ESTIMATING THE VALUE OF GROUNDWATER IN IRRIGATION

BY

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THESIS

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ABSTRACT

In recent years there has been increasing regulation of agricultural water use in order to reduce transboundary and environmental water conflicts. Effective policy analysis to support new regulations needs to have tools to estimate correctly the value of irrigation water. Irrigating land increases crop yields and this higher profitability should be capitalized into the sales price of the land. For irrigation that depends on surface water rights, studies have found this to be the case (Xu et al. 1993, Faux and Perry 1999). However, studies that have analyzed the value of groundwater in irrigation have found mixed results. Hartman and Taylor (1989) and Sunderland, Libbin and Torell (1987) find that groundwater irrigation has no significant effect on land prices; Torrell et al. (1990) find a significant positive effect of groundwater in irrigation. One explanation is that in areas where groundwater use is not restricted there is the option to implement irrigation in the future and thus the presence of groundwater irrigation may not have a large effect on the sales price. Consistent with this idea of option value, Petrie and Taylor (2007) look at differences in land values before and after a moratorium on water-use permits and find that permits add value to agricultural land only after the restriction is in place. An additional econometric issue is that the decision to irrigate is not random but is based on the underlying characteristics of the land. Thus hedonic estimates of the value of irrigation rights may be biased. In this thesis we analyze the value of groundwater in an area with pumping restrictions using both a standard hedonic model and a propensity score matching model. we use a geospatial database from Chase County, Nebraska that includes arms length sales, tax assessor's data, hydrologic and climatic variables. We find that per acre values of groundwater irrigation are over 15 percent higher using the propensity score method compared to the hedonic model. This result is driven in large part by the preferential adoption of irrigation on intermediate quality land. An important implication for policy is that hedonic estimates of the value of groundwater in irrigation may underestimate the cost, to both farmers and the government, of future water use reductions.

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INTRODUCTION AND MOTIVATION

Transboundary and water conflict issues have given rise to increasing regulation of agricultural water use. In order to develop effective policy tools to achieve water conservation, the value of irrigation water needs to be estimated accurately. Irrigated land is more profitable than dryland because of increased crop yields. This increased profitability of irrigated land should be capitalized into the sales price of the land. Previous papers on surface water rights have found this to be the case. Xu et al. (1993) found that irrigation in Washington State had a positive effect on land price and Faux and Perry (1999) found similar positive results for irrigated farmland sales in Oregon. On the other hand, studies on irrigation dependent on groundwater have found mixed results. Some studies have found a significant positive effect of irrigation (Torell et al. 1990), but others find no effect on the sale price of agricultural parcels (Hartman and Taylor 1989, Sunderland et al. 1987). One explanation for such results may be that in areas that have no restrictions on groundwater use, there exists the option to implement irrigation in the future and thus sales prices may not be affected by existing irrigation. Petrie and Taylor (2007) find this to be the case in the southeastern United States. They look at differences in land prices before and after a moratorium on water-use permits in Georgia and find that value is only added to the land after the moratorium is in effect.

Another issue that arises in modeling the value of irrigation is that the decision to irrigate a parcel is not random, but is based on underlying observable and unobservable characteristics of the land and its owners. Failure to account for sample selection may result in biased estimates when using a standard hedonic method, as is commonly used in the literature. In this thesis, I use both a standard hedonic model and a propensity score matching model to evaluate the value of groundwater in an area where pumping restrictions are in place.

My study area is Chase County, Nebraska which is part of the Republican River Basin. The county covers an area of 584,000 acres and the population is about 4,000. The majority of the land is used for agricultural production: only six sections out of 912 do not have agricultural land (Figure 1).[1] The Republican River Basin has been the source of long-term litigation between Colorado, Kansas and Nebraska. In 2002, the Supreme Court decided that groundwater pumping by Nebraska contributed to reduced instream flows in Kansas. As a result, groundwater management districts in Nebraska were forced to introduce a variety of restrictions, such as moratoria on new wells (introduced in 1999), metering of existing ones, and volumetric pumping restrictions.

I use a geospatial database that includes arms length sales, tax assessor's data, and hydrologic and climatic variables. The data include all agricultural parcels in Chase County that sold between 2000 and 2008, obtained from the Chase County tax assessor's website (http://chase.assessor.gisworkshop.com/Assessor/index.jsp). There are 330 observations in the dataset. Each parcel contains sale prices along with the new ownership and sales date. In addition, other characteristics of the parcel, such as the presence of outbuildings and the square footage and age of residences are included. Each observation also has the distribution of agricultural land (irrigated, dryland, or grassland) and four soil quality types in each type of land, resulting in a total of twelve soil classes. I also assembled georeferenced data on estimated depth to water, the rate at which a well can pump water, precipitation and growing degree days.

[1] A section is one square mile, which is an area of 640 acres.

First, I estimate an Ordinary Least Squares Regression Model to characterize the sale price per acre of the land. Several alternative specifications are considered, including year dummies, interaction terms between year dummies and irrigation, and dummies between irrigation and hydrologic variables. The main results are that (i) irrigation has a significant and positive effect on the sale price of land, (ii) the rate at which a well can pump water is important in determining the sale price, (iii) depth to water does not have a significant effect on the sale price per acre of land, and (iv) the climatic variables considered do not have an effect. From the preferred OLS model, the value of groundwater irrigation is found to be $712 per acre.

Second, I estimate a propensity score model which involves two steps. First, I estimate the probability of a parcel of land being irrigated using a probit model. The results from the probit show that farmers are more likely to irrigate on lands that are of intermediate quality (soil 2 and soil 3), suggesting that irrigation is land quality augmenting. This follows previous studies on irrigation technology adoption (Lichtenberg 1989). However, unlike results from the OLS model, depth to water and climatic variables do affect the decision to adopt irrigation with expected signs.

In the second step, I match pairs of non-irrigated and irrigated parcels that have the same probability of being irrigated and analyze whether there is a difference in the sales price. Results show that once again there is a positive and significant value associated with groundwater irrigation rights, but the difference is larger than the hedonic analysis at $839.

I find that, controlling for selection, estimates for the value of groundwater irrigation obtained with propensity score matching are higher than estimates obtained with the standard hedonic model. The difference between models appears to be driven by preferential adoption of irrigation on intermediate quality land. Presumably, irrigation is adopted on intermediate quality land because the difference in profitability from irrigation is higher on these lands than on both high and low quality lands. Given that irrigation technology is generally considered to be land quality augmenting, an important policy implication is that simple hedonic analysis may generally underestimate the value of groundwater in irrigation.

Assuming a five percent interest rate, the hedonic results translate to an annual value of water of about $34 per acre foot of water while the propensity score matching model translates to $40 per acre foot of water. In Nebraska and elsewhere where there is an ongoing debate on how to decrease agricultural water use cost-effectively, my results show that future water use reductions may be more costly than expected to both farmers and the government.

This thesis is laid out as follows. First, I provide some background of my study area. This includes the relevant regulatory history of the Republican River Basin and the Upper Republican Natural Resource District in which Chase County is located. Second, I present both the Ordinary Least Squares and Propensity Score Matching models. In the following section, I describe the economic, physical, hydrologic, and climatic data I use in the analysis. I then present the results obtained using both methods of estimation and compare them. Finally, I provide a conclusion with policy implications and future research possibilities in this area.

BACKGROUND

In this section I describe (i) previous work that has been done using hedonic analysis to estimate the value irrigation water and (ii) the institutional background of my study area.

Previous Literature

Irrigating land increases crop yields and this should be capitalized into the sale price of agricultural land. Irrigation can be either from surface water or groundwater sources. Surface water studies find that irrigation increases the sale price of land. For example, Xu et al. (1993) analyze agricultural land sales in Washington state and find that irrigation systems have a positive effect. Their model includes three types of irrigation systems: center pivot, sprinkler, and rill irrigation in areas where available. Their results show that center pivot irrigation adds most value to the sale price, followed by sprinkler irrigation and finally rill irrigation. Faux and Perry (1999) also find surface water irrigation to have a positive effect on the price of farmland in Malheur County, Oregon. They stress the importance of including separate land classes as opposed to an averaged composite index as soil class is not a continuous variable and averaging may result in loss of information. In both Oregon and Washington States, agricultural production is diverse. Conversely, in my study area, irrigated corn and dryland wheat dominate production.

Studies that use hedonic analysis to estimate the value of groundwater irrigation find mixed results. Hartman and Taylor (1989) find that groundwater does not have a significant effect on the sale price of land in Colorado. Sunderland, Libbin, and Torell (1987) find the same result in New Mexico, when analyzing land that uses groundwater from the Ogallala aquifer. Torell et al. (1990) expanded their previous study area from New Mexico to include Oklahoma, Nebraska, Kansas, and Colorado (all of which use the Ogallala) to estimate the value of groundwater. They found a positive effect of irrigation on the sale price. They suggest that the difference in results from previous studies is a result of regional differences that were not included previously. In particular, they found that saturated thickness of the aquifer and measures of farm income were significant determinants in irrigated land values. They also found declining price differentials between irrigated and non-irrigated land over time.

Another reason that may explain these mixed results is that in general, groundwater is private property and its use is not regulated. Without regulations in place there is the option to implement irrigation in the future and so the potential value of irrigation may be captured into the price of both currently irrigated land and dryland. Petrie and Taylor (2007) did a study that is the closest to my analysis. They estimated the value of water in Dooly County, Georgia before and after a moratorium on water use permits. They found that before the moratorium on water use permits there was no difference in the prices of agricultural land with or without permits. However, after the moratorium, land with water use permits attached sold for about 30 percent more than land without permits. Petrie and Taylor's (2007) interpretation was that the moratorium added value of the land with permits; an alternative interpretation is that the moratorium reduced the value of parcels without permits. The moratorium in my study area is different than that in Dooly County, Georgia: permits in the latter allow unlimited pumping from a source whereas in my area there are also volumetric pumping restrictions even with a permit.

To the best of my knowledge, there are no published papers using propensity score matching (PSM) for hedonic analysis. However, several working papers use the PSM methodology in a hedonic context. Cutter et al. (2009) use PSM to estimate the hedonic value of open space land and Lynch et al. (2009) estimate the difference in land price due to preservation programs. The PSM method is applicable to my study as I observe both parcels that are irrigated and those that are not irrigated, and I also have data on the variables that should affect the decision to irrigate. This allows for the estimation of propensity scores for both irrigated and non-irrigated parcels in order to match and compare them with each other.

Institutional Background

The Republican River is formed by the merging of the North Fork Republican River and the South Fork Republican River, both of which originate in northeastern Colorado. It flows eastward for approximately 445 miles through southeast Nebraska and further south entering into the Smoky Hills Region of Kansas where it eventually becomes the Kansas River. The Nebraska portion of the River is known as the Republican River Basin and its watershed constitutes about 24,900 square miles. In 1943 Colorado, Nebraska and Kansas agreed to the Republican River Compact which allocated the "virgin water supply" equitably among the three states. The "virgin water supply" is the "water supply within the Basin undepleted by the the activities of man" (Hinderlider et al. 1942). The compact also stated that the best use of the water was "beneficial consumptive use" which was defined as "that use by which the water supply of the Basin is consumed through the activities of man, and shall include water consumed by evaporation from any reservoir, canal, ditch or irrigated area" (Hinderlider et al. 1942).

The original Compact did not include groundwater in the calculation of the "virgin water supply". Disputes over Nebraska's consumptive water use in the Basin finally resulted in Kansas filing an original action against the states of Nebraska and Colorado in 1998. The United States Supreme Court appointed a Special Master who concluded that groundwater use should be included in the calculations for the virgin water supply and the allocations for each state. On May 19, 2003 the three states entered into a Settlement Agreement and adopted the Special Master's recommendation, as stipulated by the Supreme Court (Nebraska Department of Natural Resources and Upper Republican Natural Resource District 2008).

In Nebraska, water management is undertaken by natural resource districts (NRDs). These NRDs began operation in 1972. The four NRDs in the Republican River Basin are the Upper Republican, Middle Republican, Tri Basin, and Lower Republican NRDs. The NRDs are bounded by the natural boundaries of the Republican River (URNRD fact sheet, 2008). The Upper Republican NRD consists of Perkins, Chase and Dundy counties and covers 435,337 irrigated acres.[2] The goals of the URNRD are to make sure that it is in compliance with the Republican River Compact, that users of water in the URNRD are only responsible for their share in complying with the Compact, and to help to sustain compliance through regulation and incentive programs (Nebraska Department of Natural Resources and Upper Republican Natural Resource District 2008).

In order to comply with the Settlement Agreement, the Nebraska legislature passed LB 962 in 2004; this required NRDs that were over or fully-appropriated in their water use to develop and implement integrated water management plans. One of the methods to help control use was allowing irrigation on only certified acres. A certified acre is any acre of land that has an allocation of groundwater for irrigation allocated to it (Nebraska Department of Natural Resources and Upper Republican Natural Resource District 2008). The certification process used historical and tax assessors' rewards to determine the extent of irrigation.

[2]There are no surface water rights in the study area of Chase County and as a result, all irrigated farmland uses groundwater irrigation only.

The Upper Republican River Basin has required that all ground water use be metered and the data to be reported since 1978. From these data, the NDNR determined that the URNRD pumping volume for the years 1998-2002 was 531,763 acre-feet. It also estimated that for the same time period the URNRD's depletion to stream flow was 74,161 acre-feet. For the URNRD, these numbers mean a depletion proportion of 44 percent. In 2005, the NDNR and URNRD adopted an integrated water management plan that provided regulations starting in 2005 and running until 2007. According to this plan, the URNRD was allowed a groundwater allocation of 13.5 inches per year per certified acre. This plan was implemented to reduce water usage by 5 percent from the 1998-2002 baseline that was calculated. Furthermore, the NDNR and URNRD agreed that a 20 percent reduction in pumping from the 1998-2002 baseline would be enough to keep the total depletions within the 44 percent URNRD share until 2020 (Nebraska Department of Natural Resources and Upper Republican Natural Resource District 2008). In 2008, the URNRD further reduced the allocation to 13 acre inches per year per certified acre.

Note that in the URNRD, if farmers did not face any restrictions on water use, it is estimated that they would use up to 18 acre inches of water per year per irrigated acre (Palazzo 2009). Thus, the current allocation of 13 inches per acre per year is binding on almost all farmers.

MODEL AND ESTIMATION

I use two different techniques for the estimation process. Below, I describe the theory behind each of these models, the assumptions made, and the application to my study area.

Ordinary Least Squares

The idea of looking at the value of a good through its characteristics was first introduced by Lancaster (1966). He outlined three main assumptions of the hedonic approach which broke with tradition. First, the good does not give utility to the consumer directly, but it is the characteristics that make up the good which provide utility. Second, individual goods are made up of numerous characteristics and characteristics do not have to be tied to one good but can be shared by many goods. Third, if two or more goods are considered together they may have characteristics that are different to when each of those goods are viewed separately from each other.

The hedonic method is based on the premise that consumers and producers do not derive benefits from the good itself, but rather from the characteristics that comprise the good. This method can be used when the price of a good that has differing characteristics is observed. The value of the characteristic of interest can then be implicitly estimated using hedonic analysis. In the case of a parcel of land, it may be composed of many differing characteristics such as the the soil quality, air quality, water availability and quality, and the weather. The value of a characteristic can then be estimated from the sale price of land even though we do not observe a market for that characteristic (Freeman 1993).

Hedonic price theory for an agricultural parcel of land is explained below. In the basic model an individual receives utility from the consumption of a commodity X, which is a parcel of land in this case. This commodity or parcel is composed of a vector of hydrologic and climatic characteristics called Q, a vector of physical characteristics called S, and a vector of structural characteristics called N. A person can choose to purchase any parcel of land and increase their consumption of a particular characteristic by buying a parcel that has more of that characteristic. For example, a person can choose a parcel that receives more rain if that is the desired characteristic.

In this thesis, the commodity X is a parcel of land. The vector Q contains the depth to water, pump rate, precipitation, and beneficial and harmful degree days. The vector S includes the different soil types 1 through 4 and N is composed of the assessed value of outbuildings, house size, and age of any house on the parcel.

Mathematically, this model can be represented as:

$$P_{Li} = P_i(S_i, N_i, Q_i) \tag{1}$$

where the price of the ith parcel of land is a function of the vectors of characteristics. This function can be linear or non linear.

The utility of a buyer of a parcel can be modeled as

$$u = u(X, Q_i, S_i, N_i) \tag{2}$$

The buyer maximizes their utility according to his/her budget constraint.

The first order condition for the choice of a characteristic such a better pump rate q_i is

$$\frac{\partial u/\partial q_i}{\partial u/\partial x} = \partial P_{hi}/\partial q_i \tag{3}$$

This partial derivative with respect to any of the characteristics such as q_i, tells us the implicit marginal price of the characteristic; in this case, the pump rate. This is the additional amount that need to be paid to get one more unit of that particular characteristic.

To estimate the hedonic price function, I use an Ordinary Least Squares (OLS) regression. The dependent variable is the sale price of land per acre. Recent hedonic studies (Faux and Perry 1999, Xu et al. 1993) use the per acre sale price. This is because there is such a high range in the total acres of the parcels. The independent variables included in the model are a dummy variable for irrigation, the proportions of each soil quality type, the pump rate (gallons per minute per acre), the house size (square feet per acre), the assessed value of outbuildings ($ per acre), depth to water (feet), precipitation, beneficial growing degree days, and harmful growing degree days. Irrigation is captured with a dummy variable equal to one if the parcel is irrigated and zero if non-irrigated.

Soil qualities were included as better soil qualities are expected to lead to higher yields and so higher profitability. The pump rate is the rate at which a well can pump water. The coefficient on pump rate is expected to be positive because a faster rate of pumping would allow a farmer to irrigate more land. I include the pump rate per parcel as well as per acre. The per parcel value provides information about the decision to irrigate an entire parcel while the pump rate per acre contains information about how much of the parcel the farmer could to irrigate. Structures such as houses and outbuildings also add value to a parcel of land and so positive coefficients are also expected for these. The more recently a house was built, the better condition it should be in, and so we also expect a negative effect of increasing house age on the sales price of land. Depth to water measures the distance to the top of the aquifer. A lower depth would make the water more easily accessible and so a negative coefficient is expected for this variable. Beneficial degree days are those that are conducive to the growing of crops and lead to higher yields. Therefore, the coefficient on this variable should be positive. On the other hand, the coefficient on harmful degree days should be negative as more harmful days will lead to lower crop yields and lower profitability. More detail on each variable is provided in the Data section.

Propensity Score Matching

The second model I use estimates the causal effect of irrigation on the sales price of a parcel of land. Propensity score matching allows for the evaluation of an outcome on particular units (sale price of land, in this project) based on exposure to a program or treatment. The theory is that each unit of interest can be exposed to different levels of treatment and the focus is on a comparison of units that are exposed and those that are not exposed to the treatment (Imbens and Wooldridge 2009). An issue with this is that most often we do not observe different levels of the treatment on a single unit. We only observe the unit being exposed to one level of treatment. Therefore, comparisons must be made between distinct units that have been exposed to different levels of treatment. In the economics literature the focus has been on endogeneity or self selection which means that items that are treated are by definition different that those that are not.

There are two main assumptions that have to be made in order to estimate a PSM model. The first is the conditional independence assumption. This states that the selection into treatment is based on observable characteristics. Therefore, selection into irrigation must be explained by observable variables in the model. The variables that explain selection in this model are soil type, pump rate, depth to water, precipitation and growing degree days. The second is the common support assumption. Having common support means that the treated and untreated groups must have an overlap of propensity scores in order to match them for comparison. Probabilities of the irrigated parcels must overlap probabilities for the non-irrigated parcels.

Propensity score matching is a two step process. In the first step, a probit regression model is estimated. It estimates the probabilities of the treated and non treated variables. For this thesis, it measures the probability that a parcel of land will be irrigated. The dependent variable is a dummy variable that is equal to one if the parcel is irrigated and zero if not irrigated. The independent variables includes in the model are the proportions of soil types, the pump rate (in gallons per minute per acre and in gallons per minute), depth to water (feet), precipitation, beneficial degree days and harmful degree days. The soil qualities are included because irrigation is a land augmenting technology and I expect to see a positive coefficient for poorer quality soils (Lichtenberg 1989). The pump rate and pump rate per acre are included and expected to have a positive effect on irrigation adoption (Savage and Brozović 2009). Depth to water should have a negative coefficient as it would be more expensive to reach water that was deeper underground. Studies have shown that heat increases crop yields but extreme heat decreases yields (Schlenker and Roberts 2009). The range of temperatures for beneficial and extreme heat are discussed in more detail in the data section. Precipitation and beneficial degree days should have a negative coefficient as more precipitation and better growing degree days increase crop yields without the need for irrigation. However, extreme degree days should have a positive effect. Housing and structure data are not included as they should not effect the decision to irrigate.

In the second step of PSM, the “average treatment effect of treatment on the treated” (ATT) values are calculated. This is calculated as the difference between the variables of interest in the treated versus the non treated group that have the same probability of being treated. The control group of untreated variables can be constructed in several ways. Here, I chose nearest neighbor matching that matches a treated observation to an untreated one based on the closest propensity score estimated. The results of the ATT provide the difference in the average of the variables between the treated and control group. PSM controls for the selection into treatment, in this case selection into irrigation, and allows us to compare how the sales price and other variables differ if endogeneity is accounted for. The ATT estimates the difference in all variables of interest. Therefore, the results for variables such as housing data and structural data can also be estimated although they are not included in the first-stage probit.

DATA

For this analysis I synthesized economic, physical, hydrologic, and climatic data. The dataset used includes all agricultural parcels in Chase County, Nebraska that sold between 2000 and 2008. First I will describe data from the Chase County tax assessor's office, and then hydrologic and climatic data. Descriptive statistics for the data are reported in Table 1.

Tax Assessor's Data

Chase County is made up of mostly agricultural land. Out of 912 sections in the county (each one square mile in size), 908 contain some type of agricultural land. The total area of the county is 583,680 acres and the population is 4,381 *(http://www.co.chase.ne.us/about.html)*. Agricultural land sales in the area remain in farmland; there is currently no suburbanization or development pressure for agricultural land.

The Chase County tax assessor's office maintains records of all parcels in the county. There are 2257 agricultural parcels. From 2000 to 2008 there were 554 sales of agricultural parcels. The price range for sales was zero to $4,241,000 with the mean at $146,986. Out of the 554 sales, 190 had sale prices of zero which likely represent transfers from one family member to another. There were also 16 sales which were under $1,000.

The tax assessor's data also include information regarding the type of land in each parcel.

Agricultural land is divided into three types: irrigated, dryland, and grassland. Given current crop prices irrigated land is used mostly used for growing corn as it is the most profitable alternative, and dryland is used to grow wheat. Grassland is not used to grow crops but as pasture. However, in any year a farmer has the choice either to irrigate (if he has the right to do so via certified acres) or to be in dryland production. The tax assessor's office reports acreages in each soil class in each parcel. The soil classes range from one to four with soil class one being the best quality and soil class four the worst. The total acreage of the parcel is the total acreage found by adding averages for all the soil types. Each parcel of land can contain more than one soil type and many contain all four.

