0.54	3.6	a
#45	509	: PRE	*0.06	3.0	a
#46	601	: PRE	*0.49	4.0	a
#48	605	: PRE	*0.32	4.9	a
#49	606	: PRE	*0.37	5.2	a
#50	607	: PRE	*0.51	2.4	a
#51	608	: PRE	*0.23	3.9	a
#52	609	: PRE	*0.18	3.2	a
#54	803	: PRE	*0.21	2.2	a
#55	804	: PRE	*0.35	5.6	a
#59	808	: PRE	*0.33	4.2	a
#62	1003	: PRE	*0.05	3.8	a & b
#65	1006	: PRE	*0.57	4.5	a
#66	1007	: PRE	*0.45	1.9	a

#69	1011 : PRE	*0.39	2.5	a
#70	1012 : PRE	*0.58	2.8	a
#71	1101 : PRE	*0.19	2.5	a
#74	1104 : PRE	*0.26	4.2	a
#76	1106 : PRE	*0.27	4.7	a
#77	1201 : PRE	*0.30	4.7	a
#78	1202 : PRE	*0.19	3.2	a
#81	1205 : PRE	*0.53	2.9	a
#82	1206 : PRE	*0.03	8.1	a & b
#83	1207 : PRE	*0.40	4.3	a
#85	1209 : PRE	*0.07	5.1	a
#87	1302 : PRE	*0.54	2.9	a
#90	1305 : PRE	*0.34	5.7	a & b
#91	1306 : PRE	*0.40	9.4	a & b
#92	1307 : PRE	*0.39	3.2	a
#93	1308 : PRE	*0.04	2.3	a & b
#94	1309 : PRE	*0.02	7.4	a & b
#95	1401 : PRE	*0.20	*10.3	a & b
#96	1402 : PRE	*0.06	8.6	a & b
#98	1404 : PRE	*0.22	1.7	a
#99	1405 : PRE	*0.09	2.7	a
#100	1406 : PRE	*0.02	*33.2	a & b
#101	1407 : PRE	*0.28	3.2	a
#105	1502 : PRE	*0.36	2.4	a
#106	1503 : PRE	*0.22	8.4	a & b
#107	1504 : PRE	*0.22	7.6	a & b
#108	1505 : PRE	*0.12	4.7	a & b
#110	1507 : PRE	*0.48	4.2	a
#111	1508 : PRE	*0.16	3.1	a
#118	1607 : PRE	*0.35	3.1	a
#119	1608 : PRE	*0.16	6.4	a & b
#122	1702 : PRE	*0.48	3.4	a
#125	1705 : PRE	*0.10	8.5	a & b
#126	1706 : PRE	*0.57	3.0	a
#127	1707 : PRE	*0.17	5.5	a
#128	1708 : PRE	*0.40	5.3	a
#131	1802 : PRE	*0.54	3.2	a
#132	1803 : PRE	*0.11	4.2	a & b
#135	1806 : PRE	*0.08	*18.1	a & b
#136	1807 : PRE	*0.22	3.2	a
#138	1809 : PRE	*0.16	2.1	a
#139	1901 : PRE	*0.55	4.8	a
#140	1903 : PRE	*0.07	4.4	a
#143	1906 : PRE	*0.38	2.2	a
#144	1907 : PRE	*0.46	2.2	a
#147	2001 : PRE	*0.12	8.7	a & b
#148	2002 : PRE	*0.60	3.5	a
#149	2003 : PRE	*0.49	3.0	a
#150	2004 : PRE	*0.55	3.3	a
#151	2005 : PRE	*0.00	4.4	a
#152	2006 : PRE	*0.17	5.2	a
#153	2007 : PRE	*0.03	3.7	a
#154	2008 : PRE	*0.09	2.5	a
#156	2010 : PRE	*0.37	2.5	a
#157	2011 : PRE	*0.21	3.1	a
#158	2101 : PRE	*0.56	4.0	a
#160	2104 : PRE	*0.03	*32.6	a & b
#161	2105 : PRE	*0.25	6.7	a & b
#162	2106 : PRE	*0.26	5.7	a
#163	2107 : PRE	*0.41	4.8	a
#164	2108 : PRE	*0.59	3.5	a

#166	2201 : PRE	*0.25	2.9	a
#167	2202 : PRE	*0.54	3.6	a
#168	2203 : PRE	*0.20	8.0	a & b
#169	2204 : PRE	*0.12	*10.4	a & b
#170	2205 : PRE	*0.25	3.2	a
#172	2207 : PRE	*0.33	3.6	a
#173	2208 : PRE	*0.27	4.1	a
#174	2209 : PRE	*0.44	2.2	a
#175	3010 : PRE	*0.40	2.7	a
#176	3011 : PRE	*0.19	9.0	a & b
#179	4013 : PRE	*0.17	2.2	a
#181	5010 : PRE	*0.18	2.9	a
#182	5011 : PRE	*0.47	4.7	a
#183	6010 : PRE	*0.10	6.3	a & b
#186	6013 : PRE	*0.38	4.4	a
#187	6014 : PRE	*0.32	6.0	a & b
#189	12010: PRE	*0.57	2.3	a
#190	12011: PRE	*0.19	2.4	a
#192	12013: PRE	*0.15	*11.6	a & b
#194	12015: PRE	*0.03	3.5	a
#195	12016: PRE	*0.15	3.5	a
#198	12019: PRE	*0.36	3.1	a
#199	12020: PRE	*0.02	3.8	a
#200	12021: PRE	*0.04	8.8	a & b
#201	12022: PRE	*0.03	4.9	a
#202	12023: PRE	*0.39	7.2	a & b
#204	13011: PRE	*0.17	5.1	a
#205	13012: PRE	*0.33	9.2	a & b
#207	13014: PRE	*0.12	6.3	a & b
#208	13015: PRE	*0.16	2.3	a
#209	13016: PRE	*0.05	3.0	a
#210	13017: PRE	*0.59	2.8	a
#211	13018: PRE	*0.23	7.3	a & b
#212	14010: PRE	*0.54	3.1	a
#213	16010: PRE	*0.13	4.9	a & b
#214	16011: PRE	*0.52	2.7	a
#215	16012: PRE	*0.08	2.4	a
#216	16013: PRE	*0.31	2.7	a
#218	16015: PRE	*0.20	2.3	a
#219	16016: PRE	*0.10	3.8	a
#220	16017: PRE	*0.27	6.4	a & b
#223	18011: PRE	*0.39	4.1	a
#224	18012: PRE	*0.44	2.8	a
#226	18014: PRE	*0.56	3.8	a
#227	19010: PRE	*0.58	3.7	a
#228	19011: PRE	*0.36	4.5	a
#230	19013: PRE	*0.29	3.8	a
#231	19014: PRE	*0.33	5.8	a & b
#233	19016: PRE	*0.19	9.8	a & b
#234	19017: PRE	*0.51	2.8	a
#236	20011: PRE	*0.24	2.7	a
#237	21012: PRE	*0.11	2.4	a
#238	21013: PRE	*0.11	2.7	a
#239	21014: PRE	*0.06	5.0	a
#240	21015: PRE	*0.21	5.5	a
#242	21017: PRE	*0.24	9.4	a & b

Appendix L. Building Owner Survey

Letter and Mailed Survey

Philip Potyondy
115 Green Hall
1530 Cleveland Avenue North
Saint Paul, MN 55108
April 28th, 2011

Dear Owner or Resident of house within Hutchinson study block number ##,

Attention: Please complete eight question survey to benefit your community.

Happy Spring! Hutchinson is one of the communities that are a part of the University of Minnesota's Emerald Ash Borer Rapid Response Community Preparedness project. We are working with officials from your community, and other communities in greater Minnesota, to provide valuable information to aid in decision making in preparation for the arrival of the emerald ash borer. Emerald ash borer affects the health of ash trees (genus *Fraxinus*) throughout Minnesota.

It would be most useful to the project and your community if you would please take a few minutes to fill out the survey on the reverse side of this letter and mail it back to us. If you would prefer to submit this survey electronically visit www.mntreesource.com/energy. **It would be most useful if you could return the survey by May 16, 2011.**

Thank you for taking time to fill out this survey! The information you share with us by filling out this survey will be used to determine the impact urban forest canopy has on single family detached residential structures in your community. **All information is completely anonymous and will not be traced back to the individual households.** The data will only be used in an aggregate form, averaged with other households. This averaged data will in no way be able to identify any individual household and will be used strictly for the Emerald Ash Borer Rapid Response Community Preparedness project to benefit greater Minnesota communities.

Gratefully yours,

Philip Potyondy
Urban Forestry Graduate Student
University of Minnesota

Is the building that you own or live in within Hutchinson a single family detached residential structure?

☐ Yes ☐ No (if No – Please mail back after checking this box)

When was your home built?

☐ Before 1920 ☐ 1921-1950 ☐ 1951-1980 ☐ 1981-1994 ☐ After 1994

What is the square footage of the heated space within your home?

☐ Less than 1200 sq ft ☐ 1200-2000 sq ft ☐ More than 2000 sq ft

What is the exterior cladding material of your home?

☐ Wood ☐ Brick ☐ Cement Board/Fiber Cement ☐ Stucco ☐ Steel
☐ Aluminum ☐ Vinyl ☐ Other_____________

Has new siding been installed on your home since 1975? (*if built before 1970*)

☐ Yes ☐ No ☐ I don't know

Have there been improvements to your windows since 1975? (*if built before 1970*).

☐ Yes ☐ No ☐ I don't know

Have there been improvements to your homes insulation? (*if built before 1970*)

☐ Yes ☐ No ☐ I don't know

If "Yes" where was the insulation added?

☐ Attic ☐ Walls ☐ Both Attic and Walls

Online Form

Emerald Ash Borer Rapid Response Community Preparedness - Energy Survey

Thank you for taking time to answer these questions! The information you share with us by filling out this survey will be used to determine the impact urban forest canopy has on single family detached residential structures in your community.
* Required

Which community is the building in? *
See the salutation on the letter you received.

- Crookston
- Hendricks
- Hibbing
- Hutchinson
- Morris
- Rochester

Which study block is the building on? *
See the salutation on the letter you received.

Is the building a single family detached residential structure? *
Not an apartment, townhouse, duplex, business, commercial building, etc

- Yes
- No

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Emerald Ash Borer Rapid Response Community Preparedness - Energy Survey

When was your home built?

- ○ Before 1920
- ○ 1921 - 1950
- ○ 1951 - 1980
- ○ 1981 - 1994
- ○ After 1994

What is the square footage of the heated space within your home?

- ○ Less than 1200 sq ft
- ○ 1200 - 2000 sq ft
- ○ More than 2000 sq ft

What is the exterior cladding material of your home?

- ☐ Wood
- ☐ Brick
- ☐ Cement Board/Fiber Cement
- ☐ Stucco
- ☐ Steel
- ☐ Aluminum
- ☐ Vinyl
- ☐ Other: ____________

Has new siding been installed on your home since 1975?
If home was built before 1970.

- Yes
- No
- I don't know

Have there been improvements to your windows since 1975?
If home was built before 1970.

- Yes
- No
- I don't know

Have there been improvements to your homes insulation?
If home was built before 1970.

- Yes
- No
- I don't know

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Emerald Ash Borer Rapid Response Community Preparedness - Energy Survey

Where was the insulation added?

- Attic
- Walls
- Both Attic and Walls

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Emerald Ash Borer Rapid Response Community Preparedness - Energy Survey

Thanks!

Your response has been recorded.

The survey information you shared with us by filling out this survey will be used to determine the impact urban forest canopy has on single family detached residential structures in your community.

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Survey Results

Table 20. Building characteristics survey results.

Block	Year Built	Conditioned Space Square Feet	Exterior Cladding	New Siding Since 1975	Windows Improved Since 1975	Improved Insulation	Improved Insulation Location
1	After 1994	1200 - 2000	Vinyl	No	No	No	--
1	After 1994	> 2000	Brick, Steel	No	No	Yes	Attic
1	After 1994	> 2000	Steel	--	--	--	--
1	After 1994	> 2000	Vinyl	Yes	Yes	Yes	--
1	After 1994	1200 - 2000	Vinyl	No	No	No	--
2	1951 - 1980	1200 - 2000	Wood	No	Yes	No	--
2	1951 - 1980	> 2000	Cement Board/Fiber Cement	Yes	No	Yes	Attic & Walls
2	1951 - 1980	1200 - 2000	Wood	No	Unknown	Unknown	--
2	1951 - 1980	1200 - 2000	Cement Board/Fiber Cement	Yes	Yes	Yes	Attic & Walls
2	1951 - 1980	> 2000	Cement Board/Fiber Cement	Unknown	Unknown	Unknown	--
2	1981 - 1994	> 2000	Brick, Masonite	No	Yes	No	--
2	1981 - 1994	> 2000	Wood, Brick	No	No	No	--
2	1951 - 1980	> 2000	Brick, Masonite Siding	No	Yes	Yes	Attic
3	1981 - 1994	> 2000	Steel	--	--	--	--
3	1981 - 1994	> 2000	Wood	No	No	No	--
3	1981 - 1994	> 2000	Wood, Stucco	--	--	--	--
3	1981 - 1994	> 2000	Cement Board/Fiber Cement	No	No	Unknown	--
4	1981 - 1994	> 2000	Vinyl	Yes	No	Yes	Walls
4	1981 - 1994	1200 - 2000	Wood, Brick	No	Yes	Yes	Attic
4	1981 - 1994	1200 - 2000	Wood	--	--	--	--
5	1951 - 1980	> 2000	Wood	No	No	Yes	Attic & Walls
5	1951 - 1980	< 1200	Steel	Yes	Yes	Yes	Attic & Walls
6	1951 - 1980	< 1200	Wood	Unknown	Unknown	Unknown	--
6	--	> 2000	Wood	No	Yes	Yes	Attic & Walls
8	Before 1920	< 1200	Steel	Unknown	Yes	Yes	Attic
8	1921 - 1950	1200 - 2000	Stucco	No	Yes	Yes	Attic
10	1921 - 1950	> 2000	Brick	No	No	Yes	Attic & Walls
10	1951 - 1980	1200 - 2000	Cement Board/Fiber Cement	No	No	Unknown	--
10	1951 - 1980	< 1200	Vinyl	Yes	Yes	Unknown	--
10	1951 - 1980	1200 - 2000	Wood, Brick	Unknown	Unknown	Unknown	--
11	Before 1920	> 2000	Wood	Yes	Yes	Yes	Attic & Walls
11	Before 1920	1200 - 2000	Vinyl	Yes	Yes	Yes	Attic & Walls
12	Before 1920	> 2000	Textured Masonite	Yes	No	No	--
12	1921 - 1950	1200 - 2000	Wood	No	Yes	Yes	Attic
12	1921 - 1950	1200 - 2000	Aluminum	Unknown	Yes	No	--
12	1921 - 1950	< 1200	Steel	Yes	No	No	--
12	1921 - 1950	--	Wood, Vinyl	Yes	Yes	Yes	Attic & Walls
12	Before 1920	--	Stucco	Unknown	Unknown	Unknown	--
12	Before 1920	> 2000	Wood	No	Yes	Yes	Attic
12	Before 1920	> 2000	Stucco	Yes	Yes	Yes	Attic & Walls
12	1921 - 1950	1200 - 2000	Aluminum	Unknown	Yes	Unknown	--
12	Before 1920	1200 - 2000	Wood	No	Unknown	Unknown	--
12	1921 - 1950	> 2000	Brick, Steel	Yes	Yes	Yes	Attic
13	1921 - 1950	1200 - 2000	Steel	Yes	Yes	Yes	Attic & Walls
13	1921 - 1950	1200 - 2000	Steel	Yes	Yes	Yes	Attic & Walls
14	1921 - 1950	1200 - 2000	Vinyl	Yes	No	No	--
14	1921 - 1950	< 1200	Steel	Yes	Yes	Yes	Attic
14	1951 - 1980	1200 - 2000	Vinyl	Yes	Yes	Yes	Attic & Walls
14	Before 1920	1200 - 2000	Vinyl	Yes	Yes	Unknown	--
14	Before 1920	1200 - 2000	Masonite	Unknown	Yes	Unknown	--
15	1951 - 1980	1200 - 2000	Cement Board/Fiber Cement	No	Yes	Yes	Attic
15	1951 - 1980	1200 - 2000	Wood	No	Yes	Yes	Attic
15	1951 - 1980	< 1200	Steel	Unknown	Yes	Unknown	--
16	1951 - 1980	1200 - 2000	Steel	Yes	Yes	Unknown	--
16	Before 1920	--	Vinyl	Yes	No	Yes	Attic & Walls
16	1951 - 1980	< 1200	Wood	No	Yes	Yes	Attic
16	1951 - 1980	1200 - 2000	Wood	No	No	No	--
16	1951 - 1980	1200 - 2000	Steel	Unknown	Unknown	Unknown	--

Block	Year Built	Conditioned Space Square Feet	Exterior Cladding	New Siding Since 1975	Windows Improved Since 1975	Improved Insulation	Improved Insulation Location
16	1921 - 1950	1200 - 2000	Cement Board/Fiber Cement	No	Yes	Unknown	--
16	1951 - 1980	< 1200	Vinyl	Unknown	Yes	Yes	Attic
17	1951 - 1980	1200 - 2000	Wood	No	No	Yes	--
17	1951 - 1980	1200 - 2000	Steel	Yes	No	No	--
17	1951 - 1980	1200 - 2000	Vinyl	Yes	Yes	Yes	Attic & Walls
18	1951 - 1980	1200 - 2000	Cement Board/Fiber Cement	No	No	Yes	Attic
18	1951 - 1980	1200 - 2000	Cement Board/Fiber Cement	--	--	--	--
18	--	1200 - 2000	Wood, Stucco	No	No	No	--
18	1981 - 1994	> 2000	Wood, Brick, Aluminum	--	--	--	--
18	1951 - 1980	1200 - 2000	Steel	Yes	Yes	Yes	Attic
18	1951 - 1980	1200 - 2000	Steel	Yes	No	Yes	Attic
19	1981 - 1994	1200 - 2000	Steel	Yes	No	No	--
19	1981 - 1994	1200 - 2000	Steel	--	--	--	--
19	1981 - 1994	1200 - 2000	Steel	Yes	Yes	Yes	Attic
19	1981 - 1994	1200 - 2000	Vinyl	Yes	Yes	--	--
19	1981 - 1994	1200 - 2000	Steel	--	--	--	--
20	After 1994	> 2000	Steel	No	Yes	No	--
20	After 1994	1200 - 2000	Vinyl	No	No	No	--
20	After 1994	> 2000	Steel	--	--	--	--
20	After 1994	1200 - 2000	Vinyl	--	--	--	--
21	1951 - 1980	< 1200	Steel	Yes	Yes	Yes	Walls
21	1951 - 1980	1200 - 2000	Wood	No	No	No	--
21	1951 - 1980	1200 - 2000	Steel	Yes	Yes	Unknown	--
22	1921 - 1950	1200 - 2000	Vinyl	Yes	Yes	Yes	Attic
22	1951 - 1980	1200 - 2000	Steel	--	--	--	--
22	1951 - 1980	1200 - 2000	Aluminum	Yes	Yes	Yes	Attic & Walls
22	1951 - 1980	1200 - 2000	Cement Board/Fiber Cement	No	Yes	Unknown	--
22	1981 - 1994	< 1200	Vinyl	--	--	--	--
22	1951 - 1980	1200 - 2000	Aluminum	Yes	Yes	Yes	Attic & Walls

Appendix M. Assessor Data

Table 21. McLeod County Assessor data for sampled homes in Hutchinson.

Code	Reside Year	Siding Type	House Wrap Likely	Window Replacement Year	Improved Windows	Stories	Year Built	Basement	Heating System	Fuel	Fireplace	Air Conditioning	Conditioned Space Square Feet	Heated Garage	Pool
101	--	Steel	--	--	--	2-2.25	1998	Full	--	Gas Likely	Non-Gas	Central	2492	--	--
102	--	Vinyl	--	--	--	1	1999	None	Forced Air	Gas Likely	Gas	Central	1480	Yes	--
103	--	Steel	--	--	--	1	1999	Full	Forced Air	Gas Likely	Non-Gas	Central	3160	Yes	--
104	--	--	--	--	--	2-2.25	1999	Full	Forced Air	Gas Likely	Gas	Central	2196	--	--
105	--	Steel	--	--	--	2-2.25	1999	Full	Forced Air	Gas Likely	Non-Gas	Central	2764	Yes	--
106	--	Steel	--	--	--	1	2000	Full	Forced Air	Gas Likely	Non-Gas	Central	2976	Yes	--
107	--	Steel	--	--	--	2-2.25	2000	Full	Forced Air	Gas Likely	Non-Gas	Central	2238	--	--
108	--	Steel	--	2002	Yes	1	2000	Full	--	Gas Likely	Gas	Central	3208	Yes	--
109	--	--	--	--	--	SE/SL	1995	Full	Forced Air	Gas	Gas	Central	2922	--	--
1010	--	Vinyl	--	--	--	2-2.25	1998	Partial	Forced Air	Gas Likely	Gas	Central	2196	Yes	--
1011	--	Steel	--	--	--	SE/SL	1999	Full	Forced Air	Gas Likely	--	Central	2951	--	--
1012	--	Vinyl	--	--	--	SE/SL	2002	Full	Forced Air	Gas Likely	Non-Gas	Central	3068	Yes	--
201	--	Masonite	--	2007	Yes	2-2.25	1960	Full	Hot Water	Gas Likely	Non-Gas	Window/Wall	1960	--	--
202	--	Wood	--	--	--	1	1950	Full	Forced Air	Gas Likely	--	Central	2268	--	--
203	--	Masonite	--	--	--	1	1955	Full	Forced Air	Gas Likely	Non-Gas	Central	2728	--	--
204	1996	Steel	--	--	--	SE/SL	1950	Full	Forced Air	Gas	Non-Gas	Central	2664	--	--
205	--	--	--	--	--	1.25-1.75	1955	Full	Forced Air	Gas	Non-Gas	Central	3392	--	Yes
206	--	--	--	--	--	1	1955	Full	Forced Air	Gas	Non-Gas	Central	2622	--	--
207	2004	Wood	Yes	2004	Yes	SE/SL	1965	Full	Hot Water	Gas	Non-Gas	Central	4940	--	--
208	2003	--	Yes	2003	Yes	1	1958	Full	Forced Air	Gas Likely	Non-Gas	Central	3116	--	--
209	--	Wood	--	--	--	1	1955	Full	Hot Water	Gas	Non-Gas	Central	3208	--	--
2010	--	Masonite	--	--	--	1	1978	Full	Forced Air	Gas	Non-Gas	Central	3610	--	--
2011	--	Wood	--	--	--	1	1985	Full	Forced Air	Gas	Non-Gas	Central	4668	--	--
301	--	Steel	--	--	--	2-2.25	1993	Full	Forced Air	Gas	Gas	Central	3008	--	--
302	--	Steel	--	--	--	SE/SL	1993	Full	Forced Air	Gas	Gas	Central	3298	Yes	--
303	--	Wood	--	--	--	1	1987	Full	Forced Air	Gas	Non-Gas	Central	3472	--	--
304	--	Wood	--	2008	Yes	2-2.25	1986	Full	Forced Air	Gas	Non-Gas	Central	2291	--	--
305	--	Wood	--	--	--	1	1988	Full	Forced Air	Gas	Non-Gas	Central	3126	--	--
306	--	Steel	--	--	--	1	1990	Full	Forced Air	Gas	Gas	Central	3808	--	--
307	--	Steel	--	--	--	2-2.25	1991	Full	Forced Air	Gas	Gas	Central	4048	--	--
308	--	Wood	--	--	--	2-2.25	1993	Full	Forced Air	Gas	Gas	Central	2512	--	Yes
309	--	Steel	--	--	--	2-2.25	1992	Full	Forced Air	Gas	Gas	Central	2568	--	--
3010	--	Steel	--	--	--	1	1994	Full	Forced Air	Gas	Gas	Central	4364	--	--
3011	--	Wood	--	--	--	SE/SL	1994	Full	Forced Air	Gas	Gas	Central	2136	--	--
401	--	Steel	--	--	--	1	1968	Full	Hot Water	Gas	--	Central	2618	--	--
402	--	Wood	--	--	--	SE/SL	1962	Full	Hot Water	Gas Likely	Non-Gas	Central	2992	Yes	--
403	--	Masonite	--	--	--	1	1981	Full	Forced Air	Gas	--	Central	2000	--	--
404	2008	Vinyl	Yes	2009	Yes	SE/SL	1975	Full	Forced Air	Gas	Non-Gas	Central	2304	--	--
405	--	--	--	--	--	1	1982	Full	Forced Air	Gas	Gas	--	2440	--	--
406	--	Masonite	--	--	--	SE/SL	1985	Full	Forced Air	Gas	--	Central	1970	--	--
407	2010	Vinyl	Yes	--	--	1	1976	Full	Forced Air	Gas Likely	--	Central	3104	--	--
408	2003	Steel	Yes	2009	Yes	SE/SL	1983	Full	Forced Air	Gas	Non-Gas	Central	2458	--	--
409	--	Wood	--	--	--	1	1981	Full	Forced Air	Gas	Non-Gas	Central	3072	--	Yes
4010	--	Masonite	--	--	--	1	1971	Full	Forced Air	Gas	Non-Gas	Central	1328	Yes	--
4012	--	Masonite	--	--	--	SE/SL	1989	Full	Forced Air	Gas	Non-Gas	Central	1908	--	--
4013	2010	Vinyl	Yes	--	--	SE/SL	1987	Full	Forced Air	Gas	Non-Gas	Central	2354	--	--
4014	--	Wood	--	--	--	1	1988	Full	Forced Air	Gas	Non-Gas	Central	3224	--	--
501	--	--	--	--	--	1	1958	Full	Forced Air	Oil	--	Central	3538	--	--
502	--	--	--	2006	Yes	1	1960	Full	Forced Air	Gas	Non-Gas	Central	3238	--	--
503	--	--	--	--	--	1	1958	Full	Hot Water	Gas	Non-Gas	Window/Wall	2796	--	--
504	--	--	--	2010	Yes	1	1958	Full	Forced Air	Gas	--	Central	2472	--	--
505	--	--	--	1996	--	1	1958	Full	Forced Air	Gas	--	Central	2472	--	--
506	2006	Steel	Yes	--	--	1	1958	Full	Forced Air	Gas	--	Central	2736	--	--
507	--	--	--	--	--	1	1958	Full	Forced Air	Gas	--	Central	2452	--	--
508	--	--	--	--	--	1	1958	Full	Forced Air	Oil	--	Central	2156	--	--
509	2006	Steel	Yes	2006	Yes	1	1958	Full	Forced Air	Oil	--	Central	2556	--	--
5010	--	Steel	--	--	--	1	1960	Full	Forced Air	Gas	--	Central	2128	--	--
5011	--	--	--	--	--	1	1960	Full	Hot Water	Gas	--	Window/Wall	2448	--	--
601	2006	Vinyl	Yes	--	--	1	1962	Full	Forced Air	Gas	--	Central	2388	--	--
604	1984	Steel	--	--	--	1.25-1.75	1950	Full	Forced Air	Gas Likely	--	Window/Wall	1772	--	--
605	--	Stucco	--	--	--	1.25-1.75	1885	Full	Hot Water	Gas	--	--	1788	--	--
606	--	--	--	--	--	1	1945	Full	Forced Air	Gas	--	Central	2276	--	--
607	1995	Steel	--	--	--	1	1945	Full	Forced Air	Gas	--	Central	2112	--	--