Housing data are also provided by the tax assessor. These include the square footage of houses on agricultural parcels along with how old such houses are. There are 287 houses in the complete dataset of 2257 parcels in the county, with a mean square footage of 1550. The size of houses ranges from 384 to 4000 square feet. The age of these houses ranges from one year to 128 years with a mean age of 66 years. Other structures reported are outbuildings. There are 407 parcels with outbuildings.

For the purposes of the analysis in this thesis, I dropped the 206 observations which had sales prices of either zero or under $1,000 as these do not appear to be arms length sales. I calculated the sale price per acre by dividing these by the total acreage. This left 348 sales out of which eight had sale price per acre values of greater than $6,000 and four had total acreages of less than four. These 12 observations were also dropped from the final analysis. Parcels with sale prices per acre above $6,000 were dropped as such high prices are inconsistent with agricultural use. One of the parcels was purchased by an energy company in California and is likely to be for an ethanol plant.[3] The price of another can be attributed to a feedlot on the property. Parcels of less than four acres were dropped because such small

[3]The parcel ID for this purchase is 150002513 and it sold in December 2007.

acreages may not represent land whose primary purpose is agricultural production.[4] These changes left a total of 330 observations with a mean price per acre of $1178. Descriptive statistics for these 330 observations are presented in Table 2. Note the clustering of parcels around 160 acres in size, equal to one quarter section of land (Figure 2).

The soil data were summed up across the four different types (soil 1 through soil 4) and divided by the total acreage to obtain proportions of each type for the analysis. For the parcels that sold, the average proportions of soil 1 and soil 4 were similar at 31 and 33 percent, respectively. The average proportion of soil 2 was 15 percent and soil 3 about 20 percent. In addition, a dummy variable for irrigation was also created. The dummy equaled one if irrigated land was present in the parcel and zero otherwise. Out of the 330 observations, 163 were included some irrigated land and 167 had no irrigated land. Figure 3 shows the distribution of irrigated and dryland in the county with the sale price per acre. Note that the figure shows more irrigated land in the west of the county. This may be due in part to a large precipitation gradient across the county with lower precipitation in the west.

There were 34 observations with houses in the final data set, with a mean square footage of 1514. These were divided by the total acreage and the square feet per acre value was used in the estimation. This follows Xu et al. (1993) and Torell et al. (1990). Butsic (2007) and Parsons (1990) have also argued that weighting of the variable by parcel size is the right specification.[5] The mean house size per acre was about 2 square feet. There were 53 parcels in the final dataset with outbuildings.

Year dummies were also constructed to estimated year fixed effects. The year dummies were equal to one if there was a sale in that year and zero otherwise. Interaction terms be-

[4] Sensitivity to these cutoffs was checked and is reported in the Appendix.

[5] To test if this specification was accurate, the model was also tested using a housing dummy. The results are robust and are reported in the Appendix.

tween the year dummies and irrigation dummy were also included. These were equal to one if there was an irrigated sale in that year and zero otherwise. The number of irrigated and non-irrigated sales in each year are shown in Figure 4.

Hydrological Data

Hydrological data included in the model are depth to water and the rate at which a well can pump water (the pump rate in gallons per minute). Both the depth to water and pump rate data were obtained from the Nebraska Department of Natural Resources *(http://www.dnr.state.ne.us)* wells database (Palazzo 2009). Well-level observations were aggregated up to the section level and spatial interpolation was used to estimate values at section centroids for all parcels, whether irrigated or not (Savage and Brozović 2009). The depth to water measures the distance in feet from the land surface to the top of the aquifer. Figure 5 shows the distribution of depths in the county. The shallowest depths, that is water that is more easily reachable, are found in the west. Depth to water ranges from about 3 feet to 390 feet with a mean of 143 feet, for the parcels that sold.

The pump rate is measured in gallons per minute. The rate is an inherent characteristic of the land and does not depend on the equipment used. Figure 6 shows the distribution of pump rates and pump rates per acre. Values were calculated at the section level as described above. The mean pump rate is 1643 gallons per minute and the mean pump rate per acre 18 gallons per minute. Note that there appears to be less spatial correlation in pump rates than in depth to water (compare figures 5 and 6).

Interaction terms between pump rate and pump rate per acre and the irrigation dummy were also constructed. These variables were included to capture incremental value of pump rate specifically on irrigated land. Similarly, an interaction term between depth to water and the irrigation dummy was constructed.

Climatic Data

Precipitation and minimum and maximum temperature data obtained from the National Weather Service are included *(http://cdo.ncdc.noaa.gov)*. The precipitation data collected were annualized from total monthly precipitation (Savage and Brozović 2009). The temperature data were used to calculate beneficial and harmful growing conditions. Schlenker and Roberts (2009) found that crop production is non linear in heat: heat is beneficial up to a certain point but then it is harmful at higher levels. Schlenker and Roberts estimated that beneficial heat ranges from 8 to 29 degrees Celsius and harmful heat is anything greater than 29 degrees Celsius. Both beneficial and harmful degree days are calculated as lagged three year averages over the growing season, which is from March to August (Savage and Brozović 2009).

RESULTS

In this section I analyze and discuss the results of both the Ordinary Least Squares model and its variations and the Propensity Score Matching model.

Ordinary Least Squares Regression Results

To help with interpretation of results, I present several different models. The simplest model uses Ordinary Least Squares to measure the hedonic value of irrigation (Table 3). Three variations of the model are presented. The first model does not have year fixed effects, the second includes year dummies and the third includes year dummies as well as interaction terms between the year dummies and the irrigation dummy. Each of the variations of the model is discussed below.[6]

In general, OLS results follow expected coefficients (Table 3). The coefficient for the irrigation dummy in the first model is 712 and is statistically significant at the one percent level. This means that an irrigated parcel of land has a sale price that is $712 more than that of a non-irrigated parcel, holding everything else constant. This is the implicit price of groundwater in irrigation. The mean sale price for a parcel of land is $1178. The value of irrigated land at $712 dollars is about 60 percent more than non-irrigated land at the mean price. This result is comparable with that found by Faux and Perry (1999) but is higher than

[6]The results presented are for the dataset which includes 330 sales where total agricultural acreage is greater than four and the sale price per acre is less than $6,000. Different cutoff values were tested to check the robustness of the model. These are reported in the Appendix.

values found by Petrie and Taylor (2007) at 30 percent. The pump rate is positive and significant at the five percent level. The coefficient of 0.18 implies that a one gallon per minute increase in the pumping rate would cause the sale price of land to increase by 18 cents per acre. The house size per acre had a coefficient of 33 and was statistically significant at the one percent level. This indicates that an increase of one square foot per acre would increase the sale price by $33.[7] The dummy for outbuildings is statistically different from zero at the five percent level and is a positive coefficient of 307, implying that if there is an outbuilding on the parcel the sale price per acre of land would increase by $307. As hypothesized in the model section, depth to water is expected to have a negative coefficient because deeper water is associated with higher variable pumping costs. However, my results find no significant effect of depth on the sale price. Climatic variables also do not have an impact on the sale price.

The data on sales are from 2000 to 2008, which includes the boom in corn ethanol production. For this reason we might expect to see higher land prices in more recent years. To test if such a time trend exists the second model includes year dummies (Tables 3). For this model, the value of irrigation is $723 per acre. It is statistically significant at the one percent level. Similar to the first model, the pump rate is statistically significant at the five percent level and a one gallon per minute increase cause the sale price to increase by 18 cents per acre. An increase in the house size also causes the sale price to go up by $34. The dummy for outbuildings is statistically significantly positive at the five percent level. If a parcel has an outbuilding the sale price per acre increases by $300. None of the year dummies are statistically different from zero, suggesting that there is no strong time trend in sale price per acre of land (Table 3). However, some of the year dummies are statistically different from each other. Years 2001, 2002, 2003, and 2005 are different from 2007 and 2008 at the five percent level. Year 2001 is different from 2004 at the ten percent significance level.[8] One

[7] The housing variable was also entered into the model as a dummy variable. The magnitude and significance of coefficients are the same and are reported in Appendix Table A-9.

[8] The models were also estimated using a time trend and a shift variable. The time trend was found to be significant and also the shift variable which was equal to one after 2006 and zero before. Other coefficients

reason why no significant trend is observed may be the relatively low number of sales per year.

The ethanol boom caused prices for crops to increase overall. However, relative to other crops, corn prices increased the most. In Chase County, where corn is grown on irrigated land, we might thus expect to see a more pronounced time trend in the sale price of irrigate land. Model three includes both year dummies and year dummies interacted with the irrigation dummy to test for this. The results are reported in Tables 3. The irrigation dummy is dropped from the model to enable direct interpretation of the year irrigation dummy interaction terms. The sign, magnitude and significance of most coefficients is unchanged from the previous model. Again, the year dummies are not statistically different from zero, indicating no trend in the sale price of all land. As there was a boom in ethanol and corn prices leading up to 2007, we would expect to see a trend as corn dominates the irrigated agriculture in the area. Each year is also not statistically different from the others. The year dummies interacted with the irrigation dummy allow for the estimation of the value of irrigation in each of the eight years represented by the model. The interaction terms are significantly different from zero from 2003 to 2008. In 2003, the sale price of irrigated land was $716 more than that of non-irrigated land (significant at the five percent level). The range in the difference of the sale price per acre in each year is from $514 in 2005 to $1,051 in 2007. In addition, each of the interaction terms are not significantly different from each other except for 2002 and 2005 compared to 2007. Thus, overall, there is some weak evidence that sale prices of irrigated land were higher in the last few years. The moratorium on wells went into effect in 1998 and all data is post moratorium. Also, the moratorium was expected and so any value of water should have already been capitalized into the land for these data.

The OLS model was also estimated with the pump rate, pump rate per acre, and depth

remained the same.

to water interacted with the irrigation dummy. These variables were included as we would expect these variables to matter on land that was being irrigated and not necessarily on land which was not, given the moratorium on new wells. These results are reported in Tables 4. This model was also run with the year dummies and with year dummy and irrigation dummy interaction terms. Most previous models of groundwater do not include the pump rate. However, Palazzo (2009) found that the pump rate is an important factor in determining per acre returns to irrigation in the Republican River basin.

In all models the interaction term between pump rate per acre and the irrigation dummy is significant. This implies that a higher pump rate per acre increases the sales price of irrigated land only. For non-irrigated land, pump rate per acre is not significant. The significance of the pump rate interaction term is consistent with the results of Petrie and Taylor (2007), as following a moratorium on new wells, we would expect no additional value on non-irrigated parcels from variables associated with groundwater availability.

For models with irrigation interaction terms, the value of irrigation must be calculated as it is no longer the coefficient on the irrigation dummy. The value of irrigation can be calculated by adding the value of the irrigation dummy coefficient to the pump rate per acre irrigation interaction term multiplied by the mean pump rate for irrigated land and then subtracting the pump rate multiplied by the mean value of pump rate on irrigated land and the depth to water irrigation interaction term multiplied by the mean depth to water on irrigated land. For the first model, without year dummies, the value of irrigation is calculated to be $729 and for the second model it is $747. In all the models, the pump rate per acre irrigation dummy interaction term and house size per acre are statistically different from zero. An increase in the pump rate of one gallon per minute per acre increases the sale price of irrigated land by $24.

In the third model, the irrigation dummy is removed from the estimation and the value of irrigation is estimated for each year. I test the joint significance of the year irrigation dummy interaction term with the irrigated depth to water, irrigated pump rate, and irrigated pump rate per acre dummies. I find the dummies to be jointly significantly different from zero starting in 2003. The range of values of irrigation were from $563 in 2005 per acre to $1083 per acre in 2007. Once again, this provides some evidence that sale prices of irrigated land have been increasing over time.

Propensity Score Matching Results

In addition to Ordinary Least Squares, I used propensity score matching (PSM) to estimate the value of irrigation water. The decision to irrigate a parcel of land is not random but is based on the characteristics of that parcel. Thus, the endogeneity in the choice of whether to irrigate or not may result in biased OLS estimates. PSM is able to tackle this problem by matching each irrigated parcel to non-irrigated parcels with equivalent propensity scores.

The first step of PSM involves running a probit regression where the dependent variable is a binary variable (treatment variable). For my model, the treatment is irrigation and the dependent variable is equal to one if the parcel is irrigated and zero if non-irrigated. Independent variables included in the PSM model were soil 2, soil 3, soil 4, pump rate, pump rate per acre, depth to water, precipitation, beneficial degree days, and harmful degree days.[9] The housing and structural data are not included in this model as they are not expected to affect the decision to irrigate a parcel of land.

Marginal effects of the probit regression are reported in Table 5. These are useful in de-

[9] Results for the probit are reported in Table A-11.

scribing how each independent variable effects adoption into irrigation. The marginal effect of soil 3 is 0.691. All else equal, a parcel that consists of soil 3 only is 69.1 percent more likely to be irrigated then one that consists of soil 1 only. As the soil types are estimated as proportions and soil 1 is dropped from the model, these results on soil 3 and soil 4 are relative to soil 1. This implies that irrigation is more likely to be implemented on intermediate quality soil, so it is a land-quality augmenting technology (Lichtenberg 1989). However, unlike the results of Lichtenberg (1989), my results suggest that irrigation is least likely on the poorest quality soils, implying that there are limits on the productivity goal of irrigation.

The marginal effect of pump rate is positive at 0.0002. This means that at the average pump rate and increase in one gallon per minute would result in an increase in the probability of irrigation by 0.0002. The effect of pump rate per acre is -0.012. This negative coefficient is not what we would expect. One possibility is that there are errors in estimating the pump rates for parcels that are wholly non-irrigated. The beneficial degree days variable has a marginal effect of -0.031. This means that if growing degree days increase by one day at the average level, the probability of irrigation will decrease by 0.0267. The harmful degree days variable has a positive marginal effect of 0.031. This means that an increase in harmful degree days, which is extreme heat, will increase the probability of adoption into irrigation by 0.5195.

Depth to water and climatic variables are significant in the probit results, which is different from what I found using OLS. Overall these results suggest that depth to water is important in the decision to irrigate, but once that decision has been made, depth to water no longer matters in land value. Some support for this argument is given by Palazzo (2009), who found that high well pump rates were a more important factor in per acre profits than low depth to water. Note that even though Chase County is relatively small, there is a large rainfall gradient, and this may help to explain the significance of the climatic variables.

A hit or miss table of the probit results shows that the probit model has a good fit (Table 6). The dataset has 163 irrigated parcels of land and 167 non-irrigated parcels. To measure the goodness of fit, the irrigated parcels would be considered non irrigated as there are more non-irrigated parcels. Thus, the fit would be about 50 percent. The probit model predicts 128 of the non-irrigated parcels and 105 of the irrigated parcels correctly. This means that the goodness of fit is 70 percent, which is higher than what would have been estimated without the probit model.

The average treatment effects results are reported in Table 7. The coefficient on sale price per acre is positive and highly significant for the unmatched as well as the matched results. However, the unmatched results estimate a difference of $721 between irrigated and non-irrigated land while the difference in the matched results is higher at $839. Thus, with PSM, the value of irrigation is estimated to be higher than that found with the OLS regression. Soil 3, soil 4, pump rate, house size, value of outbuildings, house age, depth to water, and precipitation were significantly different from zero for the unmatched data but these differences disappear when they are matched.[10].

The values of irrigated land estimated above measure the price per acre of an irrigated parcel. However, in order to calculate the price of a fully irrigated acre, these estimated must be divided by the proportion of the parcel on average that is irrigated. Only 83 percent of irrigated land is irrigated on average and thus all results must be divided by 0.83 to obtain the value of a fully irrigated acre.

My results show that irrigation is being adopted more on intermediate quality soil and not on the highest or lowest quality. As irrigation is a land-quality augmenting technol-

[10]PSM estimators may be sensitive to matching on outliers. The robustness of these results was tested using different combinations of cutoffs and minimum total acreages (Table A-12)

ogy, the profits from adopting irrigation on the intermediate quality soil is the greatest (Lichtenberg 1989). This may explain the higher value of irrigation that are estimated using the PSM methodology.

CONCLUSION AND POLICY IMPLICATIONS

Growing environmental concerns regarding depletion of groundwater resources along with interstate conflicts have led to increased restrictions in agricultural water use. In order for the water management regulations to be cost-effective, the value of water must be estimated correctly. In this thesis, I compare a standard hedonic model and a propensity score matching model to estimate the value of groundwater in an area where groundwater use is permitted and there is a moratorium on new wells. I use propensity score matching in order to account for selection issues in the hedonic method, as an irrigated parcel is by definition different from a non-irrigated one and this may cause bias in the results from the first model. My data are from Chase County, Nebraska and consist of tax assessor's data, physical, hydrologic, and climatic variables related to 330 sales of agricultural land between 2000 and 2008. I compare the results of the two models and find that irrigation does have a significant and positive effect on land prices. However, the propensity score matching methodology gives estimates of the value of water over 15 percent higher than those estimated using standard hedonics.

I find that the value of water estimated using Ordinary Least Squares ranges from $712 to $723, depending on the exact specification The pump rate is an important determinant of the value of sale price using both OLS and PSM. Conversely, depth to water and climate are only important in the decision to irrigate, but variations are not capitalized into land value. There is weak evidence to suggest that prices of land were higher in the last few years than in earlier years for the period analyzed. The time trend may not be visible due to the small number of sales in each year. Using a five percent discount rate along with the allocation of 13 inches per acre per year in the Upper Republican NRD (Nebraska Department of Natural Resources and Upper Republican Natural Resource District 2008) gives an annual value of about $34 per acre foot of water. For the propensity score matching, the value is $40 per acre foot of water per year.[11] Note that only 83 percent of irrigated land is irrigated on average. In order to calculate the value of a fully irrigated acre, the annual value calculated above is divided by 0.83. Therefore, the estimated value of an acre foot of water per year in Chase County is $41 using OLS and $48 using PSM. These values are lower than those found by Palazzo (2009) in the same area but this may be because of the high commodity prices used in that analysis.

The higher value of irrigation that results from the PSM estimation may be because irrigation adoption is taking place preferentially on intermediate quality soil and not the best quality soil. This is because irrigation is a land-quality augmenting technology, so that the highest profit difference between irrigated and dryland agriculture is not on the highest quality soil (Lichtenberg 1989). Irrigation is expected to be land-quality augmenting in general and thus the result that OLS may bias values of irrigation downwards is not limited to just Chase County. Standard hedonic methods that do not account for selection issues will be biased in other areas as well.

Future work could include analyzing the value of water for other counties in the region to verify the results obtained here. Most groundwater models use depth to water as an important determinant of irrigated production and technology and do not consider well yield at all. Similarly, PSM is only one method to correct for selection issues. The Heckman selection model could also be used and the results compared to those obtained here. My results suggest that pump rate is the more important variable in determining profits and may need

[11] $a = rC/1+r$ where r=annual interest rate, C=capitalized value, and a=annual value

to be modeled explicitly.

The results of my thesis have important policy implications in areas such as Nebraska where there is debate on how to reduce water use effectively. The analyses presented here suggest that future reductions may be costlier than previous research suggests, and that the standard hedonic method may not be best in estimating the value of water. In particular, if policy analyses use a standard hedonic methodology, the reductions will be more expensive than anticipated to both the government and farmers. In Nebraska, the government has tried to reduce water use by buying permits from farmers. There has been a lot of resistance to this and one explanation for this may be that the government is not offering enough compensation for the permits.

TABLES AND FIGURES

Table 1: Description of Data

Data	Source	Description
Soil 1 Irrigated	Chase County Tax Assessor	Proportion of Soil type 1 that is irrigated in the parcel
Soil 2 Irrigated	Chase County Tax Assessor	Proportion of Soil type 2 that is irrigated in the parcel
Soil 3 Irrigated	Chase County Tax Assessor	Proportion of Soil type 3 that is irrigated in the parcel
Soil 4 Irrigated	Chase County Tax Assessor	Proportion of Soil type 4 that is irrigated in the parcel
Soil 1 Dryland	Chase County Tax Assessor	Proportion of Soil type 1 that is in dryland in the parcel
Soil 2 Dryland	Chase County Tax Assessor	Proportion of Soil type 2 that is in dryland in the parcel
Soil 3 Dryland	Chase County Tax Assessor	Proportion of Soil type 3 that is in dryland in the parcel
Soil 4 Dryland	Chase County Tax Assessor	Proportion of Soil type 4 that is in dryland in the parcel
Soil 1 Grassland	Chase County Tax Assessor	Proportion of Soil type 1 that is in grassland in the parcel
Soil 2 Grassland	Chase County Tax Assessor	Proportion of Soil type 2 that is in grassland in the parcel
Soil 3 Grassland	Chase County Tax Assessor	Proportion of Soil type 3 that is in grassland in the parcel
Soil 4 Grassland	Chase County Tax Assessor	Proportion of Soil type 4 that is in grassland in the parcel
Sales Price	Chase County Tax Assessor	The sale price of a parcel of land
Sales Year	Chase County Tax Assessor	The year the parcel of land sold
House Size	Chase County Tax Assessor	The size, in square feet per acre, of a house
House Age	Chase County Tax Assessor	The age, in years, of the most recent house on a parcel
Value of Outbuildings	Chase County Tax Assessor	The assessed value, in dollars, of outbuildings
Depth to Water	2008 Nebraska DNR database	The depth, in feet, to the top of the groundwater source. Filled empty entries with nearest neighbor information (Palazzo 2009)
Pump Rate	2008 Nebraska DNR database	The rate at which a well can pump water in gallons per minute. Filled empty entries with nearest neighbor information (Palazzo 2009)
Precipitation	National Weather Service	Annualized monthly precipitation in inches (Savage and Brozović 2009)
Growing Degree Days	Raw data from the National Weather Service	Calculated beneficial growing degree days and harmful growing degree days using raw three year moving average minimum and maximum temperatures(Savage and Brozović 2009, Schlenker and Roberts 2009)

Table 2: Descriptive Statistics: Parcels that Sold, Chase County 2000-2008

	Mean	Std. Dev.	Min	Max
Sale Price (per acre)	1178.293	952.183	63.291	5031.25
Irrigation Dummy	0.494	0.501	0	1
Soil 1 Irrigated	0.117	0.255	0	1
Soil 2 Irrigated	0.067	0.164	0	0.886
Soil 3 Irrigated	0.139	0.243	0	1
Soil 4 Irrigated	0.088	0.206	0	0.895
Soil 1 Dryland	0.192	0.345	0	1
Soil 2 Dryland	0.056	0.157	0	1
Soil 3 Dryland	0.052	0.125	0	0.949
Soil 4 Dryland	0.035	0.107	0	0.783
Soil 1 Grassland	0.005	0.022	0	0.189
Soil 2 Grassland	0.024	0.094	0	0.828
Soil 3 Grassland	0.017	0.065	0	0.784
Soil 4 Grassland	0.209	0.351	0	1
Soil 1	0.314	0.391	0	1
Soil 2	0.146	0.245	0	1
Soil 3	0.207	0.279	0	1
Soil 4	0.332	0.383	0	1
Pump Rate (gallons per minute)	1642.598	681.559	297.715	3205.91
Pump Rate (gallons per minute per acre)	17.908	51.629	1.133	658.518
House Size (sq. feet per acre)	1.926	10.267	0	129.335
House Age (years)	7.23	23.784	0	118
Assessed Value of Outbuildings ($ per acre)	41.475	239.077	0	3057.318
Depth to Water (feet)	143.063	86.254	2.988	389.86
Precipitation (inches)	200.877	12.759	138.73	207.947
Beneficial Degree Days	3492.019	46.24	3005.693	3496.441
Harmful Degree Days	72.162	2.435	44.697	72.394
Acres	192.719	131.222	4.600	651.04

Notes: There are four land classes. Soil 1 is the best quality and Soil 4 the worst. The soil data are presented as proportions of the total acreages in agricultural use in the parcel.