Code	Reside Year	Siding Type	House Wrap Likely	Window Replacement Year	Improved Windows	Stories	Year Built	Basement	Heating System	Fuel	Fireplace	Air Conditioning	Conditioned Space Square Feet	Heated Garage	Pool
608	--	--	--	--	--	1.25-1.75	1945	Full	Forced Air	Gas	Non-Gas	Central	2284	--	--
609	--	Steel	--	2003	Yes	1	1950	Full	Forced Air	Gas	--	Central	1818	--	--
6010	--	--	--	--	--	1	1950	None	Forced Air	Oil	--	Central	1264	--	--
6011	--	--	--	--	--	1	1955	Full	Forced Air	Oil	Electric	Central	1928	--	--
6012	--	Steel	--	--	--	1	1955	Full	Forced Air	Gas	--	Central	1680	--	--
6013	2000	Vinyl	Yes	--	--	1	1960	Full	Forced Air	Gas	--	Central	2244	--	--
6014	--	--	--	--	--	1	1959	Full	Forced Air	Gas	--	Central	2400	--	--
6015	--	Masonite	--	--	--	SE/SL	1968	Full	Hot Water	Gas	--	Window/Wall	1968	--	--
801	--	Masonite	--	--	--	1.25-1.75	1918	Full	Forced Air	Gas Likely	--	Central	1427	--	--
803	--	--	--	1998	--	1.25-1.75	1929	Full	Forced Air	Gas Likely	--	--	1872	--	--
804	--	--	--	--	--	1	1926	Full	Forced Air	Gas Likely	--	Window/Wall	1816	--	--
805	1984	Masonite	--	--	--	1	1923	Full	Hot Water	Gas Likely	--	Central	2112	--	--
806	--	Steel	--	--	--	1.25-1.75	1900	Full	Forced Air	Gas	--	Central	1610	--	--
807	1992	Vinyl	--	1992	--	1.25-1.75	1890	Full	Forced Air	Gas Likely	--	Central	1638	--	--
808	2000	Vinyl	Yes	--	--	1.25-1.75	1890	None	--	Gas Likely	--	Central	616	--	--
1001	--	--	--	2010	Yes	1	1950	Full	Forced Air	Gas	Non-Gas	Central	2692	Yes	--
1002	--	--	--	--	--	1	1963	Full	Hot Water	Gas	--	Window/Wall	2800	--	--
1003	--	Vinyl	--	2009	Yes	1	1952	Full	Forced Air	Gas	Gas	Central	2444	--	--
1004	1997	Vinyl	--	2004	Yes	1	1952	Full	Forced Air	Gas	Non-Gas	Central	2548	--	--
1005	2005	Vinyl	Yes	2005	Yes	1	1955	Full	Hot Water	Gas	Non-Gas	--	1986	--	--
1006	--	Steel	--	--	--	1	1973	Full	Forced Air	Gas	--	Central	3040	--	--
1007	--	--	--	--	--	1	1949	Full	Forced Air	Gas	--	--	1852	--	--
1008	--	--	--	--	--	1.25-1.75	1965	Partial	Hot Water	Gas	Non-Gas	Window/Wall	2560	Yes	--
1101	--	--	--	--	--	2-2.25	1900	Full	Forced Air	Oil	--	Central	2392	--	--
1102	--	--	--	--	--	2-2.25	1903	Full	Hot Water	Oil	Non-Gas	--	2526	--	--
1103	--	--	--	--	--	2-2.25	1898	Full	Hot Water	Oil	--	--	1921	--	--
1104	2001	Stucco	Yes	--	--	1.25-1.75	1920	Full	Forced Air	Gas	--	Central	1791	--	--
1105	--	--	--	--	--	1.25-1.75	1920	Full	Hot Water	Gas	Non-Gas	--	2136	--	--
1106	1995	Vinyl	--	--	--	2-2.25	1895	Partial	Hot Water	Oil	Gas	--	2646	--	--
1201	--	--	--	--	--	2-2.25	1915	Full	Hot Water	Gas	Non-Gas	Central	2502	--	--
1202	--	--	--	--	--	1.25-1.75	1928	Full	Central Gravity	--	Non-Gas	Central	3033	--	--
1203	--	--	--	--	--	2-2.25	1915	Full	Hot Water	Gas Likely	--	Central	1794	Yes	--
1204	--	--	--	--	--	2-2.25	1915	Full	Hot Water	Gas	--	Central	1456	--	--
1205	2007	Aluminum	Yes	2007	Yes	1.25-1.75	1950	Full	Forced Air	Gas	Non-Gas	Central	2042	--	--
1206	--	--	--	--	--	2-2.25	1927	Full	Forced Air	Gas	--	Central	2326	--	--
1207	1988	Vinyl	--	--	--	1.25-1.75	1939	Full	Forced Air	Gas	--	Central	1908	--	--
1208	--	Steel	--	--	--	1.25-1.75	1920	Full	Forced Air	Gas Likely	--	Central	2089	--	--
1209	1981	Steel	--	--	--	1.25-1.75	1923	Full	Forced Air	Gas	--	Central	1344	--	--
12010	--	--	--	--	--	1.25-1.75	1915	Full	Central Gravity	Oil	--	Central	1916	--	--
12011	--	Aluminum	--	--	--	2-2.25	1940	Full	Hot Water	Oil	Gas	Window/Wall	2025	--	--
12012	--	Aluminum	--	--	--	1	1922	Full	Forced Air	Oil	Non-Gas	Central	2400	--	--
12013	--	--	--	--	--	1	1946	None	Hot Water	Oil	Non-Gas	Central	1644	--	--
12014	--	Steel	--	--	--	1.25-1.75	1929	Full	Forced Air	Gas	--	Central	1792	--	--
12015	--	--	--	--	--	1.25-1.75	1923	Full	Forced Air	Gas	--	Central	1552	--	--
12016	1997	Vinyl	--	--	--	1	1920	Full	Forced Air	Gas	--	Central	1839	--	--
12017	--	--	--	--	--	1.25-1.75	1905	Full	Forced Air	Gas	Gas	Central	2622	Yes	--
12018	--	--	--	--	--	1	1920	Full	Forced Air	Oil	--	Central	1421	--	--
12019	2005	--	Yes	2005	Yes	1.25-1.75	1916	Full	Forced Air	Gas	--	Central	2304	--	--
12020	--	--	--	2008	Yes	1.25-1.75	1915	Full	Forced Air	Gas	--	Central	1637	--	--
12021	--	--	--	--	--	2-2.25	1908	Full	Forced Air	Gas	--	Window/Wall	1608	--	--
12022	1998	Stucco	--	--	--	2-2.25	1918	Full	Hot Water	Gas	Gas	Window/Wall	2712	Yes	--
12023	1994	Vinyl	--	--	--	1.25-1.75	1946	Full	Forced Air	Gas	--	Central	1760	--	--
1301	1984	Steel	--	--	--	1	1948	Full	Forced Air	Gas	--	Central	2544	--	--
1302	2010	Steel	Yes	2010	Yes	2-2.25	1945	Full	Forced Air	Gas Likely	Non-Gas	Central	1144	--	--
1303	--	--	--	--	--	1.25-1.75	1939	Full	Forced Air	Gas	Non-Gas	Central	1748	--	--
1304	--	--	--	2005	Yes	1.25-1.75	1945	Full	Hot Water	Gas	--	Window/Wall	1789	--	--
1305	--	--	--	--	--	1.25-1.75	1940	Full	Forced Air	Gas	Non-Gas	Central	1160	--	--
1306	--	--	--	--	--	1.25-1.75	1940	Full	Forced Air	Gas Likely	--	Central	1472	--	--
1307	--	--	--	2010	Yes	2-2.25	1940	Full	Forced Air	Gas	Non-Gas	Central	1789	--	--
1308	--	--	--	--	--	1	1949	Full	Forced Air	Gas Likely	Gas	Central	2182	--	--
1309	--	--	--	--	--	1	1946	Full	Forced Air	Gas	--	Central	2528	Yes	--
13010	--	Vinyl	--	--	--	1.25-1.75	1938	Full	--	Gas Likely	--	--	1488	--	--
13011	--	Vinyl	--	--	--	1.25-1.75	1948	Full	Forced Air	Gas	--	Window/Wall	1510	--	--

Code	Reside Year	Siding Type	House Wrap Likely	Window Replacement Year	Improved Windows	Stories	Year Built	Basement	Heating System	Fuel	Fireplace	Air Conditioning	Conditioned Space Square Feet	Heated Garage	Pool
13012	--	Masonite	--	--	--	1.25-1.75	1900	Partial	Hot Water	Gas	--	Window/Wall	1226	--	--
13013	--	--	--	--	--	1	1955	Full	Forced Air	Gas Likely	--	Central	1824	--	--
13014	--	Masonite	--	--	--	1.25-1.75	1940	None	Forced Air	Gas Likely	Non-Gas	Central	826	--	--
13015	2001	Vinyl	Yes	--	--	1	1948	None	Hot Water	Gas	--	Central	936	--	--
13016	--	--	--	--	--	1	1950	Full	Forced Air	Gas Likely	Non-Gas	Central	2024	--	--
13017	--	Aluminum	--	--	--	1	1952	Full	Hot Water	Gas Likely	--	Window/Wall	2162	--	--
13018	1986	Steel	--	--	--	1.25-1.75	1953	Full	Forced Air	Gas	--	Central	1680	--	--
1401	--	--	--	--	--	2-2.25	1890	Partial	Forced Air	Gas Likely	--	Central	1792	--	--
1402	1995	Steel	--	--	--	1.25-1.75	1928	Full	Forced Air	Gas	--	Window/Wall	2000	--	--
1403	--	Vinyl	--	--	--	1.25-1.75	1890	None	Forced Air	Gas	--	--	832	--	--
1404	1983	Masonite	--	1983	--	2-2.25	1899	Partial	Forced Air	Gas	--	--	2026	Yes	--
1405	--	--	--	--	--	2-2.25	1936	Full	Hot Water	Gas	Non-Gas	Window/Wall	1700	--	--
1406	1985	Steel	--	--	--	1.25-1.75	1941	Full	Forced Air	Gas	--	--	1179	--	--
1407	2006	Vinyl	Yes	2006	Yes	1.25-1.75	1910	Full	Forced Air	Oil	--	--	1364	--	--
1408	1994	Steel	--	1995	--	1.25-1.75	1939	Full	Forced Air	Gas	--	Central	1400	--	--
1409	--	--	--	--	--	1.25-1.75	1939	Full	Forced Air	Oil	--	--	1456	--	--
14010	2009	Vinyl	Yes	2006	Yes	1.25-1.75	1939	Full	Forced Air	Gas	--	Central	1542	--	--
1501	--	--	--	--	--	1	1961	Full	Forced Air	Gas	Non-Gas	Central	2900	--	--
1502	1986	Steel	--	2009	Yes	1	1960	Full	Forced Air	Oil	--	Central	2184	--	--
1503	--	--	--	2008	Yes	1	1960	Full	Forced Air	Oil	--	Central	2544	--	--
1504	--	Vinyl	--	--	--	1	1976	Full	Forced Air	Gas	--	Central	2814	--	--
1505	--	--	--	--	--	1	1968	Full	Forced Air	Oil	--	Central	2184	--	--
1506	--	Steel	--	--	--	1	1960	Full	Forced Air	Gas	--	Central	2184	--	--
1507	--	--	--	2010	Yes	1	1960	Full	Forced Air	Gas Likely	Non-Gas	Central	2236	--	--
1508	--	--	--	--	--	1	1960	Full	Forced Air	Oil	Non-Gas	Central	2500	--	--
1601	1990	Steel	--	--	--	1	1954	Full	Forced Air	Gas	Gas	Central	2072	--	--
1602	--	--	--	2005	Yes	1	1954	Full	Forced Air	Gas	--	Central	2340	Yes	--
1603	--	--	--	--	--	1	1954	Full	Forced Air	Gas	--	Central	1872	--	--
1604	--	Masonite	--	--	--	1	1956	Full	Forced Air	Gas Likely	--	Central	2112	Yes	--
1605	--	--	--	--	--	1	1958	Full	Forced Air	Gas	Non-Gas	Central	2652	--	--
1606	2007	Aluminum	Yes	--	--	1	1956	Full	Forced Air	Gas	Electric	Central	3104	--	--
1607	--	Vinyl	--	2010	Yes	1	1954	Full	Forced Air	Gas Likely	--	Central	1816	--	--
1608	--	--	--	--	--	1	1954	Full	Forced Air	Gas Likely	--	Central	2016	--	--
1609	--	Steel	--	--	--	1	1955	Full	Forced Air	Gas	--	Central	1824	--	--
16010	2005	Vinyl	Yes	2005	Yes	1	1957	Full	Forced Air	Gas	--	Central	1992	--	--
16011	--	--	--	--	--	1	1960	Full	Forced Air	Oil	--	Central	2348	--	--
16012	--	--	--	--	--	1	1953	Full	Forced Air	Gas	Non-Gas	Central	2592	--	--
16013	--	Steel	--	--	--	1	1953	Full	Forced Air	Gas	--	--	1824	--	--
16014	--	--	--	1998	--	1	1953	Full	Forced Air	Gas	--	Central	2304	--	--
16015	--	--	--	--	--	1.25-1.75	1957	Full	Hot Water	Gas	--	Central	1920	--	--
16016	--	Vinyl	--	--	--	1.25-1.75	1880	Partial	Forced Air	Gas Likely	--	Central	1178	--	--
16017	--	--	--	--	--	1.25-1.75	1901	Full	Hot Water	Gas	--	Central	1440	--	--
16018	--	Vinyl	--	--	--	1.25-1.75	1890	Full	Forced Air	Gas Likely	--	Central	1532	--	--
1701	2004	Steel	Yes	--	--	2-2.25	1988	Full	Forced Air	Gas Likely	Gas	Central	2878	Yes	--
1702	--	--	--	--	--	1	1966	Full	Hot Water	Gas	--	Central	2632	--	--
1703	1985	Steel	--	--	--	1	1968	Full	Forced Air	Gas	--	Central	2696	--	--
1704	--	--	--	--	--	1	1967	Full	Hot Water	Gas Likely	Non-Gas	Window/Wall	2912	--	--
1705	--	--	--	--	--	1	1966	Full	Forced Air	Gas	--	Central	3440	--	--
1706	--	--	--	--	--	1	1968	Full	Forced Air	Gas	--	Central	2408	--	--
1707	--	--	--	--	--	1	1966	Full	Forced Air	Gas	Non-Gas	Central	2860	--	--
1708	--	--	--	--	--	1	1968	Full	Forced Air	Gas	Gas	Central	3070	--	--
1709	1999	Steel	Yes	2011	Yes	1	1966	Full	Forced Air	Gas Likely	--	Central	2408	--	--
1801	--	Masonite	--	--	--	1	1976	Full	Forced Air	Gas	--	Central	2544	--	--
1802	--	Masonite	--	--	--	1	1976	Full	Forced Air	Gas	--	Central	2084	--	--
1803	1994	Steel	--	--	--	1	1976	Full	Forced Air	Gas	--	Central	2588	Yes	--
1804	1990	Steel	--	--	--	1	1976	Full	Forced Air	Gas	Non-Gas	Central	2180	--	--
1805	--	Masonite	--	--	--	1	1976	Full	Forced Air	Gas	--	Central	2408	--	--
1806	--	Masonite	--	--	--	1	1976	Full	Forced Air	Gas	Non-Gas	Central	2416	--	--
1807	2005	Steel	Yes	--	--	1	1976	Full	Forced Air	Gas	--	Central	2608	Yes	--
1808	2002	Steel	Yes	2002	Yes	1	1976	Full	Forced Air	Gas	--	Central	1824	--	--
1809	--	Masonite	--	--	--	1	1976	Full	Forced Air	Gas	--	Central	2448	--	--
18010	--	Steel	--	--	--	1.25-1.75	1978	Full	Forced Air	Gas	--	Central	1976	--	--
18011	2009	--	Yes	--	--	1	1978	Full	Forced Air	Gas	--	Central	2400	--	--

Code	Reside Year	Siding Type	House Wrap Likely	Window Replacement Year	Improved Windows	Stories	Year Built	Basement	Heating System	Fuel	Fireplace	Air Conditioning	Conditioned Space Square Feet	Heated Garage	Pool
18012	--	Masonite	--	--	--	1	1979	Full	Forced Air	Gas	--	Central	2224	--	--
18013	--	Wood	--	--	--	1	1978	Full	Forced Air	Gas	Non-Gas	Central	2912	--	--
18014	--	Stucco	--	--	--	1	1978	Full	Forced Air	Gas	Non-Gas	Central	3184	--	--
1901	--	Masonite	--	--	--	SE/SL	1986	Full	Forced Air	Gas	--	Central	1717	--	--
1903	--	Masonite	--	--	--	SE/SL	1977	Full	Forced Air	Gas	Gas	Central	2304	Yes	--
1904	1993	Steel	--	--	--	1	1978	Full	Forced Air	Gas	--	Central	2080	--	--
1905	1992	Vinyl	--	--	--	SE/SL	1978	Full	Forced Air	Gas	--	Central	1953	--	--
1906	--	Masonite	--	--	--	SE/SL	1981	Full	Forced Air	Gas	--	Central	1920	--	--
1907	1990	Masonite	--	--	--	SE/SL	1980	Full	Forced Air	Gas	--	Central	1948	--	--
1908	2002	Steel	Yes	2008	Yes	1	1987	Full	Forced Air	Gas	--	Central	2080	--	--
1909	2005	Steel	Yes	--	--	SE/SL	1986	Full	Forced Air	Gas	--	Central	1840	--	--
19010	2010	Vinyl	Yes	2010	Yes	SE/SL	1985	Full	Forced Air	Gas	Non-Gas	Central	2499	--	--
19011	--	Masonite	--	2010	Yes	SE/SL	1986	Full	Forced Air	Gas	--	Central	1728	Yes	--
19012	--	Masonite	--	--	--	SE/SL	1984	Full	Forced Air	Gas	--	--	1591	--	--
19013	--	Masonite	--	--	--	SE/SL	1985	Full	Forced Air	Gas	--	Central	1592	--	--
19014	--	Vinyl	--	--	--	1	1990	Full	Forced Air	Gas	--	--	2016	--	--
19015	2006	Steel	Yes	--	--	SE/SL	1988	Full	Forced Air	Gas	--	Central	1788	--	--
19016	--	Masonite	--	--	--	SE/SL	1984	Full	Forced Air	Gas	--	Window/Wall	1560	--	--
19017	--	Vinyl	--	2010	Yes	SE/SL	1987	Full	Forced Air	Gas	--	Central	2784	--	--
2001	--	Steel	--	--	--	SE/SL	1999	Partial	Forced Air	Gas Likely	Gas	Central	1810	--	--
2002	2007	Steel	Yes	--	--	1.25-1.75	1999	Full	Forced Air	Gas Likely	Non-Gas	Central	3487	--	--
2003	--	Steel	--	--	--	2-2.25	1999	Full	Forced Air	Gas Likely	Non-Gas	Central	3044	--	--
2004	--	Vinyl	--	--	--	1	2000	Full	Forced Air	Gas Likely	Gas	Central	3256	Yes	--
2005	--	Vinyl	--	--	--	1	2004	Full	Forced Air	Gas Likely	--	Central	2928	--	--
2006	--	Vinyl	--	--	--	1	2004	Full	Forced Air	Gas Likely	--	Central	2674	--	--
2007	--	Vinyl	--	--	--	1	2004	Full	Forced Air	Gas Likely	--	Central	2528	--	--
2008	--	Vinyl	--	--	--	1	2004	Full	Forced Air	Gas Likely	Non-Gas	Central	2516	--	--
2009	--	Stucco	--	--	--	1	1999	Full	Forced Air	Gas Likely	Non-Gas	Central	3988	--	--
20010	2001	Vinyl	Yes	--	--	SE/SL	2001	Full	Forced Air	Gas Likely	--	Central	1960	--	--
20011	--	Stucco	--	--	--	1	2003	Full	Forced Air	Gas Likely	Gas	Central	5826	Yes	--
2101	1984	Steel	--	--	--	1	1976	Full	Forced Air	Gas	--	Central	1944	--	--
2103	--	Steel	--	--	--	1	1961	Full	Hot Water	Gas	--	Window/Wall	2692	--	--
2104	--	Vinyl	--	--	--	1	1961	Full	Forced Air	Oil	Non-Gas	Central	2184	--	--
2105	--	Masonite	--	--	--	1	1960	Full	Forced Air	Gas	Non-Gas	Central	2168	--	--
2106	--	Vinyl	--	--	--	1	1960	Full	Forced Air	Gas	--	Central	2184	--	--
2107	--	Steel	--	--	--	1	1960	Full	Hot Water	Gas	--	Window/Wall	2400	Yes	--
2108	--	--	--	--	--	1	1960	Full	Forced Air	Gas Likely	Non-Gas	Central	2184	--	--
2109	--	--	--	--	--	1	1960	Full	Forced Air	Gas	Non-Gas	Central	2544	--	--
21012	2001	Steel	Yes	2001	Yes	1	1961	Full	Forced Air	Oil	--	Central	2240	--	--
21013	--	--	--	--	--	1	1961	Full	Forced Air	Oil	--	Central	2184	--	--
21014	2005	Vinyl	Yes	2005	Yes	1	1961	Full	Forced Air	Gas	--	Central	2128	--	--
21015	--	Vinyl	--	--	--	1	1967	Full	Forced Air	Gas Likely	--	Central	2288	--	--
21016	--	Steel	--	--	--	1	1967	Full	Forced Air	Gas	--	Central	2496	--	--
21017	--	--	--	--	--	1	1959	Full	Hot Water	Gas	--	--	2910	--	--
21018	--	--	--	--	--	1	1968	Full	Hot Water	Gas Likely	--	Central	2520	--	--
2201	1996	Steel	--	--	--	1	1973	Full	Forced Air	Gas	Non-Gas	Central	2512	--	--
2202	--	Steel	--	--	--	1	1930	Full	Forced Air	Gas	Non-Gas	Central	2774	--	--
2203	--	Wood	--	--	--	1	1958	Full	Forced Air	Gas	--	--	2576	--	--
2204	--	Steel	--	--	--	1	1962	Full	Forced Air	Gas Likely	--	Central	2080	--	--
2205	2008	Vinyl	Yes	2008	Yes	1	1962	Full	Forced Air	Gas Likely	--	Central	1920	--	--
2206	--	--	--	--	--	1	1958	Full	Hot Water	Gas Likely	Non-Gas	Window/Wall	2820	--	--
2207	--	--	--	--	--	1	1962	Full	Forced Air	Gas Likely	--	Central	1768	Yes	--
2208	--	Masonite	--	--	--	1	1963	Full	Forced Air	Gas Likely	--	Central	1664	--	--
2209	--	Masonite	--	--	--	1	1963	Full	Forced Air	Gas	--	Central	1664	--	--
22010	--	--	--	--	--	1	1978	Full	Forced Air	Gas Likely	--	Central	2896	--	--
22011	--	Vinyl	--	--	--	1	1962	Full	Forced Air	Gas Likely	--	Central	3264	--	--
22013	--	Vinyl	--	--	--	1	1989	Full	Forced Air	Gas	--	Central	2008	--	--

Appendix N. Parcel Scale Analysis ANOVA Tables

The first table in each ANOVA result set is the covariates without the urban tree canopy data. Chi-squared, degrees of freedom, and p-value is presented.

The next four tables in each set are ANOVA results with the urban tree canopy data included. The four tables represent tree canopy measured by different methods as discussed in the Methods section. The rows for each table are canopy measurements for increasing distances from the parcel. The columns represent p-values.

p.overall1 – is the p-value of a linear fit

p.overall2 – is the p-value of a quadratic fit

p.overall3 – is the p-value of a cubic fit

p.degree2v1 – is the p-value of the quadratic fit compared to the linear fit

p.degree3v2 – is the p-value of the quadratic fit compared to the cubic fit

P-value highlighted colors

P-values in the following charts have been color coded to show the level of significance related to the likelihood of rejecting the null hypothesis in the represented relationships. Green shows the lowest p-values of <0.001, indicating the most likely to reject the null hypothesis. Yellow shows the next level of significance with p-values <0.01. Red is next with p-values <0.05. Last is Pink showing p-values <0.10. Blue is used to show non-significant relationships for p-values >0.10 in the covariate effect plots.

P-value color code

Blue: not significant, > 0.10

Pink: < 0.10

Red: < 0.05

Yellow: < 0.01

Green: < 0.001

Heating

Full Model – Full Sample

Results for Full Model Full Sample HeatSet1

For covariates alone, without distance in the model:

	Chisq	Df	Pr(>Chisq)
YearBuilt	8.0587959	1	0.0045283
ConditionedSpace	11.0981316	1	0.0008641
Stories	11.1609395	3	0.0108867
SidingType	3.6209401	6	0.7278158
ImprovedInsulation	0.7782062	1	0.3776903
HeatingSystemType	11.8984944	1	0.0005618

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	0.8659480		0.9687910		0.9918410		0.8505650		0.8552730	
X100ft	0.5334420		0.7021090		0.7242950		0.5686610		0.4361600	
X200ft	0.7990210		0.8274850		0.8850520		0.5773830		0.6240970	
X300ft	0.6088710		0.5726950		0.5018090		0.3756090		0.3176640	
X400ft	0.5624200		0.3306820		0.3098750		0.1793740		0.2826900	
X500ft	0.5336100		0.1654160		0.1912490		0.0744020	.	0.3153340	
X600ft	0.7079450		0.3303460		0.2947790		0.1487520		0.2301250	
X700ft	0.9230530		0.5278650		0.4826960		0.2596400		0.2766330	
X800ft	0.9552200		0.3774320		0.4584780		0.1629850		0.4151770	
X900ft	0.9851090		0.3252240		0.4464010		0.1339780		0.4867480	
X1000ft	0.9493880		0.1739840		0.2725790		0.0616860	.	0.4812740	
X1100ft	0.8532790		0.1003550		0.1422190		0.0327670	*	0.3473950	
X1200ft	0.7776540		0.0767830	.	0.1032750		0.0246900	*	0.3091490	
X1300ft	0.7263760		0.0729520	.	0.1002810		0.0238750	*	0.3190160	
X1400ft	0.6912270		0.0957410	.	0.1264970		0.0334180	*	0.3139670	
X1500ft	0.6184780		0.1006220		0.1242050		0.0373560	*	0.2857310	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.5441364		0.6375594		0.6934382		0.4630661		0.4631595	
TD_100.200ft	0.9942832		0.9722239		0.9823553		0.8126599		0.7407899	
TD_200.300ft	0.4744571		0.4017354		0.5559323		0.2706907		0.6793264	
TD_300.400ft	0.5436136		0.4063344		0.3091953		0.2281498		0.1854188	
TD_400.500ft	0.5484868		0.1550088		0.2175355		0.0850968	.	0.2060262	
TD_500.600ft	0.7326518		0.5034368		0.5462872		0.2590808		0.3946721	
TD_600.700ft	0.4195595		0.6404732		0.7229186		0.6100278		0.5088537	
TD_700.800ft	0.8834128		0.1624875		0.4140373		0.0566287	.	0.8485014	
TD_800.900ft	0.8613101		0.2678670		0.2483187		0.1061811		0.2244023	
TD_900.1000ft	0.8275727		0.0086472	**	0.0191185	*	0.0023008	**	0.4841916	
TD_1000.1100ft	0.4922972		0.0202924	*	0.0039139	**	0.0079684	**	0.0225855	*
TD_1100.1200ft	0.4423304		0.1283340		0.0751442	.	0.0618920	.	0.1375904	
TD_1200.1300ft	0.4867750		0.2096229		0.2577141		0.1056824		0.3233106	
TD_1300.1400ft	0.5086430		0.4457404		0.4423357		0.2778420		0.2868707	
TD_1400.1500ft	0.2256017		0.2314072		0.2250066		0.2289043		0.2355857	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.5441360		0.6375590		0.6934380		0.4630660		0.4631600	
FD.P_parcel.200ft	0.8076610		0.8653350		0.8753280		0.6336580		0.5425620	
FD.P_parcel.300ft	0.6135430		0.6220190		0.5398670		0.4252730		0.3200450	
FD.P_parcel.400ft	0.5662200		0.3618570		0.3381380		0.2009660		0.2872650	
FD.P_parcel.500ft	0.5387620		0.1813770		0.2078530		**0.0826230**	.	0.3157390	
FD.P_parcel.600ft	0.7145840		0.3531090		0.3083370		0.1617000		0.2256690	
FD.P_parcel.700ft	0.9315990		0.5498860		0.4923150		0.2752090		0.2706110	
FD.P_parcel.800ft	0.9638450		0.3883550		0.4668060		0.1691820		0.4117840	
FD.P_parcel.900ft	0.9934970		0.3313310		0.4532960		0.1372070		0.4880540	
FD.P_parcel.1000ft	0.9568660		0.1759750		0.2755030		**0.0624910**	.	0.4827970	
FD.P_parcel.1100ft	0.8595030		0.1008320		0.1434500		**0.0328930**	*	0.3500040	
FD.P_parcel.1200ft	0.7832320		**0.0768490**	.	0.1035380		**0.0246570**	*	0.3102300	
FD.P_parcel.1300ft	0.7315780		**0.0730100**	.	**0.0999200**	.	**0.0238320**	*	0.3172070	
FD.P_parcel.1400ft	0.6965460		**0.0958760**	.	0.1257920		**0.0333650**	*	0.3107750	
FD.P_parcel.1500ft	0.6227990		0.1007720		0.1234150		**0.0372920**	*	0.2825170	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.9942830		0.9722240		0.9823550		0.8126600		0.7407900	
FD.100_100.300ft	0.6516630		0.7572550		0.8147310		0.5744560		0.5841260	
FD.100_100.400ft	0.5844840		0.4227000		0.4427950		0.2422820		0.3615200	
FD.100_100.500ft	0.5504380		0.1901150		0.2430650		**0.0860670**	.	0.3785410	
FD.100_100.600ft	0.7387950		0.3523420		0.3542180		0.1589220		0.2853960	
FD.100_100.700ft	0.9625210		0.5439150		0.5358880		0.2700260		0.3254260	
FD.100_100.800ft	0.9914950		0.3749410		0.4959480		0.1613050		0.5029440	
FD.100_100.900ft	0.9823060		0.3143720		0.4679650		0.1281950		0.5867030	
FD.100_100.1000ft	0.9784460		0.1608280		0.2758780		**0.0559770**	.	0.5740180	
FD.100_100.1100ft	0.8758260		**0.0889940**	.	0.1402230		**0.0283330**	*	0.4078080	
FD.100_100.1200ft	0.7969490		**0.0676070**	.	**0.0984460**	.	**0.0211700**	*	0.3444760	
FD.100_100.1300ft	0.7429320		**0.0650590**	.	**0.0930790**	.	**0.0207640**	*	0.3346110	
FD.100_100.1400ft	0.7059960		**0.0872910**	.	0.1180120		**0.0297550**	*	0.3210130	
FD.100_100.1500ft	0.6311170		**0.0936250**	.	0.1169630		**0.0340010**	*	0.2881020	

Results for Full Model Full Sample HeatSet2

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	13.5307769	1	**0.0002347**
ConditionedSpace	20.1561213	1	**0.0000071**
Stories	8.9195521	3	**0.0303798**
SidingType	6.0600823	6	0.4164934
ImprovedInsulation	1.8136643	1	0.1780693
HeatingSystemType	16.9140237	1	**0.0000391**
ImprovedSiding	0.4401222	2	0.8024698
ImprovedWindows	1.2744979	2	0.5287450

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	0.7545020		0.6730820		0.8359600		0.4095490		0.7878090	
X100ft	0.8479900		0.6220130		0.7232060		0.3450060		0.5729390	
X200ft	0.6478800		0.8872520		0.8998920		0.8165490		0.5553280	
X300ft	0.9480190		0.7184380		0.5927510		0.4162010		0.3056410	
X400ft	0.9227760		0.4785720		0.2760680		0.2302740		0.1441660	
X500ft	0.7971620		0.1621540		0.1310180		**0.0606430**	.	0.1759370	
X600ft	0.9985300		0.3707510		0.2810050		0.1589340		0.1801630	
X700ft	0.8593100		0.4167070		0.4623150		0.1897590		0.3622050	
X800ft	0.8998250		0.2687270		0.3764650		0.1060470		0.4787210	
X900ft	0.8908920		0.2169420		0.3025970		**0.0813510**	.	0.4060330	
X1000ft	0.9279020		**0.0984710**	.	0.1825290		**0.0313120**	*	0.3609910	
X1100ft	0.9897600		**0.0616710**	.	**0.0926810**	.	**0.0183370**	*	0.2419300	
X1200ft	0.9341990		**0.0611570**	.	**0.0552090**	.	**0.0181610**	*	0.1613540	
X1300ft	0.9012540		**0.0615340**	.	**0.0454990**	*	**0.0183840**	*	0.1233760	
X1400ft	0.8804980		**0.0738500**	.	**0.0543110**	.	**0.0227520**	*	0.1230540	
X1500ft	0.8161190		**0.0696410**	.	**0.0523820**	.	**0.0216530**	*	0.1265630	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.9225803		0.6083335		0.7056411		0.3239922		0.5577293	
TD_100.200ft	0.3777120		0.6349423		0.8831343		0.7118704		0.9349234	
TD_200.300ft	0.7104386		0.2782245		0.3965913		0.1265245		0.5929641	
TD_300.400ft	0.7472055		0.3926884		0.1853584		0.1845608		**0.0877726**	.
TD_400.500ft	0.6094374		**0.0646037**	.	0.1139024		**0.0235855**	*	0.2900516	
TD_500.600ft	0.4978010		0.3896712		0.5699202		0.2026677		0.7063676	
TD_600.700ft	0.4763299		0.3605196		0.5016325		0.1893325		0.5659918	
TD_700.800ft	0.9501897		0.1586926		0.3019583		**0.0552770**	.	0.9740031	
TD_800.900ft	0.8512275		0.2694073		0.2223358		0.1053320		0.1860413	
TD_900.1000ft	0.9216171		**0.0303603**	*	**0.0561759**	.	**0.0084852**	**	0.4418757	
TD_1000.1100ft	0.6483686		**0.0432655**	*	**0.0182886**	*	**0.0143913**	*	**0.0577048**	.
TD_1100.1200ft	0.6566169		0.2564342		0.3718365		0.1120156		0.5148048	
TD_1200.1300ft	0.7230942		0.3155065		0.2895420		0.1392262		0.2205925	
TD_1300.1400ft	0.7600852		0.3018350		0.3037707		0.1281329		0.2717333	
TD_1400.1500ft	0.4172581		0.1909071		0.1800047		0.1062666		0.2313634	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.9225800		0.6083340		0.7056410		0.3239920		0.5577290	
FD.P_parcel.200ft	0.6058610		0.8819010		0.8404460		0.9523190		0.4363020	
FD.P_parcel.300ft	0.9246380		0.7847500		0.6435020		0.4865340		0.3091360	
FD.P_parcel.400ft	0.9395950		0.5365330		0.3040090		0.2691210		0.1420890	
FD.P_parcel.500ft	0.8099910		0.1859130		0.1467210		**0.0708770**	.	0.1727920	
FD.P_parcel.600ft	0.9861090		0.3995610		0.2951540		0.1755700		0.1759410	
FD.P_parcel.700ft	0.8480420		0.4370960		0.4748830		0.2032990		0.3548470	
FD.P_parcel.800ft	0.8895280		0.2778610		0.3851680		0.1108690		0.4748750	
FD.P_parcel.900ft	0.8816250		0.2216710		0.3082710		**0.0837110**	.	0.4072680	
FD.P_parcel.1000ft	0.9197020		**0.0996230**	.	0.1851210		**0.0317450**	*	0.3626330	
FD.P_parcel.1100ft	0.9967110		**0.0620030**	.	**0.0936150**	.	**0.0184370**	*	0.2434590	
FD.P_parcel.1200ft	0.9405870		**0.0613580**	.	**0.0553440**	.	**0.0182150**	*	0.1614380	
FD.P_parcel.1300ft	0.9074410		**0.0616820**	.	**0.0452060**	*	**0.0184140**	*	0.1220810	
FD.P_parcel.1400ft	0.8865990		**0.0739880**	.	**0.0537700**	.	**0.0227710**	*	0.1211350	
FD.P_parcel.1500ft	0.8212500		**0.0697400**	.	**0.0519060**	.	**0.0216500**	*	0.1247770	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.3777120		0.6349420		0.8831340		0.7118700		0.9349230	
FD.100_100.300ft	0.8982410		0.8521740		0.8776040		0.5762380		0.5696380	
FD.100_100.400ft	0.9417290		0.5529170		0.4130570		0.2798170		0.2112420	
FD.100_100.500ft	0.8035560		0.1656720		0.1772870		**0.0613350**	.	0.2603920	
FD.100_100.600ft	0.9781120		0.3513490		0.3477740		0.1481250		0.2742360	
FD.100_100.700ft	0.8352310		0.3879930		0.4965530		0.1738130		0.4759670	
FD.100_100.800ft	0.8793760		0.2401620		0.3848490		**0.0925490**	.	0.6283800	
FD.100_100.900ft	0.8728650		0.1881770		0.3083600		**0.0685940**	.	0.5456390	
FD.100_100.1000ft	0.9113060		**0.0799680**	.	0.1798670		**0.0246020**	*	0.4776660	
FD.100_100.1100ft	0.9972860		**0.0488160**	*	**0.0892030**	.	**0.0140470**	*	0.3093440	
FD.100_100.1200ft	0.9456080		**0.0496910**	*	**0.0371500**	*	**0.0143240**	*	0.1592870	
FD.100_100.1300ft	0.9113390		**0.0514670**	.	**0.0418860**	*	**0.0149760**	*	0.1382570	
FD.100_100.1400ft	0.8895620		**0.0636450**	.	**0.0501950**	.	**0.0191480**	*	0.1331030	
FD.100_100.1500ft	0.8240780		**0.0614830**	.	**0.0488000**	*	**0.0187210**	*	0.1340730	

Results for Full Model Full Sample HeatSet2

For covariates alone, without distance in the model:

	Chisq	Df	Pr(>Chisq)
YearBuilt	9.3139466	1	**0.0022742**
ConditionedSpace	19.4320776	1	**0.0000104**
Stories	10.4084249	3	**0.0153951**
SidingType	3.1908238	6	0.7845435
ImprovedInsulation	0.4165207	1	0.5186783
HeatingSystemType	38.9304041	2	**0.000000004**
ImprovedSiding	0.1100926	2	0.9464413
ImprovedWindows	0.2965331	2	0.8622013
Fireplace	6.1623569	3	0.1039729
GarageHeated	2.1737637	1	0.1403823
Pool	**0.0528133**	1	0.8182382

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	0.4957044		0.3508876		0.5514445		0.2044050		0.9166213	
X100ft	0.7136283		0.7977705		0.9058261		0.5703727		0.7416396	
X200ft	0.7159774		0.9059274		0.9759269		0.7871622		0.8840473	
X300ft	0.8367378		0.9815949		0.8773548		0.9920816		0.4187340	
X400ft	0.7415499		0.9050020		0.8176175		0.7540710		0.3742588	
X500ft	0.7067498		0.5522276		0.7389882		0.3064092		0.7174020	
X600ft	0.8292214		0.5980816		0.7338534		0.3238003		0.5360753	
X700ft	0.6749725		0.1905049		0.5323115		**0.0879272**	.	0.8778261	
X800ft	0.6425856		0.1083066		0.1886577		**0.0460639**	*	0.5553255	
X900ft	0.6654615		0.1032189		0.1754366		**0.0426757**	*	0.5162229	
X1000ft	0.6644902		**0.0704870**	.	0.1345796		**0.0279092**	*	0.5952521	
X1100ft	0.6318121		**0.0372857**	*	**0.0848002**	.	**0.0142022**	*	0.7812558	
X1200ft	0.5672480		**0.0217089**	*	**0.0536776**	.	**0.0084673**	**	0.8595439	
X1300ft	0.5258236		**0.0210805**	*	**0.0525247**	.	**0.0088333**	**	0.8828482	
X1400ft	0.5018200		**0.0213433**	*	**0.0508994**	.	**0.0094759**	**	0.7364866	
X1500ft	0.4593140		**0.0187811**	*	**0.0452198**	*	**0.0089060**	**	0.7269615	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.4874878		0.6702943		0.8422208		0.5691717		0.8537590	
TD_100.200ft	0.7261670		0.8986661		0.9242058		0.7563849		0.6033706	
TD_200.300ft	0.9801715		0.9831220		0.9750490		0.8563171		0.6729730	
TD_300.400ft	0.6475151		0.7681905		0.7778584		0.5713463		0.4442497	
TD_400.500ft	0.6812873		0.3090543		0.4801965		0.1411751		0.6666342	
TD_500.600ft	0.8500105		0.8258712		0.5820544		0.5502841		0.1960967	
TD_600.700ft	0.3275334		0.1071256		0.2021316		**0.0736948**	.	0.6831213	
TD_700.800ft	0.5950942		0.1072578		0.1278001		**0.0472184**	*	0.2696290	
TD_800.900ft	0.8331239		0.4501715		0.7033579		0.2344525		0.3292207	
TD_900.1000ft	0.7237365		0.1147690		0.1611571		**0.0493937**	*	0.3641115	
TD_1000.1100ft	0.5304554		**0.0044063**	**	**0.0063212**	**	**0.0016270**	**	0.2267289	
TD_1100.1200ft	0.2054822		**0.0161899**	*	**0.0417763**	*	**0.0101898**	*	0.9342283	
TD_1200.1300ft	0.2225354		**0.0799508**	.	0.1460948		**0.0596580**	.	0.5589709	
TD_1300.1400ft	0.2588830		**0.0332794**	*	**0.0772524**	.	**0.0189748**	*	0.8027791	
TD_1400.1500ft	0.1964106		**0.0413579**	*	**0.0952739**	.	**0.0306368**	*	0.8863620	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.4874878		0.6702943		0.8422208		0.5691717		0.8537590	
FD.P_parcel.200ft	0.5954883		0.8245749		0.9075866		0.7363609		0.6703637	
FD.P_parcel.300ft	0.7698250		0.9609929		0.8300690		0.9783689		0.3661269	
FD.P_parcel.400ft	0.6978018		0.8713011		0.7847288		0.7160596		0.3545323	
FD.P_parcel.500ft	0.6746569		0.5131812		0.7032991		0.2818717		0.7114960	
FD.P_parcel.600ft	0.8020492		0.5805474		0.7013608		0.3136253		0.4918291	
FD.P_parcel.700ft	0.6529622		0.1849817		0.5187942		**0.0865919**	.	0.8171043	
FD.P_parcel.800ft	0.6240425		0.1045620		0.1875853		**0.0450089**	*	0.5887182	
FD.P_parcel.900ft	0.6500588		0.1000818		0.1745303		**0.0417450**	*	0.5413224	
FD.P_parcel.1000ft	0.6510309		**0.0685021**	.	0.1334042		**0.0273502**	*	0.6195560	
FD.P_parcel.1100ft	0.6205475		**0.0362932**	*	**0.0833881**	.	**0.0139366**	*	0.8034452	
FD.P_parcel.1200ft	0.5578278		**0.0210870**	*	**0.0525137**	.	**0.0082940**	**	0.8800866	
FD.P_parcel.1300ft	0.5176255		**0.0205459**	*	**0.0515201**	.	**0.0086821**	**	0.9058006	
FD.P_parcel.1400ft	0.4947543		**0.0208562**	*	**0.0502945**	.	**0.0093335**	**	0.7583674	
FD.P_parcel.1500ft	0.4531104		**0.0184431**	*	**0.0448778**	*	**0.0088187**	**	0.7478621	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.7261670		0.8986661		0.9242058		0.7563849		0.6033706	
FD.100_100.300ft	0.8810554		0.9864582		0.9701022		0.9268037		0.6403008	
FD.100_100.400ft	0.7607513		0.9281391		0.7946566		0.8021634		0.3364880	
FD.100_100.500ft	0.7167400		0.5091705		0.7184878		0.2704082		0.8172907	
FD.100_100.600ft	0.8419058		0.5573933		0.7270795		0.2901191		0.6079072	
FD.100_100.700ft	0.6766351		0.1722763		0.3189983		**0.0777161**	.	0.9099982	
FD.100_100.800ft	0.6430414		**0.0957132**	.	0.1550446		**0.0398501**	*	0.4554574	
FD.100_100.900ft	0.6671345		**0.0921413**	.	0.1444378		**0.0373136**	*	0.4222322	
FD.100_100.1000ft	0.6664134		**0.0619056**	.	0.1121474		**0.0240072**	*	0.5073753	
FD.100_100.1100ft	0.6326157		**0.0312067**	*	**0.0704877**	.	**0.0116236**	*	0.7095551	
FD.100_100.1200ft	0.5671601		**0.0176976**	*	**0.0442855**	*	**0.0067566**	**	0.8184939	
FD.100_100.1300ft	0.5252447		**0.0174379**	*	**0.0441969**	*	**0.0071681**	**	0.8656844	
FD.100_100.1400ft	0.5007922		**0.0179052**	*	**0.0433812**	*	**0.0078138**	**	0.7298849	
FD.100_100.1500ft	0.4580120		**0.0160516**	*	**0.0392910**	*	**0.0075040**	**	0.7275641	

Simple Model – Full Sample

Results for Simple Model Full Sample HeatSet1

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	11.5264598	1	**0.0006861**
ConditionedSpace	18.7609573	1	**0.0000148**
Stories	11.9088532	3	**0.0077020**
HeatingSystemType	16.4708115	1	**0.0000494**

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	0.8355850		0.9565330		0.9892260		0.8500290		0.8631920	
X100ft	0.4774110		0.7114320		0.7371680		0.6737880		0.4487170	
X200ft	0.7223630		0.8176070		0.9037500		0.6017980		0.7022130	
X300ft	0.5709840		0.6516690		0.6287220		0.4856670		0.3907760	
X400ft	0.5167330		0.3834950		0.3863650		0.2327120		0.3347610	
X500ft	0.4802590		0.1579530		0.2438600		**0.0768860**	.	0.5390060	
X600ft	0.6411690		0.3031810		0.3968030		0.1409490		0.4533160	
X700ft	0.8110510		0.4546760		0.5874460		0.2176000		0.5381440	
X800ft	0.8261320		0.3218690		0.5103740		0.1363530		0.7425390	
X900ft	0.8273830		0.1999240		0.4554970		**0.0780220**	.	0.8745780	
X1000ft	0.7744550		**0.0934210**	.	0.2567310		**0.0325340**	*	0.8710370	
X1100ft	0.6708770		**0.0500970**	.	0.1393340		**0.0171310**	*	0.6464380	
X1200ft	0.5862740		**0.0375680**	*	**0.0998370**	.	**0.0134480**	*	0.5680050	
X1300ft	0.5268400		**0.0352980**	*	**0.0653240**	.	**0.0135570**	*	0.4547350	
X1400ft	0.4793330		**0.0425720**	*	0.1067670		**0.0180280**	*	0.5326370	
X1500ft	0.4173700		**0.0528200**	.	**0.0968770**	.	**0.0227530**	*	0.4799110	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.4245308		0.5950337		0.6427018		0.5265026		0.4303908	
TD_100.200ft	0.9261049		0.9545647		0.9479955		0.7716232		0.6055274	
TD_200.300ft	0.4774655		0.5586881		0.6997029		0.4380016		0.6508640	
TD_300.400ft	0.4883249		0.3354573		0.2984646		0.1913881		0.2266348	
TD_400.500ft	0.3992886		0.1644874		0.2143105		**0.0893767**	.	0.3502900	
TD_500.600ft	0.8173341		0.4089626		0.5264193		0.1815811		0.5022599	
TD_600.700ft	0.5960815		0.6960844		0.5737125		0.5007469		0.3258238	
TD_700.800ft	0.9447727		0.1640501		0.3098131		**0.0579880**	.	0.9291017	
TD_800.900ft	0.8798069		0.2585563		0.2823764		0.1086875		0.2932206	
TD_900.1000ft	0.5112233		**0.0054182**	**	**0.0141188**	*	**0.0015958**	**	0.6220138	
TD_1000.1100ft	0.3215661		**0.0106942**	*	**0.0026488**	**	**0.0051412**	**	**0.0290441**	*
TD_1100.1200ft	0.2206814		**0.0541551**	.	**0.0540766**	.	**0.0385376**	*	0.1844266	
TD_1200.1300ft	0.2268711		**0.0957624**	.	0.1197001		**0.0737148**	.	0.2855303	
TD_1300.1400ft	0.2137533		0.1788366		0.2599243		0.1700302		0.2933311	
TD_1400.1500ft	0.1461354		0.1124827		0.1399033		0.1333215		0.2950423	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.4245310		0.5950340		0.6427020		0.5265030		0.4303910	
FD.P_parcel.200ft	0.6986690		0.8155070		0.8781890		0.6145990		0.6188990	
FD.P_parcel.300ft	0.5600940		0.6661690		0.6337540		0.5143010		0.3837620	
FD.P_parcel.400ft	0.5107480		0.3923200		0.3988940		0.2423200		0.3425560	
FD.P_parcel.500ft	0.4781590		0.1617690		0.2524930		**0.0793130**	.	0.5548160	
FD.P_parcel.600ft	0.6415740		0.3136880		0.4076080		0.1472440		0.4522710	
FD.P_parcel.700ft	0.8136800		0.4665380		0.5961470		0.2252980		0.5323630	
FD.P_parcel.800ft	0.8294890		0.3268160		0.5158290		0.1389080		0.7400260	
FD.P_parcel.900ft	0.8311910		0.2014680		0.4586220		**0.0786560**	.	0.8765690	
FD.P_parcel.1000ft	0.7778210		**0.0934830**	.	0.2572460		**0.0325130**	*	0.8740730	
FD.P_parcel.1100ft	0.6738230		**0.0498480**	*	0.1392440		**0.0170040**	*	0.6511580	
FD.P_parcel.1200ft	0.5887980		**0.0372520**	*	**0.0701360**	.	**0.0132940**	*	0.4753640	
FD.P_parcel.1300ft	0.5292680		**0.0350460**	*	**0.0647550**	.	**0.0134140**	*	0.4527040	
FD.P_parcel.1400ft	0.4818570		**0.0422750**	*	**0.0743210**	.	**0.0178320**	*	0.4299590	
FD.P_parcel.1500ft	0.4192880		**0.0525470**	.	**0.0959980**	.	**0.0225510**	*	0.4763640	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.9261050		0.9545650		0.9479950		0.7716230		0.6055270	
FD.100_100.300ft	0.6279450		0.8042870		0.8802590		0.6742770		0.6632730	
FD.100_100.400ft	0.5450480		0.4679940		0.5219350		0.2937010		0.4272760	
FD.100_100.500ft	0.5000440		0.1804770		0.2957940		**0.0871080**	.	0.6381430	
FD.100_100.600ft	0.6723570		0.3219600		0.4518390		0.1484380		0.5440160	
FD.100_100.700ft	0.8483720		0.4679410		0.6259060		0.2232810		0.6091150	
FD.100_100.800ft	0.8600050		0.3198090		0.5236700		0.1337400		0.8534770	
FD.100_100.900ft	0.8569780		0.1909780		0.4489800		**0.0728380**	.	0.9891980	
FD.100_100.1000ft	0.7999690		**0.0854150**	.	0.2439870		**0.0289340**	*	0.9770480	
FD.100_100.1100ft	0.6896640		**0.0439060**	*	0.1309490		**0.0145560**	*	0.7263960	
FD.100_100.1200ft	0.6015120		**0.0325980**	*	**0.0648430**	.	**0.0113090**	*	0.5137340	
FD.100_100.1300ft	0.5394340		**0.0309820**	*	**0.0593970**	.	**0.0115510**	*	0.4726040	
FD.100_100.1400ft	0.4900470		**0.0381120**	*	**0.0687950**	.	**0.0156930**	*	0.4413600	
FD.100_100.1500ft	0.4262800		**0.0484110**	*	**0.0620400**	.	**0.0203210**	*	0.3746510	

Results for Simple Model Full Sample HeatSet2

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	15.7202516	1	**0.0000734**
ConditionedSpace	19.0484001	1	**0.0000127**
Stories	9.7576158	3	**0.0207429**
HeatingSystemType	16.8187409	1	**0.0000411**

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	0.9805184		0.5391280		0.7368866		0.2667613		0.8475055	
X100ft	0.5590078		0.4302152		0.6364517		0.2520670		0.9364012	
X200ft	0.9650362		0.8053182		0.9210132		0.5108287		0.8294982	
X300ft	0.7378012		0.5164839		0.5274558		0.2803282		0.3884844	
X400ft	0.6478997		0.2787112		0.2281391		0.1309502		0.2130310	
X500ft	0.5645232		**0.0671525**	.	0.1035921		**0.0256691**	*	0.4137897	
X600ft	0.7844825		0.2294124		0.2932141		**0.0905052**	.	0.3731652	
X700ft	0.9001890		0.2497414		0.4277430		**0.0967304**	.	0.8083348	
X800ft	0.8370188		0.1490465		0.2944098		**0.0523368**	.	0.9779660	
X900ft	0.8304030		0.1240371		0.2581915		**0.0421711**	*	0.9146725	
X1000ft	0.7767716		**0.0661460**	.	0.1515494		**0.0207481**	*	0.8363755	
X1100ft	0.6705135		**0.0377578**	*	**0.0820155**	.	**0.0116598**	*	0.5870893	
X1200ft	0.5884838		**0.0280069**	*	**0.0514403**	.	**0.0089199**	**	0.4139576	
X1300ft	0.5319238		**0.0282513**	*	**0.0465085**	*	**0.0095650**	**	0.3504148	
X1400ft	0.4729828		**0.0291905**	*	**0.0472679**	*	**0.0106703**	*	0.3374793	
X1500ft	0.4105071		**0.0242395**	*	**0.0398763**	*	**0.0094961**	**	0.3368764	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.5441317		0.3948327		0.5806978		0.2273160		0.7803325	
TD_100.200ft	0.6517854		0.8934954		0.9694204		0.8772413		0.8733282	
TD_200.300ft	0.4872198		0.3087201		0.3427540		0.1799031		0.3521814	
TD_300.400ft	0.5666513		0.2509830		0.1135697		0.1190045		**0.0761571**	.
TD_400.500ft	0.4929324		**0.0651333**	.	0.1057134		**0.0257850**	*	0.3778866	
TD_500.600ft	0.5850288		0.5318386		0.7432081		0.3174866		0.8742269	
TD_600.700ft	0.7084903		0.3961102		0.6029049		0.1895227		0.8767249	
TD_700.800ft	0.6518404		0.1359924		0.3646760		**0.0501092**	.	0.8023558	
TD_800.900ft	0.8516806		0.2812292		0.3874388		0.1200859		0.1586496	
TD_900.1000ft	0.6032683		**0.0206177**	*	**0.0440140**	*	**0.0067781**	**	0.5397905	
TD_1000.1100ft	0.3182299		**0.0255754**	*	**0.0066868**	**	**0.0123563**	*	**0.0452120**	*
TD_1100.1200ft	0.2757463		0.1152142		0.1953732		**0.0781789**	.	0.5368249	
TD_1200.1300ft	0.2952397		0.1739724		0.2277911		0.1221436		0.3235294	
TD_1300.1400ft	0.2136026		**0.0755669**	.	0.1070507		**0.0545325**	.	0.3194032	
TD_1400.1500ft	0.1566358		**0.0532842**	.	**0.0737900**	.	**0.0509088**	.	0.3210435	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.5441317		0.3948327		0.5806978		0.2273160		0.7803325	
FD.P_parcel.200ft	0.9556425		0.8598354		0.9106599		0.5837107		0.6361221	
FD.P_parcel.300ft	0.7412085		0.5703313		0.5463526		0.3227335		0.3531996	
FD.P_parcel.400ft	0.6520501		0.3080308		0.2390674		0.1478289		0.1984418	
FD.P_parcel.500ft	0.5683370		**0.0738286**	.	0.1124174		**0.0283908**	*	0.4093260	
FD.P_parcel.600ft	0.7909248		0.2452078		0.3047441		**0.0980132**	.	0.3607158	
FD.P_parcel.700ft	0.9066183		0.2619158		0.4413870		0.1025439		0.7871342	
FD.P_parcel.800ft	0.8431252		0.1537836		0.3022153		**0.0542294**	.	0.9907766	
FD.P_parcel.900ft	0.8363488		0.1264487		0.2622963		**0.0430664**	*	0.9089902	
FD.P_parcel.1000ft	0.7818033		**0.0668784**	.	0.1529336		**0.0209712**	*	0.8338070	
FD.P_parcel.1100ft	0.6748218		**0.0379233**	*	**0.0823065**	.	**0.0116871**	*	0.5871887	
FD.P_parcel.1200ft	0.5921168		**0.0280051**	*	**0.0512959**	.	**0.0088927**	**	0.4129188	
FD.P_parcel.1300ft	0.5355748		**0.0282830**	*	**0.0462026**	*	**0.0095413**	**	0.3469275	
FD.P_parcel.1400ft	0.4763988		**0.0291975**	*	**0.0468725**	*	**0.0106266**	*	0.3330385	
FD.P_parcel.1500ft	0.4132043		**0.0242343**	*	**0.0395626**	*	**0.0094517**	**	0.3328416	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.6517854		0.8934954		0.9694204		0.8772413		0.8733282	
FD.100_100.300ft	0.8218597		0.7597434		0.7883734		0.4844000		0.4918532	
FD.100_100.400ft	0.6893220		0.3771468		0.3210968		0.1844206		0.2277998	
FD.100_100.500ft	0.5890434		**0.0815376**	.	0.1380918		**0.0306242**	*	0.4953211	
FD.100_100.600ft	0.8217200		0.2368573		0.3416433		**0.0925983**	.	0.4783683	
FD.100_100.700ft	0.9377246		0.2484297		0.4348793		**0.0955021**	.	0.9000219	
FD.100_100.800ft	0.8680598		0.1417269		0.2802728		**0.0488474**	*	0.8420391	
FD.100_100.900ft	0.8569000		0.1142441		0.2418587		**0.0379985**	*	0.9469393	
FD.100_100.1000ft	0.7997560		**0.0583815**	.	0.1384840		**0.0178390**	*	0.9628832	
FD.100_100.1100ft	0.6875280		**0.0321119**	*	**0.0753262**	.	**0.0096279**	**	0.6779155	
FD.100_100.1200ft	0.6020418		**0.0238061**	*	**0.0472943**	*	**0.0073647**	**	0.4652589	
FD.100_100.1300ft	0.5431318		**0.0245592**	*	**0.0427740**	*	**0.0080946**	**	0.3776761	
FD.100_100.1400ft	0.4820334		**0.0258572**	*	**0.0436971**	*	**0.0092151**	**	0.3555819	
FD.100_100.1500ft	0.4179703		**0.0218254**	*	**0.0371262**	*	**0.0083473**	**	0.3500668	

Results for Simple Model Full Sample HeatSet3

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	8.9727821	1	**0.0027403**
ConditionedSpace	41.6789525	1	**0.00000000011**
Stories	17.7266957	3	**0.0005008**
HeatingSystemType	45.6275754	2	**0.00000000012**

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	0.5845350		0.4063620		0.6133780		0.2210350		0.8947250	
X100ft	0.7324850		0.7922500		0.6956120		0.5558430		0.3165440	
X200ft	0.7049760		0.9314410		0.9638220		0.9909760		0.7089660	
X300ft	0.8044770		0.9183610		0.7446040		0.7402180		0.3015230	
X400ft	0.7347830		0.9436940		0.7527860		0.9488050		0.2956520	
X500ft	0.7465190		0.8284390		0.8648750		0.5994900		0.5459050	
X600ft	0.8526480		0.8508730		0.8763940		0.5900050		0.5292340	
X700ft	0.6921830		0.5672710		0.7773650		0.3227220		0.9988970	
X800ft	0.6319230		0.3918010		0.5423000		0.1999570		0.5881700	
X900ft	0.6676280		0.4137950		0.5904380		0.2093320		0.6848730	
X1000ft	0.6640020		0.3120450		0.5171570		0.1442360		0.9078610	
X1100ft	0.6150800		0.1671930		0.3212480		**0.0687040**	.	0.8722830	
X1200ft	0.5607490		**0.0961050**	.	0.1996150		**0.0373850**	*	0.8002070	
X1300ft	0.5260370		**0.0868240**	.	0.1838630		**0.0347210**	*	0.7906230	
X1400ft	0.5117820		**0.0889520**	.	0.1928510		**0.0366160**	*	0.8995840	
X1500ft	0.4745950		**0.0818300**	.	0.1807680		**0.0351590**	*	0.8678210	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.5245611		0.6885042		0.8238552		0.5627962		0.6751364	
TD_100.200ft	0.6954855		0.9268520		0.9748343		0.9689473		0.7967426	
TD_200.300ft	0.9739500		0.9025893		0.9658128		0.6515073		0.8025588	
TD_300.400ft	0.6801089		0.9147266		0.8960493		0.9088964		0.5116875	
TD_400.500ft	0.8076850		0.6000191		0.7640436		0.3264959		0.6987773	
TD_500.600ft	0.8660843		0.9016087		0.8167002		0.6710554		0.3822284	
TD_600.700ft	0.3174285		0.3732129		0.5500228		0.3222580		0.6483661	
TD_700.800ft	0.4878578		0.4132942		0.5295198		0.2582034		0.5141129	
TD_800.900ft	0.8943506		0.9895112		0.7860073		0.9410877		0.3048193	
TD_900.1000ft	0.7110264		0.4420591		0.4091757		0.2257389		0.2550229	
TD_1000.1100ft	0.4533128		**0.0143217**	*	**0.0173985**	*	**0.0049423**	**	0.2072096	
TD_1100.1200ft	0.3527112		**0.0423708**	*	**0.0989879**	.	**0.0198868**	*	0.9755838	
TD_1200.1300ft	0.3987152		0.1989728		0.2754406		0.1201001		0.3392765	
TD_1300.1400ft	0.5049669		0.1386913		0.2786662		**0.0640555**	.	0.8130862	
TD_1400.1500ft	0.3406979		0.1724039		0.3132714		0.1106409		0.5936291	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.5245610		0.6885040		0.8238550		0.5627960		0.6751360	
FD.P_parcel.200ft	0.5944130		0.8677830		0.8436820		0.9728520		0.4622930	
FD.P_parcel.300ft	0.7449150		0.9074720		0.6949730		0.7652650		0.2630460	
FD.P_parcel.400ft	0.6953050		0.9274220		0.7341530		0.9857040		0.2861640	
FD.P_parcel.500ft	0.7176260		0.7961570		0.8450260		0.5661710		0.5440050	
FD.P_parcel.600ft	0.8287340		0.8364610		0.8514480		0.5762400		0.4926620	
FD.P_parcel.700ft	0.6724340		0.5553930		0.7669820		0.3177800		0.9451820	
FD.P_parcel.800ft	0.6153210		0.3809480		0.5422480		0.1954980		0.6242290	
FD.P_parcel.900ft	0.6537320		0.4044530		0.5886870		0.2052400		0.7158160	
FD.P_parcel.1000ft	0.6518980		0.3055620		0.5119310		0.1417330		0.9391080	
FD.P_parcel.1100ft	0.6050990		0.1636890		0.3151600		**0.0675690**	.	0.8487250	
FD.P_parcel.1200ft	0.5522030		**0.0937890**	.	0.1946540		**0.0366610**	*	0.7792000	
FD.P_parcel.1300ft	0.5186320		**0.0848930**	.	0.1793730		**0.0341190**	*	0.7685330	
FD.P_parcel.1400ft	0.5053750		**0.0872340**	.	0.1892460		**0.0360770**	*	0.8763540	
FD.P_parcel.1500ft	0.4688640		**0.0805750**	.	0.1778230		**0.0348110**	*	0.8452330	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.6954860		0.9268520		0.9748340		0.9689470		0.7967430	
FD.100_100.300ft	0.8371480		0.9143150		0.9177620		0.7102490		0.5686140	
FD.100_100.400ft	0.7498220		0.9443550		0.7439860		0.8983350		0.2882720	
FD.100_100.500ft	0.7582190		0.8036810		0.8840240		0.5564970		0.6336420	
FD.100_100.600ft	0.8657030		0.8164870		0.8968680		0.5386530		0.6352660	
FD.100_100.700ft	0.6938400		0.5333670		0.7445140		0.2939040		0.9169740	
FD.100_100.800ft	0.6314800		0.3603890		0.4703010		0.1787680		0.4826300	
FD.100_100.900ft	0.6688130		0.3831550		0.5174020		0.1884510		0.5586530	
FD.100_100.1000ft	0.6657190		0.2854090		0.4667020		0.1284910		0.7764000	
FD.100_100.1100ft	0.6155150		0.1466230		0.2904770		**0.0586700**	.	0.9761830	
FD.100_100.1200ft	0.5604480		**0.0820460**	.	0.1771450		**0.0311270**	*	0.8633140	
FD.100_100.1300ft	0.5254830		**0.0743920**	.	0.1629270		**0.0290710**	*	0.8275870	
FD.100_100.1400ft	0.5106620		**0.0768010**	.	0.1709470		**0.0309490**	*	0.9221160	
FD.100_100.1500ft	0.4731280		**0.0715690**	.	0.1618420		**0.0302060**	*	0.8768160	