Table 3: Ordinary Least Squares, n=330

Variables	(1) Model	(2) Model	(3) Model
Irrigation Dummy	712.41***	723.34***	
	(104.452)	(104.662)	
Soil 2	-92.15	8.94	-28.70
	(218.781)	(218.544)	(224.104)
Soil 3	142.04	120.96	59.87
	(211.612)	(210.372)	(218.511)
Soil 4	163.15	224.75	217.59
	(150.029)	(149.232)	(152.569)
Pump Rate (gallons per minute)	0.18**	0.18**	0.18**
	(0.071)	(0.071)	(0.072)
Pump Rate (gallons per minute per acre)	-0.76	-0.65	-0.78
	(0.938)	(0.938)	(0.953)
Depth to Water (feet)	-0.27	0.04	0.01
	(0.712)	(0.717)	(0.721)
House Size (sq. feet per acre)	33.32***	33.69***	33.68***
	(5.141)	(5.141)	(5.198)
House Age (years)	-5.49**	-5.40**	-5.78**
	(2.369)	(2.365)	(2.409)
Outbuildings Dummy	307.36**	299.95**	295.87**
	(145.419)	(145.250)	(147.875)
Precipitation	1.20	0.89	1.54
	(4.293)	(4.300)	(4.403)
Beneficial Degree Days	1.41	-2.78	-5.77
	(18.746)	(19.020)	(19.281)
Harmful Degree Days	-14.97	56.94	114.05
	(356.045)	(360.643)	(365.817)
Constant	-3,646.01		
	(39,816.144)		
Year Dummies	NO	YES	YES
Year Dummy and Irrigation Interaction Terms	NO	NO	YES

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Table 3 – Continued

Variables	(1) Model	(2) Model	(3) Model
Year Dummy 2000		5,796.18	12,289.96
		(40,456.289)	(40,987.382)
Year Dummy 2001		5,478.53	11,796.29
		(40,417.675)	(40,961.927)
Year Dummy 2002		5,579.86	11,918.79
		(40,454.499)	(40,990.005)
Year Dummy 2003		5,616.87	11,831.73
		(40,455.449)	(40,993.049)
Year Dummy 2004		5,868.01	12,008.73
		(40,456.396)	(40,990.445)
Year Dummy 2005		5,646.47	11,982.34
		(40,469.850)	(41,026.755)
Year Dummy 2006		5,765.50	11,923.38
		(40,454.944)	(40,990.070)
Year Dummy 2007		6,008.51	12,058.77
		(40,455.095)	(40,991.136)
Year Dummy 2008		6,105.69	12,267.30
		(40,455.897)	(40,994.504)
Year Dummy 2000*Irrigation Dummy			341.45
			(476.352)
Year Dummy 2001*Irrigation Dummy			419.45
			(365.632)
Year Dummy 2002*Irrigation Dummy			358.05
			(316.081)
Year Dummy 2003*Irrigation Dummy			715.60**
			(277.329)
Year Dummy 2004*Irrigation Dummy			841.69***
			(228.944)
Year Dummy 2005*Irrigation Dummy			514.30*
			(261.954)
Year Dummy 2006*Irrigation Dummy			848.68***
			(266.129)
Year Dummy 2007*Irrigation Dummy			1,051.21***
			(230.349)
Year Dummy 2008*Irrigation Dummy			844.34**
			(328.645)

Standard errors in parentheses

*10% significance; ** 5% significance; *** 1% significance.

Notes: The dependent variable is sales price per acre.

Table 4: Ordinary Least Squares with Pump Rate, Pump Rate Per Acre,

and Depth to Water Dummies, n=330

Variables	(4) Model	(5) Model	(6) Model
Irrigation Dummy	486.07	555.61*	
	(311.534)	(309.487)	
Soil 2	-47.08	40.98	-5.04
	(219.221)	(218.805)	(224.490)
Soil 3	183.85	151.59	91.93
	(212.080)	(210.871)	(218.852)
Soil 4	208.61	260.55*	249.98
	(150.655)	(149.805)	(153.054)
Pump Rate (gallons per minute)	0.11	0.13	0.12
	(0.105)	(0.104)	(0.105)
Pump Rate*Irrigation Dummy	-0.01	-0.04	-0.03
	(0.155)	(0.154)	(0.156)
Pump Rate (gallons per minute per acre)	-0.79	-0.73	-0.85
	(0.951)	(0.953)	(0.966)
Pump Rate (per acre)*Irrigation Dummy	24.41**	24.22**	23.53**
	(10.087)	(10.103)	(10.227)
Depth to Water (feet)	0.04	0.28	0.16
	(0.815)	(0.819)	(0.825)
Depth to Water*Irrigation Dummy	-0.07	-0.03	0.25
	(1.178)	(1.169)	(1.196)
House Size (sq. feet per acre)	32.68***	33.26***	33.22***
	(5.136)	(5.137)	(5.199)
House Age(years)	-5.37**	-5.31**	-5.60**
	(2.357)	(2.355)	(2.401)
Outbuildings Dummy	327.39**	321.28**	308.93**
	(145.113)	(145.073)	(147.691)
Precipitation	1.66	1.11	1.93
	(4.339)	(4.353)	(4.461)
Beneficial Degree Days	0.80	-3.22	-5.30
	(18.721)	(18.975)	(19.253)
Extreme Degree Days	-2.83	66.48	105.93
	(355.555)	(359.789)	(365.293)
Constant	-2,433.72		
	(39,761.950)		
Year Dummies	NO	YES	YES
Year Dummy and Irrigation Interaction Terms	NO	NO	YES

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Table 4 – Continued

Variables	(4) Model	(5) Model	(6) Model
Year Dummy 2000		6,639.79	11,174.96
		(40,357.313)	(40,925.350)
Year Dummy 2001		6,310.81	10,693.75
		(40,320.044)	(40,898.464)
Year Dummy 2002		6,400.53	10,822.37
		(40,355.691)	(40,925.282)
Year Dummy 2003		6,443.21	10,742.00
		(40,356.793)	(40,928.396)
Year Dummy 2004		6,653.91	10,905.61
		(40,357.787)	(40,927.229)
Year Dummy 2005		6,482.46	10,874.31
		(40,370.353)	(40,962.788)
Year Dummy 2006		6,576.42	10,815.12
		(40,356.357)	(40,926.595)
Year Dummy 2007		6,835.72	10,952.00
		(40,356.381)	(40,928.163)
Year Dummy 2008		6,924.90	11,164.40
		(40,356.921)	(40,931.039)
Year Dummy 2000*Irrigation Dummy			160.40
			(555.604)
Year Dummy 2001*Irrigation Dummy			222.86
			(471.543)
Year Dummy 2002*Irrigation Dummy			115.53
			(461.896)
Year Dummy 2003*Irrigation Dummy			473.75
			(425.235)
Year Dummy 2004*Irrigation Dummy			558.41
			(376.330)
Year Dummy 2005*Irrigation Dummy			325.96
			(381.690)
Year Dummy 2006*Irrigation Dummy			614.61
			(391.256)
Year Dummy 2007*Irrigation Dummy			845.95**
			(365.670)
Year Dummy 2008*Irrigation Dummy			612.24
			(440.711)

Standard errors in parentheses

*10% significance; ** 5% significance; *** 1% significance.

Notes: The dependent variable is sales price per acre.

Table 5: Probit Regression Results, Marginal Effects, n=330

Variables	Coefficient	Std. Error
Soil 2	0.097	(0.139)
Soil 3	0.691***	(0.144)
Soil 4	-0.182*	(0.099)
Pump Rate (gallons per minute)	2E-04***	(0.000)
Pump Rate (gallons per minute per acre)	-0.012***	(0.004)
Depth to Water (feet)	-0.001**	(0.000)
Precipitation	-2E-04	(0.003)
Beneficial Degree Days	-0.031***	(0.001)
Harmful Degree Days	0.595***	(0.026)

Standard errors in parentheses

*10% significance; ** 5% significance; *** 1% significance.

Table 6: Goodness of fit of Probit Model

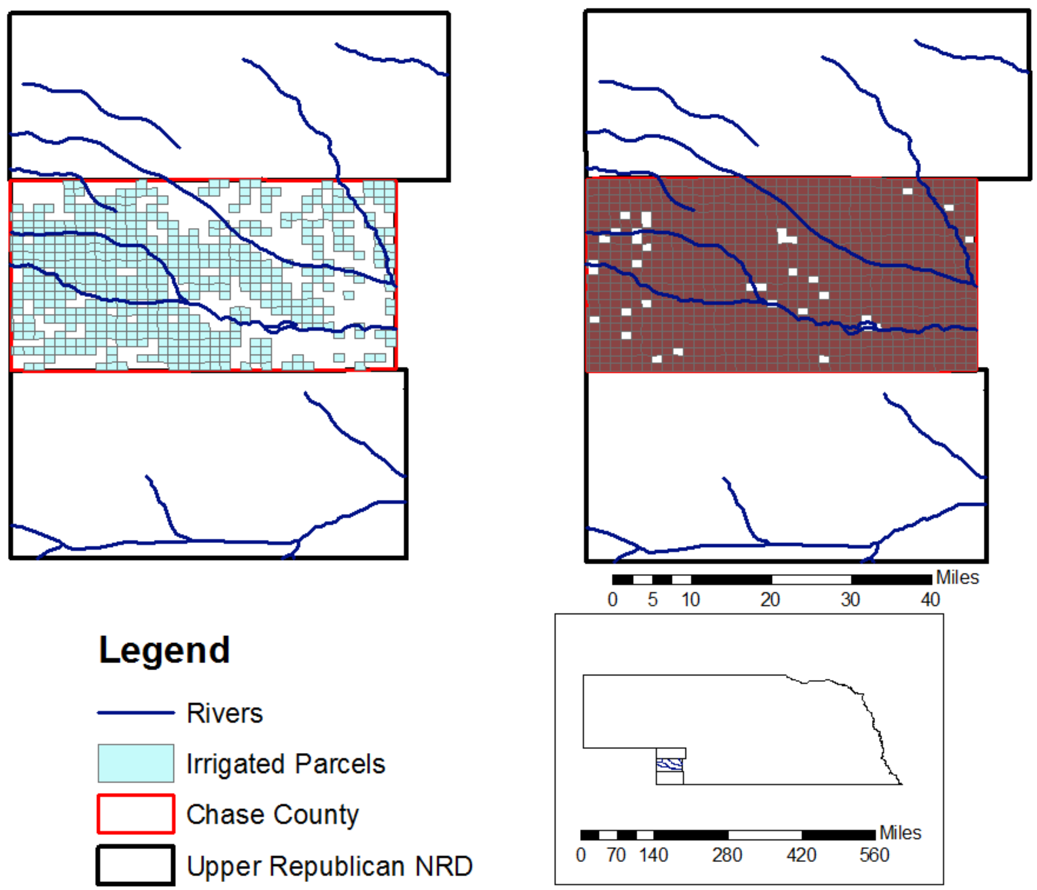
		Predicted		
		Non-Irrigated	Irrigated	
Actual	Non-Irrigated	128	39	167
	Irrigated	58	105	163
		186	144	

Table 7: Average Effect of Treatment on the Treated, n=330

Variable	Sample	Treated	Controls	Difference	Std. Error.
Sale Price (per acre)	Unmatched	1543.392	821.938	721.454***	97.149
	ATT	1543.392	703.977	839.414**	115.671
Soil 2	Unmatched	0.162	0.131	0.031	0.027
	ATT	0.162	0.153	0.009	0.057
Soil 3	Unmatched	0.325	0.093	0.233***	0.028
	ATT	0.325	0.347	-0.021	0.053
Soil 4	Unmatched	0.242	0.420	-0.178***	0.041
	ATT	0.242	0.277	-0.035	0.079
Pump Rate (gallons per minute)	Unmatched	1777.863	1510.572	267.291***	73.694
	ATT	1777.863	1783.349	-5.486	134.459
Pump Rate	Unmatched	11.031	24.620	-13.588**	5.644
(gallons per minute per acre)	ATT	11.031	11.864	-0.833	1.573
Depth to Water (feet)	Unmatched	123.276	162.375	-39.099***	9.263
	ATT	123.276	123.436	-0.160	16.935
House Size (sq. feet per acre)	Unmatched	0.543	3.275	-2.733**	1.122
	ATT	0.543	0.700	-0.158	0.646
House Age	Unmatched	5.000	9.407	-4.407	2.611
	ATT	5.000	8.883	-3.883	5.799
Outbuildings Dummy	Unmatched	.160	.162	-.002	.041
	ATT	.160	.086	.074	.075
Precipitation	Unmatched	203.022	198.783	4.240***	1.387
	ATT	203.022	202.851	0.171	2.579
Beneficial Degree Days	Unmatched	3493.470	3490.602	2.867	5.097
	ATT	3493.470	3496.441	-2.971	2.971
Harmful Degree Days	Unmatched	72.244	72.082	0.162	0.268
	ATT	72.244	72.394	-0.150	0.150

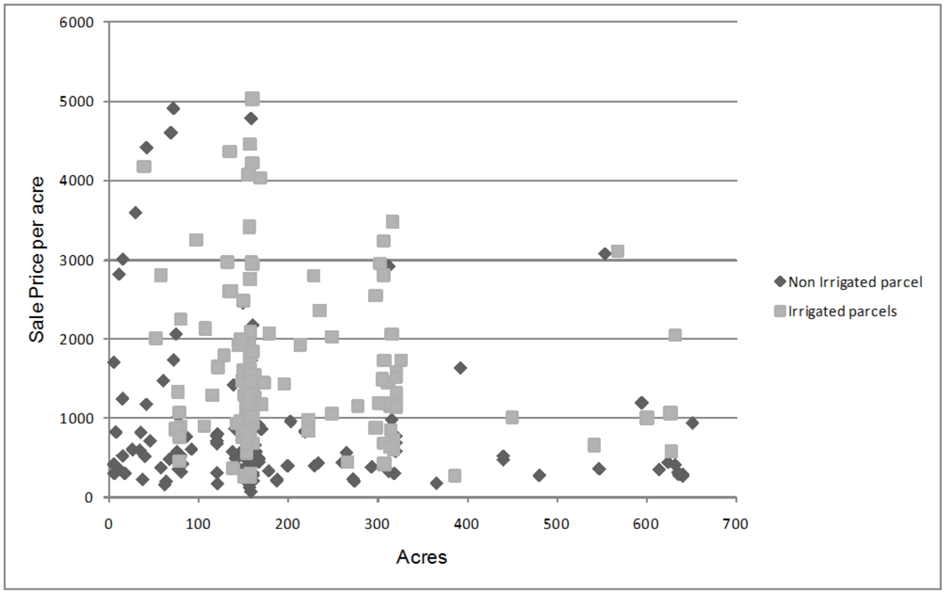
*10% significance; ** 5% significance; *** 1% significance.

Figure 1: Chase County, Nebraska: Irrigated and Non-Irrigated Land



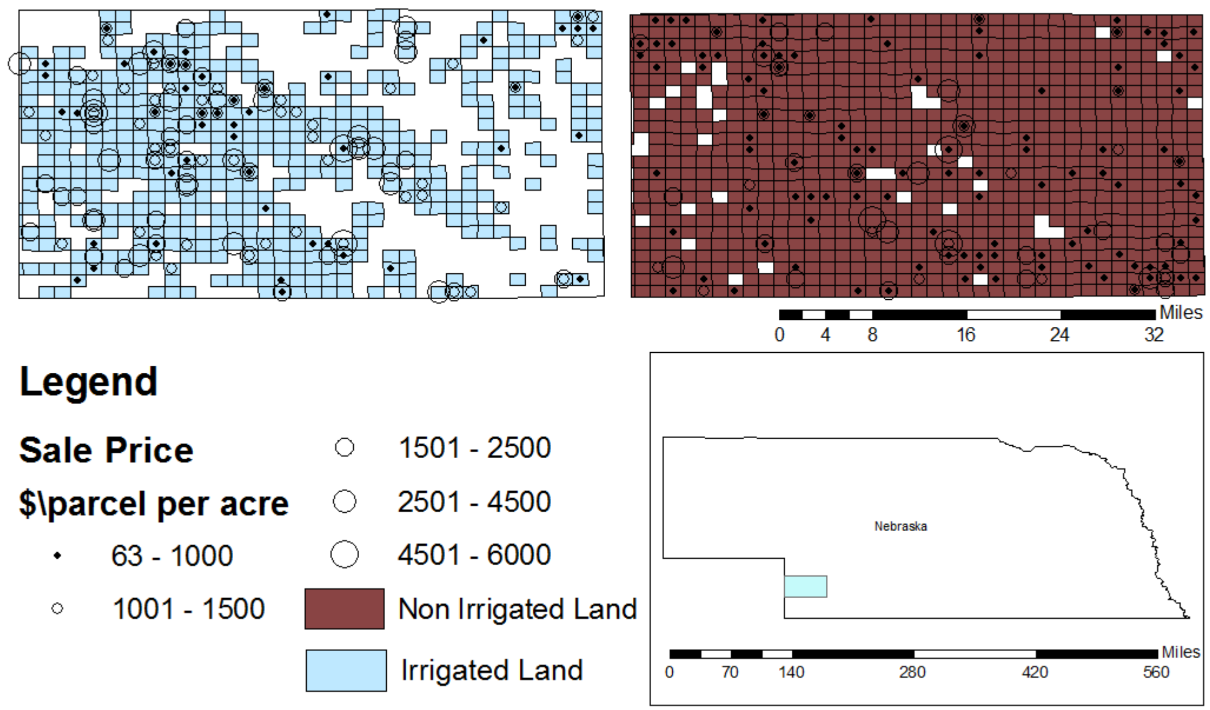
Notes: Each square is a Section which measures one mile by one mile and is equal to 640 acres. The shaded squares in the panel on the left are land that is irrigated and the shaded panels on the right are those that are non irrigated. Note that many sections include both irrigated and non irrigated parcel of land.

Figure 2: Irrigated and Non-Irrigated Sales



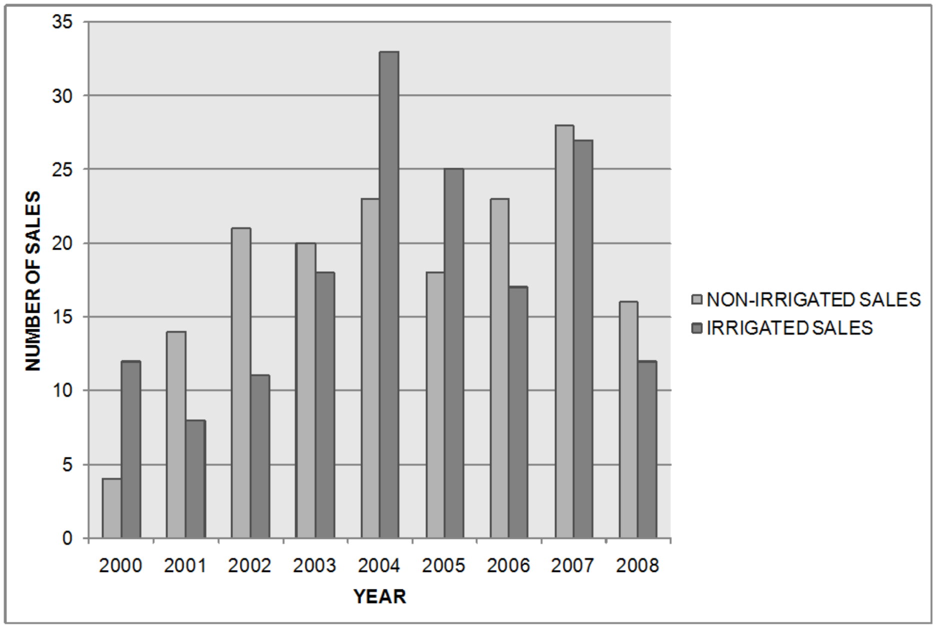
Notes: This is a scatter plot of the sale price per acre and total acreage. Non-irrigated parcels are represented by the darker diamonds and irrigated parcels by lighter squares. Note the clusters of sales at 160 acres, representing a parcel size of one quarter section.

Figure 3: All Arms Length Sales in Chase County from 2000 to 2008



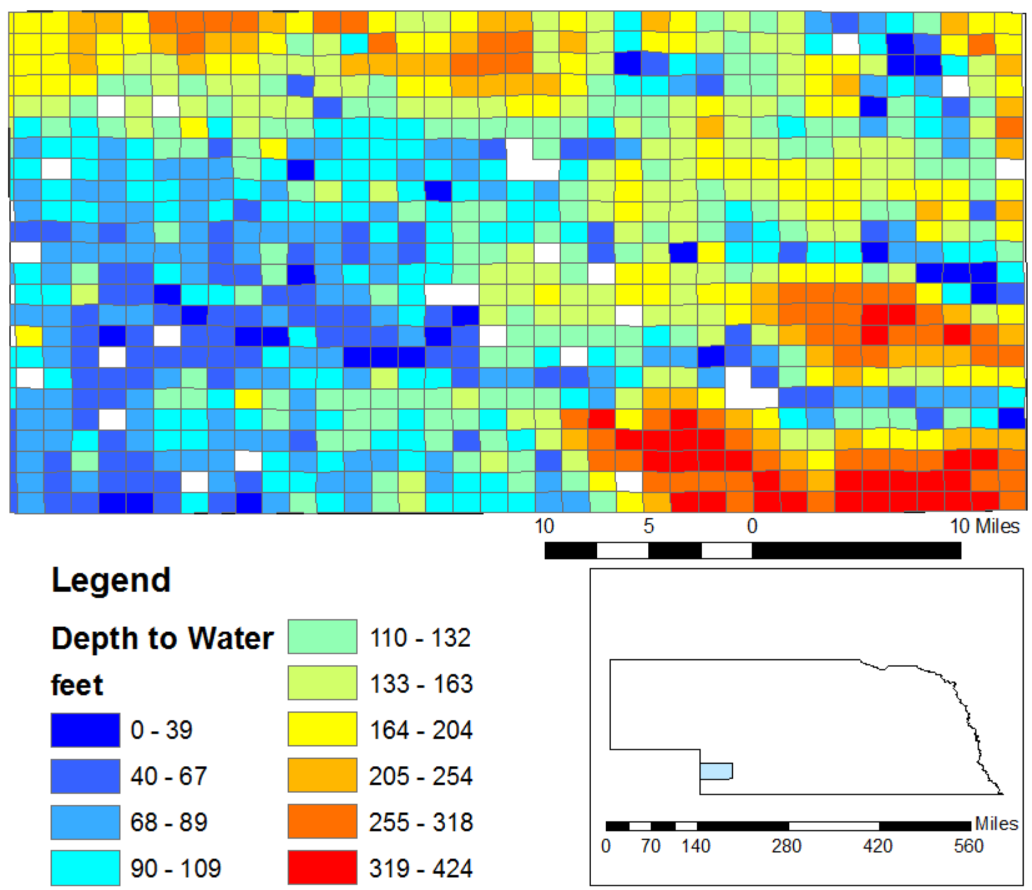
Notes: The panel on the left shows land which is irrigated and the sales that took place on irrigated land. The panel on the right shows non irrigated land and sales that occured on that land. Each circle represents sale of a parcel and larger circles represent higher per acre sale prices (n=330).