Full Model – Reduced Sample

Results for Full Model Reduced Sample HeatSet1

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
poly(YearBuilt, 2)	3.0256776	2	0.2202838
poly(ConditionedSpace,	11.8876650	2	**0.0026220**
Stories	6.1895995	3	0.1027415
SidingType	4.6406990	6	0.5906497
ImprovedInsulation	0.6103684	1	0.4346491
HeatingSystemType	10.9794394	1	**0.0009213**

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	0.2487750		0.3881823		0.4656721		0.4501284		0.4130881	
X100ft	**0.0372055**	*	**0.0783104**	.	0.1486684		0.3810829		0.5874879	
X200ft	**0.0895065**	.	**0.0645154**	.	**0.0761716**	.	0.1112109		0.2435186	
X300ft	**0.0302838**	*	**0.0252954**	*	**0.0520239**	.	**0.0865317**	.	0.5115801	
X400ft	**0.0093207**	**	**0.0115590**	*	**0.0476444**	*	0.1219206		0.9300731	
X500ft	**0.0042087**	**	**0.0070359**	**	**0.0140673**	*	0.2259991		0.3931876	
X600ft	**0.0075228**	**	**0.0074830**	**	**0.0127590**	*	0.1139948		0.3117338	
X700ft	**0.0168361**	*	**0.0087903**	**	**0.0219383**	*	**0.0594627**	.	0.6068615	
X800ft	**0.0196118**	*	**0.0080570**	**	**0.0206206**	*	**0.0462757**	*	0.6297619	
X900ft	**0.0253001**	*	**0.0137426**	*	**0.0331841**	*	**0.0650299**	.	0.6229365	
X1000ft	**0.0230525**	*	**0.0314415**	*	**0.0703856**	.	0.1917395		0.6498793	
X1100ft	**0.0219944**	*	**0.0511366**	.	**0.0745214**	.	0.3959347		0.3235078	
X1200ft	**0.0245918**	*	**0.0764195**	.	**0.0438038**	*	0.6982884		**0.0923135**	.
X1300ft	**0.0302648**	*	**0.0987905**	.	**0.0220520**	*	0.9824582		**0.0293047**	*
X1400ft	**0.0385466**	*	0.1182974		**0.0120225**	*	0.8317466		**0.0117068**	*
X1500ft	**0.0408334**	*	0.1502783		**0.0079522**	**	0.6870277		**0.0072239**	**

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	**0.0462257**	*	0.1124266		0.2284478		0.5124476		0.9035627	
TD_100.200ft	0.2554760		0.1478429		**0.0244701**	*	0.1136220		**0.0208582**	*
TD_200.300ft	**0.0255872**	*	**0.0586337**	.	**0.0684291**	.	0.3886371		0.2405346	
TD_300.400ft	**0.0050784**	**	**0.0150292**	*	**0.0354172**	*	0.4427933		0.6024094	
TD_400.500ft	**0.0074016**	**	**0.0117252**	*	**0.0325485**	*	0.1984098		0.9811170	
TD_500.600ft	0.1753151		0.3146254		0.1942023		0.4844237		0.1249297	
TD_600.700ft	0.3930638		0.6821073		**0.0793091**	.	0.8313337		**0.0146362**	*
TD_700.800ft	0.1878429		0.3200834		0.2985407		0.4564356		0.2390648	
TD_800.900ft	0.1986242		0.4353438		0.1709067		0.8559114		**0.0694833**	.
TD_900.1000ft	**0.0521890**	.	**0.0662108**	.	0.1463534		0.2020795		0.8890519	
TD_1000.1100ft	**0.0323298**	*	**0.0867468**	.	**0.0405315**	*	0.5541368		**0.0719387**	.
TD_1100.1200ft	**0.0645683**	.	0.1148165		**0.0526363**	.	0.3383134		**0.0720848**	.
TD_1200.1300ft	0.1340776		0.1409979		0.1015503		0.1985489		0.1353245	
TD_1300.1400ft	0.2148269		0.3489808		**0.0753241**	.	0.3686464		**0.0390192**	*
TD_1400.1500ft	0.1143883		0.2225363		0.1358560		0.4631994		0.1148621	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.0462257	*	0.1124266		0.2284478		0.5124476		0.9035627	
FD.P_parcel.200ft	0.1016851		0.0646899	.	0.0943676	.	0.0983000	.	0.3390715	
FD.P_parcel.300ft	0.0341831	*	0.0256464	*	0.0518608	.	0.0793547	.	0.4967057	
FD.P_parcel.400ft	0.0102492	*	0.0116436	*	0.0480648	*	0.1127320		0.9511168	
FD.P_parcel.500ft	0.0046200	**	0.0072914	**	0.0146797	*	0.2139331		0.3994209	
FD.P_parcel.600ft	0.0082000	**	0.0076743	**	0.0135094	*	0.1071600		0.3275492	
FD.P_parcel.700ft	0.0183169	*	0.0091231	**	0.0227549	*	0.0569052	.	0.6108054	
FD.P_parcel.800ft	0.0213043	*	0.0089430	**	0.0221996	*	0.0477935	*	0.6020166	
FD.P_parcel.900ft	0.0272504	*	0.0158590	*	0.0362267	*	0.0709835	.	0.5704937	
FD.P_parcel.1000ft	0.0246047	*	0.0357521	*	0.0744210	.	0.2100968		0.5696024	
FD.P_parcel.1100ft	0.0232327	*	0.0559693	.	0.0726613	.	0.4234966		0.2744294	
FD.P_parcel.1200ft	0.0257683	*	0.0808094	.	0.0410550	*	0.7284375		0.0795030	.
FD.P_parcel.1300ft	0.0315552	*	0.1022067		0.0206915	*	0.9561550		0.0261225	*
FD.P_parcel.1400ft	0.0400154	*	0.1212201		0.0114147	*	0.8093253		0.0107241	*
FD.P_parcel.1500ft	0.0422191	*	0.1529043		0.0077431	**	0.6693241		0.0068658	**

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.2554760		0.1478429		0.0244701	*	0.1136220		0.0208582	*
FD.100_100.300ft	0.0563999	.	0.0337639	*	0.0347649	*	0.0681518	.	0.1831979	
FD.100_100.400ft	0.0132148	*	0.0129008	*	0.0316478	*	0.1013475		0.6363292	
FD.100_100.500ft	0.0052887	**	0.0083915	**	0.0206574	*	0.2258572		0.5839676	
FD.100_100.600ft	0.0101486	*	0.0102554	*	0.0223682	*	0.1197289		0.4806606	
FD.100_100.700ft	0.0235837	*	0.0144187	*	0.0368830	*	0.0737700	.	0.7313647	
FD.100_100.800ft	0.0274523	*	0.0174467	*	0.0401275	*	0.0785967	.	0.5914503	
FD.100_100.900ft	0.0341856	*	0.0329696	*	0.0626437	.	0.1327184		0.4662433	
FD.100_100.1000ft	0.0299904	*	0.0617756	.	0.1029459		0.3516949		0.4221055	
FD.100_100.1100ft	0.0272043	*	0.0776760	.	0.0770387	.	0.5958445		0.1943465	
FD.100_100.1200ft	0.0294755	*	0.0958248	.	0.0385958	*	0.9004650		0.0601721	.
FD.100_100.1300ft	0.0353644	*	0.1094692		0.0209424	*	0.8148308		0.0244914	*
FD.100_100.1400ft	0.0441693	*	0.1251778		0.0124909	*	0.6951435		0.0114683	*
FD.100_100.1500ft	0.0462480	*	0.1546513		0.0088699	**	0.5831728		0.0078572	**

Results for Full Model Reduced Sample HeatSet2

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
poly(YearBuilt, 2)	5.6177812	2	**0.0602718**
poly(ConditionedSpace,	15.0731877	2	**0.0005332**
Stories	6.1840839	3	0.1029897
SidingType	6.0071709	6	0.4223873
ImprovedInsulation	**0.0259914**	1	0.8719212
HeatingSystemType	12.6223619	1	**0.0003812**
ImprovedSiding	0.1308992	2	0.9366462
ImprovedWindows	1.3238752	2	0.5158508

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	0.2800589		0.5112065		0.5482504		0.6662035		0.3772568	
X100ft	0.1560186		0.3759092		0.5209272		0.6432077		0.5745335	
X200ft	0.2977811		0.1434492		0.1120038		**0.0868723**	.	0.1511622	
X300ft	**0.0756114**	.	**0.0763540**	.	**0.0919407**	.	0.1444076		0.2779240	
X400ft	**0.0171224**	*	**0.0253854**	*	**0.0645411**	.	0.1812905		0.9696391	
X500ft	**0.0030706**	**	**0.0114789**	*	**0.0258033**	*	0.6144964		0.5158590	
X600ft	**0.0050551**	**	**0.0115191**	*	**0.0222452**	*	0.3026996		0.4003119	
X700ft	**0.0083796**	**	**0.0165101**	*	**0.0426592**	*	0.2658488		0.8209060	
X800ft	**0.0070213**	**	**0.0125753**	*	**0.0333723**	*	0.2289845		0.8125689	
X900ft	**0.0087904**	**	**0.0151477**	*	**0.0383250**	*	0.2242072		0.7371241	
X1000ft	**0.0091809**	**	**0.0225219**	*	**0.0564263**	.	0.3670101		0.8367957	
X1100ft	**0.0096851**	**	**0.0297199**	*	**0.0622486**	.	0.5338251		0.5564326	
X1200ft	**0.0115617**	*	**0.0397523**	*	**0.0595707**	.	0.7116940		0.3235093	
X1300ft	**0.0142728**	*	**0.0509799**	.	**0.0529497**	.	0.8979620		0.1940543	
X1400ft	**0.0173735**	*	**0.0609912**	.	**0.0545636**	.	0.9775940		0.1612013	
X1500ft	**0.0160910**	*	**0.0563062**	.	**0.0459097**	*	0.8722249		0.1404900	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.2330801		0.4785292		0.6856369		0.7952294		0.8670726	
TD_100.200ft	0.6364972		0.2120887		**0.0433389**	*	**0.0900578**	.	**0.0269925**	*
TD_200.300ft	**0.0353909**	*	**0.0736960**	.	0.1159317		0.3723488		0.2549882	
TD_300.400ft	**0.0038359**	**	**0.0149449**	*	**0.0367193**	*	0.7180075		0.6759319	
TD_400.500ft	**0.0010622**	**	**0.0047666**	**	**0.0143019**	*	0.7659363		0.9789575	
TD_500.600ft	0.1142690		0.2910216		0.1346132		0.9553837		**0.0811887**	.
TD_600.700ft	0.1798497		0.3815596		0.1129695		0.7026081		**0.0460845**	*
TD_700.800ft	**0.0497608**	*	0.1247778		0.2429872		0.5586475		0.8065999	
TD_800.900ft	0.1050794		0.2730063		0.3206511		0.9974570		0.3408746	
TD_900.1000ft	**0.0424526**	*	0.1072579		0.2169059		0.5389813		0.8539330	
TD_1000.1100ft	**0.0236773**	*	**0.0759677**	.	0.1026182		0.7638069		0.3089096	
TD_1100.1200ft	**0.0447465**	*	0.1297849		0.2079678		0.7550020		0.4841887	
TD_1200.1300ft	**0.0816779**	.	0.1630720		0.2283694		0.4349626		0.3991709	
TD_1300.1400ft	0.1075665		0.1759198		0.2740601		0.3457108		0.3387900	
TD_1400.1500ft	**0.0364899**	*	**0.0915050**	.	0.1257872		0.4397963		0.3285737	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.2330801		0.4785292		0.6856369		0.7952294		0.8670726	
FD.P_parcel.200ft	0.3502977		0.1330562		0.1384974		**0.0712899**	.	0.2289449	
FD.P_parcel.300ft	**0.0887502**	.	**0.0772371**	.	**0.0914329**	.	0.1264794		0.2743277	
FD.P_parcel.400ft	**0.0197023**	*	**0.0258828**	*	**0.0659332**	.	0.1609458		0.9788380	
FD.P_parcel.500ft	**0.0034772**	**	**0.0124450**	*	**0.0279415**	*	0.5762604		0.5149045	
FD.P_parcel.600ft	**0.0055602**	**	**0.0121131**	*	**0.0234197**	*	0.2881917		0.4041402	
FD.P_parcel.700ft	**0.0091647**	**	**0.0174818**	*	**0.0447259**	*	0.2577463		0.8088906	
FD.P_parcel.800ft	**0.0076905**	**	**0.0138410**	*	**0.0358210**	*	0.2331321		0.7688606	
FD.P_parcel.900ft	**0.0095387**	**	**0.0170173**	*	**0.0411751**	*	0.2371783		0.6733073	
FD.P_parcel.1000ft	**0.0098588**	**	**0.0250265**	*	**0.0602140**	.	0.3910614		0.7513358	
FD.P_parcel.1100ft	**0.0102845**	*	**0.0321978**	*	**0.0629795**	.	0.5615841		0.4935276	
FD.P_parcel.1200ft	**0.0121667**	*	**0.0421250**	*	**0.0590063**	.	0.7378995		0.2937078	
FD.P_parcel.1300ft	**0.0149461**	*	**0.0532601**	.	**0.0518962**	.	0.9213719		0.1783674	
FD.P_parcel.1400ft	**0.0181066**	*	**0.0631412**	.	**0.0535840**	.	0.9565582		0.1505350	
FD.P_parcel.1500ft	**0.0167151**	*	**0.0579412**	.	**0.0455096**	*	0.8533240		0.1340223	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.6364972		0.2120887		**0.0433389**	*	**0.0900578**	.	**0.0269925**	*
FD.100_100.300ft	0.1236927		**0.0769577**	.	**0.0544445**	.	**0.0966221**	.	0.1230289	
FD.100_100.400ft	**0.0211971**	*	**0.0238823**	*	**0.0489077**	*	0.1413322		0.6547528	
FD.100_100.500ft	**0.0029942**	**	**0.0099005**	**	**0.0307905**	*	0.4917318		0.7036623	
FD.100_100.600ft	**0.0053663**	**	**0.0139227**	*	**0.0321290**	*	0.3671091		0.5742528	
FD.100_100.700ft	**0.0100146**	*	**0.0234484**	*	**0.0594703**	.	0.3475044		0.9310267	
FD.100_100.800ft	**0.0087314**	**	**0.0209505**	*	**0.0512684**	.	0.3523704		0.7426264	
FD.100_100.900ft	**0.0109056**	*	**0.0271501**	*	**0.0585537**	.	0.3862585		0.5795457	
FD.100_100.1000ft	**0.0111746**	*	**0.0354947**	*	**0.0773834**	.	0.5890655		0.6406317	
FD.100_100.1100ft	**0.0113499**	*	**0.0399107**	*	**0.0698666**	.	0.7531299		0.4205762	
FD.100_100.1200ft	**0.0132440**	*	**0.0478416**	*	**0.0605024**	.	0.9088551		0.2564001	
FD.100_100.1300ft	**0.0160698**	*	**0.0568294**	.	**0.0520301**	.	0.9363772		0.1649172	
FD.100_100.1400ft	**0.0193142**	*	**0.0653609**	.	**0.0541661**	.	0.8356889		0.1463498	
FD.100_100.1500ft	**0.0177926**	*	**0.0590597**	.	**0.0465166**	*	0.7517647		0.1348324	

Results for Full Model Reduced Sample HeatSet3

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
poly(YearBuilt, 2)	4.0755582	2	0.1303178
poly(ConditionedSpace,	16.8061905	2	**0.0002242**
Stories	8.2696055	3	**0.0407563**
SidingType	4.0000256	6	0.6766730
ImprovedInsulation	0.3207282	1	0.5711703
HeatingSystemType	34.1953053	2	**0.00000038**
ImprovedSiding	0.3999894	2	0.8187351
ImprovedWindows	**0.0939958**	2	0.9540894
Fireplace	4.7565730	3	0.1905149
GarageHeated	0.7310835	1	0.3925322
Pool	0.1209917	1	0.7279614

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	0.7637450		0.6486760		0.8271260		0.3805150		0.8625090	
X100ft	0.2388770		0.4737550		0.3937260		0.7418960		0.2318230	
X200ft	0.1465130		0.1160630		**0.0969040**	.	0.1444630		0.1696620	
X300ft	0.2442710		**0.0712280**	.	**0.0905480**	.	**0.0474970**	*	0.2933990	
X400ft	0.1350200		**0.0659830**	.	**0.0731610**	.	**0.0691880**	.	0.2360550	
X500ft	0.1058310		0.1768220		**0.0738740**	.	0.3376280		**0.0672190**	.
X600ft	0.1946950		0.3095470		0.2240680		0.3731190		0.1742580	
X700ft	0.1263650		0.3071060		**0.0985000**	.	0.6752150		**0.0560390**	.
X800ft	0.1260390		0.3234970		**0.0782360**	.	0.8497920		**0.0402320**	*
X900ft	0.1534500		0.3612680		**0.0253960**	*	0.7827810		**0.0179490**	*
X1000ft	0.1552190		0.3400600		**0.0176850**	*	0.6670850		**0.0135840**	*
X1100ft	0.1401710		0.2648500		0.2068100		0.4832240		0.1968390	
X1200ft	0.1204370		0.1884400		0.2560590		0.3438630		0.3792640	
X1300ft	0.1241760		0.1697570		0.3093120		0.2908500		0.6470650	
X1400ft	0.1397220		0.1388830		0.2728470		0.2000620		0.6669340	
X1500ft	0.1335900		0.1065360		0.2317110		0.1519950		0.7581890	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.1222190		0.2830210		0.4361810		0.7071940		0.6666570	
TD_100.200ft	0.2073260		0.2523350		**0.0272110**	*	0.2990490		**0.0135920**	*
TD_200.300ft	0.6411870		0.3092720		0.1254240		0.1455630		**0.0700060**	.
TD_300.400ft	0.1524210		0.2157490		0.3075360		0.3251150		0.4673360	
TD_400.500ft	0.2556820		0.5323630		0.5572920		0.9961980		0.4106970	
TD_500.600ft	0.9092420		0.9897770		0.1170300		0.9197140		**0.0153960**	*
TD_600.700ft	0.1324370		0.3171900		0.3570220		0.8595650		0.3415020	
TD_700.800ft	0.3524730		0.2999750		0.4407430		0.2340540		0.6268310	
TD_800.900ft	0.5173900		0.7497990		0.8996410		0.6507240		0.9271780	
TD_900.1000ft	0.3046960		0.5969840		0.7564360		0.9104690		0.6099980	
TD_1000.1100ft	0.1503090		0.1168580		0.1354760		0.1475500		0.2389940	
TD_1100.1200ft	**0.0888900**	.	**0.0970160**	.	0.1996050		0.1998930		0.6452570	
TD_1200.1300ft	0.2329140		0.2479430		0.3686040		0.2852860		0.4408840	
TD_1300.1400ft	0.4063430		**0.0307020**	*	**0.0725660**	.	**0.0252990**	*	0.8217570	
TD_1400.1500ft	0.1848440		**0.0338970**	*	0.2021940		**0.0559780**	.	0.7410000	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.1222190		0.2830210		0.4361810		0.7071940		0.6666570	
FD.P_parcel.200ft	**0.0981510**	.	**0.0854370**	.	0.1116900		0.1463940		0.3220190	
FD.P_parcel.300ft	0.2079660		**0.0682430**	.	**0.0901280**	.	**0.0520900**	.	0.3120910	
FD.P_parcel.400ft	0.1176360		**0.0663730**	.	**0.0726590**	.	**0.0802340**	.	0.2342710	
FD.P_parcel.500ft	**0.0953910**	.	0.1726740		**0.0730670**	.	0.3710340		**0.0685550**	.
FD.P_parcel.600ft	0.1817180		0.2957860		0.2460250		0.3759220		0.2151700	
FD.P_parcel.700ft	0.1189780		0.2911890		0.1173720		0.6622030		**0.0763380**	.
FD.P_parcel.800ft	0.1200190		0.3115260		**0.0980530**	.	0.8532980		**0.0571820**	.
FD.P_parcel.900ft	0.1482230		0.3510050		**0.0343650**	*	0.7792490		**0.0270890**	*
FD.P_parcel.1000ft	0.1508340		0.3317600		**0.0248350**	*	0.6643380		**0.0212080**	*
FD.P_parcel.1100ft	0.1371830		0.2590580		0.2388740		0.4796100		0.2534810	
FD.P_parcel.1200ft	0.1180600		0.1844100		0.2696710		0.3413160		0.4353810	
FD.P_parcel.1300ft	0.1220290		0.1666380		0.3142540		0.2891830		0.7105010	
FD.P_parcel.1400ft	0.1378090		0.1365650		0.2755330		0.1986880		0.7212610	
FD.P_parcel.1500ft	0.1319470		0.1051620		0.2322360		0.1514880		0.8016950	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.2073260		0.2523350		**0.0272110**	*	0.2990490		**0.0135920**	*
FD.100_100.300ft	0.3574130		0.1340650		**0.0515050**	.	**0.0765070**	.	**0.0611330**	.
FD.100_100.400ft	0.1768850		**0.0880570**	.	**0.0644770**	.	**0.0773960**	.	0.1388280	
FD.100_100.500ft	0.1337550		0.2565870		**0.0573530**	.	0.4614100		**0.0328630**	*
FD.100_100.600ft	0.2409860		0.4350150		0.2990730		0.5304760		0.1808950	
FD.100_100.700ft	0.1535600		0.3798160		0.1646060		0.8744040		**0.0912480**	.
FD.100_100.800ft	0.1502720		0.3200660		0.1406950		0.5915530		**0.0934570**	.
FD.100_100.900ft	0.1780060		0.3318280		**0.0518210**	.	0.5245270		**0.0530260**	.
FD.100_100.1000ft	0.1758810		0.3010470		**0.0356880**	*	0.4567700		**0.0397710**	*
FD.100_100.1100ft	0.1552430		0.2260020		0.2607260		0.3379530		0.3499760	
FD.100_100.1200ft	0.1313870		0.1598850		0.2634450		0.2494660		0.5286430	
FD.100_100.1300ft	0.1338510		0.1463800		0.2911480		0.2208240		0.7784800	
FD.100_100.1400ft	0.1490450		0.1194050		0.2494740		0.1553900		0.7558080	
FD.100_100.1500ft	0.1416140		**0.0930420**	.	0.2099580		0.1219170		0.8156950	

Simple Model – Reduced Sample

Results for Simple Model Reduced Sample HeatSet1

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	7.3978477	1	**0.0065302**
ConditionedSpace	13.8694349	1	**0.0001960**
Stories	10.4947707	3	**0.0147964**
HeatingSystemType	13.7476115	1	**0.0002091**

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	0.7378449		0.8143686		0.8363068		0.5841189		0.5037594	
X100ft	**0.0556214**	.	**0.0886008**	.	0.1654608		0.2781897		0.5939553	
X200ft	**0.0952154**	.	**0.0766347**	.	0.1427923		0.1286661		0.5617368	
X300ft	**0.0455075**	*	**0.0254040**	*	**0.0636239**	.	**0.0720552**	.	0.8887700	
X400ft	**0.0148445**	*	**0.0138648**	*	**0.0361744**	*	0.1130365		0.7828552	
X500ft	**0.0047148**	**	**0.0108349**	*	**0.0223631**	*	0.3035611		0.4426454	
X600ft	**0.0093565**	**	**0.0149801**	*	**0.0280638**	*	0.2060928		0.3956744	
X700ft	**0.0219766**	*	**0.0205299**	*	**0.0491320**	*	0.1189280		0.6861146	
X800ft	**0.0218313**	*	**0.0231843**	*	**0.0564994**	.	0.1387305		0.7543342	
X900ft	**0.0250250**	*	**0.0422441**	*	**0.0973087**	.	0.2563177		0.8073326	
X1000ft	**0.0203238**	*	**0.0583777**	.	0.1283437		0.5589393		0.8012345	
X1100ft	**0.0162003**	*	**0.0562763**	.	**0.0918162**	.	0.8370366		0.3988530	
X1200ft	**0.0164781**	*	**0.0577785**	.	**0.0442283**	*	0.8856297		0.1299174	
X1300ft	**0.0190822**	*	**0.0594816**	.	**0.0212357**	*	0.6513612		**0.0494428**	*
X1400ft	**0.0224403**	*	**0.0636829**	.	**0.0131495**	*	0.5604684		**0.0257862**	*
X1500ft	**0.0218716**	*	**0.0588937**	.	**0.0092315**	**	0.5051303		**0.0186629**	*

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	**0.0465631**	*	0.1009408		0.2088416		0.4226977		0.9231261	
TD_100.200ft	0.2348578		0.1882799		**0.0840238**	.	0.1666798		**0.0729501**	.
TD_200.300ft	**0.0461933**	*	**0.0496930**	*	**0.0847150**	.	0.1592735		0.4196507	
TD_300.400ft	**0.0075325**	**	**0.0154207**	*	**0.0326448**	*	0.2760816		0.4921194	
TD_400.500ft	**0.0072342**	**	**0.0185477**	*	**0.0485715**	*	0.3769956		0.9504470	
TD_500.600ft	0.1536932		0.3452875		0.2268717		0.7358425		0.1395165	
TD_600.700ft	0.3876269		0.6838526		**0.0303536**	*	0.8803495		**0.0044411**	**
TD_700.800ft	0.1221481		0.2131714		0.1625092		0.3993425		0.1572772	
TD_800.900ft	0.1365260		0.3114560		0.1316133		0.7084311		**0.0726295**	.
TD_900.1000ft	**0.0300916**	*	**0.0319076**	*	**0.0784142**	.	0.1453212		0.9866191	
TD_1000.1100ft	**0.0131426**	*	**0.0297973**	*	**0.0126926**	*	0.3466849		**0.0586467**	.
TD_1100.1200ft	**0.0312728**	*	**0.0484407**	*	**0.0214214**	*	0.2376755		**0.0633621**	.
TD_1200.1300ft	**0.0722896**	.	**0.0748867**	.	**0.0537801**	.	0.1662156		0.1229732	
TD_1300.1400ft	**0.0964326**	.	0.1274149		**0.0538670**	.	0.2461085		**0.0650423**	.
TD_1400.1500ft	**0.0490410**	*	**0.0855752**	.	**0.0444369**	*	0.3076311		**0.0814530**	.

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	**0.0465631**	*	0.1009408		0.2088416		0.4226977		0.9231261	
FD.P_parcel.200ft	**0.0921924**	.	**0.0743912**	.	0.1510362		0.1281210		0.6902379	
FD.P_parcel.300ft	**0.0452136**	*	**0.0248257**	*	**0.0622014**	.	**0.0706109**	.	0.8758543	
FD.P_parcel.400ft	**0.0147306**	*	**0.0136492**	*	**0.0359724**	*	0.1118732		0.8077975	
FD.P_parcel.500ft	**0.0047592**	**	**0.0110024**	*	**0.0238661**	*	0.3064224		0.4845316	
FD.P_parcel.600ft	**0.0096009**	**	**0.0152574**	*	**0.0297294**	*	0.2048321		0.4238663	
FD.P_parcel.700ft	**0.0227356**	*	**0.0211032**	*	**0.0506129**	.	0.1185729		0.6960472	
FD.P_parcel.800ft	**0.0227149**	*	**0.0248144**	*	**0.0592206**	.	0.1444338		0.7242601	
FD.P_parcel.900ft	**0.0260507**	*	**0.0456987**	*	0.1019823		0.2721021		0.7467557	
FD.P_parcel.1000ft	**0.0211114**	*	**0.0618940**	.	0.1308208		0.5880039		0.7182464	
FD.P_parcel.1100ft	**0.0167863**	*	**0.0585082**	.	**0.0877295**	.	0.8688378		0.3479797	
FD.P_parcel.1200ft	**0.0170036**	*	**0.0590226**	.	**0.0411975**	*	0.8585597		0.1152113	
FD.P_parcel.1300ft	**0.0196476**	*	**0.0601425**	.	**0.0198989**	*	0.6309127		**0.0451089**	*
FD.P_parcel.1400ft	**0.0230527**	*	**0.0641296**	.	**0.0125187**	*	0.5433414		**0.0241489**	*
FD.P_parcel.1500ft	**0.0224186**	*	**0.0591572**	.	**0.0089744**	**	0.4903106		**0.0179743**	*

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.2348578		0.1882799		**0.0840238**	.	0.1666798		**0.0729501**	.
FD.100_100.300ft	**0.0754327**	.	**0.0349092**	*	**0.0588514**	.	**0.0631139**	.	0.3832298	
FD.100_100.400ft	**0.0196355**	*	**0.0159550**	*	**0.0414688**	*	**0.0993105**	.	0.8177245	
FD.100_100.500ft	**0.0059094**	**	**0.0135856**	*	**0.0357947**	*	0.3129787		0.8053449	
FD.100_100.600ft	**0.0124738**	*	**0.0208829**	*	**0.0499234**	*	0.2269360		0.6877004	
FD.100_100.700ft	**0.0293057**	*	**0.0319474**	*	**0.0771100**	.	0.1497550		0.8465000	
FD.100_100.800ft	**0.0289579**	*	**0.0418268**	*	**0.0936135**	.	0.2137033		0.7257637	
FD.100_100.900ft	**0.0322243**	*	**0.0722933**	.	0.1429685		0.4077535		0.6348980	
FD.100_100.1000ft	**0.0254894**	*	**0.0818663**	.	0.1523134		0.7881982		0.5723912	
FD.100_100.1100ft	**0.0195571**	*	**0.0675836**	.	**0.0854674**	.	0.9450422		0.2720905	
FD.100_100.1200ft	**0.0193954**	*	**0.0623804**	.	**0.0376761**	*	0.7068636		**0.0959295**	.
FD.100_100.1300ft	**0.0219799**	*	**0.0600536**	.	**0.0197952**	*	0.5191760		**0.0449006**	*
FD.100_100.1400ft	**0.0254225**	*	**0.0630419**	.	**0.0133335**	*	0.4541945		**0.0265139**	*
FD.100_100.1500ft	**0.0245447**	*	**0.0580643**	.	**0.0099658**	**	0.4172550		**0.0207186**	*

Results for Simple Model Reduced Sample HeatSet2

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	10.7841752	1	0.0010237
ConditionedSpace	18.4712726	1	0.0000172
Stories	10.1291776	3	0.0174994
HeatingSystemType	15.0618234	1	0.0001040

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	0.6470837		0.8782772		0.8347501		0.8196594		0.4375199	
X100ft	0.1275017		0.2930728		0.3323985		0.6969067		0.3276778	
X200ft	0.2095722		0.1412162		0.1607997		0.1277391		0.2672428	
X300ft	0.0632368	.	0.0494344	*	0.0950923	.	0.1130063		0.5327878	
X400ft	0.0172120	*	0.0157644	*	0.0410057	*	0.1111287		0.8478370	
X500ft	0.0037234	**	0.0094237	**	0.0190255	*	0.3370480		0.4199360	
X600ft	0.0093292	**	0.0156843	*	0.0265334	*	0.2181375		0.3389020	
X700ft	0.0164259	*	0.0273307	*	0.0679635	.	0.2336197		0.9941945	
X800ft	0.0127421	*	0.0231858	*	0.0587937	.	0.2533117		0.9953877	
X900ft	0.0143878	*	0.0301535	*	0.0739278	.	0.3143657		0.9455781	
X1000ft	0.0122211	*	0.0362010	*	0.0861727	.	0.5287959		0.8913788	
X1100ft	0.0098667	**	0.0346304	*	0.0800667	.	0.7231778		0.7611214	
X1200ft	0.0095327	**	0.0355261	*	0.0670778	.	0.8859007		0.4733531	
X1300ft	0.0105674	*	0.0393125	*	0.0547337	.	0.9739199		0.2874315	
X1400ft	0.0109993	*	0.0402355	*	0.0462943	*	0.8776320		0.2166833	
X1500ft	0.0100094	*	0.0362005	*	0.0380681	*	0.7971016		0.1878589	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.1167603		0.2854810		0.4485968		0.7916334		0.6844948	
TD_100.200ft	0.4410807		0.2108126		0.0759745	.	0.1130446		0.0551452	.
TD_200.300ft	0.0291097	*	0.0462551	*	0.0868809	.	0.2420682		0.4985196	
TD_300.400ft	0.0067529	**	0.0120356	*	0.0170578	*	0.2256764		0.2511546	
TD_400.500ft	0.0035903	**	0.0128988	*	0.0344031	*	0.5954334		0.8645883	
TD_500.600ft	0.2305657		0.4880104		0.3178776		0.9139559		0.1500290	
TD_600.700ft	0.2255312		0.4234599		0.0794046	.	0.6096889		0.0255269	*
TD_700.800ft	0.0475108	*	0.1322935		0.2550075		0.6970316		0.8167793	
TD_800.900ft	0.1007597		0.2624404		0.3560565		0.9257449		0.4478194	
TD_900.1000ft	0.0255979	*	0.0622160	.	0.1301111		0.4417802		0.7074591	
TD_1000.1100ft	0.0092367	**	0.0300532	*	0.0383226	*	0.5955456		0.2417490	
TD_1100.1200ft	0.0163909	*	0.0514945	.	0.0894903	.	0.6411796		0.4401012	
TD_1200.1300ft	0.0391011	*	0.0939167	.	0.1172974		0.4813996		0.2839492	
TD_1300.1400ft	0.0330123	*	0.0623112	.	0.0807794	.	0.3159052		0.2782415	
TD_1400.1500ft	0.0185720	*	0.0503863	.	0.0615733	.	0.4955856		0.2450135	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.1167603		0.2854810		0.4485968		0.7916334		0.6844948	
FD.P_parcel.200ft	0.2118507		0.1263258		0.1899833		0.1099589		0.4235596	
FD.P_parcel.300ft	**0.0637064**	.	**0.0463170**	*	**0.0915653**	.	0.1035753		0.5551333	
FD.P_parcel.400ft	**0.0173575**	*	**0.0150076**	*	**0.0389584**	*	0.1038490		0.8200703	
FD.P_parcel.500ft	**0.0037917**	**	**0.0094779**	**	**0.0192198**	*	0.3318904		0.4234808	
FD.P_parcel.600ft	**0.0097042**	**	**0.0158612**	*	**0.0270306**	*	0.2114043		0.3434276	
FD.P_parcel.700ft	**0.0171078**	*	**0.0278893**	*	**0.0691737**	.	0.2288074		0.9853476	
FD.P_parcel.800ft	**0.0133548**	*	**0.0244398**	*	**0.0614507**	.	0.2571208		0.9446943	
FD.P_parcel.900ft	**0.0150707**	*	**0.0322673**	*	**0.0777296**	.	0.3268107		0.8765480	
FD.P_parcel.1000ft	**0.0127619**	*	**0.0384309**	*	**0.0915468**	.	0.5507837		0.9789079	
FD.P_parcel.1100ft	**0.0102657**	*	**0.0362934**	*	**0.0808250**	.	0.7481080		0.6895906	
FD.P_parcel.1200ft	**0.0098685**	**	**0.0367738**	*	**0.0660880**	.	0.9086483		0.4348287	
FD.P_parcel.1300ft	**0.0109245**	*	**0.0404301**	*	**0.0532455**	.	0.9537596		0.2650433	
FD.P_parcel.1400ft	**0.0113397**	*	**0.0411577**	*	**0.0450441**	*	0.8591470		0.2022224	
FD.P_parcel.1500ft	**0.0102973**	*	**0.0368835**	*	**0.0373781**	*	0.7801032		0.1787931	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.4410807		0.2108126		**0.0759745**	.	0.1130446		**0.0551452**	.
FD.100_100.300ft	**0.0879020**	.	**0.0514661**	.	**0.0664938**	.	**0.0851329**	.	0.2676671	
FD.100_100.400ft	**0.0191126**	*	**0.0150009**	*	**0.0398330**	*	**0.0937500**	.	0.9406657	
FD.100_100.500ft	**0.0040379**	**	**0.0107379**	*	**0.0271859**	*	0.3662242		0.6782840	
FD.100_100.600ft	**0.0116036**	*	**0.0214333**	*	**0.0485505**	*	0.2548923		0.6151574	
FD.100_100.700ft	**0.0209470**	*	**0.0405215**	*	**0.0940386**	.	0.2994679		0.8380474	
FD.100_100.800ft	**0.0164118**	*	**0.0382841**	*	**0.0912293**	.	0.3771691		0.9746515	
FD.100_100.900ft	**0.0181740**	*	**0.0492127**	*	0.1110080		0.4914768		0.8280571	
FD.100_100.1000ft	**0.0150905**	*	**0.0510887**	.	0.1169408		0.7568020		0.9477057	
FD.100_100.1100ft	**0.0117441**	*	**0.0430192**	*	**0.0909184**	.	0.9371497		0.6349700	
FD.100_100.1200ft	**0.0110694**	*	**0.0408030**	*	**0.0691780**	.	0.9292117		0.4001701	
FD.100_100.1300ft	**0.0120414**	*	**0.0429113**	*	**0.0547589**	.	0.8192211		0.2550237	
FD.100_100.1400ft	**0.0123595**	*	**0.0426543**	*	**0.0465343**	*	0.7440346		0.2022961	
FD.100_100.1500ft	**0.0111628**	*	**0.0377551**	*	**0.0389528**	*	0.6822089		0.1838743	

Results for Simple Model Reduced Sample HeatSet3

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	6.0588148	1	**0.0138371**
ConditionedSpace	31.3012384	1	**0.000000022**
Stories	14.1848337	3	**0.0026641**
HeatingSystemType	42.2865967	2	**0.00000000066**

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	0.7659961		0.5272024		0.7353581		0.2759474		0.9651787	
X100ft	0.4428173		0.7440494		0.3287558		0.9349544		**0.0919254**	.
X200ft	0.2862543		0.1334487		**0.0991091**	.	**0.0905980**	.	0.1383934	
X300ft	0.3331517		**0.0553753**	.	**0.0720985**	.	**0.0278257**	*	0.2765077	
X400ft	0.2258457		**0.0635422**	.	**0.0780010**	.	**0.0439391**	*	0.2600594	
X500ft	0.1898193		0.1900701		0.1222928		0.2045796		0.1219018	
X600ft	0.2529088		0.3104431		0.2736473		0.2961263		0.2239384	
X700ft	0.1459754		0.3179451		0.1559896		0.6135891		**0.0910647**	.
X800ft	0.1203156		0.3113837		0.1173352		0.9716467		**0.0631126**	.
X900ft	0.1529143		0.3726144		**0.0512800**	.	0.9388836		**0.0237368**	*
X1000ft	0.1443661		0.3522545		**0.0186144**	*	0.8676174		**0.0076512**	**
X1100ft	0.1145148		0.2647604		**0.0762617**	.	0.6400591		**0.0644344**	.
X1200ft	**0.0970016**	.	0.1999497		0.2073081		0.4778883		0.2472155	
X1300ft	**0.0959245**	.	0.1829928		0.2865151		0.4188257		0.5031375	
X1400ft	0.1081219		0.1723572		0.2952118		0.3311817		0.5829296	
X1500ft	0.1064805		0.1550285		0.2923269		0.2910295		0.6998721	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.2789972		0.5572086		0.5568822		0.9512655		0.3415966	
TD_100.200ft	0.2853167		0.1910287		**0.0174133**	*	0.1448399		**0.0096721**	**
TD_200.300ft	0.5848296		0.2141849		**0.0984781**	.	**0.0951836**	.	**0.0751314**	.
TD_300.400ft	0.2348036		0.2207536		0.3485521		0.2076778		0.6093362	
TD_400.500ft	0.3112713		0.5946648		0.4659957		0.8560614		0.2864747	
TD_500.600ft	0.7032342		0.9292540		0.2253354		0.9428575		**0.0401590**	*
TD_600.700ft	**0.0882463**	.	0.1710564		0.1945080		0.6295101		0.2788244	
TD_700.800ft	0.2030261		0.2017090		0.3224805		0.2815595		0.5859118	
TD_800.900ft	0.5346234		0.6244389		0.8122305		0.4175267		0.9479054	
TD_900.1000ft	0.2144037		0.4706659		0.6500234		0.7973958		0.6627535	
TD_1000.1100ft	**0.0730014**	.	**0.0776254**	.	0.1119182		0.1675783		0.3250373	
TD_1100.1200ft	**0.0652696**	.	**0.0891010**	.	0.1865440		0.2311760		0.8068601	
TD_1200.1300ft	**0.0971567**	.	0.1319550		0.2922939		0.2551772		0.3700944	
TD_1300.1400ft	0.3013690		**0.0978315**	.	0.1978829		**0.0834297**	.	0.8390043	
TD_1400.1500ft	0.1148173		0.1285809		0.2502269		0.2047942		0.8748223	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.2789970		0.5572090		0.5568820		0.9512650		0.3415970	
FD.P_parcel.200ft	0.2094690		**0.0923940**	.	0.1225120		**0.0755750**	.	0.3177460	
FD.P_parcel.300ft	0.2872350		**0.0509390**	.	**0.0742080**	.	**0.0283810**	*	0.3271460	
FD.P_parcel.400ft	0.1995780		**0.0628160**	.	**0.0814240**	.	**0.0483630**	*	0.2839560	
FD.P_parcel.500ft	0.1726680		0.1868690		0.1294580		0.2203750		0.1356650	
FD.P_parcel.600ft	0.2362480		0.2954740		0.2976080		0.2952030		0.2771110	
FD.P_parcel.700ft	0.1368560		0.2994200		0.1813070		0.5988310		0.1225310	
FD.P_parcel.800ft	0.1138780		0.2982940		0.1415040		0.9787440		**0.0867660**	.
FD.P_parcel.900ft	0.1470430		0.3616240		**0.0668490**	.	0.9381740		**0.0345420**	*
FD.P_parcel.1000ft	0.1398150		0.3435250		**0.0267080**	*	0.8669190		**0.0121930**	*
FD.P_parcel.1100ft	0.1116660		0.2587730		**0.0923040**	.	0.6367260		**0.0859890**	.
FD.P_parcel.1200ft	**0.0947550**	.	0.1955470		0.2246710		0.4752790		0.2932720	
FD.P_parcel.1300ft	**0.0939710**	.	0.1793000		0.2960360		0.4164040		0.5647660	
FD.P_parcel.1400ft	0.1063390		0.1693090		0.3010300		0.3290740		0.6394930	
FD.P_parcel.1500ft	0.1049600		0.1527350		0.2944160		0.2897460		0.7486700	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.2853167		0.1910287		**0.0174133**	*	0.1448399		**0.0096721**	**
FD.100_100.300ft	0.3816098		**0.0876995**	.	**0.0406874**	*	**0.0430256**	*	**0.0689170**	.
FD.100_100.400ft	0.2430776		**0.0672042**	.	**0.0689851**	.	**0.0438661**	*	0.2006924	
FD.100_100.500ft	0.2036387		0.2456840		0.1138981		0.2720557		**0.0814820**	.
FD.100_100.600ft	0.2744241		0.4099222		0.3396564		0.4215423		0.2228058	
FD.100_100.700ft	0.1575871		0.3697075		0.2263317		0.7948948		0.1326819	
FD.100_100.800ft	0.1305465		0.3097992		0.1765995		0.7228417		0.1160318	
FD.100_100.900ft	0.1650925		0.3586106		**0.0860470**	.	0.6855207		**0.0519905**	.
FD.100_100.1000ft	0.1543955		0.3331434		**0.0361231**	*	0.6513741		**0.0193482**	*
FD.100_100.1100ft	0.1209428		0.2383165		0.1047849		0.4830522		0.1177387	
FD.100_100.1200ft	0.1014949		0.1768535		0.2298126		0.3692732		0.3550045	
FD.100_100.1300ft	**0.0997211**	.	0.1627405		0.2843464		0.3335278		0.6210322	
FD.100_100.1400ft	0.1116431		0.1526088		0.2814010		0.2684779		0.6716678	
FD.100_100.1500ft	0.1094905		0.1388750		0.2740047		0.2425277		0.7652957	

Cooling

Full Model – Full Sample

Results for Full Model Full Sample CoolSet1

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	**0.0262554**	1	0.8712783
ConditionedSpace	**0.0020784**	1	0.9636378
Stories	0.9553184	3	0.8120618
SidingType	13.7058473	6	**0.0331003**
ImprovedInsulation	0.2438581	1	0.6214334
AirConditioning	**0.0003160**	1	0.9858169

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	**0.0664155**	.	0.1825474		0.3205559		0.7821210		0.7059284	
X100ft	**0.0389608**	*	0.1218061		**0.0761926**	.	0.9267557		0.1093929	
X200ft	**0.0594255**	.	0.1734958		**0.0087284**	**	0.9806265		**0.0052510**	**
X300ft	0.2005683		0.4458335		**0.0785797**	.	0.9778135		**0.0240934**	*
X400ft	0.2079280		0.3806881		0.2850487		0.5483686		0.1755267	
X500ft	0.2272178		0.4196090		0.4456012		0.5880563		0.3339946	
X600ft	0.3200783		0.5721695		0.6294626		0.7081248		0.4298676	
X700ft	0.2931126		0.5360477		0.6394628		0.6936758		0.5016297	
X800ft	0.3392226		0.5891037		0.6887408		0.6929109		0.5156525	
X900ft	0.3474244		0.6232337		0.7801463		0.7848970		0.6954816	
X1000ft	0.2653674		0.5166966		0.6668211		0.7565852		0.6095214	
X1100ft	0.2026161		0.4228784		0.5844216		0.7308079		0.6241066	
X1200ft	0.1912103		0.3825650		0.5589034		0.6299095		0.6827164	
X1300ft	0.1576528		0.3087308		0.4848348		0.5419759		0.7217953	
X1400ft	0.1590103		0.3248130		0.4821026		0.5930275		0.6254113	
X1500ft	0.1693231		0.3743912		0.4913865		0.7515165		0.4964593	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	**0.0531670**	.	0.1370870		**0.0998520**	.	0.6004100		0.1370510	
TD_100.200ft	0.1521070		0.3255140		**0.0984220**	.	0.6416010		**0.0469520**	*
TD_200.300ft	0.6229570		0.8585310		0.8934270		0.7964190		0.5770170	
TD_300.400ft	0.2834490		0.4185580		0.4094570		0.4393380		0.2854280	
TD_400.500ft	0.3726840		0.6363490		0.8052490		0.7297760		0.7624450	
TD_500.600ft	0.7163770		0.7857180		0.9099710		0.5532390		0.7996040	
TD_600.700ft	0.3077350		0.5937240		0.7889970		0.8964970		0.8801330	
TD_700.800ft	0.6436710		0.8952110		0.8875120		0.9185990		0.5173360	
TD_800.900ft	0.4862530		0.7723190		0.5205660		0.8443090		0.1876440	
TD_900.1000ft	0.1065730		0.2732190		0.3832360		0.8698410		0.4886390	
TD_1000.1100ft	**0.0638780**	.	0.1644530		0.2511700		0.6428460		0.4741270	
TD_1100.1200ft	0.2106770		0.2729550		0.4152990		0.3102820		0.5964370	
TD_1200.1300ft	**0.0773610**	.	0.1297970		0.2435910		0.3257770		0.7099400	
TD_1300.1400ft	0.3170750		0.5981790		0.2572170		0.8405490		**0.0841760**	.
TD_1400.1500ft	0.5036160		0.5596400		0.3583210		0.3976460		0.1526300	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	**0.0531672**	.	0.1370871		**0.0998516**	.	0.6004099		0.1370508	
FD.P_parcel.200ft	**0.0728832**	.	0.1978556		**0.0165478**	*	0.7965439		**0.0094218**	**
FD.P_parcel.300ft	0.2220255		0.4777329		0.1403522		0.9318057		**0.0473940**	*
FD.P_parcel.400ft	0.2194788		0.4118826		0.3503622		0.5955698		0.2216283	
FD.P_parcel.500ft	0.2341563		0.4439259		0.4724704		0.6356755		0.3444103	
FD.P_parcel.600ft	0.3258561		0.5915557		0.6400352		0.7552735		0.4231588	
FD.P_parcel.700ft	0.2970232		0.5516480		0.6485674		0.7335095		0.4941671	
FD.P_parcel.800ft	0.3426725		0.6020954		0.6959586		0.7231233		0.5097351	
FD.P_parcel.900ft	0.3506270		0.6323042		0.7858477		0.8107914		0.6909127	
FD.P_parcel.1000ft	0.2674826		0.5237400		0.6717197		0.7772059		0.6059399	
FD.P_parcel.1100ft	0.2040509		0.4284156		0.5896264		0.7484279		0.6233457	
FD.P_parcel.1200ft	0.1924511		0.3878565		0.5645973		0.6432262		0.6832875	
FD.P_parcel.1300ft	0.1585528		0.3130551		0.4899775		0.5523365		0.7222363	
FD.P_parcel.1400ft	0.1598701		0.3283319		0.4863730		0.6016353		0.6268016	
FD.P_parcel.1500ft	0.1702253		0.3771134		0.4948385		0.7593868		0.4983593	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.1521070		0.3255140		**0.0984220**	.	0.6416010		**0.0469520**	*
FD.100_100.300ft	0.3573940		0.6314900		0.4742230		0.7727300		0.2089260	
FD.100_100.400ft	0.3007560		0.5379790		0.6325260		0.6700420		0.4842950	
FD.100_100.500ft	0.2930750		0.5441400		0.6508520		0.7231810		0.5116290	
FD.100_100.600ft	0.3842450		0.6763190		0.7544150		0.8504780		0.5176710	
FD.100_100.700ft	0.3378690		0.6205190		0.7310380		0.8258970		0.5560340	
FD.100_100.800ft	0.3807210		0.6650970		0.7606300		0.8103030		0.5484150	
FD.100_100.900ft	0.3814870		0.6790700		0.8279340		0.8906740		0.7232880	
FD.100_100.1000ft	0.2879650		0.5623440		0.7169650		0.8460580		0.6442340	
FD.100_100.1100ft	0.2175650		0.4583270		0.6296130		0.8058830		0.6620890	
FD.100_100.1200ft	0.2037900		0.4133790		0.5999930		0.6793100		0.7238520	
FD.100_100.1300ft	0.1675670		0.3326620		0.5186660		0.5744370		0.7571030	
FD.100_100.1400ft	0.1682740		0.3454320		0.5117160		0.6184440		0.6524350	
FD.100_100.1500ft	0.1785400		0.3929990		0.5193550		0.7747440		0.5206980	

Results for Full Model Full Sample CoolSet2

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	**0.0345089**	1	0.8526285
ConditionedSpace	0.1747313	1	0.6759408
Stories	1.8748597	3	0.5987816
SidingType	16.0220082	6	**0.0136363**
ImprovedInsulation	0.1758072	1	0.6750015
AirConditioning	**0.0014893**	1	0.9692157

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	**0.0461108**	*	0.1105698		0.2137192		0.5016394		0.7245741	
X100ft	0.1055592		0.2675098		0.2279717		0.8299678		0.1959446	
X200ft	0.2009086		0.4154894		**0.0051616**	**	0.7113994		**0.0010068**	**
X300ft	0.3946487		0.6516255		**0.0241257**	*	0.7091891		**0.0035589**	**
X400ft	0.3180617		0.5480346		0.1373430		0.6430091		**0.0387074**	*
X500ft	0.2199015		0.3072021		0.2400253		0.3543229		0.1768945	
X600ft	0.2276395		0.2971878		0.3404649		0.3242565		0.3355687	
X700ft	0.1714887		0.2202370		0.2794390		0.2829281		0.3655579	
X800ft	0.1780538		0.2267987		0.2775785		0.2834467		0.3451776	
X900ft	0.1772085		0.2700923		0.3590898		0.3707302		0.4338174	
X1000ft	0.1328782		0.2180281		0.2522166		0.3731880		0.3079597	
X1100ft	0.1043118		0.1824996		0.2227486		0.3800491		0.3212248	
X1200ft	**0.0994286**	.	0.1719318		0.2356063		0.3674067		0.3896002	
X1300ft	**0.0753923**	.	0.1204621		0.1945240		0.3012091		0.4799874	
X1400ft	**0.0701618**	.	0.1227183		0.1768820		0.3376071		0.3871315	
X1500ft	**0.0747011**	.	0.1577839		0.1755418		0.4652109		0.2643407	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.1694230		0.3710249		0.3427475		0.7357008		0.2462308	
TD_100.200ft	0.4214859		0.4693008		**0.0349934**	*	0.3515582		**0.0081959**	**
TD_200.300ft	0.7445881		0.8289264		0.6641255		0.6033363		0.2727166	
TD_300.400ft	0.2395889		0.2286207		0.2060659		0.2117273		0.2060387	
TD_400.500ft	0.1376590		0.3195441		0.4887333		0.7514488		0.6831784	
TD_500.600ft	0.3299544		0.6247112		0.7721866		0.9592440		0.6644982	
TD_600.700ft	0.1128154		0.2734609		0.4620891		0.7465553		0.9196369	
TD_700.800ft	0.3053582		0.5580270		0.7567801		0.7221118		0.8611988	
TD_800.900ft	0.2764854		0.5524045		0.6649920		0.8996314		0.5288337	
TD_900.1000ft	**0.0595418**	.	0.1526797		0.1097229		0.6246349		0.1355942	
TD_1000.1100ft	**0.0469652**	*	0.1105052		0.1303933		0.4875251		0.2683585	
TD_1100.1200ft	0.1423806		0.2264948		0.3409563		0.3644879		0.5276571	
TD_1200.1300ft	**0.0290382**	*	**0.0361776**	*	**0.0872348**	.	0.1763136		0.9947066	
TD_1300.1400ft	0.1347946		0.2492350		**0.0673507**	.	0.4568251		**0.0389227**	*
TD_1400.1500ft	0.3579842		0.6058333		0.2334574		0.6842666		**0.0716503**	.

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.1694230		0.3710249		0.3427475		0.7357008		0.2462308	
FD.P_parcel.200ft	0.2571095		0.4257169		**0.0083607**	**	0.5110111		**0.0016982**	**
FD.P_parcel.300ft	0.4421144		0.6571288		**0.0514441**	.	0.6142931		**0.0088398**	**
FD.P_parcel.400ft	0.3412115		0.5936574		0.1911847		0.7025581		**0.0552896**	.
FD.P_parcel.500ft	0.2302359		0.3371297		0.2667390		0.3898424		0.1848656	
FD.P_parcel.600ft	0.2342009		0.3208081		0.3610531		0.3534879		0.3340467	
FD.P_parcel.700ft	0.1750535		0.2363836		0.2959966		0.3067675		0.3654082	
FD.P_parcel.800ft	0.1809600		0.2397505		0.2912306		0.3020179		0.3468246	
FD.P_parcel.900ft	0.1797162		0.2811338		0.3716695		0.3886589		0.4363084	
FD.P_parcel.1000ft	0.1345160		0.2254127		0.2603947		0.3875869		0.3103291	
FD.P_parcel.1100ft	0.1054475		0.1877135		0.2294421		0.3920780		0.3246777	
FD.P_parcel.1200ft	0.1004357		0.1760924		0.2414647		0.3766583		0.3931077	
FD.P_parcel.1300ft	**0.0760829**	.	0.1232285		0.1990172		0.3079683		0.4837499	
FD.P_parcel.1400ft	**0.0707581**	.	0.1249526		0.1804766		0.3432977		0.3905864	
FD.P_parcel.1500ft	**0.0753352**	.	0.1600294		0.1786808		0.4711402		0.2668051	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.4214859		0.4693008		**0.0349934**	*	0.3515582		**0.0081959**	**
FD.100_100.300ft	0.5891980		0.6822534		0.2114240		0.4907644		**0.0537288**	.
FD.100_100.400ft	0.4079671		0.6785006		0.4108753		0.7541935		0.1480549	
FD.100_100.500ft	0.2585088		0.3807612		0.3915540		0.4167780		0.3014449	
FD.100_100.600ft	0.2561750		0.3661280		0.4572732		0.3947457		0.4382316	
FD.100_100.700ft	0.1870052		0.2741363		0.3656542		0.3565045		0.4396742	
FD.100_100.800ft	0.1919331		0.2785873		0.3531050		0.3548281		0.3983201	
FD.100_100.900ft	0.1887618		0.3170657		0.4269534		0.4469739		0.4816476	
FD.100_100.1000ft	0.1402146		0.2507864		0.3020611		0.4383569		0.3467285	
FD.100_100.1100ft	0.1091538		0.2054769		0.2608682		0.4348660		0.3576087	
FD.100_100.1200ft	0.1036343		0.1891863		0.2678767		0.4059427		0.4289917	
FD.100_100.1300ft	**0.0784646**	.	0.1311700		0.2168804		0.3253660		0.5199996	
FD.100_100.1400ft	**0.0729416**	.	0.1315640		0.1949699		0.3575223		0.4161331	
FD.100_100.1500ft	**0.0776056**	.	0.1667836		0.1925559		0.4857347		0.2849401	

Results for Full Model Full Sample CoolSet3

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	**0.0941958**	1	0.7589093
ConditionedSpace	**0.0084751**	1	0.9266501
Stories	1.9519663	3	0.5824359
SidingType	16.0791961	6	**0.0133351**
ImprovedInsulation	0.2568695	1	0.6122791
AirConditioning	0.1623885	1	0.6869669
ImprovedSiding	1.2129768	2	0.5452623
ImprovedWindows	2.6607557	2	0.2643774

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	**0.0961916**	.	0.2472355		0.1461685		0.8214803		0.1107702	
X100ft	0.2731746		0.5500068		0.2837555		0.9399815		0.1076619	
X200ft	0.4114469		0.5902043		**0.0025954**	**	0.5356281		**0.0003000**	***
X300ft	0.7252418		0.5574612		**0.0056815**	**	0.3066270		**0.0007810**	***
X400ft	0.5581641		0.8290156		0.1857012		0.8513441		**0.0353076**	*
X500ft	0.3564999		0.5721109		0.5016808		0.6018374		0.2658983	
X600ft	0.3186510		0.4667226		0.5539800		0.4650379		0.4495885	
X700ft	0.2496465		0.4040884		0.4625995		0.4825853		0.3825008	
X800ft	0.2685558		0.4516159		0.5081584		0.5415600		0.3906868	
X900ft	0.2248089		0.4222879		0.5482948		0.6097464		0.5254695	
X1000ft	0.1532786		0.3098969		0.4147957		0.5738536		0.4706227	
X1100ft	0.1154449		0.2483494		0.3726115		0.5698715		0.5505078	
X1200ft	0.1092348		0.2279030		0.3713648		0.5239364		0.6561126	
X1300ft	**0.0867921**	.	0.1753528		0.3093916		0.4540054		0.7137499	
X1400ft	**0.0800376**	.	0.1770870		0.2886518		0.5198156		0.5724780	
X1500ft	**0.0785826**	.	0.1993200		0.2740286		0.6935614		0.4130205	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.3800354		0.6486580		0.5038157		0.7502146		0.2243561	
TD_100.200ft	0.6402454		0.4357483		**0.0155589**	*	0.2298015		**0.0033449**	**
TD_200.300ft	0.8784215		0.4103688		0.4356193		0.1848944		0.3305615	
TD_300.400ft	0.3319451		0.4587528		0.5794706		0.4308944		0.5189915	
TD_400.500ft	0.1433908		0.3063090		0.5024963		0.6243525		0.9298730	
TD_500.600ft	0.3070080		0.5906001		0.7739417		0.8905064		0.7932906	
TD_600.700ft	0.1646448		0.3649206		0.4738337		0.7509240		0.4790314	
TD_700.800ft	0.4498400		0.7535060		0.8859812		0.9910596		0.7719396	
TD_800.900ft	0.1648883		0.3556448		0.3936262		0.6951742		0.3372412	
TD_900.1000ft	**0.0347284**	*	0.1056758		0.1301446		0.7863132		0.2844706	
TD_1000.1100ft	**0.0388658**	*	0.1097888		0.2030752		0.6687456		0.6402258	
TD_1100.1200ft	0.1585798		0.2486940		0.4255116		0.3714082		0.8640909	
TD_1200.1300ft	**0.0441915**	*	**0.0884324**	.	0.1830303		0.3684812		0.8370372	
TD_1300.1400ft	0.1276934		0.2922820		**0.0394676**	*	0.6915968		**0.0162645**	*
TD_1400.1500ft	0.2085968		0.4093098		0.1576481		0.6416527		**0.0661534**	.