Figure 4: Distribution of Irrigated and Non-Irrigated Sales by Year



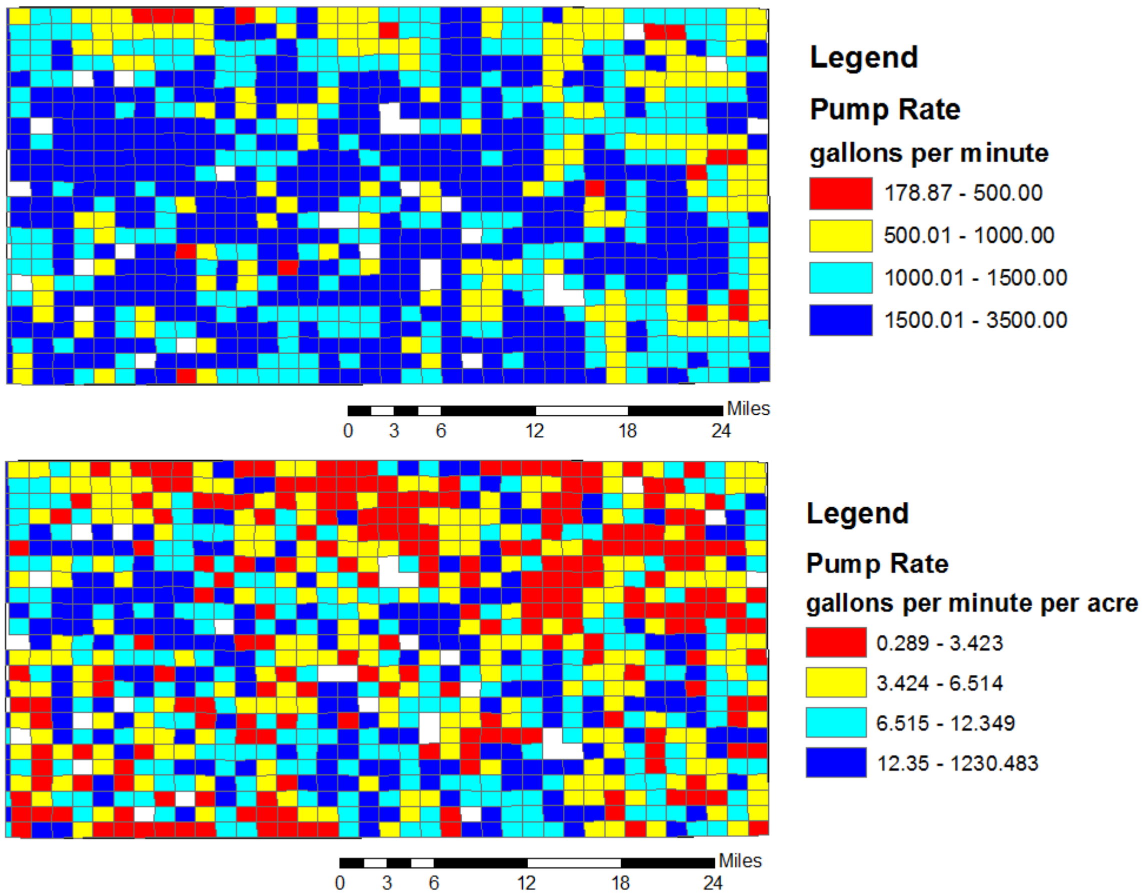
Notes: This figure shows the distribution of irrigated and non-irrigated sales in each year. The lighter bars represent non-irrigated sales and the darker bars represent irrigated sales.

Figure 5: Depth to Water



Notes: The depth to water shows the distance in feet from the surface of the land to the groundwater source. Blue colored squares represent water that is closer to the surface and thus has lower variable cost associated with pumping, and red colored squares represent water that is deeper from the surface.

Figure 6: Pump Rate



Notes: The figure on top panel shows the pump rate in gallons per minute. Blue colored squares represent faster pump rates that allow users to access water more quickly and red colors represent lower pump rates. The bottom panel shows the pump rate per acre in gallons per minute per acre. Again, blue colored squares represent faster rates.

APPENDIX A: SUPPLEMENTAL TABLES AND FIGURES

Table A-1: Descriptive Statistics: Soil (Parcels that Sold)

Soil Type	Mean (per acre)	Std. Dev. (per acre)	Min (per acre)	Max (per acre)
Soil 1 Irrigated	0.118	0.259	0	1
Soil 2 Irrigated	0.062	0.157	0	0.886
Soil 3 Irrigated	0.137	0.246	0	1
Soil 4 Irrigated	0.085	0.207	0	1
Soil 1 Dryland	0.189	0.345	0	1
Soil 2 Dryland	0.052	0.152	0	1
Soil 3 Dryland	0.061	0.155	0	1
Soil 4 Dryland	0.033	0.104	0	0.783
Soil 1 Grassland	0.007	0.056	0	1
Soil 2 Grassland	0.025	0.103	0	1
Soil 3 Grassland	0.017	0.066	0	0.784
Soil 4 Grassland	0.213	0.356	0	1

Table A-2: Descriptive Statistics: Soil (Parcels without Sales)

Soil Type	Mean (per acre)	Std. Dev. (per acre)	Min (per acre)	Max (per acre)
Soil 1 Irrigated	0.094	0.229	0	1
Soil 2 Irrigated	0.074	0.177	0	0.966
Soil 3 Irrigated	0.098	0.208	0	0.998
Soil 4 Irrigated	0.073	0.18	0	1
Soil 1 Dryland	0.153	0.306	0	1
Soil 2 Dryland	0.046	0.137	0	1
Soil 3 Dryland	0.038	0.11	0	1
Soil 4 Dryland	0.025	0.09	0	1
Soil 1 Grassland	0.011	0.058	0	1
Soil 2 Grassland	0.028	0.097	0	1
Soil 3 Grassland	0.025	0.086	0	1
Soil 4 Grassland	0.337	0.404	0	1

Table A-3: Descriptive Statistics: Soil (Parcels that Sold)

Soil Type	Mean	Std. Dev.	Min	Max
Soil 1 Irrigated	23.51	57.74	0	488.83
Soil 2 Irrigated	10.633	26.222	0	164.26
Soil 3 Irrigated	26.644	52.691	0	428.07
Soil 4 Irrigated	16.534	43.693	0	383
Soil 1 Grassland	0.656	3.068	0	34
Soil 2 Grassland	3.566	13	0	101
Soil 3 Grassland	3.95	16.72	0	213
Soil 4 Grassland	51.924	121.192	0	640
Soil 1 Dryland	28.245	56.492	0	327.5
Soil 2 Dryland	7.7	23.395	0	186
Soil 3 Dryland	8.419	22.157	0	230.42
Soil 4 Dryland	4.701	15.421	0	158.8
Total Acres	186.483	134.001	1.27	651.04

Table A-4: Descriptive Statistics: Soil (Parcels without Sales)

Soil Type	Mean	Std. Dev.	Min	Max
Soil 1 Irrigated	19.648	54.342	0	606.14
Soil 2 Irrigated	16.4	43.721	0	526.87
Soil 3 Irrigated	20.689	45.783	0	407.6
Soil 4 Irrigated	18.395	48.662	0	426.6
Soil 1 Grassland	1.917	9.636	0	229
Soil 2 Grassland	6.418	23.625	0	291.5
Soil 3 Grassland	5.562	19.84	0	250.12
Soil 4 Grassland	96.774	156.273	0	668.940
Soil 1 Dryland	27.935	64.556	0	630
Soil 2 Dryland	7.850	25.338	0	465.1
Soil 3 Dryland	6.986	21.165	0	296
Soil 4 Dryland	4.667	16.016	0	307.53
Total Acres	233.241	166.225	0.1	684

Table A-5: Descriptive Statistics: Depth to Water, Pumprate

	Mean	Std. Dev.	Min.	Max.
Per Acre				
Depth to Water (feet)	3.372	34.647	0.001	1130.3
Pumprate (gallons per minute)	46.61	529.007	0.289	16073.148
Totals				
Depth to Water (feet)	140.257	80.613	0.183	423.97
Pumprate (gallons per minute)	1598.981	653.037	178.868	3206.43

Table A-6: Descriptive Statistics: Sales Price, Sales Date, House Size, House Age, Value of Outbuildings (All Parcels)

	Mean	Std. Dev.	Min.	Max.
Sale Price($)	225596.056	323277.417	1143	4241000
Sales Year	2003.954	3.425	1975	2008
House Size (sq feet)	1552.429	639.997	460	4000
House Age (years)	70.81	33.624	5	118
Outbuildings Value	25992.333	40196.699	10	235872

Table A-7: Descriptive Statistics: Sales Price, Sales Date, House Size, House Age, Value of Outbuildings (Parcels that Sold)

	Mean	Std. Dev.	Min.	Max.
Sale Price	225596.056	323277.417	1143	4241000
Sale Year	2003.954	3.425	1975	2008
House Size	1552.429	639.997	460	4000
House Age	70.81	33.624	5	118
Outbuildings Value	25992.333	40196.699	10	235872

Table A-8: Descriptive Statistics: Sales Price, Sales Date, House Size, House Age, Value of Outbuildings (Parcels that did not Sell)

	Mean	Std. Dev.	Min.	Max.
Sale Price	1.73	13.233	0	140
Sale Year	2004.076	3.137	1981	2008
House Size	1549.393	547.996	384	3600
House Age	65.663	31.425	1	128
Outbuildings Value	20372.819	31192.344	0	240654

Table A-9: Ordinary Least Squares with Housing, n=330

Variables	1 Model	2 Model	3 Model	4 Model	5 Model	6 Model
Irrigation Dummy	723.78***	722.59***		741.24***	747.92***	
	(109.601)	(110.311)		(104.663)	(105.161)	
Soil 2	-1.58	118.30	55.63	-146.14	-39.56	-84.10
	(229.577)	(230.214)	(236.259)	(220.404)	(220.656)	(225.854)
Soil 3	155.88	152.16	65.44	104.89	87.52	23.16
	(221.691)	(221.222)	(229.861)	(211.283)	(210.418)	(218.225)
Soil 4	126.80	183.98	164.92	151.81	212.54	203.38
	(157.375)	(157.059)	(160.441)	(150.304)	(149.654)	(152.828)
Pump Rate (gallons per minute)	0.17**	0.17**	0.17**	0.18**	0.19**	0.18**
	(0.075)	(0.075)	(0.076)	(0.072)	(0.072)	(0.073)
Pump Rate (gallons per minute per acre)	0.15	0.27	0.14	-0.86	-0.72	-0.85
	(0.971)	(0.976)	(0.991)	(0.940)	(0.941)	(0.956)
Depth to Water (feet)	0.04	0.36	0.32	-0.36	-0.03	-0.06
	(0.744)	(0.753)	(0.757)	(0.712)	(0.719)	(0.722)
Housing Dummy	485.30***	500.12***	467.10***			
	(160.016)	(160.438)	(162.639)			
House Size (per acre)				32.91***	33.50***	33.26***
				(5.216)	(5.214)	(5.271)
House Age				-3.19	-3.16	-3.53
				(2.146)	(2.134)	(2.161)
Value of Outbuildings ($ per acre)	0.52**	0.45**	0.47**	0.34*	0.29	0.31
	(0.207)	(0.207)	(0.209)	(0.200)	(0.199)	(0.201)
Precipitation	-0.12	-0.14	0.87	0.98	0.80	1.50
	(4.504)	(4.529)	(4.638)	(4.307)	(4.318)	(4.417)
Beneficial Degree Days	2.25	-3.47	-5.50	1.88	-2.09	-4.83
	(19.679)	(20.043)	(20.317)	(18.792)	(19.087)	(19.333)
Harmful Degree Days	-28.15	70.48	109.01	-22.94	45.09	97.34
	(373.780)	(380.033)	(385.450)	(356.918)	(361.911)	(366.807)
Constant	-5417.158			-4625.899		
	(41799.05)			(3999.13)		
Year Dummies	NO	NO	YES	NO	NO	YES
Year Dummy and Irrigation Interaction Terms	NO	YES	YES	NO	YES	YES

Continued on Next Page…

Table A-9 – Continued

Variables	1 Model	2 Model	3 Model	4 Model	5 Model	6 Model
Year Dummy 2000		7,412.65	11,749.31		4,315.07	10,281.06
		(42,633.545)	(43,187.926)		(40,598.794)	(41,097.707)
Year Dummy 2001		6,973.01	11,218.65		3,980.34	9,761.89
		(42,592.314)	(43,161.075)		(40,559.797)	(41,071.982)
Year Dummy 2002		7,226.11	11,531.42		4,053.22	9,860.97
		(42,631.328)	(43,191.151)		(40,596.777)	(41,100.263)
Year Dummy 2003		7,146.25	11,272.18		4,090.45	9,786.64
		(42,632.403)	(43,194.380)		(40,597.611)	(41,103.165)
Year Dummy 2004		7,469.28	11,634.27		4,352.32	9,971.09
		(42,633.586)	(43,192.397)		(40,598.897)	(41,101.221)
Year Dummy 2005		7,213.62	11,462.88		4,136.06	9,930.02
		(42,647.851)	(43,230.606)		(40,612.306)	(41,137.447)
Year Dummy 2006		7,336.09	11,481.48		4,264.39	9,912.05
		(42,631.758)	(43,191.341)		(40,597.262)	(41,100.535)
Year Dummy 2007		7,562.64	11,502.43		4,489.21	9,975.58
		(42,632.351)	(43,192.878)		(40,597.582)	(41,101.646)
Year Dummy 2008		7,593.96	11,703.65		4,576.52	10,204.86
		(42,632.730)	(43,195.699)		(40,598.082)	(41,104.547)
Year 2000 Dummy*Irrigation Dummy			475.27			359.69
			(502.852)			(477.414)
Year 2001 Dummy*Irrigation Dummy			478.43			457.46
			(384.475)			(365.879)
Year 2002 Dummy*Irrigation Dummy			293.22			382.21
			(331.758)			(316.768)
Year 2003 Dummy*Irrigation Dummy			787.57***			714.12**
			(291.730)			(278.050)
Year 2004 Dummy*Irrigation Dummy			704.15***			847.53***
			(240.164)			(229.904)
Year 2005 Dummy*Irrigation Dummy			567.48**			554.90**
			(276.530)			(263.299)
Year 2006 Dummy*Irrigation Dummy			752.25***			822.32***
			(279.400)			(266.277)
Year 2007 Dummy*Irrigation Dummy			1,164.14***			1,138.49***
			(240.914)			(229.418)
Year 2008 Dummy*Irrigation Dummy			835.03**			872.74***
			(345.534)			(329.096)

Standard errors in parentheses

*10% significance; ** 5% significance; *** 1% significance.

Table A-10: Ordinary Least Squares with Outbuildings, n=330

Variables	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model
Irrigation Dummy	785.06***	712.41***	765.05***	762.67***	771.02***
	(107.268)	(104.452)	(106.036)	(103.699)	(103.683)
Soil 2	-104.52	-92.15	-221.92	-116.79	-98.46
	(223.834)	(218.781)	(222.613)	(218.060)	(217.951)
Soil 3	46.54	142.04	111.02	67.08	52.03
	(213.511)	(211.612)	(214.556)	(209.215)	(209.105)
Soil 4	150.47	163.15	152.00	190.38	181.66
	(152.523)	(150.029)	(152.639)	(149.134)	(148.574)
Pump Rate (gallons per minute)	0.15**	0.18**	0.21***	0.20***	0.19***
	(0.071)	(0.071)	(0.073)	(0.071)	(0.071)
Pump Rate (gallons per minute per acre)	-0.50	-0.76	-0.92	-0.85	-0.85
	(0.881)	(0.938)	(0.954)	(0.929)	(0.927)
Depth to Water (feet)	-0.45	-0.27	-0.28	-0.22	-0.25
	(0.712)	(0.712)	(0.723)	(0.705)	(0.703)
House Size (sq. feet per acre)	19.12***	33.32***	29.55***	33.73***	33.91***
	(7.061)	(5.141)	(5.196)	(5.163)	(5.155)
House Age (years)	-1.76	-5.49**	-2.89	-3.22	-3.21
	(3.912)	(2.369)	(2.177)	(2.120)	(2.116)
Outbuildings Dummy		307.36**			
		(145.419)			
Value of Outbuildings ($ per acre)				0.32	0.32
				(0.198)	(0.197)
Precipitation	-0.72	1.20	0.44	1.02	0.84
	(4.377)	(4.293)	(4.371)	(4.257)	(4.249)
Beneficial Degree Days	2.53	1.41	2.04	-3.06	1.68
	(17.453)	(18.746)	(19.083)	(18.649)	(18.537)
Harmful Degree Days	-34.51	-14.97	-25.56	66.61	-21.57
	(331.502)	(356.045)	(362.460)	(354.077)	(352.078)
Sale Year				59.55***	
				(20.404)	
Shift Variable for Year					328.76***
					(105.299)
Constant	-5,709.39	-3,646.01	-4,968.42	-113,309.75**	-4,128.01
	(37,070.181)	(39,816.144)	(40,533.234)	(54,244.901)	(39,372.575)

*10% significance; ** 5% significance; *** 1% significance.

Table A-11: Probit Regression Results, n=330

Variables	Coefficient	Std. Error
Soil 2	0.248	(0.353)
Soil 3	1.759***	(0.363)
Soil 4	-0.461*	(0.252)
Pump Rate (gallons per minute)	5E-04***	(0.000)
Pump Rate (gallons per minute per acre)	-0.031***	(0.010)
Depth to Water	-0.003**	(0.001)
Precipitation	-5E-04	(0.007)
Beneficial Degree Days	-0.078***	(0.001)
Extreme Degree Days	1.515***	(0.062)
Constant	163.294	(0.000)

Standard errors in parentheses

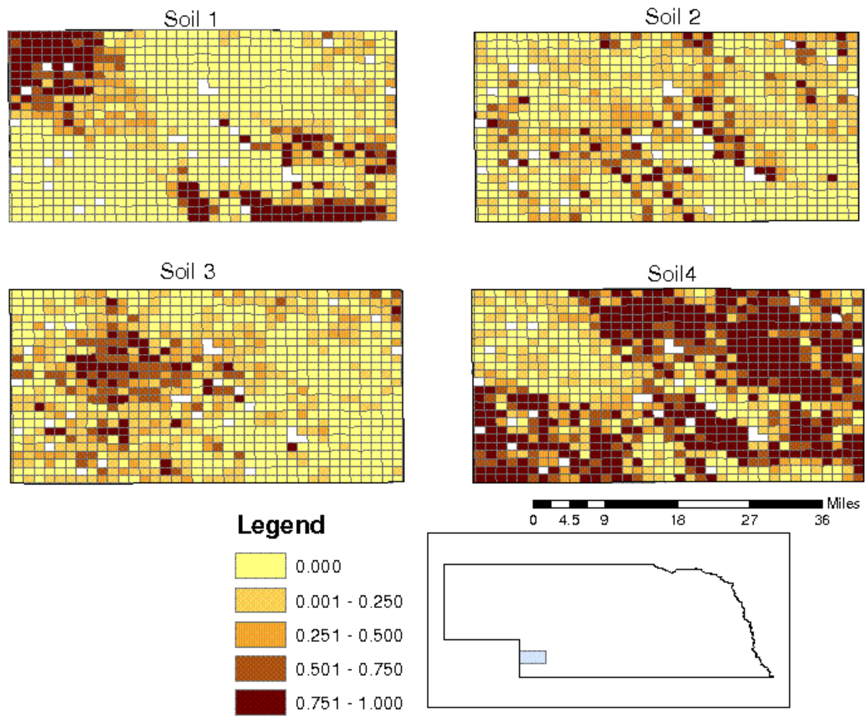
*10% significance; ** 5% significance; *** 1% significance.

Table A-12: Average Effect of Treatment on the Treated

Total Acres/ Sale per acre cutoff	6000	7000	8000	9000	10000	No cutoff
0	839.414	884.828	884.828	884.828	925.320	1013.568
5	839.414	884.828	884.828	884.828	925.320	1013.568
10	836.011	881.862	881.862	881.862	922.208	944.258
20	828.697	904.465	904.465	904.465	871.975	1090.011

Notes: The first column of the table shows the total acres of a parcel of land. The first row shows the sale per acre cut off values that were used to test the robustness of the results. The table shows combinations of cut offs for total acres and sale per acre.

Figure A-1: Distribution of Soil Types



Notes: This is a map of the soil types in the area. Each soil type is measured as a proportion of the total acreage. Soil 1 is the highest quality soil and soil 4 is the lowest quality soil. Note that many parcels and sections contain multiple soil types.