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.3800354		0.6486580		0.5038157		0.7502146		0.2243561	
FD.P_parcel.200ft	0.4864166		0.5344892		**0.0046921**	**	0.3803871		**0.0006592**	***
FD.P_parcel.300ft	0.7803287		0.4987259		**0.0147777**	*	0.2517804		**0.0026926**	**
FD.P_parcel.400ft	0.5850526		0.8336624		0.2595052		0.7939478		**0.0562176**	.
FD.P_parcel.500ft	0.3683564		0.6002566		0.5521075		0.6411048		0.2992525	
FD.P_parcel.600ft	0.3253069		0.4876622		0.5876585		0.4914433		0.4806130	
FD.P_parcel.700ft	0.2534935		0.4191003		0.4905856		0.5062072		0.4088460	
FD.P_parcel.800ft	0.2716337		0.4630771		0.5307447		0.5607265		0.4127040	
FD.P_parcel.900ft	0.2271108		0.4307853		0.5650044		0.6274941		0.5477775	
FD.P_parcel.1000ft	0.1548396		0.3161872		0.4267695		0.5890435		0.4847864	
FD.P_parcel.1100ft	0.1164704		0.2528259		0.3810859		0.5829679		0.5623496	
FD.P_parcel.1200ft	0.1102960		0.2317576		0.3778311		0.5332435		0.6643467	
FD.P_parcel.1300ft	**0.0874882**	.	0.1780345		0.3142097		0.4609571		0.7217456	
FD.P_parcel.1400ft	**0.0806588**	.	0.1791693		0.2929569		0.5252024		0.5801687	
FD.P_parcel.1500ft	**0.0791621**	.	0.2010838		0.2777520		0.6988648		0.4182440	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.6402454		0.4357483		**0.0155589**	*	0.2298015		**0.0033449**	**
FD.100_100.300ft	0.9190221		0.3922287		**0.0727086**	.	0.1724628		**0.0248511**	*
FD.100_100.400ft	0.6410576		0.8509272		0.5151205		0.7433037		0.1614301	
FD.100_100.500ft	0.3868359		0.6205258		0.7196280		0.6461133		0.5317579	
FD.100_100.600ft	0.3371413		0.5109400		0.6869239		0.5137141		0.7011527	
FD.100_100.700ft	0.2595506		0.4452922		0.5822521		0.5516938		0.5572801	
FD.100_100.800ft	0.2783428		0.4915217		0.6083014		0.6148024		0.5181320	
FD.100_100.900ft	0.2313605		0.4534978		0.6172998		0.6892543		0.6399199	
FD.100_100.1000ft	0.1568687		0.3328447		0.4708857		0.6465616		0.5612426	
FD.100_100.1100ft	0.1175702		0.2642413		0.4119390		0.6319731		0.6330594	
FD.100_100.1200ft	0.1112918		0.2405605		0.4003368		0.5661821		0.7319604	
FD.100_100.1300ft	**0.0883595**	.	0.1837021		0.3290943		0.4803792		0.7827018	
FD.100_100.1400ft	**0.0815158**	.	0.1834095		0.3070155		0.5404308		0.6246088	
FD.100_100.1500ft	**0.0800857**	.	0.2045314		0.2922341		0.7135237		0.4512258	

Results for Full Model Full Sample CoolSet4

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	**0.0430167**	1	0.8356938
ConditionedSpace	0.6444743	1	0.4220952
Stories	0.8441655	3	0.8388766
SidingType	12.5171917	6	**0.0513768**
ImprovedInsulation	0.1505602	1	0.6980006
AirConditioning	0.5356769	2	0.7650313
ImprovedSiding	0.8279987	2	0.6610014
ImprovedWindows	2.0376066	2	0.3610267

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	0.1054418		0.2626462		**0.0453876**	*	0.7873890		**0.0218016**	*
X100ft	0.4415329		0.7374387		0.4135715		0.8830535		0.1340088	
X200ft	0.5756864		0.6356634		**0.0066912**	**	0.4408907		**0.0008055**	***
X300ft	0.9382197		0.4246702		**0.0054474**	**	0.1913956		**0.0010142**	**
X400ft	0.7407382		0.7647789		0.1181648		0.5132793		**0.0211632**	*
X500ft	0.4387671		0.7194472		0.5750806		0.8007732		0.2493753	
X600ft	0.3533249		0.5536604		0.6179528		0.5681854		0.4356884	
X700ft	0.2852050		0.4984194		0.4547212		0.6118319		0.2692346	
X800ft	0.3137349		0.5528077		0.5478624		0.6735290		0.3335093	
X900ft	0.2633543		0.4991707		0.6330985		0.7010406		0.5625175	
X1000ft	0.1772982		0.3484774		0.5117300		0.5846453		0.6470394	
X1100ft	0.1439728		0.3001564		0.4682699		0.5937332		0.6992625	
X1200ft	0.1281871		0.2485854		0.4256165		0.4886179		0.8723124	
X1300ft	0.1120815		0.2083005		0.3731772		0.4307375		0.9185911	
X1400ft	0.1169476		0.2369515		0.3944535		0.5102407		0.7258469	
X1500ft	0.1195538		0.2768938		0.3978864		0.6874400		0.5249426	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.5820188		0.7849035		0.7112643		0.6684239		0.3450312	
TD_100.200ft	0.7654787		0.4219864		**0.0222068**	*	0.2008590		**0.0052677**	**
TD_200.300ft	0.6837823		0.2359232		0.2492138		**0.0990831**	.	0.2689496	
TD_300.400ft	0.4300726		0.7016073		0.6436860		0.7631454		0.3268875	
TD_400.500ft	0.1171583		0.2289944		0.3713227		0.4780583		0.6498660	
TD_500.600ft	0.2478347		0.5023046		0.7057031		0.8194648		0.8552498	
TD_600.700ft	0.1981775		0.4034652		0.4685411		0.6792951		0.3940621	
TD_700.800ft	0.5377308		0.8280541		0.8543917		0.9784729		0.5250798	
TD_800.900ft	0.1854802		0.4178657		0.3209125		0.9360997		0.1867785	
TD_900.1000ft	**0.0344473**	*	**0.0728056**	.	0.1421001		0.3784145		0.6269456	
TD_1000.1100ft	**0.0740054**	.	0.1878387		0.2899716		0.6763546		0.5169374	
TD_1100.1200ft	0.1246928		0.1098016		0.2219056		0.1531568		0.9106614	
TD_1200.1300ft	0.1038491		0.1681013		0.3120544		0.3367788		0.8615905	
TD_1300.1400ft	0.3211269		0.5967588		**0.0594262**	.	0.8132377		**0.0117387**	*
TD_1400.1500ft	0.3149793		0.5310497		0.1489201		0.6085619		**0.0445382**	*

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.5820188		0.7849035		0.7112643		0.6684239		0.3450312	
FD.P_parcel.200ft	0.6558751		0.5494349		**0.0117826**	*	0.3175143		**0.0018378**	**
FD.P_parcel.300ft	0.9902889		0.3684016		**0.0131558**	*	0.1576094		**0.0033136**	**
FD.P_parcel.400ft	0.7674568		0.7394484		0.1660062		0.4722911		**0.0347125**	*
FD.P_parcel.500ft	0.4500760		0.7380972		0.6205311		0.8387326		0.2801925	
FD.P_parcel.600ft	0.3589263		0.5715351		0.6457769		0.5952594		0.4600552	
FD.P_parcel.700ft	0.2883273		0.5105879		0.4783395		0.6358595		0.2862338	
FD.P_parcel.800ft	0.3164056		0.5615488		0.5672719		0.6916020		0.3504201	
FD.P_parcel.900ft	0.2652597		0.5056331		0.6458861		0.7166792		0.5814350	
FD.P_parcel.1000ft	0.1786256		0.3538920		0.5208047		0.5971732		0.6600550	
FD.P_parcel.1100ft	0.1449241		0.3042336		0.4748393		0.6047469		0.7086344	
FD.P_parcel.1200ft	0.1291525		0.2520440		0.4304449		0.4958324		0.8763666	
FD.P_parcel.1300ft	0.1127636		0.2107114		0.3767572		0.4356813		0.9235510	
FD.P_parcel.1400ft	0.1175696		0.2387128		0.3974862		0.5133754		0.7309006	
FD.P_parcel.1500ft	0.1201566		0.2784234		0.4006071		0.6903199		0.5281725	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.7654787		0.4219864		**0.0222068**	*	0.2008590		**0.0052677**	**
FD.100_100.300ft	0.8971698		0.2776139		**0.0550463**	.	0.1105646		**0.0260539**	*
FD.100_100.400ft	0.8087962		0.7144769		0.3195961		0.4332699		**0.0927282**	.
FD.100_100.500ft	0.4542383		0.7398753		0.7747141		0.8285406		0.4752718	
FD.100_100.600ft	0.3586797		0.5751029		0.7299675		0.6040088		0.6567681	
FD.100_100.700ft	0.2866921		0.5201279		0.5687300		0.6714052		0.3982797	
FD.100_100.800ft	0.3169038		0.5742485		0.6395741		0.7344886		0.4452907	
FD.100_100.900ft	0.2650678		0.5167041		0.6870992		0.7669428		0.6821611	
FD.100_100.1000ft	0.1775914		0.3641544		0.5510392		0.6432717		0.7528728	
FD.100_100.1100ft	0.1438722		0.3109899		0.4957109		0.6437887		0.7899444	
FD.100_100.1200ft	0.1283591		0.2572585		0.4408140		0.5197941		0.9512012	
FD.100_100.1300ft	0.1123629		0.2135501		0.3821273		0.4479107		0.9886011	
FD.100_100.1400ft	0.1174693		0.2406705		0.4065849		0.5220391		0.7803826	
FD.100_100.1500ft	0.1202869		0.2799213		0.4133664		0.6986599		0.5657158	

Simple Model – Full Sample

Results for Simple Model Full Sample CoolSet1

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	0.2673672	1	0.6051033
ConditionedSpace	1.6005419	1	0.2058264
Stories	1.6590181	3	0.6460831

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	**0.0685625**	.	0.1718103		0.3167330		0.6256338		0.8198124	
X100ft	**0.0894698**	.	0.2306765		0.1126671		0.7726384		**0.0848296**	.
X200ft	**0.0752441**	.	0.2093440		**0.0141403**	*	0.9545513		**0.0072357**	**
X300ft	0.1212023		0.3049677		**0.0422954**	*	0.9492570		**0.0172751**	*
X400ft	0.1154749		0.2507432		0.2233522		0.5771318		0.2071849	
X500ft	0.1288048		0.2882837		0.3842867		0.6512703		0.4486271	
X600ft	0.1559227		0.3474495		0.5100928		0.7252008		0.6391566	
X700ft	0.1391269		0.3186494		0.5138109		0.7244190		0.8523891	
X800ft	0.1659679		0.3762870		0.5756440		0.8081367		0.8168268	
X900ft	0.1629711		0.3815556		0.5905182		0.9415369		0.9149486	
X1000ft	0.1229752		0.3042598		0.4755850		0.8617899		0.7033110	
X1100ft	**0.0976877**	.	0.2486216		0.3804730		0.7865350		0.5750160	
X1200ft	**0.0889461**	.	0.2103634		0.3172781		0.6155082		0.5109370	
X1300ft	**0.0685603**	.	0.1535765		0.2247374		0.5008143		0.4256146	
X1400ft	**0.0615402**	.	0.1438725		0.1838027		0.5225948		0.3258608	
X1500ft	**0.0533468**	.	0.1432867		0.1645269		0.6616800		0.2722954	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.1108500		0.2097920		0.1165510		0.4407120		**0.0998480**	.
TD_100.200ft	0.1067400		0.2564350		0.1039550		0.7001380		**0.0668930**	.
TD_200.300ft	0.2500450		0.4649840		0.5479060		0.6377800		0.4399630	
TD_300.400ft	0.1382070		0.2728140		0.3900960		0.5186590		0.5114040	
TD_400.500ft	0.2299680		0.4217810		0.5636600		0.5848610		0.5651690	
TD_500.600ft	0.3299460		0.4980520		0.7105480		0.5015450		0.9593370	
TD_600.700ft	0.1521700		0.3254720		0.5074250		0.6427020		0.7427140	
TD_700.800ft	0.4332520		0.5848340		0.7480120		0.4962290		0.6894450	
TD_800.900ft	0.2445940		0.3804910		0.4352970		0.4440250		0.3706330	
TD_900.1000ft	**0.0575750**	.	0.1591930		0.2235010		0.7395750		0.3975970	
TD_1000.1100ft	**0.0506470**	.	0.1254600		0.1487890		0.5469380		0.2783870	
TD_1100.1200ft	0.1256960		0.1117490		0.1892790		0.1564880		0.5160180	
TD_1200.1300ft	**0.0325820**	*	**0.0481040**	*	**0.0661550**	.	0.2248030		0.2920650	
TD_1300.1400ft	**0.0771380**	.	0.1972210		**0.0344910**	*	0.6924550		**0.0223960**	*
TD_1400.1500ft	**0.0608090**	.	0.1267500		**0.0753640**	.	0.4264510		0.1020710	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.1108500		0.2097920		0.1165510		0.4407120		**0.0998480**	.
FD.P_parcel.200ft	**0.0834050**	.	0.2189180		**0.0257600**	*	0.7823290		**0.0139420**	*
FD.P_parcel.300ft	0.1283130		0.3147570		**0.0826210**	.	0.8672600		**0.0386670**	*
FD.P_parcel.400ft	0.1182300		0.2637680		0.2768970		0.6182920		0.2755620	
FD.P_parcel.500ft	0.1301810		0.2982480		0.4108860		0.6945990		0.4909470	
FD.P_parcel.600ft	0.1564510		0.3547530		0.5214390		0.7667980		0.6526700	
FD.P_parcel.700ft	0.1393800		0.3245040		0.5211010		0.7621880		0.8561680	
FD.P_parcel.800ft	0.1664740		0.3806750		0.5805420		0.8400260		0.8177080	
FD.P_parcel.900ft	0.1635660		0.3833730		0.5922740		0.9702130		0.9110190	
FD.P_parcel.1000ft	0.1233680		0.3064830		0.4775400		0.8848980		0.6999280	
FD.P_parcel.1100ft	**0.0979950**	.	0.2509340		0.3829320		0.8061130		0.5738150	
FD.P_parcel.1200ft	**0.0893610**	.	0.2133650		0.3204570		0.6299980		0.5093030	
FD.P_parcel.1300ft	**0.0688980**	.	0.1560230		0.2274210		0.5117060		0.4245500	
FD.P_parcel.1400ft	**0.0618320**	.	0.1457500		0.1856850		0.5315770		0.3254060	
FD.P_parcel.1500ft	**0.0535770**	.	0.1445740		0.1658040		0.6703450		0.2723260	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.1067400		0.2564350		0.1039550		0.7001380		**0.0668930**	.
FD.100_100.300ft	0.1638140		0.3547380		0.2482680		0.6937230		0.1547520	
FD.100_100.400ft	0.1369390		0.3094310		0.4419670		0.6910950		0.5467670	
FD.100_100.500ft	0.1454680		0.3377620		0.5126200		0.7817360		0.6961120	
FD.100_100.600ft	0.1721000		0.3925300		0.5892970		0.8649240		0.7888890	
FD.100_100.700ft	0.1500580		0.3540720		0.5612900		0.8611380		0.9479190	
FD.100_100.800ft	0.1781490		0.4074380		0.6151470		0.9390560		0.8718780	
FD.100_100.900ft	0.1731450		0.3988890		0.6104770		0.9368280		0.9376700	
FD.100_100.1000ft	0.1295220		0.3213180		0.5011510		0.9658030		0.7341960	
FD.100_100.1100ft	0.1022650		0.2642570		0.4074330		0.8739400		0.6080780	
FD.100_100.1200ft	**0.0929950**	.	0.2267410		0.3461190		0.6748800		0.5443940	
FD.100_100.1300ft	**0.0716980**	.	0.1660820		0.2465790		0.5414170		0.4498570	
FD.100_100.1400ft	**0.0642800**	.	0.1540110		0.1999750		0.5559490		0.3414240	
FD.100_100.1500ft	**0.0556440**	.	0.1513350		0.1778480		0.6951340		0.2865980	

Results for Simple Model Full Sample CoolSet2

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	1.0020384	1	0.3168178
ConditionedSpace	0.9711020	1	0.3244055
Stories	3.7261101	3	0.2925985

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	0.0892035	.	0.1586904		0.2683418		0.3714042		0.5945910	
X100ft	0.3110067		0.5534088		0.2769736		0.6838364		0.1031505	
X200ft	0.3508124		0.6490455		0.0029154	**	0.9561111		0.0003084	***
X300ft	0.4174162		0.7172950		0.0055503	**	0.9067765		0.0005694	***
X400ft	0.3562787		0.5136394		0.0756642	.	0.4856921		0.0191333	*
X500ft	0.2947042		0.3482875		0.2126231		0.3145871		0.1247464	
X600ft	0.2929055		0.3380901		0.3790208		0.3027701		0.3385474	
X700ft	0.2348861		0.2757085		0.4036479		0.2807627		0.5465924	
X800ft	0.2413445		0.3086486		0.4324576		0.3225236		0.5221919	
X900ft	0.2246707		0.3523991		0.5044104		0.4319520		0.6016043	
X1000ft	0.1719028		0.2669707		0.3175761		0.3773696		0.3464020	
X1100ft	0.1439007		0.2152228		0.2236405		0.3328435		0.2552903	
X1200ft	0.1318346		0.1626537		0.1619733		0.2447294		0.2226797	
X1300ft	0.1000022		0.1015175		0.1007834		0.1742837		0.2019432	
X1400ft	0.0815225	.	0.0910392	.	0.0723284	.	0.1877223		0.1438513	
X1500ft	0.0668301	.	0.1038971		0.0694367	.	0.2806856		0.1153540	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.4103904		0.7140410		0.3899406		0.9563331		0.1270732	
TD_100.200ft	0.4624565		0.6409750		0.0231005	*	0.5522934		0.0034335	**
TD_200.300ft	0.5363372		0.7639274		0.3659894		0.6895787		0.1053029	
TD_300.400ft	0.2833607		0.2271910		0.2526676		0.1793025		0.2909514	
TD_400.500ft	0.2377317		0.4872292		0.6760240		0.8101219		0.7486511	
TD_500.600ft	0.3508344		0.6486472		0.8346695		0.9475735		0.9436721	
TD_600.700ft	0.1514268		0.3577734		0.5600871		0.8905890		0.8738975	
TD_700.800ft	0.3661866		0.6557948		0.8408301		0.8506460		0.9736359	
TD_800.900ft	0.2477785		0.4636374		0.6420889		0.6448325		0.6954350	
TD_900.1000ft	0.0726703	.	0.1338601		0.0626319	.	0.3690815		0.0738341	.
TD_1000.1100ft	0.0880754	.	0.1261623		0.0831466	.	0.2685046		0.1162610	
TD_1100.1200ft	0.1644538		0.1146027		0.1855394		0.1235164		0.4756374	
TD_1200.1300ft	0.0351298	*	0.0268429	*	0.0473594	*	0.0992690	.	0.3956807	
TD_1300.1400ft	0.0495905	*	0.0785275	.	0.0054879	**	0.2685078		0.0072230	**
TD_1400.1500ft	0.0525378	.	0.1530635		0.0509440	.	0.8556333		0.0481595	*

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.4103904		0.7140410		0.3899406		0.9563331		0.1270732	
FD.P_parcel.200ft	0.4010887		0.6707861		**0.0055664**	**	0.7516395		**0.0006186**	***
FD.P_parcel.300ft	0.4464970		0.7290785		**0.0156738**	*	0.8095168		**0.0018632**	**
FD.P_parcel.400ft	0.3691320		0.5515118		0.1186796		0.5329649		**0.0315398**	*
FD.P_parcel.500ft	0.3005978		0.3748515		0.2504605		0.3449049		0.1455430	
FD.P_parcel.600ft	0.2955710		0.3592960		0.4079872		0.3287857		0.3560777	
FD.P_parcel.700ft	0.2361150		0.2922407		0.4265245		0.3041528		0.5607204	
FD.P_parcel.800ft	0.2424295		0.3227665		0.4513915		0.3436650		0.5334094	
FD.P_parcel.900ft	0.2255305		0.3636123		0.5182120		0.4537697		0.6082142	
FD.P_parcel.1000ft	0.1724792		0.2748031		0.3270871		0.3937198		0.3504745	
FD.P_parcel.1100ft	0.1443300		0.2210085		0.2302540		0.3453780		0.2582475	
FD.P_parcel.1200ft	0.1324285		0.1670268		0.1661988		0.2527330		0.2237197	
FD.P_parcel.1300ft	0.1004437		0.1042248		0.1035050		0.1795433		0.2029924	
FD.P_parcel.1400ft	**0.0818178**	.	**0.0930227**	.	**0.0740178**	.	0.1923737		0.1446119	
FD.P_parcel.1500ft	**0.0670386**	.	0.1056139		**0.0707936**	.	0.2862743		0.1160801	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.4624565		0.6409750		**0.0231005**	*	0.5522934		**0.0034335**	**
FD.100_100.300ft	0.4923336		0.7032941		**0.0860699**	.	0.6268998		**0.0155507**	*
FD.100_100.400ft	0.3836705		0.5927874		0.2910479		0.5886077		0.1019457	
FD.100_100.500ft	0.3047848		0.4037888		0.3845772		0.3823340		0.2677990	
FD.100_100.600ft	0.2994029		0.3984953		0.5173469		0.3814904		0.5044708	
FD.100_100.700ft	0.2364347		0.3294261		0.5015010		0.3646885		0.6920253	
FD.100_100.800ft	0.2436672		0.3626729		0.5220560		0.4117043		0.6254160	
FD.100_100.900ft	0.2263285		0.3966200		0.5706019		0.5296877		0.6755227	
FD.100_100.1000ft	0.1725429		0.2994358		0.3730146		0.4544465		0.3965867	
FD.100_100.1100ft	0.1443025		0.2397209		0.2634546		0.3925390		0.2896129	
FD.100_100.1200ft	0.1324624		0.1800362		0.1896052		0.2810575		0.2493607	
FD.100_100.1300ft	0.1005901		0.1115886		0.1165642		0.1961420		0.2219529	
FD.100_100.1400ft	**0.0820422**	.	**0.0985489**	.	**0.0821999**	.	0.2070707		0.1559151	
FD.100_100.1500ft	**0.0672543**	.	0.1104882		**0.0778356**	.	0.3043625		0.1250943	

Results for Simple Model Full Sample CoolSet3

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	0.6746580	1	0.4114323
ConditionedSpace	0.6856009	1	0.4076647
Stories	1.9643725	3	0.5798342

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	**0.0894801**	.	0.2312343		0.1367654		0.7960171		0.1092320	
X100ft	0.2590710		0.4092112		0.1939466		0.4715586		**0.0886065**	.
X200ft	0.3972703		0.7008294		**0.0018059**	**	0.9878305		**0.0001622**	***
X300ft	0.6260937		0.7565858		**0.0012726**	**	0.5705325		**0.0001002**	***
X400ft	0.5416127		0.8165820		**0.0925778**	.	0.8503065		**0.0142628**	*
X500ft	0.4231276		0.5794776		0.3957366		0.5011499		0.1709750	
X600ft	0.3722844		0.4582138		0.4981244		0.3813561		0.3659234	
X700ft	0.3011533		0.4005899		0.4578543		0.3825108		0.3796886	
X800ft	0.3162040		0.4596996		0.5085036		0.4569204		0.3803397	
X900ft	0.2581551		0.4384175		0.4950740		0.5392026		0.3875754	
X1000ft	0.1833452		0.3175278		0.3316892		0.4662564		0.2898443	
X1100ft	0.1431695		0.2509269		0.2800741		0.4280494		0.3017866	
X1200ft	0.1299997		0.1974463		0.2411048		0.3289705		0.3291417	
X1300ft	0.1075504		0.1464200		0.1802255		0.2640327		0.3069995	
X1400ft	**0.0954675**	.	0.1403277		0.1439777		0.2846812		0.2254001	
X1500ft	**0.0845227**	.	0.1567491		0.1324072		0.3906662		0.1710504	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.3386074		0.5773582		0.4020642		0.6638118		0.1764809	
TD_100.200ft	0.6032010		0.6016302		**0.0033245**	**	0.3875592		**0.0003859**	***
TD_200.300ft	0.9467454		0.4887522		0.2863447		0.2322019		0.1267781	
TD_300.400ft	0.4177324		0.4442037		0.6144972		0.3255703		0.6630452	
TD_400.500ft	0.2679001		0.5150111		0.7252712		0.7417870		0.9961771	
TD_500.600ft	0.3102414		0.5944649		0.7666464		0.8910751		0.7394171	
TD_600.700ft	0.1904447		0.4169750		0.5551883		0.8256173		0.5576469	
TD_700.800ft	0.4765536		0.7430796		0.8987886		0.7630238		0.9796489	
TD_800.900ft	0.1532237		0.2872976		0.4793784		0.4959878		0.9537452	
TD_900.1000ft	**0.0471754**	*	0.1117647		**0.0842589**	.	0.4972197		0.1366932	
TD_1000.1100ft	**0.0571508**	.	0.1260590		0.1873143		0.4635034		0.4144857	
TD_1100.1200ft	0.1522651		0.1151688		0.2204958		0.1334045		0.7310540	
TD_1200.1300ft	**0.0737848**	.	**0.0933432**	.	0.1532793		0.2157587		0.4617886	
TD_1300.1400ft	0.1082563		0.1749011		**0.0233774**	*	0.3402538		**0.0154061**	*
TD_1400.1500ft	0.1020256		0.2651034		0.1035181		0.9538873		**0.0627376**	.