APPENDIX B: STATA CODE

```
set mem 500m
*Merge Sales data with land and soil data
use "C:\Users\Shahnila\Documents\Thesis\Data\Data\Salesdata.dta"
sort parcelid
merge parcelid using "C:\Users\Shahnila\Documents\Thesis\Data\Data\landtype.class.dta", uniqusing sort
*Soil1dry has blank observations, drop these.
drop if soil1_dry==.
gen sold=1 if salesprice~=.
replace sold=0 if salesprice==.
drop _merge
*Merging Section-Township-Range Data to ParcelIDs
merge parcelid using C:\Users\Shahnila\Documents\Thesis\Data\Data\str.parcels.dta, sort uniqusing
*There are two parcels without S-T-R information.
*One is miscategorized and the other is 6.19 acres of dry land.
*Drop these parcels, ParcelIDs are 150018215 and 150034369.
drop if range==.
drop _merge
```

```
*Create unique identifier combining str
*egen str= concat( section town range)- Don't know if I need this since the file with the smoothed pwl, gdd, etc data may have parcel information
*Merge well yield (pumprate) and depth to water data (pwl), this file is called sales.soil.geo.dta
merge parcelid using C:\Users\Shahnila\Documents\Thesis\Data\Data\parcels.pwl.pumprate.dta, sort uniqusing
drop _merge
*Merge precipitation and gdd data, this file is called sales.soil.geo1.dta
merge parcelid using C:\Users\Shahnila\Documents\Thesis\Data\Data\ppt_gdd1.dta, sort uniqusing
drop _merge
*Turn datesold into year sold
gen salesdate= date(datesold,"MDY")
format salesdate %td
gen salesyear = year(salesdate)
*Merge residence age and square footage data
merge parcelid using C:\Users\Shahnila\Documents\Thesis\Data\Data\housing_sqft_age, sort uniqusing
drop _merge
*Merge assesed value of outbuilding (2008 values)
merge parcelid using C:\Users\Shahnila\Documents\Thesis\Data\Data\valueoutbldgs, sort uniqusing
drop _merge
*Drop non-agricultural parcel data
```

```
sort soil1_irrig
drop in 2258/3851
*Generate soil per acre
local j = 1
while ‘j’ <= 4 {
gen s_ir_‘j’ = soil‘j’_irrig/acres
gen s_dr_‘j’ = soil‘j’_dry/acres
gen s_gr_‘j’ = soil‘j’_grass/acres
local j = ‘j’ + 1
}
*Generate variables per acre
gen saleperacre=salesprice/acres
gen pump_peracre=pumprate/acres
gen h_sz_peracre=house_sqft/acres
gen vb_out_peracre= value_ass_outbldgs/acres
*Replace blank values
replace pump_peracre=0 if  pump_peracre==.
replace h_sz_peracre=0 if  h_sz_peracre==.
replace  vb_out_peracre=0 if  vb_out_peracre==.
replace  houseage=0 if  houseage==.
*Generate Sales data for Propensity Score probit
*This is all irrigated sales equal to one
gen Irrigsale=1 if (salesprice>1000 & salesprice~=. & (s_ir_1
    >0 |s_ir_2>0| s_ir_3>0 |s_ir_4>0))
*This is the irrigation dummy variable
gen pssales=1 if  Irrigsale==1
replace pssales=0 if (salesprice>1000& Irrigsale~=1&
```

```
    salesprice~=.)
*Generate soils for PSM
gen soil1= s_ir_1+ s_dr_1+ s_gr_1
gen soil2= s_ir_2+ s_dr_2+ s_gr_2
gen soil3= s_ir_3+ s_dr_3+ s_gr_3
gen soil4= s_ir_4+ s_dr_4+ s_gr_4
*Generate year dummies
gen year2000=1 if salesyear==2000
gen year2001=1 if salesyear==2001
gen year2002=1 if salesyear==2002
gen year2003=1 if salesyear==2003
gen year2004=1 if salesyear==2004
gen year2005=1 if salesyear==2005
gen year2006=1 if salesyear==2006
gen year2007=1 if salesyear==2007
gen year2008=1 if salesyear==2008
replace year2000=0 if salesyear~=2000
replace year2001=0 if salesyear~=2001
replace year2002=0 if salesyear~=2002
replace year2003=0 if salesyear~=2003
replace year2004=0 if salesyear~=2004
replace year2005=0 if salesyear~=2005
replace year2006=0 if salesyear~=2006
replace year2007=0 if salesyear~=2007
replace year2008=0 if salesyear~=2008
*Generate year dummy and irrigation dummy interaction term
gen year00_irrig=pssales*year2000
```

```
gen year01_irrig=pssales*year2001
gen year02_irrig=pssales*year2002
gen year03_irrig=pssales*year2003
gen year04_irrig=pssales*year2004
gen year05_irrig=pssales*year2005
gen year06_irrig=pssales*year2006
gen year07_irrig=pssales*year2007
gen year08_irrig=pssales*year2008
*Generate interaction terms between pumprate, pumprate per acre, and depth to water with irrigation dummy
gen ir_pumprate=pssales*pumprate
gen ir_pump_peracre=pssales*pump_peracre
gen ir_pwl=pssales*pwl
*Run Ordinary Least Squares Regression with year dummies and year dummy irrigation interaction terms, n=330
regress saleperacre pssales soil2 soil3 soil4 pumprate pump_peracre pwl h_sz_peracre houseage out_dummy *MA3 if (saleperacre<6000 & acres>4 & salesyear>1999)
regress saleperacre pssales soil2 soil3 soil4 pumprate pump_peracre pwl h_sz_peracre houseage out_dummy *MA3 year2* if (saleperacre<6000 & acres>4 & salesyear>1999), noconstant
regress saleperacre soil2 soil3 soil4 pumprate pump_peracre pwl h_sz_peracre houseage out_dummy *MA3 year* if (saleperacre<6000 & acres>4 & salesyear>1999), noconstant
*Run Propensity Score Matching
psmatch2 pssales soil2 soil3 soil4 pumprate pump_peracre pwl
```

```
*MA3 if (saleperacre<6000 & acres>4 & salesyear>1999),
    outcome(saleperacre soil2 soil3 soil4 pumprate
    pump_peracre h_sz_peracre houseage out_dummy *MA3)
*Run Probit Marginal Effects
dprobit pssales soil2 soil3 soil4 pumprate pump_peracre pwl *
    MA3 if (saleperacre<6000 & acres>4 & salesyear>1999)
```

APPENDIX C: RAW DATA

Table C-1: Soil Data

Parcel ID	Soil 1 Irrigated	Soil 2 Irrigated	Soil 3 Irrigated	Soil 4 Irrigated	Soil 1 Dryland	Soil 2 Dryland	Soil 3 Dryland	Soil 4 Dryland	Soil 1 Grassland	Soil 2 Grassland	Soil 3 Grassland	Soil 4 Grassland
150000278	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150000537	0.000	0.000	0.000	0.000	0.977	0.000	0.000	0.000	0.023	0.000	0.000	0.000
150000766	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150000855	0.000	0.000	0.000	0.000	0.056	0.000	0.007	0.000	0.077	0.000	0.041	0.819
150000979	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150000987	0.000	0.000	0.000	0.000	0.081	0.022	0.045	0.000	0.038	0.096	0.045	0.673
150001061	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.033	0.967
150001134	0.000	0.000	0.000	0.000	0.990	0.000	0.000	0.006	0.000	0.000	0.000	0.004
150001215	0.696	0.000	0.000	0.128	0.000	0.000	0.000	0.000	0.027	0.000	0.000	0.149
150001436	0.000	0.000	0.000	0.000	0.973	0.000	0.000	0.013	0.000	0.000	0.000	0.014
150001649	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150001657	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150001746	0.000	0.000	0.000	0.000	0.055	0.000	0.000	0.000	0.012	0.000	0.000	0.933
150001894	0.000	0.000	0.000	0.000	0.921	0.032	0.000	0.013	0.000	0.000	0.000	0.034
150001932	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150002181	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150002246	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.000	0.000	0.978
150002270	0.000	0.000	0.000	0.000	0.020	0.000	0.000	0.000	0.024	0.000	0.000	0.956
150002513	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150002521	0.000	0.000	0.000	0.000	0.116	0.000	0.000	0.000	0.041	0.000	0.000	0.842
150002874	0.000	0.428	0.342	0.051	0.000	0.129	0.038	0.013	0.000	0.000	0.000	0.000
150002874	0.000	0.428	0.342	0.051	0.000	0.129	0.038	0.013	0.000	0.000	0.000	0.000

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Table C-1 – Continued

Parcel ID	Soil 1 Irrigated	Soil 2 Irrigated	Soil 3 Irrigated	Soil 4 Irrigated	Soil 1 Dryland	Soil 2 Dryland	Soil 3 Dryland	Soil 4 Dryland	Soil 1 Grassland	Soil 2 Grassland	Soil 3 Grassland	Soil 4 Grassland
150003013	0.000	0.000	0.000	0.000	0.050	0.935	0.000	0.015	0.000	0.000	0.000	0.000
150003064	0.000	0.000	0.000	0.000	0.288	0.388	0.311	0.006	0.000	0.000	0.000	0.006
150003234	0.063	0.000	0.094	0.071	0.081	0.000	0.231	0.214	0.011	0.000	0.009	0.225
150003242	0.101	0.123	0.596	0.000	0.039	0.024	0.101	0.001	0.000	0.000	0.016	0.000
150003242	0.101	0.123	0.596	0.000	0.039	0.024	0.101	0.001	0.000	0.000	0.016	0.000
150003315	0.000	0.000	0.000	0.000	0.475	0.000	0.203	0.323	0.000	0.000	0.000	0.000
150003331	0.000	0.000	0.000	0.000	0.013	0.000	0.075	0.006	0.000	0.000	0.019	0.888
150003390	0.000	0.373	0.449	0.000	0.000	0.091	0.075	0.000	0.000	0.000	0.013	0.000
150003390	0.000	0.373	0.449	0.000	0.000	0.091	0.075	0.000	0.000	0.000	0.013	0.000
150003471	0.000	0.772	0.000	0.000	0.000	0.228	0.000	0.000	0.000	0.000	0.000	0.000
150003498	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.109	0.000	0.000	0.891
150003498	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.109	0.000	0.000	0.891
150003536	0.000	0.000	0.000	0.000	0.000	0.874	0.108	0.000	0.000	0.006	0.012	0.000
150003609	0.000	0.000	0.000	0.000	0.000	0.125	0.225	0.650	0.000	0.000	0.000	0.000
150003854	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.228	0.019	0.595
150004052	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150004273	0.000	0.052	0.106	0.175	0.000	0.000	0.000	0.000	0.000	0.026	0.045	0.596
150004478	0.000	0.000	0.000	0.000	0.000	0.208	0.208	0.506	0.000	0.000	0.000	0.078
150004796	0.955	0.000	0.000	0.000	0.045	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150004796	0.955	0.000	0.000	0.000	0.045	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150004796	0.955	0.000	0.000	0.000	0.045	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150004826	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.017	0.978
150004834	0.000	0.535	0.248	0.038	0.000	0.134	0.002	0.000	0.000	0.011	0.032	0.000
150004915	0.000	0.000	0.000	0.000	0.073	0.256	0.025	0.611	0.000	0.000	0.000	0.036

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Table C-1 – Continued

Parcel ID	Soil 1 Irrigated	Soil 2 Irrigated	Soil 3 Irrigated	Soil 4 Irrigated	Soil 1 Dryland	Soil 2 Dryland	Soil 3 Dryland	Soil 4 Dryland	Soil 1 Grassland	Soil 2 Grassland	Soil 3 Grassland	Soil 4 Grassland
150005318	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150005326	0.000	0.000	0.000	0.000	0.886	0.000	0.114	0.000	0.000	0.000	0.000	0.000
150005431	0.000	0.000	0.000	0.000	0.311	0.358	0.000	0.000	0.014	0.318	0.000	0.000
150005695	0.000	0.000	0.000	0.000	0.866	0.000	0.000	0.000	0.011	0.000	0.000	0.123
150005849	0.796	0.071	0.000	0.007	0.116	0.009	0.000	0.000	0.000	0.000	0.000	0.000
150006268	0.000	0.000	0.000	0.000	0.047	0.000	0.000	0.006	0.003	0.000	0.000	0.944
150006691	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150006691	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150007361	0.091	0.000	0.000	0.004	0.054	0.011	0.000	0.103	0.033	0.031	0.000	0.674
150007728	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150007981	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.147	0.169	0.684
150008031	0.000	0.769	0.056	0.000	0.000	0.122	0.046	0.000	0.000	0.006	0.000	0.000
150008112	0.567	0.000	0.243	0.000	0.128	0.000	0.062	0.000	0.000	0.000	0.000	0.000
150008295	0.000	0.000	0.000	0.000	0.874	0.093	0.000	0.020	0.000	0.000	0.000	0.013
150008740	0.000	0.000	0.000	0.000	0.541	0.215	0.000	0.122	0.000	0.000	0.000	0.122
150008783	0.754	0.000	0.000	0.084	0.077	0.000	0.000	0.000	0.045	0.013	0.000	0.027
150009003	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150009011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.985
150009089	0.000	0.000	0.000	0.000	0.000	0.006	0.016	0.019	0.000	0.058	0.014	0.887
150009267	0.000	0.000	0.000	0.000	0.084	0.136	0.019	0.382	0.000	0.000	0.000	0.379
150009429	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150009496	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150009526	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150009542	0.718	0.000	0.148	0.134	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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Table C-1 – Continued

Parcel ID	Soil 1 Irrigated	Soil 2 Irrigated	Soil 3 Irrigated	Soil 4 Irrigated	Soil 1 Dryland	Soil 2 Dryland	Soil 3 Dryland	Soil 4 Dryland	Soil 1 Grassland	Soil 2 Grassland	Soil 3 Grassland	Soil 4 Grassland
150009798	0.394	0.100	0.000	0.334	0.042	0.033	0.000	0.017	0.000	0.000	0.000	0.080
150010060	0.000	0.000	0.000	0.809	0.000	0.000	0.000	0.046	0.000	0.000	0.000	0.145
150010141	0.000	0.000	0.008	0.803	0.000	0.000	0.000	0.000	0.000	0.008	0.020	0.161
150010192	0.778	0.000	0.013	0.058	0.081	0.000	0.000	0.004	0.009	0.000	0.053	0.002
150010419	0.000	0.000	0.000	0.000	0.434	0.003	0.531	0.031	0.000	0.000	0.000	0.000
150010532	0.000	0.005	0.000	0.830	0.000	0.000	0.000	0.068	0.000	0.000	0.000	0.097
150010559	0.000	0.000	0.000	0.000	0.103	0.021	0.000	0.021	0.039	0.009	0.000	0.807
150010583	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150010753	0.000	0.000	0.000	0.000	0.829	0.000	0.000	0.044	0.008	0.000	0.000	0.119
150010834	0.000	0.000	0.000	0.000	0.863	0.000	0.000	0.138	0.000	0.000	0.000	0.000
150010834	0.000	0.000	0.000	0.000	0.863	0.000	0.000	0.138	0.000	0.000	0.000	0.000
150010915	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150010958	0.000	0.000	0.000	0.000	0.020	0.000	0.000	0.000	0.039	0.000	0.000	0.941
150011032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.981
150011350	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150011547	0.637	0.145	0.004	0.000	0.173	0.039	0.002	0.000	0.000	0.000	0.000	0.000
150011717	0.000	0.000	0.000	0.000	0.000	0.705	0.000	0.206	0.000	0.000	0.000	0.088
150011768	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.385	0.610
150012004	0.000	0.000	0.000	0.000	0.000	0.000	0.275	0.015	0.000	0.000	0.011	0.699
150012101	0.062	0.776	0.000	0.000	0.038	0.124	0.000	0.000	0.000	0.000	0.000	0.000
150012187	0.000	0.000	0.000	0.000	0.589	0.263	0.000	0.147	0.000	0.000	0.000	0.000
150012616	0.000	0.247	0.656	0.000	0.000	0.048	0.048	0.000	0.000	0.000	0.000	0.000
150012772	0.828	0.000	0.000	0.000	0.172	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150013086	0.067	0.522	0.000	0.238	0.050	0.045	0.000	0.078	0.000	0.000	0.000	0.000

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Table C-1 – Continued

Parcel ID	Soil 1 Irrigated	Soil 2 Irrigated	Soil 3 Irrigated	Soil 4 Irrigated	Soil 1 Dryland	Soil 2 Dryland	Soil 3 Dryland	Soil 4 Dryland	Soil 1 Grassland	Soil 2 Grassland	Soil 3 Grassland	Soil 4 Grassland
150013175	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150013183	0.023	0.131	0.568	0.187	0.000	0.000	0.000	0.000	0.000	0.020	0.003	0.069
150013221	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150013264	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150013396	0.556	0.161	0.141	0.000	0.109	0.000	0.033	0.000	0.000	0.000	0.000	0.000
150013418	0.000	0.000	0.000	0.000	0.987	0.000	0.000	0.013	0.000	0.000	0.000	0.000
150013523	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150013582	0.000	0.000	0.000	0.000	0.975	0.025	0.000	0.000	0.000	0.000	0.000	0.000
150013787	0.000	0.000	0.000	0.000	0.962	0.038	0.000	0.000	0.000	0.000	0.000	0.000
150013868	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150013868	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150013914	0.957	0.000	0.043	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150014120	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150014287	0.804	0.000	0.000	0.051	0.145	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150014384	0.652	0.000	0.000	0.000	0.348	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150014392	0.000	0.000	0.000	0.000	0.918	0.000	0.000	0.082	0.000	0.000	0.000	0.000
150014392	0.000	0.000	0.000	0.000	0.918	0.000	0.000	0.082	0.000	0.000	0.000	0.000
150014473	0.000	0.000	0.000	0.000	0.994	0.000	0.000	0.006	0.000	0.000	0.000	0.000
150014724	0.000	0.000	0.000	0.000	0.896	0.086	0.000	0.000	0.003	0.000	0.015	0.000
150014805	0.557	0.165	0.159	0.000	0.059	0.022	0.038	0.000	0.000	0.000	0.000	0.000
150014910	0.958	0.000	0.000	0.000	0.043	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150014961	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150015089	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150015186	0.835	0.000	0.006	0.000	0.152	0.000	0.006	0.000	0.000	0.000	0.000	0.000

Continued on Next Page…

Table C-1 – Continued

Parcel ID	Soil 1 Irrigated	Soil 2 Irrigated	Soil 3 Irrigated	Soil 4 Irrigated	Soil 1 Dryland	Soil 2 Dryland	Soil 3 Dryland	Soil 4 Dryland	Soil 1 Grassland	Soil 2 Grassland	Soil 3 Grassland	Soil 4 Grassland
150015194	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150015828	0.511	0.000	0.000	0.000	0.463	0.000	0.000	0.026	0.000	0.000	0.000	0.000
150016352	0.000	0.000	0.000	0.000	0.751	0.017	0.232	0.000	0.000	0.000	0.000	0.000
150016794	0.000	0.000	0.000	0.000	0.929	0.071	0.000	0.000	0.000	0.000	0.000	0.000
150016875	0.000	0.000	0.000	0.000	0.867	0.133	0.000	0.000	0.000	0.000	0.000	0.000
150016875	0.000	0.000	0.000	0.000	0.867	0.133	0.000	0.000	0.000	0.000	0.000	0.000
150017235	0.444	0.000	0.553	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000
150017669	0.000	0.434	0.476	0.000	0.000	0.053	0.036	0.000	0.000	0.000	0.000	0.000
150034695	0.000	0.000	0.000	0.000	0.000	0.687	0.065	0.248	0.000	0.000	0.000	0.000
150038542	0.000	0.000	0.000	0.418	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.582
150039069	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.172	0.828	0.000	0.000
150039069	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.172	0.828	0.000	0.000
150039751	0.137	0.564	0.000	0.137	0.000	0.000	0.000	0.000	0.026	0.077	0.000	0.057
150050232	0.394	0.237	0.284	0.002	0.039	0.011	0.034	0.000	0.000	0.000	0.000	0.000
150050747	0.261	0.000	0.692	0.047	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150051190	0.000	0.643	0.212	0.000	0.000	0.065	0.081	0.000	0.000	0.000	0.000	0.000
150051794	0.959	0.000	0.010	0.000	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150051905	0.000	0.617	0.227	0.030	0.000	0.087	0.011	0.007	0.000	0.021	0.000	0.000
150052170	0.000	0.000	0.000	0.000	0.000	0.096	0.132	0.000	0.000	0.210	0.000	0.562
150052316	0.520	0.000	0.412	0.067	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150052405	0.691	0.242	0.000	0.050	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.014
150052464	0.957	0.000	0.000	0.043	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150052510	0.000	0.000	0.020	0.866	0.000	0.000	0.000	0.000	0.000	0.000	0.042	0.073
150052561	0.454	0.000	0.546	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Continued on Next Page…

Table C-1 – Continued

Parcel ID	Soil 1 Irrigated	Soil 2 Irrigated	Soil 3 Irrigated	Soil 4 Irrigated	Soil 1 Dryland	Soil 2 Dryland	Soil 3 Dryland	Soil 4 Dryland	Soil 1 Grassland	Soil 2 Grassland	Soil 3 Grassland	Soil 4 Grassland
150052839	0.139	0.000	0.851	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150052936	0.679	0.089	0.000	0.047	0.138	0.047	0.000	0.000	0.000	0.000	0.000	0.000
150052936	0.679	0.089	0.000	0.047	0.138	0.047	0.000	0.000	0.000	0.000	0.000	0.000
150053207	0.000	0.020	0.840	0.000	0.000	0.007	0.133	0.000	0.000	0.000	0.000	0.000
150053347	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.053	0.042	0.905
150053355	0.000	0.000	0.208	0.212	0.000	0.000	0.000	0.000	0.000	0.000	0.042	0.539
150053398	0.631	0.000	0.150	0.000	0.179	0.000	0.040	0.000	0.000	0.000	0.000	0.000
150053401	0.000	0.000	0.000	0.000	0.520	0.000	0.086	0.394	0.000	0.000	0.000	0.000
150053568	0.861	0.036	0.085	0.012	0.000	0.000	0.000	0.000	0.001	0.005	0.000	0.000
150053738	0.000	0.688	0.067	0.049	0.000	0.000	0.000	0.000	0.000	0.106	0.023	0.067
150053886	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.875
150053894	0.000	0.000	0.096	0.706	0.000	0.000	0.054	0.059	0.000	0.000	0.000	0.085
150053908	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.130	0.000	0.870
150054106	0.000	0.000	0.000	0.000	0.594	0.245	0.000	0.161	0.000	0.000	0.000	0.000
150054149	0.000	0.284	0.506	0.006	0.000	0.000	0.044	0.000	0.000	0.104	0.045	0.010
150054394	0.367	0.000	0.477	0.000	0.094	0.000	0.061	0.000	0.000	0.000	0.000	0.000
150054580	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.131	0.000	0.869
150054661	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150054696	0.000	0.000	0.000	0.000	0.552	0.000	0.448	0.000	0.000	0.000	0.000	0.000
150054718	0.266	0.000	0.000	0.000	0.405	0.078	0.051	0.200	0.000	0.000	0.000	0.000
150054726	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150054750	0.000	0.120	0.073	0.242	0.000	0.094	0.010	0.010	0.000	0.052	0.054	0.347
150054920	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.106	0.000	0.894
150054955	0.458	0.167	0.330	0.000	0.015	0.008	0.023	0.000	0.000	0.000	0.000	0.000

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Table C-1 – Continued

Parcel ID	Soil 1 Irrigated	Soil 2 Irrigated	Soil 3 Irrigated	Soil 4 Irrigated	Soil 1 Dryland	Soil 2 Dryland	Soil 3 Dryland	Soil 4 Dryland	Soil 1 Grassland	Soil 2 Grassland	Soil 3 Grassland	Soil 4 Grassland
150055056	0.346	0.000	0.482	0.038	0.022	0.000	0.111	0.000	0.000	0.000	0.000	0.000
150055129	0.434	0.000	0.538	0.005	0.000	0.000	0.023	0.000	0.000	0.000	0.000	0.000
150055129	0.434	0.000	0.538	0.005	0.000	0.000	0.023	0.000	0.000	0.000	0.000	0.000
150055129	0.434	0.000	0.538	0.005	0.000	0.000	0.023	0.000	0.000	0.000	0.000	0.000
150055137	0.568	0.000	0.253	0.006	0.077	0.000	0.076	0.019	0.000	0.000	0.000	0.000
150055145	0.000	0.000	0.000	0.000	0.444	0.288	0.088	0.181	0.000	0.000	0.000	0.000
150055196	0.000	0.100	0.000	0.738	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.163
150055269	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.168	0.131	0.701
150055307	0.483	0.205	0.097	0.021	0.112	0.016	0.051	0.014	0.000	0.000	0.000	0.000
150055323	0.237	0.013	0.575	0.112	0.048	0.000	0.000	0.015	0.000	0.000	0.000	0.000
150055331	0.033	0.000	0.207	0.239	0.002	0.000	0.052	0.006	0.000	0.000	0.005	0.456
150055382	0.706	0.138	0.000	0.000	0.138	0.000	0.000	0.019	0.000	0.000	0.000	0.000
150055439	0.000	0.000	0.000	0.000	0.000	0.000	0.949	0.051	0.000	0.000	0.000	0.000
150055501	0.000	0.000	0.779	0.060	0.000	0.000	0.107	0.001	0.000	0.000	0.003	0.051
150055803	0.358	0.174	0.300	0.000	0.045	0.048	0.075	0.000	0.000	0.000	0.000	0.000
150055838	0.000	0.000	0.845	0.000	0.000	0.000	0.155	0.000	0.000	0.000	0.000	0.000
150055846	0.251	0.254	0.216	0.137	0.052	0.016	0.025	0.000	0.000	0.000	0.022	0.027
150055846	0.251	0.254	0.216	0.137	0.052	0.016	0.025	0.000	0.000	0.000	0.022	0.027
150055870	0.000	0.000	0.000	0.000	0.000	0.000	0.069	0.009	0.000	0.000	0.150	0.772
150055897	0.280	0.459	0.106	0.000	0.066	0.040	0.048	0.000	0.000	0.000	0.000	0.000
150055927	0.063	0.592	0.285	0.000	0.014	0.041	0.005	0.000	0.000	0.000	0.000	0.000
150056044	0.520	0.000	0.428	0.000	0.000	0.000	0.052	0.000	0.000	0.000	0.000	0.000
150056117	0.252	0.000	0.570	0.000	0.064	0.000	0.114	0.000	0.000	0.000	0.000	0.000
150056176	0.114	0.000	0.709	0.000	0.072	0.000	0.105	0.000	0.000	0.000	0.000	0.000

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Table C-1 – Continued

Parcel ID	Soil 1 Irrigated	Soil 2 Irrigated	Soil 3 Irrigated	Soil 4 Irrigated	Soil 1 Dryland	Soil 2 Dryland	Soil 3 Dryland	Soil 4 Dryland	Soil 1 Grassland	Soil 2 Grassland	Soil 3 Grassland	Soil 4 Grassland
150056184	0.043	0.159	0.227	0.000	0.009	0.137	0.426	0.000	0.000	0.000	0.000	0.000
150056230	0.000	0.000	0.000	0.000	0.988	0.000	0.006	0.006	0.000	0.000	0.000	0.000
150056303	0.269	0.000	0.531	0.000	0.128	0.000	0.071	0.000	0.000	0.000	0.000	0.000
150056346	0.705	0.000	0.143	0.004	0.073	0.000	0.066	0.009	0.000	0.000	0.000	0.000
150056400	0.000	0.162	0.530	0.111	0.000	0.055	0.104	0.000	0.000	0.000	0.006	0.032
150056427	0.239	0.000	0.623	0.000	0.096	0.000	0.022	0.020	0.000	0.000	0.000	0.000
150056486	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.164	0.151	0.685
150056540	0.000	0.000	0.000	0.000	0.395	0.000	0.605	0.000	0.000	0.000	0.000	0.000
150056648	0.329	0.000	0.590	0.000	0.030	0.000	0.052	0.000	0.000	0.000	0.000	0.000
150056648	0.329	0.000	0.590	0.000	0.030	0.000	0.052	0.000	0.000	0.000	0.000	0.000
150056788	0.000	0.066	0.808	0.000	0.000	0.006	0.120	0.000	0.000	0.000	0.000	0.000
150056907	0.063	0.010	0.769	0.000	0.035	0.020	0.102	0.000	0.000	0.000	0.000	0.000
150057164	0.002	0.000	0.816	0.000	0.019	0.000	0.163	0.000	0.000	0.000	0.000	0.000
150057210	0.000	0.000	0.994	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000
150057210	0.000	0.000	0.994	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000
150057334	0.159	0.107	0.518	0.064	0.012	0.000	0.135	0.004	0.000	0.000	0.000	0.000
150057393	0.000	0.000	0.000	0.000	0.488	0.000	0.512	0.000	0.000	0.000	0.000	0.000
150057725	0.000	0.023	0.000	0.511	0.000	0.026	0.000	0.013	0.000	0.046	0.099	0.281
150057881	0.000	0.000	0.000	0.820	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.180
150057997	0.000	0.506	0.000	0.484	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000
150058276	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.081	0.468	0.000	0.451
150058284	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.110	0.208	0.682
150058314	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.128	0.872
150058551	0.437	0.429	0.000	0.000	0.071	0.062	0.002	0.000	0.000	0.000	0.000	0.000

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Table C-1 – Continued

Parcel ID	Soil 1 Irrigated	Soil 2 Irrigated	Soil 3 Irrigated	Soil 4 Irrigated	Soil 1 Dryland	Soil 2 Dryland	Soil 3 Dryland	Soil 4 Dryland	Soil 1 Grassland	Soil 2 Grassland	Soil 3 Grassland	Soil 4 Grassland
150058594	0.000	0.000	0.000	0.827	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.173
150058632	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.543	0.194	0.263
150058675	0.000	0.000	0.000	0.000	0.000	0.104	0.701	0.013	0.000	0.000	0.087	0.095
150058993	0.000	0.000	0.000	0.000	0.075	0.757	0.168	0.000	0.000	0.000	0.000	0.000
150059221	0.000	0.077	0.883	0.000	0.000	0.000	0.040	0.000	0.000	0.000	0.000	0.000
150059310	0.000	0.000	0.000	0.000	0.050	0.581	0.250	0.035	0.000	0.000	0.006	0.078
150059329	0.584	0.011	0.238	0.000	0.066	0.017	0.083	0.000	0.000	0.000	0.000	0.000
150059418	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.325	0.675
150059418	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.325	0.675
150059434	0.000	0.000	0.214	0.611	0.000	0.000	0.057	0.118	0.000	0.000	0.000	0.000
150059469	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.111	0.153	0.736
150059485	0.000	0.000	0.000	0.786	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.214
150059485	0.000	0.000	0.000	0.786	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.214
150059817	0.162	0.151	0.214	0.016	0.098	0.147	0.027	0.122	0.025	0.025	0.000	0.014
150059825	0.000	0.000	0.042	0.798	0.000	0.000	0.000	0.160	0.000	0.000	0.000	0.000
150059833	0.000	0.000	0.000	0.000	0.000	0.193	0.807	0.000	0.000	0.000	0.000	0.000
150059892	0.000	0.000	0.472	0.381	0.000	0.000	0.063	0.032	0.000	0.000	0.022	0.030
150059922	0.000	0.157	0.601	0.051	0.002	0.015	0.086	0.043	0.000	0.013	0.019	0.011
150059922	0.000	0.157	0.601	0.051	0.002	0.015	0.086	0.043	0.000	0.013	0.019	0.011
150060009	0.000	0.000	0.047	0.774	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.179
150060297	0.000	0.000	0.000	0.000	0.000	0.310	0.144	0.101	0.000	0.089	0.042	0.313
150060521	0.212	0.122	0.295	0.122	0.054	0.131	0.035	0.022	0.000	0.000	0.006	0.000
150060629	0.000	0.000	0.108	0.830	0.000	0.000	0.032	0.030	0.000	0.000	0.000	0.000
150060882	0.000	0.000	0.000	0.000	0.239	0.126	0.439	0.195	0.000	0.000	0.000	0.000

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Table C-1 – Continued

Parcel ID	Soil 1 Irrigated	Soil 2 Irrigated	Soil 3 Irrigated	Soil 4 Irrigated	Soil 1 Dryland	Soil 2 Dryland	Soil 3 Dryland	Soil 4 Dryland	Soil 1 Grassland	Soil 2 Grassland	Soil 3 Grassland	Soil 4 Grassland
150060971	0.000	0.114	0.120	0.665	0.000	0.025	0.051	0.025	0.000	0.000	0.000	0.000
150060971	0.000	0.114	0.120	0.665	0.000	0.025	0.051	0.025	0.000	0.000	0.000	0.000
150061099	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150061099	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150061358	0.000	0.000	0.403	0.594	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000
150061382	0.000	0.078	0.414	0.326	0.000	0.045	0.075	0.061	0.000	0.000	0.000	0.000
150061439	0.000	0.000	0.581	0.259	0.000	0.000	0.053	0.058	0.000	0.000	0.000	0.049
150061439	0.000	0.000	0.581	0.259	0.000	0.000	0.053	0.058	0.000	0.000	0.000	0.049
150061587	0.000	0.000	0.304	0.651	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.025
150061684	0.000	0.000	0.008	0.869	0.000	0.000	0.006	0.072	0.000	0.000	0.000	0.045
150061773	0.000	0.000	0.000	0.000	0.000	0.128	0.000	0.000	0.000	0.121	0.040	0.711
150061846	0.000	0.000	0.000	0.000	0.000	0.063	0.242	0.126	0.000	0.111	0.000	0.458
150061978	0.051	0.026	0.744	0.000	0.045	0.000	0.135	0.000	0.000	0.000	0.000	0.000
150062206	0.000	0.000	0.822	0.000	0.000	0.019	0.159	0.000	0.000	0.000	0.000	0.000
150062346	0.000	0.000	0.000	0.000	0.984	0.016	0.000	0.000	0.000	0.000	0.000	0.000
150062494	0.000	0.000	0.187	0.548	0.000	0.000	0.058	0.000	0.000	0.000	0.008	0.199
150062516	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150062761	0.000	0.000	0.621	0.196	0.000	0.000	0.183	0.000	0.000	0.000	0.000	0.000
150062834	0.000	0.000	0.000	0.000	0.044	0.000	0.000	0.783	0.063	0.000	0.000	0.109
150063016	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150063067	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150063083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.133	0.002	0.865
150063288	0.000	0.000	0.000	0.000	0.000	0.400	0.000	0.000	0.000	0.600	0.000	0.000
150063342	0.000	0.000	0.000	0.000	0.000	0.040	0.322	0.601	0.000	0.000	0.000	0.036

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Table C-1 – Continued

Parcel ID	Soil 1 Irrigated	Soil 2 Irrigated	Soil 3 Irrigated	Soil 4 Irrigated	Soil 1 Dryland	Soil 2 Dryland	Soil 3 Dryland	Soil 4 Dryland	Soil 1 Grassland	Soil 2 Grassland	Soil 3 Grassland	Soil 4 Grassland
150063342	0.000	0.000	0.000	0.000	0.000	0.040	0.322	0.601	0.000	0.000	0.000	0.036
150063369	0.026	0.668	0.000	0.143	0.026	0.125	0.000	0.013	0.000	0.000	0.000	0.000
150063415	0.463	0.146	0.093	0.188	0.035	0.017	0.041	0.011	0.000	0.000	0.000	0.005
150063423	0.000	0.000	0.000	0.000	0.000	0.205	0.428	0.366	0.000	0.000	0.000	0.000
150063490	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.993
150063563	0.709	0.104	0.000	0.033	0.114	0.040	0.000	0.000	0.000	0.000	0.000	0.000
150063687	0.005	0.489	0.276	0.230	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150063776	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.044	0.938
150063881	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.104	0.000	0.896
150064152	0.000	0.727	0.149	0.000	0.000	0.115	0.009	0.000	0.000	0.000	0.000	0.000
150064209	0.084	0.210	0.111	0.087	0.000	0.000	0.000	0.000	0.001	0.077	0.015	0.414
150064217	0.000	0.019	0.070	0.318	0.000	0.000	0.000	0.000	0.000	0.002	0.026	0.565
150064330	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
150064543	0.000	0.000	0.751	0.218	0.000	0.000	0.029	0.000	0.000	0.000	0.000	0.002
150064691	0.000	0.000	0.000	0.000	0.244	0.643	0.000	0.113	0.000	0.000	0.000	0.000
150064896	0.000	0.000	0.000	0.000	0.000	0.873	0.000	0.048	0.000	0.079	0.000	0.000
150064926	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
150065248	0.000	0.886	0.005	0.000	0.000	0.107	0.002	0.000	0.000	0.000	0.000	0.000
150065310	0.009	0.292	0.429	0.000	0.038	0.094	0.139	0.000	0.000	0.000	0.000	0.000
150065434	0.000	0.000	0.568	0.432	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150065906	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.009	0.000	0.000	0.217	0.763
150067143	0.000	0.257	0.490	0.087	0.000	0.045	0.103	0.020	0.000	0.000	0.000	0.000
150069286	0.000	0.000	0.000	0.000	0.253	0.000	0.747	0.000	0.000	0.000	0.000	0.000
150069367	0.000	0.000	0.222	0.599	0.000	0.000	0.049	0.011	0.000	0.000	0.086	0.034

Continued on Next Page. . .

Table C-1 – Continued

Parcel ID	Soil 1 Irrigated	Soil 2 Irrigated	Soil 3 Irrigated	Soil 4 Irrigated	Soil 1 Dryland	Soil 2 Dryland	Soil 3 Dryland	Soil 4 Dryland	Soil 1 Grassland	Soil 2 Grassland	Soil 3 Grassland	Soil 4 Grassland
150069367	0.000	0.000	0.222	0.599	0.000	0.000	0.049	0.011	0.000	0.000	0.086	0.034
150070780	0.000	0.000	0.063	0.348	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.575
150076452	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150077238	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150079338	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150085141	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150085451	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150093381	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150095120	0.000	0.000	0.000	0.822	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.178
150095341	0.781	0.000	0.008	0.000	0.164	0.000	0.048	0.000	0.000	0.000	0.000	0.000
150096135	0.033	0.232	0.576	0.007	0.038	0.046	0.047	0.021	0.000	0.000	0.000	0.000
150096178	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150098618	0.000	0.000	0.000	0.000	0.015	0.000	0.001	0.000	0.000	0.064	0.277	0.642
150098626	0.000	0.212	0.216	0.446	0.000	0.000	0.046	0.080	0.000	0.000	0.000	0.000
150098790	0.000	0.607	0.104	0.163	0.000	0.000	0.000	0.000	0.000	0.081	0.000	0.044
150098790	0.000	0.607	0.104	0.163	0.000	0.000	0.000	0.000	0.000	0.081	0.000	0.044
150100132	0.000	0.000	0.288	0.706	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.005
150100213	0.000	0.000	0.102	0.000	0.000	0.000	0.201	0.000	0.000	0.000	0.285	0.413
150100787	0.000	0.000	0.000	0.000	0.909	0.091	0.000	0.000	0.000	0.000	0.000	0.000
150101716	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150102186	0.000	0.000	0.000	0.000	0.404	0.229	0.367	0.000	0.000	0.000	0.000	0.000
150102828	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.128	0.784	0.088
150102992	0.925	0.000	0.000	0.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150103565	0.006	0.242	0.581	0.000	0.018	0.069	0.084	0.000	0.000	0.000	0.000	0.000

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Table C-1 – Continued

Parcel ID	Soil 1 Irrigated	Soil 2 Irrigated	Soil 3 Irrigated	Soil 4 Irrigated	Soil 1 Dryland	Soil 2 Dryland	Soil 3 Dryland	Soil 4 Dryland	Soil 1 Grassland	Soil 2 Grassland	Soil 3 Grassland	Soil 4 Grassland
150104448	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150105770	0.000	0.000	0.000	0.895	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.105
150106955	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.994
150106971	0.000	0.000	0.000	0.000	0.281	0.000	0.156	0.097	0.000	0.000	0.268	0.198
150107986	0.000	0.000	0.000	0.000	0.000	0.000	0.618	0.000	0.000	0.000	0.382	0.000
150120937	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000
150120939	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150120940	0.000	0.000	0.000	0.000	0.012	0.000	0.000	0.000	0.049	0.000	0.000	0.940
150120941	0.000	0.000	0.000	0.000	0.000	0.579	0.061	0.360	0.000	0.000	0.000	0.000
150120941	0.000	0.000	0.000	0.000	0.000	0.579	0.061	0.360	0.000	0.000	0.000	0.000
150120941	0.000	0.000	0.000	0.000	0.000	0.579	0.061	0.360	0.000	0.000	0.000	0.000
150120946	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150120946	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150120950	0.966	0.000	0.005	0.028	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150120959	0.000	0.000	0.000	0.000	0.621	0.000	0.000	0.000	0.000	0.000	0.000	0.379
150120971	0.025	0.000	0.846	0.000	0.000	0.000	0.128	0.000	0.000	0.000	0.000	0.000
150120973	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150120975	0.990	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150120981	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150121003	0.000	0.216	0.570	0.130	0.000	0.028	0.010	0.046	0.000	0.000	0.000	0.000
150121006	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150121013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150121013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150121021	0.994	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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Table C-1 – Continued

Parcel ID	Soil 1 Irrigated	Soil 2 Irrigated	Soil 3 Irrigated	Soil 4 Irrigated	Soil 1 Dryland	Soil 2 Dryland	Soil 3 Dryland	Soil 4 Dryland	Soil 1 Grassland	Soil 2 Grassland	Soil 3 Grassland	Soil 4 Grassland
150121022	0.000	0.000	0.000	0.000	0.281	0.100	0.594	0.025	0.000	0.000	0.000	0.000
150121025	0.000	0.000	0.000	0.000	0.558	0.114	0.000	0.327	0.000	0.000	0.000	0.000
150121026	0.000	0.000	0.000	0.000	0.792	0.000	0.000	0.208	0.000	0.000	0.000	0.000
150121038	0.000	0.014	0.842	0.092	0.000	0.013	0.040	0.000	0.000	0.000	0.000	0.000
150121038	0.000	0.014	0.842	0.092	0.000	0.013	0.040	0.000	0.000	0.000	0.000	0.000
150121039	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150121042	0.745	0.255	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150121069	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150121071	0.078	0.175	0.510	0.036	0.034	0.051	0.096	0.019	0.000	0.000	0.000	0.000
150121072	0.128	0.000	0.738	0.000	0.058	0.000	0.077	0.000	0.000	0.000	0.000	0.000
150121072	0.128	0.000	0.738	0.000	0.058	0.000	0.077	0.000	0.000	0.000	0.000	0.000
150121094	0.000	0.000	0.000	0.000	0.263	0.000	0.038	0.000	0.025	0.000	0.000	0.675
150121096	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000
150121097	0.000	0.000	0.000	0.000	0.000	0.458	0.000	0.208	0.000	0.000	0.000	0.333
150121099	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.420	0.006	0.574
150121099	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.420	0.006	0.574
150121100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
150121102	0.000	0.000	0.000	0.000	0.468	0.139	0.354	0.038	0.000	0.000	0.000	0.000
150121103	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150121124	0.000	0.000	0.000	0.000	0.054	0.000	0.000	0.017	0.189	0.000	0.014	0.726
150121127	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.989
150121128	0.000	0.053	0.558	0.303	0.000	0.000	0.000	0.000	0.000	0.061	0.026	0.000
150121128	0.000	0.053	0.558	0.303	0.000	0.000	0.000	0.000	0.000	0.061	0.026	0.000
150121131	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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Table C-1 – Continued

Parcel ID	Soil 1 Irrigated	Soil 2 Irrigated	Soil 3 Irrigated	Soil 4 Irrigated	Soil 1 Dryland	Soil 2 Dryland	Soil 3 Dryland	Soil 4 Dryland	Soil 1 Grassland	Soil 2 Grassland	Soil 3 Grassland	Soil 4 Grassland
150121132	0.000	0.394	0.529	0.069	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000
150121133	0.000	0.643	0.000	0.310	0.000	0.047	0.000	0.000	0.000	0.000	0.000	0.000
150121137	0.000	0.000	0.494	0.461	0.000	0.000	0.000	0.000	0.000	0.000	0.031	0.015
150121140	0.000	0.303	0.068	0.580	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.049
150121142	0.000	0.000	0.000	0.000	0.040	0.000	0.000	0.062	0.000	0.007	0.000	0.891
150121153	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000
150121153	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000
150121168	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
150121177	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.060	0.821
150121180	0.000	0.000	0.000	0.000	0.000	0.000	0.251	0.573	0.000	0.000	0.001	0.175
150121181	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.999
150121187	0.000	0.000	0.000	0.000	0.318	0.000	0.680	0.000	0.002	0.000	0.000	0.000