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.3386074		0.5773582		0.4020642		0.6638118		0.1764809	
FD.P_parcel.200ft	0.4537227		0.7371990		**0.0033334**	**	0.8182909		**0.0003055**	***
FD.P_parcel.300ft	0.6675565		0.7158901		**0.0039849**	**	0.4862758		**0.0003873**	***
FD.P_parcel.400ft	0.5619555		0.8403968		0.1474754		0.9053843		**0.0253857**	*
FD.P_parcel.500ft	0.4334188		0.6079854		0.4637371		0.5351334		0.2109724	
FD.P_parcel.600ft	0.3769924		0.4774388		0.5423785		0.4027651		0.4120943	
FD.P_parcel.700ft	0.3038569		0.4158830		0.4924240		0.4027534		0.4177118	
FD.P_parcel.800ft	0.3184289		0.4719747		0.5370952		0.4750373		0.4108684	
FD.P_parcel.900ft	0.2596128		0.4472622		0.5163171		0.5568626		0.4112092	
FD.P_parcel.1000ft	0.1843618		0.3241298		0.3457129		0.4802472		0.3033119	
FD.P_parcel.1100ft	0.1437892		0.2556785		0.2895696		0.4394469		0.3117186	
FD.P_parcel.1200ft	0.1308886		0.2013831		0.2473825		0.3362807		0.3347458	
FD.P_parcel.1300ft	0.1081525		0.1490955		0.1848138		0.2692244		0.3122212	
FD.P_parcel.1400ft	**0.0959578**	.	0.1423053		0.1473451		0.2887876		0.2293615	
FD.P_parcel.1500ft	**0.0848594**	.	0.1583200		0.1350328		0.3949458		0.1738867	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.6032010		0.6016302		**0.0033245**	**	0.3875592		**0.0003859**	***
FD.100_100.300ft	0.7943369		0.4979175		**0.0192786**	*	0.2494278		**0.0036745**	**
FD.100_100.400ft	0.6211289		0.8825900		0.3293389		0.9310964		**0.0745272**	.
FD.100_100.500ft	0.4601860		0.6694960		0.6805681		0.6099154		0.4004923	
FD.100_100.600ft	0.3934126		0.5340023		0.6864515		0.4669726		0.6277913	
FD.100_100.700ft	0.3124139		0.4669378		0.6127481		0.4765416		0.5865689	
FD.100_100.800ft	0.3270891		0.5209255		0.6393623		0.5546847		0.5316168	
FD.100_100.900ft	0.2647912		0.4838751		0.5920504		0.6419143		0.4971576	
FD.100_100.1000ft	0.1868906		0.3517823		0.4059546		0.5503802		0.3645883	
FD.100_100.1100ft	0.1454112		0.2761551		0.3341134		0.4961801		0.3625845	
FD.100_100.1200ft	0.1321255		0.2165935		0.2813358		0.3723290		0.3807256	
FD.100_100.1300ft	0.1093591		0.1590125		0.2073819		0.2917002		0.3477505	
FD.100_100.1400ft	**0.0971258**	.	0.1500350		0.1635440		0.3076481		0.2520575	
FD.100_100.1500ft	**0.0859734**	.	0.1650144		0.1487488		0.4153911		0.1907177	

Results for Simple Model Full Sample CoolSet4

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	0.0726714	1	0.7874862
ConditionedSpace	1.8347213	1	0.1755709
Stories	1.4050854	3	0.7043431

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	0.1147276		0.2862433		0.0681319	.	0.8581608		0.0328689	*
X100ft	0.3659725		0.6337892		0.3200040		0.7515042		0.1080224	
X200ft	0.4655316		0.7464977		0.0037788	**	0.8130727		0.0003463	***
X300ft	0.7236171		0.6267756		0.0009937	***	0.3682806		0.0000944	***
X400ft	0.6160571		0.8527679		0.0439575	*	0.7930409		0.0053213	**
X500ft	0.4372201		0.6775579		0.3916396		0.6725338		0.1367391	
X600ft	0.3552229		0.5065623		0.4888609		0.4757288		0.3021092	
X700ft	0.2919423		0.4560248		0.4108380		0.4956609		0.2535052	
X800ft	0.3239513		0.5341201		0.5262504		0.5924574		0.3234343	
X900ft	0.2665109		0.4867621		0.5648135		0.6447396		0.4381539	
X1000ft	0.1886400		0.3456712		0.4359524		0.5250238		0.4359199	
X1100ft	0.1583203		0.2992670		0.3885113		0.5114541		0.4331278	
X1200ft	0.1420352		0.2297789		0.3386853		0.3744326		0.5089222	
X1300ft	0.1271355		0.1871683		0.2785273		0.3115858		0.4762723	
X1400ft	0.1230613		0.1948480		0.2484803		0.3441219		0.3549934	
X1500ft	0.1128358		0.2197182		0.2346642		0.4684322		0.2684475	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.4584779		0.7546700		0.6076360		0.8951408		0.2598460	
TD_100.200ft	0.6201827		0.5610184		0.0051762	**	0.3399669		0.0006898	***
TD_200.300ft	0.9456352		0.3003592		0.1479197		0.1212691		0.0880616	.
TD_300.400ft	0.4469142		0.6420053		0.6278340		0.5771734		0.3549309	
TD_400.500ft	0.2070962		0.4015400		0.5972073		0.6225602		0.7912064	
TD_500.600ft	0.2350561		0.4888234		0.6783880		0.8586969		0.7578191	
TD_600.700ft	0.1989446		0.4179694		0.5374096		0.7452069		0.5094999	
TD_700.800ft	0.5716853		0.8161580		0.8956142		0.7659653		0.6549453	
TD_800.900ft	0.1640574		0.3556514		0.4923291		0.7047647		0.5543826	
TD_900.1000ft	0.0489468	*	0.0873440	.	0.1213068		0.3176342		0.3335408	
TD_1000.1100ft	0.0984287	.	0.2191509		0.2493161		0.5721810		0.2993251	
TD_1100.1200ft	0.1480110		0.0645004	.	0.1368449		0.0670911	.	0.7697241	
TD_1200.1300ft	0.1374897		0.1606192		0.2464740		0.2294461		0.4799745	
TD_1300.1400ft	0.2173835		0.3589062		0.0326191	*	0.4652941		0.0100470	*
TD_1400.1500ft	0.1461687		0.3453899		0.0995817	.	0.8632400		0.0432534	*

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.4584779		0.7546700		0.6076360		0.8951408		0.2598460	
FD.P_parcel.200ft	0.5176915		0.7355194		**0.0068548**	**	0.6560395		**0.0006970**	***
FD.P_parcel.300ft	0.7607944		0.5730134		**0.0029256**	**	0.3122830		**0.0003517**	***
FD.P_parcel.400ft	0.6335808		0.8485157		**0.0720387**	.	0.7484730		**0.0098984**	**
FD.P_parcel.500ft	0.4448296		0.6958338		0.4529983		0.7031455		0.1685776	
FD.P_parcel.600ft	0.3578096		0.5207347		0.5260519		0.4962940		0.3359678	
FD.P_parcel.700ft	0.2930742		0.4667127		0.4390791		0.5152482		0.2772319	
FD.P_parcel.800ft	0.3250818		0.5420029		0.5497960		0.6088104		0.3464130	
FD.P_parcel.900ft	0.2671608		0.4921792		0.5804418		0.6596374		0.4589476	
FD.P_parcel.1000ft	0.1891489		0.3502836		0.4465547		0.5366705		0.4495785	
FD.P_parcel.1100ft	0.1586467		0.3027562		0.3958043		0.5213071		0.4421428	
FD.P_parcel.1200ft	0.1426421		0.2328583		0.3432506		0.3804861		0.5121945	
FD.P_parcel.1300ft	0.1275870		0.1893273		0.2821353		0.3156664		0.4799068	
FD.P_parcel.1400ft	0.1233932		0.1962506		0.2510397		0.3468224		0.3578586	
FD.P_parcel.1500ft	0.1130481		0.2207072		0.2365692		0.4709472		0.2704446	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.6201827		0.5610184		**0.0051762**	**	0.3399669		**0.0006898**	***
FD.100_100.300ft	0.8676712		0.3712218		**0.0129768**	*	0.1621616		**0.0032108**	**
FD.100_100.400ft	0.6791866		0.8133817		0.1601690		0.6220242		**0.0294801**	*
FD.100_100.500ft	0.4580725		0.7244420		0.6494913		0.7544690		0.3175201	
FD.100_100.600ft	0.3630265		0.5510540		0.6578149		0.5439057		0.5167879	
FD.100_100.700ft	0.2946308		0.4963219		0.5538037		0.5786695		0.4052008	
FD.100_100.800ft	0.3284553		0.5704707		0.6432909		0.6770211		0.4572255	
FD.100_100.900ft	0.2686564		0.5135003		0.6432146		0.7317908		0.5567390	
FD.100_100.1000ft	0.1891321		0.3686837		0.4974263		0.5963569		0.5306408	
FD.100_100.1100ft	0.1585345		0.3166631		0.4353733		0.5705595		0.5078149	
FD.100_100.1200ft	0.1425036		0.2437509		0.3722771		0.4103878		0.5719451	
FD.100_100.1300ft	0.1278028		0.1965393		0.3030659		0.3333335		0.5266908	
FD.100_100.1400ft	0.1239003		0.2020739		0.2688478		0.3611563		0.3895075	
FD.100_100.1500ft	0.1136690		0.2256674		0.2529501		0.4863647		0.2941773	

Full Model – Reduced Sample

Results for Full Model Reduced Sample CoolSet1

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
poly(YearBuilt, 2)	0.2501666	2	0.8824234
poly(ConditionedSpace,	1.2038660	2	0.5477518
Stories	0.9912549	3	0.8033680
SidingType	7.1759045	5	0.2078833
ImprovedInsulation	0.4891581	1	0.4843031
AirConditioning	**0.0016226**	1	0.9678688

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	**0.0204680**	*	**0.0711710**	.	0.1072350		0.9065930		0.3639590	
X100ft	**0.0309710**	*	**0.0181270**	*	**0.0446360**	*	**0.0747690**	.	0.6763770	
X200ft	**0.0610840**	.	**0.0173930**	*	**0.0373100**	*	**0.0365250**	*	0.5032050	
X300ft	0.1995840		0.1370790		0.2334030		0.1302960		0.5547420	
X400ft	0.1815340		0.2500500		0.3254640		0.3203330		0.4003120	
X500ft	0.2839660		0.3949080		0.3539660		0.3973480		0.2395850	
X600ft	0.5161340		0.6167640		0.3858140		0.4589250		0.1520220	
X700ft	0.5044300		0.6530020		0.3766510		0.5211110		0.1356800	
X800ft	0.6204070		0.7771160		0.4006410		0.6084440		0.1194940	
X900ft	0.6801390		0.8503980		0.2245640		0.6920850		**0.0448840**	*
X1000ft	0.4934430		0.6646370		0.1367500		0.5520040		**0.0309220**	*
X1100ft	0.3796880		0.5837620		0.2207420		0.5747550		**0.0699940**	.
X1200ft	0.3540180		0.6440670		0.4884640		0.8484430		0.2147870	
X1300ft	0.2833070		0.5684620		0.6268850		0.9887550		0.4295870	
X1400ft	0.2889760		0.5760350		0.7562830		0.9983750		0.7491920	
X1500ft	0.3127930		0.5991050		0.7977410		0.8755190		0.9227780	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	**0.0621270**	.	**0.0123090**	*	**0.0329030**	*	**0.0246350**	*	0.7509710	
TD_100.200ft	0.2107580		0.1059670		0.2073250		**0.0903660**	.	0.7071210	
TD_200.300ft	0.7056250		0.6263710		0.5121620		0.3730460		0.2435760	
TD_300.400ft	0.2797020		0.4231160		0.5609010		0.4537160		0.5502420	
TD_400.500ft	0.8202400		0.8536340		0.3065090		0.6063080		**0.0700550**	.
TD_500.600ft	0.6328960		0.8710820		0.9180240		0.8196780		0.6300570	
TD_600.700ft	0.6347360		0.8829340		0.5365410		0.8683890		0.1654900	
TD_700.800ft	0.8970730		0.9710630		0.2553140		0.8370560		**0.0456230**	*
TD_800.900ft	0.9218610		0.9407950		0.7069750		0.7372050		0.2595490	
TD_900.1000ft	0.1802660		0.4099850		0.6197130		0.8847650		0.8667520	
TD_1000.1100ft	0.1399170		0.3389760		0.4776470		0.8746860		0.5539060	
TD_1100.1200ft	0.2908220		0.4433080		0.5881960		0.4703090		0.5722330	
TD_1200.1300ft	**0.0845950**	.	0.2140800		0.3738790		0.6930120		0.7659560	
TD_1300.1400ft	0.4052160		0.7114140		0.3859450		0.9716520		0.1262080	
TD_1400.1500ft	0.6582930		0.4724020		0.6087420		0.2536420		0.5555210	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	**0.0621270**	.	**0.0123090**	*	**0.0329030**	*	**0.0246350**	*	0.7509710	
FD.P_parcel.200ft	**0.0899750**	.	**0.0147940**	*	**0.0361810**	*	**0.0211060**	*	0.6306940	
FD.P_parcel.300ft	0.2399030		0.1554310		0.2940340		0.1287210		0.8089890	
FD.P_parcel.400ft	0.2044840		0.2774740		0.2920110		0.3283600		0.2816460	
FD.P_parcel.500ft	0.3049410		0.4017120		0.3534880		0.3783580		0.2334780	
FD.P_parcel.600ft	0.5382770		0.6057510		0.4053880		0.4286430		0.1689480	
FD.P_parcel.700ft	0.5216420		0.6438400		0.3903730		0.4911350		0.1464590	
FD.P_parcel.800ft	0.6354000		0.7697350		0.4108230		0.5828980		0.1260030	
FD.P_parcel.900ft	0.6929730		0.8453460		0.2313530		0.6692020		**0.0471600**	*
FD.P_parcel.1000ft	0.5016590		0.6624330		0.1438170		0.5389180		**0.0332040**	*
FD.P_parcel.1100ft	0.3854180		0.5852000		0.2331760		0.5669520		**0.0754750**	.
FD.P_parcel.1200ft	0.3586320		0.6481640		0.5044410		0.8418470		0.2257550	
FD.P_parcel.1300ft	0.2868930		0.5731930		0.6405020		0.9859170		0.4463490	
FD.P_parcel.1400ft	0.2922220		0.5802980		0.7633830		0.9982300		0.7674170	
FD.P_parcel.1500ft	0.3158050		0.6030680		0.8017560		0.8775400		0.9392660	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.2107580		0.1059670		0.2073250		**0.0903660**	.	0.7071210	
FD.100_100.300ft	0.4156760		0.3117660		0.4785130		0.1975710		0.6648930	
FD.100_100.400ft	0.3105570		0.4553280		0.1503610		0.4567570		**0.0558150**	.
FD.100_100.500ft	0.4124920		0.5358360		0.3059410		0.4457050		0.1263530	
FD.100_100.600ft	0.6645300		0.7129000		0.4370860		0.4836740		0.1543910	
FD.100_100.700ft	0.6185060		0.7196720		0.4344240		0.5206050		0.1509160	
FD.100_100.800ft	0.7233820		0.8188380		0.4660870		0.5992200		0.1432400	
FD.100_100.900ft	0.7616200		0.8709460		0.2809350		0.6664850		**0.0600620**	.
FD.100_100.1000ft	0.5476890		0.6877430		0.1750730		0.5315870		**0.0413540**	*
FD.100_100.1100ft	0.4165770		0.6093470		0.2708340		0.5604000		**0.0892470**	.
FD.100_100.1200ft	0.3827500		0.6748910		0.5359950		0.8446840		0.2388700	
FD.100_100.1300ft	0.3049850		0.5967690		0.6606350		0.9953460		0.4500260	
FD.100_100.1400ft	0.3081670		0.6007460		0.7783030		0.9876500		0.7597600	
FD.100_100.1500ft	0.3308130		0.6225560		0.8161580		0.8885940		0.9261040	

Results for Full Model Reduced Sample CoolSet2

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
poly(YearBuilt, 2)	0.4240344	2	0.8089508
poly(ConditionedSpace,	0.7457643	2	0.6887464
Stories	3.0428646	3	0.3850634
SidingType	6.2054735	5	0.2867358
ImprovedInsulation	0.5734413	1	0.4488947
AirConditioning	**0.0035667**	1	0.9523774

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	**0.0203369**	*	**0.0667872**	.	0.1353318		0.7507324		0.6487651	
X100ft	**0.0822850**	.	**0.0932035**	.	0.1347126		0.1928301		0.3615601	
X200ft	0.2215465		**0.0046391**	**	**0.0141516**	*	**0.0025917**	**	0.9444536	
X300ft	0.4265199		**0.0266234**	*	**0.0592404**	.	**0.0103836**	*	0.6078892	
X400ft	0.2718070		0.1055371		0.1722986		**0.0714310**	.	0.4676629	
X500ft	0.2113786		0.2701779		0.2279693		0.3045541		0.1941544	
X600ft	0.2819566		0.4617624		0.2331336		0.5281121		0.1008621	
X700ft	0.2044432		0.3899661		0.2431791		0.5903089		0.1330740	
X800ft	0.2276430		0.4487857		0.2990793		0.6848029		0.1527068	
X900ft	0.2794340		0.5324876		0.3073142		0.7448239		0.1276845	
X1000ft	0.1928250		0.3634213		0.1984863		0.5570575		0.1077251	
X1100ft	0.1577509		0.3201137		0.2356332		0.5820326		0.1636062	
X1200ft	0.1614321		0.3681980		0.4111167		0.7995427		0.3478129	
X1300ft	0.1194178		0.3027499		0.4326124		0.9839915		0.5388739	
X1400ft	0.1155074		0.2950320		0.4874064		0.9813315		0.8677962	
X1500ft	0.1310426		0.3183289		0.5196012		0.8388177		0.9296472	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.1780530		**0.0563720**	.	**0.0715540**	.	**0.0494080**	*	0.2657110	
TD_100.200ft	0.5908530		**0.0320770**	*	**0.0733310**	.	**0.0103910**	*	0.6870910	
TD_200.300ft	0.8631710		0.2464930		0.3692100		**0.0960240**	.	0.5406370	
TD_300.400ft	0.1639330		0.3157890		0.4167860		0.5347740		0.4578520	
TD_400.500ft	0.2845090		0.4659850		0.3324680		0.5312390		0.1721340	
TD_500.600ft	0.7562560		0.9502090		0.9332980		0.9323540		0.5644320	
TD_600.700ft	0.2268160		0.4722700		0.5993950		0.8066730		0.5347530	
TD_700.800ft	0.5452060		0.8056510		0.2018240		0.7895500		**0.0412080**	*
TD_800.900ft	0.6514910		0.8975750		0.8444870		0.9023710		0.4363180	
TD_900.1000ft	**0.0901990**	.	0.2417200		0.4138950		0.9168600		0.8083370	
TD_1000.1100ft	0.1017660		0.2661220		0.4212650		0.9244850		0.6565770	
TD_1100.1200ft	0.2244520		0.4148750		0.5542210		0.5844560		0.5562590	
TD_1200.1300ft	**0.0326570**	*	**0.0867520**	.	0.1831040		0.5440280		0.8592750	
TD_1300.1400ft	0.1567490		0.3714860		0.2381550		0.9463000		0.1372140	
TD_1400.1500ft	0.4795900		0.4539270		0.5845970		0.2988630		0.5393520	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.1780525		**0.0563721**	.	**0.0715540**	.	**0.0494081**	*	0.2657114	
FD.P_parcel.200ft	0.3211912		**0.0023262**	**	**0.0074644**	**	**0.0009120**	***	0.8725110	
FD.P_parcel.300ft	0.5100738		**0.0292412**	*	**0.0723165**	.	**0.0102281**	*	0.8735807	
FD.P_parcel.400ft	0.3125468		0.1209497		0.1609994		**0.0748970**	.	0.3344590	
FD.P_parcel.500ft	0.2342482		0.2839901		0.2350058		0.2941215		0.1906357	
FD.P_parcel.600ft	0.3016397		0.4712862		0.2559484		0.5040802		0.1129093	
FD.P_parcel.700ft	0.2165618		0.3983385		0.2543631		0.5662691		0.1386476	
FD.P_parcel.800ft	0.2381571		0.4585334		0.3097523		0.6673998		0.1569460	
FD.P_parcel.900ft	0.2892223		0.5413914		0.3180022		0.7306151		0.1318269	
FD.P_parcel.1000ft	0.1988156		0.3694945		0.2073585		0.5508336		0.1124465	
FD.P_parcel.1100ft	0.1620287		0.3262179		0.2476589		0.5806606		0.1724139	
FD.P_parcel.1200ft	0.1650893		0.3743777		0.4247091		0.7995032		0.3615239	
FD.P_parcel.1300ft	0.1221103		0.3080220		0.4437906		0.9870400		0.5558784	
FD.P_parcel.1400ft	0.1178559		0.2997081		0.4944741		0.9870779		0.8852694	
FD.P_parcel.1500ft	0.1333716		0.3232192		0.5246874		0.8456274		0.9144975	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.5908530		**0.0320770**	*	**0.0733310**	.	**0.0103910**	*	0.6870910	
FD.100_100.300ft	0.7255970		**0.0820910**	.	0.1771180		**0.0273330**	*	0.9568470	
FD.100_100.400ft	0.4092070		0.2411630		0.1937350		0.1423920		0.1753180	
FD.100_100.500ft	0.2889090		0.4060940		0.2636300		0.4085930		0.1428650	
FD.100_100.600ft	0.3604040		0.5800900		0.3040920		0.6089260		0.1125700	
FD.100_100.700ft	0.2539960		0.4630360		0.2870500		0.6149690		0.1375340	
FD.100_100.800ft	0.2737600		0.5115180		0.3461630		0.6912180		0.1624920	
FD.100_100.900ft	0.3213890		0.5797300		0.3682820		0.7292210		0.1524110	
FD.100_100.1000ft	0.2186860		0.3951510		0.2433320		0.5494640		0.1309680	
FD.100_100.1100ft	0.1754530		0.3459870		0.2802970		0.5803120		0.1940530	
FD.100_100.1200ft	0.1761430		0.3940640		0.4536110		0.8097420		0.3813900	
FD.100_100.1300ft	0.1297500		0.3227440		0.4630380		0.9940000		0.5660410	
FD.100_100.1400ft	0.1243860		0.3124540		0.5100840		0.9916940		0.8870600	
FD.100_100.1500ft	0.1398470		0.3368280		0.5409760		0.8673770		0.9194290	

Results for Full Model Reduced Sample CoolSet3

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
poly(YearBuilt, 2)	0.3826203	2	0.8258764
poly(ConditionedSpace,	0.6767668	2	0.7129219
Stories	2.6979874	3	0.4405694
SidingType	10.6158621	6	0.1009993
ImprovedInsulation	0.4072203	1	0.5233838
AirConditioning	**0.0086767**	1	0.9257853
ImprovedSiding	**0.0093708**	2	0.9953256
ImprovedWindows	2.5095300	2	0.2851429

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	**0.0818548**	.	0.2240338		0.2881695		0.9869588		0.3773078	
X100ft	0.1728889		0.2665477		0.4164630		0.3737055		0.6364741	
X200ft	0.3863025		**0.0079020**	**	**0.0223653**	*	**0.0029141**	**	0.8740601	
X300ft	0.8667748		**0.0138262**	*	**0.0309836**	*	**0.0034901**	**	0.5387060	
X400ft	0.6452999		**0.0983509**	.	0.1618147		**0.0355632**	*	0.4673912	
X500ft	0.4214682		0.4728348		0.2931846		0.3557242		0.1378759	
X600ft	0.4433222		0.6999187		0.3188796		0.7163812		**0.0951139**	.
X700ft	0.3494894		0.5865963		0.4742836		0.6548302		0.2312470	
X800ft	0.4024411		0.6710536		0.6283594		0.7467674		0.3318993	
X900ft	0.3774898		0.6518154		0.5975402		0.7698400		0.3114713	
X1000ft	0.2401548		0.4518164		0.2886048		0.6374811		0.1426831	
X1100ft	0.1796813		0.3761016		0.2398385		0.6772372		0.1359148	
X1200ft	0.1746637		0.4016375		0.4026071		0.9507959		0.2936244	
X1300ft	0.1388498		0.3357701		0.4471628		0.8944081		0.4838395	
X1400ft	0.1365334		0.3333762		0.5298207		0.9353424		0.8428938	
X1500ft	0.1596960		0.3731818		0.5797403		0.8950420		0.8968893	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.2759210		0.2218190		0.2539870		0.1781220		0.3040520	
TD_100.200ft	0.8199060		**0.0357230**	*	**0.0676950**	.	**0.0101490**	*	0.4746810	
TD_200.300ft	0.5464570		**0.0951170**	.	0.1359990		**0.0375080**	*	0.3571590	
TD_300.400ft	0.3769800		0.6610490		0.8207180		0.8127730		0.7510840	
TD_400.500ft	0.2795950		0.5612130		0.3182780		0.9896300		0.1256710	
TD_500.600ft	0.7079450		0.9185510		0.9715040		0.8598060		0.7936420	
TD_600.700ft	0.3650620		0.6006560		0.7869160		0.6492820		0.8205620	
TD_700.800ft	0.7459620		0.9437620		0.4494010		0.9126200		0.1118010	
TD_800.900ft	0.4668990		0.7608740		0.8029610		0.8783620		0.5023430	
TD_900.1000ft	**0.0732210**	.	0.2045550		0.3700680		0.9590010		0.9317540	
TD_1000.1100ft	**0.0764710**	.	0.2096920		0.3772350		0.8810560		0.9290090	
TD_1100.1200ft	0.2011160		0.3246030		0.5080000		0.4297930		0.7544480	
TD_1200.1300ft	**0.0637040**	.	0.1722640		0.3239660		0.7340280		0.9857920	
TD_1300.1400ft	0.1974930		0.4358610		0.2728760		0.8891220		0.1370080	
TD_1400.1500ft	0.5876050		0.5454830		0.5867100		0.3379070		0.3949870	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.2759209		0.2218193		0.2539865		0.1781224		0.3040522	
FD.P_parcel.200ft	0.4968495		**0.0043827**	**	**0.0132480**	*	**0.0012967**	**	0.9431089	
FD.P_parcel.300ft	0.9565631		**0.0149912**	*	**0.0390197**	*	**0.0037577**	**	0.8054155	
FD.P_parcel.400ft	0.6988009		0.1084736		0.1438663		**0.0384068**	*	0.3239167	
FD.P_parcel.500ft	0.4505309		0.4892651		0.2820506		0.3533680		0.1242707	
FD.P_parcel.600ft	0.4643592		0.7160512		0.3199375		0.7101439		**0.0928832**	.
FD.P_parcel.700ft	0.3632235		0.5988384		0.4630413		0.6494309		0.2151647	
FD.P_parcel.800ft	0.4137303		0.6820717		0.6202836		0.7467189		0.3148662	
FD.P_parcel.900ft	0.3864536		0.6612425		0.5894905		0.7701544		0.2963950	
FD.P_parcel.1000ft	0.2457295		0.4593512		0.2913212		0.6383126		0.1417177	
FD.P_parcel.1100ft	0.1834466		0.3824386		0.2473533		0.6797817		0.1394336	
FD.P_parcel.1200ft	0.1778767		0.4071371		0.4116892		0.9530230		0.3000927	
FD.P_parcel.1300ft	0.1412602		0.3399517		0.4547400		0.8903631		0.4922719	
FD.P_parcel.1400ft	0.1387013		0.3371286		0.5350705		0.9280273		0.8518321	
FD.P_parcel.1500ft	0.1618114		0.3773464		0.5837500		0.9027806		0.8887849	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.8199060		**0.0357230**	*	**0.0676950**	.	**0.0101490**	*	0.4746810	
FD.100_100.300ft	0.7836980		**0.0389470**	*	**0.0926990**	.	**0.0113420**	*	0.9183860	
FD.100_100.400ft	0.8517890		0.2100730		0.2054430		**0.0790260**	.	0.2300160	
FD.100_100.500ft	0.5329660		0.6883990		0.3021090		0.5479520		**0.0894670**	.
FD.100_100.600ft	0.5354100		0.8236720		0.3258990		0.9270300		**0.0800910**	.
FD.100_100.700ft	0.4132870		0.6919840		0.5129010		0.7849890		0.2121500	
FD.100_100.800ft	0.4592180		0.7474660		0.6882760		0.8403320		0.3447590	
FD.100_100.900ft	0.4208600		0.7052710		0.6249210		0.8101650		0.3042370	
FD.100_100.1000ft	0.2668170		0.4941400		0.3141000		0.6639630		0.1451120	
FD.100_100.1100ft	0.1970240		0.4073380		0.2632760		0.6996880		0.1414690	
FD.100_100.1200ft	0.1886720		0.4256700		0.4190770		0.9776730		0.2906930	
FD.100_100.1300ft	0.1491260		0.3519600		0.4586020		0.8595510		0.4719810	
FD.100_100.1400ft	0.1454280		0.3478910		0.5445400		0.8963380		0.8246730	
FD.100_100.1500ft	0.1686060		0.3907070		0.6003430		0.9347130		0.9188470	

Results for Full Model Reduced Sample CoolSet4

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
poly(YearBuilt, 2)	0.3761177	2	0.8285660
poly(ConditionedSpace,	2.1744211	2	0.3371557
Stories	2.0662578	3	0.5587691
SidingType	9.1365143	6	0.1660449
ImprovedInsulation	0.6008713	1	0.4382458
AirConditioning	0.3785224	2	0.8275703
ImprovedSiding	**0.0731392**	2	0.9640910
ImprovedWindows	2.3124903	2	0.3146655