Table C-2: Data

Parcel ID	Sale Price	Sale Year	Pump Rate	Pump Rate (per acre)	Depth to Water	House Size (sq. feet per acre)	House Age	Assessed Value of Outbuildings	Precipitation	Beneficial Degree Days	Harmful Degree Days
150000278	482.509	2002	1520.257	10.787	389.860	0.000	0	0.000	164.523	3496.441	72.394
150000537	568.250	2005	2188.371	14.936	326.090	0.000	0	0.000	161.003	3496.441	72.394
150000766	1217.949	2006	1396.050	8.949	375.210	0.000	0	0.000	166.703	3496.441	72.394
150000855	465.909	2005	1595.411	3.626	307.550	0.000	0	0.000	168.360	3005.693	44.697
150000979	522.034	2003	2188.371	14.836	326.090	10.983	88	28.590	161.003	3496.441	72.394
150000987	765.892	2004	874.984	5.585	39.016	0.000	0	25.823	204.867	3496.441	72.394
150001061	1348.534	2007	874.984	5.700	39.016	10.319	32	127.342	204.867	3496.441	72.394
150001134	715.152	2001	1443.329	9.216	310.130	0.000	0	0.000	167.980	3012.150	47.889
150001215	552.774	2001	1443.329	9.386	310.130	0.000	0	0.000	167.980	3012.150	47.889
150001436	528.228	2006	1025.221	12.977	273.830	0.000	0	0.000	162.647	3496.441	72.394
150001649	537.975	2004	1025.221	6.489	273.830	0.000	0	0.000	162.647	3496.441	72.394
150001657	9189.189	2005	1396.050	150.924	375.210	0.000	0	0.000	166.703	3496.441	72.394
150001746	666.667	2004	1127.283	9.394	200.250	0.000	0	0.000	160.640	3496.441	72.394
150001894	668.620	2007	1566.039	9.972	322.430	0.000	0	0.000	204.867	3496.441	72.394
150001932	993.590	2005	1079.301	6.919	330.290	0.000	0	0.000	167.637	3496.441	72.394
150002181	1725.861	2006	636.528	8.907	110.670	16.961	62	175.553	169.913	3496.441	72.394
150002246	107.500	1992	807.446	2.523	225.290	0.000	0	0.000	168.707	3496.441	72.394
150002270	281.000	2001	1031.888	1.612	304.430	0.000	0	0.000	165.410	3496.441	72.394
150002513	29323.340	2007	636.528	57.814	110.670	0.000	0	0.000	169.913	3496.441	72.394
150002521	165.989	2002	1127.283	9.356	200.250	0.000	0	0.000	160.640	3496.441	72.394
150002874	303.798	2004	775.658	4.909	271.310	0.000	0	0.000	204.867	3496.441	72.394
150002874	303.798	2003	775.658	4.909	271.310	0.000	0	0.000	204.867	3496.441	72.394

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Table C-2 – Continued

Parcel ID	Sale Price	Sale Year	Pump Rate	Pump Rate (per acre)	Depth to Water	House Size (sq. feet per acre)	House Age	Assessed Value of Outbuildings	Precipitation	Beneficial Degree Days	Harmful Degree Days
150003013	389.447	2005	1229.667	6.179	105.610	0.000	0	0.050	204.867	3496.441	72.394
150003064	294.872	2001	881.650	5.652	185.030	0.000	0	0.000	204.867	3496.441	72.394
150003234	224.359	1993	1407.017	9.019	171.540	0.000	0	0.000	204.867	3496.441	72.394
150003242	303.798	2004	881.650	5.580	185.030	0.000	0	0.000	204.867	3496.441	72.394
150003242	303.798	2003	881.650	5.580	185.030	0.000	0	0.000	204.867	3496.441	72.394
150003315	443.038	2005	1407.017	8.905	171.540	0.000	0	0.000	204.867	3496.441	72.394
150003331	1000.000	2004	1637.243	10.233	240.480	0.000	0	0.000	204.867	3496.441	72.394
150003390	937.500	2003	802.870	5.018	181.840	0.000	0	0.000	204.867	3496.441	72.394
150003390	1265.625	2006	802.870	5.018	181.840	0.000	0	0.000	204.867	3496.441	72.394
150003471	1172.357	2006	802.870	4.718	181.840	0.000	0	0.000	204.867	3496.441	72.394
150003498	115.385	2005	1476.563	9.465	62.698	0.000	0	0.000	204.867	3496.441	72.394
150003498	192.308	1999	1476.563	9.465	62.698	0.000	0	0.000	204.867	3496.441	72.394
150003536	493.984	2001	1123.671	7.116	133.130	0.000	0	0.000	204.867	3496.441	72.394
150003609	309.375	2000	1056.928	13.212	145.140	0.000	0	0.000	204.867	3496.441	72.394
150003854	63.291	2002	1476.563	9.345	62.698	0.000	0	0.000	204.867	3496.441	72.394
150004052	717.949	2001	922.756	2.958	244.890	0.000	0	0.000	177.967	3496.441	72.394
150004273	270.859	2005	872.180	2.261	118.910	0.000	0	4.515	204.867	3496.441	72.394
150004478	350.649	2006	297.715	3.866	95.249	0.000	0	0.000	204.867	3496.441	72.394
150004796	2029.743	2007	2050.656	8.242	324.710	0.000	0	0.000	138.730	3496.441	72.394
150004796	1053.288	2001	2050.656	8.242	324.710	0.000	0	0.000	138.730	3496.441	72.394
150004796	703.376	1994	2050.656	8.242	324.710	0.000	0	0.000	138.730	3496.441	72.394
150004826	352.712	2008	619.709	1.133	2.988	0.000	0	0.000	204.867	3496.441	72.394
150004834	1198.718	2005	697.030	4.468	158.070	0.000	0	0.000	204.867	3496.441	72.394
150004915	433.679	2006	1107.424	4.258	95.866	0.000	0	0.000	204.867	3496.441	72.394

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Table C-2 – Continued

Parcel ID	Sale Price	Sale Year	Pump Rate	Pump Rate (per acre)	Depth to Water	House Size (sq. feet per acre)	House Age	Assessed Value of Outbuildings	Precipitation	Beneficial Degree Days	Harmful Degree Days
150005318	1812.500	2003	2516.240	15.727	365.020	0.000	0	0.000	204.867	3496.441	72.394
150005326	562.405	2004	980.417	6.230	258.850	0.000	0	0.000	204.867	3496.441	72.394
150005431	2054.054	2005	1204.504	16.277	72.864	26.554	118	10.378	204.867	3496.441	72.394
150005695	1548.460	2008	1684.045	10.900	292.780	0.000	0	0.000	204.867	3496.441	72.394
150005849	12974.920	2005	2535.190	17.048	170.170	0.000	0	0.000	204.867	3496.441	72.394
150006268	570.000	2002	2359.100	7.372	307.280	0.000	0	0.000	204.867	3496.441	72.394
150006691	387.500	1997	1482.169	9.264	323.930	0.000	0	0.000	154.970	3496.441	72.394
150006691	606.250	2006	1482.169	9.264	323.930	0.000	0	0.000	154.970	3496.441	72.394
150007361	442.624	2004	1370.175	5.148	96.890	0.000	0	0.000	204.867	3496.441	72.394
150007728	181.250	1999	875.611	1.368	117.520	0.000	0	0.000	204.867	3496.441	72.394
150007981	930.943	2000	1662.423	2.553	121.080	2.193	50	1.341	204.867	3496.441	72.394
150008031	1411.632	2005	1316.027	8.257	136.080	0.000	0	0.000	204.867	3496.441	72.394
150008112	1286.266	2000	2049.669	17.783	160.210	0.000	0	0.000	204.867	3496.441	72.394
150008295	951.557	2001	2582.934	12.768	168.570	3.599	38	17.385	204.867	3496.441	72.394
150008740	320.760	2003	1005.510	3.225	285.430	0.000	0	0.000	204.867	3496.441	72.394
150008783	1095.008	2005	2360.961	15.207	308.810	5.887	73	53.585	204.867	3496.441	72.394
150009003	589.744	2003	1352.964	8.673	335.870	0.000	0	0.000	204.867	3496.441	72.394
150009011	220.604	2004	2082.481	7.657	123.660	0.000	0	0.000	204.867	3496.441	72.394
150009089	303.937	2007	1521.036	2.395	202.580	0.000	0	0.000	204.867	3496.441	72.394
150009267	375.405	2002	1258.941	8.148	237.610	4.181	108	0.000	204.867	3496.441	72.394
150009429	574.359	2003	1990.764	12.761	281.190	0.000	0	0.000	204.867	3496.441	72.394
150009496	1057.325	2008	2513.561	16.010	317.660	12.274	103	1.854	204.867	3496.441	72.394
150009526	584.615	2003	1990.764	12.761	281.190	0.000	0	0.000	204.867	3496.441	72.394
150009542	1446.843	2003	2126.563	12.307	297.280	0.000	0	0.000	204.867	3496.441	72.394

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Table C-2 – Continued

Parcel ID	Sale Price	Sale Year	Pump Rate	Pump Rate (per acre)	Depth to Water	House Size (sq. feet per acre)	House Age	Assessed Value of Outbuildings	Precipitation	Beneficial Degree Days	Harmful Degree Days
150009798	1602.136	2007	2035.248	13.586	145.870	0.000	0	0.975	204.867	3496.441	72.394
150010060	1674.808	2002	1258.941	8.070	237.610	0.000	0	0.000	204.867	3496.441	72.394
150010141	747.863	2003	1258.941	8.070	237.610	0.000	0	0.000	204.867	3496.441	72.394
150010192	1011.531	2004	1785.597	3.974	347.110	5.057	79	100.229	146.617	3496.441	72.394
150010419	581.761	2006	2505.293	7.878	315.570	0.000	0	0.000	204.867	3496.441	72.394
150010532	1406.250	2005	1748.959	10.931	159.120	0.000	0	0.000	204.867	3496.441	72.394
150010559	428.982	2001	937.077	4.020	96.517	3.964	34	4.993	204.867	3496.441	72.394
150010583	993.590	2008	1233.582	7.908	368.650	0.000	0	0.000	204.867	3496.441	72.394
150010753	175.000	1993	1233.582	7.710	368.650	0.000	0	0.000	204.867	3496.441	72.394
150010834	297.919	2008	1894.934	11.843	308.630	0.000	0	0.000	204.867	3496.441	72.394
150010834	260.419	2008	1894.934	11.843	308.630	0.000	0	0.000	204.867	3496.441	72.394
150010915	607.595	2005	1894.934	11.993	308.630	0.000	0	0.000	204.867	3496.441	72.394
150010958	511.364	2003	562.161	1.278	291.910	0.000	0	0.000	204.867	3496.441	72.394
150011032	292.453	2001	1620.310	5.095	131.650	0.000	0	0.000	204.867	3496.441	72.394
150011350	857.510	2007	1322.184	9.448	176.860	0.000	0	0.000	204.867	3496.441	72.394
150011547	2793.540	2004	1249.095	5.452	149.190	0.000	0	0.000	204.867	3496.441	72.394
150011717	1167.910	2002	1497.372	9.599	150.670	0.000	0	0.000	204.867	3496.441	72.394
150011768	3067.417	2000	1818.007	3.285	57.483	0.000	0	0.000	204.867	3496.441	72.394
150012004	926.641	1975	2060.074	15.908	138.840	9.822	108	13.761	204.867	3496.441	72.394
150012101	1273.947	2001	1713.111	11.050	129.060	0.000	0	0.000	204.867	3496.441	72.394
150012187	600.896	2006	1322.184	14.445	176.860	0.000	0	0.000	204.867	3496.441	72.394
150012616	1489.051	2004	2716.053	17.649	147.620	0.000	0	0.000	204.867	3496.441	72.394
150012772	636.943	2002	2996.748	9.544	377.740	0.000	0	0.000	204.867	3496.441	72.394
150013086	1582.880	2005	2555.904	16.183	133.380	0.000	0	0.000	204.867	3496.441	72.394

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Table C-2 – Continued

Parcel ID	Sale Price	Sale Year	Pump Rate	Pump Rate (per acre)	Depth to Water	House Size (sq. feet per acre)	House Age	Assessed Value of Outbuildings	Precipitation	Beneficial Degree Days	Harmful Degree Days
150013175	165.161	2002	1209.498	7.803	241.670	0.000	0	0.000	204.867	3496.441	72.394
150013183	1433.178	2007	2651.757	13.573	66.717	0.000	0	0.000	204.867	3496.441	72.394
150013221	6146.878	2005	1489.996	9.641	126.440	0.000	0	0.000	204.867	3496.441	72.394
150013264	443.594	2006	1209.498	7.559	241.670	0.000	0	3.031	204.867	3496.441	72.394
150013396	1590.970	2006	2719.286	18.216	128.940	0.000	0	0.000	204.867	3496.441	72.394
150013418	682.094	2008	1297.756	4.133	120.010	0.000	0	0.000	204.867	3496.441	72.394
150013523	470.000	2003	942.118	5.888	244.060	0.000	0	0.000	204.867	3496.441	72.394
150013582	401.103	2003	623.936	3.910	135.710	0.000	0	0.000	204.867	3496.441	72.394
150013787	676.226	2008	866.218	5.424	209.500	0.000	0	0.000	204.867	3496.441	72.394
150013868	564.103	2007	1405.881	9.012	188.720	0.000	0	0.000	204.867	3496.441	72.394
150013868	435.897	2003	1405.881	9.012	188.720	0.000	0	0.000	204.867	3496.441	72.394
150013914	1188.309	2001	1954.963	6.493	158.770	5.091	67	117.566	204.867	3496.441	72.394
150014120	562.914	1999	1405.881	9.310	188.720	11.417	88	17.179	204.867	3496.441	72.394
150014287	886.244	2004	2106.769	13.337	116.620	0.000	0	0.000	204.867	3496.441	72.394
150014384	759.590	2006	1344.791	17.025	141.000	0.000	0	0.000	204.867	3496.441	72.394
150014392	253.165	2007	1626.529	10.294	215.020	0.000	0	0.000	204.867	3496.441	72.394
150014392	253.165	2007	1626.529	10.294	215.020	0.000	0	0.000	204.867	3496.441	72.394
150014473	500.000	2002	1626.529	10.166	215.020	0.000	0	0.000	204.867	3496.441	72.394
150014724	168.446	2004	1327.000	3.632	143.070	0.000	0	1.327	204.867	3496.441	72.394
150014805	634.317	1997	1327.000	8.417	143.070	0.000	0	0.000	204.867	3496.441	72.394
150014910	1100.000	2004	1458.721	9.117	147.650	0.000	0	0.000	204.867	3496.441	72.394
150014961	9632.217	2004	1913.571	33.743	56.994	0.000	0	0.000	204.867	3496.441	72.394
150015089	461.539	2007	2272.100	14.565	138.330	0.000	0	0.000	204.867	3496.441	72.394
150015186	1458.928	2007	866.218	5.495	209.500	0.000	0	0.000	204.867	3496.441	72.394

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Table C-2 – Continued

Parcel ID	Sale Price	Sale Year	Pump Rate	Pump Rate (per acre)	Depth to Water	House Size (sq. feet per acre)	House Age	Assessed Value of Outbuildings	Precipitation	Beneficial Degree Days	Harmful Degree Days
150015194	648.333	2007	1030.983	6.348	195.070	0.000	0	0.000	204.867	3496.441	72.394
150015828	3250.360	2004	2238.750	23.028	174.990	0.000	0	0.000	204.867	3496.441	72.394
150016352	788.709	2005	1191.912	9.895	174.110	0.000	0	0.000	204.867	3496.441	72.394
150016794	522.581	2001	1071.758	6.915	177.820	8.129	88	0.000	204.867	3496.441	72.394
150016875	854.430	2003	1071.758	6.783	177.820	0.000	0	0.000	204.867	3496.441	72.394
150016875	1518.987	2008	1071.758	6.783	177.820	0.000	0	0.000	204.867	3496.441	72.394
150017235	1485.297	2004	2954.450	9.688	78.570	0.000	0	0.000	204.867	3496.441	72.394
150017669	651.904	1998	954.213	19.748	25.730	30.960	20	939.611	204.867	3496.441	72.394
150034695	851.595	2004	913.572	5.387	150.860	0.000	0	0.000	204.867	3496.441	72.394
150038542	1724.930	2006	1113.115	3.410	87.123	0.000	0	0.000	204.867	3496.441	72.394
150039069	515.131	2004	297.715	20.476	95.249	0.000	0	1876.066	204.867	3496.441	72.394
150039069	1237.964	2005	297.715	20.476	95.249	0.000	0	1876.066	204.867	3496.441	72.394
150039751	1135.992	2006	1123.671	7.357	133.130	0.000	0	0.000	204.867	3496.441	72.394
150050232	2361.702	2008	2828.744	12.037	85.561	0.000	0	0.000	204.867	3496.441	72.394
150050747	6853.588	2003	2885.051	4.662	82.685	0.000	0	0.000	204.867	3496.441	72.394
150051190	1523.810	2005	2587.612	17.114	63.567	0.000	0	0.000	204.867	3496.441	72.394
150051794	1279.293	1998	1024.823	5.790	95.119	6.000	90	29.934	204.867	3496.441	72.394
150051905	1923.200	2007	1373.067	8.802	34.841	0.000	0	0.000	204.867	3496.441	72.394
150052170	1938.987	1992	2929.518	18.934	50.134	19.248	93	153.245	204.867	3496.441	72.394
150052316	681.250	2004	2181.088	13.632	73.376	0.000	0	0.000	204.867	3496.441	72.394
150052405	1432.566	2002	2876.952	18.199	118.070	0.000	0	0.000	204.867	3496.441	72.394
150052464	2959.325	2004	2393.277	15.069	97.948	0.000	0	0.000	204.867	3496.441	72.394
150052510	2066.808	2008	1293.465	7.225	74.785	0.000	0	0.000	204.867	3496.441	72.394
150052561	931.588	2002	2657.221	18.652	75.171	0.000	0	0.000	204.867	3496.441	72.394

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Table C-2 – Continued

Parcel ID	Sale Price	Sale Year	Pump Rate	Pump Rate (per acre)	Depth to Water	House Size (sq. feet per acre)	House Age	Assessed Value of Outbuildings	Precipitation	Beneficial Degree Days	Harmful Degree Days
150052839	5031.250	2003	2834.083	17.713	95.760	0.000	0	0.000	204.867	3496.441	72.394
150052936	1550.633	2006	2834.083	17.937	95.760	0.000	0	0.000	204.867	3496.441	72.394
150052936	1333.418	2002	2834.083	17.937	95.760	0.000	0	0.000	204.867	3496.441	72.394
150053207	2549.327	2005	2587.612	8.691	63.567	0.000	0	0.000	204.867	3496.441	72.394
150053347	260.000	2005	1998.696	3.123	93.427	0.000	0	0.000	204.867	3496.441	72.394
150053355	602.201	2000	1940.007	6.101	77.370	0.000	0	0.000	204.867	3496.441	72.394
150053398	903.226	2004	1466.586	9.462	136.180	0.000	0	3.535	204.867	3496.441	72.394
150053401	566.430	2005	1358.602	8.311	151.700	0.000	0	0.000	204.867	3496.441	72.394
150053568	3106.431	2006	2316.522	4.078	126.340	1.268	38	62.641	204.867	3496.441	72.394
150053738	1080.691	2000	1854.440	11.558	53.165	0.000	0	0.000	204.867	3496.441	72.394
150053886	700.000	2007	2586.948	21.558	40.851	0.000	0	0.000	204.867	3496.441	72.394
150053894	6133.949	2004	718.429	4.576	99.258	0.000	0	520.605	204.867	3496.441	72.394
150053908	972.050	2001	1554.325	4.926	50.609	0.000	0	0.000	204.867	3496.441	72.394
150054106	414.787	2004	1345.905	16.502	197.730	0.000	0	0.000	204.867	3496.441	72.394
150054149	1826.923	2008	2948.027	18.898	82.573	0.000	0	0.000	204.867	3496.441	72.394
150054394	2759.248	2000	1869.426	11.881	95.003	0.000	0	0.000	204.867	3496.441	72.394
150054580	1367.309	2005	2415.179	15.010	60.013	0.000	0	0.000	204.867	3496.441	72.394
150054661	2915.439	2004	1167.900	3.743	113.040	0.000	0	0.000	204.867	3496.441	72.394
150054696	477.612	2006	1078.687	16.100	103.330	0.000	0	0.000	204.867	3496.441	72.394
150054718	455.696	2006	1422.753	18.010	42.782	0.000	0	0.000	204.867	3496.441	72.394
150054726	1562.500	2006	2702.794	16.892	103.280	0.000	0	0.000	204.867	3496.441	72.394
150054750	999.134	2005	1951.309	3.249	55.155	0.000	0	0.000	204.867	3496.441	72.394
150054920	681.250	2001	1926.066	6.019	59.560	0.000	0	0.000	204.867	3496.441	72.394
150054955	1140.625	2003	2593.544	8.105	149.780	0.000	0	0.000	204.867	3496.441	72.394

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Table C-2 – Continued

Parcel ID	Sale Price	Sale Year	Pump Rate	Pump Rate (per acre)	Depth to Water	House Size (sq. feet per acre)	House Age	Assessed Value of Outbuildings	Precipitation	Beneficial Degree Days	Harmful Degree Days
150055056	1225.769	2005	1937.474	12.420	163.090	0.000	0	0.000	204.867	3496.441	72.394
150055129	677.468	2003	979.092	3.186	94.550	0.000	0	0.000	204.867	3496.441	72.394
150055129	1734.462	2007	979.092	3.186	94.550	0.000	0	0.000	204.867	3496.441	72.394
150055129	420.563	2005	979.092	3.186	94.550	0.000	0	0.000	204.867	3496.441	72.394
150055137	2092.848	2004	1937.474	12.262	163.090	0.000	0	0.000	204.867	3496.441	72.394
150055145	281.250	2003	2722.186	17.014	121.450	0.000	0	0.000	204.867	3496.441	72.394
150055196	2250.000	2004	1505.788	18.822	74.819	0.000	0	0.000	204.867	3496.441	72.394
150055269	823.987	2002	1880.623	8.609	89.748	8.469	108	283.031	204.867	3496.441	72.394
150055307	541.436	1999	1612.521	5.158	142.020	0.000	0	0.000	204.867	3496.441	72.394
150055323	4031.063	2004	1358.602	8.054	151.700	0.000	0	0.000	204.867	3496.441	72.394
150055331	2043.513	2003	2440.946	3.862	123.400	0.000	0	0.000	204.867	3496.441	72.394
150055382	1081.250	2000	2367.575	14.797	89.997	0.000	0	0.000	204.867	3496.441	72.394
150055439	1721.519	2007	597.442	3.781	182.000	0.000	0	0.000	204.867	3496.441	72.394
150055501	1159.375	2004	2639.102	16.494	100.340	0.000	0	0.000	204.867	3496.441	72.394
150055803	1532.966	2007	2667.231	16.796	117.450	0.000	0	59.597	204.867	3496.441	72.394
150055838	1506.813	2001	1251.833	8.201	90.466	0.000	0	0.000	204.867	3496.441	72.394
150055846	853.968	2000	1651.976	5.244	102.930	0.000	0	46.286	204.867	3496.441	72.394
150055846	1190.476	2007	1651.976	5.244	102.930	0.000	0	46.286	204.867	3496.441	72.394
150055870	398.734	2005	865.125	1.369	92.529	0.000	0	0.000	204.867	3496.441	72.394
150055897	1331.407	2005	2667.231	16.751	117.450	0.000	0	0.000	204.867	3496.441	72.394
150055927	1154.360	2004	1015.313	3.659	156.120	0.000	0	0.000	204.867	3496.441	72.394
150056044	857.800	2004	2839.652	37.862	70.747	0.000	0	0.000	204.867	3496.441	72.394
150056117	1254.820	2005	2580.116	15.793	119.240	0.000	0	0.000	204.867	3496.441	72.394
150056176	1620.253	2003	1001.227	6.337	88.064	0.000	0	0.000	204.867	3496.441	72.394

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Table C-2 – Continued

Parcel ID	Sale Price	Sale Year	Pump Rate	Pump Rate (per acre)	Depth to Water	House Size (sq. feet per acre)	House Age	Assessed Value of Outbuildings	Precipitation	Beneficial Degree Days	Harmful Degree Days
150056184	657.439	2008	1499.589	2.769	104.670	4.343	102	55.841	204.867	3496.441	72.394
150056230	437.257	2005	468.445	2.806	258.140	0.000	0	0.000	204.867	3496.441	72.394
150056303	1062.201	2002	861.958	1.375	194.100	0.000	0	0.000	204.867	3496.441	72.394
150056346	1842.368	2007	2667.231	16.658	117.450	9.893	34	115.620	204.867	3496.441	72.394
150056400	2058.917	2008	2143.688	6.790	74.973	0.000	0	0.000	204.867	3496.441	72.394
150056427	1293.618	2003	2988.356	19.825	81.801	0.000	0	0.000	204.867	3496.441	72.394
150056486	338.762	2004	2877.034	4.686	53.193	0.000	0	0.000	204.867	3496.441	72.394
150056540	504.414	2007	2613.893	65.924	89.606	0.000	0	0.000	204.867	3496.441	72.394
150056648	2806.331	2004	2582.248	8.426	98.079	0.000	0	444.213	204.867	3496.441	72.394
150056648	3238.701	2007	2582.248	8.426	98.079	0.000	0	444.213	204.867	3496.441	72.394
150056788	664.540	1993	2632.069	17.491	82.950	0.000	0	0.000	204.867	3496.441	72.394
150056907	1262.821	2005	1605.587	10.292	106.030	0.000	0	0.000	204.867	3496.441	72.394
150057164	1779.812	2007	1315.237	8.360	105.360	0.000	0	0.000	204.867	3496.441	72.394
150057210	664.629	1993	2632.069	17.493	82.950	0.000	0	0.000	204.867	3496.441	72.394
150057210	664.629	1992	2632.069	17.493	82.950	0.000	0	0.000	204.867	3496.441	72.394
150057334	1292.453	2004	2613.893	16.440	89.606	0.000	0	0.000	204.867	3496.441	72.394
150057393	565.565	2002	2076.516	15.085	47.691	0.000	0	0.000	204.867	3496.441	72.394
150057725	2956.318	2004	1598.073	5.280	56.267	4.573	83	18.147	204.867	3496.441	72.394
150057881	1193.038	2004	1441.180	9.121	78.943	0.000	0	0.000	204.867	3496.441	72.394
150057997	1794.632	2005	1598.073	12.469	56.267	0.000	0	0.000	204.867	3496.441	72.394
150058276	1101.299	2004	1298.546	8.432	45.223	0.000	0	0.000	204.867	3496.441	72.394
150058284	196.563	2002	1300.879	4.756	55.735	0.000	0	0.000	204.867	3496.441	72.394
150058314	1622.532	2004	2848.694	7.267	102.700	0.000	0	0.000	204.867	3496.441	72.394
150058551	1258.065	2002	999.005	6.445	50.580	0.000	0	0.000	204.867	3496.441	72.394

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Table C-2 – Continued

Parcel ID	Sale Price	Sale Year	Pump Rate	Pump Rate (per acre)	Depth to Water	House Size (sq. feet per acre)	House Age	Assessed Value of Outbuildings	Precipitation	Beneficial Degree Days	Harmful Degree Days
150058594	1494.626	2005	976.140	6.208	91.802	0.000	0	0.000	204.867	3496.441	72.394
150058632	354.325	2001	1229.194	8.507	88.904	0.000	0	0.000	204.867	3496.441	72.394
150058675	386.076	2006	2752.863	17.423	69.181	0.000	0	0.000	204.867	3496.441	72.394
150058993	273.921	2007	2024.768	12.605	31.537	0.000	0	0.000	204.867	3496.441	72.394
150059221	1569.620	2007	1630.761	10.321	62.659	0.000	0	0.000	204.867	3496.441	72.394
150059310	468.750	2003	2024.768	12.655	31.537	0.000	0	0.000	204.867	3496.441	72.394
150059329	1312.750	2000	3027.598	9.461	78.616	0.000	0	0.000	204.867	3496.441	72.394
150059418	200.000	2001	2489.056	15.557	101.650	0.000	0	0.000	204.867	3496.441	72.394
150059418	2165.625	2007	2489.056	15.557	101.650	0.000	0	0.000	204.867	3496.441	72.394
150059434	1069.348	2000	3205.910	5.117	92.162	0.000	0	0.000	204.867	3496.441	72.394
150059469	279.063	2005	2503.781	3.912	120.200	0.000	0	0.000	204.867	3496.441	72.394
150059485	1515.625	2000	2489.056	7.778	101.650	0.000	0	0.000	204.867	3496.441	72.394
150059485	1589.063	2005	2489.056	7.778	101.650	0.000	0	0.000	204.867	3496.441	72.394
150059817	361.011	2008	1326.084	9.575	84.867	9.993	79	94.592	204.867	3496.441	72.394
150059825	1328.506	2002	2630.121	34.157	86.263	0.000	0	0.000	204.867	3496.441	72.394
150059833	421.687	1998	2816.987	33.940	89.056	0.000	0	0.000	204.867	3496.441	72.394
150059892	1445.969	2004	1246.368	4.005	103.010	0.000	0	0.000	204.867	3496.441	72.394
150059922	840.412	2007	2816.987	12.660	89.056	0.000	0	0.000	204.867	3496.441	72.394
150059922	974.114	2008	2816.987	12.660	89.056	0.000	0	0.000	204.867	3496.441	72.394
150060009	1145.570	2003	1316.682	8.333	100.580	0.000	0	0.000	204.867	3496.441	72.394
150060297	555.388	2004	2111.398	7.977	96.333	3.627	91	2.773	204.867	3496.441	72.394
150060521	865.385	2006	938.153	6.014	96.243	0.000	0	0.000	204.867	3496.441	72.394
150060629	4458.599	2007	1713.489	10.914	96.828	0.000	0	74.159	204.867	3496.441	72.394
150060882	565.160	2005	1326.084	17.634	84.867	0.000	0	0.000	204.867	3496.441	72.394

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Parcel ID	Sale Price	Sale Year	Pump Rate	Pump Rate (per acre)	Depth to Water	House Size (sq. feet per acre)	House Age	Assessed Value of Outbuildings	Precipitation	Beneficial Degree Days	Harmful Degree Days
150060971	253.165	2001	1019.215	6.451	90.219	0.000	0	0.000	204.867	3496.441	72.394
150060971	1109.304	2004	1019.215	6.451	90.219	0.000	0	0.000	204.867	3496.441	72.394
150061099	761.875	2007	901.122	2.816	259.140	0.000	0	0.000	204.867	3496.441	72.394
150061099	761.875	2007	901.122	2.816	259.140	0.000	0	0.000	204.867	3496.441	72.394
150061358	3481.013	2007	1713.489	5.422	96.828	0.000	0	0.000	204.867	3496.441	72.394
150061382	1151.354	2002	2344.675	7.467	105.100	0.000	0	0.000	204.867	3496.441	72.394
150061439	1429.958	2005	1061.460	6.868	83.706	0.000	0	0.000	204.867	3496.441	72.394
150061439	970.560	2001	1061.460	6.868	83.706	0.000	0	0.000	204.867	3496.441	72.394
150061587	1072.152	2003	1512.660	19.148	71.318	0.000	0	0.000	204.867	3496.441	72.394
150061684	2487.015	2005	1061.460	7.068	83.706	0.000	0	0.000	204.867	3496.441	72.394
150061773	1407.942	2006	1816.680	13.117	112.810	13.054	33	74.693	204.867	3496.441	72.394
150061846	193.574	2006	1084.555	17.123	78.563	0.000	0	0.000	204.867	3496.441	72.394
150061978	1506.410	2006	2561.618	16.421	99.353	0.000	0	0.000	204.867	3496.441	72.394
150062206	791.139	2007	2306.365	14.597	55.207	0.000	0	0.000	204.867	3496.441	72.394
150062346	1069.620	2002	2575.633	16.301	109.690	0.000	0	0.000	204.867	3496.441	72.394
150062494	2937.500	2007	1079.247	6.745	115.610	0.000	0	0.000	204.867	3496.441	72.394
150062516	620.253	2006	1944.147	12.305	116.180	0.000	0	0.000	204.867	3496.441	72.394
150062761	886.076	2003	2571.633	16.276	150.090	0.000	0	0.000	204.867	3496.441	72.394
150062834	4778.323	2008	1419.143	8.982	99.438	0.000	0	0.000	204.867	3496.441	72.394
150063016	7000.000	2003	1223.402	244.681	120.170	339.200	86	3107.800	204.867	3496.441	72.394
150063067	3586.207	2002	2464.616	84.987	146.060	0.000	0	0.000	204.867	3496.441	72.394
150063083	375.683	2003	806.518	2.755	141.400	0.000	0	0.000	204.867	3496.441	72.394
150063288	3000.000	2004	1909.537	127.303	141.060	86.667	56	962.267	204.867	3496.441	72.394
150063342	872.483	2007	1427.989	9.584	90.503	0.000	0	0.000	204.867	3496.441	72.394

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Table C-2 – Continued

Parcel ID	Sale Price	Sale Year	Pump Rate	Pump Rate (per acre)	Depth to Water	House Size (sq. feet per acre)	House Age	Assessed Value of Outbuildings	Precipitation	Beneficial Degree Days	Harmful Degree Days
150063342	2449.665	2007	1427.989	9.584	90.503	0.000	0	0.000	204.867	3496.441	72.394
150063369	1167.921	2003	1179.547	7.653	129.870	0.000	0	0.000	204.867	3496.441	72.394
150063415	1463.480	2007	1427.989	9.586	90.503	0.000	0	0.000	204.867	3496.441	72.394
150063423	364.356	2007	1427.989	9.426	90.503	0.000	0	0.000	204.867	3496.441	72.394
150063490	278.302	2000	1496.074	2.352	142.720	0.000	0	0.000	204.867	3496.441	72.394
150063563	687.655	2005	1259.275	8.208	94.773	0.000	0	0.000	204.867	3496.441	72.394
150063687	1924.371	2008	1818.238	8.512	90.850	0.000	0	0.000	204.867	3496.441	72.394
150063776	281.250	2004	1818.238	11.364	90.850	0.000	0	0.000	204.867	3496.441	72.394
150063881	433.313	2003	2603.374	4.172	93.408	0.000	0	0.000	204.867	3496.441	72.394
150064152	1460.011	2005	1607.315	10.607	113.030	0.000	0	0.000	204.867	3496.441	72.394
150064209	874.008	2004	1193.870	4.013	137.410	0.000	0	0.000	204.867	3496.441	72.394
150064217	575.784	2002	1710.990	2.725	126.870	0.000	0	15.713	204.867	3496.441	72.394
150064330	562.134	2003	2193.054	14.268	90.583	0.000	0	0.000	204.867	3496.441	72.394
150064543	4076.231	2000	1193.811	7.665	165.940	0.000	0	36.289	204.867	3496.441	72.394
150064691	759.612	2001	2140.385	25.013	101.230	0.000	0	0.000	204.867	3496.441	72.394
150064896	1154.189	2007	2140.385	13.649	101.230	0.000	0	0.000	204.867	3496.441	72.394
150064926	556.988	2003	2193.054	14.138	90.583	0.000	0	0.000	204.867	3496.441	72.394
150065248	2131.801	2003	1946.445	18.041	54.512	0.000	0	0.000	204.867	3496.441	72.394
150065310	898.147	2007	807.929	7.598	112.600	0.000	0	0.000	204.867	3496.441	72.394
150065434	4176.262	2004	2692.182	69.315	55.725	0.000	0	0.000	204.867	3496.441	72.394
150065906	326.356	2003	1578.074	8.880	135.840	11.254	93	1.092	204.867	3496.441	72.394
150067143	1500.000	2007	815.360	5.096	173.810	0.000	0	0.000	204.867	3496.441	72.394
150069286	685.597	2008	2613.893	16.974	89.606	2.987	44	0.000	204.867	3496.441	72.394
150069367	506.329	1989	2561.618	16.213	99.353	0.000	0	0.000	204.867	3496.441	72.394

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Table C-2 – Continued

Parcel ID	Sale Price	Sale Year	Pump Rate	Pump Rate (per acre)	Depth to Water	House Size (sq. feet per acre)	House Age	Assessed Value of Outbuildings	Precipitation	Beneficial Degree Days	Harmful Degree Days
150069367	1360.760	2004	2561.618	16.213	99.353	0.000	0	0.000	204.867	3496.441	72.394
150070780	726.010	2005	1576.965	4.978	61.076	0.000	0	145.155	204.867	3496.441	72.394
150076452	1466.667	2003	2139.482	35.658	17.415	0.000	0	0.000	204.867	3496.441	72.394
150077238	1572.327	2006	1141.744	7.327	320.820	0.000	0	89.392	165.903	3496.441	72.394
150079338	1012.987	2004	2188.371	28.420	326.090	0.000	0	0.000	161.003	3496.441	72.394
150085141	705.185	2007	472.255	10.375	91.837	0.000	0	0.000	171.357	3496.441	72.394
150085451	292.740	2006	472.255	27.650	91.837	0.000	0	34.075	171.357	3496.441	72.394
150093381	594.937	2007	1482.169	9.381	323.930	0.000	0	0.000	154.970	3496.441	72.394
150095120	1160.256	2003	1316.682	8.440	100.580	0.000	0	0.000	204.867	3496.441	72.394
150095341	1140.032	2002	1466.586	9.401	136.180	0.000	0	0.000	204.867	3496.441	72.394
150096135	1562.835	2007	2024.768	13.414	31.537	0.000	0	0.000	204.867	3496.441	72.394
150096178	2002.310	2000	1010.212	19.450	174.460	0.000	0	186.754	204.867	3496.441	72.394
150098618	4598.540	2002	2126.563	31.045	297.280	24.876	88	278.730	204.867	3496.441	72.394
150098626	766.685	2000	1386.133	9.363	145.400	0.000	0	0.000	204.867	3496.441	72.394
150098790	2601.852	2004	1910.134	14.149	77.261	0.000	0	0.000	204.867	3496.441	72.394
150098790	4370.371	2008	1910.134	14.149	77.261	0.000	0	0.000	204.867	3496.441	72.394
150100132	1645.143	2006	1318.149	10.843	101.530	0.000	0	0.000	204.867	3496.441	72.394
150100213	264.901	2006	938.153	6.213	96.243	12.358	108	39.907	204.867	3496.441	72.394
150100787	4904.708	2004	807.929	11.322	112.600	56.054	13	631.082	204.867	3496.441	72.394
150101716	890.625	2008	2816.987	35.212	89.056	0.000	0	0.000	204.867	3496.441	72.394
150102186	457.537	2004	1015.313	6.446	156.120	0.000	0	0.000	204.867	3496.441	72.394
150102828	586.167	2002	1406.106	41.211	85.590	0.000	0	304.103	204.867	3496.441	72.394
150102992	2000.678	2008	1396.050	9.468	375.210	0.000	0	0.000	166.703	3496.441	72.394
150103565	1531.957	2006	999.005	6.122	50.580	0.000	0	0.000	204.867	3496.441	72.394

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Table C-2 – Continued

Parcel ID	Sale Price	Sale Year	Pump Rate	Pump Rate (per acre)	Depth to Water	House Size (sq. feet per acre)	House Age	Assessed Value of Outbuildings	Precipitation	Beneficial Degree Days	Harmful Degree Days
150104448	27906.430	2003	3029.183	778.710	46.802	0.000	0	60635.470	204.867	3496.441	72.394
150105770	959.826	2001	1047.073	7.160	191.150	0.000	0	1.662	204.867	3496.441	72.394
150106955	196.865	1999	681.748	2.137	129.600	0.000	0	0.000	204.867	3496.441	72.394
150106971	289.881	1999	1298.546	11.407	45.223	0.000	0	0.000	204.867	3496.441	72.394
150107986	9888.751	2007	2816.987	348.206	89.056	178.616	98	181.706	204.867	3496.441	72.394
150120937	6818.182	2001	1523.378	692.445	168.640	0.000	0	0.000	172.817	3496.441	72.394
150120939	2811.621	2002	1520.257	142.480	389.860	129.335	98	0.000	164.523	3496.441	72.394
150120940	153.921	2002	1520.257	24.632	389.860	0.000	0	0.000	164.523	3496.441	72.394
150120941	417.679	1997	1578.074	38.321	135.840	49.830	5	619.087	204.867	3496.441	72.394
150120941	4409.179	2006	1578.074	38.321	135.840	49.830	5	619.087	204.867	3496.441	72.394
150120941	1165.614	2002	1578.074	38.321	135.840	49.830	5	619.087	204.867	3496.441	72.394
150120946	8964.144	2008	2506.478	499.299	122.050	0.000	0	0.000	204.867	3496.441	72.394
150120946	289.641	2002	2506.478	499.299	122.050	0.000	0	0.000	204.867	3496.441	72.394
150120950	830.065	2004	2181.088	14.255	73.376	9.412	94	164.654	204.867	3496.441	72.394
150120959	414.079	2002	708.208	146.627	193.670	0.000	0	0.000	174.567	3496.441	72.394
150120971	768.361	2003	2338.787	15.559	63.603	0.000	0	0.000	204.867	3496.441	72.394
150120973	400.000	2003	3029.183	658.518	46.802	0.000	0	0.000	204.867	3496.441	72.394
150120975	4226.675	2007	1814.182	11.360	304.550	0.000	0	0.000	207.947	3496.441	72.394
150120981	811.503	2007	806.518	22.965	141.400	0.000	0	3057.318	204.867	3496.441	72.394
150121003	1443.854	2004	1303.862	8.557	84.461	0.000	0	0.000	204.867	3496.441	72.394
150121006	900.000	2004	1410.031	1110.260	153.400	0.000	0	0.000	204.777	3496.441	72.394
150121013	197.262	2004	1370.175	7.327	96.890	0.000	0	0.000	204.867	3496.441	72.394
150121013	215.289	2006	1370.175	7.327	96.890	0.000	0	0.000	204.867	3496.441	72.394
150121021	1016.247	2004	1458.721	9.151	147.650	0.000	0	0.000	204.867	3496.441	72.394

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Table C-2 – Continued

Parcel ID	Sale Price	Sale Year	Pump Rate	Pump Rate (per acre)	Depth to Water	House Size (sq. feet per acre)	House Age	Assessed Value of Outbuildings	Precipitation	Beneficial Degree Days	Harmful Degree Days
150121022	425.000	2004	1937.474	12.109	163.090	0.000	0	0.000	204.867	3496.441	72.394
150121025	467.533	2006	1422.753	18.477	42.782	0.000	0	0.000	204.867	3496.441	72.394
150121026	414.787	2004	1345.905	16.502	197.730	0.000	0	0.000	204.867	3496.441	72.394
150121038	828.455	2005	979.092	6.276	94.550	0.000	0	0.000	204.867	3496.441	72.394
150121038	1708.333	2007	979.092	6.276	94.550	0.000	0	0.000	204.867	3496.441	72.394
150121039	14179.100	2005	1100.222	16.421	93.435	0.000	0	0.000	204.867	3496.441	72.394
150121042	2804.265	2004	1946.445	33.612	54.512	20.584	58	126.196	204.867	3496.441	72.394
150121069	1700.000	2005	952.711	190.542	228.120	0.000	0	0.000	170.113	3496.441	72.394
150121071	1250.000	2005	885.270	5.533	88.444	0.000	0	122.031	204.867	3496.441	72.394
150121072	3418.749	2008	885.270	5.657	88.444	0.000	0	0.000	204.867	3496.441	72.394
150121072	1278.037	2005	885.270	5.657	88.444	0.000	0	0.000	204.867	3496.441	72.394
150121094	200.000	2002	504.751	3.155	178.320	0.000	0	0.000	150.980	3496.441	72.394
150121096	585.791	2006	1618.896	434.020	43.505	0.000	0	27856.3	204.867	3496.441	72.394
150121097	300.000	2006	1229.667	10.247	105.610	0.000	0	0.000	204.867	3496.441	72.394
150121099	478.555	2007	618.883	3.702	46.463	5.910	108	0.000	204.867	3496.441	72.394
150121099	897.290	2006	618.883	3.702	46.463	5.910	108	0.000	204.867	3496.441	72.394
150121100	33333.330	2006	1194.514	265.448	62.124	0.000	0	0.000	204.867	3496.441	72.394
150121102	506.329	2007	2613.893	33.087	89.606	0.000	0	0.000	204.867	3496.441	72.394
150121103	269.254	2006	1183.037	2.465	153.890	0.000	0	0.000	204.867	3496.441	72.394
150121124	216.216	2006	2966.740	80.182	372.910	0.000	0	0.000	204.867	3496.441	72.394
150121127	1186.207	2007	705.578	1.187	27.118	0.000	0	0.000	204.867	3496.441	72.394
150121128	2965.877	2006	2258.955	17.091	119.470	0.000	0	0.000	204.867	3496.441	72.394
150121128	2965.877	2006	2258.955	17.091	119.470	0.000	0	0.000	204.867	3496.441	72.394
150121131	847.458	2007	504.751	3.290	178.320	0.000	0	0.000	150.980	3496.441	72.394

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Table C-2 – Continued

Parcel ID	Sale Price	Sale Year	Pump Rate	Pump Rate (per acre)	Depth to Water	House Size (sq. feet per acre)	House Age	Assessed Value of Outbuildings	Precipitation	Beneficial Degree Days	Harmful Degree Days
150121132	1925.952	2007	2929.518	20.273	50.134	0.000	0	0.000	204.867	3496.441	72.394
150121133	1920.124	2007	2929.518	19.730	50.134	0.000	0	0.000	204.867	3496.441	72.394
150121137	2603.687	2007	1046.760	7.657	87.865	0.000	0	0.000	204.867	3496.441	72.394
150121140	1088.105	2007	1544.740	9.605	135.360	0.000	0	0.000	204.867	3496.441	72.394
150121142	392.790	2007	887.173	3.872	175.900	0.000	0	0.000	204.867	3496.441	72.394
150121153	500.000	2007	1711.645	515.556	60.551	0.000	0	13425.900	204.867	3496.441	72.394
150121153	783.133	2007	1711.645	515.556	60.551	0.000	0	13425.900	204.867	3496.441	72.394
150121168	596.974	2008	1239.081	48.064	139.540	0.000	0	0.000	204.867	3496.441	72.394
150121177	814.405	2008	2546.097	352.645	45.040	0.000	0	0.000	204.867	3496.441	72.394
150121180	365.138	2008	619.709	10.808	2.988	0.000	0	0.000	204.867	3496.441	72.394
150121181	372.451	2008	619.709	70.986	2.988	0.000	0	0.000	204.867	3496.441	72.394
150121187	772.701	2008	1371.247	11.455	131.530	0.000	0	0.000	204.867	3496.441	72.394

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