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	**0.0753030**	.	0.1839690		0.1126670		0.6184270		0.1112850	
X100ft	0.3437820		0.3606880		0.4710290		0.2852640		0.4815420	
X200ft	0.6322690		**0.0143910**	*	**0.0384990**	*	**0.0041080**	**	0.9414490	
X300ft	0.7844900		**0.0123690**	*	**0.0190380**	*	**0.0031750**	**	0.2843580	
X400ft	0.9878410		**0.0572400**	.	0.1265350		**0.0167650**	*	0.8241860	
X500ft	0.5969470		0.5412120		0.5682730		0.3301220		0.3726480	
X600ft	0.5338100		0.7835670		0.6727010		0.7466210		0.3046960	
X700ft	0.4406020		0.6375760		0.8064180		0.5777630		0.7674930	
X800ft	0.5340870		0.7682760		0.9113850		0.7041780		0.9115500	
X900ft	0.4991110		0.7862830		0.9106250		0.8651940		0.8044180	
X1000ft	0.3216070		0.6104510		0.6100650		0.9021370		0.3602360	
X1100ft	0.2663630		0.5401150		0.6288040		0.9214710		0.4745740	
X1200ft	0.2397800		0.4781260		0.6498680		0.7434210		0.6717500	
X1300ft	0.2142540		0.4128900		0.6165140		0.6246960		0.8375750	
X1400ft	0.2372510		0.4653670		0.6670530		0.7025490		0.8192590	
X1500ft	0.2788880		0.5543680		0.6947050		0.8883390		0.5994720	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.5144692		0.3167322		0.2534977		0.1714232		0.1850601	
TD_100.200ft	0.9713311		**0.0353505**	*	**0.0612069**	.	**0.0097309**	**	0.4030613	
TD_200.300ft	0.3194420		**0.0357789**	*	**0.0847008**	.	**0.0177534**	*	0.8451786	
TD_300.400ft	0.5853296		0.6137261		0.8021229		0.4096759		0.8618580	
TD_400.500ft	0.2070407		0.3982622		0.3704391		0.6088011		0.2554004	
TD_500.600ft	0.5777972		0.8388840		0.9348667		0.8324852		0.7801132	
TD_600.700ft	0.4367571		0.6144324		0.8007834		0.5411569		0.8454238	
TD_700.800ft	0.9385224		0.9629464		0.3835370		0.7918822		**0.0845190**	.
TD_800.900ft	0.5369422		0.6701619		0.7441570		0.5161365		0.5064779	
TD_900.1000ft	**0.0856800**	.	0.1649747		0.3121751		0.4162171		0.9628662	
TD_1000.1100ft	0.1610984		0.3608418		0.4651735		0.7593005		0.4673295	
TD_1100.1200ft	0.1857821		0.1551152		0.2839247		0.1616867		0.7417352	
TD_1200.1300ft	0.1712132		0.3440009		0.5439503		0.5990048		0.8673616	
TD_1300.1400ft	0.5270077		0.8039524		0.2724304		0.8406976		**0.0631653**	.
TD_1400.1500ft	0.8481773		0.6505850		0.5365701		0.3642505		0.2516879	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.5144692		0.3167322		0.2534977		0.1714232		0.1850601	
FD.P_parcel.200ft	0.7658285		**0.0082954**	**	**0.0233957**	*	**0.0020690**	**	0.9102926	
FD.P_parcel.300ft	0.7033408		**0.0125083**	*	**0.0259121**	*	**0.0033508**	**	0.4583882	
FD.P_parcel.400ft	0.9316155		**0.0605789**	.	0.1358723		**0.0179616**	*	0.9958124	
FD.P_parcel.500ft	0.6296757		0.5511588		0.5618291		0.3274223		0.3532854	
FD.P_parcel.600ft	0.5555039		0.7957607		0.6840949		0.7371127		0.3089844	
FD.P_parcel.700ft	0.4551508		0.6465790		0.8101823		0.5725621		0.7524236	
FD.P_parcel.800ft	0.5463583		0.7783643		0.9172914		0.7076832		0.9144784	
FD.P_parcel.900ft	0.5085649		0.7947454		0.9169888		0.8694330		0.8164112	
FD.P_parcel.1000ft	0.3277445		0.6183454		0.6282807		0.9065401		0.3771524	
FD.P_parcel.1100ft	0.2707954		0.5465162		0.6462687		0.9261266		0.4990572	
FD.P_parcel.1200ft	0.2433356		0.4826179		0.6597170		0.7413584		0.6939131	
FD.P_parcel.1300ft	0.2171973		0.4157030		0.6215565		0.6205209		0.8567926	
FD.P_parcel.1400ft	0.2399737		0.4673450		0.6668547		0.6954971		0.8044129	
FD.P_parcel.1500ft	0.2814767		0.5570103		0.6929026		0.8805343		0.5884577	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.9713311		**0.0353505**	*	**0.0612069**	.	**0.0097309**	**	0.4030613	
FD.100_100.300ft	0.5173866		**0.0232628**	*	**0.0488957**	*	**0.0078153**	**	0.5310302	
FD.100_100.400ft	0.8118402		**0.0928777**	.	0.1938611		**0.0302677**	*	0.9076790	
FD.100_100.500ft	0.6860548		0.7257410		0.6434719		0.4890342		0.3103111	
FD.100_100.600ft	0.5988902		0.8699039		0.7141676		0.9434476		0.2977453	
FD.100_100.700ft	0.4876542		0.7292567		0.8652956		0.6946081		0.7422368	
FD.100_100.800ft	0.5769210		0.8303424		0.9456887		0.8006967		0.9406314	
FD.100_100.900ft	0.5319638		0.8195212		0.9211629		0.9142942		0.7573258	
FD.100_100.1000ft	0.3429586		0.6386893		0.6017816		0.9336220		0.3260479	
FD.100_100.1100ft	0.2811596		0.5617517		0.6257908		0.9474199		0.4378221	
FD.100_100.1200ft	0.2513214		0.4887065		0.6436797		0.7201217		0.6174647	
FD.100_100.1300ft	0.2235054		0.4166499		0.6121979		0.5962062		0.7785146	
FD.100_100.1400ft	0.2458293		0.4683771		0.6762130		0.6696952		0.8733500	
FD.100_100.1500ft	0.2874097		0.5615598		0.7157173		0.8534689		0.6448184	

Simple Model – Reduced Sample

Results for Simple Model Reduced Sample CoolSet1

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	**0.0022728**	1	0.9619765
ConditionedSpace	0.8136343	1	0.3670479
Stories	2.0113276	3	0.5700590

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	**0.0366570**	*	0.1141060		0.1439130		0.8368040		0.3015530	
X100ft	**0.0589320**	.	**0.0208760**	*	**0.0488290**	*	**0.0455380**	*	0.6335440	
X200ft	**0.0794020**	.	**0.0150380**	*	**0.0409900**	*	**0.0237460**	*	0.9903890	
X300ft	0.1568820		**0.0526220**	.	0.1195920		**0.0514090**	.	0.8332840	
X400ft	0.1311190		0.1381310		0.1133830		0.1981710		0.1632900	
X500ft	0.1987190		0.2567540		**0.0942830**	.	0.3019060		**0.0594530**	.
X600ft	0.2926570		0.4412410		**0.0909480**	.	0.4635800		**0.0296200**	*
X700ft	0.2800700		0.4957910		**0.0869160**	.	0.6166860		**0.0242900**	*
X800ft	0.3919530		0.6589030		0.1145130		0.7379010		**0.0246080**	*
X900ft	0.4500590		0.7339520		**0.0856700**	.	0.8116310		**0.0148450**	*
X1000ft	0.3201890		0.5743620		**0.0696840**	.	0.7137030		**0.0153750**	*
X1100ft	0.2416830		0.4833640		0.1376120		0.7482000		**0.0457180**	*
X1200ft	0.1990440		0.4436500		0.3029820		0.9593560		0.1584670	
X1300ft	0.1423640		0.3424580		0.3868740		0.8747410		0.3450520	
X1400ft	0.1316720		0.3239410		0.4848350		0.8941180		0.6375440	
X1500ft	0.1294870		0.3226030		0.5121760		0.9740220		0.7862980	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	**0.0978300**	.	**0.0135680**	*	**0.0333630**	*	**0.0174170**	*	0.6372770	
TD_100.200ft	0.2029350		0.1171530		0.2384580		0.1051970		0.9520700	
TD_200.300ft	0.4579260		0.3053500		0.2847820		0.1779810		0.2360550	
TD_300.400ft	0.2019180		0.3468220		0.3548560		0.4784000		0.2885530	
TD_400.500ft	0.6426680		0.7690710		0.1508180		0.5762950		**0.0293500**	*
TD_500.600ft	0.8464660		0.9699450		0.9942050		0.8765570		0.8897810	
TD_600.700ft	0.4471900		0.7520040		0.6791980		0.9684100		0.3312970	
TD_700.800ft	0.9429110		0.9974800		0.5674810		0.9994690		0.1553750	
TD_800.900ft	0.7601370		0.9311590		0.9794680		0.8215570		0.8269450	
TD_900.1000ft	0.1311370		0.3187680		0.5200130		0.8361540		0.9143210	
TD_1000.1100ft	**0.0945330**	.	0.2393110		0.3934660		0.7460170		0.6826610	
TD_1100.1200ft	**0.0989380**	.	0.1490820		0.2586470		0.2986060		0.6063480	
TD_1200.1300ft	**0.0244310**	*	**0.0746640**	.	0.1541590		0.6614730		0.7110580	
TD_1300.1400ft	0.1271300		0.3177500		0.1734810		0.9549570		0.1053180	
TD_1400.1500ft	0.2035950		0.2596640		0.3722900		0.2990790		0.4997520	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	**0.0978300**	.	**0.0135680**	*	**0.0333630**	*	**0.0174170**	*	0.6372770	
FD.P_parcel.200ft	0.1065410		**0.0138660**	*	**0.0359720**	*	**0.0164680**	*	0.7356870	
FD.P_parcel.300ft	0.1841950		**0.0649940**	.	0.1433990		**0.0567910**	.	0.8400930	
FD.P_parcel.400ft	0.1455770		0.1603050		**0.0912340**	.	0.2168020		0.1005210	
FD.P_parcel.500ft	0.2117800		0.2665290		**0.0892660**	.	0.2979750		**0.0529200**	.
FD.P_parcel.600ft	0.3040040		0.4401190		**0.0995050**	.	0.4417140		**0.0333760**	*
FD.P_parcel.700ft	0.2890760		0.4942350		**0.0956950**	.	0.5849580		**0.0275940**	*
FD.P_parcel.800ft	0.4017160		0.6589830		0.1248120		0.7076060		**0.0275490**	*
FD.P_parcel.900ft	0.4588360		0.7343100		**0.0941210**	.	0.7812880		**0.0167340**	*
FD.P_parcel.1000ft	0.3255560		0.5742040		**0.0765380**	.	0.6926790		**0.0173130**	*
FD.P_parcel.1100ft	0.2453960		0.4853960		0.1492200		0.7339610		**0.0507400**	.
FD.P_parcel.1200ft	0.2018400		0.4484010		0.3189240		0.9705240		0.1695680	
FD.P_parcel.1300ft	0.1444690		0.3466190		0.4013610		0.8796540		0.3638530	
FD.P_parcel.1400ft	0.1334630		0.3273300		0.4945740		0.8947600		0.6620820	
FD.P_parcel.1500ft	0.1310340		0.3255610		0.5187420		0.9755040		0.8098070	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.2029350		0.1171530		0.2384580		0.1051970		0.9520700	
FD.100_100.300ft	0.2936580		0.1450620		0.2357630		**0.0986220**	.	0.5146420	
FD.100_100.400ft	0.2074090		0.2809990		**0.0647500**	.	0.3295520		**0.0329330**	*
FD.100_100.500ft	0.2780610		0.3713710		**0.0793860**	.	0.3686520		**0.0305930**	*
FD.100_100.600ft	0.3789150		0.5411620		0.1121250		0.4973480		**0.0303890**	*
FD.100_100.700ft	0.3468940		0.5651340		0.1164290		0.6053130		**0.0302950**	*
FD.100_100.800ft	0.4633280		0.7160100		0.1521810		0.7105180		**0.0324200**	*
FD.100_100.900ft	0.5097390		0.7689950		0.1262250		0.7553760		**0.0231690**	*
FD.100_100.1000ft	0.3580170		0.6011070		0.1023240		0.6677530		**0.0237570**	*
FD.100_100.1100ft	0.2667900		0.5089390		0.1816760		0.7134220		**0.0627490**	.
FD.100_100.1200ft	0.2170340		0.4723270		0.3475530		0.9767310		0.1819940	
FD.100_100.1300ft	0.1547890		0.3647480		0.4236580		0.8755170		0.3744270	
FD.100_100.1400ft	0.1419740		0.3425930		0.5128780		0.8873240		0.6676540	
FD.100_100.1500ft	0.1386050		0.3398740		0.5355350		0.9851280		0.8115580	

Results for Simple Model Reduced Sample CoolSet2

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	0.5171155	1	0.4720747
ConditionedSpace	0.4370243	1	0.5085622
Stories	4.2352279	3	0.2371585

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	0.0280787	*	0.0924697	.	0.1396445		0.9736517		0.3903307	
X100ft	0.1353875		0.1008024		0.1295539		0.1276124		0.3023532	
X200ft	0.2438760		0.0040440	**	0.0118941	*	0.0020404	**	0.7755235	
X300ft	0.3471853		0.0132312	*	0.0352740	*	0.0055532	**	0.8270645	
X400ft	0.2285095		0.0768612	.	0.0833477	.	0.0566845	.	0.2205929	
X500ft	0.1952919		0.2187578		0.0836770	.	0.2444724		0.0607555	.
X600ft	0.2264417		0.4061425		0.0700029	.	0.5533479		0.0231197	*
X700ft	0.1737470		0.3822904		0.0841073	.	0.7584169		0.0314134	*
X800ft	0.2119486		0.4566740		0.1410535		0.8644338		0.0502250	.
X900ft	0.2457815		0.5096109		0.1507766		0.8924890		0.0481348	*
X1000ft	0.1658908		0.3628632		0.1148289		0.7189808		0.0502908	.
X1100ft	0.1319740		0.3115403		0.1757785		0.7640031		0.1092038	
X1200ft	0.1143993		0.2921220		0.3009022		0.9731939		0.2752943	
X1300ft	0.0771683	.	0.2092714		0.3051079		0.8347981		0.4729385	
X1400ft	0.0662089	.	0.1860493		0.3350952		0.8594698		0.7923502	
X1500ft	0.0672647	.	0.1915212		0.3528484		0.9831933		0.9776551	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.2458240		0.0770330	.	0.0827680	.	0.0533680	.	0.2176910	
TD_100.200ft	0.5404630		0.0360050	*	0.0869190	.	0.0124340	*	0.9239540	
TD_200.300ft	0.6160060		0.1625680		0.2141090		0.0662310	.	0.3555980	
TD_300.400ft	0.1650510		0.3606050		0.3662910		0.7140270		0.2886920	
TD_400.500ft	0.3151360		0.4951860		0.2463160		0.5248140		0.0999140	.
TD_500.600ft	0.5528530		0.8402900		0.9218030		0.9849380		0.7056960	
TD_600.700ft	0.2363410		0.4942530		0.7074580		0.8746540		0.9759280	
TD_700.800ft	0.6337220		0.8710200		0.5996150		0.8197390		0.2069500	
TD_800.900ft	0.5342020		0.8255690		0.9442430		0.9645060		0.9629600	
TD_900.1000ft	0.0745810	.	0.2059570		0.3242690		0.8837270		0.5596300	
TD_1000.1100ft	0.0779610	.	0.2044160		0.3366320		0.7465680		0.6264470	
TD_1100.1200ft	0.0849230	.	0.1508500		0.2549690		0.3646740		0.5763700	
TD_1200.1300ft	0.0133350	*	0.0379480	*	0.0905300	.	0.4968220		0.8890360	
TD_1300.1400ft	0.0506360	.	0.1496040		0.1024810		0.8682850		0.1269510	
TD_1400.1500ft	0.1641740		0.2935940		0.4156590		0.4676020		0.5190740	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.2458242		0.0770328	.	0.0827685	.	0.0533676	.	0.2176909	
FD.P_parcel.200ft	0.3334548		0.0028372	**	0.0073998	**	0.0010848	**	0.5465813	
FD.P_parcel.300ft	0.4114639		0.0181344	*	0.0469068	*	0.0069331	**	0.8441336	
FD.P_parcel.400ft	0.2595016		0.0981236	.	0.0742355	.	0.0678981	.	0.1370511	
FD.P_parcel.500ft	0.2136452		0.2379598		0.0839413	.	0.2508865		0.0551593	.
FD.P_parcel.600ft	0.2398999		0.4193950		0.0804651	.	0.5440758		0.0265769	*
FD.P_parcel.700ft	0.1826294		0.3927835		0.0935161	.	0.7363630		0.0348930	*
FD.P_parcel.800ft	0.2206789		0.4677803		0.1539017		0.8448500		0.0549351	.
FD.P_parcel.900ft	0.2534911		0.5184977		0.1635307		0.8714855		0.0526725	.
FD.P_parcel.1000ft	0.1705393		0.3678773		0.1231217		0.7055856		0.0543093	.
FD.P_parcel.1100ft	0.1352035		0.3163365		0.1871099		0.7562295		0.1172834	
FD.P_parcel.1200ft	0.1168977		0.2971252		0.3133154		0.9787956		0.2884665	
FD.P_parcel.1300ft	0.0789091	.	0.2130858		0.3150048		0.8352512		0.4911409	
FD.P_parcel.1400ft	0.0675644	.	0.1890114		0.3413198		0.8566112		0.8140628	
FD.P_parcel.1500ft	0.0684820	.	0.1943046		0.3569983		0.9789435		0.9973986	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.5404630		0.0360050	*	0.0869190	.	0.0124340	*	0.9239540	
FD.100_100.300ft	0.5564490		0.0541200	.	0.1138300		0.0193770	*	0.6676930	
FD.100_100.400ft	0.3226960		0.2042060		0.0958300	.	0.1394310		0.0790570	.
FD.100_100.500ft	0.2537980		0.3449820		0.1014680		0.3625210		0.0453550	*
FD.100_100.600ft	0.2814890		0.5100810		0.1019900		0.6558900		0.0285790	*
FD.100_100.700ft	0.2108320		0.4440110		0.1130900		0.7815780		0.0386550	*
FD.100_100.800ft	0.2504490		0.5119700		0.1775210		0.8521450		0.0599310	.
FD.100_100.900ft	0.2796330		0.5512150		0.1990480		0.8474510		0.0642680	.
FD.100_100.1000ft	0.1864090		0.3891110		0.1518050		0.6882080		0.0674830	.
FD.100_100.1100ft	0.1458420		0.3331630		0.2153770		0.7429450		0.1352000	
FD.100_100.1200ft	0.1246190		0.3121630		0.3354030		0.9778170		0.3034310	
FD.100_100.1300ft	0.0838660	.	0.2229750		0.3301720		0.8232090		0.5029310	
FD.100_100.1400ft	0.0714680	.	0.1969830		0.3533480		0.8399870		0.8220100	
FD.100_100.1500ft	0.0720360	.	0.2022370		0.3684020		0.9597250		0.9994710	

Results for Simple Model Reduced Sample CoolSet3

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	0.5865435	1	0.4437589
ConditionedSpace	0.4659008	1	0.4948791
Stories	2.4757991	3	0.4796806

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	**0.0436490**	*	**0.0982167**	.	0.1997125		0.4431258		0.8241740	
X100ft	0.1339428		0.1914737		0.2824513		0.3035649		0.4697244	
X200ft	0.2921194		**0.0058978**	**	**0.0159634**	*	**0.0026052**	**	0.6958757	
X300ft	0.6347435		**0.0054909**	**	**0.0158273**	*	**0.0014332**	**	0.8382959	
X400ft	0.4945503		**0.0750310**	.	**0.0460949**	*	**0.0302417**	*	**0.0988375**	.
X500ft	0.3789073		0.3491959		**0.0463538**	*	0.2492659		**0.0162496**	*
X600ft	0.3443088		0.5707728		**0.0682694**	.	0.6284308		**0.0148171**	*
X700ft	0.2708539		0.5035520		0.2002713		0.6801226		**0.0720949**	.
X800ft	0.3412804		0.6155369		0.3986486		0.7863538		0.1599692	
X900ft	0.2939824		0.5182653		0.3983099		0.6375312		0.2011744	
X1000ft	0.1831961		0.3333202		0.1821000		0.5090620		0.1049341	
X1100ft	0.1375597		0.2856308		0.1758800		0.5737525		0.1211408	
X1200ft	0.1224627		0.3045982		0.3439738		0.8995334		0.3296735	
X1300ft	**0.0948370**	.	0.2510529		0.3853787		0.9617615		0.5859899	
X1400ft	**0.0896578**	.	0.2402256		0.4182441		0.9723242		0.9249072	
X1500ft	**0.0961492**	.	0.2531993		0.4303572		0.9336761		0.8440664	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.2194863		0.2240269		0.2167637		0.2242580		0.2293904	
TD_100.200ft	0.6760132		**0.0132443**	*	**0.0311821**	*	**0.0036295**	**	0.5979776	
TD_200.300ft	0.7873432		**0.0718938**	.	**0.0640468**	.	**0.0227271**	*	0.1632377	
TD_300.400ft	0.3729258		0.6691091		0.6527155		0.8942146		0.3630452	
TD_400.500ft	0.3661597		0.6486177		0.2192141		0.8112603		**0.0600838**	.
TD_500.600ft	0.4651898		0.7679817		0.8883011		0.9948183		0.7376822	
TD_600.700ft	0.3080479		0.4878573		0.6979527		0.5256623		0.9142887	
TD_700.800ft	0.7971251		0.9296837		0.8032233		0.7768141		0.3576118	
TD_800.900ft	0.3165512		0.5280484		0.7358309		0.5958189		0.9297698	
TD_900.1000ft	**0.0557420**	.	0.1626903		0.2872091		0.9241351		0.6793903	
TD_1000.1100ft	**0.0616889**	.	0.1772837		0.3306175		0.9489347		0.9795007	
TD_1100.1200ft	0.1012759		0.1532887		0.2703636		0.3023544		0.6555777	
TD_1200.1300ft	**0.0413787**	*	0.1205292		0.2369770		0.7411623		0.8285146	
TD_1300.1400ft	0.1158464		0.2937398		0.2539546		0.9586532		0.2051872	
TD_1400.1500ft	0.2623362		0.4737481		0.5760480		0.6188970		0.4812199	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.2194863		0.2240269		0.2167637		0.2242580		0.2293904	
FD.P_parcel.200ft	0.3825652		0.0042772	**	0.0103263	*	0.0015022	**	0.5117335	
FD.P_parcel.300ft	0.7179287		0.0072361	**	0.0203430	*	0.0018274	**	0.8407252	
FD.P_parcel.400ft	0.5425015		0.0946588	.	0.0356127	*	0.0374150	*	0.0537216	.
FD.P_parcel.500ft	0.4077588		0.3812026		0.0398022	*	0.2651184		0.0121547	*
FD.P_parcel.600ft	0.3619450		0.5963722		0.0650754	.	0.6472754		0.0132456	*
FD.P_parcel.700ft	0.2828925		0.5213354		0.1923786		0.6896430		0.0652504	.
FD.P_parcel.800ft	0.3525332		0.6308152		0.3973407		0.7981417		0.1540311	
FD.P_parcel.900ft	0.3021728		0.5300048		0.4019756		0.6438832		0.1982406	
FD.P_parcel.1000ft	0.1881453		0.3415977		0.1910632		0.5138096		0.1091255	
FD.P_parcel.1100ft	0.1408125		0.2919620		0.1870956		0.5785957		0.1290447	
FD.P_parcel.1200ft	0.1251614		0.3099855		0.3565715		0.9038580		0.3436977	
FD.P_parcel.1300ft	0.0968021	.	0.2550503		0.3940858		0.9550161		0.6019918	
FD.P_parcel.1400ft	0.0913279	.	0.2436616		0.4234271		0.9628673		0.9411688	
FD.P_parcel.1500ft	0.0976061	.	0.2564699		0.4334639		0.9429702		0.8313669	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.6760132		0.0132443	*	0.0311821	*	0.0036295	**	0.5979776	
FD.100_100.300ft	0.9773856		0.0134545	*	0.0342424	*	0.0033322	**	0.7324201	
FD.100_100.400ft	0.6917585		0.1710093		0.0520977	.	0.0663501	.	0.0434246	*
FD.100_100.500ft	0.4958776		0.5571032		0.0438563	*	0.4002266		0.0087852	**
FD.100_100.600ft	0.4301742		0.7178385		0.0718288	.	0.8288686		0.0120541	*
FD.100_100.700ft	0.3299807		0.6054172		0.2265854		0.8006380		0.0685723	.
FD.100_100.800ft	0.3989365		0.6935082		0.4693310		0.8682527		0.1802988	
FD.100_100.900ft	0.3357909		0.5747277		0.4668839		0.6637922		0.2310847	
FD.100_100.1000ft	0.2077353		0.3721308		0.2348220		0.5272940		0.1330663	
FD.100_100.1100ft	0.1535034		0.3145825		0.2209264		0.5897879		0.1505661	
FD.100_100.1200ft	0.1345032		0.3284881		0.3826064		0.9227484		0.3604507	
FD.100_100.1300ft	0.1034073		0.2680222		0.4117417		0.9286128		0.6108017	
FD.100_100.1400ft	0.0968478	.	0.2546761		0.4381145		0.9344558		0.9436714	
FD.100_100.1500ft	0.1029068		0.2679327		0.4487836		0.9719041		0.8375822	

Results for Simple Model Reduced Sample CoolSet4

For covariates alone, without distance in the model:			
	Chisq	Df	Pr(>Chisq)
YearBuilt	**0.0721400**	1	0.7882460
ConditionedSpace	1.5460631	1	0.2137176
Stories	2.0586220	3	0.5603291

For distance variables, when adding them to a model with the covariates as above:

Comprehensive parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
Parcel	**0.0766652**	.	0.1175835		0.1622925		0.2850506		0.3543614	
X100ft	0.2843815		0.2538005		0.3086332		0.2073090		0.3547514	
X200ft	0.4312763		**0.0092253**	**	**0.0220219**	*	**0.0031681**	**	0.5746288	
X300ft	0.8432167		**0.0052835**	**	**0.0146339**	*	**0.0012306**	**	0.7303132	
X400ft	0.6776064		**0.0486026**	*	**0.0689391**	.	**0.0154226**	*	0.3068757	
X500ft	0.4496319		0.3658049		0.1003074		0.2305580		**0.0410628**	*
X600ft	0.3595880		0.5763603		0.1638431		0.6044080		**0.0460889**	*
X700ft	0.2946819		0.5032050		0.4160228		0.5949358		0.2259373	
X800ft	0.4094681		0.6869978		0.6654282		0.7823445		0.3640645	
X900ft	0.3583586		0.6365657		0.6916260		0.7957764		0.4542689	
X1000ft	0.2301770		0.4698708		0.4078330		0.7732035		0.2399822	
X1100ft	0.1933326		0.4216331		0.4894019		0.8229168		0.4026454	
X1200ft	0.1683307		0.3775804		0.5636763		0.7963567		0.7395319	
X1300ft	0.1450315		0.3211697		0.5213682		0.6852642		0.9515302	
X1400ft	0.1480476		0.3343879		0.5225760		0.7336530		0.7829182	
X1500ft	0.1588301		0.3676212		0.5210287		0.8540562		0.6045759	

Thin band parcel buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
TD_parcel.100ft	0.4080191		0.2984395		0.2076208		0.1885145		0.1463930	
TD_100.200ft	0.7366210		**0.0185401**	*	**0.0425687**	*	**0.0050671**	**	0.6149552	
TD_200.300ft	0.6311081		**0.0410147**	*	**0.0552783**	.	**0.0131702**	*	0.2750443	
TD_300.400ft	0.4567104		0.7045102		0.8148509		0.6976622		0.6183445	
TD_400.500ft	0.2856269		0.5628949		0.2742499		0.8887874		**0.0993232**	.
TD_500.600ft	0.3577628		0.6576664		0.8113760		0.9883561		0.7216915	
TD_600.700ft	0.3423311		0.5222187		0.7314770		0.5257276		0.9570154	
TD_700.800ft	0.9830281		0.9930671		0.7043747		0.9076196		0.2382387	
TD_800.900ft	0.3578042		0.6557609		0.8388274		0.9376748		0.9275225	
TD_900.1000ft	**0.0701984**	.	0.1718154		0.3087114		0.6056501		0.7501421	
TD_1000.1100ft	0.1299494		0.3160158		0.3893922		0.8593873		0.3972312	
TD_1100.1200ft	0.1160837		**0.0896763**	.	0.1579419		0.1274366		0.5267273	
TD_1200.1300ft	0.1009083		0.2295680		0.3879270		0.6032185		0.7452427	
TD_1300.1400ft	0.2502606		0.5195066		0.2835370		0.9905308		0.1156552	
TD_1400.1500ft	0.3667785		0.6069287		0.5893855		0.6627125		0.3371972	

Wide band parcel excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.P_parcel.100ft	0.4080191		0.2984395		0.2076208		0.1885145		0.1463930	
FD.P_parcel.200ft	0.5229703		**0.0073773**	**	**0.0151158**	*	**0.0021948**	**	0.4163049	
FD.P_parcel.300ft	0.9155840		**0.0068557**	**	**0.0196810**	*	**0.0016057**	**	0.9858521	
FD.P_parcel.400ft	0.7199589		**0.0614684**	.	**0.0662546**	.	**0.0196284**	*	0.2093868	
FD.P_parcel.500ft	0.4731857		0.3954221		**0.0923833**	.	0.2471294		**0.0335904**	*
FD.P_parcel.600ft	0.3722547		0.5951289		0.1649065		0.6189273		**0.0447353**	*
FD.P_parcel.700ft	0.3032686		0.5151376		0.4169503		0.6006605		0.2195800	
FD.P_parcel.800ft	0.4180431		0.6981080		0.6783037		0.7933736		0.3711549	
FD.P_parcel.900ft	0.3646243		0.6450982		0.7086721		0.8034536		0.4734526	
FD.P_parcel.1000ft	0.2342518		0.4769079		0.4323785		0.7799102		0.2612659	
FD.P_parcel.1100ft	0.1962607		0.4269916		0.5109646		0.8288392		0.4339160	
FD.P_parcel.1200ft	0.1707030		0.3811376		0.5727464		0.7933625		0.7697679	
FD.P_parcel.1300ft	0.1469900		0.3234312		0.5246436		0.6796862		0.9771388	
FD.P_parcel.1400ft	0.1497045		0.3359086		0.5212379		0.7253582		0.7623044	
FD.P_parcel.1500ft	0.1602281		0.3692506		0.5182871		0.8453386		0.5897867	

Wide band parcel to 100 foot excluded buffers

	p.overall1		p.overall2		p.overall3		p.degree2v1		p.degree3v2	
FD.100_100.200ft	0.7366210		**0.0185401**	*	**0.0425687**	*	**0.0050671**	**	0.6149552	
FD.100_100.300ft	0.8839661		**0.0113857**	*	**0.0308297**	*	**0.0028084**	**	0.8919573	
FD.100_100.400ft	0.8346551		0.1014178		**0.0995795**	.	**0.0332664**	*	0.1981526	
FD.100_100.500ft	0.5301243		0.5478514		0.1108533		0.3681077		**0.0289648**	*
FD.100_100.600ft	0.4131614		0.6918581		0.1890595		0.7872840		**0.0450395**	*
FD.100_100.700ft	0.3334399		0.5829668		0.4665626		0.6974760		0.2261814	
FD.100_100.800ft	0.4503316		0.7428864		0.7328561		0.8631126		0.4056121	
FD.100_100.900ft	0.3884268		0.6750066		0.7364024		0.8252417		0.4852047	
FD.100_100.1000ft	0.2486496		0.4993313		0.4520994		0.7919761		0.2656981	
FD.100_100.1100ft	0.2062397		0.4437607		0.5213418		0.8385930		0.4255791	
FD.100_100.1200ft	0.1779745		0.3911860		0.5770828		0.7797868		0.7335238	
FD.100_100.1300ft	0.1525334		0.3289408		0.5300313		0.6609837		0.9350779	
FD.100_100.1400ft	0.1547285		0.3407799		0.5321275		0.7042567		0.7989576	
FD.100_100.1500ft	0.1651262		0.3753712		0.5345949		0.8230903		0.6236198	